



House of Commons  
Science and Technology  
Committee

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# The disclosure of climate data from the Climatic Research Unit at the University of East Anglia

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**Eighth Report of Session 2009–10**

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*Oral and written evidence*

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## The Science and Technology Committee

The Science and Technology Committee is appointed by the House of Commons to examine the expenditure, administration and policy of the Government Office for Science. Under arrangements agreed by the House on 25 June 2009 the Science and Technology Committee was established on 1 October 2009 with the same membership and Chairman as the former Innovation, Universities, Science and Skills Committee and its proceedings were deemed to have been in respect of the Science and Technology Committee.

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A list of reports from the Committee in this Parliament is included at the back of this volume.

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**Taken before the Science and Technology Committee  
(Science and Technology Sub-Committee)  
on Monday 1 March 2010**

Members present

Mr Phil Willis, in the Chair

Mr Tim Boswell  
Dr Evan Harris  
Dr Doug Naysmith

Ian Stewart  
Graham Stringer

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**Memorandum submitted by The Global Warming Policy Foundation (CRU 27)**

**INQUIRY INTO THE DISCLOSURE OF CLIMATE DATA FROM THE CLIMATIC RESEARCH  
UNIT AT THE UNIVERSITY OF EAST ANGLIA**

1. The Global Warming Policy Foundation is a registered charity (no 1131448) of an educational nature. Further details may be obtained from our website, [www.thegwpf.org](http://www.thegwpf.org). The Foundation's Chairman, the Rt Hon Lord Lawson of Blaby, and its Director, Dr Benny Peiser, will be happy to give oral evidence at the Committee's projected March evidence session in elaboration of this brief written submission. If invited, we may wish to be accompanied, if the Committee agrees, by an expert in one of the matters at issue. We have no declarable interests.

2. On the first of your three questions, we believe there are four distinct issues:

- (i) Have the CRU scientists been manipulating the raw surface temperature data in a way that is less than wholly objective and dispassionate?
- (ii) Have they refused dissenting scientists and/or other outsiders with a bona fide interest in global warming access to the raw data, contrary to the proper canons of scientific research and to the demands of scientific integrity?
- (iii) Have they been improperly seeking to avoid answering Freedom of Information Act requests?
- (iv) Have they actively sought to prevent papers by dissenting scientists, statisticians, or other informed commentators from being peer-reviewed and/or published, again contrary to the proper canons of scientific research and to the demands of scientific integrity?

3. We believe that there is compelling evidence both independent of the leaked email exchanges and arising from those emails to suggest that the answers to (ii), (iii) and (iv) above are clearly "yes". As to (i) above, we believe that the jury is still out, although the motive for the improper behaviour involved in (ii), (iii) and (iv) above needs to be investigated, as it may well have a bearing on the answer to this. Moreover, we are disturbed by the CRU scientists' treatment of the so-called divergence problem. That is the fact that, for that period of time where both a proxy global temperature series and a recorded global temperature series are available, the two series markedly diverge. This clearly suggests either that the proxy series is unreliable or that the recorded series is unreliable (or possibly both: the point is that they cannot both be true). The CRU scientists' attempt to hide the problem by concealing the divergence demonstrates, we believe, a lack of integrity.

4. On the second of your three questions, we believe that the terms of reference of the Muir Russell inquiry are almost, but not entirely, adequate. Lord Lawson has written to Sir Muir Russell, on behalf of the GWPF, setting out how we believe the terms of reference (and the modus operandi of the inquiry) should be strengthened. Lord Lawson's letter, and Sir Muir Russell's reply, are appended as an annexe to this submission.<sup>1</sup>

5. Lastly, on the third of your three questions, there are, in fact, four (not two) other international data sets, all based in the United States. Two of them—NASA and NOAA—are neither wholly independent of each other (unsurprisingly, since they are both US Government agencies) nor wholly independent of the CRU set, as indeed some of the leaked email traffic indicates. The third, and fourth, which—unlike CRU, NASA and NOAA—use not surface weather stations but satellite observations, are compiled by the

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<sup>1</sup> Not printed

University of Alabama at Huntsville (UAH) and Remote Sensing Systems (RSS). They are entirely independent of the CRU. They use the same satellite data as each other but different methodology and produce similar results to each other, which differ from those of the CRU.

*The Rt Hon Lord Lawson of Blaby*, Chairman  
The Global Warming Policy Foundation

February 2010

*Witnesses:* **Rt Hon Lord Lawson of Blaby**, a Member of the House of Lords, Chairman, and **Dr Benny Peiser**, Director, Global Warming Policy Foundation, gave evidence.

**Q1 Chairman:** Could I welcome our first panel of witnesses to this one-off evidence session on the disclosure of climate data from the Climatic Research Unit at the University of East Anglia, Lord Lawson of Blaby and Dr Benny Peiser of the Global Warming Policy Foundation, and to say to yourself, Lord Lawson and Dr Peiser, that the whole purpose of this session, given the shortage of time of the Committee, is to examine the events surrounding the disclosure of climate data from the Climate Research Unit at the University of East Anglia, to examine the implications of the disclosure on scientific integrity and to examine the independent review and the steps taken by the University since the disclosure. We are not here to discuss whether climate change is real or not, we are here to talk about what has happened at the CRU. I wonder if I could start, therefore, with you, Lord Lawson, and thank you very much indeed for coming this afternoon. The Independent Inquiry, which has been set up under the leadership of Sir Muir Russell, has now published its membership and terms of reference. Do you have confidence in it? Do you think that is about right?

**Lord Lawson of Blaby:** I am sorry, first of all, thank you very much for inviting me to this session.

**Q2 Chairman:** Not at all.

**Lord Lawson of Blaby:** I absolutely realise that the pressure of time, because the dissolution of Parliament is not that far away, means that you have had to cut this inquiry much shorter than you would otherwise have done. I think it is a pity, because I think there are some other people who have given you some excellent evidence.

**Q3 Chairman:** We have had 55 pieces of evidence. We would have liked to invite them all, but you are here, so can you answer that specific question?

**Lord Lawson of Blaby:** I will be very short. I sent Sir Muir Russell a letter on behalf of the Global Warming Policy Foundation in January saying that I thought, on the whole, the terms of reference were reasonably okay, that they needed to be extended to include more fully the issue of the dissenting scientists who had been allegedly prevented from having their papers published. That was a very, very serious part of the charges that were laid and they needed to look into that more than what actually simply emerged from the CRU. I was more concerned about the openness and transparency. I said there should be public hearings, like you are having here—I think that is very, very important—and I regret the fact that it appears that they do not intend to do this. I am now much more concerned

when we see the membership of the Inquiry. As you know, already one member has had to resign because he had already prejudged the issue. It was the editor-in-chief of Nature, who had written an editorial saying these people are absolutely in the clear and those who criticise them are paranoid; that was the word that was used in that leading article. To have him as an impartial member of the committee was ridiculous, so he was out.

**Q4 Chairman:** He has gone.

**Lord Lawson of Blaby:** He has gone, but there is still Sir Geoffrey Bolton, who is an extremely eminent geologist; but he is a committed climate alarmist, and Sir Muir Russell said that he did not want anybody who had a firm view on the issue. He is a committed climate alarmist. He is perfectly entitled to his view, but he has written and spoken on that. He is also, of course, a very distinguished alumnus of the University of East Anglia and the environmental section of that where the CRU comes from. The first 18 years of his career, his formative years, were there. All I would say is I think that it shows us, at the very least, a certain carelessness to have packed the committee in this way, and it does not create confidence.

**Q5 Chairman:** Is that what you meant by “it was CRU centric”?

**Lord Lawson of Blaby:** No, that was a different point. That was before I knew the composition of the committee. By “CRU centric” what I meant was it was too much concerned about the CRU scientists and not perhaps, I feared, enough attention paid to other scientists who were trying to get their views published on this.

**Q6 Chairman:** Some would say, Lord Lawson, it is because you are perhaps losing the argument here in terms of the panel that you are criticising them, is that fair?

**Lord Lawson of Blaby:** No, the criticisms I made of the composition of the panel are a matter for regret that I had to make these criticisms, because I think it will reduce the authority of anything which emerges from that independent review. I was the first person to call for an independent inquiry, I think.

**Q7 Chairman:** You are happy with the Chairman?

**Lord Lawson of Blaby:** I have nothing against the Chairman, no.

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**Q8 Chairman:** He will do a good job.

**Lord Lawson of Blaby:** I hope so. We shall see.

**Q9 Mr Boswell:** Can I crack straight on perhaps to the proximate cause of all this, which was the events of July 2009 when UEA, on behalf of CRU, received an unprecedented and, arguably, administratively overwhelming, 61 FOI requests relating to the work of the Climate Research Unit. I think in the previous year there had been just two. Do you consider, Lord Lawson, that it is understandable that the CRU might struggle to handle this volume of requests?

**Lord Lawson of Blaby:** Absolutely, but you have to stand back. Why was there this volume of requests? If you look at what actually happened, the sequence of events, what had happened was there had been a very, very small number of FOI Act requests to begin with and it was in response to those that there was all the evasion, the lack of disclosure and all the other things which we have seen in the emails: discussions about possibly destroying evidence and so on. All that came well before the 2009 flood of stuff. The 2009 flood, if you look at the sequence of events, was a response to the refusal to give disclosure of various things before. That was what came first. All the things that are in the emails, that read very badly—obviously your Committee will have to decide how to interpret them and so will the Muir Russell Committee—occurred before this 2009 flood. May I say this, which is, I think, very important? It goes to the heart your inquiry. The Freedom of Information Act should not have been brought into this thing at all. Proper scientists, scientists of integrity, they reveal, and voluntarily they wish to reveal, all their data and all their methods; they do not need a Freedom of Information Act request to force it out of them. If I may say so, I think you have had some very, very good submissions, a particularly good one, I thought, from the Institute of Physics, which explains really how scientists should operate, scientists of integrity, and an appalling one from the University of East Anglia, encapsulating the Climatic Research Unit, where they say, for example, “Peer review is the keystone for maintaining the integrity of scientific research.” That is not true. Ask any decent scientist and they will say the keystone for integrity in scientific research is full and transparent disclosure of data and methods, and while peer review can be helpful; it can be actually abused.

**Q10 Mr Boswell:** Just to summarise, so I am clear about this, Lord Lawson, what you are effectively saying is that it was the intransigence of the CRU scientists within UEA which triggered conduct which might, in certain circumstances, be regarded as intrinsically rather unreasonable, but it would not have been necessary to have been unreasonable if the initial matter had been helped.

**Lord Lawson of Blaby:** If the scientists at the CRU had behaved properly.

**Q11 Mr Boswell:** It is not an unfamiliar situation in true politics.

**Lord Lawson of Blaby:** That is right, yes.

**Q12 Mr Boswell:** Is that Dr Peiser’s view as well? You were nodding, I think.

**Dr Peiser:** Yes, the whole problem is quite unusual in the world of science, because, obviously, science lives and dies with the issue of testability, replication, verification, falsification, and, of course, if you have not got the data set or the methods, then you have to trust the word of a scientist, you cannot even see whether he has done these calculations correctly on the basis of solid data, and that is the core of this problem. It is not about the overall science, it is about the process of how science works, and I think we are facing a very, very severe problem with the failure to share that data and the methodologies with researchers.

**Q13 Mr Boswell:** Just to be absolutely clear, carrying on with Dr Peiser, it would be your view that the sharing of data in relation to the initial approaches would have been doable and available?

**Dr Peiser:** Well, it was. We know that the data was shared, but just with sympathetic researchers, not with the critics.

**Q14 Chairman:** That is the fundamental point that you want to make.

**Dr Peiser:** Yes.

**Q15 Graham Stringer:** I am following you very closely, Lord Lawson, and I think all the Members of this Committee would agree with what you are saying about transparency and openness and checkability. Can you tell us how your organisation is funded? We have had an email this morning saying that you have not been transparent in the funding of your organisation.

**Lord Lawson of Blaby:** I do not think that is within your terms of reference. I am happy to answer it, but we have got quite a lot to do which is within the terms of reference.

**Q16 Chairman:** Could you just answer it very briefly?

**Lord Lawson of Blaby:** We have donations from private individuals and private charitable trusts. That is how we are financed. We have one absolutely strict rule: we will not accept any money at all from the energy industry or anyone who has any significant interest in the energy industry.

**Q17 Graham Stringer:** In one sense you are right, it is not within our terms of reference, but this is a very fraught and vexed question and there is distrust on both sides, so it is better to be clear. Is there a list of your donors available?

**Lord Lawson of Blaby:** No, like most thinktanks, not all but like most, we do not publish a list, because if donors wish to remain anonymous, for whatever reasons, perfectly good reasons, then it is their privilege. I am very happy for them to be published.

**Q18 Dr Harris:** That is strange, because Sense about Science, which is an organisation we hear from a lot, publish all their donors, because they are often



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accused of being partisan. Would it not be a good idea for you to adopt that rule; otherwise people might have concerns?

**Lord Lawson of Blaby:** We are absolutely clean. I would be very happy to see the names of all our donors published, I can assure you, it would be very, very good, but if they wish to remain anonymous, for whatever reason, maybe they have other family members who take a different view and they do not want to have a row within the family, maybe they do not want a whole lot of other people asking them for money—

**Q19 Chairman:** The short answer is you are not giving us the names.

**Lord Lawson of Blaby:** In football this is called playing the man and not the ball. You get a yellow card for that.

**Q20 Chairman:** Lord Lawson, you are not going to give us those.

**Lord Lawson of Blaby:** No, when the Annual Report comes we will ask our donors if they wish to be named. Some may; some may not.

**Q21 Mr Boswell:** I have slightly broken the drift, but I think it enables us to take up events down the track. After those initial requests, which, as you say, set off what you might call a malign cycle, a number of other things have happened in relation to CRU, there has been the alleged theft of material and subsequent disclosure and then selective quoting of the emails. Would you see those as representing a series of attacks on the climate scientists working at the CRU? Would they have been co-ordinated? Would they have been conceived only for that purpose?

**Lord Lawson of Blaby:** I will ask Benny to say something. The only co-ordination that I am aware of is the co-ordination among the scientists at the CRU and some of their correspondents.

**Dr Peiser:** Of course, once the emails became public, the climate sceptics had a field day, there is no question about it, because it confirmed what a lot of them had wondered for a long time, and you cannot really be surprised that the critics used these emails to the full extent. The interesting fact is not that the sceptics were so euphoric; much more interesting is that people who were not sceptical became much more sceptical as a result. You just need to follow the media reporting on Climategate. It has been reported around the world, it is tarnishing the image of British science around the world, and unless we get to the bottom of this it will continue to be a problem, because at the core of this whole scandal is, as I said, the issue of how science works or does not.

**Q22 Mr Boswell:** One final question. I am trying to read an inference from what you have just said. Among those who you rather, I think, would have described as converted to climate scepticism as a result of these revelations, would you take the view that was on the merits of the underlying science as revealed?

**Dr Peiser:** No.

**Q23 Mr Boswell:** Or on the process?

**Dr Peiser:** Yes.

**Q24 Mr Boswell:** Which was the master concern?

**Dr Peiser:** Personally I do not think that the disclosure of these emails makes a big difference to the overall scientific debate—that is not the issue—but people have become extremely concerned about the way the issue is dealt with and the science has been worked on, and that is the underlying issue. I do not see that people have been converted—that is not the issue—but you can see people are disillusioned. You know the journalists who basically say this is not how this should have been done, and it is disappointing to see scientists engaging in that type of activity.

**Lord Lawson of Blaby:** There is one other thing, if I may add to what Benny has said. It is certainly nothing to do with the basic science—that is not the issue at all—but it is more than just the process. There is another thing, which is not new perhaps, and that is the question of the paleoclimatic record, the historic record over a long period of years of the global temperature and the hiding of the decline, the hiding of the divergence problem. This was not new—in fact I wrote about it in my book which was published in 2008—but, nevertheless, it brought it to the attention of many, many more people that there had been this fudge done and, of course, it has a strong bearing on the reliability of the paleoclimatic record, and the reliability of the paleoclimatic record raises the question of how unusual is the warming that we have seen in the latter part of the twentieth century. It is actually quite important from that point of view as well as from the process point, which I agree with Benny is the main issue.

**Q25 Chairman:** Lord Lawson, on 16 November 1999 there is the famous “trick” referred to in the email. Do you not feel that was simply a colloquialism of people exchanging emails rather than anything more sinister, or do you genuinely believe there was something more sinister in that?

**Lord Lawson of Blaby:** This bears on what I was saying a moment ago. The sinister thing is not the word “trick”. In their own evidence they say that what they mean by “trick” is the best way of doing something.

**Q26 Chairman:** You accept that?

**Lord Lawson of Blaby:** I accept that. What they are saying is: what is the best way of hiding the decline, or what is the best way of hiding the divergence? It does not make it any better; it does not make it any better at all. The thing which is reprehensible is the fact that when the proxy series, which is a very curious proxy series incidentally, based on tree rings, departed from the measured temperature series, a normal person will say maybe that means the proxy series is not all that reliable. They wanted the proxy series for an earlier bit, even though for a long period before 1421 they relied on one single pine tree, which is more than it could bear. But anyway, the fact is

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that they wanted the proxy series for a particular period in order to show the so-called, which has now been demonstrated by various committees who have looked into it, largely fraudulent “hockey sticks”.

**Q27 Chairman:** Misconceived.

**Lord Lawson of Blaby:** No, largely fraudulent, I think; certainly misconceived. You ought to read, as I do, the Wegman Report, which is a very powerful report by distinguished statisticians on the so-called “hockey stick”. The fact that they were using a procedure for hiding the decline, rather than a trick, does not make it any better.

**Q28 Graham Stringer:** What Mosher and Fuller say on that point is it is not just that they were using a strange procedure, but they did not explain it in footnotes or anywhere else in the literature. Do you agree with Mosher and Fuller?

**Lord Lawson of Blaby:** Yes, I do, and that is the significance of the word “hide”. Again, we are talking about openness, which is an essential element of integrity in science. If they had said openly that the proxy series does not fit—they say in their evidence here that it was only after 1950 or 1960 it did not fit, and that is actually not true, it is not a good fit in the latter half of the nineteenth century either, but, anyhow, if they had said it does not fit—so what we are going to do is have the proxy series for the period before the temperature readings were available and then, after that, splice on the temperature readings, and we admit that there has been a complete divergence of the two series since 1950 or 1960, if they had said that and been out in the open, it would be one thing, but they did not, they hid it.

**Q29 Dr Harris:** You do not have an issue with the word “trick”.

**Lord Lawson of Blaby:** No, that is colloquial.

**Q30 Dr Harris:** Exactly, and I would tend to agree with that. Is it fair to say that your view is that if the review panel decide that they have been clear in the literature that what hiding the decline meant was a legitimate way of treating the data to show, with an explanation, that a better way of looking at the data was not to allow the later tree ring data to influence the overall position—if they could show that that was argued in the publications; if the review panel comes to that conclusion—then you would be satisfied on the second point as well? It is just the obverse of what you have just said.

**Lord Lawson of Blaby:** I am not quite sure what you mean by “clear from the data”.

**Q31 Dr Harris:** Clear from the publications. There are two separate questions, are there not: whether scientifically discarding or trying to disregard some data is legitimate; secondly, the question that you quite interestingly raised about, if they are going to do that, it ought to be clear in the publications that they are doing it, otherwise it is a question of hiding

rather than a question of them treating the data in a way that does not allow it to impact on the observed data series in the way it is portrayed.

**Lord Lawson of Blaby:** You are quite right, you have disentangled the two points, and the second point, I think, so that it is absolutely clear, we are *ad idem* on. But also, if it is clear that where you do have, for a huge stretch of time, both proxy series and, as it were, a real series, a series of surface temperature measurements, and they diverge wildly, this would suggest to a normal, rational human being that maybe the proxy series was not very reliable.

**Q32 Dr Harris:** That is a separate question.

**Lord Lawson of Blaby:** No, that is an important question.

**Q33 Dr Harris:** It is an important separate question, but that goes to the science, not to allegations of the suppression of something.

**Lord Lawson of Blaby:** No, it is not.

**Q34 Mr Boswell:** This is a kind of “show your workings” requirement.

**Lord Lawson of Blaby:** Yes, but integrity means you show everything, absolutely, and it also means that, if you do show everything, that opens it to analysis in a way that, if you do not show it, it does not.

**Chairman:** I am going to stop that line of argument there. This is clearly something that Sir Muir Russell needs to examine. The last word goes to you, Ian Stewart.

**Q35 Ian Stewart:** Good afternoon, gentlemen. Both of you asserted that the unit was not transparent with either the data or the methodology, but they assert that the data has been freely available. Is it the data or is it the software methodology that you are really concerned about?

**Lord Lawson of Blaby:** Benny might like to say something about this, but I will add something after him.

**Dr Peiser:** My understanding is they have promised to make the data available. You have to ask them. They say they will make sure now that the data will be available, and they are asking all the organisations they work with to give this allowance. Also, if I may add, there is still outstanding information on the adjustments, the methods used—not just the raw data but the methods used too.

**Ian Stewart:** We will come to that.

**Chairman:** Can we just follow this argument.

**Q36 Ian Stewart:** Could I press you a little further? You were very clear, both of you, earlier that it was both the data and the methodology. Are unsure about whether they have placed the data in the public domain?

**Dr Peiser:** No.

**Q37 Ian Stewart:** They say they have. Are you saying they have not?

**Dr Peiser:** No, they do not say they have. They say they will. They promise that they will now make public the remaining data.

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**Q38 Ian Stewart:** Lord Lawson?

**Lord Lawson of Blaby:** Also, they have said that they have lost some of the data, so they cannot make it available. May I read what used to be on their website? It has been taken off their website, but this was on their website for a very long time until recently: "Data storage availability in the 1980s meant that we were not able to keep the multiple sources for some sites, only the station series after adjustment for homogeneity issues. We, therefore, do not hold the original raw data but only the value-added, i.e. quality controlled and homogenised data." Some of the data they were saying at that time was lost. They are now saying it was not lost. I do not know whether it is lost or not, but they keep changing their minds about that. The fact of the matter is that they were reluctant, to say the least, to provide data for a very long time. That is whether they had it or not. I do not know, but they were reluctant for a long time. That is why you had all these Freedom of Information Act requests and this is why, incidentally, it is quite clear from the evidence of the Information Commissioner that, in fact, there is prima facie evidence that they were committing a criminal offence which only ceased to be a criminal offence because the time limit had elapsed, and that is a very serious allegation.

**Chairman:** We are going to take that issue up.

**Q39 Ian Stewart:** I am not finished with you on this one yet, if you do not mind. The UEA say that the primary data has been available to anyone. They say that anyone doubting their analysis can compile their own data set from material publicly available in the US. Have you plans to do this?

**Dr Peiser:** Again, the issue is—apart from the data which is not fully published yet and they have promised to publish what remains outstanding—the problem of the methods used to adjust the weather station data.

**Q40 Ian Stewart:** I understand that.

**Dr Peiser:** Unless you have that, even if you publish the raw data, unless you actually provide independent researchers with the methodologies that were used to adjust the data, it will be very difficult to test and to check.

**Q41 Ian Stewart:** Can I take you on to the final part of my question, if you do not mind?

**Dr Peiser:** Yes.

**Q42 Ian Stewart:** In its submission the Global Warming Policy Foundation appears to be casting doubt on the reliability of the data sets, as we have heard you say today, held by NASA and the US National Oceanographic and Atmospheric Administration. Are you saying that that data is faulty or that the world's leading climate scientists are misleading us? Why should they do this and what evidence do you have?

**Dr Peiser:** This is not a question of what I believe or not, it is a question of whether that data should be available and whether the methods should be available for independent inquiries and testing. You

have to ask yourself: do you want this information to be out in the open? If it were in the open, we would not be sitting here discussing that, and so really I need to ask you the question: do you want the public to believe that the science is absolutely transparent and open and everyone can check the conclusions?

**Q43 Chairman:** We are asking you a question at the moment.

**Dr Peiser:** Yes; okay.

**Chairman:** We try and answer things later, unless you would like to swap places. I think Ian Stewart's question has not been answered.

**Q44 Ian Stewart:** I will only ask you it again. I am waiting for an answer.

**Lord Lawson of Blaby:** Ask it again. What is the question? I do not quite see it.

**Q45 Ian Stewart:** In the Global Warming Policy Foundation's submission it appears to be casting doubt on the reliability of the data sets held by NASA and the US National Oceanographic and Atmospheric Administration.

**Lord Lawson of Blaby:** Where do you find that?

**Q46 Dr Harris:** Paragraph five of your submission.

**Lord Lawson of Blaby:** What we are saying here, which is quite important—

**Q47 Chairman:** That is why we are asking the question!

**Lord Lawson of Blaby:** --is that you have these surface sets which all draw from the same basic source. You also have two satellite sets, the UAH (University of Alabama at Huntsville) set and the Remote Sensing Systems (RSS) set, and it is actually clear from the evidence that the Met Office put in that the temperature trends picture—the pages are not numbered, but in their evidence—shows considerably smaller warming in the satellite tropospheric temperature records than the surface data, and there is obviously a question, therefore, which is touched on, which is one of these, as to whether the surface data are in any way corrupted. I do not mean deliberately corrupted, but corrupted by the urban heat island effect and so on.

**Q48 Ian Stewart:** So is the answer to my question, Lord Lawson, as to whether these two American bodies are misleading us, no?

**Lord Lawson of Blaby:** The answer is that we need to have further investigation into these data sets; absolutely.

**Q49 Chairman:** We have to move on. We could clearly go on on this for some time. The fundamental issue is that the NOAA data sets and the NASA data sets are freely available to scientists?

**Dr Peiser:** Yes, but they are based—

**Q50 Chairman:** No, are they freely available, the data sets? How you model them and how you use them is entirely an issue for individual scientists, is it not?

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**1 March 2010 Rt Hon Lord Lawson of Blaby and Dr Benny Peiser**

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**Dr Peiser:** Yes. What is not available, again, are some of the methodologies they arrive their conclusions at.

**Q51 Ian Stewart:** Dr Peiser, the question you were asked was: was that information available? We now hear from you that it is.

**Dr Peiser:** Yes.

**Q52 Ian Stewart:** Are you prepared to do your own modelling? Do you intend to use that data?

**Dr Peiser:** No, I am not in the climate modelling business. My concern is about availability of all the information that is important to replicate the conclusions, and that is the basis of this inquiry.

**Q53 Dr Naysmith:** Both of you are making a great big thing of the necessity for information to be available almost immediately. It is this insistence that you have got that it should be available immediately which is not true of much of science. I have been a scientist all my life. When I had a proper job, I was a scientist! I know of two really world-shattering discoveries that resulted in Nobel Prizes where there were two or three groups researching in the same area and both of them kept data back until they were ready to publish and get it out. One of those was DNA, the original Crick and Watson stuff on DNA and the Wilkins stuff, and the second one was thymus and the role of the thymus in the generation of lymphocytes. There was an Australian group and two American groups who were competing, and both of them had data available for quite a long time until each group was ready to publish and put it out, and there were Nobel Prizes

awarded in both cases. The idea that data must be immediately available is not necessarily true. In the area that we are talking about today, the complexity from all the different sources that this data comes from, is it reasonable to say that it should be produced immediately and the conclusions drawn?

**Lord Lawson of Blaby:** Let me say three quick things. The first is that it is not a question of immediately. It took 10 years, I think, before the Yamal data was made public: so this is not a question of whether it is immediately, this is a question of whether this was held up as long as they possibly could. That is how it seems.

**Q54 Dr Naysmith:** Was it done deliberately?

**Lord Lawson of Blaby:** It seems that it was done, for whatever reason, but it was a decision to do it. I cannot recall anything else in science like this, and I have had dealings with scientists. I am not a scientist myself, of course, unlike you, but when I was Secretary of State for Energy, I used to have a lot of dealings with scientists. I cannot recall anything remotely like this. There is also the fact that these issues are particularly important because they feed into the IPCC process on which huge policy decisions, both nationally and internationally, are based and, therefore, it is more important in this area than in most areas that we do have full openness and transparency.

**Q55 Chairman:** On that note, I am going to have to finish this session. May I thank you very much indeed, Dr Peiser, for coming, and thank you very much indeed, Lord Lawson.

**Dr Peiser:** Thank you.

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**Memorandum submitted by Richard Thomas CBE (CRU 53)**

**1. INTRODUCTION**

1.1 My name is Richard Thomas. I was appointed Information Commissioner for the UK in 2002 and held that position until the end of my 2nd term in mid-2009.

1.2 I currently hold appointments as Chairman of the Administrative Justice and Tribunals Council (AJTC); Board Member of the International Association of Privacy Professionals (IAPP); Deputy Chairman of the Consumers Association/Which? and Trustee/Board Member of the Whitehall and Industry Group. I also have a part-time consultancy as a Global Strategy Adviser with the Centre for Information Policy Leadership, a think tank associated with the law firm, Hunton & Williams, that explores and develops new approaches to information governance issues, particularly in the field of privacy and data protection.

1.3 Hunton & Williams has clients, and the Centre has members, with an interest in climate change issues, but I am not representing any such client or member and no such client or member has seen or contributed to this written evidence. Equally I have not consulted the Information Commissioner's Office (ICO).

1.4 Beyond what is stated above, I have no declarable interests.

1.5 I was Information Commissioner when the Freedom of Information Act 2000 ("FOIA") came into force on 1st January 2005 and for its first three and half years of active life. As such, while leading the Information Commissioner's Office (ICO), I had a range of promotional, adjudicatory and enforcement responsibilities under that Act, under the closely-related Environmental Information Regulations 2004 ("EIR") and under the Data Protection Act 1998 ("DPA"). For convenience, I describe these collectively as the "information laws."

1.6 I am happy to assist the Committee to the best of my ability in relation to the information laws—in particular, their underlying rationales and policy objectives, their interpretation and their application in practice. This evidence is likely to be most relevant to the first two issues set out in the Terms of Reference of the Inquiry. I do not have any comments in relation to the last matter, which falls well outside of my sphere of expertise.

## 2. FACTUAL BACKGROUND

2.1 I understand that the Climatic Research Unit (“CRU”) is part of the University of East Anglia, which is a “public authority” for the purposes of the Freedom of Information Act and the Environmental Information Regulations, and a “data controller” under the Data Protection Act. I understand that on 17 November 2009, meteorological station data used for research by CRU and approximately 1,000 emails sent or received by members of the CRU were posted on the internet by a person purporting to be a whistle blower. I have not had any opportunity to familiarise myself with the detailed content of this information, but it has clearly led to questions about the integrity of the climate science research published by CRU.

2.2 CRU has responded that, although language used in the emails was ill-advised, there has been no improper manipulation of data. The University has announced 2 inquiries in order to determine (amongst other matters) whether that statement is correct. I am not aware of any statement denying the authenticity of the emails. The issues that are most relevant to the information laws appear to be:

- (a) the relevance and impact of the information laws on scientific and academic research conducted within universities;
- (b) the handling of a large number of FOIA/EIR requests by the University relating especially to climate change research which (within CRU) it “held”;
- (c) the adequacy of section 77 of FOIA to deal with suggestions that CRU researchers deleted information, not in course of normal work, but to frustrate FOIA/EIR requests; and
- (d) whether this case illustrates that there is scope to extend the “proactive” disclosure provisions of FOIA as they relate to universities.

## 3. FREEDOM OF INFORMATION ASPECTS

### *Rationales and Policy Objectives*

3.1 Put simply, the main rationales behind FOIA and EIR—the “Right to Know”—are:

- (a) to challenge unnecessary official secrecy;
- (b) to promote trust and confidence in public authorities;
- (c) to hold public authorities more accountable;
- (d) to increase accountability in particular for the use of public expenditure;
- (e) to deter—and sometimes to expose—impropriety within public authorities; and
- (f) to improve the quality of decision-making.

To summarise: citizens in a democracy are entitled to know what is being done in their name, for their benefit, and with their money. Transparency has been described as a defining characteristic of a modern democracy and there has been substantial consensus over the last decade as to the benefits of maximum transparency. As long ago as 1913 Mr Justice Brandeis famously coined the phrase in the United States that “Sunshine is the best of disinfectants.”

3.2 These rationales can be related to the present Inquiry. The public must be satisfied that publicly-funded universities, as with any other public authority in receipt of public funding, are properly accountable, adopt systems of good governance and can inspire public trust and confidence in their work and operations. The FOIA, by requiring transparency and open access, allows the public to scrutinize the actions and decisions taken by public institutions. Failure to respond or to respond properly to FOIA requests undermines public confidence in public institutions. The fact that the FOIA requests relate to complex scientific data does not detract from this proposition or excuse non-compliance. The public, even if they can not themselves scrutinize the data, want to ensure that there is a meaningful informed debate especially in respect of issues that are of great public importance currently and for generations to come.

3.3 It can also be said that failure to fulfill FOIA obligations undermines the development of public policy. The CRU is a leading climate research centre and its work has been incorporated into the assessment reports of the Intergovernmental Panel on Climate Change (IPCC).

3.4 Where public policy is based on science, the public expect the science to be the best science available and that the scientists imparting that science act impartially. Scientists must adopt high standards of ethics and scientific integrity, and allow their work to be peer reviewed, subject to appropriate safeguards of intellectual property rights.

3.5 This is especially the case in new areas of science such as climate change research, where it is clear the results are directly influencing the development of public policy. (Indeed, FOIA makes special provision for the easier disclosure of statistical data where the section 36 exemption could otherwise apply—see section

36(4)). Access to the original data, computer models and an explanation of the analytical methods used is necessary to ensure that results are reproducible. Any attempts to limit peer review, to omit or distort scientific data or to limit access to data sets, models or methodologies used and thus frustrating any review of the science would lead to legitimate questioning of the conclusions asserted. In the wider context of public sector transparency, there is a risk that attempts to withhold the disclosure of information without good reason will increasingly be characterised in terms of “something to hide.”

#### *FOIA and EIR in practice*

3.6 Parliament has created a presumption in favour of disclosure. FOIA states—with broadly equivalent provisions in EIR for environmental information as defined—that any person may make a request for any information specified in the request that is (or is thought to be) held by the public authority recorded in any form. There is no formal application process. No fees are payable in the vast majority of cases. There simply has to be a request specifying the information requested for public disclosure. When a request has been received by the public authority, it has 20 working days in which to respond. The 20 working days deadline can be extended if there are public interest issues in which case a reasonable time is provided for consideration as to whether or not the request should be granted. There is a legal duty to provide advice and assistance to those making the request, and there is a Code of Practice (known as the section 45 Code) setting out in some detail how public authorities are encouraged to handle requests that they receive.

If a request is rejected and the requested information is not disclosed, the public authority must issue a Refusal Notice and must then—if requested—carry out an internal review. There is no statutory time limit for this, but a complaint cannot normally be made to the Commissioner until the internal review has been concluded.

3.7 There are over 20 exemptions to the fundamental duty to disclose requested information in FOIA—with broadly equivalent arrangements in EIR, though with detailed differences. Eight of the main exemptions are absolute and 16 are qualified. Qualified means that there is a “public interest override,” which means that, even where the exemption applies, the public interest considerations must be considered. In formal terms, there must still be disclosure—even though the qualified exemption applies—unless the public interest in the exemption outweighs the public interest in disclosure.

The exemptions are similar to those found in other Freedom of Information laws in force in the world. I am not aware which exemptions were considered by the University as potentially applicable to some or all of the requests to CRU. I can speculate that some or all of the following (and/or their EIR equivalents) might have been considered:

- (a) Section 22—where the requested information is intended for future (but imminent) publication;
- (b) Section 40—where disclosure of personal data would breach any of the data protection principles;
- (c) Section 41—where the information had been obtained from elsewhere in such circumstances that its disclosure would constitute an actionable breach of confidence under common law;
- (d) Section 43 (qualified)—where disclosure would, or would be likely to, prejudice the commercial interests of any person, including the public authority;
- (e) Section 44—where disclosure is prohibited by another enactment or inconsistent with an EU obligation (which may include some intellectual property restrictions); and
- (f) Section 14 (not an exemption, strictly speaking)—where the request is vexatious.

I do not know whether any of these exemptions were in fact considered by the University or if they were, in fact, relied upon to justify non-disclosure. Nor do I know what complaints the requester(s) made to the ICO. And it is not possible, without a great deal more knowledge and analysis, to say whether the Commissioner would have or will uphold reliance upon any of these (or any other) exemptions. I can say, however, that the application of these and other exemptions to particular requests and fact situations can be a complex and demanding exercise, both for the public authority and the ICO.

3.8 In this case, I am aware however that the Deputy Commissioner has issued a widely-reported statement—commented on in more detail below—which suggests that at least some of the requested information should have been disclosed in the absence of applicable exemptions.

## 4. PREVENTION OF DISCLOSURE

4.1 The Deputy Information Commissioner has made a statement in this case that:

*“The FOI Act makes it an offence for public authorities to act so as to prevent intentionally the disclosure of requested information. Mr Holland’s FOI requests were submitted in 2007/8, but it has only recently come to light that they were not dealt with in accordance with the Act. The legislation requires action within six months of the offence taking place, so by the time the action came to light the opportunity to consider a prosecution was long gone.”*

This is clearly a reference to section 77 of the Act and/or the near-identical Regulation 19 of EIR. Section 77 needs to be set out in full:

***Offence of altering etc. records with intent to prevent disclosure***

1. *Where:*

- (a) *a request for information has been made to a public authority,*
- (b) *under section 1 of this Act or section 7 of the Data Protection Act 1998, the applicant would have been entitled (subject to payment of any fee) to communication of any information in accordance with that section,*

*any person to whom this subsection applies is guilty of an offence if he alters, defaces, blocks, erases, destroys or conceals any record held by the public authority, with the intention of preventing the disclosure by that authority of all, or any part, of the information to the communication of which the applicant would have been entitled.*

2. *Subsection (1) applies to the public authority and to any person who is employed by, is an officer of, or is subject to the direction of, the public authority.*

3. *A person guilty of an offence under this section is liable on summary conviction to a fine not exceeding level 5 on the standard scale.*

4. *No proceedings for an offence under this section shall be instituted:*

- (a) *in England or Wales, except by the Commissioner or by or with the consent of the Director of Public Prosecutions;*
- (b) *in Northern Ireland, except by the Commissioner or by or with the consent of the Director of Public Prosecutions for Northern Ireland.*

4.2 The Deputy Commissioner also appeared to have in mind the “boiler-plate” wording of Section 127(1) of the Magistrates Court Act which states that:

*“a magistrates’ court shall not try an information or hear a complaint unless the information was laid, or the complaint made, within 6 months from the time when the offence was committed, or the matter of complaint arose.”*

4.3 Section 77 is a very important section of FOIA, which most public authorities take very seriously. It is the only section with a criminal sanction, although there have not yet been any prosecutions. It has to be established that the “applicant would have been entitled” to receive the requested information, in particular that no exemptions applied. It is also necessary to establish that the destruction or alteration was done with the “intention” of preventing disclosure. A further problem, highlighted in the present circumstances, is that the offence can very rarely be detected—let alone properly investigated—in time for a prosecution to be brought. It can, in practice take several months before an authority carries out the internal review which is necessary before a complaint can be made to the ICO. Once a complaint is made, time continues to pass and (except in the most blatant cases) it will usually be impossible for the ICO to detect an offence within six months of its occurrence.

4.4 This problem has been raised well before the current controversy. An amendment to section 77 to extend the time limit for prosecutions was debated in the House of Lords in July 2009 at the Report Stage of the Coroners and Justice Bill. The amendment was identical to provisions already found in several other statutes, such as the Animal Welfare Act 2006 and the Theft Act (as amended by the Vehicles (Crime) Act 2001), where the government itself had decided to extend the 6 month limit for prosecutions. More recently, in 2008, the Building Regulations were amended following a public consultation, as local authorities had maintained that the 6 month period did not allow prosecutions to be brought where a breach of the regulations only came to light after completion of the building work or where remediation of the work had been promised but not carried out.

4.5 The proposed amendment would have allowed a prosecution to be brought within six months of the evidence of the offence coming to the Commissioner’s knowledge, rather than within six months of the offence being committed. The amendment was tabled to the Coroners and Justice Bill by Lord Dubs. Responding to the amendment, the Minister Lord Bach said on behalf of the government:

*“The Freedom of Information Act 2000 came into force only in 2005, and I have to tell my noble friend that we have no evidence at present that the current six-month time limit presents a systemic problem for the Information Commissioner or any other prosecutor in taking action under Section 77. However, I shall say this, which I hope will give my noble friend some comfort. We will listen to the views of the Information Commissioner and other interested parties on this point, and if there is evidence that the current legislation is causing systemic difficulties, we will look for ways to address the matter, if necessary by means of an alternative legislative vehicle in future. However, I cannot go further than that today on behalf of the Government.”*

## 5. THE TERMS OF REFERENCE AND SCOPE OF THE INDEPENDENT REVIEW

5.1 An Independent Review of the circumstances surrounding and the implications of the data release is being conducted by Sir Muir Russell.

5.2 Amongst other aspects, the Muir Russell Review will:

*“review CRU’s compliance or otherwise with the University’s policies and practices regarding requests under the Freedom of Information Act (‘the FOIA’) and the Environmental Information Regulations (‘the EIR’) for the release of data.”*

It is not clear whether the Review will look at policies and practices in general or will undertake a detailed consideration of some or all requests and their handling. If the latter, there may well be some delicate interaction with the (on-going) statutory and quasi-judicial obligations of the Commissioner to rule on individual complaints.

## 6. PROACTIVE DISCLOSURE

6.1 Towards the end of my time as Commissioner, I placed more and more emphasis on the benefits of proactive disclosure by public authorities, without the need to await requests, and often the burden and defensiveness of dealing with them. In January 2009—after extensive consultation—new arrangements were introduced for public authorities to adopt Publication Schemes in line with a Model Scheme published by the ICO. Publication Schemes are mandated by section 19 of FOIA and the new initiative was an attempt to maximise disclosure and minimise bureaucracy.

6.2 As part of the new arrangements, a “Definition Document” for Universities was published, setting out the kinds of information that universities would be expected to provide to meet their commitments. ([http://www.ico.gov.uk/what\\_we\\_cover/freedom\\_of\\_information/publication\\_schemes/definition\\_document\\_universities.aspx](http://www.ico.gov.uk/what_we_cover/freedom_of_information/publication_schemes/definition_document_universities.aspx)). This covers many aspects of university governance, administration, and operations. It explicitly includes such matters as procedures and policies for academic services, internal and external procedures for assuring academic quality, research policy and strategy, and research funding. But there is no explicit reference to research findings and data. The issues arising at the University of East Anglia suggest that this should now be addressed as a heading for proactive and routine disclosure.

## 7. RECOMMENDATIONS

7.1 Based on my current knowledge of the issues before the Committee, I suggest that the Committee might conclude that:

- (a) the legislation should be amended so that a prosecution under section 77 of FOIA or Regulation 19 of EIR could be brought within six months of evidence of the offence coming to the Information Commissioner’s knowledge;
- (b) the Information Commissioner—not the Muir Russell Review Team—should make any rulings on the validity of FOI/EIR requests; and
- (c) the Information Commissioner should be invited to extend the “Definition Document” for Universities so that—with any necessary exceptions—publicly-funded statistical or factual data and research findings should be proactively disclosed as the norm.

*Richard Thomas CBE*

*February 2010*

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*Witnesses:* **Richard Thomas CBE**, former Information Commissioner, gave evidence.

**Q56 Chairman:** We welcome in our second panel, seamlessly, Richard Thomas, the former Information Commissioner. Thank you very much indeed for joining us this afternoon. You recommended that the Freedom of Information Act 2000 should be amended so that a prosecution could be brought within six months of evidence of the offence coming to the attention of the Commissioner’s knowledge. We have heard reference to this in the previous panel. Why do you consider that such a change should be made?

**Mr Thomas:** Thank you for your welcome, Chairman. I am happy to assist the Committee to the best of my ability. If I could answer your question in context, I have put a written submission to the

Committee which, I think, is on your website. I set out that I might be able to help you with the rationales and the policy objectives of the legislation and its application in practice. I have outlined how the Act works and its application in general and in particular. This situation we are dealing with now may well engage the Environmental Information Regulations as much as the Freedom of Information Act, but they are broadly similar, with some important differences. I concluded my submission to you by making three suggestions. One was that the six-month limit for criminal prosecution under section 77 should be changed. That was your question. Secondly, I made some suggestions in relation to the Muir Russell review and, thirdly,



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suggested there might be more proactive disclosure of publicly funded research. On the question of the six-month limit, I set out in my memorandum that section 77 of the Act and the corresponding Regulation 19 in the Environmental Information Regulations are the only parts with a criminal sanction. In my view, this is a very important part of legislation, designed to prevent the destruction, the alteration, the suppression of information once a request has been made. I set out in my submission there are three really quite key issues here. First of all, it only applies to information to which the applicant is entitled; so it is only if none of the exemptions, for example, apply and information would have been discloseable under the legislation that the offence is committed. Secondly, there has to be the intention of preventing disclosure under the legislation, and proving intent in this situation is always going to be difficult. And, thirdly, because of the interaction with the Magistrates Court Act, any prosecution must be brought within six months of the offence being committed. I think it is that which perhaps caught the public's attention towards the end of January, that latter part. But I made the point in my submission that this is not a new issue, in fact, it surfaced during a debate on the Coroners and Justice Bill in 2009 when certain amendments to information laws were being made at that time, and I outlined in my submission how Lord Dubs had tabled an amendment in the House of Lords during the course of the consideration of that Bill proposing that, as in other areas of regulatory life, the six-month limit should be changed so that it is when it comes to the attention of the Commissioner, or the prosecutor. The Commissioner is the prosecutor in this particular case.

**Q57 Chairman:** There was a significant debate about that in the House of Lords and, in fact, the amendment failed.

**Mr Thomas:** It was not a very full debate. Lord Dubs put out the basic argument why it was very difficult to bring a prosecution and said that six months is a very short period of time, and there are three reasons why that should be. First of all, once a request is received by a public authority it can take weeks, months, sometimes even years for the request to be handled; secondly, there is a process of internal review without a strict time limit, which means that the process can go further still. Only then can a complaint be lodged with the Information Commissioner and, in the majority of cases, six months would have passed by that time anyway. Then, of course, there were some delays inside the ICO itself which made it even more difficult. There was a general consensus there was a problem there and the Government's reaction was that this is still fairly early legislation; we need to see if more evidence comes to light of a particular problem and then (I am paraphrasing of course) we will see whether we change the law.

**Q58 Chairman:** Tying it back into the issue of the East Anglia CRU, do you feel that if, in fact, that law was in place—in other words, that you would be

able for six months after the reporting of the offence—that there would be a *prima facie* case to answer?

**Mr Thomas:** I have no idea, Chairman. I have no idea at all what has happened inside my former office. I cannot say because this is a serious matter. It depends a great deal on the circumstances of the particular case, the evidence. I have had no direct contact with the office as to how this case is being handled. I understand it is still *sub judice*, as it were, inside the office. I have seen the Deputy Commissioner's statement of 22 January, I think it was, and I think also this Committee, on Friday last week, was sent a follow-up letter, and that was copied to me last week, which sets in context the statement made by the Commissioner's office.

**Q59 Mr Boswell:** In relation to FOI legislation, is there any acknowledgement in that legislation (and I should perhaps know this) suggesting a different approach towards scientific data on the one hand and modelling and, on the other hand, administrative records? Is there any explicit acknowledgement or any administrative understanding of any distinction there?

**Mr Thomas:** The broad answer, Mr Boswell, is no, but there are one or two features I could draw your attention to. First of all, the legislation applies to information held by the public authority, and information is not elaborated in that sense.

**Q60 Mr Boswell:** If I could gloss on that for a moment, information might be held in a data set available to that public authority but not actually its own data?

**Mr Thomas:** It is not ownership. The legislation uses the word "held", and in the Environmental Information Regulations that phrase "held" is slightly elaborated. If I can quote the regulation for you there, "It is held by a public authority if the information: (a) is in the authority's possession and has been produced or received by the authority, or (b) is held by another person on behalf of the authority." So that is an elaboration of the concept of "held". It is not ownership.

**Q61 Mr Boswell:** It is a pretty clear evidential test.

**Mr Thomas:** Indeed. Going back to your preliminary question, first of all, in the Freedom of Information Act there is a reference in section 36(4) to statistical information and, if anything, the thrust of that is to make statistical information more readily available than opinion, advice, policy analysis, and so on. When the Act itself was being debated in Parliament there was an acknowledgement that factual data, scientific data if you like (although that phrase, I do not think, was used) should be more readily available than perhaps policy advice, opinion, and so on. If I can perhaps take you to the Environmental Information Regulations, there is quite an interesting section there which I did not quote in my submission, and I would be happy to elaborate on this. It comes on to what I have been saying about the benefits of more proactive disclosure. Under the Regulations, which

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in turn are based on the European Directive and behind that the Aarhus Convention, there is a duty on public authorities to make information progressively more available. So there is a very explicit burden upon public authorities to make it more available. There is quite an interesting phrase, if I can just deal with that, in this context. Under Regulation 4, a public authority must progressively make environmental information available to the public, publish this information on the Internet in most cases and take reasonable steps to organise its environmental information to make it easier to access and publish. It goes on, “The minimum information which must be published, as listed in Article 7(2) of the European Directive, includes . . .” —and I will skip over some of the bullet points— “. . . (1) reports on the state of the environment, (2) data derived from monitored activities which affect, or are likely to affect, the environment.” I think there you see, going right back to the Aarhus Convention and the Directive and the UK regulations, a pressure, if you like, to disclose proactively scientific data, affecting the environment.

**Q62 Mr Boswell:** Thank you; that is helpful. Do you see anything of the distinction we have already heard something of today between the data, in the sense of their being factual, and the methodology which underpins them, and may, indeed, be instrumental in the way they have been drawn up or presented?

**Mr Thomas:** Both the Freedom of Information Act and the Environmental Information Regulations apply, as I mentioned, to information, and so, potentially (and I emphasise the word “potentially”) the data itself, the scientific findings, are information within the legislation. If the methodology is recorded—this is the phrase used in the legislation—if there is another file held by, in this case, the university setting out the methodology, then that would be potentially discloseable information. But there is no obligation, under either set of legislation, is to create a record of the methodology for the purposes of disclosing under the Act.

**Q63 Mr Boswell:** I have two other issues. UEA has pointed out that some of the data that was requested for release was subject to formal non-publication agreements. Is it acceptable to enter into such agreements, whether intentionally to withhold the data or with the effect of withholding the data?

**Mr Thomas:** I do not think that is for me to comment on. There is nothing prohibiting that in the legislation. In the Freedom of Information Act one of the exemptions is where information was received from another person under a duty of confidentiality, which is enforceable under common law. There is a parallel exclusion in the Environmental Information Regulations relating to information which was “received from another person” where disclosure “would adversely affect the interests” of that other person. The Regulations go on—forgive me for checking the exact wording—to apply the exclusion “where the other person was not under, and could

not have been put under, any legal obligation to supply it, secondly, did not apply it in circumstances such that the public authority is entitled to the information and, thirdly, has not consented to its disclosure”.<sup>2</sup> So that may be relevant in the current circumstances; that may lay behind the University’s point here.

**Q64 Mr Boswell:** A final question. I appreciate your crispness in dealing with these difficult factual issues. In your submission you suggest that the Information Commissioner, not Sir Muir’s review team, should make any rulings on the validity of FOI requests. Why do you say that?

**Mr Thomas:** I think I would say there are four reasons. First of all, the Commissioner, my successor now, is under a statutory duty to make rulings on complaints. Secondly, the law has been going now for some four and a half years. The Commissioner and the ICO, the Information Commissioner’s Office behind that, does have a great deal of expertise in handling the legislation and is very familiar with its own jurisprudence, the jurisprudence of cases which have gone on appeal to the Tribunal, and some cases which have gone on to the courts. Thirdly, I think there would be real confusion to have two parallel investigations into whether or not a particular request was valid or not valid, and that confusion would be even greater if the one body came to a conflicting conclusion from the other. For example (and this is purely speculation on my part) if the Commissioner decided that the information was discloseable and the Muir Russell Review said, no it was not, I think that would cause considerable confusion. Finally, the decisions of the Commissioner can be appealed *ab initio* to the Information Tribunal. That could not be the case with a conclusion of the Muir Russell Committee.

**Q65 Mr Boswell:** That, again, is very helpful, but just to deal with the converse which I was pausing on, presumably if the Muir Russell inquiry reaches a conclusion based on prima facie evidence, it is within its powers to draw that to your attention, or to your successor’s attention, for the Commissioner to make a definitive ruling. That would be the proper basis?

**Mr Thomas:** I would imagine so. I do not know what is going on behind the scenes; I can only refer to what is in the public domain. I do not know whether there has been that sort of expectation. I do know, because it is on the ICO’s website, that complaints have been received. In fact they were received just before I stood down as Commissioner in the middle of last year, and I understand these are still sub judice—ongoing inside the office.

**Q66 Dr Harris:** Sir Muir Russell is entitled to look at what he wants, is he not? There is no rule that says that this Select Committee, although we are slightly

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<sup>2</sup> Note by witness: Even where the wording of this and other EIR exclusions is met, disclosure will still be required unless the public interest test in applying the exclusion is greater than the public interest in disclosure.

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different, or another review body cannot come to a view, as long as he does not try to take away the Information Commissioner's ability to do it.

**Mr Thomas:** I entirely agree. That is why I said, there is nothing I am aware of which prevents that happening. I am just talking in terms of desirability.

**Q67 Dr Harris:** What you are saying is that you would urge people to wait for the official ruling through the statutory procedure and not to place too much reliance on what can only be a non-statutory determination of that question. Would that be a reasonable paraphrase of what you are saying?

**Mr Thomas:** I also made the point in my written submission to you that it is not clear from the Muir Russell terms of reference whether they will be looking at the general handling of complaints, looking at the arrangements in place inside the University for handling FOI requests, or whether they will be looking at particular requests to decide whether or not they were properly addressed. It is only the latter which I am considering in these exchanges with you.

**Chairman:** In these last set of questions we would be very grateful for your frankness as an ex-commissioner. We are not bound by any sort of responsibilities.

**Q68 Ian Stewart:** Good afternoon, Richard. UEA received an unprecedented amount of FOI requests. I think it ran, from memory, in previous years from two or three to something like 61 in this case. Is there a point at which the use of FOI requests becomes an abuse of the process and, in some cases, such as this, even harassment?

**Mr Thomas:** The answer, in general terms, is, yes. Undoubtedly, that is why in section 14 there is an exclusion for a vexatious or repeated request, and the corresponding regulation in the Environmental Information Regulations is a request which is manifestly unreasonable. When I was a Commissioner I was at pains to say that there is a risk that people would abuse the legislation. The guidance which we published in December 2008 is on the ICO website still, and that talks about our application of the vexatious test. Would it be obsessive? Could it cause distress to staff? Would it be a significant burden in terms of expense and distraction? Is it designed to cause disruption or annoyance? Does the request lack any serious purpose or value? I cannot comment on the particular cases in play at the moment, but I was always clear that we had to interpret that part of the legislation clearly. Not many cases, I have to say, do fall within the rubric of being vexatious. The Tribunal has addressed a number of cases and I think one would be reluctant to label a request as vexatious. I am also bound to say that I think a figure of around 60 has been mentioned. That does not strike me as being an absolutely huge number. We estimated in the first four or five years of the legislation about half a million requests across all public authorities were being made. Undoubtedly, it

has been quite popular legislation, it has been heavily used, not just by the media and by researchers and campaigners, also by the general public, and so we would be reluctant to label a request as vexatious. I do recall one example—I think it involved Birmingham City Council—where an individual made about 200 requests about a particular allotment site in Birmingham and how that was being developed.

**Q69 Ian Stewart:** Can I keep you to this case, please. Is it right that it was a significant increase from the two previous years of two or three per year to 61? Is it significant?

**Mr Thomas:** If that is the case, an increase from two or three to 60 in one year undoubtedly is a significant increase.

**Q70 Ian Stewart:** That leads me to my next question. It is quite clear from the email exchanges that these scientists were exasperated. Their argument was that they just wanted to get on with their job, and one of the plaintiffs says that he did not want to deal with the hassle, he just wanted to do his job. Do you have any sympathy with the exasperations of scientists at CRU?

**Mr Thomas:** I think one can understand what I might call the human dimension of this, and sympathy is not the right word in this context, but I can understand perhaps why people sometimes felt exasperated. We came across public authorities in Whitehall, local authorities up and down the country with this sense of exasperation and being on the receiving end of large numbers of quite difficult cases. There is no doubt about that; I can see that. At the same time, the legislation is there—there is the right to know—and in many cases the simplest approach, particularly where requests tend to generate either a defensive attitude or place a great burden on the public authority, is proactive disclosure in the first place. I often use what I call the Crown Jewels approach. Public authorities ought to decide what really has to be kept away from the public. If it is particularly sensitive or there is a good reason for withholding it, fair enough, but where there is no good reason for withholding information, then why not proactively disclose it and avoid the hassle of large numbers of requests?

**Q71 Ian Stewart:** We now understand the impact of hassle, as it was put by one of the correspondents.

**Mr Thomas:** Can I add one comment, if I you do not mind, Mr Stewart. I do not think that hassle, or whatever word we are going to use, justifies the deliberate destruction of requested information.

**Q72 Ian Stewart:** Can you let me ask the question and then you may come to it: because that is at the heart of the next part of the question that I want to ask you. Do you consider that what we have seen at CRU is muddle, irritation under pressure, rather than the intention to breach the Act?

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**Mr Thomas:** I simply do not have nearly enough inside information; I have no inside information, I cannot answer that question. All that I can say is that some of the material that has surfaced in the media and elsewhere, (with phrases like “hiding behind” or “please delete this particular email”) to any Commissioner—myself when I was Commissioner, to the current Commissioner—is something which prima facie needs investigation because that section 77, which we discussed earlier, is a very important part of the Act. When the Act first came into force there were many headlines: “The shredding machines at Whitehall are working day and night”. We asked for allegations to come forward; none came forward at all. It is a very serious part of the Act, virtually every public authority stresses to its staff “Do not destroy information when it has been requested.” I make no allegations whatsoever against the university; all I am saying is that in some of the emails that have surfaced there is prima facie evidence which I think would have required investigation had it not been for the six month limit.

**Q73 Dr Harris:** On that point, if there was prima facie evidence, do you think it is good practice for the Information Commissioner’s Office to state that “From whatever is now public it is revealed that FOI requests were not dealt with as they should have been under the legislation”? That is a statement of a finding, is it not?

**Mr Thomas:** I do not know the answer. I have only seen the public statement; I do not know the background to it, but I have seen the content of that statement. My understanding is that it was put out in response to a specific request from a journalist.

**Q74 Dr Harris:** A persistent request from a journalist apparently.

**Mr Thomas:** A request or requests from a journalist: “Why is the office not prosecuting under section 77?” The straight answer clearly was “Whatever prima facie evidence there is, there is no point in going further because the six-month limit has passed already.”

**Q75 Dr Harris:** But the University objects to the assertion that these requests were not dealt with as they should have been, as if that is a finding, and since it has not been investigated presumably because it may be pointless to investigate it because it is out of time, then how can that be put in those terms as a finding? They could say there is prima facie evidence, they could say it may not have revealed, but is it appropriate for a statutory body to make a declaration, to say something like that to the press which does have implications for the reputation of the person concerned when they have not had a chance to engage on that particular question with the Information Commissioner’s Office?

**Mr Thomas:** I do not think I can make any comment on that. I do understand that correspondence was exchanged between the University and the Commissioner’s Office. I saw that letter from the Commissioner to the University on Friday afternoon—I think it is before your Committee—and that sets out the context in which that statement was made. I have no knowledge to add to that.

**Q76 Dr Harris:** I am asking you as an ex-Commissioner and you nearly answered this, maybe you did answer it, we will have to go over the transcript, because there is a theoretical question here which is, is it appropriate for the office—not necessarily you but someone in your office—to make a statement that asserts there has been a failure when there has not been an investigation for whatever reason? Was it not better practice when you were Commissioner for you to say that there may have been a breach or that there is prima facie evidence of a breach?

**Mr Thomas:** I really do not wish to be unhelpful but it would be irresponsible for me to even attempt to answer that because I do not have the inside knowledge which led to that statement.

**Chairman:** All right, we will leave that. One final question.

**Q77 Ian Stewart:** One final stab at this. Do you accept that your assertion that everything that goes between correspondents should be held for disclosure may actually stifle scientific debate and development?

**Mr Thomas:** The way the legislation works is in terms of a presumption of disclosure. It is not an absolute entitlement that all information is disclosed and there are a number of exemptions, some 21 exemptions, in the Freedom of Information Act and a corresponding number in the Environmental Information Regulations. As a broad proposition where there is good reason for non-disclosure then there is non-disclosure. I do not wish to get drawn into the particular controversy of this particular set of circumstances, but I would just make the general point, and I think I made it in my statement, that where factual or statistical data has influenced public policy then that would seem to me to increase the case for disclosure. It may be different in some cases—and indeed the Regulations talk about incomplete research or findings which have not yet reached a conclusion, and that may be understandable—but where data is of a factual nature and is influencing public debate, public policy, then it seems to me that in general terms that points more towards disclosure. But I do understand that there may well be reasons, not least in the scientific area, where there may be good reason for non-disclosure.

**Chairman:** Thank you very much. On that note could we thank you very much indeed, Richard Thomas. Could we bring our third panel on, please?

**Letter from the Vice Chancellor, University of East Anglia, to the Chairman of the Committee,  
10 December 2009**

Thank you for your letter of 1 December 2009.

As you point out there has been considerable press coverage concerning an amount of data, emails and documents relating to the work of the Climatic Research Unit (CRU) which have been published on various websites. You ask a number of questions, which I will seek to address:

(a) *Your account of what has taken place*

A significant amount of material including emails and documents appears to have been accessed illegally from a back-up server in CRU and downloaded in whole, or possibly in part, on to the Real Climate website. Whilst it was removed promptly from that website, it was not before it had been widely accessed and distributed across a number of other websites. The method by which the material was obtained from CRU is the subject of a police enquiry. Substantial resources from the Norfolk Constabulary are being brought to bear but clearly this is a complex and technical forensic investigation, and must be expected to take time.

The contents of some of the emails, all of which were thought to be private exchanges between close collaborators, and phrased accordingly, have been publicised as calling into question the robustness of the scientific outputs of CRU ie the now commonly accepted view that the past fifty years have shown significant increases in global temperature, which can only be explained by human activity. This has largely been evidenced by a data-set (HadCRUT) of meteorological observations from around 5000 stations worldwide, compiled and analysed by CRU.

(b) *The steps that have been taken to investigate the allegations and to test the integrity of the data held and used by the CRU*

The University has commissioned Sir Muir Russell, previous Vice-Chancellor of Glasgow University and prior to that the first permanent secretary to the Scottish Executive, to undertake an independent review. Sir Muir is extremely experienced in public life, has an understanding of the conduct of universities and research, and is entirely independent of any association with this University and with the climate change debate. The terms of reference for the Review are:

“The Independent Review will investigate the key allegations that arose from a series of hacked e-mails from CRU. The Review will:

1. *Examine the hacked e-mail exchanges, other relevant e-mail exchanges and any other information held at CRU to determine whether there is any evidence of the manipulation or suppression of data which is at odds with acceptable scientific practice and may therefore call into question any of the research outcomes.*
2. *Review CRU’s policies and practices for acquiring, assembling, subjecting to peer review and disseminating data and research findings, and their compliance or otherwise with best scientific practice.*
3. *Review CRU’s compliance or otherwise with the University’s policies and practices regarding requests under the Freedom of Information Act (“the FOIA”) and the Environmental Information Regulations (“the EIR”) for the release of data.*
4. *Review and make recommendations as to the appropriate management, governance and security structures for CRU and the security, integrity and release of the data it holds.*

*Sir Muir will have the discretion to amend or add to the terms of reference if he feels necessary, devise his own methods of working, and call on appropriate expertise in order to investigate the allegations fully.*

*The University has asked for the Review to be completed by Spring 2010 and this will be made public along with UEA’s response.”*

(c) *How the CRU can justify its commitment to academic transparency*

CRU’s research outcomes have been published in peer-reviewed journals of the highest standing. All adjustments to data where this has been necessary (for example to account for the move of a meteorological station), have been explained. CRU has undertaken, with the good offices of the Met Office, to seek permission from the various national meteorological services which have provided the original station data to publish it. This is not a simple undertaking as some 150 meteorological services were involved in the collection of the original data, and some see the data as having economic value or are otherwise sensitive to its release. It should be noted that over 95% of the data has for some years been in the public domain, such as on the NOAA site.

*(d) How you propose to restore confidence in the CRU and its handling of data*

None of the adjusted station data referred to in the emails that have been published has been destroyed.

When we receive Sir Muir's findings we will understand which if any of the allegations stand and which fall and we will accordingly. We will publish the findings and the University's response.

To provide you with some further detail, I enclose a Briefing Paper and the Press Statement announcing the Independent Review.

I hope that his response is helpful to you and will give the Committee full confidence that this episode is being treated very seriously by the University, and that our response is both considered and appropriate. I would welcome the opportunity to provide evidence to the Committee in due course.

*Professor Edward Acton*  
Vice-Chancellor  
University of East Anglia

*December 2009*

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**Memorandum submitted by the University of East Anglia (CRU 00)**

**1. INTRODUCTION**

1.1 This memorandum is submitted by the Vice-Chancellor, Professor Edward Acton, the University's principal academic and administrative officer, with additional comment provided, where indicated, by the University's Climatic Research Unit (CRU).

**1.2 FREEDOM AND INTEGRITY OF SCIENTIFIC RESEARCH**

The University of East Anglia (UEA) was founded in 1963. For over 45 years it has sought to identify fruitful fields for research and study, notably in the sciences, and to provide a free environment in which new and challenging research can flourish. It is now recognised as a world leader in several branches of the geophysical sciences, and it is understandably proud of that reputation.

1.3 Like all British universities, it has a set of policies, regulations and codes of good conduct which UEA's researchers are required to follow. At the heart of these is the requirement to maintain "honesty, openness, accountability and integrity." Plagiarism, deception or the fabrication or falsification of results are regarded as serious disciplinary offences, and are a betrayal of the life of science.

1.4 When assessing the quality of scientific research work, UEA relies first and foremost on critical evaluation by the international network of specialists working in each field. This "peer review" is the keystone for maintaining the integrity of scientific research: the scrutiny, probing, questioning and evaluation of the work of each scientist by other experts in the field. It is through peer review that scientific reputations and esteem are established, that competition for research funding is determined, and that editors decide which work to publish and which to reject.

**1.5 THE CLIMATIC RESEARCH UNIT**

Four decades ago, UEA identified climate as an important field of study but one in which the data and methods used were primitive. In 1972 "the University founded the Climatic Research Unit (CRU) which has played a pioneering role in advancing human ability to understand the world's changing climate. It is part of a department with an international reputation.

1.6 CRU's contribution has included the compilation of a global land temperature record and the development of increasingly sophisticated methods by which to represent the average temperature of the globe and changes in that average over time. The evidence has steadily mounted of a marked increase in average global temperatures. This has given CRU's work momentous political and social significance.

1.7 We are well aware that research addressing issues with such profound implications for the human species is liable to trigger fierce debate. Moreover, we believe that such debate is a crucial and necessary part of the role of science in society. Currently there are deep concerns lest scientific analysis has exaggerated the rise in global temperature. But equally, there are fears that the rise may be underplayed, or dismissed altogether, by powerful commercial or political interests.

1.8 In the midst of this vital debate, the University's role remains unchanged. It is to pursue the best scientific research and data, to ensure that the research is pursued in conformity with our codes of good conduct, and that its quality is continuously tested and evaluated by peer review.

## 1.9 INDEPENDENT REVIEW

Given the high profile and importance of this research, following the theft of CRU emails in November and allegations that some pieces of work in CRU were at odds with acceptable scientific practice and with the University's codes and policies, including that on Freedom of Information, we announced on 3 December an Independent Review led by Sir Muir Russell. The University will act appropriately on the Review's findings and any recommendations it makes.

2. *Are the terms of reference and scope of the Independent Review announced on 3 December 2009 by UEA adequate?*

2.1 The terms of reference address the key allegations against colleagues:

(a) manipulation of data, (b) manipulation of the peer review system, and (c) whether or not data have been dealt with in accordance with best scientific practice and the provisions of the Freedom of Information Act (FOIA).

2.2 To ensure the scope of Sir Muir Russell's review embraces all that is pertinent, the terms of reference also give him discretion to amend or add to them as he feels necessary.

2.3 Alongside Sir Muir Russell's Review, we have decided on an additional scientific assessment of CRU's key scientific publications; an external reappraisal of the science itself. The Royal Society has agreed to assist the University in identifying assessors with the requisite experience, standing and independence.

3. *What are the implications of the disclosures for the integrity of scientific research?*

3.1 The immediate effect of these disclosures has been to open up the climate change debate. The long-term effects, within the scientific community, depend on the outcome of the two Reviews referred to above. We fully accept that any of the following allegations, if proven, would have implications for the integrity of the scientific research and the scientists involved. They would also damage the elements of CRU's contribution to the body of international climate science involved; given the scale of that international body of work, it is doubtful that they would weaken the implications of modern climate research as a whole.

(i) Fabrication: the creation of fictitious primary data, or documentation.

(ii) Intent to mislead: deliberate selection and/or manipulation of data, or documentation.

(iii) Misrepresentation: undisclosed suppression of findings and data.

(iv) Deficient management, preservation and dissemination of data (and primary materials, such as tree samples).

(v) Suppression or distortion of others' findings.

3.2 The Independent Review will examine whether there is substance to any of the allegations against CRU. Some detailed preliminary comments from CRU on the allegations are given below.

### COMMENT FROM THE CLIMATIC RESEARCH UNIT AT UEA

#### 3.3 *Fabrication of primary data*

(a) The CRU global and hemispheric land area temperature record

All of CRU's primary (raw) station temperature data were accessed from National Meteorological Services (NMSs), or from published collations of such station data (eg the Global Historical Climatology Network, GHCN), to which anyone can gain access. CRU's sources have been published in various publications (eg TR017, TR022, TR027, Brohan *et al.*, 2006).

(b) Tree-ring data

Virtually all primary data used by CRU are acquired from collaborators or from public databases. In the "trick" and "hide the decline" case, discussed below, the data were provided by the Swiss Federal Institute of Forest, Snow and Landscape Research, and are publicly available.

#### 3.4 *Intent to mislead*

3.4.1 CRU has been accused of manipulating/selecting data to exaggerate global warming. We strongly reject this, as a misunderstanding of the standard statistical techniques involved. It is sometimes necessary to adjust temperature data because changes in station location, instrument or observation time, or in the methods used to calculate monthly average temperatures can introduce false trends. These have to be removed or adjusted, or else the overall series of values will be incorrect. In the early 1980s, CRU painstakingly examined the long-term homogeneity of each station temperature series which it acquired. As a result, data were adjusted for about 10% of the sites, that is approximately 314 sites out of a then-total of some 3,276. This was in complete accordance with standard practice, and all adjustments were documented in TR017, TR022, TR027.

3.4.2 A number of stations with problems too severe to adjust were omitted from the dataset. They were generally from data-dense regions, and so their exclusion did not materially affect the global record. All omissions were documented (TR022, TR027, Jones *et al.*, 1986a, b).

3.4.3 Homogeneity assessment is best performed in-country by the NMSs themselves as they have access to the detailed local knowledge (Jones & Moberg, 2003). A number of NMSs have undertaken such exercises and, as they have become available, their homogenised series have been used to replace those in the CRU dataset.

3.4.4 One major CRU objective was to produce a gridded temperature dataset. This shows spatial patterns of change and, above all, avoids bias towards regions of greater station density. To produce the best-possible gridded dataset, it is necessary to utilise some of the station series which have been adjusted.

3.4.5 When the station temperature series are added together to produce global or hemispheric average temperatures, the adjustments (positive and negative) tend to cancel out; therefore having *little net effect* on the global/hemispheric average temperature record.

3.4.6 On 18 December 2009 the Met Office Hadley Centre (MOHC) released data from 1,741 of the stations which comprise the World Meteorological Organization (WMO) Regional Baseline Climatological Network from which data are freely available, and which are a subset of CRUTEM3, as the CRU data set is known. The global average temperature record from this subset is very similar to the record derived from the full CRUTEM3 dataset. MOHC subsequently released data from 3,780 stations (80% of the stations in CRUTEM3). Figure 1 shows the close agreement, with slight deviations only occurring in the 19th century (the early relatively data-poor period).

3.4.7 CRU has been accused of the effective, if not deliberate, falsification of findings through deployment of “substandard” computer programs and documentation. But the criticized computer programs were not used to produce CRUTEM3 data, nor were they written for third-party users. They were written for/by researchers who understand their limitations and who inspect intermediate results to identify and solve errors.

3.4.8 The different computer program used to produce the CRUTEM3 dataset has now been released by the MOHC with the support of CRU.

### 3.5 *Misrepresentation*

3.5.1 CRU has been accused of hiding data flaws and research findings. But here there has been a simple misunderstanding of technical jargon.

#### 3.5.2 “Trick” and “Hide the Decline”.

These accusations relate to the portrayal of the 1000–year Northern Hemisphere temperature record in one diagram in a publication for the WMO in 1999. The diagram integrated temperature records based on thermometer observations (which started in the 1850s) with “proxy” data (from ice cores, tree-rings, written and other sources), extending much further into the past than the instrumental record.

3.5.3 One of the three proxy-temperature reconstructions was based entirely on a particular set of tree-ring data which exhibited strong correlation with thermometer measured temperature from the 19th century to the mid-20th century. But after 1960 it did not show a realistic trend of temperature by comparison with these thermometer measurements.

3.5.4 This observation (that some otherwise temperature-sensitive tree-ring chronologies do not track the observed rise in recent temperatures) is well known. It is referred to in the literature as the “decline” or “divergence” phenomenon. The use of the term “hiding the decline” referred to the method of combining the tree-ring evidence and instrumental temperatures, removing the post-1960 tree-ring data to avoid giving a false impression of declining temperatures. What it did not refer to was any decline in the actual thermometer evidence of recent warming.

3.5.5 CRU never sought to disguise this specific type of tree-ring “decline or divergence”. On the contrary, CRU has published a number of pioneering articles that illustrate, suggest reasons for, and discuss the implications of this interesting phenomenon (eg Briffa *et al.*, 1998 a, b; Briffa, 2000 listed in the legend of the WMO figure).

3.5.6 As for the (now notorious) word “trick”, so deeply appealing to the media, this has been richly misinterpreted and quoted out of context. It was used in an informal email, discussing the difficulties of statistical presentation. It does not mean a “ruse” or method of deception. In context it is obvious that it is used in the informal sense of “the best way of doing something”. In this case it was “the trick or knack” of constructing a statistical illustration which would combine the most reliable proxy and instrumental evidence of temperature trends.



### 3.6 Urbanization in China

3.6.1 CRU has been accused of “hiding” climate data flaws by not acknowledging the degree to which the warming trend in China might be influenced by urbanization effects at some stations, and by withholding information on station moves, in Jones *et al* (1990). This is not true.

3.6.2 CRU requested, and accepted, the best station temperature data obtainable from China at that time via a scientist working in the US in 1989/90. CRU responded positively to a Freedom of Information Act (FOIA) request in 2007 for these station data (2 sets of 42 stations—one rural, one urban), including location information for all stations. Jones *et al* (1990) was referred to in the IPCC 2007 Report, as were other papers examining urbanization effects in other areas which, in turn, corroborated CRU’s findings that urbanization influences on a global land scale are small.

3.6.3 Furthermore, in 2007, CRU embarked on a detailed study of temperature trends in China using data from the China Meteorological Administration (CMA). An assessment of the consistency of 728 stations was published in Li and Li (2007), and all series were assessed and some adjusted by CMA for changes in location. CRU acquired the station data for the same stations that were used in the 1990 paper.

3.6.4 The subsequent analysis (Jones *et al*, 2008), which used the CMA data for the same period (1954–83) as the 1990 study, produced results that were almost identical. Using the longer measurement records now available from CMA, it also concluded that there was a likely urbanization effect in China of 0.1°C per decade for the period 1951–2004. After making allowance for this urbanization effect, there is still a remaining large-scale climatic warming trend of 0.15°C per decade over the period 1951–2004, increasing to 0.47°C per decade over the period 1981–2004.

3.6.5 There was no attempt at misrepresentation. This is simply an example of scientific research evolving as more and better data become available.

### 3.7 DEFICIENT MANAGEMENT, PRESERVATION AND DISSEMINATION OF DATA

3.7.1 CRU has been accused of “losing” primary station data. The accusation arose from misinterpretation of a CRU statement in summer 2009. CRU has not lost data. All the primary station data still exist, in the *World Weather Records* or in NMS Yearbooks and similar sources (particularly GHCN). The sources are documented in CRU reports published in the 1980s, and in later peer-reviewed papers.

3.7.2 CRU has been accused of refusing to release data requested under the FOIA. There are many obstacles outside CRU’s control surrounding the release of data provided by NMSs. Many FOIA requests made to CRU related to primary data provided by the NMSs. Some of these data are subject to formal non-publication agreements between the NMS and CRU. Other primary data had been provided to CRU on an individual-to-individual basis, with accompanying verbal agreements that they may be used within the gridded dataset, but should not be passed on to others. CRU responded to the FOIA requests for primary data by pointing out that data from approximately 90% of the stations in the CRU dataset are available from other sources, particularly GHCN.

3.7.3 Using these other sources, it has been possible—for a number of years—for anyone to construct their own global land temperature record, using whichever combination of stations they might choose.

3.7.4 In July 2009 UEA received an unprecedented, and frankly administratively overwhelming, deluge of FOIA requests related to CRU. These amounted to 61 requests out of a 2009 total of 107 related to CRU, compared to annual totals of 2 in 2008 and 4 in 2007 (University totals for those years were 204, 72 and 44 respectively). Accordingly CRU approached the Global Climate Observing System (GCOS), an organization within the WMO, to see if it would request the WMO to seek permission from each of its members (the NMSs) for CRU to release the primary station data for each country. WMO declined, but indicated that the appropriate procedure was for the request to come from the UK NMS (the Met Office). The Met Office agreed this was the correct procedure, and sent a letter of support to accompany an explanatory letter to each NMS on 30 November 2009. As of 1 February 2010, 35 responses to 160 requests have been received from the NMSs. Most are positive, but some are negative (confirming the constraints preventing CRU releasing the requested data).

3.7.5 Though never the subject of an FOIA request, CRU has been accused of not releasing original tree-ring width measurements from which regional chronologies in northern Eurasia were constructed (Briffa, 2000; Briffa *et al*, 2008). These datasets were never “owned” by CRU, but were provided by collaborating researchers. Initial requests for these data were redirected towards the appropriate institutions and individuals. Early release of these data (around 2000) was specifically embargoed by those collaborators who were still working towards further publications. Following publication of Briffa *et al*. (2008), CRU approached Swedish, Finnish and Russian colleagues for permission to release data. They were released in 2008/09.

3.7.6 On 22 January 2010, the Information Commissioner’s Office (ICO) released a statement to a journalist, which was widely misinterpreted in the media as a finding by the ICO that UEA had breached Section 77 of the FOIA by withholding raw data. A subsequent letter to UEA from the ICO (29 January 2010) indicated that no breach of the law has been established; that the evidence the ICO had in mind about whether there was a breach was no more than *prima facie*; and that the FOI request at issue did not concern raw data but private email exchanges.

### 3.8 SUPPRESSION OR DISTORTION

3.8.1 There has been much speculation over remarks made in an email about papers published by McKittrick & Michaels (2004) and Soon & Baliunas (2003), where it appears there was an attempt to exclude them from the Fourth Assessment Report of the IPCC (AR4).

3.8.2 The remarks were made before any of the four planning meetings for AR4. In the event, both papers were cited in AR4.

3.8.3 The original email was expressing doubts about the scientific rigour of the two papers. This concern appears to have been justified. The editor and publisher of the journal which published the second paper subsequently acknowledged the need to improve editorial procedures, and later related events led to half the journal's Editorial Board resigning. The first paper has subsequently received criticism over whether the statistical approaches used can support its conclusions (Benestad, 2004; Schmidt, 2009).

#### 4. *How independent are the other two international datasets?*

4.1 Although all three datasets have a degree of commonality in terms of the sources of primary data, they can be regarded as completely independent in terms of adjustments, and in terms of the methodology for combining the data, including gridding methodologies.

4.2 The three basic datasets for land areas of the world are:

CRUTEM3 (Brohan *et al.*, 2006)

Dataset held by the Goddard Institute for Space Studies (GISS, USA) (Hansen *et al.*, 2001)

GHCN dataset held by National Climatic Data Center (NCDC, USA) (Smith & Reynolds, 2005; Smith *et al.*, 2008)

4.3 All these datasets rely on primary observations recorded by NMSs across the globe.

4.4 GISS and NCDC each use at least 7,200 stations. CRUTEM3 uses fewer. In CRUTEM3, each monthly temperature value is expressed as a departure from the average for the base period 1961-90. This "anomaly method" of expressing temperature records demands an adequate amount of data for the base period; this limitation reduces the number of stations used by CRUTEM3 to 4,348 (from the dataset total of 5121). The latest NCDC analysis (Smith *et al.* 2008) has now moved to the "anomaly method" though with different refinements from those of CRU.

4.5 NCDC and GISS use different approaches to the problem of "absolute temperature" from those of CRUTEM3. The homogeneity procedures undertaken by GISS and NCDC are completely different from those adopted for CRUTEM3. NCDC has an automated adjustment procedure (Menne & Williams, 2009), whilst GISS additionally makes allowances for urbanization effects at some stations (Hansen *et al.*, 2001).

4.6 Figure 2 shows five series of global/hemispheric average temperatures, including three versions from the NCDC dataset. One of the NCDC series is based on station temperature data which have undergone *no* adjustments for homogeneity. All data series follow each other, and are well within the error ranges calculated by Brohan *et al.* (2006). The similarities are most striking over the last 70 years, and in the Northern Hemisphere, reflecting the better station coverage.

4.7 Another independent verification of the accuracy of CRUTEM3, for the period 1973–2008, has been published by Simmons *et al.* (2010). CRUTEM3 is compared with reanalysis data which are, essentially, current weather forecast data, updated each day with new observations. The correlation between the two global series is extremely close, and between 0.96 and 0.99 for the 6 major continents (Antarctica was excluded because of lack of sufficient data for this analysis).

4.8 There is excellent agreement between the three independently developed series at the global and hemispheric scales. The new reanalysis data agree almost completely with CRUTEM3 when averaged over the regions for which CRUTEM3 has data.

### 5. CONCLUDING COMMENTS FROM THE VICE-CHANCELLOR

The University looks forward to the results of the two reviews of the CRU. Given that the stakes for humanity are so high in correctly interpreting the evidence of global warming, we would meanwhile urge scientists, academics, journalists and public servants to resist the distortions of hearsay evidence or orchestrated campaigns of misinformation, and instead to encourage open, intelligent debate.

University of East Anglia

February 2010

The list of references and Figures are included in the Appendix to the Memorandum.

## APPENDIX

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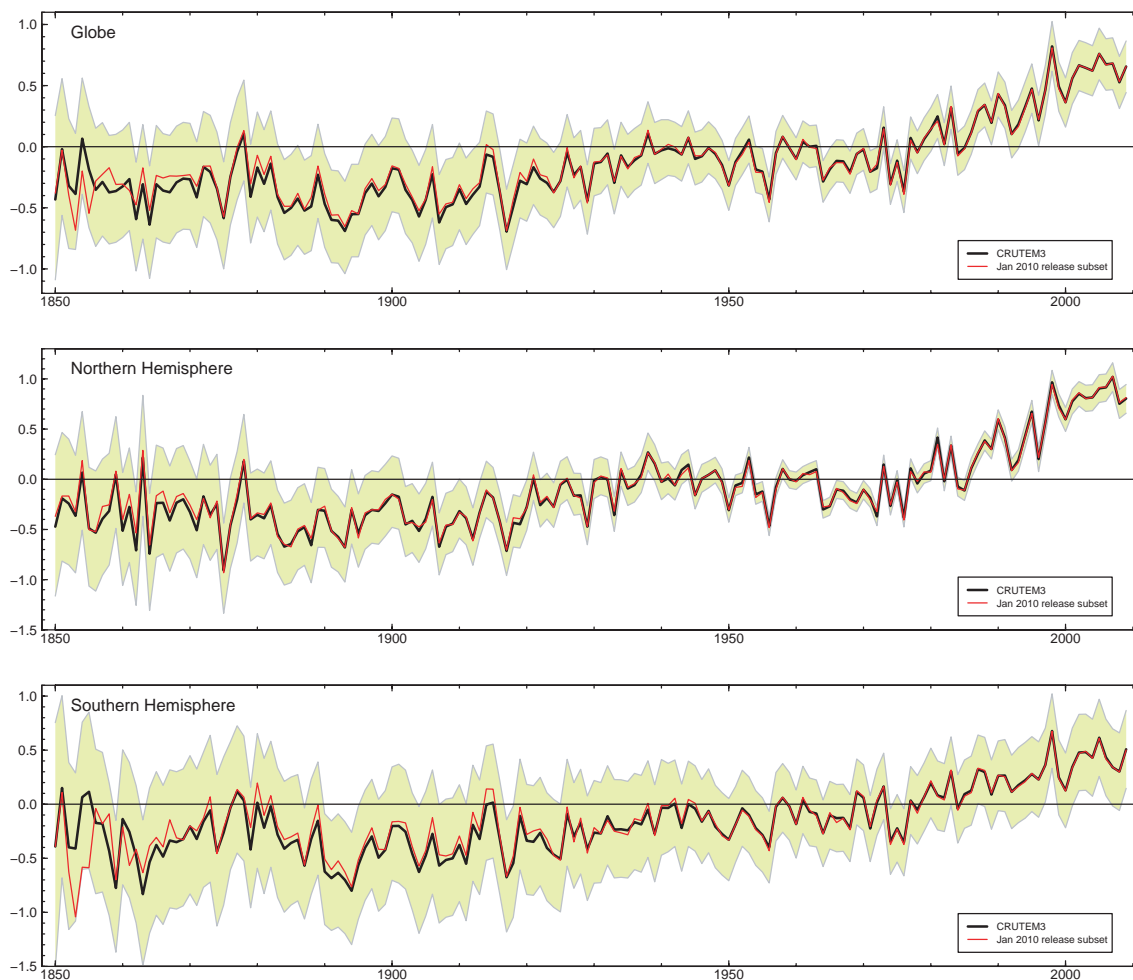
Available at <http://www.cru.uea.ac.uk/st/>

TR027—Jones, P D, Raper, S C B, Cherry, B S G, Goodess, C M and Wigley, T M L, 1986: A Grid Point Surface Air Temperature Data Set for the Southern Hemisphere, 1851–1984, U.S. Dept. of Energy, Carbon Dioxide Research Division, *Technical Report TR027*, 73 pp.

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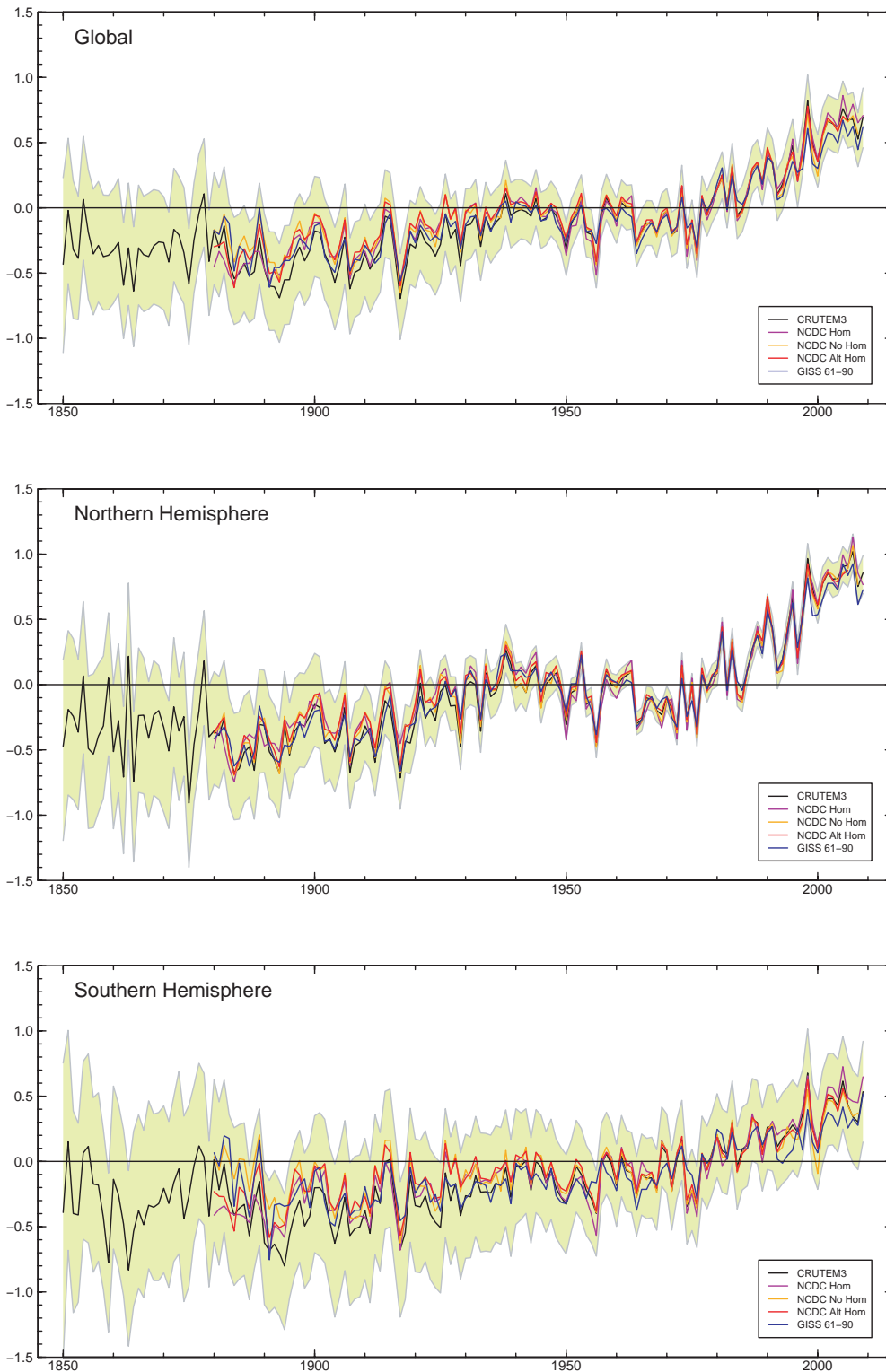
**Figure 1**

Average land temperatures as anomalies from 1961–90 for the globe and Northern and Southern Hemispheres. The black line is based on all stations contributing to CRUTEM3, while the red line is based on the 80% of stations released by MOHC. The green shading encompasses the 2.5 and 97.5% uncertainty ranges (Brohan *et al*, 2006).



**Figure 2**

Average land temperatures as anomalies from 1961–90 for the globe and Northern and Southern Hemispheres. The black line is based on all stations contributing to CRUTEM3. The blue line is for GISS (Hansen *et al.* 2001). The other three series are based on NCDC series: purple is based on Smith *et al.* (2008), red on Smith and Reynolds (2005) and the orange on unadjusted station data from GHCN. The green shading encompasses the 2.5 and 97.5% uncertainty ranges (Brohan *et al.*, 2006).



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**Supplementary memorandum submitted by the University of East Anglia (CRU 00a)**

GLOBAL TEMPERATURES: SURFACE AND SATELLITE MEASUREMENTS

- **Because they are measuring different parts of the system, differences between surface and satellite temperatures do not prove that one or both are in error.**
- The “surface” temperature record is measured at weather stations on land and by ships/buoys in the ocean.
- The “satellite” temperature record is remotely sensed from satellites and provides estimates of atmospheric temperature away from the land surface (at various heights: lower-troposphere, mid-troposphere, lower-stratosphere).
- **Both records—satellite and surface—show significant global-mean warming since 1979.**
- Of course, the surface record provides information since the mid-1800s.
- **There is greater difference between satellite-based temperature datasets than between surface temperature datasets.**
- Both surface and satellite records have a number of uncertainties and limitations—a good strategy is to use all sources of information for monitoring climate change, including both the surface and satellite records.

Comparison between the surface and satellite data for 1979–2005 were shown in Chapter 3 (Trenberth *et al*, 2007) of the IPCC’s Fourth Assessment Report; two figures have been included here.

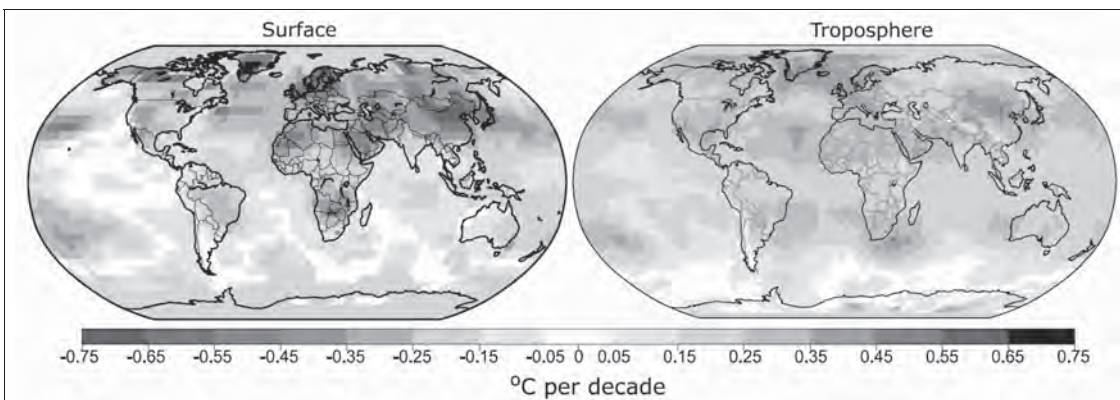
1. The maps of warming/cooling trends: both the surface (HadCRUT) and the satellite (RSS/Fu *et al*) show warming in most regions of the world. The satellite data shows more widespread warming, but over land the warming is less than in the surface record.
2. The global-mean timeseries of surface (HadCRUT and the two US datasets) and lower-troposphere (two satellite and two radiosonde datasets) temperatures all show warming trends. A visual analysis indicates reasonable agreement when these are overlaid on each other.

The Met Office 2010 submission to the House of Commons Science and Technology Committee included a figure comparing the 1979–2008 global-mean temperature trends (ie three extra years compared with the earlier IPCC assessment). They showed temperature trends from surface temperatures, mid-troposphere satellite data, and mid-troposphere radiosonde data). I have adapted their figure to also include (in purple) temperature trends from lower-troposphere satellite data).

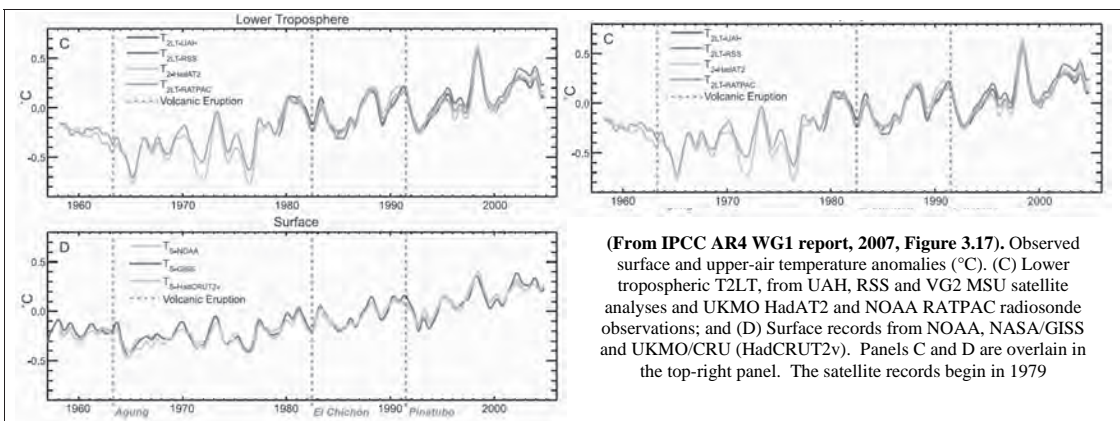
3. The two satellite-based lower-troposphere temperature trends span the warming trends estimated from the surface data, including the joint Met Office Hadley Centre (MOHC)—Climatic Research Unit (CRU) dataset HadCRUT3.
4. The difference between the two satellite lower-troposphere temperature trends is greater than the difference between the RSS satellite trend and the MOHC–CRU HadCRUT3 trend.
5. **It is misleading to state that the UAH and RSS satellite records “produce similar results to each other, which differ from those of the CRU”**—full explanation of the basis for such a statement should be given (period of analysis, region of analysis, height of analysis, how uncertainties are estimated and taken into consideration, etc).

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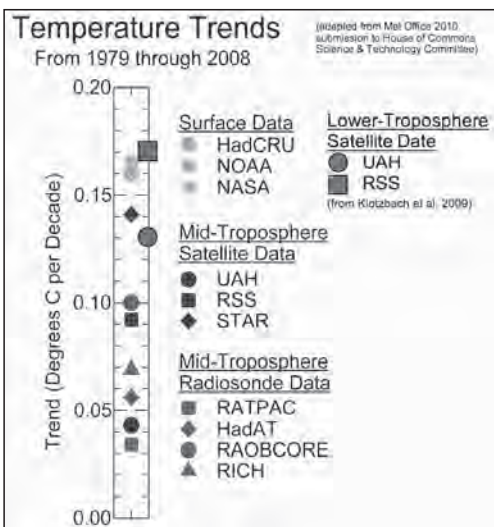
March 2010



(From IPCC AR4 WG1 report, 2007, FAQ 3.1, Figure 1). Patterns of linear global temperature trends from 1979 to 2005 estimated at the surface (left), and for the troposphere (right) from the surface to about 10 km altitude, from satellite records. Grey areas indicate incomplete data. Note the more spatially uniform warming in the satellite tropospheric record while the surface temperature changes more clearly relate to land and ocean.



(From IPCC AR4 WG1 report, 2007, Figure 3.17). Observed surface and upper-air temperature anomalies ( $^{\circ}\text{C}$ ). (C) Lower tropospheric T2LT, from UAH, RSS and VG2 MSU satellite analyses and UKMO HadAT2 and NOAA RATPAC radiosonde observations; and (D) Surface records from NOAA, NASA/GISS and UKMO/CRU (HadCRUT2v). Panels C and D are overlain in the top-right panel. The satellite records begin in 1979



(From Met Office 2010 submission to House of Commons Science and Technology Committee, adapted to include lower-troposphere satellite data from Klotzbach *et al.*, 2009). The graph shows trends in global-mean temperatures calculated over 1979–2008 from surface data (green), lower-troposphere satellite data (purple, from Klotzbach *et al.*, 2009), mid-troposphere satellite data (blue) and mid-troposphere radiosonde data (red).

*Witnesses:* **Professor Edward Acton**, Vice-Chancellor, University of East Anglia, and **Professor Phil Jones**, Head of CRU, University of East Anglia, gave evidence.

**Chairman:** Welcome to our third panel, and we are reasonably up to time so we will try and keep that way. We welcome Professor Edward Acton, the Vice-Chancellor of the University of East Anglia and Professor Phil Jones, the Head of the CRU at the University of East Anglia. Thank you both very much indeed for coming in front of the Committee this afternoon. Ian Stewart will begin this section.

**Q78 Ian Stewart:** Good afternoon, gentlemen, it is good to see you. Could I start by addressing the issue of alleged intent to mislead, which is the core of this issue I suppose. Professor Jones, there has been some speculation that the primary data has been lost and manipulated. Are all the raw data used in your various analyses accessible and verifiable?

**Professor Jones:** The simple answer is yes, most of the same basic data are available in the United States in something called the Global Historical Climatology Network. They have been downloadable there for a number of years so people have been able to take the data, do whatever method of assessment of the quality of the data and derive their own gridded product and compare that with other workers. There are two groups in America that we compare with and there are also two additional groups, one in Russia and one in Japan, that also produce similar records to ourselves and they all show pretty much the same sort of course of instrumental temperature change since the nineteenth century compared to today.

**Q79 Ian Stewart:** You believe that the data is robust and verifiable?

**Professor Jones:** Yes.

**Q80 Ian Stewart:** Can I ask you then just to explain—some of us are not scientists on this Committee—how it could be verified? Was that implicit in what you have just told us?

**Professor Jones:** That was implicit in what I told you because we are all working independently so we may be using a lot of common data but the way of going from the raw data to a derived product of gridded temperatures and then the average for the hemisphere and the globe is totally independent between the different groups.

**Q81 Ian Stewart:** I was fascinated to read the exchange of emails and the question of divergence that came up as a non-scientist, but can you tell us where primary temperature data has been recalibrated is there an audit trail showing the adjustments and why they were made? Will these adjustments be reviewed as part of the inquiry and external reappraisal of the science itself?

**Professor Jones:** There are two questions there. The first goes back to the adjustments we made to the temperature data in the 1980s and we made that for valid scientific reasons at the time. We did that by assessing each station compared to its neighbouring stations to see which ones were agreeing with each other and which were not, and based on that we made some alterations to some of the data to make

the series homogeneous, which is the word we use in climatology to mean consistent through time. All those adjustments we made and all the stations we looked at are documented in reports like this. This is the one for the Southern Hemisphere, there is a much bigger one for the Northern Hemisphere. It is all documented in these reports in the 1980s and since then we have obviously added more station data as more has become available, as countries have digitised more data; we have added that in and we have reported on that in our peer review publications in 2003 and 2006.

**Q82 Ian Stewart:** Is there anything you would like to add to that, Professor Acton?

**Professor Acton:** I would like to make a general statement.

**Chairman:** No, I am not allowing you to make any general statements at all; we will ask you questions.

**Q83 Ian Stewart:** You can couch your comments towards my questions.

**Professor Acton:** I think that answer was spot on.

**Q84 Ian Stewart:** Professor Jones, are some of CRU's problems caused by what are perceived to be exaggerated claims? For instance, are you comfortable when your staff at the CRU are quoted as saying that "Within a few years winter snowfall will become a very rare and exciting event; children just are not going to know what snow is"? Are these exaggerated and are you comfortable with such claims?

**Professor Jones:** That would be exaggerated and I do not think I ever said that. Maybe one of our staff members might have said it but I have never said that.

**Q85 Ian Stewart:** Do you agree with it?

**Professor Jones:** I do not agree with it, I think there is always going to be some snowfall in the future, even in Britain, even if we do get to be four or five degrees warmer. We are still going to have cold spells in winter; maybe not as cold as this particular one but we will still have cold spells during the winter and children will still see some snowfall.

**Q86 Ian Stewart:** Again, from memory, in the emails you explain that actually some of the criticisms meant that you revisited your own data and your methodology and you made some corrections, but if I remember correctly you also said that the corrections made no significant difference to the outcomes, is that correct?

**Professor Jones:** Yes. This relates to some work I did in 1990, looking at the urbanisation influence on temperature. Obviously if you are measuring temperature in the centre of London it is going to be warmer than it would be in the rural areas around London, but what is really important with the urbanisation effect is the growth of the city through



time. London's urbanisation is roughly the same now as it was in 1900; it is still warmer in Central London comparably as it was a century ago. But what I was talking about here was looking at other regions of the world and I started with some colleagues in 1990 looking at Australia, western parts of the Soviet Union as was and eastern China. I revisited that work in 2008 in another paper and there I worked with a different Chinese colleague who was working at the China Meteorological Administration and he had just spent a number of years assessing the quality of all the data across China, from about 700 stations across China, and I asked him specifically for the same stations that I had used in 1990. He sent me those data and I reprocessed them in the same way as I did in 1990 and got essentially the same result; that was the same temperature trends over the period 1954 to 1983. What I concluded in that paper—because it was a longer period than to 1983, it went through obviously to 2004—was that there had been an urbanisation effect in China which we had not accounted for in the earlier paper in 1990 and that effect was about 0.1 degree Celsius per decade over the period from 1951 to 2004. But there was still additional warming over China above and beyond that, so it is something that we need to reconsider. In the paper I put it down to the rapid growth and economic development of China over the last 25 years or so. It is something we need to do more research on.

**Q87 Ian Stewart:** Having come to that conclusion what would the normal process be; would you put that in the public domain?

**Professor Jones:** That paper was published in 2008.

**Q88 Chairman:** With all the variations?

**Professor Jones:** Yes.

**Q89 Ian Stewart:** And the recalculations?

**Professor Jones:** It repeated the work from 1990 and it came to a slightly different conclusion because I was looking at a longer time series and more numbers essentially.

**Q90 Ian Stewart:** Just a general point for my sake, please. Is it right that the last three decades have respectively been the highest temperatures on record for each decade?

**Professor Jones:** Yes, so the decade that has just finished, the 2000s—

**Q91 Ian Stewart:** Is the highest.

**Professor Jones:** Is the warmest going back to 1850, it is 0.16 warmer than the 1990s and that was warmer than the 1980s.

**Ian Stewart:** Thank you.

**Graham Stringer:** It is nice to meet you, Professor Jones, having read all your emails over the last few days. I understand that the criticism from McIntyre, Mosher, Fuller, Hughes and other people is not that the data has been kept secret, it has been available on different data sets, but your computer programmes and methodology and which weather stations you

have actually been putting into the papers have not been made available to them. That is the real criticism, is it not? Why have you not made that information available, because their criticism is they cannot reproduce your work and agree with it or show flaws in it if they have not got those programmes, the names of the weather stations and all that information?

**Q92 Chairman:** Can I just as a rider say, going back to Lord Lawson's comments earlier, that without the understanding of the methodology the peer review system is rather defunct.

**Professor Jones:** The methods are published in the scientific papers; they are relatively simple and there is nothing that is rocket science in them. They explain in the papers that in terms of the data itself we had entered into some agreements with some Met services to gain access to more data in certain parts of the world and we put those agreements up on our website during the summer in response to some of the FOI requests. We were trying to get more data in specific areas, but after that deluge of requests in July 2009 we contacted the Met Office and asked them how best it would be to try and move forward and release more of the data. We sent out some emails and letters to Met services around the world in November and we have got replies from many of those now and, through the auspices of the Met Office, we have now released 80% of the data on their website together with a programme that analyses the data, produces the derived product and produces the global temperature average.<sup>2</sup>

**Professor Acton:** May I point out, Chairman, that this is a very small unit. There are three fulltime members of academic staff within it and the manpower involved in exactly what has just been described is actually very considerable. May I also point out that it is not a national archive, it is not a library, it is a research unit. It has no special duty to conserve and its data is the copy of data provided by over 150 countries, whose national meteorological stations turn the data into the average for a month and then pass it on. There is no sort of primary source here.

**Q93 Chairman:** We cannot understand why you would not wish to publish it, that is the point.

**Professor Acton:** I agree; the more it is published the better.

**Q94 Chairman:** Why did you hide it then?

**Professor Acton:** Unfortunately, several of these countries impose conditions and say you are not allowed to pass it on, so there has just been an attempt to get these answers. Seven countries have said "No, you cannot", half the countries have not yet answered, Canada and Poland are amongst those who have said, "No you cannot publish it" and also Sweden. Russia is very hesitant. We are under a commercial promise, as it were, not to; we are longing to publish it because what science needs is the most openness.<sup>3</sup>

<sup>2</sup> Note by witness: For clarification see Ev 38

<sup>3</sup> Note by witness: For clarification see Ev 38

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1 March 2010 Professor Edward Acton and Professor Phil Jones

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**Q95 Graham Stringer:** Can Professor Jones answer the question I asked about the list of stations, the computer programmes and the methodology? Nobody has ever argued that the data was not available. When your scientific papers are published why cannot independent people check them for their validity?

**Professor Jones:** That is not traditionally done. You publish the paper but you do not always make the data available.

**Q96 Graham Stringer:** One has to take everything you do on trust.

**Professor Jones:** No, because we have got the agreement with the other data sets.

**Q97 Graham Stringer:** I am a scientist; if I want to go and check your work as a scientist and make a name for myself by saying it is false in some way, I cannot do it.

**Professor Jones:** You can. We have made all the adjustments we have made to the data available in these reports; they are 25 years old now. The programme that produces the global temperature average has been available from the Met Office since December.

**Chairman:** We are missing this key point so can you just plug on?

**Q98 Graham Stringer:** I will plug on. I have got one of the quotes from your emails here which does say why should I make the data available to you when your aim is to try and find something wrong with it. That is your email to Hughes. That is the nature of science, is it not, that scientists make reputations by proving or disproving what other scientists have done previously. Your statement there seems to be anti-scientific and the books that people have written around this issue have persuaded me that you have not provided all the information—the programmes, the weather stations, all the information available—so that people can replicate your work. Saying that the data is freely available in the United States does not enable anybody to go through your workings and agree with you or disagree with you.

**Professor Jones:** We did make the list of stations available in 2007; that has been on our website.

**Q99 Graham Stringer:** How long had people been asking for it at that time? You were asked for some papers in 1990 that had been kept secret.

**Professor Jones:** No, there was a paper in 1990 and we were asked for the data for that paper which I was talking about in a previous question. That was made available straightaway. The list of stations was made available after about six months from the first FOI request in early 2007.

**Q100 Graham Stringer:** You are saying that every paper that you have produced, the computer programmes, the weather stations, all the information, the codes, have been available to

scientists so that they could test out how good your work was. Is that the case on all the papers you have produced?

**Professor Jones:** That is not the case.

**Q101 Graham Stringer:** Why is it not?

**Professor Jones:** Because it has not been standard practice to do that.

**Q102 Graham Stringer:** That takes me back to the original point, that if it is not standard practice how can the science progress?

**Professor Jones:** Maybe it should be standard practice but it is not standard practice across the subject.

**Q103 Graham Stringer:** Can you explain—because a lot of people would like you to explain—if as Professor Acton says “We want all this information out”, your email to Hughes on 21 January 2005 when you said you are not going to make the data available to him because all he wants to do is find something wrong with it? That is the nature of scientific pursuit, is it not?

**Professor Jones:** Yes, I have obviously written some very awful emails and I fully admit that.

**Q104 Graham Stringer:** That is very clear; it is an absolutely clear denial of this man’s attempt to get at what you were doing.

**Professor Jones:** Yes, and I had been in discussion with him for a number of months before that trying to answer his questions.

**Q105 Graham Stringer:** He wanted the data, he wanted the codes, he wanted all the other information and you refused to give it to him. Why?

**Professor Jones:** Because we had a lot of work and resources invested in it. That was way before the FOI requests started.

**Q106 Graham Stringer:** It seems to be an attitude. I will tell you what I think: science should not have to rely on individuals making freedom of information requests for other scientists to be able to get to data. I am not really interested in that side, I am interested in why you have, both through the Freedom of Information Act requests and to Hughes and to other scientists, refused to give them the data.

**Professor Jones:** We have given them the gridded product so that we have not given them the raw station data but the product in grid boxes.

**Q107 Graham Stringer:** They cannot go back to the basics, as any scientists would want to, and say “Is this right?” You have denied them the right to check yours.

**Professor Jones:** We have made the gridded product available from the very beginning but not the raw station data. Most scientists do not want to deal with the raw station data, they would rather deal with a derived product.

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**Q108 Mr Boswell:** Very briefly, Professor Jones, if you provided the raw data, in broad terms what have you withheld and why have you withheld it?

**Professor Jones:** We have withheld the raw station data that we have used. Much the same data is available in the USA on this Global Historical Climatology Network and we have made available all the adjustments we have made to our data as well.

**Q109 Mr Boswell:** What has not gone out, which has excited these allegations of undue withholding, and why did it not go out?

**Professor Jones:** It is the specific raw data that we used. We have always put out a gridded product and people can get to much the same raw data from other sites in the USA.

**Q110 Mr Boswell:** Redundancy is the motive then, is it, it is already in the public domain?

**Professor Jones:** Most of it was already there and one of the groups in the US has also released its entire program suite as well about a year ago.

**Q111 Mr Boswell:** The issue your Vice-Chancellor raised about constraints—

**Professor Jones:** There are constraints on some of the stations.

**Q112 Mr Boswell:** Withholding information, that is the other factor is it?

**Professor Jones:** Yes. We have tried to go back to the countries and seven countries have said they would rather we did not release the copies of their data we have in our database.

**Q113 Mr Boswell:** Do they give any indication why? I realise that is sensitive perhaps.

**Professor Jones:** It is not that sensitive. Canada, for example, says they would rather we sent requests for Canadian data to their website; they do not want us to put their data on our website.

**Chairman:** I am just trying to make some progress and I am trying to get to you, Evan Harris. Doug.

**Q114 Dr Naysmith:** Would it be possible for someone to repeat exactly things you have done, but it would take years to go back to data that you got in 1990 or even before then and begin to do all the comparisons that you have done? Would it be possible for someone to do it from scratch, if that is what they wanted to do?

**Professor Jones:** It would be possible with the publications to do that.

**Q115 Dr Naysmith:** But some of the things you have not included in the publications I can understand why not, because it was not conventional to do it in your branch of science, but someone else could do it from all the information you have provided. They could approach the Russians, they could approach the Canadians and this sort of thing; it would take a long time to do but in theory it could be done?

**Professor Jones:** Yes, it could be done.

**Q116 Dr Harris:** I just want to explore this assertion that this is normal. Let us say you are a bench cell biologist and you do some work, you publish a paper and you send it for peer review. If another group of scientists want to see your workbooks, it is not my experience that you photocopy your workbooks, your lab bench books and send it all to them, so I just want to clarify to what extent you are arguing that it is just at your unit it was not standard practice, it is your field of science or do you suspect that across the field of science it is unusual to photocopy and send out all the raw data behind papers?

**Professor Jones:** It is unusual in the field of science.

**Q117 Chairman:** In your field?

**Professor Jones:** In climate science.

**Q118 Chairman:** In climate science it is unusual; that is quite important.

**Professor Jones:** It is becoming more usual now with the internet.

**Q119 Dr Harris:** You cannot speak for other fields of science I guess but do you have any idea whether, in other fields of science, the data is sent out on request? In clinical trials I have not seen photocopies of anonymised patient data being sent out on request. If peer reviewers ask to see the raw data, is there a different situation there or do they never ask for that?

**Professor Jones:** We would probably send them that then, but they have never asked for it.

**Q120 Dr Harris:** You would not object to sending peer reviewers or editors that data?

**Professor Jones:** No, but they have never asked.

**Q121 Dr Harris:** Okay. Moving on to something else, there is this whole “hide the decline” business I want to talk to you about. There was a concession from at least one set of critics that the “trick” is probably not an issue because they recognise that it is a term used.

**Professor Jones:** It is the best way of doing it.

**Q122 Dr Harris:** It may not be the view of all of your critics but at least you have some on the record saying that that is now not the issue. But then you will recall there was an exchange I had, if you were listening, with them about this question of hiding the decline and I just wanted you to respond to their assertion that when you did that it was not set out in the publications—I must say I have not gone back to the publications to read them so I am relying on your view on this but I am sure it can be done—and that in fact it was never shown that this was going on. Whereas your evidence from the UEA says very clearly that this is part of the published scientific record that you were doing it and the reasons you were doing that, and that can be criticised or agreed with by other scientists. Can you just talk about that?

**Professor Jones:** That particular email relates to this document that I produced for the World Meteorological Organisation at the end of the last millennium in 1999. One of the curves was based on tree ring data which showed a very good relationship between the tree rings and the temperature from the latter part of the nineteenth century through to 1960, and after that there was a divergence where the trees did not go up as much as the real temperatures had. We knew that because we had written a paper the year before in 1998 in the journal *Nature* which discussed this divergence between tree growth and temperatures in recent times. Not all tree ring series show that but this particular one we knew did, so we knew that putting the tree ring series in from 1960 onwards would be wrong because it does not agree with the instrumental temperature. What we did for this simplified diagram was to put the instrumental data on the end from 1960, so that only applies to one of these curves on this cover. We had written about it the year before, in one of the first papers on the divergence problem—I think other groups had actually called it the divergence problem—and, since then, we have been working with other tree ring data trying to improve the way we process the data to try and make sure we keep as much of the low frequency information on longer timescales in the trees because you have to standardise trees in a certain way to produce temperature reconstructions.

**Q123 Dr Harris:** My question is: in subsequent papers when that was done was it always explicit, albeit only by reference to the *Nature* paper to which you were referring?

**Professor Jones:** It was always explicit in the subsequent papers because some of the subsequent papers have improved the processing techniques.

**Q124 Dr Harris:** Did you understand what those witnesses (if you heard them) meant when they said that they could not see, they thought the hiding of the decline approach—which is a label from an email—the identifying and dealing with the divergence problem, was itself hidden. You do not accept that?

**Professor Jones:** We do not accept it was hidden because it was discussed in a paper the year before and we have discussed it in every paper we have written on tree rings and climate.

**Q125 Dr Harris:** While I have you on trees, if I may, an assertion was made by the first panel that all the data on trees before a previous date relates to one pine tree. I would like to call this “the case of the lonesome pine”; is that a problem from your perspective?

**Professor Jones:** No, it is not a problem at all. That particular reconstruction went back to 1400, or just after 1400, and that is because there are insufficient trees to go back before that, there are more than just one. We have criteria to determine how far you can go back in terms of the number of trees you have at a certain number of sites.

**Q126 Dr Harris:** It is not lonesome.

**Professor Jones:** No.

**Q127 Graham Stringer:** Professor Acton—you have probably read about it—the Speaker in this place lost his job partly because he seemed to think it was more important to pursue people who had leaked MPs’ expenses rather than deal with the issue which seemed to show some problems in the way members had claimed the expenses. Do you not think that your assertions and your submission to this Committee are going along the same line as being very concerned with the leaks and then prejudging the outcome of the inquiry in what you say?

**Professor Acton:** I hope not. The point of setting up the independent inquiry is to hear it and allow it to look absolutely fully into all the matters before it. I want to know the full truth; I am surprised you find a prejudging here and I am concerned.

**Q128 Graham Stringer:** The reason I say that is there is a statement from your Pro-Vice-Chancellor, Trevor Davies, who argues exactly the case that Professor Jones has been arguing, that Professor Jones has no case to answer and the only way you can read your submission to this Committee is to say that you agree with Professor Jones.

**Professor Acton:** Do you mean about the climate science?

**Q129 Graham Stringer:** Yes.

**Professor Acton:** Ah. Muir Russell’s independent review is not looking at the science, it is looking at allegations about malpractice. As for the science itself, I have not actually seen any evidence of any flaw in the science but I am hoping, later this week, to announce the chair of a panel to reassess the science and make sure there is nothing wrong. It is amongst the most thoroughly endorsed and co-witnessed science there is. Professor Jones has 450 co-authors from 100 universities—from Princeton, from Yale, from Columbia, from Imperial, from Oxford—there could be scarcely more prestigious and completely autonomous scientists endorsing it. I am a historian, it would be extraordinary for me to cast doubt on it.

**Q130 Graham Stringer:** I meant both actually, both the science and the procedures that had been followed, because one of the things you have said in your memorandum is that the Information Commissioner said that no “breach of the law has been established”, but the letter from the Commissioner states “the prima facie evidence from the published emails indicates an attempt to defeat disclosure by deleting information”. It is hard to imagine a more clear-cut or cogent prima facie piece of evidence, is it not, and yet you have taken the opposite view? You have supported the science—I accept the fact that you are not a scientist—but you have also supported the administrative process and that is rather prejudging it.

**Professor Acton:** May I comment because I am rather puzzled about the statement from the ICO because, as I understand it, our principle is that

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prima facie evidence is evidence which on the face of it and without investigation suggests that there is a case to answer. To my mind there is prima facie evidence; why else did I set up the Muir Russell independent review? Prima facie evidence is not the same as, “you have been found to breach”. You explain it to me if you would; I am very puzzled. If it is sub judice, if, as we had in a letter 10 days ago from the ICO, the investigation has not even begun, I am puzzled how we could have been found to breach if there has been no investigation.<sup>4</sup>

**Q131 Graham Stringer:** That is not what you said actually, you did not say that this is yet to be judged, what you said is: this statement “indicated that no breach of the law has been established”. That is you prejudging the case.

**Professor Acton:** It has not been established—unless there has been an investigation.

**Q132 Graham Stringer:** Would it not have been better to say that?

**Professor Acton:** I have tried to, rather succinctly. To establish is to have done an investigation.

**Q133 Graham Stringer:** Can I ask you a more general question on your attitude? I was trying, perhaps not very successfully, to draw an analogy with our problems in this place with the Speaker. Should you not actually have been delighted that all these emails have been released? On one of the most important scientific issues of our age, is it not really important that we have as much information out there as possible?

**Professor Acton:** It is, and I would think that one should go well beyond the Freedom of Information Act, the issue is so important. Once it is in the minds of some people, once they imagine there is a conspiracy to distort, then any refusal of information, even if it is nothing to do with data but private emails or commercial agreements, will feed that. I am longing for it to be completely open but whether it is a good thing that the emails are thrown open like that, I wait to judge. That there be much more public debate, I delight in and I thoroughly agree with. I am anxious if the effect of the way in which it is reported is disinformation, a sort of hint about something where there is absolutely nothing hidden. It is in a way the most deeply confirmed and affirmed, the major issue of a temperature graph from about 1850. The early medieval period—we should be spending more money on that research, but the latter is so overly endorsed by scientists I am puzzled that we should welcome a savouring of doubt where scientists say “but there is no doubt”.

**Q134 Graham Stringer:** Can you tell us how you came to choose Sir Muir Russell to run this inquiry?

**Professor Acton:** I took counsel from very senior figures, including those in higher education, about somebody who would have knowledge of university life, real experience of public life and command enormous respect for their integrity, preferably

whom I had never met. Muir Russell was the top name that came to mind and I was delighted when he agreed to do it.

**Q135 Graham Stringer:** Thank you. Can I go back to Professor Jones? I do not want to repeat the previous exchange we had but I just would like to be clear in terms of the answers to the questions from Doug and Evan about the repeatability of the works you put out. You are saying very clearly that on a lot of the papers you have put out other scientists, not that they need your working books, cannot repeat that work when those papers are published because they do not have the programs and the codes?

**Professor Jones:** They have not got the programs or the data.

**Q136 Graham Stringer:** So they cannot without that?

**Professor Jones:** That is just a fact of life in climate sciences.

**Q137 Graham Stringer:** That is very plain. Dr Graham-Cumming has made a number of points: that it appeared that your organisation, writing the different codes that it did, did not adhere to the standards one might find in professional software engineering and that the code had easily identified bugs—he himself claims to have identified bugs in the programs even after the BBC2 programme—that no visible test method was apparently used and they were poorly documented. Is that true, is Dr Graham-Cumming right?

**Professor Jones:** Those codes are from a much earlier time, they are from the period about 2000 to 2004. The codes that were stolen were earlier and we have people working on these at the moment, trying to do some other work, but they do not relate to the production of the global and hemispheric temperature series. They are nothing to do with that, they are to do with a different project.

**Q138 Graham Stringer:** Which project are they to do with, so that it is clear to us?

**Professor Jones:** They are to do with a project that was funded by the British Atmospheric Data Centre, which is run by NERC, and that was to produce more gridded temperature data and precipitation data and other variables. A lot of that has been released on a Dutch website and also the BADC website.

**Q139 Graham Stringer:** Have you now released the actual code used for CRUTEM3?

**Professor Jones:** The Met Office have, they have released their version.

**Q140 Graham Stringer:** Have you released your version?

**Professor Jones:** We have not released our version but it produces exactly the same result.

**Q141 Graham Stringer:** You have not released your version.

<sup>4</sup> Note by witness: For clarification see Ev 39

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**Professor Jones:** We have not released our version but I can assure you—

**Q142 Graham Stringer:** But it is different.

**Professor Jones:** It is different because the Met Office version is written in a computer language called Perl and they wrote it independently of us, and ours is written in Fortran.

**Q143 Graham Stringer:** How do you respond to the suggestion that you mingled confidential data with open data and, consequently, that is the reason you refused a lot of the requests for information?

**Professor Jones:** That is how it is, because we have got data coming in routinely and we have added in this extra data where we tried to get extra data for certain regions of the world.

**Q144 Graham Stringer:** According to Mosher and Fuller when you were asked to name—and Professor Acton has named a number of other ones—countries that you had confidential agreements with now, you could only produce the names of three countries. Is that right, when you were asked?

**Professor Jones:** I think it was about five.

**Q145 Graham Stringer:** Since the data has been released has there been any legal action taken against you?

**Professor Jones:** No.

**Q146 Graham Stringer:** Did you try to get round the agreements you had made with these different countries in the interests of scientific objectivity?

**Professor Jones:** Not in that way. We did, with the help of the Met Office, approach all the countries of the world and asked them whether we could release their data. We have had 59 replies of which 52 have been positive, so that has led to the release of 80% of the data, but we have had these seven negative responses which we talked about earlier, including Canada.

**Q147 Graham Stringer:** Just the final question which I think, like Ian, is the nub of the issue. I do not think you can read the emails or the responses to the freedom of information requests without coming to the view that you did not want people to have this information. Does that not firstly breed distrust and, secondly, does it not exclude newcomers? Why were you not keen for people to have this information?

**Professor Jones:** We were not excluding anybody. We were making the derived product available and the series, so those data were available on our website. What was not there was the raw station data.

**Q148 Graham Stringer:** I will repeat it one more time and then I will shut up, Chairman. That does exclude checking and it does rather put you as a scientist above interested scientists who want to check up. It is the United States Department of Energy that funds you, is it not?

**Professor Jones:** Yes.

**Q149 Graham Stringer:** It puts you above people who have paid their tax dollars to fund you because they cannot check the work you are doing.

**Professor Jones:** But they can get access to all the data on these other websites.

**Graham Stringer:** Thank you.

**Q150 Chairman:** Could I ask you briefly, before I pass on to Dr Harris for the last of these questions—and we are over-running slightly on this but it is an important session—in terms of the two datasets in the United States, particularly the NOAA dataset and the NASA dataset, and other climate scientists around the world who have principally used those datasets, have there been any similar questions as the ones that have arisen at the University of East Anglia about scientists elsewhere in the world suppressing data or changing data as has been accused of the CRU at East Anglia?

**Professor Jones:** Not that I am aware of. The NASA group have made their data available and their programs.

**Professor Acton:** There have been very closely analogous cases before the last IPCC.

**Q151 Chairman:** What I am trying to get at is whether in fact, in terms of the furore that has occurred over the Emailgate scandal or whatever you want to call it, there have been similar problems arising out of the NOAA and other datasets in the States?

**Professor Jones:** Their data is freely available so there should not be a problem.

**Q152 Chairman:** Can I very briefly come to you, Professor Acton? What staggered me, if I might be so bold, is that what mattered most to you was, as you said, “The reputation and integrity of UEA is of the utmost importance to us all.” Surely scientific integrity on the world’s leading global question should be of the greatest importance, but it seems that to you it is defending the reputation of the University of East Anglia. Have you not miserably failed? A small unit, three people, working against the odds, at the leading edge of climatology, you have let them down and now you are trying to protect their reputation.

**Professor Acton:** I hope we have not let them down. I am immensely proud of what they have done; without them humanity would be vastly less able to understand climate change. I consider the integrity of science at UEA an unbreakable part of science per se so I do not see those as alternatives. In my current post it is a matter of enormous importance that I think very, very hard about the reputation of UEA. I feel very confident about the long run, the science is robust and for a university still in its first 50 years to have made this seminal contribution is an enormous achievement, and my colleague to the left is a key contributor to that.

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**Q153 Dr Harris:** It occurred to me that one of the reasons that you might not want to make data available when you publish, or the raw data available, is this, and this may apply in other areas of science as well, because there must be a reason why it is not done other than inconvenience. If you collect all this data and you publish a paper on it, but you have got more work to do, is there an issue about you not wanting to give another group of scientists your data to publish their own conclusions from that data that you have carefully collected as a basis for you to publish work from it? Do you see the point, that you have got a publication record to develop on data you have meticulously accrued?

**Professor Jones:** We do put a lot of the data from the papers up on our website; where we can we put data up and a lot of data is related to projects we are doing. There are a lot of people who access our website for climate data and climate-derived products, so we do the best we can from the resources we have.

**Q154 Dr Harris:** I was going to ask you about the US data sets from the first panel but your late submission that we got recently deals with all the points that they made there, so we will deal with that in writing. The point that the first panel made was that transparency and openness were more important than peer review to the integrity of science, and one could get into a philosophical question about this which I am not inviting you to do. There is this question about peer review and the allegations coming from the emails that you somehow were trying to manipulate the peer review process in some way—not you or just you but colleagues collectively by preventing some people getting published, either in journals or included in the IPCC reports. Do you have a response to those allegations?

**Professor Jones:** They relate to two papers which were already in the public domain because they had been published. In some of the emails I was just commenting that I did not think those papers were very good and probably any scientist who reads a paper would think that some papers are good and some papers are poor, and I was just commenting on that.

**Q155 Dr Harris:** I was not just talking about that because those are two papers in the IPCC report; I was talking about people who complain that these emails suggest that you tried to stop some papers, for example on alleged research fraud, from being published and the editor of *Energy & Environment* complained that the emails revealed that complaints

were made against her university department, expressing anger about the way that journal had treated—in publication presumably or maybe an editorial—some other data. Do you think those are fair criticisms, even with the retrospective scope of private emails being revealed?

**Professor Jones:** On the second one, with the editor of *Climate Research* I was just writing to her head of department.

**Q156 Dr Harris:** Sorry, I had got the editor of *Energy & Environment*.

**Professor Jones:** Yes, the editor of *Energy & Environment* who works at the University of Hull.

**Q157 Dr Harris:** Yes.

**Professor Jones:** I was sending an email to the head of department about a complaint that she had made about me to the UK Climate Impacts Programme, so I was just responding there. The other point you made was about Dr Benny Peiser who was editing a series of papers in *Energy & Environment*. He asked me to comment on a particular paper and I sent him some views back that I did not think the paper was very good. It was not a formal review, he was just asking me for my views.

**Q158 Dr Harris:** The Institute of Physics say—and this is quite strong—“The CRU e-mails as published on the internet provide prima face evidence of determined and co-ordinated refusals to comply with honourable scientific traditions and freedom of information law.” That is partly, I suppose, coming back to transparency, but what is your view on that? Do you think the emails reveal anything that you may be vulnerable on or are you confident that the emails, if looked at as a whole, will clear you as it were in the review? I am not asking you to forecast the result of the review, I just want to ask your state of mind in respect of this.

**Professor Jones:** You have to realise that you have only seen a tenth of 1% of my emails in this respect.

**Q159 Graham Stringer:** We do not want to read the rest.

**Professor Jones:** But I do not think there is anything in those emails that really supports any view that I or CRU have been trying to pervert the peer review process in any way. I have just been giving my views on specific papers.

**Chairman:** On that note we do have to finish this session. Professor Edward Acton, can we thank you very much indeed, and Professor Phil Jones, thank you very much indeed for coming before the Committee this afternoon. We are heading for our fourth panel.

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**Further supplementary memorandum submitted by the University of East Anglia (CRU 00b)**

EMAIL FROM PROFESSOR JONES, 3 MARCH 2010

The yellow book I had on Monday was the smaller one for Southern Hemisphere (TR027). This is 73pp. The Northern Hemisphere one is TR022 and is about 250pp. Part of a third volume (TR017) is also necessary to follow back to the original sources. We don't have many copies of these left, so scanned them for the UEA submission.

<http://www.cru.uea.ac.uk/st/> is a link where pdf copies of these TRs can be downloaded.

These two books do not contain the climate data. Instead they document in detail the methods used for assessing the homogeneity of the temperature series in the mid-1980s. These reports document which neighbouring stations were used for comparison and to calculate the necessary adjustments, the periods over which the adjustments were calculated, the periods over which the adjustments were applied, and the adjustment values themselves (a separate value was calculated and applied for each of the 12 months of the year).

If the committee wishes to see some of the temperature data, then they would need to go to this link: <http://www.metoffice.gov.uk/climatechange/science/monitoring/subsets.html>

Once there scroll down to this line:

The station records are available in a zip file (released January 2010) (ZIP, 7.9 MB)

You then need to download this ZIP file. When unzipped there will be 99 sets of files, one for each country of the world or groups of countries. If you click on the country 03 this is the UK. Then if you click on the file called 030050 then you will see the temperature data for Lerwick in the Shetlands. This file opens best in wordpad.

I have just done this and below is what is in the file for Lerwick.

```

Number= 030050
Name= LERWICK
Country= UK
Lat= 60.1
Long= 1.2
Height= 82
Start year= 1890
End year= 2009
First Good year= 1890
Source ID= 33
Source file= Jones + Anders
Jones data to= 2001
Normals source= Data
Normals source start year= 1961
Normals source end year= 1990
Normals= 3.2 3.1 3.8 5.2 7.6 10.0 11.4 11.8 10.2 8.3 5.1 3.9
Standard deviations source= Data
Standard deviations source start year= 1941
Standard deviations source end year= 1990
Standard deviations= 1.3 1.3 1.3 0.8 0.7 0.6 0.7 0.8 0.8 0.9 1.1 1.2
Obs:
1890 5.3 5.8 4.1 5.5 9.0 9.9 10.7 11.0 11.4 7.7 5.9 3.9
1891 3.4 5.5 1.7 4.6 6.8 9.6 11.9 10.7 10.6 8.2 5.7 4.5
1892 2.5 2.2 2.5 4.6 6.8 8.9 10.3 10.6 8.8 6.2 5.8 2.4
1893 2.0 3.0 4.7 6.3 8.5 10.7 11.9 9.3 7.7 3.1 4.4
1894 3.2 3.4 5.4 7.0 6.9 10.6 13.5 11.9 9.9 7.0 7.3 4.7
1895 1.0 0.3 3.3 4.9 8.4 10.2 11.4 12.3 11.2 5.7 5.1 3.1
1896 3.7 5.2 4.2 6.4 8.9 9.9 11.5 10.7 10.1 5.8 5.4 3.9
1897 2.3 3.2 3.5 4.5 6.7 9.4 11.7 13.0 9.3 8.1 5.5 4.9
1898 5.8 3.0 3.4 5.6 6.9 9.4 10.3 11.1 10.8 8.5 5.2 5.0
1899 3.2 3.7 2.6 4.0 6.7 10.1 12.4 11.4 9.2 7.5 7.0 3.7
1900 4.0 0.6 2.5 4.8 6.7 9.8 11.5 11.2 10.2 6.1 5.8 5.2
1901 3.8 1.5 3.0 6.0 8.5 10.0 12.8 11.4 10.9 7.9 4.2 2.5
1902 3.0 2.4 4.0 5.1 6.1 9.2 9.4 9.4 9.2 8.0 6.5 4.1
1903 3.6 4.3 4.2 4.2 7.1 8.9 9.9 10.4 10.0 7.2 4.6 3.8
1904 4.2 1.9 3.2 5.2 7.4 9.7 11.1 11.2 10.9 7.6 4.6 4.1
1905 3.7 3.2 4.6 3.4 7.0 10.3 11.7 11.4 9.7 5.2 4.6 5.0
1906 3.7 2.2 2.2 4.9 6.3 9.9 10.1 11.1 10.7 7.8 6.4 2.9
1907 3.8 2.8 3.7 4.7 6.8 8.7 9.7 9.2 8.7 7.8 5.2 3.8
1908 3.9 2.7 3.2 4.2 7.1 9.2 11.2 11.1 9.9 9.6 5.4 4.6
1909 3.5 3.0 2.2 5.2 6.5 8.7 10.3 10.4 9.3 6.9 3.8 2.1
1910 2.8 3.1 4.4 4.9 8.2 10.5 11.6 12.9 10.0 8.1 2.8 4.1
1911 3.9 3.7 3.7 5.0 8.8 10.2 11.7 12.6 10.5 6.6 4.3 5.6
1912 3.1 3.5 4.6 5.2 7.2 9.3 11.4 10.7 9.4 7.5 4.0 4.2
1913 3.8 3.7 3.4 5.3 8.0 9.8 11.1 11.4 10.7 8.6 6.8 3.7
1914 4.2 5.1 3.5 6.6 6.6 10.0 12.2 12.3 10.1 8.4 5.0 3.3
1915 3.6 3.1 2.3 4.9 6.0 8.9 10.8 11.5 10.0 8.1 3.4 0.9
1916 4.7 2.9 1.7 5.4 7.0 8.3 10.7 10.7 9.9 7.7 6.5 3.7
1917 2.7 3.2 2.0 3.0 7.4 10.7 11.5 13.6 10.4 6.1 4.8 1.8

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1918	1.1	4.0	4.0	4.7	9.0	9.3	11.3	12.5	8.2	7.7	5.4	4.5
1919	4.3	1.4	1.6	4.5	8.9	10.0	10.6	10.8	10.0	6.5	2.5	3.3
1920	2.8	3.9	4.7	4.9	7.6	9.9	11.2	10.4	9.4	9.3	7.2	5.3
1921	4.2	4.9	3.9	6.1	7.0	8.8	10.1	9.8	9.6	8.3	4.9	4.2
1922	2.6	3.3	3.5	3.4	7.0	9.0	10.1	10.4	9.1	6.6	4.9	4.6
1923	3.8	3.1	4.7	4.4	5.7	7.7	11.3	11.0	9.2	7.4	3.7	2.7
1924	4.3	3.0	2.1	4.2	6.8	8.5	11.1	12.4	10.6	8.3	7.2	6.7
1925	5.6	3.2	2.7	5.0	8.1	9.8	12.8	11.3	9.2	6.7	4.1	1.8
1926	4.7	4.4	4.4	7.2	6.8	10.6	12.6	12.5	10.2	4.6	5.9	4.0
1927	3.2	4.1	5.4	3.5	5.7	7.6	12.2	12.2	9.6	6.8	4.1	2.1
1928	3.5	3.9	4.2	5.1	7.1	8.0	10.2	10.4	9.6	7.9	5.4	4.0
1929	3.9	2.3	5.9	4.6	7.9	8.8	11.2	11.1	10.3	6.7	5.7	4.7
1930	4.2	3.2	2.3	6.1	7.3	10.7	12.1	12.8	10.7	7.9	3.8	5.3
1931	2.6	2.0	1.6	5.3	8.0	8.6	11.4	10.9	9.2	7.1	7.7	5.0
1932	5.2	5.1	3.7	4.2	7.6	9.5	12.2	11.9	9.2	6.3	5.8	5.1
1933	4.3	1.9	5.2	5.2	7.8	12.1	13.6	13.1	11.5	8.2	5.9	5.5
1934	5.0	5.4	3.9	5.2	7.4	10.3	13.0	13.0	11.4	7.6	5.4	6.6
1935	4.4	2.8	5.3	5.2	7.3	9.7	11.5	12.4	10.7	7.4	6.4	3.2
1936	2.1	2.7	4.2	4.4	8.1	10.5	13.4	12.8	11.1	8.0	6.0	4.5
1937	3.8	2.3	1.6	6.2	8.6	9.8	11.8	12.1	10.3	9.1	5.1	3.3
1938	4.3	3.9	5.9	6.0	6.9	9.8	11.8	12.7	10.6	8.7	6.3	4.4
1939	2.4	5.1	4.8	5.3	8.2	10.2	11.5	12.9	11.4	7.0	5.6	3.7
1940	1.7	2.0	2.8	4.7	8.7	11.6	11.3	10.8	9.2	8.0	5.0	4.0
1941	1.1	2.0	3.0	4.5	6.7	10.1	12.8	11.8	11.1	8.0	5.6	5.1
1942	1.7	1.7	2.1	6.1	7.6	9.5	11.5	12.0	10.4	7.4	5.9	5.3
1943	3.6	4.8	5.8	6.3	8.3	10.5	11.9	11.1	10.7	9.7	5.4	5.0
1944	4.0	3.4	3.5	5.8	7.3	9.8	12.3	12.6	10.1	8.1	4.2	3.9
1945	0.8	4.5	6.3	6.1	8.1	10.5	12.5	12.5	11.5	9.6	7.2	4.7
1946	4.5	2.8	4.1	6.3	8.1	10.1	12.5	12.2	11.5	8.3	6.2	4.8
1947	3.2	-0.3	0.3	5.2	8.9	10.4	13.4	14.4	11.1	8.7	4.7	4.5
1948	2.4	4.0	5.8	6.1	7.4	9.8	11.1	10.8	10.0	6.8	6.1	6.1
1949	3.7	4.6	3.0	6.0	7.6	9.9	12.1	11.8	12.0	9.1	7.0	3.7
1950	4.8	2.7	5.2	5.2	8.0	10.5	12.4	13.1	10.4	8.0	4.6	1.3
1951	3.1	2.9	2.1	3.7	6.9	8.8	10.7	11.7	10.7	9.1	6.4	4.3
1952	1.3	2.6	4.2	6.5	8.1	8.8	11.2	11.2	8.2	7.3	3.6	3.8
1953	4.3	3.1	5.6	4.5	7.8	10.7	12.4	12.3	11.2	9.4	7.2	6.1
1954	3.5	2.5	4.1	5.5	8.5	10.6	11.1	11.5	9.3	7.0	5.6	4.2
1955	2.0	0.4	3.0	6.1	6.3	9.5	12.9	12.9	11.4	7.1	6.8	2.3
1956	1.6	2.2	3.6	4.4	8.3	9.0	11.2	10.3	10.7	7.6	6.4	4.7
1957	4.8	2.9	5.7	6.3	7.1	9.4	11.4	11.2	9.5	8.0	6.1	3.9
1958	2.4	1.2	1.6	4.9	6.4	9.9	11.9	11.7	12.1	9.5	7.2	3.7
1959	0.5	4.5	5.6	6.7	8.3	10.5	12.6	12.4	11.3	9.8	6.6	5.0
1960	2.8	2.7	4.7	6.3	9.1	11.3	12.0	12.2	11.2	8.3	5.7	4.1
1961	3.4	4.6	5.6	5.4	7.7	10.0	11.5	11.9	11.3	9.5	5.5	2.4
1962	4.0	3.3	1.4	4.8	6.9	9.9	10.6	11.1	9.9	8.7	4.5	3.6
1963	0.9	1.6	4.4	5.5	7.4	10.9	11.0	11.9	10.1	8.3	5.1	3.4
1964	5.2	4.0	4.3	6.1	8.6	10.0	11.1	10.1	9.1	7.9	5.8	2.8
1965	2.7	3.8	2.9	5.4	6.8	10.1	9.8	11.1	10.5	9.2	3.0	1.7
1966	2.4	1.8	3.9	4.3	7.6	11.2	11.3	11.4	10.3	8.1	4.3	3.2
1967	3.5	4.6	4.3	4.9	7.0	9.8	11.4	11.5	11.3	7.5	6.1	3.6
1968	2.2	1.4	3.8	5.2	6.0	10.2	11.3	11.4	11.0	8.4	5.3	3.8
1969	4.1	0.0	1.7	5.1	7.2	10.6	11.7	13.3	10.1	9.2	2.6	3.5
1970	2.6	0.9	2.4	4.2	8.2	11.0	10.6	12.2	10.4	7.5	4.5	4.5
1971	4.1	4.6	4.0	5.6	9.0	9.0	11.2	11.6	10.7	8.4	4.5	5.8
1972	3.8	4.0	4.8	5.9	8.3	9.6	11.5	11.1	9.4	8.9	5.1	5.8
1973	5.6	2.9	5.7	3.8	7.1	9.5	11.5	11.3	10.3	6.9	3.8	3.0
1974	5.0	4.4	4.6	6.6	8.2	10.2	11.3	12.2	10.3	6.8	5.8	4.5
1975	3.9	4.5	3.5	4.5	6.6	9.1	11.3	13.0	9.7	9.0	6.0	4.4
1976	2.6	4.0	3.1	5.3	8.1	10.7	12.6	12.7	9.5	9.0	6.3	2.1
1977	2.5	2.5	4.8	4.2	7.4	9.0	11.3	11.6	9.3	9.2	4.8	5.3
1978	2.7	1.4	4.3	4.3	8.2	10.1	10.3	11.3	9.8	8.4	5.8	3.3
1979	0.8	1.0	2.5	5.1	5.9	9.8	10.5	11.0	9.5	8.5	4.8	3.8
1980	2.6	3.3	3.0	5.9	7.7	11.1	11.9	11.8	11.1	6.5	4.6	4.0
1981	2.2	3.1	3.9	5.1	7.7	9.6	11.4	11.8	11.6	5.8	4.8	0.8
1982	2.7	4.5	4.6	5.9	7.9	10.0	12.0	12.1	9.9	8.8	5.9	3.6
1983	4.1	2.5	4.3	4.3	7.5	9.6	11.9	11.8	9.8	7.8	6.0	4.6
1984	1.5	4.1	3.1	5.6	7.5	10.2	11.9	12.7	10.2	8.6	6.5	5.8

1985	2.0	3.1	3.3	4.8	7.3	9.5	12.0	12.3	9.4	9.3	3.1	3.2
1986	2.0	1.8	4.4	4.3	8.4	10.2	11.4	11.1	8.9	8.0	6.0	4.0
1987	2.4	2.6	2.7	6.9	7.1	8.8	11.9	11.6	10.3	8.4	6.0	5.6
1988	3.9	3.6	3.1	4.6	8.1	10.4	12.3	11.8	10.9	8.4	5.7	5.9
1989	6.3	4.1	4.7	5.5	8.2	9.9	11.7	11.6	10.4	8.3	6.3	4.2
1990	4.9	4.7	5.1	5.5	8.3	10.4	11.8	12.5	9.9	8.8	5.9	4.1
1991	4.1	2.9	5.6	5.9	7.8	8.7	13.2	13.1	10.3	8.3	6.0	5.2
1992	5.4	4.9	4.1	5.7	9.0	11.8	11.8	11.6	10.4	6.5	5.3	4.2
1993	3.4	4.3	4.7	5.9	7.8	8.9	10.3	10.6	9.8	6.9	5.7	2.7
1994	2.9	2.7	3.1	5.3	6.8	9.2	12.6	12.0	9.7	7.3	7.2	4.5
1995	3.0	2.7	3.0	4.8	6.8	10.0	11.5	12.8	11.1	9.3	6.3	2.6
1996	4.9	2.5	3.6	6.1	6.3	10.1	11.1	12.9	11.0	9.1	3.5	3.1
1997	4.7	4.1	5.0	5.1	7.3	9.8	12.8	14.2	10.8	7.8	7.3	5.7
1998	4.6	5.4	4.3	5.3	8.5	9.3	11.2	11.2	11.5	7.3	5.4	4.8
1999	4.2	2.6	5.0	6.2	7.6	9.8	11.5	12.1	12.2	8.8	6.8	2.9
2000	4.4	3.9	4.5	5.0	8.6	9.1	11.0	11.9	11.3	9.3	6.7	4.8
2001	4.6	1.9	3.1	5.2	8.5	9.3	11.6	12.1	10.3	10.5	5.7	3.9
2002	5.2	3.5	4.5	6.7	8.8	12.1	12.3	13.8	12.0	7.4	6.6	5.0
2003	4.1	4.6	6.6	6.9	8.4	11.8	14.3	13.9	11.4	7.5	7.5	4.9
2004	4.0	3.9	5.7	7.3	8.8	10.5	11.7	13.6	11.3	8.9	5.9	5.5
2005	4.6	3.8	4.7	6.5	7.3	10.1	12.1	12.0	10.8	9.5	6.4	5.2
2006	5.5	4.5	2.2	5.0	7.8	10.6	13.7	13.2	12.7	9.8	7.1	6.5
2007	4.6	4.4	5.8	7.4	7.8	10.2	11.8	11.6	9.7	9.2	5.4	5.4
2008	4.2	5.2	3.7	6.0	9.1	10.4	13.1	13.3	12.0	7.8	5.7	4.8
2009	4.7	3.3	5.3	7.7	9.0	10.8	13.5	13.2	11.7	8.4	7.3	3.9

*Professor Phil Jones*  
Climatic Research Unit

March 2010

#### Further supplementary memorandum submitted by the University of East Anglia (CRU 00c)

Question 1: *When it emerged, last July, that the CRU were facing “an unprecedented, and frankly administratively overwhelming, deluge of FoIA requests” [UEA memo, Para 3.7.4] did the University provide extra resources to assist the Unit? If so, what resources were offered?*

Within the University’s Information Services Division (ISD) additional support was provided to the University’s Information Policy Compliance Manager (IPCM) who handles FOI requests. This included rescheduling workloads to allow him to concentrate on the CRU FOI requests and diverting secretarial support to provide additional resource. Given the high volume of requests received, the Director of Information Services (DoIS) also took an active role in the first stage of a number of requests, thus providing additional support to the IPCM. (Should any cases where the DoIS was directly involved in the first stage be appealed then we have arranged for the PVC Academic to adjudicate to ensure impartiality). ISD also fast-tracked the merging of the Security Policy and Compliance team to ensure that a fully trained back-up to the IPCM was available.

Alongside the IPCM providing significant support to staff in CRU in dealing with requests, the Science Faculty provided additional administrative support, including that of the Director of Faculty Administration, the most senior member of the Faculty’s administrative staff.

It should be noted however that the specialist nature of many of the requests required scientific knowledge and understanding of the subject area in order to provide the details. Despite the additional administrative resources provided, the requirement to respond to the 61 requests received in July 2009 impacted considerably upon the work of CRU.

Question 2: *What legal advice and guidance on handling was the Unit given by UEA in handling these FoIA requests?*

Advice and guidance on the Act in general, and on particular requests, was provided to CRU in the course of dealing with the specific requests. The IPCM provided advice to CRU on the requirements of the Act both generally, and in relation to any applicable sections, exemptions or exceptions pertaining to the specific request. In this latter role, the IPCM set out the requirements of any possible exemption or exception, inclusive of the public interest test, and elicited from CRU staff whether the public interest test had been met.

Additional advanced training was provided to the ‘FOI Contact’ for the Faculty of Science, the Director of Faculty Administration. In this role, the FOI contact acted as a support to CRU in the location and retrieval of information and provided assistance to the IPCM in exploring the application of the Act to the specific requests.

General introductory training on FOIA is available to all University staff twice yearly by way of FOIA courses and the advanced course for FOI Contacts and other interested parties is available annually.

University of East Anglia

March 2010

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**Further supplementary memorandum submitted by the University of East Anglia (CRU 00d)**

SUPPLEMENTARY SUBMISSION FROM PROFESSOR PHIL JONES

I was confused by some of the lines of questioning from Mr Stringer, for which I apologise. Now that I have seen the transcript of his questioning, I welcome the opportunity to provide clearer answers.

In his question, un-numbered between Q91 and Q92, he acknowledges that “it is not the data which has been kept secret”. In Q95 he states that “nobody has ever argued that the data was not available”. I am afraid that when I heard the word *data*, my mind was instantly drawn to the very large volume of, mostly misleading, comments which have been made about data availability over the last three months, and the university’s continuing efforts in trying to counter the mis-representations.

From the transcript, Mr Stringer’s questions appear, in fact, to be focused on other information, such as “computer programs and methodology and which weather stations you have actually been putting into the papers” (in between Q91 and Q92). Although this point was emphasised by Mr Willis (Q92)—“without understanding of the methodology, the peer review system is rather defunct”—because of the tension of the occasion, I still did not pick up the questions’ emphasis.

The key issue, both scientifically and for answering Mr Stringer’s questions, is whether we have provided sufficient information to enable others to reproduce and check our scientific results; especially the global land temperature dataset that we call CRUTEM3. My answer to this is “yes”.

The first requirement is that others should be able to obtain the data—in this case, temperature observations from weather stations around the world. Mr Stringer acknowledges that the data themselves are available, but perhaps not the list of which stations we actually used. I did later make it clear that the list of weather stations used in CRUTEM3 was made available in September 2007 (responses to Q98 and Q99). Prior to this, lists of stations used in earlier versions of our dataset were published in 1985–86 and 1991.

The second requirement is that we should provide sufficient detail of the analysis methods to enable others to implement them and carry out their own check of our results. Mr Stringer’s questioning seemed to imply that provision of computer programs was the only way in which this could be achieved, and this distracted me into concentrating on that aspect. However, I should have made clear that the analysis methods used in producing the CRUTEM3 dataset are relatively simple, and all are described in our various published articles in sufficient detail to allow others to implement them. Research papers are not generally accepted for publication in peer-reviewed journals unless sufficient details on both the nature of the observations and the methodology are provided.

The issue of whether computer programs are needed to allow our results to be reproduced is an interesting one. The principle of reproducibility in science research is an important one. It should be undertaken by independent researchers who evaluate the experiment or investigation, based on the original experimental or methodological description. One of the objectives of the peer review process is that there is sufficient methodological detail for the investigation to be reproduced by independent competent researchers.

A distinction should be made between reproducibility and repeatability. Repeatability measures the success rate of an “experiment”. If the experiment is a statistical investigation, using the same data with the same computer programs is bound to produce the same result. That will not establish the reproducibility of an investigation.

Even though reproducibility does not necessarily depend on providing computer programs, in my response to Qs 141 and 142, I also emphasised that the computer program code for CRUTEM3 has been released by the Met Office. It is their version of the program written in Perl. CRU has our own version of the program, but it is written in an older programming language called Fortran. Given the same input data, the Met Office Perl program and our Fortran program produce the same global land temperature dataset—such correspondence is one method of quality control.

To return to Mr Willis’s statement in Q92, I would like to point out that the peer review system is certainly not defunct. It is valued by the international science community precisely because it does allow all research findings to be exposed to informed sceptical probing and scrutiny by any competent scientist. Without it, science debate can be, and has been, reduced to one-way traffic of opinion and assertion.

## SUPPLEMENTARY SUBMISSION FROM THE UNIVERSITY OF EAST ANGLIA

A. With reference to comments in the meeting pertaining to the Freedom of Information Act (Q58, Q130), the University would like to draw the Committee's attention to the most recent letter from the Information Commissioner's Office of 3 March 2010. It makes plain that there is no assumption by the ICO, prior to investigation, that UEA has breached the Act; and that no investigation has yet been completed.

B. In his response to Q94 concerning the publication of data, Professor Acton outlined that a number of countries including Sweden had not given permission for UEA to publish data from their Meteorological Services on the UEA website. The information relating to Sweden was based upon a letter from the Swedish Meteorological and Hydrological Institute (SMHI) to Prof Phil Jones dated 21 December 2009. A second letter from SMHI received 8 March 2010 now gives permission for CRU to publish its Swedish data on the UEA website.

University of East Anglia

March 2010

## Annex

LETTER FROM SENIOR COMPLAINTS OFFICER, INFORMATION COMMISSIONER'S  
OFFICE TO INFORMATION POLICY & COMPLIANCE MANAGER,  
UNIVERSITY OF EAST ANGLIA, 3 MARCH 2010

Thank you for your letter of 26 February 2010. As I indicated in my letter of 16 February 2010, the purpose of the investigation that I am carrying out is to determine whether the University has complied with the relevant procedural aspects of the Freedom of Information Act and/or Environmental Information Regulations and whether it correctly applied relevant exemptions and/or exceptions.

I can confirm that I have not commenced this investigation with any assumption that the University has breached the Act and/or Regulations and any determination that is subsequently made will be based on the evidence and arguments that are provided by the University, as well as those provided by the complainant, Mr Holland.

I can confirm that the ICO is not pursuing any investigation under section 77 of the Act. That matter is closed as far as the ICO is concerned, given the statutory time limits for action.

The ICO acknowledges your concern about the statement made and the subsequent media and blog reports. Given that the Deputy Commissioner has already been publicly associated with the matter, any Decision Notice will be reviewed and signed off by another authorised signatory.

I hope this letter provides the re-assurance you are seeking. If you have any further queries with regard to the investigation, please do not hesitate to contact me.

Yours sincerely

Senior Complaints Officer  
FOI Casework—Team 1

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**Memorandum submitted by the Climate Change E-Mails Review Team (CRU 48)**

1. The Review Team's terms of reference are as follows:

“The Independent Review will investigate the key allegations that arose from a series of hacked e-mails from the University of East Anglia's Climatic Research Unit (CRU). The review will:

- 1.1 Examine the hacked e-mail exchanges, other relevant e-mail exchanges and any other information held at CRU to determine whether there is any evidence of the manipulation or suppression of data which is at odds with acceptable scientific practice and may therefore call into question any of the research outcomes.
- 1.2 Review CRU's policies and practices for acquiring, assembling, subjecting to peer review and disseminating data and research findings, and their compliance or otherwise with best scientific practice.
- 1.3 Review CRU's compliance or otherwise with the University's policies and practices regarding requests under the Freedom of Information Act ('the FOIA') and the Environmental Information Regulations ("the EIR") for the release of data.
- 1.4 Review and make recommendations as to the appropriate management, governance and security structures for CRU and the security, integrity and release of the data it holds.”

2. The Review Team membership is:

- Sir Muir Russell
- Professor Geoffrey Boulton
- Dr Philip Campbell
- Professor Peter Clarke
- Mr David Eyton
- Professor Jim Norton

Details of the members can be found on the Review website [www.cce-review.org](http://www.cce-review.org)

3. The remit requires the Review to address the specific allegations about the way in which CRU has handled its data, reflecting comments in the e-mail exchanges that have been made public. In a separate paper—Issues for examination—the Team has set out its initial view of the questions that need to be addressed. It will seek written submissions from CRU and other appropriate parts of UEA. It will also invite interested parties to comment on what the Issues paper covers, and to propose any further matters that clearly fall within the Remit and should also be examined.

4. The Review's remit does not invite it to re-appraise the scientific work of CRU. That re-appraisal is being separately commissioned by UEA, with the assistance of the Royal Society. The Review's conclusions will complement that re-appraisal by pointing to any steps that need to be taken in relation to data, its availability and its handling.

5. The Team wishes to focus on the honesty, rigour and openness with which CRU handled its data. It wishes to gain a proper understanding of:

- The range of data involved, and how it has been indexed and archived.
- The procedures, processes and relevant protocols used to handle the data, recognizing that these may have changed over time as data-handling capacity has developed.
- The associated metadata, algorithms and codes used for analysis.
- The extent to which other independent analysis produces the same conclusions.
- The peer review process, examining how much was in common between the work of the reviewers and the reviewed.

6. In making its analysis and conclusions, the Team will test the relevant work against pertinent standards at the time it was done, recognizing that such standards will have changed. It will also test them against current best practice, particularly statements of the ethics and norms such as those produced by the UK Government Office for Science and by the US National Academy of Sciences. These identify principles relating to rigour, respect and responsibility in scientific ethics and to integrity, accessibility and stewardship in relation to research data. This overall approach will allow the Team to establish a conceptual framework within which it can make judgements and comment about key issues such as the level of uncertainty inherent in all science, and the particular confidence limits associated with the CRU work.

7. The Police and the Information Commissioner are also considering issues in connection with the leaked e-mails, and the Team has established appropriate, continuing liaison with them.

8. The Team's analysis and conclusions will include not only a view of what has happened in the past, but also comments and recommendations on best practice for the future. This will be done both at the level of CRU and the University as a whole, and may have broader implications for institutions undertaking scientific work.

9. The Team will operate as openly and transparently as possible. It is establishing a website which will eventually display all of the submissions received, correspondence, analyses and conclusions. The aim will be to publish all received submissions quickly, unless there are wholly exceptional reasons to delay, for example legal issues.

#### TIMESCALE OF THE REVIEW

10. The Team invites submissions from UEA and the public by the end of February. These will require analysis and there may be follow-up questions and/or interviews. The Team expect to have at least preliminary conclusions by Spring 2010.

*February 2010*

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*Witness:* **Sir Muir Russell**, Head of the Independent Climate Change E-Mail Review Team, gave evidence.

**Chairman:** Could we welcome our fourth panel for today and we are very grateful indeed for Sir Muir Russell, Chairman of the Climate Change E-Mail Review Team, for joining us this afternoon. Welcome to you, Sir Muir. I am going to ask Dr Harris to immediately begin this session.

**Q160 Dr Harris:** I apologise, I am going to have to leave pretty soon to go to another meeting for a different Select Committee, but who chose your team originally because with Dr Campbell resigning—was that predictable or are you confident that your approach to choosing the team originally was the right one to take?

**Sir Muir Russell:** I do not think it was predictable otherwise I guess I would not have had him on the team. The approach that I took was to discuss around people that I knew and trusted, some former colleagues in Glasgow for instance, should I take this on, what would it involve, what sort of balance of skills would we need? You can see as you look at the composition of the team that I needed to be looking at climate science in general but not somebody who was associated with this particular stream of work but would understand what was going on. There were going to be huge data handling issues, there was a lot of work on computing and data security and so on and that the work was going to have a resonance out there in the real world and around the world. Really on that basis I came up with this set of names that you can see. In relation to Dr Campbell, the others that I had got together thought that it would be extremely important to have somebody who knew about peer review and that was really the qualification that brought him in.

**Q161 Dr Harris:** Are you going to replace him?

**Sir Muir Russell:** We are thinking about how best to do that. It may be that at this stage in the work bringing on a new team member fulltime would be a bit late in the day in terms of getting up to speed, but we would certainly want to have one or more people who know about the business of peer review. You can tell from the discussion that we have just been listening to how important it is to understand who does it, what they do, what information they expect to have available and who moderates it in terms of the editorial role, for example, that Dr Philip Campbell would be playing. To answer your question we need to replace him; whether it is a fulltime member or someone that we have a rather different relationship with will depend really on what can be arranged over the next while.

**Q162 Dr Harris:** Peer review is a big issue and it is often neglected. This Committee has recommended to itself several times that we look into it, but we have never managed to do it. What about statistics, do you think you have that covered, because it has been asserted that you really need to have someone with a good statistical grasp.

**Sir Muir Russell:** We will see how we go on that. Part of that relates back to the Wegman Report that Lord Lawson referred to, which is a solid piece of statistical work done in the American context. If we

discover that there are things about the evidence that we get that need to be analysed for that point of view once again we will do it. One of the things I really want to say to the Committee is that we have been given really a free hand in putting together the membership and in going where we want to go in terms of the sorts of issues that we need to examine. We have produced our initial set of papers and we have given interested parties, whoever they may be, a wide opportunity to comment on whether the issues that we have identified, based on all the comment there has been on the emails and so on, are the right ones or whether they go a little wider. If we find that the submissions which we were looking to receive by about today—and there have been a lot of them I can tell you—are identifying that or other issues that really need to be addressed, I am very confident that we can get the additional resources and do it. There is nothing in the relationship that I have with the University of East Anglia that inhibits or prevents that at all.

**Q163 Dr Harris:** The composition of your team has been criticised by people who can be described as coming from the climate sceptic point of view. Is it your ambition to satisfy them or do you recognise you may never satisfy some critics from that quarter? What is your outlook on that?

**Sir Muir Russell:** I think there will be some critics who would never be satisfied. I draw quite a clear distinction between having people who are competent, scientifically literate and know enough about what is happening in the world to have a layman's or an expert's view but not on the issue which this is about, which for this review is about these data handling issues that you have been discussing today. It is not actually about the big science of global warming and making forecasts for the next hundred years. I am not taking my review in that direction at all. The distinction that was relevant to Dr Campbell was that, very unfortunately—and he had forgotten about it—he had said things on a television interview I think in China which contained the proposition that there was no case to answer in terms of the issues facing this review, and that is different from whatever the views might have been about whether the world is getting warmer or whether there is or is not any possibility of a human connection to that. That is a different question.

**Q164 Dr Harris:** Can I just ask, do you have any lay people on your committee?

**Sir Muir Russell:** I am a lay person in the sense that my degree was in Physics. I graduated in 1970 and I have been a lapsed physicist since, doing other things, as you know.

**Q165 Dr Harris:** But you can count?

**Sir Muir Russell:** I can count the way we counted in 1970. David Eyton, who is the Group Head of Technology in BP, would be a layman in a sense. He is an engineer; he is not a climate scientist. Jim Norton is a computer man—you will know him because of the POST connection. He is not a climate scientist.

**Q166 Mr Boswell:** A number of people have criticised your review—they always will, I am sure. Can you reassure us: does the review serve any real purpose? It is not a bit of window dressing to make the University appear to be doing something, is it?

**Sir Muir Russell:** I hope not. They have certainly given me a free hand to do it. They have said that if the terms of reference need to develop, if more resources are needed, we can have those and use them. They have not interfered at all. The one person I did not discuss the composition of the team with was the Vice Chancellor or any of his colleagues. It will not be window dressing. If you run your mind back over the last two hours and look at where the issues have taken us to and the need for absolutely objective demonstration of what it is that people have said they are doing, I think that is the gap that this review ought to be able to fill. I emphasise that what we need is the definitive statements and evidence that explain what was going on about the data and the way it was handled and then the way it was made available, so that we can lay to rest one way or the other the sorts of issues that you have all been exploring today. That is the objective.

**Q167 Mr Boswell:** With presumably some recommendations which will be forwarded from the inquiry?

**Sir Muir Russell:** I would expect that if there are things that we find that do not seem to be up to the standards that you would have expected now or at the time—and those are different—then we would make recommendations, certainly.

**Q168 Mr Boswell:** Dealing with what you might call the sinews of the committee, you referred to the terms of reference and you have the opportunity of expanding your terms of reference. You have not done so but you at least have a mind that is open to doing so if necessary?

**Sir Muir Russell:** Yes. As I was explaining, what we did was to produce a paper that seemed to us to scope the issues but to expose that through our launch and through our website to literally the whole world—there was a very active set of readers of websites out there—and say, “If you think there are other things we should be covering, let us know.” The media helped us with that because that was one of the points they picked up. So the minds of the whole team are open.

**Q169 Mr Boswell:** In terms of the cost base of this, presumably the exercise is being funded by UEA, is it not?

**Sir Muir Russell:** Yes.

**Q170 Mr Boswell:** If so, does that give you any concern that even however well you have deliberated, somebody may then turn round and say it has in some sense been nobbled?

**Sir Muir Russell:** People already have. It was a point that was raised with me at the launch at the beginning of last month, and the answer that I gave I think bears repeating. It was that if we do this on the basis of collecting the evidence on the issues that

seem to the general community to be the right ones, and we make that available and test it with expertise either that we have on the team or that we bring in, that will be the measure of the independence rather than any notion of who might fund it and whatever. It is a perfectly straightforward thing that if that is what we do, you can then judge whether that is getting an independent picture or not. That is the best I can do on independence.

**Q171 Mr Boswell:** You heard the exchanges with the former Information Commissioner earlier and you know that he has tendered evidence suggesting that the Commissioner rather than yourselves should be making rulings on the validity of FOI requests. What is your take on that?

**Sir Muir Russell:** Obviously, we have talked with the Commissioner’s staff who were looking at the issues arising for CRU. I am very clear that we do not wish to get in their way or to do anything that inhibits their ability to do any statutory work that they need to do. If you look at the letters that were running around at the end of January and which came out in the media over the weekend, they are saying there are still inquiries that need to be pursued. I would want to do nothing to get in the way of those. If, looking at how the University established its own FOI policies and the processes by which it made sure that CRU complied with them or did not—we must not prejudice that—we have things to do that help the Commissioner, then that is what we will do, but I am not going to put the review into the position of making the sort of quasi-judicial, prosecutorial, investigative judgments that Mr Thomas spoke about. That is ICO’s job.

**Q172 Mr Boswell:** That is very helpful. Final question: Lord Lawson wrote to you on 26 January highlighting the importance of openness and transparency. Slightly in relation to my question to you about independence or perceived independence—you maybe have touched on this—specifically, will you be able to tell us whether the review plans to take evidence in public and to publish its report in full?

**Sir Muir Russell:** It plans to put on its website the evidence that we receive, and we have received quite a bit of it already. This is on the question of focusing on the right issues and going in the right directions.

**Q173 Mr Boswell:** Hypothetically—and I say only hypothetically—something fishy was going on, if you received evidence in confidence about that, what would you do with it?

**Sir Muir Russell:** Go back to the person and ask why they are not prepared to make their allegations public. There are a lot of enthusiastic commentators out there, and most of what these people have said is on the Web anyway, on all sides of the debate, but the issue of whether the review espouses that is a little issue just to be careful of. We will be careful of it and talking to the Data Protection people about all of that, but the principle is to be open, to be transparent, to put the stuff up, certainly to publish

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the report and to publish the notes of the proceedings of the team as we meet. You will find some of them on the Web already.

**Q174 Mr Boswell:** Just for the record, as I put in the words “in full”, publish in full unless there were some supervening reason why it was essential—

**Sir Muir Russell:** If there were something that would get us in the courts, we might just hold our hand but I think we really do—

**Q175 Mr Boswell:** You would start on the basis.

**Sir Muir Russell:** Yes.

**Q176 Graham Stringer:** Can I be clear: are you going to hold the hearings in public or private? When people come and talk to your panel, in a way a bit like a Select Committee, is that going to be in private or public?

**Sir Muir Russell:** We decided that what we would do was to seek written evidence because it seemed to us that the material we were looking at was much more referable to statements of fact about what was in publications, what had been accessed, what you could find. We have heard a lot of that today. It is a matter of provable fact whether things were made available, who was consulted and when they came out, rather than the assertions that are made about them. All my predispositions and those of the fellow team members are to do it that way rather than to do it in a hearing of perhaps this kind or in a series of one-to-one interviews or whatever. Where we have interviews with people in CRU or elsewhere, those will be written up and they will be part of the record but at the moment I am not really sure that getting to the stage of putting people in a hearing context is going to be a particularly effective way of adding value to the objective evidence that we want to get our hands on.

**Q177 Graham Stringer:** It may or may not be but, as you say, there are a lot of enthusiastic people out there who will be watching you. Part of this is about getting trust in the science and understanding what the science is about. Do you not think by operating in private you will lose a lot of that trust and people will at the beginning say, “If they have to meet in private then we can’t trust what they say”?

**Sir Muir Russell:** “Private” is a relative term. If we publish all the information we get and the conclusions we reach and the things we say when we are discussing it, that is going to go quite a long way towards saying, “This was the evidence. This was the objective view.” I am not ruling out the thought that we might have evidence-taking sessions. I am just a little unsure at the moment that they will add the kind of value that is going to make the difference between a general discussion and briefing of the press and so on and what we think we need to try to answer the questions you have all been asking today.

**Q178 Graham Stringer:** We live in an increasingly distrustful and sceptical age. You may find added value in doing things completely openly. You mentioned previously Wegman and statistical

analysis. Have you learned anything from the NAS investigation into global science? In a sense, it was not looking at leaked emails but it was looking at similar issues and you are moving into the science. Have you learned anything from that? Some of the people at the end of that inquiry came out saying, “Well, we’ve got the statistical analysis but actually we’ve agreed with everybody.”

**Sir Muir Russell:** We hope to be able to use some of those sets of standards, the NAS ones and the Government Office of Science ones, to apply to what we get and say, “Was this a reasonable way to handle data? Was this a reasonable way to treat people with respect, rigour and responsibility?” To that extent the NAS thinking about integrity in science will be something that will inform the judgments that we think we want to make.

**Q179 Graham Stringer:** Can I ask you one last question? Repeating Evan’s question, the NAS have boiled down in a lot of ways to a row between McIntyre and Mann about the statistical analysis, and they required some of the best statisticians in the world to look at that. I would ask you whether you would look at that again because if you are assessing the scientific bases, you may need a statistician. Because this is a highly politicised subject, the second question is why have you not got a serious scientist who comes from the more sceptical side of assessing the evidence on your panel?

**Sir Muir Russell:** The answer on the statistical analysis is, without giving too much away, at a minute to midnight last night Professor Mann produced a submission to us on my computer screen. We will be looking at that and that will no doubt bring up the need to refer to the sort of science that you are talking about. If that takes us into the statistical area, fine. I do not think that it would be consistent with the approach that I have been discussing of trying to move away from the issue of whether people have a view about the big picture of climate science to start trying to balance scepticism and other opinions on this review group. Where would that end? What kind of debates would one then have when one is trying to talk about the objective things we are all talking about today?

**Graham Stringer:** I think it is accepted by both sides, is it not, that while the majority of scientists in the field are not sceptical, some scientists with reputations are sceptical? Because this is not like verifying some of the more fundamental issues in physics, I think you might find more credibility to your report if you have reputable scientists from both sides. It is a political issue really.

**Q180 Mr Boswell:** If I might add to that, particularly because from our own definition this is a process inquiry rather than a substance one in relation to the facts of climate change.

**Sir Muir Russell:** That cuts both ways, I think.

**Q181 Chairman:** If I can move on, why I think this whole saga has caused so much interest around the world is that it does challenge the basic assumptions of the majority of scientists that global warming is a



reality. You have ruled out as part of your inquiry a revisiting or a reappraisal of the scientific work of CRU, yet the Vice Chancellor of course is going to do that in a separate entity. Should that not all be part of your work so that it is seen as part of the process?

**Sir Muir Russell:** It would have been possible, obviously, to have constructed an inquiry that looked at both aspects of that, and that was not what I was asked to do. Whether I would have been the right person to be asked to do it I do not know but certainly it obviously became clear to the Vice Chancellor that there was this different issue about the confidence that one should have not in all the methodological and handling issues but in the higher level set of conclusions about what was actually happening.

**Q182 Chairman:** Your review is looking at to what extent the other independent analysis produces the same results. Is that not a back way of looking at whether in fact the CRU analysis stands up to scrutiny?

**Sir Muir Russell:** It could be but the question you were all asking about how you look at the data, bring an independent eye to it, see what conclusions you get, is certainly one of the issues that is in our minds in terms of being able to say, "There it was, there's what they did with it, there's the answer they got. What did other people do with their datasets? Did they get similar answers by using different frameworks, different hypotheses, etc?" That will be looked at as part of the issue.

**Q183 Chairman:** It is a very narrow divide between that and saying whether in fact the CRU data analysis stands up to scrutiny, is it not?

**Sir Muir Russell:** Yes, but if you begin to take it into the wider issue, which the Vice Chancellor is seeking to cover in the investigation that he said he is going to announce shortly, then you are into a quite different and quite legitimate set of interests about the whole question of what weight to attach to various policy conclusions about numbers, about increases over decades, confidence limits and how you project off hockey sticks or whatever shape the graphs are. It would be very interesting to do it but it would be a completely different thing. It would have greatly lengthened and it would probably have changed the composition of this team, and it seems to me, listening to the discussion that we have had today, that there are some very straightforward integrity issues to get at about what this Unit was doing and whether one can say they were doing it right or, if they were not, what they need to do to make it right.

**Q184 Chairman:** You mentioned the word "integrity" and I think that does go very much to the heart of what your committee is trying to do. One of the things that I think has disturbed us in looking at this particular issue is the way in which UEA and the CRU looked at the peer review process and how it used the peer review process. I understand that is part and parcel of what your team is looking at.

**Sir Muir Russell:** Yes.

**Q185 Chairman:** If in fact—and this was Graham Stringer's line of questioning earlier—you are somewhat selective about the peer review process and you do not allow key information to get out there to allow the data and the methodology to be actively reviewed, is that all stuff you are going to look at in there and how are you going to deal with those very serious allegations that you could not have peer review effectively because people were not allowed to enter the fray?

**Sir Muir Russell:** That is one of the issues that we did address in the initial paper. I would expect that some of the material that has just come in may well say "You need to ask more or different questions" but certainly we do, and that was why Dr Campbell was brought on to the team because, whatever else you say about *Nature*, it is about peer review, and it was a pity that because of the—well, I gave you the circumstances. We need to fix that but peer review is important.

**Q186 Ian Stewart:** What we heard from Professor Jones in answer to Graham Stringer's question that related to the Hughes request for data was that Professor Jones did not supply the data. He was not very clear about whether he had other requests for such data or whether it was just an individual request. Will your committee take a view about consistency? If Professor Jones' refusal to give certain data on the basis he explained to this Committee, because other countries would not agree and things like that, if he was consistent in refusing that data to more than one request, that would be an issue surely that your committee would have to take into consideration?

**Sir Muir Russell:** Yes, the CRU response to us will have to explain what they did. It will have to look at the whole field, and it is part of the reason why doing it in dialogue is not the way I want to start, because they will have to say, "This is what we were doing. These are the examples." You have heard the stories about who actually owns the data. It is what was done with it, the algorithms and all the other processes, whether they are there, whether they are replicable, whether people were able to check them, and so on up the scale. It is a tricky issue. You get into the issue that Dr Naysmith raised about if somebody is doing research on mice, what do they give out and when if they want to publish a paper and get a Nobel Prize? This is not straightforward.

**Q187 Dr Naysmith:** There is very little completely raw data put into the public domain. It is data that has been worked up on statistics that is published normally for peer review.

**Sir Muir Russell:** Your job as a scientist is to make sure that the people who do get the papers have confidence in you and in your processes and in the things you are doing, so there is a proper balance to find there. We will need to ensure that we get convincing information about what they were doing at these different tiers of the process.

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**Q188 Graham Stringer:** And checked and reproduced.

**Sir Muir Russell:** Yes.

**Q189 Chairman:** A final question: when do you expect to finish your review and to publish it?

**Sir Muir Russell:** I do not know. This could lead to quite a range of follow-up questions and investigation to do. What I do not want to do is to be constantly drawn away from the focus of what we are trying to achieve, so there will be a tendency on our part to say, "Right, we've got the issues, we've

got the information, we've got the questions." Whether it leads to further written process, interviews, visits or hearings is something that we will have to see. My ambition is certainly not to let this kind of run all over the place, to use a colloquialism. That is why we are really not saying anything more than "spring"—and there is a song about that.

**Chairman:** Do not start singing to us! It is more than we can bear. On that note, could we thank you very much indeed, Sir Muir Russell, and can we also wish you well with your inquiry and we hope you are able to publish as soon as possible.

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**Memorandum submitted by Professor John Beddington, Government Chief Scientific Adviser (CRU 49)**

*What are the implications of the disclosures for the integrity of scientific research?*

1. Whilst no system can be perfect, I believe the integrity of British science stands of the highest order, with a strong framework in place to ensure this. It would not be appropriate to comment on the specific circumstances at the University of East Anglia (UEA) before the Independent Review led by Sir Muir Russell has reported. However, the fact that UEA has asked for the Review to be carried out itself demonstrates the importance that the University places on demonstrating the integrity of research, and on addressing any issues that might be identified in an open manner.

2. In general, the high quality of British science is reflected in the fact that the UK has a 12% share of world citations and 14.4% of the top 1% of the most highly cited papers.<sup>6</sup> Within environmental science, the UK is second only to the US in its share of world citations (13.6%) and is ranked first in the G8 for impact (citations/paper). The high esteem in which UK-based researchers are held is pointed to by the fact that almost half of UK peer-reviewed publications have a non-UK co-author (47% in 2007; latest data available).

3. The UK has a number of codes of practice aimed at promoting integrity in scientific research. The Government Office for Science, working with key research contacts across Government, promotes the Universal Ethical Code for Scientists, developed by Sir David King and a range of external experts in 2005. It promotes seven key tenets of behaviour under the themes of Rigour, Respect and Responsibility, and aims to embed integrity and a respect for the scientific process.

4. The UK Research Integrity Office (UKRIO) has produced a "Code of Practice for Research"<sup>7</sup> that provides general principles and standards for good practice in research to support both researchers and research organisations, and Research Councils UK (RCUK) published the "RCUK Policy and Code of Conduct on the Governance of Good Research Conduct"<sup>8</sup> in August 2009. Many organisations also have their own organisational codes, some of which are based upon or informed by the aforementioned documents.

5. Notwithstanding the need for scientists to maintain a competitive position amongst their peers, protect intellectual property and in some cases protect confidentiality, scientists should, as a general principle, aim to ensure openness and transparency of their data, methods and results at the point of peer-reviewed publication. This allows independent expert scrutiny, challenge and repetition to confirm the validity of findings, all of which are fundamental to furthering scientific understanding. Equally, scientists should feel free to openly debate their work, as this process is also essential for the furthering of robust research.

6. In the field of environmental science, the Natural Environment Research Council (NERC) requires grant-holders to lodge with it the data resulting from research supported by the grant, together with documentation/metadata describing that data, after it is completed. The data would normally be offered to one of NERC's designated data centres.

*Are the terms of reference and scope of the Independent Review announced on 3 December 2009 by UEA adequate?*

7. The terms of reference for the review give sufficient scope for the issue to be investigated in full. It is a matter for Sir Muir Russell to decide exactly how he will investigate.

8. In addition, I understand that UEA are planning an independent, external assessment of the science in key publications by the Climatic Research Unit (CRU). Details of this assessment have yet to be confirmed and I am therefore not in a position to comment on it at present.

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<sup>6</sup> *International comparative performance of the UK research base*, Evidence UK, September 2009.

<sup>7</sup> <http://www.ukrio.org/resources/UKRIO%20Code%20of%20Practice%20for%20Research.pdf>

<sup>8</sup> <http://www.rcuk.ac.uk/cmsweb/downloads/rcuk/reviews/grc/goodresearchconductcode.pdf>

*How independent are the other two international data sets?*

9. Over the past century, the three global temperature analyses (from the Hadley Centre/CRU, NASA and NOAA) all show overall warming, moderated by year-to-year and decadal variations caused by natural variability in the climate system.

10. The global records use three distinct data sets—land observations, night time marine air temperature, and sea surface temperature. All three show a consistent warming trend. Marine temperatures show a smaller rise than land temperatures, as expected due to the greater thermal inertia of the oceans.

11. The three analyses make use of the same pool of raw temperature measurements. However, they draw from this pool and analyse the data in different ways. Specifically, they use different methods to correct for sources of error (such as changes in the location of stations, observational procedures, instruments and the character of station sites), and to account for the uneven distribution of measurements around the world. For example, the NASA team interpolates over data-poor regions such as the Arctic, the UK team does not fill in data gaps, and the NOAA team takes an approach between the two.

12. Since 1980, the teams of researchers in the U.S. (at NASA and NOAA) and in the UK (at the CRU and Met Office) have worked separately to develop these methods, each with the aim of generating robust monthly and annual global surface temperature estimates. The methods used by each team are presented in peer-reviewed papers.<sup>9</sup>

13. The use of different methods to construct the three records explains why, although all three analyses show a clear warming trend, the details of temperature change vary between them. The Hadley Centre/CRU temperature series is issued with error bars which factor in uncertainties due to incomplete coverage and measurement errors. The NASA and NOAA annual temperatures are within these error bars.

14. It is important to emphasise that the evidence that the world is warming and that human activities are driving this change does not rest on the robustness or otherwise of a single temperature record. Basic physics shows that greenhouse gases absorb and re-emit long wave radiation emitted by the Earth, which warms the surface and lower atmosphere. The science underpinning this knowledge was performed over a century ago. We also know that human activities are releasing billions of tonnes of greenhouse gases—including carbon dioxide, methane, nitrous oxide and halocarbons—each year, which is increasing their concentration in the atmosphere. Since pre-industrial times, the concentration of carbon dioxide<sup>10</sup> has increased by approximately 38%, the concentration of nitrous oxide<sup>11</sup> has increased by approximately 18%, and the concentration of methane has more than doubled. The increase in the atmospheric concentration of carbon dioxide has had the direct effect of increasing the acidity of the surface ocean by 30% since pre-industrial times (a decrease in the average pH of the surface ocean of 0.1 units).<sup>11</sup>

15. As greenhouse gas concentrations increase, it follows that temperatures will rise, and this is exactly what has been observed. The warming is evident in temperature records, but it can also be seen in other variables: the extent of summer minimum Arctic sea ice has decreased by 0.6 million km<sup>2</sup> each decade since the 1970s, spring now arrives on average about 10 days earlier in the UK than it did in the early 1970s, and global sea level has increased by about 10 cm in the last 50 years. In climate models developed to date the increase in greenhouse gases is the only forcing factor that can fully explain the magnitude and the spatial pattern of the warming.

*Professor John Beddington*  
Government Chief Scientific Adviser

*February 2010*

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**Memorandum submitted by Met Office (CRU 54)**

*What are the implications of the disclosures for the integrity of scientific research?*

1. The UK enjoys a reputation for strong and robust science on the international stage. In the field of climate research the Met Office is widely acknowledged as world leading.

2. Whilst it would be arrogant to assume that any system or process is perfect, the codes and processes in place to govern science research across the UK, laid down by the Government Office for Science, the UK Research Integrity Office and Research Councils UK, form a comprehensive framework within which science research is produced and debated. In addition, the Met Office also adheres fully to the Civil Service Code and operates to the highest standards of integrity and transparency.

<sup>9</sup> P Brohan, J J Kennedy, I Harris, S F B Tett and P D Jones, Uncertainty estimates in regional and global observed temperature changes: a new dataset from 1850. *J Geophys Res*, 111, D12106, doi:10.1029/2005JD006548; Smith, T M, and R W Reynolds (2005), A global merged land air and sea surface temperature reconstruction based on historical observations (1880–1997), *J Climate*, 18, 2021–2036; Hansen, J, R Ruedy, M Sato, M Imhoff, W Lawrence, D Easterling, T Peterson, and T Karl, 2001: A closer look at United States and global surface temperature change. *J Geophys Res* 106, 23947–23963.

<sup>10</sup> Calculated using data from (i) NOAA/ESRL (available at: [www.esrl.noaa.gov/gmd/ccgg/trends](http://www.esrl.noaa.gov/gmd/ccgg/trends)) for 2008 and (ii) reference in footnote 6 for pre-industrial.

<sup>11</sup> IPCC, 2007: *Climate Change 2007: The Physical Science Basis*. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Solomon, S, D Qin, M Manning, Z Chen, M Marquis, K B Averyt, M Tignor and H L Miller (eds). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 996 pp. [Concentration data are from 2005].

3. All published science is subjected to a rigorous process of peer review: a well-established method by which scientific evidence and claims, and importantly the methodology behind these, are scrutinised by qualified experts in the field. Peer review also promotes and maintains open debate across the science community—crucial to further developments in science.

4. Transparency and integrity are vital components in maintaining the Met Office's, and the UK's, position at the leading edge in climate science and we have wherever possible, but dependant on IPR ownership, released the underlying land temperature component used in the HadCRUT analysis. The Met Office's sea temperature component has been widely available for some time.

*How independent are the other two international data sets?*

5. There is strong evidence that the globe has warmed. Three independent global temperature data sets, HadCRUT, NCDC and NASA-GISS, all clearly demonstrate the rise in global temperatures over the last 150 years. Despite the large differences in the methods used to estimate global temperature trends, these blended analyses are consistent in their view of global temperature change.

6. There are numerous studies in the peer-reviewed literature that attest to the robustness of the surface temperature records, their independence and their non-reliance on specific individual station records. Support for the reality of surface trends also comes from reanalyses and changes in ocean heat content, glaciers, humidity and a host of other indicators including phenological data. Indicators from meteorological, oceanographic and physical measurements are strongly consistent with the surface temperature records discussed above.

7. The data come from numerous different technologies and have been investigated by numerous independent groups. Where multiple datasets exist for a given parameter none fundamentally disagrees with the expected signal for a warming world. For the surface records to be wrong would require all these other analyses to be similarly wrong.

8. Annex A provides a detailed explanation of the differences between the analyses with respect to data sourcing and methodology.

## **Annex A**

### **INDEPENDENCE OF THE ANALYSES**

#### **INDEPENDENCE OF METHODOLOGY**

9. There is substantial independence between the methods used to derive the principal estimates of global land-surface air temperature trends: CRUTEM3 (*Jones and Moberg, 2003; Brohan et al, 2006*); NOAA (*Smith and Reynolds, 2005*); NASA-GISS (*Hansen et al, 2001*). The differences are summarised below and relate to choices of:

- source data;
- quality control and homogenisation criteria;
- gridding;
- merging of land and ocean data;
- in-filling for data void regions; and
- calculation of the global mean diagnostic.

10. This independence of methodology means that the estimates provide an indication of the true degree of uncertainty in the global-mean surface temperature evolution.

## SUMMARY OF DIFFERENCES IN METHODOLOGY BETWEEN ANALYSES

<i>Aspect Addressed</i>	<i>HadCRUT</i>	<i>NOAA</i>	<i>NASA</i>
	<i>Land Surface Air Temperature</i>		
Number of stations	c 4,500	4,400	c 7,300
Sources of station data	GHCN, READER, various regional studies, paper archives, US COOP network. Stations must have enough data to form a climatology (15 years in 1961–90) or have a WMO normal. Real-time updates primarily from CLIMAT messages.	GHCN which is made up of over 30 sources of data, most of which are not regularly updated. Regular updates are primarily from USHCN data in the U.S. and CLIMAT messages transmitted by WMO Members.	Unadjusted surface air temperatures from the GHCN, adjusted (except for urban warming) USHCN version 1 data and SCAR (Scientific Committee on Antarctic Research). Sites must have at least 20 years data.
Quality control procedures	Manual inspection, including real-time quality control using GIS software; quality control described in literature for the various regional studies.	A long series of automatic quality control tests based on both statistics and physics (eg, outlier tests, identical values two months in row, etc)	Some unphysical looking outliers and segments of station temperature series were eliminated after manual inspection.
Homogeneity adjustments	Visual comparison. Includes recourse to near-neighbour series. c.20% of stations affected. Regional studies have the breakpoint identification and adjustment procedures described in the literature applied.	Pair wise comparisons with neighbours to identify non-climatic step changes as well as trends and adjusting the data to remove those artificial biases.	If there are multiple records at a given location, these are combined into one record adjusting according to the average difference during the period of overlap.
Urbanisation effects	Uncertainty model includes a one-tailed estimate (assumes a warming bias persists)	Addressed by the homogeneity adjustments methodology.	Urban and peri-urban (ie, other than rural) stations (defined by night-lighting in USA and by available documentation elsewhere) are adjusted so that their long-term trend matches that of the mean of neighbouring rural stations. Urban stations without nearby rural stations are dropped.

*Ocean data*

Sources of data	Ships, buoys from ICOADS (1850–1997) and GTS (1998 on)	Ships, buoys	HadISST1: 1870–1981 Reynolds 11/1981-present Unlike NCDC and HadCRUT employed SST products these are derived products that are spatially interpolated to be complete over the ocean sphere.
Quality control	Gridbox climatology based removal of outliers. Check that consecutive ship positions and ship speeds are consistent. Buddy check using near neighbours. Rejection list of known bad observations.	Gridbox climatology based removal of outliers.	HadISST1 and Reynolds are interpolated analyses so no GISS quality control is applied.
Homogeneity adjustments	Adjustments for transition from wooden to canvas buckets in early 20th Century. Corrections are ramped down from 1939-1941 as the number of non-bucket measurements in the data base increased.	Statistical adjustment for the transition between buckets and engine intakes based on a relationship between SSTs and night time air temperature and global metadata for the timing of the transition.	HadISST1 and Reynolds are interpolated analyses so no GISS specific homogeneity adjustment is applied.

*Spatial interpolation, merging and calculating of global average*

1	<p>Merging procedures</p> <p>Accounting for data void regions</p>	<p>Gridded land and ocean temperatures merged, weighted according to inverse error estimates on a gridbox-by-gridbox basis where both exist</p> <p>No infilling performed. The effects of incomplete sampling are accounted for in the uncertainty model.</p>	<p>Land and ocean grid boxes with data merged with a weighting based on fraction of the grid box having land versus ocean.</p> <p>Empirical Orthogonal Teleconnection Functions used to interpolate land and ocean data separately with limits on how far interpolation can be made. Areas of sea ice are set to missing.</p>	<p>Land air temperature overrides SST in grid-boxes where both are available.</p> <p>A grid of 8000 grid boxes of equal area is used. Time series are changed to series of anomalies. For each grid box, the stations within that grid box and also any station within 1200km of the center of that box are combined using reference station method.</p>
Calculation of global average	<p>Average of gridbox area-weighted Northern Hemisphere and Southern Hemisphere values. Avoids over-weighting better sampled Northern Hemisphere influence.</p>	<p>Area weighted analysis based on 5x5 degree grid boxes. Recent tests to evaluate NH + SH/2 revealed for the coverage we have using EOT functions the results are nearly identical with NH + SH/2.</p>	<p>A grid of 8000 grid boxes of equal area is used. Anomalies are averaged over the areas 23.6-90N, 23.6N-23.6S and 23.6-90S, then these three averages are averaged with 3:4:3 weighting to represent their area.</p>	
Notes	<p>The uncertainty model also takes into account incorrect/missing adjustments and temporal/measurement sampling errors.</p>	<p>The above was based on GHCN version 3 which is scheduled to be released in the spring of 2010.</p>	<p>Info from Hansen <i>et al</i> 1999, 2001; and from <a href="http://data.giss.nasa.gov/gistemp/">http://data.giss.nasa.gov/gistemp/</a> Code to calculate GISSTEMP is available from <a href="http://data.giss.nasa.gov/gistemp/sources/">http://data.giss.nasa.gov/gistemp/sources/</a></p>	

#### INDEPENDENCE OF BASIC LAND DATA AND GRIDDING

11. The CRUTEM3 analysis calculates anomalies for each station and therefore requires that there are data for a station (or nearby stations) during the period 1961–90. Because some stations opened after this period, or closed before it, some short station records could not be included in the CRU analysis.

12. There are stations that are unique to each analysis reflecting both differences in methodological approach and personal contacts with potential data providers. Even where the stations are the same the raw data source, quality control procedures and adjustment protocols applied differ fundamentally between the analyses.

13. However, the set of stations used to update the datasets on a regular basis is more limited and is generally the same for each dataset. These are “CLIMAT” messages exchanged between National Meteorological Services and represent data for only those stations within their authority. Periodic efforts are made to substantially improve coverage by incorporating data from other sources and these data are incorporated in non real-time when they become available.

14. The IPCC report also included a fourth global land temperature data set: Lugina *et al.* The Japanese Meteorological Agency produced a global average (land with ocean) temperature data set by blending in a simple way GHCN data with their COBE SST analysis (Ishii *et al.*, 2005). Figure 1 in Annex B shows the global surface air temperature anomalies (relative to 1961–90) from these four global analyses.

#### OTHER TESTS OF DATA INDEPENDENCE

15. The three main datasets use as much data as possible in order to obtain a more accurate estimate of global temperature. However, various studies have shown that estimated global and hemispheric trends change very little when based on limited subsets of stations (eg Parker *et al.* (2009) and Figure 2 in Annex B).

16. Jones *et al.* (1997) showed that reliable global trends might be obtained from fewer than 200 well maintained stations. Peterson *et al.* (1999)’s subset of rural stations showed very similar trends to those derived from the full GHCN dataset. Using a worldwide network of about 270 stations, Parker (2006) obtained very similar trends to those produced by Jones and Moberg (2003) from their full network. The reason for this robustness is the geographical coherence of temperature trends (Figures 3.9 and 3.10 of Trenberth *et al.* 2007).

#### INDEPENDENCE OF METHODS USED TO MINIMISE NON-CLIMATIC EFFECTS

17. Temperature records from weather stations can be affected by many non-climatic factors, for example, changes in instrumentation, the time of day at which measurements are taken and changes in the location of the station. These changes must be accounted for before the data are interpreted as real changes in land surface air temperature. This metadata is significantly incomplete in many regions and simple photographic evidence is insufficient, especially if it is used solely as a single snap-shot. Therefore although valuable, efforts such as surfacestations.org can say very little about the long-term homogeneity of the network. Advanced statistical techniques applied to sequences of differences between neighbouring stations, however, can detect and quantify major discontinuities and relative trends in the absence of metadata. Adjustments can then be applied to the faulty series. These techniques can substantially improve the data records. If full metadata were available, even better results could be obtained.

18. The homogeneity adjustments made by CRU (Jones *et al.*, 1986a, b; Jones and Moberg, 2003) were made to only a limited number of stations (~20%) and the sum total of these adjustments has a near zero effect on large-scale temperature averages (Figure 4 of Brohan *et al.*, 2006). In addition, the likely size of errors arising from uncorrected or inadequately corrected stations was estimated and included in the uncertainty calculation (Brohan *et al.* 2006).

19. GISS and NCDC analyses are both based on the Global Historical Climatology Network (GHCN). Some of the methods used to homogenise data in the GISS and NCDC analyses are the same, but some are different.

20. Adjustments for stations in the United States HCN (USHCN) owing to changes in the time of day of measurements, station moves, and instrumentation changes are the same in both analyses. The homogeneity adjustments that are applied to the NCDC analysis involve a pair-wise neighbour based approach and impart many more adjustments than CRU.

21. In addition, GISS make an urbanisation adjustment. They use night light data (satellite photos of the earth at night showing areas that are bright and urban, or dark and rural) to classify stations as urban or rural over the US. For the rest of the world they use metadata on population contained in the GHCN data base. They then compare urban sites with nearby rural sites.

22. Different homogenisation and infilling techniques can give different results for individual stations and this is reflected in larger estimated uncertainties in poorly sampled regions (eg Brohan *et al.* 2006). However, despite the different techniques used, agreement between the data sets is good at global and hemispheric scales even at less well observed times (see figure 1 in Annex B).



## TEMPERATURES OVER THE OCEANS

23. To get a truly global estimate requires sampling the 71% of the globe covered by oceans. The sea surface datasets used in each analysis similarly exhibit a degree of difference. There are at least six different analyses of sea-surface temperature (HadISST, HadSST2, Kaplan, COBE, ICOADS, ERSST3) that extend for more than 100 years and several additional data sets (eg OI v2, plus satellite estimates) that cover the satellite period. As with the land data there is substantial overlap in the raw data, with most long analyses drawing in situ observations from the ICOADS data base. There are differences in quality control, homogenisation and data reconstruction methods used to fill gaps in the data. In the recent period, trends from in situ data are corroborated by independent estimates from satellite data. The differences between these approaches are being studied by the Global Climate Observing System's (GCOS) SST and Sea Ice (SI) Working Group whose goal is to understand differences between different SST analyses and reconstructions with the aim of producing better, long-term SST climate data records

Independence in dealing with the data gaps

24. There are large areas of the Earth's surface that are not routinely observed. The analyses differ in the extent to which such gaps in the data are filled and in the way that they are filled.

25. HadCRUT takes the simplest approach. The available data are averaged onto a regular grid. No attempt is made to fill grid boxes where there are no data, instead the empty boxes are treated as an additional source of uncertainty when area averages, such as the global average, are calculated.

26. The GISS land station data are interpolated over data free regions (including over the oceans) to a maximum distance of 1200km. This has a particularly large effect over the Arctic and Antarctic where there are few data points and temperature variability is large.

27. NCDC also uses interpolation to fill in some of the gaps in the data. Areas of sea ice are set to missing. Their method typically fills fewer gaps than the GISS analysis and the global average provided by their analysis generally lies somewhere between GISS and HadCRUT3.

28. The estimated trends over land are robust to the choice of analysis technique (*Vose et al, 2005*). This paper showed that the NCDC (*Smith and Reynolds (2005)*) and the HadCRU (*Jones and Moberg (2003)*) land air temperature analyses yield comparable trends but the GISS (*Hansen et al (2001)*) land-only analysis yields reduced trends in recent decades because their interpolation scheme gives greater emphasis to coastal and island stations. However see below for a different impact on the blended (land + ocean) dataset in the most recent years.

29. There is growing evidence that the HadCRUT3 blended product under-estimates warming since 1998 because it has on average sampled regions that exhibit less warming than the true global mean over this most recent decade (*Simmons et al, 2010*). See also the "Evidence from reanalyses and other variables" section below. Over the past decade, temperatures at high northern latitudes have increased.

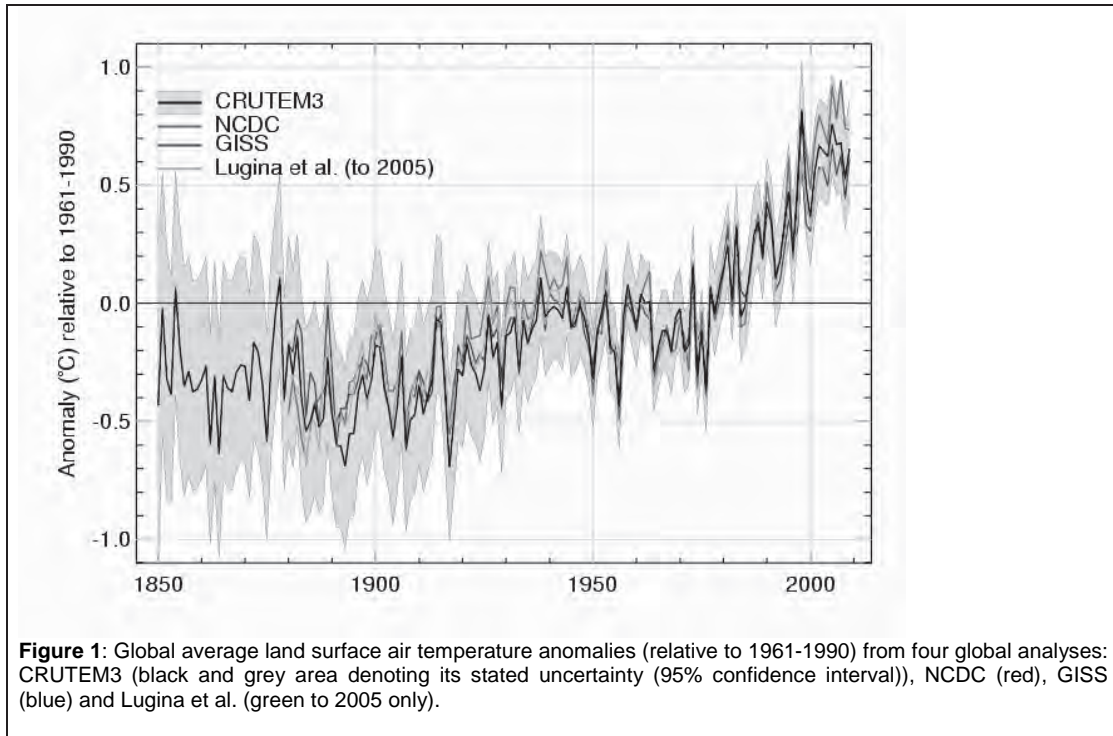
30. These regions, which are sparsely sampled, are under-represented in the CRUTEM3 analysis. Consequently temperatures in this analysis have run a little cooler in very recent years than either the GISS or NCDC analyses which interpolate over data voids in Siberia and Canada.

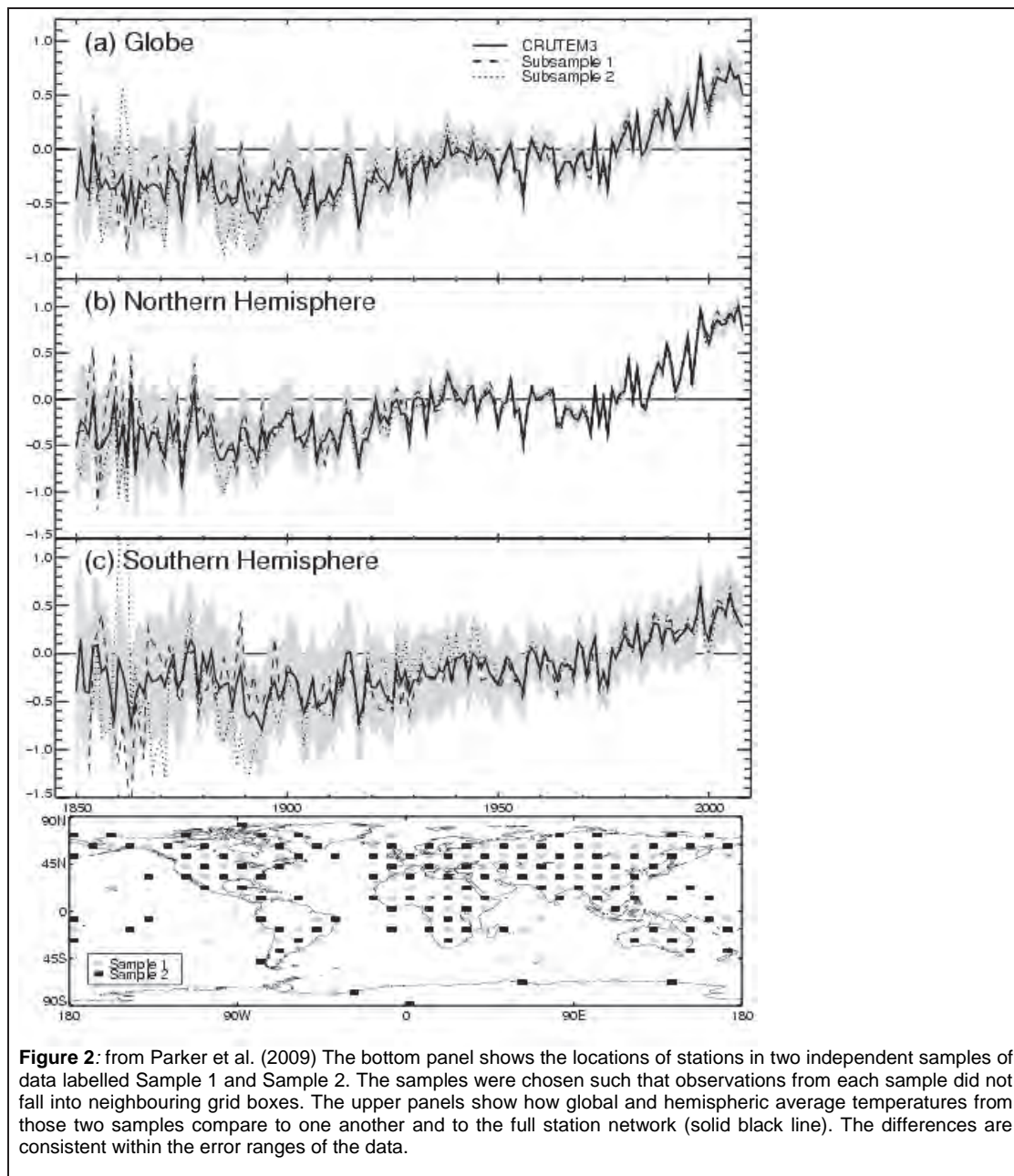
## COMPARE AND CONTRAST TO THE TROPOSPHERE

31. As at the surface, several independent groups have produced datasets of tropospheric temperatures from both satellites and radiosondes (weather balloons). Again, similarly to the surface record these groups use substantially over-lapping raw data but different methods and assumptions to account for known and suspected non-climatic influences. Figure 4 in Annex B shows that the ensuing uncertainty in global tropospheric trends is substantially larger than that at the surface. The surface data may not be perfect but our ability to diagnose the global-mean temperature is substantially better at the surface than in the troposphere. This is because the observing system at the surface has been much more stable, taken as a whole than from either satellites or weather balloons that have seen multiple, complex, changes over the period of observations.

## EVIDENCE FROM REANALYSES AND OTHER VARIABLES

32. Reanalyses consist of modern-day weather forecast model configurations run on historical observations. They take into account all observational evidence. Surface observations are used only indirectly to inform the soil moisture conditions in the most recent reanalyses and not at all in earlier products. The most recent reanalyses products offer substantial support for the reality of the surface record. Figure 5 in Annex B shows how when CRUTEM and the reanalysis are similarly sampled their timeseries overlap almost exactly. It also illustrates the impacts of the sampling on the most recent decade which in all likelihood leads to HadCRUT under-estimating the true global mean.





**Figure 2:** from Parker et al. (2009) The bottom panel shows the locations of stations in two independent samples of data labelled Sample 1 and Sample 2. The samples were chosen such that observations from each sample did not fall into neighbouring grid boxes. The upper panels show how global and hemispheric average temperatures from those two samples compare to one another and to the full station network (solid black line). The differences are consistent within the error ranges of the data.

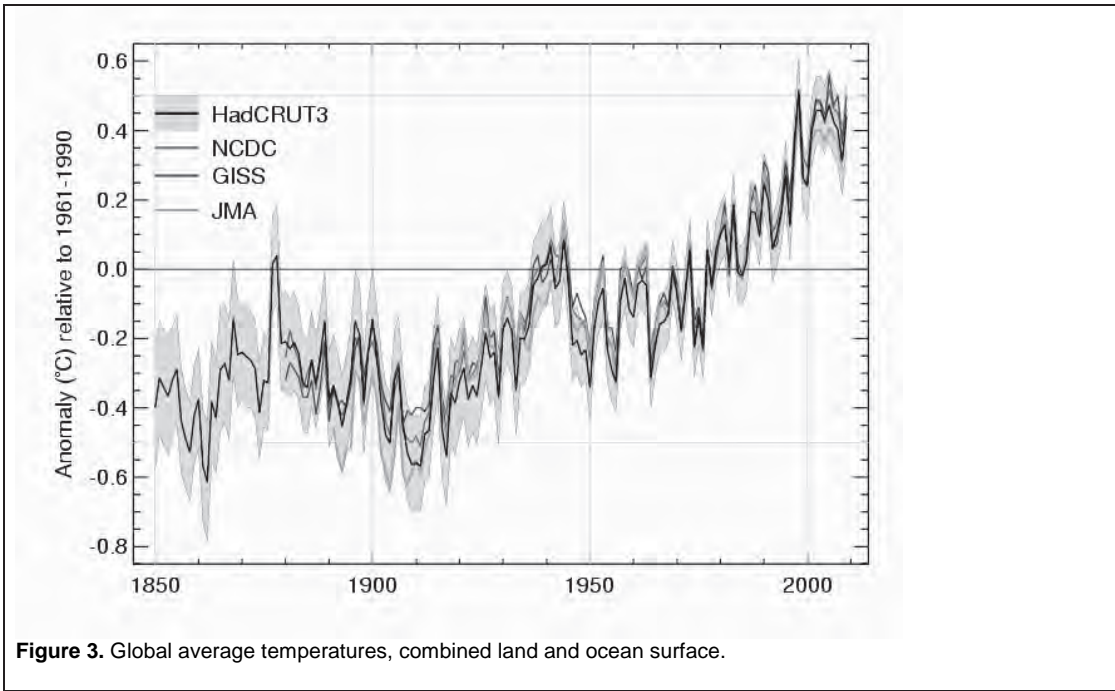
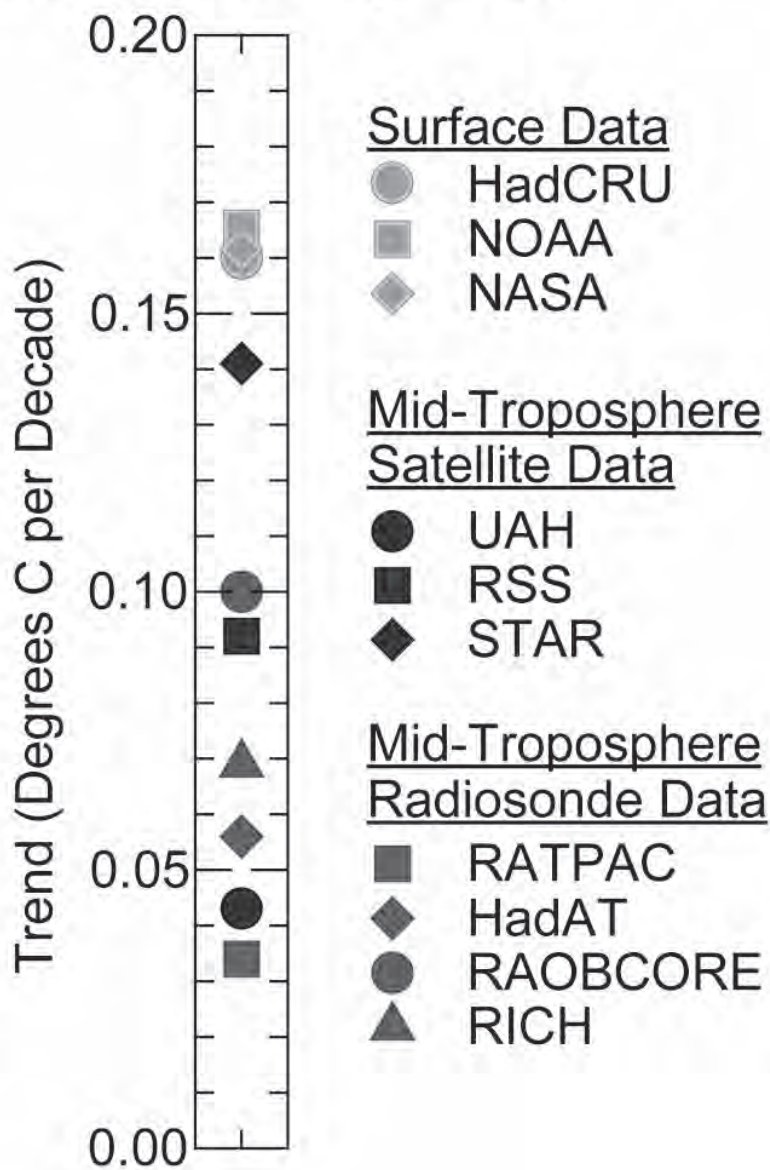


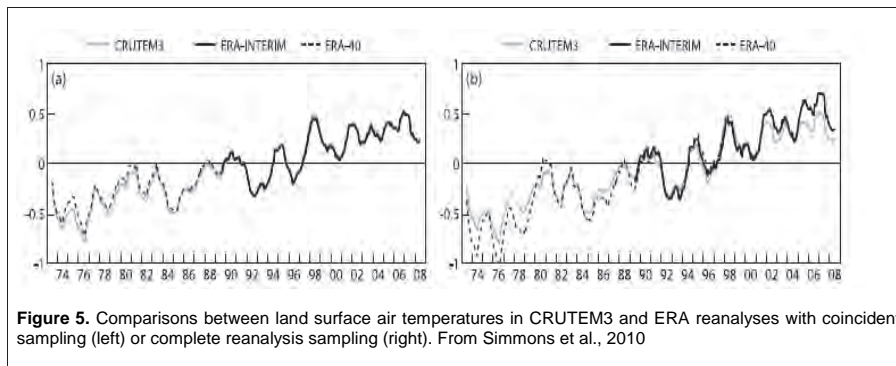
Figure 4

Temperature trends from 1979 to 2008 for the surface (green, collected from weather stations and ships/buoys) and the “Mid-troposphere” satellite retrieval (blue, measuring from the surface into the lower stratosphere with peak weight at about 8Km, 5 miles) and equivalent estimates from weather balloons (red).

# Temperature Trends

From 1979 through 2008





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*Witnesses:* **Professor John Beddington**, GCSA, **Professor Julia Slingo**, Met Office, and **Professor Bob Watson**, CSA, Defra, gave evidence.

**Chairman:** We welcome our final panel today and apologise profusely for running some 23 minutes late, but you will appreciate that this has been quite a hectic agenda this afternoon. We are very grateful to Professor John Beddington, the Government Chief Scientific Adviser, Professor Julia Slingo from the Met Office, and Professor Bob Watson, the Chief Scientific Adviser at Defra, for joining us for this final session. I am going to ask Tim Boswell if he will begin the questioning.

**Q190 Mr Boswell:** Good afternoon. If I can start with Professor Beddington, on 24 November last the Royal Society, the Met Office and NERC together released a joint statement which said, and I quote, “There was unequivocal evidence for a warming climate and a high degree of certainty that human activities are largely responsible for global warming since the middle of the 20th century.” Is that, Professor Beddington, an assessment with which you agree?

**Professor Beddington:** Yes, I would be very comfortable with that. As you will have known, I have commented on some uncertainties but I think that is a very balanced statement as it stands.

**Q191 Mr Boswell:** Following on that specific point, how much uncertainty is there? Is it an uncertainty which causes you any disquiet in your conclusion, and in particular, given the exchanges we have heard earlier today, is the data in both a sufficiently digestible form and sufficiently transparent and publicly available to be able to contest and, one hopes, in your terms, agree with the conclusion that you have reached? How much uncertainty is there in terms of the probability and are the data sufficiently reliable that we can hang on them?

**Professor Beddington:** I think I would make two points here. The first is that I think the general issue that global warming is happening, that it is induced by human activity, is absolutely correct. This is unchallengeable. I think in terms of datasets, of the way in which data is analysed, there will always be some degree of uncertainty but when you get a series of fundamentally different analyses on the basic data and they come up with similar conclusions, you get a degree of—

**Q192 Mr Boswell:** It is a sort of triangulation.

**Professor Beddington:** You get a great deal of certainty coming out of it. I think the points that are made in the statement by Professor Slingo, Martin Rees and Professor Thorpe are very much along the lines of saying, “Look, this is the sort of thing that is happening, this is where the certainties lie and this is where we need to recognise that there is other information: melting of the Arctic and so on.” So I feel reasonably comfortable. I think it is very important that the statements about this are actually framed in a probabilistic way so that they clearly recognise the uncertainty. Nobody is saying 100%; they are saying 90% or 95%, and that is appropriate. I think the sort of analysis that the Met Office did under a contract to Defra showed that very clearly

in the analysis of UK climate, in which they have gone a long way to actually document the uncertainty, both in terms of their models and the way that they actually make predictions about regional variation. I think it is in there that it is important to distinguish between a simple probability statement that it is 90% certain that this is caused by human activity and predictions about different regional events, which are much more hard to do and have more uncertainty associated with them. My position is that that uncertainty should be properly characterised and I believe Professor Slingo and her colleagues do just that.

**Q193 Chairman:** Could we ask them if they agree? Do not repeat it but if there is general agreement, could we have it for the record? Professor Slingo?

**Professor Slingo:** The statement that global warming is unequivocal, which is what the Fourth Assessment Report said, is definitely the case. It has not been challenged by any evidence that has emerged since then. In fact, as Professor Beddington said, we know that not just from the land surface temperature record, which is what we are here to discuss today, but from indeed many other variables that it is unequivocal and that, as the IPCC report said, over 90% very likely due to human activities. Where the uncertainty comes in is in the future projections of climate change, and there are uncertainties related to the emission scenarios, to some of our understanding of the physics and indeed the biogeochemical cycles of the Earth and how they will respond as the planet warms. We articulate those very, very clearly. We need to be careful not to confuse the level of certainty around the observational base, which is what we are here to discuss today, and the uncertainty that exists as we go forward, particularly towards the end of this century.

**Professor Watson:** Yes, I would agree completely with everything John Beddington and Julia said and indeed, the IPCC does point out the key uncertainties in projections for the future. That is why the projections of that mean surface temperature change over the next 100 years is a range of 1.4 to 6.4 degrees Celsius. That takes into account the two key uncertainties: uncertainties in the emissions of the greenhouse gases and uncertainty in the climate sensitivity factor. So indeed, one always does talk about uncertainty.

**Q194 Dr Naysmith:** Professor Beddington, in your written evidence to the Committee you were at great pains to emphasise the high quality of British science and the respect and the regard with which it is held in the world. However, we have heard submissions from other scientists in their memoranda to the Committee. They say the recent controversy surrounding CRU has damaged the image of science as a whole and possibly particularly the disclosure from UEA having a damaging effect on UK science in particular. Do you give that any credence?

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1 March 2010 Professor John Beddington, Professor Julia Slingo and Professor Bob Watson

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**Professor Beddington:** No, I do not think UK science has been damaged. I prefer not to comment on the UEA situation until we have seen Sir Muir Russell's report, which is going into a great deal of detail. I do not think it is appropriate for me to comment prior to that and prejudge any discussion. However, what I would be very happy to say is that once Muir Russell has reported, I would be more than happy to come back to this Committee, or indeed its successor Committee, and discuss this in detail once he has reported.

**Q195 Dr Naysmith:** Do the emails not give you any cause for concern?

**Professor Beddington:** Yes. I have said so already, that I think some of the wording is unfortunate. There is cause for concern, but I think the key about this is that Muir Russell is going to be doing a detailed and comprehensive study, he is going to look at emails in context—and we all know how things can be taken out of context—and I would like to be able to have a judgment made by Muir Russell and his team, who I have complete trust in. But I am more than happy to come back to this Committee or as I say a successor, in the event that he has reported when I have had a chance to digest that report.

**Q196 Dr Naysmith:** So do you think the Institute of Physics has been a bit premature when talking about the emails? “Worrying implications arise for the integrity of scientific research in this field,” they say, “and for the credibility of the scientific method as practised in this context.” Do you think they are prejudging things?

**Professor Beddington:** I think they are, in the sense that there is a danger of prejudging things taken out of context. What I certainly intend to do is to have detailed discussions on climate change with colleagues, to have them as open as possible, and, as you are probably well aware, I have also said that it is essential that we should be as transparent as we possibly can and make data and analyses and methodology available.

**Chairman:** Can we ask the other members of the panel?

**Q197 Dr Naysmith:** I was going to say, have you anything to add? That usually elicits a response, even though it is not intended to. Let us ask Professor Slingo: do you think there is a crisis in British science arising from the kind of thing we have just been talking about?

**Professor Slingo:** I totally agree with John Beddington that we need to wait for the Muir Russell Inquiry to report. I have absolute confidence in the science that we produce at the Met Office. We are world leading. There is no question that that will continue, and it is right that we should not make judgments until we have all the evidence, and that means waiting for the Inquiry. Again, like John, if appropriate for me to come and comment

specifically around climate science and the credibility of UK climate science once the Inquiry has reported, I would be very happy to do so.

**Q198 Dr Naysmith:** So you are not prepared to comment on whether the events at CRU undermine the IPCC or not?

**Professor Slingo:** I am prepared to comment on that because I think the one thing we have to remember is that the IPCC, through its process, puts a peer review in place on an area of science that is much greater than any other science ever receives. For example, the physical climate science—that is Working Group I of IPCC—which is essentially what we are talking about here, was reviewed; it had 619 named scientists and it was reviewed by a further 622. If we take Chapter 6, which is the debate we are having around the land surface temperature record, that had 1,000 comments. This is the most robust peer review process that you will see in any area of science. We need to remember that when we think about what has happened and therefore the robustness of the conclusions that the IPCC have drawn and which I still adhere to, as I said in the joint statement that was released.

**Professor Watson:** Two points. First, the media has certainly portrayed the UEA issue as a crisis, so I think to the public it has been portrayed as a crisis and that is why the independent Muir Russell analysis is absolutely critical to the situation. Secondly, in my opinion there is absolutely no adverse effect on any of the conclusions of the IPCC. The independent analyses done by the NASA group and by the NOAA group in the USA are absolutely solid. Independently, as has already been pointed out by Julia, there is an ensemble of climate science that goes beyond just land surface temperature: ocean temperature, precipitation, extent of glacier, sea ice temperature, what has happened to Greenland. All of this portrays a picture of the Earth's climate changing significantly in the last 100 years.

**Q199 Dr Naysmith:** Finally, Professor Beddington, on the inquiry set up by UEA, do you think it is sufficiently rigorous and do you think it will be sufficient to restore the integrity of scientific research of this type?

**Professor Beddington:** I would certainly comment that the terms of reference give the opportunity to investigate this in depth and I understand, as I indicated in my written comments to you, that I understood they were also going to supplement the Muir Russell Inquiry into some of the key scientific papers. I do not know whether the Vice Chancellor has shared that with you.

**Q200 Chairman:** He has said that this afternoon.

**Professor Beddington:** He has explained that to you. Well, taken together, I think that is an extremely comprehensive inquiry. Could I also just concur while I have the chance with the comments of Julia Slingo? You did not pose me the question about whether what happened at UEA would undermine the IPCC. Professor Slingo answered that and I completely concur with her answer.



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**Q201 Dr Naysmith:** I was just going to ask Professor Slingo: one of the things that we have encountered in previous sessions is that the Met Office has to be asked for its data to be released. Is there any reason why there would be any reason to withhold any data that the Met Office is making available to CRU at East Anglia?

**Professor Slingo:** We are not withholding any data that we have permission to release. You have to remember that the observations that went into the CRU dataset are fundamentally owned by the national met services, who, through the World Meteorological Organisation, have requirements upon them to make some of that publicly available. Those were the data we released in December.

**Q202 Dr Naysmith:** So it is really just a formality?

**Professor Slingo:** It is a formality. We wrote to 170 met services. We have so far had 58 have given permission and you will see that we now have two-thirds, soon to be three-quarters, of all the data that were used in the CRU record publicly available on our website.

**Q203 Mr Boswell:** Are some of those offices still very closely connected to their national ministries of defence? Is that one of the constraints, that they are diffident about publishing or releasing the data?

**Professor Slingo:** There are one or two that we have had replies from where they have . . . Let us be clear; it is very few. Some governments see these data as having commercial value, and I should say that one of the reasons that we have now moved this whole construction of these datasets into the auspices of the World Meteorological Organisation is to deal with some of these issues about freedom of data. I think this is a really important international issue that we must get sorted out, because these datasets are absolutely crucial to the debate around climate change.

**Q204 Graham Stringer:** Professor Beddington, some of the written submissions we have suggest that it is accepted that if a tobacco company pays for research into smoking, it tends to find that there is no damage done—that is the historical evidence. Is there a similar factor at work when tax dollars from the United States or tax pounds from this country go into research that the funding source affects the outcome? Having asked the question, do you think research should be done into that area?

**Professor Beddington:** I do not think I would pose it there. If you are seeing research which is being funded, the control of the funder is to pose the question, in a sense, “We would like this particular piece of research done” but I do not believe there is any control whatsoever on the answer, certainly not in UK science.

**Q205 Graham Stringer:** So you do not think it is worth research being done?

**Professor Beddington:** I have not seen that there is a glaring problem in this area. I think that there are some areas of research which are problematic and

where there is considerable controversy and I think the key thing there is to know that there is a controversy and that one does it, but in other areas of concern, even when there is controversy, there is an overwhelming burden of evidence and support from the scientific community. So I think it important to say it is not a soccer match—that is how I would probably put it—when you are in scientific controversy; it is not necessarily equal sides. In some areas, albeit that there are disputes about areas, the overwhelming base of support of the scientific community is in one direction or the other. On this? No, it is about even.

**Q206 Graham Stringer:** Professor Slingo, were you here when Muir Russell gave his evidence?

**Professor Slingo:** No, I was not. We were outside.

**Q207 Graham Stringer:** He basically referred to the Wegman analysis of the argument about the hockey stick between McIntyre and Mann and the reason I refer to that is because you cite all the peer review that went on into the different assessments done by the IPCC but Wegman, after 10 years of argument, seemed to side with McIntyre, who was in a tiny minority on this issue, certainly in terms of the statistical mistakes that had been made in the original Mann paper. Does that not give you some cause to worry about the peer review process at that level?

**Professor Slingo:** Not at all, no. The controversy around the original methods of Mann *et al* has been fully addressed in the peer reviewed literature and I think those issues are now largely resolved. As we have already said, the unequivocal rise in temperature during the latter half of the 20th century is now supported by many other variables in the climate system, let alone surface temperature, as we have already discussed. This goes back—and Bob Watson may like to comment on this because this was around when you were in charge of IPCC, I believe, Bob.

**Professor Watson:** Yes. I think the key point is, a lot was made of the hockey stick but a much more important issue is what has happened in the last half-century of trying to say what has actually occurred within the climate system, what has changed, and whether we can attribute cause and effect. Therefore, the theoretical modelling that has been done has tried to ask whether we can explain the observed changes, especially since 1950, on natural phenomena alone—changes in solar radiation, changes in volcanic activity—and the answer is no. So one then asks the question whether we can explain the observed changes on a combination of natural phenomena and how we humans have affected the atmosphere, both with greenhouse gases and with aerosols and changes in land surface albedo, etc and the answer is yes, and that is when the IPCC came up with the conclusion that it is very likely, greater than 90% probability, that we humans are the major cause for the observed changes in the Earth's climate since the Second World War. So the

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hockey stick was an interesting idea of trying to look over the very long temperature of, say, the last thousand years or so, the tree ring data, and what has happened in the more modern instrumental record. It is all part of science to have a paper like the Mann paper and it can be challenged. I think it is now a fully resolved issue. On the issue you mentioned of funding, I think the tobacco issue is one of the worst examples where an industry did fund research and the results were clearly distorted, but in other areas—stratospheric ozone depletion, for example—the private sector has done superb research and it was very honest and had great integrity and was very consistent with research funded both in the United States and within the UK. So I would argue, having been a funder of research both in the US and in the UK, that one tries to get all issues on the table to get to the truth.

**Q208 Graham Stringer:** Can I go back to Professor Beddington? I know you do not want to comment on the University of East Anglia case but I will try and ask it in a more general way, although it is obviously stimulated by East Anglia. Do you think it is acceptable that climate scientists or, for that matter, any other scientists refuse to publish the computer programmes that have provided the basis for their published papers?

**Professor Beddington:** I think there is a question of timing. Computer programmes which actually incorporate a methodology should be published and should be available. I think that the methodology itself, which essentially is a mathematical algorithm which specifies what the computer programme is supposed to do, should be published and that should be generally available because computer programmes have errors in them, and therefore one of the reasons why one would want to publish them is to actually get that out. That is a general principle. I would certainly support that.

**Q209 Graham Stringer:** That leads me nicely on to my last question. Is there a problem with scientific software? We have had emails from Professor Darrel Ince and from Professor Les Hatton saying that there are severe problems with scientific software. Do you think that is a general problem in UK or world science?

**Professor Beddington:** I would probably ask Julia to comment in the context of climate change science, and I think that there are some issues here. For example, some of the coding in physics runs to a million lines and that can be extremely difficult to actually guarantee that this is correct but in fact, again, it is the weight of evidence, the fact that a number of people are working on the same thing, and you would expect when you get a set of people, a large number of people, working on it that problems will start to emerge. Some of these things are extremely complicated but in the context of the climate change discussions, Julia could probably comment better than I.

**Professor Slingo:** Yes. Around the UEA issue, of course, we did put the code out at Christmas time, before Christmas, along with the data because I felt

very strongly that we needed to have the code out there so that it could be checked. If you think about the sorts of codes that we use in climate modelling, we are literally talking of hundreds of thousands of lines of code—I know because I have written some of them—and of course, there will be errors in them. At least for the UK the codes that underpin our climate change projections are the same codes that we use to make our daily weather forecasts, so we test those codes twice a day for robustness.

**Q210 Graham Stringer:** You do not always get it right though, do you?

**Professor Slingo:** No, but that is not an error in the code; that is to do with the nature of the chaotic system that we are trying to forecast. Let us not confuse those. We test the code twice a day every day. We also share our code with the academic sector, so the model that we use for our climate prediction work and our weather forecasts, the unified model, is given out to academic institutions around the UK, and increasingly we licence it to several international met services: Australia, South Africa, South Korea and India. So these codes are being tested day in, day out, by a wide variety of users and I consider that to be an extremely important job that we do because that is how we find errors in our codes, and actually it is how we advance the science that goes into our codes as well. So of course, a code that is hundreds of thousands of lines long undoubtedly has a coding error in it somewhere, and we hope that through this process we will discover it. Most of the major testing is very robust.

**Q211 Chairman:** Can I just follow up what Ian Stewart asked Professor Beddington? We heard from the ex-Information Commissioner, Richard Thomas, earlier, who indicated—and we will have to check the record on this—that all data—and indeed Dr Naysmith enquired about methodology as well—if in fact it was funded through the public purse should be immediately available and should not require a Freedom of Information request to get it. Is that not something which you, as the Government's Chief Scientific Adviser, should instruct?

**Professor Beddington:** Yes. I obviously was not here to hear that comment. I would be interested to comment in detail when I have seen it. I think there are some issues to do with timing. For example, the research councils, NERC in particular, demand that any analysis that it is funding goes into its data centre<sup>12</sup> but in terms of public bid, quite often scientists will want to have the first cut at the data so that they can do their analysis, because that is the way they will get their papers published, but subsequently that should be available. I think that is

<sup>12</sup> Note by witness: NERC requires that grant recipients offer to deposit with it a copy of datasets resulting from the research supported, after it is completed. NERC then selects those it considers to be of long-term value, which are managed for long-term re-use and re-purposing. The data would normally be offered to one of NERC's designated data centres.

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probably a reasonable way to go forward. I think the timing is therefore going to be an issue. In terms of the comments by the previous Commissioner on FOI, this is not an area I am well versed in, but I am very happy to have a look at what he actually said.

**Q212 Chairman:** Can you see where we are going with this?

**Professor Beddington:** Yes, I do.

**Q213 Chairman:** That is quite an important issue because if all publicly funded research, the raw data, has to be made available when it is, if you like, constructed, and indeed the methodology, it actually saves people around the world a lot of time and effort, does it not?

**Professor Beddington:** I think we must judge it in the context of individual scientists who are collecting data. There are some very large datasets which have a significant value, scientists have spent their lives collecting it, they then publish that and someone else does the analysis before them. This is somewhat demotivating, but once they have had the a chance to actually work—and there has to be some sort of sensible limit to look at data that you have actually collected—and publish on it, then it needs to be out into the open. So I think there is a timing issue which does need exploration for different sorts of subjects.

**Chairman:** We would just ask you, as the Government Chief Scientific Adviser, if in fact you would reflect on those comments and perhaps feed those into the Muir Inquiry or indeed to make some statement yourself.

**Q214 Dr Naysmith:** I think the most interesting series of experiments in this area is Gregor Mendel and his peas, because of course he was right, but he did refine his data that he published and people can still go back and do the original experiment, can they not?

**Professor Beddington:** Sure. I think the difficulty arises where you cannot replicate experiments. If you have experiments that are replicable, then it is very straightforward to actually do that but taking the climate case, there has only been one history of our climate, so replication is much more problematic.

**Chairman:** And there is only one Ian Stewart!

**Q215 Ian Stewart:** Good evening. The Chairman really teased out of you the answer to the first part of the question I would have asked. However, I am conscious, Professor Beddington, that you said that you would not wish to comment on the CRU situation because of the investigation that is going on. In relation to Freedom of Information, we heard earlier that CRU went from two to four requests a year to 61, a very significant change in requests, although Richard Thomas did say that the FOI Commission did not actually anticipate higher requests than that in general for the CRU. Do you have any sympathy for scientists who find that they are bogged down by FOI requests and cannot get on with their research?

**Professor Beddington:** I think that is a real issue for institutions that they need to be thinking about. Where you get an FOI request and it is a reasonably articulated request and appropriate, you pretty much should answer that. The volume of work is an issue for institutions but I certainly have sympathy for the individual scientists who are actually being in a sense expected to do all this extra work to provide their information. I think it is an institutional process. If a particular institution is overwhelmed—putting “overwhelmed” in inverted commas—or has a very large number of Freedom of Information requests to it, then it needs to be thinking how it addresses that as an issue but it should not, I believe, be a burden on the individual scientist.

**Q216 Ian Stewart:** Do you both agree with that?

**Professor Slingo:** Yes.

**Professor Watson:** Yes.

**Q217 Chairman:** Could I move on to Professor Slingo: on 24 February the Met Office issued a statement calling for a programme to deliver a new global temperature dataset, and you used the words “to augment current datasets, to refine current datasets and to follow on from the pioneering work of the University of East Anglia.” Have you lost confidence in the existing datasets?

**Professor Slingo:** Not at all, no.

**Q218 Chairman:** So why are you calling for that to be done?

**Professor Slingo:** What we are actually proposing is a new assessment which looks at much higher temporal resolution data, so in particular, if you think the CRU dataset looks just at monthly means, which is very helpful if you are interested in the global warming trend, the average changes in our climate, but what is very clear now is that we need to know much more than that; we need to know about extremes, we need to know about heat waves, daily extremes of temperature, the sorts of things we had in 2003, and whether those are changing as well. Many of the impacts of climate change will be felt through changes in extremes, probably more so than even just the average trend of global warming. What we have proposed as an international initiative under the World Meteorological Organisation is to create a new dataset that looks at daily or even sub-daily temperature, and following on from temperature then to do rainfall and other key climate variables that impact on society, ecosystems, biodiversity, and so forth. This was a really important initiative, one that actually we had been thinking about for some considerable time. We had an opportunity to present it to the Commission for Climatology, which is the appropriate body in the WMO. They meet every four years. It so happened that they were meeting this year in Turkey and we decided in discussion both with CRU and many international scientists that we should push ahead with this because we feel it is badly needed.

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**Q219 Chairman:** In your submission to the Committee you say that there are numerous studies that have tested the robustness of surface temperature records but we have received, and our stuff is now published, many submissions with contrary views. Why is there this confusion? Is that just normal scientists taking different views? The data is all there.

**Professor Slingo:** Yes, as we have shown since we have released the data. The robustness of the temperature record, independent of how many stations you have, is not what our initiative is about at all.

**Q220 Chairman:** No. The accusation is that some of the Earth-based datasets are being taken in places—which was why Dr Stringer’s comments earlier were so pertinent, that if they are taken in places where there are, if you like, other things happening, for instance, next to urban facilities that generate heat, they are massively distorted. Is that not the reason that people do not believe the integrity of where the sensors are has been fully published?

**Professor Slingo:** That is a very important point, and one of the major parts of the work, indeed, that was done at UEA over two or three decades is that whole issue of where the station is. Has it moved? Has its environment changed? We have looked extensively at issues around urbanisation, particularly related to the Chinese stations, and actually a lot of research has been done, it has been published, and we have shown that the estimated contamination of the global temperature record by urbanisation is approximately 3% of the measured warming signal for the 20th century, in other words, 0.02 degrees C. That is all looked at in great detail and that is why creating a global temperature record is a very complex issue because you must take account of all those sorts of complexities around the observations and how you construct the mean temperature record.

**Q221 Chairman:** There appears to be a difference—how significant it is you will tell us—between the surface temperature data and the satellite observation data, which seems to tell us different things. How do you explain that?

**Professor Slingo:** In fact, the satellite temperature data do not tell us different things. At the very beginning there were issues to do with . . . Let us remember, first of all, a satellite does not observe temperature; it observes the radiation that the planet emits, and you need a model to—

**Q222 Chairman:** We extrapolate the temperatures from that.

**Professor Slingo:** Yes, so we have a model that interprets the radiation that is emitted in terms of the temperature for a block of the atmosphere. The initial issues around that related to drift in the satellite orbits and also that you have to know the temperature of the body of the instrument to make sure that what you observe as the radiation being

emitted by the planet is not being contaminated by that. This comes back to John’s comments about when you release data. If you release it too early, before these sorts of checks are done by the scientists, you end up with people then doing more work on data that are not robust. What was shown at a later stage was, once those corrections were applied, there is a very robust signal in the satellite data of tropospheric warming. I would also say that the level of uncertainty in the satellite data is an order of magnitude larger than for the surface-based observations because they are not direct measurements of temperature.

**Professor Watson:** In addition, as Julia has already said, one attempts to take out the heat island effect but there is also the ocean temperature, the marine air temperature, the sea surface temperature, and the sub-sea surface temperature. There is balloon data as well. So even if you were to say a small percentage of the over 5,000 temperature land-based records have a small urban heat island effect which they take into account, you still have this other huge wealth of information that supports the picture that the Earth is warming. What has also been said by Julia about this new programme is incredibly important because it is not just monthly means we care about; it is whether there are more heat waves, extreme weather events. Theory would suggest that, as the planet warms, you would see a shift both in the mean temperature and a spread in the variance but that combination should give us far more extreme weather events, the type of event we saw in the summer of 2003. So analysing the data record to see not only what has happened to mean monthly temperatures is important but also whether there has been a change in extremes is another very valuable piece of information.

**Professor Beddington:** Professor Slingo did not make the point explicitly but I think I should, that this initiative by the Met Office was not in reaction to anything to do with the University of East Anglia and the emails. This has been planned for some time.

**Q223 Chairman:** That was the point of my question.

**Professor Beddington:** Yes, exactly, so I am quite happy to confirm it was not in reaction to that. It is doing something different and very important for taking the science of climate change forward. It was not in reaction to any concerns about the UEA record.

**Q224 Chairman:** Can I finally ask you, Professor Beddington: when we began this afternoon, Lord Lawson and his colleague made the point that in the United States the NASA data and the NOAA data are made publicly available for any nation and their scientists to actually work on, and that the problem with University of East Anglia occurred because we tried to suppress some of this data. Could you not, as the Government Chief Scientific Adviser, make it absolutely clear that all this data has to be made available at a time which is clearly stated so there is no confusion again about suppressing datasets,

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using datasets, and not allowing peer reviewers to have access to methodology? Is this not something for you to do?

**Professor Beddington:** I think there are some issues here but the one thing that Professor Slingo has explained is that there is proprietary data in CRU which they did not have permission to let go because they had been given it under conditions of some degree of confidentiality, and the same applies to the Met Office data.

**Q225 Chairman:** Does that apply to NOAA then?

**Professor Slingo:** Yes, it does.

**Q226 Chairman:** So they have exactly the same problems.

**Professor Beddington:** Yes. What I do not know, and I have not seen what Lord Lawson has said, but I would want to look to see whether in fact the constraints on the proportion of data that were published by NOAA are identical.

**Professor Slingo:** They are.

**Professor Beddington:** So I do not think there is an issue here. We can look at the detail and perhaps Professor Slingo or I could write to you about that detail when we have seen what claims Lord Lawson has made.

**Q227 Chairman:** Professor Watson, you have worked in both NOAA and NASA so you ought to know the answer to that.

**Professor Watson:** No, to be honest, I do not. All NASA's satellite data and NOAA satellite data is indeed made available very quickly. What I do not know is why NASA or NOAA would be allowed to release the same nationally owned datasets because quite clearly here there are limitations on what we are allowed to release. We need to find an answer to whether or not NASA and NOAA have actually released all the individual data.

**Q228 Chairman:** It would be useful if we could find that answer fairly quickly.

**Professor Slingo:** We can ask that question.

**Q229 Ian Stewart:** When we asked Lord Lawson and Dr Peiser the questions about this, they both said in their evidence to us that the data had not been released and the software had not been released. That changed a bit later but it would be useful for us to know whether all the data was in the public domain, and if it was limited data, whether it was limited for CRU and the two American organisations. This is what we need to clear up for ourselves.

**Professor Beddington:** We are happy to do that and write to you about it.

**Chairman:** On that note, at four minutes past six, we are four minutes over our schedule, having interviewed five panels of witnesses this afternoon. Professor Beddington, Professor Slingo and Professor Watson, we thank you very much for bringing our proceedings to a very good conclusion.

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#### Joint supplementary memorandum submitted by Professor John Beddington and Professor Julia Slingo (CRU 49a)

We are providing this note in response to a request from the Committee to clarify the availability of data used to construct the global temperature records. The Committee's request stemmed from an assertion made by Lord Lawson and Dr. Benny Peiser in their oral evidence that, in contrast to NOAA and NASA which made their datasets freely available, CRU delayed the release of temperature data they held. The key facts on this issue are set out below.

1. The data used to construct the NOAA NCDC and NASA GISS global temperature records are from datasets that have been freely available for several years.
2. The CRU dataset, which forms the land surface component of the HadCRUT global temperature record, was compiled with the aim of comprehensiveness. The majority of the data in it are derived from the same freely-available raw data sets used by NOAA and NASA. However, it also includes data derived from station data that were obtained directly from countries, institutions and scientists on the understanding that they would not be passed on. To release the data in the form held by CRU, it has therefore been necessary to write to rights holders requesting permission to publish them. Clearly, anyone wishing to obtain the underpinning data could have requested them directly from the relevant countries, institutions and scientists.

We also undertook to reflect further and comment on the principles for making publicly-funded research data and methods available. There are five key points that we would make:

1. As a general principle, publicly-funded research data and methods should be made fully and openly available to allow others to reproduce, build on, scrutinise and challenge them. However, the appropriate time to share this information varies.<sup>13</sup>
2. The point of peer-reviewed publication is often the most appropriate time to share data and methods because peer review provides a quality check and because researchers have a legitimate interest in benefiting from the time and effort they put in to producing them.

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<sup>13</sup> Many meteorological observing networks have data policies that explicitly address this issue.

3. In line with the principles laid out by the OECD,<sup>14</sup> public organisations that own data should recognise that publicly-funded research data are a public good and should be made openly available to the maximum extent possible, in a timely manner. Where data are collected on a routine basis to defined standards, it may be appropriate to release them as soon as they are collected.
4. It should be recognised that, in some cases, access to data may need to be restricted to protect confidentiality, proprietary results or national security. There is also a need to safeguard intellectual property, although this should not unduly delay or prevent sharing of information.<sup>15</sup>
5. Scientists should be free to obtain and use data under confidentiality agreements where such agreements are necessary, but they should be as clear and transparent as possible about their sources, so that anyone wishing to repeat or scrutinise their analysis could seek permission to obtain and use the same data.<sup>16</sup>

#### BACKGROUND INFORMATION

1. The three major analyses of global temperature (NOAA NCDC, NASA GISS and HadCRUT3) are compiled using datasets of land and ocean surface temperatures.

2. The ocean data used in the three analyses are derived from the International Comprehensive Ocean Atmosphere Data Set (ICOADS). These raw data have been freely available on the ICOADS website for some time.

3. For the land-surface components of their analyses, NOAA NCDC and NASA GISS use data from two publicly-available datasets: the global historical climatology network (GHCN) and the US historical climatology network (USHCN). In addition, NASA GISS also makes use of a publicly available data set for Antarctica from the Scientific Committee on Antarctic Research (SCAR).

4. The GHCN and USHCN data sets were assembled by the NOAA National Climate Data Center (NCDC), which has been designated the world data centre for climate by the World Meteorological Organization (WMO). These data sets are derived either from data that have been designated by the WMO as being for climate purposes, or from data that the rights holders have allowed to be used and, as such, are freely available.

5. The dataset of land surface temperatures that is used to construct the HadCRUT temperature record is owned by CRU. Since 2002, routine updates to this data set have been undertaken by the Met Office, and the Met Office also holds the code that creates the final gridded products for the HadCRUT global temperature analysis.

6. The CRU dataset was compiled with the aim of comprehensiveness. Most of this effort was undertaken in the late 1980s, although there have been substantial subsequent updates. A large proportion of the station records within it are derived from the raw data in the GHCN and USHCN data bases, which are publicly available as described above.<sup>17</sup> Other observations are from the “Reference Antarctic Data for Environmental Research” (READER) data base, which is also publicly available.

7. In addition, the CRU dataset uses raw or processed data obtained directly from countries and institutions (including national meteorological services), sometimes with conditions on their use and redistribution. It also includes a large number of long station records from individual studies that are ultimately owned by the individuals and organisations that produced them. The sources of all the data and the methods used to process (“homogenise”) them are fully documented in the papers that describe the CRU dataset, going back over more than two decades.

8. For completeness, the Met Office has written to all rights holders requesting and/or confirming permission to publish the data in the form held by CRU (“homogenised data”). In a small number of cases this permission has been refused. Data for which permission to publish has been granted are now available in the homogenised form held by CRU (and used to create the HadCRUT temperature record) on the Met Office website, adding to the data available from the sources outlined above.

9. Regular monthly updates to all three land-surface temperature data sets come from “CLIMAT” messages relayed from observing stations via national meteorological services. These are publicly available. In addition, NOAA NCDC use regular updates made to the USHCN data set. The CRU dataset also benefits from updates in more delayed mode accrued by CRU through various contacts.

<sup>14</sup> [www.oecd.org/dataoecd/9/61/38500813.pdf](http://www.oecd.org/dataoecd/9/61/38500813.pdf)

<sup>15</sup> Note that station-level climate data have significant financial value to rights holders, who in many cases are trading funds or entirely private entities.

<sup>16</sup> Sources of all data in the CRU dataset (as well as the methods used to process them) are documented in the publications and technical notes that describe the dataset.

<sup>17</sup> Note that because CRU and NCDC were compiling their databases at the same time, the raw data used to construct the station records may differ slightly for some stations in the two databases.

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## DATA SOURCES

### *Derived products*

The derived products used by most researchers (such as gridded data sets and the global temperature index) for each of the three major analyses of global temperature are available here:

- HadCRUT3—<http://hadobs.metoffice.com/hadcrut3/>
- NASA GISS—<http://data.giss.nasa.gov/gistemp/>
- NOAA NCDC—<http://www.ncdc.noaa.gov/oa/climate/research/anomalies/index.html>

### *Basic Land Data*

The data in the global historical climatology network (GHCN) and US historical climatology network (USHCN) have been publicly available since 1991, most latterly here:

- GHCN: <ftp://ftp.ncdc.noaa.gov/pub/data/ghcn/v2> or <http://www.ncdc.noaa.gov/oa/climate/ghcn-monthly/index.php>
- USHCN: <ftp://ftp.ncdc.noaa.gov/pub/data/ushcn/> or <http://www.ncdc.noaa.gov/oa/climate/research/ushcn/>

The SCAR (Scientific Committee on Antarctic Research) web page is <http://www.scar.org/researchgroups/> and links to the 'REference Antarctic Data for Environmental Research' (READER) data set (which superseded SCAR), which is available here:

- <http://www.antarctica.ac.uk/met/READER/>

The data from the CRU dataset which the Met Office has permission to publish are available here:

- <http://www.metoffice.gov.uk/climatechange/science/monitoring/subsets.html>

An archive of CLIMAT data used in the monthly updates of HadCRUT since 2002, when the Met Office assumed update responsibilities, can be found here:

- [http://hadobs.metoffice.com/crutem3/data/station\\_updates/](http://hadobs.metoffice.com/crutem3/data/station_updates/)

### *Basic Ocean data*

The International Comprehensive Ocean Atmosphere Data Set (ICOADS) used by all three analyses is available here:

- <http://icoads.noaa.gov/>

### *Methods*

All methods are described in the appropriate peer reviewed papers, and references therein. Some of the principal publications are:

- HadCRUT3—Brohan *et al.* (2006), Jones and Moberg (2003).
- GISS—Hansen *et al.* (2001).
- NCDC—Smith *et al.* (2008).

Further details are available from the web sites describing the data sets (copied from above).

- HadCRUT3—<http://hadobs.metoffice.com/hadcrut3/>
- GISS—<http://data.giss.nasa.gov/gistemp/>
- NCDC—<http://www.ncdc.noaa.gov/oa/climate/research/anomalies/index.html>

### *Code*

NASA GISS published the code (in 2007 or earlier) they use to create their analysis:

- <http://data.giss.nasa.gov/gistemp/sources/>

Code for creating gridded analyses and the global average temperature from the publicly available subset of the CRU data is available here:

- <http://www.metoffice.gov.uk/climatechange/science/monitoring/subsets.html>

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Hansen, J, R Ruedy, M Sato, M Imhoff, W Lawrence, D Easterling, T Peterson, and T Karl (2001), A closer look at United States and global surface temperature change, *J Geophys Res*, *106* (D20), 23947–23964, doi: 10.1029/2001JD000354.

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*Professor John Beddington*  
Chief Government Scientific Adviser

*Professor Julia Sligo*  
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*March 2010*

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# Written evidence

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## Memorandum submitted by Richard S Courtney (CRU 01)

In a press release at [http://www.parliament.uk/parliamentary\\_committees/science\\_technology/s\\_t\\_cru\\_inquiry.cfm](http://www.parliament.uk/parliamentary_committees/science_technology/s_t_cru_inquiry.cfm) your Select Committee “announces an inquiry into the unauthorised publication of data, emails and documents relating to the work of the Climatic Research Unit (CRU) at the University of East Anglia (UEA).”

And that press release also says:

“The Committee has agreed to examine and invite written submissions on three questions:

- What are the implications of the disclosures for the integrity of scientific research?
- Are the terms of reference and scope of the Independent Review announced on 3 December 2009 by UEA adequate (see below)?
- How independent are the other two international data sets?”

I am writing this as a response to that invitation because – in the context of your questions – the most important email among those hacked (?) from CRU may turn out to be one that I wrote in 2003. I had forgotten it but Willis Essenbach found it among the hacked (?) emails and circulated it. My submission to you explains its meaning and significance.

The email demonstrates that six years ago the self-titled ‘Team’ knew the estimates of average global temperature (mean global temperature, MGT) were worthless and they acted to prevent publication of proof of this.

The pertinent email can be seen at

<http://www.eastangliaemails.com/emails.php?eid=384&filename=1069630979.txt> and I copy it as Appendix A for your convenience.

And, also for your convenience, I copy a draft of the paper discussed in the email as Appendix B. I do not have a completed version of it now (only a late draft that does not include the references) but I could probably get a final version from one of its 18 co-signatories. Additionally, I shall post a hard copy of this document to you.

My tabulated paragraphs of submitted evidence are as follows.

### SUBMISSION

1. This submission concerns the importance of an email (see Appendix A) from me that was among the files hacked (?) from CRU. It demonstrates that in 2003 the self-titled “Team” knew the estimates of average global temperature (mean global temperature, MGT) were worthless, and they acted to prevent publication of proof of this.

2. Climate change “attribution studies” use computer models to assess possible causes of global climate change. Known effects that cause climate change are input to a computer model of the global climate system, and the resulting output of the model is compared to observations of the real world. Anthropogenic (ie man-made) global warming (AGW) is assumed to be indicated by any rise in MGT that occurred in reality but is not accounted by the known effects in the model. Clearly, any error in determinations of changes to MGT provides incorrect attribution of AGW.

3. The various determinations of the changes to MGT differ and, therefore, there is no known accurate amount of MGT change. But the erroneous MGT change was being input to the models (garbage in, GI) so the amount of AGW attributed by the studies was wrong (garbage out, GO) because “garbage in” gives “garbage out” (GIGO). The attribution studies that provide indications of AGW are GIGO.

4. I and others tried to publish a discussion paper (see Appendix B) that attempted to explain the problems with analyses of MGT. We compared the data and trends of the Jones *et al.*, GISS and GHCN data sets. These teams each provide 95% confidence limits for their results. However, the results of the teams differ by more than double those limits in several years, and the data sets provided by the teams have different trends. Since all three data sets are compiled from the same available source data (ie the measurements mostly made at weather stations using thermometers), and purport to be the same metric (ie MGT anomaly), this is surprising. Clearly, the methods of compilation of MGT time series can generate spurious trends (where ‘spurious’ means different from reality), and such spurious trends must exist in all but at most one of the data sets.

5. So, we considered MGT according to two interpretations of what it could be:

- (i) MGT is a physical parameter that—at least in principle—can be measured;

or

- (ii) MGT is a “statistic”; ie an indicator derived from physical measurements.

These two understandings derive from alternative considerations of the nature of MGT.

6. If the MGT is assumed to be the mean temperature of the volume of air near the Earth's surface over a period of time, then MGT is a physical parameter indicated by the thermometers (mostly) at weather stations that is calculated using the method of mixtures (assuming unity volume, specific heat, density etc). We determined that if MGT is considered as a physical parameter that is measured, then the data sets of MGT are functions of their construction. Attributing AGW—or anything else—to a change that is a function of the construction of MGT is inadmissible.

Alternatively:

If the thermometers (mostly) at weather stations are each considered to indicate the air temperature at each measurement site and time, then MGT is a statistic that is computed as being an average of the total number of thermometer indications. But if MGT is considered to be a statistic then it can be computed in several ways to provide a variety of results, each of different use to climatologists. (In such a way, the MGT is similar in nature to a Retail Price Index, which is a statistic that can be computed in different ways to provide a variety of results, each of which has proved useful to economists.) If MGT is considered to be a statistic of this type, then MGT is a form of average. In which case, the word “mean” in “mean global temperature” is a misnomer, because although there are many types of average, a set of measurements can only have one mean. Importantly, if MGT is considered to be an indicative statistic then the differences between the values and trends of the data sets from different teams indicate that the teams are monitoring different climate effects. But if the teams are each monitoring different climate effects then each should provide a unique title for their data set that is indicative of what is being monitored. Also, each team should state explicitly what its data set of MGT purports to be monitoring.

7. Thus, we determined that—whichever way MGT is considered—MGT is not an appropriate metric for use in attribution studies.

8. However, the compilers of the MGT data sets frequently alter their published data of past MGT (sometimes they have altered the data in each of several successive months). This is despite the fact that there is no obvious and/or published reason for changing a datum of MGT for years that were decades ago: the temperature measurements were obtained in those years so the change can only be an effect of altering the method(s) of calculating MGT from the measurements. But the MGT data sets often change. The MGT data always changed between submission of the paper and completion of the peer review process. Thus, the frequent changes to MGT data sets prevented publication of the paper.

9. Whatever you call this method of preventing publication of a paper, you cannot call it science. But this method prevented publication of information that proved the estimates of MGT and AGW are wrong and the amount by which they are wrong cannot be known.

(a) I can prove that we submitted the paper for publication.

(b) I can prove that Nature rejected it for a silly reason:

“We publish original data and do not publish comparisons of data sets”

(c) I can prove that whenever we submitted the paper to a journal one or more of the Jones *et al.*, GISS and GHCN data sets changed so either the paper was rejected because it assessed incorrect data or we had to withdraw the paper to correct the data it assessed.

But I cannot prove who or what caused this.

10. It should also be noted that there is no possible calibration for the estimates of MGT.

The data sets keep changing for unknown (and unpublished) reasons although there is no obvious reason to change a datum for MGT that is for decades in the past. It seems that—in the absence of any possibility of calibration—the compilers of the data sets adjust their data in attempts to agree with each other. Furthermore, they seem to adjust their recent data (ie since 1979) to agree with the truly global measurements of MGT obtained using measurements obtained using microwave sounding units (MSU) mounted on orbital satellites since 1979. This adjustment to agree with the MSU data may contribute to the fact that the Jones *et al.*, GISS and GHCN data sets each show no statistically significant rise in MGT since 1995 (ie for the last 15 years). However, the Jones *et al.*, GISS and GHCN data sets keep lowering their MGT values for temperatures decades ago.

11. Methods to correct these problems could have been considered 6 years ago if publication of my paper had not been blocked.

12. Additionally, I point out that the AGW attribution studies are wrong in principle for two reasons.

Firstly, they are “argument from ignorance”.

Such an argument is not new. For example, in the Middle Ages experts said, “We don't know what causes crops to fail: it must be witches: we must eliminate them.” Now, experts say, “We don't know what causes global climate change: it must be emissions from human activity: we must eliminate them.” Of course, they phrase it differently saying they can't match historical climate change with known climate mechanisms unless an anthropogenic effect is included. But evidence for this “anthropogenic effect” is no more than the evidence for witches.

Secondly, they use an attribution study to ‘prove’ what can only be disproved by attribution. In an attribution study the system is assumed to be behaving in response to suggested mechanism(s) that is modelled, and the behaviour of the model is compared to the empirical data. If the model cannot emulate the empirical data then there is reason to suppose that the suggested mechanism is not the cause (or at least not the sole cause) of the changes recorded in the empirical data.

It is important to note that attribution studies can only be used to reject hypothesis that a mechanism is a cause for an observed effect. Ability to attribute a suggested cause to an effect is not evidence that the suggested cause is the real cause in part or in whole. (To understand this, consider the game of Cludo. At the start of the game it is possible to attribute the “murder” to all the suspects. As each piece of evidence is obtained then one of the suspects can be rejected because he/she can no longer be attributed with the murder).

But the CRU/IPCC attribution studies claim that the ability to attribute AGW as a cause of climate change is evidence that AGW caused the change (because they only consider one suspect for the cause although there could be many suspects both known and unknown).

Then, in addition to those two pieces of pure pseudo-science—as my paper demonstrated—the attribution studies use estimates of climate changes that are known to be wrong!

13. None of this gives confidence that the MGT data sets provide reliable quantification of change to global temperature.

#### APPENDIX A

##### An EMAIL FROM RICHARD S COURTNEY DATED 23 NOV 2003 THAT WAS AMONG THOSE HACKED OR LEAKED FROM CRU

The copy of the email hacked or leaked from CRU can be seen at

<http://www.eastangliaemails.com/emails.php?eid=384&filename=1069630979.txt>

and it is copied from there below. In the copy below the words of others that are quoted by Courtney are reproduced in a different font for ease of identification.

From:

To:

Subject: Re: Workshop: Reconciling Vertical Temperature Trends

Date: Sun, 23 Nov 2003 18:42:59 EST

Dear All:

The excuses seem to be becoming desperate. Unjustified assertion that I fail to understand “Myles” comments and/or work on trying the detect/attribute climate change” does not stop the attribution study being an error. The problem is that I do understand what is being done, and I am willing to say why it is GIGO.

Tim Allen said;

In a message dated 19/11/03 08:47:16 GMT Standard Time, m.allen1@physics.ox.ac.uk writes:

*“I would just like to add that those of us working on climate change detection and attribution are careful to mask model simulations in the same way that the observations have been sampled, so these well-known dependencies of nominal trends on the trend-estimation technique have no bearing on formal detection and attribution results as quoted, for example, in the IPCC TAR.”*

I rejected this saying:

At 09:31 21/11/2003,

“It cannot be known that the “masking” does not generate additional spurious trends. Anyway, why assume the errors in the data sets are geographical and not “?”. The masking is a “fix” applied to the model simulations to adjust them to fit the surface data known to contain spurious trends. This is simple GIGO.”

Now, Tim Osborn says of my comment;

In a message dated 21/11/03 10:04:56 GMT Standard Time,

“Richard’s statement makes it clear, to me at least, that he misunderstands Myles’ comments and/or work on trying the detect/attribute climate change.

As far as I understand it, the masking is applied to the model to remove those locations/times when there are no observations. This is quite different to removing those locations which do not match, in some way, with the observations—that would clearly be the wrong thing to do. To mask those that have no observations, however, is clearly the right thing to do—what is the point of attempting to detect a simulated signal of climate change over some part of (eg) the Southern Ocean if there are no observations there in which to detect the expected signal? That would clearly be pointless.”

Yes it would. And I fully understand Myles' comments. Indeed, my comments clearly and unarguably relate to Myles' comments. But, as my response states, Myles' comments do not alter the fact that the masked data and the unmasked data contain demonstrated false trends. And the masking may introduce other spurious trends. So, the conducted attribution study is pointless because it is GIGO. Ad hominem insults don't change that.

And nor does the use of peer review to block my publication of the facts of these matters.

Richard

## APPENDIX B

A draft version of the paper that was blocked from publication and is the subject of discussion in an email from Richard S Courtney dated 23 Nov 2003 that was among those hacked or leaked from CRU

Repeated attempts to obtain peer reviewed publication of various versions of this paper were blocked in the manner explained in paragraphs 7 and 8 of the Submission to the Parliamentary Science and Technology Committee from Richard S Courtney. This draft has the same contents (except for the precise data: see paragraphs 7 and 8 of the Submission) as each of the final versions. But it is a pre-publication draft and does not include its bibliography of references.

### A CALL FOR REVISION OF MEAN GLOBAL TEMPERATURE (MGT) DATA SETS

#### 1. *Mean global temperature (MGT)*

Mean global temperature (MGT) is the average temperature of the air near the surface of the Earth derived from measurements mostly made at weather stations using thermometers. This short discussion paper calls for a revision to MGT procedures and titles and for the results of that revision to be published.

One could imagine an instantaneous value for MGT but there is no method to determine it. Therefore periodic, individual measurements (mostly made at weather stations) are used to determine an average MGT for periods of time such as days, months or years. Determination of the annual MGT has particular importance because historic data is utilized to compile time-series of MGT since ~1880 and, thus, to gain an indication of the change in MGT since then. This paper comments on the several reported cumulative data sets for these annual values of MGT.

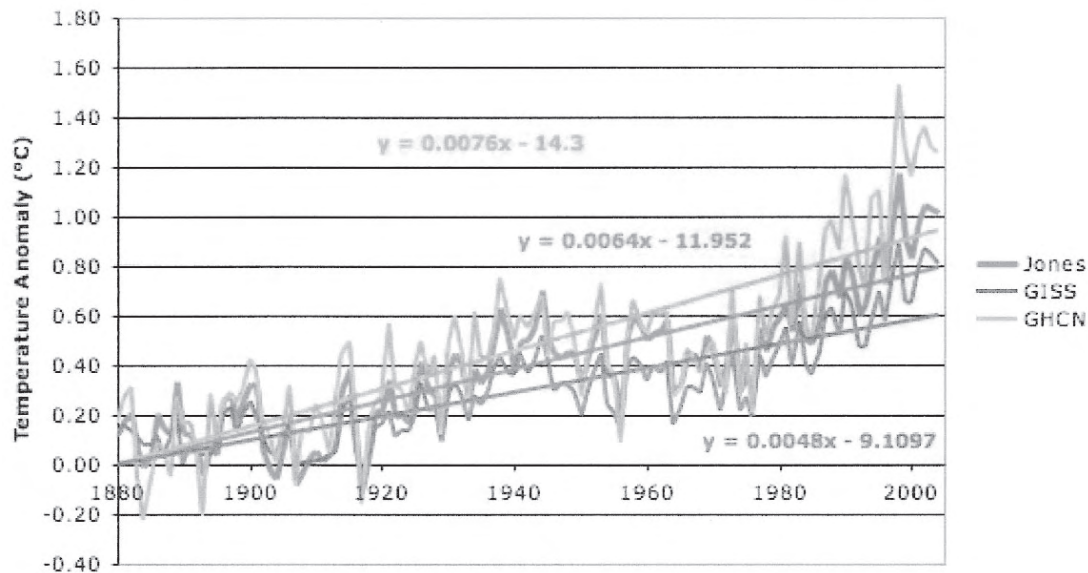
Three different research teams provide values of MGT that are widely used (eg Jones et al., GISS, GHCN). They present their results as "anomalies" from a set value (usually the average MGT of a specified period of years eg 1961–90). The "anomaly" is obtained by subtracting this average temperature value from the determined MGT. Use of anomalies permits direct comparison of the results between teams, because temperature subtractions can be used to adjust the start points of the data sets for comparison.

One important use of data sets of MGT anomalies is in "attribution" studies of climate change. Attribution studies model the effects that can alter climate, eg changes to solar radiance, atmospheric injection of volcanic aerosols, etc.). Differences between the model results and the observed changes to MGT are usually attributed to anthropogenic climate change (AGW). Any errors in the MGT data sets will clearly affect the results of attribution studies which use those data sets.

There are significant variations between the results of MGT calculated by the different teams that compile them. The teams each provide 95% confidence limits for their results. However, the results of the teams differ by more than double those limits in several years, and the data sets provided by the teams have different trends. Since all three data sets are compiled from the same available source data (ie the measurements mostly made at weather stations using thermometers), and purport to be the same metric (ie MGT anomaly), this is surprising. Clearly, the methods of compilation of MGT time series can generate spurious trends (where "spurious" means different from reality), and such spurious trends must exist in all but at most one of the data sets.

The three MGT time series are shown in Figure 1.

**Figure 1**  
MEAN GLOBAL TEMPERATURE ANOMALIES AND TRENDS NORMALIZED TO A COMMON START VALUE AS INDICATED BY THREE TEAMS (AFTER JONES *ET AL.*, GISS AND GHCN).



In this figure, the trends (in °C/decade) and the 2SD trend error are:

GHCN:  $0.076 \pm 0.010$

Jones:  $0.064 \pm 0.007$

GISS:  $0.048 \pm 0.006$

The Jones trend is significantly different from the GISS trend ( $p < 0.05$ ), and the GHCN trend is very significantly different from the GISS trend ( $p < 0.01$ ).

The data sets in Figure 1 are derived from the same available source data and, therefore, the differences between the data sets in Figure 1 demonstrate either:

(a) that they are monitoring different climate effects;

or

(b) that at least two of the data sets provide wrong results (they differ in annual change by more than double their stated 95% confidence limits in each of several years).

Each team claims to provide a true MGT, but their results differ. Each uses a unique method to derive an indication of some changes to the lower atmosphere, and these methods clearly each provide a different indication of the changes. Therefore, the minimum required amendment to MGT usage is for each team, and others who refer to their data, to use a unique title for the metric that they provide (eg “GISS Surface Temperature Index” and “GHCN World Warmth Index”).

In addition, and noting the importance of MGT time series for bodies such as the IPCC, other changes to the determination of these time series are warranted also, against two different understandings of MGT. Either:

(i) MGT is a physical parameter that—at least in principle—can be measured;

or

(ii) MGT is a “statistic”; ie an indicator derived from physical measurements.

These two understandings derive from alternative considerations of the nature of MGT:

(1) If the MGT is assumed to be the mean temperature of the volume of air near the Earth’s surface over a period of time, then MGT is a physical parameter indicated by the thermometers (mostly) at weather stations that is calculated using the method of mixtures (assuming unity volume, specific heat, density etc).

Alternatively:

- (2) If the thermometers (mostly) at weather stations are each considered to indicate the air temperature at each measurement site and time, then MGT is a statistic that is computed as being an average of the total number of thermometer indications.

The following discussions consider MGT according to each of these alternative understandings.

## 2. *Consideration of MGT as a physical parameter with a unique value for each year*

The MGT data sets provided by the various teams are often presented on the same graph (eg by IPCC) under the same heading, and there has been no public objection to this by any of these teams. This suggests that the teams agree MGT is a physical parameter that indicates a unique value for the average temperature of the air near the surface of the Earth for each year. But, the data sets provide significantly different trends, and in each of several pairs of years the annual change to MGT differs between the data sets by more than double the calculated 95% confidence limits of each data set. This paradox can be explained by application of measurement theory.

When the measurement sites are considered as being the measurement equipment, then the non-uniform distribution of these sites is an imperfection in the measurement equipment. Some measurement sites show warming trends and others cooling trends and, therefore, the non-uniform distribution of measurement sites may provide a preponderance of measurement sites in warming (or cooling) regions. Also, large areas of the Earth's surface contain no measurement sites, and temperatures for these areas require interpolation.

Accordingly, the measurement procedure to obtain the MGT for a year requires compensation for the imperfections in the measurement equipment. A model of the imperfections is needed to enable the compensation, and the teams who provide values of MGT each use a different model for the imperfections (ie they make different selections of which points to use, they provide different weightings for eg effects over ocean and land, and so on). So, though each team provides a compensation to correct for the imperfection in the measurement equipment, each also uses a different and unique compensation model.

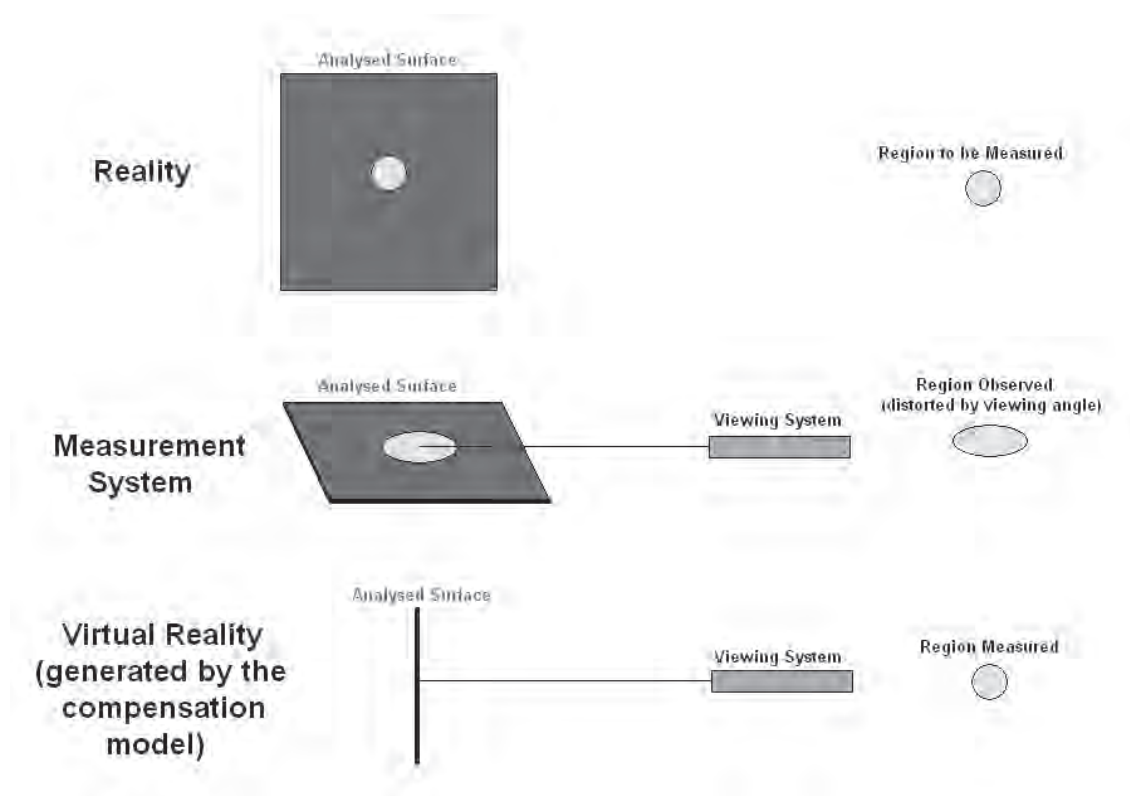
The large differences between the results generated by each team demonstrates that the compensation models used—by all except at most one of the teams—must contain large errors that generate:

- (A) spurious trends to MGT with time, and
- (B) errors to MGT that are more than double the calculated 95% confidence limits

But the fact that all the teams calculate their errors demonstrates that each of the teams thinks that its particular model is correct.

Use of an analogy may assist understanding of the problem posed by use of an imperfect compensation model. Figure 2 shows that an area to be measured by an optical system will have a distorted image if viewed at the wrong angle. But—if the viewing angle is known—then the true shape of the image can be calculated so it can be measured. However, a distorted image will still be measured if the compensation applies a wrong correction for the angle. In terms of MGT, the non-uniformity in results between the teams is analogous to different “wrong correction angles”. Perhaps most important, the magnitude of the errors to MGT resulting from imperfect compensation models cannot be known, because there is no independent calibration for MGT.

**Figure 2**  
USE OF COMPENSATION MODEL IN IMAGE ANALYSIS.



MGT time series are often used to address the question,

*"Is the average temperature of the Earth's surface increasing or decreasing, and at what rate?"*

If MGT is considered to be a physical parameter that is measured then these data sets cannot give a valid answer to this question, because they contain errors of unknown magnitude that are generated by the imperfect compensation models.

We know that the different compensation models create significantly different results for MGT. Importantly, we also know that the imperfect compensation models provide spurious trends of unknown magnitude and sign in the MGT data sets. And finally we know that the MSU data sets indicate strong warming trends that do not occur in the available MSU satellite (eg Christy—full reference needed) and weather balloon radiosonde (eg Angell—full reference needed) data sets for lower atmosphere temperature.

A result that is a function of its construction is a serious error. If MGT is considered as a physical parameter that is measured, then the data sets of MGT are functions of their construction. Attributing AGW—or anything else—to a change that is a function of the construction of MGT is inadmissible.

### 3. Consideration of MGT as a statistic with a variety of possible useful values

The issues raised in Section 2 (above) might be resolved by considering MGT as a statistic (as described in Section 1 above) which does not have a unique value. According to this consideration MGT is not measured—it is calculated from measurements—and, therefore, it is not correct to use measurement theory when considering MGT. Thereby, the arguments advanced in Section 2 (above) become invalid because they are based on measurement theory.

However, if MGT is considered to be a statistic then it can be computed in several ways to provide a variety of results, each of different use to climatologists. In such a way, the MGT is similar in nature to a Retail Price Index, which is a statistic that can be computed in different ways to provide a variety of results, each of which has proved useful to economists. If MGT is considered to be a statistic of this type, then MGT is a form of average. In which case, the word "mean" in "mean global temperature" is a misnomer, because although there are many types of average, a set of measurements can only have one mean.

Importantly, if MGT is considered to be an indicative statistic then the differences between the values and trends of the data sets from different teams indicate that the teams are monitoring different climate effects. In this case, there is no reason why the data sets should agree with each other, and the 95% confidence limits

applied to the MGT data sets by their compilers may be correct for each data set. Similarly, the different trends indicated by the MGT data sets and the MSU and radiosonde data sets could indicate that they are also monitoring different climate effects.

To treat the MGT as an indicative statistic has serious implications. The different teams each provide a data set termed mean global temperature, MGT. But if the teams are each monitoring different climate effects then each should provide a unique title for their data set that is indicative of what is being monitored. Also, each team should state explicitly what its data set of MGT purports to be monitoring. The data sets of MGT cannot address the question “Is the average temperature of the Earth’s surface increasing or decreasing, and at what rate?” until the climate effects they are monitoring are explicitly stated and understood. Finally, the application of any of these data sets in attribution studies needs to be revised in the light of knowledge of what each data set is monitoring.

#### 4. *Additional considerations*

Clearly, the issues in Sections 2 and 3 (above) need to be properly evaluated. However, all the above issues assume the source data (mostly obtained from weather stations) used to obtain MGT are correct. Though there are in fact serious reasons to doubt the quality of much of this source data, their consideration is outside the scope of this paper.

Another important consideration is that it is not self-evident that MGT is the most useful or even a valid indicator of global climate change. Doubts exist, because it can be argued that a temperature reading is not sufficient to define the quantities of heat stored in a volume of air. What needs to be resolved is the difference between:

- (a) the amount of energy the Earth has received from the Sun; and
- (b) the amount of heat retained in the atmosphere by the greenhouse gases.

A minimum of three parameters is required to determine the amount of heat stored as a result of the greenhouse gases, namely temperature, pressure and humidity. Global climate change is the average of local climate changes, and significant local climate changes may often occur without any change to the local mean temperature. Indeed, the above minimum three parameters are not sufficient to indicate the heat stored in some cases: for example, a local temperature may remain constant when additional heat added to a region melts ice in that region so heat is stored as latent heat of melting. Furthermore, alterations to precipitation or wind speeds may not be indicated by changes in MGT although the amount of energy stored in the air mass can vary considerably.

- (a) We conclude that the use of time-series of temperature change alone has the potential to be a strongly misleading indicator of global climate change.

#### 5. *Summary and Conclusions*

We have discussed the validity of the ways in which MGT is reconstructed and interpreted. However, we are also concerned about the uses to which MGT time series are put in the public discussion about possible human-caused global warming.

Whatever the interpretation placed on the reconstruction of MGT over the last ~ 100 years, the following seminal points remain true:

The three most-cited data sets (CRU, GISS, GHCN) differ significantly in the temperature trends that they portray;

For the late 20th century warming period between 1972 and 2000, the trends are +0.61 C/century, +0.48 C/century and 0.76 C/century, respectively;

- These rates of temperature change are significantly higher than the rates for the lower atmosphere measured by satellite MSUs (insert rate) and weather balloon radiosondes (insert rate).

These discrepancies notwithstanding, all these rates of change, even the highest, lie well within the variability displayed by the long term (Holocene) record of temperature change as captured in polar ice-cores and deep sea cores; and

- The pattern of all three MGT estimates between 1900 and 2005 signally fails to correlate with the pattern of human production of CO<sub>2</sub>. In contrast, more than 60% of the variance in the MGT temperature signal correlates with solar variability.

In the face of these facts, the degree to which the debate on global warming is being influenced by the publicizing of alarmist temperature scenarios—based on unverified, deterministic computer models—and by the encouragement of public hysteria about atmospheric CO<sub>2</sub>, is of great concern to us. That concern is deepened by the fact that senior governmental science advisors, once-influential science journals and distinguished science academies all currently continue to fuel such public alarmism.



## SIGNATORIES

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Ball, T	Environmental Consultant; former Professor of Climatology, U. of Winnipeg
Boehmer-Christiansen, S	Reader Dept. of Geography, U. of Hull, U.K.; editor, <i>Energy &amp; Environment</i>
Böttiger, H Bijkerk, A	Independent publisher Independent Quaternary Palaeo-Climate Researcher; Environmental Consultant; Lieut.-Colonel of the Royal Netherlands Air Force
Carter, R M	Professor of Geology, Marine Geophysical Laboratory, James Cook University, Australia
Ellsaesser, H W	US Air Force (RET 1963); Lawrence Livermore National Laboratory (RET 1997)
Ferreyra, E	President of the Argentinean Foundation for a Scientific Ecology; Independent researcher in climatology
Hissink, L	Consulting Geologist; Editor of <i>Australian Institute of Geosciences News</i>
Hughes, W S	Geologist; since 1991 has studied global temperature trend compilations; author of web pages <a href="http://www.warwickhughes.com/">http://www.warwickhughes.com/</a>
Jelbring, H	PhD thesis “Wind Controlled Climate”; President Inventex Aqua AB, Sweden
McLean, J Moura, R G Thoenes, D	Data analyst, independent climate researcher Electrical engineer and meteorologist Professor (em) Chemical and Process Engineering, Eindhoven University of Technology (1979–1995)
Rorsch, A	Professor (em) Molecular Genetics Leiden University (1967–1997); member of the board of the Netherlands Organization of Applied Science TNO (1980–1995)
van der Lingen, G J	Geologist/paleoclimatologist, Climate Change Consultant Geoscience Research and Investigations New Zealand (GRAINZ)
Winterhalter, B	Senior Marine Researcher (RET) Geological Survey of Finland

Most of the signatories are members of Sceptical Climate Science—Climatesceptics—the global scientific discussion group for climate scientists and other participants interested in discussing pro and con “mainstream”, neutral, alternative, critical and sceptical views in climatology, but the signatories represent only themselves.

*Richard S Courtney*

*January 2010*

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**Memorandum submitted by Edward Dille (CRU 02)**

I was most interested to read that the Parliamentary S&T committee will be investigating the alleged UEA “Climategate” shenanigans.

To assist the committee to “bone up” beforehand on the background to the Climate Change saga, I have today ordered two books which should be despatched to yourself. They are “Heaven and Earth, global warming: the missing science” by Plimer, and “The Real Global Warming Scandal” by Booker. Please accept them with my compliments.

I found both books excellent at putting climate change in true perspective, though neither author sits on the fence!

I am a retired, chartered Chemical Engineer, and have no direct commercial or political axe to grind. I am merely a concerned citizen who does not wish to sit by while others may take major, ill-informed decisions because they have been misled.

I do receive a small pension from Chevron and from British Sugar. I also lead occasional Process Control training courses for ESD Simulation Training of Aberdeen.

I hope the committee enjoy the books.

*January 2010*

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**Memorandum submitted by Stuart Huggett (CRU 03)**

**1. THE CRU—BACKGROUND**

1.1 Underlying the problems at the CRU at UEA is the question of their role in science. To quote from the official CRU website:

1.2 *The aim of the Climatic Research Unit is to improve scientific understanding in three areas:*

- past climate history and its impact on humanity;
- the course and causes of climate change during the present century; and
- prospects for the future

1.3 This implies an impartial and objective *scientific* approach to *understanding* the problems of climate.

**2. IMPLICATIONS OF THE DISCLOSURES FOR THE INTEGRITY OF SCIENTIFIC RESEARCH**

2.1 The most worrying aspect of the leaked emails and documents is the way in which debate, peer review and FOI requests were stifled and perverted in an institution which exists to improve scientific understanding of the matter.

2.2 If this were an obscure and abstract branch of scientific enquiry then the consequences would be insignificant and objective enquiry would gradually supplant bias on the part of the researchers. In this institution, however the results of its research have very far reaching consequences indeed with enormous sums of money involved and major shifts in political and social opinion on a global scale.

2.3 The manipulation of research in these circumstances appears to be serious fraud—not only on the part of the researchers involved but also on the part of those involved, without due diligence, in directing the course of research at the CRU and those various bodies, institutions and corporations funding, participating in and using the results of that research.

2.4 Other aspects of the researchers' methodologies revealed in the documents—data manipulation, irregular statistical practices, loss of raw data sets, etc., etc. would appear to be a consequence of their need to bias their research and serves to add substance to the fraud mentioned in 2.03 above.

2.5 The leaked documents from the CRU energised the global warming debate to the point where politicians and the media started to question the precepts of what has come to be known as 'Climate Change'. As a result further evidence of questionable scientific practices came to light in the IPCC (Himalayan glacier melting, GISS & NOAA temperature manipulation, etc., etc.) and the idea of a 'settled science' or 'consensus' is losing credibility.

2.6 The beginning of a new and more objective approach to the questions posed for the human race by climate change can now be discerned which will hopefully result in a more rational approach to our stewardship of our planet. For this we have to thank the person or persons, at present unknown, who leaked the CRU documents.

**3. TERMS OF REFERENCE AND SCOPE OF THE INDEPENDENT REVIEW BY UEA**

3.1 The Terms of Reference and Scope of the Independent Review are not adequate in that the review is not asked to examine any possible global financial consequences of the methodologies revealed by the leakage.

*January 2010*

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**Memorandum submitted by Walter Radtke (CRU 04)**

Subsequent to these investigations should be the creation of a permanent government body chartered to receive and investigate whistle blower data from ALL branches of science. Climategate reflects a near-institutional disregard for scientific method for reasons of funding, ideology or dynastic departmental positioning that exists in the disciplines of physics, astronomy, archaeology, etc. Competing theories to foundational hypotheses in all disciplines exist but see little light of day. Without publication, there is no funding, without funding there is no competing research; simple, eh.

When was the last time you read an account of big bang's rival- steady state cosmology? Just for fun, pick up a copy of the book "Seeing Red" by astronomer Edwin Hubbel's chief assistant Halton Arp and discover why big bang may be a complete waste of taxpayer funded research money.

Other such cases exist and are not hard to track down as most researchers accused of heresy and frozen out of publishing, access to research tools and funding, subject to vilification by peers, and so on, will write books on their findings for the general public.

Also to be considered would be an investigation of the PhD program in all disciplines to verify the many reports of doctrinal prejudice, ideology filtration, sycophancy, etc. Books have been written about this problem, search Amazon for starters.

January 2010

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**Memorandum submitted by G R Ryan (CRU 05)**

**SAMPLING**

As any scientist knows, comparative sampling is only valid if the samples being compared are from exactly the same medium or, where that is not possible, the differences are determined and factored into the comparison. Thus one does not compare for geochemical purposes a sample of stream sand with a sample of nearby laterite.

I would have thought, therefore, that the IPCC, when erecting its models, would have observed this rule. But it seems not.

**TEMPERATURE**

As a city grows, so does the ambient temperature. I experienced a very convincing example of this in England in 1977. I was staying with relatives in the country and went into the City for a meeting. Coming out onto slushy cold streets was not much fun. But when the train was stuck in snowdrifts on the way to where I was staying in Surrey was less fun. The Met Office explained that the snow did not reach the ground over London, and had melted into rain, because of the warmth of the city.

Thus to compare temperature readings from the same thermometer in the same location after the host city has grown both outwards and upwards by several orders of size over the decades has no validity at all.

**SEA LEVEL**

As any resident of the tropics knows, the sea can rise up to a metre at the centre of a low pressure system that has become a cyclone. Furthermore water, like most substances, expands as the temperature rises, and contracts as it cools. Thus one would have thought that when sea levels are being measured there would automatically be kept a record of the atmospheric pressure and water and atmospheric temperature at the time of the reading, so that the levels can be adjusted to a common base accordingly.

I can find no record that that is the practise, which makes statements about sea level changes suspect to say the least.

**CONCLUSION**

If these are examples of the IPCC's sampling protocols not much faith can be put in their conclusions.

January 2010

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**Memorandum submitted by Geoffrey Sherrington (CRU 06)**

**CLIMATIC RESEARCH UNIT**

Please accept this submission from an Australian scientist. Because it is from Australia, it might provide a perspective that stands aside from the UK and USA who participated in the emails under investigation. If I have erred technically in this submission, I am most willing to correct with your advice.

**DECLARATION OF INTEREST:**

My only motivation is the conduct and promotion of good science. This necessarily involves identification of bad science. I have no contract or casual association with any Party that could influence me, or me them, beyond normal media and blogging processes.

**STANDING:**

I am now retired and no longer active with several learned societies of the past. My career work was firstly with exploration geochemistry in a highly successful team that I helped manage. It was very high in world ranking. Later, in response to the manipulation of policy by activist groups, I worked at the interfaces between industry, science, economics and government. The level of work was high. For example, it caused some Federal Australian politicians to appear as defendants before the Full Bench of the High Court of Australia.

In summary, I spent many years auditing the quality of science, commerce and legislation, often in relation to budgetary approval. My science experience overlapped with several sub-disciplines of climate science, eg plant nutrition/dendro chronology; past climates; use of natural radioisotopes; statistics and mathematics such as interpolation onto grids; management of large data bases; analysis of spatial data sets; satellite data; geodesy.

#### CONCLUSION:

There is much more that could be said to the Inquiry. My full cooperation is offered. Where I have used quotations from others, I seek to convey wisdom greater than mine, not mere literary style.

#### SUBMISSION:

*What are the Implications of the Disclosures for the Integrity of Scientific Research?*

1. *“Whoever undertakes to set himself up as a judge of Truth and Knowledge is shipwrecked by the laughter of the Gods.”*

*“No amount of experimentation can ever prove me right; a single experiment can prove me wrong.”*  
attr. Albert Einstein.

2. (Note: My response deals essentially with climate temperature).

3. The implications of the disclosures *per se* are not immediately serious. Hacks and leaks, like influenza, are recurring nuisances that we tolerate. Disclosure commenced once CRU realised that laws pertaining to FOI included them. I have an FOI letter from Mr Palmer of CRU Ref: FOI\_09-137 of 23 Sept 2009, 4 days after the disclosure.

4. But, implications for the integrity of scientific research are serious. Science has been debased and seen to be. Those like me who have questioned CRU for some years were aware of the possibility that the Gods would laugh. CRU was questioned about credibility and CRU’s value was discounted some years ago. The referenced CRU scientists, without doubt, showed poor integrity. The public, plus other parties such as those who fund scientific research, now have grounds to question the motives and integrity of all scientists. Fewer students might now choose to study Science. Belief-based decisions might now further erode traditional Science-based decisions. We can expect to see an increase in fringe topics like chemophobia, fear of nuclear power, organic farming, homeopathy etc., as otherwise reasonable people lose faith in mainstream Science.

5. Integrity now requires remediation such as (a) a strong regulatory scheme to mandate the release of scientific data and code. For CRU, the “prove me wrong” Einstein test has been impossible because of the non-release of data. (b) a sustained effort in educating teachers and students about correct application of the scientific method to avoid more “shipwrecks” (c) examination of copyright enforcement to avoid false conclusions being drawn and spread by CRU using data owned by other States/Countries.

6. One must suspect that a coordinated effort to promote global warming hypotheses was made by some people higher in the chain of command, who stood to profit from the resultant global economic reaction and predictable turmoil. If a recommendation is permitted, it would be most important to set in chain the identification of the “Mr Bigs” as was done in the similar, but older case of the “Cambridge 5”.

*Are the terms of reference and scope of the Independent Review announced on 3 December 2009 by UEA adequate?*

7. *“There will be no loyalty, except loyalty towards the Party. There will be no love, except the love of Big Brother. There will be no laughter, except the laugh of triumph over a defeated enemy. There will be no art, no literature, no science. When we are omnipotent there will be no need of science.”* Orwell, G. “1984”.

8. The short but clear answer is “No” to all 4 Terms of Reference (“TOR”).

9. TOR 1 assumes “hacked” emails. I do not know if hacking is confirmed or assumed. The act of hacking, if confirmed, is less serious than the conduct it revealed. A reasonable scientist would easily find unacceptable scientific conduct. Australia’s Warwick Hughes criticized CRU in a Tasman Institute 1991 review of the Australian component of temperature records used in a 1986 Jones et al Southern Hemisphere paper. As a scientist, I was a visiting reviewer of several Tasman Institute programs at that time. I studied the report and saw subsequent blocking of data release by CRU. An often mentioned response from Professor P. D. Jones of CRU to Warwick Hughes was along the lines of “We have 25 or so years invested in the work. Why should I make the data available to you, when your aim is to try and find something wrong with it?” It has continued for some years. By all reasonable objective assessments, this is unacceptable scientific practice.

10. Thus, TOR 1 is not needed. It should be taken as a given.

11. TOR 2 should be dealt with by British police, not by Sir Muir Russell. There is abundant evidence of alleged criminality within the documents. There are separate inquiries afoot regarding copyright issues. The University of East Anglia appears to have adequate policies to cope with this TOR. Their failure was to enforce them. See 1255100876.txt in which Prof P. D. Jones of CRU admits to data destruction in contravention of University code of practice).

12. TOR 3—same comment as TOR 2. See email 1228330629.txt in which Prof P. D. Jones attempts to sway staff at CRU away from the legal procedures required by FOI law.

13. TOR 4. It is yet to be established if certain data used by CRU were obtained and/or used legally. Until that is done, the work of Sir Muir would be impeded because of his lack of powers to investigate criminality. See email 1237496573.txt where Prof P. D. Jones admits to illegal use of British Meteorological Office data.

*How independent are the other two international data sets?*

14. *Ever since the beginning of modern science, the best minds have recognized that "the range of acknowledged ignorance will grow with the advance of science." Unfortunately, the popular effect of this scientific advance has been a belief, seemingly shared by many scientists, that the range of our ignorance is steadily diminishing and that we can therefore aim at more comprehensive and deliberate control of all human activities. It is for this reason that those intoxicated by the advance of knowledge so often become the enemies of freedom.* attr: Fredrich August von Hayek.

15. (Note: The other two international data sets are not defined. Here, the subject is treated as "Is there collusion between CRU, NOAA and GISS to produce a global temperature record [or the land part of it] that is substantially in agreement?")

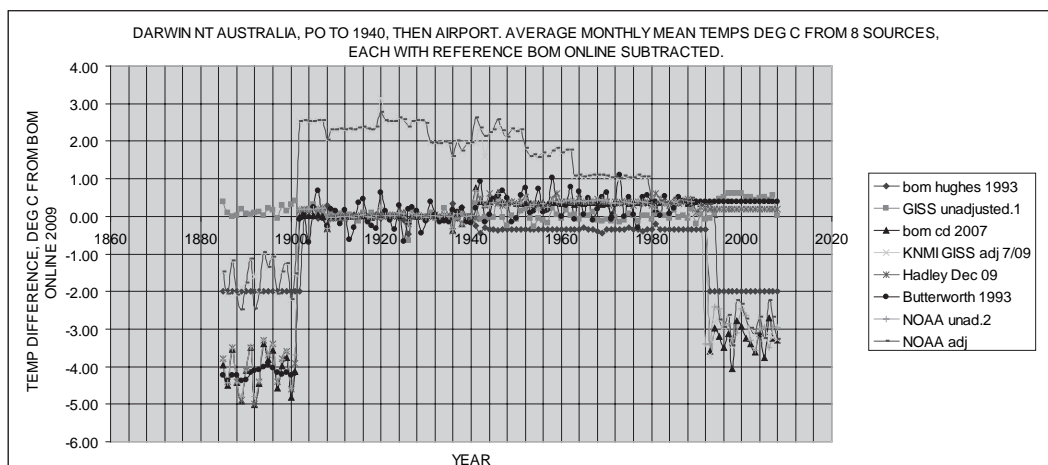
16. The answer to this question is not known by any person. The respective collecting parties acquire data in various states of adjustment from various bodies and individuals around the globe, such as the Australian Bureau of Meteorology. The volume of information is large and the adjustments to it are so frequent that it would be formidable to recreate a day-by-day comparison. There is no doubt that for some periods at some stations all three bodies would report the same result, within the bounds of error. However, prior disclosure of code and adjustment times has not been forthcoming to allow an independent audit.

17. The data sets cannot be directly compared because some deal only with land temperatures; others include sea. In any case, the error bounds, when calculated with proper formalism, are so large that the data sets would usually agree *sensu latissimo*. This can be clarified by separate comparison of temperatures from satellite observations since the early 1980s.

18. There is adequate *prima facie* evidence of collusion at least involving Michael Mann (GISS) and P.D. Jones (CRU). See email 942777075.txt. Here, a falsified graphic is used to add instrumental temperature records to proxy temperature records to change a perceived trend in the latter. This action is inarguably wrong in Science.

19. People submitting to this Science and Technology Committee will find difficulty with this question of independence because of a lack of availability of raw data and code, particularly from CRU. Its successor/partner, the British Meteorological Office at Hadley, belatedly released some temperature data on or about December 8, 2009. There was little explanatory metadata. There has not been time for a comprehensive analysis for this submission.

20. I have included the British Hadley release in the graph that follows, for Darwin, Northern Territory, Australia, as an indication of the match or mismatch of CRU/Hadley data with that of other compilers. There is grave reason for concern at the overall mismatch, because no inference of man-made global warming could be drawn from this graph, which is however a handpicked station to show mismatch. The vertical span of 8 deg C is to be contrasted with the IPCC "alarming" global estimate of 0.8 deg C for a roughly similar period. It is hard to take an accurate, small signal from noisy data. Note that all traces on the graph derive from one data set held by the Bureau of Meteorology, Australia. These data will change as knowledge advances, but this set was in this form when constructed in December 2009. It shows severe manipulation.



21. Declaration of interest: My only motivation is the conduct and promotion of good science. This necessarily involves identification of bad science. I have no contract or casual association with any Party that could influence me, or me them, beyond normal media and blogging processes.

January 2010

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**Memorandum submitted by Lalu Hanuman (CRU 07)**

1. As a former postgraduate student of the University of East Anglia [UEA], and a British Citizen, I would like to comment on your committee's planned review of the disclosure of climate data from the Climatic Research Unit [CRU] at the UEA. In particular the issue of : "Are the terms of reference and scope of the Independent Review announced on 3 December 2009 by UEA, adequate".

2. The current furore that the UEA has created by it's falsifying of climate change information, has undermined global climate change action at the recent Copenhagen talks, with some countries relying on these UEA revelations to question the validity of climate change. The resultant catastrophic effect of the UEA's actions on future generations, cannot be exaggerated, as it has helped delay united action against looming climate change. A robust and thorough transparent inquiry is called for. Sir Muir Russell's review is inadequate at least as far as point 3 of his remit goes ie "Review CRU's compliance or otherwise with the University's policies and practices regarding requests under the Freedom of Information Act and the Environmental Information Regulations for the release of data".

3. From my experience as a former postgraduate student of the UEA, I have documentary evidence that the UEA as an institution and it's agents have often indulged in falsifications, distortions, and misrepresentations. Hence the CRU in distorting information was manifestly in compliance with the University's policies and practices. There is an urgent need for a wider remit, namely to look into the institutional failings of the UEA itself.

4. Declaration of interests: None.

5. DPA: I give permission for my name, and contact details, to be released.

January 2010

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**Memorandum submitted by John Wadsworth (CRU 08)**

I have spent the last 15 months or so researching AGW, the driver being the passing of the Climate Change Act 2008.

I am not a climate scientist or hold any qualification or have any experience that relates to the field; however I am an engineer with the required understanding of the laws of physics.

The research, mostly web based, has given me cause for concern with the arguments from both sides of the divide. I have also found that both sides can become very emotive and in some cases downright ignorant when their stance is challenged.

I was therefore extremely pleased and grateful for your announcement to carry out a Select Committee investigation into the emails leaked from EAU—CRU. At last an independent inquiry into these deeply worrying issues.

The morning following the announcement of the inquiry I read in the Daily Telegraph: a statement attributed to you as the chair of the Commons science and technology committee:

"There are a significant number of climate change deniers who are basically using the UEA emails to support the case this is poor science that has been changed or at worst manipulated. We do not believe this is healthy and therefore we want to call in the UEA so the public can see what they are saying"

I would be grateful if you would please confirm that the statement attributed to you is correct? You will, I have no doubt, understand my concerns when I was looking forward to finally getting an independent review of this matter.

I have always considered it to be healthy for the chair of any committee to keep an open mind throughout the whole of the proceedings.

Following the statement, you will not be surprised to find that the "deniers" (not a word I would have chosen) side of the divide have already written off the committees proceedings as a whitewash and I have a great deal of difficulty in countering their arguments.

January 2010

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**Memorandum submitted by Peter Sinclair (CRU 09)**

I refer to your comments which appeared in the Daily Telegraph on 23 January.

“There are a significant number of climate deniers, who are basically using the UEA emails to support the case this is poor science. We do not believe this is healthy and therefore we want to call in the UEA so that the public can see what they are saying.”

I find your brief statement very disturbing in several respects.

It is very offensive to describe as “deniers” those who do not believe that carbon dioxide is the primary cause of climate change. This lays bare your prejudice.

You do not believe that such scientific scepticism is healthy. Scepticism and debate should be at the heart of the scientific process, which is why peer review is so important. It is a pity that this process was corrupted by CRU.

You want to call in the UEA so that the public can see what they are saying. So, this so-called enquiry is actually designed to be a public stage for AGW and UEA propaganda to convince the public that the science is not rotten after all. Is this what you meant by that comment?

I’m sure that the UEA and its cronies will be very supportive to try to safeguard the many millions of dollars of funding that the CRU has generated. The public is well informed (though not by the MSM and not ever by the BBC) so I think any banging of the AGW drum will further erode their low opinion of climate scientists.

Does the rest of your committee share your view of the topic?

I initially welcomed the involvement of your committee and I was planning a contribution, but now I don’t see any point.

*January 2010*

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**Memorandum submitted by Ian Goddard (CRU 10)**

You are quoted in the press today as referring to those who are sceptical about the fashionable obsession with climate change as “climate change deniers”.

It is a great pity that the Chairman of the Commons Science and Technology Committee is so blatantly blinkered. If you believe that this sort of attitude to those who demand more evidence than a flawed film by Al Gore and a discredited Hockey Stick graph is helpful then you will not succeed in your goal of convincing the sceptics. After all, in the early 60s the fashion was to use many of the factors cited as causing warming today to support predictions of cooling and a mini Ice Age.

Your Committee appears to be partisan in its treatment of this subject and I, for one, will view its pontifications accordingly.

*January 2010*

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**Memorandum submitted by Stephen McIntyre (CRU 11)**

In your terms of reference, the third question is: “How independent are the other two international data sets?” This question appears to presume that the principal issue in the Climategate Letters is the CRUTEM temperature data set.

While this is an important issue and was the topic of the FOI inquiries that drew attention to CRU, it ignores the other equally important aspect of CRU work and influence: 1000-year temperature reconstructions, a topic which is even more at issue in the Climategate Letters. I suggest a companion question along the lines perhaps of:

How independent are other 1000-year temperature reconstructions used by IPCC?

*January 2010*

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**Memorandum submitted by Martin Brumby (CRU 12)**

I write to you as Chair of the House of Commons Science and Technology Select Committee.

I understand from a report on the BBC News website that the Committee has requested an explanation of the apparent wrongdoing at the University of East Anglia Climatic Research Unit, including extensive cherry picking and manipulation of raw data, use of inappropriate statistical methods and computer

programming, refusal to comply with legitimate FOI requests and destruction of data that has been requested under FOI and systematic attempts to prevent publication of research papers which conflicted with their opinions.

I respectfully remind you that, whatever your own view of the “science”, that these “scientists” are in receipt of very considerable funds from the public purse and that the computer models they have constructed and the papers they have published have been hugely influential in the policy of all three major Political Parties in the UK and are effectively the only “evidence” (as opposed to bold assertions) that there is any “Dangerous Global Warming” and that anthropogenic CO<sub>2</sub> emissions are responsible for this.

I suggest that a proper Inquiry into this affair is essential. I also suggest that the rumoured use of Lord Rees of Ludlow to hold an UEA inquiry is completely unacceptable as he is a well known AGW alarmist.

The same objection applies to Professor Sir John Houghton, chair of the IPCC’s first science panel, who says “he would not support an inquiry as many of those demanding one were biased” And he isn’t perhaps?

I strongly suggest that if anyone is to have confidence that an Inquiry is not just another Greenie alarmist whitewash, this must be a job for a High Court Judge who has not allowed himself to be embedded into either the “alarmist” or “skeptical” camps.

January 2010

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### Memorandum submitted by Susan Ewens (CRU 13)

1. I was on-line on the night of Thursday 19 November when the “Climategate” story broke on the internet and I immediately downloaded the CRU emails and files. Contrary to the immediate excuse given by apologists that the CRU emails were “taken out of context”, it was immediately clear to those who had been following the dispute with the CRU over climate data disclosure and interpretation that long held suspicions were being confirmed in a fascinating way.

2. Within days I had written to my MP, Hilary Benn, the MP for Norwich South, Chas Clarke and the Vice Chancellor of UEA, Sir Edward Acton, to protest about the moral and scientific ethics displayed by the CRU staff in their communications and their political advocacy of debatable “findings”. Now I am writing to you. There is little else an ordinary but concerned and informed citizen can do to influence events except stand up and be counted.

3. I feel strongly about this matter. I am a woman of 62 with a BSc in Sociology from the LSE. I am capable of understanding and interpreting data from of statistical tables and graphs, etc. Until I saw the Channel4 film “The Great Global Warming Swindle” in March 2007 I went along, largely in ignorance, let it be said, with the climate “orthodoxy”. This was mainly because I trusted the BBC to present information in a balanced way. I now know it is the BBC’s firmly policed policy that the “science is settled” and they do not need to cover the findings of contrarian scientists!

4. But when, in 2007, I saw those sane and sensible men putting forward an alternative viewpoint on Channel4 I was provoked into educating myself about so-called “anthropogenic global warming” and it has been my main interest and subject of study ever since. I know what the “warmers” argue and I know what the sceptic rebuttals are. The response to those counter-arguments invariably disintegrates into ad hominem attacks, aspersions of intellectual inadequacy and the imputation of low motives. I have experienced this abuse myself from AGW believers. So be it. It that puts me in the company of people like Richard Lindzen, Roy Spencer, John Christy, Tim Ball, Steve McIntyre et al I am proud of the fact.

*What are the implications of the disclosures for the integrity of scientific research?*

5. I know this committee accepted the reality of global warming and the role of CO<sub>2</sub> back in 1999–2001 and that virtually the whole parliament voted for the November 2008 Climate Change Act, but you really must stand back a little from this now “conventional wisdom” and renew your perspective in the light of the CRU “Climategate” revelations and the groundswell of scientific opposition that led up to and provoked them.

6. The Hadley Centre and the CRU are far too closely entwined with the IPCC, with advocacy organisations like the Tyndall Centre and with UK government policy-makers to be truly independent bases of expertise. Scores of scientists round the world, some of them struggling WITHIN the biased IPCC process are now challenging what has become effectively state-promoted and established climate orthodoxy. We are in danger of Lysenkoism.

7. The CRU lies embedded at the heart of an internationally connected web of government departments, the IPCC, NGOs, environmental charities, funding/research councils, universities, science foundations, the mainstream media, the BBC and, increasingly, energy corporations, big business, financial exchanges and Carbon Traders. Here the central ideology that I have dubbed “Climatechangeism” is the dominant and unquestioned meme.



8. In fact, “Climatechangeism” has become so entrenched in the value system of certain western intelligenzias that it has become THE dominant politically correct challenge of the epoch. Extirpating this dubious ideology from its entrenched position is strongly resisted by all the vested interests listed above as well as by the scientists themselves who have become politicised. This process is evident from the increasingly confrontational tone of the CRU emails over time.

9. The CRU’s IPCC-oriented research was not funded to pursue Blue Sky thinking about the climate, it was funded to expose the anthropogenic “signal” in what was taken as given—unprecedented global mean temperature rise.

10. I have to admit that I have my doubts about EVEN that now—given the messing about with “adjustment and homogenisation” that has been done with the raw temperature data and major issues over the siting and selection of surface stations. Scientists round the world are complaining that CRU has cherry-picked national surface station data and distorted it. Re Scandinavia, Russia, Alaska, Australia, Antarctica and New Zealand there are protests that raw temperature trends have been adjusted and/or selected to demonstrate warming from datasets that show no trend other than normal oscillation.

11. Even raw data is already contaminated by the Urban Heat Island Effect, in rural areas as well as cities, because it does not take much of a change in the environment round a measuring station to bias the thermometer readings upwards. However Dr Phil Jones says its effect is negligible. How can the growth of population from 1.8 billion in 1900 to 6.8 billion today, with associated urbanisation, be deemed negligible? Most thermometers are sited in these areas of population growth. If we cannot actually measure the global temperature with accuracy how can anyone say the temperature rise (IF there is one) is “unprecedented”?

12. Can claimed global temperature changes of less than one degree Celsius over the whole of the 20th century REALLY be taken as a serious basis for major upheavals in policy and taxation in view of the margins of error involved which are far in excess of the purported trend? Remember, please, it is only the climate’s purported “sensitivity” via postulated positive (never negative) feedbacks that would lead to “runaway” change. Surely a little more research money and scientific effort can be put into investigating these currently unknown climate feedback mechanisms, before big policy changes are pursued?

13. We are increasingly seeing evidence that historical temperature data has been adjusted downwards to create a spurious and/or enhanced upward trend over the 20th century. Transparency of data and computer code for all taxpayer funded research is the very least we are entitled to demand. No-one should have to file FOIA requests to view data. Dr Jones has shown himself politically compromised in attempting to corrupt the FOI process. He is not fit to be in charge either of archiving or the adjustment of CRU’s temperature series.

14. Then there is the palaeo data—Keith Briffa’s speciality (and Michael Mann’s) most notably the tree ring proxies for historical temperature reconstructions. How was dendrochronology ever permitted to escape from university Archaeology Departments? By some ambitious dendrochronologist seeking to expand his sources of funding, in all likelihood! Wooden thermometers! What sane person would give the concept the time of day? But it got funded at the CRU, didn’t it, and in a big way, too?

15. And when the tree ring proxy data diverged from the instrumental record post-1960 it was deleted from the graphs used in IPCC AR4 and elsewhere to “hide the decline” and seamlessly melded on to the instrumental record. This “divergence” was effectively concealed in the graphs and never adequately explained in the accompanying text. What scientists worth their salt ignore such a paradox revealed in supposedly crucial data? Those who believe no-one will ever audit their “findings”, is the answer, I’m afraid. Another reason for more transparency.

16. In the IPCC process, where both Jones and Briffa were Lead Authors, they were in a position to be judge and jury of their OWN research and did their best to exclude any criticism of their viewpoint while bending the rules to include the work of their supporters and, let it be said, co-authors and collaborators. Thus the whole uncertain pile of “evidence” for warming was corruptly and artificially beefed up to demonstrate a degree of certainty that was, in fact, absent.

17. There was too much funding at the CRU chasing far too few realistic and genuinely independent avenues of enquiry. Everyone was reworking the same old data bases and reviewing each others’ “research” within a tight network of co-authorship exposed by Prof Wegman for the US Congress in 2001. Everyone was trying VERY hard to work backwards from the answer they had been given a priori—that the climate WAS changing and would continue to change “catastrophically” and that mankind was to blame. Just find the smoking gun, boys! So they did what they were funded to do and have essentially ended up in a fist-fight with scientists who displayed more allegiance to the rigours of the scientific method.

18. The CRU team went along with the flow of the funding—at least they never publicly denounced the catastrophism of James Hansen, Michael Mann, Al Gore and our very own “climatologist in chief” Sir John Houghton, did they? They might have expressed doubts privately (at least Keith Briffa did) but on the whole as time went on they increasingly chose to decry critics as “deniers”, cranks, morons or self-serving interest groups, whilst probably thanking God for the long-term funding that came on back of the climate scare stories that would take them nicely up to retirement.

19. THIS was unforgiveable and has set back the real science by decades. The result is a whole generation of young scientists who now think they have to pretend to believe and promote the STILL unproven hypothesis of AGW. Otherwise they can expect to be subject to the dirty tricks and partisan culture revealed in the climate-gate emails to discredit and silence critics and manipulate peer—review as a process of gatekeeping in defense of orthodoxy.

20. CRU was politicised from the start of its involvement with the IPCC. A large and lucrative part of the UEA is a cottage industry of folk on the make from “climatechangeism”, swapping jobs, swapping hats, moving to and from the USA like Tom Wigley, Prof Robert Watson, and Mike Hulme. I cannot help but think that if the CRU had been in a centre of REAL academic excellence like Oxford or Cambridge that CO2-induced “climatechangeism” would have been flattened at birth before some bright media-savvy whizz-kid had the chance to get it out of the seminar room.

21. Had the giants of science like Einstein, Rutherford, Feynman or Bronowski still been around do you think this threadbare, slipshod hypothesis that “CO2 will cause runaway global warming” would have been permitted to infect the world the way it has? It would have been laughed out of court. Intellectual mediocrity is the hallmark of modern mainstream “climatology”, I’m afraid. Yet the CRU “scientists” are represented as the equals of the luminaries of the Manhattan Project or Bletchley Park struggling against time to save the world from ecological disaster in necessary secrecy from an invented “enemy”.

22. What overblown self-aggrandizement of data collection clerks and number crunchers! Most of what CRU does is just arithmetic, after all, They don’t even collect the data themselves they merely process it. It’s not exactly an abstruse methodology. But their methods are still publicly undocumented and have been shown to be unreliable and misleading. Look at the Harry Read Me file, for example, where the struggles of a CRU programmer are exposed.

23. We have to get rid of politicised climate science driven by ideologues and cheered on by well-meaning “environmentalists” probably as ignorant as I used to be. The controllers of the climate agenda at the Met Office, the Tyndall Centre and the CRU have been permitted to let inadequate models plus large helpings of ideology to govern their interpretation of reality.

24. The increasing remoteness of the Met Office weather forecasts from reality is neither surprising or unexpected! Many suspect they believe the warming bias they have fed into their models courtesy of CO2, a gas whose role at the planetary level has not been quantified despite to repeated assertion to the contrary.

25. There is so much to learn about how the climate system works in all its complexity but it has to be via value-free methods of investigation. The CRU has been funded with the public’s own money, dispensed by ideologues both public and private to back UK climate research into a blind alley courtesy of the Greenhouse Gas Mafia. Please censure those who have permitted this phoney science culture to thrive and expand.

*Are the terms of reference and scope of the Independent Review announced on 3 December 2009 by UEA adequate?*

26. No. Sir Muir Russell is not sufficiently independent of the Government/Business/Climatology Establishment. He is also compromised by his association with Scottish Power.

27. Investigation of the Climategate emails and data files is too much work for one person largely ignorant of the field since the devil is in the detail and the nuances of the emails and files.

28. A team of specialists should be appointed to work on the case, including statisticians and computer scientists who are independent of the IPCC clique and its fellow-travellers in government and funding councils and who are untainted with “AGW” partisanship. An enquiry of such world-wide importance merits nothing less.

January 2010

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#### **Memorandum submitted by Roger Helmer MEP (CRU 14)**

1. I am Roger Helmer. I am a Member of the European Parliament, representing the East Midlands Region since 1999.

2 Declaration of interest: I have no financial interest in the climate debate. But for several years I have been involved in the debate, arguing against climate alarmism and in favour of a realistic approach. I believe that current changes in climate are not exceptional compared to previous periods, and are driven largely by natural terrestrial and astronomical cycles. I do not believe there is convincing evidence of significant human impact on the climate, or that proposed mitigation efforts will have any effect. I am a former member of the European parliament’s Temporary Committee on Climate Change (now disbanded). I have published books, pamphlets and DVDs on this subject. I have organised several conferences of climate realists in Brussels, and attended such conferences in the USA and elsewhere.

3. Confidence in climate data: There has been a series of revelations which cast huge doubt both on currently available climate data, and on the credibility of the UN's IPCC. The IPCC's pin-up chart, the Hockey Stick graph, has been comprehensively debunked by independent statisticians. It is perhaps the greatest false proposition in science since the Piltdown Man hoax. More recently, the IPCC has been forced to admit that its prediction of the melting of Himalayan Glaciers by 2035 is entirely without foundation, and clearly wrong. Days later, we learned that the IPCC claim linking the increased cost of natural catastrophes with global warming was equally false. It was not peer-reviewed science, as we had been led to believe, but a recycled claim by a lobby group.

4. The CRU e-mails. The leaked CRU e-mails appear to show a deliberate and systematic attempt by leading climate scientists to falsify data, to "hide the decline", and to exaggerate warming. The CRU climate data in any case is at variance with satellite data showing a much more moderate rise in temperature. The CRU scientists are closely linked with scientists in other leading climate institutions, casting a huge doubt over the basic data which the IPCC has been using.

5. The Stern Review: In reaching its estimates of the costs and benefits of climate mitigation attempts, the Stern Review, regarded by the government as the definitive economic analysis on the issue, relies heavily on the discredited link between global warming and natural catastrophes. So the conclusions of the Stern Review, and especially the claim that the costs of inaction exceed the costs of mitigation, can no longer stand.

#### 6. RECOMMENDATIONS:

- (A) Your Committee of Enquiry should appoint a team of independent statisticians, with no established position in the climate debate, to study the source data used by the CRU, and to validate the global temperature data. Your committee should listen not only to CRU scientists, but also to those who have studied and criticised the data collection methods on which the CRU analysis is based, for example Anthony Watts ([www.wattsupwiththat.com](http://www.wattsupwiththat.com)).
- (B) Your Committee should invite Lord Stern to re-work his analysis excluding the presumed additional costs of natural disasters "caused" by climate change. It should also invite a couple of distinguished independent economists to check and comment on Lord Stern's analysis, and particularly on his choice of a discount rate to evaluate future costs.

January 2010

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#### Memorandum submitted by Stephen Prover (CRU 15)

1. I write in response to the invitation that the Committee issued on 22 January 2010 for written submissions from interested parties on three questions relating to the unauthorised publication of data, emails and documents relating to the work of the Climatic Research Unit at the University of East Anglia.

2. I reply first to the question:

*What are the implications of the disclosures for the integrity of scientific research?*

According to the annexed reports of the Times and Daily Telegraph, on 5 December the Met Office took the view that, in order to restore the integrity of the Climatic Research Unit's analysis of the temperature data, the CRU must re-analyse the data.

Later the same day, according to the annexed report of BBC News, in confused terms a Met Office spokesman denied the truth of the Times and Daily Telegraph's reports.

But I share the original view that the Met Office took on 5 December upon the implications of the disclosure of climate data from the CRU for the integrity of scientific research—that is to say for the integrity of the research that the CRU has conducted with a view to establishing the global temperature record of the past 160 years.

Namely I take the view that the disclosures have so impugned the integrity of the CRU's research that the integrity of the research can only be restored by a full new, openly conducted, reanalysis of the temperature data.

3. I reply second to the question:

*Are the terms of reference and scope of the Independent Review announced on 3 December 2009 by UEA adequate?*

1. Examine the hacked e-mail exchanges, other relevant e-mail exchanges and any other information held at CRU to determine whether there is any evidence of the manipulation or suppression of data which is at odds with acceptable scientific practice and may therefore call into question any of the research outcomes.

For full comprehension, I submit that the words "manipulation or suppression of data" in the terms of reference and scope of the Independent Review should read more extensively: 'manipulation, admission or suppression, or creation of data'.

Thus eg the “admission” of unreliable data, or the unsupportable “creation” of infilling data, are also capable, as well as the “manipulation” or “suppression” of data, of corrupting the findings of an analysis of data.

4. I declare that I have no professional, commercial or financial interest in the subject matter of the Committee’s Inquiry.

I am retired. I had a scientific education in the sixth form at school, and obtained a 2:2 degree in Natural Sciences specialising in Geology from Cambridge University. Part of the activities of my last job was to critically examine scientific and engineering motorcycle research papers.

Within the limits of my non-specialised scientific knowledge, during the last two or three years I have followed some of the debates on climate change on the internet.

When I saw the Times story of 5 December 2009, I thought with pleasure and relief that at last the issues between critical scientists, mathematicians and statisticians, such as Steve McIntyre, and the Climatic Research Unit and Met Office might be resolved in a mutually acceptable, proper scientific manner.

I was thus greatly disappointed when the Met Office reversed its position later the same day.

Correspondingly my interest in the proceedings of the Committee is the hope that the Committee, upon consideration of the evidence before it, will itself equally be disappointed with the Met Office’s action. So the Committee will recommend in its report that the Met Office project again a full new, openly conducted, reanalysis of the CRU’s temperature data.

January 2010

## Annex

### 1. *The Times* 5 December 2009:

<http://www.timesonline.co.uk/tol/news/article6945445.ece>

From *The Times* 5 December 2009

#### MET OFFICE TO RE-EXAMINE 160 YEARS OF CLIMATE DATA

Ben Webster, Environment Editor

The Met Office plans to re-examine 160 years of temperature data after admitting that public confidence in the science on man-made global warming has been shattered by leaked e-mails.

The new analysis of the data will take three years, meaning that the Met Office will not be able to state with absolute confidence the extent of the warming trend until the end of 2012.

The Met Office database is one of three main sources of temperature data analysis on which the UN’s main climate change science body relies for its assessment that global warming is a serious danger to the world. This assessment is the basis for next week’s climate change talks in Copenhagen aimed at cutting CO<sub>2</sub> emissions.

The Government is attempting to stop the Met Office from carrying out the re examination, arguing that it would be seized upon by climate change sceptics.

The Met Office works closely with the University of East Anglia’s Climatic Research Unit (CRU), which is being investigated after e-mails written by its director, Phil Jones, appeared to show an attempt to manipulate temperature data and block alternative scientific views.

The Met Office’s published data showing a warming trend draws heavily on CRU analysis. CRU supplied all the land temperature data to the Met Office, which added this to its own analysis of sea temperature data.

Since the stolen e-mails were published, the chief executive of the Met Office has written to national meteorological offices in 188 countries asking their permission to release the raw data that they collected from their weather stations.

The Met Office is confident that its analysis will eventually be shown to be correct. However, it says it wants to create a new and fully open method of analysing temperature data.

The development will add to fears that influential sceptics in other countries, including the US and Australia, are using the controversy to put pressure on leaders to resist making ambitious deals for cutting CO<sub>2</sub>.

The UN’s Intergovernmental Panel of Climate Change admitted yesterday that it needed to consider the full implications of the e-mails and whether they cast doubt on any of the evidence for man-made global warming.”

### 2. *The Daily Telegraph* 5 December 2009:

<http://www.telegraph.co.uk/earth/environment/climatechange/6732011/Scientists-may-reexamine-temperature-data-to-prove-climate-change.html>

#### SCIENTISTS MAY RE-EXAMINE TEMPERATURE DATA TO PROVE CLIMATE CHANGE

Climate scientists may re-examine 160 years of temperature data after admitting that public confidence in the reality of global warming has been undermined by “climategate”.

Published: 8:00AM GMT 05 Dec 2009

A number of climate models, based on information from weather stations around the globe, show the world has been warming gradually since the 1850s.

But the figures have been called into question following the “climategate” affair at the University of East Anglia.

Sceptics alleged that emails stolen from the Climatic Research Unit at the university show scientists were willing to manipulate data to show global warming.

They also complain that the raw data for the climate models was not made available to the public.

To try to restore public confidence the Met Office is talking to other meteorological organisations around the world about recreating the model using the same raw data but more modern computers.

The whole process will also use any new information and be more open to the public.

However, it could take up to three years for the study to complete, meaning the scientific world would have to wait until after 2012 to provide updated proof of the extent of global warming.

The UEA has launched an independent inquiry into the leaked emails and the United Nations will also be looking into the scandal.’

3. BBC News 5 December 2009:

<http://www.wsmweather.co.uk/?p=3102>

WSM Weather

[www.wsmweather.co.uk](http://www.wsmweather.co.uk)

#### MET OFFICE TO PUBLISH MAN-MADE GLOBAL WARMING DATA

by admin on Dec 05, 2009, under International News

The Met Office (MO) is to announce it will publish the raw data it uses to analyse man-made global warming.

It follows a row about the reliability of data from the Climatic Research Unit (CRU) at the University of East Anglia which has been dubbed “Climategate”.

The MO has written to 188 countries for permission to publish the historic data it says proves that the world is warming up due to man-made emissions.

A spokesman denied reports ministers had tried to block the publication.

#### *E-mail row*

The material, dating back 160 years from more than 1,000 weather stations around the world, is expected to be released this week.

It comes as an independent review is announced into leaked e-mails at the CRU in Norwich to see whether there is evidence of manipulation or suppression of data “at odds with acceptable scientific practice”.

The MO—one of the foremost global authorities on climate change—works closely with the CRU.

The MO’s database is a main source of analysis for the UN’s climate change science body, the Intergovernmental Panel on Climate Change (IPCC), which joins talks next week at the long-awaited Copenhagen summit.

An MO spokesman denied it would spend up to three years re-examining the climate change data, and said it had already planned to publish the material long before the “Climategate” controversy broke.

But the spokesman admitted the e-mail row had made the whole exercise more urgent.

Downing Street has said Gordon Brown is “unequivocal” about the scientific case for action against climate change.

Mr Brown said the climate was the “greatest challenge” facing the world.

He is one of several world leaders, including US President Barack Obama, who will attend the Copenhagen summit aimed at cutting emissions.

Story from BBC NEWS:

<http://news.bbc.co.uk/go/pr/fr/-/1/hi/uk/8396696.stm>

Published: 2009/12/05 05:31:20 GMT

© BBC MMIX’

## Notes

- (1) I am forced to rely upon a recital of the BBC News story by WSM Weather, a Weston-super-Mare weather website, rather than the BBC News story itself, because some unhelpful person in the BBC has made the link to the story in the BBC News archive that WSM Weather gives now no longer point to the story, but instead to another, unrelated story.
- (2) The Met Office denial as reported in the BBC News story seems deliberately worded so as to confuse the three-year project of a complete reanalysis of the temperature data in the audience's mind with the unrelated impending announcement two days later of the intention of the Met Office to release the temperature data for a subset of over 1500 land stations.

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**Memorandum submitted by Eric Rasmusen (CRU 16)**

(1) I am a well-known economist, specializing in law-and-economics, game theory, and the economic theory of politics. Very likely any economist you ask in the UK will have heard my name, though I am nowhere near Nobel caliber. My vitae is up at <http://www.rasmusen.org/vita.htm>. I have no financial or other relevant connection to the issue on which I am commenting.

(2) I am writing now with a comment on dealing with Climategate. I write not on what happened at East Anglia, but on a narrow point of law, politics, and procedure that may have escaped your notice. My comment is on your question:

- *“What are the implications of the disclosures for the integrity of scientific research”?*
- *“Are the terms of reference and scope of the Independent Review announced on 3 December 2009 by UEA adequate (see below)?”*

The implications of this case are that criminal concealment of scientific research data in the UK is currently nonpunishable by the government, something which no Independent Review will solve. You need a new bill to punish nondisclosure. This bill could be special to scientific data, and so would, I imagine, be within your remit.

(3) It is said that a statute of limitations prevents prosecution of people undoubtedly guilty of concealing information. I take that as given for points (4) and (5). I am deeply skeptical, however. I have seen The Magistrates Court Act 1980: section 127, which I do NOT think would apply. This looks more like the kind of excuse that would fool the public but nobody who actually looked into the law. Maybe not—but do ask the lawyers to cite chapter and verse and explain the legal concept of “tolling”.

(4) You can change the statute and prosecute the guilty parties. The US Constitution has a provision banning “ex post facto” laws, which might prevent that in the US (though not obviously—here, the change would merely involve extending the statute of limitations, rather than making an action illegal that used to be legal). You have no such constraint in the U.K. You could even use a mild form of a bill of attainder—a statute to punish one person who is morally culpable but whom the courts for reason of technicalities or favoritism won't prosecute. So go ahead and change the law, and make it retroactive.

(5) It may well be the case that some people—I do not know who exactly, but I raise this as a possibility—would like to hide behind the statute of limitations to avoid doing their duty and prosecuting this crime. If so, their dereliction should be vigorously publicized. Here is the general idea:

(6) “Mr. X admits that Mr. Y has committed a crime, and ought to be punished, but he says that unfortunately the law was drafted poorly and so punishment is not possible. I have good news for Mr. X. Parliament can change the law, and punish Mr. Y for doing what was already illegal and what Mr. Y knew was illegal but which could not be prosecuted because of a draftsman's carelessness. I trust I have Mr X's enthusiastic support for this bill, because I would not like to believe that he is merely hiding behind the technicality to avoid punishing a man he admits is guilty.”

(7) I am, as I said, an economist rather than lawyer, but I have written extensively on law, bureaucracy, politics, and the mathematics of strategy, and that is what I am writing about today.

(8) I will mention one other point which might be useful. The economists at the University of East Anglia are very well regarded in the economics profession. I know a number of them personally from my visit to Oxford a couple of years ago. If you need a reliable, honest, person within the University you could do worse than to search among them.

January 2010

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## Memorandum submitted by Phillip Bratby (CRU 17)

### EVIDENCE ON QUESTION 1

*“What are the implications of the disclosures for the integrity of scientific research?”*

#### EXECUTIVE SUMMARY

The disclosures have been examined and taken together with other published information it is concluded that the whole of climate science may have been corrupted and the results of research into climate change may be unreliable. This could put the integrity of science in general into disrepute, leading to public distrust of scientists. A truly independent examination of climate science by physicists and statisticians is necessary to determine the current state of knowledge of the climate and whether any aspect of global climate change (which has always occurred) is the result of human activities. Procedures need to be put into place to ensure full transparency and disclosure of the results of government-funded research.

#### INTRODUCTION

1. My name is Phillip Bratby. I have a first class honours degree in physics from the Imperial College of Science and Technology and a doctorate in physics from Sheffield University. I am a semi-retired energy consultant, being the sole director of my own consultancy company. I worked in the military and commercial nuclear power industry for over 33 years. Since my retirement from full-time work nearly four years ago I have researched into the physics behind the hypothesis of man-made global warming (climate change as it is now called) and how “climate science” has been conducted and I have participated in a review of the CRU emails.

2. I have no financial interest in the climate change debate. I am a scientist who has taken an active interest in the climate change debate and am very concerned about the manner in which climate science has been conducted and its implication for science in general and for the public trust of scientists and scientific results.

#### THE SCIENTIFIC METHODOLOGY

3. Science works on the basis of falsifiable hypotheses as discussed by Sir Karl Popper<sup>1</sup> “*a theory should be considered scientific if and only if it is falsifiable*”. In essence, any number of pieces of evidence can support a hypothesis, but any single piece of evidence can falsify the hypothesis, in which case the hypothesis is discarded. Climate science is one in which in-situ experiments cannot be performed and the methodology has become one of inductive reasoning to “prove” a hypothesis. In other words, the scientific methodology has been inverted in climate science; a hypothesis was framed, and then data sought to confirm it rather than to falsify it. An example of this in climate science is the creation of the “hockey stick” reconstruction of past global temperatures. This is discussed at length in “The Hockey Stick Illusion” by A W Montford.<sup>2</sup>

4. The scientific methodology requires full disclosure of data, methodologies and results so that verification and replication can be performed by independent scientists.

5. Climate science is not a hard science in the way that physics and chemistry are. Even though the climate is driven by physical processes and should be a sub-branch of physics, it appears to be a mixture of many soft sciences, practised mostly by environmental scientists with very little hard science or statistical expertise involved. In particular, most of the science, particularly at CRU, is controlled by paleoclimatologists, and in particular by dendroclimatologists. Scientists in these fields do not have the knowledge required to be experts in climate science, even though they are portrayed as such.

#### THE WORK OF CRU

6. In order to answer the question posed, it is first necessary to examine the way in which scientific integrity has been abused at CRU as revealed in the leaked emails. There are two aspects to the work of the CRU. These are firstly the reconstruction of past climate (paleoclimatology, the reconstruction of past climate from proxy data) and secondly contributions to the derivation and maintenance of a global temperature dataset (eg HADCRUT), which CRU does in conjunction with the Hadley Centre of the Met Office. The scientific integrity of both these functions is discussed below based upon detailed analysis of the unauthorised publication of data, emails and documents relating to the work of the CRU.

7. Many of the emails between CRU scientists and their overseas collaborators have been examined in detail.<sup>3</sup> Although the findings relate primarily to the CRU scientists, because of the close relationship between international climate scientists (as evidenced in the findings of the Wegman Panel Report,<sup>4</sup> which noted the presence of cliques of collaborative climate scientists), it is evident that the findings are not just relevant to CRU, but are relevant to the whole field of climate science.

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<sup>1</sup> [http://en.wikipedia.org/wiki/Karl\\_Popper](http://en.wikipedia.org/wiki/Karl_Popper)

<sup>2</sup> The Hockey Stick Illusion. A W Montford. ISBN978 1 906768 35 5.

<sup>3</sup> Climategate Analysis, John P Costella. [http://scienceandpublicpolicy.org/reprint/climategate\\_analysis.html](http://scienceandpublicpolicy.org/reprint/climategate_analysis.html)

<sup>4</sup> Congressional ad hoc Committee Report On The ‘Hockey Stick’ Global Climate Reconstruction. <http://www.uoguelph.ca/rmckitri/research/WegmanReport.pdf>

8. Examples of the way the integrity of the scientific methodology has been corrupted are given by extracts from the emails. The examples below cover four areas that will need to be addressed in the future on the implications for integrity of scientific research: data handling, computer models, peer review and FOI. These factors are inter-related.

9. The raw data that the scientists were using were not archived and were not released for independent verification and replication. Only selected data were used that confirmed the hypotheses; data that did not support the hypotheses were ignored. This selective use of data is known as cherry-picking and is alien to science. It has been likened to a drug company performing trials of a drug on 100 patients with 10 of the patients showing a recovery and 90 patients showing no improvement or harmful side-effects. If the results for the 90 patients are ignored, then the drug can be claimed to be 100% successful. The use of data in this manner is not tolerated in any science other than climate science and is totally unacceptable. Instances of fabricated data also occurred.

10. Wang, a co-author of Professor Phil Jones, Director of CRU, was accused of fraud; namely fabricating data. Prof Tom Wigley, ex-CRU director to Jones “*My guess is that it [the data] does not exist . . . Were you taking [Wang] on trust? . . . However, I am concerned because all this happened under my watch as Director of CRU and, although this is unlikely, the buck eventually should stop with me.*”. Scientific malfeasance has evidently been going on for a long time and there are no archived records as Jones admits “*A lot of this history is likely best left buried . . . finding them in CRU may be difficult! . . . I don’t think it is going to help getting the real culprit to admit putting it together, so I reckon Chris is going to get the blame.*”

11. Computer models of varying complexity were used to manipulate data. The models were not properly documented, were not archived or checked and were kept secret. Chris Folland of the Met Office “*The error arose from a pre-existing hidden software bug that the person updating the data had not realised was there. The software is a mixture of languages which makes it less than transparent.*”

12. The “*co-conspirators*” (the words of Prof Tom Wigley, ex-CRU director in an email dated June 2005) manipulated the peer-review process so that their papers were reviewed by their colleagues and so that sceptical papers were not published. This manipulation involved threats to journal editors: Jones “*I’m having a dispute with the new editor of Weather. I’ve complained about him to the RMS Chief Executive. If I don’t get him to back down, I won’t be sending any more papers to any RMS journals and I’ll be resigning from the RMS.*” Jones was asked by a journal “*Please list the names of five experts who are knowledgeable in your area and could give an unbiased review of your work. Please do not list colleagues who are close associates, collaborators, or family members*”. His response to colleagues suggested five names and included the following “*All of them know the sorts of things to say, without any prompting*”.

13. Attempts were made to avoid releasing information requested under the Freedom of Information Act. Examples are in emails from Jones: “*When the FOI requests began here, the FOI person said we had to abide by the requests. It took a couple of half hour sessions—one at a screen, to convince them otherwise*” “*All our FOI officers have been in discussions and are now using the same exceptions not to respond/advice they got from the Information Commissioner*”. “*I wouldn’t worry about the code. If FOIA does ever get used by anyone, there is also IPR to consider as well. Data is covered by all the agreements we sign with people, so I will be hiding behind them*”. “*The two MMs have been after the CRU station data for years. If they ever hear there is a Freedom of Information Act now in the UK, I think I’ll delete the file rather than send to anyone. We also have a data protection act, which I will hide behind. Tom Wigley has sent me a worried email when he heard about it—thought people could ask him for his model code. He has retired officially from UEA so he can hide behind that. IPR should be relevant here, but I can see me getting into an argument with someone at UEA who’ll say we must adhere to it!*” “*Keep this quiet also, but this is the person who is putting in FOI requests for all emails Keith and Tim have written and received re Ch 6 of AR4. We think we’ve found a way around this*”. “*Think I’ve managed to persuade the UEA to ignore all further FOIA requests if the people have anything to do with Climate Audit.*” Jones in an email headed IPCC & FOI “*Can you delete any emails you may have had with Keith. Keith will do likewise. Can you also email Gene and get him to do the same? We will be getting Caspar to do likewise.*”

#### LESSONS FROM THE DISCLOSURES

14. It is evident that there have been serious failings in the scientific research carried out at CRU and related organisations. These are in the categories of the application of quality management, scientific methodology, replication, peer-review, keeping data and methods secret and avoiding FOI requests, funding-driven science and advocacy-driven science.

15. *Quality management*: It is evident that there has been no quality control at CRU and quality control would appear to be an alien concept to CRU and many other organisations involved in climate science. Orders of magnitude more money appears to have been spent on foreign travel and expenses than on quality management. As a minimum, a Quality Management System, such as specified in ISO-9001:2008, should be used for all publicly-funded research. This should cover topics such as data archiving, development, documentation, control and use of computer codes and independent checking of calculations.

16. *Scientific methodology*: There should be clear guidelines concerning objectivity of the research. Research should be investigative rather than agenda-driven and confirmatory.



17. *Peer-review*: Peer review is a necessary part, but not the only part, in the process of publication and acceptance of a paper and it is a process that is much misunderstood. Peer review does not involve checking the paper or replicating the research and so does not mean that the paper is correct or reliable. Peer review consists solely of review by experts in the field to determine that a paper is worthy of publication. The peer-review process should be transparent. Reviewers should be anonymous to the authors and all reviewers' comments and author responses should be publicly available at the time of paper publication.

18. *Replication*: All raw and intermediate data, codes and calculations (including methodology) should be publicly archived and available prior to paper publication. This will enable checking and replication to be performed after publication and will eliminate the need for FOIA requests to obtain data and codes. Data that has been obtained on a commercial basis and cannot be released should not be used in publications.. The internet has become an incredible resource by which published papers can be independently reviewed, checked and replicated.

19. *Science funding*: Obtaining funding to expand and carry on research appears to be a dominant issue with the scientists involved. The CRU appears to be entirely reliant on external funding. The funding decision-making process should be made more transparent.

20. *Advocacy*: Publicly funded scientists should not be advocating political solutions based on their results.

#### CONCLUSIONS AND RECOMMENDATION

21. It is concluded that over at least a period of 20 years, climate science has been seriously compromised by the actions of a small group of scientists who have attempted to control the debate about climate change. The effects of this are potentially profound. For example a generation of work may have been corrupted and may be unreliable. A generation of students may have been corrupted and their work may be unreliable.

22. It is concluded that the compromised climate science in the UK is not restricted to the CRU, but extends to the Met Office, the Hadley Centre and various university departments.

23. It is recommended that all government-funded research that does not have a security implication should be opened up to full independent scrutiny. Auditable Quality Management Systems should be introduced to cover all such research and to ensure compliance.

24. It is recommended that a fully independent review of all of the climate science research in the UK that has been carried out over the past 20+ years is undertaken to determine the extent of the compromised science. The review should involve physicists and statisticians.

25. It is recommended that all measures that are being undertaken based on the compromised science are stopped until the review is complete.

26. Because the general public relies on the results of scientific endeavours being of the highest integrity, it is necessary to ensure that trust is not lost and that any scientists not practising honest science are removed from the process. How can the public trust what they are being told about scientific results that affect all aspects of their lives (eg medical research) if they believe that government-funded scientists are not completely open and honest?

27. Finally I recommend that the members of the committee read chapter 15 of "The Hockey Stick Illusion" by A W Montford.<sup>5</sup>

February 2010

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#### Memorandum submitted by Godfrey Bloom MEP (CRU 18)

1. I am Godfrey Bloom. I am a member of the European Parliament, representing the Yorkshire and North Lincolnshire region since 2004.

2. *Declaration of interest*: I have no financial interest in the climate debate. But for several years I have been involved in the debate, arguing against Climate alarmism and in favour of a realistic approach. I believe that current changes in climate are not exceptional compared to previous periods, and are driven largely by natural terrestrial and astronomical cycles. I do not believe there is convincing evidence of significant human impact on the climate, or that proposed mitigation efforts will have any effect. I am a member of the European Parliament's Economic and Monetary Affairs Committee and the Environment Committee. I have published pamphlets and DVDs on this subject. I have organised several conferences in London and Brussels and attended such conferences in the USA and Copenhagen.

3. *Confidence in climate data*: There has been a series of revelations which cast huge doubt both on currently available climate data, and on the credibility of the UN's IPCC. The IPCC's pin-up chart, the Hockey Stick graph, has been comprehensively debunked by independent statisticians. More recently, the IPCC has been forced to admit that its prediction of the melting of the Himalayan Glaciers by 2035 is entirely without foundation, and clearly wrong. Days later, we learned that the IPCC claim linking the increased

<sup>5</sup> The Hockey Stick Illusion. A W Montford. ISBN978 1 906768 35 5.

cost of natural catastrophes with global warming was equally false. It was not peer-reviewed science, as we had been led to believe, but a recycled claim by a lobby group. Material is now coming from New Zealand to show statistical corruption on a grand scale.

4. *The CRU emails*: The leaked CRU emails appear to show a deliberate and systematic attempt by leading climate scientists to falsify data, to “hide the decline”, and to exaggerate warming. The CRU climate data in any case is at variance with satellite data showing a much more moderate rise in temperature. The CRU scientists are closely linked with scientists in other leading climate institutions, casting a huge doubt over the basic data which the IPCC has been using.

5. *The Stern Review*: In reaching its estimates of the costs and benefits of climate mitigation attempts, the Stern Review, regarded by the government as a definitive economic analysis on the issue, relies heavily on the discredited link between global warming and natural catastrophes. So the conclusions of the Stern Review, and especially the claim that the costs of inaction exceed the costs of mitigation, can no longer stand.

#### RECOMMENDATIONS

- Your Committee of Enquiry should appoint a team of independent statisticians, with no established position in the climate debate, to study the source data used by the CRU, and to validate the global temperature data. Your committee should listen not only to CRU scientists, but also to those who have studied and criticised the data collection methods on which the CRU analysis is based, for example Anthony Watts ([www.wattsupwiththat.com](http://www.wattsupwiththat.com)).
- Your Committee should invite Lord Stern to explain his analysis and invite distinguished independent economists who can check and comment and cross examine him, particularly on his choice of a discount rate to evaluate future costs.

February 2010

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#### Memorandum submitted by Clive Menzies (CRU 19)

I am a director of Clive Menzies & Associates Limited, an ICT support and services company specialising in the use of free and open source software.

I am also a director of Fund Building Limited which provides marketing services for fund managers, helping them to build relationships with professional investment intermediaries and institutions. My experience includes investment and economic research in the context of fund management. I have no pecuniary interest on either side of the global warming debate.

My interest in climate change has developed within the last year. Previously, I was persuaded to the view that man-made CO<sub>2</sub> emissions were causing global warming and climate catastrophe inevitable unless action was taken to avoid it. I viewed sceptics with suspicion and as environmental philistines. However, people, who's views I respect, raised doubts which prompted me to arm myself with information to refute their challenges to the man-made global warming hypothesis.

Contrary to my expectation, the more I investigated, the more sceptical of the hypothesis I became.

Following several months of investigation, I can only conclude that structural incentives, to promote the global warming agenda and obscure the truth, exist and have prevailed hitherto. The contents of the documents and emails, leaked from the CRU, confirmed what was already becoming apparent, the man-made global warming hypothesis is founded on bad (politicised) science. My submission seeks to inform the Committee of the results of my research.

#### 1. SCOPE OF THE INQUIRY

1.1 The leaking of climate data from the Climate Research Unit at the University of East Anglia provided further evidence that the paleoclimatic science community had manipulated data and programs to make climate models fit the anthropogenic global warming (AGW) hypothesis. Furthermore, the revelation by the Information Commissioner, that the University of East Anglia had contravened the Freedom of Information Act, exposes the practices adopted to frustrate the independent peer review process.

1.2 There is however, a much larger issue: there are many international scientists who dissent from the AGW hypothesis and yet their views and research have been consistently suppressed by the IPCC, the media and politicians.

1.3 There exists a perverse structural incentive to promote the AGW agenda and anyone questioning the science has been subject to ridicule and hostility.

1.4 In December 2007, the US Senate Environment and Public Works Committee published a report detailing submissions from more than 400 prominent international scientists, many of whom were current and past participants in the UN IPCC, criticising the climate claims made by the IPCC and former Vice President Al Gore. In March 2009, the report was updated to include submissions from an additional 300

international scientists bringing the total to over 700.

[http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore\\_id=83947f5d-d84a-4a84-ad5d-6e2d71db52d9](http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=83947f5d-d84a-4a84-ad5d-6e2d71db52d9)

1.5 The Science and Technology Committee will have received submissions analysing the content of the leaked documents and emails. The emails offer at least circumstantial evidence of collusion to manipulate data and suppress dissent. Some of the documents demonstrate the woeful lack of rigour in the processes to create the climate models resulting in the now discredited hockeystick graph. The document, HARRY\_READ\_ME.txt, contains programmer's comments clearly exposing the haphazard approach to data storage, maintenance and record keeping. It shows the frustration of the programmer trying to obtain suitable data and code to produce the required result. Exposing these data, assumptions and methodologies to independent scrutiny would have undermined the AGW hypothesis.

1.6 This submission addresses the following issues:

- MBH98, the paper which produced the hockeystick graph.
- Available temperature records.
- CO<sub>2</sub>'s contribution to global warming.
- Claims of climate catastrophe.
- Suppression of dissent.
- Structural incentives to suppress the truth and the misuse of public funds.

## 2. MBH98 AND THE HOCKEYSTICK GRAPH

2.1 The 1990 IPCC Report contained a graphical representation of global temperatures during the second millennium, produced by H H Lamb (IPCC 1990 Figure 7c), which clearly shows the Medieval Warm Period (MWP) and the Little Ice Age (LIA) and that the then current temperatures fell short of those of the MWP. This accords with historical evidence of the Vikings settling and farming in Greenland from around 980AD to 1400. The onset of the LIA caused the collapse of the settlements (Jared Diamond, *Collapse*. ISBN-10: 0670033375) and Greenland has been gripped in permafrost ever since. Further confirmation of the LIA is provided by Samuel Pepys who wrote of ice skating on the Thames with Nell Gwynne in 1683 when the river and surrounding coastline froze for two months. That the globe has been warming since is neither surprising nor alarming.

<http://climateaudit.org/2008/05/09/where-did-ipcc-1990-figure-7c-come-from-httpwwwclimateauditorgp3072previewtrue/>

2.2 The 2001 IPCC Report, Summary for Policymakers, contained the hockeystick graph which showed a very different pattern of global temperatures during the same period as the HH Lamb graph in the 1990 report. This graph was output from the MBH98 study by Michael Mann, Raymond Bradley and Malcolm Hughes (Mann et al). The graph showed global temperatures oscillating within a 0.5°C range throughout the second millennium before breaking out upwards in the closing decades and trending to go much higher. There was no evidence of the MWP or LIA.

<http://www.uoguelph.ca/rmckitri/research/trc.html>

2.3 Steve McIntyre, a retired geologist with a mathematics degree, and Ross McKittrick, an economist and statistician, sought to obtain the data and methodology, used to produce the hockeystick, from Mann *et al* but were met with obfuscation and hostility. However, over time they were able to piece together a critique of the study and demonstrate that the hockeystick graph was unsupported by the evidence.

<http://www.uoguelph.ca/rmckitri/research/trc.html>

2.4 In 2005, the US House of Representatives commissioned a report from a committee led by Edward Wegman, comprising three academics, to investigate and adjudicate between the work of Mann et al and that of McIntyre and McKittrick. The Wegman Report concluded: "It is important to note the isolation of the paleoclimatic community; even though they rely heavily on statistical methods they do not seem to be interacting with the statistical community. Additionally, we judge that the sharing of research materials, data and results was haphazardly and grudgingly done. In this case we judge that there was too much reliance on peer review, which was not necessarily independent. Moreover, the work has been sufficiently politicised that this community can hardly reassess their public positions without losing credibility. Overall our committee believes that Dr Mann's assessments that the decade of the 1990s was the hottest decade of the millennium, cannot be supported by his analysis." In the body of the report, it notes of the review process: "at least 43 authors have direct connections to Dr Mann by virtue of coauthoring papers with him".

[http://republicans.energycommerce.house.gov/108/home/07142006\\_Wegman\\_Report.pdf](http://republicans.energycommerce.house.gov/108/home/07142006_Wegman_Report.pdf)

## 3. TEMPERATURE RECORDS

3.1 There are limited data sources available for global temperatures and each has their flaws requiring adjustment or context. There are surface temperature data for the last 150 years and earlier records are limited to the northern hemisphere. The temperature recording stations aren't evenly sited around the globe. Inconsistencies arose, such as in the former USSR, where cold weather subsidies created a downwards bias; once the USSR fragmented, records suffered further. The data are also affected by urban heating effects.

Originally temperature recording stations were in remote locations away from centres of civilisation. Increasing urbanisation has created a warmer local environment leading to distortion of temperature records. The effect can be quite significant. Recorded differences, between Reno and its airport some way out of the city, can be as much as 10°F.

[http://wattsupwiththat.files.wordpress.com/2008/10/reno\\_virginiastreet\\_transect\\_s2n\\_102808.jpg](http://wattsupwiththat.files.wordpress.com/2008/10/reno_virginiastreet_transect_s2n_102808.jpg)

3.2 Proxy data for temperature such as ice cores, tree rings, fossil pollen and coral reefs give us a much longer perspective on global temperatures but these are similarly flawed in various ways. Ice cores only show temperatures where there is deep ice. The width and density of tree rings vary with humidity as well as temperature (and possibly CO<sub>2</sub> concentrations too). All these proxy data are location specific and can't provide a comprehensive record of global temperatures.

3.3 Radiosonde (weather balloons) provide reasonably accurate data at the specific height at which they are set to record but again they are location specific.

3.4 Satellite data provide comprehensive global coverage and are probably the most reliable. Adjustments need to be made for orbital decay. Satellites have a limited lifespan and records from successive satellites are spliced together which can produce distortions.

3.5 History provides us with evidence of the environment in which people lived enabling us to make broad assumptions about relative temperatures.

3.6 Temperature recording is improving and becoming more reliable. On the basis of current evidence, warming over the 20th century was due to natural variability following the LIA. Global temperatures have increased since the end of the last ice age (c 16,000 years ago). Within that long term trend there are shorter cycles (MWP 1000–1400AD, LIA 1400–1800). Satellite data show the last two years as being significantly cooler than 1998.

#### 4. CO<sub>2</sub> AS A GLOBAL WARMING INFLUENCE

4.1 The UK Met Office describes the AGW hypothesis as follows: *“It is now clear that man-made greenhouse gases are causing climate change. The rate of change began as significant, has become alarming and is simply unsustainable in the long term.”* For the theory to hold true, the observable rate of temperature increase would be higher in the troposphere than at the earth's surface. The rate of temperature increase would be most noticeable in the tropics because that is where the surface would be radiating the most heat. This is what the AGW climate models predict. Yet observations, from weather balloons and satellites since 1958, have consistently shown this is not the case.

4.2 Both sides of the global warming debate agree that there is a close correlation, over the last 800,000 years, of CO<sub>2</sub> concentrations in the atmosphere with global temperatures. Furthermore it is generally agreed that hitherto, the rise in temperatures preceded the rise in CO<sub>2</sub> levels by around 800 years. However, the IPCC and the pro-global warming lobby insist that it is now CO<sub>2</sub> which is driving the rise in temperature with no hard evidence to support this illogical premise. On the contrary, temperatures rose fairly rapidly from about 1900 to 1940 but then declined until the late 1970s during a period when CO<sub>2</sub> emissions were rising in the post-war industrial boom. 95% of greenhouse gas is water vapour, CO<sub>2</sub> is a relatively minor constituent making a marginal contribution to the greenhouse system. Some studies acknowledge that rises in CO<sub>2</sub> concentrations have a warming influence but that it is logarithmic, ie. the first 20 parts per million have the most effect but thereafter the influence wanes to negligible by the time the current 388 parts per million are reached. CO<sub>2</sub> concentrations have been much higher in the past but apparently not within the last 800,000 years.

4.3 Man-made CO<sub>2</sub> accounts for approximately 3% of total CO<sub>2</sub> emissions.

4.4 Most studies indicate that CO<sub>2</sub>'s life in the atmosphere, prior being absorbed, is less than 10 years. The IPCC claims however, that CO<sub>2</sub> lingers in the atmosphere for 100 years.

4.5 CO<sub>2</sub> is beneficial for promoting plant growth which is important if we are to feed the growing global human population without destroying our environment. Dutch growers buy CO<sub>2</sub> to raise concentrations in their greenhouses to increase crop yields.

#### 5. CLAIMS OF CLIMATE CATASTROPHE

5.1 Some of the most lurid claims of global warming relate to extreme weather events. Chris Landsea, of the National Oceanic and Atmospheric Administration's (NOAA) Hurricane Research Division in Miami, resigned from the IPCC in protest over claims that extreme weather events are a direct consequence of global warming. His studies show improved monitoring in recent years is responsible for most, if not all, of the observed trend in increasing frequency of tropical cyclones. A 2007 paper by Gabe Vecchi, another climate scientist at NOAA, concluded increased wind shear from rising sea surface temperatures make it more difficult for hurricanes to form and grow.

5.2 Footage of the ice shelf crashing into Arctic Ocean makes good television but polar ice undergoes significant expansion and contraction through winter and summer. On the basis of satellite data, although there is some correlation of polar ice with global temperature, the data are inconclusive. In the last couple

of years the polar ice in the Arctic has expanded. In the southern hemisphere, there is evidence of Antarctic cooling from 1966–2000.

<http://www.uic.edu/classes/geol/eaes102/Doran.pdf>

5.3 Glacial erosion in the Himalayas has been overstated by the IPCC (as indicated by the recent reversal of the claim that Himalayan glaciers will have disappeared by 2035). The most recent studies by researchers at ETH Zurich show that in the 1940s Swiss glaciers were melting at an even-faster pace than at present. The rapid erosion is ascribed to solar radiation rather than global warming.

<http://www.agu.org/pubs/crossref/2009/2009GL040789.shtml>

## 6. SUPPRESSION OF DISSENT

6.1 The leaked emails show how the website [www.realclimate.org](http://www.realclimate.org) is used to promote the AGW hypothesis and suppress dissent. The site is registered to Environmental Media Services which is associated with Fenton Communications, a media strategy group. Regular contributors include Michael Mann and Dr Gavin Schmidt of NASA GISS. Should publicly funded scientists be blogging on a political lobbying site?

6.2 William Connelly, starting in 2003, is reported to have rewritten Wikipedia's articles on global warming, on the greenhouse effect, on the instrumental temperature record, on the urban heat island, on climate models and on global cooling. On 14 February, he began to erase the Little Ice Age; on 11 August, the Medieval Warm Period. All told, Connelly created or rewrote 5,428 unique Wikipedia articles. His control over Wikipedia was greater still, however, through the role he obtained at Wikipedia as a website administrator, which allowed him to act with virtual impunity. When Connelly didn't like the subject of a certain article, he removed it—more than 500 articles of various descriptions disappeared at his hand. When he disapproved of the arguments that others were making, he often had them barred—over 2,000 Wikipedia contributors found themselves blocked from making further contributions.

<http://network.nationalpost.com/np/blogs/fpcomment/archive/2009/12/19/lawrence-solomon-wikipedia-s-climate-doctor.aspx>

6.3 The IPCC Summary for Policy Makers, produced from the climate scientists' submissions to the IPCC reports, is a political document agreed between IPCC and officials representing the participating governments. As a result there are inconsistencies between the science and the claims in the Summary.

6.4 The IPCC implies that some 2,500 climate scientists support its claims. This paper by John McLean contains analysis of the number of contributors to the AR4 (2007) report:

[http://mclean.ch/climate/docs/IPCC\\_numbers.pdf](http://mclean.ch/climate/docs/IPCC_numbers.pdf)

Just because someone's name is on the IPCC report as a contributor or reviewer doesn't mean they are a climate scientist nor does it mean they endorse the Summary for Policy Makers' conclusions. As it says in the paper: *"Fifty-three authors and five reviewers are all that might generously be said to have explicitly supported the claim of a significant human influence on climate."*

6.5 The US Senate Minority Report in 1.4 contains references to scientists being intimidated to discourage them from speaking out publicly.

6.6 The mainstream media have failed, yet again, to hold those responsible to account. With a few notable exceptions, they participate in promoting the AGW hypothesis while ignoring, ridiculing or maligning "climate deniers".

## 7. STRUCTURAL INCENTIVES FOR FRAUD AND MISUSE OF PUBLIC FUNDS

7.1 The IPCC was specifically set up to "asses the scientific basis of risk of human induced climate change, its potential impacts and options for adaptation and mitigation." If there is no AGW, the IPCC has no raison d'être and many of those involved will lose credibility and their livelihoods. \$50 billion has been spent by governments over the last 20 years exploring and promoting global warming. Some of this money was well spent on science which improved our understanding of the climate. However, a significant proportion has been wasted by selectively funding research to support the AGW theory whilst failing to fund studies of alternative causes of climate change.

7.2 Prof Stephen Schneider, Professor of Climatology at Stanford University, lead author of many IPCC reports is reported to have said: *"We need to get some broad based support, to capture the public's imagination . . . So we have to offer up scary scenarios, make simplified, dramatic statements and make little mention of any doubts . . . Each of us has to decide what the right balance is between being effective and being honest."*

7.3 Structural incentives weigh the science in favour of the AGW hypothesis. However, one individual has been a significant factor in the momentum behind the hypothesis. In addition to the opportunity to influence the establishment and promotion of the IPCC, Al Gore has a significant interest in perpetuating the AGW myth. Not least, having invested so much emotional, political and monetary capital into the project, it is almost impossible for him to reverse his position. He is Chairman of Generation Investment Management which holds 2.63% of Chicago Climate Exchange which owns the European Climate Exchange and is seeking to dominate carbon trading globally. Carbon trading amounted to some \$140 billion in 2008; should the US adopt cap and trade policies this will be a multi-trillion dollar industry. Kleiner Perkins, in which he's a partner, has some \$1Bn invested in stocks related to the global warming agenda.

7.4 Rachendra Pachauri, Chairman of the IPCC, is similarly afflicted with conflicts of interest. Everyone who has a stake in this agenda stands to lose should the AGW hypothesis be exposed as a myth: the carbon trading and investment industry, local council climate change officers, climate change journalists etc.

7.5 Governments have poured \$billions into the climate change agenda which, if the AGW hypothesis is based on a flawed process, is misuse of public funds. For example, the UK Met Office included the discredited hockeystick graph in their Climate Change booklet widely distributed in November 2009.

## 8. SUMMARY

The leaked emails and documents from the CRU merely confirmed what was already evident, that temperature data and the methodology were manipulated to fit the AGW hypothesis. Further there was resistance to sharing information for peer review. The hockeystick graph is discredited and yet continues to be promoted by the UK Met Office. The CRU leak is tangential to the main issue; the man-made global warming hypothesis does not stand up to scientific scrutiny. There is a structural bias supporting AGW in much the same way as there existed a structural bias in the sub-prime mortgage market. We are in grave danger of making significant policy errors nationally and globally which will prejudice the lives of millions. We need to reduce reliance on fossil fuels, protect our environment and build sustainable economies but CO<sub>2</sub> is not a pollutant. CO<sub>2</sub> is a fundamental building block of life on earth. There are many ecological problems which we can mitigate and relieve; those are where we should focus our attention and resources.

*February 2010*

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### **Memorandum submitted by Dr Michael Simons (CRU 20)**

#### 1. SUMMARY

This submission relates to the implications of the CRU e-mail disclosures for the integrity of scientific research. The author submits that the evidence shows that accepted scientific standards were breached by the refusal publicly to disclose important scientific data, and also by bringing improper influence to bear on the peer review and publication processes so as to suppress contrary views. These failures of proper scientific practice were generally unchallenged, and hence tacitly condoned, by much of the scientific establishment. If the integrity of the scientific process itself is not maintained, there are profound adverse implications for the future integrity of scientific research. It is further suggested that the perception that research grants were selectively directed to units and individuals whose findings supported one particular narrative might encourage the scientifically flawed behaviour suggested by the e-mails in order to get the “correct” results.

#### 2. SUBMITTER’S BACKGROUND

I write as a (retired) professional scientist who is dismayed at the apparent perversion of the scientific process revealed in the CRU e-mails and by supporting evidence, and by the apparent complicity of the scientific establishment in this. I welcome the Parliamentary Science and Technology Committee’s examination of these matters, and trust that the committee will be able to play a part in restoring integrity to the scientific process.

I studied chemistry at Oxford and Reading Universities, qualifications PhD, MRSC, CChem. Worked for 40 years as an experimental research scientist in a major international company, collaborating with international colleagues, (USA, France, Germany) and am inventor or co-inventor of some 60 granted patents, and author or co-author of 4 peer reviewed papers (patents were main publication route, for commercial reasons).

#### 3. SUBMISSION

- (i) The scientific process is widely understood to comprise three main steps:
  - (a) A study is carried out.
  - (b) The study is published with sufficient data and procedural detail to allow independent workers to replicate the work and confirm or challenge the findings. Normally a peer review process occurs before publication, to ensure that the work as published complies with accepted professional standards in the discipline.
  - (c) Other scientists can then repeat the work, and test, challenge, or develop and build on the published findings.
- (ii) The key point is that everything must be independently verifiable, by making sufficient data available to do so. It is a tough but very effective process. If the information is not made available, it is not properly verified science.
- (iii) In the case of industrial research, a similar process is carried out within the organisation. If something is patented, it must be described in the openly published patent in sufficient detail that a skilled person can independently replicate the invention.

(iv) The CRU e-mails show concerted efforts to avoid publishing CRU data requested under Freedom of Information (FOI), these data being relevant to published papers by CRU staff. The reasons are not clear, but what is clear is that it was not for legal reasons, it was because they really did not want their data made public. E-mail 1107454306 mentioned deleting data rather than letting it go public. E-mails 1106338806, 1219239172 and 1228330629 were about ways of avoiding FOI disclosure, and e-mail 1237496573, astoundingly, discussed boycotting Royal Meteorological Society journals if the RMS continued to insist on full publication of data for papers published in their journals. (Many climate journals apparently allowed publication of papers without full publication of data).

(v) The intent of the e-mails is verified by actual refusals by CRU, for various reasons, of FOI requests, by CRU removing previously available data from its website, and by CRU claiming to have lost its original raw data (Booker, *The Real Global Warming Disaster*, Continuum International publishing Group, London, 2009, pp 347, 348. Further supporting information on Climate Audit (Steve McIntyre) and Watts Up With That? (Anthony Watts) Websites). The Deputy Information Commissioner recently announced that CRU had acted in breach of the FOI Act.

(vi) These efforts effectively to conceal data are directly contrary to the principles of science. Rather than pursuing the scientific goal of revealing the truth, they seem more directed at concealing the truth.

(vii) The e-mails also reveal efforts to control and manipulate publication of papers in the climate science journals and beyond. In e-mail 1047388489, Mann to Jones, Mann suggests boycotting the journal *Climate Research* which published a paper contrary to his views, and/or leaning on the editorial board, and Jones replies “*I will be emailing the journal to tell them I’m having nothing more to do with it until they rid themselves of this troublesome editor*”. E-mail 1051190249 also discusses bringing pressure to bear on *Climate Research* editors. In e-mail 1106322460 Mann and Wigley discuss getting rid of Saiers, an editor of *Geophysical Research Letters*, which had published a paper contrary to their views. In e-mail 1255352257 Mann discusses putting pressure on the BBC who had broadcast an item not fully conforming with their “consensus”.

(viii) Such attempts to influence the editorial policy of a journal to favour one point of view and deny publication to contrary points of view is a perversion of the principles of science.

(ix) The effects of these clearly unscientific actions and intentions are to undermine the integrity of the research work in question, work which was paid for by public funds and which has been very influential in forming policy which has enormous implications on the global economy and on mankind in general. They have also shamed British science.

(x) On the wider question of the integrity of scientific research in general, it is imperative that the principles of the scientific method are re-established, and that Parliament and the scientific establishment at large roundly and publicly condemn the malpractices as revealed by the e-mails. It is significant that non-publication of data, and also non-publication of the details of climate computer models, were implicitly condoned by sections of the scientific establishment who did not insist on publication, and this was happening well before the e-mails came to light. A few journals did insist on publication, others did not, but there was no significant objection to non-publication, nor about the secretive nature of climate science which was being used to inform very important areas of public policy. Unless openness, honest dealing and transparency are restored to science it risks becoming the tool of politicians and special interest groups, and entirely losing its credibility.

(xi) Finally, there is the question why might a scientist behave in the unprofessional ways indicated by the e-mails. There is at least anecdotal evidence (see Booker, *loc.cit.*) that climate research funding was preferentially directed to units whose findings supported one particular narrative (that there was dangerous climate warming and it was caused by man’s release of carbon dioxide to the atmosphere). Such a political influence would tend to steer ambitious unit directors in that direction to maintain their research grants, which is clearly detrimental to the integrity of scientific research.

February 2010

### Memorandum submitted by Aporia (CRU 21)

#### MEMORANDUM

1. The purpose of this submission to the House of Commons Science and Technology Committee (hereafter referred to as the “Commons Committee”) is primarily to cross-reference material already submitted under the auspices of the possibly related House of Lords Science and Technology Committee (hereafter referred to as the “Lords Committee”) call for evidence regarding the setting of research funding priorities <sup>[i]</sup>.

2. In particular, the material already submitted makes reference to Aporia’s WHiSPeRiNG GaLLeRY that serves to document some of the, as yet, possibly taken-for-granted “machinery of government” mechanisms that have been subverted in order to manipulate and suppress research data, which is at odds with the otherwise expectation of an operating environment respectful—if not immediately supportive—of due scholarly impartiality and acceptable scientific practice as against a backdrop of, *inter alia*, the Haldane Principle <sup>[ii]</sup>.

3. As at the time of making this present submission to the Commons Committee, Aporia has only just managed to engage Prof Adrian Smith directly in his capacity as Director General for Science and Research during a brief exchange following his oral evidence session with the Lords Committee on 4 February, 2010, where he stated that “there is no evidence whatsoever that the . . . starting point—which is to assess excellence and fund the most excellent research—as the starting point—that has not [sic] been subverted in any way”<sup>[iii]</sup>. During the ensuing exchange, Aporia expressly sought to kindly draw Prof Smith’s attention to the existence of the WHiSPeRiNG GaLLeRY that had already been made available to the Lords Committee by way of example, perhaps, to the contrary<sup>[iv]</sup>.

4. Aporia’s WHiSPeRiNG GaLLeRY has since been updated to openly reflect this initial exchange and the email subsequently sent to persons involved in relation to the linked data sets, in order to carefully highlight the need to distinguish between “anonymous data” and “anonymised data” with regards archival integrity of emergent public interest disclosure practices for all parties concerned<sup>[v]</sup>.

5. In the first instance, Aporia continues to make best efforts to communicate possibly related evidence to the Lords Committee in good time and in good faith, including copy correspondence of this present memorandum being submitted forthwith<sup>[vi]</sup>. In the second instance, Aporia welcomes any and all derivative requests from the Commons Committee for the same once the Lords Committee has had a chance to configure its own deliberations.

6. In this sense, Aporia notes the possible sensitivity of this present memorandum with regards the timing of the information referred to herein at this stage in the Lords Committee deliberations, and as such would suggest that it may not be in the public interest to publish this memorandum without due consideration on the part of the Committees of both Houses in conference together with Aporia, for the time being at least. At any event, Aporia reserves all rights generally.

*February 2010*

Endnotes marked [i]-[vi] to appear as follows with all online cited references having been accessed as at the day of submission on 6 February, 2010:

<sup>[i]</sup> See Memorandum to the House of Lords Science and Technology Committee by Aporia, September 2009 at <http://www.parliament.uk/documents/upload/strfAporia250909.pdf>

<sup>[ii]</sup> See Ministry of Reconstruction, *Report of Machinery of Government Committee*, December 1918, Cd 9230, p 15 at <http://ia341318.us.archive.org/1/items/reportofmachiner00greaiala/reportofmachiner00greaiala.pdf> and note the possible (missed) understanding of this particular nuance with regards the House of Commons Science and Technology Committee Putting Science and Engineering at the Heart of Government Policy, July 2009, HC 168-I, p 40 at <http://www.publications.parliament.uk/pa/cm200809/cmselect/cmdius/168/168i.pdf> which only references p 30, 34, and 35 of the same.

<sup>[iii]</sup> A recording of Prof Adrian Smith’s oral evidence session to the Lords Committee can be viewed via clicking on the “watch this meeting” link appearing at <http://www.parliamentlive.tv/Main/MeetingDetails.aspx?meetingId=5774>

<sup>[iv]</sup> Aporia’s WHiSPeRiNG GaLLeRY is openly and anonymously accessible at <http://ap0riasofar.wordpress.com> with Parliamentary Archival reference to be confirmed in due course.

<sup>[v]</sup> See WHiSPeRiNG GaLLeRY exhibit at <http://ap0riasofar.wordpress.com/2008/06/05/uidm-refinement-in-action/> and attending commentary including comment number 410 at <http://ap0riasofar.wordpress.com/2008/06/05/uidm-refinement-in-action/#comment-410>

<sup>[vi]</sup> Any and all additional material may be made available to the Commons Committee at the joint discretion of the Lords Committee and Aporia on written request.

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### Memorandum submitted by David Shaw (CRU 22)

#### 1. INTRODUCTION

Firstly I would like to declare the reasons behind my interest and my quite natural sceptical viewpoint of something that I do not see as a done deal. I’m a consultant statistician in pharmaceutical research and just about everything about the climate change approach is just not scientific; the way it is rightly applied in my discipline. I have no vested interest apart from that truth be known.

It is of course incredibly difficult to prove beyond reasonable doubt that man has any sort of role in climate change. Correlations of temperature and CO<sub>2</sub> are all there seems to be and lately that is not supported by the data (irrespective of their accuracy). Even if the correlation is positive and significant (I do not say it is) it does not infer a causal relationship, it could be the reverse causality (temperature increasing CO<sub>2</sub>), simply coincidental or that both are causally related to another unknown driving force. Whatever the relationships they are far too complex for any one man or group to comprehend.



One has to agree given the consequences that if the man-made GW hypothesis is correct that one might be forgiven for relaxing the usual burden of proof. This is however not the case as far as I can see, there is very little evidence indeed. This is often referred to as the precautionary principle. I will deal with my claims that the evidence even in such a relaxed environment does not support the hypothesis to any relaxed degree in the next sections.

It is their hypothesis therefore it is incumbent upon them to reach a level of proof (possibly relaxed from the normal levels) before we reject the null position of man not being mostly responsible. This is how it works in all walks of science apart from the widely frowned upon post-modern scientific approach. So we assume man did not do it and set about gathering evidence that he might be responsible. It is impossible to conduct randomised experimentation so observational studies are all that are possible. These types of study are strewn with confounding factors that should be rigorously investigated before concluding.

We can study changes over time in temperatures but we cannot definitively attribute those to any one source and of course as already alluded to nobody actually knows what complex system is creating those changes. Nevertheless they have occurred since time began and often far more extreme without man's intervention, in the presence of levels of CO<sub>2</sub> that today would quickly lead to a conclusion that contradicts the claimed CO<sub>2</sub> effect.

It is worth mentioning publication bias in the reporting of studies, journals are unlikely to print negative findings whilst the reverse is true of positive studies. By positive I mean that have a message rather than the null position. The peer review process, if it is at all biased may introduce further publication bias via pressure on the journals to publish what is "more" acceptable.

## 2. THE DATA AND MODELS

The response variables (y's) are the temperature measures themselves and the explanatory variables (x's) are factors that might force a change in the y's. The relationship can be simply put as  $F(y) = F(x's) + E$ ; where F's are just functions of the respective variables and E the residual error unexplained by the model. These relationships may be simple (straight line) or complex non-linear relationships. The x's may covary in a very complex fashion so that over the range of say two variables the effect of one increases or diminishes the others effect on F(y). The predictive quality of any such model depends upon accurate data as well as the specifying of a reasonable model that contains important factors. This is difficult if those factors are either unknown which many must be or deliberately ill specified or omitted. As E increases relative to the overall variability in the system the model gets increasingly unable to accurately predict. Without data to estimate what must be thousands of parameters the coefficients must be estimated from peoples beliefs and worth just that. Without data and data integrity I'm afraid any fancy model is just that, fancy but useless in describing the real world and predicting its future.

Of course if the temperature measurements are themselves not a true reflection of the real state, in some way contaminated by outside influences, then one has to ask the question what is it we are trying to predict at all. What use is there in trying to model something known contaminated by something unknown and potentially biasing? Possibly the contamination is changing over time as the need for bias becomes more and more.

The problem is incredibly complex; any data manipulation itself may bring in errors that will make the interpretation even more difficult. Data manipulation is always very well documented as it can be seen as a way of affecting results in the wrong hands and reviewers are rightly sceptical. Inclusion/exclusion of data is manipulation and the size of the exclusion seen with the UEA CRU and NASA when they calculate global temperatures is vast. Why do they do this and what is perhaps conveniently left? The first question a reviewer at say the FDA would have is why, the second would be if I did it the opposite way would I get the same answer? It would not take the magnitude of the exclusions seen with the CRU or NASA to completely switch the interpretation of the data around. One naturally then might ask the question as to whether the manipulation is designed to get the result, following on what else is designed to get the result?

Scientists are incredibly ambitious, I have worked in medical research for 25 years and have inevitably seen some quite ruthless scientists wishing to get to the top of their profession as soon as is humanly possible. That involves bending the rules if necessary.

## 3. THE BURDEN OF PROOF

In science the null position is assumed and studies indicating an alternative (man-made GW) must accrue until sufficient evidence is available to conclude in favour of the alternative. The level of evidence required is usually very high so that erroneous claims are minimised and new potentially unsafe or expensive practices are not adopted in error.

It must seem to the uneducated in such matters that the roles of the null and alternative have been reversed with climate science. It is not incumbent upon those claiming mischief in the data and analysis process to prove their claims it is for the accused to support their data and analysis. If they cannot then as with the prosecution witness (the defendant being man-made GW here) who is found not telling the whole truth that his evidence is of questionable value, possibly all of it.

This is the crux of the argument, any manipulation must be rigorously supported but we as yet see no evidence that their manipulation was supportable. I see no explanation, as a sceptical reviewer (as the FDA would be in drug research), apart from convenience. A reason based on “the data do not fit the hypothesis so must be wrong” is a circular one indeed, one that will always support the hypothesis.

Peer review has also been questioned, it was almost a closed shop where heretics were frowned upon and potentially ostracised. This is not peer review as we scientists know it, that for all its faults is an honest endeavour to get the balance right. There has consequently been no balance in the debate or the governmental support so that now we have Mr Ed Miliband labelling we scientists as “dangerous” for questioning. A very dangerous stance for our government to take.

Despite the FOI being intended to make research more open the UEA CRU have released in full 10 out of 105 requests.

#### 4. THE CASE REMAINING FOR MAN-MADE GW

This is mostly based around a warming trend recorded by several academic institutions. One being the UEA CRU and another being NASA, both have been found involved in less than supportable data processing in cherry picking sensors, a process that might in all other spheres be considered a questionable practice. It is incumbent upon any data processor to explain why they have omitted even a single measurement yet NASA today only use 1,000 of the 6,000 sensors they used in 1970—with no explanation. Year on year the sample gets smaller, why? The UEA have been accused of similar practices in the former Soviet Union and in China and by their own words have suggested that currently there are no increased trends and that’s a “travesty”. Certain countries like Bolivia have no sensors that are used in the calculation, NASA choose to use those in neighbouring countries as proxies, the neighbouring countries are of course warmer than Bolivia. Hence a biased (upwards) estimate of that countries temperature must ensue. There are numerous such examples where the manipulation is likely to drive in the desired direction.

Measurements of surface temperatures are affected by man, of that there is no doubt. One only has to watch the weather at this time of the year to see that central London temperatures are plus few degrees (or more) than the surrounds. Again this is not adequately handled, the CRU have refused FOI requests on their approach to this. Clearly a sensor next to a building that was once in a field are not comparable over time. Any potential trends in real temperature over time are confounded with urbanisation effects. It is also well documented in the US that some of the sensors in use live right next to building outlet vents. Satellite measures over the last few decades have shown little if any warming, they of course measure atmospheric values which are not open to contamination by man.

So without being able to trust the data or data processing and not knowing what we are modelling, what value have any models no matter how complex? All of this does not implicate man anyway, if the world is warming then there are far more sensible candidates that correlate far better than the small contribution man makes to the CO<sub>2</sub> level.

Their models do not fit the observed situation. A real scientist would wish to search for an explanation that his understanding of the situation is furthered. Why his hypothesis was floundering, he would plan further research and modify his beliefs not religiously seek to support the unsupportable “travesty”.

#### 5. ANECDOTAL EVIDENCE

We have other sources of information that are released to the media therefore usurping the usual scientific peer review process. Endless reassessments of the likely scenario some years down the line with only more catastrophic scenarios possible it seems. No new data are proffered just a re-estimate based on a possible rethinking of how bad things might be. These are unhelpful to the scientific process and add to the publication bias effect. Newspapers rely on extreme stories to sell and the proponents of AGW seem only to willing to furnish them with them. Mostly one will find that the new releases of reassessments of doomsday coincide with inconvenient facts that question the man-made hypothesis.

Sea levels are rising slowly and show no signs of acceleration. The worlds leading sea-level expert has been a vocal opponent of such scare stories. His research in the Maldives is very clear, he sees no effects and has written much about the limitations of studies claiming otherwise. I’m afraid once again this is all computer model guesswork. The main factor is the Antarctic ice mass and to a much lesser extent the Arctic. The Antarctic despite all the media hype is actually growing according to the University of Colorado Ice Tracking unit. Anecdotal stories from inhabitants of that part of the world would support the data that previously accessible areas are now not possible due to increased ice.

Other scare stories apparently supporting the AGW theory that the CRU is a major player in, follow:

##### *Glaciers*

Involving claims about receding glaciers (Himalayas in particular) made by the IPCC and until very recently they had denied. Of course millions in research has resulted from this blatant fakery, much of that going to the perpetrators institutions. Luckily for them the story did not unfold before Copenhagen although allegedly they were well aware of it breaking imminently. What you have to do for a peace prize

these days no doubt. The 4th assessment report (AR4) was published in 2007 but it took until a few weeks ago for the IPCC to withdraw its erroneous claim and apologise. Is this another slant on peer review perhaps?

#### *Coral reef degradation*

The Nobel winning report linked this to climate change but on closer scrutiny it appears the evidence is taken from an unsupported Greenpeace report “*Pacific in Peril*”.

#### *Hurricanes and Floods*

The IPCC AR4 claim is that global warming was leading to extreme weather events such as hurricanes and floods. This was again based on an unpublished report without any scientific scrutiny through peer review. It would seem the IPCC ignored advice not to rely on its claims.

#### *Amazon forest*

The IPCC claimed that 40% of the Amazon forests could be replaced by tropical savannah’s—their source a non peer reviewed piece of work by the WWF.

One has to ask the question as to why the CRU, NASA, WWF, Greenpeace, IPCC and now our government are relentlessly pushing AGW and cutting corners that simply should not be cut? One can only conclude it is not in the interests of science which has taken a painful wrap for this pseudo-science that is being used in its name.

### 6. THE WIDER PICTURE

It is clear that current temperatures are not at all alarming, many anecdotal events are media over egged and cannot be compared over time as our exposure to news is not comparable with even just 30 years ago. Trends in data can easily be seen, you don’t need a fancy model, and in statistical research you’re best not to rely on them. Complex models have more assumptions and often when deviations from those assumptions are present they can completely nullify the usefulness of the modelling method. If you cannot see it with your own eyes it probably doesn’t exist. The temperatures in the scheme of things (thousands of years of history) are not at all remarkable, yet we hear all the time they are. The apparent rise in temperatures between 1970 and 2000 was not remarkable one only has to go back to a similar period pre WW2 to see a very similar trend. Before that another similar period in the late 19th century, the weather is indeed cyclical as is the sun’s influence. The periodicity of those cycles is easy to pick up with passing ones eye over simple plots.

Actual measurements of surface temperature began 150 or so years ago. Estimates before this period are proxies and cannot be compared directly. A proxy measurement is a guess based on a theoretical relationship and supported by present data supporting that relationship. Mann’s hockey stick uses proxy data but when the relationship does not fit what is desired or expected real data are substituted resulting in the much acclaimed Hockey Stick. Of course the methodology is rather suspect, mixing real and proxy data as if they were as one is not usual. Other scientists looking into Mann’s methodology have concluded they would get a hockey stick by sampling random numbers.

### 7. THE FUTURE

We must stop funding this worthless research, no matter if there is any grain of truth in any of the CO<sub>2</sub> arguments. We are creating a CO<sub>2</sub> dependent economy where people will make huge amounts of money whilst CO<sub>2</sub> emissions continue inexorably upwards. That research money should be targeted on real issues facing our world. We need to ask some important questions, how the world will fair when there’s 9 billion of us, half living in squalor and willing to fight hard for ever decreasing natural resources. Their land basically dust because of years of intensive farming that have reduced their future capacity to very little.

We have wasted 25 years on this fiasco and we need to catch up with what could have been funded but for this semi-parasitic industry. Most real scientists are scratching their heads and thinking how on earth have these people got away with it for so long? How is there so very little evidence yet ‘All scientists agree’ is all we hear. Let us move onto more productive projects such as alternative fuel programmes, alternative food schemes, addressing overpopulation hopefully without the claims of eugenic type monster stories.

### 8. SUMMARY

The University of East Anglia CRU is part of a tight knit community aimed at perpetuating their futures, pontificating what will happen if we do not fund them.

There is little evidence for their alternative position and as seen by the efforts of the various protagonists any evidence is being seriously overstated.

We need to tell our Government, and particularly the energy and climate change minister, that this is not a done deal and furtherance via scientific endeavour relies completely on scepticism. To be told that is a danger is incredibly naive of Mr Miliband.

Science has suffered, details that contradict the CRUs hypothesis were covered up, they systematically hushed up the counter opinion of ‘heretics’ and usurped the peer review process, they did not let other scientists validate their work possibly breaking FOI laws. The CRU, NASA and the IPCC have all not followed the normal scientific process and so anything they produce is almost worthless.

This is truly the Emperor’s new clothes of the 21st century, a story of self interest and hubris unrivalled in modern times. I have not given the wealth of references in support of the above, they are there on the internet for all to see.

February 2010

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### Memorandum submitted by Dr D R Keiller (CRU 23)

#### BACKGROUND INFORMATION AND INTRODUCTION

By way of introduction, my name is Dr Don Keiller, I studied Natural Sciences at Cambridge University, graduating with a 2.1 in 1977. After graduation I continued my studies at Cambridge University and was awarded a PhD in 1981. Since then I have held a variety of teaching and research positions at, Leicester, Sheffield, and Staffordshire Universities and for the last 18 years worked in the Department of Life Sciences at Anglia Ruskin University, where I am Deputy Head of Department. I have published 20 peer-reviewed publications, the most recent four been about the effects of enhanced ultraviolet radiation on plant growth and development. Since concerns were first raised about the environmental effects of the “Ozone Hole”, I have taken an active interest in the science of Climate Change and was one of the individuals who used the F.O.I. Act to request data from CRU.

#### SUMMARY OF MAIN POINTS

- National Oceanic and Atmospheric Administration (NOAA)’s National Climatic Data Center (NCDC), NASA’s Goddard Institute for Space Studies (GISS) and CRU databases are not independent as they all rely on the same basic ground-station data.
- Instrumental temperature data for the pre-satellite era (1850–1980) have been so widely, systematically and unidirectionally altered that it cannot be credibly asserted what level of “global warming” has occurred in the 20th century.
- All terrestrial surface-temperature databases exhibit very serious problems that render them unfit for determining accurate long-term temperature trends.
- All of the problems have skewed the data to overstate observed warming both regionally and globally.
- Global terrestrial temperature data are compromised because more than three-quarters of the 6,000 stations that once existed are no longer reporting.
- There has been a bias towards removing higher-altitude, higher-latitude and rural stations, leading to a further overstatement of warming.
- Contamination by urbanization, changes in land use, improper siting, and inadequately-calibrated instrument upgrades, further overstates warming.
- Numerous peer-reviewed papers in recent years have shown the overstatement of observed longer term warming is between 30–50% from urban heat-island contamination alone.
- Inappropriate selection of observing sites, combined with interpolation to adjacent stations and vacant data grids, may make heat-island bias greater than 50% of 20th-century warming.
- Satellite temperature monitoring has provided an alternative to terrestrial stations in compiling the global lower-troposphere temperature record. Their findings are increasingly diverging from the ground station-based temperature records in a manner consistent with evidence of a warm bias in the surface temperature record.
- Global terrestrial climate databases are seriously flawed and can no longer be used to assess climate trends, or validate climate model forecasts.

#### DETAILED SUBMISSION

1. It is my understanding that The Science and Technology Committee will be undertaking an inquiry into the unauthorised publication of data, emails and documents relating to the work of the Climatic Research Unit (CRU) at the University of East Anglia (UEA). The Committee has agreed to examine and invite written submissions on three questions:

- What are the implications of the disclosures for the integrity of scientific research?
- Are the terms of reference and scope of the Independent Review announced on 3 December 2009 by UEA adequate?
- How independent are the other two international data sets?

As these questions will require considerable in-depth study to address correctly, I am unconvinced that any single 3,000 word submission will prove adequate. Accordingly I refer the readers of this submission to selected papers from the peer-reviewed literature and webpages, where additional background information and confirmatory detail can be obtained. There are also a number of figures (Appendix 1, page 7) which help illustrate points made in the text, however the text itself is freestanding.

2. With regards to the implications of the CRU disclosures for the integrity of scientific research, a detailed timeline and (subjective) commentary of the emails can be found here; [http://scienceandpublicpolicy.org/reprint/climategate\\_analysis.html](http://scienceandpublicpolicy.org/reprint/climategate_analysis.html). What is absolutely clear from these emails is the Professor Jones and colleagues at CRU conspired to obstruct reasonable and legitimate requests for access to scientific data. This charge has been upheld by The Information Commissioner. What these emails reveal is a detailed and systematic conspiracy to prevent other scientists gaining access to CRU datasets. Such obstruction strikes at the very heart of the scientific method, that is the scrutiny and verification of data and results by one's peers. Until all data, adjustment procedures and computer code relating to CRU's temperature records are released to the scientific community, for proper scrutiny and verification, all peer-reviewed publications whose conclusions rely on CRU's temperature records must be withdrawn as "unproven". Similarly all policy decisions based on this data and conclusions drawn from it are also unsafe, until proven otherwise.

3. Secondly there is the issue of the independence, scientific credibility and integrity of CRU's and other official temperature records. Multiple lines of evidence suggest that the various official temperature records are neither independent, nor credible. Here I draw the reader's attention to the report "Surface Temperature Records: Policy Driven Deception?" by Joseph D'Aleo and Anthony Watts, (2010). Full details are at; [http://scienceandpublicpolicy.org/originals/policy\\_driven\\_deception.html](http://scienceandpublicpolicy.org/originals/policy_driven_deception.html)

Main submission follows:

#### 4. DIVERGENCE BETWEEN SATELLITE AND GROUND-BASED TEMPERATURE RECORDS

Five organizations publish Global temperature data. Two—Remote Sensing Systems (RSS) and the University of Alabama at Huntsville (UAH)—are satellite measured datasets. The three terrestrial institutions—National Oceanic and Atmospheric Administration (NOAA)'s National Climatic Data Center (NCDC), NASA's Goddard Institute for Space Studies (GISS), and the University of East Anglia's Climatic Research Unit (CRU)—all depend on data supplied by ground stations *via* NOAA. Hence the three international terrestrial data sets are not independent. When the satellites were first launched, their temperature readings were in good agreement with the surface station data. However over the 30 years of measurement, there has been increasing divergence of satellite data from ground-based stations, which now, on average, measure some 0.2°C warmer than the satellites (Figure 1, Appendix 1). Such a difference amounts to 0.6°C per century, a figure comparable in magnitude with the total measured warming over the past 100 years. Moreover this divergence does not arise from satellite errors. (Klotzbach, P J, R A Pielke Sr, R A Pielke Jr, J R Christy, and R T McNider, 2009: An alternative explanation for differential temperature trends at the surface and in the lower troposphere. *J Geophys Res*, 114), rather a multitude of technical issues with the ground-based stations, described below.

#### 5. VANISHING STATIONS

Perhaps one of the biggest issues with the global data is the disappearance of temperature monitoring stations from the Global networks after 1990. Whilst more than 6000 stations were active in the mid-1970s, only 1,500, or less, are in use today.

Of greater concern is the observation that the stations that were dropped from the monitoring network were mainly rural and/or at higher latitudes and altitudes. This positioning tended to make them "cooler" stations, hence their removal introduced a warming bias, thus making any accurate assessment of overall warming impossible. This is demonstrated in Figure 2 which shows that the temperature average of all global stations does not fluctuate significantly until 1990, after which the average temperature jumps up at precisely the time as large-scale station drop-out. A study by Willmott *et al* (Willmott, Robeson and Feddema, 1991 "Influence of Spatially Variable Instrument Networks on Climatic Averages, *Geophysical Research Letters* vol 18, No 12, pp 2249–2251) calculated a +0.2°C bias in the global average owing to pre-1990 station closures.

#### 6. DATA ADJUSTMENTS

The leaking of emails from CRU has initiated examinations of the global datasets not only at CRU, NASA, and NOAA, but in various countries throughout the World. Though the Hadley Centre implied their data was in agreement with other datasets and was thus trustworthy, the truth is that until all data is released for verification, this can not be determined. That the datasets are in agreement is not surprising given that they are not truly independent (paragraph 4). Furthermore it is clear that adjustment and manipulation of raw station temperature data is the norm, rather than the exception. Temperature adjustments are often made that are hard to explain but, with one exception (paragraph 7), invariably increase the apparent warming. Typically a warming trend is artificially introduced to rural stations by adjusting earlier periods to make them appear cooler. Unfortunately without full access to the primary temperature data and all

adjustment procedures, the accuracy of these these adjustments is impossible to quantify. An example of such a station dataset adjustment is shown in Figure 3. According to NOAA, adjustments are made for the following reasons:

- *Time of Observation (TOBS)*: The temperature data are adjusted for the time-of-observation bias (Karl, T R, C N Williams, Jr, P J Young and W M Wendland, 1986: A model to estimate the time of observation bias associated with monthly mean maximum, minimum, and mean temperature for the United States, *J Climate Appl Meteor*, 25, 145–160.), which occurs when observing times are changed from midnight to some time earlier in the day. The ending time of the 24-h climatological day varies from station to station and/or over a period of years at a given station. The time of observation (TOB) can introduce a non-climatic bias into the monthly means.
- *Equipment Change*: Temperature data at stations that have the Maximum/Minimum Temperature System (MMTS) are adjusted for the bias introduced when the liquid-in-glass thermometers were replaced with the MMTS (Quayle, R G, D R Easterling, T R Karl and P Y Hughes, 1991: Effects of recent thermometer changes in the cooperative station network, *Bull Am Meteorol Soc*, 72, 1718–1724.). The MMTS adjustment program is supposed to debias the data obtained from stations with MMTS sensors.
- *Station History Adjustment (SHAP)*: Here the homogeneity adjustment scheme described in Karl *et al* (Karl, T R and C W Williams, Jr, 1987: An approach to adjusting climatological time series for discontinuous inhomogeneities, *J Climate Appl Meteor*, 26, 1744–1763) is performed using the station history metadata file to account for time series discontinuities due to random station moves and other station changes. The debiased data from the MMTS adjustment are then entered into the Station History Adjustment Program or SHAP.
- *Fill Missing Data (FILNET)*: Estimates for missing data are provided using a procedure similar to that used in SHAP. This adjustment uses the debiased data from the SHAP and fills in missing original data when needed (ie calculates estimated data) based on a “network” of the best correlated nearby stations. Unfortunately this algorithm can produce unusual adjustments. Witness the effect of adjustments (Figure 4) made at a high quality (Climate Reference Network, CRN = 1 <http://www1.ncdc.noaa.gov/pub/data/uscrn/documentation/program/X030FullDocumentD0.pdf>) ground station (see paragraph. 8).
- *Urban Warming Adjustment* (see paragraph. 7): The final adjustment is for a positive urban warming bias which uses the regression approach outlined in Karl *et al* (Karl, T R, H F Diaz, and G Kukla, 1988: Urbanization: its detection and effect in the United States climate record, *J Climate*, 1, 1099–1123.). The result of this adjustment provides the “final” version of the data.

Interestingly, Tom Karl, author of many of these adjustment procedures, is involved with Professor Jones in many of the CRU email exchanges. The cumulative effect of all these adjustments is approximately a one-half degree Fahrenheit warming (0.28°C) in the annual time series over a 50-year period from the 1940’s until the last decade of the century. This is of a similar order of magnitude to the total amount of warming observed (Figure 5). Whether all these adjustments work as they should remains debatable. One, correction for Urban Warming Adjustment, does not, as described below.

## 7. URBAN HEAT ISLAND (UHI) EFFECT

Weather data from cities as collected by meteorological stations are indisputably contaminated by UHI bias and land-use changes. This contamination has to be removed or adjusted for in order to accurately identify true background climatic changes or trends. In cities, vertical walls, steel and concrete absorb the sun’s heat and are slow to cool at night. Oke (Oke, T R 1973. City size and the urban heat island. *Atmospheric Environment* 7: 769–779.) found that the urban heat-island (in °C) increases according to the formula—

Urban heat-island warming =  $0.317 \ln P$ , where  $P$  = population

Thus a village with a population of 10 has a warm bias of 0.73°C. A village with 100 has a warm bias of 1.46°C and a town with a population of 1000 people has a warm bias of 2.2°C. A large city with a million people has a warm bias of 4.4°C.

This effect has been well-documented by other studies eg Goodridge (1996), Figure 6.

However the IPCC continues to rely on a single paper by Professor Jones (CRU) (Jones P D, Groisman P Ya, Coughlan M, Plummer N, Wangl W C, Karl T R (1990) Assessment of urbanization effects in time series of surface air temperatures over land. *Nature* 347:169-172) that concludes that UHI only contributes 0.05°C over the period 1900 to 1990 and this is the UHI correction that is applied to the various terrestrial temperature datasets. However more recent work (Hinkel, K M, Nelson, F E, Klene, A E and Bell, J H 2003. The urban heat island in winter at Barrow, Alaska. *International Journal of Climatology* 23: 1889–1905) shows an average 2.2°C UHI in Barrow, Alaska which has a population of 4,600. Remarkably a more recent paper by Jones (Jones, Lister, and Li, 2008. Urbanization effects in large-scale temperature records, with an emphasis on China, *J Geophys Res*, 113,) finds that UHI-related warming over China is about 0.1°C degree per decade, or 1°C degree per century, some 20 times greater than he previously acknowledged. Finally GISS sites are defined to be “rural” if the town has a population under 10,000, however, as stated above, such a classification is likely to produce a significant non-climatic warming bias in ground-station data.

Furthermore, the GISS population database is out of date and stations at cities with populations greatly exceeding 10,000 are incorrectly classified as rural. For example, in Peru there are 13 stations classified as rural. Of these, one station is located at a city with a population of 400,000. Five are at cities with populations from 50,000–135,000. Clearly current corrections for UHI in the terrestrial temperature databases need urgent review.

#### 8. INSTRUMENT SITING

According to the The World Meteorological Organization's (WMO) own criteria, which is followed by the NOAA's National Weather Service (NWS), temperature sensors should be located on an instrument tower at 1.5 metres (five feet) above the surface of the ground. The tower should be on flat, horizontal ground surrounded by a clear surface, over grass, or low vegetation, kept less than four inches high. The tower should be at least 100 meters (110 yards) from tall trees, artificial heating, or reflecting surfaces, such as buildings, concrete surfaces, and parking lots. Pielke *et al* (Pielke Sr, R A, C Davey, D Niyogi, S Fall, J Steinweg-Woods, K Hubbard, X Lin, M Cai, Y-K Lim, H Li, J Nielsen-Gammon, K Gallo, R Hale, R Mahmood, S Foster, R T McNider and P Blanken, 2007. Unresolved issues with the assessment of multi-decadal global land surface temperature trends *J Geophys Res*, 112) found that the majority of U.S. stations surveyed did not meet WMO requirements for proper siting. The average warm bias for these inappropriately-sited stations exceeded 1°C, using the NWS's own criteria. A separate, independent survey of climate stations carried out by the meteorologist, Anthony Watts, came to a similar conclusion (Figure 7). There is no reason to believe that stations outside of the U.S. are any better; in fact there is evidence (paragraph 7) that they may be worse in terms of siting and maintainance. Again current methods of correction for poorly-sited stations are inadequate.

#### 9. INSTRUMENT CHANGES

The modernization of weather stations in the United States and around the World, replaced many human observers with instruments (HO-83 Hygro-thermometer) that initially had major errors and “warm biases”. Work by Gall (Gall, R, Young, K, Schotland, R, Schmitz, J: 1992. The Recent Maximum temperature Anomalies In Tucson. Are they real or an Instrument Problem? *J of Climate*, 5, 657–664) identified that the new HO-83 thermometer had a significant warm bias, whilst Karl (Karl, T R, 1995: Critical issues for long-term climate monitoring. *Climate Change*, 31, 185.) reported a sudden jump in temperature of about 0.5°C at stations when the new thermometer was introduced. This discontinuity (Figure 8), caused by the introduction of the HO-83, was not adjusted for in the USHCN database for the period from the 1980s to the late 1990s, after which the instruments were again replaced.

#### 10. HOMOGENISATION

It has been stated (Menne, Matthew J., Claude N. Williams, Jr. and Russell S. Vose, 2009: The United States Historical Climatology Network Monthly Temperature Data—Version 2. *Bulletin of the American Meteorological Society*, in press) that “station siting errors do not matter”. However their method of analysis is flawed because when they compare, for example, urban and rural stations, they do so using “post-homogenisation” data. What this homogenisation process does is to weigh the data from one station against that of its nearest neighbours. Whilst this is, ostensibly, to fill in data gaps and eliminate discontinuities, the effect is to average out individual station data. What may have well started out as a CRN = 1 station (Figure 7) is subsumed by data from poorer quality stations (see Figures 9 and 10 for explanation). One effect is to introduce an artificial warming to rural station data from adjacent urban sites, hence any post-homogenisation comparison of station data quality is meaningless.

#### 11. SUMMARY OF CONCLUSIONS

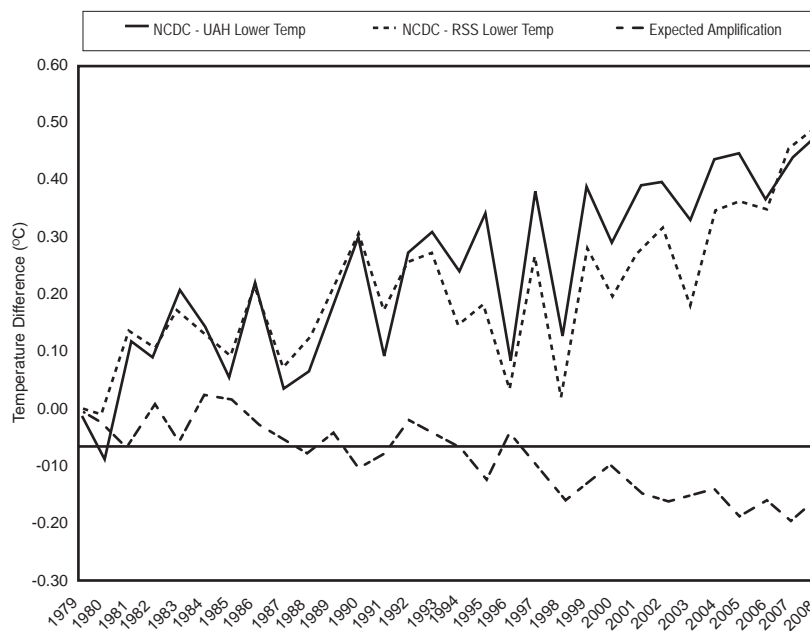
- National Oceanic and Atmospheric Administration (NOAA)'s National Climatic Data Center (NCDC), NASA's Goddard Institute for Space Studies (GISS) and CRU databases are not independent as they all rely on the same basic ground-station data.
- Instrumental temperature data for the pre-satellite era (1850–1980) have been so widely, systematically, and unidirectionally altered that it cannot be credibly asserted what level of “global warming” has occurred in the 20th. Century.
- All terrestrial surface-temperature databases exhibit very serious problems that render them unfit for determining accurate long-term temperature trends.
- All of the problems have skewed the data to overstate observed warming both regionally and globally.
- Global terrestrial temperature data are compromised because more than three-quarters of the 6,000 stations that once existed are no longer reporting.
- There has been a bias towards removing higher-altitude, higher-latitude, and rural stations, leading to a further overstatement of warming.
- Contamination by urbanization, changes in land use, improper siting, and inadequately-calibrated instrument upgrades further overstates warming.

- Numerous peer-reviewed papers have shown the overstatement of observed longer term warming is 30–50% from UHI contamination alone.
- Inappropriate selection of observing sites, combined with interpolation to adjacent stations and vacant data grids, may make heat-island bias greater than 50% of 20th-century warming.
- Satellite temperature monitoring has provided an alternative to terrestrial stations in compiling the global lower-troposphere temperature record. Their findings are increasingly diverging from the ground station-based constructions in a manner consistent with evidence of a warm bias in the surface temperature record.
- Global terrestrial climate databases are seriously flawed and can no longer be used to assess climate trends or validate climate model forecasts.

February 2010

**APPENDIX (1)**  
**FIGURES TO SUPPORT THE TEXT**

**Figure 1**  
**A COMPARISON BETWEEN SATELLITE AND GROUND-BASED TEMPERATURE TRENDS**



NCDC (terrestrial) minus **UAH (satellite: — )** and minus **RSS (satellite: - - - )**

lower-troposphere annual land temperature differences, 1979-2008. The

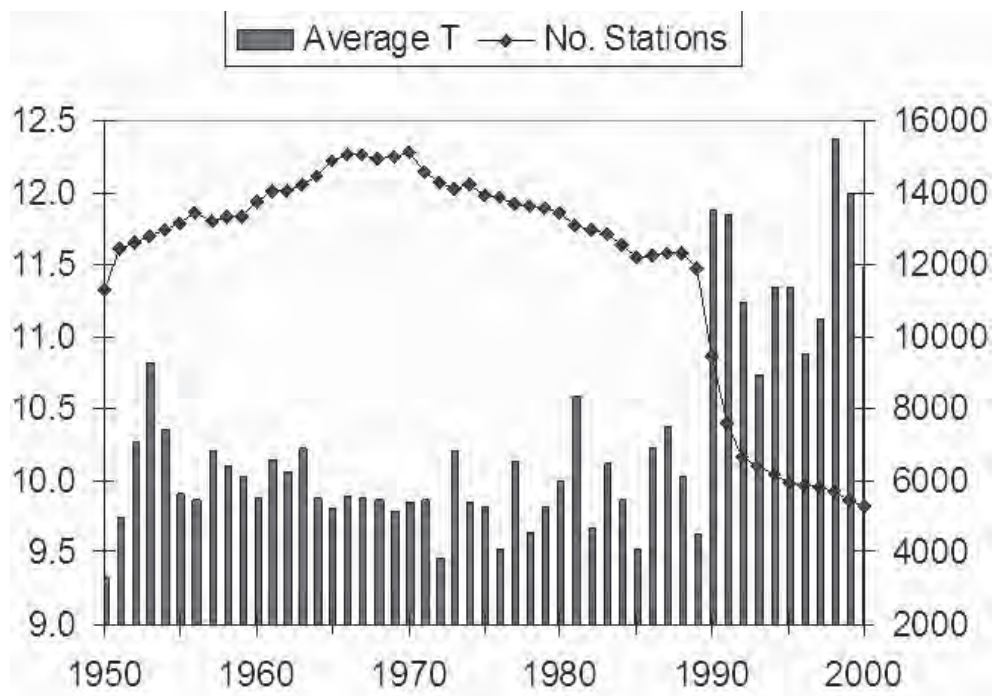
**expected difference ( - - )** given the model amplification lapse-rate factor

of 1.2 is also shown. All differences are zeroed to 1979

Note the increasingly divergent warm bias of ground-station measurements

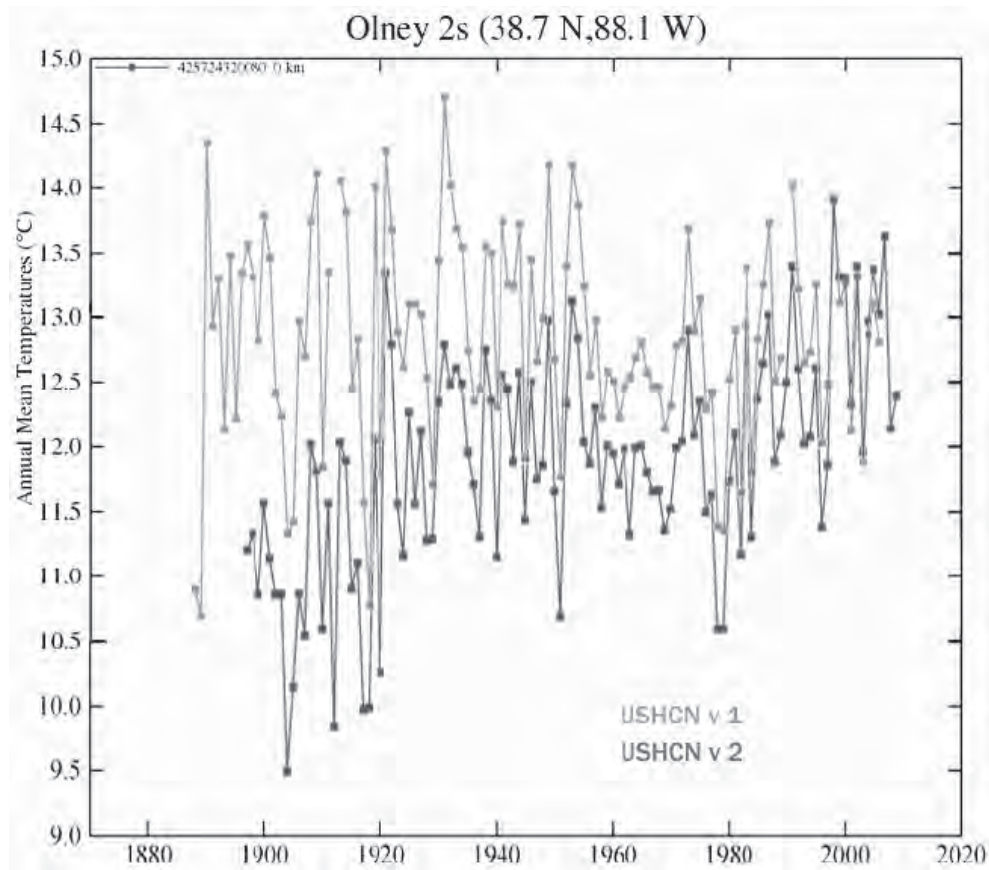


**Figure 2**  
RELATIONSHIP BETWEEN STATION NUMBERS AND GLOBAL TEMPERATURE



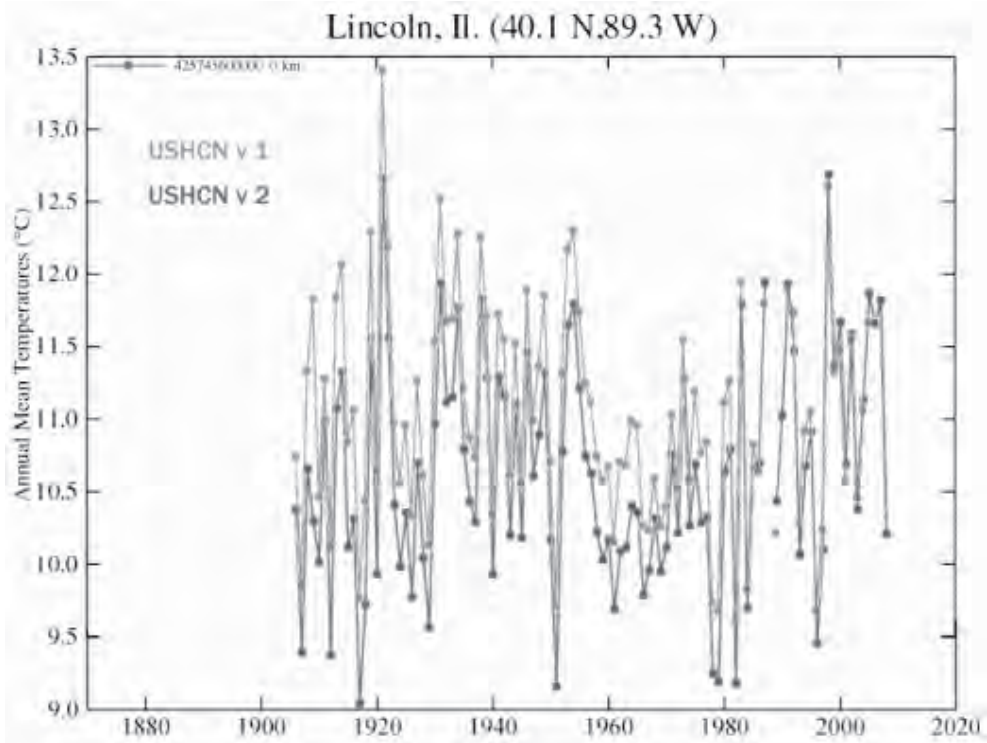
Note the step change in average temperatures that occurs as station numbers fall.

**Figure 3**  
TWO VERSIONS OF A DATASET USHCN v1 (PRIOR TO ADJUSTMENT)  
AND USHCN v2 (POST ADJUSTMENT)



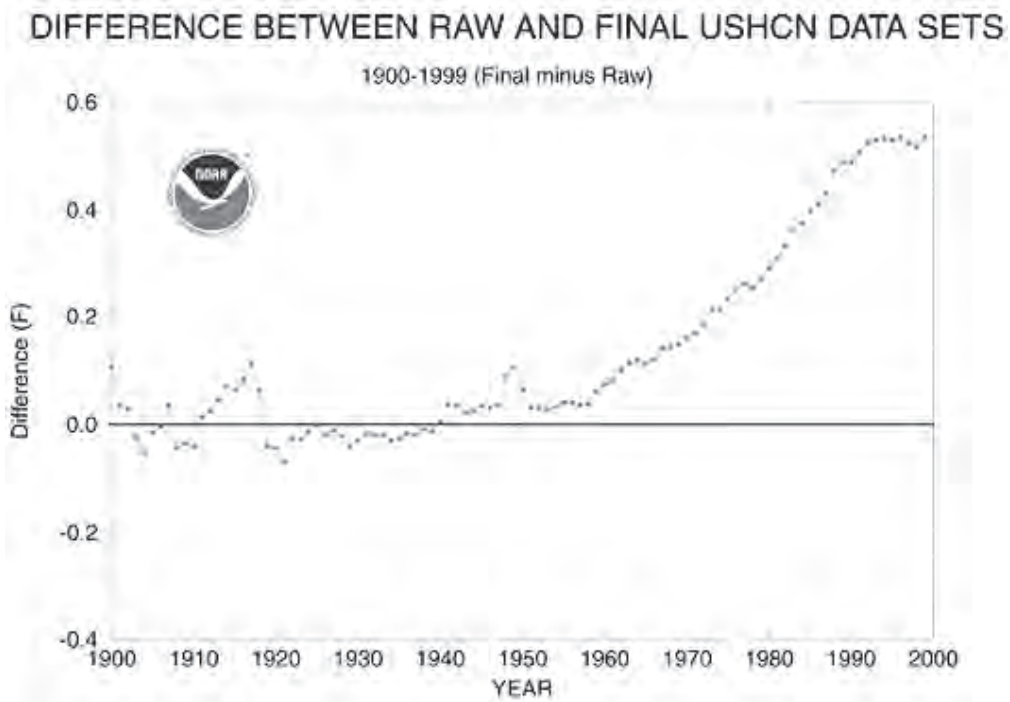
Note the marked cooling of past temperatures after adjustment.

**Figure 4**  
ADJUSTMENTS TO TEMPERATURE RECORD (USHCN v2) MADE BY “FILNET”  
COMPARED WITH ORIGINAL DATA (USHCN v1)



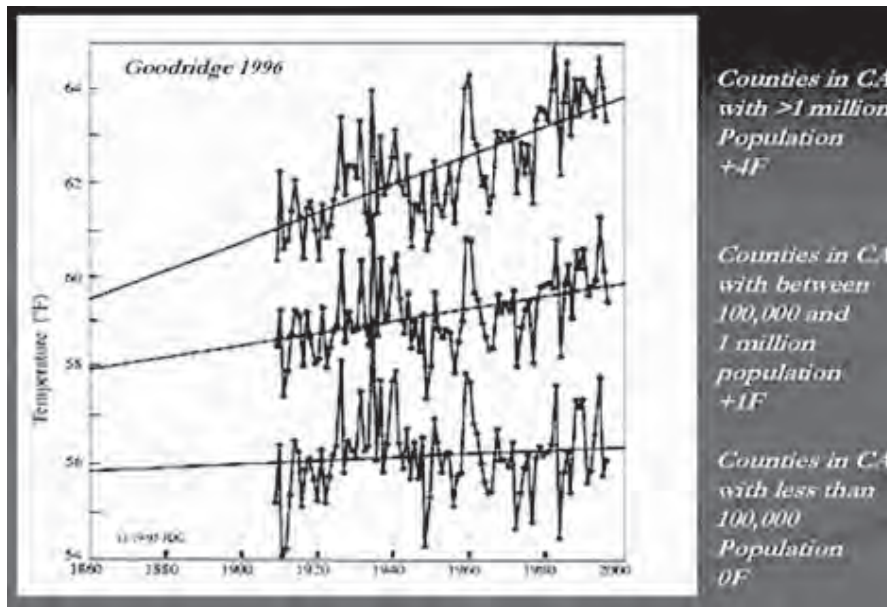
Again note the “cooling” of past temperature data.

**Figure 5**  
CULMULATIVE EFFECT OF ALL ADJUSTMENTS



Note the overall warming effect of these adjustments.

**Figure 6**  
THE URBAN HEAT ISLAND EFFECT IN CALIFORNIA (CA)

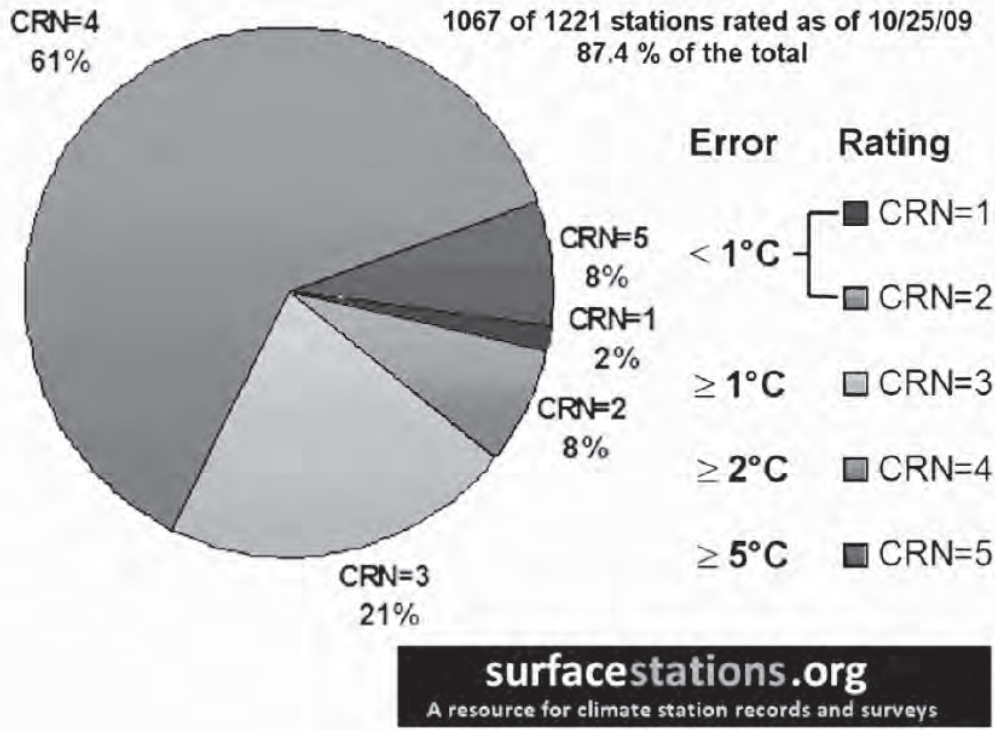


(Goodridge, J.D. (1996) Comments on "Regional Simulations of Greenhouse Warming including Natural Variability". *Bull Amer Meteorological Society* 77:1588-1599). Note increased warming in more densely populated areas.

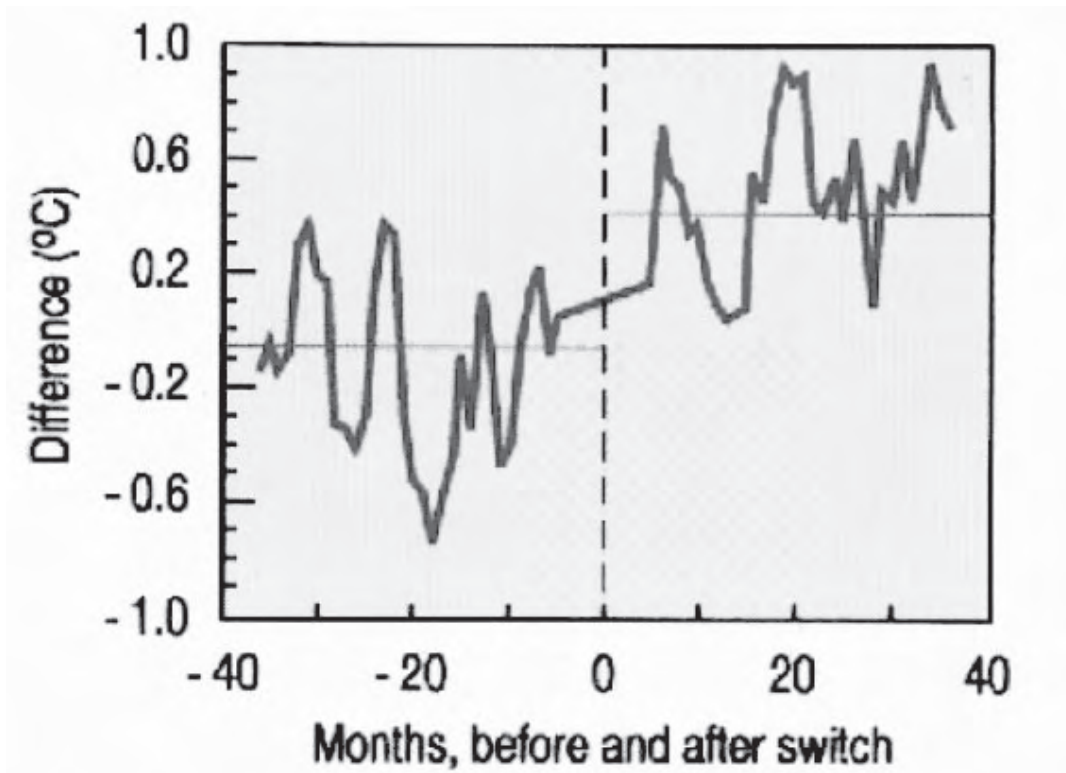
Figure 7

QUALITY ASSESSMENT OF UNITED STATES HISTORICAL CLIMATE NETWORK

### USHCN - Station Site Quality by Rating



**Figure 8**  
EFFECTS OF INSTRUMENT CHANGES



*Effects of changing from the HO-63 to the HO-83 thermometer series on maximum temperature in the United States. Source: Karl et al., 1995.*

Note the uncorrected discontinuity at the time of instrument change.

**Figure 9**

**VISUAL TABLE OF CRN STATION QUALITY RATINGS AND WHAT THEY MIGHT LOOK LIKE AS WATER POLLUTION TURBIDITY LEVELS, RATED AS 1 TO 5 FROM BEST TO WORST TURBIDITY**

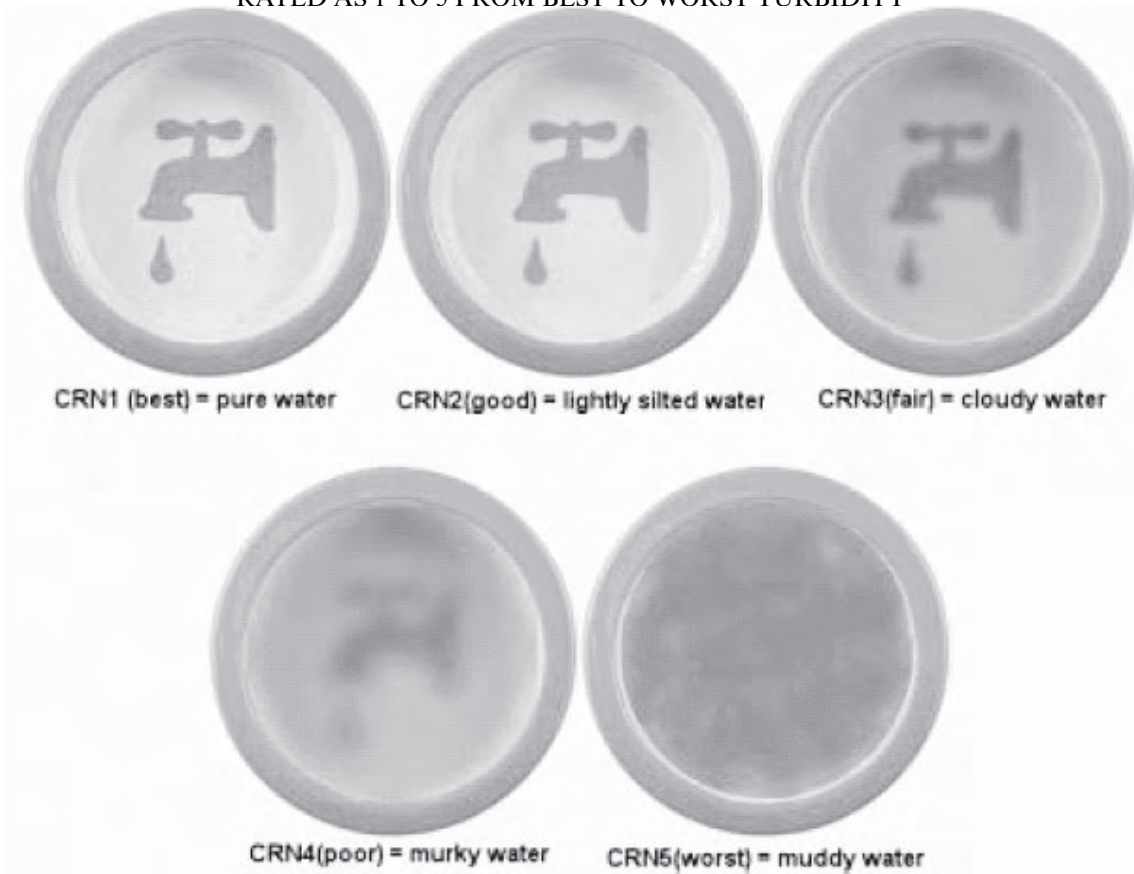
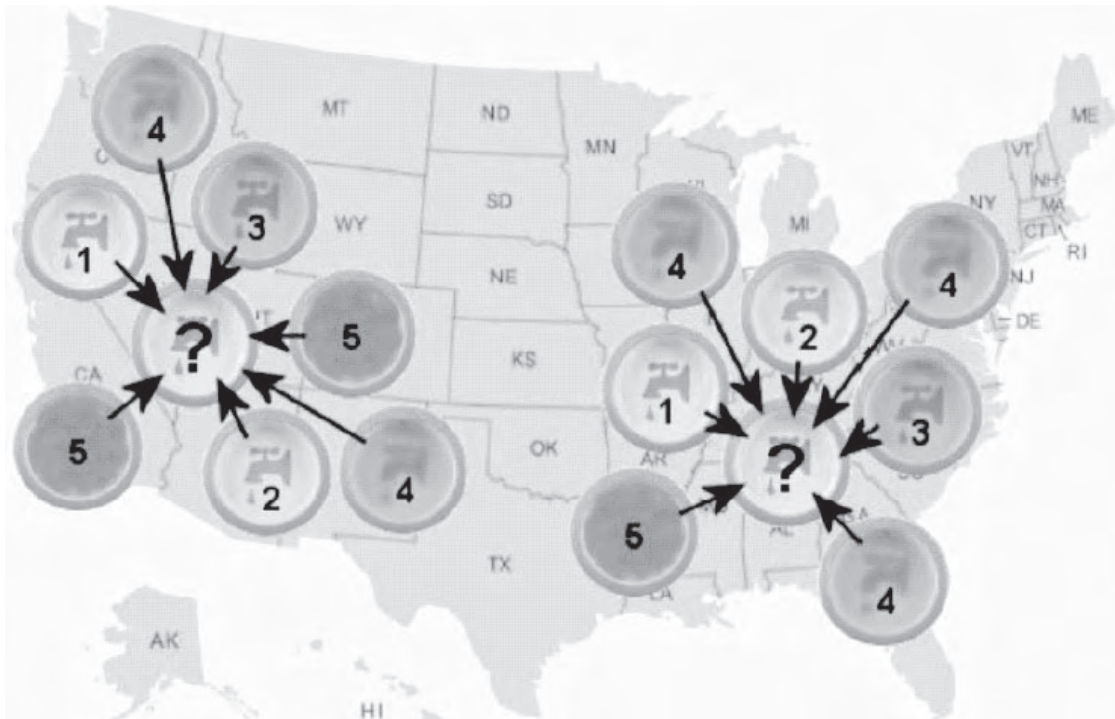


Figure 10

## THE HOMOGENISATION PROCESS

In the map below, applying a homogenisation smoothing, that is weighting stations by comparison with neighbours (often distant) results in each station producing data that would be closer to an average value based on the neighbouring stations.



## Memorandum submitted by David Holland (CRU 24)

## SUBMISSION

1. In the space available I shall only deal fully with the first of the three questions posed by the Committee regarding the implications of the release of the UEA emails. However, on the second, in regard to UEA's own enquiry, I would hope it would review the many breaches of the DPA and call for written and oral evidence from those named. On the third, regarding temperature datasets, if those using land based stations are being referred to, my answer would be, not sufficiently, and I am sure others will explain why.

2. The emails show that a group of influential climate scientists colluded to subvert the peer-review process of the IPCC and science journals, and thereby delay or prevent the publication and assessment of research by scientists who disagreed with the group's conclusions about global warming. They manufactured pre-determined conclusions through the corruption of the IPCC process and deleted procedural and other information hoping to avoid its disclosure under freedom-of-information requests.

3. The Committee should note that, despite the longstanding instruction from world governments in the Principles Governing IPCC Work<sup>6</sup> that its work should be open and transparent, only on the most recent AR4 IPCC Reports do we have any information on the assessment process and then only well after its publication. Only because of freedom of information requests by Canadian Stephen McIntyre, do we now have online the draft text that was sent out to Government and Expert Reviewers together with most of their comments and the Lead Authors' responses.

4. In 2007 I published a paper "Bias and Concealment in the IPCC Process"<sup>7</sup> in which I described the then known facts about scandals similar to, but far more important than that of the Himalayan glaciers. A reprint of this paper and one I presented at the October 2009 University of York Climate Week accompanies this submission, together with a folder of the UEA/CRU emails that I will refer to by number and an Appendix with other documents. With my submission these provide conclusive evidence of the wrongdoing I first described in 2007.

<sup>6</sup> <http://www.ipcc.ch/pdf/ipcc-principles/ipcc-principles>

<sup>7</sup> Holland, David (2007): Bias and Concealment in the IPCC Process: The "Hockey-Stick" Affair and Its Implications, Energy and Environment, 18 (7 & 8).951–983. [http://meteo.lcd.lu/globalwarming/Holland/Bias\\_and\\_Concealment.pdf](http://meteo.lcd.lu/globalwarming/Holland/Bias_and_Concealment.pdf)



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 THE HISTORIC TEMPERATURE RECORD SCANDAL

5. The emails cover the period from March 1996 just after the IPCC Second Assessment Report to November 2009. They chart the efforts by a small group to establish as a scientific certainty that the slight warming, which had then only been apparent for just over 15 years, was exceptional compared with pre-industrial times.

6. The IPCC's First Assessment Report had concluded that, because it had undoubtedly been warmer in earlier epochs with lower concentrations of carbon dioxide, it was not possible to say what part increased concentrations were playing in current warming. The suggestion that all might not be well came only from the emerging climate models run on computers.

7. The 1995 IPCC Second Assessment Report (SAR) said only that Palaeoclimate "work in progress" suggested that warming might be exceptional, but the scientists were even more confident of the alarming predictions of their models. Several Expert Reviewers strongly disagreed and insisted upon strong cautions in the text.

8. However, allegedly<sup>8</sup> under instructions from Sir John Houghton, who in turn was responding to a letter from the US State Department, UEA's illustrious alumnus Ben Santer deleted the cautions and precipitated a major dispute. This led to some dissenting scientists shunning the process. It also resulted in the addition of "Review Editors" to the IPCC assessment process.

9. However, as the recent Himalayan matter shows, this was ineffectual as Appendix A<sup>9</sup> to the IPCC Principles states that the lead authors have the final say over the text and the Review Editors are only required to submit a "written report" to the working group, who just filed them, or the Panel, who never ask for them.

## MANN "COMES ABOARD"

10. After the SAR, the hunt was on for proof that the Mediaeval Warm Period did not exist on a global basis. In email 0926010576, on 6 May 1999 Mann tells Jones that, despite some differences he is "on board" and that they are "all working towards a common goal". However, in September 1999 in email 0938018124 Briffa is not so sure and stated:

*"I know there is pressure to present a nice tidy story as regards 'apparent unprecedented warming in a thousand years or more in the proxy data' but in reality the situation is not quite so simple. We don't have a lot of proxies that come right up to date and those that do (at least a significant number of tree proxies) some unexpected changes in response that do not match the recent warming. I do not think it wise that this issue be ignored in the chapter."*

*"I do not believe that global mean annual temperatures have simply cooled progressively over thousands of years as Mike appears to and I contend that that there is strong evidence for major changes in climate over the Holocene (not Milankovich) that require explanation and that could represent part of the current or future background variability of our climate."*

11. Despite his misgivings Briffa was persuaded to stay on board and learnt to "hide the decline" in email 0942777075. The 1998–99 Mann *et al.*<sup>10</sup> "hockey stick" was shown in the 2001 IPCC Third Assessment Report (TAR) as proof that it had never been warmer and was used mercilessly to suggest that it was caused by human activity.

## MANN DISCREDITED

12. The "hockey stick" was comprehensively discredited by a succession of peer-reviewed papers from McIntyre and McKittrick. As a consequence of Mann's refusal to disclose his methodology, in 2006 two Committees of the US House of Representatives investigated his work and commissioned studies from the National Research Council<sup>11</sup> of the USA and Wegman *et al.*<sup>12</sup> Both reports vindicated McIntyre and McKittrick, despite "team" efforts in email 1142469228 to get the NRC to water down their conclusions, particularly on the divergence problem now popularised as "hide the decline".

13. The Lead Authors of WGI Chapter 6 of the most recent 2007 IPCC Fourth Assessment Report (AR4) realised that unless they could disprove the work of McIntyre and McKittrick they could not claim recent warming to be exceptional. Caspar Ammann and Eugene Wahl were entrusted with writing two papers to this end.

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<sup>8</sup> [http://www.heartland.org/custom/semod\\_policybot/pdf/22159.pdf](http://www.heartland.org/custom/semod_policybot/pdf/22159.pdf) .See also Edwards, P and S Schneider (1997). "The 1995 IPCC Report: Broad Consensus or 'Scientific Cleansing'". *Ecofable/Ecoscience*, 1:1 (1997), pp. 3–9. <http://www.si.umich.edu/~pne/PDF/ecofables.pdf>.

<sup>9</sup> <http://www.ipcc.ch/pdf/ipcc-principles/ipcc-principles-appendix-a.pdf>

<sup>10</sup> Mann, M E, R S Bradley and M K Hughes, 1998: Global-scale temperature patterns and climate forcing over the past six centuries. *Nature*, 392, 779–787.

Mann, Michael E, Bradley, Raymond S, and Hughes, Malcolm K. (1999) "Northern hemisphere temperatures during the past millennium: Inferences, uncertainties, and limitations," *Geophysical Research Letters*, 26(6), 759–762.

<sup>11</sup> NRC, 2006: Committee on Surface Temperature Reconstructions for the Last 2,000 Years, (2006) National Research Council, National Academies Press. [http://www.nap.edu/catalog.php?record\\_id=11676](http://www.nap.edu/catalog.php?record_id=11676)

<sup>12</sup> Wegman E, Scott D and Said Y, (2006): "Ad Hoc Committee Report On The 'Hockey Stick' Global Climate Reconstruction", [http://republicans.energycommerce.house.gov/108/home/07142006\\_Wegman\\_Report.pdf](http://republicans.energycommerce.house.gov/108/home/07142006_Wegman_Report.pdf)

14. However the Wahl and Ammann paper, which the Lead Authors intended to use, did not meet the published deadline in the timetable<sup>13</sup> for the assessment, by which papers had to be “in press” with final preprints available. By the WGI guidelines,<sup>14</sup> of the time, all references to it had to be removed. The paper was not published until after the IPCC Report itself.

15. As in the case of the Himalayan glaciers, Expert Reviewers and the Government for the United States of America challenged the Wahl and Ammann paper. Inexplicably, the Lead Authors contradicted their comments stating, without explanation, that the paper did meet the guidelines. The public however, as with the Himalayan matter, could not know this until too late.

16. A further problem with the Wahl and Ammann paper was that it relied, for its most important claim, upon a second paper by the same authors that was not even accepted for publication until after the IPCC Report itself was published. Its methodology was not published until August 2008. The reliance on this paper was also disputed in the comments. The response to these comments was to make assertions on statistical tests unsupported by reference to any peer-reviewed study.

17. At the time of writing my 2007 paper the “in-press” deadline issue was a mystery and I made Freedom of Information requests, first to Defra for the Review Editor’s report of John Mitchell, the Met Office Chief Scientist. Defra, which was the IPCC “focal point” and also paid Mitchell’s expenses, had no copies of any reports. In December 2007 Mitchell claimed not have a copy of his own report and emailed to suggest that I wrote to the TSU, for which he also claimed not to have an email address, which was soon to prove untrue.

18. Forwarding the copy of Mitchell’s email secured the scanning and release to me, one by one all of the WGI reports and the email correspondence leaves no doubt that no government ever asked for or saw any of them

19. Mitchell’s report raised more questions than it answered and on 22 February 2008 I asked further detailed questions of Mitchell. I also wrote to a second British Review Editor, Sir Brian Hoskins at Reading on 8 March. Though I did not learn of it until much later, Mitchell quickly found the email address for the TSU and sent my email to Susan Solomon, the WGI Co-Chair, and asked for “the IPCC” to answer. On 14 March, Solomon emailed back<sup>15</sup> telling Mitchell to answer himself but not to divulge anything not already in the public domain.

20. Solomon sent copies of her email to all 22 WGI Review Editors, including Hoskins and Miles Allen at Oxford, who I did not write to until 5 May. She also copied Keith Briffa and Renate Christ, the IPCC Secretary. Thus, before I had made any request to UEA/CRU they were put on notice not to make any disclosures.

21. I went on to make requests of the five public authorities involved in the IPCC assessment process: Defra was the IPCC “focal point” but professed total ignorance; the Met Office and the Universities of Reading and Oxford supplied Review Editors to supervise the assessment; the University of East Anglia Climatic Research Unit (UEA/CRU) provided Lead and Contributing Authors.

22. Email 1219239172 makes it clear that resisting my request and those of others became a preoccupation of the Met Office, UEA/CRU and Reading.<sup>16</sup> Oxford simply did what Susan Solomon directed.<sup>17</sup>

23. On 9 May in email 1210367056, Jones sends my formal information request to “team” members Mann, Hughes and Ammann. He writes:

*You can delete this attachment if you want. Keep this quiet also, but this is the person who is putting in FOI requests for all emails Keith and Tim have written and received re Ch 6 of AR4. We think we’ve found a way around this.*

24. On 24 May,<sup>18</sup> McIntyre explained, at ClimateAudit.com, matters that were not previously known to most people. In particular that Briffa’s response to one particular Expert Reviewer’s comment could only have been cribbed from the unpublished paper of Ammann and Wahl which had not been cited or reviewed in WGI assessment and was not at the time accepted anywhere for publication.

25. On 25 May 2008,<sup>19</sup> McIntyre also explained that to circumvent the rules, which should have prevented the paper of Wahl and Ammann from being cited, WGI which was under Susan Solomon’s direct control, retrospectively revised the deadline for papers to be in press from 16 December 2005, which was before the start of the Government and Expert Review period on the second draft, to 24 July 2006, which was almost two months after the review period. One important stipulation however was that the papers had to be published in 2006.

<sup>13</sup> See Appendix (1) or [http://ipcc-wg1.ucar.edu/wg1/docs/wg1\\_timetable\\_2006-01-20.pdf](http://ipcc-wg1.ucar.edu/wg1/docs/wg1_timetable_2006-01-20.pdf)

<sup>14</sup> See Appendix (2) This document has subsequently been deleted from the WGI server.

<sup>15</sup> See Appendix (3) for Dr Solomon’s email.

<sup>16</sup> See Appendix (4) for an email from Sir Brian Hoskins, which attests to this.

<sup>17</sup> See Appendix (5) for Oxford’s Registrar’s Letter

<sup>18</sup> <http://climateaudit.org/2008/05/24/the-dog-that-didnt-bark/>

<sup>19</sup> <http://climateaudit.org/2008/05/25/wahl-and-ammann-2007-and-ipcc-deadlines/>

26. As a consequence, many papers not previously discussed or reviewed by the Government and Expert Reviewers were added the draft after the review period. Since it was not and was never likely to be published in 2006 the Wahl and Ammann Paper failed even this improper breach of the rules, as did several other papers in various chapters of WGI.

27. The email and memo<sup>20</sup> were exceptionally cleverly worded to make what the TSU were doing seem perfectly proper, but it utterly destroyed any claim that the WGI Report was Reviewed by Experts and fundamentally invalidated the IPCC assessment process.

28. In email 1155402164 dated 12 August 2006, Ammann tells Briffa he can't guarantee publication. The "smoking gun" however, is in email 1189722851. On 12 September 2007 after the paper is finally published Jones confirms that the deadline change to July 2006 was to get the Wahl and Ammann paper into the report. He writes:

*You likely know that McIntyre will check this one to make sure it hasn't changed since the IPCC close-off date July 2006!*

29. The changed deadlines did however invite Expert Reviewers to also suggest papers to "improve the balance". McIntyre suggested<sup>21</sup> NRC, 2006 and Wegman et al., 2006. His comment was acknowledged by the TSU but has never been published by them, contrary to Appendix A of the IPCC Principles.

30. Armed with this new information on how Wahl and Ammann was smuggled into the IPCC Report, on 27 May 2008 I wrote to both UEA and the Met office with a detailed specification of what I was looking for. In particular I wanted all email discussion of the Wahl and Ammann paper and any suggestions of extra papers to be cited as a result of the revised deadline. The same day Tim Osborn in email 1211924186 asked Caspar Ammann if his emails were confidential. Ammann replied that he would look but began:

*Oh MAN! will this crap ever end??*

31. In email 1212009215 on 28 May, Jones and Osborn discuss with David Palmer the FOI officer and Michael McGarvie, the Senior Faculty Manager, how to deal with my enquiry. There is no "presumption of disclosure", only a discussion of how not to disclose.

32. On 29 May 2008 in email 1212063122 Jones asks Mann:

*Can you delete any emails you may have had with Keith re AR4? Keith will do likewise. Can you also email [Eu]Gene [Wahl] and get him to do the same? I don't have his new email address. We will be getting Caspar [Ammann] to do likewise*

33. Three days after Jones asked Mann to delete all AR4 emails, the Met Office wrote to me with the third of four false statements they made before finally admitting to holding the data I had requested. On this occasion, whether by coincidence or not, they also claimed the information was deleted.

34. The Met Office, UEA/CRU, Reading and Oxford, in my view acting in concert, all refused to accept that *any* of the Information, which I requested was subject to the Environmental Information Regulations 2004 which include a presumption for disclosure. Instead, and by agreement they misused the confidentiality exemptions of the Freedom of Information Act 2000 and in the case of the Met office and UEA/CRU used the Ministerial veto of section 36 for good measure.

35. The emails released from UEA/CRU do indeed contain much of what I was asking for and prove my assertion that the WGI assessment was corrupted. In email 1147982305 Professor Neil Roberts of Plymouth makes some suggestion for improving the draft text of Chapter 6. Roberts says Briffa had told him it would be simpler if he made direct contact. Coordinating Lead Author Jonathan Overpeck writes back:

*We've been asked to keep everything squeaky clean, and not to get comments informally.*

He tells Roberts that he is getting the TSU to add him as an official Expert Reviewer and to put in his comments. Roberts was indeed added and made his comments.

36. The email was copied to Briffa who should have been well aware of the rules anyway but there is abundant evidence in the emails that Mann dealt directly. In email 1153470204 we find Briffa writing to Eugene Wahl, who is not an officially listed Expert Reviewer:

*I am taking the liberty (confidentially) to send you a copy of the reviewers' comments (please keep these to yourself) of the last IPCC draft chapter.*

Not only had Briffa asked Wahl to help him write the section<sup>22</sup> to discredit McIntyre and McKitrick, but also he is sent their comments to Wahl, whose paper they criticised, for him to answer.

37. In email 1154353922 is further evidence that the additional comments that I was asking for were indeed sent by the TSU via Overpeck, which should have included one from McIntyre. UEA/CRU recently confirmed that this email was deleted but is held by the police in the backup server. The email also confirms that the grossly improper extension to the review stage was decided at Bergen, when the Lead Authors first considered the Reviewers' comments calling for the removal of all references to the Wahl and Ammann paper.

<sup>20</sup> See Appendix (6) (7) for email and memo changing "in press" deadline

<sup>21</sup> See Appendix (8) (9) for Stephen McIntyre's comment to TSU and their reply

<sup>22</sup> See Appendix (10) for further analysis of this matter by Stephen McIntyre.

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**CONCLUSIONS**

38. Regrettably, the reputation of a significant number of climate scientists is irreparably damaged both, in the eyes of the general public and other scientists in different fields. Climate science generally but to some extent all science will be tarred with the same brush.

39. The recommendations I made in my 2007 paper remain valid and urgent.

40. Reproducibility is a more important standard than peer-review for policymakers. An open, transparent and reproducible paper, whether peer-reviewed or not, will be falsified if wrong before it can influence any policy. The faulty peer-reviewing, combined with lack of disclosure of the “hockey stick” and IPCC reports, has shielded them for years from legitimate challenge.

41. The British government needs to take responsibility, with others, for the Intergovernmental Panel on Climate Change, which with them it jointly owns. As in any business failure, the fault lays with the owners not the part time unpaid volunteer workers that get carried away with their idealism and zeal.

42. Disgracefully, Defra claimed<sup>23</sup> to have no right to see the IPCC working papers, despite specific provisions in Appendix A to the IPCC Principles. The government should have invited the public to scrutinise drafts, Expert Comments and Lead Authors’ Responses online, before accepting the Report. The many and varied eyes would not have let the errors pass.

43. At the forthcoming 32nd Session of the IPCC in October, the Government should honour its undertakings to promote the Aarhus Convention principles in that organisation after having conducted a proper public consultation on the matter, as required by the Convention.

**APPENDICES<sup>24</sup>**
**A—DOCUMENTS REFERRED TO IN THE SUBMISSION**

The documents in this appendix, numbered 1 to 11 are referred to in the submission document.

- 1 Working Group One Timetable. Created 20 January 2006
- 2 Deadlines for literature cited in the Working Group I Fourth Assessment Report. Created 1 June 2005
- 3 Dr Susan Solomon’s email to Prof. John Mitchell and others. Dated 14 March 2008
- 4 Email sent by Sir Brian Hoskins to the University of Reading Information Officer dated 15 July 2008
- 5 Letter sent by Registrar of the University of Oxford to David Holland 13 January 2009
- 6 Email sent by Working Group One Technical Support Unit to all Expert Reviewers on 4 July 2006
- 7 Attachment to 4 July 2006 Email “Guidelines for inclusion of recent scientific literature in the Working Group I Fourth Assessment Report”. Created by Dr Martin Manning 1 July 2006
- 8 Review comment submitted by Stephen McIntyre dated 24 July 2006 13
- 9 TSU acknowledgement of McIntyre email dated 25 July 2006 14
- 10 Note from Stephen McIntyre to Channel 4 News concerning the answer Prof. Briffa gave in response to Channel 4 intended criticism of Briffa’s actions in 2006 during the IPCC WGI assessment process.
- 11 Letter from Defra to David Holland dated 15 May 2008 25

**B—EMAILS DISCLOSED BY UEA REFERRED TO IN MY SUBMISSION**
**C—REPRINT OF “BIAS AND CONCEALMENT IN THE IPCC PROCESS”**
**D—COPY OF PAPER PRESENTED TO “CLIMATE WEEK” AT THE UNIVERSITY OF YORK OCTOBER 2009.**

*February 2010*

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**Memorandum submitted by Ronald K Bolton (CRU 25)**
**SUMMARY**

1. I discuss the CRU’s apparent faking of scientific reports for the UN, as disclosed by leaked documents. This incident, called “Climategate”, has generated massive shockwaves around the world for one reason only: that it is yet another indication of the colossal fraud behind global warming.

2. It is now beyond reasonable doubt that the only people supporting AGW are those who have a financial or career interest in supporting it or who are not aware of the real evidence.

3. The CRU’s actions can only be understood by realizing that AGW is a fraud. I explain AGW and that scientific evidence to support AGW is non-existent or faked, and the reasons this fraud is perpetrated.

4. I comment on the questions the committee raise, and I make recommendations.

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<sup>23</sup> See Appendix (11) for Defra letter.

<sup>24</sup> Not printed.

## INTRODUCTION

5. I am a retired Public Health Inspector/Environmental Health Officer. In addition to the scientific training for that, I also studied public and social administration for an MA, and business for an MBA. For the last dozen years, I have been researching topics including anthropogenic global warming (AGW). I have no conflicting interests in this matter.

6. The committee is investigating activities at the Climatic Research Unit (CRU) rather than global warming per se. And this memorandum deals with the matters the committee is investigating about the CRU. However, it is imperative that the committee understand the truth about global warming.

7. Apparently people in the CRU faked scientific data about global warming, because they would be rewarded with further funding.

8. If the committee confirm this, it may consider why people at the CRU thought the IPCC wanted faked evidence of global warming.

9. If there really is evidence for AGW, why would the IPCC pay scientists to fake research?

10. Surely they would not want to mix real evidence of AGW with faked evidence? I am sure they want faked evidence because there is no real evidence.

11. It is lucky the emails and other documents have been made public. “Climategate”, as it is called around the world, is the most important of a number of revelations that have caused many people to disbelieve AGW.

## THE FACTS

### MANMADE GLOBAL WARMING

12. Certain radiation from the sun strikes the earth and bounces back, but some is trapped by “greenhouse gases” and stays in the atmosphere as heat. This is natural and essential to life on earth.

13. Proponents of the AGW hypothesis claim that man’s activities cause such an increase in these gases, principally carbon dioxide (CO<sub>2</sub>), that the earth warms more than it should.

14. They paint pictures of land being flooded or turned into desert, icebergs melting and polar bears swimming.

15. But these pictures are designed to scare, and are entirely false. At the level of Al Gore and above, it is not a mistake. People like Al Gore know their assertions are lies. For example, a person accepts scientific consensus. So Al Gore has for years been saying that all scientists except a handful of deniers accept that global warming is real, that there is a consensus, that the science is settled. Look up on Google “30,000 scientists”. You will see that in the US, more than 31,000 American scientists, including more than 9,000 PhD’s, signed a petition to the US government protesting that, paraphrased, global warming is a con that will have devastating effects.

16. The fact that Al Gore would patently lie about scientific consensus suggests that he would lie about the scientific facts themselves. And this is provably the case. The facts disprove his claims. So people—as in the CRU—feed data into computers and tweak it until their computer projections “prove” AGW is real. They can make the data look like a corrugated roof or a hockey stick. They could as easily prove the earth is flat.

17. Warming hoaxers try to confuse policy-makers with complexities, forcing them to rely on their experts. But there are simple ways to show them up.

18. Why would Al Gore continually lie that virtually all scientists support AGW?

19. Why can scientists who question AGW not get funding for research, on the basis the science is settled, but those supporting AGW can?

20. “He (Gore) had picked over the literature for almost every extreme projection he could find, then exaggerated them still further.” (Booker and North). Why?

21. The film “The Great Global Warming Swindle”, shown once on Channel 4, gives a good introduction to this subject. There are many videos and books on this theme. Just a few points:

22. Factors influencing the weather are infinitely complex, which is why weather forecasts are often wrong. But several unconventional weather forecasters study sunspot activity and their forecasts are more accurate than those of official meteorologists.

23. The earth warms and cools naturally, and the major factor is the Sun. When sunspot activity is high, the earth warms. When sunspot activity is low, the earth cools.

24. Greenhouse gases account for a small proportion of the atmosphere, but are essential to life on earth. The main greenhouse gas is water vapour, which accounts for 95% of the greenhouse gases. As natural and manmade greenhouse gases of concern total just 5%, they have little effect. Man’s activities produce CO<sub>2</sub>, but more is produced by volcanoes, more still by animals and bacteria, yet a greater amount by dying vegetation, and the greatest amount is from the oceans.

25. CO<sub>2</sub> is essential to life on earth, as are oxygen and water. There is a cycle where people take in the oxygen they need, and breathe out CO<sub>2</sub>, and plants and trees take in the CO<sub>2</sub> they need, and breathe out oxygen.

26. For much of the earth's history, it was warmer than today. In the Mediaeval Warm Period, around 1000 AD, people grew vines in London. There are today streets called Vine Street, but (sadly) no vines. Much more recently there was the Little Ice Age, where people skated and held ice fairs on the Thames.

27. Al Gore's film, *An Inconvenient Truth*, contains two lines on a graph, covering 650,000 years. One line represents temperature, and the other represents CO<sub>2</sub>. The lines are a close match. Al Gore asks: "Do they ever fit together?" These lines are accurate, but presented to mean the opposite of what they actually mean.

28. Al Gore says raised CO<sub>2</sub> levels cause warming. In fact, increased temperatures cause increased CO<sub>2</sub> levels. But there is a time lag of roughly 800 years. When the sun heats the surface of the oceans, CO<sub>2</sub> is given out from the oceans, but very slowly. When sunspot activity is low, the surface of the oceans cools, and CO<sub>2</sub> in the atmosphere is absorbed into the oceans, again very slowly.

29. So nearly all CO<sub>2</sub> on earth is in the oceans and the atmosphere, and CO<sub>2</sub> either moves from the oceans to the atmosphere, or vice versa. Which direction depends essentially on whether the earth is warming or cooling.

30. Talking about changes in CO<sub>2</sub> can mislead. Really, the amount of CO<sub>2</sub> is constant, but the CO<sub>2</sub> constantly moves from ocean to atmosphere and then back.

31. As Global Warmers shivered in the recent cold, many pointed to the term Climate Change, designed to fool people that any change in the weather proves the Climate Change people right. But their hypothesis postulates the world getting warmer, not colder.

32. In conclusion, all the evidence, looked at reasonably, does not at all support the idea that man-made greenhouse gases are likely to cause anything harmful to man. All the evidence is that they will cause very little effect, and that any effects are likely to be beneficial.

#### THE REAL REASON THE GLOBAL WARMING HOAX IS BEING FORCED ON THE WORLD

33. Al Gore and the UN's IPCC (Intergovernmental Panel on Climate Change) are pushing this hoax. Because of that, billions have flowed into this area. Al Gore's companies are likely to make billions from carbon swaps. Others are frantically getting involved to make their fortune. Researchers—as in the CRU—get funding, but only if the research supports the myth. So there is much money in Global Warming.

34. But at a higher level, the motive is not mainly money. The real aim of the global warming con is to create a totalitarian world government that will reduce the world population by 90% and treat the remainder as slaves. To people who get their news from the (controlled) mainstream media, this will sound crazy. But global warming is just one of a number of areas where what we are told is very different to the reality. People who act for the public good, seek the truth, tell the truth, and challenge the lies, are far more numerous than we are told, because the controlled media present them as being a tiny number of crazy flat-earthers.

35. Why the global warming hoax? To justify frequent inspections of people's homes to "reduce CO<sub>2</sub> generation". The state will regulate and monitor everyone's CO<sub>2</sub> emissions: how many plants people can grow, (fallen leaves emit CO<sub>2</sub>); how many children and pets and cows they can have; how far people can travel in vehicles; and masses of other rules. These will be gradually tightened, reducing quality of life, living space, etc etc, with people financially and otherwise wiped out. The planned punitive taxes will not go to "help the third world". This money will go to the people like Al Gore, and those who control them. In the third world, preventing the use of electricity, with other measures, will quickly reduce the population.

36. This memorandum barely covers the basics of global warming. There is no room to cover other areas, but the following is relevant. The Rockefellers took control of the pharmaceutical industry at the start of the 20th century, and of the American Medical Association shortly after. The Rockefellers funded eugenics research that was later used by Hitler. After World War 2, the Rockefellers set up the UN, on land the Rockefellers donated. The Rockefellers are major funders of the UN and its agencies, such as WHO. The Rockefellers continued funding eugenics, now called population control. The UN has population control programs, including vaccinations under GAVI. In 2005, WHO set up a system where it would take charge of disease control and vaccination in member states in the event of a "pandemic". Then WHO changed the definition, so that if certain numbers of people get a cold, WHO can march in. Last year, Jane Burgermeister, an Irish/Austrian journalist, discovered plots involving a Rockefeller drugs company, Baxters, and WHO. Vaccines had been contaminated so they would cause disease. This would increase fear and vaccine uptake. She filed criminal charges. She also set up a website at theflucase.com, where she lists mainstream newspaper articles. Her website deals largely with swine flu and vaccines. It informed me about this committee investigation. And the Rokerfellers are intimately involved in the global warming hoax.

37. I am sure the Rokerfellers are very nice, and I agree that growth of population and of the use of resources cannot continue indefinitely, but I disagree with their plan to kill off or enslave the world population, in which plan the false global warming threat will be a key factor.

38. Now the Rockefellers, and the others forming the tiny group known as Illuminati, or banksters, are pursuing this goal of world domination and are immensely wealthy and immensely powerful. But they can fail, because their control is at the top. Take as an example the military. The Rockefellers etc might control a prime minister, who in turn controls the generals, and all the way down to the newest recruits. Soldiers follow orders. Blindly. But only so far. Soldiers are people with families. They know right from wrong. And they see their job as protecting the nation from aggressors. When they are ordered to shoot innocent people, or forcibly vaccinate people with a poison or microchip, many will refuse, so the control stops. And if any of the officers, in the long chain of command, refuses to pass on an order because it is wrong, it also fails. Near the top, generals could seize power. This is, after all, how many coups d'état occur.

39. So this tiny number of banksters are working to take over the world, and global warming is a key factor for them. But many people are becoming aware. This puts at risk the banksters' scheme. Ultimately they will succeed or fail. It depends on what six billion people do. If the large majority apathetically do as they are told, give up their money, take the vaccine and die, then the banksters win. If the people who could do something, decline because they are afraid, or they wait till other people do something first, then the banksters win. If people say they do not want to get involved, then the banksters win. The question is not whether people get involved. They are involved. The question is whether they are going to do something about it.

40. But if a significant minority get involved, if there are people's representatives like Ron Paul, we stand a chance. (He is the most respected US politician, with a massive Internet following). If people, in whatever field or profession, and at whatever level, do their best to defeat these banksters, we stand a chance. In the second world war, people volunteered: to fight, to make weapons, anything to help. That attitude won then. We are in a war now. "What did you do, Daddy?"

#### THE POLITICIZATION OF SCIENCE

41. Science has changed enormously over the last few decades. In terms of technology, we are light years more advanced today. We have vast computing power, and we can see inside atoms.

42. But in terms of real discovery, and integrity, we are much worse. The reason is simple.

43. 50 years ago, a scientist had a back room, where he made his own equipment. He had ideas. He was free to do as he liked. And he invented things.

44. Today, scientists are employees. Employed only by drug or other companies, by government, or in academe. They depend on funding, and have to conform. A scientist working for a drug company making billions from selling Drug X, who said the drug did not work and was dangerous, would not be employed long. A climate academic who said global warming is a con, would be pressured. Money to change his mind? Ostracized? Pressure on the university?: "We will stop funding you if your scientists continue with crazy ideas that are costing many lives." So they choose between integrity and money.

*Now to the specific questions the committee want addressed*

*What are the implications of the disclosures for the integrity of scientific research?*

45. It seems likely that if the people in the CRU deliberately falsified the scientific evidence they supplied to the UN and others, they did so for mainly financial reasons.

46. Clearly, it is not in the public interest for government policy to be dictated by would-be dictators who use taxpayers' money to bribe scientists willing to prostitute themselves. The people, and government, should be able to rely on people telling the truth and acting within the law. Our body of law should be based on sound science.

47. If the government want to achieve this, they should use the law. If a man kills someone to get money, he is charged with murder. Surely a scientist who tells lies to get money, and whose actions are likely to result in many deaths, is not less culpable.

*Are the terms of reference and scope of the Independent Review announced on 3 December 2009 by UEA adequate (see below)?*

48. The terms of reference chosen by UEA are not bad. More important is how the investigator sees his job. Is it to hide as much as possible? Or about full disclosure? He can use the same words to very different effect.

49. The world is aware of Climategate at UEA. Covering up the CRU's sins would harm the university's good reputation. UEA should ensure that what happened is seen to be properly investigated and all appropriate steps taken.

*How independent are the other two international data sets?*

50. My words are limited, and I can not add much here.

## RECOMMENDATIONS

51. I suggest the committee's recommendations should take account of points made above, together with the following:

52. Faking scientific results for the UN to mislead the world should be treated as the serious crime I believe it to be.

53. UEA should be persuaded that they should take action to show that they will not tolerate corruption.

54. Government should recognize that an increasing culture of corruption is bad for society in many ways.

55. Government should accordingly take action to reduce corruption. It is probably self-defeating to lecture people. People learn best by example. They learn that some people can commit crimes and get away with them. Or they learn that crime does not pay, even at the highest levels. Government is responsible for influencing what people learn.

56. Government should recognize that the real reason for this warming myth is as a way to introduce a world totalitarian state and decimate and enslave the population, as discussed above. This is a real possibility. So every member of this committee should use every endeavour to prevent that happening. A hero does what is right, not what is safe. The British Government should take back power from Europe and the UN, consistently reduce the vast streams of taxpayer money that end up in the banksters' coffers, and end the private control of the Bank of England, which enables the banksters to control the money supply and thus create booms and busts at will.

*February 2010*

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**Supplementary memorandum submitted by Ronald K Bolton (CRU 25a)**

I understand that you, Mr Chairman, are standing down from Parliament shortly. May I take this opportunity to thank you in advance for all your efforts, in education and otherwise. I understand your decision, although you are precisely the sort of person who is needed to protect the people from bad government. It may be that public pressure over AGW, swine flu, etc will cause government to rely more on sound science and less on what seem like PR stunts. One can hope. It would be better for the country if you stayed, but you will leave a memorial in what you have done. I believe the Climategate investigation will be probably the most important you have done. Thank you for what you have done to help the British people.

It seems that you used the term "climate deniers" and subsequently apologized. That is an emotionally-charged term, which for that very reason has unfortunately become much used by those wishing to stop any criticism of the manmade global warming hypothesis. It is therefore easy to use the word "denier" when one means "sceptic". My personal belief is that the wording used, or even whether you believe global warming is real, is not so important as whether one has done one's job properly. If you have properly investigated and are sure you have done the right things, you can be proud of your actions.

I realize that with the election looming, there can be no really detailed investigation of CRU's actions, and certainly not of whether global warming is real, particularly as you are also investigating a half dozen other matters at the same time.

Can I therefore suggest the following:

1. There should be a police investigation into the activities of certain scientists. I understand the police are investigating the leaking at CRU but nothing more. With the evidence you have, particularly the memorandum from Dr Benny Peiser, there seems clear prima facie evidence that crimes have been committed. It also seems clear that this is wider than UEA.
2. There should be a detailed investigation by Parliament, after the election, into the corruption of science to support publicly funded scares that have no basis in reality. AGW is the most important, but there are many others. This last winter has been the coldest in Britain for over 30 years, and America has been covered in snow. And temperatures worldwide have declined for 15 years. Yet we are told the world is warming. Similarly, we have been told we are at risk of swine flu and coerced to get vaccinated. Yet the scientific evidence is that that flu is very mild, that many more people died of the vaccine than of that flu, and that scientists having links to Big Pharma were involved in hyping this up.
3. There should be a detailed investigation by Parliament, after the election, into whether man-made global warming is really the danger it is said to be. The UN and others are pushing politicians to support AGW. Many independent scientists and others say AGW is wrong. Certainly much of the evidence supporting AGW has been discredited, as have many of its supporters. There is a push to spend billions and alter lives permanently. Before that, there needs to be a proper examination of what the science really shows.



4. There should be as much openness and public involvement as possible in the above investigations, as well as in normal scientific matters at places like UEA. This committee has set an example for those matters that others could follow.

Thank you again.

March 2010

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### Memorandum submitted by Dr Sonja Boehmer-Christiansen (CRU 26)

#### 1. DECLARATION OF INTEREST

I have no financial interest in this enquiry; I am no longer asking for research grants and have no close personal relationships with any of the people involved.

My interests are purely academic, professional and political. I am interested in the value and misuse of the peer review process. The negative attitudes of the IPCC/CRU people to my often sceptical journal have harmed it. Its impact rating has remained too low for many ambitious young researchers to use it, and even sales may have been affected. However, this is not an interest as my work is voluntary and the publisher has remained supportive. As a member of the Labour Party and deeply politically engaged person, I have not found life as a “climate sceptic” always easy, but have kept my MP and MEP informed. I have been somewhat offended but not surprised by the “CRU-hack” revelations.

#### 2. INTRODUCTION: MY INVOLVEMENT AS RESEARCHER AND EDITOR

2.1 Since the late 1980s I have been a researcher of the politics and science of climate change, and especially the IPCC, from the perspective of energy policy and international politics. (See publications, APPENDIX). I was peer reviewer for IPCC (Intergovernmental Panel on Climate Change), peer reviewer for Working Group 3 (responses, emission scenarios, economics) for two of its reports and I studied the science and politics of IPCC under a three-year grant from the ESRC.

2.2 Since 1998 I have been the editor of the journal, *Energy & Environment* (E&E) published by Multi-science, where I published my first papers on the IPCC. I interpreted the IPCC “consensus” as politically created in order to support energy technology and scientific agendas that in essence pre-existed the “warming-as-man-made catastrophe alarm.”<sup>25</sup>

2.3 I have published peer-reviewed papers and opinion pieces by all the best known “sceptics” and know a number of them personally. My own views being known, E&E therefore attracted, inter alia, papers from IPCC-critical and therefore IPCC-excluded scientists. This did not please the senior CRU members, a number of whom I know personally.

2.4 Since the mid-1990s I have taught environmental management at the Geography Department, Hull University, after a decade as Fellow and Senior Research Fellow at the Science and Technology Research Unit (SPRU) at Sussex University. Previously, I had studied physical geography, including some climatology (as well as geology and German literature) at Adelaide University and married into a well known family of Australian scientists. Science and research have been a major part of my life. I now consider climate scepticism my (unfunded) research area but have published a great deal on the IPCC, climate science and energy policy in the past. (See Appendix)

#### 3. MY UNDERSTANDING OF THE ISSUE

3.1 I have no reason to believe that most of the scientists involved in the CRU affair (and this a group reaching beyond the UK) did anything but act in good faith, doing their duty to science, bureaucracy and the public as they saw it and as they were funded to do. It is important, however, for you check my observation, that most climate change since the late 1980s has been government—and grant—funded with the clearly stated objective that it must support a decarbonisation agenda for the energy sector.

3.2 Scientific research as advocacy for an agenda (a coalition of interests, not a conspiracy,) was presented to the public and governments as protection of the planet. This cause of environmental protection had from the start natural allies in the EU Commission, United Nation and World Bank. CRU, working for the UK government and hence the IPCC, was expected to support the hypothesis of man-made, dangerous warming caused by carbon dioxide, a hypothesis it had helped to formulate in the late 1980s and which became “true” in international law with the adoption of the 1992 Framework Convention on Climate Change.

3.3 This treaty and its protocol does not define “climate”, and applies only to anthropogenic warming assumed to be dangerous. In persuading policy makers and the public of this danger, the “hockey stick” became a major tool of persuasion, giving CRU a major role in the policy process at the national, EU and international level. This led to the growing politicisation of science in the interest, allegedly, of protecting the

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<sup>25</sup> Since the late 1990s I have contributed a lengthy “Fuel for Thought” item to the journal which documents the relevant developments/discussions in IPCC critical climate science alongside the latest development in policy, technology and finance selected and sorted from a large variety of sources and sorted. The most recent item is attached to the submissions. It deals in some length with the CRU affair and reactions to it around the world, as well as with Copenhagen.

“the environment” and the planet. I observed and documented this phenomenon as the UK Government, European Commission, and World Bank increasingly needed the climate threat to justify their anti-carbon (and pro-nuclear) policies. In return climate science was generously funded and required to support rather than to question these policy objectives. This policy was of course challenged by those unhappy with the proposed government-stimulated replacement of carbon fuels, but this need not concern this Committee beyond noting that it increased the anger of climate “sceptics” who saw science misused for policies they doubted. Others liked the policy and kept quiet. Opponents were gradually starved of research opportunities or persuaded into silence. The apparent “scientific consensus” thus generated became a major tool of public persuasion.

#### 4. ENERGY & ENVIRONMENT AND CRU

4.1 I inherited the editorship of *Energy & Environment* from a former senior scientist at the Department of the Environment (Dr. David Everest) because we shared doubts about the claims made by environmentalists and were worried about the readiness with which politicians accepted these claims, including “global warming” which followed so seamlessly from the acid rain scare, my previous research area. As editor of a journal which remained open to scientists who challenged the orthodoxy, I became the target of a number of CRU manoeuvres. The hacked emails revealed attempts to manipulate peer review to E&E’s disadvantage, and showed that libel threats were considered against its editorial team. Dr Jones even tried to put pressure on my university department.<sup>26</sup> The emailers expressed anger over my publication of several papers that questioned the “hockey stick” graph and the reliability of CRU temperature data. The desire to control the peer review process in their favour is expressed several times. Benny Peiser, the Guest Editor of a special issue will report to you on his experience.

4.2 I was sent about 20 emails (eg 125655744.text, 1256765544, 12565500876, 125510086, and 125558481) that concern me or the journal E&E. I have not spent time searching for more but have followed the wide debate in several countries. (See Fuel for Thought attachment). The emails also cover events which I have followed since the late 1980s and concern people and institutions I am to some degree familiar with.

4.3 CRU clearly disliked my—journal and believed that “good” climate scientists do not read it. They characterised it as a journal of choice for climate sceptics. If this was so, it happened by default as other publication opportunities were closed to them. Email No 1256765544, for example nevertheless shows that they took the journal seriously. An American response to McIntyre’s and McKittrick’s influential paper I published in 2005 challenging the “hockey stick” says, “It is indeed time leading scientists at CRU associated with the UK Met Bureau explain how Mr McIntyre is in error or resign.”

4.4 Most recently CRU alleged that I had interfered “maliciously” with their busy grant-related schedules, by sending an email to the UKCIP (Climate Impact Programme) advising caution in the use of CRU data for regional planning purposes. This was clearly reported to Professor Jones who contacted my Head of Department, suggesting that he needed to reconsider the association of *E&E* with Hull University. Professor Graham Haughton, while expressing his own disagreement with my views, nevertheless upheld the principle of academic freedom. I therefore have no reason to complain against the University of Hull and I am still working from the Geography Department.

4.5 The emails I have read are evidence of a close and protective collaboration between CRU, the Hadley Centre, and several US research bodies such as the Lawrence Livermore National Laboratory where former CRU students had found employment. Together they formed an important group inside IPCC Working Group 1, the science group.

#### 5. UK POLICY CONTEXT

5.1 Having recently attended a business lunch addressed by our Minister for Regional Development (Rosie Winterton) and a manager from EON (UK) in charge of offshore wind farm development (Humber Gateway, to be completed by 2014, subject to planning permission), I am fully aware of this Government’s commitment to a decarbonisation agenda as the way towards British reindustrialisation, job creation and regional development, including related research and teaching by universities. At this gathering, the problems with IPCC science<sup>27</sup> and CRU (UEA) had not yet registered or were dismissed. More generally,

<sup>26</sup> On 26 October in a confidential message also addressed to Dr. Mann, the “creator” of the hockey stick, Jones complained that E&E was to be published a paper critical of Mann’s methodology and saw this as a part of a political campaign against energy legislation in the USA. Note (Paul Chesser, GlobalWarming.org, 15 January 2010): “Professor Mann is currently under investigation by Penn State University because of activities related to a closed circle of climate scientists who appear to have been engaged in agenda-driven science”. Emails and documents mysteriously released from the previously-prestigious Climate Research Unit at the University of East Anglia in the United Kingdom revealed discussions of manipulation and destruction of research data, as well as efforts to interfere with the peer review process to stifle opposing views. The motivation underlying these efforts appears to be a coordinated strategy to support the belief that mankind’s activities are causing global warming Glosser has called for the return of over \$6 million state funding stimulus funds received by Prof. Mann and about whom US Senator Jeffrey Piccola has said: “The allegations of intellectual and scientific fraud like those made against Dr. Mann are serious against anybody involved in academics, but the impact in this case is significantly elevated. The work of Dr. Mann and other scientists at the CRU is being used to develop economic and environmental policies in states and countries across the world. Considering the saliency of the work being conducted by the CRU, anything short of the pursuit of absolute science cannot be accepted or tolerated.” (<http://spectator.org/blog/2009/12/03/heat-on-mann-at-home>)

<sup>27</sup> See [http://www.chinadaily.com.cn/opinion/2010-01/28/content\\_9388032.htm](http://www.chinadaily.com.cn/opinion/2010-01/28/content_9388032.htm) and the attached Fuel for Thought 21/2 which conveys many of the reactions around the world, including from other scientists. Note Mike Hulme from UEA.

judging by the most recent statements from leading spokesmen from all major parties, it seems that belief in IPCC science remains the primary justification for an energy policy that so obviously needs much more examination. The UK clearly hopes to continue to “lead the world” in the decarbonisation of energy. Is this wise? What other consequences might arise? When has competitive advantage been secured by making our energy differentially more expensive? Unless of course, Britain can succeed in effecting a regulatory capture in energy markets on a global scale...

## 6. YOUR SPECIFIC QUESTIONS

### 6.1 *Terms of Reference*

The four terms as set out seem appropriate and should establish useful foundations. There is, however, a broader context. The CRU case is not unique. Recent exposures have taken the lid off similar issues in the USA, the Netherlands, Australia, and possibly in Germany and Canada. There may be a systemic problem here, and it would be neither fair nor helpful to make CRU and the UK Meteorological Office the sole fall-guys. It is at least arguable that the real culprit is the theme—and project-based research funding system put in place in the 1980s and subsequently strengthened and tightened in the name of “policy relevance”. This system, in making research funding conditional on demonstrating such relevance, has encouraged close ties with central Government bureaucracy. Some university research units have almost become wholly-owned subsidiaries of Government Departments. Their survival, and the livelihoods of their employees, depends on delivering what policy makers think they want. It becomes hazardous to speak truth to power. In the area of energy policy, there are particular problems since the familiar lobbies of the privatised energy industries have been joined by new pressure groups. As the justification for policies comes to rely increasingly on “environmental” arguments, a host of NGOs, often with electorally appealing single-issue concerns and deceptively simple solutions, begin to raise their voices. The politics have become very difficult, and it is not clear that the traditional structures can cope. The responsibility for excessive pressure on “science” to deliver the desired answers must also lie with the relevant research councils, NGOs, and Parliament itself. Have politicians kept a close eye on the science debate? Have they understood what kind of a body the IPCC really is? Professor Benfield has recently begun to move the debate in an interesting direction by suggesting that that bureaucracy will have to attune itself better to the recognition of the value of diversity in scientific advice. They need to accept that policy advisors and Ministers cannot abdicate responsibility for making balanced judgements by relying on project-funded research in the hope that it will produce settled solutions. I should be happy to discuss this with you.

My suggestions for action would be to expand this enquiry to include the funding of climate science and consider the pressure put on scientists by policy-makers and assorted lobbies.

### 6.2 *How Independent Are The Other Two International Data Sets?*

I am no expert here but from the large amount of material I have read, some of it mentioned in *Fuel For Thought* paper 21/2, I do not think that they are independent but rely on the same primary sources. All have tended to serve the same master (IPCC/policy-makers) and “cause” (saving the planet) and seem affected either by similar shortcomings (the available measurement periods, changing measurement technology and above all the declining and limited number of measuring points, not to mention the urban heat island effect. These data sets may soon be replaced by better and more reliable data to demonstrate the Earth’s postglacial temperature history (which says little about attribution/causation). Postglacial climatic history is by no means well understood and the human contributions cannot yet be assessed.

*Dr Sonja Boehmer-Christiansen*  
Reader Emeritus, Hull University  
Department of Geography

*February 2010*

## APPENDIX

### RELEVANT PUBLICATIONS

#### REFEREED JOURNAL ARTICLES

- “The role of IPCC as driver of international climate policy” paper to Hamburg Institute of International Economics Conference “Critical elements of international climate policy” submitted to *Geoforum*, May 2004. To be revised/rejected.
- What drives the Kyoto Process?, translated by Kirril Kondratyev into Russian, Proceedings of the Russian Geographical Society, April 2004. Published in Russian.
- Climate Policy: Interest driven, Culture Bound or based on Science? Submitted to *Area* April 2004./rejected.
- “Investing Against Climate Change: Why Failure Remains Possible”, *Environmental Politics*: Autumn 2002; 11(3), pp.1–30.

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- *Journal of Science, Technology and Human Values*: “Science, Equity and the War against Carbon”. Winter 2003.28 (1) Differentiation since Kyoto: An Exploration of Australian Climate Policy in Comparison to Europe, *Energy & Environment*, 11 (3), 2000, p.343–353.
  - “Climate Change and the World Bank: Opportunity for Global Governance?” *Energy & Environment*, Vol.10, No.1, January 1999, pp.27–50.
  - “A winning coalition of advocacy: climate research, bureaucracy and ‘alternative’ fuels”, *Energy Policy*, Vol. 25, No. 4., 1997.
  - (with Z Young), “The Global Environment Facility: In Institutional Innovation in Need of Guidance?”, *Environmental Politics*, Vol. 6, No.1, Spring 1997.
  - “Political Pressures in the Formation of Scientific Consensus”, *Energy & Environment*, Vol.7, No.4, 1996 pp. 365–375.
  - “Britain and the Intergovernmental Panel on Climate Change: The impacts of scientific advice on global warming: Integrated policy analysis and the global dimension.” *Environmental Politics*, Vol.4, No. 1, Spring 1995, pp.1–18.
  - “Britain and the Intergovernmental Panel on Climate Change: The impacts of scientific advice on Global warming Part II: The Domestic Story of the British Response to Climate Change, *Environmental Politics*”, Vol.4, No.2, Summer 1995, pp.175–196.
  - “Reflections on the Politics linking Science, Environment and Innovation”, *Innovation*, Vol.8, No.3, 1995 pp.275–287.
  - “Global climate protection policy: the limits of scientific advice—Part I.” *Global Environmental Change*, Vol. 4, No. 2, 1994.
  - “Global climate protection policy: the limits of scientific advice—Part II.” *Global Environmental Change*, Vol. 4, No. 3, 1994.
  - (with J F Skea) “The Operation and Impact of the IPCC: Results of a Survey of Participants and Users”. STEEP discussion paper no. 16, SPRU, Brighton 1994.
  - “A scientific agenda for climate policy?” *Nature*, Vol. 372, No.6505, 1 December 1994.
  - “Science policy, the IPCC and the Climate Convention: the codification of a global research agenda.” *Energy and Environment*; Vol. 4, No. 4, 1993, pp. 362–408.

#### BOOKS AND MONOGRAPHS

- With A. Kellow, Hobart, *International Environmental Policy: Interests and the Failure of the Kyoto Process*, Edward Elgar Publishing, October 2002.
- *Acid Politics: Environmental and Energy Policies in Britain and Germany*, with J F Skea, Belhaven Press, London/New York, p 296, January 1991 (paperback April 1993).

#### BOOK CHAPTERS

- “Epilogue: Scientific Advice in the world of power politics”, final chapter (10) in Pim Martens & Jan Rotmans (eds.) (1999), *Climate Change: An Integrated Approach*. (Advances in Global Change Research), Kluwer Academic Publishers, Dordrecht, December 1999, pp. 357–397. 0-7923 5996-8 ISBN.
- “Who is driving Climate Change Policy?” In J.Morris (ed.), *Climate Change: Challenging the Conventional Wisdom*, The Institute of Economic Affairs, 1998, London.
- *Uncertainty in the Service of Science: Between Science Policy and the Politics of Power*, in Gunnar Fermann, *International Politics of Climate Change*, Scandinavian University Press, Oslo 1997; pp 110–152. ISBN—82-00-22711-
- “Science, power and policy.” In: M Imber and J Vogler (eds.), *Global Environmental Change in International Relations*; London: Routledge, 1996, pp. 171–195.

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#### Supplementary memorandum submitted by Dr Sonja Boehmer-Christiansen (CRU 26a)

I carefully listened to the above [oral evidence session, 1 March 2010] last night and did some thinking. As both the editor of several CRU/IPCC critical papers and a former science-policy researcher into the IPCC and climate scepticism, I thought that you and your committee, and perhaps Sir Russel, might be interested in my reactions. I have recently co-edited a book (with A Kellow, Hobart University) on the international politics of “Kyoto”. The book will be published by Elgar later this year.

As a general point, I regret the absence of a fuller expression of the scientific contests over the causation of climate, climatic change and climate variability in the S&T Committee Hearing, but understand the reasons. It seems that the Russell Enquiry will do likewise. No well known climate scientist critical of CRU/IPCC work, like Lindzen, Singer, Christy, Rorsch, Tennekes, Veizer, Stott, Barrett, von Storch, Plimer, Carter or Veizer are likely to be heard. I have interviewed (and later published) several of these people and am of the opinion that interviews with at least a few of them would have deepened the understanding of what your Committee and the public heard from the invited panels. Empirical temperature reconstruction is but one among several scientific issues that need “airing” and it would be unfortunate, if Sir Russell also shied away from the actual debates about, for example, the role of computer modelling in regional climate “prediction”, with results here already influencing regional planning, and the impacts of a moderate degree of warming.

While I understand the limits of official and University funded enquiries, I would like to make several more specific and outspoken comments.

1. The peer review issue does indeed deserve further exploration, but you should not expect too much from it. Editors select their peer reviewers (which can be very difficult and time consuming especially for small journals that do not advertise) and scientists tend to select the journals they publish in. Journals differ hugely in their means and impact. *Nature* and *Energy & Environment* are very different indeed. “Cliques” tend to form who review each other’s work and write papers together to increase their “citation index”. This in turn leads to a high impact rating. The impact rating of *E&E* is very low, that of *Nature* very high. Peer review does not, in my experience, involve the checking original data or, in many cases, even of the “truth” of a paper. Reviewers can only judge within the bounds of their own knowledge, resources, and experience. Logic, readability and relevance are likely to be more important selection criteria.
2. It does not take a political scientist to point out that the three people you interviewed towards the end of the Hearing (from the Met Office, DEFRA and central Government) were not primarily scientists but civil servants. While presenting themselves to you and to the public as “pure” scientists—which they indeed once were, briefly in one case,—they are now de facto administrators or managers bound by the doctrine of collective responsibility and loyalty to a government. Government people cannot be expected, in public, to make statements which may threaten their job security and reputation because ‘honesty’ might seriously undermine bi-partisan government policy and beliefs. I do not believe in dishonesty, however, but rather consider that most humans tend to merge what they are expected to promote with their private belief, hence the need for open debate and transparency of research methods and raw data. It was certainly my research experience that science managers will not challenge official climate science consensus until retired, that is when they are no longer responsible for funding an institution and attracting research projects. Several of the “loyal” people who confessed their doubts to me during the 1990s have since gone into print as “sceptics”.
3. What I cannot judge, but have no convincing reason to believe without further debate, is the claim made by your speaker for the UK Met Office that recent scientific advances have resolved all earlier doubts aired by the sceptics. This is certainly not the impression I get from listening to the debates between “sceptics”. I noted that two of these three speakers avoided looking at the audience; one made some concessions. One, “did not give an inch” but he had, after all, helped to create the “mitigation” policy and later tried to implement it via the World Bank.
4. It was not pointed out during the Hearing that for almost two decades, the UK Government of all party-political complexion expressed the ambition to lead the world in a “green” energy technology revolution. This has huge implications for public policy which is already in the process of painful implementation and remains firmly tied to the assumption not just of man-made global warming but to the assertion (proven only by computer models) that this warming is rapid, dangerous to all of humanity and caused primarily by emissions of carbon dioxide. Dangerous, anthropogenic global warming, it is asserted on the basis of consensus science negotiated by an intergovernmental panel, can be mitigated by changes in energy policy and energy “behaviour”. It is of course precisely these two assumptions that IPCC critics, or so-called “sceptics” query. CRU is therefore not at the core of the science problem; it has become so central to the climate discussion only because of the failure of Copenhagen and the desire to move on regardless, the “email leak” and wider resentment that the “hockey stick” (a “construction” from empirical data sometimes “extended” steeply upwards by computer model “predictions”) has been misused by policy-makers.
5. In my understanding the dangerous warming threat so widely used by policy-makers and some scientists, is to some considerable degree “caused” emission scenarios used in the climate models, and “visually” supported by the “hockey-stick”. The emission scenarios too have been seriously criticised but do not involve CRU. Most science educated critics of CRU/IPCC agree that there has been warming for a few decades, but also that this seems to have stopped recently, and that neither its causation nor the long-term consequences are well understood. There is a group of scientists who does not question the IPCC scientific paradigm or methodology adopted by the IPCC (or CRU’s empirical methodology), but who primarily allege politically motivated exaggeration by “users”. I would certainly class the Met Office and DEFRA among the users.

6. I hope I noted correctly that the word dangerous (warming) was not used during the Hearing. There is little debate about warming as such, what is at issue are future warming and its causation. The degree of danger and how fast it is approaching are major matters for policy, and both danger and the speed of approaching danger are likely to be exaggerated by those that want to implement policy against considerable resistance. For others, given time and good observation—Prof Jones once told me (in 2002) that the empirical record was getting worse not better—humanity can surely adapt to a degree of climate change without major global policy initiatives of the kind attempted at Copenhagen. Twenty or so years of slight warming is neither unusual nor necessarily “dangerous”, unless of course we believe the computer model prediction that major warming caused by greenhouse gases is “90% likely” to be disastrous for all nations. You forgot to ask how the IPCC arrived at that disturbing figure, I am told that nobody knows.
7. What is at stake, as I am sure your committee realises, is not “just” the truth, but the potential of the UK to achieve its ambition as world leader in carbon-free energy without doing serious harm to itself in a world that has changes significantly since the early 1990s. The UK is a minor emitter in a world where many other nations not only have similar objectives, but all now face serious new constraints on public finance. The policy response (to dangerous man-made global warming) itself in now need of debate and this can be done by opening Parliament to the science debate. I sympathise with your wish to keep “energy policy” outside your realm of investigation and adhere to scientific procedures and methods, but I wonder whether this will not unavoidably lead to an almost complete “whitewash” with CRU being perhaps reprimanded but “consensus science” and the policy it justifies remaining unchallenged. Here is a “prediction” for you!

However, in conclusion I would like to stress that there is no consensus among the critics, which may be a political disadvantage but, in my view, reflects the reality of climate science and compares favourably with the complete confidence expressed by our “government scientists”. In my understanding it is less the temperature reconstructions that are at issue, though there are conflicts about methodologies and interpretation here, than the use to which “the hockey-stick” were put by assorted advocates of rapid “decarbonisation” policies. If the desire prevails to enhance the existing international reputation of (UK) climate science, a challenge to current policy deliberately based on this (deserved) reputation may be delayed as well. As so often in politics, it may be matter of serving either to long or the short term.

*Dr Sonja Boehmer-Christiansen*  
Reader Emeritus, Hull University  
Department of Geography

*March 2010*

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#### **Memorandum submitted by Dr Timothy J Osborn (CRU 28)**

##### 1. DECLARATION OF INTEREST

- I have been a full-time member of staff in the Climatic Research Unit (CRU) at the University of East Anglia (UEA) for over 19 years.
- CRU is part of the UEA School of Environmental Sciences; I am currently an Academic Fellow in the School.
- *I am submitting this in a private capacity, rather than as a member of UEA staff; this document is not intended to represent the official view of UEA.*
- Some of the emails and documents that were hacked from our computer systems were authored by me.
- Unwarranted criticism of my scientific research and scientific activities has been made on the basis of these hacked files.

##### 2. SCOPE

- My submission only intends to address the first of the three questions:  
*What are the implications of the disclosures for the integrity of scientific research?*
- I have chosen to address this via a set of examples, taken from the hacked files and/or published discussion of them. The purpose is to demonstrate how it is possible to distort the public perception of our scientific work by misinterpreting the content of these documents and emails or by using them out of context.

### 3. INCOMPLETE AND NON-RANDOM SELECTION

- It is *impossible* to draw firm conclusions from the hacked documents and emails. They do not represent the complete record, and they are not a random selection from the complete record. They are clearly selected with a purpose in mind and it is easy for people to fall into the traps set by those who did the selection.

### 4. CRU HAS NOT DESTROYED RAW DATA

- It has been claimed that CRU has destroyed the raw temperature data recorded at thousands of weather stations around the world and that form the basis for the CRU gridded global land temperature dataset (CRUTEM3). It has further been claimed that CRU destroyed these data so that CRU's work could not be verified by others. These claims are untrue. The raw temperature data were collected or collated by various National Meteorological Services (NMSs) around the world and/or assembled by earlier initiatives into multi-country data sets. CRU obtained these data from a range of such sources, and documented them (US DoE TR017, 1985). CRU does not have the responsibility to be an official repository for such data—we are not a “World Data Centre”—nor specific responsibility to archive the data that were obtained from these sources. These data are available from the original sources (including the earlier collations), from NMSs, and from a later initiative in the US that also assembled much of this raw temperature data—the Global Historical Climatology Network (GHCN; <http://www.ncdc.noaa.gov/oa/climate/ghcn-monthly/index.php>).

### 5. CRU HAS NOT MANIPULATED TEMPERATURE DATA TO ACHIEVE A PRE-DETERMINED OUTCOME

- It has been claimed that CRU unscientifically manipulated the station temperature data so that it would show global warming, while the raw temperature data would not have shown such warming. This is false on two counts.
- First, if the raw, unadjusted, station temperature data are used to construct a gridded global land temperature dataset, then the resultant dataset shows clear warming with a very similar magnitude as shown by the CRUTEM3 dataset. I have done this myself, using the raw, unadjusted, data publicly available from the GHCN. Anybody with a little computer programming knowledge and who had spent a small amount of time reading the peer-reviewed, published articles describing the construction of CRUTEM3 could have done the same. The reason for this outcome is that the adjustments applied to the temperature data tend to cancel out—some increase the warming, some decrease the warming. The warming itself is *not* artificially created by the adjustments.
- Second, the adjustments that were applied were made for scientific reasons and were documented (US DoE TR022 and TR027, 1986). They were also only necessary for a minority of stations—the majority did not exhibit clear “jumps” and discontinuities when compared with neighbouring station records.
- If the small number of adjustments made have negligible influence on the global temperature record, then why were they made? The answer is that, although the adjustments tend to cancel when making global averages, they do not cancel out in every individual region. If only the global average was wanted, then perhaps the adjustments would not have been made. But to construct a data set that allows monitoring and exploration of regional patterns of temperature change—including, eg, the detection of the particular “fingerprints” of response to greenhouse gas and sulphate aerosol forcings—requires adjustments to be made so that all grid boxes and regions represent the best evidence for their past temperature change.

### 6. CRU HAS NOT MANIPULATED THE PEER-REVIEW SYSTEM TO DISADVANTAGE SCIENTISTS WHO PRESENT CONFLICTING VIEWS

- Various claims have been made about apparent manipulation of the peer-review system. Two examples of how the full context (not available within the deliberately selected emails) disproves such claims:
  - (a) It has been claimed that I used my role as a member of the Editorial Board of the *International Journal of Climatology* to give undue favour to an article by Ben Santer *et al.* that was published in 2008. Specifically, it is claimed that this email from me to Santer:

*“just heard back from Glenn. He’s prepared to treat it as a new submission rather than a comment on Douglass *et al.*”*

provided undue favour to Santer, because Douglass *et al.* would not have a right to reply if the Santer article was treated in this way. This is false. What was not released in the disclosed emails, however, was my discussion with the journal’s editor, where I note:

*“He (Santer) has done a substantial amount of new work that will be included, hence it is more than just a comment on Douglass *et al.*”*

*With this proper context, it now becomes clear that the reason for treating the Santer article as a new submission was because it deserved to be treated in that way—it reported many new scientific findings. It is worth also noting that treating the Santer article as a new submission does not in any way reduce the opportunity for Douglass et al to respond to Santer—via a comment on Santer et al. or via their own new submission to this journal or any other.*

- (b) It has been claimed that an email from Keith Briffa, in his capacity as an Associate Editor of the journal *The Holocene*, to a reviewer:

*“I now need a hard and if required extensive case for rejecting”*

was an inappropriate instruction from an editor and was encouraging rejection of an article that supported the sceptical view of climate change. This is again false. If an editor considers that a submitted article is too poor to publish, then they can reject it without sending it out for review—so there was never any need to instruct a review to reject it. The reviewer had probably already indicated their intention to recommend rejection of the article, and then it becomes obvious that what Briffa was asking for were clearly stated reasons for the rejection so that the author could be well informed of why their paper had been rejected. This is good academic practice. Further, there is no evidence that the article in question was authored by “climate sceptics”.

- These examples demonstrate the ease with which a partial record, taken out of context, can be used to erroneously imply lack of scientific integrity.

#### 7. CRU’S CONTRIBUTION TO THE IPCC ASSESSMENT REPORTS WAS IN ACCORDANCE WITH ACCEPTED SCIENTIFIC PRACTICE

- Much has been made of the comment:

*“I can’t see either of these papers being in the next IPCC report. Kevin and I will keep them out somehow—even if we have to redefine what the peer-review literature is!”*

First, the majority of climate science articles are not discussed in the IPCC assessment reports—there simply is neither space nor need to do so. The focus has to be on those that are most relevant to the requirements of the report, or that represent greatest advancement in knowledge. It is quite reasonable (indeed necessary) for IPCC authors to form and express their opinion about which papers do or do not meet those requirements. The remaining body of literature still provides the supporting framework within which the IPCC reports are based. Second, these papers were discussed in the IPCC report, demonstrating that the IPCC writing and reviewing process works well. Third, these papers have both received considerable criticism since the IPCC report, perhaps substantiating the initial judgement about the quality of these papers. Fourth, redefining the meaning of peer-reviewed literature is not possible for an IPCC author and the final comment is clearly flippant.

- Criticism has also been made regarding the referencing of Wahl and Ammann (2006) within the Palaeoclimate chapter of the IPCC’s Fourth Assessment Report. It has been suggested that inappropriate pressure and/or bending of the IPCC rules occurred to allow this article, which was not published until 2007, to be referenced. This article was “in press” only a short time before the IPCC deadline. Reading the emails between the various IPCC authors involved in this part of the report, however, demonstrates that there was no inappropriate pressure, and that the inclusion of this reference was in accordance with the IPCC rules. For example, this email:

*“Based on your update (which is much appreciated), I’m not sure we’ll be able to cite either... The rule is that we can’t cite any papers not in press by end of Feb.”*

demonstrates the position well—if a paper is not in press in the time indicating in the IPCC rules (end of February 2006) then it will not be cited. There is a clear acceptance of this rule, even if it would have prevented a relevant article from being cited.

#### 8. CRU’S COMPUTER CODE IS FIT FOR PURPOSE AND DOES NOT REVEAL SECRET MANIPULATION OF DATA

- A small sample of my computer programming code was included in the disclosed files. It has been argued that comments within the code such as “*Fudge factor*” and “*shouldn’t usually plot past 1960 because these will be artificially adjusted to look closer to the real temperatures*” demonstrate that data have been manipulated in an inappropriate and undisclosed manner. My programs that were highlighted on BBC Newsnight that contained comments such as these were not the basis for any published article or dataset, and thus are not a valid indication of inappropriate data manipulation. If we do need to make adjustments to data that are scientifically justified, then we state clearly both the justification and the adjustment when we publish the article or dataset. In relation to the second of the two highlighted comments, it was simply a note that should have read “*...because these will have been artificially adjusted...*” to remind myself that I had applied an adjustment to this particular set of data (for the purposes of exploring the consequences of recent trends for the calibration of tree-ring temperature proxies) and that if I did plot them it would give a false impression of the agreement between tree-rings and temperature because of the adjustment.



Thus, rather than indicating that an undisclosed adjustment would be made, it was a warning to avoid using adjusted data without realising it. To re-iterate: I have made no adjustments to data except those that are scientifically justified and stated in published papers.

*Dr Timothy J Osborn*  
Climatic Research Unit  
University of East Anglia

*February 2010*

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### **Memorandum submitted by Professor Peter Cox (CRU 29)**

#### **DECLARATION OF INTERESTS**

I am a climate scientist who was a lead-author on the last IPCC Working Group I report, so I have an interest in ensuring the integrity of climate change science. I know of Prof Phil Jones and Prof Keith Briffa through their work, and also through a recent grant proposal that we were all involved in.

#### *1) What are the implications of the disclosures for the integrity of scientific research?*

I don't doubt the integrity of the research carried-out at the Climatic Research Unit (CRU), as I have first-hand knowledge of the scientists involved. However, I am concerned that public confidence in the science of climate change has been undermined by the email leak.

I believe that many of the issues highlighted in the media concerning the emails have now been explained. The initial focus was on the use of the word "trick" by Prof Jones to describe the technique used to merge the climate proxy records (mostly from tree-rings) with the direct instrument record (from thermometers). The use of the word "trick" would have been ill-advised if the author had known that the emails were to be made public. However, he did not, so I think this colloquialism is understandable. I think many emails could be similarly misinterpreted if taken out of context in this way.

There remains an issue of how to interpret tree-ring data in the recent past (which is sometimes called the "divergence problem"), but this merely relates to how temperatures are reconstructed for the last 1,000 years based-on the direct measurements since the mid-19th century. It does not in anyway undermine the direct evidence of global warming in the industrial era.

More serious are the allegations concerning the reviewing of scientific papers and the possible deliberate exclusion of papers from the IPCC report. In at least one case (a paper for which Prof Keith Briffa was the reviewing Editor) the email exchange has already been explained. It seems that the original reviewer had already rejected a paper and Prof Briffa was merely asking the reviewer for a proper justification of the rejection. Keith Briffa is a man who encourages vigorous debate, rather than suppressing it, so I don't doubt this explanation. Rejecting papers because they are scientifically flawed is of course quite appropriate—it is how peer review maintains the integrity of the science published in peer-reviewed journals.

I suspect that other allegations that particular papers were "blocked", for reasons other than scientific merit, will also turn-out to be false. However, this is something for the Inquiry to ascertain. The integrity of the peer-review process in science is at least as important as the public's perception of climate change.

#### *2) Are the terms of reference and scope of the Independent Review announced on 3 December 2009 by UEA adequate (see below)?*

In general yes, but I believe the Inquiry should hear evidence on the reviewing of scientific papers and the exclusion of papers from the IPCC report. It will be critical to determine whether these decisions were carried-out on the basis of scientific merit alone, for the reasons outlined above.

#### *3) How independent are the other two international data sets?*

I am not an expert on climate datasets, but it seems inevitable to me that these will be based on similar data sources, as there is only so much climate data. However, I wish to reiterate that the concerns raised over the "record" of past temperatures relate to the interpretation of proxy data (especially from tree-rings), and not to the direct observational record from thermometers.

It is perhaps unsurprising that the major climate data centres agree on the extent of recent global warming given that they are based on these similar direct measurements (measurements that are not in doubt). However, I believe that each centre independently processes the raw thermometer data, suggesting that the signal of climate change in the direct observations is very robust (..as well as being consistent with our scientific understanding of the greenhouse effect and the climate system).

Our knowledge of natural climate variations prior to the instrument record (ie before the mid 19th century) is much less certain. However, the evidence of recent climate change, and its impact on natural systems, remains overwhelming (as outlined in the IPCC reports). It would be tragic if the CRU email hack

undermined public confidence in the science of global warming at a time when we need to be pulling together to deal with the problem. I hope that the Inquiry is able to clear-up some of the misunderstandings which have emerged since the breach of security at UEA.

*Professor Peter Cox*  
 Professor of Climate System Dynamics  
 School of Engineering, Computing and Mathematics  
 University of Exeter

*February 2010*

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**Memorandum submitted by Mike Haseler (CRU 30)**

**Creator of the Number 10 Petition Regarding the Climatic Research Unit:**

*We the undersigned petition the Prime Minister to suspend the Climate Research Unit at the University of East Anglia from preparation of any Government Climate Statistics until the various allegations have been fully investigated by an independent body.*

*Submitted by Mike Haseler—*

***Deadline to sign up by:*** 24 February 2010—***Signatures:*** 3,101

As the creator of the Number 10 petition regarding the Climatic Research Unit, I felt I should try to do justice to the 3,000 people who took the time to sign my petition by making a submission to your committee.

Whilst it is clearly impractical to truly represent the views of the signatories to the petition, I have consulted other “sceptics” and read as many of the various comments being expressed on the subject as I am able. I believe these show the main area of concern to be the inappropriate attitudes shown in the emails regarding the appropriate standards of integrity for those involved in scientific research and a strong disquiet with the “science” in this area.

There is a strong public feeling that there is “no smoke without fire” and the further revelations regarding the IPCC “dodgy dossier” seem to show this to be true. Whilst it is possible to find excuses for the phraseology used in the various emails, the overall impression remains that there is something very rotten with the “science”. A closer examination of the available evidence would appear to support this disquiet.

**PERSONAL DECLARATION OF INTEREST**

As someone who used to work in the UK wind sector and was even briefly selected to stand as a Scottish Green Party candidate for the Scottish Parliamentary elections, I have done more than my fair share to help convince the public of the real and imminent threat of man-made “global warming”.

Despite my scientific training, and very much to my shame, I participated in what I now see as a campaign to propagate bad science without ever really checking the scientific basis for these claims assuming that “someone” must have done the science. Only latterly did I try to assess the scientific evidence myself and to be frank I was horrified by what I found. But even then, despite the spin and clearly highly partisan use of data, I thought with the UK Met Office being responsible for compiling global temperature figures, at least the basic raw data could be trusted. Climategate proved that wrong! It was my exasperation that nothing in climate “science” could be trusted, not even the Met Office who used to be one of the great scientific institutions of the UK, that prompted me to create the petition in the hope that we could stop the rot before it spread further.

(I have absolutely no financial interest except a few “hobby” websites whose combined income does not cover the cost of coffee consumed during their production.)

**INTRODUCTION**

The public are sick and tired of seeing exaggeration used to “sex up” a situation, creating an atmosphere of fear in order to manipulate us. We saw it with Weapons of Mass Destruction (WMD), and now we see it in global warming. There should be many submissions dealing with the extent of the evidence and the quality of the scientific method. This submission will focus on the apparent public deception being perpetrated by the CRU and the wider climate community. We have no compunction in suggesting climategate has all the hallmarks of the deception over the (non-existent) Iraqi WMD as the similarities speak for themselves:

*Iraq-gate*

(1) In Iraq, the overwhelming consensus amongst the experts was: that there were WMD, the threat was “real & imminent” and, the public was told the evidence was “unequivocal”. We were being told one thing in public by a campaign using the fear of WMD to sway public opinion, whereas in private experts like David Kelly were far from convinced.

*“SIR WILLIAM EHRMAN: In terms of chemical and biological, particularly through the spring and summer of 2002, we were getting intelligence, much of which was subsequently withdrawn as invalid, but at the time it was seen as valid, that gave us cause for concern,*

*. . . March 2002: the intelligence on Iraqi WMD and ballistic missiles is sporadic and patchy.”<sup>1</sup>*

(2) How did Parliament and the public come to be so misled as to the certainty of WMD? Why did those against the Iraq war have to disprove the negative: to provide proof that every location in Iraq, where facilities for WMD might have been installed, had been searched?

*Climate-gate*

(3) The world’s climate is warming due to mankind or so the public are being told. The threat, again, is real and imminent, the evidence unequivocal. The onus is on opponents to disprove man-made global warming not the scientists to prove it. The public are being fed a daily diet by the likes of the BBC, of sexed up weather stories intended to force through a political imperative that requires a fear of climate change. How can the hurricanes, droughts, fires, famine be described except as: Weather of Mass Destruction?

(4) The truth, we learnt in November 2009, was that the public face of this well orchestrated campaign, is very much at odds with private reservations:

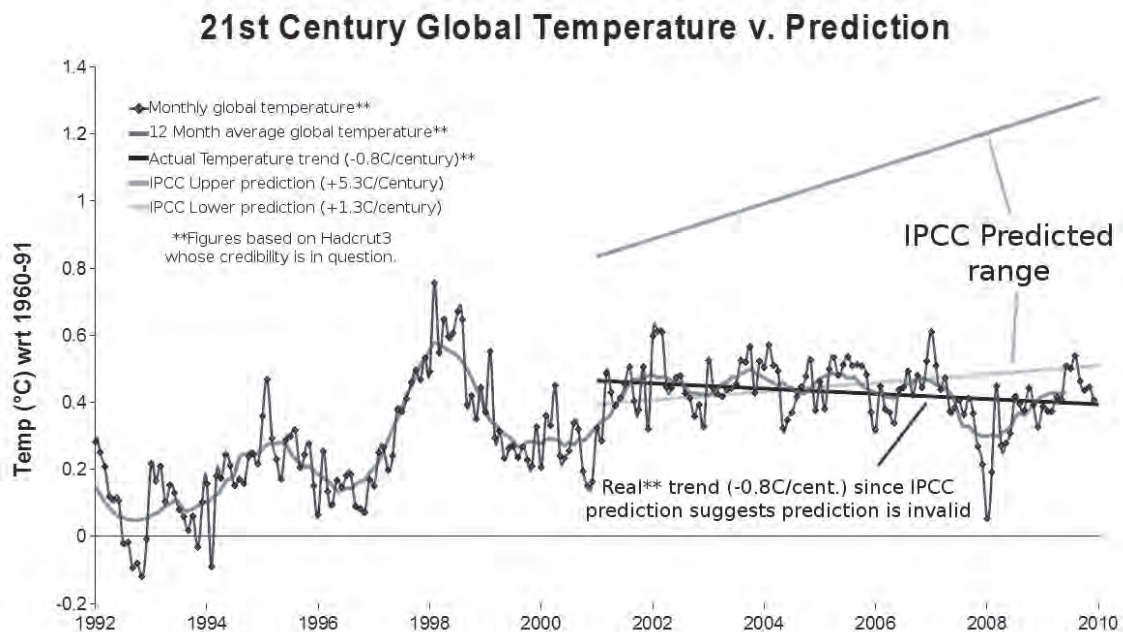
*“The fact is that we can’t account for the lack of warming at the moment and it is a travesty that we can’t. The CERES data published in the August BAMS 09 supplement on 2008 shows there should be even more warming: but the data are surely wrong. Our observing system is inadequate.” (Email: Kevin Trenberth to Michael Mann, October 2009)*

(5) Is it happening again? Private, “sporadic and patchy” evidence, being publicly spun as “unequivocal”? Are the politicians and public being misled?

A FAILED SCIENCE

(6) Far from being “unequivocal”, like WMD in Iraq, the evidence for man-made global warming is entirely circumstantial. It is based on the coincidental increase of CO<sub>2</sub> and temperature in a period of just over three decades. As climate takes around a decade to change significantly, that period of 1970–2000 represents a mere three data points. Furthermore its scientifically testable predictions have almost all failed:

1. 2001 Prediction of Warming of between 1.4–5.8C/decade in 2001—Result so far: cooling at a rate of 0.8C/century.



2. Met Office yearly Global Temperature predictions. Nine out of 10 forecasts have been high with an average error according to the Met Office equivalent to 6C/century which is larger than the projected warming.

Year	Met Office Prediction*	At confidence "better than"	Actual** Temperature (°C)	Result
2000	0.33°C	80.00%	0.24°C	Lower
2001	0.42°C	75.00%	0.400°C	Lower
2002	0.47°C	50.00%	0.455°C	Lower
2003	0.50°C	75.00%	0.457°C	Lower
2004	0.47°C	75.00%	0.432°C	Lower
2005	0.48°C	75.00%	0.479°C	Lower
2006	0.45°C	50.00%	0.422°C	Lower
2007	0.49°C	75.00%	0.402°C	Lower
2008	0.37°C	—	0.325°C	Lower
2009	>0.4°C	—	0.438°C	Higher

Available data on Met Office global temperature predictions show them to be consistently high

\*Taking eg 2000, this should be read as: “the Met office” predict with more than 80% confidence that the temperature will be higher than 0.33C above the 1960–91 average. At 0.24C the global temperature was lower.

\*\*Reported historic temperature figures have changed (yet again) since this table was originally compiled in 2008 so figures are indicative. However the overall result, a failure to predict the climate, remains the same.

#### IMPLICATIONS OF THE DISCLOSURES FOR THE INTEGRITY OF SCIENTIFIC RESEARCH?—ORGANISATIONAL

##### *Group think*

(7) Groupthink: *a mode of thinking that people engage in when they are deeply involved in a cohesive in-group, when the members' strivings for unanimity override their motivation to realistically appraise alternative courses of action.*<sup>2</sup>

##### *Causes of Groupthink*

(8) Highly cohesive and isolated groups like the CRU often develop what is known as groupthink. The cohesiveness which can be so beneficial in unifying the organisation, takes control. This creates a culture actively hostile to the diversity and self-questioning that forces normal organisations to respect wider social norms such as the openness and honesty that is the hallmark of good science. The closer the group members are in outlook, the less likely they are to raise questions that might break their cohesion. The greater the stress on the organisation, the greater the pressure on individuals to toe the line. According to Janis<sup>3</sup>, group cohesion can lead to groupthink if:

- Structural faults in the organization exist: insulation of the group, lack of tradition of impartial leadership, lack of norms requiring methodological procedures, homogeneity of members' social background and ideology.
- Provocative situational context exists: high stress from external threats, recent failures, excessive difficulties on the decision-making task, moral dilemmas.

(9) Social psychologist Clark McCauley's<sup>4</sup> gives three conditions for groupthink to occur:

- Directive leadership.
- Homogeneity of members' social background and ideology.
- Isolation of the group from outside sources of information and analysis.

(10) The CRU emails show us an insulated group, both geographically and scientifically, lacking a leadership embracing the scientific traditions of openness and impartiality. The members of the community are all very alike in view, background and ideology. The lack of any recent warming clearly caused huge stress on this group and many references to resisting FOI requests (illegally) clearly demonstrates their inappropriate response to the “high stress from external threats”. All in all the emails show us that:

the CRU met all the preconditions for the development of Groupthink.

*The Dangers of Groupthink*

(11) The Challenger Space shuttle disaster has been cited as a case study of groupthink. Roger Boisjoly, the engineer who warned about the effect of cold weather on the O-rings, argues that the caucus which resulted in a recommendation to launch, “constituted the unethical decision-making forum resulting from intense customer intimidation.” Groupthink and poor organisational quality go together:

*“The unrelenting pressure to meet the demands of an accelerating flight schedule might have been adequately handled by NASA if it had insisted upon the exactingly thorough procedures that were its hallmark during the Apollo program. ... Between that period and 1986, however, the program became ineffective. This loss of effectiveness seriously degraded the checks and balances essential for maintaining flight safety.”<sup>5</sup>*

(12) The parallels between climate “science” and Iraq should be obvious to anyone reading the torrent of news stories on poor quality science: from glaciers falsely claimed to be melting by 2035, to claims made by the IPCC being partly based on information from many dissertations by Masters students, in an uncanny similarity to the dodgy dossier:

*“Channel Four News has learnt that the bulk of an intelligence dossier heralded by Colin Powell at the UN yesterday, was copied from three different articles—one written by a graduate student.”* (C4 6 February 2003)

## THE KEY LESSONS FROM IRAQ

(13) The lessons we should learn from Iraq, were not that those who held the opinion that Saddam had WMD were wrong to hold those opinions given the evidence they had. It is that they were wrong to state the certainty of their conclusion, wrong to allow the politicisation of the evidential process and wrong to have a myopic focus on finding evidence to support the political imperative. These led to the exclusion of proper evaluation of the null hypothesis (that Saddam may not have WMD), the exclusion of those who were sceptical (such as Dr David Kelly) and the eventual distortion of the evidence through what the public know as the “sexing up of the dodgy dossier”.

(14) The process of gathering evidence (in the civil service) had to be separated from the political interpretation and campaigning on that evidence. Impartial advice can only come from impartial experts, and if experts are set, or allow themselves to seek, political targets to find evidence that fits that target, they become ingrained in the partial political world which contaminates their impartiality.

## A FAILED CULTURE IN THE CRU

(15) The CRU and the wider climate community exhibit all the failings of the Iraq “dodgy dossier” saga. They have tried to adapt the normal peer review processes, that are an essential part of quality control in science, to suit their purposes and override true peer review. The CRU has been actively partial, loudly and vociferously hostile to those who did not share its orthodoxy. Can a culture that actively endorses: “hiding the decline” be trusted? What are its boundaries of acceptability? What else might they do or have done? With the dodgy dossier on Iraq the experts gathering the data seemed impartial and though the data were “sexed up”, the politicians (and aides) did so knowing the “impartial” evidence of the experts. In contrast, the climategate experts were the ones “sexing up” the data before anyone else had the chance to see it. These “scientists” were so partisan, they even ran an enviro-political campaigning website called realclimate.com.

(16) Climate “science” at the UEA is part of a wider culture of climate “science” that permits abysmal quality of research when it supports the groupthink, and rejects everything which does not fit their groupthink mentality: the “voodoo science”, the head of the IPCC labelled scientists who pointed out errors in an IPCC report. (The IPCC falsely claimed Himalayan glaciers would melt by 2035).

*“The other paper by MM\*\* is just garbage. [...] I can’t see either of these papers being in the next IPCC report. Kevin and I will keep them out somehow—even if we have to redefine what the peer-review literature is!”* (Phil Jones to Michael Mann Jul 8 16:30:16 2004)

*“The two MM\*\*s have been after the CRU station data for years. If they ever hear there is a Freedom of Information Act now in the UK, I think I’ll delete the file rather than send to anyone.”* (2/2/2005, Phil Jones to Michael Mann )

\*\*thought to be McIntyre and McKittrick

## IMPLICATIONS OF THE DISCLOSURES FOR THE INTEGRITY OF SCIENTIFIC RESEARCH?—SCIENTIFIC

(17) According to some the “science is settled”, clearly they know nothing about science, because even Newtonian Mechanics, or well formulated theories on the ether have given way in the face of scientific experimental evidence. Far from being “settled” the “science” lacks credibility; science stands or falls on the validity of its predictions, science is inherently sceptical and, science is based on proof, not the absence of proof. The absence of an alternative explanation for the warming at the end of the 20th century doesn’t prove

the unsubstantiated theory of man-made warming must be correct. Particularly given the lack of public funds looking at alternatives, the lack of integrity of those involved, and the wholesale failure of their predictions.

*...within a few years winter snowfall will become "a very rare and exciting event. Children just aren't going to know what snow is" (Dr David Viner of the CRU, Independent 20 March 2000)*

#### *Science Requires a Control, a Null Hypothesis*

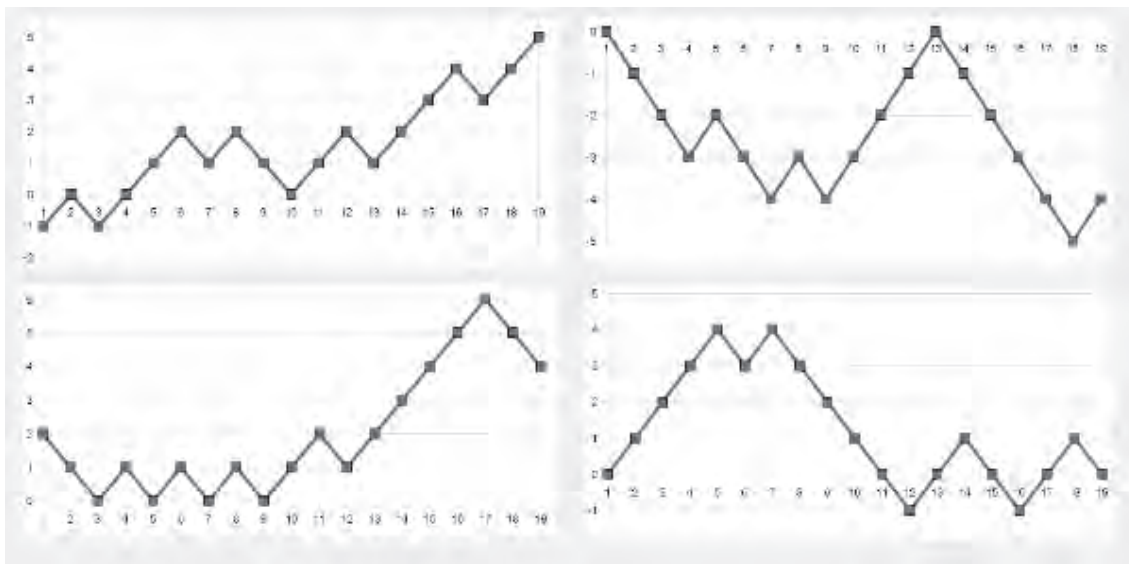
(18) In science, predictions are tested (not voted on), and in order to ensure that our predictions are not happen-chance coincidental changes, science has the concept of the "control" or "null hypothesis". The statement of causality requires more than just that two variables changed together, but that one had to cause the other. It is not sufficient to say that A seems to cause B, it must be true that B would not have happened except for A. That is the reason for the control, the control has all the same experimental conditions except the stimulus A, and in order to assert that A caused B, B must have happened with A, and it **MUST NOT HAVE HAPPENED** without A. And what is the control for man-made global warming on earth? If extra-terrestrial factors affected temperature would they affect Mars?

*"for three Mars summers in a row, deposits of frozen carbon dioxide near Mars' south pole have shrunk from the previous year's size, suggesting a climate change in progress."*<sup>6</sup>

#### *The Null Hypothesis (Natural Variation) is Consistent with Global Temperatures*

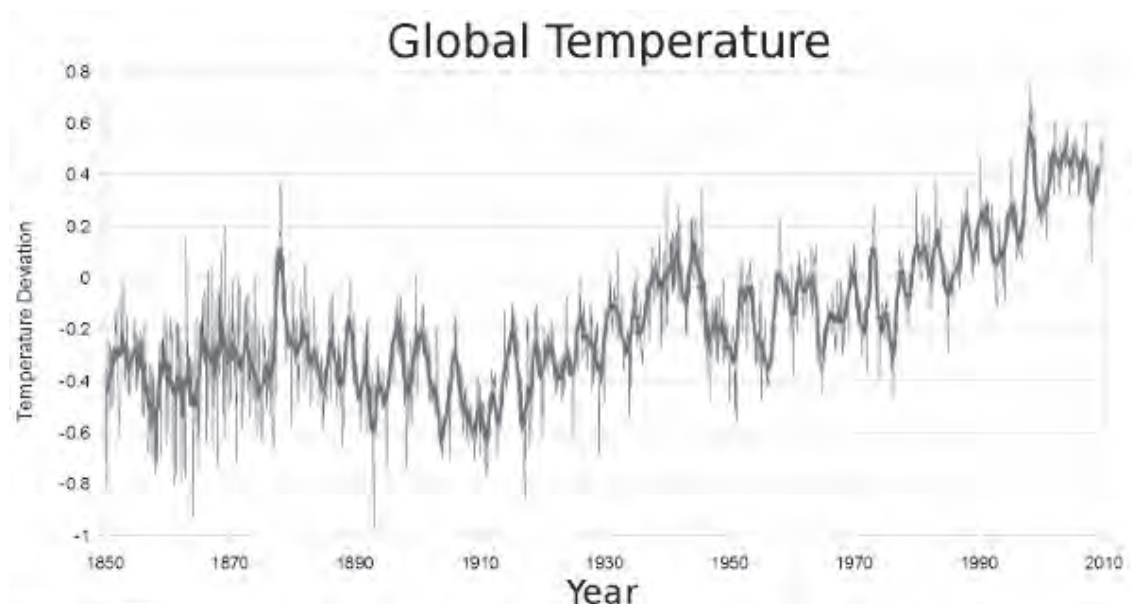
(19) The null hypothesis of man-made global warming is that the warming is natural<sup>7</sup>. As can be seen from the top left plot, it is very easy to randomly produce a signal just like the global temperature data.

#### VARIOUS RANDOM WALKS (19 DECADES)



(20) Normal variation in the climate before and after CO<sub>2</sub> levels rose have been around a tenths of a degree between decades. Out of the 15 decades of recorded global temperature data, we have seen a few runs of decades with warming, a few runs of cooling, and then at the end of the 20th century we saw a run of three decades of warming (1970s, 1980s, 1990s) followed by a decade of pause. As can be seen from the various random sequences it is highly likely that we will see a run of three decades of warming or cooling in a random sequence of 15 warming/cooling decades. Unless the warming in these decades far exceeded the normal inter-decadal change in global temperatures, the mere fact of three decades of warming is in itself entirely consistent with the null hypothesis of natural variation. Indeed a similar warming period occurred pre WWII.

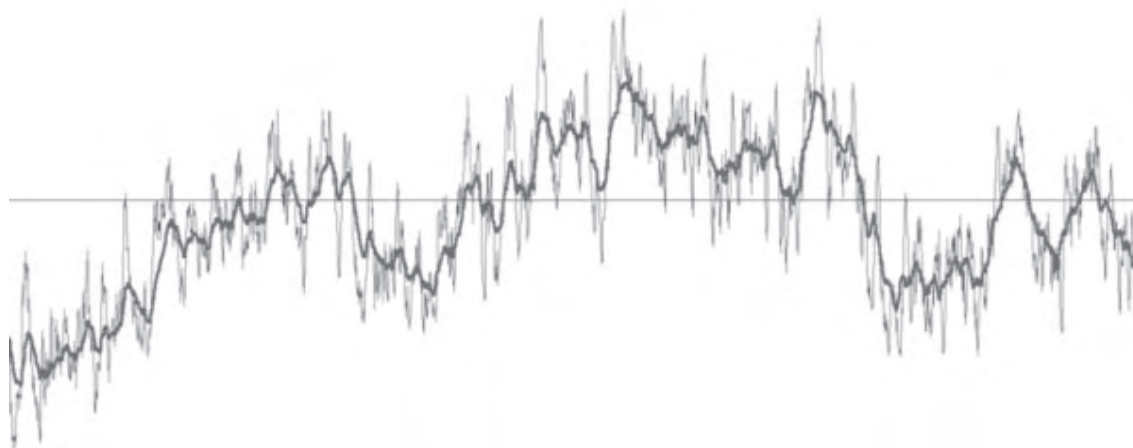
## NATURAL CLIMATIC VARIATION IS EASILY CONFUSED WITH LONG TERM CHANGE



(21) According to the IPCC<sup>8</sup> long-term climatic variation is dramatically higher than short-term variation. This means there are natural increases & decreases in temperature over periods of up to a century which are larger than the inter-decadal or year to year variation. So there are natural long-term fluctuations in the climate which may easily be misinterpreted as man-made forcing on the climate. Such long term variation is perfectly natural and present in all kinds of systems and there is no excuse for “scientists” to suggest long-term fluctuations can only be explained by external forcing. Another implication is that long-term global forecasts are inherently more difficult than short-term. Contrary to the protestations of the Met Office, if they can’t predict the climate even a year in advance, then there’s little chance of longer term forecasts being correct.

(22) To highlight the similarity of the global temperature to natural noise, a section of 1/f noise (pink noise) is shown with lines in blue modelling the yearly average and red the decadal average. The section shown represents 200 years. It has been selected from a noise sample equivalent to 2,000 years, being the section most like the global temperature record in the first 150 years. The next 50 “years” shows the typical pattern of temperature.

## 1/F PINK NOISE



## Noddy Science: Triple Glazing can't work

(23) We are told that CO<sub>2</sub> must heat up the atmosphere so the science is “unequivocal”. This is bogus “Noddy science”. Similar hand-waving arguments suggest triple glazing must be worse than the same window without the centre layer. Glass has a much higher thermal conductivity than air, so, replacing some insulating air with thermally conductive glass will reduce the overall insulation. But, if the space between the two panes of glass is sufficiently large to allow the air to move in a convective cycle, convection dominates

and the air, heated in contact with the warm pane, rises due to convection and falls down the cold pane, transferring its heat across the insulation gap. Contrary to the “Noddy science”, introducing a correctly spaced central thermally conductive layer of glass, decreases heat loss.

*Noddy Science: CO<sub>2</sub> Warms the Planet?*

(24) The complex bond structure within CO<sub>2</sub> means that it can readily absorb and emit radiation in the infra-red (IR) band where thermal radiation is given off by a blackbody<sup>9</sup> at the temperature of the earth. Much of this IR is at wavelengths at which other atmospheric constituents do not interact, so if CO<sub>2</sub> is exposed to a warmer surface like the earth, it will absorb radiation that would otherwise pass through into the cold of space AND likewise if CO<sub>2</sub> is exposed to the cool of outer space it will emit vast quantities of IR at wavelengths which other gases cannot emit.

(25) When CO<sub>2</sub> is present low in the atmosphere, it tends to block transmission of these wavelengths into space and reduce heat loss to space. When CO<sub>2</sub> is present high in the atmosphere, it helps emit IR, so causing cooling of the atmosphere acting as a vector by which other gases can lose heat into space. Like triple glazing, the system is complicated by the movement of air. Air warmed at the surface naturally tends to rise above the majority of the (blocking) atmosphere and it cannot descend until it has cooled by the emission of IR into the cool of outer space. CO<sub>2</sub> cooling is as natural as CO<sub>2</sub> warming, the atmosphere being a highly dynamic and complex system: a natural cooling system taking heat from the surface of the earth up into space via convective currents.

(26) Simple physics could suggest CO<sub>2</sub> is a cooling gas as easily as warming and “obvious” assertions must be validated against real evidence, not the preconceptions of “scientists”. CO<sub>2</sub> could impact the atmosphere in other ways: changes in specific heat capacity, density, interaction with water droplets and cloud formation. Other gases like water vapour also have their effects. It would be wrong to say that increases in CO<sub>2</sub> can not affect the climate, but it is equally absurd, in such a complex system, to say this or that effect must dominate in the absence of the normal rigorous testing required by science.

TERMS OF REFERENCE AND SCOPE OF THE INDEPENDENT REVIEW ANNOUNCED ON 3 DECEMBER 2009 BY UEA.

(27) In the eyes of most “sceptics”, this is a wholly partial review carried out by, and for, the Universities who make so much money from their threats of Weather of Mass Destruction. The only public faces of this review are the University Press Release and the statement of the scope on the committee’s own website. Attempts to contact Sir Muir Russell have received no reply. The findings will be the usual formula: “a few bad eggs, but the science (and grant money) are safe”. This review seems to serve no real purpose except the PR of the University to appear to be doing something. From the public’s view, and from the wider view of worldwide confidence in the output of the CRU, this secretive internal review is most likely a waste of the time of a good person like Sir Muir Russell.

CONCLUSION

(28) A precautionary principle is at the very heart of science: science is inherently precautionary or sceptical about claims or assertions until they are fully substantiated by the evidence. The oft cited “precautionary principle” is not part of science. It belongs in the realm of political policy making based on science. It is policy makers, not scientists, who must decide how and when to invoke the “precautionary principle” not data-gathering scientists. But in climate “science” the precautionary principle is being used to force the public to accept bad, unsupported science unless contrary evidence can be found. This is contrary to all the principles of science forcing the burden of proof not on those making assertions but on those who are sceptical of these assertions. This is wholly unscientific, completely unacceptable by people claiming to be scientists and smacks of a blatant attempt to use science to provide a thin veneer of undeserved scientific respectability to hide an enviro-political campaign dressed up as science.

(29) Whether or not one believes in man-made global warming, we should all be able to trust the raw temperature data. If we cannot trust those who are trusted with the raw data, we cannot trust their many adjustments to the raw data. If we cannot trust the adjusted data, we have no trustworthy figure on global temperature. If we cannot trust the global temperature figures, we cannot draw conclusions as to the effects of temperature change, and so, if we cannot trust the raw data we simply cannot trust anything in the area of climate “science”.

(30) The evidence is key because although different experts may interpret this evidence differently, we should all be able to agree on the validity of the original data. Global temperature data cannot be reproduced, there is no second chance to understand the global temperature within our lifetime. By their own PR, the climategate “scientists” have told us that there is no issue more important, and certainly no more costly in terms of public expenditure. They have raised their own status as keyholders to the data to such importance that trillions of dollars are riding on their integrity.

(31) But, for years, the reports of “sexing up” the data in the area of climate “science” have been legion: now those allegations have been found to stem from those right at the centre of the subject in the CRU. They had not only the means, the method, but as the emails show, they had the motive to adjust the data.



(32) Whether or not they did what they did with the best of intentions, the result of the actions of the CRU has been to undermine the credibility of the basic climate data to such an extent that no one really knows how much “man-made” global warming is the result of their “adjustments” (whose nature remain a mystery) or how much is real temperature change. For those who believe that mankind is heating the globe, for those like the CRU who say that there is no more important issue facing mankind, their crime is all the worse: there is no doubt that their failure to maintain due scientific impartiality led in part to the failure of the Copenhagen conference and the growing public scepticism on the subject.

#### NOTES AND REFERENCES

1. <http://www.iraqinquirydigest.org/?p=6286> Iraq Inquiry
2. One who uses the scientific method: the systematic pursuit of knowledge involving the recognition and formulation of a problem, the collection of data through observation and experiment, and the formulation and testing of hypotheses.
3. Janis, Irving L. *Victims of Groupthink*. Boston. Houghton Mifflin Company, 1972, page 9.
4. <http://www.brynmawr.edu/psychology/McCauley1.html>
5. Report of the Presidential Commission on the Space Shuttle Challenger Accident, Chapter 7.
6. Nasa Press Release 20 September 2005.
7. Strictly speaking the opposite of man-made warming is non-man-made and not natural the difference being the possibility aliens-caused warming.
8. IPCC climate Change 2007: Working Group I: The Physical Science Basis Figure 9.7. Comparison of variability as a function of time scale of annual global mean temperatures ( $^{\circ}\text{C2 yr}^{-1}$ ).
9. The term blackbody is a commonly used term in physics and refers to the scientific concept of an “ideal” body losing energy (heat) by radiation. At the temperature of the sun this “blackbody” radiation is in the visible spectrum. At the temperature of the earth the main radiation is in the infra-red band where  $\text{CO}_2$  has strong absorption and emission.

*February 2010*

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### **Memorandum submitted by Professor Ross McKittrick (CRU 31)**

#### SECTION 1: INTRODUCTION

1. I hold a Ph.D. in economics from the University of British Columbia and I am a tenured full professor of economics at the University of Guelph in Ontario, Canada. My area of specialization is environmental economics, and I have published many peer-reviewed papers in social and physical science journals on the topic of climate change. Some of my research work examines the quality of surface temperature data supplied by the CRU to the Intergovernmental Panel on Climate Change (IPCC) for its assessment reports. I have published several peer-reviewed journal articles presenting statistical evidence that the CRU climate data (CRUTEM) are not free of biases due to urbanization, land use change and related socioeconomic processes.

2. In this memorandum I make the following submissions for your consideration. (a) In my view the CRU makes claims about the quality of its surface temperature data that cannot be verified based on the documentation on its web site. Nor is it possible from the publicly disclosed information to determine exactly what input data is used for the production of CRU climate data series and the extent to which it overlaps with other data products. (b) Published studies have specifically tested for and rejected claims that the CRU data products are adequately filtered for climatic measurement purposes. This is an active controversy in the scientific literature. (c) Professor Phil Jones, along with his coauthor Kevin Trenberth of the US National Center for Atmospheric Research, appears to me to have used his standing as a Coordinating Lead Author of the IPCC Report to prevent evidence calling into question CRU data used in the IPCC Report from being shown to IPCC expert reviewers. (d) After the close of the review process, misleading information was inserted into the text of the IPCC Report which had the effect of downplaying evidence against the quality of the data referred to in (c) above. It is my understanding that Professor Jones had responsibility for the section in question.

3. With regard to your three questions, I comment as follows.

- 3.1 The timing and content of the emails shows that Jones was aware of a study that questioned the quality of CRU data prior to the preparation of the first IPCC draft.
- 3.2 In addition to its existing terms of reference the Independent Inquiry should consider whether CRU scientists whose responsibilities include providing climate data to the IPCC should not serve as IPCC Lead Authors (or Coordinating Lead Authors) on any Report or Chapter that assesses evidence for or against its quality for climatic research purposes.

- 3.3 The information needed to determine the independence of CRU data products compared to other major surface temperature series is not apparently available on the CRU web site, but it can be surmised that the input data are not fully independent across different products.

## SECTION 2: QUESTIONS ABOUT CRU DATA QUALITY

4. The CRU publishes several versions of a data set purporting to show trends in climatic temperatures over land in 5x5 degree land-surface grid cells. I am concerned herein with controversies surrounding the post-1979 interval. Climatic data are not simply temperature records. It has been known for many decades that temperatures at land-based observational sites can be affected by changes in the land surface due to local deforestation, introduction of agriculture, road-building, urbanization, changes in monitoring equipment, measurement discontinuities, and so forth; as well as by local emissions of particulates and other air pollutants. These are considered *non-climatic* influences, since they cause purely local, and in principle reversible, changes in regional temperatures. Hence they must be filtered out of the local temperature record in order to reveal the *climatic* record. An ideal measurement of surface climatic changes would require a monitoring site untouched by human development, the equipment for which was consistent and perfectly maintained over the entire measurement interval. However the actual data used to produce climate data sets almost never satisfies these ideals. Consequently, data sets published as “climate” records are not simply observations: they are the outputs of models that take weather records as inputs, apply adjustments aimed at removing non-climatic influences, group the resulting records into regional grids and then translate the data into deviations from a local averages, yielding what are called gridded climate “anomalies”.

5. The problems with raw temperature data are widely recognized, including by the CRU. The CRU web page (<http://www.cru.uea.ac.uk/cru/data/hrg/>) references data compilations called CRU TS 1.x, 2.x and 3.x which are not subject to adjustments for non-climatic influences. Users are explicitly cautioned not to use the TS data for measuring or analyzing climate change in the way apparently done in IPCC reports. The 1.2 release of this product provided a list of FAQ's related to time series analysis (see <http://www.cru.uea.ac.uk/cru/data/hrg/timm/grid/ts-advice.html>). The first question, and its answer, are reproduced (in part) below.

### QUESTION ONE

Q1. *Is it legitimate to use CRU TS 2.0 to “detect anthropogenic climate change” (IPCC language)?*

A1. No. CRU TS 2.0 is specifically *not* designed for climate change detection or attribution in the classic IPCC sense. The classic IPCC detection issue deals with the distinctly anthropogenic climate changes we are already experiencing. Therefore it is necessary, for IPCC detection to work, to remove all influences of urban development or land use change on the station data....If you want to examine the detection of anthropogenic climate change, we recommend that you use the Jones temperature data-set. This is on a coarser (5 degree) grid, but it is optimised for the reliable detection of anthropogenic trends.

6. The implication is that the Jones data has been adjusted “for the reliable detection of anthropogenic trends.” Readers are referred to some academic papers for further explanation. The first is Brohan et al. (2005). This paper does not explain how the data are adjusted, instead it focuses on defending the claim that the potential biases are very small. Two references are cited in support of this point. One is by US scientist Thomas Peterson, which refers to the contiguous US only. Another is by David Parker of the Hadley Centre, whose argument relied on an apparent similarity between trends on windy and calm nights. No references to papers critical of Parker’s methods are cited. Section 2.3.3 of Brohan et al. states that to properly adjust the data would require a global comparison of urban versus rural records, but classifying records in this way is not possible since “no such complete meta-data are available” (p. 11), so the authors instead impose the assumption that the bias is no larger than 0.006 degrees per century. This *assumption* later appears in the 2007 IPCC Summary for Policymakers as a research finding (see paragraph 18 below).

7. Brohan et al. refer to a 2003 paper in *Journal of Climate* by Jones and Moberg, explaining the CRUTEM version 2 data product. This paper also has little information about the data adjustments. Reference is made to combining multiple site records into a single series, but not to removing non-climatic contamination. Moreover, the article points out (page 208) that it is difficult to say what homogeneity adjustments have been applied since the original data sources do not always include this information.

8. The other reference on the website is to a 1999 *Reviews of Geophysics* paper by Jones, New, Parker et al. This paper emphasizes that non-climatic influences (therein referred to as “inhomogeneities”) must be corrected (Section 2, p. 37) for the data to be useful for climatic research. The part of the paper that provides information on the adjustments is Section 2.1, consisting of only 3 paragraphs, none of which explains the CRU procedures. The only explanatory statement is (page 174):

“All 2000 + station time series used have been assessed for homogeneity by subjective interstation comparisons performed on a local basis. Many stations were adjusted and some omitted because of anomalous warming trends and/or numerous nonclimatic jumps (complete details are given by Jones et al. [1985, 1986c].”

9. Jones et al. [1985, 1986c] are technical reports that were submitted to the US Department of Energy, but they only cover data sets ending in the early 1980s, whereas the data under dispute herein is the post-1979 interval. Even if the adjustments were adequate in the pre-1980 interval it is likely impossible to have estimated appropriate empirical adjustments in the early 1980s for changes in socioeconomic patterns that did not occur until the 1990s.

10. In sum, the CRU cautions that unadjusted temperature data is inappropriate for the IPCC's purpose, and for detection and attribution analysis more generally. The CRU refers users instead to the CRUTEM products. Yet the accompanying documentation does not appear to explain the adjustments made to make the data products reliable for such usage.

11. These references also provide tables of sources for the CRUTEM input data. It can be inferred from the tables that a substantial portion of the raw data are from the Global Historical Climatology Network (GHCN) maintained by NOAA. These data are also used as inputs for the NASA and NOAA global temperature series. Hence the three global climate data series are not entirely independent. However the extent of overlap cannot be determined without knowing exactly which GHCN series are used for the CRU data set, which was one of the points subject to Freedom of Information requests in 2009. In addition, without provision of the non-GHCN source data, and a clear description of the adjustments applied to all input data, it is likely impossible to determine the overall independence between the CRU, GISS and NOAA series.

11. I have spent several years implementing statistical models to test the claim that the adjustments to CRU data are adequate. I have argued that an indication of inadequate adjustments would be a significant correlation between the spatial pattern of warming trends in climate data and the spatial pattern of industrialization/socioeconomic development. My 2004 paper in *Climate Research*, coauthored with Patrick J. Michaels, showed that such correlations are large and statistically significant, implying that the adjustments are likely inadequate. Our follow-up paper in the *Journal of Geophysical Research* in 2007 re-established these results on a new and larger global data base. Meanwhile in 2004 and 2006 a team of Dutch meteorologists (de Laat and Maurellis) also published research showing that gridded climate data sets appear to be contaminated by effects of industrialization. They used different methodologies, and we worked independently.

### SECTION 3: THE JONES 2004 EMAIL AND SUBSEQUENT IPCC DRAFTS

12. CRU Email 1089318616.txt is available at <http://www.eastangliaemails.com/emails.php?eid=419&filename=1089318616.txt>. It appears to be a concatenation of two emails from Jones to Michael Mann with the second one dated July 8 2004. I reproduce the second one with the statement of interest underlined. The reference to the "MM" paper is to my 2004 *Climate Research* paper coauthored with Michaels.

From: Phil Jones <p.jones@xxxxxxxxxxx.xxx >  
To: "Michael E. Mann" <mann@xxxxxxxxxxx.xxx >  
Subject: HIGHLY CONFIDENTIAL

Date: Thu Jul 8 16:30:16 2004

Mike,

Only have it in the pdf form. FYI ONLY—don't pass on. Relevant paras are the last 2 in section 4 on p13. As I said it is worded carefully due to Adrian knowing Eugenia for years. He knows they're wrong, but he succumbed to her almost pleading with him to tone it down as it might affect her proposals in the future !

I didn't say any of this, so be careful how you use it—if at all. Keep quiet also that you have the pdf.

The attachment is a very good paper—I've been pushing Adrian over the last weeks to get it submitted to JGR or J. Climate. The main results are great for CRU and also for ERA-40. The basic message is clear—you have to put enough surface and sonde obs into a model to produce Reanalyses. The jumps when the data input change stand out so clearly. NCEP does many odd things also around sea ice and over snow and ice.

The other paper by MM is just garbage—as you knew. De Freitas again. Pielke is also losing all credibility as well by replying to the mad Finn as well—frequently as I see it.

I can't see either of these papers being in the next IPCC report. Kevin and I will keep them out somehow—even if we have to redefine what the peer-review literature is!

Cheers

Phil

Prof. Phil Jones

Climatic Research Unit Telephone

School of Environmental Sciences Fax

University of East Anglia  
 Norwich Email p.jones@xxxxxxxxxxx  
 NR4 7TJ  
 UK

In a UK Guardian article of February 2, 2010, Trenberth wholly disavows the underlined statement (<http://www.guardian.co.uk/environment/2010/feb/02/hacked-climate-emails-flaws-peer-review>).

13. The IPCC released the First Order Draft in August 2005. Since this was over a year after Jones' email to Mann it is clear he was aware of my study (it is not clear what is the second paper to which he refers, but it might have been one by de Laat and Maurellis, and I assume that it was). The relevant section of the IPCC Draft was Chapter 3, pages 3–9 to 3–10. Consistent with the intent expressed in the email there was no mention of either MM2004 or the de Laat and Maurellis work. IPCC Expert Reviewer Vincent Gray criticized the omission as follows:

(<http://pds.lib.harvard.edu/pds/view/7795947?n=7&imagesize=1200&jp2Res=.25>) My expert review comments also criticized the omission.

14. The IPCC Second Order Draft was released in March 2006. Again consistent with the intent revealed in Jones' email to Mann, and despite reviewer demands, there was still no mention of our findings or those of deLaat and Maurellis. I provided lengthy feedback objecting to this omission. In June 2006 the expert review period closed.

15. The final, published IPCC report in May 2007 included a new paragraph that had not been included in either of the drafts shown to reviewers. I surmise that Professor Jones, as Coordinating Lead Author for Chapter 3, wrote the paragraph alone or in consultation with Trenberth, and bears responsibility for its inclusion in the published report.

McKittrick and Michaels (2004) and De Laat and Maurellis (2006) attempted to demonstrate that geographical patterns of warming trends over land are strongly correlated with geographical patterns of industrial and socioeconomic development, implying that urbanisation and related land surface changes have caused much of the observed warming. However, the locations of greatest socioeconomic development are also those that have been most warmed by atmospheric circulation changes (Sections 3.2.2.7 and 3.6.4), which exhibit large-scale coherence. Hence, the correlation of warming with industrial and socioeconomic development ceases to be statistically significant. In addition, observed warming has been, and transient greenhouse-induced warming is expected to be, greater over land than over the oceans (Chapter 10), owing to the smaller thermal capacity of the land.

(IPCC 2007 Chapter 3 page 244, emphasis added).

16. The concept of “statistical insignificance” has a specific quantitative interpretation: it implies that an empirical test has been done yielding a *p* value greater than 0.1. The effects reported in MM2004 had *p* values on the order of 0.002 or 0.2%, indicating significance. The claim that our results were statistically insignificant is inaccurate and was made without any supporting citation. To my knowledge no study showing such a thing exists, and in fact I have a new paper forthcoming in a peer-reviewed statistics journal (see <http://sites.google.com/site/rossmckittrick>) countering the specific claim that accounting for atmospheric circulation effects undermines our previously-published results.

17. The highlighted portion of the inserted paragraph (see paragraph 15 above) is unsupported, and in the context appears to reflect a fabricated conclusion. It was not included in the drafts that underwent expert review. Moreover, the references to sections 3.2.2.7 and 3.6.4 of the IPCC Report are misleading since neither section presents evidence that warming due to atmospheric circulation changes occurs in the regions of greatest socioeconomic development. Neither section even mentions industrialization, socioeconomic development, urbanization or any related term. The final sentence in the quoted paragraph is irrelevant to the present discussion since the debate only concerns data over land: there is obviously no economic development over the open ocean.

18. The CRU data was crucial for some of the main conclusions in the published version of IPCC Report. Global temperature trends are presented in Table 3.2 on page 243 of the IPCC Report. The accompanying text (page 242) states that the CRU data uncertainties “take into account” biases due to urbanization. The Executive Summary to the chapter (page 237) asserts that “Urban heat island effects are real but local, and have not biased the large-scale trends...the very real but local effects are avoided or accounted for in the data sets used.” The influential Summary for Policymakers stated:

“Urban heat island effects are real but local, and have a negligible influence (less than 0.006°C per decade over land and zero over the oceans) on these values.”

The supporting citation was to Section 3.2, which relied on apparently unsubstantiated material. IPCC Chapter 9 provides the summary of evidence attributing warming to greenhouse gases. The problem of CRU surface data contamination is set aside as follows (p. 693):

Systematic instrumental errors, such as changes in measurement practices or urbanisation, could be more important, especially earlier in the record (Chapter 3), although these errors are calculated to be relatively small at large spatial scales. Urbanisation effects appear to have negligible effects on continental and hemispheric average temperatures (Chapter 3).

Again, the rationale for ignoring the issue of CRU data quality problems relies on a citation to Chapter 3, which in turn relied upon apparently unsubstantiated evidence.

19. I submit that sufficient evidence to disprove a claim of evidence fabrication would consist of the *p* value supporting the claim of statistical insignificance, the peer-reviewed journal article in which it was presented, and the page number where the study is cited in the IPCC Report. An inability to produce these things would, I submit, have relevance for answering the first Inquiry question.

*Professor Ross McKittrick*  
Department of Economics  
University of Guelph, Canada

*February 2010*

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### Memorandum submitted by Stephen McIntyre (CRU 32)

#### SUMMARY

1. Reconstructions of temperature over the past 1,000 years have been an highly visible part of IPCC presentations to the public. CRU has been extremely influential in IPCC reconstructions through: coauthorship, the use of CRU chronologies, peer review and IPCC participation. To my knowledge, there are no 1000-year reconstructions which are truly “independent” of CRU influence. In my opinion, CRU has manipulated and/or withheld data with an effect on the research record. The manipulation includes (but is not limited to) arbitrary adjustment (“bodging”), cherry picking and deletion of adverse data. The problem is deeply rooted in the sense that some forms of data manipulation and withholding are so embedded that the practitioners and peer reviewers in the specialty seem either to no longer notice or are unoffended by the practices. Specialists have fiercely resisted efforts by outside statisticians questioning these practices—the resistance being evident in the Climategate letters. These letters are rich in detail of individual incidents. My submission today will not comment on these individual incidents (some of which I’ve commented on already at Climate Audit), but to try to place the incidents into context and show why they matter to the research record. I will not comment in this submission on CRUTEM issues only for space reasons.

#### INTRODUCTION

2. Together with Ross McKittrick, I have published several peer-reviewed articles on 1,000-year reconstructions and reconstructions, made invited presentations to a panel of the U.S. National Academy of Sciences, to a subcommittee of the U.S. House Energy and Commerce Committee and a Union Session of the American Geophysical Union and have in-depth personal knowledge of CRU proxy reconstructions. I was a reviewer of the IPCC 2007 Assessment Report. I am the “editor” of a prominent climate blog, [www.climateaudit.org](http://www.climateaudit.org), which analyzes proxy reconstructions. I am discussed in many Climategate Letters.

#### TEMPERATURE RECONSTRUCTIONS

3. Keith Briffa was Lead Author of the IPCC 2007 section on “recent” paleoclimatology, the Climategate Letters showing that he worked closely with Mann associate, Eugene Wahl (not a listed IPCC expert reviewer). Mann was Lead Author of the corresponding IPCC 2001 section, with the Climategate Letters showing that he worked closely with Briffa and Jones.

4. Jones, Briffa and Osborn were on the editorial boards of multiple climate journals and participated actively both in peer review and the assignment of peer reviewers.

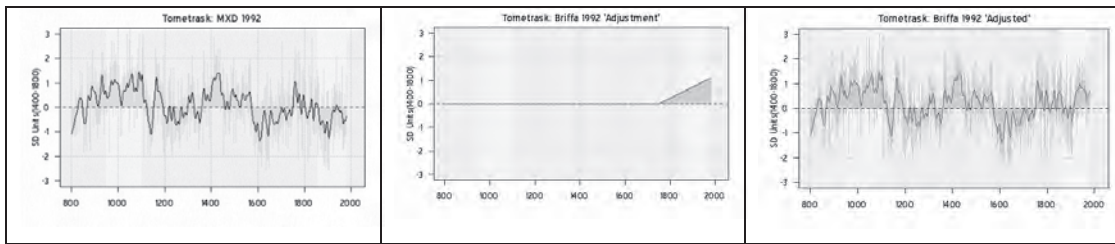
5. CRU scientists (and Climategate correspondent Michael Mann) were coauthors of all three reconstructions in the IPCC 2001 report and coauthors of six (of ten) multiproxy reconstructions in the IPCC 2007 report.

6. CRU tree ring proxies (in particular, Tornetrask, Yamal/Polar Urals, Taymir) were used in all 10 IPCC 2007 multiproxy reconstructions.

#### “BODGING”

7. One of the underlying problems in trying to use tree ring width/density chronologies for temperature reconstructions is a decline in 20th century values at many sites—Briffa’s 1992 density (MXD) chronology for the influential Tornetrask site is shown at left below. The MXD chronology had a very high correlation to temperature, but went down in the 20th century relative to what it was “expected” to do and relative to the ring width (RW) chronology (which had a lower correlation to temperature.) So Briffa “adjusted” the MXD chronology, by a linear increase to the latter values (middle), thereby reducing the medieval-modern differential. This adjustment was described in private as the “Briffa bodge” (Melvin and Briffa 2008).

**Figure 1**  
TORNETRASK FROM BRIFFA (1992)



Left—MXD chronology. Middle—“Briffa bodge”. Right—Briffa 1992 “adjusted”.

8. Although there was no scientific basis for such an arbitrary adjustment, peer reviewers of Briffa *et al* (1992) did not object. “Bodging” then seems to have entered into the CRU toolkit to get reconstructions to “look” right, as evidenced by the Climategate documents containing annotations that the method contains “fudge factors” or “very artificial corrections for decline” (eg [http://di2.nu/foia/harris-tree/briffa\\_sep98\\_e.pro](http://di2.nu/foia/harris-tree/briffa_sep98_e.pro))

```

;***** APPLIES A VERY ARTIFICIAL CORRECTION FOR DECLINE*****
valadj = [0.,0.,0.,0.,0.,-0.1,-0.25,-0.3,0.,-0.1,0.3,0.8,1.2,1.7,2.5,2.6,2.6,$
          2.6,2.6,2.6]*0.75 ; fudge factor

```

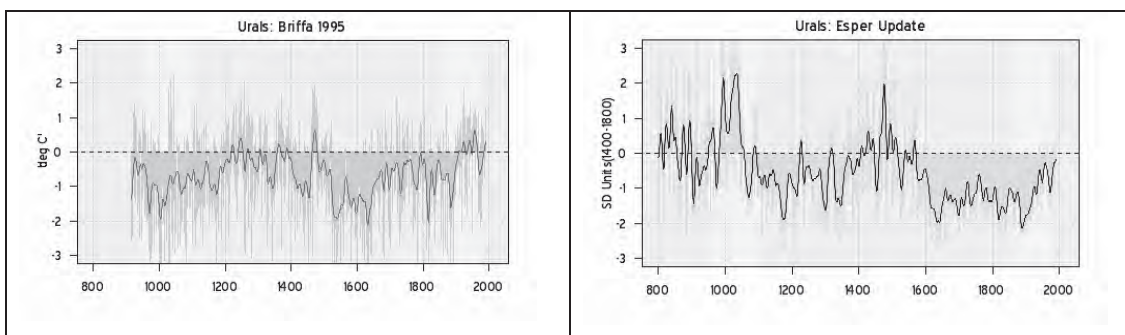
9. Although the bodge was reported in the original article, the bodge was not reported in the numerous multiproxy studies relying on the Tornetrask reconstruction nor in the IPCC reports nor was it considered in calculation of confidence intervals.

#### WITHHOLDING ADVERSE DATA

10. There are many incidents in the Climategate Letters of withholding data. I’ll review one incident which, in my opinion, has a direct impact on the research record.

11. Briffa *et al* (1995) produced an influential chronology from the Polar Urals site (Figure 2—left), which combated the idea of a widespread Medieval Warm Period, supposedly showing a very cold 11th century in Siberia, with 1032 supposedly being the coldest year of the millennium. Further measurements (Figure 2—right) yielded a chronology in which the 11th century was warmer than the 20th century. Neither CRU nor any other climate scientist ever published this update. The data at right has never been publicly archived and was obtained only through quasi-litigation at *Science*. (One of the Climategate Letters expresses regret that the data was made available.)

**Figure 2**  
URALS TREE RING CHRONOLOGIES



Left— Briffa (1995). Right—updated Polar Urals version used in Esper *et al* (2002).

12. The failure to publish this data set has two important adverse results. The inconsistency between different tree ring chronologies is disguised. In addition, the data set was unavailable for third parties interested in producing multiproxy reconstructions.

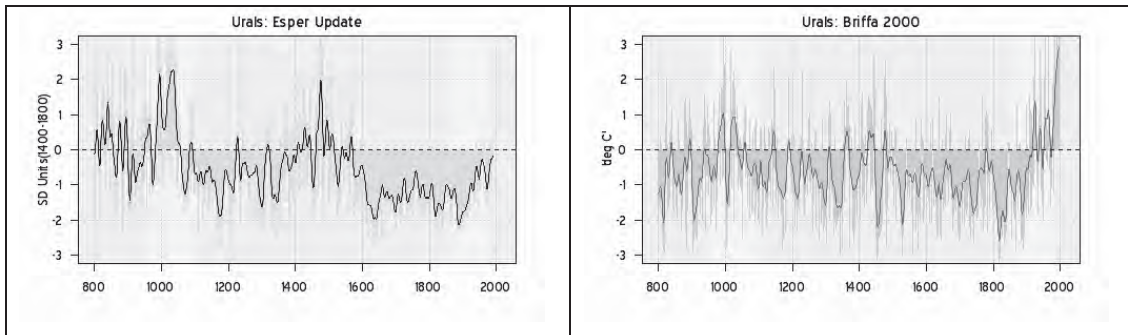
#### “CHERRY-PICKING”

13. There has been considerable suspicion that CRU cherry-picked the Yamal chronology over the updated Polar Urals chronology or a still unavailable combined chronology attested in Climategate Letter 1146252894.txt.

14. Instead of showing the updated Polar Urals chronology (Figure 3—left), Briffa (2000) replaced it without discussion with a chronology from nearby Yamal, one with an extremely pronounced hockey stick shape. This chronology became a mainstay of subsequent multiproxy reconstructions, while the unpublished

Polar Urals chronology was ignored. Measurement data for the three Briffa (2000) chronologies—Yamal, Taymir and Tornetrask—was not archived at the international tree ring measurement archive. Briffa resisted requests to archive the measurement data, which was not archived until September 2009 (and then only after Phil Trans B was asked to require its archiving.)

**Figure 3**  
URALS TREE RING CHRONOLOGIES



Left—updated Polar Urals version used in Esper *et al* (2002). Right—Yamal from Briffa (2000).

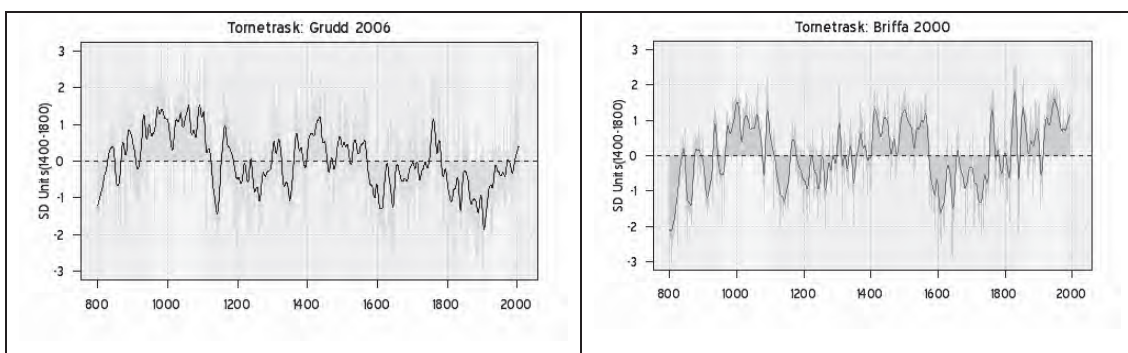
15. Replacement of the Yamal chronology with the Polar Urals chronology alters the ranking of the medieval and modern periods in, for example, the Briffa (2000) composite reconstruction, impacting IPCC assertions in respect to the confidence of their belief in unprecedented modern warmth. As an IPCC reviewer, I requested that this be disclosed. In his capacity as IPCC Lead Author, Briffa refused. In the absence of any explanation of the substitution, there is reason to be concerned about the reasons for using one series rather than the other.

16. The Yamal chronology was very much in the news just before Climategate broke, with questions being asked at Climate Audit about replication and homogeneity, neither of which had been previously addressed in peer reviewed literature.

17. The Climategate Letters (eg 878654527.txt) also show evidence that Briffa’s concern over non-linear recent growth—a concern that was not disclosed in Briffa (2000).

18. A similar cherry-picking issue arises with the preferential use in multiproxy studies of the Briffa (2000) Tornetrask version in preference to the Grudd (2006) version, which has a medieval period that is relatively “warmer” than the modern period.

**Figure 4**  
TORNETRASK RECONSTRUCTIONS

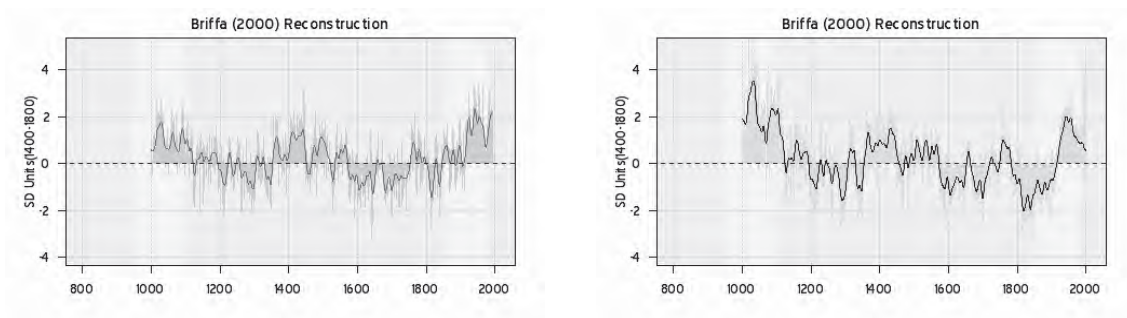


Left—Grudd 2006, 2008; Right— Briffa 2000.

**IMPACT ON RECONSTRUCTIONS**

19. The above examples show influential CRU site chronologies. However, the number of proxies in a typical IPCC multiproxy reconstruction is sufficiently small that the choice between two versions of a single site chronology can impact the overall reconstruction. For example, Figure 5 compares the published Briffa (2000) reconstruction (left) with a version derived merely by substituting the Polar Urals update for Yamal(right). The medieval-modern differential changes with one seemingly inconsequential change of version.

**Figure 5**  
**BRIFFA (2000) RECONSTRUCTION (BEFORE FITTING TO TEMPERATURE)**



Left—version from Briffa (2000); Right—varying the Tornetrask and Urals versions to newer versions.

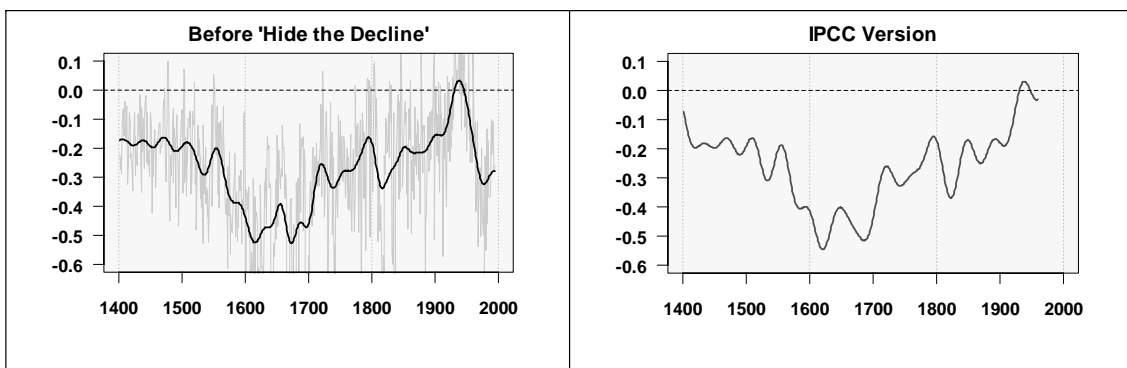
#### THE “TRICK . . . TO HIDE THE DECLINE”

20. Climate scientists have argued that the term “trick” can denote a clever way “to bring two or more different kinds of data sets together in a legitimate fashion by a technique that has been reviewed by a broad array of peers in the field.” (Penn State Inquiry). This is incorrect as applied to representations of the Briffa MXD reconstruction.

21. The “trick” arose in the context of pressure on IPCC 2001 authors to present a “nice tidy story” and to avoid a situation where the Briffa reconstruction “diluted the message” (see <http://climateaudit.org/2009/12/10/ipcc-and-the-trick/>). Two different variants of the “trick” appear in contemporary graphics.

22. Figure 6 (left) shows the actual Briffa MXD reconstruction (data available for the first time in the Climategate Letters) and (right) the version in IPCC 2001 Fig 2–21 (digitized on right). The IPCC “trick” was not a “clever” mathematical method—it was merely the deletion of inconvenient data after 1960. Post-1960 values were even deleted in the reconstruction archived version at NOAA.<sup>28</sup>

**Figure 6**



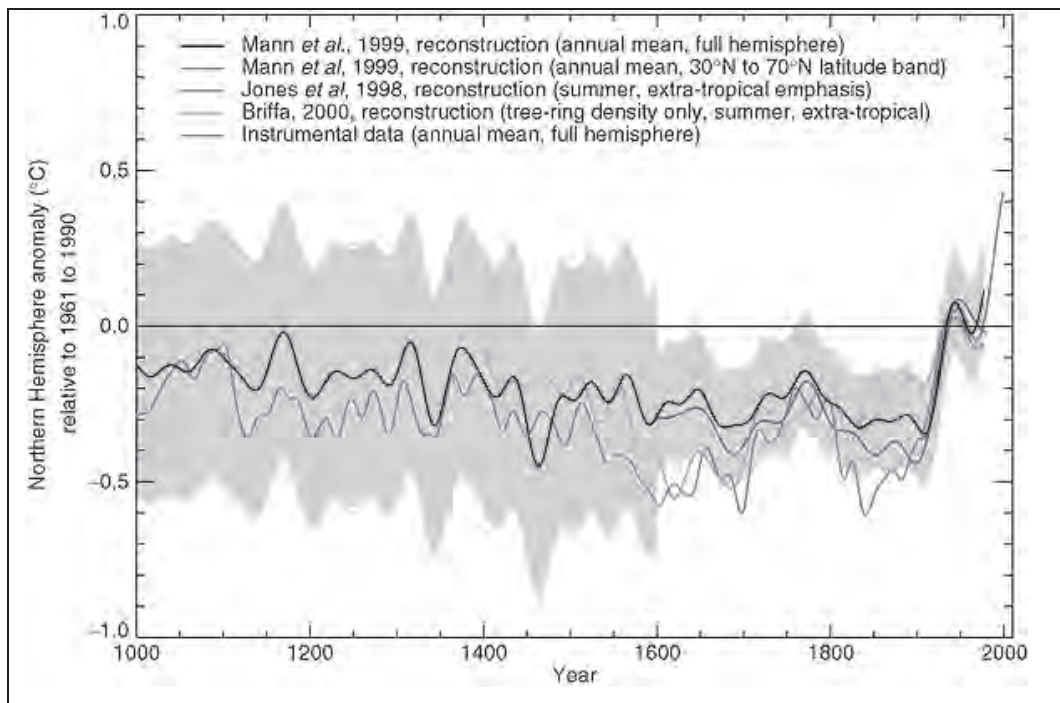
Left—Briffa MXD reconstruction re-scaled to IPCC scale with 40-point Hamming filter smooth. Right—Digitized from IPCC 2001 graphic.

23. The deletion of post-1960 values of the Briffa MXD reconstruction gave the IPCC (2001) temperature reconstructions a rhetorical appearance of consistency that did not exist in the underlying data (as shown below).

<sup>28</sup> [ftp://ftp.ncdc.noaa.gov/pub/data/paleo/treering/reconstructions/n\\_hem\\_temp/briffa2001jgr3.txt](ftp://ftp.ncdc.noaa.gov/pub/data/paleo/treering/reconstructions/n_hem_temp/briffa2001jgr3.txt)



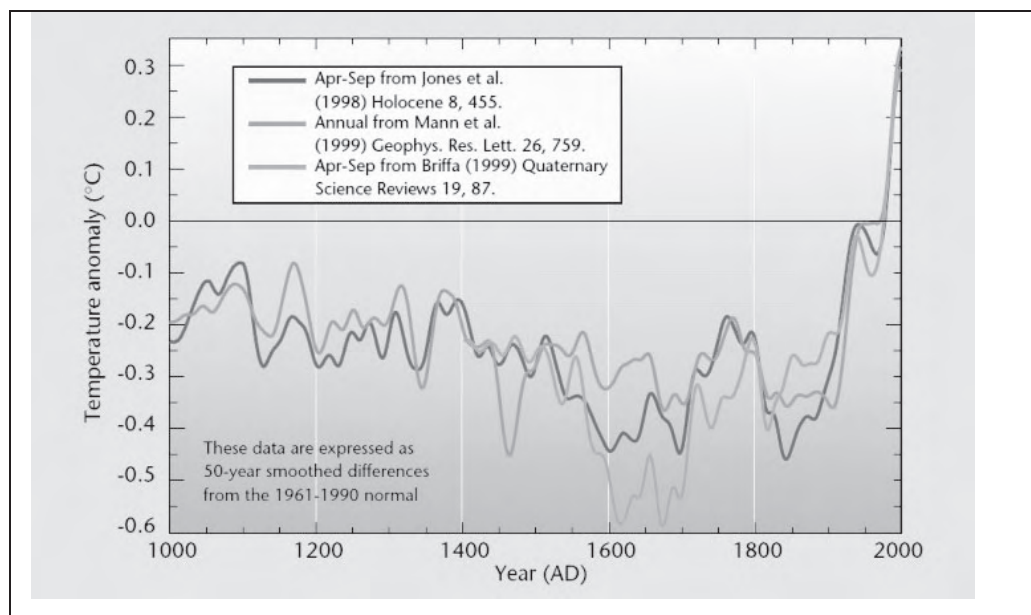
**Figure 7**  
 IPCC 2001 FIGURE 2-21. THE BRIFFA MXD RECONSTRUCTION (GREEN)  
 TERMINATES IN 1960



24. A somewhat different “trick” was used in the World Meteorological Organization 1999 report (shown in Figure 8 below). Jones substituted instrumental temperatures for MXD reconstruction values after 1960, resulting in an entirely false rhetorical impression of the efficacy of tree ring reconstructions. Far from this technique being “legitimate”, Mann himself at realclimate<sup>29</sup> had stated precisely the opposite about the splicing of temperatures and reconstructions into a single graft:

No researchers in this field have ever, to our knowledge, “grafted the thermometer record onto” any reconstruction. It is somewhat disappointing to find this specious claim (which we usually find originating from industry-funded climate disinformation websites) appearing in this forum.

**Figure 8**  
 WMO 1999, WITH THE SPLICED BRIFFA RECONSTRUCTION (GREEN)



<sup>29</sup> Myth vs. Fact Regarding the “Hockey Stick”.

## CONDUCT

25. The Climategate Letters obviously contain many dispiriting examples of poor conduct, including the following.

26. Withholding of data from potential critics:

Jones: We have 25 or so years invested in the work. Why should I make the data available to you, when your aim is to try and find something wrong with it.<sup>30</sup>

Osborn to Science: I don't have any core measurement data and therefore have none to give out!<sup>31</sup> [Climategate Letters and documents show that CRU had the requested measurement data]<sup>32</sup>

Mann to Osborn: I'm providing these [MBH residuals] for your own personal use, since you're a trusted colleague. So please don't pass this along to others without checking w/ me first. This is the sort of "dirty laundry" one doesn't want to fall into the hands of those who might potentially try to distort things.<sup>33</sup>

27. Use of the peer review process to suppress or delay adverse publications:

If published as is, this paper could really do some damage. It is also an ugly paper to review because it is rather mathematical, with a lot of Box-Jenkins stuff in it. It won't be easy to dismiss out of hand as the math appears to be correct theoretically.<sup>34</sup>

Recently rejected two papers (one for JGR and for GRL) from people saying CRU has it wrong over Siberia. Went to town in both reviews, hopefully successfully. If either appears I will be very surprised.<sup>35</sup>

I am really sorry but I have to nag about that review—Confidentially I now need a hard and if required extensive case for rejecting.<sup>36</sup>

I can't see either of these papers being in the next IPCC report. Kevin [Trenberth] and I will keep them out somehow—even if we have to redefine what the peer-review literature is!<sup>37</sup>

28. Soft reviews of submissions by close associates. The Climategate documents provide multiple examples of soft reviews of submissions by colleagues Mann,<sup>38</sup> Schmidt,<sup>39</sup> Santer<sup>40</sup> and Wahl and Ammann.<sup>41</sup> Presumably there are many others. The review of articles in which a reviewer has a personal relationship is a recognized conflict of interest in medical journals. For example, the World Associate of Medical Editors statement<sup>42</sup> says:

a reviewer may have difficulty providing an unbiased review of articles by investigators who have been working colleagues. Similarly, he or she may find it difficult to be unbiased when reviewing the work of competitors

29. The Climategate Letters are replete with examples of unprofessional language, which on occasion rises to defamation:

The important thing is to deny that this has any intellectual credibility whatsoever and, if contacted by any media, to dismiss this for the stunt that it is.<sup>43</sup>

If \*others\* want to say that their actions represent scientific fraud, intellectual dishonesty, etc. (as I think we all suspect they do), lets let \*them\* make these charges for us!<sup>44</sup>

some cool statement can be made saying we believe the "prats have really fucked up somehow"—and that the premature publication of their paper is reprehensible.<sup>45</sup>

<sup>30</sup> <http://climateaudit.org/2005/10/15/we-have-25-years-invested-in-this-work/>

<sup>31</sup> <http://climateaudit.org/2010/01/04/difference-in-yamal-versions-not-insignificant/>; March 31, 2006:

<http://www.eastangliaemails.com/emails.php?eid=680>

<sup>32</sup> <http://www.climate-gate.org/cru/documents/yamal/> and <http://climateaudit.org/2010/01/04/what-happened-to-polar-urals/>; Apr 28, 2006 <http://www.eastangliaemails.com/emails.php?eid=684>

<sup>33</sup> <http://www.eastangliaemails.com/emails.php?eid=345&filename=1059664704.txt>

<sup>34</sup> <http://climateaudit.org/2009/12/16/climategatekeeping/>;

<http://www.eastangliaemails.com/emails.php?eid=321&filename=1054756929.txt>

<sup>35</sup> <http://climateaudit.org/2009/12/16/climategatekeeping/>;

<http://www.eastangliaemails.com/emails.php?eid=407&filename=1080742144.txt>

<sup>36</sup> <http://climateaudit.org/2009/12/16/climategatekeeping/>; 1054748574

<sup>37</sup> Jones successfully kept McKittrick and Michaels (2004) out of the AR4 First and Second Drafts. After Review Comments, Jones reluctantly included a reference together with a dismissive editorial comment that was not based on any eligible peer reviewed literature, <http://climateaudit.org/2009/12/17/climategatekeeping-2/>;

<http://www.eastangliaemails.com/emails.php?eid=419&filename=1089318616.txt>

<sup>38</sup> <http://climateaudit.org/2009/12/23/climategatekeeping-jones-reviews-mann/>

<sup>39</sup> <http://climateaudit.org/2009/12/22/climategatekeeping-schmidt-2009/>;

[http://www.climate-gate.org/cru/documents/review\\_schmidt.doc](http://www.climate-gate.org/cru/documents/review_schmidt.doc)

<sup>40</sup> <http://www.climate-gate.org/cru/documents/Review-Santer-et-al-2008.doc>

<sup>41</sup> <http://www.climate-gate.org/cru/documents/Review%20of%20Wahl&Ammann.doc>

<sup>42</sup> <http://www.wame.org/conflict-of-interest-in-peer-reviewed-medical-journals>

<sup>43</sup> <http://climateaudit.org/2010/01/04/back-to-2003/>;

<http://www.eastangliaemails.com/emails.php?eid=376&filename=1067194064.txt>

<sup>44</sup> <http://climateaudit.org/2010/01/07/team-responses-to-mm2003/>;

<http://www.eastangliaemails.com/emails.php?eid=381&filename=1067596623.txt>

<sup>45</sup> <http://climateaudit.org/2010/01/07/team-responses-to-mm2003/>; <http://www.eastangliaemails.com/emails.php?eid=380>

I'm saddened to hear that this bozo is bothering you too, in addition to NCAR, NSF, NAS, IPCC and everyone else. Rest assured that I won't ever respond to McIntyre should he ever contact me, but I will forward you any email he sends related to this. I assume Scott feels the same way . . .

personally, I don't see why you should make any concessions for this moron.<sup>46</sup>

Mr Fraudit never goes away does he? How often has he been told that we don't have permission? Ho hum. Oh, I heard that fraudit's Santer et al comment got rejected. That'll brighten your day at least a teensy bit!<sup>47</sup>

I noticed that ClimateFraudit had renewed their interest in you. I was thinking about sending an email of sympathy, but I was busy preparing for a quick trip to Hawaii.<sup>48</sup>

I would immediately delete anything you receive from this fraud.<sup>49</sup>

Hi Andy, The McIntyre and McKitrick paper is pure scientific fraud.<sup>50</sup>

I've seen this junk already. Look at the co-authors! DeFrietas, Bob Carter: a couple of frauds.<sup>51</sup>

30. One of the most dispiriting aspects of the Climategate Letters is the evidence of CRU's contribution to the poisoned atmosphere of present climate science. In 2003, CRU criticized us for supposedly not attempting to reconcile differences between our methodology and Mann's methodology. In October 2003, Osborn observed:

The single worst thing about the whole M&M saga is not that they did their study, not that they did things wrong (deliberately or by accident), but that neither they nor the journal took the necessary step of investigating whether the difference between their results and yours could be explained simply by some error or set of errors in their use of the data or in their implementation of your method.<sup>52</sup>

31. Osborn proposed a draft statement, which, had it been accepted by CRU, would probably have prevented much, if not most, of the following controversy:

. . . we are withholding further comments until we can—by collaboration with M&M if possible—be certain of exactly what changes to data and method were made by M&M, whether these changes can really explain the differences in the results, and eventually which (if any) of these changes can be justified as equally valid (given the various uncertainties that exist) and which are simply errors that invalidate their results.<sup>53</sup>

32. In November 2003, I entered into negotiations with CRU, agreeing to their review of our pending follow-up to our 2003 article, on the condition that CRU agreed to issue a short statement if their review confirmed that we had raised valid concerns:

If you identify any flaws in our document, we will rectify them, and you are at liberty to hold us to public account if we fail to do so . . .

If you find our document raises valid and meritorious concerns, you will give us a short statement to that effect which we are entitled to publish.

33. In a follow-up email, I re-assured CRU that I did not have the faintest interest in publishing results that were at cross-purposes.

We have entered into discussions about a possible review by UEA/CRU in complete good faith. We do not have the slightest interest in presenting incorrect or defective results or to create debate which is merely at cross-purposes.

34. CRU then refused to carry out the review, choosing to attempt to frustrate us in secret behind the scenes. Jones, as a member of the editorial board of *Climatic Change*, actively lobbied so that Mann would not be required to disclose source code and supporting data that would have enabled us to reconcile results. Despite his adverse interest, Jones appears (according to a Climategate Letter) to have acted as a reviewer of our 2004 submission to *Nature*, intervening not to ensure the reconciliation of results proposed by Osborn, but to frustrate any criticism of the Mann reconstruction.

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<sup>47</sup> <http://www.eastangliaemails.com/emails.php?eid=973&filename=1242132884.txt>

<sup>48</sup> <http://www.eastangliaemails.com/emails.php?eid=991&filename=1248902393.txt>

<sup>49</sup> <http://www.eastangliaemails.com/emails.php?eid=458&filename=1104855751.txt>

<sup>50</sup> <http://www.eastangliaemails.com/emails.php?eid=492&filename=1107899057.txt>

<sup>51</sup> <http://www.eastangliaemails.com/emails.php?eid=773&filename=1169050678.txt>

<sup>52</sup> <http://www.eastangliaemails.com/emails.php?eid=381&filename=1067596623.txt>

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*Stephen McIntyre*  
Climate Audit

*February 2010*

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**Memorandum submitted by Steven Mosher (CRU 33)**

MEMORANDA

*How independent are the other two national data sets?*

1. Declaration of interests. My name is Steven Mark Mosher. I am a resident of the United States. My interests in this matter are as follows. I am a published author of the first book that covered the email release from the University of East Anglia. That is currently my only source of income. I have been unemployed since June of 2009. Since 2007 I have been involved in the climate debate on the web. I have received no funding or financial support in any way from any person or organizing for my activities these past 3 years. I volunteer my insights and analysis free of charge.

2. During the years of 2007 to 2009 I was employed in the Open source movement. That experience gave me an appreciation for the power of transparency. Throughout 2007 and into 2009 I followed the quest of Steve McIntyre and others as they tried to get climate data and climate code released to the public. As a former data analyst for Northrop Aircraft, former statistician and former software engineer I was interested in having access to the data and the code so that I could perform basic quality checks on the science that was being used to combat global warming.

3. On my view Global warming is a potential threat to our planet and consequently the evidence in support of global warming and the software analyzing that data should be of the highest quality. During the course of 2007 to 2009 the papers I had read and the limited data I had reviewed gave me reason to doubt the accuracy of underlying data, the robustness of the calculations described in papers, and the reliability of the results.

4. In July of 2009 I was witness to a series of FOIA requests made by Steve McIntyre and others requesting the underlying data of the global temperature index. In addition I myself sent in an FOIA request to CRU. That request asked to see the confidentiality agreements that CRU had made contradictory claims about.

5. Recently CRU have been in contact with various agencies requesting temperature data. I have a pending FOIA appeal at CRU with respect to the procedures CRU is obligated to follow when acquiring confidential data. According to FOIA guidelines CRU is not allowed to use confidential data unless it is deemed necessary or essential to their mission. In my FOIA request I requested any supporting information CRU had to support their decision to contract for confidential data. They had performed no such analysis.

6. The question in front of the inquiry pertains to the “independence” of the CRU temperature data or rather to the CRU temperature series. According to CRU publications the data they use is largely take from the repository at NCDC. This database is known as GHCN. The other two series, NASA’s series and NOAA’s series also claim to take their data from GHCN. On the surface if we take the agencies at their word they are largely dependent on the same sources.

7. There is a fundamental difficulty facing anyone who wants to validate the claim that all three series use largely the same data. In order to validate this claim with certainty, one must have access to the data as used. That is, one must have the various copies each of the agencies used in constructing their series. The point is a fine one, but is the typical first test in any quality assurance test. CRU claim to copy some of their data from GHCN. To verify this claim one must compare the data that GHCN has with the copy that CRU claim to have made.

8. This effort to conduct a simple quality check was thwarted by CRU's unwillingness to share the data as they used it. It was also complicated by the fact that they failed to keep good records on which data could be released. Simply, they comingled confidential data with open data. Consequently they refused any release. Even a release of data which they claim to have acquired from GHCN.

9. Since the state of the question regarding the dependence or independence of the data is undetermined, that is, since one cannot verify the claim or refute the claim without access to the actual data as used by CRU, any claim made about the dependence or independence is a speculation based solely on the claims made in papers.

10. This is an easy matter within the scientific community if the scientific method is followed. What follows is a series of recommendations which will allow the community of researchers to settle the questions associated with the series.

11. CRU should be required to follow the guidelines of FOIA legislation. Those guidelines require that they only acquire confidential data if it is necessary to their mission. The two other agencies do not use confidential data and they claim similar results to CRU. It is recommended that CRU avoid the use of confidential data altogether.

12. If CRU are in the process of acquiring confidential data or restricted data or have already acquired it, it is recommended that they justify the necessity of holding this data. The guidelines require that they do this. However, my FOIA request indicates that they have not objectively determined that this data is necessary to their mission.

13. If it is shown to be necessary to their mission it is recommended that they institute data control procedures which keep the confidential data segregated from the open data.

14. It is recommended operate an open access policy with regard to the data that is not covered by confidentiality agreements. Both the NASA series and the NOAA series provide public access to their data.

15. It is recommended that CRU publish its computer source code connected to all aspects of calculating the Global temperature series under the appropriate open source license. Currently, NASA provide the source code for the calculation of their series. This will allow interested parties to compare the calculations that both agencies perform on the databases.

February 2010

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#### **Memorandum submitted by Professor Darrel Ince (CRU 34)**

I am Professor of Computing at the Open University and the author of 18 books and over 100 papers on software topics. My submission to the Committee is an expanded version of an article that I wrote for the *Guardian* and was published on 5 February 2010.

1. First a disclosure: I am not a fan of computer modelling. However, most of the modelling work that has been carried out is in a sense irrelevant in that there is plenty of evidence that the earth is changing and that a potential result of this could be cataclysm. Because of the high stakes I support some of the efforts to bring our planet back to what it was 40 years ago.

2. My favourite quote about science is by Karl Popper: almost certainly the most influential philosopher of science to this day

“Every intellectual has a very special responsibility. He has the privilege and opportunity of studying. In return, he owes it to his fellow men (or ‘to society’) to represent the results of his study as simply, clearly and modestly as he can. The worst thing that intellectuals can do—the cardinal sin—is to try to set themselves up as great prophets vis-a-vis their fellow men and to impress them with puzzling philosophies. Anyone who cannot speak simply and clearly should say nothing and continue to work until he can do so.”

3. This is one of the reasons why I feel strongly about one or two of the issues you will be considering.

4. One of the spin-offs from the emails that were leaked from the Climate Research Unit at the University of East Anglia is the light that was shone on the role of program code in climate research. There is a particularly revealing set of emails that were produced by a programmer at UEA known as Harry ReadMe. The emails indicate someone struggling with undocumented, baroque code and missing data which forms part of one of the three major climate databases used by researchers throughout the world.

5. A number of climate scientists have refused to publish their computer programs; what I want to suggest is that this is both unscientific behaviour and, equally importantly ignores a major problem: that scientific software has got a poor reputation for error.

6. There is enough evidence for us to regard a lot of scientific software with worry. For example Professor Les Hatton, an international expert in software testing resident in the Universities of Kent and Kingston, carried out an extensive analysis of several million lines of scientific code. He showed that the software had an unacceptably high level of detectable inconsistencies. For example, interface inconsistencies between software modules occurred at the rate of one in every seven interfaces on average in the programming

language Fortran, and one in every 37 interfaces in the language C. This is hugely worrying when you realise that just one error—just one—will often invalidate a computer program. What he also discovered, even more worryingly, is that the accuracy of results declined from six significant figures to one significant figure during the running of programs.

7. Hatton and other researchers' work indicates that scientific software is often of poor quality. What is staggering about the research that has been done is that it examines scientific software that is commercial: produced by software engineers who have to undergo a regime of thorough testing, quality assurance and a change control discipline known as configuration management. Scientific software developed in our universities and research institutes is often produced by scientists with no training in software engineering and with no quality mechanisms in place and so, no doubt, the occurrence of errors will be even higher. The Climate Research unit Harry ReadMe files are a graphic indication of such working conditions.

8. Computer code is also at the heart of a scientific issue. One of the key features of science is deniability: if you erect a theory and if anyone produces evidence that it is wrong then it falls. This is how science works: by openness, by publishing minute details of an experiment, some mathematical equations or a simulation; by doing this you embrace deniability. This does not seem to have happened in climate research. Researchers have refused to release their computer programs—even though they are still in existence and not subject to commercial agreements. For example, Professor Mann's initial refusal to give up the codes that were used to construct the hockey stick model that demonstrated that human-made global warming is a unique artefact of the last few decades (He has now released all his code).

9. The situation is by no means bad across academia: most academics release code and data. Also, a number of journals, for example those in the area of economics and econometrics, insist on an author lodging both the data and the programs with the journal before publication. There's also an object lesson in a landmark piece of mathematics: the proof of the four colour conjecture by Appel and Haken. They showed that in a map the regions can be coloured using at most four colours so that no two adjacent regions have the same colour. Their proof was controversial in that instead of an elegant mathematical exposition they partly used a computer program. Their work was criticised for inelegance, but it was correct and the computer program was published for checking.

10. The problem of large-scale scientific computing and the publication of data is being addressed by organisations and individuals that have signed up to the idea of the fourth paradigm. This was the idea of Jim Grey, a senior researcher at Microsoft, who identified the problem well before the Climategate affair. There is now a lot of R and D work going into mechanisms whereby the web can be used as a repository for scientific publications and more importantly the computer programs and the huge amount of data that they use and generate. A number of workers are even devising systems that show the progress of a scientific idea from first thoughts to the final published papers. The problems with climate research will do doubt provide an impetus for this work to be accelerated.

11. I believe that, if you are publishing research articles that use computer programs, if you want to claim that you are engaging in science, the programs are in your possession and you will not release then you are not a scientist; I would also regard any papers based on the software as null and void. There are of course some exceptions which would apply both now and in the past and would excuse many of those who have refused to release code and will in the future refuse: for example, a scientist may have a commercial agreement with some body for the whole software, or part of the code is commercial; another issue which complicated Prof Mann's position is that of intellectual property rights. Another issue is the fact that developing software is hard to do and considerable effort goes into it. There should be a period in which it is not released so that a researcher can make the most of its efforts by, for example, publishing more papers. Steve Schneider of MIT has suggested two years.

12. There are a number of ways that this can be enforced: by journals insisting that code and data be lodged with them; by the research councils insisting that as a condition of granting research funds that all data and software be lodged somewhere and a failure to do this would result in no further funding while this occurs; and our universities making it a clause in an academic's terms and conditions that lodging data and software should occur.

13. I would be happy to meet the committee.

*February 2010*

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**Memorandum submitted by Warwick Hughes (CRU 35)**

1. My submission is mainly on your third question about the independence of the international data sets. There is a widespread view afoot that "the CRU—Jones *et al* data is basically the same as the GHCN". Professor Jones and CRU have at times pointed people wanting station data in the direction of the US based GHCN dataset.

1.1. I note that in his letter to your Committee on 10 December 2009, the UEA Vice Chancellor says, “It should be noted that over 95% of the data has for some years been in the public domain, such as on the NOAA site.” My position is that the NOAA/GHCN station data differs greatly from CRU station data and could not be expected to provide serious researchers with a proxy for CRU station data.

1.2. The two datasets, CRU and GHCN have very different origins and histories, employed different methodologies and as our maps show, end up with widely contrasting grid point trends, despite drawing raw data from a similar pool of global stations. There should be nothing surprising that two separate teams produce results that are distinctively different—that sounds to me like normal science in progress.

2. On 18 February 2005 Professor P D Jones of CRU replied to my emailed requests for his land station data by including, “Why should I make the data available to you, when your aim is to try and find something wrong with it.” See Appendix I for a copy of the email and Appendix II. For a reference to me and that email in the unauthorised release of CRU emails.

2.1. During 2005 Professor P D Jones of CRU was co-author of a study—(Vose *et al*), Citation: *Vose, R S, D Wuertz, T C Peterson, and P D Jones (2005), An intercomparison of trends in surface air temperature analyses at the global, hemispheric, and grid-box scale, Geophys Res Lett, 32, L18718, doi:10.1029/2005GL023502. <http://www.agu.org/pubs/crossref/2005/2005GL023502.shtml>*

2.2. Vose *et al* concluded that there was “reasonable agreement” between GHCN and CRU at the grid-box level during the period 1976–2003. On reading Vose *et al* and studying their Figures 5 (next page) it is clear that outside the USA and Europe there are many areas where the grid points trends (as indicated by the size of the red circles) bear little resemblance from one map panel to the other.

2.3. Looking at the Vose *et al* Figure 6 and checking the scale carefully it looked to me that there was more grid point divergence between the GHCN and CRU trends than the impression given by Vose *et al* quoting the 9.4% number in their text. With respect to the Vose *et al* Figure 6 scatter plot they say at the top left of page L18718, “. . . 9.4% of all grid-box trends differ by more than  $0.100^{\circ}\text{C decade}^{-1}$  in both magnitude and sign.”

2.4. In 2006 Dr Russell Vose kindly sent me the GHCN and CRU 5 degree grid point trends 1976–2003 used in the Vose *et al* paper and I have calculated the GHCN minus CRU trend differences and present the essence of my analysis for your Committee.

2.5. GHCN minus CRU differences for the 1976–2003 period—which was chosen by Vose *et al*. Their conclusion was that there is “reasonable agreement” between these datasets There are 524 co-located grid point difference values in the file as sent and a simple sorting and counting of the grid point differences GHCN minus CRU shows that:

At 225 grid points (42.9% of 524) the difference GHCN minus CRU measures from 0.099 to  $-0.099^{\circ}\text{C}$  per decade inclusive.

At 154 grid points (29.4% of 524) the difference GHCN minus CRU measures 0.1 and above  $^{\circ}\text{C}$  per decade.

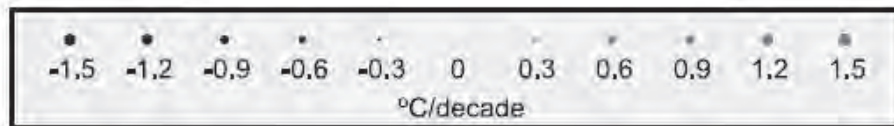
At 145 grid points (27.7% of 524) the difference GHCN minus CRU measures  $-0.1$  and below  $^{\circ}\text{C}$  per decade.

To sum up paragraph 2.5—57.1% of grid point values for GHCN trend minus CRU trend are  $0.1^{\circ}\text{C}$  per decade or greater, regardless of sign.

Note:  $0.1^{\circ}\text{C}$  per decade can be compared to  $1^{\circ}\text{C}$  per century which is greater than the rate of IPCC global warming.



Fig 1



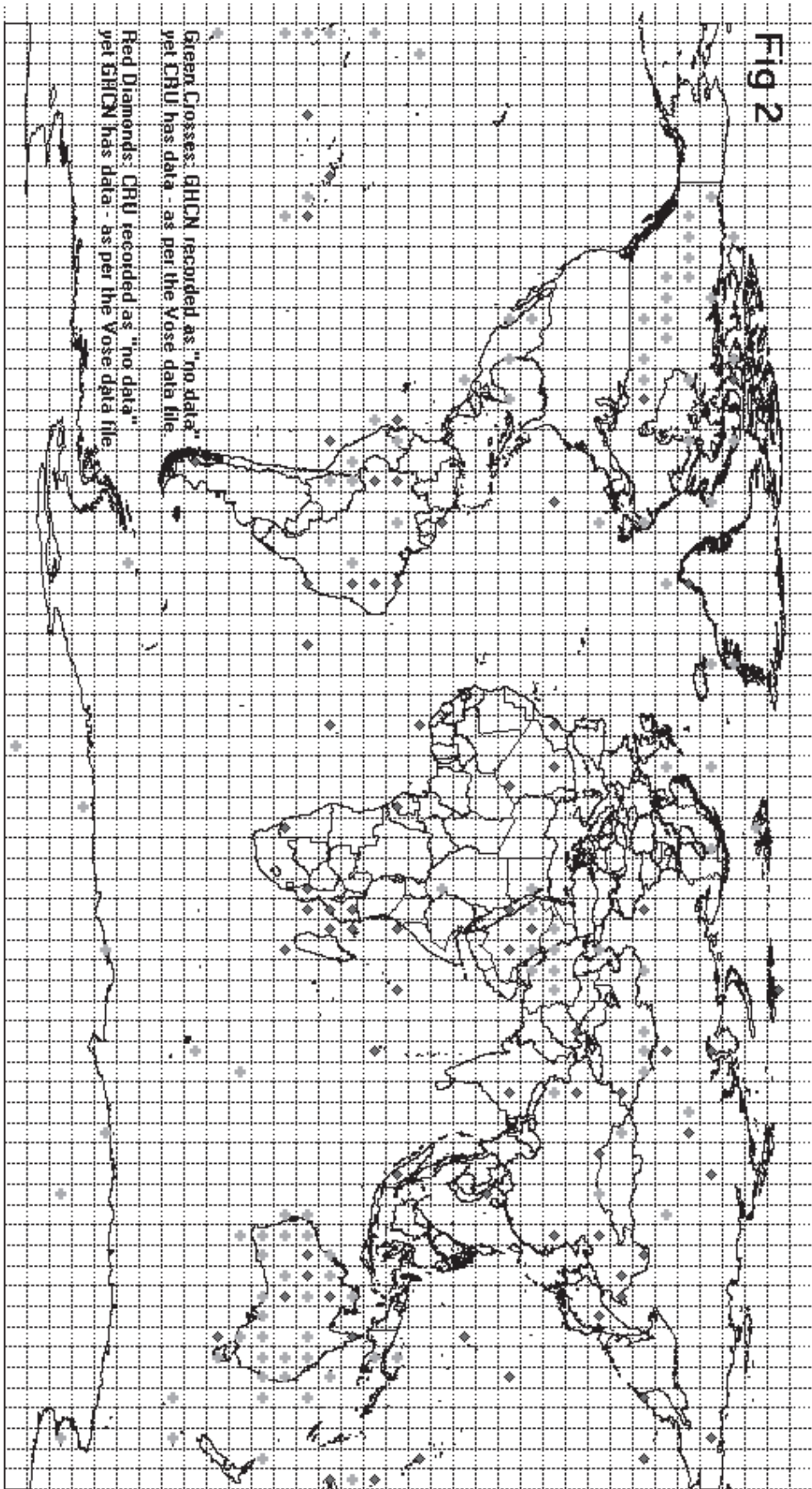
Vose et al Fig 5

**Figure 5.** Map of least-squares trends in 5° by 5° grid boxes for the period 1976–2003 for GHCN (top panel) and CRU (bottom panel).



3. Figure 2 (below) shows the grid points for which each dataset has no data while the other dataset does find data—as per the file sent by Dr Vose in 2006. To make that clear, the Green Crosses indicate grid points of five degree latitude and longitude where GHCN finds no data but CRU does have data. The Red Diamonds indicate grid points where CRU finds no data but GHCN does have data. This map by itself reveals significant differences between the GHCN and CRU datasets.

Figure 2



4. Conclusions: With respect to your Committee's Question 3 "How independent are the other two international data sets?" We believe our analysis demonstrates that the GHCN and CRU datasets at the grid point scale are robustly independent.

Any agreement on hemispheric or global scales is simply due to the cancelling out of large positive and negative differences at the grid point level. It follows that these differences would be even more marked at the station level, if indeed all the CRU station data was made freely available.

I have a geology degree with honours from the University of Auckland and have been analysing the Jones *et al*/CRU temperature compilations since 1991. My refereed published papers are listed in Appendix III.

#### APPENDIX I

Text of email to me from Professor P D Jones of CRU.

Date: Mon, 21 Feb 2005 12:12:22 +0000

From: Phil Jones

To:

Subject: Re: WMO non respondo

Warwick,

Hans Teunisson will reply. He'll tell you which other people should reply.

Hans is "Hans Teunissen" HTeunissen@wmo.int.

I should warn you that some data we have we are not supposed to pass on to others. We can pass on the gridded data—which we do. Even if WMO agrees, I will still not pass on the data. We have 25 or so years invested in the work. Why should I make the data available to you, when your aim is to try and find something wrong with it. There is IPR to consider.

You can get similar data from GHCN at NCDC. Australia isn't restricted there. Several European countries are. Basically because, for example, France doesn't want the French picking up data on France from Asheville. Meteo France wants to supply data to the French on France. Same story in most of the others.

Cheers

Phil

#### APPENDIX II

Brief extract from CRU email in file number 1256765544.txt at this URL;

<http://www.eastangliaemails.com/emails.php?eid=1065&filename=1256765544.txt>

Patrick J Michaels

Imagine if there were no reliable records of global surface temperature. Raucous policy debates such as cap-and-trade would have no scientific basis, Al Gore would at this point be little more than a historical footnote, and President Obama would not be spending this U.N. session talking up a (likely unattainable) international climate deal in Copenhagen in December. Steel yourself for the new reality, because the data needed to verify the gloom-and-doom warming forecasts have disappeared.

Or so it seems. Apparently, they were either lost or purged from some discarded computer. Only a very few people know what really happened, and they aren't talking much. And what little they are saying makes no sense.

In the early 1980s, with funding from the U.S. Department of Energy, scientists at the United Kingdom's University of East Anglia established the Climate Research Unit (CRU) to produce the world's first comprehensive history of surface temperature. It's known in the trade as the "Jones and Wigley" record for its authors, Phil Jones and Tom Wigley, and it served as the primary reference standard for the U.N. Intergovernmental Panel on Climate Change (IPCC) until 2007. It was this record that prompted the IPCC to claim a "discernible human influence on global climate."

Putting together such a record isn't at all easy. Weather stations weren't really designed to monitor global climate. Long-standing ones were usually established at points of commerce, which tend to grow into cities that induce spurious warming trends in their records. Trees grow up around thermometers and lower the afternoon temperature. Further, as documented by the University of Colorado's Roger Pielke Sr, many of the stations themselves are placed in locations, such as in parking lots or near heat vents, where artificially high temperatures are bound to be recorded.

So the weather data that go into the historical climate records that are required to verify models of global warming aren't the original records at all. Jones and Wigley, however, weren't specific about what was done to which station in order to produce their record, which, according to the IPCC, showed a warming of 0.6° +/- 0.2°C in the 20th century.

Now begins the fun. Warwick Hughes, an Australian scientist, wondered where that “+/-” came from, so he politely wrote Phil Jones in early 2005, asking for the original data. Jones’s response to a fellow scientist attempting to replicate his work was, “We have 25 years or so invested in the work. Why should I make the data available to you, when your aim is to try and find something wrong with it?”

Reread that statement, for it is breathtaking in its anti-scientific thrust. In fact, the entire purpose of replication is to “try and find something wrong.” The ultimate objective of science is to do things so well that, indeed, nothing is wrong.

### APPENDIX III

#### REFEREED PUBLISHED PAPERS

- 1992 Robert C Balling, Jr, Sherwood B Idso, and Warwick S Hughes. “Long-Term and Recent Anomalous Temperature Changes in Australia.” *Geophysical Research Letters*, Vol 19, No 23, pp 2317–2320.
- 1995 Robert C Balling, Jr and Warwick S Hughes. “Comments on Detecting Climate Change Concurrent with Deforestation in the Amazon Basin: Which Way Has It Gone?” *Bulletin of the American Meteorological Society*, Vol 76, No 4, 9. 559.
- 1995 Warwick S Hughes. Comment on D E Parker, “Effects of Changing Exposure of Thermometers at Land Stations.” *International Journal of Climatology*, Vol 15, pp 231–234.
- 1996 Warwick S Hughes and Robert C Balling, Jr “Urban Influences on South African Temperature Trends.” *International Journal of Climatology*, Vol 16, No 8, pp 935–940. Online at <http://www.john-daly.com/s-africa.htm>
- 1997 Warwick S Hughes. Comment on, “Historical Thermometer Exposures in Australia.” by N Nichols *et al.* *International Journal of Climatology*, Vol 17, pp 197–199.

February 2010

#### Memorandum submitted by Andrew Montford (CRU 36)

##### STATEMENT OF INTERESTS

1. The author, Andrew W Montford, BSc, CA, works in scientific publishing and is the author of *The Hockey Stick Illusion*, a book about some of the events leading up to the Climategate affair.<sup>1</sup> He is the author of *Bishop Hill*, one of the main websites for global warming sceptics in the UK.<sup>2</sup> He has no financial or other vested interest in the outcome of the inquiry.

##### INTRODUCTION

2. Many apparent problems with the conduct of climate science have arisen from the CRU emails— withholding of data and code, unethical pressuring of journals, gatekeeping by journal editors and on one occasion the misrepresentation of the reliability of scientific data.

3. These revelations have implications both for our assessment of climate science as a whole and for the way science policy operates in the future. The main purpose of this note is to state the key lessons that should be learned from this matter—lessons that are necessary if the reputation of science is to be restored and such incidents are not to happen again.

*What are the implications of the disclosures for the integrity of scientific research?*

Scientific data and code must be publicly available

4. The scientific method demands that findings be subject to testing and verification by others. The refusal of CRU scientists to release information to those who they felt might question or threaten their findings have led many to conclude that the CRU’s work is not trustworthy. While the some responsibility for ensuring the availability of researchers’ data and code rests with the scientific journals, government, as a major funder of research activity in the UK can help ensure the integrity of the scientific record by making disclosure of these materials mandatory and taking action against those who fail to do so.

5. Research materials, in this context, should include raw data and fully functional computer code where applicable.

6. Research materials should be made available to outsiders as a requirement of the scientific method. That scientists have failed to do so is reprehensible, but the fact that they have apparently also resorted to breaches of the Freedom of Information Act in order to do so requires urgent attention from policymakers. As has been widely publicized, no prosecutions under the Freedom of Information Act have been possible because of a six month statute of limitations for prosecutions in magistrates’ courts. Parliament will no doubt wish to amend the act accordingly, to ensure that it is no longer possible for civil servants to flout the law with impunity.

7. It has been asserted by CRU staff that they were overwhelmed by Freedom of Information requests. This is not the case. Most of these requests were prompted by the refusal of CRU to release its data for verification. CRU were unable to take advantage of the clause in the FOI Act permitting them to charge for burdensome requests, because in fact there was virtually no information to disclose.

Peer review is inadequate to the task of assessing scientific findings for policymakers

8. Academic studies on peer review to identify fraud and error have not painted a good picture of its ability to detect fraud and error. In the words of Richard Smith, the former editor of the *British Medical Journal*:

“We have little evidence on the effectiveness of peer review, but we have considerable evidence of its defects. In addition to being poor at detecting gross defects and almost useless for detecting fraud, it is slow, expensive, profligate of academic time, highly subjective, something of a lottery, prone to bias and easily abused”.

9. The CRU disclosures demonstrate that the peer review process can be subverted by a small but influential group of scientists. In the emails we see that there were at least four attempts to subvert journals<sup>54</sup> by putting pressure on editors to reject or delay submissions that were critical of mainstream climatology or to otherwise hinder sceptics. Editors who stood in the way of this group appear to have been forced from their posts. Articles by activist scientists were sent to sympathetic reviewers. Articles by sceptics were sent to hostile reviewers.

10. Policymakers need to be clear that peer review does not normally involve obtaining the scientific data and code used in a study and reproducing the findings. It is normally simply a read-through of a paper. This is adequate for finding glaring errors or non-original work. It is an absurdly inadequate process for justifying multi-billion pound decisions. As McCullough and McKittrick put it, “some government staff are surprised to find out that peer review does not involve checking data and calculations, while some academics are surprised that anyone thought it did”.<sup>3</sup>

11. With scientists assessed on their productivity, in terms of numbers of papers published and citations achieved, there is little time for replication of the work of others. However, with peer review being such a weak check on scientific correctness, replication is the only way to ensure that decisions are taken on a sound scientific basis. Policymakers need to consider how they will ensure that scientific findings on which they base their decisions have been adequately replicated.

Climate scientists are too close to environmental groups

12. The disclosures reveal several instances of government funded scientists working with environmental pressure groups. In one case, Greenpeace activists are seen helping CRU scientists to draft a letter to the *Times* and in another working closely with the World Wildlife Fund to put pressure on governments regarding climate change.

13. Since the CRU disclosures, it has become clear that some of the findings of the IPCC reports have been based on publications of green groups like WWF and Greenpeace rather than peer-reviewed journals. The use of publications by advocacy groups occurred during both the Fourth Assessment Report, under Rajendra Pachauri, and the Third Assessment Report, under Professor Bob Watson.

14. The head of the Met Office board, Robert Napier, is an environmental activist.

Scientists advising government have conflicting interests

15. It is likely that, if global warming were determined to be a minor problem, most of the scientists who appear in the emails would either be unemployed or at least much less generously funded from the public purse. This inevitably creates huge pressure to “bid up” the importance of findings that support the global warming hypothesis and to play down those that question it. The failure of policymakers to ensure that those assessing the state of climatology and providing advice accordingly represents a significant failure.

16. Scientists closely involved in the promotion of the global warming movement are also in key positions in the National Environmental Research Council (NERC). This gives them the ability to direct funding towards research that supports their case and to starve skeptical scientists of money. For example, NERC council member Professor Bob Watson has toured the country promoting the existence of manmade global warming and regularly appears on television in support of the scientists implicated in the Climategate emails. This kind of advocacy role is incompatible with responsibility for directing funding. Another NERC council member and Chief Scientist at the Met Office, Prof Julia Slingo, circulated a letter seeking scientists who would publicly support the claims of the IPCC in the wake of the revelations in the Climategate emails. It would have been hard for many scientists to resist such a request from someone with the power to shut off their funding. Several other members of the NERC council are similarly involved in advocacy roles.

<sup>54</sup> *Climatic Research*, *Geophysical Research Letters*, and on two separate occasions, *International Journal of Climatology*.

17. The state near-monopoly on research into the atmospheric sciences means that conflicts of interest and gatekeeping by scientists are hard to avoid. The so-called funding effect in science, whereby the results of scientific research seem to align with the financial incentives of the researchers, is normally associated with research funded by commercial businesses, but the same incentive structures exist for state-funded researchers and government advisers. Public choice theory—the idea that bureaucracies react to financial incentives in the same way as anyone else—may well explain much of the overheated tone in the utterances of climatologists in recent years. Policymakers should recognise this incentive and guard against it.

Climatology has lost its objectivity

18. The interests of the scientists appears to have revealed itself in the way science is conducted. The prominent climatologist Hans von Storch (who is not a sceptic) has spoken of a “spiral of exaggeration” in his specialism, with scientists seeking to make each new announcement more dramatic than the last one, in order to further what they see as their virtuous cause.

19. The IPCC reports appear to be in large measure a political project. The CRU’s Keith Briffa is seen in the emails saying that “I tried hard to balance the needs of the science and the IPCC, which were not always the same”.<sup>4</sup> In another, he speaks of pressure to report that twentieth century temperatures are unprecedented.<sup>5</sup> One climatologist has spoken of IPCC authors openly discussing writing their report so that the USA would be convinced to sign the Kyoto protocol.<sup>6</sup>

20. Von Storch also notes scientists “succumbing to a form of fanaticism almost reminiscent of the McCarthy era. In their minds, criticism of methodology is nothing but the monstrous product of ‘conservative think-tanks and misinformation campaigns by the oil and coal lobby’, which they believe is their duty to expose. In contrast, dramatization of climate shift is defended as being useful from the standpoint of educating the public”.

21. Climatologists apparently felt under pressure to produce particular results. In one email, the UEA’s Keith Briffa says “I know there is pressure to present a nice tidy story as regards ‘apparent unprecedented warming in a thousand years or more in the proxy data’ but in reality the situation is not quite so simple”. It is not clear who is putting pressure on these scientists, but it is clearly inappropriate to do so.

*Are the terms of reference and scope of the Independent Review announced on 3 December 2009 by UEA adequate?*

The independence of the review is not assured

22. Sir Muir Russell was appointed to head the review by the vice-chancellor of the University of East Anglia, Sir Edward Acton. However, the emails disclosed implicate Sir Edward’s predecessor in an apparent breach of the Freedom of Information Act and there is therefore a prime-facie case that the review is not sufficiently independent.

The review must be held in public

23. Sir Muir Russell has stated that he wants to retain the confidence of global warming sceptics. However, in his letter to Mr Willis of 10 December 2009, Sir Edward Acton, the vice-chancellor of UEA, states that Sir Muir will present his findings to Sir Edward, who will in turn present a report to the council of the university. We are asked to believe that Sir Muir will properly investigate Sir Edward’s role in the alleged FoI breaches, and that Sir Edward will pass on the findings that Sir Muir makes on this subject to the university council.

The review must take evidence from sceptics

24. At time of writing it appears that no prominent sceptic has been contacted by Sir Muir with a view to providing evidence. Without complainants being able to make their case to the review, it is unlikely that the findings will be sound or accepted by the sceptic community.

*How independent are the other two international data sets?*

The datasets are not independent

25. The three major international surface temperature datasets are not independent all relying heavily on the Global Historic Climate Network of temperature measuring stations.

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- <sup>4</sup> See <http://www.eastangliaemails.com/emails.php?eid=794&filename=1177890796.txt>

<sup>5</sup> See <http://www.eastangliaemails.com/emails.php?eid=136&filename=938018124.txt>

<sup>6</sup> John Christy of the University of Alabama. See <http://news.bbc.co.uk/1/hi/sci/tech/7081331.stm>

February 2010

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**Memorandum submitted by Richard Tyrwhitt-Drake (CRU 37)**

CLIMATIC RESEARCH UNIT

1. I am a UK subject, a software consultant and entrepreneur of thirty years standing. After graduating in Mathematics at Cambridge, in 1983 I co-founded and in 1986 became managing director of Objective Computer Systems Limited, the first consultancy in Europe to specialise in the application of object-oriented programming to commercial systems. I served on the committees of the British Computer Society's Object-Oriented Programming and Systems group 1986–90, the European Conference on Object-Oriented Programming (ECOOP) 1989, the European Java User Group 1997–99 and the first two Extreme Programming conferences in Sardinia, in 2000 and 2001. I served on the committee and was a speaker at the Charles Babbage Awards for UK IT innovation at the House of Commons in 1998. Having suggested Tim Berners-Lee for inventing the World Wide Web I was able to present the award and meet Tim at his office at MIT and a year later draw his attention to the Wiki idea invented by Ward Cunningham, which came to such prominence later in Wikipedia. Sir Tim's role in open systems for government in the UK, reportedly at the initiative of the Prime Minister himself, which I highly applaud, is I believe highly relevant to the current issues with the Climatic Research Unit (CRU) and climate science generally.

2. In my commercial work I have consulted and helped manage projects for various companies, including work on mathematical modelling and forecasting of time series for TSB Hill Samuel and Sabre Fund Management and a large initiative on discrete event simulation for the Defence Research Agency in Malvern. Objective also worked for over four years on systems for the exploration geologists of Rio Tinto. This work has I believe given me some useful additional background with which to approach the current situation in climate science. Other than that, I have no personal axe to grind.

*What are the implications of the disclosures for the integrity of scientific research?*

3. The first implication is that the integrity of scientific research is bound to increase. But it is starting from a very low base, which should be a concern to UK citizens and to those across the world wondering whether to put their trust in the findings of the United Nations Intergovernmental Panel on Climate Change. It is hard not to agree with Douglas Keenan, as quoted in one of the leaked emails: "almost by itself, the withholding of their raw data by [climate] scientists tells us that they are not scientists".

[<http://www.eastangliaemails.com/emails.php?eid=972&filename=1241415427.txt>]

Reproducibility has been key to the scientific method since the pioneering work of the Iraqi scientist al-Hassan Ibn al-Haytham a thousand years ago and was of course more recently emphasized in the western tradition by Francis Bacon and Rene Descartes. The refusal of CRU to provide data and source code to Keenan, Steve McIntyre and others was enough to convince me some years ago that this area of science was in deep trouble. That is now bound to change.

4. To restore trust there is a great need for an Open Climate Initiative, in line with Tim Berners-Lee's work on open government and the profound impact of the Internet in other areas of life. The Open Climate Initiative would comprise four principles and developing areas of praxis: open data, open source (program code), open preprints and open review. In opting to support these principles, for the public good and against all vested interests, you have a great opportunity to change the direction of history for the better.

*Are the terms of reference and scope of the Independent Review announced on 3 December 2009 by UEA adequate?*

5. Last week Steve McIntyre and Ross McKittrick informed me by email that they had not been contacted by Muir Russell. If that is still the case the scope of his review is inadequate. I also support Nigel Lawson's call for a Public Inquiry. But the Open Climate Initiative is the most important solution to the problems of climate science, revealed only in part by the leak from CRU, and it is vital to stay focused on that point.

February 2010

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**Supplementary memorandum submitted by Richard Tyrwhitt-Drake (CRU 37a)**

I am extremely concerned about the conduct of the UEA Inquiry into the leak from CRU led by Sir Muir Russell. On 10 February I delivered a submission to your own select committee's inquiry about that inquiry, with some autobiographical details, which I attach again for your convenience. It seemed extremely strange for that deadline to have passed before the announcement by Sir Muir on 11th, after more than two months silence, of many highly salient details of his efforts this year. This seemed designed to give those of us in the

UK no recourse to the best democratic option for registering any concerns we might have. As it happens I believe, like many, that it's highly inappropriate for Geoffrey Boulton to play a part in the Russell Inquiry, because of the various conflicts of interest that have been revealed in the last 10 days. But I write to you now about one highly disturbing aspect of the original leak from CRU. I use email so that you can follow any links that seem of interest to you.

I was extremely grateful to read on the "Bishop Hill" blog on 25th January that you had replied to Martin Brumby very promptly that day, concluding as follows:

I'd also like to add that I accept that my use of the phrase "Climate Deniers" was a mistake, and I shall endeavour not to use it in the future. I apologise for any offence caused by my error, although I assure you that none was intended.

I've read this morning that you are retiring from Parliament this year. If you've done nothing else in your last year as an MP you have done something of great worth here.

There are broadly two views taken of the trouble at CRU: (1) corrupt scientists exposed by those concerned for the truth or (2) blameless scientists harrassed by those with particular heinous vested interests. It probably won't surprise you that I believe (1) to be much closer to the truth. But one of the very worst features of the public debate of global warming has been the use of term climate deniers and its cognates, because this term without question started as a direct and deliberate comparison with Holocaust deniers. And that was always outrageous, highly offensive and bound to corrupt all aspects of the public discourse once it became accepted as legitimate.

As you will be well aware, a major issue in the debate about anthropogenic global warming has been whether scientists have become "too political". Consider then if labelling those that disagree with your interpretation of one piece of science as akin to holocaust deniers isn't about the most politically charged statement it's possible to make in the Western world. Then recall this statement from Mike Hulme, copied to Phil Jones and others, in one of the leaked emails, on 8 May 2004:

I must say that when I first read this paper a couple of weeks ago I wrote it off as so bad (so, so bad) that it didn't even deserve a response. To pretend that the Sahel drought didn't happen (ie, a pure artifact of wrongful use of rainfall data) is the most astounding assertion, almost on a par with holocaust denial. Try putting that proposition to the millions of inhabitants of the Sahel in the 1970s, 1980s and 1990s, many of whom died as a direct consequence and whose livelihoods were devastated. Adrian Chappell may never have visited the region, but I know Clive Agnew has (many times)—and he should know better. I did my PhD research in the region in the early 1980s and I know exactly what the rainfall conditions were like and how much ordinary people suffered as a consequence. My PhD was on rainfall variability and local water supplies in Sudan and I visited and talked to many villagers in the region.

I've done my own Internet researches for a while in the origins of this woeful abuse of the English language but this was completely new to me—and earlier than anything I'd been aware of. Here are a few key points on my own timeline:

Jun 05: *Richard North* in a piece for the Social Affairs Unit complains about "climate change denier" as "a phrase designedly reminiscent of the idea of Holocaust Denial—the label applied by nearly everyone to those misguided or wicked people who believe, or claim to believe, the Nazis did not annihilate Jews, and others, in any very great numbers." This shows it must have become common currency in some circles by this point.

Nov 05: *Margo Kingston* (ironically prompted by now-notorious reports of melting of the Himalayan Glaciers): "David Irving is under arrest in Austria for Holocaust denial. Perhaps there is a case for making climate change denial an offence—it is a crime against humanity after all."

Mar 06: *Scott Pelley* of CBS News: "If I do an interview with Elie Wiesel," he asks, "am I required as a journalist to find a Holocaust denier?"

May 06: Mark Lynas as quoted by *Brendan O'Neill* in *Spiked*: Others have suggested that climate change deniers should be put on trial in the future, Nuremberg-style, and made to account for their attempts to cover up the "global warming...Holocaust".

Oct 06: *Al Gore* as reported in the *Seattle Times*: "You know, 15 percent of people believe the moon landing was staged on some movie lot and a somewhat smaller number still believe the Earth is flat. They get together on Saturday night and party with the global-warming deniers."

Oct 06: *US Senators John D Rockefeller IV and Olympia Snowe* in an open letter to Rex Tillerson, CEO of ExxonMobil: "Obviously, other factors complicate our foreign policy. However, we are persuaded that the climate change denial strategy carried out by and for ExxonMobil has helped foster the perception that the United States is insensitive to a matter of great urgency for all of mankind, and has thus damaged the stature of our nation internationally. It is our hope that under your leadership, ExxonMobil would end its dangerous support of the 'deniers.'"

Feb 07: *Ellen Goodman* in the *Boston Globe*: "I would like to say we're at a point where global warming is impossible to deny. Let's just say that global warming deniers are now on a par with Holocaust deniers, though one denies the past and the other denies the present and future."



Aug 07: *Sharon Begley* in a cover story for *Newsweek* entitled *The Truth About Denial*: “Boxer figured that with ‘the overwhelming science out there, the deniers’ days were numbered.’... But outside Hollywood, Manhattan and other habitats of the chattering classes, the denial machine is running at full throttle—and continuing to shape both government policy and public opinion... Through advertisements, op-eds, lobbying and media attention, greenhouse doubters (they hate being called deniers)...”

Some of those references were discovered from *Brendan O’Neill’s* excellent discussion of the issue in *Spiked* in October 2006 entitled *Global warming: the chilling effect on free speech*.

The leak of FOIA2009.zip on 17 November 2009 provided an instance of this tactic of comparing those with whom you disagree with Holocaust deniers, over a year earlier than any others in my database. And the context, from what I can tell, is appalling. Professor Hulme disagreed with the emphasis of a new paper on the vast Sahel region in North Africa, which is known to have experienced terrible droughts in the 17th century and more recently. But it’s quite clear from the abstract that the authors, one a Professor of Geography at the University of Manchester, weren’t denying local droughts which may have caused great suffering and death during their period of study (1931–90). They were calling into question the accepted wisdom that overall rainfall on the Sahel had declined during the period, not least because the set of climate stations being used had changed, but also because of the statistical techniques used thus far.

To take such a serious technical critique and label the authors “almost on a par with holocaust denial”, when they weren’t denying local droughts within the Sahel region and the suffering that went with them, was utterly disgraceful. But it sheds light on two things: (1) the origins of this terrible slur, which became so mainstream, may not have been, as I expected, some dark PR agency or spin doctor but from UEA scientists and (2) the tightly-knit group of international scientists who apparently accepted this kind of language without complaint had clearly become hopelessly political, in the worst sense (the sense of partisan or what the Bible calls “party spirit”), at least by May 2004. This has absolutely profound ramifications, whatever Muir Russell and his team have to say on the matter.

To end on a happier note, though, there is much better news about the Sahel itself. From the very year that Chappell and Agnew’s study finished it has experienced a remarkable greening, due to increased rainfall. For a little amusement, the article in *National Geographic* is also worth pondering for the light it also sheds on the awesome predictive power of climate models:

“Now you have people grazing their camels in areas which may not have been used for hundreds or even thousands of years. You see birds, ostriches, gazelles coming back, even sorts of amphibians coming back,” he said.

“The trend has continued for more than 20 years. It is indisputable.”

An explosion in plant growth has been predicted by some climate models.

For instance, in 2005 a team led by Reindert Haarsma of the Royal Netherlands Meteorological Institute in De Bilt, the Netherlands, forecast significantly more future rainfall in the Sahel.

A 20-year trend is finally predicted, 15 years in, in 2005. That sounds par for the course.

Thank you again, sincerely, for your disavowal of this kind of terminology last month.

February 2010

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#### **Memorandum submitted by Dr Benny Peiser (CRU 38)**

1. I am the editor of *CCNet* and the co-editor of the journal *Energy & Environment (E&E)*. Further details may be obtained from the CCNet and E&E websites:

CCNet: <http://www.staff.livjm.ac.uk/spsbpeis/CCNet-homepage.htm>

E&E: <http://multi-science.metapress.com/content/121493/?p=5b7d9587cb4a4f608c91190241affac3&pi=0>.

I am prepared to give oral evidence at the Committee’s evidence session in elaboration of my written submission. I have no declarable interests.

2. The CRU e-mails under investigation suggest that climate scientists (not only at CRU but also elsewhere) have actively sought to prevent a paper on alleged research fraud from being published in violation of principles of academic integrity.

3. In the following, I will outline the chronology of the CRU-Keenan affair as documented in the published CRU e-mails and according to unpublished e-mail correspondence between me and Dr Jones.

4. It should be noted that the CRU e-mails regarding the Jones-Keenan affair are incomplete. I am in the possession of e-mail correspondence with Phil Jones about the Keenan paper that is not included in the published CRU e-mails. The point is that the “unauthorised publication” referred to in the terms of reference is by no means a complete publication. There is likely to be much more other CRU email traffic bearing on the question of the CRU’s scientific integrity, over and above the emails already disclosed. In the interest of

veracity and transparency all correspondence by CRU researchers regarding the fraud allegations in question should be disclosed in full so the exact nature and extent of attempts to prevent the publication of Keenan's paper can be established.

5. In the summer of 2007, I was a guest editor of a special issue of E&E ("The IPCC: Structure, Process and Policy,"—E&E Volume 18, Number 7–8/December 2007).

<http://multi-science.metapress.com/content/n2541g9607j1/?p=5be0956c6848417c85c79247097c97ad&pi=0>

6. On 29 August 2007, I received an e-mail from Doug Keenan with his paper titled "The Fraud Allegations against Wei-Chyung Wang." In this paper, Keenan accused Wei-Chyung Wang (State University of Albany, SUNY, New York, USA) of scientific fraud. In his paper, Keenan documented evidence that Wang had fabricated information about Chinese meteorological weather stations. His allegations concern two publications:

- (a) Jones P D, Groisman P Y, Coughlan M, Plummer N, Wang W-C, Karl TR (1990), "Assessment of urbanization effects in time series of surface air temperature over land", *Nature*, 347: 169–172; and
- (b) Wang W-C, Zeng Z, Karl T R (1990), "Urban heat islands in China", *Geophysical Research Letters*, 17: 2377–2380.

The study by Jones *et al* (1990) has been a corner stone in multiple IPCC reports about the allegedly minimal role of the effect of urban heat islands on the global temperature record. The latest (2007) assessment report by the IPCC concluded that urbanization effects are insignificant with regards to global warming. One of the key papers to underpin this conclusion is the study by Jones *et al* (1990). To refute Keenan's claims of scientific fraud would have only required the release of documentary information about the Chinese weather stations in question which Wang has long claimed to possess.

7. In the afternoon of the same day (29 August) I sent Phil Jones an e-mail with a copy of Keenan's paper attached. In my e-mail, I asked Jones whether he would be prepared to comment on the content and factual accuracy of the Keenan paper.

8. Later that day, Jones circulated the paper to Dr Wei-Chyung Wang and Dr Tom Wigley (University Corporation for Atmospheric Research), informing both his colleagues that he "won't be responding" to my request, but that he would be prepared to do so if his colleagues thought he should.

9. The next day, 30 August, Wang e-mailed Jones to say that Jones needed to respond "by providing E&E with a simple answer of 'false' to Keenan's write-up, based on the communication with me. [...] We are facing a tricky person and group, and the only way to do it is to follow the procedure to drive them crazy. [...] We are not going to let Keenan do things his way. [...] We should be thinking, after the whole ordeal (sic) is over, to take legal (or other) actions against Keenan. [...]"

10. In his response to Wang on the same day, Jones wrote: "Libel is quite easy to prove in the UK as you're not a public figure. Perhaps when you're back you ought to consider taking some legal advice from SUNY. Assuming the paper is published that is. [...]"

11. Later the same day, Jones e-mailed Wang and Wigley to inform them that he would not respond to my request "until the SUNY process has run its course."

12. Later still, Dr Michael E. Mann (Pennsylvania State University) contacted Jones [with e-mail copies to Dr Kevin Trenberth (National Center for Atmospheric Research) and Dr Gavin Schmidt (NASA)] to inform him about recommendations he had discussed with Schmidt: "With respect to Peiser's guest editing of E&E and your review, following up on Kevin's suggestions, we think there are two key points. First, if there are factual errors (other than the fraud allegation) it is very important that you point them out now. If not, Keenan could later allege that he made the claims in good faith, as he provided you an opportunity to respond and you did not. Secondly, we think you need to also focus on the legal implications. In particular, you should mention that the publisher of a libel is also liable for damages—that might make Sonja B-C be a little wary. Of course, if it does get published, maybe the resulting settlement would shut down E&E and Benny and Sonja all together! We can only hope, anyway. So maybe in an odd way its (sic) actually win-win for us, not them. Lets (sic) see how this plays out..."

13. On 31 August, Tom Wigley (a former CRU director) e-mailed Jones to notify him that he believed Keenan's paper raised a valid issue: "Seems to me that Keenan has a valid point. The statements in the papers that he quotes seem to be incorrect statements, and that someone (WCW at the very least) must have known at the time that they were incorrect. Whether or not this makes a difference is not the issue here." Jones was now in possession of authoritative information that undermined his claims about the integrity of CRU data products for which he is responsible. Confronted with the evidence from Keenan, and, most importantly, Wigley's advice that Keenan appeared to have a point, Jones should have been insistent on getting the data and facts out rather than keeping them secret.

14. In response to Wigley's warning, Jones now counselled him to suppress and conceal his concerns and acted as an advocate for Wang's defence despite the 'valid' evidence against his claims. In an e-mail, Jones appealed to Wigley to "keep quiet" about his apparent backing for Keenan's concern. In order to obviate any further critique or action by Wigley, Jones speciously told him that SUNY was about to take action against Keenan: "Just for interest! Keep quiet about both issues. In touch with Wei-Chyung Wang. Just

agreed with him that I will send a brief response to Peiser. The allegation by Keenan has gone to SUNY. Keenan's about to be told by SUNY that submitting this has violated a confidentiality agreement he entered into with SUNY when he sent the complaint. WCW has nothing to worry about, but it still unsettling!"

15. On 5 September, Jones e-mailed me a list of objections to the Keenan paper. Ignoring the expert advice he had received from Wigley, Jones called on me to reject the paper: "My view is that the claims are unsubstantiated."

16. I informed Jones that I would forward his objections to Keenan and stressed: "I know this is a very sensitive matter and I will not rush any decision. I will keep you updated and informed."

17. On 10 September, I received Keenan's response which I forwarded to Jones on the same day. I e-mailed Jones: "As far as I can see, his [Keenan's] basic accusation seems unaffected by your criticism. Unless there is any compelling evidence that Keenan's main claim is unjustified or unsubstantiated, I intend to publish his paper in the forthcoming issue of E&E. Please let me know by the end of the week if you have any additional arguments that may sway me in my decision."

18. On the same day, Jones forwarded my e-mail to Michael Mann and Gavin Schmidt, concluding: "It seems as though E&E will likely publish this paper."

19. The following day, (11 September), Michael Mann responded to the new development. In an e-mail to Jones, he suggested that Wang should threaten E&E with a libel suit: "Wei Chyung needs to sue them, or at the least threaten a lawsuit. If he doesn't, this will set a dangerous new precedent. I could put him in touch w/an leading (sic) attorney who would do this pro bono. Of course, this has to be done quickly. The threat of a lawsuit alone my (sic) prevent them from publishing this paper, so time is of the essence. Please feel free to mention this directly to Wei Chyung, in particular that I think he needs to pursue a legal course her independent of whatever his university is doing. He cannot wait for Stony Brook to complete its internal investigations! If he does so, it will be too late to stop this."

20. Later that day, I received three e-mails by Phil Jones with additional references and objections to the Keenan paper. Jones put additional pressure on by stressing: "I don't see how any journal would ever contemplate publishing such a paper. I hope you'll reconsider."

21. After minor revisions of the paper following peer review, I informed Keenan on 8 October that I had accepted his paper for publication with the modified title "The Fraud Allegation Against Some Climatic Research of Wei-Chyung Wang". It was published in E&E volume 18, number 7-8, pp 985-995 in December 2007.

22. The concerted efforts by a group of eminent climate scientists to prevent the publication of the Keenan paper had been unsuccessful. However, this was mainly due to the fact that I was prepared to resist peer pressure and to be open-minded regarding Keenan's evidence and argumentation. I doubt that mainstream science editors would have dared to reject the opposition by leading climate scientists who had targeted an amateur researcher. As Phil Jones fittingly put it to me in an e-mail: 'How would any journal ever contemplate publishing such a paper?'

23. On 1 February 2010, The Guardian reported that Doug Keenan's E&E paper "may yet result in a significant revision of a scientific paper that is still cited by the UN's top climate science body. [...] The [CRU] emails suggest that [Phil Jones] helped to cover up flaws in temperature data from China that underpinned his research on the strength of recent global warming. The Guardian has learned that crucial data obtained by American scientists from Chinese collaborators cannot be verified because documents containing them no longer exist. And what data is available suggests that the findings are fundamentally flawed."

24. At no time since Keenan and Wigley raised significant doubts about the reliability of Chinese climate data has Jones taken public steps to clear up the discrepancies regarding Wang's claims and data. It is unacceptable that the scientist who disseminates a data product on which international treaties are based, as well as IPCC reports and countless government policies, should actively seek to suppress information that calls the quality of the data into question, especially after one his colleagues and a leading authority has advised him that Keenan's evidence about the data appeared to be legitimate. Comparable behaviour in the private sector would be subject to severe sanction.

25. The revelations exposed by the CRU e-mails require the full disclosure of all documents and correspondence in this alleged fraud case. Until the whole affair is fully and publicly investigated, the reputation and integrity of leading climate scientists will remain to appear tainted and discredited.

*Dr Benny Peiser*  
Liverpool John Moores University, Faculty of Science

*February 2010*

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**Memorandum submitted by the Institute of Physics (CRU 39)**

THE DISCLOSURE OF CLIMATE DATA FROM THE CLIMATIC RESEARCH UNIT AT THE UNIVERSITY OF EAST ANGLIA

The Institute of Physics is a scientific charity devoted to increasing the practice, understanding and application of physics. It has a worldwide membership of over 36,000 and is a leading communicator of physics-related science to all audiences, from specialists through to government and the general public. Its publishing company, IOP Publishing, is a world leader in scientific publishing and the electronic dissemination of physics.

The Institute is pleased to submit its views to inform the House of Commons Science and Technology Committee's inquiry, "The disclosure of climate data from the Climatic Research Unit at the University of East Anglia".

The submission details our response to the questions listed in the call for evidence, which was prepared with input from the Institute's Science Board, and its Energy Sub-group.

*What are the implications of the disclosures for the integrity of scientific research?*

1. The Institute is concerned that, unless the disclosed e-mails are proved to be forgeries or adaptations, worrying implications arise for the integrity of scientific research in this field and for the credibility of the scientific method as practised in this context.

2. The CRU e-mails as published on the internet provide prima facie evidence of determined and co-ordinated refusals to comply with honourable scientific traditions and freedom of information law. The principle that scientists should be willing to expose their ideas and results to independent testing and replication by others, which requires the open exchange of data, procedures and materials, is vital. The lack of compliance has been confirmed by the findings of the Information Commissioner. This extends well beyond the CRU itself—most of the e-mails were exchanged with researchers in a number of other international institutions who are also involved in the formulation of the IPCC's conclusions on climate change.

3. It is important to recognise that there are two completely different categories of data set that are involved in the CRU e-mail exchanges:

- those compiled from direct instrumental measurements of land and ocean surface temperatures such as the CRU, GISS and NOAA data sets; and
- historic temperature reconstructions from measurements of "proxies", for example, tree-rings.

4. The second category relating to proxy reconstructions are the basis for the conclusion that 20th century warming is unprecedented. Published reconstructions may represent only a part of the raw data available and may be sensitive to the choices made and the statistical techniques used. Different choices, omissions or statistical processes may lead to different conclusions. This possibility was evidently the reason behind some of the (rejected) requests for further information.

5. The e-mails reveal doubts as to the reliability of some of the reconstructions and raise questions as to the way in which they have been represented; for example, the apparent suppression, in graphics widely used by the IPCC, of proxy results for recent decades that do not agree with contemporary instrumental temperature measurements.

6. There is also reason for concern at the intolerance to challenge displayed in the e-mails. This impedes the process of scientific "self correction", which is vital to the integrity of the scientific process as a whole, and not just to the research itself. In that context, those CRU e-mails relating to the peer-review process suggest a need for a review of its adequacy and objectivity as practised in this field and its potential vulnerability to bias or manipulation.

7. Fundamentally, we consider it should be inappropriate for the verification of the integrity of the scientific process to depend on appeals to Freedom of Information legislation. Nevertheless, the right to such appeals has been shown to be necessary. The e-mails illustrate the possibility of networks of like-minded researchers effectively excluding newcomers. Requiring data to be electronically accessible to all, at the time of publication, would remove this possibility.

8. As a step towards restoring confidence in the scientific process and to provide greater transparency in future, the editorial boards of scientific journals should work towards setting down requirements for open electronic data archiving by authors, to coincide with publication. Expert input (from journal boards) would be needed to determine the category of data that would be archived. Much "raw" data requires calibration and processing through interpretive codes at various levels.

9. Where the nature of the study precludes direct replication by experiment, as in the case of time-dependent field measurements, it is important that the requirements include access to all the original raw data and its provenance, together with the criteria used for, and effects of, any subsequent selections, omissions or adjustments. The details of any statistical procedures, necessary for the independent testing and replication, should also be included. In parallel, consideration should be given to the requirements for minimum disclosure in relation to computer modelling.

*Are the terms of reference and scope of the Independent Review announced on 3 December 2009 by UEA adequate?*

10. The scope of the UEA review is, not inappropriately, restricted to the allegations of scientific malpractice and evasion of the Freedom of Information Act at the CRU. However, most of the e-mails were exchanged with researchers in a number of other leading institutions involved in the formulation of the IPCC's conclusions on climate change. In so far as those scientists were complicit in the alleged scientific malpractices, there is need for a wider inquiry into the integrity of the scientific process in this field.

11. The first of the review's terms of reference is limited to: "...manipulation or suppression of data which is at odds with acceptable scientific practice . . ." The term "acceptable" is not defined and might better be replaced with "objective".

12. The second of the review's terms of reference should extend beyond reviewing the CRU's policies and practices to whether these have been breached by individuals, particularly in respect of other kinds of departure from objective scientific practice, for example, manipulation of the publication and peer review system or allowing pre-formed conclusions to override scientific objectivity.

*How independent are the other two international data sets?*

13. Published data sets are compiled from a range of sources and are subject to processing and adjustments of various kinds. Differences in judgements and methodologies used in such processing may result in different final data sets even if they are based on the same raw data. Apart from any communality of sources, account must be taken of differences in processing between the published data sets and any data sets on which they draw.

*February 2010*

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**Memorandum submitted by David Andrew Cockroft (CRU 40)**

1. My name is David Andrew Cockroft, a British Citizen currently resident in New Zealand.
2. I studied Mathematics, Computer Science and Geology at the University of Bristol in the late 60s early 70s, with a special emphasis on Numerical Analysis and Stochastic Processing (these latter terms have been rebranded over the years but remain fundamental to today's computer-based prediction and modelling techniques).
3. I have remained employed from then till now in the IT industry with very specific hands-on capacity. All my skills are current with many post-graduate qualifications and awards.
4. I declare my interest to be that of concerned citizen, with IT professional and personal pseudo-academic interest in Climate Modelling.
5. I do not feel that the terms of reference announced by University of East Anglia (UEA) are adequate, in that it only will look at evidence held at CRU. There is a plethora of parallel studies, some peer-reviewed, some not, that should be considered alongside evidence held internally.
6. Allegations of impropriety must be addressed not just relevant to the emails, but to the amassed allegations elsewhere. Of specific clarity to me, is Steve McIntyre, who is perhaps the most disciplined of those with contrary opinion to Prof Jones. (refer <http://climateaudit.org>)
7. The legitimacy of the NOAA source data is also subject to dispute, and since it appears CRU bases its findings almost entirely on NOAA data, it is appropriate to also investigate the problems reported here.
8. Is it also appropriate that one untested and highly-criticised data source (NOAA) should be the basis for a massive global-initiated economic upheaval? The implications for getting it wrong—either way—are horrendous.
9. Russia's Institute of Economic Analysis (IEA) issued a report condemning Hadley CRU—Specifically about dropped station data. (presumably they share the same data source as UEA—NOAA or CRU itself):
  - (a) "The IEA believes that Russian meteorological station data did not substantiate the anthropogenic global-warming theory. Analysts say Russian meteorological stations cover most of the country's territory and that the Hadley Centre had used data submitted by only 25% of such stations in its reports. The Russian station count dropped from 476 to 121 so over 40% of Russian territory was not included in global temperature calculations for some other reasons rather than the lack of meteorological stations and observations."
10. Canada, China, Australia, Africa, USA and S America all seem to suffer similar deficiencies in current station selection. The so-called "Migration to the Coast" of temperature stations where many stations that would naturally return lower temperatures (due to altitude, distance from coast, latitude etc) have been retired.

11. Indeed, many of the complaints of impropriety centre around this apparent arbitrary dropping of station data despite continuous and contemporaneous records still being available. The allegation is that the current source of surface temperature data is deliberately selected from warmer coastal lower-altitude stations, thereby producing an average higher than previous. This would be perhaps acceptable if the historic data from the inland, cooler and higher elevations was removed from the historical averages—but it appears not.

12. File “Harry\_Read\_Me.txt” apparently contains comments by Ian Harris (aka Harry), which if correct, is especially telling of the methodologies employed:

- (a) [The] hopeless state of their (CRU) database. No uniform data integrity, it’s just a catalogue of issues that continues to grow as they’re found...I am very sorry to report that the rest of the databases seem to be in nearly as poor a state as Australia was. There are hundreds if not thousands of pairs of dummy stations, one with no WMO and one with, usually overlapping and with the same station name and very similar coordinates. I know it could be old and new stations, but why such large overlaps if that’s the case? Aarrggghhh! There truly is no end in sight.
- (b) This whole project is SUCH A MESS. No wonder I needed therapy!!
- (c) I am seriously close to giving up, again. The history of this is so complex that I can’t get far enough into it before my head hurts and I have to stop. Each parameter has a tortuous history of manual and semi-automated interventions that I simply cannot just go back to early versions and run the updateprog. I could be throwing away all kinds of corrections—to lat/lons, to WMOs (yes!), and more. So what the hell can I do about all these duplicate stations?

13. NOAA data is also being questioned where older, manual stations are replaced by modern automated stations. In many instances, these have to be connected by cables to nearby buildings, in doing so are resited so as to no longer conform to the recommended positioning over grass and 30 metres from buildings etc:

- (a) In a volunteer survey project, Anthony Watts and his more than 650 volunteers (<http://www.surfacestations.org>) found that over 900 of the first 1,067 USHCN stations surveyed in the 1,221 station US climate network did not come close to meeting the required specifications. Only about 3% met the ideal specification for siting. They found stations located next to the exhaust fans of air conditioning units, surrounded by asphalt parking lots and roads, on blistering-hot rooftops, and near sidewalks and buildings that absorb and radiate heat. They found 68 stations located at wastewater treatment plants, where the process of waste digestion causes temperatures to be higher than in surrounding areas. In fact, they found that 90% of the stations fail to meet the National Weather Service’s own siting requirements that stations must be 30 metres (about 100 feet) or more away from an artificial heating or reflecting source.

14. All of the deficiencies mentioned above should be taken into account, tested, and the final outcome should be sufficiently wide ranging to ensure that best scientific procedures have and will be followed. Most especially the data, methodologies and computer code must be made publically available for scrutiny. It’s the only way the “science” will ever have a hope of being settled.

15. Distance prevents me from requesting an Oral Presentation.

*February 2010*

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**Memorandum submitted by Anne Stallybrass (CRU 41)**

**MY PERSONAL INTERESTS**

1. I am involved in an environmental group, Green World Trust. In that capacity my interest is both environmental and human, as a responsible planetary citizen. GWT were about to establish a local Transition Towns initiative (a fast-growing movement that strives to harness creative grassroots responses to the “twin threats” of global warming and Peak Oil). But this needed adherence to Anthropogenic Global Warming. I investigated the science; it took eight solid weeks which turned into a nightmare as I uncovered a monster, whose tentacles appeared to have gone very deep, with bad science in very many areas.

**THE NEED FOR LEGISLATION**

2. Much of what I say here has to be general, since the emails leak is but a part of a larger problem that needs changes in the law to protect the integrity of science in future; such changes require a proper understanding and investigation of the larger problem. The references provide the detail I cannot provide here. There must be freedom of debate, and public access to scientific data and methodology used to advise on global policies regarding Anthropogenic Global Warming (AGW) and any scientific matters requiring public response.

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## THE SCIENCE OF AGW

3. The scientific conclusion I reached was, eventually, unequivocal; manmade global warming is so small, if it exists at all, and natural variations are so much larger, that our current contribution to warming cannot even be measured. Always, CO<sub>2</sub> follows temperature, it did not lead in the past and it does not lead now; its greenhouse gas qualities are already at near-maximum effect. One factor that has seriously compromised the measurements of temperature, and has not been adequately reckoned with by either CRU, NOAA, or GISS, is the Urban Heat Island effect. Despite recent UEA denials (2/2/10), Jones' 1990 study that claimed UHI is not a serious problem, is still seriously challenged, regarding the provenance and trustworthiness of the Chinese records, and the behaviour of his co-author Wang. Several amateur studies, done out of volunteers' own pockets, have showed UHI of up to several degrees<sup>(1)</sup>, which when translated to the global temperature records, is estimated to remove more than half the warming of the last century. And warming is, on balance, beneficial, not harmful. I could answer every single scientific "answer to skeptics", that has been issued by the BBC, the Royal Society, and so on. I wrote up my story, and the scientific basis for my conclusions, on the GWT website, to make this grave matter accessible to ordinary folk who had no time or inclination for study as I had had. Many, including many readers of the *Times Higher Educational Supplement*, have thanked me for this work.<sup>(2)</sup>

## THE PUBLIC FACE OF SUPPRESSION

4. I found, with the declaration by Al Gore and others that there was "consensus" among all reasonable scientists, that my hitherto-assumed freedom to question or dissent had vanished. Those who doubted the "consensus" have been likened to holocaust deniers. All the science organizations have been putting out what I now know is bad science. Children at school are being taught lies—the most frightening lie being the demonization of CO<sub>2</sub>, since all increase is beneficial to plant growth and harmful to nothing.

5. The need to re-include "citizens' science", just as a court of law includes "12 just men and true": Simple checks the professionals could have easily done, unpaid volunteers have done instead. UHI is only one of several major problems with the three surface temperature records used for IPCC, all of which skew the temperatures towards an apparent warming effect. Skeptics have found the same small network of players behind them all; the only "objective" check has come from the painstaking researches of the few who have seen through the bad science and have not been under intolerable pressure to stay silent.

## REFERENCES

<sup>(1)</sup> <http://wattsupwiththat.com/2010/01/31/uhi-is-alive-and-well/>

<sup>(2)</sup> <http://www.greenworldtrust.org.uk/Science/Curious.htm>

<sup>(3)</sup> <http://wattsupwiththat.com/2009/12/09/picking-out-the-uhi-in-global-temperature-records-so-easy-a-6th-grader-can-do-it/>

<sup>(4)</sup> <http://www.greenworldtrust.org.uk/Science/Scientific/UK-records.htm>

February 2010

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## Memorandum submitted by the Royal Society of Chemistry (CRU 42)

### SUMMARY

- It is essential that the public and all non-specialists remain truly confident in the scientific method to provide a sound scientific evidence-base on which strong decisions can be made. Correspondingly, it is in the interest of scientists and the public that society as a whole has an understanding and an appreciation of science.
- Access to reliable, up-to-date information is vital to advancing research and enabling the discovery or development of solutions to global issues. Sharing information is especially important in multi-disciplinary research, where progress is very much dependent on willing and effective communication between different speciality areas.
- The RSC firmly believes that the benefits of scientific data being made available and thus open to scrutiny outweigh the perceived risks. To this end, scientific information should be made available on request as outlined in the Freedom of Information Act.

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**SUBMISSION**

1. The Royal Society of Chemistry (RSC) welcomes the opportunity to submit formal written evidence to the consultation on the disclosure of climate change data from the climatic research unit at the University of East Anglia.

2. The RSC is the UK Professional Body for chemical scientists and an international Learned Society for advancing the chemical sciences. Supported by a network of over 46,000 members worldwide and an internationally acclaimed publishing business, our activities span education and training, conferences and science policy, and the promotion of the chemical sciences to the public.

3. The document has been written from the perspective of the Royal Society of Chemistry. It is noteworthy that the University of East Anglia is a member of the RSC Partnership Scheme, however this in no way constitutes a conflict of interest. The RSC's Royal Charter obliges it "to serve the public interest" by acting in an independent advisory capacity, and we would therefore be very happy for this submission to be put into the public domain.

*What are the implications of the disclosures for the integrity of scientific research?*

4. The apparent resistance of researchers from the Climatic Research Unit (CRU) at the University of East Anglia (UEA) to disclose research data has been widely portrayed as an indication of a lack of integrity in scientific research. The true nature of science dictates that research is transparent and robust enough to survive scrutiny. A lack of willingness to disseminate scientific information may infer that the scientific results or methods used are not robust enough to face scrutiny, even if this conjecture is not well-founded. This has far-reaching consequences for the reputation of science as a whole, with the ability to undermine the public's confidence in science.

5. It is essential that the public and all non-specialists remain truly confident in the scientific method to provide a sound scientific evidence-base on which strong decisions can be made. Correspondingly, it is in the interest of scientists and the public that society as a whole has an understanding and an appreciation of science. The RSC strongly supports the dissemination of chemical knowledge to foster and encourage the growth and application of the chemical sciences, as stated in its Royal Charter. This includes the dissemination of scientific knowledge as a means to advance public understanding and the learning of science.

6. The dissemination of scientific information is central to progressing scientific developments, as it is based on a sound knowledge of preceding research.<sup>55</sup> Access to reliable, up-to-date information is vital to advancing research and enabling the discovery or development of solutions to global issues. Sharing information is especially important in multi-disciplinary research, where progress is very much dependent on willing and effective communication between different speciality areas.

7. It is also imperative that scientific information is made available to the wider community for scrutiny: the validity and essence of research relies upon its ability to stand up to review. In fact, advances in science frequently occur when the prevailing view is challenged by informed scepticism, this is fundamental to the scientific method and should be encouraged, even if controversial. The RSC firmly believes that the benefits of scientific data being made available and thus open to scrutiny outweigh the perceived risks. To this end, scientific information should be made available on request as outlined in the Freedom of Information Act. Furthermore, research needs to be presented in an accurate and reliable manner in the correct context in order to optimise this process. It may also be necessary to incorporate an independent auditing system into peer review with the ability to demand access to raw data sets to ensure best practices are being adhered to.

8. With the increased use of electronic media, access to information is widespread for scientists and the public alike. While this is a great benefit to society, the quality and validity of information available raises complex problems as valid scientific information and general opinion are presented side by side. The inability to decipher which information is legitimate, results in confusion, misinterpretation and may lead to mistrust of "science". There needs to be a clearer understanding in the public domain of what constitutes a reliable source, including an appreciation for the process that is used for disseminating research and the advantages of peer review.

9. The peer review system is central to the credibility of science: its purpose to prevent the dissemination of unwarranted claims and unacceptable interpretations. Formally published scientific research is subject to this authoritative process whereby a community of qualified, impartial experts examine the information and possess the ability to prevent publication. Authors generally protect their data until it has been peer-reviewed and published in a formal publication due to the competitive nature of research.

10. The issue of misinformation in the public domain must also be tackled. Just as the scientific community must be open with regard to their evidence base, those who disagree must also provide a clear and verifiable backing for their argument, if they wish their opinions to be given weight. When disagreements occur, the validity of the analysis must be established before credence can be given to any opinion. Increased understanding of the process of scientific research, firstly in the government, but also within the media and general public, is vital in order to foster a more open sharing of information.

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<sup>55</sup> Although serendipitous advances are also well recognised



11. Support from the scientific community is needed to provide context and to explain the process by which conclusions are reached. Encouraging scientists to openly engage with the public can only be achieved if researchers are given the necessary backing in the face of any unfounded arguments against their work. This support must come from the highest levels, sending out a strong message on the importance of scientific methodology and research and promoting open sharing of information between scientists and the wider community.

*Are the terms of reference and scope of the Independent Review announced on 3 December 2009 by UEA adequate?*

12. The terms of reference and scope of the independent review are adequate, although some wider reaching aspects must also be examined. The effect on other researchers working in this area such as independent researchers, as well as those collaborating with CRU, should be explored. The impact of this incident on the public perception of the CRU and UEA as a whole should also be considered as a measuring stick for the implications of such actions in the public domain. The manner in which the findings from the items set out are interpreted and applied will determine their value.

13. As has been set out in the review, it is necessary to investigate the email exchanges which were discovered along with other relevant CRU information to establish whether data have been manipulated or suppressed. This is, not only needed in order to identify any unacceptable behaviour, but also to verify the results which have been published. This is vital in clarifying the severity of the acts carried out by those scientists at the CRU involved, ie whether it was a misguided protection of their work or a malicious misrepresentation of data.

14. The review of practices surrounding CRU's use of peer review and dissemination of data should be used to shed light on how these comply with established best scientific practice. Any failings in this area should be examined in the context of the research methods used and any deviations should be assigned either to the individual researchers or to inadequate updating of the best practice to suit research in the digital age.<sup>56</sup> This will beget more valuable information on the motivation and the reasoning behind the conduct of researchers at CRU.

15. Research institutions should review established protocols regarding the management of, and access to, research data to ensure that they remain up to date and clear. This process must be developed in collaboration with researchers so that its importance can be understood. The current practices in CRU and UEA must be examined to ensure the unit and the institution fulfil public regulations and that they offer support to researchers to ensure compliance.

16. The review of the security issues surrounding the release of information is an important internal issue for CRU and UEA. Furthermore, the RSC supports investigations into the highly irregular manner in which information was obtained from the researchers.

*How independent are the other two international data sets?*

17. From the information available, the RSC cannot comment on this issue.

February 2010

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### **Memorandum submitted by Professor Hans von Storch and Dr Myles R Allen (CRU 43)**

#### SCOPE

We address the first and third questions raised by the enquiry: we have no comment on the terms of reference of the UEA enquiry.

#### DECLARATION OF INTERESTS

We are both professional statistical climatologists who have made use of the HadCRUT instrumental temperature record and participated in the scientific debate about reconstruction of the climate of the past millennium. One of us (HvS) is criticized in the leaked e-mails.

#### NOTE

A substantially abbreviated version of this submission appeared in the scientific journal *Nature* in January, 2010.<sup>1</sup>

1. The publication of hacked e-mails from prominent scientists at the Climate Research Unit (CRU) at the University of East Anglia has initiated an intense debate about the credibility of climate science. Unfortunately, this debate sometimes goes so far as to question a key result of climate science: that the climate system has unequivocally warmed over the past century and most of the recent warming is very likely

<sup>56</sup> "Ensuring the integrity, accessibility and stewardship of research data in the digital age" Committee on Ensuring the Utility and Integrity of Research Data in a Digital Age; National Academy of Sciences, 2009.

caused by human activity. We welcome debate about the ethics of science, about the interaction of climate, policy and politics. The language used in some of these e-mails has created concern, among both scientists and the public, about the openness and integrity of the scientific process. But at the same time it is critical to point out that no grounds have arisen to doubt the validity of the thermometer-based temperature record since 1850, nor any results based upon it. The mainstream media has confused discussions about uncertain climate reconstructions built on tree-ring data, such as the so-called “hockey stick”, with the more secure thermometer record. While these proxy-based reconstructions remain a controversial area of active research, the thermometer record alone shows unequivocally that the Earth is warming. Moreover, it is the temperature record, not proxy-based reconstructions, that provides the principle evidence that most of the recent warming is very likely attributable to human activity.

2. We are both statistical climatologists, specialising *inter alia* in the detection and attribution of external influences on large-scale climate and regional weather. We have variously worked with the scientists at the centre of this controversy, and have examined, used and at times criticized their data and results just as they, at times, have criticized us (both in scientific forums and in some of the disclosed e-mails). The fact that we disagree with Professors Jones, Mann and others on some matters, such as proxy-based reconstructions, has no bearing on our respect for Professor Jones’ analysis of the instrumental temperature record.

3. The hacked e-mails do not prove, or even suggest, that the main product of CRU, namely the HadCRUT record of global surface air temperature based on thermometer readings, has been compromised. Indeed, the thermometer-based temperature record has been verified by results from other groups, and no serious doubts about these products have been raised. Only two substantive criticisms to have emerged of the instrumental record through the intense scrutiny since the e-mails were disclosed:

3.1 An allegation aired on BBC’s “Newsnight” that software used in the production of this dataset was unreliable.<sup>2</sup> It emerged on investigation that the neither of the two pieces of software produced in support of this allegation was anything to do with the HadCRUT instrumental temperature record. Newsnight have declined to answer the question of whether they were aware of this at the time their allegations were made.

3.2 A problem identified by an amateur computer analyst with estimates of average climate (not climate trends) affecting less than 1% of the HadCRUT data, mostly in Australasia, and some station identifiers being incorrect.<sup>3</sup> These, it appears, were genuine issues with some of the input data (not analysis software) of HadCRUT which have been acknowledged by the Met Office and corrected. They do not affect trends estimated from the data, and hence have no bearing on conclusions regarding the detection and attribution of external influence on climate.

4. It is possible, of course, that further scrutiny will reveal more serious problems, but given the intensity of the scrutiny to date, we do not think this is particularly likely. The close correspondence between the HadCRUT data and the other two internationally recognised surface temperature datasets suggests that key conclusions, such as the unequivocal warming over the past century, are not sensitive to the analysis procedure.

5. Regarding the specific question of the independence of these three datasets, they are clearly not fully independent because all three are based on substantially the same input data, but this data (which is largely in the public domain) is not in dispute. The software used by the different groups to compile gridded datasets from these input data are independent, but this does not completely guarantee independence of results, since researchers collaborate and conventions evolve.

6. Hence, if there are serious concerns about the integrity of these surface temperature datasets (and we believe there are not), then the logical response would be to commission an independent analysis from a fully independent group (selected by a neutral party such as the Institute of Physics, mandated to exclude groups who have already “taken sides” in the climate debate). An example of good practice in such disputes would be the Remote Sensing Systems re-analysis of the Microwave Sounding Unit (MSU) temperature record<sup>4</sup> which revealed previously underappreciated biases and uncertainties in the original University of Alabama in Huntsville analysis. While the question of which MSU analysis is more accurate remains hotly disputed, it is generally agreed that the reanalysis exercise has vastly improved our understanding of the MSU record.<sup>5</sup>

7. The cost of such a complete reanalysis of the surface temperature record should not be underestimated, particularly because, to carry credibility, it would have to be undertaken by a group without an established track record in this kind of work, requiring them to build all analysis software from scratch. While it would be very interesting if such an exercise were to reach substantially different conclusions to HadCRUT or the other two internationally recognised datasets, we believe the chance of such an outcome is relatively small, and the chance of the new analysis actually proving more accurate than HadCRUT, in view of the decades of experience behind the HadCRUT algorithms, would be smaller still.

8. Despite the absence of any evidence of genuine problems in the HadCRUT data, serious doubts are now raised in the public regarding the integrity of this data and conclusions based upon it.<sup>6</sup> We do not think that they are warranted. Instead, in spite of some disagreement about technical issues which are normal in the process of science, we are convinced, insofar as is possible in an empirical science, that anthropogenic climate change is taking place and will emerge more strongly in the future. For explanation, a few comments are needed:

- 8.1 The assessment that elevated greenhouse gas concentration contributes to most of the recent warming since, say 1970, is made up of two steps, a “detection” step and a “attribution” step”.
- 8.2 The detection step reveals that the warming trend extending across the recent few decades is more rapid than warming or cooling trends what would be expected from internal variability alone (from phenomena such as El Nino, the Pacific Decadal Oscillation and so on). The statement is not that the present level of warmth is unprecedented, even though it may very well be, but that the speed of warming is remarkable. The description of the warming in recent decades (“the signal”) is based on thermometer data, including the CRU data. Even if this data may not be perfect, its uncertainties have been carefully estimated and the recent warming is robust. The detection is based on a rigorous statistical analysis, but depends on our understanding about the natural variability. The latter, the level of natural variability, is estimated again from the thermometer-based temperature record, and from long climate model simulations. Thus, climate models play only a minor role in this “detection” step, mostly in helping to determine the magnitude of internal variability.
- 8.3 Attributing observed temperature variations to specific causes relies more on climate models, as they are needed to discriminate between the response of the climate system to different “drivers”, such as solar activity, greenhouses gases and volcanoes. It turns out that the best, and really the only, satisfactory explanation of the history of surface air temperature change particularly over the last few decades is obtained when the warming influence of anthropogenic greenhouse gases is taken into account. These gases are behind most of the recent decades’ warming. The attribution argument relies on a combination of statistical evidence and physical plausibility, and hence relies on the accuracy of large-scale temperature changes simulated by climate models, and also, inevitably, leaves some room for doubt. Studies using records for other aspects of climate, including change in ocean temperatures, change in temperatures in the atmosphere, water vapour, even in precipitation, support the dominant role of human influences in the past few decades, and paint a very consistent picture of a world warming largely due to greenhouse gas increases.
- 8.4 Importantly, both of these conclusions rely on thermometer-based temperature records such as HadCRUT. They do not rely on reconstructions of temperature over the past millennium. Such reconstructions are not based on thermometer data but on indirect evidence such as tree rings, and are consequently more uncertain and have been the subject of intense debate over the last few years. Because of this uncertainty, coupled with uncertainty in the drivers of climate change prior to the 20th century, reconstructions of past climate have played a more marginal role than the instrumental surface temperature record in the detection and attribution efforts of assessing ongoing climate change. If “tree-ring-thermometers” had never been discovered, our confidence of human influence on climate over the past few decades would not be substantially diminished. It is particularly unfortunate that much of the discussion of the CRU e-mails in the mainstream media has failed to distinguish between the “hockey-stick” and the much more important and less controversial instrumental record.
- 8.5 One of us (MRA) led a study submitted at the end of 1999 making a prediction of climate change over the early decades of the 21st century, based on a combination of the HadCRUT record and climate model simulations available at that time.<sup>7</sup> If the HadCRUT record had been deliberately manipulated away from the true climate, or the attribution of causes of the observed warming were seriously in error, there would be no reason to expect such a prediction to be correct. To date, the prediction has proved remarkably accurate (see figure). While not conclusive, this fully out-of-sample forecast verification provides further evidence that there is nothing substantially wrong with the HadCRUT temperature record or conclusions based upon it.

9. Climate science is clearly a knowledge producer and broker for some of the most important issues of world policy and therefore cannot be conducted behind closed doors. Some commentators have suggested that the e-mails disclose a “team mentality” among climate scientists, as if there is a united front against dissenters. Even we—the two authors of this submission—find it impossible to agree whether or not some people went too far to ensure dominance for particular points of view. We do agree, however, that it is absurd to suggest there is some kind of global conspiracy involving all climate scientists. We welcome a dispassionate discussion on the correct balance between protecting the interests of individual researchers and institutions and the broader interests of open access and transparency. But in the midst of this, the most important conclusions about climate change itself must not be forgotten.

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- <sup>3</sup> [http://hadobs.metoffice.com/crutem3/jan\\_2010\\_update.html](http://hadobs.metoffice.com/crutem3/jan_2010_update.html)
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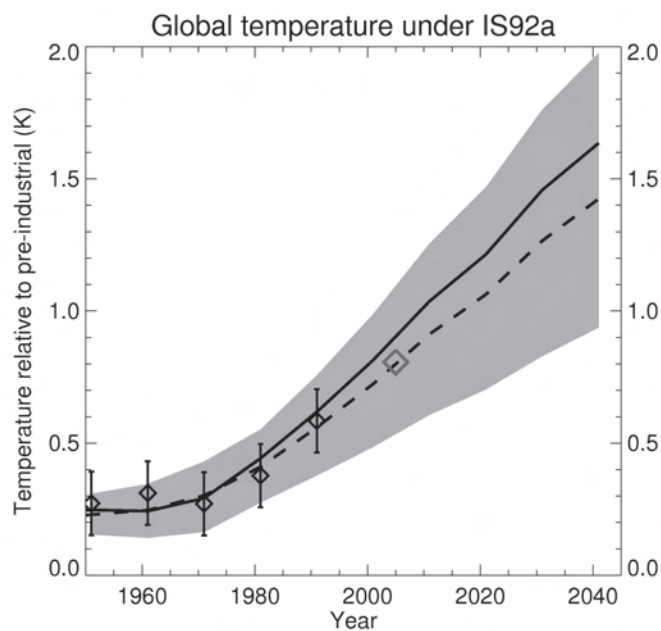
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<sup>7</sup> M R Allen *et al*, *Nature*, doi:10.1038/35036559 (2000).

Hans von Storch is director of the GKSS Institute of Coastal Research in Geesthacht, Germany, and a member of the KlimaCampus CLISAP in Hamburg. Myles Allen is Head of the Climate Dynamics Group, Department of Physics, University of Oxford, UK.

### Figure

Forecast of global temperature made in 1999 using the HadCRUT data.<sup>7</sup> Solid line shows original model projection. Dashed line shows prediction after reconciling climate model simulations with the HadCRUT temperature record, using data to August 1996. Grey band shows 5-95% uncertainty interval. Red diamond shows observed decadal mean surface temperature for the period 01-01-00 to 31-12-09 referenced to the same baseline.



February 2010

### Memorandum submitted by Research Councils UK (CRU 44)

1. Research Councils UK (RCUK) is a strategic partnership set up to champion the research supported by the seven UK Research Councils. RCUK was established in 2002 to enable the Councils to work together more effectively to enhance the overall impact and effectiveness of their research, training and innovation activities, contributing to the delivery of the Government's objectives for science and innovation. Further details are available at [www.rcuk.ac.uk](http://www.rcuk.ac.uk).

2. This evidence is submitted by RCUK on behalf of the Research Councils and represents their independent views. It does not include or necessarily reflect the views of the Department for Business, Innovation, and Skills.

### INTRODUCTORY COMMENTS

3. Research Councils fund climate change research at the University of East Anglia (UEA). Though some grants are currently held by scientists within the Climatic Research Unit (CRU) the Research Councils are not major funders of the CRU. All Research Council funding is approved through a rigorous peer review system in which applications are examined by a number of reviewers, including some international reviewers.

4. In addition to these grants, a contract using funding from the Natural Environment Research Council (NERC) was issued in November 2005 by the then Council for the Central Laboratory of the Research Councils (now incorporated within the Science and Technology Facilities Council (STFC)) for the British Atmospheric Data Centre (BADC)<sup>57</sup> to procure an updated version of the CRU high-resolution climate dataset, and software to allow BADC to carry out ongoing updates to the dataset. The desire of all parties in this contract was to make both the dataset and the methodology used in its construction more easily available and transparent. Approximately 500 registered BADC users have accessed the data to date.

5. RCUK is fully supportive of access to data to validate research, and issued its policy on good research conduct in July 2009.<sup>58</sup> This policy makes clear:

- misrepresentation of data, for example suppression of relevant findings, and/or data, or knowingly, recklessly or by gross negligence, presenting a flawed interpretation of data is unacceptable; and
- relevant primary data and research evidence should be accessible to others for reasonable periods after the completion of the research: data should normally be preserved and accessible for 10 years, but for projects of clinical or major social, environmental or heritage importance, for 20 years or longer.

6. The evidence for climate change comes not only from the temperature records but also from, for example, long term changes in: sea level rise, ecosystem degradation, intensity of rainfall changes, incidence of droughts etc. The joint Met Office, NERC and Royal Society “Climate Science Statement” highlights the weight of evidence for human-induced climate change.<sup>59</sup>

Q1. *What are the implications of the disclosures for the integrity of scientific research?*

7. Discussion of this question should await the outcome of Independent Review of the allegations, to be headed by Sir Muir Russell.

Q2. *Are the terms of reference and scope of the Independent Review announced on 3 December 2009 by UEA adequate?*

8. In circumstances where there is a question of research integrity we would expect the employing organisation to undertake an investigation in the first instance. Research Councils require an award holding organisation to have a robust policy/process for undertaking such a review, and where appropriate for reporting the outcome to the relevant councils.

9. It is not our position to intervene on individual cases where investigations are still in process, so it would be inappropriate to make any comment on the terms of reference of this review.

Q3. *How independent are the other two international data sets?*

10. At this stage, this issue is most appropriately assessed through the evidence of the research community and independent leading individual scientists rather than research funding bodies. As such, it would be inappropriate to make any further comment at this stage.

February 2010

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#### **Memorandum submitted by the Public Interest Research Centre (CRU 45)**

The Public Interest Research Centre (PIRC) is a research group, focusing on climate and energy policy. We serve as a resource for policymakers and the public, drawing on scientific and technical materials to provide a clear analysis of their public policy implications.

PIRC welcomes the opportunity to submit evidence. In particular, we will focus on the implications of the CRU leak for the integrity of scientific research.

#### **DECLARATION OF INTERESTS**

Established in 1972, the Public Interest Research Centre is an independent charity (Registered No 266446). Our funding is provided by charitable foundations and individual donations. We do not receive any corporate or government funding.

1. Phil Jones’ frequently cited proposal to employ “Mike’s nature trick” to “hide the decline”<sup>60</sup> does not refer to any attempt to literally conceal information, or decline in the established temperature record.

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<sup>57</sup> The British Atmospheric data centre is a NERC funded data centre run under contract for NERC by the Science and Technologies Facilities Council. See: <http://badc.nerc.ac.uk/home/index.html>

<sup>58</sup> <http://www.rcuk.ac.uk/cmsweb/downloads/rcuk/reviews/grc/goodresearchconductcode.pdf>

<sup>59</sup> <http://www.nerc.ac.uk/press/releases/2009/29-climate.asp>

<sup>60</sup> Email from Phil Jones to colleagues, 16 November 1999. Available at: <http://www.eastangliaemails.com/emails.php-eid=154>.

2. This decline refers not to the temperature record, but to one paleo-climate record derived from tree-rings beyond the 1960s, universally recognized as divergent from established, directly observed late-20th century temperature records. Jones was preparing a reliable long-term temperature reconstruction for the World Meteorological Organisation, combining earlier tree-ring data with late 20th century temperature records. As the Pew Centre on Global Climate Change note,

“It cannot be said that Jones was literally hiding this fact because two years before he wrote this email he was a co-author on the first paper to document this “divergence” issue. That paper, published in *Nature* in February of 1998, concluded publicly that these post-1960 tree ring data produce inaccurate temperature estimates”.<sup>61</sup>

3. This background information is referenced in the WMO reconstruction to which Jones was contributing.<sup>62</sup> It is thus clear that none of this information was hidden. The word “trick” occurs frequently across the scientific literature, employed to mean essentially a statistical device, mechanism or “clever thing to do” in handling data.

4. Remarks concerning our inability to explain the apparent recent slowdown in rising temperatures refer to the details and complexities of tracking energy flows in the earth system, not whether climate change has stopped.

5. In another much-cited email, Dr Kevin Trenberth notes the “travesty” of being unable to explain very recent, short-term variabilities in the overall global temperature trend.<sup>63</sup> This opinion is not simply privately expressed here, but offered alongside a reference to a publicly available, published paper on the issue.<sup>64</sup> The idea that “private doubts” have been concealed from the public is therefore entirely without foundation.

6. In this paper Trenberth “unequivocally” backs the scientific consensus on climate change.<sup>65</sup> The issue he raises concerns nuances—in particular, short-term temperature variabilities—in this overall picture. Trenberth’s area of study centres around the tracking of energy flows into and out of the climate system. His comment concerns the fact that, in his words “[t]he observing system we have is inadequate” in the difficult and important task of accounting for the complexities in the various mechanisms by which the earth system absorbs and releases heat—within the overall context of man-made climate change.

7. Trenberth wrote in a public statement:

“It is amazing to see this particular quote lambasted so often. It stems from a paper I published this year bemoaning our inability to effectively monitor the energy flows associated with short-term climate variability. It is quite clear from the paper that I was not questioning the link between anthropogenic greenhouse gas emissions and warming, or even suggesting that recent temperatures are unusual in the context of short-term natural variability.”<sup>66</sup>

8. The structure of the Intergovernmental Panel on Climate Change (IPCC) precludes individual scientists’ “keep[ing] out” material or “redefine[ing] peer-review” in preparing reports—and the IPCC process was demonstrably not manipulated in this way.

9. In one email, Phil Jones appears to suggest that he and another scientist will endeavour to deliberately “keep out” two papers from the IPCC’s Fourth Assessment Report.<sup>67</sup> This is undoubtedly an ill-advised remark, but must be considered in context. The comment was made in private correspondence, in which frivolous or semi-serious comments can be made in haste. Climate scientist Michael Mann comments, “No-one gets to redefine what peer reviewed” means, and the exclamation point underlines the fact that this was hyperbole.”<sup>68</sup>

10. The exclusion of these papers demonstrably did not happen: these (highly contentious) papers were discussed in the IPCC report, the IPCC process precluding any such attempt at manipulation by individual scientists. As the Pew Centre note:

“when writing their individual research papers, scientists are free to choose which published papers to cite based on their own judgment, and it is not standard practice to cite all relevant publications, since many are redundant and some lack credibility. In this case, the authors were contemplating the refusal to cite two discredited papers in the IPCC Fourth Assessment Report. In the end, since IPCC reports are more inclusive and comprehensive than individual research papers, both of the

<sup>61</sup> Analysis of the Emails from the University of East Anglia’s Climatic Research Unit, Pew Centre on Global Climate Change report, December 2009. Available at: <http://www.pewclimate.org/science/university-east-anglia-cru-hacked-emails-analysis>.

<sup>62</sup> “CRU update 2”, 24 November 2009. Available at <http://www.uea.ac.uk/mac/comm/media/press/2009/nov/CRUupdate>

<sup>63</sup> Email from Kevin Trenberth to colleagues, 12 October 2009. Available at: <http://www.eastangliaemails.com/emails.php%3Fleid%3D1048%26filename%3D1255352257.txt>

<sup>64</sup> Kevin Trenberth, “An imperative for climate change planning: tracking Earth’s global energy”, *Current Opinion in Environmental Sustainability*, Vol 1, pp 19–27; doi:10.1016/j.cosust.2009.06.001. Available at: <http://www.cgd.ucar.edu/cas/trenberth/trenberth.papers/EnergyDiagnostics09final2.pdf>

<sup>65</sup> Peter Sinclair, “Climate Crock Sacks Hack Attack Part 1”. Available at: <http://www.youtube.com/watch?v=P70SIEqX7oY>

<sup>66</sup> Kevin Trenberth, “Statement: Kevin Trenberth on Hacking of Climate Files”. Available at: <http://www.cgd.ucar.edu/cas/trenberth/statement.html>

<sup>67</sup> Email from Phil Jones to colleagues, July 8 2004. Available at: <http://www.eastangliaemails.com/emails.php%3Fleid%3D419%26filename%3D1089318616.txt>

<sup>68</sup> Correspondence with Michael Mann, February 2010.

suspect papers were cited and discussed (p 466 of the Working Group I report cites Soon and Baliunas, 2003 and McIntyre & McKittrick, 2003; <http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter6.pdf>).<sup>69</sup>

11. In considering this remark, the Committee must take into account these relevant mitigating factors. Its context raises doubts as to the seriousness with which it was made. These doubts are reinforced by the IPCC processes themselves, which are not susceptible to such manipulation, and by the fact that no evidence of wrongdoing was revealed.

12. Proposals by senior scientists—discussed as an option—to exclude flawed material from peer-reviewed journals represent a legitimate extension of the peer-review process in extraordinary circumstances.

13. As Michael Mann and Gavin Schmidt note, despite its importance as an authenticating and legitimating mechanism for scientific material, peer-review is not infallible, and can be undermined:

“Put simply, peer review is supposed to weed out poor science. However, it is not foolproof—a deeply flawed paper can end up being published under a number of different potential circumstances: (i) the work is submitted to a journal outside the relevant field (eg a paper on paleoclimate submitted to a social science journal) where the reviewers are likely to be chosen from a pool of individuals lacking the expertise to properly review the paper, (ii) too few or too unqualified a set of reviewers are chosen by the editor, (iii) the reviewers or editor (or both) have agendas, and overlook flaws that invalidate the paper’s conclusions, and (iv) the journal may process and publish so many papers that individual manuscripts occasionally do not get the editorial attention they deserve.

“Thus, while un-peer-reviewed claims should not be given much credence, just because a particular paper has passed through peer review does not absolutely insure that the conclusions are correct or scientifically valid.”<sup>70</sup>

14. It is clear that the concern discussed in the emails is that two journals—*Climate Research* and *Geophysical Research Letters*—are publishing material that is “deeply flawed”, “crap”, “crap science”, in each case apparently on account of an editorial agenda.<sup>71</sup> The scientists discuss various solutions: writing rebuttals in the journals; sending a letter of protest, signed by a large number of distinguished scientists, to the publishers, expressing their loss of faith in the journal’s conduct; bypassing the publication altogether; or gathering and presenting “a clear body of evidence” of the editorial agenda compromising the publication. As the Pew Centre note:

“To interpret this correspondence in proper context, one must recognize that science is a community-based professional enterprise. It is expected and appropriate that investigators choose in which journals to publish and recommend to their peers in which journals to publish or not publish. The notion of organizing a boycott against any journal that repeatedly departs from accepted scientific standards is both reasonable and ethical.”<sup>72</sup>

15. Any attempt to exclude material evidently held to be flawed from leading journals must be compared with routine decisions by editors and reviewers to reject publication of material. Rather than an attempt at “suppression”, this seems simply to have been an attempt to uphold the integrity of peer-review—an important but not infallible process—in one publication.

16. *Guardian* journalist Fred Pearce raises concerns that the putative independence and anonymity of the peer-review process was compromised in some cases.<sup>73</sup> Mann suggests this is misleading:

“An editor often asks the scientists being criticised to review a new submission critical of their work. This is in fact expected behaviour since it often allows any misunderstandings or misinterpretations to be resolved ahead of time. It does not imply that the criticised authors have veto power over criticism. The role of the editor is explicitly there to adjudicate these issues and obviously will take into account potential conflicts before making decisions based on \*all\* of the reviews. The problems most often arise—such as in Soon and Baliunas (2003) or McIntyre and McKittrick (2003;2005) when the criticised authors are not involved at all.”<sup>74</sup>

17. Unjustifiable attempts appear to have been made to withhold or prevent the release of information, in the context of: (a) a campaign of harassment, misrepresentation and vilification by a major industry-backed lobby; (b) CRU’s contractual obligations to keep some data out of the public domain.

<sup>69</sup> Pew Centre, *op cit*.

<sup>70</sup> “Peer review: a necessary but not sufficient condition”, Realclimate, 20 January 2005. Available at: <http://www.realclimate.org/index.php/archives/2005/01/peer-review-a-necessary-but-not-sufficient-condition/>

<sup>71</sup> Email from Michael Mann to colleagues. Available at: <http://www.eastangliaemails.com/emails.php%3Fleid%3D484%26filename%3D1106322460.txt>; Email from Tom Wigley to colleagues, 24 April 2003. Available at: <http://www.eastangliaemails.com/emails.php%3Fleid%3D307%26filename%3D1051190249.txt>

<sup>72</sup> Pew Centre, *op cit*.

<sup>73</sup> Fred Pearce, “Emails reveal strenuous efforts by climate scientists to ‘censor’ their critics”, *Guardian*, 9 February 2010. Available at: <http://www.guardian.co.uk/environment/2010/feb/09/peer-review-block-scientific-papers>

<sup>74</sup> Correspondence with Michael Mann, February 2010.

18. Some emails suggest attempts to keep scientific data out of the public domain, and possibly to delete emails either in anticipation of or response to FOI requests. While such behaviour is unjustifiable, the emails concerned contain evidence of the overarching context of these remarks: the concerted campaign of harassment, misrepresentation and vilification to which the scientists were exposed. As Phil Jones says in one of the emails concerned, “As an aside and just between us, it seems that Brian Hoskins has withdrawn himself from the WG1 [Working Group 1 of the IPCC] Lead nominations. It seems he doesn’t want to have to deal with this hassle.”<sup>75</sup> NCAR’s Caspar Amman wrote in one email: “Oh MAN! will this crap ever end?”<sup>76</sup> Gavin Schmidt writes in one email of the way FOI requests were used to harass scientists:

“The contrarians have found that there is actually no limit to what you can ask people for (raw data, intermediate steps, additional calculations, residuals, sensitivity calculations, all the code, a workable version of the code on any platform etc), and like Somali pirates they have found that once someone has paid up, they can always shake them down again.”<sup>77</sup>

19. One FOI submission to the UEA by Climate Audit contained the following paragraph:

“I hereby make a EIR/FOI request in respect to any confidentiality agreements) restricting transmission of CRUTEM data to non-academics involving the following countries: [*insert five or so countries that are different from ones already requested I*]” (emphasis added).

20. The request, clearly designed to generate repeated FOI submissions, was treated as vexatious and turned down.

21. *Nature* blogger Olive Heffernan notes:

“Between 24 July and 29 July of this year, CRU received 58 freedom of information act requests from McIntyre and people affiliated with Climate Audit. In the past month, the UK Met Office, which receives a cleaned-up version of the raw data from CRU, has received ten requests of its own.”<sup>78</sup>

22. John Houghton, former co-chair of the IPCC told the BBC that information was routinely leaked and manipulated in the public domain by a critical fossil fuel industry lobby to undermine the IPCC:

“Professor Houghton said that in future it would be wise to offer the IPCC protection from harassment in its work. ‘IPCC meetings were open to all—including (representatives) from organisations such as [fossil fuel industry lobbying coalition] the Global Climate Coalition whose clear agenda was to weaken our work and our conclusions.

A particular way they continually did this was to publish selected provisional material from the IPCC process, for example draft chapters or contributions not meant for publication, and used this to discredit the IPCC and the process.

For people being targeted, it is very difficult to be completely open when provisional material emerging during the process is being used as stick to beat the scientists with’.”<sup>79</sup>

23. This does not excuse failures to adhere to the openness that robust scientific practice demands, or apparent attempts to circumvent FOI requests, but helps explain why—absent malicious or conspiratorial motives—information was withheld.

24. As the Pew Centre note, the CRU had contractual obligations to keep some data private—problematic in terms of transparency, but fundamentally an institutional problem:

“The CRU is barred by non-publication agreements with some countries’ meteorological services from releasing to the public a small amount (less than 5%) of the weather station data the CRU uses to estimate landp-surface temperature trends. The university has confirmed that the CRU is legally barred from releasing these data. A few commentators have used this situation as a basis for accusing the CRU of suppressing data.”<sup>80</sup>

25. Gavin Schmidt notes:

“From the date of the first FOI request to CRU (in 2007), it has been made abundantly clear that the main impediment to releasing the whole CRU archive is the small % of it that was given to CRU on the understanding it wouldn’t be passed on to third parties. Those restrictions are in place because of the originating organisations (the various National Met Services) around the world and are not CRU’s to break. As of 13 November, the response to the umpteenth FOI request for the same data met with exactly the same response. This is an unfortunate situation, and pressure should be brought to bear on the National Met Services to release CRU from that obligation. It is not however the fault of CRU.”<sup>81</sup>

<sup>75</sup> Email from Phil Jones to colleagues, 20 August 2008. Available at: <http://www.eastangliaemails.com/emails.php?eid=914>

<sup>76</sup> Email from Caspar Amman to colleagues. Available at: <http://www.eastangliaemails.com/emails.php?eid=887>

<sup>77</sup> Email from Gavin Schmidt to colleagues. Available at: <http://www.eastangliaemails.com/emails.php?eid=939>

<sup>78</sup> “McIntyre versus Jones: climate data row escalates”, *Climate Feedback*, 12 August 2009. Available at: [http://blogs.nature.com/climatefeedback/2009/08/mcintyre\\_versus\\_jones\\_climate\\_1.html](http://blogs.nature.com/climatefeedback/2009/08/mcintyre_versus_jones_climate_1.html)

<sup>79</sup> “Harrabin’s Notes: Debating the IPCC”, BBC Online. Available at: <http://news.bbc.co.uk/1/hi/sci/tech/8387365.stm>

<sup>80</sup> Pew Centre, *op cit*.

<sup>81</sup> Gavin Schmidt, “The CRU Hack: Context”, Realclimate, 23 November 2009. Available online at: <http://www.realclimate.org/index.php/archives/2009/11/the-cru-hack-context/>



26. In investigating CRU's responses to FOI requests, the Committee must determine whether such requests represented a pernicious form of harassment through unreasonable, time-consuming requests for extraordinary quantities of data; and whether information was withheld due to contractual obligations.

27. No relevant evidence or data has had to undergo a correction or been found to be wrong as a result of the affair.

28. As Myles Allen, head of the Climate Dynamics group at Oxford, has commented, the CRU leak leaves us "without any evidence that any number, anywhere, is actually wrong."<sup>82</sup>

"If it could be proved that figures had been deliberately altered to give a specific result then it would be very serious, but so far no evidence has emerged from these Climatic Research Unit (CRU) emails of any error in the HadCRUT instrumental temperature record at the centre of the row, never mind proof of deliberate intent to mislead . . ."

29. Fred Pearce's investigation for the Guardian has substantiated this: none of the emails indicates extant erroneous information in the scientific literature requires correction.

30. The data sets and scientific literature the emails discuss represent a small portion of the scientific evidence supporting anthropogenic climate change. The flaws and compromises widely alleged are insufficient to seriously undermine this evidence.

31. As *Nature* note:

"Nothing in the e-mails undermines the scientific case that global warming is real—or that human activities are almost certainly the cause. That case is supported by multiple, robust lines of evidence, including several that are completely independent of the climate reconstructions debated in the e-mails."<sup>83</sup>

32. The Pew Centre explain:

"The two data sets highlighted in accusations of misconduct are very limited and consist of:

- High-latitude tree ring data that inaccurately suggest that local temperatures declined after 1960; thermometer readings from the same locations demonstrate that the tree rings accurately reflected local temperatures prior to, but not after 1960.
- A small fraction of the weather station data used by the CRU to estimate global surface temperature change . . .

"The key point is that those data that comprise the most important evidence for human-induced climate change are not in play in the emails, including those documenting:

- snow and ice cover;
- sea level rise;
- ocean heat content;
- surface temperature records maintained in the U.S. (NASA, NOAA);
- upper and lower atmospheric temperatures monitored by satellites;
- atmospheric water vapor;
- greenhouse gases;
- solar activity; and
- modeling experiments.

"As a result, the evidence for rapid warming of the Earth in recent decades remains unequivocal, including:

- Worldwide loss of snow and ice.
- Rising sea levels.
- Records of rising global surface temperatures maintained in the U.S. by NASA and NOAA.

"Further, the evidence for human dominance of recent warming remains very strong, including:

- Concomitant warming of the troposphere and cooling of the stratosphere (a greenhouse effect signature).
- Without the strong warming effect of human-induced rise in atmospheric greenhouse gas concentrations, the observed changes in solar activity over the past several decades would have led to a slight cooling of the Earth's surface.

<sup>82</sup> Myles Allen, "Science forgotten in climate emails fuss", *Guardian*, 11 December 2009. Available online at: <http://www.guardian.co.uk/commentisfree/2009/dec/11/science-climate-change-phil-jones>.

<sup>83</sup> "Climatologists Under Pressure", *op cit*.

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— Climate models only reproduce the warming of the past 50 years when they include the observed rise in atmospheric greenhouse gas concentrations.”<sup>84</sup>

33. In conclusion, whilst this affair certainly merits further investigation, the media’s allegations of wrongdoing have been decontextualised and seriously exaggerated.

February 2010

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### Memorandum submitted by Douglas J Keenan (CRU 46)

#### 1. INTRODUCTION

1.1 This submission describes some actions by Philip D Jones, a professor at the University of East Anglia. Some related science issues are also briefly mentioned.

#### 2. REVIEW BY JONES OF MY SUBMISSION TO *ENERGY & ENVIRONMENT*

##### 2.1 *Introduction*

2.1.1 In August 2007, I submitted an article to the journal *Energy & Environment*. The article concerned my allegation of fraud by a researcher at the University at Albany, Wei-Chyung Wang. Specifically, I alleged fraud in the following two research reports:

Jones P D, Groisman P Y, Coughlan M, Plummer N, Wang W-C, Karl T R (1990), “Assessment of urbanization effects in time series of surface air temperature over land”, *Nature*, 347: 169–172.

Wang W-C, Zeng Z, Karl T R (1990), “Urban heat islands in China”, *Geophysical Research Letters*, 17: 2377–2380.

2.1.2 Each report analyses temperature data from some meteorological stations in China, over the years 1954–83. (The first report also considers data from stations in the USSR and Australia; Wang was only involved in Chinese data, and so the other stations were not relevant for my article.) The first report is quite important: it is cited for resolving a major issue by the most recent (2007) assessment report of the IPCC.

2.1.3 As is standard with scholarly journals, my article was sent to other researchers for comment—what is usually called peer review. Journal editors base their decision on whether or not to publish an article on the comments received from reviewers. Usually there are two reviewers: if the two agree, the editor almost always follows their recommendation. If the two disagree, the editor typically brings in a third reviewer, as a tie-breaker. In all cases, though, the final decision rests with the editor.

2.1.4 For my article, one of the people asked to comment was Jones. Jones was asked in substantial part because he would obviously be very familiar with the issues, as he was the lead author of one of the two research reports.

2.1.5 Jones sent his comments to the journal editor in early September. Afterwards, there was some discussion between Jones and me. A full copy of the discussion is at <http://www.informath.org/appraise/a5610/b0709.htm>. What follows is a treatment of the main issues in that.

##### 2.2 *Comment on Parker (2006)*

2.2.1 Here is a statement from my article:

The study of Jones *et al* is not the sole study relied upon by the IPCC report for its conclusion about the insignificance of the urbanization effects. . . . On the other hand, assumptions made in one of the other main studies, by Parker (2006), have since been strongly criticized, both in the peer-reviewed literature and on scholarly blogs.

The statement was followed by a footnote, which read as follows: “The only response from Parker of which I am aware is blogged at <http://www.climateaudit.org/?p=1813> (dated July 2007); this also references the main criticisms.” (Note: that is the submitted version of the footnote; the published version was slightly more detailed.)

2.2.2 Jones commented on the foregoing as follows: “There are no peer-review publications that criticise Parker (2006)”. The comment is false. The most prominent publication is by Pielke *et al* (*Journal of Geophysical Research*, 2007)—in a well-respected journal; there are also other publications that are related. Jones would certainly be expected to know this, since this is his area of research. Even if he did not know it, he could have consulted the footnote in my article.

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<sup>84</sup> Pew Centre, op cit.

### 2.3 *The principal reference for Chinese data*

2.3.1 The principal reference for the Chinese data used by Jones *et al* and Wang *et al* is a report that was jointly sponsored by the U.S. Department of Energy and the Chinese Academy of Sciences. Concerning that, my article states the following: “The DOE/CAS report was formally published in full in 1991—Wang *et al* and Jones *et al* used a pre-publication version of the report”. Jones, in his review comments, said this: “The Tao *et al* (1991) report was published after the two papers from 1990”. Here again, Jones seems to be trying to make it appear that there is a deficiency in my article, when there is none.

### 2.4 *Unavailable station histories*

2.4.1 Here is another comment from Jones:

The 42-station pairs used in the two 1990 papers were selected by Professor Zeng (who was a co-author on Wang *et al*, 1990) . . . In making her decision she did have access to the station histories and the site population values.

2.4.2 This issue is discussed in my article at length. In particular, the 1991 report (and the 1997 revision) explicitly states that for 49 of the stations claimed to be studied by Jones *et al* and Wang *et al* “station histories are not currently available”. It appears that Jones ignored this part of my article.

### 2.5 *More attempted misdirection by Jones*

2.5.1 Another comment from Jones is the following:

All but one of the locations (ie one out of 34) for which Keenan cites the numbers of likely moves indicated in the site histories (on his web site, from Tao *et al*, 1991), relate to the 42 sites of urban station data used in Jones *et al* (1990). It is the rural sites that are crucial to the 1990 study, not the urban ones. The comparison in the Jones *et al* (1990) paper was between the rural station data and the CRU gridded temperature data available at the time (ie 1990).

2.5.2 Here is the relevant quote from Jones *et al*: “We assembled a network of 42 station pairs of rural and urban sites . . . stations were selected on the basis of station history: we chose those with few, if any, changes in instrumentation, location or observation times.” That assertion is untrue, for both the rural stations (40 have no histories at all) and the urban stations (nine have no histories; most of the remaining 33 had substantial moves). Again, the topic of my article is those untrue claims.

### 2.6 *Further attempted misdirection by Jones*

2.6.1 A further comment from Jones is the following:

Nowhere in the paper, nor in the Appendix, does Keenan present the result of any analyses of temperature data for any of the two sets of 42 station records. I would have thought that this would be essential for any paper, making a constructive or useful contribution to the discussion of “urban” biases.

2.6.2 My article is about the fraud allegation. Urban biases are discussed only insofar as they relate to the article’s topic. Again Jones appears to be trying to distract attention away from the article’s topic.

### 2.7 *Another issue with no relevance*

2.7.1 The next comment from Jones is this:

Site changes do influence the long-term homogeneity of the temperature series, but the magnitude of such biases can only be assessed by looking at the temperature data. In Brohan *et al* (2006), we averaged all the homogeneity adjustments for all adjusted stations across the world. The histogram in Figure 4 in that paper shows that applied adjustments are slightly more likely to lead to cooling rather than warming (but this difference is probably not significant).

2.7.2 My article is about the fraud allegation; that is stated in the title, for example. The comment above has no bearing on my article’s argument.

### 2.8 *Subsequent work on urbanization effects in China*

2.8.1 The final comment from Jones follows:

The more recent papers on urbanization in China (ie published in the last few years) generally look at differences over the period from the early 1980s or just for the 1990s. Keenan doesn’t refer to the paper by Li *et al* (2004). One of the purposes of peer review is to point out selectivity in referencing. This paper adjusts some of the temperature data and concludes the urbanization effect is of the order of 0.06°C during the last 50 years.

### 2.8.2 Here is what my article says:

Since the publication of Jones *et al* (1990), there have been several studies on the effects of urbanization on temperature measurements in China. The most recent study, in 2007, is by Guo Yu Ren and colleagues at the Laboratory for Climate Studies, China Meteorological Administration. This study concludes that a large part of the warming that has been measured in China is due to the effects of urbanization on measurement. (The study is also supported by the analysis of He *et al* (2007) for the years 1991–2000.)

The most recent works—Ren *et al* (2007) and He *et al* (2007)—would be expected to discuss prior work, including Li *et al* (2004); indeed they do, and they conclude that Li *et al* were overly optimistic. Jones' claim to have found a deficiency is untrue.

## 2.9 Conclusions for first round

2.9.1 Jones has not found any problems with my article. He has, however, repeatedly claimed to have found such. The editor of the journal forwarded my rebuttals of those claims to Jones, for further discussion.

2.9.2 This practice by the editor is unusual. The editor, Benny J Peiser, was clearly making a strong effort to determine what is true and to give Jones an ample chance to criticize my article.

## 2.10 The 49 stations with no histories

2.10.1 In the second round, Jones commented as follows:

Attached is Tao *et al* (1991). Nowhere in it does it explicitly state for 49 of the stations claimed to be studied by Jones *et al* and Wang *et al* are station histories not currently available. It says this for the 205. I'm attaching Tao *et al*. It is a scanned pdf, so the find/search facility won't work. Zeng had the station histories for the 84 sites we used. They didn't have adequate resources in the 1989–90 period to digitise everything. Keenan has been told this.

The 49 stations are all in the 205; so Jones's comment is very misleading here. Zeng said in 1991 (and again in 1997) that there were no histories for those 205: this point is discussed at length in the Appendix of my article, which Jones's comment ignores.

## 2.11 More on rural sites

2.11.1 Here is the next comment from Jones in the second round:

The data on Keenan's web site doesn't show that his statement for the rural sites to be true. He only has the station history for one urban sites. We chose those with few, if any, site moves.

They obviously could not have made the choice based on site moves, because for 49 sites—including 40 of the 42 rural sites—there were no histories of site moves.

## 2.12 Advice to the editor and conclusion

2.12.1 Jones then e-mailed the editor the following advice:

My responses the other week were limited to just a few. I don't want you to take it as a formal review.

I don't see how any journal would ever contemplate publishing such a paper.

I hope you'll reconsider.

2.12.2 Jones thus tried to persuade the editor to not publish my article—an article that implied strong criticism of work that he had published (Jones *et al*). His attempts were clearly and repeatedly dishonourable, and were not based on the article's merits.

2.12.3 The other reviewer, however, recommended accepting my article. Editor Peiser then sent my article to a third scientist for review; the third reviewer was also sent a copy of the exchange between Jones and me. (All of this is common practice.) The third reviewer recommended accepting my article for publication. The editor then made his decision: my article was to be published. (A copy is at <http://www.informath.org/pubs/EnE07a.pdf>.)

## 2.13 A further breach of trust

2.13.1 When an article is sent to a scientist for review, the article is supposed to be kept confidential. It has since emerged from the leaked CRU e-mails that Jones did not abide by this, but instead sent copies of my article to several others. This is a breach of trust.

2.13.2 Relevant e-mails that evidence this include the following: 1188412866, 1188478901, 1188508827, 1188557698, 1189515774, 1189536059.

### 3. WORK FOR THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE

#### 3.1 *Jones and a chapter of the IPCC Assessment Report*

3.1.1 Every six years or so, the IPCC issues an Assessment Report. Those reports are widely considered to be the most authoritative assessment of the scientific understanding of climate change. For the 2007 report, there were two scientists with final responsibility for the chapter in the IPCC report on “surface and atmospheric climate change” (here “surface” refers to the surface of the Earth, ie where people live). Those two were Jones and an American colleague, Kevin Trenberth.

3.1.2 The chapter on surface climate might be considered the most important chapter of the IPCC report. It cites Jones *et al* (1990), but it does not cite Wang *et al* (1990).

#### 3.2 *Citing research known to be based on false claims*

3.2.1 The principal statement in the report of Jones *et al* that I alleged to be fabricated is this: “The stations were selected on the basis of station history: we chose those with few, if any, changes in instrumentation, location or observation times”. My article argues that at the time the report was published, Jones believed the statement was true, and the responsibility for the fabrication lay with Jones’ co-author Wang. The following paragraph from my article is relevant:

How much did Jones know about Wang’s fabrications? As discussed in my Report on Wang’s claims, it appears very likely that Jones knew nothing at the time (1990). In 2001, however, Jones co-authored a study, by Yan *et al*, which considered two meteorological stations in China (at Beijing and at Shanghai). This study correctly describes how the stations had undergone relocations, and it concludes that those relocations substantially affected the measured temperatures—in direct contradiction to the claims of Wang. Thus, by 2001, Jones must have known that the claims of Wang were not wholly true.

On 19 June 2007, I e-mailed Jones about this, saying “this proves that you knew there were serious problems with Wang’s claims back in 2001; yet some of your work since then has continued to rely on those claims, most notably in the latest report from the IPCC”. I politely requested an explanation. I have not received a reply.

#### 3.2.2 The study of Yan *et al* is the following:

Yan Zhongwei, Yang Chi, Jones P. (2001), “Influence of inhomogeneity on the estimation of mean and extreme temperature trends in Beijing and Shanghai”, *Advances in Atmospheric Sciences*, 18: 309–321.

Note that Jones is one of the three authors. The study correctly describes how the Beijing station moved five times, over 41 km, as well as having changes in observation times. Shanghai also had a small move, as well as changes in observation times.

3.2.3 The above block quote from my article implies that Jones committed fraud in his work on the latest report from the IPCC—ie citing work that he knew to be based on false claims. Note too that Jones must have read the quote when he was reviewing my article; yet none of the review comments from Jones address the quote, either explicitly or implicitly. Jones seems to be thereby effectively admitting the fraud.

3.2.4 There is another aspect to this as well. In 1993, Jones was the second author of a report that examined temperature trends in China and certain other countries (Karl *et al*, *Bulletin of the American Meteorological Society*, 1993). The report states (p 1014) that “Station histories from the PRC [China] do not reflect any changes in instrumentation, instrument heights, instrument shelters, or observing procedures . . .”. That directly contradicts the claim of Jones *et al* to have chosen stations “with few, if any, changes in instrumentation”. So again, Jones knew that the IPCC Assessment Report was citing work that was based on false claims.

#### 3.3 *Ignoring research that contradicts his own*

3.3.1 The reports of Jones *et al* and Wang *et al* analyze the same data, but come to substantially-different conclusions about that data. The IPCC (2007) Assessment Report, though, only cites Jones *et al*, not Wang *et al*. *That seems to be contrary to how the IPCC is supposed to work. Consider, for example, the following quote from IPCC Chairman Rajendra Pachauri (quoted by the U.S. Environmental Protection Agency, Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act: Response to Public Comments—Volume 11, 2009):*

IPCC relies entirely on peer reviewed literature in carrying out its assessment and follows a process that renders it unlikely that any peer reviewed piece of literature, however contrary to the views of any individual author, would be left out . . . There is . . . no possibility of exclusion of any contrarian views, if they have been published in established journals or other publications which are peer reviewed.

3.3.2 If there is some reason for ignoring Wang *et al*, it should be in the peer-reviewed literature. I searched that literature (using the ISI Web of Knowledge) for work that compared Jones *et al* and Wang *et al*. I found only one such work, by Riches *et al* (*Bulletin of the American Meteorological Society*, 1992). Riches *et al*, which is co-authored by Wang, state the following (p 588).

Jones *et al* (1990) have assessed the urbanization effects in time series of surface air temperature over land areas in European parts of the CIS, eastern Australia, and eastern China. The results suggest that urbanization influence appears to be small. However, Wang *et al* (1990) have performed a more detailed study on the urban heat island effect in China. The effects were found to have a seasonal dependency, which varied considerably across the country.

3.3.3 Thus, the citing of Jones *et al* and the non-citing of Wang *et al* appear to contradict the claims made by Chairman Pachauri, and indeed obvious good practice in research. Jones, together with Trenberth, had final responsibility for that selective citation. In other words, there is evidence that Jones abused his position of responsibility for the IPCC chapter to cite his own research (in support of global warming) and ignore other research that contradicted his.

#### 4. DISCUSSION

4.1 This submission to the Committee is limited to 3,000 words. There are other topics that merit presentation, but cannot be treated in such space. In reality, Jones is more unscrupulous than the foregoing indicates. Simply put, Jones is an incompetent who has advanced himself by joining what is in effect a mutual benefit society.

4.2 In addition, there are many other researchers, in other fields of science, who are at least as unscrupulous as Jones. Consider that there are tens of thousands of scientists in the UK, and yet none of those have been found guilty of scientific fraud during the past decade, to my knowledge. It is not credible that tens of thousands of people would all act with complete integrity in all of their actions for a decade.

4.3 I once filed an allegation of scientific fraud against a researcher at the University of Reading. The university refused to investigate my allegation. I was told by telephone that the university had no procedures for investigating such allegations, because their professors always acted with integrity. With responses like that, it is easy to understand why there have been no convictions for scientific fraud.

4.4 On 2 February, a front-page article in *The Guardian* reported on some of my work and described me in part as a “researcher of scientific fraud”. Indeed, I have substantial experience with scientific fraud, in many fields, in several countries. If the Committee is interested in taking steps to address such fraud, I would be quite willing to provide further information.

Declaration of Interests: None.

February 2010

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#### Memorandum submitted by the Royal Statistical Society (CRU 47)

1. The Royal Statistical Society (RSS) is the UK’s only professional and learned society devoted to the interests of statistics and statisticians. Founded in 1834 it is also one of the most influential and prestigious statistical societies in the world. The Society has members in over 50 countries worldwide and is active in a wide range of areas both directly and indirectly pertaining to the study and application of statistics. It aims to promote public understanding of statistics and provide professional support to users of statistics and to statisticians.

2. The Society welcomes this opportunity to submit evidence to the Science and Technology committee on the disclosure of climate data from the Climatic Research Unit at the University of East Anglia inquiry.

3. The Society’s response relates to the first of the questions on which the committee invites submissions: “What are the implications of the disclosures for the integrity of scientific research?”

4. The RSS believes that the debate on global warming is best served by having the models used and the data on which they are based in the public domain. Where such information is publicly available it is possible independently to verify results. The ability to verify models using publicly available data is regarded as being of much greater importance than the specific content of email exchanges between researchers.

5. The position of the RSS regarding public dissemination of scientific data is that where the results of scientific analyses have been published or are otherwise in the public domain, the raw data, and associated meta-data, used for these analyses should, within reason, also be made available.

6. The qualification, *within reason*, is important because there are some cases where preservation of confidentiality is required to protect the rights of individuals to privacy. There are also occasions where the need to protect sensitive areas means that publication of all details is inappropriate. An example would be the exact locations of rare breeding species. Similarly, there are other occasions where overriding commercial interests may suggest that publication is inappropriate.

7. However, it is the view of the RSS that such commercial interest will only justifiably be invoked infrequently. An analogy with the common approach to patents is appropriate here. Companies may choose to keep their research secret and not patent it. However, if a patent is sought, the details of the invention must be revealed. Analogously, in the field of drug development, a pharmaceutical company is reimbursed not just because of the molecules it has discovered but also because of the knowledge it has acquired regarding the effects of those molecules. It cannot justifiably seek reimbursement for that knowledge and not make it available. Hence, by the point at which it seeks a commercial return, the data on efficacy and safety should be in the public domain.

8. It is also clearly unreasonable to require that any given scientist having published some research is then condemned to answer each and every question that might possibly arise from it.. For example, requests under the Freedom of Information act or the Environmental Information Regulations could overwhelm small groups of scientists. To avoid this it is best if data are stored in data centres that are professionally run and properly funded.

9. More widely, the basic case for publication of data includes that science progresses as an ongoing debate and not by a series of authoritative and oracular pronouncements and that the quality of that debate is best served by ensuring that all parties have access to the facts. It is well understood, for example, that peer review cannot guarantee that what is published is “correct”. The best guarantor of scientific quality is that others are able to examine in detail the arguments that have been used and not just their published conclusions. It is important that experiments and calculations can be repeated to verify their conclusions. If data, or the methods used, are withheld, it is impossible to do this.

10. The RSS believes that a crucial step in improving the quality of the debate on global warming will be to place the data, the analysis methods and the models in the public domain.

February 2010

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#### **Memorandum submitted by Peter Taylor (CRU 50)**

I would like to contribute to the issue concerning the “integrity of science” and the question of independence of the two data sets, as outlined in the Committees’ questions:

- *What are the implications of the disclosures for the integrity of scientific research?*
- *How independent are the other two international data sets?*

#### **BACKGROUND AND DECLARATION OF INTERESTS**

##### *Involvement as a scientist on climate issues*

1. I work in a small capacity as a professional ecological advisor on land use issues but I have a long history (since 1978) of involvement in science and environmental policy, particularly on global pollution issues. Currently, I sit on an advisory panel for a National Trust and Forestry Commission project in the Lake District. Between 2000–03, I sat on the joint Countryside Agency/DTI national advisory group on the Community Renewables Initiative and also produced under contract the first visual and landscape impact studies of renewable energy strategies (see [www.ethos-uk.com](http://www.ethos-uk.com)). During this work I have come to have an appreciation both of the potential impacts of climate change and of the remedies proposed to deal with it. I have a professional interest in identifying the strength, speed and future direction of such changes.

2. In order to answer some key questions in my own mind about global warming—as presented by computer simulations, I undertook an in-house three years in-depth study of the background science as represented in the peer-reviewed literature of the IPCC. I wrote a publicly available report (with many thousands of free downloads from my website) and eventually, in response to a publisher’s request, “*Chill: a reassessment of global warming theory*” in June 2009.

3. My qualifications for undertaking the review of computer-led climate science are drawn from over 20 years experience analysing and critiquing atmospheric and oceanic dispersion models as used in the development of toxic and nuclear waste disposal practices, as well as accidental discharge scenarios. My work has been sponsored by national governments (including HMG), the EU and the UN—and at times, Greenpeace. I have experience of the whole process from science to policy that is exemplified by the IPCC process (CV and peer-reviewed publications are available).

4. I hope that my past work demonstrates a commitment to the environment and to the due and correct processes of science. My reasons for writing to you are twofold:

- (i) Having read virtually all of the emails and annotated computer coding, and given my background knowledge of the science issues, I am appalled at the disrespect for the rules of science that are evident in those exchanges.

- (ii) These attitudes most certainly affect the science—indeed, they explain why the science has become so heavily criticised. The science has never been “sound” nor “settled”. This is the spin of IPCC and those scientists closely connected to that process. What has happened is that legitimate criticism of the modelling process (simulation of earth systems) has been suppressed, the peer-review process subverted, data with-held from critics and in some very important respects, data has been manipulated to conform with expectations and prior commitment.

(Please note that my book devotes several chapters to the peer-reviewed science that the IPCC either ignores or marginalises, and I would be happy to support this conclusion with a detailed presentation that the lay-person can follow.)

5. Unfortunately, the time schedule and deadline of the Committee has clashed with a research trip to the US—(away from 28 January to 10 February) for conversations with some of America’s leading climate scientists on natural cycles and modelling, and this has delayed my submission.

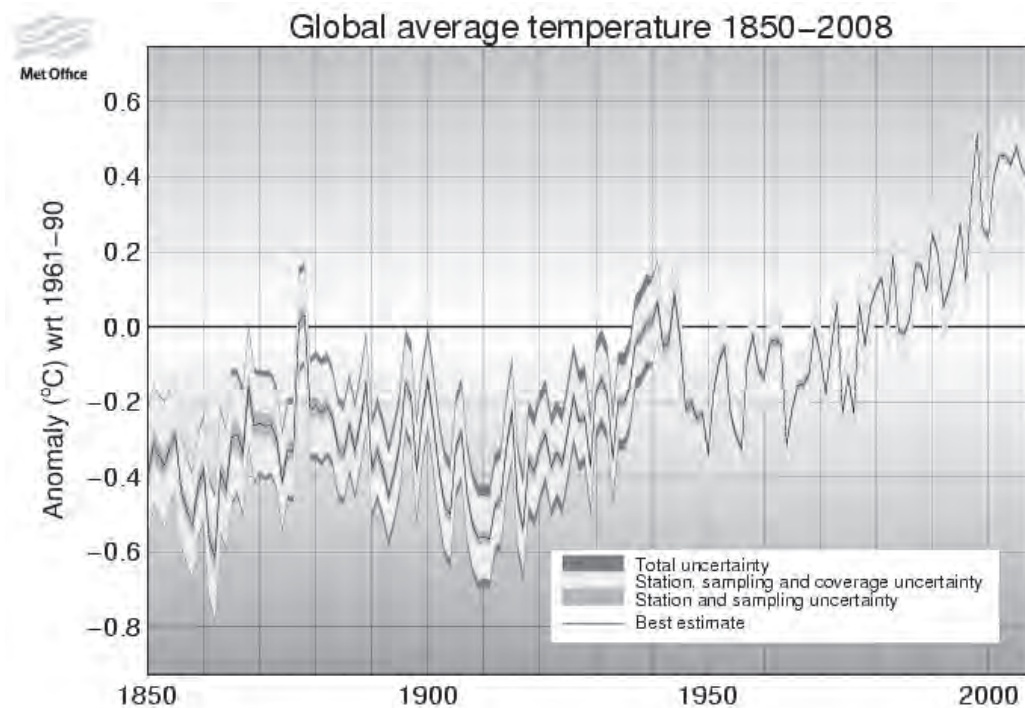
6. If I can be of direct assistance, please mail me and I would be happy to come before you in a session. I would naturally urge you to read my book—which I understand was delivered to various Select Committee libraries some months ago.

#### OUTLINE OF THREE MAIN ISSUES

##### *“Removing the Blip”*

7. In the exchange with Drs Trenberth and Jones, there is a collusion to “remove” an unexplainable (apparently) “blip” in the global temperature rise.

##### 8. *Global average temperature record*



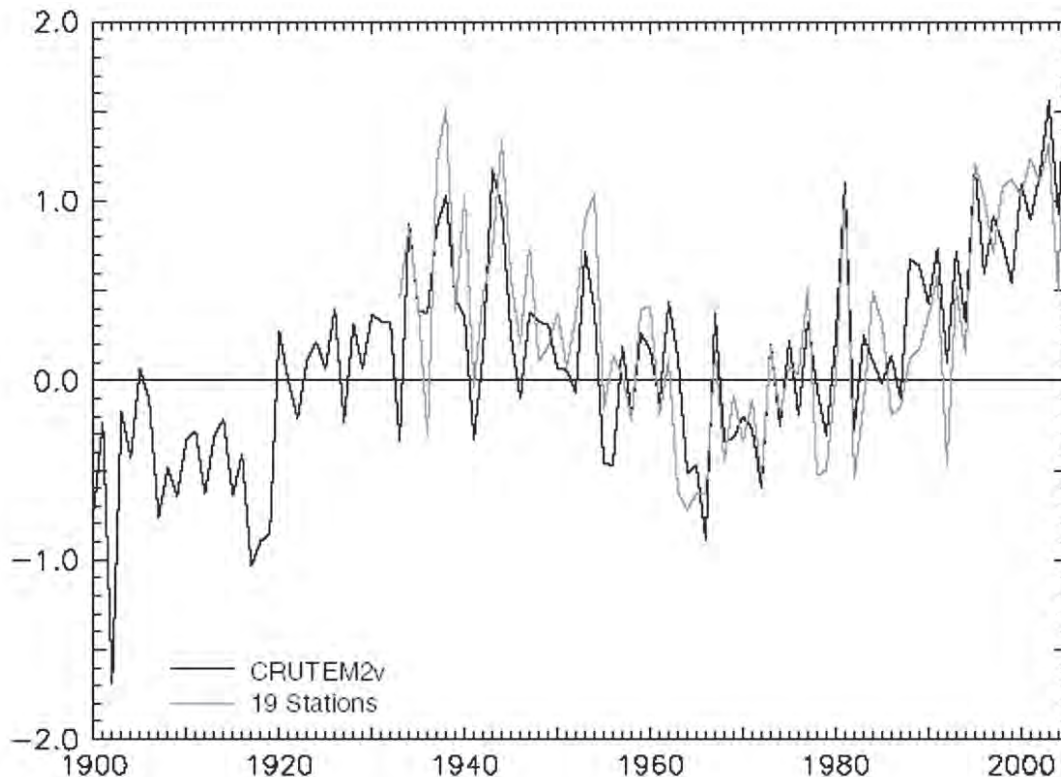


9. The blip relates to the period 1920–40, when global temperature rise accelerated beyond the steady rate observed since the mid 19th century (and when carbon dioxide levels were much lower) and then dropped (when carbon dioxide levels were rising quickly). The steepness of the first rise is comparable to the later rise from 1980–2000 (essentially the main “global warming” period without which there would have been no alarm). After 1940, temperatures fell into a trough and did not regain that level until 1980.

10. Many climate scientists regard the longer-term rise from about 1850 as part of a cycle and hence natural “recovery” from the trough of the Little Ice Age of the 15th–18th century, and from the peal of the 12th–13th century when the Viking settlements were active in Greenland. This is the view, for example, of Professor Syuin-Ichi Akasofu, the recently retiring director of the International Arctic Research Centre. As a leading geophysicist and head of the inter-disciplinary institute, Akasofu is in an excellent position to judge the science. Furthermore, it is generally agreed that “global warming” is most pronounced in the Arctic.

#### 11. *Temperatures in the Arctic:*

If we look at the Arctic, we find the “blip” is amplified. In the figure below the two peaks of the cycle can clearly be seen (there was a slightly higher spike in 2007–08 but temperatures now appear to be falling). This graph was taken from NOAA’s 2006 Arctic report card and is Fig 18, p 137 in “*Chill*”.



12. This “double hump” pattern is most marked in the northern hemisphere (in the USA, the land temperature record for the 20th century was in 1934). It would not be possible to conclude from this that air temperatures were responsible for the recent Arctic “melt-down”—which is due to incursions of warm ocean water from further south—see “*Chill*”.

13. This pattern is known as the Arctic Oscillation and caused by reversing cyclonic/anti-cyclonic patterns that also affect the North Atlantic and North Pacific. The phase of the AO changed around 2007, and high pressure systems that were responsible for the post-1940’s cooling are now repeating, bringing cold winters again to Britain.

14. This dip and the “blip” phenomenon is so powerful that it registers in the global average record and requires explanation—particularly since the cooling phase coincided with the main upward swing of CO<sub>2</sub> levels.

15. As an historical note: at first, the computer simulations that were made to essentially replicate this pattern, assumed the cooling was due to the release of counter-acting sulphur particles from the rapid post-war industrial expansion. However, that assumption was shown to be false in 2005 when data from satellite surveys from 1979 onwards were analysed (and published in the peer-reviewed journal *Science*). This revision was published in ample time for the IPCC report in 2007. IPCC acknowledged the change and the natural origin of the phenomenon, but did not highlight the implications—ie that the models were incorrect and could not be relied upon.

16. Despite the views of Kevin Trenberth at NCAR in the USA, the “blip” is completely understandable in terms of oceanography and rather well-known oscillations of warm and cold periods in several key ocean basins—mostly in the northern hemisphere. In my critique of the IPCC, I found their understanding and review of this area of science very limited and not at all representative of the literature. Furthermore, in discussions at NCAR on 3 February, one of their leading scientists had “no idea” the previous understanding of the “trough” had recently been revised.

17. During the 1920–40 “blip” the three northern oceanic basins—Pacific, Atlantic and Arctic were all “in phase” and “warm”, and then they all turned cool. In the 1980–2007 period, all cycles turned “positive” and warm thus in part driving the “global warming” signal (in my view the satellite data supports 80:20 natural vs man-made).

18. When the global temperature took off after 1980, that rise was assumed by physicists and computer programmers with a limited understanding of the real earth to be the power of carbon dioxide breaking through the natural patterns of variability. The models had programmed such variability as a “random” phenomenon and assumed the “dip” was anthropogenic (sulphur) and hence did not heed the warnings of it being a cyclic natural event.

19. You can understand therefore that conversations between two leading modellers about how to “remove the blip” take on a powerful meaning. One of the pair talks of being able to modify the sea-water temperature record (which is very patchy and therefore subject to somewhat variable “homogenisation” techniques), but then that “still leaves the land surface record”—which in the northern hemisphere, is rather more substantial. (You can also refer to the exchanges between Trenberth and Prof Karten in Sweden, as the latter makes the point that the record for Fenno-Scandinavia does not reflect the graph used by Trenberth as input to the IPCC process. The record in Scandinavia shows a very strong “blip” over the 1920–40 period, thus producing the double hump rather than the expected “hockey stick” shape).

20. I think the pair of co-workers then give up—bemoaning that they do not understand why the blip is there in the first place. I have come to expect this lack of cross-disciplinary understanding as it was a feature of past failures at a UN level (and I have written about this in the peer-reviewed ocean pollution literature).

21. This lack of understanding results as much from the compartmentalisation of the computer-led climate science community. But it is also further compounded by defensive attitudes in relation to an obvious prior commitment and an awareness of how the policy community require simple and certain directions.

#### HIDING THE DECLINE

22. This section of the email correspondence—with which I am sure you will become familiar from the input of others, refers to the choice of station data (instrumental) to replace what was perceived as faulty tree ring data. The tree ring data did not match the model expectation (ie the “hockey stick” pattern of a sudden rise at the end of the period). Rather than admit this, the team-workers discuss using Michael Mann’s “trick” of replacing the offending tree-ring data and using instrumental data in its place in a spliced graph.

23. This is, indeed, “tricky” territory. The correct scientific approach would be to:

- (i) admit the tree ring data did not follow the expected pattern and thus show both graphs and fully explain the splice and the differences; and
- (ii) engage in an open discourse with the scientific community about the problem.

24. The problem, however, is that the scientists concerned felt under some pressure from policy experts to minimise uncertainties in the data. To admit there was a problem at this level of the science would compromise that aim—and hence we see the kernel of the problem itself—*these scientists are not acting purely as scientists—they are on an inter-governmental mission, with a great deal of prior commitment.*

25. The reliability of tree-ring data and its interpretation underlies a great deal of the past reconstruction of global temperatures and the issue of whether cycles are real. If they are real, then the “global warming” signal as computed by simulators and physicists based on unproven equations<sup>85</sup> disappears.

<sup>85</sup> In the atmospheric physics of the model there is an almost threefold uncertainty in the power of carbon dioxide to warm the atmosphere because of poorly known feedback interactions with water vapour and clouds—these are discussed by IPCC but not highlighted as a real lack of consensus in the Summary Report—several scientists think IPCC err considerably toward positive feedback worst-case equations. If the critics are right, a doubling of CO<sub>2</sub> levels would not breach natural temperature fluctuations (of plus or minus 1 degree Celsius). I summarise this position in my book by quoting the leading NASA satellite specialist Takmeng Wong, who in 2008, plainly highlighted the two possibilities of global warming; in terms of being driven *either* mainly by natural cycles or mainly by greenhouse gases.

## A TRAVESTY THAT WE CAN'T EXPLAIN

26. Dr Trenberth, when referring to “hiding the decline” and feeling under pressure from critics in relation to the lack of more recent warming, uses the term—“we can’t explain (the cooling . . . and it is a travesty that we can’t”.

27. He has amplified his meaning recently in the open literature (Trenberth, K E, 2009: An imperative for climate change planning: tracking Earth’s global energy. *Current Opinion in Environmental Sustainability*, 1, 19–27, doi:10.1016/j.cosust.2009.06.001).—explaining that it is obvious the accumulated warming has gone somewhere—either to the deep ocean or into space, but the scientific monitoring network is not adequate to say where. He calls for more funding for modelling.

28. This is only partly true. The oceanographic community as well as the satellite-monitoring groups have been grappling with this issue since 2006, when oceanographers identified from their instruments a major cooling of the global oceans. The oceans appeared to have lost 20% of their heat between 2003–05, but this was revised and by 2009, the overall conclusion was of a slight but steady loss of heat since 2002.

29. Most oceanographers are looking at cloud patterns to explain the earlier warming and the current “cooling”. However, it should be said that just at the point of ocean cooling, NASA satellites picked up a large pulse of heat leaving the planet for space (implying clear skies that had hitherto been cloudy and kept the ocean’s heat in). NASA thought this an artefact.

30. Trenberth does not refer to any of this work—and part of my journey to the USA was to put this question to climate experts in that community. Dr Jerry Meehl answered for NCAR (where Trenberth works): he was not aware of the recent re-analysis published in *Science* in 2005, nor the IPCC retraction in 2007. This is surprising and disturbing. In one sense, Trenberth is right, and may be misunderstood—he thinks it a travesty because so much money and expertise has been devoted to modelling and still the basic question of heat transfer around the globe is unresolved. But part of this lack of resolution is caused by attitudes, narrow focus and not looking at contradictory data because of a prior commitment.

31. My conclusion is that global warming science is uncertain at some very fundamental levels and this has been hidden from public view by a constructed and false “consensus” presented by the IPCC. Almost all scientists with major funding are under pressure to accept that consensus and not “rock the boat” at crucial stages of policy formulation. It can clearly be seen in the emails that CRU and NCAR scientists are acutely aware of the need to provide a clear and certain signal to policy makers and avoid giving credibility to critics or highlighting the major uncertainties within the climate models concerning natural cycles.

## FURTHER ISSUES OF THE INTEGRITY OF SCIENCE AND THE RELIABILITY OF THE UEA/CRU “RESEARCH OUTCOMES”

32. In summary, I would like to add my voice of concern, and to point to implications for science and for the future work of the IPCC, CRU and Hadley Centre, should you be making recommendations:

- (i) there is a clear attitude of isolation, defensiveness, avoidance of criticism and of not giving the “opposition” any credibility;
- (ii) even well-meaning, polite and scientifically credible interveners, such as Prof Karten are treated to simplistic and impolite brush-offs; this attitude carries over into outright subversion of the peer-review process by contacting editors and peer-reviewers, as well as with-holding of data and techniques of data sampling and manipulation (including loss or destruction of data such that other workers cannot replicate or even understand the process); and
- (iv) further, this attitude extends to influencing the process of Freedom of Information requests via contact and briefing of the officials against the requests.

33. If we add this set of attitudes to attempts to bend data to fit the expectation (“removing the blip” and “hiding the decline”) and then hide from view the “bending” process, then I conclude that the integrity of science has been compromised *and* the reliability of that data put in question. I think, in the latter case, this will become more obvious as other researchers are alerted to the process of “homogenisation” of station data. Russian scientists are already questioning the analysis, as are Australians (in addition to Karten in Scandinavia).

34. Co-operation between independent research teams is normal—as are adjustments such that the two come to more or less the same answer. But here we have *collusion* between the two data teams in the US and the UK to protect a now politicised prior commitment—clearly, the two data sets are not independent enough and are more or less the same set of station data manipulated and processed in slightly different ways. Eventually, these “two” sets are fed into separate processes at GISS and Hadley where simulations are made and projections attempted. GISS and Hadley weight the regions of data in different ways and arrive at a slightly different index (for example, GISS adds greater weight to the Arctic region and this produces a 2005 figure for the highest annual global temperature, whereas Hadley’s global peak is in 1998).

35. I think that when it is revealed to the wider public that there are even deeper uncertainties with regard to the computer model, the operation of cycles and the role of cloud-feedback, there will be a major reassessment and the reliability of the IPCC will be in question.

36. Unless Hadley, GISS and NCAR can put up a convincing and open defence, there is a distinct possibility that the global index to 1979, when the satellite era began, will be declared unreliable. That is certainly what I feel from the evidence of this email saga. If “global warming” is indeed as convincing as the modellers believe, then the future satellite record will demonstrate this with a more widely acceptable global index. From a policy perspective, there is time to evaluate a response—and in the meantime a “no-regrets” demand reduction strategy is the best policy. That would be an important issue for the STC to investigate.

*February 2010*

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**Memorandum submitted by John F Kelly (CRU 51)**

**1. IMPLICATIONS FOR THE INTEGRITY OF SCIENTIFIC RESEARCH**

1.1 The Peer Review of Scientific Publications is the bedrock of scientific integrity and any corruption of the process does untold damage to science. The revelations of the CRU and other “e” mails identify that the manipulation of Peer Reviews can take many forms and have a corrosive effect on the particular profession as a whole. The perpetuation of such practises by senior scientists within an academic institution, and so called leaders in their particular field, is a doubly damaging example to students and newly qualified professionals. Unfortunately, the practice is not new and the academic institutions have appeared to have had no appetite to grasp this long running problem.

1.2 What is particularly alarming is that this is not the first time that this charge has been levelled at UEA/CRU staff with regard to Climate Science. When the Wegman Committee reported in 2006 on the charges brought against Dr M Mann (Penn State), regarding wrongly manipulated data, relevant to the infamous “Hockey Stick” air temperature presentation, which incidentally was almost a logo for the IPCC and Mr Al Gore, a very strong conclusion was that a classical social network existed, resulting in well defined cliques, one of which included Dr M Mann (Penn State), Professor P Jones (UEA/CRU), Professor K R Briffa (UEA/CRU) and Dr T Osbourne (UEA/CRU).

1.3 The effect of these “cliques” can be readily seen in published papers by Mann, Jones and Briffa and suggests that the “independent reconstructions” of air temperature profiles for example are not as independent as one might conclude. Wegman reported that in twelve major air temperature reconstruction papers the same proxy data was used. It is therefore not surprising that the papers would obtain similar results and cannot really claim to be independent verifications. This then leads on to the highly undesirable practice of authors of policy related documents, like the IPCC report, being the same people that constructed the academic papers referred to.

1.4 It is quite obvious from the disclosed “e” mails that a high proportion of the contentions regarding the “fudging” of results, and the “cherry picking” of proxy data, is centred on analytical manipulation of the raw paleoclimatological data, particularly where very low signal to noise ratios are dealt with. The Wegman Committee, with regard to their investigation involving Dr M Mann, concluded that . . . “As Statisticians, we were struck by the isolation of the paleoclimate community that rely heavily on statistical methods, yet do not seem to be reacting with the mainstream statistical community. The public policy implications of this debate are financially staggering and yet apparently no independent statistical expertise is ever sought”.

1.5 The politicization of academic endeavour, particularly in areas where very substantial amounts of public funding, and risk to human lives is at stake, necessitates the utmost level of scrutiny for formal publications. The majority of paleoclimate academic publications involve a high degree of complex statistical analysis, and it is suggested therefore that the Peer Review process should always include a Professional Statistician.

1.6 It appears to be common practice for associate editors of academic journals to select referees from the list of references in the submitted paper. If authors are in a tightly coupled group, errors can continue to be propagated or in fact reinforced.

*February 2010*

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**Memorandum submitted by Peabody Energy Company (CRU 52)**

PEABODY

1. Peabody is the world’s largest private sector coal company.

THE ATTEMPT TO PRESENT A “NICE TIDY STORY” OF UNPRECEDENTED 20TH CENTURY WARMTH

2. The CRU emails, however, reveal that the authors of this material did not present a neutral view of the science. In particular, they downplayed the considerable uncertainty inherent in trying to approximate temperatures from proxy data over a 1000-year period, they suppressed contrary information, and they suppressed dissenting views in ways that made even their own colleagues uncomfortable. Thus, in one representative email written during the preparation of the TAR, Keith Briffa stated that “I know there is

pressure to present a nice tidy story as regards ‘apparent unprecedented warming in a thousand years or more in the proxy data’ but in reality the situation is not quite so simple.”<sup>86</sup> He went on to say that “I believe that the recent warmth was probably matched about 1,000 years ago.”<sup>87</sup> Similarly, another key researcher, Ed Cook, in a lengthy email bristling at the effort to eliminate the MWP, wrote that “I do find the dismissal of the Medieval Warm Period as a meaningful global event to be grossly premature and probably wrong.”<sup>88</sup>

3. These concerns, however, were brushed aside in the final TAR. The TAR’s version of the temperature record of the last 1,000 years was based on the now infamous “hockey stick” study of Mann *et al*, a study that purported to show 1000 years of slightly declining global temperatures followed by a sharp increase in the 20th century. The hockey stick paper concluded that the 1990s were the warmest decade and 1998 was the warmest year in a millennium. The hockey stick graph was the single most important piece of information in the TAR. It was Figure 1 of the Summary For Policymakers of the TAR appearing on page 3, and it was widely relied on by advocates.<sup>89</sup>

4. Despite its prominence in the TAR, the hockey stick has now largely been discredited, with both the National Research Council (“NRC”)<sup>90</sup> and the independent Wegman Report<sup>91</sup> rejecting confidence in the conclusion that the 1990s were the warmest decade and 1998 was the warmest year in a millennium. Although the hockey stick paper was cited in AR4, its significance was downplayed, and EPA did not cite the paper in the Endangerment Finding or TSD.

5. However, the same people who gave that paper such prominence in the TAR—despite the misgivings expressed internally within the group—continued to dominate paleoclimate research and were again the leading authors of the AR4 paleoclimate material. Indeed, perhaps stung by criticisms of the hockey stick and by the appearance of so-called “skeptics” who questioned the central conclusions of the TAR, the drafting of at least the paleoclimate chapter of AR4 became more of a political than a scientific process.<sup>92</sup>

6. Thus, the two coordinating lead authors of Chapter 6 of AR4, Jonathan Overpeck of the University of Arizona and Eystein Jansen of the University of Bergen in Norway, openly coached contributors to produce materials that would serve a public policy agenda. As just a few examples, the CRU emails show that Overpeck instructed his colleagues to make sure that text was “FOCUSED on only that science which is policy relevant” and that would support pre-conceived summary bullet points.<sup>93</sup> The pair also advised authors to include graphics that would be “compelling” and that the “sign of ultimate success” of a graphic would be that it was so compelling that it would be selected for use in the policymaker’s summary.<sup>94</sup> They told authors to “pls DO please try hard to follow up on my advice” to only refer to the MWP and the Holocene Thermal Maximum in a “dismissive” way.<sup>95</sup> They expressed satisfaction with a graphic that described the MWP as heterogeneous—meaning that warming was not uniform on a planetary scale—not because it was accurate but because it read “much like a big hammer,” driving home the point they wished to make.<sup>96</sup> Moreover, although the hockey stick could no longer be relied on as a principal source of authority, authors were instructed that “[w]e’re hoping you guys can generate something compelling enough” for the summary material for policymakers, “something that will replace the hockey-stick with something even more compelling.”<sup>97</sup> Yet new research that reexamined the data on which the IPCC relied has challenged the IPCC’s dismissal of the MWP as non-heterogeneous, concluding that the IPCC’s conclusion in this regard was, at least, “premature” and based on limited data.<sup>98</sup>

7. The examples of this type of behavior abound.

#### *The “Trick” to “Hide the Warming”*

8. Much attention has been placed on Jones’ now-famous email in which he stated that “I’ve just completed Mike’s Nature trick of adding in the real temps to each series for the last 20 years (ie from 1981 onwards) and from 1961 for Keith’s to hide the decline.”<sup>99</sup> The trick he and Mann performed was to hide a decline in temperatures appearing in tree ring data in the latter part of the 20th century. Unless this trick were used, their multi-century proxy temperature reconstructions would show an embarrassing decline in temperatures at the end of the reconstruction, a decline that was not paralleled in the record of directly measured temperatures, which showed an increase. To hide the decline in the proxy data, Mann and then Jones grafted on actual temperature data to the end of their proxy reconstructions rather than using the same proxy data as had been used throughout the reconstruction.

<sup>86</sup> CRU email 938018124.txt (22 Sep 1999) (emphasis added).

<sup>87</sup> *Id.*

<sup>88</sup> CRU email 988831541.txt (2 May 2001) (emphasis added).

<sup>89</sup> See discussion in our Petition of this matter at section IV(C)(3).

<sup>90</sup> National Research Council, SURFACE TEMPERATURE RECONSTRUCTIONS FOR THE LAST 2,000 YEARS (National Academy Press 2006) (“NRC Report”).

<sup>91</sup> Edward Wegman *et al* AD HOC REPORT ON THE “HOCKEY STICK” GLOBAL CLIMATE RECONSTRUCTION. (“Wegman Report”) (July 27, 2006) available at [http://republicans.energycommerce.house.gov/108/home/07142006\\_Wegman\\_Report.pdf](http://republicans.energycommerce.house.gov/108/home/07142006_Wegman_Report.pdf).

<sup>92</sup> This matter is discussed more fully in our Petition at section IV(C)(1)(c).

<sup>93</sup> CRU email 1121392136.txt (14 Jul 2005) (capitals in original) (emphasis added).

<sup>94</sup> *Id.*

<sup>95</sup> CRU email 1105670738.txt (13 Jan 2005).

<sup>96</sup> CRU email 1105978592.txt (17 Jan 2005).

<sup>97</sup> CRU email 1116902771.txt (23 May 2005).

<sup>98</sup> Jan Esper and David Frank, *The IPCC on a heterogeneous Medieval Warm Period*, 94 CLIM CHNG 267–272 (2009).

<sup>99</sup> CRU email 942777075.txt (16 Nov 1999).

9. This trick makes the graphic presentations of the proxy reconstructions misleading, since the effect is to make it seem as if the proxy data shows rising 20th century warming when it doesn't. But the real deception in the trick was in hiding what became known as the "divergence" problem. The accuracy of tree ring data as proxies for temperatures can only be confirmed by comparing the proxy temperatures yielded by the tree rings with temperatures directly measured during the period when direct temperature measurements could be made. If the proxy data are contradicted by actual data, as they are for a significant period of the time when direct temperature measurements exist, the accuracy of the proxy data over the entire period of the proxy reconstruction is called into question. Thus, the divergence problem undermined faith in the ability of the proxy reconstructions to provide conclusive or even meaningful information about paleoclimate temperature conditions, even as the IPCC was relying on these reconstructions to conclude that temperatures in the 20th century had reached unprecedented levels in the last 1000 years. As one email candidly said, "[t]he issue of why we don't show the proxy data for the last few decades (they don't show continued warming) but assume that they are valid for early warm periods needs to be explained."<sup>100</sup> These concerns, however, were given short shrift. Although divergence was discussed in AR4, the conclusion was reached that the results of the proxy temperature reconstructions remained valid and showed that 20th century warmth was likely unprecedented in 1,000 years. If divergence was not a significant issue, however, one wonders why it was necessary to perform "tricks" to hide the problem.<sup>101</sup>

10. More importantly, after AR4 was issued, at least three studies have been published reanalyzing the data used in the proxy reconstructions cited in AR4, including two by authors whose reconstructions were used in AR4. These studies concluded that, in fact, the divergence problem makes the reconstructions unreliable.<sup>102</sup> According to one study, the divergence problem "serve(s) to impede a robust comparison of recent warming during the anthropogenic period with past natural climate episodes such as the Medieval Warm Period or MWP."<sup>103</sup> Another study found that the divergence problem makes it "impossible to make any statements about how warm recent decades are compared to historical periods."<sup>104</sup> Another concluded that the divergence problem "is of importance, as it limits the suitability of tree-ring data to reconstruct long-term climate fluctuations, particularly during periods that might have been as warm or even warmer than the late 20th century."<sup>105</sup>

11. It would seem, therefore, that the IPCC should have been more cautious in dismissing the divergence problem. It would also seem that the IPCC may have understood that there was something to hide after all.

#### *What to Make of the Current 11-Year Trend of No Warming?*

12. According to temperature data on which both EPA and the IPCC rely, the earth has experienced no warming over an 11-year period.<sup>106</sup>

13. EPA stated that warming caused by anthropogenic GHG emissions will not necessarily be uniform but instead could be muted by natural forces for a period of a decade or two. In particular, EPA cited two recent studies that attempted to show that the GHG models on which the IPCC, and therefore EPA, relied show sufficient natural variability to accommodate periods of no warming.<sup>107</sup>

14. Each of these studies has flaws discussed in the body of the Petition that result in an overstating of the likelihood that the models can account for the lack of warming. But even taken at face value, these studies should provide little comfort to EPA. One of the studies found that during the first half of the 21st century, there is a 1 in 10 chance of a zero (or negative) trend in temperatures through 10 years of data. The other study found that for the entire 21st century there is a five percent chance of a zero (or negative) trend through 11 years of data. Given these very low odds, and given that this trend occurred in the first decade of the 21st century and we have already experienced an 11-year trend of no warming, these studies hardly provide reassuring support for the underlying accuracy of the models' long-term predictive capacity.<sup>108</sup>

15. Adding to the questions about the accuracy of climate models are new results that show water vapor variations in the lower stratosphere play a large role in the variability global temperature trends over scales of several decades—influencing recent trends by some 25% to 30%. The physics governing lower stratospheric water vapor content are quite limited in current climate models, and the observed trends are poorly simulated.<sup>109</sup>

16. In fact, the CRU emails reveal that the lack of warming has caused leading IPCC scientists to question the assumed physical understanding of the climate system on which the models are based. Just last fall, even after the studies that EPA relied on had been produced, Trenberth conceded that the lack of warming exposes

<sup>100</sup> CRU email 1150923423.txt (21 Jun 2006).

<sup>101</sup> The "trick" and the divergence issue is discussed more fully in our Petition at section IV (C)(2).

<sup>102</sup> These studies are discussed in our Petition at section IV (C)(2)(d).

<sup>103</sup> Rosanne D'Arrigo, *et al.*, *On the "divergence problem" in northern forests: a review of the tree-ring evidence and possible causes*, 60 GLOB PLANET CHNG 289 (2008).

<sup>104</sup> Craig Loehle, *A mathematical analysis of the divergence problem in dendroclimatology*, 94 CLIM CHNG 233 (2009).

<sup>105</sup> Jan Esper and David Frank, *Divergence pitfalls in tree-ring research*, 94 CLIM CHNG 261, 262 (2009).

<sup>106</sup> Resp to Comm Vol 3 at 3.

<sup>107</sup> Resp to Comm Vol 4 at 23–24.

<sup>108</sup> These studies are discussed more fully in our Petition at section V(B).

<sup>109</sup> Susan Solomon *et al.*, 2010. *Contribution of Stratospheric Water Vapor to Decadal Changes in the Rate of Global Warming*. SCl (forthcoming 2010) published online at <http://www.sciencemag.org/cgi/rapidpdf/science.1182488v1.pdf>

science's basic lack of understanding of the climate system: "Saying it is natural variability is not an explanation. What are the physical processes? Where did the heat go?"<sup>110</sup> Trenberth concluded that either the understanding of the climate system reflected in the climate models is wrong:

How come you do not agree with a statement that says we are no where close to knowing where energy is going or whether clouds are changing to make the planet brighter. We are not close to balancing the energy budget. The fact that we can not account for what is happening in the climate system makes any consideration of geoengineering quite hopeless as we will never be able to tell if it is successful or not! It is a travesty!<sup>111</sup>

17. Or else the data is wrong:

The fact is that we can't account for the lack of warming at the moment and it is a travesty that we can't. The CERES data published in the August BAMS 09 supplement on 2008 shows there should be even more warming: but the data are surely wrong. Our observing system is inadequate.<sup>112</sup>

18. Or perhaps both. It is, moreover, particularly relevant that Trenberth stated that "[t]he fact that we can not account for what is happening in the climate system makes any consideration of geoengineering quite hopeless as we will never be able to tell if it is successful or not!" Trenberth's reference to "geoengineering" here includes reducing GHG emissions.<sup>113</sup> In other words, Trenberth stated that the flaws in the climate community's understanding of climatic forces that are exposed by the lack of warming is so fundamental—and the extent of natural variability must be so great—that it cannot be demonstrated that reducing GHG emissions will reduce warming.

#### *Abject Lack of Transparency*

19. The CRU materials also show a determined effort to stonewall attempts by third parties to obtain basic information underlying the scientific studies that were used in the IPCC reports. A considerable volume of transatlantic email traffic between the CRU scientists and their American counterparts was devoted to figuring out strategies to avoid producing information that could be used to critique their work, even when the information was requested under the American or United Kingdom Freedom of Information Acts ("FOIA").<sup>114</sup>

20. The emails reveal that these scientists refused to disclose information that would allow their studies to be replicated and critiqued because they saw themselves in a battle with "skeptics" who they considered to be "bozos" and "morons" and perpetrators of fraud.<sup>115</sup> They appeared to be particularly concerned that putting their information in the public domain would expose their work to criticism. As Jones said in one now-famous email, "We have 25 years or so invested in the work. Why should I make the data available to you, when your aim is to try and find something wrong with it?"<sup>116</sup> Jones' view was echoed by Mann. As Jones reported, "Mike Mann refuses to talk to these people and I can understand why. They are just trying to find if we've done anything wrong."<sup>117</sup>

21. Indeed, concern over communications these scientists had had concerning the drafting of AR4 was so great that they mutually agreed to destroy those communications in order to avoid disclosure under FOIA. Thus, on 29 May 2008, Jones sent an email to Mann under the subject line "IPCC & FOI," asking that Mann delete his emails with Briffa and advising that he would make the same request to Eugene Wahl and Caspar Amman. Wahl and Amman co-authored a paper that attempted to rehabilitate the hockey stick. As shown in the Petition, publication deadlines were improperly manipulated in order to include the paper in AR4.<sup>118</sup> Jones wrote:

Can you delete any emails you may have had with Keith re AR4? Keith will do likewise. He's not in at the moment—minor family crisis. Can you also email Gene and get him to do the same? I don't have his new email address. We will be getting Caspar to do likewise.<sup>119</sup>

22. Later in the same thread, Mann responded to Jones that he would "contact Gene about this ASAP."<sup>120</sup> Several months later Jones reported that he had in fact "deleted loads of emails."<sup>121</sup> One is forced to wonder what damaging admissions were made in these now-deleted emails concerning how AR4, in fact, was prepared.

<sup>110</sup> CRU email 1255523796.txt (14 Oct 2009) (emphasis added).

<sup>111</sup> *Id.* (emphasis added).

<sup>112</sup> *Id.* (emphasis added).

<sup>113</sup> Trenberth has publicly (and recently) referred to attempts to "reduce emissions... or reduce the amount of carbon dioxide in the atmosphere" as "geoengineering." See Physics Today letter 2/09, at <http://www.cgd.ucar.edu/cas/Trenberth/trenberth.papers/GeoengineeringPhsToday.pdf>

<sup>114</sup> This issue is discussed more fully in our Petition at section VI (C).

<sup>115</sup> CRU email 1146062963.txt (Apr. 26, 2006); CRU email 1147435800.txt (May 12, 2006); CRU email 1107899057.txt. (8 Feb 2005).

<sup>116</sup> Email provided by Warwick Hughes to whom the email was sent.

<sup>117</sup> CRU email 1091798809.txt (6 Aug 2004) (emphasis added).

<sup>118</sup> See the Petition at section VII (D).

<sup>119</sup> CRU email 1212073451.txt (29 May 2008) (emphasis added).

<sup>120</sup> CRU email 1212063122.txt (29 May 2008).

<sup>121</sup> CRU email 1228412429.txt (3 Dec 2008) (emphasis added).

23. After the efforts of these scientists to stonewall data requests were exposed to public scrutiny through FOIA and now through release of the CRU material, many of them were forced to admit that their actions were not in the best interests of science. Wigley told Briffa that “many \*good\* scientists appear to be unsympathetic” to the reasons advanced for the stonewalling.<sup>122</sup> Overpeck wrote in relation to one information request that “it would be nice if he could have access to all the data that we used—that’s the way science is supposed to work.”<sup>123</sup> And now John Beddington, the British government chief scientific adviser, has recently said, “I think, wherever possible, we should try to ensure there is openness and that source material is available for the whole scientific community.”<sup>124</sup>

#### *Publication Abuses*

24. The CRU scientists and their American colleagues engaged in a variety of practices to manipulate the peer-reviewed literature to favor publication of papers that supported their views and to discourage publication of papers that contradicted their views. As Mann told a New York Times reporter, “[a] necessary though not in general sufficient condition for taking a scientific criticism seriously is that it has passed through the legitimate scientific peer review process.”<sup>125</sup> That being the case, these scientists took steps to ensure that “skeptics” did not have access to peer-reviewed literature.<sup>126</sup>

25. For instance, enraged that the journal *Climate Research* had published a paper presenting evidence that the MWP was global and as warm as today, these scientists discussed organizing a boycott to strong-arm the journal board into firing the offending editor. Jones wrote that the journal needed to “rid themselves of this troublesome editor.”<sup>127</sup> Wholesale changes ensued at the journal.<sup>128</sup> Similar action was taken at *Geophysical Research Letters* after publication of an offending letter. Mann reported back to his colleagues that the problem had been solved: “[t]he GRL leak has been plugged up with new editorial leadership there.”<sup>129</sup> as if the appearance of a paper that did not support their view of the science was a “leak” in the peer-reviewed journalistic community that had to be “plugged.”<sup>130</sup>

#### CONCLUSION

26. Dr Briffa had it exactly right when he reported to his colleagues that “the needs of the science and the IPCC” “were not always the same.” In fact, the IPCC process has been revealed to be as much about advocacy as about science. And the CRU material is only one thin slice of information concerning the drafting of the TAR and AR4. It seems that every day new revelations appear about flaws in the accuracy of the IPCC’s conclusions and in the process that was used to select information that would, and would not, be included in the reports.

February 2010

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#### **Memorandum submitted by John Graham-Cumming (CRU 55)**

I am writing at this late juncture regarding this matter because I have now seen that two separate pieces of written evidence to your committee mention me (without using my name) and I feel it is appropriate to provide you with some further information. I am a professional computer programmer who started programming almost 30 years ago. I have a BA in Mathematics and Computation from Oxford University and a DPhil in Computer Security also from Oxford. My entire career has been spent in computer software in the UK, US and France.

I am also a frequent blogger on science topics (my blog was recently named by The Times as one of its top 30 science blogs). Shortly after the release of emails from UEA/CRU I looked at them out of curiosity and found that there was a large amount of software along with the messages. Looking at the software itself I was surprised to see that it was of poor quality. This resulted in my appearance on BBC Newsnight criticizing the quality of the UEA/CRU code in early December 2009 (see <http://news.bbc.co.uk/1/hi/programmes/newsnight/8395514.stm>).

That appearance and subsequent errors I have found in both the data provided by the Met Office and the code used to process that data are referenced in two submissions. I had not previously planned to submit anything to your committee, as I felt that I had nothing relevant to say, but the two submissions which reference me warrant some clarification directly from me, the source.

<sup>122</sup> CRU email 1254756944.txt (5 Oct 2009).

<sup>123</sup> CRU email 1252164302.txt (5 Sept 2009) (emphasis added).

<sup>124</sup> As quoted in Ben Webster, *Britain’s chief scientist John Beddington calls for engagement with climate skeptics*, THE TIMES, 27 Jan 2010, available at <http://www.theaustralian.com.au/news/britains-chief-scientist-john-beddington-calls-for-engagement-with-climate-sceptics/story-e6frg6xf-1225823874671>

<sup>125</sup> CRU email 1254259645.txt (29 Sep 2009) (emphasis added).

<sup>126</sup> This issue is discussed more fully in our Petition at section VIII(A).

<sup>127</sup> CRU email 1047388489.txt (11 Mar 2003).

<sup>128</sup> The threats to boycott the *Journal of Climate Research* are discussed in our Petition at section VIII(A).

<sup>129</sup> CRU email 1132094873.txt (15 Nov 2005).

<sup>130</sup> *The Geophysical Research Letters* matter is discussed more fully in our Petition at VIII(A).



I have never been a climate change skeptic and until the release of emails from UEA/CRU I had paid little attention to the science surrounding it.

In the written submission by Professor Hans von Storch and Dr Myles R Allen there are three paragraphs that concern me:

“3.1 An allegation aired on BBC’s “Newsnight” that software used in the production of this dataset was unreliable. It emerged on investigation that the neither of the two pieces of software produced in support of this allegation was anything to do with the HadCRUT instrumental temperature record. Newsnight have declined to answer the question of whether they were aware of this at the time their allegations were made.

3.2 A problem identified by an amateur computer analyst with estimates of average climate (not climate trends) affecting less than 1% of the HadCRUT data, mostly in Australasia, and some station identifiers being incorrect. These, it appears, were genuine issues with some of the input data (not analysis software) of HadCRUT which have been acknowledged by the Met Office and corrected. They do not affect trends estimated from the data, and hence have no bearing on conclusions regarding the detection and attribution of external influence on climate.

4. It is possible, of course, that further scrutiny will reveal more serious problems, but given the intensity of the scrutiny to date, we do not think this is particularly likely. The close correspondence between the HadCRUT data and the other two internationally recognised surface temperature datasets suggests that key conclusions, such as the unequivocal warming over the past century, are not sensitive to the analysis procedure.”

I am the “computer analyst” mentioned in 3.2 who found the errors mentioned. I am also the person mentioned in 3.1 who looked at the code on Newsnight.

In paragraph 4 the authors write “It is possible, of course, that further scrutiny will reveal more serious problems, but given the intensity of the scrutiny to date, we do not think this is particularly likely.” This has turned out to be incorrect. On February 7, 2010 I emailed the Met Office to tell them that I believed that I had found a wide ranging problem in the data (and by extension the code used to generate the data) concerning error estimates surrounding the global warming trend. On 24 February 2010 the Met Office confirmed via their press office to Newsnight that I had found a genuine problem with the generation of “station errors” (part of the global warming error estimate).

In the written submission by Sir Edward Acton there are two paragraphs that concern the things I have looked at:

“3.4.7 CRU has been accused of the effective, if not deliberate, falsification of findings through deployment of “substandard” computer programs and documentation. But the criticized computer programs were not used to produce CRUTEM3 data, nor were they written for third-party users. They were written for/by researchers who understand their limitations and who inspect intermediate results to identify and solve errors.

3.4.8 The different computer program used to produce the CRUTEM3 dataset has now been released by the MOHC with the support of CRU.”

My points:

1. Although the code I criticized on Newsnight was not the CRUTEM3 code the fact that the other code written at CRU was of low standard is relevant. My point on Newsnight was that it appeared that the organization writing the code did not adhere to standards one might find in professional software engineering. The code had easily identified bugs, no visible test mechanism, was not apparently under version control and was poorly documented. It would not be surprising to find that other code written at the same organization was of similar quality. And given that I subsequently found a bug in the actual CRUTEM3 code only reinforces my opinion.
2. I would urge the committee to look into whether statement 3.4.8 is accurate. The Met Office has released code for calculating CRUTEM3 but they have not released everything (for example, they have not released the code for “station errors” in which I identified a wide-ranging bug, or the code for generating the error range based on the station coverage), and when they released the code they did not indicate that it was the program normally used for CRUTEM3 (as implied by 3.4.8) but stated “[the code] takes the station data files and makes gridded fields in the same way as used in CRUTEM3.” Whether 3.4.8 is accurate or not probably rests on the interpretation of “in the same way as”. My reading is that this implies that the released code is not the actual code used for CRUTEM3. It would be worrying to discover that 3.4.8 is inaccurate, but I believe it should be clarified.

I rest at your disposition for further information, or to appear personally if necessary.

March 2010

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**Memorandum submitted by J Ronan (CRU 56)**

With respect to the oral submissions and questions taken on 1st March, I would like to make the following comment.

Dr Evan Harris had an interesting line of questioning concerned with the “Hide the Decline”. In his questions he was probing whether the information on how the splicing was done was covered in the literature. Prof Jones’ reply indicated that the information was there if you knew where to look for it.

Dr Harris and the committee may not be aware that the main importance of this spliced data was that the diagrams generated were used extensively in the IPCC reports, in other presentations by, for example, Al Gore, and most importantly in the IPCC Summary for Policy Makers. In none of those cases would it be easy for the interested parties to be aware of what had been done in disguising the lack of matching between the tree ring record and the instrumental record.

Thus the great importance of the “hidden decline” is not that any interested scientist could not have dug up the information (although a fair amount of digging would be required even then) but that it was used to mislead policy makers and politicians, who would not have been aware of the “trick” in the data.

*March 2010*

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**Memorandum submitted by Nicholas Barnes and David Jones (CRU 57)**

We are writing with regard to the evidence your committee has heard on the Climatic Research Unit (CRU) at the University of East Anglia. We are software experts with long industrial experience. We also have some expertise in climate science software such as that discussed in evidence, particularly the oral evidence from Professor Jones of CRU and Professor Slingo of the Met Office, and a number of evidence memoranda. We hope that our submission may clarify some of the issues raised by that evidence.

Nicholas Barnes has been a professional software engineer since 1990; David Jones has been a professional software engineer since 1994. In 1997, Nicholas founded a software consultancy firm called Ravenbrook Limited, which he continues to run today. David has worked for Ravenbrook since 2003. We work in various industry sectors, including desktop data analysis, games development, memory management, software tool integration, and robotic control. We both have degrees in mathematics, and post-graduate diplomas in computer science, from the University of Cambridge. We both have life-long interests in science and in computers.

In 2008 we started Clear Climate Code, a volunteer pro-bono project, because we saw that the clarity of software published by climate scientists was disrupting the public debate about climate change. You have asked questions and heard evidence about this disruption.

The goals of the Clear Climate Code project are:

1. To produce clear climate science software;
2. To encourage the production of clear climate science software; and
3. To increase public confidence in climate science results.

We aim to increase public confidence in results by publishing and clarifying the software which produces those results. That process will certainly uncover and correct errors. These corrections are essential to the goal. We don’t want the public to trust incorrect results; any incorrect results should be visibly corrected, so that the public may trust them.

Several other people around the world have joined and helped us in our efforts. We publish all of our work at <http://clearclimatecode.org/> and make presentations about it at conferences.

The main focus of Clear Climate Code so far has been on GISTEMP.

GISTEMP is a gridded dataset of global historical surface temperature anomalies, substantially similar to the HadCRUT3 dataset produced jointly by the Met Office Hadley Centre and by CRU. GISTEMP produces a “Global Land-Ocean Temperature Index”, a chart that shows how global temperatures have changed since 1880. see <http://data.giss.nasa.gov/gistemp/graphs/>. This chart is the analogue of HadCRUT3’s “Global average temperature” chart, see <http://hadobs.metoffice.com/hadcrut3/diagnostics/global/nh+sh/>.

The source code that produces the GISTEMP analysis is published, see <http://data.giss.nasa.gov/gistemp/sources/>. All the data used in the GISTEMP analysis is also published. Clear Climate Code have been reimplementing this analysis, with an emphasis on clarity. The intention is that anyone interested in the subject, and capable of understanding a program, should be able to download our software and easily follow it. Collectively we have closely examined every part of the original GISTEMP source code and produced a new version that produces exactly the same results as GISTEMP. We continue to refine our version, to improve its clarity. Dr Reto Ruedy, a mathematician at NASA GISS with responsibility for GISTEMP, has said recently that they would like in future to use our version.

As part of this process, we have read several of the scientific papers that describe the GISTEMP analysis, including:

J Hansen, R Ruedy, J Glascoe, Mki Sato, *J Geophys Res* 104, 30997-31022, doi:10.1029/1999JD900835 (1999).

J E Hansen, S Lebedeff, *J Geophys Res* 92, 13345–13372 (1987).

It is obvious to us that the original GISTEMP software is not engineered to a high quality. But this is not at all unusual for scientific software, or for software in the commercial sector.

Scientists generally receive little or no training in software development. In making our new implementation we have found a few minor problems or “bugs” in the GISTEMP software. We have reported these to Dr Ruedy at NASA GISS who has in all cases fixed them and thanked us for reporting them. The problems we have found either do not affect the published results, or only affect them by tiny amounts, far less than the uncertainty. For instance, one month’s reading might change by a hundredth of a degree.

As our work continues, we have also investigated some questions raised by critics of GISTEMP, for instance whether the warming signal of the results could be due to rounding numbers in the GISTEMP system, or due to the urban heat-island adjustment, or due to changes in weather station numbers in the 1990s. We have been able to show very easily that these factors are not significant—the effect of each factor is tiny, and the effects are often in the opposite direction to that suggested by critics.

Regarding GISTEMP we conclude:

- the source code could be clearer;
- the source code is free of any major errors;
- it performs as described in the scientific literature;
- it produces a result which is substantially the same as HadCRUT3, and other similar datasets;
- the result is also substantially the same when the factors commonly mentioned by critics are removed; and
- we have no reason to doubt the output of the GISTEMP analysis.

By “substantially the same” we mean that the conclusions regarding warming in the latter part of the 20th century that one can draw from the GISTEMP analysis are the same as the conclusions one can draw from the HadCRUT3 analysis.

Of course, none of our work supporting these conclusions would have been possible without the full publication of the original GISTEMP software and the data which it uses.

If you have any questions regarding this submission, or our work more broadly, we are of course available to give further evidence, in person if necessary.

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