

Public Comment on CCSP Report “Temperature Trends in the Lower Atmosphere: Steps for Understanding and Reconciling Differences”

I. Background Information

Name(s): Roger A. Pielke Sr., Professor

Organization(s): Colorado State University

Mailing Address(es): 1371 Campus Delivery, Department of Atmospheric Science, Fort Collins, CO 80523

Phone(s): 970-491-8293

Fax(es): 970-491-3314

E-mail(s): pielke@atmos.colostate.edu

Area of Expertise: Weather and climate; Original Convening Lead Author of CCSP Chapter 6

January 4, 2006

Chapter __, Page __, Line: Preface through Chapter 6

Executive Summary

The process for completing the CCSP Report excluded valid scientific perspectives under the charge of the Committee. The Editor of the Report systematically excluded a range of views on the issue of understanding and reconciling lower atmospheric temperature trends. The Executive Summary of the CCSP Report ignores critical scientific issues and makes unbalanced conclusions concerning our current understanding of temperature trends.

To substantiate these claims, this Public Comment is segmented into two main sections – one dealing with the CCSP Process and the other with science issues. The chronology of the CCSP Committee process from its precursor 2003 Asheville Workshop through to the completion of the Report is documented. This timeline clearly shows that the Report provides a limited summary of our current knowledge of lower atmosphere temperature trends, including uncertainties, newly recognized issues, and a limited list of recommendations of what is needed to improve our understanding and reconcile differences.

The CCSP Report entitled, “Temperature Trends in the Lower Atmosphere: Steps for Understanding and Reconciling Differences”, therefore, while containing useful new information on temperature trends failed to adequately evaluate the diversity of scientific issues as tasked in the charge to the Committee. Instead, the Editor and the majority of the members of the Committee intended to focus almost exclusively on seeking to remove the discrepancy noted in the NRC (2000) report between surface and tropospheric temperature trends.

The Report is useful, of course, as a document advocating a specific perspective on the issue of temperature trends, but it should not be interpreted as a balanced assessment of the state-of-the-

science on this subject. The Report neglects a diversity of important issues associated with temperature trends and arbitrarily ignores or dismisses relevant peer-reviewed literature. These issues include diverse views on the surface temperature record, the value of current reanalyses, the need to assess regional trends, and of the climate forcings as applied in models. Regional model studies which would have significantly benefited the Report were excluded. It is on the regional scale, as a complement to the global studies, that we will achieve an understanding and reconciling of temperature trends in the lower atmosphere.

The process that produced the report was highly political, with the Editor taking the lead in suppressing my perspectives, most egregiously demonstrated by the last-minute substitution of a new Chapter 6 for the one I had carefully led preparation of and on which I was close to reaching a final consensus. Anyone interested in the production of comprehensive assessments of climate science should be troubled by the process which I document below in great detail that led to the replacement of the Chapter that I was serving as Convening Lead Author.

The inappropriate substitution of a replacement Chapter 6, for the one I had led the drafting before resigning from the Committee, enforced the narrow perspective of the Chair of the Committee. The new version replaced the version that was nearly complete and accepted by the Committee in August 2005. This substitution represents an example of this usurpation of the responsibility granted in the original charge to the Committee and the forcing of the Editor's perspective on this Report. The result was the elimination from the Chapter of significant scientific issues concerning temperature trends in the lower atmosphere in the version of the Report that is now under public review.

A recommendation for future Committees of this type is that,

Future assessment Committees need to appoint members with a diversity of views and who do not have a significant conflict of interest with respect to their own work. Such Committees should be chaired by individuals committed to the presentation of a diversity of perspectives and unwilling to engage in strong-arm tactics to enforce a narrow perspective. Any such committee should be charged with summarizing all relevant literature, even if inconvenient, or which presents a view not held by certain members of the Committee.

Assessment Committees should not be an opportunity for members to highlight their own research and that which supports their personal scientific conclusions without properly placing into perspective the diversity found in the peer literature. When the Chair of such a committee seeks to limit the focus of an assessment Report in a specific direction, such as was the case with this Committee, the advancement of our understanding of the scientific issues involved suffers.

The Editor writes in the Preface (page 8) that *"This Report promises to be of significant value to decision-makers, and to the expert scientific and stakeholder communities... Readers of this Report will find that new observations, data sets, analyses and climate model simulations enabled the Author Team to resolve many of the perplexities noted by the NRC and the IPCC in their earlier Reports."*

Stating this does not make it so. **Unfortunately, the Report advocates a narrow perspective on science shared by the majority of the committee, rather than dealing comprehensively with the issues under its charge and found in the broader scientific literature. As such it does a disservice to those interested in a comprehensive review of the relevant science.**

1. Chronology of the Report

On August 13, 2005 I resigned from the CCSP Committee (**Temperature Trends in the Lower Atmosphere: Steps for Understanding and Reconciling Differences**) after serving for 1 ½ years as Convening Lead Author (CLA) on Chapter 6 entitled “What measures can be taken to improve the understanding of observed changes?” The path that led to this decision is documented below.

1.1. October 27-29 2003 Asheville Workshop – Identification of the Importance of a Regional Focus in Order to Better Understand and Reconcile Temperature Trends

The need for a regional focus in order to better understand vertical temperature trends was a major conclusion of this workshop (“[Reconciling Vertical Temperature Trends](#)”) as documented below¹². This Workshop was the precursor to the CCSP Committee.

I have extracted specific text from the Panel recommendations to document that a regional perspective was very much a priority among the Panels, several of who subsequently were appointed to the CCSP Committee.

Panel 1 What kind of atmospheric temperature variations can the current and recent observing systems detect?³

“Definition of space-time domain.....We take the spatial domain to be global and regional, with some emphasis on the tropics.”

¹ My presentation at the Workshop is available at <http://blue.atmos.colostate.edu/presentations/PPT-5.pdf> with the title “Unanswered Questions. Workshop on Vertical Temperature Trends, Panel Question 5: How well can the observed changes be reconciled with our understanding of the causes of temperature change and does this increase or decrease our confidence about the human impact on global climate change?”.

² The summary from the Working Group that I participated in ([Panel 5. How well can the observed \(vertical temperature profile\) changes be reconciled with our understanding of the causes of \(these\) temperature changes?](#)) is given at <http://www.ncdc.noaa.gov/oa/VTT%20WORKSHOP%20-%20Panel%205%20report.ppt#7>.

³ (Bates, Goldberg, Manton, Parker, Seidel, Grody) <http://www.ncdc.noaa.gov/oa/Panel-1%20Report.doc>

Panel 3 What changes of temperature have occurred in the atmosphere and at the surface since the advent of modern measurement methods?⁴

“Reconcile trend differences between datasets:Sampling: spatial and temporal differences”

Panel 4 Do observational uncertainties account for any of the observed differences in temperature trends and if so how much?⁵

“More systematic intercomparison of radiosondes, surface obs. etc.”

“Spatial:

- *global, hemispheric, tropics vs extratropics*
- *zonal means*
- *land vs ocean*
- *locally*
- *correlation with global means....*

“Recommendation: use several indicators of change, not just linear trends.”

“Other Points

- *Variability (as opposed to trend) needs to be addressed*
- *Monthly or regional....”*

“Given that global mean surface temperature anomalies are dominated by continental land areas in the NH, while global “satellite temperature” anomalies are dominated by the Tropical regions, why should we expect a relationship at all?

- *How do the surface vs boundary layer vs tropospheric temperatures covary regionally?*
- *What are the differences and similarities regionally: land vs ocean, tropics vs subtropics vs extratropics?*
- *Why are there regions (e.g., the subtropics) where the surface and mid-tropospheric monthly mean temperature anomalies are negatively correlated?....*
- *What is the heat budget in three dimensions and as a function of time? ...*
- *How well do the climate models reproduce the local and global relationships between the surface and troposphere?”*

These excerpts clearly show that the Workshop from which the CCSP Committee was launched clearly recognized that there needed to be a regional focus in addition to a global- and tropical-zonally-averaged evaluation.

⁴(Reynolds, Peterson, Lanzante, Vinnikov, Smith) http://www.ncdc.noaa.gov/oa/Panel_3_Lanzante.ppt

⁵ (Wentz, Trenberth, Seidel, Wick, Vose) <http://www.ncdc.noaa.gov/oa/TpanelReport4.ppt>

After being appointed as Convening Lead Author on the CCSP Committee, I participated in 5 meetings of the Committee in Chicago, and a symposium on the topic of the Committee in Exeter, UK from September 13-15 2004.⁶

1.2. CCSP Committee Process

The specific charge to the CCSP Committee, as reported on <http://www.climate-science.gov/Library/sap/sap1-1/sap1-1prospectus-draft.htm> includes the requirement

“Independently produced data sets that describe the four-dimensional temperature structure from the surface through the lower stratosphere provide different temperature trends. These differences are seen in varying degrees in comparisons of separate in situ (surface and weather balloon) data sets, in comparisons of separate space-based data sets, and in comparisons of individual data sets drawn from the different observational platforms and different trend analysis teams.

This CCSP synthesis product will address the accuracy and consistency of these temperature records and outline steps necessary to reconcile differences between individual data set.....”

The report had the following requirement,

“The synthesis product will identify disparate views that have significant scientific or technical support, and will provide confidence levels for key findings, as appropriate”

⁶ My powerpoint presentations at several of the Chicago meetings and the Exeter Symposium are listed below.

Pielke, R.A. Sr., D. Parker, and D. Reynolds, 2004: Question 6 - What Measures Can be Taken to Better Reconcile Observed Changes with Present Understanding. CCSP Synthesis Product Lead Author's Meeting. Chicago, IL, August 5-6, 2004. <http://blue.atmos.colostate.edu/presentations/PPT-18.pdf>

Pielke, R.A., Sr., D. Parker, D. Reynolds, T. Chase, and J. Willis, 2004: What Measures Can Be Taken to Improve the Understanding of Observed Changes? U.S. Climate Change Science Program Workshop on Profiles of Vertical Temperature Trends, Exeter, England, September 13-17, 2004. <http://blue.atmos.colostate.edu/presentations/PPT-19.pdf>

Pielke, R.A., Sr., C. Davey, and T.N. Chase, 2004: Unresolved Issues in Surface and Tropospheric Temperature Trends. U.S. Climate Change Science Program Workshop on Profiles of Vertical Temperature Trends, Exeter, England, September 13-17, 2004. <http://blue.atmos.colostate.edu/presentations/PPT-20.pdf>

Pielke, R.A. Sr., 2005: Minority Report. Comments provided to the NRC Review Committee of the Climate Change Science Program Report Entitled “Temperature Trends in the Lower Atmosphere: Understanding and Reconciling Differences”, Chicago, IL, February 23, 2005. <http://blue.atmos.colostate.edu/presentations/PPT-34.pdf>

However, as the report went through its preparation, it became increasingly clear that the Editor and the majority of the members of the Committee intended to focus almost exclusively on seeking to remove the discrepancy noted in the NRC (2000) report between surface and tropospheric temperature trends. That the main intent of this inconvenient discrepancy was the main reason for the report is clear on pages 1-2, lines 21-27 of the version released December, 2005 for Public Comment. In that text (the Preface), the Editor states

“In the early 1990s, data from NOAA’s polar orbiting satellites were analyzed for multi-decadal trends. These initial analyses indicated that temperatures in the troposphere showed little or no increase, in contrast with surface air measurements from ships, land-based weather stations, and ocean buoys. This result led some to question the reality and/or the cause of the surface temperature increase, on the basis that human influences, thought to be important contributors to observed change, were expected to increase temperatures both at the surface and in the troposphere with larger increases expected in the tropical troposphere. This surprising result led to an intensive effort by scientists to better understand the causes of the apparent differences in the rates of temperature increase between the surface and the troposphere.”

The Editor apparently uses “surprising result” since the observations conflict with the climate change model simulations. Thus the Editor, in conflict with the charge of the Committee, which did not have such a narrow emphasis, wanted to remove this discrepancy between observations and the models, rather than address other issues such as the robustness of the observed data in geographic locations where there is agreement with the models. As discussed under the science issues, there are substantive remaining uncertainties with the surface data.

Thus the focus was on the zonally averaged tropical surface and tropospheric temperatures as this is where a difference between surface and tropospheric trends has been clearly evident. This narrow perspective clearly is more limited than characterized by the written CCSP charge in which we were assigned.

As the report went through the preparation of the version to submit to the Natural Research Council (NRC) for review and in response to disagreements with text in the Chapters, the Editor promulgated the following rules for the writing on November 30th 2004:

“Dear CLAs and LAs,

First, we want to thank everyone for their dedication to the development and delivery of this document. Clearly, we have invested our hearts and souls in this assessment.

At this time it important we are all clear on how we will settle different points of view. Each Chapter has a CLA and the CLA gets 51% of the vote regarding the final outcome of their chapter after considering input from LAs within the Chapter and then comments from other CLAs and LAs. If there are irresolvable differences among us they should be noted in the text (the amount of space dedicated to these differences is at the discretion of the CLA). It is my role to assure that each CLA Chapter reflects areas of agreement and disagreement considering our page limits. Obviously the amount of space given to describing these differences must include the good judgment of the CLA.

Second, my job and that of the editorial staff is to make sure each Chapter addressed the question, and does not go beyond its charge.

Third, our job is to ensure there are no contradictions among the chapters and repetitions; that the material flows from one-chapter to the next; and is readily understood by non-experts in our field.

As John Lazante said, we basically agree on 99% of the material, but spend 99% of our time arguing about the 1% we do not find agreement. We need to keep this perspective in mind as we proceed.

It is important that we all understand these ground rules as we have only two and a half weeks left to go prior to submitting our document for NRC review. Clearly, after the NRC review we will be revising the report. The NRC may feel that some Chapters are not balanced and we will have to respond to that as well, but the ground rules listed above should not change.

I know we are pushing to meet the Dec 15 deadline, but if we let this assessment slide past the Holidays it is likely we will be into the later part of January before NRC reviews. And it is not at all clear to me we would be any further along in resolving the areas of disagreement among us.

Thanks and I look forward to a productive meeting in Chicago.

Tom Karl and the Editorial Staff”

While this very effectively limited my ability to provide input on the other Chapters, I assumed that I would at least be able to lead the effort with respect to Chapter 6. As events eventually turned out, and as explained later, this was also subsequently suppressed.

In Jan 2005, after numerous revisions and edits, the version of Chapter 6 to send for NRC Review was finalized with multiple Contributing Authors. The Editor also provided major edits which were used in the completed version. This version was agreed to by the Editor and the other members of the Committee.

However, my edits for the Executive Summary (ES) were not accepted. The first proposal by the Editor was to permit minority findings within the ES which would be responded to by members of our Committee, and this material would be also included with the submission to the NRC Review Committee. This process started, but was quickly squelched by the Editor, after second thought, purportedly in consultation with Richard Moss, Executive Director of the CCSP Report process. My name as a co-author on the ES was retained with the understanding that my minority views would be voted on and commented by individuals on the Committee who disagreed with my perspective. This agreement, however, was nullified and while my name was retained on the ES, I was told that that I could submit my comments after the Public Comment period. E-mails that document the evolution of this policy by Tom Karl are included in Appendix C to this Public Comment.

In response to the change in the procedure, I wrote a Minority Report (given in Appendix A of this Public Comment) which was intended to be included in the material submitted to the NRC Review Committee. However, this was explicitly prevented by the Editor. Thus, while the NRC did permit me to make an oral presentation⁷, they were not allowed to provide comments on my Minority Report since it was not part of the official CCSP report submitted to the NRC. This procedural maneuver clearly compromised the charge to the Committee to present the diversity of views on a subject. The final CCSP Executive Summary that has appeared in the December release of the Report perpetuates the biased perspective in the draft CCSP Executive Summary that I identified in the earlier draft.

The NRC reviews of the Report and of Chapter 6 included recognition that there was not always a clear connection between the text in the earlier Chapters and Chapter 6 (<http://www.nap.edu/books/030909674X/html/37.html> and following pages). There was not a recommendation that the focus of Chapter 6 violated the charge to the Committee. Indeed, the NRC Committee recognized the lack of clarity in defining the focus of the report:

“The committee finds that the recommendations in Chapter 6 are insufficiently specific and not clearly prioritized. Furthermore, the seven recommendations seem largely disconnected from the findings in Chapters 1-5, and even from the text in Chapter 6. This chapter needs a substantial rewrite, including re-organization of the text and reformulation of the recommendations.”

The review of Chapter 6 states that,

*“1. Chapter 6 should be reorganized into two parts:
a. The first part should take findings from Chapters 1-5 to recommend specific opportunities to improve understanding of vertical temperature trends. These should focus on addressing remaining uncertainties in existing satellite and radiosonde data sets.
b. The second part should focus on future measurement opportunities in the context of the specific goals of the report for reconciling observations and understanding of temperature trends.”*

Further that

“5. As far as the current recommendations in Chapter 6 still appear after the chapter is revised, here are comments on each of the current recommendations. The seven recommendations in Chapter 6 have been said numerous times before in other reports. Also, given the relative lack of traceability of these recommendations to the previous five chapters, it may be that a significant recommendation was omitted.”

With respect to spatial assessments, the NRC review had the following conclusion,

“e. The fifth recommendation concerns climate quality reanalyses. Just as for the third recommendation, this one needs to be reformulated or perhaps eliminated. It is not useful to state such a broad recommendation that has already been made in other contexts. If there are any specific recommendations that would help address the temperature trend problem, then they

⁷ see <http://blue.atmos.colostate.edu/presentations/PPT-34.pdf>

should be formulated. Possibilities would include careful documentation about what assimilation data is actually assimilated into the model as a function of space and time, data assimilation experiments, etc.”

On the use of models, the NRC Committee was explicit that

“c. The third recommendation concerns the use of climate models to interpret the cause of temperature trends. This recommendation needs to be reformulated or perhaps eliminated because it is too broad and inappropriate for the present study. What is recommended here should follow directly from Chapter 5 and any uncertainties or inconsistencies in the analyses that were identified. An alternative recommendation would be to “Improve the scientific understanding of the variations of the vertical temperature structure of the atmosphere”. It should also be clearly emphasized that data is being used to test models and not vice-versa.”

Finally, there was no recommendation to exclude spatial analyses in conjunction with comparisons with the surface, radiosonde, and satellite observations, and with model simulations that was highlighted in Chapter 6. Indeed the NRC Review states,

“4. A substantial amount of new information is introduced for the first time in Chapter 6, including material that should have been introduced in earlier chapters if it is deemed relevant and material that does not directly map to the seven recommendations. The following is specific information that is redundant or should be moved to previous chapters:”

In response to the NRC review, a revised version of Chapter 6 was completed and sent to the CCSP Committee on August 1, 2005 with a subsequent edited version in response to comments sent to the Committee on August 11th which documents how close the Chapter was to completion (this version of the Chapter is given in Appendix B). The framework recommended by Chris Folland and most of his edits based on my first draft of the revision was used to prepare this draft. The two Lead Authors of Chapter 6 (Dick Reynolds and David Parker) also provided edits, while the Editor provided comments and questions. A clear linkage was provided to the earlier Chapters, with positive feedback on this from other CCSP authors. At this stage, there was no indication that an attempt to replace the revised version with a completely new text would soon be undertaken.

However, on August 10, 2005, I received a copy of this new draft indirectly.⁸ Quickly, the Editor, a small number of other authors and the report technical staff person urged the replacement of Chapter 6 with this version. Repeated e-mails from the Editor forcibly pressed for this replacement.⁹ This clear violation of the protocol of working through the Convening Lead Author clearly demonstrates the general issue with the Committee on the exclusion of the diversity of views on improving our understanding and reconciling lower atmospheric temperature trends. Chris Folland is now the Convening Lead Author of Chapter 6, and despite agreeing and indeed writing parts of Chapter 6 as given in Appendix B, deleted this material when he assumed the responsibility of the Convening Lead Author.

⁸ E-mails which document the communication and responses to the appearance of an alternate Chapter 6 are given in Appendix D.

⁹ See Appendix D for a set of e-mails on these communications.

A separate concern also developed. This was the premature dissemination of the CCSP report findings prior to the finalization of the report. This is documented in the Senate testimony of Jim Hurrell

(http://energy.senate.gov/public/index.cfm?FuseAction=Hearings.Testimony&Hearing_ID=1484&Witness_ID=4227), with the relevant text reproduced below:

“... The CCSP Assessment Product on Temperature Trends in the Lower Atmosphere is assessing these new data, and the preliminary report (which has been reviewed by the NRC) finds that the surface and upper-air records of temperature change can now, in fact, be reconciled. Moreover, the overall pattern of observed temperature change in the vertical is consistent with that simulated by today’s climate models.”

This testimony was approved by the Editor of the CCSP Report. I questioned the inappropriateness of presenting material from the Report in my July 25th weblog “[Did The July 21, 2001 U.S. Senate Committee Hearing On “Climate Change Science And Economics” Provide A Balanced Perspective On The Climate Science Issues?](http://climatesci.atmos.colostate.edu/index.php?paged=4)” (<http://climatesci.atmos.colostate.edu/index.php?paged=4>).

A second premature communication, this time to the NY Times, was in the news release of August 12th, 2005 (“[Errors Cited in Assessing Climate Data.](http://query.nytimes.com/gst/abstract.html?res=F40814FF3E5A0C718DDDA10894DD404482)”

<http://query.nytimes.com/gst/abstract.html?res=F40814FF3E5A0C718DDDA10894DD404482>).

The relevant text is

“Other climate experts, however, said that the new studies were very significant, effectively resolving a puzzle that had been used by opponents of curbs on heat-trapping greenhouse gases.

‘These papers should lay to rest once and for all the claims by John Christy and other global warming skeptics that a disagreement between tropospheric and surface temperature trends means that there are problems with surface temperature records or with climate models,’ said Alan Robock, a meteorologist at Rutgers University.

The findings will be featured in a report on temperature trends in the lower atmosphere that is the first product to emerge from the Bush administration’s 10-year program intended to resolve uncertainties in climate science.

Several scientists involved in the new studies said that the government climate program, by forcing everyone involved to meet five times, had helped generate the new findings.”

The writer of that news article, subsequently claimed (see the comment on my August 12th weblog [Comment on Today’s NY Times article “Errors Cited in Assessing Climate”](#)) that

“Just to be clear, while I did interview many scientists involved with both the ScienceExpress papers and the forthcoming CCSP report on tropospheric temperatures, none of the interviewees discussed “the findings.” They did discuss the process, which I, as a reporter, feel is important for readers to understand — along with the data. To my mind, all of this (including Dr. Pielke’s

blog itself) is constructive and in keeping with the high priority that the CCSP director, Dr. James Mahoney, has placed on transparency.“

The text of the article clearly indicated otherwise.

The premature transmittal of findings from the report, without permitting the report to be finalized so that the diversity of perspectives and appropriate caveats in the findings can be read by others, including the public, in my view, fatally compromised the ability of this CCSP report to provide a balanced, politically neutral report as mandated in the CCSP charge.

The final version of the CCSP report that was released in December remains prejudiced in its perspective. While there is useful scientific information in the report, by excluding information on our understanding of the temperature trends, the authors of this report have assured that policymakers will read an unbalanced view of the science on this subject.

The authors of the Executive Summary of the CCSP readily admit to their intent to exclude perspectives. On page 25 lines 476-478 of the Summary they state

“It should be noted that, rather than invent new proposals or recommendations, the items described in Chapter 6 expand and build upon existing ideas, emphasizing those that are considered to be of highest utility.”

The title of Chapter 6, however, is “What measures can be taken to improve the understanding of observed changes?” The CCSP Report should not limit the authors from recommending new approaches to develop a better understanding and reconciliation of the temperature trends in the lower atmosphere.

I had no other ethically responsible route, therefore, but to resign despite the very substantial time I contributed to the report.

There is an obvious reason why the Report lacks the needed balance, which I urge be considered and remedied in future assessment reports. There is no question that each member of the Committee and the Editor are excellent scientists within their discipline area and are sincere in their views. However, the selection of the same individuals to review the topic as have completed the studies under review is an obvious conflict of interest. Moreover, most of the authors have published together. This conflict of interest includes the Editor who consistently rejected efforts to assess identified uncertainties in the surface temperature record, which is a main focus of his published research activities.

When I served as Chief Editor of the **Monthly Weather Review** and Co-Chief Editor of the **Journal of Atmospheric Sciences**, we never would send papers to be reviewed to referees who are also co-authors on other papers with the author of the manuscript under review. We certainly would not send to the authors themselves to evaluate. There are always scientists with the qualifications and involvement in the science to provide objective reviews. This approach was not adopted for this CCSP Report. This very serious deficiency in the process should be remedied.

The result unfortunately is a narrowly focused report which inadequately and incompletely evaluates the state of the science with respect to recent surface and tropospheric temperature trends. The Report, unfortunately, is written to remove an inconvenient conclusion of the NRC (2000) report, rather than provide a balanced summary of our understanding the spatial and temporal trends in surface and tropospheric trends and ways we can continue to advance our understanding. This cherry picking of science to promote a particular perspective is unfortunate as each member of the Committee has completed effective scientific studies. However, in their role of assuring a balanced presentation of the knowledge, as represented by peer-reviewed papers, the Report has failed.

Table 1 provides a brief overview of the chronology of the CCSP report up to my resignation.

The remainder of my Public Comments will be to address specific science issues that were underemphasized or ignored.

2. Science Issues

The science issues are segmented into categories which follow the focus provided in Chapter 6 in the form at the time of my resignation. It needs to be emphasized that this version was close to being accepted by the Committee, as can be documented in the e-mail communications upon request. This version of the Chapter, including the remaining issues to resolve in the text of that version, is given as Appendix B of this Public Comment.

2.1 Surface temperature data

One of the examples of the lack of balance in the Report is the acceptance of the trends of surface temperature data as robust (e.g., see pages 6-8 in the CCSP Chapter 3). This is an example of accepting observations where they agree with the models, without investigating the data further. The NRC Review commented on this in one of their comments:

“It should also be clearly emphasized that data is being used to test models and not vice-versa.”

An example of where the Committee failed to investigate other explanations for surface temperature trends is the following;

“Most of the recent warming has been in winter over the high mid-latitudes of the Northern Hemisphere continents, between 40 and 70° N (Nicholls et al., 1996). There has also been a general trend toward reduced diurnal temperature range, mostly because nights have warmed more than days. Since 1950, minimum temperatures on land have increased about twice as fast as maximum temperatures (Easterling et al., 1997). This may be attributable in part to increasing cloudiness, which reduces daytime warming by reflection of sunlight and retards the nighttime loss of heat (Karl et al., 1997).....”¹⁰

¹⁰ http://www.ucsus.org/global_warming/science/early-warning-signs-of-global-warming-heat-waves.html

Thus it is in the higher latitudes over land in the winter where “most of the recent warming” has occurred. However, as shown in a new paper¹¹, any nighttime warming within the boundary layer will result in an amplified near-surface positive temperature trend. An increase in cloudiness as reported in Karl et al. (1997) is one way in which nocturnal boundary layer cooling is reduced. Since night at higher latitudes in the winter frequently have stably stratified boundary layers, this issue should have been discussed in the Report. It was not (even though an earlier version of the paper was distributed to the Committee), apparently because this was a geographic area where the existing observations agree with the models.

To use these nocturnal surface temperature trends as part of the calculation of recent global warming, therefore, overstates that warming.

The major issues with the surface temperature trend data that have not been addressed satisfactorily in the CCSP Report are summarized below:

1. The temperature trend near the surface is not height invariant¹².

The influences of different lapse rates, heights of observations, and surface roughness have not been quantified. For example, windy and light wind nights should not have the same trends at most levels in the surface layer, even if the surface-layer averaged temperature trend was the same. This raises questions regarding the conclusions of the Parker (2004) and Peterson et al. (1999) papers that are specifically cited in Chapter 3 of the CCSP Report as supporting the justification of the robustness of the surface temperature data.

What is the bias in degrees Celsius introduced as a result of aggregating temperature data from different measurement heights, aerodynamic roughnesses, and thermodynamic stability?

2. The quantitative uncertainty associated with each step in homogeneity adjustments needs to be provided¹³:

Time of observation, instrument changes, and urban effects have been recognized as important adjustments that are required to revise temperature trend information in order to produce improved temporal and spatial homogeneity. However, the quantitative magnitudes of each step in the adjustments are not reported in the final homogenized temperature anomalies. Thus the statistical uncertainty that is associated with each step in the homogenization process is unknown. This needs to be completed on a grid point basis

¹¹ Pielke Sr., R.A., and T. Matsui, 2005: Should light wind and windy nights have the same temperature trends at individual levels even if the boundary layer averaged heat content change is the same? *Geophys. Res. Letts.*, 32, No. 21, L21813, 10.1029/2005GL024407.

¹² Pielke Sr., R.A., and T. Matsui, 2005: Should light wind and windy nights have the same temperature trends at individual levels even if the boundary layer averaged heat content change is the same? *Geophys. Res. Letts.*, 32, No. 21, L21813, 10.1029/2005GL024407.

¹³ Pielke Sr., R.A., T. Stohlgren, L. Schell, W. Parton, N. Doesken, K. Redmond, J. Moeny, T. McKee, and T.G.F. Kittel, 2002: Problems in evaluating regional and local trends in temperature: An example from eastern Colorado, USA. *Int. J. Climatol.*, 22, 421-434.

and then summed regional and globally to provide an overall confidence level in the uncertainty. This approach is ignored in the Report.

What is the quantitative uncertainty in degrees Celsius that are associated with each of the steps in the homogenization of the surface temperature data?

There are several other issues that are mentioned in the Report as being issues, but are dismissed as unimportant on the larger scales, but without quantitative assessment of their importance. These effects include the role of poor microclimate exposure¹⁴ and the effect of temporal trends in surface air water vapor in the interpretation of the surface temperature trends¹⁵.

There is also the question of the independence of the data from which the three main groups create global data analyses (page 8 Chapter 3). Figure 3.1 presents the plots as “Time series of globally-averaged surface temperature....datasets.” The inference one could reach from this is that the agreement between the curves is evidence of robustness of the trends plotted in the Figure. The reality is that the parent data from which the three groups obtain their data is essentially the same.

The Executive Summary even states “*Independently-performed adjustments to the land surface temperature record have been sufficiently successful that trends given by different data sets are very similar on large (e.g. continental) scales.*”

The data used in the analyses from the different groups, however, are not different but have very large overlaps! This statement in the Executive Summary is incorrect and misleading.

The report needs to answer this question,

What is the overlap in the raw data that utilized by the three groups?

The best estimate that I am aware of has a 90-95% overlap. The analyses from the three groups are hardly independent assessments, and this should not be hidden in the report.

The overlap is particularly important for the grid points analyzed in the analyses where only 1 or 2 observational data points exist. We have documented for the tropical land areas, for example (20N to 20S) about 70% of the grid points have had zero or less than one observation site¹⁶. Thus to compute an average surface temperature trend over land in the tropics, which is the area where the report narrowly focuses, almost all of the raw data used on the three analyses is from the same source. Thus to present a Figure to purportedly illustrate uncertainty in the surface temperature trends is misleading.

¹⁴ Davey, C.A., and R.A. Pielke Sr., 2005: Microclimate exposures of surface-based weather stations - implications for the assessment of long-term temperature trends. Bull. Amer. Meteor. Soc., Vol. 86, No. 4, 497–504.

¹⁵ Pielke Sr., R.A., C. Davey, and J. Morgan, 2004: Assessing "global warming" with surface heat content. Eos, 85, No. 21, 210-211.

¹⁶ Davey, C. and R.A. Pielke Sr., 2005: Comparing station density and reported temperature trends for land surface sites, 1979-2004. (in preparation).

A final overarching question is

What is the value-added of using annually-averaged surface temperatures to assess global climate system heat changes (“global warming”) over the last several decades in lieu of assessing the regional, zonally-averaged and global trends in ocean, and other climate component heat storage in units of Joules?

With respect to the assessment of tropospheric temperature trends, the heat storage and fluxes into the atmosphere from the surface are a more robust procedure to explain observed trends over the last several decades.¹⁷ The Report should have addressed the issue as to why the reconciliation of a global- and zonally averaged surface temperature trend with the tropospheric trends is even an important policy issue.

3.2. Reanalyses

The use of current reanalyses to assess trends was minimized in the Report, and was a recommendation of the NRC Review.^{18,19} However, not commented on by the Review was their use to assess trends in regions where the magnitude of the trends has been large and for seasonal averages, such that accurate comparisons with satellite and radiosonde observations can be made. This approach has been shown to be robust²⁰ Chase et al (2000), with text included on this need in the final version of Chapter 6 that I was CLA (Appendix B). The treatment of the current reanalyses as inadequate for long-term temperature trends ignores the value-added by winds in particular in defining the tropospheric layer-averaged temperatures in the mid- and high-latitudes²¹. This is an added source of information with which to quantitatively compare with the other data sets.

The reanalyses can, therefore, provide critical information on regional temperature trends. Since weather is determined by the spatial pattern of tropospheric temperatures, rather than a global- or tropical zonally-averaged mean, the reanalyses are particularly well suited for this assessment. Indeed, the [2005 National Research Council report](#) concluded that:

“regional variations in radiative forcing may have important regional and global climate implications that are not resolved by the concept of global mean radiative forcing.”

¹⁷ Pielke Sr., R.A., 2003: Heat storage within the Earth system. Bull. Amer. Meteor. Soc., 84, 331-335.

¹⁸ However, on page 20 lines 405-407 of Chapter 2 of the CCSP Report, the only caution is not to use them when stratospheric information are considered. Thus, while the Executive Summary of the CCSP Report states otherwise, even the CCSP Report, by inference, indicates reanalyses are valuable for long term lower tropospheric temperature trend assessments.

¹⁹ As a contradiction in the Report itself, Chapter 5 refers to a paper by Santer (2003a) where they used reanalyses in their study to assess long term tropopause trends.

²⁰ Chase, T.N., R.A. Pielke Sr., J.A. Knaff, T.G.F. Kittel, and J.L. Eastman, 2000: A comparison of regional trends in 1979-1997 depth-averaged tropospheric temperatures. Int. J. Climatology, 20, 503-518.

²¹ Pielke, R.A. Sr., T.N. Chase, T.G.F. Kittel, J. Knaff, and J. Eastman, 2001: Analysis of 200 mbar zonal wind for the period 1958-1997. J. Geophys. Res., 106, D21, 27287-27290.

And furthermore:

“Regional diabatic heating can cause atmospheric teleconnections that influence regional climate thousands of kilometers away from the point of forcing.”

This regional diabatic heating produces temperature increases or decreases in the layer-averaged regional troposphere. This necessarily alters the regional pressure fields and thus the wind pattern. This pressure and wind pattern then affects the pressure and wind patterns at large distances from the region of the forcing which we refer to as teleconnections. This major issue, which should have been a major focus of the Report, as recommended in the 2004 Asheville Workshop, was inadequately covered in the Report. In Chapter 5, for example, of the seven figures shown, only one presented a spatial map of the trends, and even then no quantitative evaluation of the regional skill of the models in replicating the January 1979 to December 1999 trends is given. In the Executive Summary, only a reference to fingerprint studies is present (referring to Box 5.5.) with a selected summary of previous papers given.

These comparisons should be also performed for seasonal averages and not just annual averages, which is another overlooked assessment in the Report.

To illustrate the value of using the relationship between winds and the temperature field, Figure 5.5 of the CCSP Report could have been used to compute the trends annually averaged east-west wind change that would be expected with the reported tropospheric temperature change. This would have provided an independent evaluation of the temperature trends. Using the thermal wind equation, an annual, zonally-averaged and tropospheric-layer averaged increase of 1 degree Celsius per 1000 km in mid-latitudes would produce a 4.3 meters per second increase of zonally averaged wind speed at 200 hPa. This text was also in Chapter 6, but was deleted in the ad hoc replacement Chapter.

Specific questions for the Committee for this subject area are the following:

What is the magnitude in of the regional tropospheric layer-averaged temperature gradient annual- and season-averaged trends in the middle and higher latitudes as diagnosed from the horizontal winds using the thermal wind relation? How does this analysis compare with the layer-averaged temperature trends as computed with the available radiosonde and satellite data sets?

What is the quantitative skill in degrees Celsius regionally of the temperature annual- and season-averaged trends between the models and the observed tropospheric temperatures from the satellite and radiosonde data, and from reanalyses over the recent decades?

3.3 Models

Although Chapter 5 contains a very informative summary of the latest global climate model simulations, the survey is incomplete. While the forcings listed in Table 5.2 of Chapter 5 are an improvement over past model studies, they remain a subset of the recognized climate forcings²². Moreover, the forcings included even from the Table varied among the modeling groups.

One particular serious omission is the lack of description as to what indirect aerosol effects were actually used in the few models that were listed as having this forcing. The indirect aerosol forcings are diverse and significant and include the “first indirect aerosol effect”, the “second indirect aerosol effect”, the “semidirect effect”, the “glaciation effect”, the “thermodynamic effect”, and “the surface energy budget effect”.²³ Table 1 in the Executive Summary is titled “*Summary of the most important global-scale climate forcing factors*”, but all of the most important climate forcings as identified by the 2005 National Research Council Report were not listed. This further illustrates the cherry picking of information for this Report.

The Preface of the CCSP Report (page 5, lines 102-106) provides clear evidence of the incompleteness of the Report;

“To help answer the questions posed, climate model simulations of temperature change based on time histories of the forcing factors thought to be important, have been compared with observed temperature changes. If the models replicate the observed temperature changes, this increases confidence in our understanding of the observed temperature record and reduces uncertainties about projected changes.”

First, forcing factors “thought” to be important are left out of the studies as discussed earlier in this Section. The surface temperature data also has significant uncertainties (as overviewed in Section 3.1) which raises questions about the accuracy of comparing model data. Even more importantly, the statement is silent on the spatial scale of the model-observational comparisons. Thus,

Why should the models be assumed as skillful in hindcasts if important first-order climate forcings are ignored?

What are the magnitudes of the uncertainties identified in Section 3.1 of this Public Comment?

What is the quantitative skill of the model hindcasts on the regional scale for the period January 1979 to December 1999 both in terms of annual and seasonal averages?

²² National Research Council, 2005: Radiative forcing of climate change: Expanding the concept and addressing uncertainties. Committee on Radiative Forcing Effects on Climate Change, Climate Research Committee, Board on Atmospheric Sciences and Climate, Division on Earth and Life Studies, The National Academies Press, Washington, D.C., <http://www.nap.edu/openbook/0309095069/html/>

²³ <http://www.nap.edu/books/0309095069/html/40.html> from National Research Council, 2005: Radiative forcing of climate change: Expanding the concept and addressing uncertainties. Committee on Radiative Forcing Effects on Climate Change, Climate Research Committee, Board on Atmospheric Sciences and Climate, Division on Earth and Life Studies, The National Academies Press, Washington, D.C.,

This lack of a quantitative evaluation of the skill of the models in replicating the regional trends evident in the satellite, radiosonde, and reanalysis data since 1979 is a serious omission in the Report. The second finding in Chapter 5 that “results from many different fingerprint studies provides consistent evidence for a human influence on the three-dimensional structure of atmospheric temperature over the second half of the 20th century” is not documented by specific comparisons to the regional data from the satellites, radiosondes, and reanalyses. Indeed, this section was expanded from the August 2005 version apparently to give lip service to the need in the report to consider a regional perspective. It is very inadequate and selective in its summary of regional lower atmosphere temperature trends.

The International Geosphere-Biosphere Programme (IGBP) report entitled “Vegetation, water, humans and the climate: A new perspective on an interactive system”²⁴ provides extensive documentation of significant and obvious fingerprints of a human climate forcing (in this case land use/land cover change and variability). The authors of Chapter 5 discuss fingerprint studies in Box 5.5, but fail to include the spectrum of papers on this subject that are outside their expertise, yet were made aware of during the course of the Report preparation.

The 8th Finding in Chapter 5 also is disingenuous. The statement that changes “in black aerosols and land use/land cover (LULC) may have had significant influences on regional temperature, but these influences have not been quantified in formal fingerprint studies” is incorrect. The role of these forcings is so categorical that fingerprint studies are not required.²⁵

In the Executive Summary regarding the models (page 5, lines 100-107), the authors make an astounding claim,

“On decadal and longer time scales, however, while almost all of the model simulations show greater warming aloft, most observations show greater warming at the surface. These results have at least two possible explanations, which are not mutually exclusive. Either the amplification effects on short and long time scales are controlled by different physical mechanisms, and models fail to capture such behavior; and/or remaining errors in some of the tropospheric data sets adversely affect their long-term temperature trends. The second explanation is judged more likely.”

Thus despite the caution of the NRC review of the Report earlier this year

²⁴ Kabat, P., Claussen, M., Dirmeyer, P.A., J.H.C. Gash, L. Bravo de Guenni, M. Meybeck, R.A. Pielke Sr., C.J. Vorosmarty, R.W.A. Hutjes, and S. Lutkemeier, Editors, 2004: Vegetation, water, humans and the climate: A new perspective on an interactive system. Springer, Berlin, Global Change - The IGBP Series, 566 pp.

²⁵ See the summary of these forcings in National Research Council, 2005: Radiative forcing of climate change: Expanding the concept and addressing uncertainties. Committee on Radiative Forcing Effects on Climate Change, Climate Research Committee, Board on Atmospheric Sciences and Climate, Division on Earth and Life Studies, The National Academies Press, Washington, D.C., and Kabat, P., Claussen, M., Dirmeyer, P.A., J.H.C. Gash, L. Bravo de Guenni, M. Meybeck, R.A. Pielke Sr., C.J. Vorosmarty, R.W.A. Hutjes, and S. Lutkemeier, Editors, 2004: Vegetation, water, humans and the climate: A new perspective on an interactive system. Springer, Berlin, Global Change - The IGBP Series, 566 pp.

“It should also be clearly emphasized that data is being used to test models and not vice-versa”²⁶,

the authors ignore this caution by the NRC Committee. They accept the model results (which is a hypothesis) as truth and blame the data when it does not agree. And not any data, but just the data that does not conform to their prejudices (i.e., the surface temperature data in the tropics is assumed robust, which as overviewed in Section 3.1 of this Report still contains unquantified uncertainties).

Specific questions to ask the Committee include:

What is the uncertainty in the estimates of the zonal and global averaged tropospheric temperature trends on annual and seasonal averages due to the neglect of all of the first-order climate forcings? Achieving correspondence with the observations when a subset of recognized first-order climate forcings are neglected is not a demonstration of skill.

What is the quantitative uncertainty in the model hindcasts of regional tropospheric temperatures in terms of annual and seasonal averages?

What added information on regional surface and tropospheric temperature trends are provided from regional climate models?

²⁶ <http://www.nap.edu/books/030909674X/html/39.html>

TABLE 1 Summary Chronology of the CCSP Process

1. October 27-29 2003 was invited and attended the Asheville, N.C. Reconciling Vertical Temperature Trends Workshop
2. March 16, 2004 was invited by Ari Patrinos, and on March 17, 2004 accepted, serving as one of the lead author on the CCSP report "Temperature trends in the lower atmosphere-steps for understanding and reconciling the differences". I was assigned to be convening lead author of Chapter 6 "What measures can be taken to improve the understanding of observed changes?".
3. CCSP Committee meeting held in Chicago August 5-6, 2004.
4. Invited participant in the "Unresolved Issues in Surface and Tropospheric Temperature Trends U.S. CCSP Workshop on Profiles of Vertical Temperature Trends". Exeter, England Sept 13-15, 2004.
5. CCSP Committee meeting held in Chicago December 5-6, 2004.
5. CCSP Report sent to NRC Review Panel and posted on the CCSP web page January 24, 2005; my minority report was specifically excluded (my minority report is posted at <http://blue.atmos.colostate.edu/publications/pdf/NR-142.pdf>). I did send the minority report directly to the members of the NRC Review Committee.
6. NRC Review Panel and CCSP Committee meeting in Chicago February 23, 2005. I was permitted to give an oral presentation of my substantive concerns with the CCSP Executive Summary as it was submitted to the NRC Committee (<http://blue.atmos.colostate.edu/presentations/PPT-34.pdf>).
7. NRC Review completed and released to the public May 3, 2005. I was told that they could not respond to my minority report since it was not formally included in the transmittal of the CCSP Report to the NRC Review Committee.
8. CCSP Committee meeting in Chicago on May 16-17, 2005 to discuss the responses to the reviews. A presentation summarizing the NRC review was given by William Randel, Chair of the NRC Committee.
9. Revised draft version of Chapter 6 was completed with input from several CCSP Committee members including Tom Karl and Chris Folland, and sent to the entire Committee on August 1, 2005. Constructive comments received back from several on the Committee, and it was in a near final form.
10. On August 10, I found out that a separate version of Chapter 6 existed, prepared independently by Peter Thorne (with some input from David Parker who is an author on Chapter 6) according to the email from Thorne. He said he spent 3 hours creating this new version. I was not immediately provided a copy of this new version, apparently due to an ill-timed communication problem in which the transmittal e-mail from Peter Thorne to the Committee (in which I am listed) bounced from my account. The

copy of the bounced e-mail, however, was deleted according to Peter Thorne so, at CSU, we could not confirm why this individual e-mail bounced.

11. Immediately several members of the Committee, Susan Hassol, and the Editor Tom Karl (and then followed by an e-mail stating that associate editors Bill Murray and Chris Miller, and Susan Hassol, Technical Editor agreed) strongly urged that the new replacement version of Chapter 6 should be adopted.

12. For this reason, and the others that I summarized, in my August 25 2005 blog, I resigned on August 13, 2005 from the Committee in an e-mail to Jim Mahoney.

APPENDIX A

Pielke Sr., Roger A., 2005: Minority Report, Comments Provided to the NRC Review Committee of the U.S. Climate Change Science Program's Synthesis and Assessment Product on Temperature Trends in the Lower Atmosphere. Atmospheric Science Bluebook No. 758, Colorado State University, Fort Collins, CO 80523, 8 pp.
Available online at: <http://blue.atmos.colostate.edu/publications/pdf/NR-142.pdf>

Minority Report

by

Roger A. Pielke Sr.

Comments Provided to the NRC Review Committee of the U.S. Climate Change Science Program's Synthesis and Assessment Product on Temperature Trends in the Lower Atmosphere

February 6, 2005

Inclusion in the Executive Summary (ES) of the issues raised in this minority report would have provided a more complete and accurate assessment of our current scientific understanding of recent regional and global surface and tropospheric temperature trends. I also discuss aspects of the committee's processes that militated against reaching a consensus. I underscore that aside from the issues presented in this minority report, the report provides useful information on the current state of knowledge of globally-and zonally-averaged temperature trends. I would like to acknowledge the effort and professionalism of my colleagues on the Committee to reach an acceptable consensus on a range of difficult and challenging topics.

Process Issues

There are several issues with respect to the tasks assigned to the Committee and in the selection of the Committee. First, the charge to the Committee was interpreted differently by different members. The majority view was of a highly limited focus of the report with the goal of explaining the apparent difference between recent observed and modeled annual zonally-averaged tropical tropospheric temperature trends. This was only finally clarified in the February 1, 2005 draft of the Executive Statement when the section "Motivation for this Report" was first shared among the Committee.

However, the charge to our Committee as summarized in the Preface (<http://www.climate-science.gov/Library/sap/sap1-1/sap1-1prospectus-draft.htm>), is that we were to assess the time and spatial patterns of surface and tropospheric temperature change. This should include establishing the accuracy of the data sets in observing, and of global and regional

models in simulating, the regional trends in recent decades. The report, however, ultimately focused on the narrower issue.

Future charges to CCSP Committees should be unambiguous and differences in interpretation should be resolved prior to preparation of the report text. In addition, from the outset, the process for handling conflicting views among committee members should be clearly described, and not determined at the time of the conflict. The report would be stronger by allowing minority views to be included in the body of the report, identified as such in a manner consistent with many other NRC reports, rather than relegating them to a minority report at the discretion of one or more members of the committee.

Science issues

1. The major role of regional tropospheric temperature trends on large-scale circulation changes (and, therefore, weather patterns), and of seasonal trends were not assessed.

The report offers no quantification of the skill of the GCM models that are reported in Chapter 5 to simulate regional surface and tropospheric temperature trends. As concluded by the NRC (2005; page 4) “Regional variations in radiative forcing may have important regional and global climate implications...” The report ignores this finding, which has an extensive peer reviewed literature to support it (see, for example, the summaries in Kabat et al. 2004; NRC 2005). The report therefore arbitrarily ignored the implications of numerous papers listed in those summaries and elsewhere on the significant role of regional heterogeneous climate forcings on regional temperature trends. The report also does not quantitatively assess seasonal trends and the effect of regional tropospheric temperature changes on circulation patterns (and, therefore, weather) at distances removed from the heterogeneous climate forcing. Indeed the influence of humans on the surface and tropospheric temperatures are clearest on the regional scale, yet the report ignores this information.

2. The report focuses on globally-averaged and tropical zonally-averaged annual surface and tropospheric temperature trends and on an incomplete list of major climate forcings and responses. The following text is much too broad based on the assessment given in this report.

“The improved consistency between modeled and observed temperature changes at the global scale described in this Report increases confidence in our understanding of recent climate changes.” (lines 71-73; page 2)

Logically, identification of increased observational uncertainty, as discussed in the report, should not provide more confidence in the model results. It simply means that the model results cannot be definitively falsified based on the data presented. The model simulations discussed in Chapter 5 hardly bracket the possible climate responses associated with the spectrum of climate variables (see, for example, Figure 1-1 and 1-2 in NRC (2005).

Indeed the report sends a mixed message. The models are struggling to replicate the observed tropical zonally-averaged temperature trends, as reported in the ES, and these are the

latest state-of-the-art global climate models. Therefore, any studies which provide regional-scale information for policymakers necessarily utilize simulation results with no proven predictive skill. This should have been a conclusion of the report.

3. The influence of several major regional and global climate forcings, as they affect surface and tropospheric temperature trends are not adequately represented in the report.

The ES acknowledges this for one forcing that is not included in the model simulations in Chapter 5 (the indirect aerosol effects). NRC (2005) provides a summary of additional important radiative and non-radiative forcings, which include, for example, the biological effect of increased carbon dioxide, the thermodynamic effect of aerosols, and the surface energy budget effect. Each one should have been discussed in Chapter 5 and in the ES with respect to what we know regarding their influence on global annual-mean surface temperature, and also the spatial and seasonal pattern of surface and tropospheric temperature trends. The Executive Statement makes the following claims which are at variance to the conclusions of NRC (2005) and thus arbitrarily ignore contradictory conclusions found in the peer-reviewed literature.

“Table 1: Summary of the most important climate forcing factors and their individual effects on global, annual-mean temperatures.” (page 18 line 440-441)

“...it is likely that, at least at the global scale, the other most important climate forcings have also been included in current model simulations.” (page 20, lines 464-465)

“New simulations of 20th Century climate change have been produced recently..... The most important deficiency common to all of these model simulations is their neglect of the indirect cooling effect of aerosols.” (page 25, line 583-586)

The model simulations (from PCM) shown in Figs. 8 and 9 include the most important global scale forcings, but, because they ignore indirect aerosol forcing, almost certainly underestimate aerosol effects. These simulations also ignore forcings from land-use/land-cover changes. However, other simulations that do include land-use changes are very similar to those shown in Figs. 8 and 9. (page 29, lines 638-641)

In the last sentence of the above text from the ES, no citation is provided to support the claim that other simulations show similar results due to land-use/land-cover changes. A robust literature that I have contributed to, and thus know well, shows a significant climate forcing due to land-use changes (LULC) (see summaries in Kabat et al. 2004; Pitman 2003; NRC 2005; Pielke 2001). These LULC changes continued through the 1990s at a large rate (Australia Conservation Foundation 2001; Lepers et al. 2005). A significant portion of these changes are in the tropics. The ES selectively presents LULC model runs, and does not include relevant global and regional modeling studies of the LULC effect on the climate system as summarized in NRC (2005), Kabat et al. (2004) and Pielke (2001). NRC (2005) clearly identifies a range of climate forcings which may influence the global annual-mean temperature, but all of these forcings not included in the model simulations in Chapter 5. Given that this work appears in the peer-reviewed literature, selectively de-emphasizing it in this report is difficult to understand.

The model results in Chapter 5 should, therefore, be considered as sensitivity studies, and not as reconstructions of the evolution of the climate system in recent decades (Pielke 2002). The results certainly show that the included climate forcings are major influences on the surface and tropospheric trends, but without including all of the forcings identified in NRC (2005) they are necessarily incomplete, and thus to compare them with observations as a test of predictive skill is misleading.

4. The assessment of surface and tropospheric temperature trends focuses narrowly on global and zonally averaged tropical means.

The selection of the figures in the ES emphasizes large-scale averages. Even with respect to the one figure (Figure 9) which presents a spatial map of trends, the report does not quantify the models' skill at skillfully simulating the regional trends and variations. This minimal presentation and analysis of the spatial patterns is chosen despite the first sentence in the following claim from the report;

“The temperature change signal (i.e., the time-varying, three-dimensional pattern of changes due to the combined effects of natural and human-induced climate forcing) is a complex one. There are a number of ways that this signal may be visualized. Figure 2 is one method, where large-area average trends and their uncertainties are given at different levels in the atmosphere”. (page 21, lines 487-490)

The assessment of regional trends was part of our charge to provide “four-dimensional” trend information. Moreover, regions of tropospheric warming and cooling, even if they would average to near zero when calculating a global average, can still result in major alterations in the planetary weather circulations and have significant regional effects. By contrast, the global average is less closely related to these factors. The ES misses an opportunity to assess our current level of understanding of the regional tropospheric temperature trends, and the ability of the models to simulate them.

5. The report ignores the obvious in that regional land-use/land-cover change and aerosol effects clearly influence the surface and tropospheric temperatures where this human-caused climate forcings occur.

Considerable modeling and observational evidence of the substantial human changes in regional surface and tropospheric temperature trends exists, even if the analyses are not for the specific time period chosen in Chapter 5. The ES ignores the extensive literature which documents this evidence (see citations within NRC 2005; Pitman 2003; Kabat et al. 2004, for example). The statement below, therefore, severely qualifies itself to the “forcings included in the model simulations”. This is unnecessarily hedged and is incomplete.

“In other words, there is clear (and statistically significant) evidence that the signal of human-caused climate change, for the forcings included in the model simulations, is evident in the observations. This is true, not only for the cases shown here, but also for patterns of temperature change at the surface and in the stratosphere, and for indirect indicators of temperature change such as the height of the tropopause.” (page 29, lines 632-636).

The ES also adopts a very specific definition of detection and attribution, and then uses this narrow definition to exclude other relevant literature. When the signal of human influence on climate is very strong, such as with the locations where land-use/land-cover change occur, “sophisticated statistical techniques” are not required (see, for example, the demonstration using models of a land-use change effect on regional temperatures in Marshall et al. 2004 and Pitman et al. 2004, and the global effect of land-use change on temperatures in Chase et al. 2000a and Chase et al. 2001). The regional climate modeling community has extensive literature which documents observationally and with models the “fingerprint” of LULC change and of aerosols on the surface and tropospheric temperatures. Many of these studies are summarized in NRC (2005) and Kabat et al. (2004). Despite being scientifically robust, the ES ignores such studies because they do not employ the narrow approach to attribution and detection presented here. This focus is unnecessarily restrictive and results in incomplete information being presented in the report.

6. The surface temperature record, which underpins so much of the report, is considered a robust characterization of large-scale averages, despite unresolved issues on its spatial representativeness

The report fails to acknowledge unresolved issues on uncertainties associated with the robust characterization of large-scale surface temperature trends. These include the influence of surface water vapor content changes on the trends (Pielke et al. 2004), microclimate exposure of the observing sites (Davey et al. 2005) and of continued substantial landscape conversion, including rapidly changing tropical urban landscapes (Lepers et al. 2005). Since much of the observed warming has been reported for land in the Northern Hemisphere, there needs to be more scrutiny placed on the spatial representativeness of the stations selected to compute the areal averages. This problem is recognized by the climate community, which is why there is general support for the U.S. Climate Reference Network, but the need to reduce surface temperature observational uncertainty is not represented in the ES.

Moreover, while there is discussion in the report regarding the lack of agreement between the models and the observations in the tropical troposphere, there is no examination as to whether, given the large land-use changes in the tropics (Lepers et al. 2005) with a possible effect on surface temperature trends, the agreement between the models and the observations of the tropical surface temperatures is actually robust. Indeed the report does not question the accuracy of data when it agrees with the models.

Also, the report’s abstract that

“We now have and three [analyses] for the surface (from ships, satellites, weather stations, and buoys) that have been heavily scrutinized and adjusted for potential data biases.” (page 2, lines 53-56.)

can be misinterpreted. Each of the three analyses uses essentially the same raw data such that they are not independent assessments of the surface temperature trends. This point should be made clear in the abstract (as it is on page 16 of the text in the ES).

7. The current reanalyses were not effectively used to assess lower tropospheric temperature trends since 1979.

The text listed below fails to recognize that reanalyses, despite inhomogeneities in time, provide valuable information on long term lower tropospheric temperature trends. The reanalyses are essentially independent of the UAH analysis. The NCEP reanalyses assimilate observed winds (Pielke et al. 2001), which provide additional information on the temperature fields that is not used in any of the other observational data sets discussed in the report.

“For the lower troposphere, only one data set (UAH) exists, so the constructional uncertainties cannot be assessed directly. This is an important deficiency.” (page 17, lines 418-419).

Published work (e.g., Chase et al. 2000b) has documented a close agreement of the UAH lower tropospheric data set with the NCEP Reanalysis on the global and regional scales, such that there should be more confidence in that lower tropospheric MSU data than stated in the ES. The NCEP reanalysis trend work has not been refuted in the literature, yet the ES chose arbitrarily to ignore the support for the lower tropospheric UAH data.

8. Overstatement of the skill of the GCM simulations to explain the spatial and temporal changes in tropospheric temperatures from 1979-1999.

The ES reports on the inability of the simulations to skillfully simulate the zonally-averaged tropospheric temperature changes in the tropics. Moreover, even the ES admits to excluding a major climate forcing (the indirect aerosol effect) in all of the GCM simulations. Figure 9 also shows clear, obvious inconsistencies in the ability of the PCM to simulate the spatial pattern of temperature trends as measured by the RSS, while Figure 8 illustrates that even in the zonal means, the PCM does a poor reconstruction of the HadAT2 radiosonde data. The statement that there is “improved consistency between modeled and observed temperature changes at the global scale...” is not scientifically robust. A more accurate conclusion would be that “the models demonstrate that natural and anthropogenic climate forcings have influenced the temporal and spatial patterns of tropospheric and surface temperature changes during the period 1979-1999, however the quantification of the relative roles of the important forcings remains incomplete, and the ability of the GCMs to skillfully reconstruct the observed globally-averaged, zonally-averaged and regional patterns has not been demonstrated.”

References

Australia Conservation Foundation, 2001: Australian Land Clearing, A Global Perspective: Latest Facts & Figures. 340 Gore Street Fitzroy, Vic 3065. ARBN 007 498 482 (<http://www.acfonline.org.au/docs/publications/rpt0002.pdf>).

- Chase, T.N., R.A. Pielke, T.G.F. Kittel, R.R. Nemani, and S.W. Running, 2000a: Simulated impacts of historical land cover changes on global climate in northern winter. *Climate Dynamics*, **16**, 93-105.
- Chase, T.N., R.A. Pielke, J.A. Knaff, T.G.F. Kittel, and J.L. Eastman, 2000b: A comparison of regional trends in 1979-1997 depth-averaged tropospheric temperatures. *Int. J. Climatology*, **20**, 503-518.
- Chase, T.N., R.A. Pielke, Sr., T.G.F. Kittel, M. Zhao, A.J. Pitman, S.W. Running, and R.R. Nemani, 2001: The relative climatic effects of landcover change and elevated carbon dioxide combined with aerosols: A comparison of model results and observations. *J. Geophys. Res., Atmospheres*, **106**, 31,685 -31,691.
- Davey, C.A., and R.A. Pielke Sr., 2005: Microclimate exposures of surface-based weather stations - implications for the assessment of long-term temperature trends. *Bull. Amer. Meteor. Soc.*, **86**, No. 4, 497-504.
- Kabat, P., Claussen, M., Dirmeyer, P.A., J.H.C. Gash, L. Bravo de Guenni, M. Meybeck, R.A. Pielke Sr., C.J. Vörösmarty, R.W.A. Hutjes, and S. Lutkemeier, Editors, 2004: *Vegetation, water, humans and the climate: A new perspective on an interactive system*. Springer, Berlin, Global Change - The IGBP Series, 566 pp.
- Lepers, E., E.F. Lambin, A.C. Jenetos, R. DeFries, F. Achard, N. Ramankutty, and R.J. Scholes, 2005: A synthesis of information on rapid land-cover change for the period 1981-2000. *BioScience*. **55**, 115-124.
- Marshall, C.H. Jr., R.A. Pielke Sr., L.T. Steyaert, and D.A. Willard, 2004: The impact of anthropogenic land-cover change on the Florida peninsula sea breezes and warm season sensible weather. *Mon. Wea. Rev.*, **132**, 28-52.
- National Research Council, 2005: Radiative Forcing of Climate Change: Expanding the Concept and Addressing Uncertainties. Committee on Radiative Forcing Effects on Climate Change, Climate Research Committee, Board on Atmospheric Sciences and Climate, Division on Earth and Life Studies, The National Academies Press, Washington, D.C., <http://www.nap.edu/openbook/0309095069/html/>
- Pielke, R.A. Sr., T.N. Chase, T.G.F. Kittel, J. Knaff, and J. Eastman, 2001: Analysis of 200 mbar zonal wind for the period 1958-1997. *J. Geophys. Res.*, **106**, D21, 27287-27290.
- Pielke Sr., R.A., 2001: Influence of the spatial distribution of vegetation and soils on the prediction of cumulus convective rainfall. *Rev. Geophys.*, **39**, 151-177.
- Pielke, R.A. Sr., 2002: Overlooked issues in the U.S. National Climate and IPCC assessments. *Climatic Change*, **52**, 1-11.

Pielke, R.A. Sr., C. Davey, and J. Morgan, 2004: Assessing "global warming" with surface heat content. *Eos*, **85**, No. **21**, 210-211.

Pitman, A.J., 2003. Review: The evolution of, and revolution in, land surface schemes designed for climate models. *Int. J. Climatology*, **23**, 479-510.

Pitman, A.J., G.T. Narisma, R.A. Pielke Sr., and N.J. Holbrook, 2004: The impact of land cover change on the climate of southwest western Australia. *J. Geophys. Res.*, **109**, D18109, doi:10.1029/2003JD004347.

APPENDIX B

Chapter 6 DRAFT (2005-August 11, 2005) Final Version Before Alternative Version of Chapter 6 Appeared

The only outstanding issues before the Committee before the alternative version of Chapter 6 appeared are included in this version. This clearly illustrates how close the Chapter was to completion. This was the last version of the Chapter that was sent to the CCSP Committee before my resignation.

What measures can be taken to improve the understanding of observed changes?

Lead Authors: Roger A. Pielke Sr., David Parker and Richard Reynolds

Contributing Authors: Thomas Chase, Chris Folland, Ben Herman, John Nash, Ben Santer, Steve Sherwood, Peter Thorne, Josh Willis, and Frank Wentz

Introduction

The first part of this Chapter develop the recommendations made in Chapters 1 to 5 that can be implemented now to better quantify our understanding of historical changes and their causes. The second part makes recommendations regarding future measurement opportunities to specifically address the shortfalls in historical and current monitoring. Our four most important recommendations are placed within a box.

Before proceeding we first remind readers that a major reason for undertaking this report was the oft-reported disagreement between observed and model-predicted changes in the global vertical temperature structure. The CCSP charge to the Committee recognized that independently produced data sets that describe the four-dimensional temperature structure from the surface through the lower stratosphere provide different temperature trends and that the Committee was to address the accuracy and consistency of these temperature records and outline steps necessary to reconcile differences between individual data sets..

We specifically cross-reference our discussions and recommendations to specific chapters where they are outlined in more detail to ensure traceability and to enable easy cross-referencing. We briefly reference the chapters of relevance to any given statement through use of e.g. **(C5)** for Chapter 5. We do not make specific references to sub-sections of chapters.

It is important to recognize that previous efforts have been made to address many of the problems discussed in this chapter. Rather than invent new competing proposals and recommendations we have attempted to expand and build upon existing ones. Critical documents in this regard are: the GCOS Implementation Plan for the Global Observing System (GCOS,

2004) and the wider Global Earth System of Systems (GEOSS) 10 year Implementation Plan Reference Document (GEO, 2005) which explicitly includes the GCOS Implementation Plan; the over-arching Climate Change Science Program plan (CCSP, 2004), and NRC (2003;2005) which summarize our understanding of climate forcing and feedbacks.

1. Recommendations based on previous Chapters

We include a brief background to our recommendations, concentrating on the troposphere and the surface.

1.1 Limitations of the current observing systems

Atmosphere

Radiosonde data in the tropics and over the oceans are very sparse. The GCOS Upper Air Network (GUAN) should be fully implemented (GCOS, 2004) **(C2,C3,C4)**.

Improvements to the radiation shielding of radiosondes are suspected of causing a systematic spurious cooling trend in the daytime data, especially in the tropics (Sherwood et al., 2005). Although the homogenization techniques applied to the RATPAC and HadAT products considered in this report may have removed some of this bias, Sherwood et al. (2005) argue that they are unlikely to have been entirely successful. Other changes to radiosonde instruments and observing practices have also caused biases of either sign in the raw data at individual stations, although both RATPAC and HadAT are likely to have substantially reduced the impacts of these changes. **(C4)**. The relative paucity of homogenized radiosonde records to date precludes in-depth understanding of these effects and their importance. We therefore recommend the creation of truly homogeneous radiosonde records under a number of independent approaches for temperature, taking account of possible daytime-heating biases as well as all other sources of bias **(C4)**. Information on how heights have been obtained will enable cross-validation of virtual temperature and height where the latter has been measured independently. In addition, cross-validation of collocated radiosonde and satellite profiles is a potential means of improving both **(C4)**.

For tropospheric satellite data ($T_{\text{sfc-75}}$ and $T_{\text{sfc-350}}$), the primary cause of trend discrepancies between different versions of the datasets is differences in how the data from the different satellites are merged together **(C4)**. A secondary contribution to the differences between these datasets is the difference between the diurnal adjustments that are used to account for drifting measurement times **(C4)**. Methodological differences yield data products showing differences in trends in $T_{\text{sfc-75}}$ of about 0.1 °C per decade, equivalent to the size of the climate change signal. Clearly the climate evolved in one unique way and there is a single best approach. We therefore urge ongoing research to optimize the merging process and the removal of diurnal-cycle-related drifts **(C4)**. This requires continuing efforts by independent teams to investigate the problem and share results through the peer-reviewed press and informal channels.

Land surface

The coverage of available land surface station data remains patchy in the tropics (C3,C4). The GCOS Surface Network (GSN, Peterson et al., 1997) was set up to form the basis of reliable global and continental-scale analyses of climate. However, the usefulness of the GSN has been reduced by unavailability of data and incomplete adherence to the GCOS climate monitoring principles (GCOS, 2004).

The three surface temperature analyses presented in this report are extract data from the same raw observed data, where the different research centers select different sets from this population and apply different homogenization techniques to perform their analyses (C3,C4). There are, however, remaining unaddressed issues associated with the spatial representativeness and temporal homogeneity of the raw surface temperature record (C3,C4). This is particularly an issue, such as in the tropics, where the surface data used to construct the grid point analyses is sparse such that the large scale trends may not be as accurate as needed. These issues include potential systematic biases associated with poor, changing instrumental exposure and changing measurement height (Davey and Pielke, 2005; Pielke et al., 2005), and temporally different surface temperature and water vapor (moist enthalpy) trends (Pielke et al, 2004) (C3). Non-spatially representative trends in the latter two climate variables would result in temperature trends that do not reflect the actual large scale temperature trends. In addition, the uncertainty introduced by applying time of observation, instrument change and urban corrections as part of the homogenization technique needs to be quantified further, and included when plots of trends are presented.

Ocean surface

Marine daytime surface air temperature data can be improved, given good metadata, by using a newly developed model of their biases (Berry et al., 2004). Bias corrected night-time data are an approximate check on time-varying SSTs (Rayner et al., 2003). Uncertainties in night marine surface air temperature data may be contributing to an apparent steepening of the near-surface lapse rate in some tropical areas (Christy et al., 2001; Folland et al., 2003).(C3)

Satellite-based infrared SSTs are available from satellites since the early 1980s (C2). However satellite data measure the “ocean skin” temperature, which can be appreciably different from ocean temperatures measured just below the surface (C4). Thus an expansion in the number of buoy observations is desirable as they are the best reference for calibrating satellite measurements of SST. Satellite measurements of SST can also be improved by combining microwave and infrared measurements (Wentz et al., 2000) because the microwave measurements are not affected by cloud cover or aerosols. However, this must be done carefully because the microwave measurements have lower spatial resolution and cannot be made within 50 km of land or over regions with precipitation.

New research programs are now using satellite data to improve the accuracy of SST data and analyses. For example the Global Ocean Data Assimilation Experiment (GODAE) High-

resolution Sea Surface Temperature (SST) Pilot Project (GHRSSST- PP) has been established to give international focus and coordination to the development of a new generation of global, multi-sensor, high-resolution (~6 hours and 10 km), SST products.

Problems common to all data sources

There are two problems which are generic to all data types considered in this report: a paucity of high quality metadata; and overlap in raw data used to create climate datasets. Addressing these will help to quantify the uncertainty in our estimates of recent climate change more robustly

Metadata; information as to changes in equipment, observing techniques, reporting practices, and the local environment; might significantly help in our identifying any quantifying non-climatic influences in a more robust manner (C2,C4). This is true for surface-based, balloon-based and satellite based measures. For none of these is current metadata anywhere near adequate for purpose.. Improved metadata might permit the assessment of local biases due to changes in microclimate in the immediate vicinity of the observation site (discussions of this issue are presented in Davey and Pielke, 2005; Vose et al., 2005; Peterson, 2003; Parker, 2004), and might help reduce and quantify the uncertainties in the adjustments made for these changes. Current and archival photographic documentation (on the ground and from above from satellite and aircraft imagery) of the microscale landscape of each surface observation site and its surroundings should be helpful in documenting the microclimate exposure, and its change over time.

Overlap in raw data being used in climate dataset production means that the resulting dataset estimates cannot be considered entirely independent (C2,C3). For satellite-based measures there is complete overlap for much of the period, whereas for surface and balloon-based records the degree of overlap is less and varies with time. For these latter sources even data purporting to be for the same station from independent sources can differ greatly based upon post-processing applied. Therefore separating these effects can prove problematic.

Recommendations:

- A. The causes of discrepancies between upper-air datasets need to be ascertained to gain a better estimate of the true tropospheric trend. Achieving this aim requires the development of unambiguous analysis tools that can be used to objectively discriminate between the datasets currently available (C4).**
- B. Improved metadata are required in order to better address issues such as spatial and temporal homogeneity (C4).**
- C. All climate data records, including a full audit trail (such as details including quality control steps and products used in their derivation), should be freely and fully available to the research community through the internet from one or more dedicated centers. This should be a prerequisite to the international acceptance of these data sets as being of climate quality (C4).**
- D. Following Key Action 12 of the GCOS Implementation Plan²⁷, the GCOS Surface and Upper Air Networks should be fully implemented (C2, C4).**

²⁷ Parties need to: (a) ensure the implementation and full operation of the baseline networks and systems (which include GSN, GUAN, GAW, MSU, solar and Earth radiation measurements from satellites and the atmospheric

Mining of other existing observational data sets

Many pre-1979 satellite microwave and infrared sounding data have not been used, except Vertical Temperature Profile Radiometer (VTPR) data. We need to extend and homogenize the satellite tropospheric temperature and humidity profile record backwards to about 1973, giving a better understanding of the geographical signature of the 1976-1977 climate regime shift (Trenberth, 1990), which was only sparsely sampled by radiosondes (C2).

Reanalysis products have potential advantages in producing physically consistent historical realizations of the climate system (e.g. Chase et al, 2000). However, changes in data types, coverage and instrumentation, including the introduction of satellite data, cause time-varying biases in reanalyses (Bengtsson et al., 2004) (C2,C3). Furthermore, using reanalyses to correct data might make observations artificially similar to models. Thus a strategy is needed to create geographically complete reanalyses of “climate change” quality (Thorne et al. 2005a), which takes advantage of physical relationships between temperature, winds, absolute humidity, soil moisture, upper layer ocean heat storage and other climate variables.

Recommendation:

- E. Consistent with Key Action 24 of GCOS (2004)²⁸ and a 10 Year Climate Target of GEOSS (2005), efforts should be made to create several climate change quality atmospheric reanalyses. A strategy is needed to create geographically complete reanalyses of “climate change” quality (Thorne et al. 2005a), which take advantage of physical relationships between temperature, winds, absolute humidity, soil moisture, upper layer ocean heat storage and other climate variables. It is imperative that any such system use data that are as homogeneous as possible and that reanalyses be performed at multiple Centers.(C2,C3).**

Diagnostics and additional data

The use of multivariate physical relationships between variables to assess their veracity is recommended as a climate monitoring principle by Seidel et al. (2004) and Thorne et al. (2005a) (C2,C4, C5). Here we concentrate on observed data.

component of the composite surface ocean observation system) in accord with the GCOS Climate Monitoring Principles, in order to specifically resolve reported problems, to ensure the exchange of these data with the international community, and to recover and exchange historical records; (b) establish a high-quality reference network of about 30 precision radiosonde stations and other collocated observations; and (c) exploit emerging new technology including the use of radio-occultation techniques and ground-based Global Positioning System sensing of the total water column..

²⁸ Parties are urged to give high priority to establishing a sustained capacity for global climate reanalysis, to develop improved methods for such reanalysis, and to ensure coordination and collaboration among Centers conducting reanalyses.

The global climate system is complex and an understanding of the evolution of a single variable alone is not a sufficient constraint to comprehensively understand the climate system evolution (C1). In particular, due to latent heat transport a full understanding of the energy of the climate system requires knowledge of both temperature and vapor pressure. We note that the interpretation of long term trends in these data will be complicated by regional atmospheric and oceanic circulation changes which affect both temperature and dew point, and will differ with the models from reality, at least over time periods of decades, because some of these variations are internal to the climate system and not externally forced.

In addition to avoid ambiguity it is also necessary to consider changes in a number of other variables including: cloud cover and height, Outgoing Longwave Radiation (OLR), atmospheric circulation, and ocean heat uptake. Many of the data required to create climate quality datasets in non-temperature variables already exist (C2). Efforts to create climate datasets for some of these variables have been made. It is important to devote effort to building climate data sets of these variable as well (C3). Geographical patterns of evolution in these complimentary variables will provide useful additional information and physical understanding which can help to constrain the structural uncertainty in temperature time-series (and vice-versa) and, perhaps more importantly, climate models. Continued construction and cross-validation of multivariate climate datasets must therefore be seen as a high priority.(C5).

. The change of wind with height is one example of a non-temperature variable that has been used to evaluate trends in the layer-averaged tropospheric horizontal temperature gradient (Pielke et al 2001). This relation is particularly accurate in the mid- and high latitudes over regional and larger scale areas. With this relation, the observed winds in the upper troposphere are used as an independent metric to assess the temperature field. Applying this method to Figure 6.2.2 NEEDS TO BE RENUMBERED (ROGER: PLEASE FILL IN, for example, indicates there should have been a decrease in the zonally averaged westerly winds of yyy meters per second in the Northern Hemisphere over a zzzz latitude band associated with the tropospheric warming noted in that Figure.(C3).

Another diagnostic is the ratio of changes in tropospheric to surface zonal mean temperature in the tropics associated with deep tropospheric mixing associated with cumulonimbus. This is expected to be relatively constant on annual and probably longer timescales (C5).

The validation and interpretation of climatic variations is the heat content of the ocean (Ellis et al., 1978) is another valuable diagnostic. Its changes are several orders of magnitude greater than those of the atmosphere and are detectable over the last four decades (Levitus et al., 2000, 2005; Willis et al., 2004, Barnett et al., 2005). For comparison with atmospheric trends, the changing heat content of the upper few hundred meters is likely the most important. It is recommended that more groups create such data sets beyond those of Levitus et al. (2000, 2005), Ishii et al. (2002) and Willis et al. (2004). Changes in the ocean heat content can also be used to diagnose the radiative imbalance of the Earth's climate system (Ellis et al., 1978, Pielke, 2003). For the surface and tropospheric temperature changes with time, the changing heat content of the upper few hundred meters is likely the most important. Willis et al. (2004), report that most of

the ocean heat storage changes in the 1990s were in the mid-latitudes of the Southern Hemisphere which provides a challenge for the models to reproduce (C5).

Snow, frozen soils, and sea ice constrain surface temperature on all timescales. For example, warm air advection over ice will produce near surface air temperatures that will increase with height in the lower layers of the atmosphere. Thus, homogeneous analyses of snow cover and sea ice (see e.g., Rayner et al., 2003 for sea ice and Robinson and Frei, 2000 for snow cover) are needed in the interpretation of high-latitude, low altitude atmospheric temperature profiles, although it is recognized that snow cover is an inherently noisy quantity even on large scales.

Recommendation:

- F. In order to properly understand observed and simulated temperature changes both at the surface and aloft, they should be evaluated and interpreted in the context of other types of data, such as surface and upper-air absolute humidity, winds aloft, and ocean heat content. This requires efforts to create climate quality records from a range of data sources, which to date have been under-utilized (Table 2.1). It is important to create several independent datasets for each variable to understand structural uncertainty and avoid ambiguity (C2, C3).**

. Need for more detailed spatial evaluation of trends

Discussion of trends in Chapters 2 to 5 is mainly limited to global and tropical annual averages. However, there is substantial new insight to be gained by assessing trends on regional scales, since as illustrated in Figure 5.5 (spatial plot of tropospheric temperatures globally) as there is considerable spatial structure on this scale. Indeed, it is the spatial changes in layer-averaged tropospheric temperatures which result in changes in large-scale circulation (and, therefore, weather patterns). Despite the limitations of the current reanalyses, these signals are large enough to be recognized as real tropospheric temperature changes, particularly if similar spatial patterns occur in each available reanalysis (C2,C5).

Such significant trends in regional temperature (Chase et al., 2000; Stohlgren et al., 2004; Agudelo and Curry, 2004) are associated with important long-term changes in tropospheric pressure and wind fields. The importance of such circulation changes has been documented, for example, by Trenberth and Hurrell (1994), Hoerling et al (2001), Chung and Ramanathan (2003), Scaife et al (2005), and Chase et al (2000). In addition, since the magnitudes of the trends are larger on a regional scale, it should be easier to contrast the different observational and analysis procedures than relying on global- and zonal-averages. The assessment of seasonal trends and day/night differences would also add to the ability to distinguish between the observational analyses (C5).

Recommendation:

- G. Surface and tropospheric trends, as assessed by the different observational platforms and from reanalyses and model simulations, need to be evaluated on regional for seasons and for day/night time periods and quantitatively compared with each other. All analyses should be accompanied by statistically rigorous uncertainty estimates (C3, C4, C5, and Appendix).**

Disagreement on the merit of including “reanalysis” here and on seasons and day/night (John L.)

Recommended to delete as being too general and that others are already doing this(Steve S.)

Need to perform nonlinear trend and variability assessments

Trends in temperature data sets in this report have generally been calculated using forms of linear regression. Where linear regression is used, forms that fully reflect the number of degrees of freedom and uncertainties in the data set are recommended, e.g., as discussed in Diggle, (1999); alternative estimators, such as pair-wise median slopes, that are less susceptible to outliers (e.g., Gilbert, 1987), can also be used. Many climatic time series, such as the global temperature series, however, are non-linear on multidecadal time scales, even just since 1958 (C3). For example, the flattening of the stratospheric cooling since the mid-1990s evident in Figure 4.4c is not properly characterized by a linear trend. Alternative estimates of temperature variations that include this non-linearity should be investigated (Appendix).

Recommendation:

- H. Nonlinear trend analysis is required to better quantify more complex temporal patterns of change (Appendix)**

Disagreement on the merit of including this recommendation (John L; Steve

Sherwood.)

Model studies.

The National Research Council report (NRC, 2005) provides a discussion of climate as the system consisting of the atmosphere, hydrosphere, lithosphere, and biosphere. Physical, chemical, and biological processes are involved in interactions among the components of the climate system (C1). The use of global climate models to improve our understanding of why

temperatures vary vertically need to include component models which accurately represent the oceans, atmosphere, land and continental ice and their interfacial fluxes (C5). The advancement of this understanding requires that the regional variations of surface and tropospheric temperature trends be investigated, in addition to zonally-averaged and globally-averaged trends. The suite of known anthropogenic and natural climate forcings and feedbacks needs to be included in the models.

A major conclusion of Chapter 5 was that global models simulate that natural and anthropogenic climate forcings have influenced the temporal changes of tropospheric and surface temperature on the globally averaged and zonally-averaged scales during the period 1979-1999. These models contain most of the recognized first order climate forcings and feedbacks as identified in Houghton et al., (2001), NRC (2003), and NRC (2005). This is an important step forward. However models still differ in how these forcings are applied, making it difficult to separate model differences from forcing effects on trends. Anthropogenic aerosols including black carbon, and landscape changes are significant spatially heterogeneous climate forcings; these have been included for the first time in some of the models used in this report, but explicit quantification of their effects remains difficult to ascertain because they have been included as part of a suite of forcings rather than in isolation (C5). Other climate forcings such as the biogeochemical effect of increased carbon dioxide and the complete spectrum of aerosol forcings (see Table 2-2 in NRC, 2005) have not yet been included. The impact of stratospheric forcing, both ozone changes and volcanic influences, also still needs more attention.(C5)

Published evidence (e.g. see the summary in NRC (2005)) exists that spatially heterogeneous forcings results in regional variations in the surface and tropospheric temperatures both in the regions where the forcings occur, and through changes in large-scale atmospheric circulation patterns, in remote regions (C1). In some areas, resulting regional temperature trends on a 20-year time-scale from these forcings may be at least as large as those arising from the more spatially homogeneous climate forcing from increasing well-mixed greenhouse gases. It is also likely that, owing to different real and modeled internal variability, observations and models may often disagree on regional scales over periods as short as 20-25 years. Despite this, the observational data sets themselves can and should be compared in much more detail – down to 5 degrees latitude by longitude for example - as they are sampling the same regional internal variability (C5).

To help further understand causes of temperature changes, it is necessary to carry out sensitivity tests using climate models with the suite of identified individual forcing factors and their combinations. Such tests must take full account of interannual and decadal variability, such as that related to ENSO, the NAO, volcanic and solar effects and perhaps the thermohaline circulation of the oceans, as they affect Atlantic-wide sea surface temperature. Thus, large ensembles, both multi-model and single-model, are required to estimate the influence of this variability on the results of the sensitivity tests (C5).

Recommendation:

- I. Use regional and global climate models to improve our understanding of the variations of the vertical temperature structure of the atmosphere. This will include assessment of the roles of spatially heterogeneous climate forcings and feedbacks. We recommend a structured array of experiments, in which climate models are run with different plausible estimates of solar irradiance, volcanic aerosols, anthropogenic aerosols including black carbon, land use/land cover, and stratospheric and tropospheric ozone. In these studies it should be clearly emphasized that data are being used to test models and not *vice-versa*. As well as a wide range of models, it is also imperative to use a range of climate datasets to compare with the model results to avoid ambiguity in interpretation (C5). Continue to assess tropospheric temperature trends using a full range of statistical techniques and modeling tools, and expand these assessments to cover smaller spatial scales and the effects of spatially heterogeneous forcing on long-term changes in atmospheric circulation, and therefore, regional temperature, patterns (C5, Appendix).

Recommended to be deleted by Steve Sherwood as useless and vanilla and just describe what is already going on. He suggests

“Encourage that models be sampled the same way the real atmosphere is sampled by the various observing system, in order to reduce possible errors related to poor sampling cited above”

I agree this is an excellent addition; other comments?

2. Recommendations regarding future measurement opportunities

This is an important section; John L suggests breaking into text. I prefer this format but it could be either way; preferences?

- A. Following Key Action 12 of the GCOS Implementation Plan (GCOS, 2004), develop and implement a subset of the GUAN sites as reference network sites. At these sites the goal is for full explicit characterization of the atmospheric column properties (physical and chemical), which requires a large suite of instrumentation to allow redundancy in measurements. These globally distributed super-sites should incorporate upward looking instruments (radar, lidar, Global Positioning System (GPS) related data, microwave sensors, etc.) along with highly calibrated temperature and relative humidity measurements on balloons regularly penetrating well into the stratosphere and, ideally, be located for comparison with satellite overpasses. Their primary aim is to provide unambiguous anchor points which can explicitly constrain our uncertainty in more globally complete monitoring efforts.(C2,C3,C4).

- B. The GCOS climate monitoring principles for *in-situ* and satellite observations must be fully implemented both globally and in the United States, as stressed in Key Action 12 of the GCOS Implementation Plan (GCOS, 2004). Failure to adhere to principles that have been adopted by the Conference of the Parties prejudices our ability to understand climate variations and changes throughout the atmosphere and ocean, and on land and continental ice sheets. Rigorous implementation of robust transfer standards going forward in time is essential for effective surface and upper-air climate networks. (C2,C3,C4).**
- C. When surface, atmospheric or satellite observing instruments are changed or re-sited, the period of overlap between the old and new instruments or configurations should be sufficient to allow analysts to adjust for the change with small uncertainties that do not prejudice the analysis of climate trends. Thus, replacement satellite launches should be planned to take place at least a year prior to the expected time of failure of a satellite. Also, orbital passages of two or more satellites over the same location should be used whenever available to monitor the robustness of the satellite measurements.(C2,C3,C4)**
- D. Current and planned multi-spectral infra-red satellite sounders such as AIRS and IASI have much finer resolution and have the potential to much more fully resolve the details of temperature and humidity profiles in the atmosphere (among other quantities). Higher spectral resolution also should permit a continuation of earlier coarser infra-red instrument measures (e.g. HIRS). We recommend efforts to develop climate datasets based upon global observations of infra-red radiances from satellites since 1973. Along with the production of cloud-cleared products from current multi-spectral data, this would entail the reprocessing of historical VTPR and HIRS data to correct for inter- and intra-satellite biases and trace gas influences. It is vital that several independent efforts be made to create such climate datasets, to allow us to rigorously assess observational uncertainty. (C2,C3,C4)**

Steve Sherwood questions whether climate quality information can be obtained from IR data. He prefers changing this recommendation to be closer to CH2 in which we recommend that the feasibility of using these data be investigated first.

- E. Maintain satellite Advanced Microwave Sounding Unit (AMSU-A) equivalent measurements (i.e. with the same measurement frequency and bandwidth) of the atmospheric temperature for several decades into the future with no gaps in the measurements. This builds on Key Action 12. (C2,C3,C4)**
- F. The emerging satellite-based GPS occultation monitoring system for temperature and humidity needs to be maintained for several decades at least, and its accuracy for determining long term temperature trends should be quantified. This system is self-calibrating and should provide atmospheric temperature (and therefore, height) measurements of high accuracy where water vapor has low concentrations, and below that level if water vapor can be accurately accounted for. GPS-based**

radiosonde heights for the future should also be a high priority, to enable independent validation of radiosonde-based heights derived from their virtual temperatures and humidity data. This also builds on Key Action 12. (C2,C3,C4)

G. Recommendations made in the US Climate Change Science Program must be implemented to improve our understanding of temperature changes throughout the atmosphere. For example, the US Climate Reference Network should be fully implemented. This will resolve the issues of poor microclimate exposure and spatial representativeness in USA and enable better interpretation of surface air temperature trends. (C2,C3,C4)

BOX KEY RECOMMENDATIONS

We have extracted out the most important four recommendations and display them here. The first is our key recommendation for making the best use of data we currently have or are likely to possess in the near future. The second and third activities also relate to existing data and are ripe for development in the next few years. The fourth relates to future data.

1. The causes of discrepancies between upper-air datasets need to be ascertained to gain a better estimate of the true tropospheric trend. Achieving this aim requires the development of unambiguous analysis tools that can be used to objectively discriminate between the datasets currently available. Tropospheric wind observations, and the resultant diagnosis of the temperature field, should be used as an independent metric to compare with the satellite and radiosonde observations of temperature.

2. In order to properly understand observed and simulated temperature changes both at the surface and aloft, they should be evaluated and interpreted in the context of other types of data, such as surface and upper-air absolute humidity, winds aloft, and ocean heat content. This requires efforts to create climate quality records from a range of data sources, which to date have been under-utilized. It is important to create several independent datasets for each variable to understand structural uncertainty and avoid ambiguity. Remaining issues with the homogeneity of the surface temperature data need to be resolved. This includes current and archival photographs of the sites, assessment of surface absolute humidity trends, and the quantification of the uncertainty associated with each step in the homogenization of the data.

3. Consistent with Key Action 24 of GCOS (2004) and a 10 Year Climate Target of GEOSS (2005), efforts should be made to create several climate change quality atmospheric reanalyses. A strategy is needed to create geographically complete reanalyses of “climate change” quality (Thorne et al. 2005a), which take advantage of physical relationships between temperature, winds, absolute humidity, soil moisture, upper layer ocean heat

storage and other climate variables. It is imperative that any such system use data that are as homogeneous as possible and that reanalyses be performed at multiple Centers.

4. Following Key Action 12 of the GCOS Implementation Plan (GCOS, 2004), develop and implement a subset of the GUAN sites as reference network sites. At these sites the goal is for full explicit characterization of the atmospheric column properties (physical and chemical), which requires a large suite of instrumentation to allow redundancy in measurements. These globally distributed super-sites should incorporate upward looking instruments (radar, lidar, Global Positioning System (GPS) related data, microwave sensors, etc.) along with highly calibrated temperature and relative humidity measurements on balloons regularly penetrating well into the stratosphere and, ideally, be located for comparison with satellite overpasses. Their primary aim is to provide unambiguous anchor points which can explicitly constrain our uncertainty in more globally complete monitoring efforts.

References

- Agudelo, P. A. and J. A. Curry, 2004: Analysis of spatial distribution in tropospheric temperatures. *Geoph. Res. Lett.*, **31**, L22207, doi:10.1029/2004GRL020218.
- Bengtsson, L., S. Hagemann and K.I. Hodges, 2004: Can climate trends be calculated from reanalysis data? *J. Geophys. Res.*, **109**, D11111, doi:10.1029/2004JD 004536.
- Berry, D. I., E. C. Kent and P. K. Taylor, 2004: An Analytical Model of Heating Errors in Marine Air Temperatures from Ships. *J. Atmos. Oceanic Tech.* (accepted).
- Chase, T.N., R.A. Pielke, T.G.F. Kittel, R.R. Nemani, and S.W. Running, 2000: Simulated impacts of historical land cover changes on global climate in northern winter. *Climate Dynamics*, **16**, 93-105.
- Christy, J., D. Parker, S. Brown, I. Macadam, M. Stendel, and W. Norris, 2001: Differential trends in tropical sea surface and atmospheric temperature since 1979. *Geophys. Res. Lett.*, **28**, 183–186.
- Chung, C. E. and V. Ramanathan, 2003: South Asian haze forcing: remote impacts with implications to ENSO and AO. *J. Climate* **16**, 1791-1806.
- Davey, C.A., and R.A. Pielke Sr., 2005: Microclimate exposures of surface-based weather stations - implications for the assessment of long-term temperature trends. *Bull. Amer. Meteor. Soc.*, **86**, 497–504.
- Diaz, H., C. Folland, T. Manabe, D. Parker, R. Reynolds, and S. Woodruff, 2002: Workshop on Advances in the Use of Historical Marine Climate Data. *WMO Bulletin*, **51**, 377-380.

Diggle, P.J., K. Liang and S.L. Zeger, 1999: *Analysis of longitudinal data*. Oxford University Press.

Donlon, C J., 2005: Proceedings of the sixth Global Ocean Data Assimilation Experiment (GODAE) High Resolution Sea Surface Temperature Pilot Project (GHRSSST-PP) Science Team Meeting, Met Office, Exeter, May 16-20th 2005, Available from the International GHRSSST-PP Project Office, Hadley Centre, Exeter, UK, pp 212.

Ellis, J.S., T.H. Vonder Haar, S. Levitus, and A.H. Oort, 1978: The annual variation in the global heat balance of the Earth. *J. Geophys. Res.*, **83**, 1958-1962.

Folland, C.K., Reynolds, R.W., Gordon, M. and D.E. Parker, 1993: A study of six operational sea surface temperature analyses. *J. Climate.*, **6**, 96-113.

Folland C.K., Salinger M.J., Jiang, N. and N. Rayner, 2003: Trends and Variations in South Pacific Island and Ocean Surface Temperature. *J. Climate*, **16**, 2859-2874.

GCOS, 2004: Global Climate Observing System Implementation Plan for the Global Observing System for Climate in support of the UNFCCC, GCOS-92/WMO TD 1219, WMO, Geneva, pp136, Available at <http://www.wmo.int/web/gcos/gcoshome.html>

GEO, 2005: Global Earth Observation System of Systems, GEOSS. 10-Year Implementation Plan Reference Document. GEO1000R/ESA SP-1284. ESA Publications, Noordwijk, Netherlands. pp 209. CD available.

Gilbert, R.O., 1987: *Statistical methods for environmental monitoring*. Van Nostrand Reinhold, New York.

Hoerling, M. P. J. W. Hurrell, and T. Xu, 2001: Tropical Origins for Recent North Atlantic Climate Change. *Science*, **292**, 90-92 .

Houghton, J.T. et al., 2001: *Climate Change 2001: The Scientific Basis*. Cambridge University Press, 881 pp.

Ishii, M., M. Kimoto, and M. Kachi, 2002: Historical ocean subsurface temperature analysis with error estimates. *Mon. Weath. Rev.*, **131**, 51-73.

Kabat, P., Claussen, M., Dirmeyer, P.A., Gash, J.H.C., Bravo de Guenni, L., Meybeck, M., Pielke Sr., R.A., Vörösmarty, C.J., Hutjes, R.W.A., Lütkemeier, S. (Eds.), 2004: *Vegetation, Water, Humans and the Climate: A New Perspective on an Interactive System*. Springer, Berlin,

Kent, E. C. and P. G. Challenor, 2005: Towards Estimating Climatic Trends in SST, Part 2: Random Errors. *J. Atmos. Oceanic Tech.*, in press.

Kent, E.C. and A. Kaplan, 2005: Towards estimating climatic trends in SST data, part 3: Systematic biases. *J. Atmos. Ocean. Tech.*, in press.

Kent, E.C. and P.K. Taylor, 2005: Towards Estimating Climatic Trends in SST Data, Part 1: Methods of Measurement. *J. Atmos. Oceanic Tech.*, in press.

Levitus, S., J. Antonov, T.P. Boyer and C. Stephens, 2000. Warming of the World Ocean. *Science*, **287**, 2225-2229.

NRC, 2003: Understanding Climate Change Feedbacks. Washington, D.C.: The National Academies Press.

NRC, 2005: National Research Council, 2005: Radiative forcing of climate change: Expanding the concept and addressing uncertainties. Committee on Radiative Forcing Effects on Climate Change, Climate Research Committee, Board on Atmospheric Sciences and Climate, Division on Earth and Life Studies, The National Academies Press, Washington, D.C.,

Parker, D.E., 2004: Large-scale warming is not urban. *Nature*, **432**, 290.

Pathack, B., J. Nash, R. Smout, and S. Kurnosenko, 2005: Preliminary Results of WMO Intercomparison of high quality radiosonde systems, Mauritius, February 2005. [www.wmo.ch/web/www/IMOP/meetings/Upper-Air/RSO-ComparisonMauritius/3\(16\)_UK_Nash_Vacoas.pdf](http://www.wmo.ch/web/www/IMOP/meetings/Upper-Air/RSO-ComparisonMauritius/3(16)_UK_Nash_Vacoas.pdf)

Peterson, T. C., 2003: Assessment of urban versus rural in situ surface temperatures in the contiguous United States: no difference found. *J. Climate*, **16**. 2941-2959.

Peterson, T.C., H. Daan and P.D. Jones, 1997: Initial selection of a GCOS surface network. *Bull. Amer. Meteor. Soc.*, **78**, 2145-2152.

Pielke Sr., R.A., 2001: Influence of the spatial distribution of vegetation and soils on the prediction of cumulus convective rainfall. *Rev. Geophys.*, **39**, 151-177.

Pielke Sr., R.A., 2003: Heat storage within the Earth system. *Bull. Amer. Meteor. Soc.*, **84**, 331-335.

Pielke, R.A., and T. Matsui, 2005: Should light wind and windy nights have the same temperature trends at individual levels even if the surface layer averaged heat content change is the same? Submitted to GRL.

Pitman, A.J., 2003: The evolution of, and revolution in, land surface schemes designed for climate models. *Int. J. Climatology*, **23**(5), 479-510.

Rayner, N.A. et al., 2003: Rayner, N.A., D.E. Parker, E.B. Horton, C.K. Folland, L.V. Alexander, D.P. Rowell, E.C. Kent, and A. Kaplan, 2003: Global analyses of sea surface temperature, sea ice, and night marine air temperature since the late nineteenth century. *J. Geophys. Res.*, **108**(D14), 4407, doi:10.1029/2002JD002670.

- Rayner, N.A., P. Brohan, D.E. Parker, C.K. Folland, J. Hardwick, J. Kennedy, M. Vanicek, T. Ansell, and S.F.B. Tett, 2005: Improved analyses of changes and uncertainties in marine temperature measured *in situ* since the mid-nineteenth century. *J. Climate*, (accepted).
- Reynolds, R. W, C. Gentemann, and F. Wentz, 2004: Impact of TRMM SSTs on a climate-scale SST analysis. *J. Climate*, **17**, (in press).
- Robinson, D.A. & A. Frei (2000) Seasonal Variability of Northern Hemisphere Snow Extent Using Visible Satellite Data. *Professional Geographer*, 51, 307-314.
- Ross, W.J. and W.P Elliott, 2001: Radiosonde-based Northern Hemisphere water vapour trends. *J. Climate*, **14**, 1602-1612.
- Santer, B.D., T.M.L. Wigley, C. Mears, F. J. Wentz, S.A. Klein, D. J. Seidel, K. E. Taylor, P. W. Thorne, M. F. Wehner, P. J. Gleickler, J. S. Boyle, W. Collins, K. W. Dixon, C. Doutriaux, M. Free, Q. Free, J. E. Hansen, G. S. Jones, R. Ruedy, T. R. Karl, J. R. Lanzante, G. A. Meehl, V. Ramaswamy, G. Russell, and G. A. Schmidt, 2005: Amplification of surface temperature trends and variability in the tropical atmosphere. *Science*, in press.
- Scaife, A.A., Knight, J.R, Vallis, G.K. and C.K Folland, 2005: A stratospheric influence on the winter NAO and North Atlantic winter surface climate. *Geophys. Res. Lett.*, (in press)
- Seidel, D.J. et al., 2004: Uncertainty in signals of large-scale climate variations in radiosonde and satellite upper-air temperature datasets. *J. Climate*, **17**, 2225-2240.
- Sherwood, S.C., J. Lanzante, and C. Meyer, 2005: Radiosonde daytime biases and late 20th century warming. *Science*, in press.
- Stohlgren, T.J., T.N. Chase, R.A. Pielke Sr., and J. Graham, 2004: Mapping spatial anomalies in ecology. *Frontiers in Ecol. and Environ.*, (submitted).
- Thorne, P.W., T.R. Karl, H. Coleman, C.K. Folland, W.L. Murray, D.E. Parker, V. Ramaswamy, W.B. Rossow, A.A. Scaife, and S.F.B. Tett, 2005a: Report of workshop on vertical profiles of temperature trends, Hadley Centre, Met Office, Exeter, UK, 13th – 17th September 2004. *Bull. Amer. Meteorol. Soc.*, **86**, in press.
- Thorne, P.W., D.E. Parker, S.F.B. Tett, P.D. Jones, M. McCarthy, H. Coleman, P. Brohan and J.R. Knight, 2005b: Revisiting radiosonde upper-air temperatures from 1958 to 2002. *J. Geophys. Res. (Atmospheres)*, in press.
- Trenberth, K. E., and J.W. Hurrell , 1994: Decadal atmosphere-ocean variations in the Pacific. *Climate Dynamics*, **9**, 303-319.
- Vose, R.S., D.R. Easterling, T.R. Karl, and M. Helfert, 2005: Comments on ‘Davey, C.A., and R.A. Pielke Sr., 2004: Microclimate exposures of surface-based weather stations - implications for the assessment of long-term temperature trends. *Bull. Amer. Meteor. Soc.*, **86**, 504-506.

Wentz, F.J. C Gentemann, D. Smith and D. Chelton, 2000: Satellite measurements of sea surface temperature through clouds. *Science*, 288, 847-850.

Willis, J., D. Roemmich, and B. Cornuelle, 2004: Interannual variability in upper-ocean heat content, temperature, and thermosteric expansion on global scales. *J. Geophys. Res.*, 109, No. C12, C12036 <http://dx.doi.org/10.1029/2003JC002260>

Appendix C: E-mail Documentation of Change of Policy with Respect to Dissenting Views

----- Forwarded message -----

Date: Fri, 07 Jan 2005 09:36:42 -0500

From: Thomas R Karl <Thomas.R.Karl@noaa.gov>

To: CCSP Authors <CCSPTempTrendAuthors.NCDC@noaa.gov>

Subject: Text to appear at the end of the Preface regarding dissident view

Resent-Date: Fri, 7 Jan 2005 07:36:39 -0700

Resent-From: CCSPTempTrendAuthors.NCDC@noaa.gov

Dear CLAs and LAs,

I have obtained approval from Jim Mahoney to proceed on the basis outlined in the note below. This text has been approved by Dr. Mahoney and is consistent with a broader text that the CCSP principals will take up in early Feb at their next meeting. The implications of the Note requires us to eliminate footnotes of dissent. Instead, there will be an Appendix where this material can be articulated. Please note, this is a means of last resort. It also means the CLAs and LAs can maintain their authorship on the sections assigned to them, but if they can't possibly come to a resolution on some topics within a Chapter or the ES (after the Chief Editor has determined that the CLA responsible for the Chapter or ES has adequately responded) then the dissenting LA can author a short piece in the Appendix. The Appendix also offers an opportunity for the other LAs or CLAs to respond if appropriate.

For our Report, I am hopeful we can move forward on the Executive Summary expeditiously. I know Tom W has put an awful lot of work into this over the past few weeks, and we are very close.

Thanks for those who have responded to the Chapters so far. The plan is to correct the problems identified next week and send everything to the NRC next Friday. If indeed, we need to send an Appendix, then we will indicate to them that it will follow subsequently.

Tom Karl

NOTE: Although the CCSP strives for consensus in these Synthesis and Assessment products, it is also committed to inclusion of all substantial views. This commitment includes the recognition that there may be infrequent occasions when consensus cannot be achieved. In these cases, the CCSP policy allows the inclusion, with the product, of a concise, dissenting statement that is focused on the specific areas of

disagreement. Such a situation has arisen in the preparation of this Synthesis and Assessment product in that one of the Convening Lead Authors feels that, in spite of diligent discussion, there is not a suitable reflection of his views in some aspects of the product. Consequently, a dissenting view statement is included in Appendix A of this synthesis product report. (THE FOLLOWING TEXT WOULD BE INCLUDED IF APPLICABLE) The Appendix also presents the response by the other Convening Lead Authors and Lead Authors to the dissenting view.

Date: Tue, 11 Jan 2005 19:30:34 -0700 (MST)
From: Roger Pielke <pielke@atmos.colostate.edu>
To: Thomas R Karl <Thomas.R.Karl@noaa.gov>
Subject: Executive Summary

Tom

I have read the final version of the ES. There is much that is well done in the summary, but it has embedded conclusions which go well beyond what is actually the state of the science, and is even internally inconsistent in places. The last sentence in the abstract (lines 66-68) is a remarkable stretch.

Indeed, I wish that you had required continued wordsmithing to closure. However, having now read the final text and seeing how it still conflicts with peer-reviewed published work that I have been an author on, as well as a range of other papers, despite my efforts for inclusion, I cannot have my name listed on the ES. It does not satisfactorily cover the diverse perspectives that was a requirement of our Committee.

I will prepare a minority summary for the appendix to document my reasons, as outlined in your earlier e-mail. Please let me know when you need this by. Also, how much time at the NRC review will I have to present orally my objections?

My name should remain listed on the report as a co-author, as I am very pleased with the complete agreement that was achieved for Chapter 6. Chapter 6 shows that such agreement is possible if we as co-authors are required to address diverse perspectives in the text.

Roger

Date: Tue, 11 Jan 2005 21:58:38 -0500
From: Thomas R Karl <Thomas.R.Karl@noaa.gov>
To: Roger Pielke <pielke@atmos.colostate.edu>
Cc: John Christy <john.christy@nsstc.uah.edu>, John Christy <christy@nsstc.uah.edu>, Tom Wigley <wigley@cgd.ucar.edu>
Subject: Re: Executive Summary

Hi Roger,

Thanks, if I thought that there was some chance that you and Tom and John (and other CLAs) could come to a consensus on the ES I would delay sending the report to the NRC, but to me that there seems to be an impasse. The plan is not to send the report to NRC until next week, so if you and Tom think there is still a chance, I will wait another week--- but only if there is agreement up front that by the end of next week we will have consensus.

Assuming neither of you want to agree an up front consensus approach, I would need to get a succinct dissenting view from you by Jan 25 (two weeks from today). Then I would give the other authors two weeks to respond. In this way we could have it to NRC prior to our brief to them.

We have not assembled a schedule for the NRC meeting yet, and I will be meeting with Chris Elfring tomorrow to discuss. I have just heard that the NRC may want to postpone our brief to them to the following week. I am not sure of the impact here since virtually everyone could make the Feb 16 date on our side (Feb 23 may run into problems with our team). In any case, I will know more tomorrow. It may turn out that we cannot even brief the NRC, but let our report stand for itself.

Regards, Tom

Roger Pielke wrote:

>Tom
>
> I have read the final version of the ES. There is much that is well done
>in the summary, but it has embedded conclusions which go well beyond what
>is actually the state of the science, and is even internally inconsistent
>in places. The last sentence in the abstract (lines 66-68) is a
>remarkable stretch.
>
> Indeed, I wish that you had required continued wordsmithing to closure.

>However, having now read the final text and seeing how it still conflicts
>with peer-reviewed published work that I have been an author on, as well
>as a range of other papers, despite my efforts for inclusion, I cannot
>have my name listed on the ES. It does not satisfactorily cover the
>diverse perspectives that was a requirement of our Committee.
>
> I will prepare a minority summary for the appendix to document my
>reasons, as outlined in your earlier e-mail. Please let me know when you
>need this by. Also, how much time at the NRC review will I have to present
>orally my objections?
>
> My name should remain listed on the report as a co-author, as I am very
>pleased with the complete agreement that was achieved for Chapter 6.
>Chapter 6 shows that such agreement is possible if we as co-authors are
>required to address diverse perspectives in the text.
>
>Roger
>
>
>
>

Date: Mon, 17 Jan 2005 16:01:07 -0500
From: Thomas R Karl <Thomas.R.Karl@noaa.gov>
To: Roger Pielke <pielke_r@msn.com>, Roger Pielke <pielke_r@comcast.net>,
Roger Pielke <pielke@atmos.colostate.edu>,
John Christy <christy@nsstc.uah.edu>
Subject: Appendix

Roger/John

Please keep in mind a the dissent must be to the point and concise

Thanks Tom

Date: Wed, 19 Jan 2005 11:24:30 -0500
From: Thomas R Karl <Thomas.R.Karl@noaa.gov>
To: Roger Pielke <pielke@atmos.colostate.edu>
Cc: Roger Pielke <pielke_r@msn.com>, Roger Pielke <pielke_r@comcast.net>,
John Christy <christy@nsstc.uah.edu>
Subject: Re: minority report and ES

Roger,

The Appendix will be listed in the Table of Contents as Dissenting Views
and Responses with authors identified. The ES will not refer to the

Appendix

Tom

Roger Pielke wrote:

>
> Tom-
>
> Whether to keep my name depends on how the minority view authors are
> highlighted in order to identify their disagreement. Is the ES going
> to be
> silent on this as you have in the latest version?
>
> Roger
>

From: Thomas R Karl <Thomas.R.Karl@noaa.gov>
To: Jerry Meehl <meehl@ucar.edu>
Cc: Thomas C Peterson <Thomas.C.Peterson@noaa.gov>,
_NESDIS NCDC CCSP Temp Trends Lead Authors
<CCSPTempTrendAuthors.NCDC@noaa.gov>
Subject: Re: minority report
Resent-Date: Mon, 31 Jan 2005 10:39:29 -0700
Resent-From: CCSPTempTrendAuthors.NCDC@noaa.gov

Jerry,

The protocol I wish to follow is that for each dissent -- we now have two (Roger and John C. but these may change when we get the final ES out), is that we will have one response from all the other CLAs and LAs on each of the dissents. Clearly one person will have to take the lead to write the dissent, but since they both now focus on the ES, I would expect Tom Wigley to take the lead with others signing on. Right now Roger's dissent is five pages which makes it less effective than the shorter 1 pager from John. If we have equal space for the other Lead Authors response (one person argued it should be 20 times longer since there are 20 other LAs) this would already be 12 word pages (not including references and any figures). I would hope we could limit the whole exercise to 10 pages or less including diagrams (even better if we had no dissents!).

Tom

Jerry Meehl wrote:

> I have just returned from travel and expected to see more responses to
> Tom's email. I agree with his main points, and wonder if we all
> should respond to Roger's "minority report"? If a number of LAs do
> so, the appendix will be a messy way to end the assessment, and will
> read like a series of email exchanges. I believe the best way to
> handle this, which may already be the case, is to submit the "minority
> report" and responses separately to the NRC review panel, and let them
> judge how or whether to include that material in the main report.
> Then we would all have to abide by their decision, whatever it may be.
>
> Jerry

Date: Tue, 1 Feb 2005 17:37:13 -0700 (MST)
From: Roger Pielke <pielke@atmos.colostate.edu>
To: Thomas R Karl <Thomas.R.Karl@noaa.gov>
Cc: _NESDIS NCDC CCSP Temp Trends Lead Authors
<CCSPTempTrendAuthors.NCDC@noaa.gov>
Subject: Re: 2nd 48-hour call for blunders and errors on the Executive
Summary (finally!)

Tom-

I will read and work on my minority report tomorrow and Thursday. One initial comment is that the new "Motivation for this report" section is much more narrow than the task assigned to the Committee as described on the CCSP web site. As I write in my issue with respect to the process, the CCSP text should have explicitly defined this narrow charge to the Committee when we first met, not wait until now.

As John said, we are at a disadvantage in writing a minority report. Nonetheless, my comments will be open for the community to make up their own minds about the process and the science issues related to the four-dimensional variability and trends in surface and tropospheric trends. Topics which are incompletely covered in the report and in the ES.

Roger

Date: Wed, 19 Jan 2005 10:03:02 -0500
From: Thomas R Karl <Thomas.R.Karl@noaa.gov>
To: Roger Pielke <pielke@atmos.colostate.edu>
Cc: Roger Pielke <pielke_r@msn.com>, Roger Pielke <pielke_r@comcast.net>, John Christy <christy@nsstc.uah.edu>
Subject: Re: Appendix

Thanks Roger -- did you still want your name on the ES --- most recent version attached and will be sent off late today or tomorrow.

Roger Pielke wrote:

>Tom-

>

> My minority report will be about 5 1/2 pages plus about 13 citations. I expect to complete over the next few days and send to you. I have identified 8 science issues (each with a bullet and short following text) and 1 process issue. There are no figures.

>

>Roger

>

>

>

Date: Tue, 01 Feb 2005 16:52:45 -0500

From: Thomas R Karl <Thomas.R.Karl@noaa.gov>

To: _NESDIS NCDC CCSP Temp Trends Lead Authors
<CCSPTempTrendAuthors.NCDC@noaa.gov>

Subject: 2nd 48-hour call for blunders and errors on the Executive Summary (finally!)

Resent-Date: Tue, 1 Feb 2005 14:53:04 -0700

Resent-From: CCSPTempTrendAuthors.NCDC@noaa.gov

Dear Team

This is the Executive Summary with lots of cosmetic changes from the version you saw earlier. It is debateable whether there is much substantive change, but please read and let us know whether you find any outright errors or misstatements. Again we are not wordsmithing, and I know Roger (and John) will likely have some dissents, but this is the ES from which any dissent should stem from (not the old version). We must send this along with the Preface and Glossary out to the NRC by the end of the week or Thursday if possible.

If Roger and John have a dissenting view we really need to get that finalized at that time as well (I know they both have drafts from the last ES so this should not be onerous). Roger, please see if you can shorten by at least a page or so -- thanks. Then those, along with the responses would go to the NRC a week before the meeting (I would expect the entire Team to sign on to a response, but Tom Wigley will lead the drafting since both dissents relate to the ES). To repeat, I expect the response to the dissent to be no longer than the dissent itself, and in total should be 10 word pages or less including figures.

Regards, Tom

--

Date: Wed, 02 Feb 2005 12:24:34 -0500
From: Thomas R Karl <Thomas.R.Karl@noaa.gov>
To: Roger Pielke <pielke@atmos.colostate.edu>
Cc: John Christy <john.christy@nsstc.uah.edu>
Subject: Re: 2nd 48-hour call for blunders and errors on the Executive Summary (finally!) (fwd)

Agreed -- thanks

Roger Pielke wrote:

>Tom-
>
> Since there are several further edits being made, I cannot finalize my
>minority report until the true final version is complete. Please let me
>know when that version is available and I will forward my final version.
>
>Regards
>
>Roger
>
>
>

Date: Thu, 03 Feb 2005 08:51:34 -0500
From: Thomas R Karl <Thomas.R.Karl@noaa.gov>
To: John.Lanzante@noaa.gov
Cc: CCSPTempTrendAuthors.NCDC@noaa.gov, Richard Moss <rmos@usgcrp.gov>
Subject: Re: Lead Author Meeting, February 23
Resent-Date: Thu, 3 Feb 2005 06:51:46 -0700
Resent-From: CCSPTempTrendAuthors.NCDC@noaa.gov

John,Ram, and Tom et al.,

Thanks for the comments on the draft Agenda for the NRC review on Feb 23.

Let me explain the reason we have the draft as it stands now. Based on my discussion with NRC staff they will be assigning Chapters to individuals, so although everyone is encouraged to read the report, it is unlikely by Feb 23 that they will have really sunk their teeth into the report. So, in our discussions with NRC staff this seemed like a logical choice. I do agree with the sentiments reflected below

however, and we will propose back to the NRC a modification of the draft agenda.

First, we will need to have discussion on the Prospectus and the general CCSP plan for these Synthesis/Assessment Reports. I now believe we ought to allot 45 minutes for that discussion (Richard Moss will be attending to help answer any general question on the CCSP overall plans on these Reports). Then we would introduce the ES and the important points in the Report (now making it an hour-long presentation and Q&A). Then, I still think we should follow up with each of the six chapters which will focus on more of the details. We can cut down the time to 30 minutes including discussion for each chapter, so this will mean 15 minutes for a presentation to focus on key technical points in the chapter. The rest of the time can be used for general Q&A.

We already know that some NRC Committee members want to get into the details of the report and may be requesting data sets to perform their own calculations. We are developing a policy as how we might handle such requests. Right now, we are not inclined to provide any data through the CCSP process, but would encourage reviewers, if they are so inclined, to obtain data and model results through the normal channels, e.g., Data and Analysis Centers, Labs, etc. as appropriate.

Let me know if you have other suggestions before we send this revised agenda to NRC tomorrow.

Draft Agenda - Day One of the NRC Review Committee Meeting

- > 0730 - Review of Meeting Objectives - Review Committee and NRC Staff only
- >
- > 0800 - Prospectus & Preparation Process Overview - Tom Karl (Richard Moss available for CCSP process questions)
- > 0845 - Executive Summary ---- Tom Wigley (Tom Karl to substitute)
- > 0945 - Break
- > 1015 - Chapter 1 Presentation and Discussion - V. Ramaswamy
- > 1045 - Chapter 2 Presentation and Discussion - John Christy
- > 1115 - Chapter 3 Presentation and Discussion - John Lanzante
- > 1145 - Chapter 4 Presentation and Discussion - Carl Mears
- >
- > 1215 - Lunch
- >
- > 1315 - Chapter 5 - Presentation and Discussion - Ben Santer
- > 1345 - Chapter 6 - Presentation and Discussion - Roger Pielke, Sr.
- > 1415 - Appendix A - Dissenting View - Roger Pielke, Sr.; John Christy
- > Appendix A - Response - Ben Santer, et.al.

> 1500 - Break
> 1515 - General Q&A
> 1645 - Committee Discussion - Review Committee and NRC Staff only
>

Date: Mon, 07 Feb 2005 22:27:17 -0500
From: Thomas R Karl <Thomas.R.Karl@noaa.gov>
To: Roger Pielke <pielke@atmos.colostate.edu>,
_NESDIS NCDC CCSP Temp Trends Lead Authors
<CCSPTempTrendAuthors.NCDC@noaa.gov>
Subject: Re: CCSP Minority Report_R.A.Pielke Sr. (fwd)

Thanks Roger

CCSP Team --- please see attached based on my discussions with Tom Wigley today regarding a response to Roger's dissent.

John Chrisy informed me today he will not be providing a dissenting view.

Regards, Tom

Roger Pielke wrote:

>Tom
>
> Please use this version of my minority report. I made one edit in the
>last science issue.
>
>Regards
>
>Roger
>
>
>

Dear Team,

Roger Pielke has written a dissenting view that will be published as an Appendix along with the response from the other Team members. Since the target of the Response is the Executive Summary, Tom Wigley will be leading the response. I have spoken with Tom and he has elected to identify individuals most capable of responding the specific Process and Science Issues Roger identifies. Subsequent to developing a draft response Tom will integrate and send out for all to review. We have very tight timelines for response, so here is the schedule

Feb 14 ---draft of all the responses sent to Tom W for assembly.

Feb 16 --- Tom W. distributes integrated response to Team for review, edits, and comments

Feb 17 ---- All comments and edits due back to Tom Wigley and he assembles final response

Feb 18 ---- Tom Wigley provides final response to Tom Karl and Appendix A is distributed by cob to NRC.

The list of Team members Tom Wigley is soliciting input from on a collective response for each of the areas listed below include:

Process Issues ---- Tom Karl, Chris Miller, Bill Murray

Science Issue

- 1) Tom W. and Ben Santer
- 2) Tom W. and Ben Santer
- 3) Ram and Jerry M.
- 4) Tom W. and Ben Santer
- 5) Ram and Jerry M.
- 6) Tom Peterson, R. Vose, C. Folland, D. Parker
- 7) Tom W. and Ben Santer
- 8) Tom W. and Ben Santer

Responses should be no longer than the dissent, and preferably about half as long (references are ok, but no figures). Anyone not listed but feels as if they have something to contribute is welcome to join any of the above teams.

Date: Thu, 10 Feb 2005 17:11:22 -0500

From: Thomas R Karl <Thomas.R.Karl@noaa.gov>

To: Roger Pielke <pielke@atmos.colostate.edu>, Tom Wigley <wigley@cgd.ucar.edu>, Ben Santer <santer1@llnl.gov>

Cc: Bill Murray <William.L.Murray@noaa.gov>,
Chris Miller <Christopher.D.Miller@noaa.gov>

Subject: More on Appendix A (dissent)

Dear Tom, Roger and Ben,

I just got off the phone with the CCSP Office trying to address recent concerns expressed by some members of our Assessment Team related to the time we freeze the dissenting piece submitted by Roger. The concern was raised that if the Team Responds, Roger may want to change his dissent and this could go into an infinite iterative process. Another real problem that complicates this, is the fact that the ES will undoubtedly change after the NRC review and likely after the Public Comment Period. Remember this is a draft. Therefore Roger's dissent would have to change as would any response, and I could see concerns expressed by both sides

as to changing targets, so I think you can see the problem.

I hope each of you can see the logic in the following solution, which has the blessing of the CCSP Office.

- 1) We do not submit Appendix A (the Dissent and Response) to the NRC at this time/
- 2) We do provide for discussion on the dissenting view and response at the NRC meeting ---- recognizing that these issues could change after the NRC review but may actually help the NRC in their review.
- 3) After the NRC review and the Public Review, if a dissent is still warranted --- then as stated in the Prospectus (see CCSP web site) "If needed, the NRC will be asked to provide additional scientific analysis to bound scientific uncertainty associated with specific issues."

Thanks for your patience with this tricky issue
Tom Karl

-- Date: Fri, 11 Feb 2005 17:10:50 -0500

From: Thomas R Karl <Thomas.R.Karl@noaa.gov>

To: Roger Pielke <pielke@atmos.colostate.edu>

Cc: Tom Wigley <wigley@cgd.ucar.edu>, Ben Santer <santer1@llnl.gov>,

Bill Murray <William.L.Murray@noaa.gov>,

Chris Miller <Christopher.D.Miller@noaa.gov>

Subject: Re: More on Appendix A (dissent)

Roger,

You will have time on the NRC agenda on Feb 23 to express your dissent. We will not be providing a response at this time because of the likely changes that will be forthcoming in the ES draft after the NRC and Public Review. If you feel you must also distribute a written dissent to the NRC Committee at this time you will have to do so outside of the protocol outlined in the attachment where dissents are written as a measure of last resort. It is however entirely appropriate for you to express your concerns during the NRC meeting to help with the review process. The protocol is consistent with the message I sent you yesterday outlining CCSP policy on this issue.

Regards, Tom

Roger Pielke wrote:

>Tom-

>

> Not providing my written minority report to the NRC Committee at this

>time is unacceptable. I have spent considerable time documenting my
>concerns, and a written response is appropriate, as you outlined earlier.
>The NRC Committee is entitled to view my dissenting perspective in writing
>prior to the Chicago meeting. They should have time to read and digest the
>issues I raised before then.
> Quite frankly, I view this new direction as further limiting the ability
>to present diverse views on the Report, which is contrary to the CCSP
>directive on the web page. It would have been much easier to avoid this
>disagreement if you would have required Tom W. to work with me to adopt
>mutually satisfactory language in the ES.
> I look forward to reading Tom W. and Ben S.'s written response before the
>Chicago meeting.
>
>Roger
>
>
>

ADDRESSING A DISSIDENT VIEW IN THE CCSP SYNTHESIS PRODUCT REPORTS

CCSP is committed to a transparent process in the formulation of each of its synthesis products. To best serve its mission, CCSP diligently strives to achieve a consensus view when possible, allowing differences in views to be expressed in the text of the document and to be reflected in confidence intervals and statements. It is CCSP's belief that it is best able to serve users of its reports by delivering a consensus view free of self-standing dissenting statements.

Even so, CCSP recognizes that there may be limited cases and limited portions of the synthesis report where a participating author, even after diligent discussion of views, is not able to convince his/her colleagues of a suitable reflection of his/her views in some aspects of the product. In these rare cases, the incorporation of a dissenting view statement may be part of the synthesis product. The dissenting view should be concise, focus on specific areas of disagreement, and be included as an appendix to the product.

Inclusion of any dissenting view may be reviewed and discussed by other members of the author team. If the author team reaffirms that it is not possible to incorporate the dissenting view, then additionally, the

authors may also respond to the dissenting view in the appendix to the report.

The dissenting view should be drafted after the author team has concluded its work on the draft, following the public comment period. Other members of the team should discuss the dissent and decide whether it is possible to incorporate the dissenting view, and if not, then agree whether to respond to the dissent. The dissenting view and response of the other authors (if any) will then be submitted as part of the report (in the appendix) to the CCSP. The CCSP may request that the NRC

Date: Fri, 11 Feb 2005 16:30:42 -0700 (MST)
From: Roger Pielke <pielke@atmos.colostate.edu>
To: Thomas R Karl <Thomas.R.Karl@noaa.gov>
Cc: Tom Wigley <wigley@cgd.ucar.edu>, Ben Santer <santer1@llnl.gov>, Bill Murray <William.L.Murray@noaa.gov>, Chris Miller <Christopher.D.Miller@noaa.gov>
Subject: Re: More on Appendix A (dissent)

Tom-

Please send me the specific location on the CCSP web page with respect to our Committee where this approach was adopted (as listed in your e-mail). It completely conflicts with the protocol you wrote in your Feb 7 2005 e-mail. We agreed to an arrangement where I would retain co-authorship of the Executive Summary, with my minority report and responses included as an Appendix. You have unilaterally abrogated this agreement.

With respect to my written minority report, I will, therefore, be sending to the NRC Committee. They need this information to place my oral presentation in context.

Roger

--

+++++

Roger A. Pielke, Sr., Professor and State Climatologist
1371 Campus Delivery, Department Atmospheric Science,
Colorado State University, Fort Collins, CO 80523-1371,
Phone: 970-491-8293/Fax: 970-491-3314, Email: pielke@atmos.colostate.edu
VISIT OUR WEBSITES AT: <http://blue.atmos.colostate.edu/>
and <http://climate.atmos.colostate.edu>

On Fri, 11 Feb 2005, Thomas R Karl wrote:

> Date: Fri, 11 Feb 2005 17:10:50 -0500
> From: Thomas R Karl <Thomas.R.Karl@noaa.gov>
> To: Roger Pielke <pielke@atmos.colostate.edu>
> Cc: Tom Wigley <wigley@cgd.ucar.edu>, Ben Santer <santer1@llnl.gov>,
> Bill Murray <William.L.Murray@noaa.gov>,
> Chris Miller <Christopher.D.Miller@noaa.gov>
> Subject: Re: More on Appendix A (dissent)

>

> Roger,

>

> You will have time on the NRC agenda on Feb 23 to express your dissent.
> We will not be providing a response at this time because of the likley
> changes that will be forthcoming in the ES draft after the NRC and
> Public Review. If you feel you must also distribute a written dissent
> to the NRC Committee at this time you will have to do so outside of the
> protocol outlined in the attachment where dissents are written as a
> measure of last resort. It is however entirely appropriate for you to
> express your concerns during the NRC meeting to help with the review
> process. The protocol is consistent with the message I sent you
> yesterday outlining CCSP policy on this issue.

>

> Regards, Tom

>

> Roger Pielke wrote:

>

>>Tom-

>>

>> Not providing my written minority report to the NRC Committee at this
>>time is unacceptable. I have spent considerable time documenting my
>>concerns, and a written response is appropriate, as you outlined earlier.
>>The NRC Committee is entitled to view my dissenting perspective in writing
>>prior to the Chicago meeting. They should have time to read and digest the
>>issues I raised before then.
>> Quite frankly, I view this new direction as further limiting the ability
>>to present diverse views on the Report, which is contrary to the CCSP
>>directive on the web page. It would have been much easier to avoid this
>>disagreement if you would have required Tom W. to work with me to adopt
>>mutually satisfactory language in the ES.
>> I look forward to reading Tom W. and Ben S.'s written response before the
>>Chicago meeting.

>>

>>Roger

>>
>>
>>
>
>

Date: Mon, 14 Feb 2005 10:44:41 -0500
From: Thomas R Karl <Thomas.R.Karl@noaa.gov>
To: Roger Pielke <pielke@atmos.colostate.edu>
Cc: Tom Wigley <wigley@cgd.ucar.edu>, Ben Santer <santer1@llnl.gov>, Bill Murray <William.L.Murray@noaa.gov>, Chris Miller <Christopher.D.Miller@noaa.gov>, Richard Moss <rmoss@usgcrp.gov>, Elfring Chris <CElfring@nas.edu>, "Ricky" Sinha <psinha@nas.edu>, _NESDIS NCDC CCSP Temp Trends Lead Authors <CCSPTempTrendAuthors.NCDC@noaa.gov>
Subject: Re: More on Appendix A (dissent)

Roger,

No one has abrogated your right to be a co-author on the ES AND include a dissenting view in the Appendix. What has changed is the manner in which this can occur. As I indicated to you last week, the issue is one of timing. The CCSP Office would rather have the energy of the Team focus on a report that addresses the charge and reflects current understanding and uncertainty in lay-person terms. If in the end of the process (after Public Review), you consider a dissenting view essential --- the process will accomodate this. After my initial guidance as to how we could handle the dissent, it was clear that the such a process could not work and the CCSP Office developed an interim policy. Your dissent (if you still choose to have one after the ES is finalized) will be responded to by other members of the drafting team (who care to respond). Obviously, this cannot occur until the ES is finalized. The Dissenting view and response may then be reviewed again by the NRC to ensure it speaks to relevant and important issues of the Synthesis/Assessment product's charge.

The paragraph you cited below is not yet posted on the CCSP web page. The CCSP Office is using the paragraphs I sent you and the team as an interim policy, and will ask for approval of all the CCSP principals at their next meeting the end of Feb. After that time, I would expect it would be shortly posted on the Web site.

Roger, this is the best guidance I can provide you as to how we will handle dissenting views, and I have explained the reasons why we are using such an approach. I regret that you do not agree with the timing

of including dissent as an official document of the NRC CCSP Product 1.1. As indicated earlier to you, you indeed have time on the NRC Agenda to voice your concerns.

Tom Karl

Roger Pielke wrote:

>Tom-
>
> Please send me the specific location on the CCSP web page with respect
>to our Committee where this approach was adopted (as listed in your
>e-mail). It completely conflicts with the protocol you wrote in your Feb 7
>2005 e-mail. We agreed to an arrangement where I would retain
>co-authorship of the Executive Summary, with my minority report and
>responses included as an Appendix. You have unilaterally abrogated this
>agreement.
> With respect to my written minority report, I will, therefore, be
>sending to the NRC Committee. They need this information to place my oral
>presentation in context.
>
>Roger
>
>

Date: Mon, 14 Feb 2005 15:14:14 -0500

From: Thomas R Karl <Thomas.R.Karl@noaa.gov>

To: Elfring Chris <CElfring@nas.edu>, "Ricky" Sinha <psinha@nas.edu>

Cc: Bill Murray <William.L.Murray@noaa.gov>,
Chris Miller <Christopher.D.Miller@noaa.gov>,

Roger Pielke <pielke@atmos.colostate.edu>, Richard Moss <rmos@usgcrp.gov>

Subject: Roger's Dissent

Dear Chris and Ricky,

A clarification may be required at this time. The Dissenting View forwarded to you by Roger Pielke is not presently part of the Official CCSP Product 1.1 document. As you know however, we do have time allocated on the Agenda where Roger can express his concerns to the NRC committee, and if a Dissent is desired by Roger or other authors, Appendix A will include any Dissents and Responses. At this time however we feel it premature to assume we will have an Appendix A until the final document is ready. At that time we can write Dissents and Response to a document that is not in flux.

Thank You,

Tom Karl

--

Date: Mon, 14 Feb 2005 14:27:48 -0700 (MST)
From: Roger Pielke <pielke@atmos.colostate.edu>
To: Thomas R Karl <Thomas.R.Karl@noaa.gov>
Cc: Tom Wigley <wigley@cgd.ucar.edu>, Ben Santer <santer1@llnl.gov>, Bill Murray <William.L.Murray@noaa.gov>, Chris Miller <Christopher.D.Miller@noaa.gov>, Richard Moss <rmoss@usgcrp.gov>, Elfring Chris <CElfring@nas.edu>, "Ricky" Sinha <psinha@nas.edu>, NESDIS NCDC CCSP Temp Trends Lead Authors <CCSPTempTrendAuthors.NCDC@noaa.gov>, NRC -- Judith Curry <curryja@eas.gatech.edu>, Elfring Chris <CElfring@nas.edu>, Dennis Hartmann <dennis@atmos.washington.edu>, Phil Jones <p.jones@uea.ac.uk>, Junhong Wang <junhong@ucar.edu>, Ken Kunkel <k-kunkel@uiuc.edu>, Richard S. Lindzen <lindzen@wind.mit.edu>, Richard Moss <rmoss@usgcrp.gov>, Roger Pielke <pielke@atmos.colostate.edu>, psinha@nas.edu, William Randel <randel@ucar.edu>, Richard Smith <rls@email.unc.edu>, John Michael Wallace <wallace@atmos.washington.edu>
Subject: Re: More on Appendix A (dissent)
Resent-Date: Mon, 14 Feb 2005 14:28:09 -0700
Resent-From: CCSPTempTrendAuthors.NCDC@noaa.gov

Tom-

I have documented the process by which you limited the inclusion of my minority report in my previous e-mails, and need not repeat here. The changing of the rules in response to my written comments at this late time, however, is inappropriate. My written perspective on the science issues and the process of completing the report by the CCSP Committee, are documented in my minority report, and should be available to the NRC Reviewers, as part of their review.

The Executive Summary does not provide a balanced view of the science issue, as I have documented. In your first meeting you used the term "policy neutral" (and you defined what you meant) as the framework for the report. I am disappointed that you have not followed through on that policy.

The Report does not adequately cover the charge to the Committee as I have documented in the minority report. Nor, even in the limited

focus of the report that I describe, are the implications of the study completely and adequately presented.

I look forward to presenting my perspective on these issues at the meeting in Chicago.

Roger

--

+++++

Roger A. Pielke, Sr., Professor and State Climatologist
1371 Campus Delivery, Department Atmospheric Science,
Colorado State University, Fort Collins, CO 80523-1371,
Phone: 970-491-8293/Fax: 970-491-3314, Email: pielke@atmos.colostate.edu
VISIT OUR WEBSITES AT: <http://blue.atmos.colostate.edu/>
and <http://climate.atmos.colostate.edu>

On Mon, 14 Feb 2005, Thomas R Karl wrote:

- > Date: Mon, 14 Feb 2005 10:44:41 -0500
- > From: Thomas R Karl <Thomas.R.Karl@noaa.gov>
- > To: Roger Pielke <pielke@atmos.colostate.edu>
- > Cc: Tom Wigley <wigley@cgd.ucar.edu>, Ben Santer <santer1@llnl.gov>,
> Bill Murray <William.L.Murray@noaa.gov>,
> Chris Miller <Christopher.D.Miller@noaa.gov>,
> Richard Moss <rmoss@usgcrp.gov>, Elfring Chris <CElfring@nas.edu>,
> "Ricky" Sinha <psinha@nas.edu>,
> _NESDIS NCDC CCSP Temp Trends Lead Authors
> <CCSPTempTrendAuthors.NCDC@noaa.gov>
- > Subject: Re: More on Appendix A (dissent)
- > Resent-Date: Mon, 14 Feb 2005 08:44:40 -0700
- > Resent-From: CCSPTempTrendAuthors.NCDC@noaa.gov
- >
- > Roger,
- >
- > No one has abrogated your right to be a co-author on the ES AND include
> a dissenting view in the Appendix. What has changed is the manner in
> which this can occur. As I indicated to you last week, the issue is one
> of timing. The CCSP Office would rather have the energy of the Team
> focus on a report that addresses the charge and reflects current
> understanding and uncertainty in lay-person terms. If in the end of the
> process (after Public Review), you consider a dissenting view essential
> --- the process will accomodate this. After my initial guidance as to

> how we could handle the dissent, it was clear that the such a process
> could not work and the CCSP Office developed an interim policy. Your
> dissent (if you still choose to have one after the ES is finalized) will
> be responded to by other members of the drafting team (who care to
> respond). Obviously, this cannot occur until the ES is finalized. The
> Dissenting view and response may then be reviewed again by the NRC to
> ensure it speaks to relevant and important issues of the
> Synthesis/Assessment product's charge.

>
> The paragraph you cited below is not yet posted on the CCSP web page.
> The CCSP Office is using the paragraphs I sent you and the team as an
> interim policy, and will ask for approval of all the CCSP principals at
> their next meeting the end of Feb. After that time, I would expect it
> would be shortly posted on the Web site.

>
> Roger, this is the best guidance I can provide you as to how we will
> handle dissenting views, and I have explained the reasons why we are
> using such an approach. I regret that you do not agree with the timing
> of including dissent as an official document of the NRC CCSP Product
> 1.1. As indicated earlier to you, you indeed have time on the NRC
> Agenda to voice you concerns.

>
> Tom Karl

>
> Roger Pielke wrote:

>
>>Tom-
>>

>> Please send me the specific location on the CCSP web page with respect
>>to our Committee where this approach was adopted (as listed in your
>>e-mail). It completely conflicts with the protocol you wrote in your Feb 7
>>2005 e-mail. We agreed to an arrangement where I would retain
>>co-authorship of the Executive Summary, with my minority report and
>>responses included as an Appendix. You have unilaterally abrogated this
>>agreement.

>> With respect to my written minority report, I will, therefore, be
>>sending to the NRC Committee. They need this information to place my oral
>>presentation in context.

>>
>>Roger

>>
>>

>
>

APPENDIX D

E-Mail documentation of the August 2005 alternate version of Chapter 6 which resulted in my resignation from the CCSP Committee.

This set of e-mails documents the exchange of communications regarding the replacement of the near-final version of Chapter 6 with alternative much changed version on August 10, 2005. I found out only indirectly from an e-mail that was sent by another member of the CCSP Committee. The claim was that the e-mail to me bounced; however, Peter Thorne was unable to document this, leading suspicion that the alternative version had been worked on independent from the Convening Lead Author of the Report. The alternative version was written in three hours according to the e-mail from Peter Thorne,

“Therefore I took the liberty of spending 3 hours this morning developing an alternative, which I attach.”

Whether this new version was independently written or not, the procedure clearly usurped the responsibility I was assigned as Convening Lead Author of Chapter 6 and for which we have spent many months achieving a near final version.

I have extracted a set of the e-mails from the August 10-11, 2005 time period to document the role of the Chair of the CCSP Committee in seeking to force the replacement of Chapter 6 with the alternative version. This role, in my view, fatally compromised the charge to the Committee.

----- Original Message -----

Subject: Chapter 6: an alternative? [email not for the faint hearted?]

Resent-From: CCSPTempTrendAuthors.NCDC@noaa.gov

Date: Wed, 10 Aug 2005 13:22:32 +0100

From: Thorne, Peter <peter.thorne@metoffice.gov.uk>

To: CCSPTempTrendAuthors.NCDC@noaa.gov

Dear all,

Health warning: This mail does not hold its punches

as the youngest member of this panel I suppose that I have the most to lose through Chapter 6 in its current form in terms of future research career. I also suspect that I am the most likely to run around making a pain in the proverbial of myself. My apologies for that!

I've tried over the past few weeks to help others in the Chapter 6 redrafting, but I really think that the structure we had just will not work. Therefore I took the liberty of spending 3 hours this morning

developing an alternative, which I attach. I will caveat that David has looked at this, but the rationale and most of the text is my responsibility, not his (in other words the buck stops here).

This is punchier, almost devoid of references (actually not bothered with a reference list yet - there are limits!), more tightly linked to the chapters, and contains fewer recommendations that are more focussed. I believe unless I am seriously mistaken that these are all points others have made over the recent past in relation to this chapter. They also directly assess the NRC review comments.

Every time we have put a redraft back in the past few weeks the same pet subjects have been re-inserted, lengthening the draft and destroying the flow. I'm sorry, but I for one am now utterly bored of this. You will note in the attached there are comments where I suspect this insertion of pet subjects may happen, but, in my opinion, is not justified.

I have, however, been scrupulously fair in targeting surface and upper-air records in all sections in line with the balance of the rest of this report and with Roger's concerns.

I would be particularly interested in thoughts from the editorial team and other CLAs as to whether they think this is an improvement.

My sincere apologies if this causes offence to Roger or anyone else. My sole interest is in seeing us get an excellent report out.

I will now don my flame proof jacket, but please can everyone take the time to calmly consider this mail and the attachment first.

Peter

--

Peter Thorne Climate Research Scientist
Hadley Centre for climate prediction and research
Met Office, FitzRoy Road, Exeter, EX1 3PB
Tel:+44 1392 886552 Fax:+44 1392 885681 <http://www.hadobs.org>

Date: Wed, 10 Aug 2005 08:53:44 -0400
From: Thomas R Karl <Thomas.R.Karl@noaa.gov>
To: Roger Pielke <pielke@atmos.colostate.edu>
Subject: [Fwd: Chapter 6: an alternative? [email not for the faint hearted?]]

Roger --- let me know what you think

Tom

Date: Wed, 10 Aug 2005 06:55:54 -0600 (MDT)
From: Roger Pielke <pielke@atmos.colostate.edu>
To: _NESDIS NCDC CCSP Temp Trends Lead Authors
<CCSPTempTrendAuthors.NCDC@noaa.gov>
Subject: Re: Chapter 6: an alternative? [email not for the faint hearted?]
Resent-Date: Wed, 10 Aug 2005 07:04:06 -0600
Resent-From: CCSPTempTrendAuthors.NCDC@noaa.gov

Peter

Since I was not even sent a copy of this suggested revision, it would be appreciated if you did so I can comment.

Roger

--

+++++

Roger A. Pielke, Sr., Professor and State Climatologist
1371 Campus Delivery, Department Atmospheric Science,
Colorado State University, Fort Collins, CO 80523-1371,
Phone: 970-491-8293/Fax: 970-491-3314, Email: pielke@atmos.colostate.edu
VISIT OUR WEBSITES AT: <http://blue.atmos.colostate.edu/>
and <http://climate.atmos.colostate.edu>

Date: Thu, 11 Aug 2005 09:04:53 +0100
From: "Thorne, Peter" <peter.thorne@metoffice.gov.uk>
To: Roger Pielke <pielke@atmos.colostate.edu>
Cc: Thomas R Karl <Thomas.R.Karl@noaa.gov>
Subject: Email that bounced

Roger,

I no longer have the bounced mail itself I'm afraid, but I have the saved DNS error message which is attached below:

This Message was undeliverable due to the following reason:

Your message was not delivered because the Domain Name System

(DNS) for the destination computer is not configured correctly. The following is a list of reasons why this error message could have been generated. If you do not understand the explanations listed here, please contact your system administrator for help.

- The host does not have any mail exchanger (MX) or address (A) records in the DNS.
- The host has valid MX records, but none of the mail exchangers listed have valid A records.
- There was a transient error with the DNS that caused one of the above to appear to be true.

You may want to try sending your message again to see if the problem was only temporary.

DNS for host atmos.colostate.edu is mis-configured
The following recipients did not receive this message:
<pielke@atmos.colostate.edu>

Please reply to <postmaster@mercury.ncdc.noaa.gov>
if you feel this message to be in error.

Is it possible that your server machine was temporarily down or having a patch applied at this time? That could explain it. For everyone else there was no bounce.

On Wed, 2005-08-10 at 21:04, Roger Pielke wrote:

- > Peter
- >
- > In order for us to track down the problem, please send us the e-mail as
- > it actually bounced, so that we can use the tracking information that
- > always appears on these.
- >
- > Roger

--

Peter Thorne Climate Research Scientist
Hadley Centre for climate prediction and research
Met Office, FitzRoy Road, Exeter, EX1 3PB
Tel:+44 1392 886552 Fax:+44 1392 885681 <http://www.hadobs.org>

Date: Wed, 10 Aug 2005 09:05:52 -0400
From: Thomas C Peterson <Thomas.C.Peterson@noaa.gov>
To: Roger Pielke <pielke@atmos.colostate.edu>
Subject: Re: Chapter 6: an alternative? [email not for the faint hearted?]

Roger, it was attached to Peter's email that went out to the whole team earlier today. Did you not get it?

Date: Wed, 10 Aug 2005 09:09:52 -0400
From: Thomas R Karl <Thomas.R.Karl@noaa.gov>
To: Roger Pielke <pielke@atmos.colostate.edu>
Cc: Thorne Peter <peter.thorne@metoffice.gov.uk>, Erin McKay <Erin.McKay@noaa.gov>
Subject: Re: Chapter 6: an alternative? [email not for the faint hearted?]

Roger, the e-mail from Peter was sent to the whole Trend Team so not sure why you did not get it. Maybe something wrong at your end or ours. I will as Erin to send out a test.

Tom

Date: Wed, 10 Aug 2005 14:13:56 +0100
From: "Thorne, Peter" <peter.thorne@metoffice.gov.uk>
To: Roger Pielke <pielke@atmos.colostate.edu>
Subject: Re: Chapter 6: an alternative? [email not for the faint hearted?]

This bounced from your gateway on the NCDC authors list (only your address got bounced strangely, I'd have suspected more). You may want to chase up with regards to that - I've also let Tom Karl know. Sorry, I left for the gym immediately after and have only just got back in.

Peter Thorne Climate Research Scientist
Hadley Centre for climate prediction and research
Met Office, FitzRoy Road, Exeter, EX1 3PB
Tel:+44 1392 886552 Fax:+44 1392 885681 <http://www.hadobs.org>

Date: Wed, 10 Aug 2005 09:28:47 -0600 (MDT)
From: Roger Pielke <pielke@atmos.colostate.edu>
To: "Thorne, Peter" <peter.thorne@metoffice.gov.uk>
Cc: _NESDIS NCDC CCSP Temp Trends Lead Authors <CCSPTempTrendAuthors.NCDC@noaa.gov>

Subject: Re: Chapter 6: an alternative? [email not for the faint hearted?]
Resent-Date: Wed, 10 Aug 2005 09:37:04 -0600
Resent-From: CCSPTempTrendAuthors.NCDC@noaa.gov

Peter-

Chapter 6 will retain its current structure. We adopted Chris Folland's suggested format which provides a framework to effectively communicate the diversity of issues and opportunities which the climate community can move forward with.

We welcome your suggested edits within the current framework. I already have a number that were sent to me and plan to work on a new version over the next few days. I have requested that Erin place the the current version on our web site.

Roger

--

++++
++++

Roger A. Pielke, Sr., Professor and State Climatologist
1371 Campus Delivery, Department Atmospheric Science,
Colorado State University, Fort Collins, CO 80523-1371,
Phone: 970-491-8293/Fax: 970-491-3314, Email: pielke@atmos.colostate.edu
VISIT OUR WEBSITES AT: <http://blue.atmos.colostate.edu/>
and <http://climate.atmos.colostate.edu>

----- Forwarded message -----

Date: Wed, 10 Aug 2005 09:55:02 -0400
From: Thomas R Karl <Thomas.R.Karl@noaa.gov>
To: Roger Pielke <pielke@atmos.colostate.edu>
Cc: Thorne Peter <peter.thorne@metoffice.gov.uk>
Subject: [Fwd: Chapter 6: an alternative? [email not for the faint hearted?]]

Roger -- email sent by Peter earlier. Please see heading below.

Tom

Date: Wed, 10 Aug 2005 11:47:08 -0400
From: Thomas R Karl <Thomas.R.Karl@noaa.gov>
To: Roger Pielke <pielke@atmos.colostate.edu>
Cc: Thorne Peter <peter.thorne@metoffice.gov.uk>,
_NESDIS NCDC CCSP Temp Trends Lead Authors
<CCSPTempTrendAuthors.NCDC@noaa.gov>
Subject: Re: Chapter 6: an alternative? [email not for the faint hearted?]

Roger,

I believe you have dismissed Peter's version too soon. As Chief Editor, I can tell you it much more readable, scientifically defensible, more likely to be acted upon, and addresses the issues we have (including you) raised. I propose we use Peter's version as the version we edit, and I don't think there are a lot of edits required. I believe we are at a critical juncture here. I do not want to put you in a corner, but I would like to hear the thoughts of the rest of the Team.

Tom

Date: Wed, 10 Aug 2005 10:47:54 -0600 (MDT)
From: Roger Pielke <pielke@atmos.colostate.edu>
To: Thomas R Karl <Thomas.R.Karl@noaa.gov>
Cc: Thorne Peter <peter.thorne@metoffice.gov.uk>,
_NESDIS NCDC CCSP Temp Trends Lead Authors
<CCSPTempTrendAuthors.NCDC@noaa.gov>
Subject: Re: Chapter 6: an alternative? [email not for the faint hearted?]
Resent-Date: Wed, 10 Aug 2005 10:56:16 -0600
Resent-From: CCSPTempTrendAuthors.NCDC@noaa.gov

Tom

I would interpret any change in the procedure that has been used by all of the other chapters as a violation of the CCSP charge. As clearly evident in the numerous communications on the focus of the report, you have a partisan perspective that is not permitting the diversity of views to be included. This includes your conclusions on the surface temperature record, but extends to other topics.

Chapter 6 as I sent out remains as the vehicle to suggest edits. If you prefer "to put me in a corner", then the issue will be escalated as this certainly is an inappropriate response from an Editor. Chapter 6 as it currently exists, is more inclusive and scientifically defensible, than what Peter wrote. I was appointed as CLA of Chapter 6 to write inclusive

text on the subject "What measures can be taken to improve the understanding of observed changes?". There is more than ample evidence in the voluminous e-mails, multiple drafts of Chapter 6, and the NRC review that I have continuously worked to include all perspectives in the Chapter. I will continue to do so. While this has not always been true with the other Chapters, this was and is being done for Chapter 6.

You are letting your biases on this report color your view as to what is a balanced scientific presentation. The exclusion of me from receiving the e-mail from Peter, as well as an earlier record of such exclusion further illustrates that serious problems exist.

Roger

--

+++++

Roger A. Pielke, Sr., Professor and State Climatologist
1371 Campus Delivery, Department Atmospheric Science,
Colorado State University, Fort Collins, CO 80523-1371,
Phone: 970-491-8293/Fax: 970-491-3314, Email: pielke@atmos.colostate.edu
VISIT OUR WEBSITES AT: <http://blue.atmos.colostate.edu/>
and <http://climate.atmos.colostate.edu>

Date: Wed, 10 Aug 2005 13:36:09 -0400
From: Thomas R Karl <Thomas.R.Karl@noaa.gov>
To: Roger Pielke <pielke@atmos.colostate.edu>
Cc: Thorne Peter <peter.thorne@metoffice.gov.uk>,
_NESDIS NCDC CCSP Temp Trends Lead Authors
<CCSPTempTrendAuthors.NCDC@noaa.gov>
Subject: Re: Chapter 6: an alternative? [email not for the faint hearted?]

Roger,

I beg to differ. I simply gave my thoughts as is my duty as Chief Editor and have asked others for their view. As CLA I would hope you would want to consider the views of you colleagues. Lets's hope we here from more authors.

Tom

Roger Pielke wrote:

>Tom

>
> I would interpret any change in the procedure that has been used by all
>of the other chapters as a violation of the CCSP charge. As clearly
>evident in the numerous communications on the focus of the report, you
>have a partisan perspective that is not permitting the diversity of views
>to be included. This includes your conclusions on the surface temperature
>record, but extends to other topics.
>
> Chapter 6 as I sent out remains as the vehicle to suggest edits. If you
>prefer "to put me in a corner", then the issue will be escalated as this
>certainly is an inappropriate response from an Editor. Chapter 6 as it
>currently exists, is more inclusive and scientifically defensible, than
>what Peter wrote. I was appointed as CLA of Chapter 6 to write inclusive
>text on the subject "What measures can be taken to improve the
>understanding of observed changes?". There is more than ample evidence in
>the voluminous e-mails, multiple drafts of Chapter 6, and the NRC review
>that I have continuously worked to include all perspectives in the
>Chapter. I will continue to do so. While this has not always been true
>with the other Chapters, this was and is being done for Chapter 6.
>
> You are letting your biases on this report color your view as to what is
>a balanced scientific presentation. The exclusion of me from receiving the
>e-mail from Peter, as well as an earlier record of such exclusion further
>illustrates that serious problems exist.
>
>Roger
>
>
>

Date: Wed, 10 Aug 2005 13:50:26 -0400
From: Thomas R Karl <Thomas.R.Karl@noaa.gov>
To: Roger Pielke <pielke@atmos.colostate.edu>
Cc: Thorne Peter <peter.thorne@metoffice.gov.uk>,
_NESDIS NCDC CCSP Temp Trends Lead Authors
<CCSPTempTrendAuthors.NCDC@noaa.gov>
Subject: Re: Chapter 6: an alternative? [email not for the faint hearted?]
Resent-Date: Wed, 10 Aug 2005 11:50:26 -0600
Resent-From: CCSPTempTrendAuthors.NCDC@noaa.gov

Roger --- We should be clear on one thing. I sent you the e-mail that Peter sent earlier today. It was as you could see from the header send to the Trends Lead Author team. Why you did not get it, I cannot say, so please do not jump to conclusions.

Expressing a view (and as Chief Editor I would be negligent if I did not) and asking other CLAs and LAs for their perspective is an important part of developing a Synthesis/Assessment Report. Please consider what a number of authors are expressing.

Peter could not have produced his draft without the benefit of what you had already put forward. I simply feel (and so far all the others I have hear from) have expressed the view that this is a significant improvement. Again, I think we would be better served if you worked from that version.

Tom

Date: Wed, 10 Aug 2005 11:54:58 -0600 (MDT)
From: Roger Pielke <pielke@atmos.colostate.edu>
To: Thomas R Karl <Thomas.R.Karl@noaa.gov>
Cc: Thorne Peter <peter.thorne@metoffice.gov.uk>,
NESDIS NCDC CCSP Temp Trends Lead Authors
<CCSPTempTrendAuthors.NCDC@noaa.gov>
Subject: Re: Chapter 6: an alternative? [email not for the faint hearted?]
Resent-Date: Wed, 10 Aug 2005 12:03:12 -0600
Resent-From: CCSPTempTrendAuthors.NCDC@noaa.gov

Tom-

I have worked with Chris Folland on both the current version, and the version that went out to the NRC for review. I adopted Chris's framework and most (but not all) of his edits. In the version of our report that went out to the NRC for review, if you recollect, you worked with me to complete a mutually satisfactory chapter. The same topics appear in the current version, and the latest version is responsive to the NRC review.

I look forward to working with you and the other authors on constructive and inclusive edits on Chapter 6 as I circulated. I already have valuable comments/suggested edits that have gone into the current version, or to be considered in the next draft, from David Parker, Dick Reynolds, Chris Folland, Steve Sherwood, John Lanzante, and Carl Mears (as well as by yourself!). Each does not agree completely with the current version, but has recognized that the text provides the framework where we can resolve these issues.

The insertion of a different text at this time is clearly inappropriate. Peter, and any others can suggest text but a wholesale replacement that

compromises major recommendations will not work, if we are to present policymakers more than an advocacy report. If at some point we cannot wordsmith to a consensus agreement, than we can include (via vote) majority, minority etc views. This follows the CCSP charge to include the diversity of views on this report. Peter's text does not.

We will work from the version I sent out. The reason that you are prompting Peter's text is that it fits better with your view of the subject. I respect your view. However, this is not an inclusive view, and does not reflect the spectrum of views in the community.

Roger

--
++++
++++

Roger A. Pielke, Sr., Professor and State Climatologist
1371 Campus Delivery, Department Atmospheric Science,
Colorado State University, Fort Collins, CO 80523-1371,
Phone: 970-491-8293/Fax: 970-491-3314, Email: pielke@atmos.colostate.edu
VISIT OUR WEBSITES AT: <http://blue.atmos.colostate.edu/>
and <http://climate.atmos.colostate.edu>

----- Forwarded message -----
Date: Wed, 10 Aug 2005 07:27:15 -0600 (MDT)
From: Roger Pielke <pielke@atmos.colostate.edu>
To: Thomas R Karl <Thomas.R.Karl@noaa.gov>
Cc: Thorne Peter <peter.thorne@metoffice.gov.uk>, Erin McKay <Erin.McKay@noaa.gov>
Subject: Re: Chapter 6: an alternative? [email not for the faint hearted?]

Tom-

I did not receive it until you sent it. I am receiving all other CCSP list mail.

Roger

--
++++
++++

Roger A. Pielke, Sr., Professor and State Climatologist
1371 Campus Delivery, Department Atmospheric Science,

Colorado State University, Fort Collins, CO 80523-1371,
Phone: 970-491-8293/Fax: 970-491-3314, Email: pielke@atmos.colostate.edu
VISIT OUR WEBSITES AT: <http://blue.atmos.colostate.edu/>
and <http://climate.atmos.colostate.edu>

On Wed, 10 Aug 2005, Thomas R Karl wrote:

> Date: Wed, 10 Aug 2005 09:09:52 -0400
> From: Thomas R Karl <Thomas.R.Karl@noaa.gov>
> To: Roger Pielke <pielke@atmos.colostate.edu>
> Cc: Thorne Peter <peter.thorne@metoffice.gov.uk>, Erin McKay <Erin.McKay@noaa.gov>
> Subject: Re: Chapter 6: an alternative? [email not for the faint hearted?]
>
> Roger, the e-mail from Peter was sent to the whole Trend Team so not
> sure why you did not get it. Maybe something wrong at your end or
> ours. I will as Erin to send out a test.
>
> Tom
>
> Roger Pielke wrote:
>
>>Peter
>>
>> Since I was not even sent a copy of this suggested revision, it would be
>>appreciated if you did so I can comment.
>>
>>Roger
>>
>>
>>
>
>

Date: Thu, 11 Aug 2005 07:31:20 -0600 (MDT)
From: Roger Pielke <pielke@atmos.colostate.edu>
To: Thomas R Karl <Thomas.R.Karl@noaa.gov>
Cc: Thorne Peter <peter.thorne@metoffice.gov.uk>, Bill Murray <william.l.murray@noaa.gov>, Chris Miller <christopher.d.miller@noaa.gov>
Subject: Re: Email that bounced

No Tom- The absence of the bounced e-mail demonstrates that I was not

included in this process. Quite frankly, by permitting this to go on with a separate version of the Chapter with a de facto new CLA guarantees that this will not be a policy neutral report, since Committee members will select the version that best fits their perspective rather than working on a balanced chapter.

Roger

--

+++++

Roger A. Pielke, Sr., Professor and State Climatologist
1371 Campus Delivery, Department Atmospheric Science,
Colorado State University, Fort Collins, CO 80523-1371,
Phone: 970-491-8293/Fax: 970-491-3314, Email: pielke@atmos.colostate.edu
VISIT OUR WEBSITES AT: <http://blue.atmos.colostate.edu/>
and <http://climate.atmos.colostate.edu>

On Thu, 11 Aug 2005, Thomas R Karl wrote:

> Date: Thu, 11 Aug 2005 09:29:41 -0400
> From: Thomas R Karl <Thomas.R.Karl@noaa.gov>
> To: Roger Pielke <pielke@atmos.colostate.edu>
> Cc: Thorne Peter <peter.thorne@metoffice.gov.uk>,
> Bill Murray <william.l.murray@noaa.gov>,
> Chris Miller <christopher.d.miller@noaa.gov>
> Subject: Re: Email that bounced
>
> Roger,
>
> Our we all speaking English? Peter sent you the Chapter the same time
> we all got it and it was the first time I was aware that he had a new
> version of Chapter 6.
>
>
> Tom
> Roger Pielke wrote:
>
>>Peter
>>
>> This is a disappointing response, but what I expected. It is quite clear
>>that the communications to replace Chapter 6 were going on without my
>>knowledge.
>>
>>Roger

>>
>>
>>
>
>

Date: Thu, 11 Aug 2005 12:25:32 -0600 (MDT)
From: Roger Pielke <pielke@atmos.colostate.edu>
To: Thomas R Karl <Thomas.R.Karl@noaa.gov>
Cc: Thorne Peter <peter.thorne@metoffice.gov.uk>, Bill Murray <william.l.murray@noaa.gov>, Chris Miller <christopher.d.miller@noaa.gov>, Susan Joy Hassol <shassol@agci.org>
Subject: Re: Email that bounced

Tom

Lets accept that Peter's e-mail bounced. As a primary person involved in Chapter 6, as soon as this was found out, efforts should have been made to contact me, as it was clearly recognized by the header of the e-mail that this was going to result in a significant response.

In regards to the more serious issue, it is quite easy for me to document your intransigence on this, rather than you trying to spin the history of this issue so that it is my fault. Peter is invited to contribute to the process in the defined framework as everyone else has, using the existing Chapter draft as the template. It is clear from your published work that you have much to offer scientifically but you also have a conflict of interest, and, in my view, are inappropriately exercising it in your capacity as Editor. By repeatedly stating that I am representing only myself in this debate mischaracterizes the diversity of views of others which exist in our community, and which is reported in the peer-reviewed literature.

Using your words, I hope you and the Editorial Staff do not take this controversy lightly. It is documentable that you are seeking to produce a document that is not balanced in its persepective on the issues of surface and tropospheric temeprature changes.

I will continue to work on Chapter 6, and look forward to resolving this by encouraging authors to work within the framework of the exisiting Chapter.

Roger

+++++

+++++

Roger A. Pielke, Sr., Professor and State Climatologist 1371 Campus
Delivery, Department Atmospheric Science, Colorado State University, Fort
Collins, CO 80523-1371, Phone: 970-491-8293/Fax: 970-491-3314, Email:
pielke@atmos.colostate.edu VISIT OUR WEBSITES AT:
<http://blue.atmos.colostate.edu/> and <http://climate.atmos.colostate.edu>

On Thu, 11 Aug 2005, Thomas R Karl wrote:

> Date: Thu, 11 Aug 2005 10:43:17 -0400
> From: Thomas R Karl <Thomas.R.Karl@noaa.gov>
> To: Roger Pielke <pielke@atmos.colostate.edu>
> Cc: Thorne Peter <peter.thorne@metoffice.gov.uk>,
> Bill Murray <william.l.murray@noaa.gov>,
> Chris Miller <christopher.d.miller@noaa.gov>,
> Susan Joy Hassol <shassol@agci.org>
> Subject: Re: Email that bounced
>
> Roger Pielke wrote:
>
>>No Tom- The absence of the bounced e-mail demonstrates that I was not
>>included in this process
>>
> Roger, I sent you the e-mail that Peter sent out. In the header it
> included you. I do not know why you continue to claim you are not being
> included.
>
>>. Quite frankly, by permitting this to go on with a separate version of
>>the Chapter with a de facto new CLA guarantees that this will not be a
>>policy neutral report, since Committee members will select the version
>>that best fits their perspective rather than working on a balanced
>>chapter.
>>
>>From the Entire Editorial Staff: Roger, please do not take this request
>>lightly. We politely ask you take Peter's version, since everyone so
>>far has indicated it is easier to understand, balanced, and does better
>>represent their views and indicate where you would differ (small
>>minorities views ok, but not desirable). This would be your opportunity
>>to highlight specific issues or points that are not adequately addressed
>>in the version that Peter has put out on the Table. It seems you are
>>representing yourself, at the expense of all the other authors who have
>>weighed in on this. We do not understand your intransigence on this.
>
> P.S. We purposely did not want to send this to the whole team, so you

> can respond back to us or the whole team if you prefer.
>
>>Roger
>>
>>
>>
>

Date: Thu, 11 Aug 2005 13:51:17 -0600 (MDT)
From: Roger Pielke <pielke@atmos.colostate.edu>
To: Thomas R Karl <Thomas.R.Karl@noaa.gov>
Subject: Re: Email that bounced

Tom

Peter can comment within the framework that I sent out. A easy way for Peter to do that is to use his text to make suggested edits of the text in the current Chapter 6. Then we have a forum to discuss that fits with the other comments I have received. His text as written deletes, deemphasizes and highlights issues such that an unbalanced perspective results. Mapping onto the current text is the way to highlight these differences and to produce a text that includes the diversity of perspectives.

I plan to work on the edits that were sent to me by co-authors who recognize that Chapter 6 is the working version of the text later today and tomorrow, and will send to the Committee as soon as ready. The identification of contentious issues will permit succinct text to be written that satisfies each viewpoint. Peter needs to do that and you should support me on this.

Should I have written a separate Chapter 5? This approach is inappropriate.

Roger

--

+++++

Roger A. Pielke, Sr., Professor and State Climatologist
1371 Campus Delivery, Department Atmospheric Science,
Colorado State University, Fort Collins, CO 80523-1371,
Phone: 970-491-8293/Fax: 970-491-3314, Email: pielke@atmos.colostate.edu
VISIT OUR WEBSITES AT: <http://blue.atmos.colostate.edu/>
and <http://climate.atmos.colostate.edu>

On Thu, 11 Aug 2005, Thomas R Karl wrote:

> Date: Thu, 11 Aug 2005 15:32:40 -0400
> From: Thomas R Karl <Thomas.R.Karl@noaa.gov>
> To: Roger Pielke <pielke@atmos.colostate.edu>
> Subject: Re: Email that bounced

>

> Roger,

>

> Thank you for your speedy reply. Once again, "We politely ask you take
> Peter's version to highlight specific issues or points that are not
> adequately addressed in the version that Peter has put out on the
> Table."

>

> Tom, Bill, Chris and Susan

>

>

> Roger,

>

> Thank you for your speedy reply. Could you please answer our request to
> identify those areas in Peter's draft

>

> Roger Pielke wrote:

>

>>Tom

>>

>> Lets accept that Peter's e-mail bounced. As a primary person involved in
>>Chapter 6, as soon as this was found out, efforts should have been made to
>>contact me, as it was clearly recognized by the header of the e-mail that
>>this was going to result in a significant response.

>>

>> In regards to the more serious issue, it is quite easy for me to document
>>your intransigence on this, rather than you trying to spin the history of
>>this issue so that it is my fault. Peter is invited to contribute to the
>>process in the defined framework as everyone else has, using the existing
>>Chapter draft as the template. It is clear from your published work that
>>you have much to offer scientifically but you also have a conflict of
>>interest, and, in my view, are inappropriately exercising it in your
>>capacity as Editor. By repeatedly stating that I am representing only
>>myself in this debate mischaracterizes the diversity of views of others
>>which exist in our community, and which is reported in the peer-reviewed
>>literature.

>>

>> Using your words, I hope you and the Editorial Staff do not take this
>>controversy lightly. It is documentable that you are seeking to produce a
>>document that is not balanced in its persepctive on the issues of surface
>>and tropospheric temeprature changes.

>>
>> I will continue to work on Chapter 6, and look forward to resolving this
>>by encouraging authors to work within the framework of the exisiting
>>Chapter.

>>
>>Roger

>
>++++
>++++

>>Roger A. Pielke, Sr., Professor and State Climatologist 1371 Campus
>>Delivery, Department Atmospheric Science, Colorado State University, Fort
>>Collins, CO 80523-1371, Phone: 970-491-8293/Fax: 970-491-3314, Email:
>>pielke@atmos.colostate.edu VISIT OUR WEBSITES AT:
>><http://blue.atmos.colostate.edu/> and <http://climate.atmos.colostate.edu>

>>
>>

Date: Thu, 11 Aug 2005 15:59:50 -0600 (MDT)
From: Roger Pielke <pielke@atmos.colostate.edu>
To: Thomas R Karl <Thomas.R.Karl@noaa.gov>
Cc: Ben Santer <santer1@llnl.gov>, Susan Joy Hassol <shassol@agci.org>, Chris Miller <christopher.d.miller@noaa.gov>
Subject: Re: Email that bounced

Well Tom, if you assume it is just the CLA that has concluded that chapter 6 is not appropriate, then you are mistaken. Your decision to jump into this disagreement as you have done is inappropriate. You even requested a "vote" on the versions and had only a few responses.

Lets move beyond this. We were making excellent progress towards closure, when this new version came up. Of course, if someone has a particular bias and there are two options, they will select the version that best fits their biases. That is why you have a CLA who is to work to achieve a balance. Or perhaps, we should have two CLAs on each Chapter and then take a vote? That would not be a good idea.

Roger

--
>++++

+++++

Roger A. Pielke, Sr., Professor and State Climatologist
1371 Campus Delivery, Department Atmospheric Science,
Colorado State University, Fort Collins, CO 80523-1371,
Phone: 970-491-8293/Fax: 970-491-3314, Email: pielke@atmos.colostate.edu
VISIT OUR WEBSITES AT: <http://blue.atmos.colostate.edu/>
and <http://climate.atmos.colostate.edu>

On Thu, 11 Aug 2005, Thomas R Karl wrote:

> Date: Thu, 11 Aug 2005 16:47:15 -0400
> From: Thomas R Karl <Thomas.R.Karl@noaa.gov>
> To: Roger Pielke <pielke@atmos.colostate.edu>
> Cc: Ben Santer <santer1@llnl.gov>, Susan Joy Hassol <shassol@agci.org>,
> Chris Miller <christopher.d.miller@noaa.gov>
> Subject: Re: Email that bounced
>
> Roger Pielke wrote:
>
>>Tom
>>
>> Peter can comment within the framework that I sent out. A easy way for
>>Peter to do that is to use his text to make suggested edits of the text in
>>the current Chapter 6. Then we have a forum to discuss that fits with the
>>other comments I have received. His text as written deletes, deemphasizes
>>and highlights issues such that an unbalanced perspective results. Mapping
>>onto the current text is the way to highlight these differences and to
>>produce a text that includes the diversity of perspectives.
>>
>> I plan to work on the edits that were sent to me by co-authors who
>>recognize that Chapter 6 is the working version of the text later today
>>and tomorrow, and will send to the Committee as soon as ready. The
>>identification of contentious issues will permit succinct text to be written
>>that satisfies each viewpoint. Peter needs to do that and you should
>>support me on this.
>>
>>Should I have written a separate Chapter 5? This approach is
>>inappropriate. Roger, if you believe you can deliver any Chapter within
>>a few days and all comments from authors (excepting the CLA) agree it
>>is an improvement e.g., more focused, easier to read, scientifically
>>more defensible, then we would insist that the CLA do exactly what we
>>are requesting of you in this instance.
>>
> .

>
>>
>>
>>Roger
>>
>>
>>
>>
>>
>>
>
>

Date: Sat, 13 Aug 2005 01:14:59 +0000
From: pielke_r@comcast.net
To: james.r.Mahoney@noaa.gov, james.r.Mahoney@noaa.gov
Cc: _NESDIS NCDC CCSP Temp Trends Lead Authors
<CCSPTempTrendAuthors.NCDC@noaa.gov>; richard.moss@pnl.gov,
<richard.moss@pnl.gov>
Subject: Resignation

Dear Dr. Mahoney

I am resigning effective immediately from the CCSP Committee "Temperature Trends in the Lower Atmosphere-Steps for Understanding and Reconciling Differences". For the reasons briefly summarized in my blog (<http://ccc.atmos.colostate.edu/blog/>), I have given up seeking to promote a balanced presentation of the issue of assessing recent spatial and temporal surface and tropospheric temperature trends. The NY Times article today was the last straw. This entire exercise has been very disappointing, and, unfortunately is a direct result of having the same people write the assessment report as have completed the studies.

Their premature representation of aspects of the report to the media and in a Senate Hearing before we finalized the report has made me realize that, despite the claims of some of them to the contrary, only the minimal representation of the perspective that I represent will be begrudgingly included in the report. I also learned earlier this week that a member of the Committee drafted a replacement chapter to the one that I had been responsible for and worked hard toward reaching a consensus, which was almost complete. This sort of politicking has no place in a community assessment. If such committees are put together with no intention of adequately accommodating minority, but scientifically valid perspectives, then it would be best in the future not to invite such participation on CCSP committees

I will be submitting a statement as part of the public record when the report appears documenting the specific process and science issues I have with this report. On the science issues, the community at large can make a decision as to whether or not they have merit.

Respectively

Roger A. Pielke Sr.
Professor and State Climatologist
Department of Atmospheric Science
Colorado State University Fort Collins, Colorado 80523-1371
phone:970-491-8293/fax:970-491-3314
<http://blue.atmos.colostate.edu>
<http://climate.atmos.colostate.edu>

APPENDIX E

Weblog of August 25, 2005 SUMMARY FOR THE MEDIA OF THE REASONS FOR THE RESIGNATION OF ROGER A. PIELKE SR. FROM THE CLIMATE CHANGE SCIENCE PROGRAM (CCSP) COMMITTEE

(<http://climatesci.atmos.colostate.edu/?p=38>)

Each of the authors and the editor of the report are sincere and well-qualified scientists in their specific research area. Despite this collection of expertise, however, I had to resign for the following reasons:

1. There was an inappropriate narrowing of the focus of the CCSP charge to the committee in the report;
2. The circulation of an alternative version of Chapter 6, in which I was Convening Lead Author, in order to enforce this narrow view;
3. The premature reporting of selected versions from the report to the media and policymakers prior to its actual finalization and public release.

Chapter 6 that I was lead author on was titled “What measures can be taken to improve the understanding of observed changes?” The chapter was essentially rewritten independent of me, after I had just about reached a satisfactory text with most of the committee. This new draft was circulated to the committee where it was quickly adopted by a subset of the members, the editor and the editorial staff person. The rewrite reflected a highly restricted view of the CCSP charge to the committee. I will document the CCSP charge, and its history based on panel recommendations of an October 2003 meeting in my public comment.

By seeking to limit the scope of my chapter and the report, more generally, important scientific issues were overlooked or downplayed - e.g. describing and explaining recent regional trends in surface and tropospheric temperatures. In my view, the broader perspective captured by the actual charge to the committee would better serve both science and policy.

It is highly misleading to characterize me as a climate skeptic as certain members of the media have done. I have discussed this mischaracterization on my blog (<http://climatesci.atmos.colostate.edu/>). This seems to me an effort to put my views in a convenient box. I have consistently written on the complex nature of the Earth’s climate system, and the diverse types of anthropogenic climate forcings and significant human effect on climate. The climate system is complex enough to allow for a diversity of legitimate perspectives; scientific assessments should embrace and accommodate this diversity rather than impose a single perspective