Draft Minutes
Climate Change Product Development Advisory Committee
August 8, 2007
American Geophysical Union
Washington, D.C.

Committee Members Attending in Person:

Antonio Busalacchi, Vice Chair
Curtis Covey
Henry Jacoby
Ronald Miller
Hugh Pitcher
William Pizer
Soroosh Sorooshian, Chair

Committee Members Attending by Telephone:

Karen Fisher-Vanden
Brian Flannery
William Gutkowski
Kenneth Kunkel
Richard Lindzen
Julie Winkler

Others Participating:

Anjuli Bamzai, Climate Change Research Division, Office of Biological and Environmental Research, Office of Science, USDOE
John Houghton, Life and Medical Sciences Division, Office of Biological and Environmental Research, Office of Science, USDOE
Janet Kile, Oak Ridge Institute of Science and Education
Frederick O'Hara, CPDAC Recording Secretary
Sue Wadel, Office of the Assistant General Counsel, USDOE

One other person was in attendance during the meeting.

Designated Federal Officer **Anjuli Bamzai** called the meeting to order at 1:05 pm, had the attendees introduce themselves, and introduced **Sue Wadel** of the DOE Office of the Assistant General Counsel to present an overview of ethical principles applicable to members of a Federal Advisory Committee Act (FACA) committee. She highlighted aspects of conflict of interest, use of public office for personal gain, and of an office to influence government employees on topics outside the interests of the advisory committee.

Bamzai announced the appointment by the Secretary of Energy of Soroosh Sorooshian as the Chair of this Committee and of Antonio Busalacchi as the Vice Chair.

John Houghton thanked everyone for their hard work on Synthesis and Assessment Product (SAP) 2.1. That report is being printed at Oak Ridge National Laboratory (ORNL).

Chairman **Soroosh Sorooshian** initiated a discussion of SAP 3.1.

Curtis Covey was asked to report on the status of and plans for SAP 3.1, Climate Models: An Assessment of Strengths and Limitations for User Applications, and specifically to present the changes to that report made in response to comments from the peer review and public review comments.

DOE has sent a formal request to CCSP requesting a change in title, DOE has requested that "for User Applications" be deleted from the title.

On February 7, 2007, the first draft was sent out to 7 peer reviewers, reviews were received from 6 experts. On May 22, the second draft, the Public Review Draft (PRD) was released. A response to the peer reviews was also prepared by the lead authors and posted on the CPDAC website, along with the PRD. This PRD was also sent to other principals [e.g., the National Science Foundation (NSF), NOAA, NASA]. July 6 was the deadline for public review comments. A number of comments were received. On July 25, extensive additional comments were received from Lindzen, a Committee member. These comments were not part of the public review but, rather, constitute feedback from the CPDAC on the PRD. Isaac Held has volunteered to lead a rewrite of the climate-sensitivity section. Meanwhile, on July 31, the "first-draft" response to the public comments was issued. Most, but not all, lead authors replied to this first-draft response, producing a consensus on how to respond to public comments. The current schedule is that in September 2007, a third draft will be produced; and in October 2007, the report will be circulated for concurrence among the CPDAC.

The response to peer reviews is a 40-page document that includes the original comments. One reviewer provided the reviews past the deadline, the author team has responded only to general comments. These statements were similar to those of other reviewers. Virtually all comments were constructive and were used to help write the PRD.

A major peer-review comment was that the tone of the piece was uneven. As a response, the text has been rewritten throughout to balance the lengths of discussions of different topics and to simplify technical points. The prospectus states that the target of this report is non climate scientists.

A second comment was that sections on coupled-global-climate-model (GCM) creation and on reductive vs. holistic evaluation of models seem out of place and sit uneasily in this report even though they convey something useful about how GCM people work and think. A disturbing implication is that modeling groups essentially 'cheat' by tuning equilibrium climate sensitivity. In response, misleading language was removed, and sections were combined or condensed in the subsequent draft.

A third comment was that focusing on just three U.S. modeling groups and ignoring other modeling groups around the world does not give an accurate overview of the ability of GCMs in general and is too restrictive. In response, the subsequent draft adds summaries of the full suite of the International Panel on Climate Change's Assessment Report 4 (IPCC AR4) model results [the Coupled Model Intercomparison Project third set of results (CMIP3)]. These three U.S. groups now provide examples of GCMs in general [e.g., in the El Niño–Southern Oscillation (ENSO) section]. This emphasis on U.S. models is appropriate for a U.S. target audience.

The fourth comment was that, unfortunately, much of the draft does not address user applications and appears to be directed at climate scientists, not decision makers. As a result, a change was made in the title, and the text was changed to make it more directed at nonclimate scientists.

The only reviews received from the public review of the second draft were from government agencies: the NOAA Research Council, the California Department of Water Resources, the National Oceanic and Atmospheric Administration (NOAA) Office of

Federal Coordinator for Meteorology, and the NSF. Many detailed comments down to the level of spelling and punctuation were made. Appropriate responses to the substantive comments seem possible with only minor changes to the text.

In addition, a series of very extensive comments were received from Richard Lindzen just two weeks ago. They criticize an undue emphasis on "consensus among models," stating that multi-model ensemble averages are questionable and might produce the right answer for the wrong reasons. The comments also criticized inferring climate sensitivity from models. There is a model/observation discrepancy in the relative warming of the surface and the middle-to-upper troposphere (see SAP 1.1, Fig. 5.4g). Lindzen calculated that less than one-half of recent global warming is anthropogenic. Observations of the Pacific Decadal Oscillation (PDO) lead to a response time of the climate system that scales with climate sensitivity, leading to a real-world climate sensitivity that is less than that of the models. It provides a test through comparison of PDO observation with model results. The climate sensitivity of a model can then be assessed without model intercomparison.

The review panel should take in enough time to respond seriously to Lindzen's comments. This may cause the third draft to slip past the September 2007 deadline. However, one does not want to wander away from SAP 3.1's designated topic: to provide information to those who use climate models about the strengths and limitations associated with using models. In assessing models, they should be tested against something that is independent of the model. It is very important to note that there are error bars in both observations and models. For observations of tropospheric warming, SAP 1.1 and subsequent published papers point out errors in the radiosonde data. Also, the spread of model results is a *lower limit* on the uncertainty of theory.

Lindzen commented that there should be a use of theory (where theory exists) to simplify discussion. Sorooshian said that that is a point well taken, but people are going to report model results. People should not think that these models are perfect. Lindzen pointed out that the propagation of error is never mentioned in these discussions.

Flannery commented that the models are nonlinear and not intercalibrated. It would be desirable for someone to explain why averages of nonlinear functions should produce an accurate and usable value. The question is, why should an average be better than the value calculated by any one model and be used in projections? Further, how well do the models reproduce natural variability? Are there even adequate data over multidecadal time scales to answer that question?

Lindzen noted that in the Tsonis, Swanson, and Kravtsov article, "A New Dynamical Mechanism for Major Climate Shifts," which appeared in *Geophysical Research Letters*, the PDO was enough to account for the observed variability. Several of these phenomena exist and are not well understood.

Sorooshian agreed that there *are* a lot of uncertainties.

Flannery said that the report should point out how good the data are. These phenomena are important drivers in projections.

Sorooshian asked him to please send his comments to the Committee.

Bamzai observed that this is why there is a diversity of experts on this Committee and why the drafts have been sent to other agencies: to get a better report.

Jacoby stated that the change in title seemed appropriate. However, Chapter 7 seems to have been thrown together. A whole world of use of these models is reflected in

Chapter 7. Covey responded that several reviewers had made that point. A more extensive Chapter 7 is being prepared. Winkler suggested that Chapter 7 be omitted given the small number of applications discussed and the difficulty of selecting appropriate examples for each applications. Sorooshian observed that the last chapter should pull the report together and send a message.

Jacoby said that, in Fig. 1b, it would be good to say more about the Global Energy and Watercycle Experiment (GEWEX) and to provide more information about CO_2 emissions in the 20th century. The aerosols that are assumed vary from model to model. Also, it would be interesting to note where the three American models are in this figure. Miller commented that trace gases are well-known from ice cores, for example. There *is* variability among the models, though.

Flannery said that a key issue is how well one can estimate climate uncertainty (e.g., in clouds and ocean uptake). These often play off against each other, and modeling groups vary greatly in the assumptions they make.

Lindzen found Fig. 1b difficult to understand because the *x* axis is not labeled. The metric is not known, and one cannot tell if any year-to-year variation is significant. This has to be clarified to be of use to the reader.

Flannery stated that, if each of 12 models is really off in one metric, averaging would reduce the error by 1/12, but he did not understand why that should be considered any better.

Kunkel said that the provision of key references for Chapter 7, Example Applications of Climate Model Results, would be appreciated. Gutowski stated, in regard to consensus among the models, if someone were using these models to produce input data for another model, they would need a consistent time series rather than an average value.

Flannery asked how the time it takes to run a model depends on the resolution. He would have expected an increase by a factor of 16 rather than the factor of 8 cited in the report. If one doubles the resolution in three dimensions and cuts the time steps in half, that would increase the number of calculations by a factor of 16, and the report often says 8. Covey explained that only the horizontal dimensions are cut in half to double the resolution, so the computing time increases only by a factor of 8. Flannery said that he did not realize that the vertical resolution was not altered. He asked that that fact be made clearer in the report.

Busalacchi noted that ENSO is referred to as “less credible” and as a “success story” on pages 6 and 7. This seeming inconsistency should be resolved. Covey explained that data for the tropics are less credible than those for the mid-latitudes. Also, as time goes on, models become better.

Busalacchi said that the modes of variability and their implications for regional modeling and teleconnections should be made more apparent. There is a lot of redundancy that could be reduced. Correlations are referred to as percentages rather than as *r* factors. Averaging of errors is not well understood. Climate sensitivity can also be assessed by comparison with historic volcanic activity and associated climatic effects.

Pizer stated that the report should project a clear understanding of the uncertainties and of the resulting variability across models. This topic does not jump out at the reader of this report. The reader is looking for how accurately these models are working. Sorooshian noted that there are a couple of pages on this subject; however, that

discussion is patchy, and there should be more to. In some schemes, there have been strategies for testing models, and that fact should be pointed out.

Bamzai stated that there was a comment to the discussion on the land component is too long compared to the discussion on the other components. Covey noted that this is not a report to climate modelers and does not need holistic discussions or to explain research methodologies. The question is, how confident can one be in using these models to project climate conditions?

Jacoby pointed out that Wigley is doing future forecasting in another SAP. This report raises the question of whether such forecasts should be made.

Sorooshian said that there will not be a report integrating or comparing the 21 different SAPs. The question of what is next needs to be addressed. Bamzai noted that the way the reports are staggered makes that difficult. Busalacchi pointed out that everything will change in 18 months, also.

Winkler suggested adding a caveat about driving a regional climate model (RCM) with a GCM. Any error in the GCM will be passed on to the RCM. This fact should be made plainer. Sorooshian said that the writers know the limitations of the models and need to pass on that understanding to the users of the models (e.g., to the RCM modelers).

Lindzen stated that these suggestions can be accommodated with slight changes to the text. Sorooshian said that the group will work off-line to produce a consensus report. Covey stated that Held had offered to lead the development of the next draft.

Bamzai said that the editorial staff at ORNL should get a copy of the current manuscript to get started on and that they needed the copyright sources for the figures.

Jacoby noted that there is another crocodile: the Office of Science and Technology Policy (OSTP). Reviewers there were concerned about the length of some sections, notably the Executive Summary. Sorooshian said that that will come in later. The Executive Summary *does* need to be shorter and clearer.

Bamzai noted that there are some references to the gray literature in another CCSP report and there has been a comment during the review of that report that conclusions should not be based on gray literature. Thus she recommended references in SAP 3.1 be limited to published, peer-reviewed articles, and if gray literature is included, it be stated that conclusions were not based on these.

Sorooshian said that an effort will be made to get input from Committee members who did not participate in this meeting and to pass on any comments they make to the writing panel. He called for any of the public to comment. There being none, he adjourned the meeting at 2:48 p.m.

Respectfully submitted,
Frederick M. O'Hara, Jr.
Recording Secretary
August 14, 2007