

When possible, a multi-proxy approach is preferable for inferring robust information on past climate evolution. A good example was given for southeastern Brazil (B. Turcq), where lake-level reconstructions, speleothemes (e.g., stalagmites), and pollen fossils allow the documentation of a continuous increase in precipitation since the Last Glacial Maximum.

Progress has also been made about the knowledge of past ice sheets. Geophysical constraints on the history of the Laurentide Ice Sheet (W.R. Peltier) allow the inferring of the existence of large freshwater meltwater runoff flow into the Arctic during the Younger Dryas (12,700–11,700 years ago). There are also an increasing number of attempts to extract indices of past climate variability from high-resolution paleoclimatic records, although it has not been possible so far to infer information on interannual variability that is spatially consistent (S. Brewer). Finally, detailed analysis of modern climate and pollen data remains essential, as illustrated by an extensive survey of modern bioclimatic relationships presented by B. Thompson.

Widening the Scope: New Targets for PMIP Experiments

Although the mid-Holocene and LGM continue to be of interest, other periods pose interesting challenges. Specifically, PMIP 2 has expanded the set of standard experiments to include simulations of the previous interglacial/glacial transition (this is the “glacial inception,” 115,000 years ago), the early Holocene (9000 years ago), the Younger Dryas (the cold period observed in different regions of the Northern Hemisphere between 12,700 and 11,700 years ago), and the abrupt cooling event 8200 years ago.

The focus on glacial inception is motivated by some earlier experiments suggesting that

vegetation and ocean feedbacks are essential for explaining year-to-year accumulation of snow in northeastern America at the end of the previous interglacial period. With the PMIP community focusing on fully coupled OAVGCMs, it is appropriate to revisit this issue. Younger Dryas and 8.2 kyr experiments are an opportunity to obtain information on the stability of the ocean circulation, and the consequences of possible changes in its structure, by comparing model outputs with paleoclimatic data. The meeting has allowed the defining of the corresponding experimental setups.

Several contributions also highlighted the necessity of using Earth system models of intermediate complexity to develop analysis methods, explore the parameter space, and analyze the response of climate over long timescales. For example, it was shown that several thousands of years are needed by the climate system to recover from a perturbation of the North Atlantic freshwater balance. Furthermore, the characteristic response time differs for glacial and interglacial conditions (I. Ross, E. Bauer).

A. Koutavas (LDEO, Columbia) and A. Ganopolski (Potsdam Institute for Climate Impact Research, Germany) were awarded the best poster prizes. The meeting also provided the opportunity to tighten social links; and an excursion to the nearby Porquerolles Island nicely complemented the program. Full details about the meeting, the project, and how to be involved in result analysis are available at <http://www-lsce.cea.fr/pmip2>.

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FORUM

Raising the Ante on the Climate Debate

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Almost alone in the world of science, there is a substantial U.S. effort to discredit some basic conclusions in the global warming debate. There are always legitimate reasons to query scientific conclusions, but the tenor of the debate has taken on a flavor of its own. Since the epicenter of the dispute is in Washington, D.C., the suspicion arises that not all of the discussion is business-as-usual scientific disagreement.

The most recent example of the heightening level of the dispute involves a 23 June 2005 letter from U.S. Rep. Joe Barton (R-Tex.), chair of the House Committee on Energy and Commerce, to Michael Mann (University of Virginia) and his collaborators, Raymond Bradley

(University of Massachusetts) and Malcolm Hughes (University of Arizona). The dispute centers on the much discussed “hockey stick” reconstruction of *Mann et al.* [1998, 1999]. In those reconstructions, the twentieth century warming stands well above Northern Hemisphere temperature fluctuations of the last 1000 years. Other investigators, using some of the same data but with different approaches, have also reconstructed temperatures of the last millennium (see *Mann et al.* [2003] for a summary discussion). In general, there is more agreement than disagreement among the various reconstructions. The differences stem mainly from the scaling of the oscillations, but in all cases the late twentieth century is anomalous in a millennial context.

The discussions on the hockey stick would

require many pages to describe in detail, but an apparent trigger for the 23 June development goes back to a request about three years ago by a Canadian investigator, Steven McIntyre, for all the files, data sets, algorithms, and source codes that went into the Mann et al. reconstruction. McIntyre is a semi-retired mineral trader with an interest in mathematics, and he wanted to test some of the results of the Mann et al. studies. Although the data were already available on a public FTP (file transfer protocol) computer site, Mann provided them in a different format, as requested by McIntyre. The algorithm was described in the original 1998 *Nature* paper, but an expanded version was added in 2004 on a *Nature* supplementary Web site. The source code was not provided because it is considered an intellectual property right.

McIntyre continues to press for more information. Not all of this information was provided, in part because of the sheer level of work required. Because I had also produced a millennial climate reconstruction [*Crowley and Lowery*, 2000], I too was a recipient of a request from McIntyre. I can attest that his initial message was of a somewhat peremptory

character, requesting all my files, programs, and documentation, and that a quick follow-up by him had a more threatening tone, implying that the director of the U.S. National Science Foundation (NSF) would be contacted if I did not comply. Even after I belatedly supplied some data, McIntyre sent a number of follow-up requests asking for more details on my data and analysis. These requests may have been well-intentioned, but at some point I declined to answer any more, because I was just too busy to stop and respond to the repeated questions and requests.

McIntyre and his co-author, Ross McKittrick, an economist at the University of Guelph, Ontario, Canada, subsequently published a rebuttal paper [McIntyre and McKittrick, 2003] without showing Mann, the provider of the data, a prepublication "courtesy" examination to screen for any possible errors. The McIntyre and McKittrick paper (referred to here as "MM") showed an unexpectedly large warming in the 1400s, apparently calling into question Mann's analysis and the uniqueness of the late twentieth century warming. However, the consensus among climate scientists most familiar with the data is that the MM warming in the 1400s is due to an error in the MM analysis method; it can also not be supported by an examination of the data.

The debate continues. The most recent development appears to have resulted from someone requesting a favor from Rep. Barton, for the content of the Barton letter covers not only ongoing issues between McIntyre and Mann, but also a level of detail that seems to go well beyond that. Two examples from the Barton letter to Mann, his colleagues, NSF Director Arden Bement, Jr., and IPCC (Intergovernmental Panel on Climate Change) Chairman Rajendra Pachauri illustrate the magnitude of the requests.

Your curriculum vitae, including, but not limited to, a list of all studies relating to climate change research for which you were an author or co-author and the source of funding for those studies.

Provide the location of all data archives relating to each published study for which you were an author or co-author and indicate: (a) whether this information contains all the specific data you used and calculations you performed, including such supporting documentation as computer source code, validation information, and other ancillary informa-

tion, necessary for full evaluation and application of the data, particularly for another party to replicate your research results; (b) when this information was available to researchers; (c) where and when you first identified the location of this information; (d) what modifications, if any, you have made to this information since publication of the respective study; and (e) if necessary information is not fully available, provide a detailed narrative description of the steps somebody must take to acquire the necessary information to replicate your study results or assess the quality of the proxy data you used.

The letters are available online at http://energycommerce.house.gov/108/Letters/06232005_1570.htm.

Rep. Barton displayed a remarkable grasp of some details of climate statistics when, he further requested whether Mann "calculate[d] the [sic] R2 [i.e., r^2] statistic for the temperature reconstruction, particularly for the 15th Century proxy record calculations and what were the results?" and "what validation statistics did [Mann] calculate for the reconstruction prior to 1820?" These are virtually verbatim statements from McIntyre's earlier critiques that had been posted on his own Web site.

At some point, one must ask why should a member of the U.S. Congress get involved in this matter which may have been raised by a Canadian? I believe the purpose is twofold: (1) to send a signal of intimidation to researchers who produce results that are not consistent with some political preferences; and (2) to continue to dwell on the hockey stick "hot button" by raising questions and fomenting uncertainty, with the aim to discredit greenhouse science so skeptics in government and their supporters can continue to claim that there are too many uncertainties to proceed with any action to reduce greenhouse gas emissions. U.S. Sen. James Inhofe (R-Okla.) has also focused on the Mann et al. reconstruction as a way of delegitimizing the conclusions of the IPCC. The presumed logic is that if the Mann et al. reconstruction can be proved flawed, then so too is the general report of the IPCC that highlights the Mann et al. record. Of course, such "logic"—basically, guilt by association—conveniently ignores the manifold evidence for global warming summarized in the IPCC report, the fact that the IPCC report represents a broad-based consensus not de-

pendent on any one author, and that the final report was approved not only by scientists, but also by political representatives of the countries that signed the report.

The broader scientific community should be aware of these developments, because the politicizing of data/file requests could easily be expanded to other areas where science intersects and conflicts with the interests of some political groups. For example, requests could be made to paleontologists and molecular biologists for all data and files supporting evolution. Likewise, radiochemists could be entrained into pseudo-scientific debate because of all the massive and magnificent geochronological data that have been gathered over the last few decades.

Hopefully, these extrapolations will not happen and the Barton request will be an anomaly. However, this development does warrant attention, as it seems to be consistent with the tenor of the day. Scientists and the public need to be aware of, and resist, any attempt to intimidate scientists who produce results not consistent with the position of the political party presently in power.

Disclaimer

The statements in this Forum represent my own views and understanding of the situation. Time invested in the Forum was not supported by funds from any government agency. Although I am friends with Michael Mann, Raymond Bradley, and Malcolm Hughes, I have not been involved with any of their interactions and correspondence with Steven McIntyre.

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