



Board on Atmospheric Sciences and Climate

Newsletter

The BASC Newsletter, Volume 1, Number 2, is your update on the activities of the Board on Atmospheric Sciences and Climate of the National Academies. The Board seeks to advance understanding of the Earth's atmosphere and climate, to help apply this knowledge to benefit the public, and to advise the federal government on issues within the Board's areas of expertise.

August 2004

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1. Message from the Chair

Dear Colleagues:

Since joining BASC in January, I have attended two BASC meetings and am settling in as Chair. I also just completed a three-year term on the NRC's Space Studies Board (SSB), and I think these two perspectives are particularly valuable at this time. As you know, NASA has announced a new vision that will emphasize human space flight and exploration. At the same time, the agency is in the process of implementing a major reorganization. With this reorganization, the Earth Science and Space Science Enterprises are merged into one new NASA Mission Office for Science. There will be three other mission offices: Exploration Systems, Space Operations, and Aeronautics Research. For details, see

http://www.nasa.gov/home/hqnews/2004/jun/HQ_04203_structure.html.

A principal issue that has been facing space science has been the future of the nation's space programs and particularly the International Space Station; this was brought to a head by the Space Shuttle Columbia accident. As the result of a workshop held in November, 2003, the

NRC/SSB published a report entitled "Issues and Opportunities Regarding the U. S. Space Program." This report notes that the workshop participants said it was time for a new vision for our space programs and policies. The participants commented on the high quality of the free-flying and robotic missions and successes such as Hubble and the many Earth probes. But considerable concern was voiced about human space flight and the apparent lack of goals for human space exploration. NASA's renewed emphasis on human space flight and exploration is consistent with the ideas captured in the workshop proceedings.

But there is a catch: the NASA reorganization makes Earth science less visible in NASA's structure. In addition, there are proposed budget reductions, cancellations, and delays in many earth science missions that will cause concern within the scientific community. In particular, we are all concerned that the costs of funding human exploration will be at the expense of NASA's other science programs. If this is to be NASA's strategy, is it consistent with the advice from the science community, including the SSB workshop and various BASC reports of the past decade?

All of this is particularly disturbing at a time when observations from space of the atmosphere, oceans, and land are increasingly critical for understanding and predicting weather and global change. Consequently, BASC will highlight the subject of NASA's Earth science programs and their future at its next meeting in November in order to learn more about how NASA's vision and reorganization may affect our science and our communities.

Sincerely,
Bob Serafin
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2. Upcoming Meetings

[Review of the U.S. Climate Variability and Predictability \(CLIVAR\) Project Office, August 18-20, 2004, Washington, D.C.](#)

[Strategic Guidance for National Science Foundation's Support of Research in the Atmospheric Sciences, August 19-20, Washington, D.C.](#)

Strategic Guidance for National Science Foundation's Support of Research in the Atmospheric Sciences, October 14-15, 2004, Boulder, Colorado

Climate Research Committee, October 25-27, 2004, Washington, D.C.

Board on Atmospheric Sciences and Climate, November 10-11, 2004, Washington, D.C.

3. What's New

-- The Council of the National Academy of Sciences has unanimously approved the nomination of Ralph J. Cicerone, chancellor of the University of California's Irvine campus, for election as president of the Academy, to succeed Bruce Alberts when his term as NAS president ends on July 1, 2005. An atmospheric chemist, Cicerone was dean of physical sciences at the University of California at Irvine from 1994 to 1998, and was named chancellor in April 1998. He also holds the Daniel G. Aldrich Jr. Chair in Earth System Science and serves as professor of chemistry. Cicerone was elected to the Academy in 1990. He has served on more than 40 Academy and National Research Council committees since 1984, and in 2001 he chaired the landmark study *Climate Change Science: An Analysis of Some Key Questions*, conducted at the request of the White House. Cicerone's name will be presented to the full membership for formal ratification on December 15 and the ballot will be completed on January 31.

-- In partnership with the Department of Homeland Security (DHS), Science and Technology Directorate, the Office of the Federal Coordinator for Meteorology will conduct a User Forum on Urban Meteorology. The forum will focus on identifying users' issues and needs in five priority areas: severe weather; homeland security; air quality; water quality; and climate. Participants

will include Federal agencies, public and private sector organizations, and a broad representation of users of weather information from urban communities across the nation. Experts from the many disciplines and fields relevant to urban meteorology research and applications will serve as panelists and workshop co-chairs for the forum. For details, please visit the website at http://www.ofcm.gov/homepage/text/spc_proj/urban_met/urbanmet.html.

-- BASC's recently released report [Climate Data Records from Environmental Satellites](#) will be presented at the American Meteorological Society's 13th Conference on Satellite Meteorology and Oceanography in Norfolk, Virginia, September 20-23, 2004. (For information about the conference, see <http://www.ametsoc.org/meet/fainst/13satmet.html>). If you are attending the conference, view the Climate Data Records poster and speak with committee chair David Robinson and study director Sheldon Drobot on Wednesday at 2:30 p.m. An extended abstract is available at http://ams.confex.com/ams/13SATMET/techprogram/paper_77982.htm.

-- The National Academies carry out a wide range of activities on issues related to global-scale changes in climate, land use and land cover, oceans and freshwater resources, atmospheric chemistry, and ecological systems resulting from natural variability or human influences, and the potential impacts of these changes on human systems and ecosystems. Our activities in the broad area of global change are overseen by a number of boards and committees throughout from throughout the National Academies and coordinated by the Coordinating Committee on Global Change (CCGC). The CCGC website provides an overview of these activities organized by major topical area, e.g., climate variability and change, human health, international activities, and sustainable development. To learn more about these activities, visit the CCGC website at <http://dels.nas.edu/ccgc/>.

4. Special Feature: A New Road Weather Research and Development Program?

Weather significantly affects the safety and capacity of the nation's roadways. Each year, adverse weather is associated with more than 1.5 million vehicular accidents, which result in about 800,000 injuries and 7,000 fatalities. Drivers endure the frustration of more than 500 million hours of weather-related delay annually on highways, affecting both personal lives and economic productivity. Hurricanes and severe snowstorms can cripple regional transportation systems and cause many lost work days for companies and governments. Thanks to advances made by both the transportation and meteorological communities, we are tantalizingly close to providing drivers and traffic managers with much improved real-time weather and routing information.

In January 2004, BASC released [Where the Weather Meets the Road: A Research Agenda for Improving Road Weather Services](#), which recommends that the Federal Highway Administration (FHWA) take the lead in creating a coordinated national road weather research program. The recommended program's main objective would be to bring together the weather and transportation research communities to maximize the use of available information and technologies, identify and support research priorities, and effectively implement new scientific and technological advances. As a framework for this program, the report recommends the following five key research and development foci:

- a robust, integrated observational network and data management system specifically designed to meet the needs of enhanced road weather research and operational capabilities;
- a coordinated research effort to increase understanding of road weather phenomena and develop options for increasing safety, mobility, and efficiency of the nation's roadways during all types of weather;
- improved modeling capabilities and forecast tools designed to provide relevant, useful information to those who build, maintain, operate, and use the nation's roadways;
- multiple mechanisms for communicating road weather information to the range of users in ways that support better informed decision making; and

— an infostructure that takes advantage of new technologies to monitor and predict road weather conditions and then effectively convey road weather information to end users.

Referring explicitly to this report and its recommendations, Rep. Michael C. Burgess (R-Texas) of the House Committee on Science introduced an amendment to H.R. 3551 “Surface Transportation Research and Development Act of 2003” that would create a Road Weather Research and Development Program. This bill was later folded into H.R. 3550 Transportation Equity Act: A Legacy for Users, the 6-year reauthorization of federal highway funding. House and Senate versions of the bill are currently being reconciled, and the most recent version includes a road weather program that would be funded at \$4 million annually for 6 years.

Committee on Weather Research for Surface Transportation: John Snow (*Chair*), University of Oklahoma; Elizabeth Carter, WeatherExtreme, LLC; Brad Colman, National Weather Service; Dennis Christiansen, Texas A&M University; Paul DeLannoy, Environment Canada; Francis Francois, American Association of State Highway and Transportation Officials (ret.); George Frederick, Vaisala Inc.; Frances Holt, NOAA’s National Environmental Satellite, Data, and Information Service; Margaret A. LeMone, National Center for Atmospheric Research; Curt Pape, Minnesota Department of Transportation; Leland Smithson, American Association of State Highway and Transportation Officials; Daniel Stock, American Transportation Research Institute (through April 2003); Richard Wagoner, National Center for Atmospheric Research; Amanda Staudt (*Study Director*), Board on Atmospheric Sciences and Climate.

5. Recently Released Reports

[Direct and Indirect Human Contributions to Terrestrial Carbon Fluxes](#) summarizes a workshop convened to discuss the current state of scientific understanding on issues related to quantifying the direct human-induced changes in terrestrial carbon stocks and related changes in greenhouse gas emissions, distinguishing these changes from those caused by indirect human-induced effects, natural effects, and effects due to past practices in forests and current or former agricultural lands.

[Climate Data Records from Environmental Satellites](#) provides advice on the key elements of a satellite-based climate data record (CDR) program, including lessons learned from previous attempts, important considerations for identifying an appropriate organizational framework for long-term success and sustainability, suggested steps for generating and archiving CDRs, and the importance of partnerships.

[Where the Weather Meets the Road: A Research Agenda for Improving Road Weather Services](#) examines the research opportunities and required services needed to support improved weather-related information for the nation’s roadways and provides a framework and recommendations to engage the transportation and weather communities (and other stakeholders) in the development of a strategic plan to guide road weather research.

[Understanding Climate Change Feedbacks](#) characterizes the uncertainty associated with feedbacks in the natural climate system that are important for projecting the evolution of Earth's climate over the next 100 years and defines a research strategy to reduce the uncertainty associated with these feedbacks, particularly for those feedbacks that are likely to be important and for which there appears to be significant potential for scientific progress.

[Critical Issues in Weather Modification Research](#) reviews the current state of the science of weather modification and the role of weather prediction as it applies to weather modification; identifies the critical uncertainties limiting advances in weather modification science and operation and future directions in research and operations for improving the management of water resources and the reduction in severe weather hazards; and suggests actions to identify the potential impacts of localized weather modification on large-scale weather and climate patterns.

6. Studies in Progress: For more information about a specific project, click on the link.

[Strategic Guidance for the National Science Foundation's \(NSF\) Support of Research in the Atmospheric Sciences](#) will provide guidance to NSF's Division of Atmospheric Sciences (ATM) on its strategy for supporting research to achieve the nation's scientific and education goals in the atmospheric sciences. In essence, the committee will consider how ATM can best accomplish its mission of stewardship of the atmospheric sciences into the future.

[Review of the U.S. Climate Variability and Predictability \(CLIVAR\) Project Office](#) will evaluate the performance of the CLIVAR Project Office (PO) to assess whether it is fulfilling its charge from its supporting agencies, NSF, NOAA, NASA, and DOE.

[Challenges in Representing Physical Processes in Coupled Atmosphere-Land-Ocean Models](#) will explore and evaluate current efforts to model physical processes of coupled atmosphere-ocean-land models.

[Radiative Forcing Effects on Climate](#) will examine the current state of knowledge regarding the individual direct and indirect radiative forcing effects of gases, aerosols, land-use, and solar variability on the climate of the Earth's surface and atmosphere and it will recommend strategies for improving our understanding.

[Climate Data Records from Operational Satellites](#) is assisting the National Oceanic and Atmospheric Administration-National Environmental Satellite, Data, and Information Service (NOAA-NESDIS) as it designs a plan to guide satellite data utilization from existing and new instruments aboard NOAA satellites, including National Polar-orbiting Operational Environmental Satellite System (NPOESS) instruments, for understanding, monitoring, and predicting climate variations and changes. The first report was recently released, and NOAA is now drafting a science implementation plan. The Committee expects to review that plan in late fall.

[Metrics for Global Change Research](#) will develop metrics and/or other methods for documenting progress in global change research and evaluating future performance using the objectives of global change research as articulated in the Strategic Plan for the U.S. Climate Change Science Program.

[Assessing NEXRAD Flash Flood Forecasting Capabilities at Sulphur Mountain, California](#), will evaluate whether the ground-based weather surveillance Doppler radar (Sulphur Mountain NEXRAD) located in Ventura County, California, fulfills its intended purpose to provide timely and accurate data for assisting local NWS meteorologists in forecasting flash flood events.

7. BASC in the Past: [Reconciling Observations of Global Temperature Change](#)

A little over 5 years ago, the Academies' convened a study group to examine observed trends of temperature near the surface and in the lower to mid-troposphere, and in particular major conflicts in the trends. The Panel on Reconciling Temperature Observations was composed of John M. Wallace (chair), John Christy, Dian Gaffen (Seidel), Norman Grody, James Hansen, David Parker, Thomas Peterson, Benjamin Santer, Roy Spencer, Kevin Trenberth, and Frank Wentz. While this issue surfaces periodically for fresh debate, it was addressed in a clear and comprehensive way in the panel's report released in 2000. The panel concluded that "the warming trend in global-mean surface temperature observations during the past 20 years is undoubtedly real and is substantially greater than the average rate of warming during the twentieth century. The disparity between surface and upper air trends in no way invalidates the conclusion that surface temperature has been rising. The recent corrections in the MSU processing algorithms bring the global temperature trend derived from the satellite data into

slightly closer alignment with surface temperature trends, but a substantial disparity remains. The various kinds of evidence examined by the panel suggest that the troposphere actually may have warmed much less rapidly than the surface from 1979 into the late 1990s, due both to natural causes (e.g., the sequence of volcanic eruptions that occurred within this particular 20-year period) and human activities (e.g., the cooling of the upper part of the troposphere resulting from ozone depletion in the stratosphere). Regardless of whether the disparity is real, the panel cautions that temperature trends based on data for such short periods of record, with arbitrary start and end points, are not necessarily indicative of the long-term behavior of the climate system."

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We encourage your comments on this newsletter as well as on the reports and activities of BASC. To provide input, contact basc@nas.edu.

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BASC is a unit of the National Academies. The nation turns to the National Academies -- National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council -- for independent, objective advice on issues that affect people's lives worldwide. BASC members include: Robert J. Serafin (chair), National Center for Atmospheric Research; Frederick R. Anderson, McKenna Long & Aldridge LLP; Robert C. Beardsley, Woods Hole Oceanographic Institution; Michael L. Bender, Princeton University; Rosina M. Bierbaum, University of Michigan; Rafael L. Bras, Massachusetts Institute of Technology; Mary Anne Carroll, University of Michigan; Walter Dabberdt, Vaisala Inc.; Kerry A. Emanuel, Massachusetts Institute of Technology; Cassandra G. Fesen, Dartmouth University; Jennifer A. Logan, Harvard University; William Randel, National Center for Atmospheric Research; Roger M. Wakimoto, University of California, Los Angeles; John C. Wyngaard, Pennsylvania State University; Chris Elfring (director, BASC).

We encourage you to share this newsletter with colleagues.