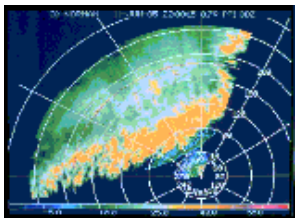

Board on Atmospheric Sciences and Climate

Newsletter

The BASC Newsletter, Volume 1, Number 3, 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.

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December 2004

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1. Message from the Director

Dear Colleagues:

Looking back on 2004, weather and climate were again big items in the news. Nine named storms – including Hurricanes Frances, Ivan, and Jeanne – contributed to record precipitation in the East, while portions of the West continued to struggle with drought conditions. This is just one reminder of the importance of the atmospheric and climate sciences in everyone's lives.

Here at the Board on Atmospheric Sciences and Climate, I want to thank the committee and board members who volunteered their time to our work and the staff for an incredibly productive year. BASC issued five new reports (details elsewhere in the newsletter) and hosted a number of workshops and discussion forums. We have nearly a dozen major activities underway. We've intensified our efforts to distribute our reports, presenting our work at AGU, AMS, and numerous

other professional meetings; briefing Congress; and seeking other ways to reach more and new audiences.

One change we've seen in the atmospheric and climate sciences community this year is NASA's renewed emphasis on human space flight and exploration, a move consistent with its mission and in line with advice it received from the science community. The NASA reorganization does, however, make Earth science less visible in its structure. That alone is not necessarily a problem; space and Earth sciences were joined in the past and it was a healthy time from both perspectives. It is the unknown of how the new structure will be implemented over time that has some in the Earth science community concerned. With tight budgets, will some Earth science missions will be cancelled or delayed?

To better understand the NASA changes, BASC and the Oceans Studies Board met with NASA managers, including Paul Hertz, Gregory Williams, Mary Cleave, and Jack Kaye, at our November meeting and talked in depth about the role of the Earth sciences in the new NASA structure. NASA sees "discovery-oriented space science" and "prediction-oriented earth science" as merging into a comprehensive array of scientific investigations into the origin, evolution, and destiny of the Earth, the solar system, and the universe. They see both enterprises as successful and said the transformation would seek to keep the unique aspects of each, ensure the successful completion of ongoing activities, minimize disruption of employees, and look for common elements where there is some logic for consolidation.

This is an important issue and BASC will stay involved, working together with a number of Boards here at the National Academies that deal with Earth science issues. There are several relevant activities underway here, including a "decadal study" on Earth science and applications from space that is being led by the Space Studies Board and a request from NASA for reviews of the NASA Roadmaps. In our BASC discussions, NASA made the point that they will be focusing on scientific questions for which NASA technology and remote sensing can make a defining contribution. This is a good concept to keep in mind: NASA has made many extremely valuable contributions to our understanding of our home planet, and this is a legacy that all of us want to see continued in the future.

Also at our BASC meeting, Dr. Rick Rosen, Assistant Administrator for Oceanic and Atmospheric Research (OAR) joined us to discuss the 2004 review of NOAA's research functions and its plans for implementing the recommendations. Some responses are already underway or actively under discussion. For instance, NOAA took immediate action to begin developing a long-term Research Vision and a shorter-term Research Plan, and it is working to develop a policy for guiding the transition of research to operations and information services. Work continues on developing criteria to determine where research is located within NOAA, and it is likely to establish an external team to evaluate and strengthen the structure and function of ecosystem research programs. More information about the review and potential responses can be found at: http://www.sab.noaa.gov/Reports/RRT_Report-080604.pdf. BASC will follow the NOAA changes over the next year as well.

On behalf of the National Academies and BASC staff, I want to wish all our colleagues the best in the coming New Year. Let it be a year where our collective work in science continues to make a better, healthier world.

Sincerely,
Chris Elfring
celfring@nas.edu

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2. Upcoming Meetings

-- Strategic Guidance for NSF's Support of the Atmospheric Sciences, Town Hall at the American Meteorological Society Annual Meeting, January 11, 2005, San Diego, California
-- Strategic Guidance for NSF's Support of the Atmospheric Sciences, February 17-18, 2005 Washington, D.C.

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3. What's New

-- The Committee on Strategic Guidance for NSF's Support of the Atmospheric Sciences will hold a Town Hall at the American Meteorological Society's Annual Meeting in San Diego, California, on Tuesday, January 11, 2005, from 7:00 p.m. to 9:00 p.m. The committee was established to 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. The town hall is an opportunity to let the committee know what you think about this important topic. If you are unable to attend, you can submit written comments to atminput@nas.edu. See http://www.nationalacademies.org/basc/atmcomm.html for more information.

-- New Report – *Radiative Forcing of Climate Change: Expanding the Concept and Addressing Uncertainties* was released on December 16, 2004. The report examines the current state of knowledge of how gases, aerosols, land use, and solar variability force the climate system, identifies key gaps in understanding, and recommends research priorities. The final version of this report will be available in March. Currently, a limited number of prepublications are available.

-- New Report – *Review of the U.S. CLIVAR Project Office* was released in November. The report evaluates the performance of the U.S. CLIVAR Project Office (PO) in fulfilling its charge from supporting agencies and provides suggestions for enhancing the communications from and visibility of U.S. CLIVAR activities and for developing strategic directions for the future.

-- New Report – *Flash Flood Forecasting Over Complex Terrain: With an Assessment of the Sulphur Mountain NEXRAD in Southern California* was released in October. The report examines the efficacy of NEXRADs sited in complex terrain as a tool for use by the National Weather Service for flash flood forecasting and warning. The final, full-color version of the report will be available after the first of the year. A four-page PDF brief is available at http://books.nap.edu/html/flash_flood/reportbrief.pdf.

-- The Division on Earth and Life Studies at the National Academies encompasses a wide range of activities where policy meets the realm of geo-, life- and the chemical sciences, including the environment, geography, laboratory animal use and resource issues. The division has produced reports on such high profile issues as drilling for oil on Alaska's North Slope, stem cell research, the transportation of nuclear waste, and protecting the nation's food supply—reports that have had many tangible impacts. Visit the Division's website at http://dels.nas.edu for updates on the latest reports, projects, and events, and to subscribe to receive updates automatically.

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4. Special Feature: Characterizing and Communicating Climate Change Uncertainties

"The only certainty is uncertainty". Pliny the Elder, AD 23-79

"When CEOs contemplate global warming, they see something they dread: uncertainty." Business Week magazine, August 16, 2004

Climate change information, particularly projections of future climate, will always be associated with often significant uncertainty. As information about potential changes in climate is used in a variety of societal applications—from water, energy, and agricultural management to national and international policy making—it will become more important for associated uncertainties to be characterized and communicated in a manner that effectively informs decision making. On

October 26, 2004, BASC's Climate Research Committee held an all-day forum that explored the ways in which uncertainties in climate change science might be most effectively characterized and communicated, in particular to more effectively inform climate change decision making. The forum highlighted key research gaps, confusions, and controversies that might be explored in more depth by a longer-term NRC study and in research and other activities supported by government agencies.

Speakers at the forum noted that reducing climate science uncertainties is often stated as a research objective and frequently purported to be a necessary step before policies can be implemented to address climate change. However, there is no consensus in the climate science community that uncertainties are so substantial that reducing them should be a top priority. Indeed, research efforts might be better spent on improving understanding and characterization of climate change uncertainties, thereby enabling decision makers to more effectively manage these uncertainties. While the climate science community has made significant advances over the past few decades in devising ways to characterize and communicate uncertainties, there is room for improvement. In particular, insufficient climate and related uncertainty information is available to support the decision needs of resource managers, policy makers, private industry, and the public.

Decision makers are faced with a large range of uncertainties of which climate change is only one factor. For example, water resource managers deal with uncertainty regarding drought and water availability, maintaining water quality, land conservation and endangered species protection, groundwater depletion and contamination, and the cost of water, among others. Decision makers invited to the forum indicated that they worry that climate change could dramatically affect their activities in the next decades, but they are unable to pay sufficient attention to the issue because they are already inundated with addressing uncertainties they face today. Thus, a major challenge for the scientific community is to provide relevant climate information to decision makers in a useful format and in a timely manner.

The full agenda for the forum and links to presentations are available on-line at http://www7.nationalacademies.org/basc/Uncertainty%20Forum.html.

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5. Recently Released Reports

Radiative Forcing of Climate Change: Expanding the Concept and Addressing Uncertainties examines the human and natural causes of climate change, including greenhouse gases, aerosols, land-use change, and solar variability. Whereas emphasis to date has been on how these climate forcings affect global mean temperature, the report finds that regional variation and climate impacts besides temperature deserve increased attention. The report also identifies research that should be pursued to improve understanding of climate forcings.

Review of the U.S. CLIVAR Project Office evaluates the performance of the U.S. CLIVAR Project Office (PO) in fulfilling its charge from supporting agencies. The Climate Variability and Predictability (CLIVAR) program, established internationally in 1995 and expanded to include a U.S. component in 1998, focuses on improving understanding and skill in predicting climate variability on seasonal to centennial time scales. The report concludes that the project office is vital for coordinating U.S. CLIVAR activities and is effective despite limited resources. It also provides suggestions for enhancing the communications from and visibility of U.S. CLIVAR activities and for developing strategic directions for the future.

Flash Flood Forecasting Over Complex Terrain: With an Assessment of the Sulphur Mountain NEXRAD in Southern California assesses the performance of the Sulphur Mountain NEXRAD in Southern California, which has been scrutinized for its ability to detect precipitation in the atmosphere below 6000 feet. The report finds that the Sulphur Mountain NEXRAD provides crucial coverage of the lower atmosphere and is appropriately situated to assist the Los Angeles-

Oxnard National Weather Service Forecast Office in successfully forecasting and warning of flash floods. The report concludes that, in general, NEXRAD technology is effective in mountainous terrain but can be improved.

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.

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

Review of the U.S. Climate Change Science Program's Synthesis and Assessment Product on Temperature Trends in the Lower Atmosphere will review the CCSP's Product on "Temperature Trends in the Lower Atmosphere: Steps for Understanding and Reconciling Differences." Among the issues the committee will consider are whether the document meets its intended objectives, whether findings are adequately supported, and whether data are handled competently. Committee selection is in progress. Check the Academies' Current Projects System in late January for more information.

Estimating and Communicating Uncertainty in Weather Forecasts and Climate Projections will provide findings and recommendations to guide NOAA/NWS as it improves methods used to estimate uncertainty in its weather, hydrometeorological, and short-term regional climate forecasts, with emphasis on the means used to communicate forecast uncertainty. Committee selection is in progress. Check the Academies' Current Projects System in late January for more information.

Future of the Tropical Rainfall Measuring Mission (TRMM) will provide advice on the future of TRMM and potential follow-on research and operational missions. In Phase I, the committee will address how best to use the remaining TRMM spacecraft life. Phase II will focus on needs for satellite-based measurements of tropical rainfall in 2006 and beyond.

Strategic Guidance for the National Science Foundation's (NSF) Support of 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.

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.

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.

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7. BASC in the Past: Under the Weather: Climate, Ecosystems, and Infectious Disease

Nearly 6 years ago, the National Academies convened an ad hoc committee to review the role that weather and climate variability plays in human health status and the emergence and spread of infectious diseases, and implications this has for the human health consequences of longer-term climate change. The Committee on Climate, Ecosystems, Infectious Diseases, and Human Health was composed of Donald Burke (chair), Ann Carmichael, Dana Focks, Darrell Jay Grimes, John Harte, Subhash Lele, Pim Martens, Jonathan Mayer, Linda Mearns, Roger Pulwarty, Leslie Real, Chester Ropelewski, Joan Rose, Robert Shope Joanne Simpson, and Mark Wilson. While this issue is complex and interdisciplinary, the committee concluded in their report released in 2001 that "temperature, precipitation, and humidity affect the lifecycle of many disease pathogens and vectors (both directly, and indirectly through ecological changes) and thus can potentially affect the timing and intensity of disease outbreaks…Ecosystem instabilities brought about by climate change and concurrent stresses such as land use changes, species dislocation, and increasing global travel could potentially influence the genetics of pathogenic microbes through mutation and horizontal gene transfer, and could give rise to new interactions among hosts and disease agents. Such changes may foster the emergence of new infectious disease threats."

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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.

To unsubscribe to this newsletter, contact basc@nas.edu.

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; Vernon R. Morris, Howard 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.