

The BASC Newsletter, Volume 5, Number 1, 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. This newsletter can be viewed in its entirety at the [BASC website](#).

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1. Message from the Director

Now that 2008 is underway, it is clear that BASC (like others in the nation) is entering a phase of intense focus on climate issues. A new, energized dialog about climate, climate change, and possible strategies to respond is emerging and gaining unprecedented attention.

The heart of our climate-related work over the next two years will be a suite of activities designed in response to a recent request from Congress: the Consolidated Appropriations Act of 2008 (Public Law 110-161) calls for NOAA to execute an agreement with the National Academy of Sciences to establish a Climate Change Study Committee that will "investigate and study the serious and sweeping issues relating to global climate change and make recommendations regarding what steps must be taken and what strategies must be adopted in response to global climate change, including the science and technology challenges." The legislation also calls for a Summit on Global Climate Change, attended by preeminent experts selected by the Academies.

The scope and approach of what we are calling simply "the Climate Study" are still being defined, but some aspects are emerging. The questions are so big, and so diverse, that we envision not one study but rather a series of coordinated activities that, collectively, describe our understanding of climate change and recommend specific actions that the nation could take to respond. Thus, there may be several Panels convened to write concurrent, in-depth reports focusing on specific types or categories of responses to climate change, such as policies and technologies to reduce greenhouse gas emissions. The Summit on Global Climate Change needs to be held fairly early in the study process, probably in early 2009.

In total, these activities will need to involve a large number of experts and stakeholders from a range of communities including academia, business and industry, nonprofit groups, and government. It will be a challenge to provide not only detailed technical assessments of response options and strategies across a range of spatial and temporal scales, but to produce products that are useful to decision makers at various levels and across the many sectors facing critical decisions about how to respond to climate change. The effort, of course, will build on previous work, including national and international assessments, the current scientific literature, and past and current National Research Council studies (such as the 1992 report *Policy Implications of Greenhouse Warming*, the 2007 Decadal Survey, and the ongoing studies on America's Energy Future).

This newsletter and the BASC website (<http://dels.nas.edu/basc/>) will keep you informed as this study develops and ask for your help when we enter the phase of seeking nominations for potential committee and panel members. This stands to be one of our most important activities and we will work closely with you, the atmospheric and climate science community, as well as with all of the other relevant National Academies units and their communities, to make sure that it is a powerful contribution to the nation's thinking and decision making.

Chris Elfring, Director

2. Upcoming Meeting

-- [June 5-6, 2008: Board on Atmospheric Sciences and Climate, Woods Hole, MA](#)

3. What's New

-- New Report: [Earth Observations from Space: The First 50 Years of Scientific Achievements](#). Over the past 50 years, thousands of satellites have been sent into space on missions to collect data about the Earth. Today, the ability to forecast weather, climate, and natural hazards depends critically on these satellite-based observations. At the request of the National Aeronautics and Space Administration, the National Research Council (NRC) convened a committee to examine the scientific accomplishments that have resulted from space-based observations. This report describes how the ability to view the entire globe at once, uniquely available from satellite observations, has revolutionized Earth studies and ushered in a new era of multidisciplinary Earth sciences. In particular, the ability to gather satellite images frequently enough to create "movies" of the changing planet is improving the understanding of Earth's dynamic processes and helping society to manage limited resources and environmental challenges. The report concludes that continued Earth observations from space will be required to address scientific and societal challenges of the future.

4. Climate Change and U.S. Transportation

The Transportation Research Board (TRB) and the Division on Earth and Life Studies (DELS) have released [TRB Special Report 290, The Potential Impacts of Climate Change on U.S. Transportation](#). The primary focus of this study is on the consequences of climate change for U.S. transportation infrastructure and operations. The report provides an overview of the scientific consensus on the current and future climate changes of particular relevance to U.S. transportation, including the limits of present scientific understanding as to their precise timing, magnitude, and geographic location; identifies potential impacts on U.S. transportation and adaptation options; and offers recommendations for both research and actions that can be taken to prepare for climate change. The report also summarizes previous work on strategies for reducing transportation-related emissions of carbon dioxide—the primary greenhouse gas—that contributes to climate change.

While every mode of transportation in the U.S. will be affected as the climate changes, potentially the greatest impact on transportation systems will be flooding of roads, railways, transit systems, and airport runways in coastal areas because of rising sea levels and surges brought on by more intense storms. Though the impacts of climate change will vary by region, it is certain they will be widespread and costly in human and economic terms, and will require significant changes in the planning, design, construction, operation, and maintenance of transportation systems.

The U.S. transportation system was designed and built for local weather and climate conditions, predicated on historical temperature and precipitation data. However, the report finds that climate predictions used by transportation planners and engineers may no longer be reliable in the face of new weather and climate extremes. Infrastructure pushed beyond the range for which it was designed can become stressed and fail, as seen with loss of the U.S. 90 Bridge in New Orleans after Hurricane Katrina.

The report calls for the federal government to have a strong role in implementing many of its recommendations that require broad-based action or regulation, such as the creation of a clearinghouse for information on transportation and climate change; the establishment of a research program to re-evaluate existing design standards and develop new standards for addressing climate change; creation of an interagency working group on adaptation; changes in federal regulations regarding long-range planning guidelines and infrastructure rehabilitation requirements; and re-evaluation of the National Flood Insurance Program and updating flood insurance rate maps with climate change in mind.

Many of the committee's recommendations need not wait for federal action. Local governments and private infrastructure providers can begin to identify critical infrastructure that is particularly vulnerable to climate change. Professional organizations can single out examples of best practices, and transportation planners and climate scientists can begin collaboration on the development of regional scenarios for likely climate-related changes and the data needed to analyze their impacts. Focusing on the challenges now could help avoid costly transportation investments and disruptions to operations in the future.

5. Recently Released Reports

[*Environmental Data Management at NOAA: Archiving, Stewardship, and Access*](#). NOAA collects, manages, and disseminates a wide range of climate, weather, ecosystem and other environmental data that are used by scientists, engineers, resource managers, policy makers, and others in the United States and around the world. The increasing volume and diversity of NOAA's data holdings—which include everything from satellite images of clouds to the stomach contents of fish—and a large number of users present NOAA with substantial data management challenges. NOAA asked the NRC to help identify the observations, model output, and other environmental information that must be preserved in perpetuity and made readily accessible, as opposed to data with more limited storage lifetime and accessibility requirements. This report offers nine general principles for effective environmental data management, along with a number of more specific guidelines and examples that explain and illustrate how these principles could be applied at NOAA.

[*Analysis of Global Change Assessments: Lessons Learned*](#). Global change assessments inform decision makers about the scientific underpinnings of a range of environmental issues, such as climate change, stratospheric ozone depletion, and loss of biodiversity. Dozens of assessments have been conducted to date by various U.S. and international groups, many of them influencing public policies, technology development, and research directions. This report analyzes strengths and weaknesses of eight past assessments to inform future efforts. Common elements of effective assessments include strong leadership, extensive engagement with interested and affected parties, a transparent science-policy interface, and well defined communication strategies. The report identifies 11 essential elements of effective assessments and recommends that future assessments include decision support tools that make use of information at the regional and local level where decisions are made.

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

[Developing Mesoscale Meteorological Observational Capabilities to Meet Multiple National Needs](#) will develop an overarching vision for an integrated, flexible, adaptive, and multi-purpose mesoscale meteorological observation network and seek to identify specific steps to help develop a network that meets multiple national needs in a cost-effective manner. The study will focus primarily on mesoscale observational requirements over the United States and adjacent coastal zones, with emphasis on characterizing the planetary boundary layer, forecasting on time scales up to 48 hours, and the needs of urban areas. It will provide a practical approach, stressing applications and how to design and implement a system that will significantly improve users' decision making. The study will also address the roles of federal, state, and local government and by commercial entities.

The Committee on [Evaluation of the Multifunction Phased Array Radar Planning Process](#) will evaluate the planning to date related to continued development of multifunction phased array radar (MPAR). Specifically, the committee will evaluate whether the planning process to date has been comprehensive and inclusive; whether the June 2006 report issued by a Joint Action Group (JAG) from the Office of the Federal Coordinator for Meteorology (OFCM) has identified the full range of benefits, costs, challenges, and potential participants; whether cost estimates to date are realistic, represent the best available information, and exclude any potential life-cycle benefits or costs; whether there are any significant gaps or errors in initial planning; whether appropriate areas of uncertainty have been identified and follow on risk assessments conducted; and, based on the information available to the committee, whether the MPAR planning process should go forward and what improvements could be recommended. Nominations for the committee been received and the committee will be provisionally appointed in December 2007.

Climate Change Science: Key Questions will provide a concise summary of climate change science in a question and answer format and writing style appropriate for policy makers, in the model of the 2001 NRC report [Climate Change Science: An Analysis of Some Key Questions](#). Similar to the 2001 report, this report is intended to be a concise, readable document that not only provides critical input to the government, but that will serve as an authoritative primer on climate change science for a broad audience. Nominations for the committee can be sent via email to Rob Greenway (rgreenway@nas.edu).

7. BASC in the Past: The Atmospheric Sciences Entering the Twenty-First Century

[The Atmospheric Sciences Entering the Twenty-First Century](#) was the final report authored by the Board on Atmospheric Sciences itself, rather than by an ad hoc committee overseen by the Board, as National Research Council rules now dictate. The Board used disciplinary assessments submitted by its standing and ad hoc committees as well as input received from a variety of scientific sources to appraise the major changes facing the atmospheric sciences and offer recommendations intended to strengthen both basic atmospheric sciences research and related applications in weather, climate, air quality, and other environmental issues. The report also offers a retrospective look at the atmospheric sciences, including the progression of the discipline over the twentieth century from a small fledgling set of basic research activities to a global enterprise providing considerable benefits to individuals, businesses, and governments.

The report, by design, focuses on atmospheric sciences research and services, but recognizes that the atmosphere interacts intimately with other parts of the Earth system and that the atmospheric sciences provide information with wide-ranging benefits including protection of life and property, agriculture, economic and industrial vitality, management of air quality, battlefield decisions, and national energy policy. Although written more than a decade ago, virtually all of the findings and recommendations in *The Atmospheric Sciences Entering the Twenty-First Century* remain highly relevant today. For instance, the report calls for new and improved observational capabilities, the development of improved strategies for providing atmospheric information, and

interdisciplinary assessments of the benefits and costs of weather and climate observations and forecasts—all of which remain important priorities.

The study was supported by a wide range of federal agencies including the Department of Agriculture, the Department of Energy, the Department of Defense, the Environmental Protection Agency, the National Aeronautics and Space Administration, the National Oceanic and Atmospheric Administration, and the National Science Foundation. The report predicts that new alliances between government, the private sector, and academe will continue to advance the atmospheric sciences and related services—a prediction that has, largely, come to pass—but also notes that the federal government has a key and continuing role in supporting research to ensure that weather forecasts and warnings will improve, that uncertainties about a changing climate or air quality will be reduced, and that future atmospheric impacts and benefits will be identified early enough to ensure the safety and vitality of the nation.

The report summary and access to the full text online case be found at:
http://books.nap.edu/catalog.php?record_id=6021

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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, 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: F. Sherwood Rowland (chair), University of California, Irvine; M. Joan Alexander, NorthWest Research Associates; Rosina M. Bierbaum, University of Michigan; Carol Anne Clayson, Florida State University; Walter Dabberdt, Vaisala Inc.; Kerry A. Emanuel, Massachusetts Institute of Technology; Dennis L. Hartmann, University of Washington; Peter R. Leavitt, Weather Information Inc.; Thomas H. Vonder Haar, Colorado State University; Chris Elfring (director, BASC).

We encourage you to share this newsletter with colleagues. If they would like to be added to the email list, a simple request to basc@nas.edu is all that is needed.