

MEETING SUMMARIES

METRICS AND COLLABORATIONS ARE KEY TO CREATING AND PRESERVING NEW OBSERVATION RECORDS

BY MELINDA MARQUIS AND PAM EMCH

A potential gap in observations from the National Oceanic and Atmospheric Administration's (NOAA's) series of polar-orbiting satellites highlights the need for crisp metrics demonstrating the value of weather and climate information. That topic and others were discussed at the American Meteorological Society's (AMS) Washington forum in Washington, D.C., on 26–28 April. The meeting's participants also agreed on the need to collaborate among federal agencies and among the private, public, and academic sectors; to meet user needs and understand local issues when providing climate services; and to improve communication with the public about climate change (and destigmatize the word "climate"). The flagging economy and federal deficit necessitate that the enterprise do more with less. The AMS's Commission on the Weather and Climate Enterprise and its Board on Enterprise

THE 2011 AMS WASHINGTON FORUM

WHAT: A total of 120 leaders of the weather and climate enterprise discussed key challenges, priorities, and business opportunities for creating and disseminating needed weather and climate information and services

WHEN: 26–28 April 2011

WHERE: Washington, D.C.

Economic Development annually host this meeting to assemble members of the weather, water, and climate community along with senior federal agency representatives, congressional staff, and leaders in the private and academic sectors.

METRICS TO SHOW THE VALUE OF WEATHER AND CLIMATE INFORMATION.

The need to improve metrics and develop business cases that quantify the value of the environmental observations and predictions was illustrated in the "Federal Agency Leadership" panel discussion, among others. One performance metric is a given percentage increase in lead time in the forecast of a weather event. The forecast of the major snowstorm that hit Washington, D.C., in February 2010 was remarkably accurate and thereby saved lives and money. Afterward, researchers analyzed the impact of

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removing the polar-orbiting satellite afternoon orbit observations from the forecast. The model analysis indicated that the forecast of this storm would have been degraded without the afternoon orbit observations. A less-accurate forecast would likely have meant increased congestion of air and surface transportation, property damage, and financial loss. However, because the afternoon satellite observations are used in the National Weather Service's (NWS's) forecasts, the prediction of this snowstorm was notably accurate. Unfortunately, because of a partially unmet budget request for funding of NOAA's Joint Polar Satellite System (JPSS), there is the potential for a gap in satellite-based observations from this forecast-enhancing afternoon orbit in the 2016 time frame. Other examples of "losses avoided" are found in instances of evacuations before floods. These savings of life and money are often not captured in metrics of the benefit of investing in environmental observations and models.

The "Executive Branch" panel discussion also stressed the importance of performance metrics. An Office of Management and Budget (OMB) representative explained key components of successful federal budget proposals. Collaboration among agencies, with each party clearly performing its own mission, can confer an advantage. Coherent performance metrics that demonstrate a likelihood of success and relevance to an agency's core objectives are essential to a proposal. OMB uses these metrics to hold agencies accountable. The OMB also uses these metrics to prioritize programs to fund. Whereas some programs and subject matter have relatively straightforward metrics—such as measurable weather forecast skill—other topics are less well suited to defining clear performance metrics. An example is climate research and services. The difficulty of defining performance metrics in climate-related budgets is a key barrier to funding these proposals. The OMB is seeking ways to address this challenge.

NEW AND LONG-TERM ENVIRONMENTAL OBSERVATIONS. The need to maintain and collect new environmental observations was emphasized throughout the meeting. During the "Congressional Staffers" panel discussion, the fiscal year 2011 (FY11) budget cuts to the JPSS program were discussed. Because many satellites now in space are near or past their expected lifetimes, getting the new JPSS Earth-observing instruments into orbit before the old instruments stop working is key to preventing a gap in observations, such as those of atmospheric temperatures, water vapor, ozone, clouds,

sea surface temperature, ocean color, and solar irradiance. NOAA polar satellite system measurements contribute to weather forecasts and are used for studies of climate processes.

Environmental observations were also highlighted during the panel discussion on "Offshore Renewable Energy—A New Pathway for the Nation." A recent Department of Energy/National Renewable Energy Laboratory report determined that U.S. offshore winds have a gross potential generating capacity of 4,000 GW, 4 times the current U.S. electric capacity. Federal agencies are helping to facilitate the development of the first U.S. offshore wind farm, Cape Wind. More environmental data would reduce the risks of development. The offshore environment has the characteristics and complexity of terrestrial environment but with additional feedbacks of ocean-atmospheric interaction. Decision makers need information on boundary layer and mesoscale processes, upwind turbine effects, extreme wind events, turbulence, spatial and temporal and wind variations, ramp events, shear, low-level jet, icing on blades, lightning, thermally driven land and sea breezes, coastal fronts, tropical cyclones, sea spray, and salt corrosion. The AMS Offshore Annual Partnership Topic (APT), under the AMS Board on Enterprise Planning, is working to compile data inventory to clarify what data are available and what are most needed.

Representatives from the Federal Highway Administration (FHA) in the Department of Transportation (DOT), U.S. Forest Service (USFS) in the Department of Agriculture (USDA), American Public Health Administration, and a private agricultural meteorologist explained the kinds of environmental observations and data they find most useful. The trucking industry loses \$3 billion per year from inclement weather. Improved weather products would help reduce that cost. These forecasts need to be fed into decision-support tools and acted on to minimize weather impacts, such as applying salt to roads to decrease icing. The largest surface transportation impacts are not necessarily caused by the largest weather events. A small storm at rush hour and the accuracy of the forecasts' timing of such an event is key. Collecting weather and other information, such as whether windshield wipers are operating from sensors on vehicles through the "connected vehicle" program, will supplement information used to make transportation warnings. The DOT works with the United Parcel Service (UPS) and Walmart to analyze freight operations, demonstrating the value of public-private collaboration. Meeting participants suggested that large companies like these, and others such as

Amazon, might be open to collaborating to provide the necessary investment in a nationwide network of networks, called for in a recent National Research Council report. The need for data interoperability was illustrated when a map showing Weather Information Management Systems used by the Forest Service revealed a paucity of data in the region observed by the Oklahoma Mesonet. The USFS and NOAA are jointly developing a test bed for fire-weather forecasting, which depends heavily on vertical profiles of wind speeds near the ground. Key agricultural weather-data needs include more rural observations, improved North Atlantic Oscillation predictability, and continued refining of El Niño–Southern Oscillation analyses. A concerted, organized approach to obtaining the observations needed for these and other industries, through a public–private collaboration, is clearly beneficial.

INTERAGENCY AND CROSS-SECTOR COLLABORATION. The benefit and necessity of collaborating among the public, private, and academic sectors was reiterated during a panel on “Cross-Sector Collaboration: New Models for Innovation, Incubation, and Intellectual Property.” One such cooperative effort aims to collect more measurements of greenhouse gases (GHGs), by combining expertise from a private company, Earth Networks, with those of Scripps Institution of Oceanography and NOAA. Scripps and NOAA have been collecting measurements of global atmospheric carbon dioxide and other GHGs for more than 50 years. Now, Earth Networks plans to deploy GHG sensors throughout the nation to gather enough data to provide GHG flux estimates at regional scales. Such estimates are needed, for example, to determine if GHG emission reduction efforts are effective.

A collaboration success story was reported in the “FAA NextGen Weather Program and the National Weather Service 4-D Wx Data Cube” panel. The Federal Aviation Administration (FAA), the Next Generation (NextGen) Joint Planning and Development Office (JPDO), and NOAA are jointly creating a “data cube” that will predict the weather at any given point in the future, but in a way that will free air pilots from having to make weather-based decisions. Canceling a flight because of inclement weather costs \$100,000–\$200,000 and rerouting a flight costs \$10,000–\$20,000, depending on aircraft size. The data cube will translate weather information into variables that the operator understands, such as “permeability” and how turbulence and convection will hinder flight routes. The data cube and “Single Authorita-

tive Source” will provide information to the aviation community to support decision making. JPDO has coordinated interagency efforts and ensured that resources are used as effectively as possible. Federal agencies have succeeded in explaining to OMB and Congress the goals of NextGen and why they make financial sense.

USER NEEDS TO DEFINE CLIMATE INFORMATION. The “National Climate Assessment” (NCA) panel also stressed the necessity of collaboration among federal agencies and all three sectors to produce critical climate services. The needs are too big for one agency or sector to provide, a Washington official said. The NCA is being conducted under the auspices of the Global Change Research Act (GCRA) of 1990, which requires a report to the president and Congress every 4 yr. NCA reports summarize climate change science and impacts. They are based on observations across the country and compare these observations to predictions from climate system models. NCA reports place advances in climate science into larger social, ecological, and policy systems, and thereby provide integrated analyses of climate change impacts and vulnerability. This panel discussed the need for long-term observations and better uncertainty information, provided in a way that users understand. Users of climate information need information about their regional or local areas. Sometimes climate models are down-scaled, and users do not appreciate the uncertainty in the information they are using to make decisions. Climate data users need to know which tools to use under which circumstances. Priorities of leaders of the National Climate Assessment include improved coordination of climate assessments at a regional level and establishment of an ongoing, sustainable assessment process that eliminates the restructuring of efforts that have occurred in the past and prevented the preparation of a new NCA every 4 yr.

Is climate information provided in a way that users need and decision makers understand to use the data most effectively? NOAA’s National Climatic Data Center (NCDC) saw an 86% increase in data distributed between 2009 and 2010; an 11% increase in customer requests via phone, fax, e-mail, and mail; and a 57% increase in website visits. NOAA, the National Aeronautics and Space Administration (NASA), USDA, and university leaders agreed that providers of climate data need to further engage users of such data to better understand user needs, especially recognizing the need for local and regional information. Forecasts of water supply,

and when and where drought will occur, are among the most-needed climate information. Successful stakeholder engagement was exemplified by a panel member who described the “New York State Sea Level Rise Task Force” report. The task force was created in 2007 by the New York State legislature to assess impacts of rising sea levels and to recommend protective and adaptive measures. All task force meetings were open to the public, and the task force engaging high-level stakeholders met first and more frequently to ensure that they provided information that stakeholders could use and that would meet their needs.

BETTER COMMUNICATION ABOUT CLIMATE CHANGE. Meeting participants said the term “climate change” is divisive because scientific information about past, present, and projected climate conditions have become entangled with suggestions about how to limit impacts of climate change. The latter are based not only on matters of science but also on opinions about policy, politics, and priorities. Reframing discussions about climate change as matters related to energy security and national security may allow policy makers to find common ground. The Department of Defense (DOD) has some of the most aggressive targets for use of alternative energy sources. Saving lives by conducting fewer fuel transportation convoys and saving money by

using solar energy are among the DOD’s motivations. Meeting participants suggested that the weather and climate community may benefit by meeting with DOD staff to look for areas of common interest, such as obtaining in situ and satellite observations that both communities need. The new AMS ad hoc Committee on Environmental Security was created to address this issue.

Many of the topics discussed during the forum were taken up during the 2011 AMS Summer Community Meeting on 8 August in Boulder, Colorado (see www.ametsoc.org/meet/fainst/2011summercommunity.html).

Details about the forum’s agenda, speakers, and presentations are online (see www.ametsoc.org/meet/fainst/2011washingtonforum.html).

FURTHER READING

- Grannis, P., and Coauthors, 2010: New York State Sea Level Rise Task Force: Report to the legislature. New York State Department of Environmental Conservation Rep., 103 pp. [Available online at www.dec.ny.gov/docs/administration_pdf/slrtrfinalrep.pdf.]
- National Research Council, 2009: *Observing Weather and Climate from the Ground Up: A Nationwide Network of Networks*. National Academies Press, 250 pp. [Available online at www.nap.edu/catalog.php?record_id=12540.]