WeatherZine

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In This Issue

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Editorial

Six Heretical Notions About Weather Policy

When in 1996 freshman Representative Dick Chrysler (R-MI) proposed eliminating the National Weather Service, he declared that the agency was not needed because "I get my weather from the weather channel." Mr. Chrysler's odd view reinforced the perspective of many in the weather community that policy makers have little understanding of meteorological research and operations. On more than one occasion I have heard weather scientists and administrators look with envy to the fortunes of the National Earthquake Hazards Reduction Program (www.whitehouse.gov/WH/EOP/OSTP/NSTC/html/USGS/index.html#anchor299544) that began in 1977 and continues today with about $100 million in annual funding, as well as to the fortunes of programs focused on global change, and more recently, on the carbon cycle. Indeed, the seeming low priority placed on the U.S. Weather Research Program, as measured by appropriated budgets, gives some plausibility to the idea that weather has been less successful in the budget process than other research communities (see this issue's guest editorial).

The perception that the weather community has been less successful than other communities has led me to take a closer look at its role in the broader environment of science policies and priorities. My initial reaction was that many of the obstacles standing in the way of increased resources for the nation's weather enterprise are to be found *inside* not outside the community. I rapidly realized that I was quickly entering what some colleagues might call "heretical" territory. So I thought I'd raise these heretical notions, to stimulate debate and discussion, and hopefully to initiate a dialogue on important issues facing the community.

To continue to raise these issues, I present below "Six Heretical Notions about Weather Policy" that I presented twice last year, first to a joint meeting of the National Academy of Sciences Board on Atmospheric Sciences and Climate (www4.nationalacademies.org/cger/basc.nsf/) and the Federal Committee for Meteorological Research and Supporting Services (www.ofcm.gov/), and then second to the Interdepartmental Committee on Meteorological Services and Supporting Research. Here is what I presented.

Purpose: These "heretical" notions are raised to stimulate debate and discussion. No claim is made as to their relative or absolute truth.

The weather community postulates that improved forecasts will benefit society.

Thus, the logic about what to do is obvious.

- To improve forecasts we must advance science.
- To advance science we need improved models.
- To test and use improved models we need better observations.
- To assimilate the better observations and run the improved models we need faster computers.
- More funding will enable faster computers, better observations, improved models, and advances in science.

Therefore, more funding for advancements in science, models, observations, and computers are necessary and sufficient to benefit society. A corollary is that the greater the rate of these advancements, the greater the benefits to society. This logic seems so obvious and inescapable that to many, great frustration is sometimes expressed when policy makers in places like Congress and the Office of Management and Budget apparently fail to grasp its self-evidence.

But how might a well-meaning, but scrutinizing, person evaluate this logic? They might raise some "heretical" notions!!

1. The atmospheric sciences collect more data than is used or can be used in either research or operations. When field programs or satellites are funded, subsequent analysis often is not. This circumstance makes it difficult for people outside the community (and indeed some inside) to understand why more data is needed, and what its ultimate value is in terms of improvements in forecasts as well as opportunities foregone.

2. Many claim that the forecasts in the United States are the best in the world. At the same time, some folks claim that the Europeans (www.ecmwf.int/) have passed us by. Some who say that the United States is keeping pace with the Europeans argue that we have done so because of innovative use of observations (via creative data assimilation techniques and use of scarce computer time). This is tantamount to saying that funding limitations have motivated extra value from existing resources. The bottom line: Do we really know how "good" forecasts have to be, and at what cost?

3. In any case, public funding for the atmospheric sciences is truly enormous -- approximately $2-3 billion is spend on weather and climate research and operations *each*. When the weather community says that forecasts could improve but only for a small budget increase, one might expect a policy maker to reply: "Great, you should be able to handle that with existing expenditures!"

4. Much more research is produced than is used, or can be used, in the operational forecast process. Much is "left on the floor." The connections between research and the use of research in operations and ultimately in benefits to decision makers is poorly understood (www.esig.ucar.edu/socasp/zine/15.html#1). Until the community can link a request for more resources with expected effects on forecasts and ultimately benefits, securing significant additional funding will be difficult.

5. In any case, improved use and value is in many instances constrained by dated products and a lack of understanding of the needs of users. Remember the case of Grand Forks (www.esig.ucar.edu/redriver/) when a technically accurate forecast was misinterpreted and misused because neither forecasters nor local decision-makers understood what it meant. Scientific and technological advances mean little if they are not well incorporated into decision making.

6. The weather community is so large and full of overlaps and redundancies that no one really knows what the universe looks like. It is difficult for a community like the weather community to speak with one voice, but at a minimum there should be some knowledge of the whole. And there is the destructive public-private debate over roles and responsibilities. Obtaining such knowledge and resolving this debate would greatly enhance credibility when a case is made for more support from the public.

So what needs to be done to better serve the interests of the weather community, the public, and their elected representatives? As a first step these six heresies might be discussed, debated, and perhaps even dismissed by the community. In the process of doing so, the community might find itself better prepared to deal with the views of well-meaning, but scrutinizing public officials.

--Roger A. Pielke, Jr.

Guest Editorial

Earthquakes and Weather: Lessons for Policy and Science

Scientists who deal with weather impacts are well positioned to help decision-makers make more effective policies to prepare for future tragedies like Hurricanes Hugo and Andrew, or the Midwest flood of 1993. However, my research on the politics of extreme events suggests that many weather experts are not highly visible in making key decisions on hazard preparedness and mitigation. Consequently, policy makers make decisions, particularly relating to the social and economic costs of extreme events, with relatively little input from the very scientists involved in learning the most about these phenomena.

Extreme events result in significant social and economic costs. Much of this cost is attributable to decisions that create greater hazard vulnerability, such as building on barrier islands and floodplains, and using structural mitigation such as levees, groins, and seawalls. These measures result in significant long-term costs without creating a proportional increase in the safety of property "protected" by these measures.

The scientific community is aware of these problems and a lively debate and discussion continues over the most effective alternatives to ineffective policies. Nevertheless, other voices in Washington often dominate this expertise. I found relatively little participation in congressional fact finding from meteorological and other experts following significant

hurricanes as well as between events. This contrasts with earthquake policy, in which considerable scientific expertise has been mobilized in the aftermath of major events to provide information to Congress and other elected officials about earthquake hazards and their mitigation.

In response to Hurricane Andrew, the Federal Emergency Management Agency (FEMA) created a Hurricane Program focused on mitigation. NOAA established the Weather Research Program to "weatherproof the nation," but both the Hurricane and Weather Research programs are small and lack the statutory status and congressional attention afforded the National Earthquake Hazards Reduction Program (NEHRP). Indeed, the NEHRP was the product of the kind of scientific coalition and group effort focused on the needs of policy makers that should be developed to deal with extreme weather as well.

Why is scientific expertise less important in dealing with hurricanes? First, scientists and other technical experts often find their voices drowned out after a hurricane by the much louder and persistent calls for disaster relief and a return to "normal." These demands come from residents, development interests, and state and local governments that seek disaster relief to restore the status quo ante, not a new development mode in which vulnerability is reduced. Congress has historically shown more interest in these interests than in applying sound science. In my research (published in my 1997 book, After Disaster: Agenda Setting, Public Policy and Focusing Events), I found that between 1960 and 1996, over 60 percent of the people who testified before Congress on hurricanes hazards did so before a committee on public works. In the earthquake case, the single most active committees were those dealing with science and technology, with 35 percent of that testimony heard by science and technology committees, and the remaining testimony spread among a variety of committees. While disaster relief concerns dominate both post-earthquake and post-hurricane discussions, between large events the earthquake science community has been much more active in claiming a place on the policy agenda. In my review of congressional testimony I found that, between earthquakes, the dominant issues on Congress's agenda related to earthquakes focused on scientific and technical matters, while Congress's hurricane agenda is dominated by issues of disaster relief and structural mitigation, regardless of whether an event is fresh in the news or is a more distant memory.

Second, many scientists simply are not involved in the public policy making process because there are often few professional rewards that come from participating in policy making. Moreover, many scientists are frustrated with the seemingly irrational, illogical way in which Congress and other organizations appear to do their work. Scientists find that, even when they make the effort to provide timely and useful information to Congress, it is either ignored or, in some cases, treated with hostility, because this participation would slow and perhaps change the flow of disaster relief funds and the return to normal.

Fortunately, there are ways for the "weather hazards community" to come together and make its expertise available to government and the media to educate all of us about cost effective, safety enhancing methods of weather hazard mitigation. Such a community would amplify the voices of experts, provide strength in numbers, and work with our allies to help us press the case for more effective and smarter hazard mitigation. Again, an apt model for this might be found in the earthquake hazards community. While there are many disciplines involved with several aspects of earthquake hazards such as soil failure, ground motion, and structural responses to earthquakes, the earthquake hazards community is led by the Earthquake Engineering Research Institute (EERI), which works to translate scientific knowledge into practice. The creation of a "Weather Research Institute" could serve as the beginning of an effort to elevate weather issues to a higher level on the federal government's agenda than the current programs. One goal of this effort might be the creation of a "National Weather Hazards Research Program" parallel to the NEHRP that would gain the statutory and scientific authority needed to influence weather hazards policy.

Finally, social scientists play an important role in this field, particularly in bridging the gaps between the natural sciences and the policy making process. EERI has long included social scientists who work together with scientists and engineers on earthquake mitigation. Connections between natural and social scientists are also growing in the weather hazards field, and it is vital that all of us who are concerned with weather hazards maintain communication to share in what I believe will be the daunting but ultimately rewarding task of reducing our vulnerability to extreme weather.

--Thomas A. Birkland
Graduate School of Public Affairs
University at Albany
State University of New York

Correspondence

Dear WeatherZine:

The most recent issue was very poignant, indeed. Whether realized or not, the theme of editorial #1 ties

together those of guest editorials #2 and #3 (see WeatherZine #20, www.esig.ucar.edu/socasp/zine/20/).

As a National Weather Service meteorologist, and one who has dealt with several of these issues from both sides of the fence, I felt compelled to respond.

The Prediction Hall of Fame
(www.esig.ucar.edu/socasp/zine/20/editorial.html)

Roger Pielke hits the nail on the head with the idea that "technically accurate" weather predictions are only as good as the proactive actions taken by those most affected - which requires the "symphony" of communication and decision making. The "over selling" of capabilities is an opinion widely held by operational forecasters, and can be somewhat justified by the simplistic marketing of Doppler radar and supercomputers as "cure-alls" rather than tools to be used by the human being.

While technical training for operational forecasters has been sufficient, customer service training has been inadequate. With the exception of Warning Coordination Meteorologists and others who partake in storm surveys, public outreach, or verification, operational forecasters are poorly versed in how the end product is perceived. Most forecasters do not get to meet the local television, radio, and print media - and contact with emergency managers is rare. Some customer feedback does arrive via electronic mail or conventional mail, but there really is no substitute for meeting customers face-to-face.

Weather Forecast Limitations Point to Need for More Research **and**
Modernization: The Challenge Continues
(www.esig.ucar.edu/socasp/zine/20/guest.html)

The juxtaposition of these editorials illustrates a growing disconnect between the direction of NOAA/NWS policymakers and that of service evaluators, both inside and outside of NOAA. Simply put, we are pitting automation against human interpretation.

In a post-mortem from the Washington Post (January 26), some were quoted as saying "...the Eta [forecast model] had it right." It was also implied that the Eta model forecasts storms such as these better than most models. What wasn't said was that the Eta also has a known bias toward rapid cyclogenesis – which means that forecasters need to exercise caution and look at what is really going on before accepting the Eta - or any - model solution.

Drs. Baker and Anthes make a strong claim for the need for more research based on the perceived failure to predict, with sufficient lead-time, the winter storm of January 25, 2000. Though it is unquestionable that more atmospheric research is needed, singling out this particular event is misguided.

That fact is, the perceived forecast bust could have been ameliorated with directed human actions - since there was a 9-hour lead-time. NWS warning services don't end with product issuance. In fact, the product issuance often is the last thing to be completed.

Conference calls involving state emergency management offices, state transportation offices, and state school systems, and military support (i.e., The National Guard) can be initiated by NWS offices prior to official warning issuance to allow rapid deployment of those personnel necessary to keep a local region from "shutting down".

With rapid deployment and readiness comes a sense of preparedness. Thus, despite the fact that today's media are hungry for sensational reporting, the headlines for this event could very well have read "Storm a Surprise for Some (lead headline)...but highway crews were ready" (sub headline).

The best models in the world can't do this; human decision-making under time pressure can. Such decision-making requires a strong confidence in predictive abilities - borne of the forecaster selection process referred to by Dr. Stewart.

For years, verification and customer service efforts were de-emphasized - largely due to attention given the entire modernization effort. Recently (some would say at long last) verification and customer service have been given their due. Unfortunately, the balance has been shifted toward pure verification: the touting of numerical improvements in warning accuracy (also known as POD), critical success index, and lead time. Even the initial rise in false alarms after implementation of Doppler Radar has begun to decrease.

However, the true measure of forecast and warning utility is the fair perception of the end user. Forecasters often believe they have succeeded with short-fused, and in some cases long-fused, warnings when, upon further evaluation, the end users did not have enough time or resources to take preventive action.

Dr. Stewart makes oblique reference to what I call forecast alchemy: the combination of computer models with forecaster skill - and a "sixth sense" that occurs through observing - the sky, wind, air mass type, etc. This alchemy is then applied to the climatological nuances of the local area to issue the best possible forecasts and warnings.

For these reasons, there will always be a need for local forecast offices – be they public or private - as well as humans to fill them.

--Barry S. Goldsmith
Senior Forecaster
National Weather Service
Tampa Bay, FL

Weather-Related News

The National Symposium on the Great Plains Tornado Outbreak of 3 May 1999: Toward a Unified Approach of Understanding, Prediction, Warning, Response and Recovery will be held April 30 through May 3, 2000, at the Westin Hotel and Resort, Oklahoma City, Oklahoma. For the registration form, agenda, list of participants, and other information about the symposium, please see the web site at geowww.ou.edu/~kkd/may3.htm.

Web Site Additions

General
www.naturalhazards.org/
Natural Hazards.org

This site provides easy access to information about all types of natural hazards, including hurricanes, tornadoes, drought, El Nino/La Nina, and snow and ice. Information about the locations and seasons of greatest risk is provided. Links to carefully selected web sites and educational products for purchase are also included.

Emergency Management
www.nws.noaa.gov/stormready/index.htm
StormReady

There are relatively few uniformly-recognized standards dealing with the specifics of hazardous weather response operations. Recognizing this need, the National Weather Service has designed a program to help cities, counties, and towns implement procedures to reduce the potential for disastrous, weather-related, consequences. By participating in "StormReady," local agencies can earn recognition for their jurisdictions by meeting criteria established by the NWS in partnership with federal, state, and local emergency management professionals.

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www.flash.org/
Florida Alliance for Safe Homes (FLASH)

FLASH is a non-profit, public/private coalition dedicated to promoting and encouraging family and home safety. FLASH strives to bring together the best minds, the latest research, and the most practical techniques to help make homes safer from natural disasters. Its goal is to help Floridians minimize deaths, injuries, suffering, property damage, and economic losses caused by hurricanes, lightning, tornadoes, or wildfires. It encourages them to build, buy, and use buildings that are safe from disaster, to know the risks that natural hazards present, and to understand ways of reducing these risks.

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www.crid.or.cr/crid/eng/crid/criden.htm
Regional Disaster Information Center, Latin America and the Caribbean

The mission of the Regional Disaster Information Center is "to promote the development of a prevention culture in the Latin American and Caribbean countries, through the compilation and dissemination of disaster-related information, and the promotion of co-operative efforts to improve risk management in the Region." To accomplish this mission, the Center has launched this web site in English and Spanish, providing on-line access to over 12,000 bibliographic references, publication and distribution of materials on disaster-related topics, and technical advice and training for the establishment of disaster information units.

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www.oas.org/usde/publications.htm
Organization of American States publications

The Organization of American States offers the following three on-line publications:

- Disaster, Planning and Development: Managing Natural Hazards to Reduce Loss (www.oas.org/usde/publications/Unit/oea54e/begin.htm)

This publication presents general principles for integrating hazard management into development planning and project formulation, as well as a set of guidelines for applying the methodologies of hazard management.

- Primer on Natural Hazard Management in Integrated Regional Development Planning (www.oas.org/usde/publications/Unit/oea66e/begin.htm)

This publication covers most of the major natural hazards and many of the current tools (including GIS and remote sensing) available to assess and deal with these risks.

- Reduction of Vulnerability to Floods in River Basins (www.oas.org/usde/publications/Unit/oea26b/begin.htm)

Specialists in the environment, planning, and flood mitigation attended presentations of case studies, discussed experiences with and strategies for reducing the impact of floods on the selected economic sectors,

and recommended activities appropriate for hemispheric cooperation. The conclusions and recommendations of this seminar are presented in this publication.

Floods

dprsj35.er.usgs.gov/public/webb/ven_1/
Venezuela Flash-flood and Landslide Disaster

This U.S. Geological Survey slide show concerning the Venezuelan flash flood and landslide disaster of December 1999 consists of a series of 42 photographs, maps, satellite images, and a table of rainfall data. Photographs show landslides, flash-flood deposits, damaged roads, houses, apartment buildings, and other structures

Injury and Damage Statistics

www.Colorado.EDU/hazards/sites/costs.html
Selected Sources of Data on Disasters and Disaster Costs

What constitutes a "disaster"? What constitutes a "cost"? Do we want to look at insured losses or all losses? How can we be sure that loss estimates are accurate for individual disasters and/or that they are comparable across disasters? How can we possibly compare the relatively high property losses in developed countries with the relatively high social costs (such as deaths, injuries, and homelessness) in developing nations? Which indirect costs should be included? To respond to these questions, the Natural Hazards Center at the University of Colorado recently added this page to its Web site. The page does not provide statistics but rather links readers to sources of such information.

Insurance

www.iii.org/home.html
The Insurance Information Institute

The Insurance Information Institute (III) Web site provides information about insurance issues related to disasters and hazards mitigation measures, as well as statistics on disaster losses including hurricanes, floods, and tornadoes.

El Nino

www.coaps.fsu.edu/lib/biblio/enso-bib-intro.html
Comprehensive Bibliography on the El Nino Phenomenon

This bibliography is searchable by author's name and can also be browsed page by page.

About Us

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