

# WeatherZine

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## Editorial

### Flying Blind:

### The Data Quality Act and the Atmospheric Sciences

Imagine that medical scientists developed in a laboratory a new drug that they believed held great promise of societal benefit. Could they then hang a shingle and begin offering the drug for sale to the general public? Of course not. Because of the potential for unexpected, adverse effects, all new drugs must go through some form of testing to evaluate costs and benefits before they are approved.

But in the world of policy, unlike the world of medicine, there are frequently times when dramatic interventions are introduced with no prior systematic consideration of their potential effects. The "Data Quality Act," to become law October 1, 2002, is one such intervention (see <http://www.whitehouse.gov/omb/fedreg/reproducible.html>). According to its supporters the Act promises to revolutionize the role of science in policy making by "ensuring and maximizing the quality, objectivity, utility and integrity" of scientific information. For a summary of the Act and related references, see the WeatherZine news item on the Data Quality Act that follows.

Few would question the goals of quality, objectivity, utility and integrity of information in the Data Quality Act. One might expect that, as occurs in medicine, some period of analysis of the effects of a particular policy intervention would precede broad implementation. But with the Data Quality Act no such analysis has occurred. (While the NRC is studying the law, the law will go into effect regardless of the results of the study, see <http://www4.nas.edu/cp.nsf/4fd1d0885e3a6a928525655f00699b9f/92c0c861c9>

[d1723885256b5f00671350?OpenDocument](http://www4.nas.edu/cp.nsf/4fd1d0885e3a6a928525655f00671350?OpenDocument).)

Instead, according to a long-time congressional staffer familiar with science policy, the Act had its origins in a political dispute over air pollution. When EPA proposed to tighten regulations on air pollution, opponents of the proposal felt hamstrung by an inability to access the supporting scientific data because the research involved human subjects and for other reasons. One result was a successful effort to amend the Freedom of Information Act to apply to scientific data, passed as a "rider" to a spending bill. The Data Quality Act was passed as another "rider" to a 2001 spending bill.

The term "rider" is inside-the-Beltway-speak for a piece of (typically) unrelated legislation added to other legislation – often funding bills (called Appropriations). Many readers will be more familiar with riders that provide a direct infusion of federal dollars into congressional districts (i.e., "pork") for capital projects like bridges and even for science (i.e. "earmarks"). An essential feature of such "riders" is that they can largely escape the normal process of review and assessment that characterizes legislation developed through congressional policy committees. If the Data Quality Act has been systematically reviewed or assessed, one won't find a record of it in congressional deliberations.

The lack of assessment and the highly politicized process that led to the Data Quality Act will not be remembered as high points in the development of United States science policies. Even so, it is important to distinguish the process that led to the Act

## Editorial Continued

from the content of the Act itself. And the content does have potential to help stimulate some positive changes. Consider the following:

- A considerable amount of research produced by the weather research community has potential for application but fails to make it into the hands of end users. In the area of weather prediction enhanced consideration of quality and utility of scientific information could foster improved connections of “research” and “operations.” A 2000 National Research Council Report (<http://www.nap.edu/books/0309069416/html/>) labeled the gap between research and operations a “valley of death.” (see <http://sciencepolicy.colorado.edu/zine/archives/1-29/15.html#1>).
- To the extent that the Data Quality Act motivates serious considerations of utility it could also help to facilitate the transfer of science and technology from the public to the private sectors. Given the vast potential for increased interactions at the interface of federal research and commercial meteorology, any motivation for closer connections would be of value (see <http://sciencepolicy.colorado.edu/pielke/workshops/private.sector/index.html>).
- The Data Quality Act, again with its focus on usability, could help make climate research more practical and of immediate benefit. If so, programs such as the Regional Integrated Science and Assessments of NOAA-OGP (see <http://www.ogp.noaa.gov/mpe/csi/risa/>) would benefit under the Data Quality Act. (Note: here at the CIRES Center for Science and Technology Policy Research we run one such RISA, the Western Water Assessment, see <http://sciencepolicy.colorado.edu/wwa/>).

At the same time that there are potential benefits, there are also valid concerns about potential negative consequences. In each of the above examples the benefits are associated with a greater consideration of the usability of science. However, none of the cases is particularly political (at least by comparison to other atmospheric sciences issues such as those explicitly focused on regulation).

In some issue areas there are valid concerns about the limits of science in decision making (see [http://www.whitehouse.gov/omb/info/nae\\_speech.html](http://www.whitehouse.gov/omb/info/nae_speech.html)). Scientific results are frequently contested, and even if not contested, uncertain to some degree. As a consequence, advocates and decision makers support particular policies based on factors other than scientific findings. Recent examples include controversy about streamflow for salmon and farmers in the Klamath River Basin (see <http://209.41.184.21/partners/670/public/news278311.html>) and the reappointment of Robert Watson to chair the Intergovernmental panel on Climate Change (see [http://www.boston.com/dailylobe2/098/editorials/A\\_chilli](http://www.boston.com/dailylobe2/098/editorials/A_chilli)

[ng\\_of\\_science+.shtml](#)).

Proponents of the Act suggest that it will improve the information base on which policies are made. James Tozzi, of the Center for Regulatory Effectiveness (see <http://www.thecre.com/>), stated in the New York Times, “Now in the world’s most powerful government you’re going to have to issue information that’s accurate.” But opponents worry that the Act would simply bias policy in favor of business-as-usual in the face of uncertainty. Joanne Padrón-Carney, director of the Center for Science, Technology, and Congress of the American Association for the Advancement of Science, stated in the same New York Times article, “We really would not like to have science attacked as a way of being sure that policy isn’t made.” (<http://www.nytimes.com/2002/03/21/politics/21DATA.html>). It is difficult to resolve these perspectives.

To be sure, policy can benefit from improved connections of science and decision making, and to the extent that the Data Quality Act helps to address these connections it is a valuable addition to the nation’s science policies. But at the same time, there is great potential for the Data Quality Act to further the politicization of science and actually impair the connections of science and policy. We won’t know whether the Data Quality Act benefits or impairs national science policies until it is implemented and analysts begin evaluating its effects. Just like putting a new drug on the shelves without any testing and seeing after-the-fact whether or not it improves human health.

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For further reading:

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Sarewitz, D. 1999 (March draft.) Science and Environmental Policy: An Excess of Objectivity, a revised version of this manuscript appears in: *Earth Matters: The Earth Sciences, Philosophy, and the Claims of Community* (Prentice Hall, 2000), edited by Robert Frodemen pp. 79-98.  
<http://www.cspo.org/products/articles/excess.objectivity.html>

## Guest Editorial

### *Tropical Cyclone Landfall Forecasting: Making Research Relevant*

**W**e've recently published research that calls into question some long-held beliefs about hurricane forecasting and research. We conclude that hurricane research can be made more relevant.

Hurricane forecasters do not focus their forecasts and warnings on the exact location of the storm center because damaging winds cover a large region surrounding the actual center. Also, since forecasters issue new storm path predictions every 6 h, the geographic region expected to be impacted by damaging winds and storm surge also varies.

How are these forecasts used in practice? Anyone with Internet access can plot the forecast track and see where it crosses the coast and how the predicted landfall location changes every 6 hours. There are even commercial software products that provide full color animation of the forecast wind field at landfall. Though probabilistic landfall forecasts are issued by the National Hurricane Center (NHC) in both text and graphical format, the general public is typically focused on when and where the storm will hit land. So in practice, even if they are looking at the center of a cone of uncertainty in a graphical product, some portion of the informed public, including the emergency managers, are really paying attention to the "landfall forecast," but this forecast is neither explicitly issued nor routinely verified.

The 12, 24, 36, 48, and 72 h (and perhaps eventually 96 and 120 h, see <http://www.noaanews.noaa.gov/stories/s883.htm>) storm positions are contained in the official forecast and these are compared to the observed location of the storm when compiling the annual error statistics. These data show 1-2% annual improvements in Atlantic basin tropical cyclone forecasts over the last three decades. While this improvement is commendable, only 15% of the forecasts issued from 1976-2001 were for storms predicted to cross the U. S. coastline, and 2% of these 15% were for storms that ended up remaining at sea. Unless the 24, 48, and 72 h positions happened to coincide with the coastline, there is no available information to suggest that the overall improvement trend applies to landfall forecasts, or that it can be projected into the future. Nevertheless, goal-setting documents from the U. S. Weather Research Program, the National Weather Service, and the Executive Office of the President have recently made this assertion. By not

verifying the most important part of the forecast in terms that the public can readily understand (when and where it crosses the coastline), we may be missing an opportunity to inform the public about the capabilities and limitations of our predictions.

In our research we asked: Does the improvement trend apply to landfall forecasts? To examine this question we followed a simple approach first used by Charlie Neumann and Joe Pelissier at NHC back in 1980: compare the observed landfall position and time to where and when the officially forecast track of the storm first crosses the coastline. Our findings (recently published in the December issue of the AMS Bulletin) suggest:

- The improvement trend does not apply to landfall position forecasts. Position forecasts do not show a significant improvement (or degradation) trend since 1976, although time of landfall does show significant improvement at the 24 h period.
- Within 30 h of the coast, forecasts tend to predict landfall too early.
- The early bias and lack of improvement are consistent with a "least regret" forecast and warning strategy to account for possible storm accelerations and intensity changes.
- Uncertainty in the time of landfall is similar when the storm is 24 h or 36 h offshore (8h +/- 11 h), suggesting that it may be possible to extend warnings to 36 h (although the length of warned coastline would need to increase).
- Landfall position and time forecasts are skillful. To be skillful the forecast has to do better than a simple model based on extrapolating the current motion (persistence) and considering how past storms have moved (climatology).
- Current hurricane warning areas imply a 5% chance that a storm might hit outside the warned area; this is ~200 km smaller than a warning area based on reducing the risk to 1%, suggesting an inherent value of \$70 million per warning episode.

Landfall time and position are never specifically forecast yet several research goal and policy-related documents have been published that aspire to improve landfall forecasts by

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[http://sciencepolicy.colorado.edu/cgi-bin/feedback.pl?site\\_id=1](http://sciencepolicy.colorado.edu/cgi-bin/feedback.pl?site_id=1)

Or send an email to:

[weatherzine-admin@sciencepolicy.colorado.edu](mailto:weatherzine-admin@sciencepolicy.colorado.edu)

and include your name, organization, and email address.

## Guest Editorial Continued

applying the well- documented improvement in basin-wide hurricane forecasting. The National Weather Service strategic plan "Vision 2005" seeks to "increase the average lead time for hurricane landfall forecasts from 19 h to beyond 24 h with no increase in warned area." In a document entitled "Effective Disaster Warnings" published by the Subcommittee on Natural Disaster Reduction with the seal of the Executive office of the President on the cover, it was stated, "Prediction of hurricane landfalls is improving...For the next four year period, forecasts for landfalling storms should improve an additional 20% due to use of better models and data." Even the U. S. Weather Research Program lists a goal of "reducing landfall track and intensity forecast errors by 20%."

Our results suggest these goals may not be achievable and the perception of accuracy improvement may be leading to unrealistic expectations of both scientists and end users alike. If such documents are calling for improvements in landfall forecasts, then we need to understand why these forecasts have not improved despite evidence of improvement of forecasts throughout the Atlantic basin. One possibility is that the forecasts near land are already pretty good (taking advantage of the proximity of the observation network) and therefore difficult to improve. Recent work by Abernethy suggests that landfall position forecasts meet or exceed an estimate of the predictability limit in the Atlantic basin at 36, 48, and 72 h. Further

examination of objective guidance and official forecasts is necessary to determine whether a "course of least regret" diverges from one of continuous improvement. Researchers should examine landfall forecasts of numerical weather prediction models to determine errors and whether improvement trends exist. In addition, they should examine landfall intensity prediction errors of official forecasts and model guidance.

If the goal is to improve landfall forecasts, let's focus on that small number of cases that really produce the impact. Our results suggest that landfall forecasts are already pretty good and difficult to improve, but we're not really sure why. The tropical cyclone community and USWRP should examine this problem in more detail and then come back with research and operational goals for forecasts that will communicate uncertainty, yet focus on what the user community wants to know: where and when is that storm going to strike, how strong will it be when it hits, how much rain will we get, and what areas will be flooded by surge, waves, and rain?

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## Student Editorial

### *Life as an Interdisciplinary Scientist: Am I being set up?*

**A**s I can now see the light at the end of the tunnel for my dissertation work, I sometimes wonder if it's an approaching freight train. Over the past several years, I have worked on interdisciplinary, stakeholder-driven research as part of the NOAA Office of Global Problems Southwest Climate Assessment Project (CLIMAS). By choosing an interdisciplinary path have I helped or hobbled my career opportunities? What lies ahead?

While an undergraduate student in Physics at New York University, I met Marty Hoffert, a charismatic faculty member researching climate sensitivity and global warming. He is also active in developing advanced alternative energies to reduce reliance on fossil fuels. I was inspired by his philosophy of "study the problem, and help fix it," which is something that slow neutron researchers, like myself, didn't hear very often.

I continued on at the University of Arizona Hydrology department under Soroosh Sorooshian. I was doing physical climate modeling research when the 1997-98 El Niño occurred. El Niño's impact on Arizona water resources is among the strongest in the nation. Given that water is life

in the desert, it seemed obvious to me that water managers would be scrambling to act.

I joined the CLIMAS project, and shifted my research to look at how water managers in Arizona responded to the forecasts. I wanted to find out where they got their information, how they used it and how climate forecasts could be more useful. I got a crash course in survey skills by CLIMAS anthropologists and was then set loose to interview an array of decision makers.

When colleagues heard about what I was doing, I received such encouragement as "Can you get away with doing just that for your degree?" To get the approval of my committee, my Master's proposal included a disjointed (but now vestigial) section describing how I'd study the anti-correlation between summer and winter rainfall in Arizona (i.e. "real science"). Meanwhile, my cold-call interviews with users revived painful high school memories as a telemarketer.

To my surprise, it all worked out in the end. Eleven talks about my research (seven of which were invited) were given at local to international venues. Out-of-state newspapers

## Student Editorial Continued

called me to discuss my work. Others told me that such exposure is uncommon among Master's students. I found that some users didn't use the climate forecasts because they didn't know how good they were. In response, Holly Hartmann, a fellow Arizona student, and I set out to do user-oriented "consumer reports"-style forecast evaluations. To learn how to evaluate forecasts for ranchers, we partnered with social scientists studying the vulnerability of ranching to climate. We gave an introductory talk about the effects of El Niño in Arizona to 17 groups (approximately 500 ranchers and farmers total) and afterwards we listened to their concerns and found out more about their operations. Most recently, I'm developing a way to get climate information into operational seasonal water supply outlooks.

This extensive stakeholder interaction has been a truly rewarding experience. Nonetheless, I can see how interdisciplinary research is not for everyone. Consider some of the downsides:

**No respect.** Although my physics degree gave me more math training than most advanced engineering programs, some colleagues look down their noses at me as a "soft" scientist. I've heard social science described as little more than "common sense" and "journalism." If you think that social science gets the same respect as natural science, compare the research funding for these endeavors.

**Extra work.** Interdisciplinary research is not easy. It involves mastering not only your own field, but another as well. Stakeholder interaction can also be challenging and consuming. Science has historically been a safe harbor for the shy and inarticulate. Personally, I'm rattled when encountering hostile stakeholders. Someone once introduced me at a meeting of a rural cattlemen's group as "the scientist" and "global warming expert" from the "University" here to "teach you about climate change." Good thing they never found out I'm from New York City!

It's not all bad news, however. Some of the advantages include:

**Guaranteed Employment.** All complex natural resource issues require interdisciplinary solutions. As far as I can tell, none of these issues is going to go away soon. If you find your niche, job offers will come at you from all directions.

**Societal Relevance.** It's satisfying to work on real-world problems and to know that my work contributes to my community. Stakeholders are generally appreciative of the opportunity to talk with a scientist without an agenda. If stakeholders like what you're doing, they'll give you lots of positive strokes. Best of all, I can discuss my research with my mother.

To students, I say, "Live in New York, but leave before it makes you hard. Live in California, but leave before you get soft". Do the hard science first and get your credentials. Explore the "other side of the tracks," but don't tarnish your reputation too much. Also, make sure at least one member of your committee is sold on the idea of interdisciplinary science and is willing to defend your work against other committee members. Hang in there and enjoy the experience.

To funding and academic agencies: I think the reward structure needs to change, beyond just paying lip service to interdisciplinary research. I don't look forward to the day when I'm a faculty member being judged by my "peers" and they find that I haven't published in the most prestigious journals and have spent most of my time interacting with researchers outside my home department. Funding agencies must face the same problem. If I am the only researcher doing what I'm doing, how do they judge my success? Who do they send to evaluate me?

So far, I think interdisciplinary research is a great way of life. However, I can't help but worry about whether the infrastructure exists to foster and support scientists like myself. As my career progresses, I suppose I will find out. Look for a follow-up report in the April 2012 WeatherZine!

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Editor's note: Tom Pagano is a graduate student at the University of Arizona Department of Hydrology and Water Resources under advisor Soroosh Sorooshian. Next month he will be joining the USDA Natural Resources Conservation Service in Portland as lead seasonal water supply forecaster for the Southwest U.S. He is also a music aficionado, with over 2,500 hours of music in his collection.

## WeatherZine News *It's Hard to Beat Climatology*

**A**quila Energy (<http://www.aquila.com/>) recently announced the winner of its summer 2001 seasonal forecasting competition (<http://www.guaranteedweather.com/guaranteedweather/>

[content/news/2002/press/pr01172002.html](http://www.guaranteedweather.com/content/news/2002/press/pr01172002.html)). Here is one reaction:

Howdy all,

I don't how many of you got the letter from Aquila Energy

## WeatherZine News Continued

announcing the winner of the Summer 2001 Seasonal Forecasting Competition. The lucky winner won \$50,000 for beating climatology in his six 3-month forecasts.

I was struck by a couple of things in the letter. Aquila noted that only 1 out of 55 people were more skillful than climatology. This seems to me to indicate that climatology is the real winner! We ought to be able to use this to show that climate data, properly used, can give very useful

information to the public for planning purposes.

The other thing that struck me was that it seems highly likely to me that by pure chance at least one of these people should have beaten climatology anyway. So I guess [the winner] may have had real skill, or may have just won the statistics lottery last year.

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## WeatherZine News Data Quality Act Could Have Far-reaching Impact on Environmental Regulation

In December 2000, Congress passed a little-known provision in its budget known as the Data Quality Act. The Act, which will go into effect next October 1, requires every federal agency to establish "guidelines ensuring and maximizing the quality, objectivity, utility and integrity of information (including statistical information)." All agencies must provide a petition process to correct inaccuracies.

Some critics of the Act are concerned that it will be used to impede environmental information and regulation. For example, the Act has already been cited as grounds for withdrawing the National Assessment on Climate Change because the report is allegedly based on flawed computer models ([http://www.thecre.com/quality/20020211\\_climate\\_letter.html#start](http://www.thecre.com/quality/20020211_climate_letter.html#start)). The National Academy of Sciences recently launched a project in which federal agencies that are required to develop guidelines to implement the Act can share their views and hear ideas and concerns from external communities.

For more information:

- Center for Regulatory Effectiveness website (<http://www.thecre.com/>) - the organization that authored the provision
- National Academy of Sciences, Ensuring the Quality of Information Disseminated by the Federal Government project (<http://www4.nas.edu/webcr.nsf/ProjectScopeDisplay/S TLP-Q-02-01-A?OpenDocument>)
- Office of Management and Budget, Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity of Information Disseminated by Federal Agencies (<http://www.whitehouse.gov/omb/fedreg/reproducible.html>)
- Andrew C. Revkin, "Law Revises Standards for Scientific Study," New York Times March 21, 2002 (<http://www.nytimes.com/2002/03/21/politics/21DATA.html>)

## WeatherZine News Special Session at Upcoming AGU Meeting

A special session will be held at the upcoming AGU meeting (Washington DC, May 28-31, 2002) entitled "Policy-Relevant vs. Policy-Driven Atmospheric Chemistry Research: What Role Do Policy Applications Play in Determining Questions, Methods, and Funding?"

The session should be a great opportunity to discuss how the consumers of scientific information affect the scientific process. An exciting list of invited speakers is lined up including Praveen Amar (NESCAUM, Northeast States for Coordinated Air Use Management), Daniel Jacob (Harvard), Bill Hooke (American Meteorological Society), Roger Pielke,

Jr. (University of Colorado), Cynthia Rosenzweig (NASA GISS), Dan Sarewitz (Columbia), and others. Questions to be addressed include the following: (1) When do funding priorities shape the science, and when do the scientific questions shape funding priorities? (2) How do agencies that need scientific information use policy-driven studies versus external research with varying degrees of policy relevance? (3) How have scientists adapted their research goals or program structures to meet the needs of the policy community?

For more information visit:  
<http://www.agu.org/meetings/sm02top.html#events>

**WeatherZine News**  
**Bureau of Labor Statistics Releases 2002-03 Edition of  
Occupational Outlook Handbook**

**T**he Bureau of Labor Statistics recently announced the release of the 2002-3 edition of its Occupational Outlook Handbook (<http://stats.bls.gov/oco/home.htm>). The handbook, a nationally recognized source of career information, describes what workers do on the job, working conditions, the training and education needed, earnings, and expected job prospects in a wide range of occupations. It is revised every two years.

The Handbook's entry for "Atmospheric Scientists" (<http://stats.bls.gov/oco/ocos051.htm>) contains the following information about expected job prospects:

"Employment of atmospheric scientists is projected to increase about as fast as the average for all occupations through 2010, but prospective atmospheric scientists may face competition if the number of degrees awarded in atmospheric science and meteorology remain near current levels."

"The NWS has no plans to increase the number of weather stations or the number of meteorologists in existing stations for many years. Employment of meteorologists in other Federal agencies is expected to decline slightly as efforts to reduce the Federal Government workforce continue. On the other hand, job opportunities for atmospheric scientists in private industry are expected to be better than in the Federal Government over the 2000-10 period. As research leads to continuing improvements in weather forecasting, demand should grow for private weather consulting firms to provide more detailed information than has formerly been available, especially to weather-sensitive industries. Farmers, commodity investors, radio and television stations, and utilities, transportation, and construction firms can greatly benefit from additional weather information more closely targeted to their needs than the general information provided by the National Weather Service."

## *Notable Quotes*

**House Budget Committee Chairman Jim Nussle, commenting on the Congressional Budget Office's economic forecasts for the coming year:**

***"I have the greatest confidence in CBO, but there's no exact science to economic forecasting. It's just like forecasting the weather. Sometimes the wind changes, and you have to rework the whole forecast."***  
**(March 5, 2002 – House Budget Committee Press Release)**

### **Research Highlight**

#### ***Natural Catastrophes and Human-Made Disasters in 2001: Human-Made Losses Take on a New Dimension***

**S**wiss Re's latest Sigma study reports human-made and natural catastrophes claimed more than 33,000 lives worldwide in 2001. At \$34.4 billion, the burden on property insurance due to catastrophe losses was extremely high – with an estimated \$19 billion incurred by property and business interruption losses arising from the September 11 event. Furthermore, the insurance industry must cover liability and life insurance losses related to the attack which are estimated between \$16.5 and \$39 billion.

More than 33,000 people lost their lives in catastrophes in 2001. The estimated death toll for the earthquake in Gujarat, India alone was 15,000, while 3,000 lost their lives in the terrorist attack of September 11 on New York's World Trade Center and Washington.

According to the Sigma study, 2001 would have gone down as an average loss year had it not been for September 11. This event confronted the insurance industry with an entirely new loss dimension. Until 2001 only natural catastrophes such as Hurricane Andrew, with losses of

## Research Highlight Continued

\$20.2 billion or the Northridge, CA, earthquake, with losses of \$6.7 billion (at 2001 prices) had caused losses of this magnitude. This terrorist attack has brought to light a new dimension of threat to the insurance industry, bringing terrorism covers into question. The traditional insurability criteria – quantifiability, randomness, diversifiability, risk-adequate pricing and conditions – are not satisfied in the current situation. According to the Sigma study, a solution consists of an insurance approach with the following elements: state as insurer of last resort, and mandatory direct insurance. This could take the form of a combination of state and private insurance resources for a transition period, until the insurance industry has accumulated the

necessary insurance capacity to cover – limited – terrorism risks.

Over the long term, despite the new dimension of threat, it is mostly natural catastrophes, i.e. storms, floods and earthquakes, which burden the insurance industry. The trend toward higher losses continues in view of the risk factors: higher population densities and higher concentrations of insured values, especially in endangered areas. It therefore remains crucial that insurers and reinsurers identify and diversify natural catastrophe risks.

A downloadable version of the full report is available at the Swiss Re website, <http://www.swissre.com>.

## Education Highlight

### *NSF Research Experience for Undergraduates (REU) Program*

**T**he National Science Foundation makes possible a number of opportunities for undergraduates to join research projects each summer. This allows students to experience first-hand how basic research is carried out, and to contribute consequentially. The principal support by NSF of such activities is through the Research Experiences for Undergraduates Program. REU "Sites" are established in all fields of science, mathematics, and engineering. Each Site consists of a group of ten or so undergraduates, who work in the research programs of the host institution. Students are in general accepted from throughout the country. Each student is assigned to a specific research project, where he/she works closely with the faculty, post-docs, and graduate students. In addition, seminars, lunch meetings, and social functions are organized to facilitate interaction between the undergraduates. Students are granted

stipends, and in some cases assistance with housing and travel. Students who are in those groups traditionally under-represented in science (women, members of under-represented minorities, and those with disabilities) are particularly urged to apply. Students with special personal needs or requirements, or who can attend a Site only under special conditions, are also encouraged to apply, and to discuss this with Site Directors in advance of the application dates. For more information, visit the REU website here

(<http://www.nsf.gov/home/crssprgm/reu/reulist.htm>).

Global Climate Change and Society (GCCS), one of the projects of the Center for Science and Technology Policy Research, is an NSF REU Program in Boulder, Colorado. For more information about GCCS, click here (<http://sciencepolicy.colorado.edu/gccs/>).

## Jobs

### *Visiting Assistant Professor Natural Resource and Environmental Policy*

**D**uke University's Nicholas School of the Environment and Earth Sciences (NSEES) seeks candidates for a two-year position, starting in Fall semester 2002, as visiting assistant professor of environmental policy. NSEES, with an interdisciplinary faculty of 50, offers professional (Master of Environmental Management) and graduate (M.S. and Ph.D.) degrees and participates in Duke's growing undergraduate environmental programs. The candidate must have a Ph.D. in a relevant social science field, including public policy, political science, cultural anthropology, political economy, or sociology. Teaching experience preferred.

The successful applicant is expected to teach 2.5 courses

yearly, with at least one course in U.S. environmental policy. Areas of particular interest are business and the environment, international environmental policy, and qualitative research methods. There are numerous opportunities for interdisciplinary collaboration within NSEES and with other academic units across the campus. Consideration begins April 1 and continues until the position is filled.

Send curriculum vitae, a one to two page summary of research and teaching plans, and three letters of reference to Professor Robert Healy, Policy Search Committee, Nicholas School of the Environment and Earth Sciences, Duke University, Durham, NC 27708-0328.



## Jobs

### **CLIMATE PROGRAM MANAGER**

#### ***The Weather Channel***

**T**he Weather Channel's Meteorology Science and Strategy Department has an immediate opening for the position of Climate Program Manager. The Climate Program Manager will manage and coordinate The Weather Channel's climate information program.

#### **RESPONSIBILITIES:**

- Serving as a climate expert on The Weather Channel video network and for other business units as appropriate.
- Working with The Weather Channel departments in climate-related efforts.
- Coordinating meteorological continuing education initiatives.
- Speaking engagements; availability for interviews by other media; liaison with academic and government sectors.
- The individual will be expected to stay abreast of latest developments in climate and related sciences; doing one's own research and publishing is encouraged as time allows.

#### **SKILL REQUIREMENTS:**

- Expert on: climate change including global warming; physical and applied climatology; planetary-scale dynamics; ENSO, AO/NAO, PNA, PDO, MJO, droughts, and other climate signals and trends.
- Knowledgeable and objective relative to scientific and

political aspects of global warming and the anthropogenic role.

- Exceptional oral and written communication skills, including the ability to explain complex scientific concepts to lay persons in simple, easy-to-understand terms.
- Effective on-camera presence, strong leadership and interpersonal skills, ability to work effectively in a team environment, proven instructional skills, and proficiency in use of computer applications.

#### **QUALIFICATIONS:**

- Distinguished in field; Ph.D. in atmospheric or related science
- Teaching experience
- Experience in developing seasonal outlooks is a plus.

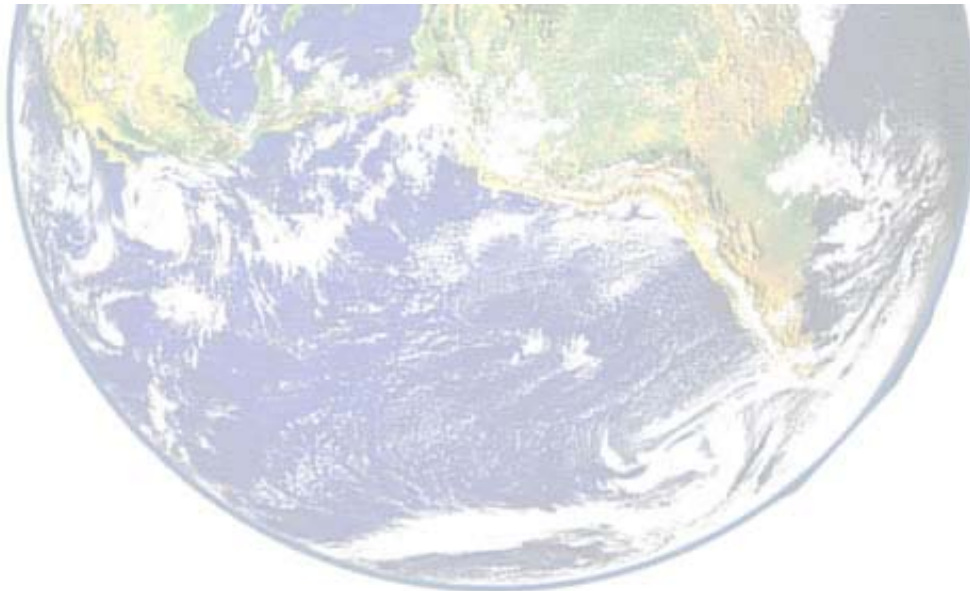
Applicants should apply online at:

<http://www.weather.com/jobs>.

You can also contact us directly: Claudine Halcomb,  
[chalcomb@weather.com](mailto:chalcomb@weather.com)

Materials can be mailed to:

Claudine Halcomb,  
HR /Re: Climate Program  
The Weather Channel®  
300 Interstate North Parkway  
Atlanta, GA 30339



## Additions to Societal Aspects of Weather Website (<http://sciencepolicy.colorado.edu/socasp>)

### Drought Monitor

<http://www.drought.unl.edu/dm/index.html>

A partnership of the National Weather Service's Climate Prediction Center, the U.S. Department of Agriculture, and the National Drought Mitigation Center at the University of Nebraska-Lincoln has responded to the need for accurate, centralized drought information by developing a map that summarizes information from numerous drought indices and indicators

in a single, easy-to-read resource. To create the map, the partnership blends current information from numerous sources, including the National Weather Service, National Climatic Data Center, Regional Climate Centers, USDA's Joint Agricultural Weather Facility, USDA's National Water and Climate Center, Department of Interior's U.S. Geological Survey and Bureau of Reclamation, as well as many other sources. This site also includes a drought forecast, archives, and summary of current conditions.

## Subscription Information

The *WeatherZine* is produced both as a web page and an email message. Subscribing to the *WeatherZine* will add you to our distribution list and you will receive the *WeatherZine* by email.

[To subscribe](#)

(<http://sciencepolicy.colorado.edu/zine/subscriptions.html>)

## About Us

*WeatherZine* is a bimonthly newsletter on the societal aspects of weather. It contains opinion pieces, news, and a brief summary of developments at the *Societal Aspects of Weather* web site.

Primary support for the *WeatherZine* comes from the U.S. Weather Research Program.

On-Line version

(<http://sciencepolicy.colorado.edu/zine/>)

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