Everyone I speak to about the AMS Journals Online seems to really value the fact that the complete contents of the Society's journals are available there. I have found, however, that even frequent users of the database are not always aware of how powerful the system is and how that power can be utilized to support their research and teaching. For instance, few seem aware that it is possible to tailor your own selection of AMS papers to your needs, drawn from the full suite of journals, and updated whenever you want at a simple click of the mouse.

Before describing some of that untapped utility in detail, however, let me say that what I am describing here is not restricted only to subscribers of the Journals Online. The Society decided at the outset to allow access to the Journals Online at the abstract level to everyone and to only require a subscription to obtain the complete full text of an article in a particular journal. That means that even without a subscription, you can carry out sophisticated searches of the full text of the entire database (which goes back to 1944) and view the abstracts of any articles that come up in your search (and for the Bulletin, you can view the full text of the article since this content is open to all). Not all publishers have provided this level of open access, but the AMS Publications Commission and Council wisely saw that this was an opportunity to provide an additional service to the community, and especially to students, and chose to make this valuable research tool available to all.

Now, back to making the Journals Online work for you; I want to point out a very powerful aspect of the system that appears to be underutilized by our community: the “computable URL.” The interface for the AMS Journals Online delivers the content by constructing a URL that contains the parameters needed to create, on the fly, the pages that are delivered. So, for example, when you request the “current issue” of a journal, the URL passed to the system contains code that requests the most recent issue—whatever it may be—rather than specifying a particular month and year. What is the big deal with that? Well, it means that you could copy and paste that URL into a document on your workstation (for example, an MS Word document) or even just save it as a bookmark in your browser and execute it directly whenever you want to see the most recent issue—thus avoiding the several clicks required to go to the opening page of the site and “drill down” to this display.

At this point you may be thinking that this is all very nice, but big deal, it saves a click or two. The concept goes far beyond this simple example, however, and can also be applied to the most complicated of searches. When you create and execute a search, a URL is constructed that includes all the parameters set in your search strategy. Again, after executing the search and receiving the results page, you can copy and paste the resulting URL into a local document (or simply set it as a bookmark) and reexecute that search at any time by clicking on your saved URL (or bookmark) without having to recreate it. So, I could create and execute a search for any articles, listed in reverse chronological order, that contained “tornadogenesis” in the full text and “tornado” in the abstract and then, when I got the results of that search, I could set the resulting page as a bookmark in my browser. If I clicked on that bookmark two months later, I would automatically execute a new search using those same parameters and get up-to-date results, allowing me to see instantly any new articles published that fit my search criteria (which would be listed first in my results page since I requested reverse chronological ordering of the results). What a powerful way to stay on top of the research being published in an area! This approach can be used with even the most sophisticated or complicated searches (which simply result in longer and more complicated URLs) and allows any user to create the equivalent of personal-
ized "virtual journals" covering topics of their choice from the contents of the complete database.

Let me close by reporting another move by the AMS Council to make the AMS Journals Online more available to the community. At their January meeting, the Council voted to change the subscription structure for AMS members to make it even more affordable to subscribe to the entire suite of AMS Journals Online. When you renew your dues at the end of the year, you will be able to subscribe to all the 2003 AMS Journals Online as a bundle for just $75 (you will also be able to subscribe to just one or two journals at $25 each if you choose to do so). This helps to remove what have become almost artificial barriers among the individual journal titles so that the community can easily subscribe to the complete database and create personalized, cross-cutting virtual journals to meet their needs.

You will be seeing other new features appearing in the AMS Journals Online in the coming months. I hope you will all find that this ever-increasing level of functionality makes the Society’s journals more valuable to your work.

KEITH L. SEITTER
DEPUTY EXECUTIVE DIRECTOR

FROM THE ARCHIVES

This view labeled “Pikes Peak Signal Station (14,134 ft),” taken in July 1886, shows three men outside the low stone observatory building. Established in 1873 as the highest meteorological station in the world, one might consider that the station would have produced observational data as significant as that of Mt. Washington. However, its operation was discontinued during the administration of Grover Cleveland and never resumed. “Though spectacularly located on one of North America’s most famous landmarks, it did not produce uniformly useful reports. Part of the problem may have been caused by the actions—or lack of same—on the part of observers such as Sergeant Timothy O’Keefe, who managed to get himself discharged from the Army in 1881 ‘without character’ for filling out weather reports without having made the requisite observations. Apparently O’Keefe’s predecessor had a similar custom which had been explained away by his delirium tremens.” (From William Lowell Putnam’s The Worst Weather on Earth: A History of the Mount Washington Observatory, 1991.)
MEET THE STAFF

STUART MUENCH
Technical Editor

There are many paths that can lead one to a position as a technical editor at AMS Headquarters in Boston. In the case of Stuart Muench, the path began with a B.Sc. degree at the Massachusetts Institute of Technology (MIT) in 1952, followed by two years of forecasting work as an air force weather officer in the Washington, D.C., area. Returning to MIT, Stuart studied for a master's degree while working as a teaching assistant under Professor Fred Sanders. His thesis topic was hurricane forecasting. In the summer of 1956, Stuart joined what was then the Air Force Cambridge Research Center, working on stratosphere circulation, with time out for teaching and working on a Ph.D. in atmospheric sciences from the University of Washington, which he received in 1964. His work then shifted to automated mesonet observations and visibility forecasting for airfields, and then to cloud specification for numerical prediction models.

Retirement came in October of 1994, but, not quite ready for the rocking chair, Stuart phoned Keith Seitter to ask if there might be some volunteer work at AMS. Keith responded with an offer for a part-time position as a technical editor, and so began a new and interesting second career. The work as a technical editor complements that of the copy editors in preparing manuscripts for publication in the Society’s journals (sizing figures, checking grammar and math, etc.), assembling journal issues, and taking care of final changes prior to printing. As this was all quite new, Stuart required some training under supervisors at the time. During this extensive process, it became obvious to Stuart that the publication process is a team effort, involving authors, editors, reviewers, the AMS staff, and the printer. Stuart feels that this interaction with interesting and dedicated people has been one of the most stimulating aspects of his work at AMS. Indeed, his broad scientific background has made the editing and interactions much easier.

The work does leave time for other activities. Many years ago Stuart found the best way to learn about weather and at the same time enjoy adventures was through hiking and climbing in the mountains. He and his wife, Betsy, have trekked the mountains of Nepal, New Zealand, Alaska, Switzerland, and Canada, as well as the Rockies, Cascades, Sierras, and New England peaks in the United States. A by-product of these trips has been a growing collection of photo albums, some narrated, which he shares with interested AMS staff. Finally, there are the daily weather observations and the check of the Internet weather sites that keep Stuart current with weather conditions to plan activities and to pass on information to associates (Stuart notes that just like editing, forecasting requires paying attention to details).

—RACHEL S. THOMAS-MEDWID

FOND FAREWELL

Evelyn Mazur retired this past December after 48 years of service to the AMS. In honor of Evelyn, the AMS Council passed the following resolution at the 13 January 2002 meeting: "Be it resolved that the Council of the American Meteorological Society extends its deep appreciation to Evelyn Mazur for her 48 years of outstanding service to the Society."

A familiar face to many members, she will be missed by them as well as the AMS staff. We all thank Evelyn for her many contributions to the Society and wish her well in her new endeavors.
AWARD PRESENTATION

Brian Lance Bosart Award

The first Brian Lance Bosart Award was presented to Brian Kahn at the Department of Atmospheric Sciences Annual Awards Dinner on 26 October 2001. Brian Bosart was a popular graduate student at the University of California at Los Angeles (UCLA) who was killed in an automobile accident while vacationing in Mexico (see the necrology in the October 2000 issue of the Bulletin). Friends, relatives, students, staff, and faculty donated to a memorial fund in his name soon after the accident. An endowment was established by the UCLA Foundation and is now being used to support the award. A plaque was created that will list all of the recipients of the award and also has the following citation inscribed:

"For unselfish service to fellow students and positive contributions to department life while demonstrating a firm commitment to academics."

Brian’s parents, Lance and Helen Bosart, traveled from New York to present the award.

AMS STATEMENT

ENHANCING WEATHER INFORMATION WITH PROBABILITY FORECASTS

(ADOPTED BY THE AMS COUNCIL, 13 JANUARY 2002)

STATEMENT

Much of the informational content of meteorological data, models, techniques, and forecaster thought processes is not being conveyed to the users of weather forecasts. Making and disseminating forecasts in probabilistic terms would correct a major portion of this shortcoming. It would allow the user to make decisions based on quantified uncertainties with resulting economic and social benefits. Widespread implementation of probability forecasts would require forecasters to become more familiar with user needs, and users to be educated on probability forecasts and how to make optimum use of this new information. The American Meteorological Society endorses probability forecasts and recommends their use be substantially increased.

BACKGROUND

Current situation. Weather forecasts have improved dramatically over the past few decades and particularly in the last 20 years (Bull. Amer. Meteor. Soc., 79, 2161–2163). Forecasts produced by operational forecasters using the new observational data and results of improved numerical models have become more accurate at practically all time- and space scales for all weather elements. These forecasts are valuable in daily operations to users, including the general public, the military, aircraft operators, businesses, and emergency managers. These forecasts contribute very useful and often critical information for decision making.

However, there is much more information available than is being provided to users. Present-day forecasts are predominantly “categorical” in that the uncertainty inherent in the forecast is not made explicit. To make this information available would require that the uncertainty be quantified and put into understandable terms. This quantification would almost certainly involve numerical probabilities.

A probability forecast of a weather event can be a forecaster’s judgement of the likelihood that the event will occur. Probability forecasts can also be produced directly from numerical models and postprocessing of model results, and climatological forecasts can be
expressed in those terms. All these forecasts have the element of uncertainty, but such forecasts should be considerably more useful to a user than categorical forecasts, and perhaps critically so.

Some progress has been made, especially in recent years, in providing forecasts in probabilistic terms. Forecasts of probability of precipitation (PoP) have been made for over 30 years and are well accepted by a large clientele. More recently, probability forecasts are issued routinely by the National Centers for Environmental Prediction for a variety of weather phenomena, such as tropical cyclone “strike probabilities” and intensity; convective outlooks; heavy snow/icing outlooks; and 6–10 day, 8–14 day, monthly, and seasonal outlooks for temperature and precipitation. National Weather Service forecast offices and river forecast centers are beginning to produce probability forecasts of river stage, volume, and flow. However, these probability forecasts are still only a small fraction of all forecasts issued.

Effective use of probability forecasts requires that users understand them. The probability of an event is a familiar concept. For instance, what is the probability a die roll will be a 6; what is the probability Dasher will win the race; what is the probability I will win the lottery tomorrow? Though the exact value of the probability may not be known, the concept is familiar and understandable. A misunderstanding that is often encountered regards the definition of the event. For example, for a forecast of 30% PoP for Boston tomorrow, a person may be unsure as to whether that means it will rain over 30% of the Boston area tomorrow, it will rain for 30% of the time tomorrow somewhere in Boston, there is a 30% probability it will rain somewhere in Boston tomorrow, or some other interpretation. Widespread use of probability forecasts will require significant efforts to educate the user in the definition of the event being forecast.

Opportunities. An operational forecaster is provided considerable guidance for making probability forecasts. The statistical postprocessing of the output of dynamic weather prediction models can and does provide well-calibrated (reliable) probability estimates. The maturing technology of ensemble forecasts can also provide, with minimal postprocessing, probability estimates of specific weather events, such as precipitation amount for a given interval of time at a specific place being over, say, 0.25 inches; some forecasts of this nature are now being made available. Such “objective” forecasts are statistical estimates of the conditional relative frequency of the event. The relative frequency of a die roll producing a 6 is known to be one-sixth, under the assumptions of a fair die and a loaded die, but if we did not know this or suspected a loaded die, we could determine the probability of a 6 for that specific die by repeated rolls. This calculated relative frequency would be an estimate of the probability of the event, and in this case, a very good estimate, provided the number of rolls was large. Numerical weather models and their postprocessing do not yet produce as good an estimate for weather events, but they do provide useful results up to a week in advance, and are continually improving. With appropriate statistical processing, the objective probability forecasts will blend into climatological relative frequencies at the long range, which are also useful to some users.

Probability forecasts offer several benefits over categorical forecasts. They contain more information, because the uncertainty in the forecast is specifically expressed; the user is made aware of that uncertainty and can use that information in decision making. Probability forecasts can be used with thresholds to make decisions, where the thresholds can vary from user to user and purpose to purpose. Availability of probability forecasts would allow users to make the go/no-go decision based on quantitative uncertainties and his/her own threshold for making the decision. For instance, a school superintendent in a hilly area might cancel school with a lower probability of 2 inches or more of snow than one in a flat area where the journey to school in snowy conditions would be less dangerous.

Too often, the roles of the forecaster and the decision maker are confused, or blended into the forecast itself. Specific probability forecasts allow the roles to be separate, as they should be. A probability of 10 percent that flood waters will overtop a levee may influence one merchant to move stock to higher ground, but another, possibly because of the high cost of moving, may not move stock until the probability is 20 percent. Given only a categorical forecast (e.g., the crest will be 6 inches below the levee top), the user may choose to ignore it, to form his/her own probability of the overtopping to occur, or to base the operational decision on other information, but does not have the opportunity to use the full extent of information available. Entire municipalities may be lulled into inaction when there is in reality a significant chance that the town is in danger.
Probability forecasts would have significant economic benefits for the nation. Because a significant portion of the economy is weather sensitive, a new economic sector of weather risk management has come into being. This management industry provides a “hedging tool,” allowing companies to even out their weather sensitive costs. Better management by these companies benefits the general public in the form of lower cost for commodities, such as power. Since this is a growing industry, the increase of probability forecasts at this time is especially appropriate.

**Challenges.** A number of challenges arise with the use of probability forecasts. The examples cited above deal with single specific events; however, many forecast decisions are complex. For instance, for quantitative precipitation, one would like a probability distribution such that a probability of any desired amount, say 0.5 to 1.0 inches, could be obtained for any desired time interval. Forecasters will need to be educated to handle these complexities. New ways for displaying and communicating probabilistic information are needed. Users must be educated on how to make optimum use of this new information. Although the concept of probability should be known, the actual use of the information may be challenging. Forecasters need to be aware of the specific user’s needs (e.g., emergency managers) and help devise methods and models for the user to employ in formulating plans of action. Guidance forecasts of weather variables will become even more important and must be communicated in probabilistic terms to operational forecasters so that they can make the best possible forecasts. Care must be taken that these forecasts are well calibrated. For instance, ensemble forecasts generally do not span the full range of meteorological possibilities, and probabilities estimated as relative frequencies directly from them may be too sharp.

**Summary.** In general, present-day weather forecasts do not contain a quantification of the uncertainty that is inherent in them. Probability forecasts based on the forecaster’s thought processes and/or available models and techniques would substantially benefit users of weather forecasts. Successful implementation and use of probability forecasts will require forecasters to understand user needs for this information and to be trained in how to best use the guidance produced by models to make probability forecasts. Similarly, users of weather information must be trained in how to best interpret and use this valuable resource—probability forecasts.

---

**AMS STATEMENT**

**FREE AND OPEN EXCHANGE OF ENVIRONMENTAL DATA**

(ADOPTED BY THE AMS COUNCIL 13 JANUARY 2002)

**STATEMENT**

Publicly financed environmental data should be regarded as a public good and made publicly available at costs commensurate with replication and transmission. Where practical, these data should be provided free of cost, and no limits should be placed on their redistribution.

The existence of privately funded compilations of publicly financed data should not preclude open public access to the original data; nor should it preclude the creation of publicly financed and publicly accessible compilations of the data.

Principal investigators should make publicly financed research data publicly available at minimal cost and as soon as feasible. Arrangements for the exclusive use of datasets by the principal investigators for some period of time (preferably as short as possible) should be negotiated with the funding agency or agencies.

In circumstances in which environmental data are acquired or generated through combinations of public and private funding, every effort should be made by the public institutions involved to ensure that public access to the data is as free and open as possible, in keeping with the spirit of this Statement.

The American Meteorological Society encourages private institutions that serve as sources of environmental data to anticipate circumstances in which some subset of their data may become critical to the public wel-
when telegraphy was introduced more than 100 years ago. Research and education in the portionality has contributed to a sense that the practice of free and open exchange of meteorological data began in many cases even between nations at war. Historically, those nations with large economies vulnerable to weather have expended the most resources in acquiring meteorological data; thus there is a rough proportionality among the amount and quality of data provided by each nation, the value of those data to the nation in question, and the ability of that nation to shoulder the costs. For example, the enormous costs of developing and deploying environmental satellites have been borne by a few of the developed nations, while all nations have benefited from satellite data. This proportionality has contributed to a sense that the practice of free and open access to environmental data is both beneficial and fair to all concerned.

It would be difficult to overstate the benefits to society of free international exchange of environmental data. Weather forecasts beyond a day or so depend on meteorological data collected over a vast region spanning many nations and international waters. Monitoring and predicting climate change require global environmental datasets and are of intrinsic value to all nations. Research and education in the environmental sciences depend crucially on the low cost and free accessibility of environmental data, and the peoples of all nations have benefited from satellite data. This proportionality has contributed to a sense that the practice of free and open access to environmental data is both beneficial and fair to all concerned.

The primary purpose of this Statement is to reassert the American Meteorological Society's commitment to a policy of free and open international exchange of environmental data, while at the same time endeavoring to draw critical distinctions among different types of environmental information. In the following section, we detail a few key, guiding principles that serve as the foundation for this Statement. In section 3 we define key terms that are used in the Statement.

2. Guiding principles.

A. Public ownership and public goods. Goods and services that are funded by taxpayers and are intended for use by the public are generally conceived of as being publicly owned. Thus, in a broad sense, the U.S. interstate highway system is publicly owned. The "public" in this sense consists generally of the citizens and permanent residents of the political entity to which the taxes are paid, but in some circumstances the sense of public extends beyond ownership. For example, the interstate highway system may be used by foreign visitors, and state highways may be used by residents of other states or countries. On the other hand, national health care systems are not intended to pay for the health care of foreign nationals, except perhaps in emergencies.

A good or service that is nondepletable is generally referred to as a "public good," whether or not it is publicly owned. Nondepletable goods and services are those that are not depleted by consumption. A public good is also often nonexcludable. A nonexcludable product is one that, once having been supplied to some, cannot easily be denied to others. An environmental datum is an example of a public good; its utility is neither depleted by virtue of being accessed nor easily denied to some after being provided to others.

Several developments over the last decade threaten the international practice of free and open exchange of environmental data. As citizens of many nations demand reduced taxes and increased efficiency from their governments, those governments are under increasing pressure to recover the costs of the services they provide, particularly if those services are seen as benefiting for-profit enterprises or the interests of other nations. And, as the economic value of environmental data inexorably increases, some private interests are pressuring their governments to reduce or cease activities they view as taxpayer-subsidized competition and to take measures to limit or eliminate competition from abroad. At the same time, the private sector itself is increasingly involved in the generation of environmental data and has a legitimate interest in protecting its intellectual property.

The society of free international exchange of environmental data, while at the same time endeavoring to draw critical distinctions among different types of environmental information. In the following section, we detail a few key, guiding principles that serve as the foundation for this Statement. In section 3 we define key terms that are used in the Statement.
It is the position of the American Meteorological Society that all publicly financed environmental data should be regarded as a public good. In particular, we assert that environmental data, even when collected over a small region, are of intrinsic value to the public broadly conceived, both through their potential real-time value to public health and welfare, and through their value in enhancing the understanding of the environment through scientific research. For these reasons, it is highly beneficial to make publicly financed data openly available to the global public.

b. Cost recovery. Under some circumstances, use of publicly owned goods and services may incur usage fees.

Regulation of demand or compensation for excessive demand sometimes justify the imposition of such fees. For example, the U.S. interstate highway system is supported through a variety of general taxes, including income taxes and taxes on fuel. But commercial trucks pay an extra road usage tax, because heavy trucks are responsible for a disproportionate amount of wear and tear on the highways. On the other hand, police and fire departments protect public property, public gatherings, private residences, and business enterprises without charging fees for basic services.

In the case of publicly financed environmental data, efforts to recover costs from users often result in no more than a reshuffling of funds among public agencies. For example, if a government environmental agency imposes fees for the use of data it collects and disseminates, the fees are often paid by other public agencies, such as public schools or government laboratories, or though government grants and contracts awarded to researchers. Moreover, if one political entity charges fees for the use of its environmental data, it must expect in turn to be charged for data it receives from other political entities. A “trade war” in environmental data can only result in greater costs for everyone involved and increasingly limited public access to the data.

Cost recovery or a sense of competition with the private sector has been used to justify the imposition of usage fees only on for-profit users of publicly financed environmental data. Apart from the difficulty of preventing such users from procuring the data indirectly through “legitimate” users of the data, such a policy can stifle the growth of private businesses that often serve valuable public functions, and it may paradoxically reduce net revenue to the government by reducing or eliminating taxable business profits.

In some cases (outside the United States), usage fees imposed on commercial enterprises have been used to expand significantly the range of goods and services provided by government entities. In these cases, the government entity is acting effectively as a private contractor, and the goods and services it provides cannot be said to be entirely publicly financed. It becomes difficult, if not impossible, to distinguish between public and private goods, and the government entity is gradually converted from a public agency to a government-subsidized private contractor. Significant, direct funding of public agencies by private interests risks subverting public enterprise to private interests.

For all these reasons, the American Meteorological Society is opposed to efforts to recover the costs of publicly financed environmental data, above and beyond any reasonable excess costs associated with dissemination of the data.

c. National security. A primary obligation of governments is to protect its citizens from direct external threats to their health and well-being, as for example during times of war. During such times and in response to such threats, considerations of public safety may warrant selective, temporary restrictions on the dissemination of environmental data.

d. Economic security. Some governments have attempted to impose selective usage fees or other restrictions on foreign users of publicly financed environmental data. The World Meteorological Organization, through its Resolution 40, explicitly states that nations or economic blocks may be justified in imposing restrictions on the reexport of environmental data for commercial purposes. As in the case of domestic restrictions on data distribution to private enterprises, it is difficult to prevent commercial enterprises from procuring the data indirectly through legitimate users of the data, thereby encouraging limitations on the distribution of certain categories of data. It is the position of the Society that conditions on the reexport of publicly financed environmental data work against the public welfare and should be discouraged.

e. Intellectual property. Research results, books, databases, analyses, computer programs, and other fruits of intellectual activity that make use of publicly financed environmental data may often be considered to be owned by some combination of the individual
or individuals who developed the products and those who funded them, whether private enterprises or public agencies. There is a large body of copyright and patent law designed to protect the intellectual property rights of such individuals, enterprises, and agencies. Such intellectual property, though its development may have depended critically on publicly financed data, often cannot be considered as publicly owned property, except under certain specific contractual arrangements where the intellectual activity was itself publicly financed.

There is much room for ambiguity between the extremes of privately held intellectual property and publicly owned data. Of particular concern are what are loosely termed "data compilations." For the present purpose, we will focus on compilations of publicly financed data. "Originality" is the primary requirement for the protection of intellectual property under U.S. copyright law. However, in a landmark case decided by the U.S. Supreme Court in 1991, the amount of labor or funding that may have gone into the creation of a data compilation does not by itself qualify the database as original for the purposes of copyright protection. Thus relatively unoriginal compilations of environmental data, such as arrangements of data in alphabetical order, do not qualify for copyright protection under U.S. law.

At the other extreme from U.S. copyright policy is the policy advanced by the European Union (EU) under its 1996 Database Directive, governing the legal regulation of noncopyrightable databases. This directive gives legal protection to databases, defined very broadly as any "collection of works, data or other independent materials arranged in a systematic or methodical way and capable of being individually accessed by electronic or other means." Of particular concern is the Directive's establishment of a "Sui Generis" right that protects not only the database itself but also, by extension, the content of the database. The way the Directive is formulated, it can be interpreted as allowing the acquisition of property rights even over long-established publicly financed datasets.

It is the position of the American Meteorological Society that the establishment of intellectual property rights must never compromise the availability of publicly financed data. While recognizing the intellectual property rights attendant on the development of new means of arranging and presenting data, such rights should never be formulated so as to restrict access to the publicly financed data on which they are based.

f. Environmental data acquired through public–private partnerships. In some cases, the acquisition and dissemination of environmental data are funded through a combination of public and private sources. The objectives of such enterprises are highly diverse, as are the reasons for securing multiple funding sources; we regard it as beyond the scope of this Statement to formulate a general policy concerning the free and open exchange of such data. The Society encourages the public institutions involved in such arrangements to explicitly address the issue of free and open exchange of environmental data in formulating public–private partnerships, so as to conform as much as possible to the spirit of this Statement.

3. Definitions. The definitions laid out in this section pertain to the use of terms in the AMS Statement. The word "data" as used here is taken to mean numbers, graphical images, or descriptions of such numbers or images, stored in electronic or magnetic media, punch cards, or on paper.

Environmental data. Those data consisting of measurements of the atmosphere, hydrosphere, biosphere, cryosphere, or the solid earth. This definition includes data that consist of "raw" measurements as well as reductions of such measurements that reflect application of quality control measures or the calculation of derived quantities, and analyses of such data in the form of gridded data and graphical images. Descriptions of the data (metadata) and forecast values of environmental variables, made using statistical and/or numerical techniques, are also considered to be forms of environmental data.

Research data. A subset of environmental data as described above, procured exclusively for scientific research. Data that have been collected for the purposes of environmental monitoring and prediction but are also used in scientific research are not categorized as "research data" for the purposes of this Statement.

Environmental data critical to public welfare. A subset of environmental data as defined above that may be used to reduce exposure of the public to a threat to its welfare. Examples of such data include measurements that reveal a leak of a toxic substance or a life-threatening natural hazard such as a tornado.

Environmental data compilations. Those arrangements of environmental data designed to facilitate ac-
cess to them. These include ordered arrangements of data and software whose main purpose is to facilitate access to data.

**PUBLICLY FINANCED.** Paid for using proceeds from government-imposed taxes. Here no distinction is made on the basis of the size of the political entity imposing the taxes; proceeds from local, state, or national taxes are all considered as examples of public financing.

**PUBLIC GOOD.** As the term is used here, a nondepletable and often nonexcludable product or service made freely available to the global community and regarded as beneficial or potentially beneficial to some or all members of the global public. A "nondepletable" good is one that cannot be diminished by repeated use, while a "nonexcludable" product is one that once having been supplied to some, cannot easily be denied to others.

**REFERENCES.** The following references were used as guidance in preparing this Statement.


Over 170 senior undergraduate and first-year graduate students took part in the First AMS Student Conference, far exceeding expectations. The conference, held on 12–13 January 2002, the weekend prior to the 82nd Annual Meeting in Orlando, Florida, was themed “Emerging Opportunities and Growth Areas in the Atmospheric and Related Sciences” and included 36 poster presentations and a career fair.

The sessions focused on various areas of employment and included speakers representing the private, academic, and government sectors, as well as a special session on UCAR/NCAR. Jefferson Wood, a student at The Florida State University and recipient of the 2001 Father James B. Macelwane Award, gave a presentation titled “Relationship of Ice Content to Hurricane Intensity Examined Using TRMM/TMI Data Sets.”

G.O.P. Obasi, secretary-general of the World Meteorological Organization, provided the luncheon address, which focused on international cooperation in meteorology. The closing address, given by William H. Hooke, director of the AMS Atmospheric Policy Program and Senior Policy Fellow, urged the students to focus on ways they can contribute to society through science.

The idea of a student-focused event was suggested by the AMS Board of Higher Education (BHE) at the 81st AMS Annual Meeting in Albuquerque, New Mexico. Richard Clark (Millersville University), member of the BHE and Student Conference program chair, spent much of the last year organizing the event and securing an outstanding lineup of speakers to form an agenda that was obviously extremely attractive to students, given the large number who chose to attend. The roster of speakers provided students with an overview of the range of opportunities currently available, as well as the trends and emerging fields that will affect their careers in the atmospheric and related sciences.

Member donations to the AMS 21st Century Campaign made it possible for AMS not to charge a registration fee for the conference, an added benefit to students who may not normally have the financial means to attend scientific conferences. Education is a key component of the campaign, which will continue to work toward raising the necessary funds for events such as the Student Conference that help provide support and encouragement to the future leaders of the atmospheric and related sciences.

OBITUARIES

Richard “Dick” Hagemeyer, former director of the National Weather Service (NWS) Pacific Region, passed away on 25 October 2001. Hagemeyer is internationally recognized for his leadership in developing the United States Tsunami Warning Program (see sidebar on next page), modernizing weather services in Hawaii and the Pacific region and improving coordination of tropical cyclone response in Pacific Rim countries.

After serving in the U.S. Army Air Corps, Hagemeyer completed his education at Parks School of Aviation and Engineering, St. Louis University. He joined the NWS (then the U.S. Weather Bureau) in 1950, serving in Washington, D.C., the Phoenix and Wake Islands, Palau, and Majuro in the Marshall Islands, where he opened the station in support of the atomic bomb testing operations on Eniwietok. For the next 30 years, he held numerous managerial positions at the headquarters level of the NWS. He returned to Hawaii in 1982 as the regional director. In
1987, he received the U.S. Department of Commerce Gold Medal, the department’s highest award, for outstanding leadership of the Pacific region.

For the past 19 years, Hagemeyer was responsible for overseeing weather services in Hawaii, Guam, American Samoa, the Federated States of Micronesia, the Republic of Palau, and the Republic of the Marshall Islands. Hagemeyer was the manager of the U.S. Tsunami Program and the U.S. representative to the International Coordination Group for the Tsunami Warning System in the Pacific. He was the only civilian member of the U.S. military’s Pacific Command Meteorological Group.

Hagemeyer had a special affection for the people who worked for him and for the communities they served throughout the Pacific. Among the accomplishments in which he took greatest pride was the expansion of meteorological training opportunities for Pacific Islanders. He was also committed to ensuring that the jurisdictions he served received the benefits of the most advanced technology available. Hagemeyer supervised the modernization of regional weather offices, transitioning from the days of hand-drawn weather maps to the sophistication of state-of-the-art satellites, Doppler radar, and advanced supercomputers. Under his directions, new facilities were built in various locations.

Hagemeyer traveled extensively both for business and pleasure. He and his wife, Helen, enjoyed visiting exotic locales all over the world. Although Dick maintained a busy schedule, he still found time to be involved in community and church affairs. A longtime resident of Hawaii Kai, he served on neighborhood associations and was a member of the Elks Lodge.

Hagemeyer, an AMS Fellow, was a strong supporter of the AMS education programs. He and Helen established a unitrust and a named undergraduate scholarship. The $3,000 scholarship is awarded annually to students entering their final year of undergraduate study. In addition, contributions are currently being received from family and friends in memory of Hagemeyer.

Hagemeyer is survived by his wife; a sister, Mary Elizabeth Crook, Columbus, Ohio; a brother, Bart Hagemeyer Jr., Zanesville, Ohio; a nephew, Bart Hagemeyer, Melbourne, Florida; and many other nieces and nephews.

—RACHEL S. THOMAS-MEDWID

TRIBUTES

NOAA RENAMES TSUNAMI CENTER IN MEMORY OF HAGEMEYER

The Pacific Tsunami Warning Center (PTWC) in Ewa Beach, Hawaii, was renamed in honor of Dick Hagemeyer, the U.S. tsunami program manager and former director of NOAA’s NWS Pacific Region.

“Dick’s interest in NOAA and improving weather services in the Pacific region made him a valuable member of our management team,” said retired Gen. Jack Kelly, director of the NWS. “He was a dedicated and energetic public servant. He will be sorely missed.”

Established in 1948, the PTWC is the operational center for the Tsunami Warning System in the Pacific and provides warnings for Pacific basin teletsunamis—tsunamis that cause damage far away from their source—to almost every country around the Pacific Rim and to most of the Pacific island states. The PTWC also provides a more rapid warning for local tsunamis generated in Hawaiian waters.

During his half-century with the NWS, Hagemeyer managed multimillion dollar budgets and hundreds of employees. In these capacities, he amassed knowledge and experience that furthered tsunami research and warning systems around the world.

“He was a skilled administrator with many years of experience in budget planning and resource management,” added Kelly. “He was also a meteorologist and understood the operational side of the NWS. His knowledge of weather forecasting, coupled with his fiscal acumen, was a great combination. Dick was a fixture here, well known and respected.”

The center was renamed in a ceremony that took place in December 2001.

P edro Ripa died on 3 October 2001 at home in Ensenada, Baja California, at the height of a brilliant career, after a brief and intense battle with brain cancer. We will all feel the loss.

He was born on 31 May 1946, in Buenos Aires, Argentina. He spent his youth in Quilmes, near Buenos Aires. He finished his undergraduate studies in physics at the Universidad de Rosario in 1968 and then came to University of Washington in Seattle for his masters degree, also in physics. Returning to Argentina, he received his Ph.D. in elementary particle physics at the Universidad de
Buenos Aires in 1972 but soon became interested in physical oceanography, switching fields entirely and becoming part of a distinguished generation of Argentinian physicists and physical oceanographers (Miguel Virasoro and Silvia Garzoli among them). Because of the political situation in his native country, he moved to the United States, where he worked first at the Geophysical Fluid Dynamics program of Princeton University (1975–77), and at the Pacific Marine Environmental Laboratories (1977–79), where he established a long-lasting friendship and collaboration with the late Stan Hayes on observational and theoretical studies of equatorial ocean dynamics.

In 1979 he moved to what would be his new home and country of citizenship for the rest of his life, to CICESE (Center for Scientific Research and Higher Education of Ensenada) in Ensenada. Here his career blossomed: he wrote more than a hundred publications, made even more friends, and advised a host of students. He became a key figure in the development of physical oceanography in Mexico and, rather naturally, he became a standard to which all his colleagues and students could look up to.

His scientific interests ran broad and deep, his research running the gamut from Hamiltonian fluid dynamics to coastal oceanography, and it seemed like he never paused for breath before embarking on a new project. There were three main areas in which he made significant contributions. One was the theory of the nonlinear interaction of ocean waves, particularly equatorial waves. The second was hydrodynamic stability theory and Hamiltonian fluid dynamics, and in this area he made some landmark contributions. In 1981, he showed that the conservation of the potential vorticity is related to the invariance of the equations of motion under the symmetry transformations of the labels that identify the fluid particles. That is, potential vorticity conservation is a consequence, via Noether’s Theorem, of the particle relabeling symmetry. And then, two years later he published a paper titled, “General Stability Conditions for Zonal Flows in a One-Layer Model on the Beta-Plane or the Sphere,” nowadays known as “Ripa’s Theorem,” which established sufficient conditions for stability in the shallow water equations. This is one of the very few Arnol’d-like stability conditions that goes beyond two-dimensional or quasigeostrophic flow, and it stands alongside other famous stability criteria in making the foundations of the field. His work in Hamiltonian fluid dynamics both anticipated and spurred the rapid developments that occurred in the field in the 1980s. Finally, his other passion (and quite a contrast from Hamiltonian stability theory) was the oceanography of the Gulf of California. Among his numerous contributions is his important paper, “Towards a Physical Explanation of the Seasonal Dynamics and Thermodynamics of the Gulf of California,” published in 1997, in which he hypothesized that the Pacific Ocean influences the seasonal variability of the Gulf of California by way of a baroclinic Kelvin wave. He had a very personal approach to work, writing up his research studies at the same time he performed his calculations. In a peculiar way, he reviewed the related literature once his studies were almost finished. The last of his papers will be published in Ciencias Marinas, Vol. 27 (1); he was a part of its editorial committee since 1991.

Pedro’s life was a kaleidoscope; he thought about and appreciated all aspects of life with an originality and simplicity that were an inspiration to many. He was not only a distinguished scientist, but a wonderful human being. He was a passionate photographer, and his restlessness and quest for simplicity took him to take ecology courses for children, just like another student. He had the gift for “hearing the unheard,” for “seeing the unseen,” and for listening to the “whispers in the forest,” meaning he would listen to the flowers open and try to appreciate all aspects of nature, and he had recently embraced Buddha’s teachings and philosophy for their spiritual meaning. His untimely death is a terrible loss to his family, friends, and colleagues all over the world. His wife, Andrea, his three daughters and son, and friends and colleagues all over the world will miss him.

—Julio Sheinbaum, Amit Tandon, and Geoffrey Vallis