

3. Specific suggestions were made for new and additional technology that should be evaluated and considered for inclusion in NCALM: ALSM wave-form digitization, single-photon signal level ALSM, color digital photography, hyper-spectral sensors, and shallow water bathymetry (integrated with the terrestrial ALSM unit).

4. A recommendation that funds be set aside for seed projects, rapid response, and other opportunities that would not need to pass through the NSF peer-review process.

5. A recommendation for a strong commitment to the development of open-source, public domain software, and to strong, Web-based access and analysis.

The proposed structure of NCALM, as presented in the UF-UCB proposal submitted to NSF is intentionally simple, modest, and user-oriented. The existing UF ALSM unit and supporting equipment and facilities will be used to collect data in areas selected through the competitive NSF grant review process. These data will be analyzed both at UF and UCB, and made available to the principal investigators (PIs) through an archiving and distribution center at UCB (building on the Berkeley Seismological Laboratory-Northern California Earthquake Data Center system). Both the UF and UCB groups will contribute to software development that will increase the processing speed and data accuracy. PIs will contact the UF group during proposal preparation to obtain guidance on cost estimates, scheduling, and related issues.

Once funded, PIs and their students will be able to participate in all phases of the work, and there is support for student involvement at both Florida and Berkeley. One of the primary goals of NCALM will be to assist graduate students in applying ALSM in their research, and the graduation of these students will contribute to the pool of personnel qualified to staff academic institutions, government agencies, and private companies.

NCALM will establish a strong, Web-based distribution system of data and software, and data will be made available to the general research community after an agreed-upon amount of time (most likely 2 years). The Web material will be an important part of the NCALM education and outreach component.

The nine-member steering committee will be used to prioritize schedules, review the center's financial management, form contacts with other programs, and review the potential for technological upgrade. The steering committee will meet twice a year. The primary contact person at the NCALM for NSF will be the elected steering committee chair.

The workshop community agreed that the duties of the initial steering committee should include writing detailed governance guidelines for NCALM, with specific procedures for electing members to the board. The following people agreed to serve on the initial steering committee: Collin Stark, Lamont-Doherty Earth Observatory of Columbia University; Bea Csatho, Ohio State University; David Tarbonton, Utah State University;

Mike Ellis, University of Memphis; Rudy Slingerland, Pennsylvania State University; Ramon Arrowsmith, Arizona State University; Don Carswell, Optech Inc.; William Dietrich, UCB; and Ramesh Shrestha, UF

The workshop participants recommended that some portion of the annual budget of the NCALM be set aside for "seed projects" that will enable PIs to get critical data to test ideas and develop major research proposals. They also emphasized that the NCALM should be able to provide rapid response to document the topographic effects of such occurrences as major earthquakes, large-scale flooding, or extensive landslides. In general, such opportunities may come along in a variety of ways, including partnering with groups in some projects that could provide valuable topographic data to the broad research community. It was suggested that something like 20% of the NCALM budget should be reserved for this purpose.

The Workshop to Discuss the National Center for Airborne Laser Mapping (NCALM) was held 24–26 April 2003, in Gainesville, Florida.

#### Acknowledgment

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—BILL CARTER and RAMESH L. SHRESTHA, University of Florida, Gainesville; and BILL DIETRICH, University of California, Berkeley

## FORUM

### Comments on "Anonymous Reviewers"

#### From C.J. Robinove

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Myrl Beck's Forum article denouncing anonymous reviews (*Eos*, 1 July 2003) is right on the money. Perhaps he read my letter in *Applied Physics* in 1990 also denouncing anonymous reviews.

Some years ago, I received an anonymous review of a paper I had submitted for journal publication. The reviewer raised such interesting questions that I wanted to discuss them with him. I phoned the editor of the journal and asked if he would tell me the name of the reviewer. He politely declined, but when I told him I thought I recognized the handwriting of the reviewer and named him, he relented and said I was correct! I called the reviewer and he was generous enough to spend a wonderful hour on the phone with me discussing the paper. The paper was published with great consideration given to his ideas, much to its

betterment. Now *that's* a reviewer whose interest is in improving the paper and helping the author, not just showing how smart he is or slapping down a junior colleague. The AGU motto, "unselfish cooperation in research," can be well exemplified by those who wish to help rather than to tear down.

When I review a paper for a journal that insists on anonymous reviews, I always state in the review that I want the author to know I reviewed it. I am not ashamed of my knowledge or my lack of knowledge in a particular field, and I will comment only on the basis of my knowledge. I may question a part of a paper, but that is because I don't know the answer and believe that other readers may also be ignorant of that point. Reviewers have a duty to help the authors, help the advancement of the science, and help the journals publish useful papers. When you criticize the work of one of your students or of a scientist who works under your direction, you are not anonymous. Why should you be with others?

Unethical reviews should also be punished, if they can be identified. I wrote a paper that was reviewed in-house by one of my USGS colleagues. I made revisions based on his

helpful suggestions. The journal to which I submitted the paper asked him to review it. Instead of telling the editor that he had already done so, he did a new review with new ideas (which were not at all helpful). He should have declined to review the paper for the journal; and I, in turn, should have told the editor about that double-dealing.

Let's do away with anonymous reviews and take both the credit and the blame for our ideas.

—CHARLES J. ROBINOVE, U.S. Geological Survey (retired), Monument, Colo.

#### From R.E. Criss and A.M. Hofmeister

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We share many of the experiences and most of the sentiments relayed by Myrl Beck in his 1 July contribution to the *Eos* Forum, as well as those of a similar nature expressed by Alexander McBirney in his March 2003 commentary in *GSA Today*. We are in fact delighted that senior scientists are speaking up about the unsatisfactory nature of anonymous reviews. However, we believe they understate the problems, partly because the situation is worsening with time. Moreover, the brunt of

such problems is disproportionately felt not by emeritus professors but by young scientists, women, and minorities, and this is the crux of the issue.

This year, we have, like Beck, received rejections based on comments by two anonymous reviewers and an anonymous associate editor. We have also received rejections from anonymous associate editors based on a single constructive review requesting minor revision, along with an anonymous hostile "review" that could have been written about any manuscript on any topic by any author. More common than these are rejections from identified associate editors based on one or two anonymous reviews, which more often than not err on most of the points made, and in two cases dispute work that resulted in Nobel Prizes. We have examples this year of each type where the senior authors are recent Ph.D.s, whose vulnerabilities underscore the reprehensible nature of this "process."

The unsatisfactory nature of anonymous reviews looms even larger in the proposal evaluation process. Here, the applicant must run a gauntlet of as many as eight anonymous reviews, in a situation where he will generally receive a declination given a single, baseless

"good" review in the company of otherwise uniformly "excellent" and "very good" reviews. The only way to succeed in such a system is to supply large lists of potential "reviewers" (i.e., friends) and equally massive lists of unacceptable "reviewers" (i.e., real or imagined enemies), and hope that the program director will follow your suggestions. In other words, the process has become political rather than scientific. A major problem is that neither popular, majority, nor biased opinion is the stuff of scientific discovery.

We sign our reviews whenever permitted; but of recent date, no more than 20% of the reviews we receive are signed. We are thus certain that signing our reviews places us at a disadvantage in a competitive, increasingly secretive environment. No one is safe though, as retaliation can be directed toward anyone who is imagined to have authored a hostile anonymous review in an earlier round. We believe that trust in the system will continue to erode, as senior scientists who experienced fairness for much of their careers are replaced by younger scientists who at least benefitted from a constructive review process in their early careers, to new Ph.D.s who experience for their first, treasured papers an unfair

process where vituperative, baseless, anonymous reviews constitute blocks of obvious effectiveness. The problem may be equally serious for females and minorities. For example, in our small sampling, the frequency of signed reviews received by Anne is about half that for Bob, despite our similar ages, education, and stature in our respective specialties.

The remedy has long been evident—reviews must be either signed or discounted. No honest, well-intentioned person requires a cloak of secrecy—the costume of crooks. Honest people, young people, women, minorities, original thinkers, and true professionals are all hugely disadvantaged by a process where anonymity is advantageous. So why do we have one?

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McBirney, A., Anonymous reviews—are the pros worth the cons?, *GSA Today*, 13, 3, 21, 2003.

—ROBERT E. CRISS and ANNE M. HOFMEISTER, Washington University, St. Louis, Mo.

## BOOK REVIEW

### Uncertain Science... Uncertain World



**HENRY N. POLLACK**

Cambridge University Press, U.K.; ISBN: 0521781884; 256 pp.; 2003; \$28.

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Why doesn't society act in the face of overwhelming evidence that human influences are changing the Earth's climate? Henry Pollack devotes his book, *Uncertain Science... Uncertain World*, to addressing one important reason. Much about climate science is highly uncertain, he argues; and as a general rule, most well-educated citizens don't understand the nature of scientific uncertainty. Thus, they have difficulty understanding competing claims made by advocates in the policy debate and in internalizing the extent of the problem.

A distinguished professor of geophysics at the University of Michigan, as well as a participant in many public debates involving science, Pollack aims to help lay readers understand the role of uncertainty in science. "In making comparisons and analogies with uncertainties that exist in science and everyday life," he writes, "my goal is to help readers to understand and accommodate scientific uncertainties in much the same way that they deal with other uncertainties in life."

Pollack does an admirable job of achieving his goal. He explains technical topics clearly

and purposefully, often relating them to familiar examples. How do scientists really know the length of an object? The book describes the history of standard lengths for the meter, first defined as the length of the king's body parts, to today's definition based on the speed of light. But even counting is not always straightforward, as Pollack exemplifies with the challenges of providing an accurate census of the U.S. population, or determining the winning margin in a very close election. He provides a masterful description of how scientists use probability to describe the accuracy of their data and measurements.

People often do not understand how opinion polls that sample only a few thousand voters can accurately represent the views of an electorate of tens of millions. Pollack explains how. He builds on these examples to provide a lucid description of the Bayesian inference methods used in his own research on the heat flows through the crust of the Earth, culminating in an elegant summary of the evidence that human actions are changing the climate, and of what scientists know and do not know about the potential impacts.

Throughout the book, Pollack emphasizes that examples of uncertainty in science are not anomalies or imperfections. Rather, uncertainty is a ubiquitous strength inherent in the endeavor. Only ideology holds definite truths. In contrast, science aims to separate the probably true from the definitely false.

Uncertainty helps drive the process forward. Science suffers when practitioners too certain

of their truth fail to question and test their conceptual models. Pollack provides a sensible overview of how people should and often do make decisions in the face of uncertainty. Predictions are often wrong, so people should develop long-term plans but prepare for many mid-course corrections along the way. To premise action on certainty is an implicit argument for inaction, since science—and little else we know about the world—is ever certain.

In contrast to his masterful summaries of scientific literature, Pollack uses vignettes to buttress his discussions of how individuals, businesses, and governments routinely make successful decisions in the face of uncertainty. But the vignettes are often wonderful. For instance, he reports on a study of the characteristics of successful—that is, surviving—World War II submarine captains. Those trained in geology and economics (then a much less theoretical discipline than today) performed better than those trained in mathematics and physics. The reason? Those with a low tolerance for ambiguity failed to act before the depth charges began falling.

A misunderstanding of scientific uncertainty is, however, only one reason society's actions against climate change often fall short. In many areas of human endeavor, decision-makers understand the uncertainties, but nonetheless lack the capability to integrate them fully into their decisions. For instance, national leaders generally understand the huge uncertainties inherent in intelligence estimates related to the war on terrorism. Legislators know from frequent experience that forecasts of future spending and tax revenues are rarely correct. Nonetheless, policy-makers often feel compelled to argue strongly and act more certain than they know they are to advance their policy