just the results of any single statistical test. When one speaks of confidence in association of the warming and greenhouse change, then one is extrapolating on the basis of disparate information from various sources and tests. The confidence quoted cannot be associated with a particular statistical test and objective number. Rather, one is making value judgments over how much confidence to associate with the circumstantial evidence that is available. When Hansen looks at the evidence and assigns a high degree of confidence to it, he is being no less, or no more, scientific than, say, fellow modeler Michael Schlesinger when he assigns a low degree of confidence on the basis of the same evidence.

The challenge presented by Hansen's manner of communicating his position (congressional testimony) is over how scientists resolve disputes over interpretation, and communicate scientific information about contentious public issues. Should Hansen have gone before Congress? Should he have used the word "confidence," or something else? What is it about the science and the policy associated with this issue that makes a high confidence statement more or less defensible than a low confidence statement? How do the standards for certainty change (if at all) when a scientific issue has policy implications? Is there a "scientific" way of communicating information outside a field? Scientists need to consider how to speak out and how to respond to those who do and those who don't. Perhaps the logical follow-up from the Amherst meeting on greenhouse science is to hold another meeting where climatologists directly address the communication issues around which they have hitherto been skirting.

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REFERENCES

1. T. P. Barnett and M. E. Schlesinger, *J. Geophy. Res.* **92**, 14772 (1987).
2. S. H. Schneider and S. L. Thompson, *ibid.* **86**, 3135 (1981).

Response: Broecker contends that the group assembled at the Amherst workshop on the greenhouse was not representative of the scientific community. To the extent that computer modelers play a role, the statement is unsupportable. There are five greenhouse modeling groups generally recognized as world-class. All were represented at the workshop. In addition, few if any researchers in the climate community have publicly agreed with Hansen's "high degree of confidence" statement.

Broecker says that concern does not rest on detection of the greenhouse warming. The reactions of Congress and the public suggest otherwise. True, the physics of the greenhouse and a wealth of circumstantial evidence require an eventual warming. But years of Capitol Hill testimony to that effect failed to sway Congress or the public. It was Hansen's claim of certain detection of the greenhouse, not hosts of calculations, that touched off last summer's media firestorm.

As Risbey ably points out, some might view Hansen's conclusion as scientific; his manner of presentation, however, might well be the subject of thoughtful discussion.

—RICHARD A. KERR

NASA's Objectives

Philip H. Abelson (Editorial, 26 May, p. 901) offers enthusiasm for the objectives of NASA in developing new satellites and other hardware for examining the earth. I have no doubt that NASA and its supporters in and outside government plan to develop that equipment. But I have serious doubts about the objectives. NASA has had extraordinary capability for many years for advancing the topics that Associate Administrator Leonard A. Fisk espoused recently before a Senate committee, but it has done so in the most modest degree.

Landsat imagery has been available since 1972. AVHRR (Advanced Very-High Resolution Radiometer) imagery, radar imagery, and imagery from other sensors have been available in the public realm for years. NASA's support for the use of these data has been miniscule. For example, extraordinary efforts have been made to persuade NASA and the Department of Energy, separately or jointly, to enable a global survey using existing satellite imagery of the area of forests and rates of deforestation to reduce some of the uncertainties about climatic change that Fisk apparently emphasized and Abelson cites. These efforts, extending over more than a dozen years, have produced little support for trifling objectives usually focused on a further development of methods or equipment, but not on data about the earth. NASA's own staff has repeatedly voiced a lack of interest in support of the very objectives now advanced.

Abelson has the emphasis correctly stated: it is the development of new hardware, not the development of new information. NASA's clients are not the scientific community interested in how the earth works and the citizens who are likely to be affected by that information, but the aerospace industry and NASA's own engineers. Only weeks ago the scientific community had to mount an extraordinary effort to persuade the Administration and Congress that the Landsat program, which gathers data from around the world under collaborative arrangements with other nations, should not be allowed to die through lack of funds. NASA's help in saving Landsat was approximately in proportion to its contributions to the use of that remarkable system.

Abelson's optimism will be justified only if Congress and the Administration join in refocusing NASA on the objectives that Fisk articulated. A step in the direction of reestablishing credibility might be to redirect some of the funds currently used in the shuttle program to the use of existing data and the development of techniques for handling more such data efficiently.

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Elephant Management

I would like to compliment *Science* on its coverage of the ivory crisis ((News & Comment, 9 June, p. 1135). Any delay in protecting the African elephant from the depredations of bounty hunters will contribute to the extinction of this valuable species, and that's why I am pushing for immediate congressional funding for effective management of these animals. I urge the members of the scientific community to join in this effort to protect one of the most important and breathtaking members of the animal kingdom.

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Erratum: In Robert Pool's Research News article of 21 April (p. 284), "Skepticism grows over cold fusion," the following remark was incorrectly attributed to electrochemist Allen J. Bard (p. 285, col. 1). "The lesson that more heat is produced than is accounted for by burning all the setup is starting to get through to me. The effects are starting to add up to a fairly strong case." That statement was made by another panelist at the cold fusion session of the April 1989 American Chemical Society meeting in Dallas, Texas.

Erratum: In Marjorie Sun's article "South Carolina blocks test of rabies vaccine" (News & Comment, 30 June, p. 1535), the person identified as Jarrett is Michael Jarrett, State Commissioner of the South Carolina Department of Health and Environmental Control. The person identified as Brown is John Brown, toxicologist and chairman of the ad hoc biotechnology committee of the South Carolina state health department.

Erratum: In Mark Crawford's News & Comment article "Agricultural groups push research plan" (14 Apr., p. 140), the U.S. Department of Agriculture's Joint Countil on Food and Agriculture Sciences was incorrectly referred to as the "Joint Council on Food and Agriculture Safety."