Science and Communicating Climate Impacts and Risks

One of the functions of *Weather, Climate, and Society* is to provide a scientific forum for research on the ways that weather and climate affect individuals and their societies and, conversely, the ways that socioeconomic forces influence weather and climate. The articles in this issue address these topics from a number of different perspectives. For example, ''Land Use Change in Central Florida and Sensitivity Analysis Based on Agriculture to Urban Extreme Conversion,'' by Hernandez et al. examines the impact of socioeconomic actors on land use and how these combine with biophysical factors in different areas of central Florida to influence land use and hence weather. Stewart and colleagues approach this question through an examination of what influences individuals' confidence in weather forecasts in ''The Relationship of Weather Salience with the Perceptions and Uses of Weather Information in a Nationwide Sample of the United States.'' They go on to show how the ways that people use weather information is related to their confidence in weather forecasts. Toegilhofer et al. examine measurement issues in determining noncatastrophic weather risks and Kvale and colleagues, in ''Carbon Dioxide Emission Pathways Avoiding Dangerous Ocean Impacts,'' model CO_2 emissions pathways. Finally, Jason C. Senkbell and colleagues study which population groups were more likely to have plans for seeking shelter prior to experiencing a tornado and which were most likely to develop such plans after the experience.

At first glance, these articles may appear to describe distinctly different parts of the elephant, but in essence, they all contribute to the broad topic of understanding the various socioeconomic implications of weather and climate and, importantly, the ways that people understand these implications. However, because national, international, and individual responses to contemporary weather and climate change will have a critical impact in shaping future climate, the communication of research findings in ways that people can understand is as important as basic scientific research. Similarly, the value of the articles in this issue is that they not only advance our understanding of weather, climate, and society, but they also contribute to improvements in the ways we communicate scientific information to the public.

Communicating the results of scientific research on climate and weather impacts has been difficult for many reasons, including the complexity of the science, the well-funded, well-organized opposition of climate deniers, and, for many people, the lack of salience of weather and climate in daily life. The weather changes every day, many argue, and it always has—so why worry now? Successful communication of the nature of contemporary weather and climate change is obviously related both to an understanding of the nature and pace of the changes taking place and to the ways that human action influences these changes. But it is also is related to an understanding of the underlying risk calculus that motivates people and how individuals perceive information and act on it. The lack of significant public interest in weather and climate change demands that the scientific community learn how to communicate information about weather and climate change more effectively to nonscientists.

A new way to communicate the changes taking place has recently been suggested by James Hansen and colleagues at the National Aeronautics and Space Administration's (NASA) Goddard Institute for Space Studies. In an article published online on 6 August 2012 in *Proceedings of the National Academy of Sciences* (*PNAS*), Hansen illustrates the changing distributions of variations in summer temperatures over the past 30 years in a series of graphics that provides visual evidence of the increase in summer heat anomalies. By

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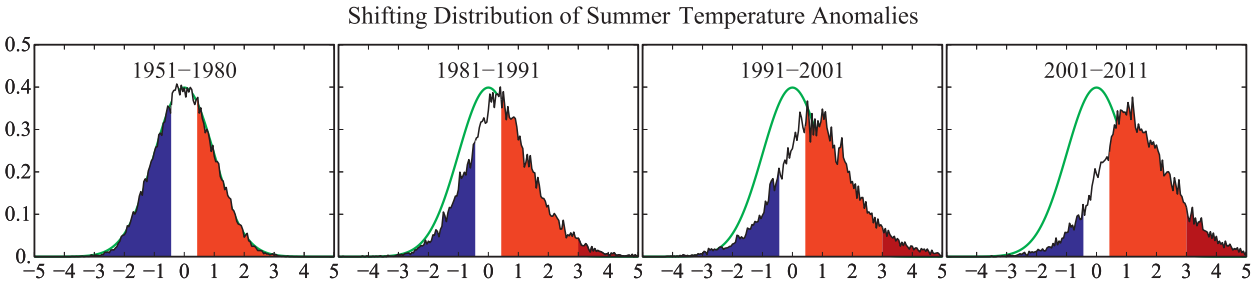

FIG. 1. Visual presentation of shifting temperature patterns. The *y* axis is the frequency of occurrence relative to baseline temperatures (from Hansen et al. 2012).

charting summer temperature anomalies each decade relative to baseline temperatures in the period from 1951 to 1980 (a period within the memory of many living people), Hansen and his colleagues show the rapid growth in the numbers of heat anomalies and the decline of cold anomalies (Hansen et al. 2012). Without getting into the causes of the changes he shows, the visual evidence of change that he portrays is incontrovertible (Fig. 1).

Increasingly, we are learning that scientific information can be conveyed as effectively through graphics as through words, and for a public that is increasingly dependent upon aural and visual learning, it may be that graphics are more effective means of communicating scientific information than the technical explanations of scientists. Scientific journals need to place greater emphasis on the graphical components of research articles, and *Weather, Climate, and Society* will continue to emphasize the need for improvements in communicating research results.

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REFERENCE

Hansen, J., M. Sato, and R. Ruedy, 2012: Perception of climate change. *Proc. Natl. Acad. Sci. USA,* doi:10.1073/pnas.1205276109, in press.