Long-Range Forecasting: Truth or Consequences

Ability to anticipate El Niño conditions foreseen, but what if the forecasters should get it wrong?

A slow warming of the waters of the eastern Pacific in the Southern Hemisphere in recent months has set atmospheric scientists talking about the possible advent of another El Niño event, the phenomenon linked to damaging departures from usual weather patterns over a large portion of the globe. Weather Service scientists called attention to the signs by launching an "El Niño watch" on 11 February and are meeting this week to assess the evidence and decide whether further comment is indicated.

In spite of, or perhaps because of, mounting optimism about prospects for long-range—monthly or seasonal—forecasts, those associated with the El Niño watch are proceeding with extreme caution. Whatever they decide to say will certainly not be labeled a forecast.

This tentative tone prevails not only because understanding of the El Niño phenomenon is far from complete, but also because of the potential economic and social consequences of such a forecast. These range from clear benefits to agriculture and economic planning generally to risks of liability actions should forecasts prove incorrect.

The policy implications of long-range forecasting were judged of sufficient near-term relevance to be the subject of a recent seminar in Washington sponsored by Resources for the Future and the National Climate Program Office of the National Oceanic and Atmospheric Administration. A major aim of the seminar was to bring together scientists working in the field and analysts and decision-makers interested in the use of long-range forecasts.

References to past and future El Niños figured prominently in the day-long discussion. Progress made in understanding El Niño is the principal source of optimism about prospects for predicting long-range weather fluctuations, particularly in the tropics. This new knowledgeability appears to be making scientists face up to questions about how to handle information about El Niño under the conditions of uncertainty that still prevail.

At the seminar, some participants saw forecasting as an information management problem. The benefits of reliable forecasts were readily acknowledged. If the government of Peru, for example, had been alerted to the impending El Niño of 1982–83, it might have acted to cushion the disastrous effect on the country's fishing fleet.

The potential pernicious effect of forecasts got more attention, however. Early access to accurate forecasts affecting agriculture could confer an unfair advantage on individuals in the commodities market. But the impact of incorrect forecasts was seen as more serious. For instance, preparations for a predicted drought that did not occur could have a devastating effect on farmers operating on a thin financial margin.

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Mention of legal liability for inaccurate forecasts was a recurrent theme at the seminar. Such suits were treated as a definite possibility although no forecasting malpractice case precedents were presented.

The problems of long-range climate forecasting were frequently compared to those affecting other geophysical predictions, such as on the buildup of carbon dioxide in the atmosphere and depletion of the ozone layer. The most direct analogy in respect to policy implications was seen to be with earthquake prediction, where the trick also will be to decide when advances in the state of the art make the benefits of forecasting outweigh the risks.

At the start of the seminar, Eugene M. Rasmussen of the weather service's Climate Analysis Center noted that the El Niño or El Niño/Southern Oscillation (ENSO) phenomenon, as it is known in the trade, has a lifetime of about 2 years and recurs irregularly every 2 to 7 years. ENSO episodes characteristically announce themselves with an anomalous warming of waters off the Pacific coast of Latin America which spreads westward into the central Pacific. Disruption of the marine ecosystem off the coast of Peru and Ecuador was early linked to El Niño, but scientists in the last two decades have shown that El Niño and the Southern Oscillation, "a global-scale seesaw in surface pressure with centers of action around Indonesia-North Australia," in Rasmussen's phrase, are related to a grand-scale global system of climate fluctuation.

ENSO episodes are recognized as leading to severe climatic conditions over a wide area. The 1982–1983 ENSO episode was a particularly powerful one causing shifts in rainfall patterns that produced record rains in usually arid coastal regions of Latin America and severe drought in eastern Australia, Indonesia, and Melanesia. The episode was also implicated in drought in areas as far flung as the east coast of Africa.

Tropic arid and semiarid regions that depend heavily on agriculture or fishing were hard hit by the 1982–83 ENSO episode. Accurate long-range forecasts are seen as especially valuable for those regions.

The 1982–83 event made a strong impression on atmospheric scientists not only because it may rank as the ENSO of the century but because it was a late bloomer and the El Niño community was slow in catching on. This seems to have increased the scientists' wariness about going on the record on a new El Niño.

The initial statement on the El Niño watch noted that the pattern of sea-surface temperature (SST) anomalies in the tropical Pacific is consistent with the early stages of an El Niño. The statement warned that "other factors often associated with the initial stages of an El Niño episode are not as yet in evidence." It went on to say that, "Nevertheless, in light of the current trend in the SST anomaly pattern, and in view of the fact that four years have elapsed since the beginning of the last El Niño event, it seems prudent to call attention to these conditions in the form of an *El Niño Watch*, covering the period February-April 1986." The statement concludes with the following disclaimers. "It should be emphasized that this watch does not imply a forecast that El Niño conditions will actually develop in the eastern Pacific. Also, there is no basis for speculation as to its possible magnitude, should the event develop."

As the El Niño watchers keep tabs on ocean-atmosphere interactions they will have to decide not only on what the diagnosis should be but what caveats to attach in going public. ■ JOHN WALSH