Wild String of Winters Confirmed

Meteorologists have measured just how erratic the weather has been from winter to winter lately—a millennium may pass before another time like it

You have known all along that the weather has been kind of crazy these past 10 years or so. Most meteorologists, being the conservative sort and preferring to analyze a long record, have been reticent about recent weather. But now three government researchers have offered an estimate of just how crazy the weather has been.

The weather of eight recent winters over the 48 states, at least, has indeed been wild. It was a spell of winter weather unprecedented in the entire 89-year weather record. Three consecutive winters of the past eight—when averaged over the 48 states—were much colder than normal. Less memorable perhaps but still significant were three winters much warmer than normal. Such a combination of six very abnormal winters in 8 years should not be expected to recur for more than 1000 years given certain assumptions, according to a study (*1*) by National Oceanic and Atmospheric Administration (NOAA) researchers Thomas Karl of the National Climatic Data Center in Asheville and Robert Livezey and Edward Epstein of the Climate Analysis Center in Washington, D.C.

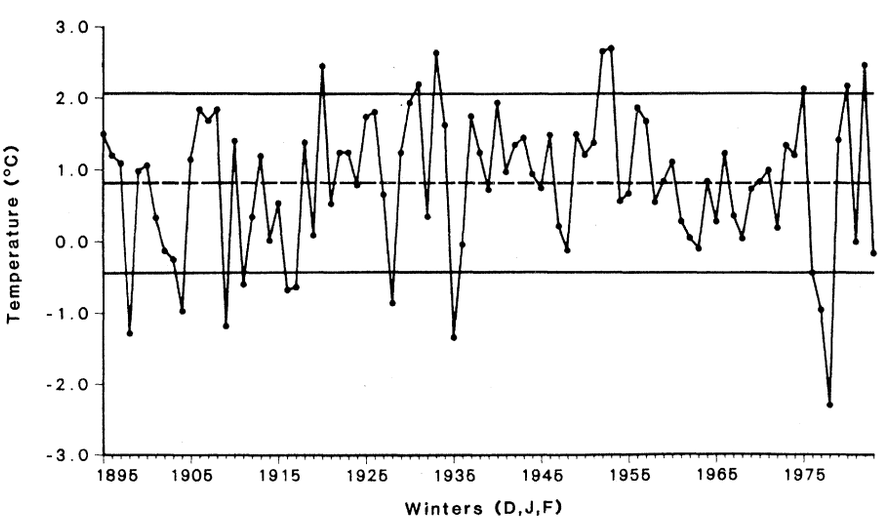
Lacking a detailed record long enough to find another such period of unruly weather, the NOAA group took the past 89 years as a model for mathematical simulations that randomly generate winter temperature averages, one winter after another, for 2 million winters in all. The model was constrained by the amount of variability from one winter to the next that was typical of the past 89 years and by the slight tendency of abnormally warm or cold winters to follow one another. That is, the design of the model was based on the assumption that climate over the contiguous 48 states had not changed during those 89 years. Under that assumption, it took about 1100 to 1250 years on average for the random, independent fluctuations of the model to produce another six winters out of eight that were at least as abnormal as those between 1975–76 and 1982–83. The run of three extremely cold winters (1976–77 through 1978–79) took about 550 years to recur.

The variability from winter to winter in the late 1970's and early 1980's may be extreme, but the stability of winter temperatures during the preceding 20 years is no less striking, according to Karl. By the standards that set off six of the eight recent winters as extremely abnormal, all 20 winters between 1955–56 and 1974–75 were unexceptional, often by comfortable margins. The unbroken string of relative stability of winter temperatures is at least as unusual as the recent period of high variability, says Karl. In contrast to the recent periods of unusually high and unusually low winter weather variability, the longer 60-year period that preceded them displayed intermediate variability, Karl notes.

Karl has found an immediate cause at least for the surprising tendency of the average winter temperature of the entire contiguous United States—including such climatically diverse spots as Seattle, Denver, and Miami—to follow similar trends. During the period of high variability, there tended to be more and longer temperature anomalies and the country tended to act in unison—extreme warmth in one region did not counteract extreme cold elsewhere. As a result, there were 20 percent more months having temperatures much above or much below normal during the recent high variability than during the preceding time of low variability.

What does it all mean? Karl and his colleagues were noncommittal—"The recent variability is either a moderately rare event in a reasonably stationary climate, or it represents climate change . . . ." Some would argue that, of course, it is climate change. Climate changes from decade to decade, they say, making the assumption of the analysis that climate remained unchanged during the record's 89 years inappropriate and the conclusion irrelevant.

Those taking a broader view of climate concede the possibility that the high variability is accompanying a long-term climate change for the United States, perhaps one induced by rising carbon dioxide. But they see no way, at this point, of distinguishing such a change from the inevitable vagaries of the atmosphere. The average global temperature, the more common measure of climate trends, fell from its 1940 peak until about 1970, when it began to rise again. Conceivably, the increased variability over the United States could reflect a shift in the way the atmosphere manages to carry excess heat from the tropics to the poles when it is being warmed overall. Whether the change in interannual variability has a physical basis or is just an accident, meteorologists are unanimous in their refusal to extrapolate recent trends and become climate forecasters.—**Richard A. Kerr**



Year-to-year gyrations of winter weather

The unprecedented high variability of winter temperatures averaged over the 48 states is evident in a string of eight recent winters of this 89-year-record. A 20-year period of unusual stability began in 1955. The dashed line is the long-term mean, and the horizontal solid lines are 1.253 standard deviations from the mean. [*Reprinted from* (1)]

References

1. T. R. Karl, R. E. Livezey, E. S. Epstein, *Bull. Am. Met. Soc.* **65**, 1302 (1984).