THE HAZARDS OF PREDICTING THE WEATHER

Happy 100th Birthday —U. S. Weather Bureau—We know it hasn't been easy

by David Ludlum

***Editor's note:** With A.B. and Ph.D. degrees from Princeton and a Masters from Berkeley, Dave has spent 50 years in weather work, including 5 years during the war as an Army forecaster in North Africa, Sicily, Italy, France, Germany and Austria. Besides being a contributor to numerous magazines, including Weatherwise which he founded and edited for 30 years, Dave has written eleven books on weather, and is currently authoring a North American Weather Guide for the National Audubon Society.*

As we celebrate the centennial of our civilian weather service in 1990, we bow in homage to those who pioneered in what is still one of the most uncertain of the sciences. "Some people are weatherwise, some are otherwise," Ben Franklin remarked in Poor Richard's Almanac in 1735. Even those who are weatherwise often err in predicting the weather. Storms veer off in unforeseen directions, frost strikes in July, a sudden shower soaks clothes on a washline. In the spring in New England, wrote Mark Twain, "I have counted one hundred and thirty-six different kinds of weather inside four-and -twenty hours."

Weather observing was the hobby of many educated men in Colonial America. Of the first six presidents of the United States, four—Washington, Jefferson, Madison, and John Quincy Adams—engaged in personal weather observing with their own instruments.

Yet, despite much attention to reading thermometers and barometers and scanning the sky, no basic principles toward an understanding of the behavior of the atmosphere were forthcoming. Something was lacking, and in 1839 John Ruskin, noted English essayist (and weather observer) put his finger on the difficulty. ''The meteorologist is impotent if alone,'' Ruskin declared.

The first technological breakthrough came in 1844 with the telegraph, which enabled weathermen to expand their horizons by communicating instantly with other observers.

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Some brave individuals attempted to forecast the weather, but with indifferent success. In the midst of the Civil War, one Francis L. Capen promised President Lincoln that "thousands of lives & millions of dollars may be saved from the application of Science to War." The President was not persuaded. He wrote on April 28, 1963, "It seems to me that Mr. Capens knows nothing about the weather, in advance. He told me three days ago

that it could not rain again until the 30th. It is raining now & has been for ten hours. I can not spare any more time to Mr. Capen."

Finally, in the autumn of 1869, when a series of disastrous storms struck Great Lakes and Atlantic Coast shipping, Congress resolved to establish a storm warning service, as Great Britain and France had already done, and in February of 1870 President Grant assigned the Army Signal Service to the job. Three times daily each station transmitted observations to Washington, where a national weather map was published.

In 1890, in response to the farmers' needs for weather data, the Department of Agriculture took over the meteorological functions of the Signal Service, and the National Weather Service was born. Mark H. Harrington, a professor of Astronomy at the University of Michigan was chosen to head the new agency. His successor was Willis Luther Moore who realized that progress in weather forecasting required knowledge of conditions in the upper atmosphere. He built a research facility on Mount Weather, a peak in the Blue Ridge Mountains, where he spent considerable time in the summers at government expense thereby inviting much criticism from Congress and others, But he survived the ensuing investigation, and the new science had taken another step.

The road ahead was still rocky.The famous missed forecast for the inauguration of President Taft on March 4, 1909 became a cause célèbre. Despite a prediction on March 3 of clear skies, the storm that was supposed to move out to sea, stayed and dumped 9.8 inches of snow on the inaugural scene, forcing the ceremonies inside.

With the advent of the age of aviation, a new era dawned, greatly enhancing the importance and responsibilities of weather forecasters. A new gospel was being preached in Europe. The polar front theory and air mass analysis were revolutionizing forecasting. Scientists there viewed the weather map as a battleground between cold air streams from polar regions and warm streams from the tropics, as well as dry air masses over the continents and moist ones over the oceans. In the U. S., weather forecasters were slow to change their traditional forecasting methods. The door opened a crack in the mid 1930's when two young upstarts from MIT (one of whom was Hurd Willett, Princeton 1924) were allowed to have a small desk behind a screen in the forecasting room at the Bureau. They were permitted to put warm fronts and cold fronts on their weather maps and analyse the data along mathematical probabilities.

But it took World War II to move us into the modern age of forecasting. By the end of the war 19,000 men and women were engaged in weather work to aid the armed forces. In the 1950's the Weather Bureau began to play a major international weather role. Cooperative ventures such as the International Geophysical Year (1957), the World Weather Watch (1968), and the Global Atmospheric Research Program in the 1980's produced tremendous amounts of information about our weather and new strides in the art of forecasting.

Today, in its 100th year, the National Weather Service employs about 4,500 people in 300 offices throughout the 50 states. The operating budget is over $300 million. Some 10,000 volunteers maintain daily records for their locations. Radar and satellite photographs enable us to see beyond the horizon, and computers enable us to use mathematical models to project weather as much as two weeks in advance with a fair degree of accuracy.

We suspect, however, that there will always be surprises and room to speculate about the weather. One of those changeable spring days in New England, with dizzying parade of sun, wind, rain, a little sleet, more sun, and a sudden snow storm, would confound the smartest computer. As Sir Graham Sutton, the eminent British scientist, said, ''Meteorology is the most fascinating, yet the most frustrating, of the earth sciences.''.