

JOSEPH HENRY

Father of Weather Service

By Frank Rives Millikan
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Storm warnings, daily weather forecasts, and weather maps seem so much a part of modern life that it is hard to imagine a world without them. But when the Smithsonian was founded in 1846, there was no central agency to provide timely data on the weather, and people had to rely on an annual almanac.

Joseph Henry helped shape the world we know when he laid the foundation of a national weather service shortly after becoming the Smithsonian's first Secretary.

Henry's interest in meteorology dated to his days as a professor at the Albany Academy in Albany, New York, where he compiled reports of statewide meteorological observations for the University of the State of New York. As a professor of natural philosophy (physics) at the College of New Jersey (Princeton), he conducted research on lightning and engaged in discussions with pioneer meteorologists both in the United States and Britain about storm patterns and atmospheric physics.

When Henry came to the Smithsonian, one of his first priorities was to set up a meteorological program. In 1847, while outlining his plan for the new institution, Henry called for "a system of extended meteorological observations for solving the problem of American storms." By 1849, he had budgeted \$1,000 for the Smithsonian meteorological project and established a network of some 150 volunteer weather observers. A decade later, the project had more than 600 volunteer observers, including people in Canada, Mexico, Latin America, and the Caribbean. Its cost in 1860 was \$4,400, or thirty percent of the Smithsonian's research and publication budget.

The Smithsonian supplied volunteers with instructions, standardized forms, and, in some cases, with instruments. They submitted monthly reports that included several observations per day of temperature, barometric pressure, humidity, wind and cloud conditions, and precipitation amounts. They also were asked to comment on "casual phenomena," such as thunderstorms, hurricanes, tornadoes, earthquakes, meteors, and auroras.

Enlisting enthusiastic volunteers proved less of a problem than interpreting their observations. In 1856, Henry contracted with James H. Coffin, a professor of mathematics and natural philosophy at Lafayette College in Easton, Pennsylvania, to carry out this task. Coffin, who received as many as half-a-million separate observations in a year, complained that some contained "new-coined characters & hieroglyphics" that made them unintelligible. He also had to employ up to fifteen human "computers" to help make the necessary arithmetical calculations. In 1861, he finally published the first of a two-volume compilation of climatic data and storm observations based on the volunteers' reports for the years 1854 through 1859.

A second aspect of Henry's meteorological project was



weather telegraphy. Early on, Henry foresaw the storm-warning potential of the telegraph, an [invention](#) he had pioneered himself in the 1830s and that Samuel Morse had made commercially feasible by 1845. Realizing that storms in the United States generally moved from west to east, he wrote in the Smithsonian's 1847 annual report that "the extended lines of telegraph will furnish a ready means of warning the more northern and eastern observers to be on the watch for the first appearance of an advancing storm."

By 1849, Henry worked out an arrangement with a number of telegraph companies to allow free transmission of local weather data to the Smithsonian. He also proposed to supply "the most important stations" with barometers and thermometers. By 1857, telegraph stations from New Orleans to New York were cooperating.

These dispatches enabled Henry to devise a large daily weather map. Its purpose, Henry wrote, was "to show at one view the meteorological condition of the atmosphere over the whole country."



Louise Rochon Hoover's painting, "Secretary Henry Posts Daily Weather Map in Smithsonian Building, 1858." Commissioned for the Smithsonian exhibition at the Chicago Century of Progress Exhibition in 1933.

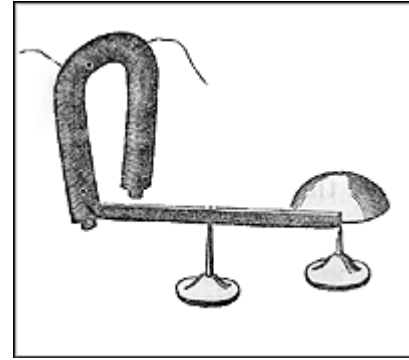
The map, which Henry mounted in 1856 for public display in the Castle, was dotted with colored discs. As telegraph reports came in each morning, an assistant placed white discs in locations with fair weather, blue ones where snow fell, black where there was rain, and brown where conditions were cloudy. Arrows on the discs showed the direction of prevailing winds.

The map became a popular attraction. Henry noted that tourists who viewed it "all appear to be specially interested in knowing the condition of weather to which their friends at home are subjected at the time." He shared the telegraph dispatches with the *Washington Evening Star*, which, in May 1857,

began publishing daily weather conditions at nearly twenty different cities. Henry thus helped give rise to the popular newspaper weather page.

Henry's map also made some forecasting possible. "If a black card is seen in the morning on the station at Cincinnati, indicating rain at that city," he noted, "a rain storm may confidently be expected at Washington at about seven o'clock in the evening." This rule-of-thumb proved reliable enough for Henry to postpone evening lectures at the Smithsonian on days Cincinnati had morning rain.

Henry apparently envisioned a system of storm warnings, announcing in his annual report for 1857 that he hoped the following year to arrange with telegraph lines "to give warning on the eastern coast of the approach of storms." But he was not able to implement the plan



Sketch of "telegraph" Henry showed his classes at the Albany Academy in 1831. From *Annual Report of the Smithsonian Institution*, 1857, p. 105.

before the Civil War engulfed the nation.

The war dealt a major blow to the meteorological project. Henry wrote in 1861 that the project "suffered more from the disturbed condition of the country than any other part of the operations of the Smithsonian establishment." Urgent public business forced weather information off the telegraph lines, and secession cut Henry off from his southern observers. Although he was able to revive the project after the war, Henry began taking steps to transfer its operations to the federal government.

In his annual report for 1865, Henry called for the federal government to establish a national weather service capable of issuing storm warnings and other weather predictions. Others urged similar proposals, and in 1870 Congress passed a bill that put storm and weather predictions in the hands of the U.S. Army's Signal Service. By 1874, Henry convinced the Signal Service to take over the volunteer observer system as well.

The weather functions of the Signal Service were transferred in 1891 to the newly established U.S. Weather Bureau, which later became the National Weather Service. That service today, as David Laskin puts it in his 1996 book *Braving the Elements: The Stormy History of American Weather*, "still adheres to the same fundamental structure and principles that Joseph Henry devised and set in motion."

[For more on Henry's interest in meteorology, see Frank Millikan, "Joseph Henry's Grand Meteorological Crusade," *Weatherwise* 50 (October/November 1997): 14-18.]

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