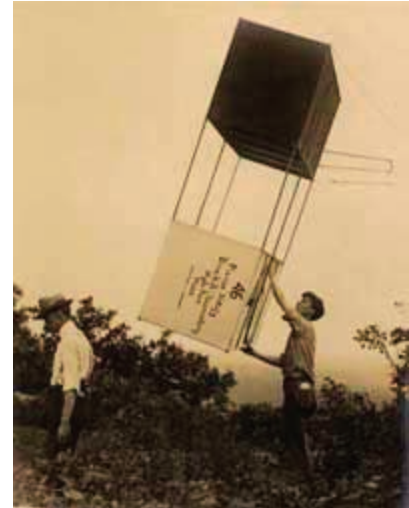




# The Box Kite in Weather Research

In the last decade of the nineteenth century, experimenters and inventors had applauded Lawrence Hargrave's invention of the box kite because they immediately understood its implications for aeronautical design. But there was also another discipline that instantly embraced the box kite as a more efficient tool for its purposes. It was the budding science of meteorology, the earth science concerned with phenomena of the atmosphere, specifically weather. The United States government was beginning to invest more attention and money in predicting the weather. Meteorologists wanted the most stable platform possible to lift measuring instruments into the upper atmosphere. As J.B. Millet said in "Scientific Kiteflying," "What is wanted in a scientific kite is the maximum of lift and the minimum of drift." The box kite, invented in 1893, came along at just the right moment.



Kites had been used to investigate the atmosphere in the mid-eighteenth century, when Dr. Alexander Wilson of the University of Glasgow in Scotland, and one of his students, Thomas Melville, had used a train of kites to lift thermometers. They conducted their experiments just a few years before Ben Franklin attached a small iron key to a kite line made of hemp and silk. But it was the founding of weather observatories in the late nineteenth century that brought kites to the forefront of meteorological research.

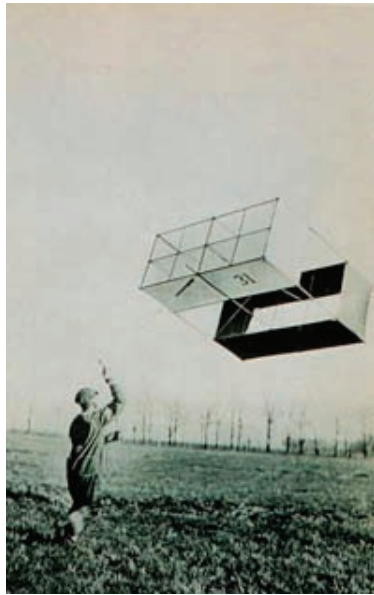


In the United States, Blue Hill Meteorological Observatory in Milton, Massachusetts opened in 1885, and that very summer (as reported by the Monthly Weather Review in September 1896) Mr. Alexander McAdie flew kites coated with tin foil to observe atmospheric electricity. Current collected in the kites, then passed down a copper wire to an electrometer in the ground. On August 4, 1894, William Eddy, inventor of the bowed kite in the West, used a train of five bowed kites to fly a modified thermograph (to record temperature) and a barograph (to record pressure) to an altitude of 1,430 feet. They were the first self-recording instruments flown by a kite.

But bowed kites in train could be cumbersome to fly. As soon as he had heard about the box kite in 1893, American William Eddy wrote Hargrave for permission to use his kite design for meteorological observations. By 1895 anemometers (to measure wind force and velocity) and meteorographs (to record pressure, temperature, and humidity simultaneously) were being lifted, and box kites had replaced bowed kites in train for most ascensions. American experimenters adapted the box kite to



the high and variable winds characteristic of the eastern United States. They used cells of different shape, such as squares or diamonds, or added wings for more lift. Hargrave, however, considered some of these adaptations "barbaric."



In the years from 1894 to 1909, kites enabled the first routine measurements of temperature, humidity, and wind in the lower atmosphere. The data collected contributed to theories about the formation of cyclones and continental waves of warm and cold air. Observatories around the world pursued similar efforts. France, Sweden, Denmark, Britain, Germany, Russia, Finland, India, and Egypt all joined in. The US Weather Bureau set up observatories at Pikes Peak, Colorado, and at Mt. Weather, Virginia, plus seventeen kite stations in the central and eastern parts of the country. Data-gathering activity with kites crested in July 1908, when balloons and kites were sent aloft from forty-four stations on land and sea in both northern and southern hemispheres. Kites continued to be used at Blue Hill until 1915, when the outbreak of war around the world



stopped international cooperation. By the early 1930s, advances in weather balloons had overtaken kites. The last kite state, in Ellendale, North Dakota, closed in July 1933.

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