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Historical Essays on Meteorology, 1919-1995

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What Moyer sets out to do, he does very well. And for anyone familiar only with Henry's grumpy-walrus portrait from late in life, the cover illustration, an 1845–50 daguerreotype, is a revelation.

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The past decade has witnessed increased interest in the history of the geophysical sciences outside of geology. The field has its own society—the History of Earth Sciences Society—and journal, neither of which exclude geology. Organizations like the American Geophysical Union and the American Meteorological Society (AMS) have established committees to encourage disciplinary history. These efforts have begun to engage scientists in the practice of history and in collaborations with professional historians, at a time when the two groups are perhaps more comfortable battling each other in "science wars."

The current "Diamond Anniversary Volume of the American Meteorological Society" is one such collaboration. James Fleming has mustered a remarkable group of eminent scientists, recognized authorities, pioneers in their fields, and more than one past president of the AMS. These authors, reflecting on histories that they themselves have shaped, have composed broad-ranging articles on the evolution of dynamic meteorology and on the emergence of numerical weather prediction; narrowly focused pieces on such topics as cloud dynamics and lightning research; and surveys of private-sector meteorology, broadcast meteorology, and the status of meteorology among the physical sciences at American universities and technical establishments.

Quite a few of these articles are so narrow and technical that only fellow practitioners will read them. Roscoe Braham's piece on the formation of rain, however, is a delight to read—in part because just how rain forms remains a mystery. From the more broadly conceived articles several themes emerge, including the impacts of applying a variety of technologies. The computer, to whose early development meteorology contributed significantly, has substituted numerical for analytical methods in meteorology and permitted the modeling of the atmosphere and its weather processes. Radar, used during World War II to locate areas of rain, has continued to be important in storm warning and research and the study of precipitation. Aircraft and then radar and satellites have provided upper-air data that have revolutionized the field. Satellites, pilotless vehicles, and other meas-

uring devices will soon provide meteorologists with greatly increased quantities of research-quality data in digital form, which may lead to the integration of numerical modeling and observation.

Several articles trace the disciplinary evolution of meteorology and its subfields. Edwin Engman's "Hydrology in the Twentieth Century" shows the transformation of the field from a narrowly focused, practical engineering discipline to a distinct science concerned with the distribution and circulation of water on the global scale. William A. Koelsch, the sole professional historian among the contributors, traces the progress of meteorology itself "From Geo- to Physical Science." At the end of the nineteenth century, as geology, geography, physics, and other sciences established themselves at American universities, meteorology was left behind, taught at colleges as part of natural philosophy or, in its guise as climatology, as part of geography. World War I and the advent of aviation sparked greater interest in the field. In 1925 Daniel Guggenheim, whose son had been a naval aviator in the war, founded at New York University a School of Aeronautics, which supported the new mathematical and physical approach to meteorology then being developed by the Norwegian school at Bergen. Meanwhile the United States Weather Bureau remained wedded to the methods of the previous century, analogical and climatological rather than mathematical and physical. World War II finally secured meteorology at a small group of institutions as a theoretical and mathematical science on a par with other physical sciences.

David Spiegler's "History of Private Sector Meteorology" is a welcome addition to what naturally enough is an internally focused collection. Irving Krick of Cal Tech is considered the founder of this branch of meteorology: he helped Hollywood filmmakers choose a night with weather suitable for the burning of Atlanta in *Gone with the Wind*—there could be no retakes of the scene! The field grew rapidly after World War II, and especially with the advent of the computer, to include the activities of insurance companies, environmental consulting agencies, instrumentation firms, and many others.

For his study, Spiegler identified companies through listings in professional magazines, sent out questionnaires, and interviewed selected leaders. The approach suggests the extent to which we find ourselves at the earliest stages of research in these investigations. Although some themes—the contributions of aviation, of two world wars, of the computer—are familiar, much of the material here offers entirely new subjects and directions for the history of the discipline. If we can follow these up, perhaps the history of meteorology, like meteorology itself, will finally establish itself on a par with the histories of its sister sciences.

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