AMS REPORTS

AMS ad hoc Committee—*Abbe Report*

August 2021

Purpose of the Report

The Committee's charge was to present a report to the AMS Council on the most probable historical account of Cleveland Abbe. To this end, the committee worked to gather sufficient information to gain a better understanding of the contributions of Cleveland Abbe to the atmospheric science community as well as to examine parts of his biography that have come into question, so that the AMS Council can make informed decisions about how to appropriately utilize his legacy.

Committee Members

Lourdes Avilés, Plymouth State University

Jim Fleming, Colby College

Penelope Hardy, University of Wisconsin—La Crosse

Bob Henson, Meteorologist and Freelance Journalist

Sepi Yalda (chair), Millersville University

General Structure and Plan for the Committee's Work in Preparation of the Report

The Committee met twice (3 March 2021 and 7 April 2021) to discuss their task and a strategy for the development of the report. The committee collaboratively gathered a collection of verified resources on Abbe, including related manuscripts, books, and other historical notes, and created a private shared drive. In addition, the Committee decided to interview experts and those most closely familiar with the existing research and documentation on Cleveland Abbe. The following experts were identified and invited for interviews:

Bill Hooke, American Meteorological Society

Sean Potter, Author, *Too Near for Dreams: The Story of Cleveland Abbe, America's First Weather Forecaster*

Greg Romano, NOAA National Weather Service

Marc Rothenberg, National Science Foundation Historian (Retired)

Louis Uccellini, NOAA National Weather Service

Two interview dates were established to speak with the experts in two group Zoom sessions. The committee put together the following questions, which were shared with the experts ahead of their interview date:

1. What were Abbe's roles and contributions in the area of science?
2. What were Abbe's roles and contributions in the area of public service?
3. Is there any evidence pointing to potential involvement by Abbe in activities in support of eugenics?
4. What were Abbe's most significant achievements related to the National Weather Service?
5. Is there anything else you think we should consider in evaluating Abbe's legacy?

The two interviews were conducted on the following dates:

13 May: Potter, Hooke, and Rothenberg

17 May: Romano and Uccellini

After the interviews were conducted, additional resources that were shared with the Committee by the experts were added to the private shared drive. The Committee met on 2 June 2021 to review the outcomes of the interviews and discuss the structure of this report. The following consensus report is based on a final review of resources, supporting documents, and expert interviews.

Introduction and background

Cleveland Abbe (1838–1916) began his professional life as an astronomer and studied and worked with several scientists between 1858 and 1864. He studied in Russia from 1864 to 1866, where he worked at the Nicholas Central Observatory in Pulkovo. When he returned to the United States in 1867, he worked as an aide at the U.S. Naval Observatory and in 1868 became the director of the Cincinnati Observatory. It was during this time that he developed a professional interest in meteorology. From September to December 1869, Abbe prepared regular weather forecasts for the public from the Cincinnati Observatory, based on the contemporary scientific understanding of weather features and on observations available through telegraph reports. These activities preceded the creation of the first national weather service, which was authorized in February 1870 under the U.S. Army Signal Service. Abbe was not directly involved in the effort to authorize the new service, although he communicated with other key individuals, such as Increase Lapham, who played a significant role in the new agency's establishment. In January 1871, Abbe joined the fledgling weather service as a civilian assistant to the chief signal officer, General Albert Myer, who adopted many of Abbe's protocols for observing and reporting the weather. Abbe dedicated the remaining 45 years of his career to the weather service, where he remained focused on science and service to the field of meteorology.

Abbe's roles and contributions in the area of science

Among Abbe's most notable scientific contributions were bridging the two disciplines of astronomy and meteorology and operationalizing the concept of regularly produced weather forecasts

based on scientific principles and observations. Fluent in both French and German, Abbe translated many of the critical works on astrophysics and atmospheric dynamics and brought them to the attention of English-speaking meteorologists. Abbe acknowledged his intellectual debts to other pioneers, such as William Redfield, James Espy, Joseph Henry, Elias Loomis, and Increase Lapham, for their significant contributions toward developing the basis for forecasting. Abbe played a key role in developing the system of storm warnings and tri-daily and long-range forecasts for the newly established weather service, supervised the service's Scientific and Study Division (also known as the "Study Room"), and helped to educate a broad audience through his work as the editor of the *Monthly Weather Review,* engaging meteorologists and other scientists in the United States and internationally, and through public lectures. Several references ranging from written testimonies to public remarks by colleagues and contemporaries support and further validate Abbe's contributions to weather forecasting activities, atmospheric science research, and the promotion of the field of meteorology. Abbe was active in international scientific and learned societies and received several major awards, including the Symons medal of the Royal Meteorological Society, the Longstreth medal of the Franklin Institute, and the Hartley medal of the National Academy of Sciences (now the NAS Public Welfare Medal). He was awarded honorary degrees by the University of Michigan, College of the City of New York, University of Glasgow, and Harvard University.

Abbe's roles and contributions in the area of service

Abbe was dedicated to public service, not only through his long-term commitment to public weather forecasting but also as evidenced through his time as a volunteer in Sunday schools in Black communities, his interest in providing education for teachers, and his efforts to improve general understanding of science. Furthermore, he was interested in inspiring teachers, lectured on various topics in meteorology at several universities, and gave a number of public lectures. He was also a strong advocate for graduate education in meteorology. Abbe stated in a letter to the Weather Bureau that "the highest ambition is to be useful and help and save others from making mistakes." He was also committed to serving the meteorological community through his service as the editor of the *Monthly Weather Review* and through communicating routinely with other scientists both at home and abroad.

Potential involvement by Abbe in activities related to eugenics

The eugenics movement gained popularity in the United States and reached its peak in 1926 with the founding of the American Eugenics Society, a decade after Abbe's death in 1916. Based on a review of the existing resources and expert interviews, the Committee found no direct evidence that Abbe was involved in the eugenics movement. Abbe worked with some individuals who may have been involved with eugenics, and his name and his longtime interest in genealogy were used after his death to promote the ideas of the movement. However, there exists no document that could be considered evidence of his involvement in the eugenics movement. It is also important to note that there is no evidence of Abbe adopting or advocating the social and political positions associated with eugenics. On the contrary, there exists evidence based on primary source materials that Abbe helped contribute to improving the conditions for persons of color in his free time, which included teaching in Sunday schools, making monetary contributions, and supporting those who were part of dedicated efforts to help support Black communities. Expert interviews highlighted the fact that even though some of Abbe's views on evolution would be considered dated, it is of utmost importance to consider this in the context of the time and as a reflection of thoughts and views that were then prevalent and accepted.

Abbe's most significant achievements related to the National Weather Service

Abbe played a significant role in establishing the forecasting methods used during the founding years of the agency that today is the National Weather Service, including the transition from a single probability forecast to a system that included three daily forecasts based on observations, and his method for long-range forecasts, described in his 1901 *Monthly Weather Review* paper titled "The Physical Basis of Long-Range Weather Forecasts." This brought him into conversation with the famous Norwegian geophysicist Vilhelm Bjerknes, who is considered the founder of geophysical fluid dynamics. Another important contribution was to encourage other researchers and scientists through the concept of the Study Room. He strongly promoted the importance of research for accurate forecasting. Abbe was not the first employee of what is now the National Weather Service and never served as its director, and there is no evidence he made either of these claims himself, although others may have done so after his death. Abbe was the agency's sole forecaster during its first year of routine daily weather predictions, and he served as a stabilizing force in the weather service, in part because of his long tenure and his dedication to advancing the science and to public service. He also contributed to the development of standard time in the United States, the need to standardize meteorological observations, translations, and encouragement of developing academic meteorology programs.

Summary statement

Based on the review of all relevant resources, supporting materials, and expert interviews, the Committee members agreed on the following statements:

- Cleveland Abbe made significant contributions to the field of meteorology and the weather service through helping to develop the system of storm warnings, establishing the practice of daily and long-range forecasts, supporting and nurturing the importance of basic research in forecasting and the science of meteorology, performing consistent and dedicated service, and promoting education and careers in the discipline.
- There is no evidence suggesting that Cleveland Abbe made a claim to have created the nation's weather service.
- There is no evidence suggesting that Cleveland Abbe was involved in and/or advocated for activities related to the eugenics movement.

Recommendation

The Committee recommends that AMS consider updating the current biography of Cleveland Abbe that was previously online, with Abbe's life story and achievements presented in an appropriate context based on the historical record. Committee members would be happy to prepare a draft of such a biography upon request.

Among Abbe's most notable scientific contributions were bridging the two disciplines of astronomy and meteorology and operationalizing the concept of regularly produced weather forecasts based on scientific principles and observations.