
The International Bibliography of Meteorology:

Revisiting a nineteenth-century classic

James Rodger Fleming
Science, Technology and Society Program
Colby College, Waterville, Maine, USA
jffleming@colby.edu

The *International Bibliography of Meteorology*, published in 1994, is a new edition of a nineteenth century bibliography supervised by Oliver L. Fassig and issued in four volumes by the U.S. Army Signal Corps between 1889 and 1891. The original volumes are not easy to find, read, or use. They were lithographed in small quantities on acidic paper. Only a few copies are still in existence and, for the most part, are now in poor condition. The 1994 edition, prepared by Roy E. Goodman and me, is still in print and is available in 120 research libraries and via interlibrary loan. This essay is a reintroduction to the history and importance of the project.

A perusal of the bibliography is a humbling experience in the richness, breadth and value of past observations. The volumes contain over 16,000 items on temperature, moisture, winds, and storms, “from the beginning of printing to 1889,” with two-thirds of the entries in languages other than English and ten percent of the entries dated before 1750. *Meteorological and Geo-astrophysical Abstracts* called the effort “the most ambitious and intensive bibliographic project ever undertaken in meteorology.”¹ Documented here are accounts of environmental changes prior to 1890, temperature and rainfall records, descriptions of hurricanes, snowstorms, shipwrecks, acid rain events, and numerous other topics of interest to researchers in such diverse fields as agriculture, forestry, exploration, geography, hydrology, oceanography, geology and geophysics, maritime history, environmental history, literature and folklore. Extinct meteorological instruments—for example, Espy's nepheloscope of the 1840s and the “rain-band” spectroscope of the 1880s—are also represented here. Some sections, such as Terrestrial radiation (volume 1), Showers of miscellaneous matter (volume 2), General atmospheric circulation (volume 3), and Development of the laws of cyclonic storms (volume 4), provide starting points for thematic historical investigations. Other sections of the bibliography document the geographical distribution of temperature, moisture, winds and storms across five seas and seven continents. The bibliography also contains very useful citations to specialized lists, tables and bibliographies such as Hermann Hager's “List of famines, severe winters &c. from A.D. 1100 to 1315” and Andreas Poëy's “Chronological table, comprising 400 cyclonic hurricanes which have occurred in the West Indies and

¹ *Meteorological Abstracts and Bibliography* 6 (1955): 85. The American Meteorological Society's *Meteorological and Geo-astrophysical Abstracts* (Boston, 1950-) indexes the current literature of meteorology and related fields.

in the north Atlantic within 362 years, from 1493 to 1855,” published in English, French, and Spanish.

Below, reprinted from the 1994 edition, is my “Historical Introduction” to the volumes. A mystery remains, however, since the massive original card catalogue containing over 60,000 titles by about 13,000 authors has not been found.

Historical Introduction

The Signal Office and the *Bibliography of Meteorology*

The U.S. Army Signal Office was established during the Civil War. From 1870 to 1891 the Signal Office served as the nation's weather service, providing “telegrams and reports for the benefit of commerce and agriculture,” collecting weather data from across the country, and issuing indications and probabilities to the general public. The Signal Office also cooperated with meteorological investigators around the world and supported a scientific research program of its own. By way of introduction, here is a brief history of the events leading up to the creation of the *Bibliography of Meteorology* by the U.S. Army Signal Office.

A.J. Myer and the U.S. Army Signal Corps

In 1860 Albert James Myer,² an assistant surgeon in the Army Medical Department and an accomplished telegrapher, became the army's first signal officer, assigned to the Navajo Expedition of 1860-61 in New Mexico. Major Myer's signaling system, known today as “wig-wag,” employed flags by day and torches by night. It provided a reliable and effective line-of-sight system of communication.

At the outbreak of the Civil War Myer returned to Washington and served as Chief Signal Officer of the Army of the Potomac. He was soon placed in charge of signal instruction for all departments of the Union Army. In 1863 Congress established a separate Signal Corps for the duration of the war with Colonel Myer as its Chief Signal Officer.

Near the end of 1863, however, a heated conflict erupted between the Signal Officer and the United States Military Telegraph over the use of civilian telegraphers. Myer was relieved of his command and demoted. Only after the war was he reinstated as Chief Signal Officer and promoted to Brevet Brigadier General by the new Secretary of War, U.S. Grant.

Myer returned to active duty in 1867. With his position restored, his promotion in hand, and his reputation intact, he now faced the task of rebuilding the Signal Corps and redefining their mission for peacetime service. He established a camp of signal instruction near Washington, D.C. and convinced the military academies at West Point and Annapolis to adopt his system. He also assumed sole

² The personal papers of Albert J. Myer (1828-1880) are located at the U.S. Army Military History Institute, Carlisle Barracks, Pa. and in the Manuscripts Division, Library of Congress. Myer's military service records and most of his official papers as Chief Signal Officer (RG-111) and head of the national weather service (RG-27) are in the National Archives and Records Administration.

On Myer's life see Paul J. Scheips, “Albert James Myer, Founder of the Army Signal Corps: A Biographical Study” (Ph.D. dissertation, American University, 1966); and Paul J. Scheips, “‘Old Probabilities’: A. J. Myer and the Signal Corps Weather Service,” *Arlington Historical Magazine* 5 (1974): 29-43.

command of electric telegraphy within the army. Congress, however, had provided no legislative authority for a separate Signal Corps.

The Signal Corps as the National Weather Service

In December 1869 Congressman Halbert Paine of Wisconsin introduced a bill to establish a national storm warning service.³ Because of their prior involvement in meteorological research, both the Smithsonian Institution and the Army Medical Department, were considered likely candidates to organize the new system. The final version of the bill, however, named the Secretary of War as the responsible party.

The Chief Signal Officer immediately called on Congress to stake his claim. Paine recalled later that Myer “was greatly excited and expressed a most intense desire that the execution of the law might be entrusted to him.”⁴ The weather service bill was ready-made for an aggressive administrator looking for a mission. Myer defined storms as the “enemy” of commerce and argued that the Signal Corps could use telegraphy to track their movement and provide meteorological intelligence: “The telegraph can announce meteorological observations, statistics, and reports giving the presence, the course, and the extent of storms... and their probable approach, as it would, in time of war, those of an enemy.”⁵

Congress was persuaded by Myer's zeal, signaling expertise, and the promise of military discipline in the system. The first national weather service was established in 1870 in the War Department under the direction of the Chief Signal Officer.⁶ With generous support from Congress, the Signal Office budget soared from \$5,000 in 1869 to \$400,000 by 1874. During the same period Myer's command expanded from three Civil War veterans to over five hundred college educated observers. The Signal Office had become a major military and scientific service, providing “telegrams and reports for the benefit of commerce” and daily weather predictions to the public.

Because of his access to commercial telegraph lines, an aggressive construction program of military telegraph lines along the Eastern seacoast and into the Southwest and Northwest frontiers, and, during national emergencies, a direct line to the White House, Myer soon found himself at the center of an electric intelligence network spanning the nation. The men of his command served as both meteorological observers and at times as secret service agents reporting to him on “peacetime” enemies such as striking workers in the rail strikes of 1877, Indian uprisings in the

³ *Congressional Globe*, 41st Cong., 2d sess., 90, pt. 1, p. 177.

⁴ Paine to Duane Mowry, Milwaukee, Wisc., Oct. 8, 1903, quoted in Eric R. Miller, “New Light on the Beginnings of the Weather Bureau from the Papers of Increase A. Lapham.” *Monthly Weather Review* 59 (1931): 68; also cited in Lewis J. Darter, Jr., “The Origin and Development of the Weather Bureau,” in Darter, comp., *List of Climatological Records in the National Archives* (Washington, D.C., 1942), 9.

⁵ Albert J. Myer to Congressman Halbert E. Paine, January 18, 1870, “Letters... Relative to storm telegraphy,” U.S. House of Representatives, Ex. Doc. 10, pt. 2, 41st Cong., 2d sess., p. 22.

⁶ On the founding of the national weather service see James Rodger Fleming, *Meteorology in America, 1800-1870* (Baltimore: Johns Hopkins Univ. Press, 1990), 141ff. Two standard histories of the Weather Bureau are Gustavus A. Weber, *The Weather Bureau: Its History, Activities and Organization* (New York, 1922); and Donald R. Whitnah, *A History of the United States Weather Bureau* (Urbana, Ill., 1961). Patrick Hughes, *A Century of Weather Service: A History of the Birth and Growth of the National Weather Service, 1870-1970* (New York, 1970), is a valuable source of early photographs. See also Joseph M. Hawes, “The Signal Corps and Its Weather Service, 1870–1890,” *Military Affairs* 30 (1966): 68–76.

Southwest, and natural hazards to commerce and agriculture. Signal service observers reported on the hatching and migration of locust swarms, on frost and drought in the cotton, corn and tobacco-growing regions, on hazards to shipping along the coast. Mercantile interests were advised of weather conditions affecting the packing and shipment of perishable goods such as oysters, pork, and ice. Sailors received notice of fogs, storms, and fair winds. Insurance companies received data useful to them for setting rates for shipping. River reports warned of floods and low water conditions; railway reports announced heavy snows and track conditions; sanitary reports tracked the course of cholera and yellow fever epidemics in the interest of public health.⁷

International Cooperation

Cooperation among national weather services was institutionalized in the latter third of the nineteenth century with the establishment of an international meteorological committee and more or less regular conferences among national representatives.⁸ In 1873 Myer, representing the United States at the International Meteorological Congress in Vienna, proposed that the weather services of the nations of the world prepare an international series of simultaneous observations to aid the study of world climatology and weather patterns.⁹ The result was the *Bulletin of International Simultaneous Observations* published by the Signal Office from 1875 to 1889. The *Bulletin* contained worldwide synoptic charts and summaries of observations recorded simultaneously at numerous locations around the world.¹⁰ In 1875 the Signal Corps became a bureau of the War Department. It received a permanent enlisted force in 1878.

In 1879 Myer returned to Europe as a delegate to the second International Meteorological Congress in Rome. The international exchange of ideas, data, and publications by the various meteorological services resulted in a growing awareness of a need for comprehensive, reliable, and easily accessible information. At the Rome meeting delegates agreed to prepare national catalogues of meteorological observations and lists of publications in the libraries of their national weather services.¹¹ By far the most enthusiastic advocates of this bibliographic effort were

⁷ [Albert J. Myer], "Some of the Chief Uses and Adaptabilities of the Signal Office Reports and Publications," typeset copy in Albert J. Myer Papers, Library of Congress. For details see *Report of the Chief Signal Officer* in the annual reports of the Secretary of War, 1871-1891.

⁸ See H. G. Cannegieter, "The History of the International Meteorological Organization, 1872-1951," *Annalen der Meteorologie* n.s., 1 (1963): 7-280, esp. 7-12; and World Meteorological Organization, *One Hundred Years of International Co-operation in Meteorology (1873-1973), A Historical Review* (Geneva, 1973). International meetings were held in Leipzig (1872), Vienna (1873), Paris (1878), Rome (1879), Berne (1880), Copenhagen (1882), Paris (1885), Zurich (1888), Paris (1889), Chicago (1893), Uppsala (1894), Paris (1896), St. Petersburg (1899), and Paris (1900). For international meteorology before 1870 see James Rodger Fleming, "Meteorological Observing Systems before 1870 in England, France, Germany, Russia, and the United States: A Review and Comparison," *WMO Bulletin* (forthcoming).

⁹ *Report of the Chief Signal Officer for 1874*, p. 505.

¹⁰ Copies of the *Bulletin* were included as appendices to the *Annual Reports* of the Chief Signal Officer.

¹¹ This was at the urging of Dr. Gustav Hellmann of Berlin. Cleveland Abbe and C.J. Sawyer, "The Signal Service Bibliography of Meteorology," *Bulletin of the Philosophical Society of Washington* 10 (1887), 20-28, published in *Smithsonian Miscellaneous Collections* 33.

Gustav Hellmann of Berlin, G.J. Symons of London, and Cleveland Abbe of Washington.

An act of February 24, 1880 established the rank of the Chief Signal Officer as Brigadier General. Albert Myer received that rank on June 16, 1880, just two months before his death. He was succeeded by a veteran of the Civil War and Indian Wars, Chief Signal Officer, General William B. Hazen.¹²

Cleveland Abbe and the International Catalogue of Meteorological Citations

The proximate origins of a comprehensive catalogue of the meteorological literature of the world can be traced to the efforts of Professor Cleveland Abbe, chief civilian scientist in the Signal Office.¹³ In 1872 Abbe had begun a private compilation of meteorological citations, largely based on the first six volumes of the *Royal Society Catalogue of Scientific Papers*, which covered the years 1800 to 1863:

I have during the past few years had copied out from the first six volumes of the *Royal Society Catalogue of Scientific Papers* all titles of work relating to Meteorology or its applications, intending this to be a first installment of a complete *Bibliography of Meteorology* of which it would form about one third or one fourth part. I have about 20,000 titles on cards 5 1/2 by 4 inches. These are at present arranged by authors' names, and although I have settled upon a plan of philosophical classification or index of subjects... I had not yet decided to arrange these cards—nor even whether it would be best to do so but whether to keep the subject index as an index only...¹⁴

Abbe claimed the catalog cost him well over \$800 to compile. Seeking to recover his expenses, and hoping that it might be used as the basis for an international cataloging effort, Abbe offered his catalog for sale: to Professor Julius Hann of Vienna, chair of the international meteorological committee; to Dr. Gustav Hellmann, bibliographer and advocate of an international meteorological catalog; to General Myer, his supervisor at the Signal Office; and to other scientists, including Elias

¹² The personal papers of William B. Hazen (1830-1887) are in the Library of Congress and the Archives Center of the Smithsonian Institution's National Museum of American History. His official papers are in the National Archives. On Hazen's life see *William Babcock Hazen, A Narrative of Military Service* (Boston, 1885); and Paul Hutton (ed.), *Soldiers West: Biographies from the Military Frontier* (Lincoln: Univ. of Nebraska Press, 1987).

¹³ Most of the personal papers of Cleveland Abbe (1838-1916) are in the Library of Congress. Smaller collections are located in Eisenhower Library at the Johns Hopkins University, at the Cincinnati Observatory, and in the library of the City University of New York. Many of his official documents are in the Records of the Weather Bureau (RG-27) in the National Archives. Many 19th century government scientists were given the rank of Professor.

On Abbe's life see William J. Humphreys, "Biographical Memoir of Cleveland Abbe, 1838-1916," U.S. National Academy of Sciences, *Biographical Memoirs* 8 (1919): 469-508, which contains Abbe's curriculum vita and a bibliography with 290 items. There is a short article in the *Dictionary of Scientific Biography*. Truman Abbe, *Professor Abbe and the Isobars: The Story of Cleveland Abbe, America's First Weatherman* (New York, 1955), was written by his son who used his father's papers to prepare the book.

¹⁴ Cleveland Abbe to Elias Loomis, May 7, 1879, Elias Loomis Papers, Beinecke Rare Book and Manuscript Library, Yale University.

Loomis at Yale.¹⁵ Finding no takers and facing delays with the international committee, Abbe brought his catalog to the attention of his new supervisor, General Hazen. He informed Hazen that G.J. Symons, publisher of the *Monthly Meteorological Magazine* had also compiled a 34-volume catalog on astronomy, meteorology, and terrestrial magnetism comprising some 18,000 titles on meteorology alone, and that Symons was willing to duplicate his catalog at cost.¹⁶

In 1881 General Hazen ordered work to begin on an international catalog of meteorological citations to be modeled after “the index catalog of the Library of the Surgeon General's Office.” It was to be a comprehensive catalogue of the meteorological literature of the world, “from the origin of printing to 1881.” The Signal Office purchased Abbe's card catalog and offered to reimburse Symons for the expense of copying citations from his catalog onto cards.

C.J. Sawyer, librarian of the Signal Office, was placed in charge of the preparation and compilation of the catalogue. He was responsible for the management of the project, the methods employed, and the accuracy of the details. In 1884, shortly after Symons's catalog arrived from London, Sawyer was relieved of his library duties and appointed Bibliographer. The project was moved out of the library and into the study room, a division of the Signal Office under Professor Abbe reserved for basic research projects and exempt from the press of daily weather service business.¹⁷ This move also served to elevate the status of the project to that of a fundamental investigation into the compilation and categorization of meteorological literature.

The international meteorological community welcomed the Signal Office effort and cooperated with it. Mr. Symons's catalog covered the libraries of the British Meteorological Office and the Royal Meteorological Society in London, the Société météorologique de France in Paris, the libraries of the Poulkova and Brussels Observatories, and the manuscript collection of Professor Andreas Pöey. Dr. Hellmann contributed 5,200 titles from his *Repertorium der Deutschen Meteorologie* (Leipzig, 1883). His work also served as a model for the larger international catalog. Professor Hann provided a catalog of the library of the Zentralanstalt für Meteorologie in Vienna. Professors Heinrich Wild and Alexander Woeikof surveyed the meteorological literature of Russia.¹⁸ Professor Henrik Mohn furnished a similar list for Norway.

Broadening the international scope of the catalog were 196 unique Danish titles from the Royal Library in Copenhagen, 337 Swedish titles from the library of Uppsala University, Polish literature extracted from the *Bibliografia polska*, Spanish

¹⁵ Abbe and Sawyer, “Signal Service Bibliography,” 21; Abbe to Loomis, May 7, 1879.

¹⁶ On Symons's contributions see *Symons's Monthly Meteorological Magazine* 17 (1882): 1, 129; and 18 (1883): 97, 135. For other contributors see “Meteorological Bibliography,” *Symons's Monthly Meteorological Magazine* 20 (1885): 161-62.

¹⁷ *Report of the Chief Signal Officer for 1887*, p. 39. Abbe and Sawyer, “Bibliography of Meteorology,” 22.

¹⁸ Gustav Hellmann was a prolific writer on meteorological subjects. Julius Hann (1839-1921) was director of the Zentralanstalt für Meteorologie in Vienna from 1877 to 1897, and editor of the *Österreichische Zeitschrift für Meteorologie* (later the *Meteorologische Zeitschrift*) from 1865 to 1920. Heinrich Wild (1833-1902) was director of the Central Physical Observatory in Russia from 1868 to 1895. Alexander Woeikof (1842-1916) was a noted Russian climatologist. Henrik Mohn (1835-1916) was a dynamic meteorologist in Norway. See Kh. Khrgian, *Meteorology: A Historical Survey* vol. 1, 2d ed., transl. Ron Hardin (Jerusalem, 1970); and Gisela Kutzbach, *The Thermal Theory of Cyclones: A History of Meteorological Thought in the Nineteenth Century*. (Boston, 1979).

material from the library of the Madrid Observatory, Portuguese titles from the Lisbon Observatory, additional German works from the library of the Deutche-Seewarte and the library of Professor H.W. Dove. Citations were also received from other nations, including Japan, Romania, Mexico, and South Africa.¹⁹

In the next few years 5,000 new titles were added from recent editions of the *Royal Society Catalogue*, 2,500 titles from Reuss's *Repertorium Commentationum*, 1,000 titles from Poggendorff's *Handwörterbuch*, and other titles from Dähuert's *Griefswald Catalogue*, the *Royal Society General Science Catalogue*, Zuchold's *Bibliotheca-Naturalis*, and May's *Bibliography of Electricity*, among many other sources. The Signal Office also surveyed American libraries, contacted some 400 individual meteorologists, and re-indexed over 6,000 periodical volumes. In 1887 Abbe could report: "The total number of titles in the office is about 48,000.... When it is remembered that the Catalogue of the Library of the Royal Meteorological Society (1876) contained only 1,214 entries, one gets an approximate idea of what a great work the Washington Catalogue will be with about forty times that number."²⁰

Although Congress had not yet voted funds for the diffusion of this "useful knowledge," Abbe believed it would do so shortly. In preparation for publication Abbe asked Elias Loomis at Yale to check the "scientific accuracy and practicality" of his classification scheme for the bibliography and to suggest modifications.²¹

When the compilation was completed, the general bibliography of meteorology contained over 60,000 titles by about 13,000 authors. They were arranged in a card catalogue by subject and author. This monumental collection covered the printed literature from the origin of printing to the end of 1889 and included citations from all the nations of the world active in meteorological research. It contained information on, among other things, the relation of basic and applied meteorology to crop production, river and ocean navigation, flood and storm warnings, and epidemic diseases. Table 1 shows the classification of the international catalog of meteorological citations. The four volumes of the bibliography that were issued (temperature, moisture, winds, storms) appear in bold and are underlined. The original card catalog, however, has not been found.

The Signal Office did not fare well in the 1880s. Its funding was reduced and some stations were closed. In 1882 Secretary of War Robert Todd Lincoln recommended an end to meteorology in the Army. Two years later a committee of the National Academy of Sciences recommended transfer of meteorology to civilian control²² and the "Allison Commission" began its congressional investigation of the scientific bureaus of the government, including the weather service of the Signal

¹⁹ Also contributing to the bibliography were Dr. Franc Karlinski (1830-1906), Poland; Miguel Merino, Madrid Observatory, Spain; Dr. Joao Carlos de Brito Capello (1831-1901), Lisbon Observatory, Portugal; Dr. Georg von Neumayer (1826-1909), Deutche-Seewarte, Germany; Dr. Stefan C. Hepites (1851-1922), Romania; Dr. J.G. Gamble, South Africa; Dr. E.R.T. Knipping, Japan; Robert Lewis John Ellery (1827-1908), Australia; and C.G. Fineman and Claes Annerstedt (1839-1927), Sweden.

²⁰ Cleveland Abbe, "The Signal Service Bibliography of Meteorology," American Association for the Advancement of Science, *Proceedings* (1887): 100.

²¹ Abbe to Loomis, Nov. 14, 1885, Elias Loomis Papers, Beinecke Rare Book and Manuscript Library, Yale University.

²² For additional evidence see "Records Relating to the Transfer of Meteorological Functions from the War Department to the Agriculture Department," 1887 (the "Brown Collection"), RG-27, National Archives.

Office.²³ In 1885 a controversy over the handling of the Lady Franklin Bay expedition resulted in Hazen's court-martial.²⁴ Considering the problems he was encountering as Chief Signal Officer, finding funds from Congress to publish the catalog of meteorological citations was not Hazen's first priority.

²³ "Testimony before the [Allison] commission to consider the present organization of the Signal Service..." U.S. Senate, Misc. Doc. 82, 49th Cong., 1st sess. See also A. Hunter Dupree, *Science in the Federal Government: A History of Policies and Activities* (Cambridge, Mass., 1957), 190, 215, et. seq.

²⁴ See e.g., Thomas Jefferson Mackey, *The Hazen Court-martial: The Responsibility for the Disaster to the Lady Franklin Bay Polar Expedition Definitely Established, with Proposed Reforms in the Law and Practice of Courts-martial* (New York, 1885).

Table 1.
Classification of the International Catalogue of Meteorological Citations²⁵

The only sections of the catalog issued in the 19th century were Temperature (II.A.1.), Moisture (II.A.2.), Winds (II.B.2.), and Storms (II.B.3.).

I. GENERAL METEOROLOGY

A. History and bibliography

B. General and collected works

C. Organization and method

D. Instruments

1. General works, 2. Meteorographs, 3. For temperature and radiation,

4. For moisture, 5. For pressure, 6. For winds, 7. For optical phenomena, 8. For electrical phenomena

II. THEORETICAL METEOROLOGY

A. Physics of the atmosphere

1. Temperature, 2. Moisture, 3. Pressure, 4. Optical phenomena, 5. Electrical phenomena

B. Mechanics of the atmosphere

1. General Circulation, **2. Winds, 3. Storms**

C. Cosmic relations of meteorology

1. Influence of the moon, 2. Influence of the planets, 3. Influence of the sun spots, 4. Phenomena attending eclipses

III. APPLIED METEOROLOGY

A. Weather prediction

B. Agricultural meteorology

C. Medical meteorology

D. Climatology

IV. TERRESTRIAL MAGNETISM

A. General

B. Observations, instruments, and methods

C. Variation

D. Distribution

E. Connection with meteorology

V. OBSERVATIONS (METEOROLOGICAL AND MAGNETIC)

Arranged geographically

²⁵ This table is a composite of the classification scheme published in Abbe and Sawyer, "Signal Office Bibliography," 26-27 and that appearing in the *Bibliography of Meteorology*.

A.W. Greely and the Publication of the Bibliography

General Adolphus W. Greely,²⁶ the celebrated Arctic explorer, became the Chief Signal Officer after General Hazen died in 1887. Greely argued strenuously that Congress should publish the entire catalog, since it would be of great value, not only to scientific meteorology, but also to agriculture, forestry, commerce, engineering, and medicine. Greely estimated the catalog had already cost the government between \$12,000 and \$15,000 to prepare and that it could be printed and distributed to the world, at a cost of about \$10,000, “as a monument and evidence of the growing scientific tendency of this nation.”²⁷

In 1888 and 1889 Greely announced major changes in the project. C.J. Sawyer had resigned to take a position in the Patent Office as an examiner.²⁸ Sawyer's assistant, Oliver L. Fassig was promoted to Signal Office bibliographer and librarian.²⁹ Fassig and his assistant, Harold E. Hilton immediately began to compile a supplementary catalog of 5,000 cards for current use in the office.³⁰

The U.S. Congress, never a patron of basic scientific research, repeatedly declined requests from the Signal Office for funds to publish the general catalog. Disappointed, Greely reported in 1889 that one of the most important portions of the catalog—on temperature—would be lithographed at Signal Office expense: “In order that the most important parts for current work should be available for reference, such titles as bear on *temperature* have been type-written in lithographic ink, and a limited number of copies have been lithographed therefrom. As opportunity allows, a similar course will be followed regarding precipitation.”³¹

Three more volumes of the *Bibliography of Meteorology* appeared: moisture (1889), winds (1891), and storms (1891). According to Greely these volumes represented about one-fourth of all the titles in the general bibliography. Approximately 50 percent of these titles were in the library of the U.S. Signal Office.

	<u># OF TITLES</u>	<u># OF AUTHORS</u>	
Part I	Temperature	4,400	1,800
Part II	Moisture	5,500	2,650
Part III	Winds	2,000	960
Part IV	Storms	4,300	1,647

²⁶ The personal papers of Adolphus W. Greely (1844-1935) are in the Library of Congress. His official papers are in the National Archives. On Greely's life see Adolphus W. Greely, *Reminiscences of Adventure and Service: A Record of Sixty-five Years*. (New York, 1927), especially chapter XVIII; and William Mitchell, *General Greely: The Story of a Great American* (New York, 1936).

²⁷ *Report of the Chief Signal Officer for 1887*, p. 39.

²⁸ *Ibid.*, 1888, p. 28.

²⁹ Oliver Lanard Fassig (1860-1936) was the first American to receive a Ph.D. in a meteorological field (Johns Hopkins, 1899). He was editor of the *Report of the International Meteorological Congress Held at Chicago*, 3 vols. U.S. Weather Bureau, *Bulletin* 11 (1893).

³⁰ The existence of this supplementary catalog is confirmed by its temporary loan to the Smithsonian Institution in 1896. Office of the Secretary (Samuel P. Langley), Box 25, folder 7 (Fassig), Smithsonian Institution Archives. Harold Hilton died in 1890.

³¹ *Report of the Chief Signal Officer for 1889*, p. 33.

The volumes were produced in limited number and distributed “to co-operating observers, chiefs of important weather bureaus, and to the most important libraries of the United States.”³² Only a few copies of the original are still in existence. Most volumes are crumbling. One copy of the bibliography, interleaved with correction sheets, is in the NOAA Central Library, Silver Spring, Maryland.

Although the names A.W. Greely and Oliver L. Fassig appear on the title pages of the bibliography, as this history shows, basic credit is due Albert J. Myer, the first signal officer, for initiating an international exchange of meteorological information; to William B. Hazen for initiating the international cataloging project in 1881; to Cleveland Abbe whose collection formed the basis of the bibliography and who continually promoted the project³³; to C.J. Sawyer, the Signal Office librarian who worked for seven years on the project but resigned before the bibliography appeared; and to G.J. Symons, Gustav Hellmann, and all the other contributors from around the world who supplied citations.

Here is the title page of the 1994 edition:

³² Ibid., 1890, pp. 26-27, and 1891, pp. 29-31.

³³ Cleveland Abbe, “The General Bibliography of Meteorology and Terrestrial Magnetism,” British Association for the Advancement of Science, *Annual Report* (1887): 593-94 and *Symons's Meteorological Magazine* (1887): 22, 121; Cleveland Abbe, “The Signal Service Bibliography of Meteorology,” American Association for the Advancement of Science, *Proceedings* (1887): 100; and Abbe and Sawyer, “Signal Service Bibliography.”

The International Bibliography of Meteorology
From the Beginning of Printing to 1889

Four volumes in one:

TEMPERATURE, MOISTURE, WINDS, STORMS

Edited by

James Rodger Fleming, Colby College
&
Roy E. Goodman, American Philosophical Society Library

With a Foreword by E. Philip Krider

Historical Introduction by James Rodger Fleming

Diane Publishing Company

Upland, Pennsylvania

1994