NOAA's National Weather Service

The National Cooperative Observer

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Spring 2014

Inside

Picture of the Atmosphere: Past, Present, Future

James B. Bunker, Observing Program Leader, NWS Mount Holly, NJ

The day starts when the sun slips over the horizon and sends the rays of light and heat across the land and water. Civilization begins to come alive on one side of the globe as the sun continues its ascent, while the other side of the planet begins its nightly phase.

Each day brings a new look to the sky with different shapes and sizes of suspended moisture fields we call clouds. It is from these clouds we find the most necessary component of a civilization's survival, water. Nature itself provides the mechanisms to transport water from one location to another in a never ending hydrologic cycle.

Throughout human existence the concept of how nature reacts in the atmosphere has always intrigued humans. The Greek philosopher, Aristotle, created theories on the formation of rain, clouds, hail, wind, thunder and other atmospheric phenomena. In fact, as a result of Aristotle's observations about what the sky was communicating, many other philosophers attempted to predict weather.

"However, by the end of the Renaissance, it had become increasingly evident that the speculations of the natural philosophers were inadequate and that greater knowledge was necessary to further our understanding of the atmosphere," (Graham, 2002).

To garner further understanding and acceptance of how our world and the atmosphere works, mankind needed further observation and documentation to develop a long-term period of record. The first atmospheric instruments on record date back to the 16th and 17th centuries. Written weather observations soon followed.

The earliest weather observers documented, with impressive detail, the state of sky and weather. In this country, Johan Campanius Holmes was the first person known to have taken written, detailed weather observations in the colonies of North America

Benjamin Franklin was another great father of modern weather observation. He was particularly interested in comparing weather observations in different areas across the country.

"Franklin recognized the importance of observations for making deductions about how the weather works and how the weather systems move," (Nese, 2002). He led the effort to establish a standard for organizing weather observers in the 18th century through the postal service. "His speculations became the starting points for weather theories of the next century," (Nese, 2002).

An observation represents a brief snapshot of the environment at a given location on our planet. An observation is the first step to forming an idea of how our sky is going to respond. Forecasting the future states of the atmosphere require a knowledge of the current values, not from just one point on the globe, but from many points across the planet.

Using a massive network of satellites, automated weather stations across land and sea, and a Franklin-type mentality of documentation with volunteer observers, we can encapsulate a state of the sky and conditions on the ground.

Weather is a record, a window into the past and present to be projected into the future.

Personal View of Prof. Cleveland Abbe, 1870-1885

Cleveland Abbe was a highly respected civilian meteorologist who worked for the Signal Service, and later the Weather Bureau. Many consider him the expert on forecasting in his time. This article was written by Prof. Abbe with minor editorial changes.

Thus, in a few years, the Signal Office officially included every form of meteorological observations or prediction that could affect the interests of agriculture and of our commerce on the Great Lakes, the oceans and the rivers.

The Joint Resolution enacted by the Congress of the United States, February 2, 1870, and signed into law by President Grant on February 9, 1870, marks an important epoch in the history of meteorology in America. It was well known that weather systems moved from west to east or from the southwest to northeast across the United States.

Previous investigators such as Redfield, Loomis, and Espy had shown the basis on which weather predictions could be safely made and Ferrel had unraveled the mechanics of the atmosphere. About this time the electromagnetic telegraph was being used to disseminate knowledge of the coming storms and weather. Professor Henry, on behalf of eminent meteorologists, had not only explained how the telegraph could be utilized for weather predictions, but had systematically done this for many years at the Smithsonian.

The Joint Resolution, provided for taking meteorological observations at military stations in the interior of the continent, and at other points in the states and territories of the United States, and for giving notice on the Northern Lakes and the seacoast by magnetic telegraph and marine signals of the approach and force of storms.

In January 1872, and in compliance with the appropriations bill of 1871, reports relative to the stages of water in the rivers were added the following spring and again in 1873, the floods of the Lower Mississippi were pre-announced in general bulletins. From this time forward that branch of work became a regular part of the duties of the Signal Service.

The appropriation bill, approved June 10, 1872, provided: “For expenses of storm-signals announcing the probable approach and force of storms throughout the United States for the benefit of commerce and agriculture;” and again, in the same bill provided: “That the Secretary of War be, and hereby is, authorized and required to provide in the system of observations and reports in charge of the Chief Signal Officer for such stations, reports and signals as may be found necessary for the benefit of agriculture and commercial interests.”

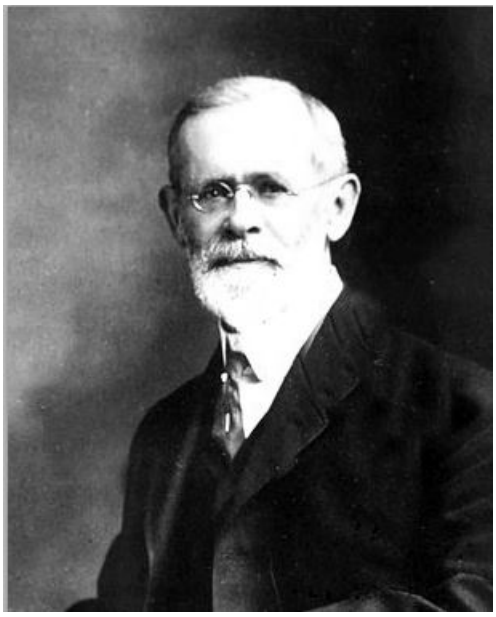
Thus, in a few years, the Signal Office officially included every form of meteorological observations or prediction that could affect the interests of agriculture and of our commerce on the Great Lakes, the oceans and the rivers.

The demands of the new agency required a trained work force familiar with observational, theoretical, and operational meteorology. To educate the officers, meteorological experts from around the country provided training in the form of classes at local offices, as well as educational notes. Experts used included:

- Prof. Henry, Smithsonian Institute
- Dr. B. F. Craig, Army Medical Corps
- C. A. Schott, Coast Survey
- Admiral Thornton A. Jenkins, U. S. Navy
- Prof. J.H.C. Coffin, Nautical Almanac
- Prof. Loomis, Yale University
- Dr. Daniel Draper
- Prof. T. B. Maury
- Prof. Lapham

A major task for General Myer was to educate weather observers of the Signal Service. He therefore added a school of meteorology to his school for instruction in telegraphy and military signaling, located at Fort Whipple, or Arlington, near the city of Washington. This school continued during his lifetime; after his death the name was changed to Fort Myer; it was abolished as a school of the Signal Service by order of the Secretary of War in 1886.

At first the instruction at this school embraced courses in military signaling, the meteorological text-books of Loomis and Buchan, the meteorological instructions relating to the special work of the Signal Office, the building and equipment of telegraph



Prof. Cleveland Abbe

lines, and such other duties as officers and men were liable to be called upon to perform.

In the early 1880s, a more formal course of meteorological instruction was designed to supplement the more informal training started in 1870. The instruction began in 1881 when four lieutenants of the Signal Corps began a course of Deschanel's Physics and a wide range of meteorological literature; it was subsequently enlarged until, in 1885-86, a class of six officers attended an extensive course of lectures and instructions supplemented by monthly examinations on the following subjects, i.e., the theory of instruments, chartography [sic], general meteorology, thermodynamics of the atmosphere; theoretical meteorology without mathematics; practical meteorology and weather predictions; topographic surveying and drawing, electricity and laboratory manipulation.

In 1886, the school of instruction for our observers in their duties was abolished, notwithstanding General Hazen's remonstrance, and its work was relegated to the sergeants at the respective stations, where it consisted mainly in the study of Loomis' textbook and of the volume of meteorological instructions and the acquisitions of good habits as observers and telegraphers.

While attempting to build up a strictly military organization, General Myer had a clear appreciation of the uses that he could make of civilian employees. Having been intimately associated with Profs. Paine and Lapham, of Milwaukee in securing the legislation that authorized the Weather Service, the Chief first secured Prof. Lapham as his civilian assistant.

After Prof. Lapham had declined a permanent appointment, on account of his health, I was called to what I then supposed would be a temporary engagement and in June 1871, Prof. T. B. Maury accepted a similar position; the electrician, or telegrapher, Mr. G. W. Maynard, was also a civilian appointee. It was all the more necessary to secure a few civilian employees in view of the fact that the officers of the Army, temporarily detailed to Signal Service duty, were liable at any time to be ordered back to their regiments.

Up to the middle of 1872 the duty of weather predictions and storm warnings devolved upon the civilians; during the remaining years of General Myer's administration it was equally divided between them and the detailed officers, Lieutenants Craig, Dunwoody, Story, Kilbourne, and Greely. During the administration of General Hazen, those who had become second lieutenants in the Army by promotion from the corps of observers in the Signal Service, and especially Lieutenants Powell and Glassford, also became "indications officers," while the special work of predicting tornadoes was assigned to Lieutenant Finley.

After the appointments of Upton, Waldo, Hazen, Russell, Sawyer, Marvin, and especially Prof. Ferrel on August 10, 1882, and Prof. T. C. Mendenhall on January 1, 1885, it came to be recognized that there were multifarious fundamental labors appropriate to the civilian experts besides the making of weather predictions, which, as a purely empirical matter, had already been brought to a satisfactory degree of perfection. General Hazen's policy of introducing into both the military and the civilian ranks as high a grade of intellectual attainment as was practicable accomplished much for the scientific reputation of the Signal Service and enabled it to accomplish far more for meteorology than could otherwise have been done.

The Prof. Abbe story, excerpted from NWS Public Affairs, continues in the summer edition of the National Cooperative Observer.

In the early 1880s, a more formal course of meteorological instruction was designed to supplement the more informal training started in 1870.

John Campanius Holm Award

Robert "Bob" Skilling holding his John Campanius Holm award. Pictured with Bob from left are Cooperative Program Manager (CPM) **Kimberly Buttrick**, Bob's wife **Beverly**, and his good friend Hingham Fire Chief **Mark Duff**.

Robert "Bob" Skilling, an Observer from Hingham, MA, received the prestigious John Campanius Holm Award for outstanding accomplishment in the field of meteorological observations. Presenting Bob's award were NWS Taunton, MA, Meteorologist-in-Charge (MIC) **Robert Thompson** and CPM **Kimberly Buttrick**. Bob's wife of 43 years, **Beverly**, and his good friend and colleague, Hingham Fire Chief **Mark Duff** took part in the presentation and celebratory lunch at Schooner's restaurant in Hull, MA. And lunch wouldn't be complete for Bob without a trip to Dunkin Donuts afterwards for a cup of coffee!

Bob, now 75, takes pride in the fact he has not missed a single observation since September 10, 1960, despite this past winter's blinding blizzards, Nor'easters and Polar Vortex episodes.

Bob has been passionate about observing weather since high school. As a full time Contract Weather Observer atop Blue Hill Observatory in Milton, MA, Bob has trained numerous observers since 1964; he continues to offer training at the observatory part-time. Bob is an expert in the field of weather observing. His tools include a mercurial barometer, micro-barograph, Universal Rain Gauge, Standard Rain Gauge, Liquid-in-Glass Max/Min thermometers, sling psychrometer, ombroscope (detects precipitation type), pyranometer (sunshine meter), aerovane, Automated Surface Observing System, F420C wind recorder, Contacting Wind Recorder and electronic Max/Min Temperature System. Not only is Bob a weather observing expert at work but also at home in Hingham, MA, where his NWS equipment resides. Thus weather observing for Bob is a job, a hobby *and* a passion!

Bob has been writing for the weekly *Hingham Journal*, since 1994. He submits weekly data of temperature and precipitation as well as a narrative discussing unusual weather phenomena during that week. He cites weather normals such as precipitation, snowfall and temperature as well as records reached or broken based on his 54 years of climate data from Hingham, MA. Bob also writes a column for Scituate, MA, newspaper, *The Mariner*, in which he covers coastal weather.

Bob is a respected member of his local community and the weather community of southern New England. He is a loving and supportive husband to Beverly, father to a son and daughter, and grandfather to three grandsons.

50 Year Honored Institution Award

Tony Matarozzo, staff at the **U.S. Bureau of Reclamation in Colorado** was presented with a 50 Year Honored Institution Award for weather observations taken at Bonham Reservoir, CO. The award was presented by Data Acquisition Program Manager (DAPM) **John Kyle**, left, NWS Grand Junction, CO. Several NWS staff members were on hand to congratulate Tony.

The **Denver Water South Platte Headquarters**, in Grant, CO, was awarded a 50 Year Honored Institution Award for its dedicated service to the National Weather Service (NWS). Pictured from left are Observers **Dennis Gilley** and **Jay Joslyn**.

50 Year Honored Institution Award

Staff at the **International Boundary and Water Commission** at Lake Amistad, TX was presented a 50 Year Honored Institution Award by Hydrometeorological Technician (HMT) **Cory Van Pelt**, NWS Austin/San Antonio, TX.

The **Arnold Arboretum of Harvard University** received a 50 Year Honored Institution Award. To ensure that daily quality observations are never missed requires a team effort. The stewards, who continue the climate legacy from left are **Eyob Solomon**, staff; **Dana Greenhouse**, Intern; **Jack Alexander**, Plant Propagator; **Irina Kadis**, Curatorial Assistant; **Bob Famiglietti**, Arboretum Greenhouse Horticultural Technologist; and **Oren McBee**, Dana Greenhouse Nursery Manager.

50 Year Honored Institution Awards

The **Lemon Grove Fire Department** received the 50 Year Honored Institution Award during a Lemon Grove City Council meeting. Deputy Fire Chief **Tim Smith** and Mayor **Mary Teresa Sessom**, accept the award from MIC **Roger V. Pierce.** Photo by Observing Program Leader (OPL) **Noel Isla**, NWS San Diego, CA.

The **Whitinsville Water Company** of Northbridge, MA, received a 50 Year Honored Institution Award. Accepting the award from left are employees **Linda St. Francis**, Accounts Payable and Billing; **Dawn Calderwood**, Office Manager; **Maureen Dowdey**, Receptionist; and **Randy Swigor,** General Manager.

45 Year Dick Hagemeyer Service Award
40 and 35 Year Length of Service Awards

Bill Gregway, was presented with the 45 Year Dick Hagemeyer Award. Bill is a dedicated Observer in Oswego, NY, a city that boasts amazing sunsets over Lake Ontario and averages over 140 inches of lake effect snow each season!

Harlan Harrison Sr., Observer at Mexican Hat, UT, was presented with a 40 Year Length of Service Award by CPM **Becky Klenk**, NWS Grand Junction, CO. Harlan has also been presented with the Holm Award in 2003 and the Jefferson Award in 2010. The staff at NWS Grand Junction looks forward to many more years of Harlan's morning weather calls.

Duanne Roberts of Kent City, MI, has carried on a family tradition of NWS Observers. He recently received his 35 Year Length of Service Award. His grandfather was the first family Observer, taking observations from the family farm. Duanne's brother took over for a couple years in the 1970s before Duanne inherited the responsibilities in 1978. Duanne worked the family farm until 2000 when he retired. He then moved a half mile away but had the NWS equipment moved with him. Now he plows snow for a mission agency in downtown Grand Rapids. This past winter has kept him extremely busy. Duanne also spends his free time welding in his sizable barn.

30 Year Length of Service Awards

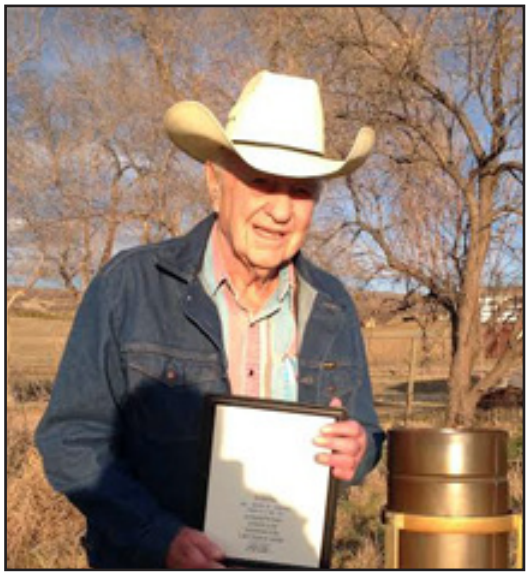
A 30 Year Length of Service Award was presented to **Tom Francis**, an Observer at Golden, CO. The award was presented by Interm **James Kalina**, NWS Boulder, CO.

Ralph Gendron, Project Manager at the U.S. Army Corps of Engineers at Barre Falls Dam, MA, received a 30 Year Length of Service Award. Park Ranger **Brianna Green** joined the presentation by CPM **Kimberly Buttrick**, NWS Taunton, MA.

Larry and Christine Petersen, right and left, were presented with a 30 Year length of Service Award by Electronics Systems Analyst (ESA) **Craig Paju**, center, NWS Glasgow, MT. Larry and Christine take and record daily weather observations for maximum and minimum temperature, precipitation, snowfall and snow depth. Photo by and NWS OPL **Matt Moorman.**

Mark Alan Lovewell of Edgartown, MA, receives a 30 Year Length of Service Award from CPM **Kimberly Buttrick**. The weather equipment is on the island of Martha's Vineyard in the backyard of his dad, **John Lovewell**. Each day before heading to work at the *Vineyard Gazette*, Mark goes over to Edgartown to take the observation and visit his feisty and fiery 92 year old dad. Both are labors of love for Mark.

25 Year Length of Service Awards



A 25 Year Length of Service Award was presented to **David A. Curtis**, an Observer at Sedalia, CO, by Intern **James Kalina**, Boulder, CO.

Karen and Jim Tande, right, were presented with a 25 Year Length of Service Award from CPM **Brian Burleson**, NWS Glasgow, MT, for all their years of service to NWS. Photo by OPL **Matt Moorman**.

Woonsocket, RI, Water Treatment Plant Operator **Bob Rochefort**, left, received a 25 year Length of Service Award and Operator **Michael Bouchard**, received a 10 Year Length of Service Award for their contributions to the climate record from Woonsocket. Much thanks to Bob and Mike for continuing the Woonsocket climate record dating back to 1931! Photo by CPM **Kimberly Buttrick**, NWS Taunton, MA.

David Duboy, of Warsaw, NY, shows his 25 Year Length of Service Award presented by NWS Buffalo, NY, OPL **Dan Kelly**. Because it's at a higher elevation east of Lake Erie, Warsaw typically picks up over 140 inches of lake effect snow each winter season.

25 Year Length of Service Awards

Jim and Karen Tande, center, were presented with a 25 Year Length of Service Award from CPM **Brian Burleson**, left, and OPL **Matt Moorman**, NWS Glasgow, MT.

Robert and Verda Huber right, of Huber Farms near Vida, MT, show their 25 Year Length of Service Award. Robert and Verda take daily weather records for maximum and minimum temperatures, precipitation, snowfall and snow depth. Intern **Amy Campbell,** NWS Glasgow, MT, presented the award. Photo by OPL **Matt Moorman**.

David McIntyre shows his 25 Year Length of Service Award as an Observer in Hastings, MI. David also calls in significant weather events to provide real-time information to the NWS. David has worked at a local radio station for decades and serves as a trusted voice for weather information on AM radio for the Hastings area. He is well known and respected in his community. David also is fond of golf and has brushed shoulders with some of the great players of the game. He proudly displays many of his autographed pictures on his living room wall. David not only takes measurements using the Minimum/Maximum Temperature Sensor, standard rain gage, and snow board, but he has a Console Replacement System as backup, which came in handy during a recent cabling problem with his MMTS. He also owns a personal weather station and likes to compare readings with the various instruments in his yard.

Frederick Kite of La Pryor, TX, was presented a 25 Year Length of Service Award by HMT Cory Van Pelt, NWS Austin/San Antonio, TX. No photo.

20 Year Length of Service Awards

Wayne Pincence, Operations Supervisor at **Lawrence Hydroelectric Associates**, received a 20 Year Length of Service Award for his contributions to the climate record in Lawrence, MA. Also pictured are Plant Operators **Pat Donahue** and **Joe Burke**. The climate site at Lawrence dates back to 1856! Photo by CPM **Kimberly Buttrick**, NWS Taunton, MA.

A 20 Year Length of Service Award was presented to **Marian F. Schneider**, an Observer at Inter-Canyon, CO**.** Photo by Intern **James Kalina**, Boulder, CO.

A 20 Year Length of Service Award was presented to **Marvin Thaller**, an Observer at Hugo, CO**.** The award was presented by Intern **James Kalina**, Boulder, CO.

Amos Yost, Observer at Montezuma, KS, displays his 20 Year Length of Service Award presented by Warning Coordination Meteorologist **Jeff Hutton**, NWS Dodge City, KS. Photo by OPL **Jesse Lee**.

15 Year Length of Service Awards

Kay and Jerry (not pictured) **Collins** have served as Observers at Cohagen, MT, for 15 years. The station was established in 1939, providing continuous weather records for 74 years. OPL **Matt Moorman**, NWS Glasgow, MT, presented the 15 Year Length of Service Award.

Justin Jones, with **Umetco Minerals** and the Observer at Uravan, CO, was presented a 15 Year Length of Service Award from NWS Grand Junction, CO. Photo and presentation by CPM **Becky Klenk**.

From left, **Dale and Janet Veseth** received a 15 Year Length of Service Award from OPL **Matt Moorman**, NWS Glasgow, MT. The station was established in 1959 about 35 miles south of Malta and has continuous records for almost 55 years. The Veseth family has kept the records for all but about 4 of those years.

Maggie Cason and **Jay VanLoan**, Observers at Glade Park, CO, were presented with a 15 year Length of Service Award from NWS Grand Junction, CO. Photo and presentation by CPM **Becky Klenk**.

15 and 10 Year Length of Service Awards

Aggie Wareham, Observer at Gateway, CO, shows her 15 Year Length of Service Award. **Rowena McLaughlin**, Aggie's Backup Observer and sister, was not available for the presentation. Photo and presentation by CPM **Becky Klenk** NWS Grand Junction, CO.

Margie and Ray Veatch, Observers in Delta, CO, were presented a 15 Year Length of Service Award by CPM **Becky Klenk,** NWS Grand Junction, CO.

Lori Dankert of Perrysburg, NY, was presented with a 10 Year Length of Service Award. As of March 25, 2014, Lori had measured 2,366.6 inches of snow in Perrysburg! Photo by OPL **Dan Kelly**, NWS Buffalo, NY.

Jim Hook and his daughter, **Sofie**, of Bluff, UT, were presented with a 10 Year Length of Service Award by CPM **Becky Klenk**, NWS Grand Junction, CO. Jim credits all of his family and staff with making sure the weather observations are gathered, recorded and disseminated each evening. Sofie, just shy of her 10th birthday, has literally grown up taking weather observations.

10 Year Length of Service Awards

Pat Doucette, right, was presented with a 10 Year Length of Service Award by ESA **Craig Paju**, NWS Glasgow, MT. Pat takes care of the electronic rain gauge station north of Dodson, MT. The station was established in 1952 and has had continuous precipitation records for 63 years. Photo by OPL **Matt Moorman**.

From left, **Sean, Cindy, John, Maria** with **Kitty #3** of West Hampstead, NH. John kelley and his family accepted a 10 Year Length of Service Award. Photo and prsentation by OPL **Nikki Becker**, NWS Gray, ME.

Jackie and Robert Massey, Observers at Jarvie Historic Site, UT, were presented a 10 Year Length of Service Award by CPM **Becky Klenk**, NWS Grand Junction, CO.

Jerry Vollmer, left, was presented with a 10 Year Length of Service Award by OPL **Matt Moorman**, NWS Glasgow, MT. The weather station has been at the Hill Top Café in Jordan since 2000 but weather records for the town go back to 1905.

Observer **Tony Pastorello** receives his 10 Year Length of Service Award with his wife, **Linda**. Tony observes at Carlsbad, NM. The award was presented by Meteorologist **Rick Hluchan,** NWS Midland, TX.

The National Cooperative Observer

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Spring 2014

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June, July, August Temperature and Precipitation Outlooks From the Climate Prediction Center