War Cannot Be Stopped Because Of Weather

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This summer marks the 140th anniversary of the Army Signal Corps' establishment of a number of weather monitoring stations mandated by a House of Representatives Resolution made in 1869.

The government's interest in weather would continue to grow, eventually giving way to meteorological training and meteorological research by the Signal Corps predecessors and the formation of the National Weather Service (NWS).

A 1960s technical report by the Signal Corps Laboratory details the importance of meteorological research to the Army. The report asks "why bother with weather research? A war can't be stopped anyway because of rain, snow, or sunshine." The report goes on to explain research at the time to enhance the understanding of weather and its effects on communication, military equipment, and weapons.

According to a news article "Looking Back: Weather before Army Air Corps Weather Service" as compiled by the U.S. Air Force weather service, the Army's interest in the weather actually dates to the early 1800s, when Army surgeons recorded weather observations. After the Civil War, this activity would become a major program for the Signal Corps.

The House of Representatives Resolution, in 1869, charged the Army with the responsibility for tracking weather. This resolution "authorized and required" the Secretary of War "to provide for taking meteorological observations." Weather observations would be taken at military installations located in the interior regions, coastal areas, and around the Great Lakes.

The resolution also required giving notice of weather, using "magnetic telegraph and marine signals" to warn of the approach and the force of storms.

The Signal Corps gained the responsibility in part because of its telegraph service. Albert James Myer, founder of the Signal Corps, gave the program the name "The Division of Telegrams and Reports for the Benefit of Commerce," highlighting the importance of meteorological observations to commerce.

Weather stations

There were 24 weather stations by the fall of 1870 because of the approaching hurricane season. Those stations were mostly located in the eastern United States. Stations gathered observations at least three times daily, and sent them by telegraph to Washington D.C.

By 1872, there were over 65 stations; by 1875, there were over 275. In its annual report, the Signal Corps reported data and weather observations, thus beginning the records of weather maintained by the NWS that we hear of to this day.

In time, the Signal Corps expanded its activities to weather forecasting, storm warning, and other forms of weather prediction. The Corps was reorganized in 1891, resulting in it being the military branch for weather and the formation of the “United States Weather Bureau,” forerunner to the NWS.

The Signal Corps continued to train Signal Corps Officers in weather observation. Interest in meteorology rose dramatically during World War I. Aviation, modern artillery, and the use of chemical weapons such as chlorine and mustard gas transformed the battlefield, and the Army needed trained weather observers to effectively deploy and defend against the new technologies and weapons. The Corps would train about 500 weathermen by the end of the war.

The Signal Corps Meteorological Service, as it was called, relocated to Fort Monmouth in 1919. Its curriculum included training in meteorology for the enlisted radio specialist. Classes began in 1920.

The course provided “Knowledge of elementary mathematics and physics sufficient to enable the student to understand the general principles of meteorology.” It also trained observers to operate field stations, to care for and use instruments, to take and record readings, to make simple computations, and to prepare reports and records.

In 1937, the operation transferred to the Air Corps. The Signal Corps would continue to be responsible for the development, procurement and improvement of meteorological equipment. Weather related courses, such as the “Meteorological Observation School” would also continue to be taught here.

Weather Laboratories

World War I brought aerial warfare and battles over vast areas and the use of chemical weapons. Laboratory research expanded to address this. Research related to weather measurement and forecasting also expanded to address weather effects on Communications and electronic equipment.

In 1929, a meteorological program from Washington D.C., previously operated by the Signal Corps at McCook Field (now Wright Patterson Air Force Base in Dayton, Ohio) was moved to Fort Monmouth.

Early research included a 1929 program for radio-equipped weather balloons. It was the first major application of electronics to the study of weather and to determine upper atmospheric conditions.

With the formation of the Signal Corps Laboratory in the 1930s, meteorology and the weather received continued emphasis during the 1930s and into World War II.

In 1942, the Dugway Field Section (a Fort Monmouth Laboratory) operated at the Dugway Proving Grounds in Utah, carried out “Project 743A,” to determine the effects of weather on droplets of chemical agent released from high altitudes.

By 1948, developments included the first weather radar. That allowed the first time ever observation of a rainstorm, detecting the storm at a distance of 185 miles and tracking it as it passed over Fort Monmouth.

Then in 1950, development was underway for a technique to obtain quicker and more accurate detection of storms and hurricanes, and to establish a nationwide network of weather radars.

To enhance the understanding of weather and the processes causing it, in 1951, light-weight miniature radar beacons and other electronic equipment were launched into the upper atmosphere at White Sands in New Mexico.

That allowed scientists to probe higher into the atmosphere than ever before (an estimated 300,000 feet). The system produced a continuous signal that was tracked as it rose through the atmosphere.

Then in 1952, laboratory scientists would study the physical properties of cumulus clouds. Study results, published in the Journal of Meteorology, helped to provide more information on cloud types, and enhanced the understanding of the impacts of clouds on communications equipment, including radar.

This experimental test model of new Army weather gun literally "shoots the breeze" as it measures low-level wind velocity. A small steel ball is fired upward into the wind at an angle calculated to make the ball fall back upon the protective aluminum shield. The gun's angle of tilt provides an accurate measure of wind velocity.

The Breeze Buster, or Weather Gun, developed in 1957 measured low-altitude wind velocity. The data was needed to determine potential impacts of winds at elevation on missiles being launched.

The Weather Gun projected a steel ball into the air; the angle of impact was used to calculate the wind velocity. The Vanguard Cloud Cover Satellite was launched in 1959, carrying

instruments in part developed by Fort Monmouth scientists. Its infrared scanning devices provided crude mapping of the earth's cloud cover; a tape recorder stored the information.

The first televised weather satellite, TIROS-1, was launched in 1960. Developed under the technical supervision of the labs here, TIROS-1 provided the first televised weather photographs of the earth’s cloud cover and weather patterns.

ECOM

In the 1960s, the Electronics Command (ECOM) was formed from the Signal Corps organizations headquartered here. The ECOM’s responsibilities included Electronic Warfare/Meteorology. The ECOM was assigned a meteorological research and development program to provide the Army with systems, techniques and expertise in the atmospheric sciences to carry on air and land battles.

In the 1960s, the Atmospheric Sciences Laboratory was also headquartered here. In 1969 it was reassigned to the White Sands Missile Range.

TIROS II, launched in 1960, provided new and more comprehensive views of the earth's ever changing weather patterns from some 400 miles up in space, providing ground work research that aided in developing long range weather forecasts.

In 1974 scientists were working with Radar Set AN/TPS-41, which would allow an operator not trained in meteorology to interpret radar signals in terms of weather parameters, and communicate that weather information back. An operator’s manual was also developed.

According to a 1976 report, meteorological satellite and ground-based data from a severe storm were used to study the relationships between satellite data and ground-based data. This study showed how satellite data could be used if surface data did not exist. The conclusion being that reasonable and useful weather information could be “supplied to the battlefield commander by using only synchronous meteorological satellite data and state-of-the-art processing techniques when combined with the expertise of a meteorologist.”

Through the 1970s, the ECOM would undergo a number of reorganizations eventually giving way to CECOM in 1981. Weather-related research continued. For example, the CECOM supported developing and fielding of weather programs to include the management of the Meteorological Measuring Set (MMS) program, and providing technical management and support to a variety of programs.

MMS

Army Magazine, in October 2008, contained an article that discussed the MMS, describing it as an upper air meteorological system, using state-of-the-art technology that made vertical profiles of the Earth’s atmosphere to process weather information to field artillery or to other operations requiring weather information.

The article goes on to discuss the MMS-Profiler (MMS-P), a replacement for MMS. MMS-P used sensors to provide highly accurate weather data over a greater range than the MMS. MMS relied on a balloon borne radiosonde to measure and transmit weather conditions. Those systems are still in use.

Today, the Communications-Electronics Research Development and Engineering Center here is addressing an issue with command and control technologies for unmanned systems and the possible need to understand weather effects related to their navigation.