

Rain Men: Scientists Here Tried to Change the Weather

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Everybody talks about the weather, but nobody does anything about it.

Except here at Fort Monmouth, where researchers changed the course of nature, and of history, in 1947.

This installation was home to Project Cirrus, a five-year foray into the science, and sometimes the art, of weather modification.

The discoveries and experiments in our very own Signal Corps Laboratories as part of Project Cirrus are still relevant, and the technology is still used worldwide.

The project was led by Nobel laureate Dr. Irving Langmuir and his protégé Dr. Vincent Schaefer, both from General Electric (GE).

Langmuir defined serendipity as “the art of profiting from unexpected occurrences.” Their discovery of cloud seeding certainly qualified as one such serendipitous event.

The cloud seeding project originated with experiments in de-icing aircraft that took them to Mount Washington, New Hampshire— home of extremely harsh winter weather.

To recreate these conditions in a lab, Schaefer invented a “cold box” to test his theories. This was a GE home freezer with a black velvet lining and a viewing light.



Employees from Fort Monmouth work on the Project Cirrus equipment.

Breathing into the cold box produced a tiny cloud of supercooled water droplets, just like in the upper parts of a cloud.

Schaefer later discovered that the addition of any substance that was -40 degrees Celsius would cause millions of ice crystals to form in the cloud. They extrapolated that this would work in atmospheric clouds, too.

So the men attempted to ‘seed’ clouds with dry ice by flying over them and releasing the particles.

On Nov 13, 1946, Shaefer dropped 1.4 kg of dry ice pellets from an airplane into a supercooled stratus cloud near Schenectady, New York. And snow fell!

In February 1947, the US Army Signal Corps became involved in these cloud seeding missions, and it earned the name Project Cirrus.

The project was a joint effort of the Army, Navy, Air Force, and GE.

William R. Cotton and Roger A. Pielke wrote about Langmuir's and Schaefer's exploration into cloud seeding with cirrus clouds, supercooled stratus clouds, cumulus clouds, and even hurricanes in their book *Human Impacts on Weather and Climate*.

The supercooled stratus clouds were the most responsive to seeding, and patterns (including L-shapes, race tracks, and Greek gammas) could be seeded into the clouds.

Retired Fort Monmouth physicist Sam Stine worked at the Evans Signal Laboratory designing experiments. He then had the job of getting into the airplanes and actually testing them.

According to Stine, "We flew about 37 experimental flights in the first year and a half. Flying into thunderstorms, line squalls, the tops of tornadoes, you have it."

Because of the inherent variability in weather patterns, attempts to modify weather did not always yield perfect or consistent results; there was also the problem of reliably attributing results to specific scientific actions.

Dr. Harold Zahl recalled in his book, *Electrons Away, or Tales of a Government Scientist*, "There were conditions when rain or snow could be precipitated, but the moisture had to be there in the first place. Nature had to be a cooperating partner and, when needed most, it seemed that she was not always ready to help."

Cloud seeding did not always produce the expected results.

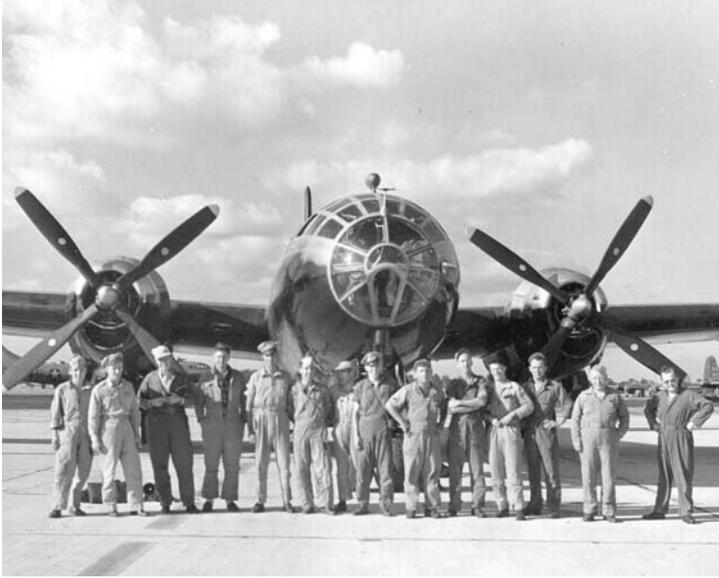
The first attempt at modifying a tropical cyclone or hurricane occurred in 1947. It was October and a hurricane was head eastward off the coast of Florida and into the Atlantic.

After 80 lbs of dry ice were dispersed into the hurricane, it briefly paused, and then headed for the shore. Winds of 85 mph were clocked in Savannah, GA, a resident there was killed, coastal areas flooded, and the damage totaled over \$20 million.



Project Cirrus plane in flight.

Jay Barnes and Steve Lyons reported in *Florida's Hurricane History*, that many believed that the seeding was responsible for the turn, including Langmuir. Hurricanes had however behaved like this in the past without seeding – only 40 years prior a hurricane did the same thing and headed due west into the coast.



Project Cirrus was a joint effort of the Army, Navy, Air Force, and General Electric. This photo was taken before one of the many flights in 1948.

Zahl reported that “we concluded it was ‘an act of God.’ If it could happen once, it could happen twice.”

Either way, GE’s lawyers told Langmuir not to discuss the hurricane until the statute of limitations had run out for prosecution.

The technology involved in Cirrus was put to good use also in October 1947, when clouds were seeded above a Maine forest fire to help extinguish the blaze.

Despite the often mixed results of Project Cirrus, Langmuir was a noted workaholic. *The New York Times* reported that upon his

retirement from GE in 1950, he did not even take a vacation, but went straight to devoting more time to Cirrus.

Langmuir told reporters for a March 2, 1950 *New York Times* article that “within the past year, Project Cirrus has grown very greatly in importance, and now I believe that the best service that I can render to the national welfare is to increase my activities in this field.”

He also expected the same rigorous work ethic from his lab personnel. On Thanksgiving 1951, he complained that his employees wanted days off for the holiday!

Cloud seeding and weather modification in general declined over the years, due to a number of reasons.

Weather modification was largely oversold to the public and legislative members; an abnormal wet period in the United States reduced demand; and changes in government and public attitudes towards other weather and climate concerns all contributed to less seeding projects over the years.

Despite this controversy, it has not stopped people continuing to try to control the weather.

The 2008 Olympic Games held in Beijing were scheduled during northern China's rainy season.

In order to prevent rain from ruining the opening ceremonies in the open-air birds nest stadium, the Chinese government seeded clouds with silver iodide to make it rain elsewhere. And there was no rain in Beijing for the opening events.

The Signal Corps Laboratories at Fort Monmouth were at the forefront of scientific exploration. What rain dances had been attempting to do for centuries, Fort Monmouth accomplished.



Dr. Vincent Schaefer prepares for a Project Cirrus flight in 1948.