Growing rain clouds

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BISMARCK, N.D. Seeding clouds to encourage rainfall has been in practice since the 1950s, and through many years of skeptics' criticisms, continues to provide added precipitation across North Dakota crops, more snow for Colorado skiers and more electricity for Southern California residents.

Darin Langerud is one of its proponents. As director of the North Dakota Atmospheric Resource Board of Bismarck, N.D., he heads up an operational program that seeds clouds for hail reduction and rain enhancement in all or parts of six counties in western North Dakota. The North Dakota Cloud Modification Project provides cloud seeding services in Bowman, McKenzie, Mountrail, Ward, Williams and Slope counties.

"The earliest cloud seeding work in North Dakota dates back to 1951," he says. "The initial discovery on how silver iodide or dry ice affected the clouds was actually made in 1956 at the General Electric laboratory in Schenectady, N.Y. From that came a pretty large research project Project Cirrus. It was to try to improve and increase rainfall in agriculture."

Since that time, cloud seeding has been successful in many areas of the country. It also now is used to reduce in crop damage from hail.

The University of North Dakota in Grand Forks has been one of the leaders in research at its Atmospheric Science Department, and the school's aerospace program offers weather modification pilot training to those seeking certification as cloud seeding pilots.

"This is an intern training program for pilots on how to work around thunderstorms," he says. "A lot of them end up as pilots in command of airplanes."

How it works

Cloud seeders have to have a rain cloud to start with. While they do not make a habit out of flying into mature thunderheads, they do seek out nearby clouds that show at least the promise of rainfall.

"The mature part of the storm has already been decided," he says. "Whatever's going to happen is already happening there. What we try to do is work on the growing side of the storms, on the smaller clouds that are growing. Some of

them are going to become rain storms somewhere in the future, so if we can work on those, we can encourage them to produce rain earlier.

"We have a combustible chamber called a Lohse generator on each wingtip that each hold about eight gallons of silver iodide solution," he says. "Once you get the plane in the right place under the cloud, it starts up and from that combustion comes microscopic particles that go up into the cloud and attract water and create ice."

The particles that the airplanes put out are called ice nuclei. They are microscopic in size.

"We do have to have a cloud, a cumulus of some kind," Langerud says. "We actually seek out clouds that are already producing precipitation, attached to a larger thunderstorm."

Each seeding mission can be as short as a half-hour or much longer, while pilots attempt to chase down the right clouds and get into position to fire their seeding equipment.

"We fly straight and level underneath the cloud to test the updraft," Langerud says. "We can tell that by the vertical velocity indicator."

When the cloud starts to suck them up into it, they know they have the updraft needed to send up their silver iodide.

"It's interesting flying, no question about that," he says.

They also fly into storms at night.

"It is more difficult because you're not able to see what you're doing. It's a little bit more by feel."

Some of their planes do have on-board radar, and they remain in constant contact with the meteorologist at his radar screen, but it takes more than that.

"They can usually get them close to where they need to be, but once they get to the clouds themselves, the pilots have to do all the work to find the right area to be in. Lightening at night helps because while it flashes, they can see the structure of the clouds. A full moon is also extremely helpful."

Once in place directly beneath the right type of cloud, they release the silver iodide.

"These nuclei are much more efficient at producing ice at warmer temperatures. As the temperature cools as it goes higher in the atmosphere, we're able to have an effect on the rainfall production. We can make use of a cloud to start producing rain much earlier than it would otherwise."

Fighting hail The NDCMP has been able to account for a 45 percent reduction in crop damage in the counties they serve.

The physical process is the same in making rain, he says. The seeders try to catch a cloud in the growth stage and "make an impression on these young clouds while they're still impressionable."

"We're not able to eliminate hail completely, but what it does is make crop insurance premiums more affordable," he says. "Their services are available in the western third of North Dakota.

"It's up to the counties whether they want to participate or not. They fund about two thirds of the operational costs of the project. Some of these counties have been doing this for more than 40 years. We cover about 10,000 square miles."

Their eight airplanes put in just under 600 combined hours this year.

Making power and powder "Many of the Western states have programs to increase snowfall in the Sierras," Langerud says. "PG&E (Pacific Gas and Electric) and Southern California Edison have the longest-running program in the U.S., started in the 1950s."

The increased snowfall creates greater runoff in the spring, which fills reservoirs and allows more draw-off of hydroelectric power. That translates into a 5 percent to 15 percent increase in usable water power, he says.

"And Vail (Colo.) Beaver Creek ski resort has been doing cloud seeding for 29 years. These are private companies that would not be doing it if it wasn't economically working. They're seeing enough evidence of increased snowfall."