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**NEWS
RELEASE**

NCAR Research Program Tests New Rainfall Enhancement Technique in Drought-Ridden Mexico

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BOULDER--Beginning this June, scientists from the National Center for Atmospheric Research (NCAR) in Boulder, Colorado, are engaged in new research that will bring more credibility to the science of weather modification and possibly some rain to the drought-ridden Mexican state of Coahuila. Working with scientists from several Mexican universities, the NCAR researchers are beginning the first field trials in North America of new techniques for seeding clouds to enhance rainfall. The Mexican government, along with agricultural and industrial interests, is sponsoring the research, with field trials planned for June to October over the next four years in Coahuila. The program will also transfer cloud-seeding technology to Mexico and train Mexican scientists in its use and evaluation.

The technique tested in Mexico this summer uses pyrotechnic flares mounted on aircraft to seed the clouds. While the aircraft flies at the base of the cloud, moisture-retaining particles produced by the burning flares rise into the cloud. As the cloud's water vapor is attracted to the particles, droplets are formed, which then fall out as rain. The wide range of droplet sizes produced by the particles encourages and accelerates the precipitation process.

This method of cloud seeding was first tried in 1990 in South Africa. There it appeared to increase rainfall by 30 to 60% over what would have occurred without the seeding. These results were confirmed in Arizona last year in a secondary program led by NCAR's Roelof Bruintjes.

The NCAR researchers are collaborating with scientists from the Universidad Autonoma de Coahuila, the Department of Meteorology at the Universidad Autonoma Antonio Narro in Saltillo, Centro Ciencias de la Atmosfera at the Universidad Nacional Autonoma de Mexico, and the Instituto Mexicano de Tecnologia del Agua. Altos Hornos de Mexico, a large steel plant in the region, is leading the private-sector interests. Weather Modification, Incorporated, in North Dakota is providing logistical support, including the research aircraft, pilots, a ground-based weather radar, and computer displays.

Cloud seeding has been practiced in various places in the world since 1946, but most experiments have

produced inconclusive results. The initial optimism that soared in the 1950s and 1960s has given way to a much more cautious approach over the last 20 years. Although there have been many rainfall-enhancement programs around the world during the last two decades, most have lacked a solid scientific basis and have had no means to validate the results of the seeding. Because of the natural day-to-day variability of clouds across geographical regions, it has been difficult for scientists to isolate the effects of seeding.

Brant Foote, director of NCAR's Research Applications Program, is coordinating the overall research program that will test and validate the new hygroscopic seeding method. He cautions that it is too early to tell whether the seeding technique will be broadly applicable to Mexico or any other rain-deficient area.

"The results in South Africa and Arizona are striking," says Foote, "but there is no guarantee of success elsewhere. These efforts are clearly still in the research phase. We anticipate that the disciplined research program in Mexico will help us better understand the physical processes that could lead to increased rainfall and clarify whether this technique works as well as we think."

The research program will include the following scientific components:

- a scientific statistical evaluation of the seeded and nonseeded clouds in the area
- studies of the cloud responses using high-resolution numerical models
- analysis of data collected by the research aircraft and ground-based radar
- a training and technology-transfer program with the scientific collaborators in Mexico
- strong collaboration with scientists in Mexico in the areas of cloud physics, data analysis, and numerical modeling.

Training and technology transfer are important goals of the project. During the first month, NCAR and Coahuila personnel are jointly developing a training plan to effectively transfer cloud-seeding technology to Mexico. Mexican university and state personnel will be integrated into all aspects of the program, including cloud physics studies, radar data analyses, and numerical modeling. NCAR will also train State of Coahuila personnel in the use and evaluation of cloud-seeding methods using hygroscopic flares and other materials. Key aspects of the training and technology transfer are

- lectures by NCAR scientists on basic cloud physics and dynamics, history of cloud seeding, cloud-seeding techniques, and statistical analysis procedures
- pairing of NCAR scientists with Mexican scientists for the entire four-year period to facilitate mentoring
- recommendations for Mexican scientists to attend U.S. universities specializing in cloud seeding and weather modification studies (bachelor's or master's degree programs)
- training of Mexican personnel to launch soundings, operate radar, conduct seeding flights, and coordinate seeding operations.

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