



# THE ATMOSPHERIC RESERVOIR

*Examining the Atmosphere and Atmospheric Resource Management*

## Research To Shed More Light on Rainfall

By Darin Langerud

During the summer of 2006, the North Dakota Atmospheric Resource Board, in collaboration with the University of North Dakota, Weather Modification, Inc., and Ice Crystal Engineering, conducted a small-scale research experiment over parts of eastern North Dakota. The Polarimetric Cloud Analysis and Seeding Test (POLCAST) was intended to study the effects of hygroscopic seeding of cumulus clouds using UND's sophisticated weather radar, dubbed NorthPol, in Grand Forks. The flares, when burned, produce billions of tiny salt particles that serve as the "seeds" for raindrop formation in water laden clouds.

Results from POLCAST showed positive trends in cloud water development, rainfall rates and rainfall duration from seeded clouds when compared to unseeded clouds. Because of the limited number of cases, however, these results are considered preliminary.

Due to the positive indications of the initial experiment, NDARB will coordinate follow-up research this summer. POLCAST2 will take place from June 9 – July 11, and in addition to the radar measurements, will include atmospheric data from an instrumented airplane. The plane will measure atmospheric aerosols (tiny particles on which water droplets form), and characterize the various sizes and concentra-

tions of water droplets in cumulus clouds. This, in addition to atmospheric temperature and humidity data, will help our research partners from UND and the National Center

for comparative analysis. Although limiting the number of seeded cases, the design provides the best chance to gain meaningful results. The pilot will select the clouds based on strict criteria established prior to the program's start, which will include cloud base temperature, width, height, and updraft velocity. After selection, the seeding decision will be made by opening a sealed envelope with instructions to either "seed," or "don't seed." After following those instructions, the selected cloud will be measured by the aircraft and radar in the same fashion, so as to remove any possible bias in the study.

The ultimate goal of POLCAST2 is to determine whether hygroscopic seeding could be successfully employed in North Dakota clouds. It has already shown great promise for increasing rainfall from experiments conducted in South Africa, Thailand and Mexico. If results of the experiment are positive, hygroscopic seeding may be incorporated into the ND Cloud Modification Project operations conducted each summer over parts of western North Dakota.

Atmospheric Resource Board  
North Dakota State Water Commission  
900 East Boulevard, Bismarck, ND 58505  
(701) 328-2788  
<http://swc.nd.gov>  
ND Weather Modification Association  
PO Box 2599, Bismarck, ND 58502  
(701) 223-4232

for Atmospheric Research (NCAR) better understand the precipitation processes of North Dakota cumulus clouds and the potential impact of seeding on rainfall development.

The operational design of POLCAST2 will be randomized, meaning that clouds will be randomly selected to be either seeded with hygroscopic flares, or left unseeded



Temperature Sensor (top) and Liquid Water Probe.



Forward Scattering Spectrometer Probe (FSSP) measures cloud droplets.

PHOTOS COURTESY OF WEATHER MODIFICATION, INC.