THE
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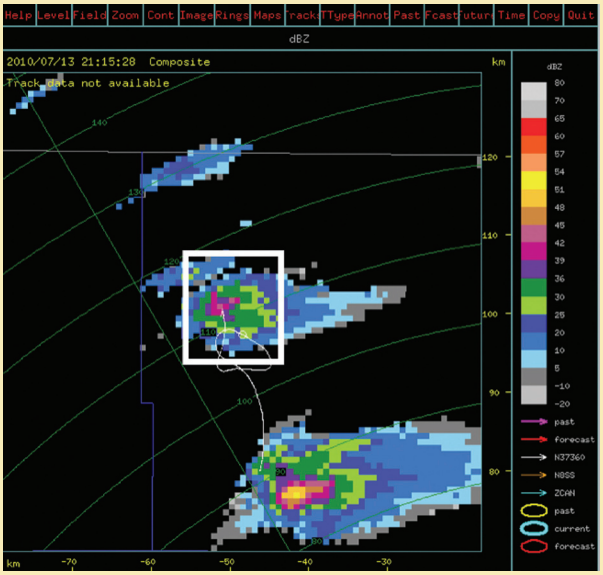
Examining the Atmosphere and Atmospheric Resource Management

"POLCAST research project set for another season"

By Darin Langerud

Scientists will be in the field again this summer studying the effects of hygroscopic cloud seeding on precipitation development. Sponsored by the North Dakota Atmospheric Resource Board (NDARB), the Polarimetric Cloud Analysis and Seeding Test (POLCAST) is a collaborative effort involving the University of North Dakota's Atmospheric Science Department (UND), the National Center for Atmospheric Research (NCAR), Weather Modification, Inc. (WMI), and Ice Crystal Engineering (ICE). The study area will cover a semi-circle 100 kilometers (62 miles) from Grand Forks on the west side of the Red River. POLCAST field operations will run from June 27 through August 3, 2012.



Radar image of a seeded case from the 2010 POLCAST field season. Courtesy, NCAR.

The operational design of POLCAST will be randomized, meaning that clouds will be randomly selected to be either seeded with hygroscopic flares, or left unseeded for comparative analysis. While randomization limits the number of seeded cases, it provides the best opportunity to find meaningful results. Candidate clouds will be selected using strict criteria that will include cloud base temperature, width, height, and updraft velocity. Once a cloud meets the criteria, the seeding decision will be made by opening a sealed envelope with instructions to either "seed" or "don't seed". After being selected, whether it's seeded or not, the cloud will be measured by the on-board aircraft instruments and UND's ground-based radar. Relatively small clouds will be chosen for study, so no noticeable change in rainfall over the project area is expected.

Seeding will be done with hygroscopic flares that produce billions of tiny salt particles on which cloud droplets, and eventually, raindrops form. In contrast to seeding with silver iodide particles, hygroscopic seeding does not require freezing temperatures, instead acting on the water condensation process lower in the cloud.

The primary analysis tool for POLCAST will be UND's sophisticated, dual polarimetric radar, dubbed NorthPol. NorthPol provides additional information on precipitation development versus conventional radars as it is able to "see" what types of precipitation particles reside in different parts of the clouds. Thus, one of the main analysis methods is to compare the rate of change of precipitation formation in the lower portion of the clouds to see if seeded clouds develop precipitation more quickly than their unseeded counterparts.

To complement and better characterize atmospheric aerosols, additional measurements will be taken at ground level on UND's campus and compared with those taken by the aircraft. In addition to the principal scientists, several UND students will be involved in POLCAST encompassing all aspects of the research, including aircraft and ground-based aerosol measurements, radar, and numerical weather modeling.

If hygroscopic seeding is shown to be effective, this method may eventually be incorporated into the North Dakota Cloud Modification Project (NDCMP), an operational rain enhancement and hail suppression cloud seeding program in 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