NEW SCIENCE FOR THE WSR-88D: STATUS OF THE DUAL POLARIZATION UPGRADE

Darcy Saxion, Rich Ice
Radar Operations Center, Air Force Weather Agency

Status: Deployment Underway
Validation Process
The NEXRAD tri-agencies (DOC, DOD, DOT) determined that adding dual polarization to the WSR-88D will provide increased information that will enhance the decision making of the users who rely on the national network of weather radars. The mission of the Radar Operations Center (ROC) is to manage the life-cycle support of this network. Therefore, the ROC ensured the upgrade was validated and determined it was ready for deployment through a subcommittee of their Data Quality Team. The success of this committee was due to the collaboration between all of its members. Five key tasks spanned a two-year effort are mentioned here: 1) Dual Polarization Upgrade, 2) Engineering Evaluation, 3) Meteorological Evaluation, 4) Operational Assessment, and 5) Zdr Calibration Validation.

Meteorological Evaluation
The WDTB, with the help of ROC Applications Branch, summarized and presented evaluations of nearly all weather events that passed through the dual polarization prototype’s umbrella. Evaluations expanded to include Beta Sites as they came online. Below are two examples:

Zdr Calibration Validation
The contractor provided a performance analysis of the engineering method for Zdr calibration. The ROC subcommittee worked to develop an independent means for validating Zdr accuracy requirements with critical contributions from the National Severe Storms Laboratory (NSSL) and an independent consultant. As data became available through the Winter, Spring, and Summer of 2010, the subcommittee adjusted their evaluation methods. Scatterplots of Reflectivity versus Differential Reflectivity for stratiform rain proved to be the method with the least variance. However, observed variance in this method slightly exceeds accuracy required. Meanwhile, the cross-polarization power technique is being adapted to the WSR-88D dual polarization design.

Operational Assessment
RCC Applications Branch and the Warning Decision Training Branch (WDTB) collaborated to organize and execute two subject matter expert reviews and an operational assessment of the dual polarization upgrade. The subject matter expert panels reviewed the impact of possible loss of sensitivity due to the dual polarization upgrade and determined that a loss up to 4 dB was not operationally significant. The operational assessment provided valuable feedback as a training, technology exposure and transition exercise. Forecasters who participated in the operational assessment felt that the additional dual polarization variables enhanced warnings and forecasts, especially in forecasting winter weather.

Dual Polarization Upgrade
L-3 STRATIS and Baron Services, Inc. were selected to design and implement the upgrade. They collaborated with the NSSL and the ROC on design recommendations and validation efforts. They added two antenna elevation arm mounted units, the RF Pallet and the Antenna Mounted Electronics (AME).