



## Dual Polarization is Coming to NEXRAD!

Beginning in 2011, all WSR-88Ds will undergo a modification to implement dual polarization capability. This new technology allows the WSR-88D to simultaneously transmit and receive in the horizontal and vertical planes, providing an additional dimension of weather features and giving the weather forecaster additional and improved tools to serve the public.

Dual Polarization technology has been the subject of research since the 1970's. However, it was not until the Joint Polarization Experiment (JPOLE) was conducted by the National Severe Storms Laboratory (NSSL) in 2002-2003 the technology was demonstrated to provide significant benefits to the forecaster. The operational benefits include improved rainfall estimation, discrimination of precipitation types, discrimination between hydrometeors and non-hydrometeors, and improvement in data quality.

Based on the results of JPOLE, the National Weather Service Office of Science and Technology entered into a contract with L3 Communications/Baron Services in September 2007 to develop and deploy this new

functionality. The contractor had the requirement to implement dual polarization on the existing WSR-88D antenna and integrate new functionality into the Radar Data Acquisition subsystem. The Government retained responsibility to ingest new dual polarization data at the Radar Product Generator and make available base and derived dual polarization products to the forecaster/users.

Throughout the program there have been two main technical areas of focus:

*Sensitivity* – Because dual polarization requires splitting of the transmitted signal into horizontal and vertical components we expected slight reduction in radar sensitivity. Prior to contract award, NSSL studied the subject in a WFO setting and concluded the effect should not be operationally significant. In March of this year, we utilized data from the Dual Polarization prototype in a Subject Matter Expert review and reached the same conclusion. The Operational Assessment conducted in August with 20 field forecasters was consistent with these earlier findings.

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## Dual Polarization

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*Calibration* – It is critical that any bias between the horizontal and vertical channels be accurately determined. The contractor has implemented an automated calibration process to periodically check this differential reflectivity (Zdr) bias. The contractor and consulting government subject matter experts have also spent a great deal of time refining the calibration process which must be conducted by the on-site technician (e.g., when certain parts are replaced).

Maintenance and operations training are a big part of the Dual Polarization program. The contractor conducted a ‘Train-the-Trainer’ session with the NWS Training Center in support of dual polarization maintenance training curriculum development. The intent is to follow the Open RDA training model, with the NEXRAD Product Improvement program paying travel costs for two technicians at each site, and at least one technician trained prior to their site being modified. The deployment schedule will drive the training schedule, timing the training of the technicians in a time period not so early the training cannot be retained, and not so late there is inadequate time to assimilate the training.

Operations training takes on new criticality, given the addition of even more data available to the forecaster and the complexity of the dual polarized data itself. During the last two years, Warning Decision Training Branch staff have been developing distance-learning courses for forecasters, as well as outreach material for public and private users of radar data (e.g., emergency managers). These materials are available at <http://www.wdtb.noaa.gov/>.

Current plans call for beta test to start in Wichita, KS in January 2011, with production deploy-

ment to follow beta test completion. The installation requires the site be off-line for up to 12 days, requiring careful planning to ensure contiguous sites are available to provide coverage and to avoid typical periods of adverse weather in the region. Production installation will begin slowly with initially only two teams in the field. We intend to ramp to five teams as deployment progresses. Deployment is scheduled to be completed in January 2013.

We look forward to bringing this important new technology to the WSR-88D for the benefits it will bring to the public. Please do not hesitate to contact our office with questions. Additional information on the project is available at the “Dual Polarization” section of the ROC web site: <http://www.roc.noaa.gov/WSR88D/>.

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