

Phased-Array Radar Evaluations

Researchers at the National Severe Storms Laboratory (NSSL) have been evaluating the capabilities of Phased-Array Radar (PAR) to provide more timely and accurate critical information on developing hazardous weather than can be obtained from conventional weather radars. During the summer of 2006, data were collected by PAR, the WSR-88D, and the Terminal Doppler Weather Radar (TDWR) on several storms in central Oklahoma.

NSSL researchers compared the data and confirmed the PAR-detected rotation, hail, microbursts, and gust fronts well ahead of the other radars primarily, because PAR has the capability for rapid volume scans. Earlier detection of hazardous severe weather using PAR has strong potential to aid forecasters in the warning decision process, helping to protect the aviation community and the public.

Phased-Array Radars transmit multiple beams from a stationary antenna and the beams can be steered electronically so forecasters can target areas of interest. PAR can execute a complete volume scan in less than 30 seconds. By comparison, the surveillance capabilities of the WSR-88D are limited by the maximum mechanical rotation speed of the pedestal and the inclination of the antenna. Rapid and significant storm development can occur while the WSR-88D radar is completing its conventional volume scan that takes about 4.1 minutes. A comparison between the PAR and TDWR in capturing a microburst event can be viewed at <http://nwas.org/committees/rs/rs.html>.

Real-time data from the NOAA National Weather Radar Testbed phased-array radar was introduced to National Weather Service operational forecasters for the first time during the spring 2007 National Weather Radar Testbed Demonstration, which was conducted at the NOAA Hazardous Weather Testbed in Norman, Oklahoma. During the experiments, forecasters performed their usual warning decision-making duties while the research team collected data from the PAR. Capitalizing on the PAR's adaptive scanning capability, the teams targeted rapidly evolving severe weather phenomena including hail, straight-line winds, microbursts, and tornadoes, and examined and interpreted the data using NSSL's Warning Decision Support System – Integrated Information (WDSSII) display. If conditions warranted, a simulated warning decision was issued. Following each demonstration period, operational benefits and challenges of using rapid update data from the PAR were evaluated by the team.

More detailed information about PAR and comparisons among PAR, WSR-88D, and TDWR observations of severe storms can be found at the NSSL Web site <http://www.nssl.noaa.gov/projects/pardemo/>.

- Jian Zhang, NWA Remote Sensing Committee

MPAR vs. TDWR Scan Rate: Microburst Event

MPAR captures 29 clear images and more data during the time it takes TDWR for 6, the result is better forecasts and earlier warnings

