

# THE ATMOSPHERIC RESERVOIR

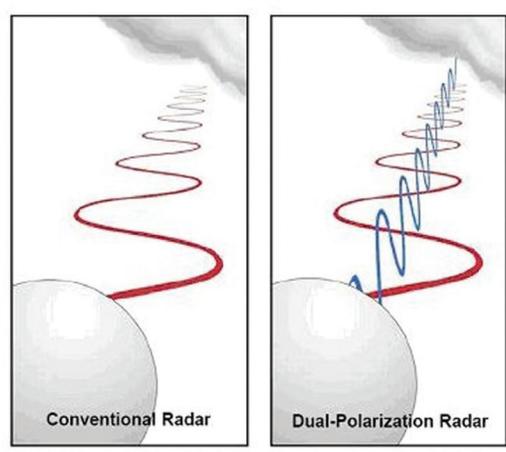
*Examining the Atmosphere and Atmospheric Resource Management*

## "New Radar Tools"

By Mark D. Schneider

During the past year and a half the National Weather Service (NWS) has been very busy upgrading its network of 160 WSR-88D weather radars with new technology called dual polarization. Dual polarization allows the radars the ability to send and receive vertical pulses of electromagnetic energy, in addition to their conventional horizontal pulses, to more clearly examine precipitation. This can be visualized by an illustration of a one-dimensional horizontal beam (conventional radar image) compared to the two-dimensional combined vertical and horizontal beams (dual-polarization radar image). Regional radars that have already received this upgrade include Aberdeen and Rapid City, SD, Billings and Glasgow, MT, Bismarck, Mayville, and Minot AFB.

The benefits of the dual polarization upgrade are substantial. For warm season convective clouds such as thunderstorms there are now radar parameters that enable NWS forecasters to differentiate between heavy rain and hail. The size and shape of large raindrops vs. hailstones is observed by the added vertical component of the radar beam. Concerning severe weather warnings issued by the Bismarck NWS during the latter half of this summer, John Paul Martin, NWS Warning Coordination Meteorologist (WCM) commented that: "There were cases this summer where



Source: NOAA National Weather Service

the use of dual-pol data assisted forecasters in deciding not to issue warnings. That proved to be the correct decision as the storms, in the end, were not severe. In other words, the public was saved from a false alarm. Without the dual-pol data, warnings would have been issued on storms that were not really severe. We avoided alarming folks unnecessarily."

Cold season benefits of the new dual polarization technology include more accurate identification and forecasting of mixed or frozen precipitation. Oftentimes there is a narrow window of opportunity to observe the transition between water droplets and frozen particles before hazardous weather conditions such as freezing rain or drizzle occur. Greg Gust, WCM for the NWS Grand Forks commented that, "We look forward to the advantage dual-pol radar should give us in dealing with our coming autumnal and wintertime mixed precipitation scenarios."

In addition to enhanced precipitation identification benefits, dual-pol radars help NWS forecasters more easily identify non-precipitation targets such as birds, insects, smoke, dust, radio and TV antennas and wind farms. Because of their distinct size and shape signatures, these biological and man-made targets are more recognizable given the two-dimensional view of the radars. Non-precipitation targets can then be filtered out of the radar image, allowing for a clearer view of the actual weather occurring. This information is helpful to emergency managers, foresters, wildlife officials, the aviation and transportation industries, and many other users and agencies.

By mid-2013 the dual polarization upgrades are scheduled to be completed on all 160 NWS radar sites. This will surely support the mission statement of the NWS to provide weather forecasts and warnings for the protection of life and property. Researchers at the National Severe Storms Laboratory in Norman, OK have been developing dual polarization technology for nearly 30 years and with the latest radar upgrades we're beginning to see its remarkable benefits.

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