

The July 8, 2014 Significant Severe Weather Event in Central New York and Northeast Pennsylvania Part 2: Examination of Legacy and Dual Polarization Radar Data

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ABSTRACT

Information on near-storm environmental characteristics is critical for determining the severe and tornadic potential of convective storms. However, highly accurate and precise observations are often lacking operationally, with forecasters typically forced to rely on lower-resolution datasets to infer storm-scale environmental characteristics, such as low-level shear, LCL height, etc. Results from several recent studies, utilizing newly-available datasets associated with the WSR-88D dual polarization upgrade, have indicated that information on hydrometeor characteristics might be useful for higher-resolution diagnoses of the storm-scale environment in and near convective storms. In this study, that idea is tested by examining dual polarization data for three convective storms that occurred across central New York and northeast Pennsylvania on July 8, 2014.

Two supercells tracked across central New York and northeast Pennsylvania during the late afternoon on the 8th, while a meso-analysis from NOAA's Storm Prediction Center indicated a favorable environment for tornadoes across the entire area. Reflectivity and velocity data from the KBGM WSR-88D indicated similar tornadic potential for both storms, with pronounced hook echo regions and strong inbound/outbound velocity couplets. Despite these similarities, one supercell in northeast Pennsylvania produced an EF2 tornado, while the other supercell in central New York produced no tornadoes. An evaluation of the tornadic storm using dual polarization data indicated features that have been identified in previous studies of tornadic storms, specifically a well-defined arc of high differential reflectivity (Z_{dr}) northeast of the tornado, and low values of Z_{dr} in the hook echo. By contrast, data associated with the non-tornadic storm indicated a disorganized pattern of Z_{dr} over the storm, with higher values of Z_{dr} in the hook echo region.

The most impactful tornado in central New York on this day occurred in a bookend vortex, associated with a quasi-linear convective system. This EF2 storm resulted in five fatalities in central Madison County, approximately 30 km southeast of Syracuse. Examination of legacy data from the WSR-88D indicated that strong rotation within this storm developed very suddenly. An evaluation of dual polarization data did not indicate the presence of a well-defined Z_{dr} arc. A tornadic debris signature was shown to develop after tornado touchdown.