

Polarimetric Doppler Radar Observations of Low-Reflectivity Ribbons in Supercells

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Polarimetric weather radars provide significantly more information than single-polarization radars, allowing one to infer microphysical characteristics of scatterers within a radar resolution volume. For nearly 10 years, faculty and graduate students at the University of Oklahoma and University of Massachusetts - Amherst have used an X-band, polarimetric mobile Doppler radar to collect high-resolution data within severe thunderstorms in the central United States. The data that have been collected in supercells often contain previously-observed polarimetric signatures, including the ZDR arc, KDP tower, and rho_{hv} ring. The high-resolution nature of the data, possibly as well as the X-band nature of the radar, have allowed for the observation of another signature – the low-reflectivity ribbon. This signature, evident at various times in at least several supercells scanned by the radar, is generally characterized by a narrow (often <750 m in width), “slithering” zone of locally-reduced ZH and ZDR located to the rear of the forward-flank downdraft near the location of the hook echo or appendage. The small spatial scale of the feature and the observed reductions in ZH and ZDR suggest the presence of a significant microphysical heterogeneity. It seems feasible to suggest that the abruptly-different microphysics hold clues into the dynamics of the observed supercells, although conclusions pertinent to such are premature at the time.