European Conference on Severe Storms 2015
14–18 September 2015, Wiener Neustadt, Austria
ECSS2015-122

Integrated Polarimetric Radar and Kinematic Analyses of the 19 May 2013 Norman-Shawnee, Oklahoma Tornadic Supercell

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High-resolution supercell intercomparisons between polarimetric radar observations and the 3D wind field via dual-Doppler analysis retrievals are generally difficult to construct and rarely performed. To synthesize dual-Doppler analyses using a grid spacing that allows for storm-scale features to be resolved typically requires at least one system to be a mobile radar because of the relatively large distances between fixed site radars. However, polarimetric radar data from mobile radars are often inferior to that from the WSR-88D network owing to data quality problems such as attenuation and the lack of volumetric data from storm mid and upper levels. Therefore, polarimetric radar data comparisons with kinematic fields in supercells optimally use data from both fixed site and mobile radar systems utilizing different center frequencies.

On 19 May 2013, a supercell that produced a violent (EF4) tornado near Shawnee, Oklahoma was observed, including during tornadogenesis, by five different Doppler radars: two dual-polarization, S-band, fixed site radars (KTLX and KOUN), one S-band, fixed site, phased array radar (MPAR), one C-band, fixed site radar (TOKC), and one dual-polarization, X-band, mobile radar (NOXP). Data from the array of radar systems can be used to compare polarimetric data at two different radar frequencies (X and S band) with kinematic analyses determined using data from as many as five radars. Possible topics discussed include (i) direct comparisons between observed polarimetric radar signatures and the 3D wind field, (ii) the cause for spatial and temporal differences in the distribution of estimated raindrop sizes in the rear flank of the storm, and (iii) the tornadogenesis process.