LOW-LEVEL TORNADIC WIND STRUCTURE: MOBILE RADAR AND IN SITU OBSERVATIONS

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One of the biggest challenges facing tornado research is characterizing the wind structure very near the surface. Near-surface winds impact and harm people and structures, yet little is known about the intensity, and spatial/temporal structure of tornadic winds in this very important region, in particular the dependence of wind velocity on height above ground. During recent decades, there have been various approaches to quantifying near-surface winds including photogrammetry, laboratory and computer modeling, damage assessment, in situ observations, and fine-scale resolution radar observations. Tornadoes are relatively rare phenomena and, while there is a theoretical understanding of vortex structure, how this is manifested in the atmosphere adjacent to the complex ground boundary remains an active field of research. With the advent of mobile research radars, observations of Doppler wind speeds and tornado structures have become, while uncommon, occasionally available. However, the interpretation of radar measurements in tornadoes are complicated by the effects of debris centrifuging and the unknown dependency of wind speed with height since most, even very proximate, radar observations are necessarily above building height. Attempts to couple proximate mobile radar observations with very near-ground in-situ data in order to bridge the gap between the surface and radar observation height will be presented. Preliminary results suggest that the most intense winds may be occurring very close the surface, but there is variability among different diagnosed tornado structures.