AN EXAMINATION OF THE BEHAVIOR OF SUBVORTICES IN THE 31 MAY 2013 EL RENO, OKLAHOMA, TORNADO AS OBSERVED BY A RAPID-SCAN, POLARIMETRIC, MOBILE RADAR

Jeffrey C. Snyder[1], Kyle J. Thiem[2], Howard B. Bluestein[3], Jana B. Houser[4]

[1] NOAA/OAR National Severe Storms Laboratory, Norman, OK

[2] National Weather Service, Peachtree City, GA

[3] School of Meteorology, University of Oklahoma, Norman, OK

[4] Department of Geography, Ohio University, Athens, OH

An extremely large and intense tornado occurred on the afternoon and evening of 31 May 2013 near the town of El Reno in central Oklahoma. The parent supercell was observed by RaXPol, a rapid-scan, polarimetric, mobile Doppler radar; 360-degree scans were collected every 2 s during tornadogenesis through the first ~10 min of the tornado's life. After a brief break in data collection during radar repositioning that lasted several minutes, RaXPol observed the very rapid evolution of two dozen subvortices, some of which lasted more than 1 min., and some of which lasted only a few seconds, that comprised the multivortex tornado. Many of the "long-lived" (i.e., those that could be tracked for at least 15 s) subvortices developed within the radius of maximum winds (RMW) in the left-rear quadrant (relative to the forward motion vector of the parent tornado) and rotated cyclonically around the center of circulation, dissipating in the right-front or left-front quadrants and at a range closer to the center of the tornado relative to range in which they developed. The translation of the subvortices was approximately in line with the asymmetric background flow field that was apparently modulated by a very strong rear-flank downdraft. Peak radial velocities of at least 135 m s^{-1} were measured within one of the subvortices as it was traversing an open field to the southwest of the radar. In addition to presenting some of the analyses of this particular tornado, we will provide a few comments on the use of weather radar to estimate wind speeds in tornadoes more generally.