EMS Annual Meeting Abstracts
Vol. 15, EMS2018-38, 2018


# The Visual Characteristics of the Tornado Funnel Cloud with the Evolving Debris Cloud using Polarimetirc Radar Measurements and High Resolution Photographs

Roger Wakimoto
UCLA, Department of Atmospheric & Oceanic Sciences, United States (wakimotoroger@gmail.com)

Polarimetric measurements recorded by a mobile X-band radar are combined with photographs of the Dodge City tornado to quantitatively document the evolving debris cloud. An inner annulus or tube of high radar reflectivity encircled the tornado at low levels. A column of low cross correlation coefficient (RHOhv) was centered on the funnel cloud during the early stage of the tornado's life cycle. In addition, two areas of low RHOhv were located near the inner annulus of high radar reflectivity and were hypothesized to be regions of high debris loading that have been reproduced in simulations of lofted debris. Another column of low RHOhv was a result of strong wind speeds that were progressively lofting small debris and dust as inflow rotated around and within the weak-echo notch of the hook echo. A column of negative differential reflectivity (ZDR) was also centered on the tornado and was hypothesized to result from common debris alignment.
The polarimetric structure undergoes a dramatic transition when the debris cloud was prominent and enveloped most of the funnel cloud. The weak echo column (WEC) began to fill at lower levels as large amounts of debris were lofted into the circulation. The axis of minimum RHOhv shifted to a radius just beyond the funnel cloud. A column of positive ZDR was collocated with the funnel surrounded by negative ZDR. The negative ZDR and low RHOhv within the debris cloud were likely the result of common debris alignment. The positive ZDR within the funnel signified the presence of a few hydrometeors.