

Processing of In-situ T-28 Aircraft Data for Coupling with Radar Observation of Hail Storms

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Spanning multiple field projects, the armored T-28 aircraft obtained in-situ measurements of particle size distributions in hailstorms. These measurements were complemented by time-synchronized scans from the CSU-CHILL S-band polarimetric radar. The T-28 is unique in its ability to sample hailstorms containing particles up to 3 inches in diameter. The aircraft dataset has been analyzed to improve processing of in situ hailstorm observations for comparison with radar measurements. Initially, the Hail Spectrometer on the T-28 aircraft provided one-dimensional (1D) size information; however, an instrument upgrade enabled two-dimensional (2D) sizing capabilities for multiple field projects. Data from 14 flights with both 1D and 2D data are analyzed. Consistent discrepancies are observed between the 1D and 2D size distributions, with the 1D method generally showing larger maximum particle sizes and lower concentrations of small particles. Manual inspection of 2D images shows that the traditional 1D sizing method overestimates particle sizes due to noise and coincidence effects indicating that the new 2D methodology should be used for creating particles size distributions. Simulated reflectivity calculated from the 2D particle size distribution has substantially lower reflectivity values and requires more water inclusion than the 1D processing method to match CSU-CHILL observations.