

Consistency between In-situ and 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 hail storms. The T-28 aircraft obtained in-situ measurements of particles sizes, while the CSU-CHILL S-band polarimetric radar obtained time-synchronized scans of the storms the aircraft was flying through. The T-28 is unique since the aircraft could sample in Hail storms with up to 3 inch diameter particles. Recently, this unique dataset has been analyzed to improve our understanding of hail storm observations. The Hail Spectrometer on the T-28 aircraft initially only provided one-dimensional (1D) size information; however, an upgrade provided two-dimensional (2D) sizing information for four different field projects. Detailed comparisons of the two sizing methods indicate that the 2D sizing method is more accurate than the 1D sizing method. The calculated reflectivity and polarimetric variables from 2D processed particle size spectrum is related to CSU-CHILL radar observations when both observations match in time and space. For consistency, the particles need different water to ice ratios for different periods to have the derived radar parameters match the observed radar parameters; especially, for area of high reflectivity (> 50 dBz). There are 11 flights where 2D particle spectrum data is available. This available 2D particle spectra are analyzed to determine what percentage of the observations are consistent with water being a component of the observed particles. As a product derived from these comparisons, the ice to liquid ratios are determined.

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