High Resolution Observations of Drop Size Distribution for GPM Ground Validation

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ABSTRACT

During the Mid-latitude Continental Convective Cloud Experiment (MC3E), NASA's GPM GV Disdrometer and Radar Observations of Precipitation (DROP) Facility deployed an array of disdrometers and rain gauges in northern Oklahoma to sample, with high resolution, the drop size distribution for use in development of precipitation retrieval algorithms for the GPM core satellites. The DROP Facility instruments deployed during MC3E consisted of 16 autonomous Parsivel units, 5 two-dimensional video disdrometers (2dvds), a vertically pointing K band radar, and 32 tipping bucket rain gauges. There were several rainfall events during MC3E in which rain drops exceeding 6 mm in diameter were recorded. The disdrometer array revealed large rain drops with diameters exceeding 6 mm and 8 mm during two separate stratiform and convective rainfall events, respectively. The NPOL radar, which was scanning in high resolution RHI mode (every 40 sec) over the disdrometer array during the stratiform event, indicated a 1 km thick bright band with a differential reflectivity column of 2-3 dB extending below the melting layer to the surface where the large drops were recorded by the 2dvds. These large drops are important for GPM since they can have a great impact upon satellite precipitation retrieval, especially near the ground and below heavy convective rainfall cores where satellites have had problems depicting the rainfall.