Investigation of Drop Size Distribution (DSD) of Mesoscale Convective System (MCS) with Squall Line Through Global Precipitation Measurement (GPM) Dual-frequency Precipitation Radar (DPR) Observations

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The current study investigates the drop size distribution (DSD) of mesoscale convective system (MCS) with squall-line based on global precipitation measurement (GPM) dual-frequency precipitation radar (DPR) observations. It is found that more hydrometeors are concentrated between squall line and tailing stratiform region (transition zone), where the radar echo is weak and the rain drop size is small. In the trailing stratiform region, a heavy stratiform region is formed usually at the center of the trailing stratiform region. The heavy stratiform region is marked with sizeable particles when they are still at upper levels, and the particles in the heavy stratiform region are relatively sparse, where the mesoscale updraft occurs at mid-to-high levels may play a key role. It may slow down the falling pace of hydrometeors and promote more collisions-coalescences to increase their size but reduce the particle number. The particle size of the stratiform area in front of/behind the heavy stratiform region is smaller, and the particle number is higher compared to the heavy stratiform region. Through the current study, a refined conceptual model of MCS with squall line is presented, and hope the refined model can help improve the parameterization of numerical weather model for MCS forecast.

Keywords: mesoscale convective system, drop size distribution, dual-frequency precipitation radar, global precipitation measurement mission