



Abstract Details

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Title: Characteristics of drop size distribution in different rain systems inferred from TRMM Precipitation Radar data

Abstract:

The standard rain profiling algorithm 2A25 estimates three-dimensional rainfall rates from radar echoes measured with the TRMM Precipitation Radar (PR). In the algorithm, the effective radar reflectivity factor is estimated from the measured apparent radar reflectivity factor by applying an attenuation correction method that uses an estimate of the path-integrated attenuation (PIA) provided by the surface echo measurements. The difference between the PIA estimate from rain echo and that from the surface echo is considered to be arising from the deviation of the drop size distribution (DSD) from the assumed initial DSD. A parameter that represents this difference is called the epsilon parameter and available in the output of 2A25. We looked at the distribution of this parameter in several different rain systems. The epsilon parameter takes large positive deviations from neutral unity over a large area in most of the typhoons observed. Such large deviations are not common in other kinds of rain systems. A positive deviation of epsilon indicates that there are relatively more small drops than the assumed spectrum for a given rainfall rate. We examine other possible causes that may deviate the statistics of epsilon. In particular, the possibility of bias in the estimates of PIA from surface echo, because strong winds over the surface in the vicinity of a typhoon may alter the surface condition substantially. Another cause of deviation in epsilon statistics is the non-uniform beam filling (NUBF) effect. We examine to what extent we can separate these causes from the actual variation of DSD and what DSD characteristics of rain systems we can infer from the epsilon statistics in combination with other parameters.

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