Analysis of microphysical characteristics for different rain systems based on long-term GPM Observations

Choeng-lyong Lee¹, GyuWon Lee¹, Geunhyeok Ryu²

¹Center for Atmospheric REmote sensing, Kyungpook National University,
²National Meteorological Satellite Center, Korea Meteorological Administration

The GPM (Global Precipitation Measurements) core satellite is a key instrument for precipitation estimation and analysis of microphysics variables. The GPM DPR (dual-frequency precipitation radar) provides detailed vertical structures of reflectivity, which can categorize rain types (convective, stratiform and shallow systems) and provides information of rain drop size distribution. In this study, we investigate the property of reflectivity, mass weighted diameter (Dₘ), and intercept parameter (N₀) for rain types using long-term GPM data.

To classify the rain types, we used the indices of rain types (typePrecip). If any shallow-rain flags (flagShallowRain) are indicated in convective areas then we categorize the shallow system. After classifying rain types, we generate the 3D-structures including CFAD (Contoured Frequency by Altitude Diagram) and vertical profiles for each rain type.

In stratiform, distribution of reflectivity, Dₘ, and N₀ are very narrow and average values are in narrow ranges of 20~30 dBZ, 1.1~1.5 mm and about 80~500 m^3 mm⁻¹, respectively. On the other hand, those distributions of convective are relatively broad at higher altitude (above 9 km) and average values are higher than those of stratiform.

Key words: GPM, Convective, Shallow system, Stratiform, Microphysics

※ This research was supported by “the Development of Meteorological Data Utilization and Operation Supportive Technology” of the National Meteorological Satellite Center (NMSE) of the Korea Meteorological Administration (KMA). This research is supported by "Development and application of Cross governmental dual-pol. radar harmonization (WRC-2013-A-1)" project of the Weather Radar Center, Korea Meteorological Administration.