DEVELOPMENT OF A RETRIEVAL ALGORITHM FOR THE GPM DUAL-FREQUENCY PRECIPITAION RADAR (DPR)

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Abstract

As a successor of the Tropical Rainfall Measurement Mission (TRMM), the core satellite of the Global Precipitation Measurement (GPM) mission will be launched with a Dual-frequency Precipitaion Radar (DPR) on board in July 2013 (as planned). A precipitation retrieval algorithm for the GPM/DPR is introduced in this presentation. The algorithm is under development, and is planned to be composed of five modules: a vertical profile module, a texture module, a drop size distribution (DSD) module, a surface reference technique (SRT) module, and a solver module.

The solver module retrieves a vertical profile of DSD (and rain rate) from observations at two frequencies of radar reflectivity factor (Zm) and path integrated attenuation (PIA). The SRT module estimates the PIA by comparing surface backscattering cross sections ($\sigma 0$) under rainfall and under no-rainfall. In the DSD module, DSD is approximated by a parametric function and constrained on DSD according to the rain-type (convective, stratiform, …) and the particle type (rain, snow, …) that are judged by the vertical profile and texture modules. The vertical profile module has another role of correcting for the attenuation in Zm and $\sigma 0$ caused by non precipitating particles (cloud, water vapor, and oxygen). The main role of the texture module is to get information about the non-uniformity of precipitation within a radar beam, which strongly affects the retrieval results.

After a general explanation of the above modules, we may focus on some hot topics related to PIA; 1) How accurately can the SRT module estimate the PIA? and 2) What accuracy of PIA is required in the solver module to retrieve the rain rate with a desired accuracy.

Keywords: GPM, DPR, TRMM, DSD, SRT