GPM Version 4 Precipitation Profiles from DPR and Combined

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Introduction

The Global Precipitation Measurement (GPM) mission core spacecraft was launched in Feb. 2014 and includes the Dual-Frequency Precipitation Radar (DPR) which consists of two radars: one operating at Ku-band (much like TRMM PR) and the other at Ka-band. The Tropical Rainfall Measurement Mission (TRMM) Precipitation Radar (PR) has provided a precipitation data record extending back to Dec. 1997 using a single frequency algorithm. This work examines the retrieved profiles of the GPM radar single and dual-frequency algorithms along with those of the Combined radar/radiometer algorithm. In addition to precipitation rates both the radar-only and Combined algorithms attempt to estimate PSD parameters such as Nw and Dm. First looks at profiles of these parameters can illuminate algorithm differences and/or deficiencies and are a helpful diagnostic tool.

GPM DPR and Combined Average Profiles

Average Corrected Reflectivity (Ze) and Precipitation Rate (R) profiles were computed from the Production Research Products for GPM DPR and GPM Combined Level-2 retrieval algorithms. (GPM V04). Average profiles are computed for all 49 angles, at each radar slant range gate for the two main precipitation classes: Stratiform and Convective. Only those cases where a clear Bright Band is detected are included in the Stratiform case. The profiles are further categorized into 14 levels; in the case of Stratiform the Height of the Bright Band is used, for Convective cases the detected Storm Height is used. September 2014 is used here as the radar antenna pattern was stabilized at that point. A previous poster compared GPM V3 profiles against the TRMM-era PR retrieval algorithm on the GPM Ku data.

Average Profiles of Corrected Reflectivity and Precipitation Rate Sept. 2014

Nadir Profiles are shown. GPM Version 4 data.

Aside : Profile Averaging.

Average profile (weighted sum) vs independent average at each bin. $j$ = Ray $i$ = Gate/Bin

Use as a potential algorithm diagnostic tool.

GPM V05 Testing at NASA Goddard / PPS

Integration and Test Environment (ITE) at PPS.

• Assist in testing modifications to GPM algorithms

• 90+ node Beowulf Cluster.

• 32 CPUs, 256GB per node.

• Test data made available to algorithm teams online FTP.