May 7, 2022

Release Notes for the PR Version 9/GPM PR Version 07A Level 2 and Level 3 products

＜Major changes in the PR Level2 products from Version 8 /V06A to Version 9/V07A＞

1. The format of V07A products has been changed from V06A (for example, adopting “FS”, instead of “NS”) as described in the ATBD. The format of the TRMM/PR is consistent of that of the GPM/DPR (in particular, the KuPR).
2. PR data are processed by essentially the similar algorithm that is used to process the DPR/KuPR data. However, algorithm differences in a scattering database appeared in V07A. In V06A, the scattering table of KuPR is used for PR by neglecting the difference of frequency (13.6 GHz for KuPR and 13.8 GHz for PR). In V07A, we implemented the scattering table calculated for 13.8GHz in the TRMM/PR algorithm. Preliminary analyses showed a histogram of PR precipitation estimates became closer to that of KuPR precipitation estimates.
3. There are several improvements associated with the DPR V07A algorithm developments. In V07A, the improved sidelobe clutter removal routine was implemented for the single frequency (KuPR, KaPR, and PR) L2 algorithms based on the results of Kanemaru et al. (2020, 2021). In addition, a new 3-D precipitation judgment method is implemented to improve the detectability of precipitation signals. This method uses signals not only in the vertical direction but also the in cross-track and along-track directions. See the ATBD for full descriptions.

Caveat:

1. PR’s rain estimates over land have significantly (about 15%) increased in V07A from V06A because of considering a soil moisture effect. Please see Seto et al. (2022) for the soil moisture effect. The PR estimates over ocean have decreased slightly.

Reference:

GPM/DPR Level-2 Algorithm Theoretical Basis Document, available from
https://arthurhou.pps.eosdis.nasa.gov/Documents/ATBD_DPR_V07A.pdf
https://arthurhou.pps.eosdis.nasa.gov/Documents/ATBD_DPR_L3_V7.pdf

Kanemaru, K., T. Iguchi, T. Masaki, and T. Kubota, 2020: Estimates of Spaceborne Precipitation Radar Pulsewidth and Beamwidth Using Sea Surface Echo Data, *IEEE Trans. Geosci. Remote Sens*, pp.1-13, https://doi.org/10.1109/TGRS.2019.2963090.

Kanemaru, K., H. Hanado, K. Nakagawa, 2021: Improvement of the clutter removal method for the spaceborne precipitation radars, IGARSS2021, https://doi.org/10.1109/IGARSS47720.2021.9554974

Seto, S., T. Iguchi, and R. Meneghini, 2022: Correction of path integrated attenuation estimates considering the soil moisture effect for the GPM Dual-frequency Precipitation Radar, *J. Atmos. Oceanic Technol.*, https://doi.org/10.1175/JTECH-D-21-0111.1