Hirose, M., S. Shige, T. Kubota, F. A. Furuzawa, H. Minda, and H. Masunaga, 2021: Refinement of surface precipitation estimates for the Dual-frequency Precipitation Radar on the GPM Core Observatory using near-nadir measurements. *J. Meteor. Soc. Japan*, **99**,
Special Edition on Global Precipitation Measurement (GPM): 5th Anniversary, https://doi.org/10.2151/jmsj.2021-060.

Plain Language Summary: This study attempts to improve surface precipitation estimates from GPM Core Observatory Dual-Frequency Precipitation Radar (DPR). We updated the low-level precipitation rate profiles (LPPs) using an a priori near-nadir database. The angle-bin difference in the detectability of shallow storms was examined to estimate the effect of missing shallow storms. We constructed a priori lookup tables constrained by the clutter-free bottom level and spatially averaged shallow precipitation fractions for the shallow precipitation deficiency (SPD) correction. Overall, these two corrections increase precipitation by 8% over land and 11% over ocean. These corrections mitigate approximately half of the incidence angle dependency over land and reduce the discrepancies from other global precipitation datasets.

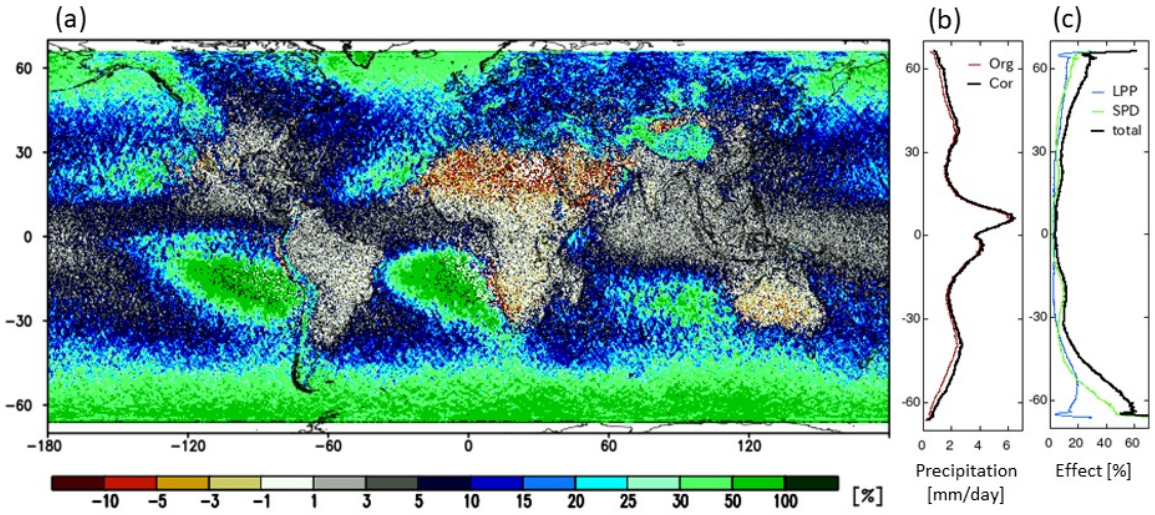

Figure 1. (a) Map of the combined corrections, (b) zonally averaged precipitation before (Org) and after (Cor) the corrections, and (c) impact of the LPP and SPD corrections on the zonally averaged corrected precipitation. The units are percentages in panels (a) and (c) and mm d^{-1} in panel (b).

- GPM DPR KuPR Version 06A data contain precipitation anomalies of −7% over land and −2% over ocean.
- The LPP correction increases precipitation, in particular, at high altitudes and at middle and high latitudes. The LPP correction results in a 5% global increase in precipitation.
- The SPD correction enhances precipitation by 6%. The impact reaches 50% over specific low-rainfall oceans in the sub-tropics and at high latitudes.
- The difference of KuPR precipitation compared to satellite-gauge blended products is reduced from –17% to –9%.