Uncertainties in gridded precipitation products derived from spaceborne radars

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The first spaceborne precipitation radar on the Tropical Rainfall Measuring Mission satellite (TRMM PR) and the follow-on sensor, the dual-frequency precipitation radar onboard the Global Precipitation Measurement mission core observatory (GPM DPR), have archived precipitation data regardless the surface type for two decades. The gridded datasets have updated the detection capability of local precipitation maxima in ungauged mountainous terrain and coastal landmasses by integrating a number of samples and by filtering artificial signals. Accordingly, subjects of research expand to kilometer-scale precipitation features in high rainfall-varying regions such as the Himalayan alpine areas. On the other hand, evaluation of regional sampling sufficiency of prevailing systems and retrieval errors inherent to the local environment becomes more importance to meet an increasing need for accuracy and resolution. This study examines the status of the spaceborne radar rainfall map and the issues it faces.

The sampling sufficiency of the long-term data is estimated in terms of the representativeness of the match-up data against the continuous observation, the number of the high-impact systems, the similarity between the subsets, and the geographical and temporal coherency. Some retrieval issues appear in the statistical differences between incidence angles. Over mountainous areas, missing shallow storms and the mismatch of the low-level profiles result in significant underestimates. In addition, some artificial echo structures are identified. The sidelobe contamination and illegal radio transmission affect to the total statistics in specific regions. These issues of current high-resolution precipitation climatology products remain to be addressed to fill in the gap between the various approaches and to discuss the diversity of precipitation systems over Asia.