

User and System Needs for the Future of Global Precipitation Datasets

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The Global Precipitation Measurement Mission (GPM) has passed a decade in operation, building a legacy of unprecedented advances in understanding the global distribution and characteristics of rain and snow. This is demonstrated through thousands of attributions in the scientific literature, public outreach and education, and real-time use by forecasters and decision makers. Much of this applications benefit derived from GPM is due to the use of the GPM Core Observatory (CO), with coincident radar and passive microwave (PMW) radiometer, as a high-quality calibrator for a larger constellation of PMW radiometers with a range of channel frequencies, various orbits, and different viewing geometries. When the constellation collectively provides “frequent” (say, ≤ 3 hr) sampling, it can enable high-quality global time-interpolated half-hourly coverage. Reprocessing of observations from the Tropical Rainfall Measurement Mission (TRMM) using GPM algorithms combines to create a precipitation record that is completing its third decade.

This presentation examines the lessons learned in GPM about user needs and the implications for designing the next generation of precipitation data systems. In some cases this is as simple as planning to continue features that users consider important, such as precipitation phase and parameter/location subsetting. In other cases, there is still work to be done. For example, at full resolution for IMERG we do not have a solid estimate of errors. Also, users requested a “stoplight chart” with a simple 3-level confidence index; the current first-generation formulation likely needs to be revised to be more useful. In a different vein, the current processing scheme for GPM data does not allow parallel processing for multiple versions, but this design seriously hampers numerous users whose near-real-time applications depend on a long record of retrospectively processed data. Finally, we know that numerical model precipitation is more skillful than observational retrievals for stratiform and solid precipitation. Introducing an additional merged observation/model precipitation variable should likely provide more skillful estimates for users across regions that have such precipitation.

The presentation will end with a brief summary of discussions and conclusions from a community Future of Precipitation Datasets Workshop, held in March 2026, which covered topics such as coping with smallsat lifetimes and new sensors, providing intercalibration standards after the GPM Core Observatory ends, and developing a next-generation processing system that can also serve as a testbed as new algorithms appear.