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Advancing GPCP Products to Version 3.2

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The Global Precipitation Climatology Project (GPCP) CDR precipitation products were upgraded in early 2022 to Version 3.2. Compared to the current operational Version 2.3, Monthly Version 3 improvements include

1. finer (0.5°x0.5°) spatial resolution,
2. extended geosynchronous infrared (geo-IR) coverage to 58°N-S,
3. modern passive microwave (Goddard Profiling; GPROF) and infrared (Precipitation Estimation from Remotely Sensed Information using Artificial Neural Networks - Climate Data Record; PERSIANN-CDR) algorithms,
4. climatological calibration from high-quality research satellites,
5. revised inter-dataset calibrations of precipitation estimates based on Television-Infrared Operational Satellite (TIROS) Operational Vertical Sounder (TOVS) and Advanced Infrared Sounder (AIRS) data,
6. finer (1°x1°) spatial resolution from the Global Precipitation Climatology Centre (GPCC) gauge analyses,
7. regional modification of the gauge undercatch correction (starting in V3.2), and
8. before 1992 the PERSIANN-CDR is climatologically calibrated.

Analysis of the previous Version 3.1 Monthly data showed that these upgrades provided useful finer-scale detail, as expected, and resolved a suspected artifact in the operational Version 2.3 GPCP Monthly product in the Southern Ocean around 60°S. However, strong interannual variation in tropical ocean regions and calibration differences between the Special Sensor Microwave Imager (SSMI) and Special Sensor Microwave Imager/Sounder (SSMIS) epochs appeared to stem from the performance of the GPROF algorithm. The development team chose to calibrate the monthly GPROF-adjusted PERSIANN-CDR estimates to the Microwave Emission brightness Temperature Histogram (METH) estimates (employed in Version 2), essentially downscaling the monthly 2.5°x2.5° METH to the 0.5°x0.5° resolution for the latitude band 25°N-S, and tapering to no METH adjustment at 45°N,S. Although METH is only available over ocean, the gauge analysis tends to dominate over land, so the exact performance of GPROF over land is not critical. As well, the Fuchs et al. gauge undercatch correction replaces Legates and Willmott correction for Eurasia north of 45°N to better match the Gravity Recovery and Climate Experiment (GRACE) water balance data.

In Version 3, the Daily GPCP product now uses daily accumulations of Integrated Multi-satellitE Retrievals for the Global Precipitation Measurement (GPM) mission (IMERG), and TOVS/AIRS estimates to fill gaps (for simplicity, the polar caps outside 55°N-S in Version 3.2), scaled to approximately sum to the GPCP V3.2 Monthly product.

The Monthly and Daily product periods of record are currently 1983-2020 and 2001-2020, respectively. The presentation will summarize the performance of the Version 3.2 products, and include a short prospectus for the future of the satellites and sensors necessary to continue computation of a CDR product.