

GPROF2014.V2 Release Notes

Version 4 of the GPROF algorithm was intentionally not changed from the previous version. The only change is thus the replacement of the a-priori database of precipitation profiles from a pre-GPM collection to GPM generated data.

Over ocean, the new database is taken from the Combined Algorithm's dual frequency (MS product). Rain rates were not altered but in some cases, cloud ice was added to CMB MS V4 products in order to get better agreement with GMI's high frequency channels. Results in the tropics are quite consistent with the previous version as well as older TRMM versions of the algorithm latitudes (N and S. of 40°), the new algorithm produces less rain than previous versions, including GPCP as shown in figure 1. This is thought to be related to the radar's inability to see the frequent drizzle, particularly in the southern hemisphere. The combined algorithm does not produce rainfall when there is no radar echo in the profiles. With little or no quantitative validation data, it was thought best to follow the GPM combined algorithm until there is specific evidence to justify a change in procedure.

Over land, the algorithm was adapted to use the DPR Ku product instead of the Combined dual frequency (i.e. MS) product. This was done because the Ku product was validating significantly better than the other GPM products when compared against the ground based radar network over the continental United States. The product differs more substantially from the previous version that used ground based radar over the continental US to construct the a-priori database. Many artificial features that resulted from sparse databases are no longer there. The validation against the ground based radar, expectedly, is a bit worse than before but global comparisons against rain gauge climatologies from GPCC are significantly improved. Results for an annual comparison against the ground radar are shown in figure 2. Results against global GPCC gauges (V3 and V4) are shown in figure 3. There is unexplained behavior in the pdf of rain rates in that the V4 appears to have a slight preference for rain rates around 0.5 and 8 mm/hr. This is shown in Figure 4.

The output format for Version 4 remains the same as Version 3 but the hydrometeor profiles are now associated with each Field of view. Hydrometeor profiles are derived from the Combined product and written out as an integer representing a shape function (archived in the file header) and hydrometeor multiplicative value that scales the shape function. This saves considerable file space and better represents the basic hydrometeor profiles available from passive microwave radiometers.

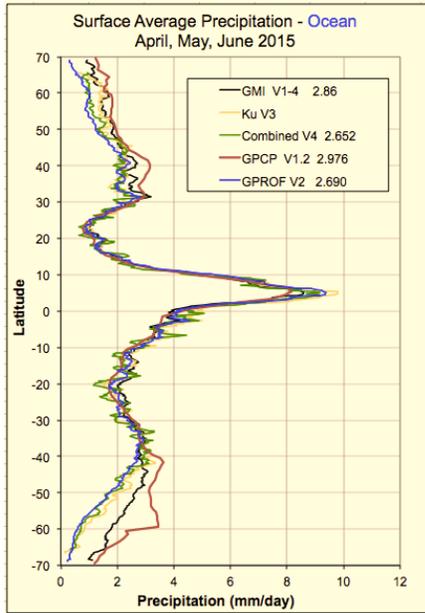


Figure 1: Zonal means comparing GMI V3 (GPROF V1.4 in plot) to V4 (labeled GPROF V2 in plot) to Combined Algorithm and GPCP product.

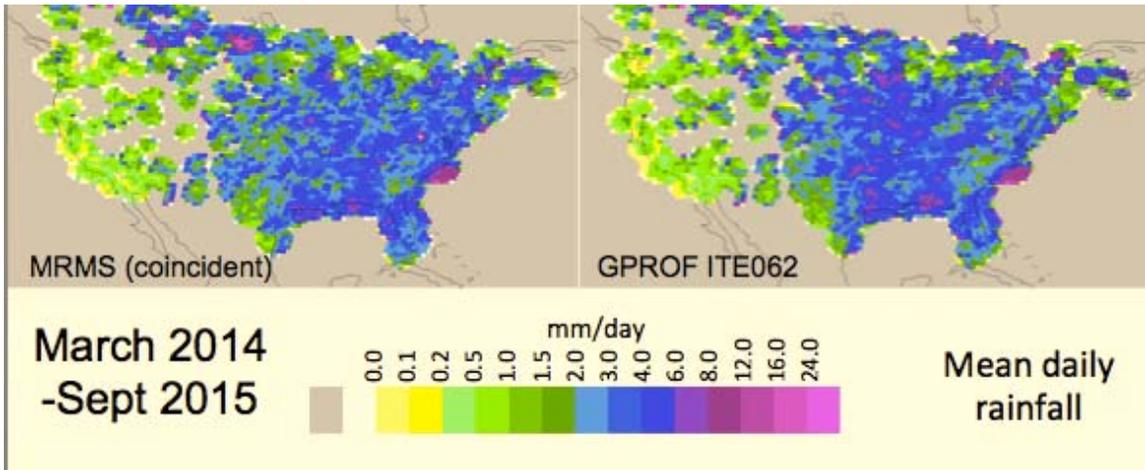


Figure 2: GPROF V4 (ITE062 in figure) compared to coincident rain from the Multi-radar multi-sensor rainfall product serving as validation data.

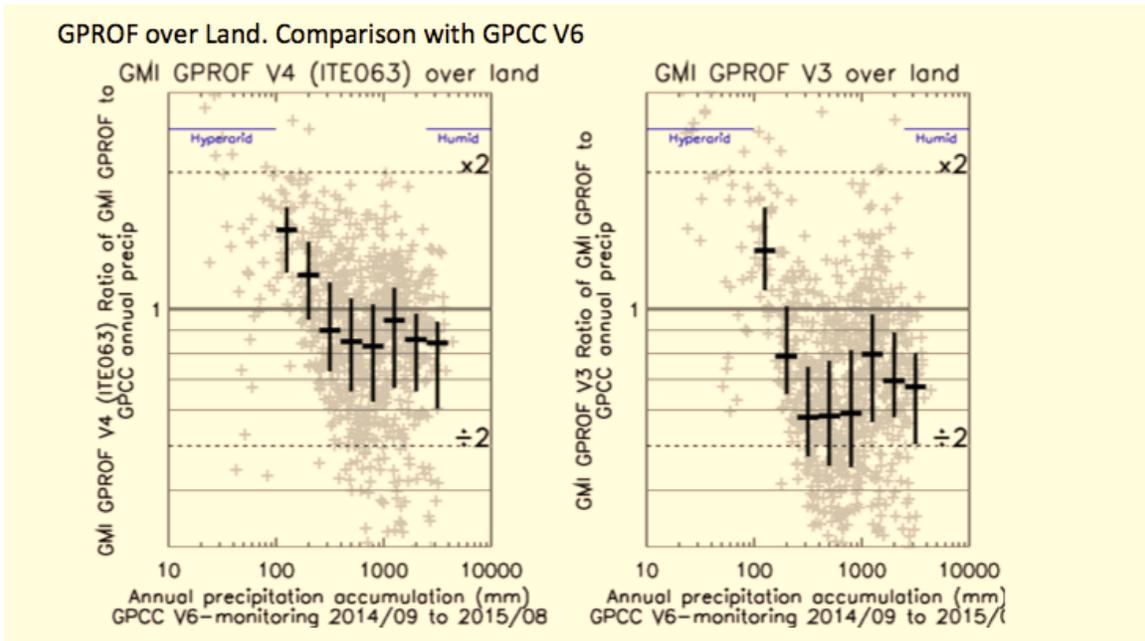


Figure 3: GPROF V4 compared with global GPCP rain gauge accumulations.

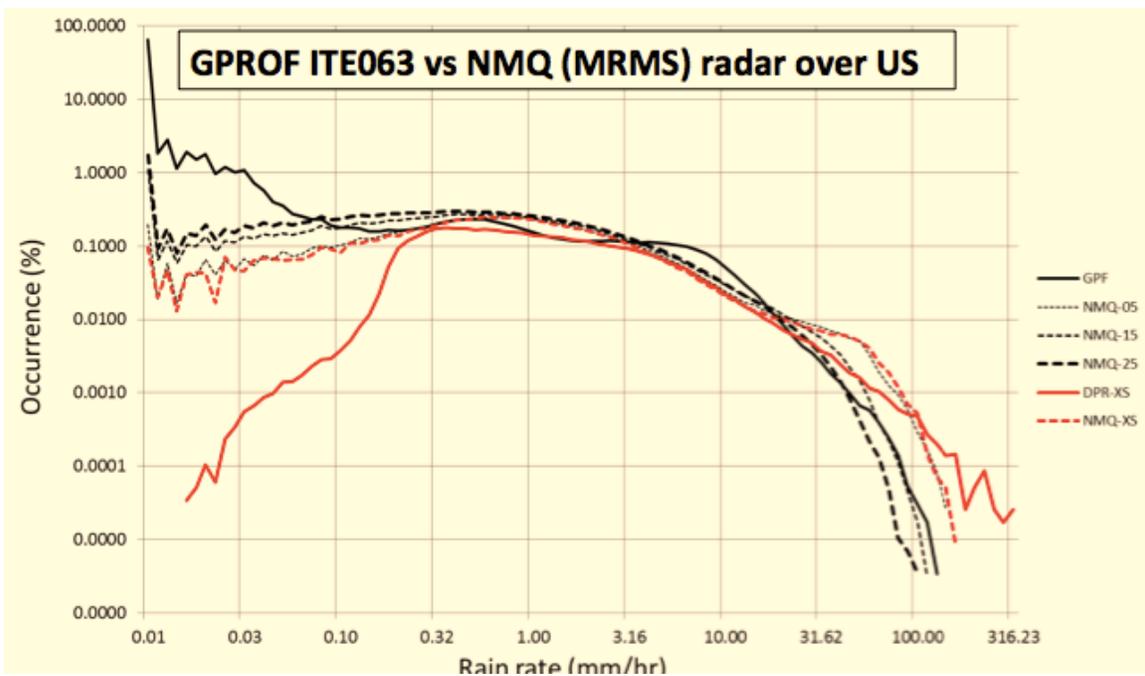


Figure4: The Probability Distribution function of rain rates from GPROF V4 (labeled GPF) compared to MRMS data averaged to various resolutions as well as DPR data for comparisons.