

Calibration of GOES-R ABI cloud products and TRMM/GPM observations to ground-based radar rainfall estimates for the MRMS system – Status and future plans

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The Multi-Radar/Multi-Sensor (MRMS) system provides surface precipitation rates, types, and accumulations at a high spatiotemporal resolution – 1-km spatial and 2-minute temporal – for the Contiguous United States (CONUS). The primary driver for the real-time rainfall rates is the WSR-88D ground-based polarimetric radar network, which is combined to provide a full CONUS mosaic of precipitation.

While ground-based radars have historically provided more accurate quantitative estimates of precipitation than satellite-based retrievals, particularly for heavier rain rates, their value is limited in areas of complex terrain. The combination of blockage of lower radar tilts by terrain and the shallow nature of orographically forced precipitation make detection and estimation of flash flood-producing rainfall difficult.

The objective of this study is to leverage the complementary advantages of both ground-based observations and satellite-based observations from GOES-R and TRMM/GPM to produce a calibrated, blended satellite+radar QPE product. It will be merged with the MRMS QPE using a weighting scheme based on ground radar coverage quality such that the rainfall estimate at any given location is derived from the best available observation.

As a first step, a multi-year database is developed for the CONUS that matches observations from all the various platforms in space and time. GOES-R-like derived cloud products from GOES-13 and lightning flash rates from TRMM LIS were collected as proxies to products that will be available in real-time from the GOES-R ABI and GLM after its launch.