

GOES-16 ABI L2+ Rainfall Rate (RR) / Quantitative Precipitation Estimate (QPE) Release
Beta Data Quality
September 14, 2017
Read-Me for Data Users

The GOES-R Peer/Stakeholder Product Validation Review (PS-PVR) for the Advanced Baseline Imager (ABI) Rainfall Rate (RR) / Quantitative Precipitation Estimate (QPE) Beta Maturity was held on May 16, 2017. Because of concerns about product performance, the PS-PVR panel recommended that the ABI QPE product be declared *conditionally* Beta until performance issues in the algorithm could be partially addressed by replacing the SEVIRI-based retrieval calibration table (SEVIRI was used as a proxy for ABI during algorithm development) with one derived from ABI to address issues caused by the differences in the water vapor passbands between the two instruments. This was done on September 13, 2017 at which point the algorithm was declared Beta validated.

The GOES-R ABI QPE product is generated from a single ABI image using ABI bands 8 (6.2 μ m), 10 (7.3 μ m), 11 (8.5 μ m), 14 (11.2 μ m), and 15 (12.3 μ m). The RRQPE product is generated every 15 minutes for every ABI Full Disk (FD) of the Earth.

A full description and format of the RRQPE product can be found in the Product Definition and User's Guide (PUG) document (<http://www.goes-r.gov/products/docs/PUG-L2+-vol5.pdf>). The algorithm used to derive the QPE product from GOES-16 ABI observations is described in detail in the "GOES-R Advanced Baseline Imager (ABI) Algorithm Theoretical Basis Document for Rainfall Rate / QPE" (http://www.goes-r.gov/products/ATBDs/baseline/Hydro_RRQPE_v2.0_no_color.pdf).

Beta maturity, by definition, means that:

- Rapid changes in product input tables / algorithms can be expected;
- Product quick looks and initial comparisons with ground truth data were not adequate to determine product quality;
- Anomalies may be found in the product and the resolution strategy may not exist;
- Product is made available to users to gain familiarity with data formats and parameters;
- Product has been minimally validated and may still contain significant errors; and
- Product is not optimized for operational use.

Beta users bear all responsibility for inspecting the data prior to use and for the manner in which the data are utilized. Persons desiring to use the GOES-16 ABI Beta maturity QPE products for any reason, including but not limited to scientific and technical investigations, are encouraged to consult the NOAA algorithm working group (AWG) scientists for feasibility of the planned applications.

The QPE product is sensitive to upstream processing that includes the quality of the calibration, navigation, and registration.

Known product issues (as of September 14, 2017) include:

1. Generally, the ABI Image Navigation and Registration (INR) performance is good, but occasional large anomalies can occur which can result in significant reductions and/or degraded quality in the QPE product;
2. The fixed calibration coefficients mean the algorithm is unable to adapt to changes between cool-season and warm-season rainfall regimes, and may lead to false rainfall signals in clear air over very cold land areas (e.g., Alaska and Canada). Ways to mitigate this are being investigated but at this point it is not clear that the algorithm accuracy and precision in the transition seasons will meet Provisional validation requirements.
3. Like all infrared (IR)-based algorithms, this algorithm performs best for convective rainfall and has a lower level of skill for stratiform rainfall. It should also be noted that the algorithm does not attempt to identify precipitation phase at the surface.
4. This version of the algorithm does not account for subcloud evaporation of hydrometeors; consequently, the rain rates may be excessive in arid regions (e.g., intermountain Western United States and Canada).
5. Each of 4 latitude bands (south of 30°S, 30°S – EQ, EQ – 30°N, north of 30°N) has a separate set of calibration coefficients for each of three cloud types. Although efforts have been made to balance consistency with accuracy, there will sometimes be discontinuities across the boundaries between latitude bands and / or cloud types.