

GOES-16 ABI L2+ Downward Shortwave Radiation: Surface (DSR) and Reflected Shortwave Radiation:
Top of the Atmosphere (TOA) (RSR) Release, Beta Data Quality
June 30, 2017
Read-Me for Data Users

The GOES-R Peer/Stakeholder Product Validation Review (PS-PVR) for Advanced Baseline Imager (ABI) L2+ Downward Shortwave Radiation (Surface) (DSR) and Reflected Shortwave Radiation (TOA) (RSR) Beta Maturity was held on June 23, 2017. As a result of this review, the PS-PVR panel recommended that the ABI DSR and RSR products be declared Beta.

The ABI L2+ DSR and RSR products include the downwelling shortwave radiation at the surface (DSR) and the shortwave radiation reflected at the top of the atmosphere (RSR). The DSR and RSR retrievals are produced during daytime with view and solar zenith angles less than 90 degrees. Data over the Full Disk (FD) of the Earth is available in an equal angle latitude-longitude grid of 0.50 degrees for DSR and 0.25 degrees for RSR. Over the Continental United States (CONUS) spatial resolutions are 0.25 degrees for both DSR and RSR. For mesoscale (MESO), only DSR is produced at 0.05 degrees. The products are generated once per hour.

Full description and format of the DSR and RSR products are 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 DSR and RSR from GOES-16 ABI observations is described in the "GOES-R Advanced Baseline Imager (ABI) Algorithm Theoretical Basis Document for Downward Shortwave Radiation (Surface), and Reflected Shortwave Radiation (TOA)" (<http://www.goes-r.gov/products/ATBDs/baseline/baseline-DSR-v2.0.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 shortwave radiation products (DSR and RSR) 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.

Known product issues being resolved include:

1. The retrieval algorithm uses pre-launch processing coefficients for converting narrowband reflectances to broadband albedos that have not yet been “tuned” to ABI.
2. Calculation of clear-sky composite top-of-atmosphere albedos has (correctable) errors.
3. As a result of 1) and 2) quality of the beta product is suboptimal. Underestimation of RSR and overestimation of DSR is especially large for bright ice clouds. Over water clear-sky RSR is larger than the reference (CERES) RSR, while cloudy-sky RSR is smaller than the reference value. DSR values tend to be larger than the reference SURFRAD values below about 500 W m^{-2} . Above this value GOES-16 DSR has a negative bias.
4. Mode 4 (M4) CONUS DSR and RSR are incorrectly mapped.
5. Incorrect initialization values (zero instead of _FillValue) are used in FD, CONUS, and MESO products.
6. Flux statistics in metadata (min, max, mean, and stddev) may have incorrect values in CONUS products.
7. Inconsistent units (degrees) are given in metadata in SZA statistics (min, max, mean, and stddev).
8. DQF attributes ‘percent_good_retrieval_qf’ and ‘percent_bad_retrieval_qf’ may have incorrect values.

Known PUG issues:

1. Lat/lon offset values for satellite TEST and EAST position are reversed in PUG Table 4.3.7-2