GOES-18 ABI L2+ Land Surface Reflectance
Beta Data Quality
May 15, 2021
Read-Me for Data Users

The GOES-18 Advance Baseline Imager (ABI) L2+ Land Surface Reflectance was declared Beta on May 11, 2022. No formal review was conducted because the algorithms are identical to the ones running with GOES-16 and GOES-17, so the Beta declaration of the ABI L1b and CMI flows down to the ABI L2+ products.

The ABI L2 BRF provides the spectral land surface reflectance, i.e., a ratio between outgoing radiance at one given direction and incoming radiance at another given direction (same or different from the incoming direction). In this product, the outgoing direction is the direction of the satellite view, while the incoming direction is the direction of solar illumination. The BRF is produced at the following wavelengths: 0.47 µm, 0.64 µm, 0.86 µm, 1.61 µm, and 2.26 µm, corresponding to bands 1, 2, 3, 5, 6. The product includes associated data quality flags and percentage of each flag value, mean, maximum, minimum, and standard deviation of BRF of each band. The ABI BRF provides spatial and temporal continuous surface reflectance information. The ABI BRF under clear-sky condition is comparable and commits well with the ground measurements; the GOES-R BRF under cloudy-sky conditions provides the contemporary surface status under clear-sky condition, thus incomparable with the ground reference influenced by the cloud.

- *Measurement range*: 0-2
- *Temporal coverage*: Solar zenith angle at < 67 degrees. Daytime solar zenith angle
- *Refresh*: 10 minutes for FD, 5 minutes for CONUS, 1 minute for Meso
- *Spatial coverage*: Full Disk, CONUS, Meso
- *Spatial resolution*: 2 km
- *Quality*: Product accuracy is 0.08 Albedo Units and precision is 0.08

The BRF algorithm requires a 10 day spin up period. After GOES-18 drifts to the near-West location and spins up, BRF is expected to reach the required accuracy.

A full description and format of the ABI BRF product will be available in a future revision of 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 BRF product from GOES-R ABI observations is described in detail in the "ABI Algorithm Theoretical Basis Document for Snow Cover" (https://www.star.nesdis.noaa.gov/goesr/documentation_ATBDs.php).

Beta maturity, by definition, means that:

- Initial calibration applied (L1b)
- Rapid changes in product input tables, and possibly product algorithms, can be expected

- Product quick looks and initial comparisons with ground truth data (if any) are not adequate to determine product quality
- Anomalies may be found in the product and the resolution strategy may not exist
- Products are made available to users to gain familiarity with data formats and parameters
- Product has been minimally validated and may still contain significant errors
- 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-18 ABI Beta maturity BRF product 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. This product is sensitive to upstream processing, such as the quality of the calibration, navigation, cloud mask, and Aerosol Optical Depth (AOD).

Status of the current GOES-18 BRF products and any remaining known issues that are being resolved:

1. Missing BRF images occur randomly due to upstream AOD input not being available for a scene, thus causing the blocks of fill data. A mitigation plan is proposed by using closest AOD within the day and an AOD climatology in development by the STAR AOD team.
2. Some differences are noted in clear-sky retrievals between the science code output running at STAR and that coming from the ground system. Related updates are needed to the ground system implementation about the upstream AOD handling: 1) the AOD at the same timestamp is preferred than that from one-hour ago and the closest timestamp within the same day is acceptable when the current timestamp is unavailable, 2) the AOD input is suggested to be restricted by its quality flag by screening the low-quality flag.
3. The BRF1 (blue band BRF) is more sensitive to AOD input than other bands and shows a higher relative error in comparison with reference value from atmospherically corrected BRF using AOD ground measurements, although all the channels are within the mission requirements.
4. Product monitoring is deficient due to the inability of the BRF intermediate product to access four-level cloud mask. It is expected that the four-level cloud mask will be written into the BRF quality flag in the future.

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