

GOES-18 ABI L2+ Land Surface Reflectance
Provisional Data Quality
November 09, 2022
Read-Me for Data Users

The Peer/Stakeholder Product Validation Review (PS-PVR) for the GOES-18 Advance Baseline Imager (ABI) L2+ Land Surface Reflectance Provisional Maturity was held on November 09, 2022. As a result of the review, the ABI Land Surface Reflectance (also referred to as Bi-directional Reflectance Factor [BRF]) products were declared Provisional Maturity.

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. 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. BRF under clear-sky conditions compares well with ground measurements; the GOES-R BRF under cloudy-sky conditions provides the surface status under clear-sky condition, thus incomparable with the ground reference influenced by the cloud.

- *Measurement range:* 0-2
- *Temporal coverage:* Daytime, with solar zenith angle at < 67 degrees
- *Temporal refresh:* 10 minutes for FD, and 5 minutes for CONUS
- *Spatial coverage:* Full Disk, CONUS, Meso
- *Spatial resolution:* 2 km
- *Quality:* The requirement of ABI BRF product accuracy is 0.08; and that of precision is 0.08. According to the validation of the product from June-August, the product has met the requirement in all bands.

GOES-18 drifted to the west location of 136.8 degrees West from May 16 to June 6, 2022, followed by a nudge to 137.0 degrees West from July 5-21, 2022. The ABI BRF performed normal and reached the required accuracy after that initial drift to 136.8 degrees West.

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 Surface Albedo" (https://www.star.nesdis.noaa.gov/goesr/documentation_ATBDs.php).

Provisional maturity, by definition, means that:

- Validation and quality assurance activities are ongoing and the general research community is

now encouraged to participate.

- Severe algorithm anomalies are identified and under analysis. Solutions to anomalies are in development and testing.
- Incremental product improvements may still be occurring.
- Product performance has been demonstrated through analysis of a small number of independent measurements obtained from select locations, periods, and associated ground truth or field campaign efforts.
- Product analysis is sufficient to communicate product performance to users relative to expectations (Performance Baseline).
- Documentation of product performance exists that includes recommended remediation strategies for all anomalies and weaknesses. Any algorithm changes associated with severe anomalies have been documented, implemented, tested, and shared with the user community.
- Testing has been fully documented.
- Product is ready for operational use and for use in comprehensive calibration/validation activities and product optimization.

Provisional data 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 Provisional 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 product and any remaining known issues that are being resolved:

1. 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.
2. 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.
3. Lack of access to the four-level cloud conditions – a BRF input intermediate product – has inhibited the efficiency of product monitoring. It is expected that the four-level cloud mask will be written into the BRF quality flag in the future.

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