GOES-19 ABI L2+ Land Surface Reflectance (BRF)
Provisional Data Quality
February 12, 2025
Read-Me for Data Users

The Peer/Stakeholder Product Validation Review (PS-PVR) for the GOES-19 Advance Baseline Imager (ABI) L2+ Land Surface Reflectance Provisional Maturity was held on February 12, 2025. As a result of the review, the ABI Land Surface Reflectance (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. 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-19 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.
- *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 Oct 2024 to Feb 2025, the GOES-19 BRF product shows better performance than the thresholds in the requirement. The GOES-19 BRF product demonstrates consistent performance with the GOES-16 and GOES-18 counterparts and show good agreement with BRF calculated from ground-based measurements.

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) Volume 5 (https://www.ospo.noaa.gov/resources/documents/goes-r.html). The algorithm used to derive the BRF product from GOES-19 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 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-19 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, and cloud mask.

Status of the current GOES-19 BRF products and any remaining known issues that are being resolved:

1. The validation metrics confirm that both FD and CONUS products have met all requirements across all spectral bands. Biases range from -0.0122 to 0.0102, well within our requirement of 0.08. Precision values range from 0.0125 to 0.0291, also well within our requirement of 0.08.
2. The BRF DQF has been enhanced with more relevant information.

Bit	Name	Value	Note
0	Quality score	0: Good 1: Snow 2: Heavy aerosol (AOD>0.5) 3: Fixed aerosol (AOD=0.05) 4: Cloudy (not absolutely clear) 5: large SZA 6: large VZA 7: Bad L1b	0~1: high 2~3: medium 4: low 5~7: invalid AOD>0.5, hazy
1			
2			
3	Retrieval path	00: R1 01: R2 10: R3 11: at least one band has no retrieval	R3 is the main subroutine for clear-sky R1 is the backup subroutine
4			

5	Small scattering angle	0: scattering angle > 5 degree 1: scattering angle < 5 degree	Scattering angle to catch approximate hotspot scope
6	Cloud	0: absolutely clear 1: probably clear, probably cloudy, absolutely cloudy	
7	AOD availability	0: valid AOD 1: invalid climatology	

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