

GOES-18 ABI L2+ Land Surface Albedo (LSA)

Full Data Quality

November 27, 2024

Read-Me for Data Users

GOES-R Advanced Baseline Imager (ABI) L2+ products will achieve Full Validation maturity by default after two years of Provisional and Operational use with no major anomalies reported (minor product improvements may still be occurring). As a result, the GOES-18 Land Surface Albedo product is considered Full Validation maturity as of January 4, 2025.

The ABI L2 LSA provides instantaneous shortwave broadband blue-sky Albedo over wavelengths between 0.4 and 3.0 μm . It is defined as the ratio between outgoing and incoming shortwave irradiance under natural illumination at the earth surface. The product includes associated data quality flags and percentage of each flag value, along with the mean, maximum, minimum, and standard deviation of LSA. The LSA product provides spatial and temporal continuous surface albedo information. Under clear-sky conditions, the LSA value compares well with the ground measurements; however, under cloudy-sky conditions, the LSA value represents the contemporary surface status under clear-sky condition and is not comparable with simultaneous ground references influenced by cloud.

- *Measurement range:* 0-1
- *Temporal coverage:* Solar zenith angle at < 67 degrees
- *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 LSA product accuracy is 0.08 Albedo Units; and that of precision is 10%. According to the validation of the product in different seasons, the operational product has demonstrated a better performance.

A full description and format of the ABI LSA product will be available in v2.5 of the Product Definition and User's Guide (PUG) Volume 5: Level 2+ Products, located on OSPO's GOES-R documents webpage: <https://www.ospo.noaa.gov/Organization/Documents/goes-r.html>. The algorithm used to derive the LSA product from GOES-18 ABI observations is described in detail in the "GOES-R Advanced Baseline Imager (ABI) Algorithm Theoretical Basis Document for Land Surface Albedo" (https://www.star.nesdis.noaa.gov/goesr/documentation_ATBDs.php).

Full maturity, by definition, means that:

- Validation, quality assurance, and anomaly resolution activities are ongoing.
- Incremental product improvements may still be occurring.
- Users are engaged and user feedback is assessed.
- Product performance for all products is defined and documented over a wide range of representative conditions via ongoing ground-truth and validation efforts.
- Products are operationally optimized, as necessary, considering mission parameters of cost, schedule, and technical competence as compared to user expectations.

- All known product anomalies are documented and shared with the user community.
- Product is operational.

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 Full maturity LSA 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, and cloud mask.

Status of the GOES-18 LSA product and any remaining known issues that are being resolved:

1. The algorithm uses the latest clear-sky top of atmosphere (TOA) reflectance observations to simulate the bidirectional reflectance distribution function (BRDF) model being used in the following day's LSA retrieval. Thus, there is at least a one-day lag in reflecting some surface dynamic events, such as seasonal snow or fire, depending on the length of the previous cloud coverage period.
2. The current summertime validation results suggest a minor over-estimation of ground shortwave albedo than the in-situ measurements.

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