

GOES-19 ABI L2+ Aerosol Optical Depth (AOD) and Aerosol Particle Size (APS) Release  
Beta Data Quality  
October 25, 2024  
Read-Me for Data Users

The GOES-19 Advanced Baseline Imager (ABI) L2+ Aerosol Optical Depth (AOD) and Aerosol Particle Size (APS) products were declared Beta maturity on October 1, 2024. No formal review was conducted because the algorithms are identical to the ones running with GOES-16 and GOES-18, so the Beta declaration of the ABI L1b and CMI flows down to the ABI L2+ products.

The ABI L2+ AOD product file includes the total column aerosol optical depth (AOD) at 550nm over land and over water, and the aerosol particle size (APS) over water. The AOD retrievals are produced during the daytime over clear-sky and snow-free regions, with view and solar zenith angles less than 90 degrees, and sun glint angles greater than -36 degrees over the ocean. The current algorithm includes retrievals over both dark land and bright land. The ABI L2+ APS is reported as the Ångström exponent (AE), which describes the wavelength dependence of aerosol optical depth. It is derived only over water from the aerosol optical depth retrieved in two pairs of ABI spectral bands, resulting in two values, AE1 and AE2, corresponding to the pairs of ABI bands in the visible and near-infrared spectrum. As such, APS does not provide a value of particle size in units of length, instead it is a proxy for it. Larger values of the Ångström exponent indicate smaller size particles and vice versa.

Data coverage over the Full Disk (FD) of the Earth is available every 10 minutes and within the Continental United States (CONUS) region every 5 minutes in operational mode 6. Note that AOD and APS are not provided in the Mesoscale domain. Data are available on a 2-km fixed grid.

A full description and format of the AOD product is in 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 Enterprise algorithm used to derive AOD and APS from ABI observations is described in the "EPS Aerosol Optical Depth (AOD) Algorithm Theoretical Basis Document", located on STAR's GOES-R ATBD webpage: [https://www.star.nesdis.noaa.gov/goesr/documentation\\_ATBDs.php](https://www.star.nesdis.noaa.gov/goesr/documentation_ATBDs.php).

GOES-19 ABI AOD and APS were compared to corresponding GOES-16 and GOES-18 products, which showed reasonable consistency with GOES-16 and GOES-18.

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.

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 AOD 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. The AOD product is sensitive to upstream processing, such as the quality of calibration, navigation, and cloud mask.

Known product issues:

1. When reading AOD product data, note that 'AOD', 'AE1' and 'AE2' and its valid range are stored as unsigned integers.
2. The retrieval algorithm uses GOES-16 land spectral surface-reflectance relationships developed at its operational position and is not optimal for the test position GOES-19 is currently at.
3. Blocks of missing values occur randomly in mode 6 and in even larger numbers in mode 4.
4. The long name of variable "aod\_outlier\_pixel\_count" is set as "number of aerosol optical depth at 550 nm pixels over land whose value is outside valid measurement range"; it should read "number of aerosol optical depth at 550 nm pixels over land *and -water* whose value is outside valid measurement range".

Contact for further information: OSPO User Services at [SPSD.UserServices@noaa.gov](mailto:SPSD.UserServices@noaa.gov)

Contacts for specific information on the ABI L2+ AOD and APS products:

Istvan Laszlo: [istvan.laszlo@noaa.gov](mailto:istvan.laszlo@noaa.gov)