GOES-17 ABI L2+ Aerosol Optical Depth (AOD) Release
Beta Data Quality
September 13, 2018
Read-Me for Data Users

The GOES-17 Advanced Baseline Imager (ABI) L2+ Aerosol Optical Depth (AOD) product was declared Beta maturity on August 27, 2018. No formal review was conducted because the algorithms are identical to the ones running with GOES-16, so the Beta declaration of the ABI L1b and CMI flows down to the ABI L2+ products.

The ABI L2+ AOD product include the aerosol optical depth at 550nm over land and over ocean. 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 40 degrees over the ocean and over dark land (ABI band 6, 2.25 μm, TOA reflectance not greater than 0.25). Because the current algorithm restricts retrievals to dark surfaces AOD data is not available for non-vegetated, sparsely vegetated, or desert land surfaces. Data coverage over the Full Disk (FD) of the Earth is available every 15 minutes and within the Continental United States (CONUS) region every five minutes in operational mode 3. In mode 4, FD observations are taken every five minutes, from which the CONUS domain is extracted. Note that AOD products are not provided in the Mesoscale domain. Data are available on a 2-km fixed grid.

Full description and format of the AOD product is in 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 AOD from ABI observations is described in the "GOES-R Advanced Baseline Imager (ABI) Algorithm Theoretical Basis Document for Suspended Matter/Aerosol Optical and Aerosol Size Parameter" (http://www.goes-r.gov/products/ATBDs/baseline/AAA_AODASP_v2.0_no_color.pdf).

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-17 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' and its valid range are stored as unsigned integers.
2. The retrieval algorithm uses GOES-16 coefficients (look-up-tables, gas-correction coefficients and spectral surface-reflectance relationships) that have not yet been "tuned" to GOES-17.
3. Internal tests have not yet been tuned for the GOES-17 AOD algorithm.
4. Blocks of missing values occur sometimes and randomly in mode 3, and in even larger numbers in mode 4.
5. The variable "algorithm_dynamic_input_data_container", meant to list names of dynamic input data files required to run AOD algorithm, is currently not set (null).
6. Mismatch between the latitude band metadata and variable 'latitude_band_bounds'. (Zonal average values are assigned to the wrong latitude bands.)
7. Inconsistent units (percent) and valid range (0, 1) in metadata variables "lat_band_aod550_percent_...".
8. 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 ocean** whose value is outside valid measurement range".
9. Focal Plane Module (FPM) overheating impacts the longwave infrared (LWIR) channels of the GOES-17 ABI. This has the following consequences for the AOD product.
    - Because the algorithm uses the visible and near-infrared channels (channels 1-6) for AOD retrieval, there is minimal impact on the AOD retrieval.
    - The upstream Clear Sky Mask (CSM), used for selecting pixels for AOD retrievals, is impacted by the LWIR FPM overheating. This in turn affects the number of retrieved AOD pixels in the first few hours of the daytime.
    - Channel 14, a LWIR channel, which is used to screen for snow and ice, affects the number of retrieved AOD pixels and the quality of retrievals over these surfaces during the first few hours of the daytime.

Known PUG issues:

1. The PUG defines the variable "algorithm_static_input_data_container", meant to list the names of static algorithm input data files. However, this variable is not present in the AOD product file.

Contact for further information: OSPO User Services at SPSD.UserServices@noaa.gov

Contacts for specific information on the ABI L2 AOD product:
Shobha Kondragunta: shobha.kondragunta@noaa.gov
Jaime Daniels: jaime.daniels@noaa.gov