

## GOES-16 ABI L2+ Aerosol Optical Depth (AOD) Release, Beta Data Quality

June 16, 2017

Read-Me for Data Users

The GOES-R Peer/Stakeholder Product Validation Review (PS-PVR) for Advanced Baseline Imager (ABI) L2+ Aerosol Optical Depth (AOD) Beta Maturity was held on May 24, 2017. As a result of this review, the PS-PVR panel recommended that the ABI AOD product be declared Beta.

The ABI L2+ AOD product includes the aerosol optical depth at 550 nm over land and ocean. The AOD retrievals are produced during daytime over clear-sky and snow-free regions, with view and solar zenith angles less than 90 degrees, sun glint angles greater than 40 degrees over the ocean, and over dark land (ABI band 6, 2.25  $\mu\text{m}$ , TOA reflectance not greater than 0.25). 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. No AOD products are 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 GOES-16 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](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.

Beta 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-16 ABI Beta maturity AOD products 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 being resolved include:

1. The retrieval algorithm uses pre-launch processing coefficients (look-up-tables, gas-correction coefficients and spectral surface-reflectance relationships) that have not yet been "tuned" to ABI.
2. Internal tests have not yet been implemented/tuned in the AOD algorithm.

3. As a result of 1) and 2) AOD is overestimated; overestimation is especially significant over ocean as seen from the initial evaluation of the product with ground-based (AERONET) measurements.
4. Blocks of missing values occur frequently 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. Metadata for AOD and surface reflectivity is sometimes out of valid range.
7. Mismatch between the latitude band metadata and variable 'latitude\_band\_bounds'.
8. DQF attributes 'percent\_good\_retrieval\_qf' and 'percent\_bad\_retrieval\_qf' may have incorrect values.
9. Metadata variables 'lat\_band\_aod550\_percent\_...' may have incorrect values.
10. Inconsistent units (percent) and valid range (0, 1) in metadata variables "lat\_band\_aod550\_percent\_...".
11. Variable "aod\_outlier\_pixel\_count" the long name 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".
12. The metadata 'standard\_name' in variable AOD should read "atmosphere\_ **extinction**\_optical\_thickness\_due\_to\_ambient\_aerosol" instead of "atmosphere\_absorption\_optical\_thickness\_due\_to\_ambient\_aerosol".

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.