

GOES-16 ABI L2+ Cloud Optical and Microphysical Properties (COMP)
Cloud Optical Depth (COD)
Full Data Quality
May 16, 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, GOES-16 Cloud Optical and Microphysical Properties (COMP) Cloud Optical Depth (COD) product is considered Full Validation maturity as of February 22, 2020. The Baseline COMP algorithm was then transitioned to the Enterprise COMP algorithm on March 9, 2023.

The ABI L2+ Cloud Optical Depth product assigns each earth-navigated cloudy pixel a value. Non-cloudy pixels or those for which the retrieval was not successful receive fill values. For pixels with solar zenith angles less than or equal to 82° (daytime), valid COD values can range from 0.5 to 50.0 while pixels with solar zenith angles greater than 82° (nighttime) will have valid COD values ranging from 1.0 to 8.0. COD values outside those ranges are considered less accurate and their usage is not recommended. Similarly, pixels with solar zenith angles between 65° and 90° should be considered less accurate and do not meet the product specifications. Daytime COD values are derived using visible and near-infrared channels while the nighttime COD values are derived from near-infrared and infrared channels. The COD product is generated for every ABI Full Disk (FD) of the Earth and Continental United States (CONUS) region.

A full description and format of the COD product can be found 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 algorithm used to derive the COD product from GOES-16 ABI observations is described in detail in the "Enterprise Algorithm Theoretical Basis Document for Cloud Optical and Microphysical Properties", located on STAR's GOES-R ATBD webpage: 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-16 ABI Full maturity Cloud Optical Depth 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. This product is sensitive to upstream processing, such as the quality of the calibration, navigation and the other cloud algorithms (mask, type/phase, height).

Known issues at Full Validation include:

1. Missing values occur randomly due to upstream L1b issues;
2. The upstream cloud algorithms can lead to clear regions being assigned a cloud optical depth or cloudy regions being classified as clear sky, hence receiving no COD value;
3. Issues in the NWP products can cause upstream cloud algorithms to misidentify cloudy pixels as non-cloudy so COD retrievals are not performed;
4. Optically thin cirrus clouds are sometimes misclassified as liquid water, supercooled liquid water or mixed phase, which impacts COD values;
5. The risk of misclassifying liquid water clouds as ice is greatest in regions with broken cumulus clouds, hence COD values are impacted in those situations;
6. The ability to correctly identify clouds that have both liquid water and ice within the portion of the cloud influencing the measured ABI radiances is limited;
7. Any past or future calibration changes to channels involved in the day or night COD retrievals can impact the COD retrievals.

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

Contacts for specific information on the ABI L2 COD product:

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