

GOES-18 ABI Level 1b Radiances and Level 2 Cloud and Moisture Imagery
Provisional Data Quality
August 4, 2022
Read-Me for Data Users

The GOES-R Peer/Stakeholder Product Validation Review (PS-PVR) for GOES-18 ABI Level 1b Radiances (L1b) and Cloud and Moisture Imagery (CMI) was held on July 28, 2022. As a result of this review, the panel chair declared that these products met the criteria for Provisional maturity.

The GOES-18 ABI L1b data products are calibrated and geo-located radiances of the 16 ABI bands over the Full Disk (FD) of the Earth, the Contiguous United States (CONUS) region, the Mesoscale (MESO) regions, and certain instrument calibration and engineer data. The CMI data products are the L1b data converted to reflectance factor for visible and near infrared (VNIR) channels or brightness temperature for infrared (IR) channels. These data have no parallax on the fixed angular grid, but if transformed to latitude/longitude grid, there can be parallax effects introduced.

By definition, Provisional maturity means that:

- Validation activities are ongoing and the general research community is now encouraged to participate.
- Severe algorithm anomalies are identified and under analysis. Solutions to anomalies are in development and testing.
- Incremental product improvements may still be occurring.
- Product performance has been demonstrated through analysis of a small number of independent measurements obtained from select locations, periods, and associated ground truth or field campaign efforts.
- Product analysis is sufficient to communicate product performance to users relative to expectations (performance baseline).
- Documentation of product performance exists that includes recommended remediation strategies for all anomalies and weaknesses. Any algorithm changes associated with severe anomalies have been documented, implemented, tested, and share with the user community.
- Testing has been fully documented.
- Product is ready for operational use and for use in comprehensive calibration/validation activities and product optimization.

Users of Provisional data bear 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 Provisional L1b and CMI products for any reason, including but not limited to scientific and technical investigations, are encouraged to gather more information from the GOES-R program and other web pages. Full description and format of the L1b and CMI products are 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 CMI from GOES-18 ABI observations is described in the "GOES-R Advanced Baseline Imager (ABI) Algorithm

Theoretical Basis Document for Cloud and Moisture Imagery (CMIP)”

(https://www.star.nesdis.noaa.gov/goesr/documents/ATBDs/Baseline/ATBD_GOES-R_ABI_CMI_KPP_v3.0_July2012.pdf).

Users are advised to be aware of the following issues:

1. Significant stray light may exist for VNIR channels approximately one hour before and after satellite local midnight for approximately forty days before and after the vernal (spring) and autumnal (fall) equinox, and may exist at other times of the day and in other days of the year. This has been confirmed with previous ABI and partially verified for GOES-18 ABI. Users are reminded that there is no requirement for VNIR channels stray light at night.
2. Stray light is expected for Band 7 (3.9 μm) within the Zone of Reduced Data Quality (ZRDQ) approximately one hour before and after satellite local midnight for approximately forty days before and after the vernal (spring) and the autumnal (fall) equinox. Stray light was detected for Band 7 within the ZRDQ between April 21 and May 3. The residual stray lights for GOES-18 ABI are less intense than those for GOES-16 and GOES-17 ABI, both of which meet the requirements. Nevertheless, some applications may still find the reduced data quality undesirable.
3. Band 5 is 5.8% brighter than the NOAA-20 VIIRS and 2.1% brighter than SNPP VIIRS. The requirement is 5%. Because of the limited amount of data for evaluation at this time, the uncertainty of these estimates is $\pm 5.1\%$, i.e., the actual difference has 66% chance to be 0.7% - 10.9% compared to NOAA-20 VIIRS, or -3% - 7.2% compared to SNPP VIIRS. The reference radiometer was SNPP VIIRS for GOES-16/17 and NOAA-20 VIIRS for GOES-18. Because of these factors, the calibration of Band 5 has not been modified.
4. VNIR channel gains may vary slightly with the beta angle (seasonally). The pattern and magnitude is similar to those for GOES-16/17 ABI. A correction for all ABIs is being investigated.
5. Band 7 has higher noise than the Band 7 on GOES-16 and GOES-17. The noise seems to self-organize into north-south oriented bands of warm and cold stripes, known as “barcode artifact”. This is more visible in images of uniformly cold scenes, animations, and time- or channel-differences such as nighttime cloud microphysics. The root cause and mitigation of the barcode artifact is under investigation.

Note that all the issues associated with the ABI Level 1b product apply to CMI. There may also be inconsistencies with the minimum (scene) Brightness Temperatures values.

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

For specific information about the GOES-18 ABI L1b Radiance and CMI data, contact:

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