

GOES-19 ABI Level 1b Radiances and Level 2 Cloud and Moisture Imagery
Provisional Data Quality
December 23, 2024
Read-Me for Data Users

The Provisional GOES-R Peer/Stakeholder Product Validation Review (PS-PVR) for GOES-19 ABI Level 1b (L1b) Radiances and Cloud and Moisture Imagery (CMI) was held on 20 December 2024. As a result of this review, the panel chair declared that these products met the criteria for Provisional Maturity.

The GOES-19 ABI L1b data products are calibrated and geo-located radiances of 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. Parallax effects are not corrected for these data on the fixed angular grid.

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-19 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, located on the OSPO documents webpage: <https://www.ospo.noaa.gov/resources/documents/goes-r.html>. The algorithm used to derive CMI from GOES-19 ABI observations is described in the GOES-R Advanced Baseline Imager (ABI) Algorithm Theoretical Basis Document (ATBD) for Cloud and Moisture Imagery

(CMIP), located on the STAR ATBD webpage:

https://www.star.nesdis.noaa.gov/goesr/documentation_ATBDs.php.

Known issues that users should be aware of include:

1. Solar channel gains have an unexpected trend that may cause more than 0.2% fluctuation between calibrations or ~2% change in a year. Investigation and mitigation of the root cause is under way. An empirical correction may be offered in fall 2025 if the root cause cannot be found.
2. Current detector used on Row 682 of Band 2 is defective, occasionally causing a defective line (stripe) in images of all segments. Mitigation is under way.
3. Faint striping can be detected in Band 1 imagery, likely due to suboptimal nonlinearity coefficients (Q-LUT). Mitigation is under way.
4. Minor discontinuity (“banding”) may be observed in swath boundary of Band 16 imagery. Mitigation is under way.
5. Band 16 radiance is lower than commonly accepted references that results in a cold bias in brightness temperature equivalent to 0.5 K at 300 K. This is likely due to an error in its Spectral Response Function (SRF). A solution to this will be worked before Full Validation.
6. While meeting requirements individually, biases for GOES-19 and GOES-16 may have opposite signs, resulting in large relative differences between the two ABI in the solar bands. This will be resolved soon using GSICS Harmonization in L1b data stream.
7. Approximately one hour before and after satellite local midnight for about forty days before and after the vernal (spring) and autumnal (fall) equinox:
 - a. Stray light may occur in Visible Near-Infrared (VNIR) channels. This is allowed, because there is no straylight requirement for VNIR channels at night.
 - b. Stray light may create a Zone of Reduced Data Quality (ZRDQ) for Channel 7 (3.9 μm). The intensity and extent of stray GOES-19 light meet the requirement and are comparable with those for GOES-16/18.

Note that all the issues associated with the ABI L1b product apply to CMI. The CMI conversion coefficients (to brightness temperature) are updated for GOES-19. There may be inconsistencies between the mean (scene) radiances in an L1b and mean brightness temperature values in a Level 2 (L2) CMI file. In CMI files, maximum brightness temperature metadata does not always reflect the largest CMI value when pixels are saturated due to a fire in the shortwave window band (Channel 7).

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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