GOES-19 GMAG Level 1b (L1b) Release
Provisional Data Quality
January 24, 2025
Read-Me for Data Users

The GOES-19 Peer Stakeholder Product Validation Review (PS-PVR) for Goddard Magnetometer (GMAG) L1b Provisional Validation Maturity was held on January 24, 2025. The result of this review was the PS-PVR panel chair recommending that the GMAG L1b data be declared Provisional Validation maturity.

The L1b data products derived from GMAG are vector measurements of the geomagnetic field sampled at 10 Hz from the inboard and outboard magnetometers.

The GOES-19 GMAG Level 1b (L1b) Provisional maturity data products are suitable for operational use with documented known considerations and implementation of critical fixes. Product performance has been demonstrated through analysis of a small number of independent measurements obtained from select locations, periods, and comparisons to nearby spacecraft and magnetic field models. The product was calibrated and validated to the extent allowed within resources available. Users bear all responsibility for inspecting the data prior to use and for the manner in which the data are utilized.

The L1b GOES-19 data set released on the NCEI website (listed below) includes a correction for arcjet contamination. However, it is highly recommended that users use the arcjet flag described below to flag the periods contaminated by arcjet firings. The correction matrices are not optimized for GOES-19. For details on the arcjet contamination and correction algorithm see Califf et al., (2019, 2020).

Additionally, L2 products based on this scientific data set are also available at the NCEI website (listed below).

Provisional Validation means:

- Validation, quality assurance, and anomaly resolution activities are ongoing;
- Solutions to severe algorithms anomalies are in development and testing;
- Incremental product improvements may still be occurring;
- Users are engaged and user feedback is assessed;
- Product performance has been demonstrated through analysis 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 and testing has been documented;
- The product is ready for operational use in comprehensive calibration/validation activities and product optimization.

We recommend that persons using the GOES-19 GMAG Provisional Validation maturity L1b products for scientific and technical investigations, particularly model validation, model development, and plasma

waves analysis, contact the responsible NOAA scientists before making definitive scientific or technical conclusions derived directly from the GMAG data.

Cautions, known issues, and issues under work for resolution at Provisional maturity status:

1. The outboard and inboard sensors (OB_* or IB_* variables in the L1b files) can be used for science and technical investigations.
2. The L1b files contain magnetic field variables that have “uncorrected” or “corrected” added to the variables name, indicating whether the data have been corrected for arcjet effects. In addition, an arcjet flag was added to the data quality flag (DQF) variable that covers the period where arcjets are fired and contaminate the magnetic field observations. Hence, it is highly recommended that users use the arcjet flag data quality bit named potentially_degraded_due_to_arcjet_firing_qf to flag the periods contaminated by arcjet firings.
3. The amb_mag_* variables in the L1b files refer to the best observation of the geomagnetic field, which is currently set to the outboard sensor values. This product is being further studied for Full maturity validation. This variable should be the default magnetic field observation used by users for science and technical investigations.

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

NCEI contact for specific information on the MAG L1b data:
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NCEI website for GOES-R Space Weather data: https://www.ngdc.noaa.gov/stp/satellite/goes-r.html

References:

Califf, S., Early, D., Grotenhuis, M., Loto'aniu, T. M., and Kronenwetter, J. (2020) Correcting the arcjet thruster disturbance in GOES-16 magnetometer data. Space Weather, 18, doi:10.1029/2019SW002347.

Califf, S., Loto’aniu, T. M., Early, D., and Grotenhuis, M. (2019) Arcjet Thruster Influence on Local Magnetic Field Measurements from a Geostationary Satellite, Journal of Spacecraft and Rockets, Vol. 57, No. 1, doi:10.2514/1.A34546