

GOES-17 SEISS MPS-HI Level 1b (L1b) Data Release  
Provisional Data Quality  
December 18, 2018  
Read-Me for Data Users

The Peer Stakeholder - Product Validation Review (PS-PVR) for the GOES-17 Space Environment In-Situ Suite (SEISS) Magnetospheric Particle Sensor – High Energy (MPS-HI) L1b Provisional Maturity was held on December 18, 2018. As a result of this review, NOAA has confirmed that the MPS-HI L1b data are at Provisional Validation Maturity as of December 18, 2018.

The MPS-HI L1b data product consists of 50 keV – 4 MeV electron fluxes and 80 keV – 12 MeV proton fluxes. MPS-HI consists of 5 electron solid-state (silicon detector) telescopes and 5 proton solid-state (silicon detector) telescopes with 30-degree full-width conical fields-of-view, arranged in a north-to-south fan with field-of-view centers separated by 35 degrees.

Each electron telescope reports 10 differential channels plus a >2 MeV integral channel. Each proton telescope reports 7 channels in the 80 keV – 1 MeV range and 4 channels in the 1-12 MeV range. The highest three energy channels generally register counts above backgrounds only during solar energetic particle events.

In addition, there are two dosimeters that distinguish dose from particles depositing < 1 MeV and > 1 MeV under domes of 250 and 100 mil aluminum shielding.

Provisional validation maturity, by definition, means:

- 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 GOES-14 and -16, separated from GOES-17 one hour in local time;
- Product analysis is sufficient to establish product performance 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, and tested;
- Testing has been fully documented;
- Product is ready for operational use and for use in comprehensive cal/val activities and product optimization.

Users of the GOES-17 MPS-HI L1b data bear responsibility for inspecting the data and understanding the known caveats prior to use. Below is the list of caveats that have been identified and are under analysis. Solutions are in development and testing.

1. No MPS-HI L1b data prior to declaration of Provisional Maturity should be used. NCEI will reprocess and release the early mission data using the Provisional Maturity algorithm and look-up tables.
2. Pitch angles are not yet available since the GOES-17 Magnetometer data have not yet reached Provisional Maturity.
3. Preliminary cross-comparisons among the MPS-HI electron telescopes using three months of data give scale factors ranging from 0.82 to 1.22 depending on the energy and telescope. These scale factors have not been applied to the data and will be revised following the application of this cross-comparison method to a longer period of data.
4. Preliminary cross-comparisons among the MPS-HI proton telescopes using three months of data give scale factors ranging from 0.73 to 2.56 depending on the energy and telescope. Some of these differences may be due to the finite gyroradii effects of the protons, particularly at higher energies, which has not been accounted for in the present analysis. These scale factors have not been applied to the data and will be revised following the application of an improved cross-comparison method to a longer period of data.
5. Preliminary comparisons between >2 MeV electron fluxes observed by GOES-17 MPS-HI and GOES-14 EPEAD indicate reasonable agreement. Remaining differences may be due to the much larger field-of-view on GOES-14; a quantitative evaluation of this effect is planned. Preliminary comparisons between >2 MeV electron fluxes observed by GOES-16 and -17 MPS-HI during the same period indicate excellent agreement.
6. Preliminary comparisons between GOES-17 MPS-HI electrons and GOES-14 MAGED electrons generally indicate good agreement, with some discrepancies, particularly between the lowest energy channels. The reasons for these discrepancies are being investigated.
7. Preliminary comparisons between GOES-17 MPS-HI protons and GOES-14 MAGPD protons indicate that MAGPD fluxes are a factor of 2-3 too low. GOES-16 MPS-HI protons are low with respect to GOES-17 measurements by a similar factor. The reasons for these discrepancies are being investigated. GOES-14 has been on-orbit since June 2009, i.e. nine years at the time of comparison, so radiation damage may be a factor.
8. Solar proton observations by GOES-17 MPS-HI could not be evaluated due to the lack of a SEP event since launch.
9. Comparisons between particle detectors with different energy channels must include careful estimation of the effective energies of the channels. The broader the channels, the more sensitive such estimates are to assumptions.

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NCEI website for GOES-R Space Weather data (provides daily aggregations of MPS-HI L1b data):

<https://www.ngdc.gov/stp/satellite/goes-r.html>