

GOES-18 SUVI Level 1b (L1b) Data Release  
Full Validation Data Quality  
November 30, 2023  
Read-Me for Data Users

The GOES-R Peer Stakeholder - Product Validation Review (PS-PVR) for Solar Ultraviolet Imager (SUVI) Extreme Ultraviolet Imagery (EUV) L1b Full Validation Maturity was held on November 30, 2023. As a result of this review, the panel chair declared that the SUVI L1b data are at Full Validation Maturity as of November 30, 2023.

SUVI data consist of solar images in six extreme-ultraviolet passbands — 94 Å, 131 Å, 171 Å, 195 Å, 284 Å, and 304 Å — with a variety of exposure times and filters in place to ensure each image set captures the full dynamic range of solar phenomena. SUVI Level-1b images have a dimension of 1280×1280 pixels, each with an angular resolution of 2.5 arcsec per pixel, for a total field of view of 53.3 arcmin square. Some corners of each passband are obscured by instrumental vignetting.

SUVI files come in two standard formats: netCDF4 and Flexible Image Transport System (FITS). In both cases, image metadata provides the image navigation information necessary to locate and orient the Sun with respect to well-known astronomical coordinate systems. For both file formats, these metadata follow the World Coordinate System ([https://fits.gsfc.nasa.gov/fits\\_wcs.html](https://fits.gsfc.nasa.gov/fits_wcs.html)) conventions for FITS files. Users who are unfamiliar with these conventions are highly encouraged to review “Coordinate Systems for Solar Image Data” (Thompson, 2006), which is linked from this page.

Images are reported in units of radiance ( $W/m^2 \text{ str}^{-1}$ ), but care must be taken to handle the data array appropriately. In netCDF files, users should be sure to apply the ‘scale\_factor’ and ‘add\_offset’ attributes. In FITS files, users should apply the BSCALE and BZERO FITS keywords following the standard convention for each file format. Some FITS and netCDF readers may apply these corrections by default.

Full Validation means:

- 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 is defined and documented over a wide range of representative conditions obtained from other sun-observing EUV instruments.
- Products are operationally optimized, as necessary, considering mission parameters of cost and schedule, as compared to user expectations.
- All known product anomalies are documented, and shared with the user community.
- Product is operational.

Users of the GOES-18 SUVI 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.

1. SUVI L1b data from GOES-18 are presently valid beginning with observations on 2 November 2022. Observations prior to this date are radiometrically calibrated but have incorrect image navigation metadata. NCEI will reprocess and release the early mission data using the Provisional Maturity algorithm and look-up tables.
2. The calculation of image navigation metadata after yaw flips of the GOES satellites requires a look-up table update, so data immediately following yaw flip could have inaccurate navigation metadata. No yaw flips are currently planned for GOES-18.
3. There is a known offset in reported radiance across all channels between SUVI L1b files from GOES-16, GOES-17, and GOES-18. The relative calibration of the individual data sets is reliable, but users may experience issues when attempting to use these data products interchangeably. NCEI is currently studying this problem and will provide updated re-scaling parameters and look-up tables to eliminate the offset at a later date.
4. Some metadata entries in SUVI L1b files may be incorrect or incomplete. The EFF\_AREA keyword does not include the effect of the camera quantum efficiency on the instrumental effective area.
5. Spikes and bad pixels are not corrected for in SUVI L1b images, users may encounter negative valued pixels or NANs in the image array. Users should note that there is an additional image array that is the bad pixel table (or Data Quality Flag) in the SUVI L1b files.
6. The GOES-18 platform location presently is specified in Earth-Centered Earth-Fixed (ECEF) coordinates by the OBSGEO-X, -Y, and -Z keywords. Users requiring platform location in heliocentric coordinate systems can refer to Hapgood (1992; [http://dx.doi.org/10.1016/0032-0633\(92\)90012-D](http://dx.doi.org/10.1016/0032-0633(92)90012-D)) for information on coordinate conversions.
7. Some users may encounter compatibility issues between some netCDF readers and FITS standard keywords that include a hyphen such as DATE-OBS when they appear in the netCDF version of SUVI L1b files. Users are encouraged to contact NCEI to report such problems and for guidance on possible workarounds.
8. There is a small, uncorrected, and varying contribution to the camera roll angle (CROTA) for all SUVI instruments. The most likely contributions have been identified, and unfortunately cannot be accounted for in the real-time data stream. NCEI will correct past L1b data through reprocessing.

Contact for further information: OSPO User Services at [SPSD.UserServices@noaa.gov](mailto:SPSD.UserServices@noaa.gov)

Users are encouraged to contact the GOES-R SUVI team in the event they have questions or encounter difficulties with SUVI files. The NCEI website provides additional information and access to SUVI L1b files: <https://doi.org/10.7289/V5FT8J93>.

NCEI contacts for specific information on the SUVI L1b data: [goesr.suvi@noaa.gov](mailto:goesr.suvi@noaa.gov)

Christian Bethge [christian.bethge@noaa.gov](mailto:christian.bethge@noaa.gov)

Jonathan Darnel [jonathan.darnel@noaa.gov](mailto:jonathan.darnel@noaa.gov)

Pamela Wyatt [pamela.wyatt@noaa.gov](mailto:pamela.wyatt@noaa.gov)