SUVI Extended Corona Imaging (ECI) Experimental Data Products Read Me

Release 1.2, August 2026

The GOES-R Solar Ultraviolet Imager (SUVI) can be run in an extended coronal imaging mode to construct three-panel mosaic images in its 171 Å and 195 Å passbands (technical aspects of this imaging mode and its development are discussed in Tadikonda et al., 2019). As of this writing, 10 such imaging campaigns have been carried out: 3 with GOES-17, 5 with GOES-18, and 2 with GOES-19:

- 2018 August 11–September 13, GOES-17, described in Seaton et al. (2021)
- 2019 August 28–December 16, GOES-17, support for Parker Solar Probe Perihelion 3
- 2021 April 27–April 30, GOES-17, support for Parker Solar Probe Perihelion 8
- 2022 July 29–August 01, GOES-18, preliminary testing of the GOES-18 ECI sequencing
- 2022 August 11–September 8, GOES-18, support for Parker Solar Probe Perihelion 13
- 2024 March 19–22, GOES-18, support for Solar Orbiter crossing the Sun-Earth line
- 2024 March 28–April 1, GOES-18, support for Parker Solar Probe Perihelion 19
- 2024 April 5–10, GOES-18, support for Total Solar Eclipse on April 8
- 2024 October 22–25, GOES-19, preliminary testing of the GOES-19 ECI sequencing
- 2025 January 16–30, GOES-19, support for CCOR-1 observations

Preliminary data products from these campaigns in FITS format are available here (“Special Event Data”). Observations in these products are provided in time-normalized instrument counts, and have a preliminary data reduction process applied. Metadata are provided in the file headers; some of these files use the FITS HIERARCH metadata convention for extended engineering metadata. Critical metadata for scientific analysis (e.g. timestamps) are provided in standard FITS keywords.

Each of these campaigns implemented slightly different operational strategies and instrument/spacecraft variations, so the files vary somewhat from campaign to campaign. There are two especially important differences in the data between 2018 and the later campaigns.

- 2018: Center panel is a single 10-s exposure, side panels are 20-s exposures binned 2×2. When the mosaics are composed the side-panels are resampled to match the pixel scale (2.5 arcsec per pixel) of the center panel.

- 2019–2025: Center panel is a single 10-s exposure. Side panels are pixel-by-pixel medians of five 17-s exposures at full resolution. This somewhat reduces the effect of noise from particle hits in the side panel images compared to the 2018 data, and improves the overall image resolution as well.

There are several important artifacts in these data sets users may encounter:

- All 10 sets are affected by a strong glint that occurs when off-axis light enters the telescope during SUVI off-points in certain directions from the Sun. This glint varies slowly over time, and can be removed to some extent from the data. We have found that one effective strategy to remove this artifact is to calculate the long-term minimum for each pixel to construct a background stray-light model that can be subtracted from the data, similar to the approach used to remove stray light from visible light coronagraph images (see, for example, Thompson et al., 2010).
- Some of the campaigns coincide at least partially with SUVI's eclipse season, thus users will encounter periodic, once-per-day periods within these files when the solar image disappears or is degraded. These generally occur around 5:30 UT, with variable duration that is longest at the equinox.
- The 2019 data contain a yaw-flip maneuver, where the GOES-17 spacecraft is rolled by 180°. This occurred on 2019 Sept 9 at about 2040 UT. The ECI campaign was paused for the maneuver, yielding a data gap that spans parts of Sept 9 and 10. Because the instrument changed orientation during this maneuver, the characteristics of the stray light pattern also rotate by 180° for observations before versus after the maneuver.

The SUVI team is trying to develop better tools and techniques for these data. Updated data will be placed online as they are developed, and this ReadMe will be updated with information accordingly.

Acknowledgement & Data Use Policy

Do not redistribute these files. Refer all users to the NCEI file distribution site at: https://www.ncei.noaa.gov/products/goes-r-solar-ultraviolet-imager-suvi/

More SUVI information and visualizations are available at the Space Weather Portal (SPOT) here: https://ncei.noaa.gov/cloud-access/space-weather-portal/

The SUVI instrument paper is available here: http://doi.org/10.1029/2022SW003044

Where possible, users should acknowledge use of GOES data with the AAS Facilities keyword: http://journals.aas.org/authors/aastex/facility.html

Contact us

Send general requests for assistance with data access to swx.euv-imaging@noaa.gov or Josh Riley (josh.riley@noaa.gov).

Specific requests for assistance with SUVI ECI Data Products can be directed to Chris Bethge (christian.bethge@noaa.gov) or Jon Darnel (jonathan.darnel@noaa.gov).

References

Seaton, D. B., Hughes. J. M., Tadikonda, S. K., Caspi, A., DeForest, C. E., Krimchansky, A., Hurlburt, N. E., Seguin, R., & Slater, G. (2021) “The Sun's Dynamic Extended Corona Observed in Extreme Ultraviolet.” *Nature Astronomy*. DOI:10.1038/s41550-021-01427-8 [arXiv Preprint]

Tadikonda, S. K., Freesland, D. C., Minor, R. R., Seaton, D. B., Comeyne, G. J. & Krimchansky, A. (2019). “Coronal Imaging with the Solar Ultraviolet Imager.” *Sol. Phys.* 294: 3. DOI:10.1007/s11207-019-1411-0 [arXiv Preprint]

Thompson, W. T., Wei, K., Burkepile, J. T., Davila, J. M., & St. Cyr, O. C., *Sol. Phys.* 262: 213. DOI:10.1007/s11207-010-9513-8