

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

Release 1.1, September 2022

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, five such imaging campaigns have been carried out, three with GOES-17 and two with GOES-18:

- 2018 Aug 11–Sep 13, described in [Seaton et al. \(2021\)](#)
- 2019 Aug 08–Dec 16, supporting [Parker Solar Probe](#) Perihelion 3
- 2021 Apr 27–Apr 30, supporting Parker Solar Probe Perihelion 8
- 2022 Jul 29–Aug 01, preliminary testing of GOES-18 ECI functions
- 2022 Aug 11–Sep 9, GOES-18 long-term test; Parker Solar Probe Perihelion 13

Preliminary data products from these campaigns in FITS format are available here.

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 latter 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.
- 2019–2022: 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 five 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 is essentially invariable over time, and thus *can* be removed from the data. We have found 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](#).)

- The 2018, 2019, and autumn 2022 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 September 9 at about 2040 UT. The ECI campaign was paused for the maneuver, yielding a data gap that spans parts of Sep 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 observations after the maneuver.

The SUVI team continues to develop better analysis tools and techniques for these data. Helpful tools will be placed online as they are developed and this readme will be updated with information about these tools at that time.

Send general requests for assistance with data access to goesr.suvi@noaa.gov. Specific requests for assistance with SUVI ECI Data Products can be directed to Dr. Dan Seaton, daniel.seaton@noaa.gov or Dr. Chris Bethge christian.bethge@noaa.gov.

Acknowledgement & Data Use Policy

Please do not redistribute these files, refer all users to the NCEI file distribution site to ensure access to the latest, best quality products.

More information about the GOES-R Space Weather instruments and data is available at the NCEI website for GOES-R Space Weather data:

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

Where possible, users should acknowledge use of GOES data with the appropriate AAS Facilities keywords:

<http://journals.aas.org/authors/aastex/facility.html>

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References

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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](#)]

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