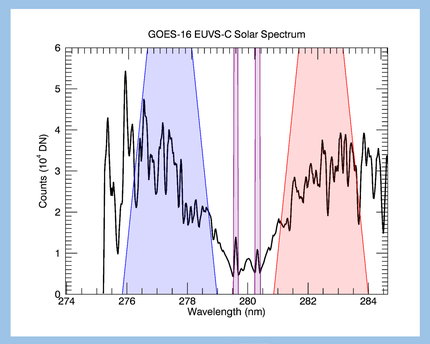
Magnesium II Index measurements from SORCE SOLSTICE and GOES-16 EUVS

M. Snow[1], J. Machol[2], F. G. Eparvier[1], A. R. Jones[1], and T. N. Woods[1]
University of Colorado: [1]LASP and [2]CIRES/NOAA/NCEI
snow@lasp.colorado.edu

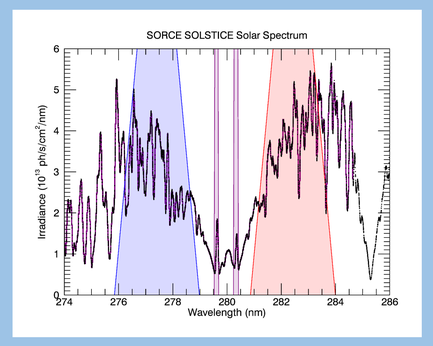
The Extreme Ultraviolet Sensor (EUVS) saw first light on January 20, 2017. It measures the solar spectrum near 280 nm, with a spectral resolution of 0.1 nm and 0.02 nm wide pixels. One spectrum every 3 seconds.

The MgII index is produced by a ratio of weighted sums for the core and wing regions. The weighting masks are shown as shaded regions. The weighting in the wings produces a measurement similar to the classic NOAA SBUV.

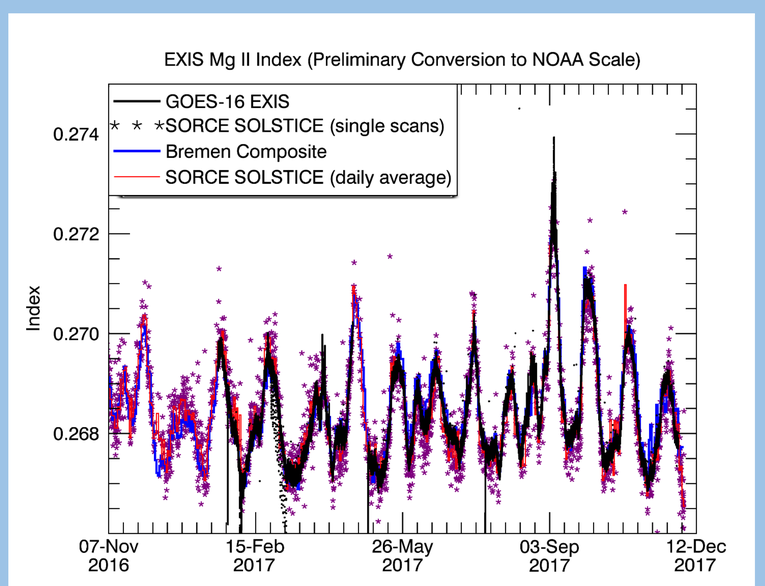


The SOLar-Stellar Irradiance Comparison Experiment (SOLSTICE) on the Solar Radiation and Climate Experiment (SORCE) was launched in 2003. It has a spectral resolution of 0.1 nm with grating steps of 0.03 nm. Several spectra per day.

In this study, weighted sums using the GOES-16 masks on an interpolated daily spectrum are used to create the index.

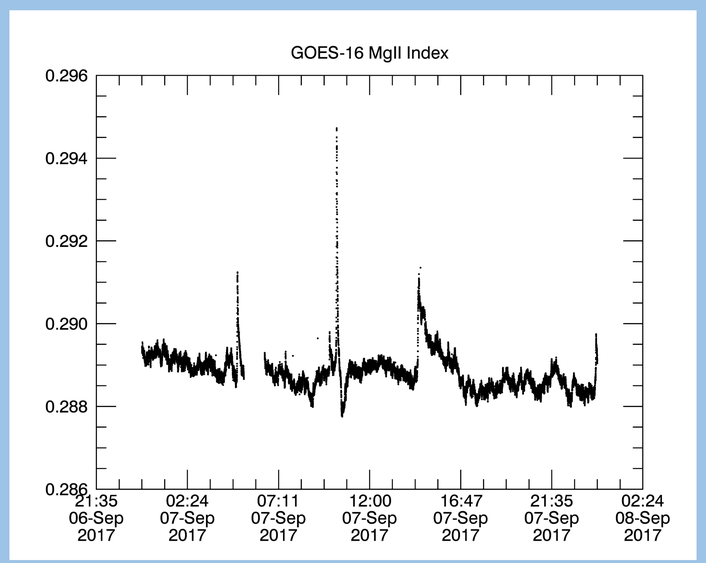


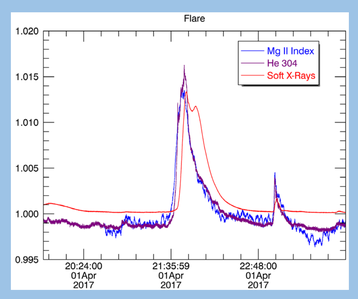
The Short



GOES-16 begins the future of the MgII facular proxy from NOAA. This is the first of four flight models, each with a 10-year mission lifetime. Instead of one measurement per day, the data will be collected operationally with a 3-second integration time from geo orbit.

High signal-to-noise and high time cadence allows GOES-16 to detect solar activity that was impossible to measure with previous generation instruments. This MgII index is a much better proxy for EUV variation.

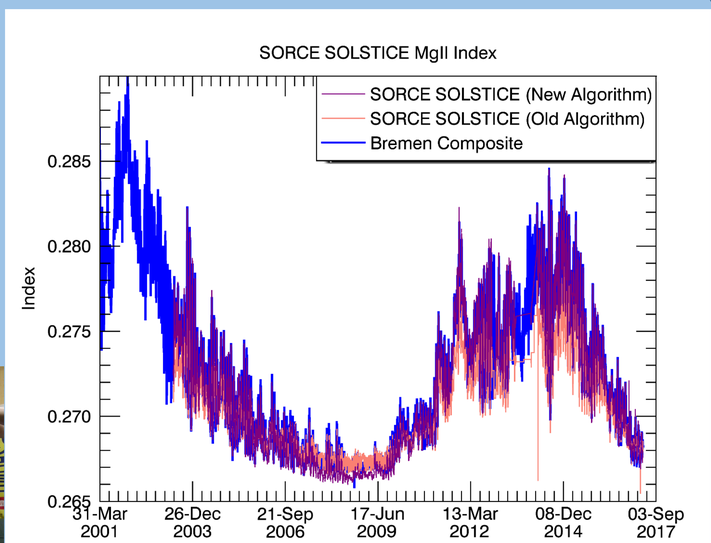




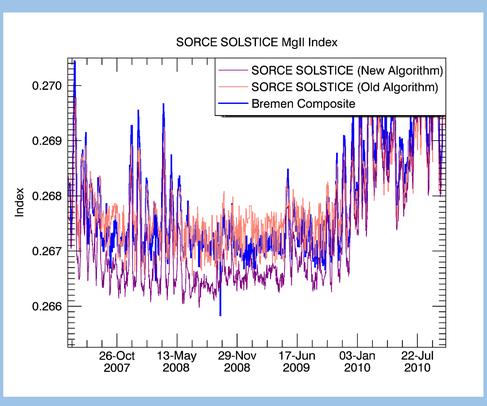
An example of the chromospheric and transition region responses to M-class flares.

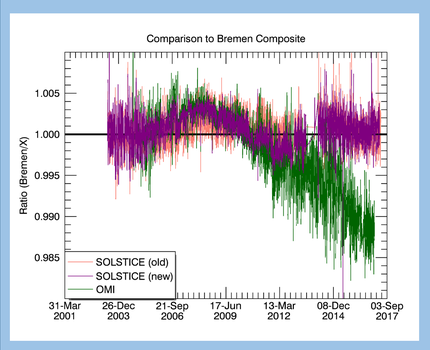
The Long

Using the algorithm developed for GOES-16 on SORCE SOLSTICE has greatly reduced the noise in the SORCE SOLSTICE MgII data product. The lower panel shows the difference at solar minimum.



The new algorithm uses all the data from a 24-hour time period to construct a single spectrum rather than taking the average of index measurements.





Comparison between SOLSTICE, OMI, and the Bremen composite show systematic differences that need to be reconciled.

SORCE Status: The spacecraft and all instruments continue to operate in a Day-Only Operations (DO-Op) mode. Plans are to continue to operate it for twelve months of overlap with the Total and Spectral Irradiance Sensor (TSIS) mission. TSIS is currently scheduled for launch on 12 December 2017.