Solar Spectral Irradiance: lyman Alpha, MagnEsium II, and Sigma k proxiEs (SSIAMESE)

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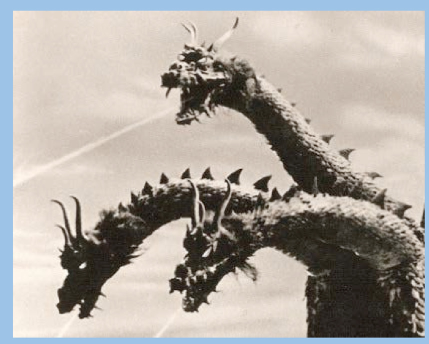
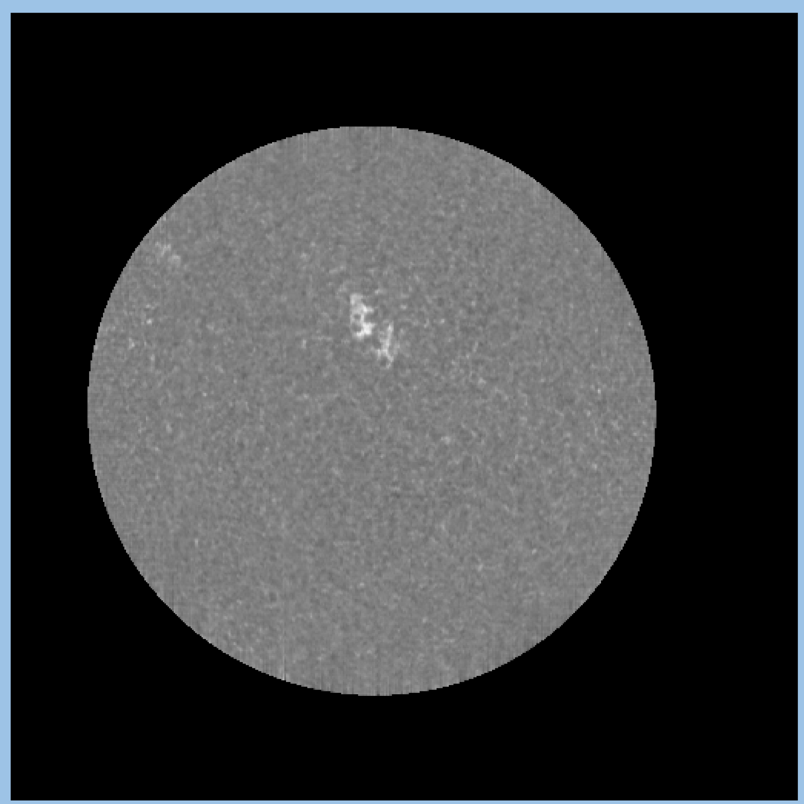
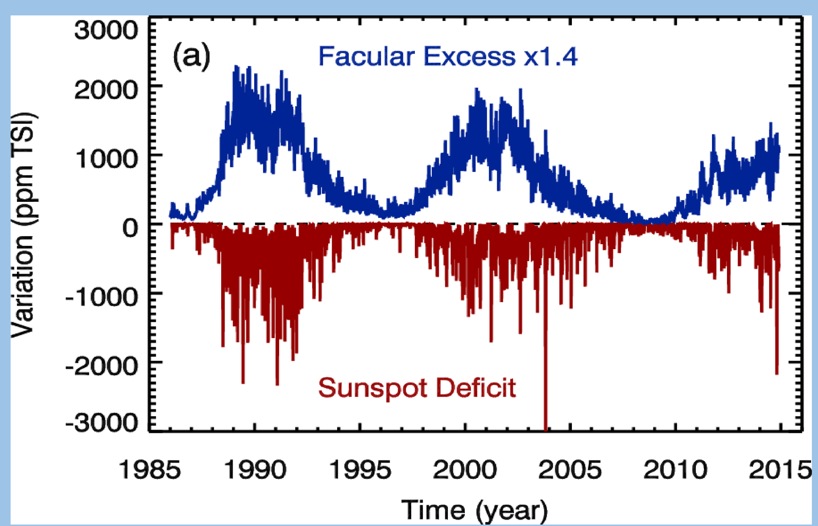
Objectives:

- Improve the San Fernando Observatory (SFO) proxies
- Improve the Lyman alpha composite
- Improve the Magnesium II composite



SFO Proxies





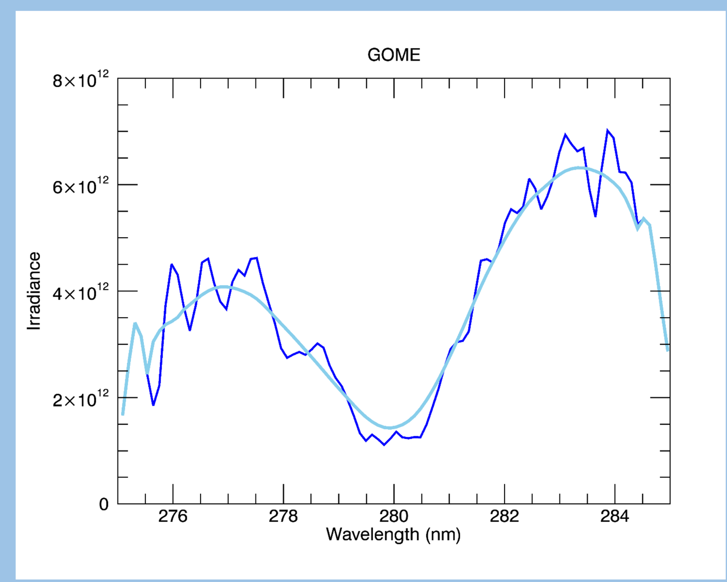
Daily solar images in Ca II K and nearby continuum are used to create facular excess and sunspot deficit proxies. These proxies are based on image contrast, and are therefore stable over long timescales.

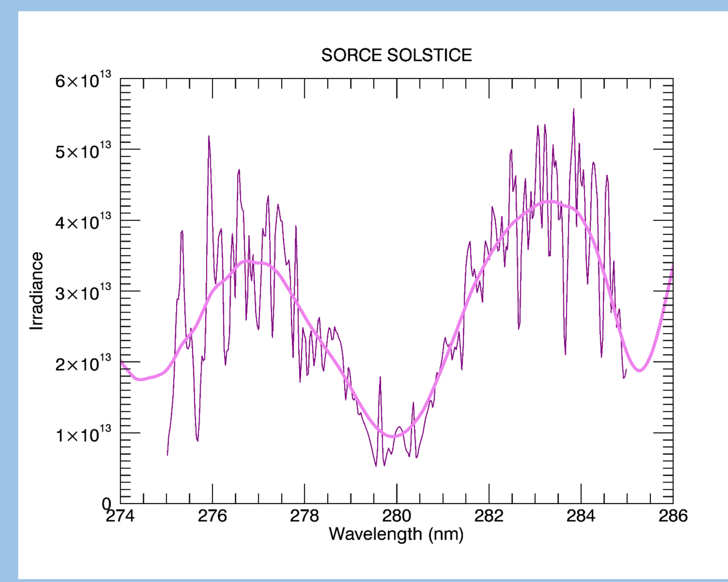
The SSIAMESE project is working towards making these proxies more readily available by hosting them on LISIRD http://lasp.Colorado.edu/lisird

SFO has moved its telescopes to the CSUN campus, and have resumed daily observations.

Magnesium II

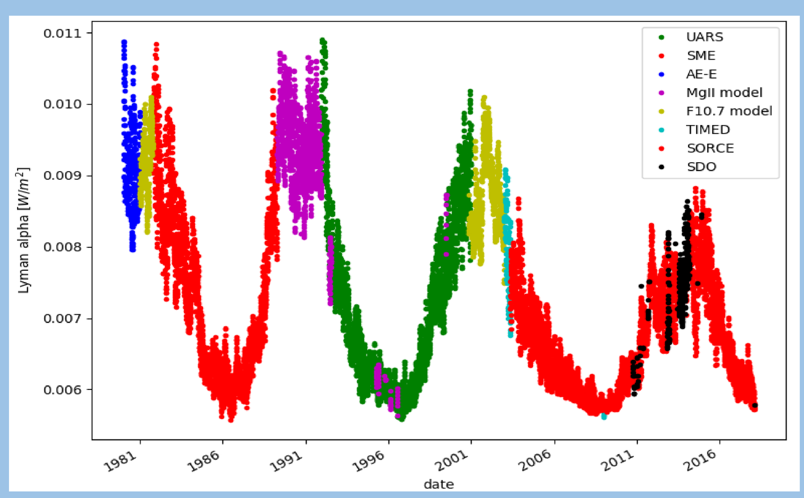
The biggest challenge in creating a composite MgII record is properly scaling each dataset without introducing artifacts. The algorithm that the Magnesium II mafia has adopted is to scale each dataset independently to a nominal 1.1 nm triangular instrument function. That obviates the need for overlap or selecting a preferred epoch.

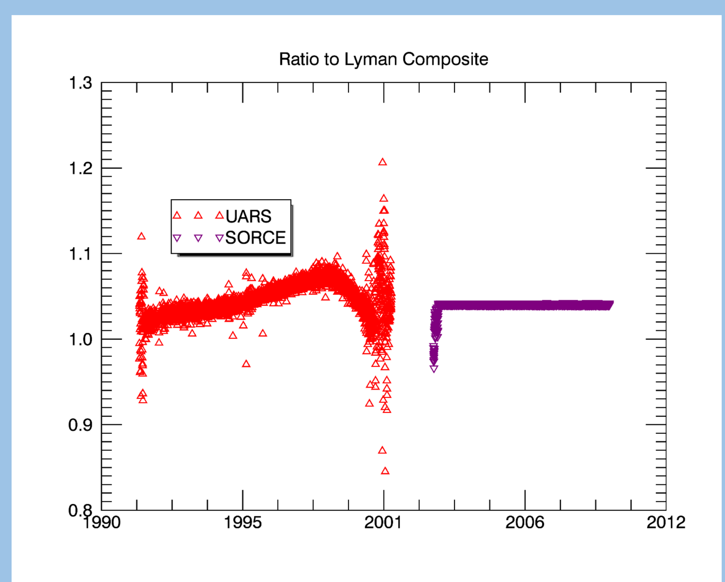




Lyman alpha

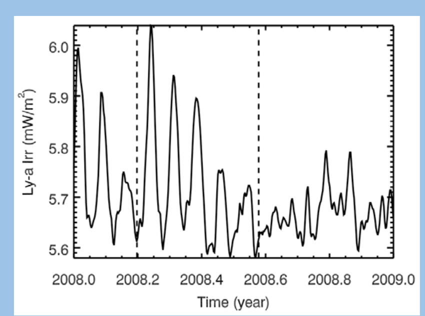
We are also updating the Woods et al. (2000) Lyman alpha composite. Since it was published, there have been new versions of several data products, including UARS SOLSTICE. We will revise the calibration of the entire composite to use SORCE SOLSTICE as the baseline, resulting in a 4% change everywhere. There are also discontinuities in 1989 and 1992 that we will correct. Additionally, we will investigate using F30 rather than F10.7 for the times when Lyman alpha observations are unavailable.

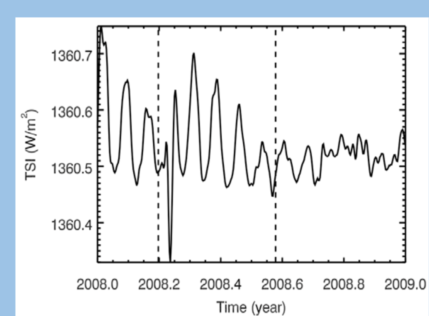




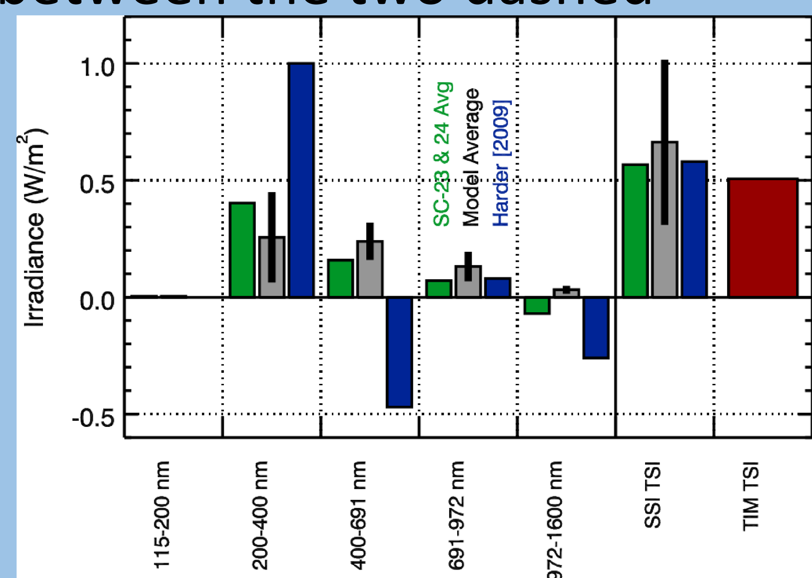
A Different View of Solar Spectral Irradiance Variations: Modeling Total Energy over Six-Month Intervals

Woods, Snow, Harder, Chapman, & Cookson (2015) Sol. Phys., 290, 2649





Solar Lyman-a (left) and TSI (right) time series in 2008 show outburst behavior (impulse response) of a single dominant active region between the two dashed lines.



The SOLSTICE-SIM energy variability results (grey bars) and average of the SC-23 and SC-24 variability measurements (green bars) are compared to the Harder *et al*. [2009] solar cycle variability results (blue bars). The composite for the energy variability used in this figure include SORCE SOLSTICE for 115-270 nm and SORCE SIM for 270-1600 nm. The grey bars use a scaling factor of 2.0 as expected from comparing the energy variability and solar cycle variability in the FUV. The SSI TSI is the sum of all the bands' irradiance variations