

SNS • SORCE News Source



Solar Radiation and Climate Experiment Monthly Newsletter

October 2015

2015 Sun-Climate Symposium –

We are looking forward to the Sun-Climate Symposium, “*Multi-Decadal Variability in Sun and Earth during the Space Era*,” which is Nov. 10-13, in Savannah, Georgia. Sponsors are the SORCE mission and the Sun-Climate Research Center – a joint venture between NASA GSFC and LASP at the University of Colorado.



The science overview, latest agenda, and all abstracts can be downloaded at the Symposium website:

<http://lasp.colorado.edu/home/sorce/news-events/meetings/2015-sun-climate-symposium/>

Session Overview

A detailed description of each session can be found on the meeting website.

Tuesday, November 10

- Session 1. *Total Solar Irradiance (TSI) Measurements and Modeling*
- Session 2. *Sun-Climate Connection: Top-down and bottom-up couplings*

Wednesday, November 11

- Session 3. *Climate Changes during the Space Era*
- Session 4. *Solar Spectral Irradiance (SSI) Measurements and Modeling*

Thursday, November 12

- Session 5. *Societal Impacts from Climate Change and Solar Variability*
- Session 6. *Variability of the Sun-like Stars*
- Session 7. *Challenges and Opportunities in Solar Observations*

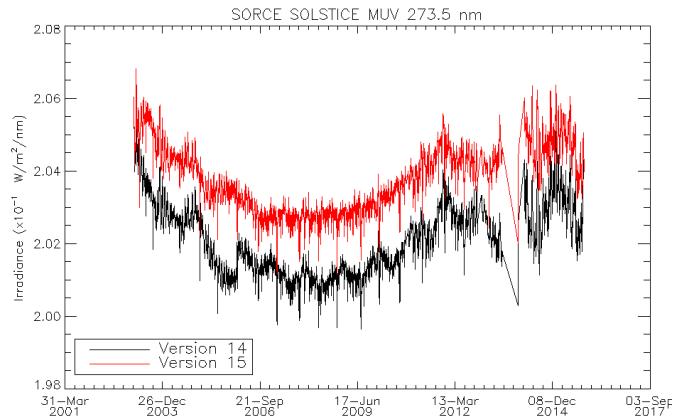
POSTER Session

Friday, November 13

- Session 8. *Next Generation Observing Systems for Climate Records*

SOLSTICE Version 15 –

By Marty Snow – LASP, University of Colorado



Sample time series showing the difference between versions 14 and 15 for SORCE SOLSTICE. The previous version is shown in black, while the new version is shown in red.

The latest version of SOLSTICE data has just been released. It includes several important corrections that improve the data quality.

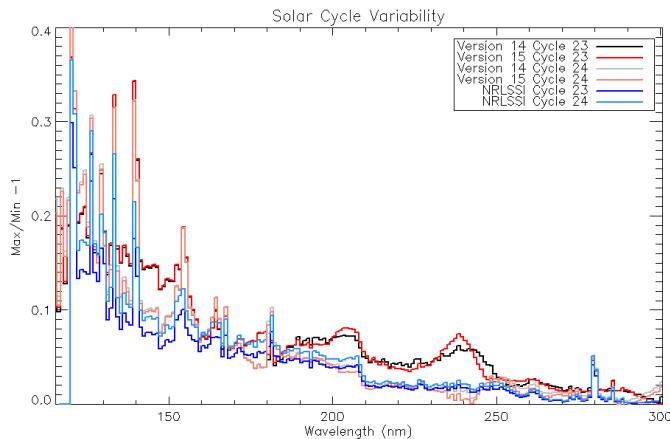
We have made two changes related to the January 2006 slit anomaly with the following effects: the discontinuity in the time series has been removed at most wavelengths, and the degradation correction is now fit separately before and after this event. We will continue to analyze the data from the first few years of the mission to improve our understanding of the instrument degradation during the decline of solar cycle 23.

Another correction is that we have discovered the cause of the annual oscillation in the SOLSTICE data. Although we make a correction for the Sun-Earth distance ($1/r^2$), we had not made a correction for the geometrical illumination of the optics due to the change in apparent size of the Sun. Using our weekly “haystack”

measurements, we calculated a change in the average responsivity over the year. This second order correction has been a great success in removing the periodic artifact from the data.

Finally, we have corrected for responsivity changes seen after the two extended safe-holds (six weeks in 2011 and six months in 2013). Without stellar measurements to track absolute responsivity, we have had to use comparisons to proxy models to estimate short term changes in the instrument. We have applied offsets to the responsivity using the SATIRE-S model. These offsets do not influence long term trends in the data, and we have added to the irradiance uncertainty. Version 14 applied such a correction to only the 2014+ data and only in the MUV. Version 15 also corrects data in 2012-2013 time frame and both FUV and MUV channels.

The solar cycle trends in the current version of SOLSTICE data are very similar to previous versions. The following plot shows the old version (black and gray), the new version (red and salmon), and the NRLSSI-1 model (blue and dodger blue) solar cycle variability for both the decline of cycle 23 and the rise of cycle 24. As before, SOLSTICE data is similar to model predictions for cycle 24, and still shows larger than expected variability in cycle 23.



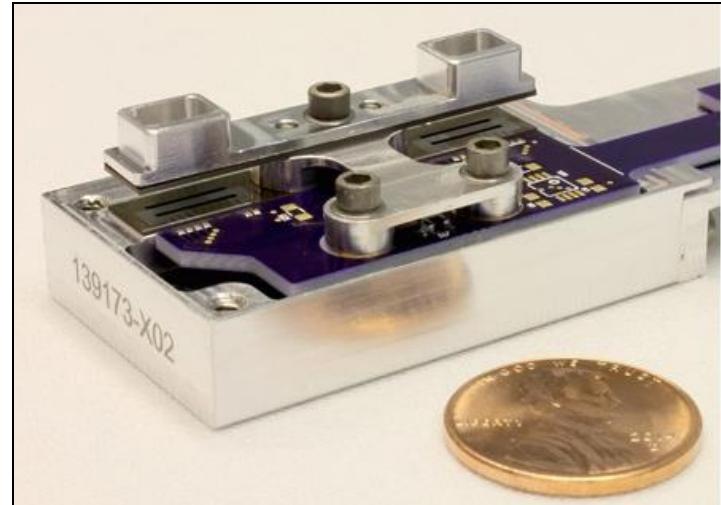
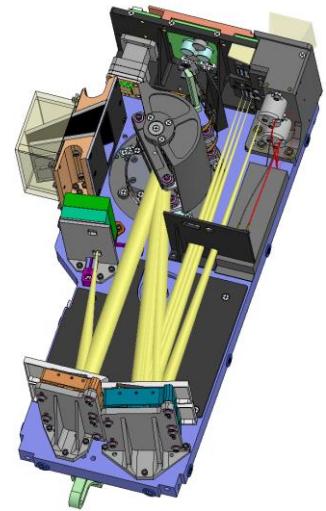
Solar cycle variability for the new version of SOLSTICE data compared to the previous version and the NRLSSI-1 model for the decline of cycle 23 and the rise of cycle 24.

We will continue to analyze the early-mission calibration data to derive the best degradation correction. In the past month, we have begun to take new calibration measurements to correct for the solar-stellar field-of-view, and we are working with the mission operations team to investigate the possibility of resuming some stellar measurements! Stéphane Béland's poster at the Sun-Climate Symposium next month will include further details on the new SOLSTICE data version. The future for SOLSTICE is very bright...almost as bright as the Sun!

CSIM Update –

By Erik Richard – LASP, University of Colorado

The Compact Spectral Irradiance Monitor (CSIM) is being developed under a \$4.5M NASA Instrument Incubator Program (PI Erik Richard) and it represents a new approach to acquiring solar spectral irradiance (SSI) measurements in the future. CSIM covers a continuous wavelength range of 200-2400 nm with the required SI-traceable accuracy and on-orbit stability to meet the solar input measurement requirements defined in the Earth Science Decadal Survey for establishing benchmark climate records. Building upon our experiences and resources from the TSIS SIM program, the instrument will reduce the cost, size, and calibration schedule of an SSI monitor with SI-traceable absolute calibration at the 0.2% uncertainty level ($k=1$) while maintaining the TSIS-level high relative stability.



Prototype CSIM ESR (Electrical Substitution Radiometer). The CSIM ESR bolometers use vertically aligned carbon nanotubes as the absorbers. This is a joint effort working with NIST

System level performance characterizations and final end-to-end absolute irradiance calibration/validation will be accomplished with the LASP Spectral Radiometer Facility (SRF), a comprehensive LASP-NIST jointly developed spectral irradiance calibration facility utilizing the SIRCUS tunable laser system tied to an SI-traceable cryogenic radiometer. The completed, flight-ready instrument will be cross-calibrated with the TSIS SIM and will potentially mitigate data continuity risks associated with future mission delays by offering an instrument with implementation flexibility for alternative flight opportunities, including ride share and hosted payloads, small satellites, and dedicated CubeSat missions.

SORCE-Related Sessions and Presentations at AGU Meeting –

While you are planning your schedule for the upcoming Fall AGU Meeting, Dec. 14-18, in San Francisco, please make note of the following SORCE-related talks and posters.

SH23B-2438 Lyman Alpha Line Profile Observations from SORCE SOLSTICE

Tuesday, 15 December 2015, 1:40 pm, Poster Hall
Authors: M. Snow, J. Machol, T. Woods, E. Quémérais, and J. Gruyer.

SH23B-2443 The Latest SORCE SIM Degradation Model and the Resulting SSI Measurements from 2003 to 2015

Tuesday, 15 December 2015, 1:40 pm, Poster Hall
Authors: S. Béland, J. Harder, M. Snow, T. Woods, and C. Lindholm

SH23B-2441 Construction of a SORCE-based Solar Spectral Irradiance (SSI) Record for Input into Chemistry Climate Models

Tuesday, 15 December 2015, 1:40 pm, Poster Hall
Authors: J. Harder and J. Fontenla

SH32A-06 Solar Spectral Irradiance Observations from the PICARD/PREMOS Radiometer

Wednesday, 16 December 2015, 11:48 am, Moscone West
Authors: M. Schöll *et al.*

GC31D-1212 Development, Production and Validation of the NOAA Solar Irradiance Climate Data Record

Wednesday, 16 December 2015, 8:00 am, Poster Hall
Authors: O. Coddington, J. Lean, P. Pilewskie, M. Snow, and D. Lindholm

SH23B-2450 Solar irradiance observed on the FY-3 satellites – instrument overview and primary observation results of in-orbit experiments

Tuesday, 15 December 2015, 1:40 pm, Poster Hall
Author: H. Wang

SH32A-03 A New Climate Data Record of Solar Spectral Irradiance from 1610 to Present

Wednesday, 16 December 2015, 10:54 am, Moscone West
Authors: O. Coddington, J. Lean, P. Pilewskie, M. Snow, and D. Lindholm



P21A-2050 New Sub-nanometer Spectral Estimates of the 0-5 nm Solar Soft X-Ray Irradiance at Mars Using the Extreme UltraViolet Monitor (EUVM) Onboard MAVEN

Tuesday, 15 December 2015, 8:00 am, Poster Hall
Authors: E. Thiemann *et al.*

SH23B-2439 The Magnetic Heartbeat of the Sun: Diagnosing Pulses in the Solar MgII Index Using Wavelet Analysis

Tuesday, 15 December 2015, 1:40 pm, Poster Hall
Author: L. Rand, O. Coddington, and M. Snow

SH23B-2440 Construction of a Ca II Core-to-Wing Ratio Image

Tuesday, 15 December 2015, 1:40 pm, Poster Hall
Author: H. Roberts, J. Harder, and M. Snow

SH23C-2451 The Impact of the Revised Sunspot Record on Solar Irradiance Reconstructions

Tuesday, 15 December 2015, 1:40 pm, Poster Hall
Authors: G. Kopp, N. Krivova, J. Lean, and C. Wu

Upcoming Meetings / Talks –

SORCE scientists will present papers or attend the following 2015-2016 meetings/workshops:

Sun-Climate Symposium (SORCE/SCRC Mtg), Nov. 10-13, Savannah, GA

AGU Fall Meeting, Dec. 14-18, San Francisco, CA
ISSI Team “Solar Heliospheric Lyman Alpha Profile Effects (SHAPE)”, January 2016, Bern, Switzerland
European Geosciences Union (EGU) General Assembly, April 17-22, Vienna, Austria

