

SNS • **SORCE News Source**



Solar Radiation and Climate Experiment Monthly Newsletter

May-June 2013

2014 SORCE Science Meeting –

Jan. 28-31, 2014
Key West, Florida

At the SORCE Science Meeting in September 2012, attendees agreed that rather than having a 10-year anniversary meeting, there should be an 11-year celebration in honor of SORCE's observations over the full 11-year solar cycle. The next SORCE Science Meeting will focus on *Variability in the Sun and Climate over the SORCE Mission*, as we look back at what we have learned over the last 11 years.



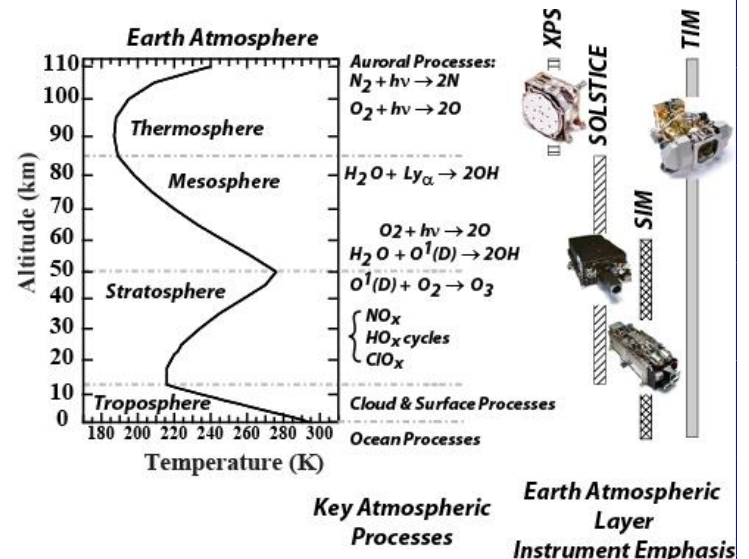
Discerning the role of the Sun in climate variations on time scales of decades is a challenging task. Climate forcing is well correlated with variations in the Sun's energy output. This is well

established for total and UV irradiance using high-precision, space-based solar measurements spanning more than two decades. When the Sun is near the maximum of its activity cycle, it is about 0.1% brighter overall, with much greater changes at UV wavelengths. SORCE and other missions measure these variations of the total solar irradiance (TSI) and solar spectral irradiance (SSI) with unprecedented accuracy, precision, and spectral coverage across the UV, visible, and IR.

Widespread empirical evidence from the extensive Earth climate datasets suggests the presence of an 11-year solar signal of order 0.1K in surface, atmospheric, and ocean temperatures. The solar forcing processes and pathways can be complex though. For example, the top-down pathway considers solar variations in the UV spectrum modulating stratospheric ozone concentrations, which then couple down to climate change via radiative and dynamical pathways. Internal atmosphere-ocean oscillations such as the NAO and ENSO may also play a role. Clouds may expedite the process via feedbacks, which require modeling very complex interactions.

Website Coming Soon:
<http://lasp.colorado.edu/sorce/news/meetings.htm>
Abstract Deadline: Oct. 11, 2013
Registration, Hotel Deadline: Dec. 20, 2013

We seek new understanding of the evidence for and mechanisms involved in decadal variability in the Sun and climate. The 2014 SORCE Science Meeting will review what we have learned in the past 11 years during the SORCE mission.

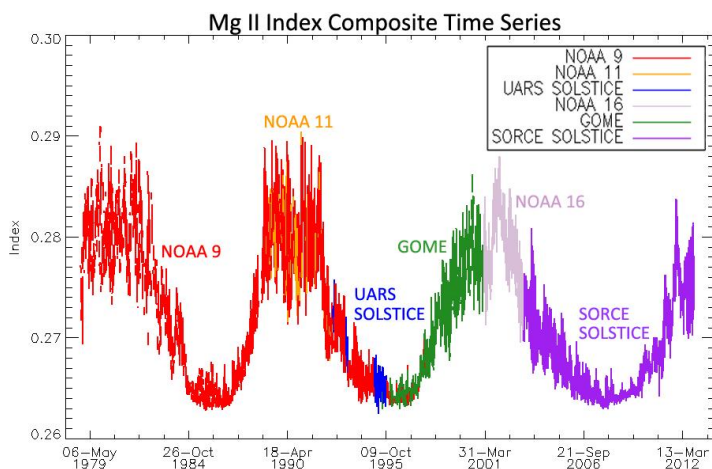


This figure represents a synopsis of the primary studies with SORCE data. The SORCE total and spectral radiometers measure daily the spectrum of the Sun and its variability. Solar energy establishes the structure of Earth's atmosphere through a series of key chemical reactions and thermodynamic processes. The SORCE instruments were designed to provide input for studying different layers of Earth's atmosphere and influences on climate change.

Sessions are organized around these key questions:

- How much have the TSI and SSI varied over the SORCE mission, starting near maximum for solar cycle 23 and currently near maximum for cycle 24?
- What has been learned from connecting the SORCE TSI and SSI measurements to the long-term TSI and SSI records?
- What has been learned from comparing TSI and SSI measurements to solar proxies and irradiance model predictions?

- How have Earth's atmosphere and climate changed over the *SORCE* mission?
- What are the dominant processes and pathways for solar forcing in Earth's environment?
- How have the extended cycle minimum in 2007-2009 and lower cycle 24 maximum affected climate differently than during the earlier solar cycle 23?
- How can these Sun-climate results be effectively applied for reconstructions to the past and for future climate change predictions?
- What are the key science results and lessons learned from the *SORCE* mission?
- How will the TSI, SSI, and Sun-climate records continue in the future?



Magnesium II Core-to-Wing Index Composite Time Series. This proxy for solar activity has been continuously measured since 1978 by a variety of instruments operated by both NOAA and NASA. *SORCE* SOLSTICE has been making daily measurements since its launch in 2003.

The *SORCE* Science Meeting will be at the **Key West Marriott**, in Key West, Florida, Tuesday-Friday, Jan. 28-31, 2014. The meeting agenda for this interactive meeting consists of invited and contributed oral and poster presentations concerning variations in the Sun's radiation and in the Earth environment. There will be 7 sessions to explore this topic:

1. Total Solar Irradiance (TSI) Measurements and Composites
2. Solar Spectral Irradiance (SSI) Measurements
3. SSI Composites, Proxies, Models
4. Sun-Climate Solar Cycle Effects
5. Climate Change during the *SORCE* Mission
6. Sun-Climate Reconstructions
7. Legacy of *SORCE* and Future Directions after *SORCE*

<http://lasp.colorado.edu/sorce/news/meetings.htm>

Mark your calendar now and watch the *SORCE* website for more information. The Call for Abstracts with full descriptions of each session will be posted soon. **We encourage your participation and hope that you will share this announcement with colleagues.**

With the current NASA sequestration issues, this meeting is considered a "conference" which means that there is an attendee limit for NASA civil servants and contractors (CS/C). We are considering requesting a waiver to go over the 50-person limit (again this just applies to NASA CS/C), but doubt it will be necessary. On your abstract form you will be asked to include if you are a NASA contractor or civil servant. We will be submitting all CS/C names to NASA for approval, and we are confident they will all be accepted.

Fall AGU Sessions –

Fall AGU Meeting, Dec. 9-13, San Francisco, CA

Abstract deadline: Tuesday, August 6th

<http://sites.agu.org/fallmeeting/>



You are encouraged to submit abstracts to the following Fall AGU Session:

Solar Irradiance: Observations, Proxies, and Models

Session GC055: Solar Irradiance: Observations, Proxies, and Models.

Conveners: Martin Snow, Greg Kopp, Janet Machol, and Frank Eparvier

Session Description:

We solicit contributions involving spectral and total solar irradiance records and their uses in climate studies. Updated data sets from longer duration measurements, new instruments, and improved ground calibrations are timely with the aging and changing spacecraft fleet. Proxies, such as the Magnesium II index, are essential for filling gaps in irradiance data, inter-instrument comparisons, and inputs to irradiance models. Recent updates to solar irradiance composites resulting from better instrument calibrations, refinements to inter-instrument comparisons, or new assessments of the long-term stabilities of irradiance records or proxies are invited. We also welcome comparisons to solar irradiance models and climate model results.

2013 *SORCE* REU Students –

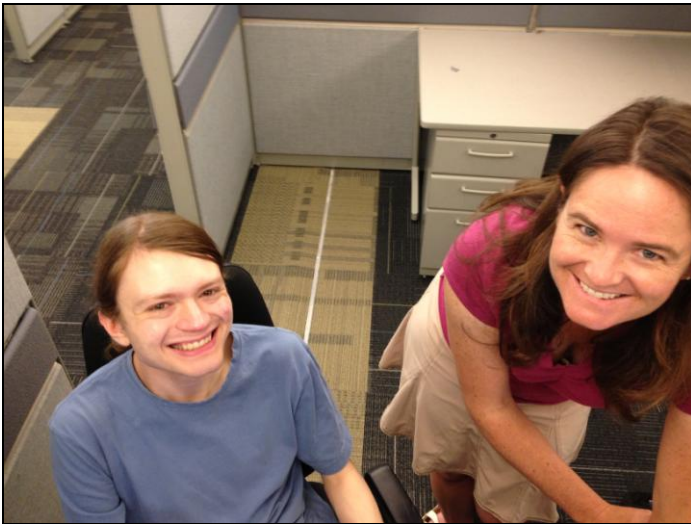
By Marty Snow, *LASP*, Univ. of Colorado

As in the past, each summer the *SORCE* mission funds student research projects as part of the University of Colorado's Research Experience for Undergraduates (REU) program. For eight weeks, the students come to Boulder, Colorado to work with *SORCE* scientists on a research project involving measurements from *SORCE*.



The 2013 REU students working in Boulder this summer.

Alexander Lanzano (Univ. of Chicago) is working with **Aimee Merkel**, **Tim Cassidy**, and **Bill McClintock** on the solar influences on Mercury's atmosphere. They will be studying the changes over the solar cycle using a combination of ground-based and space-based observations. Learning about the solar influences on the climate of Mercury will perhaps help us to better understand the Sun-Earth connection.



Alexander Lanzano (left) with mentor Aimee Merkel, *LASP*.

Kali Roeten (North Carolina State Univ.) is working with **Jerry Harder** on the solar cycle influence on the Earth's atmosphere. They are using data from *SORCE* and other satellites to examine the changes in temperature, pressure, and cloud cover over the solar cycle.



Kali Roeten (right) and Marty Snow, REU Program Coordinator.

Wren Suess (Univ. of Colorado) is working with **Rodney Viereck** and **Janet Machol** of the Space Weather Prediction Center and *SORCE* scientist **Marty Snow** on developing a proxy model for solar EUV irradiance. Existing models of the Ionosphere/Thermosphere (I/T) were designed to use proxy measurements rather than direct observations of the EUV. Now that we have EUV measurements, we need to create a high fidelity "reverse proxy" that can be used in I/T models.



Wren Suess (right) and mentor Rodney Viereck from NOAA.

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SORCE Student Samantha Liner –

By Jerry Harder, LASP, Univ. of Colorado

Samantha Liner, our exceptional SORCE graduate student, is contributing important research results to the mission. She joined the SORCE team as a graduate student in the fall of 2012. Sam did her undergraduate work at Queens University in Kingston, Ontario in



engineering physics with a focus in mechanical and aerospace engineering. She came into contact with the SORCE mission through our participation in the Canadian Solar Workshops, a group of Canadian solar scientists who meet every few years to discuss current and interesting topics related to the Sun.

After completing her degree in 2011, she participated in LASP's REU program working with Jerry Harder and Aimee Merkel to study solar cycle effects in the key atmospheric oxidant hydroxyl radical (OH). Her project involved using SORCE spectral irradiance data and OH data from the AURA MLS instrument. After working for a year as a system engineer at Bruce Power nuclear power plant in Ontario, she returned to Colorado in the fall of 2012 to work on her PhD in the University of Colorado's Aerospace Engineering Department and has now completed her first year of studies.

She is continuing and extending her research interest in atmospheric effects of solar variability under the direction of Aimee and Jerry, and will employ the NCAR WACCM global climate model as part of her thesis work. To satisfy her interests in the development space-based hardware, she is also participating as the project manager on a student engineering project with LASP and the Aerospace Engineering Department to develop a CubeSat to measure soft x-rays from the Sun.

Upcoming Meetings / Talks –

SORCE scientists plan to present papers or attend the following 2013-2014 meetings/workshops:

CALCon, Aug. 19-22, Logan, UT

SPIE Optics + Photonics, August 27-29, San Diego, CA

SOLID (1st European SOLAR Irradiance Data

Exploitation), Oct. 14-18, Orleans, France

ISSI Working Group: The Solar Activity Cycle, Nov. 11-15, Bern, Switzerland

Intl. CAWSES Symposium, Nov. 18-22, Nagoya, Japan

AGU Fall Meeting, Dec. 9-13, San Francisco, CA

SORCE Science Meeting, Jan. 28-31, Key West, FL

***Happy 4th
of July!***

