



## 2015 Sun-Climate Symposium –

Our focus topic for this 3.5-day meeting is “*Multi-Decadal Variability in Sun and Earth during the Space Era.*” Sponsors are the SORCE mission and the Sun-Climate Research Center – a joint venture between NASA GSFC and LASP at the University of Colorado.

**Call for Abstracts ☀ Due August 7**

Observations of the Sun and Earth from space have revolutionized our view and understanding about impacts of solar variability and anthropogenic forcing on Earth climate. For more than three solar cycles since 1978, the total and spectral solar irradiance (TSI and SSI) and global terrestrial atmosphere/surface have been observed continuously, enabling unprecedented quality data for Sun-climate studies. The primary objective of this symposium is to convene climate scientists, solar physicists, and experimentalists together for a better understanding how Earth climate system changes and responds to solar variability.

Please note that the Sun-Climate Symposium is slightly longer than past SORCE Meetings since we have expanded our sponsorship and meeting theme. We will meet Tuesday morning through Friday noon, Nov. 10-13.

The agenda for this interactive meeting consists of invited and contributed oral and poster presentations. We have 8 sessions which fit under 3 theme topics. **Additional information on each of the sessions, the abstract form, and submittal instructions are available on the website.** We encourage your participation and hope that you will share this announcement. Please mark your calendar to join us for a great meeting in a beautiful location!



**Nov. 10-13, 2015 \* Savannah, GA**  
**Meeting Website:**

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

## **Session and Confirmed Speakers:**

*(as of 5/15/2015, by session and then alphabetical)*

### **1. Decadal Variability of the Sun and Sun-like Stars**

#### **1a) TSI Measurements and Modeling**

Gary Chapman, *San Fernando Observatory, Cal. State Univ., Northridge*

Odele Coddington, *LASP, Univ. of Colorado, Boulder*  
Kok Leng Yeo, *Max Planck Institute, Germany*

#### **1b) SSI Measurements and Modeling**

Gene Avrett, *Harvard-Smithsonian CfA, Boston, MA*  
William Ball, *PMOD/WRC, Switzerland*  
Jim Butler, *NASA Goddard Space Flight Center, Greenbelt, MD*

Scott McIntosh, *High Altitude Observatory/NCAR, Boulder, CO*

Gary Rottman, *LASP, Univ. of Colorado, Boulder*  
Ken Tapping, *Canadian National Research Council, Herzberg Inst. of Astrophys., Penticton, BC*

#### **1c) Variability of the Sun-like Stars**

Tom Ayres, *CASA, Univ. of Colorado, Boulder*  
Jeff Hall, *Lowell Observatory, Flagstaff, AZ*  
Hugh Hudson, *Univ. of California – Berkeley/SSL*  
Phil Judge, *High Altitude Obs./NCAR, Boulder, CO*

### **2. Climate Change Theories and Observations**

#### **2a) Climate Changes during the Space Era**

Rolando Garcia, *Earth System Laboratory/NCAR, Boulder, CO*  
Drew Shindell, *Duke University, Durham, NC*

#### **2b) Societal Impacts from Climate Change and Solar Variability**

Jason Evans, *Stetson University, DeLand, FL*  
Dean Hardy, *University of Georgia, Athens*  
Rosana Rivera, *University of Georgia, Athens*

Bruce Wielicki, *NASA Langley Research Center, Hampton, VA*

### 2c) Sun-Climate Connection:

#### Top-down and bottom-up couplings

Joanna Haigh, *Imperial College, London, UK*

Andrew Kren, *LASP, Univ. of Colorado, Boulder*

Anne Smith, *Earth System Lab./NCAR, Boulder, CO*

### 3. Challenges and Opportunities for Future Solar and Earth Observations

#### 3a) Next Generation Observing Systems for Climate Records

David Crisp, *NASA Jet Propulsion Laboratory, Pasadena, CA*

Sasha Marshak, *NASA Goddard Space Flight Center, Greenbelt, MD*

Hank Revercomb, *University of Wisconsin – Madison*

Graeme Stephens, *NASA Jet Propulsion Laboratory, Pasadena, CA*

Cheryl Yuhas, *NASA Headquarters, Washington DC*

#### 3b) Challenges and Opportunities in Solar Observations

Luc Damé, *LATMOS, France*

Erik Richard, *LASP, Univ. of Colorado, Boulder*

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

## *SIM Turns On Version 22 –*

*By Stephane Beland and Jerry Harder*

SORCE SIM data Version 22 (V22) was released on April 21, 2015. V22 covers the whole mission including the hybrid mode (DO-Op mode), with scientifically valid data starting on March 12, 2014. The daily processing of the SORCE SIM data has been reinstated so the data will be available from the beginning of the mission through 7 days prior than the current day. This version extends the degradation model from V21 to the present day. SIM data are available on three websites:

SORCE website:

<http://lasp.colorado.edu/home/sorce/data/>

LISIRD at LASP:

<http://lasp.colorado.edu/lisird/sorce/>

NASA Goddard Earth Sci. Data & Info. Services Center:

<http://disc.sci.gsfc.nasa.gov/SORCE/data-holdings>

Version 22 of SORCE SIM is an incremental improvement on Version 21 in that it restarts daily processing in the 240-1600 nm range for the DO-Op mode and also includes data from the SORCE Campaign mode that was conducted over a 6-day period from 2013/12/22-2013/12/28. SIM V22 extrapolates the same basic degradation model derived for V21 data processing with the following attributes:

For complete SIM Version release notes with more information about the data correction methodology, visit: <http://lasp.colorado.edu/home/sorce/instruments/sim/sorce-sim-data-products-release-notes/>.

Work on V23 has already begun and the data processing team is exploring a new approach to determine the instrument degradation over the course of the mission. They are also working to improve the correction in the change in irradiances observed at each OBC event. These corrections as a function of wavelength have a direct impact on the long-term trends. In addition V23 of SIM processing will emphasize:

1. Continued analysis of the effective solar exposure for the UV and the VIS photodiodes. We will expand our analysis to optimize a new effective solar exposure that can be applied uniformly to all detectors.
2. The ESR data remains significantly noisier after the start of the power cycling. These are attributed to either changes in the electrical characteristics of the ESR or a potential lag in the measured and actual temperatures of the ESR.
3. A remnant temperature effect is still present in the IR photodiode in the latter part of the mission, and to a lesser extent in the VIS photodiode. Initial investigations indicate that the temperature response of these photodiodes may be changing over the course of the mission so they continue to research different ways to perform this correction.

## *SORCE Student Willow Reed Receives Award –*

SORCE student Willow Reed was awarded the 2015 Charles A. Barth Scholarship. This award goes to a University of Colorado student who is studying space research at LASP (CU's Laboratory for Atmospheric and Space Physics) and who demonstrates academic excellence. Willow is a rising junior who is studying the response of the solar Far Ultraviolet continuum to flares using data from the SOLAR-STellar Irradiance Comparison Experiment (SOLSTICE) on SORCE. She is majoring in Astrophysics with a minor in Theater, and plans to go on to graduate school when she finishes at CU.



## ***SOLSTICE Releases Version 14 –***

*By Blake Vanier and Marty Snow*

The SOLSTICE Version 14 data is mostly a maintenance update for the processing code and data product. There are no significant calibration adjustments with this version. This version includes data from the start of the mission up to the current time and appends daily measurements. The calibrated data is available from the *SORCE* website at LASP and at NASA Goddard (see links in the SIM Version 22 update article above).

### Uncertainty:

The uncertainty values in the level 3 data product have been reevaluated. They more accurately reflect the uncertainties due to systematic uncertainties and counting statistics.

### DO-Op Mode Correction for MUV:

During the second half of 2013 when the spacecraft was in safe hold, the calibration of SOLSTICE changed by a small amount. We derived a correction factor for the DO-Op period based on a proxy model. The model was adjusted to fit the SOLSTICE irradiances as a function of wavelength for the first half of 2013. This correction factor has been applied to the irradiances starting in 2014. The size of the correction is about one percent for 180-260 nm, and then decreases to zero at longer wavelengths.

More information about the improvements in SOLSTICE V14 can be found in the Release Notes at:

<http://lasp.colorado.edu/home/sorce/instruments/solstice/solstice-data-product-release-notes/>.

## ***ISSI Team Shapes Up!***

*By Marty Snow*

*SORCE* scientist, Marty Snow, organized a meeting at the International Space Science Institute (ISSI) in Bern, Switzerland to study the evolution of the Lyman alpha line profile over the solar cycle. In particular, the team is interested in understanding how the line shape impacts planetary atmospheres and the interplanetary medium. Thus the team's name is: Solar Heliospheric Lyman Alpha Profile Effects (SHAPE). The international team is composed of both observers and modelers, both solar and interplanetary. At the team's first meeting in April 2015, five collaborative projects were identified. The first is to create an empirical model of the Lyman alpha profile in irradiance from SUMER observations, using *SORCE* SOLSTICE to validate the results. The second project will use the scattered light irradiance measurements from SUMER to cross calibrate with *SORCE* SOLSTICE. A similar comparison was made to UARS SOLSTICE, but didn't use the full resolution SOLSTICE measurements. Project three will involve calculation of the radiation pressure on the interplanetary hydrogen using SWAN,

project four will compare previously unpublished Hubble Space Telescope observations to MAVEN measurements, and the final project will compare SUMER observations to measurements taken at Jupiter in 1999. The next meeting of the SHAPE team will occur in the fall of 2015.



SHAPE team members (clockwise from lower left): John Clark (Boston U), Vlad Izmodenov (Moscow State U), Olga Katushkina (LATMOS), Matthieu Kretschmar (U. Orleans/CNRS), Randy Gladstone (SwRI), Eric Quémerais (LATMOS), Werner Curdt (MPI, Göttingen), and Marty Snow (U. Colorado/LASP). Team members not shown: Greg Holsclaw (U. Colorado/LASP), Margit Haberreiter (PMOD/WRC), and Micha Shöll (CNRS).

## ***SORCE Selects Summer Undergrad Research Students –***

Each summer, the *SORCE* mission funds student research projects in concert with 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 program pays for the students' travel costs and housing, plus a \$500/week stipend.



The REU program is led by LASP's Marty Snow and Erin Wood from the EPO Dept.

This year the program will start the week of June 8<sup>th</sup> at LASP with a 1-week lecture series on Solar and Space

Physics from experts in the field. The program will run through July 31<sup>st</sup>, ending with a student symposium where the students present their findings. Marty Snow is the REU Program Organizer for the entire program which includes 17 REU students working interesting solar and space physics projects in several Boulder locations.

For 2015, three SORCE-related projects were selected for the REU program. The project title, mentors, and the REU student selected are:

- ***The Sun's statistics: developing a composite Mg II record using a Bayesian approach to source separation***

Mentors: Odele Coddington and Marty Snow, LASP, Univ. of Colorado

REU Student: Lindsay Rand, Carleton College, Northfield, MN

- ***Mag squared: understanding chromospheric magnetic structures using magnesium II spectra***

Mentor: Marty Snow, LASP, Univ. of Colorado

REU Student: Julia Zachary, Wesleyan University, Middleton, CT

- ***Image processing using graphical processing units***

Mentors: Jerry Harder, Stéphane Beland, Mark Rast, LASP, Univ. of Colorado

REU Student: Hayley Roberts, Illinois Wesleyan University, Bloomington, IL

## ***SORCE Extended Mission Proposal Submitted –***

The SORCE team submitted the SORCE Extended Mission Proposal for 2016-2018 in early March 2015. As a follow-up to the written proposal, a team of SORCE scientists and administrators met with the Sr. Review Panel at NASA on April 29 to respond to questions



needing further clarification. SORCE PI Tom Woods thought the review went well. The review panel is expected to make a decision on the next SORCE Extended Mission in early summer.

## ***Upcoming Meetings / Talks –***

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

IRIS-4 Workshop, May 18-22, Boulder, CO

SOLAR/SOLSPEC Team Meeting, June 4-5, ESTEC, Noordwijk, The Netherlands

IAU XXIX General Assembly, Aug. 2-6, Honolulu, HI

SOLID Annual Meeting, September, Greece

ISSI Team “Solar Heliospheric Lyman Alpha Profile Effects (SHAPE)”, October, Bern, Switzerland

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

AGU Fall Meeting, Dec. 14-18, San Francisco, CA