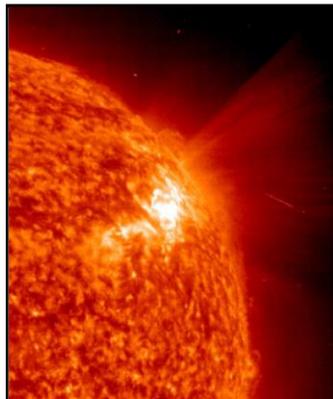




### ***SIST Workshop Summary –***

*By Marty Snow, LASP – University of Colorado*

SORCE scientists and collaborators participated in a workshop for the NASA program called: Solar Irradiance Science Team (SIST). The primary purpose of the SIST research projects is to support the development of space-based data sets of total and spectral solar irradiance (TSI and SSI). The data sets will be used as input to global models to investigate solar variations and their impacts on the Earth climate and atmospheric composition.



The 1<sup>st</sup> Annual SIST Meeting was held July 12-13 Lanham, MD, about 2 miles from NASA GSFC. The first day was taken up with presentations from each team giving a summary of the project goals, current status, and future plans. The second (half) day was discussion of how the various teams can work together for mutual benefit.



Participants listen to Erik Richard present on “The analysis of improved laboratory measurements in the re-calibration and re-evaluation of the SORCE SIM data record”.

SIST will meet again in 2017 following the next Sun-Climate Workshop. The date and location for this workshop are yet to be determined. Stay tuned!

The SIST program is a 3-year award. In 2015 NASA awarded five of the seven SIST proposals to SORCE scientists:

- *Construction of a SORCE-based SSI record for input into chemistry climate studies of Solar Cycle 23-24* (PI: Jerry Harder, LASP)
- *SSI: Lyman Alpha, Magnesium II, and Sigma k proxyEs (SSIAMESE)* (PI: Marty Snow, LASP)
- *The analysis of improved laboratory measurements in the re-calibration and re-evaluation of the SORCE SIM data record* (PI: Erik Richard, LASP)
- *A TSI Community Consensus Composite Based on an Assessment of the Accuracies and Uncertainties of Space-borne TSI Measurements* (PI: Greg Kopp, LASP)
- *How does the Sun’s Spectrum Vary?* (PI: Judith Lean, NRL)

The other two awards went to:

- *Improved Composite SSI Product Using SBUV/2 and OMI Data* (PI: Matt DeLand, SSAI and NASA/GSFC)
- *Calibration of Scattering and Diffraction Effects for ACRIM1 and ACRIM2 Satellite TSI Experiments and Reprocessing/Archiving Final Results* (PI: Richard Willson, JPL)

### ***SORCE Participating in ISSI Team Research –***

*By Marty Snow – LASP, University of Colorado*

Members of the SORCE science team will be participating in a newly selected ISSI research project called “Towards a Unified Solar Forcing Input to Climate Studies.” This ISSI team is led by Dr. Natalie Krivova from the Max Planck Institute for Solar System Research in Goettingen, Germany. Participating members from the SORCE team are Odele Coddington, Greg Kopp, and Marty Snow.

This team will bring together experts in both irradiance measurements as well as the leaders of the two most widely used irradiance proxy models: NRLSSI2 and SATIRE. The goal will be to use realistic uncertainties for both measurements and models and produce a review article for the scientific community.

The first meeting (scheduled for February 2017) will discuss the current state of the art in irradiance

measurements and models. We will define tests to compare models to measurements, and identify datasets that can be assembled into a consensus composite. The second meeting (tentatively scheduled for February 2018) will be for reports on any issues discovered during the analysis phase, and finalizing the review paper for publication. Results would be presented to the wider community at a meeting such as the IAU General Assembly later in 2018.



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## ***SORCE REU Research Projects –***

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

The University of Colorado’s Research Experience for Undergraduates (REU) 8-week summer program is well underway. After the first intense week of Solar and Space Physics class, two of the students funded by the SORCE mission have started to focus on special research projects involving measurements from SORCE.

Zoe Pierrat from Colorado College in Colorado Springs, CO, is working on **Estimating Exosphere Hydrogen Density using Lyman- $\alpha$  Irradiance Measurements from SOLSTICE**, under the guidance of Janet Machol (NOAA) and Marty Snow (LASP). She is analyzing the SOLSTICE Lyman alpha data to create a model of the exosphere. Hydrogen in the exosphere scatters Lyman alpha photons, and using measurements from different view angles throughout the orbit can constrain the exospheric density profile.



REU student Zoe Pierrat from Colorado College in Colorado Springs with her mentors, Janet Machol and Marty Snow.

Isabel Mills from Whitman College in Walla Walla, WA, is validating models of solar soft x-ray irradiance by correlating their predictions with photoelectron

measurements at Mars. Her three mentors, Frank Eparvier, Ed Thiemann, and Marty Snow eagerly await her results on her research project **Solar Variability and Mars: the MAVEN Extreme Ultraviolet Monitor**.



REU student Isabel Mills shares her modeling work on her computer screen with mentors Ed Thiemann (left) and Frank Eparvier (middle).

## ***Fall AGU – Abstracts Due Aug. 3***

**Fall AGU Meeting, Dec. 12-16, San Francisco, CA**

***Abstract deadline: Wed., August 3<sup>rd</sup>***



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



***SA018: Solar and Heliospheric Forcings and Their Effects on Climate***

**Conveners:** Gabriel Chiodo and Ethan Peck, Columbia University of New York, Palisades, NY.

**Web:** <https://agu.confex.com/agu/fm16/preliminaryview.cgi/Session13634>

**Session ID# 13634 Description:** Understanding the effects of solar and heliospheric variability on climate is a fundamental step towards quantifying climate sensitivity to external forcings. Pathways through which solar and heliospheric forcings affect climate remain poorly established despite the efforts of the scientific community. Moreover, the relatively short satellite record hinders a clean separation of observed signals from internal climate variability. In this context, improved understanding of the whole atmospheric response to solar and heliospheric

forcings through physical modelling and observational analysis are needed. This session will bring together recent advances in estimating the atmospheric response to short and long-term variability in solar and heliospheric forcings. Special emphasis will be placed on energetic particle precipitation and solar spectral irradiance variations over the 11-year solar cycle, and their influence on the thermal, dynamical, and chemical structure of the whole atmosphere. Abstracts covering any portion of the atmosphere or ocean responses to solar variability are welcome.

### **SH023: The Maunder Minimum: How Deep, How Long?**

**Conveners:** Nadezhda Zolotova, Pulkovo Astronomical Obs., St. Petersburg State Univ., Russia; and Leif Svalgaard, Stanford University, California.

**Web:** <https://agu.confex.com/agu/fm16/preliminaryview.cgi/Session13490>

**Session ID# 13490 Description:** This session is addressed to an unsolved fundamental problem first posed by Parker and Eddy in 1976: can the Sun's activity cycle operate in a different mode of nearly stopped activity. An example of such unusual behavior is widely known as the Maunder minimum extending from 1645 to 1715. This interval is obviously a key to understanding the origin of solar and stellar cyclicity. Unfortunately, due to different circumstances solar observations were often irregular, erroneous or even lost. We invite contributions including direct observations and proxies, as well as results of modeling the solar cycle, to help in reconstructing solar activity in the past.

### **SH011: New Observations and Recent Results for Solar X-ray Spectral Measurements and their Applications for Earth's Atmosphere**

**Conveners:** Amir Caspi, Southwest Research Institute, Boulder, CO; and Tom Woods, LASP, Univ. of Colorado – Boulder.

**Web:** <https://agu.confex.com/agu/fm16/preliminaryview.cgi/Session13377>

**Session ID# 13377 Description:** Solar X-rays (~0.01-10 nm, or ~0.1-100 keV) provide critical diagnostics of energetic processes in the solar corona and are significantly geoeffective in Earth's upper atmosphere. X-ray emission is especially sensitive to high plasma temperatures, which is difficult to observe at longer wavelengths, and is a unique probe of accelerated particles. This highly variable emission, changing by orders of magnitude from quiet Sun to intense flares, drives heating and dynamical processes in Earth's ionosphere, thermosphere, and mesosphere that depend critically on the spectral irradiance. Inspired by recent and upcoming missions to measure the critically under-observed ~0.2-5 keV (~0.25-6 nm) spectral range, including the Miniature X-ray Solar Spectrometer

(MinXSS) CubeSat, this session invites presentations discussing spectrally-resolved solar X-ray measurements (including spectroscopy and imaging), new techniques, and instrumentation; their implications for studies of plasma heating and particle acceleration in the flaring and quiescent corona; and their influence on Earth's upper atmosphere.

### **A079: Observational, Modeling, and Theoretical Developments that Improve the Understanding of Radiative Forcing**

**Conveners:** Daniel Feldman, Lawrence Berkeley National Laboratory, Berkeley, CA; Yi Huang, McGill University, Montreal, QC, Canada; and Martin Wild, ETH Swiss Federal Inst. of Technology, Zurich, Switzerland.

**Web:** <https://agu.confex.com/agu/fm16/preliminaryview.cgi/Session12967>

**Session ID# 12967 Description:** The radiative forcing of the Earth's climate system, whether anthropogenic such as from greenhouse gases, aerosols, and land-use changes, or naturally-occurring, such as from changes in solar irradiance or volcanism, is central to the discussion of climate change. Accurate quantification of radiative forcing is essential for reducing the uncertainty in climate projection. To that end, we need to increase the knowledge of the spatial and temporal distributions of forcing agents, as well as to improve the understanding on how they modify the radiation budget and atmospheric temperature structure. We invite submissions that show recent advances on (1) observational determination of radiative forcing with in situ, aircraft, or remote sensing measurements; (2) calculation and/or diagnosis of radiative forcing either in general circulation models or using atmospheric data at both global and regional scales; and (3) the theoretical development that improve our understanding on how radiative forcing drives climate variations.

## ***Other AGU News: Tom Woods to present the Parker Lecture –***

SORCE PI Tom Woods has been selected to deliver the Parker Lecture at the 2016 Fall AGU Meeting. The Parker Lecture is part of the prestigious Bowie Lecture program of AGU. It is one of the highest honors accorded to members of the Space Physics and Aeronomy (SPA) section of AGU. The Eugene Parker Lecture honors the life and work of solar astrophysicist, Eugene N. Parker.

Toms' lecture is entitled "*Spectroscopic Exploration of Solar Flares*," and it will be based on some SORCE data.

Congratulations Tom on receiving this honor!

**AGU Fall Meeting Website:**

<https://fallmeeting.agu.org/2016/>

**Join us! Submit your abstract soon!**

## ***Odele Coddington's Paper to be Featured on BAMS July Cover –***

*By Peter Pilewskie – LASP, University of Colorado*

In November 2015 *SORCE* team member Odele Coddington's paper, "A Solar Irradiance Climate Data Record", that reports on a new climate data record for total and spectral solar irradiance from 1610 to the present, was accepted for publication in the *Bulletin of the American Meteorological Society (BAMS)*. Recently she was notified that *BAMS* will feature her paper on the cover of its July 2016 issue (Vol. 97, No. 7). Congratulations Odele!



The full citation and link to the preliminary accepted version:

Coddington, O., J. Lean, P. Pilewskie, M. Snow, and D. Lindholm, 2015, A Solar Irradiance Climate Data Record, *Bull. Amer. Meteor. Soc.*, doi:10.1175/BAMS-D-14-00265.1, in press.

<http://journals.ametsoc.org/doi/abs/10.1175/BAMS-D-14-00265.1>

## ***Upcoming Meetings / Talks –***

*SORCE* scientists will present papers or attend the following 2016-2017 meetings/workshops:

- ISSI Team Meeting: SHAPE, September 19-21, Bern, Switzerland, <http://www.issibern.ch/teams/shape/>
- AGU Fall Meeting, Dec. 12-16, San Francisco, CA <https://fallmeeting.agu.org/2016/>
- ISSI Team Meeting: Towards a Unified Solar Forcing Input to Climate Studies. February 20-24, Bern, Switzerland.

