

SNS • **SORCE News Source**



Solar Radiation and Climate Experiment Monthly Newsletter

June-July 2011

2011 SORCE Meeting –

Decadal Cycles in the Sun, Sun-like Stars, and Earth's Climate System

Sept. 13-16, 2011 ♦ Sedona, Arizona



The Hilton Sedona Resort and Spa, a full-service meeting facility.

The meeting will be held at the **Sedona Hilton Resort & Spa** (<http://www.hiltonsedonaresort.com/>) in the Village of Oak Creek just south of Sedona city limits. You will find hotel information on the website, including a link to register online or call 1-877-273-3762 today. You should refer to the SORCE Meeting code "SORCE" to receive the special \$142/night rate. This is a beautiful property – about 70% of their rooms are suites so reserve yours early. **The cut-off date is firm: Friday, August 12.**

2011 SORCE Meeting Website

<http://lasp.colorado.edu/sorce/news/2011ScienceMeeting/>

Information on meeting registration, lodging, travel information, science program details, and special events are on the website. While you are registering, please be sure to sign-up for the **SORCE Science Dinner at the Lowell Observatory** in Flagstaff (transportation provided). It is going to be a very special evening and we hope you will join us! **Pre-Registration Note:** The pre-registration fee of \$375 goes to \$425 after the **August 12 deadline**, so register today at:

<http://lasp.colorado.edu/sorce/news/2011ScienceMeeting/meeting-registration.html>

Important Deadline: Aug. 12

Lodging and Pre-Registration

Agenda (as of July 11th)

Monday, Sept. 12

5:30 p.m. **Welcoming Reception**

Tuesday, Sept. 13

Welcome and Introduction

SORCE Status –

Tom Woods, LASP, Univ. of Colorado

GSFC/LASP Sun Climate Research Center Summary –

Peter Pilewskie, LASP, Univ. of Colorado

Bob Cahalan, NASA, GSFC, Climate & Radiation Lab

NASA Earth Science Division Status –

Jack Kaye, NASA Headquarters, Washington, DC

Ramesh Kakar, NASA Headquarters, Washington, DC

Session 1 – Solar Irradiance Cycles

Yvonne Unruh, Imperial College, London

Modeling Spectral Solar Irradiance

Matt DeLand, SSAI, Maryland

Solar Cycle UV Irradiance Variations

Jerry Harder, LASP, Univ. of Colorado

The Impact of SSI Variability on Middle Atmospheric Ozone

Richard Willson, NASA Jet Propulsion Laboratory

LASP/TRF Diagnostic Test Results for ACRIM3 and

Implications for the Multi-Decadal TSI Database

Greg Kopp, LASP, Univ. of Colorado

Status of the Total Solar Irradiance Data Climate Record

Peter Pilewskie, LASP, Univ. of Colorado

Solar Spectral Irradiance and Climate

Werner Schmutz, PMOD/WRC, Davos, Switzerland

PREMOS TSI Results

Steven Dewitte, Royal Meteorological Inst. of Belgium

First Results of the Sova-Picard TSI Instrument

Claus Fröhlich, PMOD/WRC, Davos, Switzerland

Reconstruction of TSI and Lyman-alpha back to 1913

Judith Lean, NRL, Washington, DC

Solar Irradiance Decadal Trends: Real Variability or Instrument Instability?

Thierry Dudok de Wit, CNRS & Univ. of Orléans, France

A Blind Source Separation Approach to the SSI: What does the coherence of its variability tell us?

Dora Preminger, California State University, Northridge

The Effects of Active Regions on Solar Spectral Variability: Implications for the Sun's influence on climate

Matthieu Kretzschmar, Royal Meteorological Inst. of Belgium/CNRS, Univ. of Orleans, France
Status and Last Results from the PROBA2/LYRA Solar Radiometer

Jeff Morrill, NRL, Washington, DC
Solar UV Spectral Irradiance Measured by SUSIM during Solar Cycle 22 and 23

Gary Rottman, LASP, Univ. of Colorado
Solar Variability 1981 to 1989 as Measured by the Solar Mesosphere Explorer



Sedona, Arizona – “Red Rock Country”

Wednesday, Sept. 14

Session 2 – Climate System Decadal Variability

Vikram Mehta, CRCES, Maryland
A Multi-Century History of Solar and Climate Variabilities at Decadal Timescales

Alexander Ruzmaiken, NASA JPL, Caltech
Decadal Variability of Tropical Pacific Temperature in Relation to Solar Cycles

John McCormack, NRL, Washington, DC
Characterizing the Global Impacts of Solar Variability from the Ground to the Thermosphere Using Data Assimilation

Mark Serreze, National Snow & Ice Data Center, CIRES, Univ. of Colorado
External forcing, Internal Climate Variability and the Arctic's Rapidly Shrinking Sea Ice Cover

Stergios Misios, Max Planck Institute, Germany
Mechanisms Involved in the Amplification of the Solar Cycle Signal in the Tropical Pacific Ocean

Karin Labitzke, Prof.em. Freie Universität Berlin
On the QBO-Solar Relationship throughout the Year

Hua Lu, British Antarctic Survey, Cambridge, UK
Non-linear and non-stationary Influences of Geomagnetic Activity on the Winter North Atlantic Oscillation

Pat Hamill, San Jose State University, California
Physical and Optical Properties of the Stratospheric Aerosol Layer

Lon Hood, University of Arizona, Tucson
The Tropical Lower Stratospheric Response to 11-Year Solar Forcing: Dynamical Feedbacks from the Troposphere-Ocean Response

Jae Lee, NASA JPL, California Inst. of Technology
Aura Microwave Limb Sounder Observations of the Polar Middle Atmosphere: Dynamics and Transport of CO and H₂O

Hiroko Miyahara, University of Tokyo, Japan
Decadal Variations of Solar Magnetic Field, Heliosphere and the Cosmic Rays, and Their Impact on Climate Change

Shuhui Wang, NASA JPL, California Institute of Tech.
Atmospheric OH Response to the 11-year Solar Cycle -- Could the gap between model and observations be filled by SORCE data?

Session 3 – Comparative Sun-Star Cycles

Richard Radick, Air Force Res. Lab., NSO, Sunspot, NM
Cyclic Variations of Sun-like Stars

Wes Lockwood, Lowell Observatory, Flagstaff, Arizona
Solar Variability after Dark: Photometric Evidence from Stars and Planets

Ben Brown, University of Wisconsin-Madison
Modeling Sun-like Stars

Travis Metcalfe, NCAR, Boulder, Colorado
The HAO-NOAO-SMARTS Southern HK Project

Tom Ayres, CASA, Univ. of Colorado-Boulder
What about the other Suns?

Poster Session/Reception

Posters will be available for viewing the entire SORCE Meeting, but will be featured during a special Poster Session / Reception later afternoon Wednesday.

Thursday, Sept. 15

Session 4 – Climate Sensitivity and Global Imbalance

Gerald North, Texas A&M University
Climate Sensitivity

Brian Soden, Rosenstiel School, Univ. of Miami, FL
Understanding Climate Feedbacks Using Radiative Kernels

Andrew Dessler, Texas A&M University
Observational Constraints on the Water Vapor and Cloud Feedbacks

Kevin E. Trenberth, NCAR, Boulder, Colorado
Tracking Earth's Energy: From El Niño to Global Warming

David Douglass, University of Rochester, New York
Recent Energy Balance of the Earth - Update

Seiji Kato, NASA Langley Research Center
Interannual Variability of Top-of-Atmosphere Albedo Observed by CERES Instruments

Sebastian Schmidt, LASP, University of Colorado-Boulder
The Spectral Radiative Effects of Inhomogeneous Clouds and Aerosols

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Session 5 – Solar Rotational Variability

Marty Snow, LASP, Univ. of Colorado
Rotational Variability in the Ultraviolet Solar Spectral Irradiance

Matthieu Kretzschmar, Royal Meteorological Inst. of Belgium/CNRS, Univ. of Orleans, France
Do We Understand Solar Irradiance Variations during Solar Rotations? A multi instrument study

Bill Peterson, LASP, Univ. of Colorado
Photoelectrons as a Tool to Evaluate Solar EUV and XUV Model Irradiance Spectra

Hari Om Vats, Physical Research Laboratory, Ahmedabad, India
Rotational Modulation on Total Solar Irradiance

Lowell Observatory – Fieldtrip and Science Dinner

We will take a private coach to Flagstaff – a beautiful 30-minute ride through the spectacular Oak Creek Canyon. At the Lowell Observatory we will tour the facility and learn about their research contributions as one of the major private U.S. astronomical research facilities.



Following our tour, we will enjoy a delicious dinner catered by a favorite restaurant of Flagstaff locals. We will complete our day by taking advantage of the onsite telescopes to view the evening sky. This special event is available on the registration form.

Friday, Sept. 16

Session 6 – Modeling and Forecasting Solar Cycles and Climate Impacts

Kyle Swanson, Univ. of Wisconsin-Milwaukee
Climate Regime Shifts

Robert Cahalan, NASA GSFC
Modeling Climate Response to Variations in Spectral Solar Irradiance

Bill Swartz, John Hopkins University, APL, Maryland
Decadal Variability in the Atmosphere

King-Fai Li, California Institute of Technology / Australian National University

Modeling the 11-year Solar Cycle Response in Upper Atmosphere Hydroxyl Radicals

Gary Chapman, California State University, Northridge
Modeling TSI Variations from SORCE/TIM

Nicola Scafetta, Duke University, North Carolina
Heliospheric Oscillations and Their Implication for Climate Oscillations and Climate Forecast

Judith Lean, NRL, Washington, DC
Forecasting Climate and Ozone Changes on Multi-Decadal Time Scales

Tom Woods, LASP, Univ. of Colorado
Solar Irradiance Variations during Solar Cycle 24

Ken Tapping, Herzberg Institute of Astrophysics, Penticton, BC Canada
The Next Generation in Solar Radio Monitoring

Erik Richard, LASP, Univ. of Colorado
Future SSI Records for JPSS TSIS

Note: All abstracts are available online!

2011 SORCE Meeting Website

<http://lasp.colorado.edu/sorce/news/2011ScienceMeeting/>

Meeting Location

The 2011 SORCE Meeting will take place at the beautiful **Hilton Sedona Resort**, just 90 miles north of Phoenix, Arizona. The meeting facilities are first-class and attendees will be inspired with the dramatic Red Rock views. For further information on this special venue, you can visit their website at: <http://www.hiltonsedonaresort.com/>.



~ Please join us! ~

SORCE-Related AGU Sessions –

By Marty Snow, LASP, Univ. of Colorado

The Fall AGU Meeting is Dec. 5-9, in San Francisco, California. **You are encouraged to submit abstracts to AGU sessions GC43 and GC44.**

Abstract deadline: Thursday, August 4th

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



Solar Spectral Irradiance Variability: Observations and Implications

Session GC44: Climate Change and the Sun 3.

Conveners: Marty Snow, Erik Richard, Frank Eparvier, and Rodney Viereck

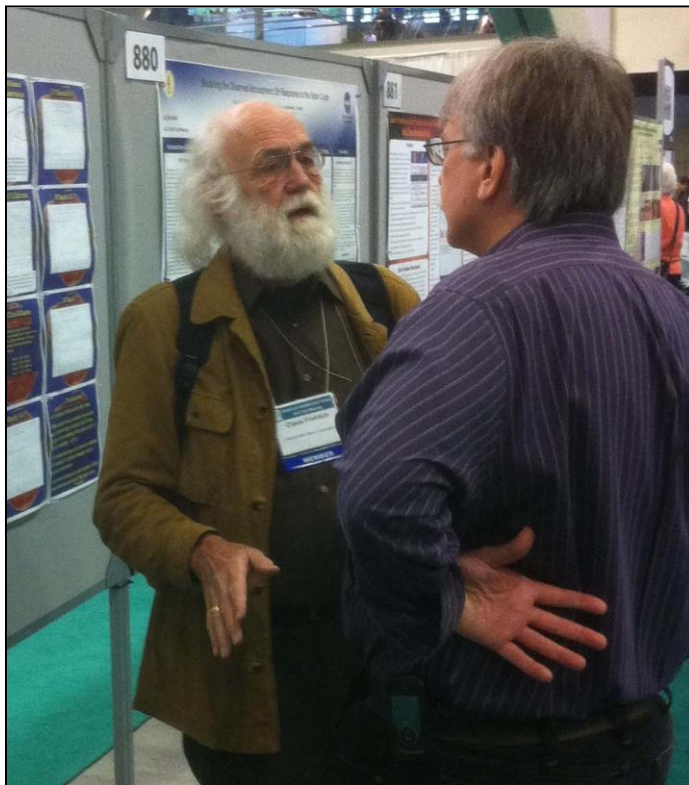
The topic of the session is the heart of the SORCE mission: the role of Solar Spectral Irradiance in the Sun-Earth system. Our goal is to have a blend of presentations on SSI observations and atmospheric modeling. Both short-term (space weather) and long-term (climate) studies are welcome. The invited speakers for this session are Caspar Ammann, Gerard Thuillier, Aimee Merkel, and Jan Sojka.

Session Description:

Continuous observations of the spectrally-resolved solar irradiance now extend over more than half a solar cycle in the visible and infrared and up to three solar cycles at shorter wavelengths. The amplitude and phase of solar spectral irradiance variability as a function of wavelength can have significant impact on the atmosphere in both the long-term (climate) and short-term (space weather).

Observations of the atmosphere, such as ozone measurements, can play a key role in helping us to understand the Sun-Earth system. Solar spectral irradiance measurements from current missions such as the Solar Dynamics Observatory, SOLar Radiation and Climate Experiment, SOL-ACES, SOLSPEC, etc. are particularly relevant to this session.

Long-term variability records are by nature a composite of measurements from a series of instruments, and the uncertainties in the data must be well understood in order to make meaningful comparisons from one solar cycle to the next. We solicit papers on both the measurement of solar spectral irradiance on all timescales and on atmospheric measurements or models that show the Sun's influence.



Claus Fröhlich (left; PMOD/WRC) talks with Jeff Morrill (NRL) during a poster session at the 2010 Fall AGU Meeting in San Francisco.

Improvements to the Total Solar Irradiance Record

Session GC43: Climate Change and the Sun 2.

Conveners: Greg Kopp and Richard Wilson

Session Description:

New total solar irradiance (TSI) sensor calibration and characterization techniques calibrated against reference cryogenic radiometers have been implemented and are helping explain on-orbit scale differences in the 33-year TSI record used for climate studies. Instrument characterizations have recently been conducted on ACRIM3, PREMOS, TIM, and VIRGO sensors, with corrections being applied to flight data based on these results. Papers discussing the impacts of calibration improvements on the TSI climate data record and related analyses of that record's accuracy are solicited.

Remember: AGU abstracts are due earlier than usual this year – ** August 4 **

3,070,434

Hits to the SORCE Website

(Since 4/21/03, As of 7/1/11)

SORCE SIM Paper Accepted in Geophysical Research Letters –

Geophysical Research Letters has accepted a paper by Aimee Merkel et al. entitled “***The impact of solar spectral irradiance variability on middle atmospheric ozone***”. The paper (2011GL047561R) presents the impact of solar spectral irradiance variability on middle atmospheric ozone over the declining phase of solar cycle 23. Using models and satellite data, including SORCE/SIM, Merkel et al. concluded that the ozone response is due to enhanced photochemical activity associated with larger solar ultraviolet variability. The research focused on the results of atmospheric modeling using the solar spectral irradiance variability measured by SORCE SIM. She showed that the resulting ozone profiles in the model agree better with measurements from the Sounding of the Atmosphere using Broadband Emission Radiometry (SABER) instrument than the profiles predicted by standard proxy models for the irradiance.

Co-authors include Jerry Harder, Juan Fontenla, and Tom Woods from CU/LASP, and Dan Marsh and Anne Smith from the Atmospheric Chemistry Division at NCAR. The abstract is below –

This study presents the impact of solar spectral irradiance (SSI) variability on middle atmospheric ozone over the declining phase of solar cycle 23. Two different types of spectral forcing are applied to the Whole Atmosphere Community Climate Model (WACCM) to simulate the ozone response between periods of quiet and high solar activity. One scenario uses the solar proxy reconstructions model from the Naval Research Laboratory (NRLSSI), and the other is based on SSI observations from the Solar Radiation and Climate Experiment (SORCE). The SORCE observations show 3-5 times more variability in ultraviolet (UV) radiation than predicted by the proxy model. While NRLSSI forcing had minimal impact on ozone, the higher UV variability from SORCE induces a 4% reduction in ozone concentration at solar active conditions above 40km. This model result is supported by 8 years (2002-2010) of ozone observations from the Sounding of the Atmosphere using Broadband Emission Radiometry (SABER) instrument. The SORCE simulation shows greater similarity with the SABER data than the NRLSSI simulation. The model and satellite data suggests that the ozone response is due to enhanced photochemical activity associated with larger ultraviolet variability.

SORCE Battery Trends–

By Tom Woods, Jerry Harder, and Sean Ryan, LASP, Univ. of Colorado

The SORCE batteries have shown steady degradation since 2009, and on May 1st the SORCE spacecraft lost one of 22 battery cells. It was not unexpected, but still was disappointing news. Power management on SORCE (e.g. changing battery charging profiles) has been at an elevated level since 2009, and battery experts at OSC, GSFC, and Aerospace Corp. have provided excellent advice and regular reviews of the battery performance. This battery loss means that all SORCE instruments, except TIM, will need to be power-cycled in the future to conserve battery power. SORCE operations are continuing with daily solar observations and we expect to be able to continue normal operations for many more months/years.



With this lower battery capacity, the SIM instrument is now being power cycled every orbit. The operation of the other solar instruments are continuing as before, namely there is no power cycling for TIM, but power cycling of XPS and SOLSTICE instruments. The XPS and SOLSTICE instruments have been in this power cycling mode for several months already. The frequency of the stellar calibrations for SOLSTICE has been reduced to about 5 calibration campaigns per year during times of short orbit eclipse periods.

SORCE Database Issues –

By Doug Lindholm, LASP, Univ. of Colorado

In case you have recently experienced difficulties getting the latest SORCE data, let us explain. On Friday, June 10, 2011, the LASP database that serves both the SORCE science and spacecraft housekeeping data had a severe disk array failure. The SORCE operations team immediately restored use of the database to support ongoing spacecraft and instrument operations; however, restoration of the entire history of SORCE telemetry data and support for science data processing activities is taking additional time. Generation of SORCE science data products has been temporarily suspended, but public access to already-processed SORCE science data is unaffected.

Please note that there was no loss of science data. We do not have an exact return to service estimate at this time, but we are hopeful that the database will be restored soon (by mid July). Science processing will resume shortly after that.

SORCE REU Students –

By Marty Snow, LASP, Univ. of Colorado

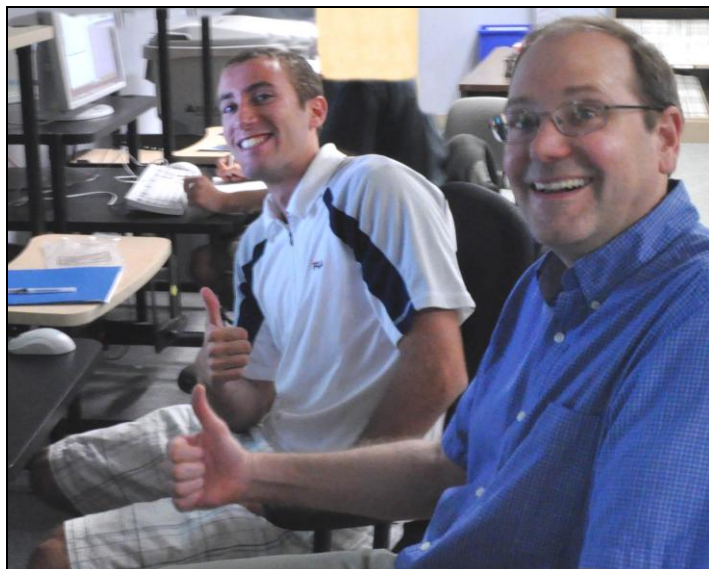
Each summer, the SORCE program at LASP employs three student research interns as part of the Boulder Solar Alliance's Research Experience for Undergraduates (REU) program. This year's students – Samantha Liner, Christopher Maloney, and Laura O'Connor – are working on a diverse set of projects using SORCE data. The students come to Boulder for 8 weeks of research, starting with a series of lectures on Solar and Space Physics from experts in the field, and ending with a student symposium where the REU students present their findings. Further information about the program can be found at <http://lasp.colorado.edu/reu>.



Samantha Liner with her mentors, Aimee Merkel (left) and Jerry Harder (standing).

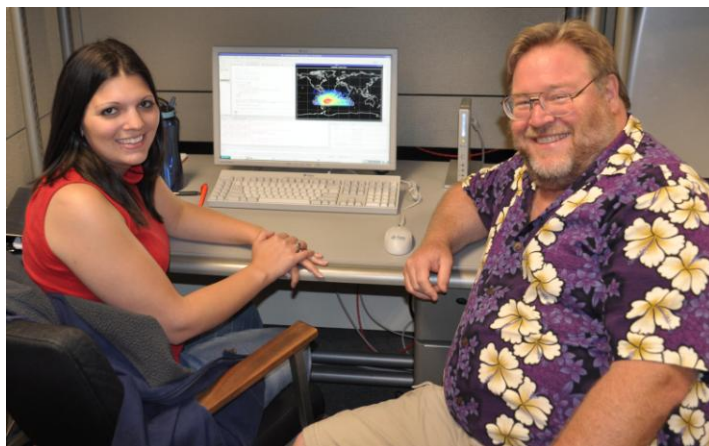
Sam Liner from Queens University in Kingston, Ontario is working with Jerry Harder and Aimee Merkel on analysis of the results from the NCAR Whole Atmosphere Community Climate Model (WACCM) using forcing from a variety of solar irradiance inputs. In particular, they are studying the effect of the visible irradiance variability measured by the SIM instrument.

Christopher Maloney from Whittier College is tackling the question of climate change during the recent solar minimum. His research mentors include SORCE PI Tom Woods and Odele Coddington. The project has a wide scope, needing temperature and other meteorological datasets as well as irradiance observations from all of the SORCE instruments.



Chris Maloney is working with Tom Woods and Odele Coddington on climate change questions.

Laura O'Connor from the University of Michigan is analyzing data from SOLSTICE to measure the properties of the South Atlantic Anomaly (SAA). As the SORCE spacecraft passes through the SAA, energetic particles trapped in the Earth's radiation belts hit the SOLSTICE sensors, causing a rise in the detector dark rate. By mapping out the position and intensity of this background, we can study the properties of the radiation belts over the course of the mission. If we include the observations from the UARS SOLSTICE, which had very similar detectors, we can study the evolution of the SAA over two decades.



Laura O'Connor and Marty Snow are analyzing SOLSTICE data.

Upcoming Meetings / Talks –

SORCE scientists plan to present papers or attend the following 2011 meetings:

SHINE Conference, July 11-15, Snowmass, Colorado

SPIE, August 21-25, San Diego, CA

CALCON, August 29-Sept. 1, Logan, Utah

SORCE Science Meeting, Sept. 13-16, Sedona, Arizona

NEWRAD, Sept. 19-23, Maui, Hawaii

AGU Fall Meeting, Dec. 5-9, San Francisco, California