2020 Sun-Climate Symposium

"What is the Quiet Sun and What are the Subsequent Climate Implications"

Jan. 27-31, 2020 * Tucson, Arizona

(as of Jan. 23, 2020)

Monday, Jan. 27

5:30 – 7:00 pm **Welcoming Reception (Marriott, Terrace or West Foyer)**

Tuesday, Jan. 28

7:15 – 8:15 am **Continental Breakfast**

8:00 – 8:30 am **Welcome/Introduction – TSIS & SORCE Status Overview**
Peter Pilewskie and **Tom Woods,** LASP, University of Colorado – Boulder

Session 1. *The Sunset of SORCE*

Chairs: Tom Woods and Gary Rottman

8:30 – 9:05 am **Gary Rottman (Keynote),** LASP/University of Colorado – Boulder
SORCE – Important Factors of Concept and Development

9:05 – 9:30 am **Robert Cahalan (Invited),** NASA Goddard Space Flight Center, Greenbelt, MD (Emeritus)
Celebrating SORCE

9:30 – 10:00 am **Break**

10:00 – 10:15 am **Greg Kopp,** LASP/University of Colorado – Boulder
Highlights from SORCE / TIM

10:15 – 10:30 am **Jerry Harder,** LASP/University of Colorado – Boulder
SORCE SIM Instrument Highlights for Middle Ultraviolet, Visible, ad Near Infrared

10:30 – 10:45 am **Bill McClintock (presented by Marty Snow),** LASP/University of Colorado – Boulder
Highlights from 17 Years of SORCE / SOLSTICE Observations

10:45 – 11:00 am **Tom Woods,** LASP/University of Colorado – Boulder, CO
SORCE X-ray Ultraviolet Photometer System (XPS) Highlights

11:00 – 11:15 am **Sean Ryan,** LASP/University of Colorado – Boulder, CO
SORCE's Flexible Satellite Architecture Allows Science to Continue Despite Hardware Challenges

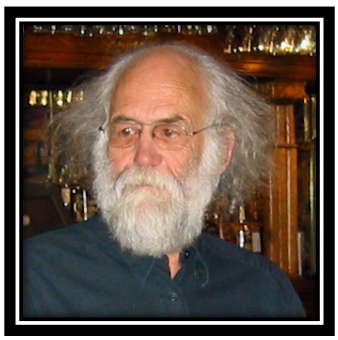
11:15 – 11:30 am **Tom Sparn,** LASP/University of Colorado – Boulder, CO
SORCE Management in a Civilized Time

11:30 – 1:00 pm **Lunch Buffet – Marriott**

Session 2. *Recent/Space-Era Solar Cycle Timescales*

Chairs: Greg Kopp, Marty Snow, and Jae Lee

1:00 – 1:30 pm **Bo Andersen (Invited),** Norwegian Space Agency, Oslo, Norway
Homage to Claus Fröhlich
What is the TSI Value at Solar Minima in the Space Age?



1:30 – 1:55 pm **Serena Criscuoli (Invited),** National Solar Observatory, Boulder, CO
Modern and Historical Reconstructions of Solar UV Irradiance Variability

1:55 – 2:10 pm **Erik Richard,** LASP, University of Colorado – Boulder
Solar Spectral Irradiance Measurements from the TSIS-1 SIM: Data continuity and comparisons to other records

2:10 – 2:25 pm **Stéphane Béland,** LASP, University of Colorado – Boulder
SORCE / TSIS Overlap Analysis

2:25– 2:40 pm **Betsy Weatherhead,** Jupiter Intelligence, Boulder, CO
Satellite Overlap Requirements for Building Long-term Continuous Records – SORCE/TSIS Case Study

2:40 – 2:55 pm **Margit Haberreiter,** Physikalisch-Metorologisches Observatorium / World Radiation Center (PMOD/WRC), Davos Dorf, Switzerland
TSI Measurements from NORSAT-1 / CLARA

2:55 – 3:10 pm **James Limbacher,** NASA GSFC and SSAI, Greenbelt, MD
Estimating the Precision of TSI Measured from VIRGO, SORCE, TCTE, and TSIS-1 Using the Triple Differencing Technique

3:10 – 3:35 pm **Break**

3:35 – 3:50 pm **Shashi Gupta,** NASA Langley Research Center and SSAI, Hampton, VA
A Comparative Examination of SORCE and TSIS-1 TSI Data during the Overlap Period

3:50 – 4:05 pm **Hanna Strecker,** Leibniz Inst. for Solar Physics (KIS), Freiburg, Germany
On the Decay of Sunspots

4:05 – 4:20 pm **Debi P. Choudhary,** San Fernando Observatory, California State University – Northridge, CA
Solar Irradiance Variations in Chromospheric Spectral Lines

4:20 – 4:35 pm **Sergey Marchenko,** NASA GSFC and SSAI, Greenbelt, MD *(Note: **Serena Criscuoli** and **Matt DeLand** to present)*
Solar Activity and Responses Observed in Balmer Lines

4:35 – 5:00 pm **Thierry Dudok de Wit (Invited),** LPC2E, CNRS and University of Orléans, France
Response of Solar Irradiance to Solar Proxies: Is it instantaneous?

Wednesday, Jan. 29

7:15 – 8:15 am **Continental Breakfast**

Session 3. *Solar Variability and Climate Trends on Secular Timescales* *(formerly Session 4)*

Chairs: Odele Coddington and Doug Rabin

8:00 – 8:25 am **Alexander Shapiro (Invited),** Max Planck Inst. for Solar System Res., Göttingen, Germany
Solar Activity over the Last Four Billion Years

8:25 – 8:40 am **Frédéric Clette**, Royal Observatory of Belgium, Brussels *(Note: **Greg Kopp** to present)*
Re-evaluation of the 400-Year Sunspot Record

8:40 – 9:05 am **Lisa Upton (Invited),** Space System Research Corp. (SSRC), Boulder, CO
Reconstructing Historical Solar Activity with the Advective Flux Transport Model

9:05 – 9:20 am **Leif Svalgaard,** Stanford University, Stanford, CA
Validation of the Group Sunspot Series

9:20 – 9:35 am **Matthias Rempel,** Natl. Center for Atmospheric Research / High Altitude Observatory (NCAR/HAO), Boulder, CO
On the Contribution of Quiet Sun Magnetism to Solar Irradiance Variations

9:35 – 10:00 am **Valerie Trouet (Invited),** University of Arizona, Laboratory of Tree-Ring Research
Reduced Caribbean Hurricane Activity during the Maunder Solar Minimum

10:00 – 10:30 am **Break**

10:30 – 10:45 am **Alexander Ruzmaikin,** Jet Propulsion Laboratory, Cal. Inst. of Technology, Pasadena, CA
The Earth Climate at Deep Minima of the Solar Activity

10:45 – 11:10 am **Jennifer van Saders (Invited),** University of Hawaii, Honolulu
The Sun in Stellar Context: Stellar Windows into Solar Magnetic Evolution

11:10 – 11:25 am **Tom Ayres,** CASA, University of Colorado – Boulder
Seeking the Quiet Sun Among the Stars

11:25 – 12:30 pm **Lunch Buffet – Marriott**

12:30 – 4:00 pm **University of Arizona – Lab Tours**

12:30 pm **Depart Marriott to walk to Univ. of Arizona**
1:00 – 2:00 pm **Group 1: Tree-Ring Lab**
Group 2: Caris Mirror Lab
2:00 – 2:30 pm **Swap – Walk to the next tour (or back to Marriott if only doing 1 tour)**
2:30 – 3:30 pm **Group 1: Caris Mirror Lab**
Group 2: Tree-Ring Lab
3:30 pm **Walk back to the Marriott**

4:00 – 6:00 pm **Poster Session / Reception**

Thursday, Jan. 30

7:15 – 8:15 am **Continental Breakfast**

Session 4. *Solar Influence on the Atmosphere and Climate* *(formerly Session 3)*

Chairs: Marty Snow, Jae Lee, and Greg Kopp

8:00 – 8:40 am **Judith Lean (Invited),** LASP/Univ. of Colorado and Naval Research Lab. (NRL Emeritus)
Navigating the Causes of Modern Climate Change

8:40 – 9:05 am **Karen Rosenlof (Invited),** NOAA Earth System Research Laboratory (ESRL), Boulder, CO
Ozone Change and Its Influence on Climate

9:05 – 9:30 am **Lon Hood (Invited),** University of Arizona, Tucson
Top-down Solar Influences on the Madden-Julian Short-Term Climate Oscillation

9:30 – 9:55 am **Robert Meier (Invited),** George Mason University, Fairfax, VA
Solar EUV Irradiance and Thermospheric Composition Trends Retrieved from FUV Dayglow Observations

9:55 – 10:25 am **Break**

10:25– 10:40 am **Scott McIntosh,** NCAR / High Altitude Observatory, Boulder, CO
A New Clock for the Sun: Sun-Climate Implications & What May Be Looming

10:40 – 10:55 am **Han-Li Liu,** NCAR / High Altitude Observatory, Boulder, CO
Atmosphere and Ocean Responses to Extreme Low Solar Activity and Their Hemispheric Differences

10:55 – 11:20 am **Cornelius Csar Jude H. Salinas (Invited),** Natl. Central University, Taoyuan City, Taiwan
Possible Solar Cycle Responses of Eddy Diffusion in the Mesosphere and Lower Thermosphere as Inferred from SABER CO_2

11:20 – 11:35 am **Jae Lee,** University of Maryland, Baltimore County, MD and NASA GSFC, Greenbelt, MD
Solar Cycle Modulation of MLS Nighttime Ozone near the Secondary Ozone Maximum Layer

11:35 – 12:00 pm **Christopher Castro (Invited),** University of Arizona, Tucson
The North American Monsoon in a Changing Climate

12:00 – 1:25 pm **Lunch – on your own**

Session 5. *A New Reference Spectrum for Remote Sensing* *(formerly Session 6)*

Chairs: Erik Richard and Dong Wu

1:25 – 1:50 pm **David Doelling (Invited),** NASA Langley Research Center, Hampton, VA
GSICS Applications and the Need of a Solar Irradiance Reference Spectrum

1:50 – 2:15 pm **Dave Crisp (Invited),** Jet Propulsion Laboratory, Cal. Inst. of Technology, Pasadena, CA
The Impact of the TSIS-SIM Data on the OCO-2/OCO-3 Data Analysis

2:15 – 2:40 pm **Brent Holben (Invited),** NASA Goddard Space Flight Center, Greenbelt, MD
AERONET – the Ground-based Aerosol Satellite

2:40 – 3:05 pm **Tom Stone (Invited),** U.S. Geological Survey, Astrogeology Science Center, Flagstaff, AZ
Requirements for a Reference Solar Spectrum for Lunar Calibration Applications

3:05 – 3:20 pm **Odele Coddington,** LASP, University of Colorado – Boulder
Progress towards a New, High-Resolution, High-Accuracy Solar Reference Spectrum based on TSIS-1 SIM

3:20 – 3:45 pm **Break**

3:45 – 4:00 pm **Xianglei Huang,** University of Michigan, Ann Arbor, MI
Thoughts on the Application of TSIS/SORCE SSI in the IPCC CMIP Modeling Efforts

4:00 – 4:15 pm **Marty Snow,** LASP, University of Colorado – Boulder
Solar Spectral Irradiance during WHPI and Comparison to WHI and WSM

4:15 – 4:40 pm **Nuno Pereira (Invited),** Royal Belgium Institute for Space Aeronomy (BIRA-IASB), Brussels
Near Infrared Ground-based Spectrum

4:40 – 4:55 pm **Luc Damé,** Laboratoire Atmosphères, Milieux, Observations Spatiales (LATMOS), France
New Absolute Reference Spectrum SOLAR-ISS2 at 2008 Solar Minimum and its Extension at Very High Resolution (0.01 nm) from 500 nm up to 4200 nm for Atmospheric Modeling and Remote Sensing

Science Dinner – *Hacienda del Sol*

5:15 pm **Motor coaches loaded (in front of Marriott)**
5:20 pm **Motor coaches depart**
5:50 pm **Arrive at *Hacienda del Sol* / Reception**
5:55 pm **Sunset**
6:15 pm **Dinner**
8:30 pm **Motor coaches loaded**
9:15 pm **Arrive back at the Marriott**

Friday, Jan. 31

7:15 – 8:15 am **Continental Breakfast**

Session 6. *Observational Predictions* *(formerly Session 5)*

Chairs: Doug Rabin and Odele Coddington

8:00 – 8:25 am **W. Dean Pesnell (Invited),** NASA Goddard Space Flight Center, Greenbelt, MD
How Well Can We Predict Solar Cycle 35?

8:25 – 8:50 am **Philip Judge (Invited),** NCAR / High Altitude Observatory (NCAR/HAO), Boulder, CO
The Next Five Decades Under the Sun

Session 7. *Looking Ahead – Future Observations of the Sun and Earth*

Chair: Peter Pilewskie

8:50 – 9:15 am **Yolanda Shea (Invited),** NASA Langley Research Center, Hampton, VA
CLARREO Pathfinder: Mission Overview

9:15 – 9:30 am **Julien Amand,** Royal Meteorological Institute of Belgium, Brussels
SIMBA, Measuring the Earth's Radiation (im)Balance

9:30 – 9:45 am **Wolfgang Finsterle,** Physikalisch-Metorologisches Observatorium / World Radiation Center (PMOD/WRC), Davos Dorf, Switzerland
Calibrating Space Radiometers to Ground-based TSI Standards

9:45 – 10:10 am **Break**

10:10 – 10:25 am **Susan Breon,** NASA Goddard Space Flight Center, Greenbelt, MD
TSIS-2: Continuing the Solar Irradiance Data Record

10:25 – 10:40 am **Dave Harber,** LASP, University of Colorado – Boulder
The Compact SIM (CSIM), Compact TIM (CTIM) and Future Compact Earth Radiation Budget Instruments

10:40 – 10:55 am **Brian Boyle,** LASP, University of Colorado – Boulder
TSIS-2 and Beyond

10:55 – 11:10 am **Charles Kankelborg,** Montana State University, Bozeman
The FURST Mission

Meeting Wrap-Up / Summary

11:10 – 11:30 am **Peter Pilewskie** and **Tom Woods,** LASP, University of Colorado – Boulder

2020 Sun-Climate Symposium – Poster Session/Reception

Wednesday, Jan. 29, 4 – 6 pm

In alphabetical order (as of 23 January 2020):

1) **Ted Amdur,** Harvard University, Cambridge, MA
Total Solar Irradiance Diverges from Sunspot Record during Solar Cycle Minima

2) **Catharine Bunn,** Montana State University, Bozeman
Detection of Explosive Events in SORCE-Calibrated IRIS Full-disk Mosaics

3) **Ana Cristina Cadavid,** San Fernando Observatory, California State University, Northridge
Total Solar Irradiance and Photometric Indices during the Activity Minimum between Solar Cycles 23 & 24

4) **Odele Coddington,** LASP, University of Colorado – Boulder
Short-term Solar Irradiance Variability as Observed by TSIS SIM

5) **Odele Coddington,** LASP, University of Colorado – Boulder
(SIST) Progress toward the Next Generation Solar Irradiance Variability Models

6) **Angela Cookson,** San Fernando Observatory, California State University, Northridge
(SIST) Analysis of Photometric Images of the Quiet Sun during Solar Minimum

7) **Luc Damé,** Laboratoire Atmosphères, Milieux, Observations Spatiales (LATMOS), IPSL/CNRS/UVSQ, Guyancourt, France
The SoSWEET-SOUP (SOlar, Space Weather Extreme EvenTs and Stratospheric Ozone Ultimate Profiles) Constellation Mission

8) **Matt DeLand,** Science Systems and Applications Inc. (SSAI) and NASA GSFC, Greenbelt, MD
(SIST) Evaluation of "Quiet Sun" Trends in SSI Observations

9) **Giuliana de Toma,** Natl. Center for Atmospheric Research / High Altitude Observatory (NCAR/HAO), Boulder, CO
(SIST) Understanding the Sources of Variability in the Mg II Index

10) **Leonid Didkovsky,** Space Sciences Laboratory, Univ. of Southern California, Los Angeles
A Dissipation of Solar Transition Region Network Cells as a Proxy of Activity Decrease

11) **Gulsun Dumbadze,** Ilia State University, Tbilisi, Georgia
Eigenspectra of Active Region Long-period Oscillations Obtained using the Image Processing Moment Method

12) **Josh Elliott,** LASP, University of Colorado – Boulder
The Latest SORCE SOLSTICE Calibrations and Data Products

13) **Josh Elliott,** LASP, University of Colorado – Boulder
The Latest SORCE XPS Calibrations and Data Products

14) **Wolfgang Finsterle,** Physikalisch-Metorologisches Observatorium / World Radiation Center (PMOD/WRC), Davos Dorf, Switzerland
Results from the Pre-Launch Calibration of DARA for JTSIM

15) **Mackenzie James**, University of Arizona, Tucson
Identifying Events with Time Lag between Change in Total Solar Irradiance and Sunspot Area

16) **Greg Kopp,** LASP, University of Colorado – Boulder
(SIST) New Historical TSI Reconstructions Based on the Revised 400-Year Sunspot Record

17) **Hunter Leise,** LASP, University of Colorado – Boulder
LISIRD: An Online Resource for Making Solar Data More Accessible

18) **Emma Lieb,** LASP, University of Colorado – Boulder
SALSA: Solar Applied pLanetary dataSet cAlibration

19) **Janet Machol,** CIRES, University of Colorado; NOAA National Centers for Environmental Information (NCEI), Boulder, CO *(Note: poster presented by Marty Snow)*
The GOES-R Extreme Ultraviolet and X-ray Irradiance Sensors (EXIS)

20) **Steffen Mauceri,** Jet Propulsion Laboratory, Pasadena, CA; and LASP/University of Colorado – Boulder
(Note: poster presented by Peter Pilewskie)
Solar Spectral Irradiance from SORCE SIM

21) **Aimee Merkel,** LASP, University of Colorado – Boulder
Response of Polar Mesospheric Clouds to the 11-Year Solar Cycle

22) **Jamie Mothersbaugh,** LASP, University of Colorado – Boulder
Quantification and Effects of Diode Detector Degradation in the SORCE SIM Instrument

23) **Suman Panda,** Montana State University, Bozeman
VUV Line Profiles of Sun as a Star from SUMER

24) **Steven Penton,** LASP, University of Colorado – Boulder
SORCE Solar Spectral Irradiance Monitor Data Release V26, and a Look Forward to V27

25) **Alberto Remesal Oliva,** Physikalisch-Metorologisches Observatorium / World Radiation Center (PMOD/WRC), Davos Dorf, Switzerland
Degradation Process Due to UV Radiation and Future Radiometers

26) **Alberto Remesal Oliva,** Physikalisch-Metorologisches Observatorium / World Radiation Center (PMOD/WRC), Davos Dorf, Switzerland
Lab Experiments: Characterization of new flat detector and its dome and degradation process in TSI radiometer

27) **Gary Rottman,** LASP, University of Colorado – Boulder
Maybe a Second Best Way to Measure TSI

28) **Laura Sandoval,** LASP, University of Colorado – Boulder
SORCE Phase-F

29) **Leif Svalgaard,** Stanford University, CA
Three Centuries of Monthly Sunspot Group Numbers

30) **Joel Tibbetts,** Grinnell College, Iowa
From Aleph to TAV: SORCE/SIM Recalibration using TSIS

31) **Bob Weber,** Lower Peninsula, MI
CO_2 Naturally Follows Solar-driven Climate Extremes

32) **Bob Weber,** Lower Peninsula, MI
TSI Sun-Climate Prediction Theory

33) **Dong Wu,** NASA Goddard Space Flight Center, Greenbelt, MD
Increases of Reflected Solar Radiation as Observed by MISR from Volcanic Eruptions in 2000-2018