2022 Sun-Climate Symposium

"Improved Climate-Record Reconstructions from Solar Variability and Earth System Observations"

May 16-20, 2022 * Madison, Wisconsin

(as of March 2, 2022)

Monday, May 16

5:30 – 7:00 pm **Welcoming Reception (Concourse Hotel)**

Tuesday, May 17

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

8:00 – 8:10 am **Welcome/Introduction**
Peter Pilewskie and Tom Woods, LASP, University of Colorado – Boulder

8:10-8:30 am **Overview of NASA Sun-Climate Missions and Research Projects**
Erik Richard, LASP, University of Colorado, Boulder
David Considine, NASA Langley Research Center, Langley, VA

Session 1. *Recent Observation and Methods for Improving Climate-Record Reconstructions*

Chairs: Greg Kopp and Tom Woods

8:30 – 9:00 am **AJ Timothy Jull (Keynote),** Department of Geosciences, University of Arizona, Tucson, AZ, Isotope Climatology and Environmental Research Centre, Institute for Nuclear Research, Debrecen, Hungary
The 14C and tree-ring view of solar flares, cycles and climate

9:05 – 9:30 am **Laure Lefevre (Invited),** World Data Center SILSO, Royal Observatory of Belgium
The Sunspot Number: Reevaluations and Reconstructions

9:30 – 10:00 am **Break**

10:00 – 10:15 am **Frédéric Clette,** World Data Center SILSO, Royal Observatory of Belgium
The F10.7cm radio flux revisited

10:15 – 10:35 am **Theodosios Chatzistergos (Invited),** Max Planck Institute for Solar System Research, Göttingen, Germany, INAF Osservatorio Astronomico di Roma, Porzio Catone, Italy
Ca II K observations for irradiance studies

10:35 – 10:50 am **Ted Amdur,** Department of Earth and Planetary Sciences, Harvard University
A stable reconstruction of total solar irradiance over the satellite era

10:50 – 11:05 am **Greg Kopp,** LASP/University of Colorado – Boulder, CO
From the Latest TSI Measurements to the Historical Record

11:05 – 11:20 am **Kalevi Mursula,** Space Climate Group, Space Physics and Astronomy Research Unit, University of Oulu, Oulu, Finland
Curious long-term increase of the visual band of the solar spectrum in TAV2 and TSIS-1 SIM datasets

11:20 – 1:00 pm **Lunch Buffet – Concourse**

Session 2. *Measurements and Models of Solar and Climate Variability*

Chairs: Jae Lee, Dong Wu and Brad Pierce

1:00 – 1:30 pm **Gavin Schmidt (Keynote),** NASA Goddard Institute for Space Studies
Historical drivers of climate change in the GISS Earth System Model

1:30 – 1:50 pm **Lynn Harvey (Invited),** LASP, University of Colorado – Boulder. CO
The role of the polar vortex in Sun-Earth coupling

1:50 – 2:05 pm **Lon Hood,** Lunar and Planetary Laboratory, University of Arizona, Tucson
QBO/Solar modulation of the Madden-Julian short-term climate oscillation: Mechanisms and comparisons with models

2:05 – 2:25 pm **Marty Mlynczak (Invited),** NASA Langley Research Center
Observations of a Cooling and Contracting Mesosphere from 2002-2021

2:25– 2:40 pm **Jae Lee,** Joint Center for Earth Systems Technology, University of Maryland, Baltimore County, NASA GSFC
Non-Gaussian Distribution of TOA SW Flux as Observed by MISR and CERES

2:40 – 2:55 pm **Xianglei Huang,** Department of Climate and Space Sciences and Engineering, University of Michigan, Ann Arbor, MI
An Update on the Direct Influence of Solar Spectral Irradiance on the Surface Climate

2:55 – 3:10 pm **Tom Woods,** LASP, University of Colorado – Boulder, CO
Solar Variability Results from the Solar Radiation and Climate Experiment (SORCE) Mission

3:10 – 3:30 pm **Break**

3:30 – 3:45 pm **Wolfgang Finsterle,** PMOD/WRC, Switzerland
The updated VIRGO TSI time series

3:45 – 4:00 pm **Sergey Marchenko,** NASA GSFC, SSAI
What Causes Total Solar Irradiance Changes During a Deep Solar Minimum

4:00 – 4:15 pm **Marty Snow,** South African National Space Agency (SANSA)
SOLSTICE: Seventeen Years, Eighteen Versions

4:15 – 4:30 pm **Serena Criscuoli,** NASA GSFC and SSAI, Greenbelt, MD
Understanding the variability of Balmer Lines

4:30 – 4:45 pm **Andrea Diercke,** National Solar Observatory (NSO), Boulder, CO
Solar H-alpha excess during Solar Cycle 24 from full-disk filtergrams of the Chromospheric Telescope

4:45 – 5:00 pm **Scott McIntosh,** National Center for Atmospheric Research, University of Maryland Baltimore County, NASA/GSFC
Sunspot Cycle 25: Early Indications, Long-term Implications

Wednesday, May 18

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

Session 2. *Measurements and Models of Solar and Climate Variability (cont.)*

8:00 – 8:15 am **Robert Leamon,** University of Maryland, Baltimore County, NASA GSFC
The Solar Cycle Clock: Prediction of F10.7, EUV Irradiance, and the Last X-flare of Solar Cycle 25

8:15 – 8:30 am **Leif Svalgaard**, Stanford University, Stanford, CA
Sunspot Group Numbers 1700-2021 with Monthly Resolution from Several Populations of Observations and Implications for Climate Change

Session 3. *Long Term Atmospheric Measurements*

Chairs: Paul Menzel and Peter Pilewskie

8:30 – 9:00 am **Norman Loeb (Keynote),** NASA Langley Research Center, Hampton, VA,
Tracking Changes in Earth's Energy Flows

9:00 – 9:20 am **Anne Sledd (Invited),** CIRES, University of Colorado – Boulder
The influence of Clouds on Solar Radiation in the "New Arctic"

9:20 – 9:40 am **Andrew Heidinger (Invited),** NESDIS GEO
Growing use of Satellites for Supporting Solar Energy Applications

9:40 – 10:00 am **Steven Platnick (Invited),** NASA Goddard Space Flight Center, Greenbelt, WI,
Time Series Analysis of the NASA MODIS and VIIRS Cloud Products

10:00 – 10:30 am **Break**

10:30 – 10:45 am **Larrabee Strow,** University of Maryland Baltimore County (UMBC) Physics Department and JCET
Satellite Hyperspectral Infrared Climate Time Series Combining AIRS and CrIS

10:45 – 11:05 am **Eva Borbas (Invited),** Space Science and Engineering Center, University of Wisconsin, Madison, WI
Inferring Three Decades of Global Cloud and Moisture Properties from the HIRS Data Record

11:05 – 11:25 am **Jacola Roman,** Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA
Evolution of Stratospheric Temperature Trends from MW+IR Sounders, GPS-RO and Reanalysis using Nonparametrics Multivariate Regression Techniques

11:25 – 11:40 am **Matthew DeLand,** Science Systems and Applications, Inc., (SSAI)
Polar Mesospheric Clouds and Solar Effects: An update

11:40 – 11:55 am **Ningchao Wang,** NASA Langley Research Center, Hampton, VA
Nitric Oxide Concentrations and Radiative Cooling in Earth's Atmosphere Derived from SABER

11:55 – 12:10 pm **Dave White,** Climate Change Truth
The Essential Role of Photosynthesis in Defining Net Zero Carbon Dioxide Emissions for Equilibrium Calculations

12:10 – 12:25 pm **Susan Nossal,** Department of Physics, University of Wisconsin, Madison
Multidecadal Northern Hemisphere Midlatitude Geocoronal Hydrogen Emission Observations

12:25 – 1:30 pm **Lunch Buffet – Concourse**

1:30 – 4:00 pm **University of Wisconsin & Monona Terrace – Tours**

1:30 pm **Depart Concourse to walk to Univ. of Wisconsin or Monona Terrace**
Group 1: Effigy Mound Tour
Group 2: Monona Terrace Tour

3:30 pm **Walk back to the Concourse**

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

Thursday, May 19

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

Session 4. *Stellar Variability and Connections to the Sun*

Chairs: Marty Snow, Greg Kopp and Doug Rabin

8:00 – 8:20 am **Vladimir Airapetian (Invited),** NASA GSFC, SEEC and American University, Washington, DC
The Active Young Sun and its Impact on the Early Earth Climate

8:20 – 8:40 am **Benjamin Montet (Invited),** School of Physics, University of New South Wales, Sydney, Australia
Magnetic Variability of Sun-like Stars Observed by Kepler and TESS

8:40 – 8:55 am **Nina-Elisabeth Nemec,** Institut für Astrophysik, Georg-August-Universität Göttingen, Göttingen, Germany, Max-Planck-Institut für Sonnensystemforschung, Göttingen, Germany
Why active Suns are spot dominated

8:55 – 9:25 am **Alexander Shapiro (Keynote),** Max-Planck Institute for Solar System Research
The solar-stellar connection

9:25– 9:40 am **Sowmya Krishnamurthy,** Max-Planck-Institut fur Sonnensystemforschung, Gottingen, Germany
Inclination and metallicity dependence of the near-UV Ca II H\&K line emissions

9:40 – 10:00 am **Cecilia Garraffo,**

10:00 – 10:30 am **Break**

Session 5. *Next-generation Observations and Models for Sun and Earth*

Chairs: Tom Woods, Erik Richard and Peter Pilewskie

10:30 – 11:00 am **Tristan L'Ecuyer (Keynote),** Department of Atmospheric and Oceanic Sciences, University of Wisconsin
The PREFIRE Mission: Documenting the Spectral Character of Polar Emission

11:00 – 11:20 am **Graeme Stephens (Invited),** Jet Propulsion Laboratory Pasadena, CA
Observing Earth's energy balance in the era of the Atmospheric Observing System (AOS)

11:20 – 11:40 pm **Vanderlei Martins (Invited),**

11:40 – 12:00 pm **Maria Hakuba (Invited),** Jet Propulsion Laboratory, California Institute of Technology, Pasadena
Future Observations of Earth's Radiation budget and the science they enable

12:00 – 2:00 pm **Lunch – on your own**

2:00 – 2:15 pm **Peter Pilewskie,** LASP/University of Colorado – Boulder
Libera and Continuity of the Earth Radiation Budget Climate Data Record

2:15 – 2:35 pm **Hank Revercomb (Invited),** University of Wisconsin-Madison, Space Science and Engineering Center (SSEC), Madison, WI
IR Measurements for CLARREO: the Compelling Need for an On-orbit SI Reference Sensor

2:35 – 2:50 pm **Yolanda Shea,** NASA Langley Research Center, Hampton, VA
CLARREO Pathfinder: A New Perspective of Earth

2:50 – 3:05 pm **Greg Kopp,** LASP, University of Colorado – Boulder
ARCSTONE: Providing a Spectral-Irradiance Reference for On-Orbit Calibrations of Earth-Monitoring Instruments

3:05 – 3:20 pm **Kelly Chance,**

3:20 – 3:50 pm **Break**

3:50 – 4:05 pm **Susan Breon,** NASA Goddard Space Flight Center
TSIS-2 Development

4:05 – 4:20 pm **Thomas Sparn,** LASP, University of Colorado – Boulder
Observation implementation lessons learned and the effect of the global pandemic on future strategies

Science Dinner – *The Pyle Center*

5:15 pm **Walk to the Pyle Center (Shuttle available)**
5:50 pm **Arrive at *The Pyle Center* / Reception**
6:15 pm **Dinner**
8:30 pm **Walk back to the Concourse (Shuttle available)**
8:45 pm **Arrive back at the Concourse**

Friday, May 20

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

Session 6. *Improved Solar Reference Spectra: Implications for Remote Sensing and Radiative Transfer*

Chairs: Odele Coddington and Peter Pilewskie

8:15 – 8:30 am **Odele Coddington,** LASP, University of Colorado – Boulder
The Full-Spectrum Extension of the TSIS-1Hybrid Solar Reference and Impacts for Solar Irradiance Variability Modeling

8:30 – 8:50 am **Daniel Marsh (Invited),** NCAR, Boulder, CO, Faculty of Engineering and Physical Sciences, University of Leeds, Leeds, UK
The impact on model state of implementing the TSIS-1 Hybrid Solar Reference and Impacts for Solar Irradiance Variability Modeling

8:50 – 9:10 am **Paul Smith (Invited),** LASP, University of Colorado – Boulder
CLARREO Pathfinder Uses Solar Calibrations to Obtain Low-Uncertainty Reflectance and Radiance Measurements of Earth Scenes

9:10 – 9:30 am **Raj Bhatt, (Invited),** NASA Langley Research Center, Hampton, VA
Impact of reference solar spectra differences on radiometric cross-calibration of satellite imagers

9:30 – 9:50 am **Fumie Kataoka,** Remote Sensing Technology Center of Japan, Japan Aerospace Exploration Agency
High spectral resolution SWIR solar reference for Vicarious Calibrations of Space-born GHGs Sensors

Meeting Wrap-Up / Summary

9:50 – 10:30 am **Peter Pilewskie** and **Tom Woods,** LASP, University of Colorado – Boulder

2022 Sun-Climate Symposium – Poster Session/Reception

Wednesday, May 18, 4 – 6 pm

In alphabetical order (as of 23 January 2020):

1) **Isaac AshLind,** Lowell Observatory, Arizona Space Grant Consortium, Northern Arizona University
The Missing S in EXPRES: Stellar Activity Index Derived Using the EXtreme PREcision Spectrometer

2) **Stéphane Béland,** LASP, University of Colorado, Boulder
Exploring New Instrument deGradiation Models and Analysis (ENIGMA)

3) **Stéphane Béland,** LASP, University of Colorado, Boulder
Absolute Scale Comparison and Stability Estimate

4) **Shreya Bhattacharya,** Royal Observatory of Belgium, WDC-SILSO,Bruxelles, Belgium
Scale Transfer of Sunspot Number Series in 1849: Heinrich Schwabe to Rudolf Wolf

5) **Luke Charbonneau,** LASP, University of Colorado – Boulder
Advancing the Solar Spectral Irradiance (SSI) Record: The Latest TSIS-SIM SSI Data

6) **Angela Cookson,** San Fernando Observatory, California State University, Northridge
Using feature identification on space-based images to further our understanding of solar irradiance variation.

7) **Serena Criscuoli,** National Solar Observatory, Boulder, CO
Historical reconstruction and forecast of solar magnetic activity and irradiance based on the use Empirical Mode Decomposition

8) **Michael Foster,** University of Wisconsin-Madison
Improving Cloud and Solar Insolation Products Using VIIRS and ABI High-Resolution Channels

9) **Margit Haberreiter,** PMOD/WRC, Davos, Switzerland, University of Oslo, Norway
Total Solar Irradiance and Outgoing Longwave Radiation as measured with CLARA onboard NorSat-1

10) **Margit Haberreiter,** PMOD/WRC, Davos, Switzerland
Solar reference spectrum combining SSI observations with high-resolution spectral synthesis

11) **Jeffrey Hall,** Lowell Observatory, Northern Arizona University
Morphology of Stellar Activity Cycles: Comparing Select Stars in the SSS and Mount Wilson Datasets

12) **Hunter Leise,** LASP, University of Colorado – Boulder
LISIRD v4: The New LASP Interactive Solar Irradiance Datacenter

13) **Joe Llama,** Lowell Observatory, Flagstaff, AZ
Observing the Sun with EXPRES and the Lowell Observatory Solar Telescope

14) **Steven Penton,** Laboratory for Atmospheric and Space Physics (LASP), Boulder, CO
GHOTI: GOES High-Cadence Operational Total Irradiance (Using the SPS on GOES-R+EXIS as a High-Cadence TSI Proxy)

15) **Cornelius Csar Jude Salinas**, Department of Space Science and Engineering, National Central University, Taoyuan City, Taiwan
Using Artificial Neural Networks to Estimate the Solar Cycle Response of Low Latitude Stratospheric Temperatures

16) **Robert Weber,** Robert Weber
Beyond Terminators, Sun-Ocean Warming Threshold is Climate Change Tipping Point through Holocene

17) **Dong Wu**, NASA Goddard Space Flight Center
A method to correct and determine irradiance variations in SDO/HMI continuum instensity during the 2012 Venus transit