



Overview of the NASA Solar Irradiance Science Team (SIST) Program

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Background

- NASA requested proposals for “...*the development of consistent multi-instrument/multi-platform space-based data sets of solar irradiance*” in Fall 2014.
- The mission of the Solar Irradiance Science Team (SIST) program is to construct unified databases of spectral and total solar irradiance.
- Proposals were also solicited for Team Leader.

Awards

- Seven investigations were selected for funding in March 2015 (*alphabetical list*).
 - Matt DeLand (PI, Team Leader), Sergey Marchenko, Linton Floyd
 - Jerry Harder (PI), Stephane Beland, John Fontenla, Aimee Merkel
 - Greg Kopp (PI)
 - Judith Lean (PI), Peter Pilewskie, Gary Rottman, Karl Battams, Odele Coddington
 - Erik Richard (PI), Stephane Beland, Jerry Harder
 - Marty Snow (PI), Janet Machol, Tom Woods, Gary Chapman, Debi Prasad Choudhary
 - Richard Willson (PI)

DeLand – Improved Composite Solar Spectral Irradiance Product Using SBUV/2 and OMI Data

- *SSI data (full record).*
- Improve quality of existing composite SSI data set [DeLand and Cebula, 2008].
- Create corrected NOAA-16, NOAA-17 SBUV/2 data (using SUSIM reference spectra) to extend current product to 2009.
- Expand OMI irradiance product to contain daily spectra with full wavelength sampling.
- Incorporate OMI data to extend composite SSI data set to present.
- Fill spectral gaps with proxy-based data.

Harder – Construction of a SORCE-Based Solar Spectral Irradiance (SSI) Record for Input into Chemistry Climate Studies of Solar Cycle 23-24

- *SSI data + model (Cycles 23-24).*
- Generate broad spectral coverage SSI data set (110-10000 nm) over Cycles 23-24 for climate models.
- Primary input data are SORCE SOLSTICE and SORCE SIM measurements.
- Extend temporal coverage back to Cycle 23 maximum (2002) using Fontenla SRPM model.
- Model will also provide self-consistent irradiances for $\lambda > 2400$ nm.

Kopp – A TSI Community Consensus Composite Based on an Assessment of the Accuracies and Uncertainties of Space-Borne TSI Measurements

- *TSI data (full record).*
- Current ISSI team has agreed on recommended value of S_0 , methodology for creating composite TSI record.
- Now want to implement approach and add time-dependent uncertainties.
- Establish system to distribute new TSI product and update as appropriate.

Lean – Participation in Solar Irradiance Science Team: How does the Sun's Spectrum Vary?

- *SSI model (full record).*
- Improve characterization of irradiance variability for proxy model.
- Evaluate each available irradiance database for proxy relationships on monthly, solar cycle, multi-decadal time scales.
- Use improved SME database to get rotational → cycle scaling at UV wavelengths.
- Repeat process with TSI data (adjusted for sunspot darkening).
- Compare solar minima in 1996, 2008 to evaluate possible decadal changes.
- Provide uncertainties for variability.

Richard – The Analysis of Improved Laboratory Measurements in the Recalibration and Reevaluation of the SORCE SIM Data Record

- *SSI data (Cycles 23-24).*
- Review SORCE SIM calibration using new laboratory measurements and facilities developed for TSIS.
- Expanded studies of SORCE SIM materials and witness samples included.
- Additional characterization of thermal sensitivity will improve ability to evaluate later portion of SORCE data record, when temperatures are more variable.

Snow – Solar Spectral Irradiance: Lyman Alpha, Magnesium II, and Sigma k Proxies (SSIAMESE)

- *Proxy data (full record).*
- Improve proxy records for Lyman α , Mg II, visible variations.
- Lyman α : Update corrections to current data, add GOES and SDO data.
- Mg II: Use ground-based Ca II data (Sigma-K) to identify satellite instrument trends, clean up artifacts.
- Visible: Develop proxy using solar continuum images as alternative approach to sunspot area.
- Develop SSI variability model using these proxy data sets.

Willson – Calibration of Scattering and Diffraction Effects for ACRIM1 and ACRIM2 Satellite TSI Experiments and Reprocessing/Archiving Final Results

- *TSI data (Cycles 21-23).*
- Characterize ACRIM1, ACRIM2 scattering and diffraction using LASP TSI Radiometer Facility (TRF).
- Anticipate finding similar absolute adjustment to correction derived for ACRIM3.
- Hope to improve or resolve “ACRIM Gap” problem in 1989-1991 using empirical corrections.

Other Recent Work

- **SOLID** – First European Comprehensive Solar Irradiance Data Exploitation.
- Integrated program to create reconstructed spectral irradiance and total irradiance data sets. Formal duration of project is December 2012 to November 2015.
 - Emphasis on filling temporal and spectral gaps using model products.
 - Specification of error and uncertainty estimates.
 - Outreach to potential users in climate community regarding content and format of data products.

Status

- All SIST teams have received Year 1 funding.
- Should the different projects within SIST be coordinated to complement the work that has been accomplished by SOLID?
- First annual SIST meeting/workshop planned for Summer 2016.
- Comments and suggestions are welcome:
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