Construction of a SORCE-based SSI Record for Chemistry Climate Models

Jerald Harder [1] *[Jerry.Harder@lasp.colorado.edu] and Juan Fontenla* [2]

[1] *Laboratory for Atmospheric and Space Physics (LASP), University of Colorado, Boulder, CO, USA*
[2] *GalactiTech LLC, Charlotte, SC, USA*

The objective of this proposal is to produce a solar spectral irradiance (SSI) record suitable for whole atmosphere chemistry-climate model (CCM) transient studies over the well-observed solar cycle 23 and 24 time period. This record will be based predominantly on observed irradiance of the SORCE mission as measured by the SIM and SOLSTICE instruments that accounts for ~97% of the total radiated output of the Sun. A viable SSI record for studies of this kind requires very broad wavelength coverage (110-10000 nm), daily spectral coverage, compliance of the integrated SSI record with the TSI, and well-defined and documented uncertainty estimates both absolute scale of the spectrum and the long-term stability of the record. While the majority of the record will be derived from SORCE observations, extensions back to the Solar Cycle 23 maximum time period (early 2002) must be generated. For this study, we will employ the Fontenla et al. (2011) Solar Radiation Physical Model (SRPM) since it gives the best estimates of a broad variety of solar structures that include bright facular and network features as well as contributions from sunspot umbra and penumbra. Image analysis of the Precision Solar Photometric Telescope (PSPT) data from both Rome Observatory (OAR) and the Mauna Loa Observatory (MLSO) also provides a very useful independent data product that provides valuable proxies that are consistent with bright facular components such as the Mg II index and the short-term sunspot darkening represented in the photometric sunspot index. The PSPT image analysis provides information about solar irradiance evolution not attainable through two-component decompositions, i.e. the evolution of network and active networks components that evolve on time scales longer than rotational period of the Sun.