

## Project Details

**ROSES ID:** NNH05ZDA001N

**Selection Year:** 2006

**Program Element:** Independent Investigation

**Topic:** Shock acceleration of solar energetic particles by interplanetary CMEs

**Project Title:**

WAVELENGTH AND TIME DEPENDENCE OF SOLAR FORCING OF EARTH'S ATMOSPHERE-OCEAN SYSTEM

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**Summary:**

The Sun's radiative input to Earth has characteristic temporal variations that depend on wavelength, as we have documented under previous funding. We propose to further analyze SIM (Spectral Irradiance Monitor) solar spectral irradiance (SSI) data, and compare with SSI synthesized from the SRPM model (Solar Radiation Physical Modeling), to estimate the statistical relations between SSI and total solar irradiance (TSI), to study the responses of atmosphere-ocean mixed layer to variations in solar spectral irradiance. Proposed research will include the analysis of existing solar spectral irradiances from SORCE SIM, with coincident ground-based and aircraft observations from the Solar Spectral Flux Radiometer (SSFR) to estimate spectral solar forcing in the troposphere and stratosphere, and to model the atmospheric response to variations in SSI, to advance our understanding of the wavelength and time dependence of solar forcing of Earth's atmosphere-ocean system. This proposal falls into the category of Independent Investigations, and has three tasks:

- (1) Variations in Spectral Solar Irradiance (SSI): Extend the analysis of SSI from SIM on SORCE to the fully calibrated time series and compare with synthesized solar spectrum from the SRPM model (Solar Radiation Physics Modeling). Estimate the statistical relations between of SSI and TSI.
- (2) Spectral Solar Forcing: Estimate the vertical profiles of spectral and total solar forcing by analyzing the existing SORCE SSI, with coincident ground-based and aircraft observations from the Solar Spectral Flux Radiometer (SSFR).
- (3) Modeling the response of the atmospheric and surface temperature to the variations of SSI: A simple radiative-convective model (RCM) will be used to study atmospheric and surface responses to variations in SSI. The 1-D RCM will be extended to account for time-dependence of both variation of SSI and response of atmosphere-ocean mixed layer.

## Publication References:

**Summary:** no summary

**Reference:**

Oreopoulos, Lazaros; Marshak, Alexander; Cahalan, Robert F.; Várnai, Tamás; Davis, Anthony B.; Macke, Andreas; (2006), New Directions in the Radiative Transfer of Cloudy Atmospheres, Eos, Transactions American Geophysical Union, Volume 87, Issue 5, p. 52-52, doi: 10.1029/2006EO050006

**Summary:** no summary

**Reference:** Sud, Y. C.; Walker, G. K.; Zhou, Y. P.; Schmidt, Gavin A.; Lau, K.-M.; Cahalan, Robert F.; (2008), Effects of doubled CO<sub>2</sub> on tropical sea surface temperatures (SSTs) for onset of deep convection and maximum SST: Simulations based inferences, Geophysical Research Letters, Volume 35, Issue 12, CiteID L12707, doi: 10.1029/2008GL033872

**Summary:** no summary

**Reference:** Sud, Y. C.; Walker, G. K.; Zhou, Y. P.; Schmidt, Gavin A.; Lau, K.-M.; Cahalan, Robert F.; (2008), Correction to ``Effects of doubled CO2 on tropical sea surface temperatures (SSTs) for onset of deep convection and maximum SST: Simulations based inferences'', Geophysical Research Letters, Volume 35, Issue 18, CiteID L18708, doi: 10.1029/2008GL035702

**Summary:** no summary

**Reference:** Cahalan, Robert F.; Wen, Guoyong; Harder, Jerald W.; Pilewskie, Peter; (2010), Temperature responses to spectral solar variability on decadal time scales, Geophysical Research Letters, Volume 37, Issue 7, CiteID L07705, doi: 10.1029/2009GL041898