Project Title:
Observational study of solar variability impacts on the troposphere, stratosphere and mesosphere

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Project Information:
In response to the LWS Program call on the Sun-Climate Theme, we propose to characterize and investigate impacts of solar variability on short (e.g., 27 days) and long (11 years) time scales with new observations from advanced satellite sensors. We analyze the high-quality solar spectral data acquired by NASA SORCE (Solar Radiation and Climate Experiment) SIM (Spectral Irradiance Monitor) and TIMED (Thermosphere Ionosphere Mesosphere Energetics and Dynamics), as well as global atmospheric data from MLS (Microwave Limb Sounder), MISR (Multiangle Imaging SpectroRadiometer), ISCCP (International Satellite Cloud Climatology Project), and FTUVS (Fourier Transform Ultraviolet Spectrometer), together with long reanalysis records, to derive, characterize and better understand atmospheric and cloud responses to the solar variability at different spectral wavelengths. As indicated in the recent SORCE SIM observations, the increasing of solar irradiance at near infrared spectral bands during the TSI (total solar irradiance) declining phase of solar cycle 23. Impacts of the spectral solar irradiance variations become even more complicated than as originally thought, and atmospheric responses to this forcing need to be investigated as a whole. We propose to explore atmospheric photochemical, radiative, and dynamical processes, and their responses to each spectral region of the solar irradiance variances over the solar cycle, and focus on coupling mechanisms that may act to amplify the solar signals in Earth's climate system. We will explore the solar-cycle responses in the GISS AR5 version of ModelE GCM, which are simulated from new observed spectral solar irradiance variations, to better understand how the coupled mechanisms work by comparing the solar signals from the observations with those from the model simulations.

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Summary: no summary

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