



Spectral Solar UV Variability and Climate Responses

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Atmospheric gaseous absorption of UV radiation depends on wavelength. UV-C is completely absorbed in the upper atmosphere, only a small fraction of UV-B penetrates to the surface, and UV-A suffers almost no atmospheric absorption. Observations from the Spectral Irradiance Monitor (SIM) onboard the Solar Radiation and Climate Experiment (SORCE) satellite demonstrate a rather large change in UV radiation during the descending phase of solar cycle 23, not anticipated by models of reconstructed spectral solar irradiance (SSI).

Here we examine implications of SIM observations on Sun climate interactions. We use the Goddard Institute for Space Studies (GISS) Global/Middle Atmosphere Model (GCMAM) to examine the climate response to two types of spectral solar forcing – one based on model reconstructed spectral solar irradiance (SSI), the other derived from SIM observations. The current version of the GISS GCMAM dynamically couples atmosphere with ocean, and has a model top near the mesopause, allowing us to examine impacts of atmosphere-ocean couplings and feedbacks on responses to the two solar forcing scenarios. We will show climate responses in the different regions of the atmosphere and geographic locations on decadal and centennial time scales.