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Modeling Climate Responses to Spectral Solar Forcing on Centennial and Decadal Time Scales

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We report a series of experiments to explore climate responses to two types of solar spectral forcing on decadal and centennial time scales – one based on prior reconstructions, and another implied by recent observations from the *SORCE* (Solar Radiation and Climate Experiment) *SIM* (Spectral Irradiance Monitor). We apply these forcings to the Goddard Institute for Space Studies (*GISS*) Global/Middle Atmosphere Model (*GCMAM*), that couples atmosphere with ocean, and has a model top near the mesopause, allowing us to examine the full response to the two solar forcing scenarios. We show different climate responses to the two solar forcing scenarios on decadal time scales and also trends on centennial time scales. Differences between solar maximum and solar minimum conditions are highlighted, including impacts of the time lagged response of the lower atmosphere and ocean. This contrasts with studies that assume separate equilibrium conditions at solar maximum and minimum. We discuss model feedback mechanisms involved in the solar forced climate variations.