



Evaluation of solar irradiance models for climate studies

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Instruments on satellites have been observing both Total Solar Irradiance (TSI) and Spectral Solar Irradiance (SSI), mainly in the ultraviolet (UV), since 1978. Models were developed to reproduce the observed variability and to compute the variability at wavelengths that were not observed or had an uncertainty too high to determine an accurate rotational or solar cycle variability. However, various models and measurements show different solar cycle SSI variability that lead to different modelled responses of ozone and temperature in the stratosphere, mainly due to the different UV variability in each model, and the global energy balance.

The NRLSSI and SATIRE-S models are the most comprehensive reconstructions of solar irradiance variability for the period from 1978 to the present day. But while NRLSSI and SATIRE-S show similar solar cycle variability below 250 nm, between 250 and 400 nm SATIRE-S typically displays 50% larger variability, which is however, still significantly less than suggested by recent SORCE data. Due to large uncertainties and inconsistencies in some observational datasets, it is difficult to determine in a simple way which model is likely to be closer to the true solar variability.

We review solar irradiance variability measurements and modelling and employ new analysis that sheds light on the causes of the discrepancies between the two models and with the observations.