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Sensitivity of stratospheric ozone to changes in spectral solar irradiance

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Heating within the stratosphere mainly results from the absorption of solar ultraviolet (UV) radiation by ozone. Variations of incoming solar UV modulate stratospheric ozone concentration and can lead to dynamical feedbacks throughout the middle and lower atmosphere. Despite three decades of ozone and solar spectral irradiance (SSI) observations, the magnitude of the solar cycle variation in each remains to be accurately determined thus leaving a gap in our knowledge of the Sun's effect on the Earth's climate system. Observations from the SORCE satellite suggest much larger solar cycle UV variations compared to SSI models based on previous data. Investigations that compare observed ozone data with the modelled ozone response from SORCE and SSI models show some similar solar cycle trends to ozone data, but the uncertainty in both SSI and ozone observations is often not considered. We show that it is, in principle, possible to combine SSI and ozone observations to better determine variations in both, though this remains a challenge while large uncertainties in both ozone and SSI observations remain.