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On the ambiguous nature of the 11-year solar cycle signal profile in stratospheric ozone

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We use three satellite datasets and simulations from a 3-D chemical transport model, forced by three different solar flux datasets, to diagnose the 11-year solar cycle signal (SCS) in stratospheric ozone. Our analysis shows that compared to SAGE II v6.2, a reduced upper stratospheric SCS in SAGE II v7.0 is due to a more realistic ozone-temperature anti-correlation. Overall, all model simulations show a positive SCS in the lower and middle stratosphere and negligible SCS in the upper stratosphere in agreement with SAGE v7.0, HALOE and MLS data. The model simulations show a differently structured SCS over different time periods covered by the satellite datasets, which helps to resolve some observed differences. Our simulations also show much reduced aliasing effect of volcanically enhanced stratospheric aerosol on the estimation of SCS. However, despite the improvements to the SAGE II data, due to remaining biases in current observational and reanalysis datasets, accurate quantification of the influence of solar flux variability on the climate system remains an open scientific question.