Replies to Reviewer 1:

General Comments:

The authors use Microwave Limb Sounder (MLS) instrument measurements to estimate the 11-year solar cycle signal (SCS) in stratospheric ozone. Their analysis of the MLS data suggests a single-peak-structured SCS signal of about 3% near 4 hPa (~40 km) in tropical stratospheric ozone. This finding is significantly different from earlier work that found a double-peak-structured SCS, which was based on ozone profiles from Stratospheric Aerosol and Gas Experiment (SAGE) II or Solar Backscatter Ultraviolet Radiometer (SBUV) satellite instruments' data. They also found that MLS-observed ozone variations are more consistent with ozone from a control model simulation using Naval Research Laboratory (NRL) v2 solar fluxes. The lowermost stratosphere modelled ozone shows a negligible SCS, which is somewhat different from the nearly 1% variation derived using MLS data.

This article contains a good thorough description of previous work on the SCS in stratospheric ozone. The presented work is then given in context with the published literature and shows a good analysis and comparison of the SCS in measurements and model simulations. It is significant that the research includes model sensitivity simulations with three different solar flux datasets (NRL2, SATIRE and SORCE). Also, it is noteworthy that an ensemble of four linear regression models were used to test the derived robustness of the SCS.

I do think that the paper should be published.

We thank the reviewer for his/her comments.

Specific Comments:

1) p. 9, lines 257-258: The sentence 'Most importantly, somewhat different (and non-linear) ozone differences seen in C_SOR suggests that SORCE solar fluxes may still have some time-varying biases' is quite important. Does this mean that the SORCE solar fluxes still possibly overestimate UV variability?

We are not sure if they overestimate UV variability. However, UV variability between NRL, SATIRE and SORCE solar fluxes is compared in Harder et al., (2019) (Figure 12). Their comparison shows that SORCE data does show larger UV variability during both the solar cycles especially during recent solar cycle (24); SORCE data suggest large changes for SSI between 300 and 380 nm.

We also added a sentence to explain these biases, "The larger UV variability reported in earlier versions of the SORCE data (see Section 1) is reduced but apparently still larger than that given by SATIRE or NRL v2"

2) p. 20, Figure 5: My eyesight is not the best and I have a minor problem distinguishing the two different colors used to present the results from MLS observations (black) and a model simulation with NRL2 solar fluxes (dark blue). The 'black' and 'dark blue' look very similar in color to me. Would it be possible to use a 'lighter blue' color for the model simulation or even a 'dashed black' line for the MLS observations? This would aid those of us with poorer vision.

We agree with the reviewer. In the revised manuscript A_NRL lines are shown with light blue colour.

References:

Harder JW, Béland S, Snow M. SORCE-based solar spectral irradiance (SSI) record for input into chemistry-climate studies. Earth and Space Science. 2019, 2487-2507.