

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2021-663

Anonymous Referee #1

Referee comment on "A single-peak-structured solar cycle signal in stratospheric ozone based on Microwave Limb Sounder observations and model simulations" by Sandip S. Dhomse et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-663-RC1>, 2021

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.

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?

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. Thanks.

Technical Corrections:

1) p. 2, line 42: Change "(2003)analysed" to "(2003) analysed"

2) p. 2, line 47: Change "upto" to "up to"

3) p. 5, line 147: Change "coefficients.ElasticNet" to "coefficients. ElasticNet"