

Interactive comment on “Ozone and temperature decadal solar-cycle responses, and their relation to diurnal variations in the stratosphere, mesosphere, and lower thermosphere, based on measurements from SABER on TIMED” by Frank T. Huang and Hans Mayr

Anonymous Referee #1

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Overall this paper has some intriguing information but it is presented in a confusing way and does not go far enough in showing the reader the changes in diurnal ozone & temperature values on a global scale. This reviewer recommends that the changes measured between solar max and minimum be plotted as a function of latitude. We believe that the diurnal changes are different at different latitudes (fig 6 of Diurnal ozone variations in the stratosphere revealed in observations from the Superconducting Submillimeter-Wave Limb-Emission Sounder (SMILES) on board the International

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Space Station (ISS) by Sakazaki et al) and that the maximum diurnal cycle occurs at 60 degrees latitude in the summer months so the question that needs to be addressed is: does the solar cycle affect ozone and temperature differently at different latitudes? If there is no difference in the changes vs latitude, then this needs to be explicitly stated early in this paper. If there is, then plots for zonal averages (10, 20 or even 30 degrees) is necessary. This could be very useful information for the satellite retrieval community as well as fodder for the modelers to compare to. Also, a short discussion of instrument/measurement error bars would be extremely helpful.

Specific comments: Line 30: based on Line 39: The understanding of the response. . . .
Line 154: responses due to the solar. . . .

Figure 1 is extremely jumbled- please remove all trailing zeros (unless you know your altitude registration to 1 meter. . . .) what does “data 2005001 2005365” mean on the plot when the caption says 2005085?

Figure 2: Please explain “znimn” in the figure caption or remove.

Line 250,258: change 20006 to 2006

Line 253-4. “The comparisons will indicate the quality of our results. . . .” Does it? Either remove or expand.

Line264-5: As stated in the beginning of this review, if there are latitudinal changes in the diurnal cycle between solar min and max, please show us! This is very useful information. Or are you saying the responses change due to increased noise and shouldn't/can't be shown?? Either way, this reviewer feels that showing two latitude bands on the globe are not enough to make the point.

Line 274; should that be figure 3 (not 4)?

Line 306: where are the uncertainties discussed? Line 307: please discuss your error bars [and/or reference]

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Figures 3-8: explain LSTNRM in caption or remove.

Figures 6,7 and 8 contain the interesting results of this paper. Again, a more comprehensive paper showing different latitudes in 10, 20 or 30 degree bands would be useful and enlightening.

Section 5.2 This reviewer can't help but feel that some numbers games are being played here. You compare SABER from 24s to 24n to Bieg 0-30 north and south separately. All the others are 25n to 25s (I believe- what latitudes are the red plusses??) so I recommend just removing the Beig data.

Line 518 Previous studies based on. . .

Interactive comment on Ann. Geophys. Discuss., <https://doi.org/10.5194/angeo-2019-38>, 2019.