

Response to Editor's Comments,

Dear Authors,

Thank you for addressing the reviewers' comments. Reading the last version of the paper, I noticed an inconsistency between Figures 8 and 9: while the extracted SAOs are in phase between the different WACCM simulations on Fig. 8, there seems to be a clear phase shift between rmSAO-TP and the others on Fig. 9. This discrepancy would have implications for the conclusions (last sentence of the abstract). Hence the paper can only be considered for publication after this difference has been explained or corrected.

We would like to sincerely thank the editor for the very helpful comments and suggestions. Following the editor's suggestion, we have substantially revised the manuscript. After a careful check of the figures, we found that the phase shift is due to a mistake in the date for the lines with the rmSAO simulation in Fig. 9. We are very sorry for the mistake. We have corrected Fig.9 and the corresponding descriptions for Fig.9 in the manuscript. Thanks again for your kind reminder.

I also have a few additional comments, which I would like you to take into account. The lines and pages refer to the tracked-change version of the manuscript.

P1 | 10 : 'Model simulations indicate that the SAO in the UTLS is partly modified by the SAO of sea surface temperatures (SSTs)' : if Figure 8 is correct, I would emphasize that 'Model simulations indicate that the SAO in the UTLS is only weakly affected by the existence of an SAO in sea surface temperatures (SSTs).' or something along those lines

Thank you for your suggestions. According to Fig. 7 and Fig.8, the SAO in the UTLS is partly affected by the existence of an SAO in SSTs in the SHM but weakly affected by the SAO in SSTs in the NHM. We have modified the sentence to summarize it more precisely.

p 1 | 20 : 'temperature variations' → 'temperature variability'

Corrected.

p2 | 50 : ' both in' → 'both over'

Corrected.

p2 | 57-58 : 'an artifact e.g., just a harmonic part of the seasonal cycle. The SAO variations investigated in this study are more sinus-like.' → 'an artifact. In particular, the SAO investigated in this study is sinus-like with periods of ~ 6 months, i.e. it is not just a harmonic of the annual cycle'.

Thank you very much for your suggestion. We have renewed the sentence in the manuscript.

P3 | 80 : ' missing data in the early part of the GNSS RO record' which time period has missing data ?

The GNSS RO data is available from May 2001. A few missing data are found during August-September 2001 and January-February 2002. We have added such information in the revised manuscript.

P6 | 158 'data limitation': please specify what limitation (GNSS RO availability if

I am correct)

As we described in the Section 2.1 GNSS RO temperature data "CHAMP provides ca. 150 occultation events globally per day from May 2001 to October 2008, and COSMIC began providing 1000-3000 occultation events per day since

late 2006”, the observations of CHAMP is limited. We have modified the sentence.

p9 | 260 ‘While’ → ‘When’

Corrected.

p 19-20 : Figures 4-5 : maybe replace ‘analysis’ and ‘analysis process’ by

‘analysis tendency’ for clarity

Corrected.