Response to reviewer

August 29, 2016

We thank the reviewer for his/her comments. Below are our responses in blue.

1 Reviewer comments

The authors have carefully considered and addressed the comments of the initial review. I have only a few remaining quite minor comments for the authors to consider before publication.

P2, l14: Since the previous paragraph discusses prior work, it would be helpful if the first sentence introducing the present study highlighted what is new about this study. As is, a hasty reader might think that this is the first study to evaluate the impact of sampling bias on climatologies of MLS, HALOE and ACE-FTS, which is not the case.

P2L14 will be changed from "In this study we evaluate the impact of the Aura Microwave..." to "In this study we **further** evaluate the impact of the Aura Microwave..."

We believe that P2L20 clearly states what is new about this study: Our study has two purposes: (1) We expand upon previous studies by quantifying the sampling bias of these instruments affecting measurements of upper tropospheric and stratospheric temperature and trace gas species. (2) We investigate how differences in data coverage may affect the outcome of two illustrative atmospheric studies: trend detection and quantification of tropical vertical velocities.

P6, l16: Here, and in the figure caption, and elsewhere, the Taylor diagrams are introduced as a metric of the "trends" of the different data sets. Given that two datasets could have similar trends but show very poor agreement on a Taylor diagram (as now stated), it seems that Taylor diagrams are not really a way to assess or compare trends. I suggest nothing more than a change of word use here (and elsewhere) when introducing the Taylor diagrams.

"Trends" will be changed to "patterns" as used by Taylor, 2001.

Figure 13 caption: It would be helpful to know whether the confidence intervals given here 1 or 2 sigma.

These confidence intervals are 95% confidence intervals. The caption will be changed to: The slopes' **95%** confidence intervals are ± 0.007, 0.06 and 0.09 for MLS, HALOE and ACE-FTS, respectively.

References

Taylor, K. E: Summarizing multiple aspects of model performance in a single diagram, J. Geoph. Res., vol 106, no. D7, 7183-7192, doi:10.1029/2000JD900719, 2001.