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Discussions

Interactive comment on "Validation of Aura MLS retrievals of temperature, water vapour and ozone in the upper troposphere and lower–middle stratosphere over the Tibetan Plateau during boreal summer" *by* X. L. Yan et al.

X. L. Yan et al.

j.s.wright@gatech.edu

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Our thanks to Anonymous Referee 2 for thoughtful comments and suggestions that have helped to improve the presentation in this manuscript. Our responses and a brief summary of related changes to the manuscript are given below.

The first comment concerns the added-value of the paper. The authors cite a number of previous publications (p2 l27-32) where MLS data have been vali-dated globally and justify their study by the fact that none has focused on the Tibetan plateau region where the presence of the Asian Monsoon Anticyclone in

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the UTLS makes it particular relative to other UTLS regions. Nevertheless, the results are not discussed enough in light of the previous validation studies cited in the introduction and one does not really see clearly wether MLS retrievals have particular difficulties in reproducing Temperature, water vapor and ozone over this region during the monsoon, that is the added value of this study. The discussion part of the paper should therefore more clearly show how the results over the Tibetan plateau agree or disagree with the previous validation studies.

We have reorganized and clarified the text in a few locations to better emphasize the added value relative to previous studies. The most important difference between our results and those reported previously is the sharp peak in the relative bias of ozone retrievals in the lowermost stratosphere, which does not appear in previous validations of MLS ozone. Other differences include larger dry biases and larger cold biases in the upper troposphere than have been reported by previous studies. Both the sharp peak in the ozone relative bias and the cold bias in the upper troposphere are enhanced during the monsoon relative to before monsoon onset, indicating that conditions in the Asian monsoon anticyclone pose unique challenges for remote sensing that affect the accuracy of MLS retrievals in this region. We find no significant difference in the upper tropospheric dry bias before and after monsoon onset. These additions supplement a series of notes in the discussion and summary sections of the original manuscript on how our results differ from those reported by previous studies.

The second comment is concerning the presentation of the results. The profile figures are good and informative. The detailed statistics are rather difficult to follow and heavy to read because presented in a very descriptive way. Three different parameters and four different sites makes a large amount of numbers which are repeatedly presented all along the paper. Furthermore, a lot of infor- mation is present in the profile figures and does not need to be described in details in the text. For the pressure-weighted mean (differnet from the profils) the statistics should be presented in a more synthetic way. Furthermore, the

paper mostly dicusses biases. The variability from MLS and the radiosonde are compared and the correlation between both are discussed in the text but not thoroughfully enough. They should appear in a more concise and synthetic way with Taylor diagramms complemented by the correponding numbers presented in tables (biases, biases of the RMs, RMS of sondes and MLS, correlation coefficients). Taylor diagramms are indeed the best way to synthetically compare the variabilities of different datasets and their correlations. With such diagramms and tables, the reader could see the agreement between both datasets in terms of correlation, RMS of the biases and variabilities much more easily.

We appreciate this suggestion, and have added three new figures and one table to address it. The three figures are modified Taylor diagrams showing standard deviations (normalized to sonde standard deviations), correlations, and RMS errors for the layer average values in the upper troposphere, tropopause layer, and stratosphere. Results are shown for both v3 and v4. Table 2 lists mean bias, RMS bias, bias of RMSs, and correlation for the same layers for all three variables. The text has been reorganized to reflect these additions, with the presentation modified to be more qualitative and less quantitative (since quantitative information is now provided in Table 2).