We thank the reviewer for the helpful comments and suggestions. They have helped make the paper more focused and clearer.

Reviewer comments in blue, our responses in black.

Page 4 Line 22: Please define SOs as 'Special Observations (SOs)' here.

We have rewritten this section as follows: SOs are more closely spaced (12 to 60 km), and extend over a few hundred to a thousand kilometers, providing more detailed information on regional variability.

Page 5 Line 13: So these levels 'sometimes' could not coincide with the lowest 3 levels? What are the uncertainty introduced here when NH3, HCOOH and CH3OH are calculated based on inconsistent levels of TES products? Can the authors use fixed 3 lowest layers to calculate the values and then compare the results?

It is true that sometimes the lowest three levels may not coincide with those we have selected. Given the fairly limited amount of information in the NH3, CH3OH and HCOOH retrievals, the algorithm tends to adjust the a priori profile where it has the most sensitivity, around the peak of the AK. If the AK peaks significantly above the first three levels, then the mean of the first three is basically the mean of the a priori at those levels. Conversely, if the AK peaks at the first level, then including the third level increases the impact of the a priori on the mean. In effect we are trying to aggregate all the information returned by the retrieval into a single value using a simple method. We have added some discussion on this topic in section 2.1. We hope this is sufficient to address the reviewer's concerns.

Page 8 Line 24 to 34: It is a little bit hard to tell the differences based on the solid line separated by dotted lines. Can the revised manuscript include some values such as 'it contains elevated O3 (xxx ppbv), CH3OH (xxx ppbv) : : :'. Or compile all the satellite measurements (TES, AIRS, and MODIS) in a table?

We agree that this format did not work well in print. We have removed the lines and added filled circles at the dates discussed in the text. We hope this makes the figure more legible.

Page 12 Line 5: The authors emphasize the importance of biomass burning to the local air quality in MCMA and Lagos, what are the possible uncertainties when using GEOS-Chem 2012 simulations driven by the seasonal biomass burning emissions from GFED4? For instance, do 2013-2015 have typical biomass burning scenario as described in GFED4? Further explanation or discussion is suggested.

We have added plots of MODIS AOD and AIRS CO for 2012 in the appendix; based on these variables the variability in 2012 was fairly similar to 2013-2015, though AOD reached the high levels observed in 2015. We have also added some more discussion in

the text. The goal of this model comparison was not validate the model but to demonstrate the additional information that can be obtained from the TES data.

We have completely revised the transect plots (Figure 1 and Figure 10); we hope the reviewer will find them much more informative.