

## ***Interactive comment on “A Multi-sensor Upper Tropospheric Ozone Product (MUTOP) based on TES ozone and GOES water vapor: validation with ozonesondes” by J. L. Moody et al.***

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We appreciate the comments of the two anonymous reviewers and their helpful remarks. We have addressed specific points of the reviewers as noted below.

### **Anonymous Referee #1**

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*The paper references Doughty et al. [2011] in terms of climatology, but Doughty et al. [2011] was not about climatology but instead it was a very similar case study paper based on the same INTEX-B April-May 2006 campaign. The main difference between*

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*these two papers is that Doughty et al. [2011] used a data assimilation method to derive tropospheric ozone profile information whereas the present paper uses a much simpler regression technique. The GMAO data assimilation used by Doughty et al. included GEOS-Chem modeled tropospheric ozone which requires emission inventories and is not easy to implement. The present regression method is far simpler to apply than data assimilation for such studies and appears to work just about as well for tropospheric ozone. The authors might want to include some of this discussion in their paper to strengthen support for the MUTOP measurements.*

Actually, the reference to Doughty does not refer to it as a climatology, as we state:

Previously, observations from two instruments on Aura, the ozone monitoring instrument (OMI) and the microwave limb sounder (MLS) have been used to evaluate individual events and to provide a global climatology of tropospheric and stratospheric columns of ozone (Doughty et al., 2011; Ziemke, et al., 2011). But this can be clarified with a bit more detailed reference along the lines of the one suggested by the reviewer.

*The paper is well written with few typos - Page 30503, line 5: Should be "As shown in Fig. 3: : :"* The paper appears as publishable with only minor changes.

Thanks, the typo will be fixed.

## **Anonymous Referee #2**

Received and published: 27 March 2012 My most significant concern is just on terminology.

*Especially in the beginning of the paper, MUTOP is frequently referred to as "imagery", but also more carefully described as "layer-average ozone mixing ratio" (both instances on p. 30491, lines 7-15). The term imagery implies to me a qualitative product, maybe only available as a JPEG. However, MUTOP is a quantitative data product that a user could plot in whatever manner they wanted. I recommend more use of "data set" or*

*"data product", or just "MUTOP", instead of "imagery".*

We have conceived of these as *derived product* imagery (DPI) in the remote sensing parlance, indicating that the result is largely empirical result, derived from remotely sensed data. This will be clarified. MUTOP, by definition, is the multi-sensor upper tropospheric ozone product, so MUTOP product is redundant, but MUTOP imagery seemed explanatory. In several places just MUTOP should work.

*Other minor comments:*

*Fig. 4b: caption is opposite of x-axis label*

Thanks, had originally plotted this the other way, but convention is predicted minus observed, so figure was switched, but the caption was missed. This will be corrected to:

**(b)** Frequency distribution of error, defined as the predicted (MUTOP) minus the observed (ozonesonde) with the average denoted by the solid line and the standard deviation by the dashed lines; shows the overall tendency for the TES derived image product to over predict the observed ozone by about 4 ppbv.

*The skew-T plots (Fig. 5c, 6b,c and 7b, etc.) are very hard to read – please redo with thicker lines and larger fonts.*

We can try to redo these plots, although skew-T plots with multiple axes are non-trivial to produce. It is also possible that we could separate the parts of the figure so that the skew-T plots are larger than in these multi-panel figures.

*It would be helpful to show the location of the radiosondes of Fig.6c in Fig.6a.*

This is a good idea, we will make this change to illustrate the sounding locations of Spokane and Great Falls, on either side of the streamer feature in Figure 6a.

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Interactive comment on Atmos. Chem. Phys. Discuss., 11, 30487, 2011.

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