Review of « Characterization of ozone profiles derived from Aura TES and OMI radiances » by Fu et al

General comments :

This paper presents a retrieval method able to derive ozone profiles using both TES and OMI data. The particularity of this article is to combine the TIR radiances and the UV radiances from TES and OMI, respectively. The authors also present a validation of this method by using coincident ozone sonde profiles for the period 2005-2008. The authors shows some improvements when using together OMI and TES data instead of TES or OMI data alone. I recommend the publication of this paper in ACP, even it will better fit in AMT, after the following recommendations :

1-The authors should present yearly ozone maps (or/and maps of DOFs) at global scale or regional scale for the three retrievals (together TES and OMI, TES only and OMI only) between surface and 700 hPa and for the free troposphere (even if the averaging kernels are different). This should qualitatively highlight the differences of each retrieval, in particular the differences from the joint OMI-TES retrievals between surface and 700 hPa.

2-Considering the weak number of ozone sondes used (which is only 22) during a period of about 3 years, the authors should be more cautious in their conclusions. A clear statement about the statistics should be added in the text.

3-OMI and TES do not have the same ground pixel size at nadir and then do not represent the same scene. When combining the two types of data, how the authors take that into account? Some clarifications are necessary in the text.

4-Sometimes the authors use the term boundary layer. This term is not appropriate because the boundary layer depth depends on many parameters. The authors should use throughout the text the "layer surface-700 hPa" which does not necessarily represent the ABL

Minor comments

-Section 2.2 there is a difference between the period used. In this section it is 2004-2008, but the analysis starts in 2005 (see table 2). Please clarify or make consistent.

-Table 2, profile 8: Please correct the latitude, this is North not South.

-Section 4.1 This is still not clear to me why in the altitude range of 300-100 hPa the joint TES-OMI retrievals show larger errors. Why two major systematic errors affect TES and OMI in this altitude range and not in the same way in lower layers? In addition the averaging kernels of joint TES-OMI seem to show more sensitivity than the others for OMI and TES alone at this altitude range. Please clarify this point.

-Section 4.1 (p 27608). The ozone retrievals for joint TES-OMI is from a classical optimal estimation method whereas the TES only retrievals use Tikhonov constraints. What is the impact of such methods in the lowermost layers? Please clarify this point in the text.

-Fig 3 and Fig 4; In the caption there is "ozone measurements (black line)" and "ozonesonde profile (black curve)". I do not see the difference. Also please add the units of ozone in the caption. In the version I have, the figures are very small, please enlarge them. In addition, there is no legend for the relative difference. Please add it in the caption.

-p27609, l 12 please correct the sentence.

-section 4.2 p 27610, l 7 . This is not clear that OMI averaging kernels peak a little below the ones of TES (we just have two figures of averaging kernels for this comparison). Is there a way to show better this effect by averaging the AK for example and show a zoom of this region in a additional figure.

-Fig 5 and Fig 6 shows two types of comparisons. Fig 5 shows data with the use of an altitude-dependent Tikhonov constraint matrix for TES only whereas Fig 6 shows the same constraints for TES only and joint TES-OMI. But the best fit is for TES only in fig 5 from the surface to 100 hPa (and also between 700 to 100 hPa in Fig 6). Why using the joint TES-OMI retrievals when there is a possible existing TES product which is better in this case? Please clarify this point in the text.

-Fig 8. Why the averaging kernels are not applied? This is not consistent with fig 5 and 6. Please add a comment in the text. Please could you provide the same comparison using the different averaging kernels (joint TES-OMI, TES and OMI) in your answer. Please add also the units of ozone in the caption.

-Fig 9 : same remark than fig 8. and please correct 700hPa to 200 hPa into 700 hPa to 100 hPa.