Dear Reviewer,

Thank you very much for your valuable comments on our paper acp-2013-537 "A novel tropopause-related climatology of ozone profiles". Below are our replies to your comments.

Reviewer#1

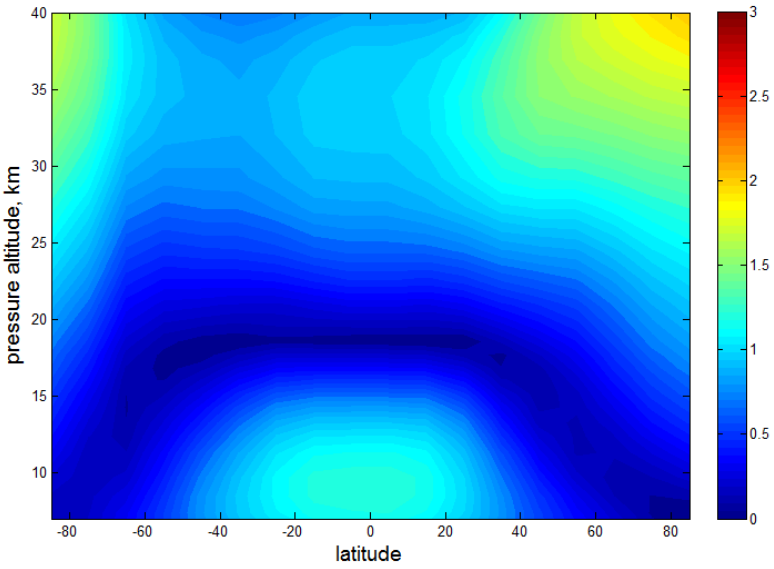
p.21353, l.17 I am surprised by the statement that the difference between pressure altitude and geometric altitude is small (less than 1km) in the UTLS. I would expect differences of 1km or larger rather common. Please comment.

Authors:

The figure below shows the mean of absolute difference Δ between the geometric altitude z and pressure altitude z_{pres}

$$\Delta = \left| z - z_{pres} \right| \tag{1}$$

(i.e., color represents $\langle \Delta \rangle$ in kilometers), for March 2008. In our calculations, we have used ECMWF data, computed the absolute difference for each profile, and then averaged in 10° latitude zones. As observed, the difference between pressure altitude and geometric altitude in UTLS is small.



Reviewer#1:

p.21356, l.16 Can you give more background why a 5-point linear transition was used in this case? Why not, say, 3km or 10km?

Authors:

The goal is to make transition from the ozonesonde to the SAGE-II climatology relatively quickly and smoothly. Above the second tropopause, a fast 3-point transition (corresponding to a 3-km layer) may induce unphysical inflections. To improve the data representativeness (the sample size for ozonesondes is not very large), we used SAGE –II data as low as possible in altitude (and not using the "standard"

transition region 20-28 km as for the single tropopauses). As a trade-off, a 5-point linear transition, corresponding to a 5 km layer, was selected. In the revised version of the manuscript we have noted that this transition corresponds to 5 km and clarified the selection of the transition method.

Reviewer#1:
p.21357, l.6 and Fig. 8 The large differences in stratospheric ozone over Antarctica for different tropopause heights were surprising for me. Can you show (or provide a reference) how closely the ozone hole actually correlates with tropopause height?

Authors:
The correlation between the tropopause height and ozone abundance over Antarctica in spring is very significant. This phenomenon is explained by Evtushevsky et al. (2008). Since the location of the tropopause over Antarctica is influenced by the temperature of the lower stratosphere, low ozone abundances in some region are associated with a high tropopause and vice versa. This phenomenon is discussed in the 1st paragraph on page 21348 of our ACPD paper. Several publication are dedicated to the springtime Antarctic ozone anomaly and they are listed on page 21348, line 2.

Reviewer#1:
p.21358, l.15 Can you provide a direct comparison with the ML climatology, rather than the indirect comparison by referring to Fig. 8 of McPeters and Labow?

Authors:
We have included the comparison with the ML climatology as a subplot of Figure 10 and updated the corresponding discussion.

Reviewer#1
p.21360, l.25 Please provide more information on the definition and meaning of the precision as shown in Fig. 13. Also a short discussion or explanation on why the new climatology improves precision would help.

Authors:
In the revised version of the manuscript we have provided the definition of the precision of the retrieved profiles. We have also provided a qualitative explanation of the improved precision with the TpO_3 climatology.

Reviewer#1:
Are Figs. 14 and 15 really needed here if the same information is also given in the README file? In addition I would like the authors (and the editor) to consider providing the climatology as a supplement to the paper in Atmos. Chem. Phys.

Authors:
The information in Figs. 14 and 15 is not essential: this is visualization of data files, which can be, of course, downloaded and read. The README file does not contain these figures. During several presentations of our work, we found that these file-visualization figures help to demonstrate the value of the created climatology. Therefore, we would like to keep these figures in the revised version.

The TpO_3 climatology is available online. However, we have no objections to providing it also as a supplement to our paper. We will discuss this issue with the Editor.

Reviewer#1:
Technical corrections
p.21347, l.1 and the chemical -> and chemical
p.21350, l.1 (Homeyer et al., 2010) -> Homeyer et al. (2010)
p.21352, l.8 (Anel et al., 2008, ...) -> Anel et al. (2008), ...
p.21355, l.11-12 "Sa" -> "SA"
p.21361, l.23 compared to a

Authors:
Corrected