

Referee report to the revised version of “Synergy of Using Nadir and Limb Instruments for Tropospheric Ozone Monitoring” by Viktoria F. Sofieva et al.

The revised manuscript has been improved. However, some of my comments have not been addressed to the full extend. The manuscript would benefit from a few additional minor changes. My detailed comments are listed below.

For minor comments, my original comments are written in blue, the responses of the authors in green and my additional comments in black.

Major comments

My comment “Supplement 3 is meant to demonstrate a good agreement of the small-scale ozone variability in OMI and SILAM data. Looking at Figs. 8-10 I cannot follow how the authors come to the conclusion that the agreement between the modeled and experimental data is very good, e.g. I see nothing in common between black or between red curves for 60°S – 90°S in Figs. 9 and 10. As this part is not highly relevant for the rest of the study this supplement can be removed. Otherwise comparisons and justification of the conclusions must be improved.” was addressed only in part. The strong disagreement at high southern latitudes is properly explained and the remaining agreement is claimed to be good. However, one still sees a lot of discrepancies, e.g. in Fig. 9 and 10 for 30°S – 30°N region the behavior of most of the curves is quite different for distances larger than 500 km, for 30°N – 60°N the blue, green, black and red solid curves are grouped clearly different, for 30°S – 60°S red and black dashed curves do not look similar. For this reason I do not agree with rating the agreement as good without any additional comments.

Minor comments

”Page 2, lines 50-52: this is only true for the along line of sight direction. The resolution can be much higher in the across direction, e.g. ALTIUS, CAIRT.”

”We added ‘along line of sight’ in the revised version.”

This must be a misunderstanding. I meant that your sentence is only true for the along track horizontal resolution while the across track horizontal resolution can be much higher (forward/backward view is assumed). With that the correction in the revised version of the manuscript is not appropriate. Suggestion: “The measurements in the limb-viewing geometry have usually a good vertical resolution but their horizontal resolution is limited by the spatial sampling. In particular, the horizontal resolution in the along line of sight direction is limited by the effective horizontal length of interaction with the atmosphere (a few hundreds of kilometers).“

Page 3, line 71: The data calibration is not a serious issue then combining total/stratospheric ozone columns retrieved with DOAS-like methods

”We agree the calibration is not a serious issue, but still an issue (Fishman and Larsen, 1987).”

As far as I know both TOMS and SAGE algorithms discussed by (Fishman and Larsen, 1987) are not DOAS-like methods. Suggestion: “ Aside with calibration issues when using a combination of TOMS and SAGE instruments, there was also...”

“Page 10, third item: this conclusion depends certainly on the sampling of the considered instruments and should not be stated in general. By the way, are the authors aware of any more or less recent publication where the residual method was applied to the monthly mean values? Isn't the recommendation not to combine the monthly mean values too obvious for the scientific community for now? Another point to this topic, as shown in Fig. S4 of the paper, there is quite a strong difference between the tropospheric ozone values calculated from daily means and from the collocated data. Thus, the recommendation given by authors to use the daily measurements can be confusing for the readers forcing them to prefer daily means to the fully collocated measurements.”

“Although we are now aware about recent publications on the residual method applied to monthly mean values, we think it is worth to keep this statement. We agree that it is rather obvious, and added 'obviously' to this sentence. It is noted in the paper that SUNLIT tropospheric ozone column correspond to the local time of OMI and TROPOMI measurements, not daily mean. We stress this more in the revised version.”

I do not mind to keep the recommendation not to use monthly mean data to calculate the tropospheric columns. However, I am still against a recommendation to use daily values. The usage of collocated measurements should still be preferred if feasible.

Page 11, lines 274: “region between the two ozone jumps is removed” - from the text above it is unclear which two ozone jumps are meant.

We changes “ozone jumps” to “pixels with huge ozone gradient”.

It is still unclear what the authors mean. Are the pixels with values over 100 DU and their neighboring pixels are removed? Does it apply to one or more neighboring pixel at each side?