
Interactive comment on

“TROPOMI/S5ptotal ozone column data: global ground-based validation & consistency with other satellite missions”

by Katerina Garane et al.

Anonymous Referee #1

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Overall, this paper is well thought out and well written. The analysis is thorough and the conclusions are easily understood. There is one major concern/issue that this reviewer believes that would possibly strengthen this paper: The comparisons of TropOMI to the column ozone measurements from other satellites are done using the Dobson and Brewer station locations as the comparison points. Why? The advantage of a satellite is that one has global coverage so why not compare 5 or 10 degree zonal means?? The authors should show the latitudinal differences (like figs 13 & 15) as well as a few latitudes of time series (figs 12 & 14) and that will avoid the missing southern hemisphere issue with the Brewer network. The time series at the higher latitudes should show some interesting differences that would strengthen your point about albedo effects and other differences in a priori. Once those more robust comparisons are shown, the paper is ready for publication.

REPLY:

The authors would like to warmly thank the referee for the review and the suggestions for corrections, which are addressed successively below.

The suggestion for the direct satellite-to-satellite comparison is very important and was seriously considered. It was decided to add a new Section (4.3) to the manuscript, showing and discussing the maps of the satellite-to-satellite comparisons that show the spatial patterns of the differences, and the time series of the percentage differences between different pairs of sensors for distinct latitude belts. Hence, a more comprehensive discussion on satellite-to-satellite comparisons has been added for both NRTI and OFFL products. In general, it was shown that satellite-to-satellite differences are small (<1%) at moderate latitudes and slightly increase in Polar Regions.

Sections 4.1 and 4.2 are also considered useful in explaining the differences between the sensors, because they interconnect the previous sections, where the TROPOMI TOC products are validated against GB measurements, with the direct satellite-to-satellite Section.

Minor corrections:

1. OMPS is misspelled in several places (as OPMS)

REPLY: The misspelled term was corrected throughout the manuscript.

2. Page 2 Line 25- local ‘equatorial’ overpass time (add equatorial)

REPLY: The word “equatorial” was added.

3. Page 3 line 11- remove commas
REPLY: Commas were removed.
4. Page 3 line 18- Define GDP
REPLY: GDP was defined by “GOME-2 Data Processor”
5. Page 5 line 24- add ‘spectrometer’ after double
6. Page 8 Line 3- no obvious ‘increase in’ variability
REPLIES: The terms/phrases were added.
7. Page 4 Line 1- remove ‘here’
8. Page 6 line 9- remove ‘at the most’
9. Page 7 line 10- remove ‘available in the specific database’
10. Page 7 line 10- remove ‘so far typically applied’
11. Page 12 line 13- remove ‘presented’
12. Page 19 line 10- remove ‘either’
13. Page 25 line 28- remove ‘utterly’
REPLIES: The words or phrases were removed.
14. Figure 1: shouldn’t the y-axis label be “Standard Deviation (%)”?
REPLY: The y-axis label in Fig. 1 was changed. Thank you for noticing this.
15. Figure 5: can an ozone scale be put on this to show the natural variability of ozone in the observation region?
REPLY: The scale for the ozone values is added to the Figure.
16. Page 12 line 19- change maybe to may be
REPLY: The word “maybe” was changed to “may be”.
17. Page 15 lines 12-15. Why do I not see this high latitude deviation in figure 7 b & d?
REPLY: In Figures 7(b) and (d) the Brewer co-locations are presented (from WOUDC and EUBREWNET, respectively). The highest latitude bin with available co-locations is 60°N - 70°N. As it was seen in Figure 8, the albedos used by the two algorithms agree quite well in this latitude bin, which results to the lack of an important deviation between the two algorithms.
18. Sections 4.1 & 4.2 should be re-done to show satellite to satellite differences directly (see comment at beginning)
REPLY: Thank you again for the suggestion. As it is said in our answer to your general comment above, it was decided to add a new section (4.3), where the satellite-to-satellite comparisons are shown and discussed.
19. Page 25- lines 7-10 This sentence is awkward and needs to be more clearly written.
REPLY: The sentence was rephrased:
“We have shown that the best co-location criteria between the satellite-borne and direct-sun GB observations are to limit (a) the spatial co-location search radius around the stations to 10 km and (b)

the temporal difference between satellite and GB co-locations (in case of individual measurements) to 40 minutes. “