

## ***Interactive comment on “Metrology of ground-based satellite validation: co-location mismatch and smoothing issues of total ozone comparisons” by T. Verhoelst et al.***

**Anonymous Referee #1**

Received and published: 18 September 2015

The manuscript presents a very comprehensive in-depth study on what should constitute the complete uncertainty budget that needs to be accounted for when using ground-based measurements to validate the corresponding satellite data. As stated and addressed by Verhoelst et al., a major challenge in satellite validation using ground-based reference data sets is the ability to accurately describe and account for the uncertainties caused by natural variability through non-perfect spatial and temporal co-location which is leading to uncertainties in sampling and smoothing differences additional to the measurement uncertainties of the respective data sets. Verhoelst et al. apply the error budget of total column ozone used for satellite validation as a case

C3016

study and apply the OSSMOSE system to close the error budget of the total column ozone comparison for the first time, and to demonstrate the applicability of the introduced system for further studies of other ECVs.

The research described in the manuscript is clearly presented and the manuscript is straightforward to follow. The scientific content is relevant for AMT and this paper is recommended for being published in AMT.

General comment:

It would be good if further thought could be given to the issue of when and in which context the terms “error” and “uncertainty” are used. It is not clear to me. Are they fully interchangeable, and should you then rather just use one or the other? Please also add a short discussion on this issue for the reader. Especially for a paper like this on, it is important to clear this up thoroughly.

Specific comments:

Abstract, page 8024, lines 13-15: delete “on the one hand” and “on the other hand” and add “ground-based” before “direct-sun”.

Abstract, page 8024, line 27: add something like “due to strong TOC gradients” after “polar vortex.”

Abstract, page 8025, line 2: delete “now”

Abstract, page 8025, line 5: should read “system”

Page 8028, lines 21-24: Would be of interest if you could add a sentence or two why there is a difference in the requirements for direct-sun and zenith-sky for TOC.

Page 8036, lines 16, 19: Please explain what exactly a “barycentre” is.

Page 8053, line 4: Replace “On the other hand,” with “However,”

Page 8053, line 6: How about replacing “too pessimistic” with “too conservative”?

C3017

Page 8053, line 22: should read “or any other erratic”

Page 8054, lines 12: replace “on the one hand” with “both,”

Page 8054, lines 14: delete “on the other hand”

Page 8055, lines 25 & 26: replace “on the other hand” with “”, however,”

Figure 1, caption: Use rather “satellite to ground”

Figure 8, caption: would be good to add explicitly what the crosses are.

Figure 9, caption: “Error budget of 5 years of . . .” should rather be 4 years, right??

Figure 31, caption: “. . ., is based on the revised estimates of the random satellite measurement uncertainty.”

Several figures (such as Figures 5 & 6 and 13-16) are very small when printed out and it would be helpful, if they could take up the whole width of the page to make them a little more readable. Figures 2, 8 & 10 are also hard to read and would benefit from being a little bigger.

---

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 8023, 2015.