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Atmospheric Measurement Techniques Discussions

Interactive comment on "Ground-based assessment of the bias and long-term stability of fourteen limb and occultation ozone profile data records" *by* D. Hubert et al.

Anonymous Referee #3

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The manuscript presents a comprehensive assessment of fourteen limb and occultation satellite ozone sensors by comparison with ground-based ozone sondes and lidars. The main focus of this study is to evaluate the long-term stability of the ozone profile datasets. By using a network of ground-based instruments as a reference, authors estimated relative drifts and the range of uncertainties for reliable detection of drifts in the satellite data records. These results can be used for interpretation of trend estimates from individual and merged satellite records.

The paper is well written and fits to the scope of problems discussed in AMT. The paper indeed is very long and contains detailed descriptions of the datasets and methods,

used in the study, as well as a throughout analysis of the obtained results. However, the referee feels that all these details are important and relevant for the presented discussion. The paper is recommended for publications after minor changes.

Specific comments:

P. 6679, l. 17: What is "the nominal mode" here? Is it the same as OR phase?

P. 6684, l. 20: The negative ozone values were removed from the analysis in this study. Even though the negative values are unphysical, but when the ozone concentration is very low and natural variability are high (e.g. like UTLS region), a retrieval algorithm can produce negative values. Moreover, these negative values are recommended to be included in the bias estimation or any other statistical analysis. By removing negative values you shift the means to higher positive values, and biases will become more positive relative to other instruments as well.

P. 6685, l. 2: what was a motivation for selecting v=100km/h? Please, explain.

P. 6685, l. 15: Why did you make an exception for MIPAS and used the MIPAS AKs instead of the triangular function? Do MIPAS AKs significantly differ from the triangular shape? Do they change over time?

P. 6690, l. 16: What do you mean here as "average single station drift uncertainties"? Is that a simple mean of uncertainties derived for each station?

P. 6690, l. 18: I don't think that drifts for SAGE II relative to lidars and sondes "are very consistent". There are significant differences between blue and black lines especially between 15 and 22 km.

P. 6690, l. 21-22: I agree that the drift is slightly negative relative to sonde data between 20 and 40 km, but not relative to lidars. Please, specify that in the text.

P. 6691, l. 21: It is not clear here what you meant by "lower and higher altitudes", please, specify.

P. 6710, l. 12: Add 'for these instruments' at the end of the sentence "to the detection threshold for these instruments."

P. 6743, Table 4: For Aura MLS 1-sigma range between 30-45 km is given as 1.5-5%, while in the text on p. 6693 it says 2-3%. I see that most of the other satellite instruments with the comparable length of the record have smaller uncertainties. Please, check if the numbers for Aura MLS given in Table 4 are correct;

P. 6746, Figure 1: You show that four satellite instruments extend their measurements down to the surface. However, I doubt that any of these sensors can provide valuable measurements in the troposphere. So my question would be: what is the lowest level you use in the analysis for these instruments? I think it would be appropriate to not show any satellite data below these levels on this figure.

P. 6748, Figure 3: What is "the standard deviation of the single site drifts"? Is that a simple mean from all red and grey error bars? Please, explain.

P. 6749, Figure 4: The grey line for SAGE II is very difficult to see. Please, consider to use another color.

P. 6750, Figure 5: This figure is a central piece of the manuscript. On my opinion individual plots on this figure are too small. I suggest to divide this figure on three parts (5a, 5b and 5c) and show no more than 4-5 plots on one page. For example, you can divide instruments based on the length of the record, and show instruments with more than 10 years of the record on one page (SAGE II, Aura MLS, OSIRIS, HALOE and SMR) and instruments with >5 years on another, or find any other way to split these plots. But the bottom line is that it is difficult to see details with 14 plots on one page. And I believe that these plots with the instrumental drifts are very important and deserve readers attention. They need to be enlarged.

P. 6751, Figure 6: I have the same remarks here as for Figure 5: split this figure into 3 and show no more than 4-5 plots per page. The current size of individual plots doesn't

allow to see any details, and make it very difficult to find a correspondence between the text in Section 5 and Figure 6.

P. 6755, Figure 10: This figure is very crowded with 10 plots and 14 lines. Also, I think that the color selection doesn't work very well here. It is very difficult to distinguish lines for ACE and MAESTRO, or HALOE and GOMOS. You might try to split this figure in two, and show 6 instruments that ceased prior 2006 on one page, and all recent instruments on another.

Minor comments:

P. 6664, l. 10: I think the word "harmonized" doesn't fit very well here. Perhaps, "consistent" would be better.

P. 6670, l. 8: Shouldn't it be "artifacts" instead of "artefacts"?

P. 6695, l.14: Since you refer readers to the next section it might better say "we will show";

P. 6703, l. 12: It might be better to replace "a more important" with "a stronger".

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 6661, 2015.