

Reviewer #3

Dear reviewer,

Thank you very much for your positive comments on our paper. We took your comments into account in the revised version of the manuscript. Please find below our detailed replies (black font) on your comments (blue font).

Reviewer#3 comments

Page 3, line 11 – “ozone profiles datasets” -> “ozone profile datasets”

Corrected

Table 1: I suggest including a column with the reference to the appropriate instrument paper for the version of the data you are using for each instrument. Also, can you please check the vertical resolution numbers here? Saying these instruments have ~1 km vertical resolution seems awfully optimistic. Just because the vertical retrieval grid is at 1 km doesn't mean the vertical resolution is, as I'm sure the authors are aware. For example, I believe the OMPS vertical resolution should be more like 2-3 km, not ~1 km.

In the revised version, we added references to the instrument papers and revised the vertical resolution numbers.

Page 3, line 16: I was originally confused by why you were mentioning both the UBr and USask retrievals. The reasoning for this is made clear later in the paper (i.e., that they have slightly different coverage that you are trying to exploit). In this section, it might be nice to have a sentence listing the new data sets you are using, and mentioning why you are adding a second OMPS data set.

In the revised version, we indicate explicitly here updated and new datasets.

Page 4, line 9 – Fix parentheses on Boone reference

Corrected

Page 6, lines 14-16: You state the systematic uncertainty below 20 km and above 50 km here – what about 20 – 50 km?

We reformulated the sentence as follows: “The total systematic uncertainty is mainly related to cloud contamination and model errors in the lower stratosphere, and to the retrieval bias at high altitudes, with total values exceeding 5 % only above 50 km and below 20 km.

Page 8, eq 1: Is there a motivation for expressing anomalies as a fraction rather than absolute values (i.e., why divide by ρ_m)? Can you briefly comment/justify this choice?

Ozone trends are usually presented in % decade⁻¹, therefore we selected such representation for visualization convenience. We added a short note in the revised version.

Page 8, lines 20-24: These two sentences are confusing. Is the second sentence referring to the new SAGE – CCI – OMPS+ data set, and saying you are doing something different than the original SAGE-CCI-OMPS data set (as described in the first sentence)? If so, you could start the sentence with something like “In SAGE-CCI-OMPS+, ...”

Both sentences are about the original SAGE-CCI-OMPS dataset.

Page 9, line 6: “ACE-FTC” -> “ACE-FTS”

Corrected

Page 9, line 6 (and elsewhere): Why do you refer to version 4.1/4.2 of the ACE-FTS data? Shouldn't it be one or the other?

The version has this full notation: “4.1” and “4.2” are related to computational resources used for the processing ACE-FTS data.

Page 12, Figure 5: Panel a has a different x-axis, please make x-axes the same in this figure.

Corrected

Page 13, line 23: Drifts and steps are very different to me. Can you point more specifically to where possible steps occur.

Strong drifts or steps detected via comparisons with other data. As observed in Figure S3, the difference between OMPS-UBr and MLS deseasonalized anomalies in the tropics at 15 km changes abruptly from positive to negative starting from 2018.

Fig. S3 caption: “NLS” -> “MLS”

Figs S5-S6: I think this is UBr OMPS. Please specify in captions.

Page 17, line 6: A colon is more appropriate here than a comma.

Page 18, line 3: “...only the data, which...” -? “... only data that ...”

Corrected

Page 18, line 7: “As mentioned above...” – I don't see where it was mentioned that you exclude UBr data 14 – 16 km and 20S-20N. But maybe I'm missing something. Although you do identify UBr as problematic in this region, I think this is the first explicit mention that you are not using data in that region. Also, when I came to this sentence I began to question both the choice of masking region as well as the entire motivation for using UBr at all. It seems like the main motivation for using UBr is to get the additional data in the tropics that USask doesn't have, but then you say you are not actually using it here. Also, is the exact choice of masking really sufficient? It would be pretty easy to answer this by showing a latitude-altitude plot of the trend in the difference between UBr and USask. This would much more clearly help justify (or not) the choice of what levels and altitudes to remove from the analysis.

In the revised version, we removed the words “as mentioned above”. Advantages of using both OMPS-LP datasets are (a) improved coverage (Figures 7 and 9; please note that only the 14-16 km region in the tropics is excluded for OMPS UBr), and (b) better agreement with other datasets than if considered separately (Figures 10 and S2). The latitude-altitude plot of UBr and USask differences is shown already in Figure 7c. For detection of drifts, it is important to observe evolution of differences, which is illustrated in Figures 8, 9, 10, S2 and S3.

Page 23, line 17: What about the negative trends in the LS. It looks like some of those are significant, and that there are maybe a few more grid boxes that are significant in the new data set in comparison to the previous data set?

There are a few altitude-latitude bins where negative trends in the lower stratosphere are statistically significant. We added this note in the revised version.