This manuscript provides a comprehensive overview of the validation of OMPS LP v2.6 ozone profiles, discussing biases with comparative observations and the long-term stability of the SNPP dataset. This work is an extension and integration of the Kramarova et al. 2024 study, which presented the OMPS LP v2.6 retrieval. The paper is well-written and well-structured, presenting the results of the validation in a clear way. Particularly interesting is the focus provided in several parts of the paper on finding a valuable set of correlative data to be used for validation, in a future with fewer limb observations available.

I have a few minor comments to the manuscript, which are listed below and a few technical corrections.

We would like to express our sincere gratitude to the referee for their thorough evaluation and valuable comments that help to improve the manuscript.

- The methodology used to compare OMPS LP with ozonesonde is unclear. It seems that you haven't used averaging kernels to match the vertical resolution of the two profiles (as done with OMPS NP), is this right? In that case how have you performed the interpolation/smoothing of the sonde profiles? Some more details in this regard are needed.

  For comparison to ozonesondes, the sonde profiles were interpolated onto the OMPS LP vertical grid using log-linear interpolation and no additional smoothing was applied. Since the OMPS LP vertical resolution is ~2km and the averaging kernels are quite narrow, almost delta functions, their application to the sonde profiles is not necessary. The figure below shows the effect of applying the OMPS LP averaging kernels to the sonde profiles on the OMPS-sonde differences over the 2012-2024 period for the 3 wide latitude bands considered in the paper. Applying the averaging kernels has little effect on the observed biases, with the largest difference (<3%) seen at the lowest altitudes in the mid-latitudes.

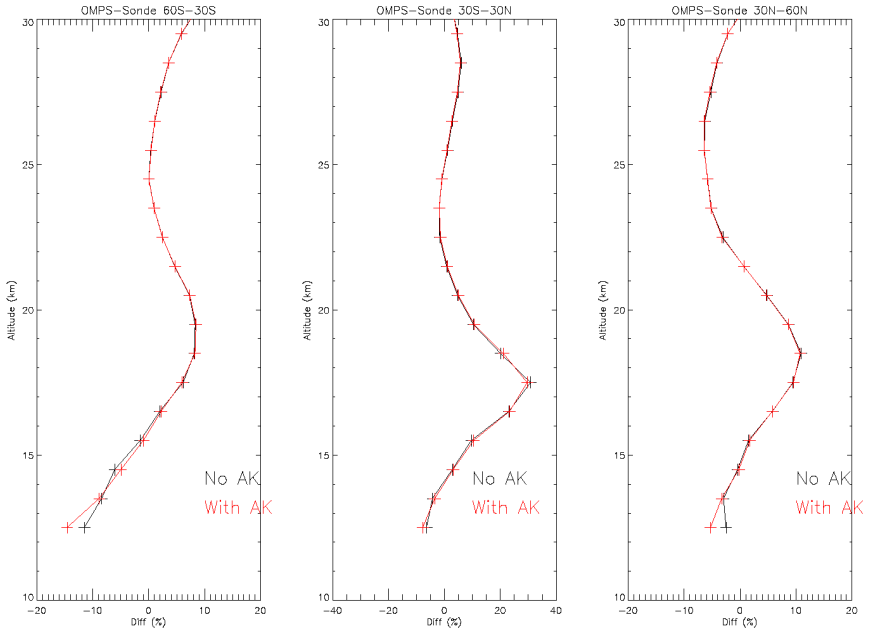

Figure RC1.1: OMPS LP vs Ozonesonde with (red) and without (black) OMPS LP averaging kernels (AK) applied

- I would also suggest to include a couple of more references in the introduction, as only the WMO assessment (2022) is used. For example, other comprehensive studies on stratospheric trends and uncertainties are the LOTUS assessment in 2019 and Godin-Beekmann et al. 2022. A recent study involving observations and models on lower stratospheric trends is the paper by Benito-Barca et al. 2025.

  Those references have been added to the introduction.

- Section 2 focuses briefly on the instrument and on the retrieval, introducing the two versions v2.5 and 2.5. For this reason, I would add "and retrieval description" to the title of the section. It is also not clear from the first paragraph that you are going to use only SNPP in this paper. In the second paragraph, would it be possible to distinguish between the improvements in L1 data and the changes in the retrieval settings between v2.5 and v2.6?

  - The section title has been updated as suggested.
  - We have added clarifying text at the end of the first paragraph to indicate that we are using SNPP in this paper.
  - Between version 2.5 and 2.6 many changes were made to both L1 and L2, the full details of the changes are given in Kramarova et al. 2024, we have re-worded this paragraph and moved the reference to Kramarova et al., earlier in the paragraph to more clearly point the reader to this paper for information on changes from version 2.5 to 2.6.

- The authors provide an insight into the approaching future, with MLS and SAGE III retiring soon. At the same time, new OMPS instruments are going to be launched. In this perspective, an overview of other instruments that are going to be designed or launched in the next years would be interesting. For example, you could mention the upcoming ALTIUS mission in the introduction or in the conclusions: for this mission, OMPS will serve as a reference, making it even more important to characterize its long-term stability and biases.

  We have added the text below to the end of the conclusions (section 9):

  With the potential upcoming "data desert" in satellite observations of atmospheric composition with high vertical resolution (Salawitch et al., 2025), the OMPS LP series of instruments will serve as a critical bridge connecting records from Aura MLS and SAGE III with future missions, like the ESA's Atmospheric Limb Tracker for Investigation of the Upcoming Stratosphere (ALTIUS). ALTIUS will be launched in 2027 and will carry a high-resolution spectral imager that measures in UV, VIS and NIR ranges. ALTIUS will acquire observations in 3 modes - limb scattering, solar and stellar occultation - to retrieve profiles of ozone, aerosol and other trace gases in the stratosphere and mesosphere.

- Since you mentioned in Sect. 5.1 a comparison of the correlation results with v2.5, you could also provide a short comparison between the biases found in version v2.5 w.r.t. v2.6. I am also wondering what is the difference between panel (c) of Fig. 4 to panel (a) of Kramarova 2024. Is it

only the considered period? The biases appear smaller and more negative in this manuscript. To help visualize the biases, I suggest reducing the color bar extension for the first three panels of Fig. 4, e.g. to ±30%.

- We have added the following sentence summarizing the improvements to the biases relative to MLS for version 2.6 over 2.5 in section 5.1 line 247:
  - These biases represent an improvement over those observed between OMPS LP version 2.5 and MLS, with the largest reduction in biases seen below 31 km, where LP retrievals primarily rely on the visible triplet (Kramarova et al., 2024), there is also a reduction in vertical oscillations seen in version 2.5, particularly where the retrieval switches between UV and visible wavelengths (approximately 28-32 km).
- Yes, the only difference between figure 4 panel (c) of this paper and figure 8 panel (a) of Kramarova 2024 is the time period used, in this paper we use April 2012 to April 2024 whereas Kramarova 2024 uses April 2012 to December 2021.
- The color bar for Fig. 4 panels a-c has been updated to ±30% as suggested:

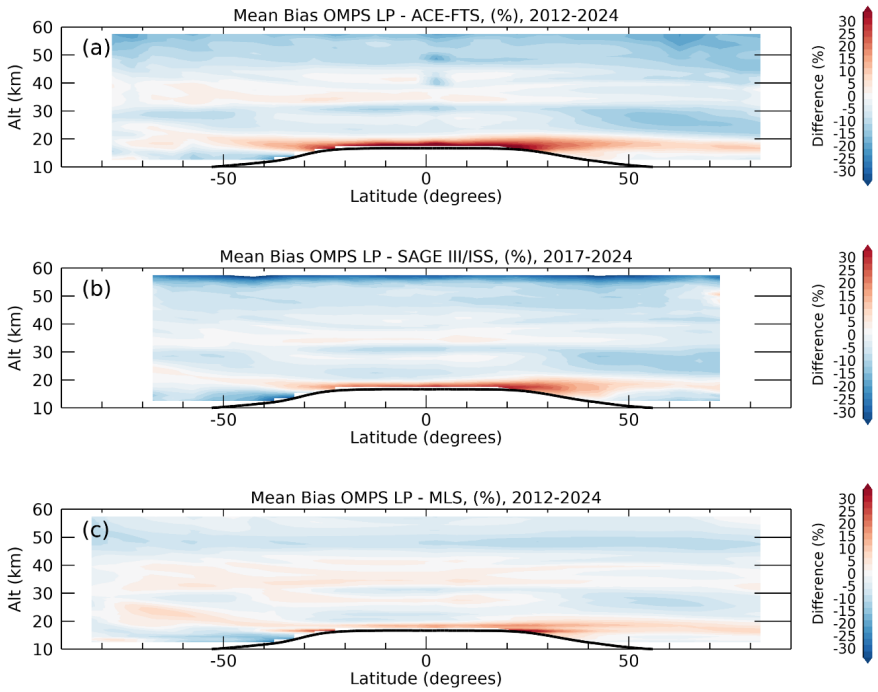

Figure RC1.2: Updated Fig. 4 panels a-c

- Can you shortly clarify the drift computation methodology? Are you computing differences for each collocation OMPS to correlative profiles, then averaging these differences on a monthly basis, removing the seasonal cycle and finally computing the linear trend? Regarding the drift, I think it would be valuable information to include an estimation of the threshold needed to confidently detect trends in the stratosphere over the last two decades, as they are often on the order of 1-2 % per decade.

    - To calculate the drifts, we first calculate monthly zonal means for each instrument, we then remove the seasonal cycle from each dataset independently, the differences between these de-seasonalized monthly zonal means are then calculated, and finally we calculate the drift by fitting a linear trend to the de-seasonalized monthly zonal mean differences.
    - We have added the text "In order to confidently detect long-term ozone trends in the stratosphere, a threshold stability requirement of 3% per decade for ozone stratospheric profiles has been set by the World Meteorological Organisation (WMO 2022)" to the drift discussion in the conclusions section

- For the comparison in polar regions, can you mention if you used a filter for polar mesospheric clouds? Have you considered any restrictions related to potential vorticity to exclude cases with collocations within/outside the polar vortex?
    - Yes, we have filtered out any profiles that contain polar mesospheric clouds. The OMPS LP version 2.6 ozone product contains a flag for PMC's which has been used to filter out those data.
    - Comparisons in polar regions were against MLS and OMPS NP for which we have very close coincidences, we therefore don't expect mapping measurements on equivalent latitude coordinates to produce substantial differences.

Technical corrections

L20: I would remove "the" from "the retrieval algorithm". - done

L30: Also here I would remove "the" from "the OMPS LP". - done

L41-43: possible re-formulation of the sentence: "These increases are consistent with model simulation showing that they arise from a combination of ozone-depleting substances concentrations and decreasing upper-stratospheric temperatures, driven by increasing CO2". - done

L48: "and so trends have large uncertainties" → "leading to large uncertainties in trends". – This sentence was removed

L61: I would remove "when validating such data" - done

L85: "which is more pronounced" → "which was more pronounced". - done

L101: Possibly mention also that the altitude range over which ozonesondes can be used for validation is limited to about 30 km. - done

L112: Is the period until April 2024 or June? For lidar December 2024 is mentioned. – This has been corrected to April 2024. MLO lidar data was only available up to December 2022 and so this is what was used in the lidar analysis.

L130: “with which to compare with” → “to use for the comparison with” - done

L152: Since the v6 became recently available and you also mention it, I would avoid saying “the latest version”. – Changed to “last version”

L175-177: I find the two sentences in these two lines very similar: isn’t the accuracy estimated by the comparison with other data sets? – We have removed the second sentence

L216: It is Fig. 4 not 1. - Corrected

L257: The sentence is not very clear to me. Could it be that the variability of OMPS retrievals at the ozone peak is lower than for the other datasets?

The variability of OMPS ozone and that of the other datasets at the ozone peak are comparable. The sentence has been revised to be clearer and now reads:

“The drop in correlations seen at around 25 km at all latitudes and against all correlative sources is likely because this is where ozone density peaks and it’s variability is lower leading to weaker correlations.”

L338: I think you mean between 20 and 30 km. – This has been corrected to 12 and 20 km

L379: I would add “above 20 km” at the end of the sentence. - done

L425: Maybe repeat the word between to make it less confusing: “and between OMPS LP and ozonesondes”. - done

L484: Typo in OMPS NP. - Corrected

L615: Remove , after “consistent”. - Done

References

Benito-Barca, Samuel, et al. "Recent lower stratospheric ozone trends in CCMI-2022 models: Role of natural variability and transport."*Journal of Geophysical Research: Atmospheres* 130.9 (2025): e2024JD042412.

Godin-Beekmann, Sophie, et al. "Updated trends of the stratospheric ozone vertical distribution in the 60° S–60° N latitude range based on the LOTUS regression model." *Atmospheric Chemistry and Physics Discussions* 2022 (2022): 1-28.

Petropavlovskikh, Irina, et al. "SPARC/IO3C/GAW report on Long-term Ozone Trends and Uncertainties in the Stratosphere." 26 Feb. 2019.