Dear Reviewer,

Thank you very much for your positive evaluation of 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#1 comments:

However, I think it would be even more useful if information about scientific contexts to the ozone changes are also included throughout this work. For instance, would atmospheric phenomena, such as large volcanic eruptions or wildfires, affect the ozone trends between 2020-2024? Was the ozone trend expected to be consistent between 2000-2020 and 2000-2024? What are the physical processes controlling the ozone trend in the upper/mid stratosphere and troposphere? What are the expectations for the ozone trends in the future? I think adding some of the scientific backgrounds of ozone trends would make this work even more valuable.

Thank you very much for the suggestion. In the revised version, we added general information about ozone recovery and what are expected estimates on ozone trends in different periods.

Specific Comments:

P2, Abstract: Adding some comments about the significance of this work in the context of the importance of long-term measurements of ozone, impact on climate, and potential improvements of atmospheric processes represented in global models would make the abstract more compelling.

Unfortunately, the abstract is limited to 250 words, so it is impossible to add details without cancelling other important information.

P2, L55: Antarctic ozone hole (Farman et al., 1985).

The reference is added.

P2, L56: References should be chronologically ordered. (?)

The references are now in chronological order.

P2, L57-60: Consider including citations supporting the information listed here.

We included the following references:

Keeble, J., Abraham, N. L., Archibald, A. T., Chipperfield, M. P., Dhomse, S., Griffiths, P. T., and Pyle, J. A.: Modelling the potential impacts of the recent, unexpected increase in CFC-11 emissions on total column ozone recovery, Atmos. Chem. Phys., 20, 7153–7166, https://doi.org/10.5194/acp-20-7153-2020, 2020.

Solomon, S., Stone, K., Yu, P., Murphy, D. M., Kinnison, D., Ravishankara, A. R., and Wang, P.: Chlorine activation and enhanced ozone depletion induced by wildfire aerosol, Nature, 615, 259–264, https://doi.org/10.1038/s41586-022-05683-0, 2023.

Wohltmann, I., Santee, M. L., Manney, G. L., and Millán, L. F.: The Chemical Effect of Increased Water Vapor From the Hunga Tonga-Hunga Ha'apai Eruption on the Antarctic Ozone Hole, Geophysical Research Letters, 51, e2023GL106980, https://doi.org/10.1029/2023GL106980, 2024

Wang, P., Solomon, S., Santer, B.D. *et al.* Fingerprinting the recovery of Antarctic ozone. *Nature* **639**, 646–651 (2025). https://doi.org/10.1038/s41586-025-08640-9

P2, L63: 'Progressing' is vague. I recommend replacing it with a bit more quantitative statement.

Since we provide the quantitative estimates in the next paragraph, we decided to remove this sentence, as it duplicates this information.

P3, L80: In addition to updating the ozone trends, adding some context in terms of changes in the atmospheric circulation since the last publication would be desirable. For instance, did the Hunga-Tonga eruption play any role in ozone trends?

In the revised version, we added a discussion on the influence of circulation on ozone trends.

P3, L84: Adding some examples of the new datasets or citations would be helpful.

Since we describe in Sect.2 the changes in existing datasets and a new (SAGEII-OSIRIS-SAGEIII) satellite dataset, we added here (in Introduction) "(the details are provided in Sect. 2)".

P4, L101: Reference for the OMPS-LP would be useful.

This sentence describes the changes in SAGE-CCI-OMPS+ dataset, therefore we moved the reference (Sofieva et al., 2023), which describes all changes, to the end of the sentence.

P4, Table 1: I wonder why a reference for the SBUV-COH is not listed here.

The references for the SBUV-COH dataset are added.

P5, L117: Is there a reference for this information?

In the revised version, we added the link https://www.usgs.gov/volcanoes/mauna-loa/science/november-27-december-10-2022-eruption-mauna-loa

P6, Table 2: Is there a website where one can download the 'Alpine' ground-based ozone profiles?

The availability of the individual datasets is mentioned in the Data Availability section. Ozone trends are evaluated for each station and instrument type separately and then averaged by instrument type. We added this clarification into the revised version.

P7, L136: data -> outputs

Corrected

P7, L149: Compared to GB22... -> This sentence is vague. Please add more information, such as, how the GHG and ozone scenarios have changed? Is aerosol forcing only included in the refD2?

In the revised version, we added a more detailed description of refD2 simulations.

P8, L180: Was the 1985-2024 period also used for the ground-based observations?

Several ground-based datasets do not cover the full period 1985-2024. Therefore, the trend analysis for ground-based measurements was restricted to the period 2000–2024. This has been clarified in the revised manuscript.

P10, L221: Does this mean 8 models and one ensemble mean?

In the revised version, we clarified: " Final results from CCMI-2022 models (9 models in total) were averaged over the appropriate latitude bands…"

P11, L233-235: What could be the reason for the differences in trends diagnosed from these two datasets? Are these consistent with the previous results?

SAGEII-OSIRIS-SAGEIII is a new dataset. For SAGE-OSIRIS-OMPS, a similar feature was observed also in GB22. In the revised version, we added this note.

P11, L241: There could be some contributions from changes in atmospheric circulation or events that could have impacted ozone in the stratosphere.

Yes, these are included in (i). In the revised version, we mention this explicitly.

P11, L248: "changes in…" – Describe what this means or include a citation here.

We explain here the changes in trends shown in Figure S2. We made rephrasing, in order to avoid confusion.

P12, L276: “vary across the datasets,” – What could be the possible reason for this?

The variations in trends in the UTLS are due to two main reasons : (1) differences in the merged datasets due to different combinations of instruments and merging principles; (2) large variability in the UTLS, which results in large uncertainties in trend estimates. However, the second part of this sentence is ambiguous, and it does not contain important information. In the revised version, we remove it.

P16, L342: Can we explain why the CCMI models can reproduce the observed ozone trends in general?

In the revised version, we added: “…for 2σ uncertainties). Since CCMI models, by design, include the key physical and chemical processes controlling ozone evolution and are driven by observation-based forcings, they reproduce observed ozone trends reasonably well. In this work, the mean CCMI ozone trends …”

P18, L402: A strong…observed. –>A strong…in the NH extratropics (at latitudes…) and below 40 km is observed.

Corrected as suggested.

P20, L449: Please add a sentence explaining why trends are unchanged in the tropics and SH mid-latitudes but became less negative in NH mid-latitudes.

We added: "primarily due to high ozone levels in 2024”.

P21, L464: Please add some information about the importance of the ozone measurements network, comprehensive analyses of the data, and perspective of ozone changes in the future.

In the revised version, we added:

“Maintaining well-calibrated, merged ozone records and conducting periodic assessments of ozone trends are essential for reliably tracking the uneven recovery of the ozone layer and comparing observations with predictions from chemistry–climate models, especially in the face of emerging disruptions such as major volcanic eruptions, extreme wildfires, increasing greenhouse gas concentrations, and increased satellite debris. As key satellite missions approach the end of their lifetimes, the risk of observational gaps is growing, particularly for critical stratospheric species (e.g., water vapor, chlorine species, N_2O) that are needed to interpret changes in ozone. A reduced number of correlative satellite observations will undermine our ability to rapidly identify anomalies and instrumental drifts, leading to increased uncertainties in merged records and derived trends. In this context, the role of the ground-based network becomes even more important, both for satellite validation and for independent assessments of regional ozone variability and long-term change."