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Reviewer Comment on acp-2021-1047

Anonymous Referee #3

Referee comment on "Global, regional and seasonal analysis of total ozone trends derived from the 1995–2020 GTO-ECV climate data record" by Melanie Coldewey-Egbers et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-1047-RC3, 2022

GENERAL

The paper is dedicated to the updated GTO-ECV total ozone climate data record, and to evaluation of global, regional and seasonal ozone trends.

The paper is well-organized and written, and it contains important information. Please find my minor comments below.

MAIN COMMENTS

- For reporting trends with uncertainty interval (x +-y%), please make clear that uncertainties are 2-sigma (I believe, they are 2-sigma). It can be done with the first such trend reporting.
- In addition to Figure 1, I would suggest adding a figure (maybe in appendix) showing the percent of variability explained by each proxy. For such analysis, 2 QBO components can be combined into one source. Such figure would be useful in visualization of relative contribution of each proxy to observed ozone variability.
- The analyses presented in the paper show pronounced dependence of ozone trends on tropopause altitude. The tropopause altitude can be also used as a proxy in regression. It would be interesting to assess the influence of using tropopause height as a proxy on estimated ozone trends.

DETAILED COMMENTS

L. 30-31, Ball et al. (2018) reported statistical significance of the lower-stratospheric trends. It is worth to mention also recent studies - (Ball et al., 2019, 2020; Orbe et al., 2020; Dietmuller et al., 2021).

L.65 “inter-relation” – do you mean correlation?

L.88, 97: Please provide quantitative measures of “a very good quality”, “very good overall agreement”, “” excellent long-term stability”.

L. 100- 103: This sentence suits better for the discussion section.

L. 205-209: The comparison with height-resolved trends at different altitudes looks strange. In (Arosio et al., 2019) and (Sofieva et al., 2021), the longitudinal difference in trends between Scandinavia and Siberia are observed at all altitude levels in the stratosphere.

L. 237 – this paragraph. Compared to Coldewey-Egbers et al. (2014), this paper uses not only the updated dataset, but also a different MLR. This is worth to note.

L.265-270. Reanalyses data can be not optimal for trend analyses, since changing number of assimilated datasets with time can introduce artificial steps in data (for example, Simmons et al., 2014). Is it checked that the NCEP trends in tropopause height are in good agreement with those from experimental data?

L.291. How many terms were used for characterization of seasonal dependence?

I think that Figure 8 does not bring essential information – this is the summary of previous figures. Furthermore, the Hemispheres cannot be directly compared, as the

latitude bands are different. I suggest placing this figure in Appendix.

L. 358-359. The last sentence of this paragraph contains technical information and can be omitted in Summary.

L. 367 Please add “statistically” before “significant”

REFERENCES

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