

RESPONSE TO REFEREE #2 COMMENTS

This paper reports on stratospheric ozone trends in the tropical region and is motivated by the recent claim by Lu (2022a, 2022b) that a tropical ozone hole exists. A rebuttal to the paper by Lu was published by Chipperfield et al. (2022) that argued that this claim is not substantiated by observations and that the interpretation of galactic cosmic rays (GCR) being a cause for this severe loss is highly unlikely. This paper confirms that there are only small tropical ozone changes observed in the tropics over the last decades supporting the arguments given in the rebuttal by Chipperfield et al. So far so good. My issue with the paper is that it is not clear to me what new insights are provided here. The small trends in the tropics have been reported before (WMO 2022, Weber et al. 2022, Godin-Beekmann et al. 2022). I also do not see what new arguments are delivered here with respect to what has been already reported by Chipperfield et al. in response to Lu (2022). The authors need to state clearly what new aspects are brought in here that justifies publication of this paper. A major revision is required.

Thank you very much for your time, review and comments on MS. Please find answers to specific comments below. Please find the response to queries and the corresponding change in the MS in blue typeface. We do hope that the referee will find the revised version more interesting and recommend a publication very soon.

Please note that we have used more measurements, reanalyses and different statistics measures for delineating the trends and interpreting the results. In addition, we have also compared our results with previous studies, including Chipperfield et al., Please find the answers to specific comments below.

Other major issues

* Various ozone and reanalysis data are used in this study and trends calculated from them. Apparently not all datasets have been updated to end of 2022. MERRA-2, ERA5, GSG, and SBUV/OMPS MOD data are available up to end of 2022. Stratospheric ozone trends from GOZCARDS, SWOOSH, and reanalysis data are only shown up to 2018, why not up to end of 2022?

Done. We have extended the data up to 2022. However, GOZCARDS data are available only up to 2021.

* To make the paper more concise (and probably shorter), the authors should try to focus on trends in the tropical region (see paper title), rather than global and extratropical regions, which are extensively discussed here.

Done, we have shortened the paper, focusing on the global tropical region. We hope that the referee would find the revised MS more interesting.

* The regression model used is poorly described. It is pretty much standard that ozone trends are derived using multiple linear regression (MLR) that contain additional terms (proxies) describing ozone variability (e.g. WMO 2022, Weber et al. 2022, Godin-Beekmann et al. 2022). What is the justification for not using MLR? A comparison between MLR (previous work) and simple linear regression results (this work) may become difficult.

Done, now we use the GOZCARDS and SWOOSH datasets to regress the ozone at different levels of the stratosphere. Please find the new figure, Figure S7, in the revised Supplementary file. Furthermore, a detailed discussion of the MLR model and results are also added to the revised MS. Please find it in lines 271–278.
