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Comment on acp-2022-202

Anonymous Referee #2

Referee comment on "Tropospheric and stratospheric ozone profiles during the 2019 TROPomi vaLIIdation eXperiment (TROLIX-19)" by John T. Sullivan et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2022-202-RC2>, 2022

Review of "Measurement Report: 1 Tropospheric and Stratospheric Ozone Profiles during the 2019 TROPomi vaLIIdation eXperiment (TROLIX-19)" by J.T. Sullivan et al.

In this manuscript the authors describe the many ozone measurements made from multiple platforms during the TROPomi vaLIIdation eXperiment (TROLIX-19) campaign in fall 2019. The campaign was designed to support satellite validation efforts with the emphasis on understanding the vertical profile retrievals of ozone. Instrumentation included ozone lidars, pandora spectrometer, Brewer Spectrophotometer and ozonesondes. Satellite data used include OMPS, MERA-2, MLS and TROPOMI. In addition, measurement data is compared with GEOS-CF model output.

The analysis focuses on two main goals; one to evaluate ozone retrievals in relation to current and future (TEMPO) satellites. And the combination of the tropospheric ozone lidar and the stratospheric lidar providing hybrid ozone profiles from ~0.2 km to ~50 km.

The article is clearly written and provides a comprehensive presentation of data from a number of measurement platforms. With figures and discussion of the comparisons across measurement platforms and model within the full column ozone and 0-2 km tropospheric column ozone. The study makes several important observations as to the structure of the ozone within the atmospheric column and the differences in instrument/model performances.

Specific comments:

I would suggest that the conclusions section needs to be expanded upon. This section emphasizes the importance of observations and for the site itself (which I agree on) but I

would like to see more quantitative evaluation of the data here to back up the statements, adding some percentage differences etc would make this an easy reference source for future readers. For example, there is a statement (line 74-75): " TROPOMI ozone profile products are able to accurately reproduce ozone quantities in the lower troposphere..." with reference to Figure 3 but this only shows TROPOMI compared with observations vertical layer at 4km. In addition, Figure 7 indicates that TROPOMI generally overestimates, especially within the troposphere. Expanding the conclusions to include some of the quantitative results would help to firm up the concluding statements.

Figure 1. Add the CESAR site also be added to the image on the right or add lat/lon information to maps.

Figure 7. Needs a color bar with values for the differences in ozone number densities