Atmospheric Chemistry and Physics Discussions

Atmos. Chem. Phys. Discuss., referee comment RC1
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Comment on acp-2021-600

Anonymous Referee #1

Referee comment on "OClO as observed by TROPOMI: a comparison with meteorological parameters and polar stratospheric cloud observations" by Jānis Puķīte et al., Atmos. Chem. Phys. Discuss., https://doi.org/10.5194/acp-2021-600-RC1, 2021

General Comments:

In this work, Differential optical absorption spectroscopy (DOAS) technique is applied to TROPOMI data to obtain OClO Slant column densities (SCDs), for Arctic and Antarctic latitudes, from November 2017 until October 2020. These SCDs have been also compared with meteorological data from the ECMWF model (temperature and potential vorticity) and CALIOP PSCs observations. Through this study, the temporal and spatial evolution of the OClO SCDs can be examined, as well as the correlation with the studied parameters, allowing also identifying possible causes of chlorine activation. A comparison between both hemispheres has also been presented, and some interesting unusual episodes concerning formation, development or deactivation of polar vortex have been studied.

The research performed in this work has been clearly presented and explained and represents useful information for the Atmospheric science community. Thus, I think that this paper should be published in ACP. However, I think that some questions should be clarified.

Specific Comments

- Has some cloud-screening been applied to the DOAS data? Could tropospheric clouds have a significate impact in the presented DOAS measurements?

- Page 5, lines 133-135: Most of the information provided by the DOAS measurements come from air mases located at certain altitude and distance from the observation point, depending on the geometry of observation, Solar zenith angle, etc.. Has been this taken into account in the comparison between the TROPOMI and the ECMWF or CALIPSO data? Is this what you mean when talking about the multilinear interpolation? Do you use a spherical radiative transfer model to do so?

- Second panel from top of figure 2 and similar figures: Just as suggestion, the colour scale of these colour maps are contrary to the rest of the panels of these figures (red means low values of PV and blue means high values). Perhaps, using similar colours scale for all the panels would be more visually intuitive.

- Figures using "Longitude" as Y axis: even if positive and negative values of longitude are usually assigned to East and West longitudes, respectively, this should be clarified somewhere in the figure captions or in the text.

- Page 12, line 211 and page 13, line 212: The provided longitude values correspond to East longitudes instead West longitudes, Is it right?

- Page 16, line 242: The provided OClO SDCs values include also those below the detection limit?

- Page 28, lines 407-409: The commented exceptional OClO increase could be related to aerosols, as commented previously by the authors (page 3, line 59)?

Technical Corrections:

- Some sentences are too long. I think some "," should be introduced. As example: Page 2, lines 29-31; Page 6, line 166: "For the comparison, .."; Page 6, line 169: "In addition, .."; Page 6, line 166: "For this winter, .."; etc.
- Page 4, line 113: Introduce the meaning of the ECMWF acronym.
- Page 5, line 135: "..19.5 km of altitude".
- Page 5, line 137: "..The obtained correlative dataset..".