

Comments on egusphere-2023-2384-revised

de Laat et al., The Antarctic stratospheric Nitrogen Hole: Southern Hemisphere and Antarctic springtime total nitrogen dioxide and total ozone variability as observed in Sentinel-5p TROPOMI data

Title: change “in Sentinel-5p TROPOMI data” to “by Sentinel-5p TROPOMI”.

P1, L8: “Denitrification of the stratospheric vortex” -> I would rather write “within in the stratospheric vortex” or “of the stratosphere”.

P1, L10: You should add a sentence and explain the connection between denitrification and the Nitrogen Hole.

P1, L14: “are what is” -> rather “is what is”? Anyway I would suggest to rephrase the sentence since both “is what is” or “are what is” does not sound so nice.

P1, L21: “is extended with past satellite observations” -> why only past? What about future satellite observations? These would also be valuable.

P1, L26-27: Rephrase sentence? Sounds that there is something missing. Maybe “that occur” after Antarctic winter.

P1, L27: Particles themself are no clouds. These form clouds. Thus, I would suggest to write “forming so-called polar stratospheric clouds – whose particles sediment after they have grown large enough for gravitational settling”.

P1, L28: Move “(denitrification/denoxification)” behind process and write “called denitrification/denoxification”.

P1, L23ff: You focus in your description solely on the Antarctic (which is reasonable since your study focuses on the Antarctic), but the processes described hold for both hemispheres and also the given references are for both hemispheres. Thus, I would suggest to rewrite the text and describe these processes naming both hemispheres (or call it just polar regions). You only need to be careful with the term “ozone hole” since this only holds for the Antarctic.

P2, L30: Please rephrase this sentence. It is not only the “presence”, rather the strong border of the vortex.

P2, L35: rather “exist” than “re-formate”.

P2, L37: Please rephrase this sentence. The vortex breakup has nothing to do with the increasing sunlight and absorption. The vortex break up or instability is always coupled to dynamical processes (waves, wind reversal from winter to summer conditions).

P2, L50: Please state instead of “mostly Antarctic” clearly “Arctic and Antarctic”.

P2, L66: Please rephrase this sentence. You shouldn’t write it like this, thus accusing the authors of mentioning something, but not showing it”. It is quite reasonable that studies focus on one hemisphere although the processes investigated are found in both hemispheres.

P3, L68, 72 and 80: Instrument names like “GOME”, “OMI” and “IASI” should be introduced.

P3, L70: What is SNO2? Stratospheric NO2? The abbreviation should be introduced.

P3, L71: is -> has been

P3, L77: Remove “but do not analyze those observation in more detail.” Don’t point out what others have not done, solely focus on what has been done previously.

P3, L79: add “in” -> in satellite nadir observations

P3, L81: The removal of HNO₃ is the main process (and not part) of the denitrification since PSC particles contain HNO₃. Please rephrase the sentence.

P3, L92: Introduce abbreviation “SCIAMACHY”.

P4, L103: I would suggest to rephrase to e.g.: “This makes the TNO₂ or SNO₂ from TROPOMI particularly suitable for explaining the Noxon cliff.....Further, you should emphasize here that TROPOMI has higher resolution compared to other nadir instruments.

P4, L117: In this paragraph references should be added. For the statements about ozone you could use the WMO report.

P5, L132: I am myself no sure, but I would rather replace “in” by “from” or write “performs measurements at four channels”.

P5, L138: wide -> width

P5, L144: What is TMP-MP. Abbreviation should be introduced.

P5, L149: Add “Antarctic” before “NO₂”.

P6, L161: qu_value -> qa_value?

P6, L163: include -> included

P6, L166: Section 4 -> Sect. 4

Note, generally in Copernicus journals Figure and Section are abbreviated as Fig. and Sec. respectively, except when they appear at the begin of the sentence. Check ACP manuscript preparation guidelines and adjust this in the manuscript accordingly.

P6, L179: Parenthesis instead of brackets.

P7, L193: means -> mean

P7, L198: appendix -> Appendix

P7, L212: Parenthesis instead of brackets.

P8, L241: Please introduce the abbreviation “TEMIS”.

P8, L250: spatiotemporal -> Spatiotemporal

P9, L267:outside the Antarctic vortexkept out of the vortex-> isn’t that some kind of doubling? Please rephrase.

P9, L270: for -> from

P9, L274: I guess MASK-1 refers to inner vortex, MASK-2 to outer vortex and MASK-3 to vortex-edge. Add this to the sentence (put the respective MASK behind the respective vortex area).

P10, L285: multi-day -> Multi-day

P10, L287: replace “-“ by to, so that it reads “(5-10 to 15-30 days)“.

P12, L350: there still is well defined -> there is still a well defined

P12, L355: 2018-2020-2021 -> 2018, 2020 and 2021

P13, L386: Introduce instrument names “OSIRIS”, “ACE-FTS” and “MAESTRO”.

P13, L395: What is the abbreviation QA4ACV standing for? Please add.

P13, L397: Introduce “OMPS”.

P13, L410: Parenthesis instead of brackets.

P14, L417: appendix -> Appendix

P14, L435: Ozone Hole -> ozone hole

P14, L444: 2018-2020-2021 -> 2018, 2020 and 2021

P15, L460-471: Check line spacing. Should be the same as for the entire manuscript.

P17 and 18: Combine these two figures either in one Figure (with one caption) or number them as Figure 1 and 2.

P18, L493: appendix -> Appendix

P21, Figure 4 and all other figures: Use parenthesis instead of brackets for the panels. This holds also for the axis labeling.

P21, Figure 4: I would suggest to also mark the stations in the other panels.

P25, Figure 5 and all other figures: parenthesis instead of brackets and small instead of capital letters should be used.

P29, L529: add degree sign so that it reads 30°S and 90°S.

P30, L541: Add “correlation” before “coefficient”.

P31ff, References: Check all references add adjust to Copernicus style. Journal names should be abbreviated accordingly and titles should be in a common manner and the subscripts for the numbers in the names of the chemical species should be used.

P44 and P45, figure captions: table -> Table