

Editor comments on egusphere-2024-3981

Evidence of Tropospheric Uplift into the Stratosphere via the Tropical Western Pacific Cold Trap by Sun et al.

P2, L33: add “by” so that it reads “These cold temperatures significantly modify the pathways of air masses by dehydrating air and **by** the release of latent heat.” Or change the latter part to “.....and releasing latent heat.”

P2, L42: troposphere -> tropospheric

P3, L74-75: Add “used” so that it reads “Further details about the lidar measurements **used** in this study will be given in Sect. 2.” However, I think this sentence is obsolete and should be deleted since almost the same is stated in the next paragraph.

P3, L76: Instead writing “In the following” I would suggest to write “In Sect. 2....”.

P3, L78: delete “in Sect. 2”.

P3, L81: “For an improved representation” not clear. Do you mean an improved representation of the results in this paper?

P3, L80-83: The text would be better readable if you would just write what is found in Section 3 without referring to every single subsection.

P3, L82-83: Rather write “In the discussion (Sect. 4) we provideand use this to discuss.....”.

P3, L84-85: Either rephrase the sentence to be more clear or just write “In Sect. 5 conclusions are drawn.”

P3, L90: add “measurements” or “observations” after “lidar” and replace “is” by “are”.

P4, L93 and 97: Make one paragraph from these three paragraphs.

P4, L94: operating -> operations

P5, L132: Here and later ERA5 has been used, but ERA5 or any other reanalysis data has been described in the method section. Thus, at least one or two sentences plus references as for NCEP should be added here.

P5, L133: Remove “the” before “Appendix”.

P5, L136: This is not clear. How can you derive information about condensation and dehydration from the cloud measurements? The presence of the clouds may be related to condensation, but not dehydration. Please rephrase the sentence.

P5, L138: Also here the sentence need to be revised. How can you just from the location of the trajectory in relation to the cloud top/bottom make statements on condensation or dehydration. I do not understand what physical mechanism should be behind this. Further, as your trajectory comparison shows differ the results between the trajectories significantly, thus, the location of the trajectory above or below the measured cloud could also be just related to model uncertainty.

P7, Figure 1: Space between panel c and d is missing.

P7, Figure 1 caption: remove space between “30” and degree sign.

P8, L178: Put “Fig. 2c” in parentheses.

P9, Figure 2: Remove “the” before “upper cloud” and “lower cloud” in the figure panels of Fig 2 a and b.

P9, Figure 2 caption: “as a function of time corresponds to Fig. 3a.” not clear. Remove this text part. Also remove “The backscatter ratio (BSR) at 532 nm as a function of time and altitude” since this sentence appears twice. The reference to Section 2 is not necessary here, I would suggest to omit this here.

P10, Figure 3 caption: put “Fig. 2” in parentheses and replace “in” by “for” and change “see supplement Fig. S1 and S2” to “see Fig S1 and Fig. S2”. Further, I would suggest to write “for the winter case (Case 1)” (thus omitting “corresponding to”).

P11, L229: remove space between opening parenthesis and “Fig.”

P11, L239: will be -> can be found (?)

P11, L243: which case? Case 1 or Case 2. Generally, you could make more usage of the already introduced naming of cases to make it easier for the reader to follow.

P11, L247: Lidar -> lidar and replace “case” by “study” and change “previous studies in other regions” to “in previous studies over other regions”.

P12, L252: you mean in an extremely cold “cold trap”?

P12, L253: add “is found” after analysis.

P12, Figure 4 caption: Add “Case 2” after “1 August 2022” and replace “in” by “for”.

P13, Figure 5: Remove “the” before “upper cloud” and “lower cloud”.

P13, Figure 5 caption: Replace “in” by “for” and add after case “Case 2” and delete “corresponding to Fig. 4”.

P13, 261: Replace “Same to the” with “As for the”

P13, L261: This is not clear. Are you calculating here different trajectories or do you just consider another parameter along the trajectories?

P13, 263: Remove sentence “The trajectory setup details are described in Sect. 2.3 and Appendix A.” Just add in parenthesis “see Sect. 2.3 and Appendix A”.

P14, Figure 6 caption: “For the clarity of display, the trajectory points in the figure are sparsified at intervals of 24 points (24 h).” not clear. Does this mean you have an hourly output and only one point per day is plotted?

P14, Figure 6 caption: “For 20-d trajectories with similar results, please see the supplement Fig. S3.” This sentence is also not clear and such a remark should rather appear in the main text than in the figure caption. Please rephrase or omit this sentence. I also do not really understand why you have two sets of trajectories, one 20d and one 10d?

P14, L280: Fig. 8 -> Fig. 7

P15, 283: ranges corresponding to -> ranges correspond to (?)

P15, L288: Remove parentheses around the references and add “are” after “but”.

P15, L308-309: Delete sentence “The inter-hemispheric mixing controls the origins of air masses from the northern or southern hemisphere in the tropics.” since it appears here for the second time.

P16, L316: compare Fig. 1 -> see Fig. 1

P16, L319: delete “in Fig. 9c” since Fig. 9c has just been referred to.

P16, L324: Tab. 1 -> Table 1

P17, L339: sinking -> descending

P18, L344-345: Delete “in a white dashed line”. This should rather appear in the figure caption. However, in the figure I cannot see any dashed white line.

P18, L351:leading to dehydration of air parcels and cloud formation.... How do you achieve this? Cloud formation and dehydration are not measured. Please rephrase the text.

P18, L352: we -> was

P18, L368: What is a/the “triple La Nina”?

P18, L373: Sec. 3.4 -> Sect. 3.4

P18, L373: add references for the QBO phases.

P18, L378: Remove “(marked as a grey shaded area and dashed curves on the bottoms of Fig. 9a and b)”

P19, L399-400: Rephrase/Correct sentence “In consistency with other studies Randel and Park (2019); Pan et al. (2016), their work shows the possible pathway of air masses toward the TWP on the one hand.”

P19, L405: Lidar -> lidar

P19, 407: What about the uncertainty of the trajectories? Couldn't it be that just the trajectories are not accurate enough?

Section 4: The discussions is extremely long, thus consider shortening.

P22, L477: Add references for the trajectory studies.

P23, Figure A1: Add altitudes for the upper and lower cloud.

P23, L481: Write “Case 2 (December)”

Put Fig. A1 and A2 on one page and Fig. A3 and A4 so that these can more easily be compared.

Appendix Figures: Remove “the” before upper cloud and lower cloud and add altitudes.

Figure A5: Also add here the altitude for the upper and lower cloud.

P26, L491: has been partly available -> has been partly made available (?)

P26, L496: Remove comma before Hersbach et al.

Supplement:

- Supplementary figures should be labelled as Fig. S1, Fig. S2 and so on.
- Remove in all figures “the” before upper cloud and lower cloud.
- Add the altitude for the upper and lower clouds.
- Replace “in” by “for” so that it reads “for the winter” add which Case you are referring to (Case 1 or Case 2).
- Don't repeat the entire caption text. Write “As Fig. xx, but.....” and point out the differences to the other figure.

- Fig. S3 caption: What is meant with simulation results? Once you calculate 10d trajectories and once 20d trajectories. Why you do this did not become clear while reading your manuscript.