

Atmos. Chem. Phys. Discuss., referee comment RC1
<https://doi.org/10.5194/acp-2021-961-RC1>, 2022
© Author(s) 2022. This work is distributed under
the Creative Commons Attribution 4.0 License.

Comment on acp-2021-961

Anonymous Referee #1

Referee comment on "An assessment of tropopause characteristics of the ERA5 and ERA-Interim meteorological reanalyses" by Lars Hoffmann and Reinhold Spang, Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-961-RC1>, 2022

This is an excellent tropopause analysis comparing the two most recent versions of ECMWF reanalysis. The exploration of the data and convincing demonstration of the factors leading to differences and quality of tropopause heights was varied, creative, and convincingly done. Comparisons between the reanalyses and several high-resolution observational datasets were key to the quality estimation. It was a pleasure reviewing this study. I only have a handful of minor points of constructive criticism for the authors to consider as they revise the paper.

I would recommend using the common acronym **UTLS** throughout in place of "upper troposphere and lower stratosphere"

Line 159: nearest neighbor is really a sampling approach rather than "interpolation"

Figure 2: would be nice to have the vertical section paths of Figs. 3 & 4 overlaid here

First part of Section 3.2 (mainly lines 234-250): I would recommend calling out the common LRT errors near the S pole here rather than later in the paper (currently at lines 395-397). There is currently too much focus here assuming these tropopause ranges and characteristics appropriately characterize the UTLS in this region.

Line 287: I am uncomfortable with the assertion that the double tropopause identifications are an "artifact" here. If they satisfy the WMO criteria, how can they be an artifact? Perhaps what is intended here is a distinction between the various formation mechanisms for double tropopauses. In the literature cited in the paper (and in other studies not cited), there are known dynamic pathways for double tropopause formation (including

lateral transport from Rossby wave breaking near the subtropical jets and column stretching/shrinking in the UTL) and contributions from radiation.

Line 355: recommending revising to "...lead to **detrainment and** formation of ice cloud..."

Line 473: "is due to" should be "are due to"