

Interactive comment on “Reanalysis comparisons of upper tropospheric/lower stratospheric jets and multiple tropopauses” by Gloria L. Manney et al.

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Manney et al. present a comparison of the representation of jets and multiple tropopauses across several reanalysis in the framework of the S-RIP. Therefore itself this paper tries to make comparisons of climatological fields and attribute differences between results through the different reanalysis.

Major comments:

- My main concern with this study is about the definition that the authors use for the tropopause and multiple tropopauses. Being clear about this the document to cite in the second paragraph in page 6 is the WMO definition of the tropopause (see below) and it could be that the computation of multiple tropopauses that

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the authors have done is wrong, as the WMO definition states that a multiple tropopause needs a vertical thermal gradient of 3 degrees to be considered as such, and not 2 degrees (Celsius not Kelvin according to the original definition to be fair). This should be double checked by the authors and figures replotted if necessary.

World Meteorological Organization (1957), *Meteorology: A three dimensional science*, WMO Bull., 6, 134-138.

- Other issue is that the paper does not include a proper discussion on how the results here shown compare to the existing literature. This is specially important because this paper deals with reanalysis and previous results include radiosonde or GPS-RO data. Therefore I think that it would be really useful a section discussing the results of multiple tropopauses (at least for the well known planetary hotspots) in comparison with those obtained by Schmidt et al. (2006), Randel et al. (2007) (already cited) and Añel et al. (2008). Again I acknowledge that the focus of the paper is on the intercomparison, but maybe a good idea of doing this is to include in the discussion the spread of the reanalysis respect to the existing literature (e.g. the reanalysis with the minimum value for MTs over Japan is X with a value of Y and this is in the range (or not) of the values obtained by previous works). Maybe a table for the four hotspots of the North Hemisphere and South Hemisphere would be a good idea.

Schmidt et al. 2006 A climatology of multiple tropopauses derived from GPS radio occultations with CHAMP and SAC-C, *Geophys. Res. Lett.*

Añel et al. 2008 Climatological features of global multiple tropopause events, *J. Geophys. Res.*

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- Also along the text and figures I have not seen a clear statement on what the authors mean by 'multiple tropopauses'. Multiple tropopauses should not be confused with double tropopauses. Right now there is a pretty clear distinction in the literature about this. From the manuscript I guess that the authors refer to double tropopauses all along the text and not multiple (e.g. triple tropopauses or above). A clear statement of what is considered as multiple tropopause should be included. For example, are you mixing cases of double tropopauses and multiple tropopauses? this could lead to inhomogeneous results because of the vertical resolution of the reanalysis. Anyway a clarification is needed.

Minor comments:

- page 2, line 22: 'they'
- page 2, line 32: Chen et al. 2013 shows a nice case study along three field campaigns with radiosondes, combined with GOME-2 ozone data, lagrangian transport modeling of STE exchange and jet analysis that could be helpful to additionally support this view:

Chen et al. 2013 The deep atmospheric boundary layer and its significance to the stratosphere and troposphere exchange over the Tibetan Plateau , PLoS ONE

- Along the text the surname 'Peña' is not well written, it would be good to write it correctly with the 'ñ'. It is just necessary copy+paste or with LaTeX to write it as 'ñ'
- page 3, line 20: it would be good to put the 'th' as uppercase
- there are some minor typos along the text, please double check them.

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Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2017-400>, 2017.

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