

***Interactive comment on “High resolution VHF radar measurements of tropopause structure and variability at Davis, Antarctica (69° S, 78° E)” by S. P. Alexander et al.***

**S. P. Alexander et al.**

simon.alexander@aad.gov.au

Received and published: 11 January 2013

Response to Referee #1

We thank Referee 1 for carefully reading the manuscript and providing valuable feedback and suggestions for its improvement.

1. Physical basis of different tropopause methods

We have added in the height of the -2PVU tropopause to Figures 9a & 9c (as a function of relative vorticity) and discussed these results. The -2PVU tropopause height variation is similar to that of the radar's, although under strong cyclonic conditions it is lower

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than the radar. We have added a new plot (and discussion) showing the variation of the different tropopauses' altitudes for different tropopause sharpness. During winter, while the WMO tropopause altitude remains fairly constant under weak sharpness, the radar and -2PVU altitudes continue to decrease. The statement in the abstract regarding the radar tropopause and -2PVU tropopause in 'close' agreement has been reworded.

The sentence discussing the PVU contour represents the dynamical state and the WMO tropopause the thermal state has been reworded.

Taking into account all of the referee's comments in this section, we expand the revised manuscript to more clearly explain the relationships and differences between each tropopause definition and with the new / expanded figures, include discussions on the sharpness and its relation with tropopause altitudes.

## 2. Tropopause folds

Following the referee's suggestion, we use the ECMWF wind data as an additional test for folds. We use a 30 m/s horizontal wind speed cut-off for the upper troposphere jet (WMO definition of a jet). This additional jet test for a fold results in fewer fold detections, nonetheless, the seasonal cycle in folds with winter maximum is still evident. The details of this are incorporated in the revised manuscript.

## 3. Tropopause altitude power spectra

Following the referee's comments, and those of Referee 2, we have removed this section in the revised manuscript.

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Interactive comment on Atmos. Chem. Phys. Discuss., 12, 26173, 2012.

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