

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.

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Response to Referee #2

We thank Referee 2 for carefully reading the manuscript and providing valuable feedback and suggestions for its improvement.

General Comment:

Following the suggestions of the referee, we will provide a summary of the pertinent Antarctic UTLS features relevant to this study in the introduction, and bring forward some of the details in the discussion section to the introduction section.

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Specific Comments:

S1) We have removed section 3.5 as suggested.

S2) The sentences discussing the radar tropopause definition have been reworked to reflect the range of previous definitions of the radar tropopause by previous authors. We state the definition of our radar tropopause in section 2, which is the maximum vertical gradient of echo power, following e.g. Vaughan et al (1995).

S3) Inspections of this outlier removal around the times of suspected tropopause folds revealed that folds could still be identified with the algorithm. We make reference to this point in the revised manuscript.

S4) Figure 3 removed.

S5) In the revised manuscript, we provide more background to tropopause sharpness and the tropopause-relative co-ordinate system. At the suggestion of Referee 1, we have included an additional plot of the variations in tropopause altitude for different tropopause sharpness. Discussions and sentences which Referee 2 mentioned here to be obscure have been reworded and extended to improve clarity.

S6) We have removed the wind speed contours from Figure 6 (and relevant text)

S7) Following comments by this referee and referee #1, we have reworked the introduction and text to clearly explain how the different tropopause definitions are related to one another and under what conditions we would expect them to diverge in altitude. We have changed the phrase in the manuscript from 'radiosonde tropopause' to 'WMO tropopause' to avoid confusion. As suggested, Figure 7 has been expanded to include an extra panel of the radar – ozone tropopause differences and these results discussed. In Figure 7, we have also added the number of data points used to construct each distribution (to clearly state the lower number of ozone profiles available).

Technical Comments:

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T1) WMO criterion on Fig 2 is corrected.

T2) The sentences regarding the echo power's relation to M have been amended and Ottersten (1969) referenced. We also mention the $1/z^2$ dependence at this point and thus rephrased the sentence to say that the echo power is proportional to M^2/z^2 .

T3) On Figure 4, as suggested, we have enlarged the red crosses (radiosonde tropopause height) and thickened the -2PVU line to make the figure more readable.

T4) Panels and text on Figure 7 have been enlarged.

T5) Sentenced amended.

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

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