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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Tropopause height at 78 N 16 E: average seasonal variation 2007–2010" *by* C. M. Hall et al.

Anonymous Referee #1

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A Review of acp-2010-818

"Tropopause height at 78°N 16°E: average seasonal variation 2007-2010"

By C. M. Hall, G. Hansen, F. Sigernes, and K. M. Kuyeng Ruiz

Recommendation: The paper may be accepted after revision based on the following comments.

Summary

The authors have investigated the average seasonal variation of tropopause height at 78°N 16E from 2007 to 2010 basing on the observations from the SOUSY VHF radar at Svalbard, and showed that the surface air temperature seasonal variation leads that of

tropopause height by approximately one month, which confirms the results of previous study (e.g., Hall et al. 2009). The study also demonstrated that the tropopause gains height during the summer coinciding with increases in troposphere temperature and gradual decrease in ozone. The winter ozone depletion coincides with the secondary maximum in tropopause altitude. Thus the authors concluded that the tropopause is determined both by tropospheric and stratospheric temperatures. The results of this paper provide some valuable information on the seasonal variation of tropopause height at 78°N 16°E. However, Figure shows there are two maximums in tropopause heights, and only one maximum in ozone concentration and surface air temperature, how to explain that? The authors need to clarify following issues before getting the paper published.

Major comments:

1. Some authors' conclusions (e.g., the surface air temperature seasonal leads that of tropopause height by approximately one month) just confirm the result of previous study, even the figures (e.g., Figs. 2 and 4) are similar to the previous ones (e.g., Figs. 5 and 8 in Hall et al. 2009). More efforts are needed here.

2. In Fig. 1, the peak of tropopause varies from year to year, how to explain that? Can the surface air temperature and total O3 also be shown for comparison?

3. In Fig. 2, the time of minimum of the result from WMO is different from the other observations, which one can we trust?

4. In Fig. 5, there are two maximums/minimums in tropopause height, but only one maximum/minimum in surface air temperature and total O3 fields, if the tropopause height is determined by tropospheric/stratospheric temperature, how to explain this inconsistence between the peaks?

Minor comments:

1. Vertical bars are not defined in Figs. 3 and 5 2. Symbol "+" is not denoted in Fig. 3

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References mentioned in this review:

Hall, C. M., RÂÍ ottger, J., Kuyeng, K., Sigernes, F., Claes, S., and Chau, J. L.: Tropopause altitude detection at 78_ N, 16_ E, 2008: first results of the refurbished SOUSY radar, Radio Sci., 44, RS5008, doi:10.1029/2009RS004144, 2009.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 39, 2011.