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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Signatures of the two day wave and sudden stratospheric warmings in Arctic water vapour observed by ground-based microwave radiometry" *by* B. Tschanz and N. Kämpfer

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Response to Anonymous Referee #1

Dear Referee, we thank you for your comment. In the following we split your comment in two parts (italics) and present our response.

In the introduction it is said that is important to understand the dynamically variable Arctic atmosphere to be able to improve atmospheric models. I think the authors have to expand upon this. Why is the Arctic atmosphere important to study? Can there for example be a connection between the dynamics in the Arctic middle atmosphere and the increased melting of the Arctic ice? Why are SSW crucial events?
During an SSW the state of the atmosphere is highly distorted with effects observed in both dynamics and composition over different latitudes and altitudes (e.g. Chau et al. (2012), Dörnbrack et al. (2012)). The relevance of SSWs for measurement - model and model - model intercomparison has been covered in a variety of publications (e.g. Salmi et al. (2011), Straub et al. (2012), Pedatella et al. (2014)).
Our paper describes a data set obtained during a campaign and presents scientific results for two selected events: the two SSWs and the strong amplitudes of the Q2DW. The analysis of the two SSWs is based on the work presented in Straub et al. (2012). Presenting the results for the two following SSWs observed with the same instrument from the same location is valuable. But we think that repeating the motivation in the current paper would not add new information. In order to include your comment, we

add the citation of Salmi et al. (2011), Dörnbrack et al. (2012) and Pedatella et al. (2014) in the introduction.

The descent rates of middle atmospheric air, after the observed SSW's, are discussed in the paper. I think the authors have to expand upon this as-well. For example, which is the normal descent of Arctic air in the wintertime due to the meridional circulation?
We agree with the referee that normal wintertime descent of the Arctic air is interesting. In MIAWARA-C's ground-based water vapour time series we see effects of the autumn descent. In autumn, the mixing barrier related to the polar vortex just starts to build up and to affect the latitudinal water vapour distribution. Therefore, the air sampled over Sodankylä does not necessarily represent "vortex air" and estimating the autumn descent from our data set would need additional investigation. Such a study is beyond the scope of our current paper but could be interesting for future work.

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