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## ***Interactive comment on “Variability of water vapour in the Arctic stratosphere” by L. Thölix et al.***

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The study presented by Thölix et al. is very interesting, but some of the references given are not correct in the context they are actually cited for. Further, I think the presentation of the results in this study would profit if more results from the the Arctic 2009/2010 winter published in the ACP special issue on “Chemistry, microphysics and dynamics of the polar stratosphere: ozone loss and climate-chemistry interactions” would be taken into account ([http://www.atmos-chem-phys.net/special\\_issue228.html](http://www.atmos-chem-phys.net/special_issue228.html)). Additionally, it should be made much clearer in the manuscript for which region the trend analyses is performed: Is it for the polar regions (70–90N) or for Sodankylä?

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P22015, I18: The Hanson and Mauersberger paper is not a correct reference for denitrification. An adequate reference would be Fahey et al. (2001) or if one aims on denitrification in connection with dehydration, the Fahey et al. (1990) paper.

P22015, I20-21: A reference is missing here. An adequate reference would be the paper book by Brasseur and Solomon on Aeronomy of the Middle Atmosphere published by Springer or the review paper by Solomon (1999).

P22016, I3: Sedimentation of what? Please be more clear.

P22016, I26, P22018, I4: Abbreviations of the satellite instruments should be introduced as well as it should be mentioned on which satellites this instruments are operating.

P22018, I9: It should be added what the abbreviation LAPBIAT is standing for and when this campaign was performed?

P22025, I14-15: I would suggest to add here at which altitude/pressure level the positive long-term trend in water vapour is observed. Does this concern only certain altitude/pressure levels or the entire stratosphere?

P22020, 7-8: "LAUTLOS": the abbreviation for this campaign has not been introduced. When was this campaign performed?

P22025, I16: At which altitude do you derive a positive trend? At a certain altitude or in the entire stratosphere?

P22026, I26: Although may derive this relationship from the formula given by Hanson and Mauersberger (1993), there are other papers actually stating this and

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would be thus a more adequate reference.

P22026, I17: Also here a reference is missing. Observation of dehydration in the Arctic during was shown for e.g. the 2009/2010 winter was reported by Khaykin et al. (2013).

P22026, L19-21: Does the simulated occurrence of ice PSCs during these 20 winters agree with observations?

P22031, I1-3: Are these long-term changes observed in the entire Arctic or solely at Sodaylä?

P22031, I11ff: Do you see the increase in ice PSCs in both, the FinROSE simulations and the CALIPSO observations or only in the FinROSE simulations? Please clarify.

P22041, Fig 4: I do not understand for which region the trend is estimated and shown in the Figure? Are you comparing here Sodankylä data with FinROSE simulations ECMWF data for the polar regions? If yes, is this an adequate approach?

P22044, Fig 7: Why not doing this comparison for the Arctic? How many CALIPSO observations were actually available for creating such a plot? I guess not that many. I remember that CALIPSO passes through certain Arctic stations locations very infrequently. What does “near Sodankylä” actually mean? What was the allowed maximum distance from Sodankylä?

#### References:

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