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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Chlorine activation on stratospheric aerosols: uncertainties in parameterizations and surface area" *by* T. Wegner et al.

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We thank the anonymous reviewer for his comments and suggestions. Please find a line by line response printed in bold below.

1. I think the title is not completely in agreement with the results. I would suggest something like: "Chlorine activation in the Arctic stratosphere: the role of different aerosols"

changed to: "Heterogeneous chlorine activation on stratospheric aerosols and clouds in the Arctic polar vortex"

2. I suggest some discussion on the role of N2O5 hydrolysis. I think this reaction could also play a role in chlorine activation.

We have added a section discussing heterogeneous reactions of N2O5 (N2O5+H2O/HCl). However, their importance for chlorine activation is limited since the hydrolysis of N2O5 occurs at higher temperatures than its reaction with HCl.

Minor comments and technical corrections 1. Page 20563, Line 3:" . . . in late in winter . . ." should be ". . . in late winter . . ."

corrected

2. Page 20565, Lines 18-19: There are other sources of NOx. Depending on the altitude the influx from the thermosphere, electron precipitation or galactic cosmic rays could contribute.

A section discussing the impact of galactic cosmic rays and energetic particle precipitation on the NOx budget of the lower stratosphere has been added. Their contribution to overall NOx is small compared to photo-dissociation of HNO3.

3. I would change "every Kelvin cooling" to "every 1 K cooling", otherwise it reads like a process "Kelvin cooling"

corrected

4. Page 20574, line 8: Does formation of NAT necessarily means irreversible denitrification?

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This has been clarified. While the formation of NAT is a prerequisite for subsequent irreversible denitrification, observations of decreasing gas-phase HNO3 cannot be unequivocally attributed to the formation of PSCs or denitrification. It only indicates that PSCs have been present at some point in the observed air masses.

5. Page 20580: If the authors refer to CCMVal-2 report than the correct reference is: SPARC Report on the Evaluation of Chemistry-Climate Models, edited by: Eyring, V. Shepherd,T. G., and Waugh, D. W., SPARC Report No. 5, WCRP-132, WMO/TD-No. 1526, 2010.

corrected

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 20561, 2012.