

## ***Interactive comment on “Observation of unusual chlorine activation by ground-based infrared and microwave spectroscopy in the late Arctic winter 2000/01” by T. Blumenstock et al.***

### **Anonymous Referee #3**

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I thank the authors for their comprehensive explanation. It will be important to add a section devoted to this accuracy of the observations. When in addition, the comments below are addressed properly I regard the paper suitable for publication in ACP.

Below I have some additional comments.

Page 9995, lines 3-7. Please rephrase these sentences. What do you mean with related processes ? What are they? You mean PSC processes? I think they have been studied in great detail.

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Page 9995, line 18 Add The before Polar night.

Page 9996, line 14. What impact has the inaccuracy of the NCEP temperatures? This question is also related to the MIRA observations in the next section.

Page 10000, Line 1 You already outlined the FTIR technique. No need to add these lines here.

Page 10000, Lines 22- 28 Please clarify how you can distinguish enhanced ClO peak in the lower stratosphere of 0.4 ppbv from observations with an uncertainty of about 0.5 ppbv (as stated on page 9997, line 3). In line with this, please clarify the judgement of a few km altitude difference when the vertical resolution is about 10 km (as stated on page 9997, line 2).

Comment on section 4.3 Non-PSC particles may be possible candidates. I have some worries how to explain chlorine activation at warm temperatures on non-PSC particles. The gamma values would be very low under warm conditions in case of sulfate particles. If the reaction surface is something else (as the authors suggest, which may seem plausible to some extent), the uptake may be quite complicated. Recent laboratory work has shown that whenever reactive uptake is concerned (and this is most likely the case with complex surfaces), the reactive uptake coefficient generally reduces due to competitive effects.

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Interactive comment on Atmos. Chem. Phys. Discuss., 5, 9993, 2005.

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