

Interactive comment on “Partitioning between the inorganic chlorine reservoirs HCl and ClONO₂ during the Arctic winter 2005 from the ACE-FTS” by G. Dufour et al.

Anonymous Referee #2

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General comment

This is overall a good nicely written paper.

In more detail:

1. Relevant scientific questions are addressed about continued understanding about the stratospheric polar chlorine chemistry.
2. Description of unique data of stratospheric chlorine species obtained by measurements from the ACE-FTS together with results from a box model

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3. Nicely written with fluent and precise language with proper credit to related work
4. On the negative side is that the geophysical conclusions are relatively weak and tends to be more qualitative than quantitative. The paper should be pushed towards a better comparison with the box model, and more quantitative conclusions in order to improve our understanding about stratospheric chlorine chemistry even further. For instance I would like to have figures were both model and chemical data are overlaid.

Specific comment

P 1251 It is mentioned that HCl and ClONO₂ have not been measured (from any technique) simultaneously prior to ACE-FTS nor has it been possible to follow the winter-spring evolution. To my knowledge this been done by ground based FTIR (but profiles are not obtained). The author should make his statement a little clearer.

P 1252 (section 2) The retrieval procedure is described very shortly and then most is referenced to Boone et al. I think some more discussion about the measurements is appropriate, such as an estimated accuracy obtained from some kind of error budget. In the retrieval it is mentioned that line parameters from HITRAN2004 but what more? . For instance is the retrieval algorithm using any a priory data, from where are they taken?

P 1255 top sentence; From the data the author claims it can be seen that the recovery occurs first at the vortex edge. I had a problem seeing this and wonder if it can be clarified better.

P 1256 (Evolution of ClONO₂) Every winter the ClONO₂-to-HCl ratio increases due to the fact that the speed of reaction ClO+NO₂ increases with colder temperature and the fact that the photodissociation of ClONO₂ decreases in the dark. Hence there is a latitudinal gradient in this ratio unrelated to heterogeneous chemical processing. This is not clearly described in the analysis of the data and should be better distinguished from the heterogeneous processing. .

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P 1260 The variability of the model data is very large (~100%), which looks larger than the measured data, although the authors claims it is similar. Quantify the variability.

Technical comments

P 1260 , top paragraph missing is (It is worth...)

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 1249, 2006.

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