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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The Influence of HCl on the Evaporation Rates of H_2O over Water Ice in the Range 188 to 210 K at small Average Concentrations" *by* C. Delval et al.

Anonymous Referee #1

Received and published: 23 May 2018

The work "The Influence of HCl on the Evaporation Rates of H2O over Water Ice in the Range 188 to 210 K at small Average Concentrations"by Delval et al. reports the evaporative flux of water from ice/HCl mixtures at 170-210K. The experimental approach builds on the long tradition of excellently received papers from this group and the data are carefully analysed and I have no doubt that the result statements are well supported by the data. Further, the topic addresses core physical chemistry of ice with its importance for atmospheric science. Therefore, the topic fits perfectly into ACP and I'd support publication after a revision of the manuscript. I'm sorry to reject it in its current form.

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The main reasons for asking for a major revision are

o Limited Discussion: The manuscript tends to stop at the level of reporting the results without relating them to the results by other groups or lifting them to a more general level.

o No Relevance Given: The introduction is very interesting to read and reveals a detailed discussion on key-topics relevant to the ice-HCl system. However, questions key to this study are not covered:

+ Why do we need to know J(des)?

+ Where and when is the lifetime of ice particles critical and is the water flux the determining factor?

+ How relevant are the non-equilibrium desorption processes described here to the environment? Please, do not get me wrong. I do believe this lists topics that are nicely addressed by this study and are highly relevant to the environment. It is primalrey the question of discussing those in the text.

o Structure: For my feeling, the manuscript jumps to much back and forth between the topics. It is rather difficult to follow.

I'd kindly ask you to address these issues and would welcome a revised version. In the following, I give some detailed questions that aim at guiding you. This is not a complete list, and I kindly ask to address the major topics first. A new review can then address the details.

Detailed comments:

Introduction, p2: The molecular and dynamic details of crystallization are mentioned. Could you give details on what this would mean for your experiment. What the role of eventually slow formation dynamics in the preparation of your samples, where apparently you start with pure ice to which to dope HCl.

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Discussion paper

Introduction, p3: Where is the paragraph starting with Fourier-Transform IR heading? What is the take home message with respect to your work?

Introduction, p3: “Regarding the nature of HCl-ice adsorbate, “ What has ionisation to do with your study? This is a long and detailed description in the introduction to which you never return in the discussion.

Experimental: Please specify how did you quantify HCl? How did you derive the mole fraction, i.e. how did you get the volume of ice? Did you assume homogeneous mixture in the total volume of ice? Why is that appropriate? Could you specify on mixing and diffusion times? What is the error on the mole fraction?

Results, p 7 The average mole fraction should be called “apparent”?

Discussion:Please add discussion of other work on H2O Fluxes from ice in presence of acidic gases. Can your findings be related to water fluxes from other surfaces? Is this result part of a larger picture?

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