

Interactive comment on “Diffusion of volatile organics through porous snow: impact of surface adsorption and grain boundaries” by T. Bartels-Rausch et al.

Anonymous Referee #2

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This article investigates the diffusion of two organic gases, i.e. methanol and acetone, through the interstitial air of snow. There has been growing interest on better defining snowpack-atmosphere gas exchanges; consequently this work is a timely contribution. I am not an expert in physical properties and interactions in snowpack, so my evaluation of this manuscript is rather crude, and I highly recommend seeking further feedback from a more qualified reviewer with more in depth expertise in snowpack physics.

This manuscript is in general well organized and well written. These authors are obviously well experienced in this research, also demonstrated by their previous record of publications in this field. Experimental protocols appear to be well documented and to

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rely on state-of-the art equipment.

It is mentioned in several places that nitric oxide (NO) was used as an inert tracer to test the system response for a gas that does not interact with the snow. However, no data or comparisons are provided for the reader to evaluate how the behavior seen in methanol and acetone compares with NO.

The role of a liquid layer surrounding ice crystals well below the freezing point has been speculated to play a determining role in snow photochemical processes. Secondly, the behavior of this liquid layer and its forcing on the chemistry appears to be to a large extent determined by trace impurities in the snow. This study touches this topic only marginally, which is somewhat regrettable as it diminishes the value of this study for snow photochemical interpretations. In particular, it's a pity that experiments were only conducted at three distinct temperatures. It would be highly desirable to have a more continuous and higher resolution record of the behavior of these two soluble gases at a range of subfreezing conditions, in particular for the range of residual liquid layer conditions (i.e. from 0°C to -20°C).

Minor comments:

Page 6146, Line 11: Check citation format.

Page 6148, Line 22: ...dominate...

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