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Interactive comment on “The role of blowing snow in the activation of bromine over first-year Antarctic sea ice” by R. M. Lieb-Lappen and R. W. Obbard

H.-W. Jacobi

hans-werner.jacobi@ujf-grenoble.fr

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Lieb-Lappen and Obbard present measurements on the chemical composition of blowing snow as a function of height. The data brings new information about the possible role of chemical processes in the snow and in the atmosphere that may modify the composition of the blowing snow. I would like to draw the attention to two points.

1. The authors base their analysis on chloride-to-bromide ratios to determine processes related to bromine. However, it is well known that chloride concentrations in snow can also be modified. This may be negligible for high chloride concentrations,

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but it can become important at concentrations below 1 kg m⁻³ [e.g. Simpson, W.R., L. Alvarez-Aviles, T.A. Douglas, M. Sturm, and F. Domine, Halogens in the coastal snow pack near Barrow, Alaska: Evidence for active bromine air-snow chemistry during springtime, *Geophys.Res.Lett.* 32, L04811, doi: 10.1029/2004GL021748, 2005 or Jacobi, H.-W., D. Voisin, J.-L. Jaffrezo, J. Cozic, and T.A. Douglas, Chemical composition of the snowpack during the OASIS spring campaign 2009 at Barrow, AK, *J.Geophys.Res.* 117, D00R13, doi: 10.1029/2011JD016654, 2012]. A more conservative tracer is sodium. Why don't the authors use chloride-to-sodium and bromide-to-sodium ratios to remove the possible role of processes acting upon chloride?

2. In contrast to the comment of referee # 1, we already reported the chemical composition of mobile blowing snow in the Arctic, which we classified as "Fresh blowing snow" [Jacobi, H.-W., D. Voisin, J.-L. Jaffrezo, J. Cozic, and T.A. Douglas, Chemical composition of the snowpack during the OASIS spring campaign 2009 at Barrow, AK, *J.Geophys.Res.* 117, D00R13, doi: 10.1029/2011JD016654, 2012]. The samples were collected directly into the sampling bottles very close to the snow surface (less than 5 cm). The advantage of this technique is that samples can be collected within minutes reducing a potential modification after collection. It also allows studying the temporal evolution of the composition of the blowing snow during the blowing snow events. For example, we found that during the event described in Jacobi et al. the depletion in bromide became only detectable after a period of several hours, while at the beginning of the blowing snow event the snow was enriched in bromide. In contrast, the samples collected by Lieb-Lappen and Obbard represent samples integrating over one blowing snow event possibly masking depletions and enrichments occurring during different phases of the event.

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