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Comment

***Interactive comment on “X-ray computed microtomography of sea ice – comment on “A review of air–ice chemical and physical interactions (AICI): liquids, quasi-liquids, and solids in snow”, by Bartels-Rausch et al. (2014)” by R. W. Obbard***

**T. Bartels-Rausch (Referee)**

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Thank you for your comment on the use of XMT to investigate the phase distribution of snow samples. My apologies for misleading you with our statement that "using XMT is difficult when liquid is present, due to the small difference in absorption of liquid solutions and of solid ice. Hence it seems likely that the liquid features documented by Obbard et al. (2009) and Murshed et al. (2008) are to a certain degree sea salts that

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have precipitated at their imaging temperature of 263 K”.

My intention was not to question your results on the identification of brine – ice – solid precipitate in sea-ice. My intention was rather to underline that the quantitative assignment of brine vs. solid ice is debated. Indeed, I'll have to leave the discussion on the particular details on quantifying liquid fraction in samples with varying molarity and composition to the experts. At the end, it might be very well the performance of different instruments that make the difference, as you suggest in your comment. Therefore, I am very thankful for your comment and suggest publication as is.

Quantifying the fraction of liquid is an important point when XMT should be applied to monitor impurities in snow or lab-grown ice as concentration in the melt might be lower than that in brine of sea-ice. The key question in context of snow research is whether the phase and distribution of impurities can be investigated without the need to refer to the phase diagram. Currently, we lack experimental proof of the phase of impurities (solution vs. participate) and of their distribution within most, if not all, samples. I think we agree that XMT is a powerful method to tackle this issue, but application to snow or lab-grown ice remains a challenge. I hope that this is the message that the reader can take home from this paragraph and that this short paragraph creates interest in the use of XMT for the ice and initiate its use to observe impurities in snow samples.

I truly regret that we did not have a chance to sort this out prior to publication. I would have been happy to revise the wording and to be more precise. I hope you can accept my apologies, this happened when I shortened and restructured the manuscript from its ACPD version to be published in ACP. Personally, I feel that, despite the wording being suboptimal, a correction would not help the reader more than this comment. I truly believe that the take-home message is not altered even if most readers should be misleading by our statement. But I leave this to the editor.

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Interactive comment on Atmos. Chem. Phys. Discuss., 15, 13167, 2015.

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