Interactive comment on “How relevant is the deposition of mercury onto snowpacks? – Part 1: A statistical study on the impact of environmental factors” by D. A. Durnford et al.

T. Bartels-Rausch

thorsten.bartels-rausch@psi.ch

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Dear Dorothy Durnford et al.

Congratulations to this very interesting manuscript. May I use the opportunity to mention results from a few recent laboratory based studies on the interaction of mercury with snow and ice?

On page 407 you mention that some Hg-halogen compounds are stable and that this reduces the re-emission of Hg from snow in presence of halogens. Our recent laboratory study on the photolytic reduction and re-emission of Hg from snow supports this role of halogens (Bartels-Rausch, T. et al., 2011. Photoinduced reduction of divalent ...
mercury in ice by organic matter. Chemosphere, 82(2), pp.199–203). In that work, we discussed a further possible mechanism: \( \text{Cl}_2^- \) which are formed during irradiation in presence of \( \text{Cl}^- \) and organic chromophorers (Jammoul, A. et al., 2009. Photoinduced oxidation of sea salt halides by aromatic ketones: a source of halogenated radicals. Atmospheric Chemistry and Physics, 9(13), pp.4229–4237. Available at: http://www.atmos-chem-phys.net/9/4229/2009/.) might oxidize the intermediate \( \text{Hg}(\text{I}) \) back to \( \text{Hg}(\text{II}) \) and thus limit the production of \( \text{Hg}(0) \).

Also, the immediate re-emission of GEM from snow surfaces is also supported by our earlier work, where we characterized the adsorption of \( \text{Hg}(0) \) to snow and ice and found it to be negligible at environmental temperatures. (Bartels-Rausch, T. et al., 2008. Interaction of gaseous elemental mercury with snow surfaces: laboratory investigation. Environmental Research Letters, 3(4), p.045009.)

I hope you find this suggestions useful, kind regards, Thorsten Bartels-Rausch