

Interactive comment on “Consumption of CH₃Cl, CH₃Br and CH₃I and emission of CHCl₃, CHBr₃ and CH₂Br₂ from a retreating Arctic glacier’s forefield” by Moya L. Macdonald et al.

Anonymous Referee #1

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This is a nicely written, well organized paper in which the fluxes of methyl halides and polybrominated methanes are determined from land surfaces exposed by glacial retreat in the Arctic. Multiple sites with different ages since becoming uncovered by an overburden glacier are studied to determine the influence of soil ecosystem development on trace gas fluxes. A number of interesting conclusions are derived that are novel and will be informative for ACP readers. I recommend publishing after further consideration of some minor issues.

I find the abstract not as informative as it should be. The quantitative information is provided without context and without mention of implications other than the one that could

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have been made even before the work was performed: "With future glacial retreat and the expansion of these surfaces, these fluxes may become important in the future". Furthermore, the quantitative results provided by the paper actually suggest that these fluxes are quite small and not that different from non-proglacial land. Hence, it is very difficult to imagine that they will become significant on a broader scale at some point in the future even with a large increase in pro-glacial land surface area. The discussion in section 5.4 seems much more straightforward in describing the implications of these fluxes. Recommendation: include many of the very informative qualitative conclusions you mention throughout the discussion section that are the result of this work (many paragraphs in section 4 and 5 starts or ends with one of these nuggets). Do not overstate the potential future importance of these fluxes; what might be viewed as a negative result here is still very useful and informative. Finally, if quantitative results remain in the abstract, mention also for context the magnitude of similar fluxes in other regions of the Arctic for context.

Details: Define the terms proglacial and forefield for this audience.

Radiocarbon dating at the tundra site indicated a date of exposure of 1850-1926 BP (before present?), so it is not clear where the "approximately 1950 year old" age comes from (abstract and elsewhere).

Line 4 of intro: this statement is not true for CH₃Cl and CH₃Br until you describe them as "the most important *natural* sources of chlorine and bromine to the troposphere".

It is not explicitly clear if the ballast synthetic air which was drawn from to maintain pressure in the chambers during sampling was the "zero air" mentioned earlier, and if this air was de-humidified and CO₂-free? I wonder if some inconsistent changes in fluxes during the 2-hr experiments might have been caused by changes in CO₂ concentrations and humidity in the chamber.

Consider in Figure 7 highlighting somehow the fluxes discussed in this paper.

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