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Interactive comment on "Atmospheric trends of the halon gases from polar firn air" *by* C. E. Reeves et al.

C. E. Reeves et al.

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Response to Trudinger (Referee)

Below we respond (A) to each of the referees comments (R).

Firstly, we would like to thank the referee for their comments, which have helped us improve our manuscript.

R. General comments This paper presents measurements of four halons in Antarctic and Arctic firn, and then uses these measurements with a model of firn diffusion and a 2-D atmospheric model to infer temporal and spatial characteristics of halon emissions. The paper is well organised and clearly written. It makes a useful contribution to the field. I definitely recommend publication in ACP.

R. Specific comments Page 938 line 19 - "The firn data is used to derive atmospheric trends..." This is a bit misleading. The firn data is used here to confirm trends derived from the 2-D atmospheric model run with specified emissions. There are other methods that could be used to derive atmospheric trends directly from firn data (e.g. Trudinger et al., 2002). It is useful to be clear about which of these different approaches you are using. There could be temporal features (particularly high frequency variations) in the atmospheric trends from the 2-D atmospheric model with specified emissions that are not resolvable from the firn data alone, and that cannot be confirmed by the firn data (because processes in the firn cause smoothing and loss of some high frequency information). I agree that the firn data are used to derive the trends, but not directly. This is only a fairly minor point, but worth being careful about to avoid confusion.

A. We agree that what we have written is rather misleading and have thus replaced the last sentence of the abstract with “Following comparison of the atmospheric model output with the firn data, modelled atmospheric trends of total organic bromine in the form of halons were derived for both polar regions.”

R. Page 940 line 10 - "To determine the atmospheric histories, a firn diffusion model was run ..." - the first part of the sentence is a bit misleading, for reasons similar to the previous comment. It seems that the aim of this work is not so much just to determine atmospheric histories, but more to test some emissions scenarios. The rest of the sentence and paragraph reflects the study well. The phrase "To determine the atmospheric histories" could simply be removed to solve the problem here, as the study is about more than just determining atmospheric histories.

A. We have removed the first part of the sentence as suggested.

R. Technical corrections Figure 6 could be made clearer by stating in the caption that the halons are plotted cumulatively.

A. We have changed the Figure 6 caption to the following to account for the comments made by both referees: “Historical trends in atmospheric concentrations of total organic

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bromine from halons at (a) NGRIP, (b) Dome C (plotted as the sum of Br from the halons).”

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 937, 2005.