

Interactive comment on “Bromine measurements in ozone depleted air over the Arctic Ocean” by J. A. Neuman et al.

Anonymous Referee #2

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Following up on Reviewer 1's comments this paper presents a significant advance in the measurement of trace inorganic halogen species. The I- chemistry allows for speciated measurement of BrO and active bromine. The authors do a commendable job addressing potential instrumental and sampling issues. This included a significant effort to characterize active bromine in the laboratory after the campaign.

The authors indicate that most of the active bromine observed in the marine boundary layer must be HOBr due to the compounds longer photolytic lifetime. From the j-values given for Br₂, and BrO (Section 3.2 line 22) the photolytic lifetime of HOBr should be in the range of 10-30 minutes. In the high wind scenario encountered on April 19th (16m/s) this seems plausible, even with a higher (500m) boundary layer. However, would a 10-30 lifetime be adequate for even distribution of HOBr throughout a 300m

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Marine Boundary Layer if winds were in the range of 2-8m/s?

Several authors (Fan and Jacob, 1992; Vogt et al., 1996) have suggested a possible heterogeneous source for Br₂. Suspended particulate matter such as blowing snow could provide a mechanism to bring the Br₂ source, at the expense of gas phase HOBr, closer to the measurement platform. Therefore it would be interesting to if there was any correlation between active bromine and aerosol number density and/or surface area.

Specific Comment: In section 3.4 The second paragraph starts out as a general summarization of MBL active bromine, BrO and BrCl and then emphasis is placed on the flight that occurred on April 19th and the meteorology that accompanied it. In the next sentence BrO mixing ratios are compared to previous campaigns. I believe BrO mixing ratios used in the comparison have shifted back to average values for all flights rather than just the April 19th flight, but it was a bit obtuse.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 3827, 2010.

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