

## ***Interactive comment on “Bromide and other ions in the snow, firn air, and atmospheric boundary layer at Summit during GSHOX” by J. E. Dibb et al.***

**Anonymous Referee #1**

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The manuscript of Dibb et al. represents an important contribution to the literature of Arctic photochemistry and helps shed light on the bromine cycle in snow and potential sources of bromine in an area little impacted by direct sea-salt deposition of halogens. The findings that indicate a pool of Br in the free troposphere exists above Greenland (in summer) is certainly intriguing, particularly coupled with the idea that widespread bromide activation (leading to the well established observations of widespread ozone depletion events in the Arctic) results in the creation of said bromide pool. This is further evidence of the wide impact of halogen chemistry in Arctic regions, once thought only to be of relatively local importance with respect to ozone/Hg depletion events.

The measurements also will represent the first published record of bromide and nitrite at Summit and will provide important background and context for subsequent studies.

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Proper modeling of Arctic photochemistry processes also require constraints by measurements, and these results will certainly aid those efforts.

One typographical correction to note: page 13613, line 22: it's should be its

One relatively minor suggestion would be to include in the manuscript a discussion of the snow characteristics (i.e. what snow type was generally sampled - fresh, wind-blown/scinttered, windpack, approximate density/grain size?, etc).

I am also curious if there are any major meteorological differences PRIOR to the sampling season that could have affected 2007 vs 2008 results. For example, could a wind event or temperature difference have led to more snow metamorphism in the sampled layers one season over another (and thus potentially the location/photochemistry of solutes/particulates within the snow grains)? Likewise, is there any other difference in the "aging" of the snow prior to the start of sampling? I make this suggestion on the assumption that such met data are available for the Summit camp for that period prior to the sampling campaign.

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Interactive comment on Atmos. Chem. Phys. Discuss., 10, 13609, 2010.

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