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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Snow-sourced bromine and its implications for polar tropospheric ozone" *by* Xin Yang et al.

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We thank you for the very useful comments on the manuscript to help us improve it. Our responses to each of the questions are shown below.

1) Page 8140 line 9 - Please state DF values used in this study are taken from Yang et al (2008).

in the revised version, we say: ' DF values used in this study are taken from Yang et al. (2008), in which DF is specified as a function of particle size, based on the dataset compiled by Sander et al. (2003), in order to estimate bromine release from differently sized sea salt aerosol particles.'

2) Page 8140 line 10 – Please provide a sentence on the sources of aerosol acidity

in marine environments (uptake of SO2, HNO3, RCOOH etc). Also comment that the spatial and temporal variations in DF are controlled by the balance between available acidity and sea salt.

In the revised version, we add 'Certainly, bromine depletion in sea salt is related to conditions in the marine environment and the spatial and temporal variations in DF are controlled by the balance between available acidity (uptake of SO2, HNO3, RCOOH, etc.) and sea salt.'

3) Page 8140 line 15 – Remove "introducing further uncertainty"

Removed

4) Page 8140 line 20 – Remove "etc" and explain what you mean.

'etc' has been removed. The reason why we used 'etc' was to try to include potential ionic sources to snow on sea ice that are not known.

5) Please where possible try to avoid the use of single sentence paragraphs (e.g. in section 2.3)

agree.

5) Page 8146 line 15 - Give lon / lat location of Weddell and Ross seas

In the revised version, we define the Weddell Sea (approximately 70S, 40W) and the Ross Sea (approximately 75S, 180W).

6) Page 8146 line 16 - Point the reader to other possible sources of BrO away from sea ice to explain the elevated BrO in figures 4e and 4f.

In the revised version, we say 'Unlike in the NH all multiyear sea ice has been ruled out as a sea salt source. However, the large Ross ice shelf near Arrival Heights is a sea salt and Br source, explaining why the model overestimates BrO at Arrival Heights during spring. The poor correlation at Neumayer could be due to the coarse model

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resolution'

7) Page 8148 line 9 - In model sensitivities after "BASE run" insert "(Figure 1)".

Changed

8) Page 8149 line 1- re-define "(BE)" after bromine explosions.

Changed

9) Page 8149 line 11 – A high sea salt flux is only part of the requirement, without sufficient acidity there will be little/no bromine. I recommend adding after "high-saline contaminated snow". . .. " and there is sufficient availability of acidifying trace gases to titrate the sea salt alkalinity, ". . ..

We have added it into the revised manuscript.

10) Figure 4 plots – correct y axis to look smarter. Use superscript for "13" and "2" and move label to centre of axis.

Changed

11) Figure 7 y axis subscript 3 in "O3"

Changed

12) Figure 7, I would recommend removing lines longitude lines which do not show any features, and just show selected longitudes. Currently the plot contains too much detail and is difficult to follow.

In the revised version, we reduced the line number in figure 7 from 8 to 4 (with regular longitude interval of 90 degrees, as shown below). We believe this change will make reader easier to follow.

Spelling / Grammar Corrections:

Corrections are all done according to your suggestions.

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Interactive comment on Atmos. Chem. Phys. Discuss., 10, 8135, 2010.

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Interactive Comment

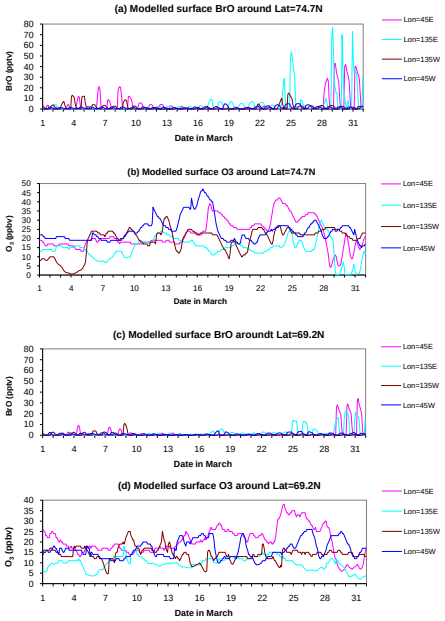

Fig. 1. updated figure 7 in the manuscript

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