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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.

Anonymous Referee #2

Received and published: 14 May 2010

Using a global Chemical Transport Model the manuscript investigates the role of sea salt aerosol generated from snow lying on sea ice during blowing snow events as a source of bromine to the high latitude boundary layer. The study shows blowing snow events are temporally consistent with bromine explosions observed during the hemisphere spring and could explain such events. The paper is well written and provides a detailed background and discussion of blowing snow events and the mechanisms involved. The author provides good arguments for periods when the model does not compare well with observations. The importance of heterogeneous chemistry for maintaining elevated BrO concentrations is also shown. I recommend this paper for publication in ACP after the following minor corrections are addressed.

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

al (2008)

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.

3) Page 8140 line 15 – Remove “introducing further uncertainty”

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

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

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

7) 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.

8) Page 8148 line 9 - In model sensitivities after “BASE run” insert “(Figure 1)”.

9) Page 8149 line 1- re-define “(BE)” after bromine explosions.

10) 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, ”. . ..

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

12) Figure 7 y axis subscript 3 in “O3”

13) 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.

ACPD

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Spelling / Grammar Corrections

Page 8140 line 21 – Missing full stop between “particle” and “The”

Page 8144 line 25 “the” missing between “around” and “Antarctic”

Page 8149 line 8 remove “, and” and start new sentence at “Heterogeneous . . .”

Figure 3 caption – insert a space on final line between “column” and “BrO”

Figure 5 caption – e and f should be in bold font

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