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ACPD

9, S1372–S1373, 2009

Interactive Comment

## Interactive comment on "Modelling chemistry over the Dead Sea: bromine and ozone chemistry" by L. Smoydzin and R. von Glasow

## Anonymous Referee #1

Received and published: 9 April 2009

This is a very nice study of the conditions potentially giving rise to high bromine mixing ratios over the Dead Sea, as previously studied in a more simple framework by Tas et al. and others. It is well structured and presented, the methodology seems on the whole sound, and the study represents a new approach to examining bromine chemistry in these environments.

By employing a much more detailed model of the microphysics and considering the deliquescence and crystallisation of aerosol, the authors conclude that sea-air exchange from the Dead Sea must be the main source of bromine here and secondly that the lack of aerosol recycling severely limits the vertical extent of gaseous reactive bromine in this environment.



Interactive Discussion

**Discussion Paper** 



I have only 2 major comments. The first is one raised already in the 2nd short comment published by Eran Tas - i.e. the efficient hydrolysis of BrONO2 on sulphate aerosol in even stratospheric conditions (Hanson and Ravishankara, 1995, 1996). This must be addressed. The second major comment is that the study makes no mention of the lifetime of HOBr against organics in seawater (nor in aerosols). Unless there are unusually small DOC concentrations in the Dead Sea (this should be discussed), at such high HOBr concentrations (if they really do exist), I would expect rapid reactions with organics. Hypohalous acids are very reactive with a range of organic materials, especially humic acids, which are present in seawater. E.g. Jaworkse and Helz (1985), show that in estuaries, the halflife of bromine oxidants is only 7 ms.

Minor comments/typos:

P4528, L 14 'It has been suggested many times' needs references. P4531 L22. Give some detail on how threshold value of total water mass is calculated P4544 L26 Al-though the explanation mark conveys the surprise regarding the large vertical gradients, it should be deleted.... P4545 L 26. Replace 'much stronger' with something like 'more rapidly' P4549-4551. Latter half of discussion reads as a critique of the Tas et al. paper. I recommend to condense this discussion and present it purely in terms of major differences of this approach to that of Tas (maybe in bullet points/Table) with explanation of limitations of previous approach. P 4550 L 30. Delete 'it happens' after 'show' P4552 L9 'extend' -> 'extent'

Figures - some of the grayscale ones look rather faint.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 4525, 2009.

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Interactive Comment

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