

## ***Interactive comment on “Model study of multiphase DMS oxidation with a focus on halogens” by R. von Glasow and P. J. Crutzen***

**Anonymous Referee #2**

Received and published: 12 January 2004

MS-NR: 2003-125 Title: Model study of multiphase DMS oxidation with a focus on halogens Authors: R. von Glasow and P. J. Crutzen

General comments \*\*\*\*\*

Important ideas are developed in this paper that advance the study of the multi-phase oxidation of DMS in the marine boundary layer, not only highlighting the potential of halogens to play a major role in the oxidation mechanisms but also the importance of processes in the aerosol and cloud phase within the MBL. The pivotal and poorly quantified role of methylsulfinic acid under both cloud free and cloudy conditions to the potential formation of new particles is also highlighted. The authors state that the consideration of halogen mechanisms and multiphase processing of sulfur "lead to a reduction of cloud albedo as opposed to the anthropogenic indirect aerosol effects".

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Certainly, this work supports the notion of efficient sulfur cycling pathways within the MBL that reduce the potential impact of biogenic DMS on climate through the indirect aerosol effect as it is suggested in the CLAW hypothesis. That is, deposition and uptake of product close to the surface reduces the source strength of nss-sulfate for new particle formation. However, rather than framing this as a "reduction in cloud albedo/new particle formation", it is important to remember that in non-polluted mid-latitude and polar oceanic regions, a strong seasonal biogenic signal exists with summertime maxima in emission of DMS and other gases that drives seasonal production of nss-sulfate (e.g. see Cape Grim winter versus summer nss-sulfate production in Table 2) and consequent seasonal satellite-observed indirect aerosol effect.

Given the complexities of the processes described, considerable value would be added to the paper if key uncertainties in the mechanisms were highlighted to assist in the design of future field experiments.

Further Specific comments \*\*\*\*\*

Whilst initial conditions are given in Table 1 for gas phase species and some information is given in the text on cloud conditions in cloudy runs, it would also be useful addition to see what aerosol/droplet initial conditions were assumed, and in particular seasonal differences for the Cape Grim runs.

P6749 L3-6 It is unclear what these % figures are.

P6761 L16 Suggest changing "We could show" to "We show"

Technical corrections": typing errors, etc. \*\*\*\*\*

P6735 L9 "the type of clouds that we focus on in this study - stratocumulus clouds - has" substitute has with have P6735 L19 "This type of clouds" substitute "This type" with "These types" P6739 L8 "Our assumption of infinite solubility might overestimates" substitute overestimates with overestimate P6740 L1 "the chemical initial and boundary condition" change condition to conditions P6741 L20 "Tables 2,2, and 3" 2 is repeated.

Interactive  
Comment

P6750 L12 "is with 13 - 33%" grammatical error P6751 L23 "runs (see Tables 2 and 2)," 2 is repeated. P6752 L10 "These diurnal variation might be used for a qualitative test during field campaigns to see if halogen chemistry was important." Change These to This. P6756 L4 "The shift of nss-SO<sub>2</sub>- 4 production from sulfate droplets to sea salt particles leads" should be "...sulfate particles to sea salt droplets"?

Within titles in the 'References' list, all place names /proper nouns require capitalization: e.g. P6762 L21, P6763 L5, L11 etc cape grim, tasmania, P6764 L10 baring head, new zealand crete, mediterranean pacific hawaiian etc.

P6763 L25 Change "thereaction of bro" to "the reaction of BrO".

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Interactive comment on Atmos. Chem. Phys. Discuss., 3, 6733, 2003.

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