

## ***Interactive comment on “Inorganic bromine in the marine boundary layer: a critical review” by R. Sander et al.***

### **Anonymous Referee #1**

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#### General Comments

This manuscript presents an extensive review of the current knowledge of concentrations and chemistry of aerosol and gas phase inorganic bromine in the marine boundary layer. This compilation of field and laboratory data is a unique resource for improving our understanding of what is known about marine boundary layer inorganic bromine chemistry. The available data are presented in a clear manner, including a critical analysis and discussion of possible uncertainties. Trends in particulate and gas phase bromine field data with respect to a number of physical and chemical variables were studied. The authors provide a careful and thorough analysis of the available data, some of which was previously unpublished. The discussion of the impact of future changes, for example in ship traffic and increased atmospheric acidification, is likely to encourage future research in this area. This paper is of very high quality and

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is recommended for publication, with only a few minor suggested revisions.

### Specific Comments

1. Page 2965 Lines 7-10: Do only the bromine depletions reflect chemical transformation? Perhaps the deviations from the expected sea water levels suggest chemical transformation (rather than enhancement and/or depletion).
2. Page 2966 Line 9: This first sentence of the introduction is unclear and suggests that it is not known who made the first measurements rather than whether or not they were the first. Suggested rewording: "Marchand (1852) reported what were probably the first atmospheric measurements of bromine (in rain)."
3. Page 2966 Line 26: Suggest "We also review relevant model studies and laboratory measurements."
4. Page 2969 Line 11: The discussion of chemical transformations suggests that ozone may also interact with sampled aerosols.
5. Page 2969 Line 17: Are the sampling locations not globally representative or did the authors intend a different meaning?
6. Page 2974 Line 19: re "concentration of aerosol bromine in addition to that originating from sea salt." This wording is somewhat vague. Suggested revision "concentration of aerosol bromine above that which originated from sea salt."
7. Page 1976 Line 13: re "sampled particulate bromine in bulk on PTFE filters." Should the term be "in bulk aerosol" or "in the bulk"?
8. Page 2983 Line 9: re "Evidently, if there is a dependence" Suggested revision: "If a dependence exists, it is masked by other factors."
9. Page 2993 Lines 5-7: These first two statements about fossil-fuel combustion sound as though the it is possible that bromine may be produced in automobile exhaust in polluted environments, but not otherwise. Reword to emphasize that bromine from

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vehicle exhaust could be an important bromine source in polluted environments, but not likely to be important in remote locations.

10. Page 2999 Line 15-16: suggest "According to Mochida et al. (2000), bromide in sea-salt is much more reactive to ozone than pure bromide.

11. Page 2999 Line 26: The statement beginning "From the observed fast decay" is misleading. I suspect that the authors did not conclude that Br<sub>2</sub> and BrCl were produced in this reaction solely based on the observed fast ozone decay. Were these species measured directly? Please clarify.

12. Page 3027 ATL80-G: Replace "?" with "See note"

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Interactive comment on Atmos. Chem. Phys. Discuss., 3, 2963, 2003.

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