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Comment

## ***Interactive comment on “Bromocarbons in the tropical marine boundary layer at the Cape Verde Observatory – measurements and modelling” by L. M. O’Brien et al.***

**Anonymous Referee #1**

Received and published: 23 February 2009

### General comments

O’Brien et al., present a good data set on halocarbons, which have been found to play important roles in the oxidant chemistry in both troposphere and stratosphere. The data presented are of good quality, the interpretations of the data are reasonable, the applied scientific approaches are good and yield reasonable results and aid the scientific community in comprehending the oceanic sources and their variability as well as their impacts on the oxidant chemistry. However the overall structure and presentation of the paper could be improved, as is described in detail below, in order to increase its readability, comprehension and validity of its conclusions. This is also, why I commented on

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some missing arguments, which are found later in the text. By combining the sections some comments will already be clarified. There are a couple of parts in the introduction, where the authors should provide more care to their citations- especially to original work. In addition, the observations could be interpreted with a littelmore care, knowledge of the literature and the region. The authors are strongly recommended to go over the text once more and reorder results, discussions, conclusions and summary, by relating to the reader and try to reorder their statements in such a way, that they clearly present what they want to say and help the reader to easily follow their arguments and thinking. The approaches and conclusions are in general very valuable and well thought but spread over the text. In addition the authors could condense the text in some parts, present their findings and conclusions in a more structured way, while partly they could extend their argumentations. Results and discussions should be merged, since quite some discussion parts are already included in the results. It would help the reader to include more paragraphs and sort some of the text accordingly. Identifying key messages and making them to paragraphs of the paper could help. A lot of important findings are currently hidden in the text. In addition the section "discussion" contains discussion, conclusions and summary and it is strongly adviced to put the discussion parts in a results and discussion section, since some discussion is presented in the results section already anyway. Thus questions evolving during the reading or caveats could be clarified at once, while currently important discussion points are only mentioned at the very end of the paper, and leave the reader to look for important information on one subject in several parts of the paper. To abandon discussion parts from the conclusion and summary part would even condense the information in the last section and increase the weight of the paper. Detailed comments follow below.

#### Specific comments

P4336 L10-13: The content of the sentences could be clarified, to that it has been own model runs, and it is not obvious from citing a paper, what is meant with this hint. It

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should rather be named than cited in the abstract.

P4338 L 13: major natural contributor of bromine is not quite right. Since its the oceanic aerosol that contributes most. Please revise this sentence

P4338 L16: Cited as Butler is arbitrary.. there was no identification of the source in his paper. In addition it seems that more papers in this section are arbitrarily cited ( e.g. Goodwin, 1997 is not an original paper in that sense). I would suggest more precise citations and references in this section

P4339 L3-4: Citing of a modeling paper for sea salt as important source seems again not appropriate. Please refer to data papers.

P4339 L10-13: There has work been done on the phytoplankton source of CH<sub>3</sub>I- please cite.

P4340 L2: Please specify the concentrations measured from Carpenter et al., 2008 as oceanic or atmospheric.

P4340 L7-9: This sentence seems senseless here. Please remove or specify.

P4340 L 17: In the 2007 paper of Quack et al. , that has been cited here, different oceanic sources of the compounds are suggested. Possibly the authors mean the other Quack et al. 2007 paper, where indeed an atmospheric correlation is described ( please cite and/or remove citation)

P4344 L22-28: Could you estimate from the above information how the relative intensities would be, since I tried to follow this, but it is not obvious how you would calculate the absolute response of a compound from the effusive information you provided, thus I would prefer to see the last step here as well.

P4345 L1-3: Since the authors described their method in detail and the interferences should indeed be small, I agree that it is possible to do so. However there are more compounds in the atmosphere, also in this retention range of the chromatogram. The

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air in tropical regions contains a lot of alkyl nitrates, which make strong ECD signals (e.g. see Atlas papers) and can be seen in the ECD-chromatogram of an air sample in Quack and Suess (1999) Volatile halogenated hydrocarbons over the western Pacific between 43° and 4°N, which the authors should consider for future work.

P4345 L25: There is no scenario B in Warwick et al., (2006), thus please correct and add the amount of emitted compounds used for the modeling.

P4346 L12-P4347 L2: It is not clear why the authors describe the pressure situation in such a detail, because the entire section could perfectly do without these lines, and still contains all the important information for the data interpretation, thus I would strongly recommend to remove these lines.

P4348 L22: please exchange...is also thought to be ... with... has been identified as ...

P4348 L23 -P4349 L7: Since it has been shown in the cited papers, that air coming from the Mauritanian upwelling contain elevated amounts of bromoform, it is misleading to construct an argumentation chain, relating the elevated CHBr<sub>3</sub> concentrations in the air to the primary productivity, since both of the cited papers show in detail that there are likely continental or coastal sources contributing to the high bromoform concentrations. Thus the lines should be removed and it is recommended to provide more information on the prevailing back trajectories during the elevated period, and a qualitative statement about the likely coincidence of elevated CHBr<sub>3</sub> encountered in air masses from northwest Africa. This is in better agreement with the recent scientific findings, than a relation to primary productivity which might not be the main source for the elevated CHBr<sub>3</sub>, and is thus misleading.

P4349 L11-L13: Please suggest an explanation for the elevation of CHBr<sub>3</sub> and the decline in the anthropogenic compounds, otherwise remove this sentence, since this has already been described above.

P4349 L17: Here it would also be nice to learn about the obvious diurnal cycle in the

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data- have the authors suggestions of interpretaions for their findings, could the shift in wind direction transport local air from coastal Santo Antao, with macroalgal compounds be the source for the elevation. Are there macro algal beds on the cap Verde coastlines.

P4348 L17- P 4350 L3: Since theses results section already contains a lot of data interpretation, the authors are strongly advised (see above details ) to revise there interpretation with more consideration of the published literature and the local conditions.

P 4350 L13 P4351 L5: The authors should provide a table with the varying conditions and emissions and the gridding used for their model runs.

P 4350 L23 P4351 L 1: It is not completely clear, if the authors always refer to their own modeling work or to the model of Warwick. It should be termed more specific if the authors relate to a specific run or to another model. Please revise the section.

P4351 L1-5: These sentences should be merged, because the first one seems not to reflect an applied situation.

P 4351 L5; The emissions increased&#8212;compared to what? Please clarify

P 4351 L11-12: This global emission estimate should be removed in view of the only regional extension of the emissions.

P4351 L12-L14: Why should the emission of CH<sub>3</sub>I resemble the emission of CHBr<sub>3</sub>? Is there any evidence for this, since both compounds have fairly different sources.

P4351 L20-23: Please relate this sentence somehow to the foregoing and remove the relation to a biological source (since there might be no causal relation)- but since the sentence doesn't help the forgoing it can also be removed.

P4352 L 4-7: Please put this in the table with model runs and move the sentence upward,

P4352 L15-16: Please specify what you are relating to or remove.

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P4353 L14: Here you could include a new paragraph.

P4354 L 2: ..is the explanation seems to teleological in this regard.. thus please use . could be a likely explanation.. or similar wording

P 4355 L6-17: The authors should look at the cause for the minimum ratios, which is the high elevation of CHBr<sub>3</sub>, even slightly higher than the emission ratio of 10 ( which is a ratio found generally at coastlines with macro algal sources...in addition with the published literature this view could help to identify the sources.

P4356 L3 -8: Here the authors should refer to the literature. since it is likely not plausible to extend the coastal emission ratio to the global ocean. Or the authors should argue, why it it should be applicable to do so. Please revise

P4356 L9 -17: This section does not seem to belong here, it rather belongs to the descriptive paragraph about the Cap Verde observations. There correlations with CHBr<sub>3</sub> have been described, why are now correlations with the longer lived CH<sub>2</sub>Br<sub>2</sub> applied. Please clarify your intention and please reorder the structure.

P4356 L12-14: Please clarify, what is meant by this sentence, considering the different sources.

P4356 L18: This section is a mix of discussion and conclusion and summary and should be named and ordered accordingly.

P4357 L7-23: This section would perfectly match behind P4356 L8. And I think it will increase the readability and comprehension of the paper to put it there.

P4357 L26: Here is an example for the improvement of the papers structure: This argument should have been mentioned much further above, to make the reader aware of the value of the used correlation approach.

P4357 L24 - L6: This would belong into a conclusion section.

P4358 L7-L18: Part of this has already been discussed in the results section, thus I

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would again recommend to combine results and discussion section and only present conclusions and summary at the end of the paper, which would condense the amount of information at the end and have the important discussion parts in the paragraphs, where they have partly been mentioned already.

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Interactive comment on Atmos. Chem. Phys. Discuss., 9, 4335, 2009.

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