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Interactive comment on “Numerical modelling of methyl iodide in the Eastern Tropical Atlantic” by I. Stemmler et al.

Anonymous Referee #1

Received and published: 22 March 2013

This paper describes a model analysis of methyl iodide in the tropical ocean. It is an issue that is important for the biogeochemical cycling of iodine and may have significant impact on atmospheric composition. Therefore it would be appropriate for publication in BGD. I do, however, have some deep concerns about the procedure, the data treatment and the conclusions. The main point of concern are: the concentration of CH₃I in the atmosphere, the performance of the model, the measurements. In addition, discussion of the scenarios and of the model results is poorly organized and rather confusing.

It seems to me that keeping the value of CH₃I constant means constraining the sea-air flux. This may lead to erroneous calculation of the concentration of CH₃I in the subsurface, which may or may not propagate to the lower levels of the water column. It is impossible to say whether this is an issue and how it affects the results and the

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conclusions. The authors seem to be aware of the potential problem (page 1130, lines 5-10) but make no attempt to deal with it or even discuss it.

The information in the Appendix and the related figures are troubling. The model does not seem to be performing well, despite claims of the opposite (btw, those figures should be rescaled to the same y-axis as Fig 4, otherwise they give a wrong impression to the reader). Particularly in the upper layers of the water column, the model does a fairly bad job at predicting salinity and temperature (especially at the TENATSO site) and terrible job at predicting phytoplankton concentration. These are key parameters for the whole study presented here. I would expect that both photochemical and biological processes are deeply affected by temperature and salinity, and obviously the model fails in predicting phytoplankton (and hence might be expected to fail in calculating CH₃I production). However I don't see anywhere in the paper any mention of these parameters as possible causes for the discrepancy between the model and the measurements. Before even looking at the optimization of the biological production parameters I would look into the basic model performance. If the authors don't think these affect the results, they should very clearly explain why.

Regarding the measurements there is not a bit of information about them, not even a reference to another paper (except the cruise report). I don't think it is acceptable to present a model-measurement comparison without giving even the basic information about the measurements. It is impossible to determine how far off the model and the measurements are, without knowing the error, the detection limit and other information about the measurements (and also about the model, to be honest).

For all these reasons, it is hard to understand what are the conclusions of the paper, the message it tries to convey and its contribution to the literature. The paper shows potential, and is potentially interesting, but it requires a lot more work before it is considered for publication.

Minor Comments:

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In the Introduction the authors should have done a literature search a little more thorough. There have been plenty of papers regarding the impact of iodine on the atmosphere and the potential sources of iodine from algae and non-organic sources since the Chameides and Davis, 1980, and the Nightingale et al., 1995, papers. In particular with regard to the Cape Verde region, as well as other tropical oceanic regions, which is very relevant to this work. It will not only put the discussion in context but also provide some material to which the present study could be compared.

The authors mention two type of DOC on page 1115, but do not say anything about the difference between them. Also, regarding the values of kpp max and kpp min, it is not clear how they were chosen and what relation they have with the values mentioned on page 1117 (lines 7-8).

page 1115, line 11: "photochemical"

page 1120: where are these climatological data coming from?

page 1123, line 20: "exceeds"

Interactive comment on Biogeosciences Discuss., 10, 1111, 2013.

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