

Interactive comment on “Air-sea fluxes of methanol, acetone, acetaldehyde, isoprene and DMS from a Norwegian fjord following a phytoplankton bloom in a mesocosm experiment” by V. Sinha et al.

Anonymous Referee #2

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It is an interesting work aiming to understand the production of oxygenated VOCs, isoprene and DMS from seawater. The measurements have been performed under semi-controlled conditions (mesocosm experiment) in Southern Norway using PTR-MS. The article contains important information and deserves publication. There few parts that needs clarification before the article is published to ACP.

The most critical point of this work is the significance of the fluxes determination. For instance although the conception of the flux calculation from the enclosure is right, the conditions applied during the experiment are far to be considered as typical for the

open ocean and thus the extrapolation of the fluxes estimated during this work to the global ocean is highly questionable. For instance the authors claim that i) the water column was stratified (page 5), ii) the lifetime of the air masses within the enclosure was of the order of 2.5-3h (important wall losses?) and iii) mixing was gently using a aquarium pump inducing subdued wave activity (page 10). It is clear that these conditions, typical for calm situations, are not favoring sea-air exchange of gases and thus fluxes can be viewed only as a lower limit (case of DMS). On the other hand under such conditions the uptake can be maximized (case of methanol). I propose to remove (or to significantly decrease) the part dealing with the comparisons with the global fluxes (page 14 and table 3).

Other comments:

- Interspecies correlation should be performed as for isoprene and acetaldehyde. The correlation should be not limited to the whole data-set but the authors have to investigate possible correlations between night and day time samples as well as between samples collected during the first and the second period.

- For the behavior of dimethylsulfide I suggest to consult the article published by Nguyen et al., 1988 during mesocosm experiments and which can help them to explain the behavior of DMS; Nguyen B.C., Belviso S., Mihalopoulos N., Gostan J., Nival P. Dimethylsulfide production during natural phytoplankton blooms, *Marine Chemistry*, 24, 133-141, 1988.

- Although the authors claim that it is extremely difficult to implicate biological parameters as these parameters were measured only once a day they try to explain for instance the behavior of methanol using *Synechococcus* sp and heterotrophic bacteria (page 12). I think that despite the relatively small number of biological parameters they dispose it is worth to try to explain the behavior of the other VOCs by doing even simple regression analysis (all samples, first period vs second period etc). This will help them to identify potential factors and recommend future studies in that direction. Note

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that the authors have successfully duplicate their experiment and thus the number of biological parameters is double.

- page 12, second paragraph, 2nd line: The emissions correlate well with both..., as well as the measured biological parameters. The last sentence is too vague, the authors should be more specific by reporting which parameter as well as regression coefficient r .

- page 13, end of the first paragraph: Proton transfer reaction mass.. This is very important statement and the authors should at least try to quantify the possible errors.

- page 13, It should be noted that the high mixing ratios of isoprene and DMS in the ambient air... The measurements of the ambient air samples within the enclosure cannot be compared with direct atmospheric measurements because they have been taken under specific conditions, i.e close to an important source or sink, high residence time etc. Also their explanation for local sources of DMS and isoprene is not valid because the authors work on relative and not on absolutely levels.

- page 13, second paragraph: The reported median values ... is approximately 6 times higher than the sum of isoprene and DMS. This is not true because the authors should compare fluxes and not concentrations. When fluxes are compared the sum of the fluxes of oxygenate VOC (0.23+ 0.27- 0.26) is a factor of two smaller compared with the sum of isoprene and DMS (0.12+ 0.3).

Finally the conclusion should be rewritten because it is not informative at all.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 9907, 2006.

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