**Biogeosciences
Discussions**

Interactive comment on "The use of algorithms to predict surface seawater dimethyl sulphide concentrations in the SE Pacific, a region of steep gradients in primary productivity, biomass and mixed layer depth" *by* A. J. Hind et al.

Anonymous Referee #2

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The aim of this paper is the comparison of different algorithms used to predict the surface seawater DMS concentration to conclude which should be the most appropriate to the area of study. They examined some of the available algorithms for the calculation of the DMS concentration in an interesting region such as the SE Pacific. The range of data used were particularly interesting because they used in situ measurements obtained at the VOCALS-REx cruise (October-November 2008), and different climatologies. They evaluated the proper algorithm to simulate the DMS concentration distribution of the area. After an interesting discussion of the outcome of their

comparisons, they conclude that non of the available algorithms, used with a range of variables, explains properly the DMS concentration values obtained in the region.

I think the work makes an advance in the field of marine biogeoscience and it is specially interesting for the DMS community. The methodology and outline is very similar to other previous studies, but the area of study is specially interesting because of its ocean parameters variability and atmosphere behavior, as it is explained in the introduction. That's the reason why I think a deeper description of the area of study is needed. The frequency plots of measured DMS, MLD and Chlorophyll-a are nicely shown in Figure 2, but I miss a two dimension graphical description of the whole area which is required to have a general view of the region. As it is shown in Figure 1 for the MLD, similar graphics can represent oceanic variables used in the study. Other variables from the literature can be added to the description. Primary productivity and biomass are refered to in the title but are hardly explored in the body of the article. The values obtained are given textually according to each Longhurst provinces (p. 5318-5320). I would like to have these results in graphic form also.

It could also be useful to have a comparison with other in situ DMS measurements to show if there is a general behavior in that region. The inclusion of calculated DMS flux emissions could also be interesting in order to have an overview of the region's behavior, specially if, as explained, the authors are interested in the implications the DMS concentrations values would have as a potential source of CCN, and hence its influence in the radiation budget. If authors choose not to report fluxes, I suggest they should tune down this objective in the introduction.

I suggest a different structure of the paper. I think the way the paper is structured is a little confused. The description of the algorithms could be given earlier, to show which variables are useful to obtain the DMS concentration values. A number of algorithms given in section 1.3. are not finally used in the analysis. It is not clear, then, why they are deeply explained. They should be omitted if they do not add anything to the argument. Alternatively, as suggested by S. Belviso in the Interactive comment, all of

the algorithms should be employed in the comparison if it is possible. Also, there is a section called "Results and discussion" (2.3) inside the section of the "Methods"(2). Clearly, this section – which should include "Kettle databases" and "DMS concentrations from algorithms" – belongs somewhere else.

The equations for all the algorithms used (now included in 2.4.4 "Predicted DMS concentrations from algorithms"(2.4.4)) could be explained in the section "Approaches to predicting seawater DMS concentration"(1.3).

On p.5338 Table 2 gives "a summary of predicted DMS values and the relation of these to the measured values". It could be much more transparent if this table was translated into a graphic representation in order to see the most appropriate algorithms and variables. Again a proper two dimensional graphic with the result that fits better with the in situ measurements could be very useful to compare with the values obtained during the track of the cruise, that should also be included, as least with the DMS concentration values.

Minor comments: Figure 3 and Figure 4 should have the labels at the same side for the same parameters. The scale should be the same to facilitate the comparison. Vallina and Simó (2007) is wrong referenced, I think it should be: Vallina, SM and Simó, R. Strong relationship between DMS and the solar radiation dose over the global surface ocean. Science, 315 (5811): 506-508, 2007. Typos: p. 5312, line 5: "the raw data they that were constructed"; p. 5314, line 12: www.clivar.org/science/vamos.htm is not found; p. 5323, line 10. Table 4 or Table 2?; p. 5323, equation (1) and (2): there is an "alpha" in the equation, "a" in the text; p. 5324, equation (3). There is a negative sign missing.

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