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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Model evaluation of marine primary organic aerosol emission schemes" *by* B. Gantt et al.

Anonymous Referee #2

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The manuscript describes the implementation and evaluation of five different marine primary organic aerosol emissions schemes within the same global aerosol model. The study is a useful contribution to the existing debate on marine organic aerosol sources. I recommend publication after the following comments have been addressed.

Comparison with weekly and hourly data

The comparison of the model against weekly and hourly data needs some additional discussion. The inability of the model to capture the observed weekly and hourly variability may be due to a number of reasons in addition to potential problems with the marine OC source function. Firstly, the emission source, which depends solely or partly on chlorophyll-a (chl-a) concentrations, is based on satellite remote sensed chl-a available with a monthly resolution. The simulated emission source therefore has

no variability due to ocean biology at a time resolution shorter than one month; the only variability is due to changes in wind speed. High concentration events of marine organic aerosol may be driven by events in the marine biology that are not captured by this monthly description of chl-a.

Secondly, there are other issues with the global atmospheric model which may impact the ability of the model to simulate aerosol at high time resolution. Examples include the coarse model resolution and the temporal availability of meteorological files that are used to force the model (are these available hourly?). I wonder how well the global model would capture hourly concentrations of other aerosol species (e.g., black carbon or sulfate) for which we likely have a better understanding of emissions? If it was possible to show that the model captured the hourly variability of other aerosol components with more skill than for organics then this would more strongly hint at an issue with the organic emission (either the source function or the ocean biology). I am not suggesting that the authors need to do this, just be aware and discuss issues around simulating aerosol at hourly time resolution.

P12857 Marine POA emissions. Please include the equations used to calculate marine POA emissions from the 5 schemes. This is especially important since these equations are not always available in the original studies meaning that a number of assumptions needed to be made.

P12863, Line 5. The very low global emission of the Fuentes et al. (2010) scheme needs some discussion. What is the reason for this low emission? Does this match what was reported in the Fuentes et al. study?

P12864, Line 16. As the authors point out the Spracklen et al. (2008) scheme was partly based upon observations from Amsterdam Island. The model overprediction at Amsterdam Island when using this scheme is therefore surprising. I think this overprediction is largely due to the PM2.5/PM10 fraction that the authors apply at this site which was not applied by Spracklen et al. (2008). For clarity this should be mentioned.

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P1286, L27-L30. This is not very convincing. Whilst there does appear to be a group of points at high windspeed where the model underpredicts there is also another cluster at low windspeed (on the 2:1 line) where the model also underpredicts. More obvious is the model overprediction at high wind speed when Equation (2) is used. Is there a way that you could make this analysis more quantitative? For example, stratify the data into low and high windspeeds and calculate NMB for both data sets?

Specify how you calculate NMB.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 12853, 2012.