

Interactive comment on “Dissolved organic matter in sea spray: a transfer study from marine surface water to aerosols” by P. Schmitt-Kopplin et al.

Anonymous Referee #1

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Review of the manuscript “Dissolved organic matter in sea spray: a transfer study from marine surface water to aerosols (BDG-8-11767-2011).

This is a very interesting work that shows the applications of advanced chemical characterization techniques to evaluate the enrichment of some compounds from surface seawater to the atmosphere during formation of primary marine aerosol. The manuscript is generally well written, but needs to introduce better some concepts so the paper is useful for a larger audience, especially those such as compositional network and others. Also, some figures need some work. However, I think this is a nice manuscript that shows the great potential that FT-ICR-MS has for characterizing the organic carbon pools. I think that the manuscript can be accepted in Biogeosciences after the modifications suggested below.

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Specific comments:

- Abstract and lines 1-3 of page 11769: The last sentence of the abstract is not very convincing. The relevance of these primary aerosols will depend on several issues, but it is not clear that these primary marine aerosols can travel long distance and to which extent will be transported to higher heights. Large aerosols will be deposited short after being formed, while small, submicron aerosols will have longer half-lives. Then, even though marine aerosols may be important in terms of fluxes of aerosol production, they are certainly also important in terms of fluxes of deposited aerosol, being the net aerosol production a function of several factors.
- Pages 11769-11770: My impression is that the “champagne paragraph” is not needed
- Page 11771: lines 5-11. I understand what the authors mean, but there are other factors that can increase the dilution of the sample from surface waters. Which was the wind speed, depth of mixing layer, chlorophyll a content, etc? All these factors, and others, will affect the amount of surfactants and “dilution” of these.
- Please note, that the word “surfactants” is ill defined. Virtually, any organic molecule induces a decrease of the surface tension of water. Obviously, some more than others. . .
- Page 11774, Line 10-13. Explain better.
- Pages 11773-11774. Concerning FT-ICR-MS and NMR, even though these are well known techniques for chemists, I would suggest to describe briefly which the information is that can be obtained from them, and why it is important for DOM characterization. Biogeosciences is a multidisciplinary journal and the results of this interesting work can be of interested for scientists from different disciplines with different background. With the same objective of making the papers understandable for a large audience, try to explain the specific concepts used in these types of studies. For example, explain the “compositional network” and “connectivity” in page 11776, I guess that this needs to be

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done in page 11773. As it is explained now, it is very difficult to understand figure 6.

- It is obvious that one needs to transfer DOM to an organic solvent, but which are the structural/morphological changes of DOM when extracted and transferred to an organic solvent? Is there disaggregation?

- Adsorbents such as C18 can give blank problems, but here no information on blanks is given. Please complete. Also, recoveries of some compounds using C18 can be low.

- Lines 11775, lines 17-21: How was ship exhaust avoided or controlled? Were samples taken during favorable wind directions? This is important, if there is evidence of contamination from the ship, then the information from these samples has a different meaning and not relevant for primary marine aerosols formation.

- Legend of Figure 4 and discussion in pages 11776: I don't understand why the enrichment in the burst is proportional to the bubble size! Where this statement is proven. Then, it is said that there is a gradient is observed between the O/C and H/C ratios and Ri. It is hard for me to see such a correlation. I suggest that the authors must apply the appropriate statistical tests to see if these statements correspond to significant trends.

- Compounds with a lower O/C ratio may be less polar, more hydrophobic (higher Kow) and may accumulate more at the sea surface micro-layer. Please, check if Ri is correlated to the O/C ratio.

- Page 11776, line6-7: specify explicitly how the anthropogenic influence can be identified in Van Krevelen plots, so the reader can understand why figure 5 is free of this influence.

- I find difficult to understand figure 8, but maybe because I'm not used to this kind of information.

- Figure 9: Very interesting but impossible to read the panel on the right and below!

- The last section is interesting, but can the authors find some structural similarities or

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estimated properties (solubility, Kow, etc) that allow to explain the process of partitioning from surface water to aerosol?

- It would be useful if the authors say something about which are the next steps to improve this line of research. New software for data interpretation? New instruments? More chemical knowledge?

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