

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

P. Schmitt-Kopplin et al.

schmitt-kopplin@helmholtz-muenchen.de

Received and published: 9 March 2012

We thank the Reviewer 1 for his constructive comments, improving the quality of our manuscript.

Abstract and lines 1-3 of page 11769: The sentences in the abstract and the text have been adjusted according to the context of the reviewer's comments.

Pages 11769-17770: We feel strongly that especially the Champagne's paragraph provides an added value to that particular paper on sea spray: bubble formation in Champagne has been investigated in very great detail and valuable information for sea spray evolution could be drawn from these findings. The respective references provided reflect own research and expertise of the authors and introduce the reader to the valuable

C6014

interdisciplinary approach and the translation of expertise needed for such studies. The link on champagne bubble formation is kept rather concise in this paragraph. Thank you for considering our wish to keep that issue in our paper.

Page 11771: The wording "dilution" may be confusing ... and we fully agree with the reviewer ... to avoid confusion we changed the text accordingly.

Page 11774. Additional information was added relative to the MassTRIX approach (similar short introduction was given to FTMS and NMR)..

Page 11773-11774 We added the direct informations as obtained from these technologies in this section. Also the network approach was explained more in details to enable the better understanding of Figure 6 (here also some details were added in the figure legend)

Transfer of DOM into solvents. Any analytical approach introduces changes of natural 3D assembly of NOM in any environmental compartment! ... We are fully aware of that issue but there are no practical alternatives when trying to understand NOM on a molecular level ... This is certainly a general problem that also happens when applying classical targeted structural analysis such as lipid, sugar, and amino acid quantification.

Adsorbants C18... We are fully aware of this selectivity problem but we needed to select the most appropriate material enabling us the harmonization in extraction of the water, burst and aerosols. PPL-SPE was used with all water samples as well and is described by Flerus et al. in the same special issue. Blanks were done to check the signals in FTMS we generated only coming from DOM and this was added to the Materials and Methods section.

Page 11775, 17-21. The focus in this paper was to show the potential in studying the sea burst and its transfer into aerosols with our analytical tools. Indeed, in certain cases, we were able to differentiate ship exhausts in some of the samples as well as terrestrial input or various anthropogenic pollution. We will described all these effects

C6015

in detail over the Atlantic transect we collected and the corresponding impact. However this would be beyond the scope of this paper that mainly describes the experimental setup and analytical principles.

Legend of Figure 4: This was confusing . . . and was changed in the legend: Circle size in the graph . . . we did not mean “Bubble size” from bursting bubbles.

Compounds with lower O/C . . . The Figure 4 legend that was changed to avoid confusion. Indeed, the higher H/C and lower O/C compounds were the most affected. Hydrophobicity is not directly related to the relative enrichment found . . . low O/C and low H/C compounds (not concentrated) could even show higher Kow.

Page 11776 line 6-7: This comment is related to a previous comment of the reviewer related to ship emissions. The information was added.

NMR spectroscopy: We adapted this section according to Reviewer 2.

Figure 7 has been improved with better clarity, less NMR resonance overlap and all referee concerns addressed; the chemical shift range of Fig. 8, panel B, is now indicated in Fig. 7 as well.

Figure 8 has from the onset been designed to occupy a full page width; then it will be nicely legible; in addition, we have enlarged the numbers and letters of NMR data indicative of acrylic acid. We have corrected the attribution of aerosol and burst NMR spectra – these have been mistakenly interchanged – this also explains the referee’s comments about NMR section integrals (Table 1). With respect to layout, the COSY NMR spectrum has been acquired from the “burst” sample, because it showed the most numerous cross peaks as well as the assignment of the acrylic acid spin system. This locates the projection spectrum directly above the COSY spectrum, and only water and aerosol were free to be interchanged. Table 1 had shown correct attribution of individual NMR integrals to respective spectra; however, we have inserted recomputed integrals in case of the burst sample with slightly altered values.

C6016

Figure 9: The Panel on the right is just a visual illustration of a metabolic pathway; this was added into the legend.

Last Section: Based on O/C and H/C elemental ratios alone, no unambiguous information about physical properties can be derived. However, the biological annotation suggested that aliphatic and highly surface active compounds were concentrated, very likely because they were actively involved in the formation of the surface organic film.

Next Steps: We added that information . . . One of the next steps will be the statistical evaluation of all the datasets and the integration of geochemical and biological information to describe the organic matter quality variation across the full length of the ANT XXV/1 Atlantic cruise; eventually leading to a meaningful description of the Meta-Metabolome.

Interactive comment on Biogeosciences Discuss., 8, 11767, 2011.

C6017