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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The physical and chemical characteristics of marine organic aerosols: a review" *by* B. Gantt and N. Meskhidze

Anonymous Referee #3

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General comments: Overall this is a decent if short review covering a broad range of topics and literature. It is very timely and I would certainly recommend publication in ACP.

Although some references are made to recent, related reviews of marine and sea spray aerosols others should also be mentioned (e.g. Lewis and Schwartz 2004; Quinn and Bates, Nature, 2011). Points of similarity and difference between the reviews should be discussed in more detail.

For completeness the authors may also want to include a section or at least statement on the effects of marine organics on atmospheric chemistry processes.

Fig. 1 is a useful figure and should be discussed further. If there isn't enough data to

confidently report spatiotemporal patterns across the globe than this is also an important point: more measurements required. What year/s are used? Define what is meant by “climatological”.

One interesting and relevant recent paper that the authors have neglected is Shank et al., (ACP, 12, 557-576, 2012). This study is important because it raises the possibility that some of the ambient observations discussed in the review may actually pertain to anthropogenic OA. This is certainly most important for coastal observations but as discussed in Shank et al. may also apply to some of the open ocean observations. Its only one study but it does suggests that future work requires speciated marine OM measurements (i.e. organic functional groups, ion fragments, isotopes), not simply total OM data, and/or concurrent measurements of anthropogenic tracers.

Specific comments: P21784 L23: Perhaps reference should be made to Fig. 1 here

P21785 L12: OC/SS$\sim$1 inconsistent with previous discussion stating this value is usually $\sim$0.1.

21787 l22: what are “smallest” sizes? This is important because studies differ.

P21789 L10: GF is defined at a given relative humidity, usually 90%. Needs to be included in this definition and discussion below should state at what RH the GF’s refer to.

21790 this is too vague; what was actually shown/proven? “The measurements indicate that the biological activity and environmental conditions can affect the relative amounts of organic and sea-salt in sea spray aerosol.”

21790: Reword and be specific. Were they marine or weren’t they? “Novakov and Penner (1993) found that due to their high numbers in the size range between 50 and 200nm in diameter, organic aerosols that were later 25 described as having a marine source (Novakov et al., 1997) made up a major part of the aerosol number concentration and CCN fraction.”

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P21792 L12: This sentence doesn't accurately summarize this section and needs clarification. The bubble chamber studies discussed observed changes in the fluxes of particles within individual lognormal modes, but total size distributions were often a combination of 3-4 modes. As a result, relative changes in the fluxes of the different modes manifested themselves as changes in the median diameter of the total size distributions, similarly to what may have occurred in the ambient studies discussed (although potentially opposite in trend i.e. presence of organics resulted in a decrease in submicron median diameter for the bubble chamber studies that are discussed). Furthermore, the section should include references to earlier bubble bursting experiments (e.g. Blanchard, D. C. (1963), The electrification of the atmosphere by particles from bubbles in the sea, Progress In Oceanography, 1(0), 73-202; Garrett, W. D. (1968), The Influence of Monomolecular Surface Films on the Production of Condensation Nuclei from Bubbled Sea Water, J. Geophys. Res., 73(16), 5145-5150; Paterson, M. P., and K. T. Spillane (1969), Surface films and the production of sea-salt aerosol, Quarterly Journal of the Royal Meteorological Society, 95(405), 526-534.). In some of these experiments organics were observed to suppress aerosol production from single bubbles, which is in apparent disagreement with the modern laboratory studies discussed. Given this I think a more appropriate conclusion would be that previous reports on the effects of marine organics on the physics of sea spray production (bubble burst dynamics, resulting aerosol size distribution) are often contradictory and considerable uncertainty remains. Further work is required since, depending on their mixing state, it may turn out that marine organics exert a greater influence on climate through their effects on sea spray size distributions and fluxes than through their effect on sea spray chemical composition.

21793: "historically" is redundant.

P21795 L13: State which mixing assumption led to lower bound estimate, and which to the higher?

P21796 L3: Which region does the 20% increase refer to? Perhaps also identify re-

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gions where the modeled increase was smaller or non-existent.

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 21779, 2012.