

Interactive comment on “North Atlantic marine organic aerosol characterized by novel offline thermal desorption mass spectrometry approach: polysaccharides, recalcitrant material, secondary organics” by Michael J. Lawler et al.

Anonymous Referee #1

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The study by Lawler et al. describes chemical measurements of aqueous extracts of filter samples collected during ship-board studies in the North Atlantic. Samples include both ambient and freshly-produced aerosols from the ocean surface using a Sea Sweep. The study adds to our knowledge of marine aerosol by providing further chemical analysis to support the classification of the aerosol into sub-types, including polysaccharides, fatty acids, SOA, and recalcitrant marine organic material. The discussion section of the paper focuses on polysaccharides. It is not clear why the study gives rather short shrift to fatty acids, which are an important group of marine organic

C1

compounds that are in need of further study. The majority of the paper is devoted to the detailed description of sub-types assigned to the aerosol samples, and so is largely descriptive. The fundamentally important results of this paper should be made clearer and more explicit. The discussion section highlights at least one unexpected result, which is not described in the abstract, nor highlighted and analyzed adequately within the context of the existing literature. While the paper appears technically sound, it could stand to be revised. Sampling a wider swath of the existing field and laboratory studies of sea spray and marine aerosol would provide for a more comprehensive discussion and contextualization of the measurements. This review also questions the manner in which the four sampling periods are interpreted as representatives of seasonal variability.

This paper is likely to be publishable in Atmospheric Chemistry and Physics upon minor revision.

Figure 8: I am concerned about the presentation of this data and its interpretation. The use of box and whisker plots to represent a dataset with a small number of samples may be leading to suspicious interpretations – or at least could confuse the interpretation of the data. What does a box and whisker plot mean when only three samples are included? The box clearly no longer represents an inter-quartile range. . . because how does one have quartiles with three samples? Or in panel (a), there is a group of 4 samples with a median value close to the lower end of the interquartile range, so is the 75th percentile and 90th percentile driven by just one point with a high ratio? It may be more useful to use a violin plot (showing the distribution of data rather than a box) or simply a plot of all of the data points without statistical treatment since the number of samples is so small. At the same time, while the authors clearly have a few data points for April, presenting the lack of data may confuse the interpretation. To be clear, it is understandable that only a small number of samples exist – the question is really about data reduction and associated interpretation.

In addition, it would be helpful to the reader's interpretation of the data if some brief de-

C2

scription of the conditions of the sampling location and/or general trends in biological productivity are described for each of the months shown. A reader who is less initiated with respect to the general seasonality or sampling plans for these North Atlantic cruises would benefit significantly from a short description of the conditions.

Lines 382 – 386: The early part of this set of lines is understandable with respect to the suggested association between CCN and sulfate. But then in the last line of the paragraph, polysaccharides are once again invoked. This transition back to polysaccharides is confusing. Is there evidence for polysaccharides to be in Na-free sea spray particles? Studies on this topic have been conducted. The question is not that this is speculative, but that the speculation is not well contextualized or supported by outside evidence.

Lines 398 - 400: See commentary about evidence for aerosol mixing state above. Sampling the literature on the mixing state of sea spray aerosol more thoroughly would improve this discussion substantially.

Minor comment Line 110: should be “mass spectrometric” as mass spectroscopy is not the proper name for mass spectrometry

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