

Interactive comment on “Shipborne measurements of Antarctic submicron organic aerosols: an NMR perspective linking multiple sources and bioregions” by Stefano Decesari et al.

Anonymous Referee #1

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Review of 'Shipborne measurements of Antarctic submicron organic aerosols: an NMR perspective linking multiple sources and bioregions' by S. Decesari et al.

The paper by S. Decesari et al. deals with the composition of marine aerosols in ambient antarctic air and artificially generated from ambient seawater as nascent sea spray, in relation with seawater composition. In particular the organic fraction of marine aerosol is analyzed with a high precision method, providing unique information on the presence of lipids, sugars and proteins in marine organic aerosols. Conclusions can be drawn on the contribution from primary vs secondary sources in ambient antarctica aerosol. Understanding the origin of the marine organic aerosol is of importance for

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climate models, as the prediction of CCN and IN of biological origin are mostly based this fraction emitted to the atmosphere. Although the introduction is very well documented, it could be completed with a few lines on why organic marine aerosols are important. Also, since the work presented here follows the publication by Dal' Osto 2019, it would be useful to summarize the Dal'Osto main conclusions and what the present work adds to them already in the introduction. Despite these remarks, because the data presented originate from a poorly characterized region, I recommend that the paper is published after minor revisions that I will detail below.

Major comments

1-Are the nascent sea spray generation experiments running with the same seawater (closed loop) or continuously flushed with fresh seawater? If performed in a closed loop fashion, what impact on an eventual depletion of surfactant organics from the sample with time? I it said that 9 samples were performed but only one sample is analyzed by HNMR. It would be useful to state what was the spatial variability of the general chemical composition of these 9 samples, and how the one sample analyzed with HNRM compared to the rest of the samples.

2-In general, variability among samples is not discussed much neither for the seawater samples. What differences amongst the 45 POC samples of seawater? Is a comparison between bloom versus non bloom POC content possible?

3-For comparing aerosol Organic carbon characteristics with those of organic carbon in the seawater, the results on the seawater DOC analysis should be known as both are expected to contribute to the aerosol organic matter. As these analysis are presumably not available, there should be a discussion on the fact that the POC 10-45micron composition does not represent the full organic mater present in the seawater. This has implications on the conclusions made on preferential organic transfer to the atmosphere.

4- Again, there is only one sample or primary marine aerosol (PMA) generated from

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the tank experiment, so we do not know the variability of the organic composition of PMA in this region. This should be discussed, especially when stating that creatinine was not detected in the PMA (this could be true for the one sample presented but not for the others..?) .

Minor comments

Line 3: two ways Line 30: century Line 134: already specified line 133 Line 255 : do you mean DMSP (and not DMPS) ?

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2019-888>, 2019.