

## ***Interactive comment on “The organic fraction of bubble-generated, accumulation mode Sea Spray Aerosol (SSA)” by R. L. Modini et al.***

**Anonymous Referee #1**

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### General comments

Modini and co-authors report the results of experiments during which volatility and growth factors of pure NaCl aerosol, artificial SSA and natural SSA were measured. The authors conclude that the organic contribution in sea spray aerosol during their experiment is lower than reported in previous studies and highlight the necessity of more investigation. The main critic to the manuscript is that coastal water have been used to perform the experiment. Although rich in organics and chlorophyll, coastal waters, particularly if highly influenced by river run-off (and probably by anthropic activity), represent a different system than open ocean waters. The organic matter volume contribution to sea spray obtained in the experiment is not representative of high biologically active open ocean regions and the data cannot be extended to the regional

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or global scale. The authors highlight the coastal origin of the collected water in the manuscript, nevertheless, the limits of the experiment should be stressed more strongly in the abstract and in the conclusions. The manuscript can be considered suitable for publication, once the following specific comments are addressed.

### Specific comments

#### Abstract and conclusions

Abstract and conclusions should be modified according to the “General comments”.

#### Introduction

P21403 – L2: in their comment about the difference between Facchini et al. (2008) and Keene et al (2007) the authors should consider that the difference is mainly due a different operative definition of soluble and insoluble organic matter. The results could be more similar than expected if measurements would have been done with comparable methods. P21405 – L24: the authors should report the particle residence time in the thermodenuder. This information is important to understand how reasonable is the assumption of complete organic matter removal by the thermodenuder. Several papers in the literature report data about thermal behavior of particulate organic matter and many of them evidence the presence of refractory, thermo-stable, material.

#### Experimental method

P21403 – L1: a figure with a scheme of the experimental setup would help the comprehension. P21403 – L2: the presented configuration suggests a high surface/volume ratio of the bubbles generator, do the authors have any estimate of the fraction of water insoluble, surface active, organic matter that can be loss by adsorption to the tube walls? This issue should be addressed because determinant for the final organic content of the sea spray aerosol. P21405 – L18: have the authors any evidence that sea water stored for days, although refrigerated in the dark, maintain its properties unchanged, especially on the organic matter content and properties point of view? One

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of the main differences between this experiment and those performed by Keene et al. (2007) and Facchini et al. (2008) lays on the fact that in this case not-freshly-collected sea water have been used for the sea spray generation. This issue should be better addressed.

#### Results and discussion

P21409 – L21: the difference between the “A” and “N” curves is not constant from 200°C on, the average value of the organic fraction volume contribution should be presented with the actual standard deviation and not with the  $\pm 6\%$  estimate derived from the V/V<sub>0</sub> measurement error. P21410 – L22: a more quantitative approach would be appreciated in the comparison between the three curves. As done for the previous plot, the authors should quantify the V/V<sub>0</sub> difference (with uncertainty) between the three curves and check its statistical significance, although it is acceptable the comment that the differences cannot be attributed only to the particle organic fraction content. P21411 – L23: the authors comment “At temperatures above 206°C the artificial and natural HGF90% curves agreed almost completely within experimental variation” is not fully convincing. Have the authors checked for statistic significance of the differences between the “Art” and “Nat” SSA HGF90% curves in the two ranges before and after 200°C?

#### Technical comments

P21403 – L12: “to act AS CCN” Figure 4: the use of a darker color for the green curve would probably help in reading the plo

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