

Interactive comment on “A miniature Marine Aerosol Reference Tank (miniMART) as a compact breaking wave analogue” by M. Dale Stokes et al.

Anonymous Referee #2

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The manuscript describes a new experimental apparatus, the miniature Marine Aerosol Reference Tank (miniMart) that reproduces aerosols created by breaking waves. The miniMART uses an intermittently plunging jet of water that is produced by a rotating wheel into a reservoir to simulate bubble plume, foam formation and to generate aerosol. Compared to the original MART, the miniMART is able to culture delicate organisms while generating aerosols. This was not possible with the original MART due to the larger pump in the original system.

The paper is very well written and the miniMART is described and illustrated very understandably. This development together with the original MART has the potential for studying aerosol production mechanism very systematically and reproducibly.

There are just a few comments listed below:

C1

(1) In the introduction part, you state that a limitation of the MART is that it can be difficult to culture delicate organisms in the reservoir due to the high flow rate leading to damage of the fragile cells. Did you perform experiments on the cell stability and could you discuss them a bit? Could you give a reference here? Regarding the cell cultures: can you control the temperature in the mini MART? Finally, did you perform tests with the miniMART on the stability of growing organisms? This point is probably addressed in the chapter 4 (page 12, line 7-22). However, it is not clear to me if this passage together with Fig. 7 should demonstrate the ability of the miniMART to stabilize the biological organisms. Could you comment on this point more clearly?

(2) In (2) the authors report about jet and film droplets that are formed via bubble bursting and the sensitivity of the mechanisms to the bubble size. Is it possible – with the mini MART as proposed standardized method for sea spray production – to distinguish between film and jet drops? How is the contribution of these two drop classes to the bubble size distribution in Figure 1? Could the authors comment on this point?

(3) There seems to be a good agreement in the bubble size distribution of the MART and the miniMART (Fig.1). However, as the authors state, there are some discrepancies in the size range around 0.1 mm. Do the authors therefore expect discrepancies on the aerosol formation (e.g. comparing the MART and the miniMART?)

(4) Cleanliness of the mini MART / Contamination issues: The authors consider the miniMART to be clean when the surface tension from water samples are the same as those from the filtered water supply used for experimentation. However, what about organic contamination? Organic compounds are present in seawater in trace levels. In Figure 7 the authors show the evolution of cDOM in seawater, starting at around 3 ppb. Did you check the blank level of cDOM concentration in the cleaned miniMART? And did you perform measurements of the organic content of aerosol particles in the miniMART (regarding contaminations?)

C2

(5) Finally, as mentioned by Referee one, it would be helpful for future operators to state under which circumstances the MART and the miniMART should be used.

Orthography:

Page 3, line 3: "have" instead of "has" Page 5, line 17: punctuation error

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C3