Atmos. Meas. Tech. Discuss.,
doi:10.5194/amt-2016-149-AC1, 2016

Atmospheric Measurement Techniques Discussions

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

M. Dale Stokes et al.

dstokes@ucsd.edu

Received and published: 18 June 2016

"There is a clear emphasizes on reproducing a correct bubble size distribution in the tank. At several locations, the authors underlie the critical aspects of having the correct timing of the intermittency. Is this most important parameters (even beside other characteristics of the plunging sheet)?"

The plunging water intermittency is very important. In order to mimic the degassing phase of an oceanic bubble plume, the plunging jet must stop for a few seconds for advected bubbles (in particular the bubbles larger than the Hinze scale) to reach the surface via buoyant forces and form foam cells. The repeated creation and degassing of bubbles at the surface changes the dynamics of the water surface microlayer.

"The tank is made of stainless steel, plexiglass and silicone wherever possible to min-

Printer-friendly version

Discussion paper

imize chemical contaminants and facilitate cleaning. However, plexiglass is typically avoided in system dealing with aerosols, and silicone is a known anti-foaming agent (that may alter the foam produced in the tank if badly applied). Maybe the authors could comment on these two points?"

Silicone is only used as an o-ring gasket material that forms a compressed seal in the lid of the water wheel and has very limited contact with the tank water. In order to make the water wheel serviceable and cleanable, a removable lid was required and necessitated the use of a gasket. Neoprene rubber o-rings were tried, however, the complex geometry of the lid caused them to leak. All other tank construction is stainless steel and plexiglass. Plexiglass surfaces can affect the distribution of charged aerosol particles within the headspace, however this effect is minimized in miniMART by using a stainless steel sampling tube that is positioned close to the water surface above the bubble plume to collect particles soon after creation by the foam and bubbles.

"MiniMART has been built to facilitate the culture delicate planktonic and microbial com- munities in the bulk water during experiments. I'm therefore wondering why it is not thermostated to have a better control the culture. Indeed, they be damaged by both temperature and mechanical actions of the water (due to the pumping)."

By eliminating the pumping motor for producing the plunging water jet, miniMART makes culturing delicate plankton possible while continuously sampling the aerosol production. Temperature control is important for some cultures, in which case the small size of miniMART allows it to be partially immersed in a thermostatically controlled water jacket. Alternatively we have operated miniMART in temperature-controlled environmental chambers or rooms. This was easier (and easier to keep clean) than including thermostatically controlled heating/cooling loops within miniMART (although they could be added).

"Finally, this paper aims at providing standard techniques. In this context, figure 2 is not informative enough for the reader willing to reproduce that tank (also more informa-

tion about the needed water levels can be added). It is stated that “a plunging water jet best replicates the bubble plumes generated by an oceanic whitecap”, while this paper discuss a plunging sheep (small vs. large tank). Now as a reader willing to use such techniques, I would appreciate have precise information on the technique to use for a given scientific or technical objective. Maybe the authors could consider adding some clear (maybe even tabulated) recommendations on the tank to use, with pros and cons."

Additional text can be added to the figure caption 2 to provide additional information. The dimensions of the tank, water wheel and water volumes are given in the main-body description and caption and the water fill line indicated. A line drawing of the tank could be provided (although it would not provide much additional information).

We are unsure what is being referred to regarding the small vs. large tank recommendations. However text can be added to the final paragraph emphasizing that the miniMART is well suited for studies requiring the maintenance of delicate organisms, but for experiments needing the generation of larger numbers of aerosols (due to sampling and instrumentation requirements for example), the larger MART system is the preferred tool.

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2016-149, 2016.

Printer-friendly version

Discussion paper