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Interactive comment on “An empirically derived inorganic sea spray source function incorporating sea surface temperature” by M. E. Salter et al.

Anonymous Referee #1

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This article describes a laboratory-based experiment in which the temperature dependence of the inorganic sea spray source function is examined. Through constant and variable temperature experiments, Salter et al. found that the number emission rate decreased with increasing temperatures while the surface area and volume emission rates increased. The sea spray aerosol size distribution was also affected by water temperature, with the accumulation and coarse modes having different temperature dependencies. These experiments led to the development of a novel sea spray aerosol source function which is implemented into a Lagrangian and global Earth Systems model. The article is well written and has a nice experimental design, and I recommend publication after addressing the comments below.

Major Comments: Section 3.2: The sudden particle size shift at 23C is a notable feature
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of Figure 2. While this feature is described in Section 1 as a potential measurement artifact, I think that additional discussion of this temperature threshold is necessary.

Section 4.1, Conclusions: The authors describe the source parameterization as having a dependence on air entrainment, thereby avoiding the contentious whitecap debate. The final parameterization, however, has a 10 meter wind speed dependence that is very similar to the whitecap-based parameterizations. I'm not sure I consider this parameterization truly avoiding the issues related to whitecaps with such a similar wind speed dependence.

Section 4.3, Figure 4: When comparing to previous source parameterizations, additional discussion of the strengths/improvements of the new parameterization developed from the laboratory experiments would be helpful for to aid future modeling studies.

Section 5, Figure 7: When discussing the predicted NorESM sea spray aerosol number concentration and aerosol optical depth, additional comparison with observed or satellite-derived data would help better evaluate the source parameterization developed from the laboratory experiments.

Minor Comments: page 13787, line 29: Should be "particle" page 13791, line 17: Should be "dependent" page 13799, line 20: define f_{int}

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 13783, 2015.

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