

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

Anonymous Referee #2

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In this manuscript the authors present a new parameterization of the sea-salt aerosol production flux obtained by laboratory experiments, with a focus on the dependence on SST. A novelty is represented by the particle size-range considered in their experiments (from 0.01 to 10 micrometers of dry diameter), which is wider with respect to other previous laboratory studies and which allows a more comprehensive description of the production flux of supermicron particles. In the parameterization proposed in this work, the production flux is described as the sum of three contributions: two submicron and one supermicron lognormal modes, which separately depend on SST. The authors found that the submicron and the supermicron modes are characterized by an opposite behavior when varying the SST: when increasing the SST, the production of large particles is increased, while the production of smaller (submicron) particles is decreased.

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This result is very important because, as the authors reported in the manuscript, it may bridge the gap between the state-of-the-art knowledge of laboratory studies (where decreasing particle production with increasing SST is found) and observations-based approaches (where increasing particle production with increasing SST is found).

Since the uncertainties that still affect the modeling of sea-salt aerosol (and especially the parameterization of its emission flux), this work can be considered very interesting and useful for the aerosol modeling community. The experimental design (both for the laboratory and for the modeling investigations) is well structured and properly described in the text, and the manuscript is well written. I strongly recommend it for publication. Minor comments below:

- Section 4.3 (P13803, L17 – P13804, L25): I suggest to expand the discussion about the comparison with other parameterizations. In this sense, I recommend to include in the discussion also the parameterization of Jaeglé et al., 2011, which is an example of observations-based approach where an increase of SST implies an increase in the production of particles, independently of particle size.
- Section 4.3, Fig. 4a: the inclusion of additional curves for Mårtensson et al., 2003 and Kirkevåg et al., 2013 (and Jaeglé et al., 2011 in case) at SST=2°C and SST=30°C could be useful for the reader to understand how the different parameterizations respond to variations in SST.
- Conclusions (L14 – L19): again, more emphasis should be given to the dependence on SST found for the different size modes. In my opinion this is the striking result presented in the manuscript and it should be underlined more; the recommendation for the modeling community is that the SST dependence of sea-salt production fluxes has to be described separately for small (submicron) and large (supermicron) particles, even when an observations-based approach is applied.