

Community comment 1

Hi authors, I have a few questions that I hope the author can help to answer.

Thank you very much for your questions. Below are our responses in blue font.

1. I am wondering why is it possible to substitute the mass fraction of sodium in aerosols for the proportion of sodium in seawater to the total sea salt mass?

Sodium has not been shown to be significantly enriched in sea spray in contrast to calcium and magnesium (Salter et al., 2016), which is also why we used sodium to normalize the bacteria concentrations when calculating the enrichment factors.

2. Figure S4 shows how the authors obtained the mass fractions of these ionic compounds. It is well known that there are a variety of ions in seawater/aerosols, but why do the authors only calculate for these six ionic compounds, so as to overestimate the mass fraction of these ions?

In this study we focused on measuring salt ions in seawater since these were needed to calculate the enrichment factors of bacteria in sea spray aerosols and estimate their fluxes relative to the salt mass. The six ions (Cl^- , Na^+ , SO_4^{2-} , Mg^{2+} , Ca^{2+} , K^+) that were measured in the current study account for 99% of the salt mass in seawater.

3. Supplementary Figure S5 appears to be the relative abundance of microorganisms at different sampling sites, rather than the bacterial enrichment factor in SML?

Thanks for pointing this out this error. We have now replaced the figure with the correct figure (now labelled S6).

4. In this paper, the author described two methods to measure bacterial flux, but because the content of organic matter in SSA is unknown, did the author finally use only one method to measure bacterial flux?

Both methods were used to estimate the bacteria flux and are represented by the blue and green line in Figure 3. We want to clarify that the bacteria flux was not measured but estimated using two different approaches: 1) by multiplying the enrichment factor derived from this study with the mass flux based on a previous parameterization derived from a companion study (represented by the green line) and 2) by multiplying the ratio of bacteria to aerosols with the number flux from the same companion study (represented by the blue line). Accurate estimation of SSA density, necessary for approach 1, would benefit from knowledge of the SSA's organic content, but measuring this was beyond our study's scope. Using a density for higher organic content would only slightly shift the estimated bacteria flux.

References

Salter, M.E., Hamacher-Barth, E., Leck, C., Werner, J., Johnson, C.M., Riipinen, I., Nilsson, E.D. and Zieger, P., 2016. Calcium enrichment in sea spray aerosol particles. *Geophysical Research Letters*, 43(15), pp.8277-8285.