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## Emission of Primary Bioaerosol Particles from Baltic Seawater

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Bioaerosols are particles originating from biological sources. Of these, primary bioaerosol particles (PBAP) are those directly emitted as entities, in parts or as agglomerates of particles such as bacteria, spores or pollen. In the atmosphere, PBAP are important players by acting as cloud condensation nuclei and ice nucleating particles (INP). Their relevance for cloud formation is especially important over pristine marine environments, where PBAP are emitted within sea spray aerosol (SSA) and are expected to contribute significantly to the abundance of INP. However, the emissions and sources of PBAP over oceans remain poorly understood.

Within this work, we performed a controlled sea spray experiment in the Baltic Sea using a novel single-particle fluorescence and scattering instrument, the Multiparameter Bioaerosol Spectrometer (MBS), in combination with bacterial analysis of aerosol and sea water communities. Using this setup, we successfully identified large PBAP ( $D > 0.8 \mu\text{m}$ ) within SSA and estimated their emissions to be  $1 \text{ s}^{-1}\text{m}^{-2}$ . Moreover, 1 out of every  $10^4$  particles ( $D > 0.8 \mu\text{m}$ ) was classified as PBAP. The morphology of large fluorescent SSA showed a clear transition during the campaign. This change was most likely linked to changes in the seawater biogeochemical properties observed during the ship campaign. This change was also observed in changes of the bacterial population of the aerosol and seawater, as determined by the 16s rRNA analysis. The bacterial populations were significantly distinct from each other, implying a selective transfer of certain species from seawater to the atmosphere.

Our results will help to better constrain the emission of PBAP from marine sources to the atmosphere and will help to understand how biogeochemical processes within the sea water can influence particle properties of SSA (e.g. particle morphology).

*The content of this work is currently in review at Environmental Science and Technology (ES&T).*