

# Sea spray aerosol concentration comparison: European Arctic vs. the Baltic Sea

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Keywords: sea spray flux, aerosol concentration gradient, near water boundary layer, Arctic, Baltic Sea  
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We would like to present the data obtained during the regular research cruises of the S/Y Oceania over a period of time between 2009 – 2015. The Baltic Sea is a very interesting polygon for aerosol measurements, however, also difficult due to the fact that mostly cases of a mixture of continental and marine aerosols are observed. It is possible to measure clear marine aerosol, but also advectations of dust from southern Europe or even Africa. This variability of data allows to compare different conditions. The data are also compared with our measurements from the Arctic Seas, which have been made during the ARctic EXperiment (AREX). The Arctic Seas are very suitable for marine aerosol investigations since continental advectations of aerosols are far less frequent than in other European sea regions.

The aerosol size distribution was measured using the TSI Laser Aerosol Spectrometer model 3340 (99 channels, measurement range 0.09  $\mu\text{m}$  to 7  $\mu\text{m}$ ), condensation particle counter (range 0.01  $\mu\text{m}$  to 3  $\mu\text{m}$ ) and laser particle counter PMS CSASP-100-HV-SP (range 0.5  $\mu\text{m}$  to 47  $\mu\text{m}$  in 45 channels). Studies of marine aerosol production and transport are important for many Earth sciences such as cloud physics, atmospheric optics, environmental pollution studies and interaction between ocean and atmosphere.

All equipment was placed on one of the masts of r/v Oceania. Measurements using the laser aerosol spectrometer and condensation particle counter were made on one level (8 meters above sea level). Measurements with the laser particle counter were performed at five different levels above the sea level (8, 11, 14, 17 and 20 m).

Based on aerosol size distribution the parameterizations with a Log-Normal and a Power-Law distributions were made. The aerosol source functions, characteristic for the region were also determined. Additionally, poor precision of the sea spray emission determination was confirmed while using only the aerosol concentration data. The emission of sea spray depends on the size of energy lost by the wind waves in the process of a collapse.

## Gathered data and results

Processed data contains cruises over the years 2008 – 2016 in the Southern Baltic Sea region, and three measurements campaigns AREX (ARctic EXperiment) in the European Arctic region over the years 2013 – 2016. All the results presented were corrected to 80% relative humidity [Fitzgerald, 1975; Petelski, 2005].

Comparison and parameterisation between aerosol flux, size distribution and wind speed in range from 6 m/s to 17 m/s were made.

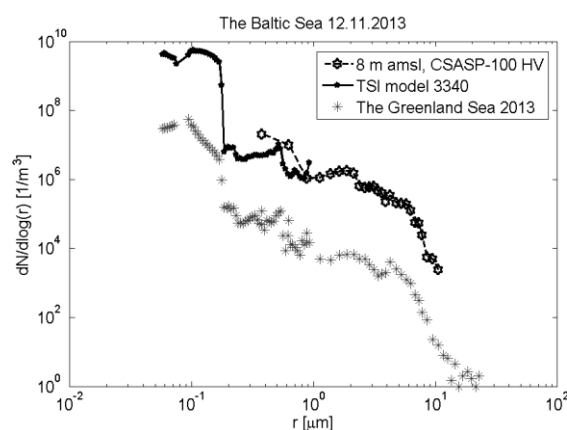


Figure 1. Exemplary comparison of aerosol concentration measurements in the Baltic Sea and European Arctic regions.

This research has been partly made within the framework of a Polish-Norwegian Research Programme operated by the National Centre for Research and Development under the Norwegian Financial Mechanism 2009-2014 in the frame of Project Contract No Pol-Nor/196911/38/2013 and Project Polar-KNOW.

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