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Aerosol Size Distribution in the marine regions

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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 – 2012.
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 advections of dust from southern Europe or even Africa. This variability of data allows to compare different conditions. The data is 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 advections 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 μm to 7 μm), condensation particle counter (range 0.01 μm to 3 μm) and laser particle counter PMS CSASP-100-HV-SP (range 0.5 μm to 47 μm 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 S/Y 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. We present the dependence between aerosol size distribution versus meteorological and micrometeorological parameters, such as wind speed, Monin-Obuchov Length, friction velocity and also turbulent fluxes of heat, momentum and humidity.