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Introduction

Biological aerosols may have important effects on clouds and precipitation due to their ability to initiate ice formation at high subzero temperatures (-10°C to -2°C). The knowledge on bioaerosols emitted from ocean surfaces is very limited, especially in remote Arctic regions. The aim of this project was to investigate bioaerosols, and their cloud-active properties along the Greenland west coast. Here we present a first brief overview of micrometer sized aerosol particles and bioaerosol concentrations from online measurements and microbial cell concentrations of seawater.

Methods

Data were collected from a navy patrol vessel over an 11-day long period in August 2016 (Figure 1). Bioaerosols were measured with a BioTrak (Model 9510, TSI Inc.) with a 1 minute time resolution and a flow rate of 28.3 L/min. The instrument detects biological particles by their fluorescence in two bands: 405-500 nm and 500-650 nm. An algorithm provided by the manufacturer is used to interpret the data and avoid false positives. We used NovoCyte flow cytometer to evaluate microbial concentrations in sea water and sea surface microlayer.

Results and conclusion

The total and biological number concentrations along the route are shown in Figure 2 below. The average concentration of biological aerosol particles was about 100 m^{-3}. Around 0.003% of the airborne particles detected in the range 0.5-10 µm bioaerosols. However, the concentrations of biological particles may be underestimated because of threshold values used for the fluorescence detectors.

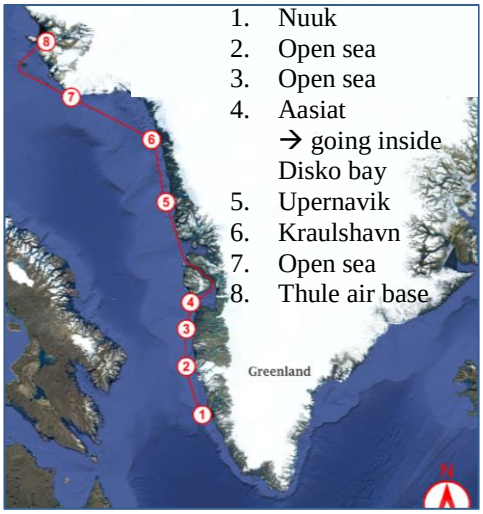

Figure 1. Ship route during the measurements.

By number, 70% of the biological particles were 1-2 µm and 20% around 3µm. The highest concentrations were found close to populated areas. There was a significant, but negligible, correlation between biological particles and total particle counts (Spearman's $\rho = 0.1$). Thus, the biological particles are likely to originate from specific sources. The seawater microbial concentrations were on average $7.7 \cdot 10^4$ cells per mL of bulk water and $2.6 \cdot 10^5$ cells per mL in the sea surface microlayer. The low number of bioaerosols thus likely reflect low source concentrations of microorganisms in the ocean.

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Figure 2. Total and biological particle concentrations.