



Organic carbon and aliphatic amines in marine particles: exchange processes between ocean and atmosphere

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Within exchange processes between air and sea, the export of organic compounds from the oceans to the atmosphere play an essential role as the oceans cover a substantial area of the planet. In order to investigate such interactions, in two intensive campaigns in 2011 at the Cape Verde islands, seawater and marine aerosol was sampled and analyzed regarding the organic content. The Cape Verdes islands generally represent a region of low nutrient supply and biological activity, but at certain times of the year biological activity increases due to local upwelling and nutrient input from the desert via dust deposition.

Chlorophyll A data showed low biological activity at the first campaign (May 2011) but higher biological activity in the second campaign (November 2011). Regarding seawater analysis, higher dissolved organic carbon (DOC) concentrations were found in November 2011. Furthermore, enrichment of organic carbon in the sea surface microlayer – the direct interface between air and sea - was found up to an enrichment factor of 2.

General aerosol composition in terms of inorganic ions (sodium, chloride, ammonium, and sulfate) was similar in May and November, but the OC content was strongly increased in November at high biological activity. Also OC enrichment in aerosols compared to seawater increased in times of high biological activity by 30%. Backward trajectories showed that the collected aerosols were all of marine origin.

Besides organic sum parameters, aliphatic amines were investigated on aerosols as they are important organic compounds in the atmosphere and expected to contribute in secondary organic aerosol formation. Aliphatic amines were found on the aerosols in concentrations between 11 and 17 ng m⁻³. Although concentrations of the amines were similar at the two campaigns, their contribution to the dissolved organic carbon was higher at times of high biological activity (November). The aliphatic amines also show a correlation to chlorophyll A and amine specific pigments determined in seawater.

The results support the assumption that organic carbon on aerosols is connected to the biological activity within the ocean being an important source.