



Atmospheric supply of Al, Fe and Ti to the Atlantic Ocean

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The deposition of atmospheric mineral particles is a major supply of Al, Fe and Ti to the open ocean. Due to the limiting role of Fe in large oceanic areas, the atmospheric input can thus strongly influence oceanic productivity. By contrast to Fe, Al and Ti are not considered bioactive and may therefore be used as tracers to assess the atmospheric flux of mineral particles to the surface ocean. In this study, the concomitant supply of atmospherically derived Al, Fe and Ti to the surface ocean was investigated on a meridional section through the Atlantic Ocean (ANT XXVI-4, Punta-Arenas, Chile, to Bremerhaven, Germany, April-May 2010). This transect covered regions with very distinct aerosol deposition characteristics: From moderate deposition in the western South Atlantic over low deposition in the South Atlantic Gyre to high deposition in the eastern tropical North Atlantic. During the cruise, dissolution experiments were performed with freshly collected aerosol and seawater samples in order to assess the instantaneous solubility of Al, Fe and Ti. We present a complete dataset of surface seawater, total aerosol and soluble aerosol Al, Fe and Ti concentrations. The results allow to better constrain the influences of both seawater and aerosol properties on the dissolution process of Al, Fe and Ti. Moreover, our data from regions with distinct aerosol deposition characteristics reveal relative differences in the dissolution of Al, Fe and Ti. These results provide the unique opportunity to thoroughly evaluate the utilization of both dissolved Al and Ti concentrations as tracer for atmospheric inputs. Overall, this study makes an important contribution to better understand the supply of atmospherically derived trace metals to the open ocean.