

A potential source of Fe binding organic ligands to the surface ocean from wet deposition

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Iron (Fe) is an essential micronutrient for all marine organisms. More than 99% of Fe (III) is bound to natural organic ligands in seawater. One of the main inputs of iron to the surface open ocean is dry and wet aerosol deposition. We measured for the first time Fe organic speciation by voltammetry (CLE-ACSV) in seven rainwater samples collected over the Eastern Tropical North Atlantic Ocean during the AMT 19 Cruise (2009). The potential involvement of bioaerosols on Fe organic speciation in wet deposition was also investigated. In these rainwaters, concentrations of total dissolvable Fe (unfiltered) ranged from 25 nM to 635 nM, while concentrations of Fe organic ligands varied between 40 and 1100 nM. Conditional stability constants were characteristic of strong Fe-binding ligands ($\sim 10^{22} \text{ M}^{-1}$). The highest Fe and organic ligand concentrations were associated with the highest aluminum and silicon concentrations from a Saharan dust wet deposition event. Genomic approach revealed the presence of bacteria and yeast in the rainwater events. Their capacity to produce siderophores was tested, highlighting their ability to produce strong Fe specific organic ligands in different environmental conditions including in salty, nutrient rich and depleted media. This suggests that bioaerosols may be a source of Fe organic ligands to the open ocean that has not been considered yet. Preliminary global modeling experiments will also be discussed in terms of potential atmospheric input of Fe organic ligands to the surface of the ocean.