

The multiple roles of dust in ocean biogeochemistry

Lithogenic material, carried by the atmosphere and deposited as dust, is a major source of nutrients and trace metals to the ocean. In the tropical Atlantic, which receives at least half of the global deposition flux to the oceans, dust is very likely to be the dominant source especially of iron. Iron is an important micronutrient for marine biology, so the delivery of dust couples the atmosphere, the global carbon cycle and climate. There are several ways how mankind is influencing this process, e.g. by changing dust emissions, but also by influencing dust particle composition, and hence iron solubility. But how much of the dust-deposited iron becomes bioavailable also depends on the seawater side: Iron is hardly soluble in oxic seawater and rapidly scavenged onto particle surfaces. Dust deposition also is a source of particles, and hence can act as a sink for dissolved iron.

This talk will give an overview about the role of dust for marine biological productivity and carbon exchange between ocean and atmosphere, and how it is affected by chemistry of iron in the ocean. I will then focus on the double role of iron as a source and sink of iron, using insights from modelling and a series of recent measurements in the tropical Atlantic. Finally I will outline gaps in our current understanding and modelling of the marine iron cycle and point to ways forward.