

On the role of lithogenic particles for iron cycling in the tropical and subtropical Atlantic

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Lithogenic material deposited as dust is one of the major sources of trace metals to the ocean, particularly in the tropical and subtropical Atlantic. On the other hand, it is also a source of scavenging surface for iron. Here we studied this double role of lithogenic material in the marine iron cycle by adding a new scheme for describing particle dynamics into a global biogeochemistry and ecosystem model, including particle aggregation and disaggregation of two particle size classes, as well as scavenging on both organic and lithogenic particles. Considering the additional scavenging of iron on lithogenic particles, the modelled dissolved iron concentration is reduced significantly in the tropical and subtropical Atlantic, bringing the model much closer to observations. This suggests to consider the double role of dust particles as an iron source and a sink in studies on the marine iron cycle in high dust regions and with changing dust fluxes, e.g. under ongoing climate change. We also compared a run using a constant ligand concentration with one with a prognostic description of ligands and show that assumptions on ligand dynamics are crucial for constraining the scavenging loss of iron.