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Importance of Colloid for Trace Metal Speciation in Natural Waters

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With growing concern about trace metal dynamics in the marine ecosystem, there is a greater interest in determining trace metal speciation in seawater. The bioavailability of trace metal to phytoplankton is influenced by its physical and chemical speciation. However, the complexity of trace metal chemistry in water and the difficulty of direct measurement of chemical species have hampered our understanding of biogeochemical dynamics of trace metal in seawater. Recent Studies indicated that colloids has considerable impact on many oceanic processes, such as buffering global climate change, biogeochemical conversions and cycling, trace element scavenging, altering the sedimentation behavior of suspended particles, carbon utilization, and generation of microbial habitat. Increasing evidences marked the significant importance of colloidal interaction of trace elements in natural waters. Colloids have a special role as metal sequestering and detoxification agents, thus regulating trace metal concentrations as well as their bioavailability and toxicity.. One of the most important questions in marine and environmental chemistry is the identification of specific functional groups which are responsible for complexing a particular trace metal, which include the concentrations and distributions of colloids in different marine waters; complexation of metal ions to specific functional groups in colloids; the structure and stability of these biopolymers towards biological, chemical and photochemical degradation. In addition, trace metal distribution in coastal waters are more dynamic and complicated than oceanic environments, being subject to varying influences of atmospheric inputs, run-off from the continents, vertical and horizontal mixing and phytoplankton productivity. Consequently, concurrent measurements of organically complexed and size-fractionated trace metals and ligands are needed to better understand biological cycling and pathways of utilization by phytoplankton and ultimately lead to a better understanding of global trace metal cycling.

Keywords: Colloid; Trace Metal; Speciation

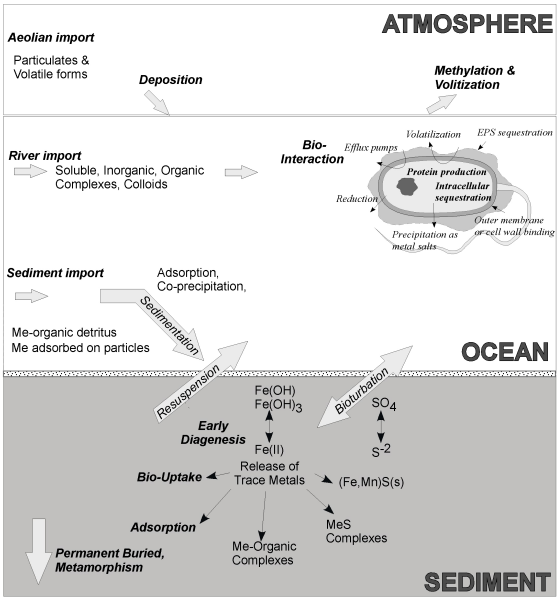

Figure 1 Schematic of Trace Metal Fluxes and Processes in Marine Environments