



Quantification and Composition Analysis of Small Mobile Colloids from Different Aquatic Ecosystem

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Natural colloids, often defined as entities with sizes $< 1.0 \mu\text{m}$, have attracted much attention due to their small size and large surface area, leading to their high reactivity with and ability to facilitate the transport of contaminants in the subsurface environment. However, the role of mobile colloids in carbon and phosphorus cycling is largely unknown, especially on the role of smaller colloids ($< 0.45 \mu\text{m}$), which are operationally considered as "dissolved" species in most studies. Our special focus is on smaller colloids in different size fractions. Colloids are sampled from different aquatic ecosystems, such as freshwater, wetland and estuary area, and include soil solution, stream water and groundwater samples. Colloids of various size fractions are separated using centrifugation or membrane filters and quantified gravimetrically and characterized using SEM or TEM with XEDs to analyze the morphology and compositions of colloidal organo-mineral associations. Preliminary results based on stream water at base flow, during storm event and wetland soil water showed that, in general, small natural colloids ($0.1 - 0.45 \mu\text{m}$ or $0.2 - 0.4 \mu\text{m}$) contribute significantly to the whole colloidal pools (< 0.7 or $1.2 \mu\text{m}$), and even dominant in some samples and play an important role in carbon and phosphorus mobilization. However, colloid concentrations varied with many factors such as stream order, precipitation time and intensity, and redox conditions. In this presentation, we will present results on quantification and characterization of mobile colloids from field samples and factors that control their mobilization and stabilization, and their role in carbon and phosphorus fate and transport.