☒ **Talk** ☐ **Poster**

Organic Colloid Composition in Variable-Redox Porewaters

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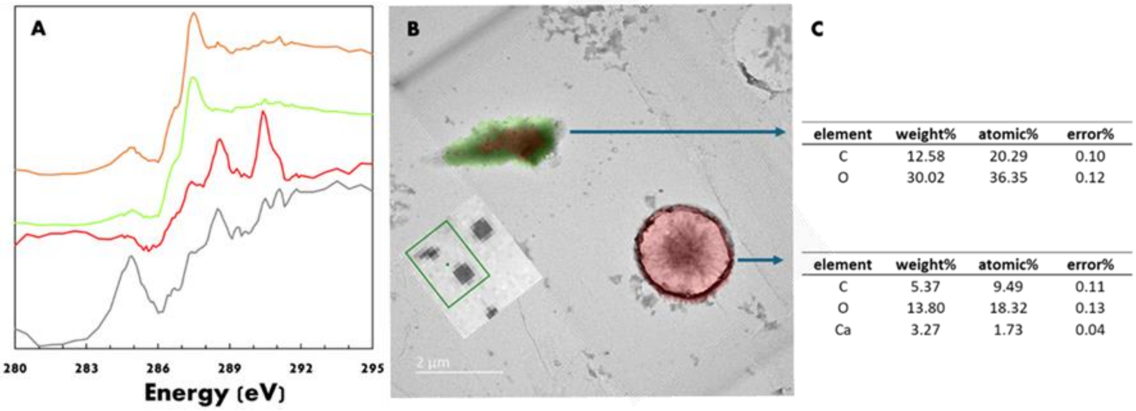
Colloidal mobilization is a well-known mechanism of metal transport in groundwater and surface water. In the subsurface, colloids can be generated under variable redox, which drives changes in solution chemistry (like pH and ionic strength), as well as mineral dissolution. Much research has focused on the inorganic composition of colloids, especially reactive iron(III) oxy(hydr)oxide minerals. However, the organic composition of colloids is less well studied. Organic matter in colloids can associate with minerals, complex metal ions, and serve as an electron donor for microbial respiration. Its composition is therefore of high interest.

In the current work our objective was to examine the composition of colloidal organic matter (< 0.6 micron) in porewater along a redox gradient in a riparian soil located along the Slate River in Crested Butte, Colorado, USA. Porewaters were collected as a function of depth (90, 130, 200, and 350 cm bgs). All depths were oxic to suboxic, except 200-cm, where the products of iron and sulfate reduction were observed concomitant with an increase in dissolved/colloidal organic carbon, pH, alkalinity, and conductivity.

The composition of porewater colloids was probed using correlated scanning transmission X-ray microscopy combined with transmission electron microscopy, which revealed organic matter enmeshed with non-crystalline iron. We observed a change in the organic matter chemistry from carboxylate-rich at the 200-cm depth (where the diversity and concentration of organic matter was also highest) to phenol-rich at the other depths. Soil porewater can flow down into the gravel bed (that lies below the soil and is connected to the river) during baseflow conditions, thus we speculate whether anoxic porewater could transport carboxylate-rich organic colloids into the gravel bed and from there into surface waters.



element	weight%	atomic%	error%
C	12.58	20.29	0.10
O	30.02	36.35	0.12

element	weight%	atomic%	error%
C	5.37	9.49	0.11
O	13.80	18.32	0.13
Ca	3.27	1.73	0.04

Figure 1: Carbon k-edge XAS spectra (A), TEM image overlaying kmeans clusters corresponding to XAS spectra (B), and chemical composition of clusters (C) determined by EDS for 350 cm sample. Inset in (B) shows resolution of STXM image of same region for comparison. Colors in (A) correspond to cluster colors in (B) with gray spectrum generated from background (non-colored) region.