Physical protection vs. inherent recalcitrance of soil organic matter in previously glaciated landscapes: a summer project on soils in the Mad River Floodplain

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Floodplains present a potentially important sink for organic carbon, however due to changes in landuse and climate, these sinks could be transformed into sources with important implications on the global C cycle.

Carbon in soils and sediments can be physically stabilized through interaction with other soil constituents (such as minerals and metals) that shield C from microbial attack. Another mechanism of C stabilization is important for C fractions that display inherent (chemical) stability due to varying amounts of very recalcitrant aromatic materials. It is unclear which stabilization mechanism is more important for floodplain soils and sediments, however such knowledge would help to make predictions on the likelihood of floodplains to transform to net C sources. Furthermore, floodplains are heterogeneous with respect to land cover and use and preliminary results indicate that this heterogeneity is reflected in C stability.

With our summer project we will test the hypothesis that variations in mobile floodplain C are due to the relative contribution of each mechanism which depends on land cover. The objective of our project is therefore to sample floodplain soils and sediments in the Mad River Floodplain that are representative for forested vs. agricultural land covers and subject these samples to replicated test on physical and chemical stability. Physical stability of aggregates will be tested using stability tests and chemical stability will be inferred from fluorescence spectroscopy analysis.