

SEDIMENT ASSOCIATED ORGANIC MATTER DYNAMICS

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The Organic-Mineral Dynamics (OMD) component of the LBL-Genomes to Watershed SFA has the long term goal of developing and parameterizing an improved conceptual model for organic matter cycling in the subsurface that can be incorporated into the developing Genome-Enabled Watershed Simulation Capability (GEWaSC) frame work. OMD activities are focused on the saturated zone of the SFA's primary field site at Old Rifle, Co. At this location, in spite of low total organic carbon, typically ~0.1%, sediment associated OM stocks are greater than DOM stocks by approximately three orders of magnitude. This disproportionate stock of sediment associated OM strongly supports the hypothesis that interactions between organic matter and mineral surfaces are a key regulator of OM transport and transformation. Accordingly, the research activities under OMD focus on elucidating the mechanisms that control OM-mineral interactions with a particular focus on sorption/desorption and co-precipitation processes. These processes are explored in the context of fluctuating redox conditions and changing DOM concentrations and characteristics. Efforts to characterize and quantify the types of sediment associated organic matter are presented in more detail in a companion poster by P. Fox et al, entitled 'Characterization of Natural Organic Matter (NOM) in Low Organic Carbon Environments: Approaches and Implications for Reactivity.' This poster in turn will focus on the other activities that constitute the OMD component of the LBL SFA. Results presented in this poster will include 1) characterization of the Fe-OM co-precipitates formation during a simulated oxidation event and the subsequent aging and re-organization of those materials; 2) release into solution and fractionation of sediment associated OM when exposed to OM free synthetic ground water; 3) thermodynamic analysis of metal binding by organic matter and organic matter association with mineral surfaces; and 4) the mechanism of organic matter binding of Fe(II), 5) the kinetics and mechanism of model organic matter compound oxidation catalyzed by Fe redox cycling.