Towards Better Models of Subsurface Microbial Communities

Objective

- Determine if spatial distributions of sediment characteristics can be used to map biogeochemically relevant properties of microbial communities.

Approach

- Focused on a stretch of the Hanford Site's 300 Area in Richland, Wash., where the subsurface geochemical and biogeochemical processes influence the transport of contaminants.
- Identified three biogeochemical types within the Ringold geologic formation characterized as chemically "oxidized," "reduced," or "transition" biogeochemical facies.
- Subsurface sediment from the different facies were obtained from four boreholes and the microbiological and geochemical properties characterized.
- Identified relationships between sediment properties and facies that enabled mapping across the landscape.

Impact

- Future hydro-biogeochemical simulations could be more realistic by adding biomass values to grid cells within each biogeochemical facies.
- Applying the biogeochemical facies approach has great potential for creating multi-scale models that have field-scale predictive value for biogeochemical function in the Earth's climate-critical transition zones between water and land.

Stegen JC, A Konopka, JP McKinley, C Murray, X Lin, MD Miller, DW Kennedy, EA Miller, CT Resch, and JK Fredrickson. 2016. "Coupling among Microbial Communities, Biogeochemistry, and Mineralogy across Biogeochemical Facies." *Scientific Reports* 6. DOI 10: 1038/srep30553.