

UC Merced Environmental Systems Seminar (ES 291)

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12.30-2.00 PM COB 105

How chemolithoautotrophic bacterial metabolism can modulate elemental cycling and water quality in aquifers



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Groundwater ecosystems are conventionally thought to be fueled by surface-derived allochthonous organic matter and dominated by heterotrophic microbes living under often-oligotrophic conditions. However, recent studies indicate that chemolithoautotrophic bacteria, which fix CO₂ and use inorganic electron donors, can catalyze metabolic reactions that have considerable influence on subsurface biogeochemical cycling and water quality. Here, we will explore this topic with two case studies: (1) a metatranscriptomic study at the Rifle (CO) aquifer documenting pervasive chemolithoautotrophic bacterial activity relevant to C, S, N, and Fe cycling and (2) functional genomic and physiological studies of the chemolithoautotrophic bacterium *Thiobacillus denitrificans* for elucidating the genes/enzymes underlying the related processes of nitrate-dependent Fe(II) and U(IV) oxidation.