

Metabolic diversity of microorganisms associated with active subsurface serpentinization

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The Cedars, in northern California, is an active site of subsurface serpentinization. The spring waters that emerge from this system feature extremely high pH (pH=11-12), low redox potential (Eh=-600 mV), low salinity, relatively rich in calcium and lack of obvious electron acceptors and carbon sources, making it an exceptionally challenging environment for life.

Geochemical studies of The Cedars revealed that the site has two different serpentinizing water sources: a deep submodern source that interacts with peridotite body as well as km-deep marine sediments, and a shallow modern source that interacts only with the overlying peridotite. The community in the shallow source was similar to serpentinization communities in other terrestrial sites, while the deep was taxonomically very unusual, being populated mostly by uncharacterized phyla or families.

To understand interaction between the microbial metabolic activities and this geological setting, we performed metagenomics studies of the microbial communities, and also physiological and genomic investigation of environmentally relevant isolates, including a new genus "*Serpentinomonas*". In addition, we further performed comparative genomics studies of organisms cultivated from The Cedars springs with the other serpentinization aquifer, Cabeço de Vide, that contain higher concentration of sulfur compounds. These studies have illustrated unusual physiological, metabolic and evolutionary features of life in the serpentinization-associated microbial ecosystem.