Microbial activity in a planetary subsurface analog environment

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Science question. Serpentinization, a type of water-rock reaction, is evident in the surface mineralogy of Mars and the ocean chemistry of Enceladus and is likely pervasive across a range of ocean worlds. Understanding the viability and productivity of microbes in serpentinizing systems on Earth will help to inform how we search for life in comparable systems beyond.

Findings. Working in serpentinizing sites in northern California and Oman, a team of Ames and CU Boulder researchers documented that **microbial sulfate reduction** occurs actively, although at low rates, in the alkaline, carbon-poor conditions typical of these systems. By accessing a diversity of fluids, the team documented a range of chemistries capable of supporting these microbes, including the highest pH at which activity is thus far documented.

Why does this matter. The findings document a **process that can sustain microbes independently of photosynthesis** or its chemical products – a necessity for life in the dark subsurfaces of Mars or the ocean worlds beyond Earth.

The Samail Ophiolite of Oman, an uplifted section of ancient ocean crust, was one of two field sites for the study. The larger, dark-toned mountains, formerly a part of Earth's mantle, have a mineralogy that makes them a key analog for processes that may be active in the subsurface of Mars and the ocean worlds of the outer solar system.

C. Glombitza, L. Putman, K. Rempfert, M. Kubo, M. Schrenk, A. Templeton, and T. Hoehler . "Active microbial sulfate reduction in fluids of serpentinizing peridotites of the continental subsurface", *Communications Earth and Environment, 2, 84 (2021).*