

INTEGRATION OF 3 CONSECUTIVE YEARS OF AQUEOUS GEOCHEMISTRY MONITORING IN THE COAST RANGE OPHIOLITE MICROBIAL OBSERVATORY (CROMO), NORTHERN CALIFORNIA. D. Cardace¹, T.M. Hoehler², T.McCollom³, M.O.Schrenk⁴, M.Kubo²

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Introduction: In August 2011, a set of 8 ground-water monitoring wells were installed in serpentinizing ultramafic rocks of the Coast Range Ophiolite near Lower Lake, CA, as a NASA Astrobiology Institute project (Cardace et al., 2013). Given the possible origin of life connections and astrobiological relevance of serpentinizing systems [2,3,4,5], the environmental geochemistry and CO₂-CH₄-H₂ dissolved gas dynamics are of great interest in serpentinizing environments [6,7].

The Coast Range Ophiolite Microbial Observatory (CROMO) plumbs groundwaters percolating through a tectonically emplaced ultramafic unit, which is part of a mélangé of Jurassic-aged oceanic crust, blocks of metabasalt and metagabbro, variably serpentinized ultramafics, and Great Valley Sequence sedimentary rocks including the Jurassic Knoxville formation and the Cretaceous Crack Canyon formation. The CROMO wells have enabled repeated sampling and analysis of aqueous geochemistry, which we present in an integrated model of the progress of serpentinization at this locality. In the vicinity are spent serpentinite-sourced springs (weathering travertines) and prominent outcrops resulting from silica-carbonate alteration of serpentinites (marginal listvenites). All of these rock units are accessible in the McLaughlin Natural Reserve (administered by the University of California-Davis).

In this work, we report on persistent geochemical trends in CROMO waters, which are gas-rich, high pH (11+), Ca²⁺-OH⁻ type waters, contrast their characteristics with other continental sites of serpentinization and deep sea serpentinizing vent systems, and place the evolution of these waters in a water-rock reaction context based on geochemical modeling.

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