Goldschmidt 2025 Abstract
https://doi.org/10.7185/gold2025.25315

Hot spring aqueous organic acid concentrations across volcanic settings in hydrothermal systems

EVA ANDRADE-BARAHONA AND ALYSIA COX
Montana Technological University

Organic acids concentrations in hot springs vary across hydrothermal systems and are influenced by multiple factors including temperature, pressure, aqueous geochemistry, and microbial activity. The Yellowstone Volcanic Plateau (YVP) hosts numerous hydrothermal springs, exhibiting wide pH ranges from acidic to basic and temperatures reaching up to the boiling point of water. Given these diverse environmental conditions, YVP hydrothermal springs serve as an ideal location for measuring and analyzing organic acids providing insight into their distribution, sources, and interactions with aqueous geochemistry. Comparing organic acid concentrations across different volcanic systems, including Ecuadorian hydrothermal springs hosted in a subduction zone offer valuable insights into how the volcanic setting influences organic acid concentrations. Here we present aqueous formate and acetate concentrations from >100 diverse hot springs located in the YVP and Ecuador. YVP springs range in pH from 2.08 - 8.79 ± 0.05. The highest formate and acetate concentrations occurred at alkaline springs, formate reaching up to 27.9 µmol/kg at the pH 7.55 ± 0.05 spring and acetate up to 4.72 µmol/kg at the pH 8.81 ± 0.05 spring. Acetate concentrations alone reached up to 46.9 µmol/kg at the pH 6.20 ± 0.05 hot spring located in the Greater Obsidian Pool Area (GOPA) potentially indicating the influences of microbial activity and organic matter degradation. Both formate and acetate concentrations in Ecuadorian hydrothermal springs were lower compared to the YVP springs. Formate and acetate concentrations reached up to 4.71 and 4.69 µmol/kg respectively at the pH 7.25 ± 0.05 spring. No clear relationship between organic acid concentrations, aqueous geochemistry, and volcanic setting of the hydrothermal springs has yet been identified. Given that organic acids are influenced by microbial activity, next steps will investigate the relationship between organic acids and the microbial community composition and functionality.