

# One Year of Continuous Biogeochemical Monitoring of Carbonate Factory Sites in Great Salt Lake, Utah, USA

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Great Salt Lake, Utah, is a mid-continental, high-altitude, hypersaline, terminal lake. It hosts diverse carbonate deposits including ooids, tufas, microbialites, and crusts. In an effort to characterize environmental and biological factors contributing to carbonate formation, particularly the formation of high-relief microbialites, two research stations were established and monitored continuously since March 2019. Data loggers recorded water depth, temperature, and light at both sites. In addition, sites were visited monthly to characterize seasonal variations in carbonate geochemistry (pH, salinity, ion concentrations, carbon and oxygen isotopes) and microbial communities (via microscopy, 16S amplicon sequencing, and dissolved oxygen measurements). The results tell of a seasonally variable carbonate saturation regime coupled with dramatic changes in the microbial community. This is unsurprising, given severe seasonal swings in water temperature ( $-1$  to  $30^{\circ}\text{C}$ ), benthic light availability (daily logged irradiance maxima ranged from  $<100$  -  $>5000$   $\text{lumen}\cdot\text{ft}^2$ ), salinity (2 - 11% from spring to fall at one site), water depth ( $\sim 1$  m seasonal variability), and other factors. However, the environmental factor with the strongest influence on carbonate saturation in Great Salt Lake is pH, which is relatively stable throughout the year (8.2 - 9.1), resulting in year-round saturation of aragonite, calcite, and dolomite at our monitored sites. If carbonate precipitation in Great Salt Lake is seasonal, as some recent geochemical analyses suggest, our results imply that variable microbial communities may be exerting a controlling influence on the modern Great Salt Lake carbonate factory.

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 Feedback/Corrections?