**Physico-chemical and biological controls on microbialite formation: experimental biomineralization in open system.**

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Continental microbialites form in various environments including freshwater to hypersaline lakes, karstwater streams and hydrothermal springs. In association with this environmental diversity, microbialites show different chemical and mineralogical compositions including various carbonate phases (e.g., hydromagnesite, Mg-calcite, aragonite, monohydrocalcite, dolomite) and authigenic Mg-silicates (e.g., smectite, sepiolite, kerolite). While numerous experimental studies have investigated the role of chemical parameters (e.g., Mg/Ca ratio, [Si] and [Mg]) on carbonates and silicates solubility, the controlling parameters on the precipitation of these minerals still remain elusive. In addition, no systematic studies have assessed the role of biotic factors on mineralization processes. Therefore, there is a crucial need to constrain the biotic and abiotic factors controlling the precipitation of carbonates and silicates in a microbialite forming environment.

In this study, we set up a flow-through cell which allows to mimic biogeochemical conditions similar to microbialite forming environments. Using this setup, we have two objectives: 1) the effects of Mg/Ca ratio, [Si] and [Mg] on Mg-silicates and carbonates, 2) the impact of the presence of cyanobacterial biofilms on mineral precipitation. The (bio)minerals formed under biotic and abiotic experiments were characterized by SEM, EDX and FTIR analyses and the solution chemistry was analyzed using ICP-OES. Preliminary findings show that under the same solution chemistry, flow conditions induce precipitation of minerals that differ from batch system. In addition, the mineralogical composition in the presence of biofilm was different than in abiotic conditions. Overall, our results will facilitate and improve our understanding of the role of the biogeochemical factors on microbialite mineralogical diversity.