Is Lake Salda a good analog for Jezero Crater, Mars?

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Studies seeking to identify the biosignature preservation potential of different geological materials have flourished in the last two decades.. Recent discovery of Mg-bearing carbonates in Jezero Crater on Mars, puts such environments under the microscope for biosignature potential, as Jezero will be visited by NASA's Mars 2020 rover to seach for biosignatures. Mg-carbonate rich stromatolites are actively growing in the shore lines of Lake Salda, an alkaline lake developed on ultramafic rocks in Turkey. Mineralogical composition of the stromatolites consist mainly of hydromagnesite ($Mg_5(CO_3)_4$. $(OH)_2$. 4H2O). An integrated approach including molecular biology, geomicrobiology, stable isotopes and mineralogy has been applied to living and sub/fossil stromatolites to elucidate the role of microorganims and their biosignatures preserved in the rocks. Unlike previous studies our results demonstrate that cyanobacteria comprises only 7 % of the community in most mat samples and majority of sequencing belonged to Firmicutes (30.1 %), γ-proteobacteria (27.82 %) and α- proteobacteria, (8 %). Petrographical features of sub/fossil stromatolites aged 750 ± 120 years BP clearly revealed well preserved remnants of cyanobacteria. Peloidal structure and dark laminae around intraclasts may be due to binding and stabilization by microbial community, particularly filamentous cyanobacteria. Discrete and non-continual lamination suggests random decomposition of phototrophic microbiota in mat samples. A thin microcrystalline carbonate crust intimately associated with aragonite needle may be due to heterotrophic degradation of organic matter. Our results suggest that symbiotic processes governed by phototrophic and heterotrophic aerobic bacteria contribute to formation of Mg-rich stromatolites in the lake and sub/fossil stromatolites carry these signatures. Therefore, elucidation of geochemical and geomicrobiological processes creating Lake Salda Mg-rich carbonates could further enhance our understanding of geological and geochemical processes occuring in Jezero Crater.