Geochemical investigation of microbial biosignatures in hydrothermally influenced rocks from the Lake Magadi hot springs

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Lake Magadi, located in the East African Rift Valley, is a hypersaline lake recharged by a network of geothermal springs. Such environments have been identified as suitable analogues for hydrothermal environments on the early Earth, and on Noachian Mars (> 3 billion years ago), Europa and Enceladus. This site offers an opportunity to investigate the preservation of microbial traces of life (biosignatures) in outcrops of silica- and carbonate-based rocks, which were likely formed under the influence of extremophilic microorganisms. We present results from a suite of complementary geochemical analyses, including Raman and Fourier Transform Infrared (FTIR) microspectroscopy, and Time of Flight Secondary Ion Mass Spectrometery (ToF-SIMS), which shed light on the distribution and types of biogenic organic moieties preserved within these rocks. This has the potential to inform the interpretation of biosignatures in rocks from the early Earth (e.g. Archaean greenstone belts), and the detection of biosignatures in samples retrieved by future Mars sample return missions, providing an insight into biogeochemical signatures diagnostic of putative ancient microbial communities in relic hydrothermal environments.

Short bio:

Amy Quinton is a PhD student, studying at Birkbeck College and the Natural History Museum in London. Previously, she obtained an MBiolSci in Biochemistry and Microbiology from the University of Sheffield, UK. Amy is interested in exploring microbial life in extreme environments analagous to the early Earth and potential habitable environments elsewhere in our Solar System. Her research is particularly focused on the microbiology of geothermal springs, and searching for biosignatures reminicsent of relic microbial communities in hydrothermally-influenced rocks.