ECOLE LEMANIQUE DES SCIENCES DE LA TERRE
DES UNIVERSITES DE GENEVE ET DE LAUSANNE

Master ès Sciences in Earth sciences

Characterization of the Malmani stromatolite

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Context

The Campbellrand-Malmani carbonate platform (South Africa) was deposited between 2.58 and 2.5 Ga and consists mostly of carbonates and mudrocks[1]. This carbonate platform is well preserved with metamorphic conditions lower than Greenschist Facies. Sedimentological and geochemical reconstructions have indicated the importance of both continental inputs and open ocean waters[2] and highlighted the structure of the platform with a steep ramp and a shallow water shelf[1]. The depositional environments consist of deep subtidal to supratidal[3]. One characteristic of the Campbellrand-Malmani is the abundance and variety of carbonated stromatolite domes with size varying from cm to several meters associated with well-preserved sedimentary structures such as ripples. Stromatolite are organic laminated sedimentary structures likely formed by microbial activities[3,4]. One drillcore and several samples have been recovered in 2019 and thus provide unique opportunity to explore microbial metabolism diversity and dynamics of carbonate precipitation. This project will consist of the mineralogical and geochemical characterization of the stromatolite samples.

Objectives and Methods

Mineralogical characterization of carbonate, sulfides and organic matter by optical microscope and SEM-EDS.
Detailed characterization of the mineral associated with organic laminae interpreted as fossil microbial mats by Raman.
Microtomography of the stromatolite
Geochemical characterization of the carbonate
Comparison with literature data

Literature

[1]Eroglu et al. (2018) Open ocean versus continentally derived iron cycles along the NeoArchean Campbellerand
[2]Altermann and Siegfried (1997) Sedimentology and facies development of an Archaean shelf: carbonate platform transition in the Kaapvaal Craton, as deduced from a deep borehole at Kathu, South Afric, Journal Of African Earth Sciences, vol 24, 3, 391-410
[3]Summer and Grotzinger (2004) Implications for Neoarchaean ocean chemistry from primary carbonate mineralogy of the Campbellrand-Malmani Platform, South Afric, Sedimentology 51,
[4]Riding The Nature of Stromatolites : 3,500 Million Years of History of Research (2011)

Malmani Stromatolite, large dome

Malmani Stromatolite

Choice of orientation :

1) Sedimentary, Environmental and Reservoir Geology **/** 2) Geochemistry, Alpine tectonics, Ore Deposits **/**