



Identification of molecular biomarkers in subsurface evaporites of Salar Grande (Atacama, Chile) with analogies to Mars halite deposits

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The hyperarid evaporitic system of Salar Grande is considered a good analogue of the halite deposits found on Mars due to the persistence of hyperaridity over millions of years, the hypersalinity, and the intense UV radiation. We investigated the occurrence of biomolecules in a 100-m depth drill on the ~9 Ma old detrital deposits topped by *La Soledad Formation*. One-dimensional GC-MS and two-dimensional GCxGC-TOF-MS gas chromatography-mass spectrometry techniques were combined with microarray immunoassays (LDChip200) to detect lipidic and polymeric biomarkers.

The immunodetection of a variety of microbial polymeric markers and lipidic congeners (*n*-alkanes, *n*-alkanols, isoprenoids, steroids, and hopanoids) and the relative abundance of functionalized fossil lipids (*n*-fatty acids or *n*-aldehydes) indicated the occurrence of (past or present) life. The lipidic record was imprinted by oxic (high pristane over phytane ratios), saline (squalane, and mono-methyl *n*-alkanes) signatures. Geolipidic signatures and LDChip200 immuno-detections indicated dominant prokaryotic sources associated with halophile bacteria and archaea, with minor contributions of lichens, macrophytes, or higher plants. The results suggested that molecular biomarkers are more abundant in the halite deposits, with implications for paleoreconstructing the halite deposits on Mars. Biosignatures interpretations in the Salar Grande would contribute to the interpretation of the results obtained by current and future instruments deployed on similar evaporitic systems on Mars.