

Mineralogy and Geochemistry in the Subsurface of Rio Tinto

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Rio Tinto is considered a good geochemical terrestrial analogue of Mars as a consequence of its high content in iron (III), acid pH and the occurrence of certain mineral phases which are also found on Mars [1, 2]. The Iberian Pyrite Belt Subsurface Life (IPBSL) is a drilling project specifically designed to answer basic questions related with the subsurface geomicrobiology and geochemistry responsible of the extreme conditions detected in the Rio Tinto basin

Here, we present a detailed mineralogical and geochemical study of two cores BH10 and BH11 of depths of 340 and 620 meters, respectively. Sediment samples from these cores were analyzed by scanning electron microscopy (SEM), energy dispersive X-ray (EDX), X-ray diffraction (XRD) and stable isotope mass spectroscopy. We have observed anomalies in the mineral composition and isotopic signal (C and S) of the sediments (BH10 and BH11, respectively) with depth. These results suggest that microorganisms control the geochemistry of certain types of sulfide and carbonate minerals present in Rio Tinto basin, such as pyrite, siderite, Fe-rich dolomite and ankerite.

This study provides potential biogeochemical-signatures that may be useful to test the Earth's surface and extraterrestrial habitats for the presence and the biomineralization activity of microbes. Our findings may help interpret the role of microorganisms in diagenetic processes resulting in sulfide and carbonate precipitation in natural systems.

[1] *Planet Space Sci* **55**, 370-381,2007; [2] *Earth Planet Sci Lett* **351**, 13-26, 2012;