



SALTGIANT ETN – Early Stage Researcher in Geobiology of saline environments – ESR 8

Title	The microbial sulphur cycle in Messinian evaporites
Duration	36 months
Expected start date	October 2018
Host Institution	Universität Hamburg, Hamburg (Germany) - www.uni-hamburg.de/en.html
Primary Supervisor(s)	Jörn Peckmann, Daniel Birgel
Objectives	<p>The overall aim is to assess the potential for surface and deep microbial biospheres in Messinian deposits that depend on the presence of sulphate-bearing minerals such as gypsum. In close collaboration with the University of Torino and the mining sector partner KNAUF, ESR 8 will carry out a multidisciplinary petrographical, isotope geochemical and biomarker investigation of selected rock samples that contain signatures of past microbial activity. These include (1) gypsum-carbonate associations formed by microbial transformation of gypsum by sulphate-reducing prokaryotes and (2) pristine, microbial filament-bearing gypsum that is widespread in Messinian strata. Gypsum-carbonate associations contain molecular fossils of microbes that thrived by reducing sulphate ions resulting from gypsum dissolution, a process that is coupled to the oxidation of reduced carbon compounds such as methane, other <i>n</i>-alkane hydrocarbons and organic matter. Enigmatic, microbial filaments enclosed in gypsum crystals are currently interpreted as either the remains of cyanobacteria (implying photic-zone palaeo-depth) or sulphide-oxidizing bacteria (implying no particular palaeo-depth). ESR 8 will analyse microbial fossil-bearing samples using cutting-edge techniques (e.g. RAMAN, stable isotopes, lipid biomarkers) to unravel the phylogenetic affiliations and metabolisms of ancient evaporite-hosted microbes. This project is closely linked to ESR 5, 6 and 7.</p>
Expected results	New constraints on surface and potential deep biospheres in Messinian deposits using biosignatures.
Planned secondments	(1) University of Torino, Torino, Italy (Francesco Dela Pierre, for the sampling of diagenetic carbonate and filament-bearing gypsum); (2) KNAUF Gips KG (Germany), field work in Mediterranean area (Matthias Reimann, for access to pristine samples of gypsum from active mines and prospection cores of the Mediterranean region); (3) Institut de Physique du Globe de Paris (Paris, France) (Giovanni Aloisi, for stable isotope composition of gypsum).
Specific requirements	Knowledge on sedimentary rocks including experience in thin section microscopy Basic knowledge on Organic and Stable Isotope Geochemistry
Keywords	Organic geochemistry, Isotope geochemistry, Geomicrobiology, Mineral authigenesis, Deep biosphere
Application	Send application via : www.ipgp.fr/saltgiant
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