Geophysical Research Abstracts
Vol. 13, EGU2011-6353-2, 2011
EGU General Assembly 2011

The application of μ-XRD^2 to identify gypsum whiskers in Messinian evaporites

Simone Ziegenbalg (1), Christoph Berthold (2), Andreas Kappler (3), and Jörn Peckmann (1)

(1) Department of Geodynamics and Sedimentology, Center for Earth Sciences, University of Vienna, Austria, (2) Applied Mineralogy, Department of Geoscience, Eberhard-Karls-University Tübingen, Germany, (3) Geomicrobiology, Department of Geoscience, Eberhard-Karls-University Tübingen, Germany

Micron-sized crystals are difficult to identify with conventional techniques like optical microscopy and standard XRD. Modern X-ray diffractometers combined with focussing X-ray optics and a large 2-dimensional detector (μ-XRD^2) enables the analysis of minute mineral phases directly on uncovered thin sections. We used a BRUKER D8-GADDS-microdiffractometer equipped with a focussing 50 μm polycapillary optic to identify the gypsum mineralogy of delicate hair-like crystals present locally in Messinian evaporites, which otherwise mostly consist of anhydrite. These peculiar crystals are characterized by a length-to-width ratio considerably higher than 100 and can therefore be regarded as whisker crystals. Gypsum whiskers typically form by efflorescence on moist porous surfaces. The whiskers studied here project from alabastrine gypsum into former cavities. The gypsum resulted from the hydration of anhydrite. The whiskers are embedded in biogenic native sulphur, which filled the cavities in the course of microbial alteration of the host lithology. The entombment by native sulphur protected these delicate minerals against destruction by dissolution during exposure of the evaporites on a dumping site of a former mine, where the rocks have been sampled. To best of our knowledge, gypsum whiskers had not been previously recognized in evaporites. Even more significant, this study emphasizes the great potential of μ-XRD2 for sedimentary petrology, because it enables in situ identification of micron-sized mineral phases, which cannot be identified with conventional techniques.