Geophysical Research Abstracts
Vol. 14, EGU2012-12002, 2012
EGU General Assembly 2012

On the distribution and morphology of grain boundary fluids in natural rock salt

J. Schmatz, M. Sadler, G. Desbois, and J. Urai

Structural Geology, Tectonics and Geomechanics, Geological Institute, RWTH Aachen University, Aachen, GERMANY (j.schmatz@ged.rwth-aachen.de)

Solution-precipitation creep and dislocation creep play a significant role in the rheology of salt bodies (Urai and Spiers, 2007). These deformation mechanisms are strongly controlled by inter-granular fluid phases and grain boundary structures.
Grain boundary-fluid morphologies occur in a continuum ranging from semi-continuous fluid films to arrays of tube shaped inclusions or isolated near-spherical inclusions. Up to now, there is no quantitative description of the distribution and morphology, neither related to the nature of the adjacent grains, nor to the pT-conditions inside the salt body. Such information, however, is needed to fully reconstruct the deformation behavior of a wet salt rock.
We present a detailed study on the distribution and morphology of fluid inclusions in grain boundaries of domal salt with special emphasis on the relation to the dominant deformation mechanism in the respective grains, in order contribute to our understanding of the interplay of these two features. Herewith, we use a special designed U-stage that allows the investigation of fluid inclusions in the plane of the grain boundary using thick sections with a thickness of up to 100 μm. Grain boundary fluids also occur in the range of a few nm. Therefore we present an accompanying study using the same samples in which we investigate the grain boundary morphology and fluid inclusion trails with high-resolution SEM by matching surface pairs of grains.

References

Urai, J.L. and Spiers, C.J. (2007). The effect of grain boundary water on deformation mechanisms and rheology of rocksalt during long-term deformation In: Wallner, M.,Lux, K.,Minkley, W.,Jr., H. Hardy (Eds.), The Mechanical Behavior of Salt – Understanding of THMC Processes in Salt Hannover.