Geophysical Research Abstracts
Vol. 16, EGU2014-14032, 2014
EGU General Assembly 2014

Rheological stratification of the Hormuz Salt Formation in Iran - microstructural study of the dirty and pure rock salts from the Kuh-e-Namak (Dashti) salt diapir

Prokop Závada (1), Guillaume Desbois (2), Janos Urai (2), Karel Schulmann (3,4), Mahmoud Rahmati (5), Ondrej Lexa (6), and Uwe Wollenberg (7)

(1) Institute of Geophysics ASCR, v.v.i., Boční II, 1401, 141 31, Czech Republic (zavada@ig.cas.cz), (2) Structural Geology, Tectonics and Geomechanics, RWTH Aachen University, Lochnerstr. 4-20, D-52056 Aachen, Germany, (3) Center for Lithospheric Research, Czech Geological Survey, Klárov 3, 118 21, Prague 1, Czech Republic, (4) École et Observatoire des Sciences de la Terre, Université de Strasbourg, UMR 7516—CNRS, 1 rue Blessig, 67084 Strasbourg Cedex, France, (5) Geological Survey of Iran, Azadi Square, Meraj Avenue, Tehran, 13185-1494, Iran, (6) Institute of Petrology and Structural Geology, Charles University, Albertov 6, 128 43, Prague, Czech Republic, (7) Institute of Geology and Palaeontology, School of Geosciences, RWTH Aachen University, Wüllnerstr. 2, D-52056 Aachen, Germany

Significant viscosity contrasts displayed in flow structures of a mountain namakier (Kuh-e-Namak - Dashti), between ‘weak’ terrestrial debris bearing rock salt types and ‘strong’ pure rock salt types are questioned for deformation mechanisms using detailed quantitative microstructural study including crystallographic preferred orientation (CPO) mapping of halite grains. While the solid impurity rich ("dirty") rock salts contain disaggregated siltstone and dolomite interlayers, "clean" salts (debris free) reveal microscopic hematite and remnants of abundant fluid inclusions in non-recrystallized cores of porphyroclasts. Although flow in both, the recrystallized dirty and clean salt types is accommodated by combined mechanisms of pressure-solution creep (PS), grain boundary sliding (GBS) and dislocation creep accommodated grain boundary migration (GBM), their viscosity contrasts are explained by significantly slower rates of intergranular diffusion and piling up of dislocations at hematite inclusions in clean salt types. Porphyroclasts of clean salts deform by semi-brittle and plastic mechanisms with intra-crystalline damage being induced also by fluid inclusions that explode in the crystals at high fluid pressures. Boudins of clean salt types with coarse grained and original sedimentary microstructure suggest that clean rock salts are associated with dislocation creep dominated power law flow in the source layer and the diapiric stem. Rheological contrasts between both rock salt classes apply in general for the variegated and terrestrial debris rich ("dirty") Lower Hormuz and the "clean" rock salt forming the Upper Hormuz, respectively, and suggest that large strain rate gradients likely exist along horizons of mobilized salt types of different composition and microstructure.