Ber. Inst. Erdwiss. K.-F.-Univ. Graz	ISSN 1608-8166	Band 20/1	Graz 2014
PANGEO AUSTRIA 2014	Graz, 14. September 2014 – 19. September 2014		

Microstructural investigation of cataclastic and dissolution-precipitation fault rocks from a shallow crustal strike-slip fault in the Northern Calcareous Alps (Austria)

BAUER, H., GRASEMANN, B., DECKER, K.

University of Vienna, Department for Geodynamic and Sedimentology, UZA II - Universitätszentrum Althanstraße, Althanstraße 14, 1090 Vienna, Austria

Faults in the upper crust can move episodically by seismic deformation (individual earthquake ruptures) and/or continuously by aseismic creep deformation. In carbonate fault zones several works have shown that seismic deformation is producing very narrow principal slip zones (cm to mm wide) that accommodate most of the fault displacement during an individual earthquake. From these principal slip zones, ultracataclasites containing the principal slip surface, fluidization of ultracataclastic sub layers and thermal decomposition of calcite due to frictional heating have been proposed as possible indicators for seismic slip. Dissolution-precipitation (DP) processes are possible mechanism of aseismic sliding on a fault, resulting in spaced cleavage solution planes and associated veins, indicative for diffusive mass transfer and precipitation in pervasive vein networks.

We investigated an exhumed, sinistral strike-slip fault in limestones of the Northern Calcareous Alps. The study addresses the quantification of deformation processes that formed cataclastic and dissolution-precipitation (DP) related fault rocks. The fault formed at a restraining bend on an eastern segment of the Salzchtal-Ennstal-Mariazell-Puchberg (SEMP)- fault system during eastward lateral extrusion of the Eastern Alps in Oligocene to Lower Miocene. Microstructural analysis of fault rocks was done with scanning electron microscopy and optical microscopy.

The investigated fault rocks give record of alternating catacalastic deformation and DP creep. DP fault rocks reveal various stages of evolution including early stylolithes, pervasive pressure solution seams and cleavage, localized shear zones with syn-kinematic calcite fibre growth and mixed DP/cataclastic microstructures, involving pseudo scand scc´ fabrics. Pressure solution seams host fine grained kaolinit, chlorite andi Illlite while the protolith shows only weak evidence of detrital clay content. Our studies suggest that velocity weakening and strengthening mechanisms alternated during the accumulation of displacement along the SEMP fault zone.