Geophysical Research Abstracts,
Vol. 10, EGU2008-A-04585, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-04585
EGU General Assembly 2008

Fluid-rock interaction in a low-angle-normal fault (Kythnos, Western Cyclades, Greece)

G. Mörtl (1), B. Grasemann (1), I. Lenauer (1), M. Edwards (1), C. Iglseder (1), M. Thöni (2), D. Mader (2)

(1) Structural Processes Group, Department of Geodynamics and Sedimentology, University of Vienna, Austria, (2) Department of Lithospheric Research, University of Vienna, Austria

The Aegean region represents high seismic activity and active tectonics caused by the escape of Anatolia, the subduction of African lithosphere and extension in this area. The island of Kythnos belongs to the western Cyclades of Greece. It is part of the Attic-Cycladic-Cristalline Complex which represents a polymetamorphic terrane. It was subjected to Eocene high pressure metamorphism under eclogite to blueschist facies conditions overprinted by Oligocene-Miocene greenschist facies metamorphism and shows evidence for several postmetamorphic brittle deformation events.

Recent structural investigations show the existence of a hitherto unrecognised large-scale ductile-brittle shear zone in the southernmost part of the island which is probably due to Miocene extension in the Aegean region. The shear zone comprises from substratum to top greenschist-facies schists and marbles, a highly strained marble-ultramylonite layer with thicknesses up to ten meters and an ultracataclastic zone of some dm-scale.

The main SW-dipping low-angle normal fault, represented by the ultra-mylonitic marble and the ultra-cataclasites, separates the quartz-feldspar protocataclasites on top from the greenschist-marble unit below. From field observations mineral lineations and partly stretching lineations in all lithologies are trending NE-SW. Ductile shear senses like SC-, SCC´-fabrics or clasts as well as all brittle/ductile shear sense indicators consistently show a top to SW directed movement.

Cross cutting relationships, orientation and chemistry of conjugate brittle veinsystems allow to separate different generations of extension gashes filled with calcite, quartz and iron minerals. Oxygen and carbon isotope ratio analysis provides a powerful tool for the study of water(fluid)/rock interactions. The analysis of stable isotopes of carbon and oxygen in carbonate-cements in veins as well as strontium-isotope-ratios in different layers of banded marble-ultramylonites allows the discrimination of various brittle/ductile deformation events and the origin of interacting fluids.