The Serifos Metamorphic Core Complex (Greece) — kinematic investigations of the southern detachment mylonites *Vortrag*

Christian Rambousek[1] Bernhard Grasemann[1] Konstantin Petrakakis[1] Michael A. Edwards[1] Christoph Iglseder[1] András Zámolyi[1]

The island of Serifos is situated about 100 km SSE of Athens in the Aegean Sea and belongs to the Attic-Cycladic massif. The geology of Serifos is largely characterized by a shallow hornblende-biotite granodiorite pluton that intruded in the late Miocene into a previously deformed (under blueschist conditions) sequence mainly consisting of ortho- and paragneisses, calc-silicate marbles, amphibolites and schists. The pluton has a dome-shaped body occupying the central and southern parts of the island (Salemink 1985). The Serifos MCC is the very western continuation of a zone of syn- to post tectonic intrusions younging from the East (Naxos, Paros ~12 Ma) to the West (Serifos 9–8 Ma). Whereas the older intrusions in the East show a top to the North geometry, the Serifos MCC has developed a South-directed low-angle detachment fault.

The northern contact of the Serifos pluton is intrusive. In the SE, towards structurally higher levels, a core becomes foliated with increasing intensity and, under greenschist facies conditions, transformed into S-dipping low temperature mylonitic to ultramylonitic rocks with abundant SSW-directed kinematic indicators (SCC′ fabrics, sigma and delta clasts, flanking structures and mica fish). This zone forms the main greenschist facies to brittle/ductile detachment of the Serifos MCC. The lineation in these rocks has a remarkably consistent NNE-SSW direction. The foliation however varies and follows the dome shaped structure caused by the exhumation and unloading of the MCC. Quantitative kinematic indicators and micro structures with monoclinic symmetry have been investigated in order to characterize the flow within the main detachment zone. It is well known that in mylonitic zones, an increase in intensity of deformation is normally expressed by a decrease in grain size, accompanied by recrystallisation (Berthé et al. 1979) as it can be observed in the ultramylonitic granodiorites of the SE detachment zone. Here the undeformed core becomes foliated towards the S and, with increasing intensity, turns into a ultramylonite with quartz-feldspar- and biotite-porphyroblasts in a very fine grained matrix.

Rigid objects in rocks undergoing penetrative ductile non-coaxial flow will tend to rotate with respect to the kinematic frame of the bulk flow, and disturb the developing foliation pattern at a small adjacent domain. To investigate the rotational behaviour of porphyroblasts in aspect to their shape, thin sections of the ultramylonitic Hbl–Bt granodiorite of the southern detachment were analyzed with the image analysis program Scion Image. Qtz, feldspar and biotite were separately plotted in aspect to their orientation (θ) and the normalized length-width ratio (B^*) of their ideal strain ellipsoid. In contrast to the plastically deforming quartz, the feldspar shows brittle deformation which sug-

[1] Department of Geodynamics and Sedimentology, Structural Processes Group, University of Vienna, Austria

gests maximum deformation temperatures of about 350°C. Our microstructural investigation reveals that feldspar grains with variable aspect ratio record no stabilization forming-clast geometries. In contrast Qtz clasts show both: stabilization of grains with high aspect ration inclined against the shear direction and grains with low aspect ratios with no stable position. Bt always forms textbook examples of mica fish type clast with stable position inclined against the shear direction. These observations from natural mylonites confirm results from analogue and numerical models (e.g. Ceriani et al. 2003, Marques et al. 2005; Schmid & Podladchikov 2005), which suggest a strong dependence of the shape and the clast matrix coupling on the rotational behaviour and stable position of clasts.

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