Geophysical Research Abstracts
Vol. 14, EGU2012-7573, 2012
EGU General Assembly 2012

The lateral boundary of a metamorphic core complex: the Moutsounas shear zone on Naxos, Cyclades, Greece

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One of the apparently best investigated metamorphic core complexes all over world is that of Naxos in the Aegean Sea and numerous high-quality data on structures and microfabrics have been published. Among these structures is the Naxos-Paros ductile low-angle fault (Gautier et al., 1993), which is located along the northern margin of Naxos and which is part of the North Cycladic Detachment System (Jolivet et al., 2010). There, structural evidence indicates that the hanging wall of the core complex experienced large-scale top-to-the-north (ca. 010º) transport along a low-angle detachment fault. Interestingly no attention has been paid on the well exposed boundary fault on the eastern margin of the Naxos Island, which is even not mentioned in the lierarure. We denote this fault as Moutsounas shear zone, which represents the lateral boundary of the Naxos metamorphic core complex.
The Naxos metamorphic core complex is a N-trending elongated dome, which exposes on its eastern side moderately E-dipping micaschists and marbles, which are largely well annealed due to late heating. These annealed rocks grade towards the Moutsounas Peninsula in retrogressed sheared rocks, mostly phyllonitic micaschists and phyllites with an E-dipping foliation and a ca. NNE-trending subhorizontal stretching lineation. Shear bands, asymmetric fringes around rigid clasts and oblique mineralized extension veins consistently indicate top-to-the-NNE shear. The shear zone is structurally overlain by hydrothermally altered Miocene conglomerates, which contain no pebbles from the Naxos metamorphic core complex but exclusively from the ophiolitic hangingwall unit. Miocene rocks are exposed both on the northern and southern edge of the Moutsounas Peninsula. Their bedding is variable but dips generally towards NW, oblique to the detachment fault, which dips with a medium-angle towards east indicating therefore a rollover structure. The Miocene succession is overlain by subhorizontal conglomerates of Pliocene age, which form the main portion of the Moutsounas Peninsula and which contain numerous clasts, mainly marble, of the metamorphic core complex. These sedimentary data indicate that exhumation of the Naxos metamorphic core complex postdate deposition of Miocene successions and predate Pliocene rocks.
We interpret the Moutsounas shear zone as a lateral boundary of the Naxos migmatite dome and relate their main activity with top NNE-shear with the main stage of updoming during migmatite formation and granite uplift between ca. 15 and 11 Ma.