TECTONOTHERMAL EVOLUTION DURING EXHUMATION OF THE UHPM KIMI COMPLEX NEAR XANTHI, RHODOPE, NE GREECE

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The tectonothermal history of an UHP area north of Xanthi was investigated using microstructures, rheology, thermobarometry and a fluid inclusion study of metamorphic index minerals like kyanite, garnet, pyroxene and quartz. The Kimi-complex of Xanthi is separated by detachments from the adjacent Sideronero Complex and consists of a variety of lithologies that have been subject to a continental subduction process. The area exhumed during Cretaceous and Tertiary times due to the collision of Europe with Apulia. The lithological sequences consist of marbles, paragneisses, orthogneisses, metabasites and ultrabasites. These crustal rocks and its mantle-derived associations experienced UHP metamorphism, supported by the occurrence of metamorphic microdiamonds in grt-ky-micaschist. The metamorphic zircon age of such a micaschist suggests UHP metamorphism at 152.8 ± 2.4 Ma (LIATI et al., this volume). The exhumation process was dominated by SW-directed thrusting, subsequently transformed into a fold and thrust belt under amphibolite facies conditions. Folding is accompanied by sinistral strike-slip tectonics. NW-SE striking foliation planes (S1) contain indicators for SW-directed shear in x-z section (parallel to the NW-dipping stretching lineation) and for sinistral shear in y-z sections (perpendicular to the stretching lineation). The fold geometry is characterized by NE-SW striking upright to SE-vergent folds with NE-dipping fold axes. Folding results in clear repetitions of the lithological units on a meter- to km-scale.
P-T data range between 580 - 630 °C and 10 - 12 kbar for metabasites and up to 900 °C and 18 kbar for metapelites. The metamorphic conditions for the formation of the ductile cleavage planes in metapelites are about 780 860 °C and 13 15 kbar. Garnets up to several centimetres in diameter grew prior to the amphibolite-facies overprint. Kyanite occurs within ductile cleavage planes and also within pressure shadows of garnets. The quartz matrix in metapelites is completely recrystallized due to high-temperature intracrystalline deformation processes. Feldspar shows also evidence for intracrystalline deformation and recrystallization. High-density CO_2-inclusions in kyanite and garnet rims give pressure conditions for mineral formation of ~ 10 kbar. Primary fluid inclusions in kyanite show variable degrees of fill and homogenisation temperatures, which is interpreted as variable density loss by leakage. Quartz enclosed within pyroxene contains high-density aqueous inclusions, suggesting pressures up to 15 kbar. A high number of H_2O-CO_2 fluid inclusions in quartz hosted by garnet have only low densities, similar to matrix quartz, where decrepitation textures of former fluid inclusions indicate density loss during relatively isothermal decompression. Transgranular fluid planes within matrix quartz from metapelites contain $CO_2 \pm N_2 \pm CH_4$ and represent a late stage of fluid entrapment below 2 kbar at a shallow crustal level.

References

LIATI, A., PETTKE, T & FANNING, M.C. (2005): Linking U-Pb SHRIMP zircon ages with metamorphic conditions: constraints from the REE composition of zircon in Alpine (U)HP rocks of the Rhodope, N'Greece. (this volume)