TIME AND DURATION OF METAMORPHISM AND EXHUMATION OF THE CENTRAL RHODOPIAN CORE COMPLEX, BULGARIA

M. Ovtcharova (1), A.V. Quadt (1), I. Peytcheva (2), F. Neubauer (3), C. A. Heinrich (1), M. Kaiser (1)

(1) IGMR, ETH Zurich, Switzerland, (2) CLMC, BAS, Sofia, Bulgaria, (3) IGP, University of Salzburg, Austria (maria.ovtcharova@erdw.ethz.ch)

The evolution of central Rhodopian dome (Bulgaria) is interpreted in terms of an extensional collapse of thickened crust (Ivanov at al., 2000). U-Pb isotope dating (single Zr and Mnz), Rb-Sr (W.R., Bt and Ap) and Ar-Ar (on Bt) were carried out on different rocks from the central Rhodope, Bulgaria, to constrain the timing and duration of the metamorphism and exhumation of the core complex. The beginning of extensional stage is marked by intrusion of earliest non-penetratively deformed granite bodies at 53Ma (U-Pb on single Zr and Mnz). The late Alpine extensional evolution of the massif is marked by a detachment system connected with exhumation of the migmatites in the core part of the dome (lower plate). U-Pb analyses on Mnz and Zr from mesosome and discordant leucosome yield a Variscan protolith age of the gneiss (311 Ma) and Eocene age (37Ma) of crystallization of the newly formed anatectic melt that corresponds with the peak of the Alpine metamorphic event (P 4.5-6kbar and T 720-750°C; Georgieva et al., 2002). Rb-Sr mineral system of the weakly deformed gneisses from lower plate of the core complex gives evidence for a cooling age of 34.5±0.34Ma. This result is confirmed by Ar-Ar on Bt from the same rock: 35.5±0.4Ma. Ar-Ar data on biotite from gneisses of the upper plate yield an age of 34.9±0.6Ma. The same age is reflected by an Rb-Sr isochron (W.R., Bt and Ap) of 35.22±0.35Ma. The post-collisional extension was followed by graben depressions filled with sediments of Eocene-Oligocene age and active volcanism and ore mineralization (Zn-Pb and Cu-Pb-Zn ore deposits). Connected with the most intensively "stretched" sections of the extensional system is emplacement of rhyolitic dikes at 32.8±0.41Ma (U-Pb on single Zr, Xe). The available data constrain narrow time bracket between timing
of high-grade metamorphism event (37Ma, > 600°C), cooling (35Ma, 300°C) of the core complex and volcanic activity (32Ma) that corresponds with rapid exhumation tectonic regime.

References: