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Petrology and geochemistry of ortho- and paragneisses from the Ada cross section in NE Rhodope massif of Greece

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The Rhodope massif is part of the Hellenic Orogen and occupies the major part of northeastern Greece and southern Bulgaria. Simplified, it can be subdivided into two units. The Lower Tectonic Unit of low temperature eclogite-facies metamorphism overprinted at upper greenschist- to lower-amphibolite facies conditions is tectonically overlain by the Upper Tectonic Unit of high temperature eclogite-facies metamorphism overprinted under medium- to upper-amphibolite-facies conditions (Mposkos 1989). Evidence for ultra-high pressure (UHP) metamorphism has been reported from few localities in the central and eastern part of the Rhodope (e.g. Mposkos & Kostopoulos 2001; Liati et al. 2002). The (U)HP rocks occur in a melange zone between orthogneisses of the Upper and the Lower Tectonic Unit, which includes metapelites, amphibolites, orthogneisses and marbles. Such a rock assemblage with similar tectonic position was studied near the village Megalo Ada in the northeastern part of the Greek Rhodope mountains. Ortho- and paragneisses were sampled and petrographically and geochemically investigated to close gaps in the magmatic and P-T-t histories as well as to find constraints for new (U)HP localities in the northeastern Rhodope and correlate them to the central part. The sampled orthogneisses are augen-gneisses and their chemistry is very similar to orthogneisses from the Lower Tectonic Unit in the central part of the Rhodope, which are Permo-Carboniferous in age (Turpaud & Reischmann 2003). The orthogneisses are characterized by moderate to high silica contents (69-72 wt% SiO2) and moderate alumina values (13-15 wt% Al2O3). The A/CNK ratio is greater than 1.5 and 1.0 wt%, respectively, indicating peraluminious character. The protolith of the orthogneisses can be chemically clas-

sified as subalkaline granite of a volcanic arc tectonic setting. The paragneisses are metapelites, which occur as thin horizons (dm-scale) of garnet-kyanite-mica-schists +/- amphibole with garnet porphyroblasts up to 2 cm. In one sample, staurolite (+ paragonite and kyanite) inclusions in garnet indicate prograde growth of garnet in the staurolite stability field, in agreement with a Barrovian type of metamorphism. Peak temperature conditions of ca. 650 °C (garnet-staurolite thermometry) might have been reached during the reaction biotite + staurolite -> garnet + kyanite. The garnets are mainly almandine (Xalm = 0.55-0.62) with decrease of Fe at the very rim, indicating later heating during retrograde metamorphism. Garnet-biotite thermometry yields retrograde temperatures between 450-550 °C at corresponding pressures between 5-10 kbar. Chloritisation in cracks of garnet defines the final stage of retrogression. Although the rock assemblage from the Ada cross section is similar to (U)HP occurrences in the central part of the Rhodope, no evidence for (U)HP metamorphism was found so far. Therefore, the correlation of the central and the northeastern Rhodope massif is still unclear.

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