



The age of UHP metamorphism and the exhumation path of microdiamond-bearing rocks (SW Rhodopes, Greece)

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One of three localities of microdiamond-bearing, ultra high-pressure (UHP) metamorphic rocks in the Rhodope Metamorphic Province is near the village Sidironero, in the northern Greece (Schmidt et al., 2010). HP and UHP metamorphic conditions are preserved in an intensely strained mélangé zone which is sandwiched between upper greenschist to lower amphibolite facies rocks in the footwall (Pangaion-Pirin Complex) and upper amphibolite facies rocks in the hanging wall (Rhodope Terrane). This mélangé zone consists of paragneisses, orthogneisses and metamafigs including eclogites. Its lithology and tectonic structure resembles the exposure of UHP metamorphic rocks at Xanthi (70 km farther east), while the UHP location at Kimi (120 km farther east) occupies a higher structural level.

Microdiamonds of up to 5 μm size representing relics of an UHP-metamorphic stage occur as inclusions in garnet porphyroblasts, which have been discovered in the kyanite and phengite-bearing mica schists (Schmidt et al., 2010). With exception of diamond, these rocks and the associated eclogites record only the P-T conditions of HP (~ 22 kbar / 750°C) metamorphism (Schmidt et al., 2010). UHP-metamorphism occurred at 202 ± 4 Ma as inferred from chemical U-Th-Pb dating of large monazites by electron microprobe analysis. This age is similar to previously published monazite ages of ~ 185 Ma from the two other UHP localities in the Rhodope Metamorphic Province farther east (Reischmann & Kostopoulos 2002; Hoinkes et al. 2008). U-Pb dating of zircons from eclogites indicate an Eocene age of the HP-metamorphic stage (Liati, 2005) and thus an independent orogenic event. Peak pressure assemblages were almost obliterated by a strong overprint under upper amphibolite facies conditions associated with migmatization at ~ 39 Ma, dated by zircons from orthogneisses (Liati, 2005). Subsequent mylonitization occurred at lower amphibolite facies conditions.

We propose that the UHP-metamorphism in the Rhodope Mountains was related to Late Triassic / Jurassic southward subduction of the Neotethys domain, while the eclogite- and amphibolite-facies overprints occurred during a second tectonometamorphic cycle (Mposkos et al., 2010) associated with northward subduction of the Pindos Ocean in Eocene time.

References

- Hoinkes, G., Krenn, E., Rubatto, D., Krenn, K., Proyer, A., Bernhard, F., Bauer, C. (2008): Timing the Rhodope UHP-event using zircon and monazite. 33rd International Geological Congress, Oslo.
- Liati, A. (2005), Identification of repeated Alpine (ultra) high-pressure metamorphic events by U-Pb SHRIMP geochronology and REE geochemistry of zircon: the Rhodope zone of Northern Greece, *Contrib. Mineral. Petrol.*, 150, 608 – 630.
- Mposkos, E., A. Krohe and I. Baziotis (2010), Alpine polyphase metamorphism in metapelites from Sidironero Complex (Rhodope Domain, NE Greece). In: Christofides, G., Kantiranis, N., Kostopoulos, D. S., & Chatzipetros, A. A. (eds.), *Proceedings of the 19th Congress of the Carpatho-Balkan Geological Association*. Scientific Annals, School of Geology, Aristotle University of Thessaloniki, Spec. Vol., 100, 173-181.
- Reischmann, T. & Kostopoulos, D. (2002): Timing of UHPM in metasediments from the Rhodope Massif, N Greece. *Geochim. Cosmochim. Acta*, 66, A634.
- Schmidt, S., Nagel, T.J., Froitzheim, N. (2010): A new occurrence of microdiamond-bearing metamorphic rocks, SW Rhodopes, Greece. *European Journal of Mineralogy* 22, 189-198.