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Timing and tectonic history of UHP rocks from the Rhodope Massif, Bulgaria

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Microdiamond inclusions in garnet delineate the Rhodope Massif (RM) as a globally important UHP locality. To date there are 4 confirmed UHP localities across the RM, with UHP indicators being restricted to garnets from metapelites. All available protolith and metamorphic ages from the RM are based on accessory minerals such as zircon and monazite, which yield a disparate array of ages spanning from pre-Variscan to post-Alpine (Eocene) times. The best estimate for the timing of the UHP event is that it was associated with a subduction event during the Jurassic[1].

This study focuses on garnets from UHP metapelites from the Central Rhodope Mts., Bulgaria, in the vicinity of the town of Chepelare. It is the first to date directly the host of the UHP indicators in the region, eliminating the risks of interpretations based on inherited inclusions. Aggregates of garnets have been dated via Sm/Nd geochronology, following a rigorous sample preparation and partial dissolution process to remove the effect of REE rich inclusions that result in low Sm/Nd ratios. Aggregate garnet ages range between 91.5 $\pm$ 4.6 Ma and 70.3 $\pm$ 2.3 Ma, which correlates well with the age of magmatic activity seen across the region.

These Late Cretaceous ages are significantly younger than the proposed Jurassic UHP metamorphic event, but correlate well with another proposed (U)HP event, based on U-Pb zircon dating[2]. Current tectonic models for the RM invoke either a protracted subduction cycle with a single, long lasting (>30Ma long) exhumation event, or a series of complex subduction -exhumation cycles preserved in multiple suture zones. We will attempt to link our new garnet Sm/Nd ages with the complex post-Jurassic tectonic evolution of the RM, and in particular add constraints to the much debated questions surrounding the nature of the exhumation of the UHP units and the evolution of the massif.

[1]Burg, J., 2011, Journal of the Virtual Explorer, 42, paper 1

[2]Liati, A.,et al., 2011,. In Dobrzhinetskaya, L. and Cuthbert, S.(Editors), Ultrahigh Pressure Metamorphism. Elsevier, London, pp. 295-324.