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Relationships between crustal blocks and UHP relics, an example from Northern Greece

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Exhumed UHP relics are rarely exposed witnesses of extreme conditions within collisional belts. In such a context of collision with local UHP occurrence, a first order problem is the characterization of the accreted crustal blocks. Then, the knowledge of the structural relationships between the UHP relics and these blocks is also required before any attempt of conceptual or physical (numeric or analogical) modelling of the exhumation processes of such deeply subducted rocks can be done.

The Rhodope Massif (Northern Greece and Southern Bulgaria) is a recently defined UHP province [1, 2, and 3]. Despite numerous studies [4, 5, 6 and ref. therein], the overall structure of the Rhodope massif is still problematic: no clear view on the structural arrangement between the HP-UHP relics and the main units has yet been achieved.

The Rhodope Massif occupies the most internal position in the Hellenides. The structure of the massif results from the top-to-the-SW stacking of high-grade nappes during a Cretaceous collision [5]. The occurrence of HP and UHP relics associated with oceanic and ultramafic material suggests the presence of a suture zone within the massif [1, 2, 3, 5, 7, 8 and 9]. Nonetheless, the exact location of this suture remains uncertain. We report orthogneiss protolith ages, within the central domain of the massif. Coupled with field observations, they help to define two crustal blocks, whose relationships with the UHP occurrences and mafic material clarify the suture location. Moreover, the structural arrangement of the crustal blocks versus UHP/HP relics is thus better constrained.

The dating of orthogneisses protoliths along two structurally constrained cross-

sections allows the identification of two intrusion-age groups. Single-zircon Pb-Pb evaporation and U-Pb SHRIMP dating were both performed on the basis of a cathodoluminescence study. Two Bt ($\pm$ Hbl) gneisses gave concordant SHRIMP ages of 158.0 $\pm$ 1.7 Ma and 164.1 $\pm$ 2.3 Ma respectively. Five additional samples are dated between 135 and 165 Ma by the Pb-Pb technique. Eleven other samples, instead, yielded protolith ages between 270 and 300 Ma by the Pb-Pb technique.

Two groups of intrusion-ages emerge, Permo-Carboniferous and Late Jurassic. Structurally, these groups correspond to distinct units: the Late-Jurassic gneissic body overthrusts the unit bearing Permo-Carboniferous orthogneisses. The striking feature is that, at a large scale, mylonitic zones associated with amphibolitic material of oceanic affinities, eclogites and UHP Grt-Ky micaschists separate these two blocks. Thus, we distinguish two igneous terranes within the Western Rhodope. The HP-UHP and amphibolitic lineament could thus represent a suture, resulting from the closure of a Tethyan marginal ocean. Until now, the UHP relics and associated eclogites have only been identified within the suture defined here, corresponding actually to a now relatively thin flat lying thrust. No UHP relics have been yet recognised within the two terranes defined in this study, suggesting that none of the terranes involved in the collision was ever deeply subducted and that the UHP relics are only preserved and exhumed within the suture zone.

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