

Paleogene thrusting in the Western Rhodopes (SW Bulgaria)

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The basement rocks of the Rhodope Metamorphic Province in SW Bulgaria and NE Greece belong to a synmetamorphic, eastern Mediterranean nappe stack with layers of continental crust and ophiolites. It has been assembled during a complex history from Jurassic times to present in an Alpine active continental margin realm along the southwestern border of Moesia. During late and post-collisional stages, deeper levels of the nappe pile have been exhumed as metamorphic core complexes along low-angle detachment faults. This extensional phase was associated with rift basin formation, volcanism, erosion and sedimentation.

We combine structural, metamorphic and U-Pb zircon geochronological datasets in order to unravel the complex history of the Rhodope Metamorphic Province. We will also present results from zircon and apatite fission track analysis.

The study area is a profile in SW Bulgaria from Gorno Spanchevo in the West to Dospat in the East. The section cuts the eastern part of the Neogene Struma Graben, the Paleogene Mesta Graben, the southern Pirin and western Rhodope Mountains, intrusions therein and several important extension-related shear zones. In the basement, two levels of the Rhodopean nappe stack are exposed. The structurally lower level (Pangaion-Pirin Complex) consists mostly of orthogneiss and marble. It represents Variscan continental crust and its cover. The higher level (Rhodope Terrane) is of mixed oceanic and continental origin and contains metamorphosed Jurassic arc magmatites. The boundary between both levels is the top-to-the-SW Nestos Shear Zone.

U-Pb zircon geochronology by LA-SF-ICP-MS was carried out on samples from three granitoid intrusions. The undeformed and therefore post-tectonic Teshovo (South Pirin) Pluton intruded into the Pangaion-Pirin Complex and gives zircon crystallization ages of 32 ± 0.2 Ma. Both the Dolno Dryanovo and Spanchevo Plutons intruded into the Rhodope Terrane and are syn-tectonic to the main foliation. Their single-phased magmatic zircons and magmatic rims yield ages of ca. 56 to 55 Ma, whereas inherited cores display ages of ca. 143 to 145 Ma. Variscan zircons, which are typical for basement rocks from the Pangaion-Pirin Complex, are not present in samples from the Spanchevo and Dolno Dryanovo Plutons. These results indicate that at ca. 56 to 55 Ma the Rhodope Terrane was not yet placed upon the Pangaion-Pirin Complex. Therefore, the southwest directed thrusting of the upper level over the lower level took place between ca. 56 to 55 Ma and ca. 32 Ma.

We propose that the Pangaion-Pirin Complex is Apulia-derived and the Rhodope Terrane belongs to an allochthonous Vardar Zone. The present day structure of the Rhodopes therein can be explained by a subduction polarity reversal from SW-dipping in the Jurassic and Early Cretaceous to NE-dipping in the Late Cretaceous and Paleogene.