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The Jurassic Rhodope subduction-accretion history: temporal relations between the Circum-Rhodope Belt Evros ophiolite, and the UHP-HP events and the granitoid magmatism in the underlying high-grade metamorphic basement, Thrace region, NE Greece

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The Circum-Rhodope Belt in Thrace region of NE Greece includes arc-related Evros ophiolite (EO) and arc to continental margin greenschist to unmetamorphosed sedimentary rocks, all thrust emplaced to the north in Late Jurassic time (Bonev et al. 2010) onto the Rhodope high-grade basement that contains ultrahigh and high-pressure (UHP-HP) relics. Ages of the EO are only available for the Petrota gabbro crystallization at 169±2 Ma, whose low-temperature evolution spans 160-140 Ma. UHP relics are considered to have formed before 170-160 Ma, while the HP event together with granitoid magmatism have occurred around 150 Ma (Liati et al., 2011). Although scarce the time constraints for EO and UHP relics both witnesses subduction setting with intricate temporal relationships of island arc system related to the Rhodope continental margin basement. Here, we provide new U-Pb LA-ICP-MS zircon geochronology in the intrusive section of the EO and the underlying high-grade basement complemented by EO geochemistry. Zircons from the plagiogranite intruding the basalts of the EO at Didymotycho, together with cross-cutting gabbro yielded crystallization ages of 172.1±1.5 Ma and 159.8±2.2 Ma, respectively. The gabbro chemistry, plus the presence of granodiorite, confirms arc signature of the EO intrusive suite that resulted via extreme fractional crystallization of basaltic magma (Bonev and Stampfli, 2009). Zircons from migmatitic gneiss intruded into the mafic eclogite in the high-grade basement of a UHP locality near the village of Sidiro yielded granitoid protolith age of 160.2±1.2 Ma. Muscovite gneiss near the village of Micro Derion, with the same relations to the host mafic rock from the basement, supplied ages in the range 155±1.97Ma–159.1±2.06 Ma. The field and radiometric results indicate that EO formation and the UHP-HP relics are temporally indistinguishable and spatially related, and therefore, both are coupled at mantle depth to the same subduction setting. The granitoid magmatism recorded by gneisses postdate UHP-HP events within the subduction zone wedge, but temporarily overlaps late stage of EO formation. Thus, the EO formation, UHP-HP metamorphism and granitoid magmatism, all temporarily relate to a single common south-dipping subduction system near the Rhodope margin. The results reveal for the first time a clearly separate Jurassic subduction system related to N-directed arc-margin collision and accretion, from a Late Cretaceous subduction system responsible for the Rhodope S-directed nappe stacking that persisted into the early Paleogene.

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