

Significance of the Nestos Shearzone in the southern Rhodopes (Northern Greece/Southern Bulgaria)

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The Nestos Shearzone can be traced over 100 kilometers and separates the two main units of the Rhodopes, the Rhodope Terrane in the hangingwall from the Pangaion-Pirin Unit in the footwall. The Rhodope Terrane consists of mingled continental and oceanic basement rocks, intruded by granitic bodies of Cenozoic age. It underwent at least amphibolite facies conditions during the Alpine orogenic cycle and several localities with preserved high-pressure and/or ultrahigh-pressure rocks have been found. The age of orogenesis and metamorphism is ambiguous and several Mesozoic and Tertiary cycles may be recorded in that unit. The lowermost level immediately on top of the Nestos Shearzone (Sidironero subunit) mainly consists of rocks derived from a Jurassic arc and appears to show the youngest reported (i.e. Eocene) high-grade metamorphism (including ultra-high-pressure conditions and a subsequent migmatitic stage). The underlying Pangaion-Pirin Unit beneath the Nestos Shearzone is built of marbles and Variscan gneisses of disputed Mesozoic paleogeographic position. It is intruded by Oligocene granitoids, which also crosscut the Nestos Shearzone. The Pangaion-Pirin Unit experienced a clockwise PT-path culminating at upper greenschist facies conditions during the Alpine cycle. The Nestos Shearzone is defined by top-to-the-southwest-directed mylonites formed under upper greenschist facies conditions. So far, it has been viewed as a thrust. We present structural and petrological data suggesting that the Nestos Shearzone is instead associated with late Eo-Oligocene extension of the overlying units. Mylonitisation along the shear zone occurred under conditions postdating peak pressures. The shear zone formed between about 40 Ma and 34 Ma as indicated by the age of high temperature conditions in the hangingwall and the age of Oligocene granitoids crosscutting the mylonites. During this time, pronounced extension and basin formation took place in the hangingwall of the Nestos Shearzone. We propose that the brittle Mesta detachment, which bounds the Mesta Graben to the East, roots into the Nestos Shearzone. The metamorphic history of the Pangaion-Pirin Unit as well as the proposed young age of the Nestos Shearzone is in conflict with studies proposing that this unit represents an independent microcontinent (Drama) accreted to the future Rhodopes in late Jurassic or early Cretaceous times. Instead, we propose that the Pangaion-Pirin Unit could be derived from the Apulian plate, which would have far reaching consequences for the structural architecture of the Aegean Sea area.