



Architecture of the Rhodope Mountains

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We propose a new grouping of the metamorphic units forming the Rhodope Mountains (Southern Bulgaria and Northern Greece). Based on (1) metamorphic grade, (2) age of metamorphism and deformation, (3) ages of gneiss protoliths, and (4) ages of post- and synkinematic granitic intrusions, four major structural levels can be distinguished, to which we refer as Lower-, Middle-, Upper-, and Uppermost Allochthon. The Lower Allochthon consists of pre-Mesozoic basement and a probably Mesozoic carbonate platform, which were metamorphosed under greenschist- to lower amphibolite facies conditions in Eo- to Oligocene times. The largest exposure is the Pangaion-Pirin Complex. We correlate the Lower Allochthon with the interior of the Mount Olympos Window further southwest, which would imply a very external paleogeographic origin. The Middle Allochthon represents an at least upper amphibolite facies, mixed unit of intermingled gneisses, amphibolites, marbles, ultramafics and mica schists. Orthogneisses have pre-Mesozoic as well as Upper Jurassic to Lower Cretaceous ages. High-temperature eclogites of Eocene age occur within the Middle Allochthon and also regional upper amphibolite-facies conditions appear to be Late Eocene in age. This indicates that the Lower Allochthon got accreted beneath the Middle Allochthon not before the Late Eocene. The Upper Allochthon is petrologically similar to the Middle Allochthon but experienced its major high-grade overprint including eclogite-facies conditions in Lower Cretaceous times. It was exhumed to near-surface conditions at the end of the Cretaceous. Relicts of ultra-high-pressure metamorphic conditions such as microdiamonds in garnet-mica schists in the Rhodopes seem restricted to the Upper Allochthon and appear to be even older, i.e. Early Jurassic in age. Protolith ages of gneisses in the Upper Allochthon are Variscan and older. The Middle- and Upper Allochthon correspond to the Kerdilion Unit and the Vertiskos-Ograzhden Unit in the Serbo-Macedonian Massif, respectively. The Uppermost Allochthon is usually referred to as Circum-Rhodope Belt. It consists of greenschist to blueschist facies metavolcanics and metasediments of Mesozoic age. The main orogenic event is Jurassic in age and was associated with top-north-directed thrusting and a south-dipping subduction. A "proto-Hellenic", north-dipping subduction was active since the Late Cretaceous. Hence, different structural levels in the Rhodopes were formed in different orogenic events at the southern margin of Europe through Mesozoic and also Cenozoic times. Granitic intrusions of Oligocene age crosscut all tectonic boundaries between the above defined units (except for Miocene detachment faults) while Paleogene intrusions are restricted to the units above the Lower Allochthon. Particularly, the now established young ages of thrusting and subduction-related metamorphism in the Lower and/or Middle Allochthon imply a major change in the architecture of the Dinarides. While the Rhodopes have traditionally been viewed as the more internal, Mesozoic precursor of the Dinarides, it appears now that Lower and Middle Allochthon are actually a part of the Dinaric orogen.