



Early Alpine Orogeny As Recorded In The Metamorphic Complexes Of Southern Bulgaria

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In addition to the Rhodope zone, several rock complexes have recorded metamorphism and deformation related to the Alpine orogeny in Southern Bulgaria. This was first recognized in the Strandja zone, where metamorphosed Mesozoic sediments are known for more than 50 years [1]. Much farther west, in Srednogorie and Kraishite zones, the base of Permian-Jurassic series display evidence for low-grade mylonitization and similar features are common in some shear zones in Kraishite [2]. Recent geochronological data point to a Cretaceous age for the development of greenschist facies shear zones in the Variscan basement of Srednogorie [3], indicating that reworking occurred during an early stage of the Alpine orogeny. Radiometric data also indicate a Cretaceous age for the medium-grade metamorphism in the Osogovo-Lisets dome, southern Kraishite zone [4]. A common feature to these complexes is the existence of a Variscan or older basement nonconformably overlain by Permian-Jurassic series. The pre-Mesozoic basement is unevenly reworked. It is either almost intact (e.g., Struma Diorite Formation, in Kraishite), or crosscut by rare shear zones (Srednogorie and Eastern Strandja), or almost completely obliterated, like in the western part of the Strandja zone (Sakar unit), where Alpine metamorphism reached the amphibolite facies [5]. Still in the western part of Strandja zone, the Permian-Jurassic cover is strongly and penetratively deformed, with occurrences of paleontologically dated Triassic metasediments containing staurolite and kyanite. In all mentioned areas, the Permian-Jurassic successions are similar to those in the most external zones of the Balkanides, next to the Moesian platform. This, as well as the lack of any track of an oceanic domain between Strandja, Srednogorie, Kraishite, on one hand, and the Moesian platform, on the other hand, is a strong argument for considering these areas as part of the southern margin of Eurasia in post-Variscan times. Allochthonous frag-

ments of low-grade Paleozoic rocks are found on top of each tectonic zone (Morava nappe in Kraishte [6], Vakarel klippe in Srednogorie, and Veleka unit in Strandja). A low-grade shear zone with top-to-north kinematics characterizes the sole of these fragments. North-vergent shearing is also dominant in the penetratively deformed parts of Strandja and in the Osogovo-Lisets dome [4]. Srednogorie and Strandja zones are bounded to the south by the NW-SE-trending Maritsa fault zone. In Bulgaria [7], as well as on the Turkish territory [8], the fault is described as a right-lateral wrench zone. Recent data from western Strandja and Srednogorie [3] indicate that the Maritsa wrench zone was already active in Early Cretaceous times, accumulating dextral ductile shear. The magnitude of the right-lateral displacement is not known, but even if a moderate amount is assumed (~ 100 km), Strandja is no longer the lateral continuation of the Rhodope massif, as commonly inferred, but was located north of it in pre-Early Cretaceous times. Finally, some lines of evidence for Early Alpine northward-vergent ductile shearing also exist south of the Maritsa wrench zone, i.e. in the Rhodope zone. In intermediate and lower units of the Rhodope metamorphic pile, recent geochronological data [9] point to a Cenozoic age for high-grade synmetamorphic fabrics that were previously interpreted as reflecting Cretaceous southwestward nappe stacking [10]. Rejecting the Cretaceous age of southwestward shear deformation imposes to re-consider the related tectonic model. It is now evident the lowermost units in the Rhodope show evidence of Tertiary deformation and metamorphism. Higher in the pile, only the sole of the uppermost units have been reworked during the Cenozoic. Similarly to what is seen north of the Maritsa wrench zone, these uppermost units (uppermost Assenitsa, Kardjali, Mandritsa-Makri [11]) record synmetamorphic top-to-north shearing. This similarity suggests that the deformation is also Early Alpine in the uppermost units of the Rhodope. The occurrence of HP relics in Assenitsa unit [12, 13] is an indication of the deep burial of this domain during Early Alpine orogeny. Altogether, these data are consistent with a geodynamic model in which the southern margin of Eurasia - at least, its eastern Mediterranean segment - was involved in a south-dipping subduction/collision system during Upper Jurassic-Cretaceous times.

1 Dimitrov, *Geologie*, 7, 3-6, 560-568 (1958). 2 Lilov Zagorchev, *Geol Balc*, 23, 46 (1993). 3 Velichkova, et al., ABCD - GEODE workshop Vata Bai, Romania, 112-113 (2001). 4 Kounov, PhD thesis, ETH-Zurich (2003). 5 Ivanov, et al., *Ann Univ Sofia, Geol* 91, 35-80 (2001). 6 Zagorchev, *Geol Balc*, 14, 37-64 (1984). 7 Ivanov, Guide to Excursion E-3. CBGA-XIV congress, Sofia, 126 p (1989). 8 Perinçek, *Am Ass Petrol Geol Bull* 75, 241-257 (1991). 9 Peytcheva, et al., *Mineralogy and Petrology*, 82, 1-31 (2004). 10 Burg, et al., *Terra Nova* 8, 6-15 (1996). 11 Bonev Stampfli, *Comptes Rendus Geoscience*, 335, 691-699 (2003). 12 Guiraud, et al., *C R Acad Sci Paris*, 315, II, 1695-1702 (1992). 13 Ichev, *C R Acad Bulg Sci*, 47, 5, 49-52 (1994).