



## **Kinematics of Tertiary convergence and extension at the western margin of the Rhodopes (SW Bulgaria)**

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Integrating the results of recent structural geological fieldwork with age constraints reported in the literature we propose a kinematic model for Eocene to Miocene tectonics in the western Rhodopes. In the past years, several authors have claimed that low-angle normal faults in the western Rhodopes and adjacent external Hellenides formed in the framework of beginning Aegean extension. The oldest low-angle normal faults identified so far were active since the Middle or Late Eocene, among them the Vertiskos-Kerdilion (Brun & Sokoutis 2007) and Ribnovo faults (Burchfiel et al. 2003) which separate “Rhodopean” rock units (Sidironero-Mesta and Asenica units) characterized by Jurassic protolith ages of orthogneiss in the footwall from “Serbomacedonian” units (Vertiskos-Ogražden unit) with significantly older orthogneiss protolith ages in the hanging wall. Activity of these extensional faults temporally overlaps with that of the Nestos shear zone. The Nestos shear zone was probably active during the entire Eocene (Jahn-Awe et al. in press) and accommodated thrusting of the Sidironero-Mesta unit onto the Pangaion-Pirin unit which we interpret to be derived from the Apulian plate (see also Dinter 1998). The fault geometries observed in the field suggest that the Ribnovo fault soles into the Nestos faults forming a large scale Late Eocene extensional fault system (Mesta-Kerdilion detachment system) with a consistent top-to-the-SW displacement sense. This implies that in the Middle or Late Eocene the Nestos shear zone changed its kinematics from reverse to normal faulting. After the first period of extensional faulting, the Mesta-Kerdilion detachment system was offset by a series of steeply NE-dipping normal faults in the NE slopes of the Pirin mountains. Following a tectonically quiet period in the Late Oligocene and Early Miocene, the Strimon valley detachment became active in the Middle Miocene. It obliquely cuts through the Mesta-Kerdilion detachment system resulting in the offset between the Vertiskos-Kerdilion and Ribnovo faults which probably originally were one coherent fault. Although the shear sense of the Strimon valley detachment is also top-to-the-SW, it was thus kinematically independent of the Mesta-Kerdilion detachment system.

Since the horizontal displacement amount of the Strimon valley detachment increases from N to S, we assume that the Strimon valley detachment accommodated relative rotation between the Rhodopes and Hellenides starting in the Middle Miocene (Kissel & Laj 1988) that resulted in particularly strong extension within the Aegean and corresponds to the the evolution of the curvature of the Aegean arc.

### References

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