

Structural and tectonic features of the western part of Carpatho-Balkanides: evidence from palaeostress analyses of Ravanica area

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This paper presents the results of detail structural and tectonic analysis of the Ravanica area (cross-section Monastery Ravanica – Vavilo). Investigated area is the most western part of Getic Nappe (Ridanj – Krepoljin zone). It predominantly consists of Ravanica limestones.

Field data were taken under detail palaeostress analysis combined with statistical analysis of brittle structures, mostly in mesoscopic field size. Clearly detected fault planes with numerous striations and shear stress orientations analysis were observed and studied by statistical analysis of stress tensor and its method of normalization - Simple Shear Tensor Average.

Three dominant deformation stages were detected in the investigated area.

D1 – The oldest deformation stage indicates a regime of ENE – WSW oriented stress field, with local deviation of ESE – WNW and E - W directions. This field stress distribution, detected in horizontal plane in the western rim of the Getic Unit, resulted in thrusting of Supragetic over Getic Unit at the end of Early Cretaceous and the beginning of Late Cretaceous (Austrian stage, 100 Ma). Overthrust has east direction in general. It is related to the period of Nappe Stacking (Willingshofer, 2000).

D2 – Second deformation stage is dominantly exposed in the investigated area. It is documented in Ravanica limestones, in large number of observation points. Stress analysis shows very strong regime of stress field and indicates subvertical maximum principal stress with NNE – SSW trending, and local deviation with ENE –SWS direction. It relates maximum stress field distribution in horizontal plane. As a result, it is visible in a large number of normal faults. Although the stress field distribution is dominantly NNE – SSW oriented, it is noticed minor stress redistribution with NW –SE direction. This deformation stage probably took place for a long period during Late Cretaceous and ended in Paleocene time (?). Three phases of magmatic activities in eastern part of Carpatho-Balkanides is related for this period. The described stress distribution strongly indicates the opening of Timok Magmatic Complex, its evolution and position with NNW – SSE direction.

D3 – The youngest deformation stage is related to Laramian stage of Alpine orogenesis (Late Cretaceous – Paleocene, 64 Ma). Field stress distribution is very well exposed in N – S direction with dominant subhorizontal principal stress axis. Kinematic activity in Ravanica area shows sinistral strike-slip regime which is the consequence of major fault structures orientation (mostly NE – SW direction). The same kinematics in the eastern part of Carpatho-Balkanides shows dextral strike-slip regime, with dominant exposure in the area of Bor and Krivelj faults. It is most possible that under the influence of this stress activity started evolution of Extensional Duplex (Drew J.L., 2006)