Tectonics of the Orava — Nowy Targ Basin

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The analysis of gravity and geoelectrical data within the Orava — Nowy Targ Basin has been carried out to recognise the structural style of the basin. The geophysical data interpretation allow the faults in the basement of the basin to be traced and correlated with some faults previously detected on the surface close to the Orava — Nowy Targ Basin. From the examination of the faults pattern two major fault systems can be identified within the basin. Two distinct depressions surrounded by these faults and separated by the basement elevation in the vicinity of Rogoźnik and Ludźmierz have been detected.

The oldest system consist of faults which are parallel or sub-parallel to the main structural units. Direction of these faults is W–E in the eastern part of the basin and gradually changes to NE–SW in the west, according to the bending of the Pieniny Klippen Belt. Longitudinal faults are cut and displaced by NNW and NE striking oblique faults which belong to the younger system. NNW and NE striking oblique faults are right and left lateral, respectively, which appear to had functioned as conjugate system of faults. Structural analysis of fault patterns indicates four major stages in the Neogene evolution of Orava — Nowy Targ Basin:

These stages are:

Formation of the system of longitudinal faults in the Lower and Middle Miocene. The origin of this system was related to oblique convergence between Carpathian microplate and North European Platform which changed into a continent — continent type collision at that time. Oblique collision produced shear stress and generated left lateral movement along these faults.

Superposition of left lateral movement and lateral irregularities of fault planes along the mentioned longitudinal faults caused local change of transpression regime and origin of the initial sedimentary basin in the Badenian.

Uppermost Badenian — Lower Sarmatian. Strike slip movements ceased but horizontal compression still existed. Horizontal compression of NNW–SSE direction generated conjugated system of oblique faults. These faults were responsible for the displacement of older fault lines and disintegration the basement of the basin into blocks.

The stress field reorganisation in the Upper Sarmatian. Post-compressional release and uplift stages favoured the development of normal faults along older fault lines (rejuvenated faults) and distinct sedimentation rate increasing.

Geoelectrical profiles shows that some faults were still active during Pliocene and Pleistocene.