

# Tectonics of the axial zone of the Podhale synclinorium in Spiš (Slovakia)

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The Podhale synclinorium extends from Orava in the west to Spiš in the east. It is an asymmetric structure built of flysch-like deposits belonging to the Central Carpathian Palaeogene Basin. Several longitudinal tectonic zones were distinguished in the Podhale synclinorium, including the axial zone in its central part (Pepol, 1972; Mastella, 1975).

The aim of the research was to describe the geological setting of the eastern part of the axial zone, recognize its geometry, and reconstruct the structural evolution by the structural analysis. The field-study was conducted directly in the axial zone and adjacent areas. The lower Zakopane Beds (Huty Fm. sensu Gross et al., 1984) and Chochołów Beds (Zuberec Fm.; op cit.) reaching a total thickness of 1 195 m were mapped in the area.

The W–E-trending axial zone is characterized by the high variety of bedding orientations and the occurrence of numerous folds. The width of the axial zone changes from 1.3 km in the west to 2.25 km in the east of the study area. The axis orientation was estimated, based on bedding orientation in both limbs of the synclinorium as 89/2 in the western part and 272/2 in the eastern part. Generalized axis orientation indicates the existence of a small depression in the study area, which is also confirmed by the orientation of mesofold axes.

Upright, gentle, parallel folds were mainly observed in the study area. The fold axes are W–E-oriented, shallow-dipping eastwards in the western part and shallow-dipping westwards in the eastern part.

The axial zone is cut by oblique NNW–SSE and SW–NE faults and parallel W–E faults. The orientation of oblique faults is similar to the orientation of the diagonal joint system.

The joint pattern in the study area is typical of the entire Podhale synclinorium (Boretti-Onyszkiewicz, 1968a, b; Mastella, 1972; Ludwiniak, 2010) and consists of a diagonal joint system (DR and DL sets), as well as longitudinal (L, L' L'') and transversal (T) joint sets.

The axial zone developed as a result of folding in the inner hinge during the formation of the Podhale synclinorium, under N–S compression. Oblique faults probably arose in two stages, as the strike-slip, *en-echelon* faults, rejuvenated as normal faults during the uplift of the Podhale flysch. Longitudinal faults developed under N–S extension are the youngest.

## References

- BORETTI-ONYSZKIEWICZ, W., 1968a: Joint anisotropy of flysch sandstones of West Podhale in the light of studies of strength. *Biul. geol. (Uniw. warszaw.)*, 10, 115 – 152.
- BORETTI-ONYSZKIEWICZ, W., 1968b: Joints in the flysch of western Podhale. *Acta geol. pol.*, 18, 1, 101 – 152.
- GROSS, P., KÖHLER, E., & SAMUEL, O., 1984: Lithostratigraphic division of the Central-Carpathian Paleogene. *Geol. Práce, Spr.*, 81, 103 – 117.
- LUDWINIAK, M., 2010: A multi-stage development of the joint network in the flysch rocks of western Podhale (Inner Western Carpathians, Poland). *Acta geol. pol.*, 60, 275 – 282.
- MASTELLA, L., 1972: Independence of joint density and thickness of layers in the Podhale flysch. *Bull. Acad. pol. Sci., Sér. Sci. géol. geogr.*, 20, 3, 187 – 196.
- MASTELLA, L., 1975: Flysch tectonics in the eastern part of the Podhale Basin (Carpathians, Poland). *Rocz. Pol. Tow. geol.*, 45, 3 – 4, 361 – 401.
- PEPOL, J., 1972: Tectonics of the axial zone of the Podhale synclinorium. *Acta geol. pol.*, 22, 3, 593 – 600.