Fault rocks of the Jelešňa fault zone (Central Carpathian Paleogene Basin, SE Orava, Slovakia)

MIROSŁAW LUDWINIAK, BARBARA RYBAK-OSTROWSKA and ARKADIUSZ GĄSIŃSKI

Faculty of Geology, University of Warsaw, Żwirki i Wigury 93, 02-089 Warszawa, Poland
miro@uw.edu.pl; Barbara.Rybak@uw.edu.pl; agasin@uw.edu.pl

The study is focused on mesoscopic fault zones which form the Jelešňa fault zone. This app. 5.5 km long, NNW–SSE-trending zone cuts flysch-like rocks of the Subtatric Group (Gross et al., 1984) and extends from the Magura Witowska Mt. to the Hladovka village (Ludwiniak and Rybak-Ostrowska, 2010). The general course of the zone is rectilinear along this section and its northern part coincides with the lineament recognized by Struska (2009, Fig. 2 ibid.). The Jelešňa fault zone is predominantly recorded by apparent deviations of bedding orientation from the regional trend. In the close vicinity of the mesofaults, the bedding strikes are frequently subparallel to them; the bedding planes are steep, sometimes vertical or even overturned. The mesofaults observed in the outcrops are mostly parallel or subparallel to the course of the Jelešňa fault zone. Other mesofaults are sub-perpendicular or oblique to the general direction of this fault zone.

Field observations point that the Jelešňa fault zone does not seem to have affected the Neogene deposits of the Orava–Nowy Targ Basin that discordantly overlies the Paleogene rocks in the northern part of the study area. Along the northern prolongation of the Jelešňa zone, the offset segments of the gravilineament are located, being distinguished by Pomianowski (2003, Fig. 10 ibid.) within the southern margin of the Orava–Nowy Targ Basin. This offset probably corresponds to an oblique/transverse fault cutting the Orava–Nowy Targ Basin basement. It is described by Pomianowski (2003) as a dextral fault, although assessment of the character and magnitude of fault displacement requires further studies.

The mesoscopic fault zones have been investigated along natural outcrops whose lengths vary from 1 to several metres. Faults cut sandstones, siltstones and shales. The fault zones contain slices of fault rocks sub-divided by packages of undeformed host rocks. The fault rocks are breccias and cataclasites (according to Killick, 2003). The cataclasites are composed of fine-grained clayey matrix and macroscopically visible variably-sized porphyroclasts. Foliation in these rocks has a random fabric. The particular fault rocks differ in composition that corresponds to the rock from which they have been derived.

The mineralogical composition of the fault rocks was investigated with XRD techniques, with particular focus on clay mineralogy. The results indicate that the rocks are typically composed of smectites, illite, kaolinite, chlorites, quartz and minor amounts of calcite and feldspars. There are some areas characterized by the higher illite, kaolinite and chlorite contents. Variations in the clay mineralogy can be interpreted in terms of paleoenvironmental conditions. The increase in (kaolinite + illite) may correspond to tectonic events and/or climatic changes (Martinez Ruiz et al., 2001). Higher contents of feldspars and lower contents of calcite are observed with decreasing content of smectites. This suggests relatively short-distance transport of these minerals.

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