

Central Carpathians–North European plates suture zone in Poland

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The goal of this research was interpretation of the deep structure of the Pieniny Klippen Belt (PKB) in the area between Czorsztyn Lake and Biały Dunajec River in Poland. The authors utilized the Czorsztyn 2D seismic survey, the first high-resolution deep seismic reflection survey within PKB in Poland. The investigation of the geological structure of three main Carpathian tectonic units: Central Carpathians, PKB and Outer Carpathians in the suture zone was one of the goals of this survey. Analysis of the seismic activity in the Czorsztyn Lake region was also the important objective of this research (Golonka et al., 2016). The knowledge of the PKB structure in Poland was based on the geological and geophysical surveys as well on the deep drillings. The geological investigations included mapping, stratigraphic, sedimentological and structural studies. The geophysical research included among the others. Deep Seismic Survey based on the refraction seismic method applied in the CELEBRATION 200 project, particularly CEL04 seismic profile (Janik et al., 2009; Janik et al., 2011 as well as magnetotelluric investigation. The following deep bore-holes: Bańska IG-1, Bańska PGP-1, Maruszyna IG1, Nowy Targ PIG-1, Bukowina Tatrzńska PGP-1, Biały Dunajec PGP-2, Biały Dunajec PAN-1, were drilled in this region, however outside the Czorsztyn 2D seismic survey lines. Input data for this study come from 2D seismic survey "Czorsztyn" (lines 01-01-15K, 02-01-15K, 03-01-15K and 04-01-15K) which was generated in 2015 by Geofizyka Kraków SA for the Institute of Geophysics, Polish Academy of Sciences (IGF PAN) and four archival profiles (24A-5-87K, 24-5-87K, 26-5-87K and 28-5-87K) generated in 1987 by the same company.

The great continental plate, known as North European Platform, forms the basement of the Northern Carpathians. This plate consists of Proterozoic, Vendian (Cadomian) and Lower Paleozoic (Caledonian) fragments, deformed and metamorphosed. The Paleozoic, Mesozoic, Paleogene and Neogene strata cover the crystalline, metamorphosed basement (Golonka et al., 2011). The PKB mark the suture zone between the Central Carpathian Plate and the North European Platform. The Central Carpathian Paleozoic and Mesozoic rocks crop out in the Tatra Mountains. Between the Tatras and PKB, they are covered by the Central Carpathian Paleogene and known only from boreholes and geophysical data (Golonka et al., 2005). The PKB is limited by two major faults (PKB_S and PKB_N), linked to the strike-slip zone.

The seismic lines show the Central Carpathian Paleogene rocks covering the Tatric units south of PKB. The Sub- Tatric cover High Tatric autochthonic and allochthonic rocks cover the Paleozoic Central Carpathian Basement. The crystalline Central Carpathian rocks are thrust over the sedimentary rocks belonging perhaps to the North European Platform cover. The North European Platform basement is visible below these sedimentary rocks. The Central Carpathian Plate is thrust over the North European Plate in the Podhale region.

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