

DESCRIPTION FOR THE GENERAL PUBLIC

Investigation of the tectonic structure of the region of south-eastern Poland and western Ukraine is of fundamental importance for understanding of geodynamic processes that occurred in this region of the Central Europe and have shaped the modern face of the Earth. The oldest tectonic unit in the area is the East European Craton, of the age of more than 1 billion years. The south-western part of the Poland enters a younger, thinner and warmer Palaeozoic Platform of the Central and Western Europe (age about 300 million years). In the south, a young Alpine system is located, which is represented in Poland by the Carpathians. These large tectonic systems of Europe are separated by a wide transition zone called the Trans-European Suture Zone (TESZ), running from the North Sea to the Black Sea. The northeastern margin of the TESZ is called the Teisseyre-Tornquist Zone. The southeastern Poland is a unique region, because these three major geological systems of Europe contact each other in this area. The proposed seismic research profile cuts this important geotectonic node of the European continent. In the contact zone of these systems, complex geological processes took place, and their understanding is crucial to solve the basic geodynamic problems of this area. A thorough knowledge of these processes is essential for understanding the tectonic evolution of Europe, especially of the Central Europe.

The aim of the research is to determine the structure of the Earth's crust and lower lithosphere using seismic methods. Expected new results will be important to define the physical processes taking place in the area of the Teisseyre-Tornquist Zone in the area of the carpathian collision and in the contact zone with the East European Craton. The results of planned research will contribute to a deeper understanding of our knowledge about the evolution of the Central Europe. New models of the Earth's crust and lower lithosphere will also allow for more accurate modelling of the Earth's deep interior zones in the region, with the use of other geophysical methods.

Planned research in the chosen area will be carried out using active seismic methods. Artificial seismic sources located every 25-60 km along the ~450 km long profile (~200 km in Poland and ~250 km in Ukraine) will generate seismic waves, which will be recorded by highly sensitive portable equipment deployed along the profile every 2.5-3.5 km. Both Polish and Ukrainian sides own appropriate research equipment. Thanks to applying modern seismic equipment, as well as recent methodology of seismic experimental data interpretation, the results of research will expand our knowledge of the structure and geodynamics of the Earth. Analysis of the obtained experimental data, using proven methods of interpretation, will be the basis for a detailed determination of the structure of the Earth's crust and the upper mantle.

Results of previous seismic investigations performed on both Polish and Ukrainian sides revealed zones of substantial gradients of the crustal thickness (depth of the Moho discontinuity) perpendicularly to the TTZ. This suggests segmentation of the of the Precambrian crust to the SE from the Fennoscandia-Sarmatia suture, and possibly also parallel to this suture. Planned investigations could help to solve this question, which is of a great importance for determination of the structure of the EEC, as well as for studies of Phanerozoic tectonic evolution of the Carpathian fragment of TTZ and TESZ.

Research in this extremely interesting area, important from the scientific point of view, are so complicated logistically that its realization by one country would be impossible. International cooperation is necessary. Moreover, it should be emphasized that in the past, in the frame of a decades long cooperation with our Ukrainian partner, we have successfully completed many experiments of a similar nature, mainly on the territory of Ukraine.