DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

The aim of the proposal is to analyze mélanges formed in the geological past define and their role in the origin of the mountain belts. Both tectonic and sedimentary (submarine mass transportation) events triggered mélanges creation.

We propose to focus the research of mélanges on Pieniny Klippen Belt (PKB) where both tectonic and sedimentary events triggered mélanges creation. The name „Klippen Belt" is derived from cliffs (German Klippen). These cliffs form harder, more erosion resistant elements, residing, like raisins in dough, within less competent clastic deposits, sandstones, shales and marls. These sandstones and shales represent alternating layers forming flysch complexes. The cliffs often represent olistoliths, that is various in size homogenous or complex rock fragments, which glided down from elevated areas to the deeper basinal zones. The other cliffs were placed within the surrounding clastic by tectonic deformational processes. The flower structure of the Pieniny Klippen Belt was formed during collision and strike-slip movement of the lithospheric plates. This structure is limited on both sides by deep-rooted faults. The Pieniny Klippen Belt obtained its present-day morphology during erosional processes, which removed less competent rock complexes, leaving harder cliffs protruding and clearly visible in a landscape. This type of morphology and geology represent classic mélange. The study of this mélange may change fundamentally our understanding of regional geology, paleogeography and paleodynamic evolution of this area and also other mountain belts.

This research project is planned as collaborative effort of research team including geophysicists and geologists. The geophysical research, that includes seismic, gravimetric and geoelectric methods belongs to the basic methods of investigations of Earth crust. Planned research should allow to obtain information about geological structure in areas where outcrop does not give insights. Especially important are seismic methods, based on analysis of the ways of elastic waves inside Earth. The gravimetric survey is based on registration of differences in density of rock masses, while geoelectric survey measures their resistivity differences. A proposed seismic survey would be an additive to deep seismic reflection surveys, which allow to imagine the depth below 300m.

Shallow seismic profiling combined with tomography based on gravimetric and geoelectric survey may allow tomographic imaging of the shallow subsurface zone of the Pieniny Klippen Belt. This tomographic imaging is similar to methods applied in medical sciences to obtain images of human bodies. This imaging will be combined with geological information obtain as a result of investigation of outcrops, stratigraphy lithology and dip of the rocks of the Pieniny Klippen Belt.

The research results may be useful in the hydrocarbon exploration in Carpathians. The Pieniny Klippen can be also treated as a geological field laboratory with visible objects and processes helping to understand the whole complex geological history of Earth. The better recognition of geology of this region will increase its attractiveness as a training area for students and young scientists and as geotouristic object with outstanding cognitive qualities.