Geophysical and Geological Model of the Contact Area of the Bohemian Massif and Carpathian Flysh Belt

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The Flysh Belt area lies at the contact of the Bohemian Massif and the West Carpathians. The data in this area include results from a number of deep boreholes (up to over 6 km deep) and an extensive complex of geophysical measurements. The analysis of frequency characterics of seismic and gravity data supplies data on the composition of density balanced cross-sections of the upper layer of the crust along selected seismic sections and tracing of tectonic elements.

Analysis of the frequency od seismic and gravity data belongs to recent geophysical research techniques. This technique allows to identify rather low-amplitude structural-tectonic features from seismic and gravity data. The method is based on combined analyses of the reflectance image of the derived gravity field and of the changes in seismic echogenity.

Methods:
- completion of gravity and derived gravity maps;
- calculation of Linsser indications of density contacts;
- completion of reflectance images of the gravity field;
- analysis of selected time seismic sections;
- mapping of tectotnic features through combined analysis of seismic and gravity data;
- examination of the digital model of topography;
- composition of density balanced cross-sections along selected seismic sections.

The principal aim is the construction of a model of geological setting of the Bohemian Massif/Carpathians contact region and the reconstruction of the development of the whole region in space and time. A crystalline basement subcrop map (colour relief map with N illumination) and Bouguer anomaly map (shaded relief map with N illumination) of the whole contact area of the Bohemian Massif and West Carpathians was constructed and presented at the lecture.

Particularly important is the further advancement in the knowledge of the structure and development of the nappe units of the Carpathian and Variscan Flysch belts. The impact of the thrusting of the Alpine nappes on the deformation of the crystalline complexes and their Paleozoic cover at the eastern margin of the Bohemian Massif will be studied. Cadomian, Variscan and Alpine structural elements at the eastern margin of the Bohemian Massif adjacent to the West Carpathians were sorted and their importance was evaluated.

General fault pattern of the Carpathian Flysch Belt includes:
- nappe fans, duplex nappes systems and anticlines, partial thrust faults
- normal slip faults, strike-slip faults, conjugate sets of left-lateral strike-slip faults
- disjunction zones passing through various nappe units

Accretionary character of the Magura Flysch wedge - origin on the upper part of subduction zone.

In the eastern part of the Nízký Jeseník Mts., the rocks show signs of only weak anchimetamorphism and very gentle ductile deformation; SE-vergent buckle folds of long wavelength are developed whose magnetic fabric can be easily unfolded geometrically. The metamorphic grade and ductile deformation gradually increase westwards. In the central areas, fracture cleavage and NW-vergent buckle folds can be found; the folds can be unfolded mostly only partially. In the western areas, NW-vergent cleavage folds and very well developed slaty cleavage occur. Magnetic fabric of the folds is homogeneous and the folds cannot be unfolded at all. The cleavage is transformed into metamorphic schistosity at the western border of the area.

The magnetic fabric in sandstones of the thrust sheets of the western sector of the Flysch Belt of the West Carpathians ranges from essentially sedimentary to mostly deformational in origin. In the thrust sheets at the margins of the Flysch Belt (outer Krosno-Menilite Flysch in the west and Bílé Karpaty unit and Oravská Magura unit in the east), magnetic fabric is mostly seimentary in origin, the ductile deformation being very weak, hardly detectable by magnetic anisotropy.

In the central thrust sheets of the inner Magura Flysch, magnetic fabric is relatively strongly affected by ductile deformation, represented by a combination of simple shear and lateral shortening, probably associated with the formation and motion of the thrust sheets driven by a push from the rear side due to the closing movements of the Magura Basin.

The ductile deformation is generally stronger in the frontal areas of the individual thrust sheets than in their central areas.