

Geodynamic model of the contact area of the Bohemian Massif and West Carpathians

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Abstract. Geophysical, geological and geochemical investigations are integrated in a model of sedimentary basin evolution and hydrocarbon generation, migration and accumulation in the contact area of the Bohemian Massif and West Carpathians.

Key words: Dynamics, Bohemian Massif, West Carpathians, Geology, Geophysics.

The model of hydrocarbon generation, migration and accumulation is based on integrated geological, geophysical and geochemical research in the contact region of the Bohemian Massif and the West Carpathians. The conceptual model is based on analysis of geochemical data organized in databases of hydrogeochemistry, production tests, geochemistry of organic matter, rock extracts, oils and gases. These serve as indicators of paleoenvironment and thermal history, as well as rock-fluid interactions. The computerized integrated modeling of basin evolution simulates burial, compaction, oil and gas generation from source rocks and enables testing of the mutual relationships of petrophysical, geothermal and geochemical processes in space and time. Significant erosion is documented in the Paleozoic of the Bohemian Massif and Rača unit of the Carpathian Flysch Belt. Some of the facies- or stratigraphy-sensitive parameters provide information on oil-oil or oil-source rock correlation in the region.

The studied area is situated on the contact of the Bohemian Massif and the Western Carpathians. The geological data in this area include results from a number of deep boreholes (up to 6 km deep) as well as an extensive data complex of geophysical measurements. The analysis of frequency characteristics and reprocessing of seismic and gravity data brings information about composition of density-balanced cross-sections of the upper layer of the Earth's crust and serve for tracing of main tectonic elements.

The analysis of the geophysical data belongs to frequently used research technique recently. This technique makes it possible to identify from the seismic and gravity data rather low-amplitude structural-tectonic features. The method is based on combined analyses of the reflectance image of the derived gravity fields and of the changes of the seismic echogenicity.

Following methods were used:

- completion of Bouguer gravity and derived gravity maps
- calculation of Linsser indications of density contacts
- completion of reflectance images of the gravity field
- examination of the digital model of the topography
- reprocessing and analysis of selected time seismic sections
- mapping of tectonic features through combined analysis of seismic and gravity
- composition of density balanced cross-sections along selected seismic profiles

We consider further advancement to be especially important in the knowledge of the structure and development of the nappe units of the Carpathian Flysch Belt. 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 was studied. The sorting of the Variscan and Alpine structural elements at the southeastern margin of the Bohemian Massif resulted also into evaluating of their importance with respect to potential oil and gas plays.

Based on a geological and geophysical synthesis the subcrop maps of the crystalline basement (Fig. 1), Paleozoic, Mesozoic, Paleogene and Miocene sediments of the Carpathian Foredeep and Carpathian Flysch Belt were constructed.

References

- Krejčí O., ed. (1999): Geodynamic model of the contact area of the Bohemian Massif and West Carpathians. Final Report - Manuscript, Czech Geological Survey, Archive, Praha, 561 p.



Fig. 1. Contact Area of the North European platform and the West Carpathians - Subcrop Map of the Cadomian Crystalline Basement