

Gravity Images of the Bohemian Massif and the West Carpathians Contact Zone

František HUBATKA¹, Oldřich KREJČÍ² and Jiří SEDLÁK¹

¹ Geofyzika a.s., Ječná 29a, 621 00 Brno, Czech Republic

² Český geologický ústav, Leitnerova 22, 658 69 Brno, Czech Republic

The study area, in the eastern part of the Czech Republic, near the border with Slovakia, covers the contact zone between the Bohemian Massif and the West Carpathians. The Bohemian Massif is represented there by the crystalline basement of Brunovistulicum and its Paleozoic and Mesozoic sedimentary cover. Toward the southeast, the Bohemian massif plunges under the Carpathian Neogene foredeep and the nappes of the Carpathian flysch belt, in the southeastern part of area with the successive Vienna Basin on the top. Klippen belt outcrops have been located along the eastern margin of the study area. The belt follows the contact of the Inner and Outer Carpathians. Densities of the study area lithologies vary within a relatively large interval of 2.00–2.90 gcm⁻³. As a result, the separate elements of the geological setting are clearly recognized within the gravity maps. Gravity images at the area of 19,000 km² are based on 75,000 gravity points. Shaded map of Bouguer anomalies has

been constructed through the N illumination. Numerous linear indications have been emphasized, among them the eastern edge of the Bohemian massif, the front line and also the inner structure of the Carpathian flysch nappes, the northeastern limit of the Vienna Basin and also the trend of Klippen belt. These NE-SW indications have also been recognized in the maps of residual anomalies and gravity gradients and reflect primarily the configuration of young tectonic elements. The NW-SE structures have also been identified in the gravity maps. They are mostly associated with deep structural elements including the basement and its platform cover. Distinct NW trending throughs, eroded on the slopes of the Bohemian Massif, have subsequently been filled up by low density Tertiary formations. Due to density contrast, the buried Nesvačilka and Vranovice throughs with significant hydrocarbon potential are clearly expressed in the gravity field images.

Tectonic Subunits in the Bôrka Nappe (Inner Western Carpathians): Their Lithostratigraphy and Original Position in the Structure of the Ancient Meliata Ocean Basin

Peter IVAN¹ and Ján MELLO²

¹ Department of Geochemistry, Comenius University, Mlynská dolina G, 842 15 Bratislava, Slovak Republic

² D. Štúr State Geological Institute, Mlynská dolina 1, 817 04 Bratislava, Slovak Republic

Geological history of the inner Western Carpathians (IWC) is closely interrelated to the evolution of the Triassic-Jurassic Meliata ocean basin. The reconstruction of this history is intricate problem due to fragmental preservation of the oceanic basin relics and extraordinary complex geological structure as a result of multi-stage nappe forming and tectonic reduction.

The Bôrka Nappe, located in the western part of the Spišsko-gemerské rudohorie Mts. and northern part of the Slovenský kras Mts., is one of the most important relics of the Meliata ocean basin including a complex of HP/LT metamorphosed rocks supposed to be a part of the accretion prism formed during the Meliata ocean subduction. Detailed study of the petrography, geochemistry and metamorphic evolution of basic magmatic rocks of the Bôrka Nappe as well as concomitant sedimentary rocks revealed that the Bôrka Nappe is composed of several individual lithostratigraphic units with different geological history. Two principal types of the units have been discerned: (1) lithostratigraphic units directly related to the Meliata ocean basin and (2) lithostratigraphic units of non-oceanic origin involved in further common tectonic evolution with oceanic rocks during subduction of the Meliata ocean. In the proposed lithostratigraphic division the (1) Hačava Formation (Fm.) and (2) Žiar Fm. belong to the first type of units and the second type is represented

by (1) Nižná Slaná Fm., (2) Jasov Fm., (3) Bučina Fm. and (4) Rudník Fm.

The Hačava Fm. is characterised by variable lithology and it comprises HP/LT metamorphosed basic magmatic rocks, clastic sedimentary rocks and carbonates. Internal structure of this unit reminds of sedimentary mélangé and locally also a system of tectonic slices. Carbonates are mostly associated with synchronous basaltic volcanism geochemically close to fractionated island arc tholeiites (IAT). Association with pelitic metasediments, rarely also with radiolaritic metachert, is rather typical for slices or small bodies of basaltic lava flows, dolerites and gabbros with back-arc basin basalt (BABB) or normal mid-ocean ridge basalt (N-MORB) signature. The Hačava Fm. was progressively metamorphosed from the prehnite-pumpellyite through prehnite-actinolite up to epidote-blueschist facies. Vestiges of pre-subduction ocean-ridge type metamorphism are preserved in dolerites and gabbro. The Hačava Fm. is supposed to be Triassic in age, whereas the age of the blueschist facies metamorphism was determined as 152–155 My.

The Žiar Fm. is lithologically similar to Hačava Fm. and represents probably mélangé of carbonate and basalt/dolerite olistoliths in the pelitic matrix. Basic volcanics crystallized from differentiated magma (Fe-basalts) and they are geochemically close