elements (Ta, Nb, Zr, Hf) and moderately enriched in Y and Cr relative to UCC.

Ternary diagrams used for the determination of tectonic setting of sediment provenance (e.g., Co-Th-Zr/10 and Sc-Th-Zr/10) from Bhatia et al. (1986) document continental arc / active continental margin provenance of the studied clastics. The sediments were derived for the most part from intermediate and acid magmatic rocks as shown in the Rb vs. K diagram.

## Conclusion

The source area of the Early Palaeozoic basal clastics of the sedimentary cover of the Brno massif was of the continental arc / active continental margin type, and was dominated by intermediate and acid igneous rocks. Somewhat higher contents of Yb, Lu and Cr in some samples (from boreholes Uh-6, Nik-4 and Te-1) may evidence a contribution of mafic rocks to the clastic material of the studied sediments. Micas and staurolite, identified in the clastic rocks, suggest the presence of metamorphics in the source area. Now available petrological and geochemical data on the studied set of samples do not distinguish between the "Cambrian" and "Devonian" groups of the clastics. The chemical composition of the studied samples was strongly influenced by diagenetic processes – e.g., carbonatization and kaolinitization.

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# Geodynamic Evolution Stages in the Outer Carpathians

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The Magura Basin, the Dukla and Fore-Magura set of basins, the Silesian Basin, the Sub-Silesian Ridge and the Skole Basin have been distinguished in the Polish Outer Carpathians. The last three units form true Outer Carpathian realm of the Late Jurassic to Neogene age of the basin development. The Magura Basin has a different history. A part of this basin was incorporated into the Pieniny Klippen Belt, while another part shared the geodynamic history with the other Outer Carpathians unit from the Late Cretaceous onwards. The following stages of geodynamic evolution could be distinguish in the Outer Carpathians defined as above: I – synrift and postrift, formation of passive margin and basin with attenuated crust, II – collisional, development of subduction zones, partial closure of oceanic basin, development of flysch basin, III – orogenic, perhaps terrane–continent collision with the accompanying convergence of two large continents, IV – postcollisional. These stages correspond with the global sequence stratigraphy, the three supersequences encompassing one stage.

During the Late Jurassic, rifting started in the southern part of the North European Platform, and small basins were formed: the proto-Silesian Basin in the Western Carpathians and the Sinaia Basin in the Eastern Carpathians. The rifting process was accompanied by volcanic activity, which persisted until the end of the Hauterivian. The Late Jurassic – Hauterivian deposition in the Silesian Basin was controlled by syn-rift subsidence, and later (Barremian – Cenomanian) by post-rift thermal subsidence, which culminated with the Albian – Cenomanian expansion of deep-water facies.

The Cenomanian – Late Eocene collisional stage is characterized by the formation of subduction zones along the active margin, partial closure of oceanic basin and development of main flysch basins associated with rifting on the platform (passive margin) with attenuated crust. Oxic conditions generally prevailed, with characteristic appearance of red and green shales. In the foreland of the Inner Carpathian folded area, within the Outer Carpathian realm, several basins became distinctly separated. At that time, the Magura Basin was incorporated into the Outer Carpathian realm. At the end of the Turonian, the Silesian Ridge was restructured and uplifted (Poprawa et al., 2002). The uplift of the Silesian Ridge was accompanied by an increase of deposition rates in the Silesian Basin. This uplift could have been connected with the shortening of the Silesian Basin (Oszczypko, 1999) and development of the Subsilesian peripheral bulge dividing the Silesian and Skole Basins during the Santonian – Paleocene times. At the end of the Paleocene, the Carpathian basins were affected by general subsidence and sea-level rise. This general trend dominated during the Early to Middle Eocene times in the northern basins as well as in the northern part of the Magura Basin (Poprawa et al., 2002). The Paleocene – Middle Eocene subsidence In the Magura Basin was related to the uplift of the Pieniny Klippen Belt and formation of an accretionary prism, which caused a shift of depocenters towards the north. The northern, deepest part of the basin, often lying below the CCD, was dominated by basinal turbidites and hemipelagites. During the Eocene, the axes of subsidence of the Magura Basin migrated towards the north.

The Latest Eocene – Burdigalian – orogenic stage is characterized by a collision, perhaps terrane–continent, with the accompanying convergence of two large continents. Terranes in the circum-Carpathian region Adria–Alcapa (Inner Carpathians) continued in their northward movement during the Eocene – Early Miocene (Golonka et al., 2000). Their oblique collision with the North European plate led to the development of the accretionary wedge of Outer Carpathians. During the Priabonian and Rupelian, a prominent uplift was recorded in the Outer Carpathian basin. The Outer Carpathian remnant oceanic basins turned into foreland basins (Oszczypko, 1999). The Oligocene subsidence was accompanied by a progressive migration of axes of depocentres towards the north. After the Late Oligocene folding, the Magura Nappe was thrust northwards onto the terminal Krosno flysch basin. This was followed by the last, minor subsidence event (Oligocene – Early Miocene) which can be partially related to the load of the accretionary wedge. The centres of subsidence were located in the Krosno basin and Magura piggy-back basin.

Africa converged with Eurasia during the Miocene. A direct collision of the supercontinents never happened, but their convergence did not leave much space, leading to the permanent setting of the Alpine–Carpathian system. Tectonic movements caused final folding of the basin fills and created several imbricated nappes which generally reflect the original basin configurations. During thrusting, the marginal part of the advanced nappes was uplifted whereas in inner part sedimentation continued in the remnant basin. Big olistoliths were often sliding down from uplifted parts of the nappes into the adjacent, more outer basins. The nappes became uprooted from the basement and the allochtonous rocks of the Outer Carpathians were thrust northward in the west and eastward in the east onto the North European Platform for a distance of 50 km to more than 100 km. Thrusting migrated along the Carpathians from the west towards the east. The inner part of the platform, including the marginal part of the flysch basin in the east, started to downwarp in front of the advancing Carpathian nappes, and a tectonic depression formed during the Early Miocene. It was filled with thick molasse deposits. At the end of the Burdigalian the basin became overthrust by the Carpathians and a new, more external one, developed. Clastic and fine-grained sedimentation of the Carpathian and foreland provenance prevailed with a break during the Late Langhian to Early Serravallian, when younger evaporate basin developed. Olistostromes were locally deposited (Oszczypko, 1998) with material derived from the Carpathians and the inner margin of the molasse basin. During the Langhian and Serravallian, a part of the northern Carpathians collapsed and sea invaded the already eroded Carpathians. The foreland basin and its depocentre migrated outward and eastward, simultaneously with the advancing Carpathians nappes. As a result, the Neogene deposits show diachroneity in the foreland area. Sedimentation terminated in the Langhian already in the west and continued till the Pliocene in the east. These events mark the postcollisional stage in the evolution of the Outer Carpathians.

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# European Suture in the Carpathians and the Scientific Problems of the Orava Deep Drilling Project

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A significant progress in the investigations of geodynamics and plate tectonics of the Carpathian orogen was achieved in the last years (Birkenmajer, 1988; Golonka et al., 2000; Kováč et al., 1998; Plašienka et al., 1991; Plašienka, 1999). This progress enabled to formulate new scientific ideas and highlight problems that could be solved by scientific drill-