Turbiditic sedimentary fill of the Central-Carpathian Paleogene Basin

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The Central-Carpathian Paleogene Basin (CCP Basin), located south of the Carpathian Klippen Belt, is elongated, tectonically confined basin with prevailing turbiditic sedimentary fill. The basin fill records a delicate interplay between the tectonics, eustasy and climate governing deposition style and position of depocenters in time. Location of the basin in the buffer zone between the Carpathians and the North-European Platform suggest an important role of tectonics during its evolution, which often overprints effects of global eustasy and climate. Investigation of the basin east of the Tatra Mts. points to its complex tectono-sedimentary history.

Filling of the basin commences with subaerial deposition in the Paleocene and Early Eocene which is recorded by fluvial and slope deposits huging the northern slopes of pre-Tertiary units generally located south of the basin. It suggests uplifted massifs of Gemericum and Veporicum during the Paleogene. The Paleocene – early Eocene evolution at the northern margin of the basin is still not clear, however, sedimentary contact between the Paleocene, Early and Middle Eocene deposits and rocks of Mesozoic Haligovce Unit in the Pieniny Klippen Belt realm (Potfaj and Rakús in Janočko et al. 2001; Köhler and Buček 2000; also see Gross et al. 1993) may suggest similar history at the northern margin of the CCP Basin.

The first marine incursion into the basin occurred in the Middle Eocene. It is recorded by shallow-marine deposits containing foraminifera fauna and nanoplankton. The Middle Eocene deposits were found in several boreholes in the Polish part of the basin (e.g. Olszewska and Wieczorek). In the eastern, Slovakian part of the basin the Middle Eocene deposits were found near Ždiar on the northern slopes of the Tatra Mts., in the surroundings of Lipany (Buček 2001) and in the eastermost part of the basin near Humenné (S. Buček pers. commun. 2000). Distribution of the Middle Eocene deposits points to marine incursion from the area of present-day Klippen Belt. Subaerial and shallow-marine deposition prevailed until the later part of the Middle Eocene. At the end of the Middle Eocene accomodation space increased resulting in prevailing mudstone deposition as recorded in the Šambron – – Kamenica zone. The mudstones are overlain by several turbidite systems evolving at the end of the Middle Eocene (NP16) and suggesting fall of relative sea level.

At the beginning of the Late Eocene turbidite deposition switched off in the Šambron – Kamenica zone and passed into basin widespread mudstone deposition. This is recorded in Kamenica and Ždiar areas and in the Polish part of the basin. At the end of the Late Eocene thick, massive sandstones (Spišská Magura) and chaotic breccias (Vítkov breccias) were deposited suggesting fall of relative sea level. This was followed by subsequent sea level rise recording by mudstone deposition almost in the whole area of the eastern part of the basin. Already in the Early Oligocene channel-and-levee turbidite systems originated and their activity continued until the Late Oligocene. The deposition in the basin terminated by thick sandstone and conglomerate packages suggesting fall of relative sea level.

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Strontium Chemostratigraphy of Carbonate Sediments – Pilot Study of Silurian and Devonian Brachiopods from the Prague Basin

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The widespread and largely uninterrupted carbonate sedimentation in Late Silurian–Middle Devonian times, wealth of fossils, as well as two centuries of detailed palaentologic research made Prague Basin an archetypal terrain with several internationally recognized stratotypes. Unfortunately relatively little attention has been paid to chemostratigraphy, with Sr isotopic

data being virtually absent. This fact seriously restrains utility of the Prague Basin as an international standard and complicates interpretation of its development in time and space.

Hence main aims of our study were: (1) to characterize the Sr isotopic composition of Late Silurian to Middle Devonian seawater in this region in order to facilitate correlations with similar sequences abroad, (2) to test whether (when) the studied basins were fully connected with the world ocean reservoir and provide constraints on their sedimentary environment, (3) to apply the Sr isotopic composition for direct dating of sections lacking stratigraphically significant pelagic faunas (e.g., on reefs). As a study material were chosen microdrilled samples of secondary layer of carefully selected, little altered brachiopods, arguably the best available proxies for composition of Palaeozoic seawater (e.g., Veizer et al. 1999 and references therein).

The newly obtained Sr isotopic data for Lochkovian and Early Givetian brachiopods from the Prague Basin behind the Koněprusy reef closely follow the development of the main ocean reservoir. In Pragian to Emsian, however, the data points plot above the seawater curve extrapolated from the extensive reference database of Veizer et al. (1999). This fact, together with high contents of transition metals and anomalous, high $\delta^{18}O$ values in carbonate of the studied brachiopods (Hladíková et al. 2000), indicate that the communication of Prague Basin with the main ocean reservoir had to be limited during a substantial part of Early Devonian. On the other hand, this barrier must have been incomplete, as the exchange of planktonic faunas was not interrupted.

As an analogous trace-element and O isotopic anomaly was not observed in brachiopods from the Pragian sequence of the Koněprusy reef itself, it may be concluded that this reef was exposed to open ocean. Hence Sr isotopic ratios from the exposed side of the reef should mimic those of the main ocean reservoir and should be usable for dating. When our results from apical part of the reef are compared with reference data by Veizer et al. (1999), ratios 0.70840 to 0.70842 indicate Middle Pragian ages corresponding to the *kindlei* Z. (Janoušek et al. 2000). On this basis it seems that the Pragian sedimentation on the Koněprusy ridge was relatively short-lived, reflecting mostly a secondary mid-Pragian sea level rise, with the Upper Pragian carbonate beds being either primarily absent and/or later largely truncated.

Taken together, the easiest explanation of the available stratigraphic and geochemical data is that reef structure at Koněprusy, preserved fragmentarily, originally continued in large oceanic reef chains of atoll shape (Galle et al. 1999) that separated the inner part of the Prague Basin from the main ocean reservoir. Considering a slight and even diminishing content of silt and clay in carbonate deposits of these Pragian–Eifelian times, the anomalously radiogenic compositions of the brachiopods may be due to: (1) retarded development of Sr isotopic composition as a consequence of incomplete homogenization of the detached basin with the main ocean reservoir, (2) deposition of aeolian dust from the Old Red Continent in the NW (cf. rich Old Red spore assemblages in zoo-geographically peri-Gondwanan Barrandian, Hladil and Bek 1999), (3) limited dispersal of lateritic weathering products around eustatically emerged carbonate plateaux.

This work was supported by the Czech Grant Agency Grant 205/98/0454 and institutional project Z 3-013-912.

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The Pb-Zn Deposits Connected with the Rejuvenation of the Staré Město – Kletno – Marcinków Fault Zone

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The Staré Město–Kletno–Marcinków fault zone is a steep, NW-trending polyphase feature which cross-cuts various lithostratigraphic units of the Śnieżnik Metamorphic Complex. The northern part the S–K–M f. z. is about 1,5 km wide and makes the boundary between the Stronie schists and the Śnieżnik orthogneisses. An early ductile deformation gave rise to mylonitisation along this boundary on the fault steeply dipping toward NNE, which developed in a normal regime (Cwojdziński 1983).

The S–K–M f. z. was rejuvenated at brittle conditions in a regime with significant thrust component and some unmetamorphosed conglomerates, considered Late-Devonian – Early-Carboniferous in age, was trapped near Kletno. Among clasts occur pebbles of the surrounding rocks and those of unknown provenence (Kasza 1964). In the vicinity of Marcinków S–K–M fault is located 1 km to the east of the schists-gneisses boundary within quartz-graphite schists (Cwojdziński 1983).