

SUBSURFACE MODELLING OF THE BOHEMIAN CRETACEOUS BASIN: TOP ENVELOPE OF PERMOCARBONIFEROUS DEPOSITS, PRELIMINARY RESULTS

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Introduction

The extensive basement area of the Bohemian Cretaceous Basin (BCB) consisting of crystalline rocks and Permocarboniferous deposits is subject of the Research Centre project aiming at the construction of 3-D model of the major geological units composing the BCB. This project is focused on re-evaluation of extensive borehole data, presently from the central part of the BCB and on interpretation of existing geological and geophysical datasets. Construction of subsurface 3-D model provides an insight beneath the BCB sedimentary cover and represents a powerful tool for applied geosciences. Primarily 3-D models of the crystalline basement and Permocarboniferous fill represent the key features for evaluation of potential carbon dioxide geological storage in the Czech Republic. Thus, preliminary results of construction of the Permocarboniferous top envelope 2-D model (Fig. 1) are presented in this paper.

Permocarboniferous top envelope

Archive borehole data from the ČGS-Geofond were processed with the aim to derive borehole depth database and to create 3-D model of the subsurface top limitation of Permocarboniferous sedimentary and volcanic rocks in the central part of the BCB. The study area involves borehole data from the Mnichovo Hradiště Basin, Krkonoše Basin, western part of Intrasudetic Basin, northern part of Orlice Basin and Blanice Graben. Furthermore, studied area was extended towards the E (Krompach-Doksy-Sojovice-Brandýs-Říčany line) and the S (Říčany-Kutná Hora-Chrudim-Litomyšl line) with the aim to trace isolated relicts of Permocarboniferous deposits. Seismic cross sections, vertical electric sounding logs and gravimetry maps were used as additional data source for modelling.

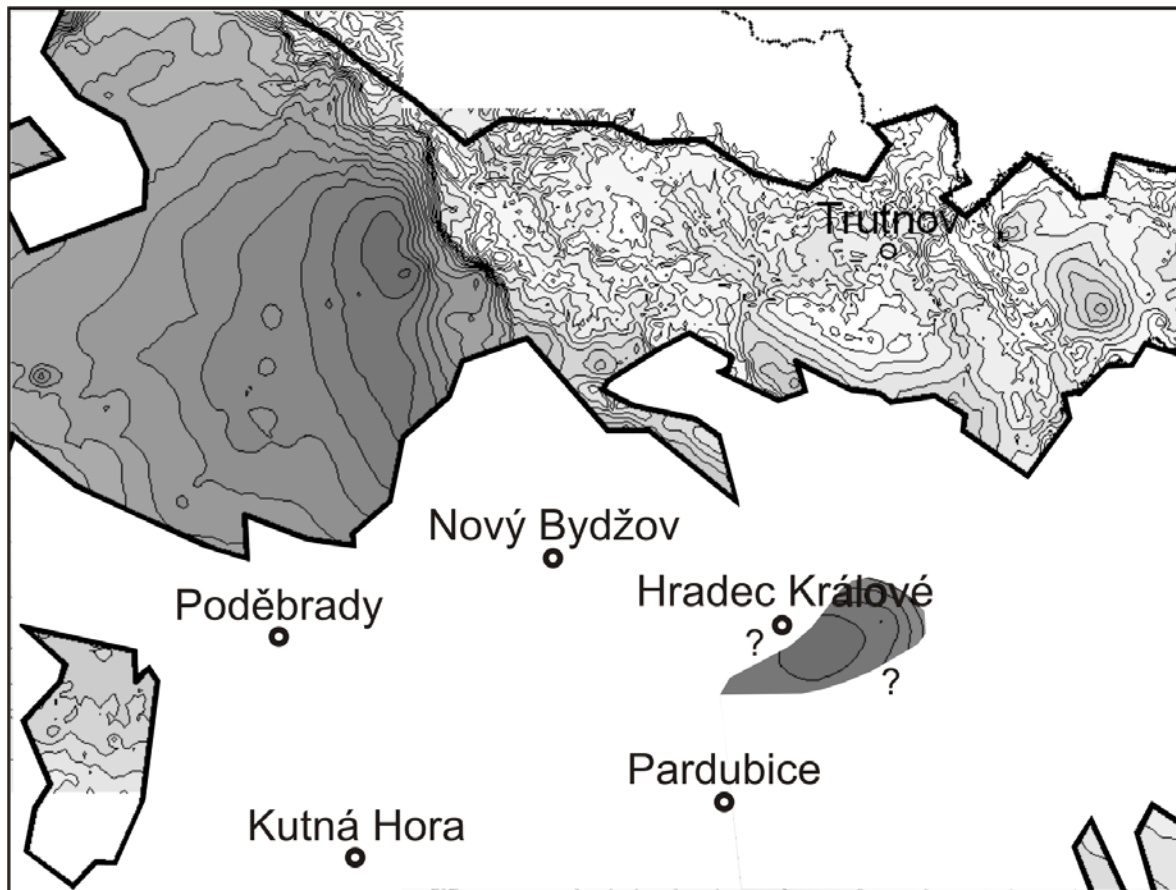


Fig. 1. 2-D model of Permian-Carboniferous top envelope altitudes in the Blanice Graben, Mnichovo Hradiště Basin, Krkonoše Basin, western part of Intrasudetic Basin, and northern part of Orlice Basin. Greyscale with interval from +500 m to -400 m darkens down to minimum altitude of -343 m.

Preliminary results of 2-D modelling are illustrated in Fig. 1, which represents map of altitude isolines of the Permian-Carboniferous deposits upper limitation. The map was constructed by borehole data interpolation using Surfer SW. Based on geophysics data, the Permian-Carboniferous relicts at the southern margin of the Krkonoše Basin (eg. Hořice relict) have been incorporated into Krkonoše Basin area. On the other hand, the isolated Hradec Králové relict was only penetrated by 3 boreholes and seismic data are absent in this area. Despite the former interpretation (Holub and Müller, 1972) of relict extent described its limitation as tectonically bounded triangular block elongated to the N, another deep borehole reached Carboniferous strata in the area between Pardubice and Hradec Králové and is most probably interconnected with Hradec Králové relict (Fig. 1). Moreover, this interpretation is supported by 2-D model of crystalline basement but due to limited subsurface exploration of this area additional modelling of tectonic blocks will be necessary.

Nevertheless, the Hradec Králové relict with minimum altitude of –345 m and the Jizera paleovalley area parallel with the Lužice fault with minimum altitude of –327 m represent the deepest levels of Permocarbiniferous top envelope and important Cretaceous depocentres. On the opposite side of the Jizera paleovalley, the Cenomanian strata are not developed in Hradec Králové area. This situation is explained by the existence of paleoelevation in Cenomanian (Vachtl, 1965). Due to middle Turonian tectonic activity, normal faults of the NW- SE orientation were activated (Malkovský et al., 1974) and the Hradec Králové area Permocarbiniferous deposits and crystalline basement formed present depression. As mentioned above, further tectonic studies have to be performed in this area to explain structure of the Hradec Králové relict. The present modelling of the Permocarbiniferous top envelope is focused on tectonic interpretation of the studied area, on construction of 3-D models of Permocarbiniferous deposits and volcanites, and on construction of 2-D model of the extent of stratigraphic units.

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