

Tectonosedimentary Evolution of NW Bohemia Based on the Digital Elevation Model of Crystalline Basement and Upper Paleozoic Strata: Preliminary Results.

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Digital elevation model of crystalline basement underlying sedimentary and volcanic units in the area of NW Bohemian brings a new view on geological structures in this area. Digital elevation model (DEM) of crystalline basement in the area of Doupovské hory Mts., North Bohemian basins and České středohoří Mts and DEM of the surface of Upper Palaeozoic strata were constructed using completely reevaluated well log database of the Geofond CR and other sources. Total amount of c. 20,000 well logs for the construction of basement relief and 2606 well logs for the surface of Upper Paleozoic strata were processed. Areas where crystalline basement outcrops on the present-day surface, were covered by data from Digital elevation model (DMR 2, grid 100 × 100 m). Results of previous interpretations (Mlčoch and Martínek, 1998) and seismic reflection profiles (Chudomel et al., 1983) was used in regions with low density of well log data. Basic 3D modelling was used, no break lines (faults) were incorporated in 3D surface modelling.

Presented 3D models show main geological structures in greater detail, more completely and on significantly larger area than previous studies. Morphology of the crystalline basement is the result of polyphase tectonic development from the Upper Paleozoic until present. Morphology of the Upper Palaeozoic sediments show post-Permian activity on several fault systems.

Three main fault systems are well-expressed in DEMs – NE-SW, E-W and NW-SE. These systems played most important role in forming the Upper Paleozoic, Cretaceous and Tertiary sedimentary basins. The normal faults with high displacement are morphologically most expressive as well as separated depressional and elevational structures. Strike slip faults and faults with small displacement are beyond resolution of this model.

During the Upper Paleozoic the largest part of tectonic activity took place, which is evidenced by largest displacement on the normal faults. Crystalline basement extensionally collapsed and disintegrated along normal faults to several blocks. This break-up was accompanied by formation of sedimentary basins of extensional half-graben setting. At least two main stages of tectonosedimentary development of these basins can be recognized. Asymmetry of Westphalian - Stephanian B sedimentary fill shows that during this period subsidence along the southern marginal faults of SE direction was the main factor controlling architecture of the basins. At Stephanian B–C boundary large unconformity can be observed in the sedimentary record. Half-grabens reversed and younger strata show asymmetrical fill with maximum thickness along northern marginal faults (Střezov and Litoměřice faults, Figs. 1 and 2), which were the main structures controlling basin architecture at that time. Post-Permian de-

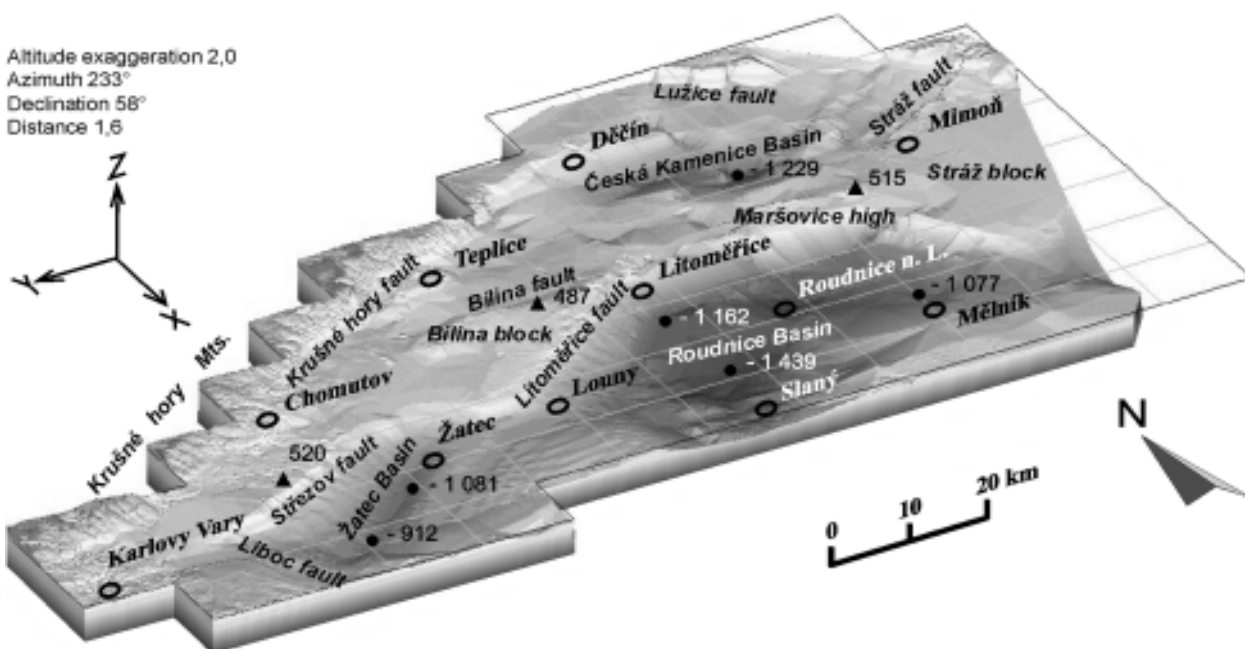


Fig. 1. Digital elevation model (DEM) of the crystalline basement in the study area, NW Bohemia. Main faults, basins and elevation structures are shown. Triangles – elevation highs, full circles – elevation lows, empty circles – towns.

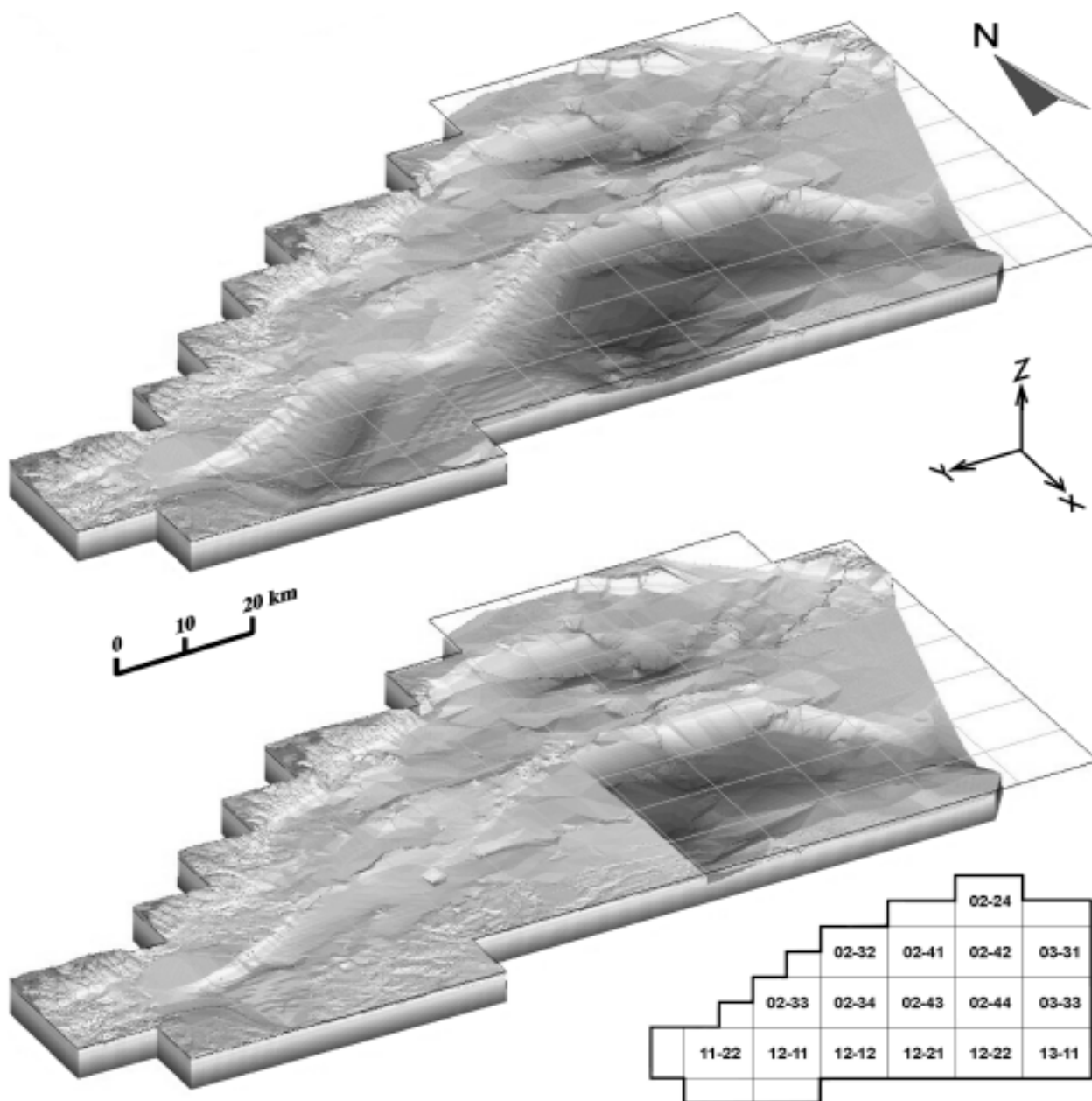


Fig. 2. Digital elevation model (DEM) of the crystalline basement in the study area, NW Bohemia (above). Digital elevation model (DEM) of the crystalline basement in the study area, surface of the Upper Paleozoic strata covers only western part of the area under consideration (below).

velopment can be deduced from the surface of Upper Paleozoic strata. The presence of NE oriented depocenter along the Střezov fault and E-W-oriented depocentres along the Bílina fault and Žatec-Louny depression evidence subsidence along these faults during the Mesozoic and Cenozoic.

The 3D model of crystalline basement shows clearly three main sedimentary Upper Paleozoic basins in the study area: Žatec Basin, Roudnice Basin and Česká Kamenice Basin, which are separated by elevations of the basement. The Žatec Basin occupies approximately the area of the Žatec depression (western part of the Kladno–Rakovník Basin sensu Holub and Pešek

1992) and Roudnice Basin covers the area of central and eastern part of the Kladno–Rakovník Basin and Mšeno–Roudnice Basin sensu Holub and Pešek 1992. As indicated by Holub-Pešek 1992, their classification of sedimentary basins in this area is based on traditional names of coal mining districts and does not reflect structural development. Boundaries between their “basins” are more or less formal, following postsedimentary NW striking faults. From the tectonosedimentary point of view it is apparent that Žatec, Roudnice and Česká Kamenice basins are the main Upper Palaeozoic basin structures present in the study area.