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A 3D basin model of the Budejovice Basin (southern Bohemia) with a special focus on the Hluboká-Fault Zone

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The Budějovice Basin, along with the adjacent Třeboň Basin in the east, is part of the South Bohemian Basins located on the Bohemian Massif in Czech Republic. These sedimentary basins occupy an area of approximately 2300 km^2 overlying Variscian crystalline basement. The basins are partly delimited by NNE-SSW and NW-SE striking fault systems. Deposition of sediments started in the Upper Cretaceous and lasted till Neogene times. The depocenter of the Budějovice Basin is located in its south-eastern part with an overall depth of 340 m below surface. To the NE the basin is confined by the Hluboká-Fault, which partly appears as a morphological scarp.
The aim of this study is to get new insights into the poorly known kinematic history and the timing of fault activity of the Hluboká-Fault Zone by investigating structural features along the fault. Therefore, structural data were collected from ductile (foliation, folds and stretching lineation) and brittle structures (faults, slickensides, tension gashes etc.) from 30 outcrops situated along the Hluboká-Fault Zone. For information about the ages of the different fault movement events, data were collected from outcrops located in crystalline basement rocks, further in Permian, Cretaceous and Miocene sediments of the Budějovice Basin. In addition, computer aided 3D modeling of the crystalline basement and the sedimentary fill helps to understand the tectonic evolution of the Budějovice Basin. Drilling reports from the Czech Geological Survey in Prague (Geofond) were used for modeling the basin shape, as well as the thickness of the Upper Cretaceous and Neogene sediments. The current basin model is based on subcrop information obtained from 679 wells.
Information obtained from structural field data and thin section analysis indicates that the first movement of the Hluboká-Fault System occurred at low to very low metamorphic conditions in late Variscan times. The ductile structures are overprinted by brittle faults. These include sub-vertical strike-slip faults striking parallel to the Hluboká-Fault with dextral sense of shear - found in most of the outcrops - and brittle normal faults and mineralized extension gashes revealing SW-directed Extension. The latter occur in Variscan phyllite, Permian sediments and Cretaceous shales suggesting post-Cretaceous Deformation age.

Interpretations of the 3D basin model show that the crystalline Basement plunges towards the eastern border of the basin with a dip of approximately 5°. On the eastern and north-eastern border of the basin the Hluboká Fault offsets the crystalline Basement for up to about 340 m. Data show that the fault steeply dips towards SW with approximately 65°.