

Tectonic and Stratigraphic Study of Limestones at the Western Border of the Brno Massif.

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Limestone bodies of the eastern border of the Boskovice Furrow were investigated within the project „Stratigraphic, facial and tectonic research of localities of limestones of western Brunovistulian cover“ (GAČR grant No. 205/98/0751). In this contribution the most important preliminary results of meso- and microstructural analysis and stratigraphic study are summarized.

Stratigraphic study is highly complicated by deformation. In many parts of the area sedimentary structures are tectonically modified to such an extent that the lithostratigraphic parallelization with the units of the Moravian Karst is impossible. We consider palaeontology supported by a detailed microscopic analysis of thin-sections as the only objective stratigraphic methods.

Biostratigraphic study is focused on the analysis of foraminiferal assemblages in thin-sections and of conodonts in insoluble residues of limestones. Due to a bigger resistance during deformation the study of stromatoporoids and corals is suitable as well. The finds of poorly preserved fossils are very scarce and together with microfacies analysis they confirm similarity of the limestones studied with the limestones of the Moravian Karst. Besides limestones of platform facies also limestones of deeper environments were identified, similar to Devonian and Lower Carboniferous calciturbidites of the southern part of the Moravian Karst or of basinal development.

Conodont alteration indices (CAI) indicate maximum temperatures from 190-300°C (CAI 4) to 300-480°C (CAI 5). The surfaces of the conodonts are corroded and opaque, which also indicates higher alteration temperatures. These values of temperatures are comparable with the results of vitrinite reflectance analysis in sediments of the Konice Palaeozoic which are interpreted as a result of considerable tectonic burial (possibly >5 km, Střelcová et al. 1997).

Magnitude of the ductile deformation varied considerably in different parts of the area which is indicated by relatively well preserved fauna at some localities. We suppose that the deformation concentrated mainly in narrow shear zones which developed in less competent facies.

Strong deformations are indicated by isoclinal folds in the area of southern termination of the furrow. Two generations of foliations and lineation which is non-parallel to the fold axis evidence a complex deformational history. Microstructures also indicate strong deformation. The elongation of 260–380 % was calculated from book-shelf boudinage of calcite clasts in the limestones of the Kadov locality. In the central and northern parts of the area ductile deformation is indicated by fibrous pressure shadows of quartz clasts. 170–220 % elongation was measured in pressure shadows in the Veveř-Chudčice limestone belt (central part). In the northern termination of the Brno massif up to 440–500 % elongation is indicated.

Relatively strong shape anisotropy is developed in some of the limestone samples. With the use of the X-ray textural analysis crystallographic preferred orientation of calcite in homogeneous fine-grained limestones could be described in quantitative and qualitative terms. Mechanisms of deformation and active slip systems were studied from the symmetry and orientation of the maxima in the crystal orientation distribution. Deformation temperatures obtained from CAI fall in the area of conditions where dominance ratio of the activity of e-twinning, r- and f- slip changes significantly (e.g. Wenk et al. 1987).

The analysis of ductile deformation showed a strong cataclasis caused by thrusting of the Brno massif over the Permian-Carboniferous sediments of the Boskovice Furrow.

References

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