the Upper Devonian, the blocks collided, rotated and were imbricated. In some places the blocks may have collided according to to the scheme theoretically worked out by Cloetingh and Banda (1992). They formulated an idea about interfigering of collided blocks, which may explain the presence of HP rocks in some horizons without subduction.

This succession of events is in accordance with the opinion expressed long ago by H. Teisseyre (1959), K. Dziedzic (1965) and J. Don (1961). According to these investigatores there are no signs of Sudetic Phase in the Sudetes. The above mentioned phenomena also explain the mosaic-like design in the Sudetes, and the generation of large amouts of granitic magmas, with different S_{ri} ratio, in an unusually thick crust after the collision. The different S_{ri} ratios are easily explained by partial fusion of blocks sandwiched with remnants of oceanic crust involved in the imbrication proccess.

The collision of the Sudetic blocks also explains the phenomena of three virgations situated in the corners of the Sowie Góry Mts. The western virgation has probably the nature of a syntax dividing the Kaczawa Mts. and also hidden under the Strzegom–Sobótka granite massif. This is only a working hypothesis and has to be elucidated by further investigations.

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Structural-Tectonic Study of Sedimentary Complex of the Chrudim Palaeozoic: An Example of the Prachovice Quarry (Železné hory Mts.)

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Introduction

The Prachovice quarry in the Železné hory Mts., E Bohemia, is a supplier of raw material to one of the largest cement works in the Czech Republic. The study of its structural characteristics was focused on the black zones of the Silurian–Devonian sequence of the Prachovice Formation (black graphitic shales and dark grey limestones) and on the light grey Podol Limestone frequently occurring in all profiles of the quarry (Fig. 1).

The aim of the study was to document and measure structural elements originating from the processes of sedimentation and the modes of deformation of the above mentioned rock types.

Results

The Devonian Podol Limestone is several times overthrust by the black shales of the Prachovice Formation (Silurian and Lower Devonian) to the N direction. The latter form three dark E–W-trending belts in the ligth grey Podol Limestone.

Boundaries between the individual lithostratigraphic units, which are gradational in a normal stratigraphic succession, as well as the sharp contacts between the overthrust zones represent notable structural elements. Both types of boundaries plunge S at moderate to steep angles (35°–85°). The black shales are slightly folded with high wavelengths and low amplitudes. The axes of the folds are mostly very flat, trending E–W.

Characteristic lithofacies of the Prachovice Formation are the black graphitic shales with intercalated thin-bedded clayey limestones. Bioclastic limestones with cephalopods and disarticulated columnals of crinoids were observed in the middle and upper parts of the Prachovice Formation. Orthocone cephalopods are dominantly orientated by paleocurrents in the E–W direction.

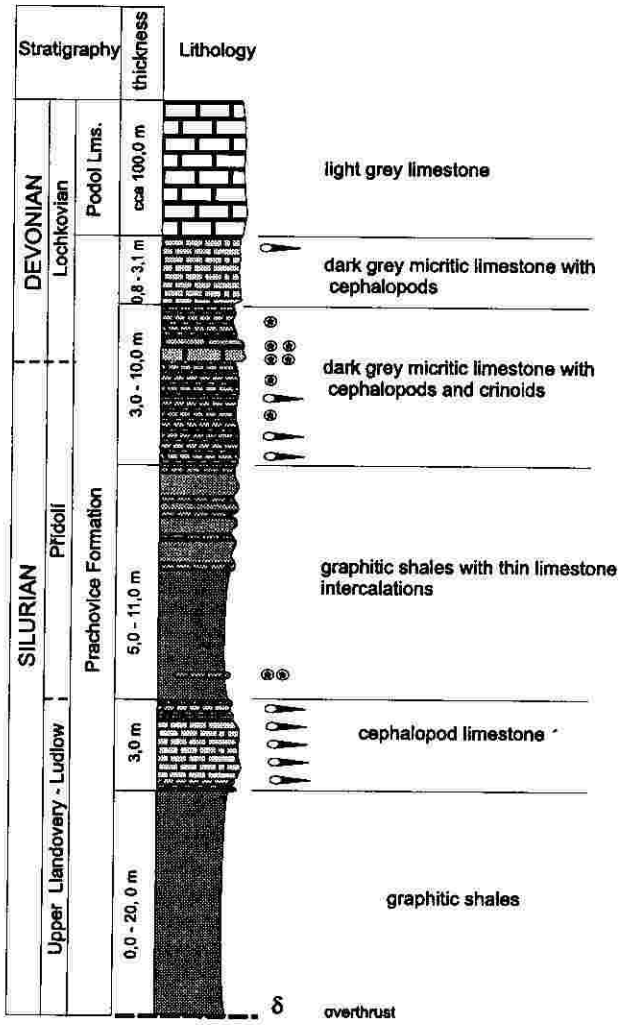

Fig. 1. Idealized lithological section through the Silurian and Devonian in the Prachovice quarry

Layers of black graphitic shales and of dark grey limestones of variable thicknesses are extensively foliated and folded; or, the graphitic shales may anastomosingly embed individual blocks of dark grey limestones. The foliations dip S at moderate to very steep angles (25°–85°). Fold axes show highly variable trends and lie mostly subhorizontal. The cleavage dips E and W at moderate angles or lies subhorizontal.

Light grey limestones of the Podol Mb. display the original sedimentary bedding characterized by changes in lithology. The bedding is affected by all subsequent deformation processes. The deformation event associated with the formation of metamorphic foliation and lineation probably transposes the original bedding, since no angular changes were observed. Isoclinal folds locally developed in the limestones. Bedding and foliation planes dip S at 40°–90°, generally very steeply. Lineation, as defined by the orientation of calcite, shows gentle and flat plunges to the SE. Both the axes and the axial planes of the folds are flat and orientated to the SE.

The faults in the quarry are characterized by brittle shear zones filled with breccia and coarse-grained calcite. These structures are mostly steep to subvertical, striking NW–SE. Joints are mostly developed in the limestones. They were produced by brittle deformation, are very steep to vertical and strike N–S. The cleavage dips SE and E at medium angles or lies subhorizontal.

Discussion and conclusions

From the viewpoint of the deformation mechanism, rocks in the quarry were divided into two types: i) limestones, ii) black graphitic shales. The limestones were folded to form isoclinal folds and show a complicated joint system resulting in considerable degree of brittle deformation. Graphitic shales were more plastic than limestones, were more intensively folded, and anastomosingly embed the blocks of dark grey limestones.

All the above mentioned findings indicate that the complicated tectonic evolution of the Prachovice section of the Vápenný Podol Syncline was dominated by overthrusting, i.e., the isoclinal structure of the study area can be excluded.

Indications of Recent Vertical Crustal Movements in the Nový Kostel Focal Area

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Significant contribution to the study of crustal dynamics is provided by geodesy. In the last decade the classical geodetic methods (triangulation) were replaced by the revolutionary GPS system (Global Positioning System). This satellite technique of position determination eliminated time-consuming geodetic measurements and enabled to install large-scale networks even in extremely difficult conditions. The disadvantage of the GPS is a relatively lower precision in vertical component (height), as even many hours of recording do not provide an accuracy better than 1 centimetre. From this reason, a precise levelling method has to be applied in some cases of vertical movements investigation.

Since 1994 annual campaigns of precise levelling have been performed on the network established in the surroundings of Nový Kostel. The network covers the most dynamic part of the West Bohemian seismoactive region with a total of 70 points in 1999. The measurements are connected to a reference point of the national levelling system and to our GPS-gravity network. It was proved by the error and confidence level of the data that small displacements of three and more millimetres can be recognised.

The analysis of data showed that all points of our network could be divided into several groups according to changes in height through time. Mutual comparison of these changes enabled to detect both general and very local short-term movements. It appeared that, in general, the involved part of the mountain block is subsiding relative to the Cheb Basin. This is in contradiction to the Recent uplift of the Krušné hory Mts.