the Krumlovský les Upland. Their presence testifies to totally denudated Jurassic limestones in this part of the Bohemian Massif. Finally, it is possible to find the Jurassic geodes at many sites of Pleistocene terrace gravels in South Moravia.

Megascopically the geodes have usually globular shape, sometimes with a stalk-like prominence. As for their origin, since the beginning of their research in the second half of the 19th century it was believed they could represent especially silicified Porifera or other marine animals (Wankel 1882, Mejzlík 1977). The authors of this contribution prepared thin sections of such geodes resembling the sponges, examined them by means of microscope and they found no traces of organic textures. On the other hand, as a typical sign of Moravian Jurassic geodes their sculpted outer surface similar to a cauliflower has to be mentioned. Geodes with analogical shapes and surfaces have been described from various parts of the world. In addition to it, the authors found relics of sulphates (anhydrite, barite) in all studied geodes.

In thin sections it is possible within the geodes to distinguish a few zones differing in presence of some varieties of SiO_2. The margin of geodes is built of spherical or radial aggregates of probably quartzine (fibers of chalcedony having a positive crystallographic elongation) with relics of anhydrite textures showing brown coloration of central part of aggregates when we study the thin section only with polarizer. These marginal parts do not contain sulphate inclusions. The geode border passes continuously in the zone of coarse-grained subhedral quartz with undulatory extinction. The presence of sulphate inclusions is typical of this part of geodes. The EDX-analyses and XRD examination proved anhydrite in geodes from primary occurrence in Jurassic limestone at Klepačov (west of Olomučany in the Moravian Karst) and from secondary position in the Syrovice – – Ivaň Pleistocene terrace at Žabčice (South Moravia). The XRD analyses identified beside prevalent quartz unambiguously the two strongest x-ray diffractions of anhydrite – 3.499/100, 2.849/10 (d/I_r). Using the spot EDX-analyses inclusions of barite were found in a smaller amount as well. The inclusions of sulphates have usually lath or leaf shape with their dimensions in 0,X – 0,0X mm. It is possible to prove the parallel extinction to their elongation. The distribution of inclusions is prevalently irregular but they also form clusters in the central part of quartz crystals. The internal part of geodes is built of coarse-crystalline quartz forming druses of crystals absolutely without sulphate inclusions. Covers of chalcedony (having often the so- called zebra pattern in crossed polars) represent the innermost and youngest parts of the geodes.

Conspicuous morphological similarity of Moravian Jurassic geodes with the geodes from Rutba in Iraq (Petránek et al. 1983) and from Triassic dolomite conglomerates in the surroundings of Bristol, UK (Tucker 1976) was noticed already by Petránek (1995). Our microscopical study of Moravian geodes has confirmed the similar genetic interpretation with the Iraqi and English geodes – siliceous pseudomorph after sulphate (prevalently anhydrite) concretions. This conclusion is based not only on the presence of sulphate inclusions but also on identification of SiO_2 varieties and other textural signs typical of pseudomorphosed sulphates (Siedlecka 1972; Milliken 1979). It is necessary to mention other occurrences with the same interpretation in the world – geodes from Lower Carboniferous dolomite formations in Tennessee and Kentucky, USA (Chowns and Elkins 1974, Milliken 1979) or from Upper Cretaceous dolomite sequences in northern Spain (Garcia-Garmilla and Elorza 1996; Bustillo et al. 1999).

The finds of numerous sulphate inclusions are important from the palaeoclimatic point of view. Origin of anhydrite concretions in carbonate rocks indicates a presence of hypersaline pore waters during early diagenesis in the sediments at the sea margin, probably under conditions of its regresion. The sedimentary environment has been often compared to the recent sabkhas in Persian Gulf. We suppose similar sedimentary setting at the end of the Upper Jurassic in the central part of the Moravian Karst and in the Krumlovský les Upland.

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Tectonometamorphic Evolution of the Stronie Series near Javorník

Markéta ROMANOVÁ and Pavla ŠTÍPSKÁ

Institute of Petrology and Structural Geology, Charles University, Albertov 6, 128 43, Prague, Czech Republic

The studied area occurs at the NE margin of the Orlica-Sneznik orogenic root which represents a deformed and metamorphosed Late Precambrian-Early Paleozoic basement-cover sequence composed of granites and volcano-sedimentary series. The present work is essentially focused on the description of structures and related metamorphic evolution of one part of the volcano-

sedimentary Stronie series which extends from the Javorník town at the NE towards the Polish border at the SW.

The investigated belt is composed of paragneisses and micaschists with intercalations of amphibolites, amphibole-bearing gneisses, marbles and quartzites and is surrounded by the augen to fine-grained orthogneisses. The first recognized structure in the area is a rarely preserved subvertical NE-SW trending foliation S_1 defined by metamorphic and lithological layering without an apparent lineation. The S_1 foliation is folded by open to isoclinal F_2 folds which led in some areas to a complete transposition into the S_2 foliation. The centimetre- to several metre-scale F_2 folds are asymmetrical to subhorizontal NE-SW trending axes and axial planes dipping to the NW under shallow to intermediate angles. In the areas of the complete transposition, the S_2 foliation dips under shallow to intermediate angles to the NW or to the SE and bears a NE-SW trending intersection lineation L_2 parallel to the fold axes. Isoclinal centimetre-scale rootless F_2 folds composed of quartz and feldspar exudations are often preserved within the transposed S_2 foliation. The degree of transposition is most advanced in the soft micaschists and paragneisses, whereas in the areas with higher amount of stronger amphibolite and marble layers the folds are more open, and locally vertical S_1 foliation is preserved. In the surrounding orthogneisses, the dominant structure is the S_2 flat lying foliation with rarely preserved isoclinally folded ribbons of recrystallized feldspars and quartz.

The peak mineral assemblage in the micaschists comprises st-grt-bt-ms-pl-qtz or ky-st-grt-bt-ms-pl-qtz and in the amphibolites amp-ep-pl-qtz ± grt. Secondary growth of sillimanite and andalusite was observed. in the micaschists The microstructure in micaschists is characterized by crenulation foliation S_1-S_2 often completely transposed into the S_2 foliation. The kyanite and staurolite grew during the D_1 deformational phase and are often entirely reoriented into the S_2 foliation. Usually straight quartz and ilmenite inclusion trails in garnet are oriented at a high angle to the matrix S_2 foliation which indicates that the growth of the garnet occurred during the D_1 deformational phase. However, the inclusion trails in the andalusite porfyroblasts are curved, evidencing the later growth synchronous or even post-dating the F_2 crenulation. Inferred minimum PT conditions based on the peak metamorphic assemblages in metapelites and published petrogenetic grids are ~600 °C and ~8 kbar. The growth of sillimanite and andalusite indicates the decompression at still high temperature.

Our structural and metamorphic investigations show that the Stronie series in the studied area was buried at a depth corresponding to ~8 kbar at ~600 °C and that the development of the peak metamorphic assemblages was contemporaneous with the development of the S_1 foliation. The F_2 folding occurred at decreasing pressure conditions at still high temperature as indicated by the later local growth of sillimanite and subsequent andalusite overgrowths of the S_2 crenulation. The first deformational and metamorphic stage is interpreted to be a result of burial associated with the thickening of the orogenic root during the Variscan convergence, whereas the second deformational stage and growth of the later mineral phases in metapelites is connected with the subsequent exhumation.

Mid-Crustal Emplacement of the Třebíč Durbachite: a Result of Interplay between Compressional and Wrench Tectonics due to Block Rotations

Karel SCHULMANN, František HORUDA, Ondrej LEXA, František MLEJNECKÝ, Stanislav ULRICH and Jiří KONOPÁSEK

Institute of Petrology and Structural Geology, Charles University, Albertov 6, 12843, Prague, Czech Republic,

We have examined emplacement mechanisms of durbachite magma of one of the largest plutons within the Moldanubian orogenic root system. The structural study of magmatic and subsolidus fabrics was carried out by means of standard methods of field structural geology, systematic measurements of fabrics of large feldspar phenocrysts using reflection goniometry and regional AMS study. These investigations were supported by detailed structural investigations of the country rocks.

Tectonics of the eastern Variscan orogenic root is controlled by 350–340 Ma successive westward thrusting of the lower crustal Gfohl unit (15 kbar/800 °C peak) over the middle crustal Varied group to the east (7–9 kbar/700 °C peak), and eastward thrusting over the easterly middle crustal Svratka crystalline complex (6–9 kbar/650 °C). This extrusion of lower crustal segment was controlled by originally NNE-SSW trending continental margin of the easterly lying Brunovistulian basement and was terminated at ca 340 Ma ago. This compressional structural fabric was modified by a dextral lithospheric NW-SE Elbe fault zone at ca 330–325 Ma. This fault zone is responsible for dextral rotation of the adjacent crustal blocks into parallelism with major sense of shearing.

This tectonic template created complex polyphase geometrical boundary conditions controlling emplacement of mantle – – derived (ultra Mg-K) syenite of triangular shape (500 km^2) along tectonic contact of lower crust and middle crustal units. The boundaries of the pluton are steep to the east (parallel to continental margin) and north (parallel to one of lithospheric faults), whereas western margin is flat and parallel to regional mid-crustal fabrics. Structural and petrological study of country rocks, regional AMS study (800 sites) and reflection goniometry of feldspar phenocrysts show dextral flow along the eastern margin, sinistral along the northern edge and flat flow pattern parallel to the western margin. The magmatic flow is polyphase which is reflected by steep and NNE-SSW trending early magmatic