

Paleostress analysis of NE part of the Brno Massif: Another piece of puzzle

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The Brno Massif is a composite unit built up mainly by igneous rocks of Cadomian age, which belongs to the Brunovistulian Unit, situated on the eastern margin of the Bohemian Massif. The Brno Massif consists of two granodiorite parts separated by the Metabasite zone, composed of metamorphic rocks (mainly green schists). In the west, the Brunovistulicum borders with the Moldanubian Unit, which is thrust over it along so-called Moldanubian thrust. This area was tectonically affected during Variscan orogeny, inducing the Moravo-Silezian shear zone with dextral kinematics in SSW–NNE direction. Nevertheless, some observations are in contrast with this dominant top-to-the NNE sense of movement.

In 1983 and 1991, the first discrepancy with general dextral movements within the Brno Massif was published by Hrouda et al. and Hrouda. Based on petrophysical data, the sinistral strike-slip movements was predicted in the Metabasite zone. This predication was subsequently confirmed by porphyroclast systems with sinistral shear sense, observed by Hanžl (1996).

Another example of untypical kinematics was described by Roupec (1992) in a limestone quarry near Lelekovice village, where tectonic contact of the Metabasite zone rocks and the Devonian limestones crops out. The limestone bears NW-dipping stretching lineation with top-to-the SE (sinistral) movement. This kinematics indicates NW–SE orientation of the main principal stress σ_1 (maximal compression).

Equivalent tectonic movement was presented by Bábek et al. (1995) on asymmetric structures surrounding the Visean limestone pebbles in calcareous sandstones quarries near Černá Hora village. Furthermore, Melichar et al. (1999) described intensively deformed granodiorite with incorporated slices of Devonian limestone in an outcrop near the Valchov village. The older kinematics of this restrained limestone was top-to-the SE, whereas younger one indicated top-to-the NNE sense of movements.

New method of paleostress analysis (Kernstocková and Melichar, 2011; Melichar and Kernstocková, 2011) was used to determine stress state in the north-eastern part of the Brno Massif. Data from several outcrops along the Svitava river was processed by a computer programme MARK 2010 (Kernstocková, 2011). There occurred predominantly

reverse or strike-slip faults, which were filled or altered with older chlorite, epidote and younger hematite or calcite. The main principal stress σ_1 (maximal compression) was oriented in SE quadrant of equal-area plots, and principal stress σ_3 (relative extension) was oriented in SW quadrant of equal-area plots. These results are compatible with the above mentioned anomalous movements.

All this evidence probably suggest some old Variscan tectonic events. Lower limit of the age determination is induced by limestone biostratigraphy which is even post-Givetian if Visean (post V2a). On the other hand, these events must be older than the Moldanubian thrust which is indicated by the Valchov outcrop. The succession of mineral alteration indicates cooling process corresponding probably with the orogeny evolution. Unfortunately, interpretation of these results is not clear enough. Some pieces of eastern margin of Bohemian Massif puzzle are still missing.

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