Orientation of Joints in the Western Bohemia Region, their Role during Post-Variscan Faulting

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The relationship between faults and joints can very considerably. En-echelon failures can originate during movement along fault plane as accompanying structures. On the other hand, pre-existing joints represent discontinuities, which can be subsequently reactivated and faulted. The reactivation of pre-existing failure with convenient orientation in relation to principal stresses is more easy than origin of authigeneic fault.

The study of joint orientation carried out in the Western Bohemia was focused on the investigation of relationship between orientations of joints and faults. Orientations of joints and faults were measured in postkinematic late-Variscan granitoids of the Karlovy Vary Pluton and the Smrčiny Pluton and in crystalline units north of the Cheb Basin (Svatava crystalline area and Vogtland-Saxonian Pleozoic complex). Several major joint systems were regognized in the studied region.

Particurarly in the case of granite bodies, the oldest joints, which were connected with pluton cooling, were formed already a few million years after emplacement of the host pluton (see e.g., Bergbauer and Martel, 1999). These joints must have existed during subsequent tectonic stages and represented weaked zones in the pluton body But the coincidence of fault pole orientation and orientations of poles of joint originated due to cooling of pluton was found only exceptionally in the Kyn•vart part of the Karlovy Vary Pluton and on the eastern margin of the Smrčiny Pluton. On the other hand, some fault poles are close to the poles of joints which belong to other systems. In all studied regions situated both in the Variscan plutons and in the metamorphosed rocks, some fault poles are close to poles of joints which belong to system of NW-SE steep joints. These faults were active under approximately N-S maximum compression and E-W maximum extension which can correspond to the Upper Cretaceous to the Paleogene NNE-SSW compression known from the Bohemian Massif (see Peterek et al., 1997; Coubal, 1990). Thus the system of NW-SE orientated steep joints probably played significant role during post-Variscan faulting in the Western Bohemia region.

Very accurately localised epicentres show that the recently active Nový Kostel-Počátky-Zwota line oriented NNW-SSE is formed by a number of about 1–2 km long en-echelon NNE--SSW faults (Nehybka and Skácelová, 1995). The predominantly NNE-SSW or WNW-ESE orientation of recently active faults in this tectonic zone follows also from the computed focal mechanisms (see Dahm et al. 2000; Skácelova et al., 1999). In the Kyn•vart granite body, the steep joints connected with cooling of pluton are oriented NNE-SSW and WNW-ESE, in the other studied regions the joints of these orientations exist but they are less frequent. But the NNE-SSW and WNW-ESE oriented faults, which were active under NE-SW maximum compression and NW-SE maximum extension (it means opposite orientation of principal stresses in comparison with recent stress), were found in the Nejdek part of the Karlovy Vary Pluton. This fact shows possibility of recent reactivation older (Tertiary) strike-slip faults with opposite sense of shear movement in the epicentral area near Nový Kostel.

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Variscan and Post-Variscan Paleostresses on the Southeastern Margin of the Nízký Jeseník Region (Czech Republic)

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The southeastern margin of the Nízký Jeseník region was significantly affected by both the Variscan and Alpine orogenesis. The Upper Devonian – Lower Carboniferous sediments were deposited during the Variscan Orogeny. The Neogene sediments of the Carpathian Foredeep represent molasse formed during the Alpine Orogeny. Eastwards, the Bohemian Massif with its sedimentary cover is dipping under the West Carpathian nappes.

The paleostress analyses based on the study of fault-slip