Summing up, the tectonic units comprised in the Bystrzyckie Mts. recorded different metamorphic conditions. These can be generally characterized as relatively HP/LT for the structurally lowermost Równia Łomnicka unit and MP/MT for the Gniewoszów-Kamieńczyk unit and the structurally uppermost Niemojów-Czerwony Strumień unit. This implies that they may represent individual thrust sheets which underwent different P-T paths. Consequently, it is suggested that the whole Bystrzyckie Mts. represent a pile of nappes showing tectonically inverted metamorphic zoning. This inversion of metamorphic gradient was most probably achieved during the D_3 tectonic episode under a transpressive regime. It was possibly associated with the dextral strike-slip displacement along the contact of the Teplá–Barrandian and Moldanubian terranes, postulated by Aleksandrowski et al. (2003).

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The Role of Zinc in Stabilization of Spinel-Bearing Mineral Assemblages – Examples from the Bohemian Massif and NW Namibia

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Spinels are chemically diverse minerals found in many igneous and metamorphic rocks, and spinel-bearing mineral equilibria are considered as important indicators of physical conditions of metamorphism. Chemical composition of spinels in metasedimentary and acid meta-igneous granulite-facies rocks usually approaches Fe-rich members of the spinel ($MgAl_2O_4$) – hercynite ($FeAl_2O_4$) solid solution. Important minor constituents expanding the spinel stability field are represented by Fe^{3+} (magnetite), Ti (ulvöspinel) and Zn (gahnite) components (White, 2002; Harley, 1989; Carswell, 1993). The stability field of spinel is expected to expand also with increasing fO_2, which probably leads to an inversion of topology in the petrogenetic grid, where the invariant points [spinel] and [sillimanite] are stable at low oxygen fugacity, and [sapphirine], [garnet] and [cordierite] points are stable at high oxygen fugacity (Hensen, 1986; Powell, 1988). Petrogenetic grids in the extended KFMASHTO system have already been constructed (Clarke, 1989; White, 2002) providing important constrains on the influence of TiO_2 and Fe_2O_3 on spinel and biotite-bearing equilibria.

Zn content in spinel composition causes a similar topological inversion. The gahnite component can stabilize this phase to lower temperatures and higher pressures, which has been demonstrated by several experimental works (Hensen, 1986; Shulters, 1989; Nichols, 1992). Samples of spinel-bearing acid granulites from the Bohemian Massif (the Strazek Moldanubicum) and from the Neo-Proterozoic Kaoko belt of NW Namibia were chosen to test the influence of gahnitic component on the spinel stability field. In samples from the Bohemian Massif, hercynite crystals were observed rimming metastable kyanite crystals, probably as a result of local equlilibrium between Grt and newly formed Sill. In several cases, Hc was observed in association with Bt. Samples from NW Namibia also show the stable mineral assemblage Grt-Sill-Hc-Bt. In all samples, the spinels correspond to spinel-hercynite-gahnite solid solution with moderate (0.05–0.09 pfu.) to high (0.08–0.18 pfu.) Zn content, and the X_{Mg} values in the range of 0.046–0.098 and of 0.07–0.10, respectively. The amount of Fe^{3+}, (e,g, the magnetite component) was estimated using stoichiometric constrains and its content is 0.03–0.05 pfu for the Bohemian Massif samples and 0.01–0.07 pfu for the samples from Namibia. The amount of Ti is negligible in both cases.

The PT conditions of equilibration of the mineral assemblage Grt-Sill-Hc-Bt were calculated using the software VERTEX (Connolly, 1990). In order to model the expansion of the stability field of the spinel-bearing assemblages, the thermodynamic data for the gahnite end-member (Dessureault, 1994) were incorporated in the dataset of Holland and Powell (1998). Simple mixing model for spinel-hercynite-gahnite end-members with interaction parameters of Nichols et al. (1992) was adopted for the calculation.

The incorporation of Zn component has (as Fe^{3+} and Ti) a significant influence on spinel-bearing equilibria. Thermodynamic modelling shows spreading of the stability field of spinel-bearing mineral assemblages towards lower temperatures and higher pressures, which is consistent with experimental works of (Nichols, 1992; Hensen, 1986; Shulters, 1989). Moreover, the addition of gahnite component stabilizes the observed spinel+biotite bearing assemblages, and also increases the stability of spinel in assemblages with quartz. In case of samples from the Bohemian Massif, improved estimates of equilibration conditions for spinel-bearing mineral assemblage in the KFMZnASH system are in good agreement with PT estimates from surrounding cordierite-bearing metasediments. Our modelling suggests that it is impossible to make correct quantitative PT estimates for reaction textures involving spinel without consideration of minor components.

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Changes in Depositional Style of an Intra-Continental Strike-Slip Basin in Response to Shifting Activity of Basement Fault Zones: Cenomanian of the Bohemian Cretaceous Basin

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The Bohemian Cretaceous Basin of Central Europe represents an intra-continental system of pull-apart basins and intervening uplifts formed within the Bohemian Massif in response to eo-Alpine compressional phases (e.g. Ziegler, 1990; Uličný, 2001). It was characterized by low rates of displacement along the governing strike-slip fault zones, which resulted in low subsidence rates and a relatively minor deformation of the basin fill. This, together with an extensive subsurface database, allowed a detailed recontruction of the evolution of depositional geometries during the basin lifetime, and interpret its relation to the successive reactivation of different basement fault zones. Such interpretations are difficult in many strike-slip basins, characterized by high structural complexity and rapidly changing infill styles.

Apart from the improved understanding of kinematic evolution of a strike-slip basin, the knowledge of timing of tectonic events and interpretation of their causal relationships with palaeostress conditions is important also for correlation between