HYDROTHERMAL ALTERATIONS OF GRANITES IN THE SOUTH BOHEMIAN PLUTON

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The South Bohemian Pluton shows a complex multiphase intrusion history. All three main types of granites (Weinsberg, Mauthausen, and Eisgarn granite) are affected by local hydrothermal alterations. Petrological and geochemical studies, fluid inclusion and O-isotope investigations on whole-rock samples have been carried out in the areas of Nebelstein and Hirschenschlag. In both cases the intensive alteration and mineralization is connected with the intrusion of a young biotite granite known from drilling cores only. This granite can be interpreted as thermal source for fluid convection leading to greisenization processes (GÖD & KOLLER, 1989; KOLLER et al., 1992, 1994).
O-isotope studies of unaltered granites (Weinsberg granite $\delta^{18}O$ 8.7 - 9.8, Mauthausen granite 9.0 - 10.5, Eisgarn granite 10.2 - 10.9) show no penetrative influence of surface-derived fluids (data partly from VELLMER, 1992).

Nebelstein is characterized by strongly altered two-mica and muscovite granites as well as irregularly shaped bodies of greisen rocks in connection with a disseminated sulphidic mineralization and a cogenetic formation of magnetite. Preexisting fluids (aqueous, low salinity) in granites show a peak homogenisation temperature (T_h) at 300 °C. The greisen rocks contain mixed H_2O-CO_2 (three phase) inclusions with a peak of T_h at 200 °C and enhanced salinity.

O-isotope data show little scatter in altered granites ($\delta^{18}O$ 8.2 - 9.8) but more scatter and enhanced values ($\delta^{18}O$ 8.5 - 12.0) in greisen rocks with late infiltration of quartz veins. This points to a multiphase complex fluid evolution, which is not fully understood at present. It could be consistent with a cooling magmatic (high $\delta^{18}O$) fluid.

At Hirschenschlag the type of greisenization and vein type mineralization is of a more "distant" style, fitting to more apical parts of greisen systems. Additionaly to pure aqueous and three phase H_2O-CO_2 inclusions, also inclusions containing pure CO_2 are found. Aqueous fluid inclusions show a single frequency peak of T_h at 200 °C. The lower salinity of the aqueous inclusions at Hirschenschlag seems to be due to more intense mixing with meteoric water. O-isotope data show clear tendency towards lower values with increasing alteration. $\delta^{18}O$ values as low as 4.8 in the most altered rocks suggest high temperature interaction with surface-derived (meteoric?) fluids.

A combination of all those data demonstrates that lower crustal levels are exposed in the S (Nebelstein) than in the N (Hirschenschlag). This evidence corresponds very well with geophysical data (HEINZ & SEIBERL, 1994; HÜBL et al., 1994) and is probably due to large scale tilting of the southern Moldanubian area.

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METAMORPHISM AT THE NORTHERN PART OF THE MORAVIAN ZONE OF THE THAYA WINDOW: GEOTECTONICAL IMPLICATIONS

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Inverted metamorphic zonation in the nappes of Moravian zone of the Thaya dome is characterized by 1) kyanite and sillimanite zones in the upper thrust sheet (Bíteš nappe), 2) staurolite zone in the lower thrust slice (Pleissing nappe) and the upper part of the parautochthonous unit (Therasburg formation) and by 3) garnet zone in the rest of the parautochthonous domain. This anomalous inverted metamorphic gradient is marked by temperature and pressure difference between the top and the base of the stack reaching about 150 °C and 2 - 3 kbars for the thickness 5 - 6 km of continental crust. This type of Barrovian thrust related metamorphism is well known from other collisional zones, e.g. the Himalayas and the French Massif Central. It is commonly interpreted in terms of overthrusting of a hot crystalline slab over cold basement rocks (hot iron effect) or as a result of stacking of previously metamorphosed crystalline sheets.

One dimensional thermal model was worked out for Moravian zone introducing the thickness of individual sheets, calculated P and T data and displacement rate characteristic for viscous deformation of continental crust. It is shown that conductive heat from the Moldanubian hot slab is not sufficient to perturb continen-