



Variscan polymetamorphism recorded in garnet bearing paragneiss migmatites from the Bavarian Unit, Upper Austria

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A Carboniferous LP–HT metamorphic overprint, associated with granitic plutonism and crustal anataxis, characterizes the Bavarian Unit (Finger et al., 2007) in the southwestern part of the Bohemian Massif.

Scarce migmatite with large garnets recorded detailed information regarding the regional P–T–t evolution. The large garnet porphyroblasts of this exceptional rock preserved a complex three phase growth zoning which give evidence for a polymetamorphic evolution. Garnet cores (grt1) with elevated grossular contents (5–6 mol %) are discontinuously mantled by lower grossular garnet (grt2). This Ca-poor (1–2 mol %) garnet mantle zone is again overgrown by a garnet rim zone (grt3) with elevated grossular content (3–4 mol %). Garnet zones also exhibit different inclusion assemblages, i.e. spinel, sillimanite and plagioclase in grt1 and staurolite, muscovite, sillimanite, biotite and plagioclase in grt2. Cordierite, spinel, sillimanite, K-feldspar and plagioclase in the matrix are equilibrated with grt3.

Thermodynamic modelling in conjunction with geothermobarometric calculations define a medium pressure, medium temperature (MP–MT) peak of 0.85–1.10 GPa at 720–780°C (grt1 & inclusions) for the first metamorphic event. This first stage was followed by decompression and cooling which resulted in a partly resorption of the first garnet generation. A second prograde metamorphic stage initiated a new growth phase of garnet. It started from 0.45–0.60 GPa at 580–630°C (grt2 & inclusions) and proceeded to low pressure granulite facies (LP–HT) peak conditions of 0.55–0.65 GPa and 830–900°C (grt3 & matrix).

U–Th–total Pb dating of monazite inclusions in grt1 reveals an age of 340 ± 7 Ma for the first MP–MT metamorphic event, which correlates well with thrusting and nappe stacking in the Moldanubian Superunit (Petrakakis, 1997). Matrix monazite and inclusions in grt3 yields an age of 312 ± 5 Ma for the LP–HT event, which is typical for the main metamorphic overprint in the Bavarian Unit – the so-called “Bavarian event” (Grauert et al., 1974; Kalt et al., 2000; Finger et al., 2007).

The P–T–t evolution of the Bavarian Unit to mid-crustal levels (around grt2 evolution), before isobarically heated to granulite facies conditions, point to a significant external heat influx into the middle crust at the final stage of the Variscan orogeny (e.g. mantle delamination and intrusion of the South Bohemian Batholith).

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Grauert, B., Hänni, R. & Soptrajanova, G. (1974): *Contributions to Mineralogy and Petrology*, 45, 37–63.

Kalt, A., Corfu, F. & Wijbrans, J. R. (2000): *Journal of Petrology*, 40, 601–627.

Petrakakis, K. (1997): *Journal of Metamorphic Geology*, 15, 203–222.