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# Multistage evolution of UHT granulites from the southernmost part of the Gföhl Nappe, Bohemian Massif, Lower Austria

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A detailed petrological investigation has been undertaken in leucocratic kyanite-garnet bearing and mesocratic orthopyroxene bearing granulites from the Dunkelsteiner Wald, Pöchlarn-Wieselburg and Zöbing granulite bodies from the Moldanubian Zone in the Bohemian Massif (Austria). A combination of textural observations, conventional geothermobarometry, phase equilibrium modelling as well as major and trace element analyses in garnet enables us to confirm a multistage Variscan metamorphic history. Chemically homogenous garnet cores with near constant grossular-rich plateaus are considered to reflect garnet growth during an early HP/UHP metamorphic evolution. Crystallographically oriented rutile exsolutions restricted to those grossular-rich garnet cores point to a subsequent isothermal decompression of the HP/UHP rocks. Overgrowing garnet rims show a pronounced zonation and are interpreted as the result of dehydration melting reactions during an isobaric heating phase which could have taken place near the base of an overthickened continental crust, where the previously deeply subducted rocks were exhumed to. For this HP granulite facies event maximum PT conditions of ∼1050 °C and 1.6 GPa have been estimated from leucocratic granulites comprising the peak mineral assemblage quartz, ternary feldspar, garnet, kyanite and rutile. The pronounced zoning of garnet rims indicates that the HP granulite facies event must have been short lived since diffusion in this temperature region is usually sufficient fast to homogenize a zoning pattern in garnet. A retrogressive metamorphic stage is documented in these rocks by the replacement of kyanite to sillimanite and the growth of biotite. This retrograde event took place within the granulite facies but at significantly lower pressures and temperatures with ∼0.8 GPa and ∼760 °C. This final stage of re-equilibration is thought to be linked with a second exhumation phase into middle crustal levels accompanied by intensive mylonitization.

Keywords: Bohemian Massif; Moldanubian; granulite; HP/UHP, HP granulite facies, LP granulite facies overprint; Andes type geodynamic model.