# TWO STAGE METAMORPHIC HISTORY OF HP-UHT GRANULITES FROM THE MOLDANUBIAN ZONE (BOHEMIAN MASSIF) REVEALED BY GARNET ZONING AND MINERAL INCLUSIONS

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Mineral inclusions and compositional zoning in garnet crystals of felsic and mafic granulites from the Gföhl Nappe System, southeastern Moldanubian Zone, provide detailed information of a two stage metamorphic history of these rocks. The first metamorphic episode is related to deep crustal subduction at eclogite facies conditions while the second one records an UHT overprint that occurred within the orogenic root zone. Both the felsic and mafic granulites contain conspicuous garnet zoning profiles with chemically homogenous high-grossular cores with $X_{Grs}$ values of about 30-35 mol.%. In contrast, the rim parts of the garnets show a pronounced zoning where almandine and pyrope increase but grossular values decrease dramatically. To reconstruct the two stage metamorphic evolution, PT-path modelling was performed by the Gibbs free energy minimization software package Theriak-Domino (DE CAPITANI, 1994) in combination with major and trace element zoning in garnet. In that respect, chemically homogenous garnet cores with high-grossular plateaus suggest formation during a prograde low to medium-temperate eclogite facies event, probably up to UHP conditions. This is documented by columnar shaped inclusions of altered jadeite relics in high-grossular garnet cores from felsic granulites. Pronounced zoning at the garnet rims is compatible with an isobaric heating phase reaching approximately 1000-1100°C and 1.6-1.8 GPa. The common occurrence of polyphase mineral inclusions consisting of K-feldspar + kaolinite (hydrated kyanite) + quartz and melt inclusions in low-grossular garnet rims indicate muscovite-consumption and incipient melting during this granulite facies temperature increase. The observed mineral inclusions and garnet zoning pattern suggest that after the eclogite facies event isothermal decompression was followed by near isobaric heating to UHT conditions. Final exhumation and emplacement within the Moldanubian nappe pile is seen in highly deformed and partly hydrated and retrograded granulites.

DE CAPITANI, C. (1994): Beihefte zum European Journal of Mineralogy, 72, 48.