Extensive post-collisional melting in a mid-crustal gneiss dome – case of the Variscan Melechov Pluton, Moldanubian Batholith

V. JANOUŠEK[1*], J. TRUBAČ[12], W. DÖRR[3], A. GERDES[3], J.-F. MOYEN[4], J. ŽÁK[2] AND D. MATĚJKA[2]

[1]Czech Geological Survey, Klárov 3, 118 21 Prague 1, Czech Rep. (*correspondence: vojtech.janousek@geology.cz)

[2]Faculty of Science, Charles University in Prague, Albertov 6, 128 43 Prague 2, Czech Republic

[3]Institut für Geowissenschaften, Geochemie & Petrologie, Altenhöferallee 1, D-60438 Frankfurt, Germany

[4]Département de Géologie, Université Jean-Monnet, 23 rue du Docteur Michelon, 42023 Saint-Etienne, France

The Melechov Pluton consists of several nested two-mica granite pulses interpreted as forming an apical part of a mid-crustal granitic diapir [1]. Their composition resembles the 'Eisgarn' suite elsewhere in the Moldanubian Batholith [2].

The TIMS-ID Concordia ages of single monazite (Mnz) from the outer facies (Lipnice, Světlá, and Kouty) range between 332 ± 1 and 323 ± 0.4 Ma (mostly 327 ± 0.5 Ma, n = 12). These fit within error with Lipnice LA ICP-MS Mnz ages (324.8 ± 2.4 Ma) and previous U–Pb zircon (Zrn) and Mnz dating from the 'Eisgarn' suite granites (328–326 Ma) [3–5]. The youngest Mnz ages (323–326 Ma) for each granite facies probably correlate with the final emplacement. Zircon grains are dominated by inheritance, proving, besides low Zrn solubility in the low-T felsic melt, rapid anatexis. Concordant LA ICP-MS ages show that the source contained mainly Ediacaran (570–630 Ma), with minor Eburnean (~2 Ga), Cambrian (>490 Ma), and Silurian (~420–430 Ma) zircon.

The Sr–Nd isotopic signatures and comparison of the Zrn inheritance spectra with literature [6] point to Monotonous Group paragneisses as the most appropriate source. The paragneisses were derived from the Neoproterozoic active continental margin of the northern Gondwana, and now form mantle of the so-called Pelhřimov Core Complex [7]. Such an idea is supported by phase-equilibria (PERPLE_X) modelling of their anatexis. The calculated major-element composition of melts, and trace-element characteristics computed from phase proportions, compare well with the actual granites.

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