

## The Weinsberg granite – connecting the prime example of late-Variscan crustal recycling from source to emplacement

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The Weinsberg granite, a very coarse-grained K-feldspar phyric biotite granite, dominates the South Bohemian Batholith. Whereas the granite intruded the Moldanubian nappes in the Waldviertel area clearly discordant, in the southwestern part of the batholith the granite occurs within the Bavarian Unit, where intense crustal anatexis characterizes the country rocks. Moreover, rare Opx-bearing variants are embedded in the Weinsberg granite within the Bavarian Unit (Frasl & Finger, 1988). These differences may be attributed to key processes of granite evolution: magma formation by partial melting of continental crust and melt transport in the Bavarian Unit as well as the final stage of discordant emplacement at the eastern margin of the batholith. Comparing these different parts of the batholith two interesting questions arise:

1) Is it possible to relate the huge eastern part of Weinsberg granite to a source area like the Bavarian unit? Especially the Opx-bearing granites give evidence to magma formation by large-scale fluid absent melting of biotite, plagioclase and quartz in the lower crust at 850°C and maximal 0.7 GPa (Finger & Clemens, 1995). Orthopyroxene-rich cumulates in the Bavarian Unit possibly indicate areas close to magma formation. A systematic evaluation of enclaves in the eastern emplacement area proved the known occurrence of xenoliths from country rocks and absence of basic enclaves. In addition, enigmatic quartz-rich enclaves in cm-scale and pseudomorphous intergrowth of biotite and quartz within aggregates of biotite were repeatedly identified. These findings may be remnants from Opx-bearing cumulates respectively single crystals from the source region, which ascended with the magma. The geochemical and isotopic characteristics of the Weinsberg granite (c.f. Gerdes et al., 1998) indicates that a crustal segment like the Bavarian unit could be a reliable crustal source.

2) Which kind of impacts to the country rocks occur along the eastern contact due to the emplacement of the large Weinsberg granite pluton? In tribute to historical concepts (c.f. Suess, 1926) the frequent cordierite-paragneisses of the Monotonous Group were for long times regarded as possible contact metamorphic aureole from the granite emplacement. However, in the region of the Ysper valleys, garnet-sillimanite-paragneisses of the Gföhl Nappe System crop out near the granite contact. Nevertheless, the granite contact of this Nappe System gives a well record of the extent of contact metamorphism. Very close to the granite contact, kyanite was decomposed to corundum and up to 1 km distance from the contact andalusite formed in two-mica orthogneisses. Furthermore, alteration by induced fluid circulations reaches 2 km distance. Rb-Sr ages of biotite confirm the reheating in the aureole and batholith cooling below 300°C about 15 Ma after the emplacement around 328 Ma.

These observations suggest that the potassium-rich magma of the Weinsberg granite was generated basically by dehydration melting of biotite-bearing ortho- and paragneisses in the lower crust. Possible remnants of orthopyroxene indicate this lower crustal source for the whole pluton. The emplacement, as final stage of the granite forming process, took place in a depth lower than 16 km, proved by contact metamorphism with andalusite.