The results indicate equilibration volumes that extend ~400 to 500 μm around each kyanite. This is in good agreement with results from image analysis that shows significant depletion of the matrix in plagioclase around kyanite crystal on this spatial scale. Our results demonstrate that modelling of diffusion-driven metamorphic reactions requires careful estimate of equilibration volume because of the limited scale of equilibration at fluid-absent conditions.

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Correlation of Structural and Metamorphic Evolution of Metamorphic Rocks from the Svratka and Polička Crystalline Complexes

Lucie TAJČMANOVÁ[1], Kryštof VERNER[1] and Jaroslava PERTOLDOVÁ[2]

[1] Czech Geological Survey, Klárov 3, 118 21 Praha, Czech Republic
[2] Institute of Petrology and Structural Geology, Faculty of Science, Charles University, Prague, Czech Republic

In the present study, we considered a record of the tectono-metamorphic evolution of the high-grade metamorphic rocks from the south-eastern part of the Polička crystalline complex (PCC) – Vír area (VA). In addition, we compared our new data with the evolution of less metamorphic rocks (paragneisses, mica-schist and metagranites) from the western part of the PCC and the Svratka Crystalline Complex (SCC). The VA unit is composed of felsic to mafic granulites and high-grade migmatites and is surrounded by layers of anatectic amphibolites which lithologically contrast with the surrounding mica-shists and paragneisses. The dominant fabric observed in high-grade rocks from VA is represented by steeply dipping SW to NE metamorphic foliation. This foliation is sporadically overprinted by moderately dipping NE foliation accompanied by gently to moderately plunging NW–NNW stretching lineation and thrusting kinematic indicators. These younger structures were also detected as a dominant fabric in the central and western part of the PCC and in the central and eastern part of the SCC.

In the high-grade rocks, we have observed a succession of stable mineral assemblages, which can be described as follows. Samples from the central part of the Vír body represent the felsic granulites with stable mineralogy Grt-Ky-Bt-Plg-Kf-Qtz within the sub-vertical foliation. This mineral association is comparable with high pressure granulites in the Moldanubian zone of the Bohemian massif. More often, granulitic samples show extensive conversion of kyanite to sillimanite, suggesting stabilization of the mineral assemblage: Grt-Sill-Bt-Plg-Kf-Qtz. In several samples from the younger foliation, we observed a stable association of hercynite with quartz. Crd is absent in all the samples, which can be explained by higher amounts of Zn in spinels, which extends the stability field of hercynite with quartz towards lower temperatures. In the northern part of the body, the felsic granulites are surrounded by layers of mafic to intermediate granulites, with the stable mineral assemblage Cpx-Opx-Grt-Plg-Kfs-Q corresponding to the early steep fabric. It is obvious from the bulk composition that the felsic varieties are highly depleted in CaO. These samples contain albitic plagioclases and garnets with a maximum of 6 % of grossular contents in the core which makes the peak PT estimates difficult. More suitable samples consist of mafic granulites from this area, where preliminary peak PT conditions for the Cpx-Opx-Grt-Plg-Kfs-Q association were estimated at about 850–900 °C and 13–14 kbar using the pseudosection approach with the PERPLE_X thermodynamic software set (Connolly 1990). In addition, we have calculated the preliminary PT conditions for the mica-shists and paragneisses of the SCC. They show maximum pressures in a range of 7–9 kbars at about 680 °C.

Based on our structural data and the results of thermodynamic modelling from high-grade rocks (VA), mica-shists and paragneisses from PCC and SCC, we assume that HP/HT metamorphic conditions (850–900 °C and 13–14 kbar) in granulites reflect the early stage of the high-grade evolution of the PCC (VA). On the contrary, the petrological study of the mica-shists in the SCC (7–9 kbars and ~680 °C) shows that these rocks never experienced such HP/HT conditions.

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