Abstract

In the thesis I focuse on petrographic, geochronological and geochemical characterization of gabbroic rocks to provide constrains on the Cambro-Ordovician and Variscan evolution of the Teplá-Barrandian Unit in Bohemian Massif situated in Central Europe. The studied rocks occur in two areas of interest in the western margin of the Teplá-Barrandian: (1) along the contact of the Teplá Crystalline and Mariánské Lázně Complexes in the north-western part of the TBU, (2) in area between the Domažlice Crystalline Complex and Kdyně-Neukirchen Massif (KNM) in the south-western part of the Teplá-Barrandian Unit. Detailed petrological study together with U–Pb dating of representative samples allow to characterize three events (I–III) defined by different textural position of analyses zircon and titanite grains. The oldest (Cambrian) event I is recorded in isolated metamictized matrix-hosted grains that yield similar mean age of c. 500–510 Ma in both areas. The second Cambro-Ordovician event II was connected with formation of tiny zircon grains forming rim around ilmenite at ~480–490 Ma due to diffusion reaction of ilmenite and surrounding silicate matrix enabled by increase of temperature. The youngest (Variscan) event III is associated with the formation of zircon corona around baddeleyite at ca. 360–380 Ma. Similar age (c. 370 Ma) was also obtained for titanite grains forming corona around ilmenite and/or rutile indicating metamorphic re-equilibration. Major/trace element and Sr–Nd isotopic compositions imply that gabbroic rocks formed from two consecutive melt batches that undergone different evolution. First magma represented by samples from Neukirchen-Kdyně Massif was emplaced at c. 510 Ma and underwent fractional crystallization and crystal accumulation, while the second one represented by samples from the Teplá Crystalline and Mariánské Lázně Complexes and Domažlice Crystalline Complex intruded c. 10 My later is characterized by significant influence of assimilation of adjacent sedimentary rocks. Consequently, all the gabbroic bodies were collectively metamorphosed and

exhumed during Variscan orogenesis. Metamorphism led to destabilization of primary mineral assemblage that resulted in formation of single or multiple coronas at the contact of plagioclase with the other primary minerals such as olivine or orthopyroxene and to decomposition and subsequent recrystallization of primary plagioclase. The P–T conditions calculated for garnet corona in TCC-MLC samples show an increase in metamorphic grade from eats-southeast (~600±50°C; 10±1.5 kbar) to west-northwest (~700±50°C; 13.5±1.5 kbar), which corresponds to previously reported Variscan metamorphic field gradient in this area. Across the studied samples we can demonstrate progressive breakdown of magmatic labradorite and its effect on plagioclase recrystallization. In initial phases plagioclase breakdown occur in domains located at marginal parts of the large grains, where the original grain is replaced by a mixture formed by thin elongated lamellae of anorthite-bytownite (An83-91) with apparent random orientation enclosed within oligoclase-andesine (An27-48) matrix and accompanied by crystallization of small spinel and corundum grains. With ongoing metamorphism, the breakdown of labradorite occur in the whole volume of the plagioclase grains and subsequent recrystallization started on previously exoluted lamellae. Additionally, the formation of spinel and corundum is interpreted due to variable diffusion rates of Ca and Al from the plagioclase during the corona formation.