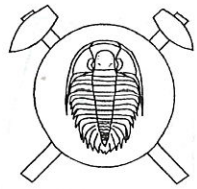
Typology and internal structure of zircons from the granites of the Krušné hory – Erzgebirge batholith and associated rhyolite and granite porphyry (Czech Republic)



Typologie a vnitřní stavba zirkonů žul krušnohorského batholitu a na něj vázaného rhyolitu a žulového porfyru (Czech summary)

(10 text-figs., 1 plate)

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Dimensions, typology and internal structure of zircon crystals was studied on 5 samples of granites from the Western pluton of the Krušné hory/Erzgebirge granite batholith, a sample of granite porphyry and a sample of the Teplice rhyolite from the Eastern pluton area. Zircons indicate a considerable genetic unity of the rocks examined. According to zircon typology the granite of the Older Intrusive Complex belongs to the granites of mixed crustal and mantle origin whereas the granites of the Younger Intrusive Complex to the granites of crustal origin. Five zones of growth were determined in the zircon crystals which are unevenly distributed in different types of rocks examined. There is no correlation based on zircons between the "granite porphyries" in the western pluton area (granites from Doubí) and the granite porphyry from the eastern part of the batholith.

Introduction

The Late Variscan Krušné hory – Erzgebirge granite batholith of Central Europe has been studied for almost 150 years. Its genesis, however, still remains subject of discussions. One of the essential problems is whether the batholith was formed by a continuous magmatic evolution in Late Variscan time from a single source or whether several sources existed in the time of granite genesis, emplacement and origin of associated volcanic rocks. The paper attempts to use mainly zircon typology in comparing individual members of the granite series and of associated volcanic rocks to contribute to elucidation of these questions.

Samples were taken from seven main granites, granite porphyry and rhyolite of the area which are in the authors' opinion representative to demonstrate the Late Paleozoic evolution of the batholith. The samples were taken from the Czech part of the batholith.

Geologic position

The Krušné hory – Erzgebirge granite batholith of Late Variscan age is located in the Krušné hory and Slavkovský les areas in the Czech Republic and in the Erzgebirge and Vogtland in Germany. The batholith continues to the Smrčiny – Fichtelgebirge but this part was not the subject of the present study.

The batholith is partly hidden and its size is estimated to be about 6000 km^2. It intruded in the Late Variscan time (330 – 290 m.y.) in the Upper Proterozoic gneisses and Cambro–Ordovician schists and phyllites which were folded and metamorphosed during Variscan orogenesis. The batholith consists of three major outcrop areas (Western, Middle and Eastern) (fig. 1) corresponding to partly hidden plutons.

The magmatites of the batholith are grouped into two major compositionally different intrusive complexes (table 1). The granites of the Older intrusive complex (OIC) (approx. 330 to 305 m.y.) are predominantly monzogranites (Tischendorf and Förster 1990, Štemprok 1986) with Mg – Fe biotites, plagioclase An_{10-30} and with average SiO_2 about 70 %, TiO_2 0.5 and CaO 1.7%. Rb varies between 170 – 300 ppm, Sr is relatively high 125 – 300 ppm. The Zr content of the granites ranges between 100 and 250 ppm.

The granites of the Younger Intrusive Complex (YIC) are mostly syenogranites with alkali feldspars (albite and orthoclase), plagioclase An_{10-20}, Fe – Mg biotites, common accessory topaz and fluorite. Average SiO_2 is about 74 %, TiO_2 0.13 % and CaO 0.65 % (Štemprok 1986). Rb varies from 400 to 900 ppm, Sr is lower than 50 ppm. Zr contents range from about 20 to 150 ppm (fig. 2) in the main types of the YIC granites but are higher (to about 170 ppm) in the so called intermediate granites which built up the marginal, presumably upper parts of the YIC granites. Intermediate granites contain alkali feldspars, plagioclase An_{10-20}, biotite, muscovite,