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ENCLAVES FROM THE VARISCAN STRZEGOM-SOBÓTKA HORNBLLENDE-BIOTITE GRANITE.

INTRODUCTION

The Variscan Strzegom-Sobótka massif (Fore-Sudetic Block, NE Bohemian Massif) is composed of one granodiorite- (biotite-granodiorite) and three granite-facies (two-mica granite, biotite granite, hornblende-biotite granite). Domains of different lithology, tectonic style and age surround Variscan Strzegom-Sobótka granitoid massif. The source of granitic melt (protolith) is discussible and unsolved problem. Using isotopic data Pin et al. (1989) proposed different magma source for eastern and western part of the pluton. Low initial strontium isotopes ratio (0,705-0,7082) obtained for eastern part of the massif suggests dominant mantle input during granite formation or diversified crustal source. In the contrary, high initial strontium isotopes ratio (0,7098) obtained for western part of the massif indicates continental crustal rocks (argillites, greywakes, silica-rich volcanics) as possible magma source (Pin et al. 1989; Puziewicz, 1990).

Some of the granite facies comprises many enclaves of composition varying from diorite, tonalite to granodiorite (Domańska, 1984). The origin of the enclaves as well as their relation to granite is not precisely recognised. Puziewicz (1990) discussed the genesis of the enclaves occurring in the biotite granodiorite. He favoured, that enclaves could be restite of un-melted, young basaltic material. Numerous enclaves of similar composition have been found also in the hornblende-biotite granite (western part of the pluton).

ENCLAVES – MODAL COMPOSITION, GROWTH TEXTURES

Enclaves found in the hornblende-biotite granite (hbl-bi granite) display oval or sharp-bordered shape. This study considers only the first type. The modal composition of the oval enclaves locates them within diorite, quartz diorite, granodiorite. Fe-Ti oxides, hornblende and/or biotite accompany felsic minerals. Epidote, zircon and apatite, allanite occur as accessory phases. Feldspars in the marginal part of the enclave, especially plagioclases show outward growth into granite. They cross the enclave margin and precede their growth into granite quartz. Gra-

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nite minerals dive into the enclave showing typical “inward” growth morphology. Within enclaves big single plagioclase or alkali feldspar crystals are visible. Their growth morphology doesn’t fit to the enclave’s groundmass feldspars but show similar features with granite feldspars. The CL evidence supports this observation. They have been mechanically introduced into the enclave. Macroscopically well-defined contact between enclave and granite changes due to the interaction between both crystallization environments into almost unrecognised one under microscope. The enclaves are usually surrounded with “bleeding” zones enriched in quartz and K-feldspars (Vernon, 1991).

GEOCHEMISTRY

Twenty-one hbl-bi granite samples and twenty-six enclaves separated from the granite has been analysed for major and some trace elements (Rb, Sr, Ba, Cr, Nb, Y, Zn, Zr) by means of XRF method. Harker’s diagrams (Fig. 1) show both data sets. Two kinds of trends appear on the plots. Some of the major and trace elements define linear trends over whole (enclave and granite) silica range (e.g. Al_2O_3 , Fe_2O_3 ; Fig. 1a, b), which could point to co-magmatic origin of both of the rock sets. For some of them the trends are different for enclaves and granite (e.g. K_2O , Rb; Fig. 1c, d), which in turn excludes the above-mentioned hypothesis.

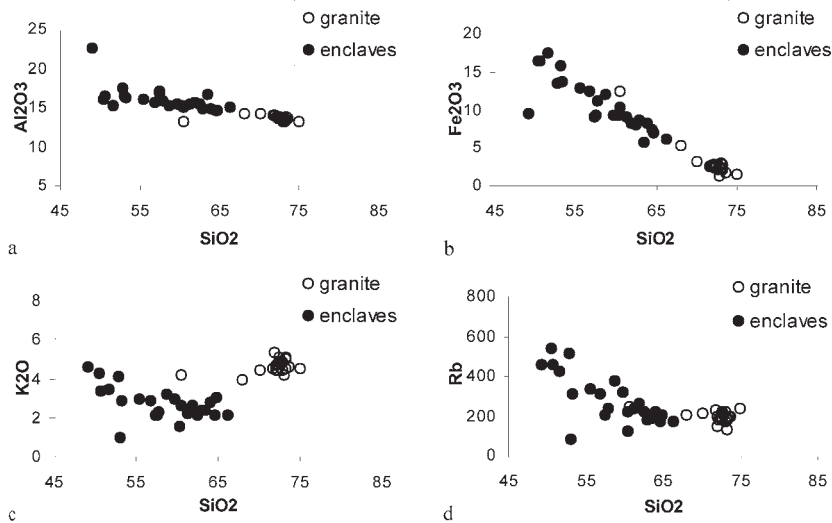


Fig. 1. Harker diagrams for: Al_2O_3 (a), Fe_2O_3 (b), K_2O (c), Rb (d).

Basing on differences in trace elements behaviour during partial melting and fractional crystallization, the process accounting for enclave’s differentiation trends has been recognised. Diagrams Log(compatible element) versus Log(incompatible element) have been drawn. All of them show sub-horizontal trend in-

dicating partial melting. Partial melting however can't be the only process determining the differentiation trends, because of some inconsistency in elements behaviour. Strontium behaves like incompatible element and shows no affinity to calcium. Rubidium, yttrium and niobium behave like compatible elements.

FINAL REMARK

Due to mineral growth morphology observed in the oval enclaves found in hbl-bi granite the conclusion could be derived, that they present remnants of magma blobs introduced into the granitic melt. Mineral "inward" and "outward" growth textures recognised in the enclaves argue in favour of this hypothesis. Modal composition of the enclaves shows wide range from mafic till silica-oversaturated rocks. Geochemistry of the rocks points to their common origin with a partial melting as a process responsible for their differentiation. Some of the elements show however behaviour, which is not consistent with partial melting (e.g. lack of Sr affinity to Ca). The process seems to be obscured by interaction with felsic melt i.e. mixing-mingling. Mechanically introduced feldspars into the enclaves are records of this process. It is difficult to ascertain the interaction range between both melts. Using mass balance law for mixing and assuming the most silica-rich granite composition as felsic liquid contaminating initial mafic melt the degree of contamination for the most silica-rich enclave has been calculated. Due to the calculation the contamination degree might reach almost 40%. The result is unrealistic and acknowledges, that enclave's composition is a result of much more complicated process than suggested, i.e. including two interacting sources.

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