5.5.P11

Rare-earths and more trace elements distribution in S-granites of the Melechov Massif, Czech Republic, and origin of M-type tetrad effect in apatite

V. PROCHÁZKA AND D. MATĚJKA

Prirodovdecka fakulta UK, UGMNZ (Faculty of Science of Chares Univ. – Inst. of Geochemistry (vprochaska@seznam.cz; matejka@natur.cuni.cz)

Behavior of the REE and some other trace elements and various accessory minerals associations in the peraluminous, phosphorus-rich granites of the Melechov Massif are presented. There are two populations of apatite: the most of apatite in each sample is weakly magnetic (was cought at 1,4 A at separations). This population forms usually hypautomorphic 0,05-0,3 mm grains, and the non-magnetic grains are irregular and smaller. The main cause of magnetism is Mn and particularly Fe; Mn compound of apatite reaches up to 2 % and it generally increases from the less- to the more differentiated rocks. The magnetic population crystallized from magma and contains most of P in the rocks. The LREE and Th are controlled by monazite, whereas the HREE by zircon in the less acid and rather by apatite in the most acid rocks. In ratio to the whole rock apatite is most enriched with Tb, Dy, Ho and Er and Y, which had been relatively less concentrated in monazite as well as in zircon. The REE-distribution in apatite shows a tetrad effect of the M-type with negative Eu- and Ce-anomaly, when expressed as a ratio to the chondritic but also to the whole-rock values. This fractionation probably originated at separation of magmatic and aqueous phase, which occurred after crystallization of monazite but not later than apatite and major minerals crystallized. In the whole-rock distribution, the tetrad effect is marked for the apatite-controlled REEs. The Ce-anomally has probably an older origin. Cores older than magmatic are probably contained in many zircon grains and even more often in monazite, and analyses of these minerals and their separate zones have to be performed yet to solve the REE-distribution completely.

At irregular occurring albitization the non-magnetic population of apatite appeared. This population has lower content of REE than the magnetic one, but the shapes of the distribution patterns are identical. In some cases monazite was replaced with thorite and new monazite with lower Th-compound. More post-magmatic fluid influences on accessory minerals association are described, but they seem unlikely to be the cause of observed REE-fractionation.

5.5.P12

Peraluminous two-mica granites in Northern Portugal: A contribution to the understanding of Palaeozoic continental crust evolution

A. ALMEIDA AND F. NORONHA

Geology Department, Faculty of Sciences, Porto University, Portugal (aalmeida@fc.up.pt; fmnoronh@fc.up.pt)

Two Variscan two-mica granite batholiths in NW Portugal have been selected for a study in order to provide constraints for the genesis and evolution of granite magmas: the complex of Cabeceiras de Basto, composed by three granite suites and spatially related to Li mineralizations, and the Porto granite[1,2]. Both granite bodies are syn-orogenic granites and define NW-SE alignments parallel to Variscan structures. Field relations, mineralogy and major and trace element data indicate that these granites are strongly peraluminous highly evolved rocks, affected by late- and post-magmatic hydrothermal processes. U-Pb zircon and monazite geochronology in both areas has defined a reverse discordia, revealing an inherited Pb component. The lower intercept, interpreted as the minimum emplacement age, has yielded 311±1 Ma for the Cabeceiras massif and 318±2 Ma for the Porto granite. In Cabeceiras massif at least three different granite units could be distinguished which were submitted to an isotope study. $(^{87}Sr/^{86}Sr)_i$, and εNd ratios show significant differences in each unit: 0.711, -8.7; 0.715, -10.6 and 0.719, -16.4, respectively. The high values of $(^{87}Sr/^{86}Sr)_i$ and the very low negative values of εNd suggest that the massif may have derived from a heterogeneous crustal source dated around 1200 Ma (upper intercept of the discordia). A petrogenetical model for the granite complex is proposed, involving partial melting of a heterogeneous continental crust containing an important metasedimentary component, followed by a magmatic evolution dominantly controlled by crystal fractionation and large scale late- to post-magmatic hydrothermal alteration

Peraluminous granite plutons worlwide are characterized by almost similar petrographic, mineralogical, chemical and isotopic features, often associated with Sn-Li mineralization, suggesting that these granites were issued from the melting of an equivalent heterogeneous upper crustal source enriched in lithophile elements, assumed as corresponding to Proterozoic metasediments.

References

[1] Almeida, A., Leterrier, J., Noronha, F. & Bertrand, J.M., (1998). *C.R. Acad. Sci. Paris*, **326**: 779-785.

[2] Almeida, A., (2001). III^{er} Congreso Ibérico de Geoquímica, VIIIº Congreso de Geoquímica de Espaňa. M. Lago, E. Arranz y C. Galé (eds.): 311-315.