ORIGIN OF GRANITOID ROCKS OF THE DITRĂU ALKALINE MASSIF, TRANSYLVANIA, ROMANIA

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Recent analyses of the granitoid rocks of the Ditrău Alkaline Massif (DAM) have shown that the massif is more complex than it was suggested earlier. The modal analyses enabled the identification of nine different rock types from an area that was handled as a homogenous granite body before. The most abundant accessory minerals are apatite, zircon, sphene and allanite, suggesting that the granites of the DAM were formed by magmatic differentiation processes (BROSKA & UHER, 1991).

On the basis of ASI, varying between 0.92-1.06 (mean = 1.01), most of the samples are peraluminous. When considering their geochemical character, two groups, namely subalkaline and alkaline can be identified. Rocks of higher SiO_2 content are subalkaline, while those of lower SiO_2 content are alkaline (e.g. COX *et al.*, 1979). A magmatic evolutionary differentiation and fractionation relationship can also be detected among the examined rocks. The most fractionated samples are those oversaturated rocks (granites) which represent the subalkaline branch of the magmatic trend. The other branch is alkaline, and involves Qtz-monzonites, Qtz-syenites, syenites and probably nepheline syenites (PÁL-MOLNÁR, 2000; MOROGAN *et al.*, 2000).

Based on the comparison of major and trace elements found in some characteristic samples, the granitoid rocks of DAM have higher Al_2O_3, Na_2O, K_2O, Rb, Sr, Nb, Zr, Ga and lower MgO, CaO, Ba, Pb, Y, Ni contents. These data suggest that the examined rocks belong to A-type granites, which is also supported by discrimination diagrams. The examined rocks plot to the A1 subgroup. The Harker variation diagrams for major, trace and REE elements show that the samples are representatives of the evolutionary trend characterising magmatic differentiation. The value of $(Eu/Eu^*)_{ch}$ indicates different degree of fractionation in terms of the examined samples. The lowest value (0.10) represents the most fractionated sample which is monzogranite, while the highest value (0.48) refers to a slightly differentiated Qtz-monzonite sample. The Nb/Ta ratio varies in a wide range: 13.2 and 32.3, indicating heterogenites. Besides, it refers to the fractionation and differentiation trend as well.

The morphology of zircons shows that they were crystallised under a high temperature (800–850 °C), in a hyperalkaline environment, which also proves the mantle derivation of the magma.

Applying geothermobarometry on quartz inclusions (Th and salinity data) the trapping temperature and pressure of fluid inclusions were also estimated: T = 620–680 °C, P = 6.2–10.2 kbar. These results show that the crystallization of quartz took place in the upper crust.

K/Ar radiometric dating of the examined granitoid rocks suggests that they have magmagenetic relationship with hornblendites and nepheline syenites (PÁL-MOLNÁR, 2000). The rocks represent a Middle Triassic-Lower Jurassic comagmatic suite which can be separated from younger diorites and syenites of DAM on the basis of dating. Geochronology also confirms that these granitoids are end-products of the magmatic differentiation of mantle derived ultramafic rocks.

Considering the results above, it is possible that the source of the examined rocks were mantle derivatives formed in an extensional, within-plate tectonic environment and subsequently modified by differentiation and crustal contamination.

References

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