K-Ar age and stable isotope geochemistry of A-type granitoids in the Divrigi-Sivas region, Turkey

D.BOZTUĞ[1], Y. HARLAVAN[2], AND G.B. AREHART[3]

[1]Dept. of Geological Engineering, Cumhuriyet Univ., 58140 Sivas, Turkey
[2]Geological Survey of Israel, 30 Malkhe Israel St. 95501, Jerusalem, Israel
[3]Department of Geological Sciences, University of Nevada, Reno, 89557-0138 USA

The bimodal, A-type Dumluca and Murmana granitoids, consisting of felsic monzonitic/syenitic and mafic monzogabbroic/monzodioritic rocks, intrude the Cretaceous ophilitic suture zone. These intrusions, resulted from the slab break-off stage of the Neo-tethyan convergence system, are also associated with giant contact metasomatic skarn and hydrothermal iron oxide deposits that occur where three rock types are in close proximity: ultramafics, limestones, and granitoids. New hornblende and biotite K-Ar dates yield cooling ages ranging from 71.5 $\pm$ 0.1 to 77.4 $\pm$ 1.5 Ma, and from 62.1 $\pm$ 0.3 to 76.6 $\pm$ 1.6 Ma for the felsic and mafic rocks, respectively. $\delta^{18}O$ values of the felsic rocks of the Dumluca and Murmana plutons average 10.5‰ and 11.7‰, respectively. Mafic rocks from these plutons have average values of 8.2‰ and 9.6‰, respectively. The felsic rocks from the Dumluca and Murmana plutons are clearly distinct in terms of their $\delta^{34}S$ values, averaging 4.7‰ and 15.7‰, respectively. The mafic rocks of the two intrusions also are very different in terms of $\delta^{34}S$ values, averaging 2.4‰ and 7.4‰, respectively for the Dumluca and Murmana plutons. The felsic parts of these A-type plutonic suites exhibit the high ^{18}O-granitic characteristics with the $\delta\ ^{18}O$ values greater than 10‰ that can be derived mainly from a significant crustal contribution during magma genesis and ascent. The mafic parts show an apparent "mantle-derived" ^{18}O-granitic pattern with lower $\delta^{18}O$ values, between 6‰ and 10‰. However, most of the values fall at the higher end of this range and may have resulted from a minor crustal contribution into a mantle-derived mafic magma source. $\delta^{34}S$ values from the mafic rocks are low relative to $\delta^{34}S$ values of cogenetic felsic rocks. However, there is a significant difference between the two suites, with Dumluca having $\delta^{34}S$ values nearer to mantle values than those of Murmana. In addition, Dumluca $\delta^{18}O$ values are generally lower than those from Murmana. From these data it is clear that the Murmana suite incorporated significantly more crustal material during ascent than the Dumluca suite. In addition, we suggest that a significant source of sulfur for almost all of these magmas is the crustal rocks, probably those containing evaporitic components (i.e., sulfates).

Petrogenesis of the peralkaline, cryolite-tin-mineralized albite granite from Pitinga, Brazil

H. T. COSTI[1], R. DALL'AGNOL[2], O. T. RÄMÖ[3] AND M. PICHAVANT[4]

[1]Museu Paraense Emílio Goeldi, Laboratório de Microscopia Eletrônica de Varredura, 66077-530, Belém, PA, Brazil. (tulio@museu-goeldi.br)
[2]Centro de Geociências, Universidade Federal do Pará, Caixa Postal 8608, 66075-100, Belém, PA, Brazil. (robdal@ufpa.br)
[3]Department of Geology, P.O. Box 64, FI-00014 University of Helsinki, Finland. (tramo@mappi.helsinki.fi)
[4]Institut des Sciences de la Terre d'Orléans, CNRS, 1A Rue de la Férollerie, 45071, Orléans, CEDEX 02, France. (pichavan@cnrs-orleans.fr)

The magmatic, subsolvus Madeira albite granite crystallized from a F-rich, H_2O-bearing melt enriched in Sn and HFSE. It is composed of a peralkaline, cryolite-bearing core facies and a peraluminous to metaluminous, oxidized, fluorite-bearing border facies, the latter generated by autometasomatic processes. A hypersolvus granite is comagmatic with the albite granite. In the albite granite, crystallization of quartz started at ~700°C, the quartz–K-feldspar cotectic line was attained at ~650°C; at a lower temperature, the ternary feldspar solvus was reached and crystallization of albite started. The solidus was strongly depressed, allowing reequilibration of feldspar compositions along the solvus. At the solidus, around 500°C, feldspars approached end-member compositions. Massive cryolite and pegmatitic rocks in the centre of the stock were derived from residual melts. An albite-rich rock associated with the core facies is representative of this residual melt. The early facies of the Madeira pluton are comagmatic and show the characteristics of typical rapakivi granites. Nd isotopes imply that these granites and the hypersolvus and albite granite facies were derived from a Paleoproterozoic crustal source. The early facies and the albite granite are not comagmatic.