Geophysical Research Abstracts
Vol. 17, EGU2015-7014, 2015
EGU General Assembly 2015

Petrogenesis of Post-collisional high Ba-Sr granitoids: the Solarya Pluton, NW Turkey

Alp Unal, Omer Kamaci, and Safak Altunkaynak

İstanbul Technical University, Mine Faculty, Geological Engineering, Istanbul, Turkey (alp.unal@itu.edu.tr)

In NW Turkey, the Late Oligocene-Early Miocene phase of post-collisional magmatism is characterized by widespread granitic pluton emplacements straddling the continental collision zone marked by the Izmir-Ankara suture zone (IASZ). This granitic magmatism produced both low Ba-Sr- and high Ba-Sr granitoids with distinct geochemical properties. One of the major plutons emplaced to the north of İzmir-Ankara suture zone, the Solarya pluton is representative of high Ba-Sr granitoids. We present here whole-rock chemical and Sr–Nd–Pb-O isotopic compositions, as well as $^{40}Ar/^{39}Ar$ ages of the Solarya pluton to evaluate the timing, nature and genesis of potassic, high Ba-Sr granites. The Solarya pluton consists of three coeval granitic members (K-Feldspar megacrystalline granodiorite, fine grained granodiorite and haplogranite) and associated mafic magmatic enclaves/dykes of gabbroic diorite to dioritic in composition. K-feldspar megacrystalline granodiorite, fine grained granodiorite and haplogranite are high K calc-alkaline in character whereas low silica mafic magmatic enclaves and dykes are mildly alkaline and display shoshonitic affinity. Both granitic members and mafic enclaves/dykes are characterized by high Ba (710-2489 ppm), Sr (305-708ppm), low Y and HREE contents and lack of significant negative Eu anomalies. They are metaluminous and display enrichment in LILE and depletion in P, Ta, Nb and Ti.

Sr-Nd-Pb and O isotope compositions of mafic enclaves and dykes are similar to their host granitoids. They have initial $^{87}Sr/^{86}Sr$ values of 0.70702- 0.70805 and $^{143}Nd/^{144}Nd$ values of 0.51235-0.51250 and their εNd values range between -4,9 and -2,05. $^{206}Pb/^{204}Pb$ and $^{207}Pb/^{204}$ Pb isotopic values vary from 18,75 to 18,88 and 15,68 to 15,73, respectivelly. Whole rock and quartz ^{18}O isotopic ratios range between 8 and 10,6. All these isotopic characteristics and major-trace element compositions of Solarya pluton and associated mafic enclaves/dykes suggest a subcontinental litospheric mantle source or depleted mantle source highly enriched by earlier subduction event(s) for their parental magma. Evolution of parental magma proceeded by open system processes (AFC and/or mingling) and further fractional crystallization.

$^{40}Ar/^{39}Ar$ dating yielded isochron ages of 23.2$\pm$0.2-21.6$\pm$0.4 Ma (Early Miocene), indicating that cooling of the pluton and exhumation of Kazdağ and Menderes metamorphic core complexes occurred concurrently. Regarding the Cenozoic tectonic history of NW Anatolia, not only the age of the Solarya pluton but also inferred mantle source and magma evolution suggest that the melt generation to produce high Ba-Sr granitic magmatism was most propably the result of partial delamination or convective removal of the base of mantle lithosphere beneath NW Anatolia.