U-Pb zircon dating and Sr-Nd-Pb isotope systematics of post-collisional I-type monzonitic intrusions in the Gölköy (Ordu) area, NE Turkey

MEHMET ARSLAN[1], İRFAN TEMİZEL[1], EMEL ABDİOĞLU YAZAR[1], ZAFER ASLAN[2], ABDULLAH KAYGUSUZ[3]

[1]Department of Geological Engineering, Karadeniz Technical University, 61080-Trabzon, Turkey (marslan@ktu.edu.tr)
[2]Department of Geological Engineering, Balıkesir University, 10145-Balıkesir, Turkey
[3]Department of Geological Engineering, Gümüşhane University, 29000-Gümüşhane, Turkey

Palaeogene aged mafic to felsic intrusions are widespread in varying ages, sizes and compositions throughout the Eastern Pontides Orogenic Belt in NE Turkey. Of these, two monzonitic bodies (approximately 16 and 7 km^2) in the Gölköy (Ordu) area, extending nearly NW–SE and E-W orientated, emplaced into Upper Cretaceous and/or Eocene volcanic and sedimentary rocks. The studied monzonitic intrusions compositionally consist of fine-medium grained monzonite, monzodiorite and subordinate quartz-monzonite with monzonitic, poikilitic, perthitic, anti-rapakivi and graphic textures. Petrochemically, these monzonitic intrusions show a post-collisional, I-type, metaluminous (A/CNK=0.76-0.93) and shoshonitic features. LA-ICP-MS U-Pb zircon dating of the monzonitic intrusions yielded 43.6-39.7 Ma. The intrusions have $^{87}Sr/^{86}Sr$ ratios (0.70500 to 0.70554), $^{143}Nd/^{144}Nd$ ratios (0.512634 to 0.512682), εNd values (-0.02 to +0.86), Δ8/4Pb (50.3-54.5) and Δ7/4Pb (10.9-11.8). Whole-rock major oxide and trace element variations suggest fractionation of plg ± K-feld ± cpx ± hbl ± bio in the evolution of these monzonitic intrusions. Primitive mantle-normalized trace element patterns of the studied intrusions exhibit enrichment in LILE, Th, Ce and negative Nb and Ti anomalies, all of which suggest subduction and/or crustal components in their petrogenesis. Moreover, chondrite-normalized rare earth element plots of the intrusions show moderately enriched concave-shaped patterns (La_N/Lu_N=9.3-12.6) with negative Eu anomalies (Eu_N/Eu^*=0.69-0.84), all of which imply significant plagioclase and clinopyroxene ± hornblende fractionations in their evolution. All obtained geochemical data suggest that the studied intrusions are moderately evolved from parental magmas derived from melts of lower crustal (metabasaltic-metaandesitic protoliths) and subcontinental lithospheric mantle components in a post-collisional setting.

This study was funded by the Turkish Scientific Research Council (TUBITAK project no: 113Y404).