

Sr-Nd-Pb isotope geochemistry and U-Pb zircon geochronology of post-collisional adakitic intrusion in the southwest of Samsun, N Turkey

İR FAN TEMİZEL¹, MEHMET ARSLAN¹, EMEL ABDİOĞLU YAZAR¹, ABDULLAH KAYGUSUZ², ZAFER ASLAN³

¹Department of Geological Engineering, Karadeniz Technical University, 61080-Trabzon, Turkey (itemizel@ktu.edu.tr)

²Department of Geological Engineering, Gümüşhane University, 29000-Gümüşhane, Turkey

³Department of Geological Engineering, Balıkesir University, 10145-Balıkesir, Turkey

Eocene aged granitoidic intrusions are common in varying sizes and compositions in N-NE Turkey. Of these, the intrusion in the southwest of Samsun, extending N-S orientated, intruded into Eocene volcanoclastic rocks, and compositionally includes medium grained granodiorite with granular, porphyric and micrographic textures, and also contains mafic microgranular enclaves (MMAs). Petrochemically, the studied intrusion exhibits a post-collisional, I-type, metaluminous-peraluminous transitional ($A/CNK=0.95-1.06$) and medium-high-K calc-alkaline characteristics. Furthermore, the intrusion also shows adakitic signatures with high Al_2O_3 (15.5-16.0 wt%), Sr/Y (40.7-61.6) and La_N/Yb_N (14.4-23.7), and low Y (8.2-9.9 ppm) and Yb_N (3.1-4.4). Besides, the intrusion has high SiO_2 (66.6-68.0 wt%) and low MgO (1.6-1.8 wt%), reflecting features of high- SiO_2 and post-collisional adakitic rocks. The LA-ICP-MS U-Pb zircon dating of this adakitic intrusion yielded 38.7-42.9 Ma and its MMA gave 40.5 Ma. Sr-Nd-Pb isotope systematics of the adakitic intrusion are as $^{87}Sr/^{86}Sr$ (0.70477-0.70493), $^{143}Nd/^{144}Nd$ (0.512767 to 0.512774), ϵNd values (+2.52 to +2.65), $\Delta 8/4Pb$ (52.9-54.5) and $\Delta 7/4Pb$ (10.4-10.8) whereas its MMA are as $^{87}Sr/^{86}Sr$ (0.70471 ile 0.70488), $^{143}Nd/^{144}Nd$ (0.512769 to 0.512781), ϵNd values (+2.56 to +2.79), $\Delta 8/4Pb$ (46.3-52.9) and $\Delta 7/4Pb$ (9.9-10.4). Major oxide and trace element variations suggest fractionation of $plg \pm K-feld \pm hbl \pm bio$ in the evolution. Primitive mantle-normalized trace element patterns of the intrusion exhibit enrichment in LILE, Th and Ce, and negative Nb and TiO_2 anomalies. Chondrite-normalized rare earth element plots show enriched patterns with $La_N/Lu_N=14.2-21.6$. All these obtained geochemical data suggest that parental magma of the studied adakitic intrusion were derived from melts of delaminated and/or thickened lower crustal and/or sub-continental lithospheric mantle components in a post-collisional setting.

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