

Rb-Sr, Sm-Nd isotopic composition of Toygar Volcanics in Alaşehir Graben, western Turkey

T. KORALAY¹, K. DENİZ², S. Y. JIANG³,
Y. K. KADIOĞLU^{2,3,4}

¹Pamukkale Univ., Geol.Eng. Dept., 20017 Denizli TURKEY
tkoralay@pau.edu.tr; tkoralay@gmail.com

²Ankara Univ., Geol. Eng. Dept., 06100, Ankara-TURKEY

³Nanjing Univ., Dept. of Earth Sci., 210093, P.R.China

⁴Ankara Univ. Earth Sci. Application&Res. Center-TURKEY

Lower Miocene Toygar volcanics, located at the northern border of Alaşehir graben (Manisa). They have basaltic andesite, hornblende andesite and trachy-andesitic rocks in composition. In terms of mineralogical composition, Toygar volcanics are composed of plagioclase (mostly labradorite and bytownite) + amphibole (ferroan pargasitic hornblende) + biotite (Mg biotite) + pyroxene (Clinoenstatite) + Fe-Ti oxides (Ilmenite) supported by electron microprobe studies. The volcanic rocks display hypohyaline porphyritic, vitrophyric, flow textures and have medium K₂O content. The molar ratios of (Al₂O₃/(CaO+Na₂O+K₂O)) are between 0.74-1.70. Toygar volcanics have Th/Y 0.51-0.75, Nb/Y 0.57-0.90, Ba/Nb 25.10-46.40, Hf/Th 0.24-0.68, K/P 21.18-29.92, Ce/P 0.08-0.11 and Th/U 0.58-4.54 incompatible element ratios and show Volcanic Arc Basalts (VAB) with crustal enrichment nature. According to spider diagrams; volcanics exhibit a clear enrichment in LILE and HFSE. In REE diagram, it displays marked enrichment in light rare earth elements (LREE) ((La/Sm)_N = 3.4-3.73) relative to heavy rare earth elements (HREE) ((Sm/Yb)_N = 2.63-2.75). Furthermore, all samples have negligible negative Eu anomalies ((Eu/Eu*)_N = 0.81-0.89), indicating the minor role of plagioclase in the fractional crystallization. Toygar volcanics display limited range in ⁸⁷Sr/⁸⁶Sr (0.71067 to 0.711222) and ¹⁴³Nd/¹⁴⁴Nd (0.512229 to 0.512252) isotopic ratios and similar to Continental Margin Volcanics (Fig 1).

Petrographic, geochemical and Sr-Nd isotope results suggest a significant role of chiefly hornblende, plagioclase and clinopyroxene fractionation during the evolution of volcanics. Furthermore, these results reveal that the volcanics of Toygar volcanics evolved through fractional crystallization and crustal contamination of the parent magma were formed during the partial melting of the lower crust and mixing with the upper crust material.

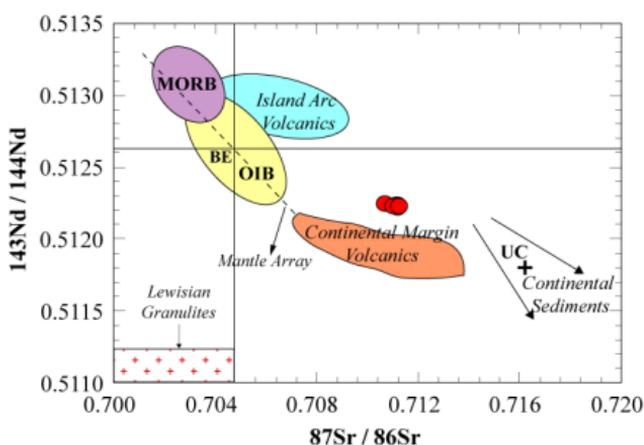


Fig. 1 ⁸⁷Sr/⁸⁶Sr versus ¹⁴³Nd/¹⁴⁴Nd isotope correlation diagram of Toygar Volcanics