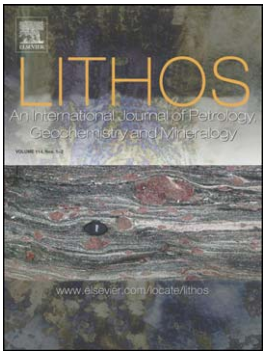

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Geochronology and geochemistry of Eocene-aged volcanic rocks around the Bafra (Samsun, N Turkey) area: constraints for the interaction of lithospheric mantle and crustal melts

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Abstract

^{40}Ar-^{39}Ar age, whole-rock chemical and Sr-Nd isotope data are presented for the post-collisional, Eocene (51.3-44.1 Ma)-aged volcanic rocks from the Bafra (Samsun) area in the western part of the Eastern Pontides (N Turkey) aiming to unravel their sources and evolutionary history. The studied Eocene volcanic rocks can be divided into two groups: analcime-bearing (tephritic lava flows and dykes) and analcime-free (basaltic to trachytic lava flows and basaltic dykes). The analcime-bearing volcanic rocks have a fine-grained porphyritic texture with clinopyroxene phenocrysts, whereas analcime-free volcanic rocks show a variety of textures including hyalo-microlitic microgranular porphyritic, intersertal, trachytic, fluidal and glomeroporphyritic. The volcanic rocks also show evidence of mineral-melt disequilibrium textures such as sieved, rounded and corroded plagioclases, partially melted and dissolved clinopyroxenes and poikilitic texture. Petrochemically, the parental magmas of the volcanic rocks evolved from alkaline to calc-alkaline lava suites and include high-K and shoshonitic compositions. They display enrichments in light rare earth and large ion lithophile elements such as Sr, K and Rb, as well as depletions in high field strength elements such as Nb, Ta, Zr and Ti, resembling subduction-related magmas. The analcime-bearing and -free volcanic rocks share similar incompatible element ratios and chondrite-normalised rare rearth element patterns, indicating that they originated from similar sources. They also have relatively low to moderate initial $^{87}Sr/^{86}Sr$ (0.7042 to 0.7051), high positive $\varepsilon Nd_{(t)}$ values (+0.20 to +3.32), and depleted mantle Nd model ages (T_{DM1} = 0.63-0.93 Ga, T_{DM2} = 0.58–0.84 Ga). The bulk-rock chemical and Sr-Nd isotope features as well as the high Rb/Y and Th/Zr, but low Nb/Zr and Nb/Y ratios, indicate that the volcanic rocks were derived from a lithospheric mantle source that had been metasomatised by slab-derived fluids. Trace element modelling suggests that the parental magma(s) of the volcanic rocks represent mixtures of melts derived by low-degree (~5–10 %) partial melting of spinel-lherzolite (40–85%) and garnet-