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Origin of the Eocene Volcanic Rocks in Muradlu Village, Azerbaijan Province, Northwest of Iran

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Abstract : Abstract The Muradlu volcanic area is located in Azerbaijan province, NW Iran. The studied area exposed in a vast region includes lesser Caucasus, Southeastern Turkey, and northwestern Iran, comprising Cenozoic volcanic and plutonic massifs. The geology of this extended region was under the influence of the Alpine-Himalayan orogeny. Cenozoic magmatic activities in this vast region evolved through the northward subduction of the Neotethyan subducted slab and subsequence collision of the Arabian and Eurasian plates. Based on stratigraphy and paleontology data, most of the volcanic activities in the Muradlu area occurred in the Eocene period. The Studied volcanic rocks overly late Cretaceous limestone with disconformity. The volcanic sequence includes thick epiclastic and hyaloclastite breccia at the base, laterally changed to pillow lava and continued by hyaloclastite and lave flows at the top of the series. The lava flows display different textures from megaporphyric-phyric to fluidal and microlithic textures. The studied samples comprise picrobasalt basalt, tephrite basanite, trachybasalt, basaltic trachyandesite, phonotephrite, tephrophonolite, trachyandesite, and trachyte in compositions. Some xenoliths with lherzolitic composition are found in picrobasalt. These xenoliths are made of olivine, cpx (diopside), and opx (enstatite), probably the remain of mantle origin. Some feldspathoid minerals such as sodalite presence in the phonotephrite confirm an alkaline trend. Two types of augite phenocrysts are found in picrobasalt, basalt and trachybasalt. The first types are shapeless, with disharmony zoning and sponge texture with reaction edges probably resulted from sodic magma, which is affected by a potassic magma. The second shows a glomerocryst shape. In discriminative diagrams, the volcanic rocks show alkaline-shoshonitic trends. They contain (0.5-7.7) k2O values and plot in the shoshonitic field. Most of the samples display transitional to potassic alkaline trends, and some samples reveal sodic alkaline trends. The transitional trend probably results from the mixing of the sodic alkaline and potassic magmas. The Rare Earth Elements (REE) patterns and spider diagrams indicate enrichment of Large-Ione Lithophile Element (LILE) and depletion of High Field Strength Elements (HFSE) relative to Heavy Rare Earth Elements (HREE). Enrichment of K, Rb, Sr, Ba, Zr, Th, and U and the enrichment of Light Rare Earth Elements (LREE) relative to Heavy Rare Earth Elements (HREE) indicate the effect of subduction-related fluids over the mantle source, which has been reported in the arc and continental collision zones. The studied samples show low Nb/La ratios. Our studied samples plot in the lithosphere and lithosphere-asthenosphere fields in the Nb/La versus La/Yb ratios diagram. These geochemical characters allow us to conclude that a lithospheric mantle source previously metasomatized by subduction components was the origin of the Muradlu volcanic rocks.

Keywords : alkaline, asthenosphere, lherzolite, lithosphere, Muradlu, potassic, shoshonitic, sodic, volcanism
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