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The Study of Petrology and Geochemistry of Eocene Volcanic Rocks in Central Iran Zone (Aran area) With Emphasis on Magma Mixing

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Abstract

The study area located in Central Iran zone and is a part of Uremieh -Dokhtar volcanic belt. The area consists of the Eocene volcanic, volcano-sediment and sedimentary units forming three marine, shallow marine and continental facieses.

Middle-Upper Eocene units consists of tuffite, green tuff, siltstone, shale, limestone, conglomerate and volcanic rocks of basaltic-andesitic composition related to marine and shallow marine environments. Upper Eocene units consist of volcanic (basic, intermediate and acidic) rocks, pyroclastic rocks and ignimbrite as well as sedimentary rocks (limestone, sandstone and conglomerate). The volume of volcanic units is more than that of sedimentary units. Eocene and some Oligo-Miocene feeder dike swarms affect the Eocene volcanic units.

The prominent phenomena in petrologic studies are the presence of pillow lava structures in marine facies, existence of plagioclase and pyroxene megacrysts in basaltic lavas, and also veins of epidotic and jaspilitic alteration. From the view point of petrographic studies several types of alteration such as propyllitic, iron oxidation and carbonatization were identified, and by using remote sensing studies zones of propyllitic, iron oxidation and argillic alterations also recognized and separated. The predominant alterations in the area are hydrothermal origin, producing low degree static metamorphic (green schist) rocks.

Petrographic and geochemical evidences show the effects of fractionation, magma mixing and crustal contamination processes in the rocks of the area. Existence of glomeroporphyric textures is an indication of fractional crystallization. Occurrence of inequilibrium textures such as sieved, dusty, or fritted plagioclase crystals and their existence together with clear normal plagioclase crystals, pseudomorphic phases after the mafic phases, the wide range in the plagioclase rim compositions and oscillatory and inversed zoning of plagioclases phenocrysts, existence of hybrid zone and coexistence of two or three kinds of glass phases in the same sample, etc, can be considered the evidences for inequilibrium conditions and magma mixing in the rocks of the area. Based on the geochemical discrimination diagrams, continental within plate tectonic environment is inferred for the basic rocks. With respect to these discrimination diagrams, the rocks were most likely formed in an extensional zone.