The geochemical evolution of lateral and vertical direction of Delihalil volcano (Yumurtalık, Turkey)

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The study area, located between Ceyhan and Osmaniye in Southerh Turkey, is surrounded by pyroclastics and lavas of Delihalil volcano. The lateral and vertical composition of these lavas are different. Basaltic lavas have different shapes as porous and masive in this region. Generally, porous basalt is seem on surface. Geochemical evolution of the Delihali basaltic volcanism in the vertical direction was investigated in this study.

Delihalil volcano and other young volcanics in study region erupted from late Pliocene to historical time along the NE-SW trending left lateral Yumurtalık fault zone in southern Turkey which is characterized by alkali olivine basalts on surface [1]. These lavas were drilled up to 20 m depth at different points. Core samples were taken to determine the vertical compositon of lavas.

These lavas are composed of olivine, plagioclase, augite and titanoaugite crystals and display porphyritic to aphyric textures. The basaltic lavas display transitional characteristics from alkaline to subalkaline and are basanite, alkali basalt and subalkali basalt. MORB pattern of the basaltic lavas imply that basanitic and basaltic lavas erupted from Delihalil volcano could have been derived from a mantle source like within plate. LREE of the most primitive lavas display strong enrichments relative to HREE and MREE on Chondrite-normalized spider diagrams. This finding indicates the presence of garnet in the mantle source.

A partial melting model was conducted to evaluate partial melting processes in mantle source of the basanites and basalts in the Delihalil volcano alkaline volcanism. Results of this study suggest the presence of both strongly garnet and slightly spinel peridotite in the source, a partial melting degree of 0.1-3 % and mixing of the derivative melts from them in the genesis of the mafic basanitic and basaltic lavas.

[1] Parlak, O., Delaloye, M., Kozlu, H., Fontıgnıe, D., 2000. Bulletin of Earth Sciences Application and Research Centre of Hacettepe University, 22: 137-148.

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