

## **Preliminary evaluations of the petrographic and geochemical features of Tertiary volcanic rocks from the Borcka area (Artvin, NE Turkey)**

**Emre AYDINCAKIR<sup>1</sup> and Ciineyt ŞEN<sup>2</sup>**

<sup>1</sup> Department of Geological Engineering, Gumushane University, TR-29000 Gumushane, Turkey, aydincakir61@gmail.com <sup>2</sup> Department of Geological Engineering, Karadeniz Technical University, TR-61080 Trabzon, Turkey

The eastern Pontide Orogenic Belt is divided into three subzones as northern, southern and axial zones from north to south, based on different lithological and tectonic characteristics. This study focuses on the mineralogical, petrographical and geochemical features of the Tertiary volcanic rocks in the Borcka (Artvin) area, located in the southern zone of the Eastern Pontides, are investigated. The Tertiary volcanics consist mainly of basalt, basaltic tracy-andesite, andesite and associated pyroclastics (volcanic breccia, vitric and crystal tuff). These volcanics are composed of plagioclase, clinopyroxene, hornblende, rarely magnetite and apatite and are characterized by microlitic-porphyrific, porphyric, rarely intersertal, intergranular, fluidal and glomeraporphyric textures. In addition, they show disequilibrium textures such as oscillatory zoning, sieve textured and resorbed plagioclase phenocrysts, breakdown and opaqued hornblendes, dissolution in clinopyroxene.

The volcanic rocks are tholeiitic to calc-alkaline transitional in nature and generally have low to medium K<sub>2</sub>O contents (0.18-2.0 wt%). In binary plots, K<sub>2</sub>O, Na<sub>2</sub>O, Rb and Ba show positive correlation, whereas CaO, MgO, Fe<sub>2</sub>O<sub>3</sub>, Al<sub>2</sub>O<sub>3</sub>, P<sub>2</sub>O<sub>5</sub>, TiO<sub>2</sub>, Zr, and Ni show negative correlation with silica content of the rocks, suggesting significant plagioclase, hornblende and Fe-Ti oxide fractionation during the evolution of volcanics. N-type mid-ocean ridge basalt-normalized trace element patterns indicate enrichment in large-ion lithophile element (LILE) and Th, and negative anomalies in Ta, Nb, Ti and P elements. This may possibly indicate that the previous subduction event(s) together with the crustal contributions had played an important role in the magma genesis. The chondrite-normalized rare earth element patterns suggest a similar source for the volcanics.

The preliminary interpretations of the geochemical data obtained from this study indicate that the Borcka volcanic rocks evolved by fractional crystallization and magma mixing ± contamination/assimilation of a parental magma, and the sources of those volcanics are probably derived from an enriched source region (probably lithospheric mantle) which was previously modified by fluids. *Keywords: Eastern Pontides, Borqka (Artvin), fractional crystallization, geochemistry, Tertiary volcanics*

Borcka (Artvin, KD-Turkiye) yoresi Tersiyer volkanik kayaflann petrografik ve jeokimyasal ozellikleri

iizerine ilk bulgular

Dogu Pontid Orojenik Kusagi farkli litolojik ve tektonik ozelliklere bagh olarak kuzeyden gilneye dogru, bashca tic zona aynhr. Bu calismada, Dogu Pontid'lerin Gilney zonunda yer alan, Borcka (Artvin) ve cevresinde yilzeylenen Tersiyer volkanitleri mineralojik, petrografik ve kimyasal olarak incelenmistir. Tersiyer volkanitleri bashca bazalt, bazaltik trakiandezit, andezit ve bunlarla iliskili piroklastik kayaclardan (volkanik bres, vitrik ve kristal till) olusmaktadir. Bu volkanik kayaclar, mikrolitik-porfirik, porfirik, yer yer intersertal, intergranuler, akma ve glomeroporfirik doku gostermede olup, plajiyoklas, klinopiroksen, hornblend, daha az oranda da magnetit ve apatitten olusmaktadir. Bunun yam sira, plajiyoklas fenokristallerinde halkali zonlanma, elek dokusu, kemirilme; hornblenlerde opaklasma ve bozusma ve klinopiroksenlerde de kemirilme yapilari gibi dengesizlik dokulari gozlenir.

Volkanik kayalar, toleyitik ve kalk-alkali gecisli olup, dusilk-orta derecede K<sub>2</sub>O (% 0.18-2.0) icerirler. Artan SiO<sub>2</sub>'ye karsi K<sub>2</sub>O, Na<sub>2</sub>O, Rb ve Ba icerikleri pozitif, CaO, MgO, Fe<sub>2</sub>O<sub>3</sub>, Al<sub>2</sub>O<sub>3</sub>, P<sub>2</sub>O<sub>5</sub>, TiO<sub>2</sub>, Zr, ve Ni icerikleri negatif korelasyon gostererek, kayaclarm gelisminde plajiyoklas, hornblend ve Fe-Ti oksit fraksiyonlasmasinm etkili olduguna isaret etmektedir. Volkanitlerin N-tipi Okyanus Ortasi Sirti Bazalti'na gore normalize edilmis iz element dagilimleri; buyilk iyon yaricaph litofil element (LILE) ve Th iceriklerinde zenginlesme ile Ta, Nb, Ti ve P elementlerinde gozlenen fakirlesmeler magma gelisminde daha onceki dalma batma ve kabuk katkisi stireclerinin onemli rol

oynamis olduklarim dusundiirmektedir. Volkanitlerin kondrite normalize edilmiş nadir toprak element dagilimlan, kayaclarm benzer kaynaktan tilrediklerini gostermektedir.

Elde edilen jeokimyasal verilerin on degerlendirmesi ile volkanik kayaclann fraksiyonel kristallenme, magma karisimi  $\pm$  kontaminasyon/asimilasyon olaylari sonucunda gelistiklerini ve volkanitlerin kaynaginm muhtemelen daha onceden akiskanlar tarafmdan metasomatizmaya ugratilmis zenginlesmis bir kaynak bolgeden (muhtemelen litosferik manto) tilreyebileceklerini ifade etmektedir. *Anahtar Kelimeler: Dogu Pontid, Borgka (Artvin), fraksiyonel kristallenme, jeokimya, Tersiyer volkanitleri*