Geophysical Research Abstracts
Vol. 14, EGU2012-4917, 2012
EGU General Assembly 2012
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Main peculiarities of N-Q magmatism of the Greater Caucasus

A. Dokuchaev, S. Bubnov, O. Bogatikov, and Yu. Goltsman

Institute of Geology of Ore Deposits, Petrography, Mineralogy, and Geochemistry of RAS, Petrography, Moscow, Russian Federation (alexandre-dokuchayev@yandex.ru)

Three stages are recognized in young magmatic activity of the Greater Caucasus: Late Miocene, Pliocene, and Quaternary.

Products of Late Miocene stage are confined to the northern and southern margins of the Greater Caucasus, respectively: laccoliths of Caucasian Mineral Waters (CMW) (∼8 Ma) and magmatic complexes of Central Georgian neovolcanic area (6.4-6.1 Ma) (Lebedev at al., 2006).

CMW granitoids are represented by high-Mg# granosyenites, granites, and leucogranites with high alkalinity. They show Mo-Sn±Au-W and base metal ore-geochemical signature.

Lavas of Central Georgian area correspond to K-Na subalkali and alkali basalts with high Mg# (0.56-0.67) and elevated Sr, Ba, Nb. Their ore-geochemical specialization has not been defined yet.

Pliocene stage was responsible for the formation of Chegem volcanic center (∼2.8 Ma), several plutonic complexes (Eldzhurta, Dzhimara, Sangutidon, Kyrtyk) (3.75-1.6 Ma), felsic ignimbrites, rhyolites, rhyodacites of NE and W Elbrus area (3.0-1.6 Ma), as well as dacites and rhyodacites of dikes and stocks of Tyrnyauz area (2.5-2.1 Ma) (Chernyshev et al., 2011).

Rocks of Chegem center were formed during three main phases: (1) basaltic andesites of Surkh and Krandukh volcanoes; (2) pyroclastic sequences of Upper and Lower Chegem volcanic highlands and Dzhungusu intrusive massif (dacites, rhyolites, trachyrhyolites, granodiorite porphyries); (3) andesites of Kumtyube and Kyugenkaya stratovolcanoes.

Initial and final stages represented by calc-alkaline rocks, whereas second stage was marked by K-Na subalkaline and calc-alkaline rocks. Chegem volcanic center have Pb-Zn±Mo ore-geochemical signatures.

Eldzhurta Massif is made up of K-Na granites and leucogranites, while Dzhimara, Tepli, and Sangutidon massifs consist mainly of calc-alkaline diorites and granodiorites with high Ti and Mg contents. Granitoids of Eldzhurta Massif bear W-Mo-Sn-Cu-base-metal signatures, while the Tepli and Sangutidon massifs are characterized by Cu-Mo porphyry specialization.

Products of Quaternary magmatic activity are developed in Elbrus and Kazbek neovolcanic areas. Five phases were documented in the Quaternary activity (950-<30 Ka) of Elbrus. Early-stage rocks are ascribed to calc-alkaline basaltic andesites, dacites, and K-Na trachybasaltic andesites, while later stages produced calc-alkaline rhyolites, dacites, andesites, and K-Na trachydacites and trachyandesites.

Four phases of activity were identified in Kazbek area (450-< 30 Ka, Dzhava, Keli, Kazbek, and Kabardzhin-Sakokhetsky centers).

Dzhava center is represented by the andesites, Keli center produced rocks from andesites (K-Na trachyandesites) to rhyolites. Kazbek center rocks vary in composition from basaltic andesites (K-Na trachybasaltic andesites) to dacites. Kabardzhin-Sakokhet center includes subalkaline basalts to dacites.

Quaternary volcanics of the Greater Caucasus have Pb-Zn ore-geochemical signature.

Young magmatism of the region was formed in a complex geotectonic setting combining continental collision with mantle hot spot activity.

Parental magmas of Neogene-Quaternary volcanics of the Greater Caucasus were derived from a multicomponent source involving mantle and crust components. Majority of young granitoids were derived through lower crustal melting.

Work was supported by the RFBR (projects 11-05-00933, 11-05-00726) and Program 4 of the RAS Presidium.