

Petrology and U-Pb Zircon Dating of the Vakijvari Ore-Bearing Pluton, Lesser Caucasus, Georgia

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In the SW part of the Lesser Caucasus is represented Paleogene-Neogenian the Achara-Trialeti fold-thrust belt, which is considered an intra-continental rift trough [1]. Vakijvari pluton is located in the central part of the belt and represents one of the largest magmatic body of the region. The plutonic body cuts through the Middle Eocene volcanicogenic-sedimentary formations of mainly andesitic composition. There are identified about eight outcrops of the plutonic body exposed along the Vakijvari ore field and cover an area of 75 km².

Vakijvari ore-bearing pluton contains mostly coarse-grained rocks of subalkaline, syenetic composition with pyroxene-biotite and hornblende-bearing varieties, though biotite-pyroxene monzonites have been observed as well. Their chemical composition varies within the following limits: SiO₂ = 56.5-61.5%, Al₂O₃ = 16.2-17.7%, Fe₂O₃ = 2.5-4.3%, FeO = 2.2-4.8%, CaO = 4.2-6.7%, Na₂O = 3.3-5.3%, K₂O = 3.8-5.9%.

In the contact area of volcanicogenic-sedimentary rocks and Vakijvari pluton strong postmagmatic hydrothermal alteration zone is developed. Thus, 10 gold bearing ore occurrences have been investigated in this area, which are genetically connected with the plutonic body. These occurrences are presented at the following ore associations: quartz-low sulfidic, quartz-copper-polymetallic, iron ore-pegmatite, sulphur-pyrite and copper-porphry-molybdenum.

The U-Pb radioisotope dating of zircons from the Vakijvari syenite pluton has been conducted by means of Agilent 7500s ICP-MS coupled with a New Wave UP213 laser ablation system in the Department of Geosciences, National Taiwan University followed the analytical procedures by Chiu et al. (2009). One of the dated samples (#12Geo13), provided from the central part of the plutonic body, is identified as hornblende-syenite (SiO₂=59.7%). Consequently, 24 zircon grains have been separated from this sample and dated during the investigation [2].

In all zircons Th/U index is always >0.4, which demonstrates clearly their typical magmatic formation. The weigh mean U-Pb age of 43.26 [U+FOB1] 0.72 Ma (MSWD = 0.74, Probability = 0.030) for zircons has been identified, which corresponds to the Middle Eocene Epoch (Lutetian Stage).

Based on paleontological data, the plutonic body has been dated Upper Eocene, whereas volcanic rocks in contact with pluton, have been assigned a Middle Eocene age. According to current study results, it should be suggested that volcanic activity has been immediately followed by plutonic injection. Therefore, the rock types that are represented in the study area should be considered as homogeneous volcano-plutonic formations.

REFERENCES

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