

Geological Premises for the Finding of Silicate Fe-Ni Mineral Deposits in Mitrovica Region Locality Bajaska

Afrim Koliqi, Nurten Deva*, Albana Koliqi

Faculty of Geosciences and Technology, University of Mitrovica, KOSOVO

Received March 27, 2016; Accepted June 29, 2016

Abstract: In Bajaska locality are used geochemical methods in regional geology research in order to determine the weathering crust on ultrabasics massife. Study locality belong Mitrovica topographic planschettes, southern parts of Albanik (Kopaonik). This locality is a part of ophiolite Vardar zone and represents the northern sides of the Kosovo territory. These studies have given result on the existence the appearance of Nickel silicate ores and appearance of Ni, Pb, Cu and other sulphide mineralization the genesis of which is related to basic and ultramaphite rocks. Samples are taken in flow river Bajaska also in the surroundings of the monastery Bajaska, Lozna, Jelakce and Raic Breg area. In each locality were taken from 30 samples in total 120. From the samples taken by contacting the red series and serpentinite are obtained results that range from 1.4-2.2% Ni. Spectrochemical analyses 96% of the total samples have determined that the average of Ni content ranges 0.16-1.0 % Ni. The paper aims to determine the potential places for detailed geology research which will enable finding new structural metalogeny zones with mineral deposits of nickel silicate in Kosovo territory.

Keywords: *Bajaska, Kosovo, nickel silicate, ore appearances, weathering crust,*

Introduction

Kosovo is situated in the southeastern part of Europe and extends into the central part of the Balkan Peninsula characterized by geological and tectonic specifications. Territory of Kosovo has a varied geology that ranges in age from the Neo-Proterozoic to the Holocene. Old rocks Cambrian, Paleozoic and Mesozoic aged are more compact structure and composition that differ from new Cenozoic (Tertiary, Quaternary) rocks which are composed of plastic no compact structure. The tectonic is characterized by fault and wrinkles geology development in Mediterranean zone, including segment the Vardar Ocean (Paratethys) across Kosovo (Doglioni et.al., 1998; Pamić et al., 2002).

The products of the weathering crust of nickel silicate in Kosovo are related in genetics and spatial aspects with ultrabazic complexes (Maksimović, 1962; Matijević, 1980). Ultrabazic rocks in the Kosovo region are Alpine type and are formed by partial or full of the melting of mantle Earth and presented as massive or islands (Karamata et al., 1980) Figure 1. This ultrabazic complex is the result of oceanic crust development in two tectono-metallogeny zone, Vardar ophiolitic zone and Mirdita-Dukagjin ophiolitic zone (Dukagjin et al., 1988; Koliqi., 2003).

Ophiolites created by the closure of the Vardar Ocean are important because of ultrabasic complex associated chromites deposits. In these serpentines rocks in tropical and subtropical climate for dominant development intensive physics-chemical process of alteration is formed weathering crust important for products of bauxite and lateric nicke (Boev et al., 1995; Pruthi, 1986).

Bajaska region is located of northeast city of Mitrovica and show southwest part of the central Albanik (Kopaonik) shown in Figure 1. Researched areas have difirent geology and structural specifics. Geology of this territory are building of serpentinite, ultrabazic rocs, magmatic products of Tertiary, Cretaceous flysch, sediments and Pliocene coverings (Figure 2).

Appearances of Ni silicate ore in Bajaska

Region of Bajaska belongs to Mitrovica planchettes and present southeast part of Rogozna and northeast part of Mokra moutain. This region belongs to Vardar ophiolite zone that is characterized with tectonic structures by NNW-SSE extension. By aspect of geology building can be differ terranis which they are conditioned by tectonic events. The terrane built by Paleozoic series, diabase-chart series and vulcanite's of Tertiary. The rest of terrane built serpentised peridotites and serpentinite western part of researched and terrane built senonian flysch and Pliocene sediments presented from the river terraces, alluvial deposits, bigar and humus cover (Figure 2).

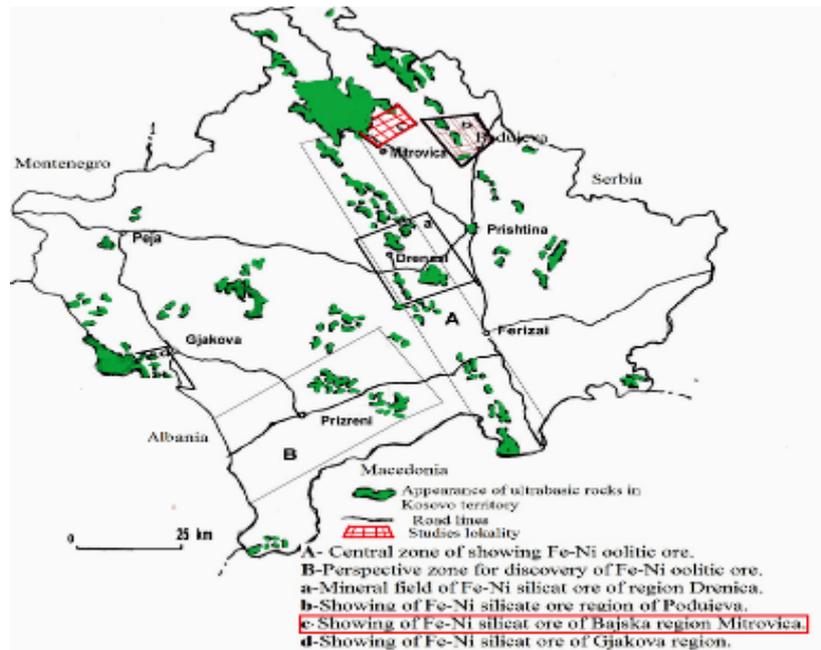


Figure 1. Ultrabasic rocks appearance of Kosovo territory.

In this territory serpentine are discovered in an area of several square kilometers. The western border of this zone with Cretaceous sediments is tectonic. Serpentinite are cover by river terraces and Quaternary sediments that they have served for the saved weathering crust products (silicate Fe-Ni ore).

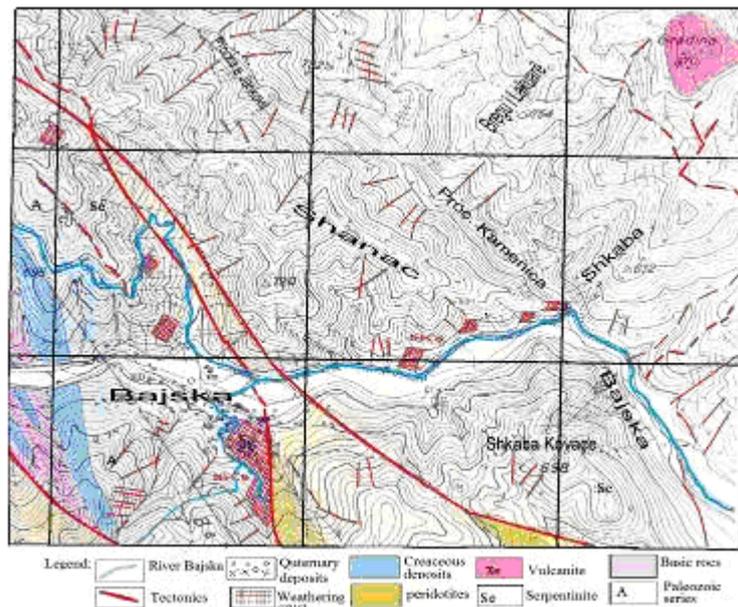


Figure 2. Geology and structural map of Bajaska – Mitrovia planschettes.

Results and Discussion

Experimental results of analyses

Samples by geochemical research are taken in flow river Bajaska also in the surroundings of the monastery Bajaska , Lozna , Jelakce and Raic Breg. In each locality were taken from 30 samples in total 120. Samples are traded in company “Ferronickel” in Drenas with semiquantitative and spectrochemicals analyze.

Results of these analyzes are determinate existence of nickel silicate product and appearance of Ni, Pb, Cu and other sulphide mineralization the genesis of which is related to Tertiary basic-ultramaphite rock and serpentinite rocks a later Jurassic age. Spectrochemical analysis determined Ni

content from 0.16%Ni to 1.0%Ni, Cu and Pb until 100 ppm, Ba until 300-800ppm and contents Zn on this samples range till to 250 ppm, see Table 1.

Table 1. The spectrochemical average content analysis in the locality of Bajaska . Company “Ferronickel” Laboratory, Drenas

Elements	Content %	Microelements	Content ppm
SiO ₂	45.40 - 49.80	As	-
TiO ₂	0.31 - 0.36	W	0-30
Al ₂ O ₃	8.90 - 11.48	Bi	-
Cr ₂ O ₃	0.59 - 0.68	Ba	300-800
Fe ₂ O ₃	22.96 - 25.16	V	5-70
FeO	0.26 - 0.28	Cd	-
MnO	0.69 - 0.95	Cu	30-100
NiO	0.16 - 1.00	Zn	30-250
MgO	3.95 - 7.59	Ag	0-001
CaO	0.69 - 0.98	Pb	10-100

The compositions of the refinement were extracted different minerals in varying amounts. Some refinements in an increased content of magnetite ore the electromagnetic fraction have a higher content of ilmenite and minor epidote. Ilmenite content varies from 2.6-41.6% in the electromagnetic fraction while epidote content is smaller and varies from 23.3-37.6%. In electromagnetic fraction magnetite varies to 14.8% while other minerals are amphibole, tourmaline garnet, pyroxene, biotite, chlorite and serpentine they definite by smaller amount.

Conclusion

Studies in the Bajaska region as prospecting research they have defined very important premise for the discovery of new deposits of nickel silicate. Defined geological composition of ultrabasic rocks where the weatherings crust development. Weathering crust in many places keeps vertical geochemical zonality which has been developed on the contact of serpentinite and river terraces and other Pliocene sediments. In some localities nickel silicate products of weathering crust are saved at contact with the red series where met great percentage of nickel silicate that ranges from 1.4-2.2% Ni. Spectrochemical analyzes have determined nickel silicate ore with economic percentage that ranges Ni content 0.16%Ni to 1.0%Ni and sulfide mineralization. Research details in this region mean applying geophysical methods and drilling wells for the discovery of deposits of Fe-Ni importance for national economy.

References

- Boev B, Serafimoski T, (1995) Metalogentetic features of Fe-Ni lateritic deposits in the Vardar zone. Republic Macedonia. *Second national symposium “Metalogeny of Bulgaria”*, Sofija.
- Dukagjin Sh, Mullina Ç, Zhivanoviq Sh, (1988) *Raport mbi kërkimet e Fe-Ni në Kosovë*. Fondi i dokumentacionit në Ferronikel, Lypjan.
- Doglioni C, Moreti I, Rouer F, (1998) Basal litosferic detachment, estward Mantile flow and Mediterranean Alpine palogeography. Department of Geology, University of Florida.
- Karamata S, Majer V, Pamic J, (1980). Ophiolites of Yugoslavia. Sp. Issu. Tethyan ophiolite I, Wesern area, (ed.) G. Rocci Bologna, pp.105-125.
- Koliqi A, (2003) Metalogeny the products of the wethering crust of Fe-Ni silicate in Kosovo. Study of doctoral dissertation, Tirana. pp. 69-72.
- Maksimoviç L., (1962) Problems of research of Ni in the ultrabazic rocks. Scientific Symposium at Belgrade.
- Matijeviç I, (1980) Report of regional research of silicate ore in KSA Kosovo. Geozavod Belgrade.
- Pamić J, Tomljenović B, Balen D, (2002) Geodynamic and petrogenetic evolution Of Alpine ophiolites from the central and NW Dinarides: an overview. *Lithos* **65**, 113-142.
- Pruthi V, (1986) Modern methods of regional geological studies in K.S.A Kosovo with particular emphasis on the prognosis of metalogeny and prognosis of mineral resources. Dissertation, Faculty Geosciences & Technology, Mitrovica.