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Opinion

Secondary Dispersion Halos of Platinum and Palladium in the Shorzha Dunite-Peridotite Massif of the Sevan Ophiolite Belt of Armenia

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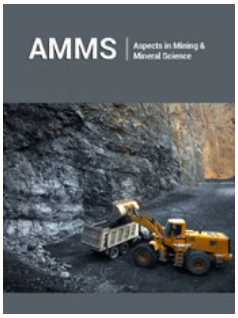

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Opinion

Distribution of platinoids within the massifs of Sevan ophiolitic belt has been very poorly studied. As a result of the research implemented, a negative assessment of the prospects for platinum content of dunite-harzburgite massifs of Sevan ophiolitic zone was given [1,2]. In order to study the disposition of platinum and palladium, as well as their possible clusters within Shorzha massif, research of secondary geochemical haloes was carried out, the results of which are given in this article.

Geological structure of NE shore of Lake Sevan

Amasia-Sevan-Hakari ophiolitic zone is the central part of Alpine-Himalayan ophiolitic belt. In the territory of Armenia, it stretches from Amasia village to the SE through the Bazum ridge up to the southern slope of the Shirak ridge. According to the data of numerous researchers, the ophiolites of Amasia-Sevan-Hakari zone are fragments of oceanic crust of Tethys, which as a result of collision, obducted onto the continental crust in the form of scales and plates [3-7]. Numerous bodies of chromite ores occur in dunnites, represented by massive and ingrained varieties. Shorzha deposit of chromites was most thoroughly studied, where small grains of platinum were found for the first time [2]. At present for endogenous deposits of platinoids, unlike the deposits of other metals, no methodology of geochemical prospecting of sub eroded and hidden ore bodies has been developed [8]. Processing of the results of analysis of lithogeochemical samples made it possible to reveal a number of multiplicative anomalies of platinum and palladium in the dunite- peridotite rocks of Shorzha massif (Figure 1). As can be seen from Figure 1, the largest in size and intensity multiplicative anomalies of platinum and palladium are revealed in the east (anomalies III, IV, V) of the sampled area, which expand to the northeast.

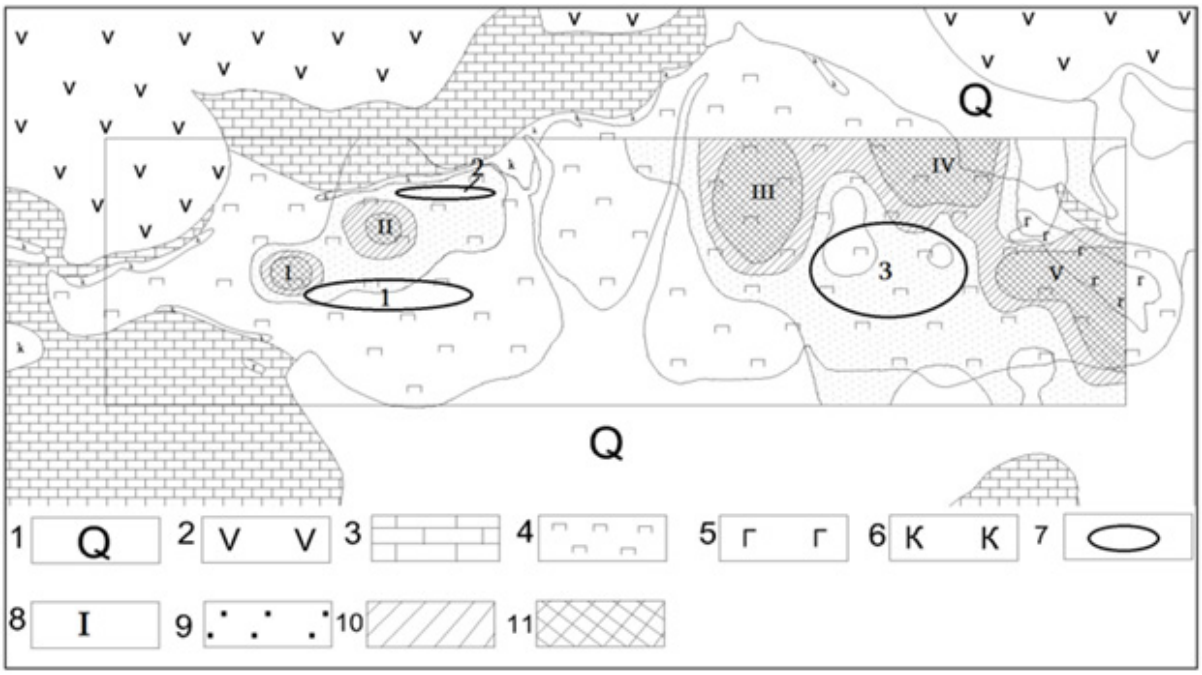

Figure 1: Schematic geological map of Shorzha ore field with the secondary multiplicative haloes of dispersion of platinoids. Conventions: 1. Modern alluvial-dealluvial deposits; 2. Middle Eocene: lava flows, volcanogenic formations of andesite composition; 3. Upper Cretaceous: Campanian-Maastrichtian, limestones and marls; 4. Middle Jurassic: peridotites (harzburgites and wehrlites); dunnites, serpentinites; 5. Middle Eocene: gabbro, olivine gabbro, tractolites, anorthosites; 6. Carbonatites; 7. Contours of the site and zones of chromite mineralization (1. Southern chromite zone, 2. Northern chromite zone, 3. Site "Zalezh"); 8. Numbers of anomalies; 9, 10, 11. Distribution of platinoids (Pt, Pd) in the secondary haloes (9. 50-70mg/t, 10. 70-90mg/t, 11. 90-385mg/t).

Serpentinized dunnites and peridotites are developed within the anomalies. No accumulation of chromite mineralization has been revealed in them. Chromite-bearing dunnites in the form of ingrained mineralization are only delineated on the site "Zalezh". In trench and core samples of basic hyperbasites of central parts of the III and IV anomalies, the contents of chromium oxide - 0.37-1.45%, of platinum - 0.00012-0.01g/t and palladium - 0.0011-0.17g/t have been determined. The accumulation trend of Pt and Pd is observed in the samples, where the content of chromium oxide is within 0.6–1.45% (high-chromium hyperbasites). In chromite clusters the contents of PGM (Platinum Group Metals) rise. In samples taken from chromite zones of the site "Zalezh" (the content of chromium oxide - 3.14-8.74%) the contents of 0.002-0.8g/t platinum and 0.0012-1.38g/t palladium were obtained by spectrochemical analyses of 20 samples. The V anomaly in the east also partially covers tractolites, which are embedded in peridotites. In root samples of tractolites the contents of platinoids do not exceed 0.001g/t. The anomaly may be due to the movement of eluvium. Even though sometimes "hurricane" contents of platinum (up to 15g/t) are obtained in rock chip samples, and the presence of platinum minerals was established in chromite ores, it should be noted that, within development of massive chromite bodies in the southern chromite zone of the western part of Shorzha massif, anomalous geochemical sites of PGM are not formed. Absence of anomaly within chromite clusters is explained by the fact that chromite areas are more difficult to erode than the hyperbasites of Sevan ophiolitic zone. The results we obtained prove that PGM are characteristic not only of chromite ore bodies, as noted by A.G. Betyekhtin, but they are also developed in ore-hosting dunnites and peridotites, where the sum of platinoids and gold (∑МПГ+Au) is 0.22g/t on average.

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