GEOLOGICAL AND STRUCTURAL CONDITIONS AND COMPOSITION OF THE GOLD-SILVER ORES OF THE UPPER BRYANTINSKY ORE CLASTER

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Upper Bryantinsky body is geographically located in Tynda district of Amur oblast. Geologically, the object belongs to Upper Bryantinsky potential silver-gold ore cluster inside Sutamo-Bryantinsky potential silver-gold district (Fig.1) From the standpoint of geological structural position the area is located within Bryantinsky volcano-tectonic structure, which consists of early Cretaceous volcanic-sedimentary and subvolcanic formations and is laid on the archaean-proterozoic basement. Rusburmash Corporation has already prospected and evaluated the body and identified category P1 of resources in the amount of 20 tons of gold and 140 tons of silver. Their interpretational scheme is presented in Figure 2. We have reinterpreted source rocks, and, in our opinion, this will increase metallogenic potential of the district.

To solve the problem the following tools and methods were used: 3D terrain modeling, field magnetic survey data, mine data, rock composition analysis.

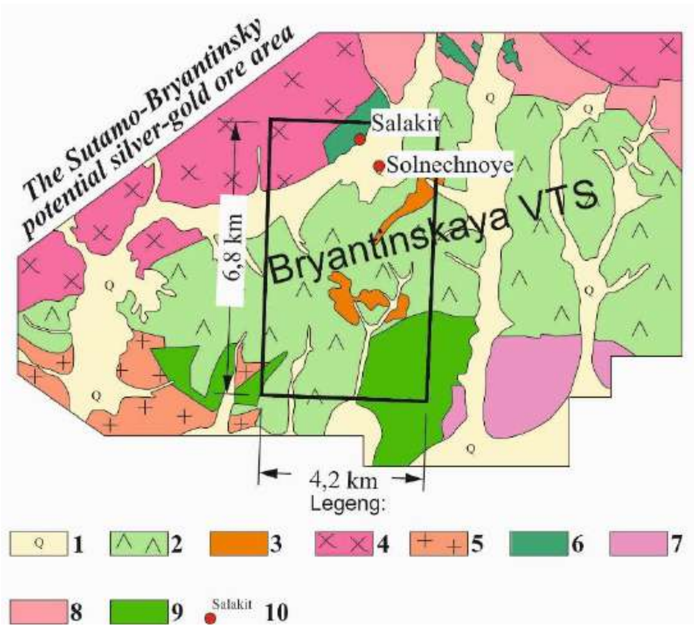

Fig.1. Scheme of the geological structure of the Sutamo-Bryantinsky potential silver-gold ore area: 1 - Quaternary sediments; 2 - Segangrinsky volcanogenic-sedimentary complex; 3 - Segangrinsky subvolcanic complex; 4 - Tynda-Bakaransky intrusive complex; 5 – Late-Stanovoy intrusive complex; 6 - Luchansky intrusive complex (gabbro, gabbro-norita, etc.); 7 - Upper Archean. Gudyn Formation (gneiss, crystal slate); 8 - ancient intrusive complex (granite gneiss); 9 - Horogochinsky intrusive complex (metagabbro); 10 - occurrences;

Detection of a caldera or a paleocrater in the territory would be a favorable factor for increasing the prospects of this body, therefore, it became the main trend in our study.

First of all we analyzed geomorphological conditions of the location using satellite images and three-dimensional modeling of the relief. (Fig.3) The aim was to identify ring-shaped elements (typical for classical calderas, or craters) within the zones of volcanite occurrence.

As a result of the study, a ring structure well defined in the relief was identified, supported by the river network. (Fig. 3) However, it is just an indirect feature, and it must be confirmed by other methods.

To verify the identified ring structure, the data of the magnetic survey of 1:10 000 scale were used. Unfortunately, the data do not cover the entire study area, but most of it.

The analysis of magnetic survey data also made it possible to distinguish ring and radial structures by positive magnetic anomalies, which go well with the geomorphological prerequisites of a paleocrater or even caldera. The centers of the ring structures on the geomorphological and geophysical data are the same.

A number of positive magnetic anomalies are identified by mine workings (wells, ditches), which reveal the subvolcanic bodies of acid-alkali composition, according to silicate analysis, correspond to dacites and trachydocytes. This allowed us to interpret the positive magnetic fields within the Bryantinsk volcano-tectonic structure as an indirect sign of the presence of subvolcanic bodies. Acidic magma is known to be more viscous compared with the basic one, and, as a rule, it is acidic magma that clogs the volcanic vents forming necks. This fact, although indirectly, also testifies the presence of a paleocrater in the study area.

Presence of tuff breccia within the supposed ring structure is an important fact supporting our hypothesis, because of tuff breccia is a typical vent rock. It means that there is a nearby source of volcanic-sedimentary rocks.

Thus, we have considered several factors that do not contradict, but, on the contrary, testify for the presence of a paleo-crater within the territory under consideration. Both geomorphological conditions, and geophysical fields, and lithological prerequisites — all these factors positively combine with our point of view regarding the potential presence of a paleocrater or even a caldera.

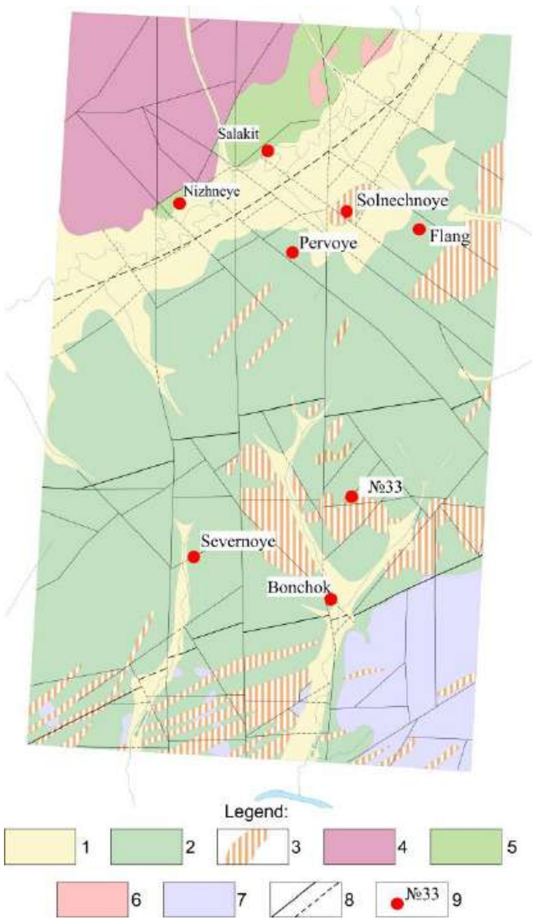

Fig.2. Geological scheme of the Upper Bryantinsky area: 1 - Quaternary sediments; 2 - volcanogenic-sedimentary rocks, Segangrinsk Formation;
3 - subvolcanic formations (andesites, dacites, rhyodacites), Segangrinsk formation;
4 -granodiorites, Tynda-Bakaransky complex;
5- gabbroids, Luciansky complex; 6 - granite gneiss, Drevneshtanova complex; 7 - gabbro, Horogochinsky complex; 8 - tectonic disturbances; 9 - ore occurrences.

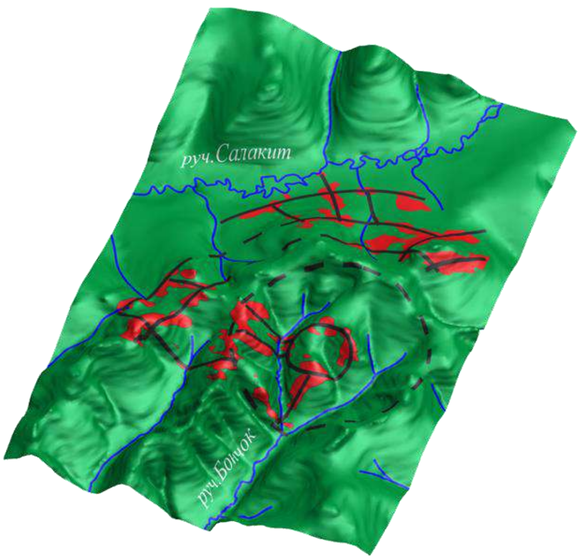

Fig. 3. Three-dimensional model of the relief of Upper Bryantinsky area with positive magnetic anomalies (in red) and river network.

References

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