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Research of ore-controlling factors and significant sign of mineralization of Kokpatas and Cenral Bukantau Regions (Uzbekistan)

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Abstract

The mineral components method is based on a color composition of 3 indices: the clay rocks index, the iron-containing minerals index, and the iron oxide index. In the resulting image, the red color corresponds to clay rocks, the green color corresponds to iron–containing minerals, and the blue color corresponds to rocks with iron oxide. Each image processing software includes numerous processing methods, some of which are used by geologists in their research. The main methods of image processing for obtaining geological information include PCA, ITS, CC color composition in standard and natural colors, some filtration methods, and others. The geological informativeness of the results obtained by these methods is noted in the works of domestic and foreign researchers.

Introduction

In addition to the above-mentioned image processing methods, there are methods based on linear combinations of channels of a single image. The results obtained by these methods are called indexes or new channels. Indexes are the result of the mathematical combination of digital values of different source channels of the same image.

All indexes are based on absorbing and reflecting properties. They are related to the chemical composition of the studied surface. From a geological point of view, these indices determine the difference between different types of rocks (Figure 1).

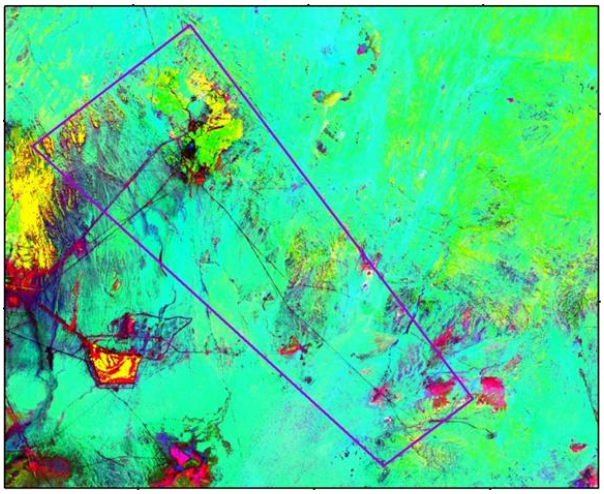

Figure 1. The result of processing by the mineral composition method

Material and Method

Determination of the main factors of localization of gold ore and other manifestations of minerals is a necessary condition for improving the efficiency of forecasting and prospecting.

The gold deposits and manifestations of Bukantau belong to four formations: gold-sulfide veined-interspersed ores, gold-sulfide-quartz, gold-silver, and gold-scarn. The deposits of the gold (sulfide)-quartz formation can be divided into two sub-formations: a) low-sulfide vein-veined zones and stockwork and b) low-sulfide veins, linear vein zones, and breccias.

It should be noted that the isolated gold ore formations cannot be considered as genetically separate groups, since they do not differ either in the source of the metal, in connection with magmatism, or in the time of formation, i.e., different stages. Their formational appearance is determined by the degree of development of certain mineral associations and depends, first of all, on the nature of the host environment and spatial relationships with the massifs of granitoid rocks, as well as the composition of the latter.

The established main factors of localization of ore fields are common to the entire folded system.

Along with this, the roles of some of them may be different in each tectonic segment. As well as for each formation type of gold deposit, the selected factors have a slightly different meaning.

The main factors of mineralization are Structural; igneous; lithological.

In the Pre-Mesozoic basement between the Kokpatas and Okjetpes mountains, deposits of the Kokpatas and Tubabergen formations, Devonian-carboniferous carbonate formations, granitoid massifs, ore-bearing faults have been identified. Promising sites have been identified for setting up deep searches for gold, silver, and tungsten. The gold content in core samples reaches 0.15-0.3 c/u, however, in most samples, it does not exceed tenths of c/u.

The results of the interpretation of gravimetric data used made it possible to clarify the structure of the Bokalin intrusive massif, to draw up a diagram of discontinuous tectonics and a diagram of the block structure of the central part of the Bukantau mountains. Four systems of hidden deep foundation faults were identified - latitudinal, meridional, north-eastern, and north-western. In the complex analysis of geological and geophysical materials, six blocks have been identified, each of which is characterized by its magmatic, tectonic, lithological, and geochemical factors. To study the deep tectonic structure and magmatism, the information in (Figure 2) was attracted.

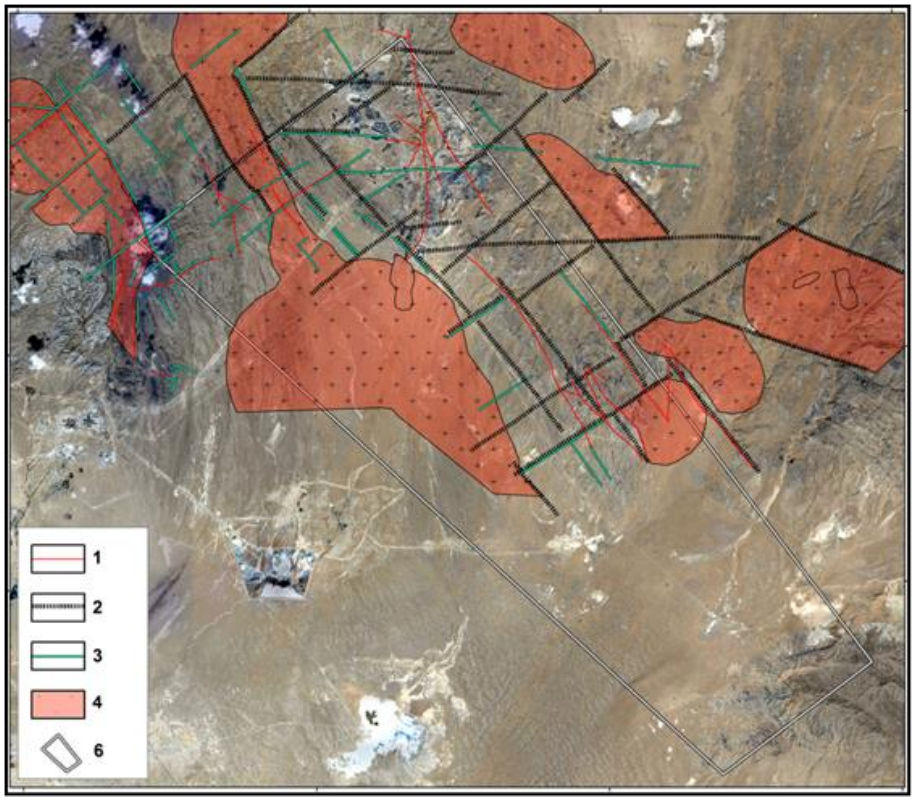

Figure 2. Deep tectonics and magmatism of the Kokpatas ore region according to gravity and magnetic exploration data

Results

Compiled using materials by [1] Symbols: 1-tectonic disturbance according to geological data; 2-Tectonic disturbance established according to gravity survey data; 3-tectonic disturbance established according to magnetic survey data; 4-counter area of work of the Kokpatas-Okjetpes trend.

The above-mentioned intrusive boundaries must be taken into account when conducting prospecting operations, in which the main factor of mineralization is the magmatic factor.

The structure of the surface of the Karashakho formation has been studied and a structural map has been constructed along the sole of volcanogenic formations. On the map of the isodynamic of the field, the zonal magnetic maxima of the field, mainly of the submeridional and north-western strike, are confined to the development of hyperbaric bodies within their limits. On Derbez-Boztau Square, a map of the anomalies of the Bug Δg has been compiled, on which the northeastern end of the Kokpatas granitoid is characterized by an intense gravitational minimum in the southwestern part of Derbez Square. The spatial relationship of gold mineralization with elements of geophysical fields is determined. Areas of local negative anomalies have been identified that have a close connection with all known gold ore objects. The regions of the local positive components of the field Δg are associated with a local increase in the power of the productive thickness. The regions of local negative anomalies of the gravity field associated with tectonically weakened zones of increased fracturing, to which all known objects of gold mineralization gravitate, are determined. Numerous magnetic anomalies have been identified mapping the area of contact-metasomatic transformations of the Kokpatas intrusive and the ultrabasic body, including the Karashakho anomaly. The work carried out made it possible to predict endogenous gold mineralization using the pattern recognition technique, to identify a number of promising sites for setting up prospecting for gold, as well as for the search for tungsten mineralization of the scarn type and sites promising for the localization of nickel associated with ultrabasic.

Kokpatas monzodiorite-granodiorite complex C_3k

It was isolated by [1]. It is represented by the reference array of the same name, located in Southern Bukantau. It breaks through the deposits of the Kokpatas formation, cornified in a narrow (up to 100 m) exocontact zone of the intrusive. It is discordant in relation to the host rocks.

The Kokpatas massif is exposed on the surface by only 3 sq.km, but its total area, almost completely covered by the Mesocainozoic cover, is about 350 sq.km.

The structure of the bulk of dike rocks varies from microgranite to felsic, often complicated by blastomylonite; the composition is close to the rocks of the main phases. The accessories of the complex are apatite, sphene, orthite, monazite, and zircon. An unstable type of alkalinity, moderate total ferruginousness is characteristic.

In high–carbon content – rubidium, strontium, chromium, thorium in moderate – fluorine, zirconium, in low - barium.

Central Bukantau diorite-lamprophyre dike complex (Ps)

The complex includes dikes of medium composition, common only in the area of the South-Bukantau zone, which arose at the final stage of Permian intrusive magmatism. These dykes belong to the Kokpatas intrusive complex of the middle carboniferous [2-4].

The study of the Kokpatas ore field revealed a wide distribution of dikes of diorites and lamprophyres here. The areas of their maximum accumulation are located outside the Kokpatassky intrusive. In the intrusive body itself, such dikes are rare, while in other intrusive arrays, which are accompanied by their own dike series, the greatest condensation of dikes is observed precisely within the arrays themselves.

The dikes of the complex form the Kokpatas dike belt, elongated in the sub-latitudinal direction by almost 60 km with an average width of 10-15 km). The area of th [1] Kokpatas ore field is characterized by the greatest saturation of dikes. The size of individual dikes is 0.4-5m power, the length is from several tens to the first hundreds of meters.

Spatially and in time, gold mineralization is close to the formation of the described dyke complex.

Conclusion

In this study, the object of research is the perspective area of Derbez - the western flank of the Kokpatas deposit, Kokpatas-Okjetpes trend.

Studies were carried out using remote survey materials that contribute to the improvement of existing and the creation of new research methods, the study of the geological structure of large regions, to the identification of factors responsible for the localization of minerals. At the same time, structural patterns of mineralization localization in individual areas were revealed, and the connections of cosmo-geological objects with the distribution of minerals were studied.

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