APPLICATION OF INTEGRATED INTERPRETATION OF GEOPHYSICAL DATA IN SEARCH OF HIDDEN MINERALIZATION (ON EXAMPLE OF SULTAN-UVAIS AND TAMDYTAU MOUNTAINS)

Abduvaliev A.A., Nurmukhamedov I.I., Eshmurodov A.P.

Institute of Geology and Geophysics named after H.M. Abdullayev, State committee of the republic of Uzbekistan on geology and mineral resources

Abstract. *Application of the geophysical method of induced polarization on the example of the search for hidden mineralization of chromites. In the mountains of Uzbekistan.*
Keywords: *Induced polarization, chromites, hidden mineralization.*

Despite the rather detailed knowledge of most aspects of the geological structure and ore content of the Sultanuvais and Tamdytau mountains up to date, the problems of identifying patterns of localization and development of chromite mineralization in promising areas, the development of criteria for forecasting and assessing hidden mineralization remain relevant and requiring solution. This is important for addressing issues related to vertical and horizontal zoning elements, the identification of which is necessary for in-depth prediction of mineralization. Many of the Uzbekistan's hyperbasite massifs are overlain by loose sediments, making it difficult to study them geologically from the surface. Disseminated ores is characterized by a very wide range of changes in physical properties, depending on the content of chrome spinel in the ore, the nature of silicate cement, porosity and fracturing. In the matter of finding deposits under siege geophysical methods help, but serpentinization, the tectonic nature of ore-controlling structures and the vein-like shape of chromite deposits greatly complicate the overall picture of physical fields [1]. This paper raises the question of the possibility of using a complex of geological and geophysical data at the stage of searching for local deposits and hidden mineralization. The purpose of this work was to study the polarization properties of chromium ores and their host ultramafic rocks of the ophiolite series. Ore occurrences and deposits, as is known, are confined to the intersections of tectonic faults. On a regional scale, confirmation of this are easily found, both when considering the location of oil and gas deposits and in the spatial position of various ore deposits. [6].

In order to answer this question, we have done a number of works:

1. According to previous geological and geophysical work, the most promising areas were identified
2. Geophysical work was carried out on a local scale with their subsequent processing and as a result we obtained area maps of the distribution of physical parameters of the studied areas.
3. Comparative analysis and interpretation of the data were performed.

Knowing that minerals are confined to the zones of intersection of tectonic faults, the first step was to identify them at the work site. To do this, we interpreted the map of the magnetic field in the areas of Sultan-Uvais and Tamdytau (Fig. 1) [4].

The first research area is located within the central part of the Sultan-Uvais massif. The central strip of ultramafite formations of the Sultanuvais mountains stretches through the entire ridge from northwest to southeast for almost 50 km with an average width of 2-2.5 km [2.6]. Serpentinites and products of their change (listvenites, talcites, pyroxenites, rodingites, talc-carbonate, actinolite, tremolite rocks, gabbro and gabbro-amphibolites, as well as plagiogranites developed in its eastern part [6]. The zone of ophiolite complexes outcrops of the Sultan-Uvais ridge has a significant extent and finds its expression in high positive magnetic field anomalies. Often, bodies not only split, but, following the latter, make knee-like bends. These blocks are the least studied, but a number of features in them can be expected to identify industrial deposits. After conducting electro- and magnetometric studies in the selected area, we obtained the following values of electromagnetic fields, shown in Figure 2. Magnetic exploration was carried out by equipment GSM-19 manufactured by GEM Systems, Inc Canada. Also, vertical electric probing profiles were passed with the measurement of induced polarization (VEZ-VP) by a IMVP-8 device manufactured by North-West company. As can be seen from the figure, a zone with increased magnetic field intensity corresponds to a zone with reduced resistance and increased polarization. Such a ratio of abnormal fields, according to [1], corresponds to the zone of latent mineralization.

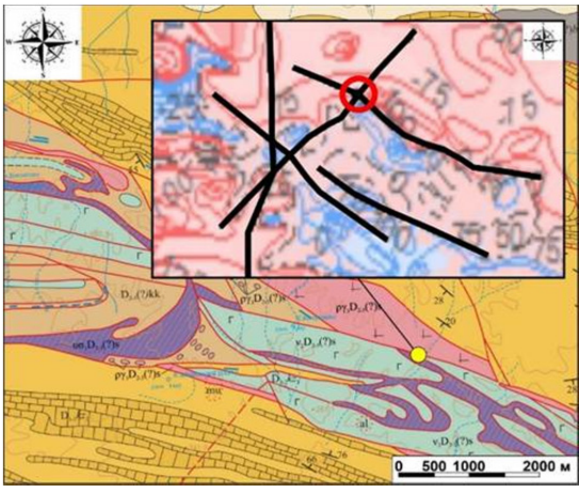

Fig. 1. Field area based on geomagnetic data interpretation. Black - lines of suspected tectonic faults, yellow point - work area. The basis is a fragment of the geological map of the Sultan-Uvais mountains, [2], a map of magnetic anomalies [4].

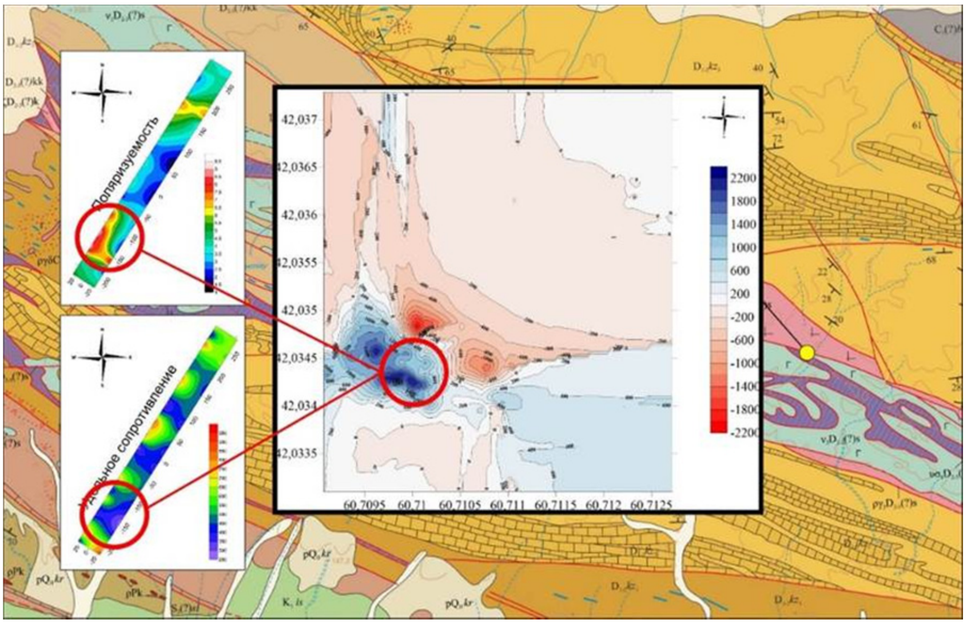

Fig. 2. Results of electrical and magnetic survey work on the Sultan-Uvais area.

Ultrabasite-basite formations of Northern Tamdytau are divided into two formation complexes: Tamdy gabbro-peridotite and Djamankingir gabbro-plagiogranite complexes [6,7]. They are confined to the zone of the deep Muruntau-Nuratau fault and are located in its operating structures at the junction of the Silurian and Riphean formations [3]. Field experimental and methodological studies in order to develop elements of the technology for prospecting for chromite deposits using high-precision magnetic and electrical prospecting were carried out using the method of induced polarization by installing a median gradient (Fig. 3).

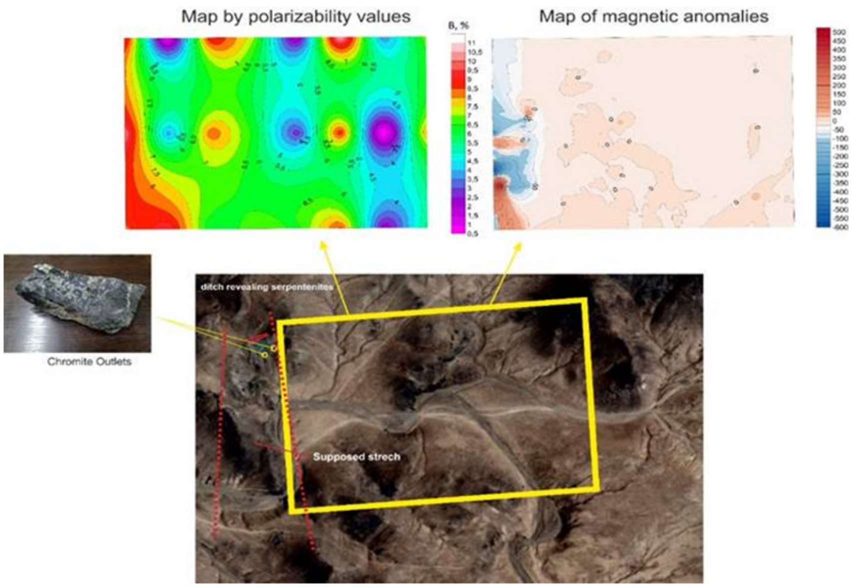

Fig. 3. Area of works performed with reference to coordinates.

The sections show a pronounced electrical resistivity anomaly at the expected intersection of the profile with the ore vein. The magnetic field within the work area has a complex structure. The intensity of positive and negative anomalies reaches 500 nT. Only one linear anomaly is well manifested in the structure of the magnetic field. The interpretation scheme identifies an extended linear minimum with an intensity of -50 nT above the outcrops of chromite-containing rocks in the left part of the observation area. Also, a reduced magnetic field is observed over large dunite lenses. In most of the area covered by Quaternary deposits, a calm field of positive anomalies is observed. It is known that chromites in magnetic fields, as a rule, are distinguished by the minimum values of ΔT. The correctness of the ore body reference is confirmed by a negative magnetic field anomaly of -50 nT.

Conclusion.

The study of the polarization and electromagnetic properties of chromite ores and ultramafites containing them in their natural occurrence using electrical and magnetic exploration facilities in Uzbekistan is still under development. The experience of prospecting for the search for chromites in two areas shows that ground-based magnetic survey and the method of induced polarization in the VP-SG survey options, in combination with geological studies, can effectively solve the problems of searching for objects. Based on the research results, we have obtained encouraging results on the anomalous behavior of electrical resistance and magnetic field anomalies in the proposed ore zones. The use of geophysical prospecting methods is several times cheaper than exploratory drilling, which reduces costs and speeds up the process of searching for hidden mineralization.

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