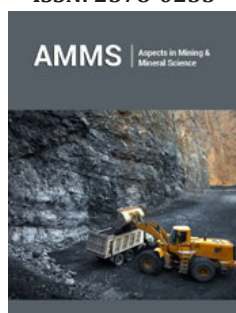


# Scientific Basis for the Development of Promising Directions of Geological Exploration in Order to Strengthen the Mineral and Raw Material Base of East Kazakhstan Region

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## Opinion

The beginning of the XXI century was marked by a sharp increase in fundamental geological research in order to create a modern scientific base for further development of the mineral and raw material sector of the world economy. Mineral resources are still the basis of the economies of many countries, but at present there is a tendency for their depletion as a result of intensive development of known deposits. East Kazakhstan is a unique geological site, which contains numerous deposits of copper, lead, zinc, gold, rare metals and lands. The basis of the mining and industrial complex is represented by non-ferrous metals obtained during the development of pyrite-polymetallic deposits of Rudny Altai (Cu, Pb, Zn, Au, Ag, etc.). However, the fund of easily discovered deposits has already been exhausted, the remaining reserves of subsoil resources will only be enough for the first decades. In this regard, the relevant issue is to strengthen and improve the mineral and raw material base for operating mining and metallurgical enterprises of Rudny Altai. To increase the efficiency of geological exploration work, a new high-quality forecasting of ore-bearing structures is needed, which requires the increase in the depth of geological mapping and prospecting work with the involvement of significant volumes of drilling and mining operations, in their rational integration with geophysical and geochemical methods. It is necessary to further improve the conduction of geological survey work and the compilation of geological and forecast metallogenic maps of a new generation developing legends and software at the international standards level. A greater in-depth study of the petrological and mineralogical-geochemical composition of productive geological formations and ore matter using high-precision electron microscopy methods is advisable.

A systematic analysis of large factual geological data of past years and new research results on the Great Altai issue (geology and metallogeny) from modern scientific and methodological positions shows that the region has prospects for the discovery of new deposits of non-ferrous, rare metals, lands and other minerals [1]. Key findings are based on specific factors and criteria. In the Phanerozoic history, a sole geostructure of the Greater Altai was formed as a result of collision and splicing of the Kazakhstan and Siberian microcontinent in the process of degradation of the Paleo-Asian Ocean. There is an important ore-control value due to the identified mineragenic specialization of various geodynamic conditions, in which the leading types of deposits were formed (pyrite of Rudny Altai - in rift genic and island-arc, D<sub>1-3</sub>), gold ore in Western Kalba - collisional, C<sub>2-3</sub>, rare-metal Kalba-Naryma and Zharma-Saura - postcollisional, P<sub>1-2</sub>, residual weathering crusts Ni, Co, Ti, Zr, Au - in the regime of continental rifting T<sub>2</sub>-Pg). A regular linear-nodal distribution of deposits in a system of parallel ore belts of regional rank (Rudnoaltaisky pyrite-polymetallic, Kalba-Narymsky rare metal, West Kalbinsky gold-ore and Zharma-Saursky multimetal), the prospects of which have not yet

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been exhausted, is emphasized. In the placement of ore objects, the leading importance is attached to fault tectonics. In Rudny Altai, deep faults controlled the areas of manifestation of Devonian basalt-andesite-rhyolite volcanism, with which pyrite-polymetallic deposits (Ridder-Sokolnoye, Tishinskoye, Maleevskoye, etc.) are genetically related. In the Western Kalba and the Charskaya zone, the ore-controlling one was a system of diagonal and latitudinal deep faults (Charsko-Gornostaevsky, Kyzylovsky, etc.), actively manifested at the stage of the Hercynian collision (the Bakyrchik, Suzdal, etc. deposits) [2]. In the Kalba-Narym zone, the main rare-metal pegmatite fields and deposits were controlled by a system of latitudinal regional faults and their feathering fracture structures (Bakennoye, Belaya Gora, Yubileinoe deposits, etc.). On the basis of a detailed study of fluid minerals, mineralogical and geochemical criteria for forecasting and prospecting for gold-sulfide deposits of the Western Kalba and rare metal pegmatites of the Kalba-Narym zone with the isolation of typomorphic minerals and geochemical elements-indicators of ore formation were determined [3]. As a result of the study, the identified complex of

geotectonic, geophysical, geological-structural, ore-petrological, and mineralogical-geochemical factors and criteria is considered as a scientific basis for the development of promising directions of geological exploration. The promising areas and sites for setting up deep geological mapping and prospecting works in the ore regions of Rudny Altai, Kalba and Zharma-Saura, the positive implementation of which can contribute to strengthening the raw material base for mining and metallurgical enterprises of East Kazakhstan, have been identified.

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