

## **Ion-sorption prospecting method for concealed pyrite-polymetallic deposits**

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The method is based on identifying and interpreting of geochemical anomalies formed in soils as the result of the modern migration of ore components from the deep ore sources to the surface. Solid, liquid and gas components content in soils can increase due to concentration on the surface of colloid particles.

Non-selective leaching of metals 1M HNO<sub>3</sub> (1:100) is used to recover ore components from soils. Soil sample (fraction <0.1 mm) is taken from A1 level (5-10 cm depth) to analyze for Zn, Cu, Pb, Ag, As, Sb, Cd, Te, Se, Tl, Bi, Mo, W, Co, V and Cr. Element content in nitric acid extracts at 0.08-0.1 ppb levels is measured by ICP-MS method. A unified sample preparation procedure allows to minimize the analytical error.

Mathematical processing of acquired data is performed to reduce random geochemical field fluctuations and increase the ore anomaly regular component for more precise identification of anomalies. Anomalies are 5-10 times wider compared to ore thickness irrespective of their depth and overlying lithology. Concurrently, determination of the rock-forming (petrochemical) component (K, Na, Mg, Ca, Fe) anomalies is performed. These components correspond to zones of metasomatic alteration of the host rocks around ore bodies. All of the identified anomalies are interpreted based on prospecting models combined with geological, geophysical and landscape features. Anomalies are classified by types, geochemical spectra, quantitative parameters and other indicators.

The ion sorption method was tested in prospecting for polymetallic deposits in Russia, in various landscape and climatic environments (permafrost taiga, steppe, forest-steppe, etc.). The most of testing areas are characterized by complex geological conditions of geochemical anomaly development (areas overlain by recent sedimentary cover, old crusts of weathering and buried ore deposits).