



Results of combined application of geochemical and geophysical methods for exploration of primary gold mineralization within the accretionary zone of the Taimyr Peninsula (Verkhneilingradsky Area)

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The Taimyr-Severnaya Zemlya gold province discovered in late 20 century has been studied very irregularly. It has been identified that most of the known gold occurrences are confined to Riphean-Vendian formations of two different geodynamic zones: passive margin-collision and accretion zones (Zabiyaka, 1978; Shanurenko, 1981; Vernikovskiy, 1996, etc.). Within the latter, the promising Verkhneilingradsky area was distinguished during prospective and metallogenic investigations of FGUP VSEGEI geologists (Proskurnin, Gavrish, 2010). Its structural and geological features allow analogies with primary gold fields in Late Precambrian carbonaceous volcanogenic-carbonate-terrigenous formations of the fold framing of the Siberian Platform (Yenisei Ridge type). In 2009-2013, within the Verkhneilingradsky area, geological exploration works, anticipatory geochemical exploration by superfine fraction analysis method (MASF), interpretation of airborne and ground geophysical data were done by FGUP "VSEGEI" with participation of the authors.

Interpretation of airborne geophysical survey data made it possible to develop a physical-geological model, to determine the optimal set of geophysical and geochemical criteria of mineralization. Contrast secondary sorption-salt halos of Au (up to 0.2 ppm – 68 KK), Ag, As, Sb, Mo, weakly contrast - Pb, Bi, Mo, Sn, Cu, Zn, Ni, Cr, Mn, Ti, PGE as well as other elements were identified from interpretation results of geochemical surveys at a scale of 1:50000.

A linear auriferous (up to 38 ppm in individual grab samples) zone of crumpling, cataclasis and cleavage of Riphean volcanogenic-carbonate-terrigenous formations (Verkhnesvetlinsky Prospect) has been established from combination of integrated geophysical prognostic parameter, anomalous geophysical field and geological observations.

High-contrast secondary sorption-salt Au (up to 0.46 ppm), As, Pb, Cu halos that generate a linear anomalous zone of about 1.5 km long have been outlined from results of detail (1:10000) geochemical exploration. Zonal structure of the anomalous geochemical field has been determined: in the core zone Au, As, Ag, Sb, Hg are accumulated and Ti, V, Cr are depleted; in the peripheral zone of exchange, the opposite range of elemental accumulation is observed. Such a zonation can indicate possible ore mineralization concentration (Sokolov, 1998).

On geophysical evidence, the Verkhnesvetlinsky Prospect is characterized by weakly intensive magnetic field, elevated polarization anomalies, which coincide with decreased values of electrical resistivity, elevated minimal anomalous K and U concentrations against the background of decreased minimal anomalous Th concentrations.

Commercial gold-sulphide-quartz mineralization intervals in the metasomatite of beresite-listvenite series with average Au contents of more than 2 ppm (up to 3.32 ppm for 18 m in individual trenches) have been discovered in the Verkhnesvetlinsky Prospect from sampling data of trenches and shallow wells (5 to 10 m).

Positive results of integrated application of geochemical and geophysical methods are indicative of their high effectiveness. The procedure of rational combination of geochemical and geophysical methods in primary gold ore exploration can be recommended for other prospective areas of the accretionary zone of the Taimyr Peninsula.