Geophysical Research Abstracts
Vol. 16, EGU2014-13538, 2014
EGU General Assembly 2014

Application of the superfine fraction analysis method in ore gold geochemical prospecting in the Shamanikha-Stolbovsky Area (Magadan Region)

Yuliya Makarova (1), Sergey Sokolov (1), and Anton Glukhov (2)

(1) VSEGEI, St. Petersburg, Russian Federation (yuliya_makarova@vsegei.ru), (2) NEISRI FEB RAS, Magadan, Russian Federation

The Shamanikha-Stolbovsky gold cluster is located in the North-East of Russia, in the basin of the Kolyma River. In 1933, gold placers were discovered there, but the search for significant gold targets for more than 50 years did not give positive results. In 2009-2011, geochemical and geophysical studies, mining and drilling were conducted within this cluster.

Geochemical exploration was carried out in a modification based on superimposed secondary sorption-salt haloes (sampling density of 250x250 m, 250x50 m, 250x20 m) using the superfine fraction analysis method (SFAM) because of complicated landscape conditions (thick Quaternary sediments, widespread permafrost). The method consists in the extraction of superfine fraction (<10 microns) from unconsolidated sediment samples followed by transfer to a solution of sorption-salt forms of elements and analysis using quantitative methods. The method worked well in areal geochemical studies of various scales in the Karelian-Kola region and in the Far East.

Main results of the work in the Shamanikha-Stolbovsky area:

1. Geochemical exploration using the hyperfine fractions analysis method with sampling density of 250x250 m allowed the identification of zonal anomalous geochemical fields (AGCF) classified as an ore deposit promising for the discovery of gold mineralization (Nadezhda, Timsha, and Temny prospects). These AGCF are characterized by following three-zonal structure (from the center to the periphery): nucleus zone – area of centripetal elements concentration (Au, Ag, Sb, As, Cu, Hg, Bi, Pb, Mo); exchange zone – area of centrifugal elements concentration (Mn, Zn, V, Ti, Co, Cr, Ni); flank concentration zone – area of elevated contents of centripetal elements with sub-background centrifugal elements.

2. Detailed AGCF studies with sampling density of 250x50 m (250x20 m) in the Nadezhda, Timsha, and Temny prospects made it possible to refine the composition and structure of anomalous geochemical fields, identify potential gold zones, and determine their formation affinity.

Nadezhda Site. Contrast Au, Ag, Pb, Bi, Sb, As dispersion halos that form a linear anomalous geochemical field of ore body rank are identified. Predicted mineralization was related to the gold-sulfosalt mineral association according to the secondary dispersion halos chemical composition.

Timsha Site. Contrast secondary Au, Ag, Sb, As, Hg, Pb, Bi dispersion halos are identified. These halos have rhythmically-banded structure, which can be caused by stringer morphological type of mineralization. Bands with anomalously high contents of elements have been interpreted by the authors as probable auriferous bodies. Four such bodies of 700 to 1500 m long were identified. Mineralization of the gold-sulfide formation similar to the "Carlin" type is predicted according to the secondary dispersion halos chemical composition as well as geological features.

Temny Site. Contrast secondary Au, Ag, W, Sb dispersion halos are identified. A series of geochemical associations was identified based on factor analysis results. Au-Bi-W-Hg, and Pb-Sb-Ag-Zn associations, apparently related to the mineralization are of the greatest interest. Geochemical fields of these associations are closely spaced and overlapped in plan that may be caused by axial zoning of the subvertically dipping auriferous body. Three linear geochemical zones corresponding to potentially auriferous zones with pyrite type mineralization of the gold-quartz formation are identified within the anomalous geochemical field core zone.

3. In all these prospects, mining and drilling penetrated gold ore bodies within the identified potentially gold zones. The Nadezhda target now has the status of gold deposit.