

Economic geology & potential element in Kelisakandi-NW of west Azarbayjan

Sayed Vahid Shahrokhi*, MohammadReza Hazareh** و Mohsen Hasanvand

*Geology group, Faculty of Science, Islamic Azad University , Khorramabad branch

(Vahid.shahrokhi@Gmail.com)

*Geological survey of Iran

Abstract:

In this study with the aim of exploration, tried to introduce area with potential mineralization in Kelisakandi sheet. Systematic sampling of stream sediments will be carried out with study area. Analytical results Kelisakandi show some unknown area in Kelisakandi sheet. In this sheet, some area such as show high anomaly Cu and Zn after analyzing sediments of secondary halo. More ever, study of heavy mineral samples, also show the presence of mineral and paragenesis such as Chalcopyrite. These associations are also supported our interpretations.

Key word: *Systematic geochemical, Factor analyze, Principle component analysis map*

Introduction

Kelisakandi 1:50000 sheet is about 675 km² and is located in NW of Iran with Uromieh–Dokhtar trend. The area is limited to geographical latitudes of 39°15' to 39°30' N and longitudes of 44°00' to 44°15' E.

The main units of structural in this sheet point of view of exploration in clouded of ultramafic units and volcano–sedimentary units belong to ophiolites complexes such as harzburgite, lherzolite and donite, that altered to serpentine. Databases included of 1:50000 Geological map, satellite information, economic geology data's and geochemical analysis which are used more. Because of Security problems in border lines there is no any geophysics data.

Method of study

For doing systematic geochemical exploration, firstly, based on former data, the area under study has investigated. Then sampling have been done. In the next step calculation of analysis error have done for assemblies rocks in around. Based on this information process of data has did. Sampling of heavy minerals and drawing maps and study of rock samples so are studied.

Designing of sampling network

For distinction of really geochemical anomalies and separate types related to mining deposition from other types in each area, It is needed that a constant part of flood channel such as to -80 mesh or heavy mineral for example - 20mesh has selected for experiment. Diameter of this firm part is dependant of weather condition, topography, and distance of origin of mineralization.

Density of sampling from flood channel is dependant of channel density in watershed. Hence for area under study that has a cold climate and belong to mountain area there is one sample for one or some kilometers. In kelisakandi's sheet with attention to outcrops, 115 samples. Selected for area, each one sample only for 700m².

Tried distribution of samples in mountain area was based on watersheds gravity that will be controlled by stratigraphy, Lithology, tectonics, Intrusive bodies and subvolcanics.

Samoeling acts

Attention to the study area show that geochemical exploration in scale of 1:50000 must be do in secondary environments. These information is based on distribution of elements in secondary halos especially river sediments and soils. each sample of geochemical is about 100-200 grams of 80mesh flood channels.

After sieving the dry sediment area put in the safe packet with numbering.

Sending samples of geochemical to laboratory:

The whole of samples have sent to laboratory of geological survey and some samples have sent to laboratories of Canada.

After providing of samples, samples selected for analysis of 30 elements. Samples analyzed based on ICP method(AES,MS).Limit of sensivity for samples has been accepted that are following (quantity is based on ppm): (table 1)

Process of data

In this sheet for each sample 30 elements are calculated and then have been processed. in this step for a portion of data sensor did replacement amounts calculated and have been replacement.

Replacement of sensord amounts by most Kohen correctly method:

most of important statistics methods need total set of nonsensord data. For estimate of amount of sensord there is some methods. In here is used of from method and that is kohensmethod. This method included of average society of normal log with use of most corrections.

The below table show the sensord estimate amunts by kohen's method correction. (Table 2)

X_0 =Limit sensitive of device .

X_R =Replacement amounts for sensord data.

Separation and briefly of rock societies based on 1:50000 map of kelisakanadi

Importance division of taken samples based on type of rock in superior area is for processing of data for amount of earth and limit of threshold separate for each area that depend on homogenesis group that have been Investigated.

In this way we can help to neutral phenomena of syngenetic.

In this case effort to manifest of origin of each sample from sediments that the results are as follows.

1-Sob monolithic System: 6Samples of 3 different type rocs.

2-sobdilitic System: 17 Samples of 6 different type rocs.

3-sobtirlic system: 5 samples of 4 different type rocs.

Index enrichment

According to definition, Index enrichment of a element in a special sample is ratio of viscosity that element to average viscosity that element in each society the sample belong to

its. Hence efficient factors in Index enrichment of a special element in a sample is dependant of amount of that element in sample and the same element in society too.

Index enrichment can separate geochemical data from lithological variation (syngentic phenomena) in the origin of area. For calculation of Index enrichment we can use from

Following formula:
$$Ei = \frac{Gj}{(cmed)^j}$$

In this formula EI is enrichment of index, Gj is amount of abundantly of element in a specific element and J (cmed) is amount of groundmass of the same element from society that belong to them.

Calculation of probability of occurrence each of Index enrichment

The geochemical map of flood channel sediments from point of two view is included of evaluation of potential mining of Lithological units and structural units and finally provide of metallogeny map of these units in the way of distribution abundantly map of elements and evaluation of anomalies that will be useful for comparative exploration activity. In these study, for doing two views, except of distribution geochemical elements map in the field scale, effort to calculation probability of occurrence of each amount of anomalies in the same region, more over calculation of statistics parameters of each society, after normalization, occurrence probability of amount of each element in any sample is calculated too.

According to this, expectation area for elements such as CU, Zn, Fe, Ni, Mn, As, and Cr show first degree anomalies.

Evaluation of studies and expectation areas

Kelisakandi s 1:50000 sheet is located in western Alborz zone that including ultramafic units, Ophiolites layers with basalts, andesite and recent alluvial traces too.

Ophiolites layers of this sheet are located along Sanandaj-Sirjan zone. Oldest rocks of these areas belong to upper Eocene and the youngest ones belong to recent alluvial sediments. Alteration in this zone is included, epidotization, chloritization, hemetitization and limonitization, especially in faulted zone regions.

In flood channel samples the elements of such as Cu, Au, Mn, Fe, Cr and Zn are as anomaly. In the centre of area, rocks belong to oceanic crust are widespread in the vertical scale.

Distinguished three anomalies that are following, Pirahmadkandi, Dalkverd and markoli. Dalkverdy anomaly in some regions is included 1-2 percents of CU. Pirahmadkandi anomaly is including of Cu, Au, Zn. In point of heavy mineral, Cu is reported.

Conclusion

Neither of anomalies distinguished in this area have not been revenue before and there is no any documents. Among this region Dalkverdy anomaly is very important from the point of bearing Mn and Cu rocks, we suggest a primary exploration by hammer method.

Extent of this area is 12 km². The other important anomaly is Pirahmadkandi that has 7.6 km² extent. From the point of metal mineral studies such Au, Cu, Fe and Mn are priority for two stage studies.

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Table 1: Limit of sensivity for samples

| PPm | | | | | % |
|----------|----------|---------|--------|----------|---|
| Au=0/001 | Cd=1/9 | Mn=2040 | Sr=125 | Ti=0/45 | |
| Ag=0/5 | Co=166 | Mo=2 | Th=20 | S=0/03 | |
| As=11 | Cr=1525 | Ni=2280 | Tl=10 | Na=3/36 | |
| Ba=1000 | Cu>10000 | P=670 | U=10 | Mg=12/65 | |
| Be=0/5 | Ga=10 | Sb=5 | V=139 | K=2/49 | |
| Bi=2 | La=10 | Sc=26 | W=10 | Fe=5/91 | |
| | | | Zn=585 | Ca=7/12 | |
| Al=7 | | | | | |

Table 2: sensord estimate amunts by kohen's method

| Variabl | Au | Mo | Pb | Be | Bi | Sb | Zn | As |
|---------|-------|-----|-----|-----|-----|-----|-----|------|
| Xo | 1 | 0.1 | 0.2 | 0.2 | 0.1 | 0.1 | 0.2 | 0.05 |
| Xr | 0.001 | 2 | 8 | 0.5 | 2 | 5 | 585 | 13 |
| | PPm | | | | | | | |