

Comparative study of systemic methods in geochemical data optimization, Ghoulan area, E-Azerbaijan, Iran

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Detection of optimized geochemical patterns requires Orientation Survey (O.S.) in which one of its important layers is selecting an effective data analysis method.

In order to detect favourable potentials in Ghoulan area, discrimination of mineralized and blind ore zones using advanced techniques with presenting a suitable geochemical pattern and relative pathfinders is the scope of this study. In this respect, 233 stream sediment samples were collected from the area and analyzed for base metals (Cu, Mo, Cr, Co, Ni, Pb, Zn, As, Y) and their indicator elements.

The anomalous zones in the area were detected using two systemic methods such as principal component analysis (PCA) and Fractal (F) methods. Application of F method on geochemical data leads to detection of two anomalous zones of Cu in Gharachilar and W-Loutkeh, with Mo appearance in Namnigh. The separation of these two anomalous zones (Cu & Mo) probably is due to acidity of area formed by solubility of sulphides from outcrops and migration of Mo in the form of molybdate which caused the precipitation of Cu and Mo in two different zones.

The results show that both methods (F & PCA) have similar detection zones but the capability of PCA in enhancement of halos and detection of blind ore zones is more effective than F method. As in this case, it could detect strong blind anomalous zone of Mo in Namnigh in addition to Cu & Mo trend. Overall, the characterization of methods also revealed that the PCA is more reliable in rejecting the syngenetic effects and the results can be more precisely used in the area.