عنوان مقاله:

A comparative study of fractal models and U-statistic method to identify geochemical anomalies; case study of Avanj porphyry system, Central Iran

محل انتشار:

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خلاصه مقاله:

The most significant aspect of a geochemical exploration program is to define and separate the anomalous values from the background. In the past decades, geochemical anomalies have been identified by means of various methods. Most of the conventional statistical methods aiming at defining the geochemical concentration thresholds for separating anomalies from the background have limited the efficiency in the areas with complex geological settings. In this work, three methods including the Concentration-Area (C-A) and Spectrum-Area (S-A) fractal models, and the U-statistic method are applied to identify the geochemical anomalies in Avanj porphyry system due to a complex geological and tectonic setting. The results obtained show that the S-A and U-statistic methods present more acceptable outputs than the C-A method. The C-A model acts well to identify the geochemical anomalies within a region including a simple geochemical background; however, the model has limitations within a region including a complex geological setting, where each sub-area is characterized by different geochemical fields. The U-statistic method, by considering the location of sampling points, their spatial relation, and radius of influence for each point in the estimation of anomaly location, overcomes the limitations of the C-A model. The S-A model is a powerful tool to decompose mixed geochemical patterns into a geochemical anomaly map and a varied geochemical background map. The output of this method shows the analysis of geochemical data in the frequency domain, which can provide new exploratory information that may not be revealed in the spatial domain. Eventually, it can be pointed out that the accuracy of the S-A fractal model for determining the thresholds is higher than the other two methods mentioned.

کلمات کلیدی:

C-A fractal, S-A Multi-Fractal, Geochemical Anomaly, Anomaly separation, U-statistic, Avanj porphyry system