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Geochemical anomaly recognition of rare earth elements using multi-fractal modeling correlated with geological features, Central Iran

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Abstract

The aim of this paper is the geological studies and delineation of geochemical anomalies of lanthanum (La), cerium (Ce) and yttrium (Y) rare earth elements (REEs) in Saghand area, Central Iran. In order to recognize the mineralization zones considering their concentrations, the results of the sampled litho-geochemical data were processed by concentration-area (C-A) fractal model. The C-A log-log plots of the elements were generated and their thresholds were identified. Therefore, the high intensive geochemical anomalies of the studied elements were discriminated. A part of their high intensive geochemical anomalies are situated in the west of the study area occurred within the metasomatic, porphyry microdioritic and acidic volcanic rocks associated with epidotic alterations. The other high intensive geochemical anomalies of Ce and Y are located in the center of the study area. In addition, the moderate anomalies of La and Ce were located in the metasomatic units associated with epidote and chlorite alterations in the central part of the study area. The SE parts of the Ce moderate anomalies are probably related to basic dykes associating with epidotic alterations which are situated between metasomatic and microdioritic units. Based on the results obtained from multi-fractal modeling, the locations of the main anomalies of La, Ce and Y were recognized which all are in the western, central, southern, and SE parts of the study area. Several high and moderate concentration anomalies obtained from the C-A model were confirmed by ground surveying and compared with the achieved result from remote sensing investigation.

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