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Local singularity based on gradient for mapping geochemical anomalies in Gejiu, Yunnan, China

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The concepts and models of local singularity[1] are utilized to demonstrate that the singularity index, which is the exponent of the power-law associating density with scale (area or volume) of geochemical anomaly, determines an essential dimensional property of geochemical anomaly that is independent of its geometrical scale. Usually singularity index was calculated on the basis of an isotropical moving window in GIS environment. However singularity is anisotropy that means that there are some differences between the singularity index in different directions.

In this paper, a calculation model of singularity index based on gradient is proposed. The gradient of the geochemical field is a vector field, in which geochemical concentration is fastest growth in gradient direction. In the model, gradient of the geochemical field is calculated firstly, which determine the gradient direction for each location on a map. Then the singularity index along the gradient direction calculation with anisotropic local window[2]. As case study, the singularity analysis methods were successfully applied to process regional stream sediment geochemical maps for geochemical anomalies in Gejiu, Yunnan, China.

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References:

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