Geophysical Research Abstracts
Vol. 17, EGU2015-7055, 2015
EGU General Assembly 2015

Practical aspects with multifractal simulation of a geochemical landscape

Lingqing Yao
China University of Geosciences (Wuhan), Wuhan, China (yaolingqing@gmail.com)

Geochemical prospecting plays important role in mineral exploration and environmental risk monitoring. Either targeting a potential mineralized area or evaluating the environmental risk, has close relationship with identification of geochemical anomalies, which are featured by spatial patterns of geochemical elements. Simulation technique helps to mathematically capture the mechanism of formation of a geochemical landscape, and to reproduce the related spatial patterns. Traditionally, conditional simulations are used to reproduce the frequency distributions and spatial correlations of geochemical landscapes. The traditional approaches to conditional simulation assume wide sense stationary and Gaussian distribution, and thus have limitations with simulating the skewed distributions and reflecting singularity of geochemical anomalies.
Multifractal simulation provides an alternative to generate the spatial patterns of the geochemical landscapes, and most importantly, to reproduce the singularity of geochemical concentrations. Multiplicative cascade process has been one most compelling method to implement multifractal simulation and there are several different ways to perform the simulation in the context of different disciplines or mechanisms, and thus the results can also be different. In the present work, moment method is used to find the scaling law and to analyze the multifractal spectra. A second-order spatial correlation as a power-law model is constructed from the scaling properties of the data, and conditional simulation is carried out with the correlation model. Moreover, multifractal simulations are generated from the multiplicative cascade models which are discrete-in-scale and continuous-in-scale, respectively. A specific data is used as an example to carry out the simulations with different methods, and some findings with respect to the practical aspects of multifractal simulations of a geochemical landscape are given from further analysis and comparison of the simulation results.