Organic matter record of Xifeng eolian deposits in Chinese Loess Plateau and its paleoclimatic significance

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The organic compound is an important component in the Chinese loess-red clay sequence, and studies on the relationship between organic material content and magnetic susceptibility of Chinese eolian deposit will be benefit understanding better paleoclimatic implication of magnetic susceptibility, biogeochemical process and paleoclimate reconstruction of Chinese Loess Plateau. The organic matter content and magnetic susceptibility values of Xifeng section with the total depth of 224.0 m consisting of the Quaternary loess-paleosol sequence and late Pliocene Red-clay deposit were analyzed at intervals of 10 cm, and then the variations of organic matter content are compared with the magnetic susceptibility curves. The result indicates that nearly all the organic matter maximum correspond with susceptibility peaks, and organic matter minimum marching with susceptibility troughs. All of these demonstrate that the variations of organic matter content of the aeolian sequences may be regarded as an efficient proxy of biogeochemical process strength of the loess-red clay sequence pedogenesis and the susceptibility has the similar significance as that of organic content. The micro-organism is a bridge between the magnetic susceptibility of aeolian sediment in Northwest China and paleoclimate. Thus it is suggested that the magnetic susceptibility value of the Tertiary Red clay deposit has the same significance as the Quaternary loess-paleosol sequences, which shows biogeochemical process intensity during aeolian sediment pedogenesis.

Evaluation of ore-forming potential by fractal/multifractal analysis

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In recent years, fractal and multifractal techniques have been extensively used to emphasize spatial structures of geochemical data for mineral exploration. In this work, a total of 7270 stream sediment samples were collected in four areas (Bange, Duoba, Gongma and Jiurucuo) of Tibet in southwest China where numerous polymetallic Cu deposits have been found. Concentrations of thirteen elements were measured in each sample.

The method of moments and the parabolic model are used and several fractal/multifractal parameters are obtained to characterize the fractal/multifractal properties of the distribution patterns of element concentrations. The multifractality for Cu in Gongma area is much stronger than those in the other areas. Both asymmetry index and variance of Cu in Gongma are highest, which imply that the distribution pattern of Cu in Gongma area is the most dispersed. Parabolic indices also show such kind of irregular distribution patterns. Traditional analysis of anomaly contrasts reflects that Cu and associated elements are much more accumulated in Gongma. In conclusion, the Gongma area is the most optimum for prospecting, the Bange area should be prospected further because the fractal/multifractal parameters show strong ore-forming potential, but the Duoba and Jiurucuo areas seem to be not good for prospecting. All the results are in good agreement with field observations and results of petrological analysis, which display that skarn-type Cu-Fe polymetallic deposits are present in the Gongma area. Fractal/multifractal analysis may provide more new avenues for geochemical exploration.