

New Methods for Data Processing in Geochemical Hydrocarbon Exploration and Their Application in Chinese Continent

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One of the reasons why surface geochemical survey remains an unconventional approach is that there are many problems in data-processing, which cannot be solved by only using typical statistic methods. Most anomalies processed with these traditional methods do not correlate with oil / gas fields in China. Since 1991, we have studied the methods for interference elimination and anomaly recognition to improve the application of the existing data. From the literature and geochemical data, two types of interference were revealed. One is the superimposition type originating mainly from microorganisms and contamination, and the other is the multiplication type resulting from variations in soil mineral components.

Then a new method for eliminating both types of interference was established. Moreover, we found types of anomalies. One of them directly reflects oil and gas fields, referred to as micro-seepage anomalies. The other is related to faults, referred to as seepage anomalies. As the prospecting method varies with the anomalous types, they need to be recognized while separated from background. To do this, we established a set of methods employing statistics, multi-fractal model and back propagation artificial neural network. So far, the geochemical data from five provinces of China have been processed by using the new methods. The seepage anomalies, recognized after the interference elimination, display a string bead-shaped pattern and are distributed along faults. The micro-seepage anomalies are ring-shaped and coincide with oil / gas fields and traps. Reprocessing of existing geochemical data using the new methods can greatly improve geochemical hydrocarbon prospecting.