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Geochemical identification marks of hydrothermal metallogenic system boundary

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The identification of temporal and spatial boundary of metallogenic system not only has an important significance in theory research, but also can guide the mineral exploration and provide direct information for deep and periphery prospecting of known deposits. However, at present how to determine hydrothermal mineralization boundary is still a lack of research.

In order to serve the geochemical exploration for deep ore bodies, the authors put forward a new law of anomalies related to the hydrothermal nonferrous metal mineralization, multidimensional anomaly system(MAS), on the basis of studies on over forty deposits. The multidimensional anomaly system refers to the anomalies which are orderly coexisting spatially, of different formation mechanisms and indicative of further multilevel geochemical anomalies observes in specific geological bodies of geological periods. Specifically, the MAS include the sub-system of negative anomaly of elements, anomaly of mineralizers, synergy balance among milerazers, Fe and ore-forming elements, anomaly of ore-forming and associated elements and mass conservation of inert components, etc. In the MAS, negative anomalies of play a unique role in determining boundaries of hydrothermal mineralization system, which would provide great insight into guiding subsequent deep ore prospecting activities.

This paper taking Anhui province Matou porphyry molybdenum copper mine for an example, puts forward to some geochemical identification marks to determine and judge the boundary of hydrothermal ore-forming. The experimental results show that orebody is located in the negative anomalies system of some elements such as Na_2O. In ore output area the out amount of Na_2O of powder sandstone and granite diorite porphyry is more than 80% and rare earth element Eu shows obvious negative anomaly. In the earth's surface, mineralized belt is located in the Na_2O negative anomaly, its content ranging from 0.1% to 0.2%, and the $\delta^{34}S$ value is less than 3.2 ‰ and significantly lower than that of granite in mining area periphery. Therefore, we infer that the out amount of Na_2O

more than 80%, with rare earth element Eu negative anomaly, is geochemistry identification mark of deep metallogenic boundary of Matou porphyry mine. Na_2O negative anomaly with content ranging from 0.1% to 0.2% and $\delta^{34}S$ value less than 3.2 ‰ are geochemical marks of the peripheral metallogenic boundary. Our test results provide a reference for deep and periphery prospecting of Matou deposit and have a broad application prospect on delineating temporal and spacial boundary of exploration area.