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## Application of Anomaly Components of Multi-Element Combination Extracted from Stream Sediments Data by BEMD in Mapping Ore Prospectivity Within the JGCR, Eastern China

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The significant decline in the number of newly discovered mineral deposits and the dramatic increase for the global demand for mineral resources in recent years have led exploration geologists to search for more efficient and innovative methods to explore recognized and concealed mineral resources. However, the multi-stages of metallogenesis have made the distribution of ore-forming elements exhibit complexly overlapped characteristics within geological units. We have been tasked with finding an innovative technology capable of recognizing ore footprints from the complexly overlapped phenomena created by the multi-stages of metallogenic processes. In this study we establish a hybrid method by integrating Bi-dimensional empirical mode decomposition (BEMD) with Principal Component Analysis (PCA) to extract local and regional anomaly components of multi-element combination from stream sediment concentration data, which can be used for recognizing ore footprints. The proposed model is applied to spatial analysis of the mineralization in the giant Jiaodong Gold polymetallic Cluster Region (JGCR), Eastern China.

The research results have shown as follows: the local anomaly components can identify Au-Ag-Cd and Be-La-Mo-Nb-Th-U-Y ore targets, and the regional anomaly components can recognize their high background zone favorable mineralization in the JGCR, Eastern China. Combined with the spatial distribution of both the local anomaly components and the granitic intrusions, it is inferred that the Au-Ag-Cd mineralization be related to the Linglong granitic intrusion and the Guojialing granodioritic intrusion, and the Be-La-Mo-Nb-Th-U-Y to the Guojialing granodioritic intrusion and the Weideshan monzonitic intrusions. The Guojialing granodioritic intrusion may be dual mineralization characteristics of both precious metals and critical metals. With the insights acquired from this study, the proposed hybrid method by integrating BEMD with PCA can serve as an effective tool in the exploration information system to trace the footprints left behind by magma hydrothermal fluid flow for directing prospecting concealed ore bodies.