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Application of a Singular Value Decomposition (SVD) for Identification of Au Anomalies in the Jiaodong Gold Field, Eastern Shandong Peninsula, Eastern China

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The Jiaodong gold field covers an area of about 68104 km^2 in Eastern Shandong Peninsula, Eastern China, and is located in the southeastern margin of the North China Craton and to the east of the NNE-trending Tan-Lu Fault. The region contains numerous gold deposits, including a few super-large ore deposits, such as the Linglong, the Jiaojia and the Sansandao gold deposits and so on. Large-scale gold mineralization may be associated with the Yanshannian granitoids and related to a transition of NNE-trending structures from early Early Cretaceous normal faulting to late Early Cretaceous sinistral strike–slip faulting (Deng et al, 2015). It is difficult to decompose anomalies related to mineralization from the geochemical data with multi-patterns using conventional statistical methods, such as multi-variate statistical analysis because of complex ore-forming geological background. In this study, Singular Value Decomposition (SVD) (Zhao, 2011) was effectively used to handle a total number of 17026 Au stream sediment data at scale of 1:200000 covering the Jiaodong gold field. Firstly, the Au data were decomposed into different eigenimages with the help of Singular Value Decomposition method (SVD). Secondly, the threshold between the eigenvalues reflecting the gold ore-forming back ground and gold ore-forming anomalies were established by multi-fractal method. Finally gold ore-finding targets showing the gold anomalies which may be associated with gold mineralization were identified from numerous **gold anomalies.** The study results are shown as follows: (a) The traditional statistical methods can only consider the element concentration and ignore the spatial relationship between samples. (b) Using the Singular Value Decomposition (SVD) method, local gold anomalies can be effectively decomposed from high geochemical backgrounds that arise from the Proterozoic metamorphic greenstone belt. Some of the identified local Au anomalies provide new target areas for prospecting new gold deposits. (c) Singular Value Decomposition (SVD) can decompose geochemical data with complicated patterns effectively and efficiently into different, meaningful indictor components compared with conventional statistical methods.

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