

Application of BEMD in Extracting Gravity Anomaly Components Showing Deep Ore-Forming Geo-Dynamic Background of Jiaodong Giant Gold Cluster Region, Eastern China

Aoyue Zheng, Yongqing Chen

School of Earth Sciences and Resources, China University of Geosciences, Beijing, China

The Jiaodong gold cluster region, with approximate gold reserve of 5,000 t and located at the southeastern edge of the North China Craton, is the third largest gold cluster region in the world. BEMD (Bi-empirical mode decomposition) is applied in extracting gravity anomaly components showing deep ore-forming geodynamics at different depths. (a) At a depth of about 30 km, there are three tectonic units: the mantle uplift (I) with gravity values ranging from 2 to 14 $\mu\text{m/s}^2$, a mantle depression (II) with gravity values varying from 0 to -13 $\mu\text{m/s}^2$, and a mantle flat (III) with gravity values ranging from -2 to 2 $\mu\text{m/s}^2$. All giant gold deposits are distributed within the mantle depression. It may illustrate that mantle uplifting triggered hot, ore-forming fluids concentrating into the mantle depression to accumulate, forming giant gold deposits. (b) At about 17.1 to 12.5 km, there three tectonic units: Jiaolai-Jiaobei mantle uplift showing a strong positive gravity anomaly with gravity values ranging from 1.5 to 10 $\mu\text{m/s}^2$; the Sulu ultra-high pressure metamorphic block displaying a negative gravity anomaly with gravity field values ranging from -10 to -1.5 $\mu\text{m/s}^2$; and the Jiaoxibei gold cluster region exhibiting gravity background with gravity values varying from -1.5 to 1.5 $\mu\text{m/s}^2$. (c) At about 8.9 to 5.3 km, there is a series of positive and negative gravity anomalies. Most granites with low density display negative gravity anomalies, among which there are some negative anomalies with positive anomalous edges which contain gold deposits. This may illustrate an ore-forming pattern of granite (negative gravity anomaly) alteration (positive gravity anomaly). It has been illustrated that geological architectures at different depths as well as the giant Jiaodong gold cluster region was formed by the asthenosphere rises triggered by NNW subduction of the Izanagi Plate over a time period from about 200–100 Ma