SEG 2024 Conference: Sustainable Mineral Exploration and Development

Application of BEMD in Extracting Gravity Anomaly Components Showing Deep Ore-Forming Dynamic background of the Giant Jiaodong Gold Cluster Region

Yongqing Chen, Xu Zhu, Chen Chen
School of Earth Sciences and Resources, China University of Geosciences, Beijing, China

The Jiaodong gold cluster region with approximately gold reserve over 5000t, located at the southeastern edge of the North China Craton, is third largest gold cluster region in the globe. The BEMD (Bi-empirical mode decomposition) is applied in extracting gravity anomaly components showing the deep structures of the lithosphere at different depths. (a) At a depth of about 30 km, there are three tectonic units: the mantle uplift with gravity values ranging from 2 to 14 $\mu m/s^2$, a mantle depression with gravity values varying from 0 to -13 $\mu m/s^2$, and a mantle flat with gravity values ranging from -2 to 2 $\mu m/s^2$. All giant gold deposits are distributed within the mantle depression. It may illustrate the mantle uplifting triggered hot ore-forming fluids concentrating into the mantle depression to accumulate forming giant gold deposits. (b) At about 12.5 to 17.1 km, there are three tectonic units: Jiaolai-Jiaobei mantle uplift showing a strong positive gravity anomaly with gravity values ranging from 1.5 to 10 $\mu m/s^2$, the Sulu ultra-high pressure metamorphic block displaying a negative gravity anomaly with gravity field values ranging from -10 to -1.5 $\mu m/s^2$, and the Jiaoxibei gold cluster region exhibiting gravity background with gravity values varying from -1.5 to 1.5 $\mu m/s^2$. (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 that contain gold deposits. This may illustrate that an ore-forming pattern of granite (negative gravity anomaly)- alteration(positive gravity anomaly). It has been illustrated that the geological architectures at different depths and the giant Jiaodong gold cluster region were formed by the asthenosphere rises triggered by NNW-ward subduction of the Izanagi Plate over a time period from about 200 to 100 Ma.