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Lithologic identification & mapping test based on 3D inversion of magnetic and gravity

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Though lithologic identification & mapping to achieve ore concentration district transparent within 5km depth is the main way to realize deep fine structures study, to explore deep mineral resources and to reveal metallogenic regularity of large-scale ore district . Owing to the wide covered area, high sampling density and mature three-dimensional inversion algorithm of gravity and magnetic data, so gravity and magnetic inversion become the most likely way to achieve three-dimensional lithologic mapping at the present stage. In this paper, we take Lu-zong(Lujiang county to Zongyang county in Anhui province ,east China) ore district as a case, we proposed lithologic mapping flow based 3D inversion of gravity magnetic and then carry out the lithologic mapping test.
Lithologic identification & mapping flow is as follows:
1. Analysis relations between lithology and density and magnetic susceptibility by cross plot.
2.Extracting appropriate residual anomalies from high-precision Bourger gravity and aeromagnetic.
3.Use same mesh, do 3D magnetic and gravity inversion respectively under prior information constrained, and then invert susceptibility and density 3D model.
4. According setp1, construct logical topology operations between density 3D model and susceptibility.
5.Use the logical operations, identify lithogies cell by cell in 3D mesh, and then get 3D lithological model.
According this flow, we obtained three-dimensional distribution of five main type lithologies in the Lu-Zong ore district within 5km depth. The result of lithologic mapping not only showed that the shallow characteristics and surface geological mapping are basically Coincide,more importantly ,it reveals the deeper lithologic changes.The lithlogical model make up the insufficient of surface geological mapping.
The lithologic mapping test results in Lu-Zong ore concentration district showed that lithological mapping using 3D inversion of gravity and magnetic is a effective method to reveal the lithological characteristics and to explore deep mineral resources in ore concentration district.