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Curie point depth and heat flow maps deduced from magnetic data of Gonghe Basin, China

Zhuo Wang and Zhaofa Zeng

College of Geoexploration Science and Technology, Jilin University, Changchun, China (wangzhuo18@mails.jlu.edu.cn)

Most recently, energy consumption around the world steps into a new situation divided by petroleum, natural gas, coal and new energy. Fossil fuels are disputed for pollution and CO₂ emission, and geothermal energy is popular as a clean, ecofriendly and renewable new energy, which can be used for power generation or direct application (e.g. bathing, building heating).

Gonghe Basin, located in the western part of China, has been thought as a potential geothermal field since 1989. To investigate geothermal distribution in Gonghe Basin and adjacent area, magnetic data is used in this paper. Firstly, we proposed an improved magnetic interface inversion method based on traditional Park-Oldenburg method. This improved method introduces dual geological interfaces instead of one interface, variable magnetic susceptibility instead of constant magnetic susceptibility and upward continuation in a form equivalent to inversion iteration in the Fourier domain instead of the divergent, downward continuation term, to improve suitability and precision of the inversion method. Then Curie point depth (CPD) map and heat flow map could be deduced from magnetic data through the improved Park-Oldenburg method.

The CPDs range from 16 to 25.5 km and heat flow values range from 61 to 91 mW/m². What's more, we take faults and seismic activities into account, we find that study area has greater geothermal potential in eastern part with shallower CPD, higher heat flow values and more active subsurface structure. Considering with known geothermal value in actual measurement, the results indicate high heat flow value in Gonghe Basin is coaction of high thermal background, radiogenic heat and partial geothermal anomalous heat source.