

Three dimensional structure of the Luzong ore district, eastern China: electrical model from magnetotelluric data

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The Lujiang–Zongyang (Luzong) ore district is a late Mesozoic NE-trending subaerial volcanic basin rich in Fe-S-Cu and other minerals. Most previous work focused on surface geology, mineral exploration, petrogenesis and metallogenesis, but less on the crustal structure. The deep geophysical exploration, such as magnetotelluric (MT), is one key for a crustal structural study to understand the geological setting.

MT data used in this research were collected from 76 broadband sites. To obtain enough electrical information, the acquisition time exceeded 20 hours at each site. A de-noising method has been used to select the data automatically without human input. The exploration depth can be more than 50 km computed by the skin depth function, in which the average apparent resistivity is more than 200 Ωm and the lowest data frequency of each site is 0.01-0.001 Hz. The MT data were inverted using the 3D nonlinear conjugate gradient inversion algorithm (Zhang et al., 2014) to fit two impedance tensor components (Z_{xy} and Z_{yx}), which contain a static shift correction process (Zhang et al., 2016).

In the 3D electrical model (Figure 1a), the structure is complex and presents the changing characteristic at the bottom of volcanic rocks (or top depth of the detachment layer beneath the volcanic rocks). This hints at a relative structure change of rift-uplift-rift in the upper–middle crust from northwest to southeast, considering the residual gravity anomaly and magnetic anomalies (Figure 1b). Two main NE-trending faults are suggest as the tectonic boundary (Figure 1c). In addition, several copper deposits were found in the uplift region of the Luzong ore district. Therefore, we suggest that the uplift in the Luzong ore district (exposed felsic intrusion) and its boundary are important metallogenic copper prospects (Figure 1).

References

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The study is supported by National Key R&D Program of China (NO. 2016YFC0600201), Geology Survey Project (DD20160082) and Basal Research Fund (JYYWF20180101).

Kun Zhang, Dr. geophysics. Study on algorithms of electromagnetic and deep structure exploration.

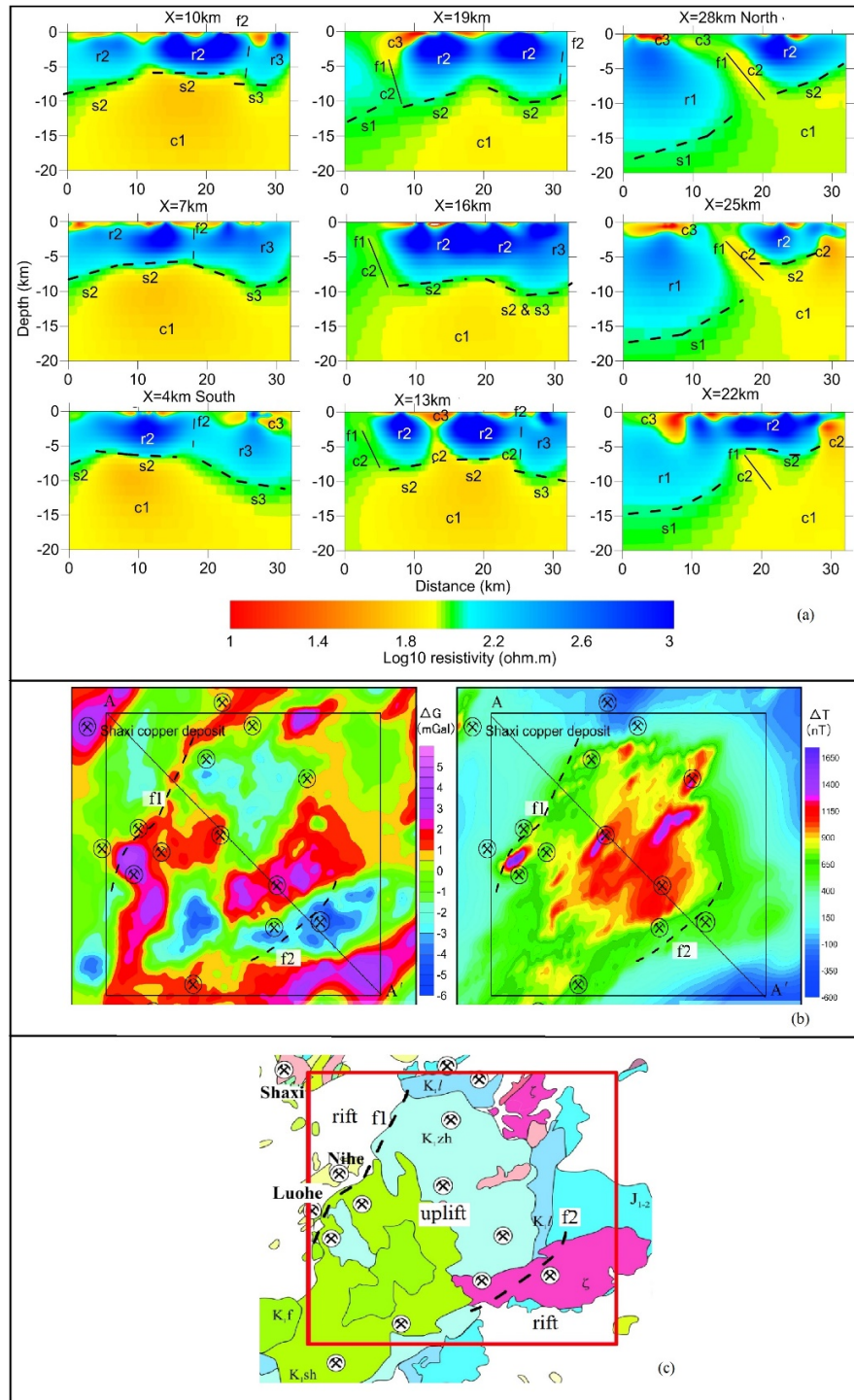


Figure 1. Geophysical abnormal analysis and discussion in the Luzong area. (a): electrical model; (b): residual gravity and magnetic results; (c) deduced position of rifts and uplift in the study area.