The electrical structure beneath the Lower Yangtze Depression (middle section) from magnetotelluric data

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The Mid-Lower Reaches of the Yangtze River is a key area for the study and discussion of the collision between the North China and Yangtze Blocks. Most previous work focused on the geology, geochemistry, and geochronology, but less on the deep structure from geophysics. Magnetotelluric (MT), is one useful method for deep structural studies and discussion on the tectonic evolution.

MT data used in this research were collected from 80 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 150 km computed by the skin depth function, in which the average apparent resistivity is more than 100 Ωm, and the lowest data frequency of each site is less than 0.0005 Hz. The MT data were inverted using the 2D and 3D nonlinear conjugate gradient inversion algorithm (Zhang et al., 2011; 2014) to fit the apparent resistivity, impedance phase and impedance tensor, which contains the static shift correction process (Zhang et al., 2016).

In the electrical model, the complex structures can be separated into three sections based on the vertical conductive bands and the different electrical structures on their both sides, the Dabie Orogenic Belt (DOB) in the northwestern section, the Lower Yangtze Depression (LYD) in the central section, and the Jiangnan Orogenic Belt in the southeastern section. The Tancheng-Lujiang fault (TLF) is revealed as the eastern boundary of the the Yangtze Deep fault (CJF) and main thrust fault (MTF) are represented as upper crustal vertical bands beneath the LYD, which are connected with the lower detachment layer together with the TLF. We found a ramp thrust structure is composed of the upper crust resistors taken CJF and MTF as the centre upon the detachment layer, where the dip of the resistors are opposite on both sides. A "crocodile" structure beneath the DOB and LYD is revealed in the electrical model and is composed of the detachment layer and the resistors upon it, which are separated by crustal faults with southeast dip.

References

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