

## Assembly and Deformation Pattern of the East Asian Lithosphere as Revealed by the SinoProbe Long Magnetotelluric Transect

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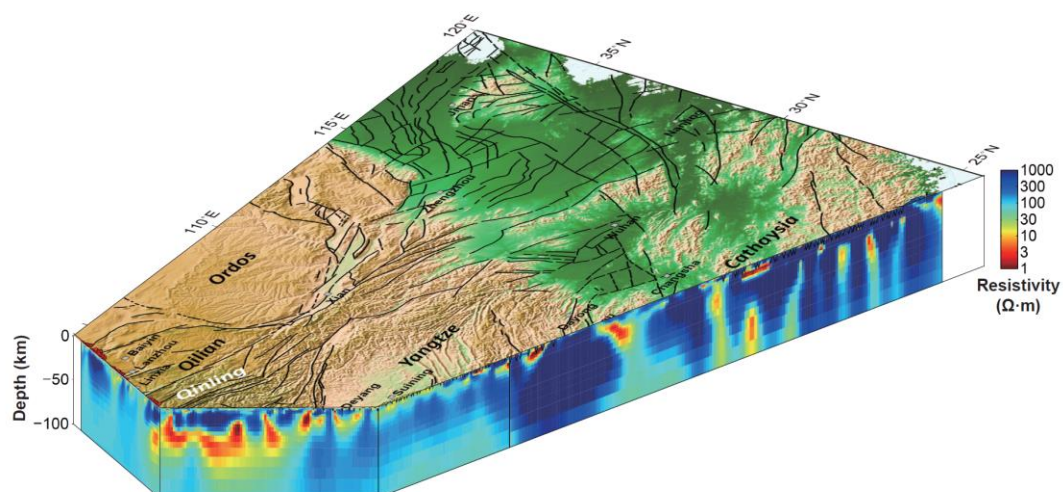
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### SUMMARY

The East Asian continent has undergone a complex evolution history, resulting in diverse deformation patterns. However, the relationship between surface deformation and deep lithospheric structure is still not well elucidated. In this contribution, we use a ~2400 km long Magnetotelluric (MT) transect finished under the SinoProbe project to investigate the lithospheric electrical structure across the major portion of the Chinese continent and further infer the lithospheric deformation mechanism. The profile passes by the northeastern and eastern margins of the Tibetan Plateau and extends southeastward to the coast region of South China. 264 MT sites from the long transect were inverted using the ModEM package with the LBFSGS algorithm. The distribution of seawater and marine sediments near the coastal region was incorporated into the initial and prior model based on the global 3-D electrical conductivity model of the ocean and marine sediments. The inversion results reveal contrasting electrical features between the actively deformed Tibetan Plateau and the relatively stable South China block. Within the Tibetan Plateau, conductors are found to be pervasive in the lower crust and upper mantle, implying a regime dominated by continuous deformation. In contrast, the lithosphere of South China is generally resistive with isolated conductors associated with paleo-suture or faults. In comparison, the conductors within the Cathaysia block are more developed than the Yangtze block. The isolated conductors in the Cathaysia block are mostly sub-vertical in their geometry, which could be attributed to mantle-sourced fluid flux released from the subducted Pacific Plate. The electrical structure model is further compared with the overlapped deep seismic reflection profiles, which suggest generally good consistency. We further use electrical resistivity to infer the effective viscosity properties of the lithosphere, which indicates that the northeastern and eastern Tibetan Plateau is dominated by continuum deformation, while South China deforms more like rigid blocks.

\* This Study is funded by project SinoProbe-02-04 and NSFC (42074089).

**Keywords:** Magnetotellurics, East Asian lithosphere, electrical structure, deformation mechanism, SinoProbe long MT transect



**Figure 1.** Synthesis of the 3D inversion model along the SinoProbe Long Magnetotelluric Transect.