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TITLE: Three-dimensional structures and geometries of central Tibetan Plateau from INDEPTH magnetotelluric data

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ABSTRACT BODY: During the past 15 years, broadband and long period magnetotelluric data have been collected and interpreted in Tibet as a part of the InterNational DEep Profiling of Tibet and the Himalaya project (INDEPTH). The study presented herein is focused on data acquired during Phase III along two N-S profiles crossing the Banggong-Nujiang Suture, which separates the Qiangtang and Lhasa terranes, approximately along the longitudes of 89°E (longer “500 line”) and 92°E (shorter “400 line”). Both magnetotelluric TE and TM modes with the vertical field geomagnetic transfer functions have been derived for defined regional azimuth angle oriented approximately in an east-west direction, and modeled using isotropic and anisotropic 2D inversion.

The preferred model of line 500 confirms previous observations concluding that the region is characterized to first-order by a resistive upper crust and a conductive middle to lower crust that extends, with varying depth, from the Lhasa terrane to the Qiangtang terrane. The conductive layer is relatively uniform along whole profile, except for two breaks in the region of the Banggong-Nujiang suture and 50 km south of it. Absence of attenuating high conductivity crustal layers in these short sections of line 500, coupled with careful selection of long period magnetotelluric responses, allow us to obtain information about deeper structures below the thickened crust, and reveal the possible existence of a high conductivity layer localized at upper mantle depths. The same conductive structure setting is also present on the shorter 400 line. From deep electromagnetic and petro-physical investigation we can estimate the next upper-mantle conductive layer at depths from 200 km to 250 km below the Lhasa block, and less resistive Tibetan lithosphere below Qiangtang terrane with conductive upper-mantle in depths about 120 km.

The along-strike and across-strike analysis and 3D inversion models of MT data from lines 500, 400, 200 and 600 show more detailed information about lateral variation of geoelectrical structures associated with the Banggong-Nujiang suture and in central Tibet between the longitudes of 88°E and 92°E. The eastern part exhibits a shallower crustal conductive layer and a sharp horizontal jump in conductivity close to the surface trace of the Banggong-Nujiang suture, in comparison with the western part of the investigated region. The 3D modeling exhibits regional resistive and conductive structures correlated with the Tanggula fault system, Tanggula Mountains and strike-slip faults, such as the BengCo fault in the south.

These spatial differences represent varying conditions, such as temperature, partial melt content and connectivity, and fluid content and connectivity, and/or varying rock types, and support the model of Indian lithosphere penetratively underplating Tibet as far north as the Banggong-Nujiang Suture.

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INDEX TERMS: [8108] TECTONOPHYSICS / Continental tectonics: compressional, [1515] GEOMAGNETISM AND PALEOMAGNETISM / Geomagnetic induction, [8159] TECTONOPHYSICS /