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Three Dimensional Lithospheric Electrical Structure of the Tibetan Plateau as Revealed by SinoProbe Long Period Magnetotelluric Array Data

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The on-going continent-continent collision between the Indian and Eurasian plates since ∼55 Ma has created the spectacular topography of the Tibetan plateau. However, many first order questions remain to be answered as to the mechanisms behind this young orogenic process. Under the auspices of the SinoProbe Project, a three dimensional (3-D) Magnetotelluric (MT) array have been deployed on the Tibetan Plateau from 2010 to 2013 to better understand this orogeny. By the end of 2013, 1099 MT stations have been completed, including 102 combined broadband MT (BBMT) and long period MT (LMT) stations. In this study, MT data of these 102 combined stations have been used to investigate the deep lithospheric electrical structure of the Tibetan Plateau. MT impedances within the period range of 10 – 50000 s were extracted to be used for 3-D inversions with the ModEM code using the standard NLCG algorithm. The resulting lithospheric electrical structure of the Tibetan Plateau shows a distinct pattern of strong variation not only vertically, but also horizontally. Conductors are found to be widespread in the middle to lower crust. But their geometries are quite complex, and not obviously consistent with the hypothesis of continuous eastward channel flow. Instead, most crustal conductors in central and southern Tibet display a pattern of N-S extension. In the depth range of the upper mantle, two more conductive regions can be identified in the southern Qiangtang Terrane and in the central Lhasa Terrane. Resistor associated with the underthrust Inidan plate can be traced beneath the Bangong-Nujiang suture in western Tibet, but only beneath the central Lhasa terrane in central Tibet.

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