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TITLE: Lithospheric Structure Across the Altyn-tagh Fault on the North Margin of the Tibetan Plateau Revealed by Magnetotelluric Data

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ABSTRACT BODY: Scientists working under the auspices of the INDEPTH project (InterNational DEep Profiling of Tibet and the Himalaya) have undertaken a series of integrated geological and geophysical studies across the Tibetan Plateau since 1993. The final stage of INDEPTH study (INDEPTH-IV) is focused on the dynamics of the northern Tibetan Plateau. As part of this study, two magnetotelluric (MT) profiles were acquired across the Altyn Tagh Fault (ATF) in Qinghai and Gansu provinces (see Figure 1). These two profiles are located on the west and east margins of the Qaidam Basin within the Tibetan Plateau. The MT data were recorded in 2009 and 2010, and include both broadband MT (BBMT) and Long Period MT (LMT) data on both profiles. MT data were processed with standard routines and inverted with a 2D NLCG (Nonlinear conjugate gradients) algorithm.

The best-fitting inversion model of the west line reveals a major, south-dipping conductor beneath the mountain range between the Altyn Tagh Fault and the North Altyn Tagh Fault (NATF), which penetrates the crust and upper mantle. This could represent a zone of upwelling fluids extending from the upper mantle to the surface along the NATF. The model also indicates a thickened crust beneath this range, interpreted to be caused by the underthrusting of the Tarim Block into the Tibetan Plateau, as evidenced by previous seismic studies. In contrast, no major conductive feature was observed extending through the entire lithosphere on the east line. This implies that the Altyn Tagh Fault is a relatively shallow feature at this location, and suggests that the eastern segment of the ATF is a crustal-scale structure. A conductive feature in the mid-crust under the Qaidam basin, south of the ATF was detected in the inversion models from both lines. This is likely due to fluids in the fractured zone as the moving block of the Tibetan Plateau meets the stable block of Tarim Basin. This conductor may connect with the conductive layer already known to be widespread in the Tibetan crust.

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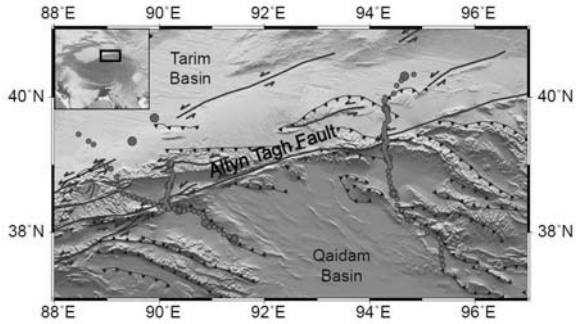

Figure 1. Topography map showing major tectonic structures as well as MT station locations in the survey area. Red dots are broadband MT stations, and green dots are long-period MT stations.

(No Table Selected)

INDEX TERMS: [8100] TECTONOPHYSICS, [8118] TECTONOPHYSICS / Dynamics and mechanics of faulting, [8150] TECTONOPHYSICS / Plate boundary: general, [8159] TECTONOPHYSICS / Rheology: crust and lithosphere.
