

## Geodynamic Implications of a Giant Conductor Imaged in the Western Junggar and Chinese Northwest Tianshan

Yixian Xu<sup>1</sup>, Bo Yang<sup>1</sup>, Anqi Zhang<sup>2,3</sup>, Sue O'Reilly<sup>3</sup>, Qinyan Wang<sup>1</sup>, Qunke Xia<sup>1</sup>, Wencai Yang<sup>1</sup>

<sup>1</sup>School of Earth Sciences, Zhejiang University, Hangzhou, Zhejiang Province 310027, China, [yxian@zju.edu.cn](mailto:yxian@zju.edu.cn)

<sup>2</sup>Institute of Geophysics and Geomatics, China University of Geosciences, Wuhan, Hubei Province 430074, China

<sup>3</sup>ARC Centre of Excellence for Core to Crust Fluid Systems, Department of Earth and Planetary Sciences, Macquarie University, Sydney, New South Wales, Australia

Recent years have seen an increasing interest in the causes of high electrical conductivity in the sub-continental lithospheric mantle (SCLM), allowing for tracing of lithospheric geodynamic processes. Traditionally the presence of conductors in the SCLM is ascribed to melt or water. Here we present an alternative explanation for a giant conductor imaged by magnetotelluric (MT) data in a region across the West Junggar and the Chinese northwest Tianshan. It extends for over 300 kilometres and is located at a depth of 120 to 220 km, corresponding to a relatively fertile and low temperature lithospheric mantle; its shape clearly sheds light on the subducted Paleo-Asian oceanic slab, and its electrical conductivity can be attributed to volatile-bearing metasomatic minerals, which were probably transported into the deep lithosphere by slab subduction and/or break-off and were sub-arc metamorphosed from the serpentinites and altered oceanic crust by rising melts/fluids generated during post-collisional extension; its longevity was promoted by mechanical decoupling of a weak layer developed in the lower crust. The present study demonstrates that a subducted slab can become buoyant and well preserved in the continental lithosphere, which thereby opens a venue to trace the origin and evolution of plate tectonics.