

## Electrical structures beneath the Tarim-Tien Shan junction zone: possible evidence of regional underthrusting?

Elena Yu. Sokolova<sup>1</sup>, Hao Dong<sup>2</sup>, Anatoly K. Rybin<sup>3</sup>, Pavel Yu. Pushkarev<sup>4</sup>, Vitaliy E. Matiukov<sup>3</sup>

<sup>1</sup>Schmidt Institute of Physics of the Earth, Russian Academy of Sciences, Moscow  
[sokol\\_l@mail.ru](mailto:sokol_l@mail.ru)

<sup>2</sup>China University of Geosciences, Beijing, China  
[donghao@cugb.edu.cn](mailto:donghao@cugb.edu.cn)

<sup>3</sup>Research Station of the Russian Academy of Sciences in Bishkek

<sup>4</sup>Geological Department, Lomonosov Moscow State University, Moscow

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### SUMMARY

Located in the heartland of Eurasia, the Tien Shan orogeny is considered as one of the largest and most active intracontinental orogenic belts on the earth. Being thousands of kilometers away from all active boundaries of major tectonic plates, how did Tien Shan rise in Cenozoic as a majestic orogeny remains an enigmatic question and has long been one of the most debated geological topics in central Asia. To better understand the deep geodynamic process beneath the junction zone of the Tien Shan and Tarim plate, we re-investigate a previously acquired Artush-Aksai magnetotelluric dataset across the China-Kyrgyzstan border, using new 3D modelling methods. Similar to the previous 2D results, the model shows a highly conductive sedimentary layer of ~10 kilometers thickness in the Tarim plate. The South Tien Shan - Tarim accretionary belt is imaged as the most resistive block, where stresses are accumulated and most crustal and upper mantle earthquake epicenters are situated. The striking feature beneath Tien-Shan is a highly conductive layer in the middle crust (~20km depth), which inclines to the north and then extends deep beneath the Naryn Arc. The conductive layer correlates well with the middle crust low-velocity feature revealed in previous seismic results. Considering the much higher geothermal heat flow of the orogeny comparing with the bounding regions, it is tempting to interpret the conductive feature as fluids/partial melting induced by the upwelling mantle material. The upwelling may be triggered by the underthrusting and possible detachment of the Tarim tectonic plate against the south Tien Shan orogeny and probably contributes to the negative regional gravity anomaly. In turn the intrusion/underplating of material from mantle may induce the rapid uplift of Tien Shan in Cenozoic.

**Keywords:** Tien-Shan Orogeny, magnetotellurics, delamination, Tarim Basin, underthrust

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