

Crustal Structure beneath East Himalayan Syntaxis and the Relation to its Rapid Uplift and Exhumation

Hao Dong^{1,2*}, Jialin Qi¹, Sheng Jin^{1,2}, Gaofeng Ye^{1,2} and Wenbo Wei^{1,2}

¹China University of Geosciences, Beijing,

²State Key Laboratory of Geological Process and Mineral Resources, Beijing

*donghao@cugb.edu.cn

SUMMARY

The unique East Himalayan Syntaxis (EHS) is featured with a sharp U-turn of all geological boundaries, geomorphic features and river systems at the east end of the Himalayan orogenic belt. The EHS is believed to be one of the regions with the strongest Cenozoic uplift and exhumation in Tibetan Plateau. Among the EHS, the most significant geomorphology feature is the Namcha Barwa (NB) peak, which rises abruptly to over 7700m from the surrounding Yarlung-Tsangpo canyon. The core Namcha Barwa area remains a high uplift rate since late Pliocene and forms a series of high-angle fault systems centered on EHS. To understand the mechanisms behind the rapid uplift of the study region, magnetotelluric array dataset were used to image the 3D electrical structure beneath the EHS. The inversion model reveals crustal high conductivity anomalies around the NB region, at the depth of 20-40 kilometers. The rapid uplift of the region may lead to decompression melts of the mid-to-lower crust, which is correlated with local leucogranites. The melts may provide the heat sources for the hydrothermal systems around Namcha Barwa. On the other hand, the crustal structure directly beneath NB is imaged as highly resistive NNE directed anomaly. This feature is consistent with previous regional magnetotelluric model and the high-velocity structure discovered by Rayleigh wave velocity results, but do not support the popular “tectonic aneurysms” model which involves crustal advective flows towards the topographic gap. The resistive “wedge” may reflect the northward intrusion of deep materials into the crust of the Lhasa block, which further induces the uplift of regional structure and the upwelling of hot materials at the front end. With the gradual intrusion of the wedge, the uplift may gradually expands to the northeast, forming the long and narrow compound anticline responses.

Keywords: East Himalayan Syntaxis, Namcha Barwa, Magnetotellurics, uplift and exhumation
