

Primary discussion about tectonic deformation characteristics in the east Yarlungzangbo suture and subsurface structure of the Yarhashampo dome as revealed by a deep seismic reflection profile

Wenhui Li¹, [Xinyu Dong](#)², Zhanwu Lu¹, Xiaoyu Guo² and Rui Gao^{1,2}

¹Institute of Geology, Chinese Academy of Geological Sciences, Beijing, China

²Sun Yat-Sen University, School of Earthsciences and Engineering, Guangzhou, China, dongxy5@mail2.sysu.edu.cn

The India-Asia plate collision is the largest scale and most classic continent to continent collision orogeny in the Cenozoic. The Yarlungzangbo suture is not only the surface collision boundary between the Indian plate and the Asian plate but also represents the new-Tethys subduction and extinction process. People are looking forward to understand the deep and fine structure of the India-Asia continental collision zone, crustal deformation characteristics and deep internal processes caused by the collision. The Lhagoikangri dome belt which is located on the southern margin of the Yarlungzangbo River and the North Himalayas is one of the very important extensional structures in the India-Asia continental collision belt, forming since the Miocene. The Yarhashampo dome is a typical gneiss dome located in the eastern part of the Lhagoikangri dome belt. This dome is a key locality to understand the structural deformation conditions of the dome belt and to understand the north Himalaya crustal feature. Hence, understanding the tectonic characteristics in the north Himalayas, deciphering the continent to continent collision and orogenic process on the Himalaya-Tibet plateau, a deep seismic reflection profile across the Yarlungzangbo suture along 92°E has been conducted at Shannan Prefecture of eastern Tibet in 2017 (for profile location see figure1).

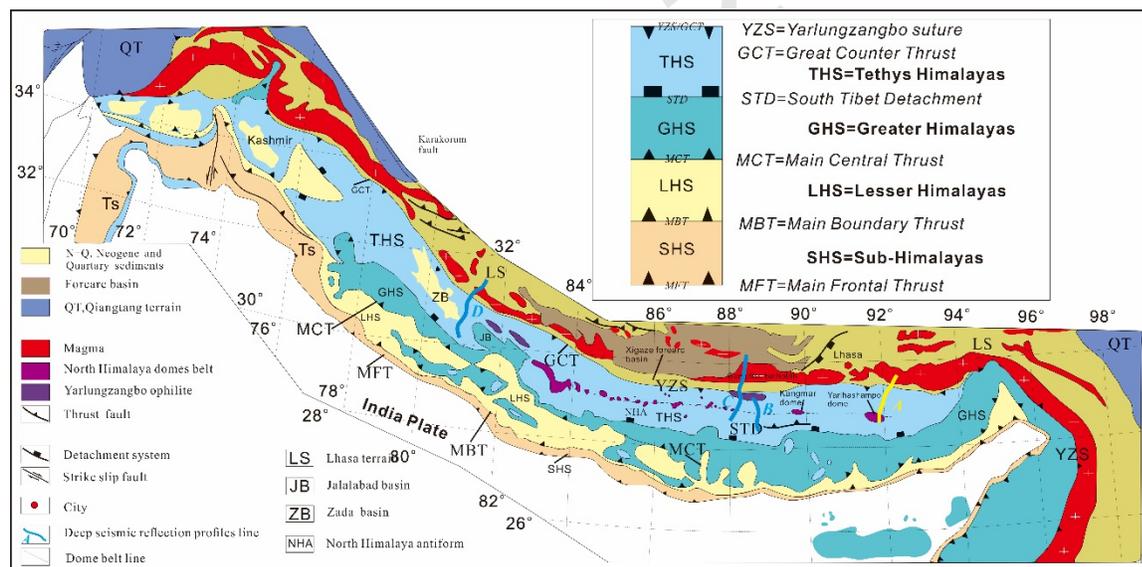


Figure 1. Profile location: Yellow line A is the location of this research profile, blue line B and C are location of Xietongmen profile(Guo et al.,2017) and blue line D is the location of Pulan profile(Gao et al.,2016).

Three types of explosive sources were used in the field data acquisition process: 48 kg shots in single shot holes at 30 m depth with 250m intervals, 192kg shots in pairs of shot holes with 50 m intervals of 1 km, and 2000 kg shots in clusters of 15 shot holes at 50 m depth at interval of 50 km for achieving good reflection data. These data were recorded by 720 receiver traces over a 60s two-way travel time window, and the field experimental setup provided a nominal 60-fold common mid-point (CMPs) stacked section. Processing used Kirchoff pre-stack time migration besides routine data processing procedures.

The finally processed deep seismic reflection profile outlines the fine subsurface structure of the Yarhashampo dome and the relationship between the south Tibet detachment system and the Yarhashampo dome, and also found one concealed thrust fault beneath the Yarhashampo dome which has cut STD, may as one symbol of N-S direction compression event from ~13 Ma in the interior of the Tibet plateau, on the other hand, further both proving that the Indian crust underthrust the southern Lhasa terrain only to a limited degree and clearly shows the duplexing process which is one of the reasons for causing uplift during the past 50 Ma as well as a nonuniform-tearing subduction process in the east Himalayas.

References

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