Deep seismic reflection profiling of the continental China by SinoProbe

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The SinoProbe, deep exploration in China, has successfully completed ca.6000-km-length deep seismic reflection profiling sections of the continental China, including the Northeastern China (NEC), the Central Asia – North China (CA-NC), the Lower Yangtze (LYZ), the Pulan (PL) and the Shiquanhe (SQH) in South Tibet, the Central Tibet (CT), the Northeastern Tibet (NET), the Eastern Tibet – South China (ET-SC), and the South China (SC) profiles (Fig. 1). Through refined processing and detailed structural analyses of the deep seismic reflection profiles, the SinoProbe has revealed the complex structures of the lithosphere underneath the continental China and deep processes there, including lithospheric mantle reflection beneath the northeastern China, and the Moho surface below the thick crust of the central Qinghai–Tibet Plateau.

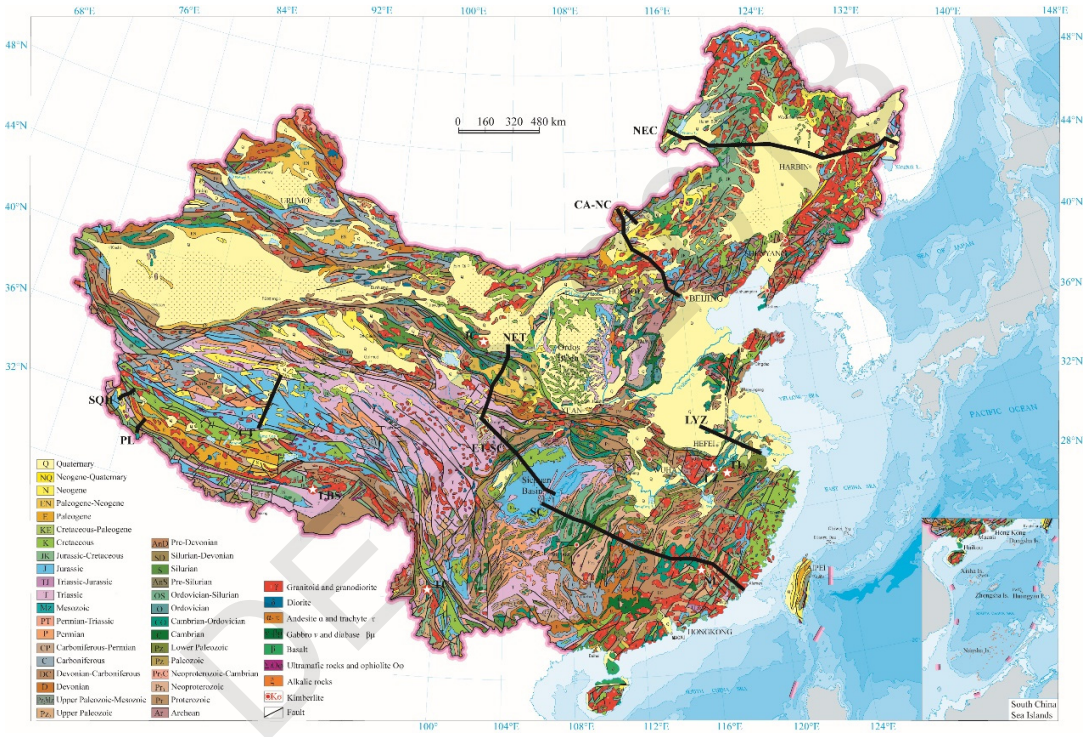

Figure 1. Deep seismic reflection profiles and scientific drilling holes carried out mainly by the SinoProbe during the years from 2008 to 2013.

Deep seismic reflection profiles: NEC, the Northeastern China profile; CA-NC, the Central Asia – North China profile; LYZ, the Lower Yangtze profile; NET, the Northeastern Tibet profile; ET-SC, the Eastern Tibet – South China profile; SC, the South China profile; CT, the Central Tibet profile; PL, the Pulan profile; SQH, the Shiquanhe profile. Scientific drilling holes: LBS， the Luobusha hole; JC, the Jinchuan hole; TC, the Tengchong hole; NL, the Nanling hole; TL, the Tongling hole; LZ, the Luzong hole.

In eastern China, the Northeastern China (NEC) profile reveals the bidirectional facing subduction underneath the Songliao Basin, with the subduction of the Mongolia-Okhotsk Plate in the west, and that of the Pacific Plate in the east, which results in convergence structures around the Songliao Basin. The North China (NC) profile provides evidence in depth for the understanding of the plate convergence, continental crust growth, and related deep processes during the Central Asia Orogeny, and also constrains on the

Yanshannian Orogeny in Middle-Late Jurassic and North China Craton breakdown and crust extension probably in Cretaceous. The Lower Yangtze (LYZ) profile links the North China and the South China Blocks in the view of deep lithospheric structures, revealing the deep geological background for the formation of the metallogenic belt in the Middle and Lower Reaches of the Yangtze River. The South China (SC) profile gives an opportunity for the perspective view of the complex lithospheric structure of the South China Block, helping to understand the deep processes for the formation of a uniform South China including the Yangtze Block (with a fossil subduction zone; maybe a Neo-Proterozoic subduction zone beneath Sichuan Basin), the Jiangnan Orogeny, and the Cathaysia (Huaxia) Block.

In Tibet (SW China), the Pulan (PL) and the Shiquanhe (SQH) profiles reveal crustal-scale duplexing beneath the Yarlung Zangbo suture in the western Himalaya, including north-dipping strong reflectors in the lower crust, strong reflectors underneath the Gangdese Magmatic Belt, and flower structure of the Kalakunlun fault in the upper crust. The Central Tibet (CT) deep seismic reflection profile reveals the Moho with a depth of 75.1 km in the most north part of the Lhasa Terrane, the Moho with a depth of 68.9 km in the most south part of the Qiangtang Basin, and Moho cut off of ~6.2 km for the Bangong Co - Nujiang suture (BNS). The Northeastern Tibet (NET) profile reveals duplex structures in the upper crust, nearly horizontal detachment in the lower crust, and the mantle involved Moho cut-off, imbricated thrust and duplex in the bottom of the lower crust, and provides evidence for the subduction of the Zoige (Ruoergai) lower crust underneath the west Qinling Terrane. The Eastern Tibet (ET) profile shows that the crust of the Yangtze Block extends far from the Longmenshan fault zone into the Longriba fault zone interior of the Tibet. The deep seismic reflection profiling, combined with magnetotelluric (MT) sounding, suggests that the lower crust channel flow may be blocked in the eastern part of the Tibet.