

The lithospheric layer and block velocity structure and motion of Substance for Tibetan plateau

Teng Jiwen, Zhang Yongqian, Hu Guoze, Zhang Zhongjie, Yang Hui, Pi Jiaolong, Yan Yafen

Institute of Geology and Geophysics, Academy of Science.
Beijing 100029, China,
jwten@mail.iggcas.ac.cn

Under the collision between the Indian and Eurasian plates, the deep substance beneath the Tibetan plateau began to move. This results in not only the shortening and thickening of the Tibetan plateau, but also the lateral flow of the deep substance in the crust and the upper mantle. Based on the lithospheric layer and block velocity structure, especially the special layers beneath the Tibetan plateau and its adjacent areas, the research results suggest that the crust beneath the Tibetan plateau is very thick while the lithosphere of it is thin. There exists a low velocity layer with P-wave velocity of 5.7 ± 0.1 km/s and thickness of 8 ± 2 km at depth of 20 ± 5 km. The top boundary of the asthenosphere lies at depth of 110 ± 10 km.

There are not necessary or sufficient boundary conditions for the existence of channel flow in the lower crust. Under the force system in direction of N-NNE caused by the collision between the Indian and Eurasian plates, the high velocity substance of the lower crust and the upper mantle move laterally together. During its movement, the lower velocity layer in crust and the asthenosphere act as the first and the second slip interfaces respectively. Taking the big strike slip faults as channel boundaries, the substance move eastward and is obstructed by the Yangtze craton on its north margin. This results in the special deep geodynamical process and environment beneath the Tibetan plateau and its adjacent areas.

Key words: Tibet, fine structure of the crust and upper mantle, low velocity layer in crust
Asthenosphere of upper mantle