

Crust and Uppermost mantle P-wave velocity structure of the Ordos block and its neighbors based on travel time tomography

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The Ordos block is located on the west side of the North China Craton, adjacent to the northeastern part of the Tibetan Plateau, with the Yinshan orogenic belt to the north and the South China block to the south. And the tectonic evolution of Ordos block is controlled by the North China basin extension caused with subduction of the Pacific plate and the extrusion and sheared from the northeastern margin of the Tibet Plateau follow the collision of the Indian-Eurasian plate.

The study area spans from 32°N to 42°N and 108°E to 114°E, which includes the Ordos block and its adjacent structures. The seismic data we used for inversion were recorded by 1244 stations including: 198 permanent stations and 1043 temporary stations (ChinArray II and III), from November 2013 to August 2017. The study uses local-seismic for inversion. After manual labeled the seismic phase, we select events with more than ten phase records of individual seismic events. The epicentral distance is less than 200km. Finally, we obtained about 22,500 phase records of 1882 local seismic events.

Our preliminary research results are consistent with previous studies and surface structures of a wide range of velocity distributions. However, in the middle-upper crust under the Liupan Mountain, the low-speed anomaly extending downward is shown, which may be caused by the horizontal extrusion caused by the eastward asthenosphere flow driven by the continuous compression of the northeastern margin of the Qinghai-Tibet Plateau during the Cenozoic. While, in the middle crust of the Ordos Basin, there are weak high-speed anomalies that divide the low-speed disturbances in the basin into three parts, showing the fluctuation of the crystalline basement of the basin. In the Taihang Mountains in the west of the study area, low-velocity anomalies extending to the upper layer of the mantle are shown. We initially believe that this anomaly is related to the volcanic thermal motion that once existed on the area.

Keywords: P-wave velocity structure, Ordos block