



Upper Mantle Anisotropy Beneath the Ordos Basin in China and its geodynamic significance

Liangshu Wang, Ning Mi , Zhouchuan Huang, and Mingjie Xu

School of Earth Science and Engineering, Nanjing 210023, China (lswang@nju.edu.cn)

The Ordos basin is a stable block between the Eastern and Western China, and surrounded by active thrust belts and extensional graben systems. Investigations on the upper-mantle deformation and flowing pattern beneath the Ordos basin will help to illuminate how the different geodynamical processes affect the intra-continental deformation in China.

From five portable seismic arrays in the southern Ordos block, SKS and SKKS phases are used to estimate the S-wave splitting parameters. The results show distinct anisotropy in the upper mantle beneath the Ordos area. To the southwest of the Ordos, the orientations of anisotropy are NNW-SSE, which are subparallel to the thrust belt and boundary faults between the Ordos and the Northeast Tibetan Plateau, mapping a clockwise mantle flow induced by the eastward extrusion of the Northeast Tibetan Plateau and deflected by the Ordos block. To the south of the Ordos, mantle flow direction is nearly E-W, parallel to the strike-slip direction of the Weihe graben, indicating an eastward mantle flow from the NE Tibetan plateau to the eastern part of China. To the east of the Ordos, the direction of fast S-wave is changing slowly from NWW-SSE to E-W, perpendicular to the main tectonic direction in Shanxi graben system, showing an extension feature similar to that of the North China.

Above results illuminate much information on the mass deformation and migration in the upper mantle resulting from the interactions between the Ordos block and its surrounding dynamic systems. It can be seen that the thrust faults and extensional grabens around the Ordos block are the positions where the anisotropy shows obvious change. As the boundary area of different blocks, they are the key areas to adjust the transformation between different geodynamic systems.