Crustal and upper mantle Structure Beneath the Ordos Block by Multi-scale seismic tomography

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The Ordos Block located in the center of China mainland, which is one of the oldest and most stable cratons in Asia. It is contiguous to the Yinshan Block, the North China Craton, Alex Block, Yangze Block, and Northeast Tibet. Numerous geologic and geophysical studies engaged in the mechanics of the Ordos Block deformation and evolution, but the detail structure and deformation style of the Ordos Block remains uncertain due to poor geophysical data coverage. During 2013 and 2018, China Earthquake Administration developed XMLY Seismic Array in Ordos Block and adjacent area, which operated more than 1000 broadband seismic stations with an average station spacing of 35km. Using the P-wave Travel time data recorded by the array and multi-scale seismic travelttime tomography technique, we obtained a high-resolution P-wave velocity structure beneath Ordos Block. The seismic tomography algorithm employs sparsity constrains on the wavelet representation velocity model via the L1-norm regularization. This algorithm can efficiently deal with the uneven-sampled volume, and give multi-scale images of the model. Our preliminary results can be summarized as follows: 1, the crustal and upper mantle P-wave velocity structure is strongly inhomogeneous and consistent with the surface geological setting; 2, significant low-velocity anomalies exist beneath the northwestern margin of Ordos Block, which suggested that there exist upper mantle upwelling; 3, There have obvious boundary between Alex and Ordos Block along 104°E at upper mantle; 4, Along 38°N tectonic line, there exist different structure between south part and north part of Ordos upper mantle, the south part of Ordos show high-velocity feature and the upper mantle show low-velocity anomalies in north part of Ordos Block. This feature can be interpreted that the two parts of the Ordos Block undergone different Tectonic evolution processes.