



Lithospheric structure of the northern part of the North China from surface wave dispersion analysis

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Rayleigh and Love wave phase velocities in the northern part of the North China are obtained from ambient noise tomography in the period range of 8 to 35 s and two plane wave earthquake tomography at periods of 20 to 100 s using data recorded at 222 broadband seismic stations from the temporary North China Seismic Array and permanent China Digital Seismic Array. The dispersion curves of Rayleigh and Love wave from 8 to 100 s are jointly inverted for the 3-D shear wave structure and radial anisotropy in the lithosphere to 140 km depth. Low velocity anomalies are largely imaged beneath the Shanxi rift and Taihangshan uplift while high velocity anomalies are present in the North China plain from the lower crust to the depth of 140 km. The high velocity in the North China plain is probably related to mafic intrusion and depleted mantle residual of Archean lithosphere associated with strong lithosphere extension. The prominent low velocity anomaly beneath the Shanxi rift and Taihangshan uplift may be related to the asthenosphere upwelling during the Mesozoic reactivation. Large positive anisotropy with $V_{sh} > V_{sv}$ in Shanxi rift, Taihangshan uplift and North China plain could indicate horizontal layering of intrusion and alignment of minerals in the lithospheric mantle, which also argue for vigorous extensional deformation.