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Azimuthal anisotropy of Rayleigh-wave from ambient noise tomography based on a dense coverage seismic array in NE Tibetan Plateau

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Seismic anisotropy provides evidence for the physical state and tectonic evolution of the lithosphere. As being a possible outward-moving channel of the materials, the northeastern margin of the Tibetan Plateau has been an ideal place to understand the deformation mechanism of the Tibetan Plateau. In this work, we apply the ambient noise tomography to study the azimuthal anisotropy of Rayleigh-wave beneath the northeastern margin of the Tibetan plateau and its adjacent areas.
Continuous time-series of vertical component between Dec 2013 and Mar 2015 ($\sim$ 15 months), recorded by a total number of 668 broadband and very broadband portable stations (China Seismic Array, Phase II) and 62 permanent broadband stations, have been cross-correlated to obtain estimated Green's functions. Over a total number of 113 000 phase velocity dispersion curves have been measured. Finally, Rayleigh-wave phase velocity and azimuthal anisotropy maps at periods ranging from 6 s to 40 s have been reconstructed with a grid size of $0.5^\circ \times 0.5^\circ$.
For the distribution of the phase velocities, the results show that at short periods (e.g., <=10s), the phase velocity variations has good relationship with the geological units, with low-speed anomalies corresponding to the major sedimentary basins and high-speed anomalies coinciding with the main mountain ranges. The phase velocity in Ordos gradually changes from low-velocity anomalies to high anomalies, reflecting the depth of sediments in the Ordos block. At long periods (e.g. >=30 s), the phase velocity distribution is mainly associated with the crustal thickness. The Hetao basin characterizes with obvious low-speed anomalies from 6 s to 30 s. The Tibetan Plateau is also imaged with obvious low-speed anomalies referred to the surrounding blocks at all interested periods. For the distribution of the azimuthal anisotropy, at short periods of 6$\sim$15s, the anisotropy is consistent with the strike of the regional tectonic lines. At periods of 18$\sim$40 s, the predominant direction of fast waves in the Qilian and western-Qinling blocks is NW-SE, while there is a clockwise rotation of fast wave direction in the interior of Tibet. The amplitude of the anisotropy always exhibit much stronger at periods of short periods (e.g., <=15 s) and long periods (e.g., >=36 s) than that at other period range. The amplitude is always very strong at all periods in the interior of Tibet refer to its adjacent areas, indicating that it has more active tectonics for the NE Tibetan Plateau.
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