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Seismic anisotropy of the crust and upper mantle beneath the northeastern margin of the Tibetan Plateau

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We investigate the seismic anisotropy of the crust and upper mantle beneath the northeastern margin of the Tibetan Plateau (NETP) at 55 stations from a temporary experiment (ANTILOPE-IV) operated from 2010 to 2013 using teleseismic shear wave splitting (SWS) measurements. Assuming a single-layer anisotropic model, we obtain 631 pairs of SKS splitting parameters represented by fast polarization directions (FPDs) and delay times (DTs). The general orientations of the seismic anisotropy in the NETP indicate WNW-ESE direction, with average FPD of $\sim$92.9° and average DT of $\sim$1.20 s. Most of the FPDs follow the tectonic trends except those in the Qaidam basin and southwestern Qilian orogen. The stacking FPDs in the Altyn Tagh fault and northwestern Qilian orogen is NW-SE trending, parallel or sub-parallel to the azimuthal anisotropy of the Pn wave and the direction of the absolute plate motion, indicating the major source of the anisotropy is the asthenosphere flow. The FPDs beneath the East Kunlun-West Qinling Fault are E-W and/or ENE-WSW trending, parallel or subparallel to the azimuthal anisotropy of the Pn wave and the trend of the regional geological structures. The FPDs beneath the Qaidam basin are NE-SW trending, parallel to the direction of the GPS velocity, inferring that the source of the observed anisotropy is from the crust and the upper mantle lithosphere. The results of the SWS lead to a vertically coherent deformation pattern in NETP.