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Seismic anisotropy inferred from direct S-waves derived splitting measurements and its geodynamic implications beneath southeastern Tibetan Plateau

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The present study aims for detecting seismic anisotropy parameters beneath southeastern Tibet near Namche Barwa Mountain using splitting of direct S-waves. We employ the reference station technique to remove the effects of source side anisotropy. Seismic anisotropy parameters, splitting time delays and fast polarisation directions were estimated through analyses on a total of 501 splitting measurements obtained from direct-S waves from 25 earthquakes ($\geq$5.5 magnitude) that recorded at 42 stations of Namchebarwa seismic network. We have observed a large variation in time delays ranging from 0.64 to 1.68s, but in most cases, it is more than 1s, which suggests a highly anisotropic lithospheric mantle in the region. A comparison between direct S- and SKS derived splitting parameters shows a close similarity although some discrepancies exist where null or negligible anisotropy is reported earlier using SKS. The seismic stations with null or no anisotropic measurements are now supplemented with new measurements having clear anisotropic signatures. Our analyses indicate a sharp change in lateral variations of fast polarisation directions (FPDs) from consistent SSW-ENE or W-E to NW-SE direction at the southeastern edge of Tibet. Comparison of the FPDs with global positioning system (GPS) measurements, absolute plate motion (APM) directions and surface geological features signify that the observed anisotropy and hence inferred deformation patterns are not only due to asthenospheric dynamics but is a combination of lithospheric deformation and sub-lithospheric (asthenospheric) mantle dynamics. Direct S-waves-based station averaged splitting measurements with increased back azimuthal coverage tend to fill the missing links that remain rather elusive due to lack of SKS measurements.