P Wave Azimuthal Anisotropic Tomography in Northern Chile: Insight Into Deformation in the Subduction Zone

Huang, Zhouchuan

Tilmann, Frederik

Comte, Diana

Zhao, Dapeng

Based on a large data set of local body wave travel times, we determined the first 3-D model of azimuthal P wave anisotropic tomography of northern Chile in order to study the deformation in the subduction zone. Our results indicate different deformation patterns in the overriding lithosphere, mantle wedge, and the subducting Nazca slab as well as significant along-arc variations. Radiating fast velocity directions (FVDs) around the rupture zone of the 2014 Iquique earthquake (Mw 8.2) are notable in the crust, which may reflect the specific crustal extension induced by a point-like stress source in the form of a fully locked asperity at the plate interface. In most of the study region, FVDs in the mantle wedge are trench normal, which we interpret to have resulted from mantle wedge flow driven by the oceanic plate subduction. However, trench-parallel FVDs are found beneath the northern segment, which may imply the occurrence of B-t