Crustal shear-wave velocity structure beneath northeast India from teleseismic receiver function analysis

Presenter: Sun, Yuan-Cheng

Abstract

In this paper investigated the seismic shear-wave velocity structure of the crust beneath nine broadband seismological stations of the Shillong–Mikir plateau and its adjoining region using teleseismic P-wave receiver function analysis. The inverted shear wave velocity models show 34–38 km thick crust beneath the Shillong Plateau which increases to 37–38 km beneath the Brahmaputra valley and 46–48 km beneath the Himalayan foredeep region. The gradual increase of crustal thickness from the Shillong Plateau to Himalayan foredeep region is consistent with the underthrusting of Indian Plate beyond the surface collision boundary. A strong azimuthal variation is observed beneath SHL station. The modeling of receiver functions of teleseismic earthquakes arriving the SHL station from NE backazimuth (BAZ) shows a high velocity zone within depth range 2–8 km along with a low velocity zone within 8–13 km. In contrast, inversion of receiver functions from SE BAZ shows high velocity zone in the upper crust within depth range 10–18 km and low velocity zone within \_18–36 km. The critical examination of ray piercing points at the depth of Moho shows that the rays from SE BAZ pierce mostly the southeast part of the plateau near Dauki fault zone. This observation suggests the effect of underthrusting Bengal sediments and the underlying oceanic crust in the south of the plateau facilitated by the EW-NE striking Dauki fault dipping 30° toward northwest.

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