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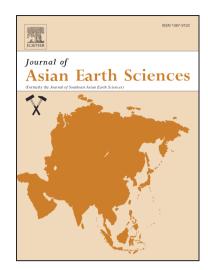
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1

Seismological evidence of the Hales discontinuity in northeast India

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Abstract

The crust and upper mantle shear wave velocity structure beneath the northeast India is estimated

by joint inversion of Rayleigh wave group velocity and receiver function, calculated from

teleseismic earthquakes data recorded at nine broadband seismic stations. The Assam valley and

the Shillong-Mikir plateau are the two important tectonic blocks in the northeast India, which are

surrounded by the Himalayan collision zone in the north, Indo-Burma subduction zone in the

east and by the Bengal basin in the south. The joint inversion followed by forward modeling

reveal crustal thicknesses of 30-34 km beneath the Shillong plateau, 36 km beneath the Mikir

hills and 38-40 km beneath the Assam valley with an average shear wave velocity (Vs) of 3.4-3.5

km/s. The estimated low upper mantle shear wave velocity (Vsn) 4.2-4.3 km/s may be due to

the rock composition or grain size or increased temperature and partial melt (<1%) in the upper

mantle, or an effect of all. Also, we report for the first time, the existence of the Hales

discontinuity at depths 56-74 km with Vs ~4.4-4.6 km/s. Variable depth of the Hales

discontinuity may be explained by the geotherm and /or addition of Cr3+ and Fe2+ in the spinel-

garnet system.

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