EGU24-1075, updated on 08 Oct 2024
https://doi.org/10.5194/egusphere-egu24-1075
EGU General Assembly 2024


# 3D crustal shear wave velocity structure in northeast India from joint inversion of receiver function and Rayleigh wave group velocity

**Aakash Anand**[1], Kajaljyoti Borah[1], Sourav Mandal[2], and Dipok Bora[3]
[1]Indian Institute of Science Education and Research Kolkata, Department of Earth Sciences, India (aakashanand.iiserk@gmail.com)
[2]Charles University, Prague, Czech Republic
[3]DiphuGovernment College, Department of Physics, Diphu, India; GovernmentModel College, Deithor, India

In this study, we computed the Rayleigh wave group velocity tomography of northeast India (NEI) to a higher resolution of 2°×2° for a 15 to 80-second period. The group velocity dispersion obtained from the tomography was inverted using two ways – (a) inversion for every 0.2 degree of the study area to estimate the 3-D shear wave velocity, which overcome the constraint of sparse seismic station coverage in a few segments of the study region,(b) Joint Inversion of the computed dispersion with the  Receiver Function from 22 stations spread across NEI, covering all major geological features, to deduce the shear wave velocity structure. Moho geometry showed significant variation in the region, with IBR (~ 43–62 km) and Himalaya (~ 40–53  km) showing deeper Moho; Assam Valley (~ 33–38 km), Shillong Plateau (~ 30–32 km) and Bengal Basin (~ 37 km) being comparatively shallower. Moho beneath Shillong Plateau is found to be the shallowest (~ 30 km). For stations, TAWA, RUPA, ITAN, and TZR significant back azimuthal variation in shear wave velocity structure is observed. The average crustal shear wave velocity Vs beneath Shillong Plateau (Vs ~ 3.16-3.27 km/s) and Assam Valley (Vs~3.14-3.35 km/s) is found to be lower than the average crustal Vs (~3.75 km/s) beneath the Indian shield. Shillong Plateau and proximal Assam Valley stations showed low uppermost mantle shear wave velocity ($Vs_n$ ~ 4.0-4.1 km/s), which might be attributed to factors such as rock composition, grain geometry, higher temperature or the presence of partial melt.The eastern segment of the Assam Valley is not in conformity with the western segment, as evident from the DIBR station at the eastern edge of Assam Valley which doesn't show this decreased $Vs_n$.Thus indicating prima facia towards different geodynamics along the eastern and western segment of the Assam valley, which might be attributed to the role played by the uplifted, uncompensated Shillong Plateau and/or the Kopli Fault. Relatively higher $Vs_n$ (~ 4.2-4.6 km/s) observed beneath the IBR stations can be associated with the deeper moho (~ 43–62 km). Thus the improvised Moho geometry, crustal velocities structure, $Vs_n$ could be crucial in understanding the geodynamics of the region and could provide better constraint on the quantification of seismic hazards in the region.