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Implication of mantle dynamics beneath North-East India through the perspective of SKKS splitting analysis

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SKKS phase being an unique one among other core refracted phases like PKS, SKS etc. is capable of imaging the anisotropic contribution from lower mantle as per its raypath is considered. Its unique property of reflection at the core-mantle boundary enables it to carry forward the lower mantle contribution in case of seismic anisotropy is concerned. The lower mantle as a whole is assumed to be isotropic except the lowermost 200-300km (D" layer) which pertain a distinct diversity in the raypath of SKKS phases beyond 130^{o} epicentral distance and thereby manifest the possible influence of lower mantle in the deformation pattern of any region. The present study of SKKS splitting analysis comprising an epicentral range of 140^{o}-180^{o} is primarily intended to complement the existing shear wave splitting dataset associated with north east India as well as to understand the effect of lower mantle on the splitting parameters (fast polarization direction (FPD,) and delay time (δt)). The motive of the study can be further extended to decipher the implication of such narrow epicentral range on splitting analysis. The analysis suggests that, beneath sub-Himalaya, the Indo-Eurasia collision derived lithospheric force along major thrust faults is the prime source behind the deformation, while Assam foredeep is somewhat influenced by the seismogenic Kopili Fault. There exist a striking difference in anisotropic directions between northern and southern fringe of Shillong plateau where deformations are governed by the absolute plate motion (APM) of Indian plate driven asthenospheric flow and seismically active Dauki and Dapsi faults respectively. Such disparity in splitting attributes can be inferred as the interplay of constricted back-azimuthal distribution and lean range of epicentral distance of seismic events, though the probability of lower mantle involvement cannot be ignored completely.