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Implications on source localization and central depth of anisotropy beneath the Sikkim Himalaya: an appraisal on lithospheric deformation

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For the understanding of deformational mechanism and geodynamics of a tectonic set up, the source localization and central depth of anisotropy plays a vital role. Though mantle dynamics and deformation patterns can be understood from studying the shear wave splitting mechanism, the true interpretation of under earth mechanism governing the geodynamics remains little biased and unrealistic without the proper justification and identification of the source localization and depth of anisotropy. Our present study is focused on the possible central depth determination and source localization of anisotropy beneath the Sikkim Himalayan region based upon the well-established spatial coherency method of Splitting parameters, an improved and dynamic principle of grid search analysis based on the Fresnel zone concept. The principle is based upon the maximum coherency relation between the splitting parameters suggested by a minimization in the variation factor as a function of true depth of the anisotropy. Sikkim Himalaya, sandwiched between the central Nepal Himalaya and the eastern Bhutan Himalaya, demarcates the distinct change in the width of the Himalayan foreland basin and the Main Himalayan Thrust (MHT), which is a part of the active deforming eastern Himalayan fold axis and thrust belt. The Spatial coherency analysis of splitting parameters suggests the central depth of heterogeneity at around 130 km beneath this Sikkim Himalayan region as a consequence of the deformation patterns governed by the complex lithospheric mass at this particular depth.

KEYWORDS

Spatial coherency, Shear wave splitting, Sikkim Himalaya, lithosphere.