Spatial and Depth Variation of Tectonic Stress Pattern obtained in the Kangra-Chamba Seismic Regime of NW Himalaya

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The Fault plane solutions (FPS) of earthquakes quantify the nature and plane of movement during rupture and these are effective tools to constrain the active tectonics generating earthquakes. Further, the vector decomposition of FPS can help to define the direction and form of principal stresses operative in the seismic regime of the region. As an independent mode to constrain the seismotectonic model of the Kangra-Chamba region, FPS of recent 45 well located events ($2.5<M\leq5.0$) are computed using P-wave first polarity motions recorded at more than ten. The complex tectonic setting of the sector is immediately evident from the fact that three dominant fault mechanisms noted are: (1) thrust fault mechanism with strike slip component, (2) strike slip movement with thrust component and (3) normal fault motion with strike slip component. The FPSs of the past earthquakes located at detachment highlight the dominance of the thrust environment of the region on a broad tectonics. The earthquakes occurring along the shallow sections of the Main Boundary Thrust and Punjal Thrust are characterized by thrust mechanisms with varying component of strike slip movement. The decreasing dip of the nodal planes with increasing depths on these thrusts favor the tectonic hypothesis that steeply dipping thrusts near the surface flatten out at depth to merge with the detachment plane zone marking top of the downgoing Indian Plate. Similarly, earthquake occurring on the Chamba Thrust (CT) support that strain resulting from continued collision are being consumed by reverse-fault movement on the CT. The normal fault mechanism along the plane which is seen as a subsurface extension of the Chenab Normal Fault is consistent with the tectonic model which postulates NE-SW directed extensional tectonics responsible for the southward displacement of the Chamba Nappe along the normal fault. Earthquakes located beneath the detachment zone in a localized cluster NE of the epicenter of the Kangra earthquake are dominated by normal fault mechanism. Orientation of P- and T-axes, obtained by tensor decomposition of the FPS, indicates that stress pattern in the region is governed by two distinct tectonics.