Moment Tensor Inversion and Source Parameters Estimation of Earthquake Events in Kashmir Himalaya

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This study of determining source parameters and focal mechanism solution of earthquake events is carried out in the Kashmir region of NW Himalaya within very complex tectonics of Indo-Eurasion collision zone. This region is recognised as seismically very active yet there have been very few studies conducted because of dearth of good quality data due to limited number of local recording stations. In present study, shallow focus earthquake events of magnitude between (M_L) 3.0-4.0 around the region are analysed which is monitored through a local seismological network of six seismic stations deployed around Ratle HEP dam-site for a period of six month from May to November 2022. The azimuthal coverage of these stations are well distributed that the events happened lie within local epicentral distance of these stations. The area of study consists of number of local and regional tectonic features such as, the Main Boundary thrust (MBT), Main Central thrust (MCT) and Kishtwar fault.

Moment tensor inversion has been performed with the help of MATLAB based technique named ISOLA. The methodology used in this tool helps to determine the moment tensor coefficients via source function inversion through iterative deconvolution method. In addition to that the Green's function for synthetic representation of source waveform is calculated from discrete wavenumber method by utilizing the 6 basic elementary moment tensors. Appropriate selection of frequencies for inversion was chosen on the basis of epicentral distance and magnitude of earthquake event. The best results are chosen from automatic selection containing the maximum spatial correlation between real and synthetic data. The moment tensor solution provides the dominant behaviour of Double-Couple mechanism (DC) with inclusion of Compensated Linear Vector Dipole (CLVD). Various source parameters, eigenvalues of moment tensor and maximum & minimum compression stress directions are precisely determined in this work.

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