



Amplitude ratios for complete moment tensor retrieval: FOCMEC upgraded.

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We generalized the Snoke's method of inversion of amplitude ratios and polarities (P, SH, SV) designed to determine double-couple earthquake focal mechanism. We search for a general dipole source described by unconstrained seismic moment tensor, i.e. non-double-couple (non-DC) source components are allowed as well. From 3-component records of P and S waves the amplitude ratios SH/P, SV/P and SV/SH are constructed. To these data the synthetic amplitude ratios are matched subjected to the constraint of keeping the P-polarities. The cost function is constructed as sum of differences of logarithms of amplitude ratios. Contrary to Snoke's approach employing the grid search over three parameters of the DC source model, here the minimum in the 6-dimension model space is search by a genetic algorithm. Based on synthetic tests simulating various configurations of seismic stations from sparse to dense networks and from low to high number of stations conditions for successful convergence. We specified minimum amount of data, i.e. number of stations used and amplitude ratios employed, for reliable retrieval of non-shear source components. We demonstrated that processing of non-DC data by traditional DC-constrained algorithm could provide distorted fault-plane solution which, in consequence, may hamper their application in the stress analysis.

Snoke, J. A., 2003. FOCMEC: FOcal MEchanism determinations, International Handbook of Earthquake and Engineering Seismology (W. H. K. Lee, H. Kanamori, P. C. Jennings, and C. Kisslinger, Eds.), Academic Press, San Diego, Chapter 85.12