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Inversion for Kinematic Source Parameters

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Standard catalogues of seismic source parameters currently available, e.g. the Harvard CMT-catalogue, contain moment tensor parameters derived from a point source. Parameters related to the finite extension of a fracture are not available for the majority of earthquakes. Such parameters like the dimension of the activated fault plane, rupture directions and velocities are more and more important to understand in more detail the physical processes generating earthquakes. A major advance on that topic could be expected if such kinematic parameters of seismic sources would be available for a large number of globally distributed earthquakes. Therefore a project has been started to investigate a method for seismic waveform inversion in time and/or frequency domain which matches two important conditions: (1) it should be able to resolve effects of a finite source and (2) it should be stable to allow an automated processing and to provide robust estimations of the desired parameters. An implementation of such an inversion algorithm at the Seismological Observatory Gräfenberg and its integration into the daily routine analysis of seismic events will ensure a steady development of the proposed event data base.

Keywords: Seismic sources; moment tensor; finite source;

References

[1] T. Dahm, G. Manthei and J. Eisenblätter, Automated moment tensor inversion to estimate source mechanisms of hydraulically induced micro-seismicity in salt rock, Tectonophysics, 306, 1-17, 1999.

[2] T. Dahm and F. KrÜger, Higher degree moment tensor inversion using far-field broadband recordings: theoryand evaluation of the method with application to the 1994 Bolivia

[3] A.M. Dziewonski, T.A. Chou and J.M. Woodhouse, Determination of earthquake source parameters from waveform data for studies of global and regional seismicity. J. Geophys. Res. 86, 2825-2852, 1991