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Moment tensor inversion

The seismic moment tensor is a general description of seismic point sources, establishing a linear relationship between observed ground motion and a set of Green’s functions or fundamental fault responses. Green's functions for the inversions have been computed for several layered halfspace models and are stored in libraries. We invert for the deviatoric moment tensor using time domain seismograms recorded at local-to-regional distances including the full waveforms (P-, S-, Love and Rayleigh waves).

The best solution is defined to minimise the L2-norm of the misfit between observed and predicted synthetic displacement seismograms. The non-linear depth estimation is addressed by a grid-search. Recordings with high noise level or other deficits are excluded from the inversion; the remaining waveforms may be weighted for inversion where appropriate. All waveforms are ‘long period’ filtered according to data characteristics and quality, typical filter bands are 50 to 20 s for Mw > 4, and 35 to 15 s for smaller events.

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