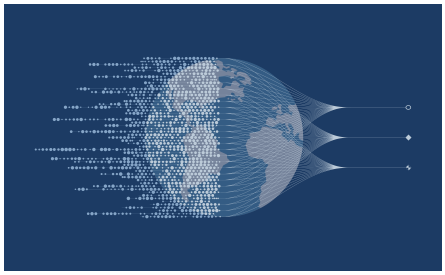

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# of Inversion Methods for Calculating Full Moment Tensor Solutions using Earthquake and Announced Nuclear Test Datasets

The full moment tensor solution (MTS) allows characterisation of the source mechanism by resolving the six independent components of the source moment tensor. Determining the proportion of isotropic and deviatoric moment released by a source is essential to distinguish between explosion and earthquake sources. However, complications occur because explosions can produce deviatoric deformation via tectonic release, and shallow depth sources cause underdetermined inversions. Here we compare MTSs from the MTTime and MTUQ packages for earthquakes and announced nuclear tests. Synthetic datasets demonstrate that subtle adjustments in time shifts and station distribution can produce variable seismic source interpretations. After tuning of station-specific time-shifts, MTSs for six announced nuclear explosions at the DPRK Test Site have large positive isotropic components, with significant deviatoric components. The collapse event following the 2017 DPRK test has a large negative isotropic component, whereas MTSs for earthquakes located near to the DPRK Test have larger deviatoric components compared to the explosions and collapse sources. In all cases the compensated linear vector dipole component is substantial, and solutions are not always stable. Care must therefore be taken in characterising the source of a seismic disturbance using moment tensor inversions.

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