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Rapid and automated full seismic source characterization: seismic monitoring application for the North Korean region

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Rapid full source characterization is strongly recommended for providing pertinent information after the occurrence of an event of interest such as a nuclear test. Full moment tensor inversion using long-period seismic waveforms recorded at regional distance has shown its relevance for confirming the isotropic component of a seismic source. In order to rapidly determine the full source parameters of events occurring in a region of interest, an automated grid-search moment tensor approach can be proposed. Here, we show that such method called GRiD MT reveals the main parameters of any events with magnitude above 3.5 within a few minutes: detection, origin time, location, moment magnitude and mechanism. We demonstrate its interest for seismic monitoring when implemented over the North Korean region using only a limited number of seismic stations. Correct identification of all past North Korean nuclear tests (including the smallest one in 2006) is rapidly obtained within an easy-to-use algorithm for a seismic analyst. Lastly, GRiD MT can be used for the monitoring of small to larger tectonic events, and is currently being tested and implemented for multiple objectives at the French National Data Center: nuclear test monitoring, earthquake monitoring, and tsunami warning.

Promotional text

This presentation shows the substantial interest for a national data center to develop and implement full source inversions in near-realtime for seismic event characterization.

Primary author: Ms GUILHEM TRILLA, Aurelie (Commissariat à l'énergie atomique et aux énergies alternatives (CEA), France)

Presenter: Ms GUILHEM TRILLA, Aurelie (Commissariat à l'énergie atomique et aux énergies alternatives (CEA), France)

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