

Real-time Seismology—From hours to seconds

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Abstract

Real-time seismology refers to a practice in which seismic data are collected and analyzed quickly for effective post-earthquake emergency response. As the computer technology and seismic instrumentation have tremendously advanced, processes that took hours can be done in a few minutes, for some special purposes, even in seconds. Accordingly, some important applications of real-time seismology are presented, in both basic principles from seismological point of view and the development in techniques. We first focus on a perfect application of real-time seismology – Earthquake Early Warning system (EEW). By analyzing a short template of the initial P-waveform, the preliminary earthquake size can be estimated as crucial information on issuing an appropriate warning before strong ground shaking hitting a given site. Secondly, the progress that has been made in seismic source observation is introduced, including the real-time moment tensor monitoring and the real-time finite-fault modeling. With the availability of high-rate GPS data in recent years, the combined use of seismic and geodetic observations now becomes a practical strategy in rapid seismic source modeling. Geodetic data offer stable measurements in static displacement relevant to tsunami excitation, where seismic data carry temporal and spatial information from the source rupture. We demonstrate how these real-time datasets improve seismic and tsunami hazard assessment in the future.

References

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