

Construction of Repeating Earthquakes Monitoring System by NIED Hi-net

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Repeating earthquakes with very similar waveform are probably caused by repeated rupture of small asperities. Space-time distribution of quasi-static slip on the plate boundary in the northern Japan arc was estimated from small repeating earthquakes (Igarashi et al., 2003; Uchida et al., 2003; Matsubara et al., 2005). The plate boundary of the Philippine Sea plate in the Kanto district was also estimated from repeating earthquakes (Kimura et al., 2006). In this study, we have developed automatic detection and monitoring system for repeating earthquakes using Hi-net waveform data in near real-time.

The National Research Institute for Earth Science and Disaster Prevention (NIED) are operating High Sensitivity Seismograph Network (Hi-net), which composed of about 700 stations all over Japan. The data acquisition, monitoring, processing, and archive are automatically controlled by a database management system. The following procedure is used to detect repeating earthquakes. Earthquake pairs are defined as earthquakes with epicenter separations of less than 30 km. Vertical-component bandpass-filtered seismograms with a passband frequency of 1-8 Hz and epicentral distance of less than 200 km are used. The time window is defined as that from 1 s before P-wave arrival to 5 s after S-wave arrival. Repeating earthquakes were identified based on earthquake pairs with waveform cross-correlation coefficients of larger than 0.95 at three or more seismic stations.

Now, our system has started test operation in the Hokkaido district. This area is suitable for evaluation of the validity of our system since repeating earthquake activity in this region was reported by Matsubara et al (2005). It is necessary to consider the technique of processing and an efficient data-archive, and the extraction algorithm for repeating earthquakes.