

## Evaluating performance of automatic earthquake detection and location system developed to the nationwide seismic network

Takashi NAKAYAMA<sup>1\*</sup>, HIRAHARA, Satoshi<sup>1</sup>, KONO, Toshio<sup>1</sup>, NAKAJIMA, Junichi<sup>1</sup>, OKADA, Tomomi<sup>1</sup>, UMINO, Norihito<sup>1</sup>, HASEGAWA, Akira<sup>1</sup>, HORIUCHI, Shigeki<sup>2</sup>, HORIUCHI, Yuko<sup>2</sup>

<sup>1</sup>Graduate School of Science, Tohoku University, <sup>2</sup>Home seismometer corp.

In addition to the nationwide dense Kiban seismic network, which is composed of about 1200 seismic stations, many temporary seismic networks with a variety of dimensions have been deployed in various areas in Japan. The number of seismic stations will increase even more. Ability of managing such a huge amount of seismic waveform data by manually picking P- and S-wave arrival times, P-wave polarities, S-wave maximum amplitudes etc. is limited, and therefore application of automatic earthquake detection and location system is anticipated.

Horiuchi et al. (2012) developed such an automatic processing system, and recently Horiuchi et al. (2013) have further developed the system for the application to the nationwide seismic network. This system was set up at Tohoku University, and automatic detection and location processing for the nationwide seismic network has started. It can detect and locate many earthquakes which are difficult to be located by the routine processing based on manual pickings of P- and S-wave arrivals. However, sometimes earthquakes cannot be correctly discriminated by the system: for example, when more than two earthquakes occur almost simultaneously.

In order to consider the application of automatic earthquake detection and location system to the actual seismic network, we need to know its performance. When earthquakes are detected and located by the system, how correctly P- and S-wave arrival times can be picked, and how accurately their hypocenters can be determined? How well is the detection capability of the system in region to region? In which case the system cannot detect or cannot correctly discriminate earthquakes?

To answer these questions, we have started to evaluate performance of the earthquake detection and location system presently developed for the application to the nationwide seismic network. Preliminary results obtained for 1 week period data show that the automatic system can detect and locate earthquakes about 1.5 times more than those in the JMA unified catalogue, which were located by manually picked P- and S-wave arrival times. Frequency distribution of magnitudes shows that the automatic system extends the lower limit of the detection capability to much smaller magnitude range than that by the JMA unified catalogue. Events with magnitudes greater than  $\sim 0.0$  can be located in the inland areas of Japan by the presently developed automatic processing system. We will report evaluation results of performance of the system applying to much longer period data.