

Automatic Event Detection by AVM method and Measurement of P- and S- arrival times for MeSO-net data

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We have installed and been maintaining the Metropolitan Seismic Observation network (MeSO-net) which consists of 296 seismic stations in Tokyo metropolitan area. The advantage of the network is that we continuously record wide frequency band and dynamic range seismic data. We developed an autonomous cooperative transfer protocol (ACT) to use a relatively low cost communication line. We have developed a new automatic event detection method, the apparent velocity matching (AVM) method.

We tested the AVM method for the MeSO-net data during a period of 13 days from September 4, 2011. An event detection rate of 94% and a correct answer rate of 98 % have been achieved after manual inspection of an operator. 24 % of the detected events are not listed in Japan Meteorology Agency (JMA) unified catalogue. However, still 12% events that are judged as an earthquake by the AVM method are noises that are verified by a manual inspection. We propose a method to reduce the noise ratio by calculating cross correlation of waveforms between a target event and a reference event that is estimated to occur near the target event. The method works well and reduces the noise ratio dramatically.

We are now developing a total system that consists of automatic event detection, estimating absolute arrival times, measuring relative arrival times, verification of measurements by manual inspection, and reporting. The system will be implemented in the MeSO-net and tested under real time processing.

Keywords: event detection, automatic processing, Locally stationary AR model, waveform correlation