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A feasibility study of fast and continuous strong-motion observation

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Most earthquake early warning systems including JMA EEW predicts strong-motion parameters (seismic intensity, PGA) using estimated earthquake parameters (epicenter location, focal depth, magnitude) and attenuation equation. Thus, prediction of strong-motion parameter is affected by estimation error of earthquake parameters and inaccuracy of attenuation equation. We can, however, observe the true value of strong motion parameter at each observation site where main part of ground motion has arrived in a certain time after the earthquake occurrence. We can improve accuracy of prediction of strong-motion parameters using observed value of strong-motion parameters if strong-motion data is available in real-time. For this purpose and also real time seismic risk evaluation, National Research Institute for Earth Science and Disaster Prevention (NIED) started research and development of the real-time strong-motion monitoring system. One of the key components of the system is fast and continuous strong-motion observation.

We studied for feasibility of fast and continuous strong-motion observation using tens of K-NET strong-motion seismographs in operation. We installed an improved firmware in K-NET seismograph. The firmware can continuously send waveform data in 0.1s-length packet. Investigating packets sent by 35 K-NET seismographs in 38 hours through 64kbps best-effort type communication line, we concluded the end-to-end packet delay of most packets are shorter than 0.2s. Time delay of 0.2s is acceptable for our use.

Keywords: strong-motion observation, strong-motion seismograph, earthquake early warning