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How long do we need to wait to judge an earthquake size

Shunroku Yamamoto[1*], Shinji Sato[1], Masahiro Korenaga[1], Shunta Noda[1], Hideo Kiya[1]

[1]Railway Technical Research Institute

Rapid estimation of earthquake size is an essential requirement of an Earthquake Early Warning (EEW) system. Though JMA magnitude (Mj), defined by displacement, is used as a seismic parameter in most of the EEW systems in Japan, it is found that Mj is not the most suitable seismic parameters in terms of rapidity in estimating strong ground motions. For more rapid estimation, Yamamoto et al.(2007) proposed seismic intensity magnitude (Mi), defined by observed seismic intensity. In this study, characteristics of time-domain growth of seismic intensity for different magnitudes are studied, in order to estimate necessary window length for judging earthquake size. Waveform data recorded by K-NET are used in this study. Data, whose epicentral distance is 40-60km, for 3 magnitude groups (Mj=5, Mj=6, Mj=6.9-7.1) are selected. After real-time seismic intensities (RTSI) are calculated for those data, time histories of average RTSI and RMS are computed for each magnitude group.
Comparing these time histories of Mj=5, 6, 7 groups, we concluded that 1)it is difficult to judge the final size of earthquake by using the first 0.5-sec data, 2)it is necessary to wait at least 1 second to judge the occurrence of M=6 event, and 3 second to judge the occurrence of M=7 event.

Keywords: earthquake alert, earthquake early warning system, seismic intensity, seismic intensity magnitude, magnitude