

Possible quantification of earthquake size using strong motion duration and displacement amplitude

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Hara (2014) showed the correlation between strong motion duration and duration of high band-pass filtered tele-seismic P waves. In this study, we investigated the possibility to quantify earthquake sizes using strong motion durations and displacement amplitudes referring to Hara (2007), who showed that it is possible to determine magnitude for huge earthquakes using high frequency energy radiation durations and displacement amplitudes from tele-seismic P waves. We used horizontal components of strong motion seismograms from the KiK-net borehole stations for nine large earthquakes that occurred in and around Japan since 2003, which were retrieved and processed by Hara (2014). We obtained displacement records by integration of strong motion seismograms and measured amplitudes after applying high-pass filter with the corner frequency of 0.01 Hz. We used the strong motion durations obtained by Hara (2014), who used high band-pass filter with the corner frequencies of 5 and 10 Hz. He suggested the duration dependence on epicentral distance. We calculated the logarithms of the products of the strong motion durations and displacement amplitudes divided by the epicentral distance twice and compared them to the moment magnitudes. Although the scatter is large, they correlate well, which suggests the possibility to quantify the earthquake size using durations and displacement amplitudes measured from strong motion seismograms.

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