

Characterization of earthquakes in terms of duration of high frequency energy radiation and displacement amplitudes

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Hara (2007a) showed that it was possible to determine earthquake magnitudes consistent with moment magnitudes in the Global CMT catalog using duration of high frequency energy radiation and maximum displacement amplitudes of first arriving P-waves. Hara (2007b, submitted) showed that this technique was applicable to tsunami earthquakes, and that the analyzed tsunami earthquakes were characterized as those with longer source durations and smaller displacement amplitudes. In the present study, we investigated earthquakes with characteristics similar to tsunami earthquakes among the events studied by Hara (2007b). There are four such events; two of them (1997 May 10 Northern Iran [Mw 7.2], and 2001 November 14 Kunlun [Mw 7.8]) occurred under continents, and the other two (2002 October 10 Irian Jaya [Mw 7.5], and 2003 July 15 Carlsberg Ridge [Mw 7.5]) occurred under oceans. The moment magnitudes of these events are comparable to their surface wave magnitudes, which is different from the cases of tsunami earthquakes. Therefore, it seems difficult to identify tsunami earthquakes using only duration of high frequency energy radiation and maximum displacement amplitudes of first arriving P-waves. Interestingly, the focal mechanisms of all of these four events are strike slip types. We also calculated the ratio of the maximum velocities to the maximum amplitudes during source time inferred from duration of high frequency energy radiation, and found no significant trend for tsunami earthquakes.