

Comparisons of source characteristics among recent disastrous inland earthquake sequences in Japan (3)

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Toward strong motion prediction for earthquakes in high strain rate zone in Japan, Somei et al. (2010, 2011) have investigated seismic scaling relationship for M7-class inland earthquake sequences in Japan to discuss source characteristics between eight sequences occurring in the high strain rate zone and five sequences occurring in others. They showed that there was no obvious difference between stress drops of them.

After the great Tohoku earthquake (M_w 9.0) occurred, several large inland crustal earthquakes occurred in the high strain rate zone (the 2011 North Nagano prefecture earthquake; M_w 6.7 and the 2011 West off Aomori prefecture earthquake; M_w 6.1) and outside of the zone (the 2011 East Shizuoka prefecture earthquake; M_w 5.9 and the 2011 East Fukushima prefecture earthquake; M_w 6.6). In this study, we continued to investigate source characteristics for these crustal earthquake sequences. Then, we obtained stress drops of events (M_w : 3.1-6.9) in sixteen earthquake sequences using S-wave coda spectra of strong motion network (K-NET and KiK-net) records. S-wave coda spectral ratio between large and small event records gives source spectral ratio. For a number of event pairs including large earthquakes such as mainshocks, we also used F-net (Full range seismograph network) records. As these records have high SN ratios in the lower frequency range, we can obtain the full-range source spectral ratios, whereas we could not obtain full-range spectral ratios when we used the strong motion records. Because the source spectra of large earthquakes have the lower corner frequencies, the full-range spectral ratios are available to estimate the corner frequencies of those earthquakes. Most of source spectra obey omega-square source spectra. Stress drops are estimated by the corner frequency f_c from observed source spectral ratio and the seismic moment M_0 given by the moment tensor solution of F-net. In results, there is also no obvious difference between stress drops of events in the high strain rate zone and others.

Acknowledgements

We would like to sincerely thank CEORKA, NIED (K-NET, KiK-net) for providing the strong motion data. The hypocenter information was providing by JMA and moment tensor by F-net of NIED. Prof. Kato permits us to use relocated hypocenter information of the 2007 Noto and the 2004 Chuetsu earthquakes.

Keywords: High strain rate zone, S-wave coda, Source spectral ratio, Corner frequency, Scaling