

Source model of the 2011 East Shizuoka prefecture, Japan, earthquake by using the empirical Green's function method

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On March 15, 2011, an inland crustal earthquake ($M_{JMA}6.4$, Strike slip type) occurred in the east Shizuoka prefecture, Japan. A strong ground motion of about 1000cm/s^2 , 70cm/s was recorded at the nearest strong motion station, SZO011, about 20 km away from the hypocenter. Maeda and Sasatani (2009) showed that a similar large ground motion of 1100cm/s^2 , 75cm/s at HKD020 during the 2004 South Rumoi district, Japan, inland crustal earthquake ($M_{JMA}6.1$, Dip slip type) is mainly attributable to the source effect, short distance from the strong motion generation area (SMGA) and the forward directivity effect. To investigate the factors of this large ground motion at SZO011 from a source's point of view, we estimate the source model by strong motion simulations. The source model is constructed based on the forward simulations using the empirical Green's function method (Irikura, 1986) in the frequency range between 0.3Hz and 10Hz. One rectangle SMGA is estimated to include the rupture start point that is a hypocenter of the mainshock determined by Japan Metro Agency. The rupture of this SMGA mainly propagates from deep side to shallow side for dip direction, and also propagates bi-laterally for strike direction. The obtained source model explains the observed acceleration, velocity, and displacement waveforms of this event in the broadband frequency range fairly well. The parameters of this SMGA are consistent with the previous studies for inland crustal earthquakes (e.g., Miyake *et al.*, 2003).

On the other from site's point of view, we compare observed seismograms at SZO011 with those of SZOH37 that is close to the SZO011 station and located on the rock site. For a variety of earthquakes, the spectral levels at SZO011 tend to larger than those of SZOH37. Strong ground motion was affected not only directivity effects but also large site response at SZO011. The site response of the mainshock based on the S-wave horizontal-to-vertical spectral ratio method (e.g., Noguchi and Sasatani, 2011) shows the non-linearity for the frequency range from 3 Hz to 5 Hz. However, the site response shows linearity for other small earthquakes.

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