

Difference in Ground Motion Characteristics Between the Surface and Buried Rupture Crustal Earthquake in Japan

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Existence of surface fault rupture in inland crustal earthquake significantly affects on ground motion characteristics. Somerville (2003) has indicated that the ground motion by buried rupture is larger than ground motion by surface rupture earthquake in the period range around 1 second.

Inland crustal earthquakes in Japan have occurred frequently after the 1995 Kobe earthquake, and some of them have surface fault ruptures (e.g., 2008 Iwate-Miyagi earthquake, 2011 Fukushima-Hamadori earthquake, 2014 Nagano-North earthquake).

The ground motion characteristics were compared from the deviation of the observed response spectrum with average response spectrum calculated from spectrum attenuation relationship by Chiou and Youngs(2006). The result basically agrees well with the difference between the two types of earthquakes proposed by Somerville (2003).

The source parameters were obtained through detecting fault rupture area and asperity areas from slip distribution, applying the method by Somerville et al. (1999), and the source characteristics were compared from the source parameters between the two types of earthquakes.

Finally, we created the characteristic source models from the source parameters, and calculated waveforms using Stochastic Green's function method. The result agrees well with the characteristics from observed ground motion.

Reference

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