

Effect of rupture propagation on strong motion records for the 2007 Chuetsu-oki earthquake

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JMA Intensity of 6+ was observed at Iizuna-town, Nagano Prefecture, during the 2007 Chuetsu-oki earthquake in spite of the epicentral distance of Iizuna-town is more than 90 km. PGA's observed for the main shock at Iizuna-town and the neighboring stations are extremely large in comparison with those at other stations with almost the same epicentral distances. However, PGA's for the largest aftershock do not show such extreme values. Therefore, it is suggested that the extremely large ground motion for the main shock at Iizuna-town was caused by the source characteristics of the main shock.

Ratio of the total power of ground acceleration and the spectral ratio are calculated between the main shock and the largest aftershock at each of the stations within 120km from the epicenter of the main shock. Path effect and site effect on the records are removed empirically through this procedure. The ratios of the total power at Iizuna-town and the neighboring stations are extremely larger than the ratio of squared radiation coefficients expected for their focal mechanism solutions. The spectral ratios show strong azimuth dependence in the frequency range from 0.5Hz to 2Hz. The spectral ratio in this frequency range is the largest at Iizuna-town that is located in the SSW of the epicenter and it is the smallest at NIG013 that is located in the NE. The strong azimuth dependence of the spectral ratio suggests that the fault rupture propagated toward Iizuna-town. On the focal sphere of the main shock, Iizuna-town is located close to the NW dipping nodal plane. Currently, the SE dipping nodal plane is considered to be the fault plane based on the study on permanent ground displacement and aftershock distribution. However, the present result suggests that the fault rupture, which caused the extremely strong ground motion at Iizuna-town, propagated on the NW dipping nodal plane.

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