Site characteristics in Okayama prefecture inferred from strong-motion records of the 2016 Kumamoto earthquake

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The mainshock of the Kumamoto earthquakes (M_{JMA}7.3) occurred in Kumamoto prefecture, Japan, at 1:25 on 16 April 2016 (JST). The ground motion during this event observed on many stations in Southwest Japan, and several seismic stations in southern Okayama and a part of northern mountain area recorded a seismic intensity of 3 on the JMA scale. Since the azimuths, directions from the source toward the stations, are between 40-50 degrees in Okayama, we regard that the source and the path effects are not different for each station. Therefore, the difference among ground motions observed in Okayama only depends on the site effect under each station. In this study, we analyze strong-motion records in Okayama prefecture and evaluate the site characteristics under their stations. We use strong ground motion records at 113 stations from the networks of K-NET and KiK-net in NIED and seismic intensity meter in Okayama prefecture. We pick P- and S-wave arrivals and identify phases by polarization analysis. Since S-wave durations are for about 11 s from polarization analysis, we calculate Fourier spectra for 10 s after arriving S-wave. Setting on OKYH12 station (Ohara) built on the rock as a reference point, we calculate spectral ratio between another stations and the reference point. Also we compute H/V spectral ratio. Then, we measure primary peak frequency in each spectral ratio. Peak frequencies and shapes of spectral ratio for the reference point correspond to ones of H/V spectral raio in coast area and Hiruzen. However, in another area, primary peak frequencies of H/V are lower than ones of the ratio for reference point. Then, comparing to above peak frequency and site amplification rate in J-SHIS, seismic wave is well amplified under their stations, because 3320112 (Urayasu) and 3358860 (Tsuyama) stations have high site amplifications and low primary peak frequencies. Although 3321430 and 3358860 stations in Hiruzen have high PGA and PGV and low primary peak frequencies, site amplification rates are low. Hence, J-SHIS model cannot describe observed facts in their stations.
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