Characteristics of teleseismic S-wave response of the Kanto sedimentary basin inferred from dense seismic observation and numerical simulation

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To investigate characteristics of long-period (> 5 s) ground motions and related structural heterogeneities within the Kanto Basin, we analyzed near-vertical incident teleseismic *S* waves observed at MeSO-net and F-net stations. Comparisons of seismograms between MeSO-net and F-net stations, which are located within/outside the Kanto Basin, allow us to evaluate the long-period (5-20 s) seismic response of the Kanto Basin. Since azimuth and incident angle of teleseismic *S* waves are similar among all stations, differences of observed seismograms at each station could reflect the lateral variation of structural heterogeneities beneath each station.

We selected teleseismic earthquakes with epicentral distances of 30°-100° from the Kanto Basin. We applied a band-pass filter with a passband of 5-20 s to observed seismograms. Seismic energies of direct *S* and later phases were calculated by integrating the three-component squared velocity seismograms for following two time windows; (1) 60 seconds from 10 seconds before the arrival of *S* wave, (2) 50 seconds from 50 seconds after the arrival of *S* wave. First and second time windows are corresponding to those for direct *S* and excited later phases, respectively. To quantify the levels of excited later phases, excitation intensity is calculated by dividing the seismic energy of the later phases by that of the direct waves. We also evaluated the seismic energy ratio between stations within/outside the Kanto Basin. The energy ratio at each MeSO-net station is calculated by dividing the seismic energy at each MeSO-net station by averaged seismic energy of F-net stations. In the case of the Mw 7.9 Gulf of Alaska earthquake on January 23, 2018, observed seismic energy ratio for horizontal components range 5-20 and excitation intensity exhibits a clear positive correlation with bedrock depth of Koketsu et al. (2012). These results indicate that the later phases are excited by the 3D heterogeneities within the Kanto Basin, such as irregular bedrock topography and complex sedimentary *S*-wave velocity structure.

To explain the observed characteristics of teleseismic *S*-wave response, we conducted FDM simulations using OpenSWPC [Maeda et al. (2017)] and 3D velocity structure model [Koketsu et al. (2012)]. Our simulation model covered a volume of $375\times375\times250$ km^3, which was discretized by a grid interval of 0.25 km. We assumed vertical and inclined incidence of *SH* plane waves. Simulation results roughly explained the observed seismic energy ratio of horizontal ground motions. Simulated excitation intensity increases about 0.1-0.2 per bedrock depth (km). In contrast, simulation results in vertical component did not agree with observed characteristics.

In the presentation, we will discuss a spatial variation of teleseismic *S*-wave response of the Kanto Basin for other teleseismic earthquakes. We will also perform various simulations for *SV*-wave incidence and other teleseismic earthquakes.

Acknowledgment

FDM simulations were conducted on the computer systems of the Earthquake and Volcano Information Center of the Earthquake Research Institute, the University of Tokyo. We used MeSO-net and F-net

continuous seismograms.

Keywords: Kanto sedimentary basin, FDM simulation, Teleseismic earthquake, Long-period ground motion

