

Spectral characteristics of ground accelerations by the 2004 Kii Peninsula earthquakes and ground noise observed in Tono area

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We have investigated seismic amplification of the ground in Tono area, Gifu Prefecture, Central Japan, by using Fourier spectra of the records of earthquakes (M7.1 and 7.4) occurred off Kii Peninsula on Sep. 05, 2004. The seismic records were obtained with acceleration seismographs at 37 stations of dense network of Tono Research Institute of Earthquake (TRIES). Since the origin of the two earthquakes are located about 200km to the south of the network, we can expect similar incident seismic waves from the two earthquakes at the basement rock (layer) in Tono area. We calculated Fourier spectra of the records observed with the TRIES network and concluded that the spectral peaks with the frequency range from 2 to 5Hz give a general feature such that the oscillation amplitudes of 2-3Hz in the NS components depend only the ground conditions. On the other hand, the EW and UD components include the original characteristics of seismic waves incident to the rock basement in Tono area to some degree.

In order to develop a simple and reliable method for ground evaluation, we compared the maximum spectral peaks of the main shock appeared at the arrival of S and Rayleigh waves with the maximal spectral peaks of ground noise, which were observed at the same stations just 9.7sec before the arrival of the first motions from the foreshock. The correlation coefficient is 0.59 and this indicates a significant relation between the largest seismic motions and the large amplitudes of ground noise having the frequency of 2-3Hz, namely Rayleigh waves from the seismic source and ground noise at each station.