Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

SSS023-P22 Room:Convention Hall Time:May 24 16:15-18:45

Estimating small-scale site effect as functions of the frequency range from 2 to 4Hz by observing microtremors

Torao Tanaka[1*], Makoto OKUBO[1], harumi aoki[1]

[1]TRIES

Remarkable amplifications of seismic waves caused by shallow ground soil generate seismic damages. The frequency of characteristic vibrations of popular wooden houses in Japan ranges from 2 to 4Hz and is same to the range of the seismic magnification of shallow ground soil, and may be called the site effect. Accordingly it is essential for mitigation of seismic hazards to estimate the site effect quantitatively in detail within the area concerned. Since the observation of microtremor amplitudes is comparatively simple and carried out anytime, it will be one of effective and simple methods, if the observed amplitudes are significantly related with those of the maximal amplitudes of seismic waves. Thus we have investigated the spectral characteristics of acceleration records observed at TRIES network. Analyzed data are the amplitudes of microtremors, the biggest part of surface waves caused by distant and large earthquakes such as the 2004 Off Kii Peninsula Earthquakes and S waves by local and small earthquakes observed at the same network since 1999. We calculated spectral amplitudes of microtremors, the surface and S waves by Fourier transform. Spectral amplitudes of microtremors were obtained from the same seismograms recorded during about 10 seconds from the start of recording by the trigger signal to the arrival of initial seismic P wave. We define the site effect as a magnification function of seismic spectral amplitudes in the three directions of UD, NS or EW, depending on the frequencies in the range of 2 to 4Hz. Since our investigations depend on the stationarity of the spectral amplitudes of microtremors at the point concerned, it is fundamental to show that our assumption holds with high credibility, as well as mitigation of seismic hazard by using our site effect will be possible or not. Though preliminary analyses of microtremor amplitudes give a credibility of about 70% of the seismic magnification, we are continuing further data analyses of the relation between maximal seismic waves and microtremor amplitudes.

Keywords: microtremor, ground soil, site effect, characteristic oscillation, Fourier transform, maximal amplitude