

An application of the method for subsurface structure evaluation from spectra of micro-tremor to data observed in Tono district

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Introduction

At previous meetings in 2004 and 2005 we proposed a new simple method for subsurface structure evaluation from the spectral ratios of micro tremors in a middle frequency range (1.0 to 5.0 Hz; hereafter M zone) as well as a high frequency range (5.0 to 30Hz; H zone) over a low frequency range (0.1 to 1.0Hz; L zone), and checked the feasibility of our new method by using data observed at 40 seismic stations of the high density network by Tono Research Institute of Earthquake Science (TRIES), Association for The Development of Earthquake Prediction, Tokyo, Japan. Here we have improved the three dividing frequencies to L, M and H zones. In addition we carried out 2 dimensional surface wave explorations by using a small hummer to obtain the S wave velocity structures at the shallow part under 12 seismic stations, and compared the structures with the evaluation by micro-tremors and with the maximum observed velocities/accelerations.

Data and analysis

Used data are micro-tremors observed at 40 seismic stations observed with two sets of Micro-tremor H/V Measurement System in cooperation with the member belonging to Prof. Y. Sawada, Graduate School of Engineering, Nagoya University. The new three frequency zones are L zone of 0.1-0.7Hz, M zone of 0.7-3.5Hz and H zone of 3.5-15 Hz. By using the spectral ratios of H zone to L zone of U-D component of micro-tremors we could obtain more reliable amplifying factors due to the subsurface structures under the seismic stations. Especially the correlation coefficient of 0.46 is obtained between the micro-tremors and the maximum seismic velocities/accelerations by earthquakes at off-Ibaraki Prefecture and off-Kii Peninsula. In order to find the relation between the observed characteristics of micro-tremors and the S wave structures at the shallow parts under seismographs, we carried out 2 dimensional surface wave explorations using a small hummer at 12 stations of TRIES network.

Results

We have obtained the better correlation between the new spectral ratios H/L of U-D components and the magnifying factors of the maximum seismic velocities/ accelerations observed with the TRIES network. This may indicate the availability of our method. On the other hand, we need more investigations of S wave velocity structures at wider area as to the surface wave exploration.