

# A simple method for subsurface structure evaluation from spectra of micro-tremor

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## Preface

It is well known that investigations of subsurface structure by micro-tremor observation can be used to grasp seismic characteristics at the shallow part of the ground. Seismic motions are sometimes amplified more than twice by multiple reflections within the surface layer. In this research micro-tremor observations were carried out at three areas in Aichi and Gifu Prefectures for the purpose to evaluate the method which we had proposed at the previous Meeting last year.

## Observation and Sites

13 observation points had been established at the campus of Meijo University in Tenpaku-ku, Nagoya in 2001 and micro-tremor observations with SMAC-MD strong seismographs were made twice in 2001 and 2004 in order to check the temporal stability of the spectral structures. Similar observations have been made at Kisogawa River area in Ichinomiya. At Tono area in Gifu Prefecture 50 stations with strong motion seismographs are run in and around Mizunami City by Tono Reseach Institute of Earthquake Science. We carried out micro-tremor observations at 40 from the 50 stations with a set of Micro-tremor H/V Measurement System in cooperation with the member of Graduate School of Engineering, Nagoya University.

## Analysis

On spectral analysis of micro-tremors observed we have divided the frequency domain in three zones, Low frequency (L) zone, Middle frequency (M) zone and High frequency (H) zone, namely in the range from 0.1 ~1.0, 1.0~5.5 and 5.5~30Hz, respectively. Power spectral ratios, M/L and H/L were then calculated in order to judge the subsurface characteristics at each site.

## Results

From comparison of two observations in 2001 and 2004 at the campus of Meijo University it became clear that the spectral ratios, M/L and H/L generally give stable results without remarkable changes between the two observations, though the surface condition of the campus had been changed by constructions of new buildings in that period. From the observations at Kisogawa River and Tono areas the conclusion was obtained that the ratios M/L and H/L, and (M+H)/L may be successfully applied to evaluate the subsurface structure. Comparison of structural evaluations based on the spectral ratios with the amplification of seismic accelerations due to the difference of subsurface structures at the 40 stations shows a good correspondence that indicates the usefulness of the proposed method.