

## Microtremor array survey for subsurface structure of active faults in the 2008 Iwate-Miyagi earthquake source region

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A microtremor array survey was carried out to depict subsurface structures around a back thrust and a flexure deformation zone in the 2008 Iwate-Miyagi inland earthquake source region. A survey area of Hanokidachi, Ichinoseki city, is characterized by relatively strong inhomogeneous 3D structures, which is not a usual target of a microtremor array survey.

A vertical component seismometer array is composed of two equilateral triangles, one of which has 75 m of a side of the triangle, and the other triangle has 32 m of a side. A total of 11 microtremor survey points were arranged along a 2D line to cover the back thrust and the flexure deformation zone with a survey line length of 500 m. A natural frequency of seismometers used is 0.2 Hz. A total of 60 min data were recorded simultaneously at the seven locations at each array using 24 bits digital recorders with a sampling rate of 100 Hz.

Dispersion curves of the Rayleigh waves were extracted from the vertical component of microtremors using the spatial autocorrelation (SPAC) method (Okada et al. 1987). The dispersion curves were obtained at each array point along the 2D line described earlier. An apparent S-wave velocity profile (Ling et al, 2003) is used to show a cross section of the velocity structure, converted from the Rayleigh wave dispersion curves. An S-wave velocity inversion analysis was also applied at three array points to verify the apparent S-wave velocity structures.

Dispersion curves obtained show generally normal property with phase velocities from 1500 m/s to 500 m/s for a frequency range between 1.2 Hz and 7 Hz, while the dispersion curves for the foot wall side of the back thrust show anomalous behaviors for frequencies over 1.5 Hz. The apparent S-wave velocity profile shows anomalous structures related to the back thrust and the flexure deformation zone. It is noted that the apparent S-wave velocity structures are consistent with the true S-wave velocity structures obtained by the inversion analysis at the three array points.

Keywords: microtremor array survey, active fault, subsurface structure, the 2008 Iwate-Miyagi inland earthquake, back thrust, flexure deformation zone