A test of the VSE-15D6 velocity seismometer and its application on the central part of the Ishikari plain

Kunikazu Yoshida[1]; Haruo Horikawa[1]; Masayuki Yoshimi[1]; Yuji Ishida[2]; Seiji Ishii[2]; Isamu Yokoi[2]

[1] Active Fault Research Center, AIST, GSJ; [2] none

1. Introduction

We evaluated the new developed seismometer, Tokyo Sokushin VSE-15D6 seismometer, which is mainly targeted for long-period microtremor. The VSE-15D6 seismometer is portable seismometer (called a 'servo velocity meter' by Tokyo Sokushin) with high resolution (1.5 micro kine) and a flat response to earth velocity from 0.1 Hz to 70 Hz.

2. Physical Characteristics

One of the features of the VSE-15D6 seismometer is small and light-weight. The horizontal dimensions are 55 mm by 55 mm. The vertical dimension is 75 mm. Its weight is approximately 270 g.

3. Laboratory test

We examined the VSE-15D6 seismometer by comparing the recorded data from seismometers placed close together. The seismometer outputs were connected to a LS-7000XT digitizer/data logger with 24 bits of resolution. Data were recorded at 100 samples per second.

First test is the comparison of two VSE-15D6 seismometers. The VSE-15D6 seismometers were set on the floor of the AIST laboratory, adjacent to each other. The coherency calculated from the recorded data indicated the good agreement (coherency was nearly 1.0) for shorter period than 8 seconds.

Next, we compared the data from VSE-15D6 seismometers with the ones from Lennartz electronics LE-3D/5s and Akashi JEP-6A3, most common seismometers for the observation of microtremor. The records obtained from the VSE-15D6 and LE-3D/5s seismometers are nearly identical in shorter period than 8 seconds.

At the ground of the AIST campus, we also compared the data from VSE-15D6 and LE-3D/5s. The seismometers were buried in the ground. The records of the VSE-15D6 and LE-3D/5s agree well in shorter period than 10 seconds. This result indicates the VSE-15D6 sensor operates well in these periods. When the seismometers were set on the ground, the records of the seismometer agree in longer period than 4 seconds. We suggest that the VSE-15D6 light-weight seismometer is hit by winds during the observation and that the output of the sensor was disturbed.

4. Field Observation

Microtremor was observed at four sites on the Ishikari plain using 1.2-km radius array. Using SPAC technique, we measured phase velocities in the frequency higher than 0.24 Hz at three sites. At one site, it is failed to estimate phase velocities because of the long-period drift that seemed to be caused by winds.