

## Seismic exploration using three-component seismogram array at Unzen volcano, Japan.

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<http://www.seis.nagoya-u.ac.jp/STAFF/ymok/unzen2001/unzen2001.html>

### Introduction

An exploration experiment was made at Unzen volcano in order to survey subsurface structure from 15 through 24 of December 2001. Three VIBROSEIS vibrators are used for vibration sources for reflection survey along the road running just to the west of Unzen's summit. During the experiment we operated a seismic array composed of 34 three-component-elements using portable data-loggers near the middle part of the exploration line. As the analysis is in progress, here we show the detail of the observation we made at Unzen.

### Purpose of the experiment

The purpose the experiment we made is to know how the internal structure of volcano looks like using vibrator sources together with seismic arrays. The result of the observation will lead to the feasibility study of ACROSS, which we are developing, for the monitoring of temporal variation of the structure beneath volcanoes. Though the principle of ACROSS differs from that of VIBROSEIS, we may interpret the result for the application of ACROSS system in volcanic area. For the purpose mentioned above we made the experiment as follows.

We chose the location of the seismic array to overlap the main line of the reflection survey. As we do not know the subsurface structure of the volcano it will be very hard to identify the source of coherent phase if we may detect. In the actual monitoring for temporal variation it will be desirable to have a static structure in advance. Another purpose to share the same survey line with the reflection survey is to record horizontal components for additional information using three component seismometers. PS-converted wave at reflection, scattering and refraction will be detected and will leads to important information on the magma system beneath Unzen volcano.

### Outline of the observation

We deployed seismic array composed of 34 three-component seismometers with a natural frequency of 4.5Hz along the middle of the reflection survey line, around the Fukikoshi pass near the junction of route 389 and Nita-Toge road. As the road winds and branches around the pass, we can construct a two-dimensional array even if we put seismometers along the road. We did not adopt a grouping of seismometers because analogue grouping will distort the frequency response due to mutual interaction among sensors. We used two kinds of data-loggers, LS8000SH by Hakusan Corporation and DAT recorder borrowed from Earthquake Research Institute, University of Tokyo. The sampling frequency was 200Hz for LS8000SHs and 100Hz for DAT recorders. As the LS8000SH has a memory of only 20Mbyte we assign two data loggers for one station, switching two or three times a day for continuous monitoring. Time calibration was made one an hour to keep the accuracy of less than 1 millisecond. DAT recorders are continuously operated on 19 stations during the period of the experiment. Time calibration was made one per three hours for DAT recorders. We succeeded to record the data without major failure in this experiment. The data will be analyzed in the coming half-year.

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