

Fine seismic structure around the Atotsugawa fault revealed by seismic refraction and reflection experiments

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1. Introduction

It has been considered that the prediction of the occurrence of inland earthquakes is very difficult. We did not have much knowledge about the mechanism of inland earthquakes compared with that of inter-plate earthquakes because the cyclic interval of the inland earthquakes is about several hundred or several thousand years. Spatially high dense GPS array (GEONET) reveals a fine map of the strain rate distribution in Japan. A high strain rate zone, which was called the Niigata-Kobe Tectonic Zone (NKTZ), was found at the central part of Japan. To know the structure of NKTZ is important to understand the mechanism of stress and strain accumulations in the Japanese Islands. A large right-lateral fault, Atotsugawa fault, is located inside NKTZ. The area is one of the important fields to know the mechanism of the inland earthquakes, because a large right-lateral fault is located at the central part of the high strain rate zone. We conducted geophysical observations in this area. As the results of researches in this area, a low velocity area was detected in the lower crust beneath the Atotsugawa fault. A seismic experiment was conducted to reveal the seismic structure of the low velocity area beneath the Atotsugawa fault. In this study, the reflected waves are researched.

2. Data

A seismic experiment with seven explosive sources with 1108 seismic stations was conducted around the Atotsugawa fault zone, central part of Japan. The refraction and reflection experiments have done with the profile line length of 170 km.

3. Analysis and Results

The general feature of the seismic structure was obtained. The seismic velocity at the upper crust beneath the Toyama plane was low and that beneath the Atotsugawa fault was high. The reflective zone was detected beneath the Atotsugawa fault. Several later phases were observed on the record sections of different shot. The seismic boundaries are located at the depths of around 15 km and 20 km. The boundary with a depth of about 15 km is located around the reflective zones beneath the Atotsugawa fault. The boundary with a depth of about 20 km is located beneath the Toyama plane. The boundaries in the upper crust were detected beneath the Mt. Norikura. The causes of the boundaries will be considered with other geophysical data.

Keywords: crustal structure, Atotsugawa fault, seismic exploration