Seismic Exploration on Hokkaido Komagatake volcano with Active Sources in 2002 - Outline of the Experiment -

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Mt. Komagatake, located in the Southwestern part of Hokkaido, is one of the active volcanoes in Japan. Last magmatic eruption took place in 1929. Since the 1943 eruption after the 1929 magmatic eruption, the activities of the volcano have been in quietness until the minor phreatic explosion in the summit 1996. Successively, small phreatic explosions occurred 1998 and 2000, and the inflation of the volcano edifice is also found by geodetic surveys. These evidence suggests that the activity of magma is intensifying.

In order to make monitoring of magmatic process more accurate at the Komagatake, Seismic exploration was conducted from 26 September to 2 October 2002 by 9 national universities of Japan and Sapporo Metrological agency. We deployed 129 temporary seismic stations with a three-component seismometer and 92 stations with a vertical-component seismometer to reveal S-wave velocity structure in addition to 3D P-wave velocity structure. Dynamite charge of 250-300kg detonated at 5 shot points encircling the whole volcano. The excited seismic waves were recorded with sampling interval 4 ms by a data logger at each station.

The onset of the head waves is clear, and the travel time curves shows the following features reflecting geological structure:

(1) From the two-layered travel time analysis, the average thickness and P-wave velocity of the surface layer are estimated at about 2 km and 2.6 km/s. The velocity of the basement is also obtained at 6 km/s, which is correlated with the Pre-Neogene distributing in the shallow depth beneath the volcano.

(2) P-wave velocity of the surface layer is estimated at 2.5-3.0 km/s from travel time data obtained by the shots in the Neogene Tertiary system, while the velocity is calculated at 2.0 km/s from the travel time date from the shot in alluvium. The travel time curve for the shot in distribution area of the Neogene shows that the P-wave velocity of the surface layer and the basement are 2.0-2.5 km/s and 3.0-3.2 km/s. These results implies that the surface layer obtained by above analysis divided into two sub layers whose P-velocity are 2.0-2.5 km/s and 3.0-3.2 km/s, and the sub layers are correlated with Quaternary and the Neogene Tertiary systems.

(3) The P-wave velocity of the basement obtained from travel time date for the shots in southeastern side of the volcano is high in comparison with that for the shots in the northern side. This trend is explained by the structure of the basement dipping toward the Komagatake volcano from the southwestern mountain.

Meanwhile, the S phase is so unclear in all the seismograms that the careful examination of the phase is required.

The analysis committee has picked the arrival time of the P and S phase with polarity of ground motion. The committee presents preliminary 3D seismic velocity structure in this session.

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