Article

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Structure of Northeastern Sakurajima, South Kyushu, Japan, Revealed by Seismic Reflection Survey

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Seismic reflection structure in the northeast part of Sakurajima Volcano is discussed down to ca. 11 km with three profiles. Data acquisition was conducted along intersecting two lines with 221 stations and eight shot points. The two lines covered the northeastern portion of the volcano. One of the lines was spread along NNW to SSE direction in the east foot, and another line was oriented east to west in the northern flank of the volcano. Data processing were made through the conventional procedure of the reflection seismology, and depth migrated sections were obtained. Four continuous reflection horizons appear in the profiles. One of the reflection horizons around 5.4 km depth disappears in the northeast portion of the coverage area. The interruption of the horizon suggests existence of magma or magma supply path beneath it. The inferred magma supply path locates to the west of that previously presented.
Key words: Sakurajima volcano, Seismic structure, Seismic exploration

1. Introduction

Sakurajima is an active volcano with an altitude of 1117 m located in southern Kyushu. In Sakurajima volcano, effusive eruptions were recorded in history (Fukuyama and Kobayashi, 1981). In this half century, frequent explosions from the summit crater of Mt. Minamidake begun in 1955 and continued afterwards until 1990's. Recently, the Showa crater opened again at the eastern flank of the Mt. Minamidake in June 2006, and explosive eruptions from the crater have been enhanced since February 2008 (Iguchi *et al*. 2008).

Such progress of the activity has a close relation to accumulation of the magma in the reservoir beneath Aira caldera in the depth of 10 km, and movement of the magma to the deep part below Mt. Minamidake. According to ground deformation analyses, two pressure sources are presented in the depth of 10 km beneath Aira caldera, and at 5 km depth beneath Mt. Minamidake and are inferred as magma chambers. For example, Eto *et al*. (1997) explained that subsiding ground deformation during 1974–1992 is due to the major pressure source in the depth of 10 km beneath Aira caldera and the additional pressure source beneath Mt. Minamidake. Hidayati *et al*. (2007) presented a model that magma moves along an tensile crack from northeast to the southwest through the foot of Mt. Minamidake, which was inferred from inflation around Aira caldera and the seismicity in northeastern Sakurajima (Fig. 1).

The subsurface structure of Sakurajima volcano has been investigated by gravity survey and by electromagnetic sounding. Yokoyama and Ohkawa (1986) constructed the first density model and presented the gravity basement depth at 2.5 km beneath Sakurajima volcano and a graben-like structure beneath Kagoshima Bay from the Bouguer anomaly. Then Komazawa *et al*. (2008) performed the high density gravity survey, and presented detailed topography of the gravity basement around 1.2 km b. s. l., which is approximately northeastern dip and ridges eastward in the northeast Sakurajima. Furthermore, Kanda *et al*. (2008) performed the AMT electromagnetic sounding in Sakurajima, and revealed that a high resistivity layer is deeper in northeastern part than in other part in Sakurajima. The deeper high resistivity layer implies the basement and underlies the low resistivity layer which is possibly contained by permeable materials.

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