

Magmatic hydrothermal system of Shiga Volcano, central Japan, inferred from a three-dimensional resistivity structure

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SUMMARY

Shiga Volcano (SV), adjacent to an active volcano, Kusatsu-Shirane Volcano (KSV), is a Quaternary volcano located in central Japan, and recent advances in geological studies are revealing its Holocene activities and its potential for future magmatic and hydrothermal activities. To date, few geophysical studies have referred to SV, but our previous resistivity survey revealed a wide range of resistivity structures centered around KSV, including a part of SV. However, since the resolution of the inferred structure around SV was poor, the detailed subsurface structure of SV and the possible correlation between the magma-hydrothermal system of KSV and that of SV have been still unclear.

Here, we present two three-dimensional resistivity structure models based on newly obtained magnetotelluric survey data around SV and Takayama Village as well as on the data around KSV obtained by the previous study. They were estimated under two different conditions, targeting the shallow part of SV and the wide areas from SV to KSV. As a result, we found that the model of shallow subsurface showed a moderately low-resistivity zone beneath SV and highly resistive zones near the surface and just below the northern part of SV which had not been detected by the previous study. The other model revealed a resistivity structure to the deeper part and showed a sub-vertical conductive structure extending from the shallow part of SV to a depth that reaches the magma-supplying system of KSV revealed by the previous study.

Our results provided information on the shallow geological structures formed by Quaternary activities and on the flow regime of the shallow hydrothermal system of SV which was thought to have mainly mild activity. In addition, the magma-supplying system of KSV is considered to have relations not only to SV but also to volcanoes within the entire study area.

Keywords: resistivity structure, hydrothermal system, Shiga Volcano, Kusatsu-Shirane Volcano
