

Hydrothermal model of Aso volcano, Central Kyushu, Japan, inferred from AMT and ACTIVE datasets

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SUMMARY

Aso volcano, Central Kyushu, Japan is one of the most active volcanos in Japan. It has an activity cycle with a period of about 15 to 20 years consisting of the active phase for about one year accompanied by mud, strombolian, and phreatic/phreatomagmatic eruptions and the other quiescent phase. Since the phreatomagmatic eruptions of Aso volcano are most devastating during the active period, our aim is to reveal the hydrothermal system of Aso volcano and understand the mechanism of the phreatic/phreatomagmatic eruptions. To reveal its shallow resistivity structure, two kinds of electromagnetic (EM) measurements have been conducted in Aso volcano: AMT and ACTIVE (Array of Controlled Transient-electromagnetics for Imaging Volcano Edifice, Utada et al. 2007). ACTIVE is a volcano monitoring system using transient EM method composed of a source electric dipole with earthing two electrodes and induction-coil receivers for measurement of the vertical component of the induced magnetic field. Our previous study (Minami et al., 2018) revealed the temporal change in the three-dimensional (3-D) resistivity structure through the magmatic eruptions of Aso volcano from August 2014 to August 2015 using the ACTIVE campaign datasets. With the aid of the hydrothermal simulation code TOUGH2 (Pruess, 1991), on the other hand, we recently found that a hydrothermal model assuming empirical porosity, permeability, and heat source at depth of the active crater explains well the 3-D resistivity structure inferred from AMT survey data (Kanda et al., 2019). We are currently integrating the hydrothermal model from the AMT dataset and the temporal variation in the resistivity structure revealed by the ACTIVE datasets. In the presentation, we present how our hydrothermal model explains the resistivity structure inferred from the AMT dataset and our project to integrate AMT and ACTIVE datasets into a hydrothermal model of Aso volcano.

Keywords: volcano, Aso, hydrothermal system, MT, CSEM
