A 3-D resistivity model of Kuchi-erabu-jima volcano

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1. Introduction
In Kuchi-erabu-jima volcano, a phreatic eruption occurred on Aug.3, 2014 after the preparation period of about 20 years. The existence of magma was presumed in the shallow edifice by several observational evidences such as a large amount of SO2 degassing and volcanic glows, which resulted in a phreatomagmatic eruption accompanied by the pyroclastic flow on May 29, 2015. In this presentation, we report on the three dimensional (3-D) resistivity model of Kuchi-erabu-jima volcano inferred from reanalysis of the AMT (audio-frequency magnetotellurics) data obtained in 2004, in order to reexamine the preparation zone of phreatomagmatic eruption.
2. AMT data
The AMT data were acquired at a total of 27 sites around the Shin-dake crater during September to November of 2004. A part of the data has already published as the two dimensional (2-D) model along the WNW-ESE measurement line (Kanda et al., 2010). As a result, we found a low resistive zone thinly spreading near the surface of craters, and another conductive zone over the whole edifice at depths of 200-800m. These conductive zones were interpreted as layers containing low-permeable clays which were formed by the hydrothermal alteration. A groundwater layer was located between these low-permeable layers, which was considered to constrain the behavior of variation sources of the geomagnetic field and the deformation. However, we performed a 3-D modeling by using all the data obtained at 27 sites because these results were obtained by two-dimensional assumption, and because the data more than a half was not used.
3. 3-D modeling
The 3-D inversion code developed by Siripunvaraporn and Egbert (2009) was used. Full components of impedance tensor of 15 frequencies between 2 and 3000 Hz (error floor: 5%) were used for calculation. Horizontal mesh size around the Shin-dake crater was set to 40 m and the vertical size was 10-15m, a total of 64×64×66 meshes was discretized. Topographic and bathymetric features were accounted for in the model and resistivity blocks corresponding to seawater were fixed at 0.33 Ωm during the inversion process. Although a detailed resistivity distribution around the craters was obtained at present, it is necessary to examine its sensitivity because the site is unevenly distributed along the several trails. We will report the outline of these results.
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