

Shallow Resistivity Changes of Sakurajima Volcano from Magnetotelluric Continuous Observation

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In order to monitor the resistivity structure of Sakurajima volcano, we started magnetotelluric (MT) continuous measurements since May 1st, 2008. Two observation sites were set up at 3.3km east (Kurokami), and 3km WNW (Haruta-yama) of the summit crater. Two components of electric field (N-S and E-W), and three components (N-S, E-W, and vertical) of geomagnetic field have been measured by using Phoenix MTU-5 system in each site.

The preliminary analysis shows slight “apparent resistivity” changes, which continues 20~50 days, in the frequency range between 300-1 Hz at the both observation sites. This frequency range corresponds to the depth around sea level, where groundwater is likely to exist. The start of the resistivity changes coincide with the start of the uplift of the summit crater detected by the Arimura borehole tiltmeter, which is one of the most reliable indicators of the subsurface magma intrusion of Sakurajima volcano. We carefully investigated the cause

of the resistivity change by taking various data of volcanic activities. A most plausible cause of the apparent resistivity change is the volatile degassed from rising magma. By MT continuous measurement, it may be possible to monitor subsurface magma movement and corresponding lateral (not vertical) degassing.

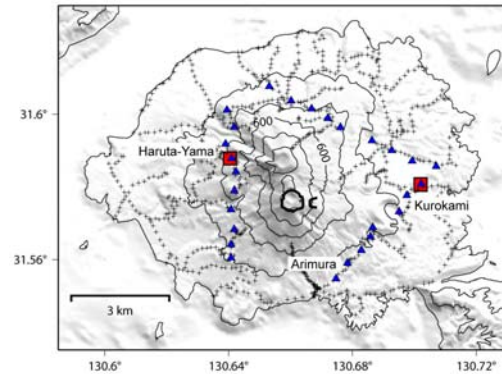


Figure 1 The EM measurement sites of Sakurajima. Two Squares (Haruta-Yama and Kurokami) are MT (300-0.001Hz) continuous measurement sites. Triangles and crosses are AMT (10,000-1Hz) and Self potential measurement sites, respectively.

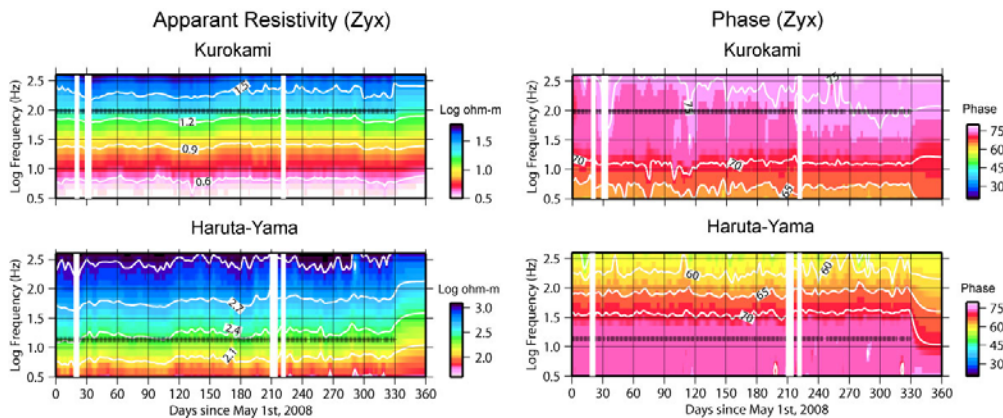


Figure 2 Temporal changes of apparent resistivity and phase (Zyx).

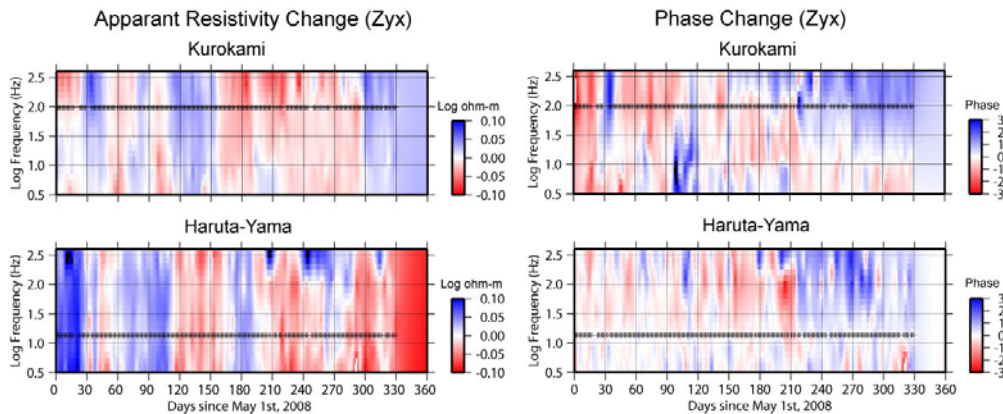


Figure 3 Temporal changes of apparent resistivity and phase (Zyx). Average values of each frequency are subtracted.