Deep magma and its ascending route of Kuju volcanoes inferred from three dimensional resistivity structure

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The Kuju volcanoes consists of more than 20 volcanoes distributed over an area of approximately 20 km x 20 km area. The recent active volcano (Iwo-yama; erupted in 1995), the largest geothermal power plant in Japan (Otake–Hatchobaru power plant; 120 MW), and many active geothermal zones, exist around the volcanoes. The erupted rate of recent 200 ky is estimated approximately 0.09 to 0.18 km3/ky (Yamazaki et al., 2016). To image the root of Kuju volcanoes, we have been conducting broad-band magnetotelluric (MT) surveys around the volcanoes since 2014. In this study, we use the MT data at 192 sites to estimate 3-D resistivity structure. The result shows two inclined conductive bodies. One is located east of the Otake–Hatchobaru power plant, and another is located west of the plant. Considering that the seismicity is very low inside the conductors, we interpret the conductors as high temperature magmatic fluid pathway. The shallower ends of the conductors extend to the Iwo-yama and the geothermal zones, while their deeper ends both extend to the north of the Kuju volcanoes, above which the 100 ky old caldera exist. We speculate the magma pluming system similar to the Kirishima volcanoes (Aizawa et al., 2014) that the old solidified magma beneath the caldera impede the ascent of present magma, thereby the magmatic fluids traveled obliquely to the geothermal zones and active volcanoes.

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