Three-dimensional electrical resistivity structure of kuju Volcano, Central Kyushu, Japan revealed by Magnetotelluric survey data

*Sabry Abdallah[1], Mitsuru Utsugi [1], Koki Aizawa[2], Makoto Uyeshima[3], Wataru Kanda[4], Takao Koyama[3]

1. Institute of geothermal science, Faculty of Science, Kyoto University, 2. Institute of Seismology and Volcanology, Faculty of Sciences, Kyushu University, 3. Earthquake Research Institute, The University of Tokyo, 4. Volcanic Fluid Research Center, School of Science, Tokyo Institute of Technology

The Kuju volcano is located in south western part of Oita prefecture, Japan , and is one of the important geothermal areas in Japan. It has began to erupt on October 11,1995 at the eastern flank of Mt. Hossho, which is in the central part of Kuju volcano. Second eruption started again in the middle of December, 1995, producing an ash volume of about 5000 m^3. Iwoyama is the central part Kuju Volcano and considered to be one of the most hydrothermal active hydrothermal field in Japan. Geothermal areas beneath active volcanoes may have an important role in geothermal energy development in the future. so it is important to monitor and clarify the thermal and hydrologic processes occurring beneath volcanoes. Magnetotelluric (MT) investigation is an important tool to identify the subsurface resistivity structure using natural variation in the electromagnetic field, therefore it is convenient to for the hydrothermal system investigation. We applied a Wide-band MT survey method to identify the structures associated with the hydrothermal systems beneath Kuju volcano. MT field survey data were collected at 63 observation points around the Kuju volcano from September to October 2015. Fourier Transform(FT) applied to the collected data to reduce the background noise associated with Power supply of 60 Hz and other noises associated with higher frequencies. Inverse FT was applied to the data to transform from frequency-domain to time-domain data. The 3-D resistivity structure model is obtained by inverting the MT impedance using ModEM code (Kelbert, A. et al., 2014). The primary 3-D resistivity structure model clarified that, a resistive structure (100-300 Ω.m) prevail the most of Kuju Volcano area. A very conductive structure (~1Ω.m) exists around Iowyama-Kuju area and extends with the depth towards the south-east part of Iowyama. In comparison with the previous studies, the resistive structure can be interpreted as lava and pyroclastic deposits, whereas the conductive structure around Iowyama-Kuju area is maybe corresponds to aquifers and altered layers.

Keywords: MT survey at Volcanic areas, 3D MT inversion, Hydro-thermal energy

©2019. Japan Geoscience Union. All Right Reserved.