

Estimation of 3-D resistivity structure under the Kikai submarine caldera volcano.

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SUMMARY

This study aims to understand the current magma supply system leading to giant caldera eruptions. Our target is the Kikai submarine caldera volcano, located in the southern part of Kagoshima Prefecture, southwest Japan. It is proposed that the central lava dome of Kikai Caldera volcano has been fed with magma even after the latest giant caldera eruptions at 7.3 ka. The Vp structure at this area estimated by a refraction survey suggests the existence of magma chamber. In this study, we show the resistivity structure by MT survey and interpret the results together. We estimated the MT response functions by the data from Ocean Bottom ElectroMagnetometers at 32 points using BIRRP. The magnetic data at Kakioka, Kanoya, Memanbetsu and Chichi-jima were used for remote data. In the MT response function, the two main features were found: yx-component of apparent resistivities tend to be larger than xy-component of ones; yx-component of MT responses' uncertainty tend to be smaller than xy-component of ones. A 3-D resistivity model (300 x 300 x 2500km) was estimated using the MT inversion code ModEM+FS. This code is based on ModEM and can handle the undulating bathymetry by applying the Flattening Surface technique to sea layers. We inverted only high-quality MT responses, and checked the reliability of each anomaly in the estimated model. In addition, we inverted same data using other MT inversion code FEMTIC, and compare the estimated models from two inversion codes. These results show that the estimated model has reliable conductive anomalies beneath the Kikai Caldera volcano, which will indicate the presence of a magma chamber. We will report the estimation of melt fraction from our resistivity model, and compare with an estimation from seismic approach.

Keywords: Kikai submarine caldera volcano, Giant caldera eruption, Ocean Bottom ElectroMagnetometer, Vp structure, Flattening Surface technique
