The Analysis of magnetotelluric sounding data on Kikai submarine caldera.

*Toki Hirose[1], Tetsuo Matsuno[2,1], Nobukazu Seama[1,2], Yuki Okizono[4], Hiroshi Ichihara[3], Hiroko Sugioka[1,2], Yoshiyuki Tatsumi[2,1]

1. Department of Planetology, Graduate School of Science, Kobe University, 2. Kobe ocean Bottom Exploration Center, Kobe University, 3. Graduate school of environmental studies, Nagoya University, 4. Department of Planetology, Faculty of Science, Kobe University

Kikai submarine caldera locates on the south waters of Kagoshima. The caldera was formed after super eruption on 7.3ka, and have formed huge lava dome since the eruption(Tatsumi et al., 2018). A main aim of this study is to determine the electrical resistivity structure beneath the Kikai caldera, and estimate the distriution of melt, magma chamber and thermal anomaly. As one step to the main aim, this study presents the results of calculations of apparent resistivity and phase, and estimating 1D inversion resistivity structure models after their correction for topographic distortion.
Measurements of the time variations of electric and magnetic fields at the seafloor were conducted at 10 sites with a sample rate of 8 Hz for about 20 days. At the four of those after the surveys, measurements were switched to the sample period of 60 s for about half year. Observed data with sample rate of 8 Hz were processed as followings: (1) downsampled to 1 Hz, (2) corrected by comparing the instrument clocks with GPS time, (3) detrended for longer-periods than 1 day, and (4) corrected instrument inclines. The instrument coordinates were transformed to geographic coordinate system. After these processing, we extracted the data without noises which attribute to the shaking of instrument and calculated magnetotelluric(MT) inpedances, apparent resistivity, and phase using the BIRRP method(Chave and Thomson, 2004). Kanoya magnetic observatory was used as the magnetic remote reference.
Estimated apparent resistivities were characterized with respect to periods and elements, whose characteristics are commonly found at all the sites. With respect to periods, off-diagonal apparent resistivity ranges 1Ωm to 10Ωm at the periods of 21s, and increases to 10Ωm to 100Ωm at a longer periods of 1024s. As for elements, diagonal elements are smaller than non-diagonal elements by a degree of magnitude. Estimated phases were characterized by xy and yx elements that are within the range of the first quadrant and the third quadrant respectively.
Effect of topography on MT impedances are modeled with with FS3D(Baba and Seama, 2002). Using The results of FS3D and the method of removing of topographic distortion(Nolasco et al., 1998), MT impedance are corrected for bathymetry. Using the corrected MT impedance, the 1D electrical resistivity structure models at the observation sites are estimated by OCCAM1D inversion program(Constable et al., 1987). The 1-D structure models are compared to 3-D electrical resistivity structure model(Matsuno et al., presented at this meeting) .

Keywords: magnetotelluric, Kikai caldera, 1D inversion

