One-dimensional resistivity structure of Iwo-yama, Kirishima Volcanoes

Kaori Tsukamoto[1]; Koki Aizawa[2]; Wataru Kanda[3]; Kaori Seki[4]; Takahiro Kishita[4]; Makoto Uyeshima[5]; Mitsuru Utsugi[6]; Takao Koyama[7]
[1] Grad.Sch.Sci.,Kyushu Univ.; [2] SEVO, Kyushu Univ.; [3] KSVO, Tokyo Inst. Tech.; [4] Earth and Planetary Sciences, Tokyo Tech.; [5] ERI, Univ. Tokyo; [6] Aso Vol. Lab., Kyoto Univ.; [7] ERI, University of Tokyo

Iwo-yama is located in Kirishima volcanic group, southern part of Kyushu Island, Japan. Around Iwo-yama and Karakuni-dake, tectonic earthquakes have increased since December 2013, and volcanic tremors have occasionally occurred since July 2015. In December 2015, fumarolic gases appeared at the southwest of the crater of the Iwo-yama for the first time in 12 years. Moreover the leveling survey detected the ground uplift more than 1 cm during June to December 2015 (Matsushima et al., 2015), while the interferometry observations detected the ground uplift at 4 cm (134th Coordinating Committee for prediction of volcanic eruption). These events suggest that volcanic activity has been increasing in Iwo-yama.

Previous magnetotelluric survey at the site 400 m northeast of Iwo-Yama imaged the electric conductive zone approximately at a depth of 0.1 to 0.7 km, and interpreted it as the low permeability altered clay layer (Aizawa et al., 2013). The upper level of the hypocenters of tectonic earthquakes corresponds to the bottom of the conductive zone. In addition, the pressure source by the leveling survey also corresponds to the bottom of the conductive zone. These spatial relationships suggest that the supply of high temperature fluids has increased beneath Iwo-yama, and causes the increase in pore pressure beneath clay layer, resulting in the increase of earthquakes and ground inflation. In order to examine this hypothesis, we conducted the broadband (0.005˜3000s) magnetotelluric (MT) measurements around the Iwo-yama. As compared to audio-magnetotellurics (AMT), broadband MT have advantage in that it can resolve a resistivity structure to a depth greater than the bottom of the shallow conductive zone. During 11 April 2016 to 30 April 2016, we recorded two components of electric fields at 20 observation sites and five components of electric and magnetic fields at 7 observation sites. In this presentation, we will show one-dimensional resistivity structure of each station, and discuss the association with the earthquakes and inflation source.