

EGU21-1866, updated on 19 Jan 2022

<https://doi.org/10.5194/egusphere-egu21-1866>

EGU General Assembly 2021

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Understanding Magmatic System of Unzen Volcano (Nagasaki, Southwest Japan) Inferred from Broad-band Magnetotelluric Observation

Agnis Triahadini¹, Koki Aizawa², Tasuku Hashimoto³, Kazunari Uchida², Yuto Yamamoto¹, Keita Chiba², Dan Muramatsu¹, Kanta Miyano¹, Yuta Kawamura¹, and Aniya Satoru¹

¹Department of Earth and Planetary Sciences, Grad. School of Science, Kyushu University, Japan (agnis@sevo.kyushu-u.ac.jp)

²Institute of Seismology and Volcanology, Department of Earth and Planetary Sciences, Faculty of Science, Kyushu University, Japan

³Earthquake Research Institute, University of Tokyo, Japan

Unzen Volcano is located in Shimabara Peninsula, Nagasaki, Japan. After 198 years of dormancy, the volcano erupted throughout 1990-1995 and resulted the emergence of new lava dome called Heisei-Shinzan. Following the eruption, numerous studies have been intensively conducted in Unzen volcano to assess the eruption mechanism and the magma plumbing system. Regarding to the magmatic system, the most preferred model is that the primary supply of magma is stored beneath Chijiwa bay. This magma chamber is located about 15 km west of the active dome at vertical depth approximately 15 km, and followed by subordinate shallower magma chambers beneath the volcano (e.g. Nakamura 1995; Kohno et al 2008). Upon the eruption, the magma ascended obliquely towards the summit in east direction (e.g. Umakoshi et al 2001). However, how main magma chamber and shallower chambers are connected to the summit via oblique pathway is poorly imaged in terms of structure.

As widely known, Magnetotelluric method is highly sensitive to low resistivity zone caused by interconnected fluids. Low resistivity zone detected in the volcanic area usually can be interpreted as hydrothermal/magmatic fluid and or magma chamber containing partial melt (e.g. Aizawa et al 2014; Hill et al 2015). Thus, by using broadband Magnetotelluric method, we aim to investigate resistivity structure of Unzen volcano associated with magmatic system and its controlling structure (e.g. pathway and faults).

Although the shallow structures around Unzen volcano are estimated by the 2017-2019 campaigns (Triahadini et al 2019; Hashimoto et al 2020), we are unable to image deeper structure around the proposed location of magma chambers and magma pathway. To achieve our goals, during November-December 2020, we installed 35 new sites to cover whole area in Shimabara Peninsula. In total, deployed 99 Magnetotelluric stations covering Unzen volcano and Shimabara Peninsula. On this meeting, we would like to present our resistivity structure derived from all dataset.