Report on Broadband Magnetotelluric Survey for Elucidating the Sakurajima Magmatic System

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Sakurajima is a volcanic Island located in the northern part of Kagoshima Bay, Kyushu. In 1914, a great Taiso eruption occurred, causing severe damage and loss. The eruption was preceded by frequent earthquakes, serving as a warning sign that also alerted local residents to a major disaster threat and prompted them to evacuate immediately. This history highlights the importance of a disaster mitigation plan in saving lives and minimizing losses. Therefore, massive surveys and monitoring are continuously carried out to evaluate the potential hazards at Sakurajima.

Magnetotelluric (MT) survey is one of the suitable methods for hazards asessment in volcanic areas. It is remarkably sensitive to magma, which is the source of eruptions. Moreover, it can properly image subsurface features in volcanic areas with good resolution. Therefore, we used the MT method to characterize the Sakurajima magmatic system.

In FY2024, 35 MT measurements were carried out inside Sakurajima Island from October 2024 to February 2025. Then, we performed the two-dimensional modeling using the Ogawa and Uchida (1996) code. The conductive zones were found below the crater and in the northeast of Sakurajima Island. We consider this conductive zones are correlated with the magma accumulation. The magma source may originate from a deeper part (around 6 km) of northeastern Sakurajima. This argument is supported by a seismic reflector finding at 6.2 km of depth (Tsutsui et al., 2016), in the same area with the conductive zones. However, seismic tomography revealed that the main magma chamber is located in the Aira caldera at a depth of 15 km (Tameguri et al., 2022).

In FY2025, 36 additional sites were installed outside Sakurajima Island from November 2025 to January 2026. By expanding our survey area, we aim to reveal the deeper part of the main magma chamber and observe its distribution in the surrounding area. In this presentation, we will present the current progress after analyzing all the data from Fig. 1.
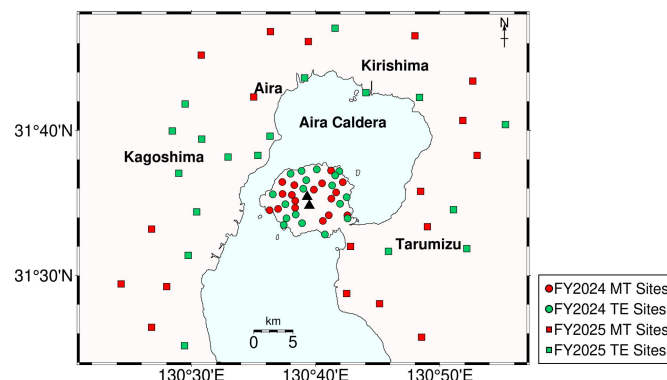

Figure 1. Magnetotelluric Survey Map