

Imaging the shallow hydrothermal system beneath the Numanotaira Crater of the Adataro volcano in Japan, Using audio-frequency magnetotelluric surveys

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The Numanotaira Crater of Adataro volcano, located in central Fukushima Prefecture, has repeatedly experienced phreatic eruptions in the past. Recently, although no eruption occurred from, hot mud effusion and increased fumarolic activities were observed from 1996 to 2003. Intensive observations conducted during this active period confirmed significant crustal deformation and changes in total magnetic force and gravity (Yamamoto et al., 2008), indicating the formation of an active hydrothermal system beneath the crater. However, as no exploration for the subsurface structure has been conducted so far, it remains unclear where and on what scale the hydrothermal system is developed.

In this study, an audio-frequency magnetotelluric (AMT) survey was conducted in and around the crater in September 2023. We obtained good quality MT response function in general between 1 and 10,000 Hz for 10 sites and between 3 and 10,000 Hz for 14 sites. A three-dimensional resistivity structure was inferred from MT response functions using the inversion code FEMTIC (Usui, 2015; Usui et al., 2017). The obtained resistivity structure model revealed a characteristic structure in which a large low resistivity region extending from the deep southwest toward the Numanotaira crater floor branches off near the surface layer and connect to region less than 10 Ωm .

In this presentation, we will discuss the relationship between the inferred shallow resistivity structure and various sources of volcanic activities estimated in previous studies.

Keywords: Magnetotellurics, Adataro volcano, Hydrothermal system, Resistivity structure
