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フィリピン・タール火山の比抵抗構造 -周辺の海の構造の評価-
Resistivity imaging by magnetotelluric method on Taal volcano, Philippines -Evaluation of the sea effect-

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Taal volcano, located in the Taal caldera lake, the southern part of the Luzon Island, is one of the most active volcanoes in Philippines. We conducted a magnetotelluric resistivity survey to clarify the distribution of ground water and magma reservoir beneath the volcano. AMT and wideband MT data were measured along two lines, which were crossing the main crater lake (MCL) at the center of the volcano island, and the southwestern flank. The impedance tensor and induction vector were calculated from the time series data. Prior to a 2-D analysis, the phase tensor analysis suspected the electromagnetic strike direction in the study area as N35E, which is approximately perpendicular to our survey lines. Here, during the 2-D analysis, it is required to consider the sea effect to the MT data because the study area is surrounded by the ocean, being about 15 km distant from there. The measured induction vectors pointing toward the ocean are obviously affected by the seawater. The 3-D forward model assuming a simplified bathymetry with 0.3 ohm-m seawater evaluated this effect. The calculated induction vectors explained well the observed ones at a frequency band below 0.01 Hz, reflecting the sea effect. However, this effect to the impedance above 0.3 Hz was not so large as to give critical artifacts to a resistivity structure suspected by a 2-D analysis. Therefore, the apparent resistivity and impedance phase above 0.3 Hz were inverted to resistivity sections, by using the 2-D resistivity inversion scheme developed by Ogawa and Uchida (1996). The 2-D bathymetry was fixed during the inversion. The inverted resistivity section across the MCL indicates a relatively resistive body (30-100 ohm-m) at 1-3 km (b.s.l.) surrounded by conductive layer. Since this feature is common to the other resistivity section, the conductor can shape a kind of the shell spherically covering the resistive body. This resistive body can be interpreted as a volcanic gas reservoir or intruded rocks during past eruptions. The saturation of lake water and alteration due to volcanic fluid and heat can generate a surrounding conductor.

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