R003-11
D 会場 ： 11/25　AM2（11:05-12:35）
12:20〜12:35:00

島弧火山の形成メカニズム解明に向けた沈み込み帯の電気比抵抗構造における不均質性の比較（２）

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Comparison of Resistivity Heterogeneity in Subduction Zones to Clarify the Formation Mechanism of Island Arc Volcanoes (2)

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In subduction zones, the movement and distribution of fluids brought into the Earth's interior by the subducting oceanic plate (slab) are crucial for driving igneous/volcanic activity and seismic events. As these fluids reach specific temperature-pressure conditions during the subducting process, they are released from the oceanic plate through a dehydration reaction. The released fluids in the mantle lead to partial melting of the mantle, resulting in the formation of magma sources for island arc volcanoes. This process establishes volcanic chains/regions (on island arcs) that align with depth contour lines of the subducting plate. On the other hand, some island arcs, such as the island of Kyushu in Japan and the North Island of New Zealand, exhibit non-volcanic regions devoid of active Quaternary volcanoes for approximately 100 km. It is not entirely understood why volcanic and non-volcanic regions form, or why volcanic chains are discontinuous in a single-island arc despite being under the same tectonic conditions. Thus, a key objective of our research is to obtain and compare subsurface heterogeneity information for different island arcs using the electromagnetic method to aid in understanding the mechanism behind the formation of island-arc volcanoes.

In addition, due to the subduction of oceanic plates, various types of earthquakes have recurrently occurred in and around the island of Kyushu and the North Island of New Zealand, including significant thrust earthquakes offshore and historic earthquakes along tectonic lines within the land area. We have constructed three-dimensional (3-D) electrical resistivity structures by inverting magnetotelluric (MT) data, which were collected across the entirety of Kyushu through various surveys, to elucidate the fluid/magma distribution beneath Kyushu [e.g., Hata et al., 2015; 2017; 2020]. The 3-D resistivity models reveal magma and fluid systems associated with slab-derived fluid as notable electrical resistivity features/anomalies. Furthermore, we conducted long-period MT surveys over a 300 km $\times$ 150 km area, encompassing the southernmost part of the Taupo volcanic zone (TVZ) and a non-volcanic region on the North Island of New Zealand within the Hikurangi subduction zone, from July 2023 to January 2024. The primary objective of these surveys is to extract information on subsurface heterogeneity, covering the depths of the crust and mantle in the transition area between the TVZ and the non-volcanic region, as a 3-D electrical resistivity model. In this presentation, we provide a detailed discussion of the subsurface heterogeneity beneath the transition area between the volcanic and non-volcanic regions of the two island arcs, as inferred from the 3-D resistivity distribution.