3-D resistivity structure of the southern part of NE Japan

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The southern part of NE Japan is full of in-land activities due to the subduction system. There are quaternary volcanoes on the backbone range and the back-arc side, active deformation regions, and shallow to deep seismic activities. Such activities in the subduction zone are generally viewed to be caused by fluids in the crust and upper mantle that originated from the subducting slab (e.g., Iwamori, 1998; Wallace, 2005). Therefore, this study aimed to reveal the electrical resistivity structure beneath the area because bulk resistivity is sensitive to the composition and connectivity of fluids. We performed a wide-band MT study by deploying electromagnetic field recording stations on three parallel NW-SE profile lines across the island arc. Each line consists of about 15 stations with nearly 10 km intervals. The time-series data has been processed into frequency domain response functions using the BIRRP code (Chave and Thomson, 2004) with periods ranging from 0.03 to 13,000 seconds. We estimated the MT impedance, vertical magnetic field transfer function (VMTF), and inter-station horizontal magnetic field transfer function (HMTF). We used HMTF because a theoretical study by Campanyà et al. (2016) showed that it could provide additional constraints on 3-D resistivity structure. Previously, we interpreted the data two-dimensionally for each profile line. But as 3-D effects are observed at some stations, such as out of quadrant phase, we proceeded to the 3-D interpretation for a more reliable resistivity structure. FEMTIC inversion code (Usui, 2015; Usui et al., 2017) was used because it can jointly invert the three response functions. In the presentation, we discuss the resulting resistivity structure and its correlation with active volcanoes and earthquakes. Also, we compare the result with the 2-D interpretation.

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