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房総半島外房地域の比抵抗構造
Resistivity structure of the Sotobo area in Boso Peninsula, Central Japan

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Boso peninsula is located in a tectonically complicated area where the Pacific plate, the Philippine Sea plate and the North-American plate converge. The Philippine Sea plate is subducting along the Sagami trough, where megathrust earthquakes have repeatedly occurred. Near the megathrust earthquake source region, slow slop events (SSEs) have occurred at least five times within 20 years and the recurrence interval has decreased [Ozawa et al., 2014]. The studies of SSEs have been advanced actively. For example, it was indicated that SSE is a major driving process for earthquake swarms [Hirose et al., 2014]. On the other hand, Obara [2007] argued that SSE may be related to fluid liberated from down-going slab by dehydration process. But the details of the subsurface structure where it occurred have not still understood well.

A magnetotelluric (MT) survey was carried out between November and December in 2014 to investigate the structure relating to SSE and subduction of the Philippine Sea plate under the continental plate. Time series of the MT data were recorded using the MTU-5 system manufactured by Phoenix Geophysics Co. Large artificial electromagnetic noise was observed in this area during operation time of DC trains. Reduction of the serious noise will be essential to investigate deeper depth. In this preliminary stage, we analyzed only data for two hours per a day that was obtained from 2 to 4 a.m. to avoid the DC train noise. However the lower frequency bands (0.1 - 0.001 Hz) data still have not well identified due to local noise. We used the data at the frequency band of 320 to 1 Hz and applied the remote reference method referring the other site observed in same time. We acquired apparent resistivity and phase on each site based on the above process, and we also computed the phase tensor and induction vectors. The phase tensor was nearly circle at each frequency, and the induction vectors have not point to the specific direction in the frequency range. Finally we inverted the apparent resistivity and phase data and drew out a MT model.

MT images have showed basically three layer structure. Top layer, having 10 Ω-m, is extending to the several hundred meter depth and underlying the very low resistivity layer (>1 ohm-m). According to the drilling data, these two layers are interpreted as Shimosa and Kazusa Group respectively. The bottom of Kazusa group in the west area seems to be deeper than that of the east area of the survey area and has showed basin like structure. The resistive layer is distributed at several kilo-meters depths in the northeast area. This layer was interpreted as pre-Tertiary bed rocks. As shown here, we imaged subsurface structure of the Sotobo area at depths of several kilo-meters in this stage using noise free frequency band data. However we would like to delineate image the deeper area than the result of this survey to elucidate the structure of SSE or the relation of the two plates, so we need to remove noises from obtained data and observe wider area in the next stage.

Keywords: Magnetotelluric, Resistivity structure, Boso Peninsula, Kazusa Group