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Analysis of the Network-MT and conventional MT data measured in the southern part of Kii Peninsula, Southwestern Japan

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The Kii Peninsula in the forearc region of southwestern Japan has distinct structural and tectonic features due to the subducting Philippine Sea (PHS) slab. These features include high seismicity, deep low-frequency earthquakes (DLEQ), and hot springs containing high 3He/4He isotopic ratios. These tectonic and geological activities may be caused by interstitial fluids released from the subducting PHS slab. Since electrical resistivity is one of the physical properties sensitive to the existence and connectivity of subsurface fluids, elucidating its structure beneath the Kii Peninsula is key to understanding the relationship between deep fluids and various tectonic activities. In this study, we analyzed long-period MT data, wide-band MT data, and network-MT data acquired in the Kii Peninsula to obtain a 3-D deep resistivity structure of higher resolution and accuracy in the vicinity of the DLEQ source area.

The network-MT (NMT) method employs a commercial telephone network to obtain voltage difference data over long lengths. We obtain better data than conventional MT methods in the following points: higher signal-to-noise ratio, less static effects, and easier acquisition of long-period data. Therefore, the NMT data enable us to resolve conductivity structure in deeper areas than the conventional MT method. On the other hand, it had low resolution for the middle and upper crust due to lack of high-frequency data. Additionally, observations can only be performed in areas where telephone lines are available. These two factors create gaps in data in both the spatial and frequency domains. To address these limitations, we are now trying to use and newly obtain conventional MT data from the wide-band and the long-period MT surveys and combined them with the Network-MT data.

In this presentation, we will present a basic characteristic of the so far obtained conventional MT data in the southern part of Kii Peninsula and compare them with the Network-MT data. We then discuss on an inversion scheme to combine both data sets, and present a preliminary 3-D resistivity structure by combining both data sets.