Resistivity image around San-in region deduced by Marine and Land MT surveys

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The eastern part of San-in region in southwestern Japan is classified as an area of high seismicity. Hypocenter distribution extends in a east-west direction, and large earthquakes such as the Western Tottori earthquake and Northern Hyogo earthquake occasionally occurred in this region. It is noteworthy that almost all earthquakes occurred at the shallower than 15 kilometers.

Many types of magma is known to have extrude in this region, and the andecite-dacite magma in particular was caused by dehydration from the subducting Philippine Sea Plate (PHP) or slab melting. Therefore, volcanic activity may be related to seismic activity via subsurface fluid dynamics. However, not only the shape of PHP but also the dynamics in the crust and mantle are not clear beneath the San-in region.

Our group has carried out land magnetotelluric (MT) observation, and low resistivity zones in the lower crust were detected below the San-in region. However, these resitvitity studies based on land MT survey were not sufficient for imaging the deep structure which may be related to various magmatism. The objective of this study is to obtain the crust and mantle resisitivity image using both marine and land MT surveys that enable deep and regional electromagnetic (EM) imaging. Deeper images can clarify the relationship between the magmatism and seismicity.

Marine EM surveys were carried out off Tottori/Hyogo Prefecture in 2006 and 2007, and EM data were obtained at seven sites. After the clock and tilt correction, we calculated MT/VGS/GDS responses using the robust remote reference method code (rrrmt ver.8) of Chave et al. (1987) for the period range from 100 to 10000 seconds. The calculated phases show the lowest value around a few hundreds seconds, and increase gradually toward longer periods. On the other hand, the apparent resistivity indicates the maximum value around the thousand seconds, and decrease toward longer periods. These features are similar to the marine EM data in Nankai trough as has been reported by Kasaya et al. (2005). Advanced analyses such as determination of two-dimensional electrical sections will be further discussed.