A research report on the fundamental investigations of an electrical resistivity structure beneath Chugoku and Shikoku regions, southwestern Japan(2018)

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In order to contribute to a reduction in damage caused by earthquakes and volcanic eruptions, heterogeneities of crustal and upper mantle structure should be clarified based on fundamental investigations of electrical resistivity structure in Chugoku and Shikoku regions, southwestern Japan arc.
Our research group has shown that there is a clear relationship between resistivity and seismicity in the San'in and Shikoku regions. In the eastern part of San'in region, it was found that a conductive area exists in the deep crust part under the seismic region, which is a resistive area, along with the seismic activity area stretching nearly in the east and west direction. Assuming that inland earthquakes occur because of local stress concentration caused by heterogeneity beneath a seismic activity band(Iio, 2009), it is necessary to improve spatial data and to clarify the heterogeneity in this area hereafter.
On the other hand, in the Shikoku district, it was suggested that the distinctive low resistivity region exists in the upper crust mainly from the survey results in the outer belt, and that there is a clear relation between the low resistivity and low seismicity in the central and the western area. In order to understand the earthquake phenomenon, it is important to clarify the generation environment and the principle as well as the activity style of the slow earthquake (Obara(2017)).
In this background, a Magnitude (M6.6) Earthquake in the Central Tottori Prefecture on October 21, 2016 occurred. In order to elucidate the heterogeneous structure of the lower crust beneath the seisimic region, we set up several survey lines across the central focal region of the Chubu region to carry out wideband MT observation at 12 sites in the observations gap area around this region.
By integrating the existing MT data, we tried model analysis using the program code of Ogawa and Uchida (1996) assuming that this region had a two-dimensional structure of EW strike direction harmonious with the seismic active band. According to the 2D model, we confirmed the southern limit of the low resistivity part existing in the deep crust of the focal region.
In the Chugoku and Shikoku district, we aimed to determine the 3D resistivity structure as a whole, and as in the 2017 research, 1D Occam inversion analysis based on determinant impedance was performed and integrated with existing MT data to estimate the preliminary spatial resistivity structure distribution. As a result, in San'in region, it is generally harmonious with the former studies, the low resistivity region in the deep crust continues to exist in the east-west direction with a certain scale.
In the Shikoku district, the resistivity in the mid crust shows the existence of a relative high/low resistivity boundary in the vicinity of the MTL is prominent, consistent with the existing research. Although there is a observation gap on the Seto Inland Sea side, continuity to the south of the low resistivity region of the San'in region is suggested with respect to the northern extension of the high resistivity crust. Moreover, when we look at the correspondence with the epicentral distribution of the crustal earthquake at this depth, there is clear correspondence with the high resistivity region in the north side of inner zone around

the Median Tectonic Line. This relevance is common knowledge with that in the San'in region.
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