A research report on the fundamental investigations of an electrical resistivity structure beneath Chugoku and Shikoku regions, southwestern Japan(2015)

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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. In this presentation, a research report on fundamental surveys for the following two topics, using data acquired in 2015 incorporated in the existing data, will be shown.
(1) Our research group has shown that there is a clear relationship between resistivity and seismicity in the Sanin 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. Harmonious research results has been shown from geodetic GNSS(GPS) data analysis by Nishimura (2015) who implies that relationship between strain concentration zone in Sanin region and the occurrence of the 1943 Tottori earthquake, the 1983 Tottori Chubu earthquake, and the 2000 western Tottori earthquake.
However, recent observation result conflicts with the model advocated by the group including the author that has studied electrical resistivity in Sanin region (ex, Shiozaki et al.,2015). That is, there is a possibility that the deep low resistivity area beneath the Sanin region does not exist in series. Assuming that inland earthquakes occur because of local stress concentration caused by heterogeneity beneath a seismic activity band (Iio, 2009), the heterogeneity in this area should be clarified hereafter.
Therefore, in this study, mainly using the wide area electromagnetic data of eastern and central Tottori Prefecture, we tried to extract the key feature of the dimension and the strike direction of resistivity structure beneath Shikano-Yoshioka fault and its surrounding area. The results of this analysis will be shown here.
(2) On the other hand, in the Shikoku region, investigations were carried out mainly in the outer zone, and the result suggested that a remarkable conductive area should exist in the upper crust and that the conductive area in the central and western part should have a clear relation with the non-seismic area. These studies suggest that high conductivity(low resistivity) is possibly caused by the existence of deep crustal fluids, which probably play an important role in the inland earthquake occurrence mechanism of these regions. Therefore, in order to grasp a whole tectonic setting, from the fore to the back arc side in the southwestern Arc, quantitative discussions based on the wideband MT survey covering whole these regions should be required (Shiozaki et al.,2014). In order to elucidate the regional characteristics of the large scale resistivity structure, fundamental wideband MT observations have been conducted at 10 sites in the observations gap area in the east and central region of Shikoku from late Oct to late Nov 2015. Based on a one-dimensional structure analysis using invariant impedance, a preliminary research result shows that it is consistent with the relationship between resistivity and seismicity from the former studies in the Shikoku regions.
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