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A report on the fundamental investigations of an electrical resitivity structure beneath Chugoku and Shikoku regions

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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 sructure in Chugoku and Shikoku regions, southwestern Japan arc. In this presentation, a preliminary report on fundamental surveys, using data acquired in 2014 incorporated in the existing data, will be shown.

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. However, recent observation result conflicts with the model advocated by the group including the author that has studied electrical resistivity in Sanin region (ex, Ozaki et al., 2013). 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. Wideband MT obsevations were carried out at 5 sites in the western extension area of Shikano and Yoshioka faults, from late Sep to early Oct 2014. The area is located between the 1943 Tottori earthquake (M7.2) and 1983 Misasa earthquake (M6.2) source regions. Natural geomagnetic and electric field variations were measured using Phoenix MTU5 systems. Apparent resistivity and phase data were used for model analysis assuming an EW strike direction. A preliminary two-dimensional model shows almost a similar resistivity structure, as a whole, to those obtained by the existing studies in this region. However, the location of the deep crustal conductor is slightly shifted to the south.

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 resitivity) 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. However, the existence of the plate is not thoroughly identified in the geological inner zone of the southwestern Japan Arc. 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 5 sites in the observations gap area in the east and central region of Shikoku from late Nov to mid-Dec 2014. Preliminary results show that the derived apparent resistivity and the phase curves have a common feature for all 5 sites.

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