A research report on the fundamental investigations of an electrical resistivity structure beneath Chugoku and Shikoku regions, southwestern Japan(2016)

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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 2016 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. 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.
In this background, a Magnitude (M) 6.6 Earthquake in the Central Tottori Prefecture on October 21, 2016 occurred. Before this earthquake, there were earthquakes frequently occurred since October 2015 in the area about 10 km east of the area where the 2016 earthquake occurred, and the east side is the western extension of the Kano and Yoshioka faults, the 1943 Tottori earthquake fault. 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. According to the result of one-dimensional analysis of Bostic inversion based on determinant impedance by integrating existing MT data, it was shown that the low resistivity region exists continuously in the form of a band around the depth of 10 km in the region.
(2) In the Shikoku region, in order to elucidate the regional characteristics of the large scale resistivity structure, fundamental wideband MT observations have been conducted at 8 sites in the observations gap area around the central part of Shikoku region.
By integrating the existing MT data, we tried model analysis using the program code of Ogawa and Uchida (1996) assuming that the midwestern part of Shikoku region has a two-dimensional structure of N75E strike direction harmonious with the geological structure. The preliminary resistivity model shows interesting features; the north-dip resistivity structure matching with the hypocentral distribution found at the upper crustal depth in the northern part of the Median Tectonic Line, etc.
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