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Three-dimensional resistivity imaging around Ishikari-teichi-toen fault zone

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The Ishikari-teichi-toen active fault zone is located on the eastern edge of Ishikari lowland. This region corresponds to the geological and tectonic boundary between the central and southwestern Hokkaido. The fluids and heterogeneous structure in the lower crust can take part in occurrence of inland earthquakes in such tectonic boundary region. In order to image a resistivity structure including the lower crust, a magnetotelluric survey was carried out in this region. The obtained 2-D resistivity sections resembled each other and their features were consistent with the geological structure. For details, however, these sections were inconsistent and this fact suggested the presence of three-dimensional inhomogeneous structures. Prior to a 3-D modeling, we estimated an effect due to conductive seawater surrounding the study area. The estimation showed that the induction vector at a lower frequency band was not explained only by the existence of seawater. Instead the coupling of the seawater and conductive sediments well demonstrated the feature of the measured vectors. The coupling also affected the apparent resistivity and impedance phase by up to 30% and 10%, respectively. Therefore, it will be required to analyze with considering the effect of the three dimensional structure surrounding the study area.

Keywords: Ishikari-teichi-toen fault zone, magnetotelluric, 3D resistivity structure