

3-D resistivity structure beneath the Atotsugawa Fault zone revealed by the Network-MT observations

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Magnetotelluric (MT) soundings were carried out around the concentrated deformation zone, Chubu region, Japan (NKTZ: Niigata-Kobe Tectonic Zone, e.g. Sagiya et al., 2000). The NKTZ becomes one of important target areas in 'the 2nd new Program of and Observation for Earthquake Prediction' (Hirata, 2004). A multidisciplinary research around the NKTZ, especially in the vicinity of the Atotsugawa fault, using dense GPS, seismological observations and investigation of crustal resistivity structure has been started since 2004.

To reveal heterogeneity along the fault plane, we first carried out wide-band MT survey along the Atotsugawa fault in Oct. 2005, and subsequently have performed Network-MT survey since Aug. 2006. A seismic gap and a creep-like crustal movement were observed along the Atotsugawa fault (e.g. Ito et al., 2007; Geographical Survey Institute, Japan, 2002). Preliminary 2-D TM inversion result from the conventional wide-band MT survey revealed lateral inhomogeneity correlated with heterogeneity in seismicity along the fault (Yoshimura et al., 2007). The relatively low seismicity region on the eastern part of Atotsugawa fault plane in the upper crust seemed to be imaged as resistive body. However, in addition to the fact that the western part of the fault with high seismicity and relatively high conductivity is not a low velocity region from the seismic tomography (Kato et al., 2007), there existed some discrepancies between resistivity structures along and across the fault beneath their intersecting point.

Then we analyzed the Network-MT data in the vicinity of the fault to determine a 3-D resistivity structure. In the inversion, electrode location and dipole configuration are taken into consideration and response functions of voltage difference on respective dipoles to horizontal magnetic field are directly inverted. As a result, the similar feature as was revealed by the wide-band MT was obtained also from the Network-MT. Interesting feature is that the seismically active region is corresponding to relatively conductive region in the upper crust and more conductive region exists in the lower crust with no seismicity.

In the seismic structure, there exists a low velocity region at the center of the Atotsugawa fault beneath Higashiurushiyama area. However, we cannot find corresponding relatively conductive region there. One possible reason why we could not find it is due to lack of EM data partly because of difficulty in performing the wide-band MT in that area and partly because of very long dipole length of the Network-MT. Then, in order to confirm existence or non-existence of the conductive region, we have added electrode points in the Network-MT survey since Nov., 2007 to enable us to examine the finer structure along the fault. In the presentation, we will show the 3-D imaging results including these new data and try to elucidate conclusive structure.