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広帯域ＭＴ・ネットワークＭＴ法による新潟－神戸歪集中帯・跡津川断層周辺域での深部比抵抗構造

Deep resistivity structure beneath the Atotsugawa F Area in the NKTZ revealed by a joint inversion of MT and NMT

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The dense GPS network observation revealed the Niigata-Kobe tectonic zone (NKTZ, Sagiya et al.,2000), which is the region with high strain ratio. In order to figure out mainly why the strain rate is large in NKTZ, we investigated the resistivity structure around the Atosugawa Fault (AF). Some studies have already investigated the resistivity structures around AF (Goto et al.,2005, Yoshimura et al.,2009). Their models are reliable, however, only in the crust and they could have been misestimated static shifts because they only used the data of conventional wideband MT (WMT) surveys.

In order to investigate the reliable structure from the upper crust to the upper mantle, we performed the joint inversion of the data of WMT survey and the ones of Network-MT (NMT) survey. In NMT survey, the telephone lines are used to measure the voltage differences, so that we can estimate impedance tensors with high S/N ratio in long periods (>10000s). Additionally, NMT survey can make static shift negligibly-small because voltage differences are measured by kilometer-scale baselines.

By the joint inversion using the observed data, we obtained the model which can reconstruct the data very well (RMS=1.72). In the lower crust in NKTZ, there are conductive areas (anout 10 Ohm-m) just below AF, the Ushikubi fault (UF) and the Takayama-Oppara fault zone (TOFZ).

Although seismic tomography results (Nakajima et al., 2010) indicated that there exits interstitial fulids (probably water) in the lower crust of the area, those fulids cannot be connected with the (P, T) condition of the lower crust if the hydrostatic equilibrium is achieved (Yoshino, 2002). Thus some mechanism is necessary to explain existence of the low resistivity areas in the lower crust just beneath the three main faults, since isolated fulids cannot contribute to electrical conduction. Existence of localized ductile shear zones is considered to be a probable candidate for generating the conductive zones in the lower crust.

The resistivity structure also supports a hypothesis from the seismic tomography results that those crustal fulids are supplied from the dehydration on the subducting Philippine Sea Slab deep beneath the area.

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