

Resistivity structure of Itoigawa-Shizuoka tectonic line active fault system around Lake Suwa lake

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Paleo-seismological studies of the Gofukuji fault, which is one of the segments of ISTL active fault system revealed unusual large displacement per one earthquake event (8.6-9.5mm/y) and an unusual short recurrence time (1000 years). Based on these observations, ISTL active fault system is believed to have a potential of M8 earthquake, if the whole fault segments of ISTL are activated. In addition to geographical and geological studies, the geophysical studies are important to image the deep geometry and heterogeneity of the fault system. Magnetotelluric method (MT) can image resistivity structure at depth, which represents the distribution of fluids. In the study area, there are two fault segments. One is the southern end of the Gofukuji segment and the other is the northern end of the Chino segment. These fault segments run along the rim of the Suwa basin in NW-SE directions. Thus the underlying structure of the Suwa basin may be complex structure.

We carried out magnetotelluric survey using wideband (300Hz-0.1Hz) and audio-frequency (10KHz-0.3Hz) equipments to reveal the underling structure. The sites are aligned in a profile (13km long), roughly perpendicular to the fault segments. To elucidate the cultural noise, the wide-band data were referenced to the data at the Esashi station of Geographical survey institute. Audio-frequency data were referenced to the relatively clean data within the survey profile.

First of all, the regional strike was inferred from the tensor decomposition. From the histogram, we chose N45W as the strike angle. Then the Groom-Bailey decomposition was further applied with the strike direction as N45W. The optimum resistivity model was inverted using decomposed TE and TM mode data. The final resistivity model is characterized by the followings.

(1) Eastward thickening conductor is found from the western end of the profile and stops at the Gofukuji segment. This geometry is similar to the one which was found at the northern edge of the Gofukuji segment.

(2) A sub-vertical west-dipping conductor was between the Gofukuji and Chino segment. This may imply the west-dipping listric nature of the Chino segment.