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Audio-frequency Magnetotelluric Survey of the Yasutomi and Kuresakatouge Faults, Yamasaki Fault System, southwest Japan

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The Yamasaki Fault System of southwest Japan is a typical left-lateral strike-slip fault system that extends for over 80 km striking ~ N60W?S60E. Many micro-earthquakes have been recorded along this fault system (Shibutani, 2004), in addition to large historical earthquakes such as the magnitude 7.1 Harima Earthquake of 868 AD (Okada et al., 1987). The northwestern part of the system consists of the Ohara, Hijima, Yasutomi, and Kuresakatouge Faults and the southeastern part consists of the Biwako and Miki Faults.
Electromagnetic Research Group for Active Fault (1982) was first to detect a clear fault zone conductor along the Yasutomi Fault. Handa and Sumitomo (1985) conducted an ELF-MT (Extremely Low Frequency Magnetotelluric) survey around the Yasutomi Fault with the aim of determining the resistivity structure beneath the fault. Their model is characterized by a large conductive zone (< 1,000 ohm-m) of 6 km in width and 3 km in depth, including the surface fault trace; however, the precise nature of the resistivity structure beneath the Yamasaki Fault System has yet to be established. Recently, Yamaguchi et al. (2010) reported a detailed two-dimensional geoelectrical model across the Hijima Fault, which is next to the Yasutomi Fault by an AMT survey. Their model is characterized by two conductors; the shallow one includes surface trace of the fault and the deep conductor was newly discovered at depths of 800?1,800 m to the southwest of the fault. It is an interesting and important point that these conductors are common feature along the Yamasaki Fault System or are local feature of the Hijima Fault.
Audio-frequency Magnetotelluric (AMT) surveys were undertaken at 14 sites along a line (~8 km), which were laid across the Yasutomi and Kuresakatouge Faults in order to image subsurface structure of these faults. AMT is a magnetotelluric method that uses natural magnetic field fluctuation with frequencies of 10^{4}- 10^{-1}Hz and it is suitable for surveying relatively shallow structures (from the surface to a few kilometers in depth).
Using remote reference processing (Gamble et al., 1979), MT responses with frequencies between 10^{4}? ~10^{-1}Hz were obtained at each site. We adopted the phase tensor analysis (Caldwell et al., 200 4) to estimate the dimensionality of the resistivity structure beneath the study area and to determine the regional strike in cases where the resistivity structure was 2-D. The regional strike of resistivity structures beneath the study area was determined to be E-W.
The apparent resistivity and phase data for both TM and TE modes of each line were inverted simultaneously using the code of Ogawa and Uchida (1996). Out resistivity model is characterized by two highly conductive zones (C1 and C2), one moderately conductive zone (C3) and one highly resistive zone.
In this presentation, we will show the resistivity model and its interpretation in addition to introduce the AMT survey in detail.

Keywords: Yamasaki Fault System, Yasutomi Fault, Kuresakatouge Fault,
Audio-frequency Magnetotelluric, conductivity structure, active fault