Resistivity structure beneath the southeastern part of the Yamasaki fault zone, southwest Japan

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The Yamasaki fault zone (YFZ) consists of the Nagisen fault, the main part of the YFZ, and the Kusadani fault. The main part of the YFZ is further divided into a northwestern (NW) group (the Ohara, Hijima, Yasutomi, and Kuresakatouge faults) and a southeastern (SE) group (the Biwako and Miki faults) based on their latest faulting events and mean slip rates; AD 868 and 1.0 m/kyr for the NW group vs. AD400 - 600 and 0.8 m/kyr for the SE group (Okada, 1987; Earthquake Research Committee, 2013). The Biwako fault consists of the western trace (A) and eastern trace (B) (Okada and Togo, 2010).
Magnetotelluric methods are powerful methods of surveying the subsurface structure of active faults as characteristic electrical conductivity variations are expected around an active fault. Among available methods, the audio-frequency magnetotelluric (AMT) method is useful because of its high spatial resolution for the depth range concerned.
Aiming to reveal conductivity structure beneath each fault and relationship between them, many AMT surveys have been made along transects across the main part of the YFZ, that is 81 stations along seven survey lines for the NW group and at only 29 stations along two survey lines for the SE group. It is clear that more observation is necessary to clarify features of resistivity structure below whole SE group.
We made an AMT survey along the line across the trace B of the Biwako fault where is between the trace A and the Miki fault and established the 2-D resistivity model along the line (BWK_B model). Further, we reanalyzed the data along MIKI line and establish the new 2D resistivity model (MIKI model).
In this paper, we explain features of the BWK_B and MIKI models, then show variation of the resistivity structure along the SE group, finally, interpret them by taking into geological structure and other geophysical information (Bouguer anomaly and seismological survey).

Details of observation, data analysis, and modeling process are shown blow.

Observation

AMT surveys were undertaken in February 2015 and March 2016 at 24 stations along the line (BWK_B line) at 24 stations along the line across the trace B of the Biwako fault. Two horizontal components of electrical field and three components of magnetic field were measured at each station. The remote station of the magnetic field was made ~18km north from the northeastern end of the BWK_B line.

Analysis

After MT response functions were obtained according to the remote reference method (Gamble *et al.*, 1978), we estimated dimensionality below the study area and strike of resistivity structure if structure is estimated to be two-dimensional. Then the two-dimensional resistivity model was constructed using the code of Ogawa and Uchida (1996). Ultimately, we established the BWK_B and MIKI models.

Keywords: Yamasaki fault zone, active fault, Magnetotelluric method, resistivity structure

