

Assessment of ancient stream channel offset across the Koyo fault using ground-penetrating radar, Kobe-Ashiya area, Japan

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Ground-penetrating radar (GPR) and seismic reflection surveys found a southwestward extension of the Koyo fault (active strike-slip fault) beneath the urban area of Kobe-Ashiya, Japan. The Koyo fault, having a strike of NE-SW and nearly vertical dip, partly crops out in the eastern Rokko Mountains. However, information about strike slip on the Koyo fault is very limited, because the Koyo fault is broadly covered with the Quaternary terrace deposits. Accordingly, we investigated the distribution of buried, ancient streams in the terrace along the southwestward extension (hidden segment) of the Koyo fault using the GPR unit GSSI and two 100 MHz antennas in order to make clear its horizontal displacement.

We used the GSSI GPR unit and a two connected antennas of the 100 MHz frequency: One is as transmitter and the other is as receiver. The range of the two-way travel time was used 200 ns. Their antennas were pulled at a low speed by a car. The GPR data were processed to accentuate geologic features by high pass filtering, low pass filtering and migration. The time profile changed to a depth profile by the wide-angle measurement. We conducted the GPR survey along six roads of the direction of almost east-west across the southwestward extension of the Koyo fault. The length of each survey line is 150-800 m.

The following results were obtained from our GPR investigation and the boring logs (Kansai Geo-Informatics Database, 2007): (1) Along one of the GPR survey lines, detection of an anomalous reflector was found at the southwestward extension of the Koyo fault. (2) We found two offset channels across the extension of the Koyo fault in the urban area of Kobe-Ashiya. (3) The two stream channels indicate the right-lateral offsets of approximately 100m along the southwestward extended Koyo fault. When these conditions are favorable, the GPR imaging techniques are very useful for assessment of the ancient stream channel offset along the concealed active fault in the urban area of mega-city.