

# Georadar Imagery of the Uzugamori fault extended to the urban area of Kobe

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Georadar surveys were conducted within the urban area of Kobe in order to investigate a southwestward extension of the already-known Uzugamori fault. After the 1995, Mw 6.9 Kobe (Hyogo-ken Nanbu) Earthquake, the Oji hidden fault was found in the urban area, southwest of the Uzugamori fault by the seismic reflection survey (e.g., Huzita and Sano, 1997). However there is a 500 m-distance gap in between the two faults. Therefore we take up a problem of this gap.

Geologic setting: The Goshukebashi fault zone runs to the northeast-southwest in the Rokko Mountains. This fault zone is composed mainly of the Otsuki fault, Gosukebashi fault and Uzugamori fault from north to south. Sugimura (1981) pointed out that its fault was a main extension of the Gosukebashi fault in the Rokko Mountains. The Uzugamori fault is estimated from a lineament of stream valley on the topographical map of 1/20,000 in 1886 (Meiji 19). According to Maruyama et al. (1997), the Uzugamori fault has a right-lateral offset of the stream valley. On the other hand, the fault outcrop, appeared during the construction of housing, has known at Uzugamori. The Uzugamori fault is an active fault, because it cuts the middle terrace deposits.

Georadar method: Using the georadar unit and antennas of 35 and 100 MHz frequency, we investigated along four survey lines across the extensional Uzugamori fault. The georadar data were processed to accentuate geologic features by distance normalization, horizontal scaling, range gain, stacking, high pass filter, low pass filter and migration. The time profile changed to a depth profile by wide-angle measurement. We prepared a combination profile compound from the georadar data of different antennas.

Results: The following results were obtained from our georadar surveys: (1) The detected anomalies with a weakly reflected signal (dark) were found at ~10 m wide across the Uzugamori fault. (2) This dark zone, extended vertically on the georadar profile, can be imaged as the fracture zone, while the part of strongly reflected signal (multicolor), spread on both sides of the dark zone, can be imaged as the granites. (3) The multicolor part has a vertical offset along the dark zone. (4) Detection of an anomalous reflector appeared along the southwestward extension of the Uzugamori fault. (5) The new location of the Uzugamori fault in this area is located at 80-m south away from its location on the already-published geological map.

Conclusions: Judging from the georadar, seismic reflection, topographical and geological data, we conclude that the Uzugamori fault links with the Oji hidden fault. Secondary, the new location of the Uzugamori fault at Takaha-cho coincides with the location of its fault on the seismic reflection profile, the location of a sharp variation of the repetitious leveling during March to July in 1995 after the Hyogo-ken Nanbu (Kobe) Earthquake. Therefore we found georadar to be very useful in grasping the accurate location of concealed active faults in the urban area of megacities.