# GPR imaging of hidden faults in the urban area of mega-city

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After the 1995 Hyogoken-Nanbu (Kobe) Earthquake ($M_{JMA}$7.3), several projects of active fault research using seismic and acoustic exploration operated around the Osaka Bay area (e.g. Yokota, *et al*., 1997; Yokokura *et al*., 1999). In the results, faults are recognized as discontinuity bed rock plane and unconformity flexure of unconsolidated sediments. The newly found faults are tracked as traces of co-seismic movement such as house inlet and so on (e.g. Nigauri and Miyata, 1998). Such faults probably have a connection between the faults in the Rokko Mountains and faults beneath the Osaka Bay. Especially the eastern Kobe city, there is a possibility that the Gosikebashi fault, the Yahatadani fault (Miyata *et al*., 2006), the Ashiya fault and the Koyo fault extend from the Rokko Mountains to under the urban area. Lin *et al*., (1997) reported the Gosukebashi Fault moved in last 7300 yrs. from the displacement of the K-Ah tephra bed. Then other parallel faults may have the similar activity.

The faults and deformed unconsolidated sediments are clearly imaged on seismic reflection survey profiles. The upper limit is about more than 50 m depth. It is correspond to Ma12 layer in the Osaka Group, aged from 130 to 70 ka. But to discuss the recent activity, the subsurface information is needed to know. It is difficult to read such information from the seismic reflection profile because of relatively low resolution. GPR is one of the suitable tools to survey subsurface geological structures.

We carried out GPR surveys in the urban area of Kobe along the Sumiyoshi River and the areas of the southwest extension of the Gosukebashi fault and the Yahatadani fault. Discontinuities and flexures of layers are detected in several profiles. Some of the areas are on the hidden faults. From the point of view these faults may be active recently. To clear recent activity of faults, comparative study of GPR profiles, boring logs and surface topography will be needed.

The difficulty of interpretation on a GPR profile is signals from artificial constructions. The artificial noise signals come from both underground (e.g. water pipes) and upper air (e.g. electronic power lines and viaduct). To remove the noise signals, the detailed field data are needed. Another difficulty is discontinuity of layers under complex alluvial fans in the south of Rokko Mountains. To solve the problem, using boring database and 3D arrangement of survey lines will be effective. If we can find age fixed tephra beds and paleosols in that process, the understanding of fault activities will be made great progress.

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