

Investigation of the shallow subsurface geological structures using the Ground Penetrating Radar

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Information on the subsurface geological structures, shallower than 10m in depth, is extremely useful to identify concealed faults and to characterize their exact locations, historical activities, and so on. The GPR (Ground Penetrating Radar) survey was carried out to clarify the shallow geological structures in the two sites, Kaishin and Hokushin districts in the Horonobe Town, northern Hokkaido, where the Omagari-Toyotomi Fault is assumed. The survey was also complemented with aerial photo-interpretation, detailed topographic and geological surveys.

The GPR survey consists of two stages. The first stage was conducted along the long survey line running perpendicular to the Fault, using an antenna set with low frequency of 25 MHz (deep penetration). The second stage GPR traverse was applied to the selected shorter survey lines, using an antenna set with high frequency of 100 MHz (high resolution).

The alluvium and the river terrace deposits are distinguished from basement rocks on the GPR profiles based on the difference of reflection pattern. Thicknesses of the alluvium and river terrace deposits estimated from the GPR profiles show fair agreement with those estimated by geological survey results. On the GPR profiles, fault-related geological structures such as tilting and discontinued layering of reflectors and discontinuities of layered reflectors are also recognized.

The results of this study suggest that GPR technique is an effective tool to investigate the shallow geological structures related to faults in the area where the fault topography are secondarily altered by periglacial phenomena and man-caused effects.