

3-D GPR survey for the Nojima fault on the Awaji Island

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Three-dimensional ground-penetrating radar (3-D GPR) surveys were conducted across the well-known Nojima surface fault on the northern Awaji Island in order to investigate the 3-D images of the fault. The Nojima surface fault was revealed by the 1995 Hyogoken-nanbu Earthquake. The GPR is a useful instrument to investigate under subsurface structures by using electromagnetic wave. The 3-D GPR is superior to a 2-D GPR, because we can visually obtain clear fault images, showing the strike and dip of the fault, and the amount of horizontal displacement along the fault.

We chose the following three sites along the Nojima surface fault on the northern Awaji Island: Hirabayashi, Ogura, and Nashimoto. We take up the optional GPR survey area as each place, which is 15*10m, 9*4m, and 10*3m respectively. The grid cell size is 0.5 m*0.5 m. We used a SIR-3000 system with the 100MHz antenna. The GPR data were processed with software (RADAN6). The general processing is high-pass filtering and low-pass filtering to clear geologic features and to reduce the system noise. The time profile can change to a depth profile, by using a wide-angle measurement. By fitting the 2-D GPR images to the coordinates, the 3-D images were formed by the 3-D software.

The following results were obtained: (1) The detected anomalies, suggesting an existence of the fault, found on the 3-D GPR image. (2) We investigated the strike and dip of the fault. (3) We estimated the displacement amount of the strike slip by using the 3-D GPR imaging techniques. These data well coincide with the results of the geological observation (Odaka et al., 1996) and boring (Ito et al., 1996).

We proved the utility of the 3-D GPR survey for understanding the strike and dip of the fault, and strike-slip displacement on a fault.