

Very shallow seismic surveys of the Shionohira earthquake fault appeared at the Fukushima-ken Hamadori earthquake

YAMAGUCHI, Kazuo^{1*} ; ITO, Shinobu¹ ; KANO, Naomi¹ ; YAMANAKA, Yoshiaki² ; ITO, Shunichiro²

¹AIST,GSJ, ²Suncoh consultant

In the southern part of the Fukushima-ken Hamadori area, seismicity increased after 2011 Tohoku earthquake and an M7.0 earthquake occurred on April 11th, 2011. Remarkable surface ruptures appeared along active faults by this earthquake. We conducted very shallow seismic surveys to reveal subsurface structure of the surface rupture down to 20 m in depth.

The survey line is located along a road in the Shionohira of Iwaki city. The displacement of the surface rupture is 2m east-side-up and 0.4m left lateral at the cross point of the survey line. The road was fixed and flat at the survey time.

The survey menus were S-wave survey and P-wave survey. Survey instruments and specifications are as following. Seismic source: S-wave/SWG-5(Suncoh), P-wave/10kg hammer, receiver: S-wave/GS20DM(Oyo Geospace, 28Hz), P-wave/GS11D(OyoGeospace, 4.5Hz), recorder: DSS-12(Suncoh), line length: 191m, source interval: 1m, receiver interval: 1m, stack number: 1-5, spread: S-wave/192ch fixed, P-wave/96ch landstreamer. The data quality was good because of low traffic noise.

The data were processed by S-wave refraction, S-wave reflection, P-wave refraction and surface wave methods. S-wave tomography and P-wave tomography analyses were applied and confidence of resolution and dependency to primary model were estimated. P-wave data were processed by inversion of phase velocity dispersion and S-wave velocity structure was obtained. S-wave data was processed by CMP stacking method and time section, migrated section and depth section were obtained.

According to S-wave velocities by S-wave refraction and surface wave methods, velocity layers below 0.7 km/s is thick to the west of the fault and thin to the east of the fault. Strong reflector between sediments and basement is deep and continuous to the west of the fault, shallow and uneven to the east of the fault and steps are recognized around the fault. The basement rises between this step and 135m of the survey line. This corresponds to the part of high Bouguer anomaly of 0.06 mgal.

Keywords: Fukushima-ken Hamadori earthquake, Itozawa fault, Shionohira fault, subsurface structure, very shallow seismic survey