

Seismic surveys of the earthquake faults appeared at the Fukushima-ken Hamadori earthquake

Kazuo Yamaguchi^{1*}, Shinobu Ito¹, Naomi Kano¹

¹AIST,GSI

Remarkable surface ruptures appeared along the Itozawa fault and Yunodake fault at the earthquake (M7.0) on April 11th, 2011, in Iwaki city, Fukushima prefecture. This earthquake is considered as an induced earthquake of the 2011 Tohoku earthquake (M9.0). We conducted seismic surveys along three lines which cross the Itozawa fault (line1) and Yunodake fault (line2) respectively and extension area of the Yunodake fault (line3). The length of line1, 2, 3 are 6.6km, 6.5km and 4.2km, respectively. The seismic source was two - four Envirovibes. Intervals of source and receiver were 10m, respectively, and two sweeps were stacked at one source point for the three lines. In line1 and 2, intervals of source and receiver were 5m within 1km from the surface ruptures of faults for high resolution survey and ten sweeps were stacked at 40m interval of source for deep reflection and refraction surveys. The source-receiver spreads were fixed for all receivers of each line. In line1, continuous reflectors are not seen in the shallower part and fault structure is difficult to identify. The CMP stacked time section is relatively more reflective to the east of the surface rupture and lacks continuous reflectors to the west of the surface rupture between 0.3s and 1.5s in two way time. This may show the inner condition of the basement rock. In deeper part, amplitude of reflectors decreases below 7km in depth. This boundary corresponds to the intensive area of hypocenters of aftershocks. In line2, a sedimentary basin is well imaged in the area of Tertiary and Quaternary sediments. The top of the basement shows complicated shape and reaches 700m in depth. Two small anticlines are recognized in the sedimentary layers. The velocity structure by ray tomography corresponds very well to the sedimentary structure by the reflection survey. In line3, the basement is 500m deep at the southern edge, almost flat and gently dips at two parts on the way northward and 800m deep at the northern edge. The sediments gently dip northward. Stratigraphic throws are not perceived on the whole seismic section of line3.

Keywords: Fukushima-ken Hamadori earthquake, Itozawa fault, Yunodake fault, Subsurface structure, Seismic survey