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High-resolution seismic reflection survey along the coastal line of Niigata Plain using P-wave type Land Streamer

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Active faults which have the potential to cause disastrous earthquake in the near future are widely distributed in Japan. As well known, faulting structure recorded in the near surface layers is the key to clarify the behavioral pattern of each fault and evaluate the potential activity. High resolution seismic reflection method using Land Streamer developed by PWRI is capable to reveal the near-surface faulting structure. We utilized it to image detailed structure of Kakuda-Yahiko fault, Niigata Prefecture. The purpose of the survey was to clarify the behavior of Kakuda-Yahiko fault at the boundary zone between inland and offshore area.

A 2 km-long seismic line was deployed along the coastal line of the northwestern part of the Niigata Plain to obtain a P-wave seismic profile across the fault. A newly developed P-wave type Land Streamer having 96 active channels was used for the field measurement. A total of 1251 shot records were obtained during 7 days by 6 crew personnel. The data were processed on a PC using the VISTA processing package (Seisimage, Inc.). CMP stacked time sections profiled a high angle reverse faulting and related bulge structure at the hanging wall side in the near surface down to 200 m in depth. Increase in layer dipping with depth was also recognized at the footwall side. As a result, high-resolution shallow seismic reflection surveying using Land Streamer is helpful to provide valuable information regarding seismic zoning near an active fault for earthquake disaster prevention of infrastructures.

Keywords: concealed fault, Niigata Plain, Kakuda-Yahiko fault, Land Streamer, seismic reflection surveying