Application of high density CSAMT exploration for the Senya active fault, eastern margin of the Yokote basin fault zone.

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We have been studying to understand accurately surface location and subsurface shape of the active fault by applying multiple geophysical exploration methods together with reflection seismic survey.

CSAMT survey is one of geophysical method to obtain the resistivity structure, and the depth of exploration is about 1000 m to 2000 m. In conventional CSAMT, the interval of measurement point is set to several hundred meters, but the high density CSAMT is set the interval to about 50 m by using the multi-channel electromagnetic survey system (Sakashita et al., 2017). By making the high density measurement points, we aim to understand detailed changes of the subsurface resistivity structure accompanying the fault activity and try to estimate the location and shape of the active fault.

At the Senya fault in the eastern margin of the Yokote basin, Akita prefecture where the surface earthquake fault appeared at the 1896 Rikuu Earthquake, reflection seismic survey with a length of about 6 km was conducted (Sato et al., 1997). Kagohara et al. (2006) estimated the evolution of the active faults based on data from the seismic reflection profiling and investigations into tectonic geomorphology and structural geology.

We conducted the CSAMT survey with almost the same line of the seismic reflection profiling. The total length of the survey line was about 6 km, of which the part of about 2.5 km where the active faults crossing the survey line, the interval of measurement point was set to about 50 m. In the other part of the survey line, the interval is set to about 100-200m. The total number of measurement points was 70 points. The measurement frequency was from 0.5 Hz to 8192 Hz, and the distance of source-receiver is about 15km.
As a result of the analysis, a resistivity cross section which can be reliable up to the depth of 1500 m was obtained. In the resistivity image, the distribution of the low resistivity with a complex shape was shown. The shape of the low resistivity suggests the distribution of the mudstone layer, and its complicated shape is presumed to indicate the situation divided by the fault activity. Interpretation in conjunction with the seismic reflection profiling was improved the shape of the blind thrust structure over the conventional interpretation.

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