Seismic Reflection Survey at Niitsuru Aizumisato Fukushima

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We have tried to understand geological structure in Aizu Basin for utilization of geothermal energy. We conducted boring survey at Niitsuru area, Aizumisato in the 2016 fiscal year. Niitsuru area is where the Sagase River runs on an alluvial fan from southwest, turns toward southeast, and run together with the Miyakawa from south to north. The surface trace of the West Aizu Basin Fault Zone shows mainly NS direction, but the trace to the south of Niitsuru area shifts toward west to the north of Niitsuru area. The main trend of geological structure in Aizu Basin is NS direction, but the geological structure in Niitsuru area is relatively more complex. The boring survey is effective to understand geological structure. However, it is important to understand not only boring data but also spatial extent of geological structure. Seismic reflection survey is one of the most effective tools.

Fukushima Prefecture conducted seismic reflection survey at Yonezawa, on the south of Niitsuru area. The strike direction of the West Aizu Basin Fault at Yonezawa is almost NS. It is easy to conduct seismic reflection survey because some roads lead straightly east to west. On the other hand, a prefectural road and a railway (JR Tadami Line) block roads east to west at around the borehole in Niitsuru main area. Moreover, it is difficult to deploy a telemetry seismic recording system over railways without bridges. Therefore, we designed seismic reflection survey along three EW survey lines to the south of the borehole.

The survey was conducted from September 5 to 16 in 2016. The Aizumisato Niitsuru 1 Survey Line (AMN1) is deployed near the borehole, and the length of the line is about 440m. Whole survey line of AMN1 is located east of the railway, and we used only telemetry system. The Aizumisato Niitsuru 2 Survey Line (AMN2) is located about 500m south to the AMN1, and the length of the survey line is about 520m. We deployed both telemetry system and self-recording system because the survey line crosses the railway. The west end of the survey line is the prefecture road 59. The Aizumisato Niitsuru 3 Survey Line (AMN3) is located about 200m south to the AMN2. The survey line crosses the prefecture road the prefecture road 59. West of the road 59 is a paved road, but east is a dirt road. The length both of the west and the east is about 100m, and we fixed a deployment of the telemetry system. The sampling interval for AMN2 with both telemetry and self-recording system is 1ms, but that for AMN1 and AMN3 with only telemetry system is 0.5ms. We used horizontal single component geophones with GS32CT (f_o =10Hz). We also used a transportable vibrator system. Sweep frequency of the vibrator is 20 to 160Hz, sweep duration is 7s, and recording duration before cross correlation is 8s. Spatial intervals of both sweep points and recording points are 2ms, number of recording channels is 96, and sweep count at each sweep point is 5 to 10 corresponding to offset length.

We confirmed good shot records for telemetry system. On the other hand, it is impossible to see shot records for self-recording system without some processing. After the survey, we also confirmed shot records for self-recording system with telemetry system. We are going to apply seismic processing to these records.

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