

2011年東北地方太平洋沖地震によって被災した大崎市古川の地盤構造の推定 Estimation of ground structure using gravity survey method around Furukawa, Japan, where was severely damaged by the 2011

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Estimation of ground structure using gravity survey method around Furukawa, Japan, where was severely damaged by the 2011 off the Pacific coast of Tohoku earthquake

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The 2011 off the Pacific coast of Tohoku earthquake caused vast damages to Japan, especially in the Northeastern part of country. Most of those damages came from the resulting Tsunami, some came from liquefaction, whereas only a few places were damaged by earthquake ground motions.

Furukawa in Osaki city is one of a few places, where was severely damaged by ground motions. Nevertheless, the level of damage to the structure within this town was totally different even the size of this town is not big, about 2km x 2km. In addition, there are 2 seismometers installed in this town, which are JMA-Furukawa and K-NET-MYG006 stations. Although distance between these 2 stations is about 1 kilometer, the velocity response spectrums of both seismometers were different about two times.

Therefore, investigation of ground structure is necessary. We carried out gravity survey in this town with the observation interval less than a few hundred meters because there was an estimation of depth to the engineering bedrock in this area is less than 50 meters. Moreover, we also carry out another observation using very dense sensors installed in this town to ensure the results of research. Within the area 2km x 2km, 34 sensors have been installed.

The Bouguer anomaly, as a result from gravity survey, has some significant variations in some places, which correspond to the most severely damaged places. Furthermore, residual anomaly as extracted from regional anomaly also states the similar fashion to both Bouguer anomaly and severe damaged places. Moreover, simulated 3-D map showing the altitude of basement, or engineering bedrock with the density of 2.4 g/cm³, presents the variations of the depth in 2km x 2km with the maximum different depth up to 67 meters.

These results from gravity survey are also corresponding to the latest result from very dense sensors project, which measured the arrival time of surface wave at every sensors from earthquake event on December 07, 2012 with epicenter off the Pacific coast.

Because the ground structure beneath this town is quite complicated and generate ground motions non-uniformly, so we will use receiver function analysis technique to supplement our study to better understand the characteristics of ground structure in this area.

Keywords: Furukawa, Osaki, Miyagi, 2011 Tohoku earthquake, gravity survey, ground structure, dense seismic array observation