

Ground amplification estimates based on very dense seismic array observation in Furukawa district, Osaki, Japan

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On March 11, 2011, a huge earthquake hit the eastern part of mainland Japan. The earthquake caused a huge tsunami that killed more than ten thousand people. Structures were also severely damaged over the area of eastern Japan by the tsunami, ground motions, liquefaction, and so on. We focus on the Furukawa district of Osaki City, where severe residential damages occurred downtown. Ground motion records in the downtown area are available at two stations, MYG006 (K-NET) and JMA Furukawa (JMA). The damage level was different between the areas within several hundred meters from the MYG006 and JMA Furukawa stations, which are about 1km away from each other. The severe damages were concentrated within the area approximately 1x1km² including the JMA station. This implies that the ground motion characteristics were not uniform in sub-kilometer scale, and the existing two stations are not enough to clarify the damage distribution (Goto and Morikawa, 2012).

In aftermath of the earthquake, we distributed dozens of low-cost seismometers, namely ITK sensor, around the area about 3x2km² in the Furukawa district (Goto et al., 2012). The observed data are sent to the remote server through internet connection in real time. The seismometers were installed beside the volunteers' houses. The volunteers can access the interactive information service, namely on-line viewer system. The observed PGA and PGV values show significant spatial variability that may be correlated to the structural damage caused by the major 2011 event.

We assumed one-dimensional horizontally-layered structure just beneath the stations and estimated ground structure by using the records based on the observation. The results indicate that the area where the severe damages were concentrated is related to the area with the thicker surface layers. The distribution is also indicated by the results obtained from gravity anomaly data.

References

Goto and Morikawa: Ground motion characteristics during the 2011 off the Pacific coast of Tohoku earthquake, *Soils and Foundations*, 52(5), 769-779, 2012.

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