

Observation of microtremors and aftershocks of the 2016 Kumamoto earthquake in the Kumamoto basin

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We have performed temporary strong motion observation for aftershocks of the 2016 Kumamoto earthquake at the damaged area due to the event (Yamanaka et al. 2016). We have already completed the observation in the town of Mashiki, village of Nishihara, city of Aso and village of Minamiaso, but the observation in the city of Kumamoto is still continued. We here report the strong motion records and microtremor measurements in the Kumamoto basin.

We have started the temporary strong motion observations immediately after the event of 17 April 2017. Several months after the observation, we removed and reinstalled the temporary stations in the city of Kumamoto and we here report the record observed mainly in July 2016. Two temporary stations were installed in Chuo-ward, one in Higashi-ward, three in Minami-ward, and two in Nishi-ward in the city of Kumamoto. The stations installed in Chuo-ward and Nishi-ward is close to the sites where the apartments had severe damage and liquefaction occurred. Less damage was found at the other stations. We used a seismometer JEP-6A3 (Mitutoyo Corp.) which has a sensitivity of 10V/G or 2V/G with a data logger LS7000XT or LS8800 (Hakusan Corp.). Stations continuously record ground motions with 100 Hz sampling and GPS signals were received for time correction.

It is observed 22 aftershocks with M_j 2~4. The strong motion records vary at each station. High frequency motions were observed at the stations located in the northern east of Kumamoto basin and in the Nishi-ward where the apartment was severely damaged. It is observed long period later phases at the stations in Minami-ward. It is also observed in the spectral ratio to the reference station in the northern east of the city of Kumamoto.

We conducted microtremor array measurements at all the temporary stations and estimated the shallow S-wave velocity structure. At any stations, the low velocity layer having a S-wave velocity of about 150m/s was found and its thickness was more than 15m. The thickness was more than 25m at the station in Minami-ward. It was about 2m at the station located in the middle terrace in Chuo-ward. The site response characteristics calculated from the shallow structures have the first dominant period at the period between about 0.5-1.0 seconds. It is more than 1 second at the station close to the coastline in Minami-ward.

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