Long-period strong ground motion of the Tokyo Bay area during the M6.7 event occurred near the triple junction.

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The M6.7 (Mw6.2) event occurred near the triple junction southeastern off the Boso peninsula on Sept. 23, 2016, and the seismic intensity 1 was observed in the Kanto district. In this epicentral area, "Boso-oki earthquake" (M7.4) occurred on November 26, 1953. Moreover, the “Enpo earthquake” in 1677 is also considered to be the M8 class earthquake which occurred in this area. Therefore, it is important to analyze the earthquake ground motion record during the event which occurred in this area, when assuming the long-period strong ground motion of the Tokyo Bay area.
This report shows that the characteristics of the record obtained by the broadband velocity type strong-motion seismograph installed in the thermal power plants on the Tokyo Bay shore by Tokyo Electric Power Company Holdings. Across Tokyo Bay, five observation points exist in the east side, and eight observation points exist in the west side. The epicentral distance is from 205 to 210 km for the observation points on the Tokyo Bay east side and is from 225 to 235 km for the observation points of the Tokyo Bay west sides except for Yokosuka (215 km). In addition to main shock(9:14, M6.7) record, record of a foreshock (0:57, M5.9) and three aftershocks (14:34, 15:13, 19:28, all are M5.7) is also obtained.
The waveform observed at all station during the M6.7 event have a long time duration with long-period waves and the neighbor e main shock and the waveform of the adjoining observation point is well alike except for some later phases. The amplitude of an east side observation point is twice the amplitude of a west side observation point.Moreover, there is a tendency for amplitude to be large as the north side in Tokyo Bay. In velocity response spectrum of horizontal components, there are significant peak at period of 10 seconds for all stations and there are peak at period of about 6 seconds for the east side stations. The response spectrum calculated by record of foreshock and aftershock shows that a peak exists in 10 seconds like a main shock in many observation points. However, the amplitude of the response spectrum is from 1/7 to 1/5 of the amplitude of a main shock with the period range from 1 to 15 seconds. Considering that the difference of magnitude is 1, this is an appropriate level.
The earthquake of M6.3 (Mw6.2) had occurred on June 06, 2012 slightly closely to Boso Peninsula than the 2016 event. The source mechanism of the 2016 event is reverse fault and that of the 2012 event is strike slip fault. The source mechanism is different but moment magnitude of both events are the same 6.2. So we compared these two events. The epicentral distances of Chiba station, where is the most closest to epicenters, are 205 km for the 2016 event and 131 km for the 2012 event. Although there is a difference of distance, the velocity amplitude in Chiba is comparable. However, the apparent predominant periods of two events are different and the predominant period of the 2016 event is longer than that of the 2012 event. The velocity response spectra of the 2012 event doesn’t have the peak at 10 seconds and show flat feature in period range from 1 to 10 seconds. The velocity spectrum of the 2016 event have significant peak at about 10 seconds and the peak level is twice of the spectrum of 2012 event. On the contrary, the spectrum level of the 2016 event is 1/4 of the 2012 event in period range between 1 to 2 seconds.
Two inland earthquakes with M6.7 also occurred in Northern Nagano prefecture in 2011 and 2014. The epicentral distances of these events are near to those of triple junction event. The source mechanisms of the 2011 event and 2014 event are both reverse faults type the same as the 2016 event. The velocity response in period range from 1 to 2 seconds is low and about 1/2 of those of other two event. On the contrary,. the velocity response of the 2016 event at period of 10 seconds is lager than other two events.

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