Continuous buoy observation of ocean bottom pressure and sea surface height and the system revision

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We have developed buoy system for tsunami and crustal displacement (Takahashi et al., 2014; 2015; Imano et al., 2015). This system has pressure sensor on the sea bottom, and logger for precise point positioning plus various meteorological sensors and sea current meter on the buoy. We carried out sea trial around the Nankai Trough area for approximately one year and introduce the comparison among these data recorded by various sensors on the sea bottom and sea surface here.

Bottom pressure sensor data is sent to the buoy using acoustic data transmission. Observed pressure data is converted time length of double pulses on the sea bottom, and these are converted again to digital data after the acoustic transmission. The time is needed to keep dynamic range with high resolution for the bottom pressure data, and we set eight meters and 1 centimeter as these parameters. Therefore, data sampling of the bottom pressure is 15 seconds.

The bottom pressure was various signals, which were tsunami signals by off the southeastern coast of Mie-prefecture (M6.5), disturbance of sea surface height by typhoon, and so on. Some very low frequency earthquakes were also recorded, which have time duration of approximately 500 seconds and frequency component of a few minutes. In addition, characteristic signals with long time duration of over three days and frequency component less than 16 minutes were also observed approximately every month. We interpret them to be possible tubidite flows along near major canyons.

We consider revision of the buoy system. Sea bottom pressure we collected are transmitted to the wire-end station set at 1,000 m below sea level using acoustic transmission. And the data collected by the wire-end station are sent to the buoy station through a wire-line. Current issues to be resolved are transmission error due to acoustic noises and damages on the wire-line due to rotation of the buoy during long period implementation. In addition, we consider to improve electrical consumption for acoustic data transmission and the successful ratio.

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