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A Development of Tsunami Monitoring System using GPS Buoy

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A new tsunami observation system has been developed, which employs the RTK-GPS technique to detect a tsunami before it reaches the coast. After a series of preliminary experimental studies, the operation-oriented experiments were conducted at two offshore sites. These systems succeeded to detect four 10cm tsunamis on 23rd June 2001 Peru earthquake, 26th September 2003 Tokachi earthquake, 5th September 2004 Kii earthquake and 28th February 2010 Chile earthquake. The newly established Muroto GPS buoy system is continuously operating now. These results well substantiate of a GPS buoy to be a powerful tool for early detection of tsunami.

Currently, the GPS buoy system uses RTK-GPS which requires land base for precise positioning of the buoy. This limits the distance of the buoy from the coast at most 20km. There are two problems to be solved; one is the accuracy of GPS and the other is the data transmission. We are now testing the improved RTK method and 400MHz radio system for 50km long base line in the Muroto GPS buoy, also now planning to introduce the other algorithm of precise point positioning method. As a future scope, we will try to implement some other additional facilities for the GPS buoy system which is so-called GPS/Acoustic system for monitoring ocean bottom crustal deformation and to develop a system to predict the arrival time and tsunami height at the coast by combining the observed tsunami and numerical simulation.

Keywords: GPS, tsunami-meter, tsunami, RTK