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» Abstract

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»Abstract

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Category	RTK-GPS and ambiguity resolution
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Title of the Paper	Development of a New Tsunami Monitoring System Using a GPS Buoy
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Abstract	<p>A tsunami monitoring system using a GPS buoy has been developed for more than ten years. Real-time kinematic (RTK) GPS technology was used for this purpose. After a series of preliminary experimental studies, the fourth system was newly designed and was established about 12km south of Muroto Peninsula, southwestern Japan in early April 2004. The buoy has experienced nearby passages of several typhoons with a maximum wave of about 20meter and has shown a total integrity for an operational use. On September 5th 2004, a large earthquake of Mw7.4 occurred about 200km east of the buoy. The GPS buoy successfully recorded the tsunami with about 10cm amplitude at the first peak arrival of about 10 minutes before its arrival at the nearest coast of Muroto Promontory. The simulated record has shown excellent consistency with the observed tsunami, suggesting high potential for predicting tsunami height at the coast before its arrival, if the record is efficiently implemented in the tsunami warning system (Kato et al., 2005).</p> <p>The system developed in this study can also be used for wind wave observations. The Port and Airport Research Institute, Japan, and associated agencies have operated so-called NOWPHAS (Nationwide Ocean Wave information network for Ports and HARbourS) system which uses ultrasonic waves to detect ocean current and waves. A NOWPHAS system is operated offshore Muroto port and the current and wave data are compared with GPS buoy data. Results suggest that GPS buoy can accurately measure the wind speed without correction for swing of buoy. Current speed can also be measured if we focus on longer period of current of, say, longer than 30seconds of periods. The results suggest that GPS buoy could replace the NOWPHAS system in the future (Nagai et al., 2008).</p> <p>The buoy was unfortunately sunken by the crash of a large vessel on March 2005. However, a new GPS buoy was established again on April 2008. The diameter, the weight, and the height above sea-level of the new buoy are 4.5meter, 38ton and 8.3m, respectively. The buoy was set at about 13km WNW of Muroto Peninsula, where the water depth is about 130m.</p> <p>We are trying to implement some new features to the new system. First, we update data dissemination system. So far, we used only internet browser for monitoring the sea-wave. Considering, however, that many of people who needs the data include elderly people, we try to use mini-FM radio for broadcasting various sea wave information including wave heights, current direction, current speed, water temperature etc. Second, in order to improve integrity of the system, triple analysis systems are implemented; namely, new RTK software, RTKin and RTNet commercial software. This redundant system makes the chance of data mis-fix much lower. We are also trying to set the base stations at</p>
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	three distant location; 10km, 13km and 50km to test if longer baseline is feasible or not.
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