Geophysical Research Abstracts
Vol. 18, EGU2016-12048-3, 2016
EGU General Assembly 2016

Practical performance evaluation of the Wave Glider in geophysical observations

Hiroko Sugioka (1) and Yozo Hamano (2)

(1) Kobe University, Kobe, Japan (hikari@pearl.kobe-u.ac.jp), (2) Japan Agency for Marine-Earth Science and Technology, Yokosuka, Japan (hamano@jamstec.go.jp)

The Wave Glider (WG), manufactured by Liquid Robotics Inc. of California, USA, is the first wave and solar powered autonomous sea surface vehicle. It has led the way to make ocean data collection and communications easier and safer, lower risk and cost, and real-time. By analyzing data from a long-term deployment of the WG in the sea to investigate the feasibility, an assessment of operating characteristics informs the potential utility of the WG to identify the parameters for a seafloor experiment designed the WG as a station-keeping gateway. We apply the WG in the following two observation systems that we have been developing.

First, after the 2011 Tohoku earthquake tsunami, we have developed a real-time offshore tsunami monitoring system using a new type of seafloor tsunami sensor called Vector TsunaMeter (VTM) able to directly estimate the tsunami propagation vector based on the electromagnetic induction theory to provide early and reliable information at the coastal area. The WG equipped with both an acoustic modem and a satellite communication modem is used in the system as a relay platform for data transfer and communications between the sea bottom observatory and the land station. We had some experiments beginning with newly developing of the VTM in November 2012 to complete as a real-time monitoring system using the WG in March 2014. During the last experiment, we succeeded in detecting the micro-tsunami associated with the 2014 Iquique, Chile earthquake with Mw 8.2 on April 1 to confirm the practical utility of the WG.

Second, since the Nishinoshima volcano of the Bonin Islands erupted in November 2013, we have been developing an isolated volcanic activity monitoring system using the unmanned WG vehicle. In this system the WG plays roles not only in a relay station with a satellite communication modem but also in a multi-purpose observatory platform with microphone for detecting acoustic waves in the air due to eruptions, with hydrophones for detecting acoustic and seismic waves in the ocean, and with wave gauges for detecting heave displacements due to volcano collapse tsunami. A brand new island was born by the first eruption on November 20, 2013. Over the past two years with continued volcanic activity, it has grown up to 12 times the size of the original, which is offering us a rare opportunity to study how volcanic island forms and grows. We will install the monitoring system as soon as possible.