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Ocean-bottom pressure observation of Dense Oceanfloor Network System for Earthquakes and Tsunamis

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The source regions of the subduction zone earthquakes are located beneath the sea in the Nankai seismogenic zone except for that of the Tokai earthquake. Real-time seafloor monitoring system for earthquake and tsunami is very important for improvement of early warning system and understanding of the subduction zone earthquakes. The Japan Agency Marine-Science and Technology has constructed the Dense Oceanfloor Network System for Earthquakes and Tsunamis (DONET) at the seafloor just above the source region of the Tonankai earthquake since 2006. Following DONET2 project which aims to cover the eastern half of the source region of the Nankai earthquake was also launched at 2010.

In DONET system, ground motion sensing and pressure sensing packages are connected by a submarine cable so that data is transferred to the landing station in real time. Conventional submarine systems have sensors in submarine cables, but DONET uses science nodes which are devices with the role of hub to connect the submarine cable with instruments directly installed on the seafloor. That makes possible to distribute observation points in dense, to replace instruments at the seafloor, and to make maintenance by using ROV. The pressure sensing package is composed of quartz pressure sensor, differential pressure sensor, hydrophone and precise thermometer to observe broadband tsunami phenomena, which will be installed at twenty sites of the seafloor. Total eight stations had been set by January, 2011

The observed data has been collected since the first sensor was installed in March 2010. In December 2010, the earthquake (M7.4) of Chichijima was accompanied by a small tsunami which was clearly recorded by the ocean-bottom pressure sensors of DONET about an hour and a half later in the earthquake origin time. The tsunami signal reached at DONET stations about 20 minutes earlier than the coast observation points. We accordingly insist that the tsunami early warning will be dramatically improved by using the real-time data observed by DONET. I will show the detail of DONET and a plan of the tsunami real-time analysis in the oral presentation.

Keywords: DONET, Nankai trough, Ocean-bottom pressure observation, Tsunami