

The development of the self pop-up ocean bottom pressure gauge (OBP) with precision thermometers attached

SUZUKI, Syuichi^{1*} ; ITO, Yoshihiro² ; HINO, Ryota³ ; INAZU, Daisuke⁴ ; OSADA, Yukihiro³

¹Graduate School of Science, Tohoku University, ²Disaster Prevention Research Institute, Kyoto University, ³International Research Institute of Disaster Science, Tohoku University, ⁴National Research Institute for Earth Science and Disaster Prevention

We have installed autonomous ocean bottom pressure recorders (OBPRs) off Miyagi and off Nemuro to observe seafloor vertical displacements in response to large earthquakes and aseismic slip. Most notably, an uplift of 5 m due to the 2011 Tohoku-Oki earthquake (Ito et al., 2011) and transient crustal deformations accompanied by slow slip events that occurred before the earthquake (Ito et al., 2013) were measured by the OBPRs which had been installed off Miyagi since 2008. Recent our observations on seafloor show a seawater-temperature anomaly after the 2011 Tohoku-Oki earthquake (Arai et al., 2013.) Here we show our new OBPRs with precise thermometers to observe both of vertical displacement and temperature anomaly on seafloor.

We design the new OBPR with two precise thermometers. The two thermometers are exterior to our ordinal OBPR. A quartz crystal pressure sensor within the ordinal OBPR is firstly equipped with a thermometer, which is used for temperature compensation of output frequency of quartz oscillator. This means the thermometer with the ordinal OBPR measures a temperature within the vessel of the pressure sensor. By the new attached two thermometers, a actual seawater-temperature are measured accurately.

The development of OBPs with precise thermometers attached enables us to record temperatures of seafloor and seawater along with OBP observations. We are planning to deploy these newly developed OBPs around Japan trench and east off North Island of New Zealand. Especially at the landward Japan Trench slope, increase in the amount of water discharge has been reported by the submarine observation after the 2011 Tohoku-Oki earthquake. Therefore, the installation of the new OBPs with thermometers around this area is expected to allow us to observe not only the seafloor vertical displacements accompanying the postseismic deformation but also the time variation of seafloor water temperature associated with the time variation of the amount of water discharge.

Keywords: Two precise thermometers, Sea-bottom water temperature, Ocean bottom pressure gauge