

Development of ocean bottom cabled seismic and tsunami observation system using ICT

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The Pacific plate is subducting below the northeastern Japan islands arc. The 2011 Tohoku earthquake occurred at the plate boundary between the Pacific plate and the landward plate below landward slope of the Japan trench. In 1996, Earthquake Research Institute, University of Tokyo had installed seismic and tsunami observation system using seafloor optical fiber in the off-Sanriku area. The cabled system observed seismic waves and tsunamis generated by the 2011 Tohoku earthquake, and the data from the system are indispensable to estimate the source process of the 2011 event. However, the landing station of the system was damaged by huge tsunami 30 minutes after the mainshock. Therefore we decide to install newly developed Ocean Bottom Cabled Seismic and Tsunami (OBCST) observation system off Sanriku to continue the sea floor observation.

Until 2010, we had already developed and installed the new compact Ocean Bottom Cabled Seismometer system near Awashima-island in the Japan Sea. After the installation, data are being collected continuously and we have continuous seismic data for approximately 2.5 years at the present. The new system for off-Sanriku area is based on this system. The new OBCST has three accelerometers as a seismic sensor. Signals from accelerometers are 24-bit digitized with a sampling rate of 1 kHz and sent to a landing station using standard TCP/IP data transmission. A precise pressure gauge is equipped as a tsunami sensor. The tsunami data are also transmitted by TCP/IP protocol. In addition, we have a plan that an observation node has an external port for additional observation sensor which will install on seafloor using Power over Ethernet technology. The data will be stored on the landing station and sent to Earthquake Research Institute in the real-time. At the present, we are producing a proto-type of the new OBCST. In this paper, we will present a system of the new OBCST in detail, and installation plan.