Cruise Summary

1. Cruise Information

Cruise number	KR09-18
Ship name	KAIREI
Title of the cruise	Research dives by KAIKO7000II
Chief Scientist	Hajime Shiobara [ERI, Univ. Tokyo]
Representative of Science Party	Hajime Shiobara [ERI, Univ. Tokyo]
Title of proposal	Study for mobile ocean bottom broadband seismic observation of the next generation
Cruise period	17 – 27, Dec., 2009
Port call	Jamstec, Yokosuka – Jamstec, Yokosuka
Research Area	Philippine Sea
Research Map	Refer to Figure 1

2. Overview of Observation

-Purpose and background

We have already developed the mobile broadband ocean bottom seismometer (BBOBS), and many practical observations and the result have been achieved since 1999. But, through the evaluation of the broadband seismic data, the noise level of horizontal components those are important in data analyses, is rather high in average and its variation in time is also large. The reason of this is assumed as the small tilt variation of the large housing sphere due to a tidal bottom current. To clear this problem, one idea of observation without tilt variation due to the bottom current is the use of small and low profile broadband sensor that enables to intrude into the sediment. Now, we are on the way to develop this new generation BBOBS (BBOBS-NX) under support of Grant-in-Aid for Scientific Research (B) during 2007–2010. Its final goal is the free fall deployment and self pop-up recovery system as same as the BBOBS in present.

-Observations

We recover the BBOBS-NX2 deployed in the KR09-05 cruise and the BBOBS-NX3 those were not operated in the previous KR09-11 cruise, due to malfunction of the ROV, KAIKO7000II. To perform the test observation using the BBOBS-NX3 planned in the KR09-11 cruise, we deploy the BBOBS-NX3' with support of the ROV. The BBOBS-NA2 (BBOBS using a new style anchor) is also deployed by the free-falling way. It is impossible to do this kind of test observation on the land, because there is almost no low noise station similar to the deep sea floor and the condition of

solid-liquid interface and the existence of the bottom current.

-Method and Instruments

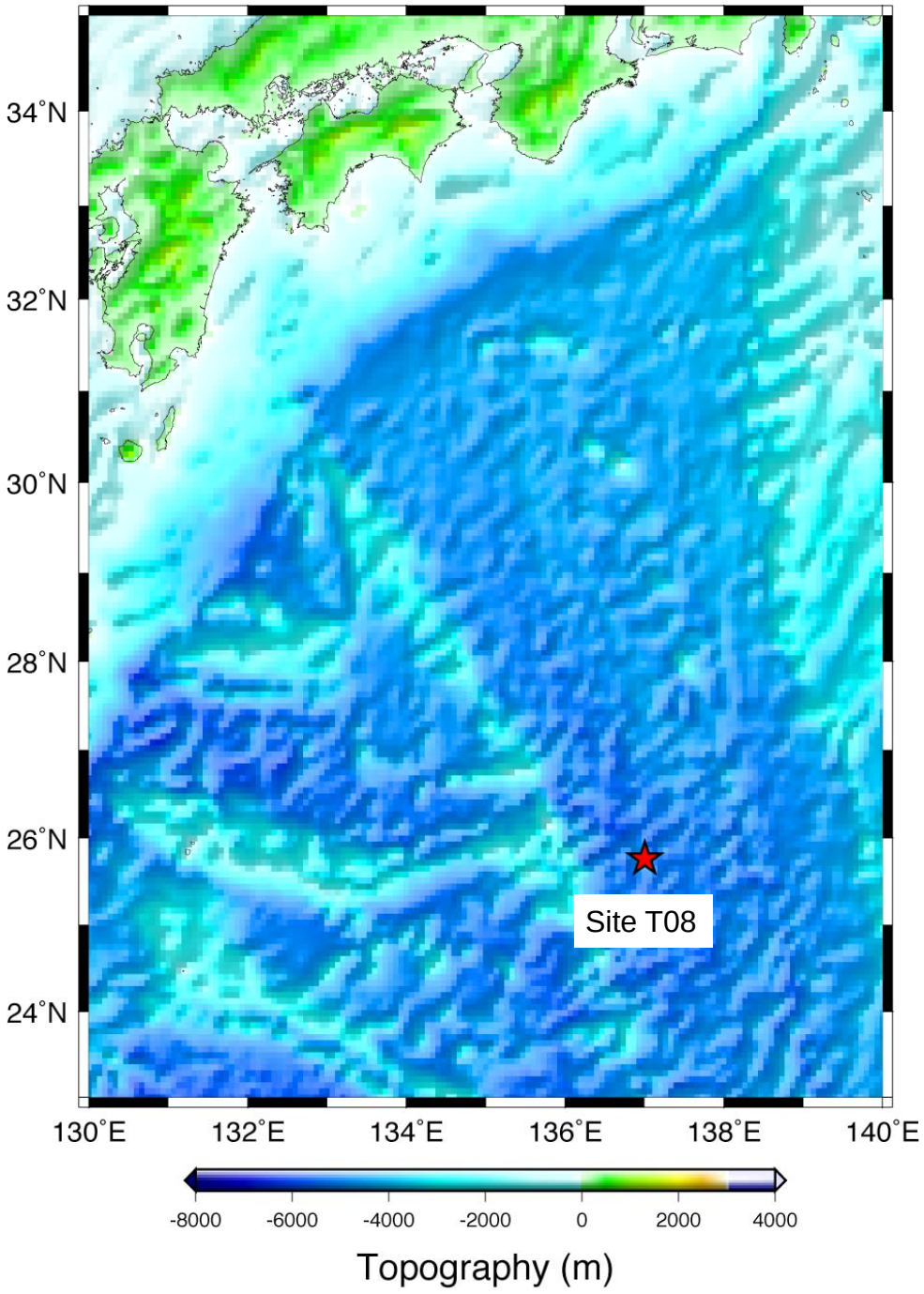
The BBOBS-NX3' and BBOBS-NA2 are deployed by the free-falling nearby the BBOBS-NX2. The recording unit of the BBOBS-NX3' is moved from the top of the sensor unit and is put on the sea floor. Finally, the BBOBS-NX2 and the BBOBS-NX3 are recovered through two dives of the ROV.

-Research Result

The BBOBS-NX3' was landed about 200 m of distance toward the south from the BBOBS-NX2, while the expected drift direction was opposite from previous deployments. The BBOBS-NA2 did not answered when it should be at the sea floor. The BBOBS-NX3' intruded to the sediment with tilt of about 5 degrees by the acoustic communication from the ship. In the first dive of the ROV, all four instruments the BBOBS-NX2, the BBOBS-NX3, the BBOBS-NX3' and the BBOBS-NA2 answered well, when the ROV was close to the sea floor. The final deployment of the BBOBS-NX3' was correctly performed. As the BBOBS-NA2 was only 17m from there, we observed the tumbled one. Next, we started to recover the BBOBS-NX2, and it was done safely. In the second dive, we covered the sensor of the BBOBS-NX3' by using fine sands. Next, the BBOBS-NA2 was tried to be in correct situation, but it was failed. At least, the acoustic communication from the ship is possible by a rolling of it. The BBOBS-NX3 was also recovered same as the BBOBS-NX2.

The data of the BBOBS-NX2 and the BBOBS-NX3 were correctly obtained. The noise level of the BBOBS-NX3 that was not correctly deployed was similar to that of the normal BBOBS. But, the noise level of the BBOBS-NX2 is low enough as we expected. It proved the way to deploy for high quality broadband seismic data.

Figure 1



Site T08: Broadband seismic observation station (depth : 4900 m)