



Kairei Cruise Report

KR12-08

Improvement of real-time seafloor observatory technology using
“Deep Seafloor Observatory off Kushiro-Tokachi”

March 14th 2012 ~ March 20th 2012

Japan Agency for Marine-Earth Science and Technology
(JAMSTEC)

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1 Cruise Information

- Cruise ID : KR12-08
- Name of vessel : Kairei
- Title of the cruise and title of proposal :
Improvement of real-time seafloor observatory technology using
“Deep Seafloor Observatory off Kushiro-Tokachi”
- Cruise period : March 14 2012-March 20 2012
- Ports of call : Hakodate – JAMSTEC Yokosuka
- Research area : Off Kushiro-Tokachi
- Ship Track

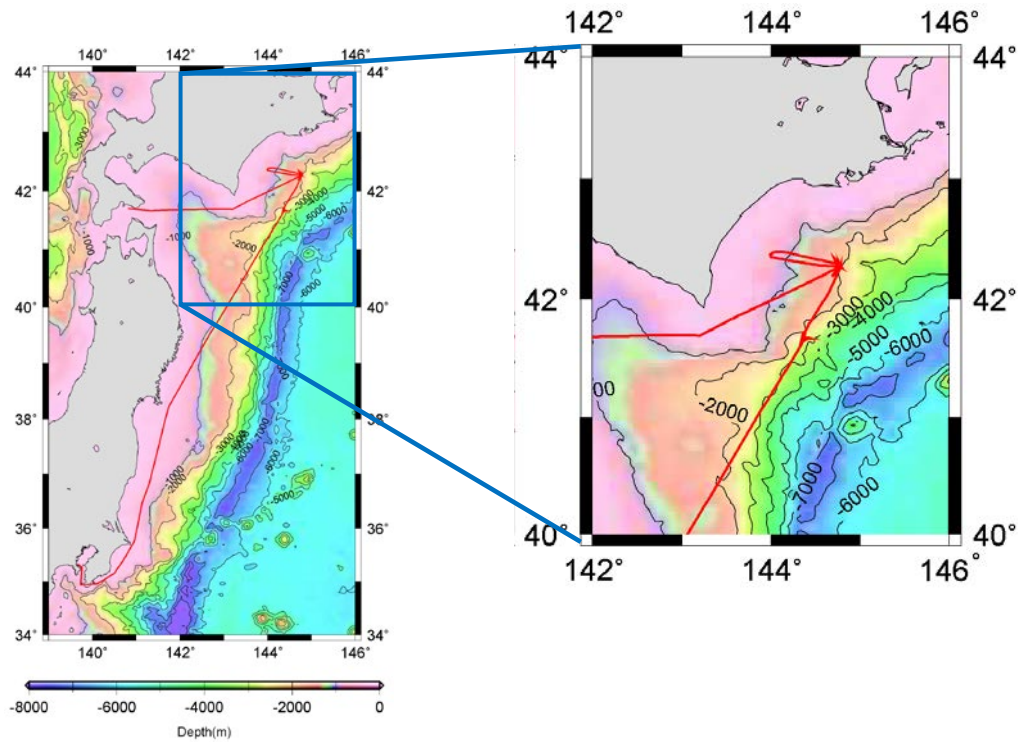


Fig.1 ship Track

2 Researchers

- Chief scientist; Katsuyoshi KAWAGUCHI [JAMSTEC]
- Representative of the science party; Katsuyoshi KAWAGUCHI [JAMSTEC]
Hiroyuki MATSUMOTO [JAMSTEC]
Shuhei NISHIDA [JAMSTEC]
Jin-Kyu Choi [JAMSTEC]
Takashi YOKOBIKI [JAMSTEC]
- Science party;

3 Overview

AOS (Adaptable Observation System) is a battery operated real-time data correctable ad hoc observation test bed for long term deep seafloor observatory OFF Kuroshio/Tokachi System (backbone cable system). It consists of a science node (named J-MUX), sensors, a battery unit and an extension fiber optic cable system. The system operated by the power from battery unit and transmits the observation data by real time through fiber optic line in backbone cable system. The project was carried out from 2001 to 2008 and the data for approximately four years was recorded on this period. This observational data was used for evaluation of a seafloor sensors (such as broadband seismometer and Tsunami pressure gauge), and the result of this experiment is efficiently utilized in the present project "DONET". The recovery of observatory component of AOS was planned in this cruise to evaluate the condition of materials of apparatus that spend long period of time on seafloor. In addition, a LED technology based house made deep sea lighting system which was survived more than five years at 2540m depth of seafloor was also planned to recover for maintenance operation.

4 Instruments of AOS

1) J-MUX

J-MUX (Joint-MUX) equips multiplexer, telemetry unit, pressure housing, frame buoyancy material, underwater mateable connector, acoustic releaser, flasher and radio beacon. J-MUX controls observatory instrument and communication with the landing station. J-MUX interfaces are one RS-232c port and two RS-422 ports, of which one RS-232c port is used for the broadband seismometer in the current observation.

2) Battery Unit

Battery unit equips Lithium battery for J-MUX and the broadband seismometer, pressure housing frame, buoyancy material, and underwater mateable connector. Battery unit provides power to J-MUX and the broadband seismometer. Battery capacity is 27V/1000Ah and life time is approximately 1 year.

3) Broadband seismometer

Broadband seismometer can measure ground motion between the low and high frequencies.

4) Extension cable

The extension cable is laid by ROV or Deep Tow. A one kilo-meter extension cable is wound up to a bobbin. In the current observatory, the extension cable which is 600 meters long was laid on the deep sea floor.

5 Dive summary

1) Kaiko7000II Dive #550

Date: 2012/3/15

Objective : To recover the wide band seismometer and the battery package.

Pilot : Shota IHARA, Seiji SHIGETAKE, Ryu ASAI

Diving Site : offshore Kushiro and Tokachi, south-southeast of Hokkaido

Reference Point : 42-16.3N 144-46.6E, 2075m depth

The ROV Kaiko7000II landed on muddy seafloor at 09:21 (42-16.5N 144-46.8E, 2061m depth). Then, the ROV moved to the wide band seismometer as shown Fig.2. The cover over this wide band seismometer was removed at 09:43, (42-16.4N 144-46.8E, 2061m). The condition of this cover was corrosion very well. This condition was guessed it is difficult to recover the cover. And then, the wet-mate connector which was connected between the wide band seismometer and Joint-MUX was unmated as shown Fig.3.

Next, the ROV moved to J-MUX at 10:46 (42-16.4N 144-46.8E, 2061m depth). The connector which was connected between the battery package and Joint-MUX was unmated, and the connector which mounted Joint-MUX was mated on dummy cap. Then, the connector for battery was brought to the battery package.

The ROV arrived to the battery package at 11:20 (42-16.4N 144-46.8E, 2061m depth), and put this wet-mated connector with the cable for battery on the seafloor near the battery package. And, the ROV returned to the wide band seismometer at 11:31.

The ROV which arrived at the wide band seismometer removed the glass beads and muds filled in the casing by “DOROTHY” as shown in Fig.4. After that, the wide band seismometer was picked up as shown in Fig.5, and carried near the battery package at 12:34.

Finally, the hooks with ropes were hung on the wide band seismometer and battery package, then ROV left seafloor.

In this dive, the wide band seismometer with wet-mate connector and the battery package are recovered.

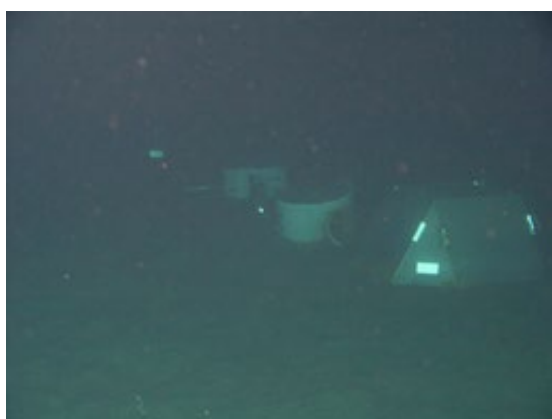


Fig.2 The Cover of the Seismometer

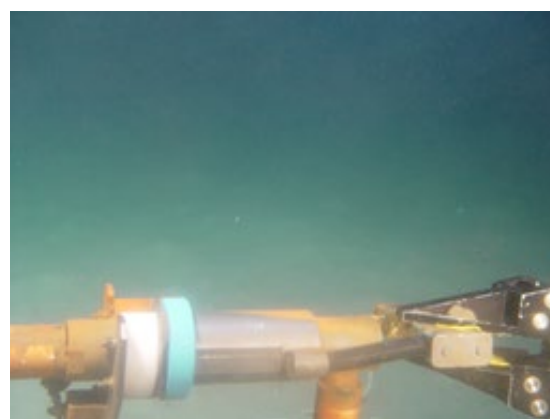


Fig.3 The Connector of the seismometer



Fig.4 The removing glass beads by the
DOROTHY

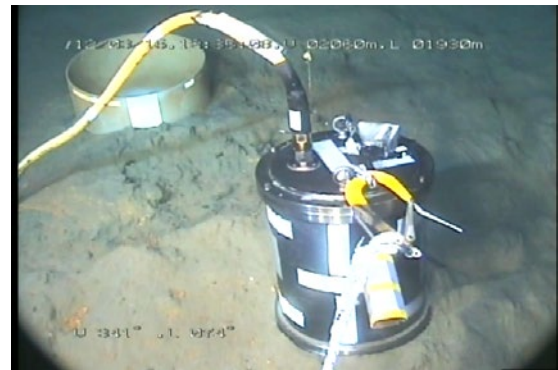


Fig.5 Picked up the seismometer

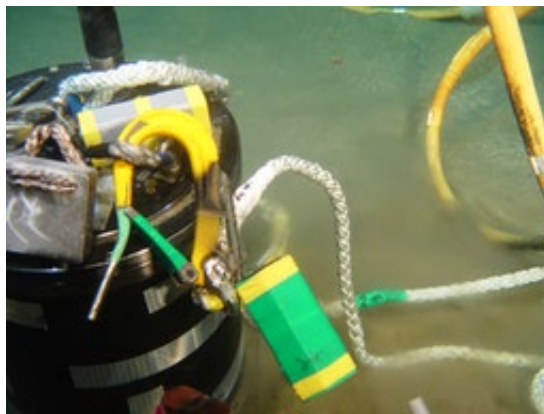


Fig.6 The wide band seismometer with
hooks and ropes for recovering

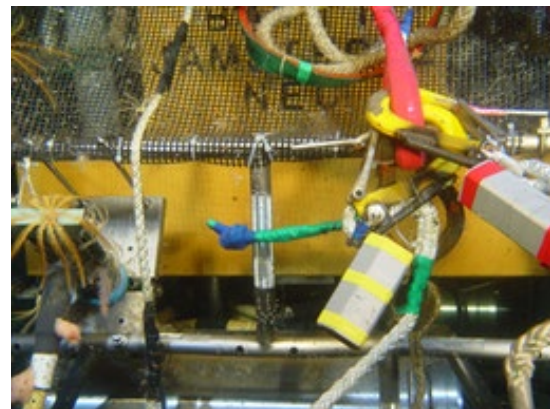


Fig.7 The battery package with hooks and
ropes for recovering

2) Kaiko 7000 II Dive #551

Date: 2012/03/16

Objective: To recover the J-MUX and the underwater mateable connector

Pilot: Asai, Kondo, Ihara

Diving Site: Offshore Kushiro and Tokachi

Reference Point: 42°16.19'N, 144°46.64'E, 2067m depth

After landing on muddy seafloor at a depth of 2067m, the vehicle moved to the B-MUX (42°16.20'N, 144°46.61'E, 2068m depth) and detached the target connector from the B-MUX. A dummy cap was put on the connector at the B-MUX as a substitute of the detached one. Then, the vehicle moved to the J-MUX (42°16.44'N, 144°46.87'E, 2061m depth) while having the detached connector. After arriving, the vehicle cut the cable that connects the cable bobbin with the J-MUX. Lastly, hooks with ropes were hung to the frame of the J-MUX for recovering. The recovery work was carried out successfully without any problem. Figs. 8 and 9 shows the underwater mateable connector and the J-MUX on the seafloor and Figs. 10 and 11 show the recovered ones.

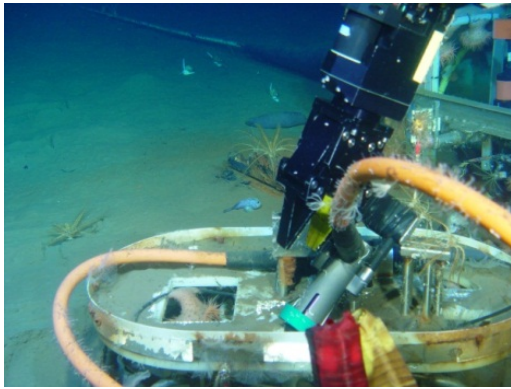


Fig. 8 Underwater mateable connector on seafloor

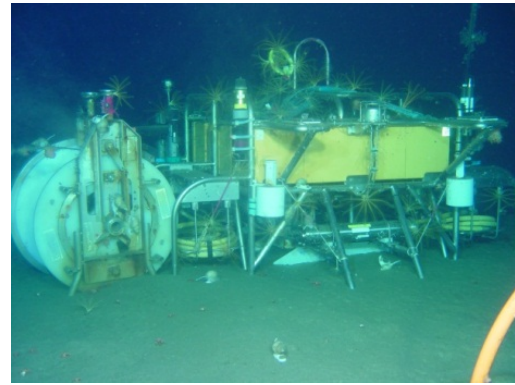


Fig. 9 J-MUX on seafloor

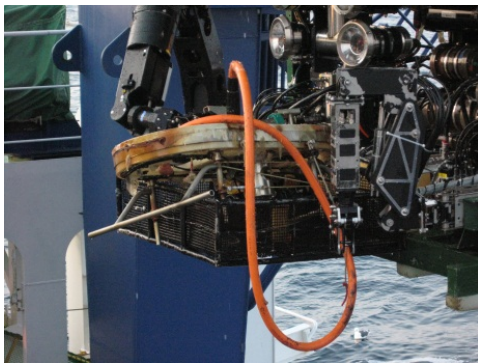


Fig. 10 Recovered underwater mateable

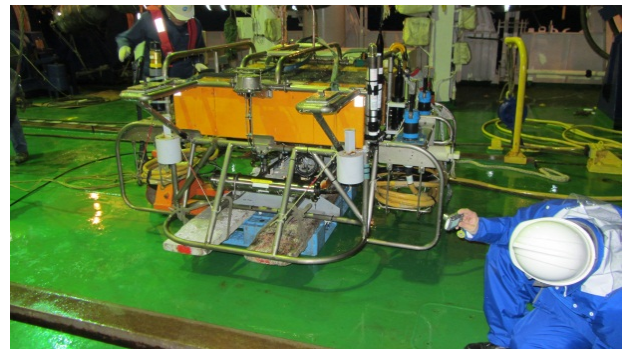


Fig. 11 Recovered J-MUX

3) Kaiko 7000II Dive #552

Date: 2012/3/15

Pilot : Tetsuya ISHITSUKA, Shota IHARA, Tomoe KONDO

Objective : To Recover the Cable-Bobbin which was connected between B-MUX and J-MUX.

Diving Site : offshore Kushiro and Tokachi, south-southeast of Hokkaido.

Reference Point : 42-16.3N 144-46.6E, 2075m depth

The ROV Kaiko7000II was landed on muddy seafloor at 10:18 (42-16.4N 144-46.9E, 2061m). And then, the ROV moved near the cable-bobbin which was connected between the B-MUX and the J-MUX. At 10:33, the ROV arrived at the recovered target in this dive as shown Fig.12. Finally, hooks with rope are hung the frame of the bobbin and the wet-mate connector as shown Fig.13 and Fig.14. Then, the ROV left seafloor.

In this dive, the Cable-Bobbin with wet-mate connector is recovered.



Fig.12 The Cable-Bobbin and Wet-mate Connector



Fig.13 The Wet-mate Connector with Hooks for Recovering



Fig.14 The Cable-Bobbin and the Wet-mate Connector with Hooks for Recovering

6 Conclusion and Remark

The all observatory component of AOS (a node, sensors, a cables system and a battery unit) was successfully recovered in this cruise. The deterioration of materials using observatory will be tested on land test facilities. The test result will bring about new knowledge about the design of seafloor apparatuses. The 4th dive of this cruise was canceled by weather condition and the recovery of LED lighting system was carried over in the future.

7 Notice on Using

Notice on using: Insert the following notice to users regarding the data and samples obtained.

This cruise report is a preliminary documentation as of the end of the cruise. This report may not be corrected even if changes on contents (i.e. taxonomic classifications) may be found after its publication. This report may also be changed without notice. Data on this cruise report may be raw or unprocessed. If you are going to use or refer to the data written on this report, please ask the Chief Scientist for latest information. Users of data or results on this cruise report are requested to submit their results to the Data Management Group of JAMSTEC.