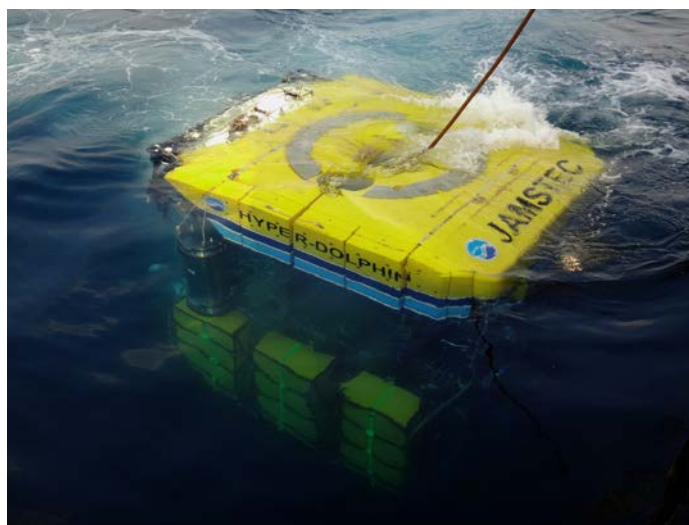




Shinsei-maru Cruise Report KS-18-J04

Development of continuous real-time observation system for crustal deformation



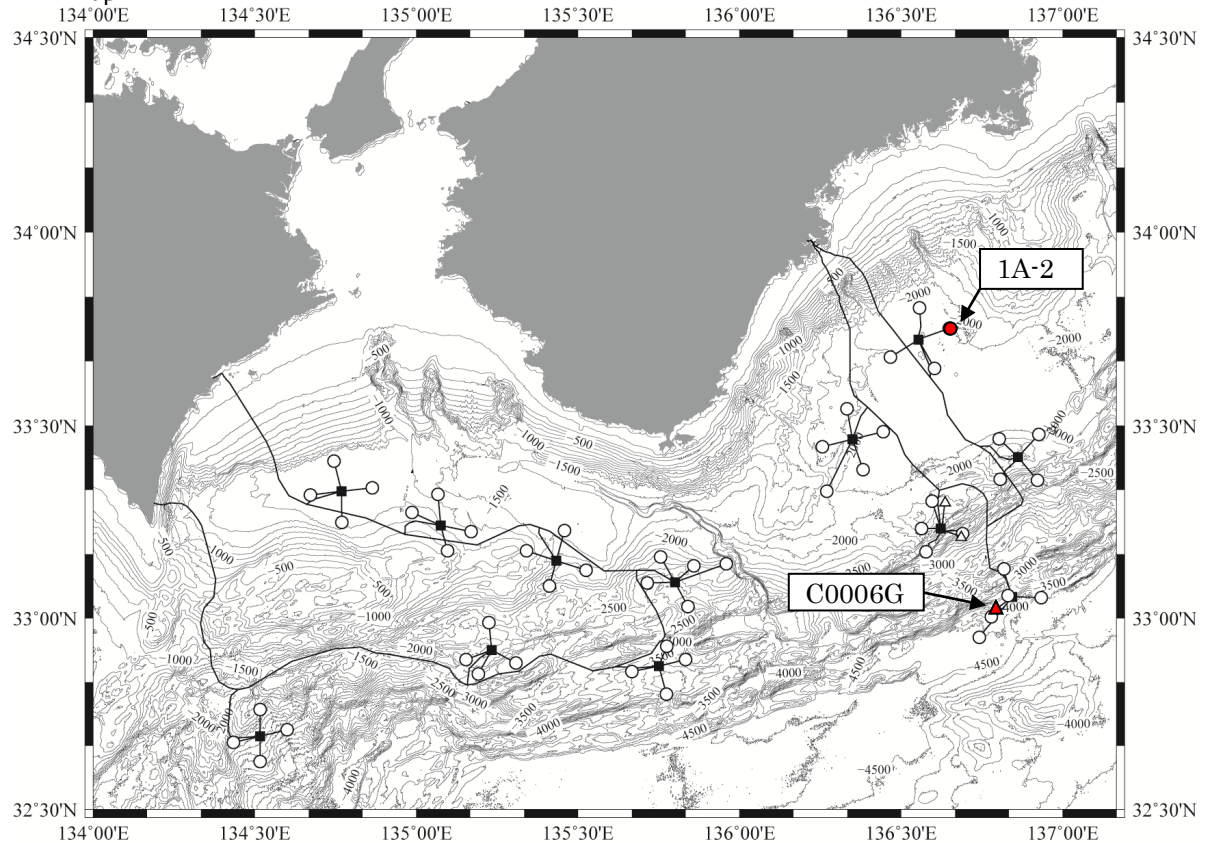
Kumano-nada

March.15,2018-March.30,2018

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

1. Cruise Information

- Cruise ID KS-18-J04
- Name of vessel R/V Shinsei-maru
- Title of cruise Development of continuous real-time observation system for crustal deformation
- Chief Scientist [Affiliation] Takashi YOKOBIKI [JAMSTEC]
- Cruise period 15-March 2018 – 30 March 2018
- Ports of departure / call / arrival JAMSTEC Yokosuka – Wakayama port– JAMSTEC Yokosuka
- Research map



Observatory No.	Latitude	Longitude	Depth [m]
C0006G	33-01.649' N	136-47.647' E	3,874
1A-2	33-45.144'N	136-38.930'E	2,011

2. Research Proposal and Science Party

- Title of proposal Development of continuous real-time observation system for crustal deformation
- Representative of Science Party Shuichi KODAIRA [JAMSTEC]
Takashi YOKOBIKI [JAMSTEC]
Toshinori KIMURA [JAMSTEC]
- Science Party (List) Shuhei NISHIDA [JAMSTEC]
Yuya MACHIDA [JAMSTEC]
Masayuki TOIZUMI [NME]
Ryuya SUGIYAMA [NME]
Yoshiki HORIUCHI [NME]

3. Dive summary (Research/Development Activities)

3.1 DIVE#2049 on March 18, 2018: Route survey

Before the cable laying operation, it is required that the route survey and clearance of the cable route. In this dive, the route clearance and the route survey were conducted from the en route of the cable route of 1C-11 observatory to the C0006G long-term real-time borehole observatory. At first, ROV Hyper Dolphin (HPD) was dive to 33-02.005N 136-48.446E where is near the 1C-11 cable route and started route survey. Soon, at 33-02.000N 136-48.454E, we confirmed the extension cable of 1C-11 (Fig.1-1) on mud sea floor. When HPD moved along the extension cable, the operation was interrupted because the ground fault was occurred at 400m from the start point.



Fig.1-1 The extension cable of 1C-11 (Black line)

3.2 DIVE#2050 on March 19, 2018: Calibration of the borehole pressure gauge and route survey (Canceled)

This dive was canceled because the ground fault was occurred in the HPD at a water depth of 370m.

3.3 DIVE#2051 on March 19, 2018: Calibration of the borehole pressure gauge and route survey

In this dive, The HPD operated the valves on the wellhead to calibrate the pressure gauges. The route survey was also carried out for the remaining section.

The HPD started dive at 11:02 and approached to the wellhead. At first, we checked where to put a bobbin of extension cable and set the ROV Homer (ID:19) at the planed point. (Fig.2-1) Next, the HPD put the sandbags temporary on the ROV platform. The sandbags were used to prevent the bobbin rolling in later dive.

On the platform, there are Underwater mateable connector to communicate with pressure gauges. The pressure gauges were checked through the connector to confirm that they were operating properly. (Fig.2-3) The valves that can change the observation point were turned in preparation for observation. (Fig.2-4)

Among the planed cable extension route, the route survey of the remaining section of Dive #2049 was conducted and left the sea floor.



Fig.2-1 Wellhead and ROV Homer



Fig.2-2 Sandbags were put on temporary

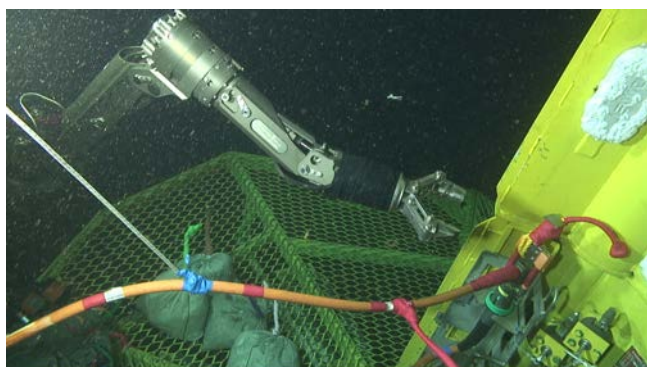


Fig.2-3 Connect the UMC



Fig.2-4 the valve was turned to “OPEN”

3.4 DIVE#2052 on March 24, 2018: Installation of the interface of borehole instruments

Before this dive, the interface was loaded onto the HPD's payload space. (Fig.3-1) The HPD landed on the platform of wellhead at 8:52, and she placed the interface in the exact position of the planned place. (Fig.3-2) The three pins were pushed down on the interface not to shift the interface. After the placement work, the four jumper cables were connected to the port of the wellhead respectively. (Fig.3-3, Fig.3-4) We made the visual check around the wellhead, and left the sea floor at 10:07.



Fig.3-1 The interface on the HPD

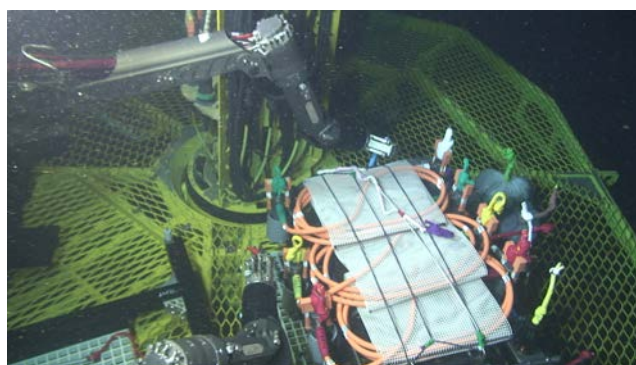


Fig.3-2 The interface set on the platform

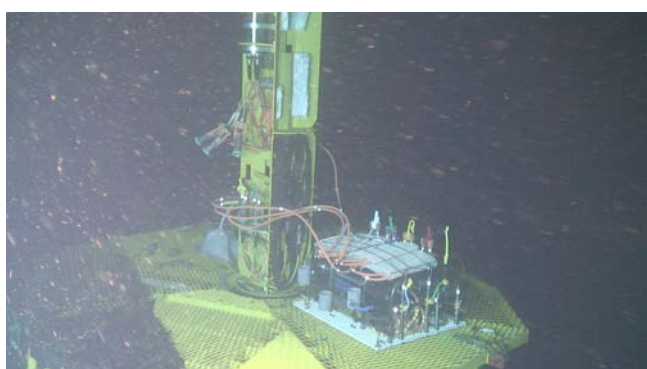


Fig.3-4 Connection of the jumper cables (South side)

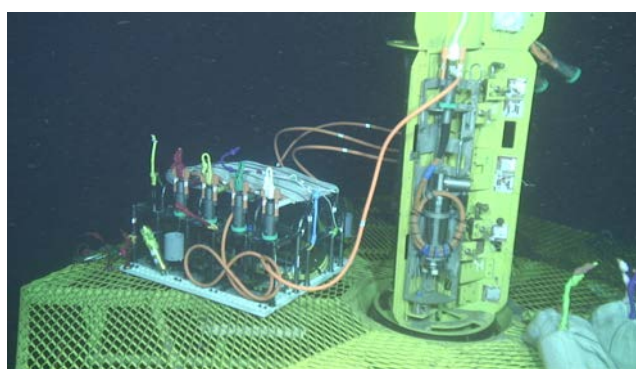


Fig3-4 Connection of the Jumper cable (North side)

3.5 DIVE#2053 on March 26, 2018: Cable laying operation (Canceled)

The cable-laying operation from Node 1C to the C0006G long-term borehole observatory was carried out using the automated cable-laying system. After landing near Node 1C, the HPD connected the underwater mateable connector of upper end of the cable into the port 6 of the node. After that, the junction box was placed on the sea floor and the

cable-laying operation was started. However, after laying 400m section of the extension cable, the trouble occurred on the electric motor of the sheave. After trying to recover for one hour, we decided to quit the cable laying operation. All equipment connected to the extension cable were recovered. HPD returned to the mother vessel with our hopeless. But, as the result of inspection conducted on the mother vessel, it was confirmed that the extension cable was not damaged.

3.6 DIVE#2054 on March 27, 2018: Cable laying operation

Before this dive, the electric motor of the sheave was replaced with a spare motor, and it was confirmed that the automated cable-laying system worked quite well.

The HPD started to dive at 9:13, and landed near Node 1C at 11:18. The HPD connected the underwater mateable connector into the port 6 of the node 1C again. And the cable-laying operation was started at 11:35 after placed the junction box. The HPD arrived at the observatory C0006G, the cable bobbin was placed at the planned position at 19:13. (Fig.4-3) The lower end of the extension cable was connected to the interface on the platform. (Fig.4-4) It was confirmed that there was no problem in communication between the observatory C0006G and the Furue landing station. After receiving the good report from the Furue landing station, the HPD left the sea floor.

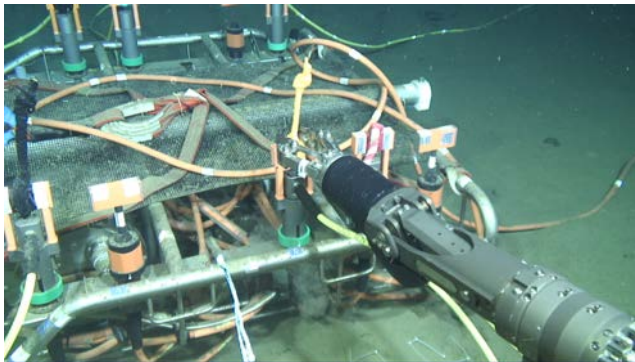


Fig.4-1 Connection with the Node 1C port 6

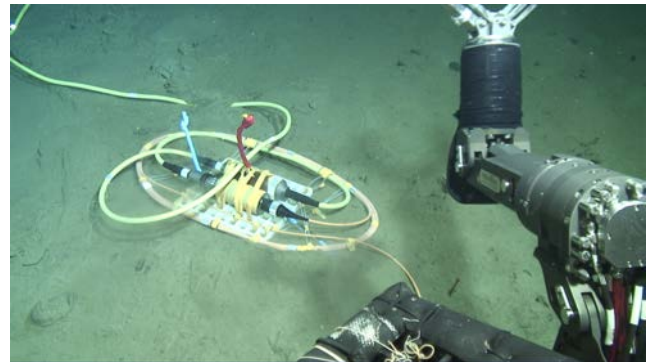


Fig.4-2 Junction box

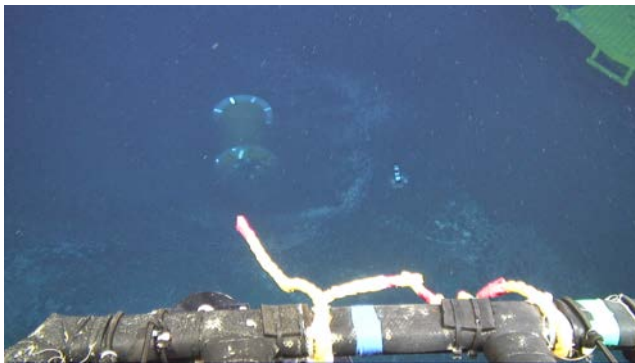


Fig.4-3 Cable bobbin near the wellhead

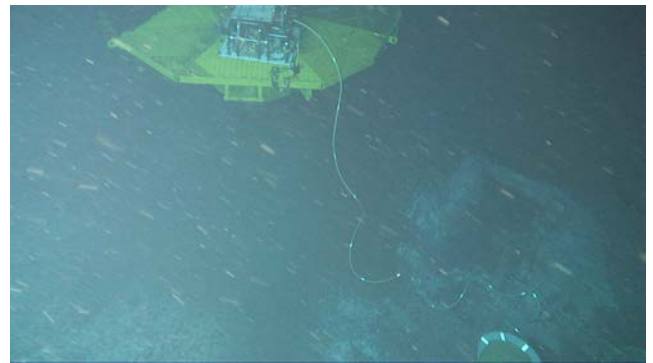


Fig.4-4 Connection to the interface

2.7 DIVE#2055 on March 26, 2018: Sea trial of Mobile Pressure Calibrator for Ocean Bottom Pressure Gauge (1A-2 observatory)

The Mobile Pressure Calibrator is a device that can be carried while maintained verified precise pressure, and it calibrates a water pressure gauge installed on the seabed. The calibrator is equipped with a level adjustment mechanism that can change the position of the unit that maintained precise pressure.

In this dive, the function of the Mobile Pressure Calibrator was checked fixing on the sample basket of the HPD. But before the dive, since the ground fault had been occurred in the level adjustment mechanism, we disconnected the cable related to the mechanism from the HPD.

The HPD started to dive at 7:09 and landed 3m from the pressure sensor unit of DONET1 at 8:37. The pressure sensor unit of 1A-2 observatory was irradiated with a laser that is equipped to confirm the level, and the condition of the irradiation was checked by cameras of the HPD. (Fig.5-2) Due to the arrival time of the next day, the HPD left the seabed at 9:52 and on the deck at 10:45.



Fig.5-1 Mobile Pressure Calibrator
on the sample basket of the HPD



Fig.5-2 the pressure sensor unit of DONET1

4. Notice on Using

This cruise report is a preliminary documentation as of the end of cruise.
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