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Cruise Report

YK10-E02

(R/V Yokosuka)

Site Surveys for IODP expeditions in the Kumano-nada area

October 17 - 19, 2010

Center for Deep Earth Exploration (CDEX)

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

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Preface

The YK10–E02 cruise of the *R/V Yokosuka* was carried out as an operational site survey for hazard assessment of the NanTroSEIZE project with the *D/V Chikyu*, the Integrated Ocean Drilling Program (IODP). The mission of this cruise was to retrieve two mooring systems, which had been installed near the IODP site, C0002, during the YK10-06 cruise in mid-June 2010 for recording sea current profiles on an ordinary pass of the Kuroshio current. The retrieval operations were conducted on 18 October 2010 and both the two mooring systems were retrieved successfully without serious damages on the systems. The data obtained by the mooring systems shall be used for a riser analysis at Site C0002, at which an ultra deep riser hole is supposed to be drilled in near future.

1. Participants aboard the R/V Yokosuka cruise YK10-02E

Kan AOIKE (Chief Scientist) JAMSTEC/CDEX

2. Objectives

The YK10–E02 cruise of the *R/V Yokosuka* was scheduled as an operational site survey for hazard assessment of the NanTroSEIZE project with the *D/V Chikyu*, the Integrated Ocean Drilling Program (IODP). The mission of this cruise was to retrieve two mooring systems, which had been installed near the IODP site, C0002, during the YK10-06 cruise in mid-June 2010.

The site C0002 at which an ultra-deep riser hole toward a seismogenic zone of the eastern Nankai Trough is planned is unfortunately situated on a major pass of the Kuroshio current. This strong current, exceeding 5 knots sometimes, is expected to exert severe influences on the riser pipe of the *D/V Chikyu* while operations. In order to simulate behaviors of the riser pipe and mitigate operational risks under such strong current conditions, a riser analysis using actual data of current direction and speed with temporal variation of a reasonably long period is required. We, thus, installed mooring systems equipped with acoustic Doppler current profilers to target sites for recording sea current profiles of direction and speed for an extended period of time.

3. Survey Areas

The area for the operations is located near an IODP site, C0002, at the southern margin of the Kumano Basin, a forearc basin of the eastern Nankai Trough, about 70 km southeast of Shingu City, Wakayama Prefecture, Kii Peninsula (Fig. 1). There are two sites, CM03 and CM04, to which the mooring systems are placed, situated at an upstream area of Site C0002 along the Kuroshio current ordinary pass. Site CM03 (33°17.8651'N, 136°31.4941'E) is located on the northern foot of a knoll, 12 km east from Site C0002, 1912.0 m in expected water depth. Site CM04 (33°16.0531'N, 136°33.9294'E) is located near the top of the knoll, 8 km southeast, 1749.0 m in expected water depth. Each mooring systems is equipped with one Acoustic Doppler Current Profiler (ADCP) at the top, four Doppler current meters (RCM 11), three conductivity-temperature-depth recorders (CTD) and two acoustic releasers (Fig. 2, Fig. 3). The top buoys of the sites CM03 and CM04 are arranged to set at about 600 mbsl and 350 mbsl, respectively.

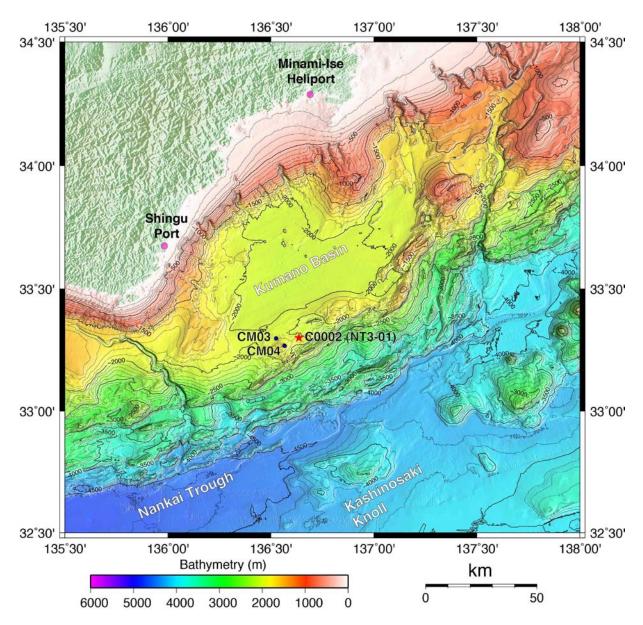
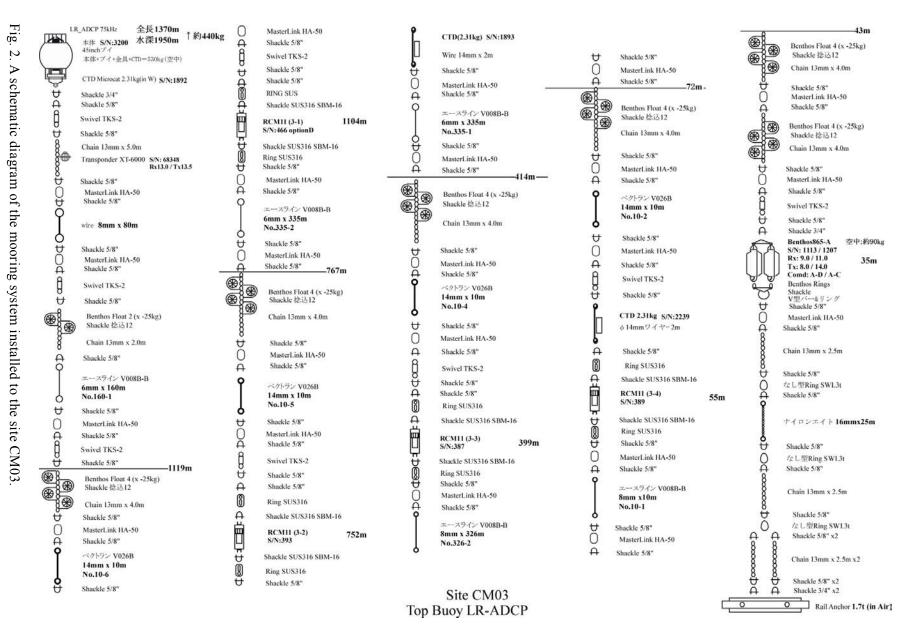


Fig. 1. A bathymetry map the eastern Nankai Trough with showing the installation points of the mooring systems and the location of Site C0002.



2 \triangleright schematic diagram ofthe mooring system installed to the site

BB_ADCP 150kHz 全長1435m Shackle 5/8" 本体 S/N:1152 水深1790m Shackle 5/8" 49inch 7 本体+ブイ+金具+CTD=650kg(空中) ↑約450kg Shackle SUS316 SBM-16 エースライン V008B-B エースライン V008B-B **®** 8mm x 30m 8mm x 146m Benthos Float 4 (x -25kg) CTD Microcat 2.31kg(in W) S/N:2287 RCM11 (4-1) 1158m No.30-1 No.146-1 Shackle 捻达12 S/N: 467 option D Shackle 3/4" t Shackle 5/8" Chain 13mm x 4.0m Shackle 5/8" MasterLink HA-50 Ü Shackle SUS316 SBM-16 A Shackle 5/8 Shackle 5/8" Shackle 5/8" Ring SUS316 Shackle 5/8" エースライン V008B-B t Shackle 5/8" エースライン V008B-B MasterLink HA-50 Swivel TKS-2 8mm x 177m 8mm x 326m Shackle 5/8" Masterl ink HA-50 A No.177-1 Shackle 5/8" No. 326-1 Shackle 5/8" t Shackle 5/8" Transponder XT-6000 S/N: 50320 Rx13.0 / Tx14.5 Benthos Float 4 (x -25kg) Shackle 5/8" エースライン V008B-B 0 Shackle 捻达12 MasterLink HA-50 Chain 13mm x 5.0m MasterLink HA-50 8mm x 75m A Shackle 5/8" Chain 13mm x 4.0m A 72m No.75-1 Shackle 5/8" Shackle 5/8" 442m-MasterLink HA-50 Shackle 5/8" t Shackle 5/8" (1) Benthos Float 3 (x -25kg) Shackle 5/8" (8) Benthos Float 3 (x -25kg) MasterLink HA-50 Shackle 5/8" Shackle 捻达12 Shackle 捻込12 Shackle 5/8" エースライン V008B-B wire \$ 8mm x 80m Chain 13mm x 4.0m 6mm x 265m Swivel TKS-2 Chain 13mm x 4.0m No.265-1 0 Shackle 5/8" Shackle 5/8" Shackle 5/8" Ă Shackle 3/4" Shackle 5/8" Shackle 5/8" ++ MasterLink HA-50 MasterLink HA-50 Benthos865-A MasterLink HA-50 MasterLink HA-50 A Shackle 5/8" Shackle 5/8" S/N: 1086 / 1120 Shackle 5/8" A Shackle 5/8" Rx: 10.0 / 9.0 Swivel TKS-2 ベクトラン V026B 35m Tx: 13.0 / 9.5 14mm x 10m ベクトラン V026B Benthos Float 3 (x -25kg) Shackle 5/8" Comd: B-E / A-F 空中:約90kg 14mm x 10m No.10-8 Shackle 捻込12 Ò Benthos Rings (Benthos Float 3 (x -25kg) No.10-1 t Shackle 5/8* Shackle Shackle 捻込12 Chain 13mm x 4.0m V型バー&大リング ₩ ? Shackle 5/8" MasterLink HA-50 Shackle 5/8" Chain 13mm x 4.0m tt Shackle 5/8" MasterLink HA-50 A MasterLink HA-50 Shackle 5/8" MasterLink HA-50 Shackle 5/8" A Shackle 5/8" Shackle BB16 Swivel TKS-2 Shackle 5/8" A Swivel TKS-2 wire φ8mm x 175m Shackle 5/8" Chain 13mm x 2.5m ベクトラン V026B Shackle 5/8" 14mm x 10m Shackle 5/8" No.10-3 CTD (2.31kg in W) S/N: 2289 Shackle BB16 t Shackle 5/8" Ring SUS316 φ14mmワイヤー2m なし型Ring SWL3t MasterLink HA-50 Shackle 5/8" Shackle BB16 A Shackle SUS316 SBM-16 Shackle 5/8" MasterLink HA-50 Shackle 5/8" A Shackle 5/8" Swivel TKS-2 RCM11 (4-3) Ring SUS316 ナイロンエイト 16mmx25m Shackle 5/8" S/N: 139 Swivel TKS-2 Shackle SUS316 SBM-16 Shackle SUS316 SBM-16 t Shackle 5/8" **®** Benthos Float 3 (x -25kg) Shackle 5/8" RCM11 (4-4) 55m A Shackle 5/8" Shackle 捻达12 Ring SUS316 S/N: 394 なし型Ring SWL3t Shackle 5/8" Shackle 5/8" Ring SUS316 Chain 13mm x 4.0m MasterLink HA-50 Shackle SUS316 SBM-16 A Shackle SUS316 SBM-16 Shackle 5/8" Ring SUS316 Shackle 5/8" Chain 13mm x 2.5m MasterLink HA-50 Shackle 5/8" RCM11 (4-2) 801m エースライン V008B-B S/N: 380 Shackle 5/8" MasterLink HA-50 8mm v 30m Shackle 5/8" ベクトラン V026B Shackle SUS316 SBM-16 Shackle 5/8" No.30-2 0 なし型Ring SWL3t 14mm x 5m (8) エースライン V008B-B Shackle 5/8" x2 Ring SUS316 Shackle 5/8" No.5-1 U 8mm x10m Ū Shackle 5/8" A Shackle 5/8" t Shackle 5/8" No.10-2 Chain 13mm x 2.5m x2 0 CTD(2.31kg in W) MasterLink HA-50 S/N: 2288 Shackle 5/8" A Shackle 5/8" Ŭ Shackle 5/8" x2 Wire 14mm x 2m MasterLink HA-50 A A Shackle 3/4" x2 Swivel TKS-2 Site CM04 A Shackle 5/8" Shackle 5/8" Shackle 5/8" Top Buoy BB-ADCP Rail Anchor 1.8t (in Air) MasterLink HA-50

Fig. $\dot{\omega}$ \triangleright schematic diagram ofthe mooring system installed to the site CM04.

4. Chronicle of the Cruise

2010/10/19 09:00

The *R/V Yokosuka* left from a quay of the Kobe Port Island at 15:00 on 17th October and arrived at the objective area at 04:00 on 18th and resumed to move to the first site, CM03, at 06:00. The retrieval operations started at 7:00 and finished at 14:30. Then the vessel left for Yokosuka. The vessel came alongside the quay of JAMSTEC, Yokosuka, at 09:00 on 19th October. The cruise log is shown as follows and the ship track is shown in Fig. 4.:

```
2010/10/16
   Position: 34°40.2'N, 135°12.1'E / Weather: cloudy / Wind direction: SSW/ Wind force: 2/ Wave: 1
   m/ Swell: 0 m/ Visibility: 6 nautical miles (12:00 JST)
   17:00
            Onboard
2010/10/17
   Position: 34°40.2'N, 135°12.1'E / Weather: cloudy / Calm/ Wave: 1 m/ Swell: 0 m/ Visibility: 6
   nautical miles (12:00 JST)
   08:00
            Rig a ship for the mooring buoy system
   13:30
            Briefing about ship's life and safety
   14:30
            Safety education and training for operation
   15:00
            Departure from Kobe
   15:30
            Proceeding to the site CM03
2010/10/18
   Position: 33°16.2N, 136°36.0E / Weather: cloudy / Wind direction: NNE/ Wind force: 5/ Wave:
   4m/ Swell: 2 m/ Visibility: 7 nautical miles (12:00 JST)
   04:00
            Arrival at the site CM03
   07:20
            Transmission of enable command and receive the command
   08:58
            Transmission of release command and receive the command
   09:05
            Surfacing of the top buoy
   11:06
            Recovered the CM03 mooring system
   11:10
            Proceeding to the next site CM04
   12:10
            Arrived at the site CM04
            Transmission of enable command and receive the command
   12:15
   12:20
            Transmission of release command and receive the command
   12:24
            Surfacing of the top Buoy
   14:17
            Recovered the CM04 mooring system
   14:30
            Left the site CM04
   15:00
            Proceeding to Yokosuka
```

Alongside the quay and disembarkation

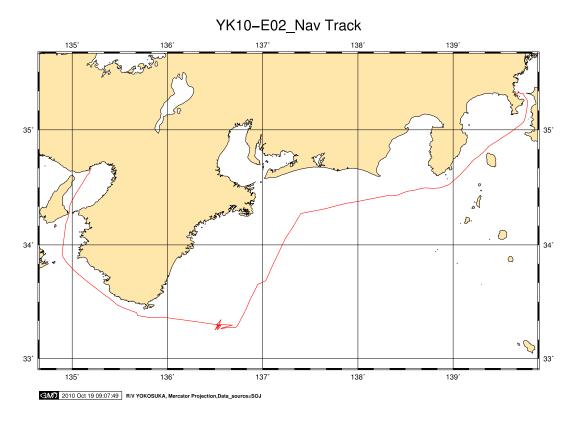


Fig. 4. A map showing the cruise track of YK10-E02.

5. Operations Result

In the mooring retrieval operation at CM03 the first releaser did not respond properly to signals from the onboard communication station and caused a misunderstanding that the mooring might be coming up to the surface; however, the second releaser did respond and the mooring was retrieved successfully. In the second operations at the site CM04 the retrieval proceeded smoothly. No serious damage was observed on both the systems. Data retrieval works were performed while sailing to Yokosuka and continued after being alongside the quay. The data obtained shall be used for a riser analysis, by which behaviors of the Chikyu's riser pipe under high current conditions is examined.

6. Acknowledgement

We thank Captain Satoshi Susami, crew and technical staffs of our operations conducted during the YK10-E02 cruise, for their kind and thoughtful supports during the cruise.

XNotice on using

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 Office, Data Management Group, Data Management and Engineering Department, Data Research Center for Marine-Earth Sciences, JAMSTEC.