



R/V KAIYO Cruise Report

KY15-E04

Site Survey for IODP IBM Drilling Project

(Retrieval of Mooring Systems)

Northern Izu-Ogasawara Arc

December 13 – 16, 2015

Japan Agency for Marine-Earth Science and Technology

(JAMSTEC)

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1. Cruise Information

Cruise ID: KY15-E04

Name of vessel: R/V KAIYO

Title of the cruise: Site Survey for IODP IBM Drilling Project, Northern Izu-Ogasawara Arc
(Retrieval of Mooring Systems)

Title of proposal: Site Survey for IODP IBM Drilling Project, Northern Izu-Ogasawara Arc

Cruise period: 13 -16 December 2015

Ports of departure / arrival: Yokosuka - Yokosuka

Research area: Northern Izu-Ogasawara Arc

Research Map: See Fig.1

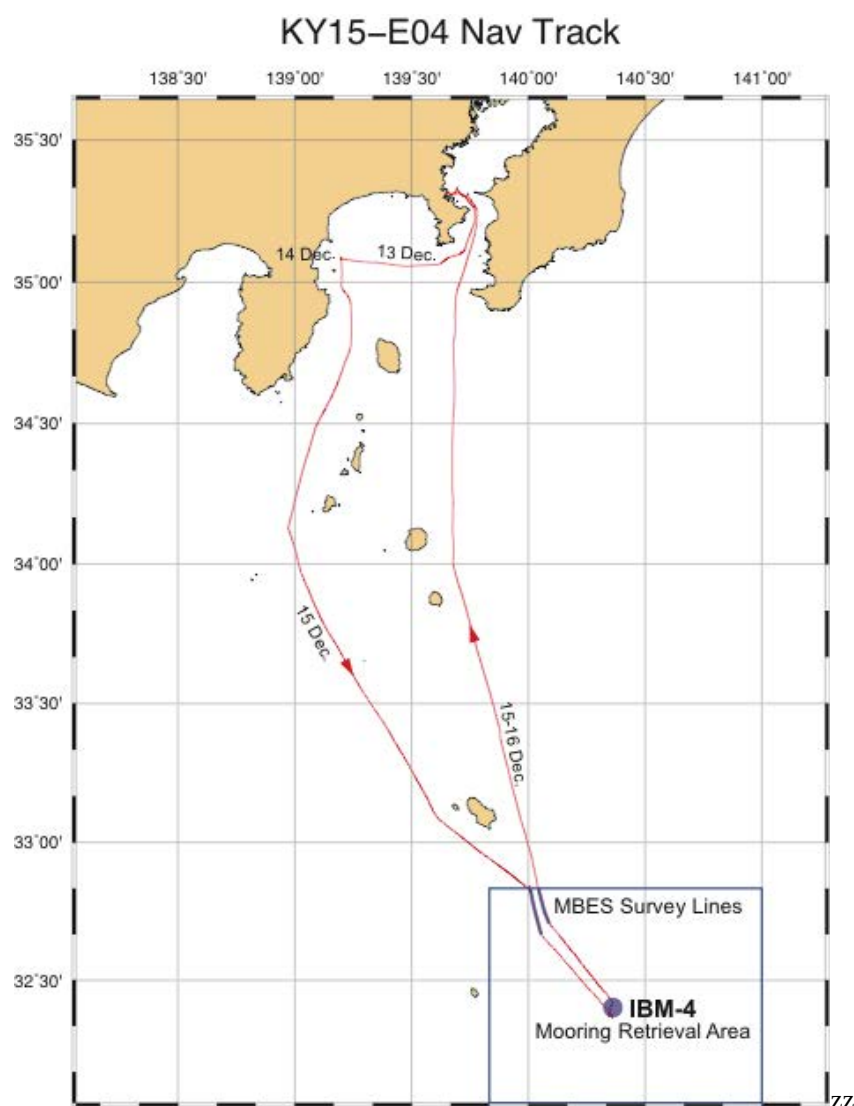


Figure 1. Ship track and survey locations of KY15-E04 cruise. Blue envelope indicates the proposed survey area.

2. Researchers and Technicians

Chief Scientist

Kan Aoike (Center for Deep Earth Exploration, JAMSTEC)

Representative of the Science Party

Kan Aoike (Center for Deep Earth Exploration, JAMSTEC)

Science Party (Onshore Scientists)

Tomokazu Saruhashi (Center for Deep Earth Exploration, JAMSTEC)

Eigo Miyazaki (Center for Deep Earth Exploration, JAMSTEC)

Yoshihiko Tamura (Research and Development Center for Ocean Drilling Science, JAMSTEC)

Technicians

Shusuke Machida (Nippon Marine Enterprises, Ltd.)

Hiromichi Soejima (Nippon Marine Enterprises, Ltd.)

Takuya Onodera (Nippon Marine Enterprises, Ltd.)

Ozawa Tomofumi (Marine Works Japan, Ltd.)

Keisa Matsumoto (Marine Works Japan, Ltd.)

Shungo Oshitani (Marine Works Japan, Ltd.)

3. Surveys

3.1. Objectives

This cruise was planned to retrieve two sets of mid-depth subsurface mooring system, CM-07 and CM-08, which were installed to Site IBM-4, about 55 km off the east of Aogashima Island for long term sea current observation in June 2014 during the YK14-10 cruise (Fig. 2). The retrieval operation was supposed to have been completed during the KY15-15 cruise (4-11 Oct. 2015), however, it was cancelled due to rough sea condition. Site IBM-4 is a deep riser drilling site proposed for the International Ocean Discovery Program (IODP), about 1800 m in water depth, potentially drilled by D/V Chikyu in near future. Long term sea current observation data is one of operational site survey data required for safety assessments of riser drilling, especially for assessment of riser behavior in high current conditions (riser analysis). Since the IBM-4 is located in an area where the Kuroshio Current passes sometimes according to its meandering patterns, we installed the mooring systems to collect sea current data for more than a year (up to two years) for the riser analysis. The deployed mooring systems are about 1500 m in length and so designed as to situate the top buoys at about 300 m under low current conditions (Fig. 3). Besides the mooring system retrieval, there were two supplemental surveys in this cruise as follows:

[Main Survey]

- 1) To recover the two subsurface mooring systems,

[Supplemental Surveys]

- 2) To fill in gaps of the preexisting multibeam bathymetry map around the IBM-4 obtained by JAMSTEC vessels if time allows, and
- 3) To obtain vertical sea current profiles with the hull-mounted ADCP while the vessel stays in the proposed survey area.

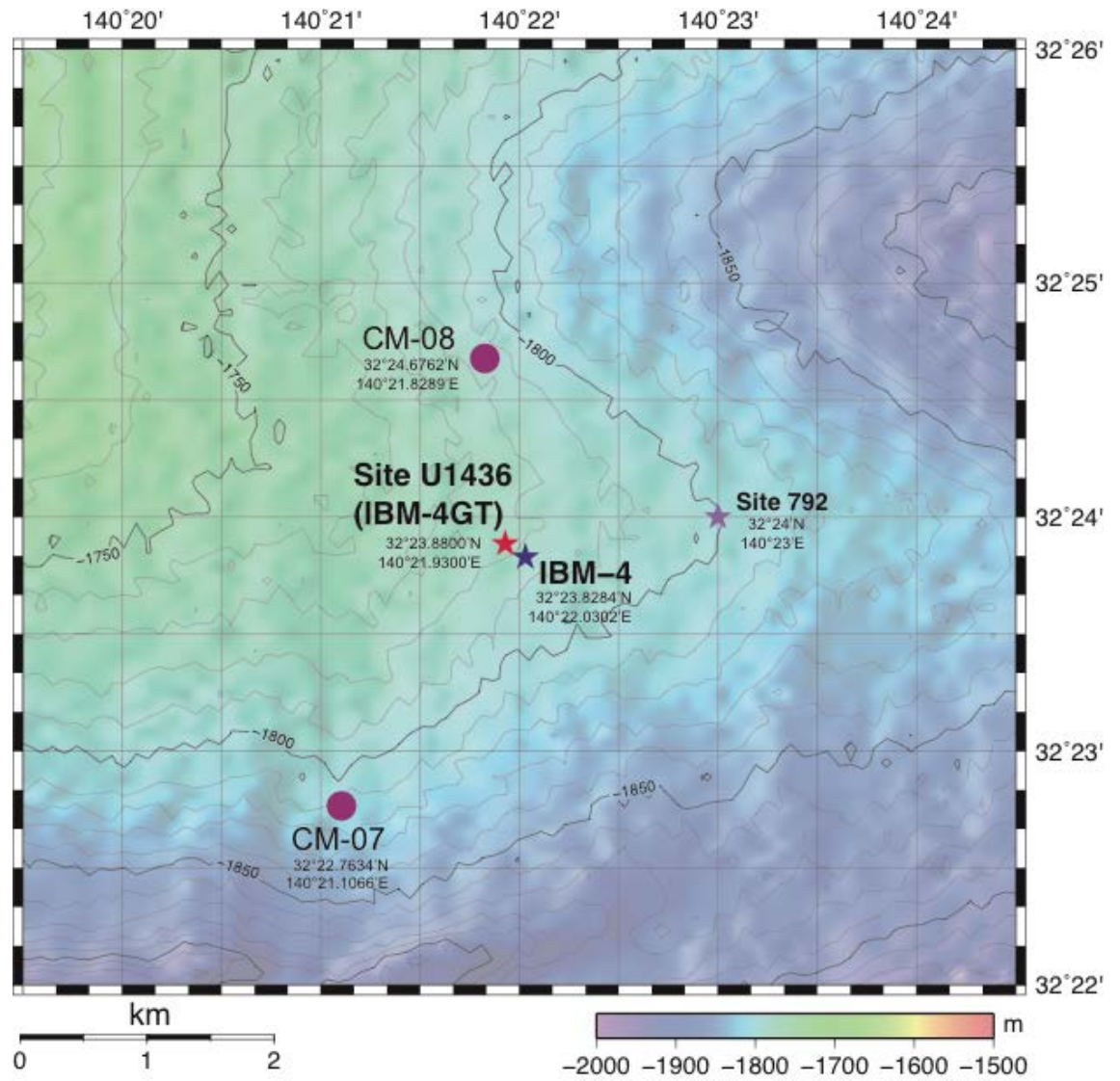


Figure 2. Bathymetry map around Site IBM-4 and the locations of mooring systems, CM-07 and CM-08. Site 792 and Site U1436 are existing drill sites of ODP and IODP, respectively.

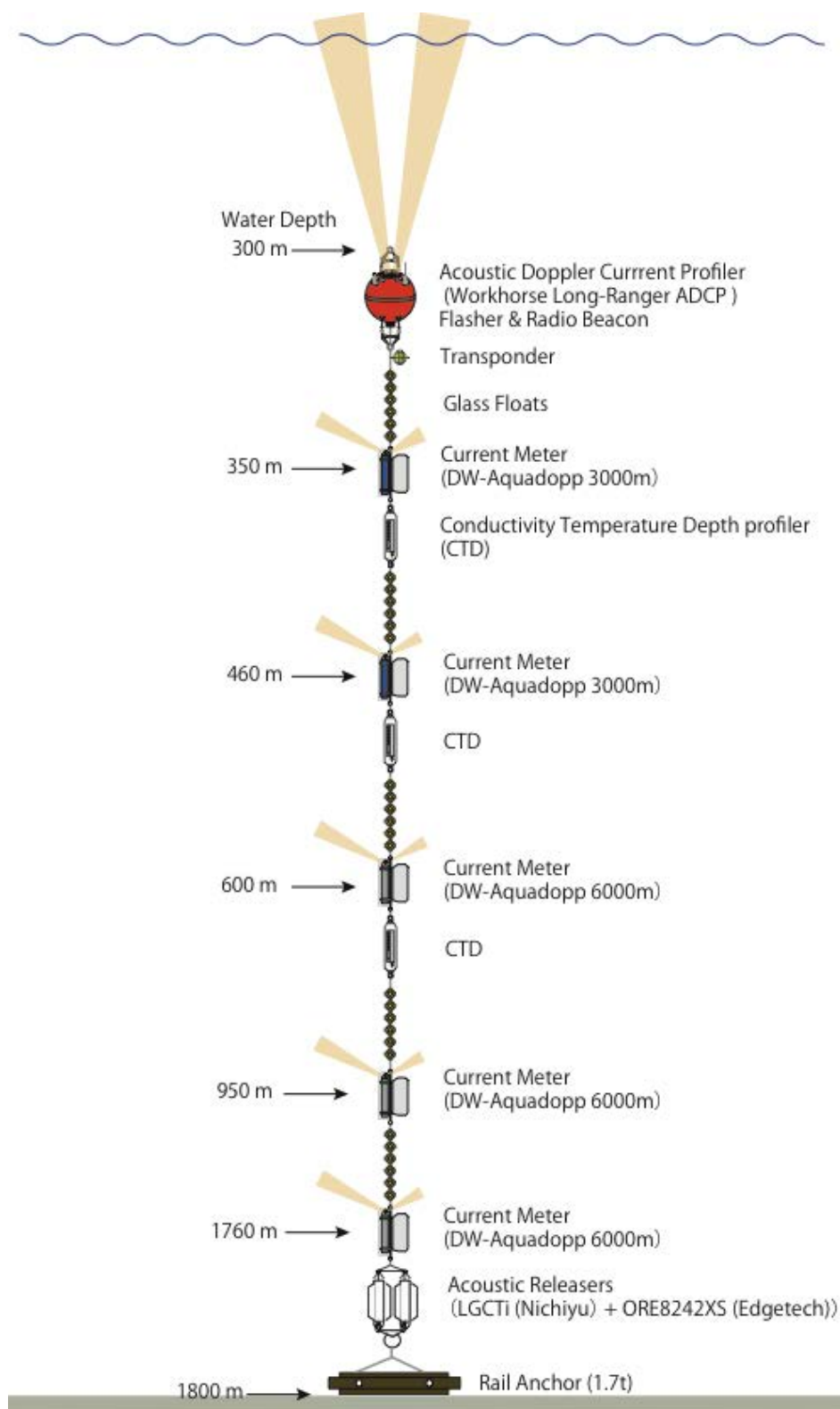


Figure 3. Schematic diagram of the subsurface mooring systems deployed to CM-07 and CM-08.

3.2. Operation Summary

[13-14 December]

R/V Kaiyo departed the JAMSTEC quay of the Yokosuka headquarter on 13 December at 08:30 (JST), however, she went directly to the Sagami Bay off Hatsushima island for wait-on-weather (WOW). After 14 hours WOW, the vessel left the Sagami Bay on 14 December at 03:00 and started to sail toward the site off the east of Aogashima island. On the way to the site, bathymetry survey was carried out with the ship-mounted multi-beam system from 19:01 to 20:19 on 14 December along the approach route. Ahead of the bathymetry survey, XBT survey was performed at 18:30. Once the vessel went into the survey area for the XBT survey, she got out of the area and then reentered the bathymetry survey line. Getting out of the line, the vessel continued to sail and arrived near the first site, CM-07, on 14 December at 23:40.

[15 December]

We started preparation to retrieve the mooring system from 06:35 on 15 December. It was cloudy to rainy and windy with somewhat higher heave by the halfway through the operations, but turned to fine weather later. Since the Kuroshio Current was flowing in the north of the site during the cruise, the surface current speeds at the both sites were no greater than 0.5 knot throughout. The vessel approached the site from about 500 m upstream and then stopped the thrusters at 06:49. The transponder below the top buoy was waked up at 06:52. The release command was sent to the Nichiyu releaser at 06:59 and worked successfully on the first try. The top buoy surfaced at 07:02 and the last set of glass floats came on surface at 07:19. Although lower three sets of glass floats were twined due to the low current condition, the whole CM-07 mooring system was successfully recovered at 09:20 (releaser on deck).

The vessel moved to the next site, CM-08, immediately and arrived a location 500 m upstream from the site at 09:45. The thrusters were stopped at 09:51 and then the transponder was waked up at 09:52. The release command was sent to the Nichiyu releaser at 09:59 and worked successfully on the first try. The top buoy surfaced at 10:02 and the last set of glass floats raised to surface at 10:16. Although two sets of glass floats were twined due to the low current condition, the whole CM-08 mooring system was successfully recovered at 12:09 on 15 December (releaser on deck).

The vessel started to sail back to Yokosuka immediately after completion of the mooring recovery operations. On the way, bathymetry survey with the multi-beam system was carried out again from 14:16 to 15:16 along the return route in the northwest side of the survey area.

[16 December]

The vessel arrived off the JAMSTEC Yokosuka Headquarter at 04:55 and got alongside the

quay at 09:00 on 16 December.

4. Survey Results

4.1. Retrieval of Mooring Systems

The two sets of the mooring systems were successfully retrieved as planned. It took about 2.5 hours for each retrieval operation. It was confirmed that both of the mooring systems were standing almost upright based on results of tracking of the transponder below the top buoy with the vessel's SSBL system (Fig. 4). This is because the site was situated in a low current area at the time. No physical damage was found in the retrieved sensors and other electrical apparatuses. All sensors except one had recorded data properly with expected size. However, a single-layer current meter (DW-Aquadop 3000m) at the top position (about 600 m below sea surface) in the CM-08 mooring system had recorded no data. Data QC is carried out onshore after this cruise. Besides other components, such as fiber ropes, iron shackles and bolts etc., had been damaged severely in part by fish bites and electric corrosion. Some damages could have caused instrument lost if the retrieval was delayed another several months.

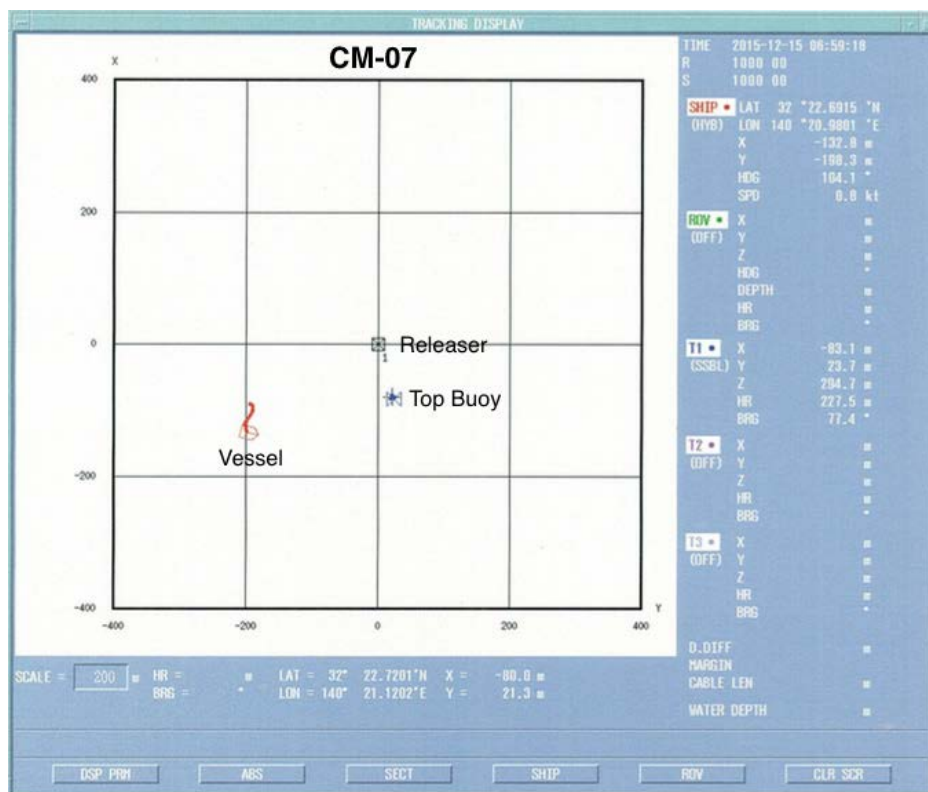


Figure 4. Screenshots of SSBL positioning for the top buoy of each mooring system.

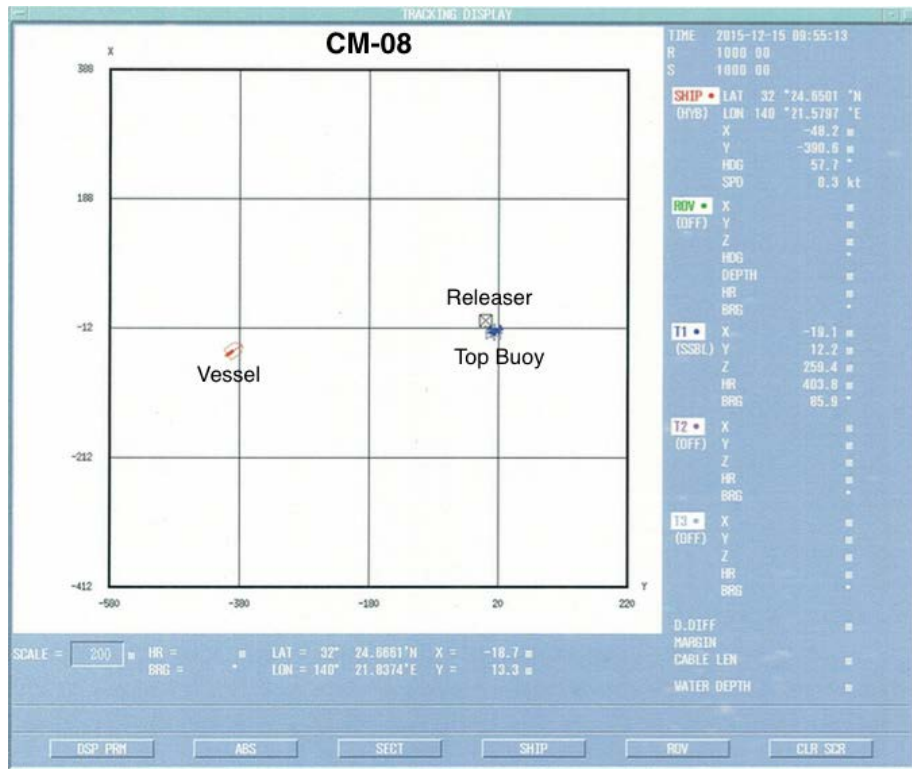


Figure 4. (continued)

4.2. Bathymetry Survey

Multi-beam bathymetry survey was carried out twice along the approach and the return routes in the northwestern part of the proposed survey area (Fig. 5). XBT profile for sound velocity correction was taken just before the first survey along the approach route (Fig. 6). New bathymetry data for two small blank areas was obtained and added to the JAMSTEC's multi-beam bathymetry dataset by this survey.

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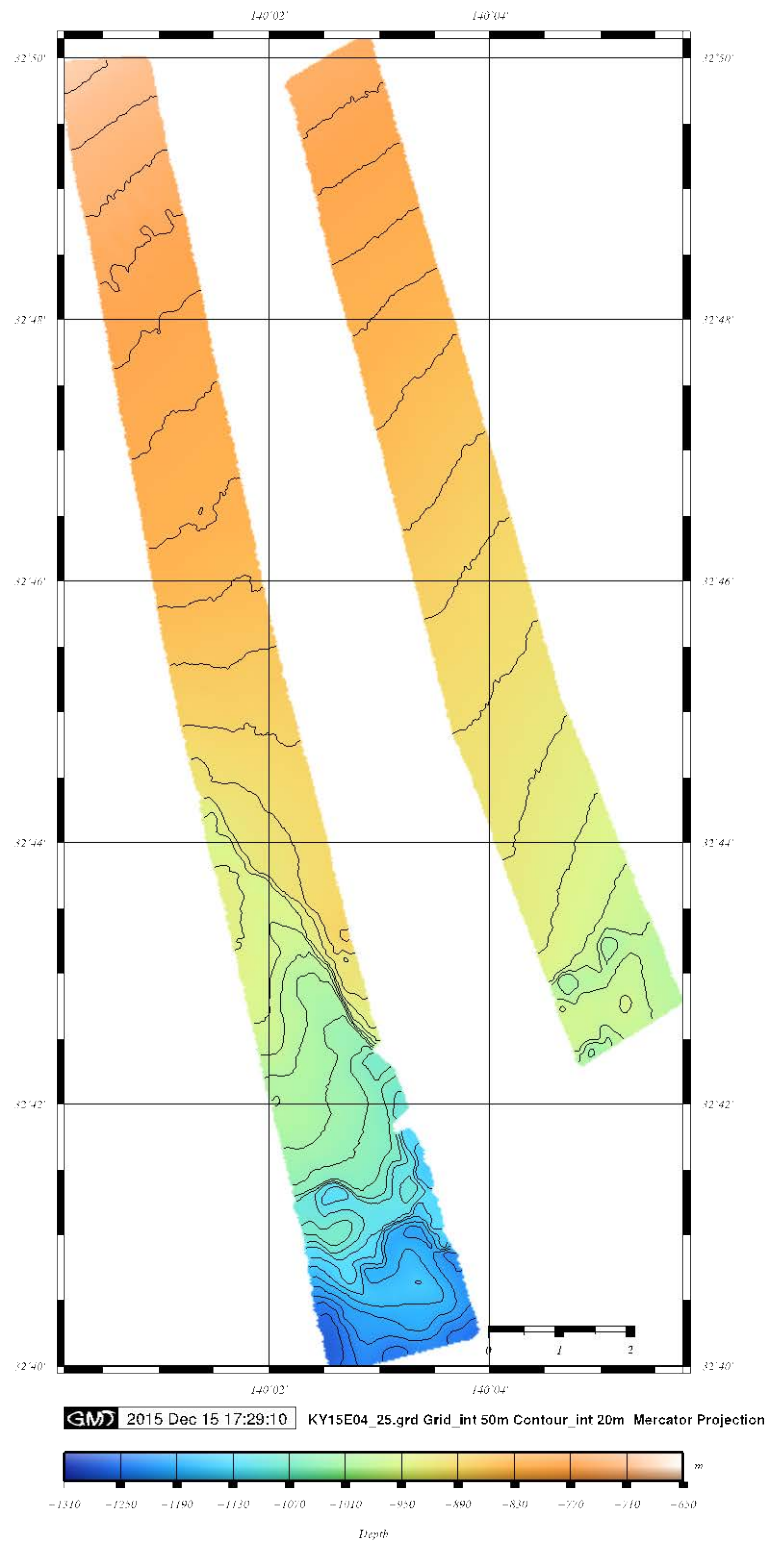


Figure 5. Bathymetry map of two survey lines based on newly obtained multi-beam data in this cruise.

データベース名 : c:\Program Files\NK-130\LAN\data¥	デバイス名 : XBT	BATHYプローブ : 231
データ名 : BT-201512140933	フロータイプ : T05	BATHY処理器 : 43
データナンバ : 0438	深度係数 a : 6.828	
日付 : 2015/12/14	深度係数 b : -1.82	
時刻 : 09:33:06	最大深度 (m) : 1830	
緯度 : 32-49.9231N	データ数 : 1831	深度ステップ : 1m
経度 : 140-00.0905E		

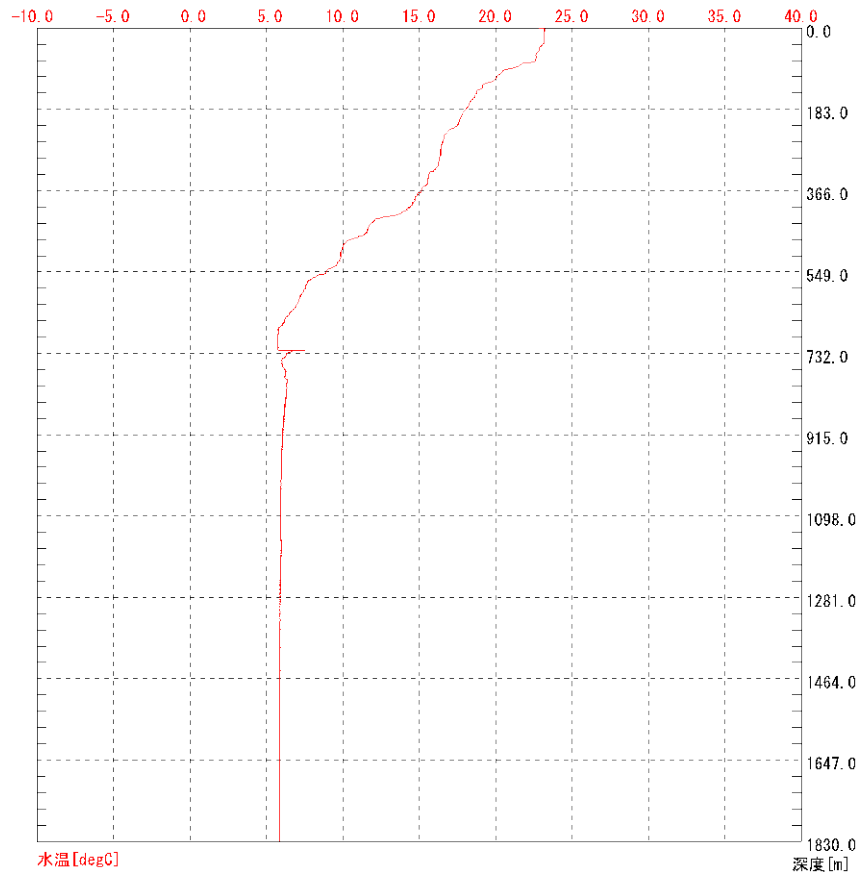


Figure 6. XBT profile taken before the first multi-beam bathymetry survey along the approach route.

4.3. Sea Current Observation

Sea current data was recorded with the hull-mounted ADCP during the cruise. As mentioned above, the Kuroshio Current path was situated in the north of the sites during the cruise. This situation caused very low surface current no greater than 0.5 knot around IBM-4. A snapshot of sea current profiles during retrieval of the CM-07 mooring system is shown in Figure 7.

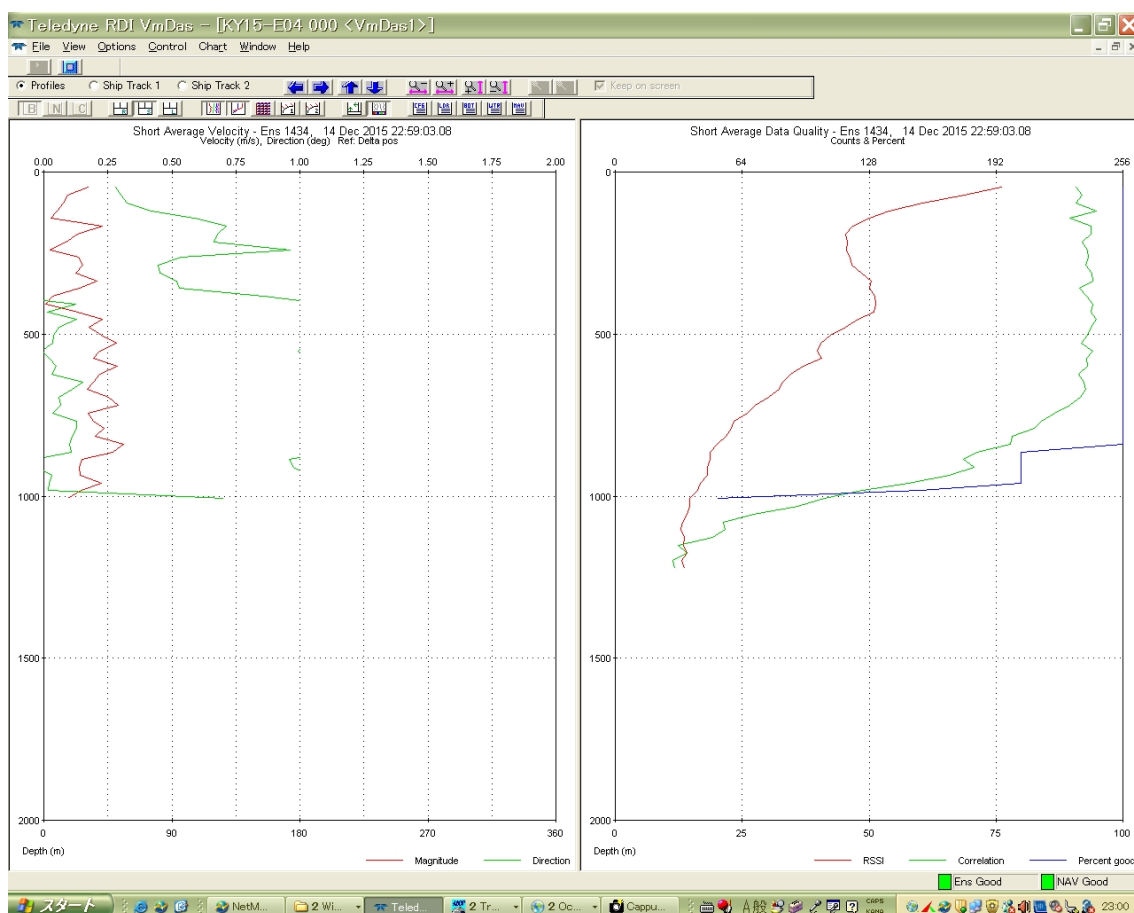


Figure 7. Screenshot of a sea current profile obtained by the hull-mount ADCP at 08:00 on 15 December during retrieval of the CM-07 mooring system.

5. 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.