



KAIYO CRUISE REPORT

KY10-06

Northern Izu-Bonin Area

20 April 2010 – 23 April 2010

Center for Deep Earth Exploration
Japan Agency for Marine-Earth Science and Technology

Contents

Preface.....	3
1. Cruise Information.....	3
2. Objectives.....	3
3. Time Sequence of Activities.....	5
4. Overview of Survey Tools.....	6
4.1. Mooring System Recovery.....	6
4.2. Hull-mounted ADCP Survey.....	6
4.3. Mutibeam Bathymetry Survey.....	6
5. Results.....	9
5.1. Mooring System Recovery.....	9
5.2. Bathymetry and Current Profile Surveys.....	9
Acknowledgement.....	12
References.....	12
Notice on Using.....	13

Preface

KY10-06 cruise was conducted for recovering the two suits of mooring that had been set in about 60 km east off Aogashima island, northern Izu-Bonin arc, during KY09-04 cruise for observation of sea current around the proposed drilling site of an IODP proposal 698-Full2 and 698-Full2-Addendum (IBM-4) as a site survey for riser drilling operations by D/V Chikyu in future. The moorings were successfully recovered on 22nd April with sea current data of about ten months, after one day wait-on-weather. The obtained data shall be used for the analysis on riser behavior in high current (Kuroshio Current) at this location.

1. Cruise Information

Cruise ID:	KY10-06
Vessel Name:	R/V Kaiyo
Cruise Title:	Site Survey for an IODP Expedition in the Northern Izu-Bonin Area
Cruise Period:	20 April 2010 ~ 23 April 2010
Ports of call:	Yokosuka (New Yokosuka Port) – Yokosuka (JAMSTEC Quay)
Survey Area:	About 60 km east of Aogashima Island, northern Izu-Bonin arc (Fig. 1)
Chief Scientist:	Kan Aoike (CDEX, JAMSTEC)
Representative of Science Party:	Takashi Agatsuma (CDEX, JAMSTEC)

2. Objectives

This cruise is a site survey of Integrated Ocean Drilling Program (IODP) campaign, planned primarily for the purpose of recovering two suits of mooring, which had been set in the northern Izu-Bonin arc area during KY09-04 cruise for monitoring sea current variations at the site on which deep drilling with the Chikyu's riser system is proposed in IODP proposal 698-Full2 and 698-Full2-Addendum (Tatsumi et al., 2007, 2009). It is very important for planning and implementing a safe riser drilling program to know vertical profiles and time variations of the actual sea current at the site. The data obtained shall be used for the analysis on riser behavior in high current conditions (Kuroshio Current). In addition, seafloor bathymetry and sea current surveys around

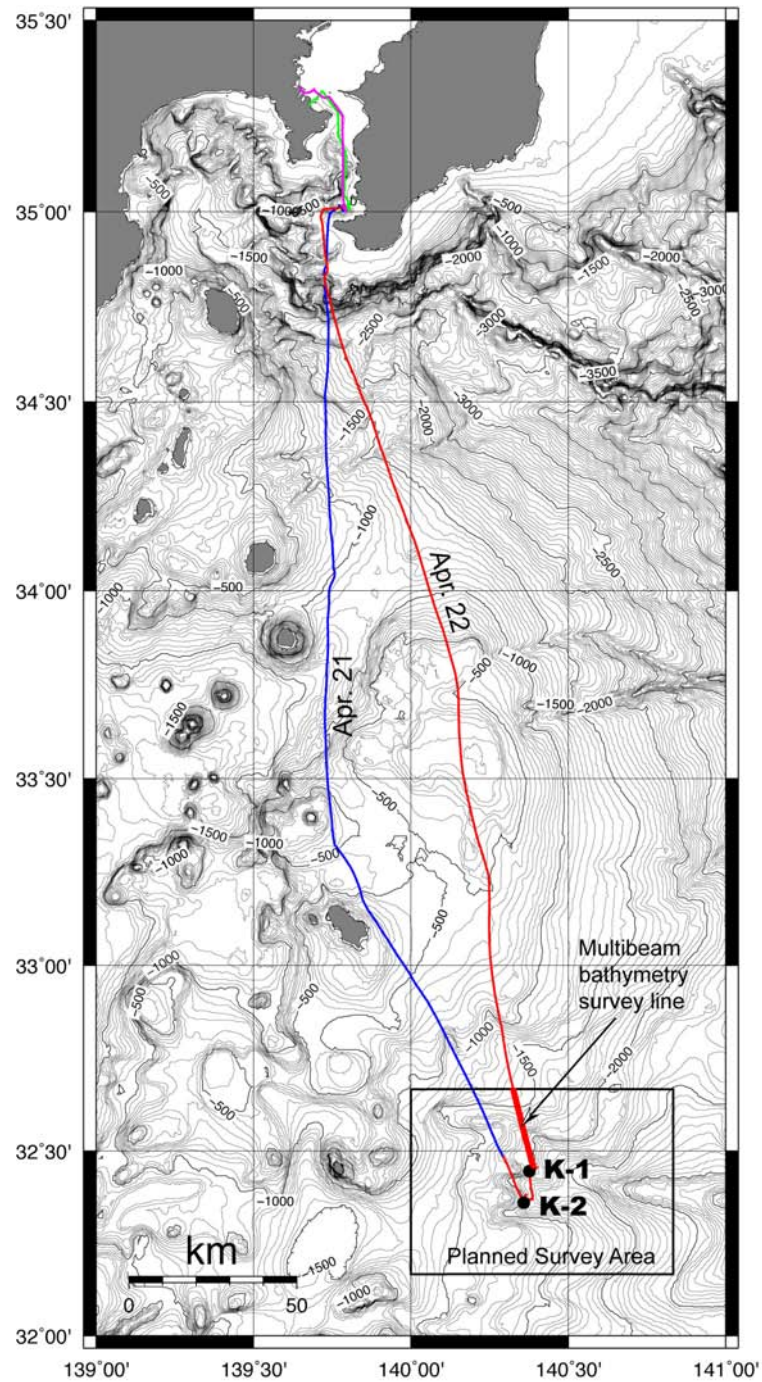


Fig. 1 Mooring sites and ship tracks. The seafloor bathymetry survey with the shipboard multibeam bathymetry system was carried out along the thick red line within the planned survey area that is shown by a thick black line square. The sea current survey with the hull-mounted Acoustic Doppler Current Profiler (ADCP) was conducted continuously along the ship track.

the site was intended to be conducted supplementary in the night and redundant times with the shipboard multibeam bathymetry system and the hull-mounted ADCP as much as possible for increase the amount of our dataset.

3. Time Sequence of Activities

20 April

10:00 Departure from New Yokosuka Port

11:11 Start data acquisition of the hull-mounted ADCP in bottom track mode

12:40 ~ 24:00 Evacuation from rough sea condition at off-Tateyama

21 April

0:00 ~ 08:00 Evacuation from rough sea condition at off-Tateyama

03:12 Change data acquisition mode of the hull-mounted ADCP from bottom track mode to water track mode

08:00 Departure from off-Tateyama

08:00 ~ 24:00 Sailing to the site

22 April

0:00 ~ 00:50 Sailing to the site of K-2

00:50 ~ 04:30 Stand-by at the site of K-2

04:13 Start bathythermography survey with XBT

04:30 ~ 06:40 K-2 mooring recovery work (successfully done)

06:40 ~ 07:15 Sailing to the site of K-1

07:15 ~ 09:15 K-1 mooring recovery work (successfully done)

09:26 ~ 10:27 Multibeam survey while sailing to Yokosuka

10:27 ~ 24:00 Sailing to Yokosuka

11:50 ~ 11:53 Change data acquisition mode of the hull-mounted ADCP from water track mode to bottom track mode

20:52 Terminate bathythermography survey with XBT

23 April

00:00 ~ 09:00 Sailing to Yokosuka (JAMSTEC quay)

06:27 Terminate data acquisition of the hull-mounted ADCP

09:00 Alongside the JAMSTEC quay

4. Overview of Survey Tools

4.1. Mooring System

Each mooring system that had been set at K-1 and K-2 sites during KY09-04 cruise (Fig. 1) consists of one Acoustic Doppler Current Profiler (ADCP), four RCM-11 Doppler current-meters, three conductivity-temperature-depth recorders (CTD) and two releasers (Fig. 2, Fig. 3). The total length of the system is approximately 1300 m and the top buoy was designed to situate at about 500 m water depth.

4.2. Hull-mounted ADCP

R/V Kaiyo is equipped with an ADCP system, Ocean Surveyor 38KHz, mounted on the hull, of which the transducer depth is 5 m. The data was acquired with settings where thickness of each layer is 16 m, number of layer is 100 bin for the bottom track mode and 75 bin for the water track mode, respectively, blank distance is 16 m, and ensemble interval is 15 seconds. In the planned survey area, the water track mode was applied.

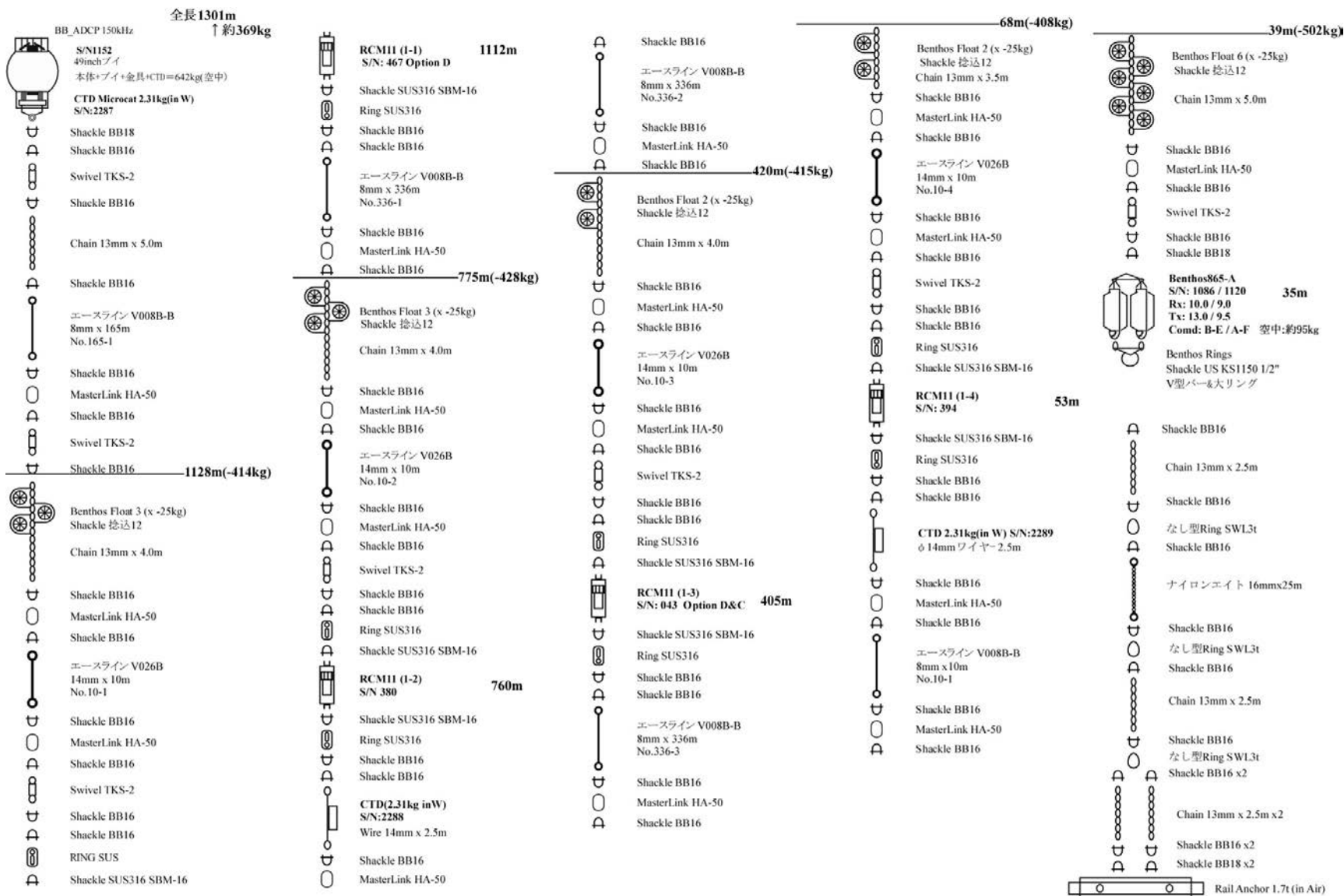
4.3. Multibeam Bathymetry

R/V Kaiyo is equipped with a multibeam bathymetric survey mapping system, SeaBeam2100, of which the beam frequency is 12 kHz. The bathymetric survey with this system was carried out after completion of the mooring recovery work, from the vicinity of K-1 site to the margin of the planned survey area while transit along just only one track (Fig. 1, Table 1). Expendable Bathythermograph (XBT) tool was deployed for velocity calibration just before the mooring recovery work at a point near the K-2 site.

Table 1 Survey line of multibeam bathymetry mapping survey

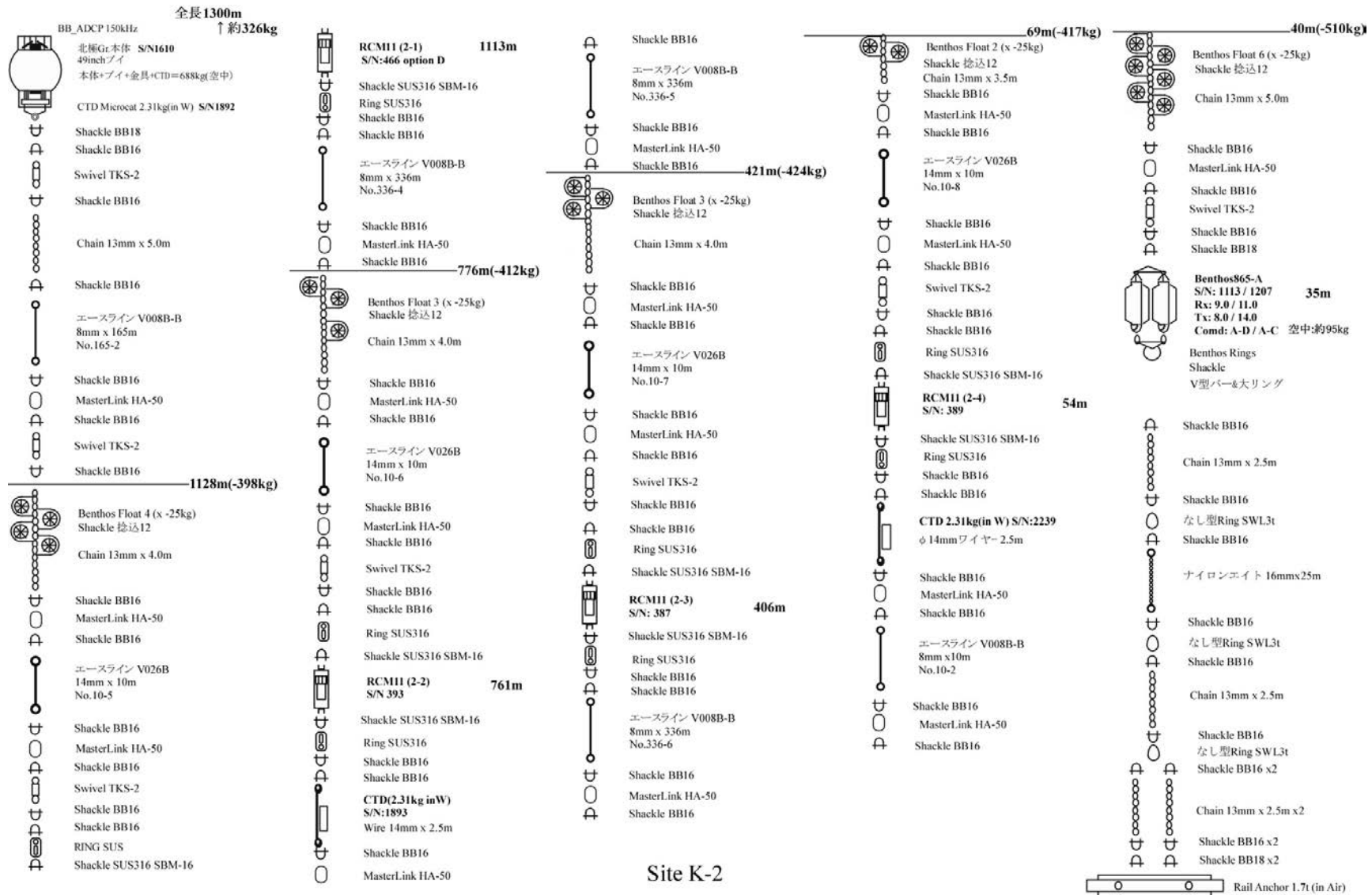
Start Time (UTC) Start Point	End Time (UTC) End Point
2010.4.22 00:26 32°28.0239'N, 140°23.1168'E	2010.4.22 01:27 32°40.0939'N, 140°19.4678'E

Fig. 2 Composition diagram of the mooring system set at the site K-1



Site K-1

Fig. 3 Composition diagram of the mooring system set at the site K-2



5. Results

5.1 Mooring Recovery

Recovery of the two sets of mooring was successfully completed in the morning on April 22, quite long before the sea condition getting worth. Condition of recovered instruments was examined while data extraction work: minor water leakage was found in one RCM and improper action was recognized in one releaser. Data processing and validation will be done onshore.

5.2 Bathymetry and Current Profile Surveys

Multibeam survey was conducted on the way of sailing to Yokosuka with a rushing speed (~12 kt) after recovering the mooring systems, because the rough sea condition was getting close. The obtained bathymetric map is shown in Fig. 4. Current survey with hull-mounted ADCP was continuously performed while sailing. An example data, which was obtained around the K-1 site, is shown in Fig. 5.

KY10-06

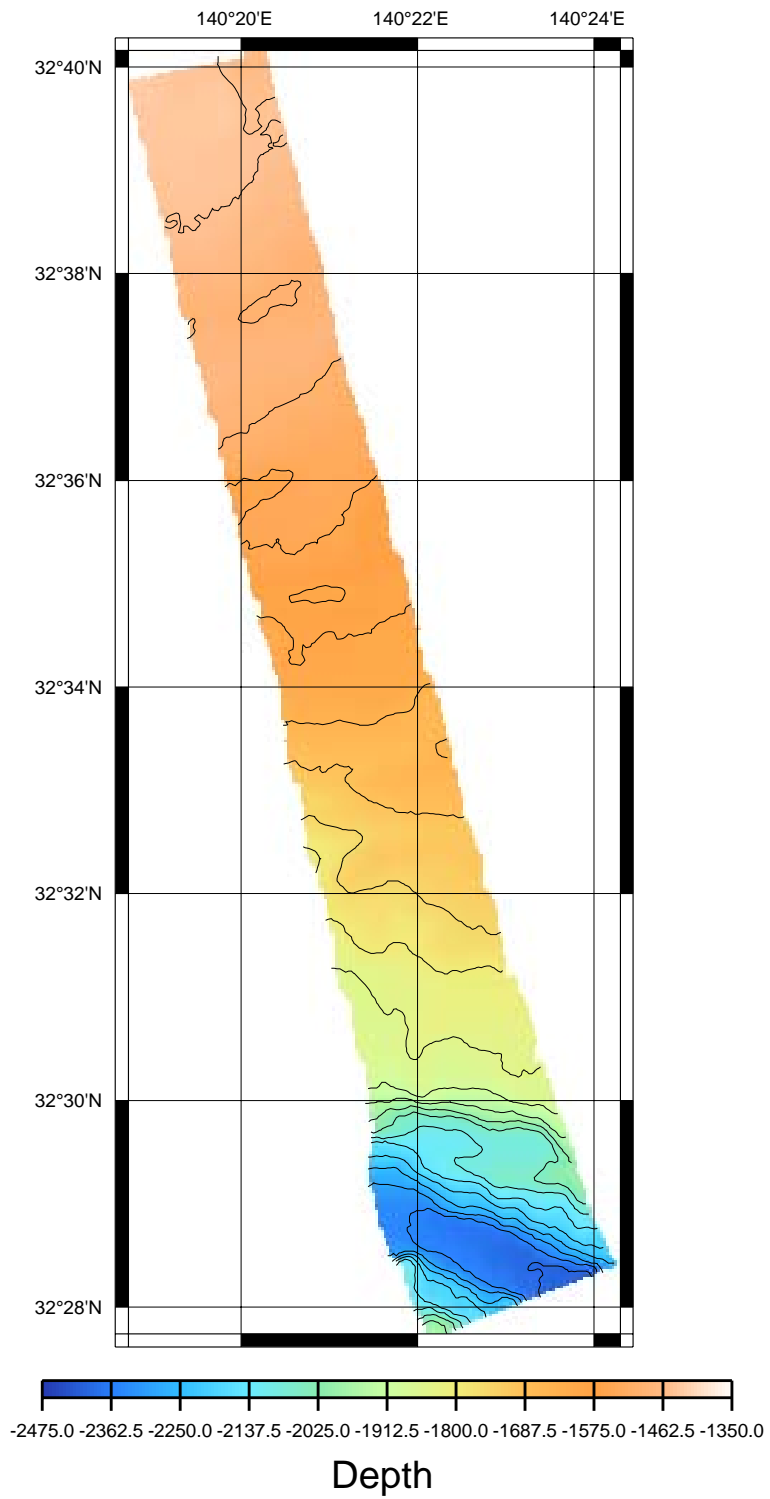


Fig. 4 Bathymetric map based on the data obtained by the multibeam survey along the survey line shown in Fig. 1 and Table 1.

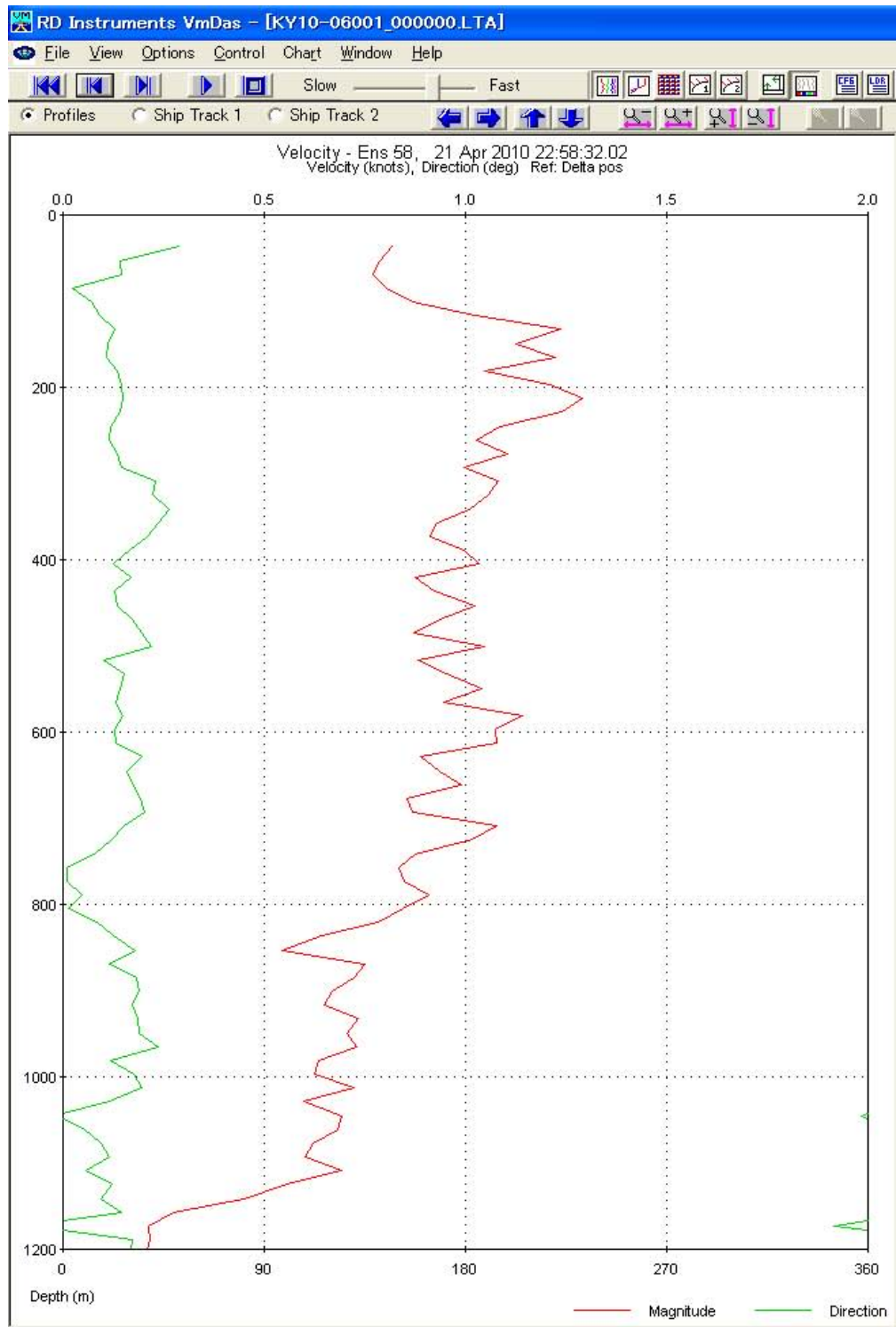


Fig. 5 Current profile near the K-1 site

Acknowledgement

We are pleased to acknowledge the considerable efforts and assistance of Captain Koji Sameshima, crew and marine technicians for completing successfully the planned surveys during the KY10-06 cruise.

References

- Tatsumi, Y. et al., 2007. Continental Crust Formation at Intra-Oceanic Arc: Ultra-Deep Drilling to the Middle Crust of the Izu-Bonin-Mariana Arc. IODP Proposal 698-Full2.
- Tatsumi, Y. et al., 2009. An Addendum to IODP Proposal 698-Full2 (Continental Crust Formation at Intra-Oceanic Arc: Ultra-Deep Drilling to the Middle Crust of the Izu-Bonin-Mariana Arc), IODP Proposal 698-Full2-Addendum.

Notice on Using

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Users of data or results on this cruise report are requested to submit their results to the Data Integration and Analysis Group (DIAG) of JAMSTEC.