



ROV HYPERDOLPHIN & R/V NATSUSHIMA

NT12-12

Off Sendai and off Sanriku, Northeastern Japan

May.14,2012 - May.23,2012

Japan Agency for Marine-Earth Science and Technology

(JAMSTEC)



“Close Encounters of the Hyperdolphin” photo by Takuya Onodera

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4. Notice on Using

1. Cruise Information

- Cruise ID: NT12-12
- Name of vessel: R/V Natsushima
- Title of the cruise: Off Sendai, off Sanriku, Cruise
- Title of proposal (If there are no scientific proposals, it is not necessary to fill this section for exception)

Studies on biodiversity and biogeochemical properties on the sediment surface across oxygen minimum zone in off Tohoku, influenced by the huge earthquake.

- Cruise period: May.14,2012 – May.23,2012
- Ports of call: Kurihama Port – Naoetsu Port
- Research area: Off Sendai and off Sanriku.
- Research Map

NT12-12 ShipTrack

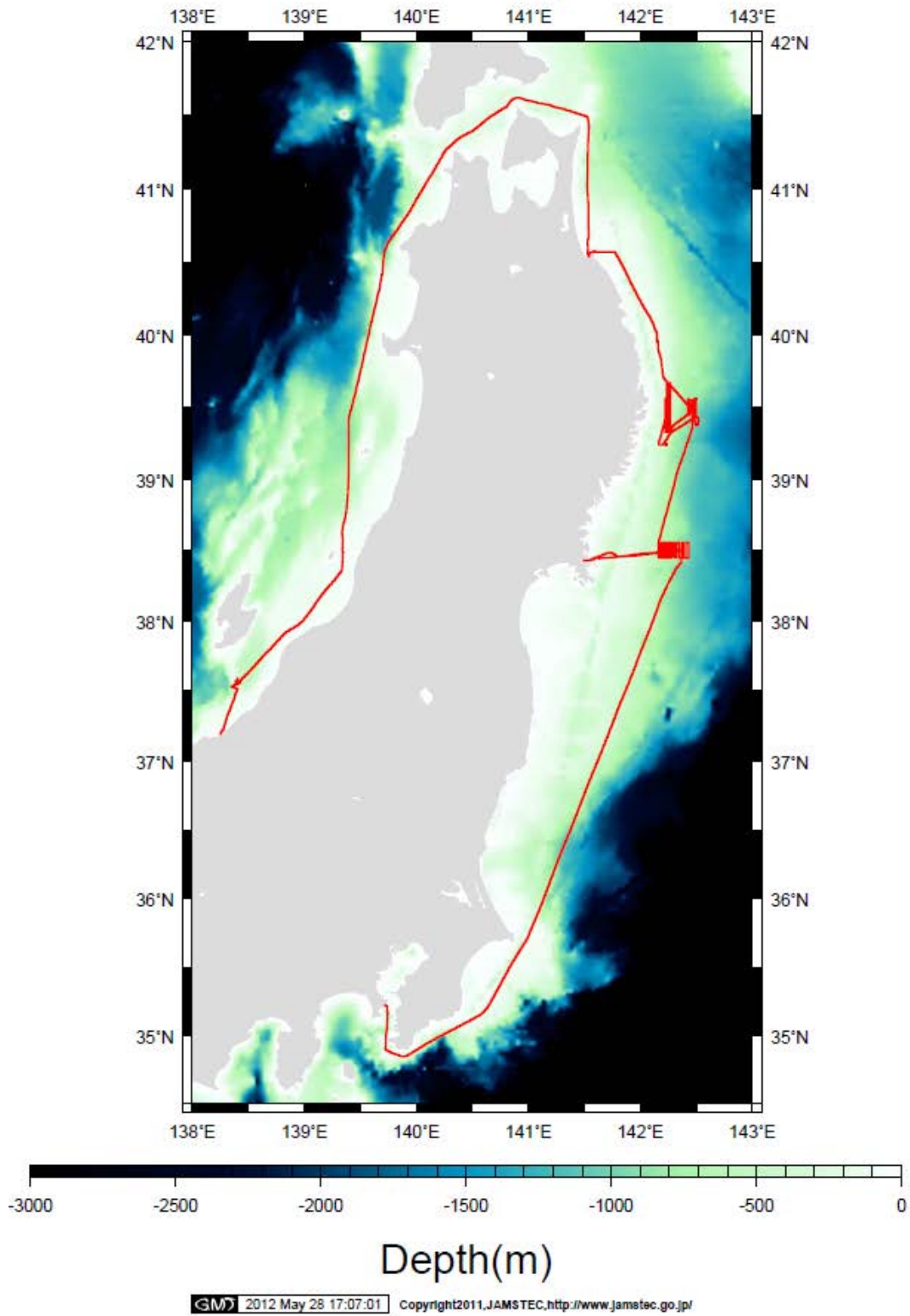


Fig. 1-1. Ship track.

NT1212_Sendai_Oki50_cl5A3.ps

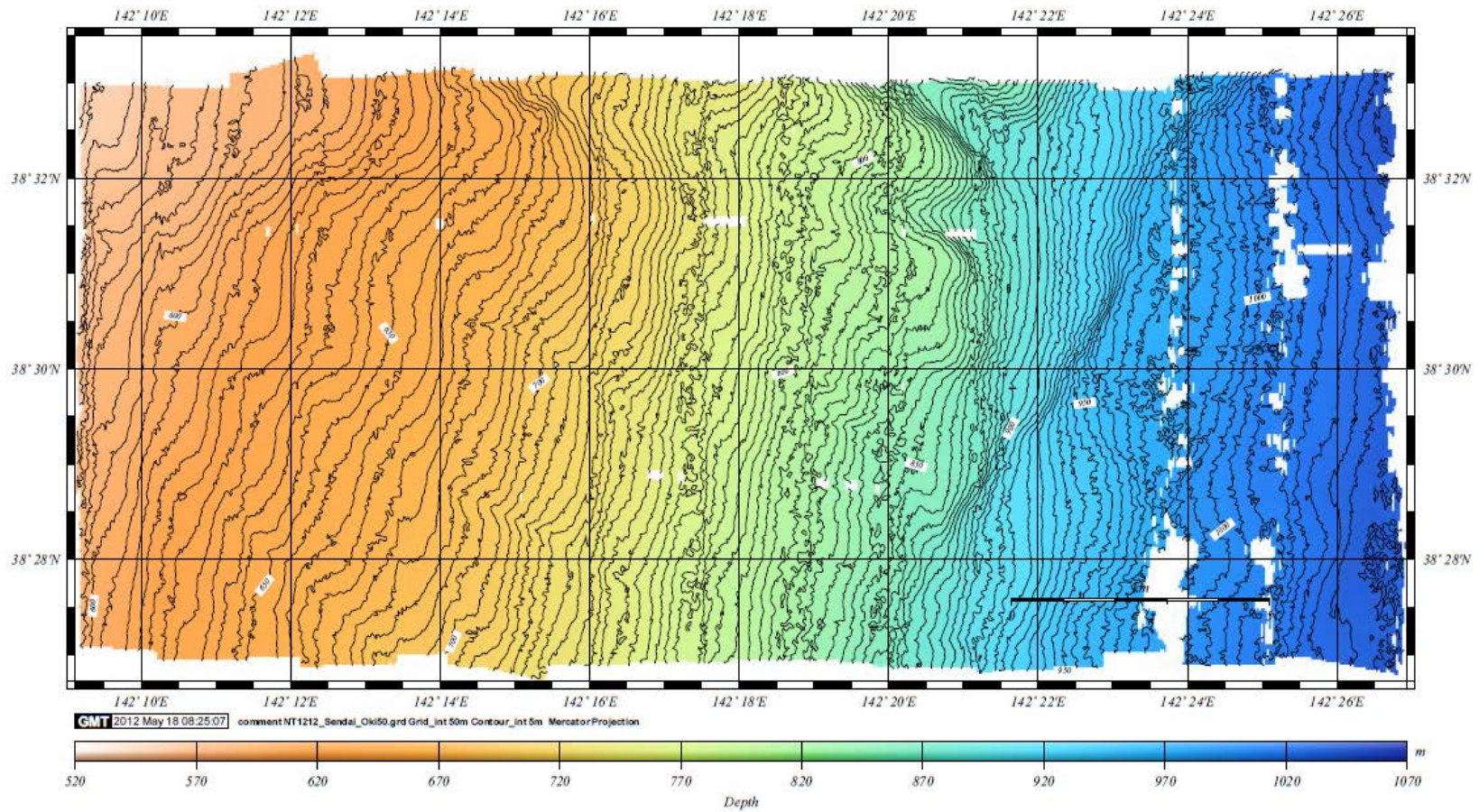


Fig. 1-2. Map of off Sendai area.

Dive1384_50_cl5A3.ps

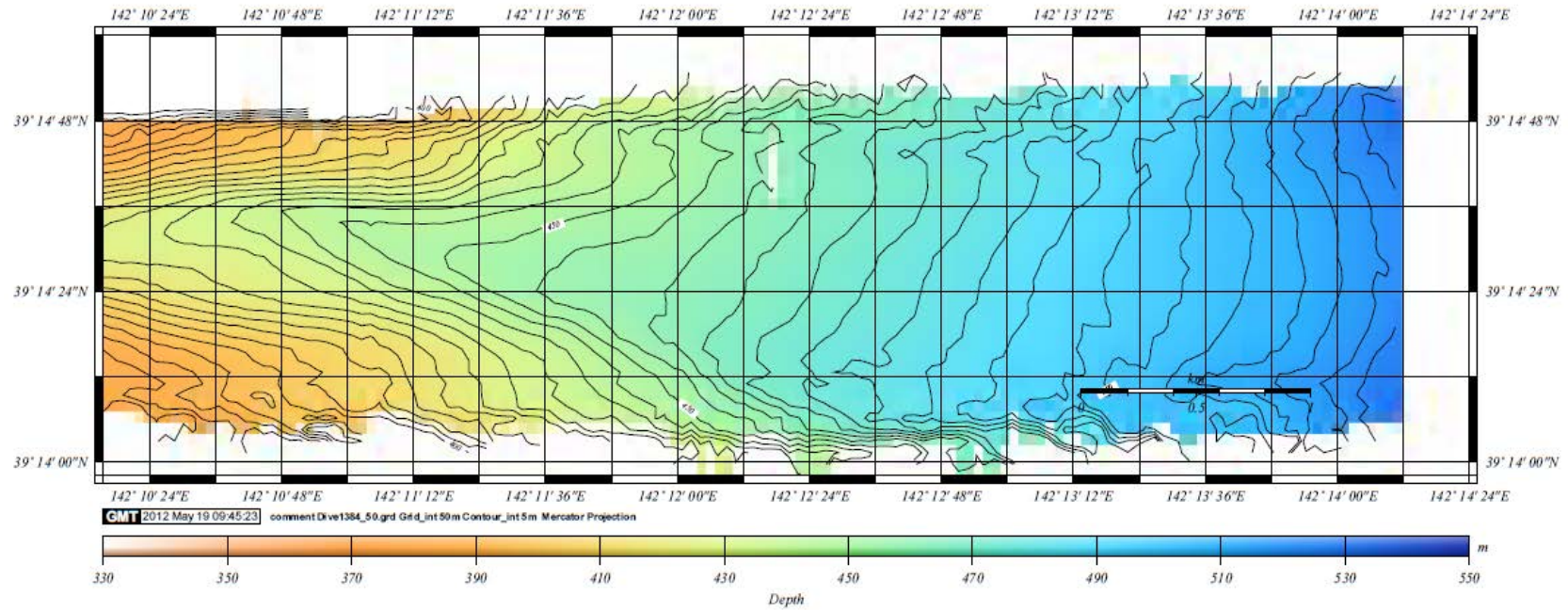


Fig 1-3. Map of off Ohtsuchi area.

NT1212_Sanrikuoki50_cl10A3.ps

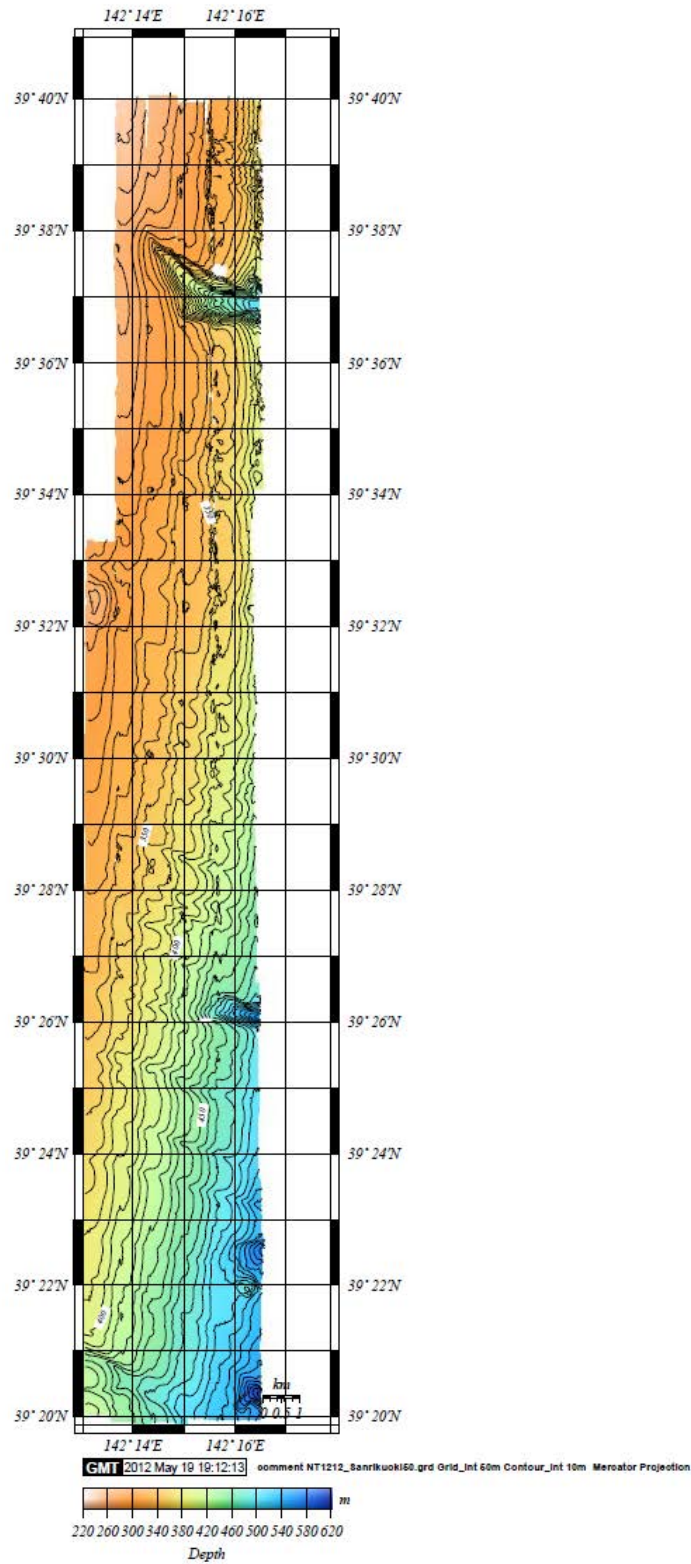


Fig. 1-4. Map of off Sanriku area.

2. Researchers

- Chief scientist: Kazumasa Oguri (Institute of Biogeosciences/ Marine Technology Center, JAMSTEC)
- Representative of the science party

Kazumasa Oguri (JAMSTEC) 「 Studies on biodiversity and biogeochemical properties on the sediment surface across oxygen minimum zone in off Tohoku, influenced by the huge earthquake. 」

Scientists

Kazumasa Oguri	Japan Agency for Marine-Earth Science and Technology
Takashi Toyofuku	Japan Agency for Marine-Earth Science and Technology
Pauline Duros	Japan Agency for Marine-Earth Science and Technology
Minami Fujii	Yamaguchi University
Syouichi Shiozaki	Yamaguchi University
Kazuno Arai	Chiba University
Haruka Shibata	Kitasato University

Marine Technician

Takuya Onodera	Nippon Marine Enterprises, LTD.
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R/V NATSUSHIMA Officers and Crew

Captain	Hitoshi Tanaka
Chief Officer	Naoto Kimura
2nd Officer	Isao Maeda
3rd Officer	Motoi Katsumata
Chief Engineer	Minoru Tsukada
1st Engineer	Kimio Matsukawa
2nd Engineer	Takahiro Mori
3rd Engineer	Hozumi Kuratomi
Junior 3rd Engineer	Naoomi Uemura
Chief Electronic Operator	Tokinori Nasu
2nd Electronic Operator	Yoichi Inoue
3rd Electronic Operator	Ryosuke Komatu
Boat Swain	Tadahiko Toguchi
Able Seaman	Yasuo Konno
Able Seaman	Nobuyuki Ichikawa
Able Seaman	Matsuo Yoshiaki
Able Seaman	Hiroaki Murase
Sailor	Kazuho Ikeda

Sailor	Yasunobu Kawabe
Sailor	Yusaku Kaneda
No.1 Oiler	Kiyoshi Yahata
Oiler	Katsuyuki Yoshida
Oiler	Ryota Suzuki
Assistant Oiler	Ryo Sato
Assistant Oiler	Taijyun Iwao
Assistant Oiler	Aoi Takamiya
Chief Steward	Teruyuki Yoshikawa
Steward	Shinsuke Tanaka
Steward	Koji Kirita
Steward	Hiroyuki Ohba
Steward	Tatsuya Yamamoto

ROV Hyper-Dolphin operation team

Submersible Operation Manager	Yoshinari Ono
1st Submersible Technical Officer	Homare Wakamatu
2nd Submersible Technical Officer	Katsushi Chiba
2nd Submersible Technical Officer	Tomoe Kondo
2nd Submersible Technical Officer	Teppei Kido
2nd Submersible Technical Officer	Yudai Sakakibara
2nd Submersible Technical Officer	Ryo Saigo

3. Observation

- Observation

3.1. Time series observations of O₂ distributions at sediment-water interface in oxygen minimum zone, off Sendai and Sanriku.

Kazumasa Oguri (Institute of Biogeosciences / Marine Technology Center, JAMSTEC)

Takashi Toyofuku (Institute of Biogeosciences, JAMSTEC)

3.1.1 Purpose

Water depth around 800-1200m of Northeastern Pacific are attributed to low dissolved oxygen concentration (DO) due to the highly seasonal primary productivity in the euphotic layer. In the previous cruises, O₂ concentrations at bottom water and the O₂ microprofiles at sediment-water interface have been investigated to understand O₂ dynamics and remineralization rates, as well as biological activities. The purposes of this study are: (1) to test planar O₂ optode system for in situ measurement modified for battery operation, (2) to obtain DO in bottom water, and (3) to obtain time series changes of two dimensional O₂ profiles and the corresponding images at sediment surface.

3.1.2. Method

3.1.2.1 Planar O₂ optode

The deployments of planar O₂ optode have been performed in the previous cruises (since NT06-22). The system was basically designed to connect submarine cable for the power supply. This time, the system has greatly modified to mount battery and high precision timer circuit. To save the effort for the calibration, in situ calibration scheme was attempted. The system mounted on an ELINOR type lander was released at two different sites. The descending speed of the lander was in average. Weight in water was estimated to 40~50 kg. After the measurement, the whole lander including the optode system was recovered by ROV-Hyperdolphin. Deployment schedule and configuration were summarized in Table 1 and Fig.1, respectively. After the recovery of the system, the obtained data were transferred to the computer on board. The image processing and the analysis will be performed on land.

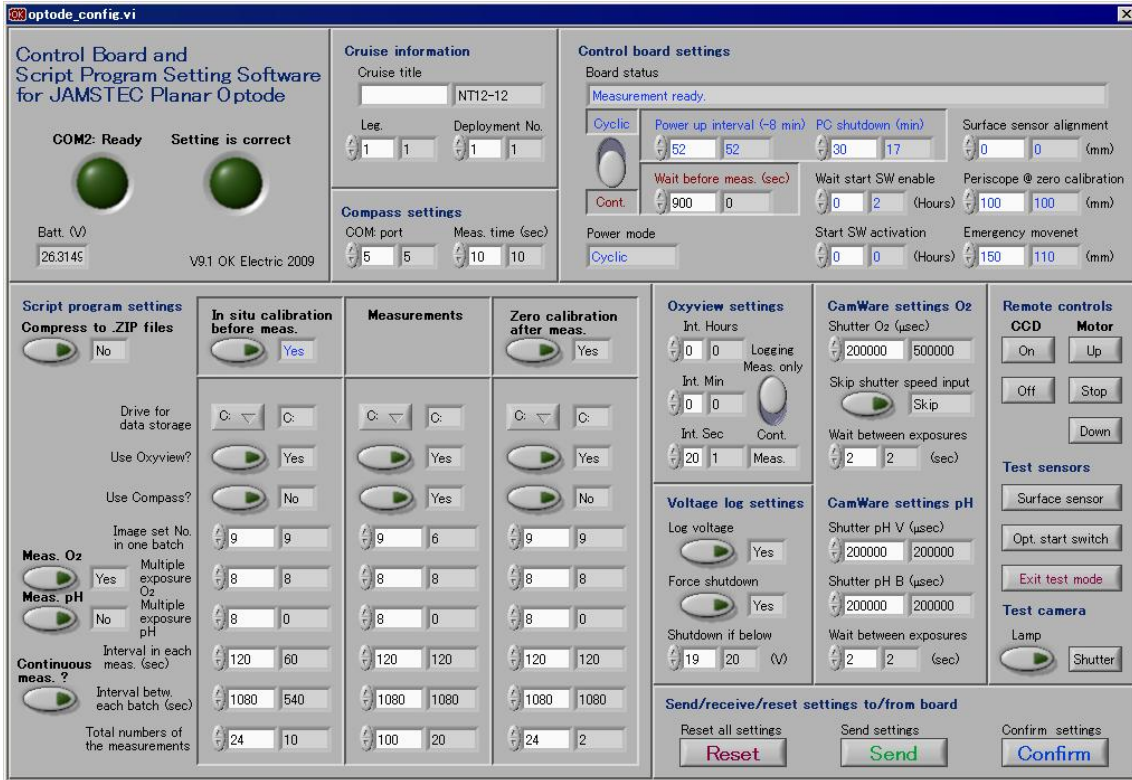


Fig. 1-1. Setting of the planar O2 optode for the deployment at off Sendai.

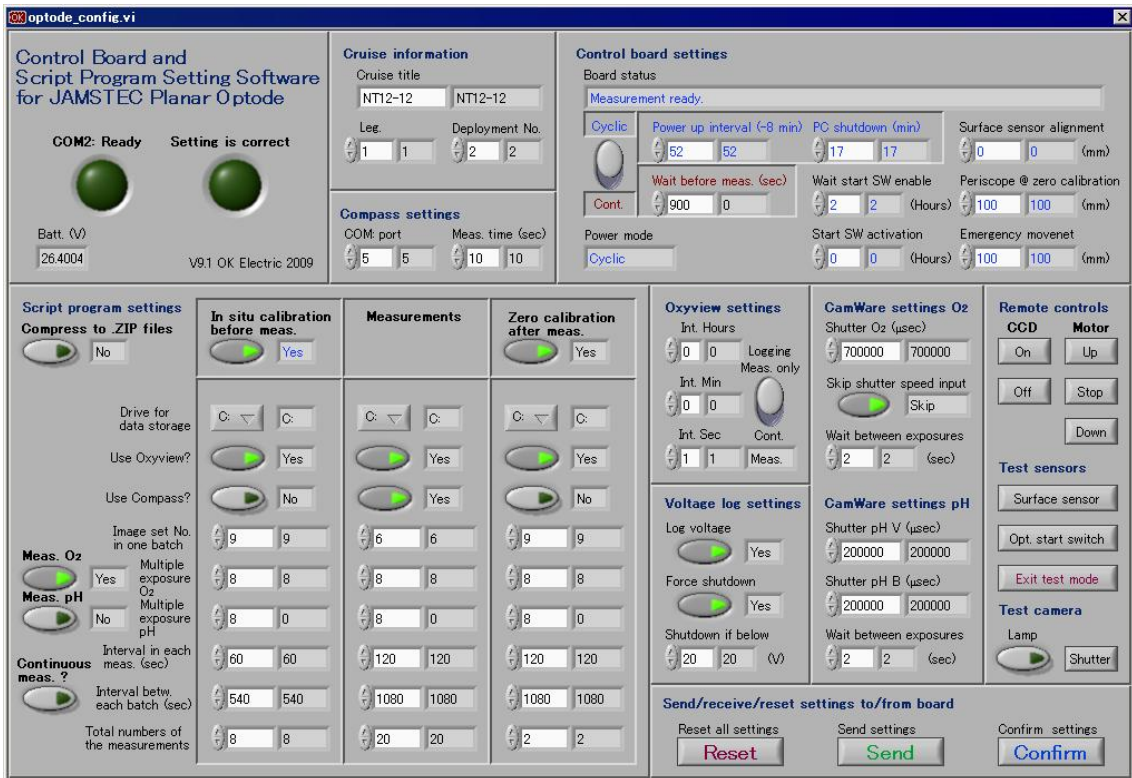


Fig. 1-2. Setting of the planar O2 optode for the deployment at off Sanriku.

Table 1 Deployment schedule of the lander system

Site	Latitude (N)	Longitude (E)	Depth (m)	Start deployment	End observation	Dive (recovery)
Off Sendai	38 ° 29.951	142 ° 21.984	901	2012/5/15 13:26	2012/5/16 13:25	#1383
Off Sanriku	39 ° 28.418	142 ° 27.940	934	2012/5/18 15:11	2012/5/19 16:03	#1385

3.1.2.2. DO profiles in water column

As a calibration of the optode system, a DO sensor (Aanderaa 3830) was installed in ROV-Hyperdolphin. The data were transferred via the serial communication and they recorded into the PC in the control room. Fig.2 shows the DO profiles in the respective dives. Unit in the X axis represents concentration in μM , and the Y axis represents water depth, respectively

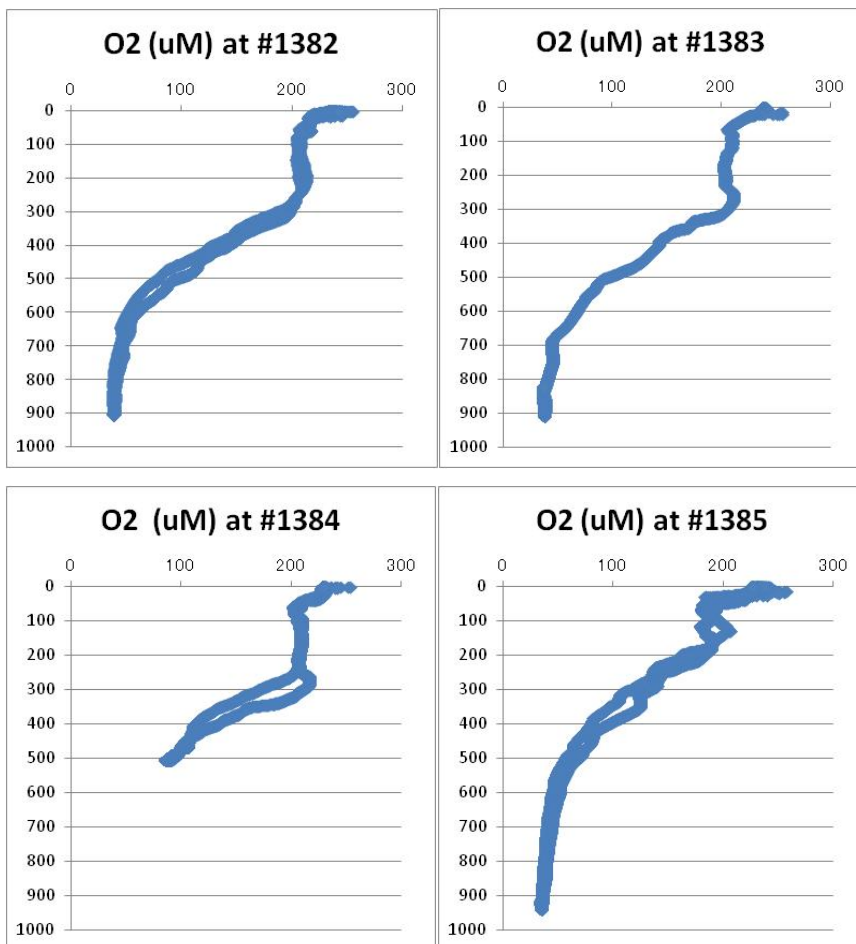


Fig. 2 DO concentration in water column recorded with O₂ sensor installed in ROV.

3.1.2.3. DO in bottom water

During the measurement of O₂ profiles, O₂ sensor monitored DO in bottom water. The results are shown in Fig.2.

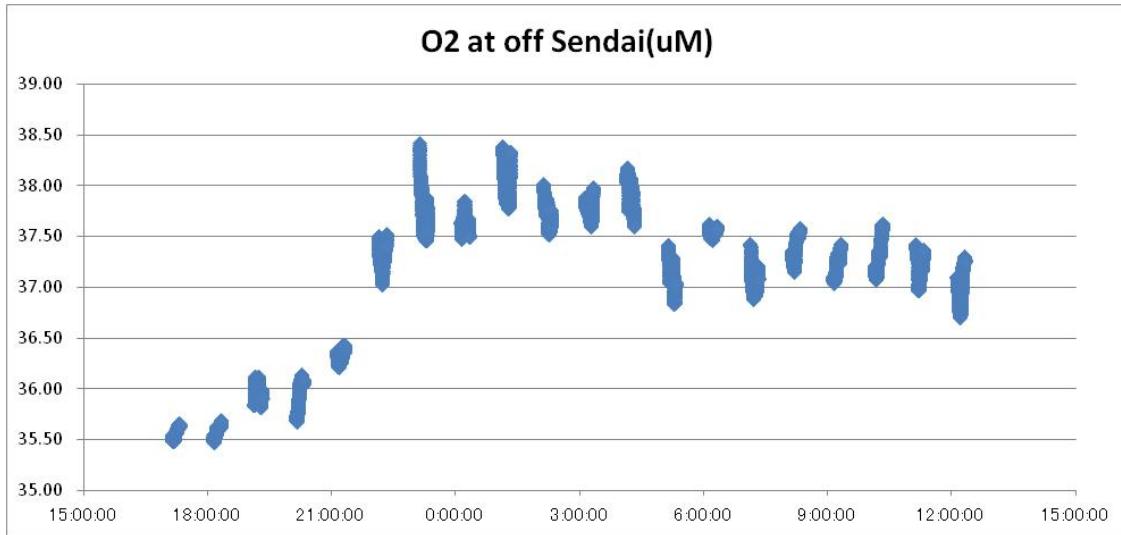


Fig. 3-1. Time series changes in DO at bottom water at off Sendai

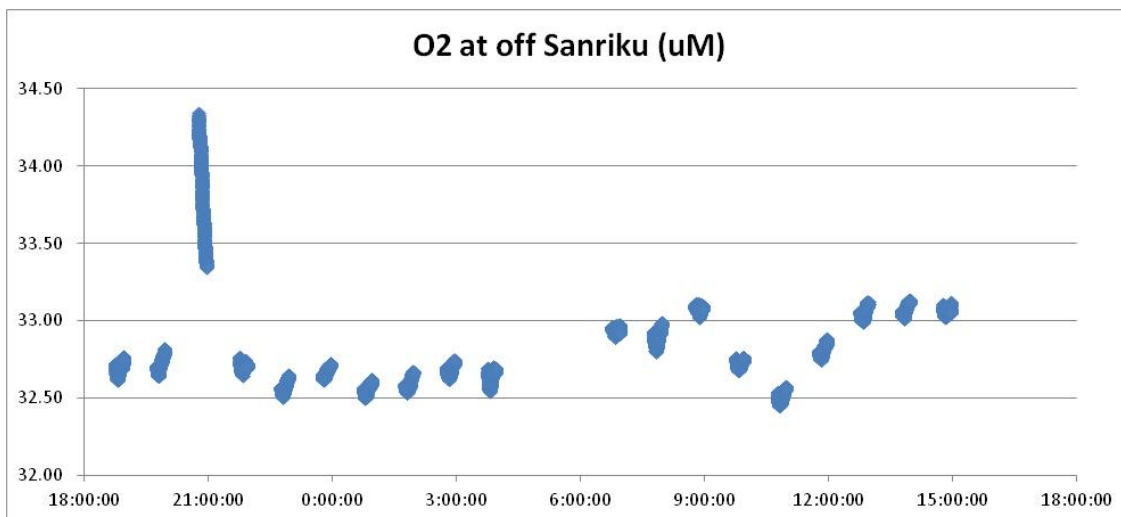


Fig. 3-2. Time series changes in DO at bottom water at off Sanriku

3.1.3. Future plan

The obtained data throughout the in situ observations will be processed into grayscale profile images and DO profiles, respectively. To analyze them, DO changes of the profiles induced by physical and biological process will be investigated. As well, how the system worked will be evaluated to see the log recorded in the PC. The working process

of surface sediment detection, data for the in situ calibration of O₂ concentration and battery consumption rates are examined. These data will be reflected to the improvement of the system for the next opportunity.

3.2. Living (Rose Bengal stained) benthic foraminifera and meiofauna

Takashi Toyofuku, Pauline Duros (Institute of Biogeosciences, JAMSTEC).

Motohiro Shimanaga (Kumamoto Univ.) and Tomo Kitahashi (AORI, Univ. Tokyo)

3.2.1. Purpose

Aim of sample collection is assessment of living (Rose Bengal stained) benthic foraminifera and meiofauna from 3 sites in the Tōhoku area, more than 1 year after the terrible earthquake and related tsunami. Benthic communities are considered as reliable tools (i.e. bio-indicators) for environmental biomonitoring in marine ecosystems. In active submarine canyons, or along seismically-active margins where sediment gravity flow related to earthquake/tsunami may supply organic and inorganic detritus by lateral advection to the deep ocean foraminiferal and meiobenthic faunas are characterised either by recolonisation stages occurring after physical disturbance (*e.g. turbidite related to tsunami*) or by equilibrium phases related to gradual organic matter focussing (*e.g. eutrophication*). Biotic recovery after benthic crisis consists in the dominance of opportunistic pioneer species. The meiobenthic biodiversity is low. When the resilience of an ecosystem is surpassed (after weeks, months or years), opportunistic taxa are generally replaced by highly specialised communities. The meiobenthic diversity. In other ways, meiobenthic fauna are relevant bio-indicators to appreciate the resilience of marine biodiversity after benthic crisis such as the one related to the terrible Tōhoku Tsunami.

3.2.2. Methods

During the oceanographic cruise, 3 benthic sites (i.e. off Sendai site (900 m), Ohtsuchi canyon site (500 m) and off Sanriku site (900 m)) were sampled using the ROV Hyper Dolphin.

At each sites, 2 MBARI sediment cores were dedicated to foraminiferal analysis. Cores were sliced every half cm between 0 and 4 cm, every centimetres between 4 and 6 cm and every 2 cm between 6 and 10 cm. Sediments were stored in 500 cc bottles, which were filled with 95% ethanol containing 1 g/ L Rose Bengal stain (in order to discriminate foraminifera living at the sampling period from the dead ones). Then, all samples were gently shaken for several seconds in order to get a homogeneous mixture.

3.2.3. Expected results

Pauline Duros will realise the foraminiferal analysis during the post-doctoral position at JAMSTEC within the next months. The living foraminifera belonging to the large-size fraction ($>150\ \mu\text{m}$) will be hand-picked under wet conditions and stored on micropaleontological slides. After picking processes, the structure of foraminiferal faunas (standing stocks, diversity indices, microhabitat in the sediment) will be described at each station, and compared with overall environmental data (sedimentology and geochemistry). On such comparative basis, the foraminiferal response to putative environmental stress related to earthquake/tsunami will be enlightened. In such manner, we should understand the impact of tsunami on benthic biodiversity from our study area.

At these both sites, we may expect to observe biotic/biodiversity recovery with the occurrence of pioneer foraminiferal populations. On the contrary, we may observe highly specialised communities indicating that the resilience of the ecosystem is surpassed (1 year and 2 months after the Tōhoku disaster).

3.3. Observation of deep-sea litter and floating litter

Haruka Shibata¹ and Hiroshi Miyake¹

¹ School of Marine Biosciences, Kitasato University

3.3.1 Objective and achievement in this cruise

Marine litter is found in the oceans of the world. Marine litter is classified into beach litter, floating litter and benthic litter. Floating litter drifts to the beach or sinks to the bottom. Marine litter causes environmental, human health and aesthetic problems.

Enormous Tsunami caused by the Tohoku-Pacific Ocean Earthquake on 11th March, 2011. The Tsunami flowed out a large number of houses, cars, ships and all property of people lived at Sanriku Coast to the ocean. Satellite imagery shows us the existence of floating litter on the surface of the ocean. Floating litter will be sink to the deep-sea bottom. Therefore we thought that in-site investigation was necessary to identification of benthic litter. The aim of this cruise is to observe floating litter and deep-sea litter, animals that animals benthic litter in-situ.

Video recording was conducted for getting quantitative data of floating litter on day time. A video camera (Sony) was set at navigation bridge deck. Some deep-sea litter was collected by the manipulator of *Hyper Dolphin 3000*. These collected debris were taken pictures, measured the size, and observed the attached organisms. Some core was collected by the MBARI core. These core was cut into 1cm increments. After observation, sample was preserved in deep freezer (-80 °C).

We observed a lot of deep-sea litter off Sanriku, but was not observed off Sendai. Observed deep-sea litter was can, plastic bag, vinyl, sinking wood and etc. These collected litter was many cans, plastic bag, old vinyl, and sinking wood. There were attached hydrozoa, sea anemone, echinoderm, egg and etc.

3.3.2. Future studies

- * analysis of the biological and physico-chemical environments

- *analysis of the video footages that recorded by *Hyper Dolphin 3000* camera

3.4 Geology/Sedimentology

Kazuno Arai (Chiba University)

3.4.1. Purpose

To reconstruct the sedimentological events (such as turbidity currents, debris flows) in sea due to the 2011 off the Pacific coast of Tohoku Earthquake and the Tsunami, observation of seafloor topography and sampling seafloor deposits were conducted. Eastern Japan such as Sanriku Coast was severely damaged by the earthquake and the inundation of the tsunami on land. These phenomena on land were recorded and investigated in a variety of ways. However, it is not clear that what happened in sea and near seafloor. Previously, we revealed that the broad region of seafloor from shelf to the trench was covered with soft muddy deposit. In this cruise, observation of seafloor topography, sampling MBARI core of seafloor deposits were conducted using ROV Hyper Dolphin to investigation seafloor event deposits.

3.4.2. Method

Observation of seafloor topography and sampling seafloor deposits were conducted at 3 sites (off Sendai, Ohtsuchi canyon and off Sanriku site) using the ROV Hyper Dolphin. Observation of seafloor topography was conducted using CCD, HD, SeaMax cameras of that. 8 core samples of seafloor deposits were collected using 30 cm MBARI corer with 4 color tape to know the compass of core sampling. Cores were split whole cores into half-and-half. These half cores describe sedimentary structures by naked eyes and take photographs.

3.4.3. Result

Off Sendai site (900 m, HPD#1382, 1383)

Seafloor deposit is composed of silty sand or sandy silt. A lot of burrows, fragments of organisms and artificial trails were observed on rough seafloor. Roughness of seafloor topography changed because of amount of bioturbation, bedforms (ripples?) and artificial activities.

2 core samples were collected. At top of cores, graded layer (4 – 5 cm) was observed. This layer is composed of sand – silt sized particles. Below 5 cm, hardly bioturbation and pumice was shown.

Ohtsuchi canyon site (500 m, HPD#1384)

Seafloor deposit is composed of sand and silty sand, coarser than off Sendai site. Roughness of seafloor topography was smaller. Many brittle stars were shown on seafloor. Sometimes,

big holes (burrows?) and rocks with many organisms were shown.

4 core samples were collected along the canyon. Sediment color changes at 9 cm of RY core. Some gravels were shown below 1 cm of Green core. Shell was shown at 18 cm of blue core.

Off Sanriku site (920 m, HPD#1385)

Seafloor deposit is composed of silt, finer than other 2 sites. Seafloor topography was very smooth. Shells (or sea urchin spines), coarse particles, litters were accumulated at some points.

2 core samples were collected. At top of cores, high water content layer (4 – 5 cm) was observed. This layer is composed of silt – clay sized particles.

3.4.4. Future plan

Characteristics of seafloor topography (such as bedforms, flow direction) at each site will be observed in detail using movies and photos of the ROV Hyper Dolphin. Cores of seafloor deposits will be described by naked eyes and smearslices and analyzed by X ray-CT, grain size analysis, XRD, SEM.

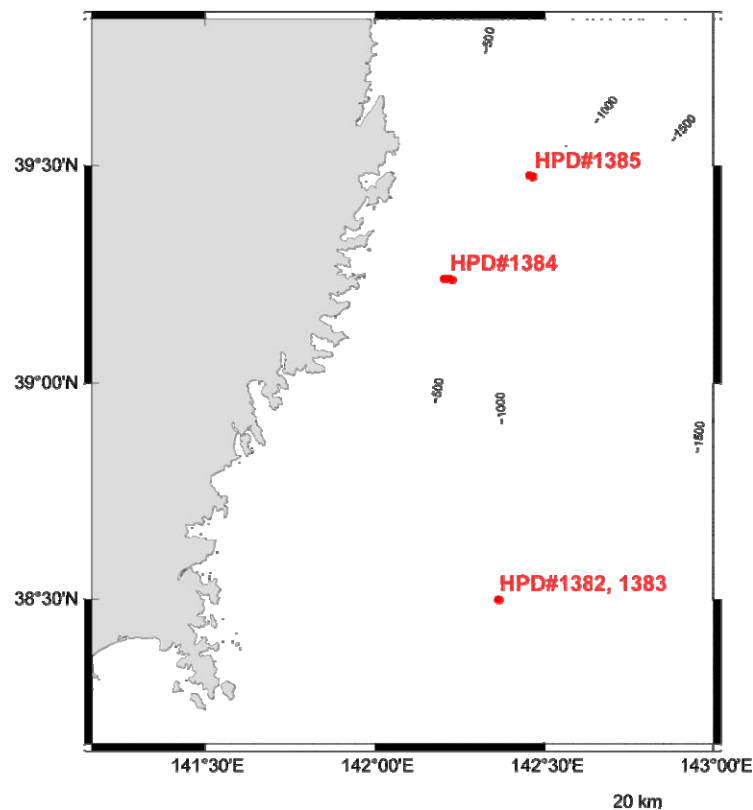


Fig. 1 Index map of HPD dives. Red circles: Core sampling points. Bathymetry image is made, based on J-EGG500 data.

3.5. Investigation into the biological decomposition of wood in the sea

Takaki Y, Hatada Y and Yoshida T, Biogeos/JAMSTEC

3.5.1. Purpose

A purpose of this research is to examine the biological process of wood decomposition in the sea, in order to estimate the time required for natural degradation of the organic part of debris such as wood deposited by the tsunami on the seabed off the coast of the Tohoku area.

3.5.2. Method

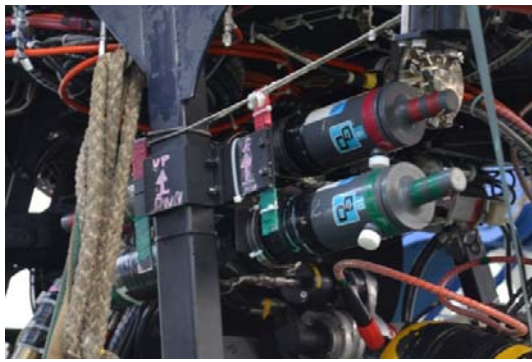
Marine macro- and micro-organisms adhering to the wood falls taken from seabed in this cruise (39 ° 14.409N, 142 ° 13.433E, water depth=492m at Hyperdolphin Dive #1384) will be isolated carefully. For the phylogenetic analysis of the isolates, 18S or 16S rRNA gene will be amplified and sequenced. Additional EST analyses may reveal the functional gene for the decomposition of woody materials in the debris. Furthermore, degradation enzyme activities to the wood components, mainly cellulose and lignin, will be measured for each isolate, in order to estimate the process of the wood decomposition by them.

3.5.3. Future plan

To understand the features of the biodegradation of wood at the bottom of the sea, Additional repeated sampling and analyses of the debris are required. In order to measure the rate of biodegradation of the debris on the seabed, we will install the model debris of wood on the seafloor to observe the process of the decomposition periodically.

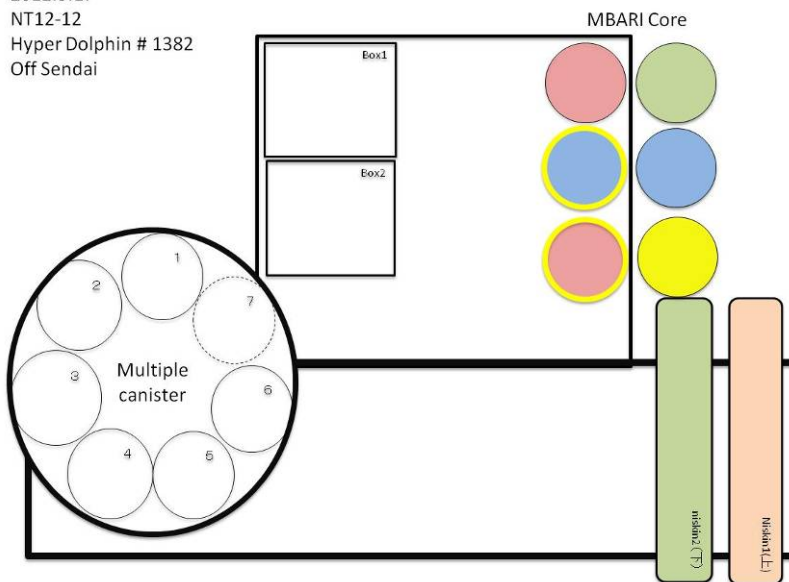
Appendix

(1) Payload photos and descriptions.

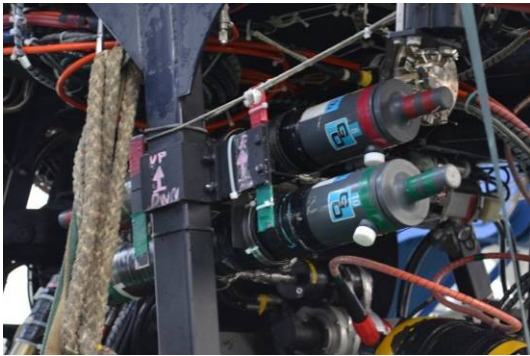


- Sample box x2
- Scoop x1
- MBARI core x6
- Niskin x2
- Vacuum sampler with revolver canister

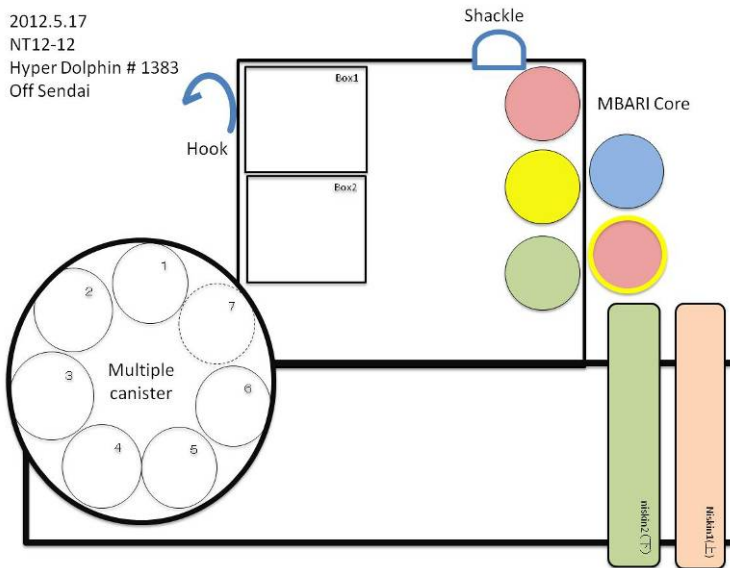
2012.5.17
 NT12-12
 Hyper Dolphin # 1382
 Off Sendai



Dive #1382 Payload

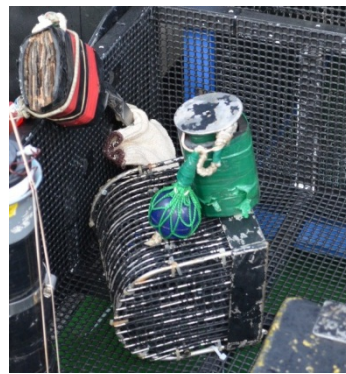
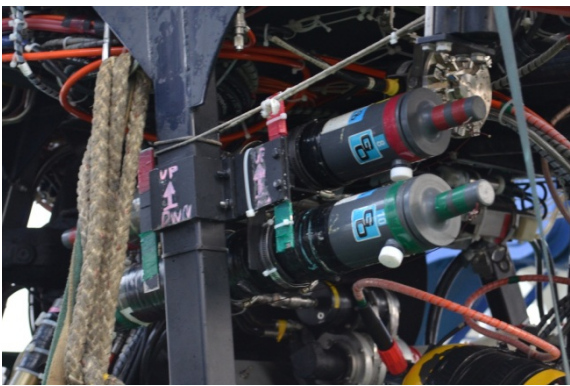


2012.5.17
 NT12-12
 Hyper Dolphin # 1383
 Off Sendai

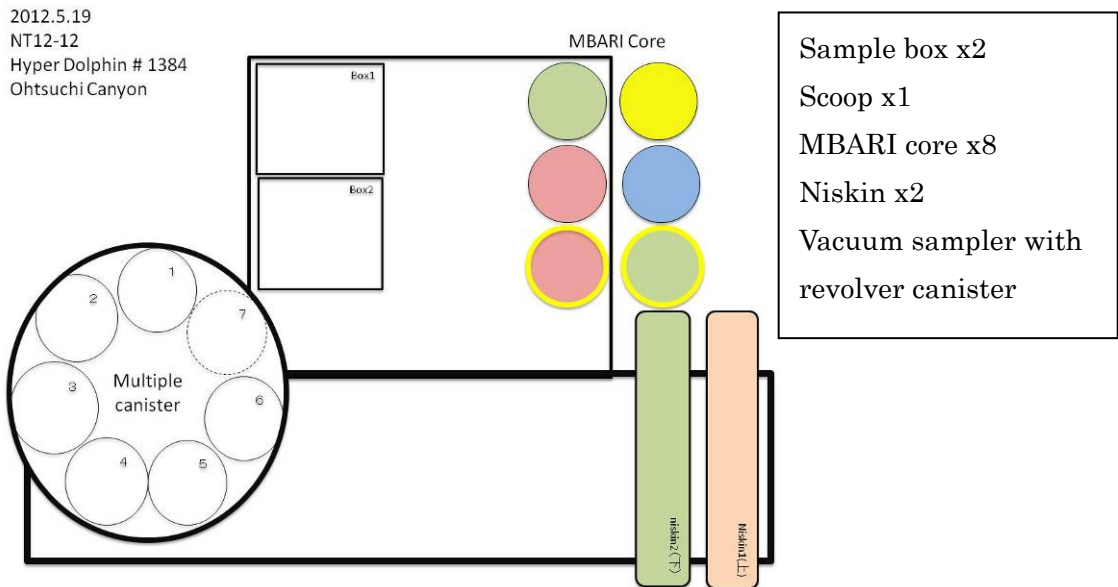


- Sample box x2
- Scoop x1
- MBARI core x5
- Niskin x2
- Shackle x1
- Recovery hook x1
- Vacuum sampler with
revolver canister

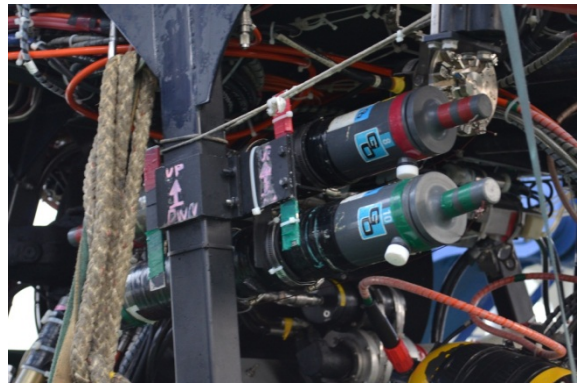
Dive #1383 payload



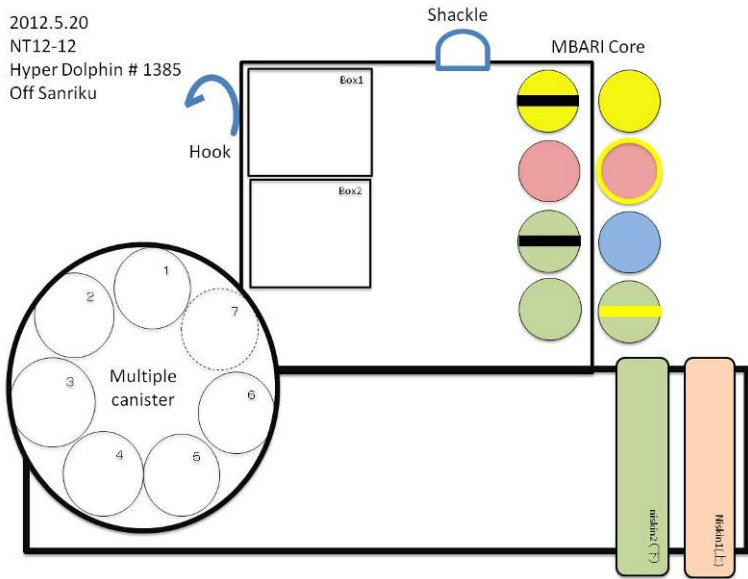
2012.5.19
 NT12-12
 Hyper Dolphin # 1384
 Ohtsuchi Canyon



Dive #1384 payload



- Sample box x2
- Scoop x1
- MBARI core x8
- Niskin x2
- Shackle x1
- Recovery hook x1
- Vacuum sampler with revolver canister



Dive #1385 payload

(2) Dive data

ハイパードルフィン 3000 潜航記録

平成 24 年 NT12-12 行動

記載者 木戸 哲平

潜航年月日 2012/05/17

位置 作図中心位置

潜航回数 1回

緯度 38° 30.000 ' N

通算潜航回数 1382回

経度 142° 22.000 ' E

WGS-84

潜航海域 仙台沖

潜航目的 調査潜航

「東北震災に伴う堆積過程と生物地球化学的変動の研究: 酸素極小層を挟んだ生物相調査と生元素循環過程の解明」

調査主任 小栗一将

Pilot 木戸 哲平

ビークル指揮 大野 芳生

Co. Pilot 榊原 佑太

作業経過時刻	
吊揚	08:11
着水	08:14
潜航開始	08:25
着底	09:01
離底	11:05
浮上	11:31
揚収完了	11:46

累計時間	
潜航時間	3:06
通算潜航	6729:56
ケーブル	ケーブルNo. 4
	使用時間 3:35
	通算時間 1314:6

気象・海象

天候	風向	風力	風浪	うねり	視程
c	SW	3	2	3	2

最大潜航深度 903 m

着底深度 903 m

着底底質 泥

離底深度 894 m

離底底質 泥

記事 海底を観察しながら航走し、採泥、採水及び生物採集を行った。

ハイパードルフィン 3000 潜航記録

平成 24 年 NT12-12 行動

記載者 木戸 哲平

潜航年月日 2012/05/17

位置 作図中心位置

潜航回数 2回

緯度 38° 30.000 ' N

通算潜航回数 1383回

経度 142° 22.000 ' E

WGS-84

潜航海域 仙台沖

潜航目的 調査潜航

「東北震災に伴う堆積過程と生物地球化学的変動の研究: 酸素極小層を挟んだ生物相調査と生元素循環過程の解明」

調査主任 小栗一将

Pilot 木戸 哲平

ビークル指揮 大野 芳生

Co. Pilot 榊原 佑太

作業経過時刻	
吊揚	13:09
着水	13:13
潜航開始	13:24
着底	13:58
離底	15:42
浮上	16:16
揚収完了	16:31

累計時間		
潜航時間	2:52	
通算潜航	6732:48	
ケーブル	ケーブルNo.	4
	使用時間	3:22
	通算時間	1317:28

気象・海象

天候	風向	風力	風浪	うねり	視程
○	SE	2	2	3	3

最大潜航深度 905 m

着底深度 904 m

着底底質 泥

離底深度 903 m

離底底質 泥

記事 海底を観察しながら航走し、採泥、採水、生物採集及びランダー回収を行った。

ハイパードルフィン 3000 潜航記録

平成 24 年 NT12-12 行動

記載者 榊原 佑太

潜航年月日 2012/05/19

位置 作図中心位置

潜航回数 3回

緯度 39° 15.000' N

通算潜航回数 1384回

経度 142° 12.000' E

WGS-84

潜航海域 三陸沖

潜航目的 調査潜航

「東北震災に伴う堆積過程と生物地球化学的変動の研究: 酸素極小層を挟んだ生物相調査と生元素循環過程の解明」

調査主任 小栗一将

Pilot 榊原 佑太

ビークル指揮 大野 芳生

Co. Pilot 西郷 亮

作業経過時刻	
吊揚	08:09
着水	08:13
潜航開始	08:26
着底	09:00
離底	16:21
浮上	16:36
揚収完了	16:49

累計時間	
潜航時間	8:10
通算潜航	6740:58
ケーブル	ケーブルNo. 4
	使用時間 8:40
	通算時間 1326:8

気象・海象

天候	風向	風力	風浪	うねり	視程
bc	E	2	2	3	5

最大潜航深度 502 m

着底深度 500 m

着底底質 泥

離底深度 462 m

離底底質 泥

記事 海底を観察しながら航走し、採泥、採水及び生物採集を行った。

ハイパードルフィン 3000 潜航記録

平成 24 年 NT12-12 行動

記載者 西郷 亮

潜航年月日 2012/05/20

位置 作図中心位置

潜航回数 4回

緯度 39° 28.500 ' N

通算潜航回数 1385回

経度 142° 28.000 ' E

WGS-84

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「東北震災に伴う堆積過程と生物地球化学的変動の研究: 酸素極小層を挟んだ生物相調査と生元素循環過程の解明」

調査主任 小栗一将

Pilot 西郷 亮

ビークル指揮 大野 芳生

Co. Pilot 近藤 友栄

作業経過時刻	
吊揚	08:15
着水	08:19
潜航開始	08:31
着底	09:06
離底	15:40
浮上	16:15
揚収完了	16:32

累計時間		
潜航時間	7:44	
通算潜航	6748:42	
ケーブル	ケーブルNo.	4
	使用時間	8:17
	通算時間	1334:25

気象・海象

天候	風向	風力	風浪	うねり	視程
bc	ESE	2	1	2	7

最大潜航深度 938 m

着底深度 922 m

着底底質 泥

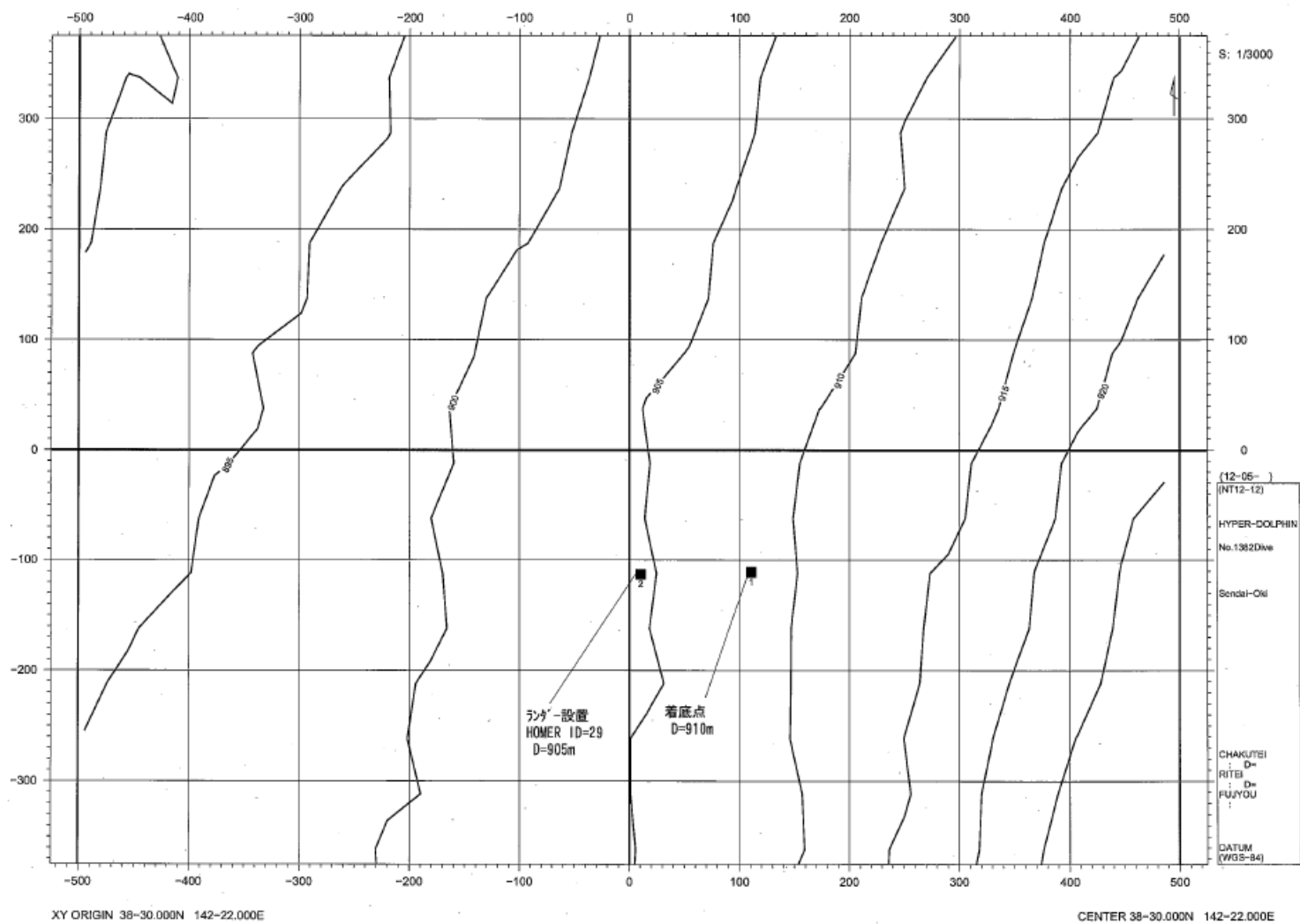
離底深度 934 m

離底底質 泥

記事 海底を観察しながら航走し、採泥、採水、生物採集及びランダー回収を行った。

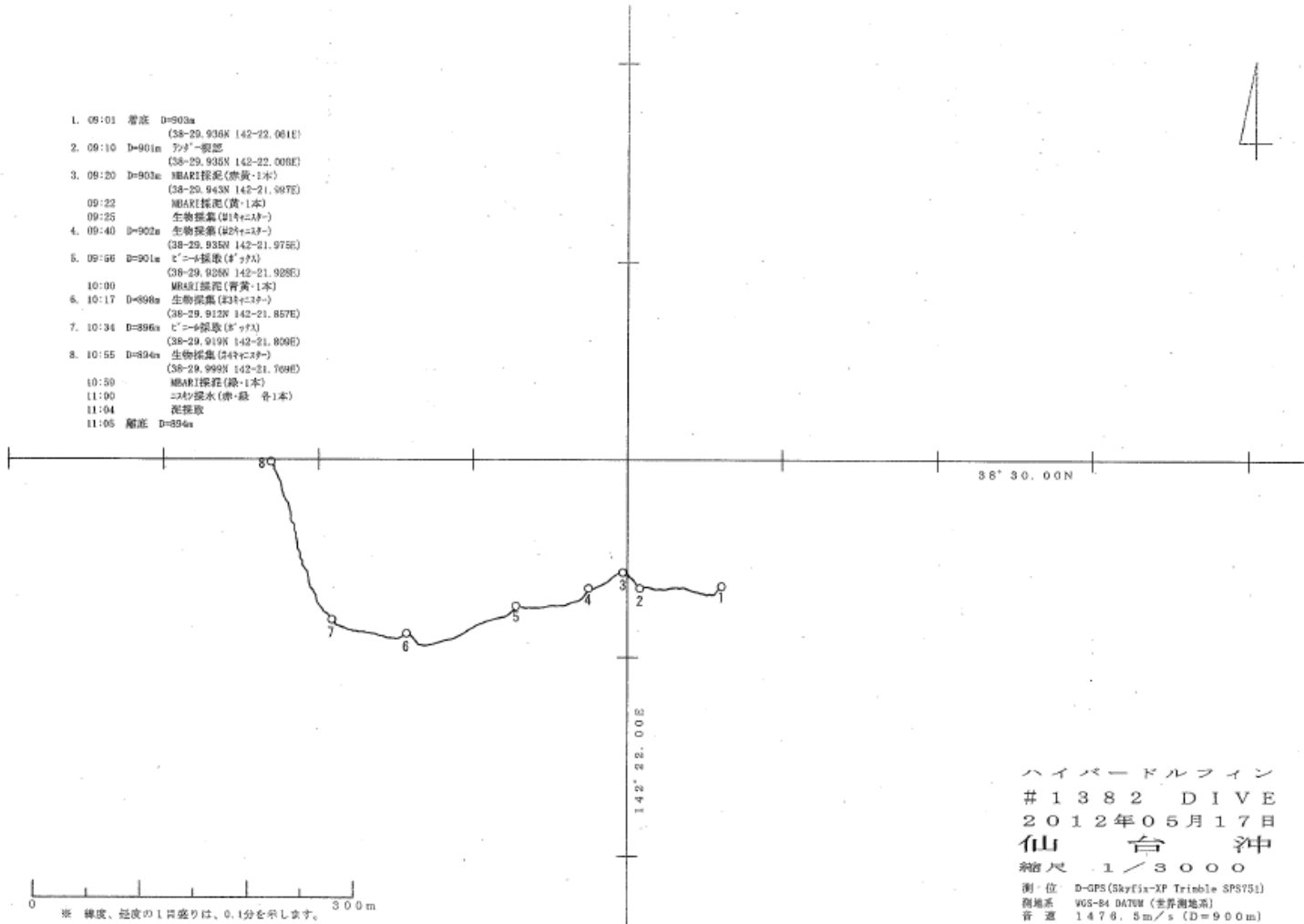
(3) Research Information

Research points

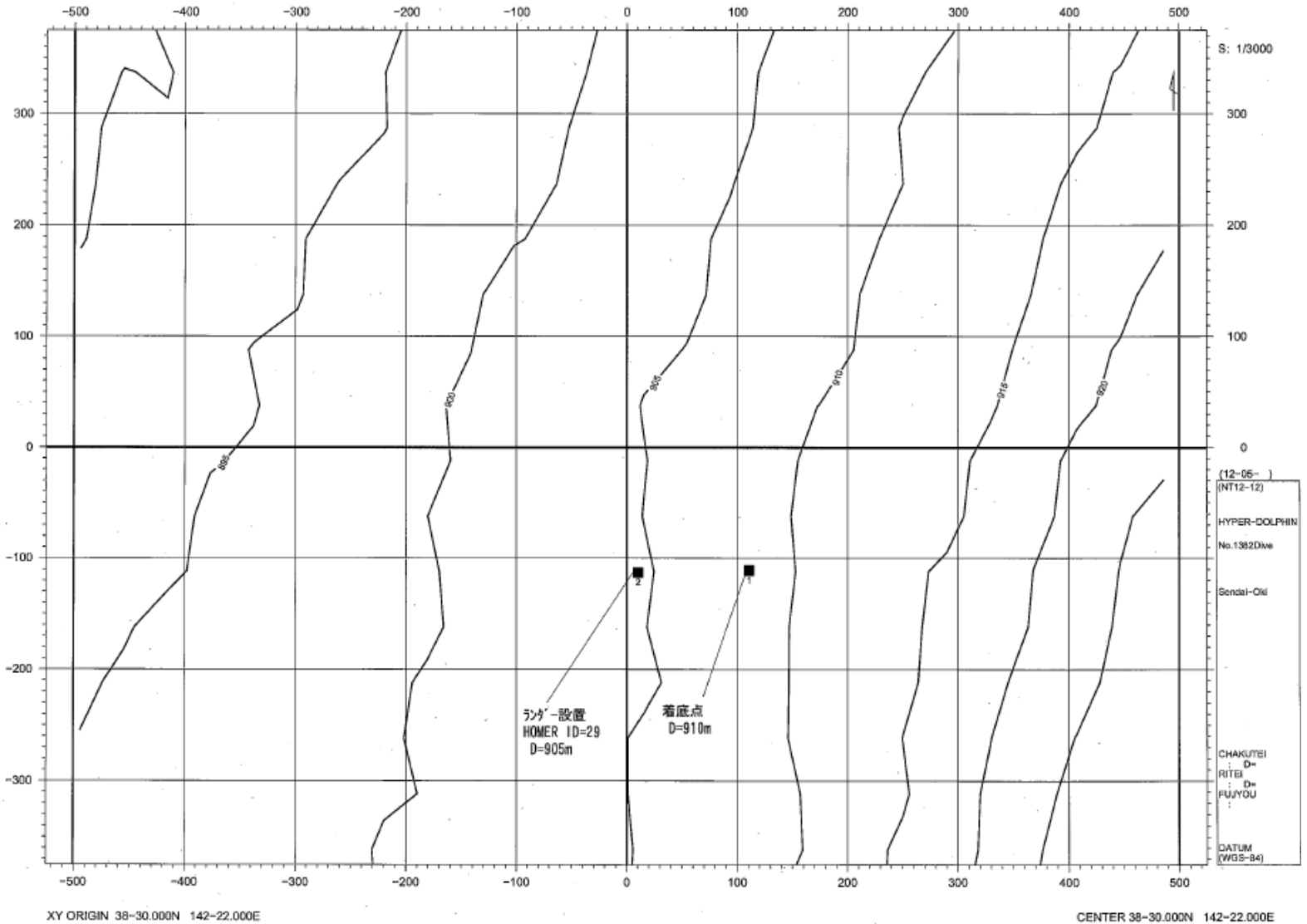


Dive #1382 map

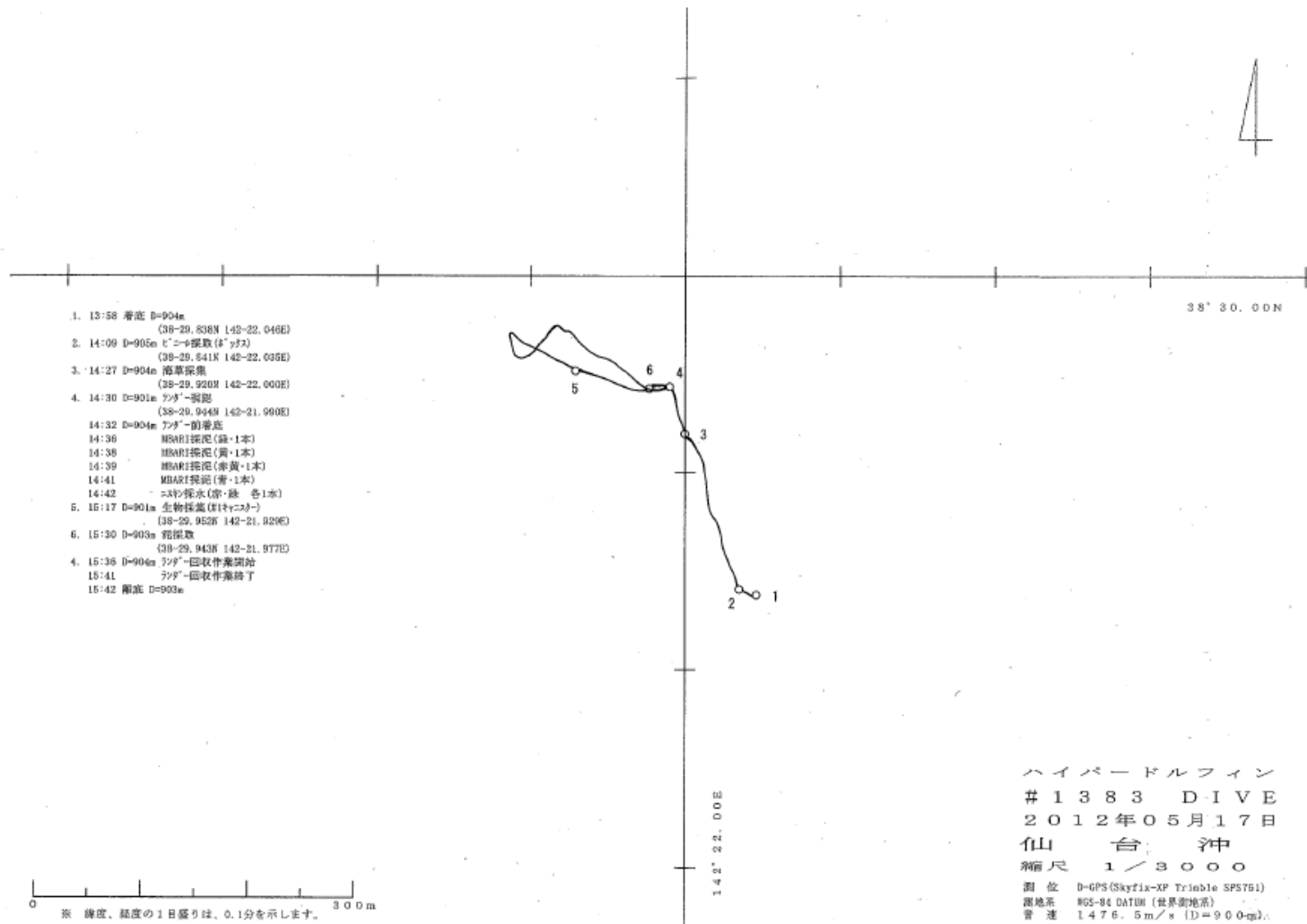
1. 08:01 着底 D=902m (38-29.936N 142-22.061E)
2. 08:10 D=901m 79°-観測 (38-29.935N 142-22.008E)
3. 08:20 D=901m MRARI標尺(青黄-1本) (38-29.943N 142-21.987E)
- 09:22 MRARI標尺(黄-1本)
- 09:25 生物採集(244-237-)
4. 09:40 D=902m 生物採集(244-237-) (38-29.935N 142-21.975E)
5. 09:56 D=901m C'-6標尺(8'9'X) (38-29.926N 142-21.928E)
- 10:00 MRARI標尺(青黄-1本)
6. 10:17 D=898m 生物採集(244-237-) (38-29.912N 142-21.857E)
7. 10:34 D=896m C'-6標尺(8'9'X) (38-29.919N 142-21.809E)
8. 10:55 D=894m 生物採集(244-237-) (38-29.999N 142-21.769E)
- 10:59 MRARI標尺(緑-1本)
- 11:00 2号標尺(赤-緑 各1本)
- 11:04 底採取
- 11:05 離底 D=894m



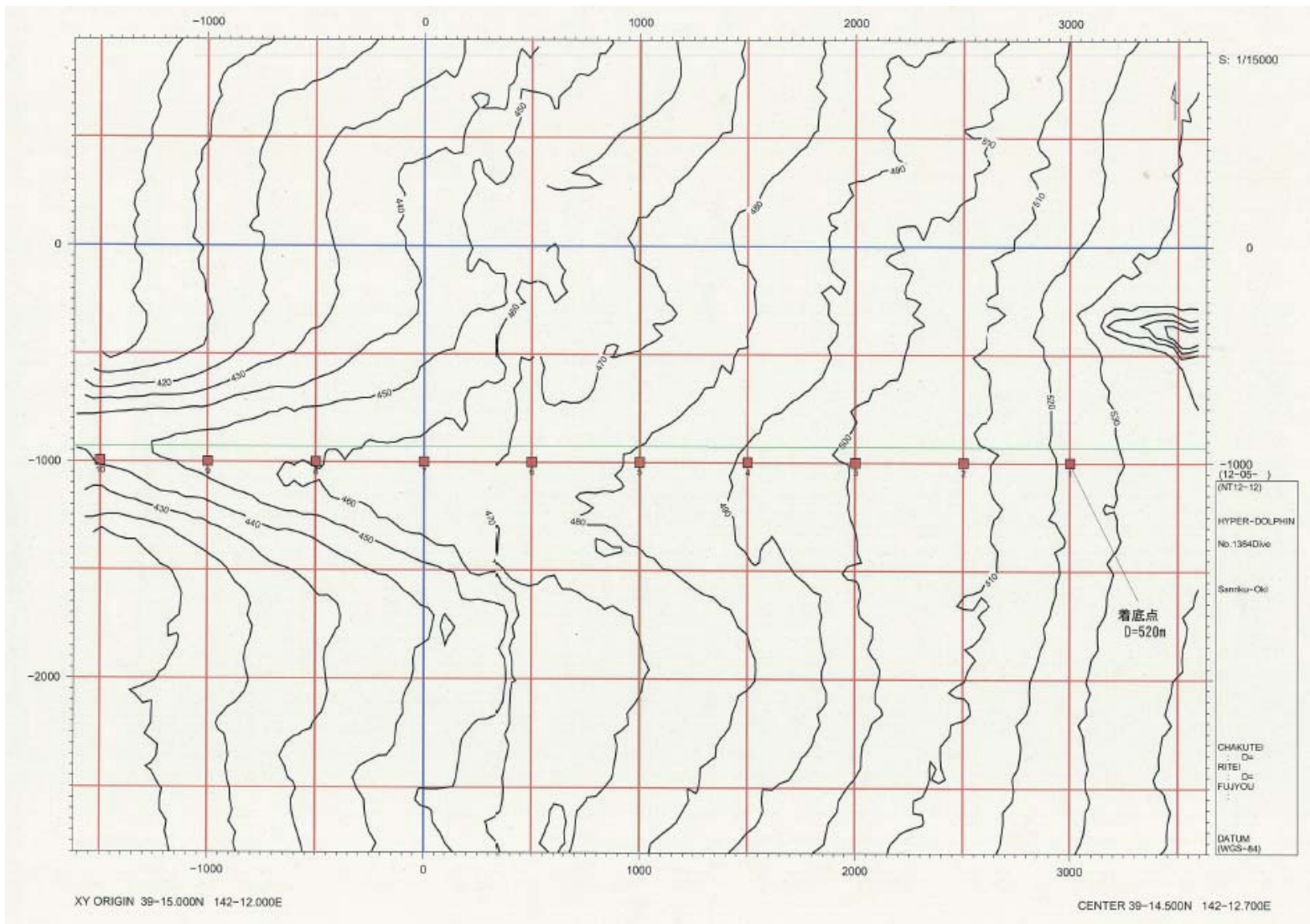
Dive #1382 track chart



Dive #1383 map



Dive #1383 track chart

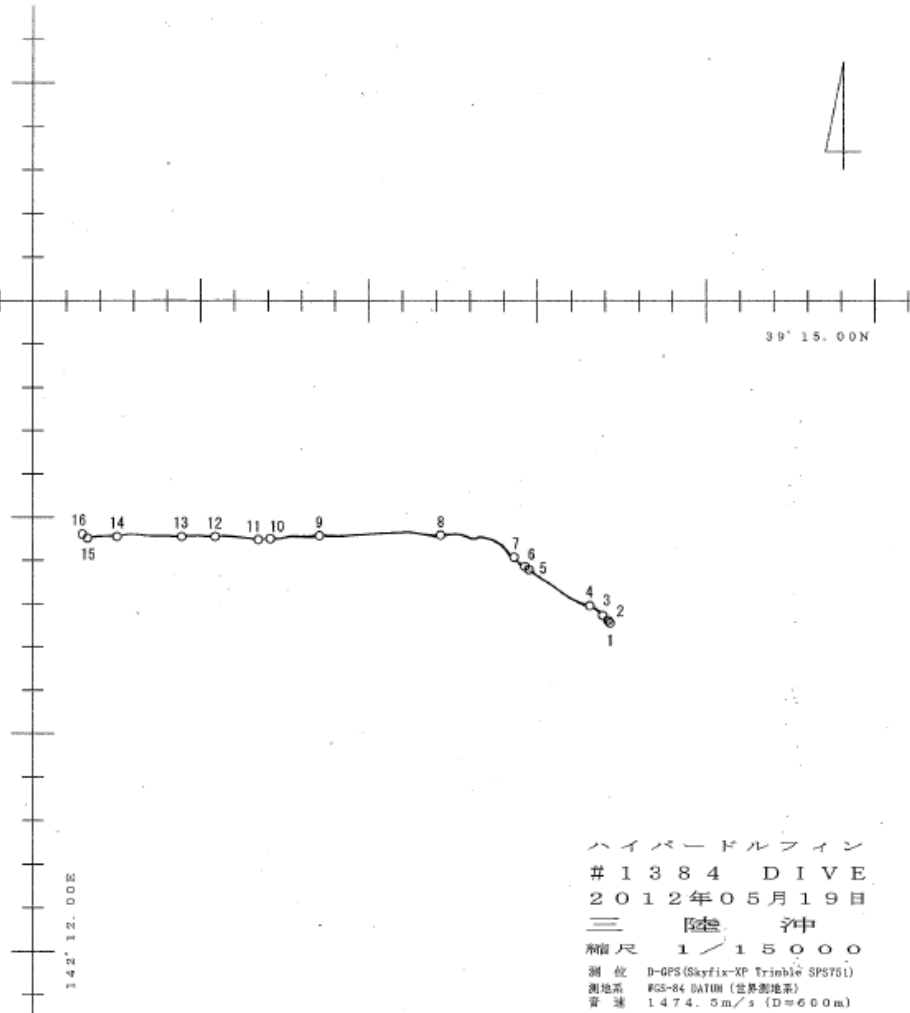


Dive #1384 map

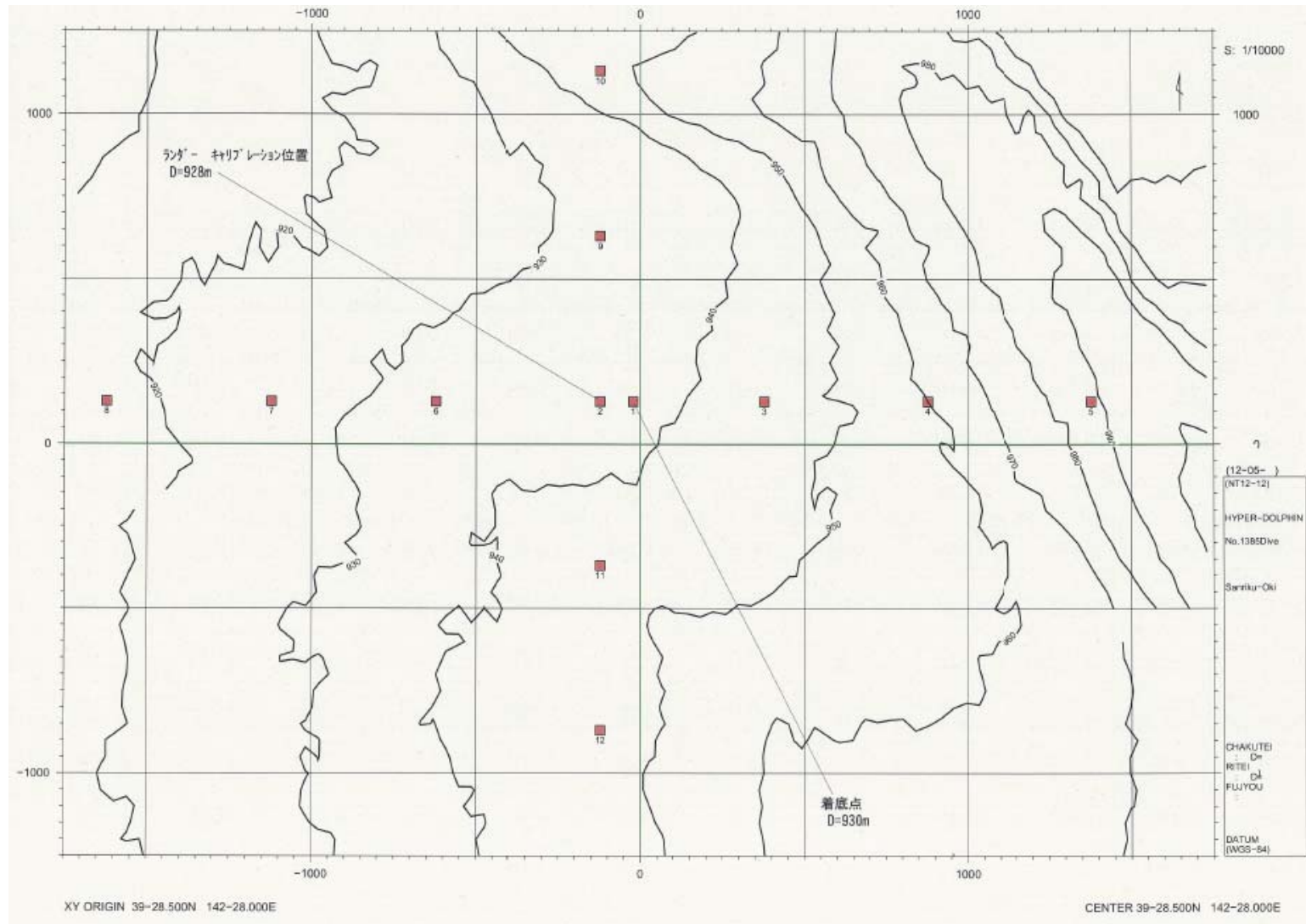
1. 09:00 船底 D=500m
(39-14.257N 142-13.710E)
- 09:01 二枚採水(黄・1本)
- 09:10 MBAR探照(黄・1本)
- 09:15 MBAR探照(黄・1本)
2. 09:22 D=502m 生物採集(13ヶ所)
(39-14.263N 142-13.710E)
- 09:25 L'-採取
3. 09:32 D=502m 磁石採取(1個)
(39-14.274N 142-13.694E)
- 09:43 生物採集(13ヶ所)
- 09:46 L'-採取
4. 10:00 D=500m 材木採取
(39-14.297N 142-13.666E)

5. 10:46 D=497m r-ア 視認
(39-14.390N 142-13.477E)
6. 11:03 D=497m 生物採集(22ヶ所)
(39-14.398N 142-13.464E)
- 11:04 木片採取、ワケ視認
7. 11:17 D=496m 木片採取
(39-14.409N 142-13.433E)
8. 12:31 D=492m MBAR探照(黄・1本)
(39-14.460N 142-13.214E)
9. 13:32 D=482m 空缶採取(1個)
(39-14.458N 142-12.858E)
10. 13:57 D=478m L'-採取
(39-14.461N 142-12.708E)
- 14:01 MBAR探照(黄・1本)
11. 14:11 D=477m 生物採集(22ヶ所)
(39-14.449N 142-12.673E)
12. 14:35 D=473m 空缶採取(1個)
(39-14.456N 142-12.646E)
- 14:39 MBAR探照(黄・1本)
13. 14:59 D=470m 空缶採取(1個)
(39-14.456N 142-12.446E)
14. 15:44 D=464m L'-採取
(39-14.456N 142-12.252E)
- 15:50 MBAR探照(黄・1本)
15. 16:04 D=462m 空缶採取(1個)
(39-14.452N 142-12.164E)
16. 16:06 D=462m 二枚採水(黄・1本)
(39-14.461N 142-12.149E)
- 16:11 MBAR探照(黄・1本)
- 16:15 MBAR探照(黄・1本)
- 16:19 泥採取
- 16:21 船底 D=462m

0 1500m
※ 緯度、経度の1目盛りは、0.1分を示します。



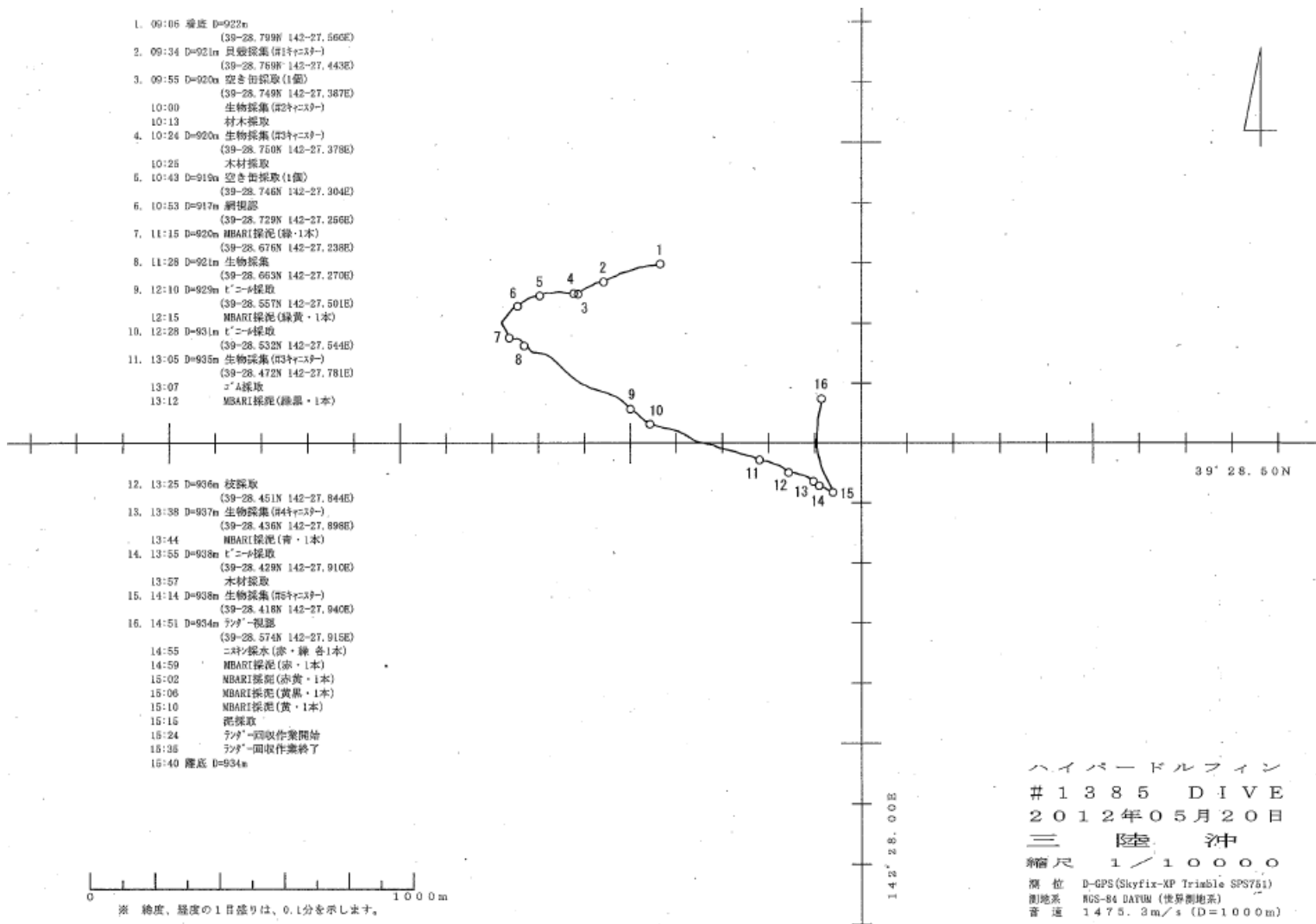
Dive #1384 track chart



Dive #1385 map

1. 09:05 離底 D=922m
(39-28.799N 142-27.566E)
2. 09:34 D=921m 貝殻採集(青・黄・赤・黒)
3. 09:55 D=920m 空き缶採取(1個)
(39-28.749N 142-27.387E)
- 10:00 生物採集(青・黄・赤・黒)
- 10:13 木材採取
4. 10:24 D=920m 生物採集(青・黄・赤・黒)
- 10:25 木材採取
6. 10:43 D=919m 空き缶採取(1個)
(39-28.746N 142-27.304E)
6. 10:53 D=917m 網振取
(39-28.729N 142-27.266E)
7. 11:15 D=920m MBARI採泥(緑・1本)
(39-28.676N 142-27.238E)
8. 11:28 D=921m 生物採集
(39-28.663N 142-27.270E)
9. 12:10 D=929m Eコーン採取
(39-28.557N 142-27.501E)
- 12:15 MBARI採泥(緑・黄・1本)
10. 12:28 D=931m Eコーン採取
(39-28.532N 142-27.564E)
11. 13:05 D=935m 生物採集(青・黄・赤・黒)
- 13:07 Eコーン採取
(39-28.472N 142-27.781E)
- 13:12 MBARI採泥(緑・黄・1本)

12. 13:25 D=936m 枝採取
(39-28.451N 142-27.844E)
13. 13:38 D=937m 生物採集(青・黄・赤・黒)
- 13:44 MBARI採泥(青・1本)
14. 13:55 D=938m Eコーン採取
(39-28.429N 142-27.910E)
- 13:57 木材採取
15. 14:14 D=938m 生物採集(青・黄・赤・黒)
- 14:18 MBARI採泥(赤・黄・1本)
16. 14:51 D=934m テンゲ-視認
(39-28.574N 142-27.915E)
- 14:55 ニホン採水(赤・黄・黒 各1本)
- 14:59 MBARI採泥(赤・1本)
- 15:02 MBARI採泥(赤・黄・1本)
- 15:06 MBARI採泥(黄・黒・1本)
- 15:10 MBARI採泥(黄・1本)
- 15:16 泥採取
- 15:24 テンゲ-回収作業開始
- 15:38 テンゲ-回収作業終了
- 15:40 離底 D=934m



※ 緯度、経度の1目盛りは、0.1分を示します。

Dive #1385 track chart

(4) Dive log

Dive Log of HPD Dive #1382						Area Name Off Sendai	2012/05/17
Time (JST)	Dep. (m)	Alt. (m)	Head (Deg)	Pos. Xm	Pos. Ym	Description	Remarks
08:57	819		270			jelly fish	
09:00	895	10	270			red jelly fish	
09:01	903	3	270			CCD show bottom	
09:01	903	2	270			arriving at bottom	
09:02	904	2	270			comatulid, conger, starfish, artificial trail	many polychaetes
09:04	904	1	280			conger, organisms on a gabage	
09:06	904	0.7	282			gabage	
09:06	903	1.3	280			conger, sea cucumber	
09:10	902	1.8	305			Oguri's lander visible in CCD	current flow from north to south
09:11	902	1.3	305			conger	
09:12	903	0	305			landing on bottom	
09:12	903	0	305			close to Oguri's lander	
09:13	903	0	306			re-landing on bottom	
09:14	903	0	308			sea cucumber	
09:20	903	0	308			sediment core recovered by MBARI (Red-yellow)	
09:22	903	0	308			sediment core recovered by MBRARI (yellow)	
09:25	903	0	309			slurpgunsampling comatulid in 1st canistar	
09:25	903	0	308			slurpgunsampling sea cucumber in 1st canistar	
09:27	903	0	270			going to observation toward 270°	
09:29	902	1	260			going to observation toward 260°	
09:30	901	1	270			snail with trail, sea anemone, brittle star	
09:39	903	0	309			slurpgunsampling snail and sea anemone in to 2nd canistar	
09:42	902	1	270			move to observation. Gabages are almost nothing.	
09:49	900	0	260			landing to see an artificial material (plastic sheet?)	
09:56	900	0	262			artificial material (vinyl) recovered into sampling box by manipulator	
09:59	901	0	260			sediment core recovered from below the artificial material by MBARI (blue-yellow)	
10:01	900	0	260			bottom cod, move to observation	
10:03	900	0	270			artificial trail	
10:04	899	1	270			artificial trail	
10:05	899	1	270			artificial trail	
10:07	897	1.1	272			snail	
10:09	897	0	344			lading, snail with comatulid, brittle star	
10:12	898	0	342			surface becomes smooth	
10:13	898	0	342			slurpgun sampling snail with comatulid, brittle star in 3rd canistar	
10:14	898	0	343			sample is stopped on the way to canistar	
10:15	898	0	343			sample is in canistar.	
10:17	898	0	343			artificial trail from the upper right to the lower left on the screen	
10:18	897	0.7	270			artificial trail	
10:19	896	0.9	300			starfish, macrouridae, comatulid	
10:20	897	1.1	301			less species of organisms	
10:21	897	0	299			shell	
10:21	898	0	303			increasing snail	
10:22	898	0	303			<i>Lycerchelys albomaculata</i> on artificial trail	
10:23	898	0	303			surface sediment is sandy deposits	
10:23	898	0	303			synaphobranchidaeconger is swimming	
10:24	898	0	304			increasing number of fish	
10:26	898	0	355			try to collect <i>Lycerchelys albomaculata</i> , it got away	
10:27	897	0	300			wide artificial trail	
10:30	896	0	302			gabage vinyl	
10:31	896	0	336			artificial trail from the upper right to the lower left on the screen	
10:33	897	0	332			lading, sampling gabage(vinyl) in box1	
10:36	895	0	300			going to observation toward North. Increasing burrow. Go out articial trail	
10:37	895	1.1	360			articial trail	
10:39	895	0	359			big shell, starfish	
10:41	894	0	0			Macrouridae	
10:42	895	0	1.2			starfish, fish	
10:43	894	0	1.1			articial trail along isobath	

Dive Log of HPD Dive #1383						Area Name Off Sendai	2012/05/17
Time (JST)	Dep. (m)	Alt. (m)	Head (Deg)	Pos. Xm	Pos. Ym	Description	Remarks
13:38	288		303			Fish, squid	
13:40	334		340			jelly fish	
13:42	390		22			Fish	
13:43	418		19			many squid, small Fish	
13:44	450		20			squid	
13:45	482		22			Fish	
13:46	510		22			Fish	
13:47	540		25			Fish, house	
13:48	600		40			house, squid	
13:50	655		41			Fish	
13:50	667		45			shrimp	
13:51	695		43			shrimp, jelly fish	
13:52	728		42			jelly fish	
13:53	777		225			jelly fish	
13:54	800		20			to north	
13:55	832		30			jelly fish	
13:56	860		37			shrimp	
13:57	900	2	340			Cloudy, Fish	
13:58	904	0	340			Landing on bottom	
14:00	903	1.3	340			thin litter	
14:02	905	0	344			many burrow, surface sediment is sandy mud or muddy sand	
14:10	905	0	9			thin litter in BOX1	
14:11	904	0	347			starfish	
14:12	904	0	350			Fish	
14:13	904		350			sea cucumber	
14:14	904		350			Fish, starfish	
14:15	903		350			Fish	
14:17	903	1	0			cucumber, starfish	
14:19	903	0.7	0			red and blue Fish	
14:20	903	0.7	0			decreasing organisms	
14:22	901	2.3	0			starfish	
14:23	903	0	0			a seaweed with starfish, surface sediment is finer than before	
14:26	904	0	359			a seaweed in BOX1	
14:30	900	2.7	1			shrimp, discover Lander	
14:33	903	0	1.3			sampling m bari green core near lander	
14:34	903	0				sampling done	
14:36	903	0	1			sampling m bari yellow core near lander	
14:37	903	0				sampling done	
14:38	903	0	2.3			sampling m bari red and yellow core near lander	
14:39	903	0				sampling done	
14:39	903	0	2.4			sampling m bari blue core near lander	
14:40	903	0				sampling done	
14:42	903	0				niskin bottle prelevement near lander	
14:48	897	5.3	315			leave from lander	
14:51	900	0	319			sea stars observation	
14:53	900	0	319			sea stars and bottom fish	
14:54	899	1	319			sea stars and leaf	
14:56	900	0	319			leaf observation	
14:58	900	0	352.3			picture with high resolution of the leaf	
15:01	900	0	22.1			zoom on a sea concomber (holothuriae)	
15:05	898	1.7	230			2 sea stars and a bottom fish	
15:05	897	1.3	249			red shrimp	
15:06	898	1.3	266			a sea star and a fish	
15:08	897	1.3	311			6 sea stars	
15:10	898	1	96			2 sea concombers	
15:11	898	1	96			2 sea stars	
15:13	899	1.3	96			black sea concomber observation	

15:16	901	0	97		deployment of the ROV arm to capture the black sea concomber	
15:17	901	0	97		capture in pot number 1	
15:21	900	1.3	99		2 sea stars and a fish	
15:24	901	0.7	100		lander observation	
15:25	903	0	98.8		take off of the ROV deployment of its arm	
15:28	903	0	98.9		scoop prelevment	
15:29	903	0	98.7		scoop sediment in the box number 2	
15:30	903	0	98.3		lander observation	
15:36	903	0	162		Start lander recovery	
15:38	903	0	162		Recovery hook was connected to the lander rope	
15:41	903	0	162		Recovery U-bolt was conncted to the lander rope	
15:42	903	0	162		Recovery setup has completed	
15:43	903	0	162		Start ascending from the sea floor	
15:48	882	19	178		Confirmed the lander from the CCD camera	
16:03					On the surface (estimated time)	

Dive Log of HPD Dive #1384						Area Name Ohtsuchi canyon	2012/05/19
Time (JST)	Dep. (m)	Alt. (m)	Head (Deg)	Pos. Xm	Pos. Ym	Description	Remarks
08:09	0					suspended, take water	
8:26						Dive start	
8:54	347	0	358			Squids	
9:01	500	1	298			Landed. Sandy mud surface with brittle stars.	
9:02	500	1	301			Water sampling, Niskin red	
9:10	502	0	296			MBARI core green, hard bottom.	arrowworm and isopoda come together for right.
9:16	502	0	296			MBARI core red-yellow, hard bottom.	?
9:21	502	0	300			beroida	
9:22	502	0	300			Slurp gun (Canister #1) vadokari	
9:25	502	0	297			Sampling: Vinyl (Box #1)	
9:33	502	0	288			Sampling: Stone (Basket)	
9:39						much biomass. Many brittle star, fish, Cephalopoda, jelly fish, vinyl, rock	
9:42	502	0	295			Slurp gun zoarcidae in#1canister	
9:44	502	0	293			Sampling: vinyl (in Box1)	
9:48	501	0	290			big star fish, akebonochoutin	
9:49	501	0	290			cucumber, many zoarcidae	
9:51	500	0	293			many arrowworm	
9:53	500	0	294			squid, zoarcidae	
9:54	500	0	290			wood with helmet-crab, conch	
10:00	500	0	290			Sampling: wood (Basket)	
10:01	500	0	287			many arrowworm	
10:03	499	0	286			cucumber many house	
10:04	500	0	287			rock, conch	
10:05	499	0	286			cucumber, rockfish, cucumber	
10:06	499	0	287			jelly fish, zoarcidae, cucumber, arrowworm, many house	
10:08	499	0.4	386			cucumber, actinia on garbage, pentangular starfish, starfish	
10:16	499	0.4	284			starfish	
10:17	499	0	284			vinyl	
10:19	498	1.1	299			cucumber	
10:20	498	0.7	301			rockfish, zoarcidae, macrouridae	
10:22	499	0	300			rockfish	
10:23	498	0.4	300			starfish	
10:25	498	0.4	301			cucumber2	
10:25	497	0	301			sea squirt, cucumber, starfish	
10:28	497	0.7	300			starfish,	
10:29	496	0	301			cucumber4	
10:30	496	0.4	302			cucumber	
10:31	496	1.1	300			feather star, cucumber	
10:32	496	0.7	300			rockfish, cucumber3, feather star	
10:33	497	0.4	300			rockfish, cucumber4, fish	
10:34	497	0	297			shall2, ripple ?	
10:36	497	0	300			feather star	
10:36	497	0	300			cucumber 3	
10:37	497	0	300			cucumber 2	
10:38	497	0	300			jelly fish	
10:38	497	0	299			feather star	
10:38	497	0	299			cucumber	
10:39	497	0	299			goat, cucumber 3	
10:40	497	0	299			macrouridae, rockfish	
10:41	497	0	299			conch	
10:41	497	0	299			fish, cucumber 2	
10:42	497	0	299			sea squirt ?	
10:43	497	0	299			cucumber 2	
10:43	497	0	299			many poket, zoarcidae (horizontal reinforcement ?)	
10:44	497	0	299			jelly fish house ? In CCD	
10:45	497	0	299			red ribbon	
10:48	497	0	298			actinia	

10:50	497	0	296		rusty stick,on feather star, sea squirt ?	
10:52	497	0	295		Devil fishCCD	
10:59	497	0	292		rusty wire	
11:02	497	0	292		sampling shrimp	
11:03	497	0	292		sampling wood	
11:05	497	0	298		cucumber,queen crab,jelly fish	
11:06	497	0	300		jelly fishCCD	
11:06	497	0	299		stick	
11:07	496	0	300		cucumber,macrouridae? macrouridae ?	
11:07	496	0	300		cucumber 2	
11:08	496	0	300		conch2	
11:09	496	0	300		feather star,cucumber2	
11:10	496	0	300		synphobranehidae ? ,brittle star gathering spot	
11:11	496	0	300		cucumber,feather star,pocket geography CCD	
11:11	496	0	299		fish 2 , white wood ?	
11:17	496	0	298		sampling wood	
11:18	495	0	299		cucumber.starfish,conch ? ,helmet-crab,actinia,cucumber	
11:19	495	0	299		fish,cucumber,conch,	
11:21	496	0	299		zoarcidae,feather star	
11:22	495	0	301		feather star,brush,cucumber,conch,starfish	
11:24	495	0	298		CCD microtopography	
11:24	495	0	299		vinyl bag	
11:25	495	1	298		CCD house,HDTVactinia,feather star, devilfish	
11:26	495	0	300		conch	
11:28	495	0	300		block 2	
11:28	495	0	300		CCD house	
11:29	495	1	299		zoarcidae,feather star,rockfish	
11:30	495	1	299		helmet-crab,actinia, fish,conch	
11:31	495	1	300		cucumber,feather star,cucumber	
11:32	495	1	299		Go to event4	
11:33	495	1	268		actinia	
11:34	495	1	269		CCD trail N-W, cucumber	
11:35	495	1	268		zoarcidae,poket,zoarcidae, fish	
11:37	495	0	268		cucumber,starfish,feather star,feather star	
11:38	495	0	268		actinia, fish	
11:40	494	0	267		fish	
11:41	494	0	267		starfish,cucumber,	
11:43	494	0	267		cucumber 2 ,conch,actinia	
11:44	494	0	267		feather star,synphobranehidae,goat,can	
11:45	494	0	267		Landing on bottom, georgia coffee can 1 9 9 8	
11:45	494	0	267		Goat timber 300°	
11:49	494	0	267		many plankton	
11:51	494	0	268		bed fine (on landing, deep cloudy,flow into weak)	
12:00	494	0	270		flow go up, current direction from shallow	
12:01	494	0	270		current direction transform itself	
12:03	494	0	270		restart	
12:03	494	0	267		starfish,cucumber 2	
12:04	494	0	266		raincoat	
12:06	493	0.4	270		rockfish, fish,starfish	
12:07	493	0.7	268		cucumber 5 ,feather star,synphobranehidae	
12:07	494	0	269		cucumber,feather star,starfish,actinia	
12:08	493	0	270		starfish 1 ,feather star 1	
12:09	493	0	269		vinyl, starfish	
12:10	493	0	251		poket,zoarcidae,starfish,actinia,rockfish	
12:11	493	0	251		actinia 2	
12:12	491	0	250		actinia 2 ,sponge, starfish	
12:13	493	0.4	251		starfish,cucumber 2	
12:15	491	1.5	250		starfish,shrimp, sea star, feather star,rock	
12:15	492	0.7	251		jelly fish,cucumber,zoarcidae, jelly fish	
12:16	493	0	249		zoarcidae, poket	
12:17	492	0	251		scallop aquafarming net on feather star, wire, fish,cucumber,actinia,brittle star,marine algae,conch	

12:22	492	0	250		starfish,house,	
12:24	491	0	250		jelly fish,starfish	
12:25	491	0	251		starfish	
12:25	491	0	250		decline biomass. not get any better brittle star	
12:25	490	0	250		cucumber 2	
12:27	491	0	251		landing on bottom,	
12:30	492	0	248		sampling Blue MBARI (blue & red)	bed is fine, core more deep stick
12:42	489	0.4	270		many brittle star(kitahashi), some cucumber, decline biodiversity	
12:42	490	0	270		canv tubular fishing equipment, starfish, brittle star	
12:44	490	0.4	270		zoarcidae	
12:46	490	0.4	260		cucumber3.actinia 1	
12:48	489	0.4	260		Wire?, blade	
12:51	489	0.4	260		cucumber.actinia.feather star	
12:51	489	0.4	260		latex gloves ,cucumber 3	
12:51	489	0.4	260		poket, animate beings	
12:56	486	0.4	247		korean plastic bottle, cucumber	
12:57	486	0.4	247		feather star,cucumber 4	
12:59	486	0.4	251		brush, rockfish	
13:00	486	0.4	251		cucumber 3 ,actinia	
13:03	486	0.9	251		actinia	
13:04	487	0	250		wood	
13:05	485	0.7	250		cucumber 2	
13:06	485	0.9	250		feather star,starfish	
13:06	485	0.4	250		decline feather star	
13:07	485	0.9	250		actinia,cucumber	
13:08	485	0.4	251		cucumber2	
13:09	485	0.7	250		fish 2	
13:09	484	1.5	250		cucumber,starfish	
13:11	484	0.4	250		burrow	
13:12	483	0.4	250		burrow, carpet	
13:15	484	0.4	250		fish.actinia,cucumber	
13:16	483	0.9	250		house,cucumber 3	
13:17	483	0.4	250		cucumber.fish	
13:17	483	0.4	250		cucumber 4	
13:19	482	0.9	250		cucumber	
13:20	482	0.7	250		fish,wood,cucumber 3	
13:21	482	0.4	250		cucumber	
13:22	482	0.9	251		cucumber 3	
13:23	482	0.7	251		white-black wood	
13:24	481	0.9	251		feather star,cucumber	
13:25	481	0.7	250		cucumber 3	
13:26	481	0.4	250		cucumber 2 ,jelly fish	
13:26	481	0.4	250		cucumber 4	
13:27	481	0.7	254		cucumber 2	
13:28	481	0.4	250		vinyl bag,cucumber,can,ripple.burrow	
13:32	481	0	249		Sampling: AsahiBeerCan (inBox1)	
13:35	481	0.4	249		feather star	
13:35	480	1.3	249		cucumber 2 ,jelly fish	
13:36	480	0.7	249		cucumber 2 ,feather star	
13:37	480	0.4	247		jelly fish.actinia.feather star.synphobranchidae, jelly fish	
13:37	480	0.7	249		rockfish.feather star,cucumber	
13:38	480	0.7	249		feather star	
13:38	480	0.7	249		cucumber 3 ,feather star 2 ,actinia 2	
13:39	479	0.7	252		cucumber 5 ,actinia,fish	
13:40	479	0.9	260		many cucumber.actinia.feather star	
13:41	479	0	260		cucumber	
13:41	479	1.1	260		cucumber 3	
13:42	479	0.4	260		feather star 2 ,zoarcidae.actinia.feather star	
13:43	479	0.7	260		cucumber.actinia.synphobranchidae.feather star	
13:44	478	0.7	206		cucumber,wood	
13:45	478	0.7	260		poket	

13:46	478	0.4	260		cucumber 4 ,incline feather star,decline brittle star	
13:47	477	0.9	260		cucumber 2	
13:47	477	0.7	260		cucumber 2	
13:48	477	0.7	260		actinia 2 ,cucumber 2	
13:49	477	0.7	260		cucumber 2 ,red vinyl ?	
13:49	477	0.7	260		cucumber ,bone ?	
13:50	477	0.4	260		actinia ,conch,cucumber	
13:50	476	1.1	260		feather star	
13:51	477	0.7	260		jelly fish,zoarcidae,cucumber	
13:51	477	0.7	260		actinia,cucumber 3 ,starfish	
13:53	476	0.9	259		vinyl"AGEICHIBAN"	
13:57	477	0	258		Sampling: AGEICHIBAN(in Box1)	
14:01	477	0	256		MBARI core red, (blue & red)	
14:03	477	0.7	259		cucumber 4 ,actinia,lumpy bed, fish, feather star,starfish	
14:04	476	0.4	259		cucumber 3 ,starfish,	
14:05	475	1.3	259		many cucumber ,band,feather star	
14:07	476	0.4	259		feather star	
14:07	475	0.9	259		actinia,cucumber	
14:08	476	0	259		boot half below ground, feather star	
14:12	476	0	256		Slurp gun #2 feather star,shrimp	
14:13	475	0.4	262		starfish	
14:14	475	0.7	260		cucumber	
14:15	475	0.7	270		synphobranchidae,cucumber 2 ,starfish	
14:16	475	0.4	270		feather star,cucumber,starfish	
14:17	474	0.7	269		decline animate beings, decline brittle star and get smaller	
14:19	475	0.7	270		starfish	
14:19	474	0.7	269		cucumber	
14:20	474	0.4	270		zoarcidae,cucumber	
14:21	473	0.7	268		sponge,conch	
14:22	474	0.4	270		starfish,feather star,fish,cucumber,actinia	
14:23	473	0.4	270		cucumber 2 ,actinia	
14:24	473	0.4	270		feather star 2 ,actinia,cucumber	
14:25	473	0.7	270		cucumber 2 ,decline inequality, fish, conch	
14:26	473	0.4	270		feather star,cucumber	
14:26	472	0.7	270		rockfish,cucumber,synphobranchidae,cucumber	
14:27	472	0.7	270		starfish,cucumber 3	
14:28	472	0.4	269		sea star	
14:30	472	0.4	269		can	
14:30	472	0	270		zoom on the can	
14:34	472	0	267		deployment of the ROV arm for can prelevement	
14:34	472	0	267		prelevement of the can	
14:36	472	0	267		preparation of sediment prelevement with green and yellow core	
14:38	472	0	267		sediment prelevement	
14:39	472	0	267		end of prelevement	
14:40	472	0.4	269		crab	
14:41	471	0.4	270		jelly fish	
14:42	471	0.4	269		holothurioidea	
14:44	471	0.4	269		sea star on a gastropod and holothurioidea	
14:45	470	0.4	270		fish and holothurioidea	
14:46	470	0.4	269		jelly fish	
14:46	470	0.4	269		sea star and holothurioidea	
14:47	470	0.4	269		sea anemona	
14:50	469	0.4	269		jelly fish	
14:50	469	0.4	269		2 crabs and a sea star	
14:51	469	0.4	269		jelly fish colony	
14:52	469	0.7	270		sea star , a rock and a can	
14:54	470	0	271		zoom for picture on the sea stars, the and the can	
14:56	470	0	270		deployment of the ROV arm for prelevement	
14:58	470	0	263		prelevement of the can	
14:59	470	0	263		prelevement done	
15:00	470	0	263		sea star was removed from the rock	

15:02	470	0	286		zoom on the rock for pictures	
15:06	468	0.7	271		sea anemona	
15:07	468	0.7	271		sea star	
15:08	468	0.4	270		holothurioidea	
15:08	468	0.4	270		crab	
15:09	467	0.7	270		ebi	
15:10	467	0.9	272		sea star	
15:11	467	0.7	271		fish and sea anemona	
15:11	466	1.5	270		sponge	
15:12	466	1.1	271		jelly fish and holothurioidea	
15:12	466	0.9	271		fish	
15:13	467	0	270		holothurioidea and plastic bag	
15:15	467	0	270		zoom for pictures on the plastic bag	
15:16	467	0	272		sea star on a blue garbbage	
15:17	467	0	271		zoom for pictures	
15:20	466	0.9	270		sea star and holothurioidea	
15:21	465	1.1	270		fish and holothurioidea	
15:22	465	1.3	270		holothurioidea	
15:24	466	0.4	270		sponge	
15:25	464	0.7	270		holothurioidea	
15:26	465	0.4	270		sea star and gastropod	
15:27	465	0.4	271		crab	
15:27	465	0.7	270		sea star	
15:28	464	0.4	271		holothurioidea	
15:31	465	0	271		cucumber.starfish.brush, Pokarisweat can	
15:34	464	0	271		cucumber 5 ,rockfish 1	
15:38	464	0	271		cucumber 2 ,actinia	
15:38	464	0.7	271		Smaller brittle star,declin actinia and cucumber	
15:40	464	0	273		sampling silver vinyl bag.start	
15:44	464	0	273		Sampling silver vinyl bag.finish	
15:50	464	0	268		MBARI core Yellow, Hard bottom	
15:55	463	0.7	269		decline biomass.especially brittle star	
15:55	463	0.7	276		cucumber	
15:58	463	0.4	276		many small fish like polliwog	
16:03	463	0	275		sampling kirin beer can	
16:06	461	0.7	320		Water sampling, Niskin green	
16:12	462	0	319		MBARI core Green-Black	
16:15	462	0	319		MBARI core Yellow-Black	
16:19	462	0	319		Kumade scoop, surface sediment sampling	
16:22	462	0	319		Dive complete. Start ascending.	

Dive Log of HPD Dive #1385						Area Name off Sanriku (Lander site)	2008/05/19
Time (JST)	Dep. (m)	Alt. (m)	Head (Deg)	Pos, Xm	Pos, Ym	Description	Remarks
08:59	716		276			logging start	toyofuku
9:04	867	46	68			jelly fish	
9:06	922	0	271			2 sea eel, landing, mush burrow	
9:08	922	0	272			sea eel attack samplbox	
9:08	922	0	270	551	-630	Dive start	
9:10						3sea star	
9:10	922		280			sea eel	
9:11	921	1	280			Comatulid?, 3sea eel, sea star,	
9:12	922	0	281			Sardine? Sea ell, macrouridae, sea star, sea star	
9:13	922	0	280			sea star, sea star, sea star, sea eel, macrouridae, many marine snow but less biomass, No cucumber	
9:14						no observation trail of the trawl	
9:15						sea star2, fish	
9:15	921		279			cucumber, sea star, macrouridae	
9:16	921		280			fish, stay	
9:18	922		279			Landing on bottom	
9:20						look to break up cloudy	
9:21				527	-734	many small brittle star	
9:23						restart, 2sea eel, sea star	
9:24	921		280			black fish, macrouridae, macrouridae, sea star,	
9:25	921		280			some burrow ,bed is smooth	
9:26	921		270			macrouridae	
9:26	921		270			3sea eel, 2sea star	
9:27	921	0	271			macrouridae, 2sea star	
9:28						sea eel, 2sea star	
9:29	921		271			rockfish	
9:29	921		271			sea eel, 3sea star	
9:31	921		271			Landing on bottom	
9:34	921		271			sea eel	
9:35	921		271			slurp gun sampling shell	
9:39	920		274			touch sea star	
9:40	920		270			sea eel, macrouridae, 3sea star	
9:41	921		271			macrouridae	
9:41	921		271			3sea star, fish	
9:42	921		271			sea star	
9:43	921		271			fish	
9:44	920		270			2sea star, macrouridae	
9:44	920		270			2sea star, macrouridae	
9:45	920		270			sea star	
9:46	920		270			sea eel	
9:46	920		270			2sea star	
9:47	920		270			2comatulid, sea star, 4sea eel	
9:48	920		270			sea star, sea eel, fish	
9:48	921		274	463	-873	steel can "shoya" Landing on bottom, bivalve shall?	
9:51	921		274			this spot bed-sediment is coarse. maybe roll up geography?	
9:51	921		274			house	
9:55	921		274			sampling can, macrouridae	
9:57	921		274			dig up shallfish ,sampling 3shell and shrimp, sea eel	
10:00	921		274			look on sediment, fish, sea eel,	
10:13	921		274			comatulid, landing on bottom, sampling wood	
10:15	920		294			restart	
10:16						sea eel, sea star, sea eel	
10:17	921		280			wood major axis NE-SW, landing on bottom	
10:22	921		280			slurp gun sampling conch in #3canistar	
10:24	921		280			sampling wood in basket	
10:27	920		270			restart	
10:27	920		270			macrouridae	
10:28	920		270			sea star	
10:28	920		270			2fish, sea 3star, 1fish	
10:29	920		270			sea eel, sea star, cucumber?	
10:31	917	2.7	271			sea eel, sea star	
10:32	918		270			sea eel, sea star	
10:32	919		260			sea star2, jellyfish, sea eel	
10:33	918		260			fish, sea star3, Synaphobranchidae	
10:35	918	1	260			fish,	
10:36	918	0.7	260			sea star	
10:37	918	1.2	260			Synaphobranchidae	

10:38	918	1	260		Synaphobranchidae, garbag, can "sapporo", fish, ripple	
10:41	918	0	260		Sampling can "sappolo"(in BOX1)	
10:46	918		260		Synaphobranchidae,sea star3	
10:46	918	1.2	250		Synaphobranchidae,sea star	
10:47	918	1	250		sea star2	
10:48	918	1	240		sea star3,fish,sea eel	
10:49	918	1	240		Synaphobranchidae,macrouridae,sea star4,zoarcidae	
10:51	918	0.6	240		sea star2,sea eel, turbidity has increased	
10:52	917	1.2	240		sea eel3,sea star	
10:53	917	1	240		sea star5	
					sea star6, roll net, many animals meet at the net	
10:53	917	1.3	240		(brittle star, sea star)	
10:57	918		318		sea eel,macrouridae,sea star5	
10:58	981	0.7	318		sea eel,sea star	
11:00	918	0.4	327		network come out fine ,many sea star, fish	
11:02	918	1	317		yet net,macrouridae2, many sea star	
11:04	981	0.4	301		garbeg fall foul of roll net	
11:06	919	0.4	140		sea eel	
11:08	919	0.7	120		sea eel2	
11:10	920	0.6	119		sea star3,sea eel	
11:12	920	0	9		MBARI core green, some burrows	
11:14	920		9		sea eel	
11:16	920		12		sea eel	
11:16	920	0	123		sea star	
11:17	920	0.4	120		sea star3	
11:18	920		120		sea star3	
11:18	920		120		fish,sea star2	
11:19	920	0.4	120		sea star	
11:20	920	0.4	24		Comatulid2, bed is muddy ,sea eel, stone or wood	
11:26	921		19		Sampling comatulid and stone or wood (in Basket)	
11:30	921		19		sea eel1	
11:33	920	1	120		cloudy	
11:33	920	1	120		comatulid,sea star2	
11:34	920	1.2	120		sea star2	
11:35	921	0.7	120		sea eel, jellyfish	
11:36	922	0	109		sea star2, conch, house	
11:36	921	0.6	104		sea star2, house	
11:37	922	0.7	103		sea star, burrow come to large	
11:38	922	0.6	102		sea star2	
11:38	922		103		jellyfish,fish,sea eel,sea star	
11:39	922	0	103		sea star2	
11:40	922	0.6	108		sea eel3,sea star	
11:40	921	0.6	120		sea squirt, sea eel, sea star	
11:41	922	1.2	119		sea star2	
11:42	922	0.9	119		sea star	
11:43	922	1.9	119		sea star	
11:43	923	0.7	119		sea eel2,sea star	
11:44	923	0.7	119		Lycenchelys albomaculata	
11:44	924	0.6	119		sea eel, house	
11:45	923	0.6	118		wood	
11:45	923	1.3	119		sea star4	
11:47	923	0.9	120		sea eel2,sea star2	
11:47	924	0.6	120		sea star2, NO cucumber	
11:48	925	0	120		macrouridae3	
11:49	925	0.7	120		macrouridae,blacky fish,sea star	
11:50	925	0.6	99		sea eel2,sea star	
11:50	925	0.6	99		sea eel4,sea star	
11:51	925	0.6	99		macrouridae3	
11:52	925	1	99		sea eel,sea star,actinia ,macrouridae	
11:53	926	0.4	100		sea star3	
11:54	925	0.6	99		sea eel2	
11:55	925	0.9	100		macrouridae2,sea eel3,sea star	
11:56	925	0.7	99		sea eel3,sea star	
11:56	926	0.4	100		macrouridae,sea eel	
11:57	926	1	100		sea star3,sea eel	
11:58	927	0.6	100		sea star2,sea eel	
11:59	926	0.7	99.7		sea eel	
12:00	926	1.3	99.2		macrouridae	
12:01	927	1.5	110		squid	
12:02	928	0.6	110.1		jellyfish	
12:03	928.7	0.4	109.2		sea star	
12:04	928.5	0.3	928.8		sea eel,sea star	

12:06	929	0	928.1		landing to bottom, garbage?(similar ray)	
12:08	928.6	0	43.3		peck gabage	
12:10	929	0	44.9		Sampling bagage in Box1	
12:14	929	0	44.5		MBARI core green-yellow	
12:15	929	0	45		take off,restart, make for southing 150m of point1 (on DiveChart)	
12:17	929.1	0	110.4		sea eel	
12:18	929.4	0	110.6		macrouridae4,brittle star,sea eel	
12:19	929.2	0.4	101.1		sea star	
12:20	929.8	0	100		brittle star2	
12:21	929.8	0	94.1		sea star3,brittle star2	
12:22	930	0	89.7		sea star,brittle star2,sea eel	
12:27	930.5	0	90.7		vinyl, landing to bottom	
12:27	930.5	0	87.2		Sampling green vinyl in Box1, sea eel	
12:29	929.5	1	89.5		restart , make for southing 150m of point1, sea eel, brittle star	
12:31	930	0.9	90.2		red fish (rockfish?)	
12:32	930.5	0.6	90.2		macrouridae,sea star2	
12:33	930.5	0.6	89.9		macrouridae,sea star	
12:34	931.1	0	90		sea star	
12:35	930.1	0	90.3		sea star2,macrouridae,sea eel2	
12:36	931.5	0	90.2		sea star2,brittle star	
12:37	931.4	0	90.1		sea eel2,sea star	
12:38	931.5	0.6	90.3		sea eel2,black fish,sea star	
12:40	931.8	0.4	89.9		macrouridae	
12:41	931.8	0.7	89.4		macrouridae,sea eel,sea star2,shrimp	
12:42	932.3	0.6	90		sea eel3,brittle star,sea star	
12:43	932.3	0.7	90.3		sea star,sea eel	
12:44	932.7	0	90.3		jelyfish,macrouridae	
12:45	932.5	0.7	89.4		macrouridae2,sea eel,sea star2	
12:46	932.7	0.6	89.5		sea star,sea eel,macrouridae	
12:47	932.7	1	89.7		sea star,brittle star	
12:48	932.7	0.7	89.4		house,macrouridae	
12:49	930.9	3	89.6		large gabege	
12:50	933.2	0.7	90.2		sea star,macrouridae,sea eel2,brittle star2,black fish	
12:51	933.5	0.9	89.5		sea eel,macrouridae	
12:52	934.2	0	91.1		sea eel2,macrouridae2,sea star2	
12:53	933.7	0.4	88.9		macrouridae	
12:54	933.3	0.7	88.9		black fish	
12:55	933.6	1	89.5		macrouridae,sea star,jelyfish	
12:56	934	0	78.7		sea star2,brittle star2,sea eel2,macrouridae	
12:57	934.4	0.4	89.9		jelyfish,sea star,sea eel,macrouridae2,brittle star	
12:58	933.7	1.2	89.5		sea eel2,shrimp,macrouridae	
12:59	934.4	0.4	89.7		sea star,sea eel,macrouridae,plastic garbage ,landing to bottom, shrimp3 hide	
13:03	935.3	0	88.7		slurpgun sampling shrimp in canistar#3	
13:04	935	0	88.7		slurpgun sampling shrimp3 in canistar#3	
13:05	935.5	0	88.7		pick up plastic garbage, observation	
13:07	935.3	0	88.6		sampling plastic garbage, plastic garbage is GUM tyre	
13:11	935.3	0	88.7		MBARI core green ,macrouridae	
13:14	934.8	0.6	89.8		restart, sea star	
13:15	934.7	0.7	90.4		sea star2,sea eel,macrouridae	
13:16	935.1	0	91		sea eel,sea star	
13:17	935.5	0.4	90.7		macrouridae,sea star2	
13:18	935.5	0	90.3		sea eel2	
13:19	935.3	0.4	89		red actinia, sea eel, shrimp, sea eel, sea star	
13:20	935.5	0.4	89.7		sea eel2,macrouridae	
13:21	936.1	0	88.6		black sea eel,macrouridae	
13:22	936.1	0	90.1		sea star,small black fish, sea eel, wood, landing to bottom	
13:25	936.4	0	86.2		Sampling wood in Box1,sea eel	
13:26	935.5	0.2	86.1		restart	
13:28	936.2	0.4	90.1		macrouridae,sea eel	
13:29	935.5	0.9	89.8		sea star5,macrouridae	deep cloudy
13:31	936.4	0.7	100.2		sea eel,sea star2	
13:32	936.6	0.4	100.3		cucumber7,sea eel2	cucumber consic
13:35	937	0	101		cucumber3,sea star,sea eel	of late date sedir
13:37	937	0	98.7		Slurpgun sampling cucumber2 in canistar#4	
13:38	937	0	98.7		rockfish,sea eel,cucumber2	
13:44	937	0	102		MBARI core blue	
13:46	937	0.7	101		restart	
13:47	937	0.7	102		sea eel,sea star2	NO Cucumber, b
13:48	937	0	101		white new vinyl bag, comatulid attach garbage, gorgonian?	
13:52	937	0	101		Brush wood vinyl bag, uniform orientation,103?56 °?	
13:55	938	0	102		sampling litter (vinyl bag) in box1	

13:57	938	0	90.7		sampling wood in basket	
13:59	937	0	91		restart, sea star	
14:00	938	0	89		landing to bottom,shooting photo use in panoramic photograph	
14:02	938	0	89		restart, sea star, sea eel	
14:04	937	0	101		sea star2,sea eel,macrouridae	
14:04	937	0	101		sea eel,sea star	
14:05	937	0	101		make for point2	
14:06	937	1.2	100		wood,rockfish',sea star	
14:07	938	0	101		landing to bottom,long wood,actinia.polyp,many conch, vinyl found in	
14:14	938	0	125		slurpgun sampling conch,actinia in canistar#5	
14:16	938	0	125		shrimp,sea eel	
14:18	937	0.6	350		restart, make for point2 ,head is 350°	
14:19	937	0.6	350		shrimp,sea star3,macrouridae	
14:20	937	0.9	350		sea star,macrouridae	
14:21	937	0.9	351		macrouridae,sea star3	
14:22	937	0.7	351		macrouridae,sea star2	
14:23	936	0.7	351		sea star3,red object,sea eel2	
14:25	936	0.7	360		the head trained on noth	
14:25	936	0.7	360		sea star,gorgonian?or wood ,sea eel	
14:27	936	1.2	360		sea star5,macrouridae, burrow	
14:28	935	1.4	360		sea star5,sea eel2	
14:30	935	1.2	359		sea star3, red object	
14:31	935	0.7	359		sea eel2,sea star, fish	
14:32	935	0	359		sea eel,sea star2	
14:33	935	0	359		sea star2,sea eel	
14:34	935	0.7	9.7		jelyfish,sea star	
14:36	934	1.6	9.5		sea star,macrouridae,sea eel	
14:38	934	0.7	9.7		sea eel,sea star3,brush?,	
14:40	935	1.5	10.2		sea eel2,sea star4	
14:41	934	1.2	10.7		house,sea star4,sea eel	
14:42	934	0.7	10.2		gorgonian or brush,sea star4,macrouridae,sea eel	so higher Alt, ha
14:44	933	1.2	10.2		sea star6,macrouridae	
14:45	933	1.2	15		sea star,sea eel,fish	
14:46	934	1.5	19.8		macrouridae,sea star2,sea eel, head 20°	
14:47	933	1.5	19.6		sea star5,sea eel2,shrimp,rockfish'	
14:48	933	1.5	19.7		sea eel,sea star3,shrimp	
14:49	932	1.9	20.1		sea eel,sea star3,macrouridae	
14:49	933	0.9	20.1		eyeball lander	
14:50	933	0.9	19.9		sea eel,macrouridae	
14:51	932	2.8	43.3		sea star	
14:52	934	0	45		landing to bottom, check lander	
14:53	934	0	45		sea stars, 3sea eel ,bottom cod	
14:55	934	0	45		lander's leg litle buried, sediment is soft	
14:55	934	0	45		Sampling SINISUKIN red and green	
14:59	934	0	44		sampling Red MBARI core	
15:03	934	0	44		sampling Red-Yellow MBARI core	
15:06	934	0	44		sampling Yellow-Black MBARI core	
15:07	934	0	44		sea eel	
15:10	934	0	44		sampling Yellow MBARI core	
15:11	934	0	44		preparation for scoop sediment prelevement	
15:14	934	0	46		scoop sediment prelevement	
15:15	934	0	46		sediment is deposited in the box number 2	
15:16	934	0	46		sediment deposition finish	
15:17	934	0	46		sea max view on the lander bottom	
15:19	934	0	46		fishes near the lander	
15:20	934	0	46		pictures of the lander	
15:20	934	0	72		fish	
15:23	934	0	73		ROV in position for attached the lander	
15:24	934	0	73		the ROV start the attachment procedure of the lander	
15:27	934	0	73		the first ROV hook is attached to the lander	
15:34	934	0	73		the second ROV hook is attached to the lander	
15:35	934	0	73		lander attached on the ROV	
15:36	934	0	73		right arm positioning before go up	
15:37	934	0	73		left arm test the resistivity of the link between the ROV and the lander	
15:41	934	0	73		end of the dive 1385, the ROV and the lander go up to the sea surface	

Recovery information

Lander with planar O2 optode system and extension cable (dive #1383)

Lander with planar O2 optode system and extension cable (dive #1385)

○ About data

Include any information that may be necessary for analysis and QC planning and secondary use (publications, provisions, etc.)

4. 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.

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