



R/V Yokosuka Cruise Report  
YK11-E04 Leg1

Impact by the huge earthquake on marine ecosystem including  
environment, chemical, geology and geophysics in the Off  
Sanriku area

June 03 - 13, 2011

JAMSTEC (JAMSTEC)

## **Contents**

### **1. Cruise Information**

- Cruise ID
- Name of vessel:
- Title of the cruise
- Title of proposal
- Cruise period
- Ports of call
- Research area
- Research Map

### **2. Researchers**

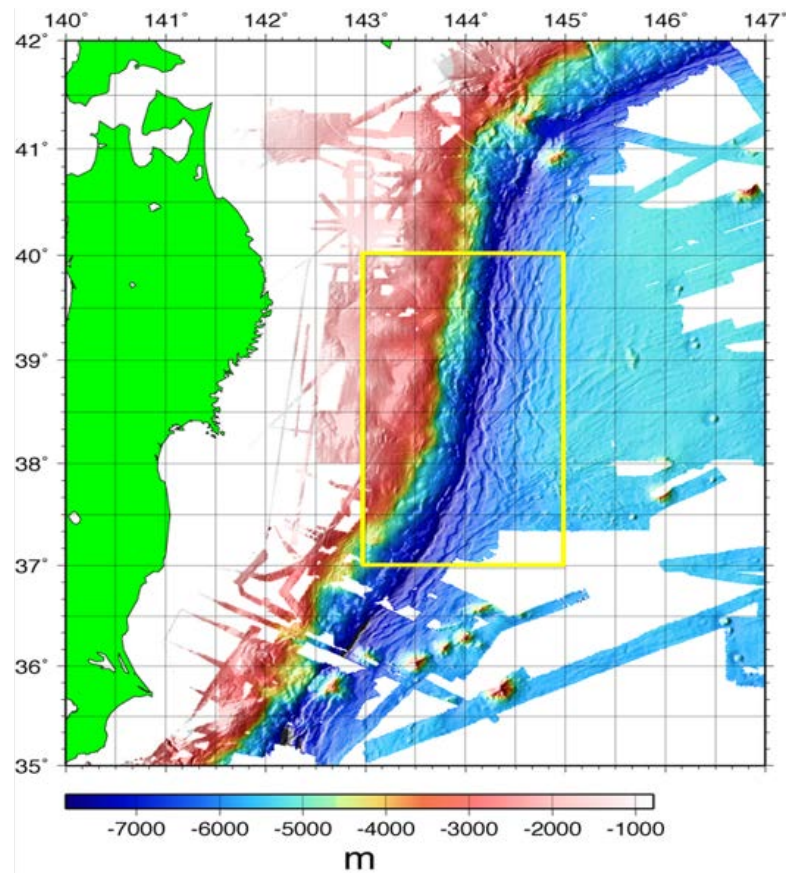
- Chief scientist
- Science party

### **3. Observation**

- Observation
- Methods, Instruments
- Cruise log
- Dive and research information, and future plan
  - Deep Tow Survey (4000YKDT & 6000YKDT)
  - Study of marine litter distribution Off Sanriku
  - OBS recovery and deployment
- About data

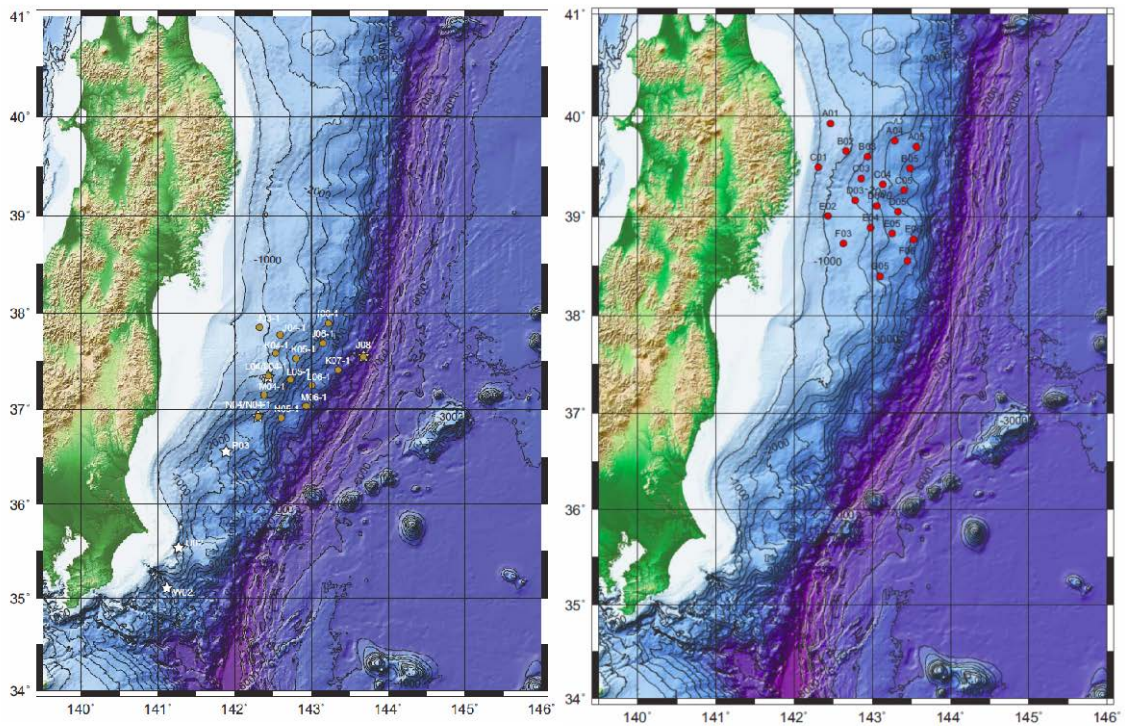
## 1. Cruise Information

- Cruise ID: YK11-E04
- Name of vessel: R/V Yokosuka
- Title of the cruise: Impact by the huge earthquake on marine ecosystem including environment, chemical, geology and geophysics in Off Sanriku area
- Title of proposal: Impact by the huge earthquake on marine ecosystem including environment, chemical, geology and geophysics in Off Sanriku area
- Cruise period: June 03, 2011-June 23, 2011
  - 1 leg: June 03, 2011 - June 13, 2011
  - 2 leg: June 14, 2011 - June 23, 2011
- Ports of call
  - 1 leg: Yokosuka, JAMSTEC June 03, 2011 - Yokosuka, JAMSTEC June 13, 2011
  - 2 leg: Yokosuka, JAMSTEC June 14, 2011 - Yokosuka, JAMSTEC June 23, 2011
- Research area: Off Sanriku, Japan
- Research Map



General survey area, Off Sanriku (water depth range: 1,600m~7,500m).  
37°00.0'N, 143°00.0'E, 40°00.0'N, 143°00.0'E  
40°00.0'N, 145°00.0'E, 37°00.0'N, 145°00.0'E

## OBS recovery & deployment sites



## 2. Researchers

### ● Chief scientist

Leg1: Katsunori Fujikura (BioGeos, JAMSTEC)

### ● Science party (List)

YK11-E04 Leg1 Scientist List

名前	Name	position	affiliation
藤倉 克則	FUJIKURA, Katsunori	Principal Scientist	Biodiversity Research Program, Institute of Biogeosciences, JAMSTEC
古島 靖夫	FURUSHIMA, Yasuo	Research Scientist	Biodiversity Research Program, Institute of Biogeosciences, JAMSTEC
渡部 裕美	WATANABE, Hiromi	Research Scientist	Biodiversity Research Program, Institute of Biogeosciences, JAMSTEC

宮本 教生	MIYAMOTO, Norio	Research Scientist	Biodiversity Research Program, Institute of Biogeosciences, JAMSTEC
金松 敏也	KANAMATSU, Toshiya	Senior Technical Research Scientist	Institute for Research on Earth Evolution, JAMSTEC
牧田 寛子	MAKITA, Hiroko	Research Scientist	Institute of Biogeosciences, JAMSTEC
植平 賢司	UEHIRA, Kenji	Assistant Professor	Institute of Seismology and Volcanology, Faculty of Sciences, Kyushu University
山田 知朗	YAMADA, Tomoaki	Assistant Professor	Earthquake Research Institute, University of Tokyo
中東 和夫	NAKAHIGASHI , Kazuo	Researcher	Earthquake Research Institute, University of Tokyo
辻 健	TSUJI, Takeshi	Assistant Professor	Graduate School of Engineering, Kyoto University
柴田 晴佳	SHIBATA, Haruka	Ph.D. student	Graduate School of Fisheries, Kitasato University
川村 喜一 郎	KAWAMURA, Kiichiro	Senior Research Scientist	Fukada Geological Institute
新井 和乃	ARAI, Kazuno	Ph.D. student	Graduate School of Science, Chiba University
泉 典洋	IZUMI, Norihiro (Not onboard)	Professor	Division of Field Engineering for the Environment, Faculty of Engineering, Hokkaido University
横川美和	YOKOKAWA, Miwa (Not onboard)	Professor	Lab. of Geoenvironment, Faculty of Information Science and Technology, Osaka Institute of Technology

成瀬 元	NARUSE, Hajime (Not onboard)	Associate Professor	Department of Earth Sciences, Faculty of Science, Chiba University
三宅 裕志	Miyake, Hiroshi (Not onboard)	Associate Professor	Kitasato University
中島 悦子	Nakashima, Etsuko (Not onboard)	Ph.D student	Ehime University

### 3. Observation

#### ● Observation

The purpose of this cruise is to understand impact to marine ecosystems by the 2011 Off Tohoku Earthquake. Due to the earthquake, various phenomena such as,

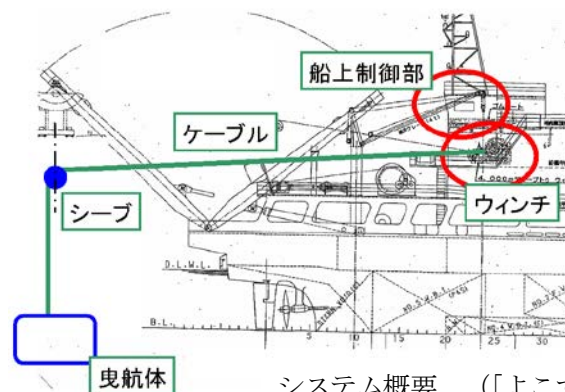
- gushing out unique fluids from ocean bottoms,
- occurrence of large scale turbinate,
- supplement of huge amount of stuff including artificial materials from land areas,
- huge mass accumulation of stuff in the trench bottom,
- extinction of marine organisms

have been occurred in Off Sanriku area, northern Japan. We investigate about relationship between marine ecosystems and earthquake using mainly 6000 m-class deep towing TV camera system. We also focus on not only biology but also geology, chemical, and geophysics aspects. Additionally, this cruise is reconnaissance for the HOV Shinkai 6500 dive in near future.

#### - Methods, Instruments

Sea bottom observations using 4000m and 6000m class Deep tow cameras. Operation and specification of the 6000m-class Yokosuka Deep Tow Camera (YKDT) are following in Japanese.

本システムは、観測装置を鉄パイプ製のフレームに固定し、海中に吊り下げて海底・海中の観測を行う装置であり、曳航体、曳航ケーブル、ウインチ、シーブ、船上制御部よりなる。カラーTV映像、白黒TV映像、カラー写真（デジタルカメラ）、CTD データなどが取得できる。曳航中の測位は母船に装備されているD-GPS および音響航法装置によるハイブリッド測位により行う。なおケーブル長さの制約から、曳航体を繰り出せるのは最大 6000m である。



システム概要 (「よこすか」の船尾)

Leg1 では 6000m まで繰り出すのでトラクションウインチ搭載

## 曳航体

曳航体はTVカメラ、デジタルスチルカメラ、CTD等を装備し、船上制御部との間で光ファイバーを経由したシリアル通信を行っている。また、切離装置、方位計等を装備可能となっている。



Deep Tow Fish

- Size : 3,000×1,200×1,200mm (L×W×H)
- Weight : 650kg (air)、400kg (in water)
- Max. depth : 6000m
- Speed : ~1.0kt
- Towing height : 2~5m
- Dredge : 1

### specifications

Color TV camera	SONY DXC-990, NTSC
B/W TVcamera	SONY XC-ST50, NTSC
Still Camera	AquaPix SeaSnap (3.34Mpixel)
Light	500W×2 灯 250W×2 灯
CTD	Seabird SBE49
Altimeter	MESOTECH 1007 型
Transponder	Oki SB-1023(7kHz 帯)
Releaser	Inter Ocean MR5000

## Cable

曳航ケーブルには 5200m の鉄線二重鎧装光電気複合ケーブルを用いている。これは 4 本の電力線と 4 本の光ファイバーをもっており、このうち電力線は 2 本一組 1 対として使用し、光ファイバーは常用 1 本、予備 1 本を常に使用可能な状態にし、残り 2 本は水中コネクタには接続せずに予備としている。

## Winch

ウインチは光 2 系統のロータリージョイントおよび電力 4 系統のスリップリングを備えている。また線長および張力を検出する機能を持ち、これらは遠隔で表示され、ウインチのコントロールボックスと共にウインチ操作者の下に置かれる。駆動源は母船より供給される油圧を用いている。

## シーブ

今回はジンバルシーブを用いた。



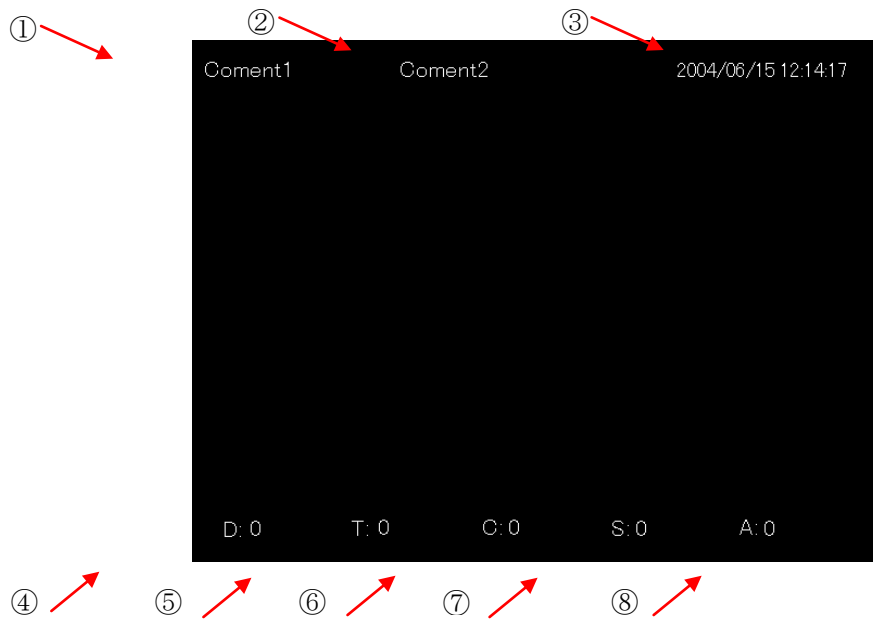
ジンバルシーブ

### **Control system**

曳航体に装備されている各機器の制御は船上から行う。船上制御部は制御ソフトの入ったパソコン、TVモニター、光伝送装置、ビデオデッキ等からなる。電源は母船より供給され、高圧給電盤を介し曳航体に送電する。

海中で取得したデータはこの船上制御部で記録され、一部のデータはカラーTVカメラ映像と共に研究者用モニターや船内共聴（CATV）へ配信される。





#### TV 映像テロップ

- ① コメント 1 表示
- ② コメント 2 表示
- ③ 日時表示
- ④ 深度表示 (m) 「DEPTH」
- ⑤ 水温 (°C) 「Temperature」
- ⑥ 電気伝導度 (S/m) 「Conductivity」
- ⑦ 塩分濃度 (psu) 「Salinity」
- ⑧ 高度 (m) 「ALTITUDE」

#### - Cruise log

YK11-E04 Leg1 Shipboard Log:

Date Time Log

2011/6/3

Weather: fine/ Wind direction: SSE/ Wind force: 2/ Wave: 0.5m/

Visibility: 7 miles (12:00 JST)

07:30 Onboard

07:40-07:50 Scientific Meeting (1 Lab.)

08:00 Departure from YOKOSUKA (JAMSTEC)

10:00-10:30 Briefing about ship's life and safety

11:00-11:30 Explanation of Deeptow

13:00-14:00 Scientific Meeting (1 Lab.)

14:58 OBS deployment (W02)

16:48 OBS deployment (U02)

18:00-18:30 Scientific Meeting (1 Lab.)

2011/6/4

Weather: cloud/ Wind direction: South/ Wind force: 4/ Wave: 1.25m/

Visibility: 6 miles (12:00 JST)

07:40 Arrival at survey area  
07:51 XBT  
09:42 Launch Deeptow (YKDT#93dive)  
11:14 DT lands (3,456m)  
14:00 DT leaves the bottom (3,647m)  
15:50 DT on deck  
17:10-18:04 SSB  
18:00 Scientific Meeting (1 Lab.)

2011/6/5

Weather: fog/ Wind direction: West/ Wind force: 2/ Wave: 0.5m/

Visibility: 1 miles (12:00 JST)

06:19 OBS recovery (I06-1)  
08:51 OBS recovery (J06-1)  
14:23 OBS recovery (K07-1)  
15:05-15:20 Scientific Meeting (1 Lab.)  
18:30 SSB

2011/6/6

Weather: fine/ Wind direction: WNW/ Wind force: 3/ Wave: 0.50m/

Visibility: 5 miles (12:00 JST)

06:37 OBS recovery (F06)  
07:26 XBT  
07:58 Launch Deeptow (YKDT#94dive)  
09:03 DT lands (3,245m)  
13:36 DT leaves the bottom (2,897m)  
14:36 DT on deck  
15:48-16:46 SSB  
18:00-18:30 Scientific Meeting (1 Lab.)

2011/6/7

Weather: fine/ Wind direction: SSW/ Wind force: 3/ Wave: 0.50m/

Visibility: 9 miles (12:00 JST)

05:57 OBS recovery (E06)  
08:06 OBS recovery (E05)  
10:25 OBS recovery (D05)  
12:43 OBS recovery (C05)

15:13 OBS recovery (D04)  
17:26 OBS recovery (E04)  
18:00-18:30 Scientific Meeting (1 Lab.)

2011/6/8

Weather: fine/ Wind direction: SE/ Wind force: 3/ Wave: 0.50m/

Visibility: 4 miles (12:00 JST)

06:49 Launch Deeptow (YKDT#95dive)  
09:13 DT lands (5,940m)  
14:40 DT leaves the bottom (5,607m)  
17:02 DT on deck  
18:00-18:20 Scientific Meeting (1 Lab.)

2011/6/9

Weather: fog/ Wind direction: SE/ Wind force: 1/ Wave: 0m/

Visibility: 0.1 miles (12:00 JST)

06:41 Launch Deeptow (YKDT#96dive)  
09:01 DT lands (5,739m)  
13:30 DT leaves the bottom (5,608m)  
15:54 DT on deck  
17:08-18:08 SSB  
18:00-18:30 Scientific Meeting (1 Lab.)

2011/6/10

Weather: mist/ Wind direction: South/ Wind force: 5/ Wave: 1.25m/

Visibility: 1 miles (12:00 JST)

06:40 Launch Deeptow (YKDT#97dive)  
09:00 DT lands (5,757m)  
13:30 DT leaves the bottom (5,570m)  
15:57 DT on deck  
18:00 XBT  
18:00-18:20 Scientific Meeting (1 Lab.)  
18:26-19:16 SSB

2011/6/11

Weather: rain/ Wind direction: South/ Wind force: 2/ Wave: 0.50m/

Visibility: 1 miles (12:00 JST)

06:40 Launch Deeptow (YKDT#98dive)  
08:53 DT lands (5,345m)  
13:00 DT leaves the bottom (5,336m)

15:17 DT on deck  
18:00-18:20 Scientific Meeting (1 Lab.)

2011/6/12

Weather: Cloud/ Wind direction: WNW/ Wind force: 2/ Wave: 0.50m/

Visibility: 3 miles (12:00 JST)

07:09 OBS recovery (J03-1)  
12:30 OBS deployment (P03)  
18:00-18:30 Scientific Meeting (1 Lab.)

2011/6/13 (JST)

08:00 Arrival at YOKOSUKA(JAMSTEC), YK11-E04 Leg1 finish and  
disembarkation

- Dive and research information, and future plan

Deep Tow Survey (4000YKDT & 6000YKDT)

**6000YKDT #93**

Date: 2011/6/4

Survey site: Off Sanriku

Landing Point: 38-11.2301N 143-33.1992E, 3445m

Leaving Point: 38-09.2745N 143-32.6749E, 3617m

Dive Summary:

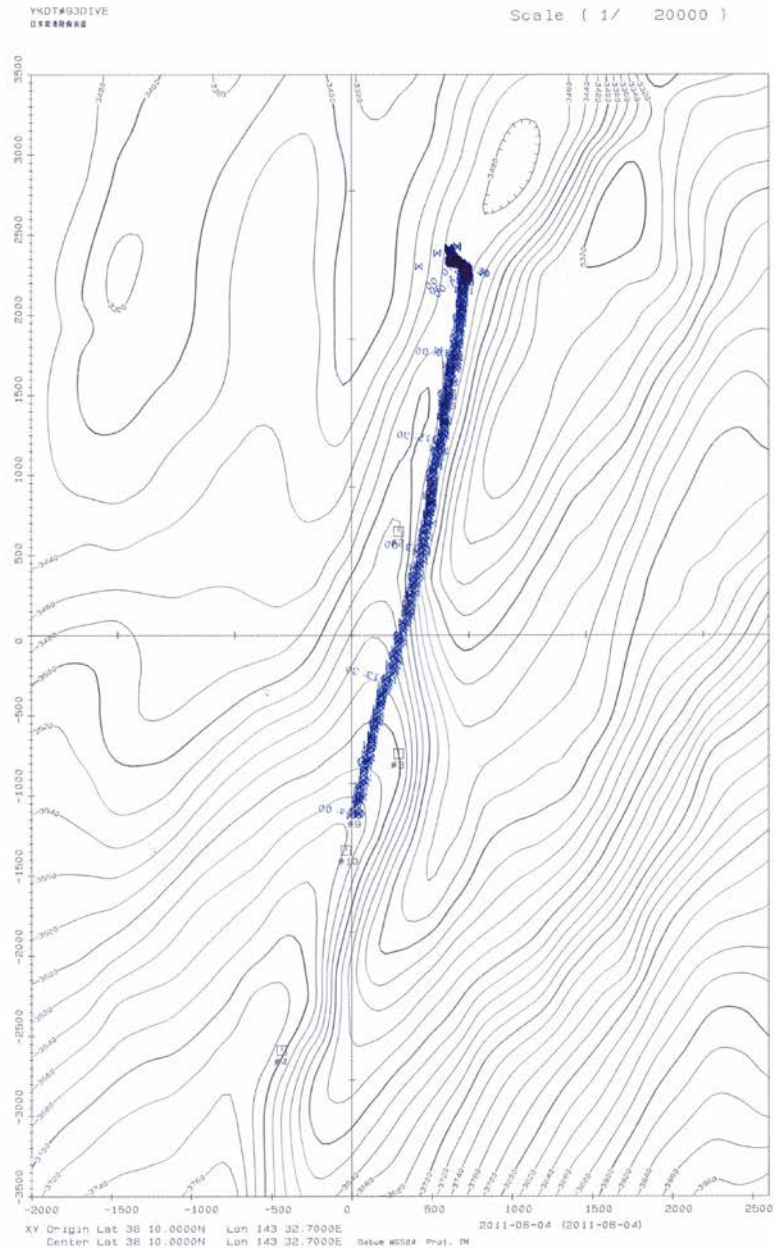
The YKDT were towed along a small N-S valley associated with a normal fault in the Off Sanriku area. Observation results were as follows:

- a lot of sinking stuffs looks like Appendicularia's old houses occurred in midwater from 1800m deep to bottom,
- diatomaceous soft sediment layer as well as greenish fluffs cover the seafloor. (This soft sediment should be deposited during or after the 2011 earthquake),
- gravels distributed on the seafloor decrease compared to the pre-earthquake cruise, suggesting surface erosion or recent sedimentation,
- recent erosive surfaces on a bottom of the valley (the erosive surface was not clearly observed at the pre-earthquake observation),
- muddy water was observed at the cliff terrace,
- some fishes, gorgonians, sponges, asteroids and ophiuroids were observed.

Water samples were taken using the Niskin bottles just above sea floor and midwater.

Sediment sample on seafloor was taken using the dredge for 5 minutes before leaving for seafloor. Sediment sample is composed of mud- to gravel-size sediment. Mud contains many diatoms. There is three kind of gravel, R1-1, R1-2, R1-3.

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### Dive track

#### 4000YKDT #94

Date: 2011/6/6

Survey site: Off Sanriku

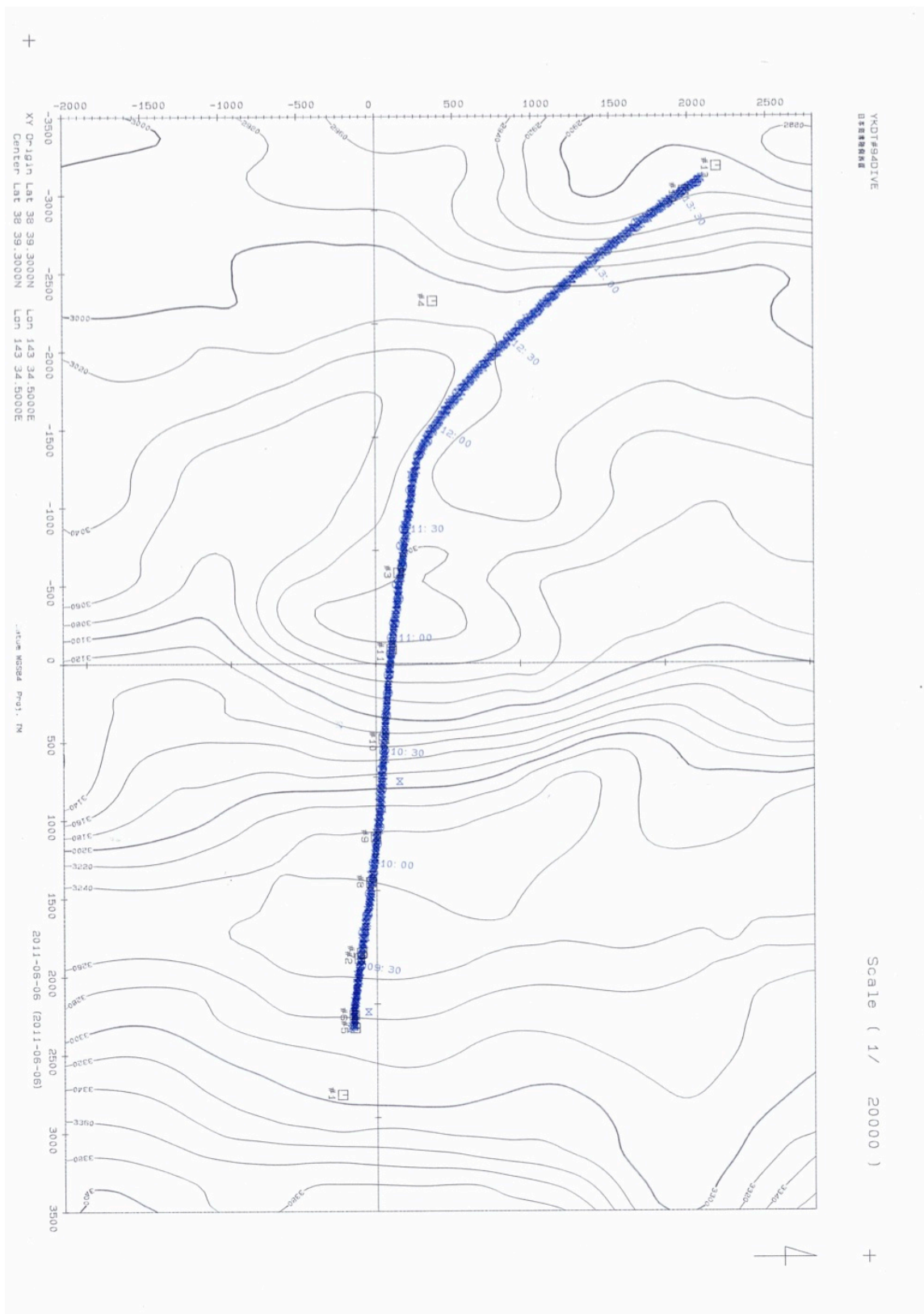
Landing Point: 38-39.2243N 143-36.1058E, 3243m

Leaving Point: 38-40.4182N 143-32.3721E, 2901m

Dive Summary:

To describe the geological and biological changes after the earthquakes and tsunami, YKDT was towed to trace the dive track of ROV Kaiko 10K#245 in 2002, an E-W transect of a scar around the depth in 3200m. At least three cracks were discovered around the landing point.

The species of the benthic fauna on the muddy sea floor or hard substrata were almost the same as those observed in 2002 (fishes, holothurians, ophiuroids, sea anemones, sea spider, shrimps and snails), but their frequencies of each species had been changed from 2002. A collapsed scar without any sessile animals was observed in a turbid area. Around the western end of the track of Kaiko, the direction of YKDT was changed to NW. Totally eight water samples were collected in the turbid water for chemical and microbiological analyses. A small discoloration area and (probably) some scattered bivalve shells were observed in the slight slope to the leaving point. The water become clear around the depth in 2940m on the slope. YKDT left the bottom after dredge sampling.



Dive track

**6000YKDT #95**

Date: 2011/6/4

Survey site: Off Sanriku

Landing Point: 38-09.5488N 143-47.0608E, 5942m

Leaving Point: 38-12.5877N 143-46.8352E, 5617m

Dive Summary:

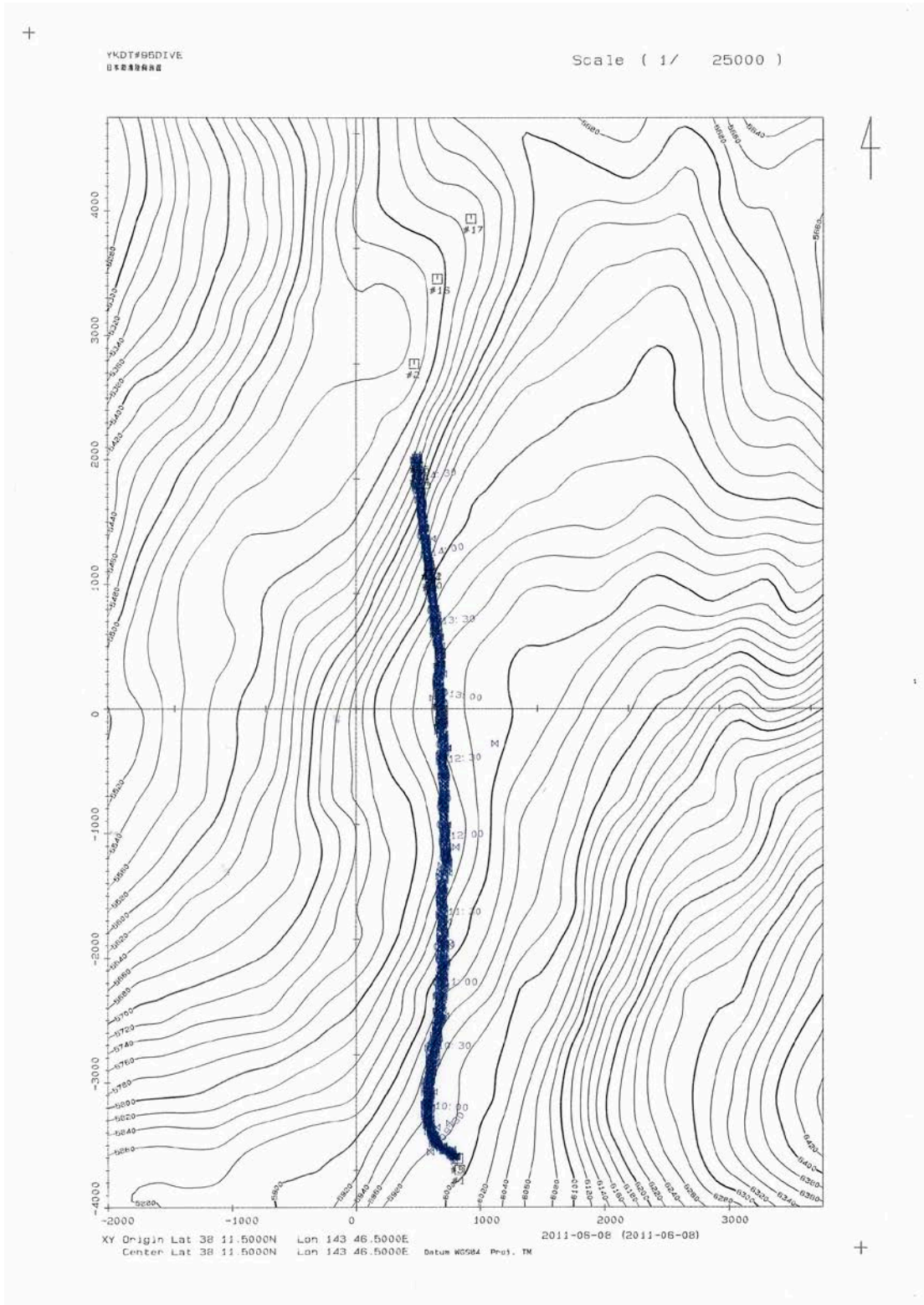
The purpose of this Deep-tow dive #95 is to know dynamic change of seafloor geometry and animal distribution associated with the 2011 Tohoku earthquake. Four *Shinkai 6500* dives had been conducted in this site before the 2011 Tohoku earthquake (Dive #1069, #1072, #1073, and #1074). The previous Shinkai dives revealed *Calyptogena* colonies at some areas along a steep cliff, where the reverse fault was expected from seismic profiles (Tsuji et al., 2011). In this Deep-tow dive, we revisited the steep cliff as well as *Calyptogena* colonies.

Dark brown (5Y4/4) diatomaceous soft sediment layer of about 5 cm thick cover on the seafloor. This soft sediment could be deposited after the 2011 earthquake. However, compared to the landward diving site (DT#93), thickness of the soft sediment layer seems to be thicker than that in this diving point. This is because of deeper and steeper seafloor. At the superficial layer, we observed many bands of darker and lighter color. These may be indicating current directions during or just after the deposition of the soft sediment. Below the soft sediment, we observed relatively consolidated mud rock. Above the soft sediment layer, we observed greenish fluffs of about several tens cm. These are composed of mainly diatoms, sponge spicules and calcareous nannofossils, even though this dive site is clearly deeper than the carbonate compensate depth CCD, indicating any calcareous fossils are dissolved. This might suggest that the fluffs were transported rapidly from shallower water depth than the CCD.

Dead *Calyptogenas* are scattered at several points. All *Calyptogenas* observed in this dive have died, maybe due to dynamic seafloor slide during the earthquake. Some *Calyptogenas* were collapsed under falling rocks. Furthermore, other animals are sparsely distributed compared to the pre-earthquake observations. The seafloor slide associated with the earthquake may flow animals on the seafloor.

We found several fissures along the steep cliff. Huge fissures of about 2-3 m in width were observed at the bottom of the steep cliff. Some of the fissures were arranged in N-S direction. Because these fissures were not observed in pre-earthquake observations (YK08-06), they should be appeared between 2008 in the Shinkai dive and 2011 in this dive. We have some small earthquakes for the three years, but the most presumable reason to form these fissures is the Tohoku earthquake. We observed white-colored spots (maybe corresponding to bacteria mattes) at a rim of the fissures, suggesting existence of extensive cold seep. Since such these white-colored spots were not observed during the previous Shinkai dive, these extensive cold seeps should be induced by the 2011 Tohoku earthquake. Thus, we disclosed clearly drastic changes of seafloor geometry and animals before and after the earthquake by the dive #95.





Dive track

**6000YKDT #96**

Date: 2011/6/8

Survey site: Off Sanriku

Landing Point: 38-11.3745N 143-46.5049E, 5743m

Leaving Point: 38-13.3228N 143-47.1882E, 5608m

Dive Summary:

The objective of YKDT #96 was follow-up of YKDT #95. #95 found huge fissures and scattered *Calyptogena* shells in the slope (see YK11\_E04 Leg.1 YKDT#95 Report). It is supposed that the fissures were formed in the slope in association with 2011 Tohoku earthquake, and *Calyptogena* colonies were disturbed by an event relating to the earthquake also. YKDT #96 was planned to revisit the fissures area found in YKDT #95, and survey along the structure in order to observe details.

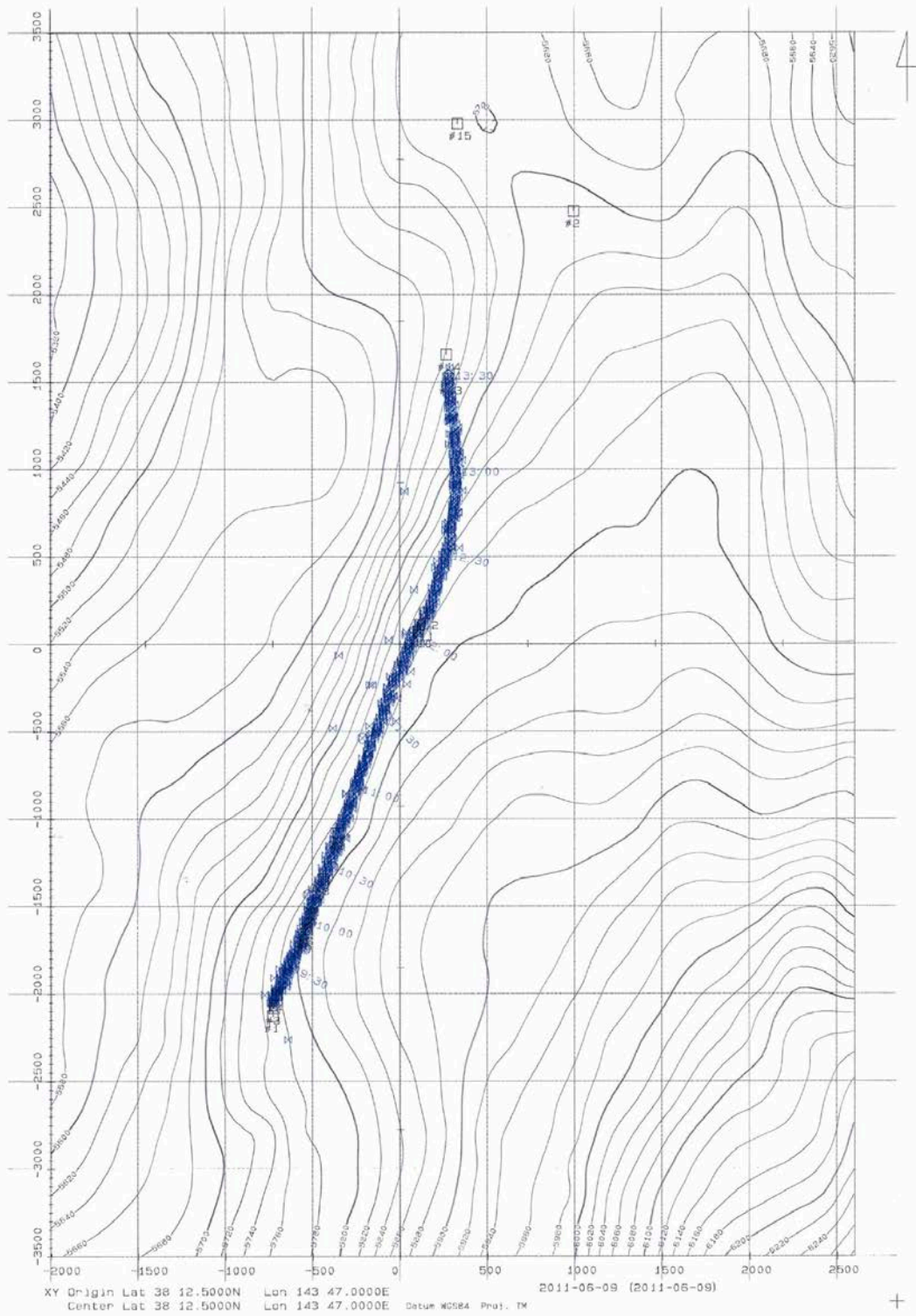
Lithology of surface sediment is similar to those of previous dives. Bedrocks are covered by soft light –dark brownish sediments, and greenish soft fluff (algae-like) materials. Fissures observed during # 96 are 2-3 m in width. The bottoms of fissures are covered by thin brownish sediments, which is same as covering the surface. Judging from the color of side-walls of fissures, the fissures seem to be generated recently. White spots, which is probably bacteria mattes, are observed sporadically. More clear distribution of white spots, which are aligned in line, was found at 38-11.6044N,143-46.6291E. *Calyptogena* shells are sparsely scattered around the fissure area. Much dense distribution of *Calyptogena* shells was observed around 38-11.9158N,143-46.7579E.

Artificial debris, such as blankets, glass bottles, fish nets, and plastic bags, are observed. It is not clear that these materials were derived by 2011 Tohoku earthquake.

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YKDT#96DIVE  
日誌記録用紙

Scale ( 1/ 20000 )



Dive track

6000YKDT #97

Date: 2011/6/10

Survey site: Off Sanriku

Landing Point: 38-39.9152N 143-49.4318E, 5758 m

Leaving Point: 38-37.7032N 143-48.7141E, 5571 m

Dive Summary:

Deep-tow #97 followed a roughly south-to-north heading along and up the foot of the lower trench slope, south of the Sanriku escarpment and downslope (to the east) of #94. The area was located on foot of a large submarine landslide, where Sasaki (2003; PhD thesis) described broad folds and a large cliff on the basis of bathymetric maps. Such structures may be related to both the general subduction processes associated with the 2011 Tohoku earthquake, and the effects of the submarine landsliding. Dredge samples from the surface sediment layer in this area could also decipher various geological records for dynamic changes associated with the 2011 Tohoku earthquake.

The dive site is mainly characterized by three regions; a valley, a cliff and a terrace. I described in detail the dive results following the three regions on time series.

First, we landed on a small valley. The seafloor was covered with a soft sediment layer of a few cm thick. Many bands of darker and lighter colors were observed on the superficial layer. These may be indicating current directions during or just after the deposition of the soft sediment layer. Above the sediment layer, we observed greenish fluffs of several tens cm, which are same as the last dive results. But I felt that the amount of these fluffs were smaller than that during the last dives a bit. Gravels of several tens cm in diameter were disseminated in place on the valley, and they are slightly increasing at the deepest floor as a channel axis.

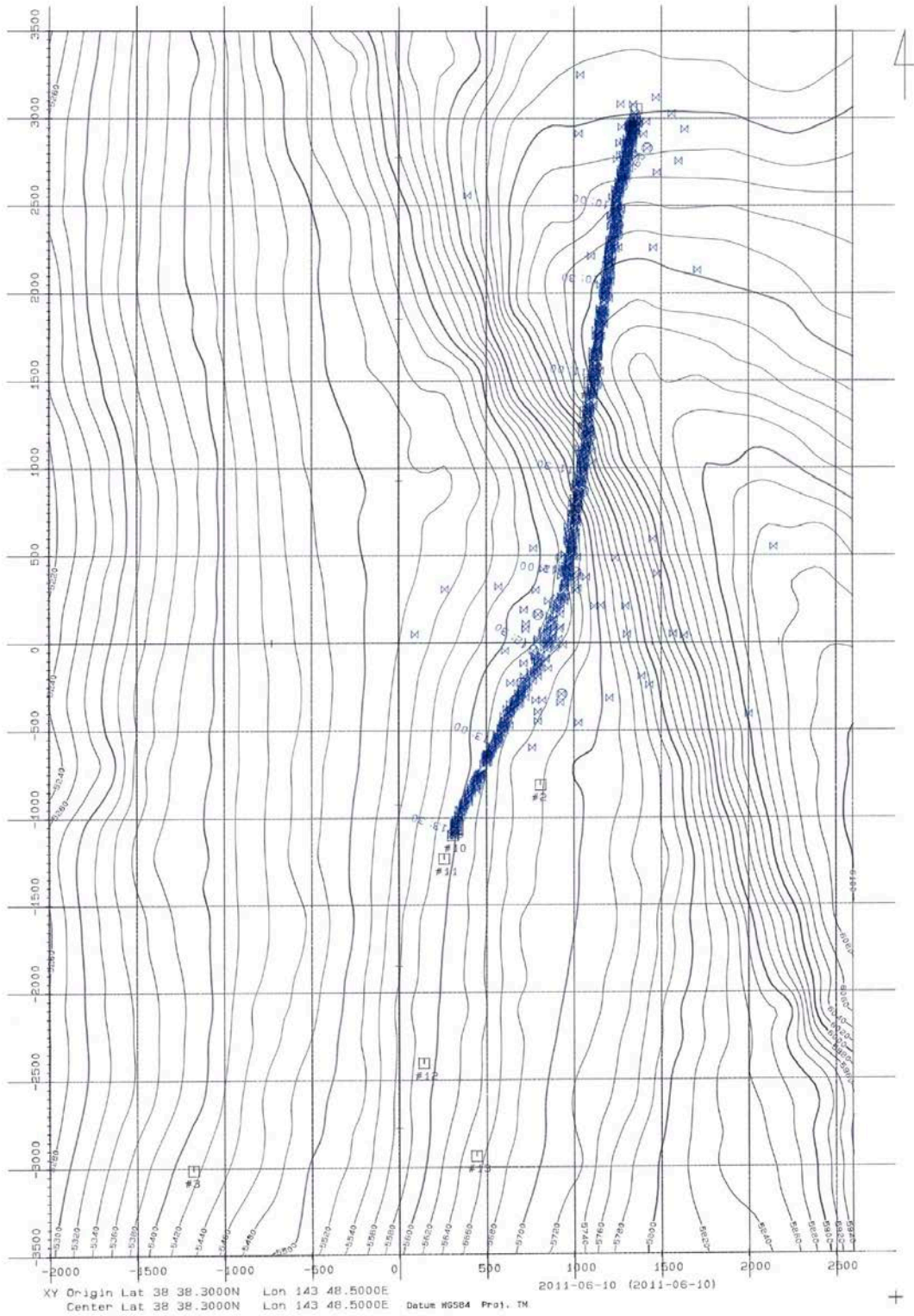
Then we climbed up to a large cliff of about 200 m in height. On foot of the cliff, we observed bolder-to-cobble-sized gravel strata of about several meters in thickness (as talus deposits?). The cliff was stepped by a repetition of a scar, an overhang, and a steep slope. We observed thin sediment cover, greenish fluffs, bedding planes of strata and fractured rocks on the cliff throughout. There is a shell of *Calypptogena* on the lower steep slope, and a fissure of several cm in width on the upper scar. The fissure was mostly filled with soft sediments and/or greenish fluffs, and it might be formed by the Tohoku earthquake. Furthermore, we observed two types of outcrop surface colors; brownish and grayish rock surfaces. The brownish and grayish surfaces may indicate older weathered rock surface and fresh rock surface (indicating recent collapse of cliff), respectively.

Finally, we arrived at a terrace having a step of a gentle muddy slope and a rocky scar of several meters in height. Gravels of several tens cm in diameter were disseminated on the muddy slope nearby the rocky scar. We also observed thin sediment cover and greenish fluffs in this area.

Several small rock samples were collected from the rocky cliff on the terrace using a dredger. The samples comprise pebble-sized mudstones and sandstones with small amount of mud samples of yellowish brown (2.5Y5/4) diatomaceous silty clay. Some important structures include: (1) tiny fracture cleavages in mudstones, (2) thin mudstone layers on sandstones, (3) black rounded mudstones, like a fluvial gravel.

YKDT#97DIVE  
日本海海図

Scale ( 1 / 2000 )



Dive track

6000YKDT #98

Date: 2011/6/11

Survey site: Off Sanriku

Landing Point: 39-06.1469N 143-54.1548E, 5348m

Leaving Point: 39-06.2341N 143-53.7515E, 5333m

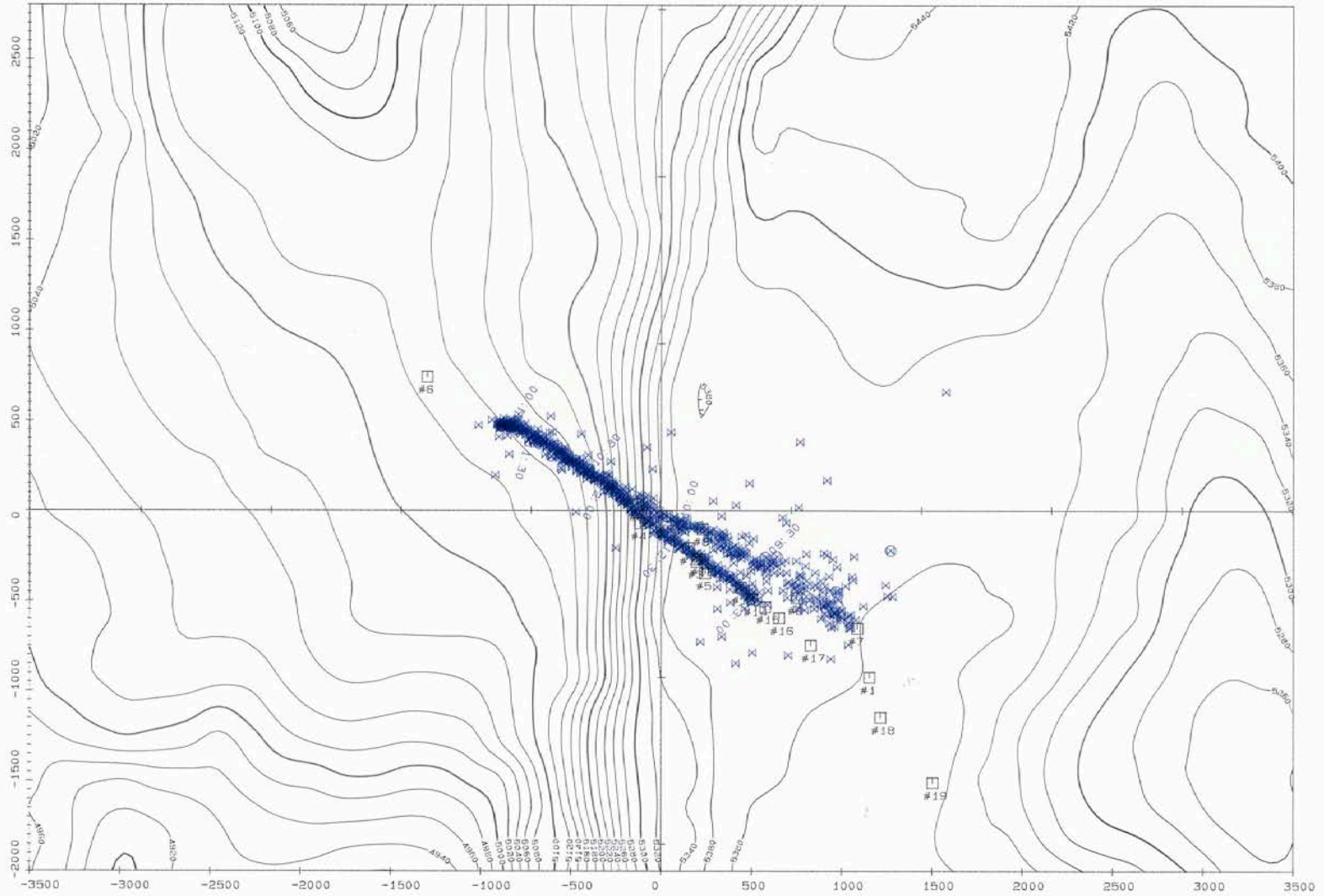
The purpose of YKDT #98 was to research the geological and biological changes after the 2011 Tohoku earthquake. YKDT #98 was planned to visit the Calyptogena colonies site. The previous dives, such as YK06-05 (#956, 957, 958), YK07-15 (#1038, 1039m), KR07-14 (#399), YK06-06 (#959), KR00-07 (#183), KR02-09 (#254, 258), YK00-04 (#550, 543, 553), YK09-12 (#1160.1163) observed Calyptogena colonies at some areas along a terrace cliff.

At the landing point, muddy seafloor and no significant mud plume were observed. Dark brown diatomaceous fluffy materials were much less than another site in this cruise. The YKDT head to northwest, and went along the dive points of Calyptogena colonies, which found in previous dives, through the YKDT camera observation. Very small Calyptogenas colony, Dead Calyptogenas and white animals (white bars) were observed around 39-06.3876N 143-53.5055E. Muddy seafloor with numbers of ripple marks was observed around this site. Then, we found 6k ballast in the sloop. We didn't found fissures along the steep cliff in this dive. However, we found changes habitats of Calyptogena colonies site, before and after the earthquake by the dive #98.

YKDT left the bottom after dredge sampling. The species of the benthic fauna on the muddy sea floor were almost same as another site of this cruise, fishes, holothurians, ophiuroids, sea anemones, sea spider, shrimps and snails were observed, but their frequencies of each species were decreased. Artificial debris, such as fish net, lumber, glass bottles, and plastic white board, are observed. Totally eight water samples were collected for chemical and microbiological analyses.

YKDT#88DIVE  
■■■■■■■■■■

Scale ( 1/ 20000 )



Dive track

XY Origin Lat 39 06.5000N Lon 143 53.4000E  
Center Lat 39 06.5000N Lon 143 53.4000E

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2011-06-11 (2011-06-11)

## Future plans

Based on these results, we plan to more detail survey using the HOV Shinkai 6500 in next July.

- Study of marine litter distribution Off Sanriku
- OBS recovery and deployment

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### Recovered OBS

Site No.	OBS No.	OBS Position*				RadioBeacon CallSign	Recovered Date (Y/M/D)[JS T]	*notes	
		Latitude N (deg. Min.)	Longitude E (deg. Min.)	Depth (m)					
<b>C05</b>	OBS 109	39	15.7883	143	24.3796	2374	JS1615	2011/06/07	by acoustics
<b>D04</b>	OBS 165	39	06.4163	143	03.3257	1877	JS1784	2011/06/07	by acoustics
<b>D05</b>	OBS 097	39	02.8466	143	19.7626	2446	JS1185	2011/06/07	by acoustics
<b>E04</b>	OBS 049	38	53.3215	142	58.6884	1524	JS1794	2011/06/07	by acoustics
<b>E05</b>	OBS 143	38	49.7680	143	15.0154	2219	JS163	2011/06/07	by acoustics
<b>E06</b>	OBS 134	38	46.1887	143	31.3095	2564	JS1620	2011/06/07	by acoustics
<b>F06</b>	OBS 126	38	33.3186	143	27.3098	2546	JS1624	2011/06/06	throwing point
<b>I06</b>	Q2-A	37	53.71010	143	13.28598	2658	JS625	2011/06/05	throwing point
<b>J03</b>	Q2-I	37	51.30315	142	19.57093	892	JS613	2011/06/12	throwing point
<b>J06</b>	Q2-L	37	41.19255	143	08.97767	3259	JS1299	2011/06/05	throwing point
<b>K07</b>	Q2-H	37	24.55263	143	20.92264	5160	JS1312	2011/06/05	throwing point

### Deployed OBS

Site No.	OBS No.	OBS Position*				RadioBeacon CallSign	Deployment Date (Y/M/D-H: M:S)[JST]	*notes	
		Latitude N (deg. Min.)	Longitude E (deg. Min.)	Depth (m)					
<b>P03</b>	ERI-5D	36	33.5176	141	53.5571	2320	JS1348	2011/06/12-12:30:51	throwing point
<b>U02</b>	ERI-5B	35	31.6511	141	15.8824	651	JS1092	2011/06/03-16:48:28	throwing point
<b>W02</b>	ERI-5E	35	05.4948	141	07.7212	2510	JS1190	2011/06/03-14:57:59	throwing point

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About data



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

### **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.