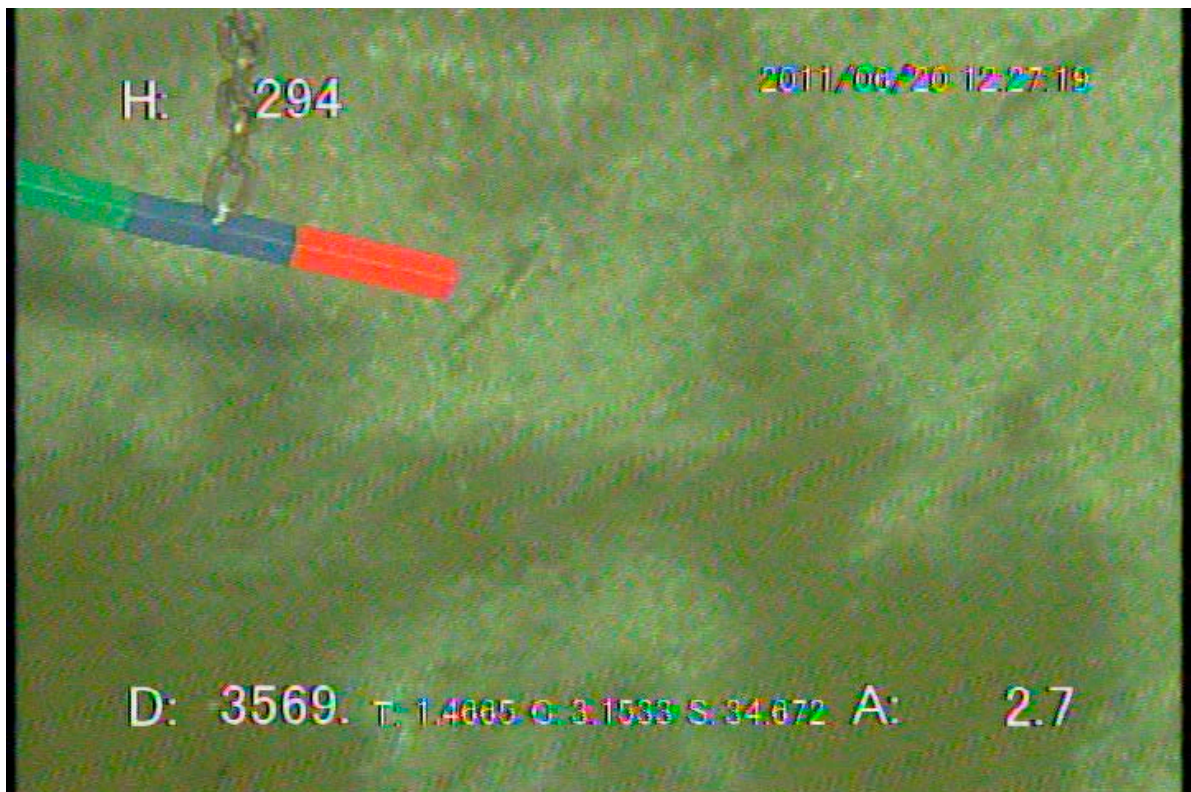


Yokosuka Cruise Report

YK11-E04 Leg2

**An urgent research cruise for shift in chemical
fluxes and deep-sea microbial communities
associated with environmental disturbance
after 3.11 Tohoku Earth Quake**



June 14, JAMSTEC – June 23, JAMSTEC, 2011

**Japan Agency for Marine-Earth Science & Technology
(JAMSTEC)**

Scientific party

Chief Scientist

Dr. Ken Takai

Staff Scientists

Dr. Takuro Nunoura

Dr. Shinsuke Kawagucci

Dr. Junichi Miyazaki

Dr. Toshiya Fujiwara

Dr. Kiichiro Kawamura

Marine Technicians

Mr. Kaoru Tsukuda (Nippon Marine Enterprises)

Mr. Yosaku Maeda (Nippon Marine Enterprises)

Mr. Fujio Kobayashi (Marine Works Japan)

“Deep tow” Operation Team

Commander

Kazuhiro Chiba

“R/V Yokosuka” Crew

Captain

Koji Samejima

Acknowledgements

We are grateful to Captain Mr. K. Samejima, Chief Officer Mr. T. Aoki and Chief Engineer Mr. T. Kikkawa for their safe navigation and their skillful handling of “R/V Yokosuka”. Great thanks are due to Commander Mr. K. Chiba and “Deeptow” operation team for their operations in sampling. We also thank Mr. K. Tsukuda and Mr. Y. Maeda, Nippon Marine Enterprise, Ltd., for his attentive supports. Moreover, we thank Mr. F. Kobayashi for preparation of CTD water sampler. We thank all the JAMSTEC personnel who have supported us. Finally, we would like to appreciate all the person who supported directly or indirectly this cruise.

Contents

Acknowledgements	3
Contents	4
List of participants	5
Scientific group	5
Marine Technician	6
Captain and crew of the R/V Yokosuka	8
Shipboard Log of YK10-E04 Leg2	10
I. Cruise summary	13
II. Introduction	15
General background and objectives	
III. CTD cast report	18
IV. YKDT Dive report	27

LIST OF PARTICIPANTS

Scientific Participants

Chief Scientist:

Dr. Ken Takai

Program Director (Geomicrobiology)

SUGAR Program & Precambrian Ecosystem Laboratory

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

Staff Scientists:

Dr. Takuro Nunoura

Research scientist (Microbiology)

Subground Animalcule Retrieval (SUGAR) Program

JAMSTEC

Dr. Shinsuke Kawagucci

Postdoctoral fellow (Geochemistry and Biogeochemistry)

Precambrian Ecosystem Laboratory

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

Dr. Junichi Miyazaki

Research scientist (Microbiology)

Subground Animalcule Retrieval (SUGAR) Program & Precambrian Ecosystem
Laboratory

JAMSTEC

Dr. Toshiya Fujiwara

Research scientist (Geophysics)

Institute for Research on Earth Evolution

JAMSTEC

Dr. Kiichiro Kawamura

Research scientist (Geology and Sedimentology)

FUKADA GEOLOGICAL INSTITUTE

Marine Technician:

Kaoru Tsukuda

Marine Technician

Marine Science Department, Nippon Marine Enterprises, Ltd.

Mr. Yosaku Maeda

Marine Technician

Marine Science Department, Nippon Marine Enterprises, Ltd.

Mr. Fujio Kobayashi

Marine Technician

Marine Works Japan, Ltd.

Captain and crew of the R/V YOKOSUKA

Captain	Koji Samejima
Chief Officer	Takafumi Aoki
2nd Officer	Shozo Fujii
3rd Officer	Yumihiko Kobayashi
Chief Engineer	Hiromi Kikkawa
1st Engnieer	Takashi Ota
2nd Engnieer	Saburo Sakaemura
3rd Engnieer	Kenta Ikeguchi
Chief Radio Officer	Tokinori Nasu
2nd Radio Officer	Yoshikazu Kuramoto
Boat Swain	Seiichi Abe
Able Seaman	Nobuyuki Ichikawa
Able Seaman	Masanori Ohata
Able Seaman	Katsumi Shimizu
Able Seaman	Syuji Takuno
Sailor	Shinsuke Uzuki
Sailor	Hiroki Shigeta
No1. Oiler	Kazuaki Nakai
Oiler	Ryo Sato
Oiler	Takeshi Watanabe
Oiler	Sohta Misago
Oiler	Masayuki Fujiwara
Chief Steward	Teruyuki Yoshikawa
Steward	Takahiro Abe
Steward	Shinsuke Tanaka
Steward	Mizuki Sano
Stewerd	Yoshinori Tada

4kYKDT operation team

Chief ROV Operator	Kazuhiro Chiba
ROV Operator	Masanobu Yanagitani
ROV Operator	Keigo Suzuki

ROV Operator

Akihisa Ishikawa

ROV Operator

Takuma Ohnishi

Shipboard Log of YK10-E04 Leg2

Date	Time (JST)	Description	Ship position / Weather Sea condition (Noon@JST)
June 14	13:00	Scientist party on board a ship	
	14:00	Departure from JAMSTEC	
	14:30-15:30	Scientific Meeting	
	15:30	Briefing about ship's life and safety	
June 15	06:40	Arrived at OBS Site K04-1	37-43.5N,143-17.0E
	06:42-07:23	Recovery of OBS	Fine but cloudy
	08:30	Arrived at OBS Site J04-1	Wind:NE-Light breeze
	08:33-09:14	Recovery of OBS	Wave:2 (Smooth)
	11:45	Arrived at CTD Stn.1	Swell:2 (Low Swell long)
	12:12-14:36	CTD (Stn.1 Depth:3,664m)	Visibility: 12 miles
	16:20	Arrived at OBS Site K05-1	
	16:27-17:27	Recovery of OBS	
	19:00-19:20	Scientific Meeting	
June 16	05:45	Arrived at CTD Stn.2	38-09.7N,143-26.4E
	06:03-07:42	CTD (Stn.2 Depth:2,275m)	Fine but cloudy
	08:45	Arrived at CTD Stn.3	Wind:South-Gentle breeze
	09:19-11:14	CTD (Stn.3 Depth:2,964m)	Wave:2 (Smooth)
	12:30	Arrived at CTD Stn.4	Swell:1 (Low swell short)
	13:20-15:39	CTD (Stn.4 Depth:3,563m)	Visibility: 12 miles
	19:00-19:20	Scientific Meeting	
June 17	05:30	Arrived at CTD Stn.5	38-14.9N,43-55.0E
	06:05-09:15	CTD (Stn.5 Depth:5,776m)	Fine but cloudy
	10:30	Arrived at CTD Stn.6	Wind:SE-Fresh breeze
	1048-14:36	CTD (Stn.6 Depth:6,652m)	Wave:3 (Slight)
	19:00-19:20	Scientific Meeting	Swell:2 (Low swell long)
			Visibility: 10 miles
June 18	07:50	Arrived at CTD Stn.7	37-40.8N,143-33.7E
	06:04-09:28	CTD (Stn.7 Depth:6,223m)	Overcast
	10:30	Arrived at CTD Stn.8	Wind:ESE-Light breeze
	10:48-14:36	CTD (Stn.8 Depth:5,329m)	Wave:2 (Smooth)
	16:35	Arrived at OBS Site L06-1	Swell:1 (Low swell short)
	16:38-18:02	Recovery of OBS	Visibility: 12 miles
	19:00-19:20	Scientific Meeting	

June 19	04:00	Arrived at OBS Site M06-1	37-01.8N,142-20.5E
	04:22-06:30	Recovery of OBS	Overcast
	07:50	Arrived at OBS Site N05-1	Wind:Clam
	07:53-09:10	Recovery of OBS	Wave:1 (Calm)
	10:15	Arrived at OBS Site N04-1	Swell:1 (Low swell short)
	10:20-11:24	Recovery of OBS	Visibility: 10 miles
	12:30	Arrived at OBS Site M04-1	
	12:33-13:18	Recovery of OBS	
	14:20	Arrived at OBS Site L04-1	
	14:24-15:03	Recovery of OBS	
	16:10	Arrived at OBS Site L05-1	
	16:17-17:22	Recovery of OBS	
	19:00	Arrived at dive#99 point	
	19:00-19:20	Scientific Meeting	
June 20	05:47	Release of XBT at 37-43.55N, 143-16.90E	37-44.5N,143-16.9E
	07:19	Launch YK Deep-tow (YKDT#99dive)	Fine but cloudy
	08:36	YKDT lands (Depth:3,778m)	Wind:South-Moderate breeze
	15:15	YKDT leaves the bottom (Depth:3,537m)	Wave:2 (Smooth)
	16:21	YKDT on deck	Swell:1 (Low swell short)
	18:15	Arrived at dive#100 point	Visibility: 12 miles
	19:30-19:50	Scientific Meeting	
June 21	06:50	Launch YK Deep-tow (YKDT#100dive)	38-14.0N,143-06.0E
	07:35	YKDT lands (Depth:1,983m)	Fog
	13:58	YKDT leaves the bottom (Depth:1,705m)	Wind:SW-Light breeze
	14:34	YKDT on deck	Wave:1 (Calm)
	17:45	Arrived at dive#101 point	Swell:1 (Low swell short)
	17:49-18:40	The MBES survey (Dive site preliminary survey)	Visibility: 0.1 miles
	18:00-18:20	Scientific Meeting	
	19:50	Release of XBT at 37-13.94N, 142-56.35E	
June 22	05:10-05:30	Figure eight turn (Magnetic calibration)	37-20.8N,143-00.8E
	06:56	Launch YK Deep-tow (YKDT#101dive)	Fine but cloudy
	08:19	YKDT lands (Depth:4,376m)	Wind:WSW-Fresh breeze
	10:15	YKDT leaves the bottom (Depth:4,320m)	Wave:3 (Slight)
	11:31	YKDT on deck	Swell:2 (Low swell long)
	18:00-18:20	Scientific Meeting	Visibility: 10 miles
June 23	09:00	Arrived at JAMSTEC	

		YK11-E04 Leg.2 finish and disembarkation	

I. CRUISE SUMMARY

In this expedition, we totally conducted 8 casts of CDT water samplings, 3 dives of YKDT (4.5K) surveys and recovery of 10 ocean bottom seismometers (OBS). These were indeed the entire missions that we expected to do prior to the expedition. We fully did the missions of this expedition.

Stns. 2-6 of CTD water sampling will represent the shifts in chemical and microbiological compositions in the deep-sea environments about 3 months after the 3.11 Tohoku Earth Quake, which are comparative data obtained from the previous cruises. Stns. 1, 7 and 8 of CTD water sampling represent another comparative line for the shifts in chemical and microbiological compositions in the deep-sea environments across the landward slope of the Japan Trench around the hypocenter of the 3.11 Tohoku Earth Quake. The considerably turbid bottom waters in both sampling lines were still found.

YKDT survey #99 found potentially fresh microbial mats just on the seafloor above the normal fault that was predicted from the D02 MCS survey data. This result indicated biological signatures for the seepage of deep-sourced geofluids that was triggered by the earthquake-driven geofluids circulation and was entrained along the faults.

YKDT survey #100 found potential normal faults that were re-created by the earthquakes and YKDT survey #101 also found the trace (heavy turbidity in the bottom water) of large scale of landslide. All these seafloor observations demonstrated that the 3.11 Tohoku Earth Quake had enormous impacts on the deep-sea environments in the quite widespread area of the Japan Trench.

Shore-based chemical and microbiological investigations of collected waters will provide clearer evidences how the environmental disturbance occurred by means of the earthquake and how shifts in chemical fluxes and deep-sea microbial communities were induced, widespread and continued.

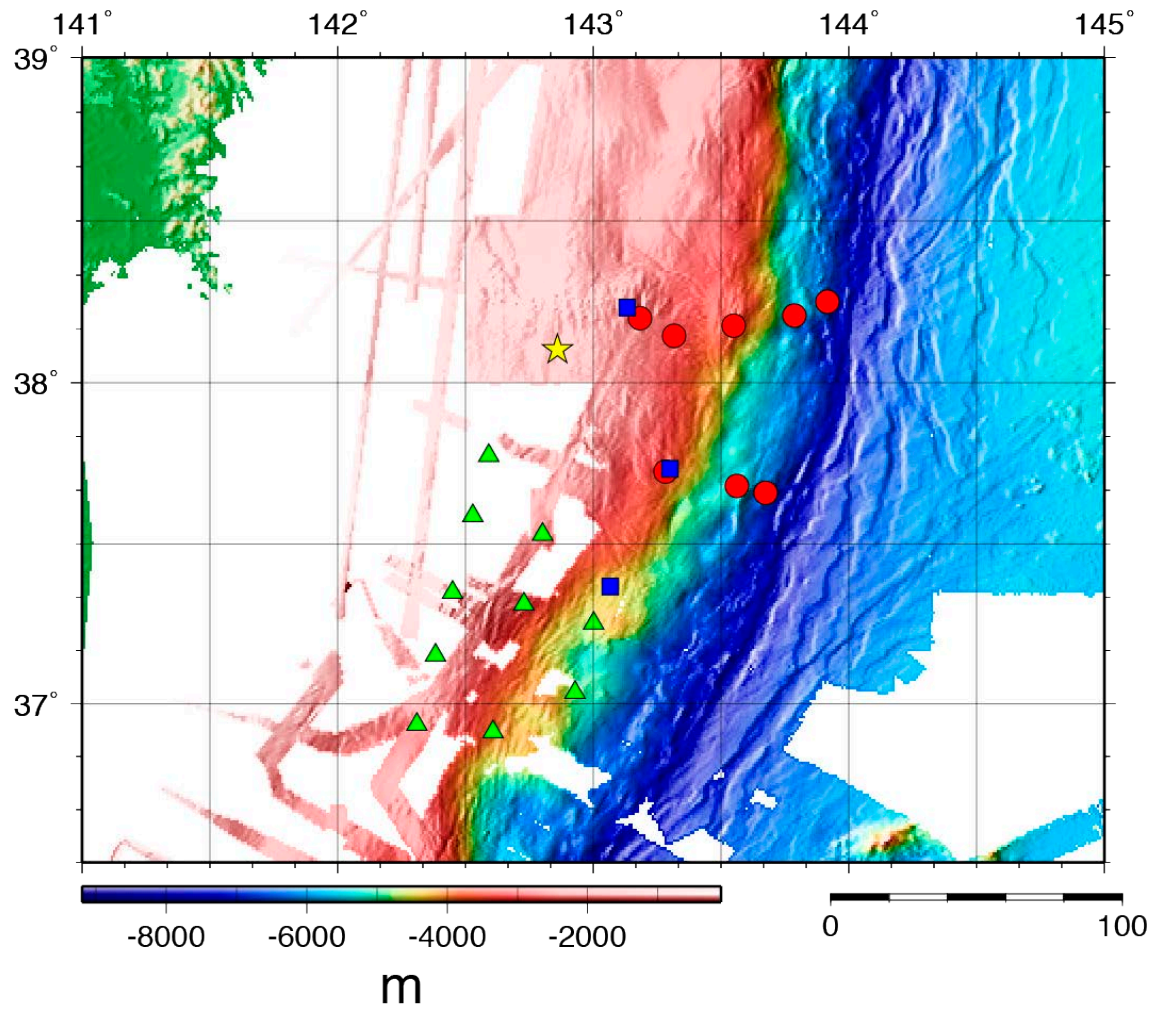


Fig. Event map of YK11-04E Leg2. Yellow star indicates a hypocenter of the 3.11 Tohoku Earth Quake. Red circles are the stations of CTD water sampling. Blue squares are points of YKDT (4.5K) surveys. Green triangles indicates the locations of OBS recovered in this expedition.

II. Introduction

General background and objectives

This is one of a series of urgent scientific investigation for shift in chemical fluxes and deep-sea microbial and faunal communities responding to environmental disturbance after 3.11 Tohoku Earth Quake. The gigantic disaster occurring on March 11 in the eastern Japan induced unprecedented human and social damage in Japan. A potential hypocentral region of the largest earthquake was located at a depth of about 20 km below seafloor off Ojika Peninsula, Miyagi Prefecture, in the forearc basin of the Japan Trench. Several geophysical and seismologic investigations were conducted in the Japan Trench around the potential hypocenter immediately after the earthquake. These investigations have suggested:

- (1) the gigantic landslides of the landward slopes occurred at around the deepest trench axes (JAMSTEC press release on April 28; http://www.jamstec.go.jp/j/about/press_release/20110428/), and
- (2) Tsunamigenesis may be induced by the upshift of the large unit of landward slope characterized by the plate boundary and the enormous normal fault that was delineated by the MSC seismic reflection survey (Tsuji et al., 2011).

It is evident that the fault-induced variation of seafloor and subseafloor structures in the landward slope of the Japan Trench would have triggered a subsequent disturbance of physical-chemical conditions in the subseafloor, seafloor and deep-sea environments. Predicted disturbing events are:

- (1) discharging and recharging patterns and fluxes of geofluids through the faults,
- (2) chemical in- and out-fluxes by means of geofluids between the deep-sea and subseafloor environments,
- (3) spreading and diffusion of sediments through the landslides,
- (4) chemical inputs by means of landslides in the deep-sea,
- (5) burying the seafloor faunal communities by landslides, and etc.

Apart from the geophysical and seismologic investigations, shifts in chemical fluxes and deep-sea microbial and faunal communities responding to environmental disturbance after 3.11 Tohoku Earth Quake are of great scientific interests and

would provide quite important scientific basis to estimate and help the recovery of ocean and coastal ecosystems that would ultimately lead to the recovery of fishery industries suffered from the earthquake. Thus, we, JAMSTEC and Japanese deep-sea research scientists, have planned a series of urgent scientific investigation for shifts in chemical fluxes and deep-sea microbial and faunal communities responding to environmental disturbance after 3.11 Tohoku Earth Quake. To date, we have conducted three urgent expeditions (MR11-03, YK11-E03 and YK11-E04 Leg 1). Through these expeditions, it has been demonstrated:

- (1) the turbidity in seawater was observed quite widely in the landward slope one month after the earthquake and potentially had the maximum in the deepest part of trench axes,
- (2) the chemical influxes to the deep-sea were different between the units of the landward slope,
- (3) the turbidity in seawater rapidly disappeared quite in two months after the earthquake but still left in the deepest part of trench axes,
- (4) Many fissures were discovered along the normal fault at a depth of 5200-5500,
- (5) Microbial communities shifted in responding to the change of potential chemical fluxes, and etc.

In this expedition (YK11-04E Leg 2), we focus on the extended CTD water sampling survey for investigation of shifts in chemical fluxes and deep-sea microbial communities responding to environmental disturbance. The data will provide a significant envision how the environmental disturbance occurred by means of the earthquake and how shifts in chemical fluxes and deep-sea microbial communities were induced and widespread. For another expedition purpose, we will retrieve a number of OBS that was deployed on the seafloor around the Japan Trench after the earthquake. The recorded earthquake data will provide important information for understanding how the catastrophic earthquake was generated, whether additional large earthquake will happen in the future, and if happens, when and where it will be most likely.

Reference:

Tsuji, T., Ito, Y., Kido, M., Osada, Y., Fujimoto, H., Ashi, J., Kinoshita, M., and Matsuoka, T. (2011) Potential Tsunamigenic Faults of the 2011 Tohoku Earthquake.

Earth Planets Space, doi:10.5047/eps.2011.05.028.

III. CTD Cast Report

Cast ID E41S01 – E48S01

Stn.	Cast no.	Date (UTC)	Time (UTC)		Bottom Position		Depth (m)	Wire Out (m)	Wire Tension	HT Above Bottom	Max Depth	Max Pressure
		(mmddyy)	Start	End	Latitude (N)	Longitude (E)						
01	1	061511	3:09	05:41	37°43.50'	143°16.97'	3664	3643.0	1.9	9.6	3645.3	3704.1
02	1	061511	20:57	22:45	38°11.98'	143°11.02'	2275	2247.7	1.3	10.3	2250.4	2279.8
03	1	061611	00:14	02:17	38°08.69'	143°19.02'	2964	2938.0	1.6	9.5	2942.5	2985.7
04	1	061611	04:10	06:42	38°10.53'	143°32.96'	3503	3485.7	1.9	10.5	3487.3	3543.0
05	1	061611	21:01	00:18	38°12.57'	143°47.14'	5776	5720.9	2.8	10.3	5722.2	5844.2
06	1	061711	11:42	05:39	38°14.96'	143°55.03'	6652	6632.9	3.2	9.1	6631.2	6785.7
07	1	061711	21:00	00:30	37°39.44'	143°40.58'	6223	6197.3	3.0	10.3	6195.2	6333.7
08	1	061811	01:49	05:03	37°40.74'	143°33.70'	5329	5304.4	2.7	8.9	5306.7	5414.2

CTD cast ID: E41S01**Date:** 15 June 2011 (JST)**Site:** Japan Trench (Station 1)**Start of Logging:** 12:09**Bottom position:** 37°43.50'N, 143°16.97'E, Depth= 3664 m**End of Logging:** 14:41**Sensors from the science party**

Turbidity sensor

Summary of water samples

Bottle No.	Time (JST)	Depth (m)	Depth (db)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	Altitude (m)
1	13:15	3646.276	3705.812	1.4766	3.157473	34.6789	10.5
2	13:20	3625.348	3684.363	1.4737	3.156472	34.6790	28.2
3	13:22	3607.127	3665.689	1.4737	3.155792	34.6788	45.4
4	13:26	3581.233	3639.154	1.4717	3.154674	34.6788	68.9
5	13:29	3554.104	3611.358	1.4704	3.153569	34.6788	-
6	13:33	3454.958	3509.800	1.4736	3.150104	34.6774	-
7	13:36	3354.901	3407.357	1.5113	3.149256	34.6723	-
8	13:41	3155.303	3203.137	1.5341	3.143422	34.6678	-
9	14:00	2000.420	2025.204	1.9116	3.125693	34.6034	-
10	14:16	999.645	1009.603	3.0038	3.162416	34.4038	-
11	14:24	499.375	503.739	3.9151	3.185255	33.9867	-
12	14:29	249.066	251.089	3.8163	3.128531	33.5477	-

CTD cast ID: E42S01**Date:** 16 June 2011 (JST)**Site:** Japan Trench (Station 2)**Start of Logging:** 5:57**Bottom position:** 38°11.98'N, 143°11.02'E, D= 2275 m**End of Logging:** 7:45**Sensors from the science party**

Turbidity sensor

Summary of water samples

Bottle No.	Time (JST)	Depth (m)	Depth (db)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	Altitude (m)
1	21:44	2250.9	2280.3	1.7546	3.124133	34.6273	9.7
2	21:47	2231.1	2260.1	1.7612	3.123814	34.6261	29.8
3	21:50	2210.6	2239.2	1.7630	3.123107	34.6256	50.5
4	21:51	2185.7	2213.9	1.7814	3.123445	34.6224	-
5	21:54	2161.2	2188.9	1.7852	3.122726	34.6217	-
6	21:59	2060.7	2086.6	1.8427	3.122846	34.6117	-
7	22:03	1960.3	1984.4	1.9939	3.129840	34.5866	-
8	22:08	1760.1	1780.9	2.1457	3.132442	34.5575	-
9	22:14	1499.4	1516.3	2.3460	3.136197	34.5233	-
10	22:22	999.7	1009.7	2.9697	3.157963	34.3859	-
11	22:31	499.9	504.3	4.7786	3.272469	34.1192	-
12	22:35	249.7	251.7	5.3027	3.271841	33.7086	-

CTD cast ID: E43S01

Date: 16 June 2011 (JST)

Site: Japan Trench (Station 3)

Start of Logging: 9:14

Bottom position: 38°08.69'N, 143°19.02'E, D= 2942.5 m

End of Logging: 11:17

Sensors from the science party

Turbidity sensor

Summary of water samples

Bottle No.	Time (JST)	Depth (m)	Depth (db)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	Altitude (m)
1	1:09	2942.4	2985.6	1.5526	3.136561	34.6629	9.5
2	1:13	2922.2	2965.0	1.5563	3.136064	34.6622	29.2
3	1:15	2903.3	2945.7	1.5593	3.135553	34.6617	-
4	1:17	2878.4	2920.3	1.5700	3.135402	34.6602	-
5	1:18	2852.5	2893.8	1.5736	3.134672	34.6595	-
6	1:21	2802.9	2843.2	1.5821	3.133355	34.6578	-
7	1:23	2753.0	2792.1	1.5974	3.132561	34.6554	-
8	1:25	2702.1	2740.2	1.6205	3.132303	34.6519	-
9	1:28	2653.3	2690.4	1.6335	3.131358	34.6498	-
10	1:30	2603.4	2639.5	1.6471	3.130398	34.6475	-
11	1:33	2552.5	2587.6	1.6778	3.130710	34.6430	-
12	1:57	1001.0	1011.0	3.1102	3.171577	34.4012	-

CTD cast ID: E44S01

Date: 16 June 2011 (JST)

Site: Japan Trench (Station 4)

Start of Logging: 13:10

Bottom position: 38°10.53'N, 143°32.96'E, D= 3503 m

End of Logging: 15:42

Sensors from the science party

Turbidity sensor

Summary of water samples

Bottle No.	Time (JST)	Depth (m)	Depth (db)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	Altitude (m)
1	5:24	3488.4	3544.2	1.4737	3.151386	34.6778	9.8
2	5:27	3466.8	3522.1	1.4793	3.151006	34.6770	30.7
3	5:29	3447.3	3502.1	1.4837	3.150628	34.6764	50.2
4	5:31	3423.7	3477.9	1.4969	3.150758	34.6748	77.3
5	5:33	3397.7	3451.3	1.4999	3.150009	34.6741	-
6	5:37	3347.2	3399.6	1.5051	3.148508	34.6731	-
7	5:40	3296.1	3347.3	1.5169	3.147493	34.6714	-
8	5:44	3246.2	3296.3	1.5258	3.146280	34.6699	-
9	5:47	3196.2	3245.1	1.5378	3.145296	34.6680	-
10	5:50	3147.5	3195.3	1.5435	3.143877	34.6670	-
11	5:53	3096.2	3142.9	1.5534	3.142664	34.6652	-
12	6:23	1000.3	1010.3	2.9399	3.155306	34.3850	-

CTD cast ID: E45S01

Date: 17 June 2011 (JST)

Site: Japan Trench (Station 5)

Start of Logging: 6:01

Bottom position: 38°12.57'N, 143°47.14'E, D= 5776 m

End of Logging: 9:18

Sensors from the science party

Turbidity sensor

Summary of water samples

Bottle No.	Time (JST)	Depth (m)	Depth (db)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	Altitude (m)
1	22:32	5723.0	5844.6	1.6027	3.238845	34.6916	10.1
2	22:37	5701.3	5822.2	1.5998	3.237936	34.6917	31.0
3	22:38	5682.1	5802.3	1.5968	3.237099	34.6919	61.2
4	22:40	5655.9	5775.2	1.5935	3.235994	34.6917	-
5	22:42	5631.6	5750.1	1.5902	3.234971	34.6919	-
6	22:45	5580.5	5697.3	1.5838	3.232826	34.6917	-
7	22:48	5532.0	5647.1	1.5774	3.230762	34.6917	-
8	22:50	5482.7	5596.2	1.5711	3.228676	34.6917	-
9	22:59	4999.8	5097.6	1.5177	3.208571	34.6909	-
10	23:21	3500.3	3556.4	1.4999	3.153910	34.6757	-
11	23:30	3000.2	3044.7	1.5771	3.140775	34.6614	-
12	23:58	998.4	1008.3	3.0492	3.163675	34.3717	-

CTD cast ID: E46S01**Date:** 17 June 2011 (JST)**Site:** Japan Trench (Station 6)**Start of Logging:** 10:42**Bottom position:** 38°14.96'N, 143°55.03'E, D= 6652 m**End of Logging:** 14:39**Sensors from the science party**

Turbidity sensor

Summary of water samples

Bottle No.	Time (JST)	Depth (m)	Depth (db)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	Altitude (m)
1	3:37	6631.4	6786.2	1.7372	3.277249	34.6915	9.0
2	3:42	6611.0	6765.0	1.7338	3.276397	34.6918	27.7
3	3:44	6591.7	6745.0	1.7309	3.275591	34.6917	46.2
4	3:49	6543.8	6695.3	1.7232	3.273576	34.6918	-
5	3:52	6491.6	6641.1	1.7152	3.271403	34.6919	-
6	3:55	6442.1	6589.7	1.7076	3.269322	34.6919	-
7	3:59	6342.3	6486.2	1.6921	3.265111	34.6921	-
8	4:04	6141.4	6277.8	1.6623	3.256652	34.6922	-
9	4:13	5701.1	5821.9	1.6018	3.238133	34.6921	-
10	4:24	5001.4	5099.3	1.5223	3.209017	34.6908	-
11	4:46	3500.6	3556.7	1.5170	3.155252	34.6739	-
12	4:54	3000.4	3044.9	1.5880	3.141625	34.6602	-

CTD cast ID: E47S01**Date:** 18 June 2011 (JST)**Site:** Japan Trench (Station 7)**Start of Logging:** 6:00**Bottom position:** 37°39.44'N, 143°40.58'E, D= 6223 m**End of Logging:** 9:30**Sensors from the science party**

Turbidity sensor

Summary of water samples

Bottle No.	Time (JST)	Depth (m)	Depth (db)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	Altitude (m)
1	22:41	6195.9	6334.0	1.6719	3.259004	34.6913	10.3
2	22:45	6177.2	6314.7	1.6684	3.258160	34.6915	28.0
3	22:47	6155.0	6291.7	1.6652	3.257239	34.6915	-
4	22:50	6106.7	6241.7	1.6578	3.255173	34.6916	-
5	22:52	6056.5	6189.6	1.6506	3.253057	34.6916	-
6	22:54	6006.1	6137.4	1.6437	3.250951	34.6916	-
7	22:58	5905.6	6033.3	1.6306	3.246806	34.6917	-
8	23:03	5705.4	5826.2	1.6037	3.238384	34.6916	-
9	23:11	5207.9	5312.1	1.5444	3.217605	34.6910	-
10	23:20	4706.7	4795.3	1.4982	3.197081	34.6893	-
11	23:44	2998.3	3042.7	1.5598	3.139358	34.6634	-
12	23:59	2000.6	2025.3	1.9171	3.126033	34.6016	-

CTD cast ID: E48S01**Date:** 18 June 2011 (JST)**Site:** Japan Trench (Station 8)**Start of Logging:** 10:49**Bottom position:** 37°40.74'N, 143°33.70'E, D= 5329 m**End of Logging:** 14:03**Sensors from the science party**

Turbidity sensor

Summary of water samples

Bottle No.	Time (JST)	Depth (m)	Depth (db)	Temperature (°C)	Conductivity (S/m)	Salinity (PSU)	Altitude (m)
1	3:25	5307.4	5414.8	1.5467	3.221034	34.6917	9.3
2	3:30	5285.1	5391.8	1.5431	3.220031	34.6919	30.0
3	3:32	5264.9	5370.9	1.5418	3.219254	34.6917	49.3
4	3:34	5214.4	5318.7	1.5379	3.217285	34.6915	-
5	3:37	5166.3	5269.2	1.5318	3.215211	34.6914	-
6	3:39	5116.7	5218.0	1.5267	3.213165	34.6913	-
7	3:42	5015.2	5113.3	1.5156	3.208911	34.6912	-
8	3:47	4817.5	4909.4	1.4972	3.200787	34.6907	-
9	3:56	4317.2	4394.5	1.4682	3.181162	34.6877	-
10	4:15	3000.2	3044.6	1.5402	3.137895	34.6654	-
11	4:30	2000.0	2024.8	1.8992	3.124713	34.6047	-
12	4:44	1000.1	1010.0	3.0621	3.167367	34.4018	-

IV. YKDT (4.5K) DIVE REPORTS

DIVE #99	Dr. Kiichiro Kawamura
DIVE #100	Dr. Kiichiro Kawamura
DIVE #101	Dr. Kiichiro Kawamura

YKDT Dive #99 Report

Date: 20 June 2011

Site: Japan Trench

Landing: 8:36, 37-43.9994N,143-19.5009E, 3750 m

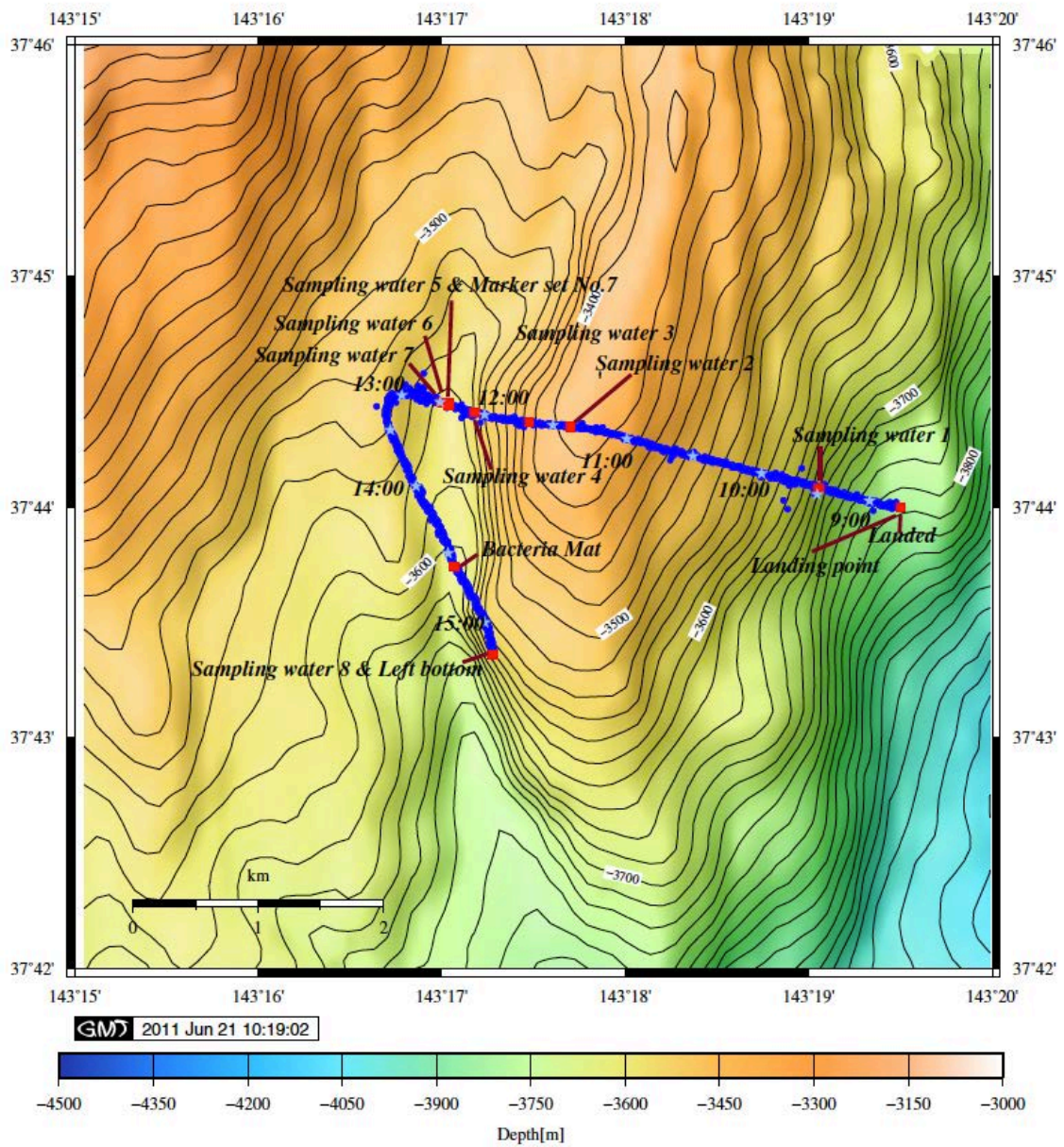
Leaving: 15:15, 37-43.3614N,143-17.2783E, 3600 m

Observer: Kiichiro Kawamura

Dive 99 (2011/ 6/20) Events: Time (X, Y), Lon., Lat., Water depth

1. Observe the seafloor: 08:36 (-930,4040), 37-43.9994N,143-19.5009E, 3750 m
2. Collect Water Sample 1: 09:28:17 (-775.3,3386.7), 37-44.0808N,143-19.0557E, 3670 m
3. Collect Water Sample 2: 11:21:42(-283.3, 1397.3), 37-44.3468N,143-17.7013E, 3370 m
4. Collect Water Sample 3: 11:37:51 (-246.0, 1066.6), 37-44.3670N,143-17.4762E, 3370 m
5. Collect Water Sample 4: 12:07:25 (-171.2,632.0), 37-44.4074N,143-17.1803E, 3498 m
6. Find bacterial mats, collect Water Sample 5 and put Marker No. 7: 12:23:51 (-110.0, 422.7), 37-44.4405N,143-17.0378E,Sampling Water5 & Marker set No.7, 3571 m
7. Collect Water Sample 6: 12:25:41 (-96.7, 421.2),37-44.4477N,143-17.0368E, 3570 m
8. Collect Water Sample 7: 12:27:51 (-91.3, 361.3),37-44.4506N,143-16.9960E, 3569 m
9. Find Bacterial mats: 14:36:27 (-1404.6,469.2),37-43.7406N,143-17.0695E, 3600 m
10. Collect Water Sample 8 and leave the seafloor: 15:15:34 (-2106.0, 775.9),37-43.3614N,143-17.2783E, 3600 m

YKDT_99DIVE_AREA



YKDT Dive #100 Report

Date: 21 June 2011

Site: Japan Trench

Landing: 7:35, 38-13.9798N,143-09.5066E, 2010 m

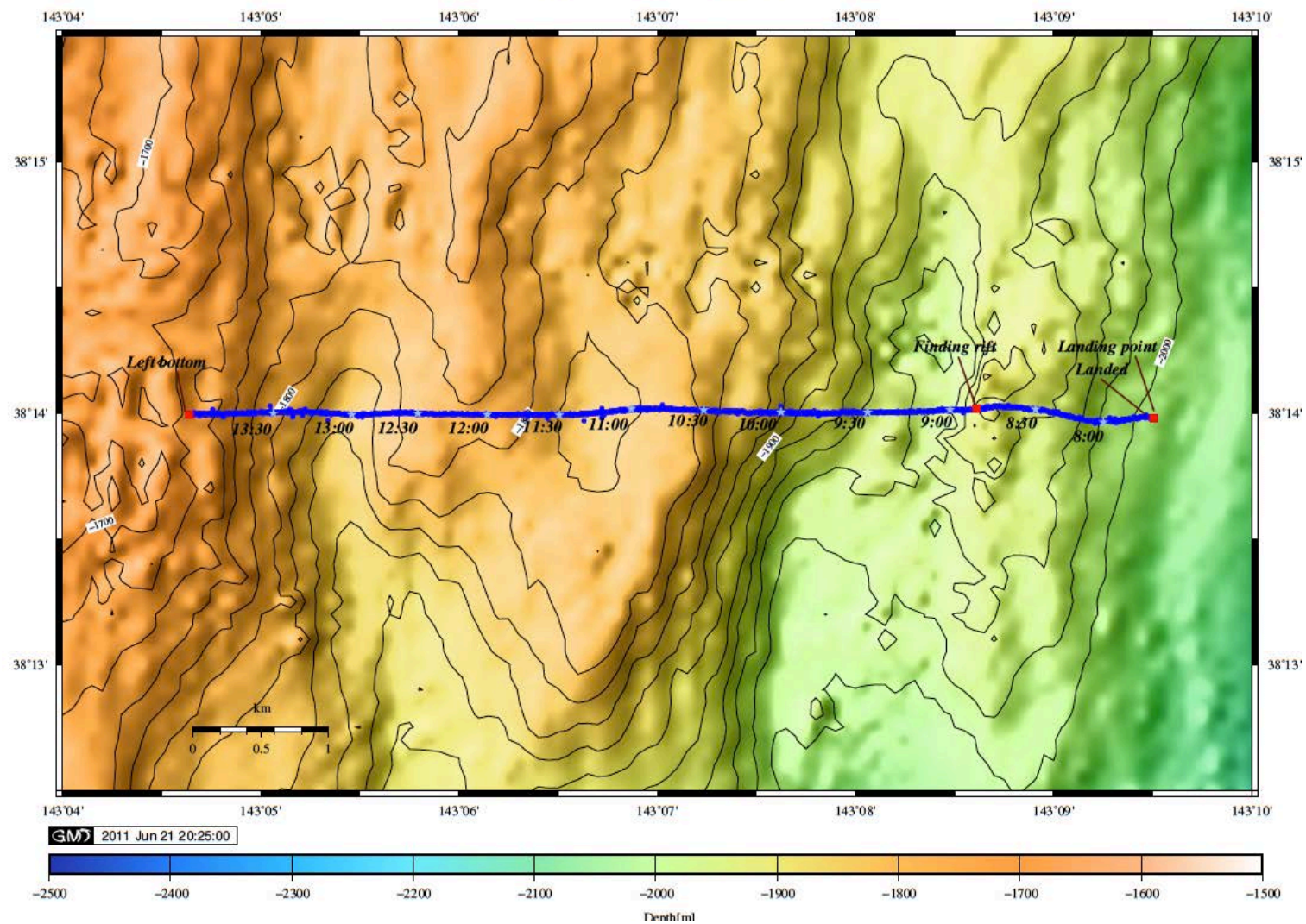
Leaving: 13:58, 38-13.9993N,143-04.6369E, 1705 m

Observer: Kiichiro Kawamura

Dive 100 (2011/ 6/21) Events: Time (X, Y), Lon. Lat.

1. Observe the seafloor: 07:35 (-40,3660), 38-13.9798N,143-09.5066E, 2010 m
2. Find fault scars: 08:59:11 (36.0,2346.6),38-14.0195N,143-08.6083E, 1940 m
3. Leave the seafloor: 13:58:43 (-1.2,-3447.9),38-13.9993N,143-04.6369E, 1705 m
4. Collect Water Sample 1: 14:12:25 (-45.3,-3873.3),38-13.9755N,143-04.3453E, 1000 m
5. Collect Water Sample 2: 14:12:25 (-45.3,-3873.3),38-13.9755N,143-04.3453E, 980 m
6. Collect Water Sample 3: 14:15:53 (-94.7,-3970.7),38-13.9488N,143-04.2786E, 750 m
7. Collect Water Sample 4: 14:15:53 (-94.7,-3970.7),38-13.9488N,143-04.2786E, 737 m
8. Collect Water Sample 5: 14:20:20 (-228.0,-4086.7),38-13.8767N,143-04.1991E, 500 m
9. Collect Water Sample 6: 14:20:20 (-228.0,-4086.7),38-13.8767N,143-04.1991E, 488 m
10. Collect Water Sample 7: 14:24:29 (-505.3,-4192.0),38-13.7268N,143-04.1269E, 250 m
11. Collect Water Sample 8: 14:24:29 (-505.3,-4192.0),38-13.7268N,143-04.1269E, 238 m

YKDT_100DIVE_AREA



YKDT Dive #101 Report

Date: 22 June 2011

Site: Japan Trench

Landing: 8:19, 37-22.0621N,143-04.3134E, 4382 m

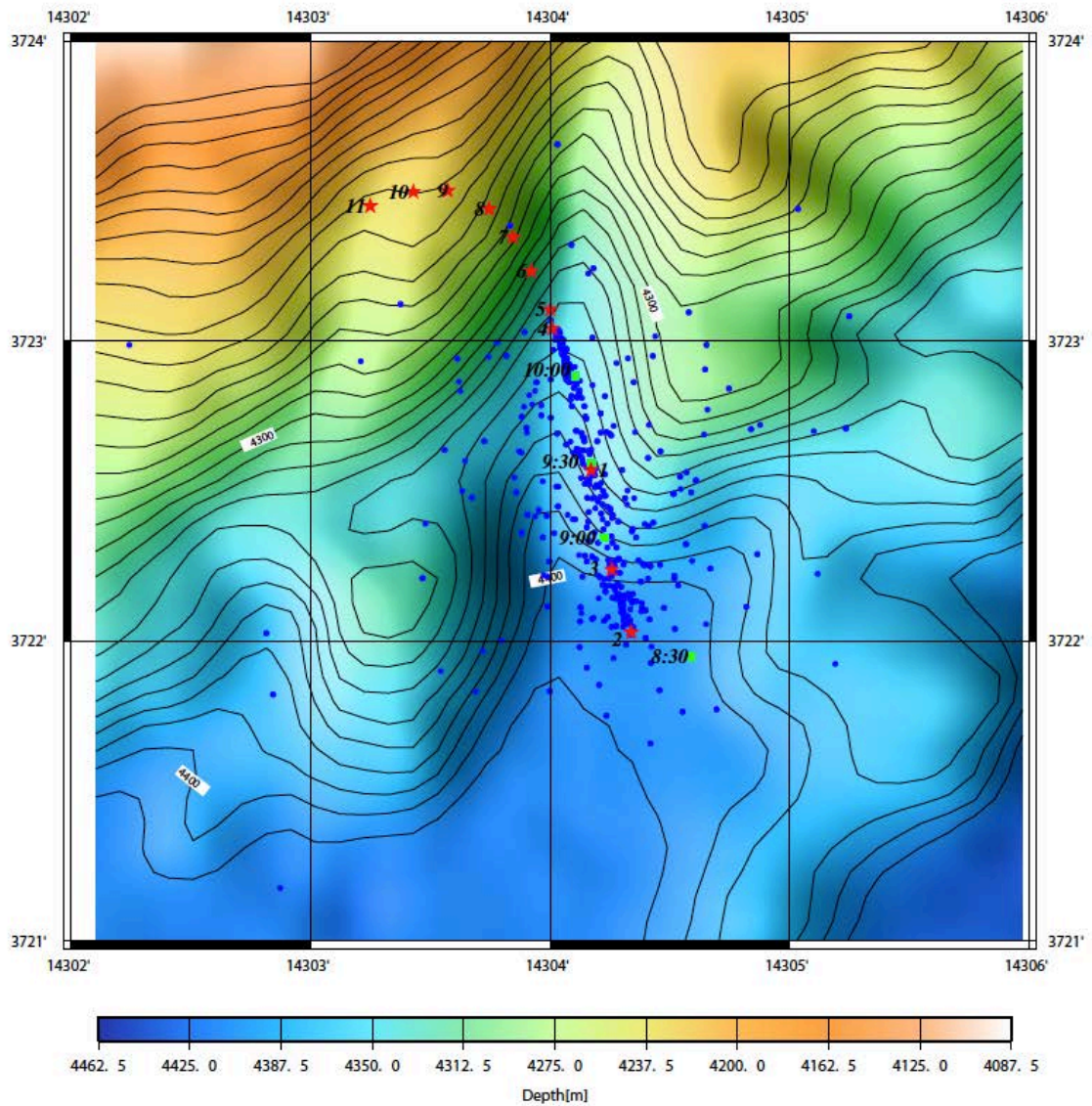
Leaving: 10:15, 37-23.0422N,143- 4.0090E, 4320 m

Observer: Kiichiro Kawamura

Dive 101 (2011/ 6/22) Events: Time (X, Y), Lon. Lat.

1. Observe the seafloor: 08:19 (-440,460), 37-22.0621N,143-04.3134E, 4382 m
2. Collect Water Sample 1: 8:50:24 (-112.0,378.6),37-22.2394N,143- 4.2565E, 4366 m
3. Leave the seafloor: 10:15:07 (1372.7,13.2),37-23.0422N,143- 4.0090E, 4320 m
4. Collect Water Sample 2: 10:21:07 (1490.7,1.3),37-23.1060N,143- 4.0009E,4000 m
5. Collect Water Sample 3: 10:29:32(1726.7,-116.6),37-23.2336N,143- 3.9210E, 3500 m
6. Collect Water Sample 4: 10:38:01(1934.6,-230.7),37-23.3460N,143- 3.8437E, 3000 m
7. Collect Water Sample 5: 10:45:32(2108.6,-378.6),37-23.4401N,143- 3.7435E, 2500 m
8. Collect Water Sample 6: 10:53:28(2220.7,-630.6),37-23.5007N,143- 3.5728E, 2000 m
9. Collect Water Sample 7: 11:01:01(2214.6,-844.6),37-23.4974N,143- 3.4278E, 1500 m
10. Collect Water Sample 8: 11:08:00(2128.6,-1110.6),37-23.4509N,143- 3.2476E, 1000 m

YKDT101DIVE



-EVENTMARKS-

- | | |
|----------------------------|----------------------------|
| 1. Landing Point | 7. Sampling water4 D=3000 |
| 2. Leaving Point | 8. Sampling water5 D=2500 |
| 3. Sampling water1 D=4366m | 9. Sampling water6 D=2000 |
| 4. Left Bottom D=4366m | 10. Sampling water7 D=1500 |
| 5. Sampling water2 D=4000m | 11. Sampling water8 D=1000 |
| 6. Sampling water3 D=3500m | |