

Cruise Report

KS-16-J03

ROV *Hyper-Dolphin*/RV *SHINSEI MARU*

Researches on marine ecosystem dynamics off Sanriku



Off Sanriku

March 4th – 11th, 2016

Japan Agency for Marine-Earth Science and Technology

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1. Participants

SCIENTIFIC PARTY

Shinji Tsuchida, Japan Agency for Marine-Earth Science and Technology

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Yoshitaka Watanabe, Japan Agency for Marine-Earth Science and Technology

Yoshimi Takahashi, Japan Agency for Marine-Earth Science and Technology

Ayaka Kasai, Japan Agency for Marine-Earth Science and Technology

Hiroyuki Yokooka, Idea Consultants, Inc.

Tsuyuko Watanabe, TV Asahi Productions

SHINSEIMARU CREW

Captain RIKITA YOSHIDA

Chief Officer SHOZO FUJII

2nd Officer TAKESHI MURAMATSU

3rd Officer SAITO TAKATA

Chief Engineer MINORU TSUKADA

1st Engineer DAISUKE GIBU

2nd Engineer RYUZO MIKAMI

3rd Engineer TAKAMASA OCHIAI

Chief Electronics Op	TOKINORI NASU
2nd Electronics Op.	YOSUKE KOMAKI
Boat Swain	HIDEO ISOBE
Able Seaman	YOSHITSUGU FUJII
Able Seaman	NOBUYUKI ICHIKAWA
Able Seaman	KAITO MURATA
Able Seaman	HIROAKI NAGAI
Able Seaman	NAO ISHIZUKA
Sailor	YUTA OHJIRI
No.1 Oiler	TOSHIKAZU IKEDA
Oiler	MASAYUKI FUJIWARA
Oiler	RYOTA SUZUKI
Oiler	KOTA AIZAWA
Assistant Oiler	DAIKI SATO
Assistant Oiler	KOSHI NAKAJIMA
Chief Steward	TOMIHISA MORITA
Steward	TOURU WADA
Steward	YUKIHIDE CHIKUBA

Hyper-Dolphin Operation Team

Operation Manager	YOSHINARI ONO
2nd ROV Operator	TEPPEI KIDO
2nd ROV Operator	YUDAI SAKAKIBARA
2nd ROV Operator	ATSUSHI TAKENOUCI
2nd ROV Operator	RYO SAIGO
2nd ROV Operator	YUDAI TAYAMA

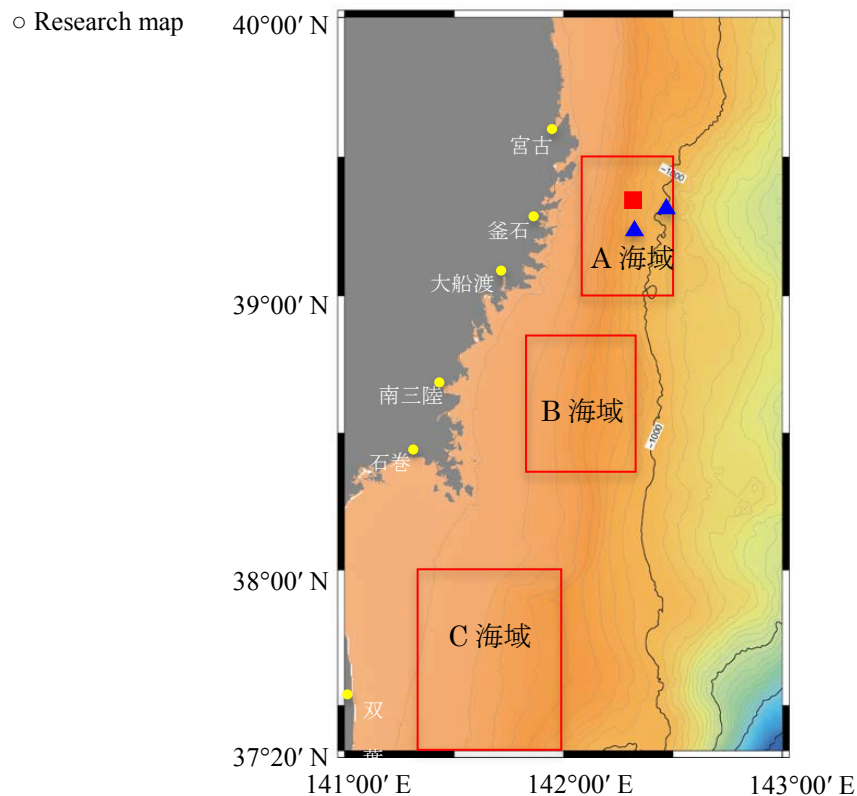
Marine Technician

Chief Technician	MORIFUMI TAKAESU
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2. Cruise Summary

Cruise Information

- Cruise ID KS-16-J03
- Name of vessel SHINSEI MARU
- Title of the cruise Researches on marine ecosystem dynamics off Sanriku
- Chief scientist Shinji Tsuchida [JAMSTEC]
- Representative of the Science Party Shinji Tsuchida [JAMSTEC]
- Title of proposal Researches on marine ecosystem dynamics off Sanriku
- Cruise period March 4th –11th 2016
- Ports of departure / call / arrival JAMSTEC/JAMSTEC
- Research area off Sanriku



Overview of the Observation

- Topographic survey

During the cruise, two lines off Iwate were topographically surveyed.

- Quantitative observation of benthic animals and debris using by the stereo camera system

The quantitative biomass of benthic animals and mass of marine debris were observed by the stereo camera system loaded inside of the Hyper-Dolphin skid for establishing the habitat models.

- Behavior and distribution patterns of commercial species recorded by the bio-tracking system

Five bio-tracking base stations and an ADCP deployed off Otsuchi, 700m depth along with the deep-sea canyon, were successfully recovered.

- Off shore environmental dynamics measured by the long term monitoring system

Long term monitoring systems deployed off Kamaishi deep-sea canyon in October 2014 at 760m depth and off Otsuchi in May 2015 at 1000m depth were recovered successfully and obtained data sets.

- Title of project

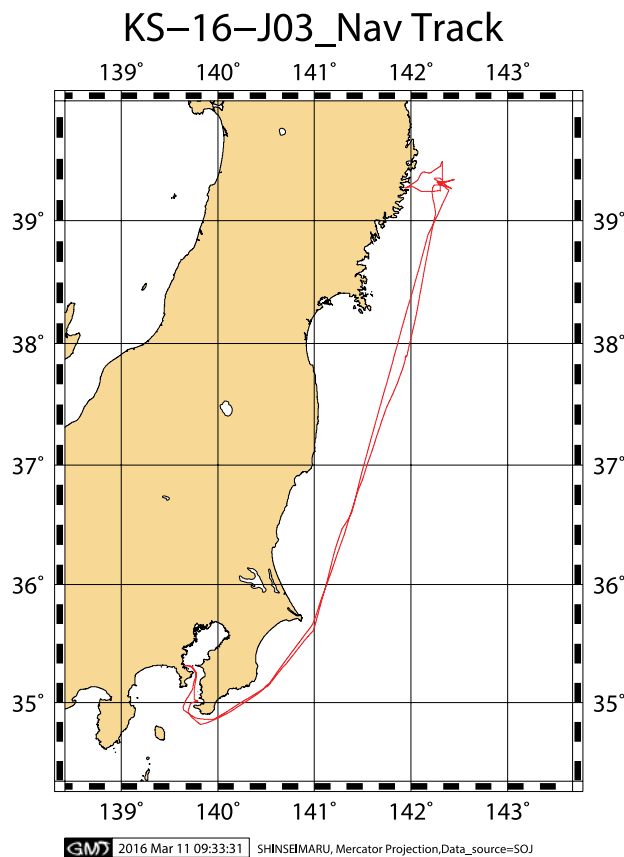
Project Team for Analyses of Changes in East Japan Marine Ecosystems
(Tohoku Ecosystem-Associated Marine Sciences)

3. Ship Log

Date	Local Time	Description	Position / Weather / Wind, Sea condition (Noon)
Fri. 04.Mar	08:00	Scientists party onboard a vessel	off SUZAKI
	09:00	Let go all shore line & left JAMSTEC	34-51.9N, 139-47.0E
	09:30	Onboard lecture for evacuation and onboard life	Fine but Cloudy
	10:30	Meeting for research schedule and dive plan w/ HPD team, KS crew	ESE-4 (Moderate breeze)
	16:40	CONPIRASAN	3 (Sea Slight) 2 (Low Swell Long) Visibly: 5'
Sat. 05.Mar	11:00	Arrived at off SANRIKU, research area A, off IWATE pref.	off SANRIKU
	11:16	Released XBT at 39-14.5312N, 142-23.4397E	39-18.6N, 142-18.3E
	13:14	Hoisted up Hyper-Dolphin	Fine but Cloudy
	13:17	Launched	NE-4 (Moderate breeze)
	13:30	Started HPD#1950 operation	3 (Sea Slight)
	14:11	Landed on the sea floor	2 (Low Swell Long)
	16:41	Left the sea bottom	Visibly: 7'
	17:09	Hyper-Dolphin floated	
	17:28	Recovered HPD	
	17:44	Recovered 2 Bio-Tracking System Base Station	
	19:15	Scientist Meeting	
	19:41-21:12	Carried out MBES mapping survey	
Sun. 06.Mar	06:30	Proceeded to KAMAISHI wan	KAMAISHI wan
	09:00	Arrived at KAMAISHI wan	39-15.9N, 141-56.9E
	09:00	Suspended today's dive operation due to rough sea	Rain
	13:00	Scientist Meeting	SW-3 (Gentle breeze) 2 (Sea Smooth) 2 (Low Swell Long) Visibly: 0.3'
Mon.07.Mar	10:00	Proceeded to research area	off SANRIKU
	12:00	Arrived at dive point	39-14.6N, 142-18.3E

	12:30	Transmitted call for transponder of Lander, no response	Overcast
	13:53	Hoisted up Hyper-Dolphin	SSW-4 (Moderate breeze)
	13:56	Launched	3 (Sea Slight)
	14:08	Started HPD#1951 operation	3 (Moderate Short)
	14:46	Landed on the sea floor	Visibly: 7'
	15:56	Left the sea bottom	
	16:26	Hyper-Dolphin floated	
	16:39	Recovered HPD	
	16:51	Recovered Lander system	
	19:00	Scientist Meeting	
	19:57	Confirmed response from transponder of BTS #5 and #6, good response	
<hr/>			
Tue. 08.Mar	08:31	Hoisted up Hyper-Dolphin	off SANRIKU
	08:33	Launched	39-18.6N, 142-17.8E
	08:46	started HPD#1952 operation	Fine but Cloudy
	09:23	Landed on the sea floor	South-5 (Fresh breeze)
	11:24	Left the sea bottom	3 (Sea Slight)
	11:52	Hyper-Dolphin floated	2 (Low Swell Long)
	12:05	Recovered HPD	Visibly: 7'
	12:19	Recovered 2 Bio-Tracking System Base Station	
	13:16	Transmitted call for transponder of Anti Trawl Lander, no response	
	13:38	Hoisted up Hyper-Dolphin	
	13:41	Launched	
	13:55	started HPD#1953 operation	
	14:36	Landed on the sea floor	
	15:31	Left the sea bottom	
	16:07	Hyper-Dolphin floated	
	16:20	recovered HPD	
	16:27	Recovered Anti Trawl type Lander system	
	18:00	Scientist Meeting	
<hr/>			
Wed. 09.Mar	08:10	Hoisted up Hyper-Dolphin	off SANRIKU
	08:14	Launched	39-18.5N, 142-18.4E
	08:30	started HPD#1954 operation	Overcast
	09:03	Landed on the sea floor	East-3 (Gentle

			breeze)
	15:05	Left the sea bottom	3 (Sea Slight)
	15:36	Hyper-Dolphin floated	3 (Moderate Short)
	15:49	Recovered HPD	Visibly: 7'
	15:49	Recovered ADCP	
	15:56	Recovered a Bio-Tracking System Base Station	
	18:00	Scientist Meeting	
	19:00	Proceeded to off FUKUSHIMA, research area C	
Thu. 10.Mar	02:50	Arrived at off FUKUSHIMA, research area C	off SHIOYASAKI
	06:27	Carrided out figure 8 circle for magnetic calibration (~06:47)	36-53.9N, 141-30.3E
	06:50	unfortunately, decided to suspend today's dive operation due to rough sea	Fine but Cloudy
	07:00	Proceed to JAMSTEC	North-7 (Near gale)
	09:00	Scientist Meeting	4 (Sea Moderate)
	18:00	Scientist Meeting	3 (Moderate Short)
	20:00	wrap up party	Visibly: 7'
Fri. 11.Mar	11:00	Send out 1st shore line, arrived at JAMSTEC	
		completed KS-16-J03 cruise	



4. Dive reports

Dive Report HD#1950

Date: March 05, 2016

Site: Off Otsuchi **Depth:** 722-728m

Landing (Lat., Long., Time, Depth): 39°18.6146'N, 142°18.3474'E, 15:44, 714m

Leaving (Lat., Long., Time, Depth): 39°18.7059'N, 142°18.2964'E, 17:02, 687m

Pilot: Ryo Saigo **Co-Pilot:** Teppei Kido

Observer: Shinji Tsuchida

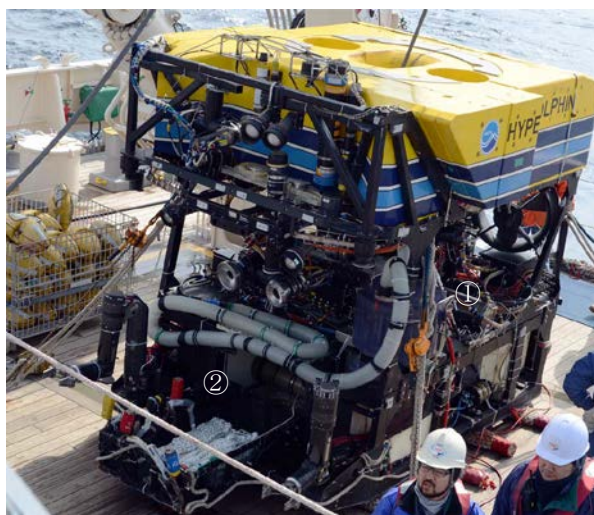
Theme: Researches on marine ecosystem dynamics off Sanriku

Purpose:

1. Recovery of the bio-tracking base station.
2. Stereo camera 3D mapping.

Payload Equipment:

1. Stereo camera system
2. Recovery rope with snap shackle
x3



Sampling Points and Markers:

Time	Position	Depth(m)	Events
14:38	39°18.658' N, 142°18.296'E	704	Carrying No. 3 bio-tracking base station to the point of No. 4.
16:35	39°18.706' N, 142°18.022'E	684	Recovery of No. 3 and 4 bio-tracking base stations.

Dive Summary

We landed at the point of about 200m distance in south-east from the bio-tracking base station No. 3, 714m depth. We moved to the station and found it soon using ROV homer and sonar. No.3 station was fallen down on the bottom with hydroids? and ophiuroids on the surface (Fig. 1). Grasping the top rope of

the station and carried to the front of No. 4 station keeping 5-6m altitude. No. 4 station was also easily found and we observed it standing on the bottom with dense patch of hydroids? and some of ophiuroid (Fig. 2). No. 3 station was put on the bottom neighbor to the No.4 and tied them with recovery ropes. Then we ascended to the surface and succeeded to recovery two base stations on deck.

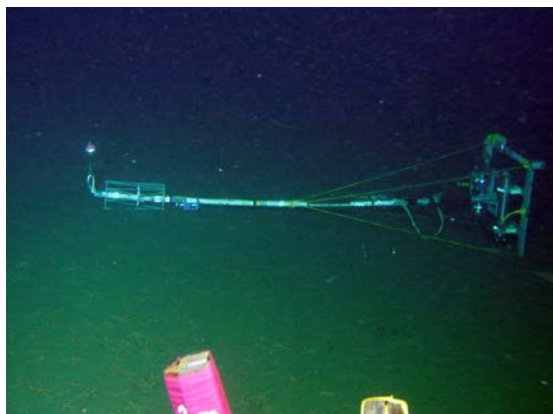


Fig. 1 No.3 base station fallen down on the bottom.

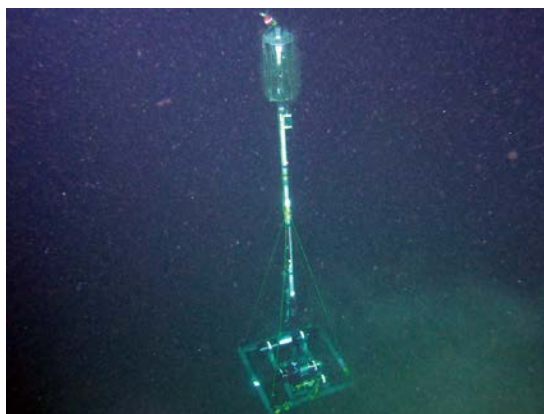


Fig. 2 No.4 base station.

Dive Log

Time (JST)	Dep. (m)	Pos. Lat				Pos. Lon				Description
13:14:00										ビークル吊り上げ
13:19:00										着水
13:30:26	0	39	-	18.9001	N	142	-	18.5508	E	潜航開始
13:33:47	73.8	39	-	18.8829	N	142	-	18.5424	E	
13:45:23	294.2	39	-	18.7842	N	142	-	18.5061	E	イカ
13:45:38	297.3	39	-	18.7829	N	142	-	18.5055	E	サメ
13:46:52	326.5	39	-	18.7674	N	142	-	18.4995	E	ちいさいイカ
13:47:50	346.7	39	-	18.7539	N	142	-	18.4934	E	イカ
13:49:25	388.5	39	-	18.7419	N	142	-	18.481	E	ハダカイワシ
13:51:35	437	39	-	18.7194	N	142	-	18.4647	E	クラゲ
13:53:32	483.7	39	-	18.7022	N	142	-	18.459	E	クシクラゲ
13:57:07	567.2	39	-	18.6772	N	142	-	18.4411	E	とうめいな魚
13:58:37	568.7	39	-	18.6632	N	142	-	18.4185	E	ホーマー検知
13:58:43	570.5	39	-	18.6635	N	142	-	18.4175	E	マンジュウクラゲ
14:00:54	572.9	39	-	18.6558	N	142	-	18.4009	E	カムリクラゲ
14:04:50	584.2	39	-	18.6335	N	142	-	18.3731	E	クラゲ
14:05:46	608.2	39	-	18.6312	N	142	-	18.3687	E	アカカブトクラゲ
14:08:10	663	39	-	18.6234	N	142	-	18.3617	E	イカ
14:09:57	696.1	39	-	18.6192	N	142	-	18.3538	E	

14:11:21	707.6	39	-	18.6169	N	142	-	18.3491	E	海底視認
14:11:29	707.6	39	-	18.6169	N	142	-	18.3491	E	泥
14:11:33	713.1	39	-	18.6162	N	142	-	18.3491	E	ノルマンクモヒトデいっぱい
14:11:57	715.7	39	-	18.6146	N	142	-	18.3474	E	着底
14:12:46	715.2	39	-	18.6127	N	142	-	18.3439	E	魚
14:13:15	715.2	39	-	18.6114	N	142	-	18.3375	E	石おちてる
14:13:30	714.9	39	-	18.6124	N	142	-	18.333	E	イカ
14:13:47	714.7	39	-	18.6121	N	142	-	18.3317	E	ビニールゴミ
14:14:04	713.8	39	-	18.6137	N	142	-	18.3294	E	ウニ
14:14:08	713.8	39	-	18.6137	N	142	-	18.3294	E	キチジ
14:14:42	713.9	39	-	18.6174	N	142	-	18.3241	E	シロブチヘビゲンゲ
14:14:54	714.1	39	-	18.6186	N	142	-	18.3209	E	ウミサボテン
14:15:14	712.7	39	-	18.6191	N	142	-	18.3198	E	シロブチヘビゲンゲ
14:15:43	711.7	39	-	18.622	N	142	-	18.3145	E	キチジ
14:15:56	712	39	-	18.6215	N	142	-	18.3125	E	ソコダラ
14:16:44	710.3	39	-	18.6253	N	142	-	18.3071	E	チゴダラ
14:16:59	711.4	39	-	18.6274	N	142	-	18.3074	E	ゲンゲ
14:17:38	708.5	39	-	18.6301	N	142	-	18.3011	E	カイメン
14:19:15	708.9	39	-	18.633	N	142	-	18.2994	E	キチジ
14:23:12	708.5	39	-	18.6313	N	142	-	18.301	E	魚
14:23:37	709.1	39	-	18.633	N	142	-	18.3005	E	でっかいカイメン
14:25:09	707.8	39	-	18.6412	N	142	-	18.2982	E	カナダダラ
14:25:52	706.2	39	-	18.6465	N	142	-	18.2992	E	四角いもの
14:26:22	704.2	39	-	18.6499	N	142	-	18.2996	E	基準局3 たおれている
14:29:53	704.1	39	-	18.6579	N	142	-	18.2964	E	キチジが座っている
14:35:38	704.7	39	-	18.6574	N	142	-	18.2965	E	回収作業開始
14:36:42	704.1	39	-	18.6563	N	142	-	18.2962	E	つまんだ
14:38:05	703.9	39	-	18.6578	N	142	-	18.2972	E	移動開始
14:40:44	699.1	39	-	18.6531	N	142	-	18.2971	E	イカ
14:42:28	699.2	39	-	18.6487	N	142	-	18.283	E	魚 あなご?
15:02:05	701	39	-	18.6709	N	142	-	18.1055	E	フウセンクラゲ
15:08:31	695.5	39	-	18.6865	N	142	-	18.0523	E	ゲンゲ
15:10:05	690.8	39	-	18.6909	N	142	-	18.0409	E	ゲンゲ
15:14:26	687.8	39	-	18.702	N	142	-	18.0255	E	基準局4 視認 立っている
15:21:45	686.3	39	-	18.7074	N	142	-	18.0188	E	基準局3 仮置き

15:23:52	689.1	39	-	18.7046	N	142	-	18.0194	E	着底 基準局観察
15:29:03	687.7	39	-	18.7064	N	142	-	18.02	E	シロブチヘビゲンゲ
15:30:36	689	39	-	18.7074	N	142	-	18.0196	E	回収作業開始
15:41:20	689.4	39	-	18.7077	N	142	-	18.0198	E	フック持ち直し
15:48:52	688.6	39	-	18.7087	N	142	-	18.0208	E	クラゲ
15:50:37	689.9	39	-	18.708	N	142	-	18.0195	E	フックかかった (1 個目)
16:04:47	691.2	39	-	18.7079	N	142	-	18.0202	E	フックかかった (2 個目)
16:32:42	691.2	39	-	18.7079	N	142	-	18.0202	E	アイとった
16:35:28	689.3	39	-	18.7073	N	142	-	18.0206	E	回収作業終了
16:35:50	688.5	39	-	18.7059	N	142	-	18.0202	E	ビークル離底
16:41:14	688.7	39	-	18.706	N	142	-	18.0192	E	離底

Dive track HD#1950

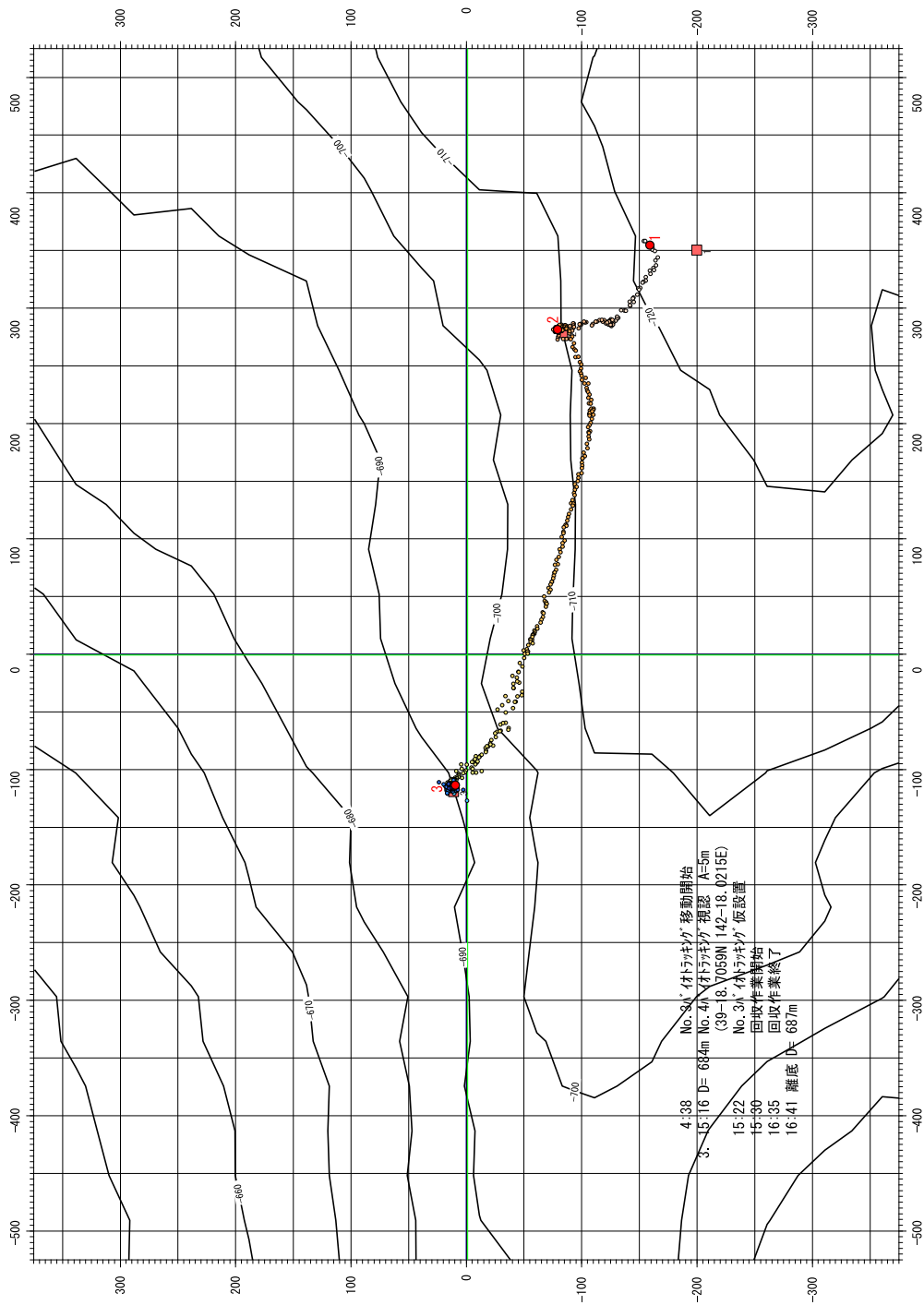


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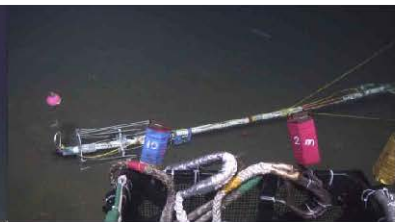
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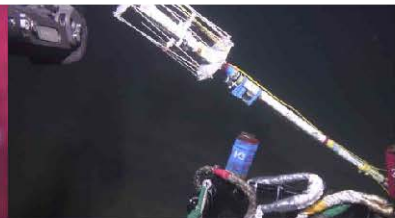
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Dive Report HD#1951

Date: March 07, 2016

Site: Off Kamaishi **Depth:** 722-728m

Landing (Lat., Long., Time, Depth): 39°14.5695'N, 142°18.2643'E, 14:46, 761m

Leaving (Lat., Long., Time, Depth): 39°14.5906'N, 142°18.2061'E, 15:56, 762m

Pilot: Yuta Sakakibara **Co-Pilot:** Jun Takenouchi

Observer: Yoshihiro Fujiwara

Theme: Researches on marine ecosystem dynamics off Sanriku

Purpose:

1. Retrieval of deep-sea lander
2. 3D mapping using a stereo camera system

Payload Equipment:

1. Stereo camera system x1
2. Suction sampler x1
3. MBARI corer x3
4. Recovery rope with a snap shackle x2



Sampling Points and Markers:

Time	Position	Depth (m)	Events
14:50	39°14.5695'N, 142°18.2643'E	761	Sediment core sampling using a MBARI corer (Red/Green)
15:15	39°14.5906'N, 142°18.2061'E	761	Sediment core sampling using a MBARI corer (Yellow)
15:18	39°14.5906'N, 142°18.2061'E	761	Sediment core sampling using a MBARI corer (Blue)
15:23	39°14.5906'N, 142°18.2061'E	761	Biological sampling using a suction sampler
15:56	39°14.5906'N, 142°18.2061'E	761	Retrieval of a deep-sea lander

Dive Summary

A deep-sea lander, deployed in a bacterial mat area off Kamaishi on October 2, 2015, was retrieved. Before this dive, no acoustic signal of the lander was detected using the MST-10D (Kaiyo Denshi) transponder system from R/V *Shinseimaru*. Acoustic signals of an ROV homer installed on the lander were detected during this dive. The lander was soon discovered and was safely retrieved (Fig. 1). Sediment core sampling was conducted beside the lander (two cores) and 100 m away from the lander (one core) (Fig. 2). Suction sampling was conducted beside the lander in two canisters of the sampler. No stereo mapping was conducted due to the electrical problem of the camera system.

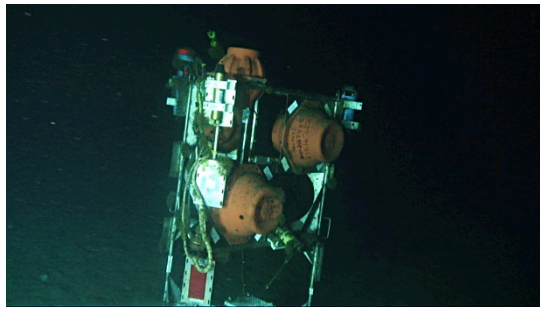


Fig. 1. A deep-sea lander discovered during this dive

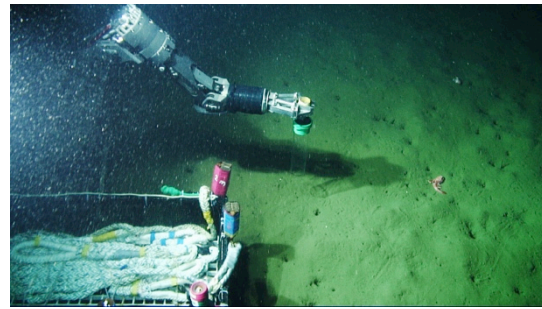


Fig. 2. Sediment core sampling using a MBARI corer

Dive Log

Time (JST)	Dep. (m)	Pos. Lat.	Pos. Lon.	Description
13:53:36		-	-	ビークル吊り上げ
13:56:25		-	-	着水
14:08:20	24.1	39 - 14.5406 N	142 - 18.3244 E	潜航開始
14:14:36	91.3	39 - 14.5377 N	142 - 18.3366 E	
14:18:01	132.5	39 - 14.5361 N	142 - 18.3307 E	サメ通過
14:28:45	346.6	39 - 14.5581 N	142 - 18.2932 E	航走開始
14:29:57	378	39 - 14.559 N	142 - 18.2938 E	イカ
14:30:26	398.4	39 - 14.5566 N	142 - 18.2945 E	イカ
14:34:00	491.5	39 - 14.5692 N	142 - 18.2856 E	イカ
14:40:27	668.7	39 - 14.5749 N	142 - 18.2667 E	クラゲ
14:42:09	703.9	39 - 14.5784 N	142 - 18.2547 E	クラゲ
14:44:02	717.6	39 - 14.5767 N	142 - 18.2676 E	クラゲ
14:45:36	754.8	39 - 14.5709 N	142 - 18.2649 E	海底視認
14:45:57	761.3	39 - 14.5697 N	142 - 18.2656 E	着底 泥 ランダー東北100m
14:46:41	762.4	39 - 14.5706 N	142 - 18.2635 E	ホラアナゴ
14:49:58	762.4	39 - 14.5685 N	142 - 18.2647 E	MBARI Core 赤緑採集

Time (JST)	Dep. (m)	Pos.	Lat.	Pos.	Lon.	Description
14:51:41	761.8	39	- 14.5688 N	142	- 18.2659 E	航走開始
14:51:53	762.2	39	- 14.5687 N	142	- 18.2655 E	ワニトカゲギス (?)
14:55:11	760.6	39	- 14.5694 N	142	- 18.2534 E	キチジ
14:55:56	760.2	39	- 14.5703 N	142	- 18.25 E	シロブチヘビゲンゲ
14:57:14	761.4	39	- 14.573 N	142	- 18.24 E	あなご キチジ
14:57:51	759.9	39	- 14.5754 N	142	- 18.2334 E	ワニトカゲギス (?)
14:59:54	760.9	39	- 14.5804 N	142	- 18.2219 E	魚
15:01:39	760.5	39	- 14.5826 N	142	- 18.2137 E	キチジ
15:02:24	760.6	39	- 14.5841 N	142	- 18.2107 E	ランダー視認
15:05:23	762.2	39	- 14.591 N	142	- 18.2051 E	着底 観察
15:05:51	762.6	39	- 14.5905 N	142	- 18.2054 E	キチジ
15:09:50	762.7	39	- 14.5918 N	142	- 18.2056 E	アナゴ
15:15:21	762	39	- 14.5914 N	142	- 18.2052 E	MBARI Core 黄色採集
15:18:13	762.1	39	- 14.5909 N	142	- 18.2047 E	MBARI Core 青採集
15:19:29	762	39	- 14.5904 N	142	- 18.2054 E	泥色茶 還元層見えず
15:20:38	762.7	39	- 14.5921 N	142	- 18.2053 E	多連キャニスター3 生物採集
15:22:43	762.3	39	- 14.5907 N	142	- 18.2058 E	多連キャニスター4 生物採集
15:23:33	762.5	39	- 14.5916 N	142	- 18.2052 E	スラップガン終了
15:38:51	763.4	39	- 14.5926 N	142	- 18.2073 E	ロープかける
15:51:04	762.9	39	- 14.592 N	142	- 18.206 E	回収索フックかかる
15:56:44	762.2	39	- 14.5916 N	142	- 18.2059 E	回収作業終了
15:57:05	764.8	39	- 14.5924 N	142	- 18.2043 E	ビークル離底

Dive track HD#1951

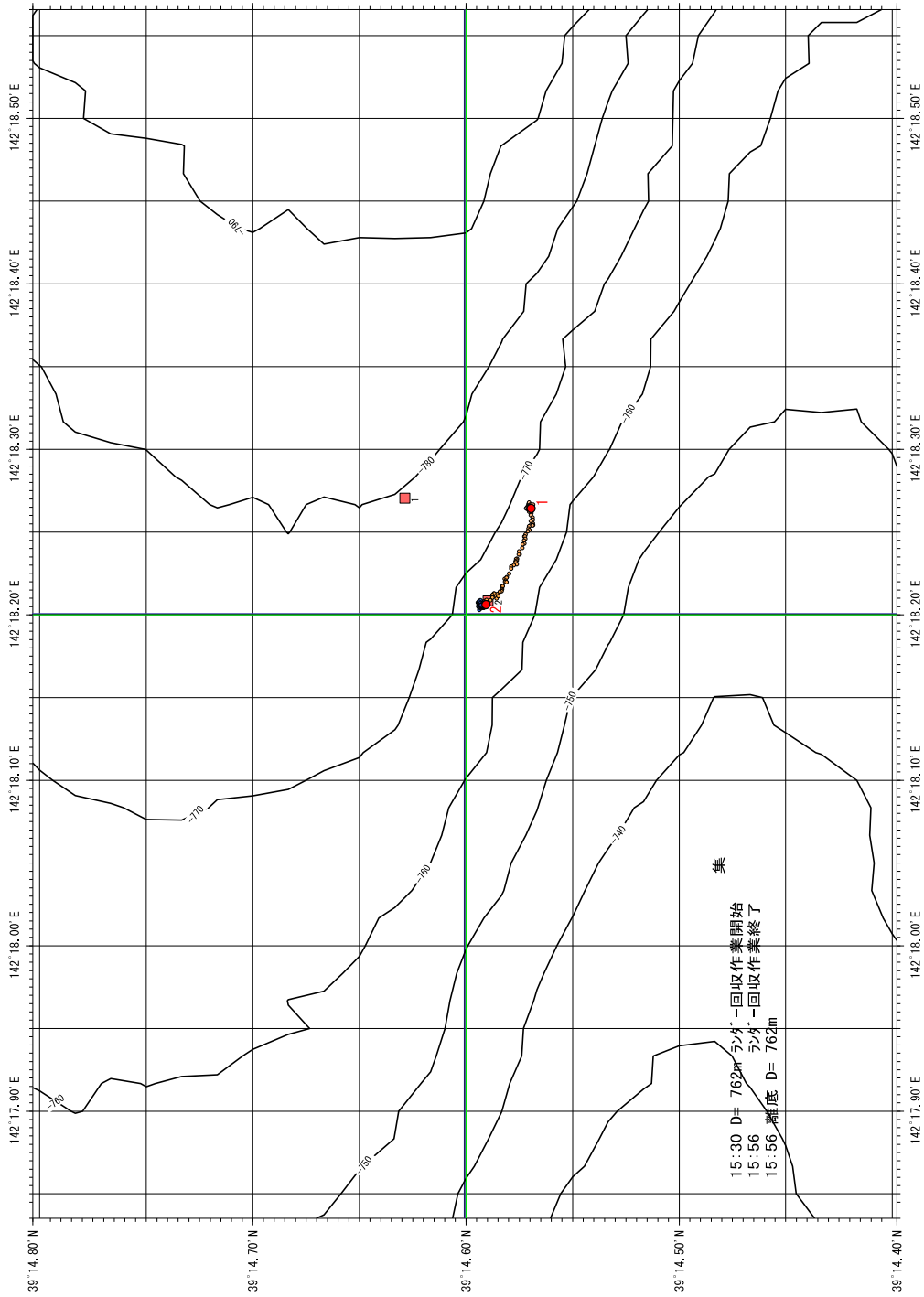


Photo selected



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2016_0307_145125AA



2016_0307_145848AA



2016_0307_150526AA



2016_0307_150731AA



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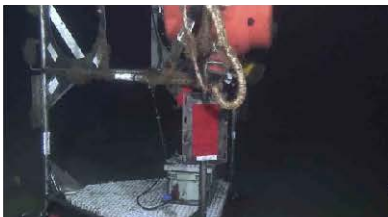
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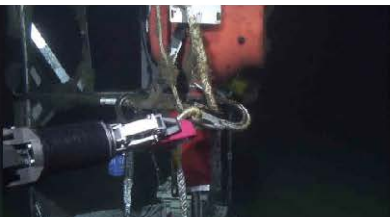
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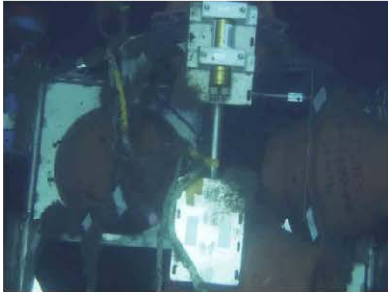
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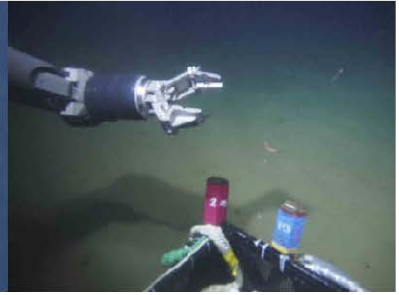
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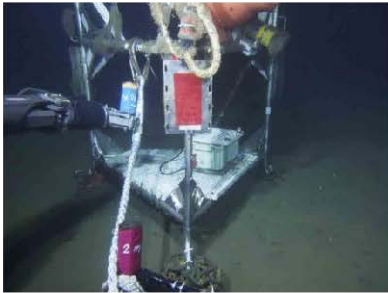
2016_0307_151041AA



2016_0307_151054AA



2016_0307_151412AA



2016_0307_153939AA

Dive Report HD#1952

Date: March 08, 2016

Site: Off Otsuchi **Depth:** 675-707m

Landing (Lat., Long., Time, Depth): 39°18.4402'N, 142°18.1864'E, 09:23, 707m

Leaving (Lat., Long., Time, Depth): 39°18.5368'N, 142°17.8161'E, 11:24, 675m

Pilot: Teppei Kido **Co-Pilot:** Ryo Saigo

Observer: Yoshitaka Watanabe

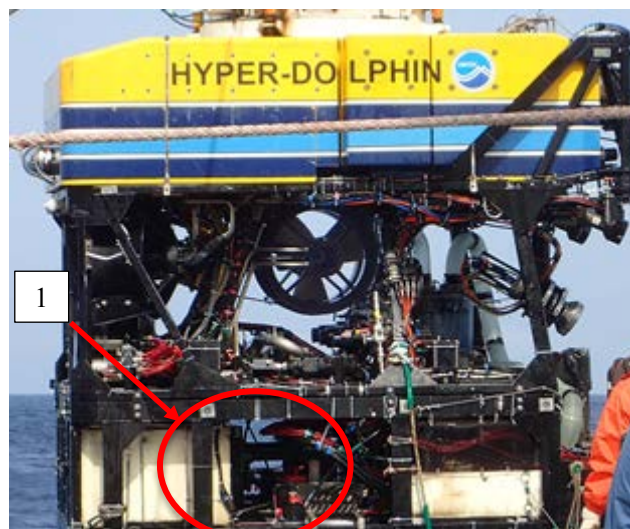
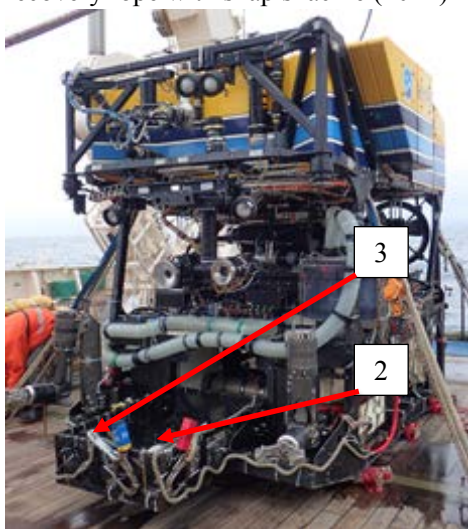
Theme: Researches on marine ecosystem dynamics off Sanriku

Purpose:

1. Recovery of the bio-tracking base stations No. 5 and No. 6.
2. Stereo camera 3D mapping.

Payload Equipment:

1. Stereo camera system
2. Recovery rope with snap shackle (2 m)
3. Recovery rope with snap shackle (10 m)



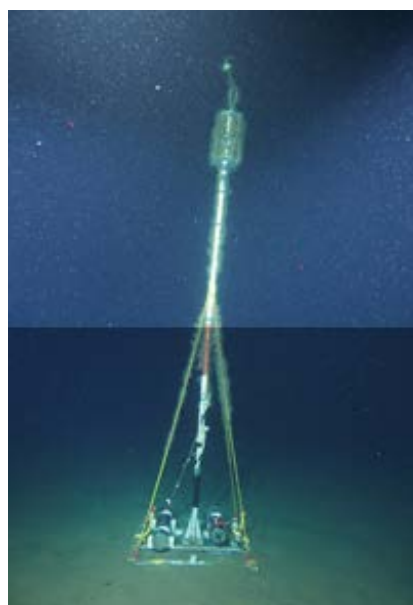
Sampling Points and Markers:

Time	Position	Depth(m)	Events
09:59	39°18.4585' N, 142°18.0483'E	690	Carrying No. 6 bio-tracking base station to the point of No. 5.
11:24	39°18.5368' N, 142°17.8161'E	675	Recovery of No. 5 and 6 bio-tracking base stations.

Dive Summary

We landed at middle point between No. 6 and No. 7 base stations. At first, No. 7 base station, which could not be confirmed the existence around allocated point by transponder response previously, was searched by ROV homer, however, could not be found. No. 6 and 5 base stations were found by ROV homer immediately when ROV homer was turned on. No. 6 base station was pick up and carried near allocation point of No. 5 base station. Then these two base stations were respectively hooked by two snap shackles and recovered successfully with HPD ascending. Both recovered base stations were standing in correct condition when they was in visual contact. (see figures below)

On the other hand, bottom images were taken by stereo camera system during movement toward No. 6 and No. 5 base station.



No. 6 base station.



No.5 base station.

Dive Log

Time (JST)	Dep. (m)	Pos. Lat			Pos. Lon			Description		
6:49:45		-			-			ビークル吊り上げ		
6:53:44		-			-			着水		
6:55:36		-			-			油漏れのため一度揚収		
6:56:54		-			-			離水		
7:00:36		-			-			オンデッキ		
								HPD 修理		
8:32:02		-			-			ビークル吊り上げ (再)		
8:34:04		-			-			着水		
8:48:10	43.1	39	-	18.5259	N	142	-	18.1655	E	潜航開始
8:49:31	66.4	39	-	18.5235	N	142	-	18.1651	E	汽笛
9:03:24	350.6	39	-	18.4664	N	142	-	18.1468	E	イカ多数

9:16:21	697.9	39	-	18.4391	N	142	-	18.1768	E	No. 7 ホーマー受からず
9:18:25	699.8	39	-	18.4411	N	142	-	18.1802	E	No. 6 ホーマー反応あり
9:23:29	707.3	39	-	18.4393	N	142	-	18.1879	E	着底
9:23:35	707.7	39	-	18.4389	N	142	-	18.1868	E	泥
9:24:10	706.5	39	-	18.4385	N	142	-	18.1876	E	基準局 No. 6 へ向かう
9:24:31	706.5	39	-	18.4382	N	142	-	18.1846	E	アナゴ
9:29:26	693.8	39	-	18.4353	N	142	-	18.1386	E	アナゴ
9:30:51	701.6	39	-	18.4359	N	142	-	18.1282	E	シロブチヘビゲンゲ
9:32:39	700.4	39	-	18.4349	N	142	-	18.106	E	ワニトカゲギス
9:33:18	699.7	39	-	18.4387	N	142	-	18.1059	E	シロブチヘビゲンゲ
9:34:21	698.8	39	-	18.4333	N	142	-	18.0968	E	タコ
9:34:39	699.3	39	-	18.4365	N	142	-	18.0937	E	シロブチヘビゲンゲ
9:35:16	698	39	-	18.4348	N	142	-	18.0912	E	シロブチヘビゲンゲ
9:35:31	696.4	39	-	18.4369	N	142	-	18.0817	E	ヒトデ
9:37:04	698.3	39	-	18.4366	N	142	-	18.0729	E	アナゴ
9:38:06	694.8	39	-	18.4331	N	142	-	18.0778	E	イカ
9:41:43	694.8	39	-	18.4418	N	142	-	18.0734	E	段差あり 境い目にクモヒトデ
9:42:04	694	39	-	18.4465	N	142	-	18.0705	E	キチジ シロブチヘビゲンゲ
9:43:43	693.8	39	-	18.4427	N	142	-	18.0622	E	くぼみの深さ 4 m位
9:45:10	696.2	39	-	18.4426	N	142	-	18.0585	E	基準局 No. 6 視認立っている
9:48:37	697	39	-	18.4452	N	142	-	18.0532	E	着底
9:49:22	697	39	-	18.45	N	142	-	18.0491	E	大量にヒドロチュウがついている
9:52:06	699.2	39	-	18.447	N	142	-	18.0529	E	アナゴ
9:54:37	695.7	39	-	18.4454	N	142	-	18.0572	E	基準局 No. 6 のスーパーボールのロープを掴んだが切れた
9:56:54	695.4	39	-	18.4482	N	142	-	18.0557	E	うまくいかない
9:59:53	688	39	-	18.4483	N	142	-	18.0476	E	基準局 No. 6 仮回収
10:32:09	670.1	39	-	18.5291	N	142	-	17.8274	E	基準局 No. 5 視認立っている
10:41:38	671.7	39	-	18.5341	N	142	-	17.821	E	向きを変えて再視認 基準局 No. 5
10:57:41	673.7	39	-	18.5368	N	142	-	17.8184	E	基準局 No. 6 仮置き
11:01:08	676.6	39	-	18.5351	N	142	-	17.82	E	着底 回収作業開始

11:02:06	678.8	39	-	18.5358	N	142	-	17.8201	E	フック 10m つかむ
11:03:05	677.9	39	-	18.5341	N	142	-	17.8203	E	基準局 No. 5 回収索リング にフックを掛ける
11:13:05	677.1	39	-	18.5359	N	142	-	17.8162	E	フック 2m つかむ
11:18:45	677.2	39	-	18.5361	N	142	-	17.8131	E	基準局 No. 6 回収索リング にフックを掛ける
11:24:45	677.5	39	-	18.5352	N	142	-	17.8172	E	回収作業終了
11:24:53	675.9	39	-	18.5365	N	142	-	17.8163	E	離底
11:52:27	17.9	39	-	18.4377	N	142	-	17.9192	E	ビークル浮上
12:00:59			-				-			揚収完了

Dive track HD#1952

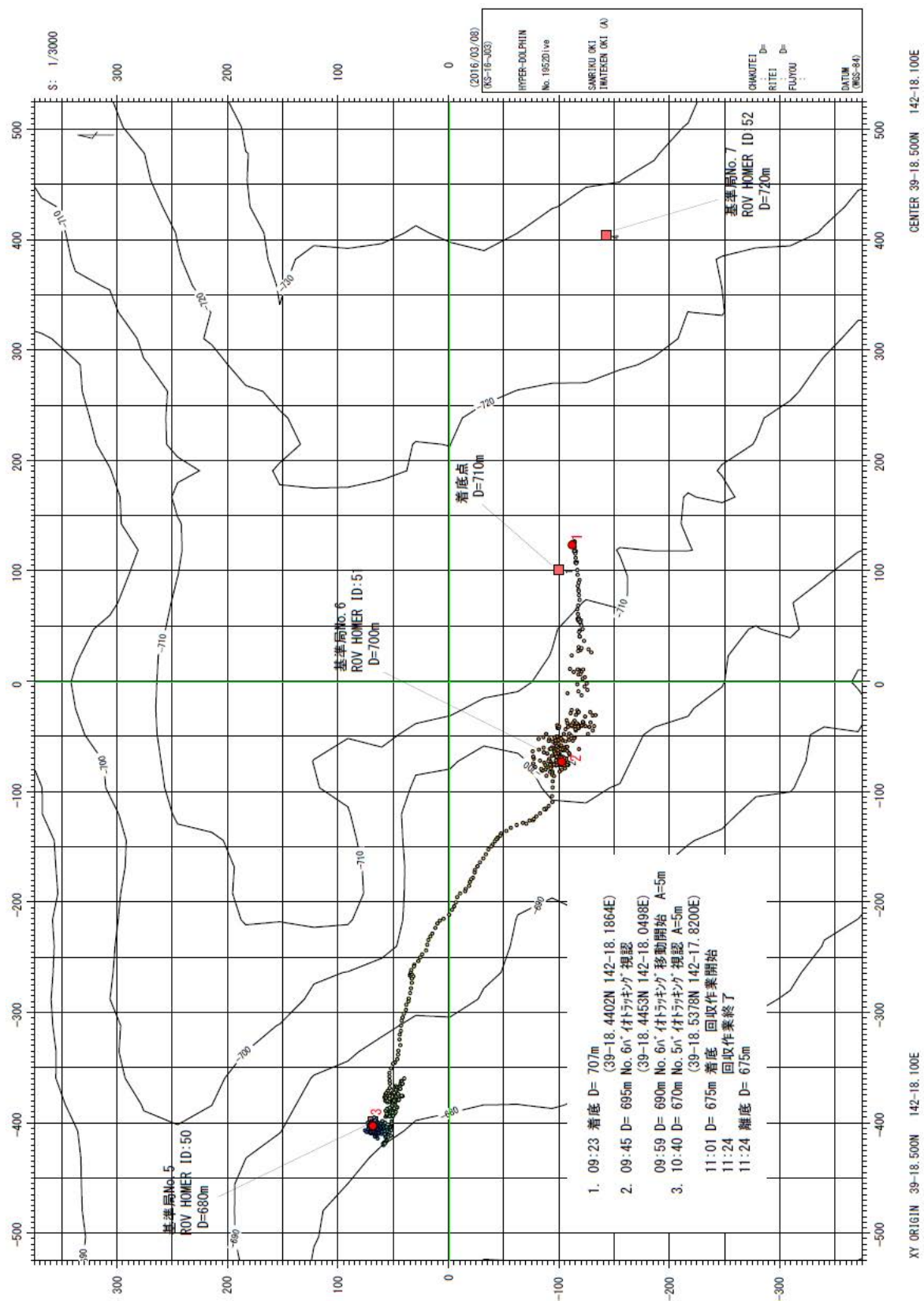


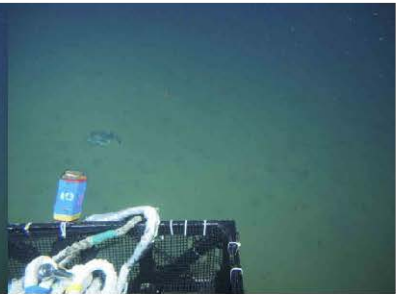
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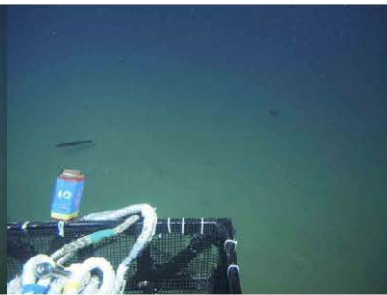
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2016_0308_093206AA



2016_0308_093311AA



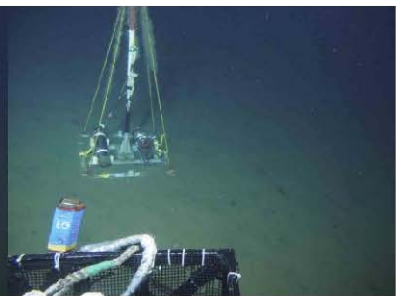
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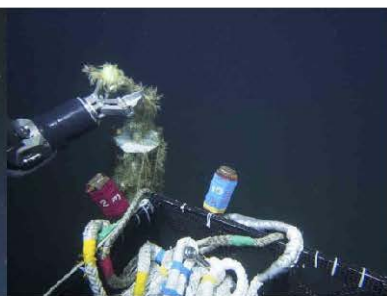
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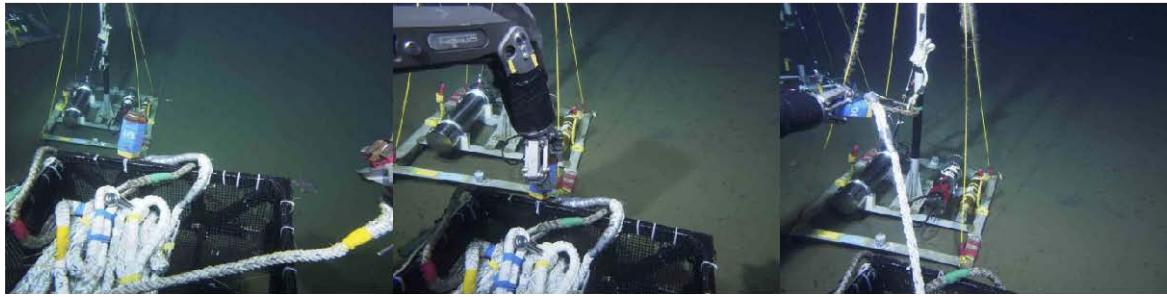
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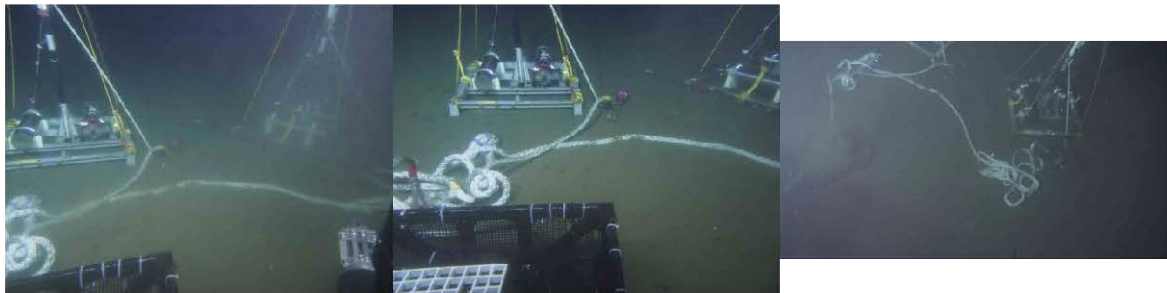
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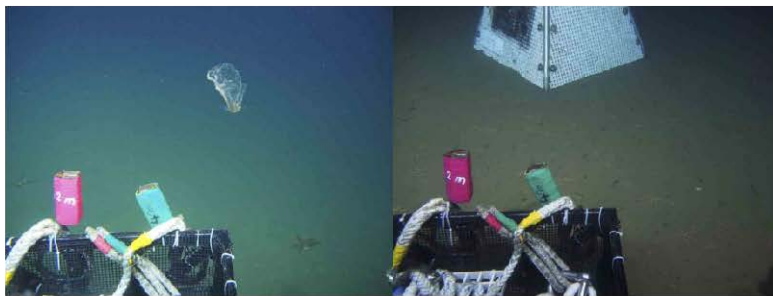
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2016_0308_112506AA

2016_0308_112606AA

hdc20160308112538_in2_1



2016_0308_144246AA

2016_0308_144948AA

Dive Report HD#1953

Date: March 08, 2016

Site: Off Otsuchi **Depth:** 967-968m

Landing (Lat., Long., Time, Depth): 39°19.9578'N, 142°26.9407'E, 14:36, 968m

Leaving (Lat., Long., Time, Depth): 39°19.9905'N, 142°26.8970'E, 15:31, 967m

Pilot: Teppei Kido **Co-Pilot:** Ryo Saigo

Observer: Shinji Tsuchida

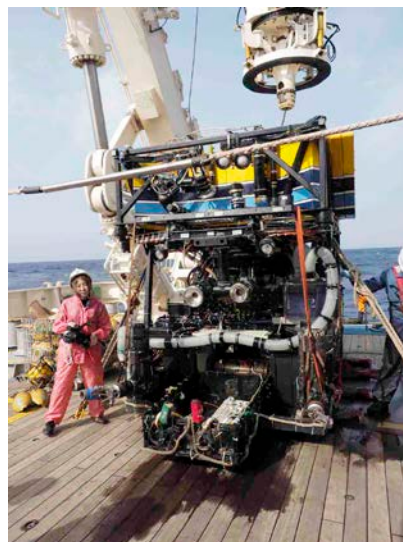
Theme: Researches on marine ecosystem dynamics off Sanriku

Purpose:

1. Recovery of the Lander System deployed on the bottom off Otsuchi.
2. Stereo camera 3D mapping.

Payload Equipment:

1. Stereo camera system
2. Recovery rope with snap shackle
x2



Sampling Points and Markers:

Time	Position	Depth(m)	Events
14:46	39°19.9905' N, 142°16.8970'E	966	Found the Lander System
14:55	39°19.9905' N, 142°16.8970'E	967	Sampling animals, Canister#2 and #3.
15:31	39°19.9905' N, 142°16.8970'E	967	Recovery of the Lander System

Dive Summary

We landed at the point of about 200m distance in south-east from the lander system at 968m depth. We moved to the lander and found it soon using ROV homer and sonar (Fig.1). ROV rotated around the lander and checked the position to hook snap shackles with recovery ropes. Then, we landed in front of the lander and collected benthic animals such as ophiuroids on sediment by the slurp gun. After the short sampling, we hooked recovery rope to the frame angle and the shackle ring attached to the lander (Fig.2). Then we ascended to the surface and succeeded to recovery the lander on deck.

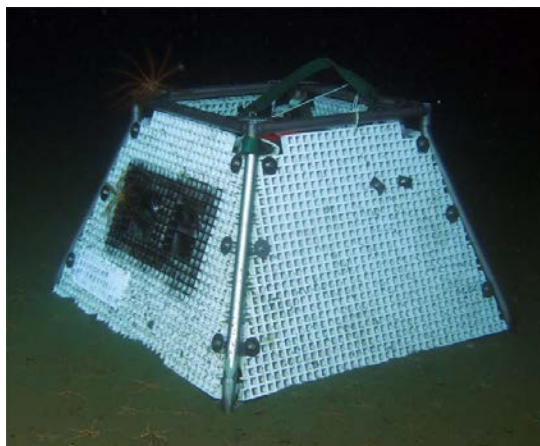


Fig. 1 Lander system deployed on the bottom.

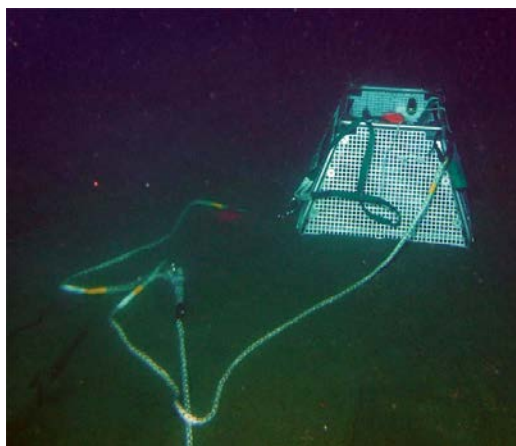


Fig. 2 Lander system connected to Hyper-Dolphin with recovery ropes.

Dive Log

Time (JST)	Dep. (m)	Pos. Lat			Pos. Lon			Description	
13:39:42		-			-			吊り上げ	
13:42:06		-			-			着水	
13:55:59		-			-			潜航開始	
14:11:56	350.2	39	-	19.9773	N 142	-	26.9612	E	イカ
14:35:50	964	39	-	19.9592	N 142	-	26.9429	E	海底視認
14:36:07	966	39	-	19.9577	N 142	-	26.9405	E	アナゴ
14:36:16	966	39	-	19.9578	N 142	-	26.9407	E	ノルマンクモヒトデ
14:37:03	966.8	39	-	19.9592	N 142	-	26.9393	E	アナゴ ウミシダ
14:39:22	965.8	39	-	19.9666	N 142	-	26.9254	E	ソコダラ
14:39:47	967.9	39	-	19.9672	N 142	-	26.9216	E	アナゴ
14:41:50	966.3	39	-	19.9764	N 142	-	26.9085	E	ウミシダ ポツポツいる
14:43:42	965.3	39	-	19.9812	N 142	-	26.9012	E	ランダー視認
14:50:23	966.1	39	-	19.9891	N 142	-	26.8945	E	観察終了
14:52:15	966.9	39	-	19.9903	N 142	-	26.8969	E	スラップガン生物採集 キャニスタ 2
14:53:23	966.7	39	-	19.9908	N 142	-	26.8981	E	魚に逃げられた
14:59:04	967.6	39	-	19.9916	N 142	-	26.8977	E	エビ採集 キャニスタ 3
15:07:05	967	39	-	19.9898	N 142	-	26.8978	E	ランダー回収作業開始
15:15:58	966.3	39	-	19.9892	N 142	-	26.8947	E	アナゴ
15:18:35	968.1	39	-	19.9899	N 142	-	26.8969	E	フックついた
15:31:13	967.6	39	-	19.9889	N 142	-	26.8964	E	回収終了
15:31:51	967	39	-	19.9888	N 142	-	26.8962	E	離底

Dive track HD#1953

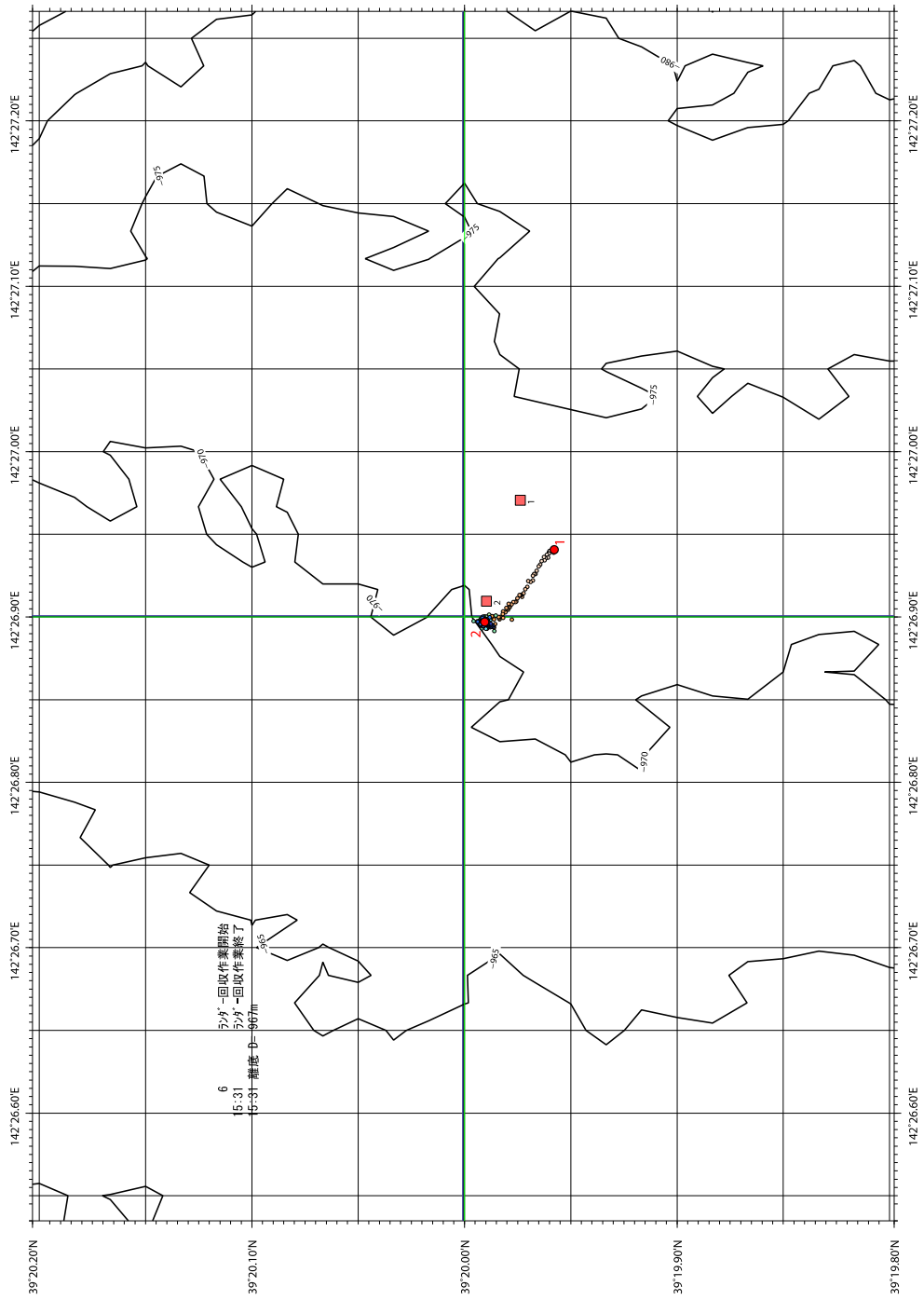
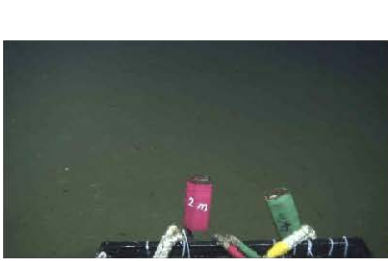


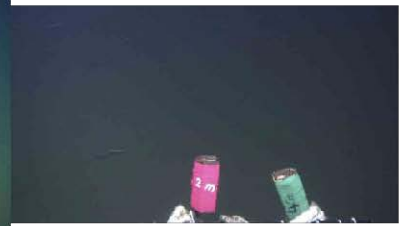
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2016_0308_144127AA



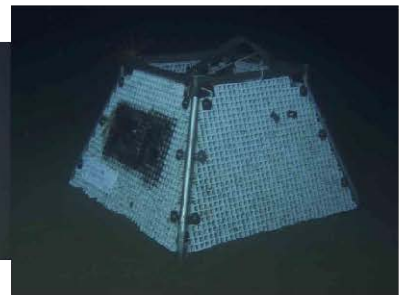
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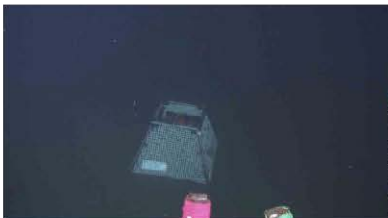
2016_0308_144715AA



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2016_0308_145000AA



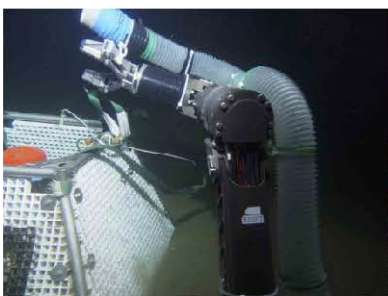
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hdc20160308144646_in2_1



hdc20160308144657_in1_1



2016_0308_160929AA



2016_0308_152730AA



2016_0308_153331AA



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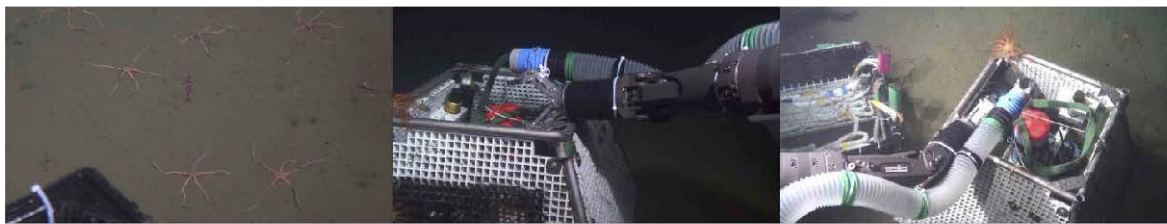
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hdc20160308145750_in1_1

hdc20160308150714_in1_1

hdc20160308150714_in2_1



hdc20160308150828_in1_1

hdc20160308151822_in1_1

hdc20160308153240_in2_1

Dive Report HD#1954

Date: March 09, 2016

Site: Off Kamaishi **Depth:** 722-728m

Landing (Lat., Long., Time, Depth): 39°18.6068'N 142°19.0632'E, 09:03, 746m

Leaving (Lat., Long., Time, Depth): 39°18.5958'N 142°18.6532'E, 15:05, 728 m

Pilot: Jun Takenouchi **Co-Pilot:** Yuta Sakakibara

Observer: Yoshihiro Fujiwara

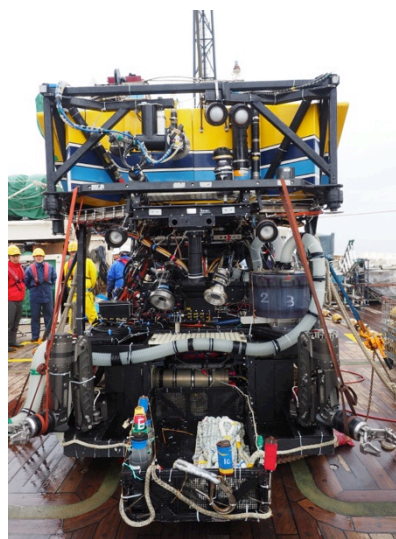
Theme: Researches on marine ecosystem dynamics off Sanriku

Purpose:

3. Retrieval of “bio-tracking” base stations and an ADCP
4. 3D mapping using a stereo camera system

Payload Equipment:

3. Stereo camera system x1
4. Suction sumpler x1
5. Recovery rope with a snap shackle x2



Sampling Points and Markers:

Time	Position	Depth (m)	Events
08:51	39°18.6040'N, 142°19.0649'E	470	Biological sampling using a suction sampler (midwater, #1 canister)
12:18	39°18.4775'N, 142°18.4214'E	728	Long pipe?
14:07	39°18.5141'N, 142°18.5807'E	738	Retrieval of an ADCP
14:31	39-18.5958'N 142°18.6532'E	729	Retrieval of a bio-tracking base station (#2)

Dive Summary

A “bio-tracking” base station #2, deployed on May 9, 2015, and an ADCP were safely retrieved. No acoustic signal from the base station #1, 7 and 8 was detected using the MST-10D (Kaiyo Denshi) transponder system from R/V *Shinseimaru* but was #2. The ROV *Hyper-Dolphin* visited the deployment points of the three base stations but none was discovered. There were many artificial traces caused probably

by trawling nets around the deployment points. An ADCP and the #2 base stations were found around the deployment locations and both were fallen down on the seafloor (Fig. 1 & 2). Suction sampling was conducted before landing in mid water in #1 canister of the sampler.

No stereo mapping was conducted due to the electrical problem of the camera system.

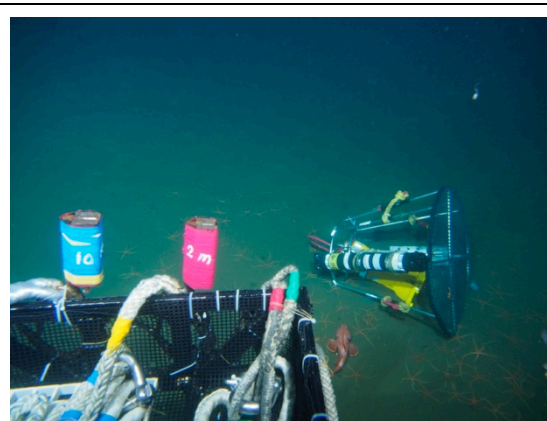


Fig. 1. An ADCP fallen down on the bottom

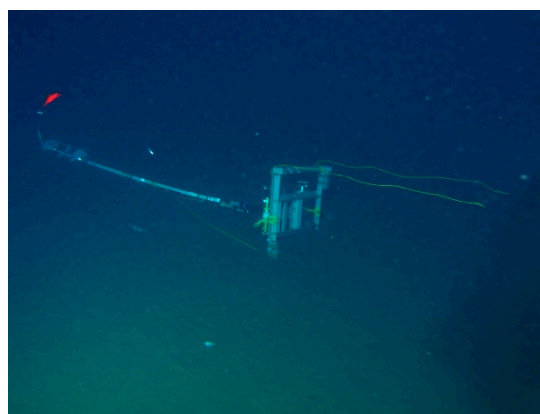


Fig. 2. A “bio-tracking” base station fallen down on the bottom

Dive Log

Time (JST)	Dep. (m)	Pos. Lat				Pos. Lon				Description
8:14:35			-			-			着水	
8:31:44			-			-			潜航	
8:40:22	179.4	39	-	18.6273	N	142	-	19.0927	E	さめ
8:44:58	301.6	39	-	18.6078	N	142	-	19.0838	E	イカジュニア群
8:46:27	344.3	39	-	18.6034	N	142	-	19.085	E	クラゲ、魚
8:50:23	447.7	39	-	18.6068	N	142	-	19.0652	E	1 キャニスタ
8:51:38	483.2	39	-	18.6094	N	142	-	19.0662	E	イカ
9:01:50	742.6	39	-	18.6089	N	142	-	19.0525	E	海底視認
9:03:46	747.9	39	-	18.6132	N	142	-	19.0633	E	着底
9:04:07	746.9	39	-	18.6112	N	142	-	19.0685	E	こそ匹あと
9:04:09	746.9	39	-	18.6112	N	142	-	19.0685	E	はだかいわし
9:04:58	747.8	39	-	18.6047	N	142	-	19.0633	E	クモヒトデ少ない
9:05:26	748.3	39	-	18.6045	N	142	-	19.0524	E	不細工な魚
9:06:20	746.8	39	-	18.6126	N	142	-	19.0527	E	イカ
9:06:51	745.6	39	-	18.6108	N	142	-	19.0547	E	不細工な魚
9:07:03	747.3	39	-	18.6085	N	142	-	19.0577	E	やっぱクモヒトデいた！！
9:07:21	745.2	39	-	18.6115	N	142	-	19.06	E	ゲンゲ
9:12:09	746	39	-	18.6076	N	142	-	19.0643	E	はだかいわし

Time (JST)	Dep. (m)	Pos. Lat				Pos. Lon				Description
9:13:51	746.1	39	-	18.6177	N	142	-	19.0602	E	そこびきあと
9:14:14	746.6	39	-	18.613	N	142	-	19.0622	E	ソコダラ、シロブチヘビゲンゲ
9:15:33	746.8	39	-	18.6131	N	142	-	19.0516	E	キチジ
9:16:44	745.7	39	-	18.61	N	142	-	19.0536	E	キチジ
9:18:06	746.4	39	-	18.62	N	142	-	19.0186	E	アナゴ
9:18:23	746.7	39	-	18.611	N	142	-	19.0227	E	キチジ
9:19:50	746.6	39	-	18.6078	N	142	-	19.0213	E	底引きあと
9:21:57	744.2	39	-	18.6086	N	142	-	19.0101	E	あなごんた
9:22:07	745.6	39	-	18.6072	N	142	-	19.0107	E	底引きあと、ゴミ
9:23:36	744.6	39	-	18.6021	N	142	-	18.9771	E	キチジ
9:23:44	747.1	39	-	18.609	N	142	-	18.9743	E	底引き跡
9:24:35	745.3	39	-	18.602	N	142	-	18.9905	E	底引き跡
9:25:27	744.3	39	-	18.6052	N	142	-	18.9783	E	そこ曳あと
9:25:43	744.6	39	-	18.6037	N	142	-	18.961	E	キチジ
9:26:08	743.8	39	-	18.6058	N	142	-	18.9598	E	底引き跡
9:26:51	744.8	39	-	18.6065	N	142	-	18.9647	E	ソコダラ
9:27:40	744.4	39	-	18.609	N	142	-	18.958	E	げんげ
9:28:22	743.4	39	-	18.6055	N	142	-	18.9357	E	底引き跡
9:29:16	742.9	39	-	18.6025	N	142	-	18.9388	E	ソコダラ
9:31:34	744.7	39	-	18.6066	N	142	-	18.9508	E	ビークル 方向変えて基準局捜索
9:32:45	746.2	39	-	18.5947	N	142	-	18.958	E	キチジ
9:34:51	746.8	39	-	18.5843	N	142	-	18.968	E	シロブチヘビゲンゲ
9:35:25	749	39	-	18.5852	N	142	-	18.9758	E	イカ
9:36:15	748.9	39	-	18.5746	N	142	-	18.9703	E	アナゴ
9:36:58	749.6	39	-	18.5632	N	142	-	18.9895	E	ビークル 北へ向ける
9:37:57	748.2	39	-	18.5612	N	142	-	18.9993	E	底引き跡
9:39:28	749.3	39	-	18.5794	N	142	-	19.003	E	アナゴ ゲンゲ
9:40:27	749.8	39	-	18.5843	N	142	-	18.9881	E	シロブチヘビゲンゲ
9:40:49	749.4	39	-	18.5912	N	142	-	18.9851	E	ビニールゴミ
9:41:01	748.7	39	-	18.5894	N	142	-	18.987	E	アナゴ
9:41:29	747.4	39	-	18.5797	N	142	-	18.9772	E	ヒトデ
9:42:45	746.3	39	-	18.5927	N	142	-	18.9992	E	シロブチヘビゲンゲ
9:43:59	747.1	39	-	18.6009	N	142	-	18.983	E	ゲンゲ アナゴ
9:44:18	747.9	39	-	18.6031	N	142	-	18.9835	E	キチジ

Time (JST)	Dep. (m)	Pos. Lat				Pos. Lon				Description
9:45:11	744.1	39	-	18.6093	N	142	-	18.9972	E	底曳跡
9:47:04	742	39	-	18.6229	N	142	-	18.9765	E	底曳跡
9:48:14	741.4	39	-	18.633	N	142	-	18.9693	E	キチジ
9:48:29	742.8	39	-	18.6425	N	142	-	18.9747	E	真っ赤なイカ
9:48:54	740	39	-	18.643	N	142	-	18.9895	E	イベントマーク3へむかう
9:49:24	740.5	39	-	18.6465	N	142	-	18.9889	E	底引き跡
9:51:27	740.8	39	-	18.6523	N	142	-	18.9811	E	底引き跡 南北方向
9:52:07	742	39	-	18.6457	N	142	-	18.9752	E	シロブチヘビゲンゲ
9:53:36	741.5	39	-	18.6356	N	142	-	18.9883	E	底引き跡
9:55:10	743	39	-	18.6221	N	142	-	18.9643	E	ビニールゴミ
9:56:46	745	39	-	18.6083	N	142	-	18.9577	E	底引き跡
9:59:40	744.5	39	-	18.5809	N	142	-	18.9397	E	ビークル南へ向ける
10:00:36	746.2	39	-	18.5787	N	142	-	18.9272	E	ホーマー反応無し
10:01:51	746.4	39	-	18.5753	N	142	-	18.9259	E	基準局8へ向かう
10:02:02	748.2	39	-	18.5738	N	142	-	18.9237	E	ナマコ
10:03:52	749.4	39	-	18.5575	N	142	-	18.9088	E	底引き跡
10:05:42	750.6	39	-	18.5418	N	142	-	18.8905	E	ヒトデマツリ
10:06:12	751.1	39	-	18.5399	N	142	-	18.8865	E	なんかノカタマリ
10:09:42	751.1	39	-	18.5134	N	142	-	18.8601	E	タコ?
10:09:59	750.1	39	-	18.5117	N	142	-	18.8577	E	ソコダラ
10:14:17	750.3	39	-	18.483	N	142	-	18.8178	E	ソコダラ
10:16:52	749.3	39	-	18.457	N	142	-	18.8042	E	サカナダッカ
10:17:25	749.2	39	-	18.4528	N	142	-	18.8001	E	シロブチヘビゲンゲ
10:17:48	749	39	-	18.4498	N	142	-	18.7969	E	アナゴ
10:18:36	748.2	39	-	18.4457	N	142	-	18.7924	E	アナゴ
10:19:01	749.8	39	-	18.4427	N	142	-	18.7876	E	シロブチヘビゲンゲ
10:19:44	747.7	39	-	18.4391	N	142	-	18.7838	E	キチジ
10:23:06	746.2	39	-	18.4142	N	142	-	18.7546	E	アナゴ
10:23:33	747.1	39	-	18.4079	N	142	-	18.7497	E	シロブチヘビゲンゲ
10:26:00	745.2	39	-	18.3899	N	142	-	18.7297	E	ソコダラ
10:26:55	743.6	39	-	18.3828	N	142	-	18.7215	E	基準局8へ向かう
10:28:13	743.2	39	-	18.3812	N	142	-	18.711	E	キチジ
10:28:27	743.3	39	-	18.3804	N	142	-	18.7101	E	ゴミ
10:29:00	741.9	39	-	18.3798	N	142	-	18.7043	E	ダーリア
10:30:35	741.3	39	-	18.3827	N	142	-	18.6903	E	アナゴ

Time (JST)	Dep. (m)	Pos. Lat				Pos. Lon				Description
10:31:13	742.2	39	-	18.3818	N	142	-	18.6815	E	タコ
10:31:22	739.1	39	-	18.3828	N	142	-	18.6819	E	アナゴ
10:31:53	740	39	-	18.3826	N	142	-	18.6772	E	シロブチヘビゲンゲ
10:32:20	740.4	39	-	18.3835	N	142	-	18.6744	E	ビニールゴミ
10:33:07	739.4	39	-	18.3815	N	142	-	18.6651	E	カブトクラゲ
10:33:42	739.9	39	-	18.3811	N	142	-	18.6579	E	ナマコ
10:34:43	738.2	39	-	18.3797	N	142	-	18.6484	E	アナゴ
10:02:03	748.2	39	-	18.5738	N	142	-	18.9237	E	アナゴ
10:35:33	735.1	39	-	18.3793	N	142	-	18.6385	E	アナゴ
10:39:25	737.1	39	-	18.361	N	142	-	18.6469	E	キチジ
10:39:39	738.5	39	-	18.3596	N	142	-	18.6482	E	ベニズワイ
10:40:40	739.5	39	-	18.3515	N	142	-	18.6547	E	キチジ
10:40:52	737.9	39	-	18.3506	N	142	-	18.656	E	ゲンゲ
10:41:04	736.8	39	-	18.3502	N	142	-	18.6573	E	シロブチヘビゲンゲ
10:42:01	738.2	39	-	18.3422	N	142	-	18.6617	E	キチジ
10:43:07	736.1	39	-	18.3368	N	142	-	18.6663	E	ソコダラ
10:43:43	736	39	-	18.3401	N	142	-	18.6688	E	キチジ
10:44:05	737.5	39	-	18.3405	N	142	-	18.6671	E	アナゴ
10:45:47	736.6	39	-	18.3538	N	142	-	18.6635	E	くろいかたまり
10:46:40	738.7	39	-	18.3603	N	142	-	18.6641	E	ゴミ
10:47:18	739.4	39	-	18.3657	N	142	-	18.6659	E	ゴミ
10:48:11	739.6	39	-	18.3712	N	142	-	18.6688	E	キチジ
10:50:03	741.1	39	-	18.3866	N	142	-	18.6714	E	コンゴウアナゴ
10:53:33	741.1	39	-	18.4101	N	142	-	18.6716	E	ツブレタドンコ
10:55:09	741.3	39	-	18.4217	N	142	-	18.6646	E	カッパ
10:57:36	741.6	39	-	18.425	N	142	-	18.6554	E	チゴダラ科
10:59:10	740.3	39	-	18.4251	N	142	-	18.6509	E	ナマコ
10:59:38	739.1	39	-	18.424	N	142	-	18.6442	E	キチジ
11:01:39	739.5	39	-	18.4262	N	142	-	18.6218	E	タコ
11:01:55	738.3	39	-	18.4278	N	142	-	18.6195	E	アナゴ
11:03:11	739.2	39	-	18.4291	N	142	-	18.6047	E	シロブチヘビゲンゲ
11:03:55	736.8	39	-	18.4291	N	142	-	18.5952	E	タコ
11:04:35	738.2	39	-	18.4316	N	142	-	18.5861	E	シロブチヘビゲンゲ
11:06:04	737.3	39	-	18.4332	N	142	-	18.5664	E	ゴミ
11:07:21	737.2	39	-	18.4347	N	142	-	18.557	E	チョウチンカンコウノヨウナサ

Time (JST)	Dep. (m)	Pos. Lat				Pos. Lon				Description
										カナ (サブ)
11:11:04	733	39	-	18.4386	N	142	-	18.5171	E	タコ
11:11:54	733	39	-	18.4396	N	142	-	18.5065	E	キチジ
11:12:17	732	39	-	18.4402	N	142	-	18.5037	E	ゴミ
11:13:45	731.2	39	-	18.4432	N	142	-	18.485	E	シロブチヘビゲンゲ
11:13:59	731.4	39	-	18.4425	N	142	-	18.4843	E	キチジ
11:14:58	729.9	39	-	18.4425	N	142	-	18.4736	E	ヒトデ
11:15:06	728.8	39	-	18.4438	N	142	-	18.471	E	アナゴ
11:15:32	730.6	39	-	18.4437	N	142	-	18.4651	E	ゴムテブクロ
11:15:57	728.4	39	-	18.4436	N	142	-	18.4619	E	アカドンコ
11:16:23	729.5	39	-	18.4437	N	142	-	18.4581	E	ヒトデ
11:16:31	729.8	39	-	18.444	N	142	-	18.4582	E	シロブチヘビゲンゲ エビ
11:16:57	728.6	39	-	18.4458	N	142	-	18.4534	E	ビニールゴミ
11:17:11	727.8	39	-	18.4467	N	142	-	18.4487	E	底引き跡
11:17:22	728.6	39	-	18.4467	N	142	-	18.4477	E	アナゴ
11:17:41	729.4	39	-	18.4467	N	142	-	18.4422	E	クモヒトデ少ない
11:18:06	728.1	39	-	18.4465	N	142	-	18.4382	E	キチジ
11:18:29	728.2	39	-	18.4486	N	142	-	18.4334	E	エダ
11:21:40	724.6	39	-	18.4504	N	142	-	18.3971	E	キチジ
11:21:51	724	39	-	18.4495	N	142	-	18.3935	E	石
11:22:16	723.2	39	-	18.4499	N	142	-	18.3884	E	底引き跡
11:22:25	723.6	39	-	18.4509	N	142	-	18.3862	E	シロブチヘビゲンゲ
11:22:43	723.1	39	-	18.4515	N	142	-	18.3804	E	寄生虫付アナゴ
11:23:08	722.4	39	-	18.4511	N	142	-	18.3749	E	ソコダラ
11:23:42	720.5	39	-	18.4511	N	142	-	18.3679	E	ダーリア キチジ
11:25:00	720.9	39	-	18.4504	N	142	-	18.3554	E	ソコダラ
11:26:22	719.3	39	-	18.4494	N	142	-	18.3465	E	アナゴ
11:27:38	720	39	-	18.4413	N	142	-	18.3489	E	アナゴ
11:27:58	720	39	-	18.4381	N	142	-	18.3517	E	シロブチヘビゲンゲ
11:28:11	721.3	39	-	18.4348	N	142	-	18.354	E	キチジ
11:28:23	719.9	39	-	18.4324	N	142	-	18.3544	E	アナゴ
11:28:39	721.3	39	-	18.4305	N	142	-	18.3546	E	ゴミ
11:29:49	720.1	39	-	18.4193	N	142	-	18.3593	E	アナゴ
11:29:59	720.2	39	-	18.419	N	142	-	18.36	E	キチジ
11:30:36	719.9	39	-	18.4114	N	142	-	18.3649	E	ベニズワイ

Time (JST)	Dep. (m)	Pos. Lat				Pos. Lon				Description
11:31:06	719.7	39	-	18.4056	N	142	-	18.3679	E	ベニズワイ
11:33:36	720.9	39	-	18.4022	N	142	-	18.3672	E	ベニズワイ
11:35:14	719.5	39	-	18.4192	N	142	-	18.3599	E	キチジ
11:35:26	718.9	39	-	18.4218	N	142	-	18.3595	E	ゴミ
11:35:53	720.3	39	-	18.4261	N	142	-	18.358	E	アカドンコ
11:36:06	721.7	39	-	18.4275	N	142	-	18.3566	E	ゲンゲ
11:36:17	720.7	39	-	18.4311	N	142	-	18.3561	E	アナゴ
11:38:33	719.6	39	-	18.4472	N	142	-	18.349	E	キチジ
11:38:51	719.1	39	-	18.4486	N	142	-	18.3476	E	基準局 探索終了
11:39:12	718.8	39	-	18.4479	N	142	-	18.3472	E	キチジ カニの探索開始
11:45:48	721.6	39	-	18.4691	N	142	-	18.3468	E	ナマコ
11:52:33	725.6	39	-	18.4717	N	142	-	18.3896	E	イソギンチャク
11:55:09	725.6	39	-	18.4708	N	142	-	18.3994	E	キチジ
11:55:23	727.5	39	-	18.4708	N	142	-	18.3988	E	シロブチヘビゲンゲ
11:57:27	726.6	39	-	18.4716	N	142	-	18.4112	E	あなごんた
11:58:07	728	39	-	18.4712	N	142	-	18.4164	E	キチジ
11:59:34	728.1	39	-	18.4721	N	142	-	18.4224	E	銀色の人工物
12:00:58	727.9	39	-	18.473	N	142	-	18.4215	E	着底
12:01:12	727.2	39	-	18.4726	N	142	-	18.4219	E	銀色の人工物観察
12:05:45	730.5	39	-	18.4724	N	142	-	18.4211	E	パイプ？
12:06:46	727.9	39	-	18.4722	N	142	-	18.4216	E	アナゴ
12:13:22	729.1	39	-	18.4726	N	142	-	18.4231	E	透明なフォース？
12:15:13	729.6	39	-	18.4735	N	142	-	18.422	E	ヒトデ、ヤドカリ、
12:18:04	727.6	39	-	18.4758	N	142	-	18.4201	E	どこまーでもどこまーでもはて しない、パイプウ♪
12:20:52	726.4	39	-	18.4874	N	142	-	18.4221	E	磯銀
12:24:57	728.4	39	-	18.5004	N	142	-	18.4193	E	キチジ
12:26:32	727.6	39	-	18.4991	N	142	-	18.4207	E	人工物離れます。
12:28:08	729.7	39	-	18.4983	N	142	-	18.4347	E	ヒトデ、キチジ、アナゴ
12:30:30	730.1	39	-	18.4991	N	142	-	18.4431	E	変な魚
12:31:50	732.4	39	-	18.4995	N	142	-	18.4496	E	キチジ
12:32:48	730.6	39	-	18.5013	N	142	-	18.4551	E	ヒトデ、シロブチヘビゲンゲ
12:34:18	731	39	-	18.5031	N	142	-	18.4603	E	木T次
12:34:47	731.7	39	-	18.5046	N	142	-	18.462	E	ヒトデ
12:35:56	730.8	39	-	18.5047	N	142	-	18.469	E	木維持

Time (JST)	Dep. (m)	Pos. Lat				Pos. Lon				Description
12:38:15	732.4	39	-	18.5035	N	142	-	18.4815	E	ナマコ
12:39:25	734.2	39	-	18.504	N	142	-	18.4825	E	着底
12:41:02	733.6	39	-	18.504	N	142	-	18.4828	E	なんかノ墓場
12:41:35	733.4	39	-	18.5027	N	142	-	18.4833	E	ゲンゲ
12:44:20	733	39	-	18.5027	N	142	-	18.489	E	アナゴ
12:45:56	734.7	39	-	18.5037	N	142	-	18.4978	E	キチジ
12:49:45	735.1	39	-	18.5077	N	142	-	18.5198	E	キチジ
12:51:26	734.9	39	-	18.5123	N	142	-	18.5227	E	ヒトデ
12:53:03	738.5	39	-	18.5173	N	142	-	18.5237	E	キチジ
12:54:22	734.9	39	-	18.521	N	142	-	18.5227	E	ヤドカリ
12:55:29	736.3	39	-	18.5239	N	142	-	18.5223	E	キチジ
13:03:08	732.9	39	-	18.5513	N	142	-	18.5208	E	西に旋回
13:04:57	733.2	39	-	18.5528	N	142	-	18.5145	E	魚
13:07:35	734.6	39	-	18.5504	N	142	-	18.5137	E	シロブチヘビゲンゲ
13:07:57	734.8	39	-	18.5491	N	142	-	18.5134	E	サブ キチジ
13:09:31	734.1	39	-	18.5433	N	142	-	18.5057	E	ビニールゴミ
13:09:49	734.2	39	-	18.5428	N	142	-	18.5039	E	キチジ
13:10:45	732.9	39	-	18.5413	N	142	-	18.5027	E	キチジ
13:12:55	732.1	39	-	18.5445	N	142	-	18.4888	E	シロブチヘビゲンゲ
13:13:31	730.7	39	-	18.5455	N	142	-	18.4854	E	キチジ
13:14:41	732.6	39	-	18.5457	N	142	-	18.4793	E	シロ
13:16:43	731.2	39	-	18.55	N	142	-	18.4639	E	キチジ
13:17:16	730.8	39	-	18.5475	N	142	-	18.4614	E	シロブチヘビゲンゲ
13:17:45	730.7	39	-	18.5482	N	142	-	18.4591	E	チゴダラ科
13:18:59	728.3	39	-	18.5512	N	142	-	18.4519	E	シロブチヘビゲンゲ
13:19:15	730	39	-	18.55	N	142	-	18.4484	E	キチジ
13:19:55	730.4	39	-	18.5492	N	142	-	18.4461	E	キチジ
13:20:53	730.2	39	-	18.5498	N	142	-	18.4396	E	キチジ
13:21:40	728.1	39	-	18.5505	N	142	-	18.4347	E	キチジ
13:21:54	728.2	39	-	18.5509	N	142	-	18.4337	E	アナゴ
13:23:14	728.3	39	-	18.5497	N	142	-	18.4225	E	キチジ
13:23:19	728.3	39	-	18.5497	N	142	-	18.4225	E	底引き跡
13:24:06	728.4	39	-	18.5499	N	142	-	18.415	E	キチジ
13:25:27	727.5	39	-	18.5506	N	142	-	18.4122	E	キチジ
13:26:01	727.1	39	-	18.5509	N	142	-	18.4096	E	ナマコ

Time (JST)	Dep. (m)	Pos. Lat				Pos. Lon				Description
13:27:02	727.6	39	-	18.5501	N	142	-	18.3978	E	海底黒い
13:29:41	725.6	39	-	18.5518	N	142	-	18.3835	E	あなごんた
13:30:54	727.9	39	-	18.5464	N	142	-	18.3937	E	キチジ
13:31:51	729.1	39	-	18.5415	N	142	-	18.3994	E	キチジ
13:32:14	726.4	39	-	18.5401	N	142	-	18.3988	E	石
13:32:46	727.4	39	-	18.5383	N	142	-	18.4014	E	シロブチヘビゲンゲ
13:33:21	728.7	39	-	18.5347	N	142	-	18.4048	E	キチジ 2匹
13:33:52	725.7	39	-	18.5321	N	142	-	18.4045	E	石たくさん
13:34:31	728.2	39	-	18.5295	N	142	-	18.4063	E	キチジ
13:35:20	726.9	39	-	18.5284	N	142	-	18.4119	E	キチジ
13:35:40	727	39	-	18.5264	N	142	-	18.4129	E	東にむかう
13:37:34	730.7	39	-	18.5218	N	142	-	18.4315	E	キチジ
13:37:49	729.5	39	-	18.5219	N	142	-	18.4346	E	キチジ
13:39:37	730.5	39	-	18.5183	N	142	-	18.4494	E	キチジ
13:39:48	730.1	39	-	18.5177	N	142	-	18.4513	E	シロブチヘビゲンゲ
13:40:44	730.4	39	-	18.5174	N	142	-	18.464	E	アナゴ
13:40:58	731.1	39	-	18.5174	N	142	-	18.4665	E	キチジ
13:42:13	731.9	39	-	18.5152	N	142	-	18.4826	E	キチジ
13:42:50	731.5	39	-	18.5153	N	142	-	18.4863	E	キチジ
13:43:40	732.1	39	-	18.5131	N	142	-	18.4944	E	キチジ
13:49:39	737.1	39	-	18.5083	N	142	-	18.5586	E	キチジ
13:51:34	736.1	39	-	18.5107	N	142	-	18.5727	E	a d c p 視認 コロガッテ イル
13:52:25	735.6	39	-	18.5126	N	142	-	18.5785	E	キチジ
13:56:51	739	39	-	18.5129	N	142	-	18.5778	E	a d c p 観察
14:05:58	737.8	39	-	18.5134	N	142	-	18.5815	E	a d c p 回収
14:13:00	739.1	39	-	18.5225	N	142	-	18.6168	E	キチジ
14:13:42	737.6	39	-	18.5297	N	142	-	18.6196	E	キチジ
14:21:59	728.7	39	-	18.5913	N	142	-	18.6529	E	基準局2 視認 倒れている
14:22:29	727.9	39	-	18.5914	N	142	-	18.6541	E	ロープ切れている
14:23:38	727.3	39	-	18.5941	N	142	-	18.651	E	キチジ
14:31:33	730.1	39	-	18.5964	N	142	-	18.6535	E	adcp 仮置き
14:34:16	728.8	39	-	18.5956	N	142	-	18.6518	E	ちょっとだけ移動
14:39:58	728.3	39	-	18.5977	N	142	-	18.6555	E	フックかける、台座に
14:46:09	728.7	39	-	18.5967	N	142	-	18.6544	E	10Mロープだし

Time (JST)	Dep. (m)	Pos. Lat				Pos. Lon				Description
14:52:05	730.1	39	-	18.597	N	142	-	18.6562	E	2 Mロープリングにかける
14:59:38	728.2	39	-	18.5968	N	142	-	18.6555	E	ADCP 回収バスケット
15:05:13	728.9	39	-	18.596	N	142	-	18.654	E	作業終了
15:08:58	724.3	39	-	18.5969	N	142	-	18.6527	E	離底

Dive track HD#1954

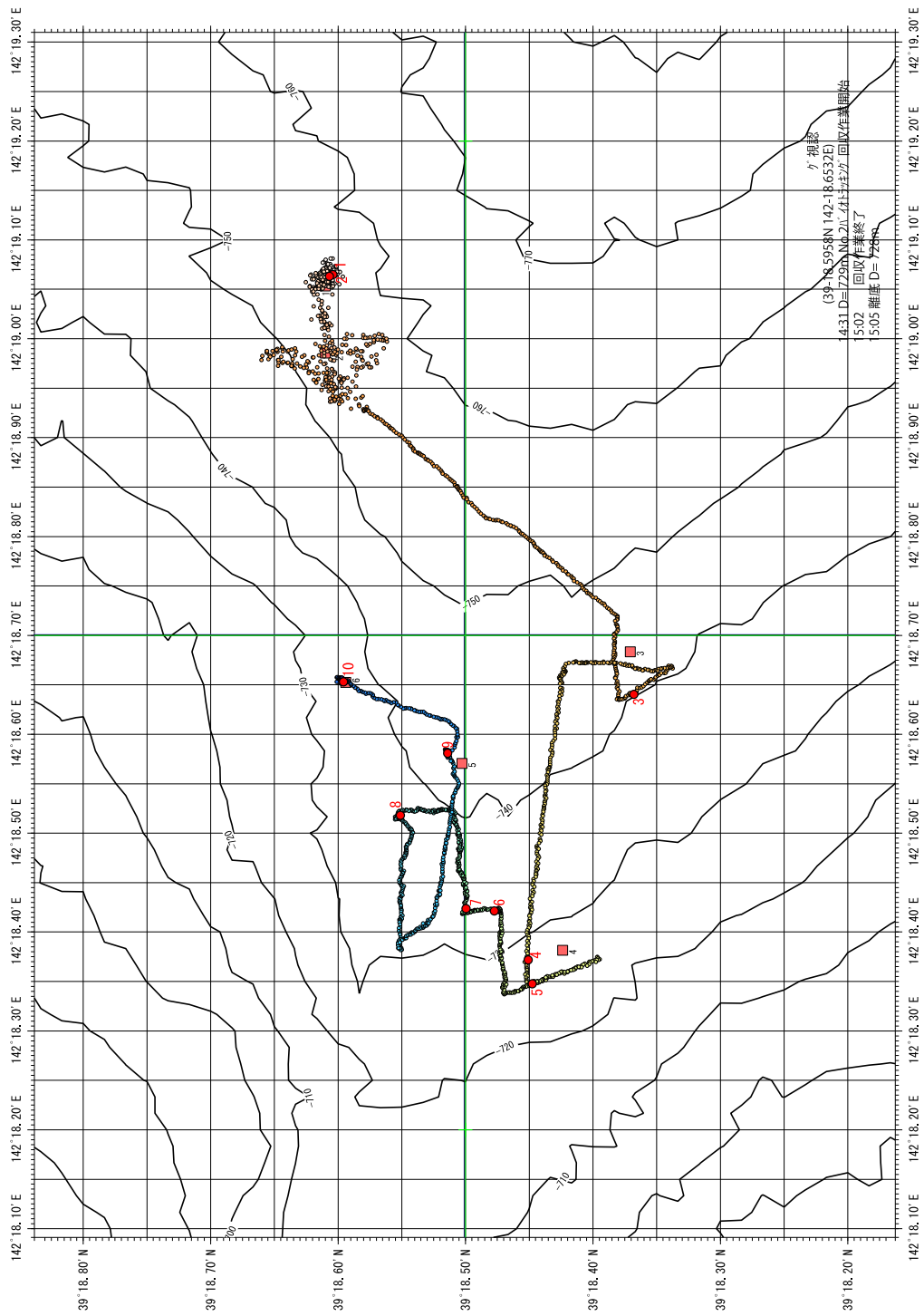


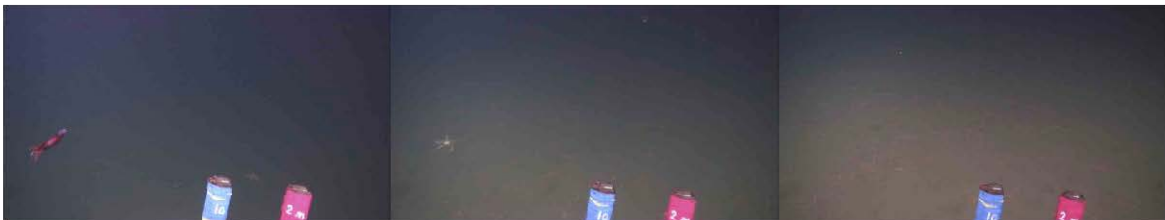
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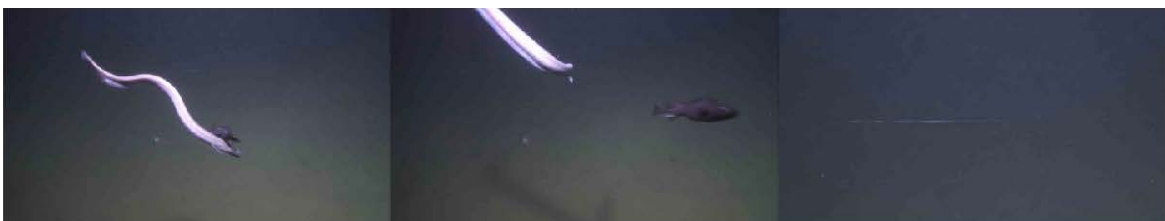
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By Shinji Tsuchida, chief scientist of KS-16-J03 Cruise