



**Preliminary Report**  
**of**  
**the *R/V KAIMEI* Cruise KM17-09**

September 13 – 22, 2017

Training cruise for Boring Machine System (BMS)  
in the Sagami-Bay, Takuyou Daisan SeaMounts,  
Bayonnaise Knoll

JAMSTEC~JAMSTEC

**Marine Technology and Engineering Center (MARITEC)**  
**R&D Center for Submarine Resources (SRRP)**

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

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## PREFACE

In September, 2017, the KM17-09 cruise using *R/V KAIMEI* of JAMSTEC (Japan Agency for Marine-Earth Science and Technology) was successfully carried out in the Sagami-Bay, Takuyo Daisan Seamounts, Bayonnaise Knoll, Japan. The purpose of this cruise is training for the newly acquired Boring Machine System (BMS) onboard the *R/V KAIMEI*. To understand and practice the launch and recovery procedure for BMS was safely conducted during cruise. KM17-09 cruise marked its first scientific operation.

### 1. Participants aboard the *R/V KAIMEI* cruise

Masanobu YANAGITANI	Chief Scientist, JAMSTEC	09/13 – 09/22
Hideki MACHIYAMA	Vice-chief Scientist, JAMSTEC	09/13 – 09/22
Hirofumi YAMAMOTO	JAMSTEC	09/13 – 09/22
Koichi IJIMA	JAMSTEC	09/13 – 09/22
Masayuki WATANABE	JAMSTEC	09/13 – 09/22
Takashi YOKOBIKI	JAMSTEC	09/13 – 09/22
Hideki KOBAYASHI	JAMSTEC	09/13 – 09/22
Hirohide FURUTA	Mitsubishi Heavy Industries, Ltd.	09/13 – 09/14
Itsuki KOJIMA	Nishiyama Corporation	09/13 – 09/14
Breanna HAYTON	Cellula Robotics	09/13 – 09/22
Peter HAMPTON	Cellula Robotics	09/13 – 09/22
Scott BAUER	Cellula Robotics	09/13 – 09/22
Atsushi OIKAWA	Japan Drilling Co., Ltd.	09/13 – 09/22

#### *KM-ROV/BMS Operation Team*

Atsumori MIURA	Operation Manager	09/13 – 09/22
Kazuhiro CHIBA	Operation Manager	09/13 – 09/22
Tomoe KONDO	1st ROV Operator	09/13 – 09/22
Tetsuya ISHITSUKA	2nd ROV Operator	09/13 – 09/22
Atsushi TAKENOUCI	2nd ROV Operator	09/13 – 09/22
Shigeu KIKUYA	2nd ROV Operator	09/13 – 09/22
Yudai SAKAKIBARA	2nd ROV Operator	09/13 – 09/22
Shinnosuke KUMAGAI	3rd ROV Operator	09/13 – 09/22
Shuya SUGIURA	3rd ROV Operator	09/13 – 09/22
Satsuki Iijima	3rd ROV Operator	09/13 – 09/22

Marine technician

Tohru KODERA	Nippon Marine Enterprises, Ltd.	09/13 – 09/22
Hiroyuki HAYASHI	Nippon Marine Enterprises, Ltd.	09/13 – 09/22
Miki TAWATA	Nippon Marine Enterprises, Ltd.	09/13 – 09/22
Yusuke SATO	Marine Works Japan Ltd.	09/13 – 09/22
Yuji FUWA	Marine Works Japan Ltd.	09/13 – 09/22
Hiromichi SOEJIMA	Marine Works Japan Ltd.	09/13 – 09/22
Mika YAMAGUCHI	Marine Works Japan Ltd.	09/13 – 09/22
Takehiro KANII	Marine Works Japan Ltd.	09/13 – 09/22

**2. Specification of the BMS**

The BMS is a state of the art, fourth generation seafloor drill capable of providing a complete suite of accurate and reliable geotechnical coring. An integrated hydraulic power unit, thrusters, telemetry and control system enables the BMS to operate without any subsea support in water depths down to 3,000m.

A wireline tool system further enhances the speed of operation. The BMS includes H-size and 146T tools and a custom 450mm diameter casing system.



Fig. 1 BMS

During drilling and sampling, a full spread of cameras and sensors provide the operator with information on all of the sub-systems and enables user intervention as required. Specifications of the BMS is as follows;

### Specifications

#### (1) Physical

- 3,000 m operating depth
- 13,000 kg in air (with full tool suite)
- 10,300 kg in water
- 3.2 x 2.4 x 5.6 m (H x W x D)

#### (2) Drills

- Conventional (T146) or wire line (H-size)
- 100 kN push & pull force
- Up to 800 RPM

#### (3) Tools

- 30m continuous coring depth with 12m casing
- Industry standard H-size tooling
- 1.5 m rods and core samples
- 63.0 mm core diameter

#### (4) Control

- 20' ISO container control van
- Dual operator chairs
- Autonomous tool handling
- Real time telemetry and control
- Eight video channels & sensor feedback on all actuators
- Leveling legs up to 30° slopes
- Maneuvering thrusters

### 3. Survey area

Fig. 2 shows planned survey point in Sagami-Bay.

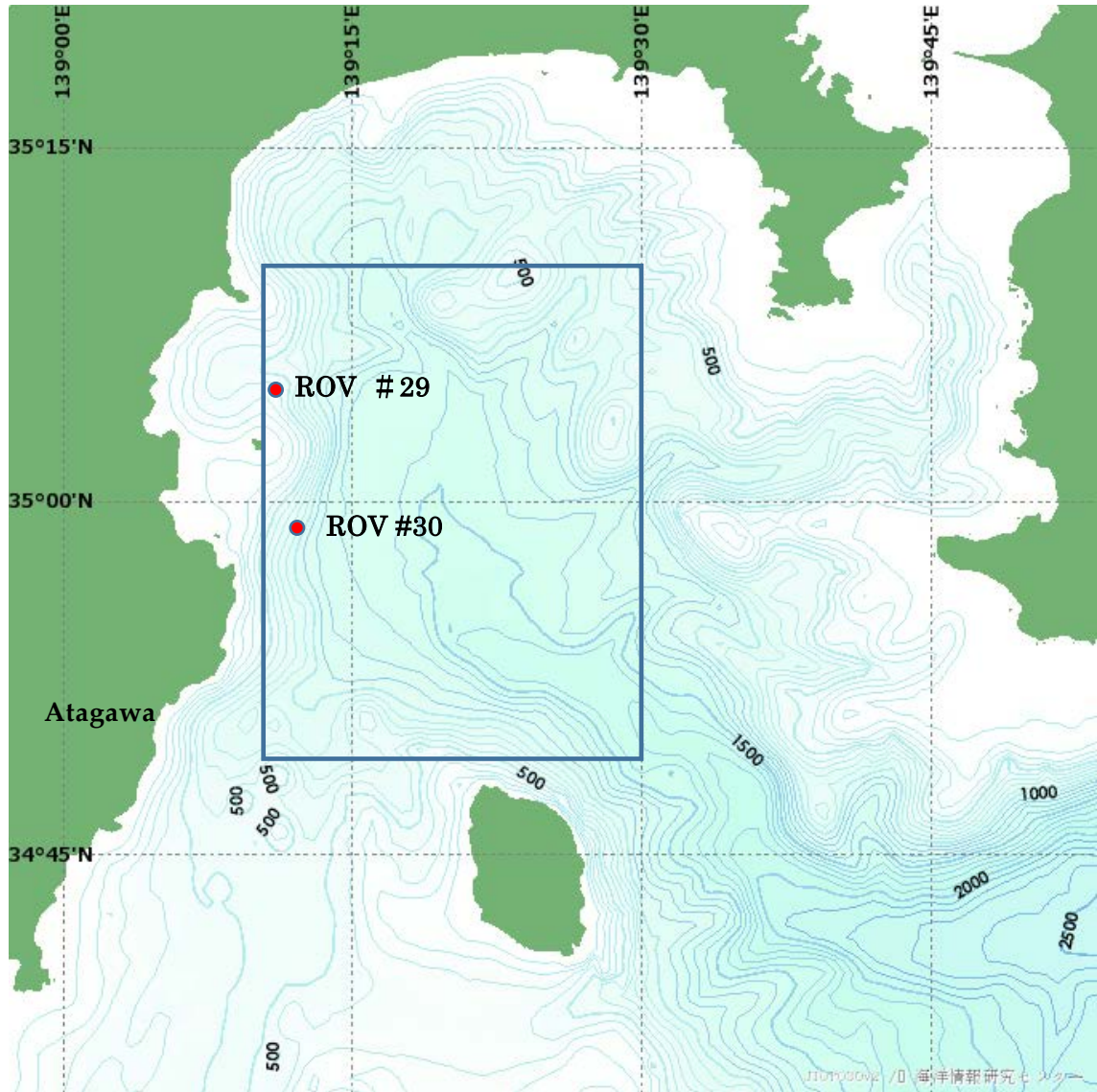


Fig. 2 Survey area in Sagami-bay

Fig. 3 shows planned survey point in Takuyou Daisan Seamounts. Proposed drilling site, Takuyou Daisan Seamounts is shown in this figure.

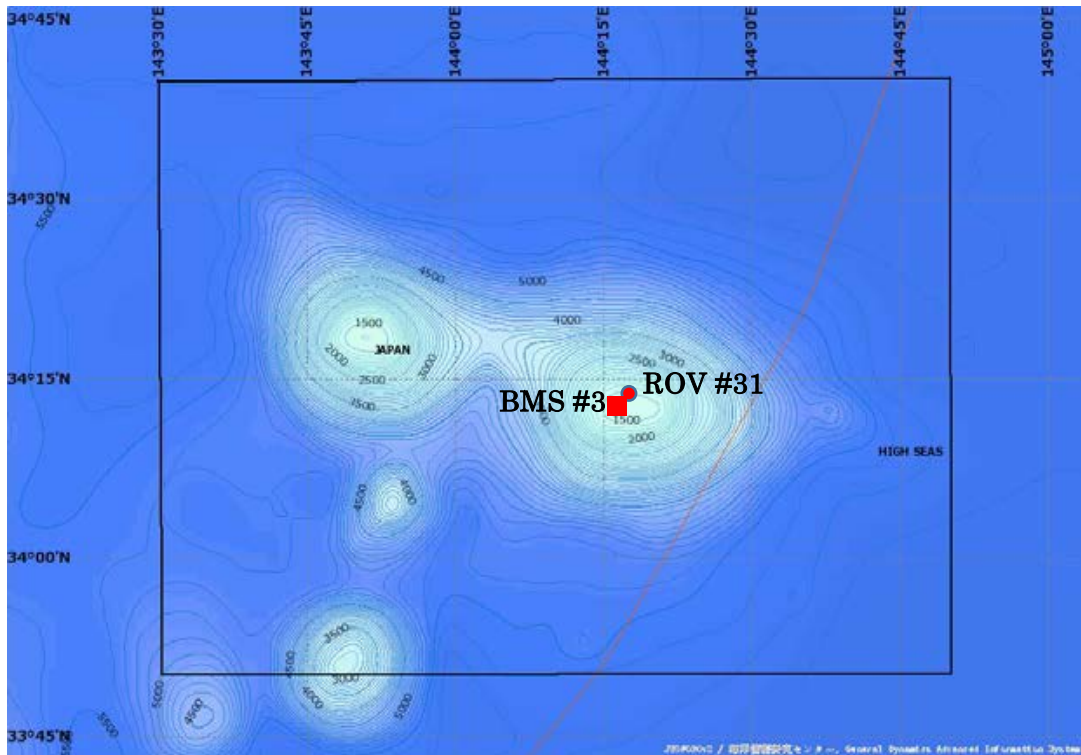


Fig. 3 Survey area in Takuyou Daisan Seamounts

Fig. 4 shows planned survey point in Bayonnaise Knoll. Proposed drilling site, Bayonnaise Knoll is shown in this figure.

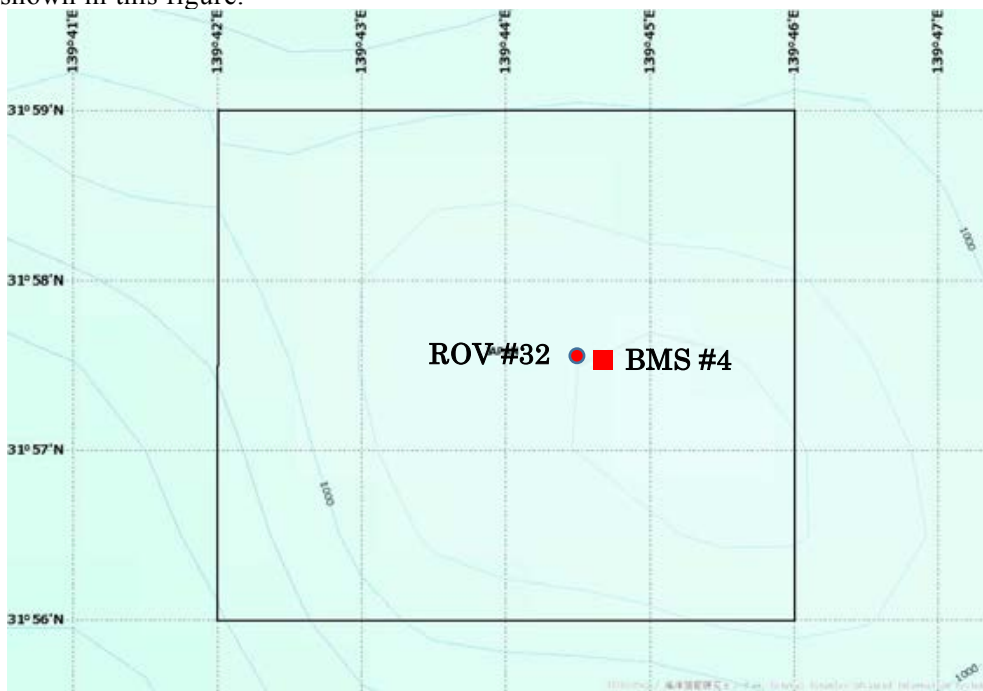


Fig. 4 Survey area in Bayonnaise Knoll

#### 4. Cruise track

KM17-09 cruise was started from JAMSTEC pier on September 13 and then, the vessel went to the survey area. Each of 1 ROV dive at proposed drilling site and 1 BMS dives were conducted at Takuyou Daisan Seamounts and Bayonnaise Knoll. Finally, the vessel arrived at JAMSTEC Pier on September 22 and we ended KM17-09 cruise. Fig. 5 shows ship's tracks for the entire cruise and table 1 shows activity log during the cruise.

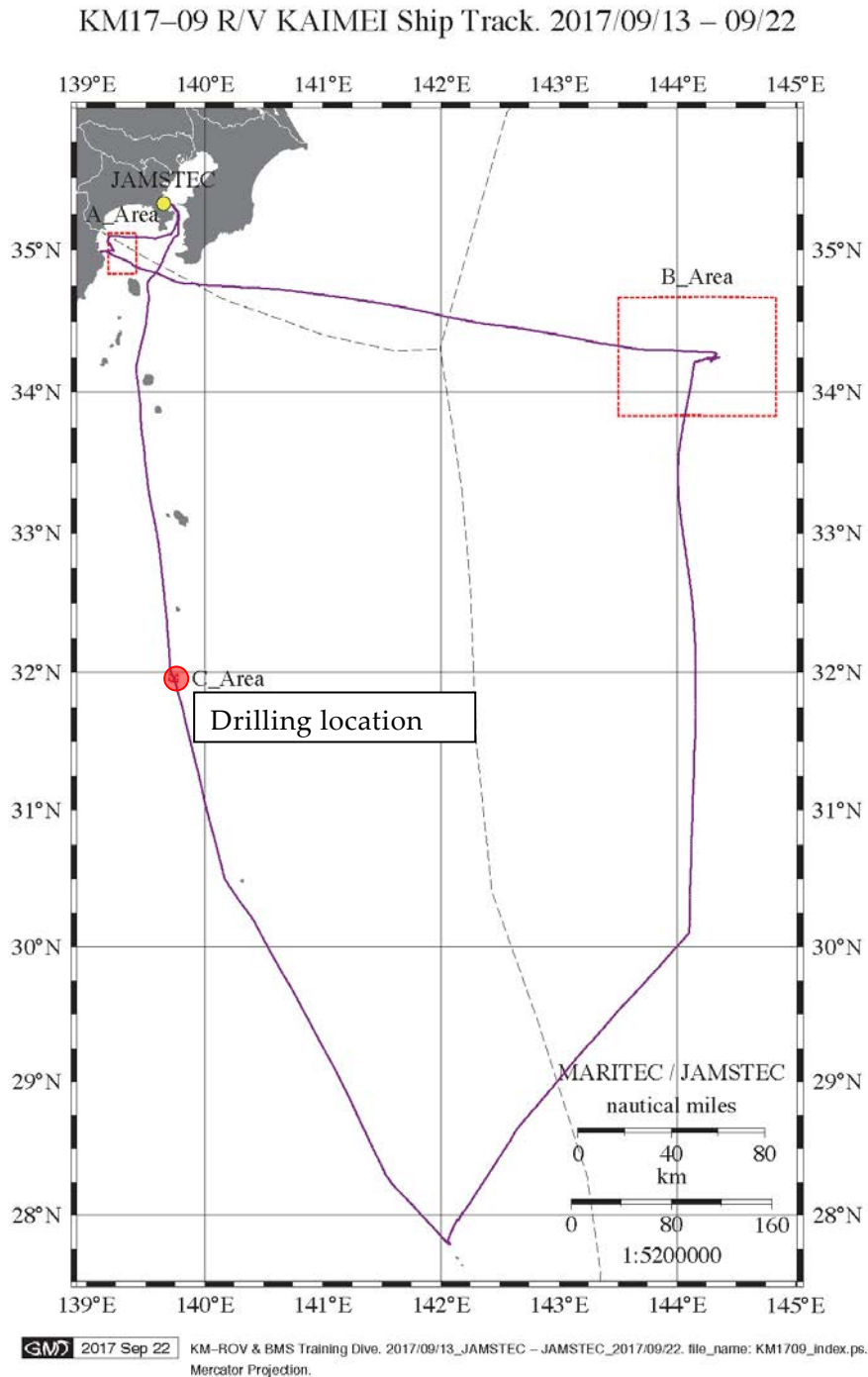


Fig. 5 Ship's tracks for the entire KM17-09 cruise



Table 1 Cruise log  
R/V "KAIMEI"KM17-09 Cruise Log

Date & Time (JST: UTC +9h)	Description	Weather / Wind / Sea Condition
2017/09/13 Wed.	Noon Position: 35-05.3'N, 139-18.3'E (SAGAMI-WAN)	bc / West-2 / 2
08:00	Onboard "KAIMEI" at JAMSTEC	
09:00	"KAIMEI" departed from JAMSTEC, Commenced KM17-09	
10:30-11:00	Carried out Shipboard education & training for scientist	
12:03	XBT @ 35-05.2438'N, 139-20.0944'E	
13:39	Hoisted up KM-ROV	
13:45	Launched KM-ROV Started operation#28	
14:35	Hoisted up KM-ROV	
14:41	Recovered KM-ROV & finished the operation	
15:27	Hoisted up KM-ROV	
15:33	Launched KM-ROV Started operation#29	
16:17	KM-ROV landed the bottom (35-05.679'N, 139-11.309'E, D=626m)	
17:41	KM-ROV left the bottom (39-08.506'N, 142-19.703'E, D=615m)	
18:11	Hoisted up KM-ROV	
18:17	Recovered KM-ROV & finished the operation	
18:00-18:10	scientist meeting	
2017/09/14 Thu.	Noon Position: 34-59.7N,139-13.8E (SAGAMI-WAN)	bc / NNE-1 / 2
08:05	Hoisted up KM-ROV	
08:11	Launched KM-ROV Started operation#30	
08:54	KM-ROV landed the bottom (35-05.679'N, 139-11.309'E, D=1212m)	
11:09	KM-ROV left the bottom (39-08.506'N, 142-19.703'E, D=1225m)	
11:56	Hoisted up KM-ROV	
12:04	Recovered KM-ROV & finished the operation	
	Shifted to off ITO-KO	
14:53	2 persons disembarked	
15:20	Commenced proceeding to TAKUYO-DAISAN-KAIZAN	
18:00-18:05	scientist meeting	
2017/09/15 Fri.	Noon Position: 34-14.7N,144-20.4E (off East BOUSO)	c / North-3 / 3
10:50	Arrived at research area, TAKUYO-DAISAN-KAIZAN	
10:58	XBT @ 34-16.2758'N, 144-19.7137'E	

11:16-11:33	Carried out MBES site survey	
12:33	Hoisted up KM-ROV	
12:43	Launched KM-ROV Started operation#31	
14:09	KM-ROV landed the bottom (34-14.340'N, 144-18.024'E, D=1470m)	
16:18	KM-ROV left the bottom (34-14.5805'N, 144-18.055'E, D=1413m)	
17:23	Hoisted up KM-ROV	
17:28	Recovered KM-ROV & finished the operation	
18:00-18:05	scientist meeting	
2017/09/16 Sat.	Noon Position: 34-14.3N, 144-14.8E (off East BOUSO)	bc / NE-3 / 3
08:22	Hoisted up BMS	
08:31	Lunched BMS Started operation#3	
10:34	BMS landed the bottom (34-14.190'N, 144-16.909'E, D=1530m)	
10:38	BMS left the bottom (34-14.190'N, 144-16.909'E, D=1413m)	
11:34	Hoisted up BMS	
11:40	Recovered BMS & finished the operation	
14:20	Com'ced proceeding to OGASAWARA-SYOTO	
18:00-18:10	scientist meeting	
2017/09/17 Sun.	Noon Position: 29-25.0N, 143-24.0E (off NorthEast CHICHI-JIMA)	bc / South-4 / 3
18:00-18:10	scientist meeting	
20:20	Arrived at OGASAWARA-SYOTO (off MUKO-JIMA)	
2017/09/18 Mon.	Noon Position: 27-48.0N, 142-03.2E (off North MUKO-JIMA)	bc / SSW-4 / 3
13:00	Com'ced proceeding to Byonesu Knoll	
18:00-18:10	scientist meeting	
2017/09/19 Tue.	Noon Position: 31-57.4N, 139-44.6E (off South AOGASHIMA)	bc / West-3 / 3
09:50	Arrived at research area Byonesu Knoll	
09:59	XBT @ 31-52.5754'N, 139-45.93362'E	
10:31-10:39	Carried out MBES site survey	
11:16	Hoisted up KM-ROV	
11:23	Launched KM-ROV Started operation#32	
12:13	KM-ROV landed the bottom (31-57.382'N, 139-44.600'E, D=820m)	
14:26	KM-ROV left the bottom (31-57.3639'N, 144-44.7983'E, D=741m)	
15:01	Hoisted up KM-ROV	
15:13	Recovered KM-ROV & finished the operation	

18:00-18:05	scientist meeting	
2017/09/20 Wed.	Noon Position: 31-57.3N,139-44.8E (off South AOGASHIMA)	bc / West-3 / 3
08:09	Hoisted up BMS	
08:16	Lunched BMS Started operation#3	
12:51	BMS landed the bottom (31-57.353'N, 139-44.814'E, D=736m)	
13:32-23:59	Carried out BMS digging the sea bottom	
2017/09/21 Thu.	Noon Position: 32-08.0N,139-41.7E (off East AOGASHIMA)	bc / NW-3 / 3
07:15	BMS left the bottom (31-57.353'N, 139-44.814'E, D=736m)	
07:48	Hoisted up BMS	
07:55	Recovered BMS & finished the operation	
11:30	Left research area for YOKOSUKA	
15:00	scientist meeting	
2017/09/22 Fri.		
09:30	Arrived at YOKOSUKA(JAMSTEC),then completed voy. No.KM17-09	

## 5. Preliminary results

### 5-1. KM-ROV AutoTrack test

Function of AutoTrack mode for the KM-ROV was tested 2 dives for the AutoTrack data analysis using SSBL navigation data.

### 5-2. Site survey at proposed drilling site by KM-ROV

ROV was dived into proposed drilling site and collected some rock samples in Takuyou-Daisan Seamounts and Bayonnaise knoll. And finally, BMS landing points were confirmed. BMS core catcher was considered based on the samples in Bayonnaise knoll.

### 5-3. Drilling by BMS

#### (1) Dive #3

In Takuyou Daisan Seamounts, we conducted BMS diving, but excavation training was not carried out, only equipment operation check was carried out.

Fig. 6 shows drilling locations of the BMS dive #3

KM17-09 R/V KAIMEI, Dive Sites @ Takuyo-Daisan Guyot.

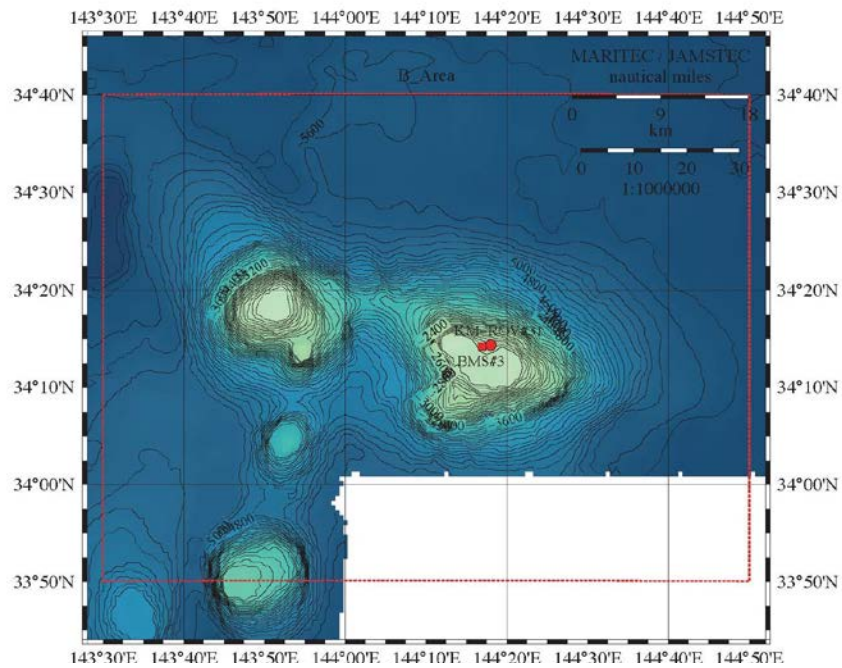


Fig. 6 BMS drilling locations (Dive #3)

(2) Dive #4

H-size tools were used for coring in Dive #4.

Fig. 7 shows drilling locations of the BMS dive #4.

KM17-09 R/V KAIMEI, Dive Sites @ Bayonnaise.

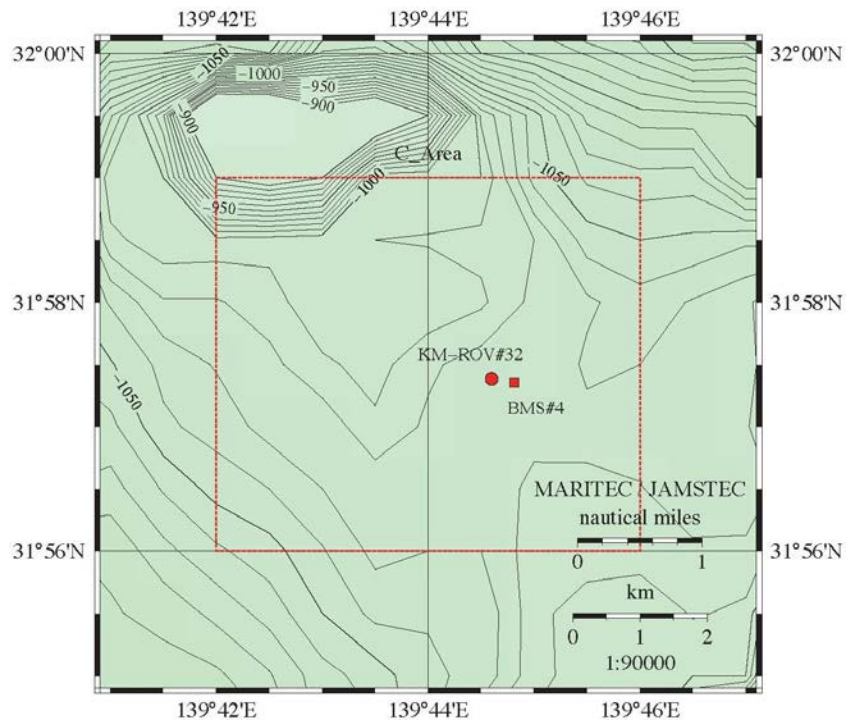


Fig. 7 BMS drilling locations (Dive #4)

○Coring record BMS Dive#4

Site : Bayonnaise Knoll

Date : 2017/09/20

Position : 31-57.353N, 139-44.814E

Depth : 737m

Coring tool : H-size

Barrel length : 12.286m

Core length : 9.57m

Recovery : 77.89%

Section length(m)

Section1 : 0.61, Section2 : 0.46, Section3 : 0.37, Section4 : 1.33, Section5 : 1.39

Section6 : 1.29, Section7 : 1.42, Section8 : 1.36, Section9 : 1.34

## 6. Acknowledgement

We thank Captain YOSHIDA Rikita, crews and technical staffs of our experiments conducted during the KM17-09 cruise, for their kind and thoughtful supports during the cruise.

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