

Cruise Report

R/V NATSUSHIMA + ROV Hyper-Dolphin

NT12-19

July 20, 2012 – August 4, 2012



July 31, 2012 Tateyama Bay

Institute for Research on Earth Evolution
Japan Agency for Marine-Earth Science and Technology
(IFREE, JAMSTEC)

***Understanding the activities and volcanic processes of the
submarine silicic volcanoes in the Northern Izu-Bonin Arc***

Oomurodashi, Kuroshe Hole, and Kurose-Nishi Hole
Northern Izu-Bonin Arc

Table of Contents

Cruise Information	1
List of cruise members	2
Acknowledgements	4
Cruise Summary	6
1 Operations and data processing information	
1.1 SEABAT bathymetric survey	16
1.2 Stand Alone Heat Flow meter (SAHF) measurement	16
1.3 Hyper-Dolphin3000 survey	17
2 Scientific results	
2.1 Hyper-Dolphin dive surveys	
2.1.1 HPD1401 dive	19
2.1.2 HPD1402 dive	21
2.1.3 HPD1403 dive	22
2.1.4 HPD1404 dive	23
2.1.5 HPD1405 dive	24
2.1.6 HPD1406 dive	25
2.1.7 HPD1407 dive	26
2.1.8 HPD1408 dive	27
2.1.9 HPD1409 dive	28
2.1.10 HPD1410 dive	29
2.1.11 HPD1411 dive	31
2.1.12 HPD1412 dive	32
2.1.13 HPD1413 dive	33
2.1.14 HPD1414 dive	34
3 Notice on using this cruise report	35

Cruise Information

1. Cruise ID

R/V NATSUSHIMA NT12-19 ROV Hyper-Dolphin3000

2. Cruise title

Understanding the activities and volcanic processes of the submarine silicic volcanoes in the Northern Izu-Bonin Arc

3. Chief scientist & representative of science party

Kenichiro Tani

Research Scientist, Institute for Research on Earth Evolution (IFREE),
Japan Agency for Marine-Earth Science and Technology (JAMSTEC)

4. Cruise period

July 20, 2012 – August 4, 2012

5. Port call

JAMSTEC pier, Yokosuka – JAMSTEC pier, Yokosuka

6. Research area

オームロダシ、黒瀬穴、黒瀬西穴

(Oomurodashi, Kurose Hole, and Kurose-Nishi Hole)

List of cruise members:

Scientific members:

Kenichiro Tani (Principal Scientist)

Research Scientist, Japan Agency for Marine-Earth Science and Technology

Osamu Ishizuka

Research Scientist, Geological Survey of Japan/AIST

Hiroshi Shukuno

Research Scientist, Japan Agency for Marine-Earth Science and Technology

Yuka Hirahara

Research Scientist, Japan Agency for Marine-Earth Science and Technology

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ROV Hyper-Dolphin Operation Team:

Chief ROV Operator	Yoshinari Ono
ROV Operator	Mitsuhiro Ueki
ROV Operator	Yosuke Chiba
ROV Operator	Kondo Tomoe
ROV Operator	Teppei Kido
ROV Operator	Shigeru Kikuya
ROV Operator	Atsushi Takenouchi
ROV Operator	Daichi Urata

R/V NATSUSHIMA crew:

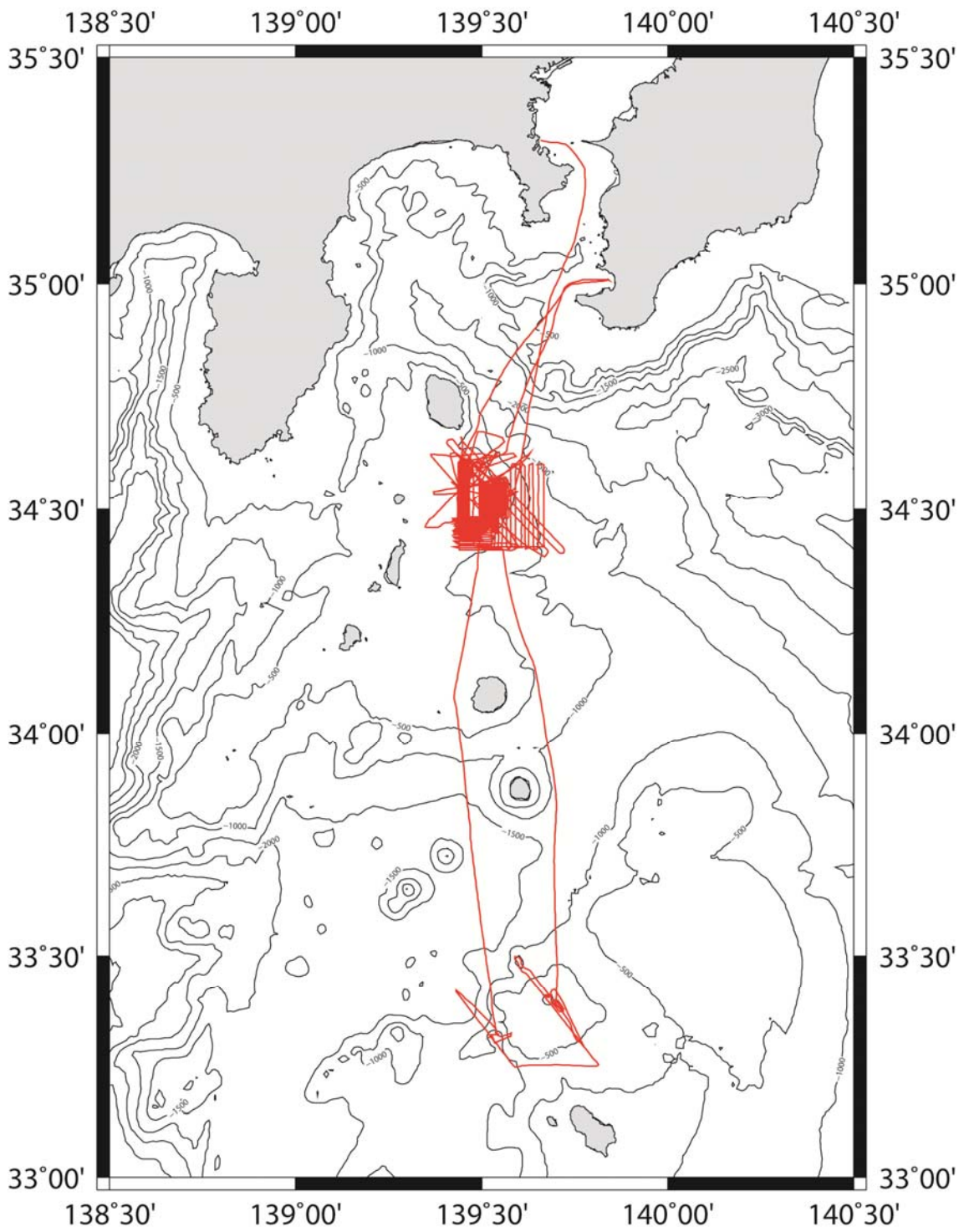
Captain	Hitoshi Tanaka
Chief Officer	Naoto Kimura
2nd Officer	Masato Chiba
3rd Officer	Motoi Katsumata
Chief Engineer	Koji Hunae
1st Engineer	Naohito Tadooka
2nd Engineer	Takahiro Mori
3rd Engineer	Hozumi Kuratomi
Chief Radio Officer	Yoichi Inoue
2nd Radio Officer	Yamamoto Yohei
3rd Radio Officer	Ryosuke Komatsu
Boat Swain	Hatsuo Oda
Able Seamen	Yasuo Konno

Able Seamen	Nobuyuki Ichikawa
Able Seamen	Yukito Isii
Able Seamen	Yoshiaki Matsuo
Sailer	Hideo Ito
Sailer	Yusaku Kanada
No.1 Oiler	Masaru Kitano
Oiler	Tsuneo Harimoto
Oiler	Ryota Suzuki
Assistant Oiler	Taijun Iwao
Assistant Oiler	Aio Takamiya
Chief Steward	Tomihisa Morita
Steward	Shinsuke Tanaka
Steward	Kiyotaka Kosuji
Steward	Hiroyuki Ohba
Steward	Katsuhiko Kawase
Jr.3rd Engineer	Naomi Uemura

Acknowledgements

We are grateful to Captain Hitoshi Tanaka and the crew of the R/V NATSUSHIMA, the Hyper-Dolphin operation team manager Yoshinari Ono and the ROV operators for their professional and outstanding efforts to make this scientific cruise successful. We also thank Masataka Kinoshita of KCC, JAMSTEC for their helpful support related to the SAHF measurements.

Figure 1. NT07-15 Ship track



Cruise Summary

R/V NATSUSHIMA and ROV Hyper-Dolphin3000 cruise NT12-19 was held from July 20, 2012 to August 4, 2012, a round trip from JAMSTEC pier in Yokosuka. The chief targets of this cruise were to investigate the eruption histories of the submarine silicic volcanoes in the Izu-Bonin Arc and to understand the volcanic processes that occur during the explosive submarine silicic eruptions. For these purposes, we have selected three silicic submarine volcanoes situated in the volcanic front region of the Northern Izu-Bonin Arc: Oomurodashi, Kurose Hole, and Kurose-Nishi Hole (Figure 1).

The surveys during the cruise were generally smooth and successful, except that we were forced to anchor at the Takeyama Bay from July 31 to August 2 as a result of strong swell from Typhoon No. 10, losing 2 of our planned dive survey days. We have completed a total of 14 ROV Hyper-Dolphin3000 dives, collected over 650 kg of rock, sediment, and water samples. Collected rock samples were predominantly rhyolitic to dacitic pumice and lava, as well as basalt, andesite, and hydrothermal deposits. In addition, SEABAT bathymetric survey and single-channel seismic survey were conducted to understand the detailed volcanic structures of the studied submarine volcanoes.

NT12-19 Shipboard Log:

Date	Local Time	Note	Position/Weather/Wind/Sea condition
20-Jul-12		Sail out, proceeding to research area.	07/20 12:00 (UTC+9h)
	10:00	Left Yokosuka.	Off Suzuki
	11:00-11:30	Carried out shipboard education & training for scientists.	35-00.9N 139-40.4E
	14:00	Arrived at research area (Oomurodashi).	Overcast
	14:12	Released XBT at 34-39.2770N 139-36.7787E.	East-3(Gentle breeze)
	15:06	Com'ced MBES mapping survey.	1(Calm)
	18:00-18:30	Scientist meeting.	1(Low swell sea)
			Visibly:7'
21-Jul-12		Dove HPD#1401	07/21 12:00(UTC+9h)
	06:02	Finished MBES mapping survey then com'ced proceeding to dive point.	North Izu · Ogasawara
	06:30	Arrived at dove point.	34-36.3N -139-30.3E
	10:14	Hoisted up HPD.	Overcast

10:18	Lounded HPD.	NE-4(Moderate breeze)
10:33	HPD dove & started her operation(#1401).	3(Sea slight)
11:55	HPD lounded on the sea bottom(D=559m).	3(Moderate short)
17:02	HPD left the sea bottom(D=262m).	Visibly:7'
17:15	HPD floated.	
17:25	Hoisted up HPD.	
17:30	Hoisted up HPD & finished above operation.	
19:02	Com'ced MBES mapping survey.	
19:00-	Scientist meeting.	
19:30		

22-Jul-12

Dove HPD(#1402,#1403)

07/22

		12:00(UTC+9h)
06:30	Finished MBES mapping survey then com'ced proceeding to dive point.	North Izu · Ogasawara
07:15	Arrived at dove point.	34-35.9N,139-28.9E
08:14	Hoisted up HPD.	Overcast
08:19	Lounded HPD.	NNE-5(Fresh breeze)
08:31	HPD dove & started her operation(#1402).	3(Sea slight)
08:51	HPD lounded on the sea bottom(D=388m).	3(Moderate short)
11:08	HPD left the sea bottom(D=141m).	Visibly:5'
11:23	HPD floated.	
11:39	Hoisted up HPD.	
11:44	Recoverd HPD & finished above operation.	
13:16	Hoisted up HPD.	
13:20	Lounded HPD.	
13:34	HPD dove & started her operation(#1403).	
13:54	HPD lounded on the sea bottom(D=487m).	
16:00	HPD left the sea bottom(D=329m).	
16:27	HPD floated.	
16:42	Hoisted up HPD.	
16:56	Recoverd HPD & finished above operation.	
18:18	Com'ced MBES mapping survey.	
18:20-	Scientist meeting.	
18:50		

23-Jul-12	Dove HPD(#1404,#1405)	07/23
		12:00(UTC+9h)
07:10	Finished MBES mapping survey then com'ced proceeding to dive point.	North Izu · Ogasawara
07:25	Arrived at dove point.	34-35.2N,139-28.2E
08:08	Hoisted up HPD.	Fine but cloudy
08:13	Lunched HPD.	East-3(Gentle breeze)
08:25	HPD dove & started her operation(#1404).	1(Calm)
08:41	HPD lounded on the sea bottom(D=197m).	1(Low swell sea)
10:58	HPD left the sea bottom(D=86m).	Visibly:7'
11:08	HPD floated.	
11:17	Hoisted up HPD.	
11:22	Recoverd HPD & finished above operation.	
12:40	Hoisted up HPD.	
12:45	Lunched HPD.	
13:00	HPD dove & started her operation(#1405).	
13:28	HPD lounded on the sea bottom(D=370m).	
16:03	HPD left the sea bottom(D=116m).	
16:24	HPD floated.	
16:32	Hoisted up HPD.	
16:38	Recoverd HPD & finished above operation.	
18:13	Com'ced MBES mapping survey.	
18:20-	Scientist meeting.	
18:50		
24-Jul-12	Dove HPD(#1406,#1407)	07/24
		12:00(UTC+9h)
06:04	Finished MBES mapping survey then com'ced proceeding to dive point.	North Izu · Ogasawara
07:25	Arrived at dive point.	34-33.7N,139-30.1E
08:08	Hoisted up HPD.	Fine but cloudy
08:12	Lunched HPD.	SW-4(Moderate breeze)
08:21	HPD dove & started her operation(#1406).	3(Sea slight)
08:45	HPD lounded on the sea bottom(D=81m).	2(Low sea long)
09:40	HPD left the sea bottom(D=58m).	Visibly:7'
09:45	HPD floated.	

09:53 Hoisted up HPD.
 09:59 Recoverd HPD & finished above operation.
 11:05 Hoisted up HPD.
 11:09 Lounched HPD.
 11:20 HPD dove & started her operation(#1407).
 11:36 HPD lounded on the sea bottom(D=282m).
 16:06 HPD left the sea bottom(D=83m).
 16:12 HPD floated.
 16:19 Hoisted up HPD.
 16:25 Recoverd HPD & finished above operation.
 17:55 Com'ced MBES mapping survey.
 18:10- Scientist meeting.
 18:30

25-Jul-12

Dove HPD#1408

07/25

12:00(UTC+9h)

06:45 Finished MBES mapping survey then com'ced proceeding to dive point.
 08:12 Hoisted up HPD.
 08:16 Lounched HPD.
 08:26 HPD dove & started her operation(#1408).
 09:12 HPD lounded on the sea bottom(D=194m).
 16:23 HPD left the sea bottom(D=197m).
 16:36 HPD floated.
 16:46 Hoisted up HPD.
 16:51 Recoverd HPD & finished above operation.
 18:17 Com'ced MBES mapping survey.
 18:20- Scientist meeting.
 18:50

North Izu ·
 Ogasawara
 34-32.8N, 139-26.5E
 Fine but cloudy
 SW-4(Moderate breeze)
 2(SeaModerate)
 2(Low sea long)
 Visibly:7 '

26-Jul-12

Dove HPD#1409 & SCS Survey (Line A3)

07/26

12:00(UTC+9h)

07:34 Finished MBES mapping survey then com'ced proceeding to dive point.
 08:09 Arrived at dive point.
 08:13 Hoisted up HPD.
 08:31 Lounched HPD.

North Izu ·
 Ogasawara
 34-32.8N, 139-26.5E
 Fine but cloudy
 SW-3(Gentle breeze)

	08:31	HPD dove & started her operation(#1406).	3(Sea Slight)
	09:01	HPD lounded on the sea bottom(D=81m).	1(Low swell sea)
	16:14	HPD left the sea bottom(D=58m).	Visibly:7'
	16:23	HPD floated.	
	16:34	Hoisted up HPD.	
	16:39	Recoverd HPD & finished above operation.	
	17:08-	Launched GI gun.	
	17:11		
:	17:12-	Launched streamer cable.	
	17:22		
	18:10-	Scientist meeting.	
	18:40		
	19:51	Com'ced SCS survey on line A3< 34-39.1500N,139-26.89636E >.	
27-Jul-12		SCS Survey (Line 3,Line2,Line1,Line5)	07/27
			12:00(UTC+9h)
	00:22	Cleaed out lineA3 at < 34-24.91516N,139-41.71875E >	North Izu · Ogasawara
	01:03	Entered line A2 at < 34-24.80507N,139-41.71875E >	34-26.7N,139-37.9E
	07:52	Cleaed out line A2 at < 34-39.41780N,139-25.26123E >	Fine but cloudy
	08:13	Entered line A1 at < 34-38.67233N,139-24.53156E >	WSW-4(Moderate breeze)
	12:40	Cleaed out line A1 at < 34-24.92981N,139-40.09735E >	3(Sea Slight)
	12:56-	Recovered streamer cable.	1(Low swell sea)
	13:01		
	13:03-	Recovered GI gun.	Visibly:7'
	13:06		
	14:33-	Lounched streamer cable.	
	14-37		
	14:39-	Lounched GI gun.	
	14:45		
	14:59	Entered line A5 at < 34-31.52916N,139-28.95538E >	
	16:44	Cleaed out lineA 5 at <	

	34-36.57188N,139-36.08826E >	
16:46-	Recovered streamer cable.	
16:52		
16:53-	Recovered GI gun.	
16:56		
17:57	Com'ced MBES mapping survey.	
18:00-	Scientist meeting.	
18:30		
22:35	Finished MBES mapping survey then com'ced proceeding to dive point.	
28-Jul-12	Dove HPD(#1410,#1411) & SCS Survey (Line B8)	07/28
		12:00(UTC+9h)
05:50	Arrived at Area B.	North Izu · Ogasawara
05:56-	Carried out MBES site survey.	33-19.5N,139-32.4E
06:19		
06:40	Released XBT at < 33-18.2972N,139-32.3686E >	Fine but cloudy
08:05	Hoisted up HPD.	SSW-3(Gentle breeze)
08:09	Lunched HPD.	2(SeaModerate)
08:20	HPD dove & started her operation(#1410).	1(Low swell sea)
09:02	HPD lounded on the sea bottom(D=1219m).	Visibly:7 '
11:32	HPD left the sea bottom(D=913m).	
11:58	HPD floated.	
12:06	Hoisted up HPD.	
12:10	Recoverd HPD & finished above operation.	
13:13	Hoisted up HPD.	
13:09	Lunched HPD.	
13:30	HPD dove & started her operation(#1411).	
14:10	HPD lounded on the sea bottom(D=1219m).	
16:31	HPD left the sea bottom(D=913m).	
16:49	HPD floated.	
16:57	Hoisted up HPD.	
17:01	Recoverd HPD & finished above operation.	
17:28-	Lunched streamer cable.	
17:31		

17:36- Lunched GI gun.
 17:39
 18:25 Com'ced SCS survey on line B8 <
 33-24.11337N,139-25.90302E >
 18:15- Scientist meeting.
 18:45
 21:23 Cleared out line B8 <
 33-14.93271N,139-35.29083E >
 23:20 Entered line B5 at <
 33-15.24628N,139-48.85529E >

29-Jul-12

Dove HPD(#1412,#1413) & SCS Survey (Line B5,Line B4)

07/29
 12:00(UTC+9h)
 North Izu ·
 Ogasawara
 33-24.8N,139-41.0E

03:49 Cleared out B5 at <
 33-29.89838N,139-35.31281E >
 03:59 Entered line B4 < 33-29.58618N,139-36.29425E
 >
 06:29 Cleared out B4 at <
 33-21.48399N,139-43.79974E >
 06:31- Recovered streamer cable.
 06:37
 06:38- Recovered GI gun.
 06:41
 07:57- Com'ced MBES mapping survey.
 08:09
 09:01 Hoisted up HPD.
 09:05 Lunched HPD.
 09:14 HPD dove & started her operation(#1412).
 09:44 HPD lounded on the sea bottom(D=736m).
 11:47 HPD left the sea bottom(D=473m).
 12:04 HPD floated.
 12:11 Hoisted up HPD.
 12:16 Recoverd HPD & finished above operation.
 12:30- Finished MBES mapping survey.
 13:20
 13:45 Hoisted up HPD.
 13:49 Lunched HPD.
 14:00 HPD dove & started her operation(#1413).

Fine but cloudy
 SSW-4(Moderate
 breeze)
 3(Sea Slight)
 2(Low swell long)

Visibly:7'

14:29 HPD lounded on the sea bottom(D=444m).
 15:38 HPD left the sea bottom(D=311m).
 16:16 HPD floated.
 16:19 Hoisted up HPD.
 16:25 Recoverd HPD & finished above operation.
 21:50 Arrived at area A.
 21:52 Com'ced MBES mapping survey.

30-Jul-12

SCS Survey (Line A6,Line A7)

07/30

12:00(UTC+9h)

06:44 Finished MBES mapping survey

North Izu ·

Ogasawara

07:02- Lounched streamer cable.

34-37.2N,139-24.6E

07:10

07:12- Lounched GI gun.

Fine but cloudy

07:16

07:59 Com'ced SCS survey on line A6<

South-4(Moderate

34-27.99088N,139-21.02783E >

breeze)

11:01 Cleaed out line A6 at <

3(Sea slight)

34-37.06696N,139-21.02783E >

11:03- Recovered streamer cable.

3(Moderate short)

11:09

11:10- Recovered GI gun.

Visibly:7'

11:13

12:06- Lounched streamer cable.

12:10

12:13- Lounched GI gun.

12:17

12:40 Com'ced SCS survey on line A7<

34-37.01271N,139-21.95892E >

16:26 Cleaed out line A7 at <

34-24.90509N,139-35.09216E >

16:28- Recovered streamer cable.

16:33

16:34- Recovered GI gun.

1636

17:33 Com'ced MBES mapping survey.

18:00- Scientist meeting.

	19:00		
31-Jul-12		Anchoring at TATEYAMAWAN	07/31
			12:00(UTC+9h)
	08:40	Finished MBES mapping survey then left research area	TATEYAMA WAN
		&com'ced proceeding to TATEYAMA WAN due to heavy swell	35-00.5N,139-50.5E
	11:50	Let go anchor arrived at TATEYAMA WAN	Fine but cloudy
	18:00-	Scientist meeting.	East-4(Moderate
	18:30		breeze)
			2(Sea smooth)
			1(Low swell sea)
			Visibly:7 '
01-Aug-1		Anchoring at TATEYAMAWAN	08/01
2			12:00(UTC+9h)
		Scientist meeting.	TATEYAMA WAN
			35-00.5N,139-50.5E
			Fine but cloudy
			East-3(Gentle
			breeze)
			1(Calm)
			1(Low swell sea)
			Visibly:7 '
02-Aug-1		Anchoring at TATEYAMAWAN	08/02
2			12:00(UTC+9h)
	17:40	Scientist meeting.	TATEYAMA WAN
	-18:00		
	17:50	Brought up anchor,left TATEYAMA WAN proceeding to research area.	35-00.5N,139-50.5E
	20:30	Arrived at research area.	Fine but cloudy
	20:31	Released at XBT.	NW-2(Light air)
	21:05	Com'ced MBES mapping survey.	1(Calm)
			1(Low swell sea)
			Visibly:7 '

03-Aug-1		Dove HPD#1414	08/03
2			12:00(UTC+9h)
	06:26	Finished MBES mapping survey arrived proceeding to dive point.	North Izu · Ogasawara
	07:25	Arrived at dive point.	34-32.6N, 139-35.0E
	08:09	Hoisted up HPD.	Fine but cloudy
	08:14	Lunched HPD.	NE-6(Near gale)
	08:35	HPD dove & started her operation(#1414).	4(sea moderate)
	09:07	HPD lounded on the sea bottom(D=746m).	4(Moderate average)
	11:31	HPD left the sea bottom(D=542m).	Visibly:7 '
	11:55	HPD floated.	
	12:01	Hoisted up HPD.	
	12:07	Recoverd HPD & finished above operation.	
	18:00-	Scientist meeting.	
	19:00		

04-Aug-1	9:00	Arrived at YOKOSUKA
2		

1. Operations and data processing information

1.1 SEABAT bathymetric survey

Bathymetric data were obtained by a hull-mounted multi-narrow beam mapping system SEABAT 8160 aboard R/V Natsushima. The SEABAT system has hydrophone arrays that synthesize narrow, fan-shaped beams. The width of the sea floor mapping in a single swath is generally ca.0.7 times the local water depth, and the resolution of the depth measurement is generally within 0.25 % of the water depth. The SEABAT system can collect up to 126 soundings on each ping cycle over depths varying from 10 to 3,000 meters, providing swath width coverage up to 150°. The ship speed was kept below 8 knots (against water) during the SEABAT survey. In measurement of bathymetry, one of the important parameters is the sound velocity profile of the local water column. We calculated the sound velocity profile onboard, using a temperature profile based on in-situ XBT (Expendable Bathythermograph) measurements.

1.2 Stand-Alone Heat Flow meter (SAHF) measurements

The Stand-Alone Heat Flow meter (SAHF) is designed to measure heat flow from manned submersibles or ROVs (Fig. 2). Five thermistors are situated within the probe at 11 cm intervals. Since SAHF takes measurements as an “OFF LINE” system, heat flow can be measured while observer is conducting other tasks at that position or elsewhere.

While Hyper-Dolphin3000 (HD) is descending or ascending, SAHF is set in a case beside the sample basket. After HD lands on the seafloor, SAHF is grasped by the HD's left manipulator and takes a reference water temperature for 5 minutes. SAHF is then pushed vertically into the sediment and the temperature gradient is measured for at least 15 minutes. Thermal conductivity data is necessary to obtain a heat flow value, which is not available on current SAHF. We measured thermal conductivities after the cruise from the sediments sampled simultaneously using push-cores and MBARI-type cores from nearby (<1 m) sites.

The following are descriptions of SAHF.

Material	Titanium alloy
Weight	4.0 kg in air, 2.6 kg in seawater
Length of pressure case	294 mm
Diameter of pressure case	85 mm
Length of probe	600 mm
Diameter of probe	13.8 mm (filled by silicon oil inside)
Number of thermistors	5
Intervals of thermistors	110 mm
Accuracy	0.01 °C
Resolution	0.001 °C
External Interface	RS232C (9600bps, 8bit, Non-parity, 2 stop-bit)

Figure 2. Stand-Alone Heat Flow meter (SAHF)

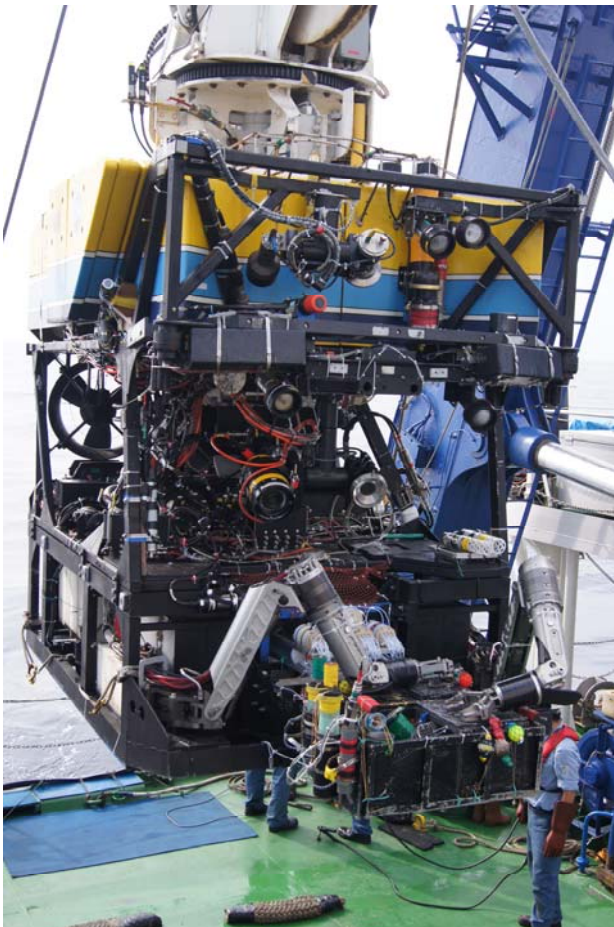


1.3 Hyper-Dolphin3000 survey

Geological observations, rock/sediment sampling, and heat flow measurements were conducted using the ROV Hyper-Dolphin3000. The general payload of the Hyper-Dolphin3000 surveys was a large sample basket subdivided into smaller baskets and lidded boxes (Figure 3). In some dive sites, metal scoop and MBARI-type core were used to collect fragile pumice samples and sediments, respectively. In dive #1409, offline 128-barrel water sampler (ANEMONE11) and online high-temperature thermometer were equipped on the ROV.

Video images (high definition & CCD cameras) and digital still-photographs (SEAMAX) from the dives are archived in JAMSTEC.

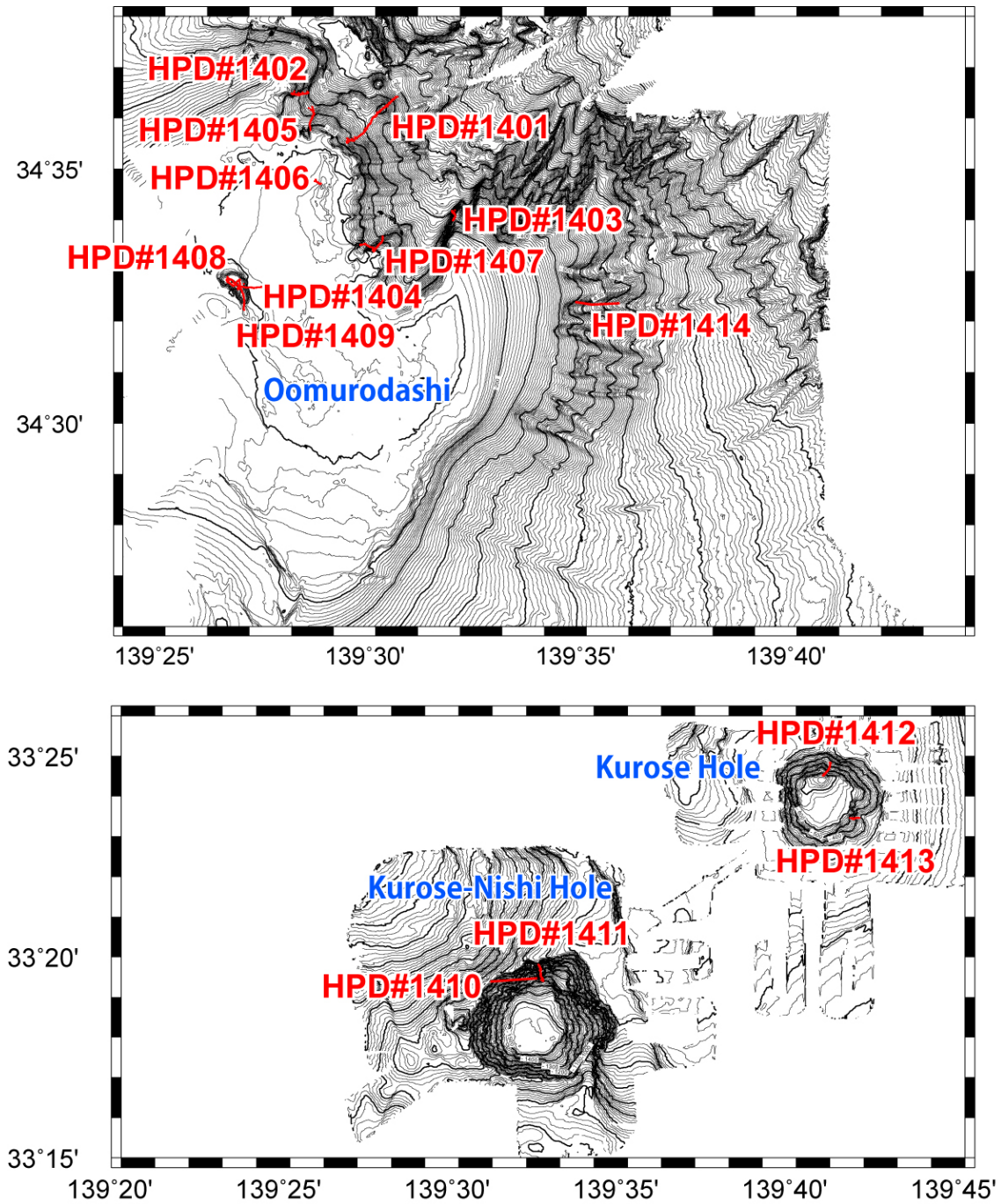
Figure 3. ROV Hyper-Dolphin3000 with large sample basket



2. Scientific results

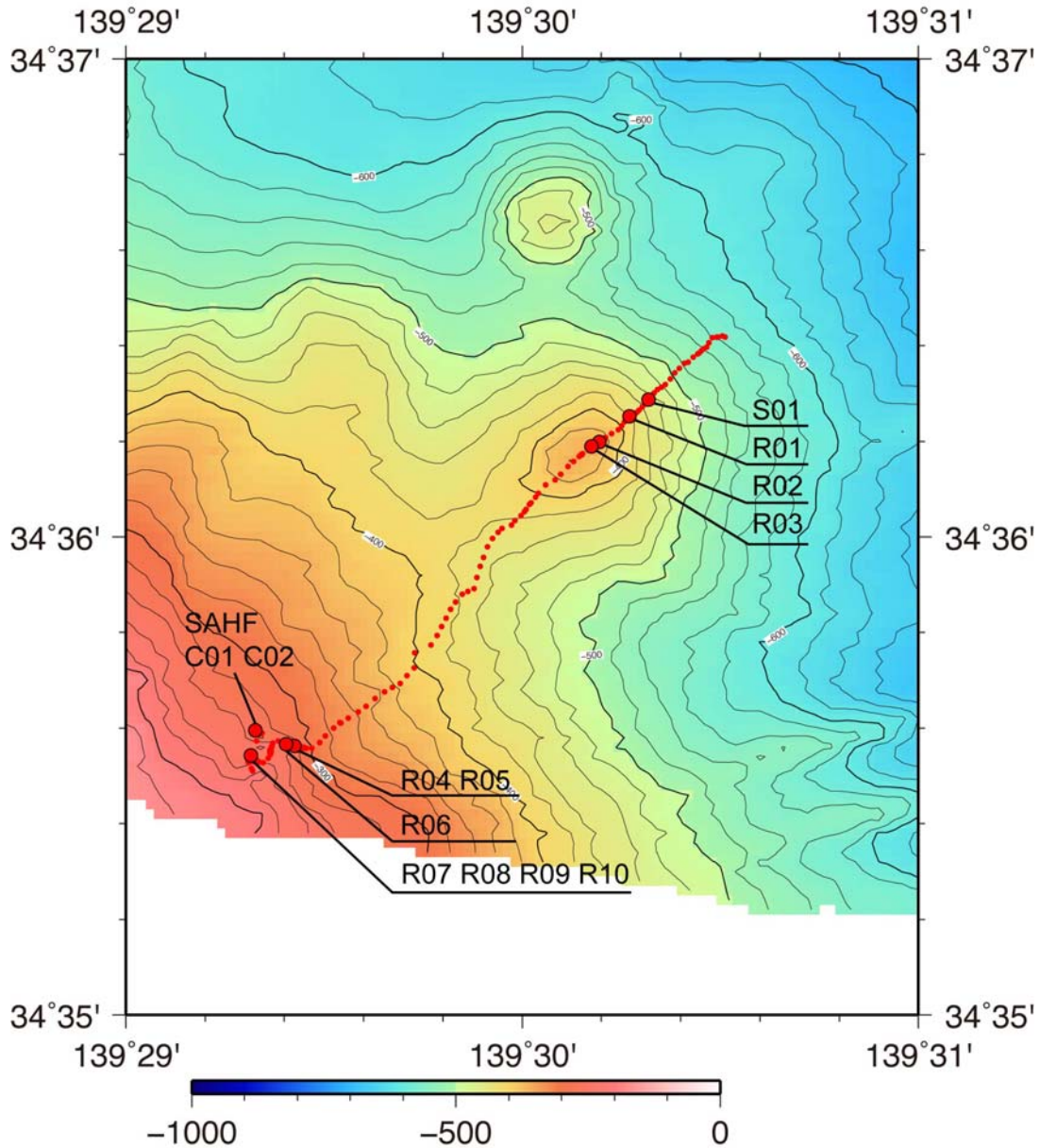
2.1 Hyper-Dolphin3000 dive surveys

Figure 4. Dive Sites



2.1.1 HPD1401 Dive

Hyper-Dolphin Dive: HPD1401 HPD1401



Date: July 21, 2012

Location: Northeastern slope of Oomurodashi

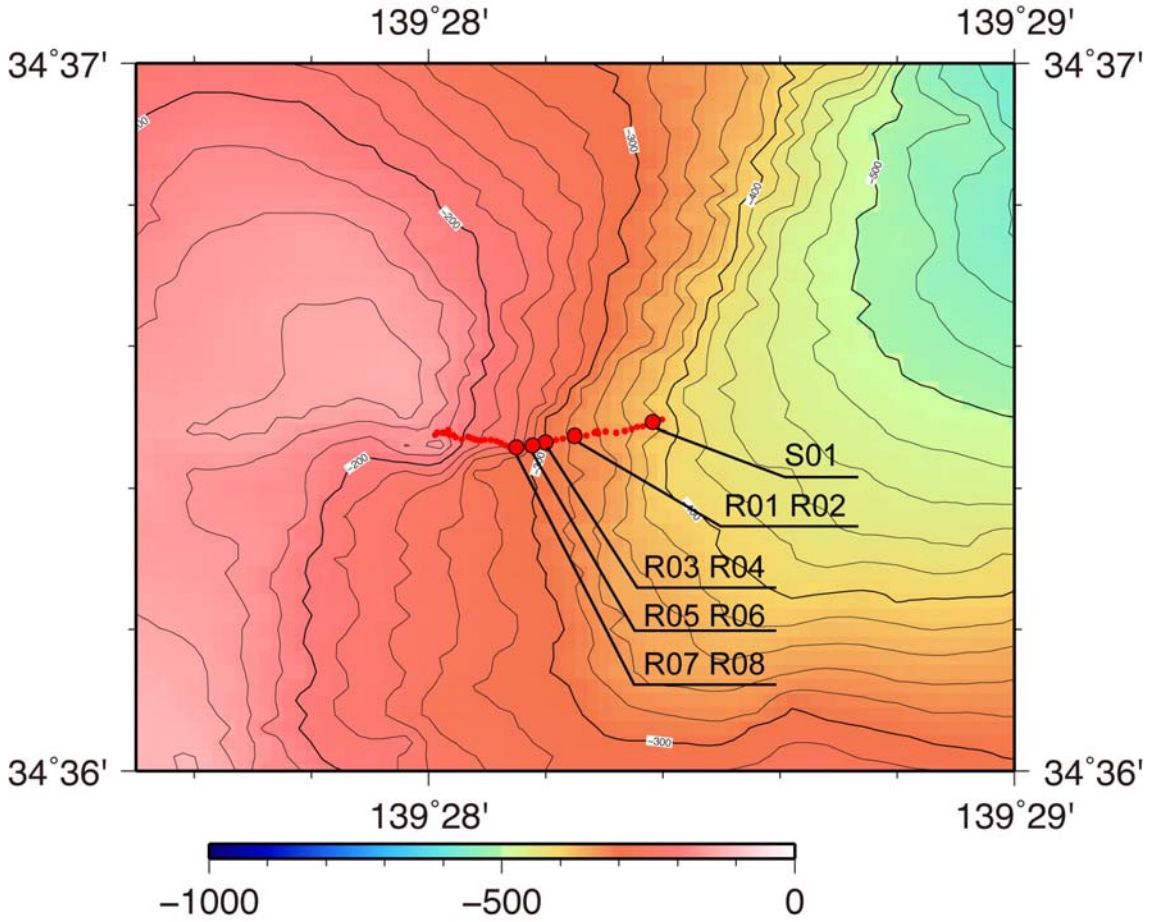
Objectives: Observe and sample knoll and then climb up main edifice. Originally we planned to dive further to the north-east on the satellite cone between Izu-Oshima and Oomurodashi but a submarine cable passes through this area, and as a result the planned dive track had to be altered.

DIVE #1401	On bottom:	Off bottom:
Time (local):	11:14	17:03

Latitude:	34° 36.416'N	34° 35.595'N
Longitude:	139° 30.515'E	139° 29.327'E
Depth (m):	559	262

2.1.2 HPD1402 Dive

Hyper-Dolphin Dive: HPD1402
HPD1402



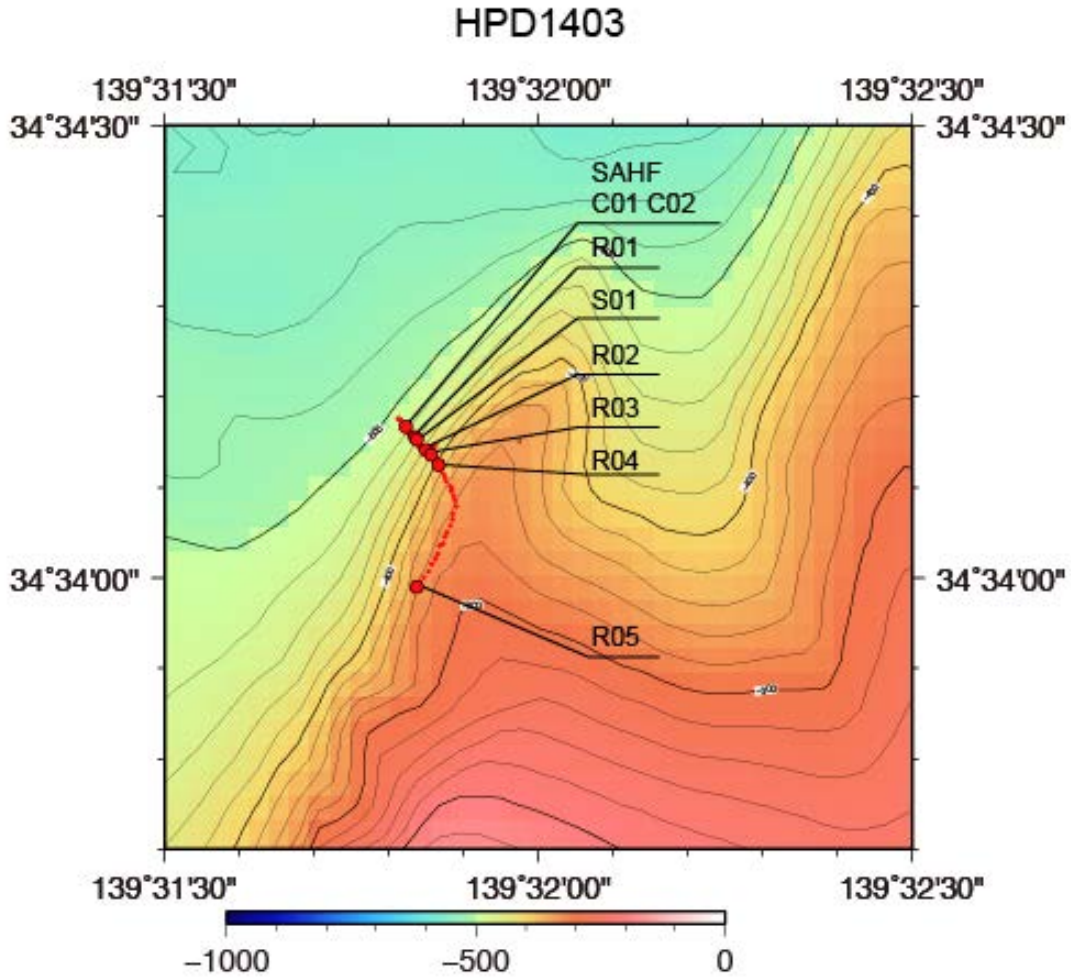
Date: July 22, 2012

Location: North-eastern slope of Oomurodashi

Objectives: Observe and sample slope climbing up ridge to flat top summit. Track forms transect NW of and parallel to transect taken in dive #1401.

DIVE #1402	On bottom:	Off bottom:
Time (local):	08:51	11:08
Latitude:	34° 36.497'N	34° 36.478'N
Longitude:	139° 28.398'E	139° 28.016'E
Depth (m):	387	141

Hyper-Dolphin Dive: HPD1403



Date: July 22, 2012

Location: North-eastern slope of Oomurodashi

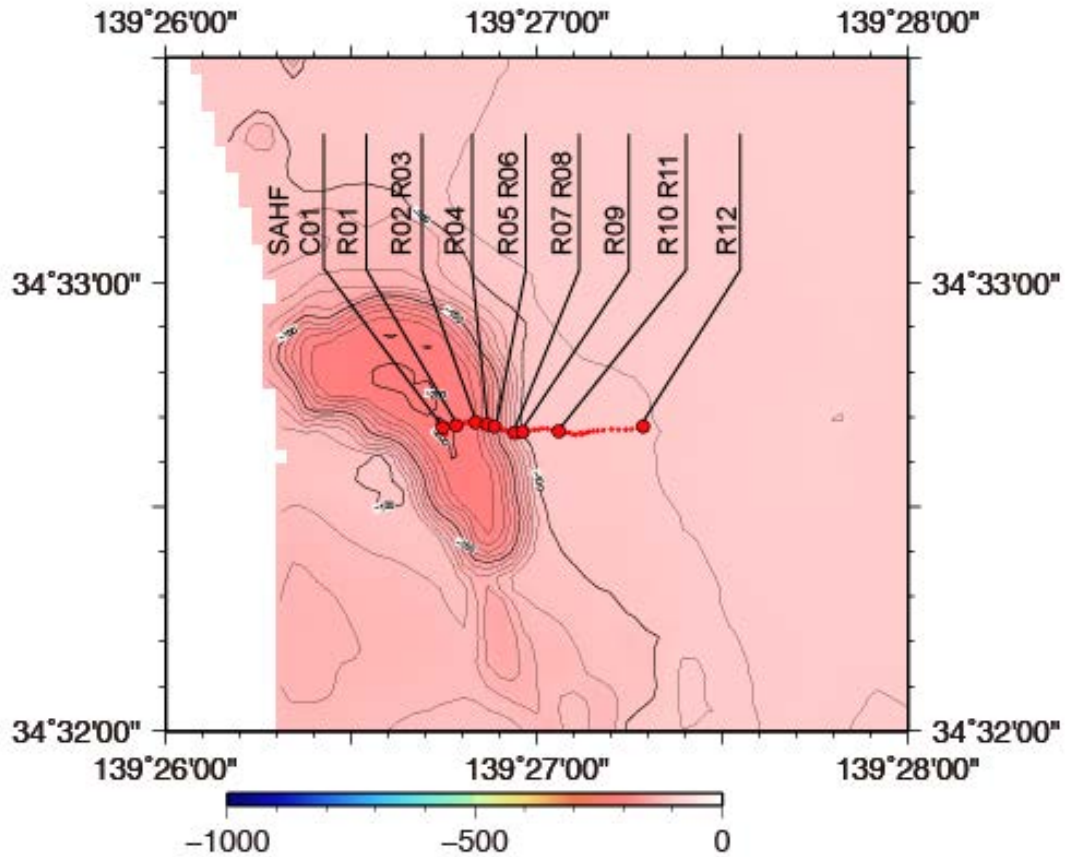
Objectives: To explore and sample the geologic diversity of the northeast Oomurodashi volcano. To use a steep slope on a knoll to access in situ deposits. To collect a heat flow measurement from this area of the volcano.

DIVE #1403	On bottom:	Off bottom:
Time (local):	13:55	16:28
Latitude:	34° 34.175'N	34° 33.990'N
Longitude:	139° 31.823'E	139° 31.838'E
Depth (m):	487.5	328

2.1.4 HPD1404 Dive

Hyper-Dolphin Dive: HPD1404

HPD1404



Date: July 23, 2012

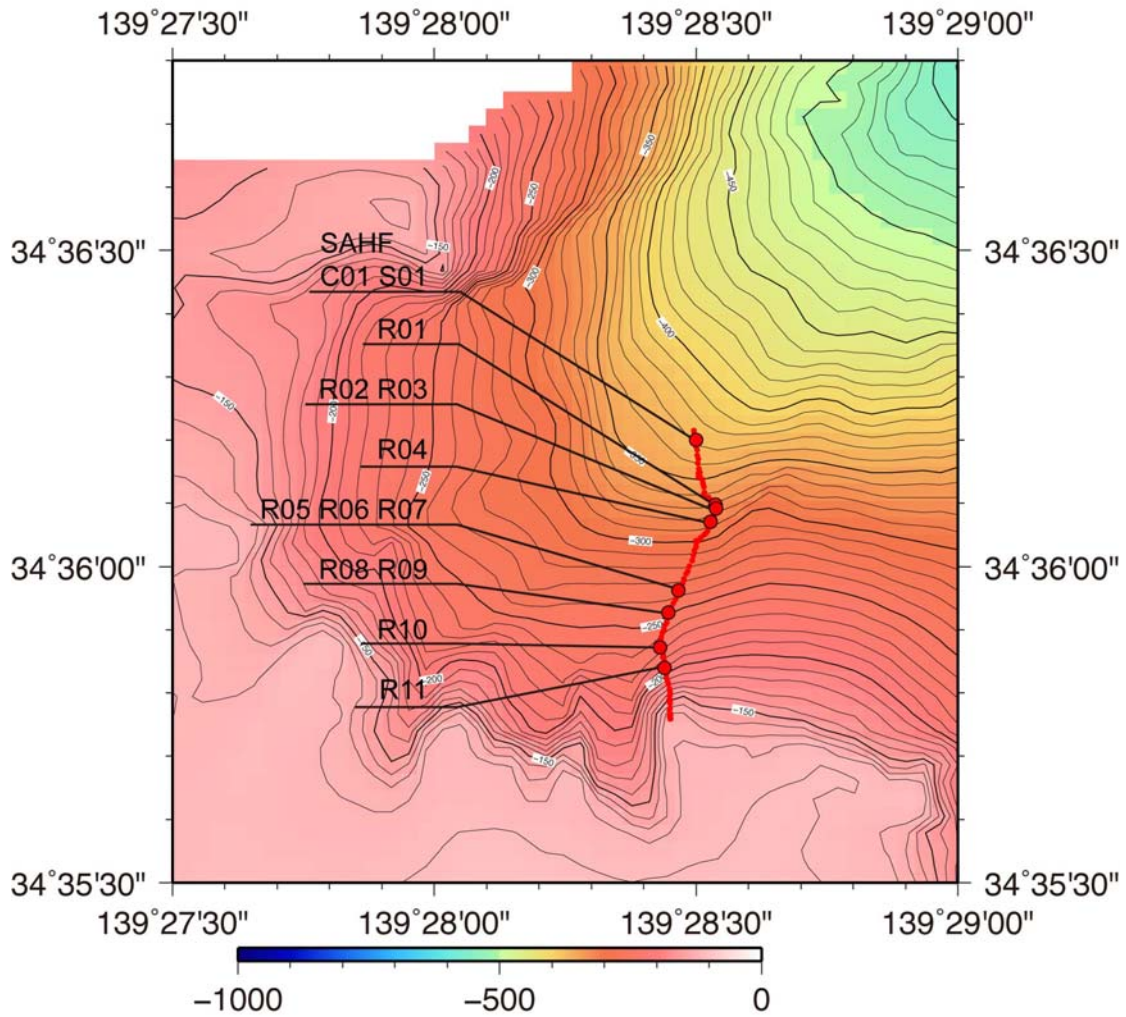
Location: East crater wall of Omuro Hole, on summit plateau of Oomurodashi

Objectives: Carry out heat flow measurement on crater floor. Observe and sample succession in crater wall on east side of crater. Climb crater wall, and observe surface of plateau east of crater.

DIVE #1404	On bottom:	Off bottom:
Time (local):	08.40	10.58
Latitude:	34° 32.660'N	34° 32.678'N
Longitude:	139° 26.754'E	139° 27.287'E
Depth (m):	197	85

2.1.5 HPD1405 Dive

Hyper-Dolphin Dive: HPD1405
HPD1405



Date: July 23, 2012

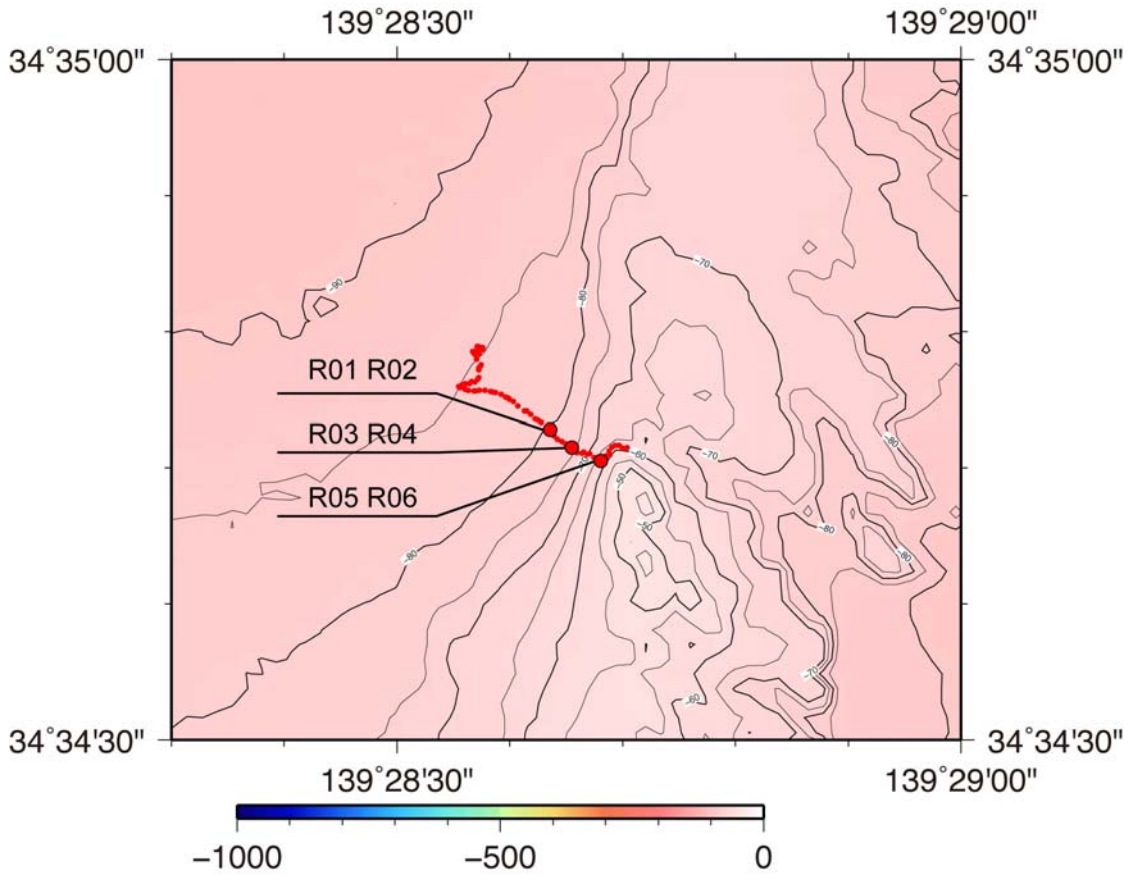
Location: North-eastern slope of Oomurodashi between HPD dives #1401 and #1402.

Objectives: To further investigate and attempt to understand the diversity of rocks produced by Oomurodashi volcano.

DIVE #1405	On bottom:	Off bottom:
Time (local):	13:28	16:03
Latitude:	34° 36.219'N	34° 35.760'N
Longitude:	139° 28.495'E	139° 28.451'E
Depth (m):	370	116

2.1.6 HPD1406 Dive

Hyper-Dolphin Dive: HPD1406 HPD1406



Date: July 24, 2012

Location: Flat summit of Oomurodashi

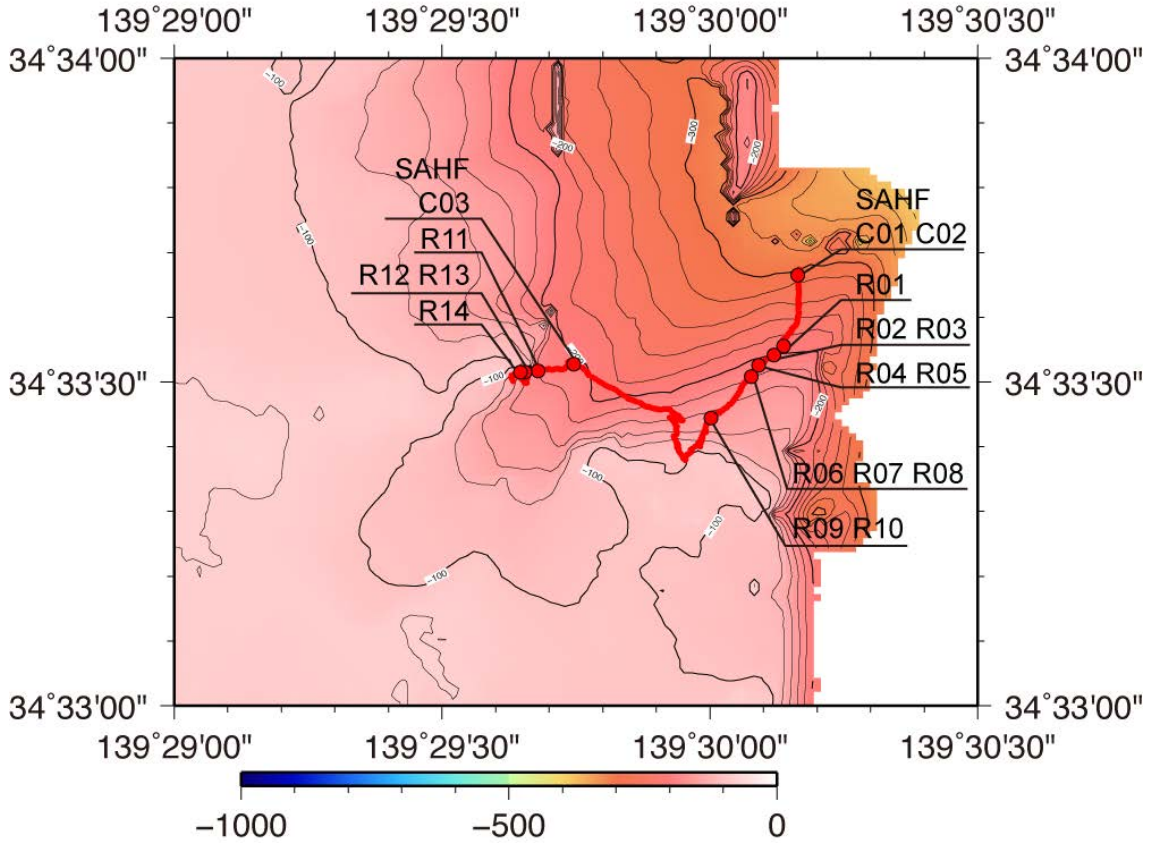
Objectives: To investigate the latest activity of Oomurodashi volcano, and origin of bathymetric high on top of the flat summit of this volcano.

DIVE #1406	On bottom:	Off bottom:
Time (local):	08:12	16:03
Latitude:	34° 34.788'N	34° 34.714'N
Longitude:	139° 28.571'E	139° 28.715'E
Depth (m):	81	58

2.1.7 HPD1407 Dive

Hyper-Dolphin Dive: HPD1407

HPD1407



Date: July 24, 2012

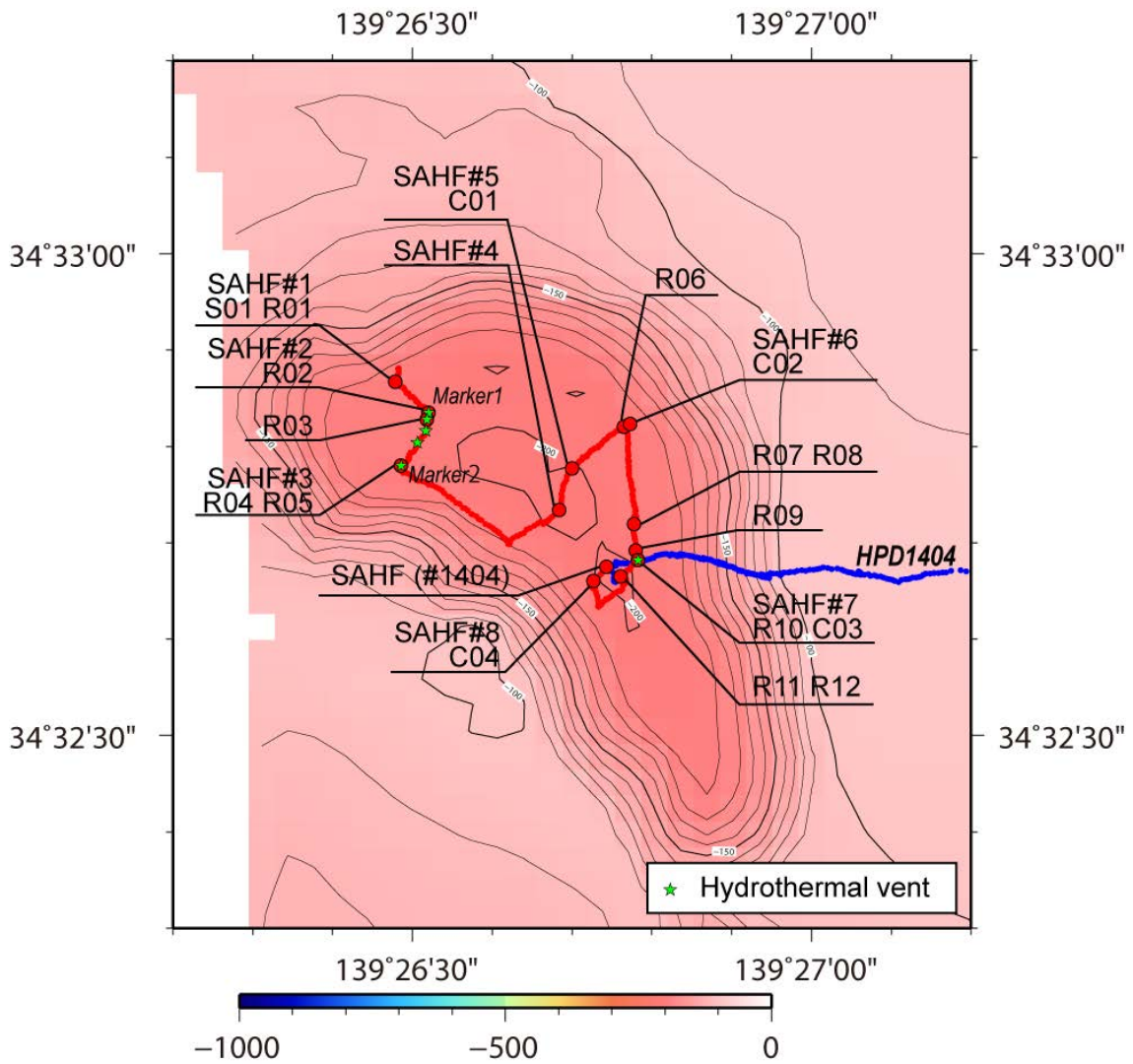
Location: North-eastern slope of Oomurodashi (south of HPD dive #1401)

Objectives: To further investigate and attempt to understand the diversity of rocks produced by Oomurodashi volcano.

DIVE #1407	On bottom	Off bottom:
Time (local):	11:36	16:06
Latitude:	34° 33.672'N	34° 35.595'N
Longitude:	139° 30.168'E	139° 29.629'E
Depth (m):	282	83

2.1.8 HPD1408 Dive

Hyper-Dolphin Dive: HPD1408 HPD1408



Date: July 25, 2012

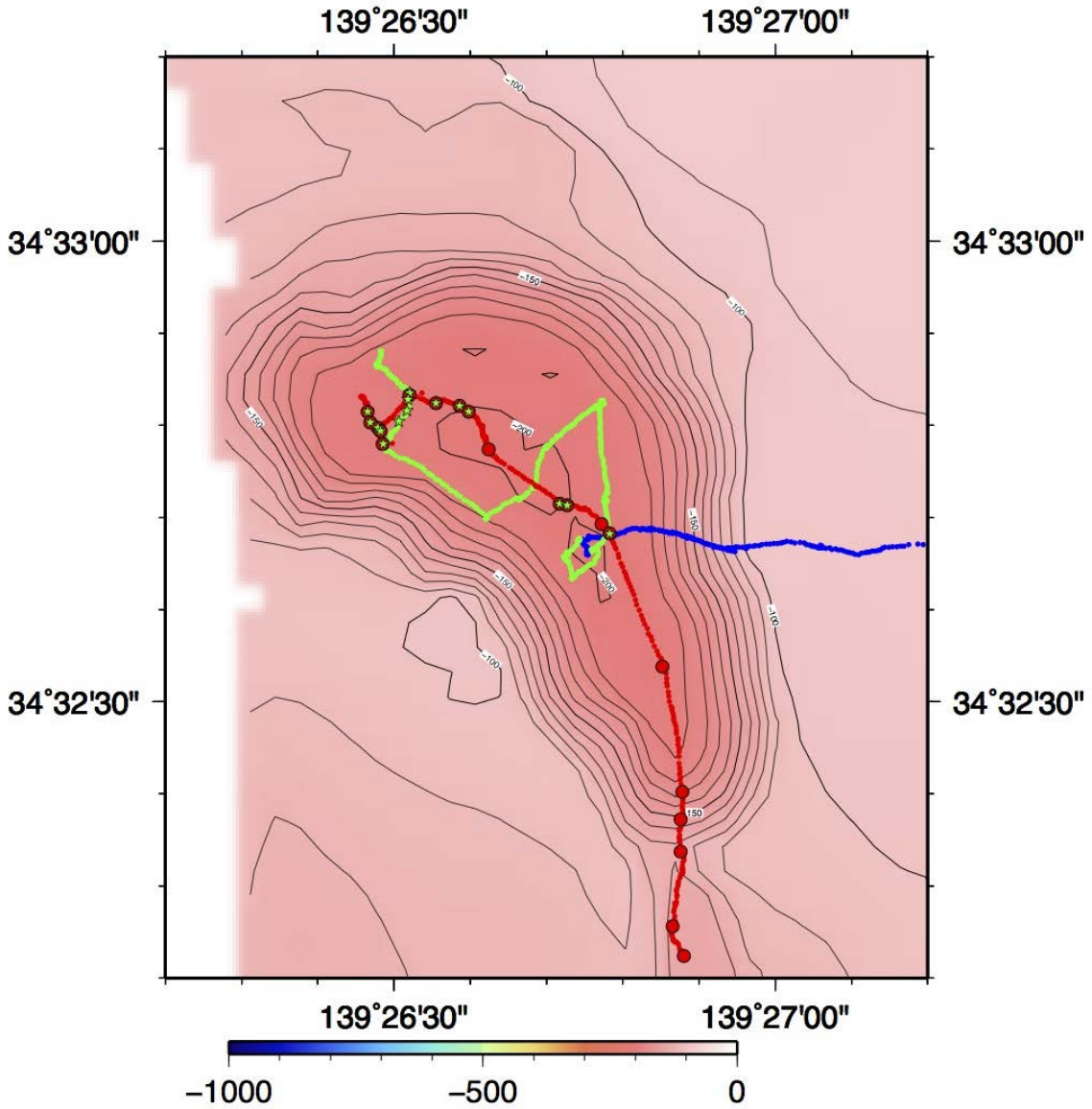
Location: Central pit of Oomurodashi

Objectives: Observe and sample the crater floor. Take heat flow measurements, and search for source of seismic anomaly in water column.

DIVE #1408	On bottom:	Off bottom:
Time (local):	09:12	16:24
Latitude:	34° 32.879'N	34° 32.675'N
Longitude:	139° 26.481'E	139° 26.743'E
Depth (m):	194	197

2.1.9 HPD1409 Dive

Hyper-Dolphin Dive: HPD1409



Date: July 26, 2012

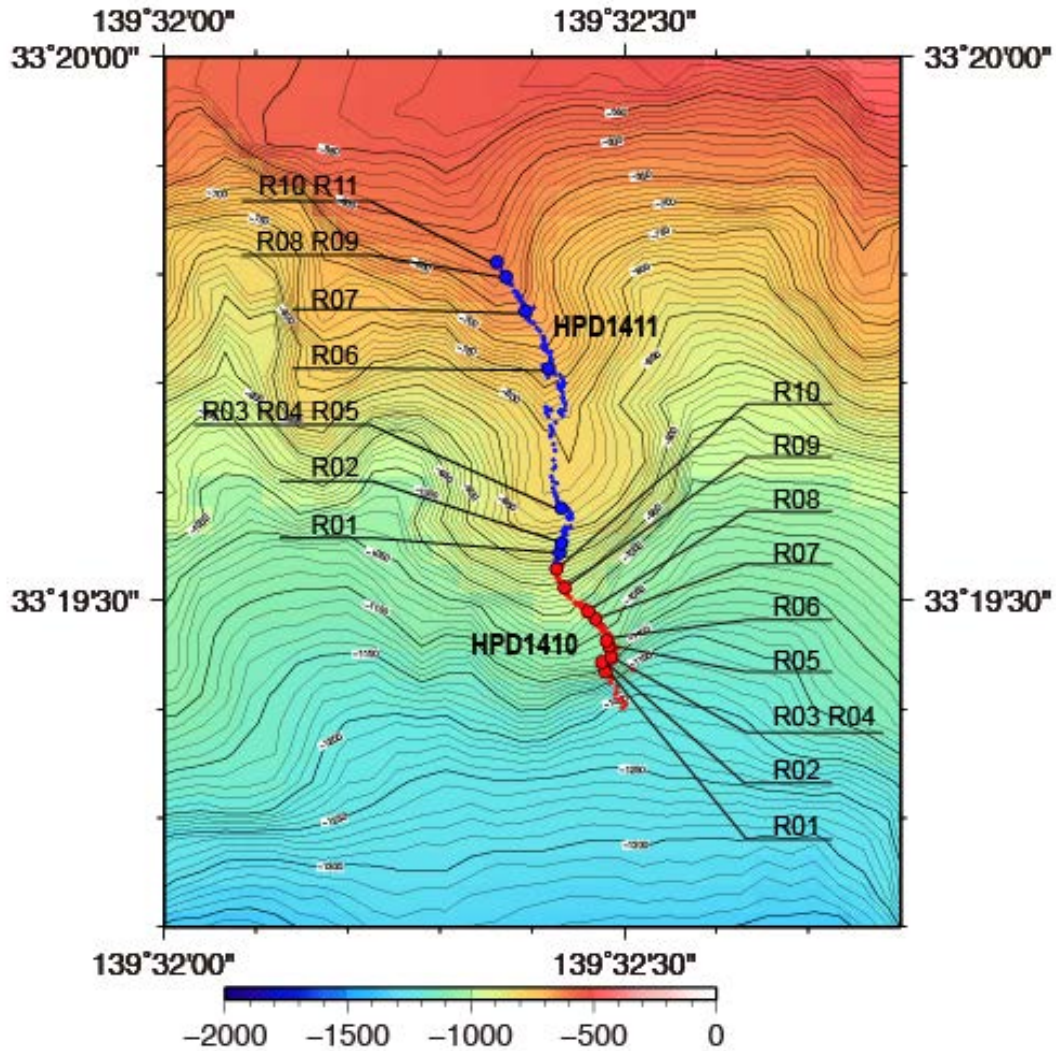
Location: Pit crater in the flat plain that forms the summit of Oomuradashi.

Objectives: To return to the active hydrothermal vent areas that we found on dive 1408 for temperature and heat flow measurements, as well as additional sampling both within the pit and up the southern wall.

DIVE #1409	On bottom:	Off bottom:
Time (local):	9:01	16:13
Latitude:	34°32'50"	34°32'12"
Longitude:	139°25'26"	139°26'54"
Depth (m):	192	134

Hyper-Dolphin Dive: HPD1410

HPD1410-1411



Date: July 28, 2012

Location: Kurose-Nishi

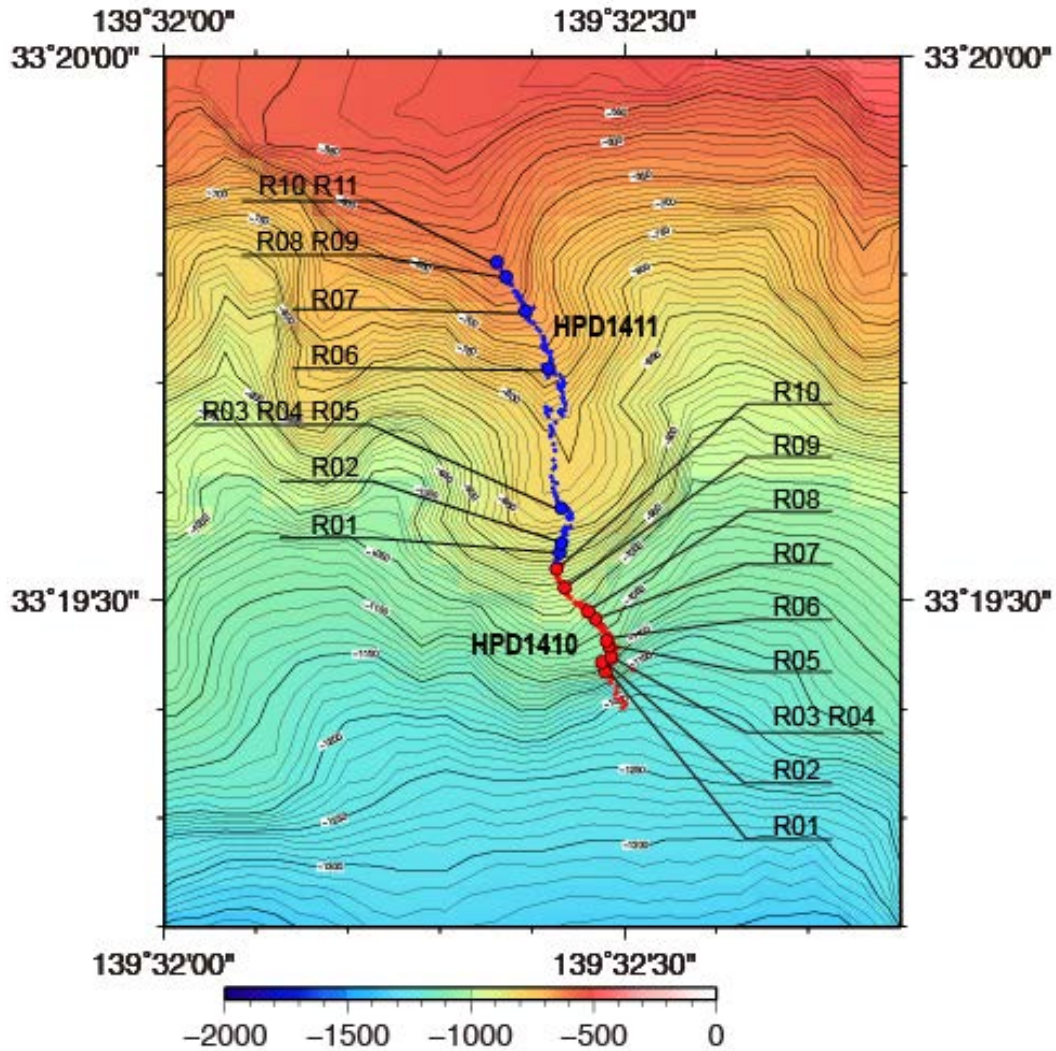
Objectives: To observe and sample the northern wall of the Kurose-Nishi caldera.

The seismic line from 2007 showed an interesting upper unit, which needs to be explored. To collect pumice from the caldera wall that can then be compared to pumice that litters the surrounding seafloor. This littering pumice deposit is thought to be linked to a recent eruption of Kurose-Nishi. It has hornblende in it, which may be an identifying characteristic.

DIVE #1410	On bottom:	Off bottom:
Time (local):	09:02	11:32
Latitude:	33° 19.401'N	33° 19.529'N
Longitude:	139° 32.499'E	139° 32.427'E
Depth (m):	1219	913

Hyper-Dolphin Dive: HPD1411

HPD1410-1411



Date: July 28, 2012

Location: Upper section of north caldera wall, Kurose Nishi Caldera (West Kurose Hole)

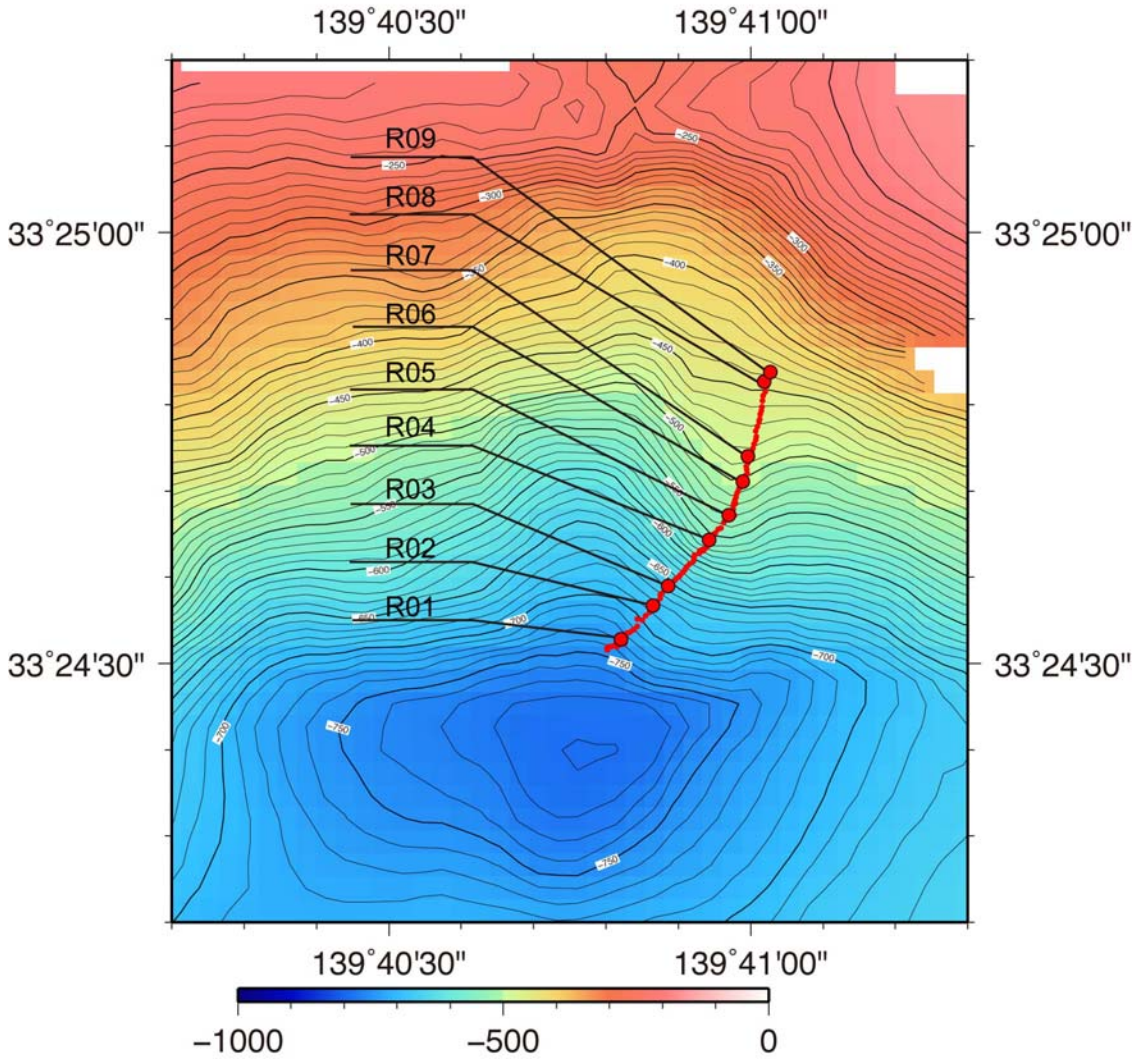
Objectives: Observe and collect samples from succession exposed in upper caldera wall.

DIVE #1411	On bottom:	Off bottom:
Time (local):	14.09	16.31
Latitude:	33° 19.528'N	33° 19.811'N
Longitude:	139° 32.422'E	139° 32.362'E
Depth (m):	910	605

2.1.12 HPD1412 Dive

Hyper-Dolphin Dive: HPD1412

HPD1412



Date: July 29, 2012

Location: Northern slope of Kurose Hole, the smaller crater in Kurose, to the north-east of Kurose-nishi Hole.

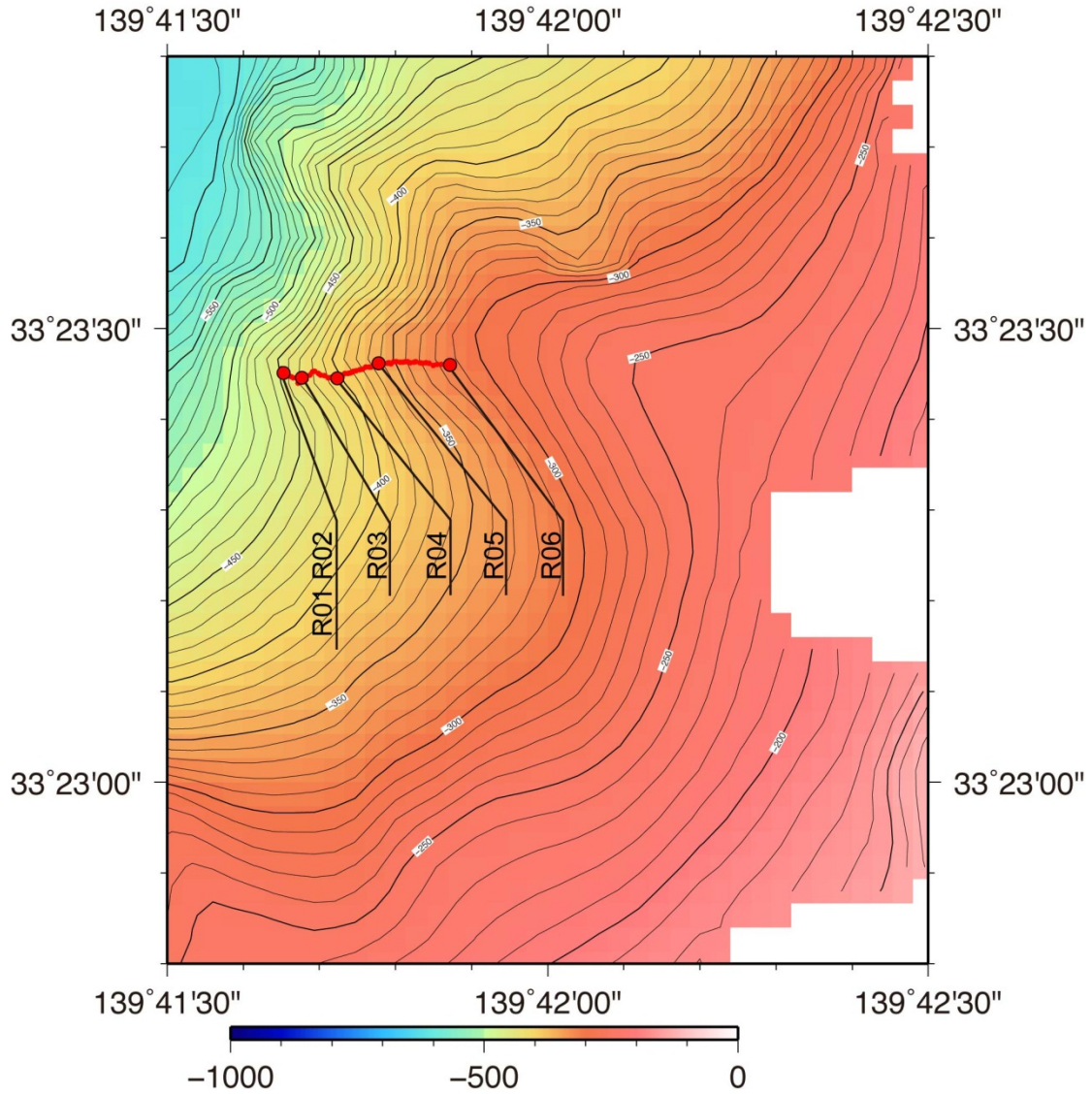
Objectives: To observe and sample material from Kurose Hole for the first time.

DIVE #1412	On bottom:	Off bottom:
Time (local):	09:44	11:47
Latitude:	33° 24.519'N	33° 24.827'N
Longitude:	139° 40.798'E	139° 41.027'E
Depth (m):	736	437

2.1.13 HPD1413 Dive

Hyper-Dolphin Dive: HPD1413

HPD1413



Date: July 29, 2012

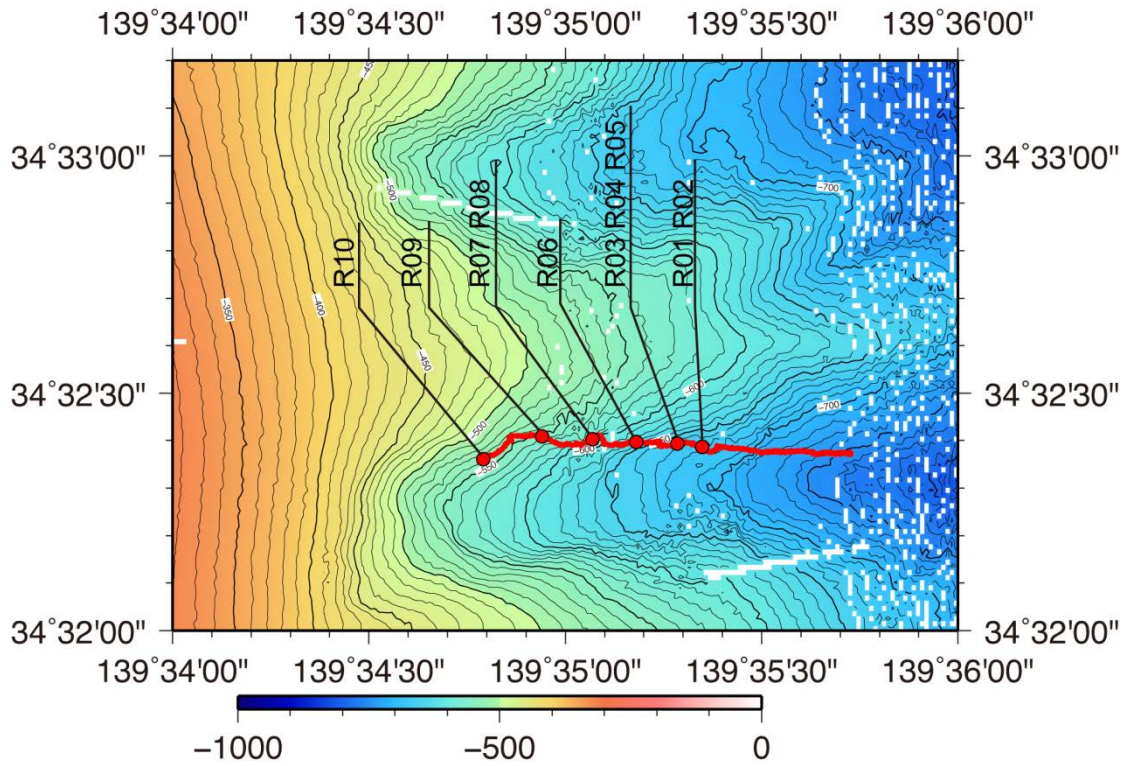
Location: Southern crater wall of Kurose Hole

Objectives: Observe and sample the crater wall. Search for source of seismic anomaly in water column.

DIVE #1413	On bottom:	Last recorded:
Time (local):	14:28	15:35
Latitude:	33° 23.456'N	33° 23.460'N
Longitude:	139° 41.649'E	139° 41.872'E
Depth (m):	444	311

2.1.14 HPD1414 Dive

Hyper-Dolphin Dive: HPD1414
HPD1414



Date: August 3, 2012

Location: Lower eastern slope of Oomurodashi

Objectives: Observe and sample the lower eastern slope of Oomurodashi.

DIVE #1414	On bottom:	Off bottom:
Time (local):	09:07	11:31
Latitude:	34° 32.374'N	34° 32.357'N
Longitude:	139° 35.732'E	139° 34.783'E
Depth (m):	746	542

3. Notice on using this cruise report

This cruise report is a preliminary documentation as of the end of the cruise. It may not be corrected even if changes on content (i.e. taxonomic classifications) are found after publication. It may also be changed without notice. Data on the cruise report may be raw or not processed. Please ask the Chief Scientist for the latest information before using.