doi : 10.17596/0003772

R/V Yokosuka and HOV Shinkai6500 Cruise Report YK23-12

Deep-sea soundscape investigation in Sagami Bay and Izu-Ogasawara Arc hydrothermal vent fields

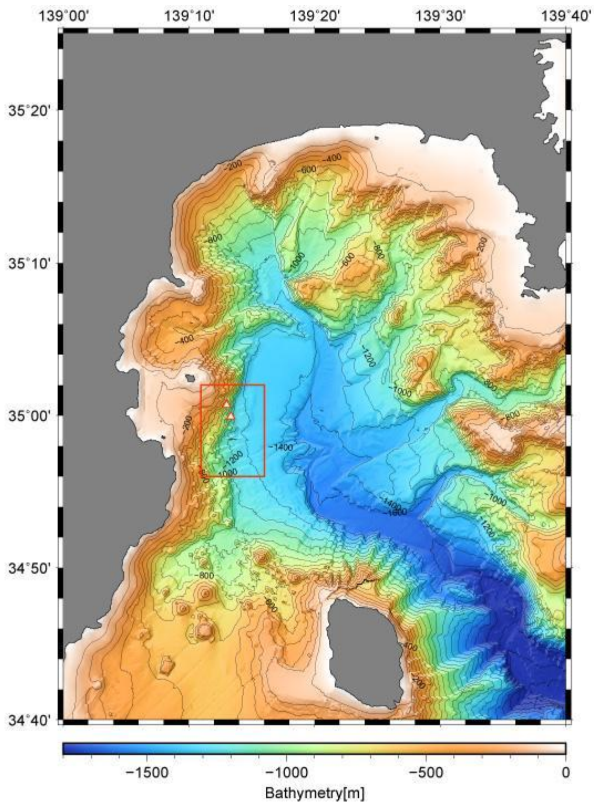
Sagami Bay and Izu-Ogasawara Arc

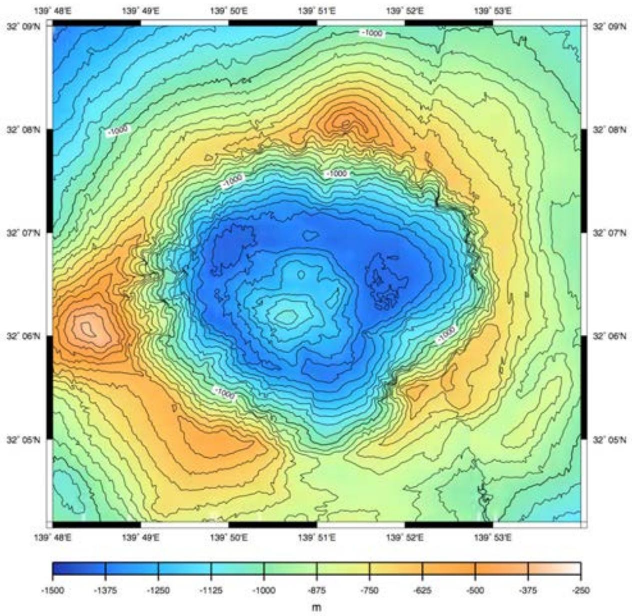
11 July 2023 – 18 July 2023

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

1. Cruise Information

- Cruise ID: YK23-12
- Name of vessel: R/V Yokosuka and HOV Shinkai6500
- Title of cruise: Deep-sea soundscape investigation in Sagami Bay and Izu-Ogasawara Arc hydrothermal vent fields
- Chief Scientist [Affiliation]: Ken TAKAI [X-star, JAMSTEC]
- Cruise period: From 11th July, 2023 to 18th July, 2023
- Ports of departure / call / arrival: Yokosuka / Yokosuka
- Research area: Off Hatsushima, Sagami Bay and Myojin Knoll, Izu-Ogasawara Arc
- Research map:





Left: Off Hatsushima, Sagami Bay, right: Myojin Knoll, Izu-Ogasawara Arc

2. Research Proposal and Science Party

- Title of main proposal: Deep-sea soundscape investigation in Sagami Bay and Izu-Ogasawara Arc hydrothermal vent fields with attracting new marine R&D supporters through experience at cutting-edge research at ocean (Ken TAKAI)
  Associated proposal by a graduate student: Construction of a model of the cellular morphological processes in the establishment of symbiosis between *Bathymodiolus* mussels and chemosynthetic bacteria (Ayu YUASA)
- Representative of Science Party [Affiliation]: Ken TAKAI [X-star, JAMSTEC]
- List of Participants

<u>Scientific party</u>

Chief Scientist
Dr. Ken Takai
Director General (Geomicrobiology)
Institute for Extra-cutting-edge Science and Technology Avant-garde Research (X-star)
Japan Agency for Marine-Earth Science & Technology (JAMSTEC)

Dr. Chong Chen
Research Scientist Science (Biology)
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Dr. Hiromi Watanabe
Associate Research Scientist (Biology)
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Mr. Masayuki Miyazaki
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Dr. Hiromi Kambara
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ExCELLS Fellow (Microbiology)
Deep-Sea and Deep Subsurface Life Research Group
Section for Exploration of Life in Extreme Environments
Exploratory Research Center on Life and Living Systems (ExCELLS)
National Institutes of Natural Sciences

Dr. Yu Nakajima
Young Research Fellow (Microbiology)
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Japan Agency for Marine-Earth Science & Technology (JAMSTEC)

Dr. Paulina Prondzinsly
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Ms. Ayu Yuasa
Graduate Student
Graduate School of Marine Science and Technology
Tokyo University of Marine Science and Technology (TUMSAT)

Mr. Yuikadu Ito
Undergraduate student
Research Institute for Global Change (RIGC)
Japan Agency for Marine-Earth Science & Technology (JAMSTEC)

Captain and crew of the R/V YOKOSUKA

Captain	NAKAMURA, Y.
Chief Officer	SHIRAYAMA, T.
2nd Officer	ASAJI, K.
3rd Officer	SAKAMOTO, R.
Jr. 3rd Officer	MATSUDA, R.
Chief Engnieer	IKUTA, S.
1st Engnieer	FUJII, K.
2nd Engnieer	IMOTO, T.
3rd Engnieer	SHIMIZU, K.
Jr.3rd Engineer	TERAKAWA, A.
Chief Radio Officer	MABARA, T.
2nd Radio Officer	ONIKUBO, R.
Boat Swain	ISOBE, H.
Quarter Master	OGASAWARA, K.
Quarter Master	CHIMOTO, T.
Quarter Master	NAGAI, H.
Quarter Master	NASU, K.
Quarter Master	KOJIMA, S.
Sailor	MATSUDA, T.
No.1 Oiler	MORI, J.
Oiler	FUJIWARA, M.
Oiler	SUZUKI, R.
Assistant Oiler	FUJISHIMA, T.
Assistant Oiler	DANTSUKA, A.
Chief Steward	HONDA, S.
Steward	NAGATOMO, T.
Steward	KASHIWAGI, K.
Steward	NAKANO, M.
Steward	FUJIMOTO, Y.

"Shinkai6500" Operation Team

Operation Manager	CHIBA, K.
Deputy Op. Manager	MATSUMOTO, K.
1st Submersible Staff	KONDO, T.
1st Submersible Staff	ISHIKAWA, A.
1st Submersible Staff	SAITO, F.
2nd Submersible Staff	SAIGO, R.
2nd Submersible Staff	ONISHI, T.
2nd Submersible Staff	KURAMOTO, Y.
2nd Submersible Staff	IIJIMA, S.
2nd Submersible Staff	MINAMINO, N.
3rd Submersible Staff	MATSUSAKA, M.
3rd Submersible Staff	ICHINOSE, D.

3. Research/Development Activities

The YK23-12 cruise aimed to establish a deep-sea soundscape baseline in specific deep-sea ecosystems around Japan. These ecosystems included deep-sea low- and high-temperature hydrothermal fields that host biological communities relying on chemosynthetic primary production. The cruise involved four HOV Shinkai6500 dives conducted at Off Hatsushima in Sagami Bay and Myojin Knoll on the Izu-Ogasawara Arc.

During the dives, hydrophones were deployed and recovered to collect soundscape data. Additionally, samples of mega-, macro-, and meio-fauna, as well as microbes in sediment cores and waters, were collected from the studied sites to describe the ecosystem. All collected samples will be analyzed in shore-based laboratories to establish the soundscape baseline and to characterize the specific deep-sea ecosystem around Japan.

The following project was also carried out in the YK23-12 cruise, as a joint use with the participation of graduate students; “Construction of a model of the cellular morphological processes in the establishment of symbiosis between *Bathymodiolus* mussels and chemosynthetic bacteria”, proposed by A. Yuasa in Tokyo University of Marine Science and Technology.

Dive reports

6K#1704 DIVE (Off Hatsushima) Dr. CHEN, C. and Ms. YUASA, A.
6K#1705 DIVE (Myojin Knoll) Dr. TAKAI, K. and Ms. MASUKAWA, H.
6K#1706 DIVE (Myojin Knoll) Dr. KAMBARA, H.
6K#1707 DIVE (Off Hatsushima) Dr. NAKAJIMA, Y.

Dive Report: Shinkai6500 #1704
Date: July 12, 2023
Site: Off Hatsushima seep, Sagami Bay
Landing: 10:45, 35° 0.9791' N,139° 13.6335' E, D = 1125 m
Leaving: 16:24, 35° 0.9687' N,139° 13.4993' E, D = 805 m
Observer: Chong CHEN (JAMSTEC), Ayu YUASA (TUMSAT)
Pilot: Takuma ONISHI

Objectives:

The objectives of this dive were to 1) deploy a hydrophone and 2) collect fluid samples, core samples, and animals associated with chemosynthetic activity in the Off Hatsushima seep site, Sagami Bay.

Dive summary:

First, Shinkai6500 reached the bottom far from planned landing point about 150m North East at 10:41 a.m., so we started sailing to The Real Bomberhead at 10:46 a.m. The bottom condition was concretion covered with mud. At 11:13, Shinkai6500 reached The Real Bomberhead. We searched for *Shinkaia crosnieri* but it couldn't be seen. After that, we found *Otukaia kiheiziebisu* which is rare, so we tried to catch that by slurp gun and we got that. Another that one is found, but it couldn't catch because of the angle of Shinkai6500. At 11:44 a.m., we caught *Conchocele bisecta*. After, we caught many organisms on the tubeworm to No.1 canister. At 11:56 a.m., we started to measure DO and stopped at 11:59 a.m. At 0:01p.m., we collected tubeworm.

After that, we started sailing to *Bathymodiolus* site passing through *Lamellibrachia* tubeworm colonies. At 0:35 p.m., we started observation to try to find and catch *Bathymodiolus aduloides.* We measured DO from 0:45 p.m. to 0:48 p.m. After measuring DO, we caught some mussels to No.2 multiple canister and measured DO, but they were elongated *Bathymodiolus japonicus* and not *B. aduloides*.

At 1:12 p.m., we suction sampled organisms living on the tubeworm to No.2 multiple canister and caught tubeworm to the right basket sample box at 1:23 p.m. We started sailing again to *Bathymodiolus* site and we reached *Bathymodiolus* colony at 1:41 p.m. At 2:03 p.m., we found the slurp gun's hose was broken. We tried to catch mussels using slurp gun, but couldn't. From 2:04 p.m. to 2:07 p.m., we measured DO and caught *Calyptogena* to fixation box. Since slurp gun hose was broken, we caught *Bathymodiolus japonicus* and *Bathymodiolus platifrons* to fixation box instead using manipulator. At 2:57 p.m., we found the fixation box's handle was broken, so we had to hold down the box by manipulator.

We started sailing to vesicomyid clam colony at 2:57 p.m. and reached at 3:03 p.m. We tried to sample water using MJ-type water sampler, but its windmill didn't work. We checked the sampler by sucking surface of the mud, and it seemed to actually work fine. So, from 3:27 p.m. to 3:32 p.m., we started to sample water from close to seafloor surface by MJ-type water sampler (red) and closed the valve at 3:33 p.m. After, we sampled No.1 core at the same point as MJ (red), but because the bottom condition was hard, the core was very short. We sampled No.2 core just forward of No.1 core at 3:42 p.m. This time, it could catch almost full length. At 3:44 p.m., we sampled No.3

core in front of No.2 core. At 3:46 p.m., we sampled No.4 core but this one also only got small amount of sediment like No.1 core. From 3:55 p.m. to 4:00 p.m., we sampled water from close to seafloor surface by MJ-type water sampler (green) and closed the green valve. At 4:02 p.m. No.5 core was sampled and at 4:03 p.m., No.6 core was sampled. At 4:08, we set hydrophone near the vesicomyid clam colony.

We prepared to leave the bottom at 4:15 p.m. and completed preparing at 4:17 p.m. We started sailing to East to throw away ballast. At 4:24 p.m., we left the bottom and reached surface at 4:44 p.m.

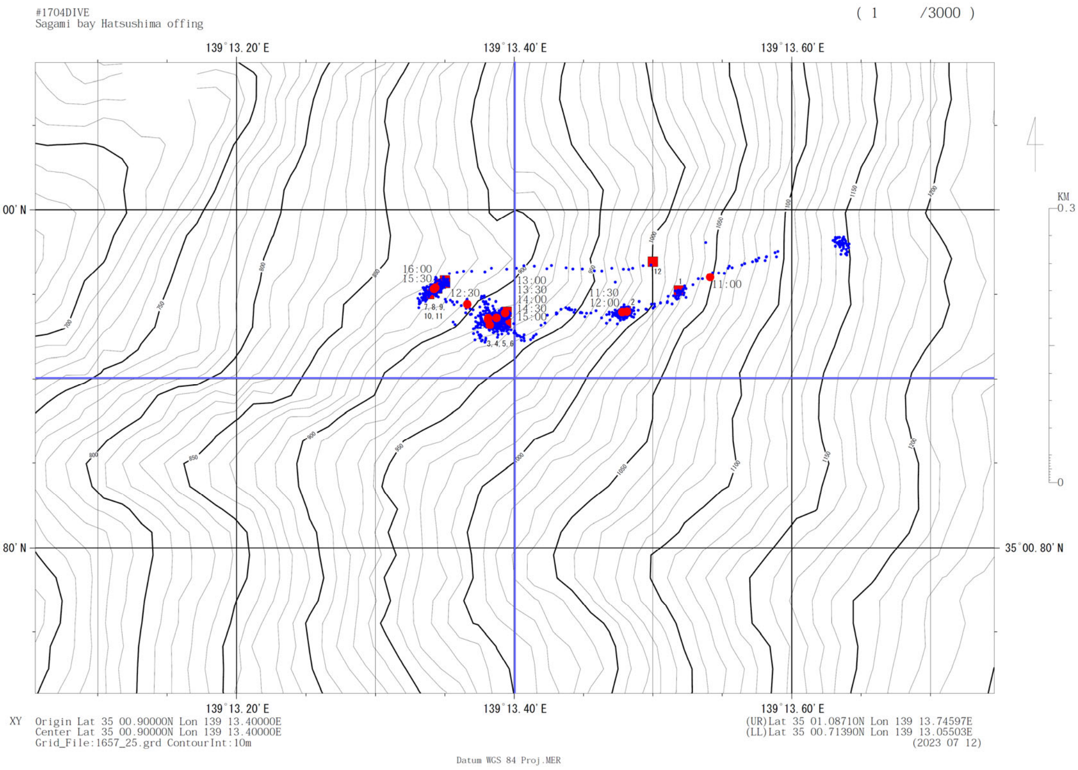
Payloads:

- Suction sampler with multiple canisters
- DO sensor
- MJ water sampler (x2)
- Niskin sampler (2.5 l)
- Hydrophone
- Sample box (x2)
- MBARI corer (x6)
- Bag water sampler

Event list:

10:45	35° 0.9791' N,139° 13.6335' E, D = 1125 m, "Landing"
12:03	35° 0.9393' N,139° 13.4798' E, D = 956 m, "Sampling Mussels, Animal, Measurement DO"
13:23	35° 0.9313' N,139° 13.3854' E, D = 902 m, "Measurement DO, Sampling Mussels, Tubeworm"
14:14	35° 0.9390' N,139° 13.3942' E, D. = 906 m, "Measurement DO, Sampling Mussels, Calyptogena"
14:35	35° 0.9322' N,139° 13.3936' E, D = 905 m, "Sampling Mussels, Rock"
14:57	35° 0.9361' N,139° 13.3880' E, D = 904 m, "Sampling Mussels"
15:07	35° 0.9492' N,139° 13.3385' E, D = 849 m, "Sampling Niskin Alt=5 m"
15:33	35° 0.9555' N,139° 13.3468' E, D = 855 m, "Sampling MJ (Red)"
15:39	35° 0.9574' N,139° 13.3495' E, D = 855 m, "Sampling Core (#1)"
15:50	35° 0.9560' N,139° 13.3500' E, D = 855 m, "Sampling Core (#2~#4)"
16:08	35° 0.9525' N,139° 13.3443' E, D = 855 m, "Sampling MJ (Green), Core (#5, #6), Set Hydrophone"
16:24	35° 0.9687' N,139° 13.4993' E, D = 805 m, "Left bottom Alt=170m"

Dive track of 6K#1704



Dive Report: Shinkai6500 #1705
Date: July 15, 2023
Site: Myojin Knoll
Landing: 11:06, 32˚ 06.308' N, 139˚ 52.0317' E, D = 1349 m
Leaving: 15:59, 32˚ 06.1823' N, 139˚ 52.0858' E, D = 1191 m
Observer: Ken TAKAI (JAMSTEC), Hinako MASUKAWA (JAMSTEC/Univ. Tokyo)

Objectives:
The objectives of this dive are to deploy hydrophone, collect chimney samples, hydrothermal mixing fluids, core samples, and chemosynthetic animals in the Myojin Knoll hydrothermal fields.

Dive summary:

We landed on the muddy and sandy seafloor about 150 m west from the Wakai EMES site. First, we obtained 2 MBARI core samples at the landing point and then headed to east.

After several 10s meters east from the landing point, we found microbial mats. Further 100 m east, we encountered chimney alignment along a crack parallelly caldera slope (north-south direction), and first obtained Niskin water sample at 1 m above the chimney. Then we landed in front of chimney sequence. We collected pieces of several active chimneys, several dead chimneys and a rock bearing mussels here. We also obtained the diffusing fluids in MJ sampler (500 ml) and Bag sampler (1000 ml).

200 m east from the chimney site, we found the Wakai EMES site and set a hydrophone near the Wakai EMES and at a position of 6 m deeper than EMES site, we deployed a marker.

300 m south from the Wakai EMES site, we finally found the Wakai mussel site and mussel cliff site. Here, we measured DO values of barnacles' colony, polychaetes' colony and mussels' colony, and animal individuals at each of colonies. We also tried to collect other animals and chimneys here but collapse of dead chimney happened.

After the escape from the mussels' cliff, we headed to the Daimyojin chimney. Unfortunately, however, we did not arrive at the Daimyojin in our dive schedule. Then we left the bottom.

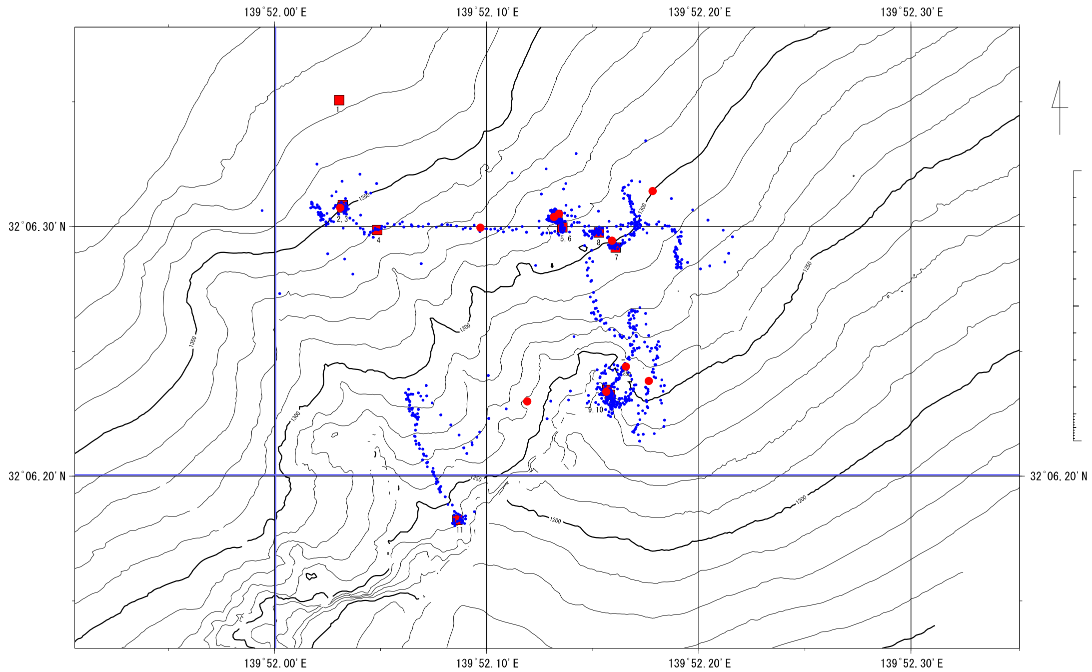
Payloads:

- Suction sampler with 6 canister
- DO meter
- MJ water sampler
- Niskin sampler
- Hydrophone
- Sample box (x2)
- MBARI corer (x2)
- Bag sampler

Event list:

11:06	32° 06.3080' N, 139° 52.0317' E, D = 1349 m	Landing
11:16	32° 06.3079' N, 139° 52.0315' E, D = 1349m	MBARI core samples (x2)
11:22	32° 06.2985' N, 139° 52.0479' E, D = 1340m	Found microbial mats
11:43	32° 06.2995' N, 139° 52.1352' E, D = 1308m	Found a chimney site and took a Niskin sample
12:16	32° 06.3036' N, 139° 52.1328' E, D = 1311m	Collected active chimneys, dead chimneys, a rock and hydrothermal fluids with MJ and Bag sampllers
13:29	32° 06.2916' N, 139° 52.1603' E, D = 1294m	Set a hydrophone
13:38	32° 06.2974' N, 139° 52.1525' E, D = 1299m	Set a marker
15:02	32° 06.2342' N, 139° 52.1563' E, D = 1237m	Collected barnacles, polychaetes, mussels and measured DO of their colonies
15:59	32° 06.1823' N, 139° 52.0853' E, D = 1191m	Left Bottom

Dive track of 6K#1705



Dive Report: Shinkai6500#1706

Date: July 16, 2023
Site: Myojin Knoll
Landing: 11:05, 32° 6.3981' N, 139° 52.0090' E, D = 1391 m
Leaving: 15:56, 32° 6.1897' N, 139° 52.0345' E, D = 1232 m
Observer: Hiromi KAMBARA (JAMSTEC)

Objectives:
The objectives of this dive are to retrieve a hydrophone and collect chimney samples, hydrothermal mixing fluids, core samples, and chemosynthetic animals in the Myojin Knoll hydrothermal fields.

Dive summary:
We landed on the muddy and sandy seafloor about 80 m northwest of the Landing target at 11:05. The temperature of the ambient seawater at the bottom was 4.2ºC. We stayed here for about 35 minutes due to a malfunctioning gyroscope. Despite our efforts, we were unable to recover the gyroscope and had to rely on a compass for navigation.

We headed to the Hydrophone site near the Wakai EMS site. Along the way, we encountered several microbial mats; however, we decided not to sample them as our priority was to recover the hydrophone. We found the hydrophone itself was 6 m shallower than the marker. We retrieved the hydrophone with two rods for fixing it, leaving the marker there.

80 m south of the hydrophone site, we found the mussels' cliff. We collected animals: mussel, Barnacle, Polychaeta, and Crab. DO was measured at each sampling site where animals were collected. We also collected several dead chimneys.

60 m northwest of the mussels' cliff at a bearing of 300º, we encountered a relatively large active chimney. The maximum temperature of the vent was about 240ºC. Here, we collected two kinds of hydrothermal mixing fluids in red MJ sampler (50–100ºC) and green MJ sampler (12–60ºC). While we were able to collect the upper part of the chimney, our attempts to collect a larger part resulted in the collapse and loss of the lower part. Due to this collapse, the water became muddy. After that, we obtained Niskin sample 2 m above the chimney at an altitude of 16 m, which had a temperature of 4.3ºC and was not muddy.

75 m southwest of the chimney site at a bearing of 240º, we obtained four MBARI core samples from almost identical areas. These areas showed no color

changes.

40 m southwest of the core sampling sites, we finally found the Daimyojin. Then we left the bottom at 15:56.

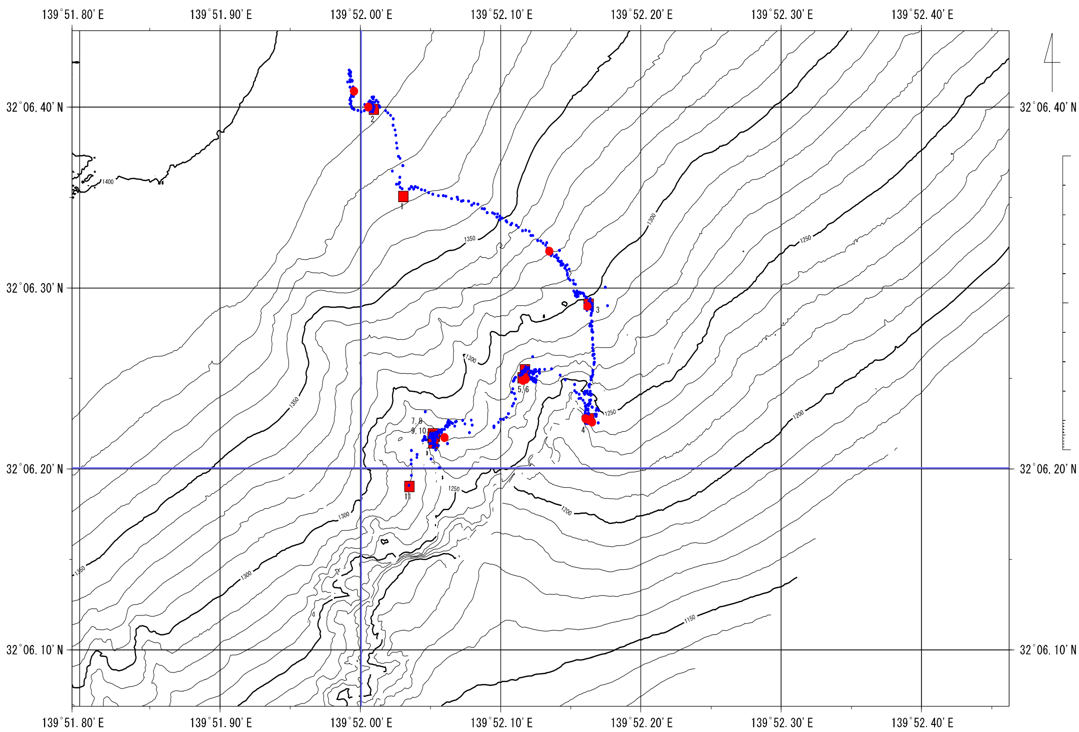
Payloads:

- Suction sampler with 6 canister
- DO meter
- MJ water sampler
- Sample box [x2]
- 6k marker [x2]
- MBARI sampler [x6]
- Peristaltic Pump
- Niskin water sampler [5Lx1]
- Slurp gun
- Hydrophone (retrieved)
- Bag sampler

Event list:

11:05	32° 6.3981' N, 139° 52.0090' E, D = 1391 m	Landing
12:27	32° 6.2904' N, 139° 52.1621' E, D = 1294 m	Retrieve Hydrophone
14:07	32° 6.2270' N, 139° 52.1624' E, D = 1237 m	Sampling Animals, Sampling Polychaeta, Measurement DO, Sampling Chimney, Sampling Crab, Sampling Barnacle
15:10	32° 6.2497' N, 139° 52.1151' E, D = 1253 m	Measurement Temperature (60degree, Sampling Water (Red, Green), Sampling Chimney
15:14	32° 6.2541' N, 139° 52.1168' E, D = 1252 m	Sampling NISKIN
15:37	32° 6.2188' N, 139° 52.0513' E, D = 1279 m	Sampling core (#5)
15:38	32° 6.2175' N, 139° 52.0525' E, D = 1278 m	Sampling core (#6)
15:44	32° 6.2167' N, 139° 52.0509' E, D = 1279 m	Sampling core (#2, #3)
15:51	32° 6.2137' N, 139° 52.0515' E, D = 1242 m	Finding Daimyojin (Summit)
15:56	32° 6.1897' N, 139° 52.0345' E, D = 1232 m	Left Bottom

Dive track of 6K#1706



Dive Report: Shinkai6500#1707
Date: July 17, 2023
Site: Off Hatsushima seep, Sagami Bay
Landing: 10:43, 35° 0.893' N, 139° 13.4759' E, D = 1018 m
Leaving: 15:35, 35° 0.1197' N,139° 13.4575' E, D = 1133 m
Observer: Yu NAKAJIMA (JAMSTEC)
Pilot: Ryo SAIGO; **Co-Pilot**: Motohiro MATSUSAKA

Objectives:
The objectives of this dive are to retrieve a hydrophone and collect bacterial mat core sample in the off Hatsushima seep, Sagami Bay.

Dive summary:
We landed on the muddy and sandy seafloor about 100 m southwest from the Landing target. First, we move to retrieve a hydrophone from the vesicomyid clam colony. We measured DO values at this point.

After retrieving the hydrophone, we moved a few meters to the northeast and sampled reference core sample. After that, we move towards the old station site and explored bacterial mats.

We found a bacterial mat around the old Off Hatsushima observation station, but we could not collect mat. After searching for it in laps, an orange mat was found, and we would set the sampling point. We collected water sample with Niskin bottle.

After that, we measured DO values, collected water sample with MJ water sampler, and bacterial mat core samples above orange bacterial mat.

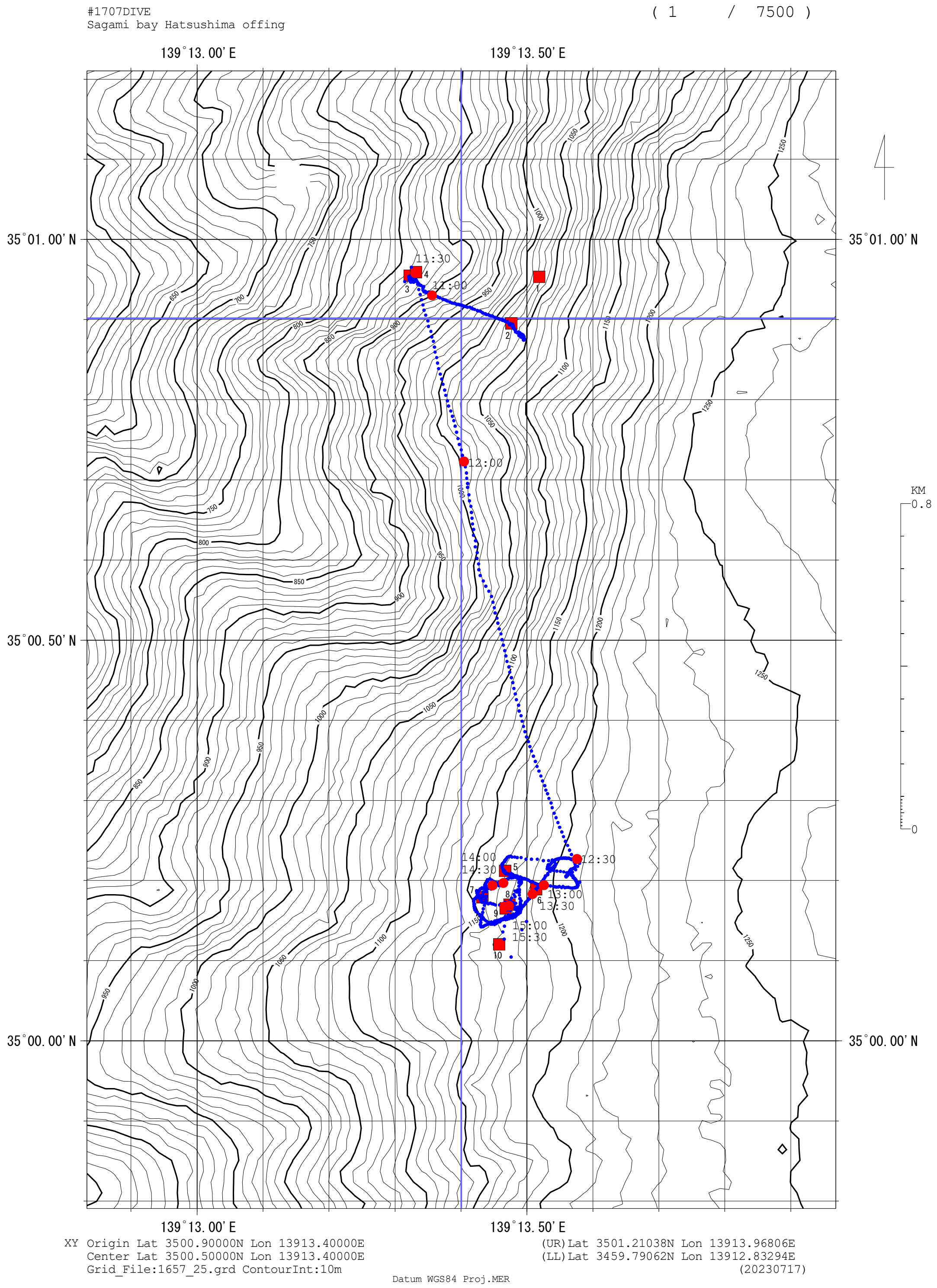
We move a few meters behind, and we collected sample with slurp gun. That was all of this dive sampling. We move about 100m to the south to left bottom.

Payloads:
- Suction sampler with 6 canister
- DO meter
- MJ water sampler
- Sample box [x2]
- MBARI sampler [x6]
- Peristaltic Pump
- Niskin water sampler [5Lx1, 2.5Lx1]
- Slurp gun
- Hydrophone (retrieved)
- Bag sampler

Event list:

10:43 35° 0.8937' N, 139°13.4759' E, D = 1018 m, "Landing"
11:20 35° 0.9529' N, 139°13.3220' E, D = 854 m, "Retrieve Hydrophone"
11:40 35° 0.9575'N, 139° 13.3313'E, D = 852 m, "Sampling Core (#1), Measurement DO"
13:09 35° 0.2113' N, 139°13.4664' E, D = 1159 m, "Finding Bacteria Mat"
13:27 35° 0.1884' N, 139°13.5135' E, D = 1181 m, "Finding Donet Cable"
13:46 35° 0.1782' N, 139°13.4320' E, D = 1153 m, "Finding Bacteria Mat"
14:57 35° 0.1691' N, 139°13.4730' E, D = 1171 m, "Sampling Niskin"
15:25 35° 0.1646' N, 139° 13.4669' E, D = 1170 m, "Measurement DO, Sampling Water (Red, Green), Core(#2~#4), Bacteria Mat"
15:35 35° 0.1197' N, 139° 13.4575' E, D = 1133 m, "Left Bottom Alt = 30m"

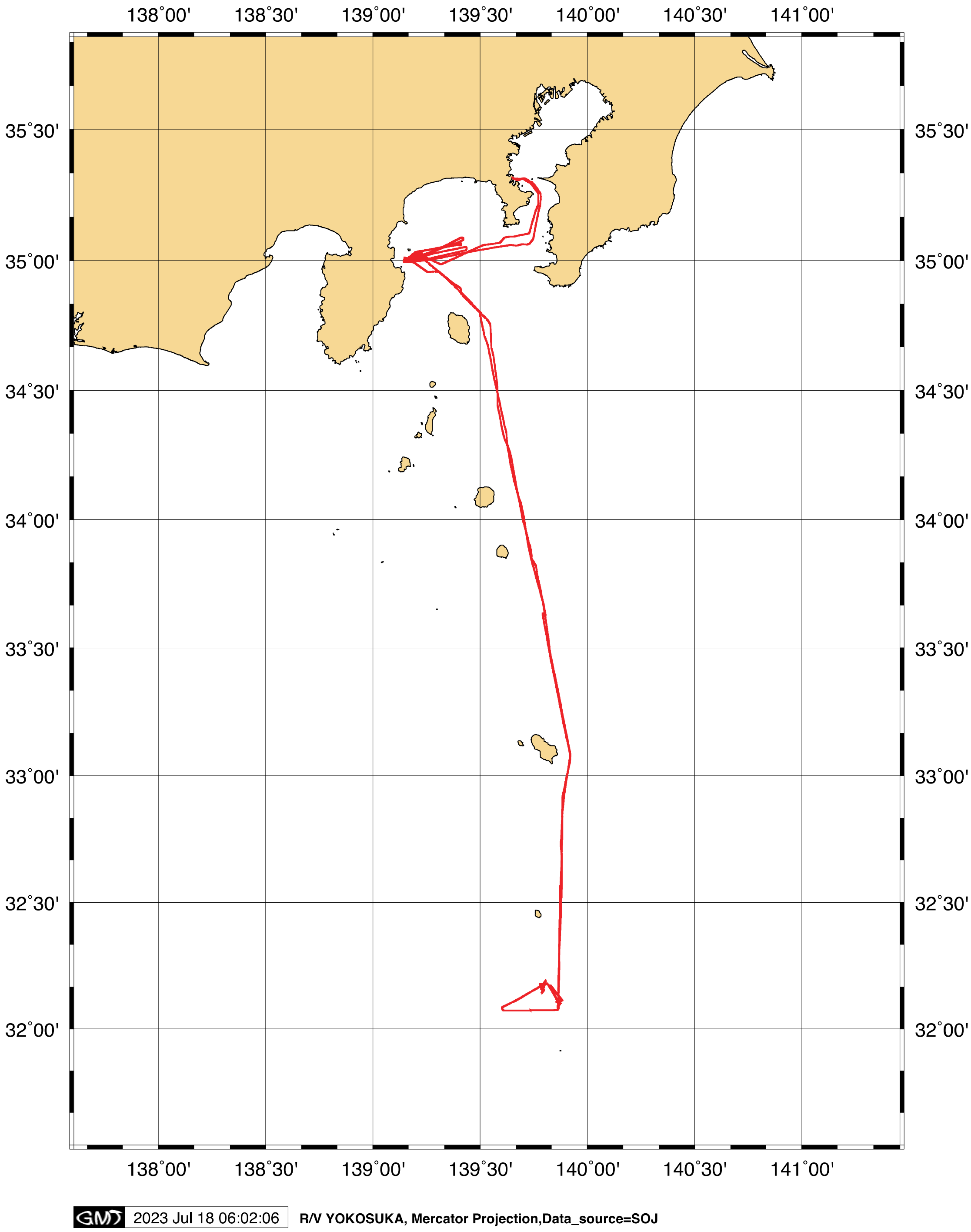
Dive track of 6K#1707



4. Cruise Log

Date / Time	Descriptions	Weather, Wind and Sea condition
2023/07/11 Tue.	**Noon Position: 35-05.2N, 139-36.7E (South of Jogashima)**	**bc / SW-3 / 1**
8:00	All scientists went aboard	
8:15	Shifted from NISSAN Dock to JAMSTEC	
8:45	Arrived at JAMSTEC and loaded SHINKAI6500	
9:40	Let go all shore lines and left JAMSTEC for research area	
10:30 - 11:00	Research meeting (Shinkai6500 operation team and scientists)	
13:15 - 14:00	Carried out education and training for scientists	
14:00 - 16:00	SHINKAI6500 briefing	
18:00 - 18:30	Research meeting (scientists only)	
2023/07/12 Wed.	**Noon Position: 35-01.0N, 139-13.5E (Sagami bay Hatsushima offing)**	**bc / SW-4 / 1**
9:49	Hoisted up SHINKAI6500	
9:56	Launched	
10:03	SHINKAI 6500 dove and started her operation #1704	
10:45	Landed on the sea floor (D=1125m)	
16:24	Left the sea bottom (D=805m)	
16:43	Refloated	
17:17	Recovered SHINKAI 6500	
19:00 - 19:30	Research meeting (scientists only)	
2023/07/13 Thu.	**Noon Position: 34-59.9N, 139-10.5E (Sagami bay Hatsushima offing)**	**o / SW-3 / 1**
	SHINKAI6500 Maintainance day	
18:00 - 18:30	Research meeting (scientists only)	
2023/07/14 Fri.	**Noon Position: 35-00.1N, 139-11.3E (Sagami bay Hatsushima offing)**	**c / East-2 / 1**
	SHINKAI6500 Maintainance day	
12:00	Commenced proceeding to research area (Myojin Knoll)	
18:00 - 18:30	Research meeting (scientists only)	
2023/07/15 Sat.	**Noon Position: 32-06.3N, 139-52.0E (Myojin Knoll)**	**bc / SW-4 / 2**
9:57	Hoisted up SHINKAI6500	
10:05	Launched	
10:13	SHINKAI 6500 dove and started her operation #1705	
11:06	Landed on the sea floor (D=1349m)	
15:59	Left the sea bottom (D=1191m)	
16:27	Refloated	
16:52	Recovered SHINKAI 6500	
18:30 - 19:00	Research meeting (scientists only)	
2023/07/16 Sun.	**Noon Position: 32-06.4N, 139-52.1E (Myojin Knoll)**	**bc / SW-4 / 1**
9:54	Hoisted up SHINKAI6500	
10:00	Launched	
10:08	SHINKAI 6500 dove and started her operation #1706	
11:05	Landed on the sea floor (D=1391m)	
15:56	Left the sea bottom (D=1232m)	
16:25	Refloated	
16:52	Recovered SHINKAI 6500	
17:40	Commenced proceeding to research area (Sagami bay)	
18:15 - 18:45	Research meeting (scientists only)	
2023/07/17 Mon.	**Noon Position: 35-00.8N, 139-13.3E (Sagami bay Hatsushima offing)**	**bc / WNW-1 / 1**
9:49	Hoisted up SHINKAI6500	
9:56	Launched	
10:04	SHINKAI 6500 dove and started her operation #1707	
10:43	Landed on the sea floor (D=1018m)	
15:35	Left the sea bottom (D=1133m)	
16:01	Refloated	
16:25	Recovered SHINKAI 6500	
18:00 - 18:30	Research meeting (scientists only)	
2023/07/18 Tue.	**Noon Position: 35-03.1N, 139-35.0E (South of Jogashima)**	**bc / SW-3 / 1**
10:45	Commenced proceeding to JAMSTEC	
15:00	Sent out 1st shore line, arrived at JAMSTEC, then completed voy. No. YK23-12	

YK23−12 NavTrack



5. Notice on Using

This cruise report is a preliminary documentation as of the end of cruise.
This report is not necessarily corrected even if there is any inaccurate description (i.e. taxonomic classifications). This report is subject to be revised without notice. Some data on this report may be raw or unprocessed. If you are going to use or refer the data on this report, it is recommended to ask the Chief Scientist for latest status.
Users of information on this report are requested to submit Publication Report to JAMSTEC.

http://www.godac.jamstec.go.jp/darwin/explain/1/e#report
E-mail: submit-rv-cruise@jamstec.go.jp