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R/V *Kaimei* /ROV *KM-ROV* Cruise Report

KM20-09

Sagami Bay & Suruga Bay

Nov. 14, 2020–Nov. 22, 2020

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

Contents

Abstract

To understand the current situations of marine plastics and to acquire reference information on environmental DNA researches by use of deep-sea pumped water, ROV dives, CTD casts, neuston net sampling, and bait-camera casts were conducted in Sagami and Suruga Bays from November 14, 2020 to November 22, 2020.

Twelve ROV dives were conducted off Akazawa, off Hatsushima in Sagami Bay and off Yaizu in Suruga Bay. Five dives were conducted off Akazawa around the water intake of the DHC deep-sea water pumping facility at a depth of 800 m to observe the installation status of the intake tower on the seafloor and the benthic fauna around the intake. The tower was upright on the seafloor, and several *Nealotus tripes* (Furaikamasu) were seen under the tower. Two dives were conducted at hydrocarbon seeps off Hatsushima at depths between 850 and 950 m, and collected *Bathymodiolus* mussels for studies on microplastic acquisition. Five dives were conducted off Yaizu around the water intake of the Shizuoka deep-sea water pumping facility. The inlet laid on the seafloor beside a large outcrop. Several deep cracks were seen around the inlet, and *Helicolenus hilgendorfi* (Yumekasago), *Physiculus japonicus* (Chigodara), conger eels, *Harpadon microchir* (Mizutengu), *Dalatias licha* (Yoroizame), and *Chlamydoselachus anguineus* (Rabuka) were seen around the inlet during the dives.

Six CTD casts were conducted off Akazawa and off Yaizu for environmental DNA analyses at the maximum depths of 800 and 390 m, respectively. A total of 18 surface net tows were conducted in both bays. Microplastics were confirmed in the net samples at all the stations. At St. 1 in Sagami Bay, the third net towing encountered a current rip, resulting in a significantly higher number of micro- and macro-plastics. A considerable number of microplastics was also observed at St. 4 in Suruga Bay probably because it was located at the edge of the main current of Kuroshio that generally brings a large amount of debris. Two baited cameras were deployed around each inlet 4 times and recorded predators/scavengers such as several species of deep-sea sharks, conger eels, rattails, and morids.

1. Participants aboard

1-1. Research group

Chief Scientist	Yoshihiro Fujiwara Japan Agency for Marine-Earth Science and Technology
Vice-chief	Shinji Tsuchida
Scientist	Japan Agency for Marine-Earth Science and Technology
Scientist	Akinori Yabuki Japan Agency for Marine-Earth Science and Technology
Scientist	Yuriko Nagano Japan Agency for Marine-Earth Science and Technology
Scientist	Masaru Kawato Japan Agency for Marine-Earth Science and Technology
Scientist	Masashi Tsuchiya Japan Agency for Marine-Earth Science and Technology
Scientist	Tetsuro Ikuta Japan Agency for Marine-Earth Science and Technology
Scientist	Ryota Nakajima Japan Agency for Marine-Earth Science and Technology
Scientist	Yuka Amari Japan Agency for Marine-Earth Science and Technology
Scientist	Taichi Yokokawa Japan Agency for Marine-Earth Science and Technology
Scientist	Shigeru Kawai Japan Agency for Marine-Earth Science and Technology
Scientist	Noriyuki Isobe Japan Agency for Marine-Earth Science and Technology
Scientist	Satoshi Hiraoka Japan Agency for Marine-Earth Science and Technology
Scientist	Kunihiro Aoki Japan Agency for Marine-Earth Science and Technology
Scientist	Haruhiko Nakata Kumamoto University
Scientist	Nurlatifah Kumamoto University
Artist	Akira Fujimoto DGN Co., Ltd.
Scientist	Tadahisa Iwata The University of Tokyo
Scientist	Taku Ohmura The University of Tokyo
Scientist	Kohei Hidaka National Institute of Technology and Evaluation

Marine Technician	Morihumi Takaesu Nippon Marine Enterprises, Ltd.
Marine Technician	Waka Komatsu Nippon Marine Enterprises, Ltd.
Marine Technician	Masanori Enoki Marine Works Japan, Ltd.
Marine Technician	Rei Ito Marine Works Japan, Ltd.
Marine Technician	Shungo Oshitani Marine Works Japan, Ltd.
Marine Technician	Akihiro Tame Marine Works Japan, Ltd.

1-2. Operation team of the ROV *KM-ROV*

Operation Manager	Tetsuya Ishitsuka
Deputy Submersible Technical	Atsumori Miura
2nd ROV Operator	Yousuke Chida
2nd ROV Operator	Shinnosuke Kumagai
3nd ROV Operator	Shuya Sugiura
3rd ROV Operator	Atsushi Koguma

1-3. Captain and crew of the R/V *Kaimei*

Captain	Naoto Kimura
Chief Officer	Takeshi Muramatsu
2nd Officer	Ryo Yamaguchi
3rd Officer	Asami Kikuchi
Chief Engineer	Shuichi Hashide
1st Engineer	Wataru Kurose
2nd Engineer	Yoichi Yasue
3rd Engineer	Naoyuki Hamakawa
Chief Electronic op.	Yosuke Komaki
2nd Elect. Op.	Ryosuke Matsui
3rd Elect. Op.	Kohei Maeda
Boatswain	Masanori Ohata
Quarter Master	Masashige Okada
Quarter Master	Yukito Ishii
Quarter Master	Hideaki Tamotsu
Quarter Master	Yuta Ohjiri
Quarter Master	Sho Suzuki
Sailor	Yuki Sato
No.1 Oiler	Masanori Ueda
Oiler	Ryota Suzuki

Assistant Oiler	Masakazu Ishida
Assistant Oiler	Ruki Saito
Chief Steward	Yukihide Chikuba
Steward	Yoshitaka Yamamoto
Steward	Shinobu Ohyu
Steward	Koichiro Kashiwagi

2. Purposes

KM20-09 cruise was conducted under the following research and outreach subjects:

- Understanding the current situations of marine pollutants, especially plastics and assessing their impact on marine ecosystems
- Understanding the biodiversity in deep sea using environmental DNA analyses and obtaining reference data on the diversity by ROV and baited camera observations
- Evaluation test for deterioration of biodegradable plastics under deep-sea environment
- Establishment of analysis method related to "Development of automatic microplastic analysis using hyperspectral camera"
- Field and laboratory studies on plastic deterioration under deep-sea environment
- Elucidation of the transportation process of microplastics in marine environment
- Outreach on marine plastics

3. Results

3-1.ROV dives

3-1-1. Dive list

Date	Dive#	Site	Landing Leaving	Lat	Lon	Depth (m)	Comment
Nov. 15	KM-ROV#110	off Akazawa	10:57 12:08	34°50.318'N 34°50.326'N	139°08.253'E 139°08.185'E	824 818	Observation of the deep-sea water intake and sampling sediment cores
Nov. 16	KM-ROV#111	off Hatsushima	08:55 12:16	35°00.963'N 35°00.973'N	139°13.455'E 139°13.322'E	944 848	Sampling animas animals, sediment cores, and recovery of the in-situ equipment for plastic decompose assessment
Nov. 16	KM-ROV#112	off Hatsushima	15:02 16:42	35°00.934'N 35°00.955'N	139°13.398'E 139°13.327'E	918 858	Sampling animals
Nov. 17	KM-ROV#113	off Akazawa	09:56 10:59	34°49.629'N 34°49.633'N	139°08.021'E 139°08.002'E	817 814	Recovery of the baited camera (BCM3-8)
Nov. 17	KM-ROV#114	off Akazawa	13:51 14:52	34°50.481'N 34°50.529'N	139°08.211'E 139°08.220'E	807 814	Recovery of the baited camera (BCM2-9)
Nov. 18	KM-ROV#115	off Akazawa	08:54 09:52	34°49.459'N 34°49.441'N	139°07.987'E 139°07.983'E	813 814	Recovery of the baited camera (BCM3-9)
Nov. 18	KM-ROV#116	off Akazawa	12:08 14:14	34°50.290'N 34°50.418'N	139°08.213'E 139°08.199'E	817 809	Observation of the deep-sea water intake and recovery of the baited camera (BCM2-10)
Nov. 19	KM-ROV#117	off Yaizu	12:37 15:27	34°51.194'N 34°51.191'N	138°21.475'E 138°21.454'E	411 399	Observation of the deep-sea water intake and sampling sediment cores
Nov. 20	KM-ROV#118	off Yaizu	08:29 09:01	34°50.701'N 34°50.701'N	138°22.003'E 138°21.967'E	404 396	Recovery of the baited camera (BCM3-10)
Nov. 20	KM-ROV#119	off Yaizu	11:46 13:58	34°51.186'N 34°51.205'N	138°21.474'E 138°21.424'E	411 397	Observation of the deep-sea water intake and recovery of the baited camera (BCM2-11)
Nov. 21	KM-ROV#120	off Yaizu	08:28 09:12	34°50.711'N 34°50.705'N	138°22.021'E 138°21.963'E	409 394	Recovery of the baited camera (BCM3-11)
Nov. 21	KM-ROV#121	off Yaizu	11:06 14:22	34°51.189'N 34°51.201'N	138°21.680'E 138°21.3993'E	447 392	Observation around the deep-sea water intake and recovery of the baited camera (BCM2-12)

3-1-2. Dive report

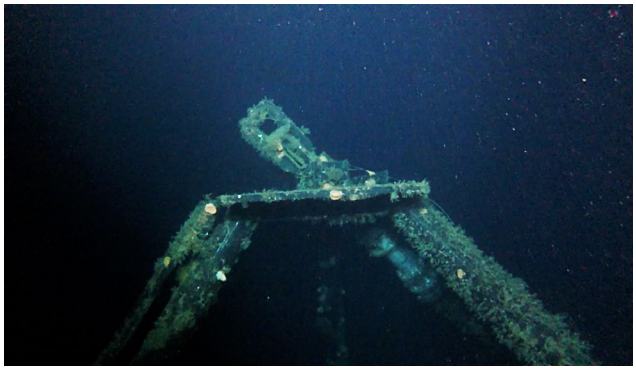
KM-ROV#110

Date: November 15, 2020
Site: Off Akazawa, Sagami Bay, ***Depth:*** 820 m
Landing (Lat., Lon., Time, Depth): 34°50.318’N 139°08.253’E, 10:57, 824 m
Leaving (Lat., Lon., Time, Depth): 34°50.326’N 139°08.185’E, 12:08, 818 m
Observer: FUJIWARA, Yoshihiro

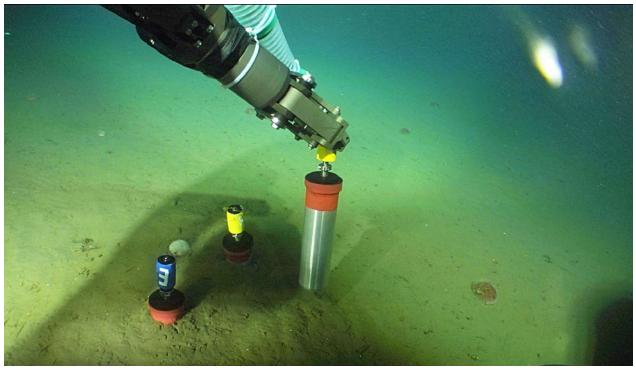
Theme: Marine plastic dynamics and influence of environmental changes on deep-sea ecosystems

Purpose of dive:
1. Observation of water intake station of DHC deep-sea water pumping facility off Akazawa
2. Sampling of organisms around the station
3. Mapping and sampling of plastic trash

Dive Summary
Small amount of trash was seen at the beginning of dive. The water intake station of DHC deep-sea water pumping facility off Akazawa was observed at a depth of 817 m. Cnidarians, bivalves, and gastropods were attached on the station. Several individuals of snake mackerels inhabited the site. No visible inlet was observed. Three push cores were collected beside the station.

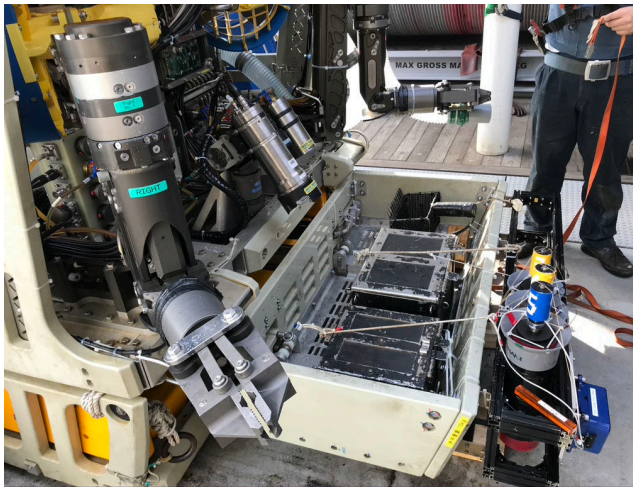


Top of the water intake station



Sediment-core sampling

Payload Equipment:
1. Sample box x2 (Front)
2. “Kumade” sampler x1 (Front)
3. Suction sampler and multi-bottled canister x1 (Rear)
4. H-type push corer x3 (Front)
5. GoPro housing x1 (Front)
6. 6.5K Cam x1 (Rear)
7. Line laser x2 (Rear)
8. 24W LED light x2 (Rear)



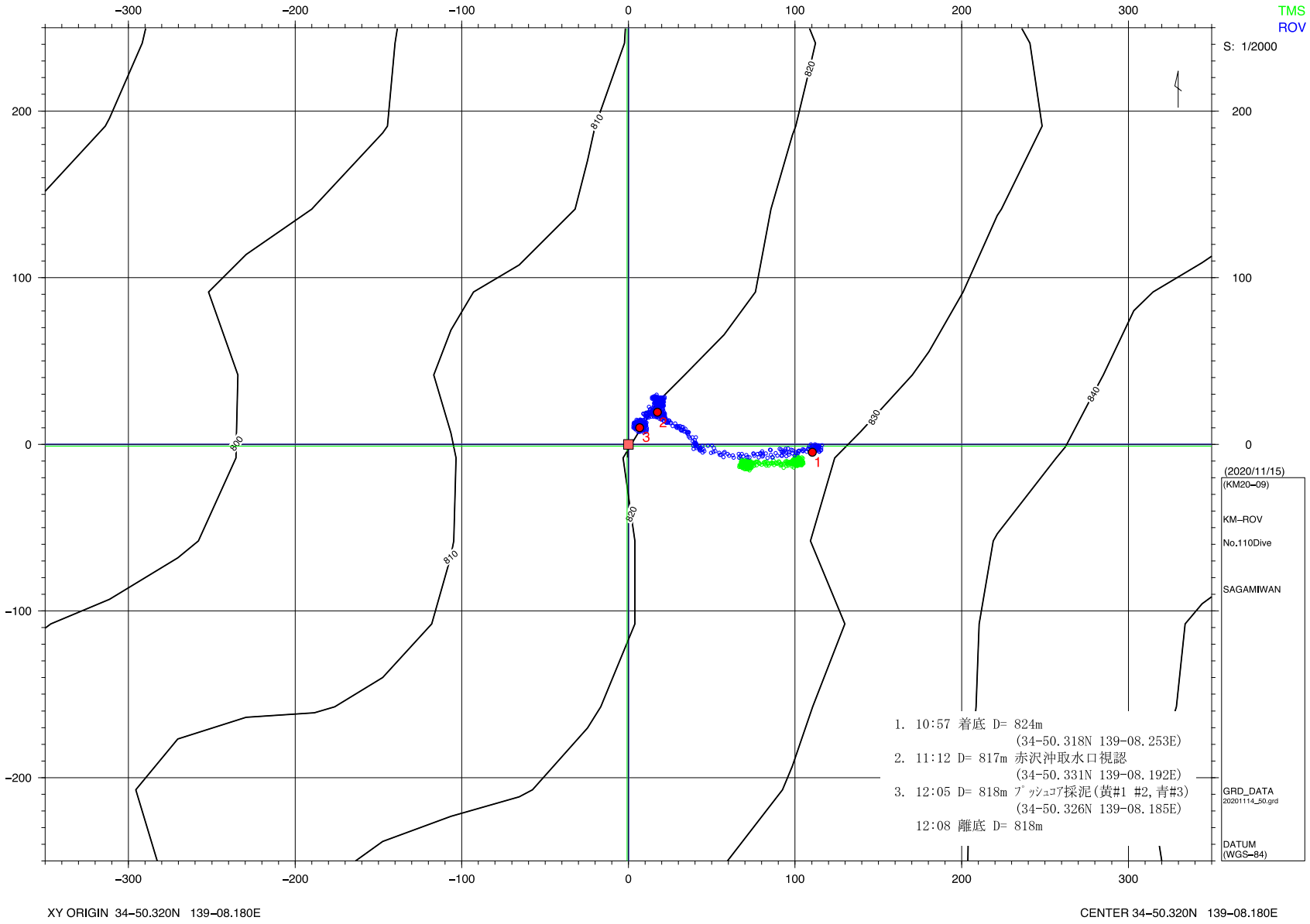
Front payload

Rear Payload

Sampling Points and Markers:

Time	Position	Depth (m)	Events
11:12	34°50.331’N, 139°08.192’E	817	Water intake station of DHC deep-sea water pumping facility
12:05	34°50.326’N, 139°08.185’E	818	Sediment core sampling

Dive track KM-ROV#110



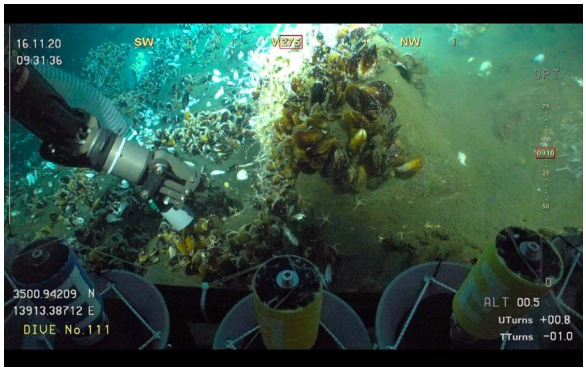
KM-ROV#111

Date: November 16, 2020
Site: Off Hatsushima, Sagami Bay, ***Depth:*** 855 m
Landing (Lat., Lon., Time, Depth): 35°00.963'N 139°13.455'E, 08:55, 944 m
Leaving (Lat., Lon., Time, Depth): 35°00.973'N 139°13.322'E, 12:16, 848 m
Observer: ISOBE, Noriyuki

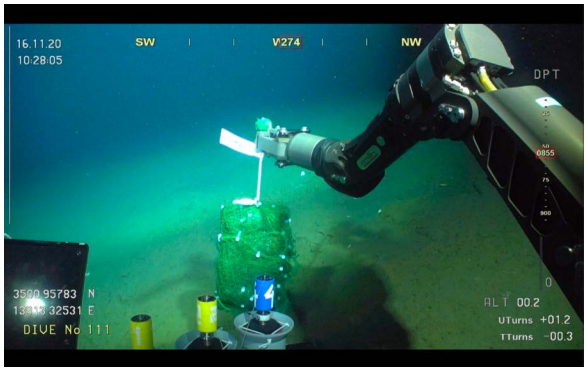
Theme: Development of marine-degradable bioplastic on the deep-sea floor

Purpose of dive:
1. Sampling megabenthic animals
2. Deposition of the sample chambers for on-site degradation test of biodegradable plastics
3. Recovery of the on-site degradation test chambers deposited during YK19-11
4. Sampling the sediments around the degradation test site

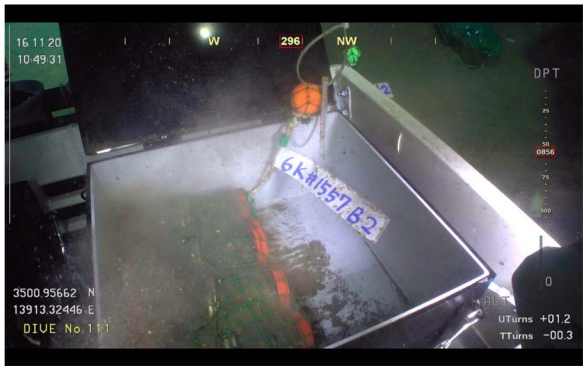
Dive Summary
Bathymodiolus mussels were sampled with a suction sampler at a depth of 910 m. The sample chambers for on-site degradation test of biodegradable plastics were deposited at the depth of 855 m. The on-site degradation test chambers deposited during YK19-11 (denoted as 6K#1557 B2) were recovered in the extra-large sample box. Three push cored sediments were collected near the deposition site.



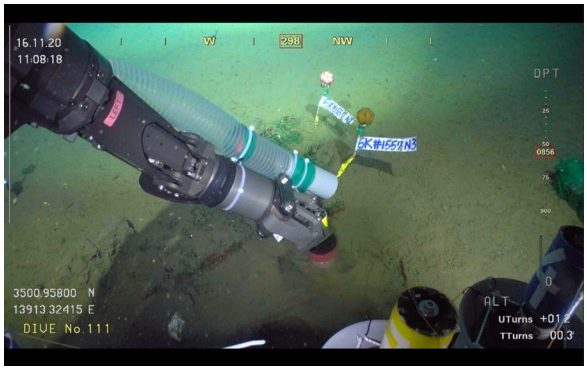
Sampling *Bathymodiolus* mussels



Deposition of chambers



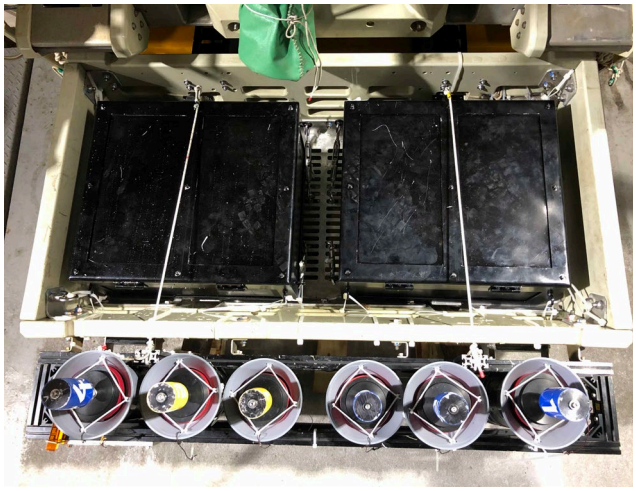
Recovery of chambers



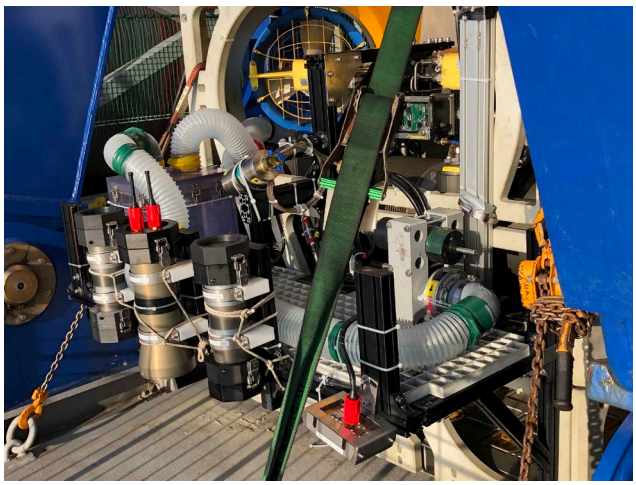
Sediment-core sampling

Payload Equipment:

1. Extra-large sample box x2 (Front)
2. Suction sampler and a single canister x1 (Rear)
3. H-type push corer x6 (Front)
4. GoPro housing x1 (Front)
5. 6.5K Cam x1 (Rear)
6. Line laser x2 (Rear)
7. 24W LED light x2 (Rear)



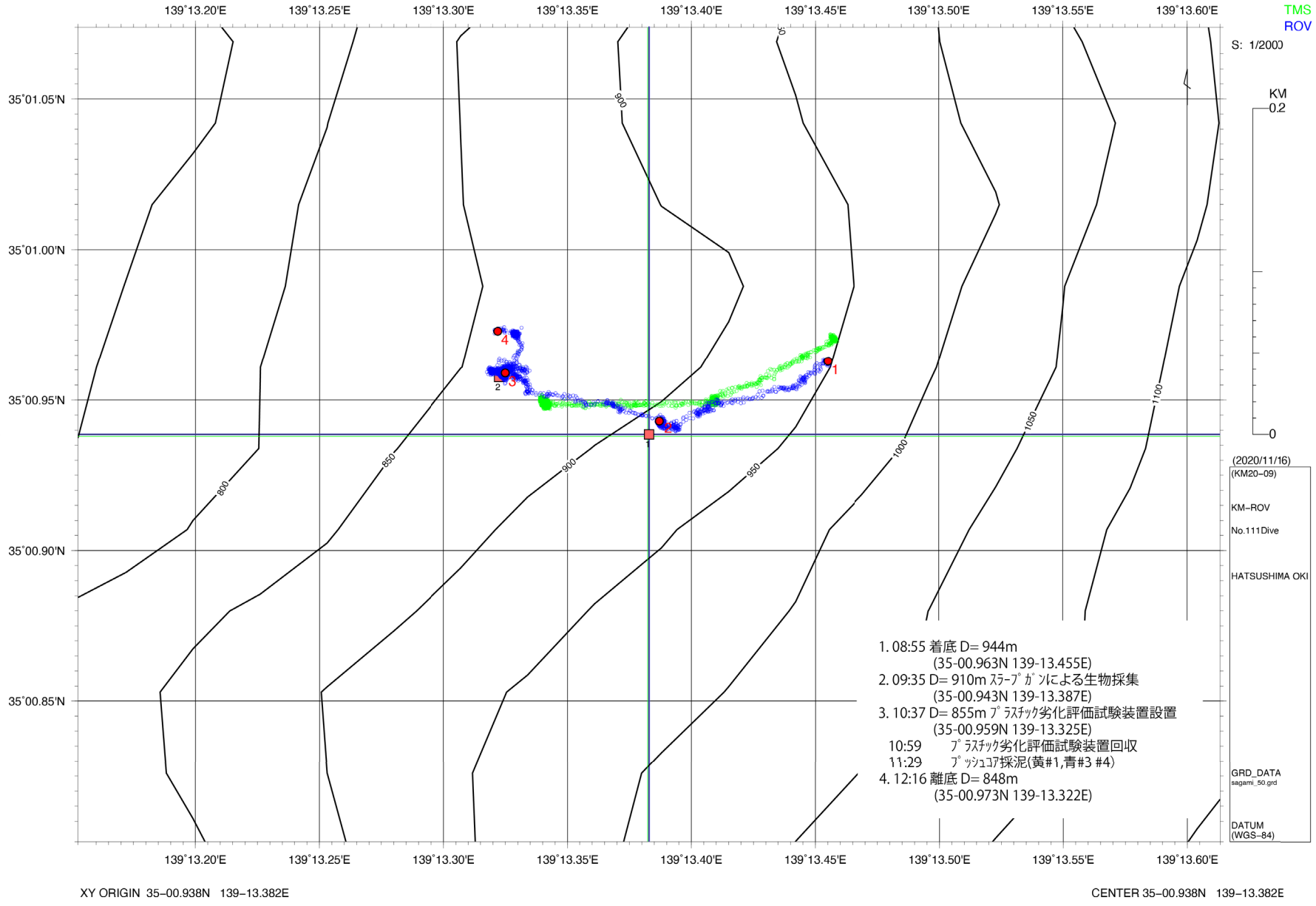
Front payload



Rear Payload

Sampling Points and Markers:

Time	Position	Depth (m)	Events
09:35	35°00.943’N, 139°13.387’E	910	Sampling *Bathymodiolus* mussels
10:37	35°00.959’N, 139°13.325’E	855	Deposition of chambers
10:59	35°00.959’N, 139°13.325’E	855	Recovery of chambers
11:29	35°00.959’N, 139°13.325’E	855	Sediment core sampling


139°13.20'E
139°13.25'E
139°13.30'E
139°13.35'E
139°13.40'E
139°13.45'E
139°13.50'E
139°13.55'E
139°13.60'E
35°01.05'N
35°01.00'N
35°00.95'N
35°00.90'N
35°00.85'N
TMS
ROV
S: 1/2000
KM
0.2
0
900
850
800
950
1000
1050
1100
1
2
3
4
1. 08:55 着底 D= 944m
(35-00.963N 139-13.455E)
2. 09:35 D= 910m ｽﾗｰﾌﾟｶﾞﾝによる生物採集
(35-00.943N 139-13.387E)
3. 10:37 D= 855m ﾌﾟﾗｽﾁｯｸ劣化評価試験装置設置
(35-00.959N 139-13.325E)
10:59 ﾌﾟﾗｽﾁｯｸ劣化評価試験装置回収
11:29 ﾌﾟｯｼｭｺｱ採泥(黄#1,青#3 #4)
4. 12:16 離底 D= 848m
(35-00.973N 139-13.322E)
(2020/11/16)
(KM20-09)
KM-ROV
No.111Dive
HATSUSHIMA OKI
GRD_DATA
sagami_50.grd
DATUM
(WGS-84)
XY ORIGIN 35-00.938N 139-13.382E
CENTER 35-00.938N 139-13.382E

KM-ROV#112

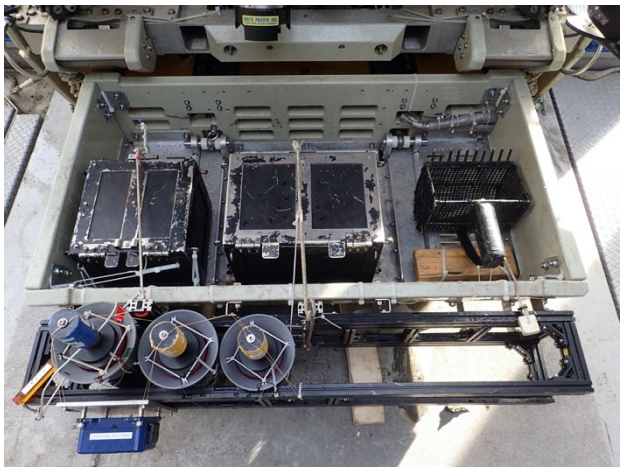
Date: November 16, 2020
Site: Off Akazawa, Sagami Bay, ***Depth:*** 850 m
***Landing (Lat., Lon., Time, Depth)*:** 35°0.9231’N, 139°13.4098’E, 15.02, 919 m
***Leaving (Lat., Lon., Time, Depth)*:** 35°0.9505’N, 139°13.3533’E, 16:43, 841 m
Observer: IKUTA, Tetsuro

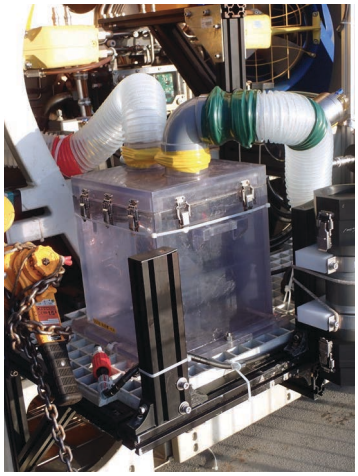
Theme: Marine plastic dynamics and influence of environmental changes on deep-sea ecosystems

Purpose of dive:
1. Sampling of megabenthic animals
2. Sampling of sediment cores
3. Mapping and sampling of plastic debris

Dive Summary
Bathymodiolus mussels were sampled with a suction sampler, and *Phreagena* clams were sampled with a scoop sampler into a sample box. Due to the limited dive time, sediment cores and plastic debris were not sampled.

Payload Equipment:
1. Sample box x2 (Front)
2. Scoop sampler x1 (Front)
3. Suction sampler with a single canister x1 (Rear)
4. H-type push corer x3 (Front)
5. GoPro camera x1 (Front)

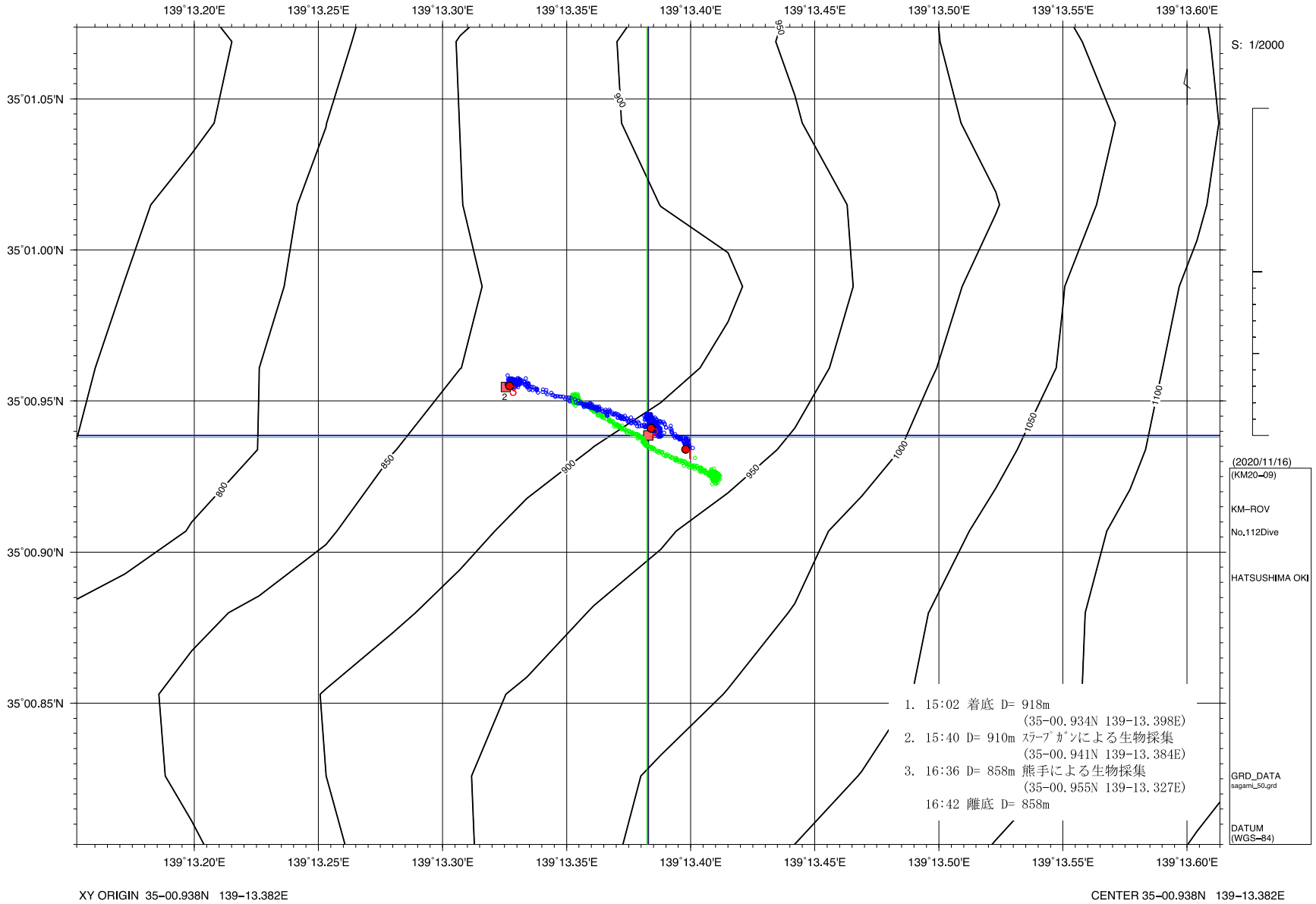

Front payload


Rear Payload

Sampling Points:

Time	Position	Depth (m)	Events
15:40	35°00.941’N, 139°13.384’E	910	Sampling of *Bathymodiolus* mussels
16:36	35°00.955’N, 139°13.327’E	858	Sampling of *Phreagena* clams

Dive track KM-ROV#112



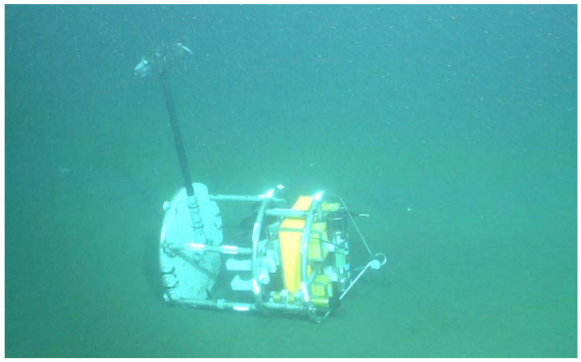
KM-ROV#113

Date: November 17, 2020
Site: Off Akazawa, Sagami Bay, ***Depth:*** 820 m
Landing (Lat., Lon., Time, Depth): 34°49.629’N 139°08.021’E, 09:56, 817 m
Leaving (Lat., Lon., Time, Depth): 34°49.633’N 139°08.002’E, 10:59, 814 m
Observer: TSUCHIDA, Shinji

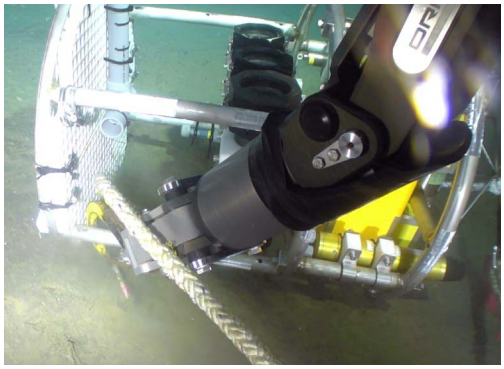
Theme: Marine plastic dynamics and influence of environmental changes on deep-sea ecosystems

Purpose of dive:
1. Recovery of the baited camera, BCM3-8

Dive Summary
KM-ROV landed at the bottom about 30m East from the baited camera. Soon we found the camera turned over, directing upward. ROV operated to hook the four- and two-meter ropes with the flame of camera and succeeded to recovery it on deck.

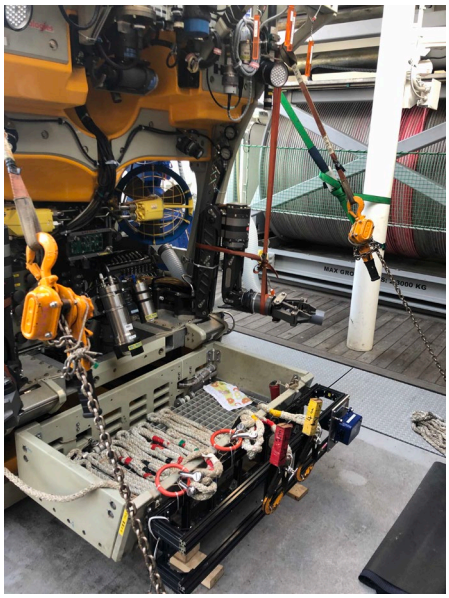


Baited camera landed upward



Rope hooking by the manipulator

Payload Equipment:
1. Two-meter recovery hook x1 (Front)
2. Four-meter recovery hook x1 (Front)
3. GoPro housing x1 (Front)
4. Suction sampler and multi-bottled canister x1 (Rear)
5. 6.5K Cam x1 (Rear)
6. Line laser x2 (Rear)
7. 24W LED light x1 (Rear)



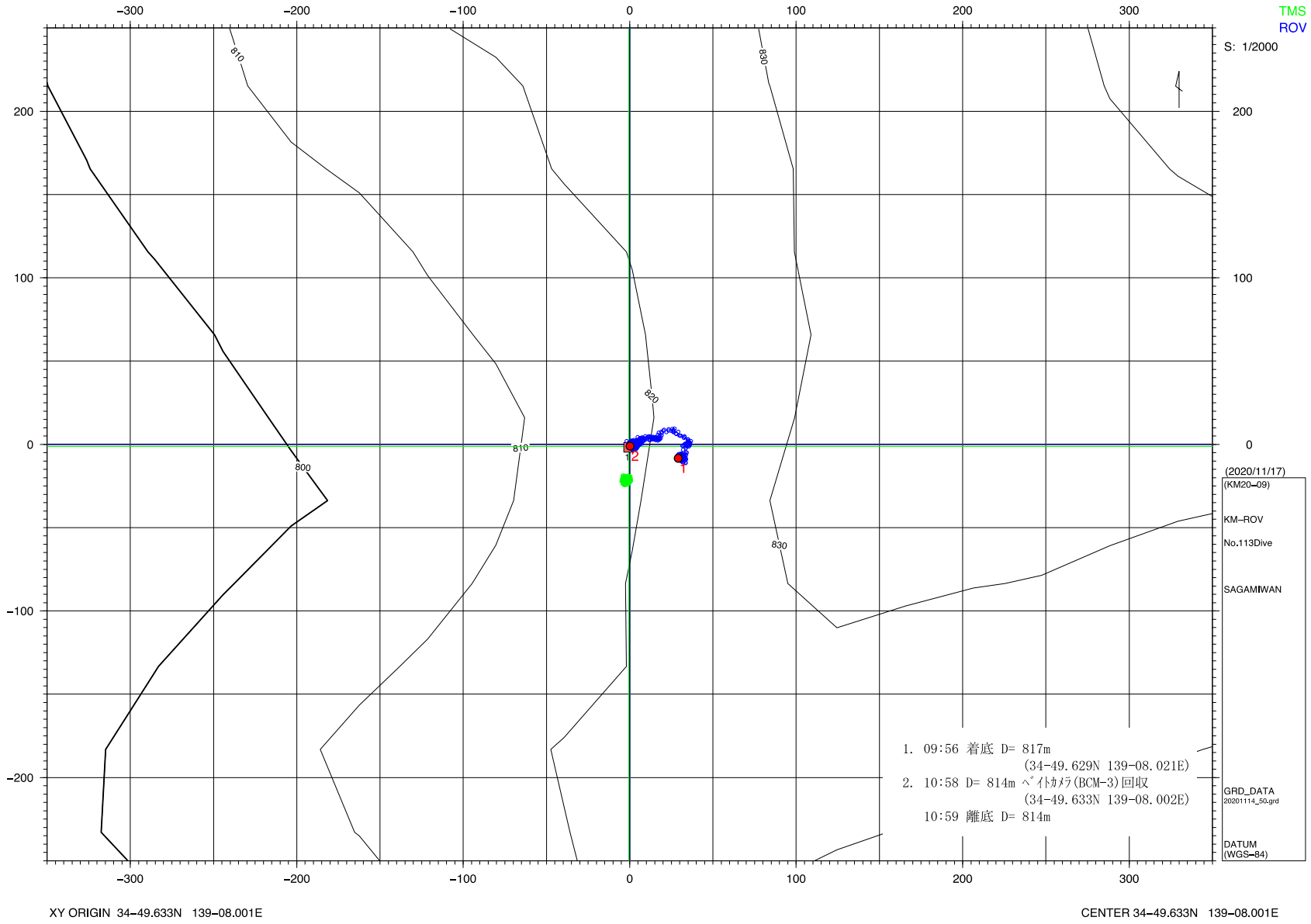
Front payload

Rear Payload

Sampling Points and Markers:

Time	Position	Depth (m)	Events
10:58	34°49.633’N, 139°08.002’E	814	Recovery of the baited camera (BCM3-8)

Dive track KM-ROV#113



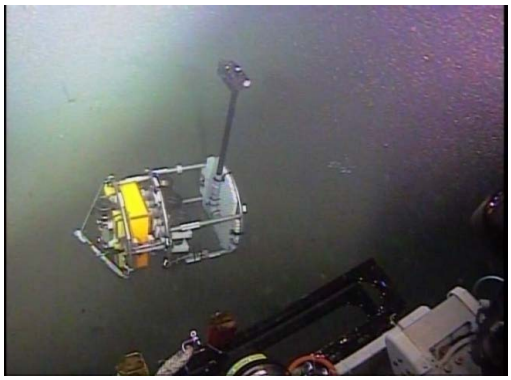
KM-ROV#114

Date: November 17, 2020
Site: Off Akazawa, Sagami Bay, ***Depth:*** 820 m
Landing (Lat., Lon., Time, Depth): 34°50.481’N 139°08.211’E, 13:51, 807 m
Leaving (Lat., Lon., Time, Depth): 34°50.529’N 139°08.220’E, 14:52, 814 m
Observer: KAWATO, Masaru

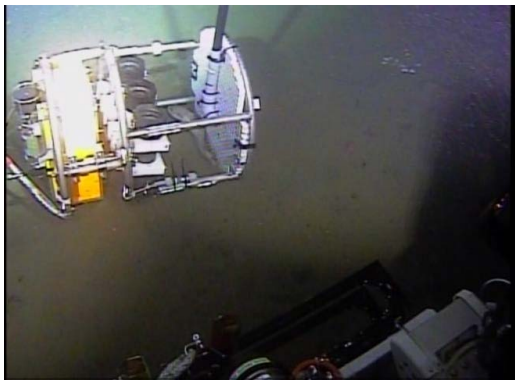
Theme: Marine plastic dynamics and influence of environmental changes on deep-sea ecosystems

Purpose of dive:
1. Recovery of the baited camera, BCM2-9

Dive Summary
KM-ROV landed at the bottom about 100m South from the deployed baited camera. Soon we started to travel north, to find the baited camera. The baited camera was fallen down on the sediment same as BCM3-8 camera. ROV operated to hook the four- and two-meter ropes with the flame of camera and succeeded to recovery it on deck.

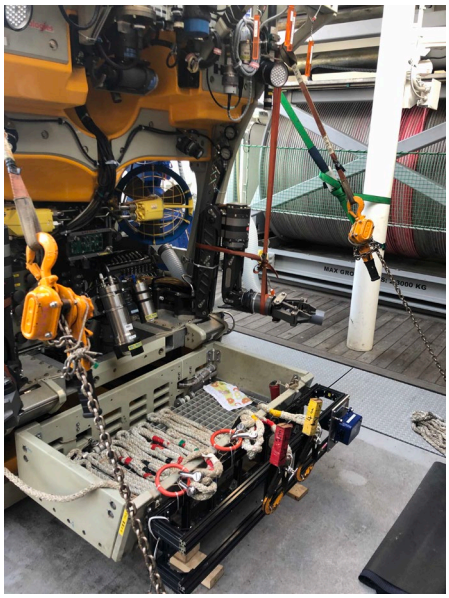


Baited camera landed upward



Physiculus japonicus in the camera frame

Payload Equipment:
1. Two-meter recovery hook x1 (Front)
2. Four-meter recovery hook x1 (Front)
3. GoPro housing x1 (Front)
4. Suction sampler and multi-bottled canister x1 (Rear)
5. 6.5K Cam x1 (Rear)
6. Line laser x2 (Rear)
7. 24W LED light x1 (Rear)



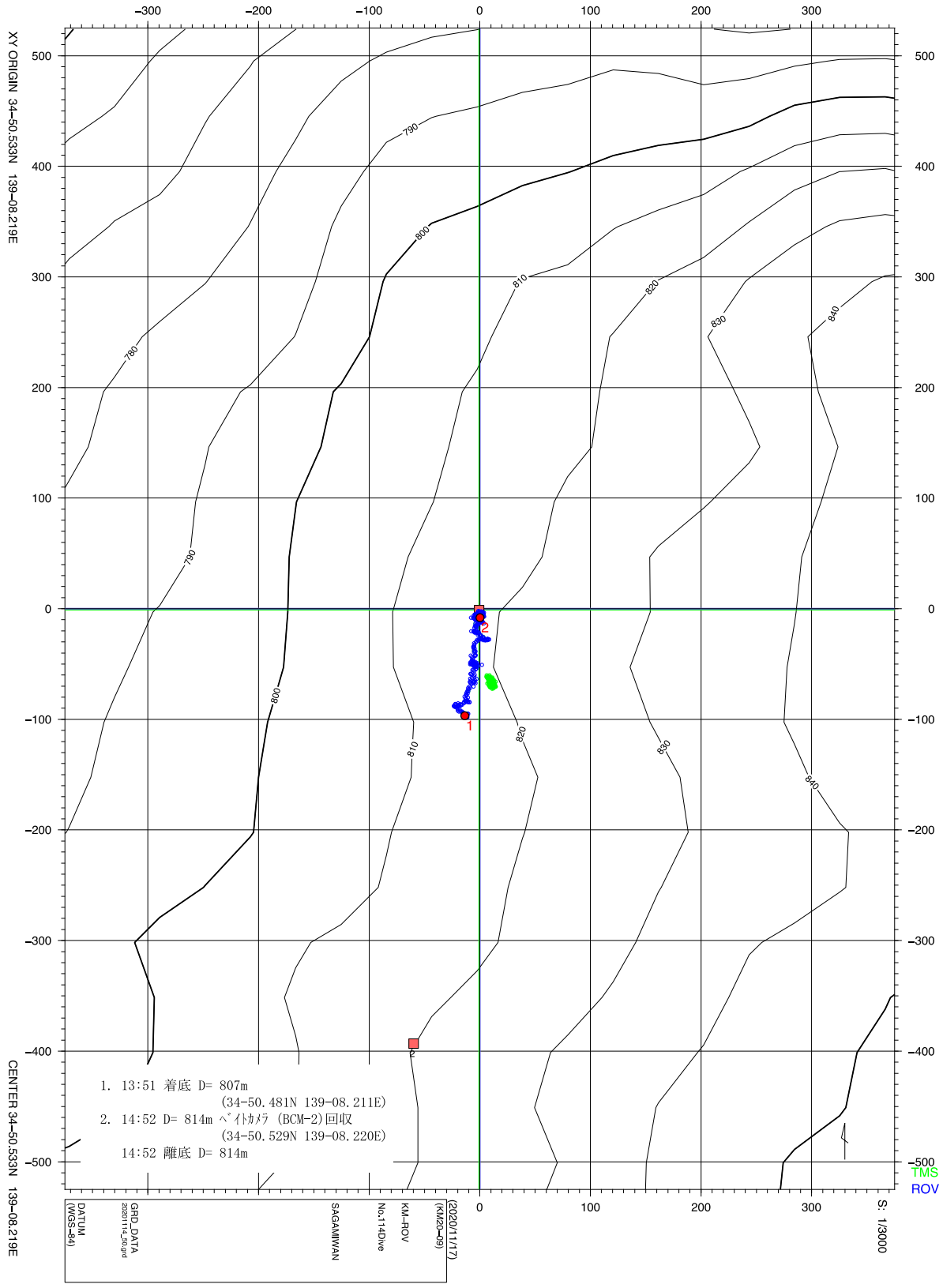
Front payload

Rear Payload

Sampling Points and Markers:

Time	Position	Depth(m)	Events
14:52	34°50.529’N, 139°08.220’E	814	Recovery of the baited camera (BCM2-9)

Dive track KM-ROV#114



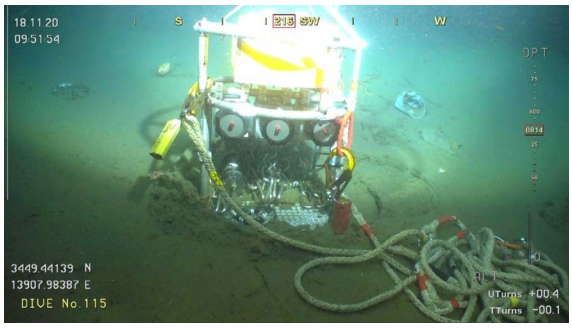
KM-ROV#115

Date: November 18, 2020
Site: Off Akazawa, Sagami Bay, ***Depth:*** 813 m
Landing (Lat., Lon., Time, Depth): 34°49.459’N 139°07.987’E, 8:53, 813 m
Leaving (Lat., Lon., Time, Depth): 34°49.441’N 139°07.983’E, 9:52, 814 m
Observer: YABUKI, Akinori

Theme: Marine plastic dynamics and influence of environmental changes on deep-sea ecosystems

Purpose of dive:
1. Retrieving the bait-camera system (BCM3-9)
2. Observation of deep-sea debris around the bait-camera

Dive Summary
BCM3-9 was found at the depth of 813 m. Several marine debris were found around BCM3-9 and they were carefully observed using the high vision camera equipped on KM-ROV. After hooking BCM3-9 using the rope prepared in the basket, KMROV left the bottom.

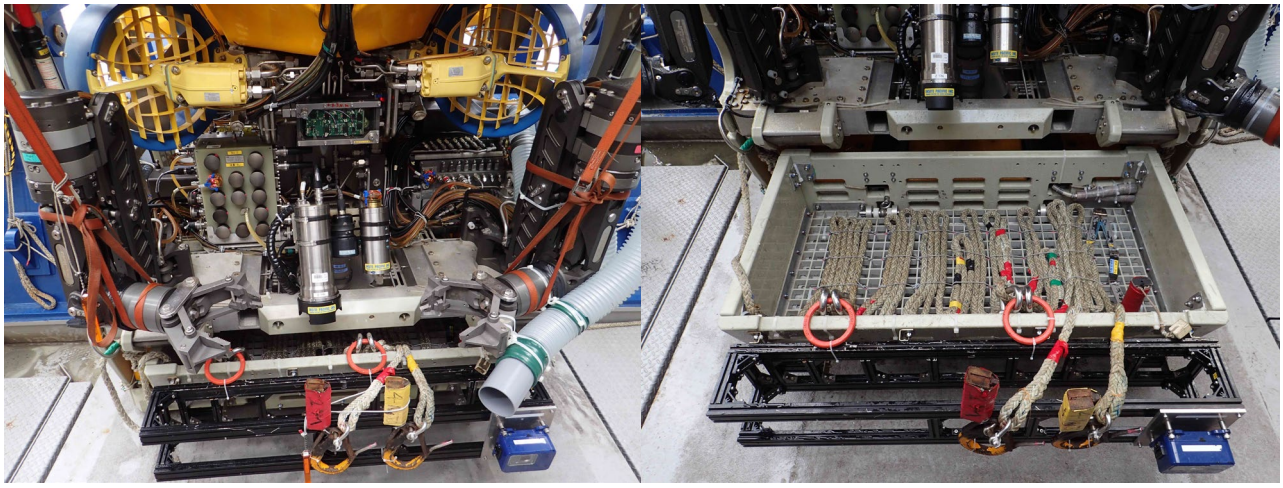


BCM3-9 at the bottom

Marine debris found arlound BCM3-9

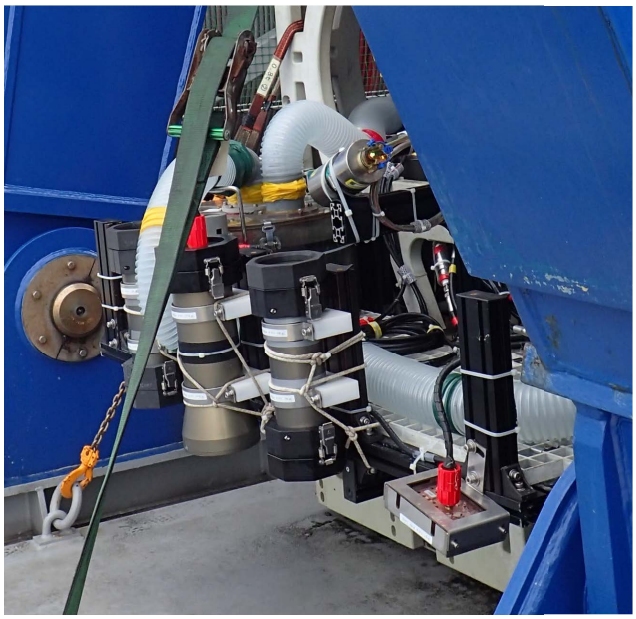
Payload Equipment:

1. Suction sampler and multi-bottled canister x1 (Rear)
2. GoPro housing x1 (Front)
3. 6.5K Cam x1 (Rear)
4. Line laser x2 (Rear)
5. 24W LED light x2 (Rear)



Front view of the payload at KM-ROV#115 and the inside of the sample basket.

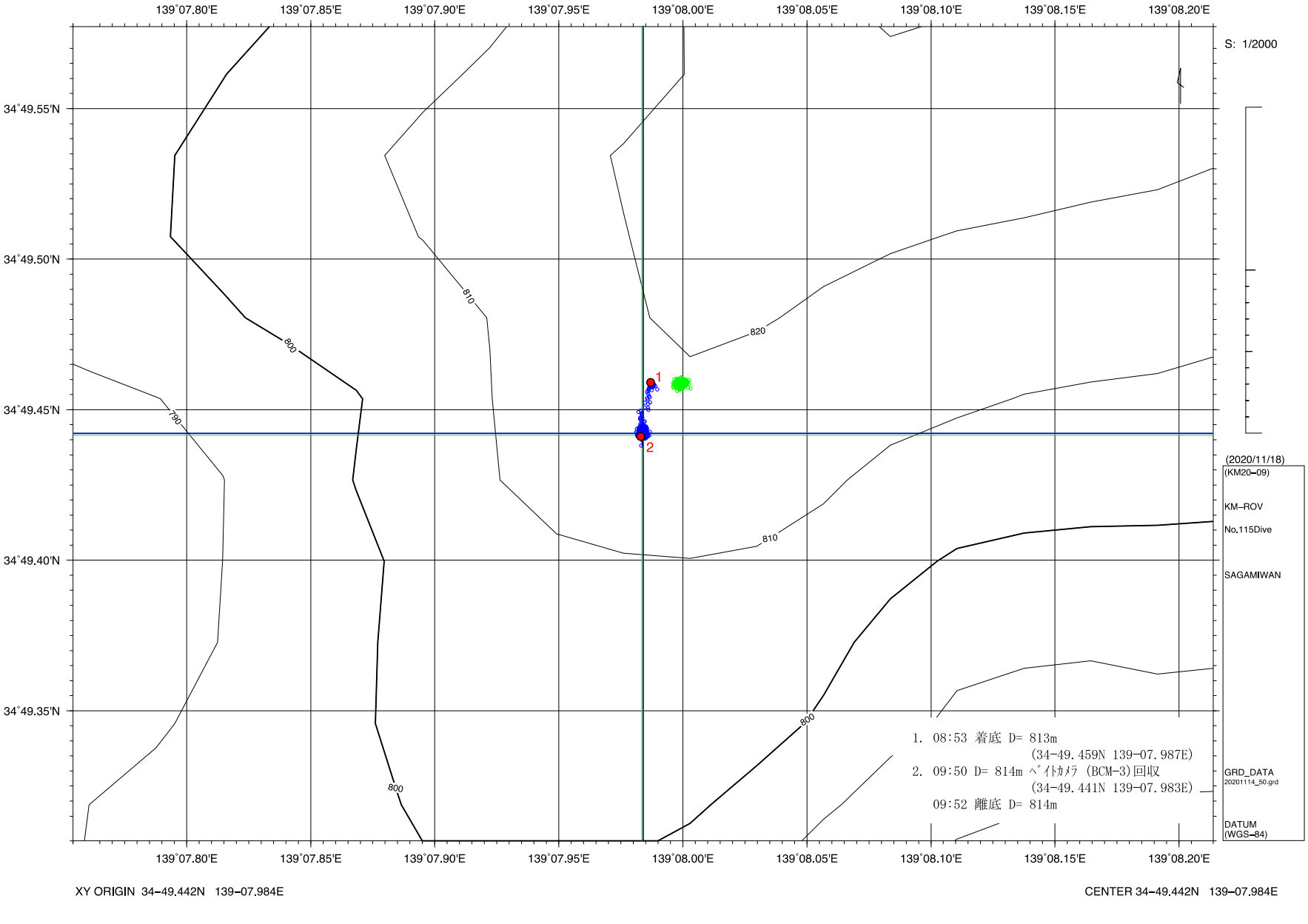
*The picture of the basket was taken at KM-ROV#116, which was exactly same as that of #115.



Rear view of t KM-ROV#115

Sampling Points and Markers:

Time	Position	Depth(m)	Events
08:53	34°49.459’N 139°07.987’E	813	Landing
09:50	34°49.441’N 139°07.983’E	814	Retrieving BCM3-9
09:52	34°49.441’N 139°07.983’E	814	Leaving the bottom



Dive track KM-ROV#115

KM-ROV#116

Date: November 18, 2020
Site: Off Akazawa, Sagami Bay, ***Depth:*** 817 m
Landing (Lat., Lon., Time, Depth): 34°50.2899'N 139°08.2128'E, 12:08, 817 m
Leaving (Lat., Lon., Time, Depth): 34°50.4185'N 139°08.1989'E, 14:15, 809 m
Observer: NAGANO, Yuriko

Theme: Marine plastic dynamics and influence of environmental changes on deep-sea ecosystems

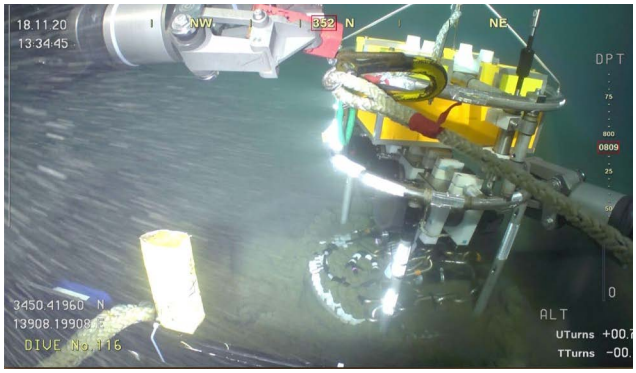
Purpose of dive:

1. Observation of water intake station of DHC deep-sea water pumping facility off Akazawa
2. Observation of organisms and plastic waste around the water intake station.
3. Collection of bait camera system (BCM2-10)

Dive Summary

Some fish (Moridae etc.) were observed around the water intake station of DHC deep-sea water pumping facility off Akazawa at a depth of 817 m. Cnidarians, bivalves, and gastropods were attached on the station. No visible plastic waste was observed around the station. We did a detailed observation of the water intake station to find the inlet. However, we could not identify the obvious inlet. After the observation, we left the water intake station and moved to collect the bait camera system (BCM2-10). Then it was collected successfully.

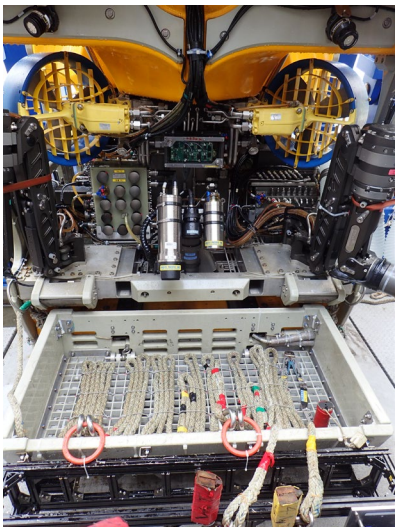
Top of the water intake station



Collection of bait camera system (BCM2-10)

Payload Equipment:

1. Suction sampler and multi-bottled canister x1 (Rear)
2. GoPro housing x1 (Front)
3. 6.5K Cam x1 (Rear)
4. Line laser x2 (Rear)
5. 24W LED light x2 (Rear)



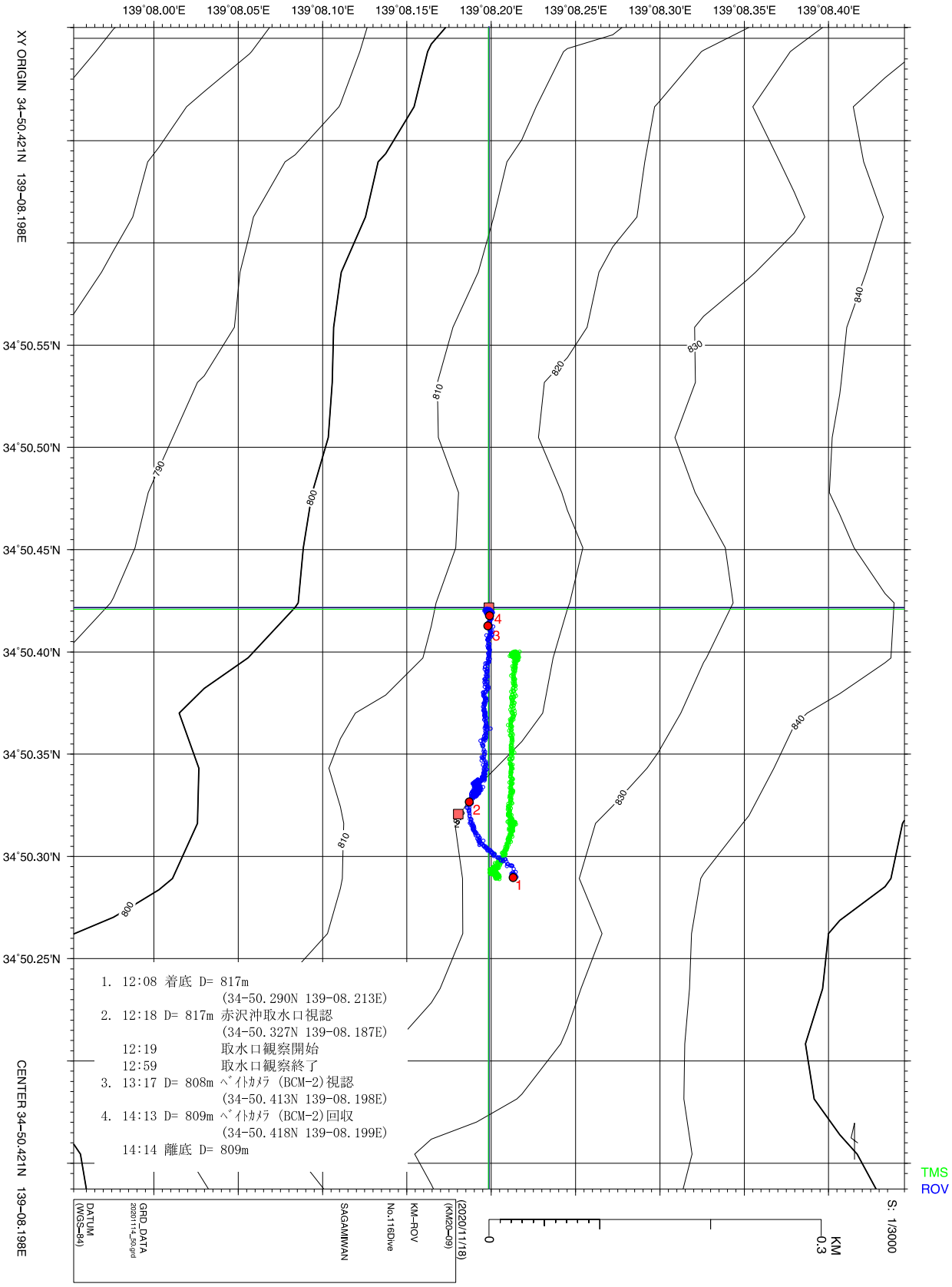
Front payload

Rear Payload

Sampling Points and Markers:

Time	Position	Depth (m)	Events
12:18	34°50.331’N, 139°08.192’E	817	Water intake station of DHC deep-sea water pumping facility
13:19	34°50.419’N, 139°08.198’E	809	Landed to collect BCM2-10

Dive track KM-ROV#116



KM-ROV#117

Date: November 19, 2020
Site: Off Yaizu, Suruga Bay, ***Depth:*** 397 m
Landing (Lat., Lon., Time, Depth): 34°51.194’N 138°21.475’E, 13:27, 411 m
Leaving (Lat., Lon., Time, Depth): 34°51.191’N 138°21.436’E, 15:27, 399 m
Observer: TSUCHIYA, Masashi

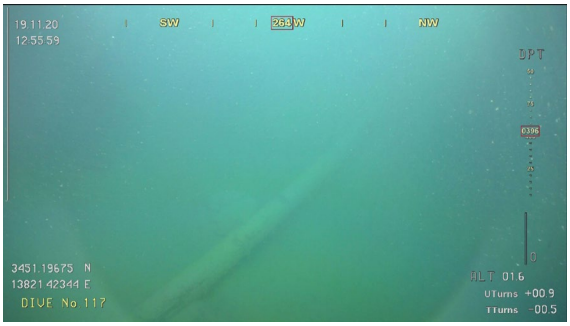
Theme: Marine plastic dynamics and influence of environmental changes on deep-sea ecosystems

Purpose of dive:

1. Observation of water intake station of deep-sea water pumping facility off Yaizu
2. Sediment Sampling around the station
3. Mapping and sampling of plastic debris

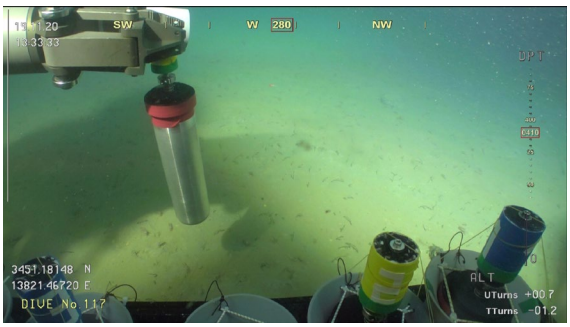
Dive Summary

- The water intake pipe of deep-sea water pumping facility off Yaizu was observed but not found the mouth of water intake at around the site.
- Six H-type push core sampling were conducted beside the pipe.
- Several individuals of fishes were found during the dive.
- No plastic debris was found during the dive #117.

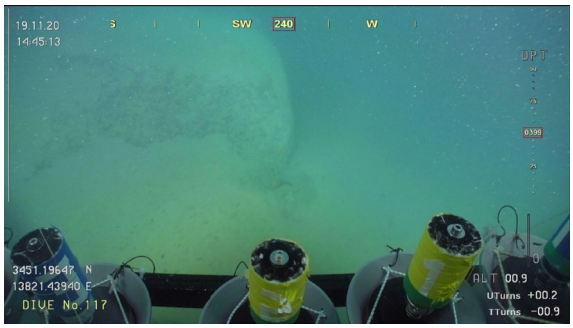


The water intake pipe

Frill shark



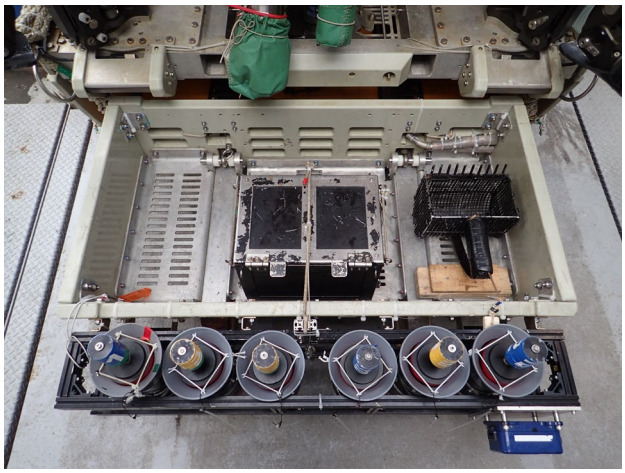
Sediment core sampling



Mouth of the water intake pipe?

Payload Equipment:

1. Sample box x1 (Front)
2. “Kumade” sampler x1 (Front)
3. Suction sampler and multi-bottled canister x1 (Rear)
4. H-type push corer x6 (Front)
5. GoPro housing x1 (Front)
6. 6.5K Cam x1 (Rear)
7. Line laser x2 (Rear)
8. 24W LED light x2 (Rear)

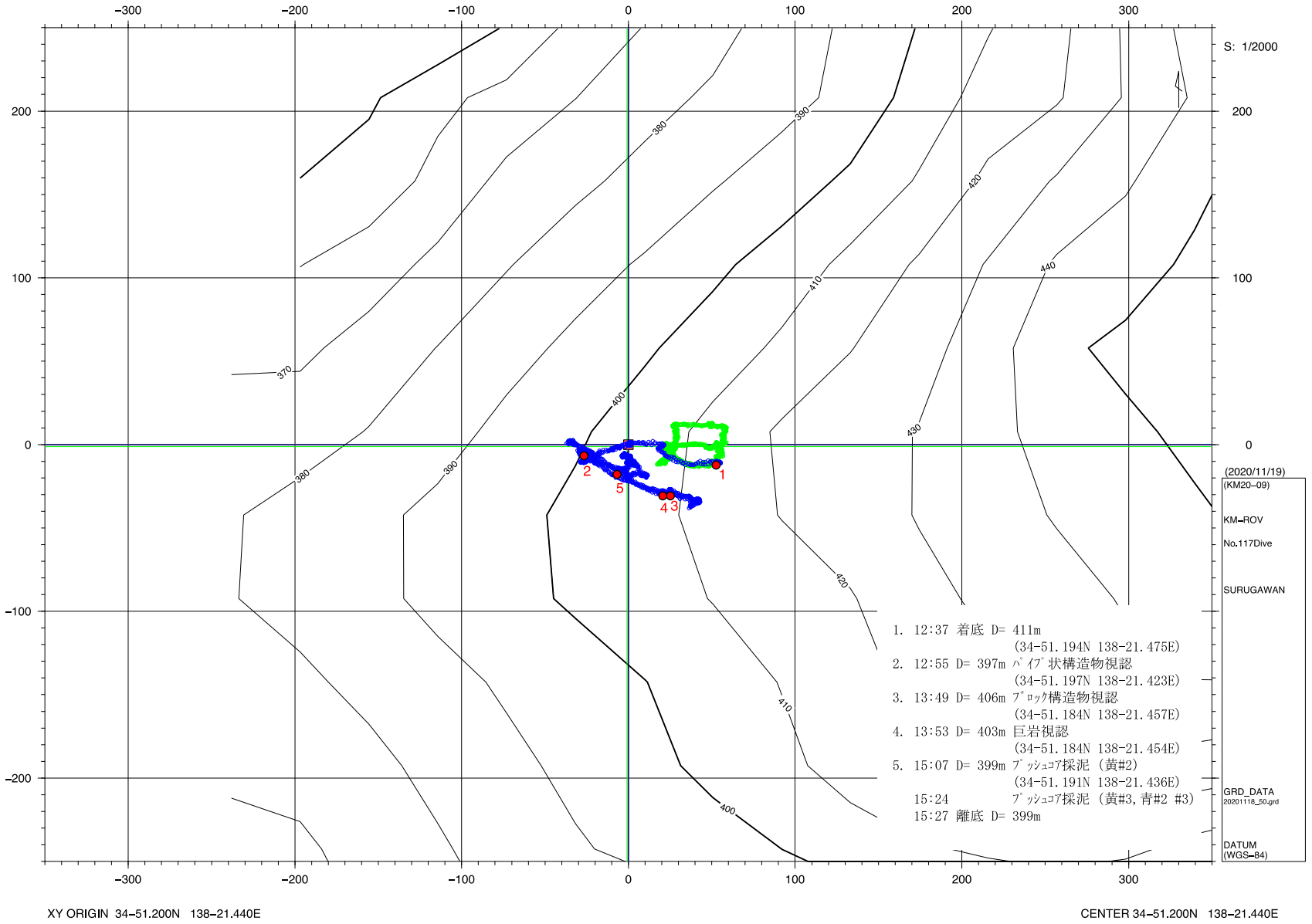


Front payload

Rear Payload

Sampling Points and Markers:

Time	Position	Depth (m)	Events
12:55	34°51.197’N, 138°21.423’E	397	Water intake pipe of deep-sea water pumping facility
13:49	34°51.184’N, 138°21.457’E	406	Concrete brock
13:53	34°51.184’N, 138°21.454’E	403	Rock
15:07	34°51.191’N, 138°21.436’E	399	Sediment core sampling


S: 1/2000
(2020/11/19)
(KM20-09)
KM-ROV
No.117Dive
SURUGAWAN
GRD_DATA
20201118_50.grd
DATUM
(WGS-84)
1. 12:37 着底 D= 411m
(34-51.194N 138-21.475E)
2. 12:55 D= 397m ﾊﾟｲﾌﾟ状構造物視認
(34-51.197N 138-21.423E)
3. 13:49 D= 406m ﾌﾞﾛｯｸ構造物視認
(34-51.184N 138-21.457E)
4. 13:53 D= 403m 巨岩視認
(34-51.184N 138-21.454E)
5. 15:07 D= 399m ﾌﾟｯｼｭｺｱ採泥 (黄#2)
(34-51.191N 138-21.436E)
15:24 ﾌﾟｯｼｭｺｱ採泥 (黄#3, 青#2 #3)
15:27 離底 D= 399m
XY ORIGIN 34-51.200N 138-21.440E
CENTER 34-51.200N 138-21.440E

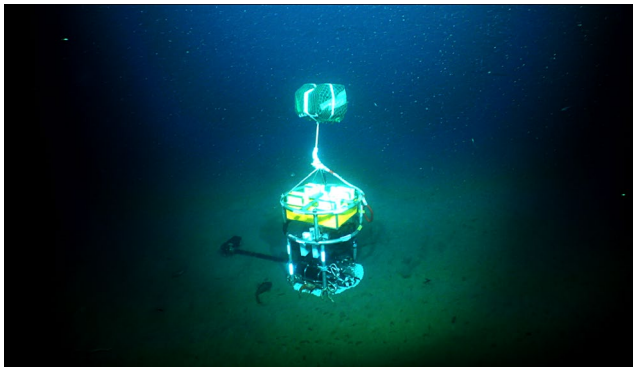
KM-ROV#118

Date: November 20, 2020
Site: Off Yaizu, Ssuruga Bay, ***Depth:*** 400 m
Landing (Lat., Lon., Time, Depth): 34°50.701’N 138°22.003’E, 08:29, 404 m
Leaving (Lat., Lon., Time, Depth): 34°50.701’N 138°21.967’E, 09:01, 396 m
Observer: FUJIWARA, Yoshihiro

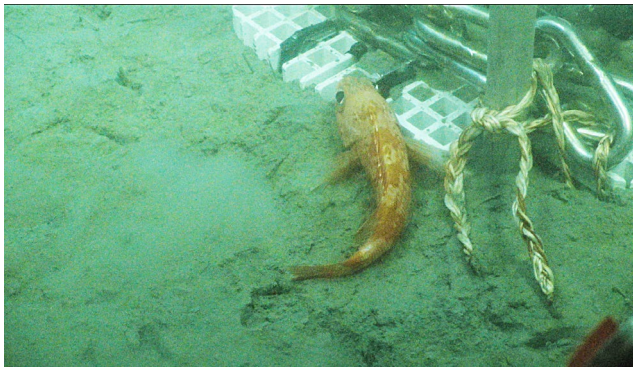
Theme: Marine plastic dynamics and influence of environmental changes on deep-sea ecosystems

Purpose of dive:
1. Retrieval of baited camera (BCM3-10)

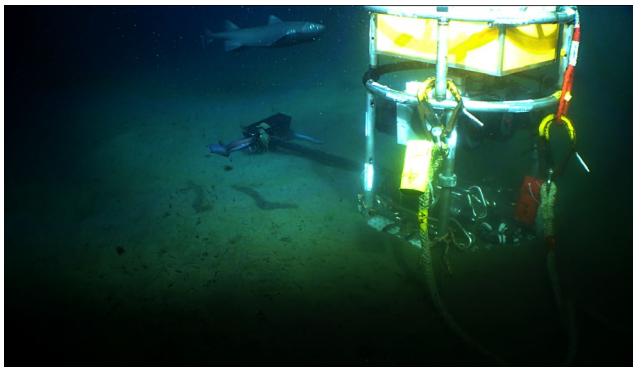
Dive Summary
BCM3 (cast no. BCM3-10) was found 0.7 nautical miles southeast from the inlet of the deep-sea water pumping facility off Yaizu at a depth of 396 m. BCM3 landed upright on the flat muddy bottom. *Helicolenus hilgendorfi* (Yume-kasago), *Physiculus japonicus* (Chigodara), and conger eels came around BCM3, and *Dalatias licha* passed by the side. Two recovery ropes were hooked well on BCM3, and it was retrieved successfully.



BCM3 landed on flat muddy bottom



Helicolenus hilgendorfi

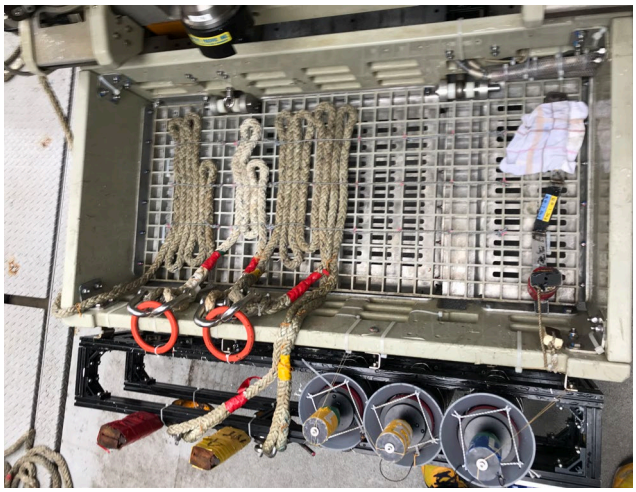


Dalatias licha

Suspended BCM3 (bottom mapping camera view)

Payload Equipment:

1. Recovery rope and hook x2 (Front)
2. H-type push corer x3 (Front)
3. GoPro housing x1 (Front)
4. Suction sampler and multi-bottled canister x1 (Rear)
5. 6.5K Cam x1 (Rear)
6. Line laser x2 (Rear)
7. 24W LED light x2 (Rear)

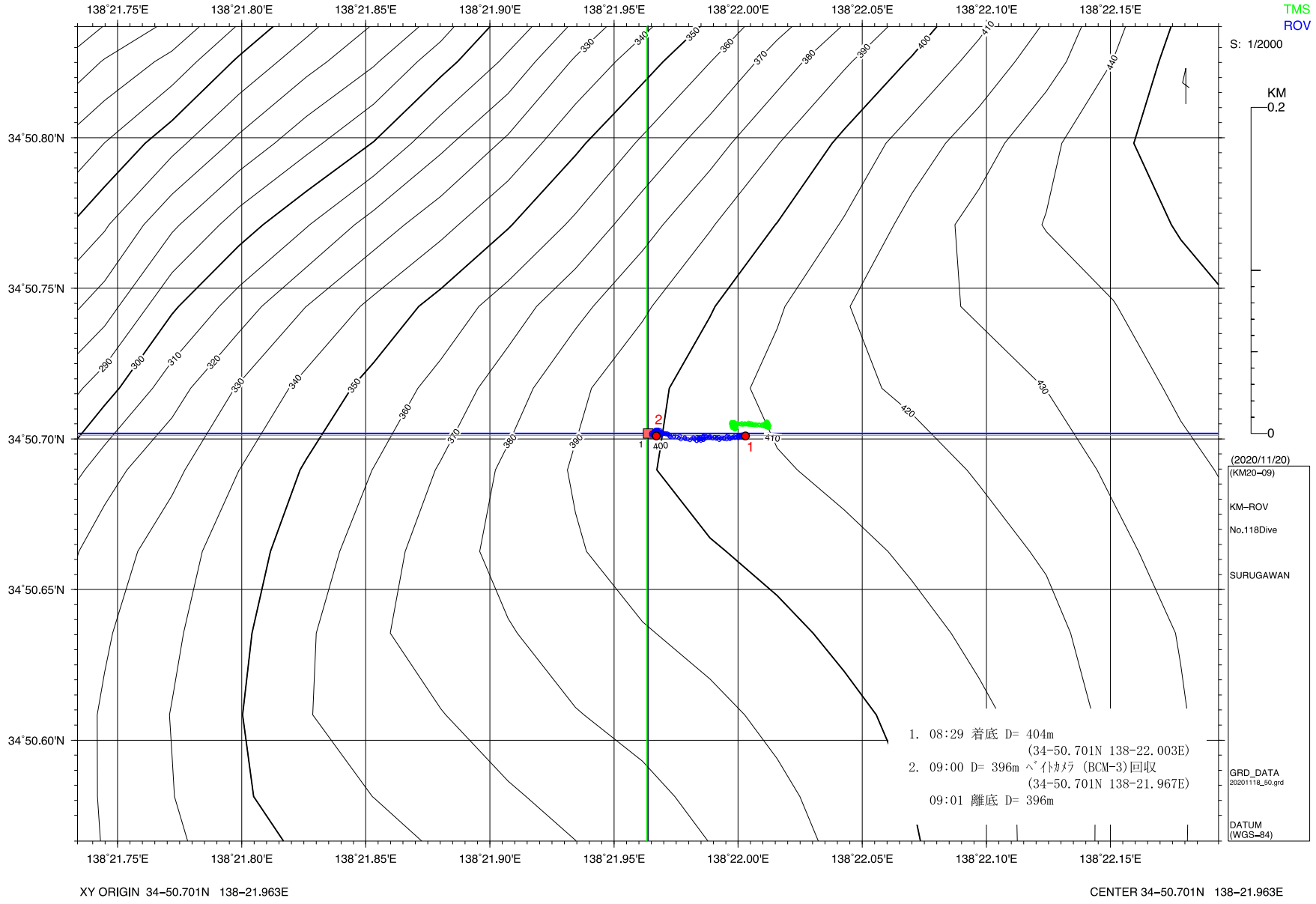


Front payload

Rear Payload

Sampling Points and Markers:

Time	Position	Depth (m)	Events
09:00	34°50.701’N, 138°21.967’E	396	Retrieval of BCM3


138°21.75'E
138°21.80'E
138°21.85'E
138°21.90'E
138°21.95'E
138°22.00'E
138°22.05'E
138°22.10'E
138°22.15'E
34°50.80'N
34°50.75'N
34°50.70'N
34°50.65'N
34°50.60'N
TMS
ROV
S: 1/2000
KM
0.2
0
1. 08:29 着底 D= 404m
(34-50.701N 138-22.003E)
2. 09:00 D= 396m ﾍﾞｲﾄｶﾒﾗ (BCM-3)回収
(34-50.701N 138-21.967E)
09:01 離底 D= 396m
(2020/11/20)
(KM20-09)
KM-ROV
No.118Dive
SURUGAWAN
GRD_DATA
20201118_50.grd
DATUM
(WGS-84)
XY ORIGIN 34-50.701N 138-21.963E
CENTER 34-50.701N 138-21.963E

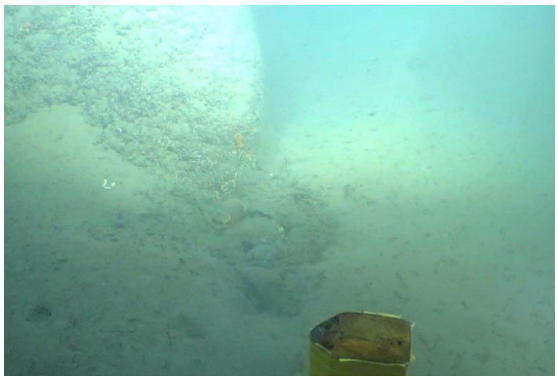
KM-ROV#119

Date: November 20, 2020
Site: Off Yaizu, Ssuruga Bay, ***Depth:*** 400 m
Landing (Lat., Lon., Time, Depth): 34°51.186’N 138°21.474’E, 11:46, 411 m
Leaving (Lat., Lon., Time, Depth): 34°51.205’N 138°21.4247’E, 13:58, 397 m
Observer: TSUCHIDA, Shinji

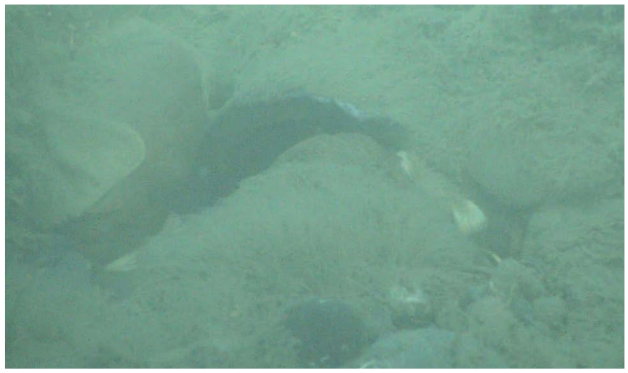
Theme: Marine plastic dynamics and influence of environmental changes on deep-sea ecosystems

Purpose of dive:
1. Retrieval of baited camera (BCM2-11)
2. Sediment core sampling
3. Observation of water intake of deep-sea water pumping facility off Yaizu

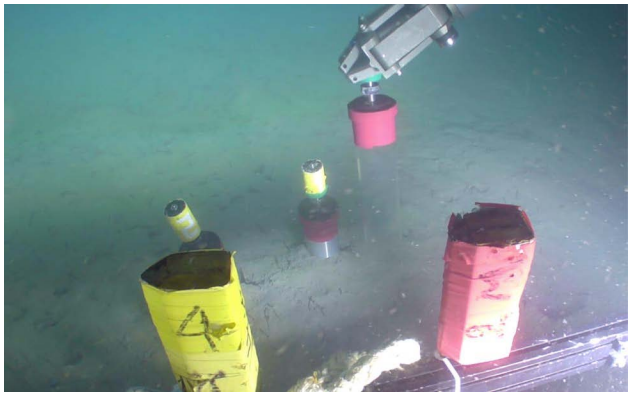
Dive Summary
KM-ROV landed at the bottom about 90m East from the baited camera (BCM2-11). First, we tried to find the intake of deep-sea water pumping facility off Yaizu. About 60m west form the landing point, finally we made sure of the intake which is same as the suspected point of KM-ROV#110 dive. After moving 30m west, we found the baited camera keeping good position at the bottom. ROV operated to hook the four- and two-meter ropes with the flame of camera and succeeded to recovery it on deck.



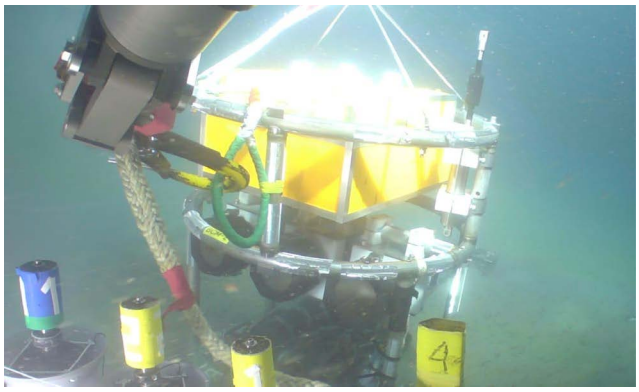
Deep-sea water intake



Close-up of the intake



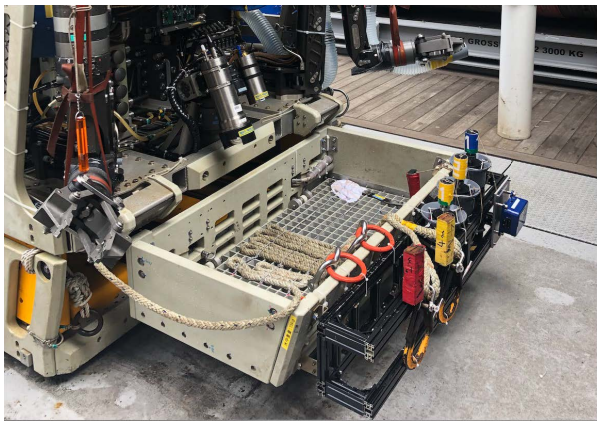
Sediment core sampling



Rope hooking with the flame of camera

Payload Equipment:

1. Recovery rope and hook x2 (Front)
2. H-type push corer x3 (Front)
3. GoPro housing x1 (Front)
4. Suction sampler and multi-bottled canister x1 (Rear)
5. 6.5K Cam x1 (Rear)
6. Line laser x2 (Rear)
7. 24W LED light x1 (Rear)



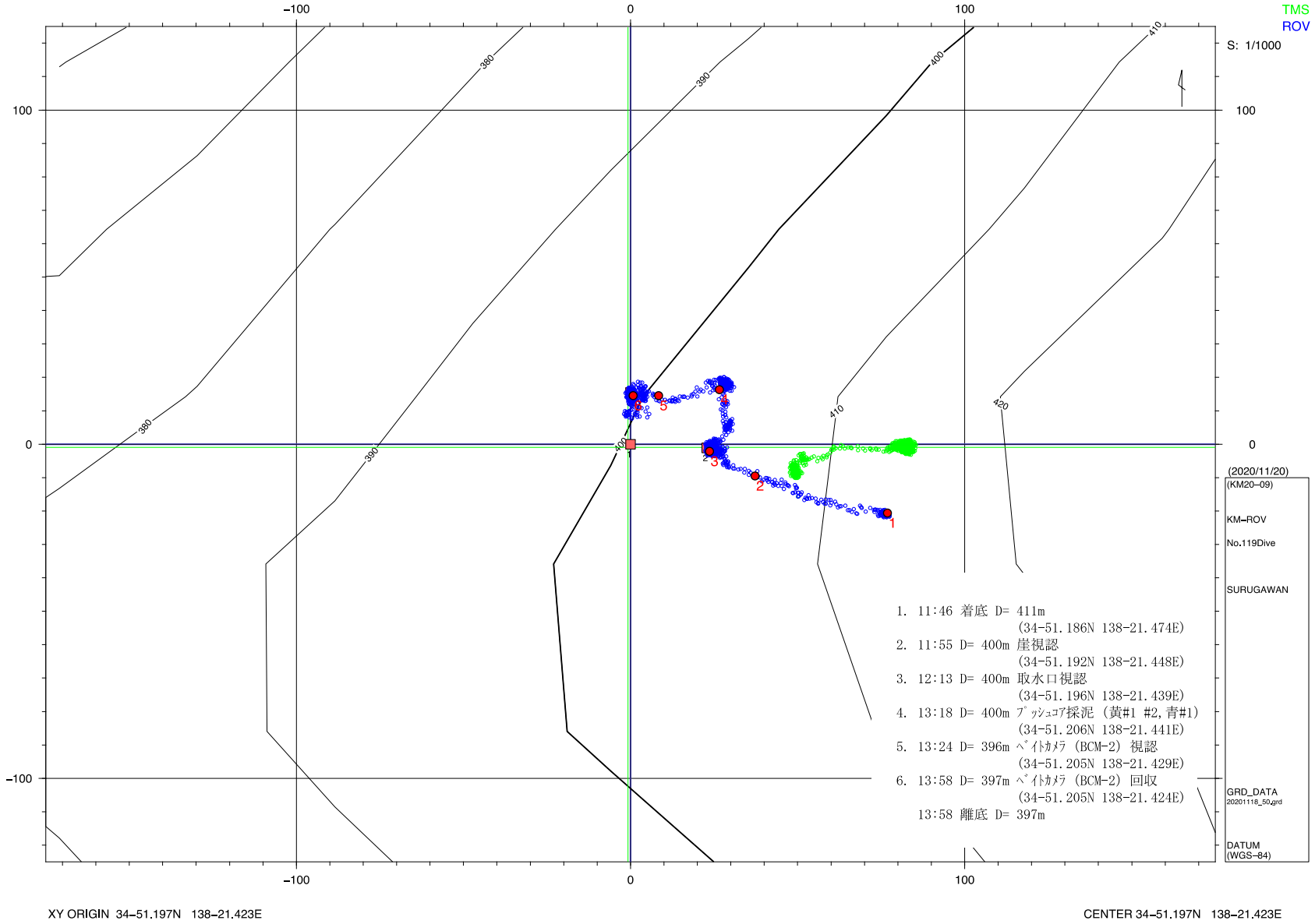
Front payload

Rear Payload

Sampling Points and Markers:

Time	Position	Depth (m)	Events
12:13	34°51.196’N, 138°21.439’E	400	Observation of deep-sea intake
13:18	34°51.206’N, 138°21.441’E	400	Sediment core sampling
13:58	34°51.205’N, 138°21.424’E	397	Recovery of the baited camera

Dive track KM-ROV#119



KM-ROV#120

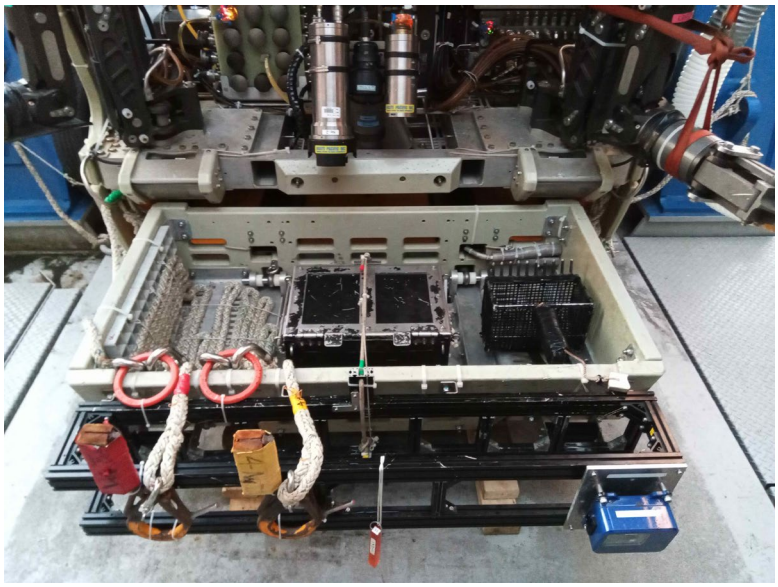
Date: November 21, 2020
Site: Off Akazawa, Sagami Bay, ***Depth:*** 394 m
Landing (Lat., Lon., Time, Depth): 34°50.711'N 138°22.021'E, 8:28, 409 m
Leaving (Lat., Lon., Time, Depth): 34°50.705'N 138°21.963'E, 9:12, 394 m
Observer: YABUKI, Akinori

Theme: Marine plastic dynamics and influence of environmental changes on deep-sea ecosystems

Purpose of dive:
1. Retrieving the bait-camera system (BCM3-11)
2.

Dive Summary
BCM3-11 was found at the depth of 394 m point. Any debris were not found during the dive. After successful hooking on the BCM3-11, KM-ROV left the bottom.

Payload Equipment:
1. Suction sampler and multi-bottled canister x1 (Rear)
2. GoPro housing x1 (Front)
3. 6.5K Cam x1 (Rear)
4. Line laser x2 (Rear)
5. 24W LED light x2 (Rear)

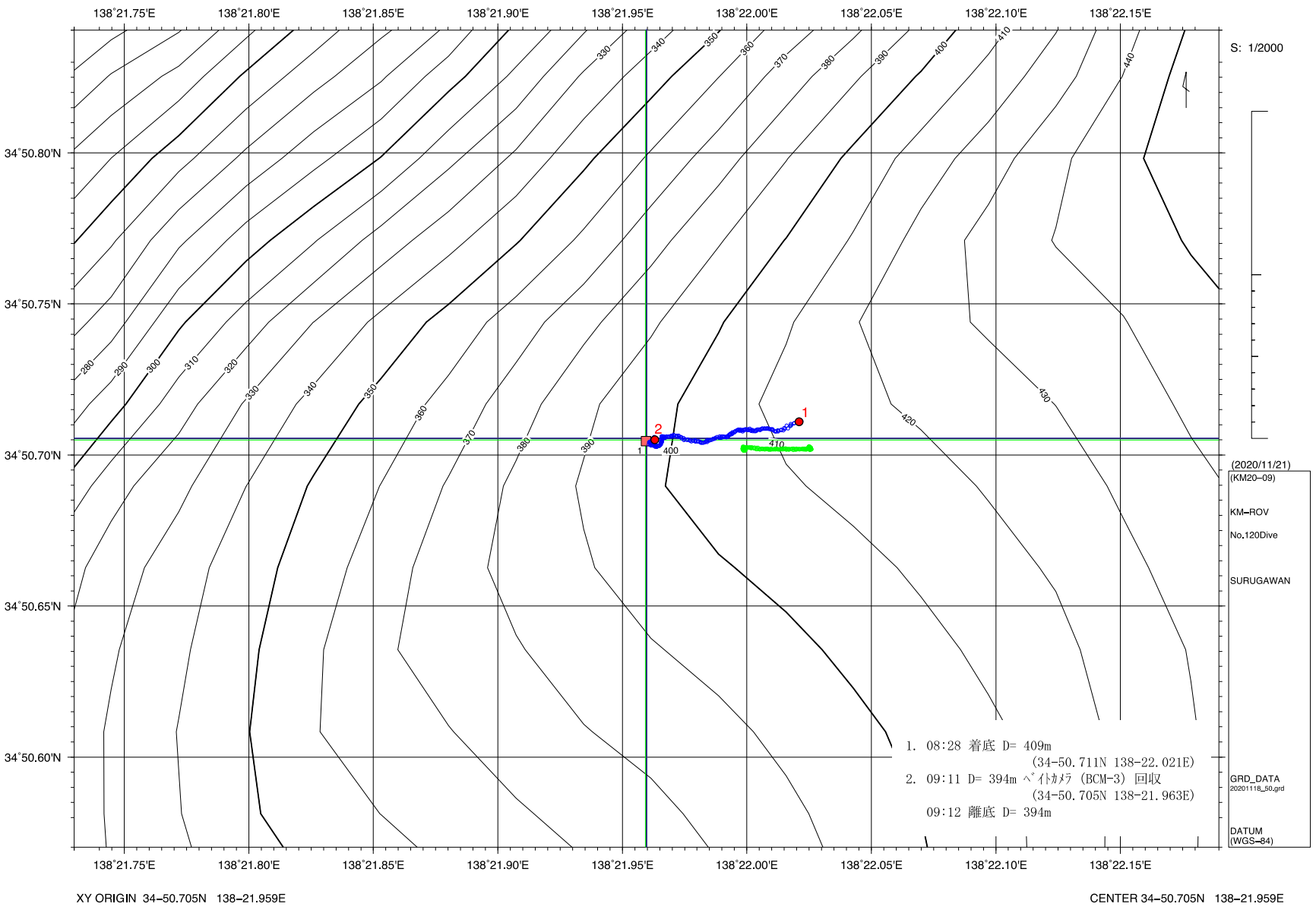


Front view of the payload at KM-ROV#120 and the inside of the sample basket.

Sampling Points and Markers:

Time	Position	Depth(m)	Events
08:28	34°50.711’N 138°22.021’E	409	Landing
09:11	34°50.705’N 138°21.963’E	394	Retrieving BCM3-11
09:12	34°50.705’N 138°21.963’E	394	Leaving the bottom

Dive track KM-ROV#120



KM-ROV#121

Date: November 21, 2020
Site: Off Yaizu, Suruga Bay, ***Depth:*** 450 m
Landing (Lat., Lon., Time, Depth): 34°51.189’N 138°21.680’E, 11:06, 447 m
Leaving (Lat., Lon., Time, Depth): 34°51.201’N 138°21.399’E, 14:22, 392 m
Observer: KAWATO, Masaru

Theme: Marine plastic dynamics and influence of environmental changes on deep-sea ecosystems

Purpose of dive:
4. Observation around the water intake port
5. Recovery of the baited camera, BCM2-12

Dive Summary
KM-ROV landed at the bottom about 400m East from the deployed baited camera at the depth of 450m. Soon we started to travel west, observing benthos and debris. A part of plastic bucket was corrected. ROV operated to hook the four- and two-meter ropes with the frame of camera and succeeded to recovery it on deck.

A debris and *Deania hystricosa*

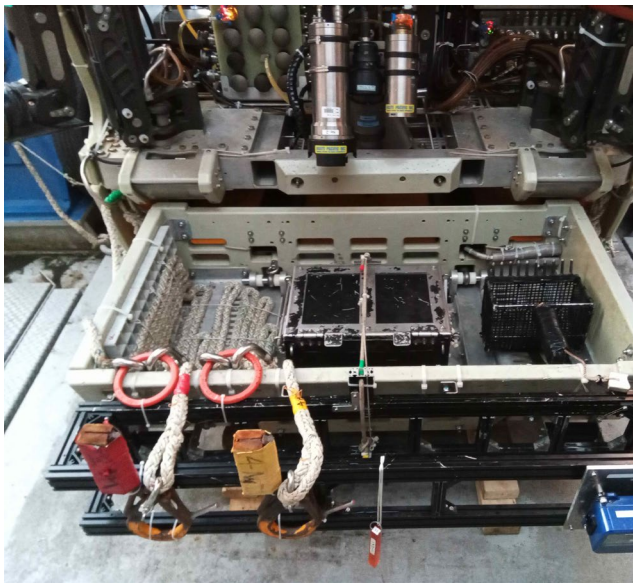
Two individuals of the genus *Ebinania*

Plastic bucket

Baited camera, BCM2-12

Payload Equipment:
9. Two-meter recovery hook x1 (Front)
10. Four-meter recovery hook x1 (Front)

11. GoPro housing x1 (Front)
12. Suction sampler and multi-bottled canister x1 (Rear)
13. 6.5K Cam x1 (Rear)
14. Line laser x2 (Rear)
15. 24W LED light x1 (Rear)



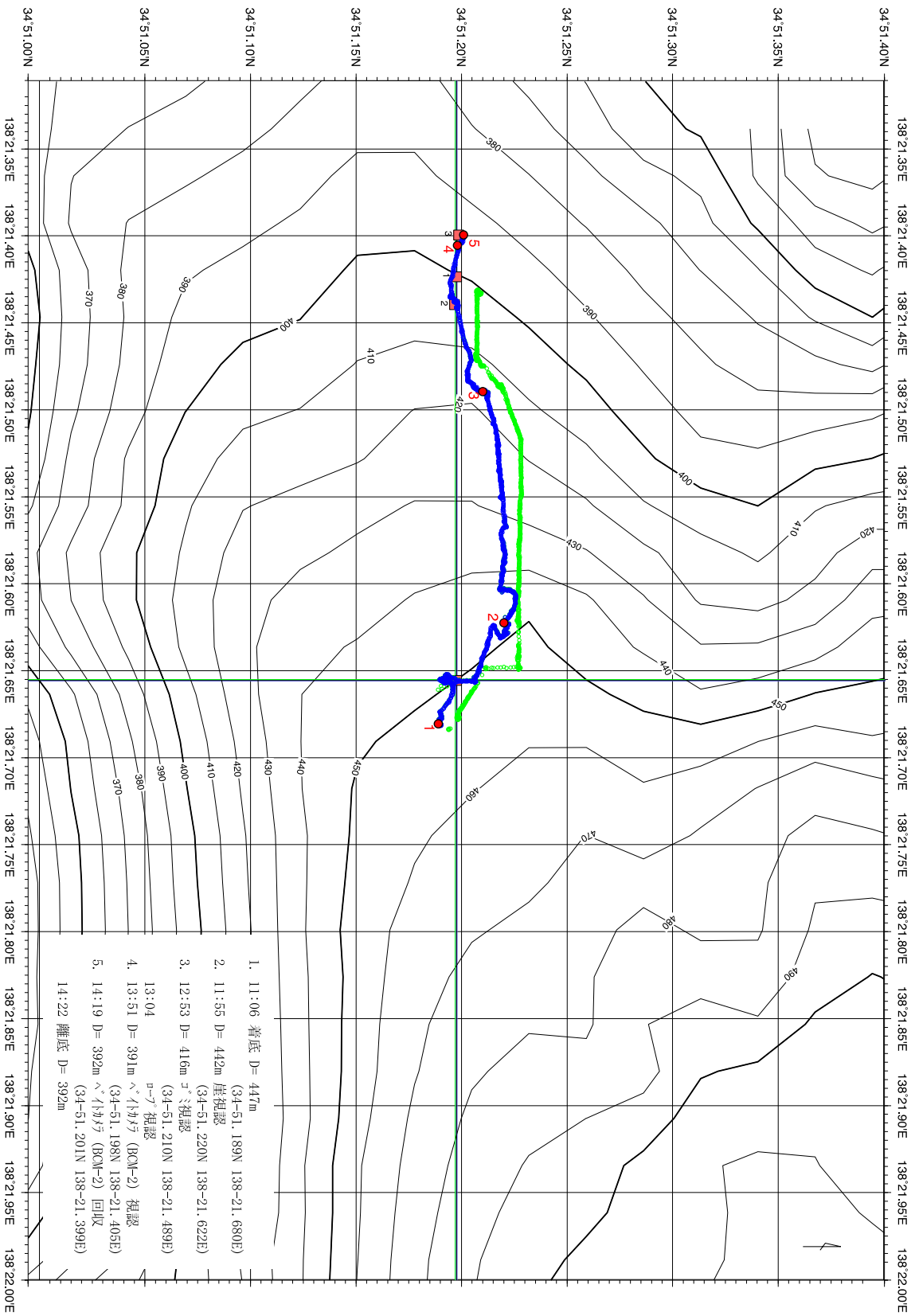
Front payload

Rear Payload

Sampling Points and Markers:

Time	Position	Depth (m)	Events
13:04	34°51.210’N, 138°21.489’E	416	Sampling of a part of bucket
14:19	34°51.201’N, 138°21.399’E	392	Recovery of the baited camera (BCM2-12)

Dive track KM-ROV#121



3-2. CTD water sampling

(1) Personnel

Akinori Yabuki (JAMSTEC) *Principal Researcher
Satoshi Hiraoka (JAMSTEC)
Taichi Yokokawa (JAMSTEC)
Masanori Enoki (MWJ) *Operation leader
Shungo Oshitani (MWJ)
Rei ITO (MWJ)

(2) Objective

Investigation of oceanic structure and water sampling

(3) Parameters

Temperature (Primary and Secondary)
Salinity (Primary and Secondary)
Pressure
Dissolved Oxygen
Fluorescence
Beam Transmission
Turbidity
Colored Dissolved Organic matter (CDOM)
Photosynthetically Active Radiation (PAR)
Altimeter

(4) Instruments and Methods

CTD/Carousel Water Sampling System, which is a 36-position Carousel Water Sampler (CWS) with Sea-Bird Electronics, Inc. CTD (SBE9plus), was used during this cruise. 12-liter sample Bottles were used for sampling seawater. The sensors attached on the CTD were temperature (primary and secondary), conductivity (primary and secondary), pressure, dissolved oxygen, fluorescence, Beam Transmission, Turbidity, Colored Dissolved Organic matter and photosynthetically active radiation. Salinity was calculated by measured values of pressure, conductivity and temperature. The CTD/CWS was deployed from starboard on working deck.

Specifications of the sensors used are listed below.
CTD: SBE911plus CTD system
Under water unit:
SBE9plus (S/N: 09P84583-1235, Sea-Bird Electronics, Inc.)
Pressure sensor: Digiquartz pressure sensor (S/N: 134402)
Calibrated Date: 04 Mar. 2020

Carousel water sampler:

SBE32 (S/N: 324510-1086, Sea-Bird Electronics, Inc.)

Temperature sensors:
Primary: SBE03Plus (S/N: 03P2730, Sea-Bird Electronics, Inc.)
Calibrated Date: 28-Dec-2019

Secondary: SBE03 Plus (S/N: 034811, Sea-Bird Electronics, Inc.)
Calibrated Date: 27-Dec-2019

Conductivity sensors:
Primary: SBE04C (S/N: 044450, Sea-Bird Electronics, Inc.)
Calibrated Date: 10-Jan-2020

Secondary: SBE04C (S/N: 041172, Sea-Bird Electronics, Inc.)
Calibrated Date: 10-Jan-2020

Dissolved Oxygen sensors:
Primary: RINKOIII (S/N: 0221, JFE Advantech Co., Ltd.)

SBE43(S/N: 430205, Sea-Bird Electronics, Inc.)
Calibrated Date: 13-Dec-2019

Fluorescence sensors:
Chlorophyll Fluorometer (S/N: 3701, Seapoint Sensors, Inc.)

Gain setting: 30X, 0-5 ug/l
Offset: 0.000

Transmission meter:
C-Star (S/N CST-1727DR, WET Labs, Inc.)
Calibrated Date: 03 Jun. 2015

Turbidity:
Turbidity Meter (S/N: 14954)
Gain setting: 100X

Scale factor: 1.000

Calibrated Date: None

Photosynthetically Active Radiation (PAR) sensor

PAR-Log ICSW (S/N: 1026, Satlantic, Inc.)
Calibrated Date: 6-Jul-2015

Colored Dissolved Organic Matter sensor
Ultraviolet Fluorometer (S/N: 6223, Seapoint Sensors, Inc.)
Gain Setting: 30X (0-50 QSU)

Altimeter:
Benthos PSA-916T (S/N: 52396, Teledyne Benthos, Inc.)

Submersible Pump:
Primary: SBE5T (S/N: 058145, Sea-Bird Electronics, Inc.)

Secondary: SBE5T (S/N: 058088, Sea-Bird Electronics, Inc.)

Bottom contact switch: (Sea-Bird Electronics, Inc.)

Deck unit: SBE11plus (S/N 90876-1033, Sea-Bird Electronics, Inc.)

The CTD/CWS was deployed from starboard on working deck. The CTD raw data were acquired in real time using the Seasave (ver.7.26.7.121) provided by Sea-Bird Electronics, Inc. and stored on the hard disk of the personal computer.
The bottle was fired after waiting from the stop for more than 30 seconds below thermocline to stabilize. For depths where vertical gradient of water properties was expected to be large, the bottle was exceptionally fired after waiting 60 seconds from the stop to enhance the exchange of water between inside and outside of the bottle. 6 casts of CTD measurements were conducted (Table 1).

Data processing procedures and used utilities of SBE Data Processing-Win32 (ver.7.26.7.121) and SEASOFT were as follows:

(The process in order)
DATCNV: Converted the binary raw data to engineering unit data. DATCNV also extracts bottle information where scans were marked with the bottle confirm bit during acquisition. The duration was set to 3 seconds, and the offset was set to 0.0 seconds.

RINKOCOR (original module): Corrected the time dependent, pressure induced effect (hysteresis) of the RINKOIII profile data.

RINKOCORROS (original module): Corrected the time dependent, pressure induced effect

(hysteresis) of the RINKOIII bottle information data by using the hysteresis corrected profile data.

BOTTLESUM: Created a summary of the bottle data. The data were averaged over 3 seconds.

ALIGNCTD: Convert the time-sequence of sensor outputs into the pressure sequence to ensure that all calculations were made using measurements from the same parcel of water. Dissolved oxygen data are systematically delayed with respect to depth mainly because of the long time constant of the dissolved oxygen sensor and of an additional delay from the transit time of water in the pumped pluming line. This delay was compensated by 6 seconds advancing dissolved oxygen sensor (SBE43) output (dissolved oxygen voltage) relative to the temperature data. RINKOIII voltage (User polynomial 0) was advanced 1 second.

WILDEDIT: Marked extreme outliers in the data files. The first pass of WILDEDIT obtained the accurate estimate of the true standard deviation of the data. The data were read in blocks of 1000 scans. Data greater than 10 standard deviations were flagged. The second pass computed a standard deviation over the same 1000 scans excluding the flagged values. Values greater than 20 standard deviations were marked bad. This process was applied to pressure, depth, temperature (primary and secondary) and conductivity (primary and secondary) dissolved oxygen voltage (SBE43).

CELLTM: Removed conductivity cell thermal mass effects from the measured conductivity. Typical values used were thermal anomaly amplitude alpha = 0.03 and the time constant 1/beta = 7.0.

FILTER: Performed a low pass filter on pressure and depth data with a time constant of 0.15 second. In order to produce zero phase lag (no time shift) the filter runs forward first then backward.

WFILTER: Perform a median filter to remove spikes in the fluorescence data, transmission data, transmission beam attenuation, transmission voltage, turbidity and Ultraviolet fluorometer. A median value was determined by 49 scans of the window. The data were further processed by using boxcar filter with 361 scans of the window.

SECTIONU (original module of SECTION): Selected a time span of data based on scan number in order to reduce a file size. The minimum number was set to be the starting time when the CTD package was beneath the sea-surface after activation of the pump. The maximum number of was set to be the end time when the package came up from the surface.

LOOPEDIT: Marked scans where the CTD was moving less than the minimum velocity of 0.0 m/s (traveling backwards due to ship roll).

DESPIKE (original module): Removed spikes of the data. A median and mean absolute deviation was

calculated in 1-dbar pressure bins for both down and up cast, excluding the flagged values. Values greater than 4 mean absolute deviations from the median were marked bad for each bin. This process was performed twice for temperature, conductivity and dissolved oxygen (RINKOIII and SBE43) voltages.

DERIVE: Compute dissolved oxygen (SBE43).

BINAVG: Average the data into 1 decibar bins.

BOTTOMCUT (original module): Deletes discontinuous scan bottom data, when it's created by BINAVG.

DERIVE: Compute salinity, potential temperature, and density (sigma-theta).

SPLIT: Separate the data from the input .cnv file into down cast and up cast files.

(5) Station list

During this cruise, 6 casts of CTD observation were carried out. Date, time and locations of the CTD casts are listed in Table 1.

(6) Preliminary Results

During this cruise, we judged noise, spike or shift in the data of some casts. These were as follows.

(7) Data archive

These data obtained in this cruise will be submitted to the Data Management Group of JAMSTEC, and will be opened to the public via "Data Research System for Whole Cruise Information in JAMSTEC (DARWIN)" in JAMSTEC web site.

<http://www.godac.jamstec.go.jp/darwin/e>

Table 1. KM20-09 CTD cast table

Stnnbr	Castno	Date(UTC)	Time(UTC)		BottomPosition		Depth	Wire	HT Above	Max	Max	CTD
		(mmddyy)	Start	End	Latitude	Longitude	(m)	Out (m)	Bottom (m)	Depth	Pressure	Filename
001	1	111420	23:04	23:54	34-50.32N	139-08.19E	819.2	804.2	18.9	800.6	808.0	001M001
001	2	111520	04:12	04:53	34-50.34N	139-08.18E	820.4	810.9	9.7	806.6	814.0	001M002
002	1	111620	19:08	23:07	34-50.32N	139-08.17E	820.1	797.3	22.7	793.7	801.0	002M001
003	1	111820	23:36	01:25	34-51.20N	138-21.45E	407.4	385.6	17.8	385.8	389.0	003M001
003	2	111920	02:26	02:57	34-51.21N	138-21.43E	402.2	393.2	7.6	392.8	396.0	003M002
004	1	112020	22:01	22:33	34-51.19N	138-21.44E	400.3	392.9	8.8	391.8	395.0	004M001

3-3. Neuston net sampling

The monitoring of the distribution and abundance of microplastics in the coastal waters near largely populated areas is crucial for understanding the efficiency of the mitigation strategies against plastic pollutions. This study aimed to obtain baseline data of the distribution and abundance of microplastics in the two large coastal waters, Sagami and Suruga bays.

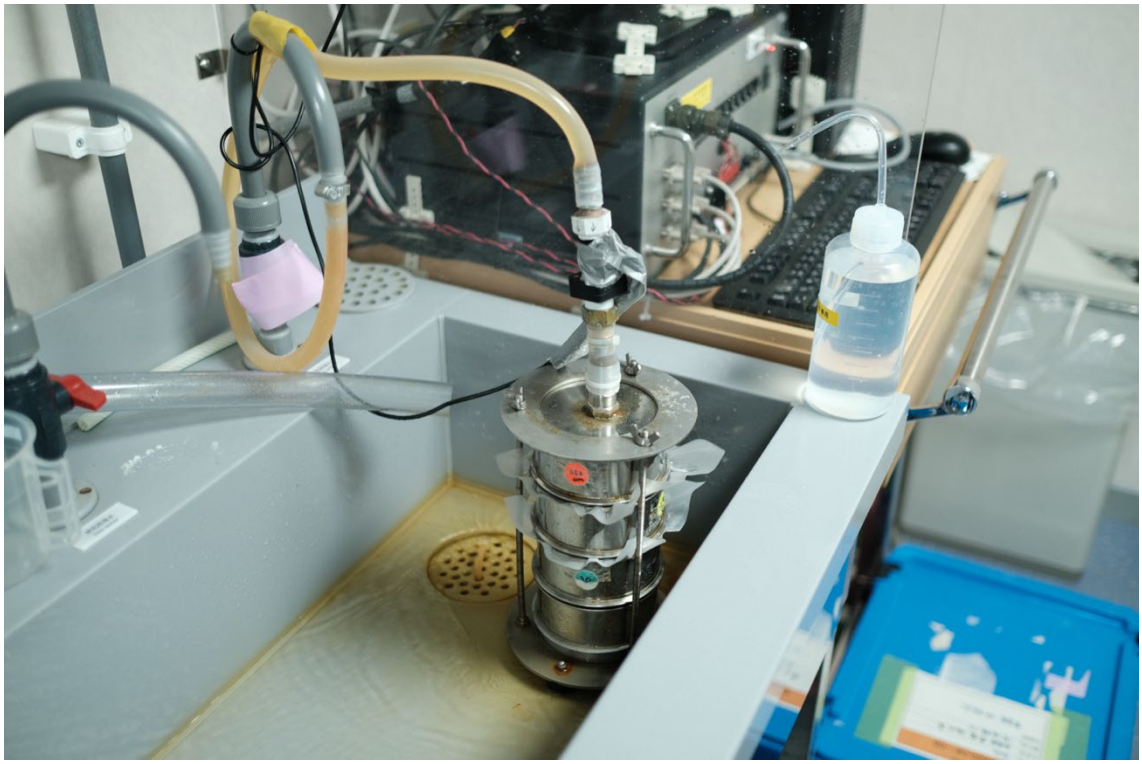
From November 14th to November 21th 2020, a total of 18 surface net tows were carried out at Sts. 1, 3, Akazawa, 4, Yaizu and 6 between 34°25’N-35°02’N and 138°30’W- 139°23’W by R/V Kaimei. Floating microplastic samples were collected using a neuston net with a rectangular mouth opening of 75 cm height and 100 cm width, equipped with a 333 μm mesh opening net with a collecting bottle at the cod-end. The net without a cod-end was rinsed from the outside with seawater prior to use. At each station, the net was towed three times at 1-2 knots for 10-20 min from the starboard side. A flow-meter was installed at the net mouth to estimate the volume of water filtered during each tow. The collected samples were fixed with 3-5% formalin and stored at room temperature until analysis.

Microplastics were confirmed in the net samples at all the stations. At St. 1, the third net towing encountered a current rip, resulting in a significantly higher number of micro- and macroplastics. A considerable number of microplastics was also observed at St. 4 probably because it was located at the edge of the main current of Kuroshio that generally brings a large number of debris.

Neuston net

3-4. Pumped Seawater sampling

Subsurface microplastic samples were collected at ca. 5 m depth below the sea surface using a pumped seawater system of the vessel throughout the cruise. The pumped unfiltered seawater was continuously filtered through a 333 μm mesh screen and then 100 μm mesh screen at flow rates of 9 -12 L/min. These meshes were placed in the system upon arrival to a sampling site and then collected when the vessel leaves the site. The collected meshes were each wrapped with an aluminum foil and stored at 4°C until analysis.



Pumped Seawater-Microplastic sampler

3-5. Baited Camera deployment

Baited cameras used in this cruise were illustrated shown below.

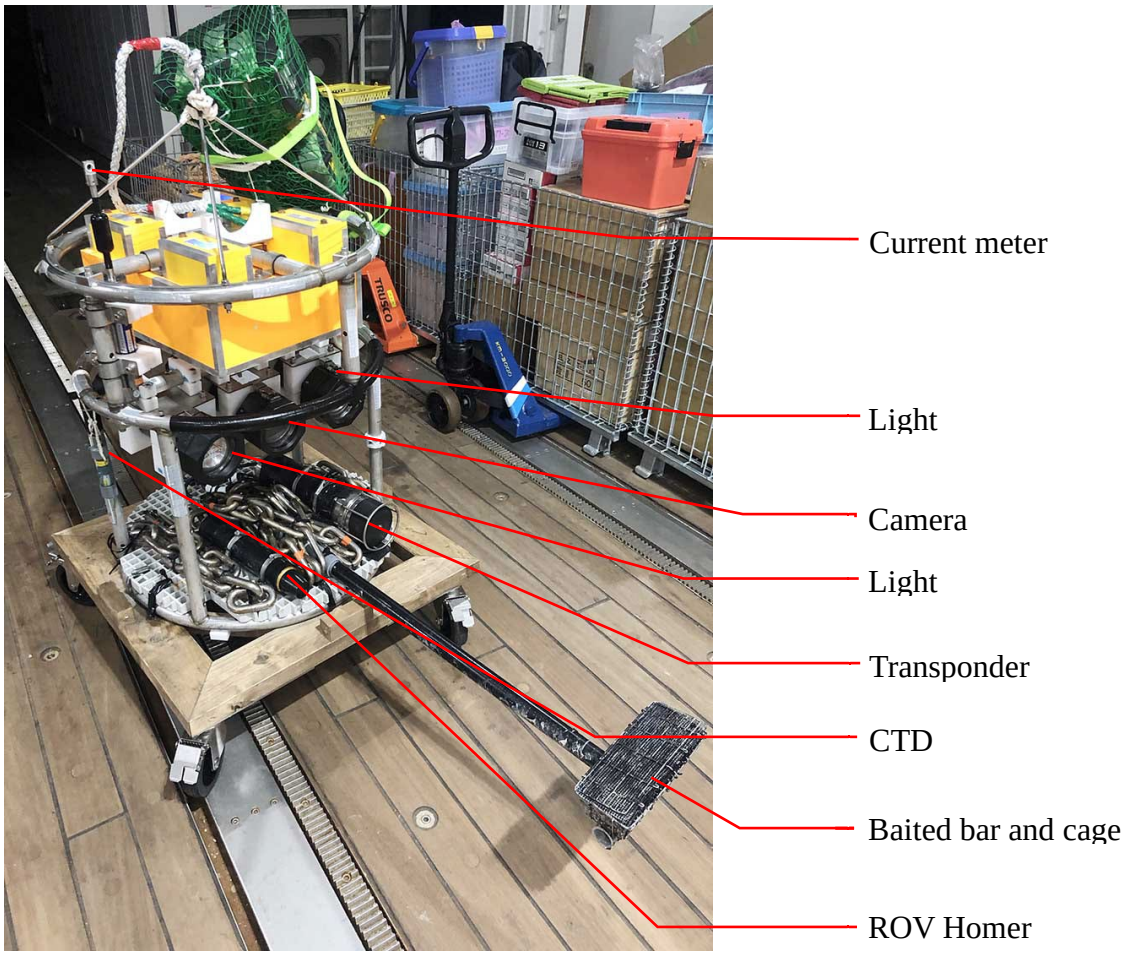


Fig. 1. Baited camera used in this cruise

Two baited cameras were operated by free-fall deploying from the vessel and recovering by KM-ROV. Video recorded more than seven hours at most 13 hours using near infrared LED light or white light with wave cut filter. First arrival times of each animals mainly focused on predators and scavengers appeared in movies will be measured. Equipment loaded on the camera listed below,

	BCM2	BCM3
Transponder	4B-2	4D-1
ROV Homer	35	33
Current meter	1733	1694
CTD	9274	9273

The first cast of this cruise, baited cameras landed over at the bottom, baited bar directing upward for bad balance. From the second cast, 20kg weight and -22.7kg float added on the camera as Fig. 1. Total of eight casts listed as below.

Table 1. Cast list of the baited camera during KM20-09 Cruise

Casting Date	Cast No.	Casting Point	Casting Time	Recovery Time	Descent speed (m/m)	Lat.	Lon.	Depth(m)	Recoery Date	Recovery Dive No.
2020 11.15	BCM2-9	North of the inlet of Akazawa	15:38	15:52	58.59	34_50.5327N	139_08.2193	820.2	2020 11.17	KM-ROV#114
	BCM3-8	South of the inlet of Akazawa	16:12	16:25	63.16	34_49.6329N	139_08.0014E	821.1	2020 11.17	KM-ROV#113
2020 11.17	BCM2-10	North of the inlet of Akazawa	17:13	17:24	74.21	34_50.4209N	139_08.1982E	816.3	2020 11.18	KM-ROV#116
	BCM3-9	South of the inlet of Akazawa	16:38	16:49	74.69	34_49.4415N	139_07.9835E	821.6	2020 11.18	KM-ROV#115
2020 11.19	BCM2-11	Nearby inlet of Yaizu	16:07	16:13	67.05	34_51.2052N	138_21.4234E	402.3	2020 11.20	KM-ROV#119
	BCM3-10	South of the inlet of Yaizu	16:33	16:39	66.88	34_50.7012N	138_21.9632E	401.3	2020 11.20	KM-ROV#118
2020 11.20	BCM2-12	Nearby inlet of Yaizu	15:57	16:03	66.28	34_51.1986N	138_21.3993E	397.7	2020 11.21	KM-ROV#121
	BCM3-11	South of the inlet of Yaizu	15:24	15:30	68.42	34_50.7049N	138_21.9592E	410.5	2020 11.21	KM-ROV#120

3-6. Geophysical survey results

MultiBeam Echo Sounding system (MBES) is collecting continuous bathymetric data along ship's track to make a contribution to geological and geophysical investigations and global datasets.

Specification and method-

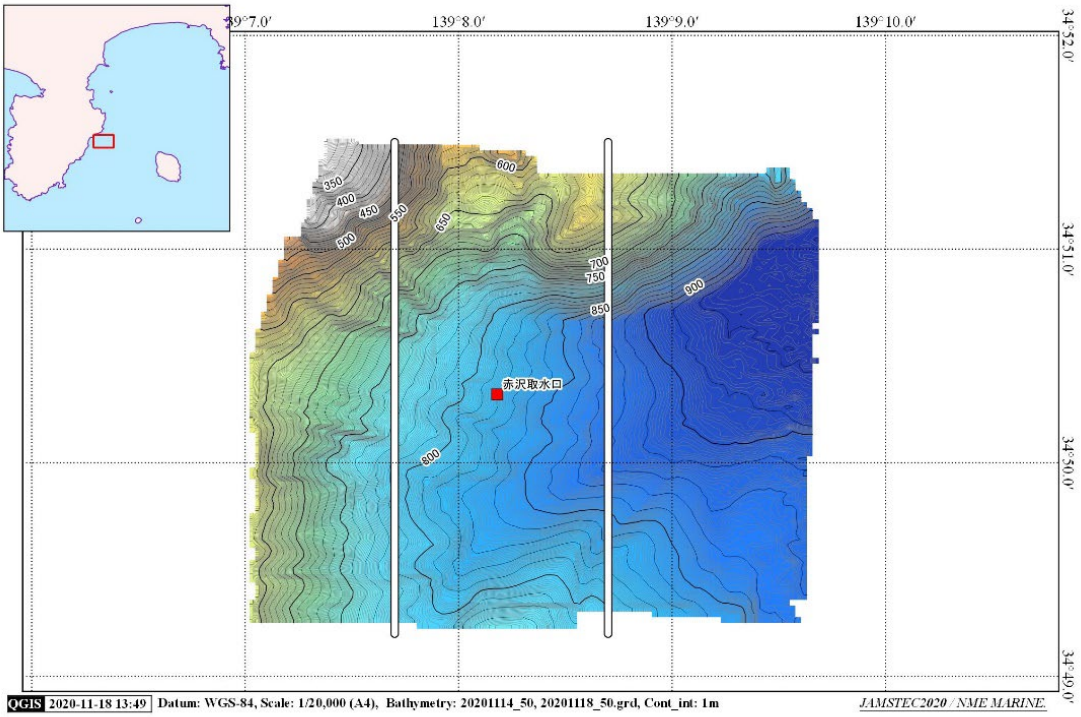
The "EM122" & "EM711" on R/V KAIMEI are multibeam echo sounder for bathymetry mapping. The system configuration and performance for EM122 (12 kHz system) and EM712 (40 ~ 100 kHz system) is listed below.

Deep multibeam echo sounder (Kongsberg / EM122)
Frequency: 12 kHz (10.5 ~ 13 kHz)
Beam width: 1 degree × 1 degree
Transmit pulse length: CW; 3 to 15 msec. / FM chirp; 25 to 100msec (auto)
Depth range: 20 to 11,000 m
Number of beams: 288
Number of footprints: 432 (864; Dual swath mode)
Swath width: 150 degree (max)
Depth accuracy: 0.2 % of depth (swath width ± 45degree)
Gyro & Motion: PHINS, IXSEA BLUE
Navigation: StarPack-D (G2, XP2 and L1), Fugro

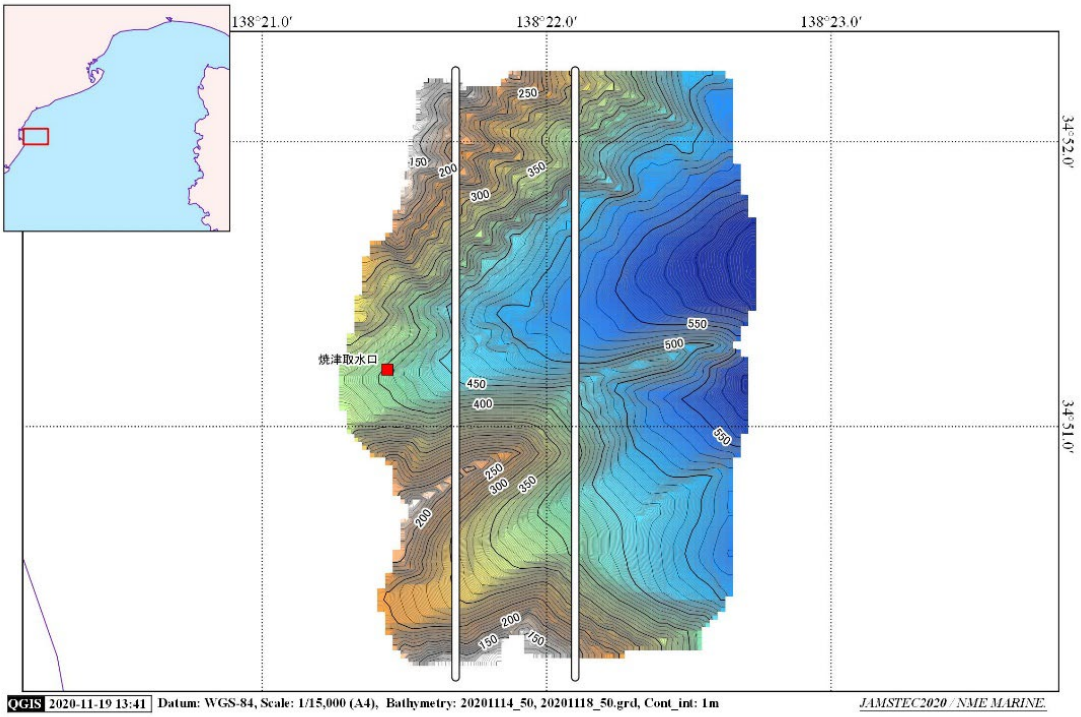
Shallow multibeam echo sounder (Kongsberg / EM712)
Frequency: 40 ~ 100 kHz
Beam width: 50 kHz; 1degree × 1 degree
100kHz; 0.5 degree × 0.5 degree
Transmit pulse length: CW; 0.2 to 2 msec, / FM chirp; 25 to 120 msec. (auto)
Depth range: 3 to 3,600 m
Number of beams: 256
Number of footprints: 400 (800; Dual swath mode)
Swath width: 140 degree (max)
Depth accuracy: 0.2 % of depth (swath width ± 45degree)
Gyro & Motion: PHINS, IXSEA BLUE
Navigation: StarPack-D, Fugro

To get accurate sound velocity of water column for ray-path correction of acoustic multibeam, we used Surface Sound Velocimeter (Smart SV/AML) data to get the sea surface (5.5 m) sound velocity, and the deeper depth sound velocity profiles were calculated by temperature and salinity profiles from CTD and XBT data during the cruise.

KM20-09, MBES Site Survey, Off Hatsushima, Suruga Bay



KM20-09, MBES Site Survey, Off Yaizu, Suruga Bay



3-7. MASS Pump filtration

The “MASS Pump” is a large-scale *in situ* filtration system for seawater for environmental DNA research. It consists of three units: a filter unit (four Sterivex filters with 0.45 µm in pore size installed), a pump unit, and a control unit containing a system controller and a battery (Fig. 3-7-1). During this cruise, the pump was equipped on the CTD water sampling system (Fig. 3-7-2), and two trials of filtration were conducted off Akazawa at a depth of 793.7 m and off Yaizu at a depth of 385.8 m. The filtration durations and volumes were shown in Table 3-7-1.

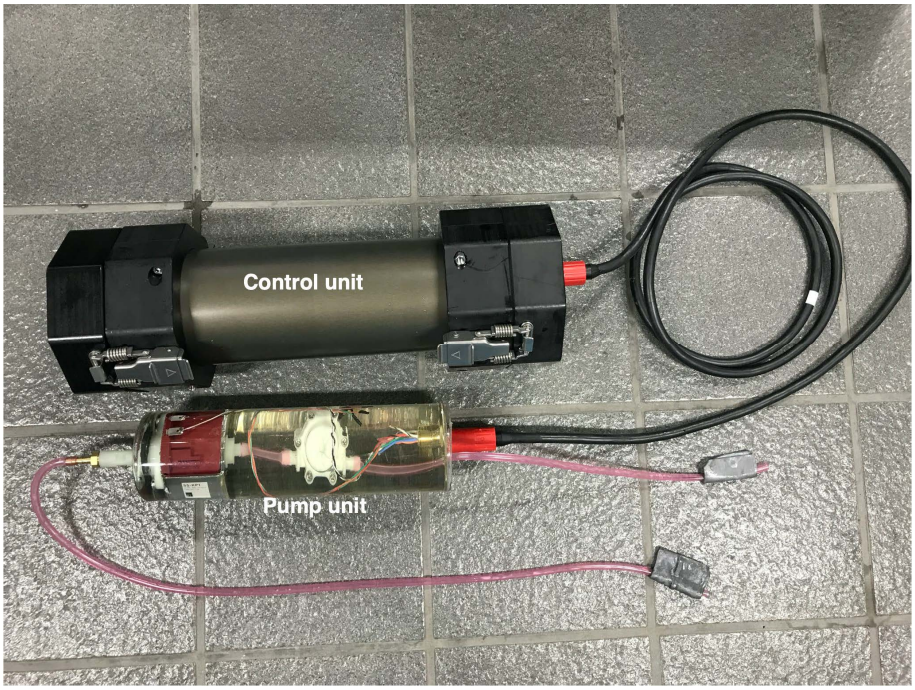


Fig. 3-7-1. MASS Pump.

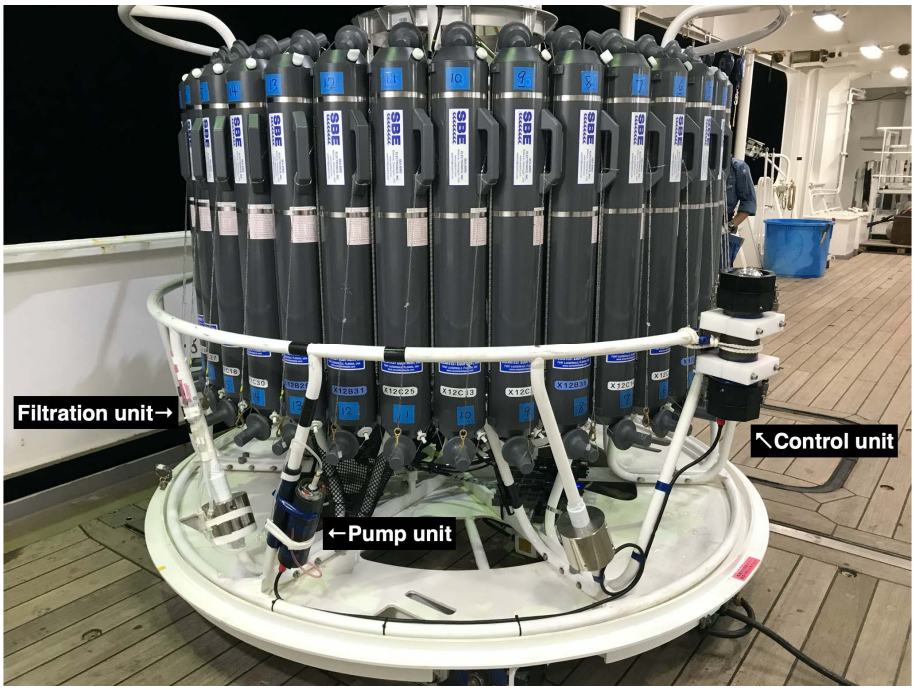


Fig. 3-7-2. MASS Pump installed on a CTD water sampling system.

Table 3-7-1. Filtration results using MASS Pump.

CTD cast no.	Location	Depth (m)	Filtration duration	Filtration volume (L)
002-1	Off Aakazawa	793.7	3:00:00	110.1
003-1	Off Yaizu	385.8	1:30:00	56.4

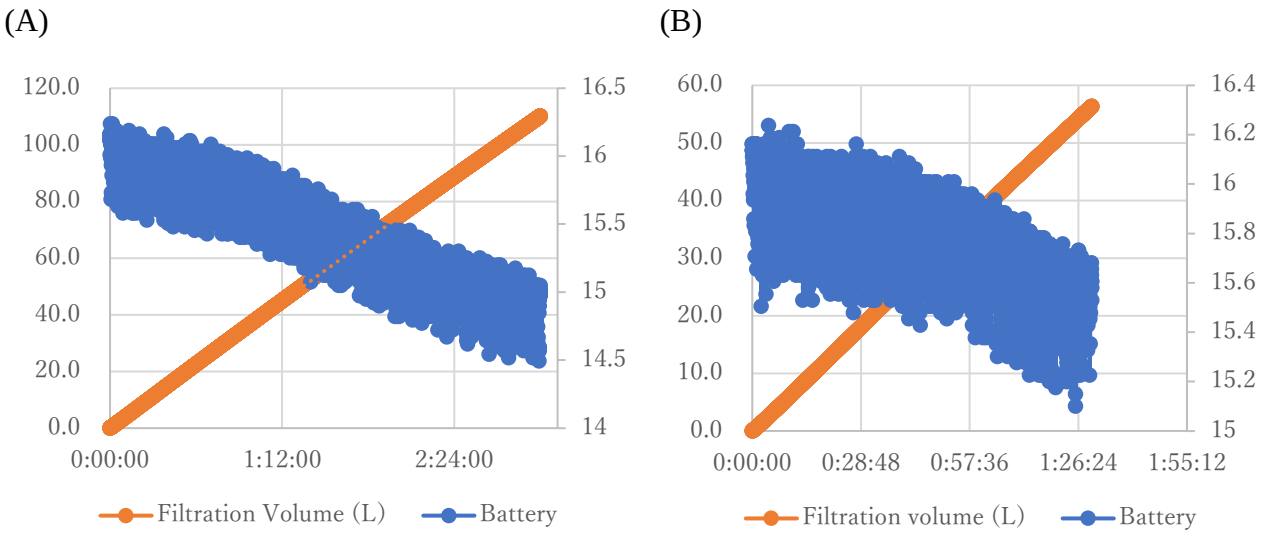


Fig. 3-7-3. Filtration rate and battery consumption. (A) CTD cast no. 002-1, (B) CTD cast no. 003-1.

4. Proposals for the future studies

Fujiwara, Yoshida, Kawato, Tsuchida, Nagano, Yabuki

Can deep-sea pumped water be a window to deep-sea biodiversity? -comparison of faunal diversities between in situ observations and environmental DNA collected from the pumped water.

Faunal diversities of deep-sea ecosystems off Akazawa and Yaizu were investigated using ROV and baited cameras. Just after this cruise, pumped deep-sea water will be filtered at on-land pumping facilities in Akazawa and Yaizu, and the filtered samples are planned to be analyzed by use of NGS. Both faunal information will be compared, and the availability of such pumped water to reveal the diversity without any field research will be assessed.

Kitahashi, Tsuchiya, Aoki, Nakata

Microplastic and chemical additives, and meiofaunal analysis

Sediment samples were collected, by the H-type push corer at stations off Hatsushima, Akazawa, and Yaizu. We used two types of the core, acrylic and aluminum-made core tubes. Aluminum-made tubes were used in this study for microplastic analysis to prevent plastic contamination. Three sediment samples collected with aluminum-made core tube were used for chemical additives at off Hatsushima, off Akazawa and off Yaizu sites and two sediment cores were used for microplastic analysis at off Akazawa and off Yaizu sites, and one sediment samples collected with acryl made core tubes were used for meiofaunal analysis at off Hatsushima. On board, sediment samples were sliced every 1 cm down to bottom of the core for microplastic analysis and chemical analysis. In addition, for one sediment sample collected with aluminum-made core tube will be analyzed pollutants including plastic additives. For meiofauna analysis, on board, sediment samples were sliced into 11 layers (0.5 cm intervals down to 1 cm depth, 1 cm intervals down to 10 cm) and fixed with formalin.

Sediment samples will be treated according to the procedure described by Nakajima et al. (2019) and extracted microplastics will be counted under a fluorescence microscope of FTIR microscopy. Sediment samples will be treated according to the procedure described by Danovaro (2010) and meiofauna specimens will be counted and identified under a binocular stereoscopic microscope.

Aoki, Tsuchiya, Nakajima, Kitahashi

Fracture process of marine plastics inferred from size distributions at the sea surface and bottom

The fracture of marine plastics is a key phenomenon that regulates the concentration of the microplastics in the ocean. Two mechanisms have been proposed: a successive fragmentation toward smaller sizes and a fragmentation with a fracture energy limit in the tiny size. This study aims at clarifying which mechanism is more applicable for explaining nature, by comparing the size distributions of the microplastics for the neuston net and sediment samples with those expected from the suggested mechanisms.

Isobe, Hidaka

Physico-chemical analysis on structural polysaccharids

Sediment samples were collected by the H-type push corer (polycarbonate) at stations off Hatsushima, Akazawa, and Yaizu. On board, sediment samples were sliced every 1 cm down to 5 cm,

and every 5 cm to bottom of the core.

Sediment samples will be subjected to solvent extraction. The extracted fractions will be analyzed by X-ray diffraction, FT-IR, and NMR. In addition, microbial analysis will be performed on the surface layer of sediments (0-1 cm).

Yabuki, Nagano

Cultivation of microbial eukaryotes

Sediment samples were collected by the H-type push corer (polycarbonate) at stations off Hatsushima, Akazawa, and Yaizu. On board, the sediment samples were sliced in the following way: 0-1 cm, 5-6 cm and 10-11 cm, and then they were kept at 4°C.

Sediment samples will be inoculated into and on several kinds of culture medium and agar plate. The microbial eukaryotes, such as flagellates and fungi, which grow in the media and plates will be isolated and established as clonal cultures.

Hiraoka, Kawai, Yokokawa

Culture-independent metagenomic analysis of coastal marine microbes

Water samples were collected from Sagami and Suruga bays at several water depth layers using Niskin bottles or intake pipe and conducted onboard water filtration for collecting prokaryotic cells. The cell samples will be used for shotgun metagenomic sequencing to investigate taxonomic composition, genetic diversification, and DNA chemical modification in coastal marine environment.

Hiraoka & Deep-sea biodiversity research group

Understanding the eDNA based biodiversity in the deep-sea environments

Water samples were collected off Akazawa in Sagami bay and off Yaizu in Suruga bay at the depth of 803-805 m and 384-386 m, respectively. The collected samples were subsequently filtered through 0.45 μm Sterivex filters and kept at -80°C onboard. The samples will be subjected to the eDNA extraction and NGS analyses to retrieve the barcode sequences of several eukaryotic taxa (e.g., Metazoa, Fingi and Excavata). The information derived from the analyses will be compared between two loci and also compared with the results of bait-camara observation.

Ikuta

Physiological impacts of microplastics on deep-sea megabenthic animals

The presence of microplastics in the marine environment has become an emerging threat to marine ecosystems. Due to their small size, microplastics may be ingested or uptaken by megabenthic or mega-planktonic animals. The animals living in the deep-sea will be no exception. However, the distribution of microplastics in deep-sea animals and the physiological effecs of microplastics on them have been poorly understood. To address this issue, in this cruise, we collected some megabenthic animals. After the cruise, content of microplastics as well as the amount of persistent organic pollutants (POPs) will be analyzed. In addition, the uptaking mechanisms of microplastics into the animal bodies will be investigated.

Isobe

Development of marine-degradable bioplastic on the deep-sea floor.

The plastic pollution is now considered as one of the most threatening social problems. To reduce the amount of plastic debris in the ocean, especially those found on the deep-sea floor, the development of marine-degradable bioplastic is in urgent need. Here, in this study, the on-site biodegradability test of novel marine-degradable bioplastic developed by the group of Professor Iwata (University of Tokyo) are performed. Various kinds of bioplastics stored in the sample chambers were deposited on the deep-sea floor off Hatsushima at a depth of 855 m almost 1 year ago (2019/09/12). The samples were recovered during this cruise and will be subjected to the chemical, physical, and biological analyses to understand the key for the efficient biodegradation of bioplastics on the deep-sea floor.

Nakajima

Neuston net sampling and pumped seawater system

Microplastic samples from the neuston net and the pumped seawater system will be subjected to enumeration and identification of plastic polymer types using a stereoscopic microscope and FT-IR at JAMSTEC. The microplastics will also be weighed for mass calculation. The distribution, density and concentration of microplastic in this study will be compared with the previous reports from the Sagami and Suruga Bays. One of the data obtained in this cruise will be analyzed at JAMSTEC.

Nakata

Sediment cores and neuston net samples

Plastic additives will be analyzed in sediment cores to understand their temporal pollution in Sagami and Suruga bays in Japanese coastal waters. Also, neuston net samples, such as weathered PET bottle and plastic products, will be analyzed to identify the occurrence and abundance of microplastics in their surfaces.

Appendix

I. Sample list

I-1. Macro/mega organisms

Onboard ID	Dive no.	Sample name	Amount	Sampling method	Fixation	Preservation	Area	Site	Latitude(N)		Longitude(E)		Depth (m)	Sampling date		
Dive#111-B01	KM#111	*Bathymodiolus japonicus*	many	Slurp gun	frozen	frozen	Sagami Bay	Off Hatsushima	35	00.943	139	13.387	910	2020	11	16
Dive#111-B02	KM#111	*Bathymodiolus platifrons*	many	Slurp gun	frozen	frozen	Sagami Bay	Off Hatsushima	35	00.943	139	13.387	910	2020	11	16
Dive#111-B03	KM#111	Ophiuroidea sp.	many	Slurp gun	frozen	frozen	Sagami Bay	Off Hatsushima	35	00.943	139	13.387	910	2020	11	16
Dive#112-B01	KM#112	*Bathymodiolus japonicus*	many	Slurp gun	frozen	frozen	Sagami Bay	Off Hatsushima	35	00.941	139	13.384	918	2020	11	16
Dive#112-B02	KM#112	*Bathymodiolus platifrons*	many	Slurp gun	frozen	frozen	Sagami Bay	Off Hatsushima	35	00.941	139	13.384	918	2020	11	16
Dive#112-B03	KM#112	*Phreagena sp.*	15	Scoop sampler	frozen	frozen	Sagami Bay	Off Hatsushima	35	00.955	139	13.327	858	2020	11	16
Dive#112-B04	KM#112	Ophiuroidea sp.	many	Slurp gun	frozen	frozen	Sagami Bay	Off Hatsushima	35	00.941	139	13.384	918	2020	11	16
KM20-09 NN st. 1	st. 1	sea eel grass	500 gram	Neuston net	Frozen	Frozen	Sagami bay	Center	35	01.25	139	22.65	0	2020	11	14
KM20-09 #110	KM#110	Polychaetes	1	Push core	Frozen	Frozen	Sagami bay	Off Akazawa	34	50.326	139	08.15	818	2020	11	15
KM20-09 #119	KM#119	Bathysiphon	2	Push core	Frozen	Frozen	Suruga bay	Off Yaizu						2020	11	19
6K#1557 B2	KM#111	Microorganisms	26 pieces	Smapling box	Sea water	Refrigerated	Sagami bay	Off Hatsushima	35	00.959	139	13.325	855	2020	11	16
6K#1557 B2	KM#111	Microorganisms	26 pieces	Smapling box	Frozen	Frozen	Sagami bay	Off Hatsushima	35	00.959	139	13.325	855	2020	11	16
6K#1557_N2	KM#111	Plastics	16	Manupulator	Frozen	4℃,-80℃	Sagami bay	Off Hatsushima	35	00.959	139	13.325	855	2020	11	16

Onboard ID	Dive no.	Sample name	Amount	Sampling method	Fixation	Preservation	Area	Site	Latitude(N)		Longitude(E)		Depth (m)	Sampling date		
6K#1557 B2	KM#111	sea water	500mL	Manupulator	N/A	4℃	Sagami bay	Off Hatsushima	35	00.959	139	13.325	855	2020	11	16
KM#115_bait_1	KM#115	Unidentified amphipods	10	Bait box	Frozen	-80℃	Suruga bay	Off Akazawa	34	49.441	139	07.983	814	2020	11	18
KM#115_bait_2	KM#115	Unidentified amphipods	5	Bait box	Frozen	-80℃	Sagami bay	Off Akazawa	34	49.441	139	07.983	814	2020	11	18
KM#115_bait_3	KM#115	Unidentified isopods	1	Bait box	Frozen	-80℃	Sagami bay	Off Akazawa	34	49.441	139	07.983	814	2020	11	18
KM#116_bait_1	KM#116	Unidentified amphipods	5	Bait box	Frozen	-80℃	Sagami bay	Off Akazawa	34	50.418	139	08.199	809	2020	11	18
KM#116_bait_2	KM#116	Unidentified isopods	1	Bait box	Frozen	-80℃	Sagami bay	Off Akazawa	34	50.418	139	08.199	809	2020	11	18
KM20-09#Akazawa	Akazawa	seawater	1000 L	Niskin Sampler	Frozen	Frozen	Sagami Bay	Akazawa	34	50.32	139	8.19	5-750	2020	11	14
KM20-09#Yaizu	Yaizu	seawater	1000 L	Niskin Sampler	Frozen	Frozen	Suruga Bay	Yaizu	34	51.2	138	21.44	5-350	2020	11	18
KM20-09 # AKA1	Akazawa	seawater	50 ml	SW tap in No. 3 lab.	Frozen	Frozen	Sagami Bay	Akazawa	34	50.32	139	8.19	5-750	2020	11	14
KM20-09 # AKA1	Akazawa	seawater	50 ml	SW tap in No. 3 lab.	Frozen	Frozen	Sagami Bay	Akazawa	34	50.32	139	8.19	5-750	2020	11	14
KM20-09 # YAI1	Yaizu	seawater	50 ml	SW tap in No. 3 lab.	Frozen	Frozen	Suruga Bay	Yaizu	34	51.2	138	21.44	5-350	2020	11	18

I-2. Sediments

Sampling method: H-type push corer

Dive #110 , Off Akazawa, Sagami Bay

34-50.3277N, 139-08.1848E, 820 m (Nov. 15, 2020)

Core Blue #3 (length 20 cm (sampling ~18 cm)

- Yabuki: for protist (5 ml@0-1 cm)
  - ✓ Store at 4˚C
- Nagano: for fungi (0-1 cm, 5-6 cm, 10-11 cm 3 ml x 2 each)
  - ✓ Store at 4˚C, -80˚C
- Isobe: for cellulose (1 cm interval down to 5 cm, 5 cm intervals down to 15 cm, 3 cm @ 15-18 cm)
  - ✓ Store at -80˚C

Core Yellow #1 (length= 22 cm)

- Nakata: for chemical analysis for plastics additives (1 cm intervals down to 21 cm)
  - ✓ Store at 4˚C

Core Yellow #2 (length = 18 cm)

- Kitahashi, Tsuchiya, Aoki: for microplastics (1cm intervals down to 17 cm)
  - ✓ Store at -80˚C

Dive #111, Off Hatsushima Is., Sagami Bay

35-00.9583N, 139-13.3248E, 855 m (Nov. 16, 2020)

Core Yellow #1 (length= 25 cm)

- Nakata: for chemical analysis for plastics additives (1 cm intervals down to 25cm)
  - ✓ Store at 4˚C

Core Blue #3 (length = 17cm)

- Kitahashi, Tsuchiya: Blue #3 for meiofauna (0.5 cm intervals down to 1 cm, 1 cm intervals down to 10 cm)
  - ✓ Store at -80˚C

Core Blue #4 (length 25 cm: sampling ~25 cm)

- Yabuki: for protist (3 ml@0-1 cm)
  - ✓ Store at 4˚C
- Nagano: for fungi (0-1 cm, 5-6 cm, 10-11 cm 2 ml x 2 each)
  - ✓ Store at 4˚C, -80˚C
- Isobe: for cellulose (1 cm interval down to 5 cm, 5 cm intervals down to 15 cm, 3 cm @ 15-25 cm)
  - ✓ Store at -80˚C
- Hidaka: for microbes (1 ml@0-1 cm)
  - ✓ Store at 4˚C

Dive #119, off Yaizu, Suruga Bay

34-51.206N, 138-21.441E, 400 m (Nov. 20, 2020)

Core Yellow #1 (length= 15 cm)

- Nakata: for chemical analysis for plastics additives (1 cm intervals down to 15 cm)
  - ✓ Store at -80˚C

Core Yellow #2 (length = 14 cm)

- Kitahashi, Tsuchiya, Aoki: for microplastics 1cm intervals down to 13 cm)
  - ✓ Store at -80˚C

Core Blue #1 (length 14.5 cm: sampling ~14.5 cm)

- Yabuki: for protist (3 ml@0-1 cm)
  - ✓ Store at 4˚C
- Nagano: for fungi (0-1 cm, 5-6 cm, 10-11 cm 2 ml x 2 each)
  - ✓ Store at 4˚C, -80˚C
- Isobe: for cellulose (1 cm interval down to 5 cm, 5 cm intervals down to 14.5 cm)
  - ✓ Store at -80˚C

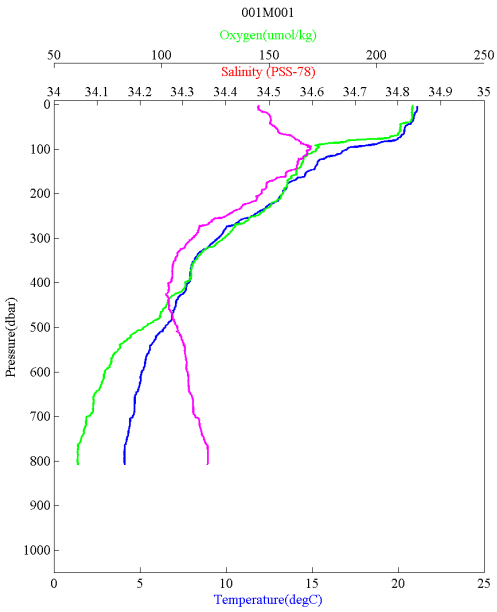
I-3. Pumped seawater samples

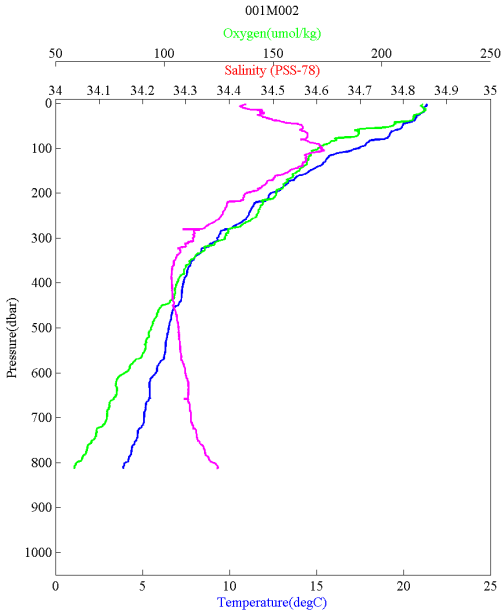
Year	Month	Date	Station	Start	End	Filtered Volume (l)	Flow rate (l/m)
2020	11	15	Akazawa	7:46	17:25	6190	11.12
2020	11	16	Hatsushima	8:07	17:07	5820	11.21
2020	11	19	Yaizu	9:24	17:17	5234	9.91

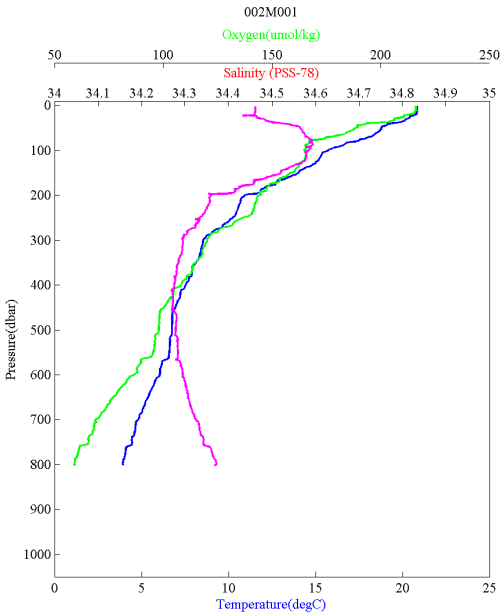
I-4. Neuston net samples

Year	Month	Date	Station	Cast	Start	End
2020	11	14	St.1	1	12:38	12:58
			35-19.09110N	2	13:02	13:22
			139-39.02290E	3	13:26	13:46
2020	11	14	St.3 (Hatsushima)	1	15:04	15:24
			35-19.06850N	2	15:27	15:47
			139-39.06210E	3	15:50	16:10
2020	11	15	Akazawa	1	14:08	14:18
			34-50.32340N	2	14:26	14:36
			139-08.18810E	3	14:40	14:50
2020	11	18	St.4	1	17:02	17:22
			34-49.46380N	2	17:28	17:48
			139-08.00800E	3	17:50	18:10
2020	11	20	Yaizu	1	09:49	10:09
			34-50.70920N	2	10:17	10:37
			138-21.98780E	3	10:41	11:01
2020	11	21	St.6	1	16:17	16:37
			34-50.70900N	2	16:41	17:01
			138-21.99050E	3	17:04	17:24

II. CTD/DO profiles

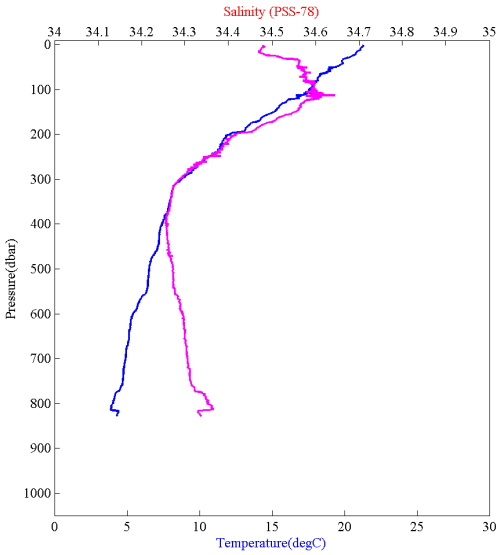




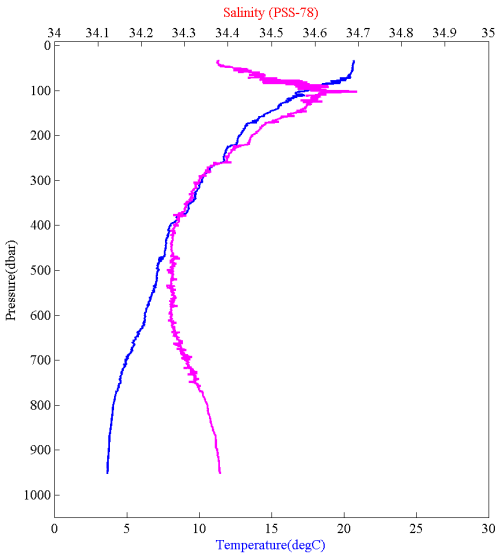


CTD Water Sampler profile (15th Nov 2020 – 17th Nov 2020 (JST). 001M001, 001M002, 002M001)
(Akazawa deep-water inlet in Sagami Bay)

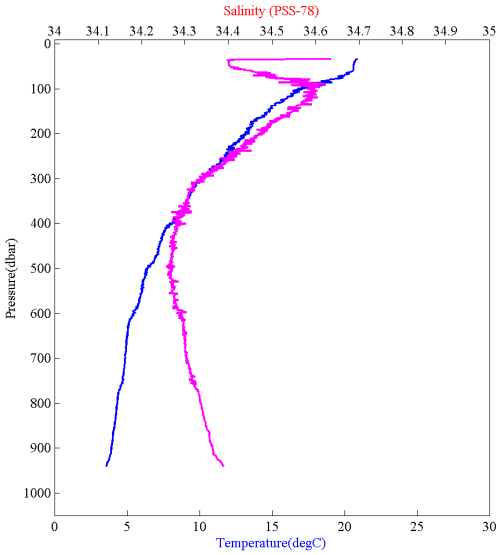
Dive 110



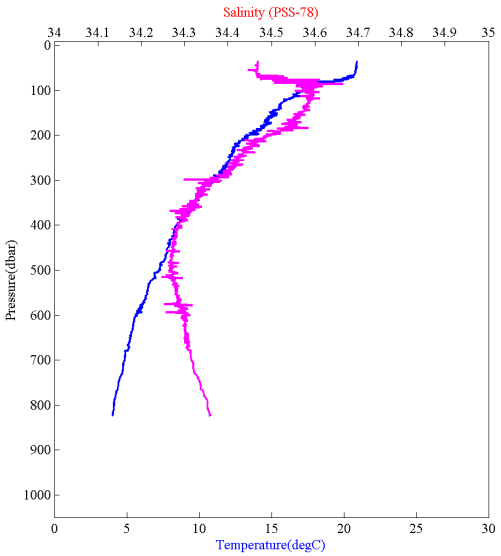
Dive 111



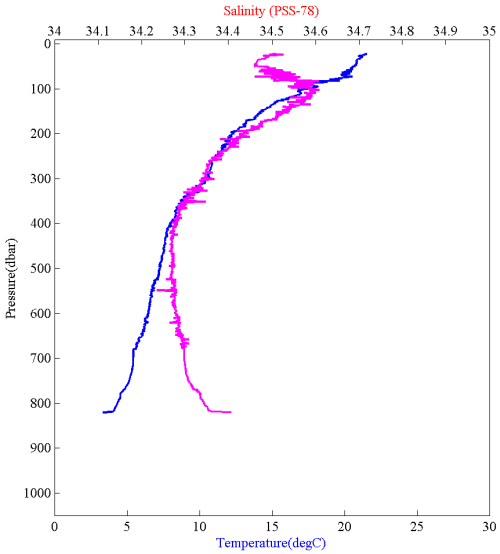
Dive 112



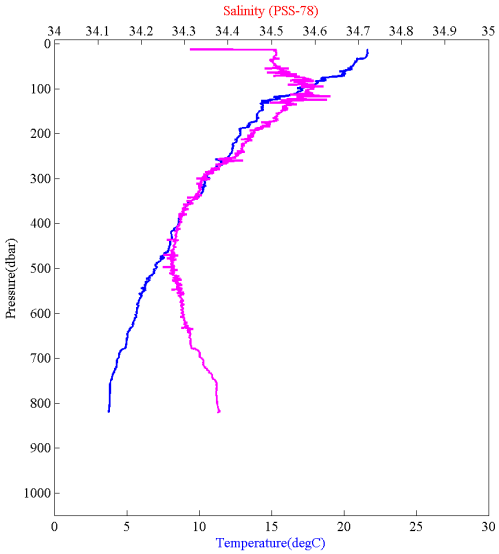
Dive 113



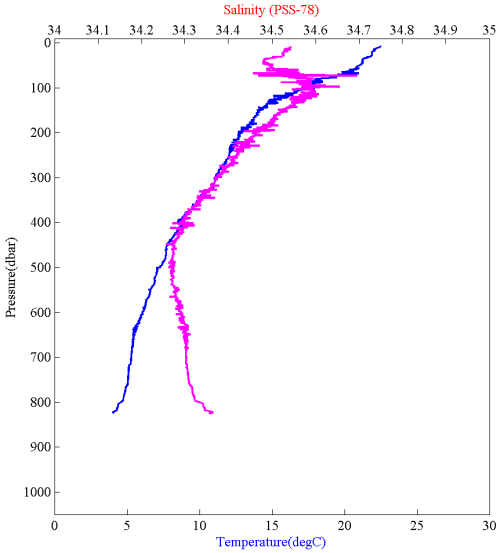
Dive 114



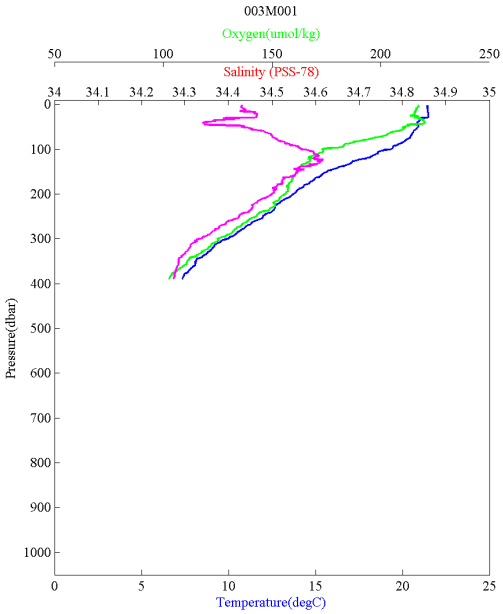
Dive 115

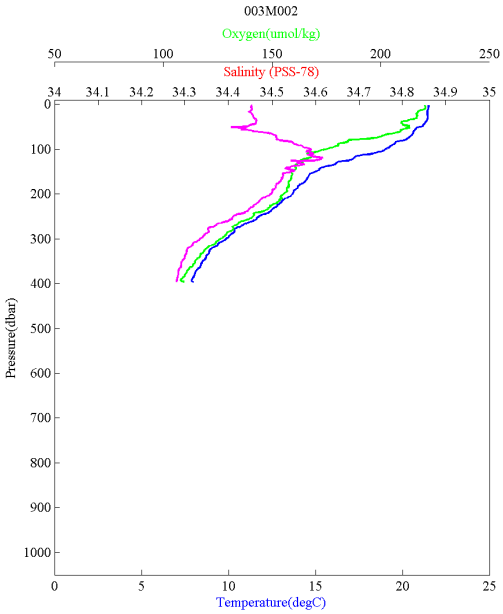


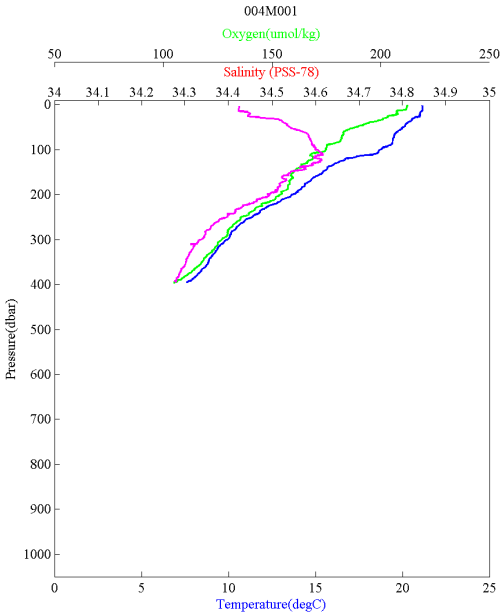
Dive 116



KM-ROV CTD profile (15th Nov 2020 – 18th Nov 2020 (JST). Dive 110 - 116) (Akazawa deep-water inlet in Sagami Bay)

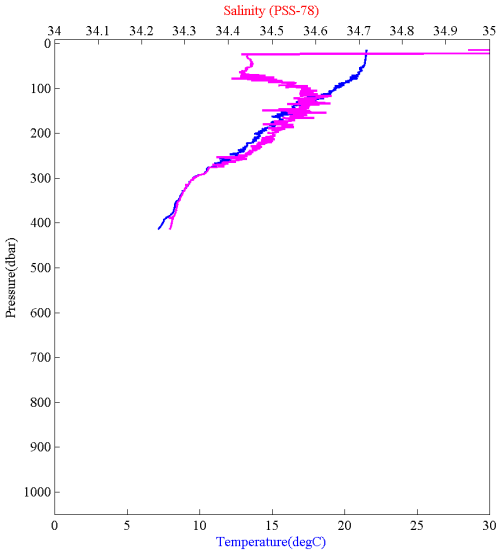




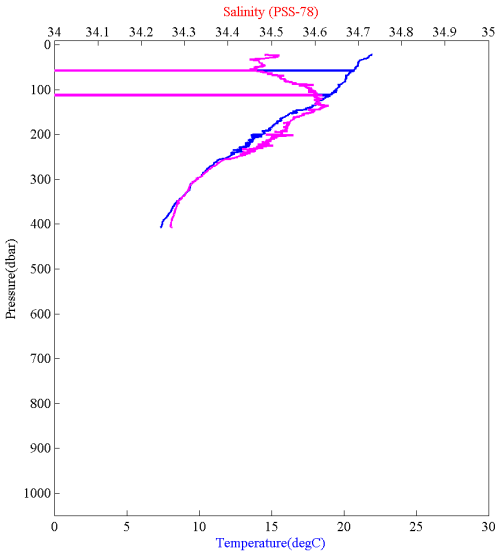


CTD Water Sampler profile (19th Nov 2020 – 21th Nov 2020 (JST). 003M001, 003M002, 004M001) (Yaizu deep-water inlet in Suruga Bay)

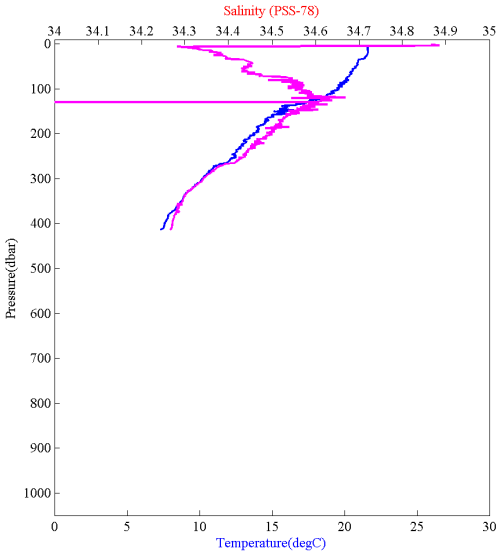
Dive 117



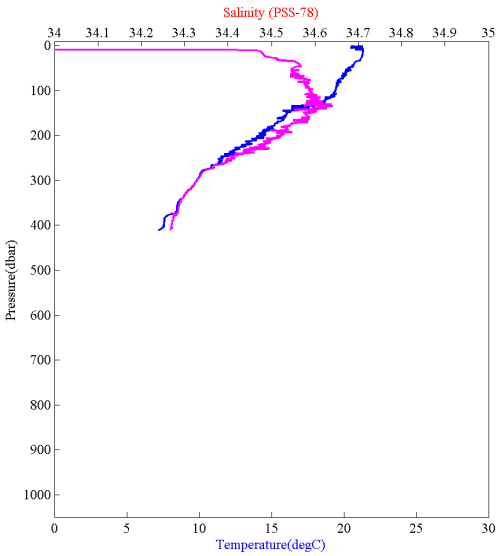
Dive 118



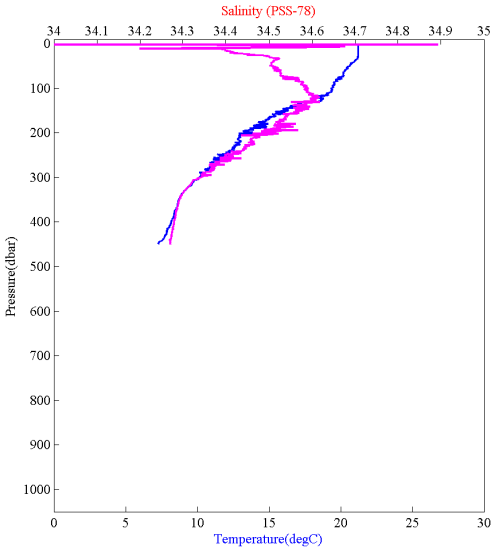
Dive 119



Dive 120



Dive 121



KM-ROV CTD profile (19th Nov 2020 – 21th Nov 2020 (JST). Dive 117 - 121) (Yaizu deep-water inlet in Suruga Bay)

III. Shipboard log & ship track

Date & Time	Description	Weather / Wind / Sea Condition
2020/11/14 Sat.	Noon Position: 35-01.7N, 139-26.1E (Sagami Bay)	bc / NE-5 / 3
08:00	Onboard "KAIMEI" at JAMSTEC	
09:00	Let go all shore lines & left JAMSTEC for Sagami Bay	
09:40	Research meeting	
10:20	Carried out education & training for scientists	
12:30	Arrived at research area Sagami Bay, point St.1	
12:38-13:49	Carried out towing NEUSTON NET sampling (3 cast)	
13:55	Commenced proceeding to research point St.3	
15:00	Arrived at research point St.3	
15:04-16:11	Carried out towing NEUSTON NET sampling (3 cast)	
18:00	Research meeting	
2020/11/15 Sun.	Noon Position: 34-50.2N, 139-08.2E (Sagami Bay)	bc / NE-1 / 1
04:00	Proceeded to off AKAZAWA DEEPSEA INLET	
06:00	Arrived at of AKAZAWA DEEPSEA INLET	
06:02	Released XBT at 34-49.2297N, 139-08.7170E	
06:23-07:11	Carried out MBES site survey	
08:01-08:54	Carried out CTD operation (W.O.=804m)	
09:34	Hoisted up "KM-ROV"	
09:40	Launched "KM-ROV", then it done & commenced her operation #110	
10:57	"KM-ROV" landed on the sea bottom (D=824m)	
12:08	"KM-ROV" left the sea bottom (D=818m)	
12:46	Hoisted up "KM-ROV"	
12:54	Recovered "KM-ROV" & finished above dive operation	
13:08-13:53	Carried out CTD operation (W.O.=812m)	
14:07-14:51	Carried out towing NEUSTON NET sampling (3 cast)	
15:38	Deployed BAIT CAMERA at BC 1115a	
16:12	Deployed BAIT CAMERA at BC 1115b	
16:30	Proceeded to off HATSUSHIMA	
18:00	Arrived at of HATSUSHIMA	
18:00	Research meeting	
2020/11/16 Mon.	Noon Position: 35-01.0N, 139-13.3E (Sagami Bay)	bc / NE-1 / 1
08:06	Hoisted up "KM-ROV"	
08:16	Launched "KM-ROV", then it done & commenced her operation #111	
08:55	"KM-ROV" landed on the sea bottom (D=944m)	
12:16	"KM-ROV" left the sea bottom (D=848m)	
12:52	Hoisted up "KM-ROV"	
13:02	Recovered "KM-ROV" & finished above dive operation	
14:20	Hoisted up "KM-ROV"	
14:28	Launched "KM-ROV", then it done & commenced her operation #112	
15:02	"KM-ROV" landed on the sea bottom (D=918m)	
16:42	"KM-ROV" left the sea bottom (D=858m)	
17:15	Hoisted up "KM-ROV"	
17:24	Recovered "KM-ROV" & finished above dive operation	
18:00	Research meeting	
2020/11/17 Tue.	Noon Position: 34-50.0N, 139-08.0E (Sagami Bay)	bc / NNE-5 / 3
00:00	Proceeding to research point off AKAZAWA DEEPSEA INLET	
01:40	Arrived at research point off AKAZAWA DEEPSEA INLET	
4:05-08:07	Carried out CTD operation (W.O.=797m)	

Date & Time	Description	Weather / Wind / Sea Condition
09:13	Hoisted up "KM-ROV"	
09:23	Launched "KM-ROV", then it done & commenced her operation #113	
09:56	"KM-ROV" landed on the sea bottom (D=817m)	
10:59	"KM-ROV" left the sea bottom (D=814m)	
11:41	Hoisted up "KM-ROV"	
11:51	Recovered BAIT CAMERA at BC 1115a	
11:53	Recovered "KM-ROV" & finished above dive operation	
13:14	Hoisted up "KM-ROV"	
13:22	Launched "KM-ROV", then it done & commenced her operation #114	
13:51	"KM-ROV" landed on the sea bottom (D=807m)	
14:52	"KM-ROV" left the sea bottom (D=814m)	
15:30	Hoisted up "KM-ROV"	
15:37	Recovered BAIT CAMERA at BC 1115b	
15:39	Recovered "KM-ROV" & finished above dive operation	
16:38	Deployed BAIT CAMERA at BC 1115a	
17:13	Deployed BAIT CAMERA at BC 1115b	
17:30	Proceeded to off INATORI	
18:30	Arrived at off INATORI	
18:00	Research meeting	
2020/11/18 Wed.	Noon Position: 34-50.3N, 139-08.2E (Sagami Bay)	bc / NNE-2 / 1
00:00	Commenced proceeding to dive point off AKAZAWA DEEPSEA INLET	
01:00	Arrived at dive point off AKAZAWA DEEPSEA INLET	
08:04	Hoisted up "KM-ROV"	
08:25	Launched "KM-ROV", then it done & commenced her operation #115	
08:53	"KM-ROV" landed on the sea bottom (D=813m)	
09:52	"KM-ROV" left the sea bottom (D=814m)	
10:26	Hoisted up "KM-ROV"	
10:34	Recovered BAIT CAMERA at BC 1115a	
10:37	Recovered "KM-ROV" & finished above dive operation	
11:26	Hoisted up "KM-ROV"	
11:38	Launched "KM-ROV", then it done & commenced her operation #116	
12:08	"KM-ROV" landed on the sea bottom (D=817m)	
14:14	"KM-ROV" left the sea bottom (D=809m)	
14:50	Hoisted up "KM-ROV"	
14:58	Recovered BAIT CAMERA at BC 1115b	
15:00	Recovered "KM-ROV" & finished above dive operation	
15:15	Commenced proceeding to research point St.4	
17:00	Arrived at research point St.3	
17:02-18:11	Carried out towing NEUSTON NET sampling (3 cast)	
18:20	Proceeded to off YAIZU	
22:06	Arrived at alone area & released XBT at 34-48.0107N, 138-24.2365E	
22:29-23:06	Carried out MBES site survey	
18:30	Research meeting	
2020/11/19 Thu.	Noon Position: 34-51.2N, 138-21.5E (Suruga Bay)	bc / SE-2 / 1
08:33-10:25	Carried out CTD operation (W.O.=385m)	
11:23-11:57	Carried out CTD operation (W.O.=393m)	
12:07	Hoisted up "KM-ROV"	
12:14	Launched "KM-ROV", then it done & commenced her operation #117	
12:37	"KM-ROV" landed on the sea bottom (D=411m)	
15:27	"KM-ROV" left the sea bottom (D=399m)	
15:53	Hoisted up "KM-ROV"	

Date & Time	Description	Weather / Wind / Sea Condition
15:59	Recovered "KM-ROV" & finished above dive operation	
16:07	Deployed BAIT CAMERA at BC 1115a	
16:33	Deployed BAIT CAMERA at BC 1115b	
18:00	Research meeting	
2020/11/20 Fri.	Noon Position: 34-51.2N, 138-21.5E (Suruga Bay)	o / WSW-4 / 3
08:03	Hoisted up "KM-ROV"	
08:11	Launched "KM-ROV", then it done & commenced her operation #118	
08:29	"KM-ROV" landed on the sea bottom (D=404m)	
09:01	"KM-ROV" left the sea bottom (D=396m)	
09:26	Hoisted up "KM-ROV"	
09:33	Recovered BAIT CAMERA 3	
09:39	Recovered "KM-ROV" & finished above dive operation	
09:50-11:01	Carried out towing NEUSTON NET sampling (3 cast)	
11:17	Hoisted up "KM-ROV"	
11:25	Launched "KM-ROV", then it done & commenced her operation #119	
11:46	"KM-ROV" landed on the sea bottom (D=411m)	
13:58	"KM-ROV" left the sea bottom (D=397m)	
14:26	Hoisted up "KM-ROV"	
14:31	Recovered BAIT CAMERA 2	
14:37	Recovered "KM-ROV" & finished above dive operation	
15:25	Deployed BAIT CAMERA 3	
15:57	Deployed BAIT CAMERA 2	
18:00	Research meeting	
2020/11/21 Sat.	Noon Position: 34-51.2N, 138-21.7E (Suruga Bay)	bc / East-3 / 2
06:58-07:33	Carried out CTD operation (W.O.=392m)	
08:01	Hoisted up "KM-ROV"	
08:08	Launched "KM-ROV", then it done & commenced her operation #120	
08:28	"KM-ROV" landed on the sea bottom (D=409m)	
09:12	"KM-ROV" left the sea bottom (D=394m)	
09:36	Hoisted up "KM-ROV"	
09:42	Recovered BAIT CAMERA 3	
09:47	Recovered "KM-ROV" & finished above dive operation	
10:38	Hoisted up "KM-ROV"	
10:45	Launched "KM-ROV", then it done & commenced her operation #121	
11:06	"KM-ROV" landed on the sea bottom (D=447m)	
14:22	"KM-ROV" left the sea bottom (D=392m)	
14:45	Hoisted up "KM-ROV"	
14:51	Recovered BAIT CAMERA 2	
14:55	Recovered "KM-ROV" & finished above dive operation	
15:10	Commenced proceeding to research point St.6	
15:00	Arrived at research point St.6	
16:17-17:24	Carried out towing NEUSTON NET sampling (3 cast)	
17:30	Left research area for YOKOSUKA	
18:00	Research meeting	
2020/11/22 Sun.	Arrived at JAMSTEC	
09:00	Arrived at JAMSTEC YOKOSUKA	
12:00	Scientists disembarked	

IV. Group portrait

V. Miscellaneous photographs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VI. Acknowledgements

We thank the captain and crew of the R/V *Kaimei* and the operation team of ROV *KM-ROV* for organizing the cruise and conducting the diving research and sampling. We also thank marine technicians from Nippon Marine Enterprises and Marine Work Japan for research support and ground stuff from Japan Agency for Marine-Earth Science and Technology for all the procedures to establish this cruise.

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