



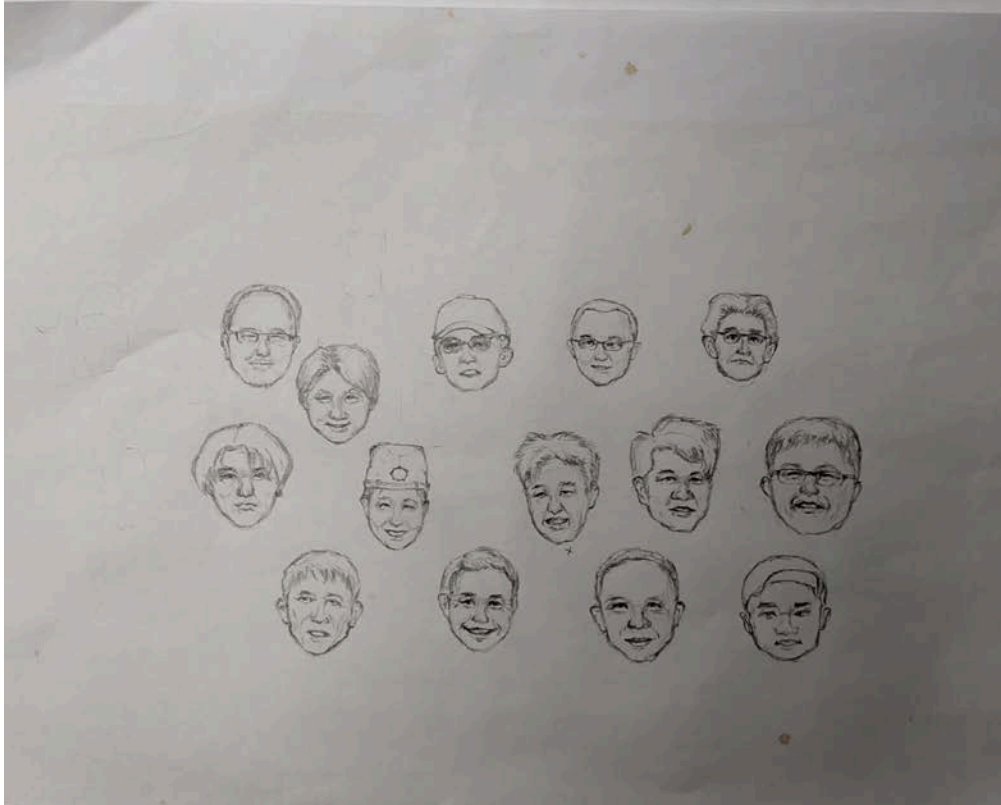
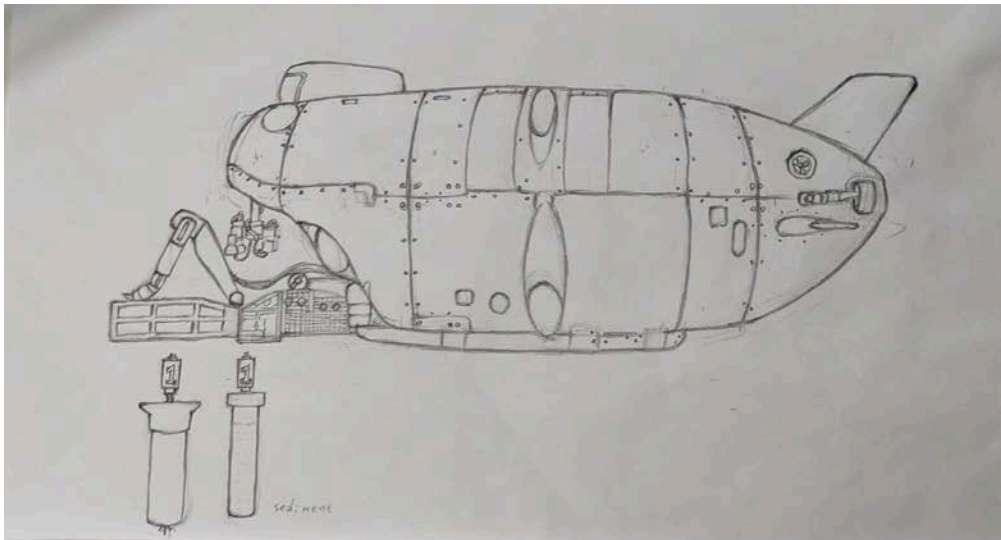
Yokosuka “Cruise Report”

Cruise ID: YK26-06S

The investigations of the fisheries resources from
submarine landslides which were caused by the Noto
Peninsula Earthquake in Toyama Bay

May.31,2026-Jun.12,2026

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



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1. Cruise Information

- Cruise ID

YK26-06S

- Name of vessel

R/V Yokosuka

- Title of the cruise

The investigations of the fisheries resources from submarine landslides which were caused by the Noto Peninsula Earthquake in Toyama Bay

- Title of proposal

The investigations of the fisheries resources from submarine landslides which were caused by the Noto Peninsula Earthquake in Toyama Bay

- Cruise period

From 31 May 2026 to 12 June 2026

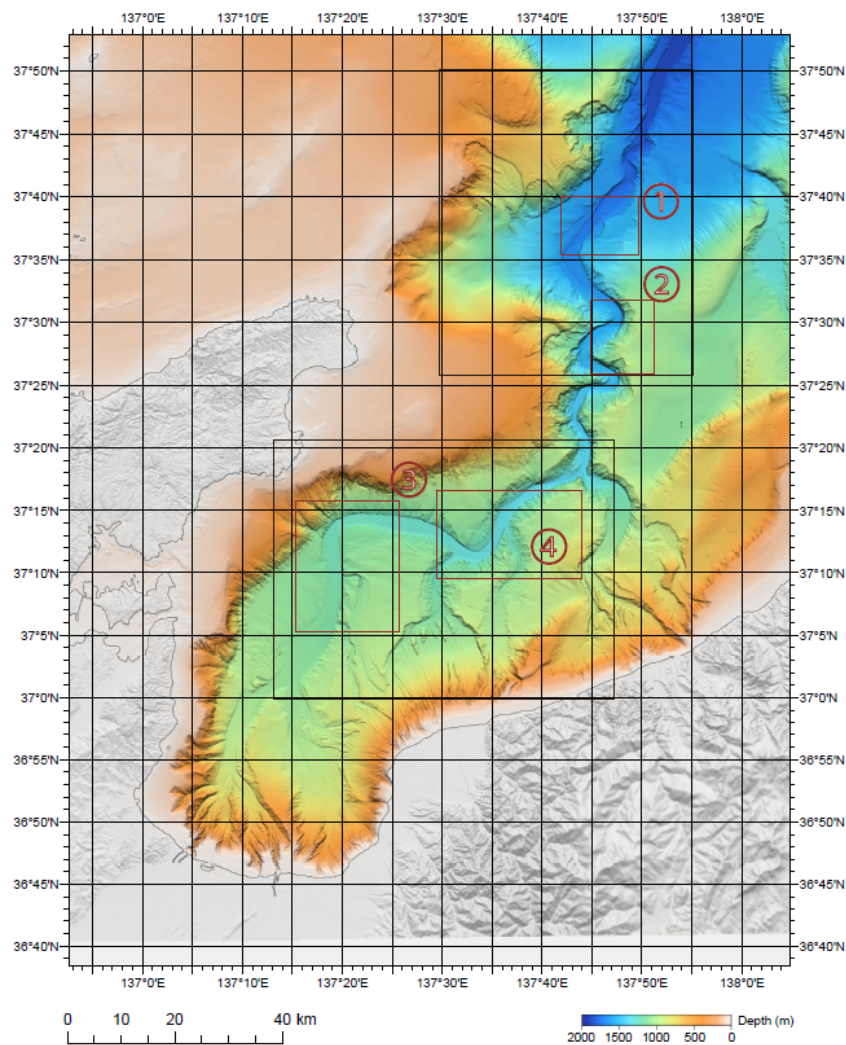
- Ports of departure / call / arrival

Yokosuka/ Fushiki Toyama/ Yokosuka

- Research area

The Toyama Bay

- Research Map



2. Researchers

- Chief scientist

Noriko Kawamura

Japan Coast Guard Academy

- Representative of the science party

Noriko Kawamura

Japan Coast Guard Academy

- Science party (List) [Affiliation, assignment etc.]

Co-chief scientist	Tatsuo Kanamaru	College of Humanities and Sciences
	Hiroki Minami	JCG
	Masahiro Sanga	Toyama Prefectural Fisheries Laboratory

Jing Zhang	Faculty of Science, University of Toyama
Takanori Kagoshima	Faculty of Science, University of Toyama
Naoto Ishikawa	School of Sustainable Design, University of Toyama
Ryo Tateishi	School of Sustainable Design, University of Toyama
Michael Julian Haryanto	Faculty of Science, University of Toyama
Yangxin Mo	Faculty of Science, University of Toyama
Ichika Nakata	Faculty of Science, University of Toyama
Takanori Kagoshima	Faculty of Science, University of Toyama

3. Observation

3.1 Deep Ocean Floor Survey System

YK26-06S_DT#01&DT#02 - Dive Report

Operator: Mitsuru Torigoe

Observer : **Jing ZHANG, Ichika NAKADA, Takanori KAGOSHIMA, Michel Julian HARYANTO, Yangxin MO, and YK26-06S Scientific party**

Site: Toyama Bay

Date: June 4-5, 2026

Survey Area:

For Sea Area 1, investigations were conducted along Route 1–1 (from 37°38.5938'N, 137°44.7731'E to 37°37.0756'N, 137°46.2811'E) at an average towing speed of 1.16 kt, and Route 1–2 (from 37°37.1467'N, 137°45.9359'E to 37°37.6578'N, 137°46.4035'E) at 0.33 kt. In Sea Area 2, investigations were conducted along Route 2–1 (from 37°9.7466'N, 137°19.1783'E to 37°10.8045'N, 137°19.8462'E) at 0.41 kt, and Route 2–2 (from 37°10.8045'N, 137°19.8462'E to 37°10.9789'N, 137°24.609'E) at 0.86 kt.

Purpose:

The primary objective of the Deep-Tow survey is to characterize the seafloor environment for the inaugural *Shinkai 6500* dive in Toyama Bay. By mapping topography and identifying hazards—such as discarded fishing gear—the survey ensures the safety and efficiency of the mission while establishing a vital baseline of high-resolution imagery and bathymetry. These data will facilitate the analysis of microtopography, such as scarps, steps, and cliffs, providing a foundation for future regional research.

Minami and Kawamura (2025) reported that a submarine landslide occurred in the DT-1 area following the 2024 Noto Peninsula Earthquake, while Sanga et al. (2025) documented a decline in snow crab populations in the DT-2 area. Consequently, the survey will conduct detailed observations of both the physical seafloor environment and the local benthic fauna to better understand the ongoing environmental impacts of the earthquake. To achieve these objectives, we will also survey and map bacterial mats—indicators of methane seepage—and identify suitable sites for push-core sampling in the DT-1 and DT-2 areas.

Summary:

In Area 1, multiple fresh landslide features, likely formed during the 2024 Noto Peninsula Earthquake, were identified. Large cliff-like scarps and step-like geomorphological structures were observed along both survey lines, indicating widespread seafloor deformation related to slope-failure processes. These features constitute targets by shinkai-6500 for understanding earthquake-induced sediment transport and redeposition processes.

Bacterial mats were observed at various locations along Route 1–1. In particular, extensive white bacterial mats were identified at Site A (37°37.7400'N, 137°45.6686'E). Their occurrence suggests a possible association with fluid discharge and/or methane seepage from beneath the seafloor. Such bacterial mats are considered important indicators of subseafloor geochemical activity and provide valuable insights into the environmental and biogeochemical characteristics of the seafloor.

Furthermore, several areas were identified along both survey routes near the cliffs where clusters of unidentified, yellowish-speckled marks were found. However, the origin and composition of these structures remain unclear at this time.

Based on these observations, push-core sediment sampling is planned at sites characterized by well-developed landslide topography and at locations where bacterial mats were identified, in order to investigate earthquake-induced sedimentary processes and subseafloor geochemical conditions.

In Area 2, fishing gear such as crab pots were observed on the seafloor. In contrast to Area 1, the seafloor topography of Area 2 was relatively flat, with no prominent cliffs or large-scale landslide features.

Regarding biological communities, Area 2 hosted a diverse assemblage of benthic and pelagic organisms, including red snow crabs, sea anemones, squid, whelks, moray eels, shrimp, and jellyfish etc. These observations suggest that Area 2 supports a more diverse community and may represent a more stable seafloor environment

compared to Area 1.

Similar to Area 1, yellowish spotted marks were also identified in Area 2. To investigate their formation mechanisms and associated sedimentary characteristics, we plan to conduct push-core sediment sampling in the vicinity of these marks during subsequent dives.

Furthermore, a black, coating-like mat was observed at Site B (37°37.7400'N, 137°45.6686'E). To clarify the nature of this feature and its potential association with seafloor fluid activity, this site is planned as one of the targets for future dive observations and sampling investigations.

Overall, these two surveys successfully mapped the seafloor environment and potential hazards in both areas, providing essential data for *Shinkai 6500* mission planning, safety management, and the selection of optimal sampling sites.

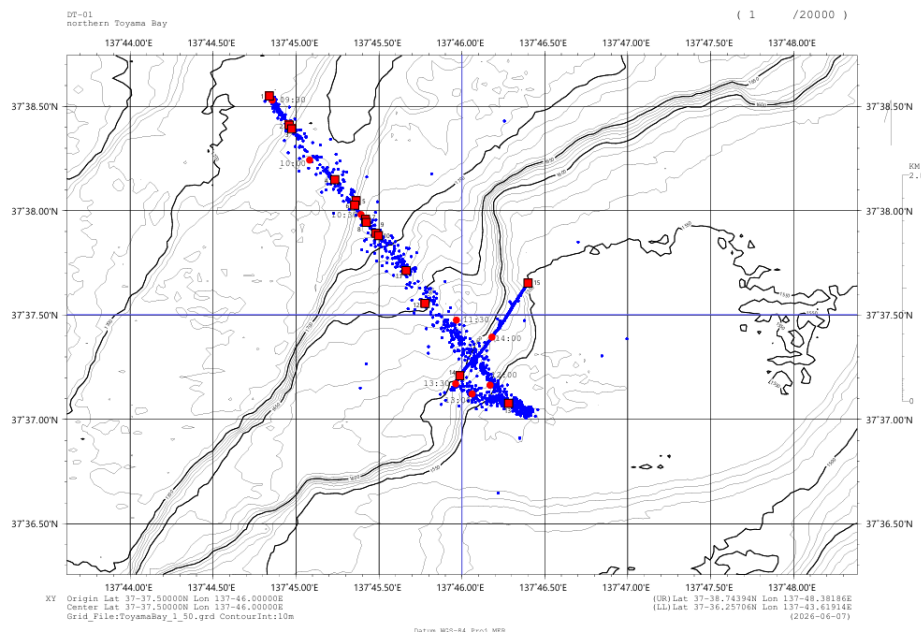


Figure 1. Survey track line in Area 1.

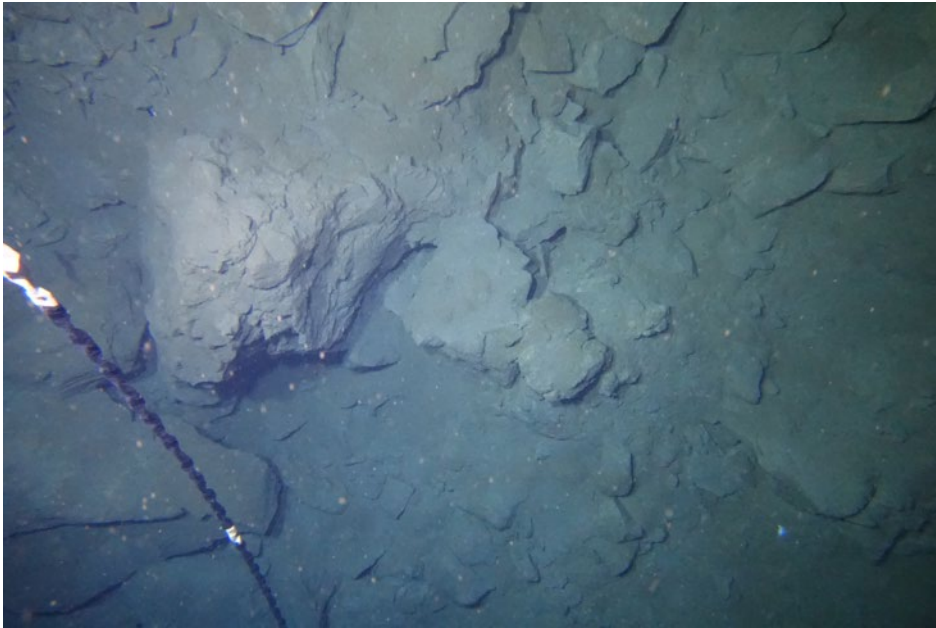


Figure 4. Landslide topography observed in Area 1($37^{\circ}38.0135'N$ $137^{\circ}45.3586'E$)



Figure 5. Fishing gear observed along the survey track in Area 2 ($37^{\circ}10.8701'N$ $137^{\circ}20.5528'E$)

3.2 Multibeam survey

3.2.1 Multibeam survey (by Minami Hiroki)

3.2.1.1 Data acquisition

Bathymetry, backscatter, and water column data were acquired by the R/V *Yokosuka*, which was outfitted with a Kongsberg Maritime EM122 multibeam sonar system (Table 1). It operates at a frequency of 12 kHz, with an operating depth ranging from 20 to 11,000 meters. The beam width is 2°for across-track and 2°for along-track. The swath width was set to 120. The high-density dual-swath and equidistant modes were used with 432 beams to ensure a uniform resolution across the entire swath and adequate sounding density. The R/V *Yokosuka* runs at 8 knots during the survey.

Multibeam data acquisition was carried out using Kongsberg Maritime's Seafloor Information System (SIS) software, version 4.1.3. Standard corrections were applied during the acquisition, including vessel offset, attitude, angular biases, surface sound speed and sound speed profile. Installation parameters entered in the SIS are shown in Figure 1. The sound velocity profiles were calculated from the data obtained using the temperature obtained from the eXpendable Conductivity, Temperature and Depth (XCTD) casts. Table 2 shows where the sound speed profiles are obtained. No tide corrections were applied. The bathymetry and backscatter data were recorded in *.all format, while the water column data was recorded in *.wcd format. A total of 58 files were acquired between 3 and 6 June 2026 (Supplementary Table 1).

Table 1. EM122 multibeam sonar system on R/V *Yokosuka*.

General control room



Hydrographic Work Station



EM122 transmitter unit



Kongsberg Seatex MRU5+

Motion reference unit (left)
GNSS antenna (right)



AML Micro X

Surface sound speed



T.S.K XCTD-4N/XCTD-1N

Sound speed profile



Installation parameters

Installation and Test

OK CANCEL

PU Communication Setup Sensor Setup System Parameters BIST System Report

Settings Locations Angular Offsets

Offset angles (deg.)

	Roll	Pitch	Heading
TX Transducer:	-0.236	0.180	358.827
RX Transducer:	-0.081	0.147	358.757
Attitude 1, COM2/UDP5:	0.58	0.00	1.1
Attitude 2, COM3/UDP6:	0.00	0.00	0.00
Stand-alone Heading:			1.10

Installation parameters

Installation and Test

OK CANCEL

PU Communication Setup Sensor Setup System Parameters BIST System Report

Settings Locations Angular Offsets

Location offset (m)

	Forward (X)	Starboard (Y)	Downward (Z)
Pos, COM1:	0.00	0.00	0.00
Pos, COM3:	0.00	0.00	0.00
Pos, COM4/UDP2:	0.00	0.00	0.00
TX Transducer:	11.595	-1.202	4.785
RX Transducer:	8.612	-0.486	4.795
Attitude 1, COM2/UDP5:	0.00	0.00	0.00
Attitude 2, COM3/UDP6:	0.00	0.00	0.00
Waterline:			0.19

Figure 1. Installation parameters (angular biases and offsets) in the SIS.

Table 2. Locations of the XCTD cast used to create the sound speed profile.

date (JST)	location	depth	Sensor	XCTD file asvp file
3, June. 2026 04:08	37°42.909'N 137°50.198'E	2000 m	XCTD-4N (1850 m)	CTD-202606021907. CTD 20260602xctd.asvp
3, June. 2026 13:12	37°13.483'N 137°28.166'E	1085 m	XCTD-1N (1000 m)	CTD-202606030411. CTD 20260603xctd.asvp

3.2.1.2 Data processing

Bathymetry

The multibeam data were processed using CARIS HIPS and SIPS software ver. 12.1.2 developed by Teledyne CARIS. Any obvious outliers and noise were manually removed using the swath and subset editors. The processed soundings were gridded with a cell size of 20 m using the Combined Uncertainty and Bathymetric Estimator (CUBE) algorithm, which was implemented in CARIS, to convert randomly spaced soundings into regularly spaced grids (surfaces). [Table 3](#) shows the uncertainty values (offsets and standard deviations) that were entered into the CARIS vessel file to calculate total propagated uncertainty (TPU). [Table 4](#) shows the uncertainty values for the tide and sound speed data that were entered into the Georeference Bathymetry process to calculate TPU. The surface was stored in CARIS Spatial Archive (*.csar) format using the WGS1983/UTM53N projection. The final CUBE surface was exported as a raster file in GeoTIFF format and as a CSV file containing longitude, latitude and depth data.

Table 3. TPU values entered in Yokosuka_EM122_20230829.vessel file.

Sensor offsets	value	Sensor standard deviation	value
MRU to Trans X (m)	-1.202	Heading/gyro (deg)	0.000
MRU to Trans Y (m)	11.595	Heave % Amp	0.000
MRU to Trans Z (m)	4.785	Heave (m)	0.000
Nav to Trans X (m)	-1.202	Roll (deg)	0.000
Nav to Trans Y (m)	11.595	Pitch (deg)	0.000
Nav to Trans Z (m)	4.785	Position Nav (m)	0.010
Trans Roll (deg)	-0.236	GPS Height (m)	0.000
Other standard deviation	value	Timing trans (s)	0.003
Offset X (m)	0.01	Nav timing (s)	0.003

Offset Y (m)	0.01	Heading/Gyro timing (s)	0.003
Offset Z (m)	0.01	Heave timing (s)	0.003
Vessel speed (m/s)	0.000	Pitch timing (s)	0.003
Loading (m)	0.000	Roll timing (s)	0.003
Draft (m)	0.000	MRU Align StdDev gyro	0.1
Delta Draft (m)	0.000	MRU Align StdDev Roll/Pitch	0.1

Table 4. TPU values entered in Georeference Bathymetry process in CARIS

Tide	
Measured tide: 1.0 m	Tide zoning: 5.0 m
Sound velocity	
Measured Sound Velocity: 5.0 m/s	Surface Sound Velocity: 0.50 m/s

Backscatter Intensity

A backscatter mosaic with a cell size of 20 m was created using the CARIS SIPS Backscatter (WMA with area-based average) processing engine (Fig. 2). No beam pattern file was created. No gain corrections were applied during post processing.

New SIPS Mosaic

Input

Source: Selected Track Lines

Options

Resolution: ☒ 20.000000 m

Mosaic Engine: SIPS Backscatter (WMA with Area based AVG)

Output

Extent: ☒ 730556.03 4176338.44 760933.58 4159659.44 m

Fixed extent

Output Coordinate Reference System: WGS 84 / UTM zone 53N [WG84] EPSG:32653

Output File: C:/caris_project/YK26-06S/surface/YK26-06S_SIPS_BS_20m_utm53n.csar

OK Cancel Help

Figure 2. Screen capture of SIPS backscatter processing engine in CARIS.

Water Column Anomaly

The water column data (*.wcd) were imported into CARIS and checked manually for any anomalies (plumes) using the swath editor. No distinctive anomalies were identified in Area 1, Area 3, and Area 4.

3.2.1.3 Results

Multibeam data were acquired in three areas: Area 1, Area 3, and Area 4 ([Fig. 4](#)).

[Figure 5](#) shows the bathymetry and backscatter intensity maps for Area 1.

[Figure 6](#) shows the bathymetry and backscatter intensity maps for Area 3 and 4.

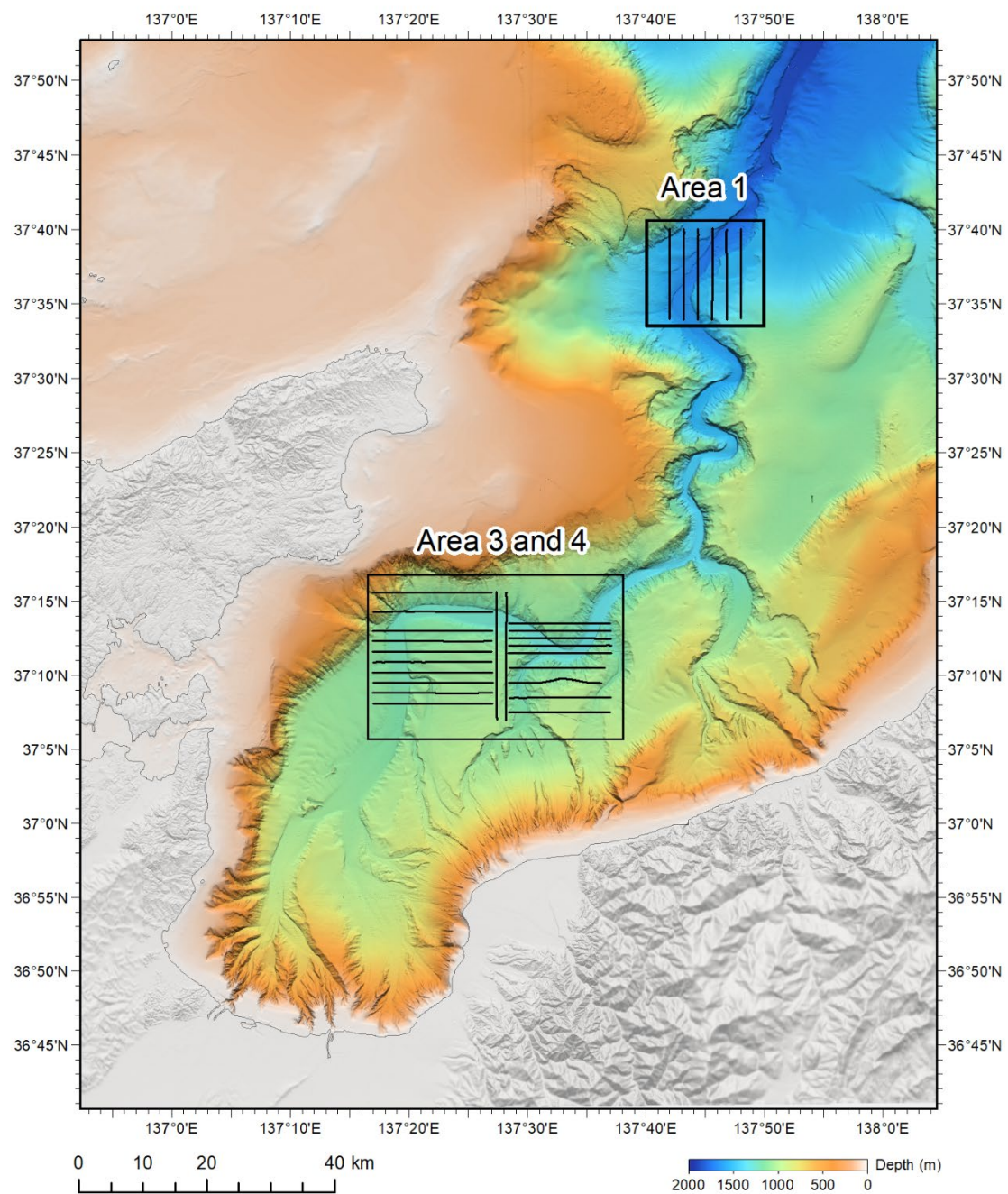


Figure 4. Location map of Area 1, Area 3. and Area 4. Black lines show tracklines.

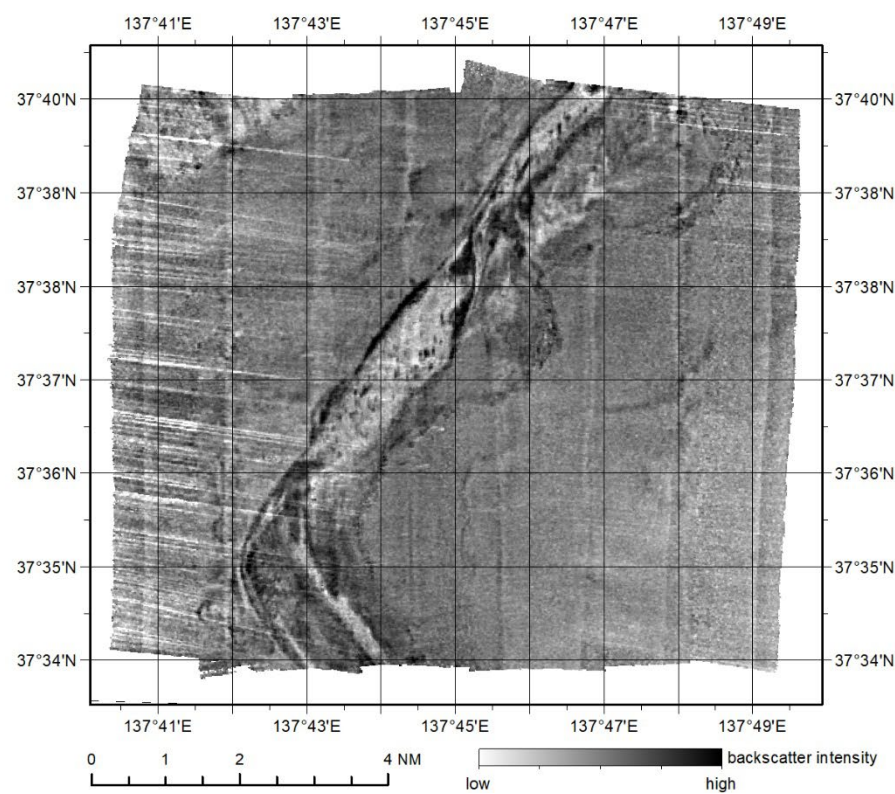
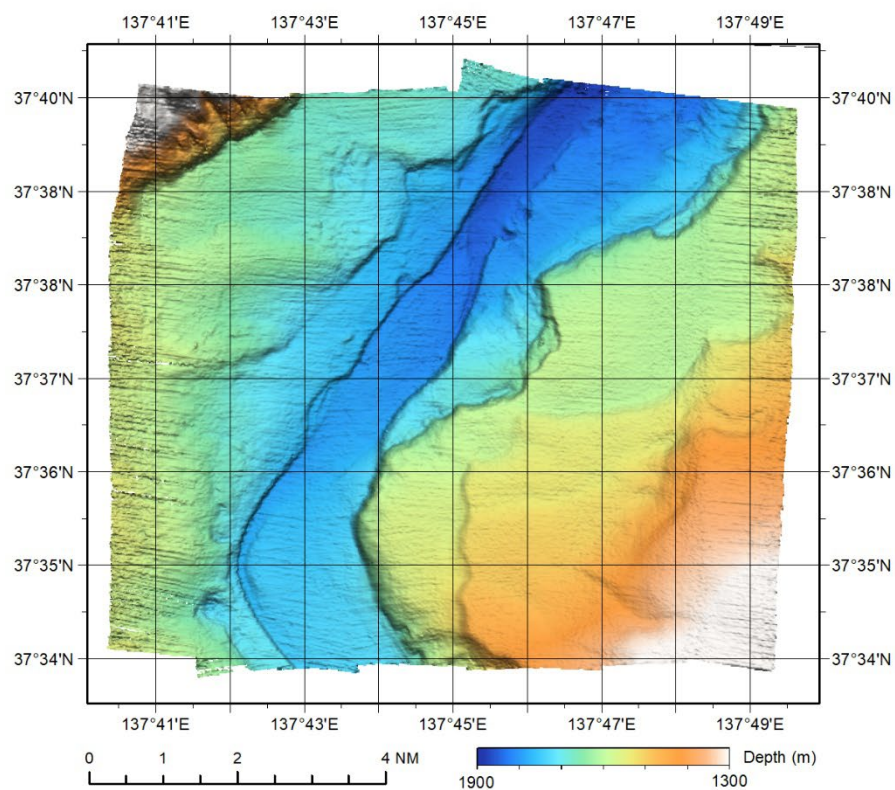


Figure 5. Bathymetric and backscatter intensity maps of Area 1.

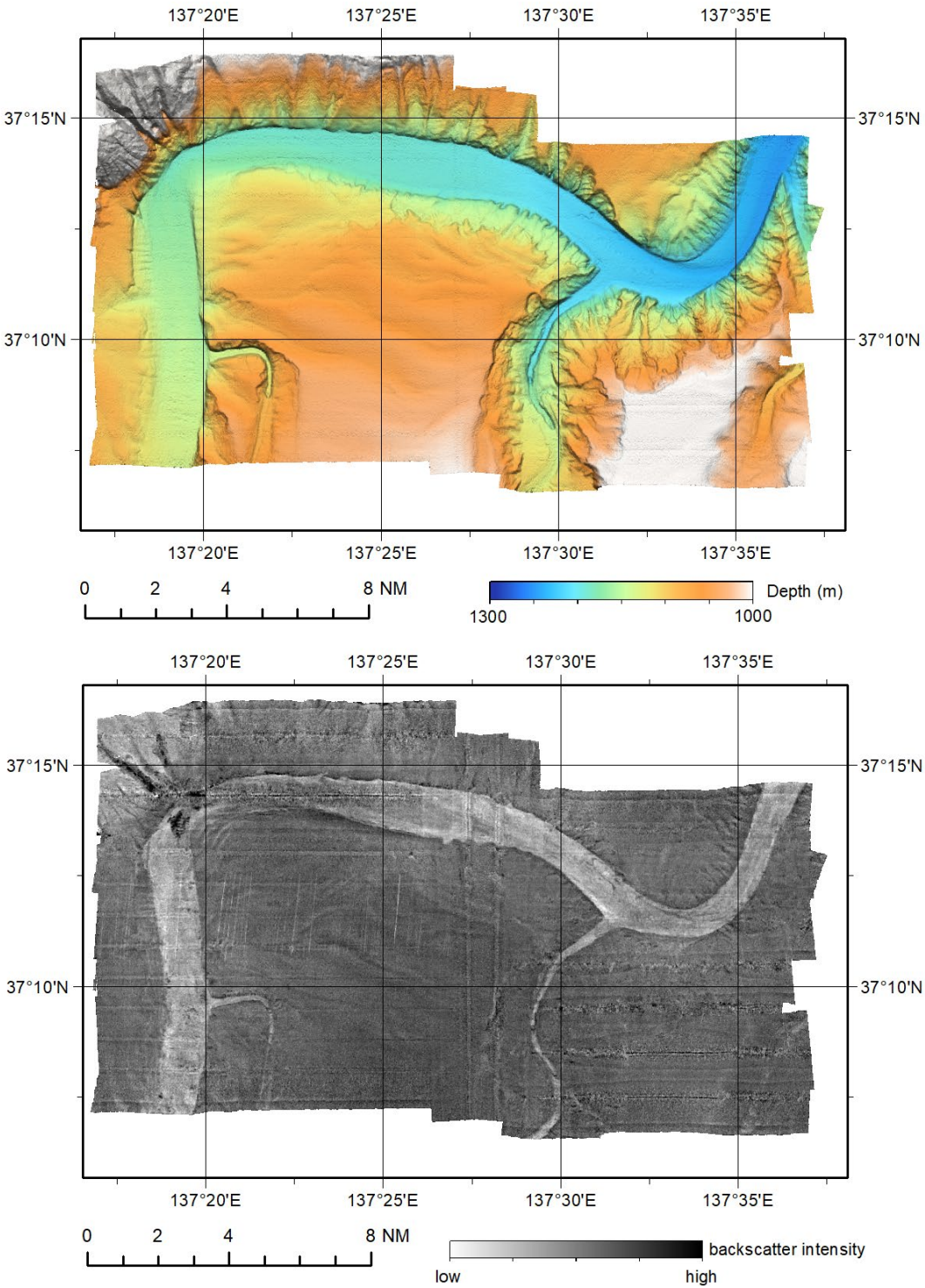


Figure 6. Bathymetric and backscatter intensity maps of Area 3 and 4

Supplementary Table 1. EM122 raw data files. A total of 58 files were processed.

Area 1 / 12 files		
0100_20260602_194830.all/wcd		0101_20260602_201829.all/wcd
0103_20260602_204436.all/wcd		0104_20260602_211435.all/wcd
0106_20260602_214227.all/wcd		0107_20260602_221227.all/wcd
0109_20260602_225329.all/wcd		0110_20260602_232328.all/wcd
0113_20260603_000918.all/wcd		0114_20260603_003919.all/wcd
0116_20260603_010456.all/wcd		0117_20260603_013456.all/wcd
Area 3 / 16 files		
0126_20260603_043712.all/wcd		0127_20260603_050711.all/wcd
0129_20260603_054426.all/wcd		0130_20260603_061423.all/wcd
0132_20260603_065016.all/wcd		0133_20260603_072013.all/wcd
0135_20260603_075912.all/wcd		0136_20260603_082910.all/wcd
0138_20260603_090516.all/wcd		0139_20260603_093515.all/wcd
0141_20260603_101234.all/wcd		0142_20260603_104237.all/wcd
0145_20260603_114537.all/wcd		0146_20260603_121537.all/wcd
0148_20260603_125400.all/wcd		0149_20260603_132402.all/wcd
Area 4 / 10 files		
0158_20260604_082404.all/wcd		0159_20260604_085404.all/wcd
0161_20260604_092129.all/wcd		0162_20260604_095133.all/wcd
0164_20260604_101753.all/wcd		0165_20260604_104753.all/wcd
0168_20260605_082735.all/wcd		0169_20260605_085735.all/wcd
0171_20260605_092715.all/wcd		0172_20260605_095717.all/wcd
Area 3 (additional) / 20 files		
0175_20260605_104908.all/wcd		0176_20260605_111908.all/wcd
0177_20260605_114909.all/wcd		0179_20260605_120223.all/wcd
0180_20260605_123224.all/wcd		0181_20260605_130224.all/wcd
0183_20260605_131648.all/wcd		0185_20260605_134849.all/wcd
0186_20260605_141848.all/wcd		0188_20260605_144749.all/wcd
0189_20260605_151748.all/wcd		0193_20260606_070840.all/wcd
0194_20260606_073841.all/wcd		0196_20260606_080715.all/wcd
0197_20260606_081235.all/wcd		0198_20260606_083721.all/wcd
0200_20260606_090205.all/wcd		0201_20260606_093203.all/wcd
0203_20260606_100335.all/wcd		0204_20260606_103333.all/wcd

3.3 Heat flow measurement using SAHF

Observer: **Takanori Kagoshim**

Location: The northern area of Toyama Bay (Dive 6K#1905), Central Toyama Bay (Dive 6K#1906)

Objective: Subseafloor temperature measurement

(Dive 6K#1905)

	On bottom:	Off bottom:
Time (local)	11:04	16:29
Latitude:	37°38.25' N	37°37.15' N
Longitude:	137°45.10' E	137°46.20' E
Depth (m):	1732	1570
Date:	7 th June 2026	

Subseafloor temperature was measured at four sites during the Dive 6K#1905.

(Dive 6K#1906)

	On bottom:	Off bottom:
Time (local)	10:41	16:30
Latitude:	37°10.1161' N	37°10.8713' N
Longitude:	137°19.4572' E	137°20.2956' E
Depth (m):	1192	1156
Date:	8 th June 2026	

Subseafloor temperature was measured at four sites during the Dive 6K#1906.

Purpose:

Intense earthquake swarms had been observed in the Noto Peninsula since December 2020, and the involvement of fluids rising in the upper crust was pointed out (Nishimira et al., 2023). Helium isotope data of ground water in the Noto Peninsula (Umeda et al, 2024; Kagoshima et al., 2025) show high contributions of the mantle component, indicating that the fluids containing mantle-derived volatiles may have risen through permeable seismogenic zones and reached the shallow aquifer from the depth. The fluids beneath the Noto Peninsula may rise not only to the land area but also

to the surrounding sea area where a lot of active faults are observed.

The scale of deep to surface fluid migration should be strongly related to the earthquake swarm mechanism. Geothermal gradient and heat flow are powerful tools for investigating underground fluid cycles. In the YK26-06S cruise, we measured subseafloor temperature using SAHF (stand-alone heat flow meter) in order to obtain heat flow data in Toyama Bay.

Observations:

We used SAHF owned by JAMSTEC (Fig. 1) to measure subseafloor temperature. Five thermistors are situated within the 60 cm-probe at the interval of 11 cm (Fig. 2). Before each dive, we started “measurement” of SAHF on the ship and attached it to Shinkai 6500. SAHF kept measurement during dives with the logging interval of 10 seconds. After each dive, we stopped “measurement” on the ship and extracted logged data for analysis.



Figure 1. SAHF (stand-alone heat flow meter)

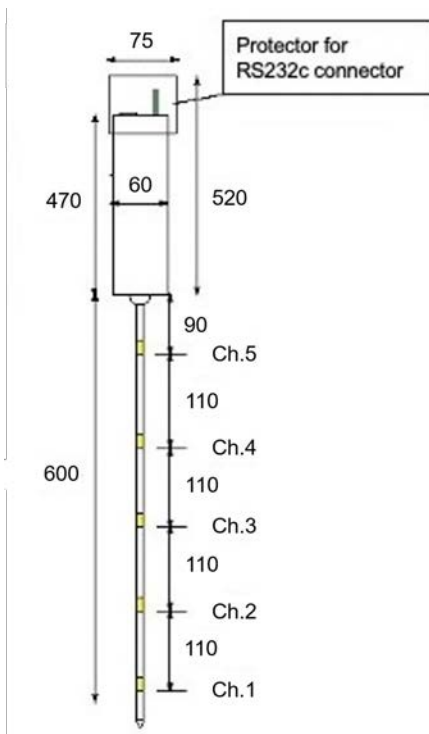


Figure 2. A schematic view of SAHF

During the Dive 6K#1905, SAHF measurements were conducted at four stations HF1905-1, HF1905-2, HF1905-3 and HF1905-4 whose coordinates are (37°37.9561'N, 137°45.3743'E), (37°37.5348'N, 137°45.8279'E), (37°37.5056'N, 137°45.8516'E) and (37°37.2321'N, 137°46.1390'E), respectively (Fig. 3). The depth ranges between 1572 and 1704 m. Although thermal conductivity data are needed to calculate heat flow values, they are not available. Hereafter, we assume a constant value of 1 (W/m)/K for calculations. Heat flow values are calculated to be 54.4 mW/m², 76.4 mW/m², 178.0 mW/m² and 220.7 mW/m², at stations HF1905-1, HF1905-2, HF1905-3 and HF1905-4, respectively.

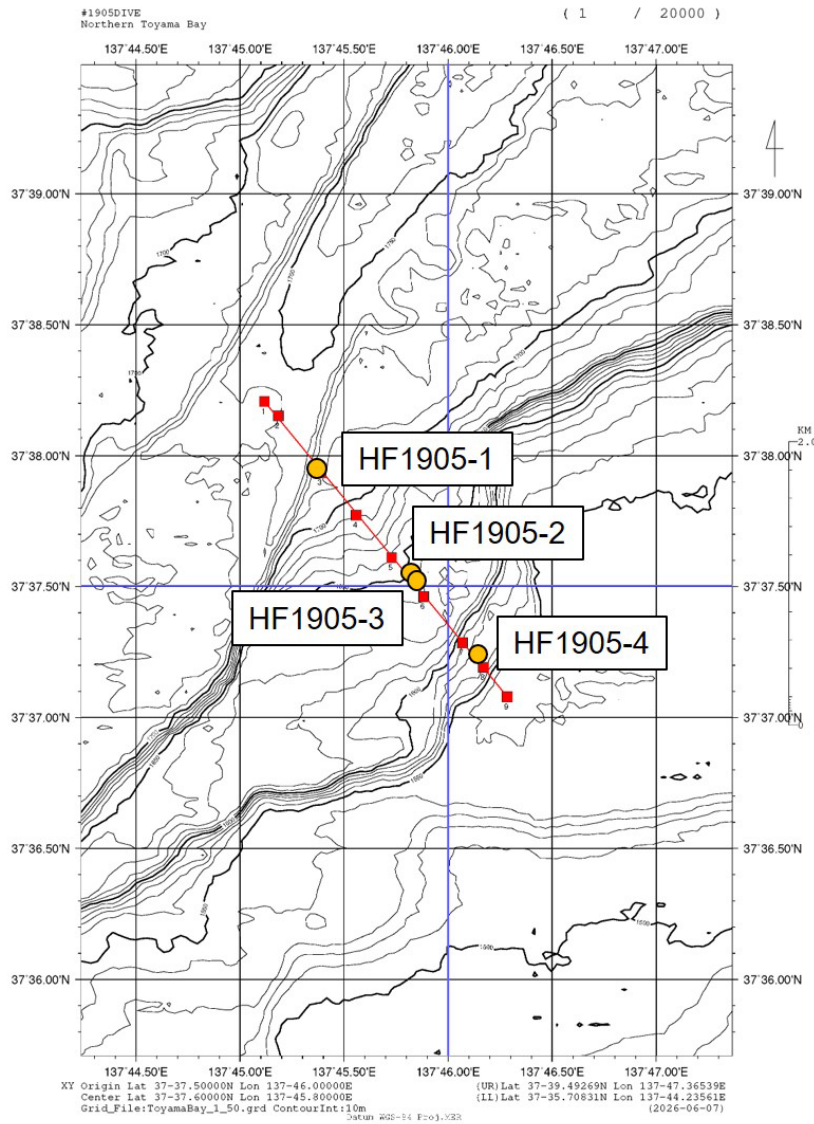


Figure 3. Heat flow stations during the Dive 6K#1905

The stations where heat flow was measured are depicted as yellow circles with their station names. This figure was produced modifying the track chart of the Dive 6K#1905 (Shinkai 6500).

During the Dive 6K#1906, SAHF measurements were conducted at four stations HF1906-1, HF1906-2, HF1906-3 and HF1906-4 whose coordinates are (37°10.1252'N, 137°19.4499'E), (37°10.2477'N, 137°19.4934'E), (37°10.5081'N, 137°19.6378'E) and (37°10.8448'N, 137°20.1405'E), respectively (Fig. 4). The depth ranges between 1176 and 1201 m. Heat flow values are calculated to be 46.2 mW/m², 55.9 mW/m², 87.8 mW/m² and 104.4 mW/m², at stations HF1906-1, HF1906-2, HF1906-3 and HF1906-4, respectively.

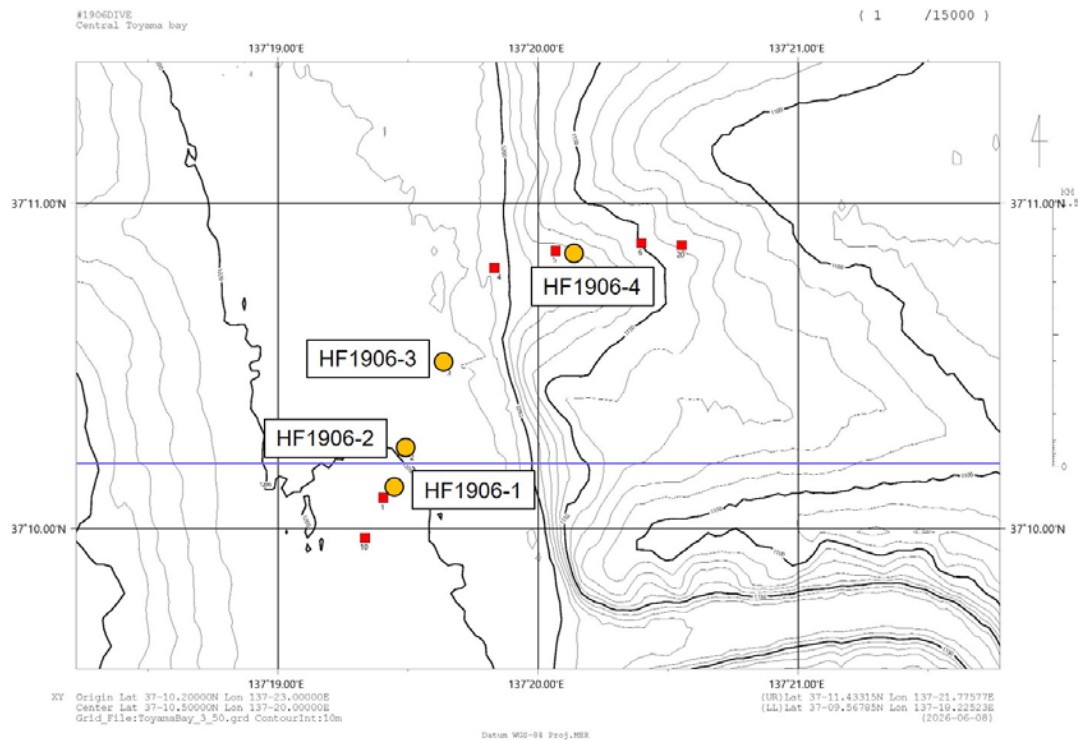


Figure 4. Heat flow stations during the Dive 6K#1906

The stations where heat flow was measured are depicted as yellow circles with their station names. This figure was produced modifying the track chart of the Dive 6K#1906 (Shinkai 6500).

The preliminary results of SAHF measurement are summarized in Table 1. They are provisional values, and additional analyses will be conducted in the future.

Table 1. Descriptions of SAHF stations and the estimated heat flow values

Station ID	Dive ID	Latitude	Longitude	Depth (m)	Heat flow value (mW/m ²)
HF1905-1	6K#1905	37°37.9561'N	137°45.3743'E	1704	54.4
HF1905-2	6K#1905	37°37.5348'N	137°45.8279'E	1639	76.4
HF1905-3	6K#1905	37°37.5056'N	137°45.8516'E	1638	178.0
HF1905-4	6K#1905	37°37.2321'N	137°46.1390'E	1572	220.7
HF1906-1	6K#1906	37°10.1252'N	137°19.4499'E	1192	46.2
HF1906-2	6K#1906	37°10.2477'N	137°19.4934'E	1194	55.9
HF1906-3	6K#1906	37°10.5081'N	137°19.6378'E	1201	87.8
HF1906-4	6K#1906	37°10.8448'N	137°20.1405'E	1176	104.4

3.4 Dive#1905 report

Observer: Noriko KAWAMURA

Pilot: Ryo Saigo

Copilot: Motohiro Matsuzaka

Location: The northern area of Toyama Bay

Objective: Sediment and benthic organism samplings and seafloor observation of the landslides located within the northern Toyama Bay.

	On bottom:	Off bottom:
Time (local)	11:04	16:29
Latitude:	37°38.25' N	37°37.15' N
Longitude:	137°45.10' E	137°46.20' E
Depth (m):	1732	1570
Date:	7 th June 2026	

10 sediment samples were collected. Red snow crabs and bottom seawater samples were also taken.

Purpose:

The Dive 6K#1905 was planned to survey the landslides in the northern part of the Toyama Bay. Minami and Kawamura, *Landslides* (2026) reported that the submarine landslides were occurred by the 2024 Noto Peninsula Earthquake in the bay.

The detailed bathymetry changes and impacts on benthos and were unknown.

This dive was designed to examine and sample the sediments and benthos of the landslides in the northern part of the Toyama Bay. As this was the first HOV SHINKAI 6500 dive of the YK26-06S cruise, we also planned to test payload instruments: line laser for oriented core samplings and heat flow.

Observations:

We arrived at the seafloor at 11:04 (JST), 1732 mbsl. The landing site was covered by sediments. We collected two rock samples: R01 and 02 from the central part of the Toyama Seachannel. M-bari type of sediment cores were taken from the seachannel (Figure 1). We also collected a red snow crab by a slurp gun and was stored canister No. 1.

After that, we reached the slope of the seachannel, the operations of M-bari and H type of cores and feat flow were conducted (Figure 2).



Figure 1. A boulder sampling. Captured image from No.2 Camera.



Figure 2. The operation of feat flow and H type core sampling. Captured image from No.2 Camera.

Summary:

Dive #1905 surveyed the landslides which were occurred by the 2024 Noto Peninsula Earthquake in the western slope of the Toyama Seachannel. Orientated sediment cores for the bottom current directions and chemical analyses were collected. A crab was taken for the ecological survey after the earthquake. The measurement of feat flow also conducted to investigate the fluid from underground.

Payloads:

- Suction sampler
- Multi-rotary chambers for suction sampler
- Large 6K Sample Box x1
- A vent fluid sampler with pump
- JAMSTEC 8K camera
- H-type push-core (plastic x 4)
- M-bari type core sampler (x 6)
- Downward-looking camera

3.5 Dive#1906 report

Observer: **Masahiro SANGA**

Pilot: Takuma Ohnishi, Naoto Minamino

Location: Central Toyama Bay

Objective: Biological Sampling and Seafloor Observation of the Toyama Deep-Sea Channel in Central Toyama Bay

	On bottom:	Off bottom:
Time (local)	10:41	16:30
Latitude:	37°10.1161' N	37°10.8713' N
Longitude:	137°19.4572' E	137°20.2956' E
Depth (m):	1192	1156
Date:	8 th June 2026	

7 crab and 8 eelpout, 1 shrimp, 1whelk samples collected

Purpose:

Dive 6K#1906 was conducted to estimate the population density of red snow crabs (*Chionoecetes japonicus*) in the central part of Toyama Bay. Toyama Bay is one of the largest and deepest bays in Japan, with a surface area of 2,120 km² and a maximum depth of 1,250 m. Submarine canyons extending from the coast are connected to the Toyama Deep-Sea Channel. The 2024 Noto Peninsula Earthquake, which occurred on January 1, 2024, triggered seafloor landslides and turbidity currents in Toyama Bay, affecting the red snow crab stock (Sanga et al., 2025). In particular, in the Toyama Deep-Sea Channel, water depth has decreased by up to 3 m in some areas because of sediment deposition, suggesting substantial impacts. In addition, catches from small-mesh crab pots have declined to approximately one-sixth of previous levels. However, little information is available on the microtopography and seafloor characteristics of the Toyama Deep-Sea Channel, and available data on the channel remain limited. Furthermore, because only medium- to large-sized individuals have been collected using small-mesh crab pots, the population status of red snow crabs in the Toyama Deep-Sea Channel, including small individuals, remains unclear.

This dive was conducted to estimate the population density of red snow crabs in the Toyama Deep-Sea Channel, located in the central part of Toyama Bay, and to collect specimens of red snow crabs. The estimated population density will be compared with that obtained during a previous dive (2K#1208). Furthermore, the collected red snow crabs will be used in rearing experiments to examine their responses to turbid

conditions, such as those caused by turbidity currents.

Observations:

We arrived at the seafloor at 10:41 (JST), 1192 mbsl. The landing site was covered by sediments (Fig. 1). At the landing site, sediment cores were taken using M-bari and H-type push-core. In addition, heat flux measurements were taken for 10 minutes using a SAHF (Stand Alone Heat Flow meter) (Fig. 2). After that, we then proceeded diagonally toward the Toyama Deep-Sea Channel at a heading of 18°, observing red snow crabs, *Bothrocara hollandi*, *Malacocottus gibber*, *Buccinum tsubai*, *Buccinum tenuissimum*, *Argis toyamaensis* and *Eualus biunguis*. Traces of benthic activity were observed on the seafloor. The depressions and mounds observed appeared to have central openings when viewed from directly above, suggesting that they were burrows constructed by polychaete worms. *Argis toyamaensis* individuals were often observed partially buried in the sediment. Short, discontinuous linear tracks were presumed to have been formed by *A. toyamaensis*, whereas long, continuous linear tracks were attributed to whelks. Also, between the landing site and Point 1, we collected benthos and demersal fishes: 3 crab and 2 eelpout in slurp gun canister No. 1.



Figure 1. Sediments covering the landing site. Screenshot from Downward-looking camera.



Figure 2. The operation of feat flow and H type core sampling. 10:55, 1193 mbsl (IN2 Camera, SHD_IMG_0003.jpg).

At 11:34 (JST), we arrived at Point 2 at a depth of 1,195 mbsl, where sediment core sampling using M-bari and an H-type push core, as well as heat flux measurements, were conducted. Subsequently, while proceeding diagonally through the Toyama Deep-Sea Channel along a heading of 18°, ripple marks were observed at a depth of 1,199 mbsl at 12:13 (JST) (Fig. 3). At 12:24 (JST), the submersible reached Point 3 at a depth of 1,195 mbsl, where the same operations were carried out.

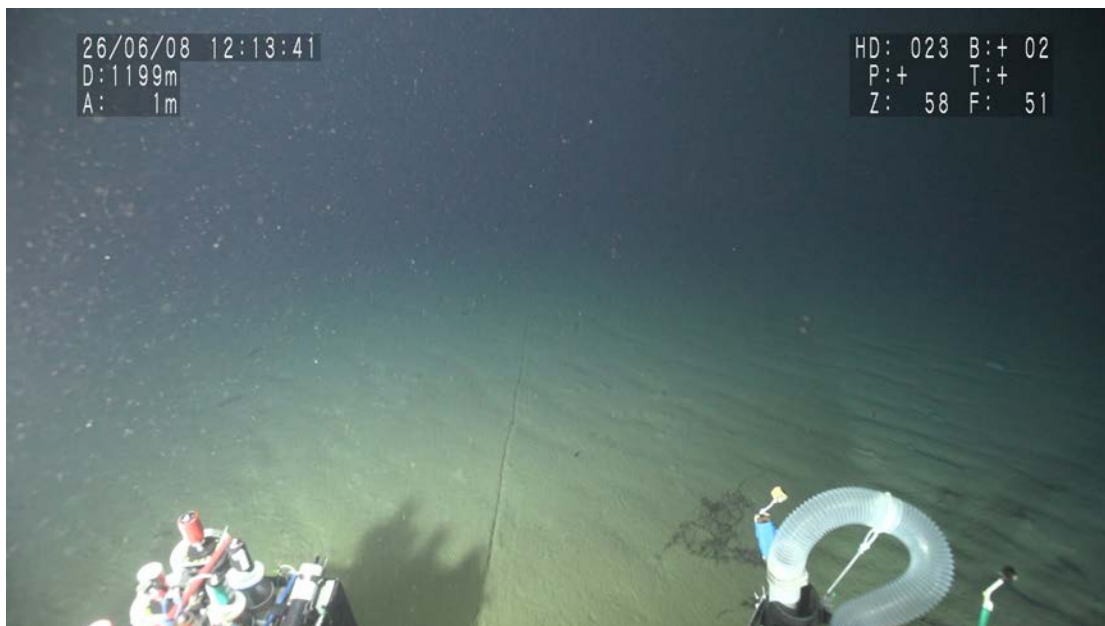


Figure 3. Ripple marks observed in the Toyama Deep-Sea Channel. Screenshot from No.1 Camera.

Thereafter, while proceeding diagonally toward Point 4 along a heading of 320°, patches of yellowish seafloor sediment began to appear. At 13:14 (JST), in an area at a depth of 1,204 m where patches of yellowish sediment were observed, water samples were collected using a Niskin sampler, and sediment cores were retrieved using an Mbari corer. Subsequently, after passing through Points 4 and 5 and proceeding along a heading of 90°, we arrived at 14:56 (JST) at a site at a depth of 1,117 mbsl, where patches of yellowish seafloor sediment were observed. At this site, water samples were collected using a Niskin sampler, a sediment core was retrieved using an H-type push core, and heat flux was measured (Fig. 4). In addition, we collected benthos and demersal fishes: 2 crab, 1 shrimp and 6 eelpout in slurp gun canister No. 1, 2 crab and 1 whelk in sample box (Fig. 5).



Figure 4. Patches of yellowish seafloor sediment. Captured image from No.2 Camera.



Figure 5. Collection of a red snow crab using a slurp gun. Captured image from No.2 Camera.

Summary:

During Dive #1906, the population density of red snow crabs was investigated through direct observation. In addition, ripple marks were observed on the floor of the Toyama Deep-Sea Channel, suggesting the occurrence of strong bottom currents, such as turbidity currents, along the channel. Although further analysis is required to estimate the exact population density of red snow crabs, the results suggest that turbidity currents triggered by the 2024 Noto Peninsula Earthquake may have affected the red snow crab population.

Payloads:

- Suction sampler
- Multi-rotary chambers for suction sampler
- Large 6K Sample Box x1
- A vent fluid sampler with pump
- JAMSTEC 8K camera
- H-type push-core (plastic x 4)
- M-bari type core sampler (x 5)
- Downward-looking camera
- Niskin sampler (5L x 2)
- Stand Alone Heat Flow meter

4. 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 Cooperative Research Cruise office.

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