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Mirai "Cruise Report"
MR24-02

Geological Study of Paleo-Earthquakes and Tsunamis along the Chishima Trench

Chishima (Kuril) Trench

March 12, 2024 – March 28, 2024

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

Contents

1. Cruise Information

- Cruise ID: MR24-02
- Name of vessel: R/V Mirai
- Title of cruise 1: Geological study of paleo-earthquakes and tsunamis along the Chishima Trench
- Representative of Science Party 1: Toshiya Kanamatsu [Research Institute for Marine Geodynamics (IMG), JAMSTEC]
- Title of cruise 2: Contourite deposition processes in the outer rise of the Chishima Trench
- Representative of Science Party 2: Hisashi Ikeda [Graduate School, Yamaguchi University]
- Chief Scientist: Toshiya Fujiwara [IMG, JAMSTEC]
- Cruise period: March 12, 2024 – March 28, 2024
- Ports of departure / arrival: Sekinehama / Shimizu, Japan
- Research area: Chishima Trench
- Research map:

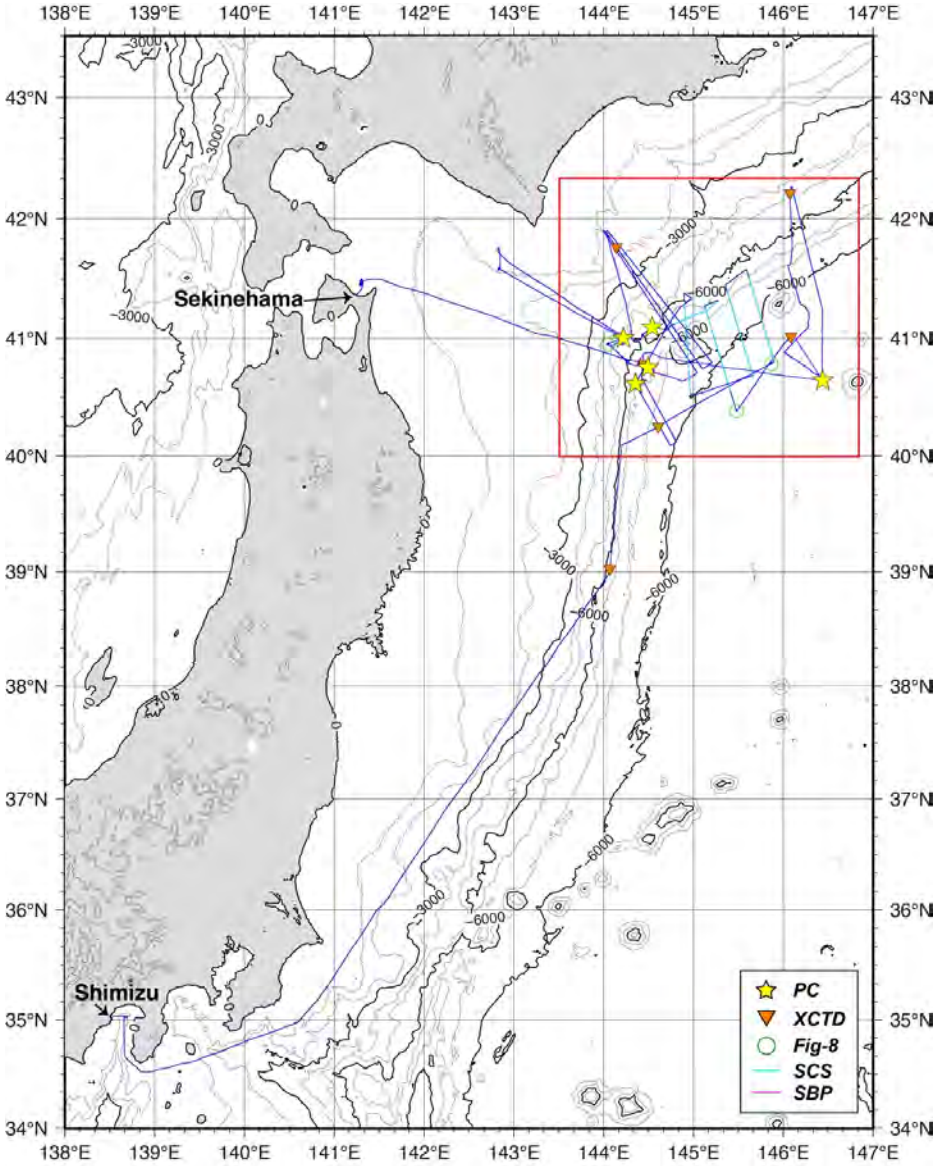

Figure 1-1: Survey lines and locations in the cruise area. Blue lines show the R/V "Mirai" ship tracks. PC: piston core, Fig-8: "Figure-8" sailing, SCS: single-channel seismic reflection survey, SBP: sub-bottom profiling.

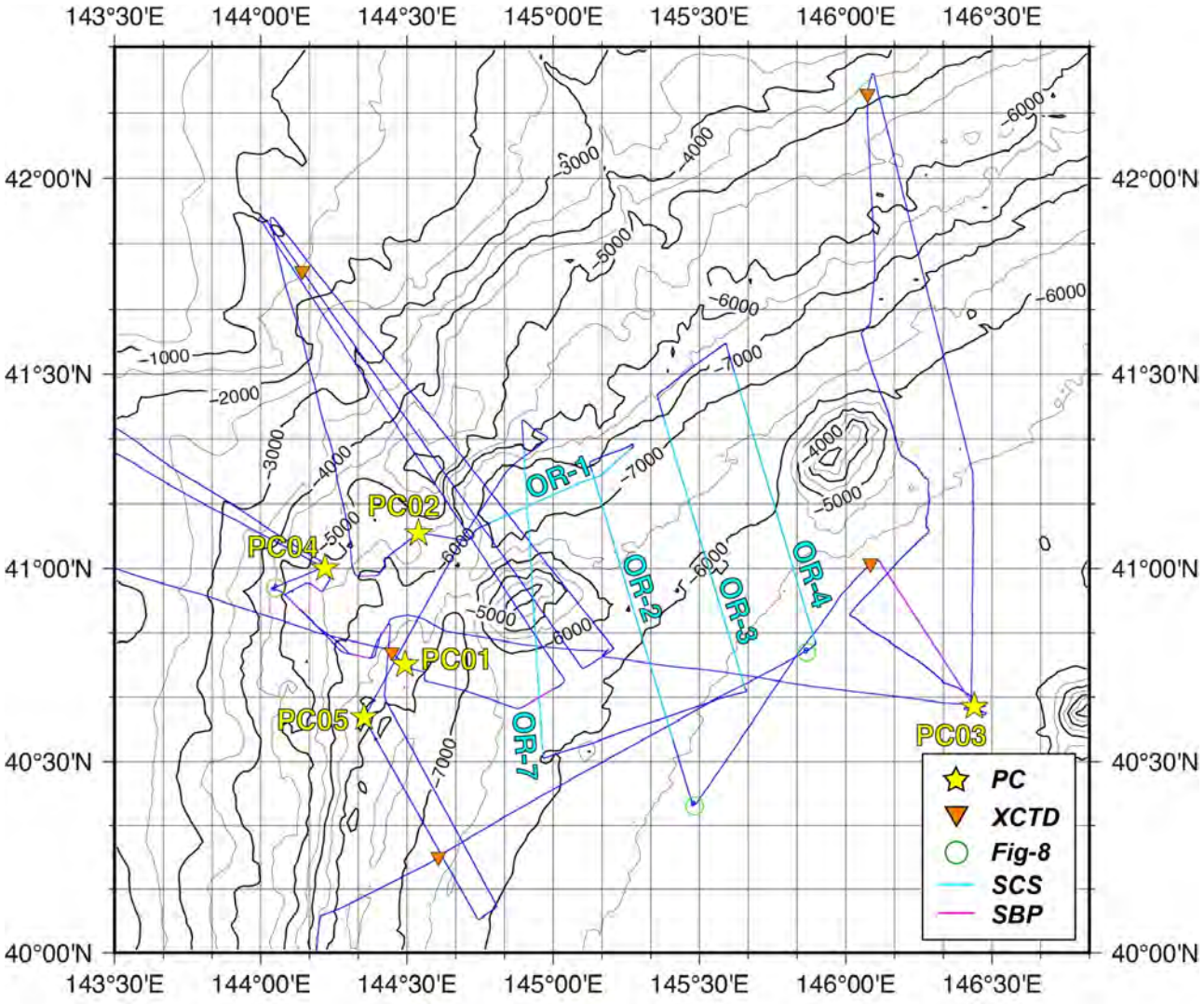

Figure 1-2: Survey lines and locations in the survey area. Blue lines show the R/V "Mirai" ship tracks. PC: piston core, Fig-8: "Figure-8" sailing, SCS: single-channel seismic reflection survey, SBP: sub-bottom profiling.

2. Participant List

Science Party

Toshiya Fujiwara	IMG, JAMSTEC
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Yuji Yamamoto	Kochi University
Makoto Jonishi	Kochi University
Isao Yosano	Kochi University
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Ryo Oyama	NME
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NME: Nippon Marine Enterprises Ltd.

Piston Corer Operation & Core Measurement Team

Yuki Miyajima	MWJ
Kango Fukuyama	MWJ
Yuta Shinomiya	MWJ
Takuya Izutsu	MWJ
Tomohiro Tani	MWJ
Ritsuko Sawada	MWJ
Mariko Sano	MWJ
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MWJ: Marine Works Japan Ltd.

R/V Mirai Crew

Haruhiko Inoue	Master
Takeshi Egashira	Chief Officer
Yuki Furukawa	Jr. 1st Officer
Yasuhito Iida	2nd Officer
Natsuko Sakurai	3rd Officer
Koji Funae	Chief Engineer
Jun Takahashi	1st Engineer
Ryuzo Mikami	2nd Engineer
Genta Takeya	3rd Engineer
Yoichi Inoue	Chief Radio Operator
Kazuyoshi Kudo	Boatswain
Tsuyoshi Sato	Quarter Master
Yukito Ishii	Quarter Master
Shuji Komata	Quarter Master
Hideaki Tamotsu	Quarter Master
Hideyuki Okubo	Quarter Master
Shohei Uehara	Quarter Master
Kenta Nasu	Quarter Master
Keisuke Isobe	Sailor
Yuki Oishi	Sailor
Shin Ito	Sailor
Kazuya Sunomozawa	Sailor
Iori Terasaki	Sailor
Daisuke Taniguchi	No.1 Oiler
Kazuya Ando	Oiler
Takuya Watanabe	Oiler
Shodai Kayaba	Assistant Oiler
Marina Shimizu	Assistant Oiler
Eima Fujiura	Assistant Oiler
Toru Murakami	Chief Steward
Kanjuro Murakami	Steward
Jun Sato	Steward
Kina Abe	Steward
Mizuki Nakano	Steward

3. Cruise Summary

Research Objectives

To understand the history of paleo-earthquakes and tsunamis along the Chishima Trench from geological studies, sediment core samples including earthquake-induced turbidite will be collected on the landward trench slopes. Bathymetry, geology, and sub-surface structure of sedimentary layers around the sediment core sampling sites will be surveyed. To understand depositional processes and paleo-oceanographic changes in the Northwest Pacific, sediment core samples including contourites affected by Lower Circumpolar Deep Water (LCDW) will be collected in the outer-rise. And bathymetry, geology, and sub-surface structure of sedimentary layers around the sediment core sampling sites will be surveyed.

Activities (observation, sampling, methods, instruments)

Piston-coring, sub-bottom profiling, single-channel seismic reflection survey, multibeam bathymetric survey, XCTD measurement, shipboard gravity meter measurement, surface-towed and shipboard three-component magnetometer measurement, and surface seawater sampling.

Results

- Sediment core samples were collected at 5 sites. The water depths of the sampling sites were 5171-7040 m. The length of piston core was 6 m.
- Single-channel seismic reflection surveys were conducted along 5 lines. The seismic source was a 355 cu in (G: 250, I: 105) ×2 GI guns.
- Sub-bottom profiler surveys were conducted at 10 locations and along the single-channel seismic reflection survey lines. The piston-coring sites were selected from the results of this survey.
- Multibeam bathymetric surveys were conducted in the survey area.
- XCTD measurements were conducted at 6 sites to determine sound velocity profiles for the bathymetric survey.
- Surface-towed geomagnetic measurements using a cesium magnetometer were conducted during the multibeam bathymetric survey.
- Shipboard gravity data and shipboard three-component magnetic data were collected throughout the cruise. "Figure-8" sailings for data calibration of the shipboard magnetic data were conducted at 3 locations.
- Surface seawater was sampled at 72 sites during the cruise.

4. Acknowledgments

We are grateful to captain Haruhiko Inoue, the officers, and the crew of the R/V Mirai for the outstanding professionalism and dedication that made the cruise successful. We are also indebted to the marine technician team's invaluable help at sea. We thank Masanobu Yanagitani for the arrangements for the cruise. Support from the research fleet department of MarE3, JAMSTEC, Nippon Marine Enterprises Ltd., and Marine Works Japan Ltd. is greatly acknowledged. Visual core descriptions are provided by Ken Ikehara. A figure of magnetic anomaly is provided by Chian-Yu Huang. Figures of seismic profiles are provided by Cheng-Chun Chung. A figure and description regarding sub-bottom profiling at ORPC10 are provided by Hisashi Ikeda. Information of water sampling is provided by Zihan Huang. Cruise log and descriptions regarding the underway geophysics are provided by NME underway geophysics team. Descriptions regarding the single-channel seismic reflection survey are provided by NME SCS team. Descriptions regarding the piston coring are provided by MWJ team.

5. Notice on Using

6. Cruise Log

R/V "MIRAI" MR24-02 Cruise Log (Time: JST (UT+9 hrs))

Date & Time	Description	Weather / Wind / Wave Height, Sea Swell
2024/03/12 Tue.	Noon Position: 41-22.0N,141-14.4E (Sekinehama-Port)	r / - / -,-
16:00	Let go all shore lines & Departed SEKINEHAMA port for research area	
18:30	Carried out on board Education for Researchers	
2024/03/13 Wed.	Noon Position: 41-30.0N, 141-24.1E (East Off of Honshyu)	bc / NW-7 / 4,3
09:00	Carried out practical fire abandon ship and damage control station drill	
11:20	Start SSV & Sea surface water pump	
11:30	Bound for SLPC08	
2024/03/14 Thu.	Noon Position: 40-45.1N,144-29.5E (South of Erimo-Misaki)	bc / SW-6 / 5,2
05:42	Arrived at Research area	
05:45	Launched XCTD #1	
06:04-07:26	Carried out Sub Bottom Profiler survey	
08:25-13:18	Carried out sediment sampling by Piston Corer (1)	
13:30	Bound for Cesium Observation Line	
13:47-06:03	Commenced towing cesium magnetometer	
15:30-01:28	Commenced SBP & MBES Survey	
2024/03/15 Fri.	Noon Position: 40-50.4N,145-09.5E (South of Erimo-Misaki)	bc / WNW-4 / 3,2
02:19	Launched XCTD #2	
10:54-21:55	Commenced MBES Survey(Mb2-m,Mb2-se)	
05:05-05:37	Commenced SBP survey	
2024/03/16 Sat.	Noon Position: 41-05.5N,144-32.4E (South of Erimo-Misaki)	bc / NW-4 / 3,3
07:12	Arrived at SLPC 05	
08:15-12:09	Piston Corer	
12:30	Bound for SCS line(OR-1)	
14:24	Deployed SCS air gun	
14:31	Deployed streamer cable	
15:25-21:23	SCS line Survey(OR-1)	
23:48-14:00	SCS line Survey(OR-2)	

2024/03/17 Sun.	Noon Position: 40-31.9N,145-25.1[E (South of Erimo-Misaki)	o /ESE-6 / 3,2
14:03-14:06	Recovered SCS streamer cable	
14:09-14:20	Recovered SCS air gun	
14:27-14:51	Carried out eight-figure trace calibration of magnetometer #1	
18:48	Release XCTD #3	
19:11-02:03	SBP Survey	
2024/03/18 Mon.	Noon Position: 40-44.7N,146-16.5E (South of Erimo-Misaki)	r / W-8 / 7,5
02:06	Made Mirai Drift	
16:42	Bound for MBES Surver Line(Mb1-m)	
2024/03/19 Tue.	Noon Position: 41-39.9N,146-05.2E (South of Erimo-Misaki)	bc / WNW-8 / 6,5
15:29	Release XCTD #4	
16:01-23:37	MBES Surver(Mb1-m)	
2024/03/20 Wed.	Noon Position: 40-38.6N,146-26.4E (South of Erimo-Misaki)	c / NE-4 / 3,3
03:00	Arrived at ORPC10	
06:17-13:32	Piston Corer(3)	
13:40-19:03	Commenced towing cesium magnetometer	
13:54	Bound for SBP Surver Line	
22:09-04:08	SBP survey(SBP03,SBP04,SBP06,SBP05,SBP02)	
2024/03/21 Thu.	Noon Position: 41-39.6N,142-50.7E (South of Erimo-Misaki)	o / E-4 / 2,2
	Made Mirai Drift(or Positioning at fix point)	
2024/03/22 Fri.	Noon Position: 41-00.3N,144-13.2E (South of Erimo Misaki)	c / N-4 / 3,2
00:00	Bound for SLPC10	
06:42	Arrived at SLPC10	
08:15-12:05	Carried out sediment sampling by Piston Corer (PC-5)	
12:55-13:21	Carried out eight-figure trace calibration of magnetometer #2	
13:27-05:43	Commenced towing cesium magnetometer	
13:59-17:42	SBP &MBES survey(SBP06,SBP04,SBP03)	
18:56-05:26	MBES survey	
2024/03/23 Sat.	Noon Position: 40-49.6N,144-30.3E (South of Erimo-Misaki)	bc / S-2 / 2,2
05:30	Arrived at SLPC09	
06:11-10:39	Carried out sediment sampling by Piston Corer (SLPC-09)	
10:42	Left SLPC09 for SCS Survey Line(OR7)	
16:04-16:13	Deployed SCS Air Gun	
16:17	Deployed SCS streamer cable	
17:17-05:00	Commenced SCS survey (OR7)	

2024/03/24 Sun.	Noon Position: 40-40.3N,145-36.7E (South of Erimo-Misaki)	bc / SSE-3 / 2,2
12:38-05:00	Commenced SCS survey (OR3)	
2024/03/25 Mon.	Noon Position: 40-58.5N,145-49.9E (South of Erimo-Misaki)	c / West-6 / 4,2
03:14-14:23	Commenced SCS survey (OR4)	
14:49-14:56	Recovered SCS streamer cable	
15:04-15:14	Recovered SCS air gun	
15:21-15:46	Carried out eight-figure trace calibration of magnetometer #3	
15:51-09:01	Commenced towing cesium magnetometer	
22:03	Launched XCTD #5	
2024/03/26 Tue.	Noon Position: 38-29.2N,143-37.2E (Off East Coast of Honshyu)	o / NE-5 / 4,2
00:01-08:13-	Commenced MBES mapping survey (Mb4)	
07:56	Launched XCTD #6	
2024/03/27 Wed.	Noon Position: 34-48.7N,140-02.6E (Off Boso-Peninsula)	bc / NNE-5 / 3,2
13:15	Stopped Sea Surface Water pomp & Sea Surface Velocimeter pomp	
2024/03/28 Thu.	Noon Position: 35-02.2N,138-30.6E (SHIMIZU port)	o / - / -
08:40	Took first shore line & arrived at SHIMIZU port Completed MR24-02 cruise	

Weather: **b**: Blue sky, **bc**: Fine but cloudy, **c**: Cloudy, **o**: Over cast, **r**: Rainy,

7. Instruments and Operations

7-1. Piston Coring

7-1-1. Overview

Piston core sampler system consists of 0.59 ton weight, 6 m long stainless steel barrels trigger which works as the balance and a pilot core sampler (**Figure 7-1-1**). In addition, the polyvinyl chloride (PVC) liner tube is inside the stainless steel barrel. The inner diameter (I.D.) of the liner tube is 75 mm. The total weight of the system is approximately 0.8 ton. The piston is composed of two O-rings (size: P63). For a pilot core sampler, we used a “74 mm diameter long-type pilot corer” which is 112 kg weight, 70 cm long of the stainless steel pipe and the poly-carbonate liner tube. The transponder (KAIYO DENSHI Co., Ltd.) was attached to the winch wire above 50 m from the PC to monitor the PC position.

7-1-2. "K-value"

"*K value"* is the strength barometer of the sea bed sediment, which is expressed by the following formula: *K value = pure pull out load / (outer diameter of outer pipe* x *penetration length)*.

7-1-3. Winch operation

At the beginning of the operation of the PC, the speed of wire out was set to 0.3 m/sec, and then increased lowering the speed up to 1.2 m/sec gradually. Wire out was stopped at a depth about 100 m above the seafloor for about 3 minutes to stabilize some pendulum motion of the system. After the wire tension was stable, the wire out was restarted at a speed of 0.3 m/sec, and we carefully watched a tension meter to observe the reaching of the PC to the seafloor. When the corer reached the seafloor, wire tension abruptly decreased by the loss of the corer weight. Wire out was stopped immediately when the corer hit the seafloor. Winding of the wire was started at a speed of 0.3 m/sec until the tension gauge indicates that the corer was lifted off the seafloor. After leaving the PC from the seafloor, the winch wire was wound at the maximum speed.

The results of this cruise are summarized in **Table 7-1-1**. Graphical tension records of winch wire during the operations are attached to the APPENDIX. Coring positions were measured by the transponder.

Table 7-1-1: Summary of the piston coring during MR24-02

Date (UTC)	Core ID	Water Depth	Position (Transponder)		Recovery (m)		Tension MAX	K
		(m)	Latitude	Longitude	PC	PL	(kN)	value
20240314	PC01	6,856	40-45.0848N	144-29.5338E	5.54 / 6	0.81	6.9	0.04
20240316	PC02	5,563	41-05.4356N	144-32.3028E	5.59 / 6	0.31	6.3	0.16
20240320	PC03	5,141	40-38.5399N	146-26.3868E	5.42 / 6	0.62	5.7	0.21
20240322	PC04	5,356	41-00.0603N	144-13.1818E	4.88 / 6	0.76	6.0	0.14
20240323	PC05	7,034	40-36.7139N	144-21.0884E	5.34 / 6	0.85	7.3	0.08

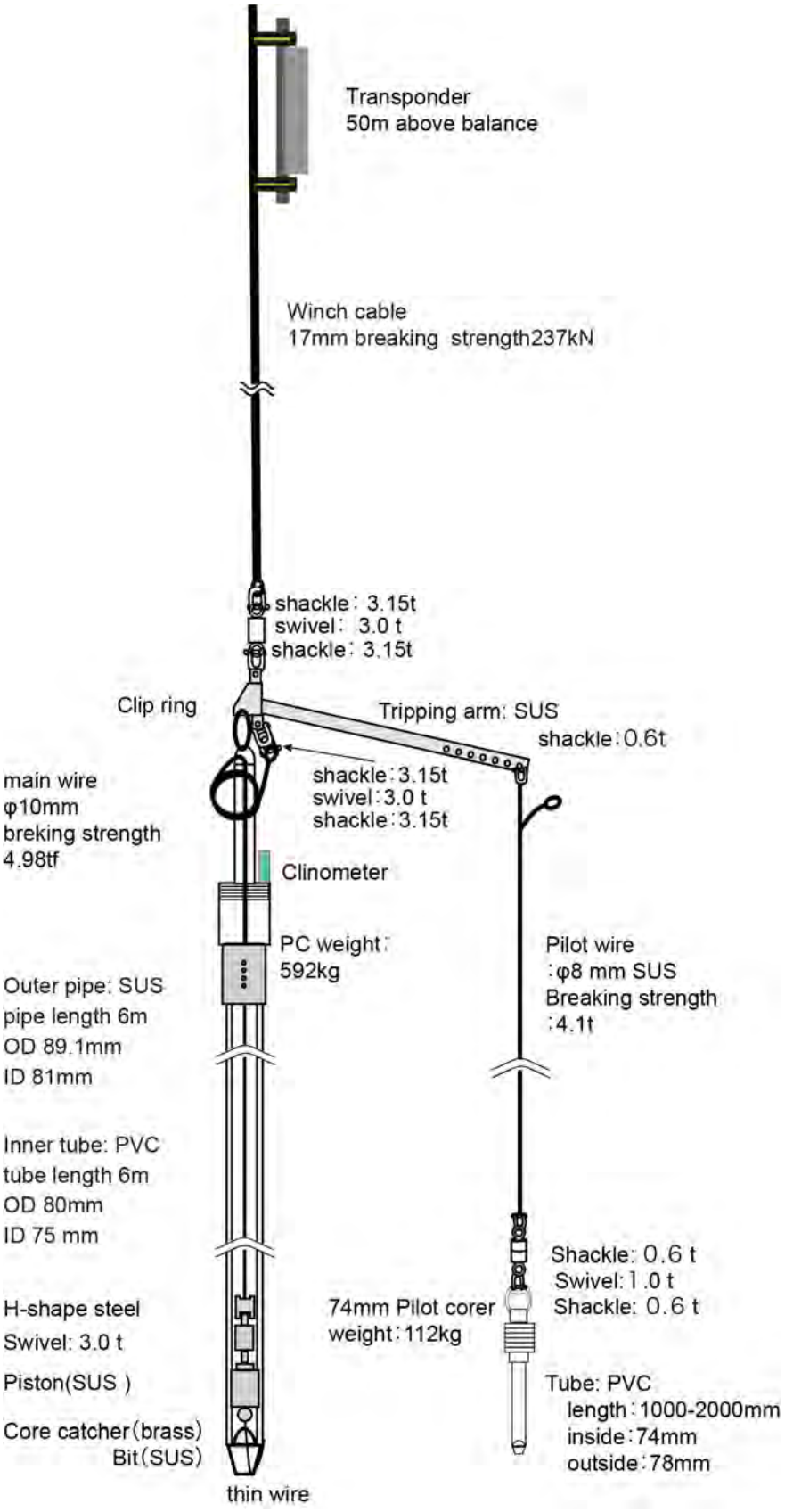


Figure 7-1-1: Piston-corer system used in this cruise.

7-1-4. Multi-Sensor Core Logger (MSCL)

Physical properties are measured with a GEOTEK multi-sensor core logger (MSCL). MSCL has sensors that the gamma-ray attenuation (GRA), the P-wave velocity (PWV) and the magnetic susceptibility (MS), the Non-Contact Resistivity (NCR) and the Natural Gamma Ray Radiation (NGR).

Whole-core samples were kept in the laboratory for the night to equalize the sediment temperature with the room temperature. The measurement interval was every 2 cm for cores (Only an NGR sensor interval was every 6 cm). **Table 7-1-2** is shown the sensor's settings.

After MSCL measurement, whole-core samples were longitudinally cut into working and archive halves by a splitting device and a nylon wire.

Table 7-1-2: Sensor's settings.

Sensor	Interval	Measurement time	Condition check	Calibration
GRA	2 cm	10 seconds	Before Measurement	3/14
PWV	2 cm	Variable	Before Measurement	3/14, 3/24
MS	2 cm	1 second	Before Measurement	3/14
NCR	2 cm	5 seconds	Before Measurement	3/14
NGR	20 cm	120 seconds	Before Measurement	3/14

7-1-5. Digital imaging system

GEOTEK multi-sensor core logger (MSCL) has a Geoscan V system, which is a line scan camera system with automated focus, aperture, and illumination control that is designed to image split sediment core surfaces.

Split core samples were scanned after scraping the sample surface. Two LED lights were manually adjusted by checking the lightness of the core sample image. **Table 7-1-3** is shown the sensor's settings. After scanning, a ruler was added to the left-hand edge of the images.

Table 7-1-3: Sensor's settings.

Item	Setting	Condition check	Calibration
Focus	Auto	Before Measurement	Before Measurement
Color Balance	Auto	Before Measurement	Before Measurement
Aperture	Auto	Before Measurement	Before Measurement

7-1-6. Workflow of piston/pilot cores on board

Upon retrieval of the piston coring system, the recovered cores were brought onto the deck and subdivided into 1-meter sections, each assigned a section ID. Core catchers (CC) were also retrieved from the bottom of both the piston core (PC) and the pilot core (PL), as shown in Figure K1. The whole round sections (WR) were allowed to acclimate to room temperature for one day before undergoing Multi-Sensor Core Logger (MSCL-S) measurements. Each whole round section was then split into semicircle pillar-shaped sections, referred to as archive (A) and working (W) halves. The working halves were photographed using a Nikon D850 camera before undergoing imaging with the Multi-Sensor Core Logger (MSCL-I). Regular sampling procedures, including plastic cube (Cube) sampling and LL-Channel (LL) sampling, were conducted on each section. Additional sampling, such as smear slide (SS), grain-size analysis, and cubes for micro-sedimentary structures, were also carried out. Any void spaces left after sampling were appropriately filled with foam. The archive half was conducted for visual core description (VCD). Following sampling on board, both the working and archive halves were packed into 4-degree container for temporary storage.

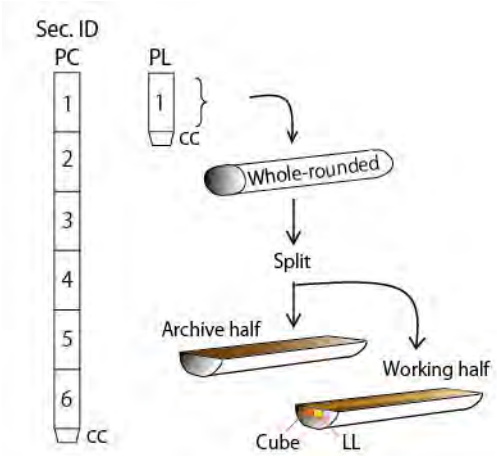


Figure 7-1-2: Workflow of piston/pilot cores on board.

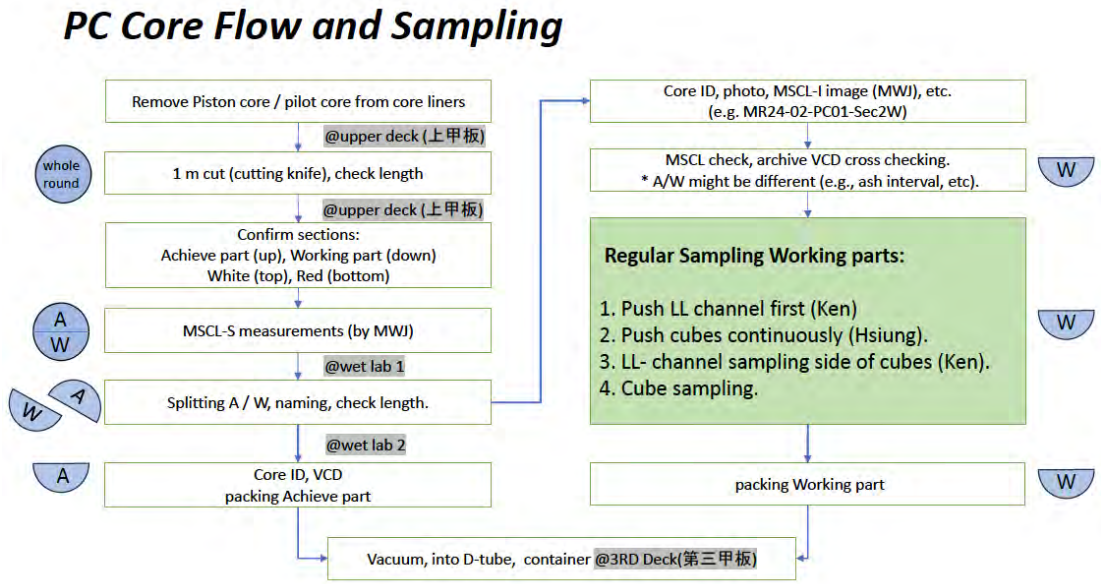


Figure 7-1-3: Workflow of piston/pilot cores and sampling.

7-2. Multibeam Bathymetric Survey

7-2-1. Data acquisition

R/V Mirai is equipped with a Multi narrow Beam Echo Sounding system (MBES), SEABEAM 3012 (L3 Communications, ELAC Nautik, **Table 7-2-1**). The MBES collects continuous bathymetric data along the ship's track to make a contribution to geological and geophysical investigations and global datasets.

To get an accurate sound velocity of the water column for ray-path correction of acoustic multibeam, we used Surface Sound Velocimeter (SSV) data to get the sea surface sound velocity (at 6.62m). Sound velocity profiles in the deeper water column were calculated using measurements from XCTD measurements. The equation of Del Grosso (1974) was used for the calculation.

The bathymetric surveys were conducted at ship speeds of 4-8 knots along the tracks simultaneously single-channel seismic reflection (SCS), sub-bottom profiler, and geomagnetic total force surveys were carried out.

Table 7-2-1: SEABEAM 3012 system configuration and performance.

Frequency:	12 kHz
Transmit beam width:	2.0 degree
Transmit power:	4 kW
Transmit pulse length:	2 to 20 msec.
Receive beam width:	1.6 degree
Depth range:	50 to 11,000 m
Number of beams:	301 beams
Beam spacing:	Equi-angle
Swath width:	60 to 150 degrees
Depth accuracy:	< 1 % of water depth (average across the swath)

7-2-2. Data processing

i) Sound velocity correction
Each bathymetry data were corrected with sound velocity profiles calculated from the nearest XCTD data in the distance. The equation of Del Grosso (1974) was used for calculating sound velocity. The data corrections were carried out using the HIPS software version 10.2 (Teledyne CARIS, Canada).

ii) Editing and gridding
Editing for the bathymetry data was carried out using the HIPS. Firstly, the bathymetry data during the ship's turning was basically deleted, and the spike noise of each swath data was removed. Finally, all accepted data were exported as XYZ ASCII data (longitude [degree], latitude [degree], depth [m]), and converted to 200 m grid data using "xyz2grd" utility of GMT (Generic Mapping Tool) software.

7-3. XCTD Measurement

XCTD (eXpendable Conductivity, Temperature, and Depth) measurements to obtain vertical profiles of seawater temperature and salinity were conducted at 6 sites. We launched XCTD-4N probes by using the automatic launcher, MK-150N digital converter (Tsurumi-Seiki Co.), and AL-12B software (Ver.1.6.4; Tsurumi-Seiki Co.).

Specifications of XCTD probes (Tsurumi-Seiki Co.) are as follows;

Item	Range	Accuracy	Resolution
Conductivity	0 ~ 60 [mS/cm]	+/- 0.03 [mS/cm]	0.015 [mS/cm]
Temperature	-2 ~ 35 [deg-C]	+/- 0.02 [deg-C]	0.01 [deg-C]
(XCTD-4N) Depth	0 ~ 1850 [m]	5 [m] or 2 [%] (whichever is greater)	

The summary of the XCTD measurements were shown in **Table 7-3-1**.

Table 7-3-1: Summary of XCTD measurement and launching log (Time: UTC).

No.	Station No.	File Name (.ALL/.CTD/.RAW)	Date [YYYY/MM/DD]	Time [hh:mm]	Latitude [deg]	Longitude [deg]	Depth [m]	SST [deg-C]	Probe S/N	Probe Type
01	SLPC08	202403132044	2024/03/13	20:44	40-47.0408N	144-26.9256E	6,848	6.4	24018727	XCTD-4N
02	Mb2	202403141718	2024/03/14	17:19	41-45.7995N	144-08.4946E	1,496	1.2	24018726	XCTD-4N
03	sbp-ORPC10	202403170947	2024/03/17	09:48	41-00.7712N	146-05.0941E	5,400	15.4	24018728	XCTD-4N
04	Mb1	202403190629	2024/03/19	06:29	42-12.8492N	146-04.4844E	4,835	7.5	24018729	XCTD-4N
05	Mb4-N	202403251301	2024/03/25	13:03	40-15.0724N	144-36.4262E	6,713	7.1	24018731	XCTD-4N
06	Mb4-S	202403252255	2024/03/25	22:56	39-01.5120N	144-04.1275E	6,448	17.0	24018730	XCTD-4N

Depth: Water depth [m]
SST: Sea Surface Temperature [deg-C] measured by RFN2-0 (Koshin Denki, Japan) in bow thruster room.

7-4. Sub-Bottom Profiling

Sub-bottom profiler (SBP) data were collected using a SyQwest Bathy 2010 sub-bottom profiler with a 3.5 kHz frequency and a 30° beam width (**Table 7-4-1**). Survey ship speeds were 4 knots. The survey was conducted to inspect piston coring sites for deposition in slope sedimentary basins on the landward slope of the Chishima Trench. And SBP data were also collected during the piston coring operation and the single-channel seismic reflection survey.

Table 7-4-1: Bathy2010 system configuration and performance

Frequency:	3.5 kHz (FM sweep)
Transmit beam width:	30 degrees
Transmit pulse length:	0.5 to 50 msec
Strata resolution:	Up to 8 cm with 300 m of bottom penetration according to bottom type
Depth resolution:	0.1 feet, 0.1 m
Depth accuracy:	±10 cm to 100 m, ± 0.3% to 6,000 m
Sound velocity:	1,500 m/s (fix)

A total of 10 lines of the SBP surveys were conducted (**Table 7-4-2**).

Table 7-4-2: Summary of the SBP survey lines.

1) SLPC08 NW-SE
   Period: 21:09UTC 13 Mar. 2024 ~ 21:38UTC 13 Mar. 2024
   Line: 144° 30.583' E, 40° 44.452'N ~ 144° 28.577' E, 40° 45.746'N
2) SLPC08 NE-SW
   Period: 21:57UTC 13 Mar. 2024 ~ 22:25UTC 13 Mar. 2024
   Line: 144° 30.36' E, 40° 45.70'N ~ 144° 28.87' E, 40° 44.25'N
3) SBP-ORPC01
   Period: 06:30UTC 14 Mar. 2024 ~ 07:47UTC 14 Mar. 2024
   Line: 144° 54.55' E, 40° 38.83'N ~ 144° 59.95' E, 40° 41.27'N
4) SbpPlus01
   Period: 19:58UTC 15 Mar. 2024 ~ 20:38UTC 15 Mar. 2024
   Line: 144° 20.67' E, 40° 58.79'N ~ 144° 23.66' E, 40° 58.91'N
5) SbpORPC10
   Period: 10:06UTC 17 Mar. 2024 ~ 17:03UTC 17 Mar. 2024
   Line: 146° 07.026' E, 41° 01.016'N ~ 146° 27.444' E, 40° 37.255'N
6) SbpPlus03
   Period A: 13:08UTC 20 Mar. 2024 ~ 13:33UTC 20 Mar. 2024
   Period B: 08:11UTC 22 Mar. 2024 ~ 08:43UTC 22 Mar. 2024
   Line: 144° 24.58' E, 40° 49.57'N ~ 144° 25.91' E, 40° 51.07'N
7) SbpPlus04
   Period A: 14:07UTC 20 Mar. 2024 ~ 14:48UTC 20 Mar. 2024
   Period B: 06:56UTC 22 Mar. 2024 ~ 07:38UTC 22 Mar. 2024
   Line: 144° 18.46' E, 40° 46.72'N ~ 144° 22.04' E, 40° 46.12'N
8) SbpPlus06
   Period A: 15:57UTC 20 Mar. 2024 ~ 16:45UTC 20 Mar. 2024
   Period B: 04:56UTC 22 Mar. 2024 ~ 05:48UTC 22 Mar. 2024
   Line: 144° 05.13' E, 40° 55.80'N ~ 144° 08.23' E, 40° 53.54'N

9) SbpPlus05
Period: 17:31UTC 20 Mar. 2024 ~ 17:56UTC 20 Mar. 2024
Line: 144° 10.56' E, 40° 57.50'N ~ 144° 12.30' E, 40° 56.52'N
10) SbpPlus02
Period: 18:25UTC 20 Mar. 2024 ~ 19:08UTC 20 Mar. 2024
Line: 144° 12.24' E, 41° 01.10'N ~ 144° 14.06' E, 40° 58.60'N

7-5. Single Channel Seismic Reflection Survey

7-5-1. Data acquisition

The single channel seismic reflection (SCS) survey was conducted along 5 survey lines. Two GI guns (Sercel) were used for a seismic source. The chamber size was 355 cu in. (Generator: 250 cu in., Injector: 105 cu in.). The GI gun was towed 17.27 m behind the ship's center and towing depth was ~3 m. A hydrophone streamer was towed behind the ship from the port side. A 12-channel streamer (S.I.G.16) was used. The streamer lead-in-cable length was 135 m and the active section length was 60 m (**Figure 7-5-1**). Survey ship speed was ~4 knots, and shots were fired at a time spacing of 17 seconds (~35 m spacing). The ship tracks are shown in **Figures 7-5-2 to 7-5-7**. The detailed information on the SCS survey is described in **Tables 7-5-1** to **7-5-4**.

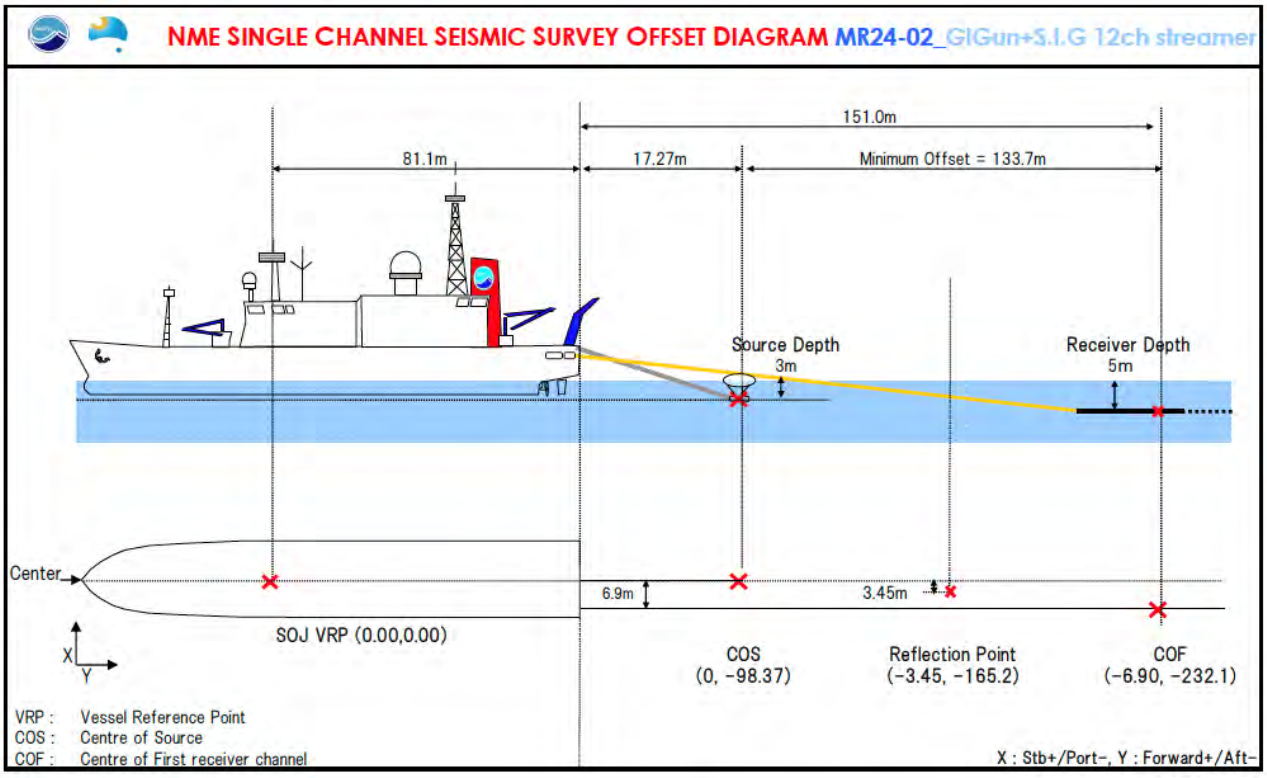
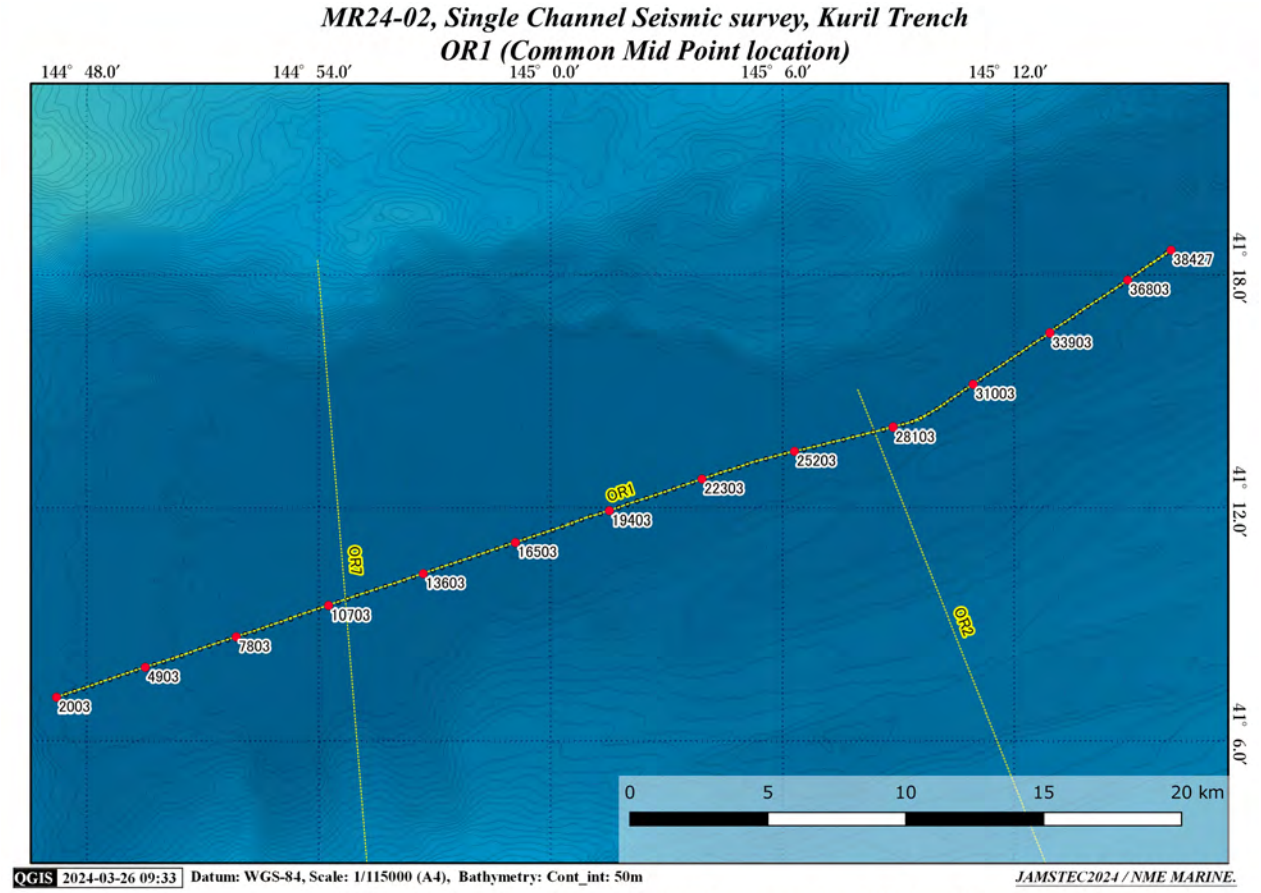


Figure 7-5-1: Offset diagram.



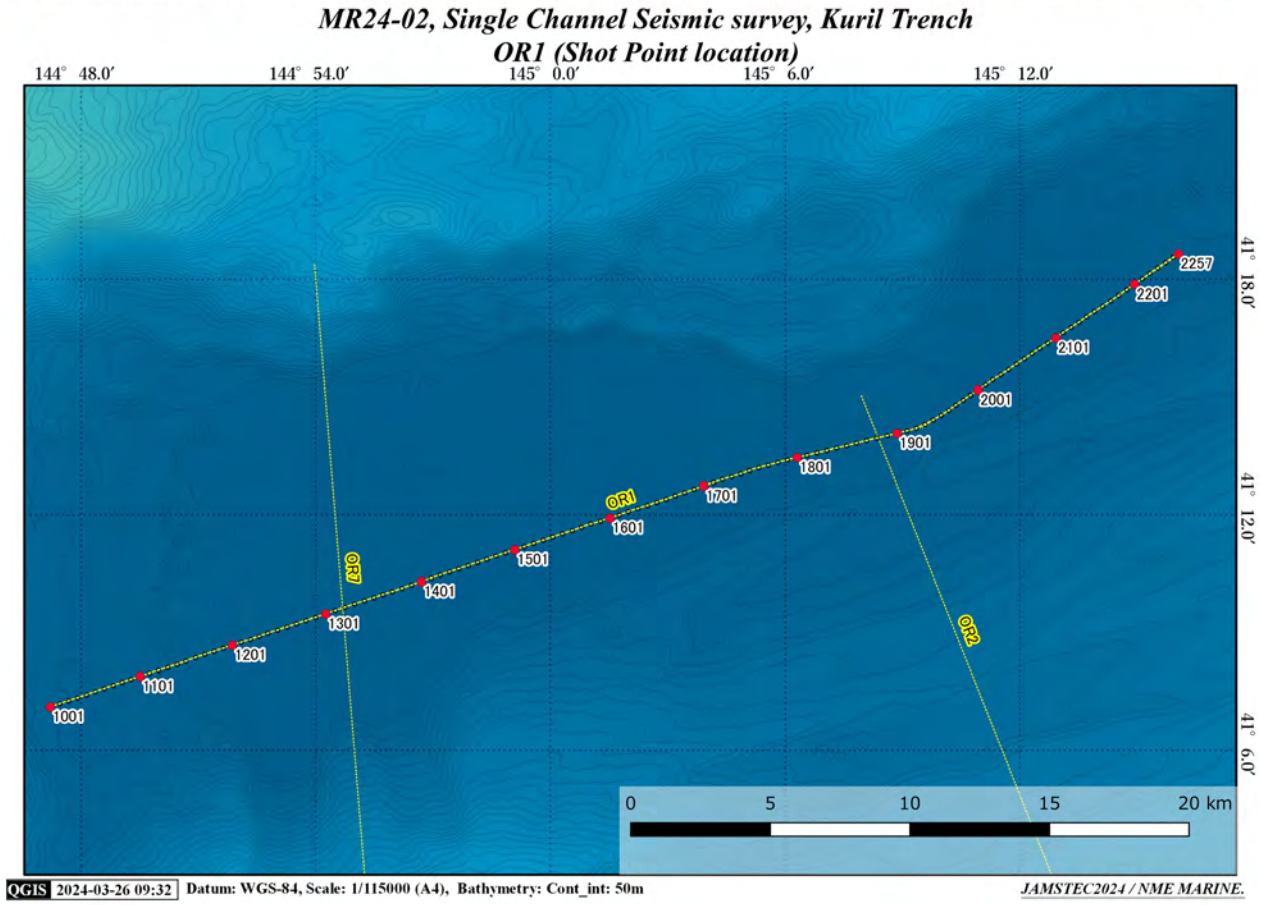
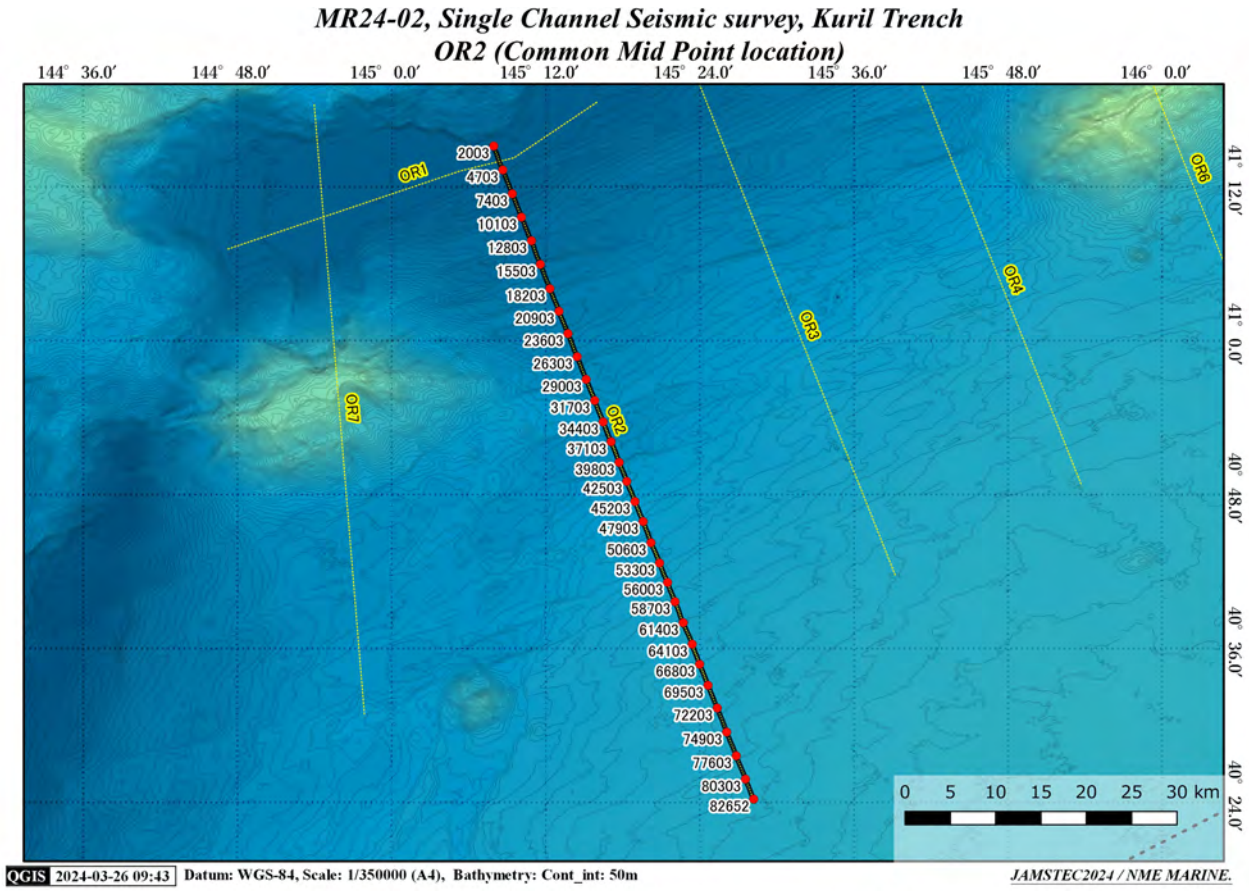


Figure 7-5-2: Survey ship track (OR-1).



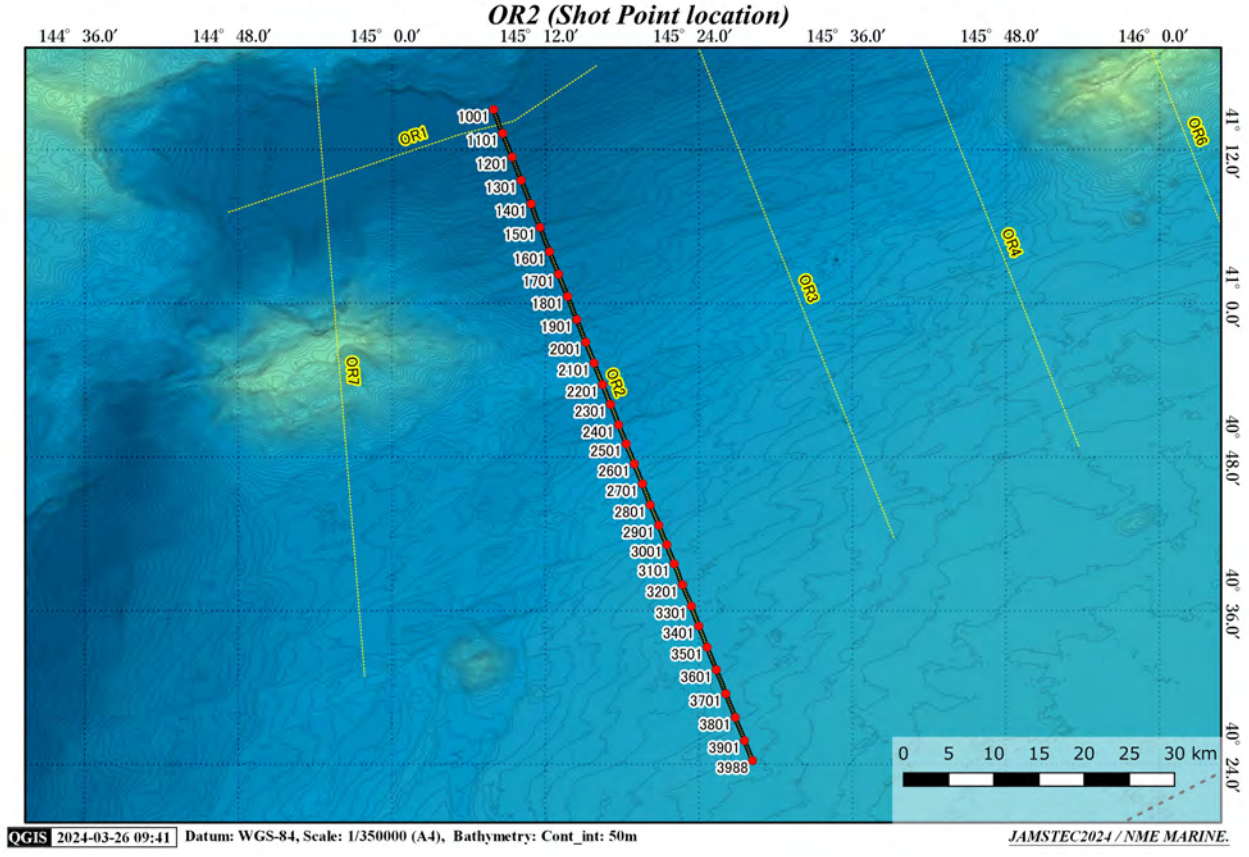
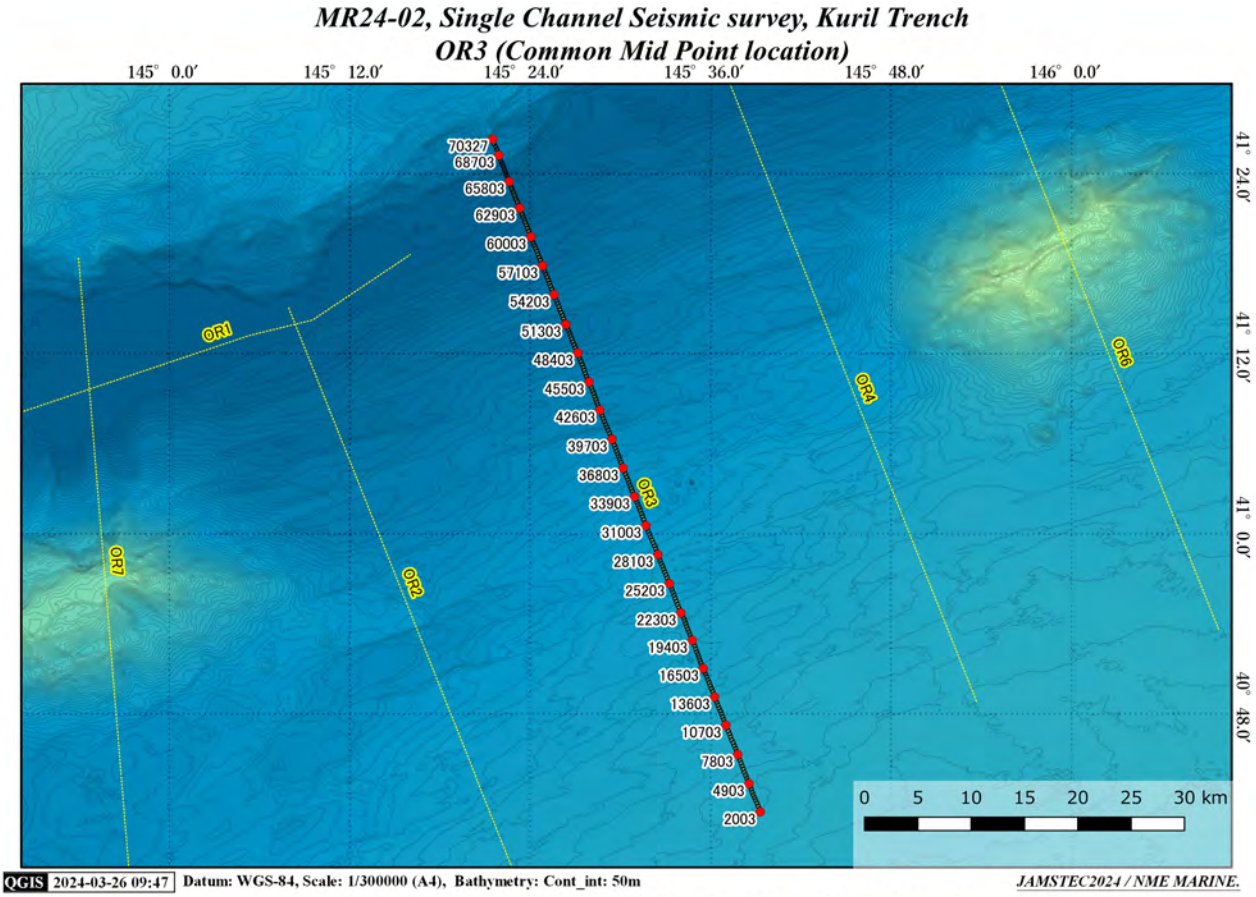


Figure 7-5-3: Survey ship track (OR-2).



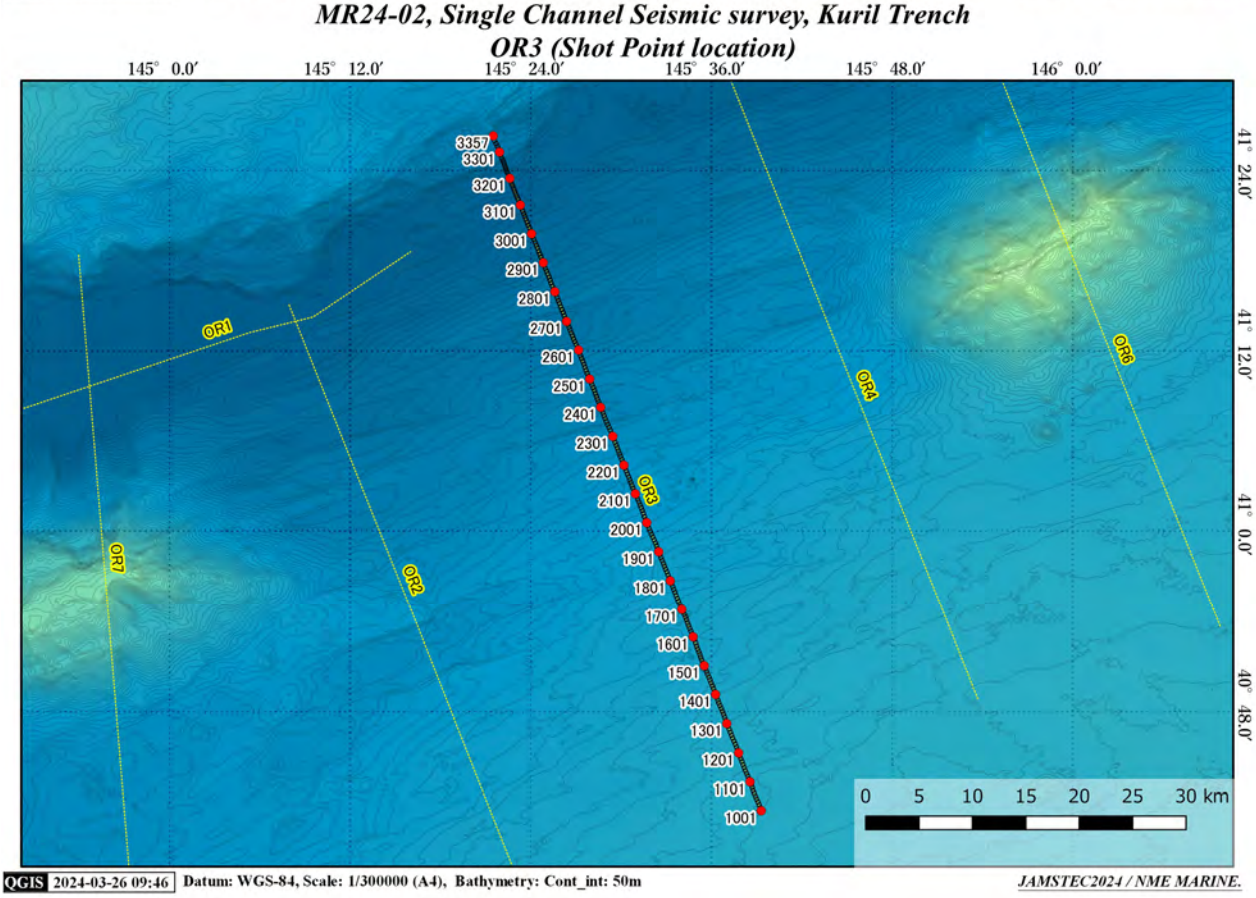
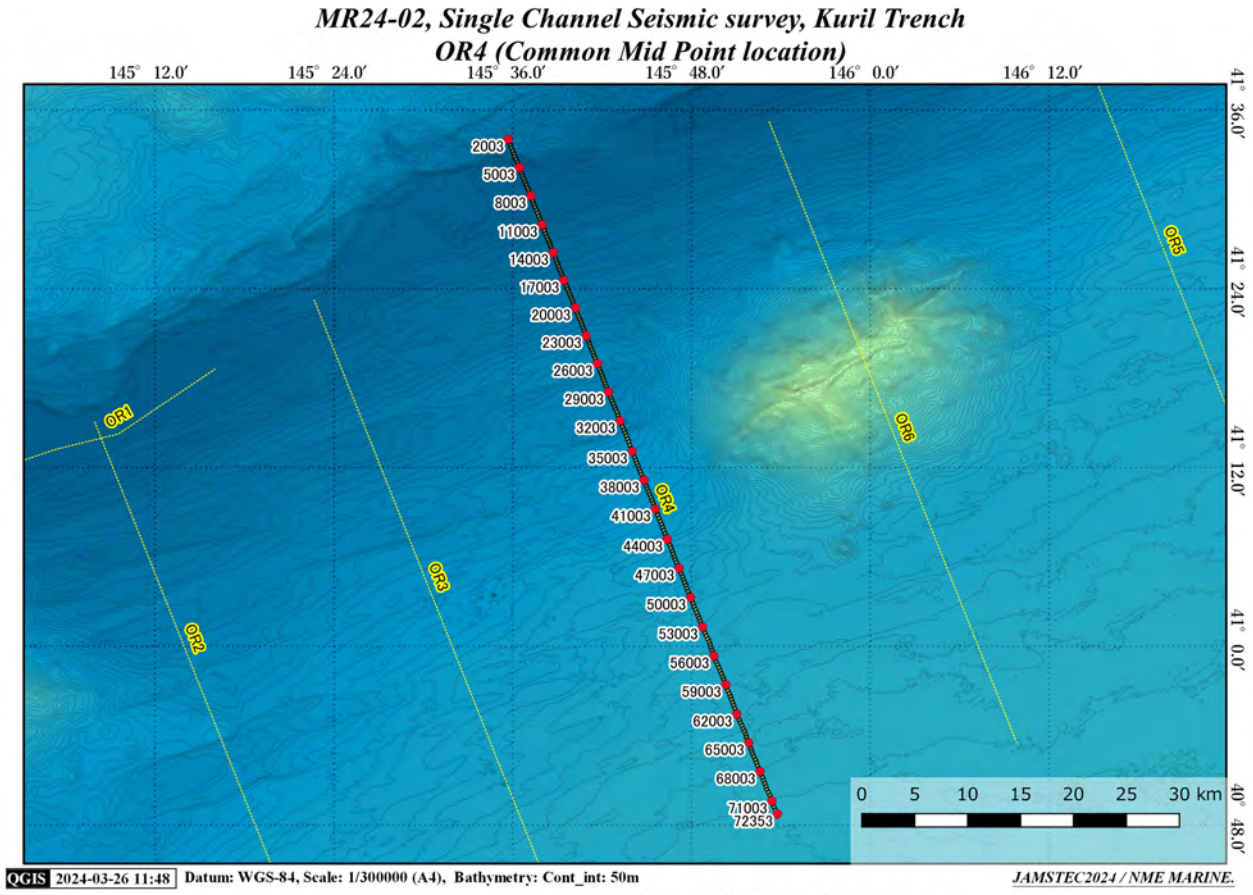


Figure 7-5-4: Survey ship track (OR-3).



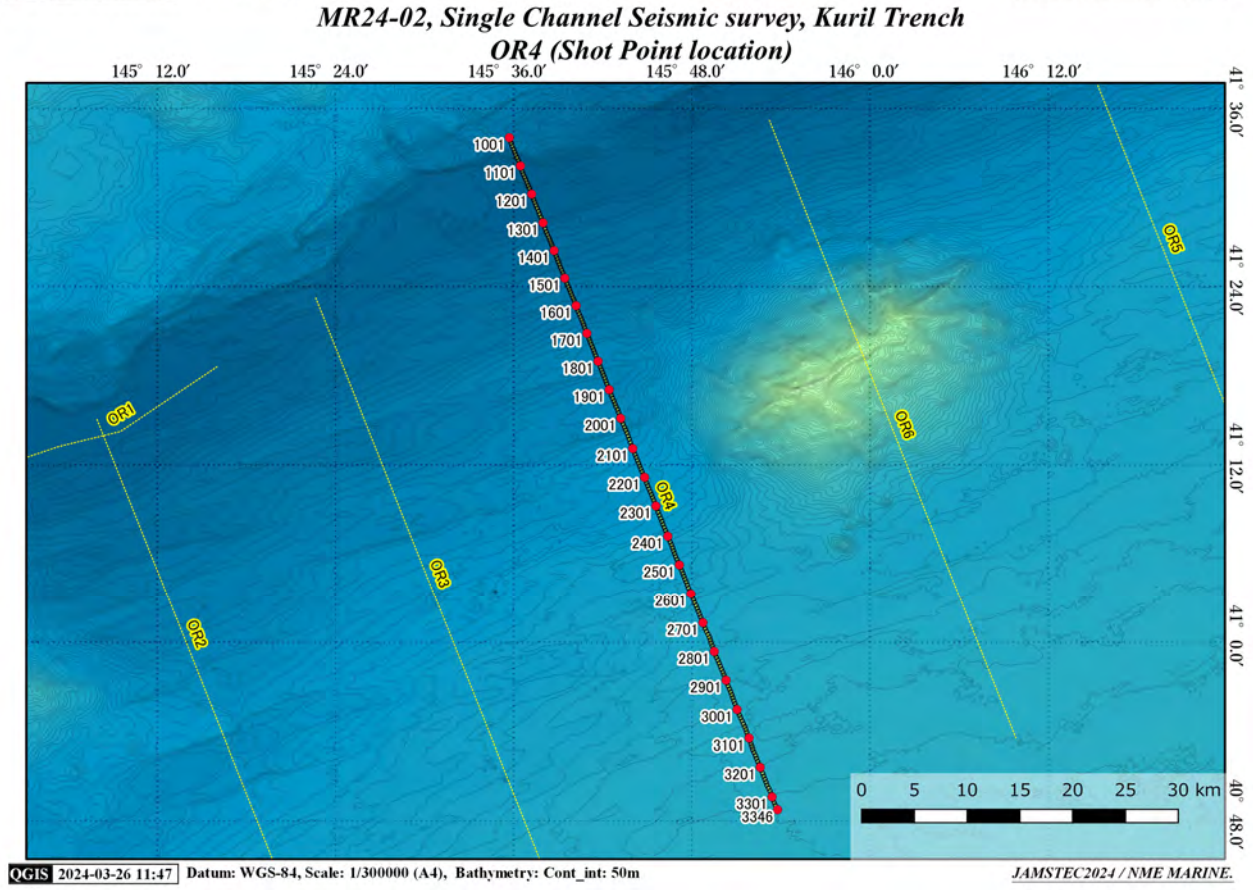
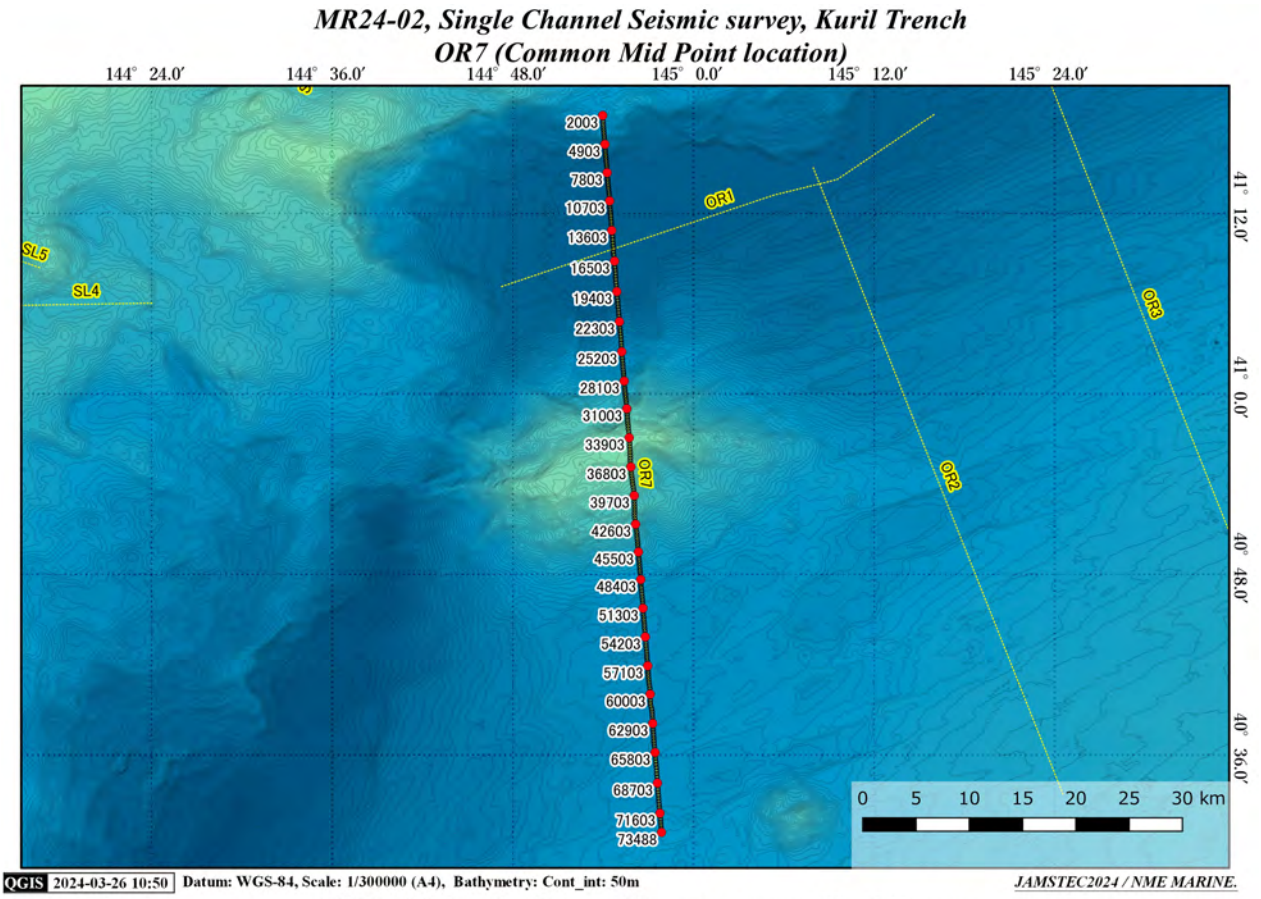


Figure 7-5-5: Survey ship track (OR-4).



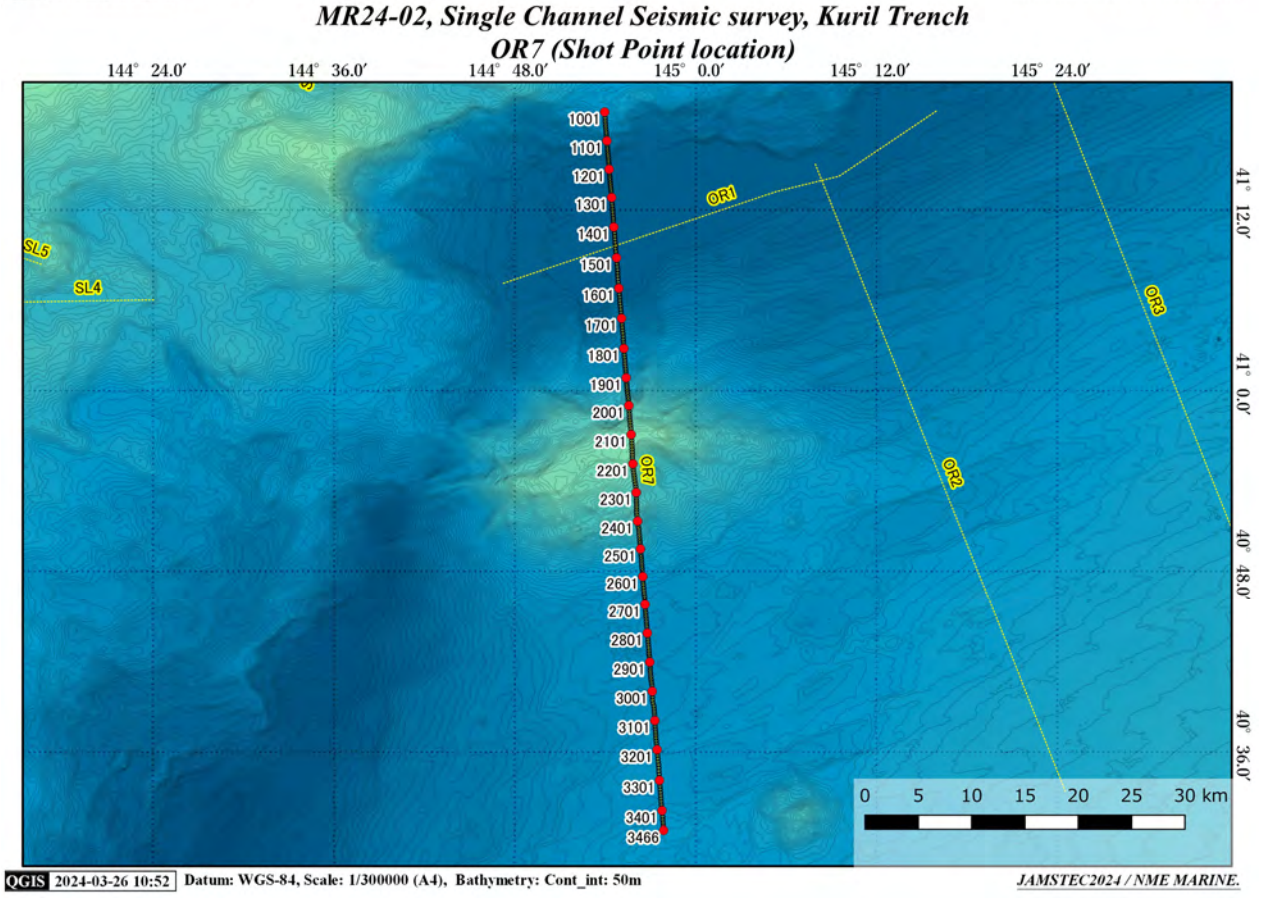
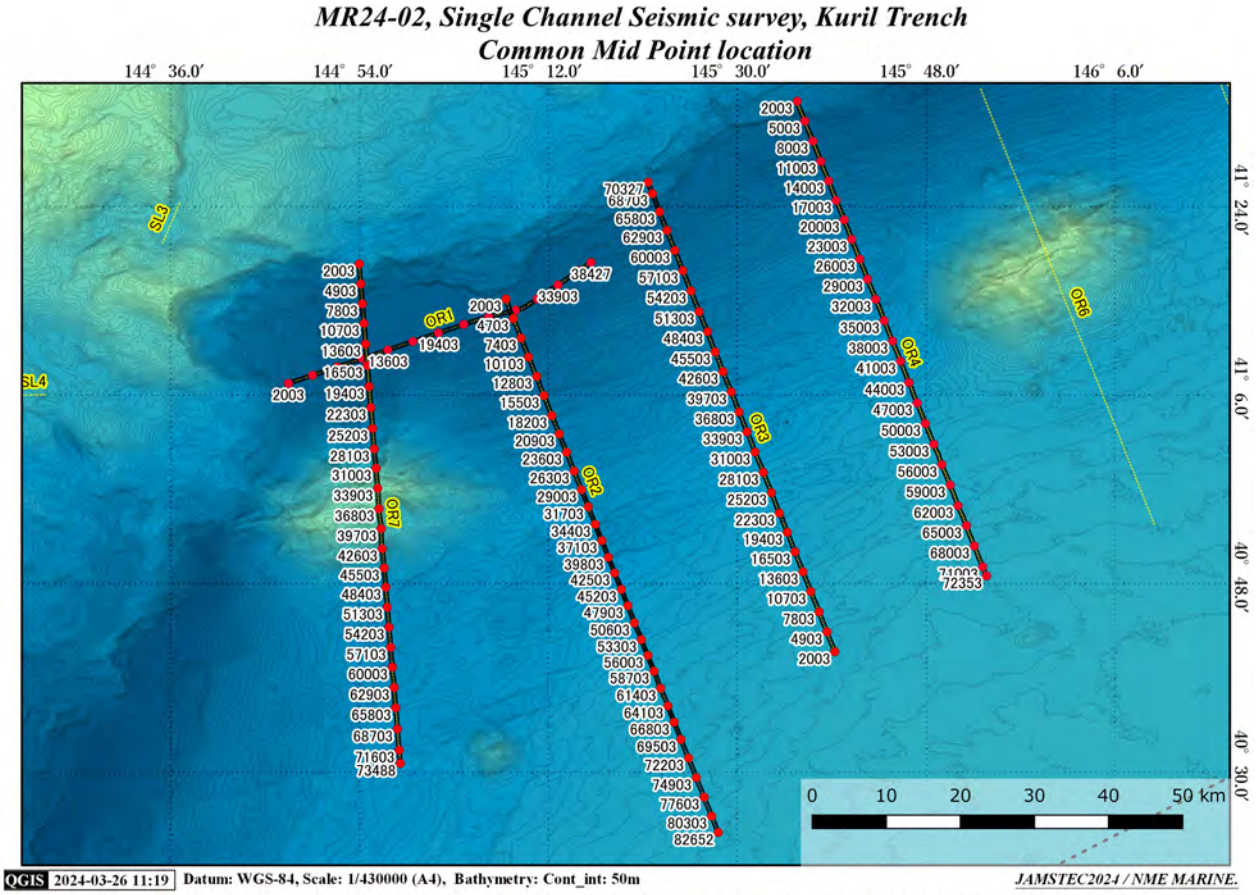


Figure 7-5-6: Survey ship track (OR-7).



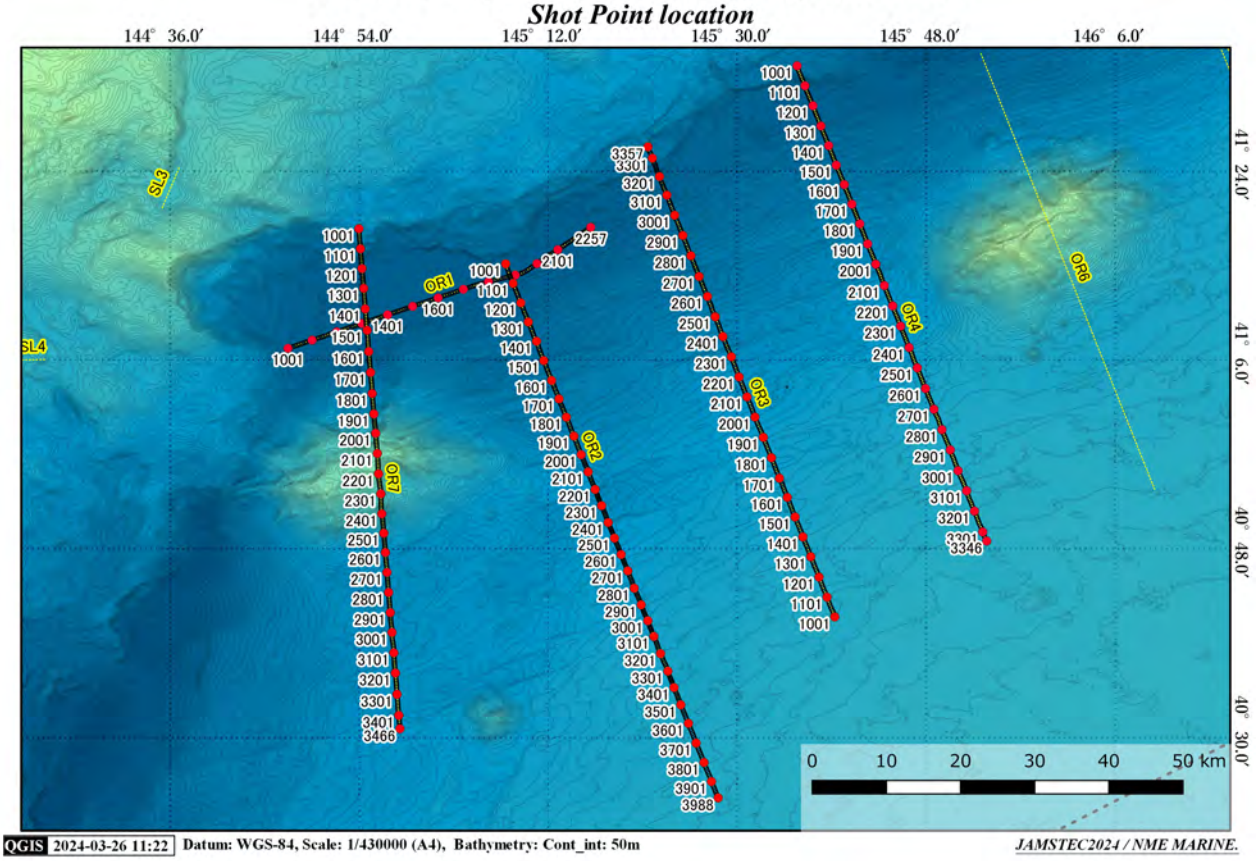


Figure 7-5-7: Survey ship track (All tracks).

Table 7-5-1: Single channel seismic equipment and survey specification for MR24-02.

Streamer

Manufacturer	S.I.G Multi-Channel Streamer
Active section length	60 m (Hydrophone section 30m)
Hydrophone interval	0.41 m
Type of hydrophone	S.I.G.16
Hydrophone output	-183 dB, re 1V/μbar, ±1dB
Frequency	flat ±1 dB, over the frequency range 10 to 1000 Hz
Depth sensor	None
Preamp gain	26 dB (Unvariable)
Power supply unit gain	0 dB
Lead in cable length	135 m

Source

Manufacturer	Sercel
Type of airgun	GI Gun
Volume	355 cu.in (G:250 cu.in, I:105 cu.in), × 2 guns, 1 array (Used Dubble Parallel Cluster Frame)
Air pressure	13.4 MPa (1950 psi)
Source depth	3 m
Gun controller	Hotshot ver. 3.3000

Air Compressor

Manufacturer	National Compressed Air
Type of machine	NCA5-138×2(Used 1 unit)
Air supply capacity	5 m^3/min/Unit.

Recording System

Manufacturer	GEOMETRICS
Type of system	Geode ver. 11.1.69.0
Recording format	SEG-D 8058 Rev.1 Promax
Recording length	12,000 msec
Water delay	0 msec
Sample rate	1 msec
Analog gain (12dB or 24dB)	12 dB

High cut filter	None
Low cut filter	3 Hz
Recording media	Hard Disk

GPS System

Manufacturer	Fugro
Type of system	StarPack-D
DGPS reference station	Best Position Reference Station (OCSAT)

Navigation System

Manufacturer	MARIMEX JAPAN
Type of system	NAVLOG ver. 2.2.8

Air-Gun Shot

Time mode shooting	harmonic mode (355 cu.in)
Shot interval	17 sec

Geodetic Parameter

Spheroid	WGS84
Semi-major axis	6,378,137 m
Inverse flattening	298.26
Projection	U.T.M Zone55

Table 7-5-2: Single channel seismic survey line list.

NME SCS SURVEY LINE LIST MR24-02

Line No.	Date (UTC)	Time (UTC)	Passing Point	Shot No.	Shot Position		Length [m]	Direction [deg]
					Lat.	Lon.		
OR1	2024/3/16	6:25:50	F.S.P = F.G.S.P	1001	41-07.13762N	144-47.27144E	46,139	63.6
	2024/3/16	12:23:48	L.S.P = L.G.S.P	2257	41-18.67496N	145-16.11102E		
OR2	2024/3/16	14:48:51	F.S.P = F.G.S.P	1001	41-15.10784N	145-07.96409E	98,498	164.7
	2024/3/17	4:59:58	L.S.P = L.G.S.P	3988	40-24.20528N	145-28.22040E		
OR7	2024/3/23	8:17:25	F.S.P = F.G.S.P	1001	41-18.45360N	144-53.97491E	88,475	178.2
	2024/3/23	20:00:03	L.S.P = L.G.S.P	3466	40-30.78827N	144-57.88422E		
OR3	2024/3/24	3:38:51	F.S.P = F.G.S.P	1001	40-41.55556N	145-39.28894E	86,680	344.2
	2024/3/24	14:50:17	L.S.P = L.G.S.P	3357	41-26.35689N	145-21.48010E		
OR4	2024/3/24	18:14:50	F.S.P = F.G.S.P	1001	41-33.98094N	145-35.71838E	87,682	164.3
	2024/3/25	5:23:12	L.S.P = L.G.S.P	3346	40-48.68340N	145-53.78082E		

Table 7-5-3: Information on each survey line.

NME Single Channel Seismic Survey General Information

MR24-02

General

CLIENT	JAMSTEC			
CRUISE	MR24-02			
AREA	Kuril Trench			
LINE	OR1			
DIRECTION (°)	63.6° *Refer to remarks			
DATE	2024/3/16			
WEATHER	Fine but Cloudy			
WIND	WNW-6(Strong breeze)			
SEA CONDITION	Sea Moderate			
FIRST SHOT POINT	SP No.	1001	FF No.	1001
FIRST GOOD SHOT POINT	SP No.	1001	FF No.	1001
	N		41-07.13762	
	E		144-47.27144	
	Time (UTC)		6:25:50	
	Water Depth (m)		7,083	
LAST SHOT POINT	SP No.	2257	FF No.	2247
LAST GOOD SHOT POINT	SP No.	2257	FF No.	2247
	N		41-18.67496	
	E		145-16.11102	
	Time (UTC)		12:23:48	
	Water Depth (m)		7,167	

Source

GUN TYPE	GI Gun
SHOT TYPE	Harmonic Mode
SHOT MODE	Time
SHOT INTERVAL	17 sec
NUMBER OF STRINGS	array(2 Guns,used Dubble Parallel Cluster Fram
TOTAL VOLUME	710 cu.in.
CONFIGURATION	(Generator:250 + Injector:105 cu.in) x 2
GUN DEPTH	3.0 m
AIR PRESSURE	13.4 MPa (1950 psi)
GUN CONTROLLER	Hotshot ver 3.300
GUN TOWING WIRE LENGTH	18.9 m

Receiver

RECEIVER TYPE	S.I.G Multi-Channel Streamer
HYDROPHONE	S.I.G.16
NUMBER OF CHANNEL	12
NO. OF HYD./GROUP	5
SENSITIVITY	-183 dB, re 1V/μbar, ±1dB
Active Section depth	5.1 m (avarage)
ACTIVE SECTION	30.0 m
LEAD-IN Towing Length	135.0 m

Recording

RECORDING SYSTEM	Geode ver 11.1.69.0
SAMPLE FREQUENCY	1 msec
RECORDING LENGTH	12,000 msec
WATER DELAY	0 msec
RECORDING FORMAT	SEG-D 8058 Rev.1 Promax
ANALOG / PREAMP	26 dB / 12 dB
HICUT FILTER	None
LOWCUT FILTER	None
SYSTEM DELAY	100ms (from start recording to gun firing)
GPS SYSTEM	Best Position Reference Station (OCSAT)
NAVIGATION SYSTEM	Navlog ver 2.2.8

Data

SEISMIC DATA	1001.sgd - 2247.sgd(1247 Files)
	(Folder name : MR24-02_OR1)
NAVIGATION DATA	OR1_Shot.csv
	OR1_LOG.csv

Remarks

SHIP SPEED AGAINST GROUND : 4.2 knot
SHIP SPEED AGAINST WATER : 4.0 knot
The ship changed its direction at waypoints.
Start→WP1 : Direction 69.8° (SP1001 - SP1220)
WP1→WP2 : Direction 67.4° (SP1221 - SP1430)
WP2→WP3 : Direction 64.9° (SP1431 - SP1640)
WP3→WP4 : Direction 67.3° (SP1641 - SP1758)
WP4→WP5 : Direction 73.3° (SP1759 - SP1855)
WP5→WP6 : Direction 73.2° (SP1856 - SP1917)
WP6→WP7 : Direction 49.6° (SP1918 - SP2076)
WP7→End : Direction 43.5° (SP2077 - SP2257)

10 records of segD data could not be recorded on Geode(segD recording system).
Due to Geode recording error. *Refer to Observer Log.

SPW prosessing used file = FF1001-FF2247
SPW prosessing image(BITMAP)
- MR24-02_OR1_stk_tilt.bmp (Hi resolution image)
=1inch per 500 m survey distance(≒400 traces)

Processing

Static Correction	94.6 msec
Time Variant Bandpass Filter	20-25-400-500 Hz
Spherical Divergence Correction	$T^{1.6}$
Normal Move Out / CMP Stack	1525m/s
Time Variant Bandpass Filter	20-25-240-250 Hz

Observer

Naoto NOGUCHI, Toshimasa NASU, Haruki DOI, Kenya YAMANAKA

NME SINGLE CHANNEL SEISMIC SURVEY GENERAL INFORMATION

MR24-02

GENERAL

CLIENT	JAMSTEC			
CRUISE	MR24-02			
AREA	Kuril Trench			
LINE	OR2			
DIRECTION (°)	164.7° *Refer to remarks			
DATE	2024/3/16-2024/3/17			
WEATHER	Cloudy			
WIND	SE-3(Gentle breeze)			
SEA CONDITION	Sea Smooth			
FIRST SHOT POINT	SP No.	1001	FF No.	1001
FIRST GOOD SHOT POINT	SP No.	1001	FF No.	1001
	N		41-15.10784	
	E		145-07.96409	
	Time (UTC)		14:48:51	
	Water Depth (m)		7,174	
LAST SHOT POINT	SP No.	3988	FF No.	3970
LAST GOOD SHOT POINT	SP No.	3988	FF No.	3970
	N		40-24.20528	
	E		145-28.22040	
	Time (UTC)		4:59:58	
	Water Depth (m)		5,397	

SOURCE

GUN TYPE	GI Gun
SHOT TYPE	Harmonic Mode
SHOT MODE	Time
SHOT INTERVAL	17 sec
NUMBER OF STRINGS	array(2 Guns,used Dubble Parallel Cluster Frame
TOTAL VOLUME	710 cu.in.
CONFIGURATION	(Generator:250 + Injector:105 cu.in) x 2
GUN DEPTH	3.0 m
AIR PRESSURE	13.4 MPa (1950 psi)
GUN CONTROLLER	Hotshot ver 3.300
GUN TOWING WIRE LENGTH	18.9 m

RECEIVER

RECEIVER TYPE	S.I.G Multi-Channel Streamer
HYDROPHONE	S.I.G.16
NUMBER OF CHANNEL	12
NO. OF HYD./GROUP	5
SENSITIVITY	-183 dB, re 1V/μbar, ±1dB
Active Section depth	4.5 m (avarage)
ACTIVE SECTION	30.0 m
LEAD-IN Towing Length	135.0 m

RECORDING

RECORDING SYSTEM	Geode ver 11.1.69.0
SAMPLE FREQUENCY	1 msec
RECORDING LENGTH	12,000 msec
WATER DELAY	0 msec
RECORDING FORMAT	SEG-D 8058 Rev.1 Promax
ANALOG / PREAMP	26 dB / 12 dB
HICUT FILTER	None
LOWCUT FILTER	None
SYSTEM DELAY	100ms (from start recording to gun firing)
GPS SYSTEM	Best Position Reference Station (OCSAT)
NAVIGATION SYSTEM	Navlog ver 2.2.8

DATA

SEISMIC DATA	1001.sgd - 3970.sgd(2967 Files)
	(Folder name : MR24-02_OR2)
NAVIGATION DATA	OR2_Shot.csv
	OR2_LOG.csv

REMARKS

SHIP SPEED AGAINST GROUND : 3.8 knot
SHIP SPEED AGAINST WATER : 4.0 knot
The ship changed its direction at waypoints.
Start→WP1 : Direction 164.6° (SP1001 - SP1275)
WP1→WP2 : Direction 164.4° (SP1276 - SP1545)
WP2→WP3 : Direction 164.4° (SP1546 - SP1826)
WP3→WP4 : Direction 164.3° (SP1827- SP2117)
WP4→WP5 : Direction 164.3° (SP2118- SP2430)
WP5→WP6 : Direction 164.3° (SP2431- SP2752)
WP6→WP7 : Direction 164.2° (SP2753- SP3074)
WP7→WP8 : Direction 164.2° (SP3075- SP3386)
WP8→WP9 : Direction 165.0° (SP3387- SP3481)
WP9→End : Direction 167.0° (SP3482- SP3988)

21 records of segD data could not be recorded on Geode(segD recording system).
Due to Geode recording error. *Refer to Observer Log.

SPW prosessing used file = FF1001-FF3970
SPW prosessing image(BITMAP)
・MR24-02_OR2_stk_filt.bmp (Hi resolution image)
=1inch per 500 m survey distance(≒400 traces)

PROCESSING

Static Correction	95.0 msec
Time Variant Bandpass Filter	20-25-400-500 Hz
Spherical Divergence Correction	T^1.6
Normal Move Out / CMP Stack	1525m/s
Time Variant Bandpass Filter	20-25-240-250 Hz

OBSERVER

Naoto NOGUCHI, Toshimasa NASU, Haruki DOI, Kenya YAMANAKA

NME SINGLE CHANNEL SEISMIC SURVEY GENERAL INFORMATION

MR24-02

GENERAL

CLIENT	JAMSTEC			
CRUISE	MR24-02			
AREA	Kuril Trench			
LINE	OR7			
DIRECTION (°)	178.2° *Refer to remarks			
DATE	2024/3/23			
WEATHER	Overcast			
WIND	SE-5(Fresh breeze)			
SEA CONDITION	Sea Slight			
FIRST SHOT POINT	SP No.	1001	FF No.	1001
FIRST GOOD SHOT POINT	SP No.	1001	FF No.	1001
	N		41-18.45360	
	E		144-53.97491	
	Time (UTC)		8:17:25	
	Water Depth (m)		6,041	
LAST SHOT POINT	SP No.	3466	FF No.	3466
LAST GOOD SHOT POINT	SP No.	3466	FF No.	3466
	N		40-30.78827	
	E		144-57.88422	
	Time (UTC)		20:00:03	
	Water Depth (m)		5,949	

SOURCE

GUN TYPE	GI Gun
SHOT TYPE	Harmonic Mode
SHOT MODE	Time
SHOT INTERVAL	17 sec
NUMBER OF STRINGS	array(2 Guns,used Dubble Parallel Cluster Frame
TOTAL VOLUME	710 cu.in.
CONFIGURATION	(Generator:250 + Injector:105 cu.in) x 2
GUN DEPTH	3.0 m
AIR PRESSURE	13.4 MPa (1950 psi)
GUN CONTROLLER	Hotshot ver 3.300
GUN TOWING WIRE LENGTH	18.9 m

RECEIVER

RECEIVER TYPE	S.I.G Multi-Channel Streamer
HYDROPHONE	S.I.G.16
NUMBER OF CHANNEL	12
NO. OF HYD./GROUP	5
SENSITIVITY	-183 dB, re 1V/μbar, ±1dB
Active Section depth	2.1 m (avarage)
ACTIVE SECTION	30.0 m
LEAD-IN Towing Length	135.0 m

RECORDING

RECORDING SYSTEM	Geode ver 11.1.69.0
SAMPLE FREQUENCY	1 msec
RECORDING LENGTH	12,000 msec
WATER DELAY	0 msec
RECORDING FORMAT	SEG-D 8058 Rev.1 Promax
ANALOG / PREAMP	26 dB / 12 dB
HICUT FILTER	None
LOWCUT FILTER	None
SYSTEM DELAY	100ms (from start recording to gun firing)
GPS SYSTEM	Best Position Reference Station (OCSAT)
NAVIGATION SYSTEM	Navlog ver 2.2.8

DATA

SEISMIC DATA	1001.sgd - 3466.sgd(2466 Files)
	(Folder name : MR24-02_OR7)
NAVIGATION DATA	OR7_Shot.csv
	OR7_LOG.csv

REMARKS

SHIP SPEED AGAINST GROUND : 4.1 knot
SHIP SPEED AGAINST WATER : 4.1 knot
The ship changed its direction at waypoints.
Start→WP1 : Direction 177.8° (SP1001 - SP1242)
WP1→WP2 : Direction 177.8° (SP1243 - SP1515)
WP2→WP3 : Direction 177.8° (SP1516 - SP1781)
WP3→WP4 : Direction 177.3° (SP1782- SP2064)
WP4→WP5 : Direction 178.4° (SP2065- SP2343)
WP5→WP6 : Direction 181.1° (SP2344- SP2632)
WP6→WP7 : Direction 177.8° (SP2633- SP2911)
WP7→WP8 : Direction 177.7° (SP2912- SP3191)
WP8→End : Direction 177.7° (SP3192- SP3466)

SPW prosessing used file = FF1001-FF3466
SPW prosessing image(BITMAP)
・MR24-02_OR7_stk_filt.bmp (Hi resolution image)
=1inch per 500 m survey distance(≒400 traces)

PROCESSING

Static Correction	96.6 msec
Time Variant Bandpass Filter	20-25-400-500 Hz
Spherical Divergence Correction	T^1.6
Normal Move Out / CMP Stack	1525m/s
Time Variant Bandpass Filter	20-25-240-250 Hz

OBSERVER

Naoto NOGUCHI, Toshimasa NASU, Haruki DOI, Kenya YAMANAKA

NME SINGLE CHANNEL SEISMIC SURVEY GENERAL INFORMATION

MR24-02

GENERAL

CLIENT	JAMSTEC			
CRUISE	MR24-02			
AREA	Kuril Trench			
LINE	OR3			
DIRECTION (°)	344.2° *Refer to remarks			
DATE	2024/3/24			
WEATHER	Cloudy			
WIND	WSW-5(Fresh breeze)			
SEA CONDITION	Sea Slight			
FIRST SHOT POINT	SP No.	1001	FF No.	1001
FIRST GOOD SHOT POINT	SP No.	1001	FF No.	1001
	N		40-41.55556	
	E		145-39.28894	
	Time (UTC)		3:38:51	
	Water Depth (m)		5,391	
LAST SHOT POINT	SP No.	3357	FF No.	3357
LAST GOOD SHOT POINT	SP No.	3357	FF No.	3357
	N		41-26.35689	
	E		145-21.48010	
	Time (UTC)		14:50:17	
	Water Depth (m)		6,680	

SOURCE

GUN TYPE	GI Gun
SHOT TYPE	Harmonic Mode
SHOT MODE	Time
SHOT INTERVAL	17 sec
NUMBER OF STRINGS	array(2 Guns,used Dubble Parallel Cluster Frame
TOTAL VOLUME	710 cu.in.
CONFIGURATION	(Generator:250 + Injector:105 cu.in) x 2
GUN DEPTH	3.0 m
AIR PRESSURE	13.4 MPa (1950 psi)
GUN CONTROLLER	Hotshot ver 3.300
GUN TOWING WIRE LENGTH	18.9 m

RECEIVER

RECEIVER TYPE	S.I.G Multi-Channel Streamer
HYDROPHONE	S.I.G.16
NUMBER OF CHANNEL	12
NO. OF HYD./GROUP	5
SENSITIVITY	-183 dB, re 1V/μbar, ±1dB
Active Section depth	4.8 m (avarage)
ACTIVE SECTION	30.0 m
LEAD-IN Towing Length	135.0 m

RECORDING

RECORDING SYSTEM	Geode ver 11.1.69.0
SAMPLE FREQUENCY	1 msec
RECORDING LENGTH	12,000 msec
WATER DELAY	0 msec
RECORDING FORMAT	SEG-D 8058 Rev.1 Promax
ANALOG / PREAMP	26 dB / 12 dB
HICUT FILTER	None
LOWCUT FILTER	None
SYSTEM DELAY	100ms (from start recording to gun firing)
GPS SYSTEM	Best Position Reference Station (OCSAT)
NAVIGATION SYSTEM	Navlog ver 2.2.8

DATA

SEISMIC DATA	1001.sgd - 3357.sgd(2357 Files)
	(Folder name : MR24-02_OR3)
NAVIGATION DATA	OR3_Shot.csv
	OR3_LOG.csv

REMARKS

SHIP SPEED AGAINST GROUND : 4.2 knot
SHIP SPEED AGAINST WATER : 3.7 knot
The ship changed its direction at waypoints.
Start→WP9 : Direction 344.0° (SP1001 - SP1086)
WP9→WP8 : Direction 344.0° (SP1087 - SP1346)
WP8→WP7 : Direction 344.1° (SP1347 - SP1613)
WP7→WP6 : Direction 344.1° (SP1614- SP1877)
WP6→WP5 : Direction 344.1° (SP1878- SP2139)
WP5→WP4 : Direction 344.2° (SP2140- SP2396)
WP4→WP3 : Direction 344.3° (SP2397- SP2660)
WP3→WP2 : Direction 344.3° (SP2661- SP2917)
WP2→WP1 : Direction 344.3° (SP2918- SP3183)
WP1→End : Direction 349.7° (SP3184- SP3357)
SPW prosessing used file = FF1001-FF3357
SPW prosessing image(BITMAP)
· MR24-02_OR3_stk_filt.bmp (Hi resolution image)
=1inch per 500 m survey distance(≒400 traces)

PROCESSING

Static Correction	94.8 msec
Time Variant Bandpass Filter	20-25-400-500 Hz
Spherical Divergence Correction	T^1.6
Normal Move Out / CMP Stack	1525m/s
Time Variant Bandpass Filter	20-25-240-250 Hz

OBSERVER

Naoto NOGUCHI, Toshimasa NASU, Haruki DOI, Kenya YAMANAKA

NME SINGLE CHANNEL SEISMIC SURVEY GENERAL INFORMATION

MR24-02

GENERAL

CLIENT	JAMSTEC			
CRUISE	MR24-02			
AREA	Kuril Trench			
LINE	OR4			
DIRECTION (°)	164.3° *Refer to remarks			
DATE	2024/3/24-2024/3/25			
WEATHER	Cloudy			
WIND	West-7(Near gale)			
SEA CONDITION	Sea Rough			
FIRST SHOT POINT	SP No.	1001	FF No.	1001
FIRST GOOD SHOT POINT	SP No.	1001	FF No.	1001
	N		41-33.98094	
	E		145-35.71838	
	Time (UTC)		18:14:50	
	Water Depth (m)		6,740	
LAST SHOT POINT	SP No.	3346	FF No.	3346
LAST GOOD SHOT POINT	SP No.	3346	FF No.	3346
	N		40-48.68340	
	E		145-53.78082	
	Time (UTC)		5:23:12	
	Water Depth (m)		5,282	

SOURCE

GUN TYPE	GI Gun
SHOT TYPE	Harmonic Mode
SHOT MODE	Time
SHOT INTERVAL	17 sec
NUMBER OF STRINGS	array(2 Guns,used Dubble Parallel Cluster Frame
TOTAL VOLUME	710 cu.in.
CONFIGURATION	(Generator:250 + Injector:105 cu.in) x 2
GUN DEPTH	3.0 m
AIR PRESSURE	13.4 MPa (1950 psi)
GUN CONTROLLER	Hotshot ver 3.300
GUN TOWING WIRE LENGTH	18.9 m

RECEIVER

RECEIVER TYPE	S.I.G Multi-Channel Streamer
HYDROPHONE	S.I.G.16
NUMBER OF CHANNEL	12
NO. OF HYD./GROUP	5
SENSITIVITY	-183 dB, re 1V/μbar, ±1dB
Active Section depth	5.1 m (avarage)
ACTIVE SECTION	30.0 m
LEAD-IN Towing Length	135.0 m

RECORDING

RECORDING SYSTEM	Geode ver 11.1.69.0
SAMPLE FREQUENCY	1 msec
RECORDING LENGTH	12,000 msec
WATER DELAY	0 msec
RECORDING FORMAT	SEG-D 8058 Rev.1 Promax
ANALOG / PREAMP	26 dB / 12 dB
HICUT FILTER	None
LOWCUT FILTER	None
SYSTEM DELAY	100ms (from start recording to gun firing)
GPS SYSTEM	Best Position Reference Station (OCSAT)
NAVIGATION SYSTEM	Navlog ver 2.2.8

DATA

SEISMIC DATA	1001.sgd - 3346.sgd(2346 Files)
	(Folder name : MR24-02_OR4)
NAVIGATION DATA	OR4_Shot.csv
	OR4_LOG.csv

REMARKS

SHIP SPEED AGAINST GROUND : 4.3 knot
SHIP SPEED AGAINST WATER : 4.2 knot
The ship changed its direction at waypoints.
Start→WP0 : Direction 164.2° (SP1001 - SP1201)
WP0→WP1 : Direction 164.2° (SP1202 - SP1451)
WP1→WP2 : Direction 164.2° (SP1452 - SP1720)
WP2→WP3 : Direction 166.4° (SP1721- SP1984)
WP3→WP4 : Direction 164.1° (SP1985- SP2237)
WP4→WP5 : Direction 164.0° (SP2238- SP2490)
WP5→WP6 : Direction 164.0° (SP2491- SP2744)
WP6→WP7 : Direction 164.0° (SP2745- SP3010)
WP7→WP8 : Direction 163.9° (SP3011- SP3259)
WP8→End : Direction 163.9° (SP3260- SP3346)

The SP listed in the HotShot Log of SP2875 is SP2874.
Delta error of No. 1 air gun occurred 12 times.
Due to loosening of No. 1 gun hydrophone jig. *Refer to Observer Log.

SPW prosessing used file = FF1001-FF3346
SPW prosessing image(BITMAP)
· MR24-02_OR4_stk_filt.bmp (Hi resolution image)
=1inch per 500 m survey distance(≒400 traces)

PROCESSING

Static Correction	94.6 msec
Time Variant Bandpass Filter	20-25-400-500 Hz
Spherical Divergence Correction	T^1.6
Normal Move Out / CMP Stack	1525m/s
Time Variant Bandpass Filter	20-25-240-250 Hz

OBSERVER

Naoto NOGUCHI, Toshimasa NASU, Haruki DOI, Kenya YAMANAKA

Table 7-5-4: Seismic observer log.

SEISMIC OBSERVER LOG MR24-02
Area Name: Kuril Trench
Line Name: OR1

File No.	SP No.	REMARKS
1001	1001	FSP = FGSP
1054	1054	SP=FF
-	1055	Miss Record#1
1055	1056	File Number = Shot Point Number -1
1268	1269	File Number = Shot Point Number -1
-	1270	Miss Record#2
-	1271	Miss Record#3
1269	1272	File Number = Shot Point Number -3
-	1273	Miss Record#4
1270	1274	File Number = Shot Point Number -4
1481	1485	File Number = Shot Point Number -4
-	1486	Miss Record#5
-	1487	Miss Record#6
1482	1488	File Number = Shot Point Number -6
-	1489	Miss Record#7
1483	1490	File Number = Shot Point Number -7
1696	1703	File Number = Shot Point Number -7
-	1704	Miss Record#8
1697	1705	File Number = Shot Point Number -8
1910	1918	File Number = Shot Point Number -8
-	1919	Miss Record#9
1911	1920	File Number = Shot Point Number -9
2123	2132	File Number = Shot Point Number -9
-	2133	Miss Record#10
2124	2134	File Number = Shot Point Number -10
2257	2247	LSP = LGSP

Sampling Interval : 1 msec
Record Length : 1,200 msec
SP No. increment : +1

FSP : First Shot Point, FGSP : Firtst Good Shot Point, LSP : Last Shot Point
LGSP : Last Good Shot Point, DC : Distance Across the Line

SEISMIC OBSERVER LOG MR24-02

Area Name: Kuril Trench

Line Name: OR2

File No.	SP No.	REMARKS
1001	1001	FSP
1001	1001	FGSP
1014	1014	SP=FF
-	1015	Miss Record#1
1015	1016	File Number = Shot Point Number -1
1227	1228	File Number = Shot Point Number -1
-	1229	Miss Record#2
-	1230	Miss Record#3
1228	1231	File Number = Shot Point Number -3
-	1232	Miss Record#4
1229	1233	File Number = Shot Point Number -4
1440	1444	File Number = Shot Point Number -4
-	1445	Miss Record#5
1441	1446	File Number = Shot Point Number -5
1653	1658	File Number = Shot Point Number -5
-	1659	Miss Record#6
1654	1660	File Number = Shot Point Number -6
1867	1873	File Number = Shot Point Number -6
-	1874	Miss Record#7
1868	1875	File Number = Shot Point Number -7
2081	2088	File Number = Shot Point Number -7
-	2089	Miss Record#8
2082	2090	File Number = Shot Point Number -8
2510	2518	File Number = Shot Point Number -8
-	2519	Miss Record#9
2511	2520	File Number = Shot Point Number -9
2723	2732	File Number = Shot Point Number -9
-	2733	Miss Record#10
2724	2734	File Number = Shot Point Number -10
3152	3162	File Number = Shot Point Number -10
-	3163	Miss Record#11
3153	3164	File Number = Shot Point Number -11
3364	3375	File Number = Shot Point Number -11
3365	3376	Miss Record#12 ※SEG-D data not saved
-	3377	Miss Record#13
-	3378	Miss Record#14
-	3379	Miss Record#15
-	3380	Miss Record#16
3366	3381	Miss Record#17 ※SEG-D data not saved
-	3382	Miss Record#18
3367	3383	Miss Record#19 ※SEG-D data not saved
3368	3384	File Number = Shot Point Number -16
3580	3596	File Number = Shot Point Number -16
-	3597	Miss Record#20
3581	3598	File Number = Shot Point Number -17
3794	3811	File Number = Shot Point Number -17
-	3812	Miss Record#21
3795	3813	File Number = Shot Point Number -18
3970	3988	LSP = LGSP

Sampling Interval : 1 msec
Record Length : 1,200 msec
SP No. increment : +1

FSP : First Shot Point, FGSP : Firtst Good Shot Point, LSP : Last Shot Point
LGSP : Last Good Shot Point, DC : Distance Across the Line

SEISMIC OBSERVER LOG MR24-02

Area Name: Kuril Trench

Line Name: OR7

File No.	SP No.	REMARKS
1001	1001	FSP = FGSP
3466	3466	LSP = LGSP

Sampling Interval : 1 msec
Record Length : 1,200 msec
SP No. increment : +1

FSP : First Shot Point, FGSP : Firtst Good Shot Point, LSP : Last Shot Point
LGSP : Last Good Shot Point, DC : Distance Across the Line

SEISMIC OBSERVER LOG MR24-02

Area Name: Kuril Trench

Line Name: OR3

File No.	SP No.	REMARKS
1001	1001	FSP = FGSP
3357	3357	LSP = LGSP

Sampling Interval : 1 msec
Record Length : 1,200 msec
SP No. increment : +1

FSP : First Shot Point, FGSP : Firtst Good Shot Point, LSP : Last Shot Point
LGSP : Last Good Shot Point, DC : Distance Across the Line

SEISMIC OBSERVER LOG MR24-02

Area Name: Kuril Trench

Line Name: OR4

File No.	SP No.	REMARKS
1001	1001	FSP = FGSP
1001	1001	No. 1 air gun Delta Error(+1.3 msec)
1005	1005	No. 1 air gun Delta Error(+1.0 msec)
1180	1180	No. 1 air gun Delta Error(-1.0 msec)
2083	2083	No. 1 air gun Delta Error(-1.0 msec)
2166	2166	No. 1 air gun Delta Error(-1.1 msec)
2468	2468	No. 1 air gun Delta Error(-1.5 msec)
2473	2473	No. 1 air gun Delta Error(-1.4 msec)
2666	2666	No. 1 air gun Delta Error(-1.2 msec)
2790	2790	No. 1 air gun Delta Error(-1.7 msec)
2869	2869	No. 1 air gun Delta Error(-1.5 msec)
2996	2996	No. 1 air gun Delta Error(-1.2 msec)
3155	3155	No. 1 air gun Delta Error(-1.4 msec)
3346	3346	LSP = LGSP

Sampling Interval : 1 msec
Record Length : 1,200 msec
SP No. increment : +1

FSP : First Shot Point, FGSP : Firtst Good Shot Point, LSP : Last Shot Point
LGSP : Last Good Shot Point, DC : Distance Across the Line

7-5-2. Data processing

The onboard data processing flow is summarized in **Figure 7-5-8**.

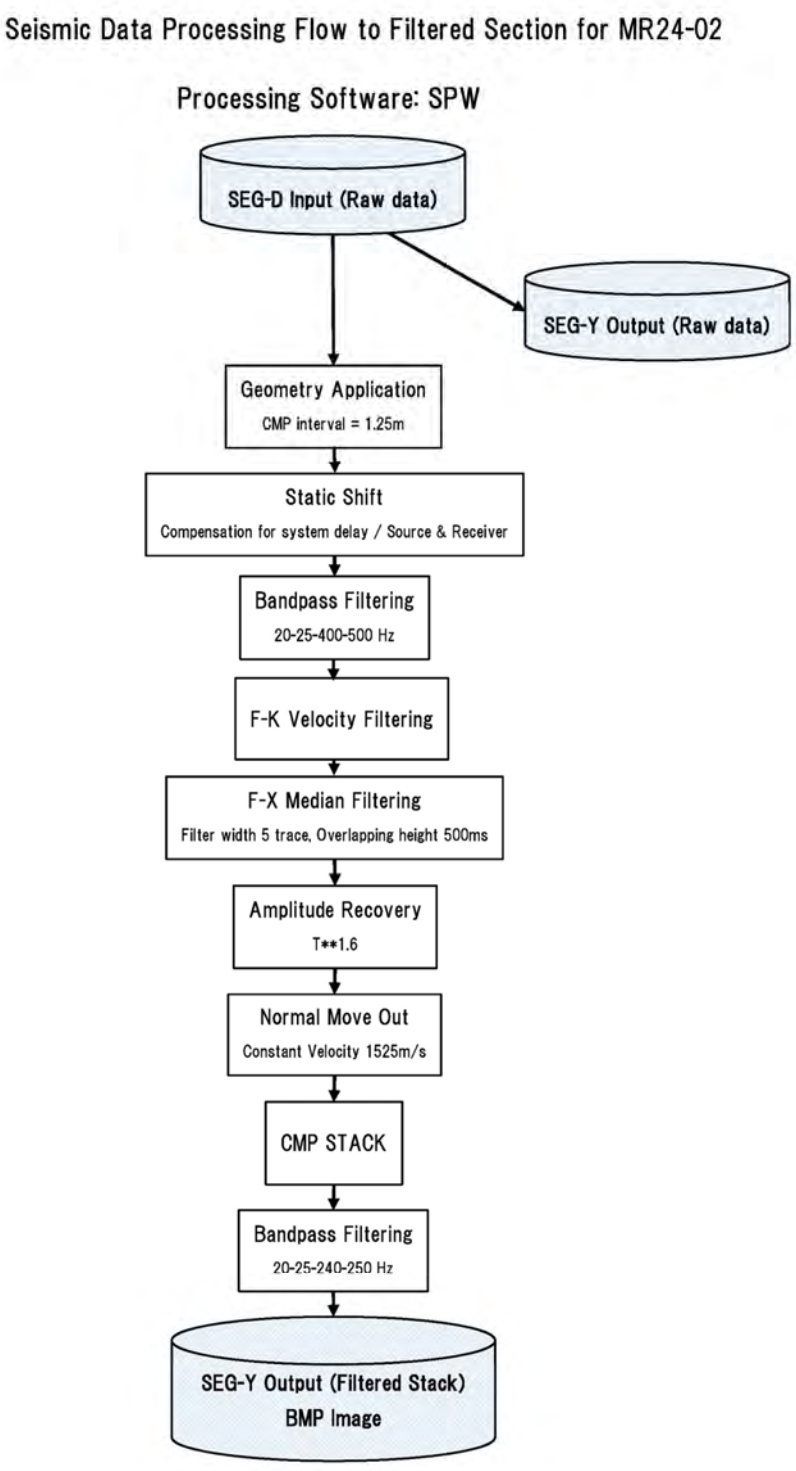


Figure 7-5-8: Onboard data processing flow.

7-6. Magnetic Survey

7-6-1. Measurement of three-component of the geomagnetic field

A shipboard three-component magnetometer system (Tierra Tecnica SFG-2018) is equipped on-board R/V Mirai. Three-axis flux-gate sensors with ring-cored coils are fixed on the foremast. Outputs from the sensors are digitized by a 20-bit A/D converter (1 nT/LSB) and sampled 8 times per second. The ship's heading, pitch, and roll are measured by the Inertial Navigation System (PHINS, IXblue, Flance). The ship's position and speed data are taken from LAN every second.

The three-component of geomagnetic field data were collected throughout the cruise. "Figure-8" sailings (clockwise and counterclockwise 360° turns) for data calibration of the shipboard magnetic data were conducted at 3 locations (**Table 7-6-1**).

Table 7-6-1: Summary of "Figure-8" sailings (Time: UTC).

1: 145° 29'E, 40° 23'N, 05:27 - 05:51UTC 17 Mar. 2024
2: 144° 03'E, 40° 57'N, 03:55 - 04:21UTC 22 Mar. 2024
3: 145° 52'E, 40° 47'N, 06:21 - 06:46UTC 25 Mar. 2024

7-6-2. Measurement of the geomagnetic total force

Geomagnetic total force data were obtained by using a surface-towed cesium marine magnetometer (Geometrics Inc., G-882) and recorded by a G-882 data logger (Clovertech Co., Ver.1.0.3b). The G-882 magnetometer uses an optically pumped Cesium-vapor atomic resonance system. The sensor fish is towed 500 m behind the ship to minimize the effects of the ship's magnetic field. The distance from the system position to the stern is 80 m. **Table 7-6-2** shows system configurations of the R/V MIRAI cesium magnetometer system.

Table 7-6-2: System configurations of R/V MIRAI cesium magnetometer.

Property	Description
Dynamic operating range:	20,000 to 100,000 nT
Absolute accuracy	<±2 nT throughout range
Cycle rate	1 second
Sensitivity	0.001265 nT at a 0.1 second cycle rate
Sampling rate	1 second

The geomagnetic total force data were collected during the following periods. The magnetic survey was conducted during the multibeam bathymetric and SBP survey.

04:55UTC 14 Mar. 2024 - 13:33UTC 14 Mar. 2024
16:21UTC 14 Mar. 2024 - 11:37UTC 15 Mar. 2024
04:47UTC 20 Mar. 2024 - 09:40UTC 20 Mar. 2024
04:37UTC 22 Mar. 2024 - 20:30UTC 22 Mar. 2024
06:58UTC 25 Mar. 2024 - 23:40UTC 26 Mar. 2024

7-7. Gravity Survey

Shipboard gravity data were collected throughout the cruise. The gravity measurement was carried out using a LaCoste & Romberg S-116. The sampling rate is 1 second.

The recording gravity unit is [CU: Counter Unit]. To convert from CU to relative gravity [mGal], multiply by the coefficient: (0.9946).

[mGal] = 0.9946 * [CU]

The shipboard gravity data are tied to absolute gravity values at the port. **Table 7-7-1** shows absolute gravity table of this cruise.

Table 7-7-1: Absolute gravity table of the MR24-02cruise.

No.	Date mm/dd	UTC	Port	Absolute Gravity [mGal]	Sea Level [cm]	Ship Draft [cm]	Gravity at Sensor * [mGal]	S-116 Gravity [mGal]
#1	03/12	01:19	Sekinehama	980,371.87	326	625	980,373.08	12638.78
#2	03/29	07:35	Shimizu	979,729.06	198	605	979,729.84	11996.25

*: Gravity at Sensor = Absolute Gravity + Sea Level*0.3086/100 + (Draft-530)/100*0.2222

Calibration stations (departure & arrival berth)
Sekinehama berth: 141°14.3736'E, 41°21.9680'N
Shimizu Okitsu berth No.11 bit36: 138°30.6493’E, 35°02.1774’N

As the result, the drift rate of the shipboard gravitymeter during this cruise period is estimated to be 1.320 mGal/month (0.044 mGal/day).

8. Preliminary Results

8-1. Sediment Core

Piston cores (PC01–PC05) with gravity pilot cores (PL01–PL05) were collected at five sites during this cruise. Four cores were obtained from slope basins at the lower landward slope of the northern Japan Trench to examine the geological evidence of paleo-earthquakes and tsunamis off Hidaka. Another core (PC03 and PL03) was obtained from outer rise area near the foot of Ryofu-Daini Seamount to understand depositional processes and fluctuation of bottom water circulation. Coring sites and data are summarized in **Table 8-1-1**. Lithological columnar section and section length of each core is shown in **Figure 8-1-1** and **Table 8-1-2**. Physical property and color profiles obtained by MSCL are presented in **Figures 8-1-2** and **8-1-3**, and core photos and images are shown in **Figures 8-1-4–8** and **8-1-9–13**. Void-free length and brief description of the obtained cores were summarized below.

Slope basin cores:
PC01 (549.3 cm long) and PL01 (80.1 cm long): Lithology of PC01 and PL01 is characterized by grayish olive–olive black bioturbated diatomaceous silt. Iron-monosulfides occur in olive black silt. Two tephra layers, one grayish tephra spots and another 5–10 mm scattered pumices, occur in bioturbated silt. Homogeneous silt without bioturbation is another characteristic lithology of PC01. The upper homogeneous silt is thin (~50 cm in thickness) and olive black in color. Basal contact is sharp, but no obvious coarse-grained layer is found at the base. The lower one is thick (~3.6 m in thickness) and grayish olive in color. Many thin coarse-grained layers, some of which are fluidized and distorted, are intercalated. The lower homogeneous silt becomes coarser near the core bottom and the thickest (~30 cm thick) very fine sand layer with woody fragments occurs at the core bottom. Upward decreasing trend in gamma-ray attenuation bulk density of the lower homogeneous silt also suggests fining-upward grain-size trend.

PC02 (556.2 cm long) and PL02 (31.0 cm long): Major lithology of PC02 and PL02 is olive black diatomaceous silt with bioturbation. Numerous thin (<1 cm) coarse-grained layers are intercalated in the bioturbated silt. Homogeneous or weakly laminated silt occurs above the thin coarse-grained layers. Some coarse-grained layers are correlative with high magnetic susceptibility peaks but no clear correlation with bulk density profile is observed. Two possible tephra layers occur at ~50 cm core depth of PC02 and core top of PL02.

PC04 (495.4 cm long) and PL04 (71.2 cm long): Lithology of PC04 and PL04 is composed of olive gray–gray and olive black–black diatomaceous silt with bioturbation and grayish olive–olive black homogeneous diatomaceous silt with thin coarse-grained layer at base. Thickness of the homogeneous silt ranges between 20 and 90 cm. Boundaries between homogeneous silt and bioturbated silt is generally sharp, and erosional feature found at base of the coarse-grained layers. In general, high bulk density and magnetic susceptibility peaks could be correlated with coarse-grained layers at base of homogeneous silt. Bulk density is higher in homogeneous silt than in bioturbated silt. Upward decreasing trend in bulk density of homogeneous silt suggests fining-upward grain-size trend. Iron-monosulfides occur in olive black–black bioturbated silt.

PC05 (528.5 cm) and PL05 (84.0 cm): Major lithology of PC05 and PL05 is black–olive black silt with bioturbation and intense iron-monosulfides. Slight fluctuation in darkness is observed. A rounded pumice patch occurs at the uppermost part of PC05. A ~160 cm thick homogeneous and grayish olive–gray–olive black silt with volcanic and pumiceous fine and medium sand layers (~10 cm thick) at base occurs at the upper part of PC05. Coarse silt to very fine–fine sand layers and blocks, some of which are highly fluidized and distorted and are pumiceous, are found in the homogeneous silt. Bulk density of the homogeneous silt is higher than that of bioturbated silt. Decreasing of bulk density at basal sandy part of the homogeneous silt suggests fining-upward grain-size trend in the sandy part. Peaks in magnetic susceptibility are generally correlated with coarse-grained layers in the homogeneous silt.

Outer rise core:

PC03 (478.1 cm long) and PL03 (61.5 cm long): Lithology of PC03 and PL03 is characterized by gray, grayish olive, olive black bioturbated diatomaceous silt (0~199.5 cm of PC03) and flow-in (199.5~478.1 cm of PC03). The uppermost 8cm of PL03 is the oxidized layer of dark brown-olive brown silt. Numerous thin (<2 cm) diatom-rich silt layers are intercalated in the bioturbated silt. Three tephra layers, (1) homogeneous very fine sandy pumice (3.4 cm thick), (2) grading fine to medium sandy pumice mixed with sand, (3) grading very fine to medium sandy pumice (21 cm thick), occur in bioturbated silt. Rounded gravels (~1 cm) are sparsely distributed in the bioturbated silt.

Table 8-1-1: Summary of the piston coring operation

Coring Summary(PC) **MR24-02**

Date (UTC) yyyymmdd	Core ID	Location	Water Depth (m)	Positon			Corer type				Core length（m）				Tension MAX (t)	K value**
				Latitude	Longitude	Type	Type*		Wegiht		PC			PL		
20240314	PC01	Off Hidaka	6,856	40-45.0848N	144-29.5338E	Transponder	IN	PC	592	kg	5.54	/	6	0.81	6.9	0.04
20240316	PC02	Off Hidaka	5,563	41-05.4356N	144-32.3028E	Transponder	IN	PC	592	kg	5.59	/	6	0.31	6.3	0.16
20240320	PC03	Off Nemuro	5,141	40-38.5399N	146-26.3868E	Transponder	IN	PC	592	kg	5.43	/	6	0.62	5.7	0.21
20240322	PC04	Off Hidaka	5,356	41-00.0603N	144-13.1818E	Transponder	IN	PC	592	kg	4.89	/	6	0.73	6.0	0.14
20240322	PC05	Off Hidaka	7,034	40-36.7139N	144-21.0884E	Transponder	IN	PC	592	kg	5.34	/	6	0.85	7.3	0.08

* "IN" is Inner type corer.

** "K value" is the strength barometer of the sea floor sediment; K value = pure pull out load / (outer diameter of outer pipe * penetration length).

Table 8-1-2: Summary of VCD-based void-free section length

Core	Date	Corer	Sec. 1	Sec. 2	Sec. 3	Sec. 4	Sec. 5	Sec. 6	Sec. CC	Total Length	Remarks
PC01	14-Mar-24	6m PC	66.5	100.4	99.8	99.9	100.5	82.0		549.3	1W: 66.7 cm. The uppermost 0.2 cm of 1A may be missed.
PL01	14-Mar-24	0.7m PL	80.1							80.8	1W: 80.9 cm, The uppermost 0.7 cm of 1A may be missed.
PC02	16-Mar-24	6m PC	58.7	100.0	100.6	100.4	100.4	96.1		556.2	6A: 32.5-32.9 cm void.
PL02	16-Mar-24	0.7m PL	31.0							31.0	
PC03	20-Mar-24	6m PC	41.0	99.7	34.2	99.0	97.4	95.9	10.8	478.1	1W: 41.1 cm. The uppermost 0.1 cm of 1A may be missed. 3A: 9-75 cm void, 4A: 18-19.5 cm void, below 24.5 cm flow-in, 5A:27-29.5 cm void.
PL03	20-Mar-24	0.7m PL	61.5							61.5	1W: 61.2 cm
PC04	22-Mar-24	6m PC		89.3	99.8	99.9	100.4	95.8	10.0	495.4	2W: 89.5 cm. The uppermost 0.2 cm of 2A may be missed. The upper ~21.5 cm was rotated during core split.
PL04	22-Mar-24	0.7m PL	71.2							71.4	1W: 71.5 cm. The uppermost 0.2 cm of 1A may be missed.
PC05	23-Mar-24	6m PC	28.0	99.9	100.4	100.5	100.5	99.2		528.5	
PL05	23-Mar-24	0.7m PL	84.0							84.0	1W: 84.3 cm. The lowermost 0.3 cm of 1A may be missed.

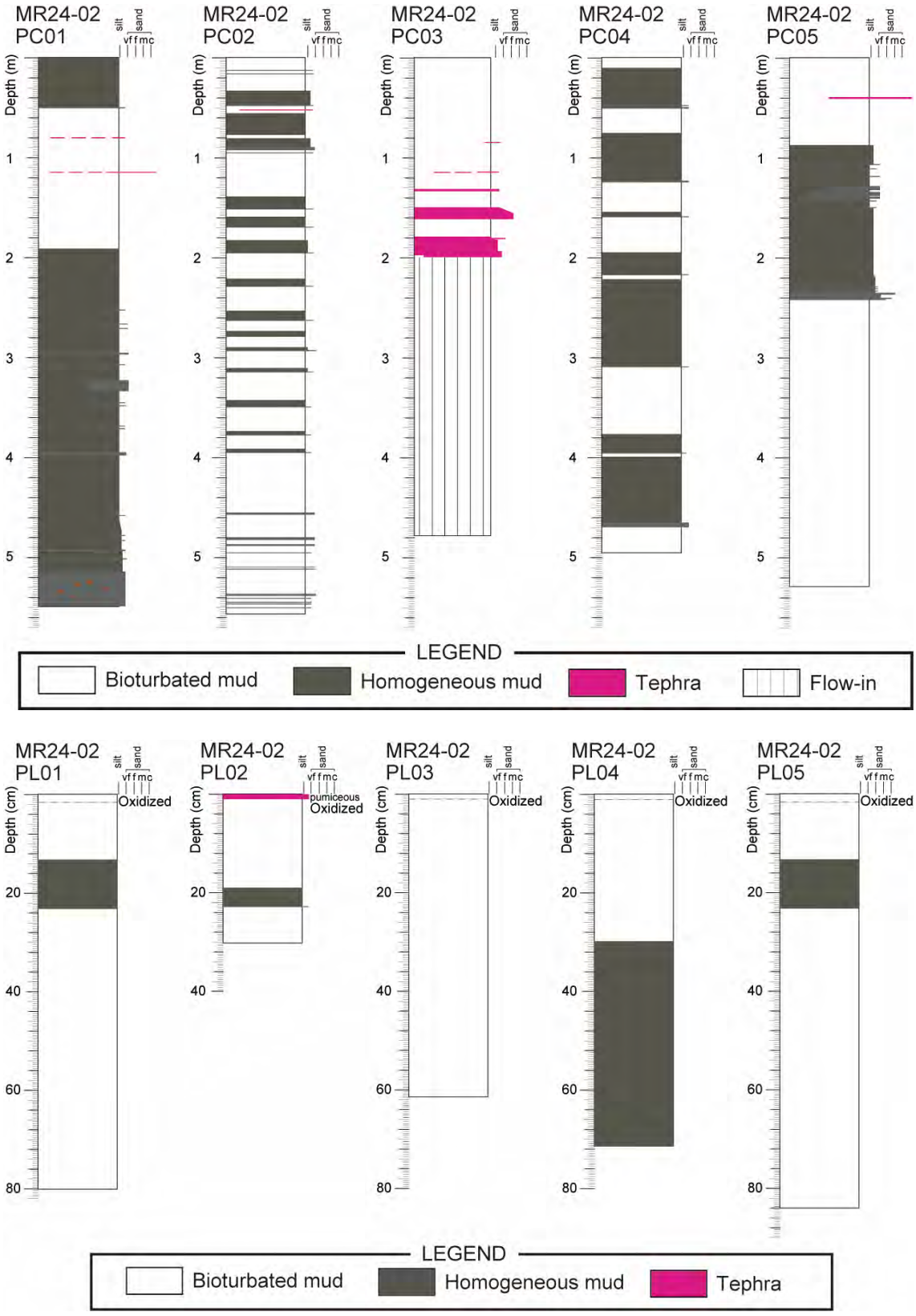


Figure 8-1-1: Lithology of PC01-PC05 and PL01-PL05. White: bioturbated mud interval, gray: massive mud interval, black: coarse grained interval, red: tephra layer.

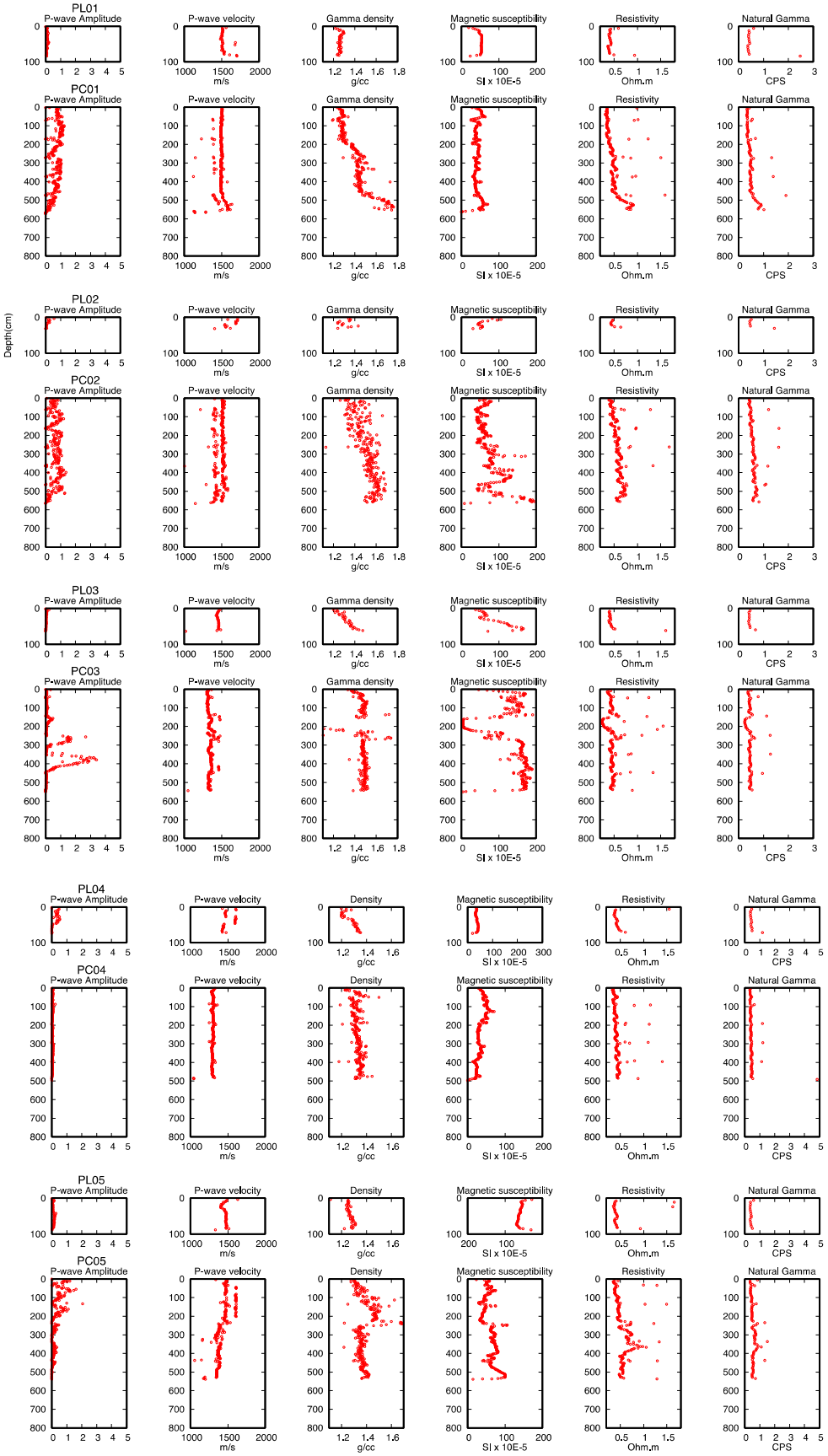


Figure 8-1-2: Summary of MSCL measurements (P-wave amplitude, P-wave velocity, Gamma-ray attenuation density, Magnetic susceptibility, Resistivity and Natural gamma-ray count) of the obtained cores.

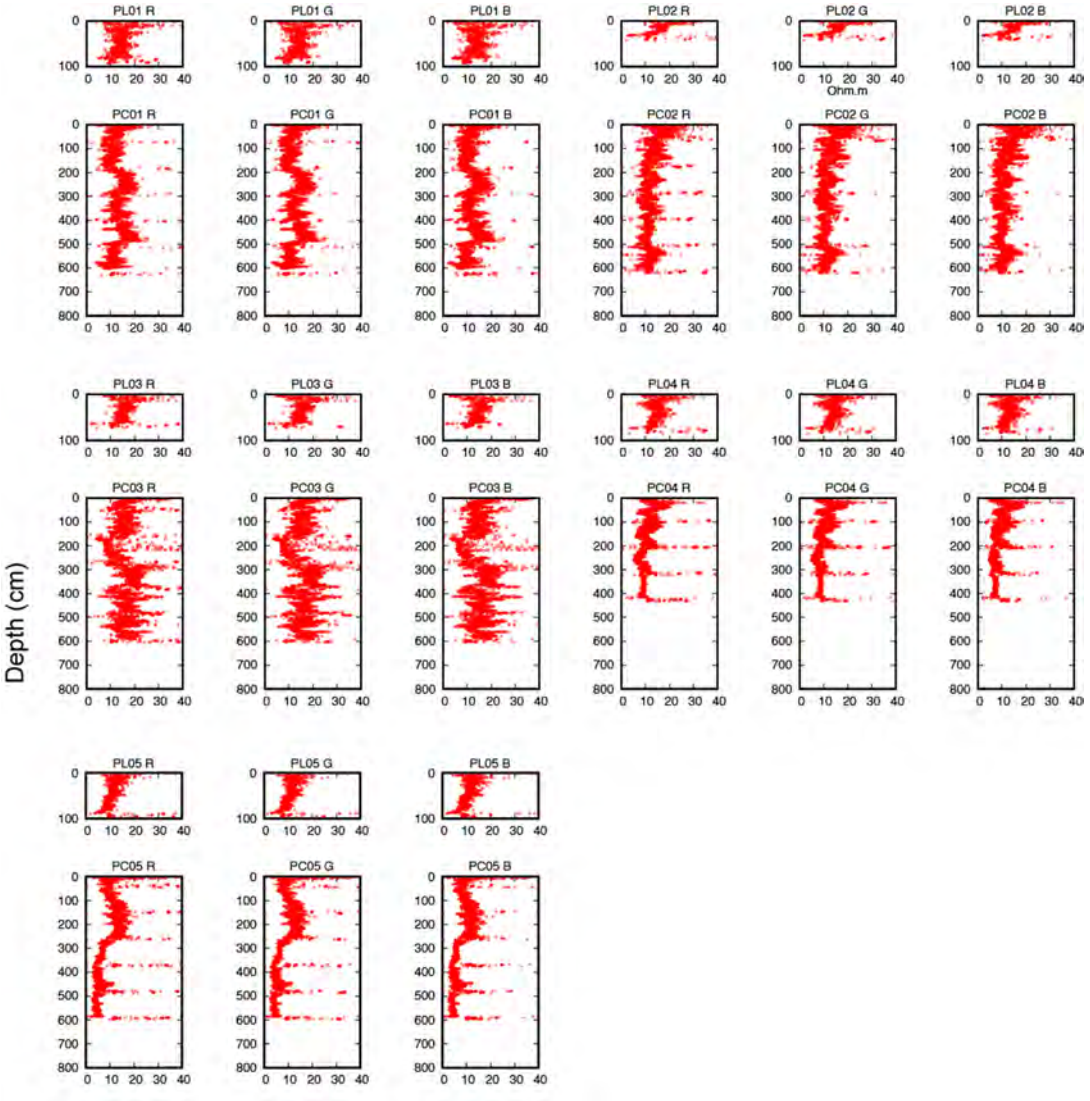


Figure 8-1-4: RGB values for PL01, PC01, PL02, PC02, PL03, PC03, PL04, PC04, PL05, and PC05.

Figure 8-1-4: Core photos of PL01 & PC01.

Figure 8-1-5: Core photos of PL02 & PC02.

Figure 8-1-6: Core photos of PL03 & PC03.

Figure 8-1-7: Core photos of PL04 & PC04.

Figure 8-1-8: Core photos of PL05 & PC05.

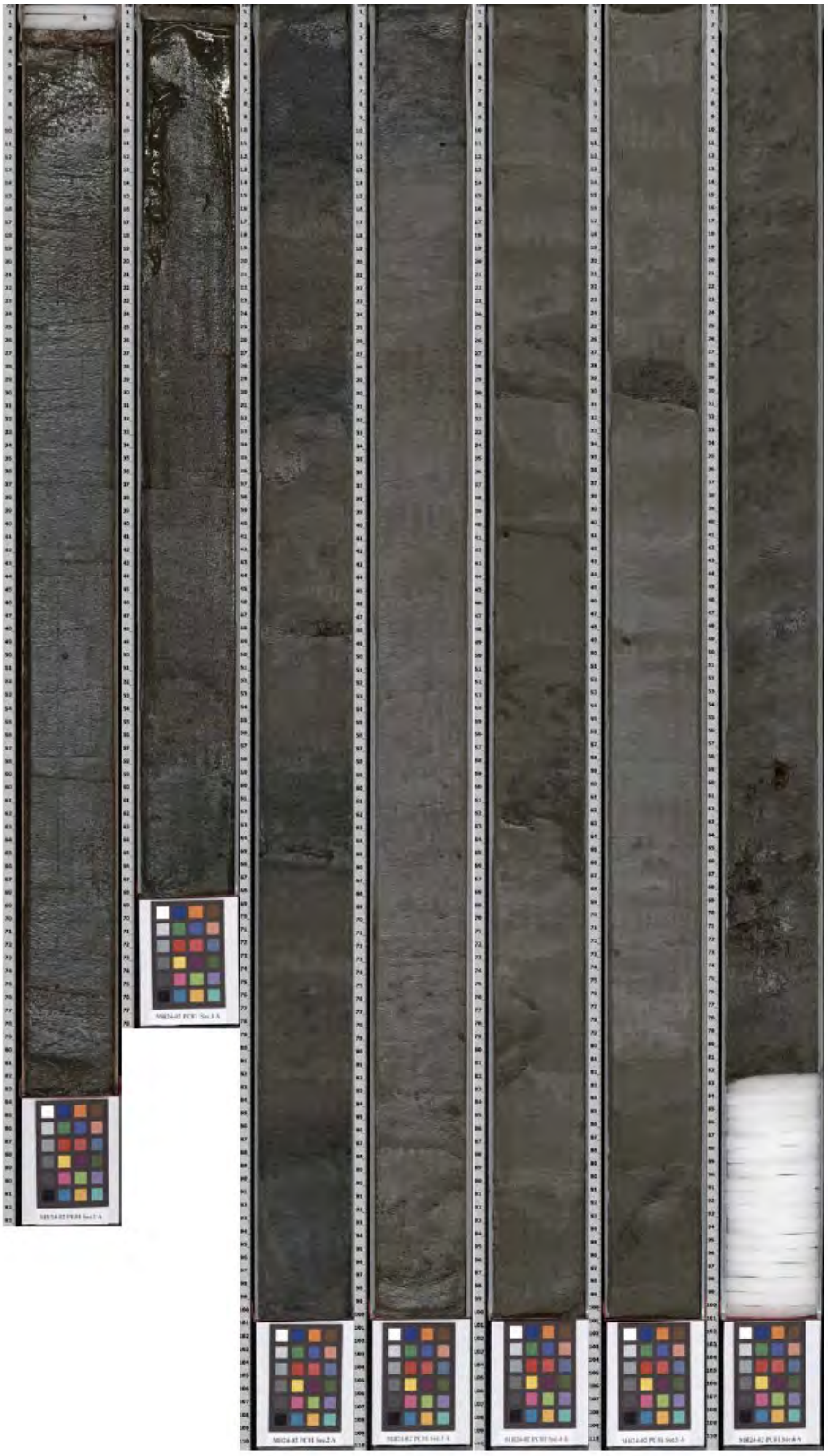


Figure 8-1-9: Scan image of MR22-04 PL01 & PC01.

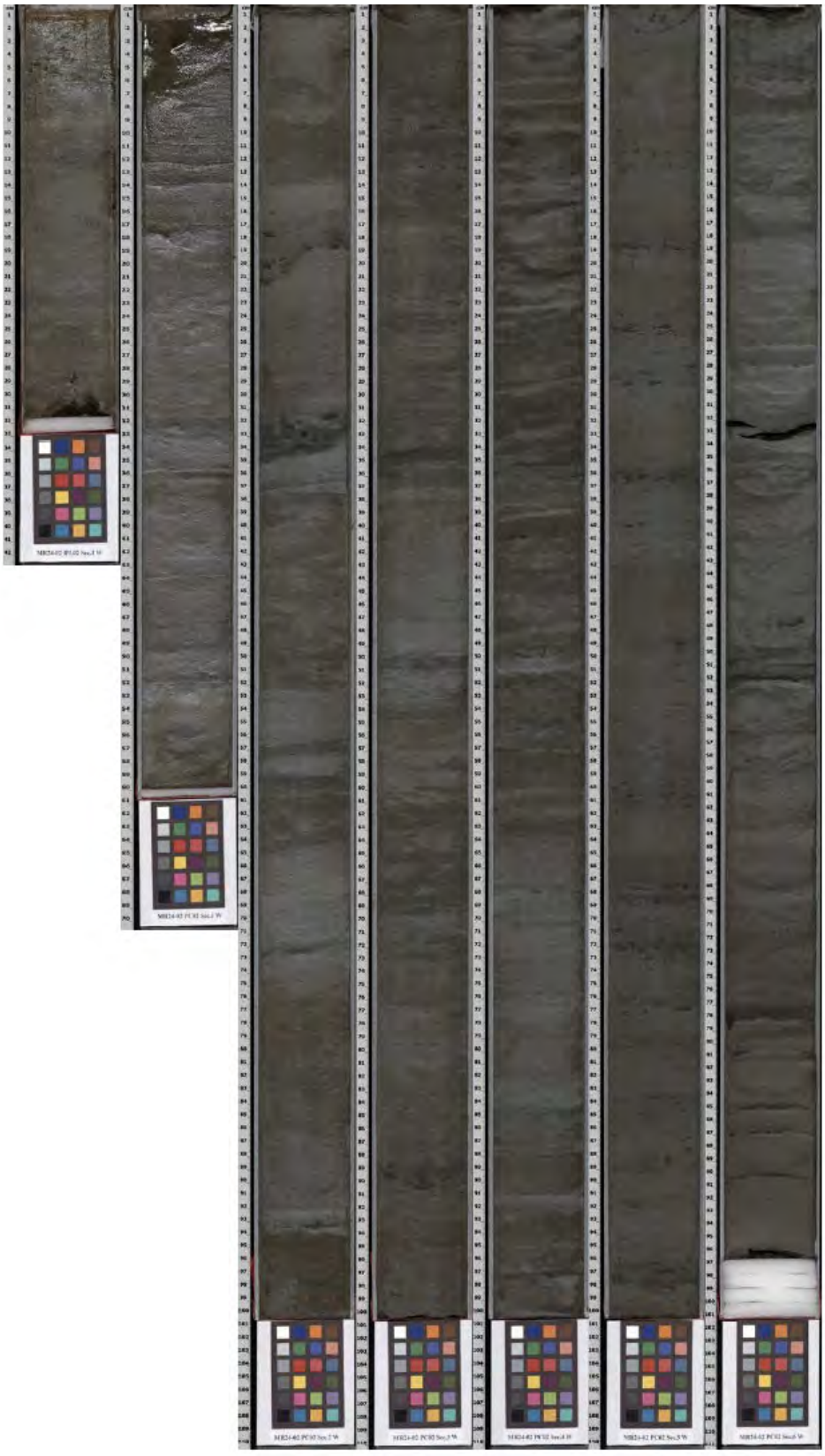


Figure 8-1-10: Scan image of PL02 & PC02.

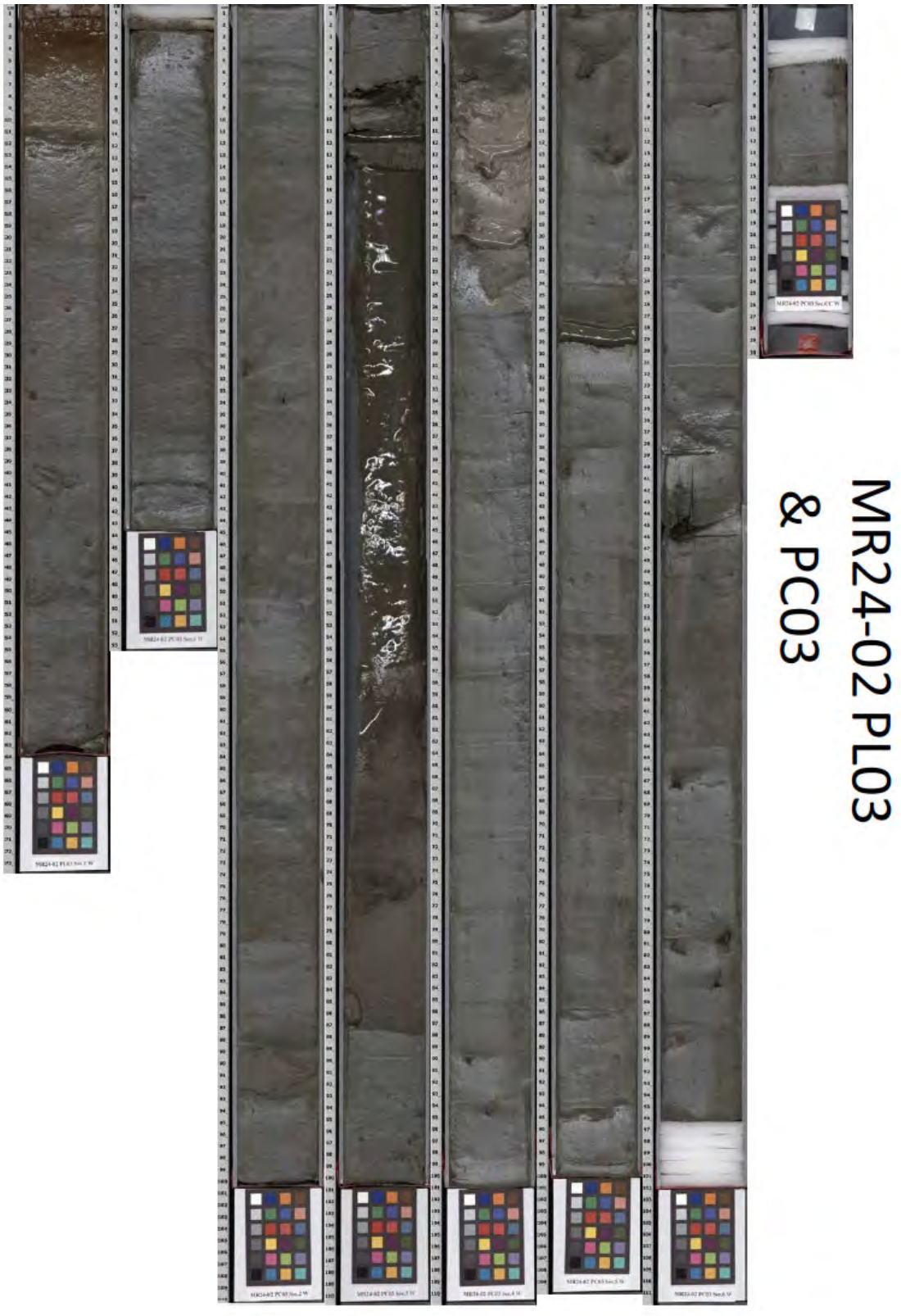


Figure 8-1-11: Scan image of PL03 & PC03.

Figure 8-1-12: Scan image of PL04 & PC04.

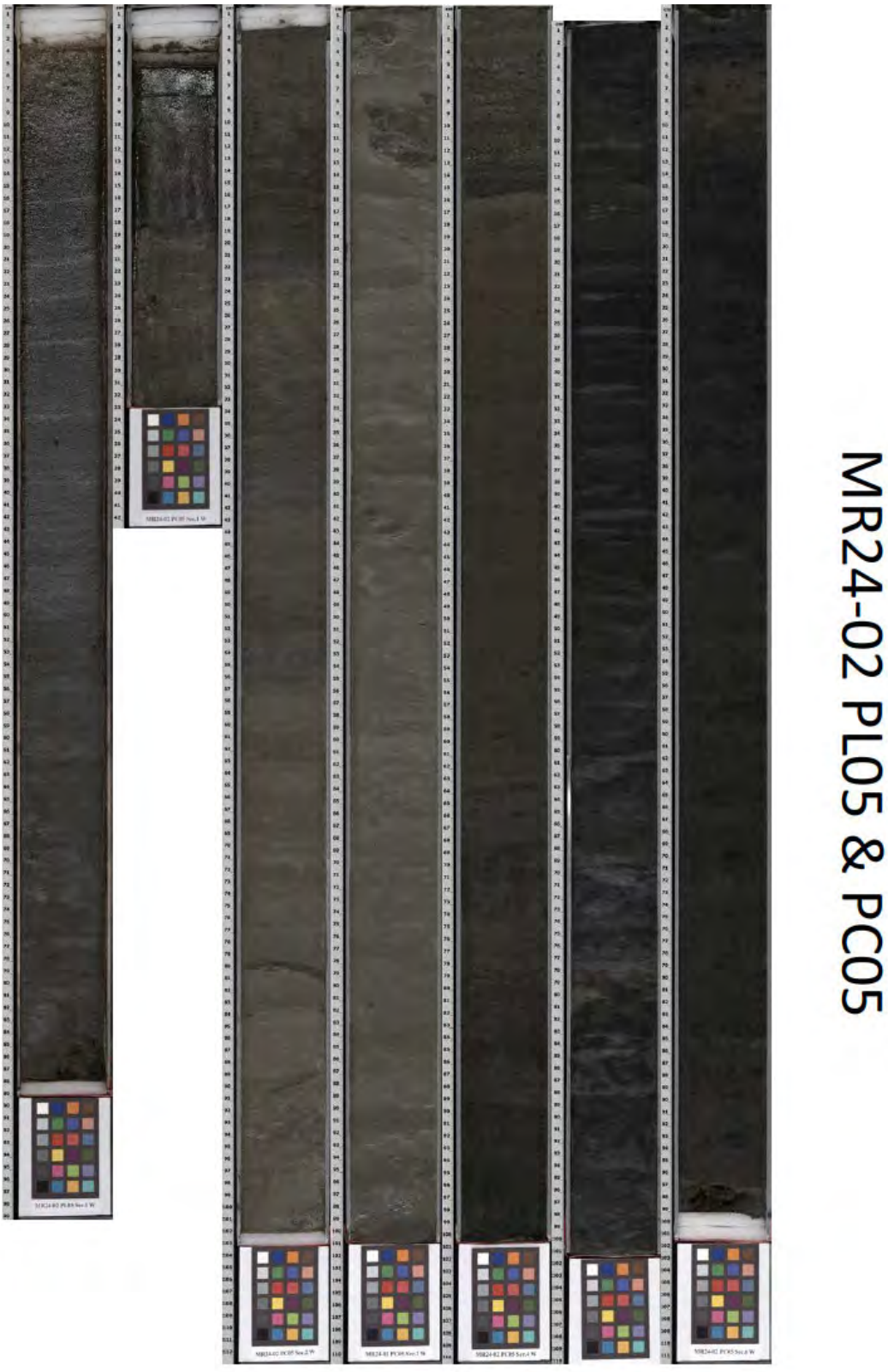


Figure 8-1-13: Scan image of PL05 & PC05.

8-2. Multibeam Bathymetry

Bathymetry maps using the data obtained during the cruise are shown in **Figures 8-2-1**.

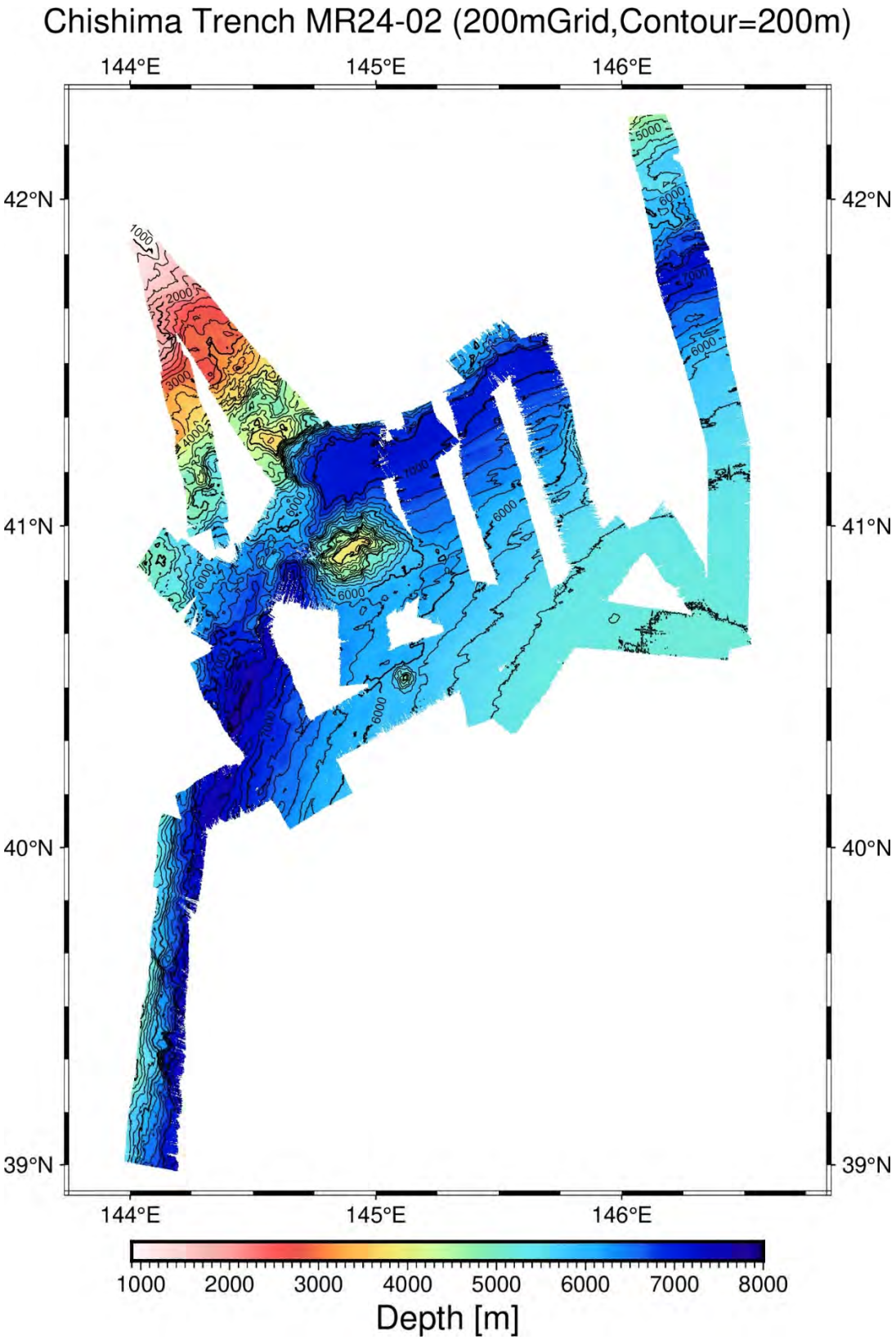


Figure 8-2-1: Bathymetry in the survey area. Contour interval is 200 m.

8-3. XCTD Profile

Vertical profiles of seawater temperature and salinity conducted at 6 sites are shown in **Figure 8-3-1**.

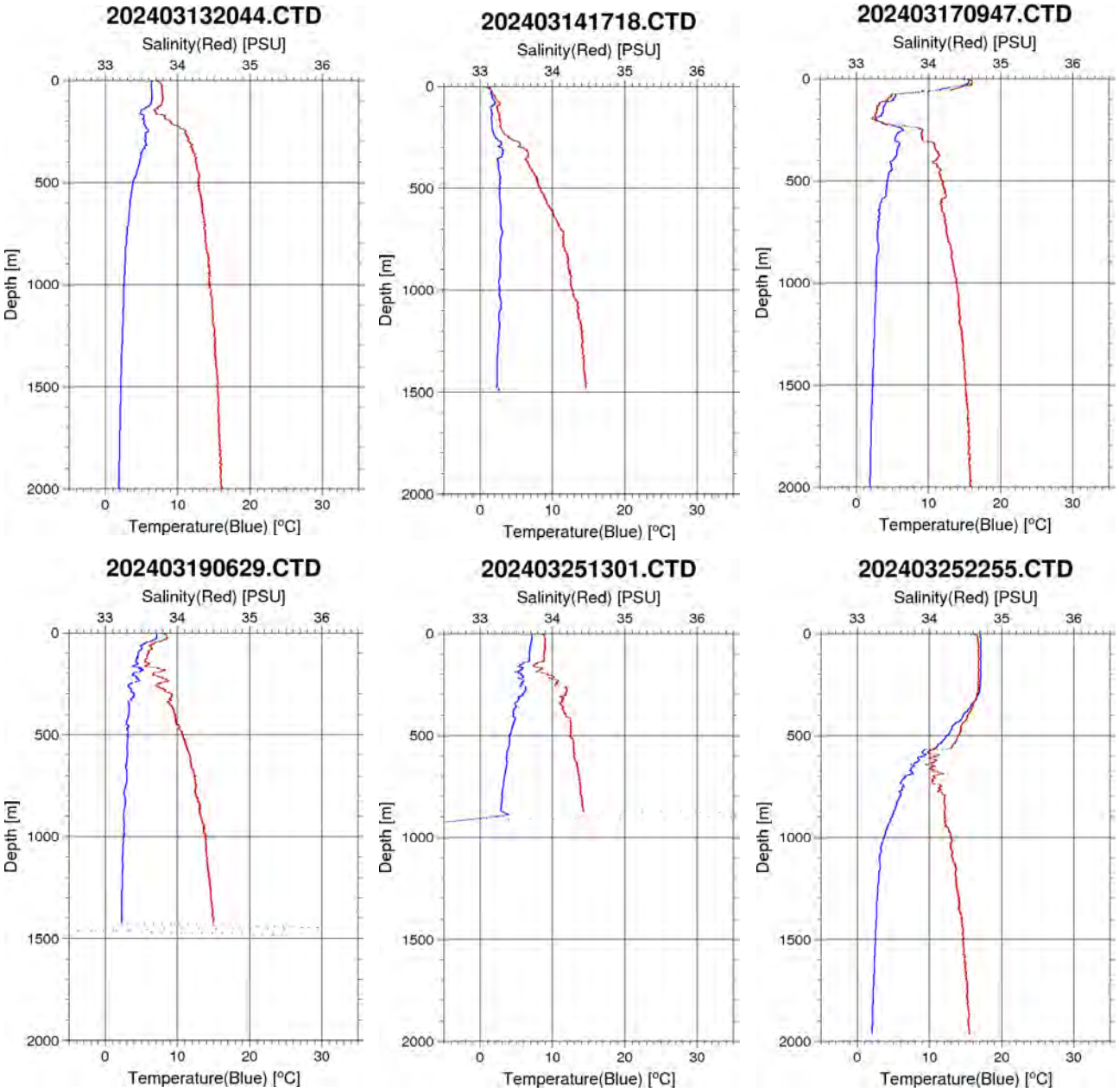


Figure 8-3-1: Profiles at 6 stations. See **Table 7-3-1** for information on the station.

8-4. Sub-Bottom Profile

8-4-1. Sub-bottom profiling survey

To find the piston coring points, sub-bottom profiling (SBP) surveys were performed in advance. Bathymetric features showing basin-like were selected for the SBP survey, and 10 lines were profiled. Six points in the surveyed lines were selected for the piston coring.

SLPC08 (MR24-02PC01) point Survey NW→SE

IN	2024/3/13	21:09	40-45.70002N	144-28.65125E
OUT	2024/3/13	21:38	40-44.43050N	144-30.62737E

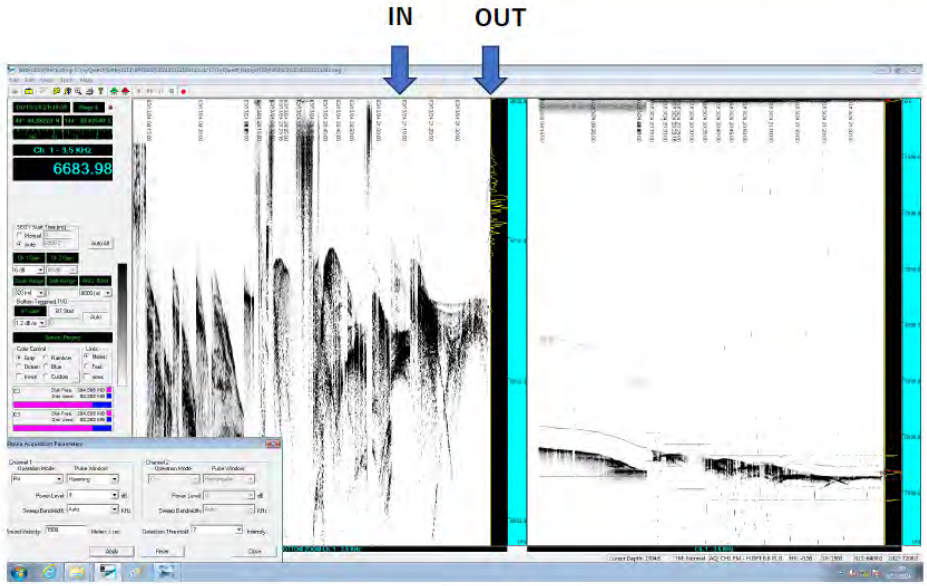


Figure 8-4-1: Sub-bottom profiling record of SLPC08 (NW-SE) around PC01 point.

SLPC08 (MR24-02PC01) point Survey NE→SW

IN	2024/3/13	21:57	40-45.77937N	144-30.45253E
OUT	2024/3/13	22:25	40-44.23119N	144-28.86461E

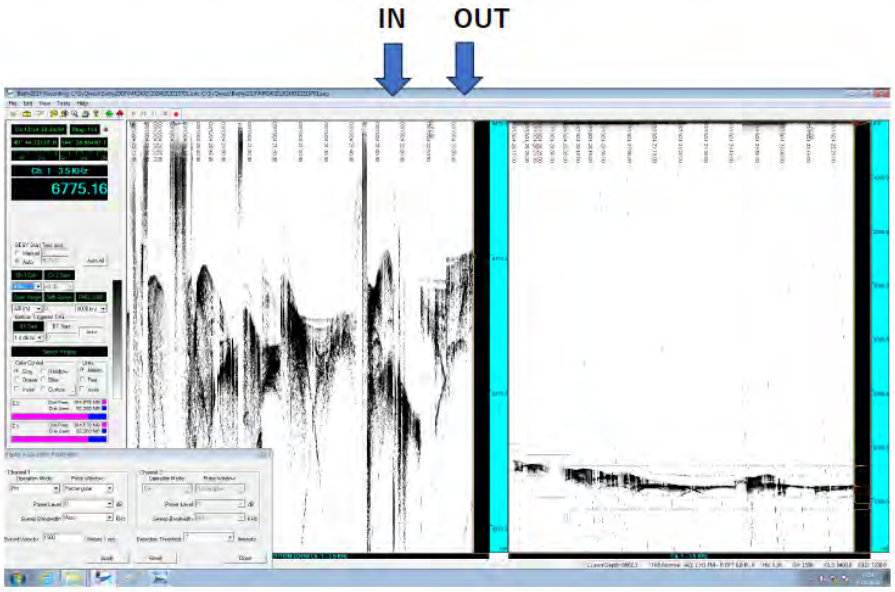


Figure 8-4-2: Sub-bottom profiling record of SLPC08 (NE-SW) around PC01 point.

sbpPlus01 LINE					
	IN	2024/3/15	19:58	40-58.78554N	144-20.01550E
	OUT	2024/3/15	20:38	40-58.91589N	144-23.70935E

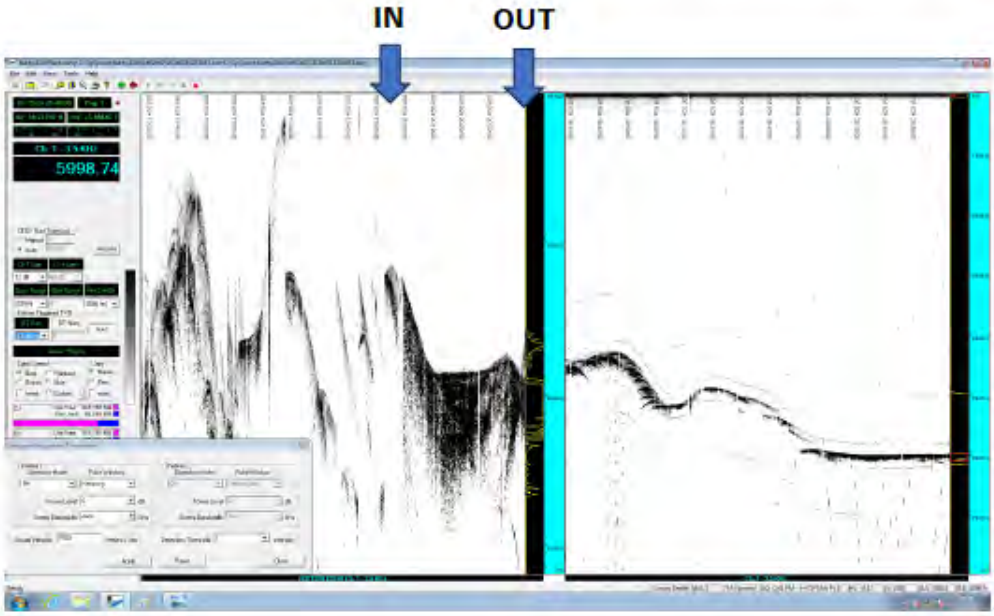


Figure 8-4-3: Sub-bottom profiling record of sbpPlus01.

sbpPlus03 LINE					
	IN	2024/3/20	13:08	40-51.17042N	144-25.97202E
	OUT	2024/3/20	14:07	40-46.12543N	144-22.35041E

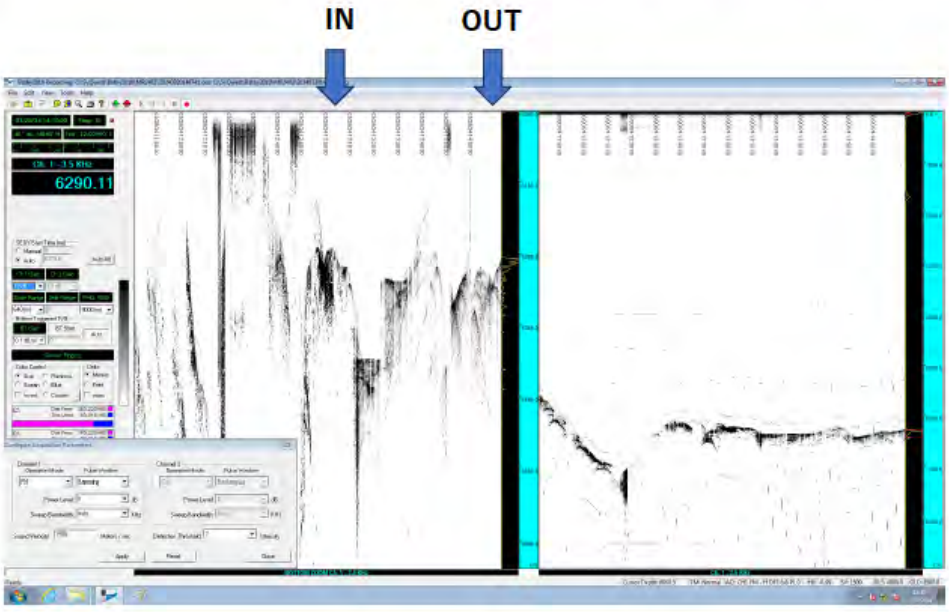


Figure 8-4-4: Sub-bottom profiling record of sbpPlus03.

sbpPlus04 LINE

IN	2024/3/20	14:07	40-46.12543N	144-22.35041E
OUT	2024/3/20	14:49	40-46.74930N	144-18.33236E

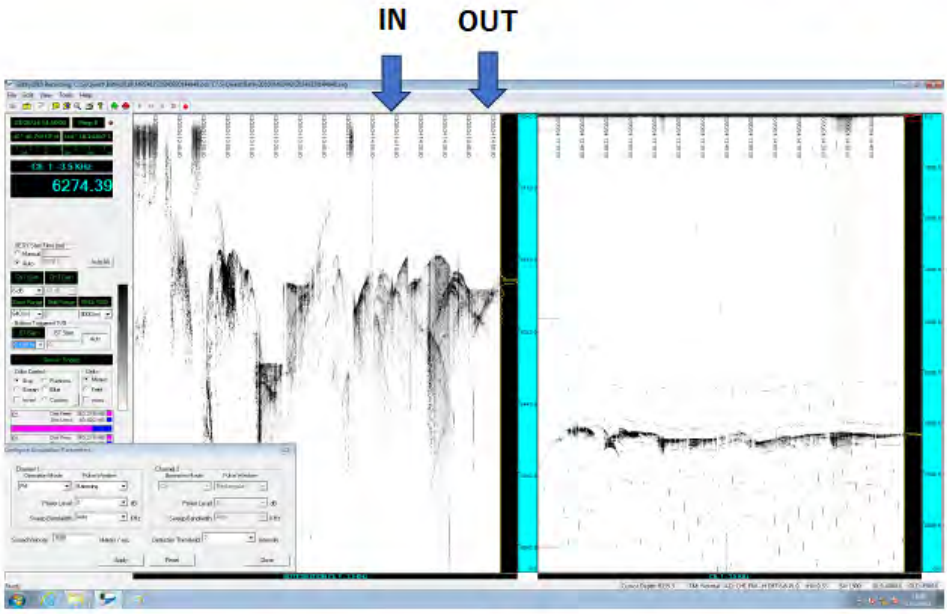


Figure 8-4-5: Sub-bottom profiling record of sbpPlus04.

sbpPlus06 LINE

IN	2024/3/20	15:57	40-53.52420N	144-08.17904E
OUT	2024/3/20	16:45	40-55.78278N	144-05.16419E

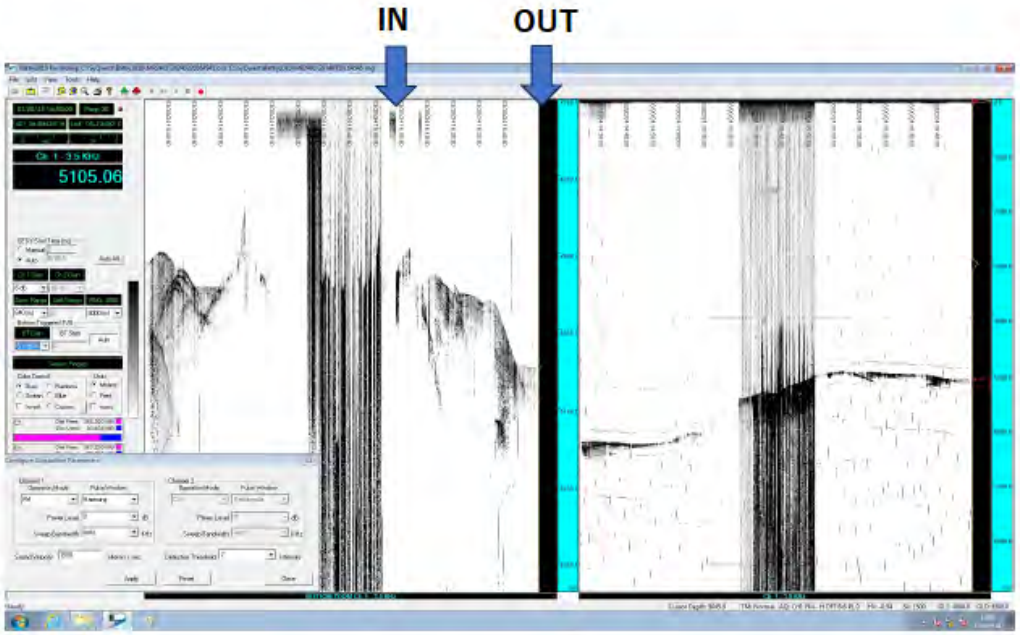


Figure 8-4-6: Sub-bottom profiling record of sbpPlus06.

sbpPlus05 LINE

IN	2024/3/20	18:25	40-58.60379N	144-13.99704E
OUT	2024/3/20	19:08	41-01.10529N	144-12.21846E

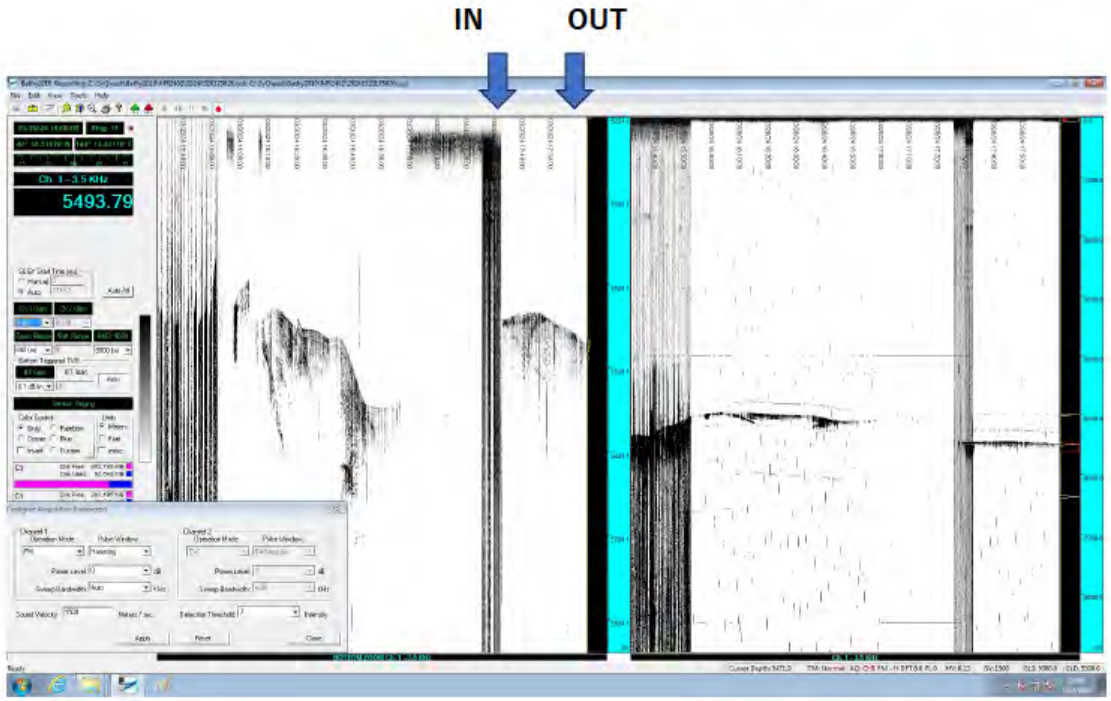


Figure 8-4-7: Sub-bottom profiling record of sbpPlus05.

sbpPlus02 LINE

IN	2024/3/20	18:25	40-58.60379N	144-13.99704E
OUT	2024/3/20	19:08	41-01.10529N	144-12.21846E

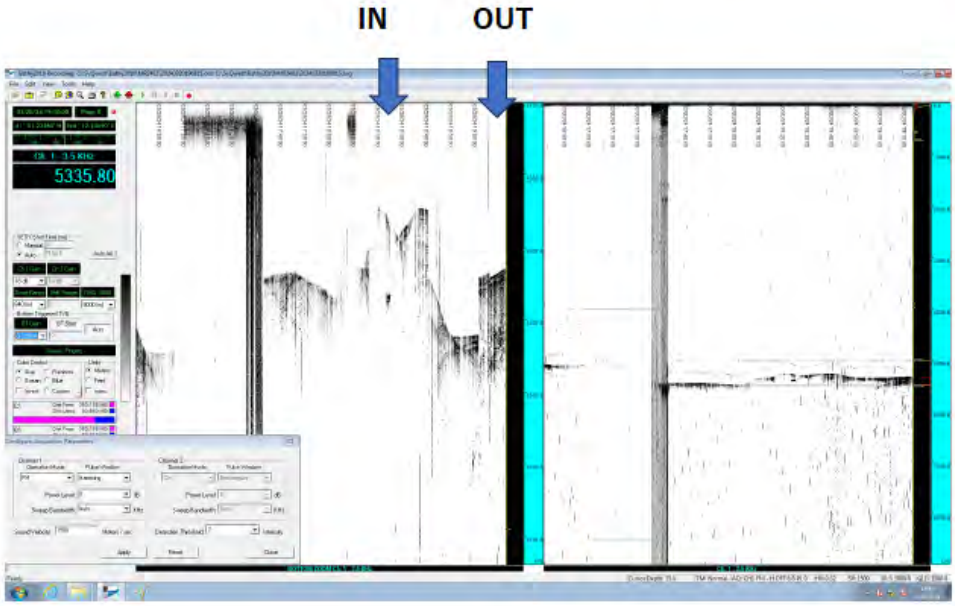


Figure 8-4-8: Sub-bottom profiling record of sbpPlus02.

sbpPlus06 LINE 2nd

IN	2024/3/22	4:56	40-55.92172N	144-04.95094E
OUT	2024/3/22	5:48	40-53.55100N	144-08.22720E

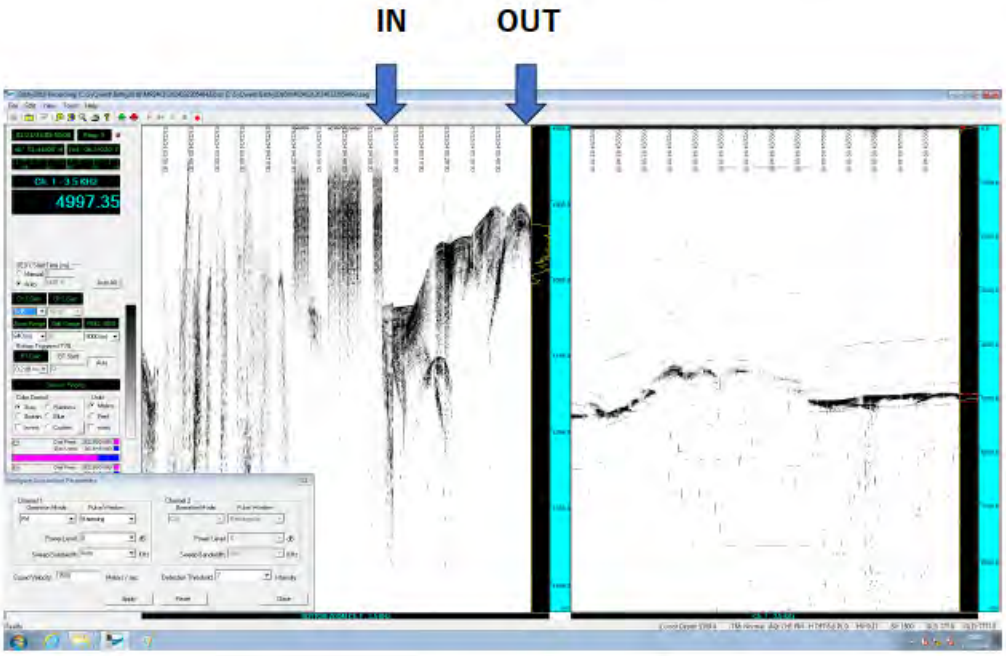


Figure 8-4-9: Sub-bottom profiling record of sbpPlus06 (2nd).

sbpPlus04 LINE 2nd

IN	2024/3/22	6:56	40-46.72457N	144-18.37899E
OUT	2024/3/22	7:38	40-46.12050N	144-22.02269E

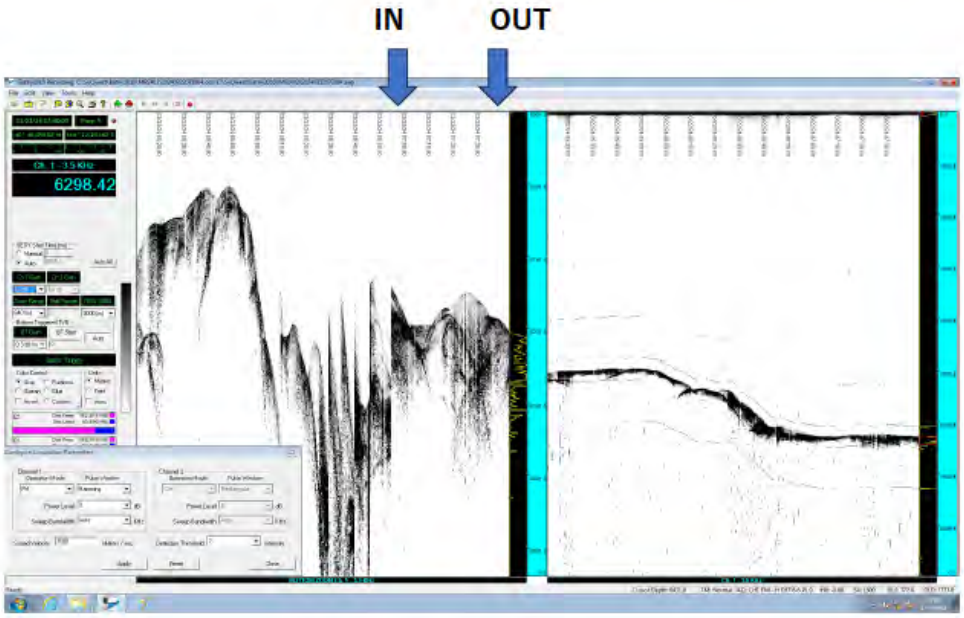


Figure 8-4-10: Sub-bottom profiling record of sbpPlus04 (2nd).

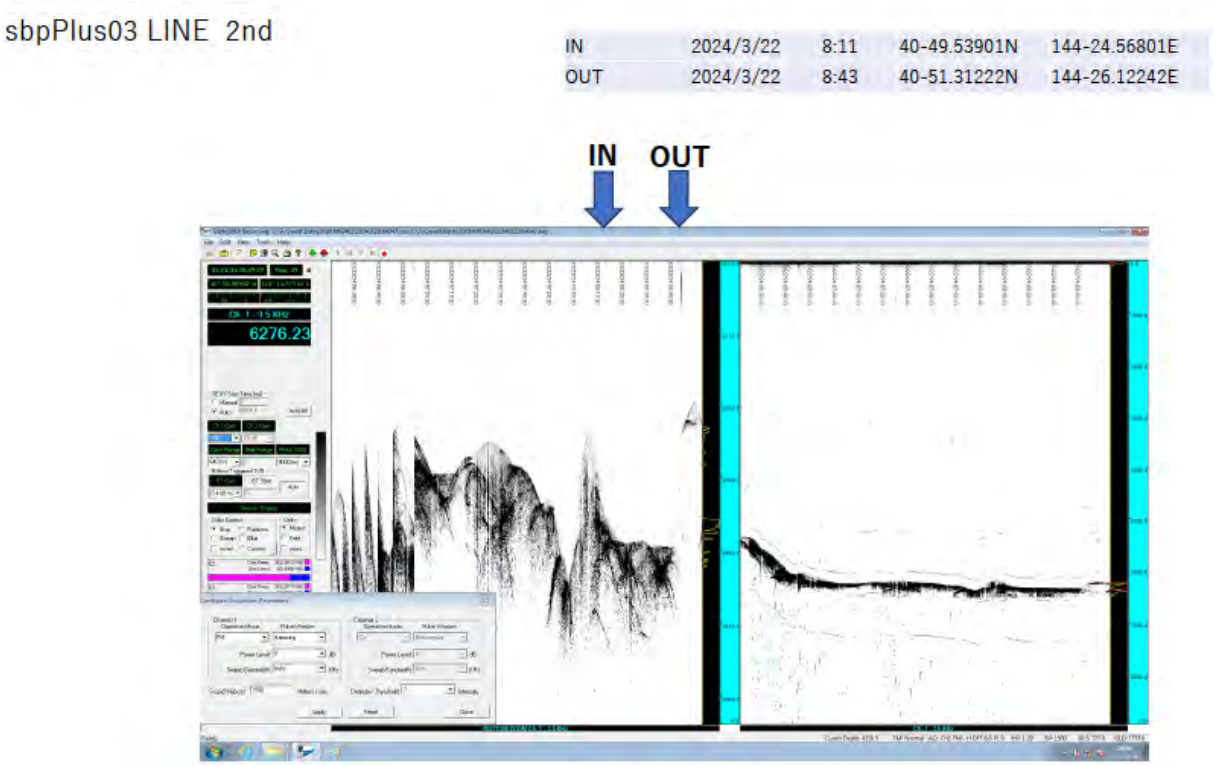


Figure 8-4-11: Sub-bottom profiling record of sbpPlus03 (2nd).

We surveyed sbpORPC10 between the Takuyo-Daiichi seamount and the Ryofu-Daini seamount. The purpose of the survey was to understand the sedimentary structure of the outer-rise sediments deposited under the LCDW. This survey line was about 53 km long and recorded sediments about 30 m below the seafloor. Sediments distributed just below the seafloor are characterized by the reflector with weak reflection. The thickness of this sediment was thinner at the foot of the Ryofu-Daini seamount than in the middle of the survey line.

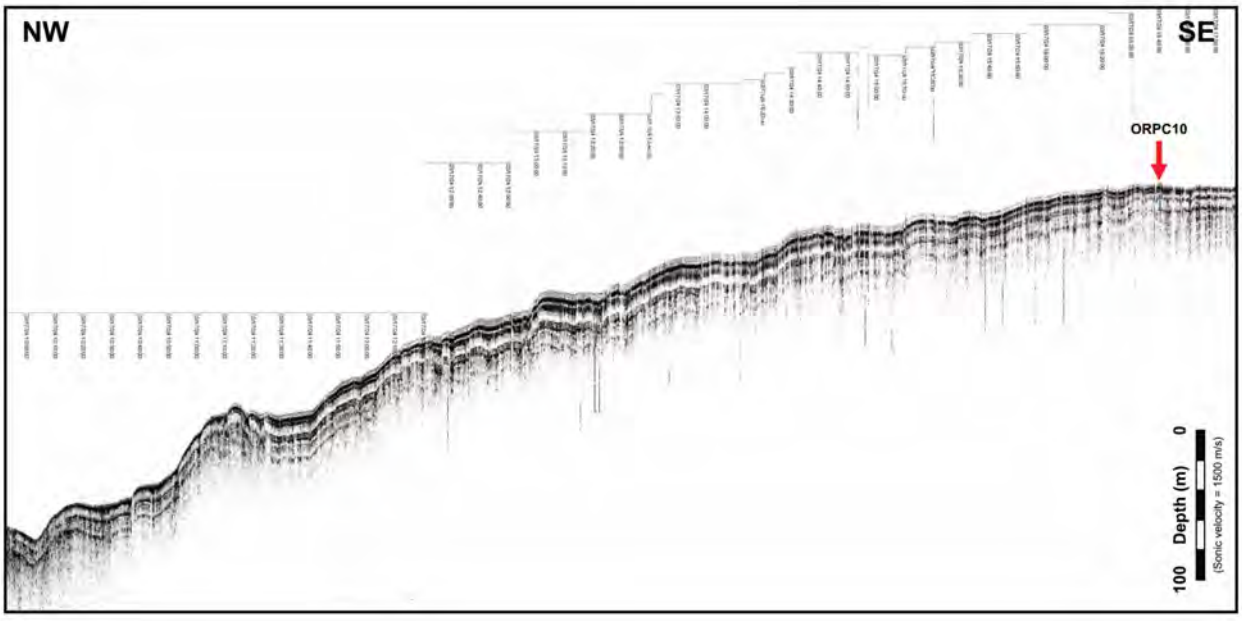


Figure 8-4-12: Sub-bottom profiling record of sbpORPC10 drawn by Hisashi Ikeda (Yamaguchi University).

8-4-2. SBP continuous imaging during PC operation

We conducted SBP imaging to refine the sub-bottom structure at the PC points during PC operation. Because the ship stays at the same position, it is possible to make the images clearer at the PC point. Capture images are presented in **Figures 8-4-13** to **8-4-17**.

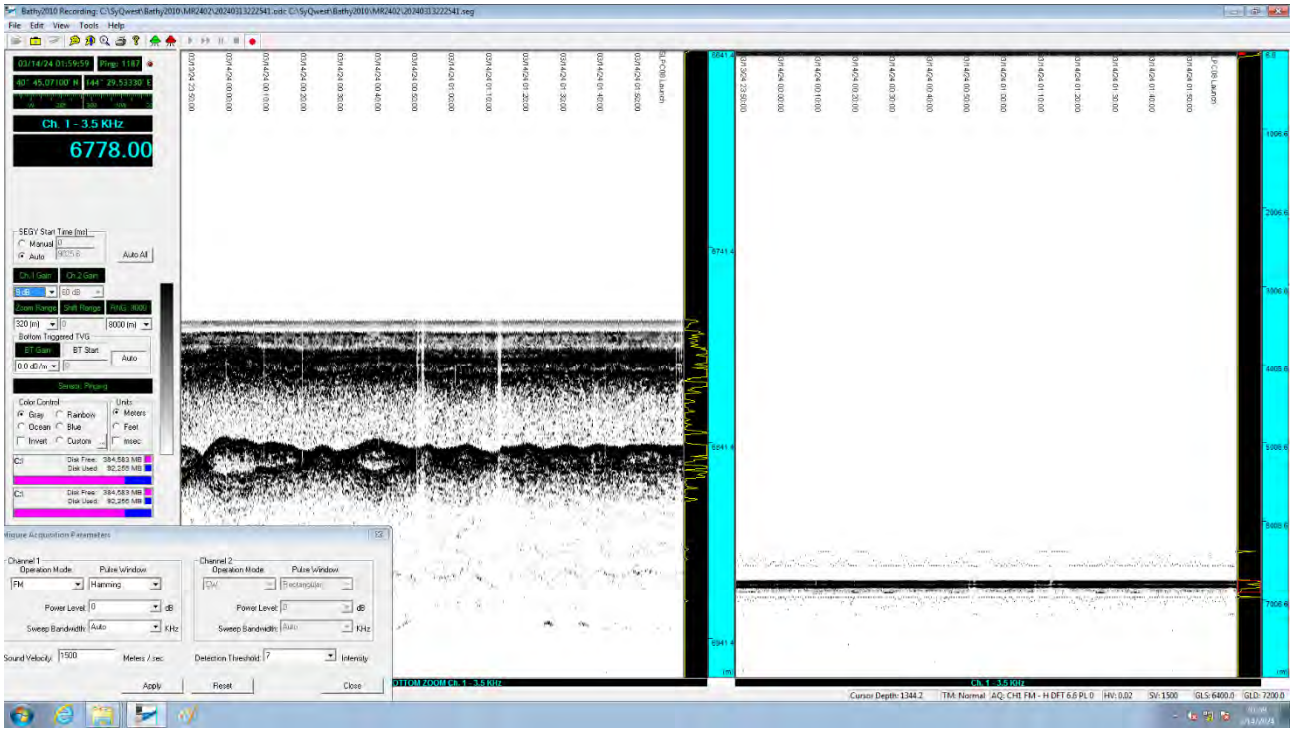


Figure 8-4-13: Sub-bottom image at SLPC08 (PC01).

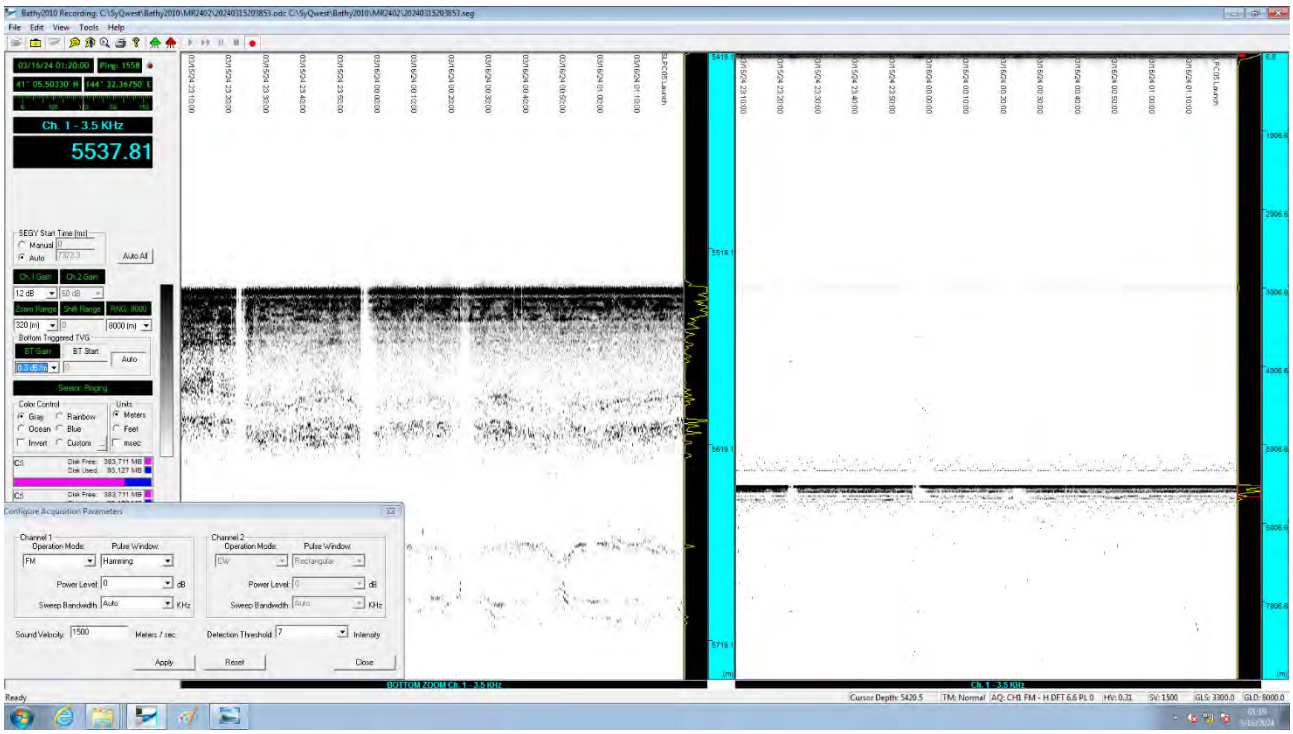


Figure 8-4-14: Sub-bottom image at SLPC05 (PC02).

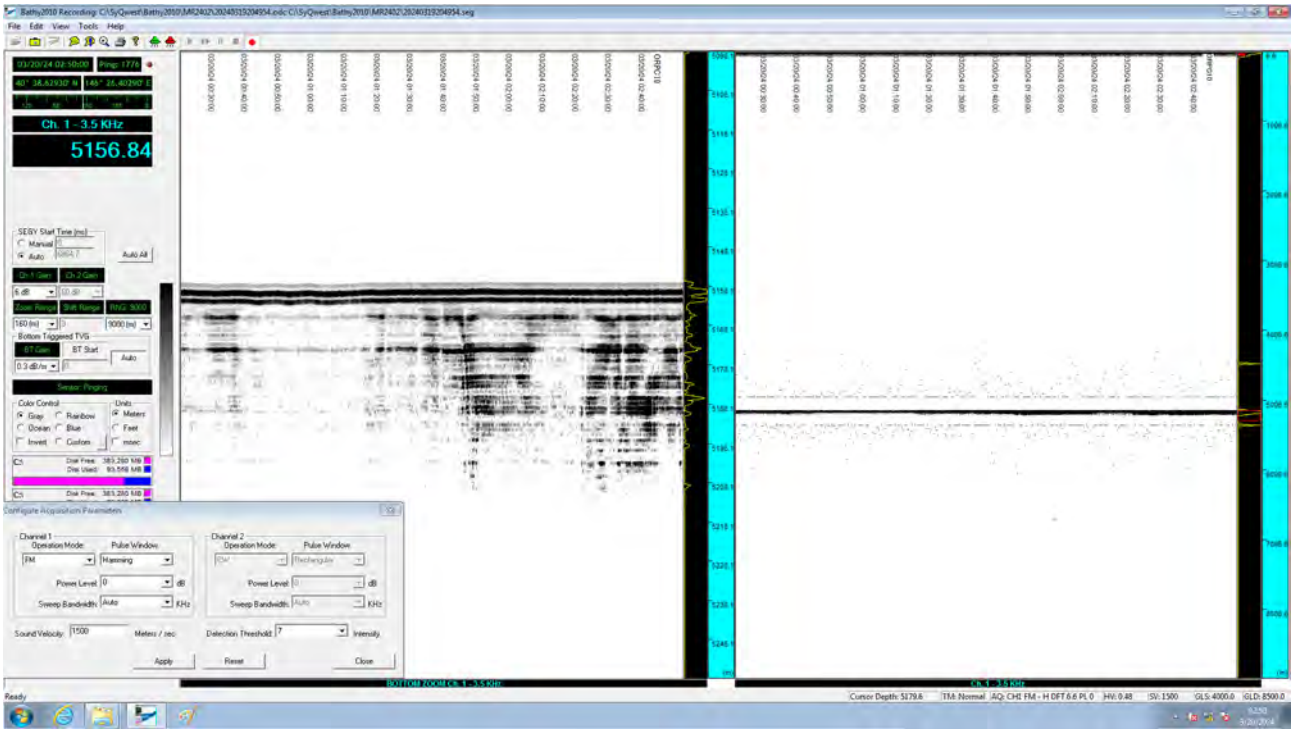


Figure 8-4-15: Sub-bottom image at ORPC10 (PC03).

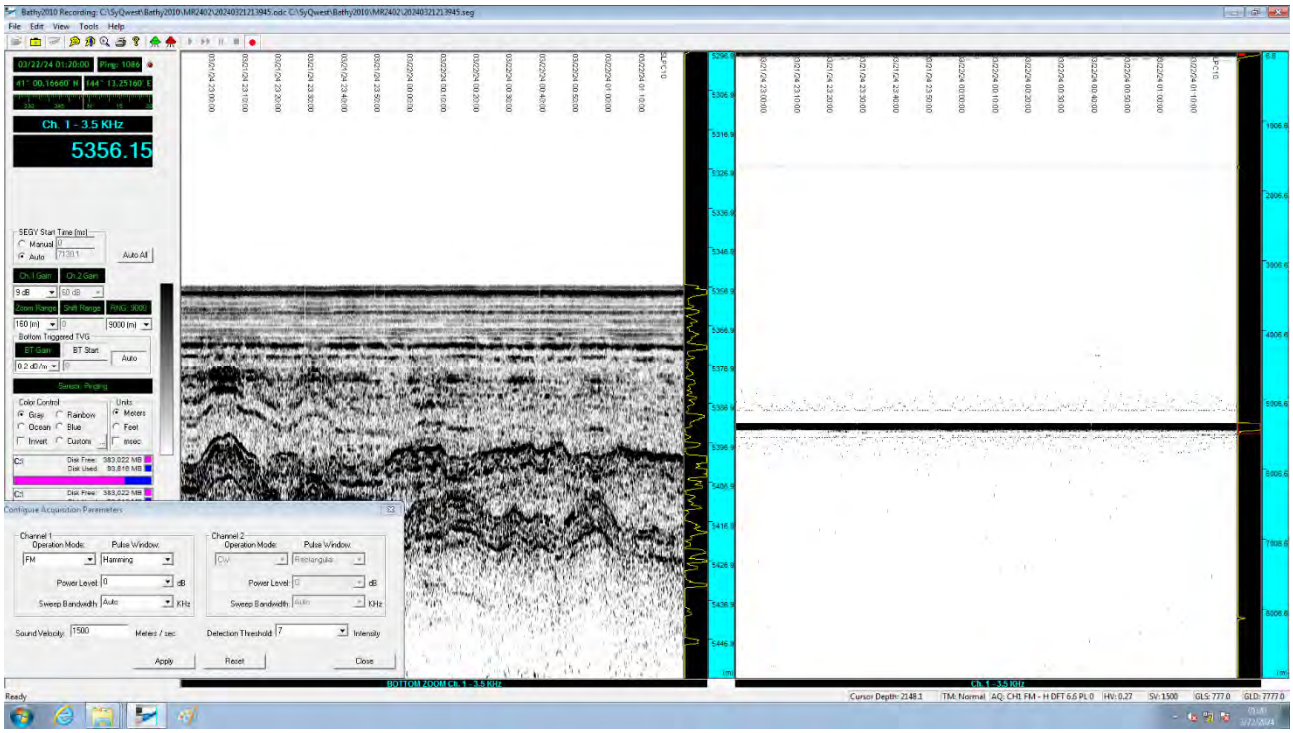


Figure 8-4-16: Sub-bottom image at SLPC10 (PC04).

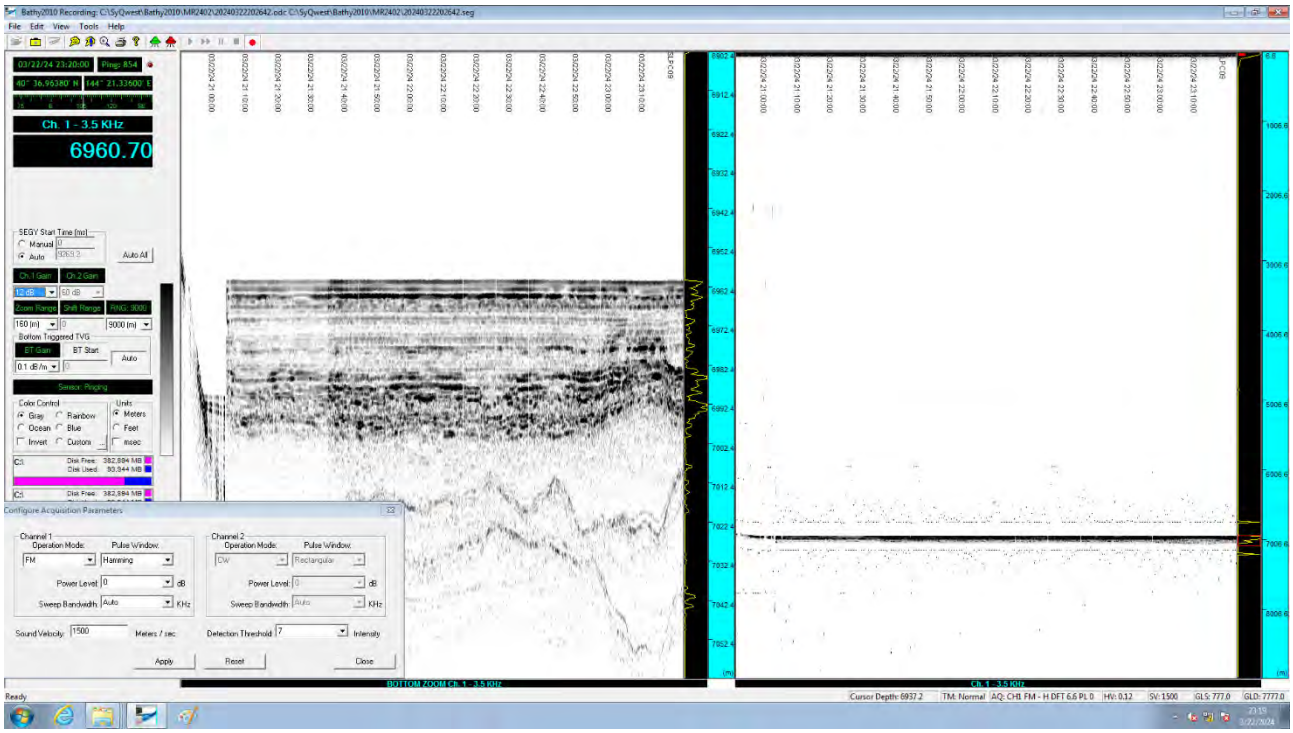


Figure 8-4-17: Sub-bottom image at SLPC09 (PC05).

8-5. Single Channel Seismic Reflection Profile

Onboard processing seismic profiles are shown in **Figures 8-5-1** to **8-5-7**. Note that the aspect ratio is different for each profile.

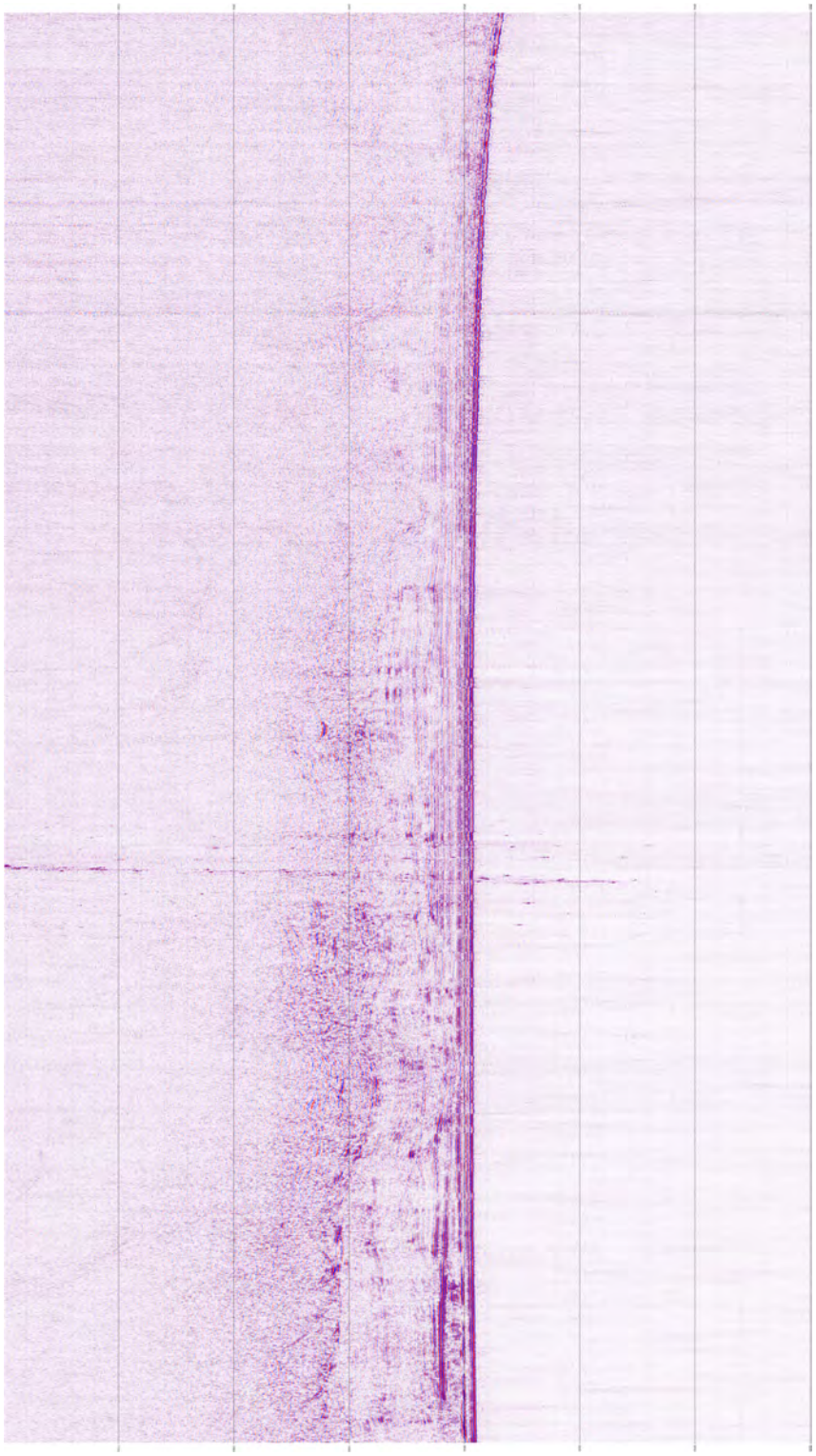


Figure 8-5-1: Seismic profile of Line OR-1. Left (WSW) – Right (ENE). The interval of horizontal thick grid lines is 500 msec.

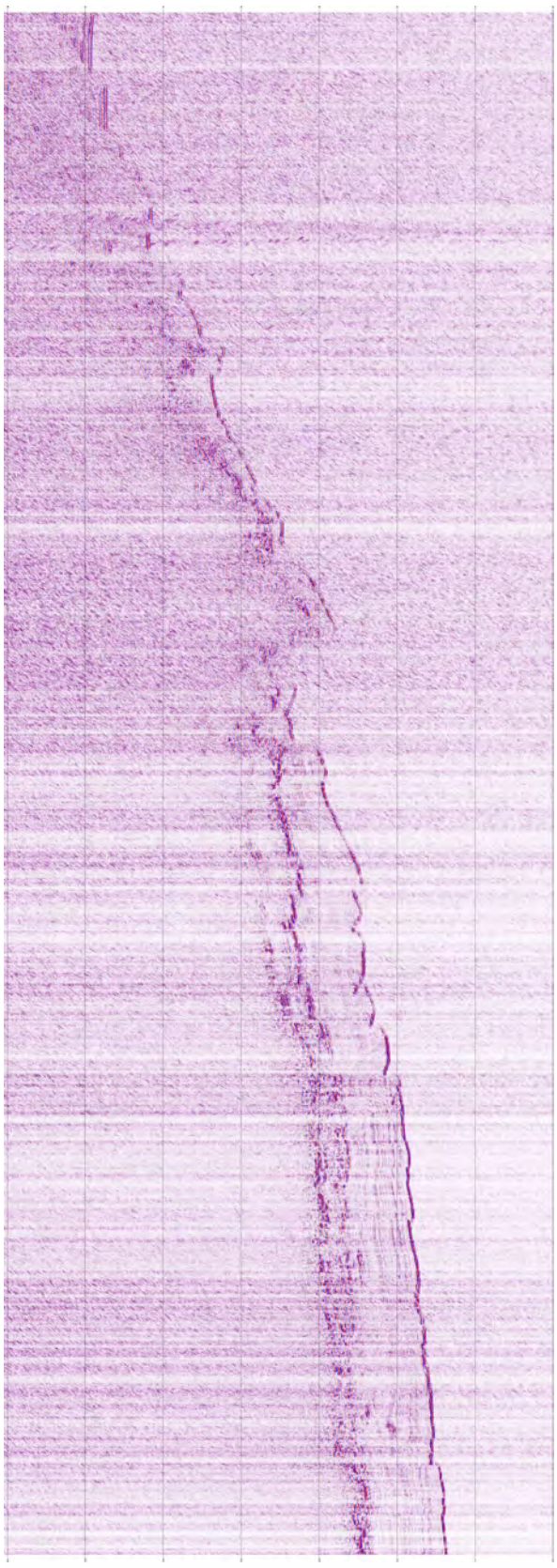


Figure 8-5-2: Seismic profile of Line OR-2. Left (NNW) – Right (SSE). The interval of horizontal thick grid lines is 500 msec.

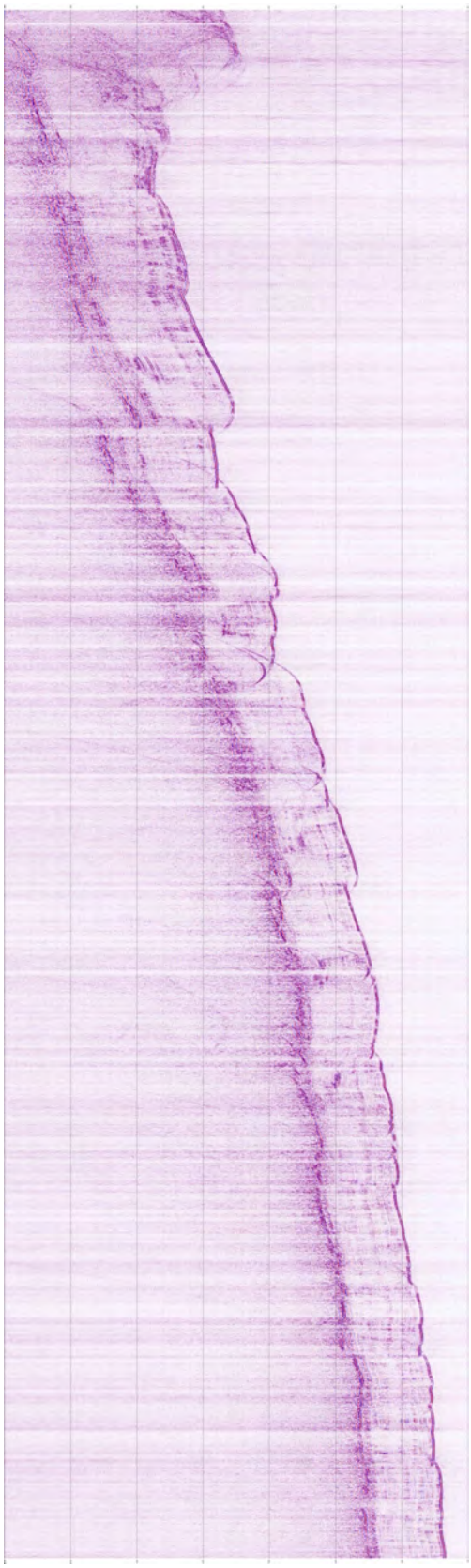


Figure 8-5-3: Seismic profile of Line OR-3. Left (NNW) – Right (SSE). The interval of horizontal thick grid lines is 500 msec.

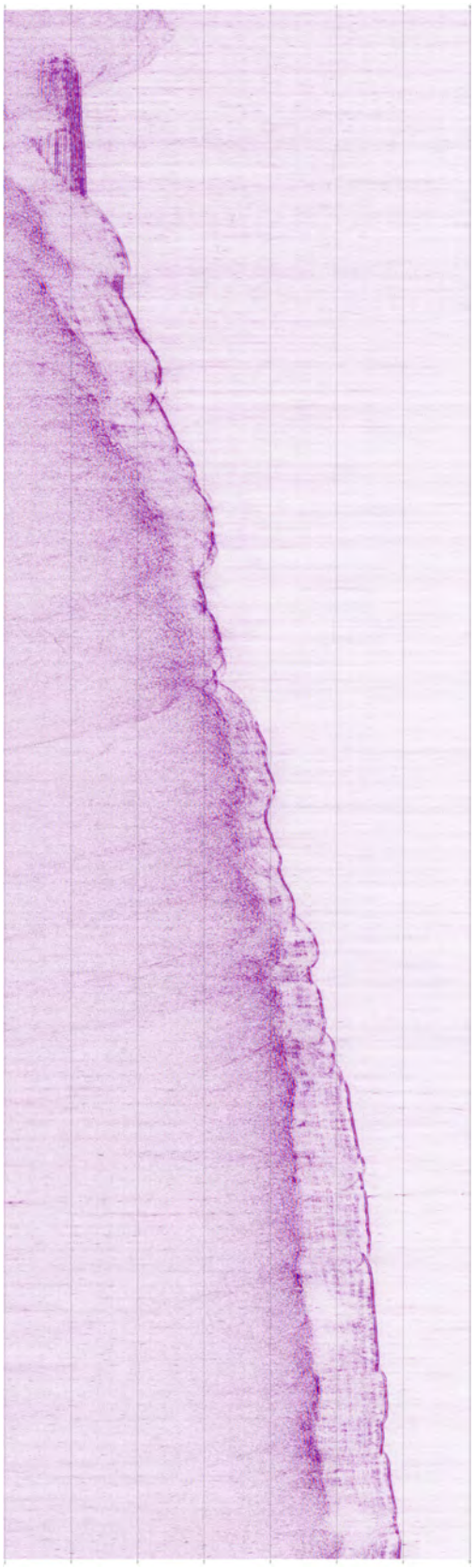


Figure 8-5-4: Seismic profile of Line OR-4. Left (NNW) – Right (SSE). The interval of horizontal thick grid lines is 500 msec.

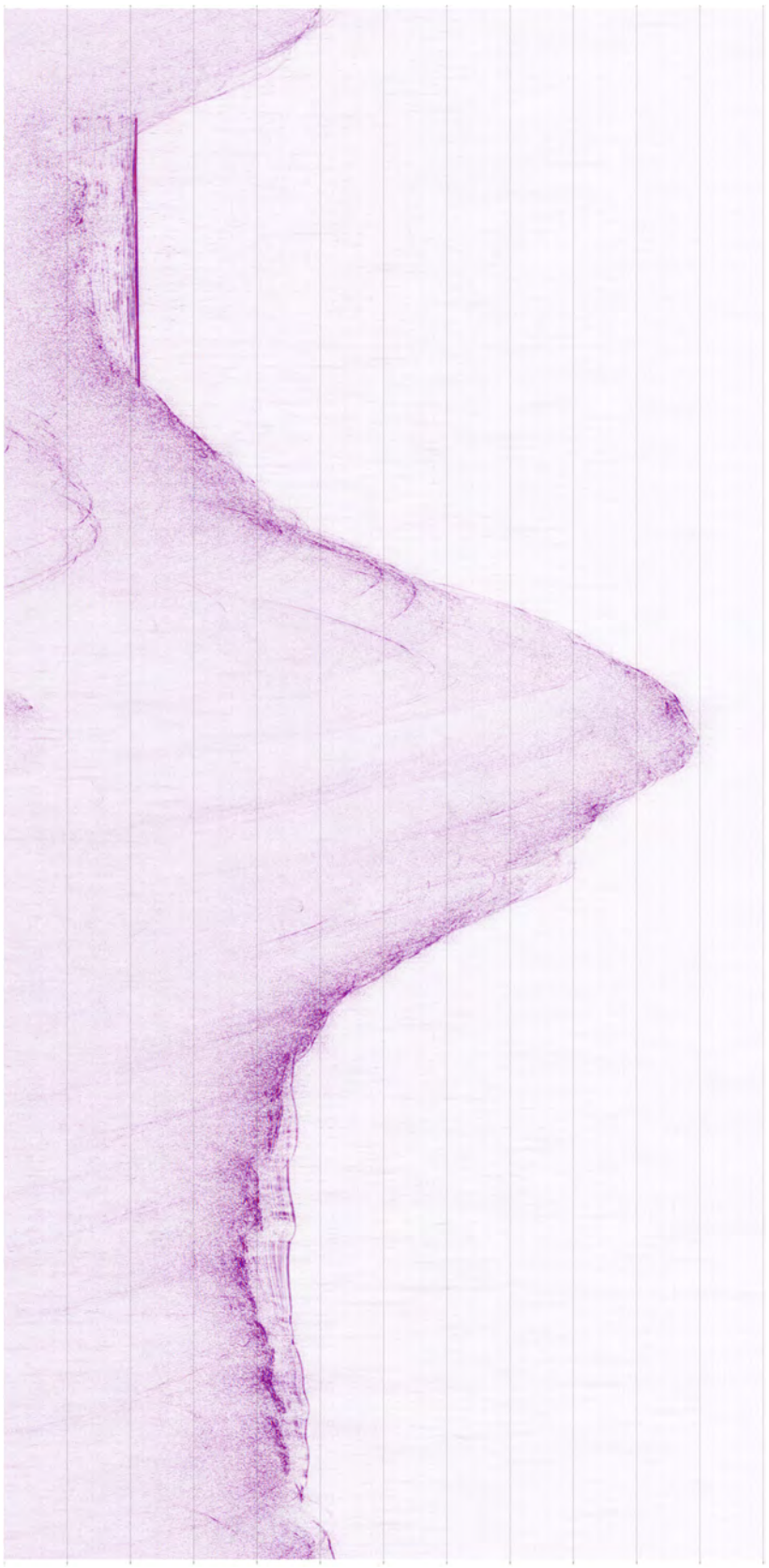


Figure 8-5-5: Seismic profile of Line OR-7. Left (N) – Right (S). The interval of horizontal thick grid lines is 500 msec.

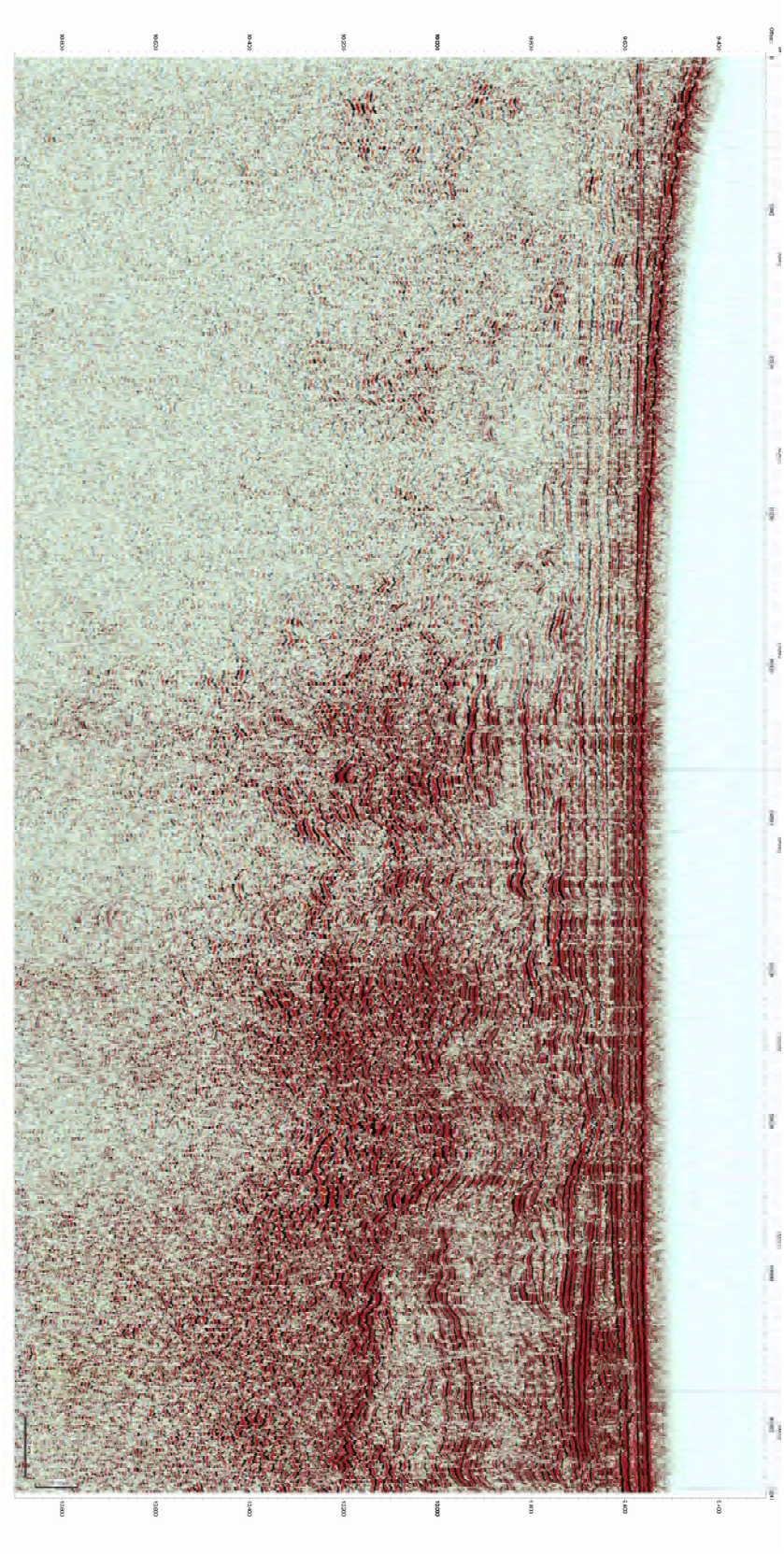


Figure 8-5-6: Seismic profile of Line OR-1. Left (WSW) – Right (ENE). The profile was processed by Cheng-Chun Chung (NTU).

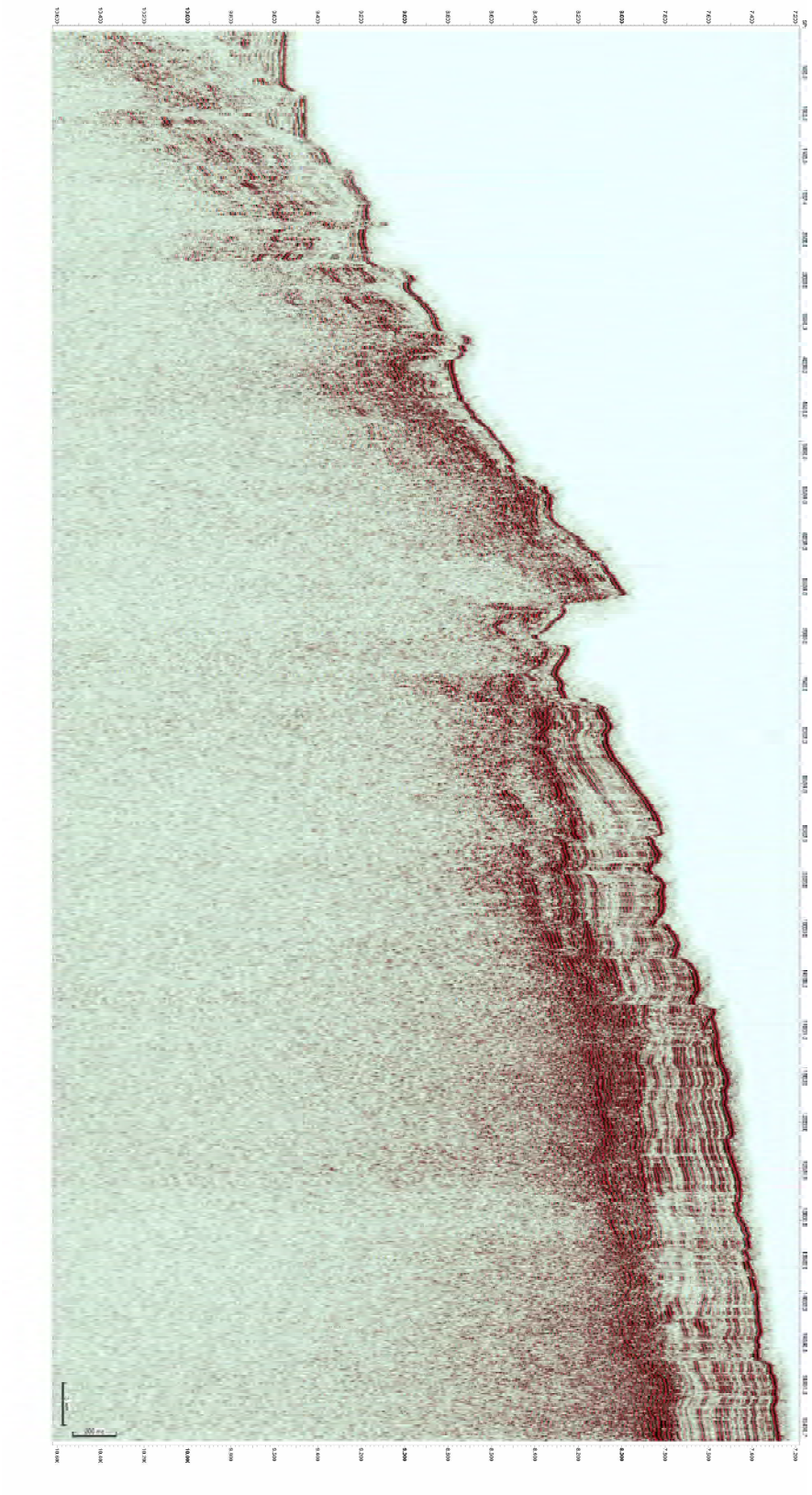


Figure 8-5-7: Seismic profile of Line OR-2. Left (NNW) – Right (SSE). The profile was processed by Cheng-Chun Chung (NTU).

8-6. Magnetic Anomaly

Surface-towed geomagnetic measurements using a cesium magnetometer were conducted during the single-channel seismic reflection survey and the multibeam bathymetric line survey. The survey tracks are perpendicular to or parallel to the Chishima Trench axis. Mesozoic magnetic anomalies (Japanese Lineation Set, e.g., Nakanishi et al., 1989) are identified along the tracks perpendicular to the trench axis (**Figure 8-6-1**).

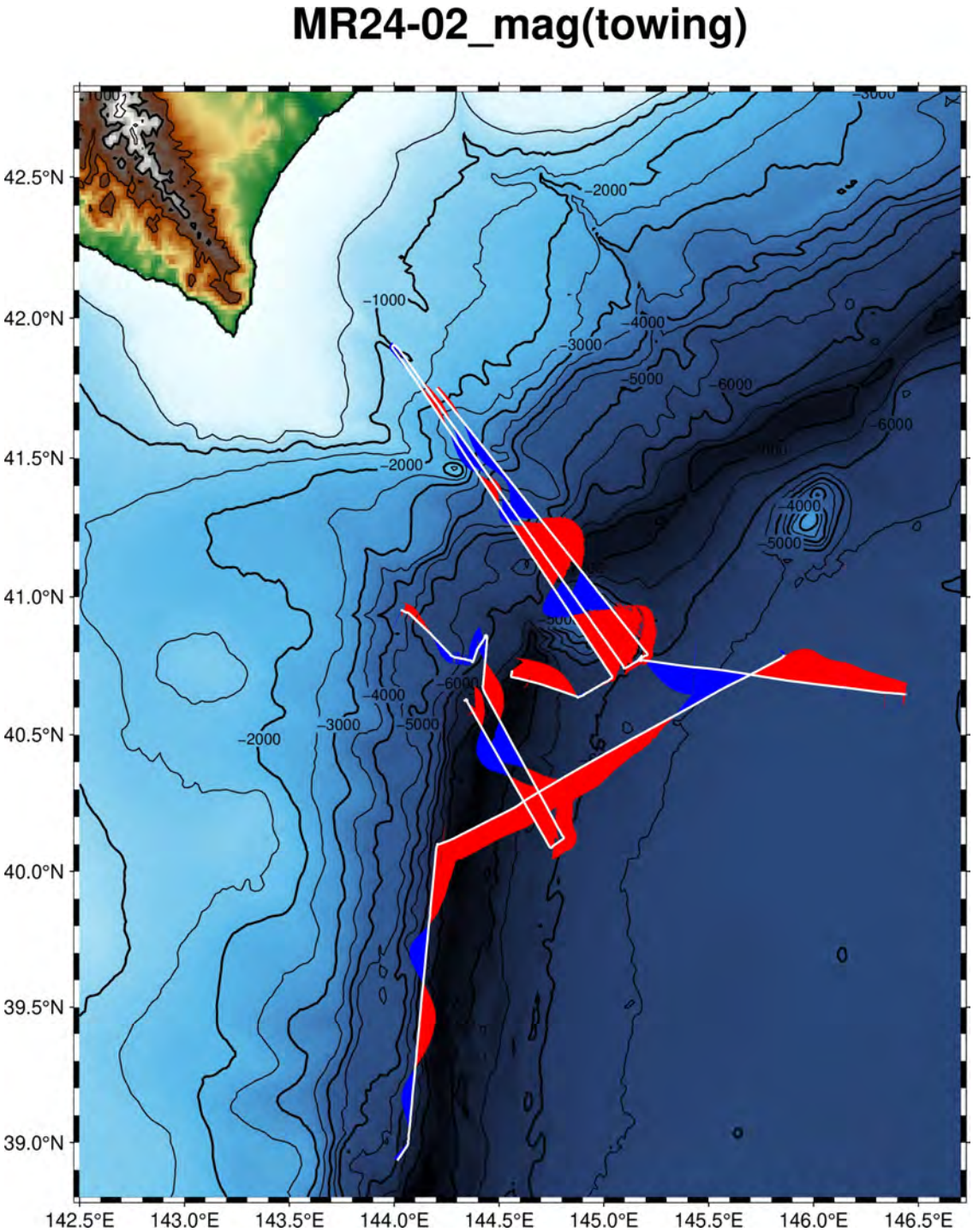


Figure 8-6-1: Quick look at the geomagnetic total force data. Observed data minus the global geomagnetic field are plotted along tracks. Areas, where the positive geomagnetic anomalies, are filled in red. Areas, where the negative geomagnetic anomalies, are filled in blue. The data were processed by Chian-Yu Huang (NTU).

8-7. Gravity Anomaly

The gravity data are output with a delay of 120 seconds because of the QC filtering. Eotvos correction is performed after correcting for the 120-second delay. Free-air gravity anomaly is calculated by subtracting from the corrected data the theoretical gravity formula of the Geodetic Reference System 1980.

8-8. Water Sampling

Surface seawater is pumped into the vessel from the bow and can be collected from a faucet in the laboratory. Water sampling and discharging from the stern is done constantly so that local seawater can be sampled in real time.

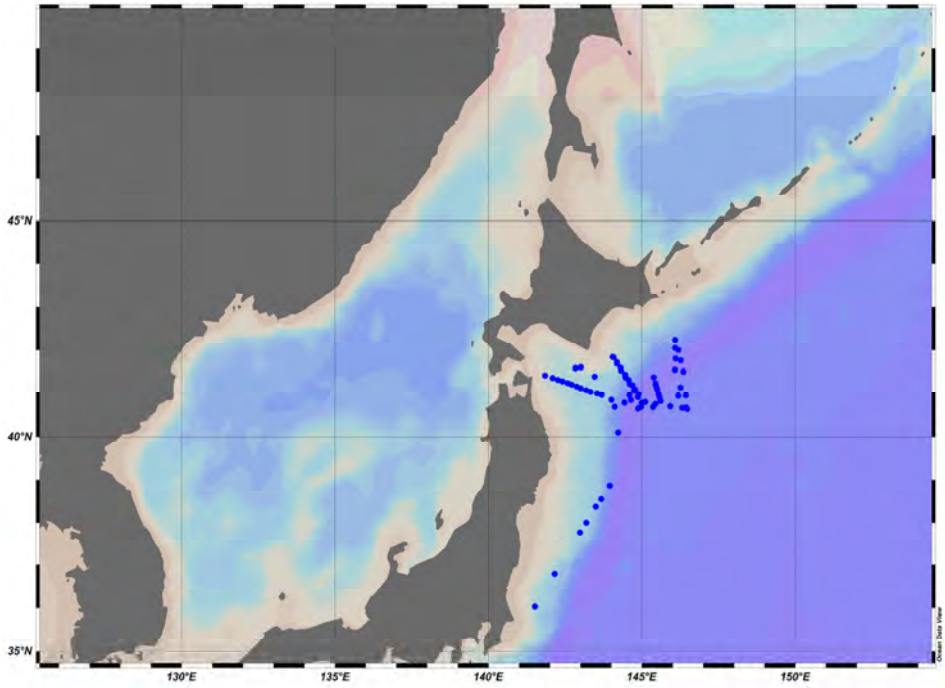


Figure 8-8-1: Water sampling points (DIC).

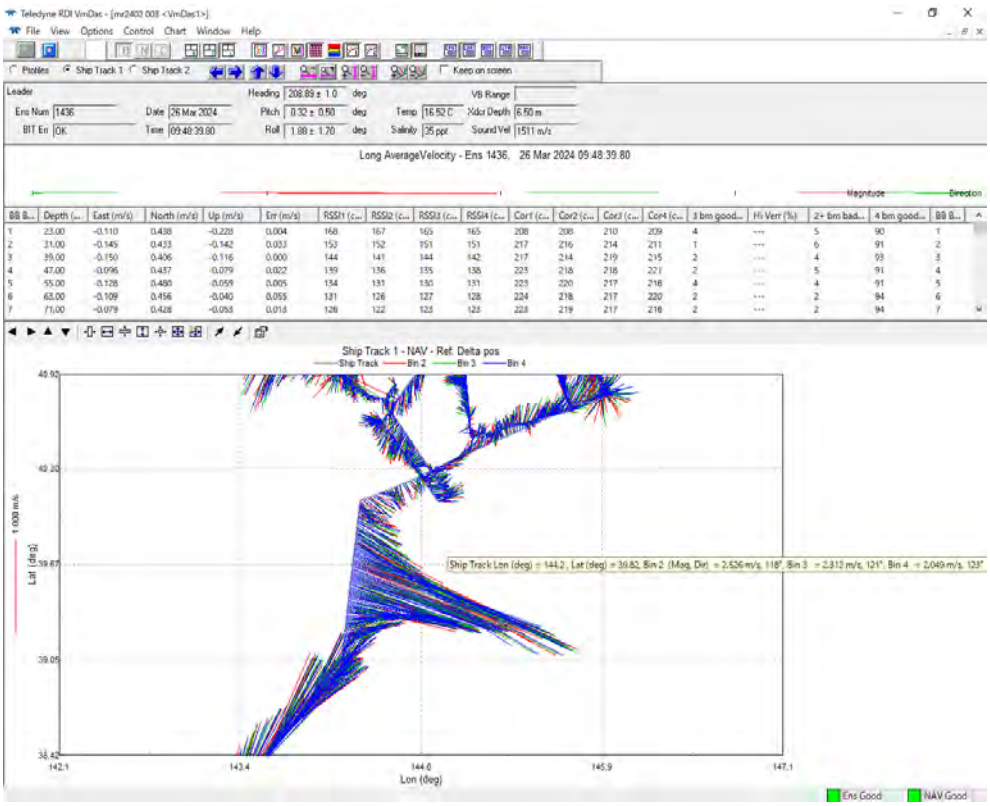


Figure 8-8-2: ADCP profile. We crossed the strong Kuroshio current at DIC-66.

Bottle No.	Sampling Depth (m)	Bottom Depth (m)	Date	Collection Time	UTC/JST	Latitude				Longitude				SST (° C)	Comments	Shift
						Deg.	Min.	N/S	Dec.	Deg.	Min.	E/W	Dec.			
DIC-1	6	981	2024/3/13	4:58	UTC	41	24.77857	N	41.41297617	141	50.75899	E	141.8459832	4.9	added >50uL HgCl2; no tube to overflow	Miya
DIC-2	6	1131	2024/3/13	6:05	UTC	41	21.40027	N	41.35667117	142	5.50953	E	142.0918255	6.4	added >50uL HgCl2; no tube to overflow	Miya
DIC-3	6	1258	2024/3/13	7:02	UTC	41	18.6957	N	41.311595	142	15.58357	E	142.2597262	6.6	no tube to overflow	Miya
DIC-4	6	1351	2024/3/13	8:00	UTC	41	16.49457	N	41.2749095	142	24.52756	E	142.4087927	6.9	no tube to overflow	Miya
DIC-5	6	1530	2024/3/13	9:05	UTC	41	13.91787	N	41.2319645	142	34.94927	E	142.5824878	6.3	no tube to overflow	Miya
DIC-6	6	1696	2024/3/13	9:52	UTC	41	12.04886	N	41.20081433	142	42.51452	E	142.7085753	6.5	no tube to overflow	Miya
DIC-7	6	1893	2024/3/13	10:55	UTC	41	9.23227	N	41.15387117	142	52.28924	E	142.8714873	6.4	no tube to overflow	Yosano, Miya
DIC-8	6	1948	2024/3/13	11:46	UTC	41	6.84499	N	41.11408317	143	0.26987	E	143.0044978	4.8	no tube to overflow	Ikeda, Miya
DIC-9	6	1971	2024/3/13	12:55	UTC	41	3.67319	N	41.06121983	143	10.76059	E	143.1793432	6.4	no tube to overflow	Kaneko, Miya
DIC-10	6	1975	2024/3/13	13:52	UTC	41	1.74517	N	41.02908617	143	19.53658	E	143.3256097	7.8	no tube to overflow	Jonishi, Miya
DIC-11	6	2048	2024/3/13	14:08	UTC	40	59.4866	N	40.99144333	143	32.32514	E	143.5387523	9.4	no tube to overflow	Miya
DIC-12	6	2282	2024/3/13	15:00	UTC	40	57.4314	N	40.95719	143	41.15558	E	143.6859263	8.5	no tube to overflow	Miya
DIC-13	6	6319	2024/3/14	6:21	UTC	40	38.32045	N	40.63867417	144	52.558	E	144.8759667	5.4	no tube to overflow	Miya
DIC-14	6	6230	2024/3/14	7:25	UTC	40	40.49234	N	40.67487233	144	58.2641	E	144.9710683	6.4	no tube to overflow	Miya
DIC-15	6	6177	2024/3/14	8:34	UTC	40	46.05	N	40.7675	144	59.42	E	144.9903333	6.1	no tube to overflow	Miya
DIC-16	6	3986	2024/3/14	9:50	UTC	40	54.299	N	40.90498333	144	52.1919	E	144.869865	7.5	no tube to overflow	Liu
DIC-17	6	6346	2024/3/14	10:50	UTC	41	3.48	N	41.058	144	44.1676	E	144.7361267	6.9	no tube to overflow	Liu
DIC-18	6	4128	2024/3/14	11:50	UTC	41	12.7975	N	41.21329167	144	35.9776	E	144.5996267	7.8	no tube to overflow	Liu
DIC-19	6	4561	2024/3/14	12:50	UTC	41	22.0567	N	41.36761167	144	27.9033	E	144.465055	10	no tube to overflow	Liu
DIC-20	6	2997	2024/3/14	13:50	UTC	41	31.5725	N	41.52620833	144	19.4718	E	144.32453	9	no tube to overflow	Liu
DIC-21	6	2233	2024/3/14	14:51	UTC	41	41.1311	N	41.68551833	144	11.0554	E	144.1842567	1.4	no tube to overflow	Liu
DIC-22	6	1120	2024/3/14	15:50	UTC	41	50.3897	N	41.83982833	144	2.8049	E	144.0467483	1.2	no tube to overflow	Jim
DIC-23	6	1128	2024/3/14	16:50	UTC	41	49.79	N	41.82983333	144	4.73	E	144.0788333	1.2	no tube to overflow	Miya
DIC-24	6	1723	2024/3/14	17:50	UTC	41	43.21	N	41.72016667	144	10.96	E	144.1826667	1.7	no tube to overflow	Miya
DIC-25	6	2858	2024/3/14	18:45	UTC	41	35.2	N	41.58666667	144	18.52	E	144.3086667	1.2	no tube to overflow	Miya
DIC-26	6	3678	2024/3/14	19:47	UTC	41	25.8223	N	41.43037167	144	27.35	E	144.4558333	10.2	no tube to overflow	Miya
DIC-27	6	4368	2024/3/14	20:52	UTC	41	18.63	N	41.3105	144	34.1	E	144.5683333	8.8	no tube to overflow	Miya
DIC-28	6	6387	2024/3/14	22:00	UTC	41	11.013	N	41.18355	144	41.254	E	144.6875667	7.4	no tube to overflow	Yanxi, PJ
DIC-29	6	6883	2024/3/14	22:57	UTC	41	4.746	N	41.0791	144	47.119	E	144.7853167	7.6	no tube to overflow	Yanxi, PJ
DIC-30	6	7300	2024/3/14	23:59	UTC	40	58.003	N	40.96671667	144	53.403	E	144.89005	7.4	no tube to overflow	Yanxi, PJ
DIC-31	6	5692	2024/3/15	1:07	UTC	40	50.355	N	40.83925	144	0.543	E	144.00905	7.8	no tube to overflow	Yanxi, PJ
DIC-32	6	6203	2024/3/15	2:02	UTC	40	40.699	N	40.67831667	144	6.638	E	144.1106333	9.6	no tube to overflow	Yanxi, PJ
DIC-33	6	5696	2024/3/17	0:35	UTC	40	40.3	N	40.67166667	145	21.8	E	145.3633333	10.3	no tube to overflow	Miya
DIC-34	6	5321	2024/3/17	11:36	UTC	40	56.03	N	40.93383333	146	11.3	E	146.1883333	14.7		Miya
DIC-35	6	5149	2024/3/17	17:49	UTC	40	37.7	N	40.62833333	146	28.23	E	146.4705	9.4		Miya
DIC-36	6	5156	2024/3/18	23:08	UTC	40	39.84	N	40.664	146	26.107	E	146.4351167	8.5	stormy	Miya, 日新, PJ
DIC-37	6	5440	2024/3/18	11:50	UTC	41	7.564	N	41.12606667	146	15.529	E	146.2588167	11.3	very stormy + snowing	Miya
DIC-38	6	6565	2024/3/19	1:13	UTC	41	32.57	N	41.54283333	146	4.57	E	146.0761667	11.9	stormy	Miya
DIC-39	6	6437	2024/3/19	3:54	UTC	41	47.89	N	41.79816667	146	5.94	E	146.099	12.1	stormy	Miya
DIC-40	6	5436	2024/3/19	5:29	UTC	42	3.117	N	42.05195	146	4.892	E	146.0815333	6.5		Miya
DIC-41	6	4630	2024/3/19	6:44	UTC	42	14.5	N	42.24166667	146	4.897	E	146.0816167	5.2		Miya
DIC-42	6	5856	2024/3/19	8:59	UTC	41	59.91	N	41.9985	146	11.03	E	146.1838333	11.4		Miya
DIC-43	6	6971	2024/3/19	10:51	UTC	41	45.42	N	41.757	146	15.86	E	146.2643333	10.4		Miya
DIC-44	6	5682	2024/3/19	12:47	UTC	41	30.126	N	41.5021	146	20.97	E	146.3495	10		
DIC-45	6	5270	2024/3/19	16:12	UTC	40	56.86	N	40.94766667	146	26.02	E	146.4336667	7.9		
DIC-46	6	5137	2024/3/20	5:19	UTC	40	39.299	N	40.65498333	146	18.604	E	146.3100667	7.6	after piston retrieval	Miya
DIC-47	6	5137	2024/3/20	5:19	UTC	40	39.299	N	40.65498333	146	18.604	E	146.3100667	7.6	top water of pilot core PC03(?); felt quite cold; sucked gum tube with mouth first before filling the bottle; likely bottom water from ~5km but mixed with water when taken back to surface	Miya
DIC-48	6	5255	2024/3/20	6:43	UTC	40	41.489	N	40.69148333	145	55.6	E	145.9266667	6.1		Miya
DIC-49	6	5655	2024/3/20	8:32	UTC	40	44.678	N	40.74463333	145	26.21	E	145.4368333	8.7		Miya
DIC-50	6	6082	2024/3/20	10:33	UTC	40	47.338	N	40.78896667	145	6.35	E	145.1058333	7.7		Miya
DIC-51	6	7331	2024/3/20	12:15	UTC	40	50.207	N	40.83678333	144	38.48	E	144.6413333	7.6		Miya
DIC-52	6	1931	2024/3/20	23:07	UTC	41	23.05	N	41.38416667	143	27.81	E	143.4635	1.6	stormy	Miya
DIC-53	6	835	2024/3/21	1:19	UTC	41	36.078	N	41.6013	143	0.69	E	143.0115	0.5	stormy	Miya

DIC-54	6	5137	2024/3/20	5:19	UTC	40	39.299	N	40.65498333	146	18.604	E	146.3100667	7.6	pore water (probably mixed with seawater) in PC03 sect.3; 3/21 5:15 transferred from steel bucket to 250mL glass bottle with 5mL pipette without overflowing and then added HgCl2	Miya
DIC-55	6	920	2024/3/21	13:41	UTC	41	34.824	N	41.5804	142	49.927	E	142.8321167	5.7	first 24hr not in fridge	Miya
DIC-56	6	6591	2024/3/22	9:14	UTC	40	46.39	N	40.77316667	144	26.07	E	144.4345	7.7		Miya
DIC-57	6	6284	2024/3/23	3:43	UTC	40	56.85	N	40.9475	144	35.7	E	144.595	8.5		Miya
DIC-58	6	5541	2024/3/24	5:31	UTC	40	49.04	N	40.81733333	145	36.3	E	145.605	8		Miya
DIC-59	6	5694	2024/3/24	6:46	UTC	40	54.0348	N	40.90058	145	34.336	E	145.5722667	8.7		Miya
DIC-60	6	5791	2024/3/24	7:45	UTC	40	57.965	N	40.96608333	145	32.746	E	145.5457667	8.2		Miya
DIC-61	6	6104	2024/3/24	9:24	UTC	41	4.67	N	41.07783333	145	30.07	E	145.5011667	7.1		Miya
DIC-62	6	6413	2024/3/24	10:33	UTC	41	9.29	N	41.15483333	145	28.25	E	145.4708333	7.6		Miya
DIC-63	6	6747	2024/3/24	11:39	UTC	41	13.699	N	41.22831667	145	26.4798	E	145.44133	9		Miya
DIC-64	6	7093	2024/3/24	13:46	UTC	41	22.3	N	41.37166667	145	23.04	E	145.384	8.1		Miya
DIC-65	6	6885	2024/3/25	14:51	UTC	40	6.135	N	40.10225	144	13.45	E	144.2241667	7.5		Miya
DIC-66	6	5891	2024/3/26	0:25	UTC	38	51.64	N	38.86066667	143	57.21	E	143.9535	17	2-3am-ish: strong current from west to east; jet stream(?); kuroshio	Miya
DIC-67	6	3963	2024/3/26	2:33	UTC	38	32.5	N	38.54166667	143	40.25	E	143.6708333	17.1	kuroshio	Miya
DIC-68	6	3225	2024/3/26	3:53	UTC	38	21.48	N	38.358	143	29.92	E	143.4986667	17.2		Miya
DIC-69	6	2506	2024/3/26	6:15	UTC	38	0.118	N	38.00196667	143	11.11	E	143.1851667	17.2		Miya
DIC-70	6	2062	2024/3/26	7:39	UTC	37	46.087	N	37.76811667	142	59.2	E	142.9866667	17		Miya
DIC-71	6	2689	2024/3/26	13:27	UTC	36	48.17	N	36.80283333	142	9.44	E	142.1573333	17		Miya
DIC-72	6	2025	2024/3/26	18:02	UTC	36	1.87	N	36.03116667	141	31.02	E	141.517	16.5	stormy	Miya

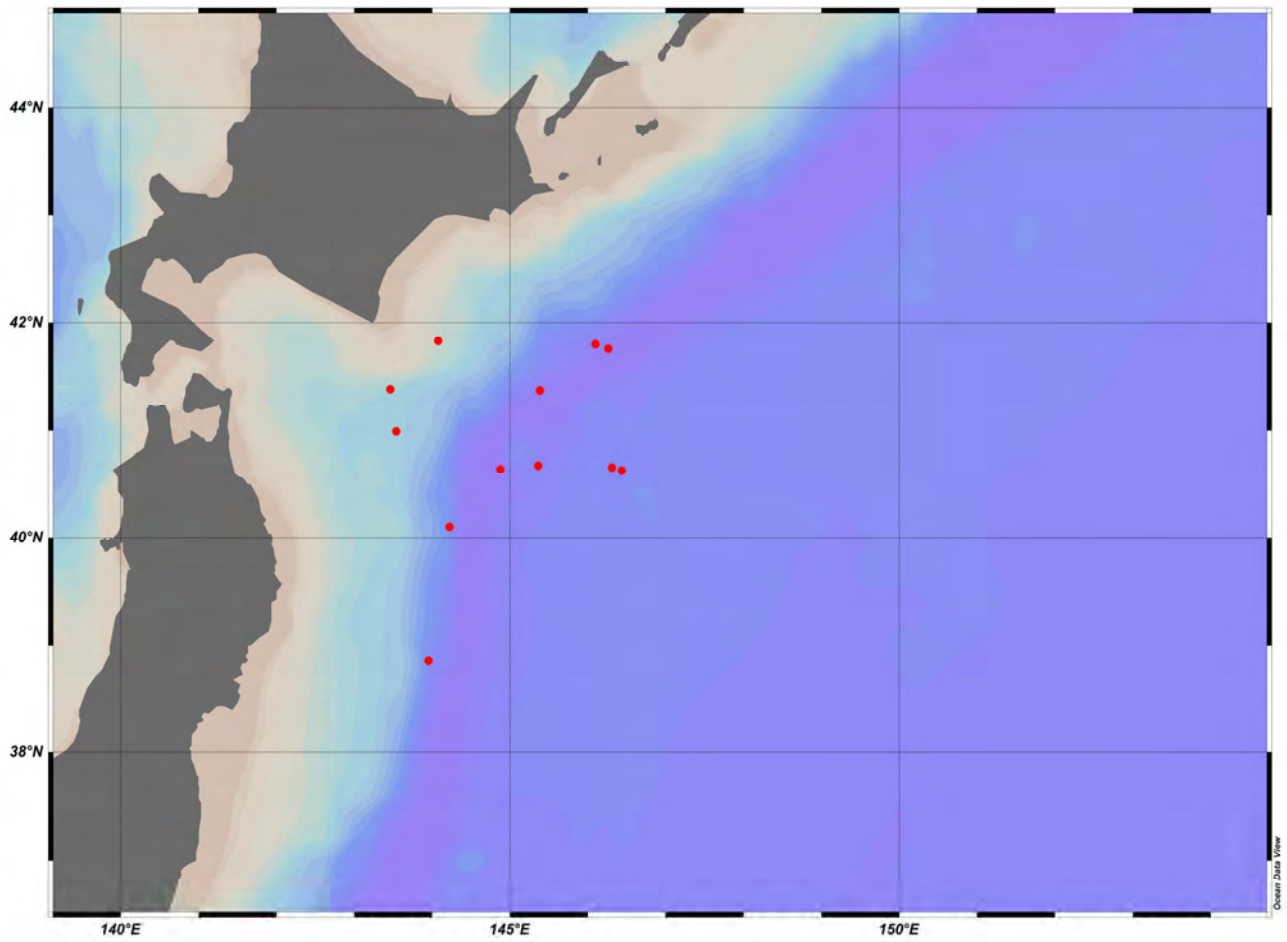


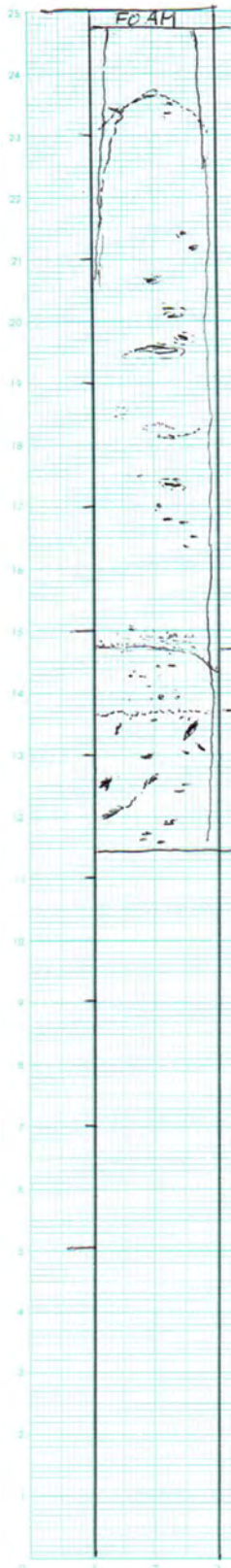
Figure 8-8-3: Water sampling points (DOC).

Bottle No.	Bottom Depth (m)	Date	Time (UTC)	Time (JST)	Latitude			Longitude			SST	Comments
					Deg.	Min.	Dec.	Deg.	Min.	Dec.		
DOC-1	981	2024/3/13	4:58	13:58	41	24.77857	41.41297617	141	50.75899	141.8459832	4.9	cracked since filled too full
DOC-2	1815	2024/3/13	10:27	19:27	41	10.54462	41.17574367	142	47.98999	142.7998332	6.5	broken since filled too full
DOC-3	2048	2024/3/13	15:08	0:08	40	59.4866	40.99144333	143	32.32514	143.5387523	9.4	when changing, closed vacuum, not tube of vacuum
DOC-4	6319	2024/3/14	6:30	15:21	40	38.32045	40.63867417	144	52.558	144.8759667	5.4	when changing, closed vacuum, not tube of vacuum
DOC-5	1128	2024/3/14	16:50	1:50	41	49.79	41.82983333	144	4.73	144.0788333	1.2	when changing, closed vacuum, not tube of vacuum
DOC-6	5696	2024/3/17	0:35	9:35	40	40.3	40.67166667	145	21.8	145.3633333	10.3	when changing, closed vacuum, not tube of vacuum
DOC-7	5156	2024/3/18	23:08	8:08	40	37.7	40.62833333	146	26.107	146.4351167	8.5	stormy (Miya & PJ)
DOC-8	6437	2024/3/19	3:54	12:54	41	47.89	41.79816667	146	5.94	146.099	12.1	stormy
DOC-9	6971	2024/3/19	10:51	10:51	41	45.42	41.757	146	15.86	146.2643333	10.4	
DOC-10	1931	2024/3/20	23:07	23:07	41	23.05	41.38416667	143	27.81	143.4635	1.6	stormy
DOC-11	5137	2024/3/20	5:19	5:19	40	39.299	40.65498333	146	18.604	146.3100667	1.6	pore water (mixed with seawater probably) in PC03 sect.3; filtered ~24hrs after core retrieval (~5:30 on 3/21); took ~1.5hrs & 3 sets of filter papers to filter
DOC-12	7093	2024/3/24	13:46	13:46	41	22.3	41.37166667	145	23.04	145.384	8.1	
DOC-13	6885	2024/3/25	14:51	14:51	40	6.135	40.10225	144	13.45	144.2241667	7.5	
DOC-14	5891	2024/3/26	0:25	0:25	38	51.64	38.86066667	143	57.21	143.9535	17	kuroshio

9. Appendix

9-1. Visual Core Description

MR24-02 PC01 sec. 1A 2024.3.17



5Y4/2 silt homogeneous oxidized.

7.5Y3/1 silt homogeneous a few iron monosulfides spots.

weak bioturb?

57.5-57 7.5Y3/1 c.silt-v.f.s. paral. laminated sharp base

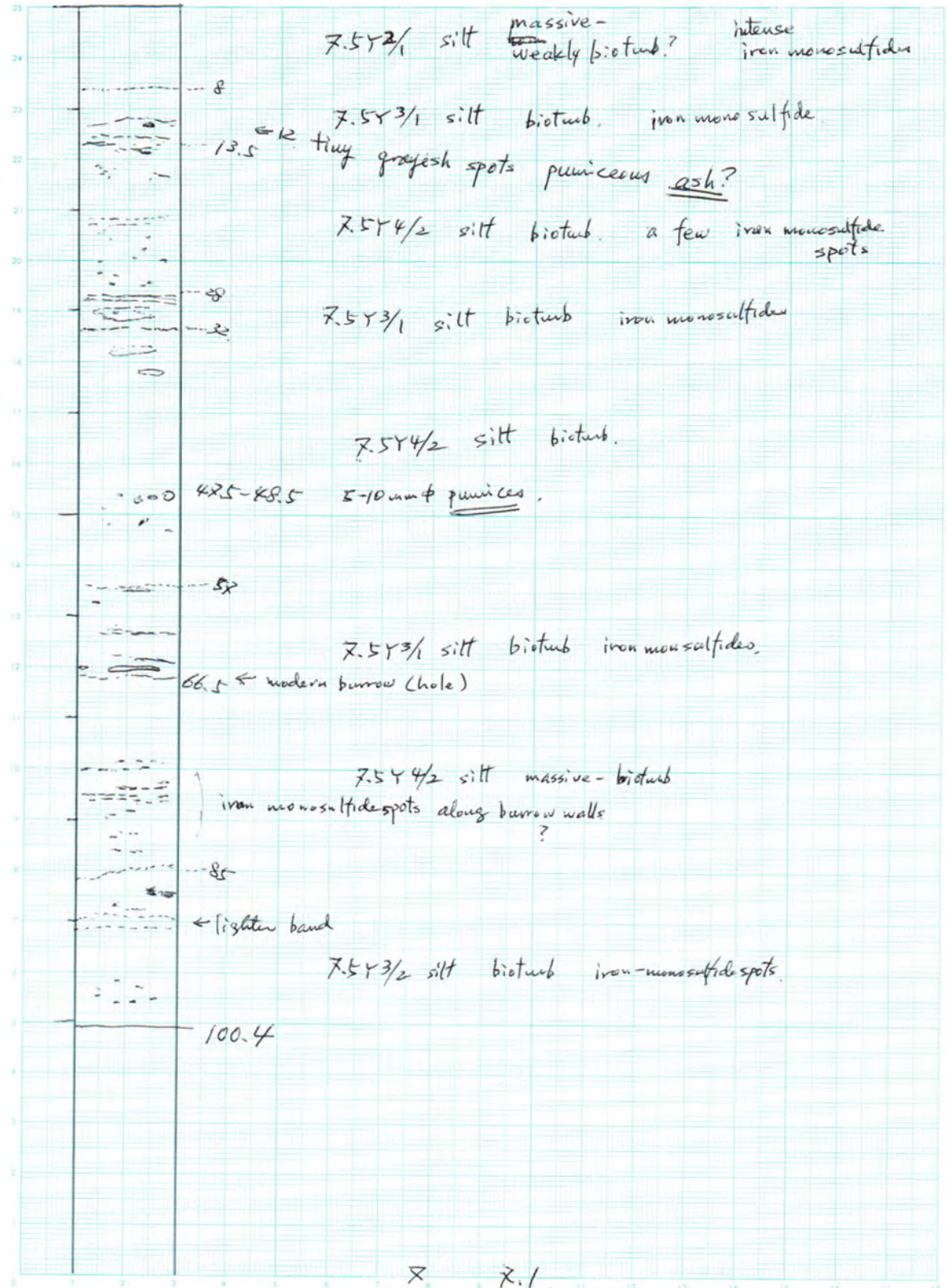
7.5Y4/1 slightly clayey silt bioturb
a few iron monosulfide spots.
bioturb boundary.

7.5Y3/1 slightly diat. clayey silt
iron monosulfide spots
right half of the lowermost ~3cm
oxidized
(after splitting)

PC01 1W liner 68.1cm
top 1.4cm.
liner obliquely cutted.

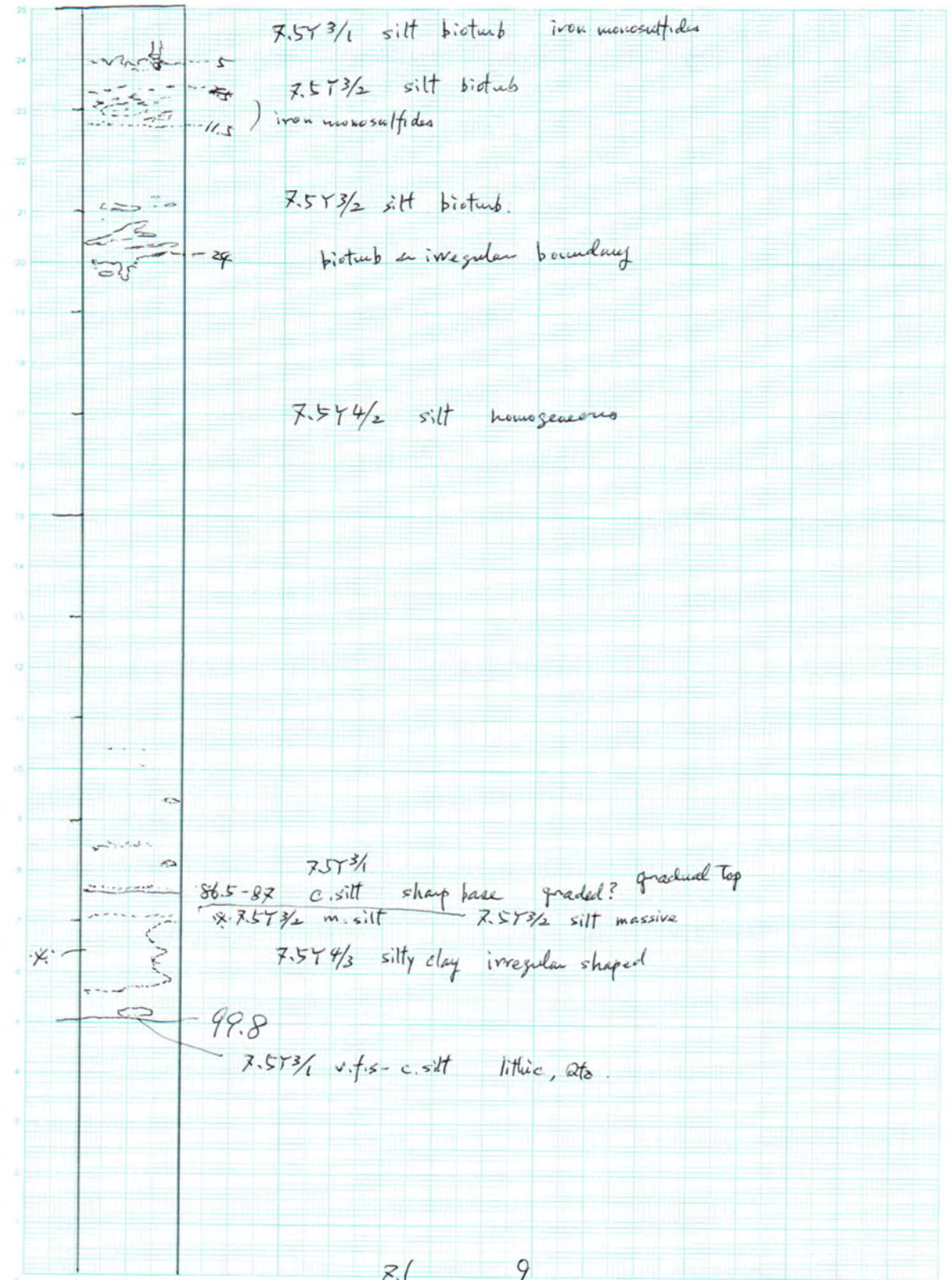
1.4 - ~~67.8~~ 67.9 (0.2-66.5)

MR24-02 PC01 sec. 2A 2024. 3. 17



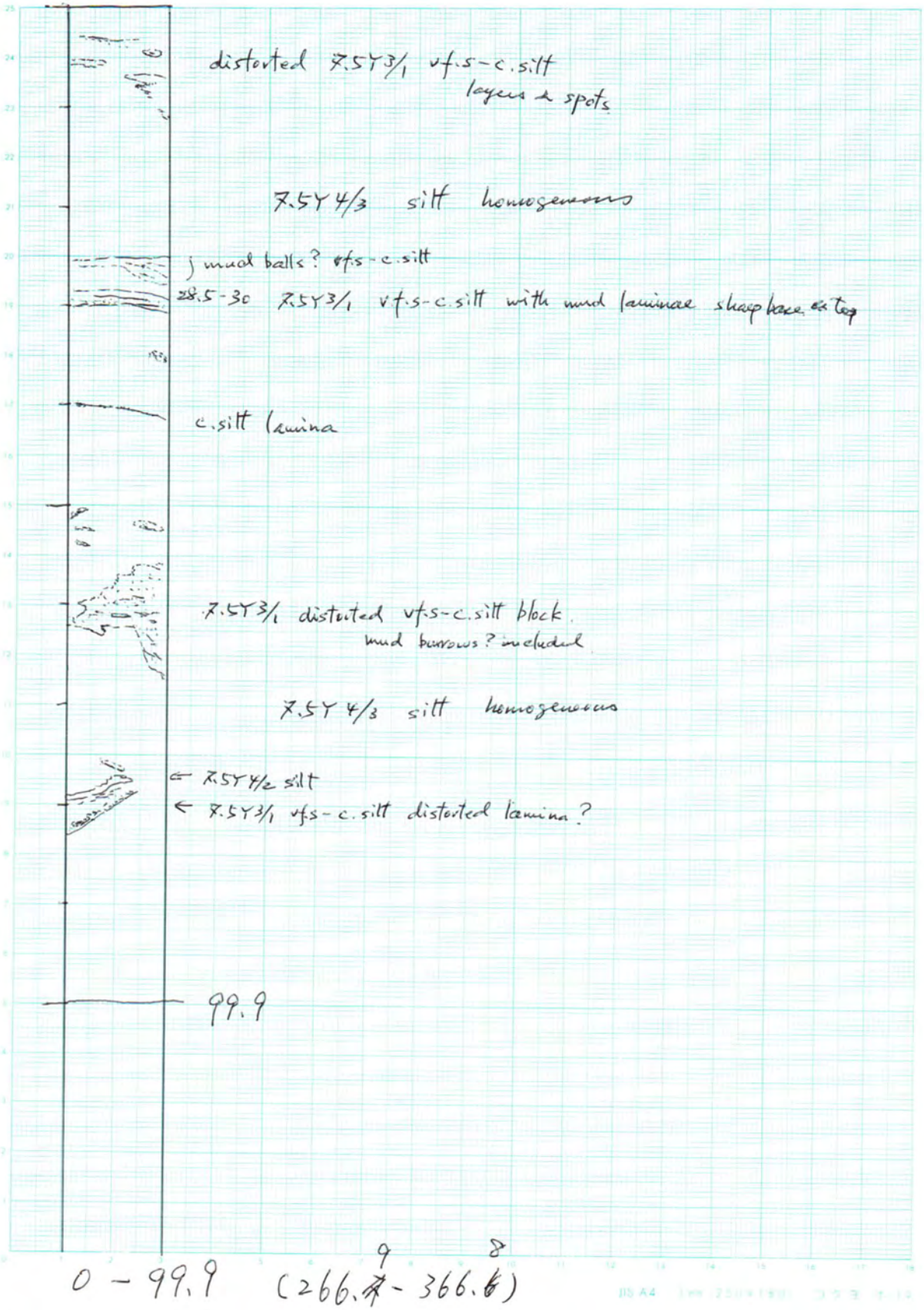
0 - 100.4 (66.5 - 166.9) x 1

MR24-02 PC01 sec. 3A 2024.3.17



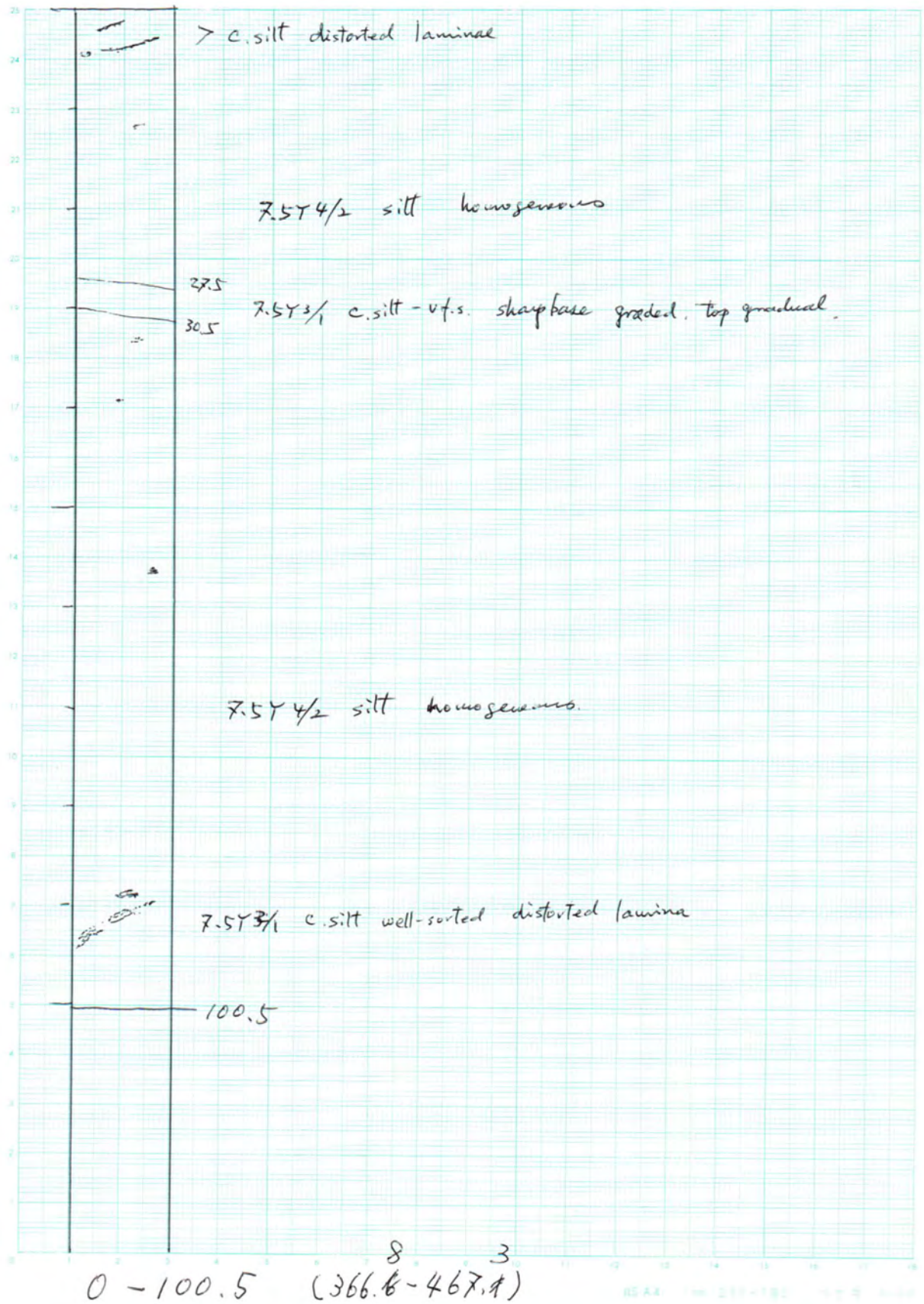
0 - 99.8 (166.~~9~~ - 266.~~7~~ 7.1 9)

MR24-02 PC01 sec. 4A 2024. 3. 17



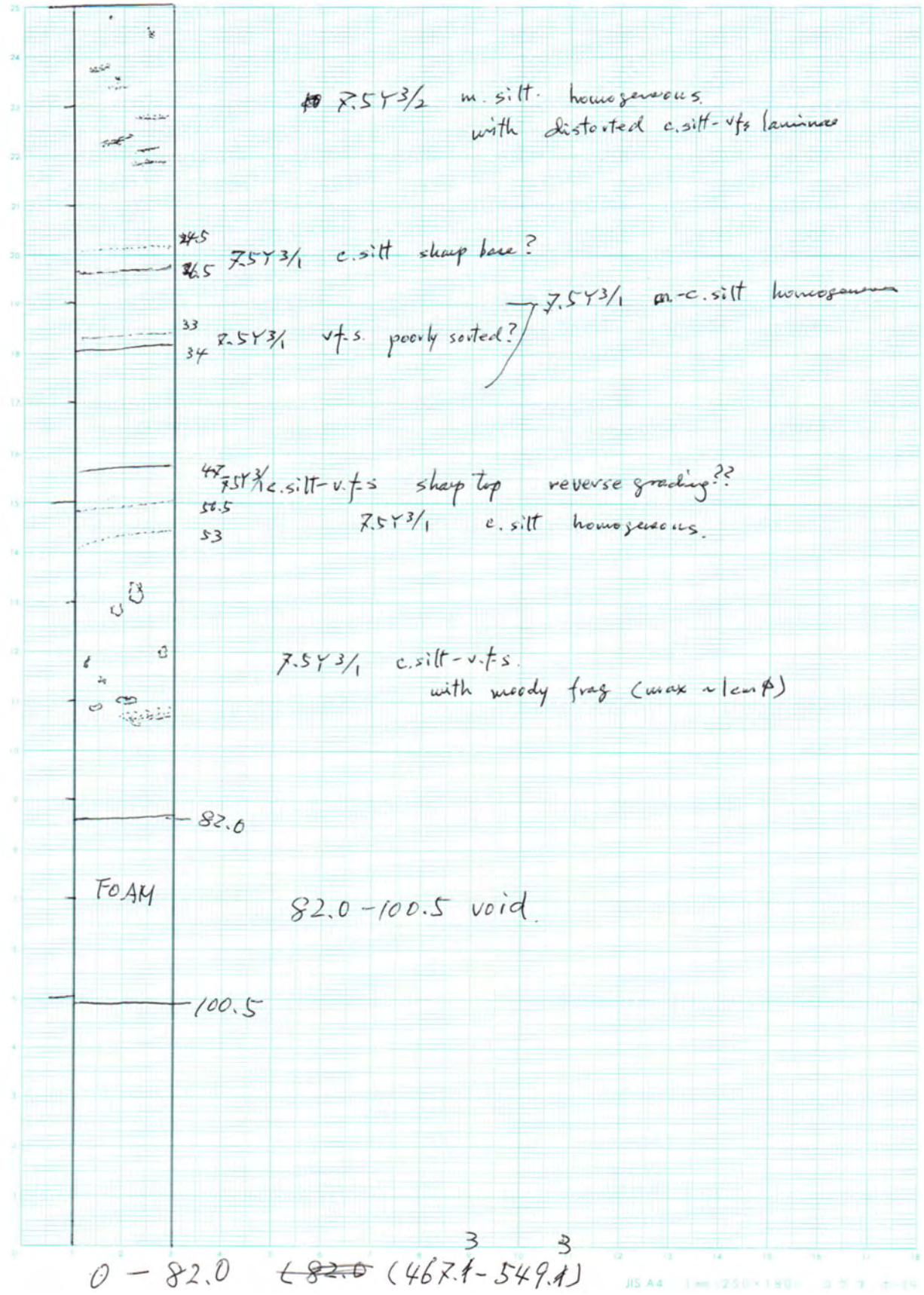
0 - 99.9 (266.~~7~~9 - 366.~~6~~8)

MR24-02 PC01 sec.5A 2024.3.17



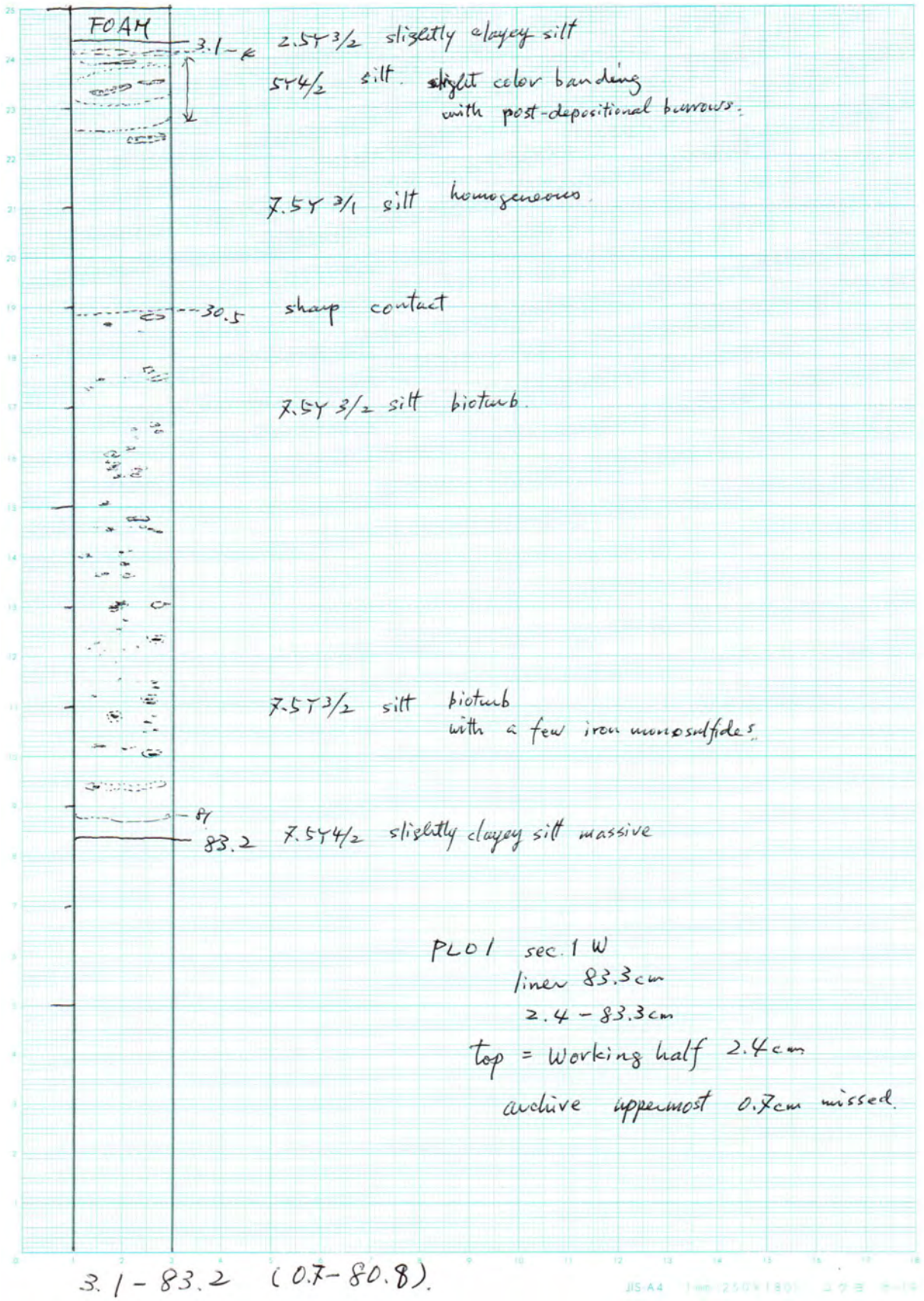
0 - 100.5 (366.8 - 467.3)

MR 24-02 PC01 sec. 6A 2024.3.17



0 - 82.0 ~~82.0~~ (467.1-549.1)

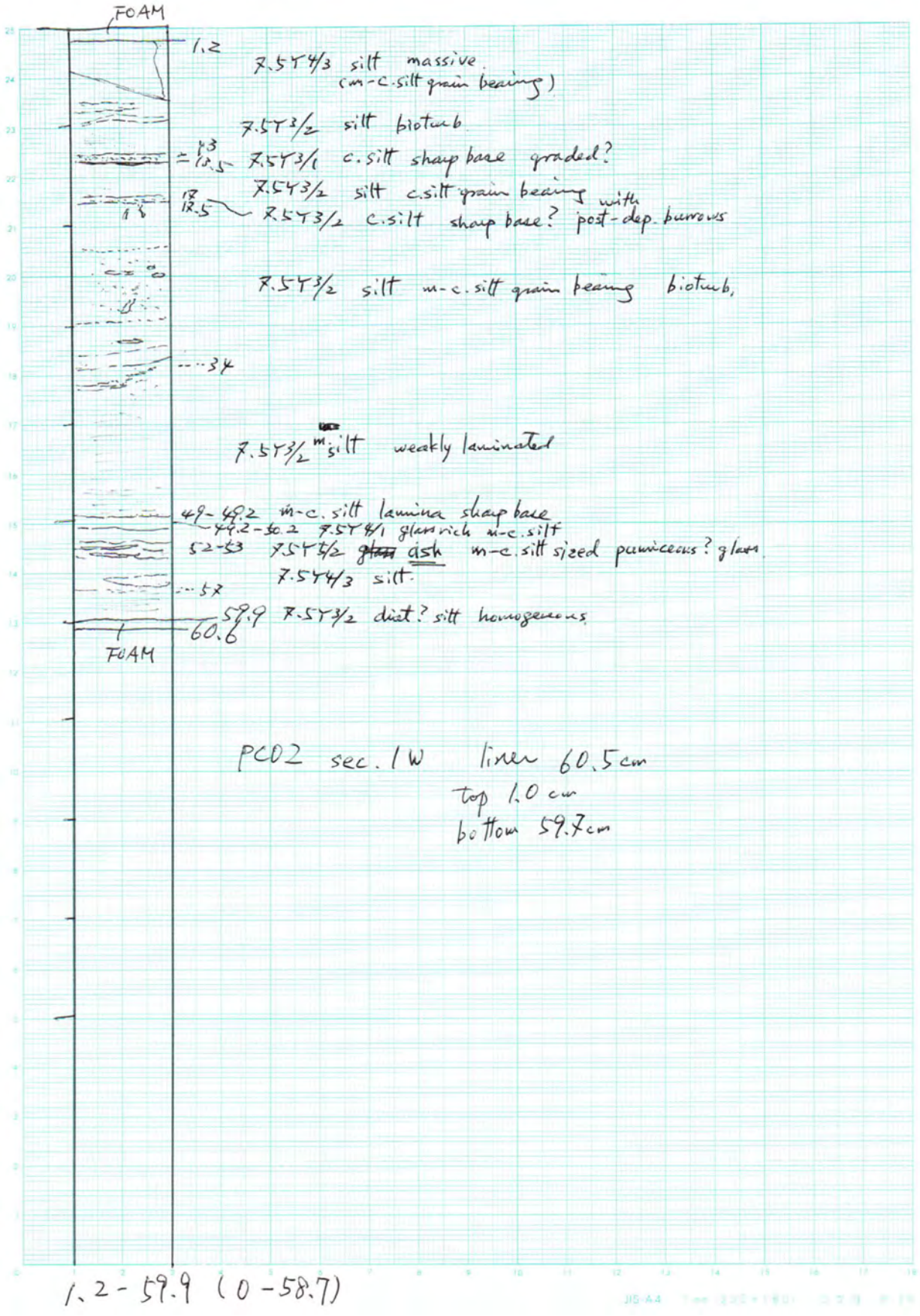
MR24-02 PL01 sec. 1 A 2024.3.16



PL01 sec. 1 W
liner 83.3cm
2.4 - 83.3cm
top = Working half 2.4cm
archive uppermost 0.7cm missed.

3.1 - 83.2 (0.7 - 80.8).

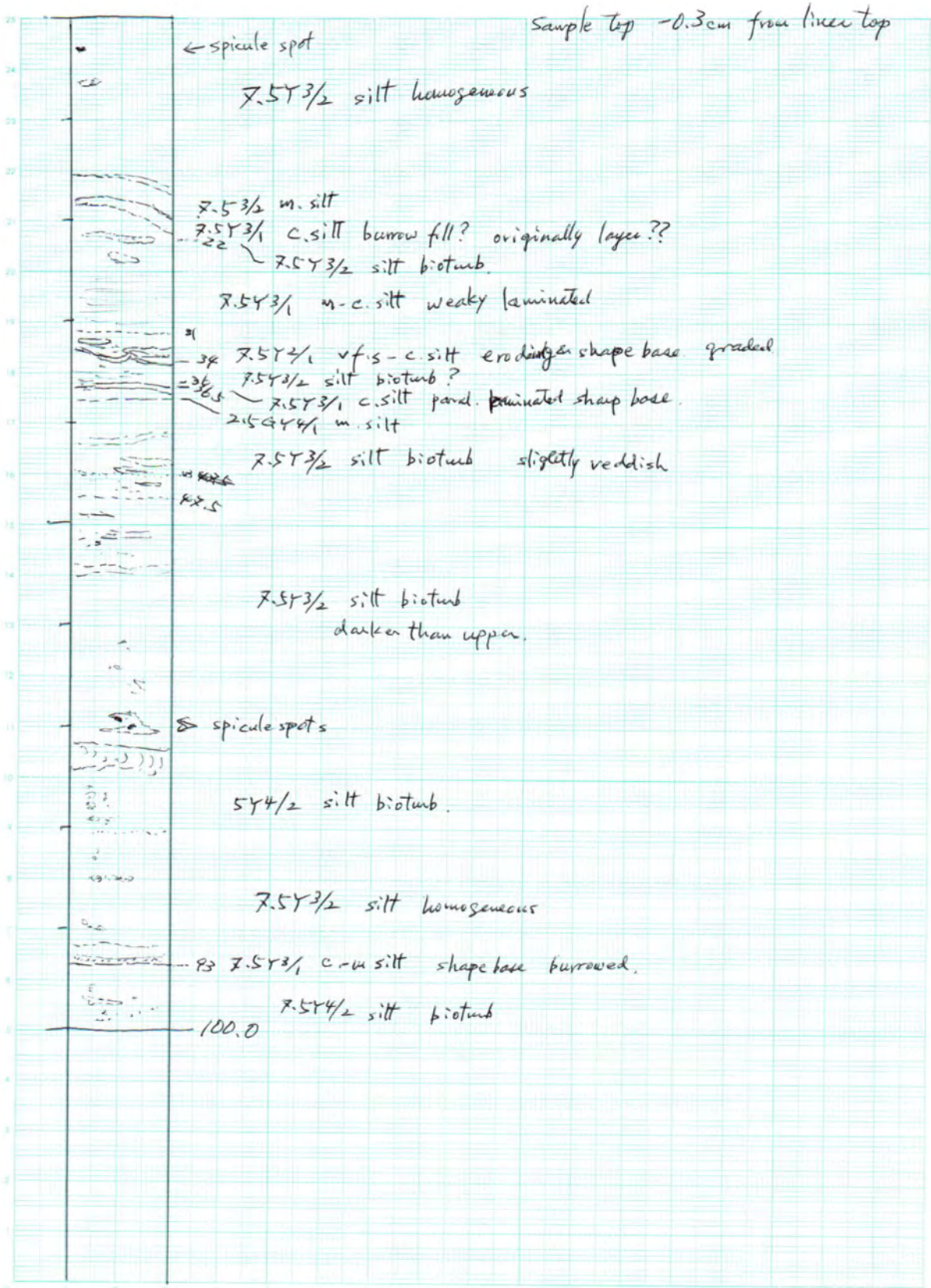
MR24-02 PC02 sec. 1A 2024.3.17



PC02 sec. 1W liner 60.5 cm
top 1.0 cm
bottom 59.7 cm

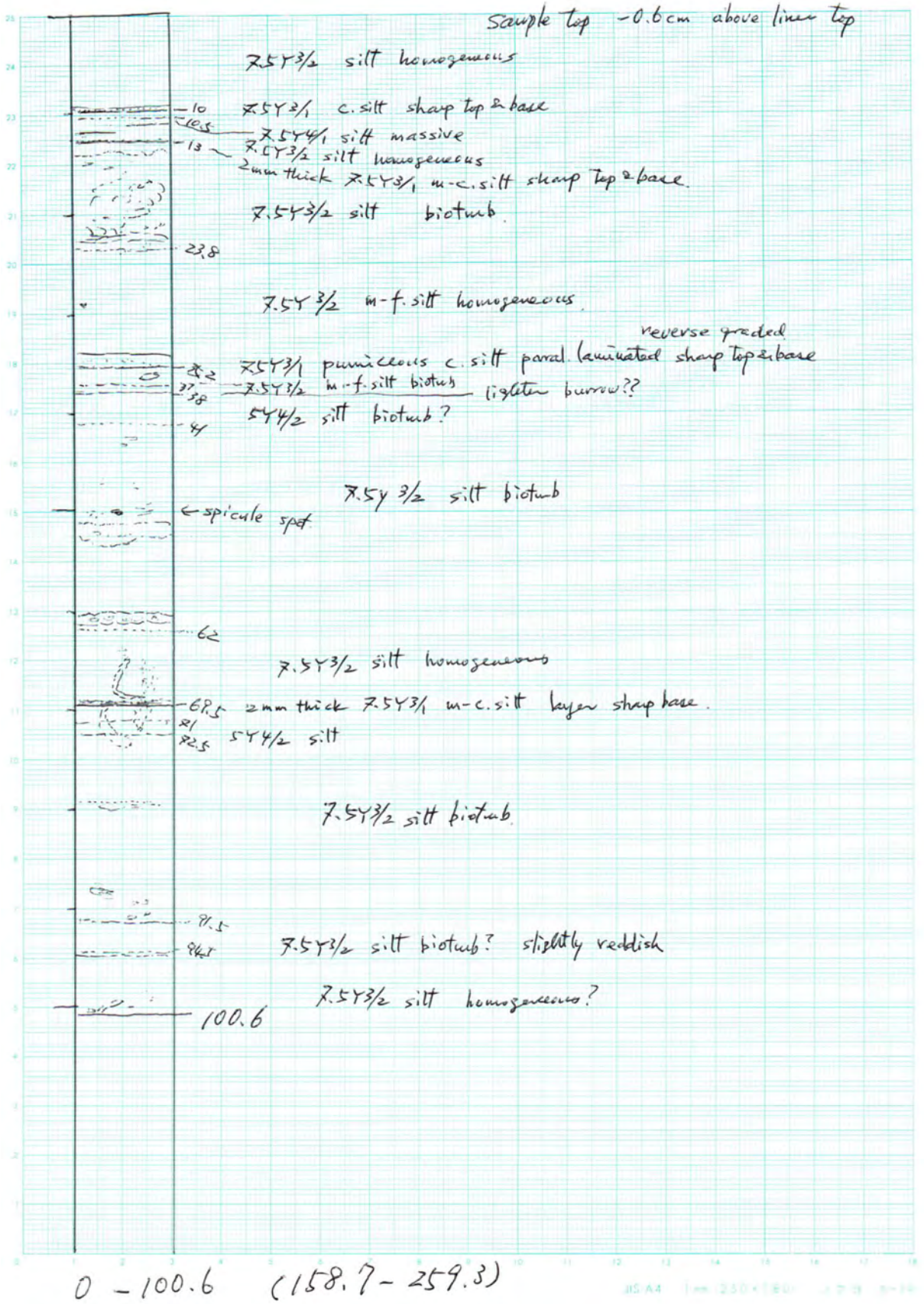
1.2 - 59.9 (0 - 58.7)

MR24-02 PCO2 sec. 2A 2024.3.17



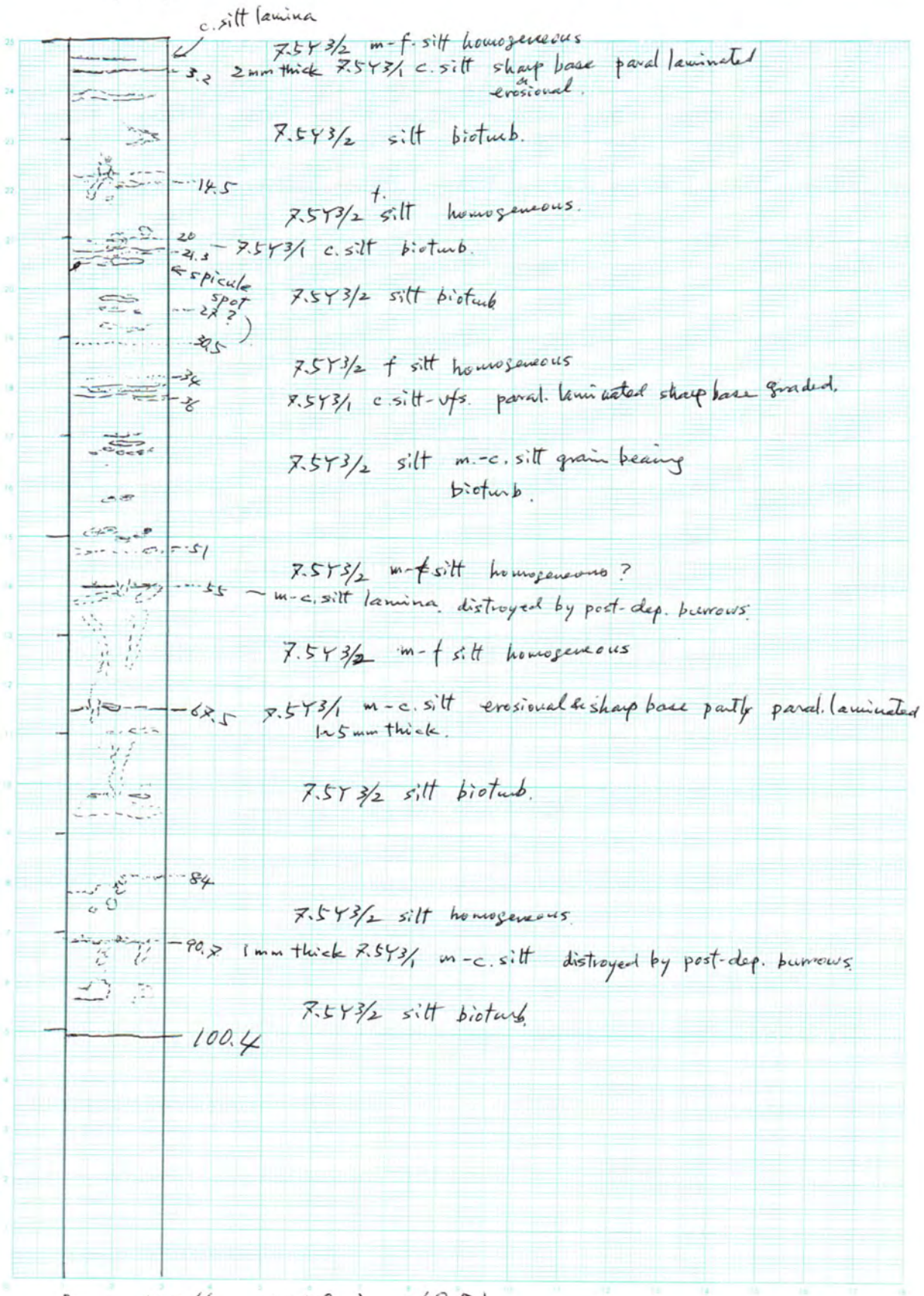
0 – 100.0 (58.7 - 158.7)

MR24-02 PCO2 sec. 3A 2024.3.18



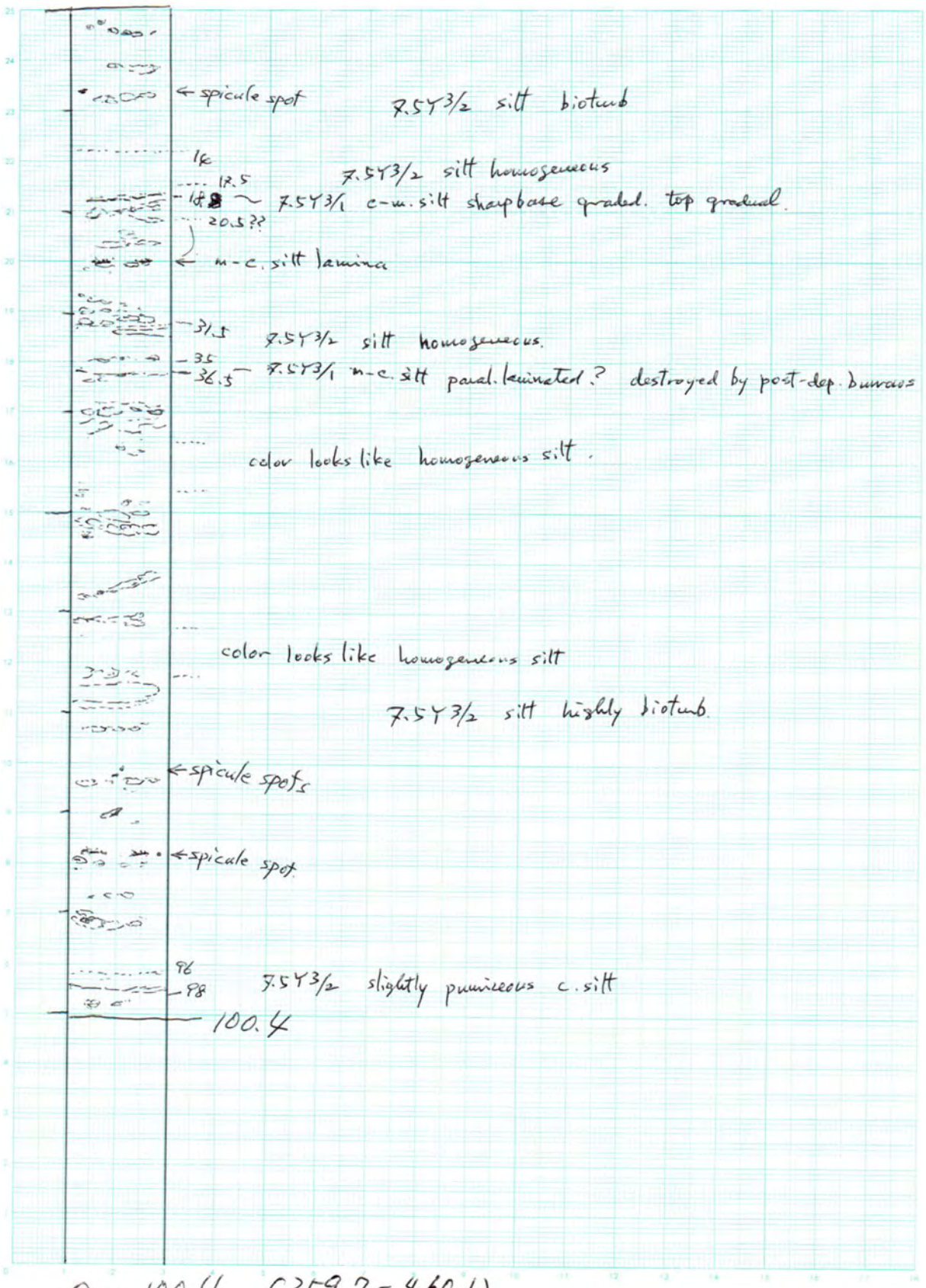
0 - 100.6 (158.7 - 259.3)

MR24-02 PC02 sec. 4A 2024.3.17



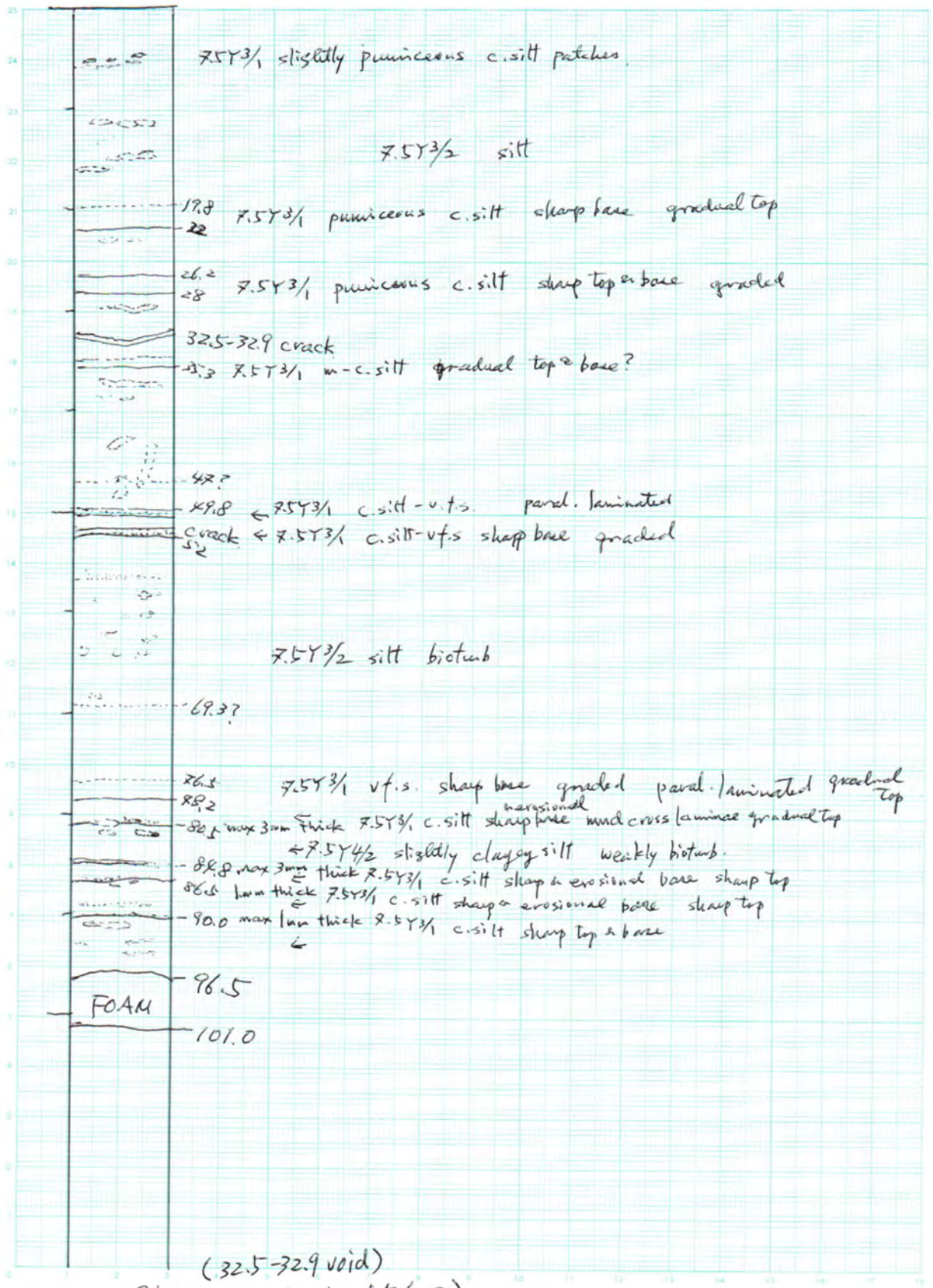
0 - 100.4 (259.3 - 359.7)

MR 24-02 PC02 sec. 5A 2024.3.17



0 – 100.4 (359.7 – 460.1)

MR24-02 PC02 sec. 6A 2024.3.19

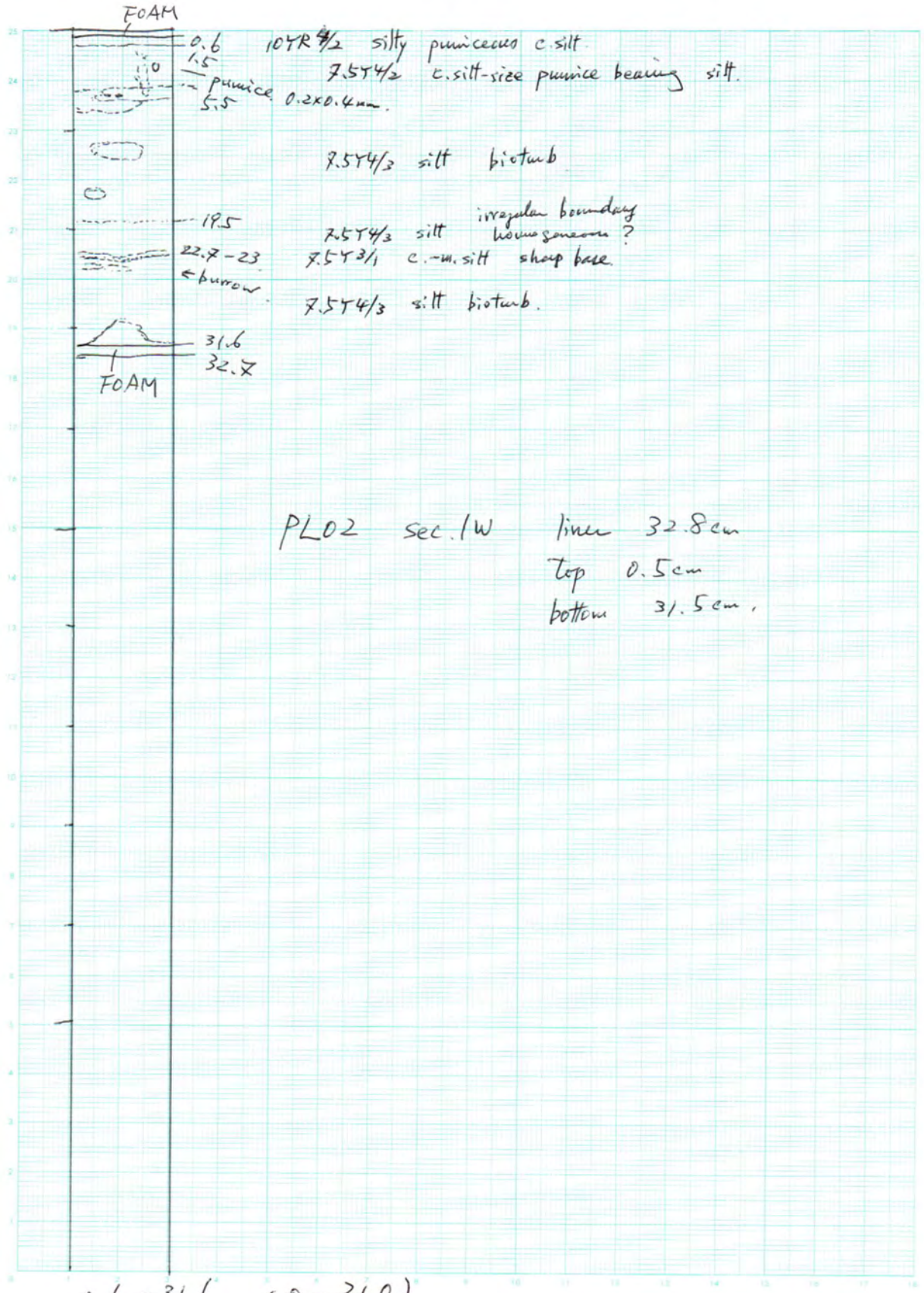


(32.5-32.9 void)

0 - 96.5 (460.1-556.2)

2024.3.14

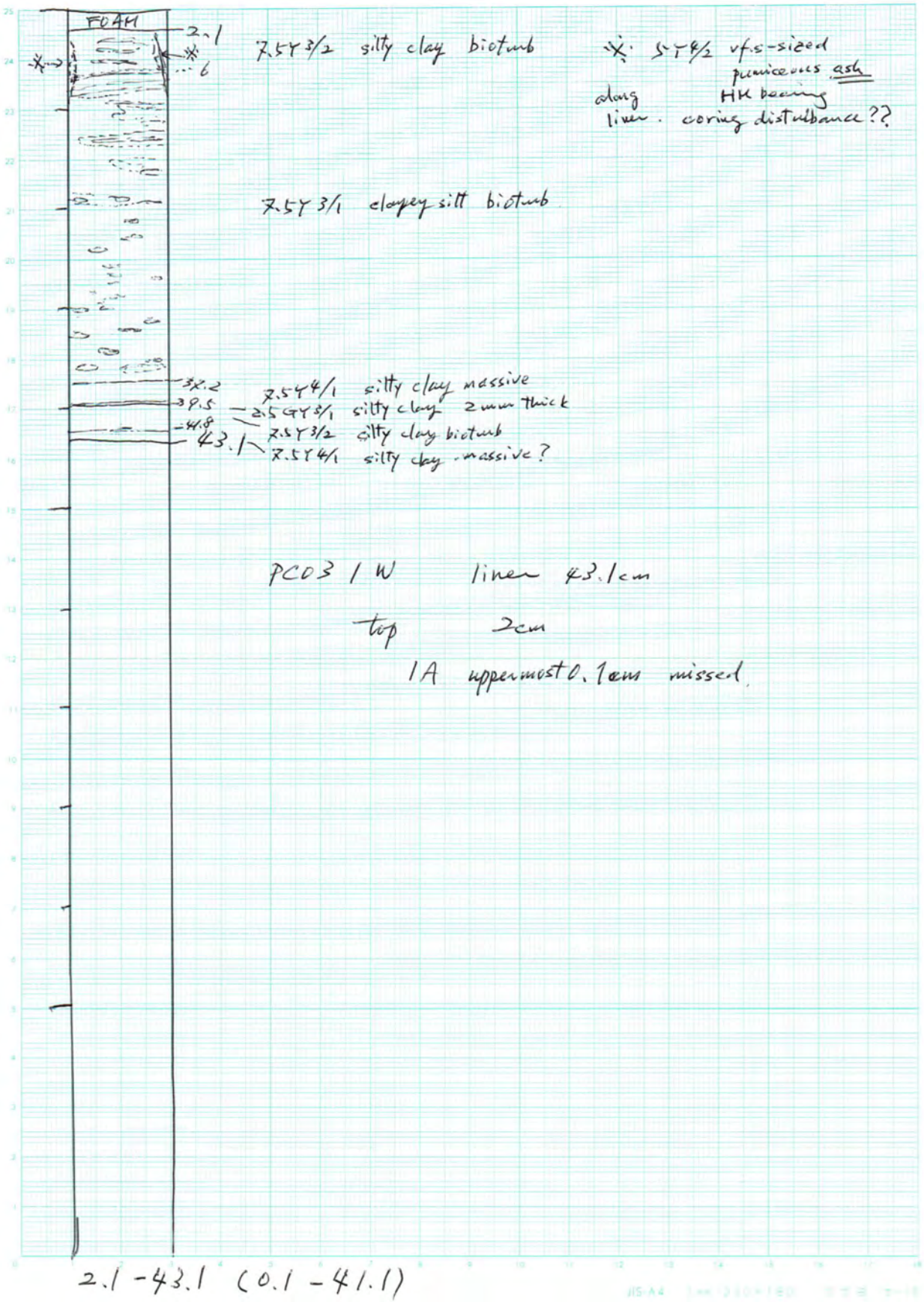
MR24-02 PL02 sec.1A



PL02 sec.1W liner 32.8cm
top 0.5cm
bottom 31.5cm.

0.6 - 31.6 (0 - 31.0)

MR 24-02 PC03 sec. 1A 2024.3.22



2.5Y3/2 silty clay bioturb

※: 5Y4/2 vf.s-sized pumiceous ash HK bearing

along liner. coring disturbance??

2.5Y3/1 clayey silt bioturb

2.5Y4/1 silty clay massive

2.5GY5/1 silty clay 2mm thick

2.5Y3/2 silty clay bioturb

2.5Y4/1 silty clay massive?

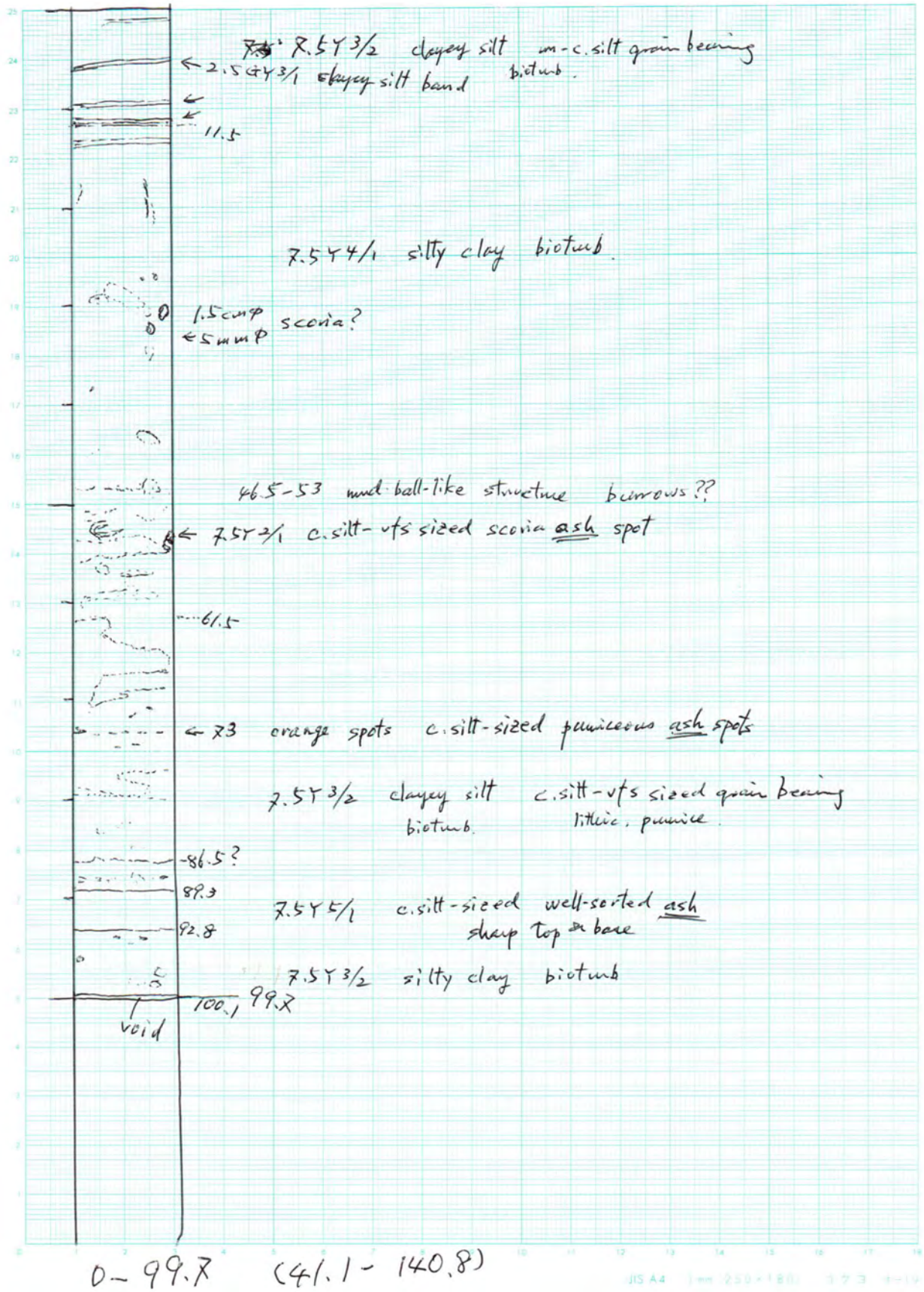
PC03 / W liner φ3.1cm

top 2cm

1A uppermost 0.1cm missed.

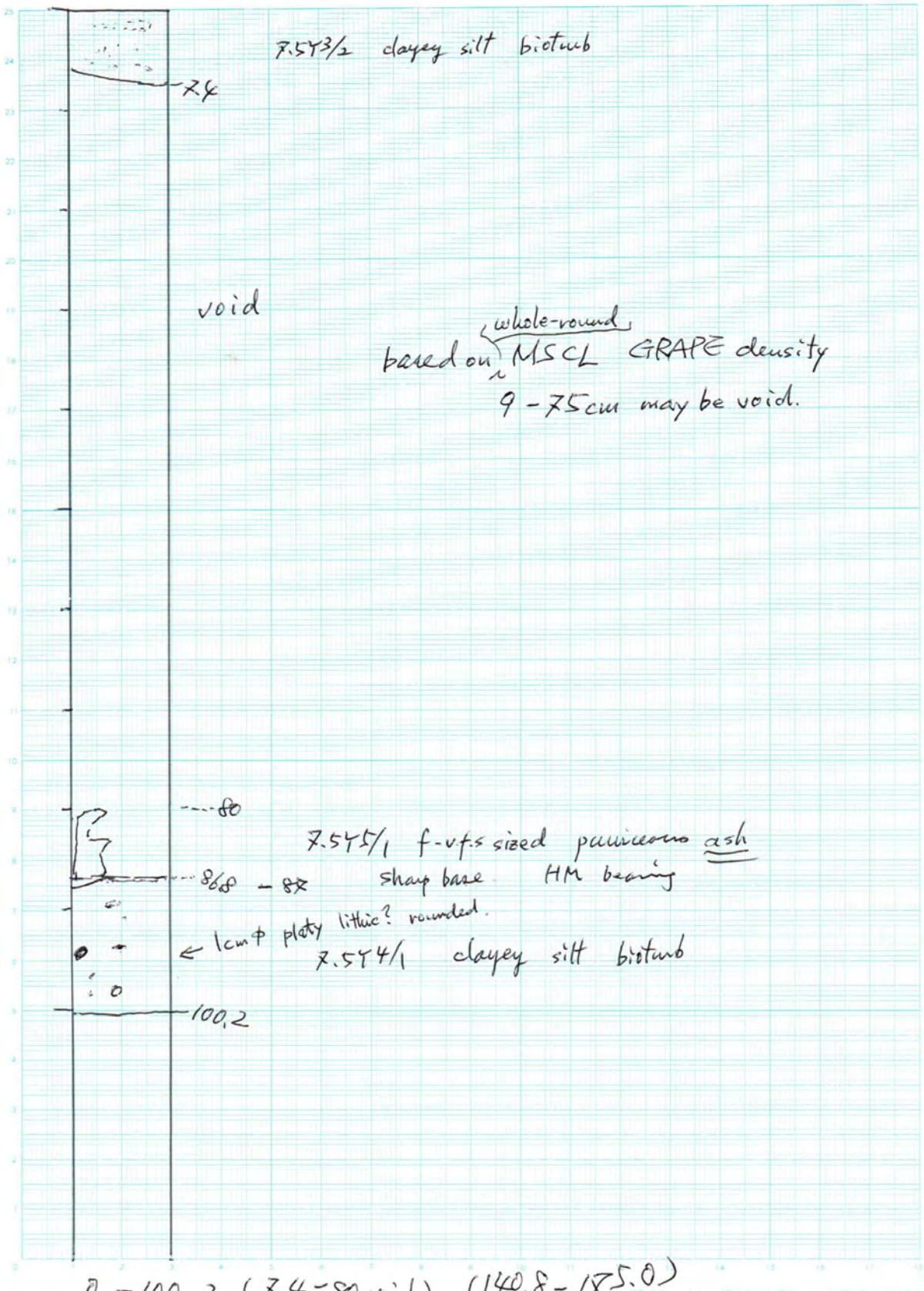
2.1 - 43.1 (0.1 - 41.1)

MR24-02 PC03 sec. 2A 2024.3.22



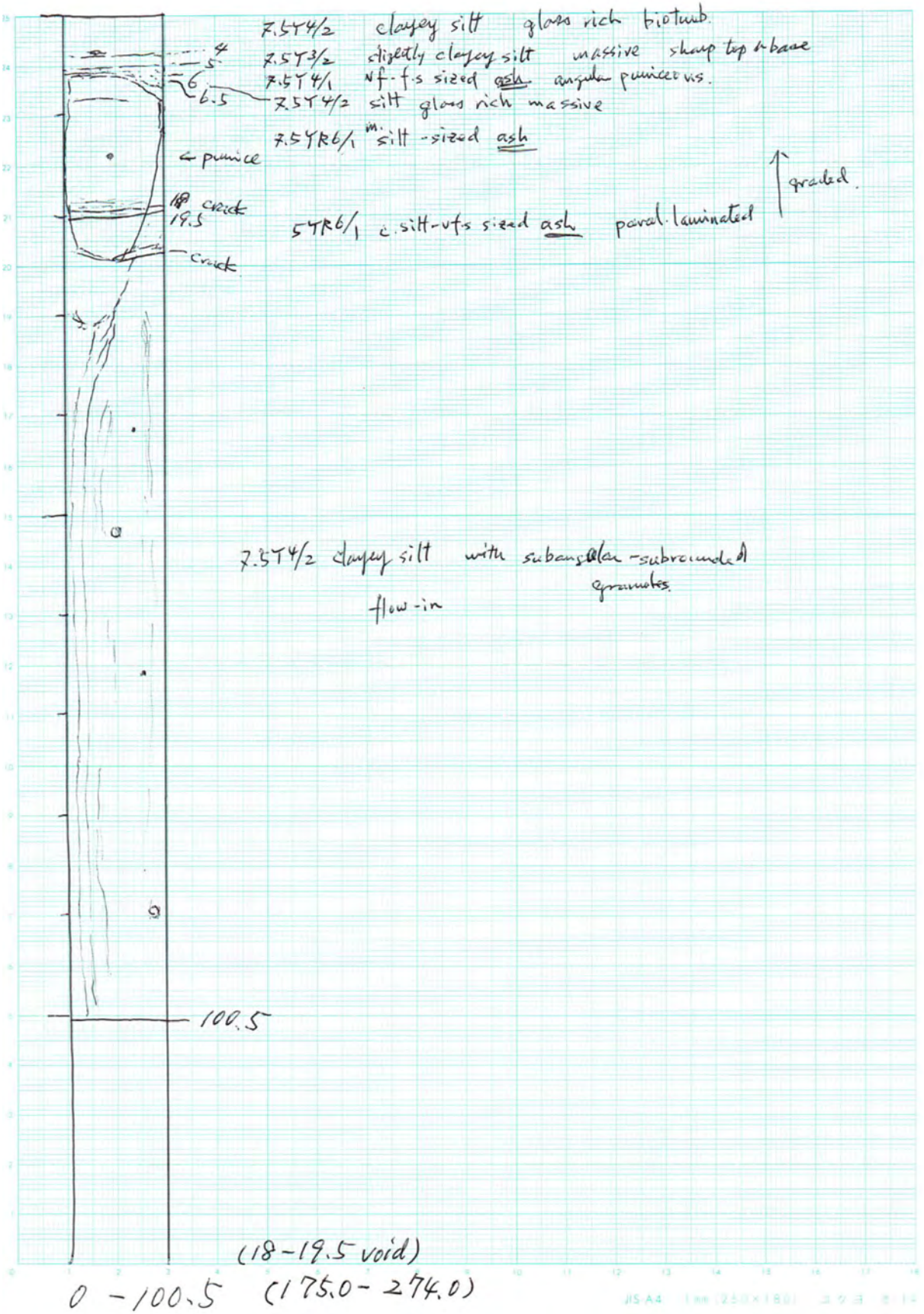
0-99.7 (41.1-140.8)

MR24-02 PC03 sec.3A 2024.3.22

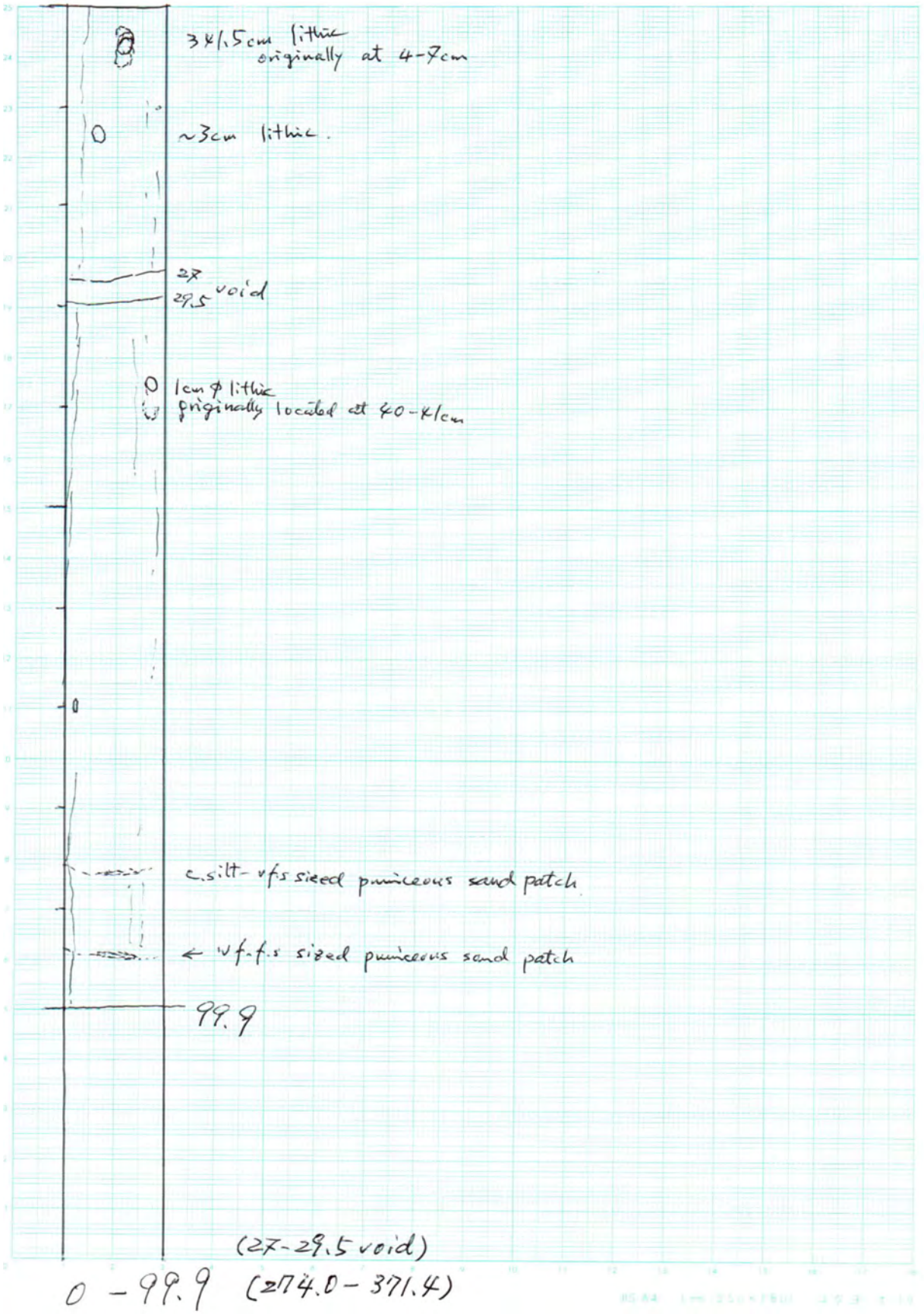


0 - 100.2 (7.4 - 80 void) (140.8 - 185.0)

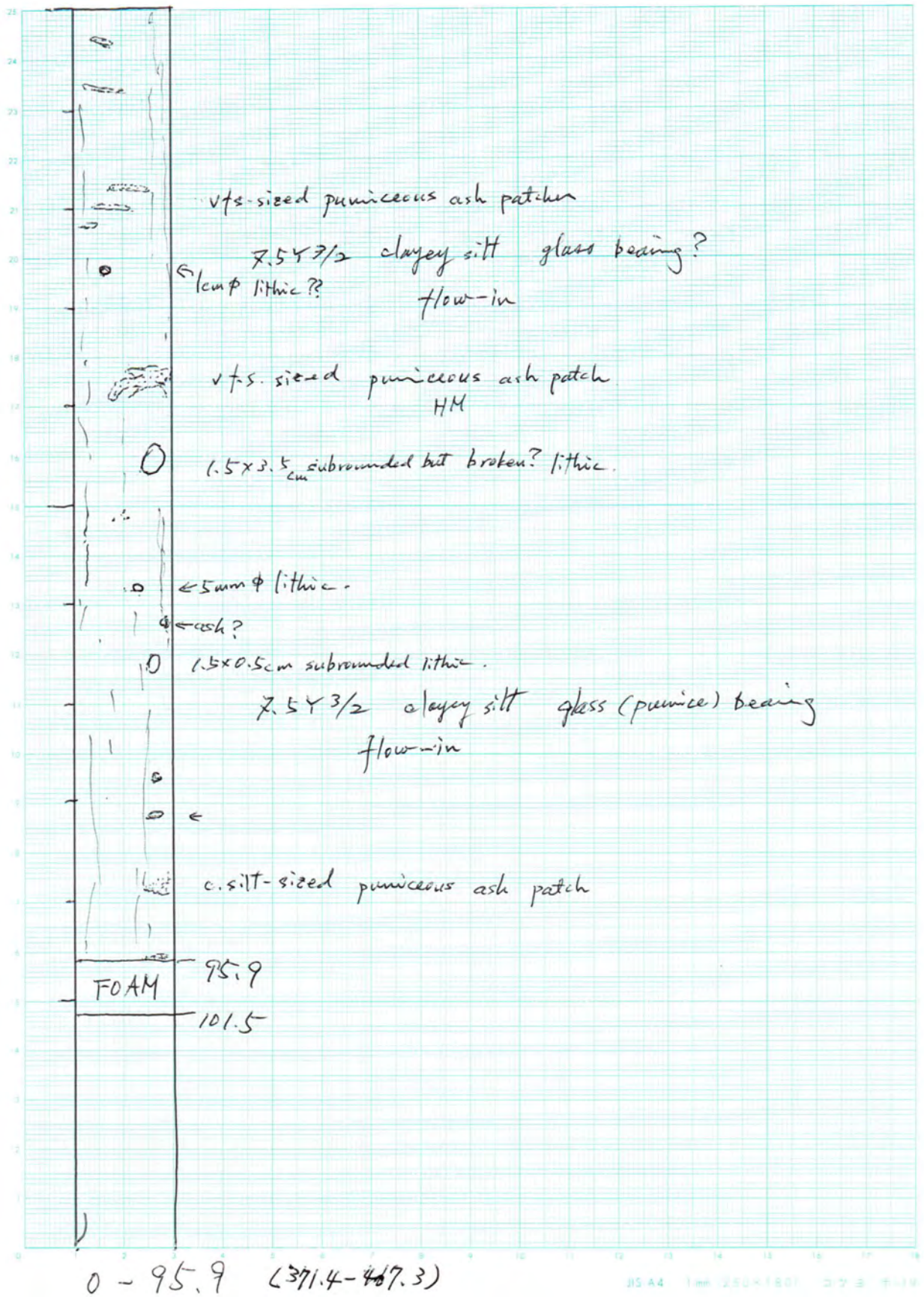
MR24-02 PC03 sec.4A 2024.3.22



MR24-02 PC03 sec. 5A 2024.3.22

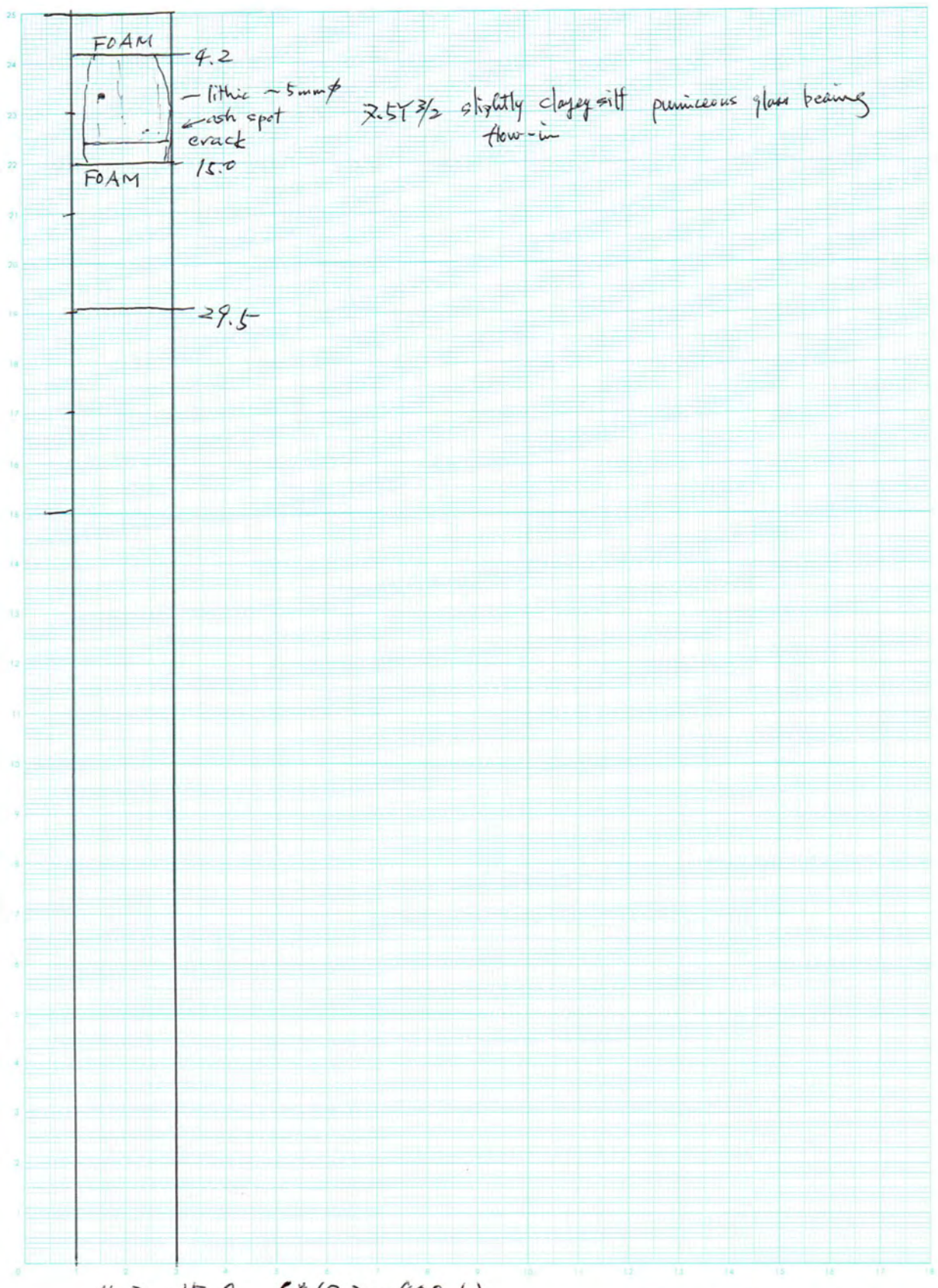


MR24-02 PC03 sec. 6A 2024. 3. 22



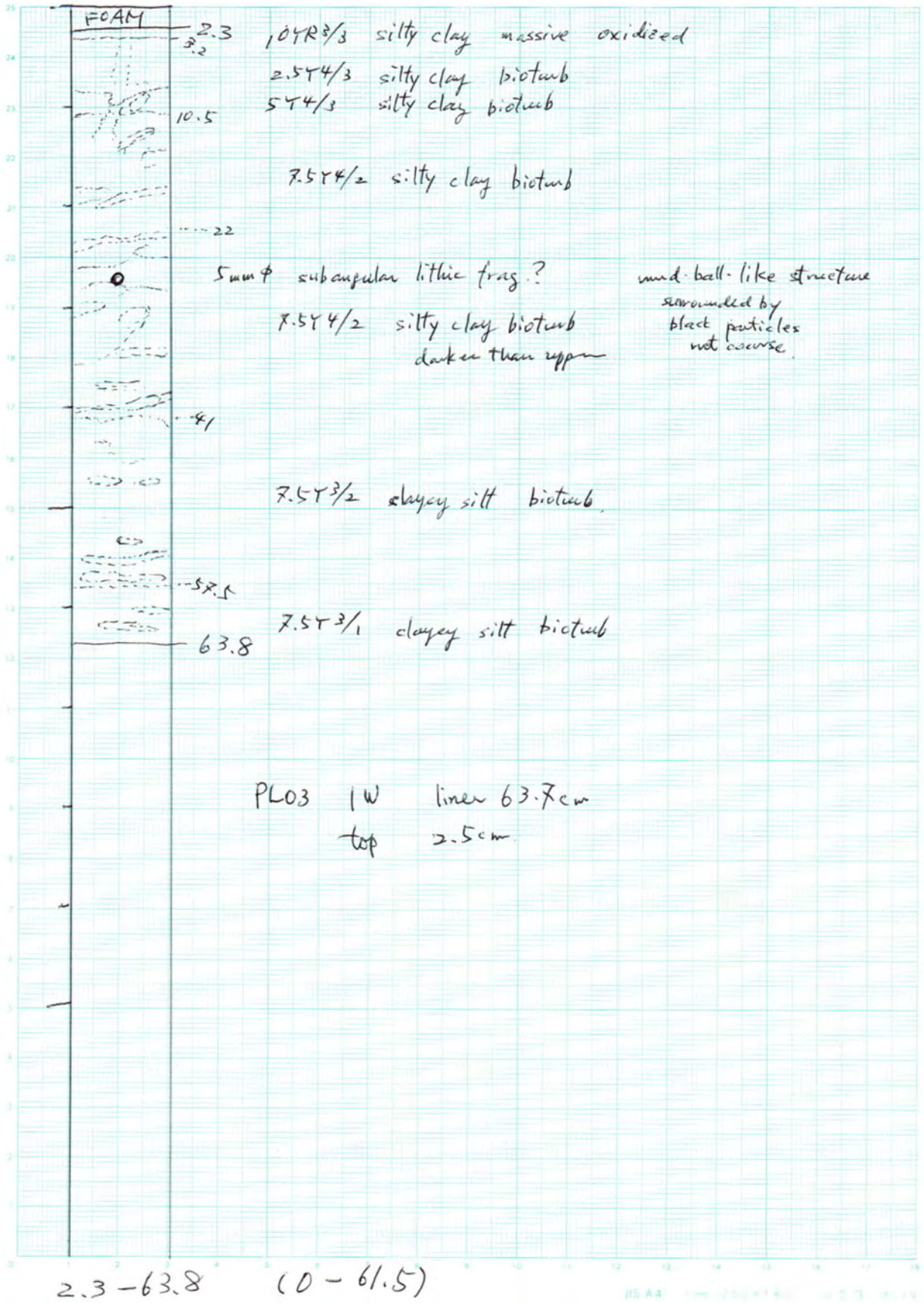
0 - 95.9 (371.4-467.3)

MR24-02 PC03 sec. CC A 2024.3.22



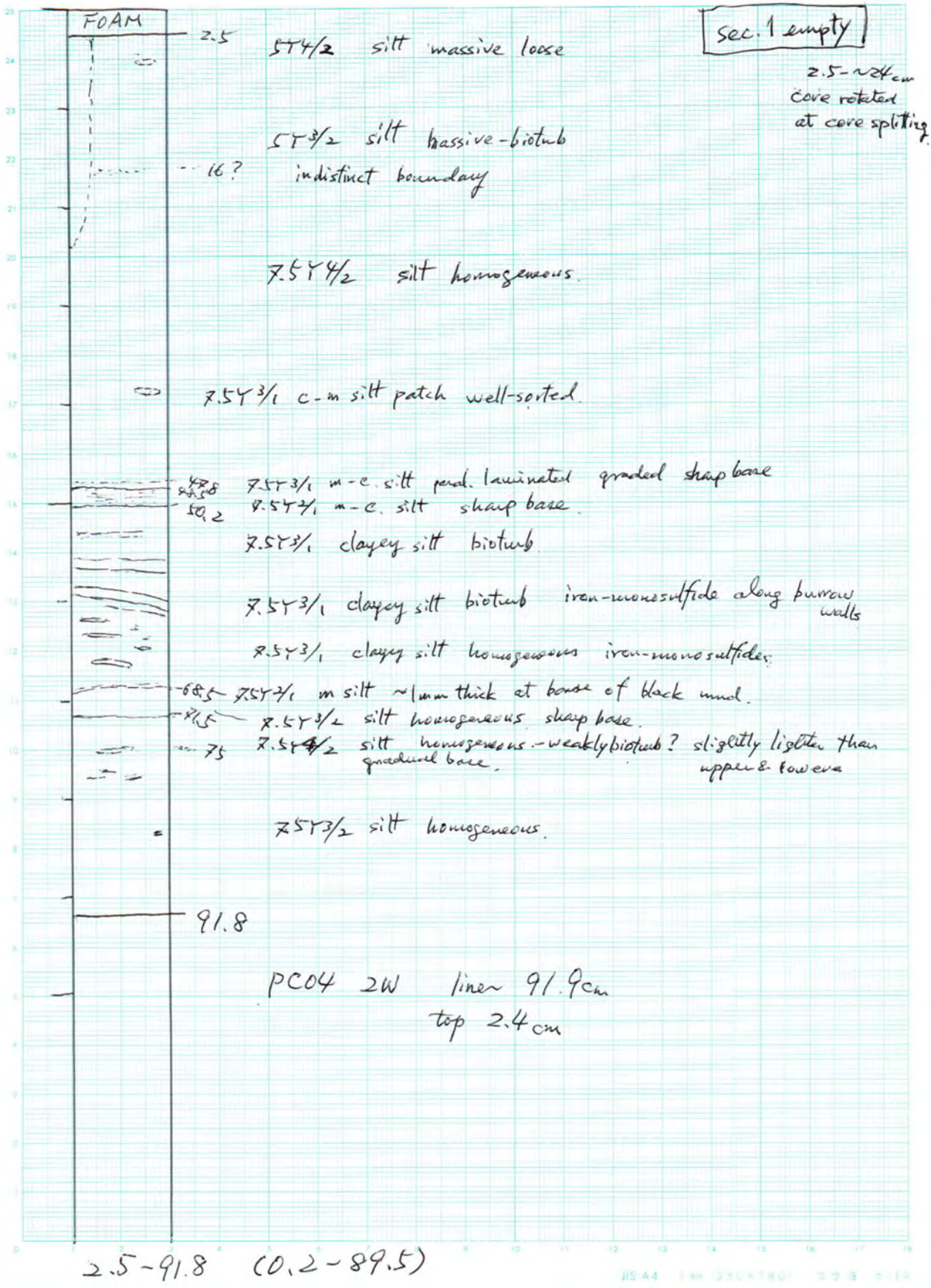
4.2 – 15.0 (467.3 – 498.1)

MR24-02 PL03 sec. 1A 2024.3.22

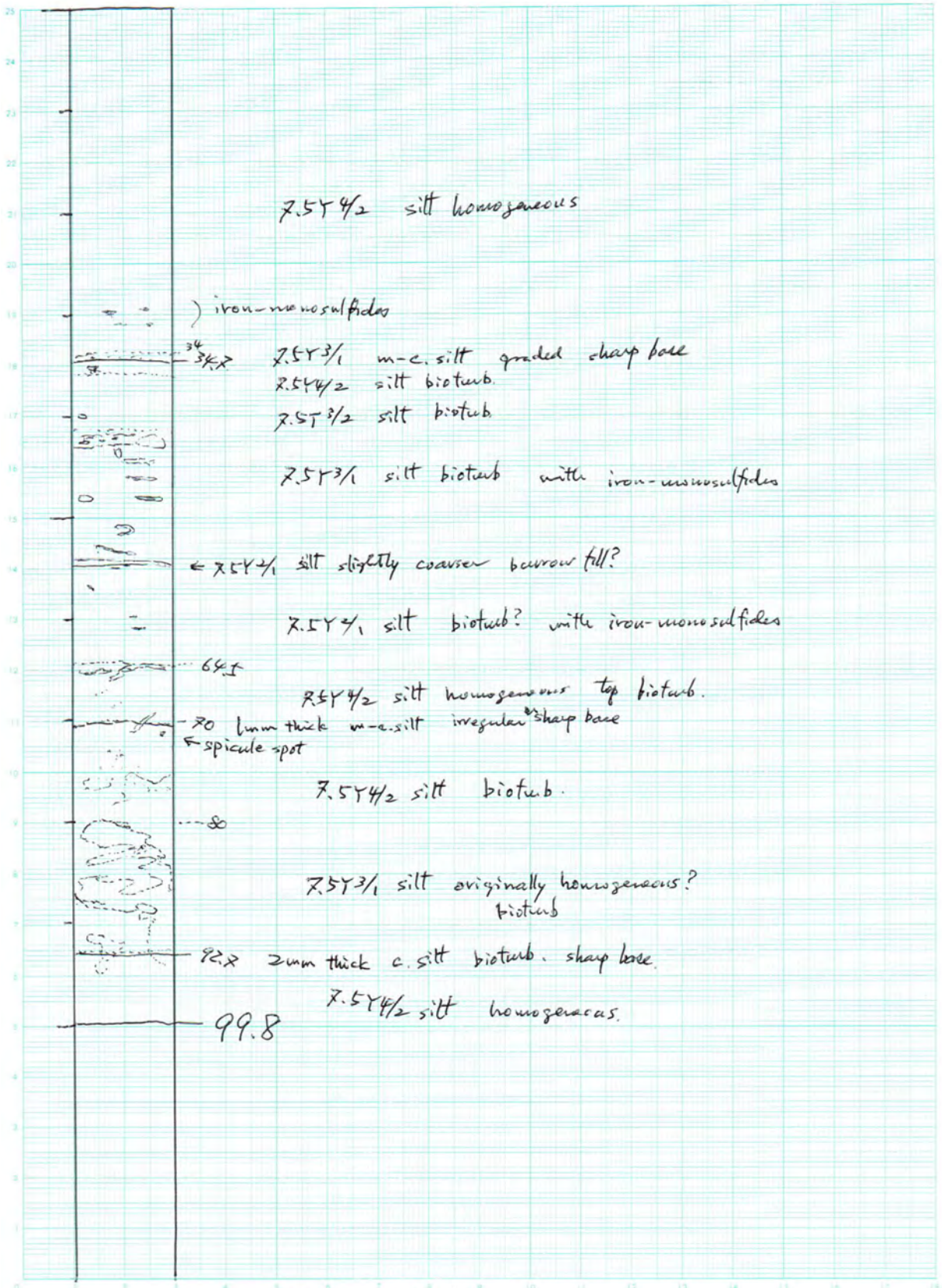


2.3 – 63.8 (0 – 61.5)

MR 24-02 PC04 sec. 2A 2024.3.24

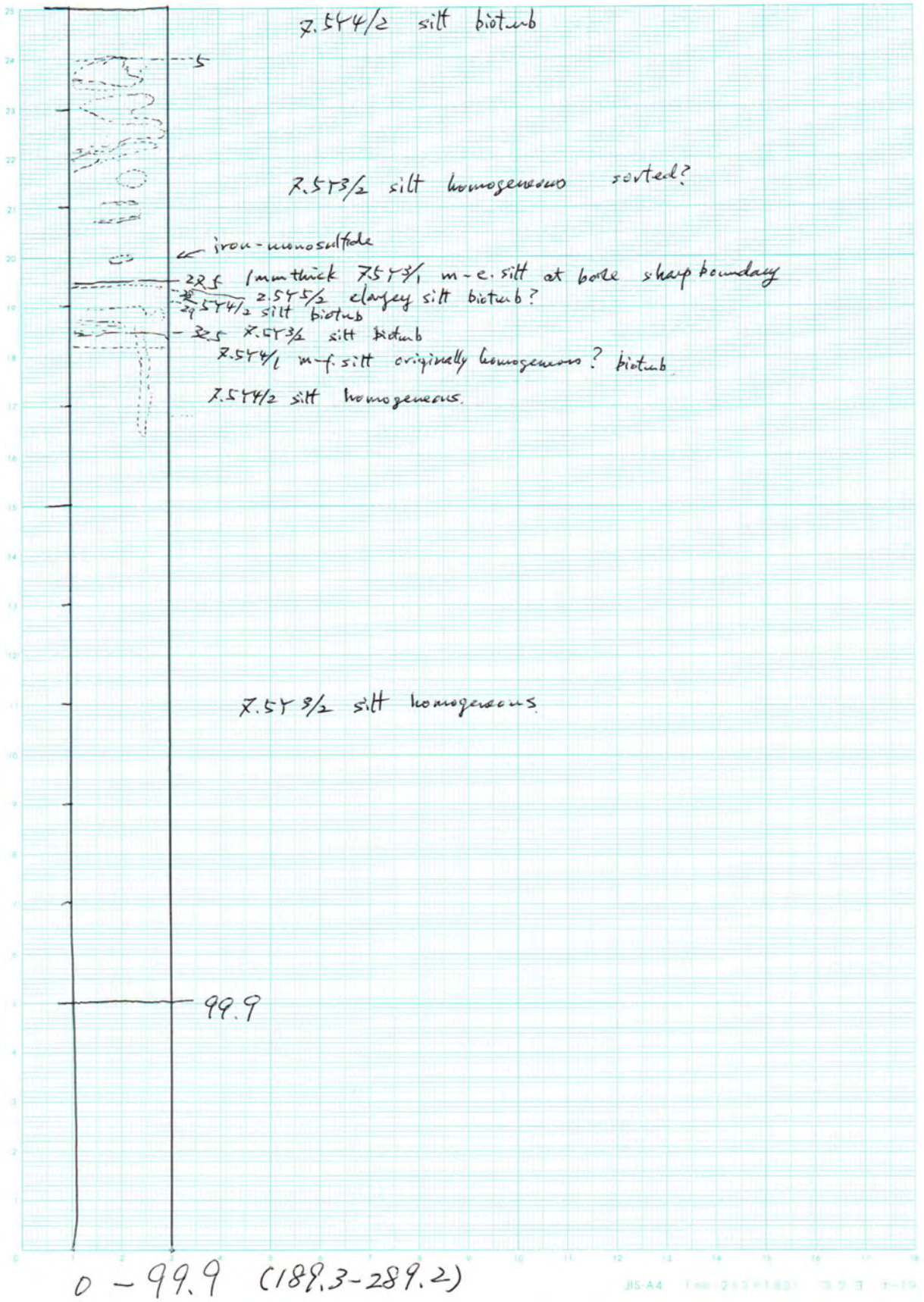


MR24-02 PC04 sec. 3A 2024.3.24



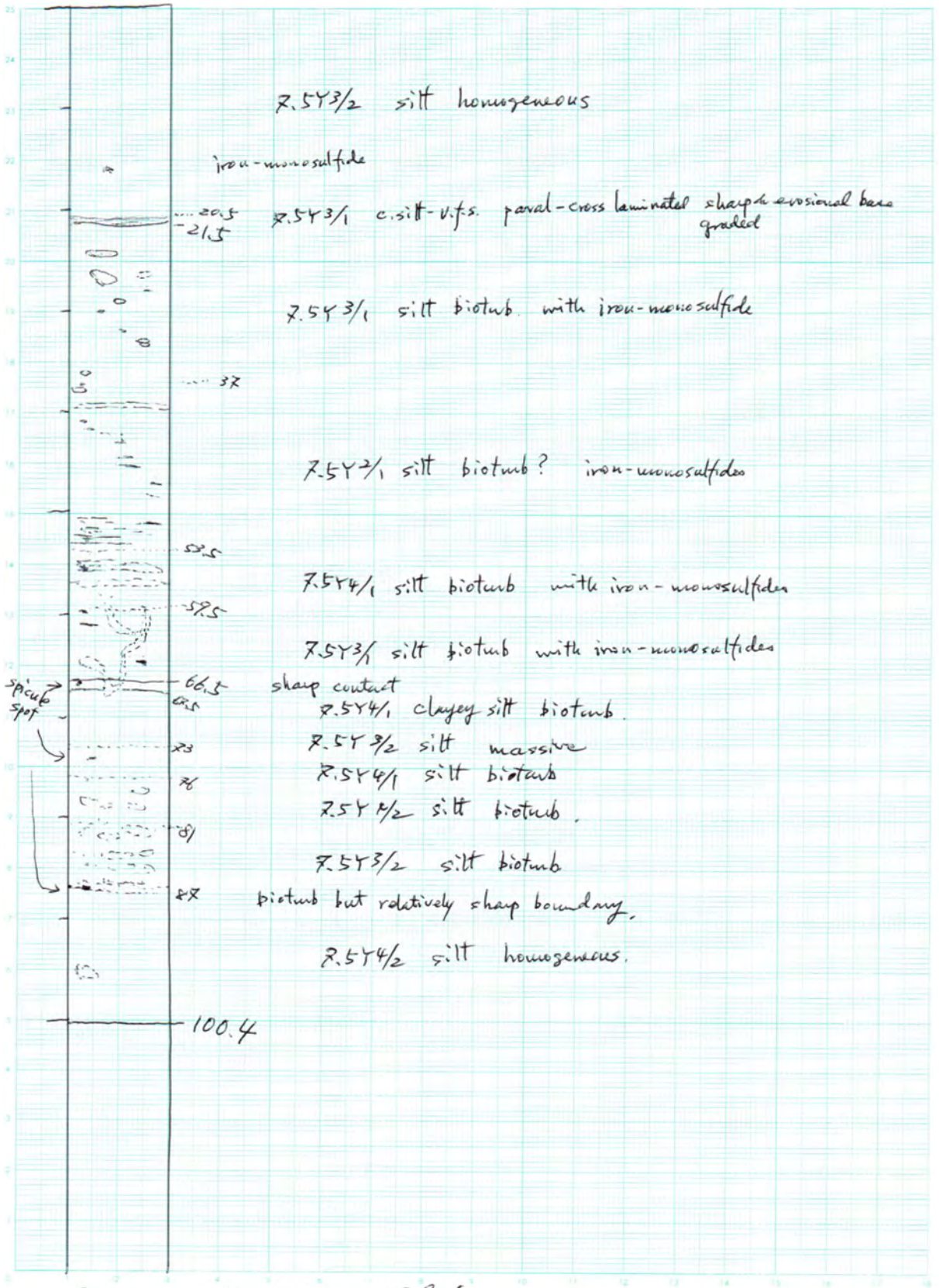
0 - 99.8 (89.5 - 189.3)

MR24-02 PC04 sec. 4A 2024.3.24



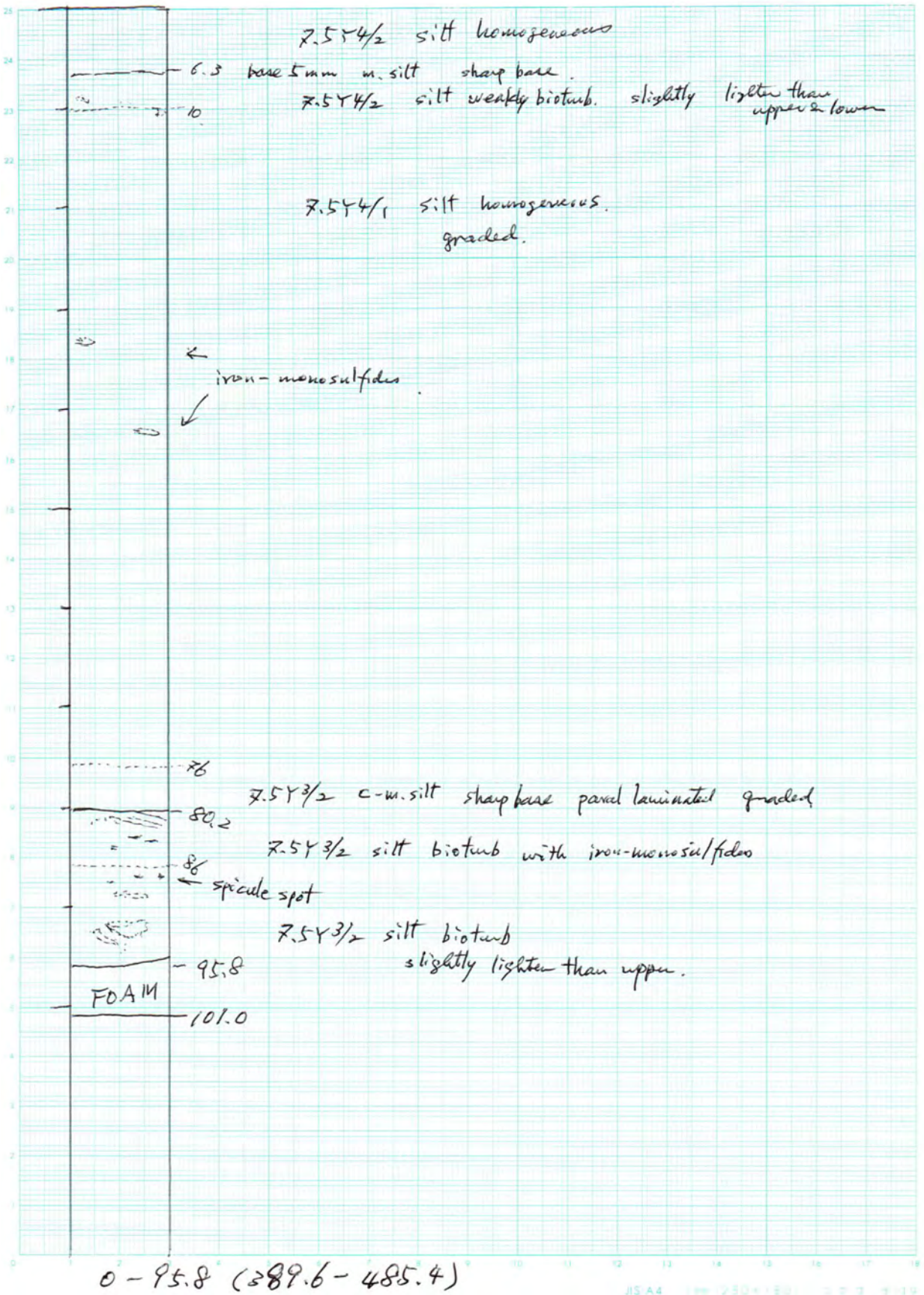
0 - 99.9 (188.3-289.2)

MR24-02 PC04 sec. 5A 2024.3.24



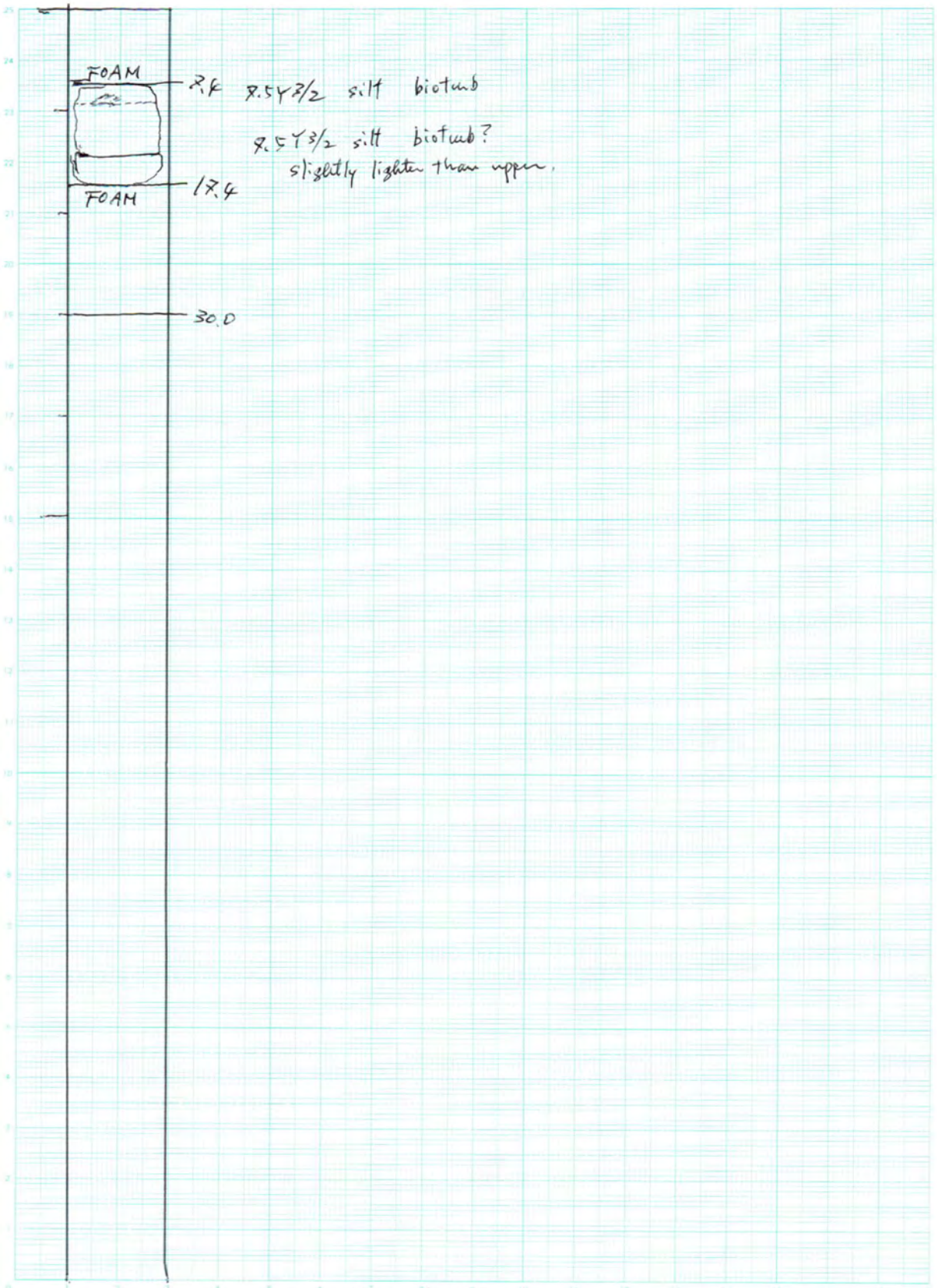
0 - 100.4 (289.2-389.6)

MR24-02 PC04 sec. 6A 2024.3.24



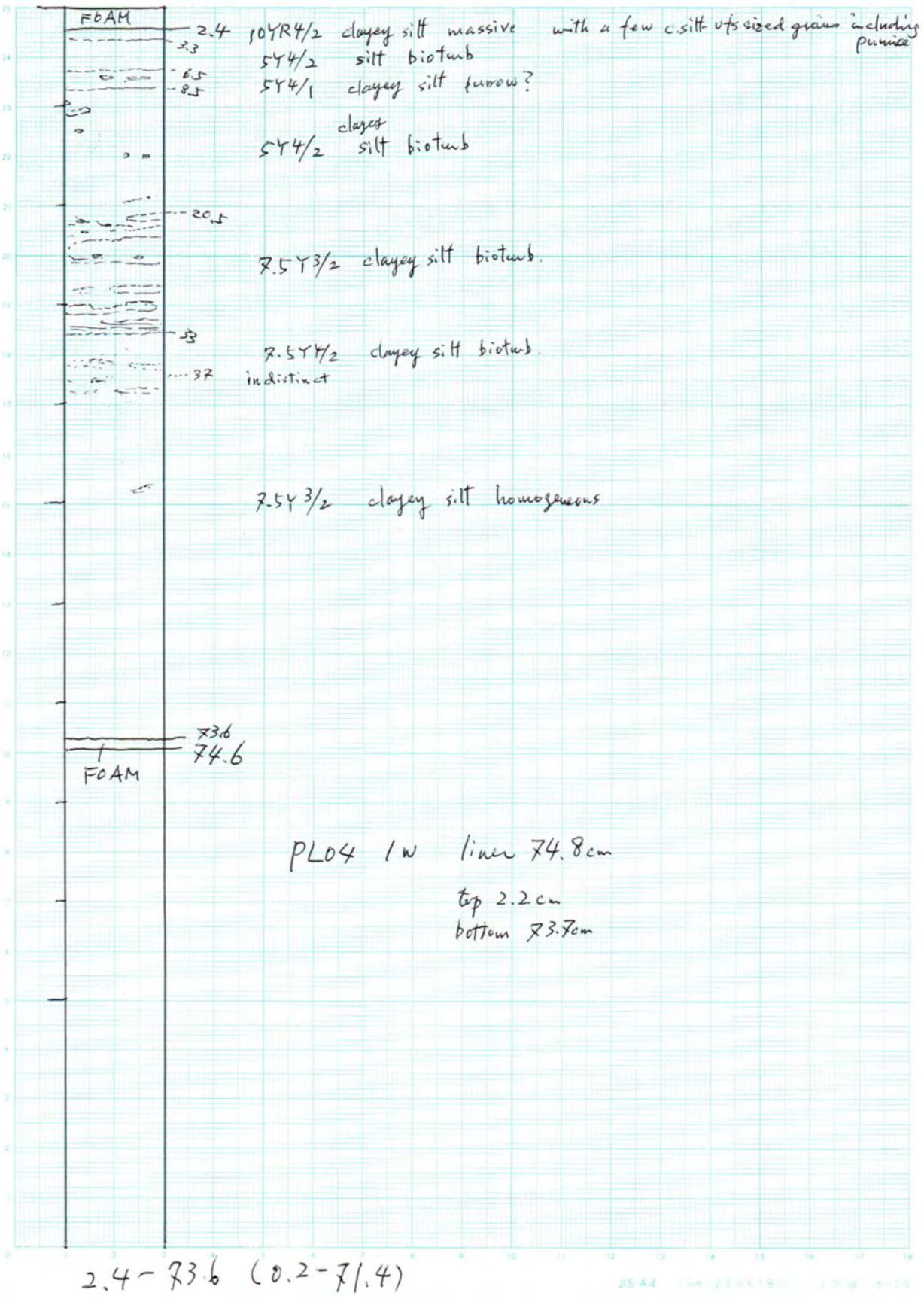
0 - 95.8 (≒89.6 - 485.4)

MR24-02 PC04 sec. CCA 2024.3.24



7.4 - 17.4 (485.4-495.4)

MR 24-02 PL04 sec. 1A 2024. 3. 24

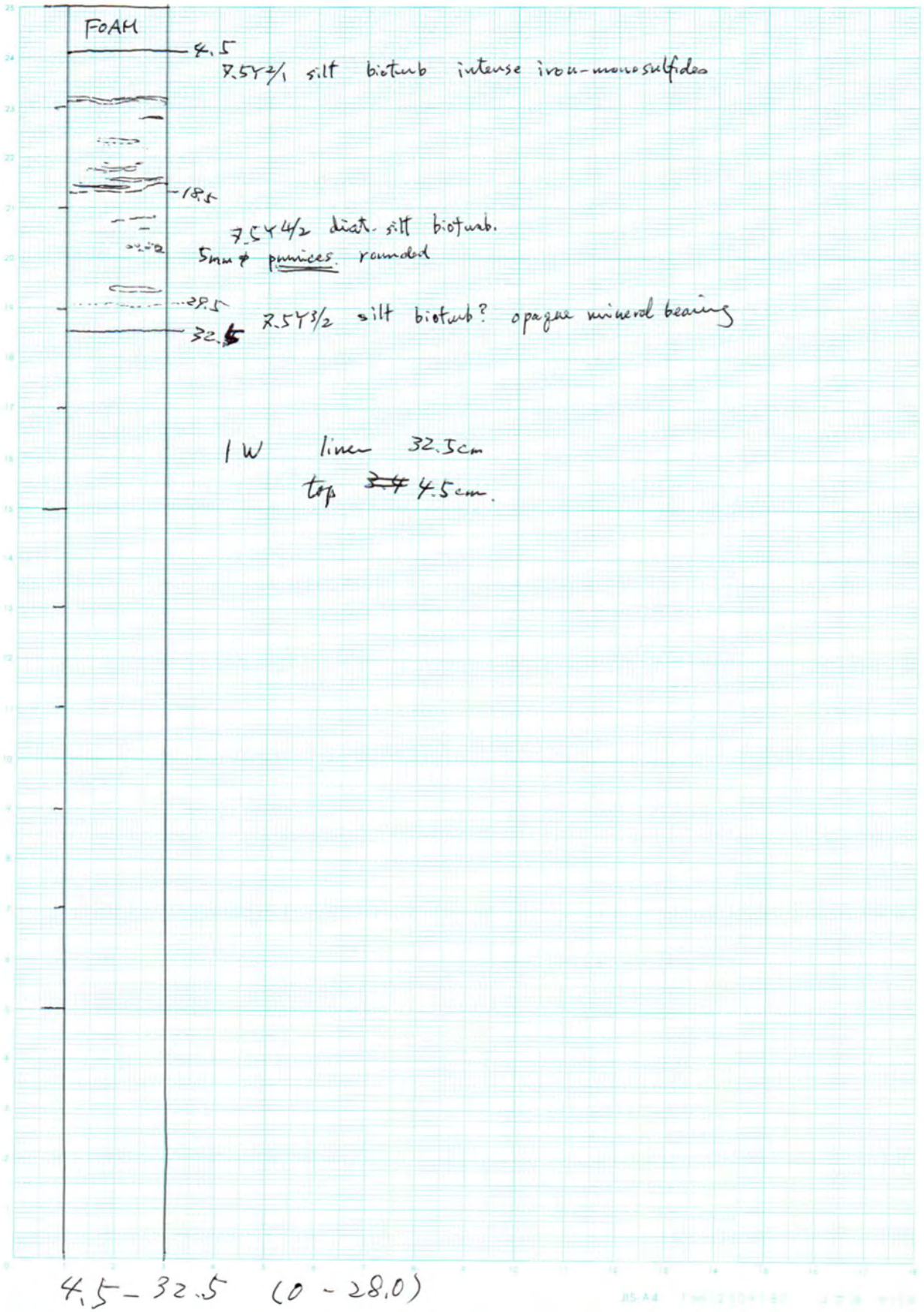


10YR4/2 clayey silt massive with a few c.silt-vfs sized grains including pumice
5Y4/2 silt bioturb
5Y4/1 clayey silt furrow?
5Y4/2 clayey silt bioturb
7.5Y3/2 clayey silt bioturb.
7.5Y4/2 clayey silt bioturb. indistinct
7.5Y 3/2 clayey silt homogeneous

PL04 1W liner 74.8cm
top 2.2cm
bottom 73.7cm

2.4 - 73.6 (0.2 - 71.4)

MR24-02 PC05 sec. 1A 2024.3.25

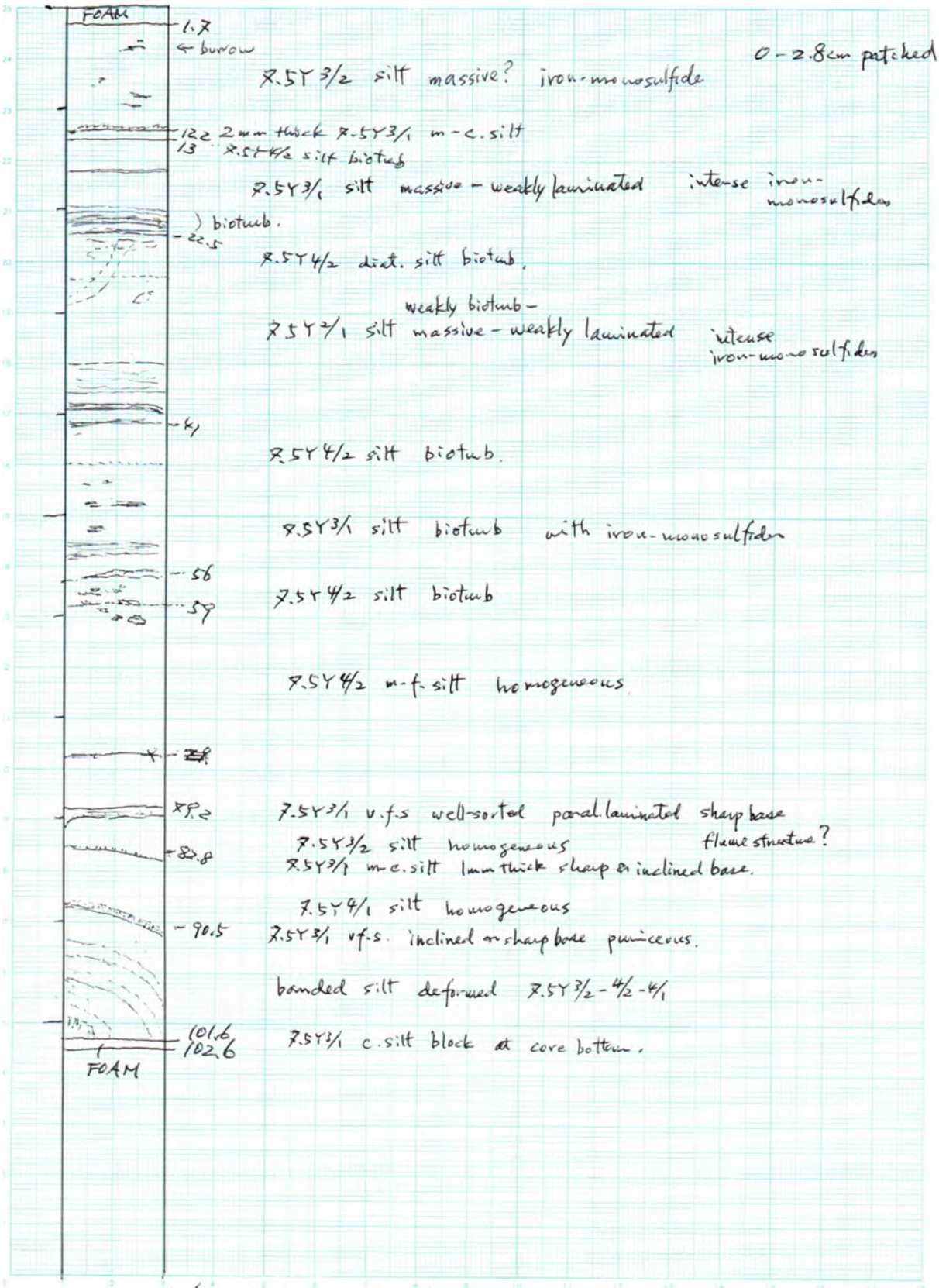


1W liner 32.5cm

top ~~3.5~~ 4.5cm.

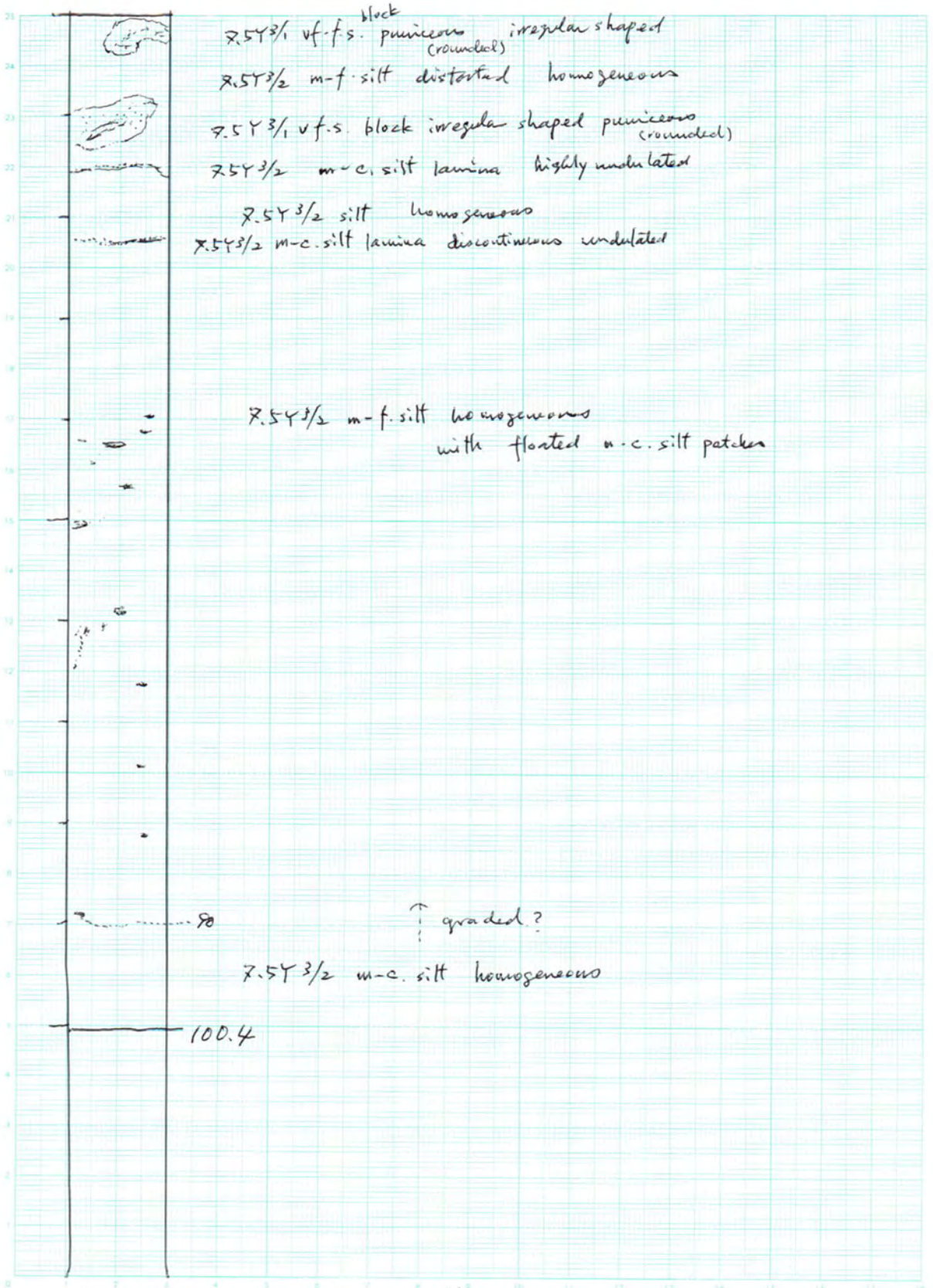
4.5 – 32.5 (0 – 28.0)

MR24-02 PC05 sec. 2A 2024.3.25



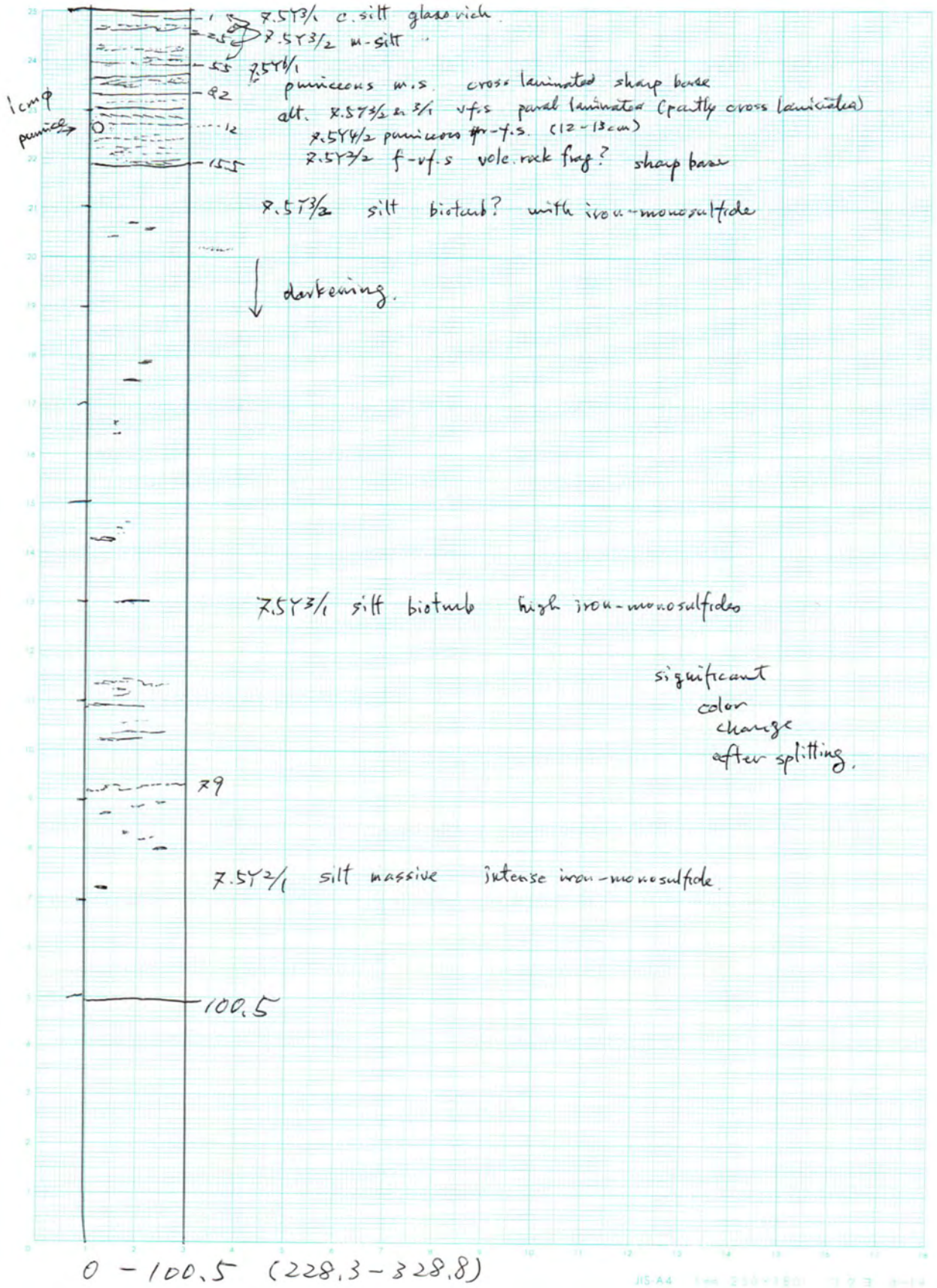
1.7 - 101.6 (28.0 - 127.9)

MR24-02 PC05 sec 3A 2024.3.25



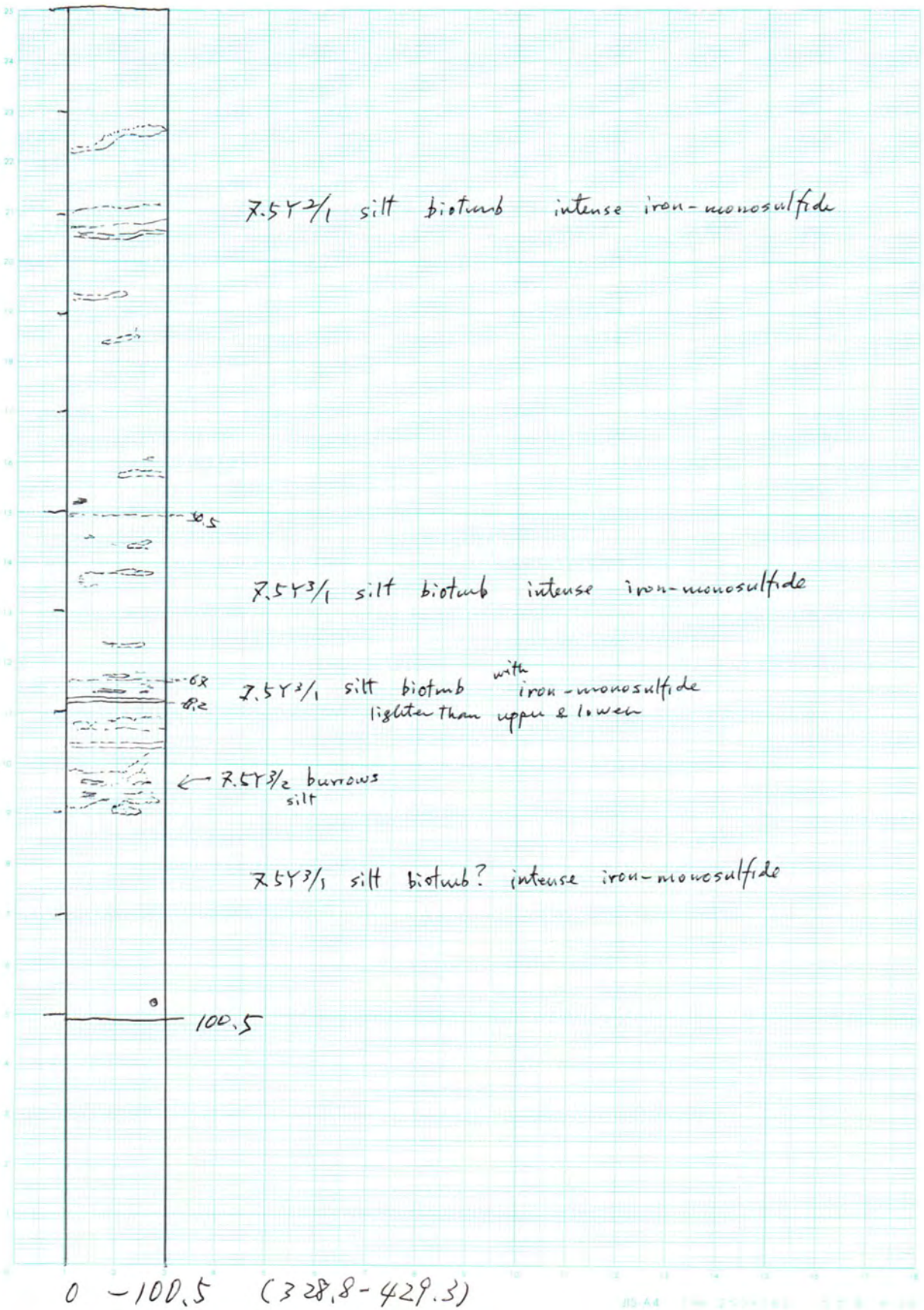
0 - 100.4 (128.9 - 228.3)

MR 24-02 PC05 sec. 4A 2024.3.25



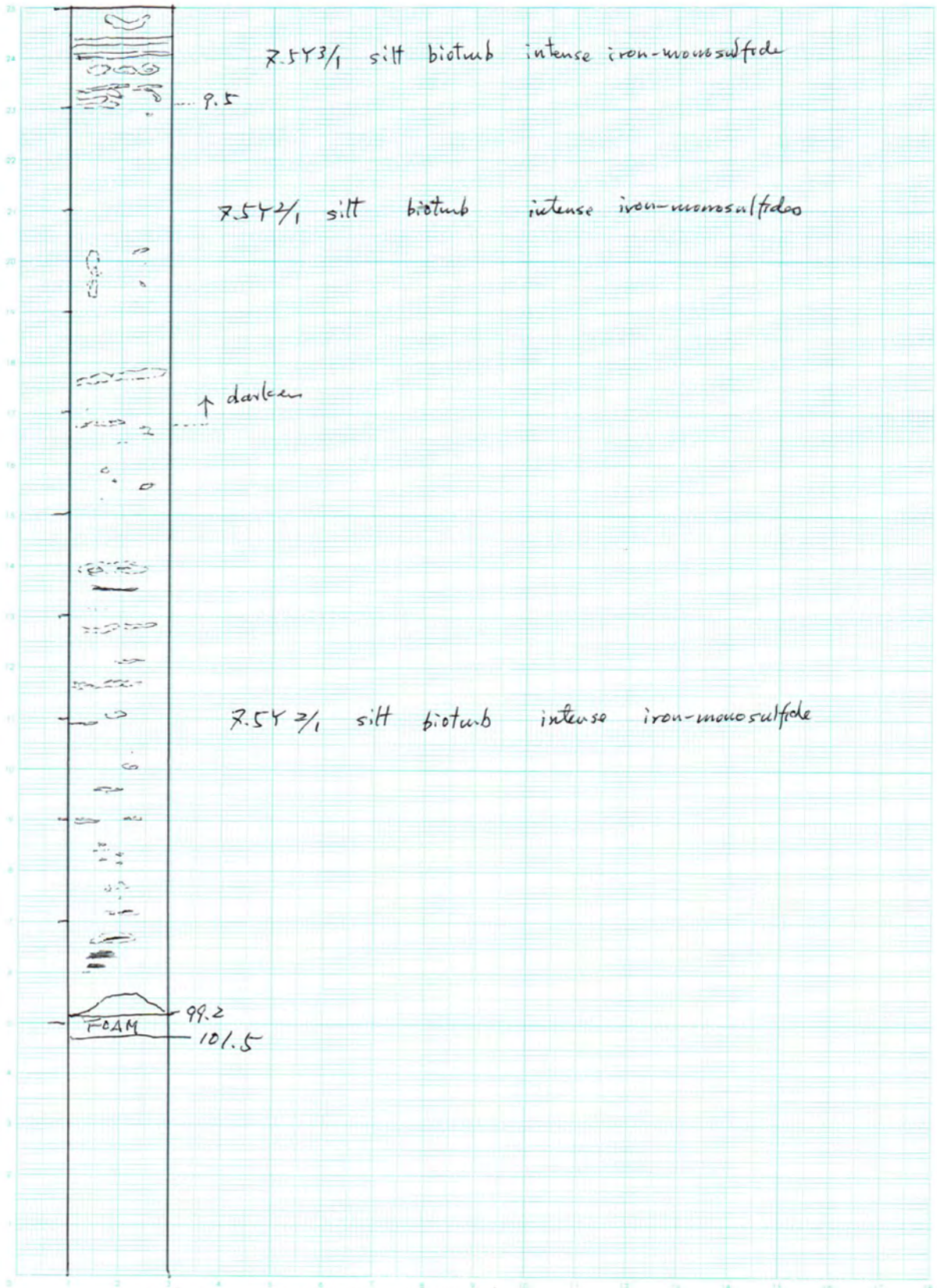
0 - 100.5 (228.3 - 328.8)

MR24-02 PC05 sec.5A 2024.3.25



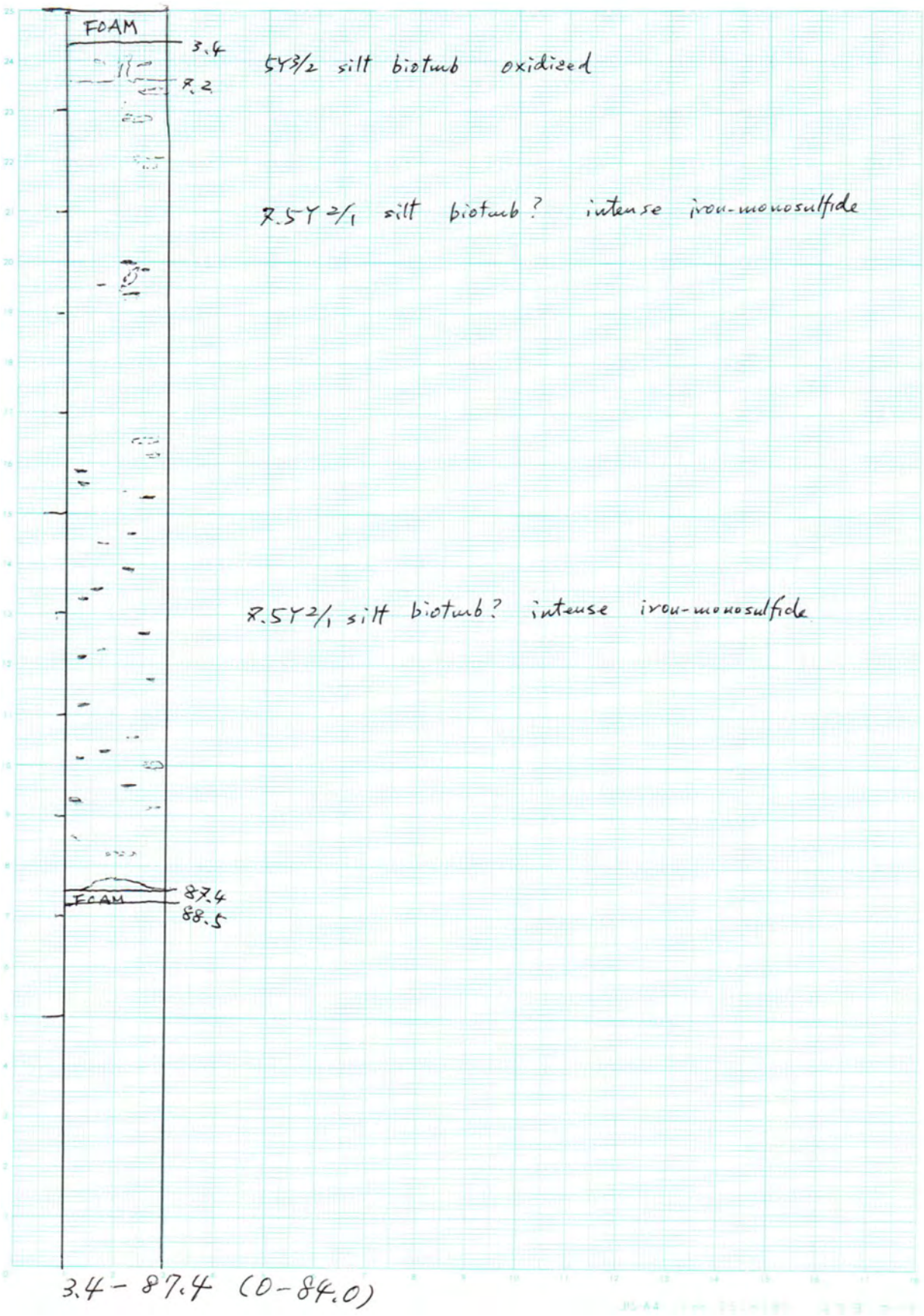
0 – 100.5 (328.8 – 429.3)

MR 24-02 PC05 sec. 6 ~~A~~ A 2024.3.25



0 - 99.2 (429.3 - 528.5)

MR24-02 PL05 sec. 1A 2024.3.25



3.4 - 87.4 (0-84.0)

9-2. Piston Coring Operation Log

Coring Inventory

別紙12
PC インベントリシート

< Observation info.>

Cruise name	MR24-02	Operator	Miyajima
Date (UTC) Y/M/D	2024 / 3 / 13 ~ 14	Recorded by	Tani
Core Number	PC 01	Transponder (超深海トランスポンダー)	SI2-1KP
Area	OFF HIDAKA	Inclinometer	APC11-USB(S/N : 0001)
Sampling Site	SLPC-08	others	—

<Corer info.>

Corer type	Inner ・ Piston	Pilot type	74コアラー
Total Weight	(643) / 660 kg	Pilot Weight	112 kg
Pipe Length	SUS (6) / 8 m	Pilot Pipe Length	1.0 m
Main wire	φ 10 mm × 12.8 m	Pilot Wire	12.6 m
Free Fall	3.4 m		

<Condition>

Weather	Fine	Wave height	3.0 m
Wind direction	278 deg.	Current direction	311.7 deg.
Wind speed	6.2 m/s	Current speed	0.7 knt

<Operation>

	Time	Latitude	Longitude	Depth
Start operation	3/13 23:26			
Hit the bottom	3/14 1:56:32	(TP) 40-45.0848N	144-29.5338E	6774 m
		(Ship) 40-45.07205N	144-29.53681E	6856 m
Finish operation	4:20			

MEMO

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Cruise Name: MR24-02 | Core Name: PC 01 | y m d: 2024/ 3 /13～14 | Page: 1 / 3

Recorded by: Tani

	Time (UTC)	Water depth (m)	Wire out length (m)	Tension (t)	Wire speed (m/s)	Wire out / in (↓ / ↑)	Remarks
3/13	23:26	6856	–	–	–	–	作業開始
	23:37	6856	–	–	–	–	天秤取付け
	23:43	6851	–	~~0.2~~	–	–	PC着水
	23:52	6857	–	~~0.05~~	–	–	PL吊り上げ
	23:53	6860	–	~~0.02~~	–	–	PL着水
	23:58	6851 ~~5851~~	–	~~0.1~~	–	–	トラポン ON
	23:58	6851	–	~~0.1~~	–	–	PL 天秤に取付け
	23:59	6853	–	~~0.08~~	–	–	注水開始
3/14	00:00	6851	–	~~0.11~~	–	–	注水終了
	00:00	6851	–	~~0.13~~	–	–	天秤 安全ピン脱
	00:01	6850	–	~~0.12~~	–	–	ビット着水
	00:01	6851	–	~~0.08~~	–	–	錘着水 . ビット調
	00:04	6854	50	~~0.12~~	–	–	トラポン取付け
	00:08	6856	50	~~0.04~~	–	–	トラポン
	00:09	6856	70	~~0.04~~	1.0	↓	トラポン着水
	00:16	6850	500	0.85	–	–	スウェルコン ON
	00:19	6850	500	0.9	1.0	↓	繰り出し
	00:28	6851	1000	1.3	1.2	↓	
	00:35	6857	1500	1.7	1.2	↓	
	00:42	6849	2000	2.1	1.2	↓	
	00:49	6853	2500	2.5	1.2	↓	
	00:55	6852	3000	2.9	1.2	↓	
	01:02	6851	3500	3.4	1.2	↓	
	01:09	6854	4000	3.9	1.2	↓	
	01:16	6854	4500	4.3	1.2	↓	
	01:23	6851	5000	4.7	1.2	↓	
	01:30	6856	5500	4.9	1.2	↓	
	01:37	6852	6000	5.4	1.2	↓	

Cruise Name: MR24-02 | Core Name: PC 01 | y m d: 2024/ 3 / 16 | Page: 2 / 3

Recorded by: Iwatsu · Tani

Time (UTC)	Water depth (m)	Wire out length (m)	Tension (t)	Wire speed (m/s)	Wire out / in (↓/↑)	Remarks
1:43	6853	6500	5.9	1.2	↓	
1:47	6851	~~6956~~ 6900	6.4	1.2	↓	ウインチ減速
1:49	6853	6750	6.4	—	—	ウインチ停止
1:52	6860	6751	6.0	0.3	↓	繰出し
1:56:32	6856	6826	min 5.4	0.3	↑	着底、巻き上げ
1:57:36	6853	6809	max 6.9	0.3	↑	離底確認
1:58	6859	6745	6.4	0.3	↑	ウインチ増速
2:02	6852	6500	6.4	1.2	↑	
2:09	6852	6000	6.0	1.2	↑	
2:16	6854	5500	5.6	1.2	↑	
2:23	6855	5000	5.0	1.2	↑	
2:30	6852	4500	4.4	1.2	↑	
2:37	6852	4000	4.3	1.2	↑	
2:44	6851	3500	3.6	1.2	↑	
2:51	6852	3000	3.3	1.2	↑	
2:58	6855	2500	2.8	1.2	↑	
3:05	6852	2000	2.5	1.2	↑	
3:12	6853	1500	2.0	1.2	↑	
3:18	6852	1000	1.5	1.2	↑	
3:26	6851	500	1.1	—	—	一旦停止、スウェルコンOFF
3:28	6851	500	1.0	1.1	↑	巻き上げ
3:36	6855	46	0.8	0.1	↑	トラポン水切り
3:37	6850	35	0.7	—	—	トラポン取外し
3:39	6851	—	0.6	—	—	トラポンOFF
3:40	6854	—	0.6	—	—	天秤水切り
3:44	6849	—	0.4	—	—	白パイロットワイヤー 天秤から取外し
3:45	6850	—	0.5	—	—	PL 水切り
3:49	6852	—	0.5	—	—	PL オンデッキ

PRC-SG1-030 別紙13
PCログシート

Cruise Name: MR24-02 | Core Name: PC 01 | y m d: 2024/ 3 / 14 | Page: 3 / 3

Recorded by: Taus

Time (UTC)	Water depth (m)	Wire out length (m)	Tension (t)	Wire speed (m/s)	Wire out / in (↓/↑)	Remarks
3:54	6848	—	—	—	—	下降開始ストレ
4:04	6850	—	—	—	—	ビット水切り
4:20	6853	—	—	—	—	PC オンデッキ

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Coring Inventory

PRC-SG1-030 別紙12
PC インベントリシート

< Observation info.>

Cruise name	MR24-02	Operator	miyajima
Date (UTC) Y/M/D	2024 / 3 / 15~16	Recorded by	Izutsu
Core Number	PC 02	Transponder	超深海トランスポンダー SI2-1KP
Area	Off Hidaka	Inclinometer	APC11-USB(S/N : 0001)
Sampling Site	~~PC02~~ SLPC-05	others	—

<Corer info.>

Corer type	Inner ・ Piston	Pilot type	74コアラー
Weight	643 / 660 kg	Pilot Weight	112 kg
Pipe Length AL / SUS	SUS 6 / 8 m	Pilot Pipe Length	0.7 m
Main wire	φ φ 10 mm × 12.8 m	Pilot Wire	12.6 m
Free Fall	3.4 m		

<Condition>

Weather	fine	Wave height	2.72 m
Wind direction	339 deg.	Current direction	253.5 deg.
Wind speed	11.1 m/s	Current speed	0.8 m/s

<Operation>

	Time	Latitude	Longitude	Depth
Start operation	3/15 23:20			
Hit the bottom	3/16 1:14:04	(TP) 41-05.4356N	144-32.3028E	5473.5 m
		(Ship) ~~41-05.5164N~~ 41-05.5059N	~~144-32.37307E~~ 144-32.36805E	5562 m
Finish operation	3:11			

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Cruise Name: MR24-02 | Core Name: PC 02 | y m d: 2024/ 3 / 15~16 | Page: 1 / 2

Recorded by: Daitsu

	Time (UTC)	Water depth (m)	Wire out length (m)	Tension (t)	Wire speed (m/s)	Wire out / in (↓/↑)	Remarks
3/15	23:20	5560	—	—	—	—	作業開始.
	23:25	5560	—	—	—	—	天秤 取り付け
	23:26	5560	—	—	—	—	錘つり上げ
	23:30	5560	—	—	—	—	PC着水
	23:36	5562	—	—	—	—	PL 吊り上げ
	23:37	5560	—	0.5	—	—	PL 着水
	23:40	5557	—	0.6	—	—	PL 天秤に取り付け
	23:40	5557	—	0.6	—	—	注水 開始.
	23:42	5558	—	0.6	—	—	安全ピン 脱
	23:43	5558	—	0.5	—	—	天秤着水. ゼロ調
	23:44	5557	30	0.6	—	—	トラポン ON
	23:46	5559	50	0.5	—	~~—~~	トラポン 取り付け
	23:47	5559	50	0.6	—	—	トラポン 取り付け 完了
	23:48	5559	76	0.6	1.1	↓	トラポン着水
	23:55	5559	500	0.9	—	—	スウェルコン ON
3/16	0:06	5559	1000	1.8	1.2	↓	
	0:13	5556	1500	1.7	1.2	↓	
	0:20	5554	2000	2.2	1.2	↓	
	0:26	5557	2500	2.7	1.2	↓	
	0:33	5562	3000	3.1	1.2	↓	
	0:40	5561	3500	3.8	1.2	↓	
	0:47	5560	4000	3.8	1.2	↓	
	0:54	5559	4500	4.3	1.2	↓	
	1:00	5558	5000	4.7	1.2	↓	
	1:07	5559	~~5460~~ 5460	5.0	≠—	~~↓~~—	一時停止.
	1:10	5562	5460	5.4	0.3	↓	繰り出し再開.
	1:14:04	~~5563~~ ~~5559~~	~~5530~~ 5530	Min 4.35	0.3	≠↑	着底 発生.
	1:15:06	5556	5519	Max 6.29	0.3	↑	離底/確認

※1t ≒ 9.8kN

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Marine Works Japan LTD.

Cruise Name: MR24-02 | Core Name: PC 02 | y m d: 2024/ 3 / 16 | Page: 2 / 2

Recorded by: [illegible]

Time (UTC)	Water depth (m)	Wire out length (m)	Tension (t)	Wire speed (m/s)	Wire out / in (↓/↑)	Remarks
1:23	5562	5000	5.0	1.2	↑	
1:30	5557	4500	4.6	1.2	↑	
1:36	5557	4000	4.3	1.2	↑	
1:43	5558	3500	3.8	1.2	↑	
1:51	5559	3000	3.4	1.2	↑	
1:58	5557	2500	2.9	1.2	↑	
2:04	5556	2000	2.5	1.2	↑	
2:11	5557	1500	2.0	1.2	↑	
2:18	5558	1000	1.6	1.2	↑	
2:26	5559	500	1.1	1.2	一時	一時停止. スクリュコン OFF
2:28	5559	500	1.1	1.0	↑	巻き上げ 再開
2:35	5557	40	0.8	—	↑	トラポン 水切り
2:36	5558	20	0.8	0.7	↑	トラポン 取り外し. OFF
2:38	5559	—	0.6	0.2	↑	天秤に切り
2:40	5559	—	0.4	—	—	PL 天秤から外し
2:42	5558	—	0.4	—	—	PL 水切り
2:46	5559	—	—	—	—	PL オンデッキ
2:49	5559	—	—	—	—	天秤 取り外し.
2:56	5558	—	—	—	—	錨 水切り
2:56	5558	—	—	—	—	ビット 水切り
3:09	5556	—	—	—	—	PC オンデッキ

※1t ≒ 9.8kN

Coring Inventory

PRC-SG1-030 別紙12
PC インベントリシート

< Observation info.>

Cruise name	MR24-02	Operator	Sawada
Date (UTC) Y/M/D	2024 / 3 / 19 ~ 20	Recorded by	Tani
Core Number	PC 03	Transponder	超深海トランスポンダー SI2-1KP
Area	Off ~~Hidaka~~ Nemuro	Inclinometer	APC11-USB(S/N : 0001)
Sampling Site	ORPC10	others	—

<Corer info.>

Corer type	Inner ・ Piston	Pilot type	74コアラー
Weight	(643) / 660 kg	Pilot Weight	112 kg
Pipe Length AL / SUS	SUS (6) / 8 m	Pilot Pipe Length	0.7 m
Main wire	φ φ10 mm × 12.8 m	Pilot Wire	12.6 m
Free Fall	3.4 m		

<Condition>

Weather	Fine	Wave height	3.0 m
Wind direction	350 deg.	Current direction	300 deg.
Wind speed	6.7 m/s	Current speed	0.4 m/s

<Operation>

	Time	Latitude	Longitude	Depth
Start operation	3/19 21:17			
Hit the bottom	3/20 2:44:30	(TP) 40-38.5399N	146-26.3868 E	5071 m
		(Ship) 40-38.64414N	146-26.40402E	5141 m
Finish operation	4:31			

MEMO

天秤が作動していなかったため再投入した。

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Cruise Name: MR24-02 | Core Name: PC 03 | y m d: 2024/ 3 / 19～20 | Page: 1 / 4

Recorded by Tani

Time (UTC)	Water depth (m)	Wire out length (m)	Tension (t)	Wire speed (m/s)	Wire out / in (↓/↑)	Remarks
21:17	5141	—	—	—	—	作業開始
21:26	5142	—	—	—	—	天秤取付け
21:29	5142	—	—	—	—	PC錘吊り上げ
21:30	5141	—	0.4	—	—	PC着水
21:36	5141	—	0.4	—	—	メインワイヤー ゴイル外す ~~パイロットワイヤー 天秤取付け~~
21:37	5142	—	0.4	—	—	PL吊り上げ
21:38	5142	—	0.5	—	—	PL着水
21:41	5144	—	0.5	—	—	パイロットワイヤー 天秤取付け
21:41	5144	—	0.5	—	—	注水開始
21:42	5142	—	0.6	—	—	注水完了
21:43	5142	—	0.6	—	—	安全ピン脱
21:43	5142	—	0.6	—	—	ビット着水
21:44	5142	—	0.5	—	—	錘着水、ゼロ調
21:48	5140	50	0.6	—	—	トラポン取付完了
21:49	5142	62	0.6	1.0 m	↓	トラポン最着水
21:59	5144	500	1.0	—	—	スウェルコン ON
22:09	5143	1000	1.3	1.2	↓	
22:16	5142	1500	1.7	1.2	↓	
22:23	5143	2000	2.2	1.2	↓	
22:29	5140	2500	2.7	1.2	↓	
22:36	5140	3000	2.9	1.2	↓	
22:43	5147	3500	3.4	1.1	↓	
22:50	5142	4000	3.9	1.2	↓	
22:58	5142	4500	4.3	1.1	↓	
23:05	5143	5000	4.6	1.0	↓	
23:07	5138	5040	4.8	—	—	一旦停止
23:10	5141	5040	4.8	0.3	↓	繰り出し
23:13:42	5145	5098	min 3.8	0.3	↑	着底、巻き上げ

※1t ≒ 9.8kN

Ver.2.30(20140909)
Marine Works Japan LTD.

Cruise Name: MR24-02 | Core Name: PC 03 | y m d: 2024/ 3 / 19 ~ 20 | Page: 2 / 4

Recorded by: Tani

Time (UTC)	Water depth (m)	Wire out length (m)	Tension (t)	Wire speed (m/s)	Wire out / in (↓/↑)	Remarks
23:15:31	5143	5065	max 6.4	0.3	↑	離底確認
23:23	5145	4500	4.6	1.2	↑	
23:30	5143	4000	4.3	1.2	↑	
23:37	5143	3500	3.6	1.2	↑	
23:45	5143	3000	3.2	1.2	↑	
23:51	5144	2500	2.8	1.2	↑	
23:58	5145	2000	2.3	1.2	↑	
3/20 00:05	5149	1500	1.9	1.2	↑	
00:12	5138	1000	1.6	1.1	↑	
00:21	5142	500	1.0	—	一	一旦停止、スウェルコンOFF
00:25	5143	500	1.0	0.2	↑	巻き上げ
00:34	5141	52	0.7	0.1	↑	トラポン水切り
00:35	5140	40	0.7	0.4	↑	トラポン取外し
00:35	5141	40	0.7	0.8	↑	トラポン OFF
00:37	5147	—	0.6	—	—	天秤水切り
						天秤未作動．再投入
00:41	5145	—	—	—	—	トラポン ON
00:41	5145	—	0.7	1.0	↓	ゼロ調
00:46	5142	50	0.7	—	—	トラポン取付完了
00:47	5143	60	0.7	0.6	↓	トラポン着水
00:48	5149	75	0.7	—	—	一旦停止
~~00:57~~	~~5144~~	~~500~~	~~0.9~~	~~1.0~~		ウインチ調整のため．待機
00:57	5144	500	0.9	1.0	↓	
01:05	5142	1000	1.5	—	—	一旦停止
1:26	5142	1000	1.5	1.2	↓	繰り出し
1:33	5140	1500	1.8	1.2	↓	
1:40	5141	2000	2.2	1.2	↓	
1:43	5142	2194	2.5	—	—	一旦停止

※1t ≒ 9.8kN

Cruise Name: MR24-02 | Core Name: PC 03 | y m d: 2024/ 3 / 20 | Page: 3 / 4

Recorded by: Tani

Time (UTC)	Water depth (m)	Wire out length (m)	Tension (t)	Wire speed (m/s)	Wire out / in (↓/↑)	Remarks
1:46	5145	2194	2.5	1.2	↓	繰り出し
1:51	5144	2500	2.7	1.2	↓	
1:58	5138	2997	3.2	—	—	一旦停止、スウェルコンON
2:03	5145	2997	3.2	1.2	↓	繰り出し
2:11	5143	3500	3.4	1.2	↓	
2:18	5142	4000	3.8	1.2	↓	
2:25	5144	4500	4.2	1.2	↓	
2:34	5143	5000	4.8	0.5	↓	
2:35	5144	5040	4.9	—	—	一旦停止
2:39	5147	5040	4.8	0.3	↓	繰り出し
2:44:30	5141	予想 5136	min 3.8	0.3	↑	着底、巻き上げ
2:45:39	5148	5116	max 5.7	0.3	↑	擬底確認
2:47	5141	5000	5.0	1.2	↑	
2:54	5146	4500	4.6	1.2	↑	
3:01	5146	4000	4.1	1.2	↑	
3:08	5143	3500	3.7	1.2	↑	
3:15	5143	3000	3.3	1.2	↑	
3:22	5144	2500	2.9	1.2	↑	
3:29	5143	2000	2.4	1.2	↑	
3:35	5140	1500	1.9	1.2	↑	
3:42	5144	1000	1.5	1.2	↑	
3:50	5148	500	1.0	—	—	一旦停止、スウェルコンOFF
3:51	5145	500	1.0	1.2	↑	巻き上げ
3:58	5151	53	0.7	0.1	↑	トラポン水切り
4:00	5144	41	0.7	0.7	↑	トラポン収納
4:00	5144	41	0.7	0.7	↑	トラポン OFF
4:02	5139	—	0.6	0.1	↑	天秤水切り
4:06	5143	—	0.5	0.1	↑	PL 水切り

※1t ≒ 9.8kN

Ver.2.30(20140909)
Marine Works Japan LTD.

Cruise Name: MR24-02 | Core Name: PC 03 | y m d: 2024/ 3 /20 | Page: 4 / 4

Recorded by: Tani

Time (UTC)	Water depth (m)	Wire out length (m)	Tension (t)	Wire speed (m/s)	Wire out / in (↓/↑)	Remarks
4:07	5145	—	0.5	—	—	PL オンデッキ
4:13	5143	—	—	—	—	大科取外し
4:21	5138	—	—	—	—	PC錘水切り
4:22	5145	—	—	—	—	ビット水切り
4:31	5145	—	—	—	—	PC オンデッキ

※1t ≒ 9.8kN

Ver.2.30(20140909)
Marine Works Japan LTD.

Coring Inventory

PRC-SG1-030 別紙12
PC インベントリシート

< Observation info.>

Cruise name	MR24-02	Operator	Sawada
Date (UTC) Y/M/D	2024 / 3 / 21~22	Recorded by	Fukuyama
Core Number	PC 04	Transponder	超深海トランスポンダー SI2-1KP
Area	Off Hibaka	Inclinometer	APC11-USB(S/N : 0001)
Sampling Site	SLPC10	others	—

<Corer info.>

Corer type	Inner ・ Piston	Pilot type	74コアラー
Weight	(643) 660 kg	Pilot Weight	112 kg
Pipe Length AL / SUS	SUS (6) 8 m	Pilot Pipe Length	0.7 m
Main wire	φ φ 10 mm × 12.8 m	Pilot Wire	12.6 m
Free Fall	3.4 m		

<Condition>

Weather	Cloudy	Wave height	3.5 m
Wind direction	20 deg.	Current direction	257 deg.
Wind speed	8.1 m/s	Current speed	0.4 kt ~~m/s~~

<Operation>

	Time	Latitude	Longitude	Depth
Start operation	3/21 23:14			
Hit the bottom (TP)	3/22 1:16:11	41-00.0603N	144-13.1818E	5274 ~~5287.6~~ m
(Ship)		41-00.1608N	144-13.2501E	5356 m
Finish operation	3/22 3:05			

MEMO

Ver.3.00(20140909)
Marine Works Japan LTD.

Cruise Name: MR24-02 | Core Name: PC 04 | y m d: 2024/ 3 / 21~22 | Page: 1 / 2

Recorded by Fukuyama.

Time (UTC)	Water depth (m)	Wire out length (m)	Tension (t)	Wire speed (m/s)	Wire out / in (↓/↑)	Remarks
3/21 23:14	5364	—	—	—	—	作業開始
23:23	5355	—	—	—	—	天秤取付け
23:34	5352	—	0.5	—	—	メインワイヤー取付け
23:35	5356	—	0.5	—	—	~~PC~~ PL着水.
23:41	5346	—	0.6	—	—	注水完了
23:42	5353	—	0.5	—	—	PC錘着水，ゼロ調
23:43	5353	—	0.5	—	—	トラポンON
23:45	5358	×50	0.6	—	—	トラポン取付け
23:47	5352	×50	0.6	—	—	トラポン取付け完了
23:48	5352	60	0.6	0.8	↓	トラポン着水.
23:59	5353	500	1.0	—	—	スウェルコンON
3/22 00:08	5352	1000	1.3	1.2	↓	
0:15	5348	1500	1.7	1.2	↓	
0:22	5360	2000	2.2	1.2	↓	
0:28	5358	2500	2.5	1.2	↓	
0:36	5358	3000	3.0	1.2	↓	
0:42	5357	3500	3.4	1.2	↓	
0:49	5363	4000	3.8	1.2	↓	
0:56	5359	4500	4.2	1.2	↓	
1:03	5356	5000	4.6	1.2	↓	
1:09	~~5350~~ ~~5250~~	5250	5.0	—	—	一旦停止
1:11	5352	5250	5.0	0.3	↓	繰り出し.
1:16:11	5347	5342	min ~~4.07~~	0.3	※↑	着底，巻き上げ.
1:17:41	5347	5319	max 6.02	0.3	↑	着底確認.
1:22	5364	5000	5.0	1.2	↑	
1:29	5357	4500	4.6	1.2	↑	
1:36	5358	4000	4.1	1.2	↑	
1:43	5355	3500	3.7	1.2	↑	

※1t ≒ 9.8kN

Ver.2.30(20140909)
Marine Works Japan LTD.

Cruise Name: MR24-02 | Core Name: PC 04 | y m d: 2024/ 3 / 22 | Page: 2 / 2

Recorded by Fukuyama

Time (UTC)	Water depth (m)	Wire out length (m)	Tension (t)	Wire speed (m/s)	Wire out / in (↓/↑)	Remarks
1:50	5361	3000	3.3	1.2	↑	
1:57	5352	2500	2.8	1.2	↑	
2:04	5356	2000	2.3	1.2	↑	
2:11	5356	1500	1.9	1.2	↑	
2:18	5358	1000	1.5	1.2	↑	
2:25	5352	500	1.0	—	↑	一旦停止、スラェルコンOFF
2:28	5357	500	1.0	1.2	↑	巻き上げ
2:34	5354	53~~45~~	0.7	1.0	↑	トラポン水切り
2:36	5349	42	0.6	0.8	—	トラポン取外し
2:37	5357	14	0.6	0.5	↑	トラポンOFF
2:37	~~5349~~	—	0.5	0.08	↑	天秤水切り
2:41	5352	—	~~0.4~~	—	—	PL 水切り
2:42	5349	—	—	—	—	PL オンデッキ
2:47	5351	—	—	—	—	天秤取外し
2:55	5356	—	—	—	—	PC錘 水切り
2:55	5356	—	—	—	—	PC水切り
3:05	5360	—	—	—	—	PC オンデッキ

※1t ≒ 9.8kN

Ver.2.30(20140909)
Marine Works Japan LTD.

Coring Inventory

PRC-SG1-030 別紙12
PC インベントリシート

< Observation info.>

Cruise name	MR24-02	Operator	Miyajima
Date (UTC) Y/M/D	2024 / 3 / 22 ~ 23	Recorded by	Tani
Core Number	PC 05	Transponder	超深海トランスポンダー SI2-1KP
Area	off Hidaka	Inclinometer	APC11-USB(S/N : 0001)
Sampling Site	SLPC09	others	—

<Corer info.>

Corer type	Inner ・ Piston	Pilot type	74コアラー
Weight	643 / 660 kg	Pilot Weight	112 kg
Pipe Length AL / SUS	SUS (6) / 8 m	Pilot Pipe Length	0.7 m
Main wire	φ φ 10 mm × 12.8 m	Pilot Wire	12.6 m
Free Fall	3.4 m		

<Condition>

Weather	Sunny	Wave height	2.5 m
Wind direction	186 deg.	Current direction	286.3 deg.
Wind speed	1.2 m/s	Current speed	0.3 m/s

<Operation>

	Time	Latitude	Longitude	Depth
Start operation	3/22 21:13			
Hit the bottom	3/~~23~~22 23:26:38	(TP) 40.36.7139N	144.21.0884E	6948 m
		(Ship) 40-36.96688N	144-21.33305E	7034 m
Finish operation	3/23 1:41			

MEMO

Ver.3.00(20140909)
Marine Works Japan LTD.

Cruise Name: MR24-02 | Core Name: PC 05 | y m d: 2024/ 3 / 22～23 | Page: 1 / 2

Recorded by: Tani

Time (UTC)	Water depth (m)	Wire out length (m)	Tension (t)	Wire speed (m/s)	Wire out / in (↓/↑)	Remarks
3/22						
21:13	7032	-	-	-	-	作業開始
21:18	7032	-	-	-	-	天秤取り付け
21:20	7025	-	-	-	-	錘吊り上げ
21:27	7027	-	0.6	-	-	PL 吊り上げ
21:28	7026	-	0.6	-	-	PL 着水
21:30	7029	-	0.7	-	-	PL 天秤に取り付け
21:32	7025	-	0.7	-	-	注水完了
21:33	7033	-	0.7	-	-	天秤安全ピン脱
21:33	7024	-	0.6	-	-	錘着水．ゼロ調
21:34	7031	-	0.6	-	-	トラポン ON
21:36	7035	51	0.7	-	-	トラポン取付け
21:38	7028	51	0.7	-	-	トラポン取付け完了
21:39	7028	60	0.7	1.0	↓	トラポン着水
21:48	7029	500	1.0	-	-	スウェルコン ON
21:56	7023	1000	1.4	1.2	↓	
22:03	7030	1500	1.9	1.2	↓	
22:09	7031	2000	2.3	1.2	↓	
22:16	7041	2500	2.7	1.2	↓	
22:23	7033	3000	3.1	1.2	↓	
22:30	7027	3500	3.5	1.2	↓	
22:36	7036	4000	3.9	1.2	↓	
22:43	7032	4500	4.3	1.2	↓	
22:50	7024	5000	4.8	1.2	↓	
22:56	7025	5500	5.1	1.2	↓	
23:04	7021	6000	5.5	1.2	↓	
23:10	7045	6500	5.9	1.2	↓	
23:18	7029	6920	6.5	-	-	一旦停止
23:21	7036	6920	6.5	0.3	↓	繰り出し

※1t ≒ 9.8kN

Ver.2.30(20140909)
Marine Works Japan LTD.

Cruise Name: MR24-02 | Core Name: PC 05 | y m d: 2024/ 3 / 22 ~23 | Page: 2 / 2

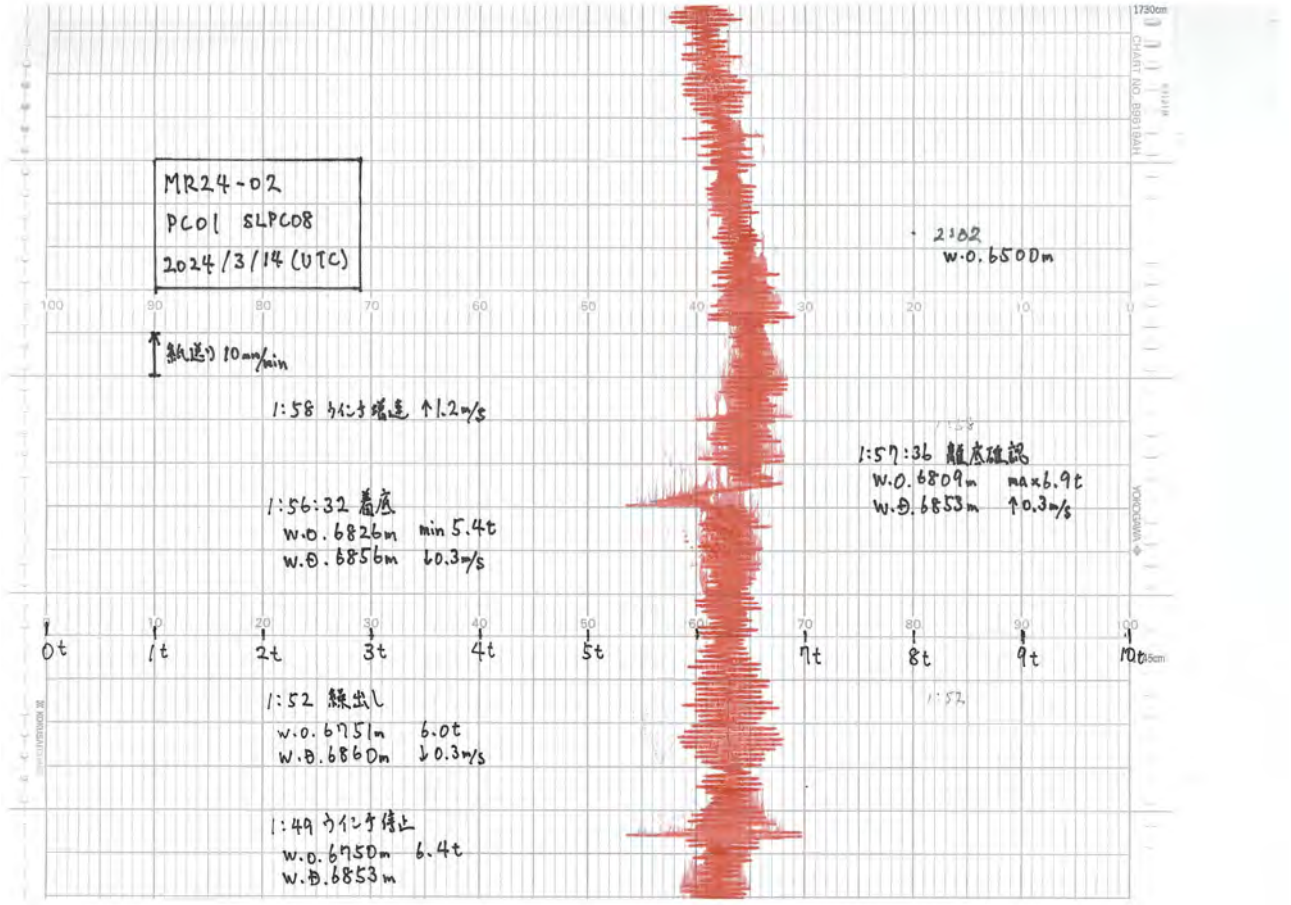
Recorded by: Tano

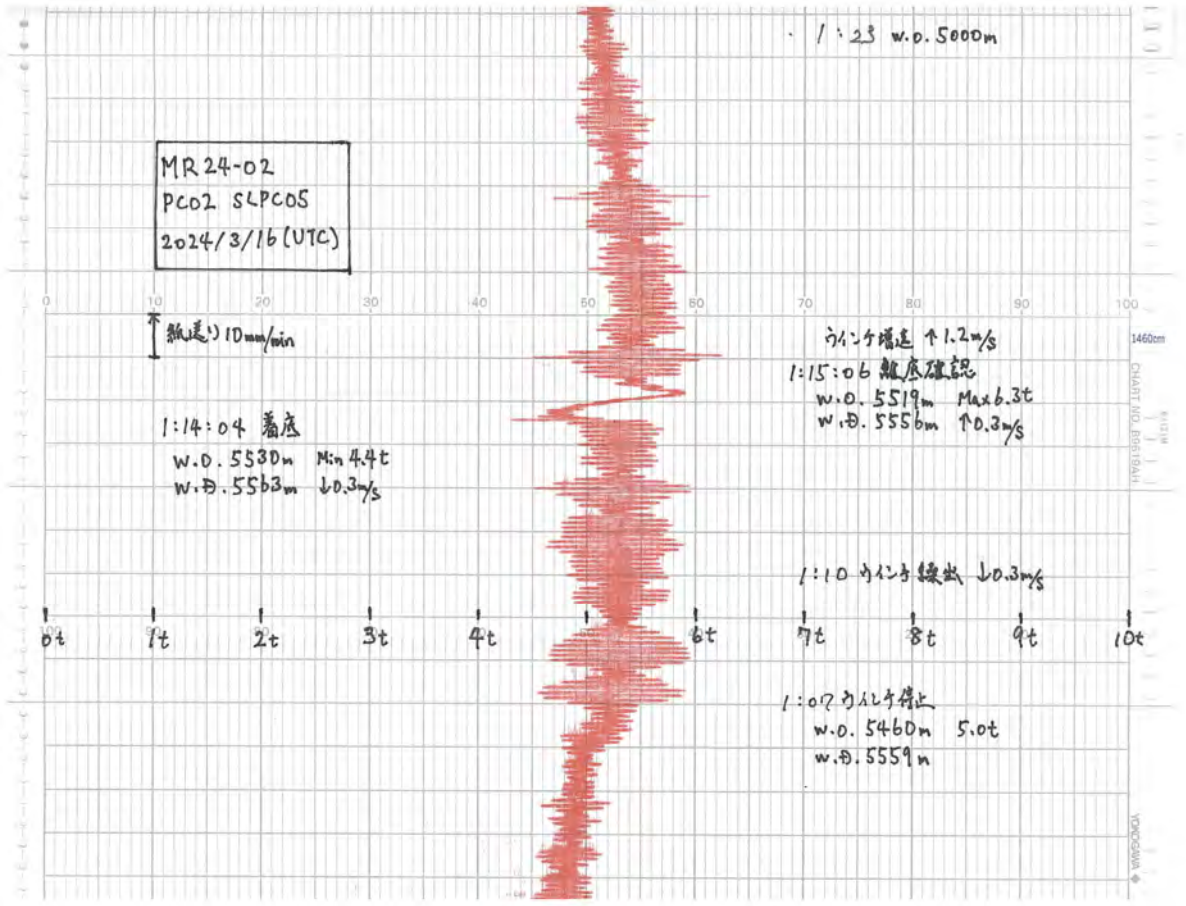
Time (UTC)	Water depth (m)	Wire out length (m)	Tension (t)	Wire speed (m/s)	Wire out / in (↓/↑)	Remarks
23:26:38	7034	7027	min 5.6	0.3	↑	着底・巻き上げ
23:27:31	7032	7012	max 7.3	0.3	↑	海底確認
23:35	7041	6500	6.5	1.2	↑	
23:42	7042	6000	6.1	1.2	↑	
23:49	7042	5500	5.6	1.2	↑	
3/23 23:55	7041	5000	5.3	1.2	↑	
0:02	7040	4500	4.7	1.2	↑	
0:09	7044	4000	4.2	1.2	↑	
0:16	7041	3500	3.9	1.2	↑	
0:23	7040	3000	3.4	1.2	↑	
0:29	7040	2500	2.9	1.2	↑	
0:36	7040	2000	2.4	1.2	↑	
0:43	7040	1500	2.2	1.2	↑	
0:50	7040	1000	1.6	1.2	↑	
0:57	7044	500	1.2	—	—	スカニルコン OFF
0:59	7042	500	1.2	0.2	↑	巻き上げ
1:08	7041	46	0.8	0.1	↑	TP 水切り
1:10	7052	35	0.8	0.6	↑	トラポン OFF
1:11	7040	—	0.7	0.1	↑	天秤 水切り
1:15	7047	—	0.6	—	—	PL 水切り
1:18	7039	—	0.6	—	—	PL オンデッキ
1:21	7043	—	—	—	—	天秤取り外し
1:28	7041	—	—	—	—	錘 水切り
1:28	7041	—	—	—	—	ピット水切り
1:41	7042	—	—	—	—	PC オンデッキ

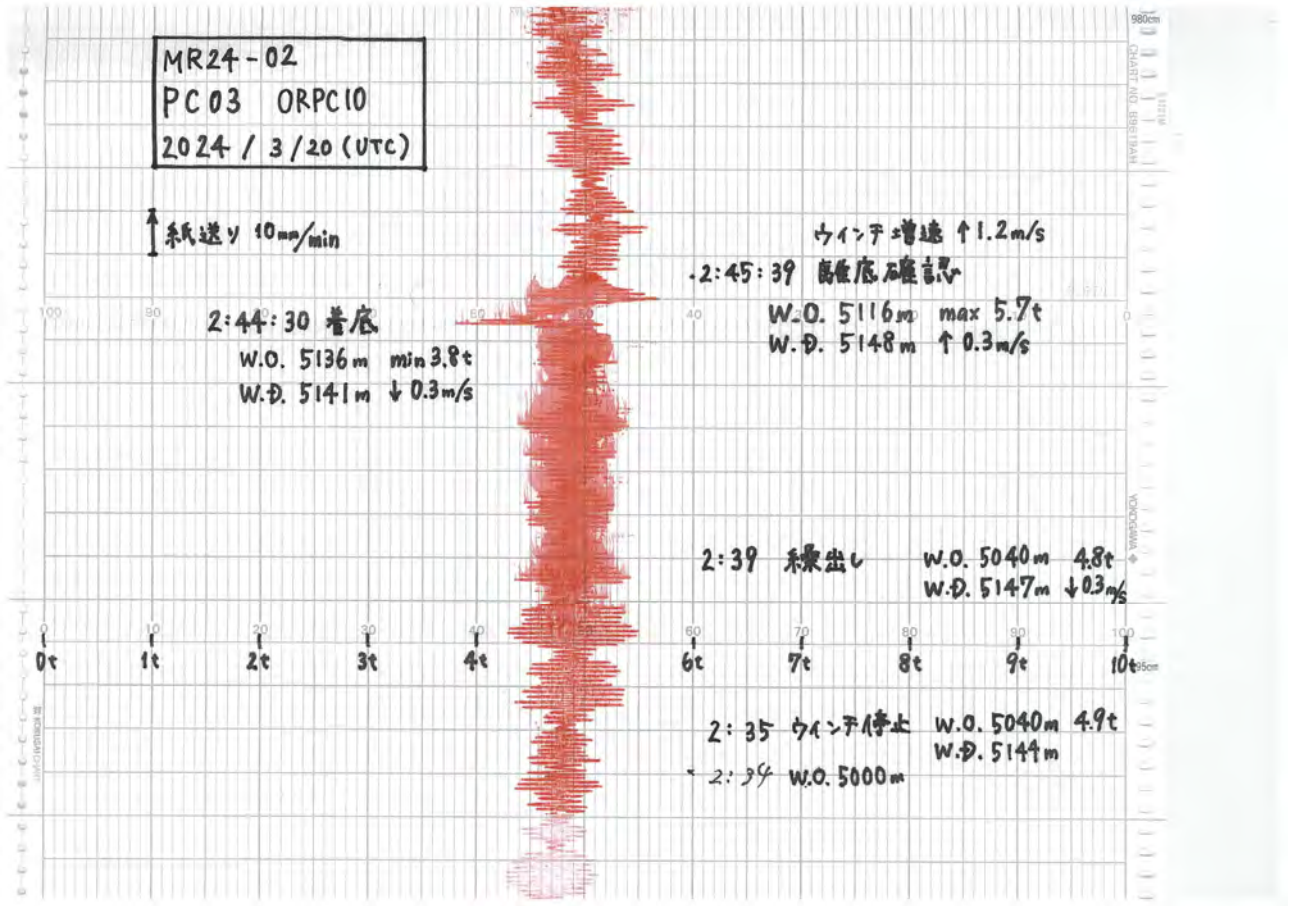
※1t ≒ 9.8kN

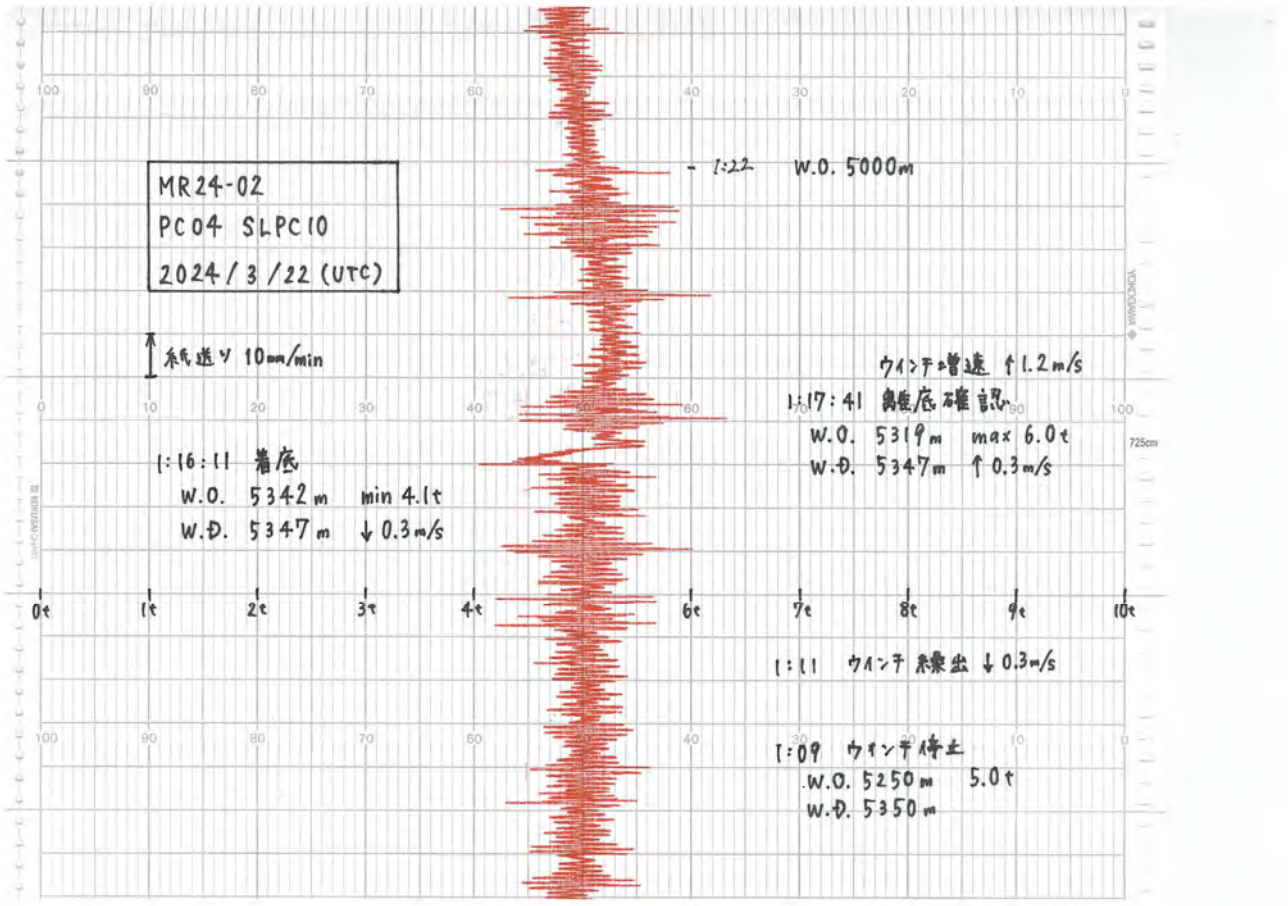
Ver.2.30(20140909)
Marine Works Japan LTD.

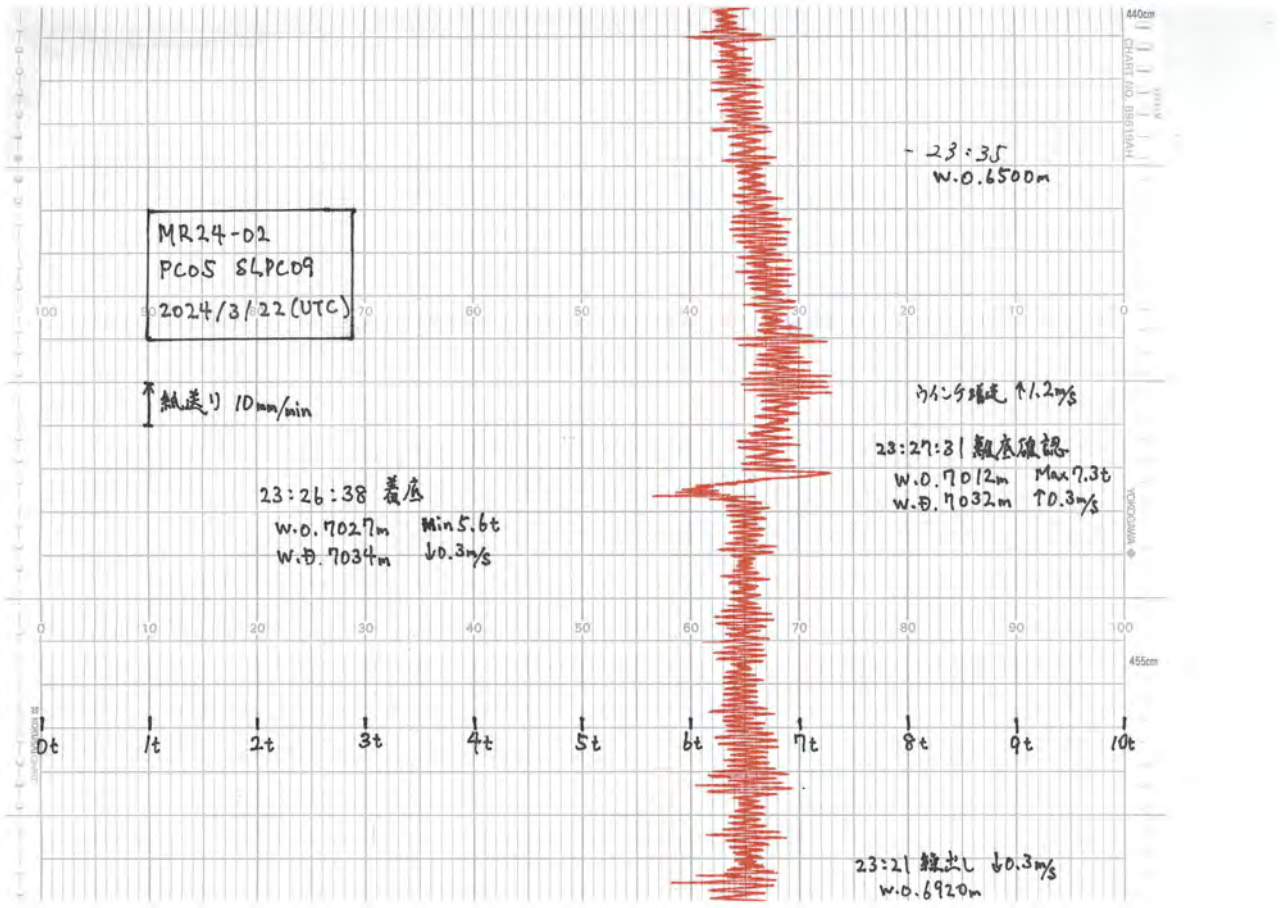
9-3. Tension Record of PC Operation




MR24-02
PCO2 SLPCOS
2024/3/16(UTC)
紙送り10mm/min
1:14:04 着底
W.O. 5530m Min 4.4t
W.D. 5563m ↓0.3m/s
1:23 W.O. 5000m
ウインチ増速 ↑1.2m/s
1:15:06 離底確認
W.O. 5519m Max 6.3t
W.D. 5556m ↑0.3m/s
1:10 ウインチ繰出 ↓0.3m/s
1:07 ウインチ停止
W.O. 5460m 5.0t
W.D. 5559m
0t
1t
2t
3t
4t
6t
7t
8t
9t
10t


MR24-02
PC03 ORPC10
2024 / 3 / 20 (UTC)
紙送り 10mm/min
2:44:30 着底
W.O. 5136m min 3.8t
W.D. 5141m ↓0.3m/s
ウインチ増速 ↑1.2m/s
2:45:39 擬似底確認
W.O. 5116m max 5.7t
W.D. 5148m ↑0.3m/s
2:39 繰出し
W.O. 5040m 4.8t
W.D. 5147m ↓0.3m/s
2:35 ウインチ停止
W.O. 5040m 4.9t
W.D. 5144m
2:34 W.O. 5000m
0t
1t
2t
3t
4t
6t
7t
8t
9t
10t


MR24-02
PC04 SLPC10
2024/3/22 (UTC)
紙送り 10mm/min
- 1:22 W.O. 5000m
ウインチ増速 ↑1.2m/s
1:17:41 海底確認
W.O. 5319m max 6.0t
W.D. 5347m ↑0.3m/s
1:16:11 着底
W.O. 5342m min 4.1t
W.D. 5347m ↓0.3m/s
1:11 ウインチ繰出 ↓0.3m/s
1:09 ウインチ停止
W.O. 5250m 5.0t
W.D. 5350m
0t
1t
2t
3t
4t
6t
7t
8t
9t
10t


MR24-02
PC05 SLPC09
2024/3/22(UTC)
紙送り 10mm/min
23:26:38 着底
W.O.7027m Min5.6t
W.B.7034m ↓0.3m/s
23:27:31 離底確認
W.O.7012m Max7.3t
W.B.7032m ↑0.3m/s
ウインチ速度 ↑1.2m/s
23:35
W.O.6500m
23:21 繰出し ↓0.3m/s
W.O.6920m
0t
1t
2t
3t
4t
5t
6t
7t
8t
9t
10t