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KAIREI “Cruise Report”

KR16-E06

Research of the Paleoseismology in the slope to trench in Nankai Trough (Nansei-shoto)

Dec. 7th, 2016-Dec.16th, 2016

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

KR16-E06 Cruise Report Contents

1. Cruise Information

Cruise ID: KR16-E06

Name of vessel: R/V KAIREI

Chief scientist [Affiliation]: Toshiya Kanamatsu [CEAT JAMSTEC]

Representative of the Science Party [Affiliation]: Toshiya Kanamatsu [CEAT JAMSTEC]]

Proposal representative [affiliation]: Shuichi Kodaira [CEAT JAMSTEC]

Title: Research of the Paleoseismology in the slope to trench in Nankai Trough”

Cruise period: Dec. 7th 2016 to Dec. 16th 2016

Ports of departure / arrival: Kagoshima/Naha

Research area: Nansei-shoto

Research map Refer **Fig. 4-1**

2. Participant list

Scientific party

Toshiya Kanamatsu	CEAT, JAMSTEC
Ken Ikehara	Geological Survey of Japan, AIST
Kazuko Usami	Geological Survey of Japan, AIST
Kan-Hsi Hsiung	ODS, JAMSTEC
Takuya Onodera	Nippon Marine Enterprise
Ei Hatakeyama	Marine Works Japan Ltd
Yusuke Sato	Marine Works Japan Ltd
Yuji Fuwa	Marine Works Japan Ltd
Yohei Katayama	Marine Works Japan Ltd

RV KAIREI Ship Crew

Master	TAKAFUMI AOKI
Chief Officer	YASUHIKO SAMMORI
2nd Officer	HIDEHIKO KONNO
3rd Officer	KEIJI ITAHASHI
Chief Engineer	EIJI SAKAGUCHI
1st Engineer	TAKASHI OTA
2nd Engineer	KENICHI SHIRAKATA
3rd Engineer	YOICHI YASUE
Chief Electronics Operator	MASAMOTO TAKAHASHI
2nd Electronics Operator	YUKA MORIWAKI
3rd Electronics Operator	RYOSUKE MATSUI
Jr.3rd Electronics Operator	RYUJI ONIKUBO
Boat Swain	TADAHIKO TOGUCHI
Quarter Master	KAZUMI OGASAWARA
Quarter Master	MINORU KISHI
Quarter Master	NOBUYUKI ICHIKAWA
Quarter Master	YOSHIAKI MATSUO
Quarter Master	DAISUKE YANAGITANI
Sailor	TAKUMI MIURA
No.1 Oiler	YUKIHIRO YAMAGUCHI
Oiler	YUJI HIGASHIGAWA
Oiler	MASAKI TANAKA
Oiler	EIJI ARATAKE
Assistant Oiler	TORU HIDAKA
Chief Steward	TOYONORI SHIRAISHI
Steward	HIDEO FUKUMURA
Steward	TORU MURAKAMI
Steward	KOICHIRO KASHIWAGI
Steward	YUDAI KUSUNOKI

3. Cruise Log

07th Dec (Wed)12:00 JST Southwest of Sata-misaki (30-59.1N,130-33.7E)
weather: bc (half clear) / wind dir: NW /wind-force: 2 / wind wave: 2 / swell : 0 / visibility: 8nm

09:00	Left the North No.01 pier, Kagoshima port
10:15-11:03	Briefing on ship life and Sci. meeting
16:30-17:00	Konpira-sanpai

08th December(Thr)12:00 JST West of Okinawa Is (26-31.1N,127-23.2E)
weather: c / wind dir: NE / wind force: 4 /wind wave: 3 / swell: 1 / visibility: 8nm

Transit to the survey area

09th December(Fri) 12:00 JST East of Ishigaki Is (23-54.5N,124-34.1E)
weather: bc/ wind dir: NE / wind force: 6 / wind wave: 4 / swell: 3 / visibility: 8nm

00:20	enter the survey area
00:29-04:41	MBES survey
05:25	XBT measurement
05:47-06:55	SBP survey
07:50	Meeting at deck
08:33	PC02 deploy (KR16Plan09)
09:43	hit bottom
10:55	PC02 Retrieve
11:41-12:50	SBP survey
13:41	PC02 deploy (KR16Plan091)
14:49	hit bottom
16:00	PC02 Retrieve
17:53-	MBES survey

10th December (Sat) 12:00 JST East of Ishigaki Is.(23-59.3N,124-42.2E)
weather: bc / wind dir: NE / wind force: 6 / wind wave: 5 / swell: 3 / visibility: 8nm

05:35	terminate MBES survey
06:03-06:53	SBP survey
09:06-	start MBES survey

11th December, 2016 (Sun) 12:00 JST **southeast of Ishigaki(24-20.1N,124-56.3E)**
weather: bc / wind dir: ENE / wind force: 6 / wind wave: 5 / swell: 3 / visibility: 8nm

-04:07	MBES survey
10:45-	MBES survey

12th Dec 2016 (Mon) 12:00 JST **southeast of Ishigaki(23-52.3N,124-40.0E)**
weather: bc / wind dir: SE / wind force: 5 / wind wave: 4 / swell: 3 / visibility: 8nm

-06:48	MBES survey
07:28-08:10	SBP survey
08:48-10:10	SBP survey
13:00	meeting at deck
13:36	PC03 deploy (KR16Plan01alt)
14:58	hit bottom

16:13	PC03 retrieve
17:36-17:57	SBP survey
19:05-	MBES survey

13th December, 2016 (Tue) 12:00 JST **South of Ishigaki(24-01.7N,124-44.2E)**

weather: bc / wind dir: NNW / wind force: 3 / wind wave: 2 / swell: 3 / visibility: 8nm

-05:30	MBES survey
08:00	meeting at deck
08:33	PC04 deploy (KR16Plan04)
09:43	hit bottom
10:46	PC04 retrieve
13:00	meeting at deck
13:28	PC05 deploy (KR16Add02)
14:42	hit bottom
15:46	PC05 retrieve
17:06-19:48	MBES survey
20:00	heading to Nakagusuku to make harborage.

14th December, 2016 (Wed) 12:00 JST **Nakagusuku Bay (26-17.9N,127-53.3E)**

weather: bc / wind dir: North / wind force: 7 / wind wave: 3 / swell: 0 / visibility: 8nm

10:00	Anchoring at Nakagusuku Bay

15th December, 2016 (Thr) 12:00 JST

weather: bc / wind dir: Noth / wind force: 6 / wind wave: 3 / swell: 0 / visibility: 8nm

	Anchoring at Nakagusuku Bay
15:00	Heaving anchor, left Nakagusuku-wan Off Kin-Nakagusuku-ko for Naha-ko.

16th December, 2016 (Fri) 12:00 JST

09:00	Sent out 1st shore line, arrived at Naha-ko, then completed voy. No. KR16-E06.

4. Objectives

This cruise was conducted as a part of the study of “Project for wide-area earthquake research of the Nankai Trough” funded by the Ministry of Education, Culture, Sports, Science, and Technology of Japan. The objectives of the cruise are to explore the recurrence record of large Tsunami and earthquake, which are archived in the deep-sea sediment in the Nansei-shoto. The cruise was planed to follow YK15-01 and KR15-18 cruises, which conducted in the south of Ishigaki-Isalnd in 2015.

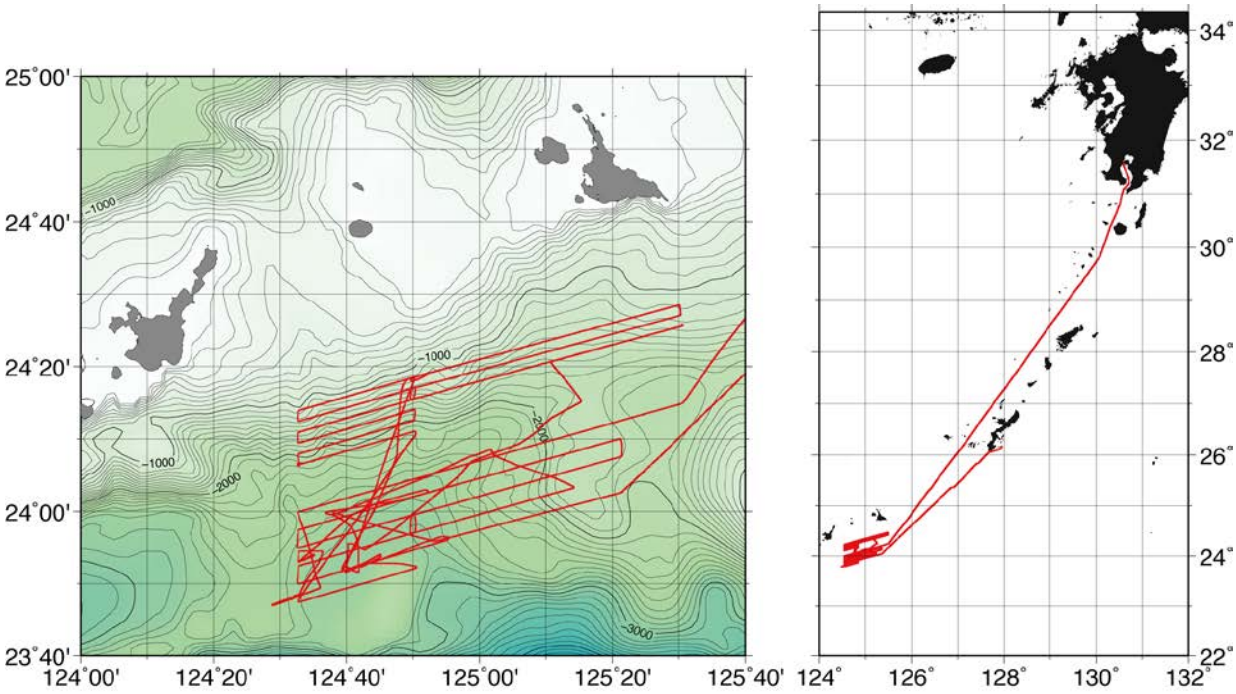


Fig. 4-1. Ship track and working area of KR16-E06. Red line: Ship track.

5.Instruments and Operations

5-1. Multibeam Echosounder System and Sub-bottom profiler

The SeaBeam3012 Multi beam Echo sounder system (MBES), and Bathy 2010 subbottom profiler (SBP) equipped with RV KAIREI were used to collect bathymetric and sub-bottom data in the study area. General specifications of the systems are summarized below.

MBES:	Frequency	12kHz
	Depth range	50～11,000m
	Swath width	Max150°(90° at Water depth 11000m)
	Max beam number	301beams
	Beam width	2°×1.6°
SBP:	Frequency	3.5 kHz
	Depth range	10～12,000m

5-2 Expendable Bathy Thermograph

The sound velocity profile of the local water column, which was used for calibration of depth data for the bathymetry, was estimated from a temperature profile based on in-situ Expendable Bathythermograph (XBT) measurement. (**Table 5-2-1**). Temperature depth profile is shown in **Fig. 5-2-1.**

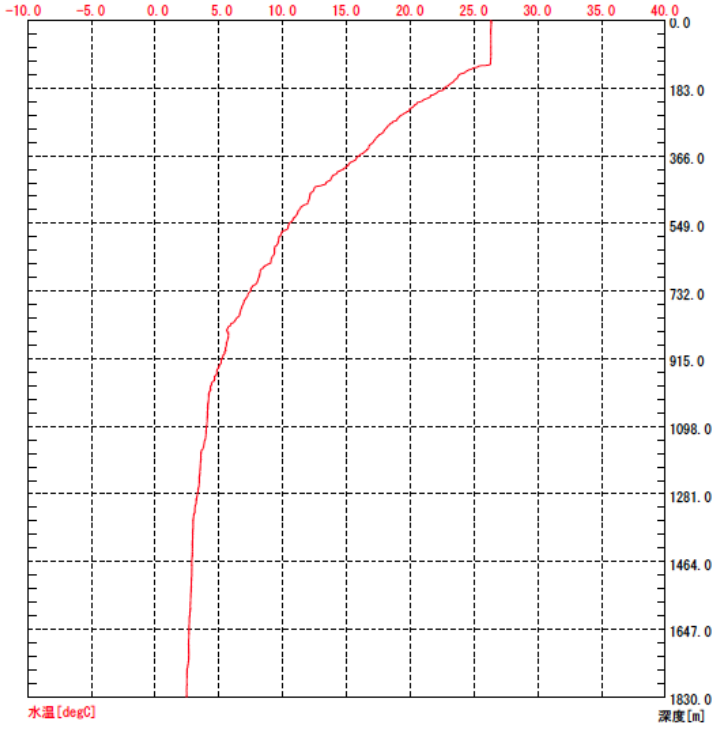


Fig.5-2-1. Temperature profiles measured by XBTs

Table 5-2-1 Positions of XBT measurement

Num	Date	time	Lat	Long	Probe Type	Max depth (m)
0453	2016/12/08	20:25:03	23-50.9336'N	124-35.4299'E	T05	1830

5-3. Piston corer system (MWJ)

Piston corer system (PC)

A piston corer system consists of 0.59 ton weight, 6 m long stainless steel barrels trigger which works as the balance and a pilot core sampler (**Fig. 5-2-1**). In addition, the polyvinyl chloride (PVC) liner tube is inside of the stainless steel barrel. The inner diameter (I.D.) of liner tube is 75 mm. The total weight of the system is approximately 0.8 ton. The piston is composing 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, 50 cm long stainless steel barrel and PVC liner tube. The transponder (SGK system giken co. Ltd.; maximum depth 6,000 m) was attached to the winch wire above 50 m from the PC to monitor the PC position.

“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).*

Winch operation

In the beginning of operation of the PC, a speed of wire out was set to 20 m/min, and then increased lowering speed up to 50 m/min 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 20 m/min, and we carefully watched a tension meter to observe reaching of the PC to seafloor. When the corer reached to seafloor, wire tension abruptly decreased by the loss of the corer weight. Wire out was stopped immediately when the corer hit to seafloor. Winding of the wire was started at a speed of 20 m/min until the tension gauge indicates that the corer was lifted off seafloor. After leaving of the PC from seafloor, winch wire was wound at the maximum speed.

Core splitting

The sediment sections were horizontally split half as working and archive halves with the core splitter and nylon wires.

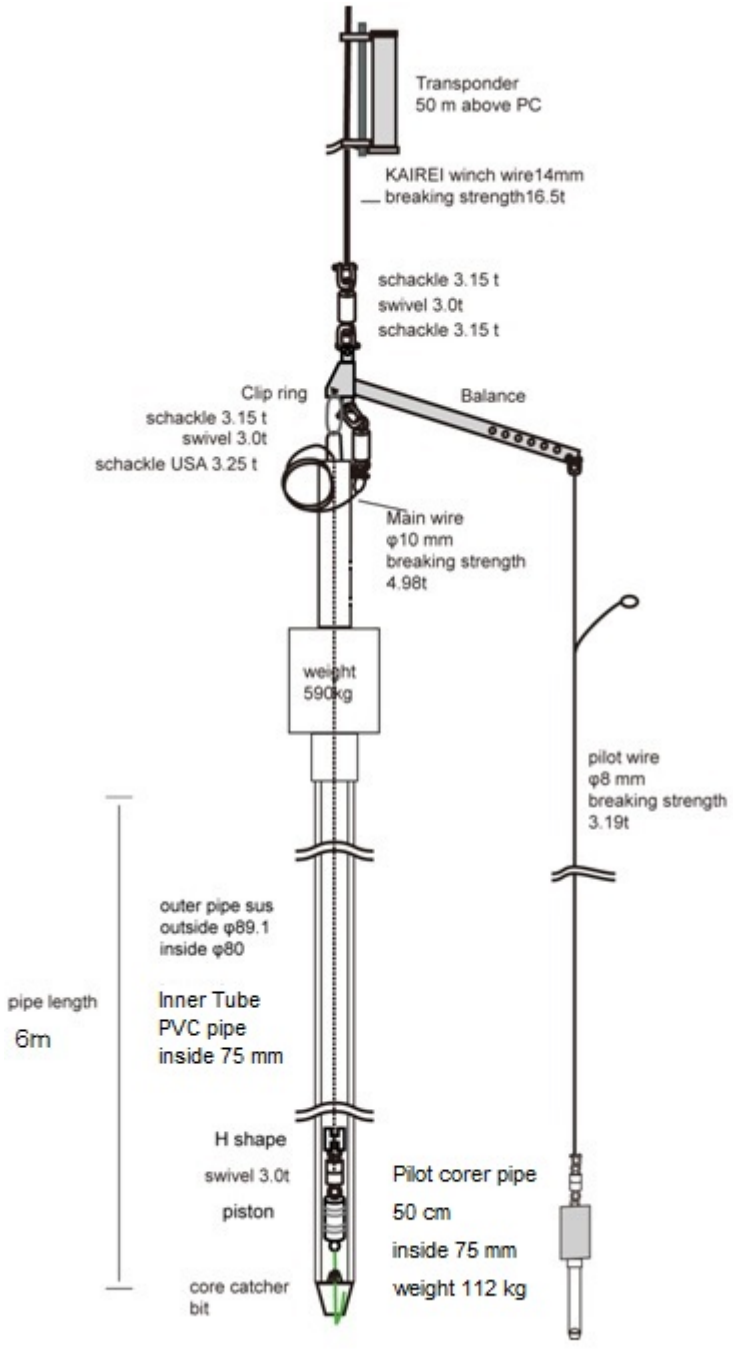
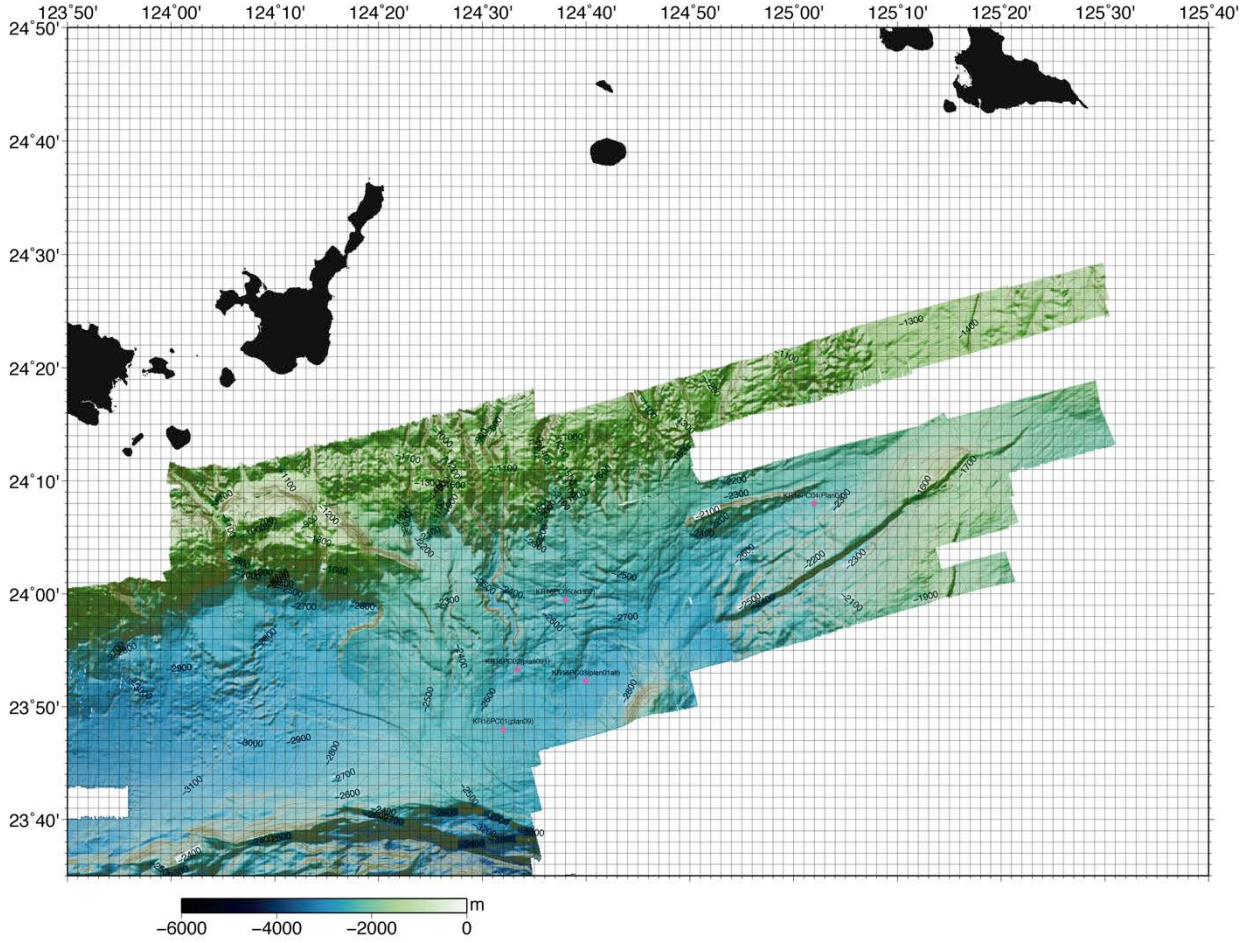


Fig. 5-2-1: Piston-corer system used in this cruise

6. Preliminary results

6-1. Bathymetric survey

The areas mapped by MBES are shown in **Fig 6-1-1-1**. We conducted MBES survey to fill unmapped area in the previous two cruises. The mapping was conducted in the south area between Ishigaki and Miyako islands.



Figs 6-1-1 Mapped areas shown with colored area. Red small circles: Piston coring site. Bathymetric data obtained in the previous cruise is partially merged in this figure.

6-2. SBP data

SBP images obtained are shown in the following figures. Refer **Fig. 6-1-2-1** for the locations of survey lines

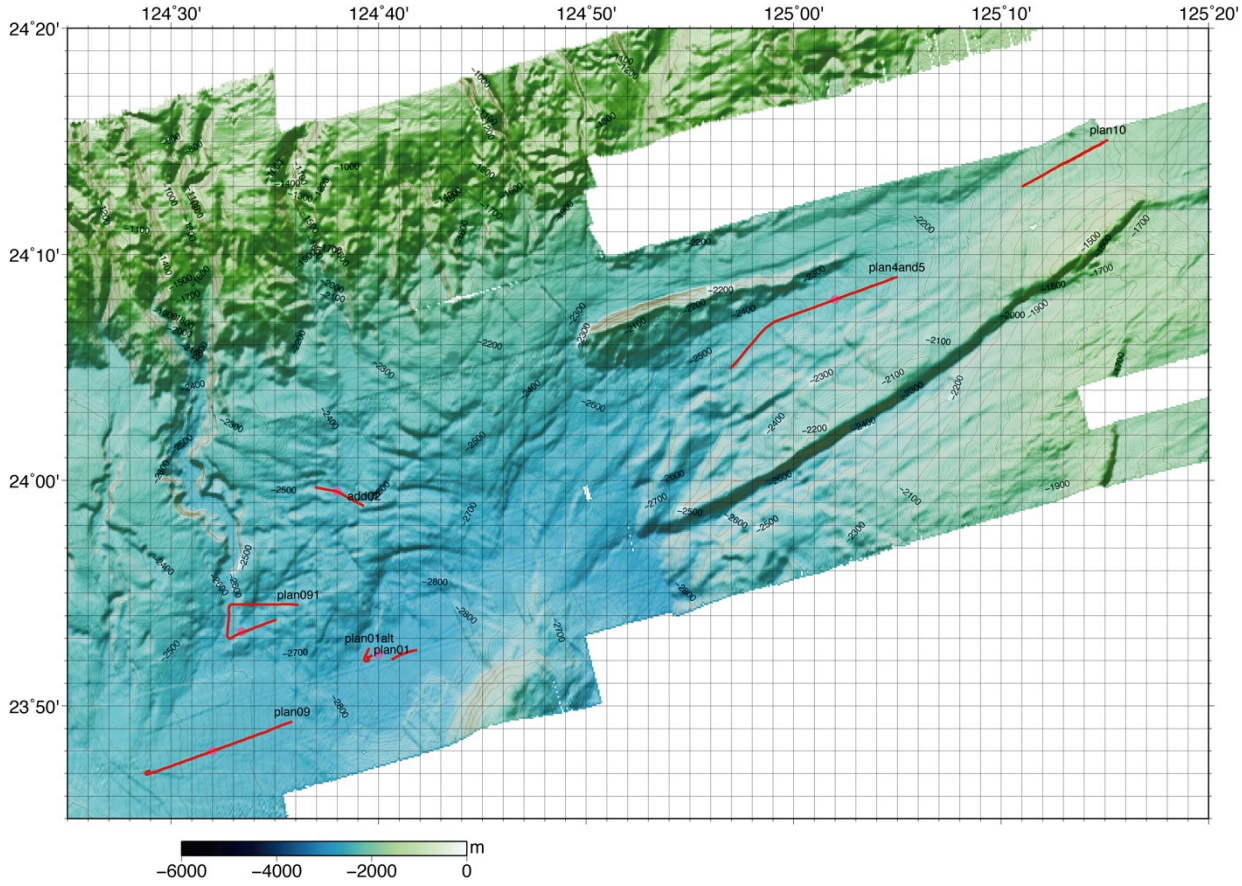


Figure 6-2-1. Index map for the SBP lines

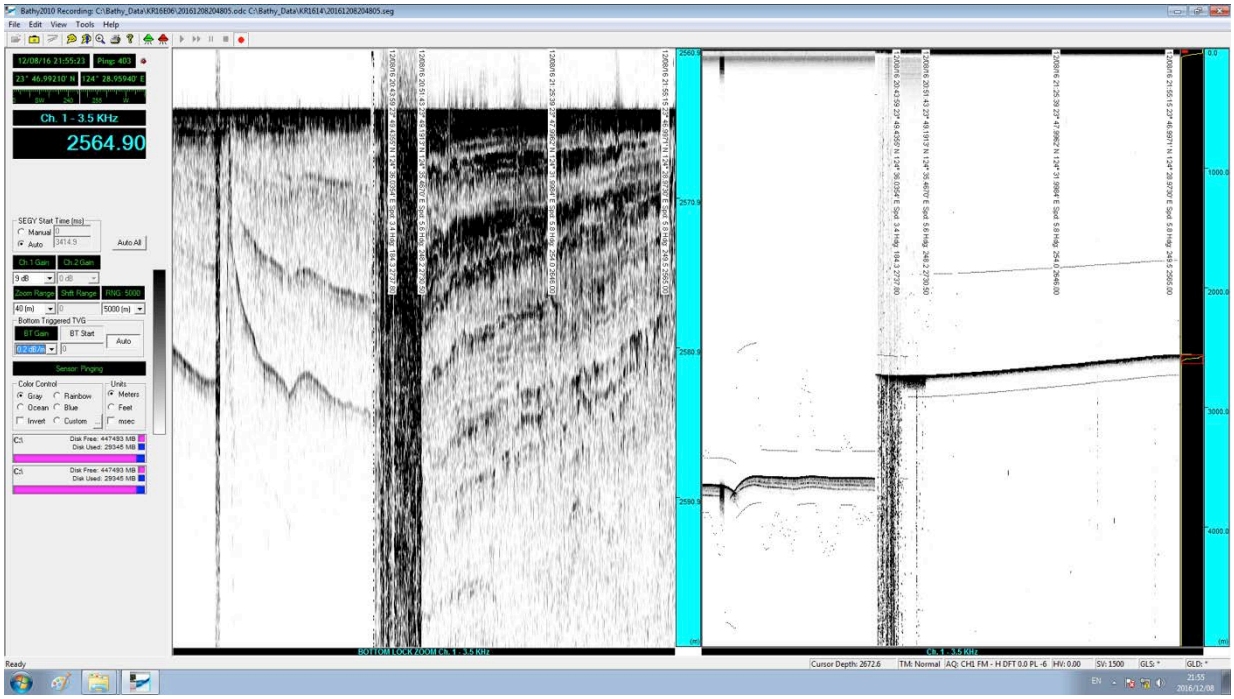


Figure 6-2-2: SBP image of Line Plan09 (around PC01)

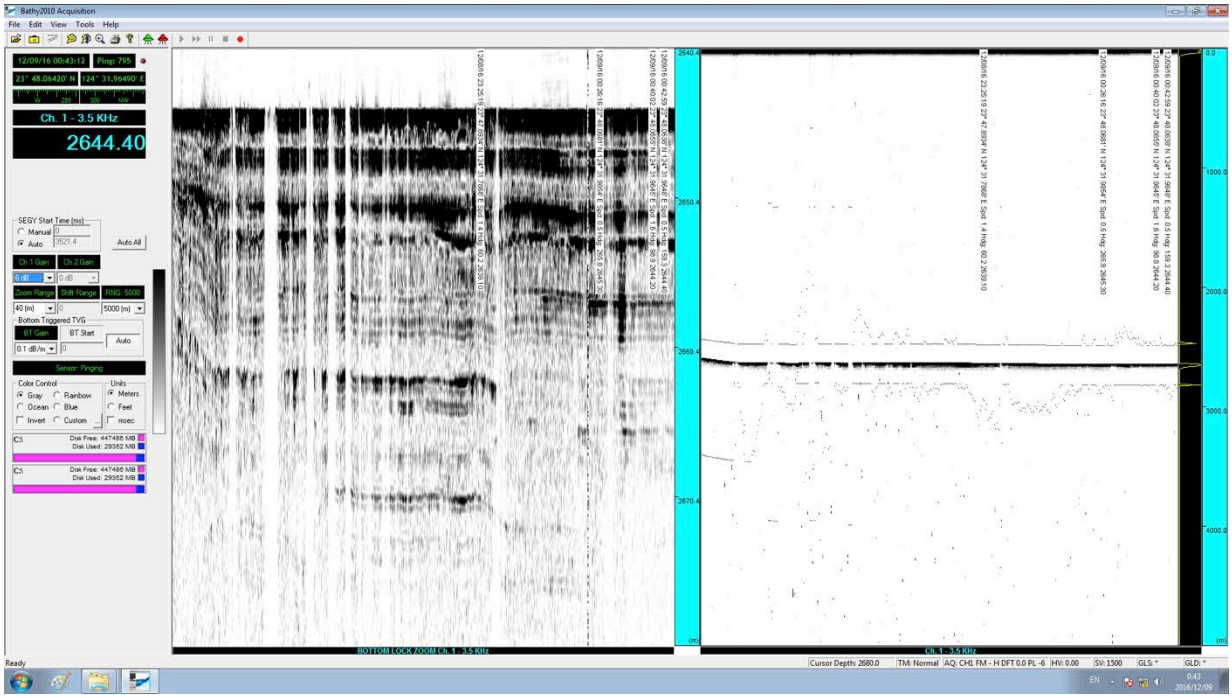


Figure 6-2-3: SBP image during PC01 operation

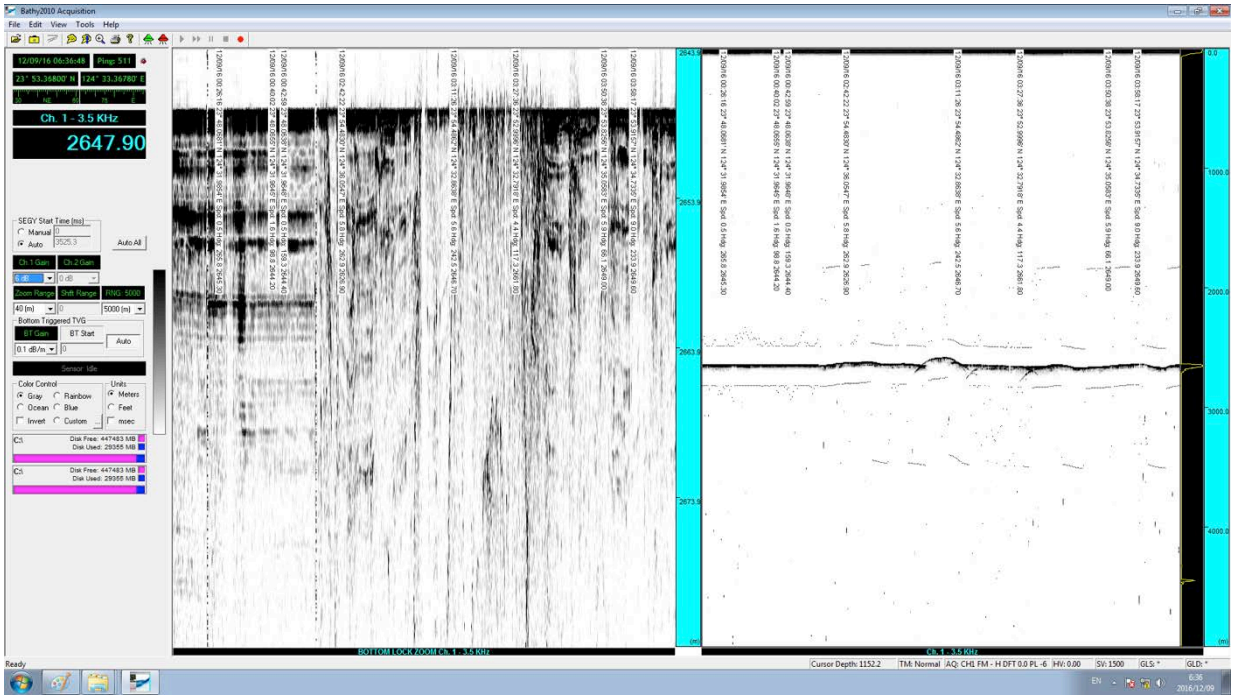


Figure 6-2-4: SBP image during PC01 operation (left side) and Line Plan091 right side

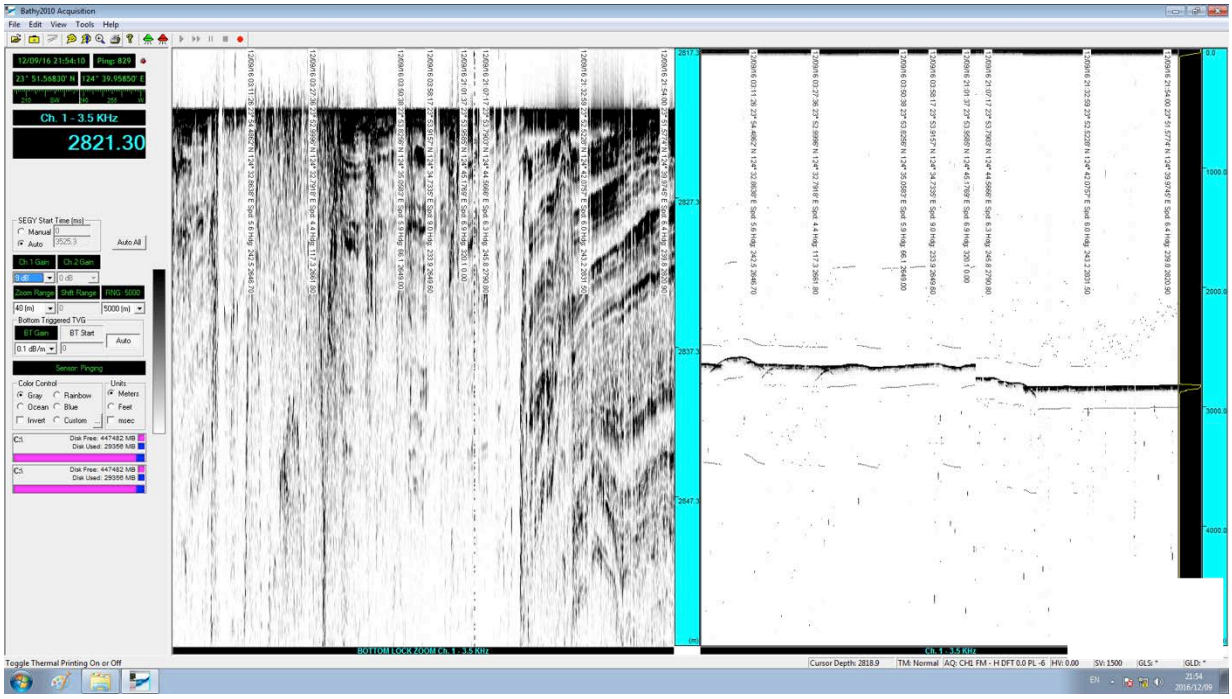


Figure 6-2-5: SBP image Line Plan091 (left side) of Plan 01 line (right side)

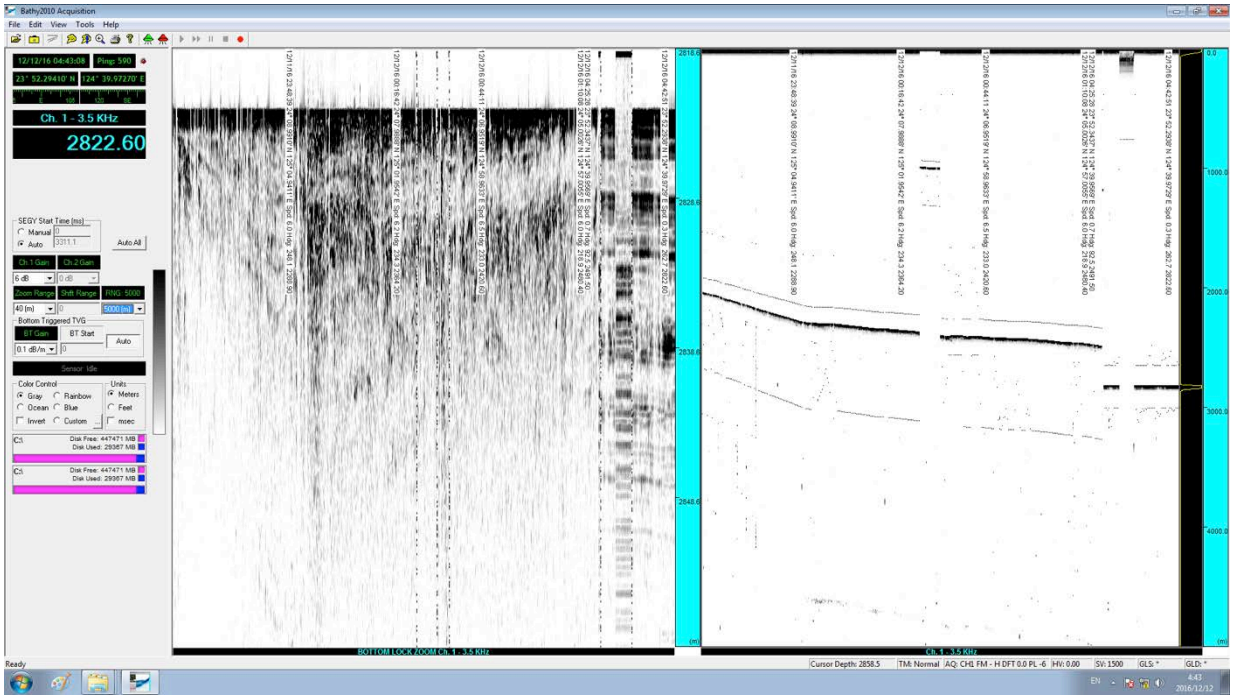


Figure 6-2-6: SBP image of Plan 4and 5 Line (left side) and image of PC01alt during PC03 operation.

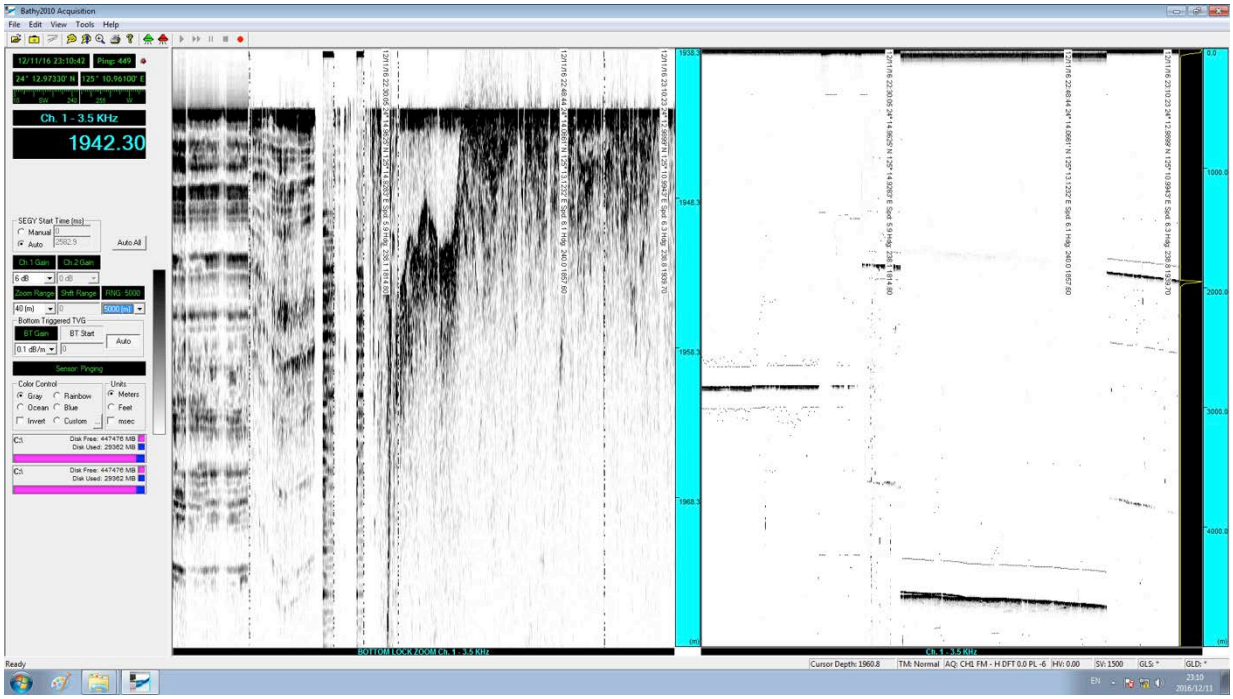


Figure 6-2-7: SBP image of Plan 10 (right side)

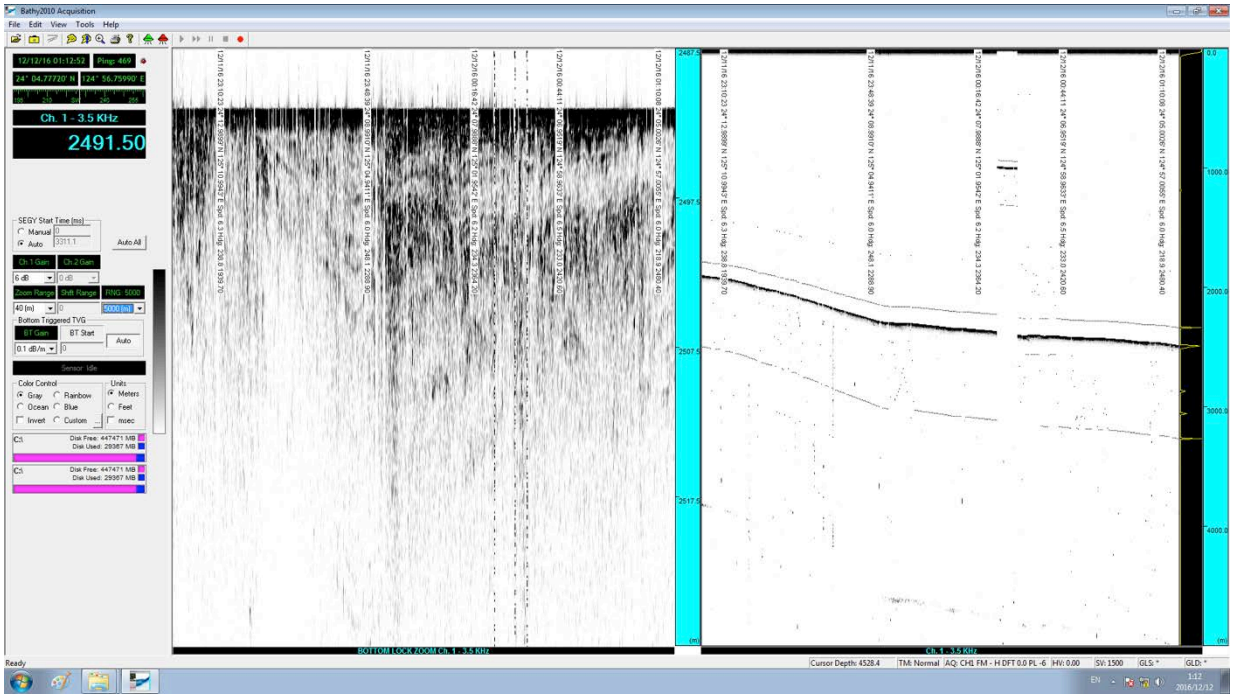


Figure 6-2-8 SBP image of Plan04 and 05 (right side)

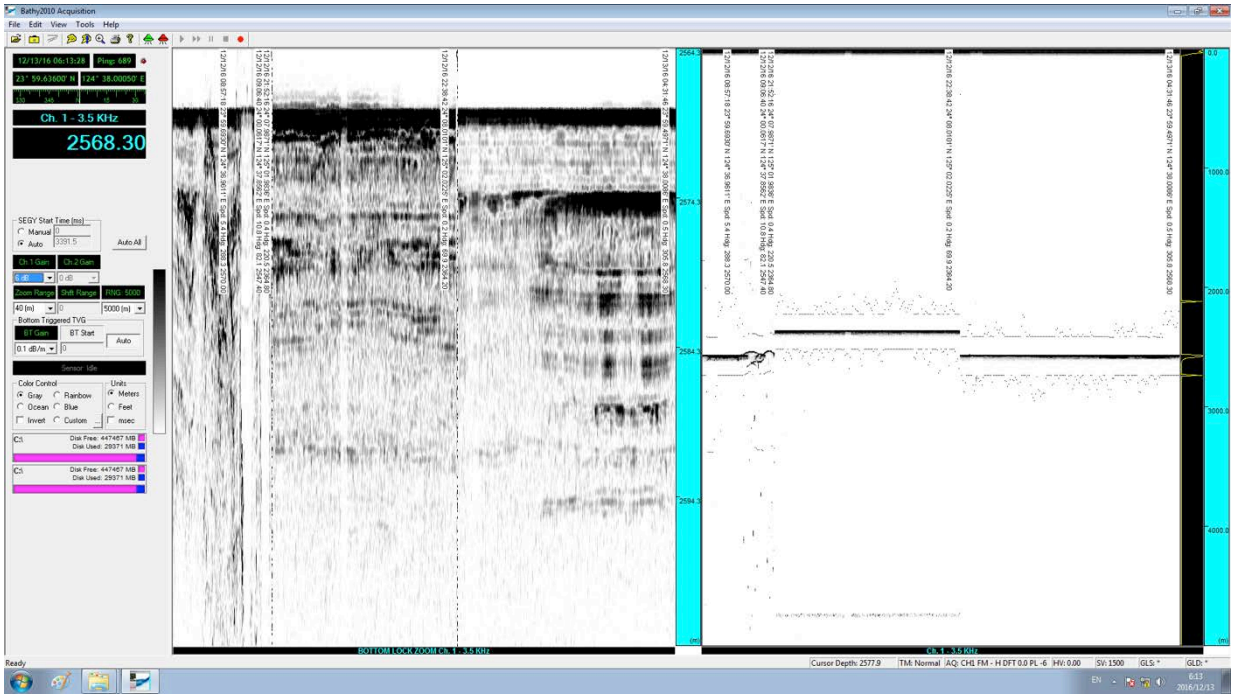


Figure 6-2-9 SBP image during PC04 and PC05 operations.

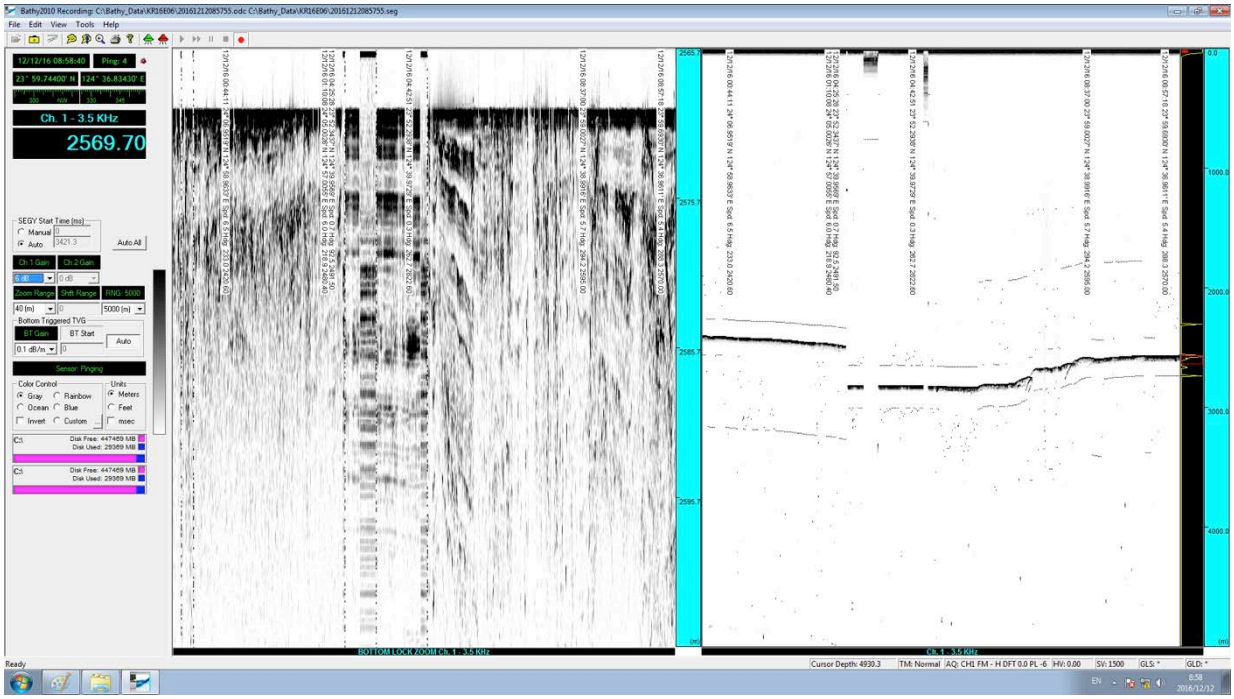


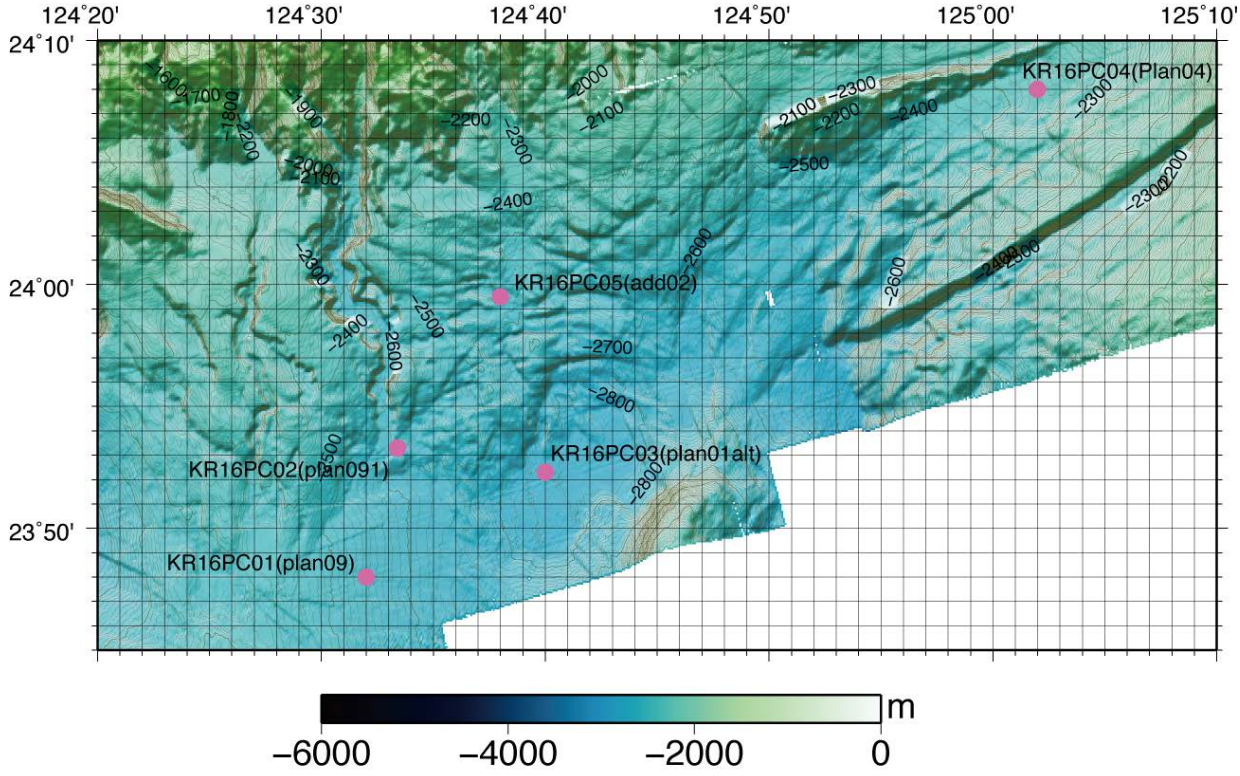
Figure 6-2-10 SBP image add02 line.

6-3. PC operations

The records coring operations are summarized in **Table 6-3-1**. Graphical tension records of wire winch during the operations are attached to the APPENDIX. Coring positions were measured by a transponder “OKI SB-1018 (S/N 08209)”. "*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)*. The detailed locations of PC are shown in **Figs. 6-3-1.**

Table 6-3-1 summary of PC operation during KR16-E06

Date (UTC)	Core ID	Location	Water Depth	Position			Corer type		Core length (m)			Tension MAX	K
yyyymmdd			(m)	Latitude	Longitude	Type	Type*	Weight	PC		PL	(t)	value**
20161209	PC01	Off Nansei Islands	2,647	23-48.0312N	124-31.9954E	Transponder	IN PC	592 kg	4.04	/ 6	0.14	3.5	0.17
20161209	PC02	Off Nansei Islands	2,644	23-53.2923N	124-33.3699E	Transponder	IN PC	592 kg	4.55	/ 6	0.15	3.0	0.08
20161212	PC03	Off Nansei Islands	2,825	23-52.2962N	124-39.9991E	Transponder	IN PC	592 kg	4.91	/ 6	0.70	3.5	0.13
20161213	PC04	Off Nansei Islands	2,363	24-08.0317N	125-02.0022E	Transponder	IN PC	592 kg	4.83	/ 6	0.27	3.5	0.19
20161213	PC05	Off Nansei Islands	2,569	23-59.4875N	124-38.0062E	Transponder	IN PC	592 kg	3.66	/ 6	0.14	3.7	0.24
* "IN" is Inner type corer, "OUT" is Outer type corer													



Figs. 6-3-1 ●: Locations of KR16-E06 PC01-05: forearc and trench floor of SW Ishigaki Island.

6-4. Lithology of piston cores

Five piston cores were obtained using a 6 m-long piston corer with a gravity corer as a pilot corer during the KR16-E06 cruise. The cores (PC01-PC05) were collected from forearc area between Ishigaki and Miyako islands. Lithology of each core is summarized as follows. Columnar sections, visual core descriptions and core photographs are shown in Fig. (columns), Appendix (VCD) and Appendix (core_photos).

Core KR16-E06 PC01

This core was collected at south of mouth of a submarine canyon. The coring site locates on a gentle slope toward east.

A 401.3 cm-long core (PC01) and a 13.5 cm-long pilot core (PL01) was obtained. The uppermost part of the core is composed of brownish calcareous silt with bioturbation. Most of the core is silt with bioturbation and grayish in color. Thin very fine sand-coarse silt layers are intercalated in the upper part of the core.

Core KR16-E06 PC02

The core was obtained on the small relief along a submarine canyon.

Total core length of the core (PC02) is 457.5 cm. A 14.7 cm long gravity core (PL02) of dark grayish yellow bioturbated silt was also obtained. Most of the main core is composed of grayish bioturbated silt intercalated with 7 very fine sand-coarse silt layers. These coarse layers have sharp basal contact and upward fining grading structure.

Core KR16-E06 PC03

This core was collected at a small forearc basin.

Total core length of this core (PC03) is 490.9 cm. A 69.7 cm-long pilot core (PL03) is also obtained. The core is composed of bioturbated silt and silty clay intercalated with very fine-fine sand and coarse silt beds with sharp and erosional basal surface. Some of these layers are thick with a few tens cm in thickness. Homogeneous silty clay bed is occurred in the pilot core.

Core KR16-E06 PC04

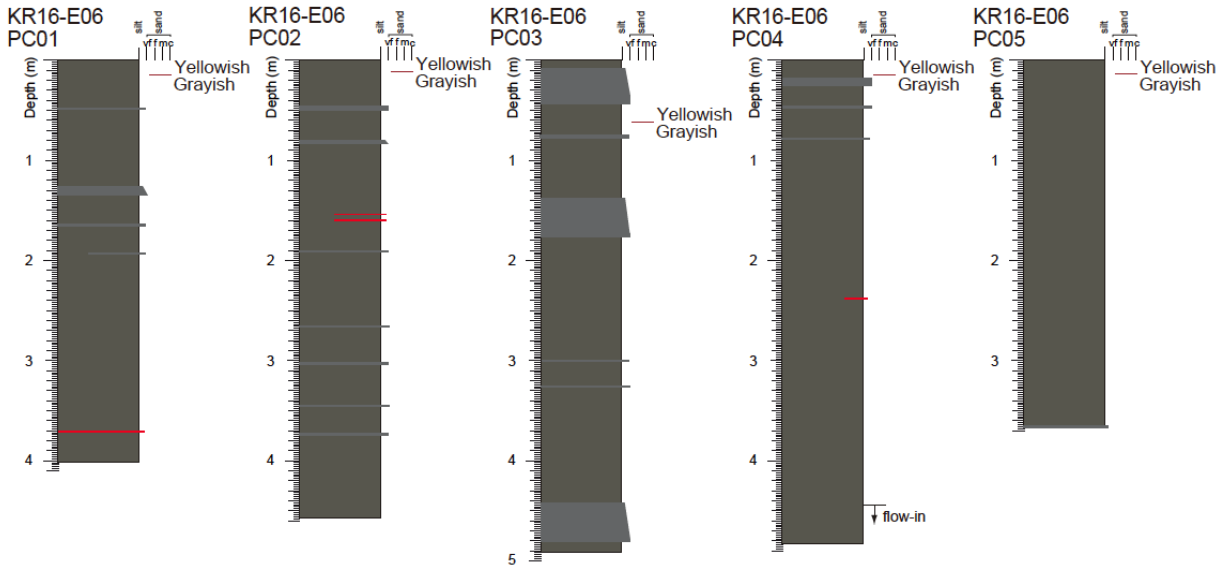
This core was obtained from a forearc slope at SW of Miyako Island.

A 482.8 cm long piston (PC04) and a 27 cm long gravity (PL04) core are obtained at this site. The lowest 36 cm of the piston core is flow-in. The piston core is composed of gray silty clay intercalated with two very fine sand layers at the upper part.

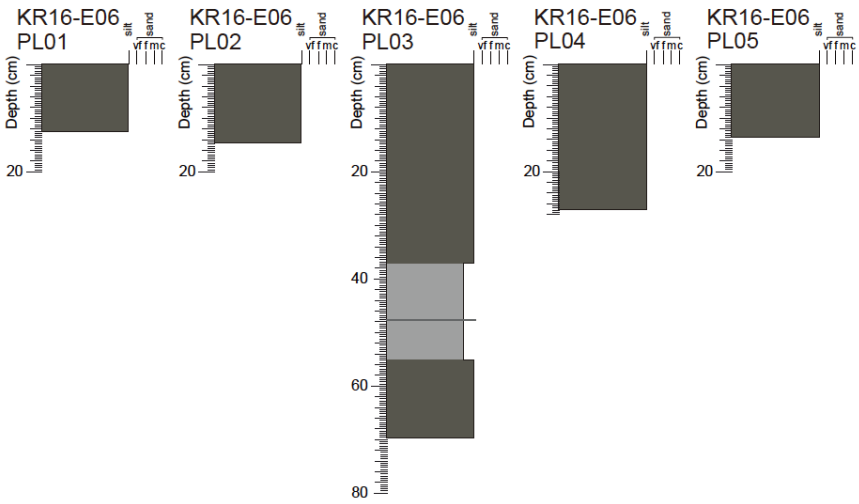
Core KR16-E06 PC05

The core was obtained from a small depression near the mouth of a submarine canyon.

Total core length of the core (PC05) is 366.3 cm. A 13.5 cm-long pilot core (PL05) is also obtained. The core is composed of grayish silt with color darkness variation. No coarse layer is observed except of coarse silt with volcanic glass shards and planktonic forams at the bottom of core.



Figs. 6-4-1 Lithologic columns of PC01-PC05



Figs. 6-4-2 Lithologic columns of PL01-PL05

7. Acknowledgement

We gratefully recognize the efforts of Kairei Captain Takafumi Aoki and his crews during the cruise. We thank all the support from staffs in JAMSTEC. Especially thanks to Mr. Kashiwase in the Research Fleet Department for his considerable efforts.

8. Notice on Using

Notice on using: Insert the following notice to users regarding the data and samples obtained.

APPENDIX

Core Photo

KR16-E06

PL01

PC01

sec.2 3 4 5 6

C. C.

KR16-E06

PL02

PC02

sec.2 3 4 5 6

KR16-E06

PL03

PC03

sec.2

3

4

5

6

KR16-E06

PL04

PC04

sec.2 3 4 5 6

KR16-E06

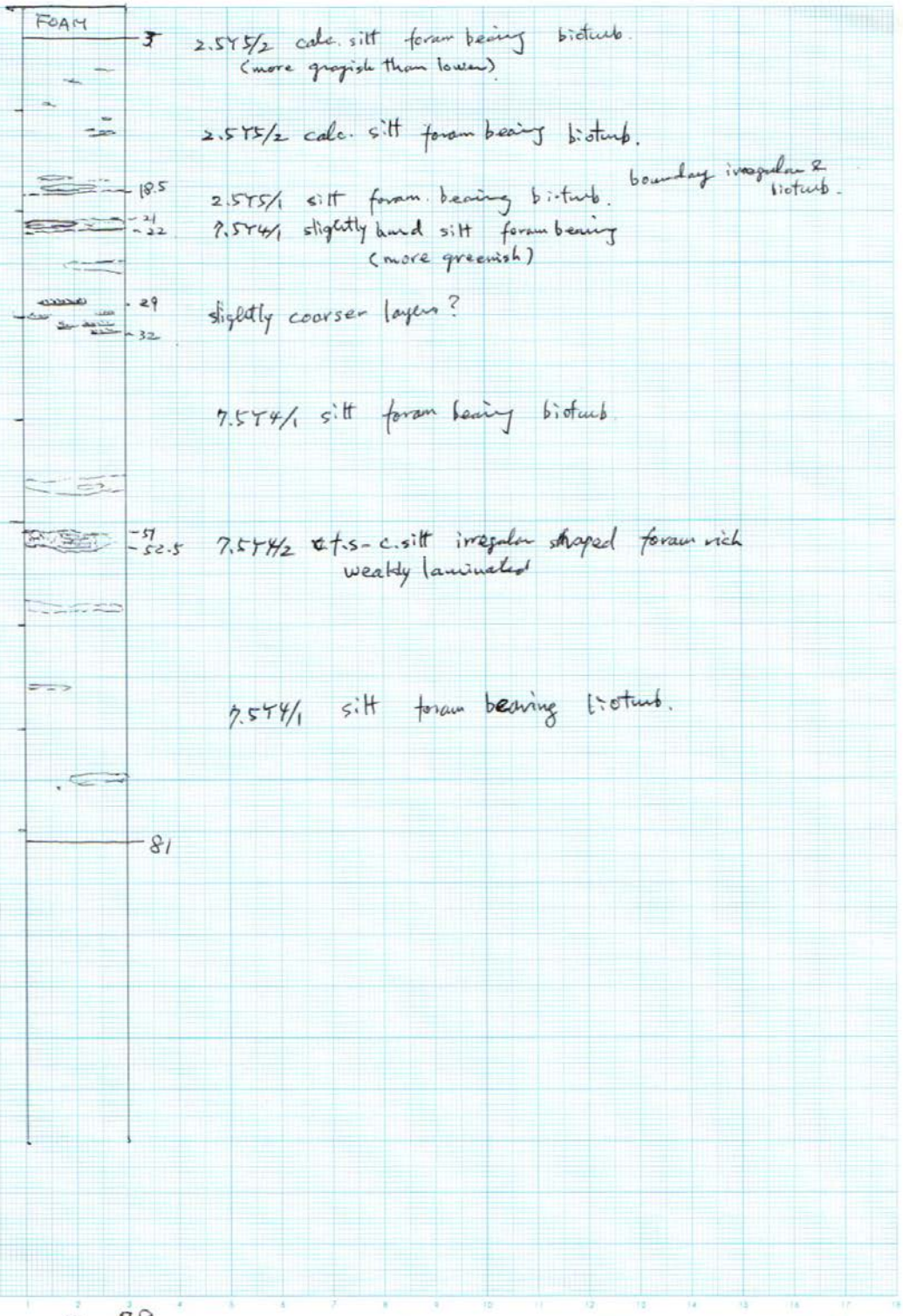
PL05

PC05

sec.1 2 3 4 5

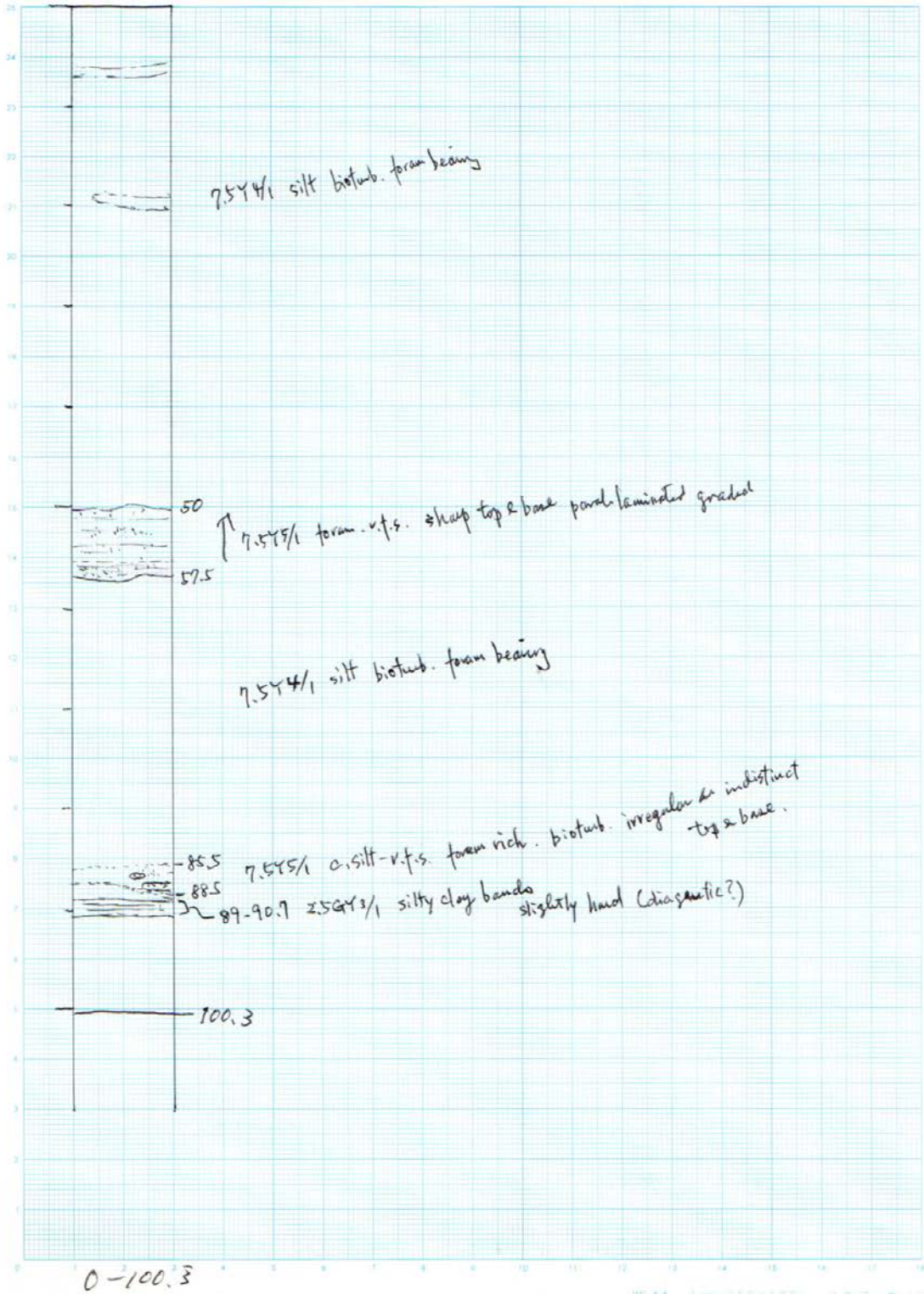
Visual Core Description

KR16-E06 PC01 sec. 2 (W) /6



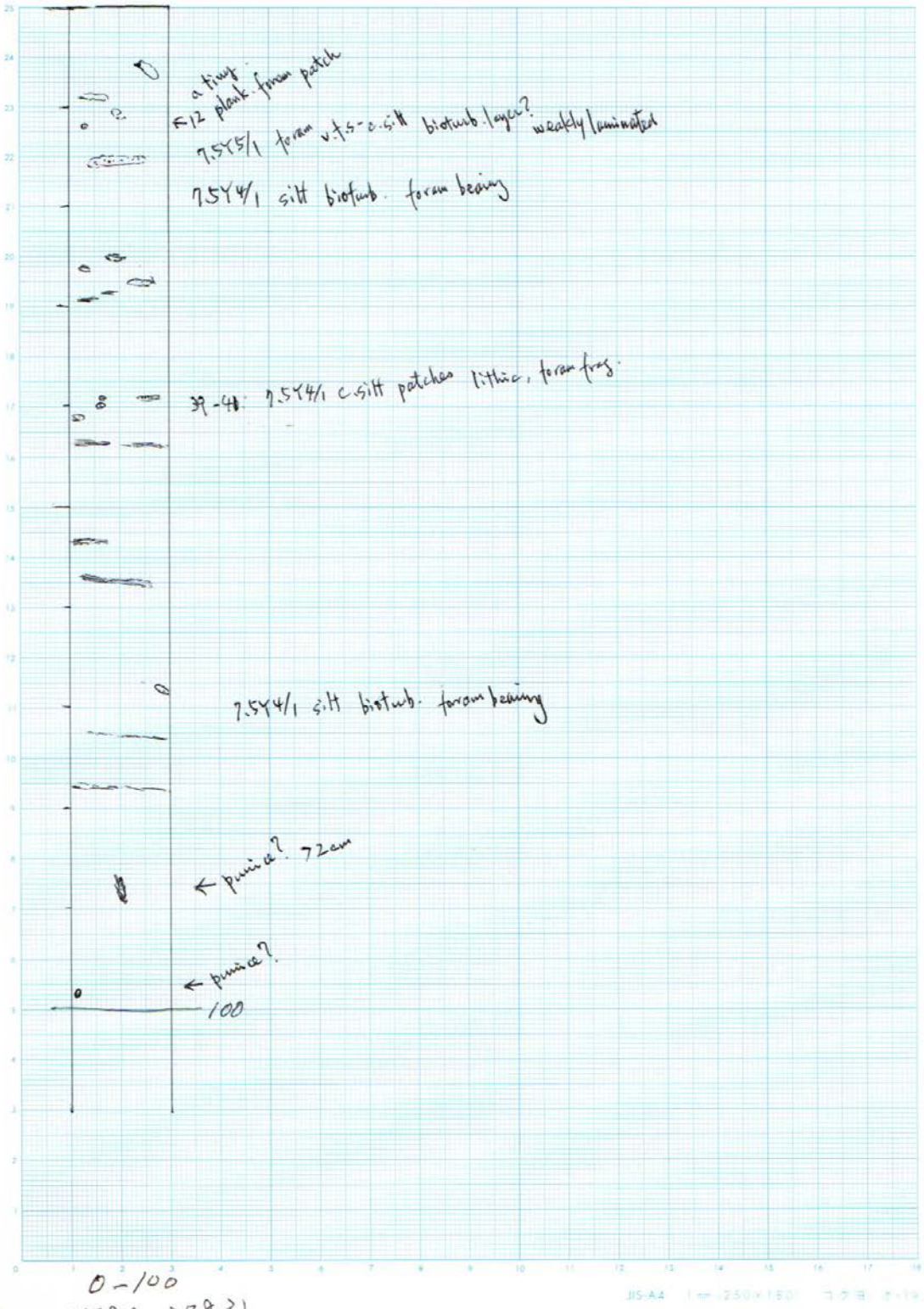
0-78
(0-78)

KR16-E06 PC01 sec. 3 (W) / 6



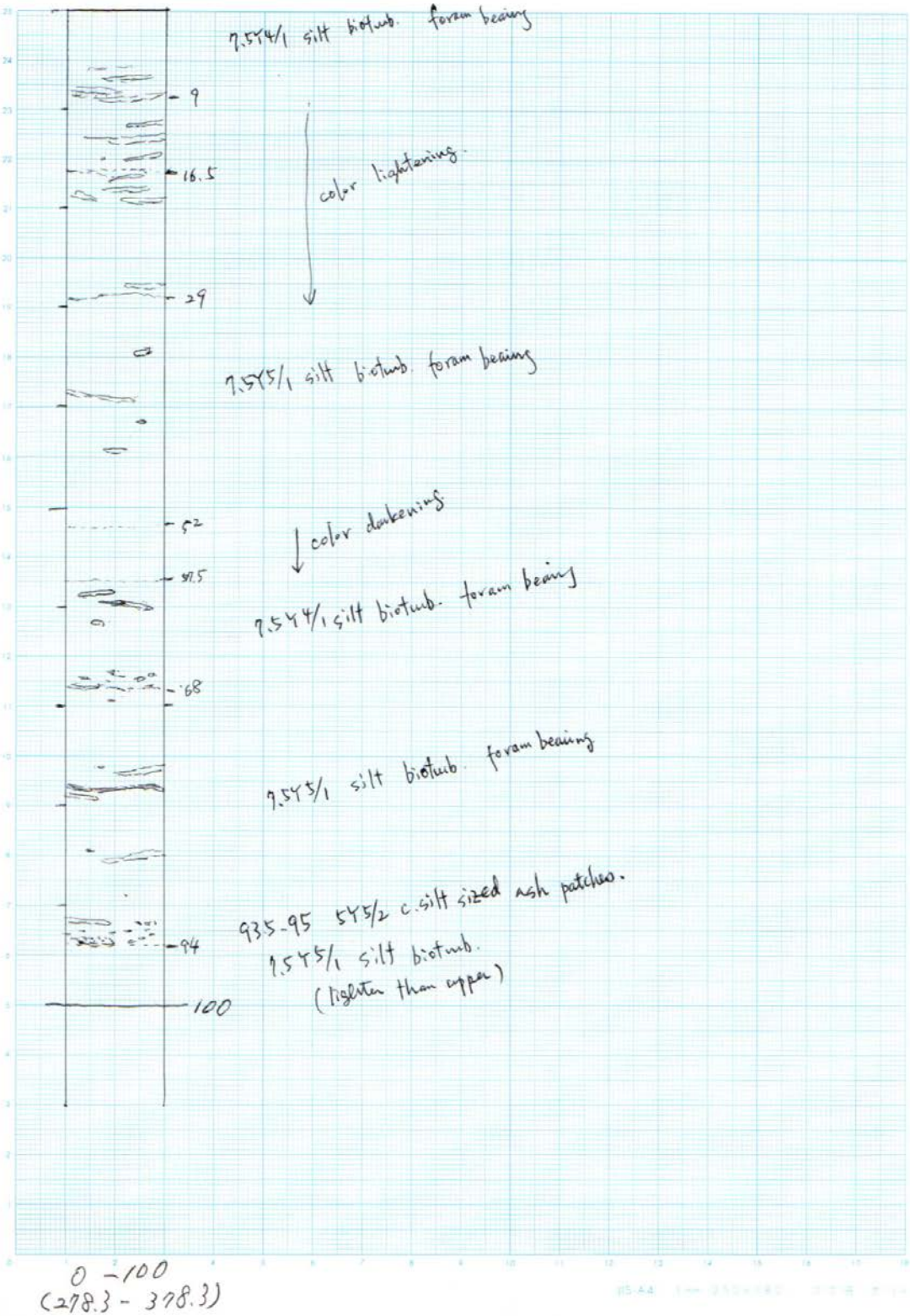
0-100.3
(78-178.3)

KR16-E06 PC01 sec. 4 (W) /6



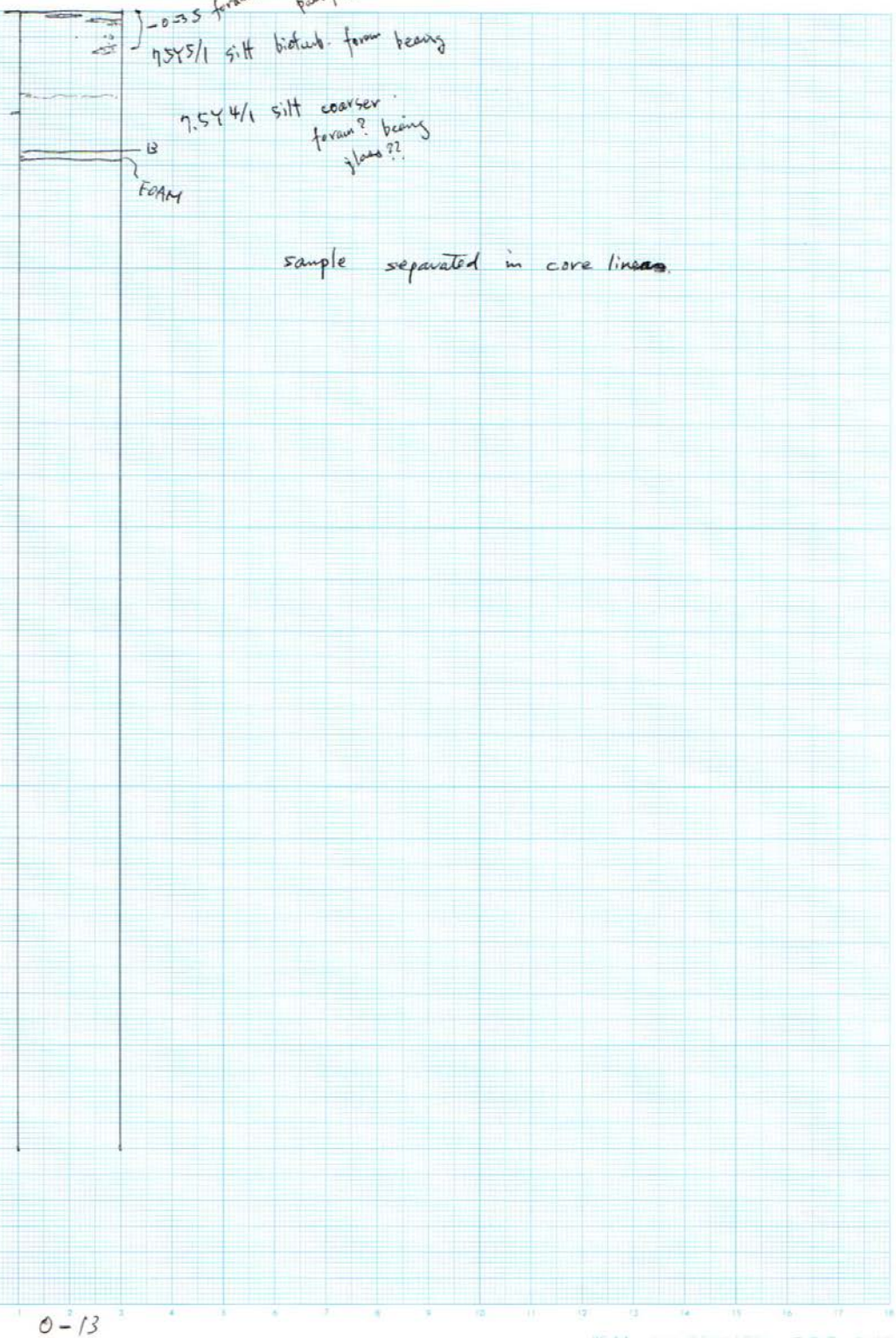
0-100
(178.3-278.3)

KR16-E06 PC01 '5(W)/6



0 - 100
(278.3 - 378.3)

KR 16-E06 PC01 sec. 6 (W)/6



sample separated in core liner.

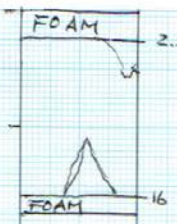
0-13
(378.3 - 391.3)

KR16-E06 PC01 CC (W)

9.5Y4/1 silt foram bearing
(maybe different lithology with the lowest sec. B)

0-10

KR16-E06 PL01 1 (W)

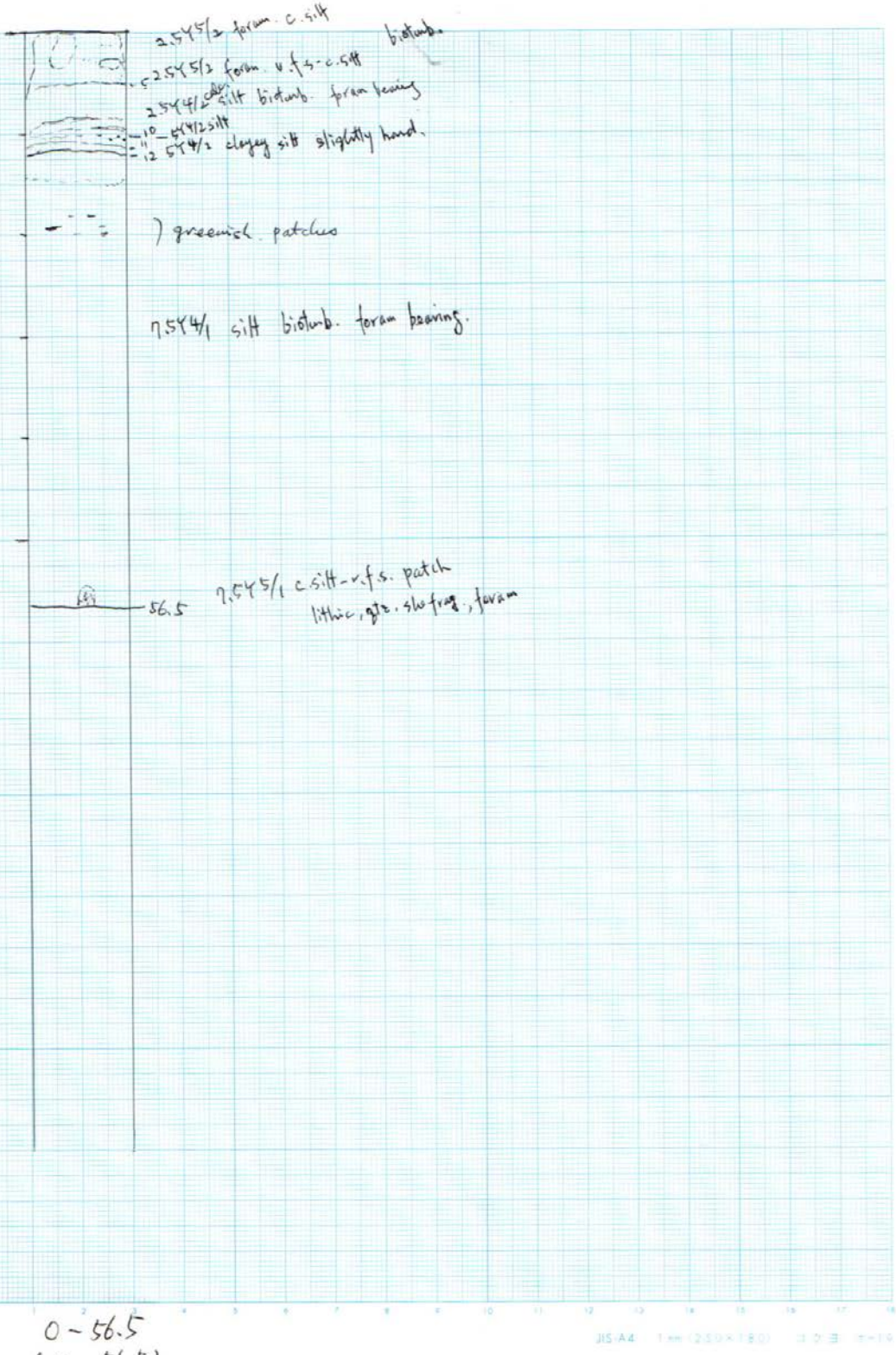


2.5Y 5/2 calc. silt foram bearing

slightly darker at top

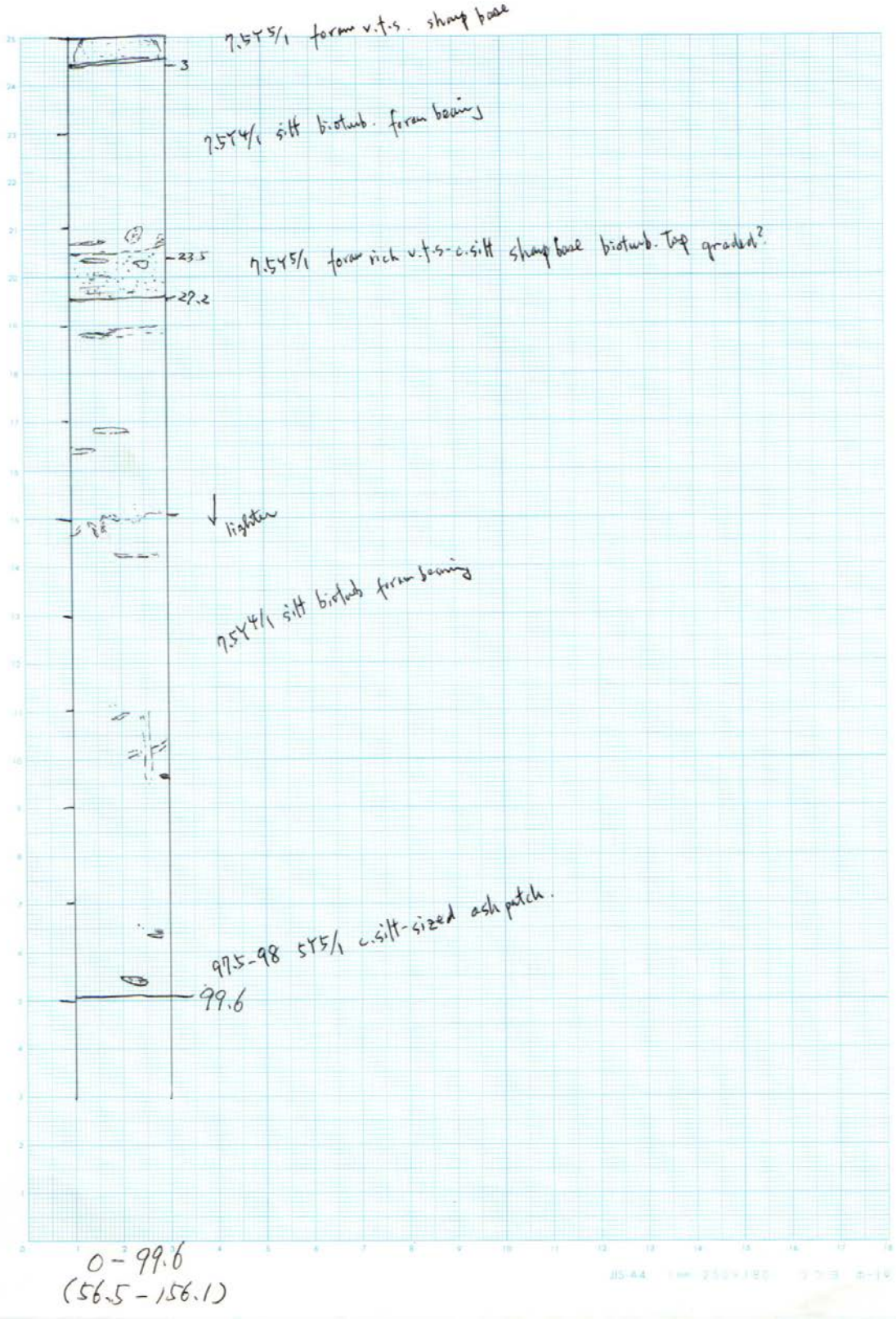
2.5 - 16
(0 - 13.5)

KR16-E06 PC02 2(W)/6



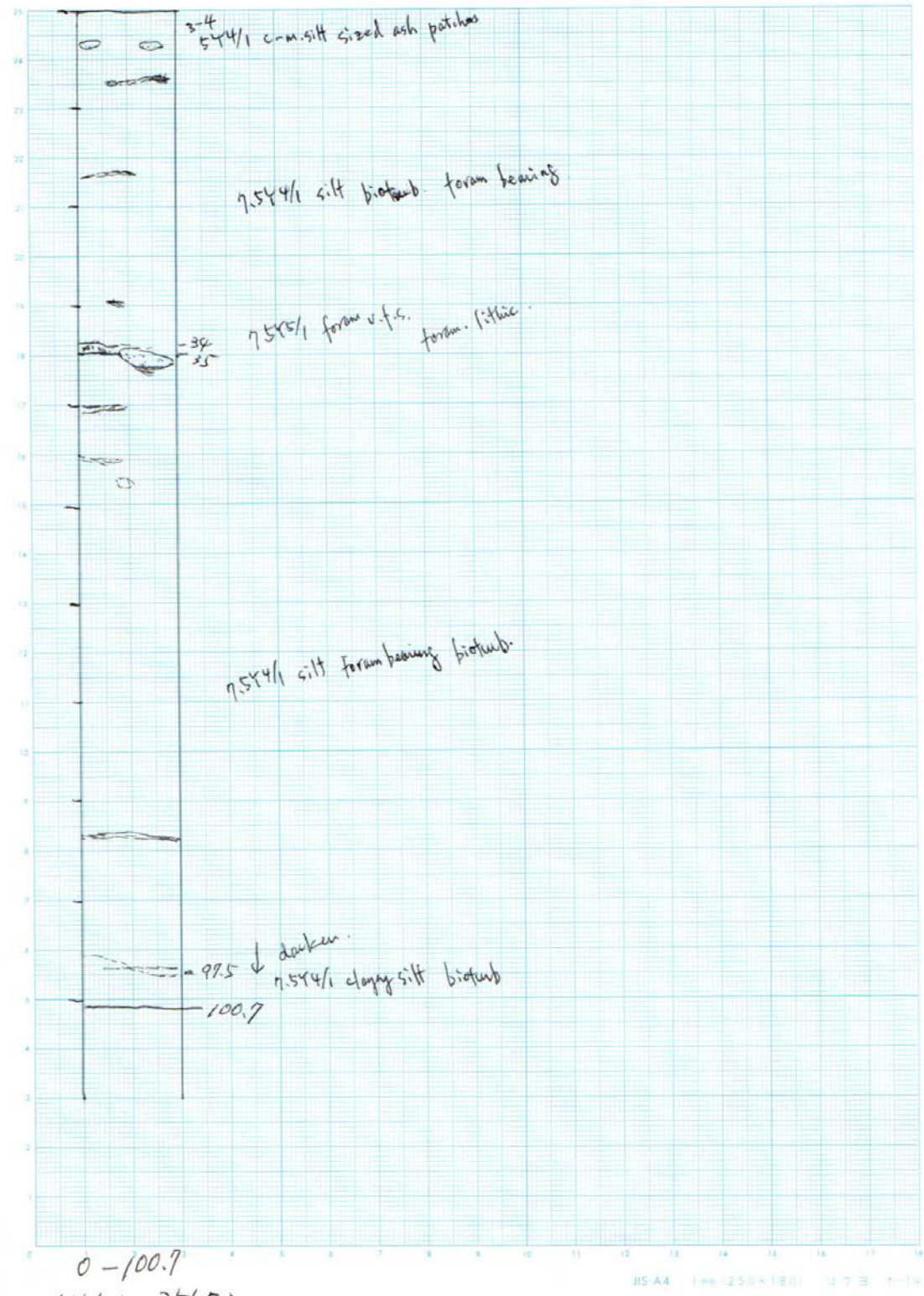
0-56.5
(0-56.5)

KR16-E06 PC02 3 (W) 16



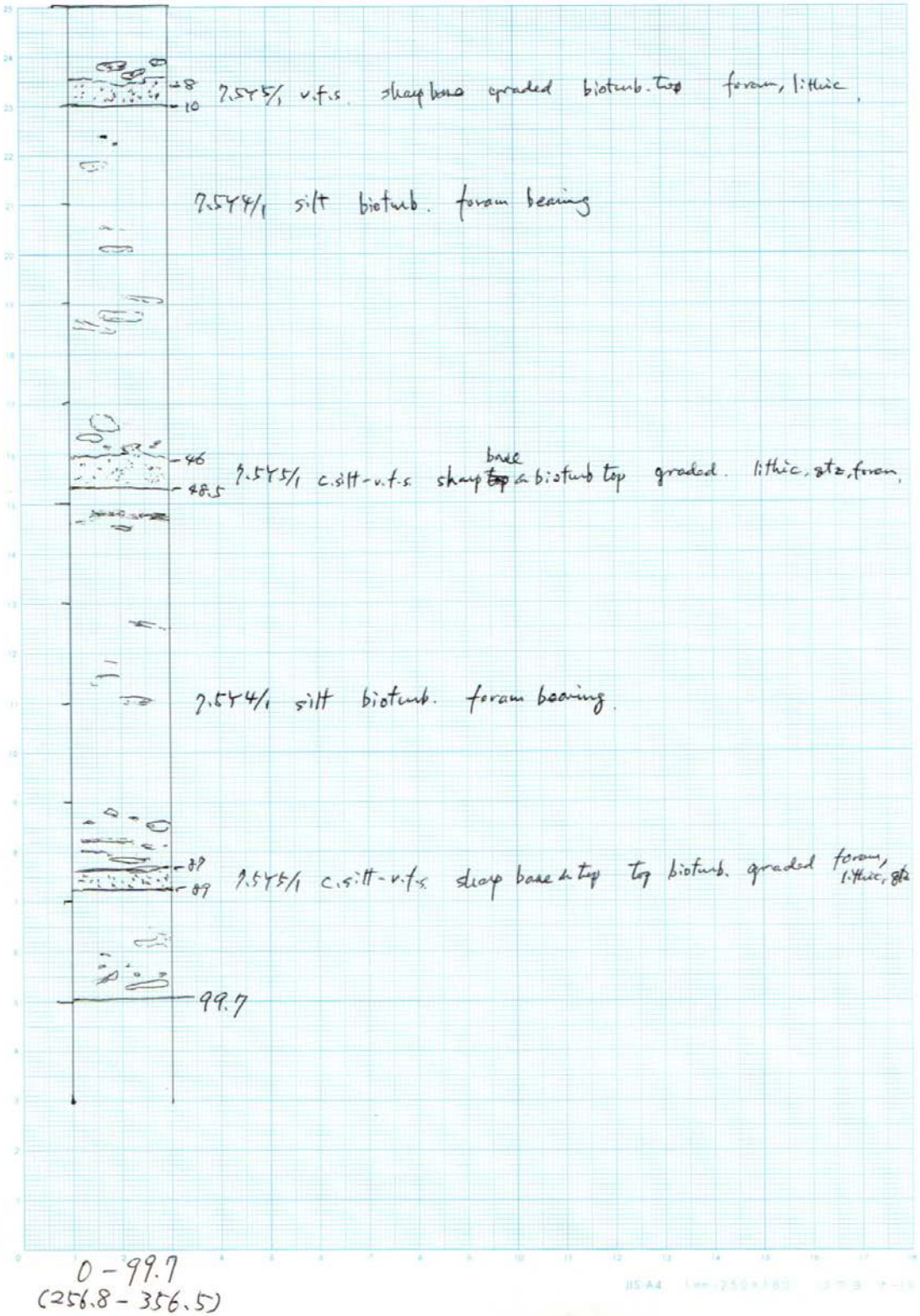
0 - 99.6
(56.5 - 156.1)

KR16-E06 PC02 4 (W) /6



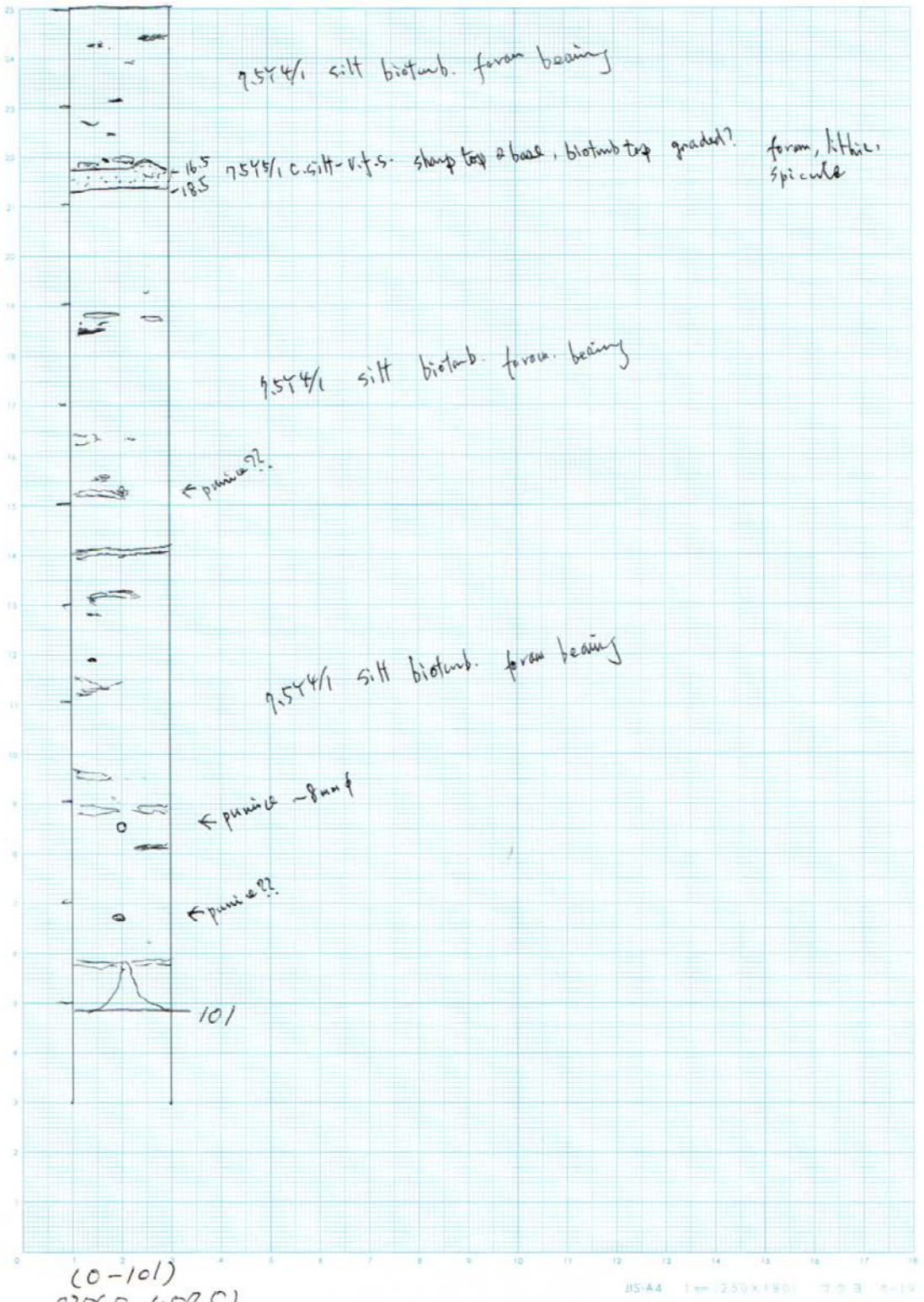
0 – 100.7
(156.1 – 256.8)

KR16-E06 PC02 5 (W) /6



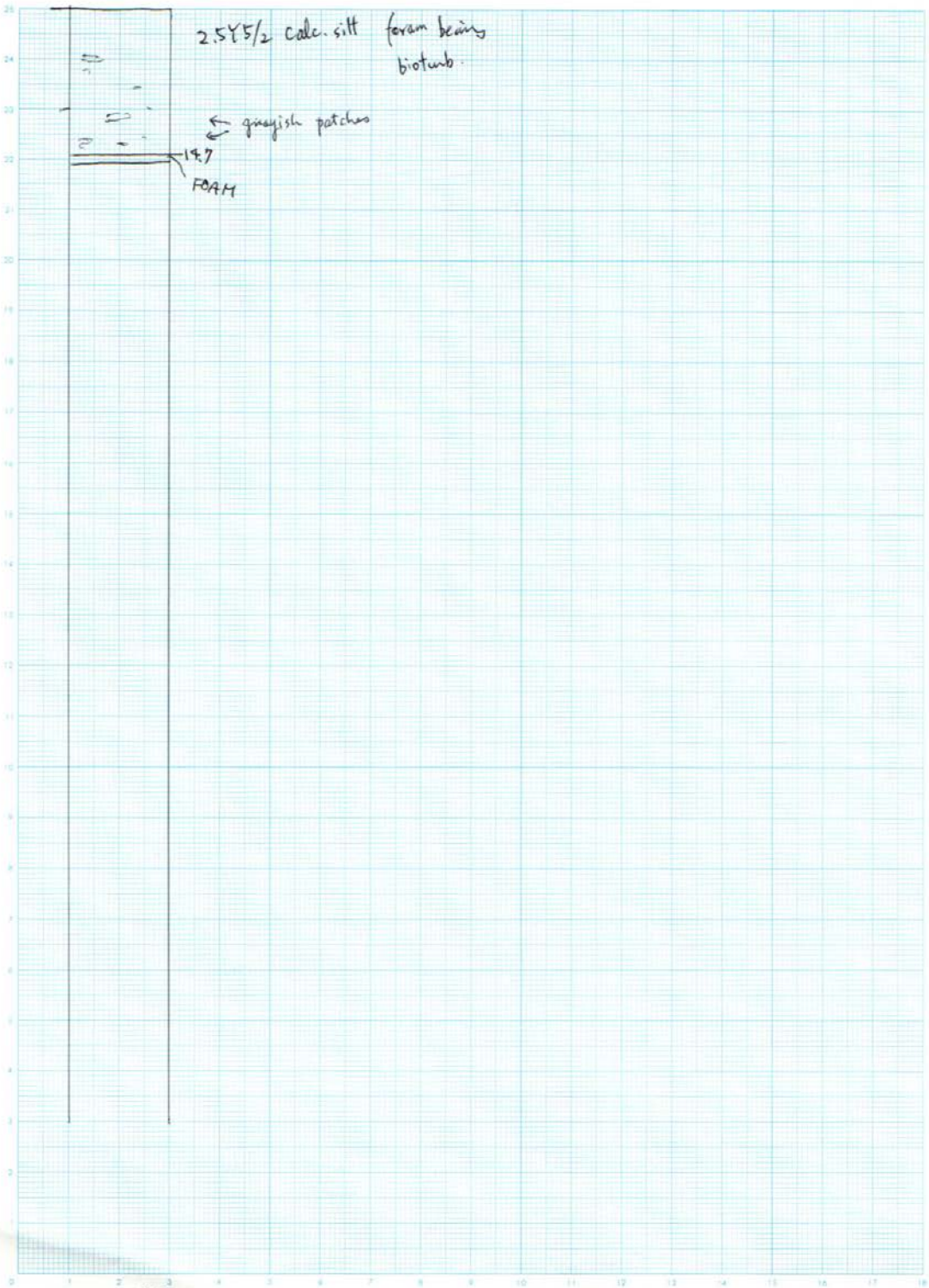
0 - 99.7
(256.8 - 356.5)

KR16-E06 PC02 sec. 6 (W)/6



(0-101)
(358.5-457.5)

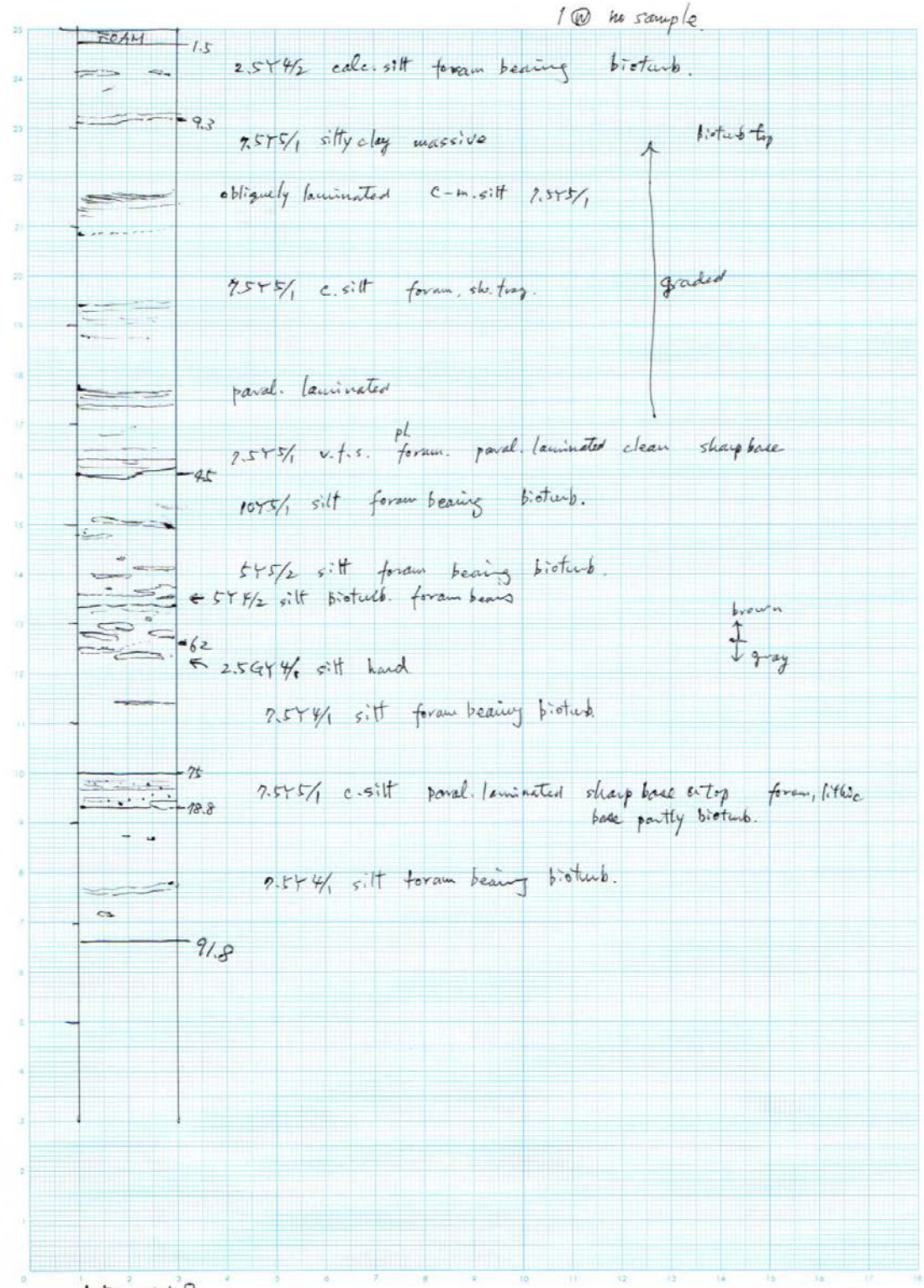
KR16-E06 PL02 1 (W)



0 - 14.7
(0 - 14.7)

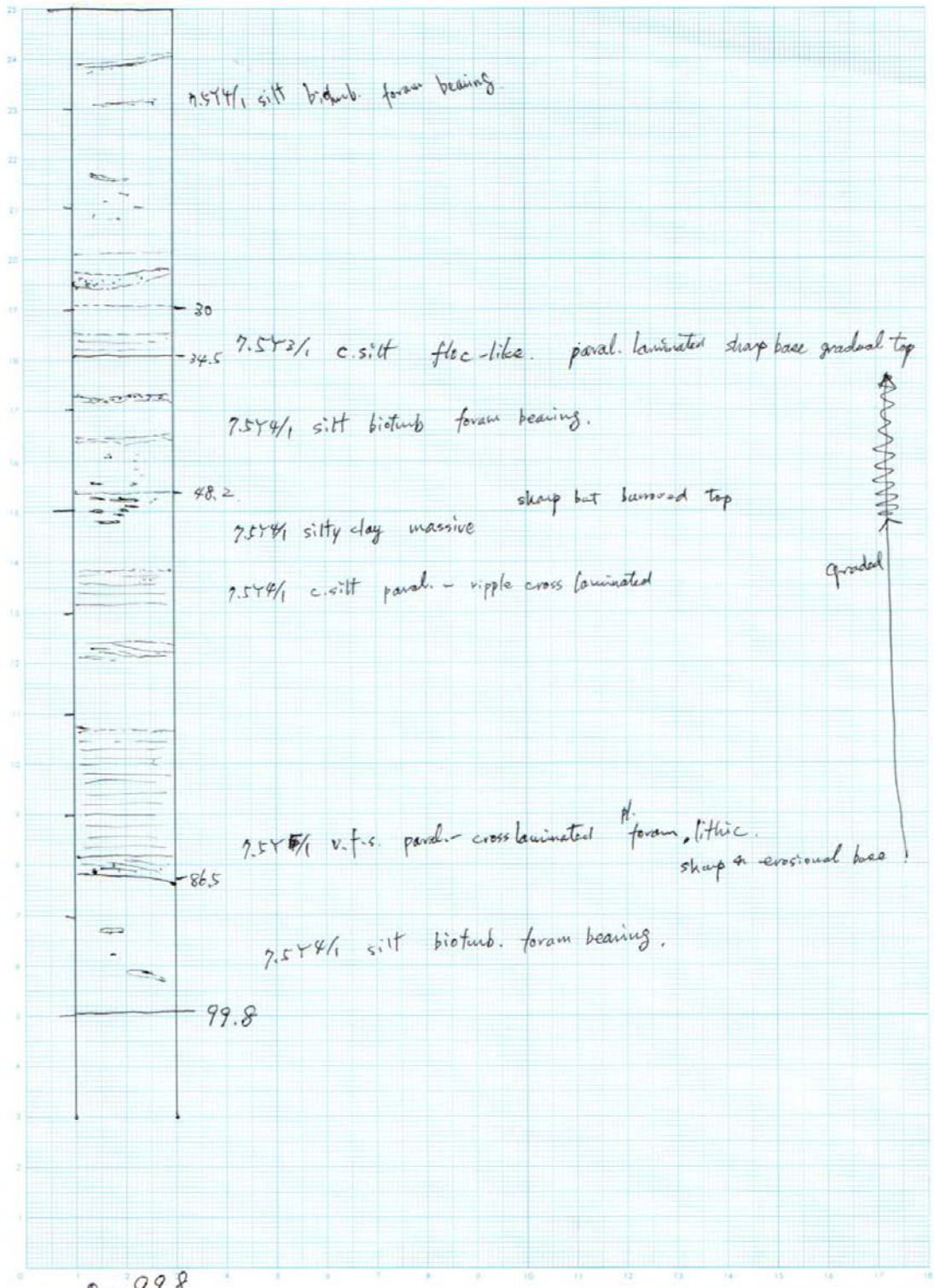
KR16-E06 PC03 2(W)/6

1(W) no sample



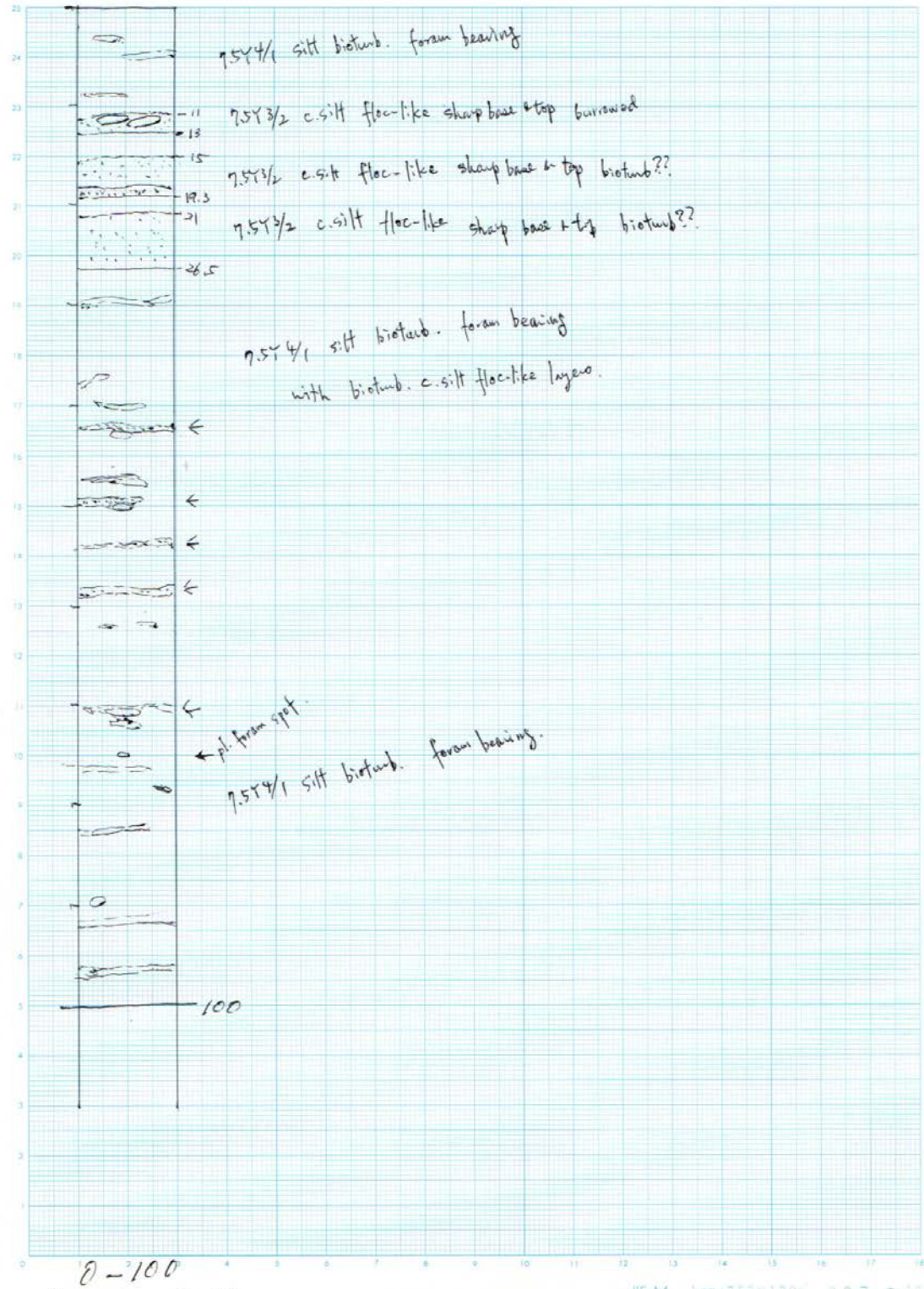
1.5 – 91.8
(0 – 90.3)

KR16-E06 PC03 3(W) 16



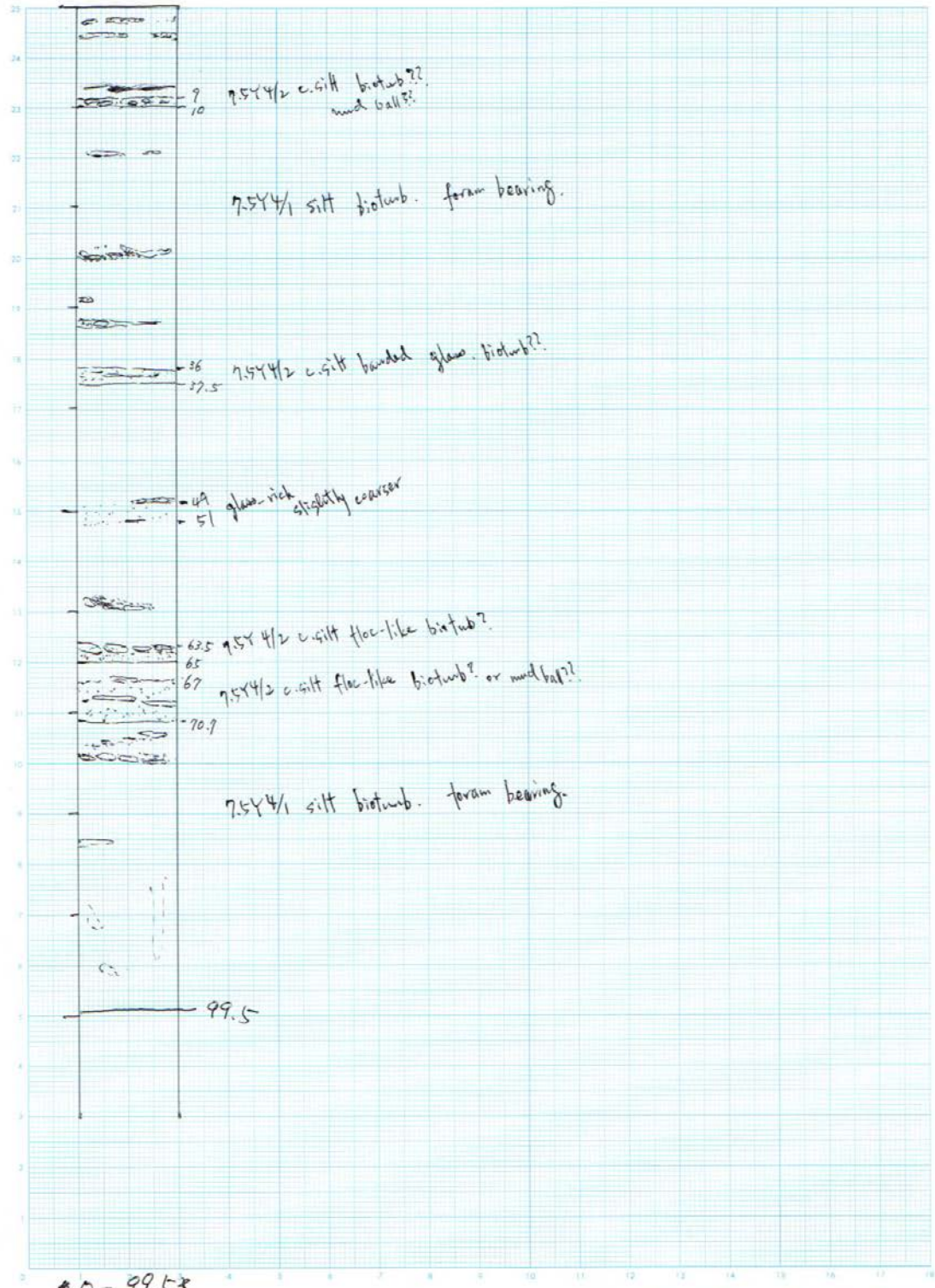
0-99.8
(90.3-190.1)

KR16-E06 PC03 4(W)/6



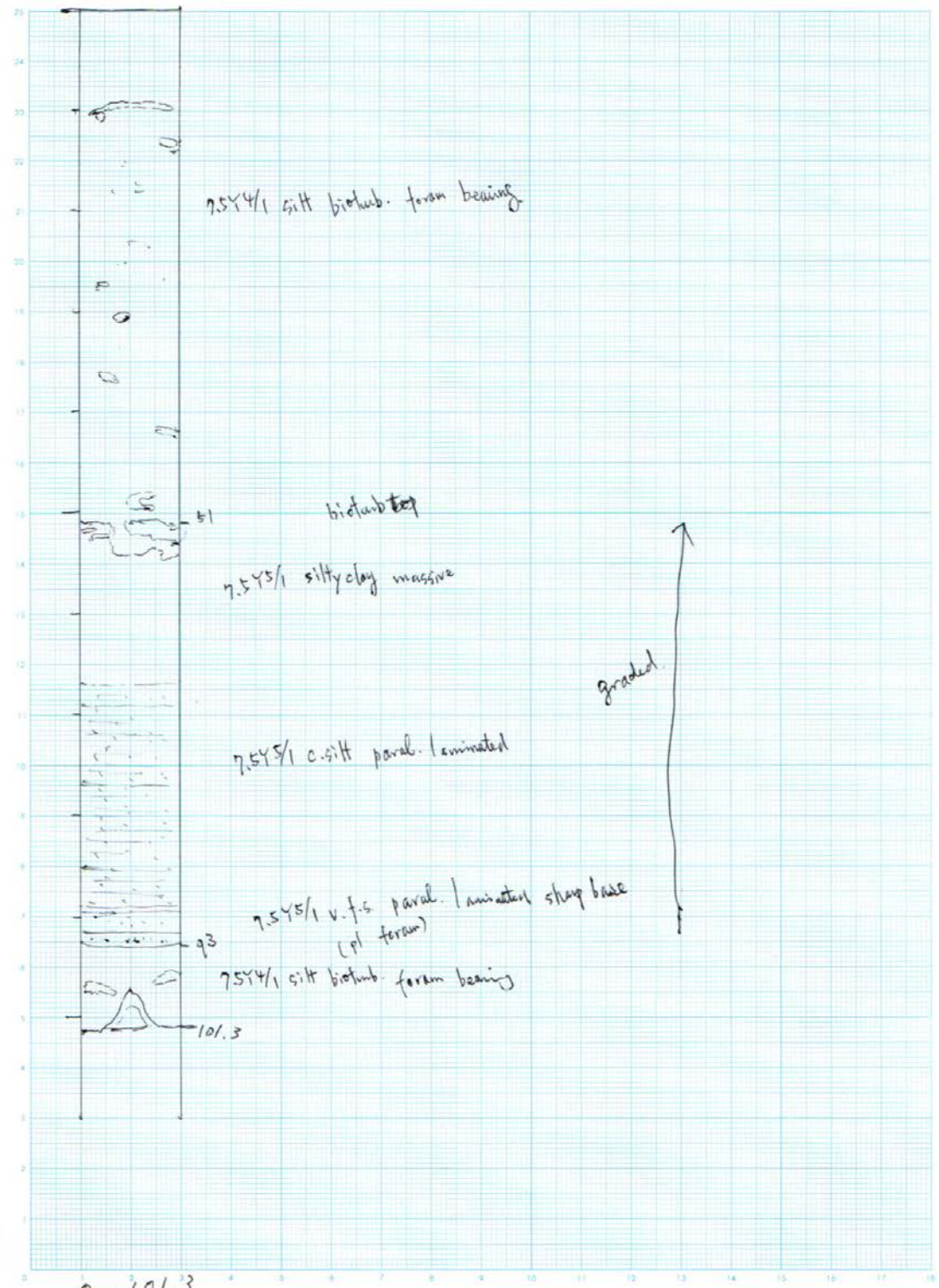
0-100
(190.1-290.1)

KR16-E06 PC03 5(W)/6



0 - 99.53
(290.1 - 389.6)

KR16-E06 PC03 6 (W) /6



0 - 101.3
(389.6 - 490.9)

KK16-E06 PL03 (W)

2.5Y4/2 calc. silt foram bearing

↓ lightening.

2.5Y5/1 calc. silt foram bearing bioturb.

2.5Y4/2 calc. silt foram bearing bioturb.

↓ lightening

2.5Y5/1 calc. silt foram bearing bioturb

5Y5/2 silty clay – silt massive sharp base bioturb. top

7.5Y5/1 ~~silty~~ clay massive sharp based Top

2.5Y4/2 calc. silt foram bearing. bioturb.

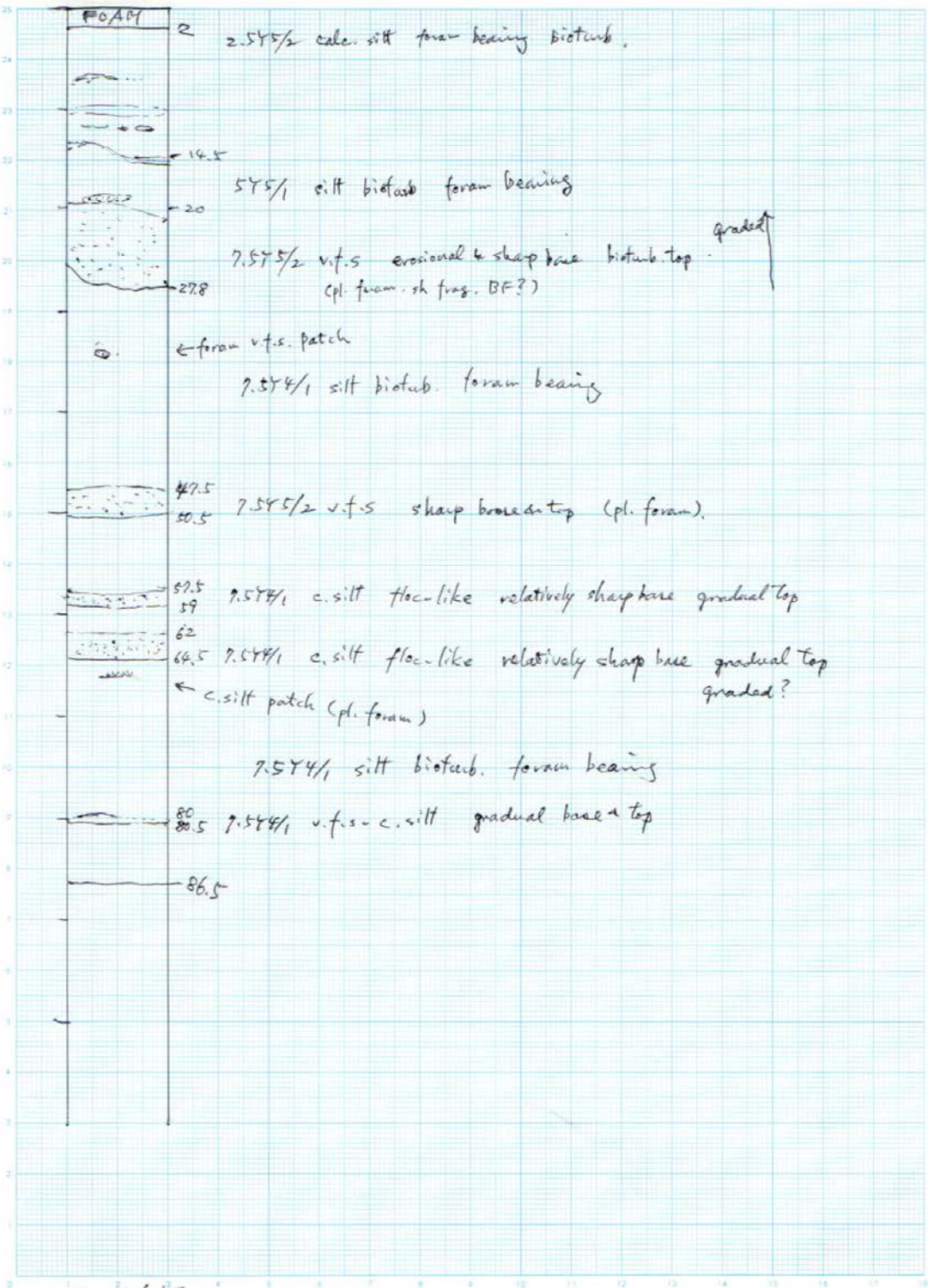
↓ lightening

2.5Y5/2 calc. silt foram bearing bioturb.

liner 70cm

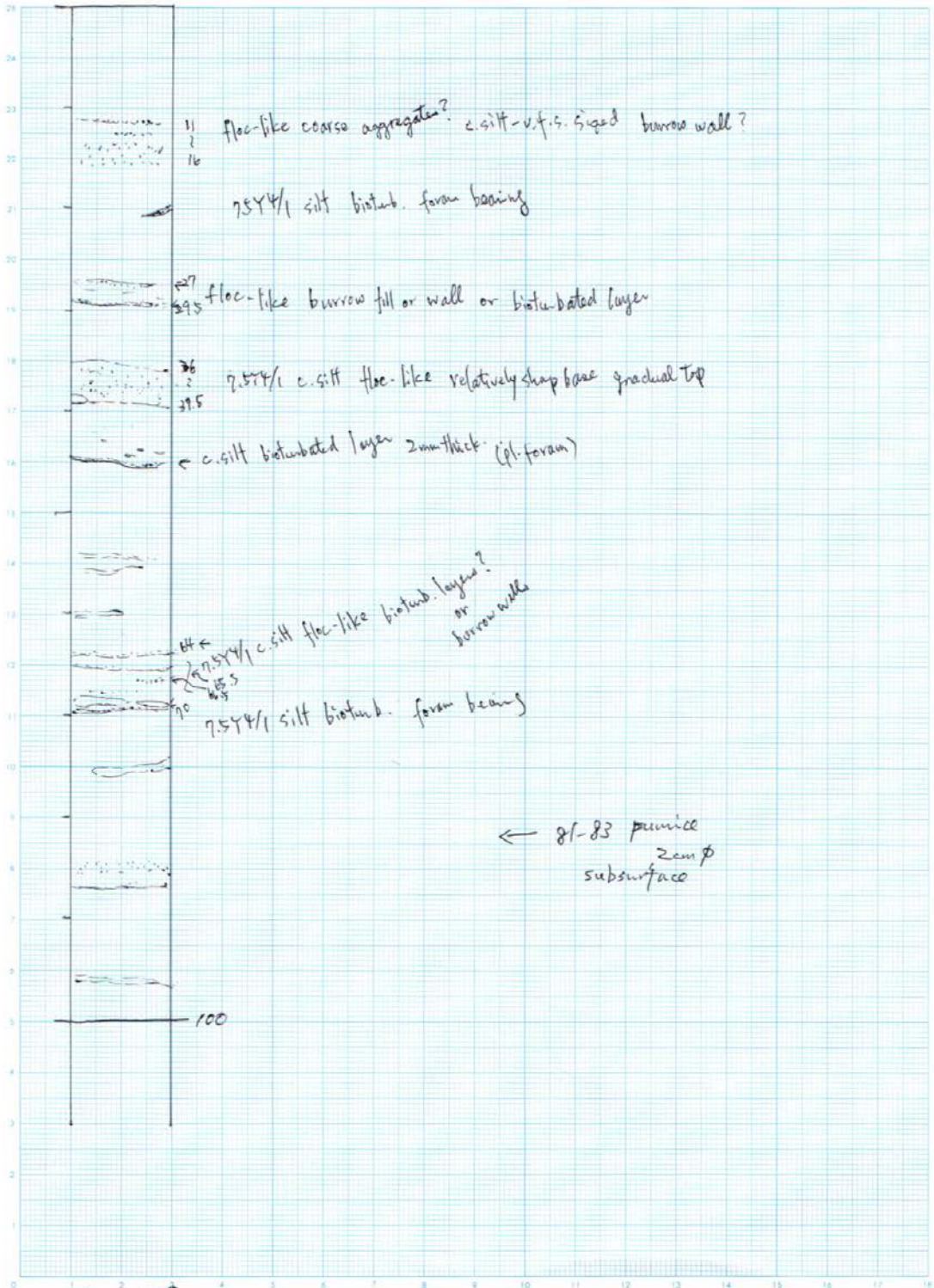
0-69.7
(0-69.7)

KR16-E06 PC04 sec. 2 (W) 16



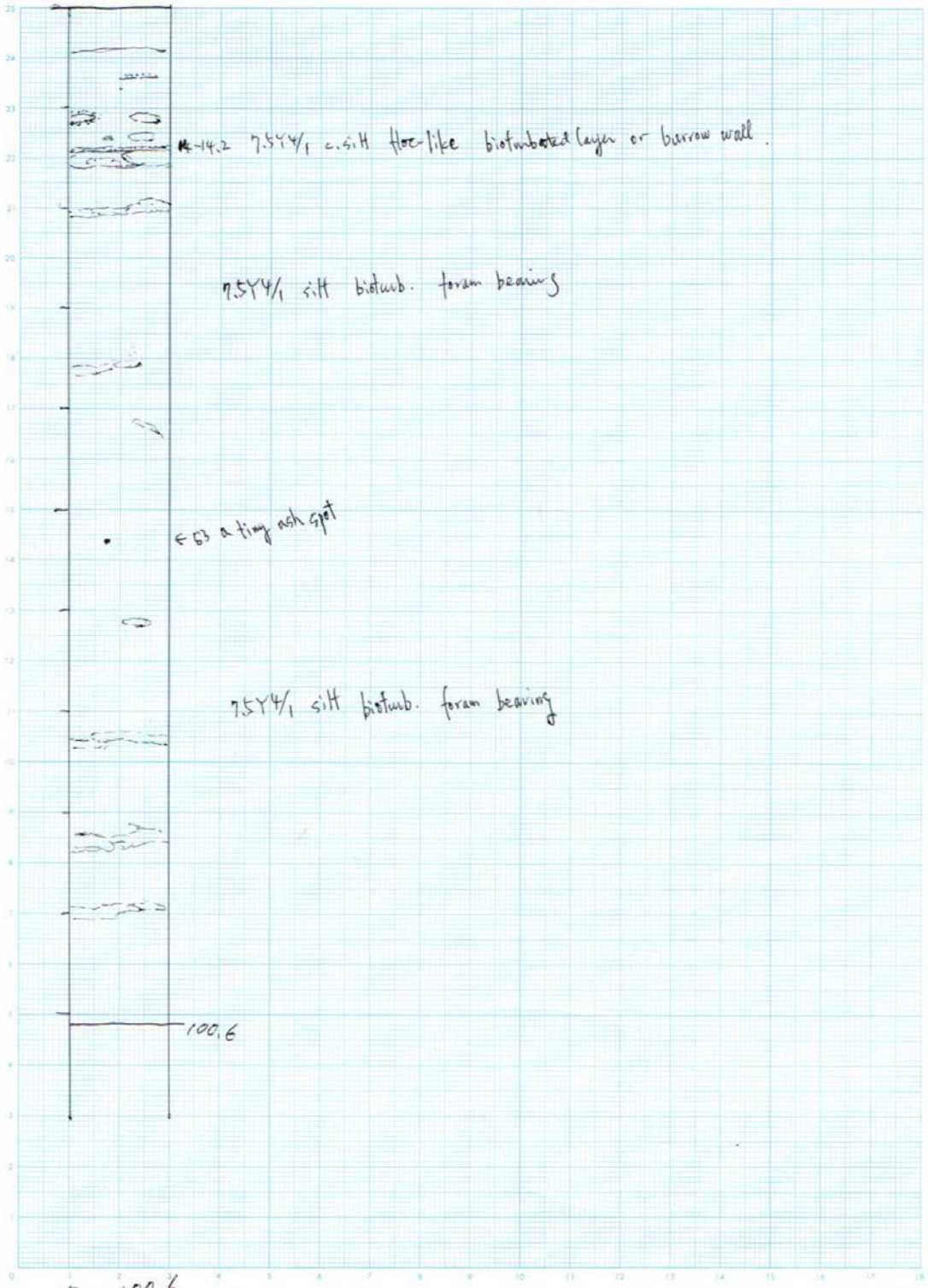
2-86.5
(c-84.5)

KR16-E06 PC04 sec. 3 (W) /6



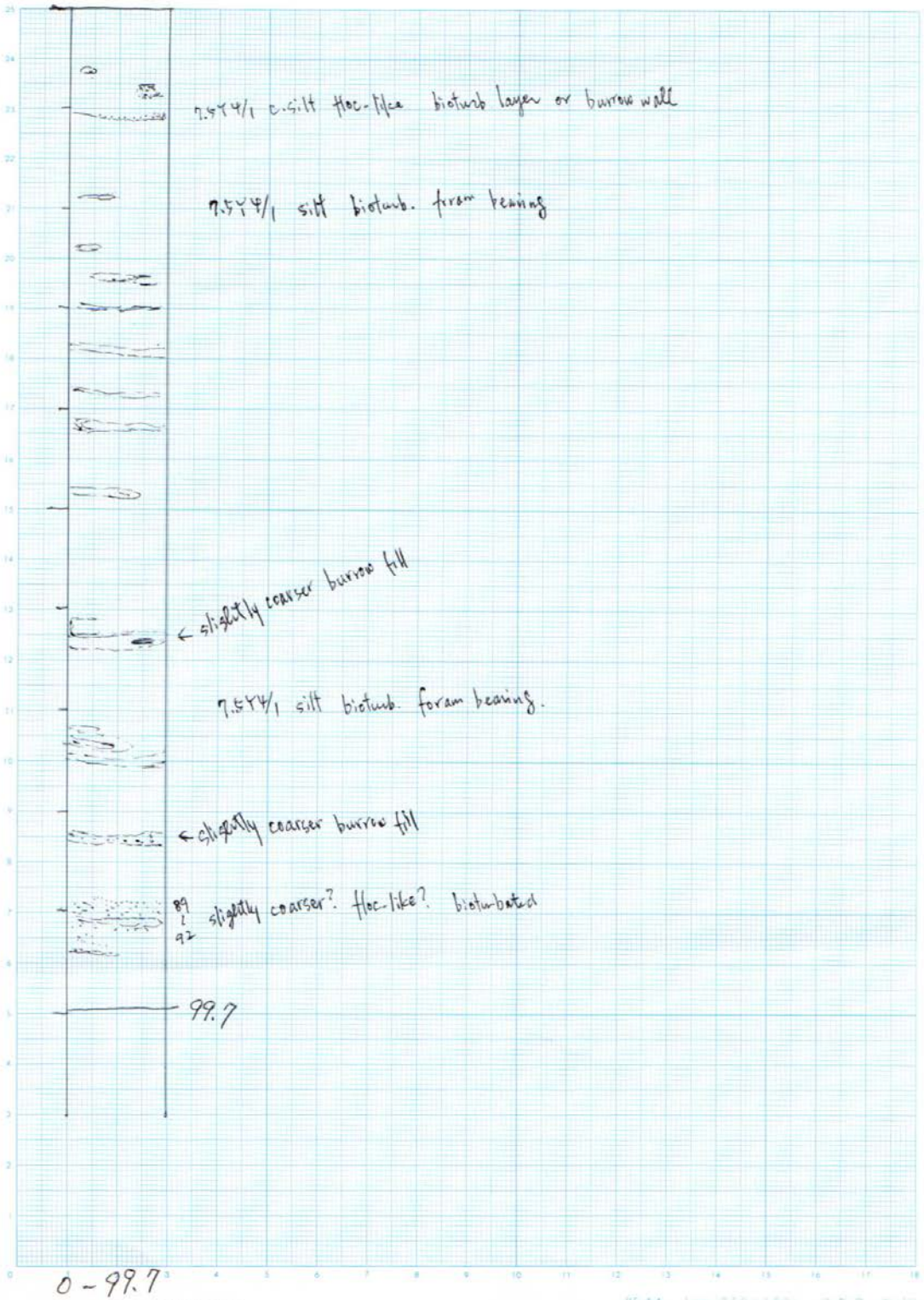
0 – 100
(84.5 – 184.5)

KR16-E06 PC04 sec. 4@16



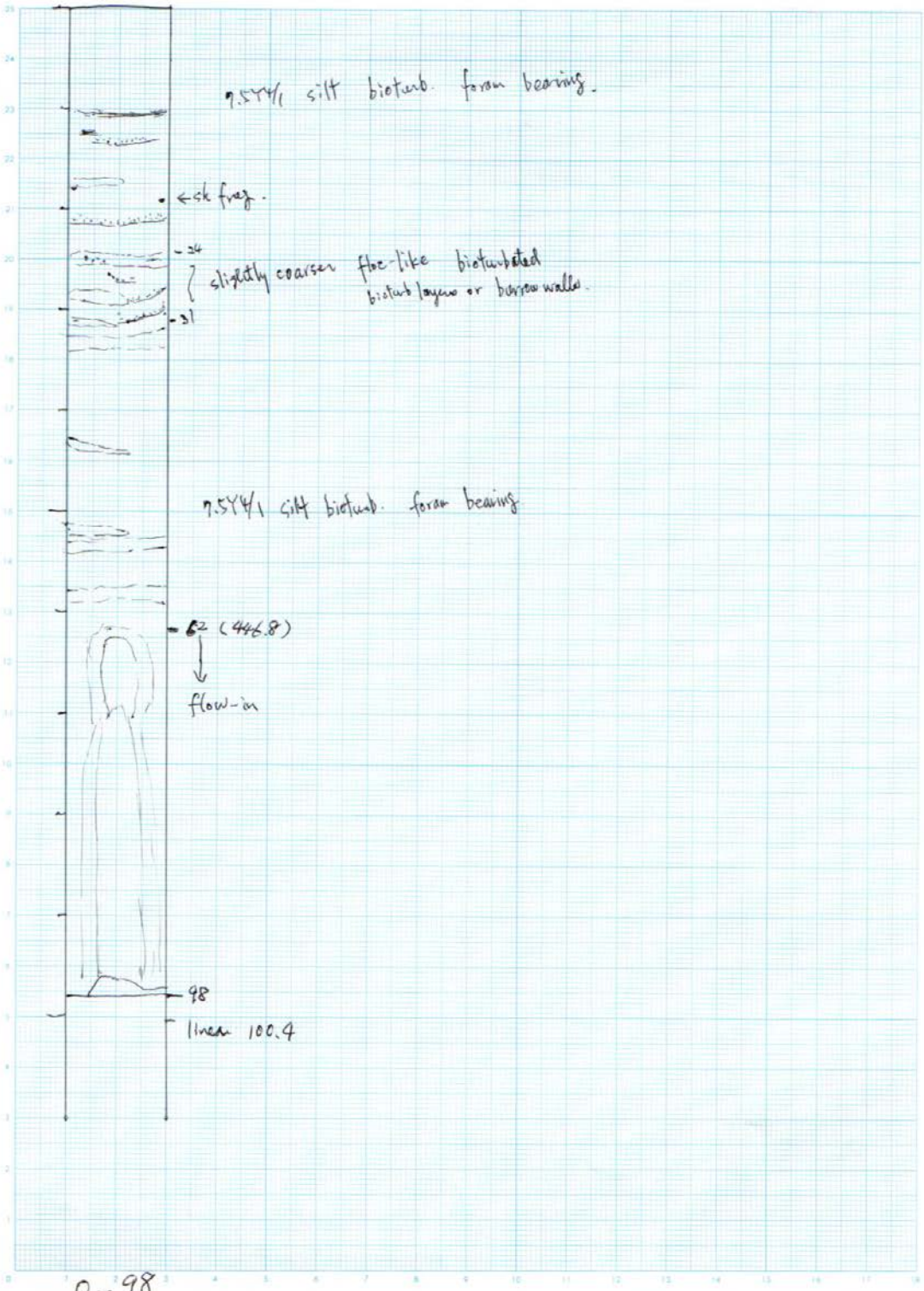
0 – 100.6
(184.5 – 285.1)

KR16-E06 PC04 sec. 5 (W) /6



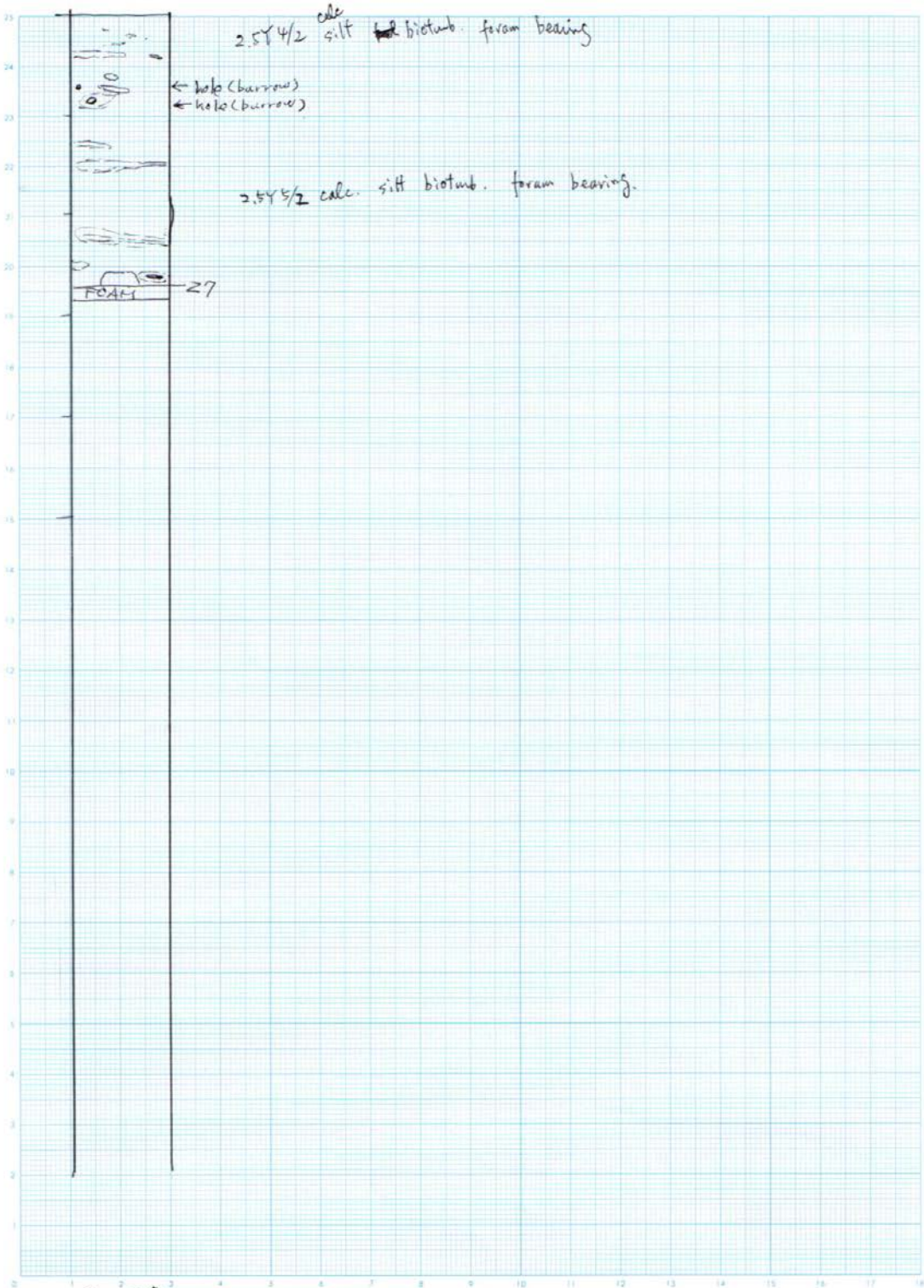
0 - 99.7
(285.1 - 384.8)

KR16-E06 PC04 sec. 6 @/6



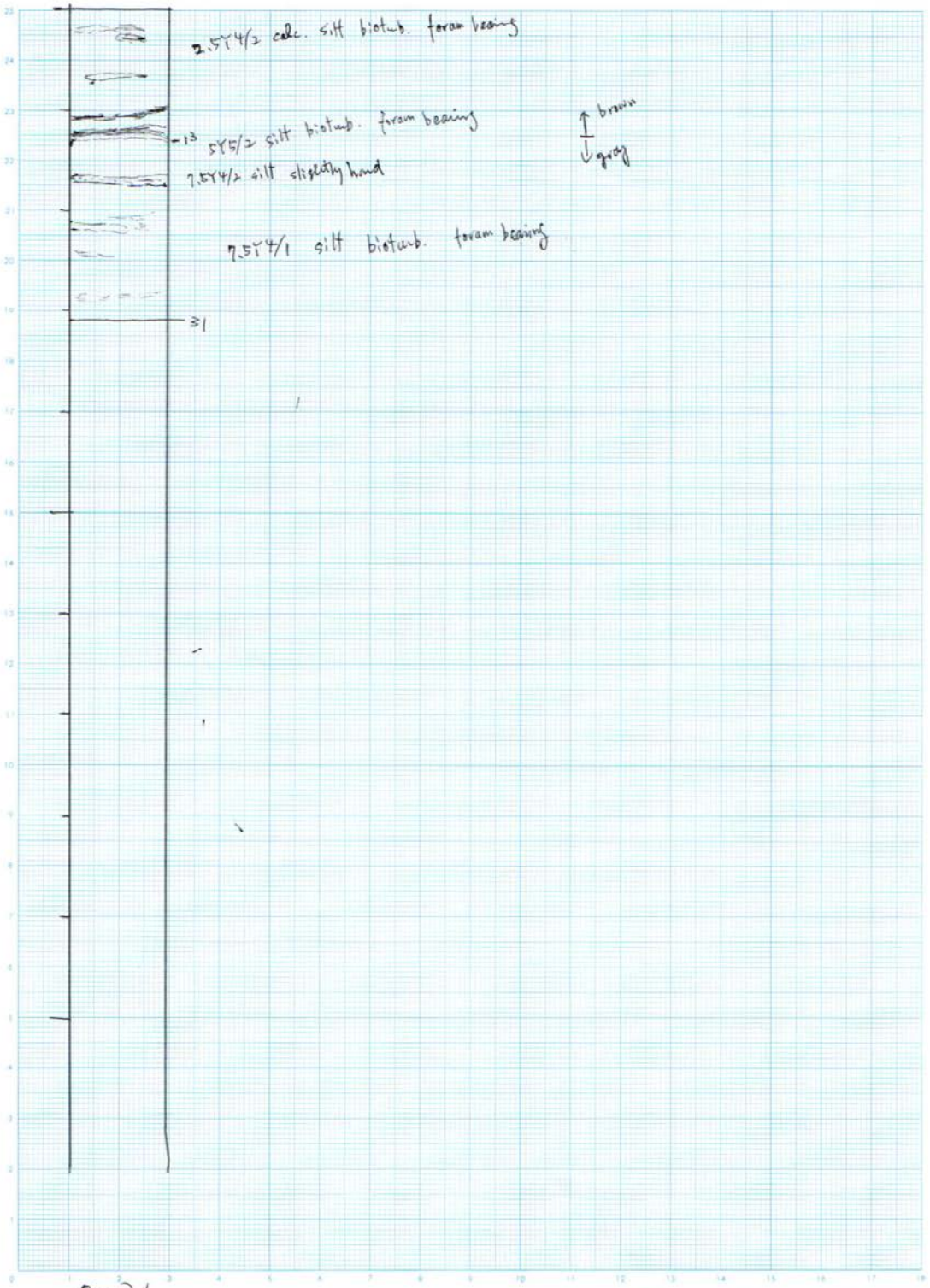
0 - 98
(384.8 - ~~4~~82.8)

KR16-E06 PL04 1 (4)



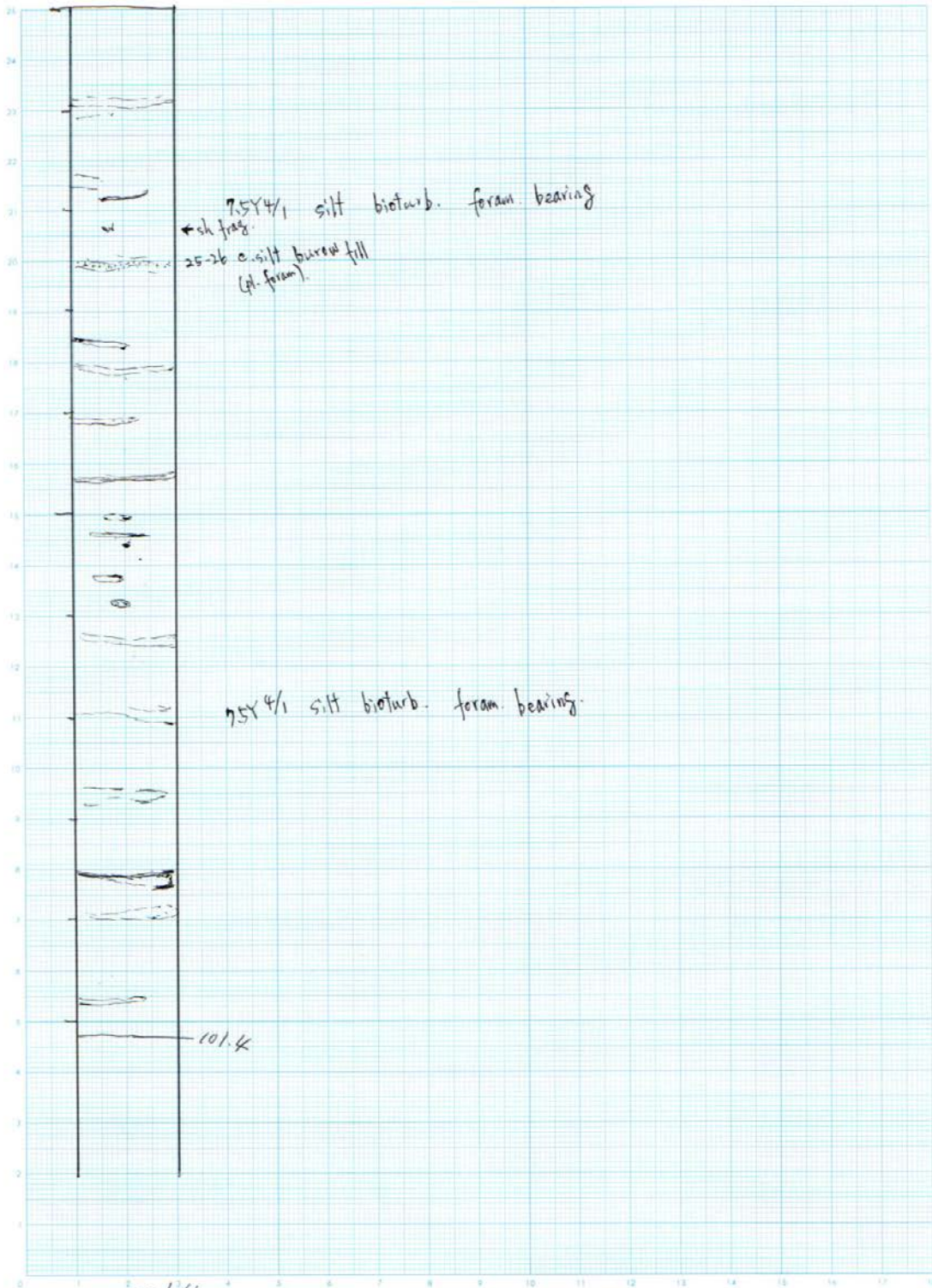
0-27
(0-27)

KR16-E06 PC05 sec. 1(W)/6



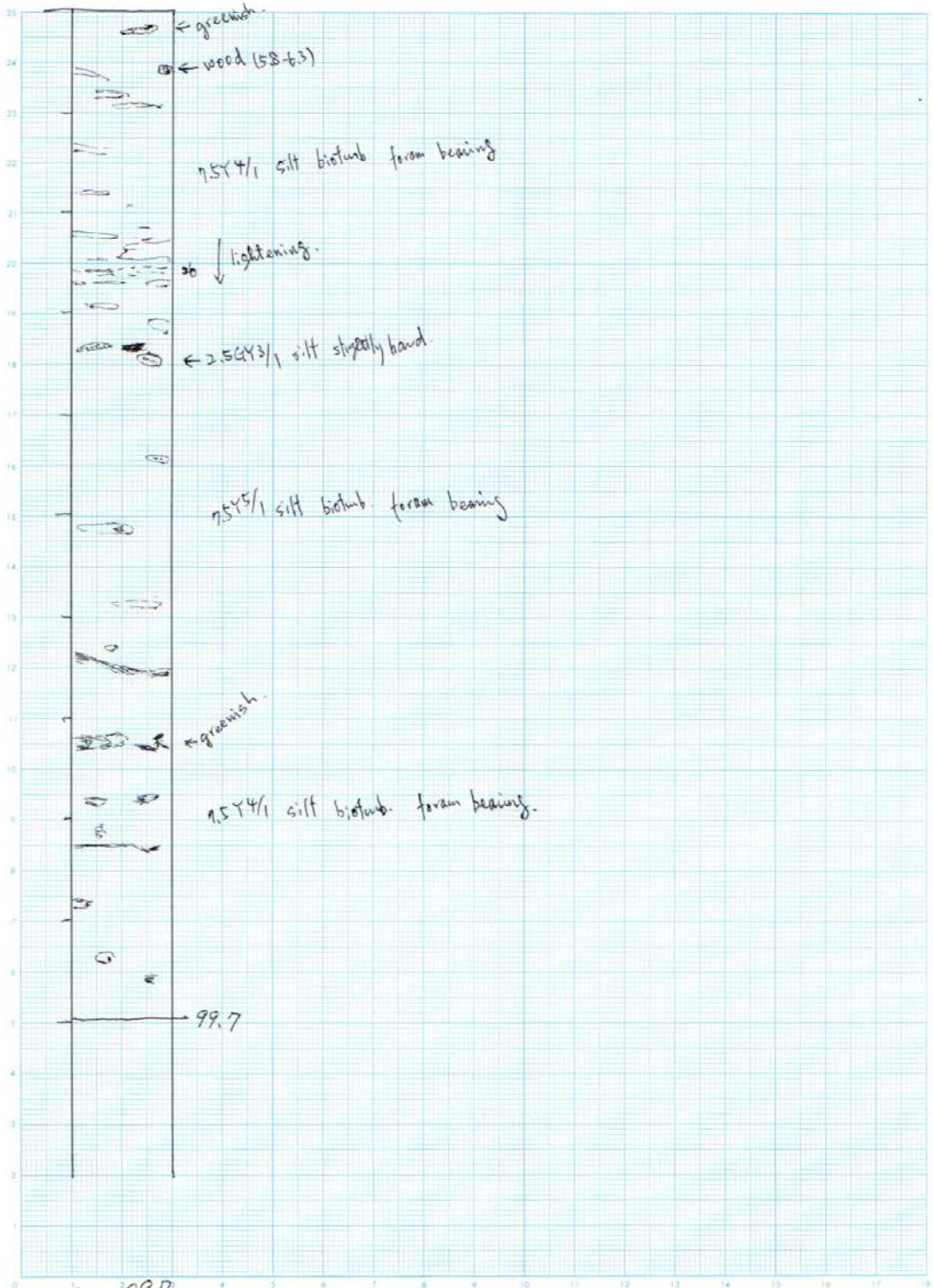
0-31
(0-31)

KR16-E06 PC05 sec. 2 (W)/6



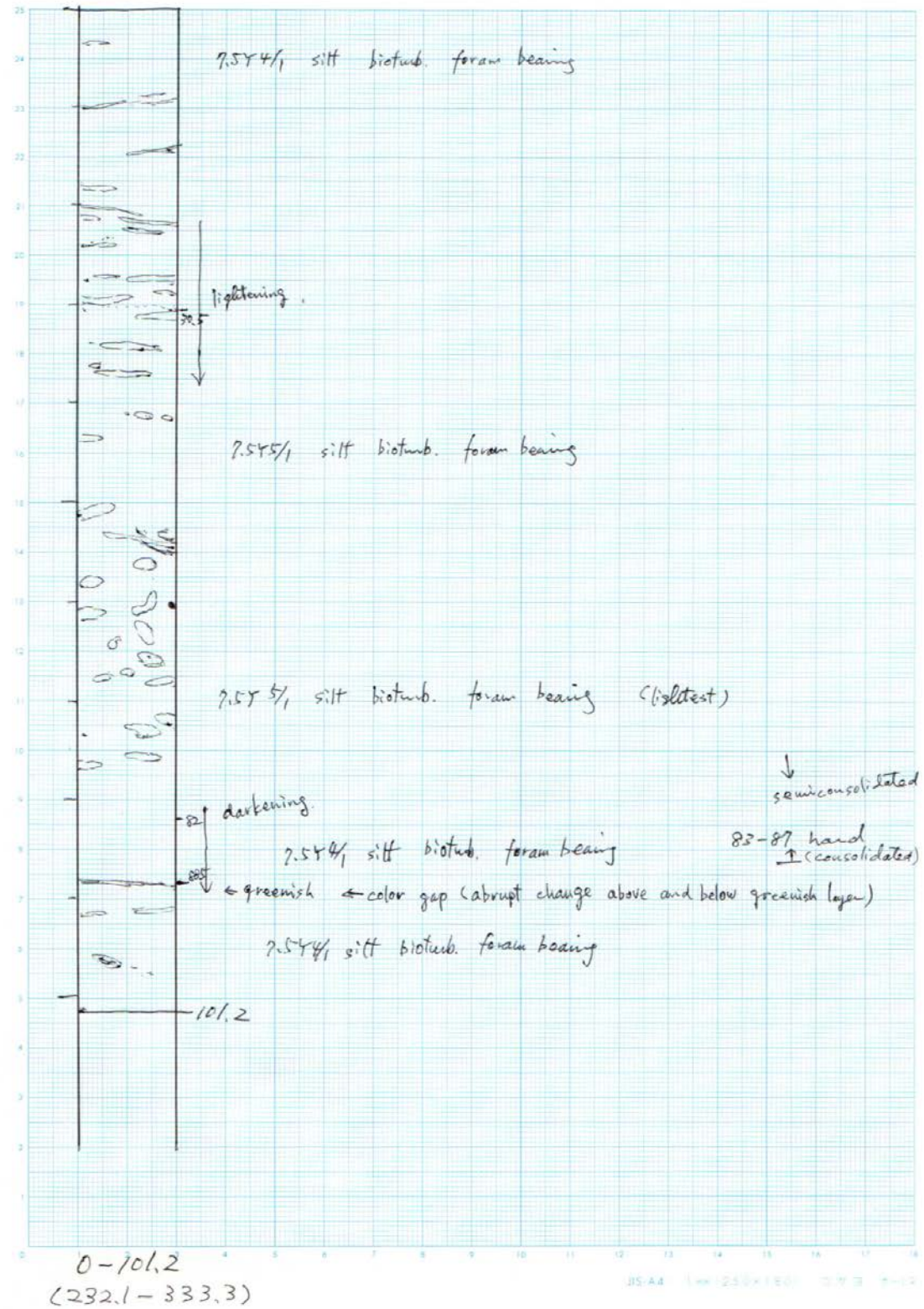
0 - 101.4
(31 - 132.4)

KR16-E06 PC05 sec. 3 (W)/6



0 - 99.7
(132.4 - 232.1)

KR16-E06 PC05 sec. 4(W)/6



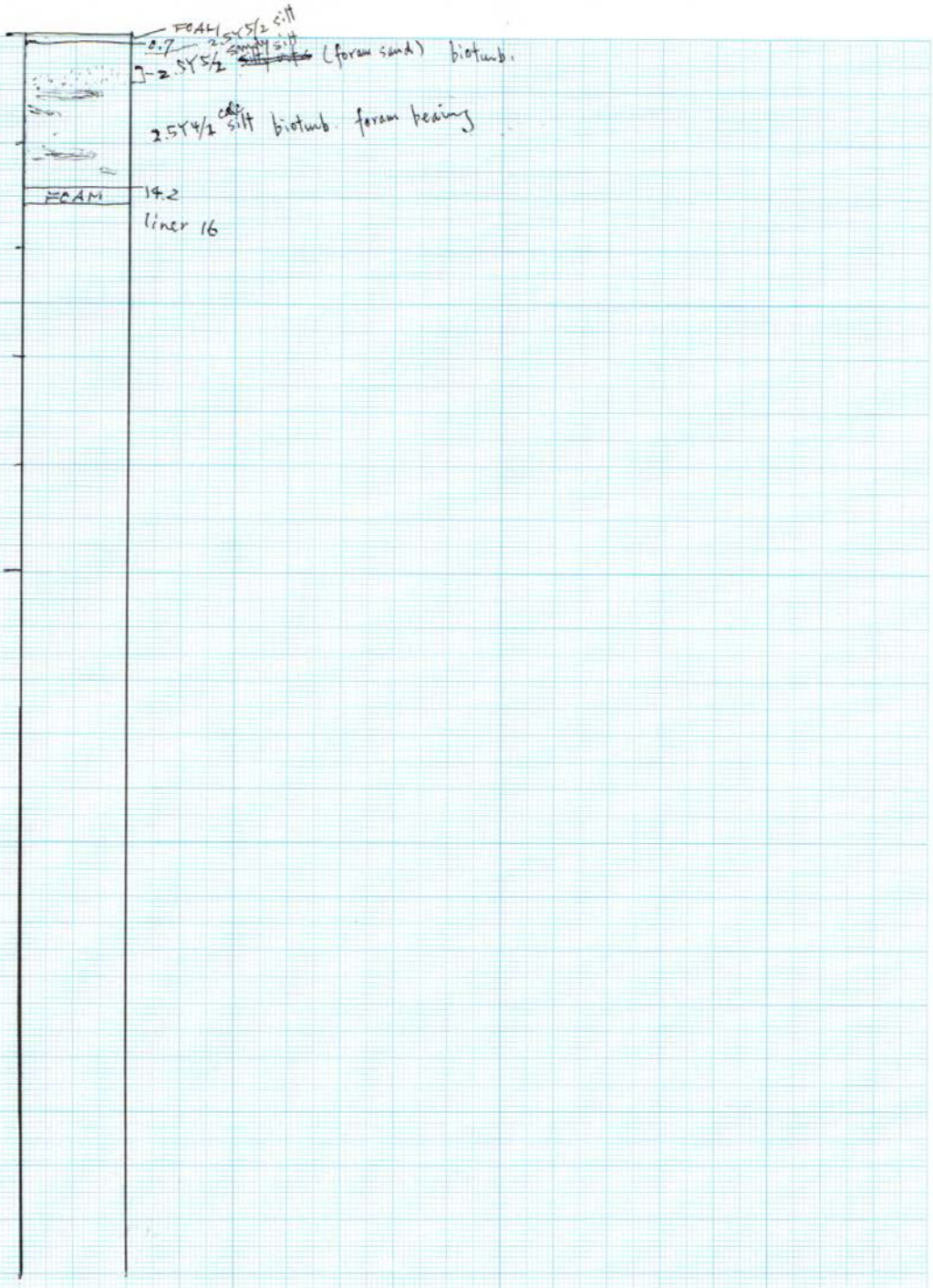
0-101.2
(232.1-333.3)

KR16-E06 PC05 sec. 5 (W)/6

sec.6 no sample

0-33
(333.3 - 366.3)

KR16-E06 PL05 1/(W)



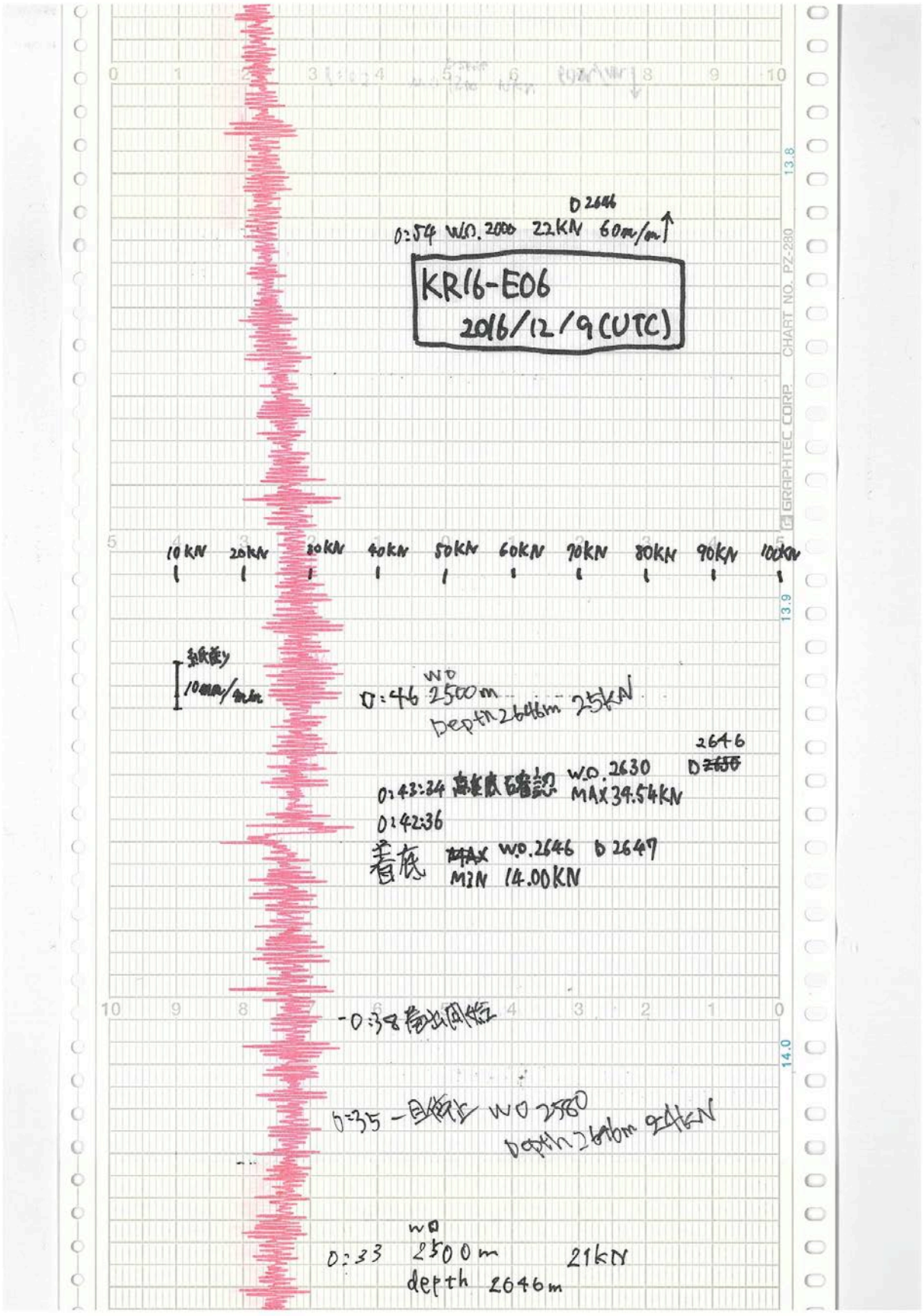
0.7-14.2
(0-13.5)

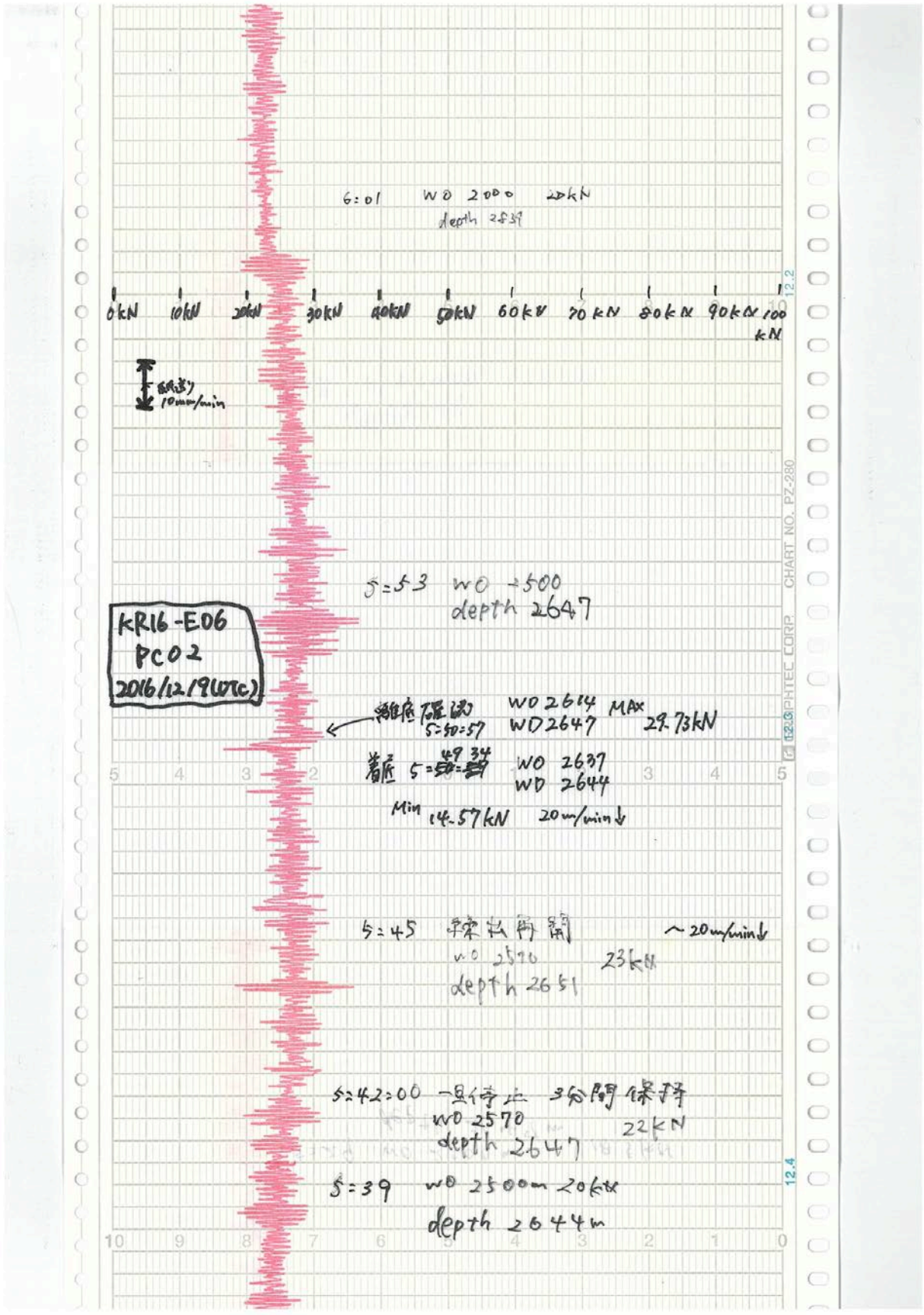
Winch Tension records during PC operation

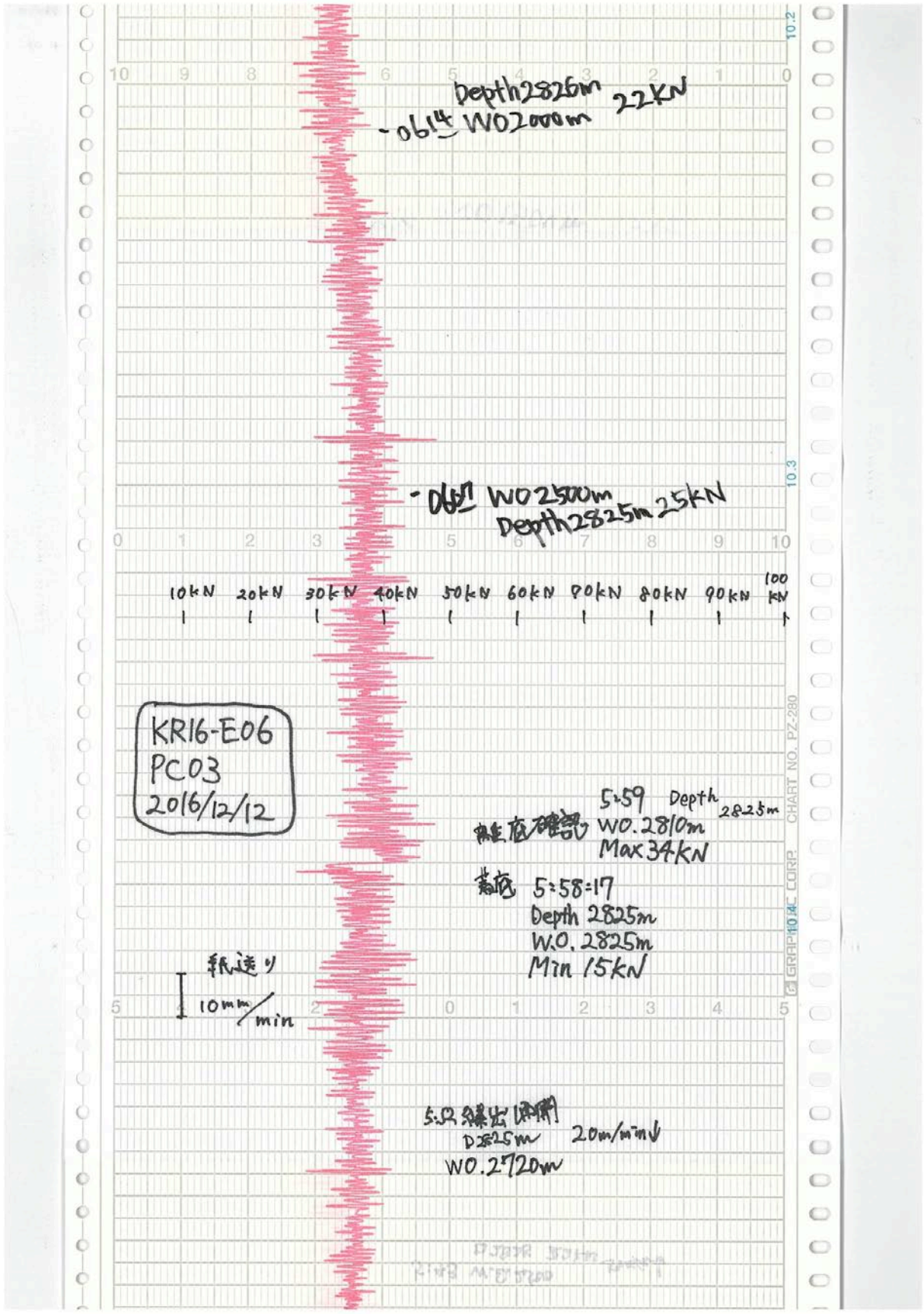
Horizontal axis :tension (kn)

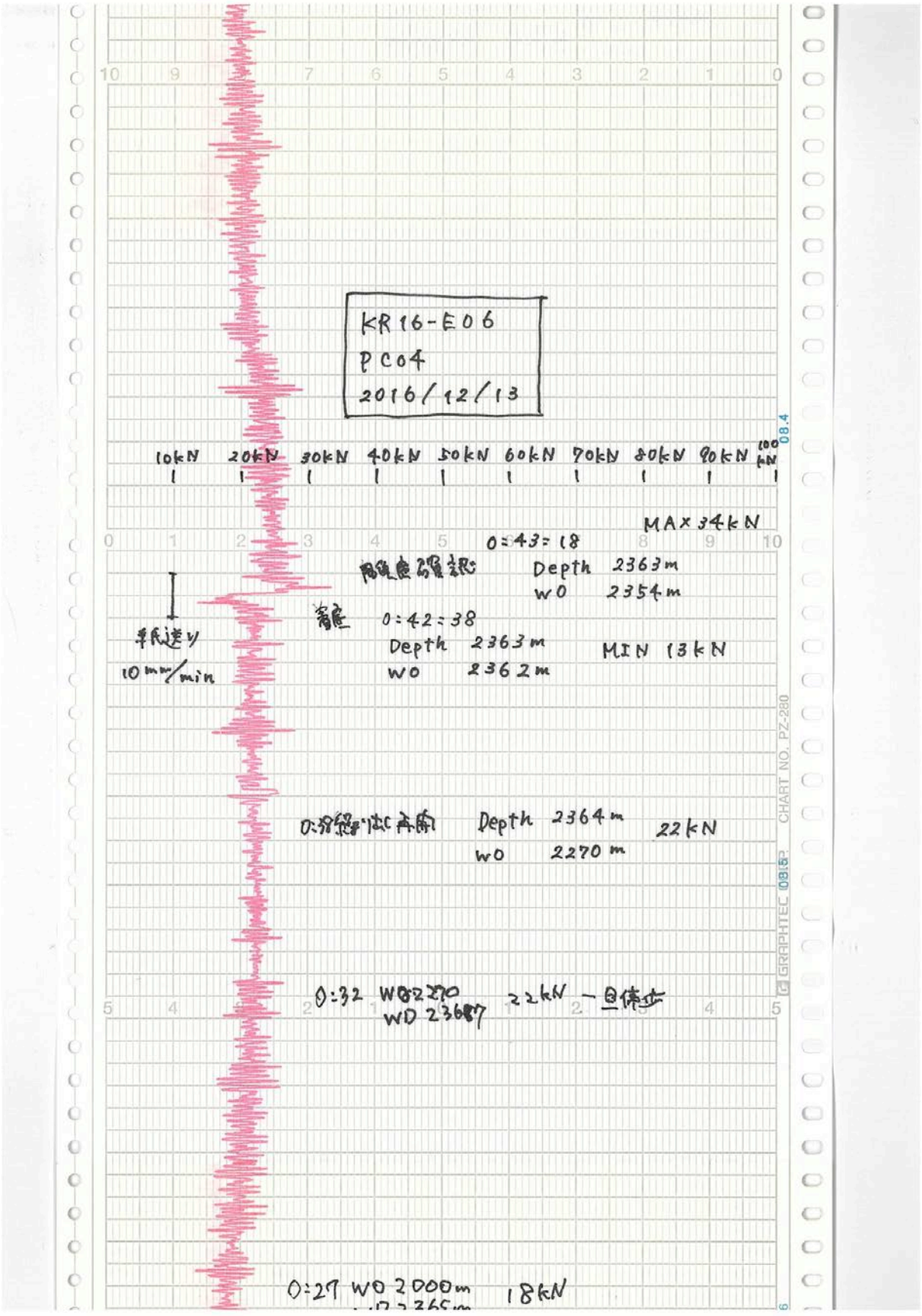
Vertical axis: time

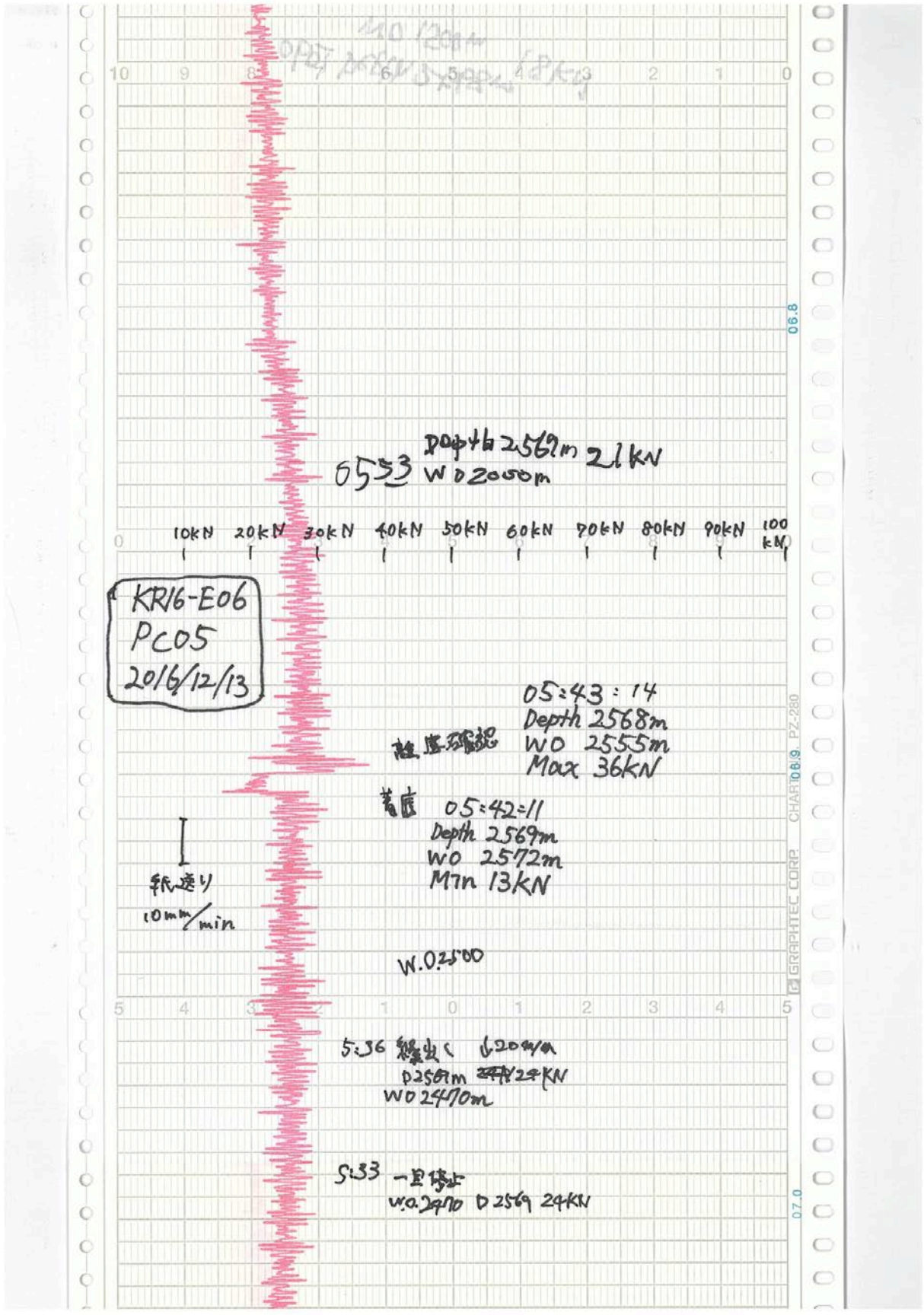
Annotation: Events


D 2646
0:54 W.O. 2000 22KN 60m/m↑
KR16-E06
2016/12/9(UTC)
GRAPHTEC CORP. CHART NO. PZ-280
10KN 20KN 30KN 40KN 50KN 60KN 70KN 80KN 90KN 100KN
感度
10mm/min
0:46 WO 2500m
depth 2648m 25kN
2646
D 2650
0:43:34 高度良確認 W.O. 2630
MAX 39.54KN
0:42:36
着底 MAX W.O. 2646 D 2647
MIN 14.00KN
-0:38 巻出開始
0:35 一旦停止 WO 2580
depth 2648m 24kN
WO
0:33 2500m 21kN
depth 2646m


6:01 WO 2000 20kN
depth 2639
0kN 10kN 20kN 30kN 40kN 50kN 60kN 70kN 80kN 90kN 100kN
kN
12.2
10mm/min
KR16-E06
PC02
2016/12/19(Mon)
5:53 WO 2500
depth 2647
着底確認 WO 2614 MAX
5:50:57 WD 2647 29.73kN
着底 5:49:34 WO 2637
WD 2644
Min 14.57kN 20m/min↓
5:45 探査開始 ~20m/min↓
WO 2576 23kN
depth 2651
5:42:00 一旦停止 3分間保持
WO 2570 22kN
depth 2647
5:39 WO 2500m 20kN
depth 2644m
12.4
PHTEC CORP CHART NO. PZ-280


Depth2825m 22kN
-061 WO2000m
-062 WO2500m
Depth2825m 25kN
10kN 20kN 30kN 40kN 50kN 60kN 70kN 80kN 90kN 100kN
KR16-E06
PC03
2016/12/12
5:59 Depth 2825m
WO. 2810m
Max 34kN
5:58:17
Depth 2825m
W.O. 2825m
Min 15kN
10mm/min
5:52 Depth 2825m 20m/min
WO. 2720m
CHART NO. PZ-280


KR16-E06
PC04
2016/12/13
10kN 20kN 30kN 40kN 50kN 60kN 70kN 80kN 90kN 100kN
MAX 34kN
0:43:18
Depth 2363m
WO 2354m
0:42:38
Depth 2363m
WO 2362m
MIN 13kN
手送り
10mm/min
Depth 2364m
WO 2270m
22kN
0:32 WO2270
WD 2368?
22kN 一旦停止
0:27 WO 2000m
18kN


0553 Depth 2569m 21kN
WO 2050m
10kN 20kN 30kN 40kN 50kN 60kN 70kN 80kN 90kN 100kN
KR16-E06
PC05
2016/12/13
05:43:14
Depth 2568m
WO 2555m
Max 36kN
着底 05:42:11
Depth 2569m
WO 2572m
Min 13kN
紙送り
10mm/min
W.O2500
5:36 離出く 620m/m
WO 2470m
5:33 一旦停止
w.o 2470 D 2569 24KN
GRAPHTEC CORP. CHART 06.9 PZ-280
06.8
07.0