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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)

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## **APPENDIX**

Core Photo

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#### 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. 7<sup>th</sup> 2016 to Dec. 16<sup>th</sup> 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 OperatorYUKA MORIWAKI3rd Electronics OperatorRYOSUKE MATSUIJr.3rd Electronics OperatorRYUJI ONIKUBOBoat SwainTADAHIKO TOGUCHIQuarter MasterKAZUMI OGASAWARA

Quarter Master MINORU KISHI

Quarter MasterNOBUYUKI ICHIKAWAQuarter MasterYOSHIAKI MATSUOQuarter MasterDAISUKE 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
1 6 20 17 00	77

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

17:53-

## 09th December(Fri) 12:00 JST East of Ishigaki Is (23-54.5N,124-34.1E)

weather: bc/ wind dir: 1	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

## 10<sup>th</sup> December (Sat) 12:00 JST East of Ishigaki Is.(23-59.3N,124-42.2E)

MBES survey

weather: bc / wind dir: NE / wind force: 6 / wind wave: 5 / swell: 3 / visibility: 8nm

US.SS terminate MDES surv	05:35	terminate MBES	surve
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06:03-06:53 SBP survey 09:06- start MBES survey

## 11<sup>th</sup> 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

## 12<sup>th</sup> 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 MBES survey 19:05-

#### 13<sup>th</sup> 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	8	MBES survey
20:00		heading to Nakagusuku to make harborage.

#### 14<sup>th</sup> 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

## 15<sup>th</sup> 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

Sent out 1<sup>st</sup> shore line, arrived at Naha-ko, then completed voy. 09:00

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.

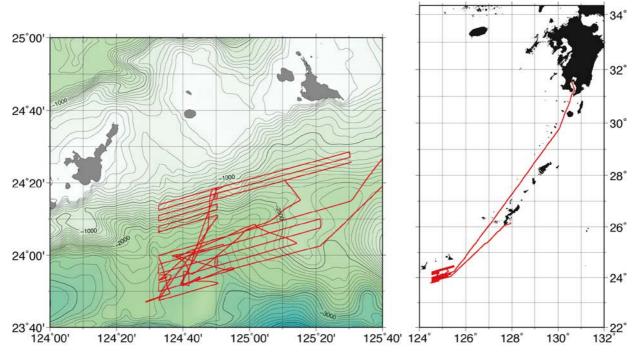


Fig. 4-1. Ship track and working area of KR16-E06. Red line: Ship track.

## **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  $50\sim11,000$ m

Swath width Max150°(90° at Water depth 11000m)

Max beam number301 beamsBeam width $2^{\circ} \times 1.6^{\circ}$ Frequency3.5 kHzDepth range $10 \sim 12,000 \text{m}$ 

#### 5-2 Expendable Bathy Thermograph

SBP:

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**.

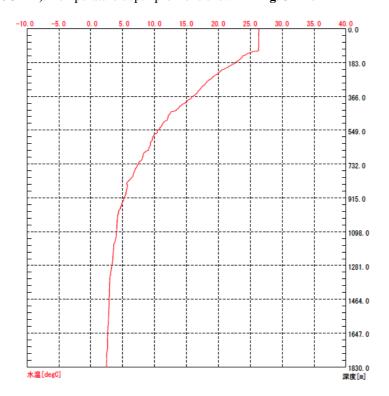


Fig.5-2-1. Temperature profiles measured by XBTs

Table 5-2-1 Positions of XBT measurement

1 4010		of The Inco	tour chicke			
Num	n 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.

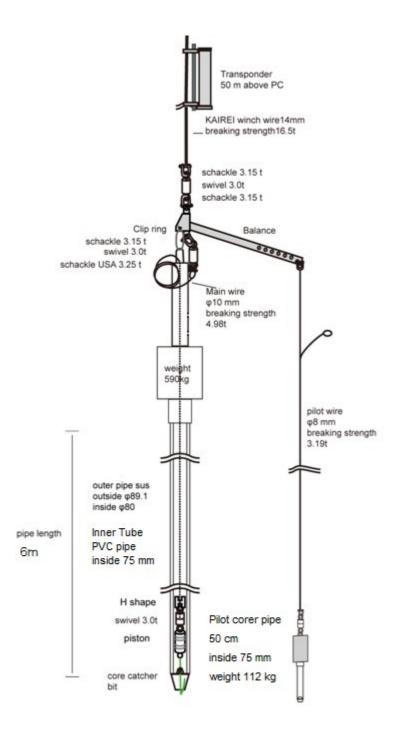
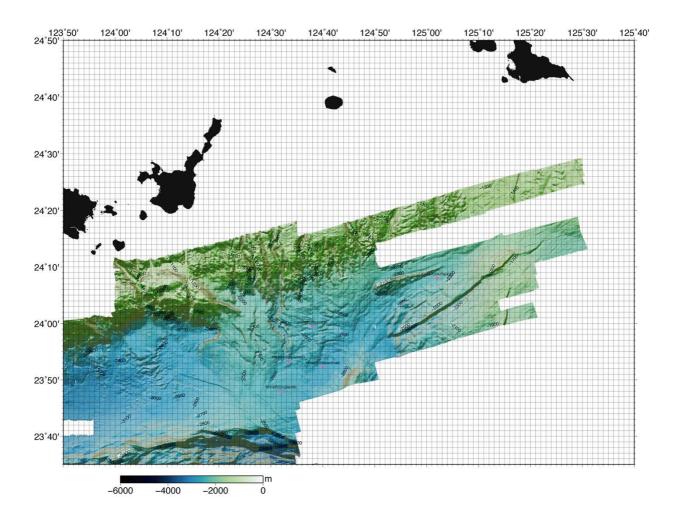


Fig. 5-2-1: Piston-corer system used in this cruise

## 6. Preliminary results

## 6-1. Bathymetric survey

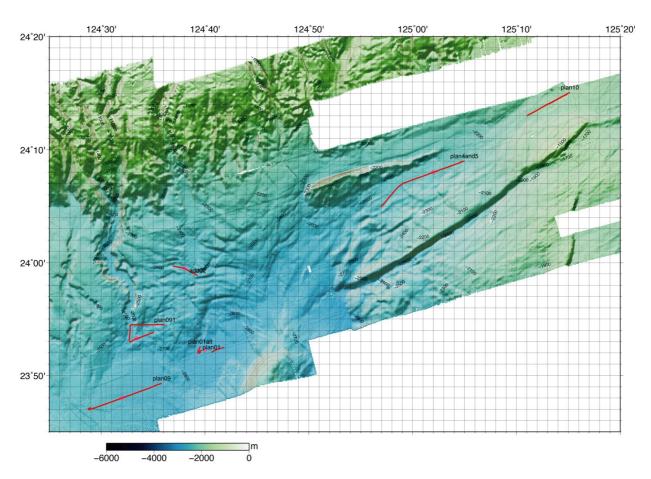
The areas mapped by MBES are shown in **Fig 6-1-1-1**. We conducted MBES survey to fill unmapped area in the previous two cruises. The mapping was conducted in the south area between Ishigaki and Miyako islands.



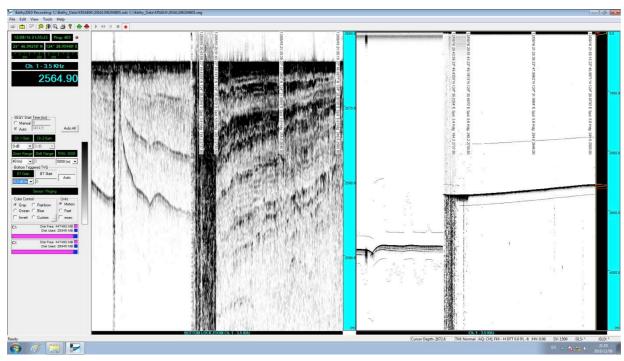
**Figs 6-1-1** Mapped areas shown with colored area. Red small circles: Piston coring site. Bathymetric data obtained in the previous cruise is partially merged in this figure.

## 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)

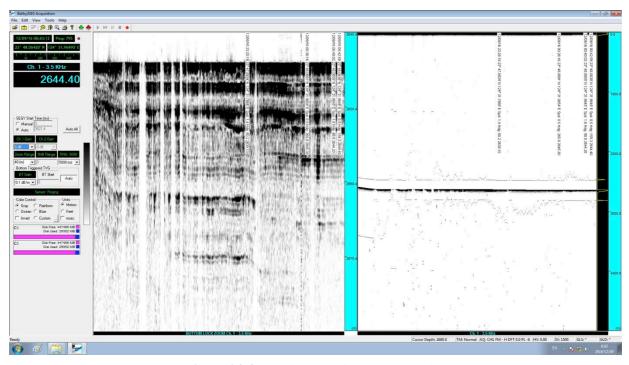


Figure 6-2-3: SBP image during PC01 operation

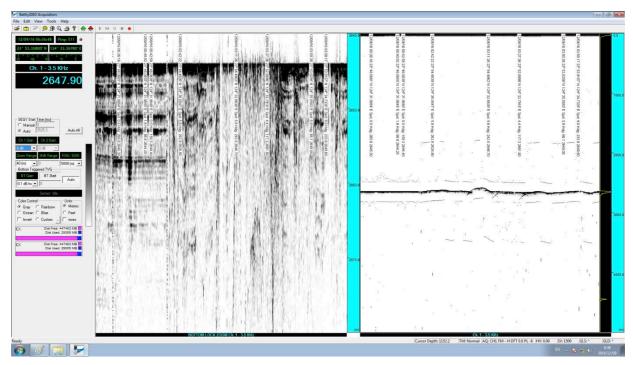


Figure 6-2-4: SBP image during PC01 operation (left side) and Line Plan091 right side

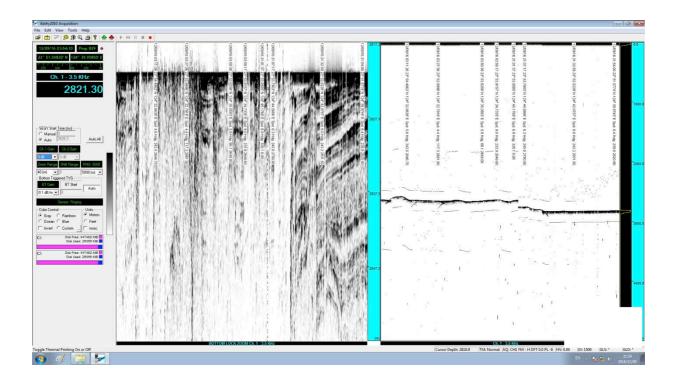


Figure 6-2-5: SBP image Line Plan091 (left side) of Plan 01 line (right side)

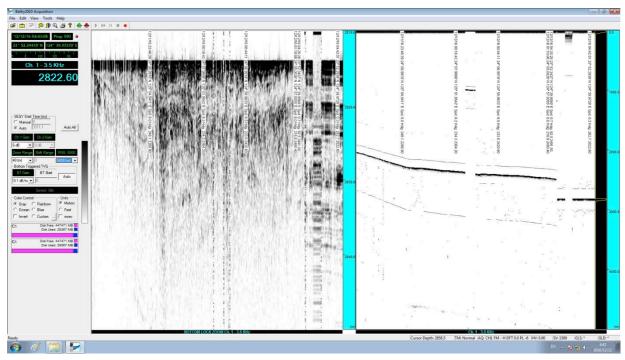


Figure 6-2-6: SBP image of Plan 4and 5 Line (left side) and image of PC01alt during PC03 operation.

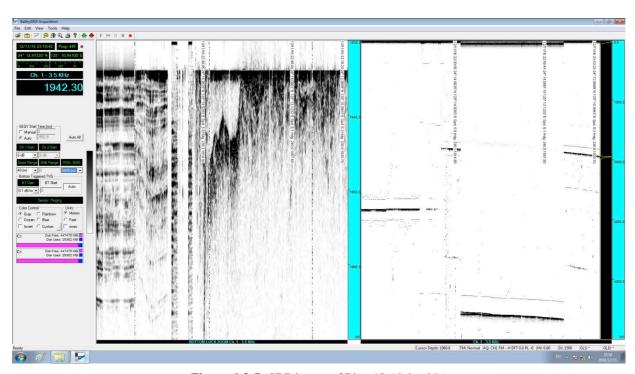
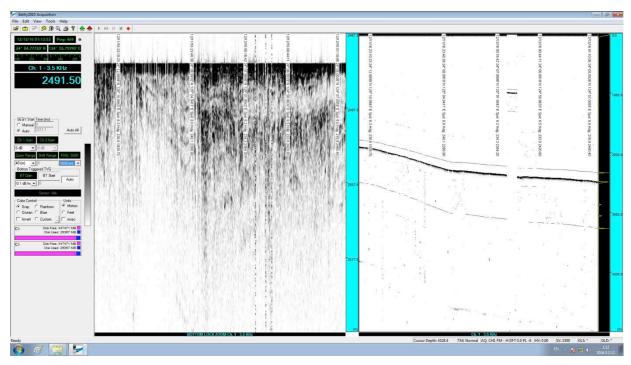
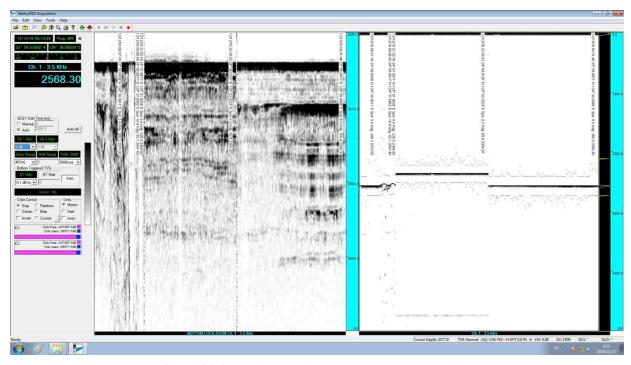


Figure 6-2-7: SBP image of Plan 10 (right side)



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



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

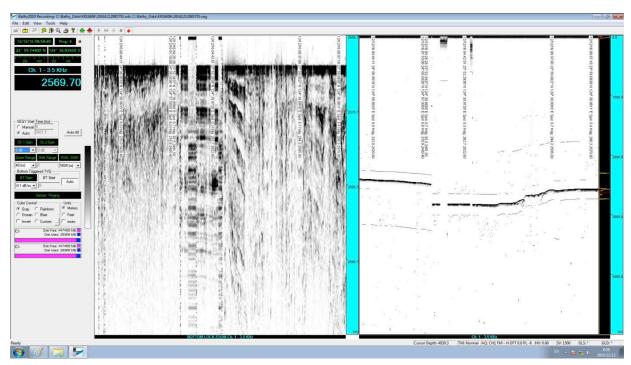


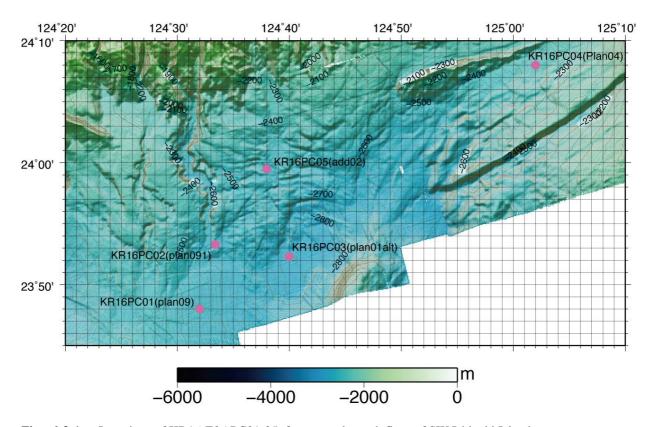
Figure 6-2-10 SBP image add02 line.

## 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	Positon				er type	Com bengti	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 t	type corer, '	"OUT" is Oute	r type cor	er								



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

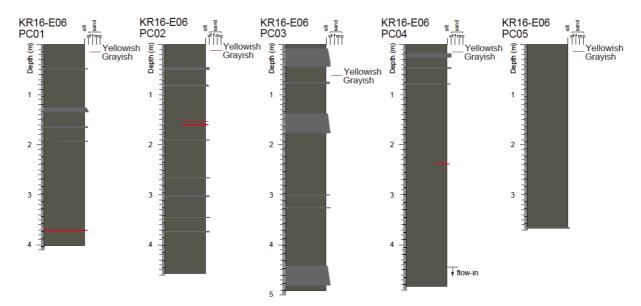
This core was obtained from a forearc slope at SW of Miyako Island.

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.

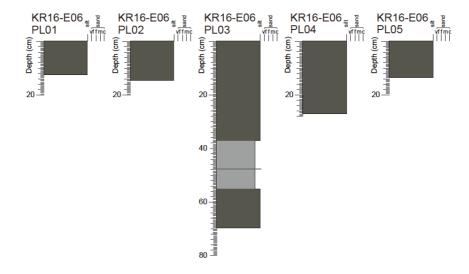
#### Core KR16-E06 PC05

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.

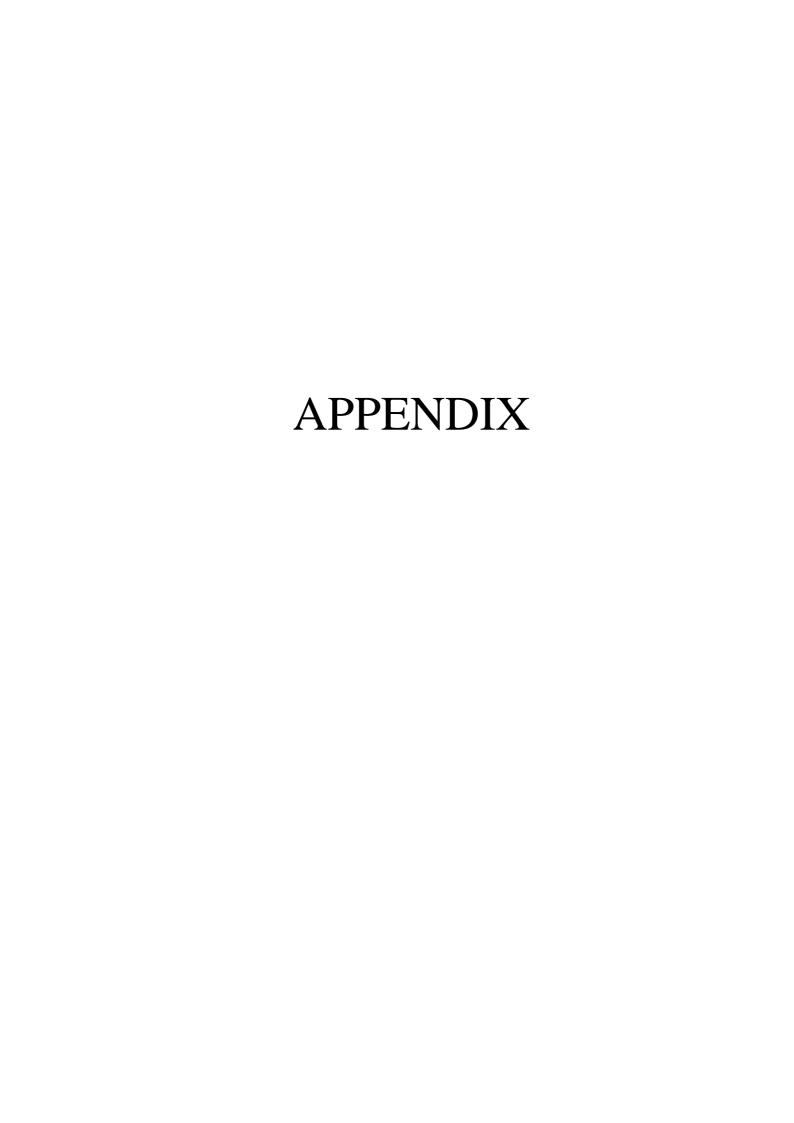
## 8. Notice on Using

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

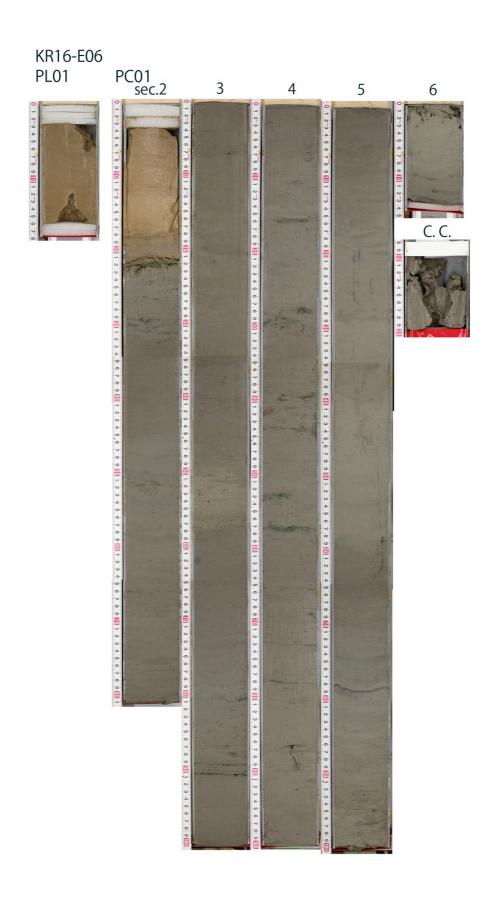
This cruise report is a preliminary documentation as of the end of the cruise.

This report may not be corrected even if changes on contents (i.e. taxonomic classifications) may be found after its publication. This report may also be changed without notice. Data on this cruise report may be raw or unprocessed. If you are going to use or refer to the data written on this report, please ask the Chief Scientist for latest information.

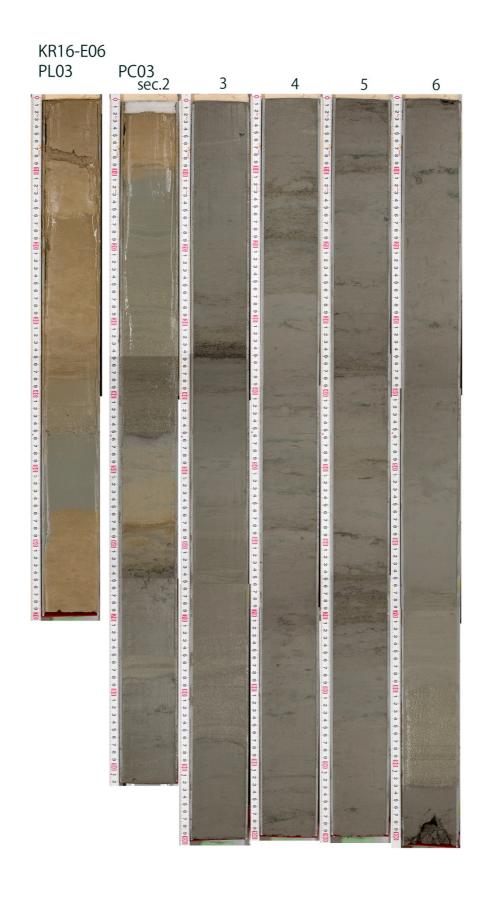
Users of data or results on this cruise report are requested to submit their results to the Data Management Group of JAMSTEC.



## Core Photo











# Visual Core Description

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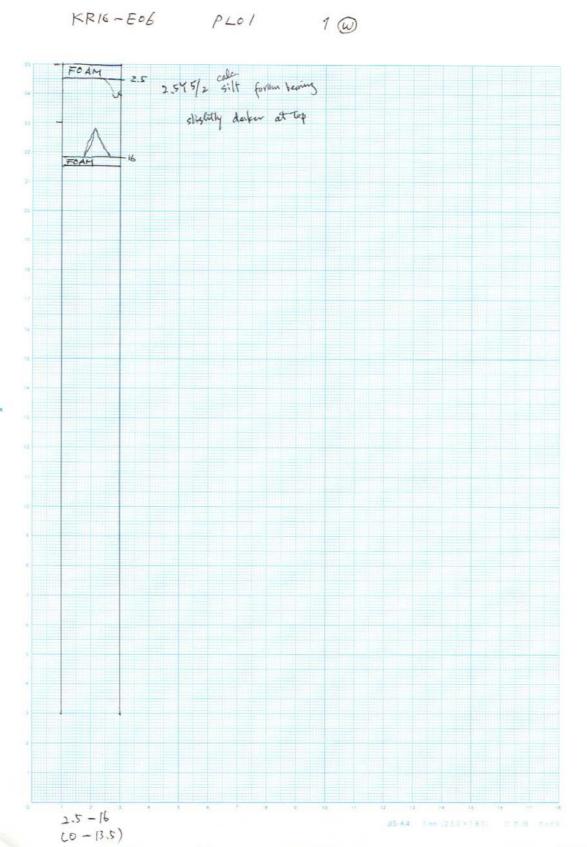
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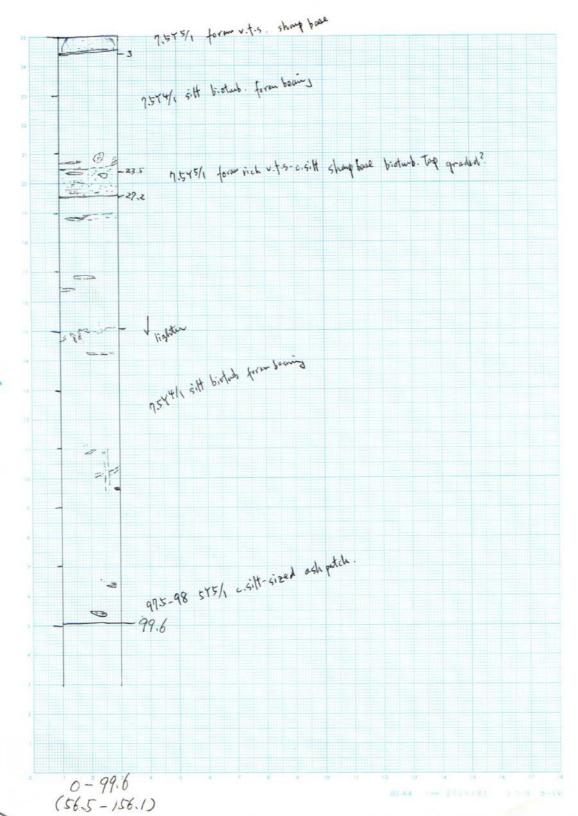
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10 th 412511t clayer sit slightly hand.			
= 574/2 clayer sit stightly marri			
) greenish patches			
1 / greener parcus			
7544/ silt bioturb. toram bearing.			
1 1 5 7 5 1 7 5 1			
- 56.5 7.545/1 c.silt-refs. patch			
18 56.5 P. EY 5/1 C. S. Horor, gte. shofting, foram			
19 Marily			
	+		
4			
0 1 2 2 4 3 8 7 8 5 10 11 12	14	15 17	

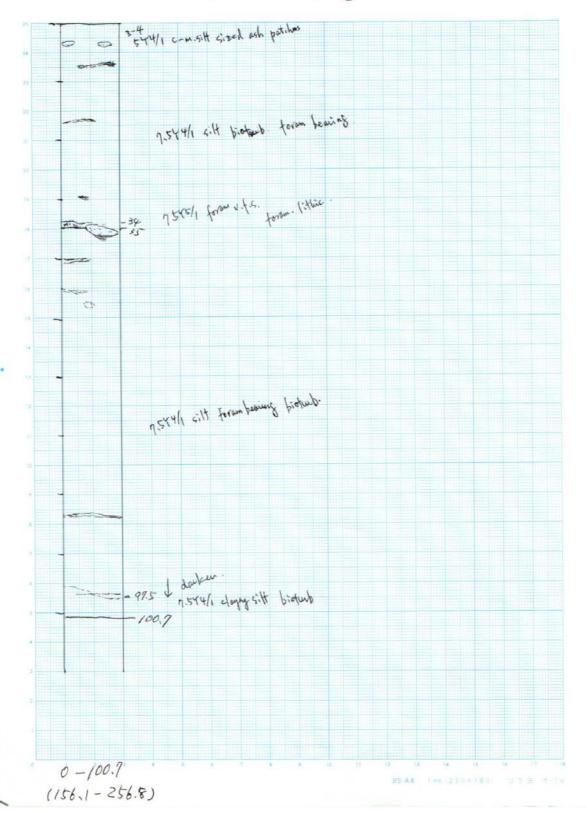
JIS-A4 1 ++ (2.5.0 × 18.0) □ 0 ∃ | t=1.0

0-56.5

## KR16-E06 PC02 3W/6

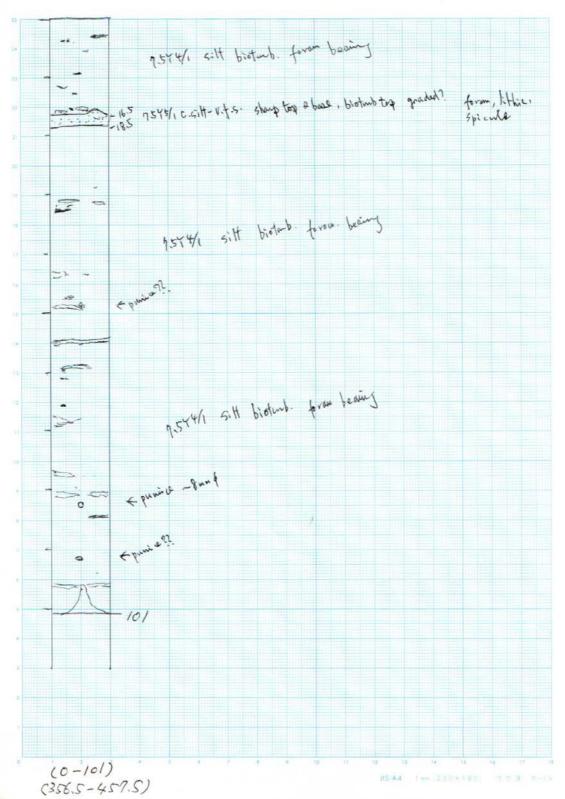


#### KR16-E06 PC02 4@16



## KR16-E06 PCOZ 500/6

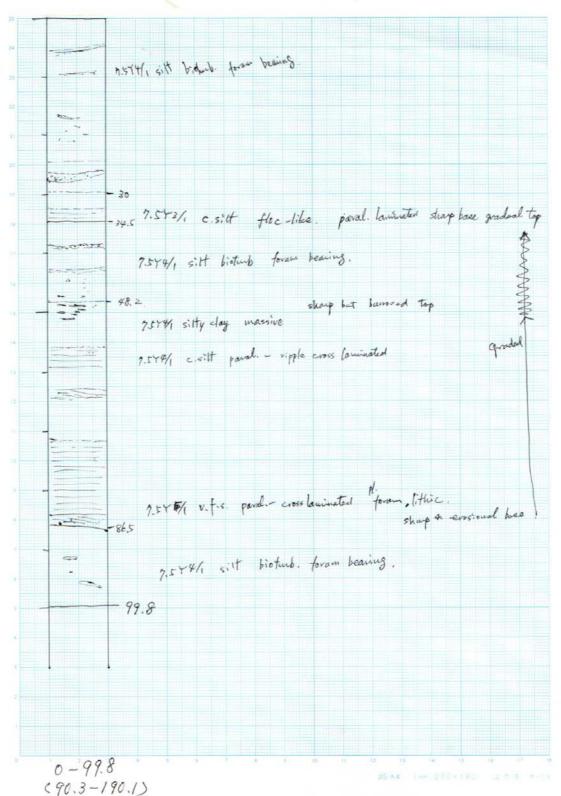
- 9,	8 mm ms ( ) I is a moderal listency took form, littlice
	8 7.575% vifis, shappins graded biotemb. Top forem, littic,
	7.544/1 sift biotub. forom bearing
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2.00	\$6 9.575/1 c.sitt-v.f.s shaptop a bisturb top graded. lithic, ste, from,
- Janes	
	7.574/1 silt biotemb. foram bearing.
	. 89 1.575/1 c.sitt-v.fs. deep base to ty bioturb. graded formy,
	-44.7
2	



2.575/2 cale sitt forum being biotub. \* FOAH 0-14.7

(0-90.3)

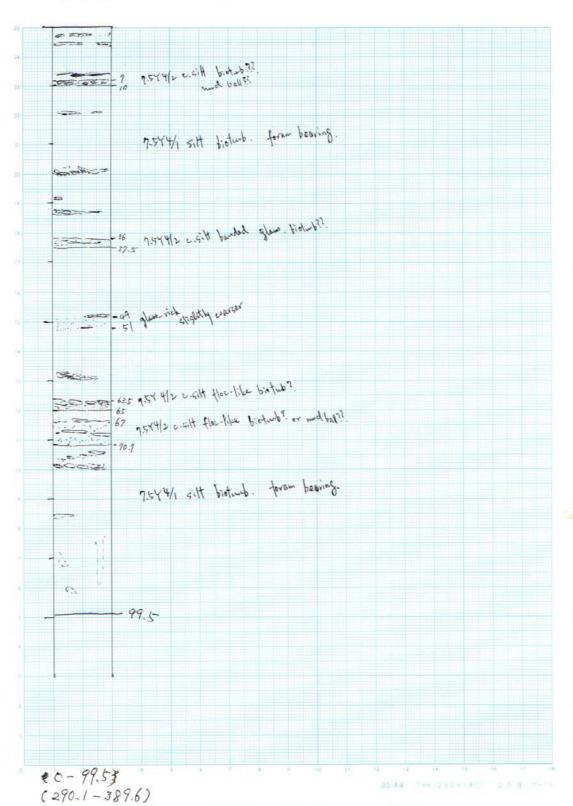
100 he sample calc. sitt foram bearing bioturb Bistub top 7.575/1 sitty clay massive obliquely laminated C-m.sit 7.575/1 graded 7575/1 c. silt foram, she tray paral. laminated 2.575/1 v.f.s. foram. paval lawinates clean sharp base 1075/ silt form bearing bioturb. +57 /2 sitt foram bearing bioturb. = 2.5GY 4/ sit hand 2574/1 sitt foram bearing bioture. 7.575/1 c. silt poral laminated sharp base extop foram, little base partly biotemb. 9.544/ silt toram beary biotub 91.8 1.5-91.8

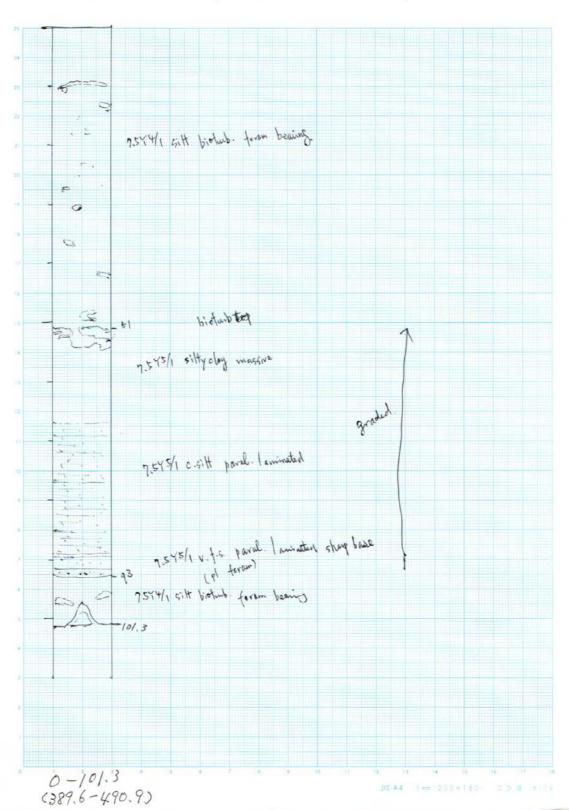


## KR16-E06 PC03 400/6

	0.	9544/ Sitt bioturb. forom beauting
	00	11 7573/2 c.silf floorlike sharp bowe otop burrowed
j	- 1, 1,4	15 7.573/2 e.s.t floc-like sharp base a top biotub??
	71. 11. 12.	31 7543/2 c.silt floc-like sharp book + to bioturb??
~		7.57 4 ( sift biotach. foram bearing
Ì	P	with biotub. c. silt floc-like layers.
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		÷
j	<u>-</u>	
		6_ X:
	and the second	1.574/1 Silt piotant. foran bearing.
-	•	1.554/1 Sift pro1
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-	<u>*</u>	-100
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#### KR16-E06 PC03 500/6





## KK 16-E06 PL03 W

25 /	2.574/2 sit foram bearing
	2. > 1/2 S. 11 foram beauty
	lightaning.
	11301201. 8
	2.575/1 cole. silt from loaving bioturb.
12	2.57 4/2 calc. sitt foram bearing biotumb.
21 -	2.51 7/2 East. Sin ( " 0
	1 ,,
	lightening
	" Come birtub
2 0	2.575/1 calc. sit foram bearing birtub
,	575/2 silty clay-silt massive sharp base biotury top
	~ US
	7.575/ sitty clay massive sharp boosed top
7	- ts.5 2.574/2 cale sift form bearing. biotus.
1- 1-	
o " w	1 lightening
- 0	- 69.7 2.575/2 cade. Still foram bearing biotumb.
	-69.7 2.575/2 case. SIN form
	liner 70 cm
-	
4	

0-69.7

## KR16-E06 PC04 Sec. 200 16

FOAM	
FOAM	2 2.545/2 cale sitt from bearing picturb.
epo	
	- 14.5°
_0502 _	-20 575/1 with biotasto foram bearing graded
, CS (47	-20
2.1	and the second
(1)	7.575/2 Vit.5 evosional & sharp base pirtue lop
	7.57 5/2 v.f.5 evosional a sharp bone histurb top.
0	e-forau v.f.s. patch
	7.574/1 silt biotub. foram bearing
4	
	504 (5)
	\$7.5 7.585/2 v.f.s sharp broseditop (pl. foram).
	50.5 1 12 v. 13 sharp broken up (pl. foram).
ور	57.5 0 584 - 17 +6 14 - 1 +6 de de la 10 - 10 - 10 - 10 - 10 - 10 - 10 - 10
1000	59.5 1.574, c. sitt Hoc-like velatively sharp have gradual top
1000	62
_asests	64.5 7.57711 c. s. 17 floc. like relatively sharp base gnadual top
	c.silt patch ( ) graded?
	62 66.5 9.544/1 c. silt floc-like relatively charp have gradual top c. silt patch (pl. forms) graded?
	7.574/1 sitt biotub. foram bearing
-	80.5 7.584/1 v.f.s-c.silt gradual base a top
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	- 0/ .
	- 86. s-
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T 11 floc-like course	e appregater? e.sitt-v.f.s.siged burrow wall?
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395 We like bur	I'm or wall or bisturballow layer
26 perel	the like volit in down base southed too
	floe-like velatively shap base gradual top
c. silt biotombated	Juyan Zumthick (of foram)
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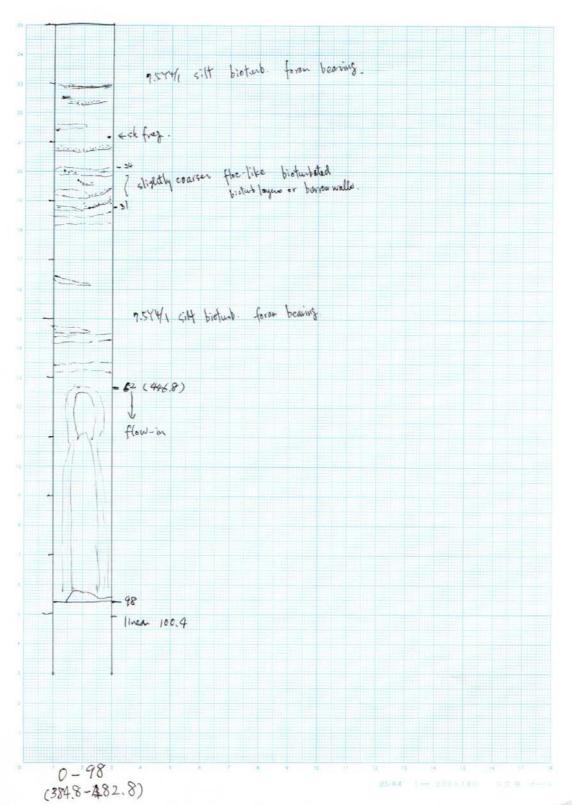
#### KR16-E06 PC04 sec. 400/6

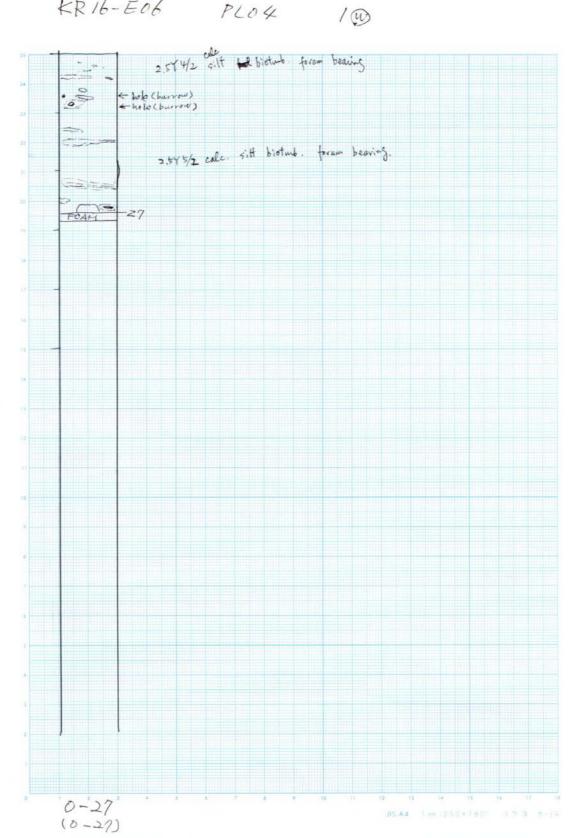
	the state of the state of the state of
4	-14.2 7.574/ c.s.H Hot-like biotmboted layer or burrow wall.
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	7574/1 sitt biotoub. foram bearing
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### KR16-E06 PC04 sec. 5 @/6

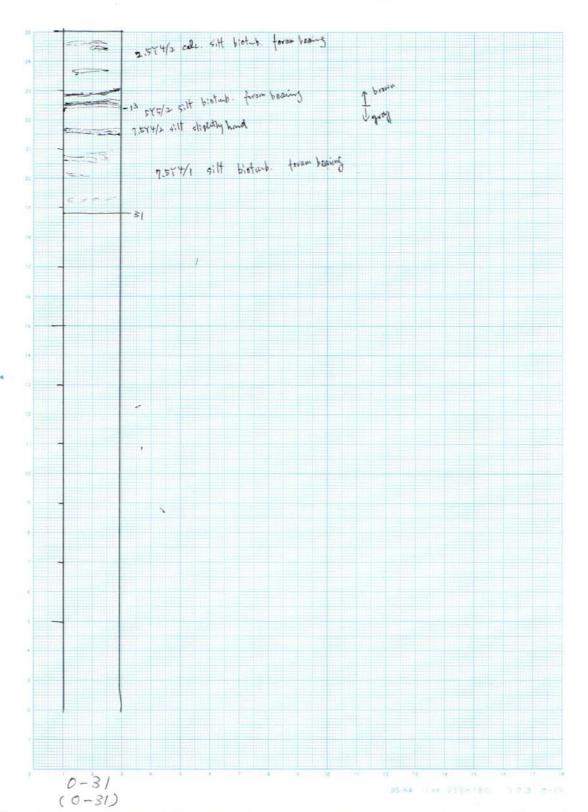
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100	7.474/1 c. sitt Hos-Idea bioturb layer or burrow wall
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	7.574/1 sitt biotouts. from bearing
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	7.574/1 silt biotumb. foram bearing.
	- chipully coarses burrow fill
STEPTISE 6	- chip of course for
200000000000000000000000000000000000000	t . oth coarser? Hocalike? bioturbated
	t slightly coarser? Hoc-like? bioturbated
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0-99.7	4 5 6 7 8 9 10 11 12 13 14 13 16 17

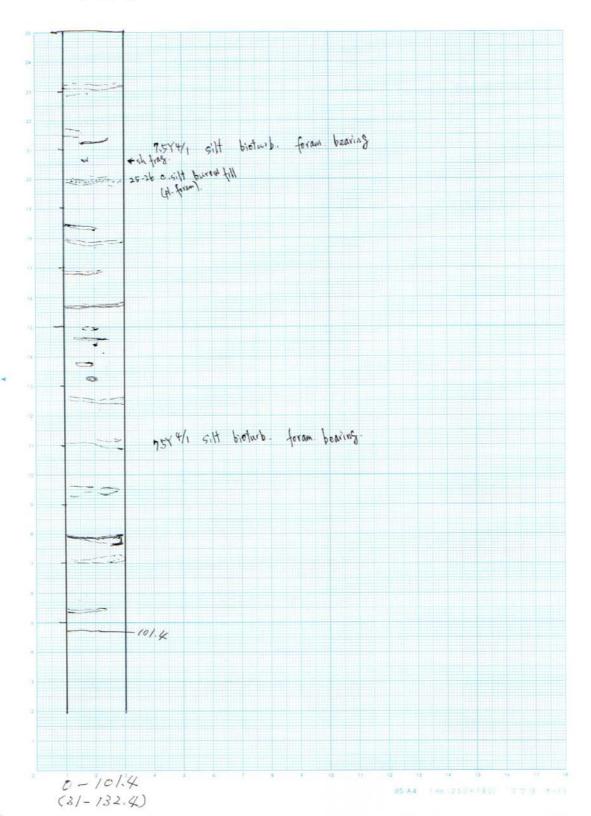
#### KR16-E06 PC04 sec. 6@/6

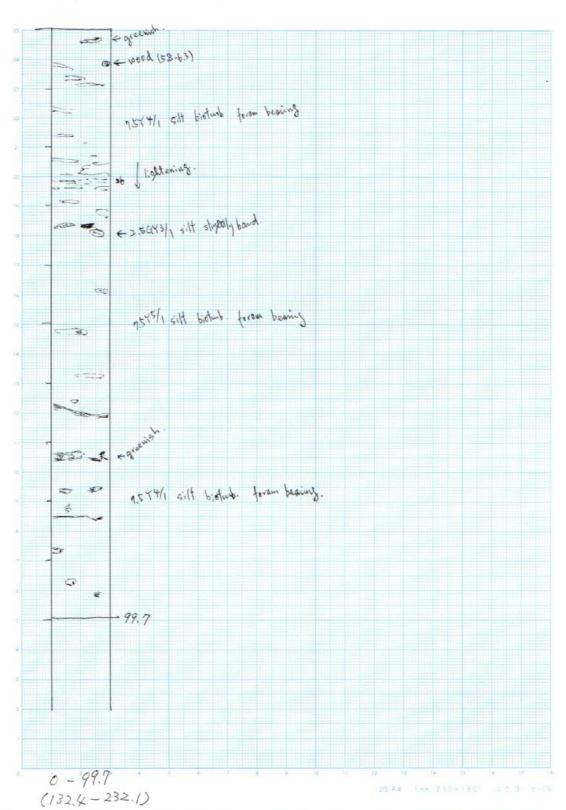




KR16-E06 PC05 sec. 100/6

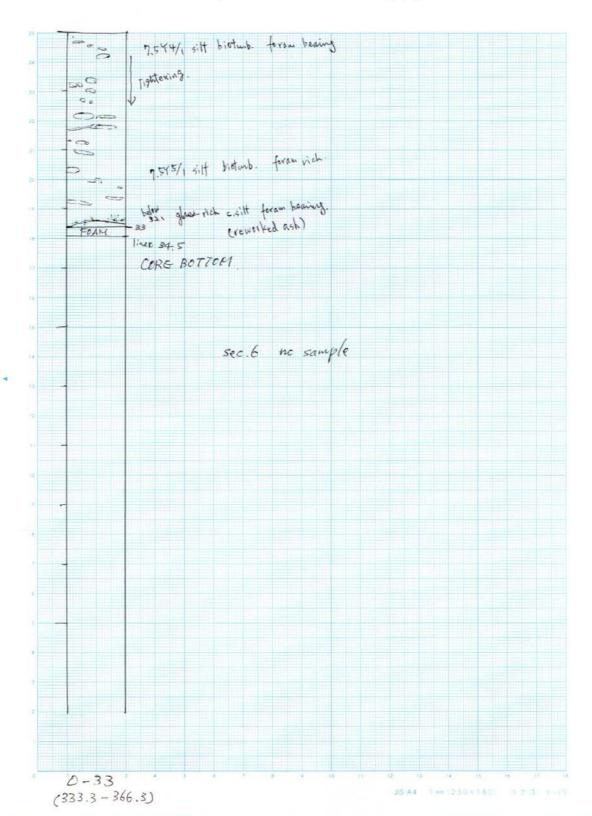






## KR16-E06 PC05 sec. 400/6

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	7.544/1 sitt biotub. foram bearing	
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	7.575/1 silt biotumb. forum bearing	
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00000	7,57 5/, silt bioturb. foram bearing (	
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		J semiconsolilate
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	2 darkening. 2.574, sitt biotub. foram beauty	
	2 darkening. 2.574/ sitt biotub, foram beauty	semiconsolilate 83-87 hand 1 (consolidate
	2 darkening. 2.574, sitt biotub. foram beauty	semiconsolilate 83-87 hand 1 (consolidate
	set darkening.  7.574/ sitt biotud, foram beauty  885 & greenish & color gap (abrupt change above	semiconsolilate 83-87 hand 1 (consolidate
	2 darkening. 2.574/ sitt biotub, foram beauty	semiconsolilate 83-87 hand 1 (consolidate
	set darkening.  7.574/ sitt biotud, foram beauty  885 & greenish & color gap (abrupt change above	semiconsolilate 83-87 hand 1 (consolidate
80.	at darkening.  7.574/ sitt biotub, foram beauty  est < greenish < color gap (abrupt change above  7.574/ sitt biotub. foram boaring	semiconsolidate 83-87 hand 1 (consolidate
8.	set darkening.  7.574/ sitt biotud, foram beauty  885 & greenish & color gap (abrupt change above	semiconsolidate 83-87 hand 1 (consolidate
80	at darkening.  7.574/ sitt biotub, foram beauty  est < greenish < color gap (abrupt change above  7.574/ sitt biotub. foram boaring	semiconsolidate 83-87 hand 1 (consolidate
	at darkening.  7.574/ sitt biotub, foram beauty  est < greenish < color gap (abrupt change above  7.574/ sitt biotub. foram boaring	semiconsolidate 83-87 hand 1 (consolidate
	at darkening.  7.574/ sitt biotub, foram beauty  est < greenish < color gap (abrupt change above  7.574/ sitt biotub. foram boaring	semiconsolidate 83-87 hand 1 (consolidate
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	at darkening.  7.574/ sitt biotub, foram beauty  est < greenish < color gap (abrupt change above  7.574/ sitt biotub. foram boaring	semiconsolidate 83-87 hand 1 (consolidate
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	at darkening.  7.574/ sitt biotub, foram beauty  est < greenish < color gap (abrupt change above  7.574/ sitt biotub. foram boaring	semiconsolilate 83-87 hand 1 (consolidate
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8.	at darkening.  7.574/ sitt biotub, foram beauty  est < greenish < color gap (abrupt change above  7.574/ sitt biotub. foram boaring	semiconsolidate 83-87 hand 1 (consolidate



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0.1-17.							IS-A4	1 mm		1851	3 2 B

# Winch Tension records during PC operation

Horizontal axis:tension(kn)

Vertical axis: time Annotation: Events

