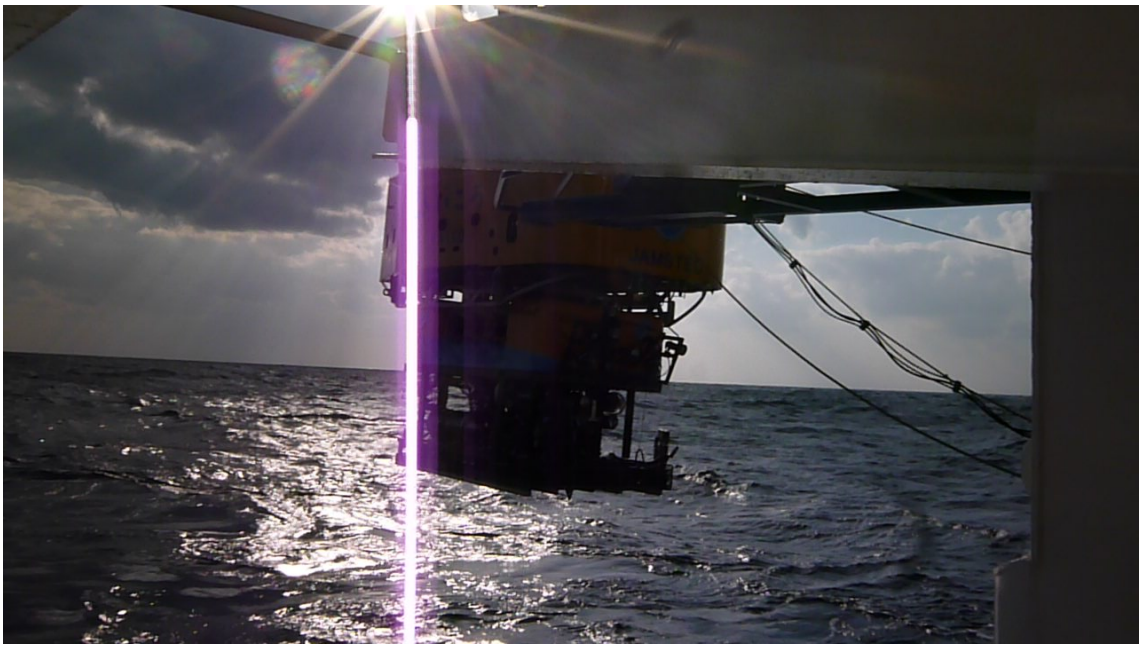
doi : 10.17596/0003040

Preliminary Report on

KR12-17 Cruise in the Nankai Trough off Muroto



Nov. 1 – Nov. 9, 2012

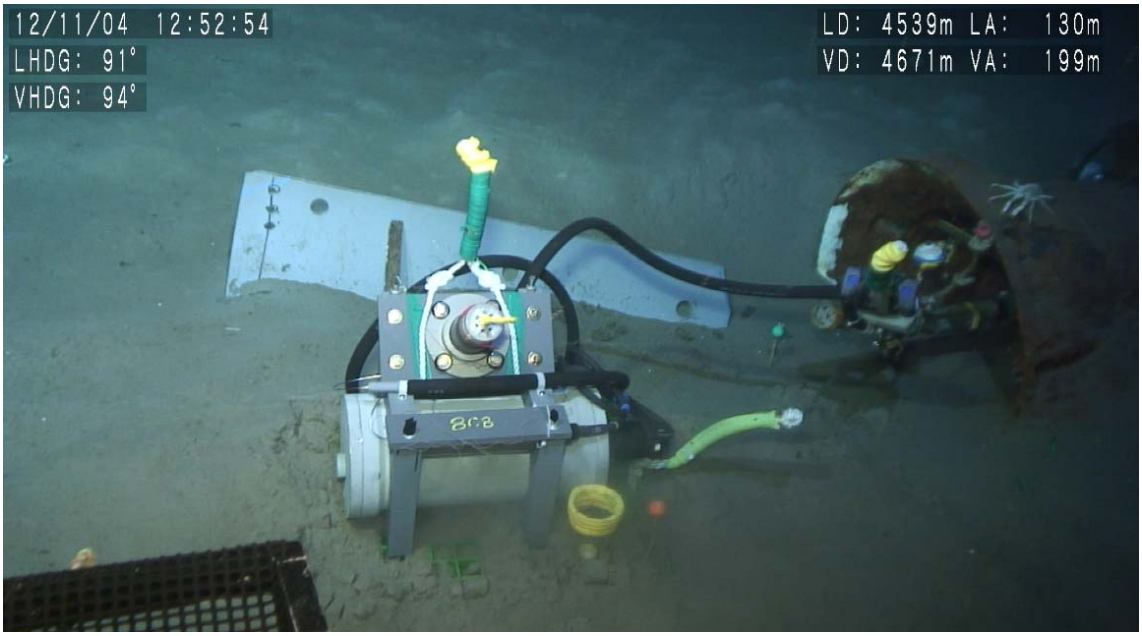
Yokosuka - Muroto - Shingu

Masataka Kinoshita (Kochi Core Center, JAMSTEC) and

KR12-17 Science Party

Acknowledgments

The science party would acknowledge that the KR12-17 cruise involved very challenging operations which were only made possible by the professional skill of the following persons: Captain Masayoshi Ishiwata, Chief Officer Hiroaki Masujima and KAIREI marine crew for overall supports, including ship navigation, KAIKO launching/recovery operation, and ship's life; Chief ROV Operator Atsumori Miura and KAIKO Operation Team for KAIKO operation, including installation of new dataloggers at 1173B and 808I, JAMSTEC Marine Operation Department for cruise logistics, and Satomi MInamizawa with Nippon Marine Enterprises, LTD. for the technical support. This survey was financially supported by JAMSTEC under its 'open-call survey proposal and peer-review' system. Funding for this study was supported by the Grant-in-Aid for Scientific Research on Innovative Areas (21107006), the US National Science Foundation and Geological Survey of Canada.



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Abstract

Five dives were completed using ROV '*KAIKO*' onboard R/V *KAIREI* during the KR12-17 cruise (Nov. 1-9, 2012), in order to retrieve the pressure data from ACORKs at ODP Holes 808I and 1173B deployed in the Nankai Trough off Muroto. The operations have been conducted almost every year, and we now have 11+ years of continuous pore pressure data since June 2001, across the toe of Nankai Trough off cape Muroto since. All the pressure data from multiple depths show continuous modulation with tidal signals throughout the period.

Two dives were dedicated at Hole 808I. Besides data retrieval, a new data logger system with two pressure transducers was deployed to monitor the pressure inside the ACORK casing, through the valve attached to the bridge plug at the ACORK head. A slight overpressure was observed immediately after the hydraulic connector mated the valve.

At 1173B, we spent three dives. First, we deployed a new module with a 20-m extension cable/connector and an external battery. The extension was intended to avoid connecting the ROV connector at the ACORK, which is not safe enough with the capability of KAIKO manipulators. During the second dive we used this new module on the seafloor for data retrieval, but there was no response. Thus we decided to revisit, during the third dive, to download the data directly from ACORK and to recover this failed module. Data was successfully retrieved, and we found that one of the sockets on the female ROV connector attached to this module did not have a contact. Thus we gave up deploying this module at 1173B.

1. Introduction

Two Advanced CORKs (ACORKs) were installed in the frontal thrust and on the trough floor of the Nankai Trough off Muroto during the ODP Leg196 in 2001 (Mikada et al., 2002; Figs. 1.1 – 1.3). Since then, data was retrieved basically once per year by ROV KAIKO or HOV Shinkai 6500 (both from JAMSTEC). The downhole pressure data have been continuously recorded since the installation of ACORK in 2001 at Hole 808I (frontal thrust site) and at Hole 1173B (trough floor).

Davis et al. (2006) reported a transient pressure increase in July-2003, and interpreted that it was caused by a series of very-low-frequency events in the accretionary prism.

Because of incomplete installation of ACORK at 808I, its top 40m part could not be inserted in the borehole and was forced to lay down on the seafloor. As such, the bridge plug which should isolate the lowermost section in the decollement could not be installed during the drilling operation, so that S1 pressure data (pressure at the deepest interval) remain identical with those on the seafloor. Earl Davis built another bridge plug to be inserted horizontally into the ACORK head on the seafloor, and it was attempted to insert during the KR03-05 KAIKO cruise in 2003. However, we have had bad luck of losing (old) KAIKO vehicle and could install the bridge plug during that cruise. Two more cruises in 2004 and 2006 were spent to complete this operation but we could not do it (Table 1.1).

In 2007, we set a bridge plug (inflatable packer) into the mouth of ACORK head at ODP Hole 808I during the KR07-18 cruise, in order to seal off the lowermost pressure port in the decollement. The result, however, was not satisfactory. From the data recovered during KR08-13 cruise in 2008, we found no change in the lowermost pressure after the packer deployment. We then removed the bridge plug and replaced with a new, swellable packer into the casing. We expected to recover data in 2009, but the KR09-12 cruise was not successful for retrieving any data because of typhoon evacuation, etc.

In 2011, we were finally able to revisit both sites during the KR11-12 cruise, and we closed the valve that is attached to the bridge plug. This should finally isolate the décollement zone and we can now find the insitu pressure there.

The objectives of this cruise (KR12-17) are to retrieve data from both ACORK sites and to see the pressure condition including the decolement zone at 808I, and to install a new pressure data logger for monitoring the pressure at the bridge plug of 808I. This document reports preliminary results of the cruise KR12-17.

Table 1.1 List of research cruises related to Nankai ACORK

Cruise	Period	Chief Sci.	Platform	Mission & achievements
ODP Leg196	2001	Mikada/Becker	JOIDES Resolution	ACORK Installation
KR02-10	2002	Mikada	Kairei/KAIKO	Data download
KR03-05	2003	Mikada	Kairei/KAIKO	Data download & Deploy BP
YK04-05	2004	Kinoshita	Shinkai 6500	Data download / BP set not completed / recover BP
KR06-10	2006	Kinoshita	KAIKO 7000II	Data download / BP not launched
KR07-18	2007/12/ 16-26	Kinoshita	KAIKO 7000II	Data download / Remove mud / set BP
KR08-13	2008/10/ 5-14	Kinoshita	KAIKO 7000II	Data download / Remove BP / Set swellable packer
KR09-12		Kasaya	KAIKO 7000II	Observe shimmering from 808 hydraulic port
KR11-12	2011/12/ 20-25	Kinoshita	KAIKO 7000II	Data download / fluid sampling from 808 / SSS/SBP across the frontal thrust
KR12-17	2012/11/ 1-9	Kinoshita	KAIKO 7000II	Data download / Install new data logger (808) and extension with new battery (1173)

Note: 'BP' stands for the bridge plug.

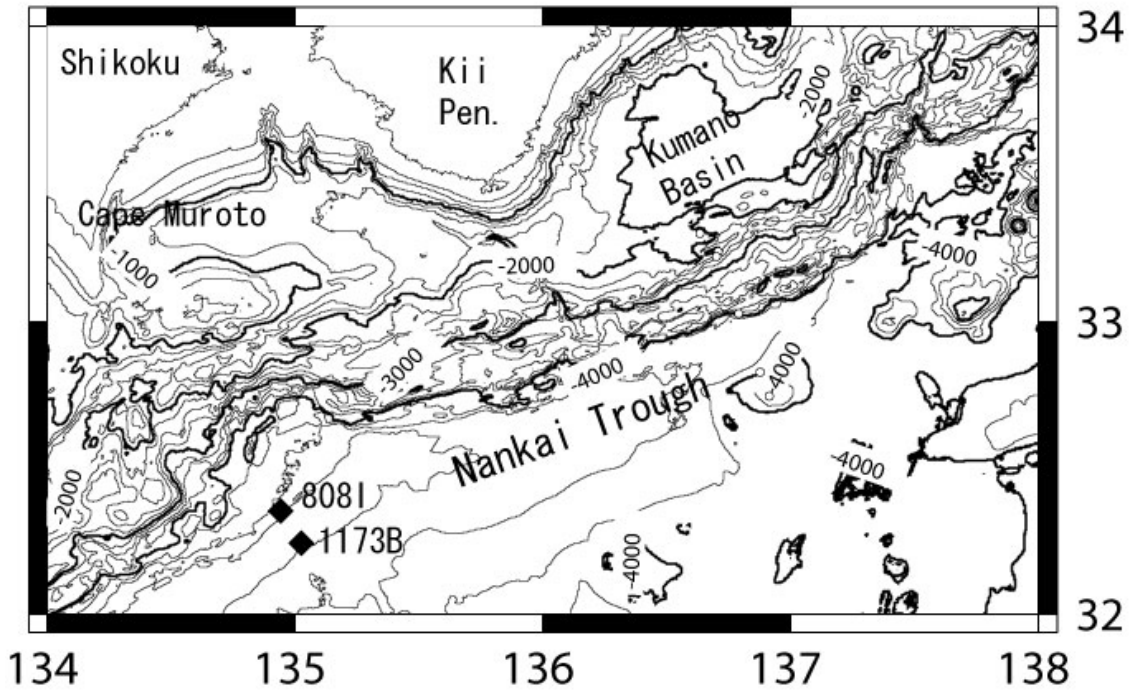


Fig. 1.1 Index map showing the dive locations (808I and 1173B) .

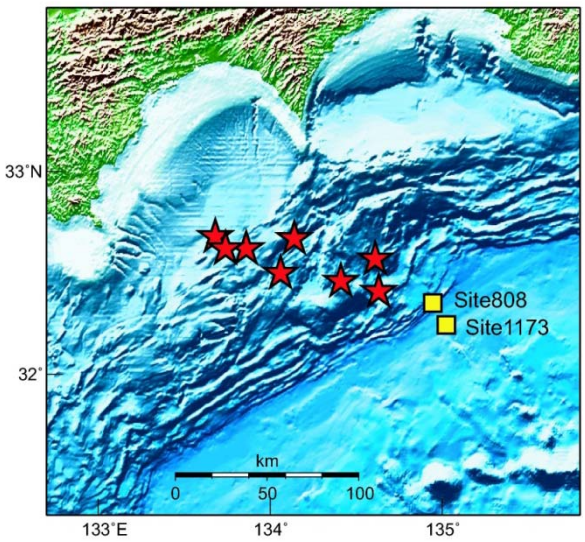
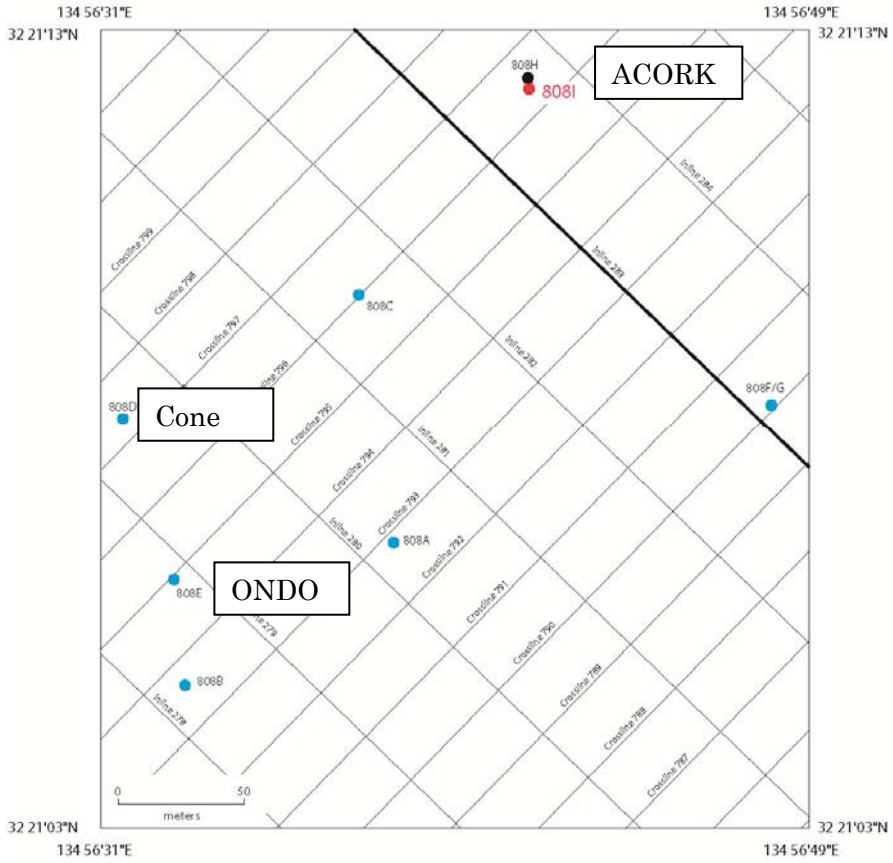


Fig. 1.2 Location of ACORK sites 808 and 1173. Stars indicates spicenter of very low frequency events in 2003 (Ito and Obara, 2006).



Precise location of Hole 808I (ODP Leg196).

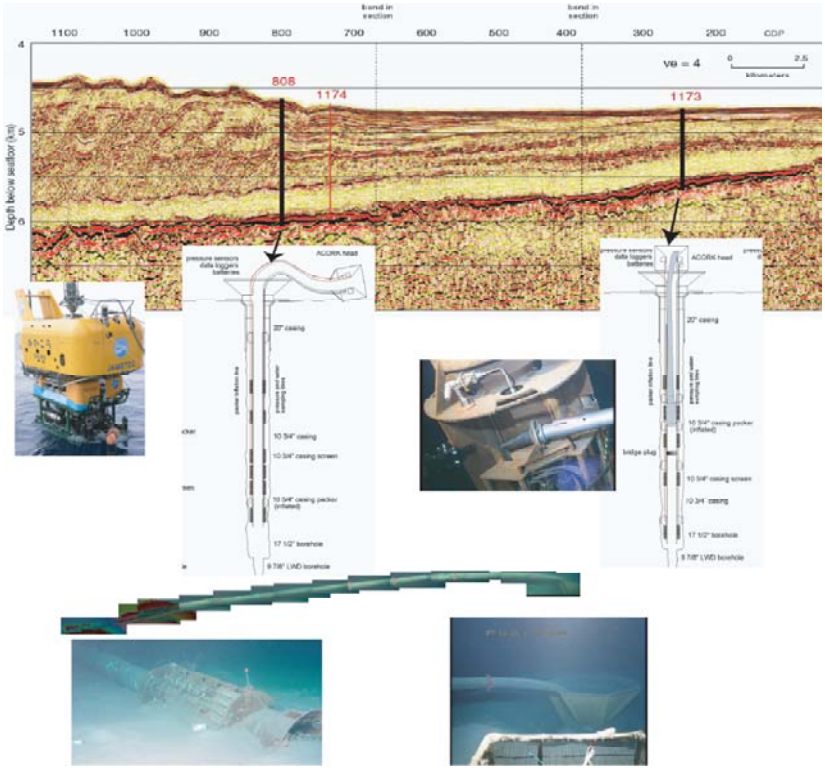
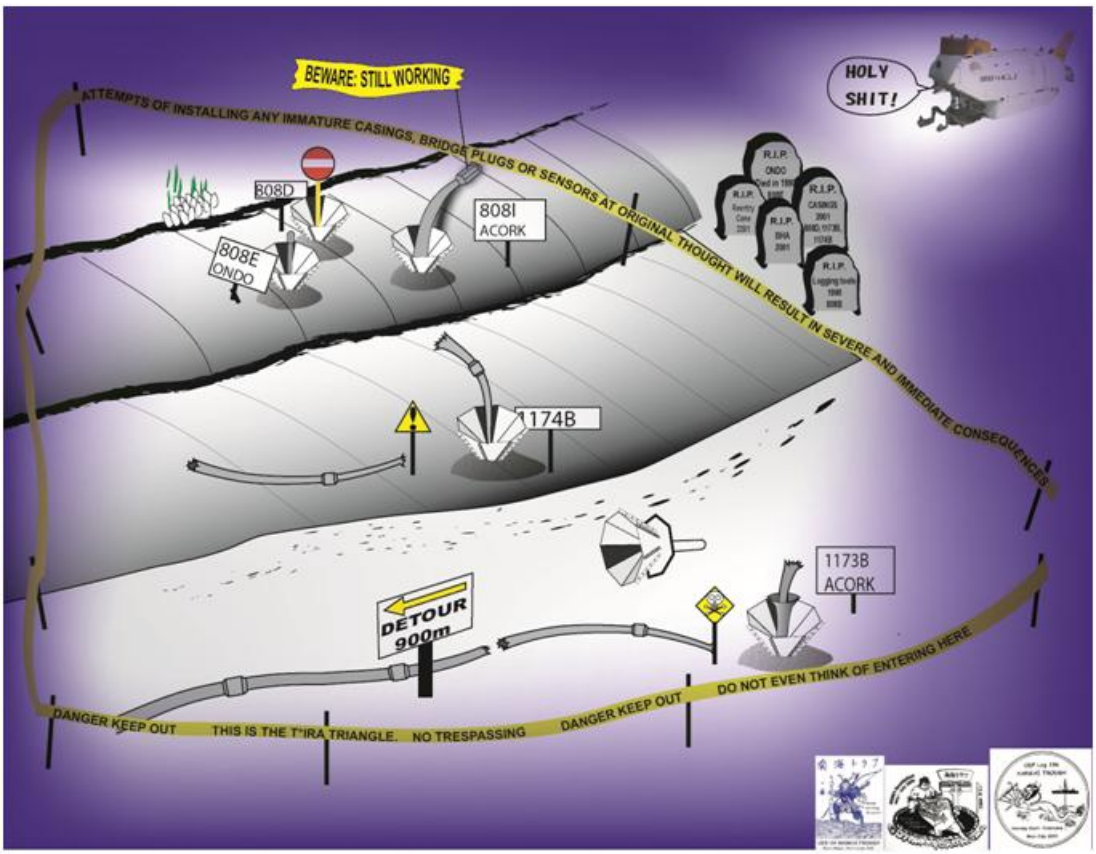


Fig. 1.3 Location, schematic diagram and photos of ACORK at 808 and 1173.



Schematic overview of existing structures around ACORKs.

History of ACORK head at 808I

2003 (KR03-05)

2006 (KR06-10)

2006 (KR06-10)

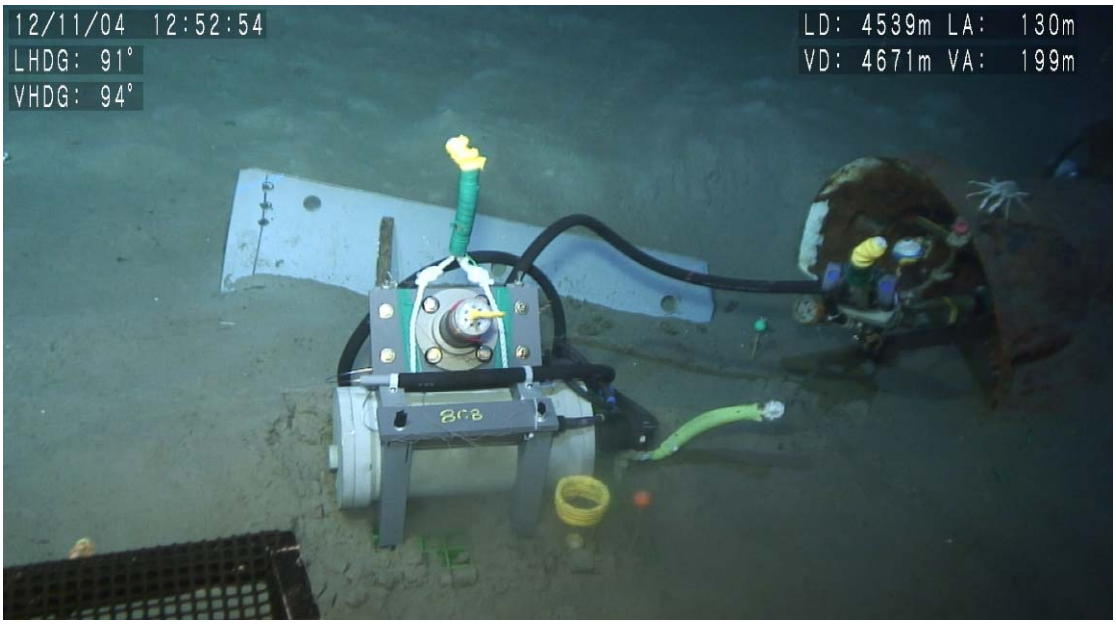
2007(KR07-18)

2007(KR07-18) after removing the mud

2007 First bridge plug installed

2008(KR08-13) Second bridge plug set

2011(KR11-12) Fluid sampling



2012(KR12-17) New data logger

KR12-17 Cruise Information

● Cruise ID KR12-17

● Name of vessel KAIREI

● Title of the cruise Hydrological study through ACORK in the Nankai Trough

● Chief scientist [Affiliation] Masataka Kinoshita [JAMSTEC]

● Representative of the Science Party [Affiliation] Masataka Kinoshita [JAMSTEC]

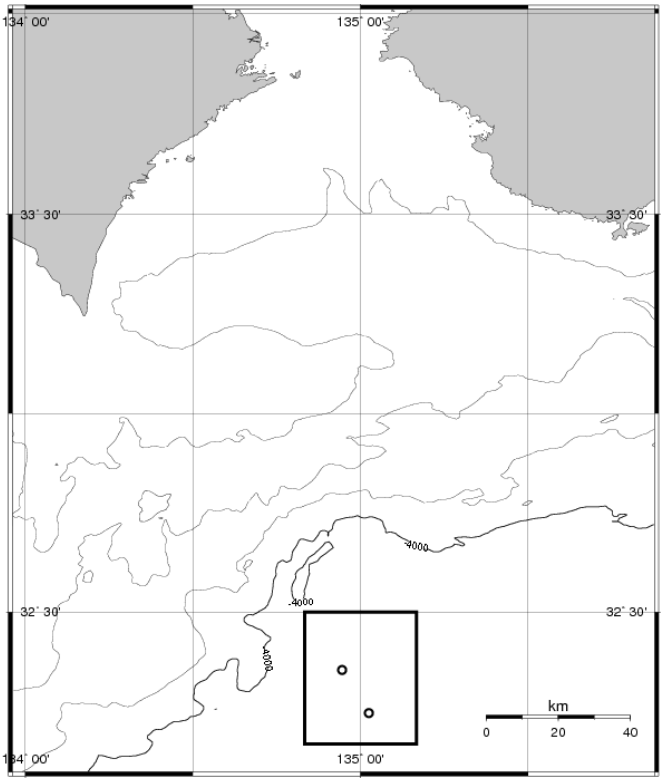
○ Title of proposal Understanding degree of plate coupling at the toe of Nankai Trough theough long-term borehole pressure monitoring

● Cruise period Nov. 1-9, 2012

● Ports of call Yokosuka - Shingu

● Research area Nankai Trough

○ Research map



KR12-17 Shipboard Log
(01. Nov, 2012 - 09. NOV, 2012)

Bayonnaise caldron

日付 Date	時間 Local Time	内容 Note	特記事項 Description	本船位置／気象／海象 Position/Weather/Wind/Sea
01-Nov-12		**Sail out, proceeding to research area**		11/01 12:00 (UTC+9h)
	09:00	boarded		35-01.0'N,139-34.0'E
	10:00	let go all shore line, left YOKOSUKA	for Nankai- Trough	South off Jogasaki
	11:00-11:15	carried out onboard education & training for scientists		Fine but cloudy
	13:00-13:30	meeting for KAIKO 7000II operation		SSW-5 (Fresh breeze)
	18:00	commenced drifting off OMAEZAKI		3 (Sea slight)
				1 (Low swell short)
				Visibly: 8'
02-Nov-12		**Proceeding to research area**		11/02 12:00 (UTC+9h)
	06:00	proceeding to off MUROTO		34-12.3'N,137-06.0'E
				East off Daiohsaki
				Fine but cloudy
				NW-6(Strong breeze)
				4 (Sea moderate)
				4 (Moderate average)
				Visibly: 8'
03-Nov-12		**Proceeding to research area**		11/03 12:00 (UTC+9h)
	05:30	arrived at Muroto-ko		33-02.4'N,133-57.0'E
	07:00	disembarked 1 scientist, then embarked 1 scientist by traffic boat		Off Shikoku
	08:15-08:30	carried out onboard education & training for scientist		Fine but cloudy
				NW-4 (Moderate breeze)
	M.N.	proceeding to dive point	for 808I site	3 (Sea slight)
				2 (Low swell long)
				Visibly: 8'
04-Nov-12		**Dive#582 @ 808I site**		11/04 12:00 (UTC+9h)
	05:50	arrived at dive point		32-21.3'N,134-56.6'E
	05:57	released XBT @ 32-21.2554'N, 134-56.9674'E		Off Kii-suido
	08:29	hoisted up KAIKO 7000II		Fine but cloudy
	08:34	launched KAIKO 7000II, and started 7K#582 dive operation	Dive#582	NNE-4 (Moderate breeze)
	11:18	landed at sea bottom	Depth = 4672m	3 (Sea slight)
	13:40	left bottom	Depth = 4671m	2 (Low swell long)
	15:56	hoisted up KAIKO 7000II		Visibly: 8'
	16:04	recovered KAIKO 7000II		
	16:35-17:05	carried out MBES mapping survey		
	18:50	proceeded to research area	for 1173B site	
	20:21	arrived at research area		
05-Nov-12		**Dive#583 @ 1173B site**		11/05 12:00 (UTC+9h)
	08:23	hoisted up KAIKO 7000II		32-14.6N,135-01.4E
	08:29	launched KAIKO 7000II, and started 7K#583 dive operation	Dive#583	Off Kii-suido
	10:53	landed at sea bottom	Depth = 4789m	Overcast
	13:04	left bottom	Depth = 4789m	SE-5 (Fresh breeze)
	15:29	hoisted up KAIKO 7000II		3 (Sea slight)
	15:36	recovered KAIKO 7000II		3 (Moderate short)
				Visibly: 8'
06-Nov-12		**Dive#584 @ 1173B site**		11/06 12:00 (UTC+9h)
	08:21	hoisted up KAIKO 7000II		32-14.7'N,135-01.4'E
	08:26	launched KAIKO 7000II, and started 7K#584 dive operation	Dive#584	Off Kii-suido
	11:14	landed at sea bottom	Depth = 4789m	Cloudy
	13:40	left bottom	Depth = 4789m	NW-6 (Strong breeze)
	16:05	hoisted up KAIKO 7000II		4 (Sea moderate)
	16:14	recovered KAIKO 7000II		3 (Moderate short)
				Visibly: 8'
07-Nov-12		**Dive#585 @ 1173B site**		11/07 12:00 (UTC+9h)
	08:27	hoisted up KAIKO 7000II		32-14.7'N,135-01.4'E
	08:32	launched KAIKO 7000II, and started 7K#585 dive operation	Dive#585	Off Kii-suido
	11:03	landed at sea bottom	Depth = 4789m	Fine but cloudy
	13:08	left bottom	Depth = 4789m	NW-5 (Fresh breeze)
	15:24	hoisted up KAIKO 7000II		4 (Sea moderate)
	15:32	recovered KAIKO 7000II		3 (Moderate short)
				Visibly: 8'
08-Nov-12		**Dive#586**		11/08 12:00 (UTC+9h)
	08:28	hoisted up KAIKO 7000II		32-21.2'N, 134-56.7'E
	08:33	launched KAIKO 7000II, and started 7K#586 dive operation	Dive#586	Off Kii-suido
	12:02	landed at sea bottom	Depth = 4672m	Fine but cloudy
	13:54	left bottom	Depth = 4672m	East-4 (Moderate breeze)
	16:08	hoisted up KAIKO 7000II		3 (Sea slight)
	16:15	recovered KAIKO 7000II		2 (Low swell long)
				Visibly: 8'
09-Nov-12		**Arrived at SINGU**		
	09:00	arrived at SINGU-ko		
	10:00	disembarked from KAIREI		
		finished KR12-17 cruise		

Participants List (KR12-17)

Scientists

Masa Kinoshita	Kochi Core Center, JAMSTEC
Hidenori Kumagai	IFREE, JAMSTEC
Keir Becker	RSMAS, University of Miami

Marine Technician

Satomi MINAMIZAWA	Nippon Marine Enterprises, LTD.

ROV KAIKO 7000II operation team

Operation Manager	ATSUMORI MIURA
2nd ROV Operator	KIYOSHI TAKISHITA
2nd ROV Operator	TOMOE KONDO
2nd ROV Operator	TETSUYA ISHITSUKA
2nd ROV Operator	SEIJI SHIGETAKE
3rd ROV Operator	RYU ASAI
3rd ROV Operator	SHOTA IHARA
3rd ROV Operator	GOTO TAKUMA

R/V KAIREI Officers and Crew

Captain	MASAYOSHI ISHIWATA
Chief Officer	HIROAKI MASUJIMA
2nd Officer	ISAO MAEDA
3rd Officer	HIDEHIKO KONNO
Chief Engineer	TADASHI ABE
1st Engineer	KAZUNORI NOGUCHI
2nd Engineer	RYUZO MIKAMI
3rd Engineer	YOSHIHIRO OTSUGA
Chief Electronics Operator	TOKINORI NASU
2nd Electronics Operator	SHUNSUKE FUKAGAWA
Boat Swain	TADAHIKO TOGUCHI
Able Seaman	TAKAO KUBOTA
Able Seaman	YOSHIAKI MATSUO
Able Seaman	SAIKAN HIRAI
Sailor	HIROTAKA SHIGETA

Sailor	YOSHIHIRO OGAWA
Sailor	YASUNOBU KAWABE
No.1 Oiler	KAZUAKI NAKAI
Oiler	SHINYA SUGI
Oiler	MASANORI UEDA
Assistant Oiler	DAIKI IGARASHI
Assistant Oiler	AOI TAKAMIYA
Chief Steward	ISAO MATSUMOTO
Steward	HIDEO FUKUMURA
Steward	KAZUHIRO HIRAYAMA
Steward	NAKAMICHI KANDA
Steward	MANAMI TAKAHASHI

2. Explanatory Note

2-1. R.V KAIREI

全　　長	:	104.9m
幅	:	16.0m
喫　　水	:	4.5m
総トン数	:	4,628 トン
速　　力	:	16.7 ノット
航続距離	:	約 9,600 海里（約 17,800km）
主推進機関	:	ディーゼル機関 2 基×2,206kW×600rpm
推進システム	:	可変ピッチプロペラ 2 軸　バウスラスタ
乗 組 員	:	60 名 (乗組員 29 名・研究者等 31 名)
建 造 年	:	1997 年
建造造船所	:	川崎重工業(株)坂出工場
運航会社	:	日本海洋事業(株)

2-2. ROV KAIKO 7000II

「かいこう7000Ⅱ」の主要項目

方　　式	:	有索中継機方式、遠隔操作自航（ランチャー方式）	
最大潜航深度	:	7000m	
		ランチャー	**ビークル**
長　　さ	:	5.2m	2.8m
幅	:	2.6m	2.5m
高　　さ	:	3.2m	2.0m
空中重量	:	5.8 トン	2.9 トン
水中重量	:	3.8 トン	0 トン

2.3. ACORK

Two Advanced CORKs (ACORKs) were installed during Leg 196 to provide long-term in-situ pressure records in the Nankai Trough. The ACORKs were an important advance over the simple CORK hydrogeological observatories successfully installed in many other ODP locations since 1991 (Figure 1). Objectives of these long-term installations range from assessing background state of formation fluids to detecting deformation-induced transients to constraining elastic and hydrologic properties of the subsurface from tidal loading signals.

The original CORKs have a single seal at the seafloor and therefore integrate hydrogeologic signals over the entire drilled interval beneath the seal, whereas the ACORK has multiple seals and monitoring intervals in a single borehole to allow pressure measurements at isolated stratigraphic intervals. Prior CORK results and the ACORK concept are described in more detail in a workshop report (Becker and Davis, 1998) and in several summary articles (e.g., Becker and Davis, 2000; Davis and Becker, 2001; Becker and Davis, 2005).

Table 1 shows the ACORK channel assignment. On both sites, SF stands for seafloor pressure, S1 the deepest interval, and S5 (S6) the shallowest interval. Table 2 shows the history of data retrieval since 2002.

ACORK at Hole 808I

The ACORK at Site 808 has two packers and six screens and was intended to penetrate the decollement. Due to poor drilling conditions and failure of the underreamer, actual penetration concluded ~36 meters short of the goal of 964 mbsf. The ACORK head therefore extended 42 meters above the seafloor, and the casing string could not support its own weight. Upon removal of the drill string, the ACORK slowly tipped within seconds. Careful video inspection showed the casing to be bent but not broken. Fortuitously, the ACORK head tipped in the best possible direction—the ACORK rests on its side with logger bay and sample ports facing upward.

Principal observation zones at Site 808 include the Lower Shikoku Basin formation at several depths above the decollement, the overlying Upper Shikoku Basin formation, and the Outer Marginal Trench-Wedge facies near the frontal thrust (Figure 2).

ACORK at Hole 1173B

The ACORK at ODP Site 1173B has four packers and five screened monitoring intervals. It was successfully installed to 728 meters below seafloor (mbsf). A bridge plug was installed to isolate the deepest screen from pressure at the seafloor via the open casing. During deployment, the bridge plug set prematurely at approximately 466 mbsf. The rig floor did not sense the bridge plug setting, and the drill pipe broke off at the ACORK head. A video inspection at the end of Leg 196 confirmed that the drill pipe broke off precisely at the ACORK head and that the ACORK head suffered no damage, and data show that the bridge plug seated properly. Unfortunately, the broken drill pipe prevented installation of a thermistor cable supplied by JAMSTEC.

Principle observation zones at Site 1173 include oceanic basement below 731 mbsf, the Lower Shikoku Basin formation below the stratigraphic projection of the decollement, and the stratigraphic projection of the decollement within the upper section of the Lower Shikoku Basin formation (Figure 2).

The ACORK head is a 30" diameter cylindrical frame fabricated from 3/8" steel around a section of 11-3/4" casing. In three separate bays, the ACORK head houses: 1) the sensor/logger/underwater-mateable connector assembly, 2) the spool valves and sampling valves and ports, and 3) the three-way pressure sensor valves and geochemical sampling valve and port (Becker and Davis, 2005). At the top of the ACORK head is a 30" reentry cone for drill-bit, sub-casing, or wireline tool delivery systems.

References:

Becker, K. and Davis, E.E., 2000, Plugging the Seafloor with CORKs, Oceanus, 42, 14-16.

Becker, K., and E.E. Davis, A review of CORK designs and operations during the Ocean Drilling Program, in *Proceedings IODP*, edited by A.T. Fisher, Urabe, T., Klaus, A., and the Expedition 301 Scientists, Integrated Ocean Drilling Program Management International, Inc., College Station, TX, 2005.

Davis, E.E., and K. Becker, Using ODP boreholes for studying sub-seafloor hydrogeology: results from the first decade of CORK observations, Geoscience Canada, 28, 171-178, 2001.

Mikada, H., Becker, K., Moore, J.C., Klaus, A. et al., 2002, Deformation and fluid flow processes: Logging while drilling and Advanced CORK in the Nankai Trough accretionary prism, Proc. ODP, Init. Repts, 196, in press.

Mikada, H., Kinoshita, M., Becker, K., Davis, E., Meldrum, R., et al., Hydrological and geothermal studies around Nankai Trough (KR02-10 Nankai Trough Cruise Report), *JAMSTEC Journal of Deep Sea Research*, *22*, 125-171, 2003.

Table 1. ODP Leg 196 ACORK configurations (Modified from Earl Davis's note)

808I

Screen	1	2	3	4	5	6	Seafloor
Depth	922 mbsf	879	833	787	533	371	
Valve	6	5	4	3	2	1	
Sensor	2	3	4	5	6	7	1
Chennel	S1 (open)	S2	S3	S4	S5	S6	SF
Color		Red	Magenda	Yellow	L.Green	Green	Blue

Hole 1173B

Screen	1	2	3	4	5	Seafloor
Depth	728 mbsf	569	445	402	359	
Valve	1	2	3	4	5	
Sensor	6	5	4	3	2	1
Chennel	S1	S2	S3	S4	S5	SF
Color		Red	Magenda	Yellow	L.Green	Blue

Notes:
- Screens numbered from bottom up
- Sensors are numbered in logging order (as they appear in data files)
- 1/8" o.d. geochemistry line used to connect screen 6 to valve 1 and pressure sensor 7 in Hole 808I
- 1/8" o.d. geochemistry line, devoted to separate valved sampling port, connected to screen 4 in Hole 1173B

'Channel' is the header of each column in the *.ACP file. In some cruises the header in *.ACP were numbered on the reverse order but the data itself was ordered in the same way as others.

```
=====  "*.ACP" file contents ====================================
A-Cork 9736 pressures from 11k808i.raw  6407936  12-21-11  04:15:20

logger pressure gauge numbering:     1        2        3        4        5        6        7
  line  date     time     Vb       SF        S1        S2        S3        S4        S5        S6
     1 08/10/06 03:20:00  0.00  47674.527 47685.680 47769.148 47701.379 47679.309 47679.000 47680.656
     2 08/10/06 03:30:00  0.00  47674.387 47685.707 47769.066 47701.250 47679.199 47678.949 47680.656
     3 08/10/06 03:40:00  0.00  47674.258 47685.707 47769.090 47701.379 47679.398 47679.180 47680.949
================================================================
```

Table 2. History of data retrieval and other operations

808I

Cruise ID	Channel order	Start time	End Time
KR02-10	SF S6 S5 S4 S3 S2 S1	2001/06/18 07:20:00	2002/08/02 01:20:00
A		2002/08/02 02:00:00	2002/08/06 00:50:00
B		2002/08/06 01:10:00	2002/08/06 02:05:20
C		2002/08/06 01:10:00	2002/08/06 03:00:00
KR03-05	SF S6 S5 S4 S3 S2 S1	2002/08/06 03:10:00	2003/05/29 03:40:00
YK04-05	SF S6 S5 S4 S3 S2 S1	2003/05/29 04:10:00	2004/04/30 05:20:00
KR06-10	SF S1 S2 S3 S4 S5 S6	2004/04/30 06:00:00	2006/08/24 03:10:00
KR07-18	SF S6 S5 S4 S3 S2 S1	2006/08/24 04:50:00	2007/12/18 03:20:00
KR08-13	SF S1 S2 S3 S4 S5 S6	2007/12/18 04:20:00	2008/10/06 02:40:00
KR11-12	SF S1 S2 S3 S4 S5 S6	2008/10/06 03:20:00	2011/12/21 03:30:00
KR12-17	SF S1 S2 S3 S4 S5 S6	2011/12/23 02:40:00	2012/11/08 99:99:00

KR02-10	Valve closed
KR07-18	First bridge plug (inflatable packer) set (Dec. 2007)
KR08-13	First bridge plug removed
KR08-13	Second plug (flabber plug) set (valve remainopen)
KR09-12	Fluid venting from the hydraulic port (Sep. 5, 2009)
KR11-12	Valve closed, venting stopped
KR12-17	New logger installed

1173B

Cruise ID	Channel order	Start time	End Time
KR02-10		2001/06/01 08:30:00	2002/08/03 04:20:00
KR02-10P		2002/08/03 04:40:00	2002/08/08 01:20:00
KR02-10Q		2002/08/03 04:40:00	2002/08/08 04:10:00
YK04-05		2002/08/08 04:30:00	2004/04/29 05:20:00
KR06-10	SF S5 S4 S3 S2 S1	2004/04/29 05:50:00	2006/08/22 03:10:00
KR07-18	SF S1 S2 S3 S4 S5	2006/08/22 04:37:00	2007/12/19 03:40:00
KR11-12	SF S1 S2 S3 S4 S5	2007/12/19 04:40:00	2011/12/22 02:50:00
KR12-17	SF S1 S2 S3 S4 S5	2011/12/## 99:99:00	2012/11/07 99:99:99

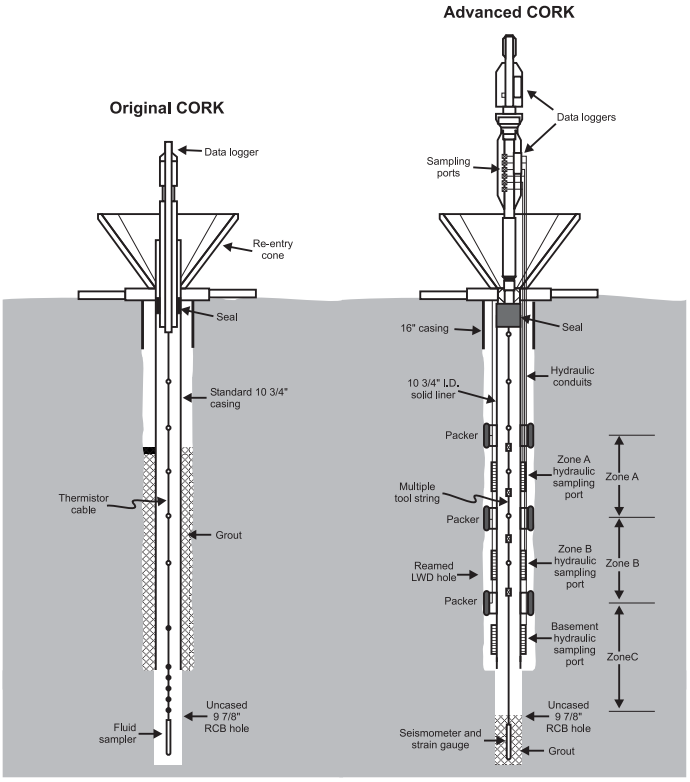


Fig. 1: Schematic diagram of CORK and Advanced CORK borehole observatories. Exchange between permeable subseafloor formations and the ocean is prevented in the CORK by a seal within the inner casing and by multiple packers that isolate individual screens.

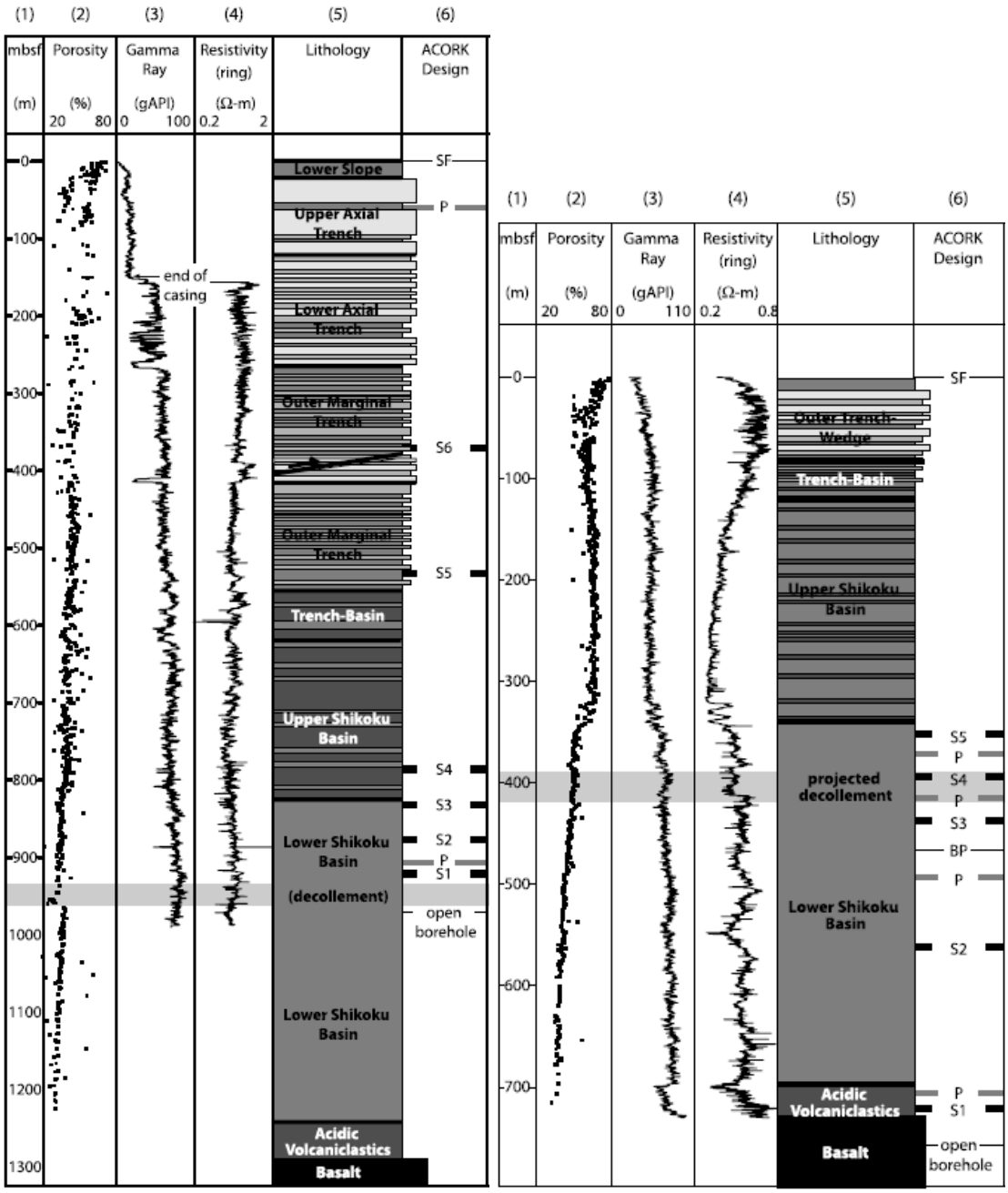


Fig. 2 Location of ACORK sensors at Hole 808I left) and 1173B (right) (Sawyer et al., 2008).

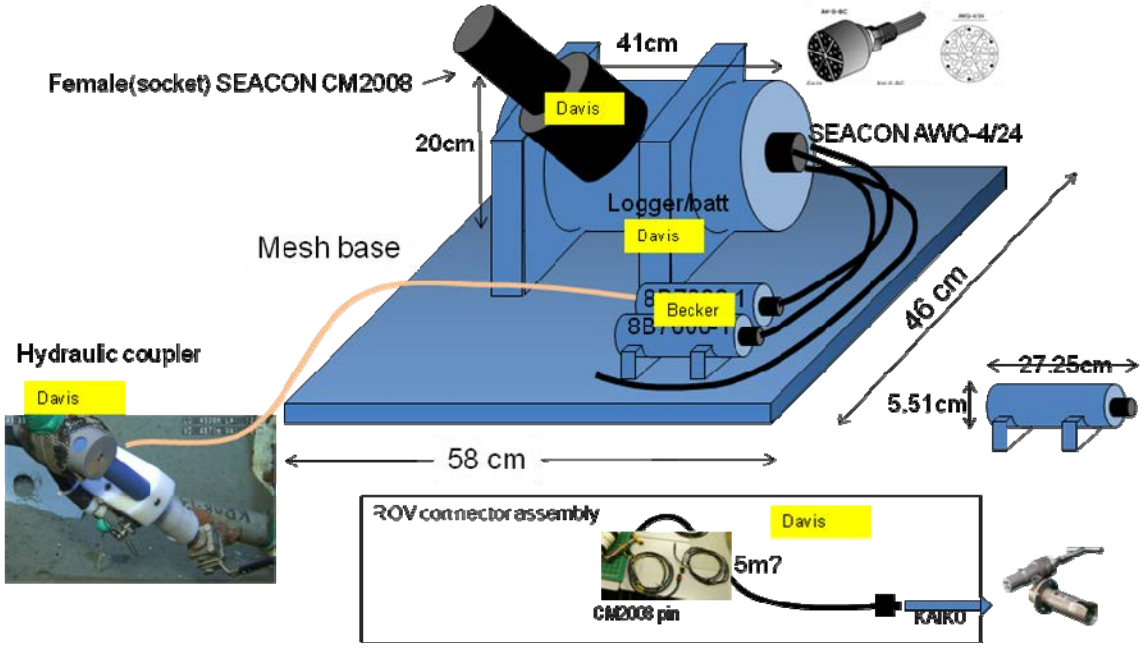
2.4 New ACORK Data Logger and Battery Pack

In addition to downloading data from the original ACORK data loggers at Holes 808I and 1173B, important objectives of KR12-17 included installing a new data logger at Hole 808I and a supplemental battery pack to extend the life of the original logger at Hole 1173B. Both devices were prepared before the cruise by Earl Davis and Bob Meldrum at the Geological Survey of Canada. The following two paragraphs summarize details of the two new units.

New 808I data logger: This unit was designed to be connected hydraulically to the Aeroquip sampling port on the bridge plug that was installed in the ACORK head in 2008. It had been producing fluids from near decollement and was sampled during KR11-17 before the sampling valve was closed for pressure monitoring. The unit includes an original ACORK data logger of the same type as the original ACORKs, so identical communications protocols are followed. It also includes the same SeaCon CM2008 underwater-mateable connector (UMC) as the original CORKs, so the same mating connector can be used on Kaiko for all operations at the sites. The new logger monitors two Paroscientific 8B7000-2 pressure gauges, one for seafloor reference, the other for formation pressures via the bridge plug. The formation pressure signal is transmitted via about 3 m of 1/16" diameter SS316 tubing, protected inside a hydraulic hose, that connects the formation pressure gauge to the Aeroquip hydraulic coupler mounted on a handle suitable for ROV manipulation.

New 1173B battery pack: This unit was designed to be electrically connected to the original ACORK data logger via its original SeaCon CM2008 UMC, and to provide supplemental battery power plus a communications pass-through to the original data logger. It includes 20 m of cable terminated with the CM2008 (male) UMC to connect to the CM2008 (female) UMC on the original data logger. It also includes a second CM2008 (female) UMC for all future communications with the data logger via the instrument package once it is set on the seafloor within 20 m of the ACORK.

Pre-dive preparations: Lithium batteries for both new unit were shipped directly to JAMSTEC and installed in port on 31 October, 2012. During the transit to the dive sites, the hydraulic connector for the new 808 logger was replaced because of minor damage to the original coupler. This required re-attaching the 1/16" tubing to the replacement Aeroquip fitting, after which air was purged from the tubing run to the Paroscientific pressure gauge. Also during the transit, full communications to ACORK data loggers via the Kaiko-7K system and its UMC were verified in two ways: (1) to the new 808 logger by connecting the Kaiko UMC (male) to the mating UMC (female) on the new logger, and (3) to the new 808 logger through the 1173B supplemental battery pack, by connecting (a) the Kaiko UMC (male) to the battery pack UMC (female) and (b) the battery pack UMC (male) to the new logger UMC (female). The latter was important in terms of verifying full RS-232 communications via the combination of the Kaiko system and the 20 m extension cable from the 1173B battery pack to the 1173B original logger.



Concept of the new data logger at 808I.

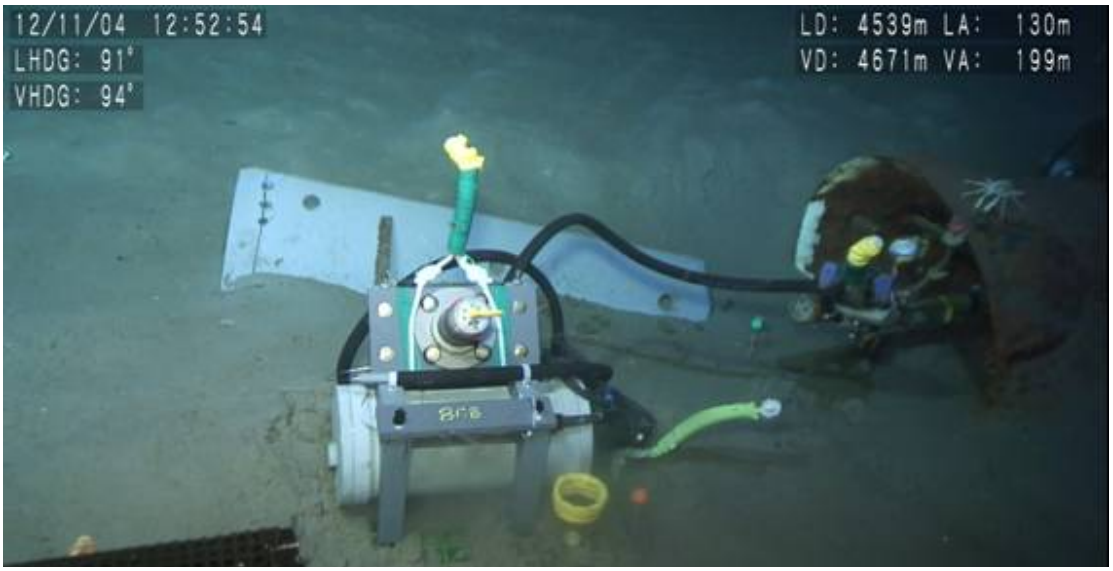
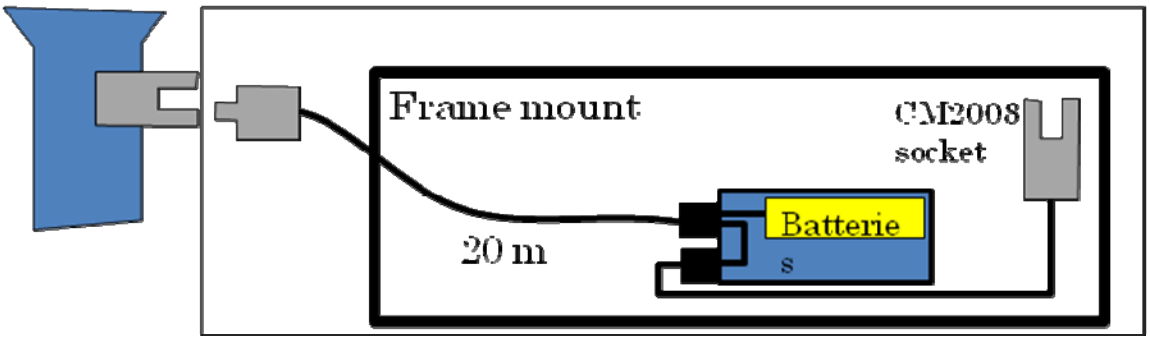


Photo of the new data logger at 808I.



Concept of the extension cable/connector and the external battery pack at 1173.

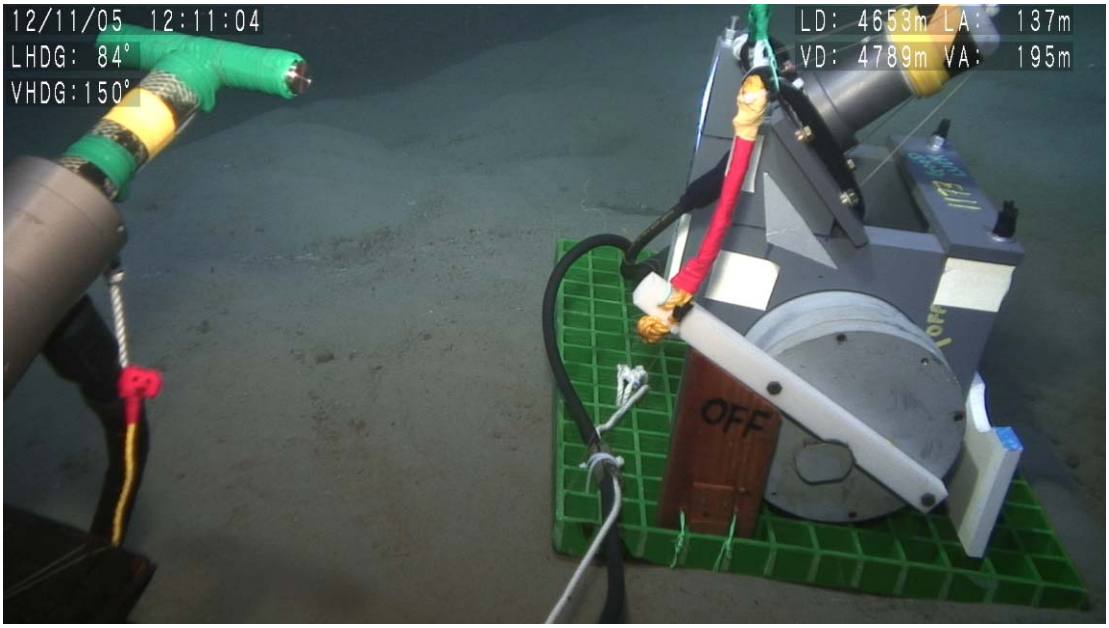


Photo of the module at 1173.

3. Dive Summary

Dive	Date/2012	Site	Operations	
582	Nov. 4	808I	Data retrieval, Set new pressure data logger	
583	Nov. 5	1173B	Set new battery and extension cable	
584	Nov. 6	1173B	Communication through new cable, failed	
585	Nov. 7	1173B	Data retrieval, Recover new battery & extension	
586	Nov. 8	808I	Retrieve data, inspect tangles strings	

(1) Hole808 I 32_21.215'N, 134_56.700'E, water depth=4,675m

(2) Hole1173B 32_14.683'N, 135_01.484'E, water depth=4,791m

Kaiko-7k Dive 582 notes, 04 November, Keir Becker – all times UTC

0153 vehicle at bottom

0213 808I ACORK casing in view

0218 landed at 808I wellhead, mud cloud cleared in ~2 min

0226 prepare to connect UMC

0232 UMC mated, communications established (log file 12K808i.txt)

0235 downloading data

0258 download and reprogramming complete (log file 12K808i2.txt)

0300 UMC unmated

0301 UMC back in holster (dummy UMC female)

0320 trying to mate Aeroquip of new logger to bridge plug valve

0330 coupler seems mated

0333 trying to open valve, but coupler knocked off

0335 valve reclosed, vehicle repositioned

0343 Aeroquip coupler mated

0350 open valve, wait ~15 minutes to download new logger

0406 prepare to connect UMC

0410 UMC connected, log file (12K808BP.txt), data confirmed Aeroquip coupling with ~10 kPa pressure increase at formation gauge starting at 0330 reading

0420 attempt to disconnect UMC but data logger too light, requires port arm to hold down data logger, difficult with 45° angle

0427 UMC disconnected

0437 UMC on holster

0438 dust cover installed

0445 end dive

Dive Log of
KAIKO7000II Dive #582 **Nankai-Trough** **2012/11/04**

Time (JST)	Dep. (m)	Alt. (m)	Head (Deg)	Pos. Xm	Pos. Ym	Description	Remarks
08:34	0	-	-			潜航開始（Dive#582）	
10:40	4544	124	16.8	32-21.22	134-16.7	7K離脱開始(ランチャー深度：4542m）	
10:50	4627	39	46.6				
10:53	4665	3	2.1			海底視認、底質：泥	
11:01						ヒトデ視認	
11:03						魚視認	
11:05	4669	1	63.4				
11:10	4671	1	64.2	32-21.19	134-56.71		
11:11	4671	2	52.8			808I視認	
11:12						横たわる掘削パイプ視認	
						コネクタ付近が泥に埋まっている。パイプ自体も半分以上が堆積物に覆われている。北からの潮流が強い。	
11:18	4672	0	66.4	32-21.22	134-56.75	着底、底質：泥	
11:21						パイプヘッドに白いエビらしき生物を数匹視認	
11:25	4672	0	81.1			キャップ外した	
11:29						コネクタ側へビークル微移動	
11:32	4672	0	82.5			コネクタへアクセス（筒挿入完了）	
						通信作業開始	
11:33						コネクタとの通信確認	
11:37						データ吸い出し開始	
11:51						データ吸い出し完了	
						データ確認（2011/12/23～2012/11/4_02:30[UTC]まで データ吸い出し）	
11:58						通信終了	
12:00	4672	0	84.6			コネクタ抜き取り	
12:02						キャップをコネクタに戻した	
12:05						新型ロガー設置の準備のため、ビークル左に少し移動	
12:09						少し前に移動	
12:12						設置作業開始	
12:13						ピン抜く	
						引き出す	
12:15						持ち上がる	
						置く	
12:17						CWに回す	
						ほぼ正対する いい位置に来た	
12:20						水コネクタを取り外す	
12:22						水コネクタをaeroquipにさすが、外れる	
12:26						右手にもちかえて、水コネクタをaeroquipにさす	
						水コネクタを何度か揺らしてみて、しっかり接続しているこ	
12:33						バルブを開する、半分くらい開けたところでリークを確認	
12:34						水コネクタが外れたため、バルブ閉	
12:38						ビークルをやや南へ移動	
12:42						外れた水コネクタをaeroquipに再度さす	
12:44						水コネクタがaeroquipの奥までなかなか刺さらない	
						これ以上、刺さらないのでにバルブを開けてみる。	
12:50	4671	0	92.5			バルブをゆっくり開け、全開とした。リークは確認されな	
						１０分間データ取得を行い、その後、通信確認を行う。	
13:07						コネクタのカバーを外す	
13:10						コネクタにアクセス（筒挿入完了）	
13:11						コネクタを上から押してしっかり刺した	
13:12						通信作業開始	
13:12						コネクタとの通信確認	
13:17						データ吸い出し完了（繋げた瞬間、10kPaの圧力上昇を確認）。このままもう少し接続しデータの確認を行う。	
13:20						通信確認終了	
13:22						コネクタを抜き取ろうとしたら、ロガー自体が浮き上がった	

13:24						左手で新型ロガーの台座をおさえ、右手で筒を引き抜こうとしたが、抜けない	
13:27						再度トライ	
13:29						コネクタのすぐ下（808と黄文字で記載がある）塩ビ部分に左手、右手で筒を引き抜き成功！！	
13:37						筒をビークルに戻す	
13:38						新型ロガーのコネクタにキャップをかぶせた	
13:40						新型ロガーをわずかに左へ移動させ、微調整。	
13:40						離底、底質：泥	
13:56						7K結合	

かいこう７０００Ⅱ　潜航記録

平成 24　年　　KR12-17　行動　　記載者 井原　章太

潜航年月日 2012 年 11/04

着底予定位置

潜航回数 1 回

通算潜航回数 582 回

緯　度 32° 21.21′ N

経　度 134° 56.70′ E

測地系 WGS-84

潜航海域 南海トラフ　Hole 8081

潜航目的 調査潜航　孔内間隙圧モニタリングによる固着域海側プレート境界の固着度の推定

調査主任 木下 正高　　ﾗﾝﾁｬｰ PILOT 重竹　誠二

所　属 海洋研究開発機構　　PILOT 井原　章太

COPILOT 近藤　友栄

作業経過時刻	
吊揚	08:29
着水	08:34
離脱	10:40
着底	11:18
離底	13:40
結合	13:56
水切	15:56
揚収完了	16:04

累計時間	
潜航時間	7:22
前回潜航	3664:42
通算潜航	3672: 4

ケーブル使用時間	
1次使用時間	7:35
1次前回時間	3807: 2
1次通算時間	3814:37
2次使用時間	3:16
2次前回時間	1784:11
2次通算時間	1787:27

ｹｰﾌﾞﾙ番号別使用時間	
1次番号	2
1次番号別前回時間	2901:37
1次番号別通算時間	2909:12
2次番号	S2
2次番号別前回時間	23:47
2次番号別通算時間	27: 3

海象・気象

天候	風向	風力	波浪	うねり	視程
bc	NNE	4	3	2	8

最大潜航深度 4672 m

着底深度 4672 m　　離底深度 4671 m

着底底質 泥　　離底底質 泥

記事　ACORK8081既存ポートへROVコネクタを接続し、データ収集。その後、新型データロガーをACORK採水口近傍に設置、採水口へ採水管を接続し、通信及び作動確認を実施した。

KAI KO Di ve582
NANKAI - TROUGH

(1 / 5000)

134 56.2E　134 56.4E　134 56.6E　134 56.8E　134 57E　134 57.2E

32 21.4N

32 21.2N

32 21N

HOLE8081
D=4,675m

1. 10:53 D=4666m 海底視認
(32-21.1905N 134-56.6813E)
2. 11:12 D=4668m ACORK視認
(32-21.2092N 134-56.7620E)
3. 11:18 着底 D=4672m
(32-21.2237N 134-56.7773E)
11:24 ACORKﾎﾟｰﾄ接続作業開始
11:32 ﾎﾟｰﾄ接続終了
11:33 ﾃﾞｰﾀ収集開始
11:58 ﾃﾞｰﾀ収集終了
11:58 ﾎﾟｰﾄ取り外し作業開始
12:01 ﾎﾟｰﾄ取り外し作業終了
12:18 新型ﾃﾞｰﾀﾛｶﾞｰ設置
12:22 ｺﾈｸﾀ接続作業(孔口採水口)開始
12:31 ｺﾈｸﾀ接続作業(孔口採水口)終了
12:33 ｺﾈｸﾀ外れ ﾊﾞﾙﾌﾞ閉
12:43 孔口採水口へのｺﾈｸﾀ再接続
12:50 孔口採水口ﾊﾞﾙﾌﾞ開
13:11 ﾃﾞｰﾀ抜き取り開始
13:20 ﾃﾞｰﾀ抜き取り終了
13:38 ｺﾈｸﾀｷｬｯﾌﾟ取付
13:40 離底 D=4671m

KM
0.5
0

XY Origin Lat 32-21.21500N Lon 134-56.70000E
Center Lat 32-21.21500N Lon 134-56.70000E
Grid_File: ae150.grd ContourInt: 5m
Track_File: 121104_KAIKO_No582.xyz

(UR) Lat 32-21.54016N Lon 134-57.25863E
(LL) Lat 32-20.89084N Lon 134-56.14237E
(2012-11-04)

Datum WGS-84 Proj. MER

Kaiko-7k Dive 583 notes, 05 November, Keir Becker – all times UTC

0151 1173B in sight, spool valve side; set down Kaiko to reposition launcher
0204 launcher in position, move Kaiko clockwise to pressure side
0207 at pressure bay, back off to check seafloor for battery pack location
0215 good spot ~10 m back but bad dust cloud (not much current)
0230 spot looks good, dust cloud cleared
0232 Kaiko lift off but new dust cloud obscured 1173B
0237 come up to 15 m altitude, back down to 5 m
0248 set Kaiko down again
0310 set battery pack on seafloor
0315 back off paying out cable
0320 at wellhead
0321 grab wellhead with R arm, then L arm, then release R arm to get UMC
0324 UMC off holster
0328 UMC mated
0330 all cable off basket
0333 at battery pack, excess cable on side opposite UMC
0337 move some cable, reposition battery pack
0340 turning battery on, wood blocking last 10-15°
0352 reposition to use both arms
0354 R arm hold battery pack frame, L arm bend wood away
0356 turn lever fully on
0359 reposition battery pack for level, stable setting
0405 lift off, survey cable, check 1173B UMC still fully attached
0410 end dive

Dive Log of
KAIKO7000II Dive #583 **Nankai-Trough** **2012/11/05**

Time (JST)	Dep. (m)	Alt. (m)	Head (Deg)	Pos. Xm	Pos. Ym	Description	Remarks
08:29	0	-	-			潜航開始(Dive#583)	
10:35	4657	127	87	32-14.70	135-1.46	7K離脱開始(ランチャー深度：4654m)。XYはランチャー位	
10:42	4717	67	354	32-14.71	135-1.45	ビークル下降中。これ以後のXYはビークル位置	
10:48						海底視認、底質：泥	
10:51						1173B向け移動中。海底面に白い波紋のような跡あり（バクテリアマット？？掘削くず？？）	
10:51	4785	5	56.9			1173B視認。掘削孔は垂直に立っている。	
10:53	4789	0	40.2	32-14.72	135-1.45	着底、底質：泥。 バルブに正対する位置に着底。	
						掘削孔の中心は窪地であるが、その周囲は平坦で、心配された掘削くずの壁は見当たらない。	
11:01						ランチャー移動待ち。掘削孔のバルブ付近を観察したところ異常はみられない。	
11:04						ビークル掘削孔バルブ向け移動開始。魚視認	
11:08	4790	0	125.7	32-14.73	135-1.46	掘削孔から10m離れた位置に着底。弱い流れ有（NNE→	
						泥が晴れるまで待機	
11:31						空き缶視認	
11:32			166			作業再開。掘削孔の向かって左へ抜ける。泥が舞い視界	
11:33	4786	5	166			視界クリア、移動中	
11:34	4783	7	63.1			視界クリア、移動中	
11:35	4782	8	249.1			視界クリア、移動中。掘削孔にかなり近い。TV一2で孔視	
11:36	4778	5	242			HDTVにて孔視認、非常に近い。上昇しビークル位置調	
11:37	4775	15	71.1			アプローチし直す	
11:40	4784	5	179.5			移動中、ビークル反転した	
11:46	4785	5	166.4			ゆっくり前進開始	
11:47	4789	0	150.9			着底。濁りが晴れるのをまつ。ビークルは孔の北北西10mの位置にいると思われる	
12:03	4789	0	150.8	32-14.72	135-1.47	視界クリア、設置作業開始	
12:06						新型ロガー引き出し開始：右マニュピ	
12:09						持ち上げる	
12:11						海底に設置	
12:12						向きを変える CCW	
12:13						ロープ付きケーブルを少し繰り出す	
12:15						展張開始 真後ろに下がる	
12:16						17m	
12:17						展張完了 停止	
12:18						前進 170度 23m先 高度5m	
						濁りが激しいがACORKは見えている	
12:19						真下にロガー見える	
						ACORKに接近	
12:21						右手でACORK握る	
12:22						左手でACORK握る	
12:23						右手離す	
12:24						コネクタ掴む	
12:28						コネクタをACORKにさす	
12:29						引き止めトリガーをはずす	
12:30						ケーブルをみながらロガーに戻る 開始	
12:32						ロガー見える	
12:33						ロガー前に着底	
						濁りが晴れるのを待つ	
12:39	4789	0	56.6			作業再開。電源のレバー引き始める	
12:39						レバーの先端が台座の木材に当たった	
12:50						右回頭	
12:51						着底。濁りが晴れるのを待つ	
12:53						木材をはがす作業開始	
12:55						木材がレバーから離れた!	
12:56						レバーさげ、電源ON!!	
12:59						新型ロガー位置の微調整開始	
13:02						ケーブルを踏んでいないか確認	

13:04						ロガーを水平にした。(約4度SW側に傾いていた:画面左	
13:06	4788	1	110.8			浮上	
						ロガーを上から観察	
						ロープ付きケーブルを観察しながら孔へ	
						ケーブル長:9m、展長方向:南北	
13:08	4784	5	164.7			コネクタ部分観察→問題なし	
						調査終了	
13:09	4784	6	153.4			離底、底質:泥	
13:25	4655	130	18.5			7K結合	

かいこう７０００Ⅱ　潜航記録

平成 24　年　　KR12-17　行動　　記載者 重竹　誠二

潜航年月日 2012 年 11/05

着底予定位置

緯　度 32°14.68'N

経　度 135°01.48'E

測地系 WGS-84

潜航回数 2 回

通算潜航回数 583 回

潜航海域 南海トラフ　Hole 1173B

潜航目的 調査潜航　孔内間隙圧モニタリングによる固着域海側プレート境界の固着度の推定

調査主任 木下 正高　　ﾗﾝﾁｬｰ PILOT 近藤　友栄

所属 海洋研究開発機構　　ＰＩＬＯＴ 重竹　誠二

ＣＯＰＩＬＯＴ 浅井　隆

作業経過時刻	
吊揚	08:23
着水	08:29
離脱	10:35
着底	10:53
離底	13:04
結合	13:24
水切	15:29
揚収完了	15:36

累計時間	
潜航時間	7: 0
前回潜航	3672: 4
通算潜航	3679: 4

ケーブル使用時間	
１次使用時間	7:13
１次前回時間	3814:37
１次通算時間	3821:50
２次使用時間	2:49
２次前回時間	1787:27
２次通算時間	1790:16

ｹｰﾌﾞﾙ番号別使用時間	
１次番号	2
１次番号別前回時間	2909:12
１次番号別通算時間	2916:25
２次番号	S2
２次番号別前回時間	27: 3
２次番号別通算時間	29:52

海象・気象

天候	風向	風力	波浪	うねり	視程
o	SE	5	3	3	8

最大潜航深度 4790 m

着底深度 4789 m　　離底深度 4789 m

着底底質 泥　　離底底質 泥

記事　ACORK1173B近傍の海底に新型データロガーを設置し、新型データロガー付きROVコネクタ（ケーブル全長：約20m）をACORK1173Bのデータ抜き取りポートに接続した。

KAI KO Di ve583
NANKAI - TROUGH

(1 / 5000)

1. 10:48 D=4786m 海底視認
(32-14.7029N 135-01.4380E)
2. 10:54 着底 D=4789m
(32-14.7346N 135-01.4533E)
12:03 新型ﾃﾞｰﾀﾛｶﾞｰ設置作業開始
12:14 新型ﾃﾞｰﾀﾛｶﾞｰ設置作業終了
12:15 水中ｺﾈｸﾀｰ(延長)展張
12:27 水中ｺﾈｸﾀｰ(延長)接続
12:56 新型ﾃﾞｰﾀﾛｶﾞｰ電源ON
13:04 離底 D=4789m

HOLE1173B
D=4,791m

KM
0. 5
0

XY Origin Lat 32-14.70000N Lon 135-01.50000E
Center Lat 32-14.70000N Lon 135-01.50000E
Grid_File: Dive526_100.grd Contour Int: 5m
Track_File: 121105_KAIKO_No583.xyz

Datum WGS-84 Proj. MER

(UR) Lat 32-15.02517N Lon 135-02.05795E
(LL) Lat 32-14.37583N Lon 135-00.94305E
(2012-11-05)

Kaiko-7k Dive 584 notes, 06 November, Keir Becker – all times UTC

0150 1173B on sonar

0208 1173B in sight and battery pack to left, near top of berm

0214 landed at battery pack, a little dust moving to right

0215 reposition battery pack for better access

0219 move Kaiko a little closer for access with both arms

0223 dust cover off battery pack UMC, reposition pack again

0230 UMC off holster

0236 UMC mated

0240 no communications - even if battery pack not actually turned on, original 1173B battery should be good enough

0240-0300 multiple retries: both USB ports on mini, spare Belkin USB-RS232 adaptor (HPmini sees it as com9), change Kaiko control room RS-232 cable, repositioning battery pack; decide to attempt re-mating of UMC

0302 very difficult to unmate, even with both arms

0318 finally unmated, inspect pins: whitish glob on pin 2, disintegrated when shaking UMC

0322 decide to reholster UMC (male) in order to inspect female on battery pack

0328 UMC male back in holster

0330 inspect female – looks OK

0333 reposition Kaiko for battery orientation in second mating attempt

0338 move battery pack for better orientation

0344 UMC (male) off holster

0346 UMC (male) fell off female onto seafloor

0353 after moving SAHF out of way, pick up UMC and put on basket

0412 UMC almost mated, but not last ~2mm. Something in way? Rubber band? Quick check – no communication

0416 disconnect UMC, inspect pins – look OK

0420 UMC re-mated

0425 no comms, tried both USB ports, new Kaiko lab RS232 cable

0429 disconnect UMC

0436 UMC back on holster

0437 dust cover on battery pack UMC

0451 visually verify UMC's still mated on 1173B wellhead; end dive

Dive Log of
KAIKO7000II Dive #584 **Nankai-Trough** **2012/11/06**

Time (JST)	Dep. (m)	Alt. (m)	Head (Deg)	Pos. Xm	Pos. Ym	Description	Remarks
	0	-	-			潜航開始(Dive#584)	
10:33	4664	120	287.8	32-14.69	135-1.48	7K離脱開始(ランチャー深度：4659m)。XYはランチャー位置	
10:40	4706	78	12.9	32-14.66	135-1.47	ビークル下降中。これ以後のXYはビークル位置	
10:47	4787	2	43.1	32-14.64	135-1.48	海底視認、底質：泥	
10:48						ソナー画面の反射物確認	
10:50	4787	2	40.6			1173Bに向け航走開始、40m手前まで近づく	
						海底は平坦、一面堆積物に覆われている	
10:53						HDTV1カメラに生き物視認。	
10:56						HDTV1カメラに反射物。ごみ？？何かわからない	
11:04	4788	1	32.8	32-14.66	135-1.57	40m手前に到着	
11:08	4787	3	357.6			HDTV2カメラにて、11173B孔視認	
11:09	4788	2	21.7			孔の左側に新型ロガー視認、接近開始	
11:13						ロガーの手前。昨日7Kが着底した跡がみられる	
11:14	4789	0	58.2	32-14.68	135-1.54	着底、底質：泥。昨日の離底位置とほぼ同じ場所に着底。	
11:15						台座のロープを握ってロガー持ち上げる	
11:16						手前に引き寄せる	
11:17						ロガーを引っ張ってコネクタの位置を微調整。	
11:19						塩ビ部分を持ち上げ、ロガーをいい位置へ移動	
11:21	4789	0	80.2			ビークルちょと左へ移動、SAHFをかわす	
11:23						ロガーのキャップを外す	
11:24						ロガーを持ち上げ、少し左へ移動	
						ロガーを引いて、少し回転	
11:29						ロガーを吊上げ、少し回転。位置決まった！	
						コネクタへの接続作業開始	
11:30						筒抜いた	
						コネクタへ接続を試みる	
11:32						刺さった！	
11:34						筒握り直し	
						CCW	
11:35						コネクタからいったん抜く	
11:36						はいった！	
11:36						通信開始	
						応答が確認できない	
						USBポートをかえて再度トライ	
11:38						通信開始	
						応答が確認できない	
						USBポートをかえて再度トライ	
11:39						通信開始	
						応答が確認できない	
						ロガーを水平にしてみる	
11:49						ロガーつり上げた状態で通信確認	
						応答なし	
						USBポートをかえて再度トライ	
						船上局側のケーブルの作動確認。ポート立ち上げ直し	
						USBを予備と交換	
						船上局のケーブルを予備と交換	
12:00	4789	0	72.8			ロガーを置く	
12:09						コネクタから筒がなかなか抜けない	
12:17						筒の持ち手を持って、ゆらしてみる	
12:18						抜けた！！	
12:18						HDTV1カメラで、なかのチェック	
						2番のピンがおかしい。金属が見えず、白っぽい	
12:22						腕をゆすって、みる。雲みたいなのは流れた	
12:26						筒を握り直す	
12:27						鞘に納める	
12:28						コネクタ部分のチェック	
12:33						ビークル移動濁ったので晴れるまでまつ	

12:38						ロガーを反転させる	
12:43						ロガー位置、微調整。いい位置にきた	
12:44						筒抜いた	
12:46						筒落ちた	
12:50						SAHF8のピン抜く	
12:50						SAHF取り出し、	
12:51						さす	
12:51						刺し終わり。3番まで刺さった	
12:52						抜く	
12:52						さす	
						2～4度さし直した	
12:53						刺し終わり。全部刺さった	
12:54						筒リカバー	
						バスケットとロガーの間におとして持ち直し	
12:57						筒、左手に持ち替える	
12:58						右手に持ち替える	
						筒の中、確認	
13:01						HDTV2カメラで確認。暗くてよく見えない	
						持ち手、握り直し	
13:08	4789	0	30.54			ビークルちょっと前進した	
13:10						コネクタ接続	
13:11						筒しっかり押さえる	
13:14						通信開始	
						応答なし	
13:16						コネクタ抜く	
						筒の中確認→問題なし	
13:20						もう一度、コネクタ接続	
						通信確認	
						応答なし	
13:27						筒抜いた	
13:36						筒をバスケットに戻す	
13:37「						コネクタ用キャップをとる	
13:38						SAHF抜く	
13:39						SAHFバスケットに戻す	
13:40	4789	0	28.9	32-14.67	135-1.51	離底、底質：泥	
13:42						1173B孔視認	
13:42	4785	4	140.2			濁りで孔を見失う。晴れるのを待つ	
13:47						孔視認、前進	
13:51	4768	4	161.9			孔のコネクタ周りを観察。問題ないように見える。	
						調査終了	

かいこう７０００Ⅱ　潜航記録

平成 24　年　　KR12-17　行動　　記載者 近藤　友栄

潜航年月日 2012 年 11/06

着底予定位置

潜航回数 3 回

通算潜航回数 584 回

緯　度 32°14.68'N

経　度 135°01.48'E

測地系 WGS-84

潜航海域 南海トラフ　Hole 1173B

潜航目的 調査潜航　孔内間隙圧モニタリングによる固着域海側プレート境界の固着度の推定

調査主任 木下　正高　　ﾗﾝﾁｬｰ PILOT 浅井　隆

所属 海洋研究開発機構　　ＰＩＬＯＴ 近藤　友栄

ＣＯＰＩＬＯＴ 石塚　哲也

作業経過時刻	
吊揚	08:21
着水	08:26
離脱	10:33
着底	11:14
離底	13:40
結合	14:06
水切	16:05
揚収完了	16:14

累計時間	
潜航時間	7:39
前回潜航	3679:4
通算潜航	3686:43

ケーブル使用時間	
１次使用時間	7:53
１次前回時間	3821:50
１次通算時間	3829:43
２次使用時間	3:33
２次前回時間	1790:16
２次通算時間	1793:49

ｹｰﾌﾞﾙ番号別使用時間	
１次番号	2
１次番号別前回時間	2916:25
１次番号別通算時間	2924:18
２次番号	S2
２次番号別前回時間	29:52
２次番号別通算時間	33:25

海象・気象

天候	風向	風力	波浪	うねり	視程
c	NW	6	4	3	8

最大潜航深度 4789 m

着底深度 4789 m　　離底深度 4789 m

着底底質 泥　　離底底質 泥

記事 #583Diveにて設置した新型Batt'容器にROVｺﾈｸﾀを接続しﾃﾞｰﾀ通信を試みるも、通信が確認できなかった。

KAI KO Di ve584
NANKAI - TROUGH

(1 / 5000)

135 1E 135 1.1E 135 1.2E 135 1.3E 135 1.4E 135 1.5E 135 1.6E 135 1.7E 135 1.8E 135 1.9E 135 2E

32 15N
32 14.9N
32 14.8N
32 14.7N
32 14.6N
32 14.5N
32 14.4N

1. 10:46 D=4787m 海底視認
(32-14.6340N 135-01.4784E)
2. 11:14 着底 D=4789m
(32-14.6885N 135-01.5365E)

11:22	水中ｺﾈｸﾀｰ接続準備作業
11:29	水中ｺﾈｸﾀｰ接続作業開始
11:35	水中ｺﾈｸﾀｰ接続作業終了
11:45	通信確認出来ず
12:18	ｺﾈｸﾀｰ抜き差し作業開始
12:32	ｺﾈｸﾀｰ抜き差し作業終了
12:51	SAHF設置
13:38	ｷｬｯﾌﾟ取付
13:39	SAHF回収
13:40	離底 D=4789m

HOLE1173B
D=4,791m

-4810
-4800
-4790

KM
0.5
0

XY Origin Lat 32-14.70000N Lon 135-01.50000E
Center Lat 32-14.70000N Lon 135-01.50000E
Grid_File: Dive526_100.grd Contour Int: 5m
Track_File: 121106_KAIKO_No584.xyz

Datum WGS-84 Proj. MER

(UR) Lat 32-15.02517N Lon 135-02.05795E
(LL) Lat 32-14.37583N Lon 135-00.94305E
(2012-11-06)

Kaiko-7k Dive 585 notes, 07 November, Keir Becker – all times UTC

0156 1173B on sonar

0159 1173B in sight and battery pack to left

0203 landed at battery pack

0205 dust cap off

0206 UMC off holster

0209 reposition Kaiko, use left arm to stabilize battery pack

0214 UMC mated

0215 no communications – tried 4 times with HPmini/Belkin; 3 times with Mac/Keyspan

0220 leave UMC on, prepare to turn battery lever off, grab frame with port arm

0224 battery lever off

0226 try comms again – no joy

0227 UMC pulled off

0229 UMC back in holster

0231 dust cover on, lift off for 1173B

0236 approaching 1173B, wellhead SeaCons are well mated

0237 grab wellhead with starboard arm

0240 grab wellhead with port arm, release starboard arm

0242 UMC disconnected, return to battery pack

0250 landed near battery pack, wait for dust to clear

0252 battery pack dust cover off

0253 mate battery pack UMC's, lift off for 1173B

0300 back at 1173B

0302 grab wellhead with starboard arm

0304 grab wellhead with port arm, release starboard arm

0305 UMC off holster

0307 UMC mated

0308 communications established right away, start normal checks and download

0310 data downloading

0331 communications done

0332 UMC pulled off

0335 UMC back on holster

KB to lunch, Kaiko to battery pack, download UMC pulled off holster so cable is clear for picking up battery pack onto basket

0358 back from lunch, UMC in holster except last 2 mm, battery pack on basket

0400 bungee stuck in UMC pulled out to allow full return to holster

0410 lift off, dive over

Dive Log of
KAIKO7000II Dive #585 **Nankai-Trough** **2012/11/07**

Time (JST)	Dep. (m)	Alt. (m)	Head (Deg)	Pos. Xm	Pos. Ym	Description	Remarks
	0	-	-			潜航開始(Dive#585)	
10:39	4667	118	269.1	32-14.60	135-1.51	7K離脱開始(ランチャー深度：4657m)。XYはランチャー位置	
10:52	4770	17	359.4	32-14.71	135-1.47	ビークル下降中。これ以後のXYはビークル位置	
10:53	4787	3	352.4			海底視認、底質：泥	
10:56	4785	4	78.8			80度方向へ航走開始	
						70度方向へ変更	
						40度方向へ変更	
10:59						1173B孔視認（HDTV1カメラ）	
11:00						近づいていく、ロガー視認	
11:03	4789	0	26.6	32-14.69	135-1.51	ロガーの正面に着底、底質：泥	
						ケーブルは踏んでいないと思われる	
						コネクタへの接続作業開始	
11:05						キャップ外した	
11:06						ビークルから筒引き抜いた	
11:09						ビークルちょっと前へ移動	
11:10						コネクタへなかなか接続できない	
						左手でロガーの位置調整	
11:14						コネクタ接続	
						接続部、ズームして確認	
11:15						通信開始	
						応答なし	
11:17						ケーブルを踏んでいないことを確認	
						PCをかえて通信を試みるが応答なし	
11:25						ロガーの電源をOFF	
11:26						通信確認	
						応答なし	
11:27						筒を抜いた	
11:29						ビークルに筒を戻した	
11:31						ロガーのコネクタ部にキャップした	
11:32						孔へアタックするため移動開始	
						潮流が強い模様	
11:33	4785	4				ゆっくり右回頭	
11:34	4786	3	126.8			孔視認	
11:36						ゆっくり近づく	
						コネクタ部分には正対している、慎重に近づいている	
11:37						右手、孔のフレーム掴んだ！	
11:40						左手でフレーム掴む	
						右手ゆっくり離した	
11:41						コネクタ掴む	
11:42						抜けた！！	
						ビークル孔から離れる	
						距離をとって、ロガーに戻る	
						ケーブルを確認しながら後進（TV1カメラ）	
11:44						TV-2カメラでロガー視認	
11:46						ケーブル、ロガーをかわす	
						ビークル、ロガーに戻る。難しいアプローチだ	
						濁ってし視野悪い	
11:50						TV-1カメラでロガー視認	
11:50	4789	0	30.8			着底、濁りが晴れるのを待つ	
11:52						ロガー視認。左側に着底していた	
11:53						キャップは自然に外れていた。そのままコネクタをロガーに	
11:54						データ回収のため、孔へアタック開始	
						浮上、泥が晴れるのを待つ	
11:58	4786	3	189.2			孔に向け前進	
11:59						孔、視認。正面（HDTV2カメラ）	
12:02						右手でACORKつかむ	
12:04						左手でACORKつかむ	

12:05						右手はなし、コネクタ抜く	
12:07						コネクタさす　つかんだまま	
12:09						通信OKデータ吸い上げ開始 38400bps	
12:23						吸い上げ終了、データ確認	
12:27						11/12/22 04:00 ～12/11/7/03:10までのデータ取得を確認	
12:31						通信作業終了	
12:32						左手掴み直し	
12:32						コネクタ抜いた	
12:34						ビークルに戻した	
12:37	4786	3	209.5			ACORKから離れる。後進開始	
						ロガー視認（TV2カメラ）	
12:41	4789	0	128.5			着底	
12:44						ビークルの筒外して、バスケットの隅にのける	
12:47						左手で、邪魔なケーブルをのける	
12:49						ロガー持ち上げ	
						バスケットの縁に乗せた	
12:51						バスケットの中に引き込み	
12:52						ロガー格納完了	
12:53						端にのけていたコネクタ掴む	
12:55						左手に持ち替える	
12:56						右手に戻す	
12:58						コネクタをメスプラグに差し戻した	
13:02						キャップをバスケットに戻す	
						離底準備	
13:08	4789	0	128.9	32-14.68	135-1.52	離底、底質：泥	

かいこう７０００Ⅱ　潜航記録

平成 24　年　　KR12-17　行動　　記載者 浅井　隆

潜航年月日 2012 年 11/07

着底予定位置

緯　度 32°14.68'N

経　度 135°01.48'E

測地系 WGS-84

潜航回数 4 回

通算潜航回数 585 回

潜航海域 南海トラフ　Hole 1173B

潜航目的 調査潜航　孔内間隙圧モニタリングによる固着域海側プレート境界の固着度の推定

調査主任 木下　正高　　ﾗﾝﾁｬｰ PILOT 石塚　哲也

所属 海洋研究開発機構　　ＰＩＬＯＴ 浅井　隆

ＣＯＰＩＬＯＴ 井原　章太

作業経過時刻	
吊揚	08:27
着水	08:32
離脱	10:39
着底	11:03
離底	13:08
結合	13:22
水切	15:24
揚収完了	15:32

累計時間	
潜航時間	6:52
前回潜航	3686:43
通算潜航	3693:35

ケーブル使用時間	
１次使用時間	7: 5
１次前回時間	3829:43
１次通算時間	3836:48
２次使用時間	2:43
２次前回時間	1793:49
２次通算時間	1796:32

ｹｰﾌﾞﾙ番号別使用時間	
１次番号	2
１次番号別前回時間	2924:18
１次番号別通算時間	2931:23
２次番号	S2
２次番号別前回時間	33:25
２次番号別通算時間	36: 8

海象・気象

天候	風向	風力	波浪	うねり	視程
bc	NW	5	4	3	8

最大潜航深度 4789 m

着底深度 4789 m　　離底深度 4789 m

着底底質 泥　　離底底質 泥

記事 ACORK1173Bの既存ﾎﾟｰﾄへROVｺﾈｸﾀを接続しﾃﾞｰﾀ収集を行った。また、#583Diveにて設置した新型Batt'容器の通信不良を確認し、回収した。

KAI KO Di ve585
NANKAI - TROUGH

(1 / 5000)

135 1E 135 1.1E 135 1.2E 135 1.3E 135 1.4E 135 1.5E 135 1.6E 135 1.7E 135 1.8E 135 1.9E 135 2E

32 15N
32 14.9N
32 14.8N
32 14.7N
32 14.6N
32 14.5N
32 14.4N

1. 10:54 D=4786m 海底視認
(32-14.6650N 135-01.5150E)
2. 11:03 着底 D=4789m
(32-14.6646N 135-01.5272E)

11:06	ｺﾈｸﾀｰ接続作業開始
11:15	ｺﾈｸﾀｰ接続作業終了
11:20	電源OFF作業開始
11:25	電源OFF作業終了
11:27	ｺﾈｸﾀｰ取り外し作業開始
11:32	ｺﾈｸﾀｰ取り外し作業終了
11:38	ACORKｱﾀｯｸ ｺﾈｸﾀｰ外し作業開始
11:42	ｺﾈｸﾀｰ外し終了
11:53	新型ﾛｶﾞｰﾍｹｰﾌﾞﾙ戻し作業終了
11:54	ACORKｱﾀｯｸ ｺﾈｸﾀｰ取り外し作業
12:08	ACORK ｺﾈｸﾀｰ接続
12:11	ﾃﾞｰﾀ抜き出し作業開始
12:24	抜き出し終了
12:32	ｺﾈｸﾀｰ取り外し
12:44	新型ﾃﾞｰﾀﾛｶﾞｰ回収作業開始
13:01	新型ﾃﾞｰﾀﾛｶﾞｰ回収作業終了
13:08	離底 D=4789m

HOLE1173B
D=4,791m

-4810
-4800
-4790

KM
0. 5
0

XY Origin Lat 32-14.70000N Lon 135-01.50000E
Center Lat 32-14.70000N Lon 135-01.50000E
Grid_File: Dive526_100.grd ContourInt: 5m
Track_File: 121107_KAIKO_No585.xyz

Datum WGS-84 Proj. MER

(UR) Lat 32-15.02517N Lon 135-02.05795E
(LL) Lat 32-14.37583N Lon 135-00.94305E
(2012-11-07)

Kaiko-7k Dive 586 notes, 08 November, Keir Becker – all times UTC

0154 casing in sight – but it's not 808I; several sonar targets

0210 at cone with broken casing/pipe – not 808I

0232 at another cone – ONDO hole?

0235 Kaiko heading NE

0241 sonar target

0257 ACORK casing in sight – dust cap reflection

0305 Kaiko in position at new 808 logger

0306 release SAHF pull pin

0307 SAHF off basket, inserted in sediments out of the way of arm

0309 dust cap off new logger

0311 UMC off holster – but UMC slot oriented wrong, need to bring in port arm for arm to arm xfers to line up slot

0340 UMC finally on, begin download

0346 download finished

0347 port arm on frame base, then reposition to top of frame

0352 UMC off, start arm to arm xfers to line slot up for holster

0405 UMC back on holster

0407 dust cover back on

0411 lift off to go to valve side of wellhead and inspect string

0413 set down too far away for first look

0424 move Kaiko closer but still not too close

0425 two plastic bags and some string on valves (valves all fully closed)

0429 use SAHF tip for at-distance removal of one bag

0445 SAHF inserted in sediments

0448 push core taken

0450 video survey string – extends down ACORK string below wellhead

0452 pull out SAHF

0455 lift off, dive over

Dive Log of
KAIKO7000II Dive #586 **Nankai-Trough** **2012/11/08**

Time (JST)	Dep. (m)	Alt. (m)	Head (Deg)	Pos. Xm	Pos. Ym	Description	Remarks
	0	-	-			潜航開始(Dive#586)	
10:39	4552	112	351.7	32-21.18	134-16.67	7K離脱開始(ランチャー深度：4547m)。XYはランチャー位置	
10:41	4567	97	332.8	32-21.24	134-16.70	ビークル下降中。これ以後のXYはビークル位置	
10:50	4665	3	350.9			海底視認、底質：泥	
10:54	4664	4	172			横たわるパイプ視認。	
10:56	4655	3	157.4			パイプ観察。目的のパイプではない	
11:00						白い魚2匹視認。(HDTV1&2)	
11:01	4663	4	162.8			ACORK捜索再開	
						ソナーに反応のある箇所を確認	
11:06	4666	2	140			航走再開	
						160 度方向へ変更	
11:10	4665	4	138	32-21.13	134-16.67	ウェルヘッド視認、観察。これではない	808D site
						ACORK捜索再開	
11:17	4664	5	169.1			TV-2パイプ視認	
11:20						TV-2パイプ視認。2本ありクロスしている。これではない	
						ACORKより200m以上、西側にいるのか？	
11:30	4665	5	154.3			パイプ視認、これではない	
11:33	4667	4	156.5			パイプの向こうにウェルヘッド(ONDO)視認	808E site
						東へ移動する	
11:47	4668	4	55.6	32-21.0	134-56.78	移動中	
11:56				32-21.11	134-56.77	パイプ視認(HDTV1)	
12:00						新型ロガーに接近する	
12:02				32-21.25	134-56.75	着底　新型ロガーの目の前	
12:04						こしおれエビがたくさん　孔の中にもいる	
12:08	4672	0	124			SAHFを近くにさす(邪魔になる)	
12:09						ロガーのキャップをはずす	
？						コネクタ抜く	
12:31						コネクタ浅くさす、キーの位置確認	
12:33						コネクタ抜けた	
12:36						コネクタさす	
12:38						根元確認	
12:39						データ通信開始	
12:39						応答あり	
						孔の中を確認。えび孔内に集まっているように見える	
12:41						データ吸い出し開始	
12:42						データ吸い出し完了	
						データ確認→OK	
12:46						通信終了	
12:52						コネクタ抜く	
13:41						ビークルのメス側にさす	
13:06						キャップつける	
						回り込んでテグスに近づく	
13:07						SAHF抜く	
13:08						鞘に戻す	
13:10	4672	0	121.3			浮上	
13:11	4671	2	178.9			回頭、回り込んでテグスに近づく。潮流れ強い	
13:13	4672	0	300.1			着底	
						濁りが晴れるのを待つ	
13:15						テグス観察	
						コネクタ付近にテグスがある。	
						ビニル袋や網のようなものも引っかかっている。	
						こしおりエビが数匹いる	
13:20	4671	1	287.6			コネクタへ近づく	
						泥が晴れるのを待つ	
13:27						SAHF取り出し	
						バスケットの角でSAHF角度調整	
13:28						ビニル袋つついてみる	

13:29						SAHF海底にさして、掴み直す	
13:31						バスケットの角で角度修正	
						ビニル袋右隅をちぎりたい。(コネクタに巻き付いているとこ	
						ビニル袋の真ん中がさけた	
13:33	4672	0	301.9			もう少しだけ近づく	
						ビニル袋さけた	
13:39						SAHFで下に引き抜く	
						ビニルは堆積物に埋まった	
13:40						孔からビニル袋は取り除かれた	
						SAHF1番～3番まで堆積物付着	
13:43						エビのいたところでSAHF計測開始	
13:45						MBARI取り出す	
13:47						MBARI、SAHFの右側にさす	
13:48						MBARI採泥	Red
13:49						MBARI鞘に戻す	
						孔の観察	
						左のビニル袋は1本のテグスに引っかかっているもよう。このテグスをきれば、ビニルは流れそう	
13:52						SAHF引き抜き開始	
13:53						SAHF引き抜き終了、鞘に戻した	
13:54	4672	0	304	32-21.19	134-56.75	離底、底質：泥	

かいこう７０００Ⅱ　潜航記録

平成 24　年　　KR12-17　行動　　記載者 石塚　哲也

潜航年月日 2012 年 11/08

着底予定位置

緯　度 32°21.22'N

経　度 134°56.70'E

測地系 WGS-84

潜航回数 5 回

通算潜航回数 586 回

潜航海域 南海トラフ　Hole 808I

潜航目的 調査潜航　孔内間隙圧モニタリングによる固着域海側プレート境界の固着度の推定

調査主任 木下　正高　　ﾗﾝﾁｬｰ　PILOT 井原　章太

所　属 海洋研究開発機構　　ＰＩＬＯＴ 石塚　哲也

ＣＯＰＩＬＯＴ 重竹　誠二

作業経過時刻	
吊揚	08:28
着水	08:33
離脱	10:38
着底	12:02
離底	13:54
結合	14:11
水切	16:08
揚収完了	16:15

累計時間	
潜航時間	7:35
前回潜航	3693:35
通算潜航	3701:10

ケーブル使用時間	
１次使用時間	7:47
１次前回時間	3836:48
１次通算時間	3844:35
２次使用時間	3:33
２次前回時間	1796:32
２次通算時間	1800: 5

ｹｰﾌﾞﾙ番号別使用時間	
１次番号	2
１次番号別前回時間	2931:23
１次番号別通算時間	2939:10
２次番号	S2
２次番号別前回時間	36: 8
２次番号別通算時間	39:41

海象・気象

天候	風向	風力	波浪	うねり	視程
bc	W	4	3	2	8

最大潜航深度 4672 m

着底深度 4672 m　　離底深度 4672 m

着底底質 泥　　離底底質 泥

記事 #582Diveにて設置した新型データロガーよりデータの抜き出し行い、A-CORKに絡んでいるテグスの状況確認及び近傍にてSAHFによる温度計測、MBARI採泥を行った。

KAI KO Di ve586
NANKAI - TROUGH

(1 / 5000)

134 56E　134 56.2E　134 56.4E　134 56.6E　134 56.8E　134 57E

32 21.4N

32 21.2N

32 21N

-4610　-4620　-4630　-4640　-4650　-4660　-4670　-4680　-4690　-4700　-4710

特異点②
D=4,650m

HOLE808I
D=4,675m

1. 10:54 D=4664m 海底視認
(32-21.1729N 134-56.6694E)
2. 11:10 D=4664m Hole_808D視認
(32-21.1416N 134-56.6477E)
3. 11:33 D=4667m Hole_808E視認
(32-21.1123N 134-56.6809E)
4. 12:02 D=4672m 着底
(32-21.2422N 134-56.7803E)

12:08 SAHF仮設
12:11 ｺﾈｸﾀｰ取り付け作業開始
12:39 ﾃﾞｰﾀ抜き出し作業開始
12:46 ﾃﾞｰﾀ抜き出し作業終了
12:53 ｺﾈｸﾀｰ引き抜き
13:06 ｷｬｯﾌﾟ取り付け
13:07 SAHF回収
13:14 ﾃｸﾞｽ観察
13:27 ﾃｸﾞｽ除去作業
13:43 SAHF設置　温度計測開始
13:47 MBARI採泥　赤・１本
13:52 SAHF回収
13:54 離底　D=4672m

KM
0. 5
0

XY Origin Lat 32-21.20000N Lon 134-56.70000E
Center Lat 32-21.25000N Lon 134-56.50000E
Grid_File: ae150.grd Contour Int: 5m
Track_File: 121108_KAI KO_No586.xyz

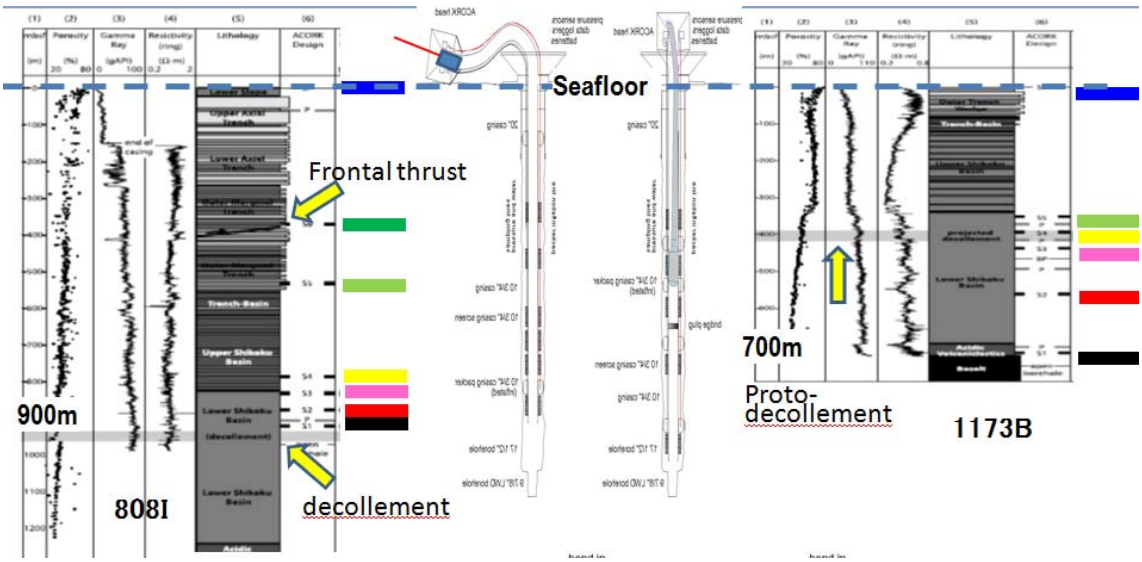
Datum WGS-84 Proj. MER

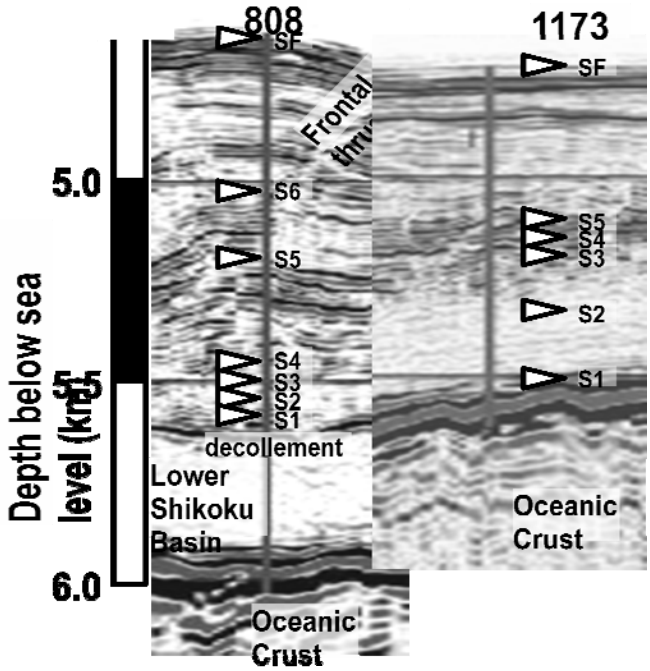
(UR) Lat 32-21.57516N Lon 134-57.05862E
(LL) Lat 32-20.92584N Lon 134-55.94238E
(2012-11-08)

4. Preliminary Results

4-1. ACORK

During the KR12-17 cruise, seafloor and downhole pore pressure data were retrieved from ACORK site 808I and 1173B in the Nankai Trough of Cape Muroto. Nearly one-year records were now added to the 10-year-long record obtained by the last year.





Configuration of the ACORKs.

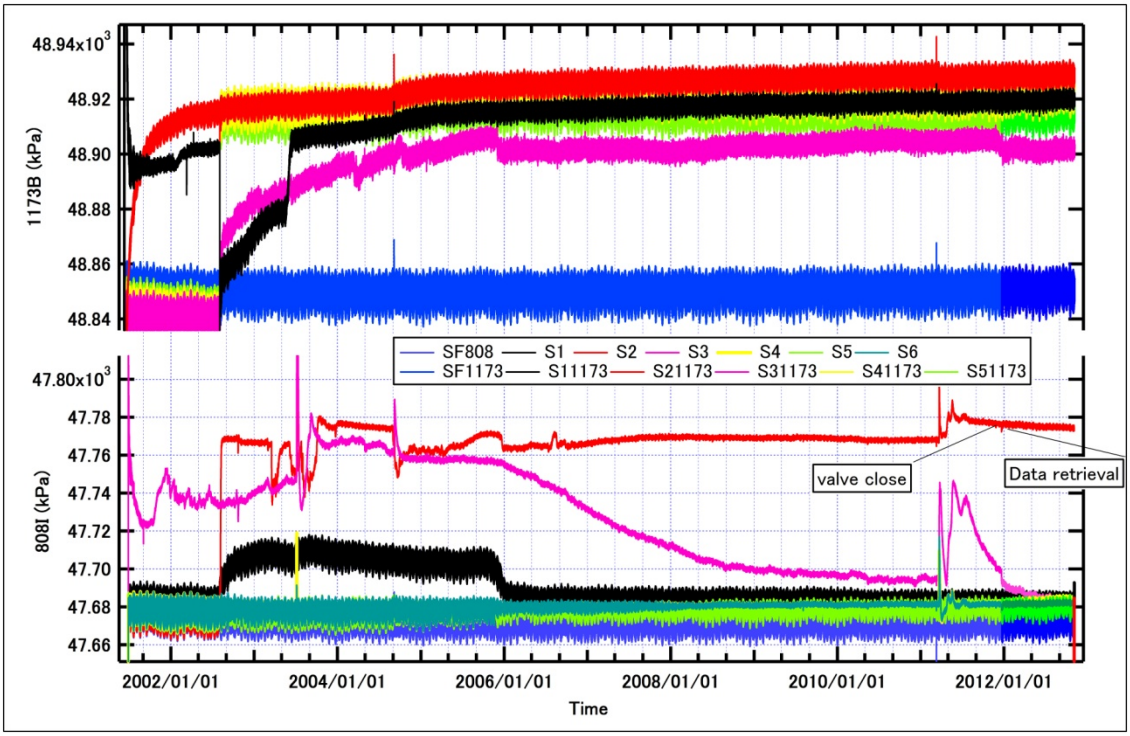
808I

Screen	1	2	3	4	5	6	Seafloor
Depth	922 mbsf	879	833	787	533	371	
Valve	6	5	4	3	2	1	
Sensor	2	3	4	5	6	7	1
Chennel	S1 (open)	S2	S3	S4	S5	S6	SF
Color		Red	Magenda	Yellow	L.Green	Green	Blue

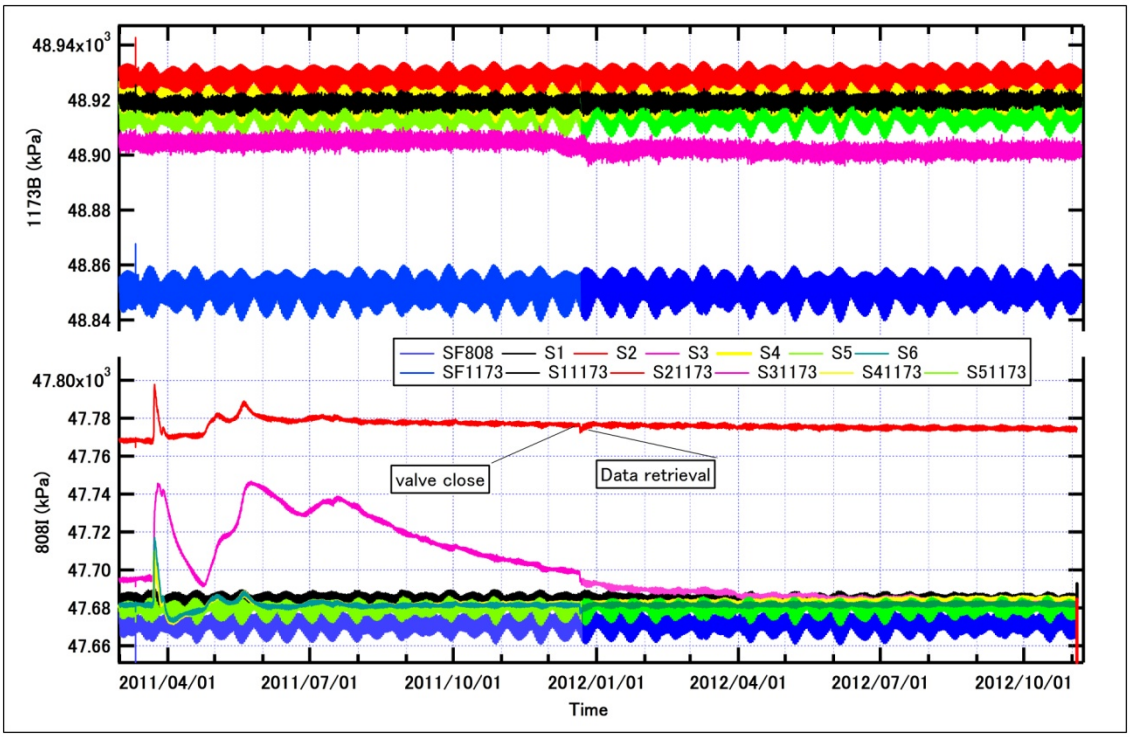
Hole 1173B

Screen	1	2	3	4	5	Seafloor
Depth	728 mbsf	569	445	402	359	
Valve	1	2	3	4	5	
Sensor	6	5	4	3	2	1
Chennel	S1	S2	S3	S4	S5	SF
Color		Red	Magenda	Yellow	L.Green	Blue

Channel assignment of the ACORK system in the Nankai Trough off Muroto.



ACORK data at 808 and 1173 for the whole period (2001-2012).



ACORK data since 2011 Tohoku earthquake.

ACORK at ODP Hole 808I

ACORK at 808I was visited by KAIKO dives 582 and 586 during the KR12-17 cruise. During dive582, nearly 1-year-long data was retrieved, followed by the installation of the new data logger on the bridge plug sampling valve. It is equipped with two pressure gauges, allowing for logging the pressure inside the ACORK casing through the bridge plug hydraulic port and the pressure in the ambient sea water. Hydraulic connector was connected to this port, then th valve was open. After waiting for 20 minutes, the first data from this new logger was downloaded. All the operation was completed very smoothly.

Data recovered from the ACORK showed no significant pressure increase at S1 (808I) (near the décollement zone) since last year, when the valve at the wellhead (which is connected to the decollement through the casing pipe) was first closed during the KR11-12 cruise.

Fluid venting was observed when the valve was open before connecting the hydraulic connector for the new pressure data logger. Its flux seems as strong as what we observed last year during the KR11-12 cruise.

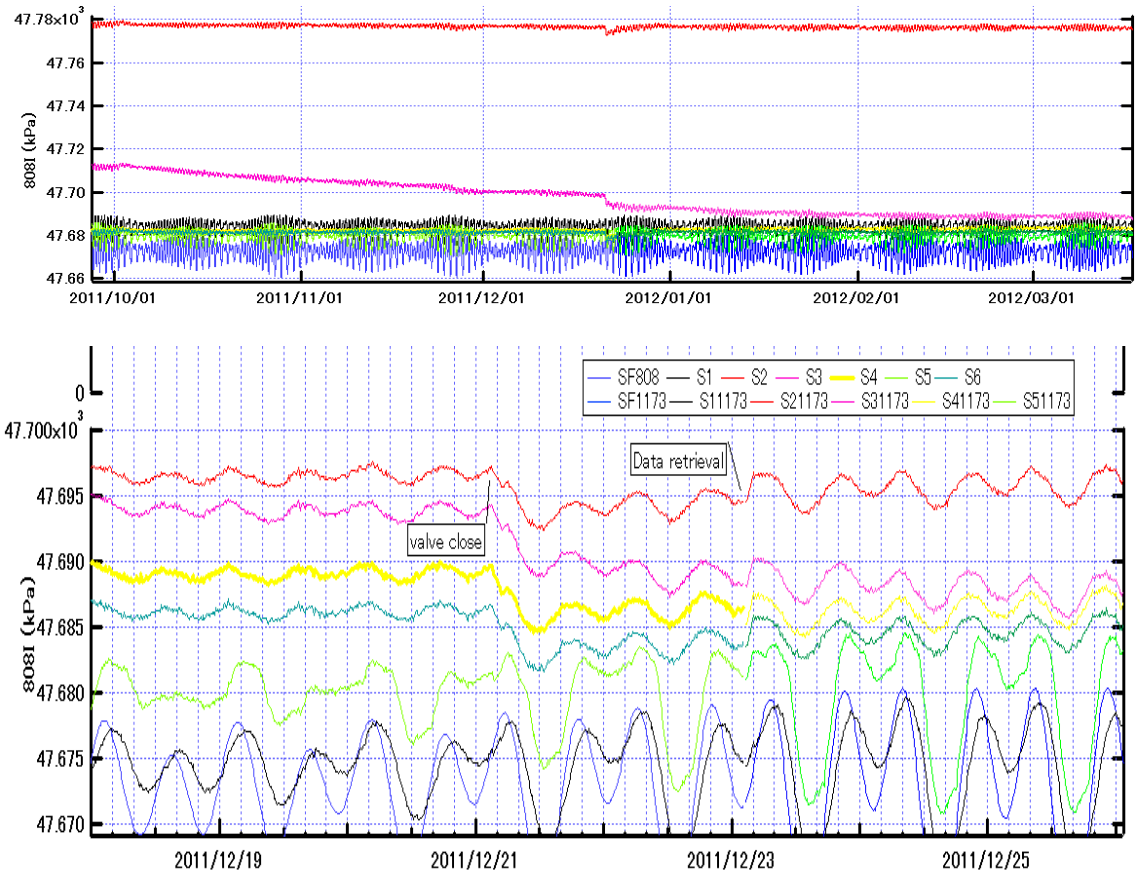
+10 KPa pressure stepwise increase was observed from the newly installed

hydraulic port, which is also supposed to be connected to the décollement.

During the KR11-12 cruise the valve at the newly installed port was first closed since its installation in 2008. At that time, pressure decrease by ~3 kPa were observed at S2, S3, S4 and S6 at 808I. On the other hand, no significant pressure changes were detected at S1 and S5.

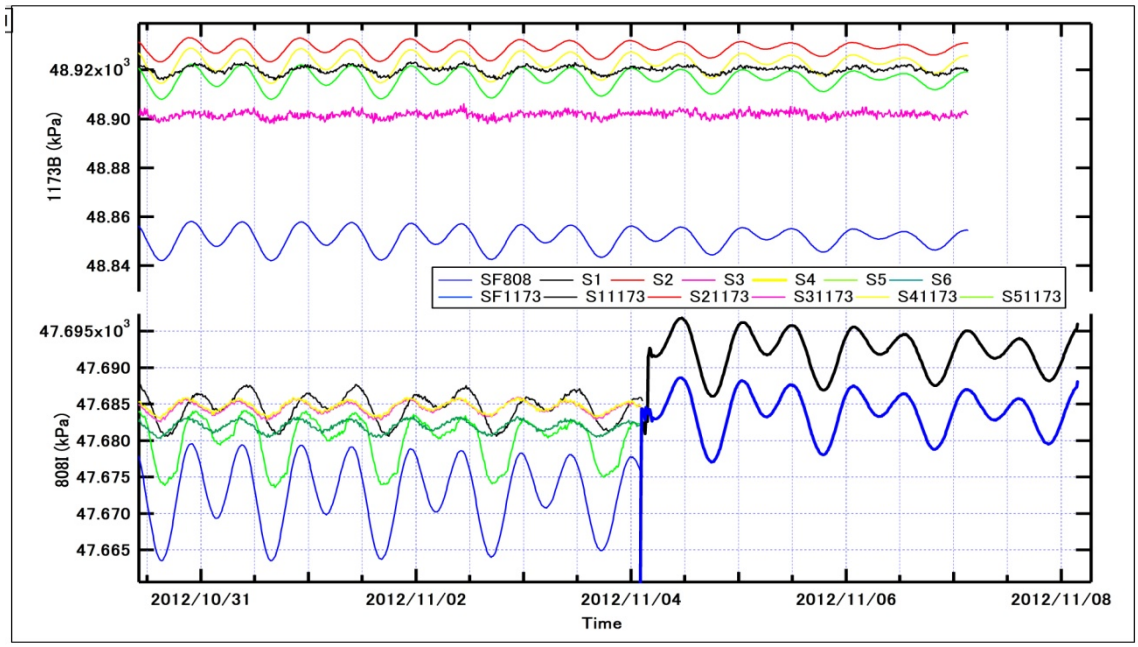
During the second dive (dive 586), we retrieved the data from the new pressure logger and obtained 4-day-long data since dive 582. Both channels show nearly identical tidal variation with the 10kPa offset remain constant. However, a preliminary comparison of the tidal response between two pressure gauge (one from the port and the other on the seafloor) showed a small but significant decrease (90%) in the M2 tidal amplitude and a phase delay of ~3 degrees.

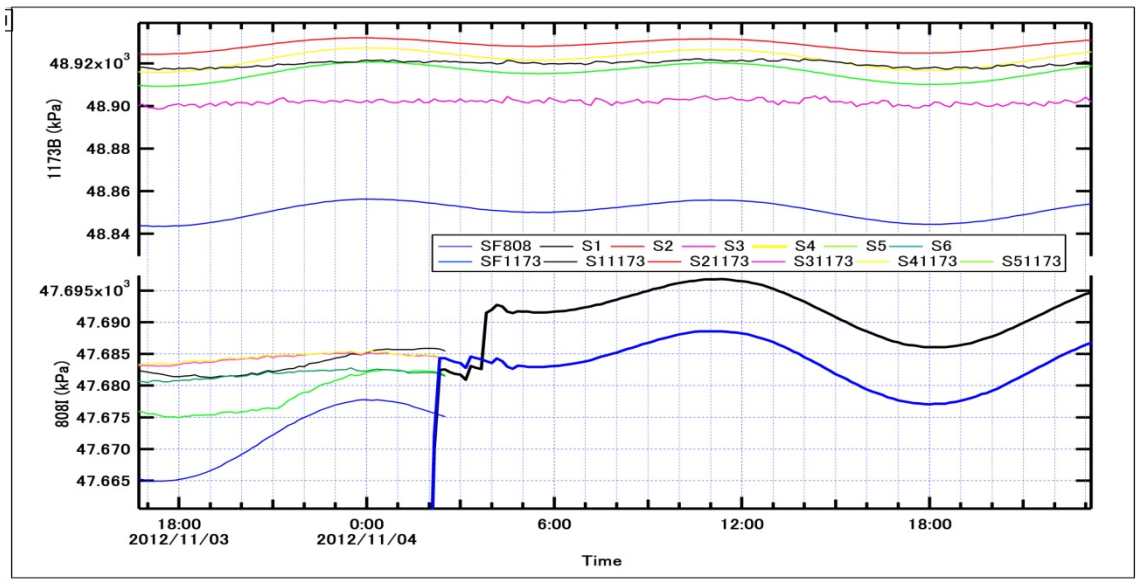
After that we inspected the tangled string on the other side of the ACORK 808, and found that strings are deeply tangled around the valves, ports, etc., so that we could approach the valves/ports without removing them. Further consideration will be done postcruise.



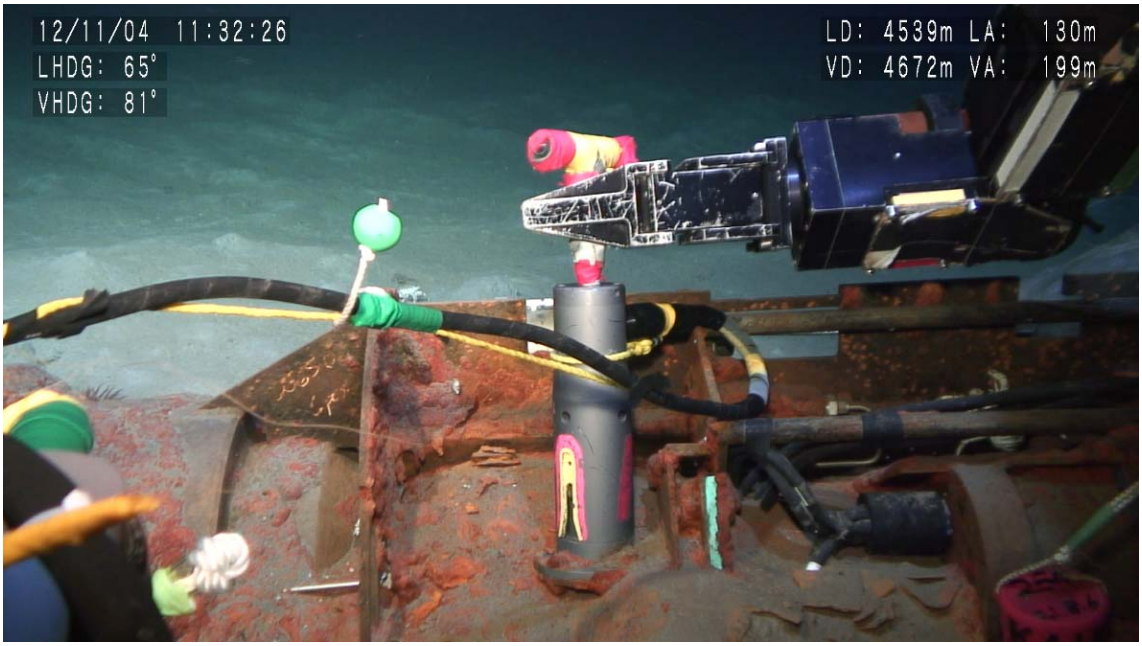
Pressure decrease by ~3 kPa observed at S2, S3, S4 and S6 at 808I, when the valve at

the mouth of ACORK head was first closed since its installation in 2008. No significant pressure changes were detected at S1 and S5. (Note that vertical offsets are applied to all data).





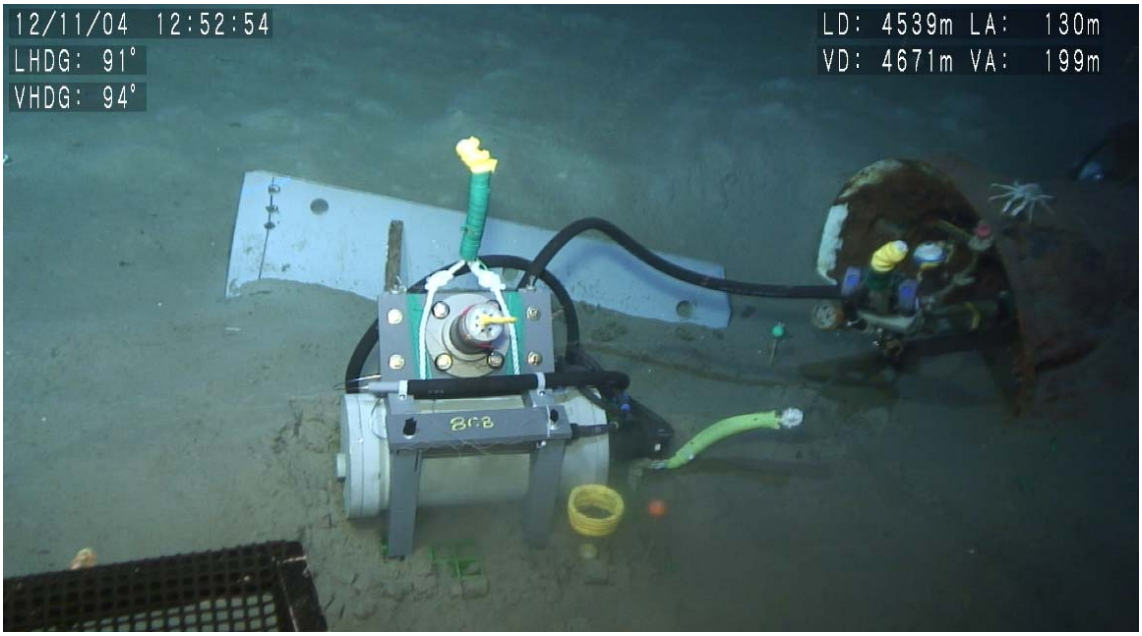
Pressure data from 808I-BP. Thick black line is the pressure from the bridge plug hydraulic port connected during dive 582, and thick blue line is the pressure on the seafloor. Note the remarkable pressure increase by 10kPa from this hydraulic port. Thin lines are newly obtained data from the existing ports.

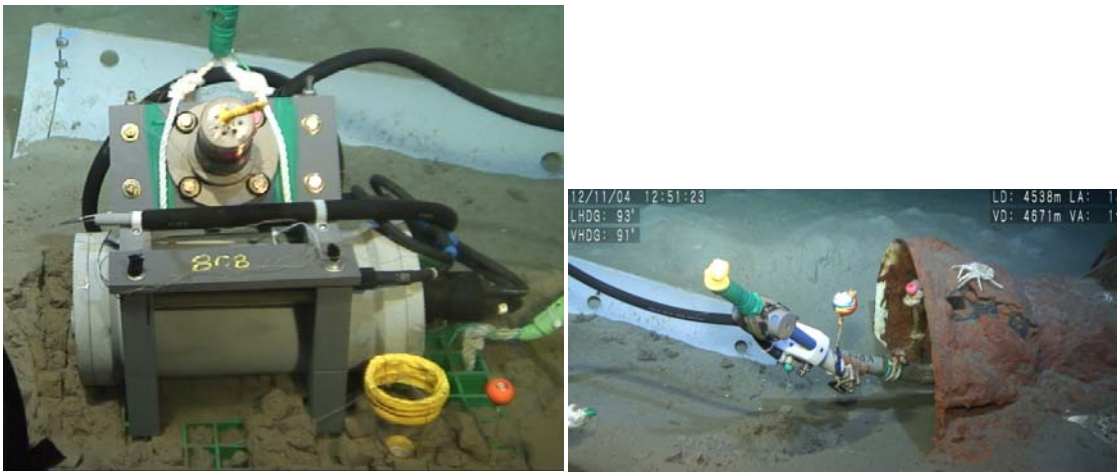


Downloading the data from ACORK 808I during dive 582.

Hydraulic port at the mouth of ACORK head at 808I before connecting the hydraulic connector of the new pressure data logger. Valve is still closed.

Fluid venting was observed when the valve was open before connecting the hydraulic connector. Its flux seems as strong as what we observed last year during the KR11-12 cruise.





The new pressure data logger installed at ACORK 808I.

ACORK at ODP Hole 1173B

ACORK at 1173B was visited by KAIKO dives 853, 854 and 855 during the KR12-17 cruise.

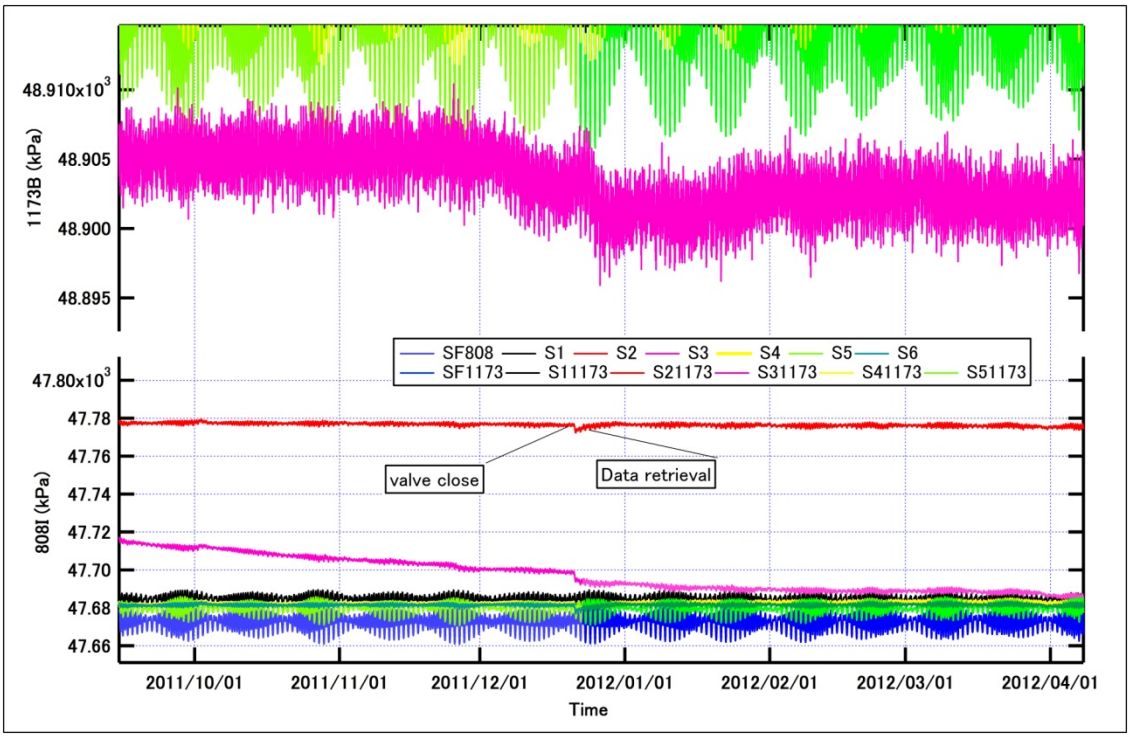
Dive 583 was dedicated for installation of the extension connector with the 20-m cable and the new battery pack pressure case (we call this system 'Extension Module' here). After locating the ACORK, we set the Extension Module 10 meters to the north of the ACORK. It allows an extra 10 meters of the extension cable (20-m long). Then the extension cable was paid out from the KAIKO stage to the north (away from the ACORK). After the full cable was paid out, KAIKO headed toward the ACORK, and connected the extensnio connector to the ACORK connector.

During dive 584, we revisited this site for downloading data through this new Extensinon Module. However, we could not establish communication to the ACORK. After disconnecting and re-connecting with no improvement, we concluded some communication failure either at the Extension Module or at the ACORK itself. Before leaving the site, we examined the ACORK again, and found no anomalies to the connector and cable. After the dive finished, we inspected the ROV connector and found a little damage to some pins, probably due to the corrosion. However, communication test on deck was successful.

The third visit to ACORK 1173B was made during dive 585. Prior to the dive, we replaced the ROV connector with the spare, and checked that it can communicate with the dummy ACORK module. However, another trial for communication through the newly installed Extension Module did not work again. Then, we removed the Extension Module and tried a direct connection to the ACORK. It was successful and we

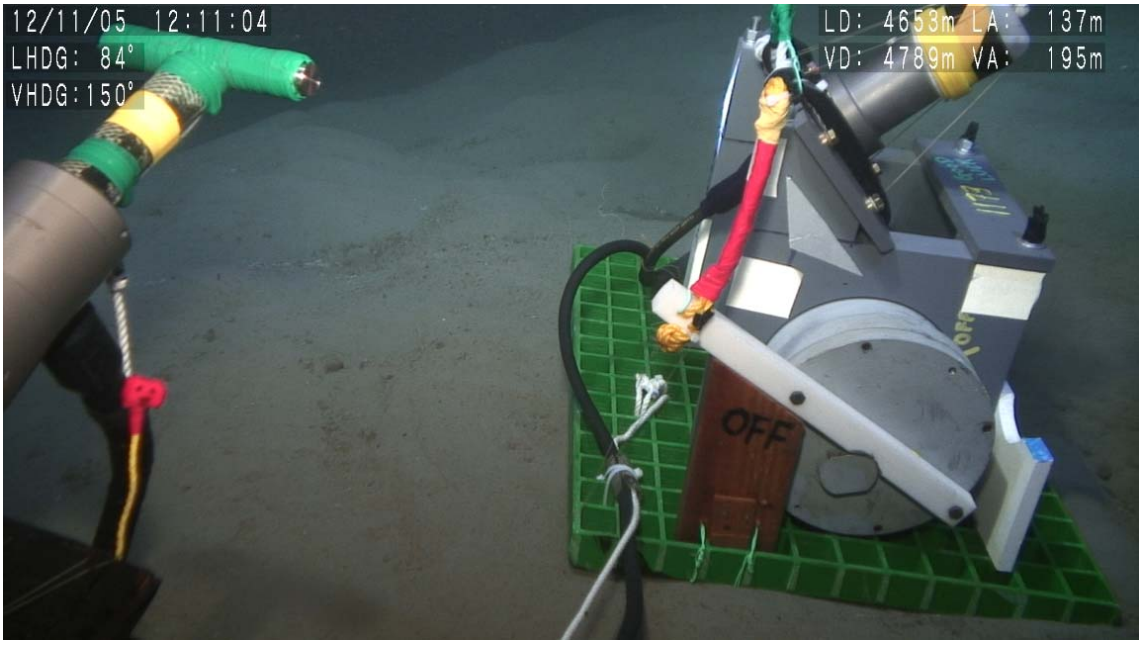
were able to retrieve the one-year-long data with 38400 bps. Therefore, we concluded that the Extension Module has a communication problem, and we decided to recover it onboard KAIKO for later inspection.

All the pressure data were continuous from the last year. One exception is 'S3', which showed a gradual decrease by ~5 kPa in December 2011.



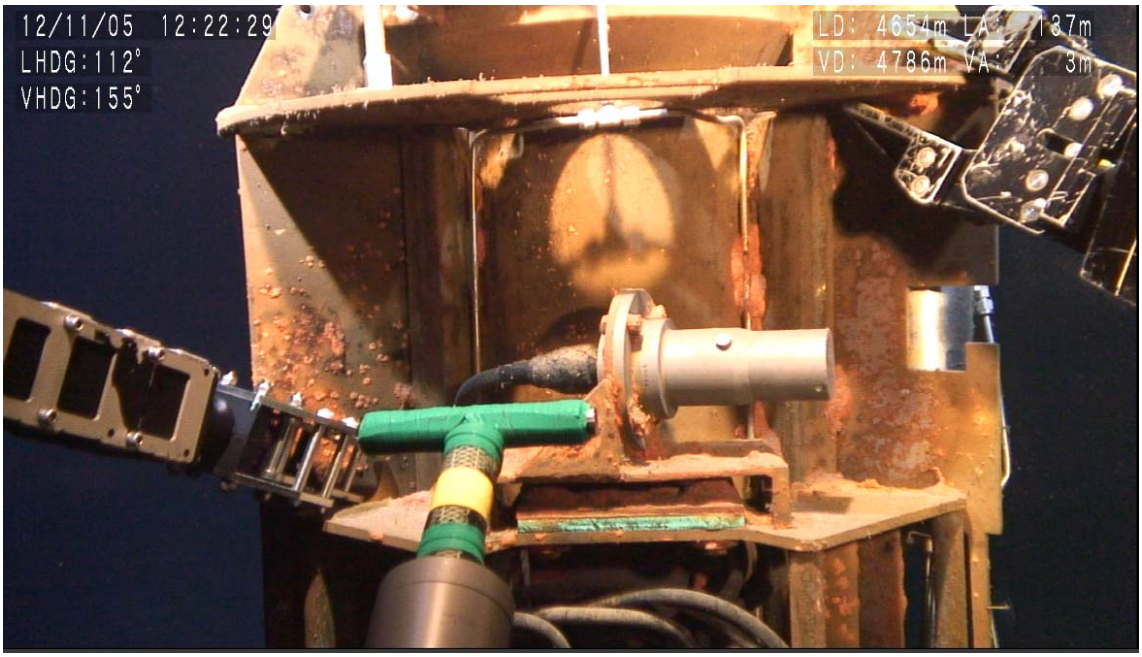
ACORK data, showing a gradual decrease at S3 (pink) of 1173.

View of ACORK at Hole 1173B (seen from south).

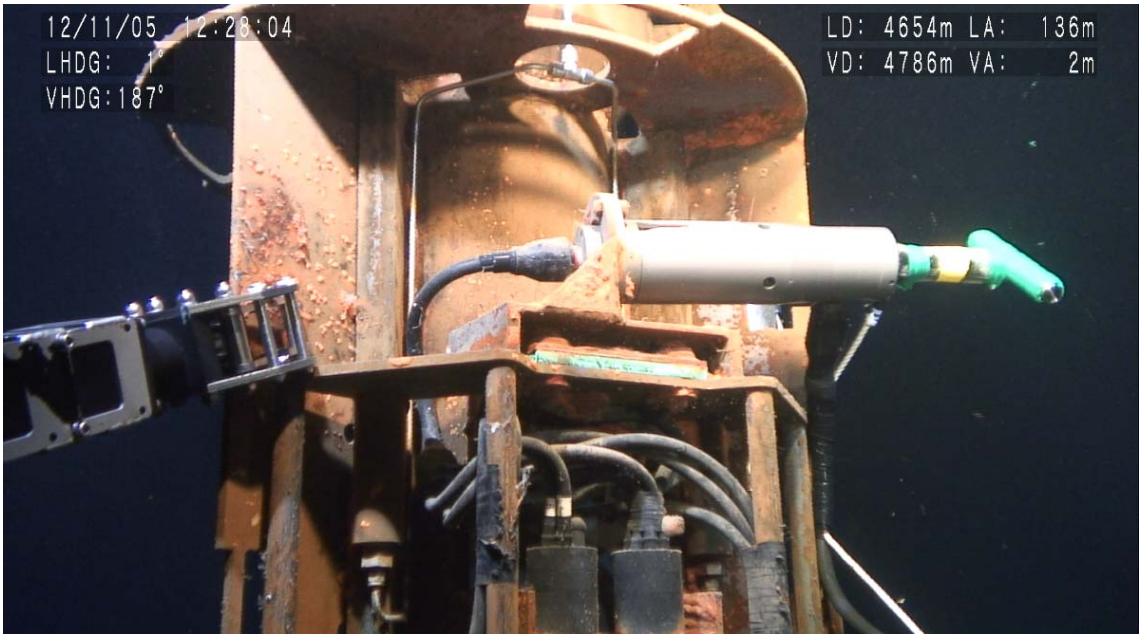


Installation of the Extension Module during dive 583. 1: Setting the frame.

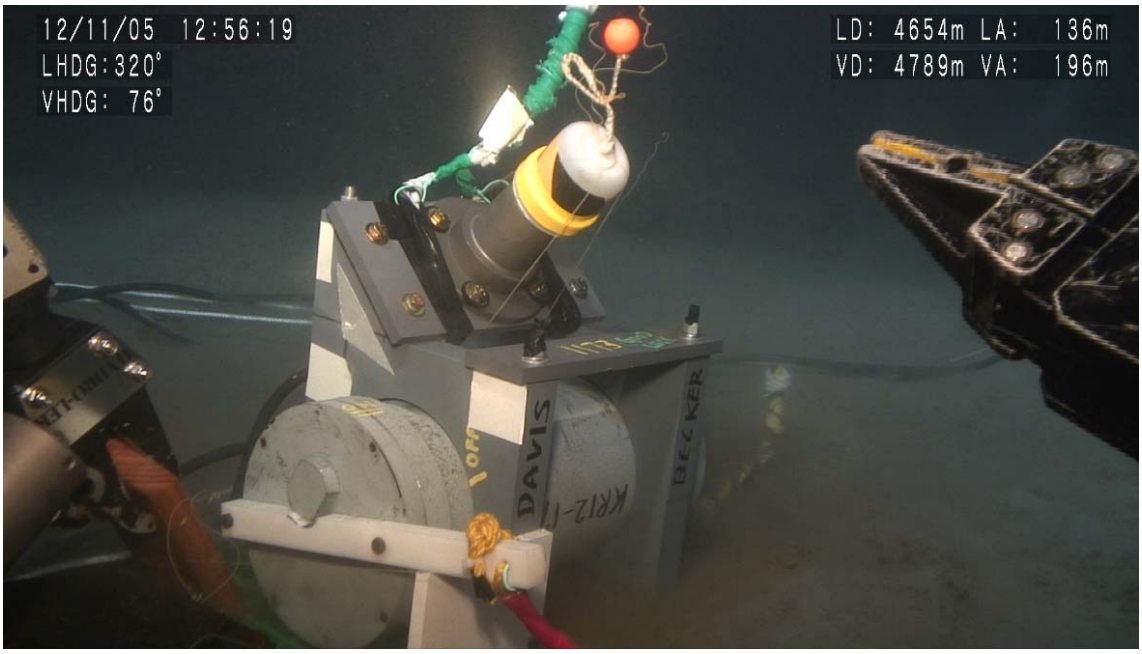
Installation of the Extension Module during dive 583. 2: Extending the cable



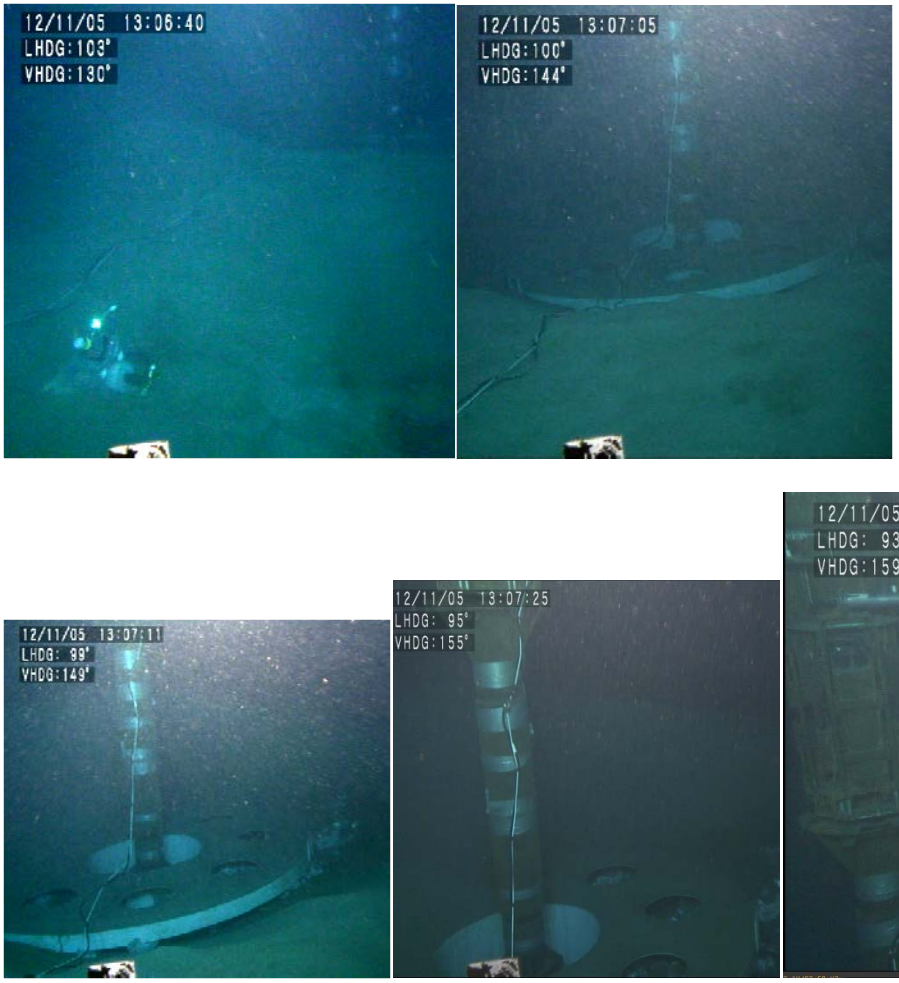
Installation of the Extension Module during dive 583. 3: Holding the ACORK with both manipulators..



Installation of the Extension Module during dive 583. 4: Extension connector is connected to the ACORK.

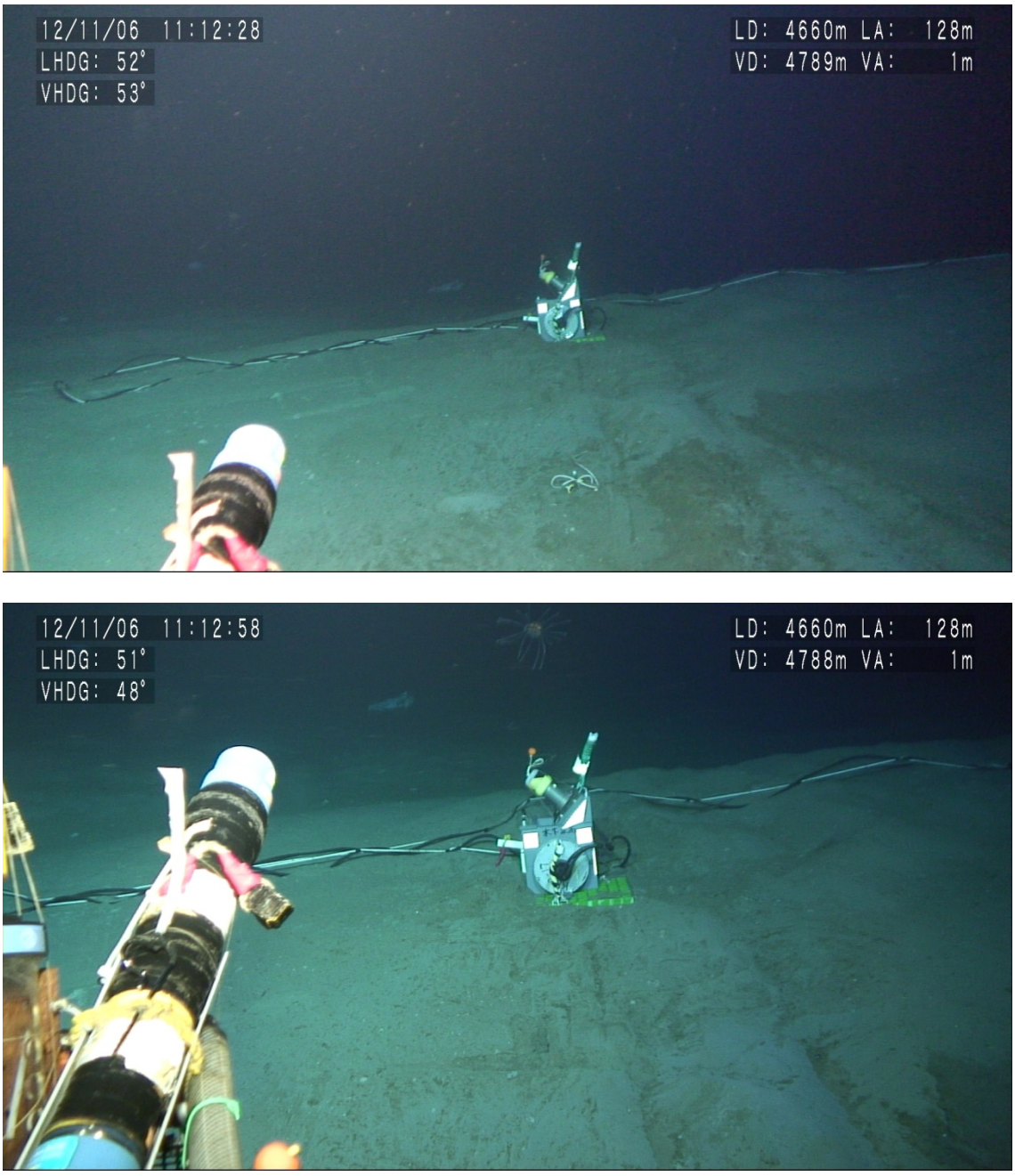


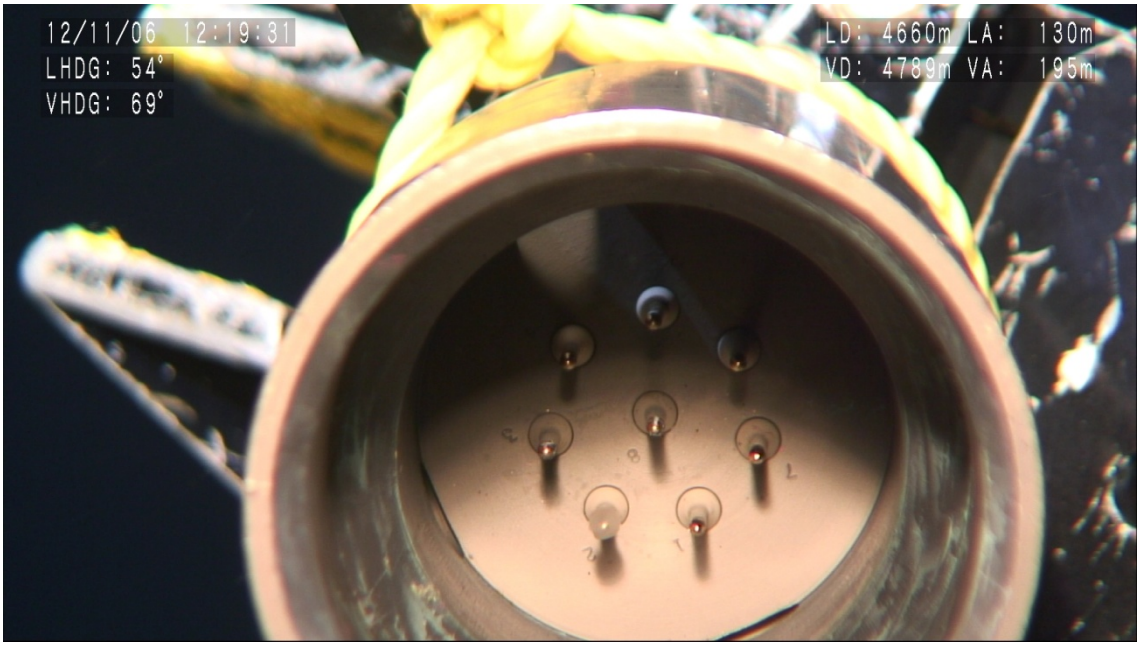
Installation of the Extension Module during dive 583. 5: Mercury switch is now ON.



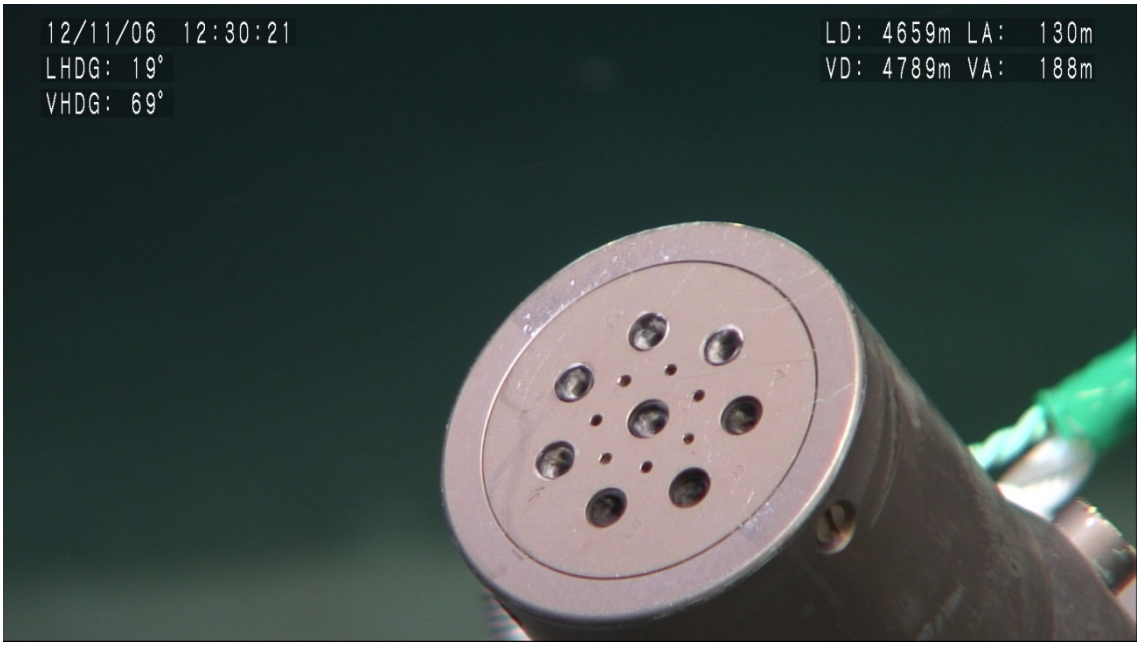
Overall view of the extension module at ACORK 1173B.

Side view of the Extension Module (left) at ACORK 1173B (right).

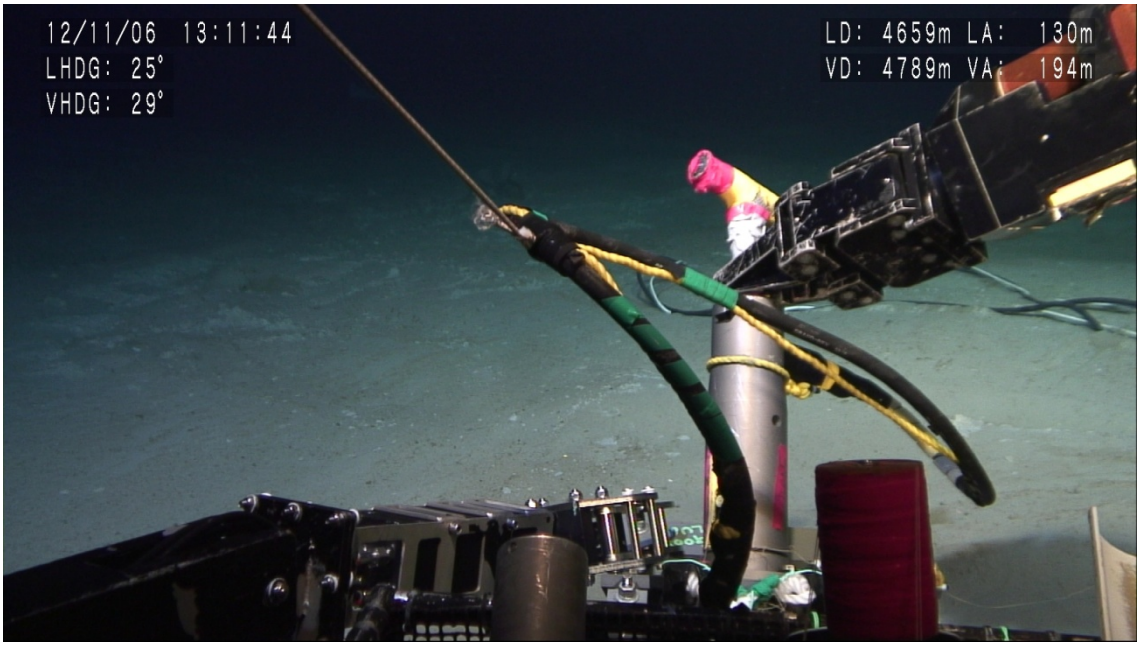




Blowup of the ROV connector. Note that pin #2 is surrounded by some dust-like material, indicating a corrosion.

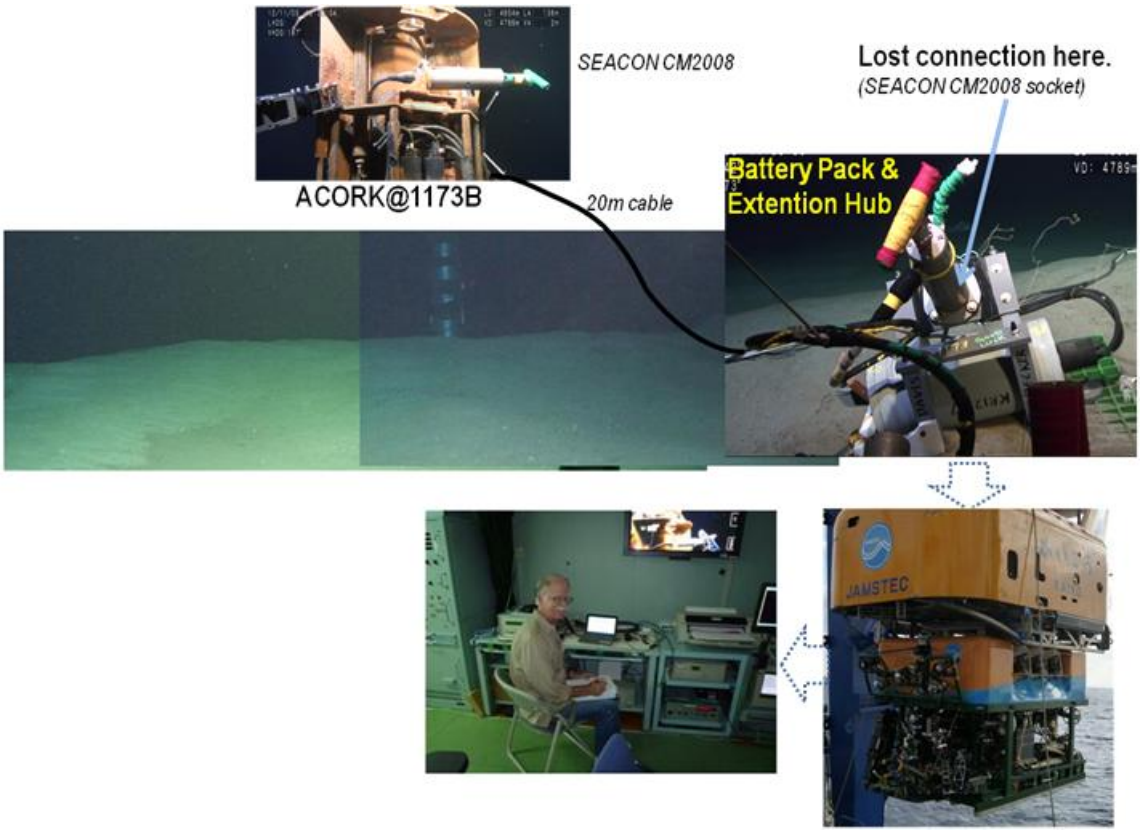


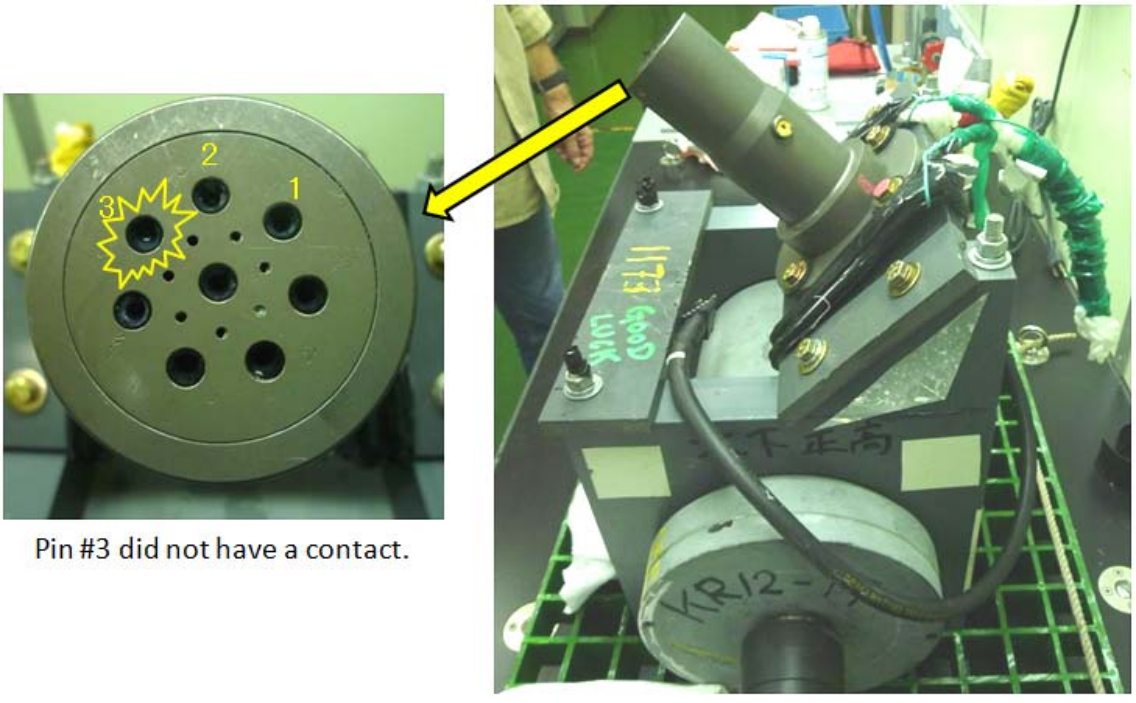
Receptacle (female) attached to the Extension Module.



Trying to connect the Extension Module with some difficulty.

Connector pin of the SEACON ROV connector examined after dive 583.



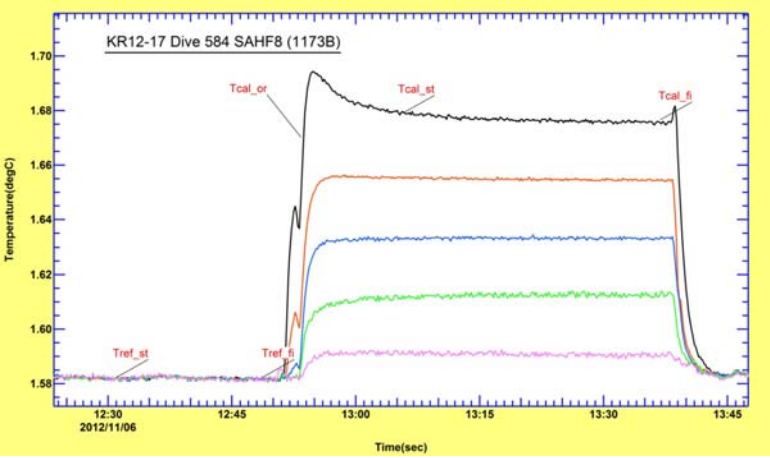


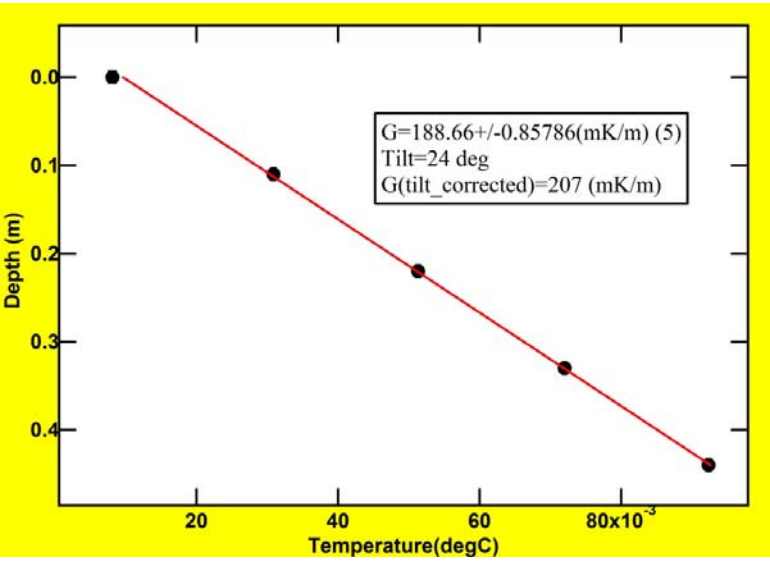
Pin #3 did not have a contact.

(Top) Overview of 1173 extension system. (Bottom) SEACON CM2008 socket attached to the battery pack & extension hub module.

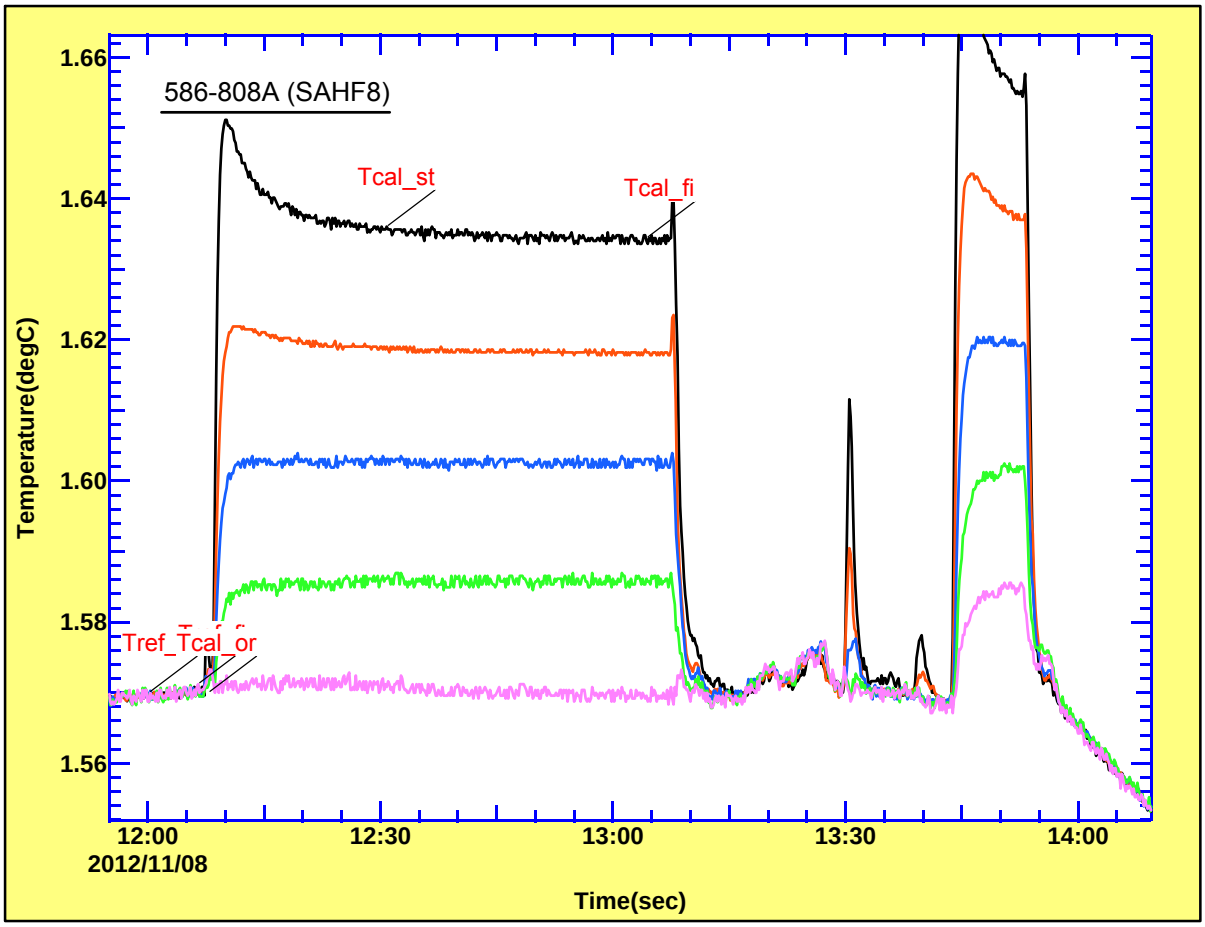
4-2. Heat flow measurements

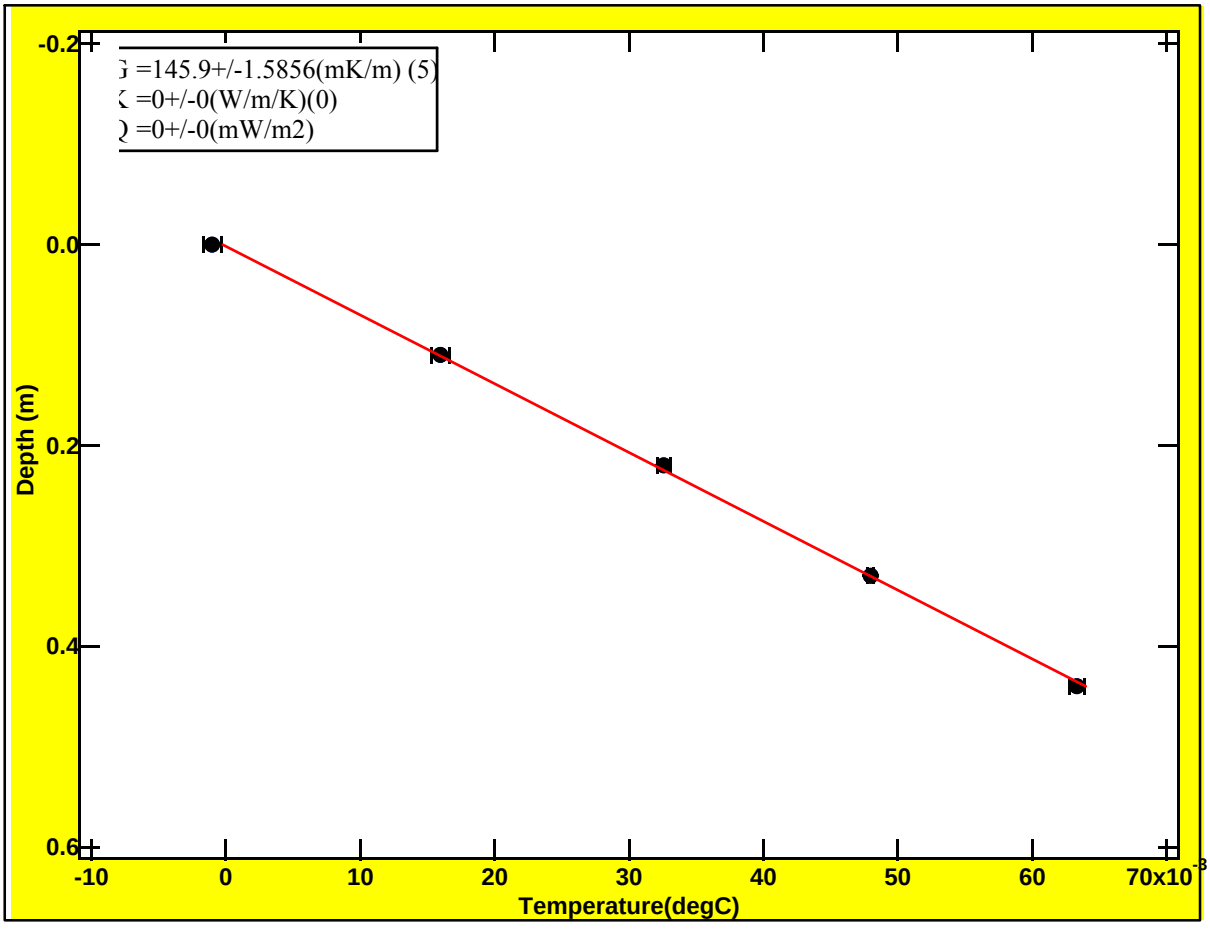
During dive 584 at Hole 1173B, one heat flow measurement was 'accidentally' made by the battery module which is located =10 m north of ACORK. Obtained geothermal gradient is 207 mK/m, after corrected for the instrument tilt. Assuming a surface thermal conductivity of 0.9 W/m/K, this gives a surface heat flow of 186 mW/m^2. This value is consistent with that obtained at Hole 1173B (180 mW/m^2) (Leg 196 Shipboard Scientific Party, 2001).

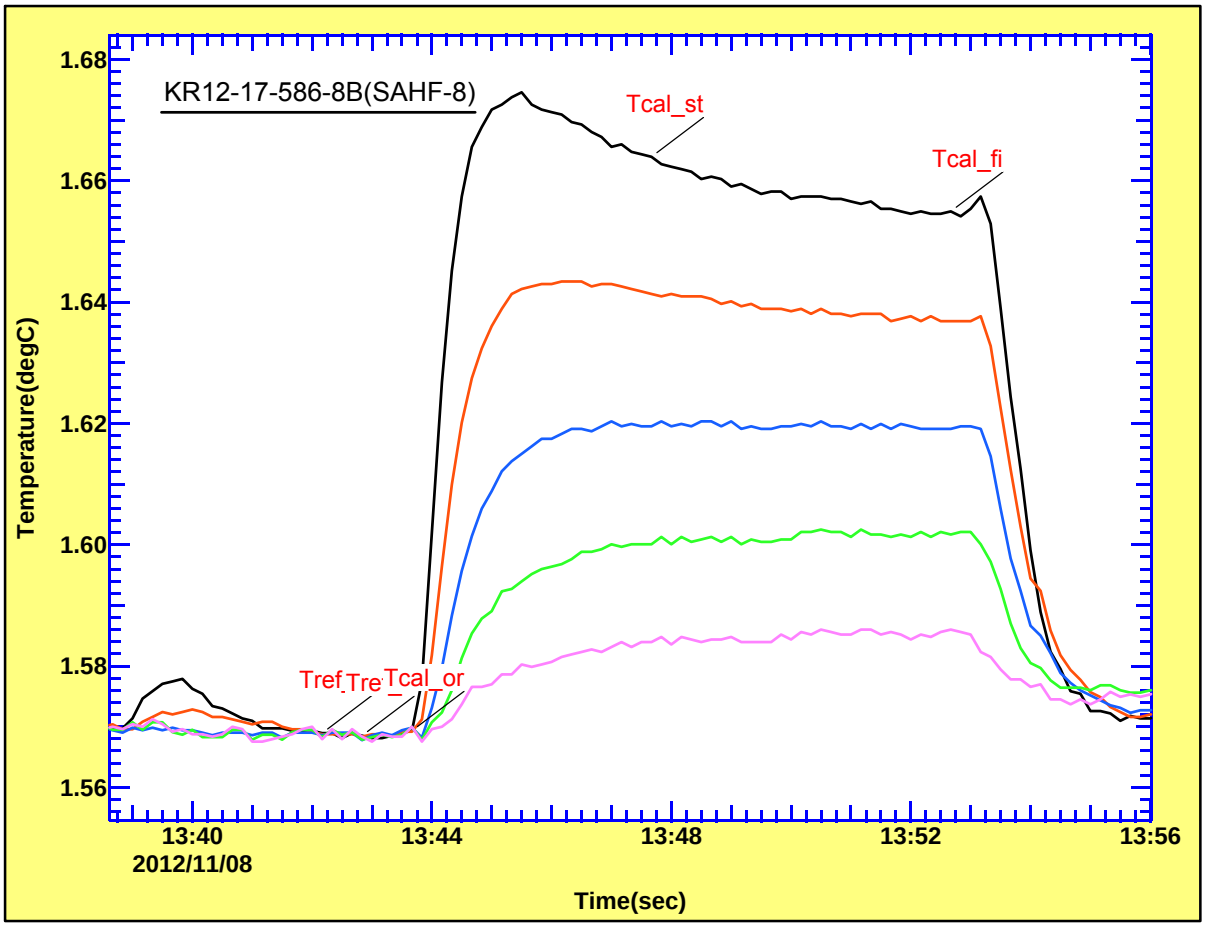


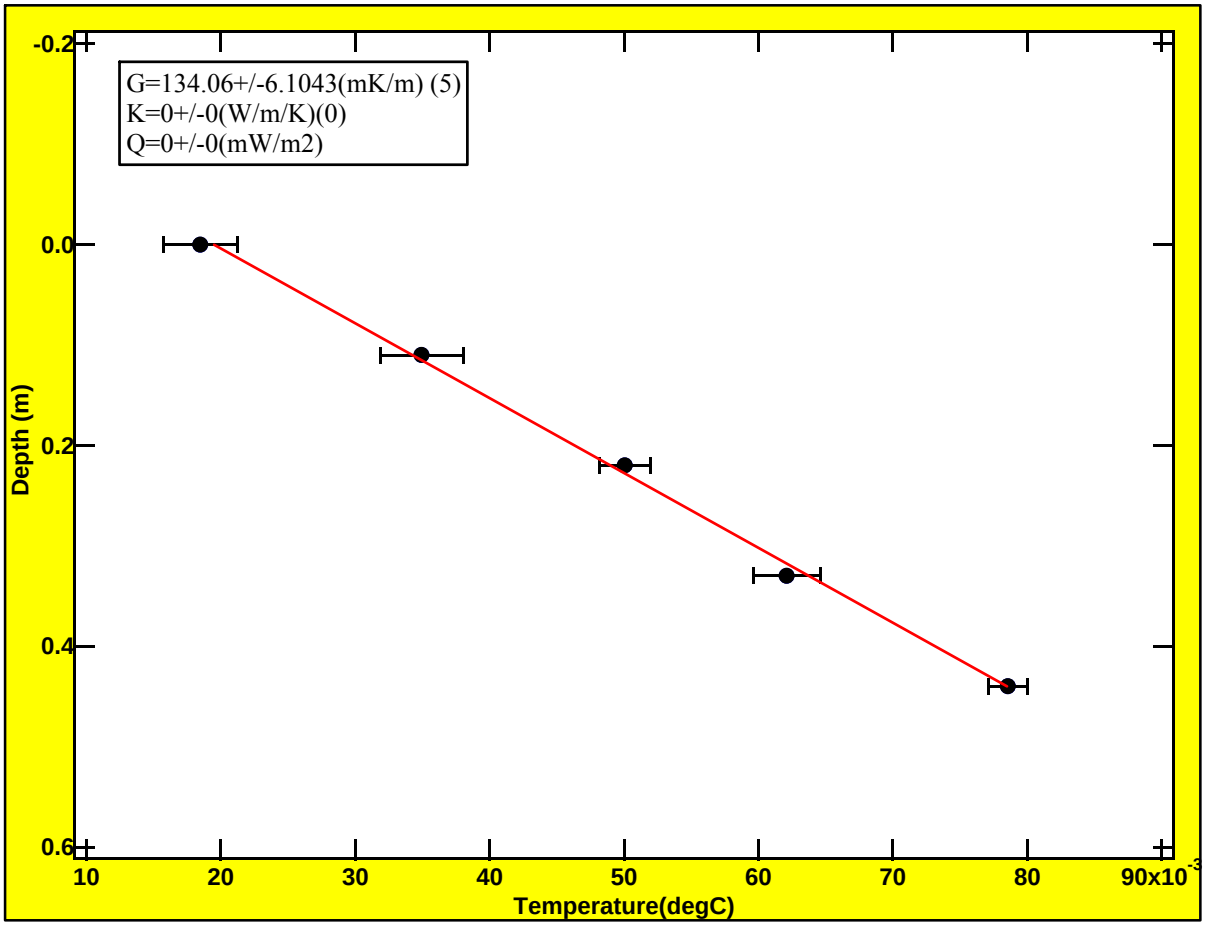


Shipboard Scientific Party (2001), 4. Site 1173, in Moore, G.F., Taira, A., and Klaus, A., et al., 2001, Proceedings of the Ocean Drilling Program, Initial Reports Volume 190.


586-808A (SAHF8)
Tcal_st
Tcal_fi
Tref_Tcal_or
1.66
1.64
1.62
1.60
1.58
1.56
Temperature(degC)
12:00
2012/11/08
12:30
13:00
13:30
14:00
Time(sec)


=145.9+/-1.5856(mK/m) (5)
=0+/-0(W/m/K)(0)
=0+/-0(mW/m2)
-0.2
0.0
0.2
0.4
0.6
Depth (m)
-10
0
10
20
30
40
50
60
70x10
Temperature(degC)


KR12-17-586-8B(SAHF-8)
Tcal_st
Tcal_fi
Tref
Tre
Tcal_or
1.68
1.66
1.64
1.62
1.60
1.58
1.56
Temperature(degC)
13:40
2012/11/08
13:44
13:48
13:52
13:56
Time(sec)


G=134.06+/-6.1043(mK/m) (5)
K=0+/-0(W/m/K)(0)
Q=0+/-0(mW/m2)
-0.2
0.0
0.2
0.4
0.6
Depth (m)
10
20
30
40
50
60
70
80
90x10-3
Temperature(degC)

Nov. 8, 2012 (Photo by Satomi)