Preliminary Report of The Hakuho Maru Cruise KH-12-4 (BIG DIPPER Expedition)

August 23, 2012 to October 3, 2012

Zonal Studies on Biogeochemistry of Trace Elements and Isotopes in the Sub-Arctic North Pacific Ocean (GEOTRACES)

Atmosphere and Ocean Research Institute
The University of Tokyo
2012

by
The Scientific Members of the Expedition
Edited by
Toshitaka GAMO

Preliminary Report of The Hakuho Maru Cruise KH-12-4 (**GEOTRACES** cruise in the north Pacific Ocean): BIG DIPPER Expedition

August 23, 2012 --- October 3, 2012

Contents

1. Introduction

The *Hakuho Maru* KH-12-4 cruise, which consisted of the following two legs, were conducted from 23 August 2012 to 3 October 2012 (43 days in total, including an extra day due to the passage of the International Date Line) in the northern North Pacific Ocean. We nickname this cruise "Big Dipper (BD) Expedition".

Leg-1: Tokyo, Japan (23 Aug. 2012) to Dutch Harbor, USA (13 Sept. 2012)
Leg-2: Dutch Harbor, USA (17 Sept. 2012) to Vancouver, Canada (3 Oct. 2012)

In the original plan, the departure date from Dutch Harbor was 16 Sept. 2012, but it was postponed to 17 Sept. 2012, because of a severe sea state southeast of Dutch Harbor.

This cruise has been internationally authorized as the GEOTRACES zonal study in the North Pacific Ocean (GP02). GEOTRACES is a "New Wave" of global marine geochemical studies, started in 2006 as one of the large-scale international programs sponsored by SCOR (Scientific Committee on Oceanic Research). GEOTRACES means an international study of the marine biogeochemical cycles of trace elements and their isotopes (TEIs) with a global point of view. The determination of trace elements has recently become a central focus of many research programs that seek information on the biogeochemical processes in the ocean. The study of TEIs has graduated from a curiosity to understand how the chemical diversity of trace elements, in their various redox and chemical ~~speciation~~ states, interacts with the physical and biological processes occurring in the ocean. This is particularly important in the case of micronutrients such as Fe, whose oceanic distributions seem to be a crucial link to climatic processes. Together with other biologically required TEIs, perturbations of their cycles induced by the climate change may have fundamental consequences for the global carbon cycle, which is firmly associated with global climate. Although our knowledge on the behavior of TEIs in the ocean is fairly small at the present stage, recent advances on analytical and clean sampling techniques have just enabled us to get precise information on TEIs in the ocean, which is the powerful background to initiate a new international program, GEOTRACES.

This cruise aimed at establishing the first 2-dimensional profiles of GEOTRACES trace elements and isotopes (TEIs) in the northern (subarctic) North Pacific, in order to advance ocean sciences on trace elements and isotopes as mentioned above. We conducted various observations and studies on marine geochemical processes and ocean flux in the North Pacific Ocean. Our ability to predict the future environmental change caused by the global warming depends upon knowledge on the distribution of biologically important chemical species in the ocean and their exchange flux at the air-sea and sediment-water interfaces. The Pacific Ocean occupies a vast area of the world ocean, but little is known about the marine biogeochemical cycles on TEIs. This cruise occupied an important part of the northern North Pacific, known as a typical HNLC zone. Some radioisotopes are associated with the accident at Fukushima nuclear power plant on March 11, 2011. Submarine hydrothermal activity at Juan de Fuca Ridge is an important target as a significant source of trace metals from lithosphere to seawater. In order to pursue these purposes, seawater samples were taken from surface to bottom by clean CTD hydrocasts (12L Niskin-X bottles) using a Ti-armored cable and a large volume (250L) water sampling system. Bottom sediments were also sampled by using a multiple corer. *In situ* samplings and measurements were also performed. Measurements of chemical constituents and isotopes were and will be performed in clean rooms on board the ship and in shore-based laboratories. In addition, we conducted inter-calibration studies, by comparing the GEOTRACES-recommended K~~k~~evlar wire hydrocast with the R/V *Hakuho Maru*'s titanium wire hydrocast. We visited one baseline station, K2 at (47°N, 160°E) in the northwest Pacific Ocean, taking seawater samples not only for shipboard scientists but also for other international scientists who will be interested in measuring some of the GEOTRACES key parameters for intercomparison. Although It is a pity that we had to significantly modify the planned zonal line along 47°N in the northeast Pacific due to too severe weather condition, we (33 scientists and technical supporting staffs (including graduate students) from various universities and research institutes in Japan) did our best to pursue international collaborative studies on GEOTRACES. We hope that the obtained data by this cruise will play an important role in the GEOTRACES program as a first zonal data in the northern North Pacific Ocean.

It is our great pleasure to thank Captain Takatoshi Seino, the officers and crew of R.V. *Hakuho Maru* for their invaluable collaboration in the successful conduct of all shipboard works. Sincere thanks are also due to Office for Cruise Coordination of Ocean Research Institute, the University of Tokyo, and Research Vessel Operation Department of Japan Agency for Marine-Earth Science and Technology (JAMSTEC) for their great efforts to support the cruise.

Toshitaka Gamo (Chief Scientist)
and the Shipboard Scientific Party

2. Caution about the cruise data

2.1. General rules

Data in this preliminary report should be treated as carefully as possible, in order to protect the priority of the participants of the KH-12-4 cruise.

Confidential and publication policies are as follows, mainly according to the data policy provided by the Steering Committee on Cooperative Studies using research vessels Hakuho Maru and Tansei Maru:

(1) No one other than the cruise participants can submit papers or give oral presentations using any data in this report within two years after the end of the cruise.

(2) Although all data included in this report is common to the cruise participants, primary investigators of each study item have higher priority to use them.

(3) Any information on the release of the cruise data (oral presentations, publications of papers, etc.) by the cruise participants should be sent to the chief scientists and the Office for Cruise Coordination of Ocean Research Institute, the University of Tokyo.

(4) Any questions or problems on the publication policy should be forwarded to the chief scientists.

There may be some misprints or mistakes to be corrected later in this report. If any misprint or mistake is found, kindly inform the chief scientists, who are responsible for distributing the correct data to the cruise participating GEOTRACERS.

2.2. GEOTRACES Data Policy (from http://www.bodc.ac.uk/geotraces/data/policy/)

GEOTRACES seeks, on the one hand, protection of the intellectual effort and time of originating investigators (those who plan an experiment, collect, calibrate, and process a data set to answer some questions about the ocean), and on the other hand, the need to compare various data sets and data types to check their consistency, to better understand the ocean processes involved, and to see how well the numerical models describe the real ocean. We stress that data will not be released within the proprietary period (see below) without the permission of the originator.

Data/Metadata Submission (timeline):

- As soon as a cruise is organised: **Precruise metadata** to be submitted to GEOTRACES IPO and GDAC.
- Within one week of cruise completion:
  Submit Postcruise metadata forms from chief scientist

Submit electronic versions (scanned or original) of event log and log sheets

Submit copy of **ROSCOP/CSR** form where one is required by ship operator

- Within 6 months of end of cruise:

  Chief scientist submits cruise report, where one is required by ship operator.

  Data and metadata for shared ancillary parameters (e.g., nutrients) submitted to DAC*.

  Submit CTD and underway data (both raw and processed files; sensor information and calibration) to national DAC (e.g., BCO-DMO) and BODC.

- As soon as possible, after the proprietary period (see below):

  Submit all data sets and accompanying metadata to DAC*

(*DAC: In most cases, data will be submitted initially to a national data centre (DAC). Where no national DAC is available, information should be submitted directly to the GDAC at BODC. In case of Japan, JODC plays a role as DAC.)

Data Access (timeline):

- Precruise metadata will be publicly accessible (GDAC web site) as soon as it is available
- Any metadata and data produced during the cruise/process study should be made available to participating scientists immediately in preliminary form during the cruise/process study.
- Any data generated from a cruise and submitted to the DAC will be password protected and available only to registered users (data originators and their designated collaborators) until the public release date.

Prior to public release, all data will be considered preliminary. Data should be shared with other cruise/process study participants as soon as they become available during or after a cruise or process study, to enable data synthesis to proceed rapidly, with the understanding that the data are the proprietary material of the originating scientist and may not be used without their permission. However, for non-participating scientists the data can be obtained only with the permission of the responsible participating scientist.

Proprietary period

Most nations have rules about data release that are imposed by funding agencies. GEOTRACES will adhere to these rules. In addition, we expect that all data will be released within two years of data generation, or at the time of publication (whichever is sooner). Exceptions are possible in the case of data forming a part of a student's thesis.

Adherence to this data policy is expected of all scientists participating in national and international GEOTRACES activities. Exceptions to this GEOTRACES policy may be allowed; e.g., where the policy is overridden by national constraints on data access.

3.1. KH-09-5　List of scientists

	Family name	Given name	Affiliation	Leg-1	Leg-2
1	GAMO	Toshitaka	Univ. Tokyo	◎	◎
2	OBATA	Hajime	Univ. Tokyo	○	○
3	NAKAYAMA	Noriko	Univ. Tokyo		○
4	ISHIGAKI	Hideo	Univ. Tokyo	○	○
5	TAKEUCHI	Makoto	Univ. Tokyo	○	○
6	KIM	Tae Jin	Univ. Tokyo	○	○
7	SUZUKI	Asami	Univ. Tokyo	○	○
8	TAKAHASHI	Samiko	Univ. Tokyo	○	○
9	OOKI	Mitsuhiro	Univ. Tokyo	○	○
10	NISHIOKA	Jun	Hokkaido Univ.	○	○
11	TANAKA	Minako	Hokkaido Univ.	○	
12	KANNA	Naoya	Hokkaido Univ.		○
13	TAZOE	Hirofumi	Hirosaki Univ.	○	○
14	HORIKAWA	Keiji	Univ. Toyama	○	○
15	ANDREAS	Roy	Univ. Toyama	○	○
16	NAGAI	Hisao	Nihon Univ.	○	
17	YAMAGATA	Takeyasu	Nihon Univ.	○	○
18	HASEGAWA	Akira	Nihon Univ.	○	○
19	KATO	Yoshihisa	Tokai Univ.	○	○
20	MINAMI	Hideki	Tokai Univ.	○	○
21	OBA	Takafumi	Tokai Univ.	○	○
22	SAWAZAKI	Kazuya	Tokai Univ.	○	○
23	TAKANO	Shotaro	Kyoto Univ.	○	○
24	KONAGAYA	Wataru	Kyoto Univ.	○	○
25	TAKEDA	Koichi	Kinki Univ.	○	○
26	ISSHIKI	Kenji	Univ. Kochi Pref.	○	
27	IWATA	Toru	Okayama Univ.	○	○
28	SAKATA	Kohei	Hiroshima Univ.	○	○
29	MUKAE	Yuichi	Nagasaki Univ.	○	○
30	NAOE	Rumi	Nagasaki Univ.	○	○
31	YAMASHITA	Nobuyoshi	Natl. Inst. Adv. Ind. Sci. Tech.		○
32	OMORI	Yuko	Natl. Inst. Environ. Sci.	○	○
33	HATAKEYAMA	Ei	Marine Works Japan Ltd.	○	○
				30	29

3.2. Sharing of the shipboard works

Leg. 1

Sampling group

1) CTD-CMS

1-1. Routine sampling: K. Isshiki*, T. Iwata, Y. Oomori, M. Takeda, R. Naoe, T. Oba, K. Sawazaki

1-2. Clean sampling: H. Obata*, J. Nishioka, T. J. Kim, A. Suzuki, S. Takahashi, S. Takano, W. Konagaya, M. Tanaka, Y. Mukae

2) Large volume sampling: H. Nagai*, H. Tazoe, T. Yamagata, A. Hasegawa, K. Sakata, M. Ooki

3) Muliple-Corer sampling: H. Minami*, Y. Kato, K. Horikawa, T. Oba, K. Sawazaki, R. Andreas

4) Flux Bouy: T. Iwata*, Y. Oomori

5) In-situ filtration: J. Nishioka*, M. Tanaka

6) Clean Hydrocast Sampling: J. Nishioka*, H. Obata, T. J. Kim, Y. Mukae, M. Tanaka

Group for Routine Analyses

1) Salinity: H. Obata*, H. Nagai, Y. Kato, H. Tazoe, S. Takano

2) Dissolved Oxygen: Y. Oomori*, T. Iwata, K. Horikawa, T. Yamagata, T. J. Kim, S. Takahashi

3) Nutrients: M. Takeda*, K. Sawazaki, T. Oba

4) Chlorophyll a.: K. Isshiki*, J. Nishioka, A. Suzuki, Y. Mukae, R. Naoe

5) pH/Alkalinity: T. Gamo*, M. Tanaka, M. Ooki, A. Hasegawa, K. Sakata, R. Andreas, W. Konagaya

*: Leader

Leg. 2

Sampling group

1) CTD-CMS

1-1. Routine sampling: N. Nakayama*, T. Iwata, Y. Oomori, M. Takeda, R. Naoe, T. Oba, K. Sawazaki, N. Yamashita

1-2. Clean sampling: H. Obata*, J. Nishioka, T. J. Kim, A. Suzuki, S. Takahashi, S. Takano, W. Konagaya, N. Kanna, Y. Mukae

2) Large volume sampling: H. Tazoe*, T. Yamagata, A. Hasegawa, K. Sakata, M. Ooki

3) Muliple-Corer sampling: K. Horikawa*, Y. Kato, T. Oba, K. Sawazaki, R. Andreas

4) Flux Bouy: T. Iwata*, Y. Oomori

5) In-situ filtration: J. Nishioka*, M. Tanaka

6) Clean Hydrocast Sampling: J. Nishioka*, H. Obata, T. J. Kim, Y. Mukae, N. Kanna

7) GAMOS: H. Obata*, S. Takahashi

Group for Routine Analyses

1) Salinity: H. Obata*, Y. Kato, H. Tazoe, S. Takano, N. Kanna

2) Dissolved Oxygen: N. Nakayama*, Y. Oomori, T. Iwata, K. Horikawa, T. Yamagata, T. J. Kim, S. Takahashi

3) Nutrients: M. Takeda*, K. Sawazaki, T. Oba

4) Chlorophyll a.: J. Nishioka*, A. Suzuki, Y. Mukae, R. Naoe , N. Yamashita

5) pH/Alkalinity: T. Gamo*, M. Ooki, A. Hasegawa, K. Sakata, R. Andreas, W. Konagaya

*: Leader

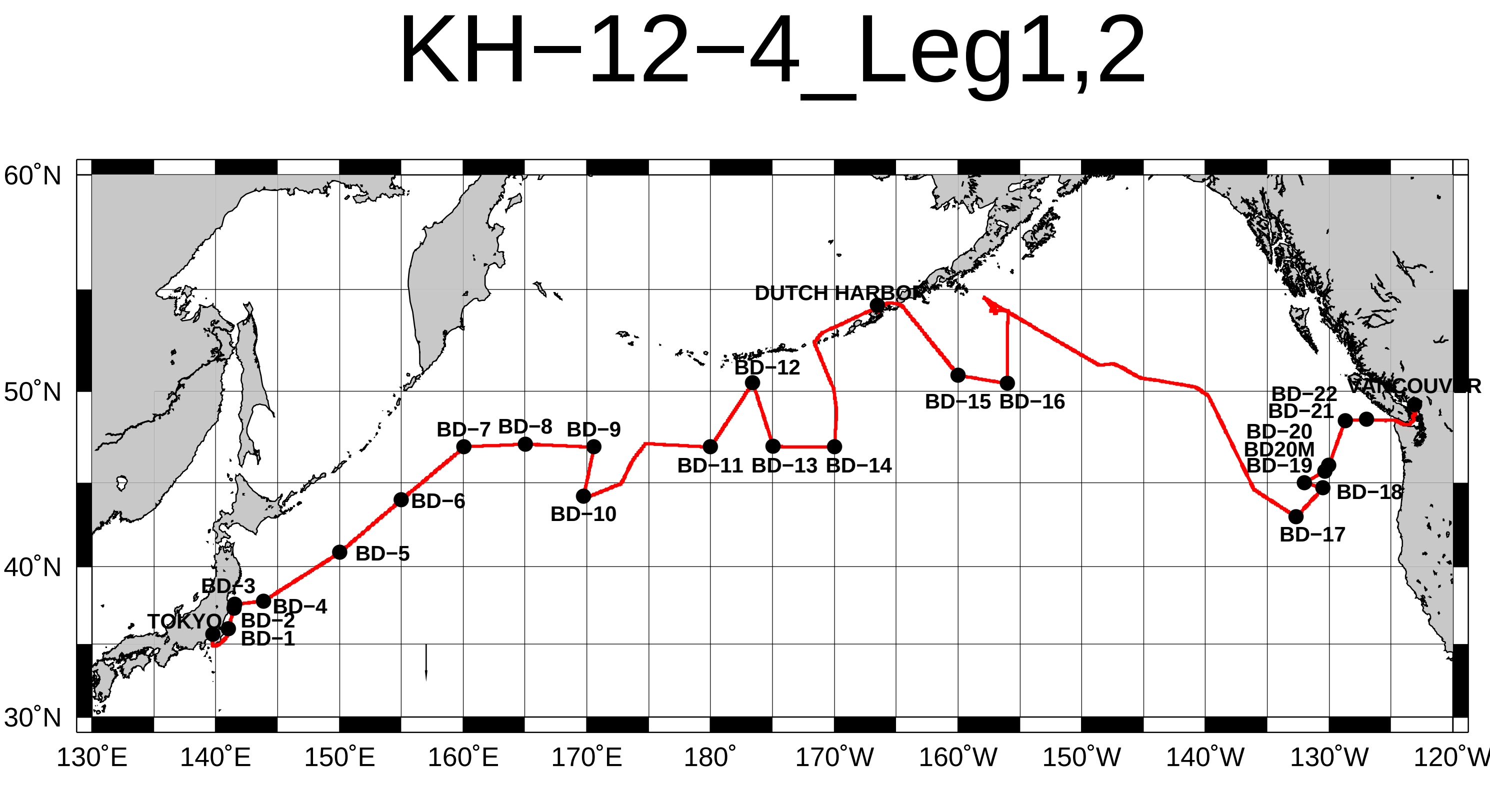
3.3. KH-12-4 List of crew

	Family name	Given name	Rating	Leg-1	Leg-2
1	SEINO	Takatoshi	Master	○	○
2	OKUBO	Suguru	Chief Officer	○	○
3	KIYOMIYA	Tomonori	First Officer	○	○
4	SATO	Makoto	Second Officer	○	○
5	OHARA	Toshiyo	Junior Second Officer	○	○
6	OZAKI	Nana	Third Officer	○	○
7	SHIOJIMA	Tsubasa	Junior Third Officer	○	○
8	SUZUKI	Akira	Boatswain	○	○
9	HATTORI	Minoru	Associate Boatswain	○	○
10	NISHIDATE	Shintaro	Associate Boatswain	○	○
11	URABE	Tsuyoshi	Associate Boatswain	○	○
12	OGAWA	Hiroyuki	Quartermaster A	○	○
13	YAMAZAKI	Myuta	Quartermaster B	○	○
14	HANAZAWA	Jiro	Quartermaster C	○	○
15	MIURA	Shun	Sailor	○	○
16	TAKAHASHI	Yoshimitsu	Chief Engineer	○	○
17	FUNATSU	Hironori	First Engineer	○	○
18	YAMANE	Tsukasa	Junior First Engineer	○	○
19	MIYAMOTO	Goro	Second Engineer	○	○
20	YAMAMURA	Takatoshi	Junior Second Engineer	○	○
21	USAMI	Koichi	Third Engineer	○	○
22	NAKAJIRI	Kenji	No. 1 Oiler	○	○
23	ISHII	Yoshihiko	No. 2 Oiler	○	○
24	YOSHIDA	Minoru	No. 3 Oiler	○	○
25			No. 4 Oiler		
26	YAMANAKA	Takahiro	No. 5 Oiler	○	○
27	TANIGUCHI	Keiya	No. 6 Oiler	○	○
28	WATANABE	Takuya	No. 7 Oiler	○	○
29	SHIBATA	Kyohei	Machine Man	○	○
30	MAKI	Tetsuji	Chief Electronics Officer	○	○
31	MORI	Hiroyasu	Electronics Officer	○	○
32			Ship's Doctor		
33	SAKUMA	Seizo	Chief Steward	○	○
34	HAYASHI	Takumi	Associate Steward	○	○
35	SAITO	Akihide	Steward	○	○
36	OHYU	Shinobu	Steward	○	○
37	HIDAKA	Yoshie	Steward	○	○
				35	35

4. Track and station list

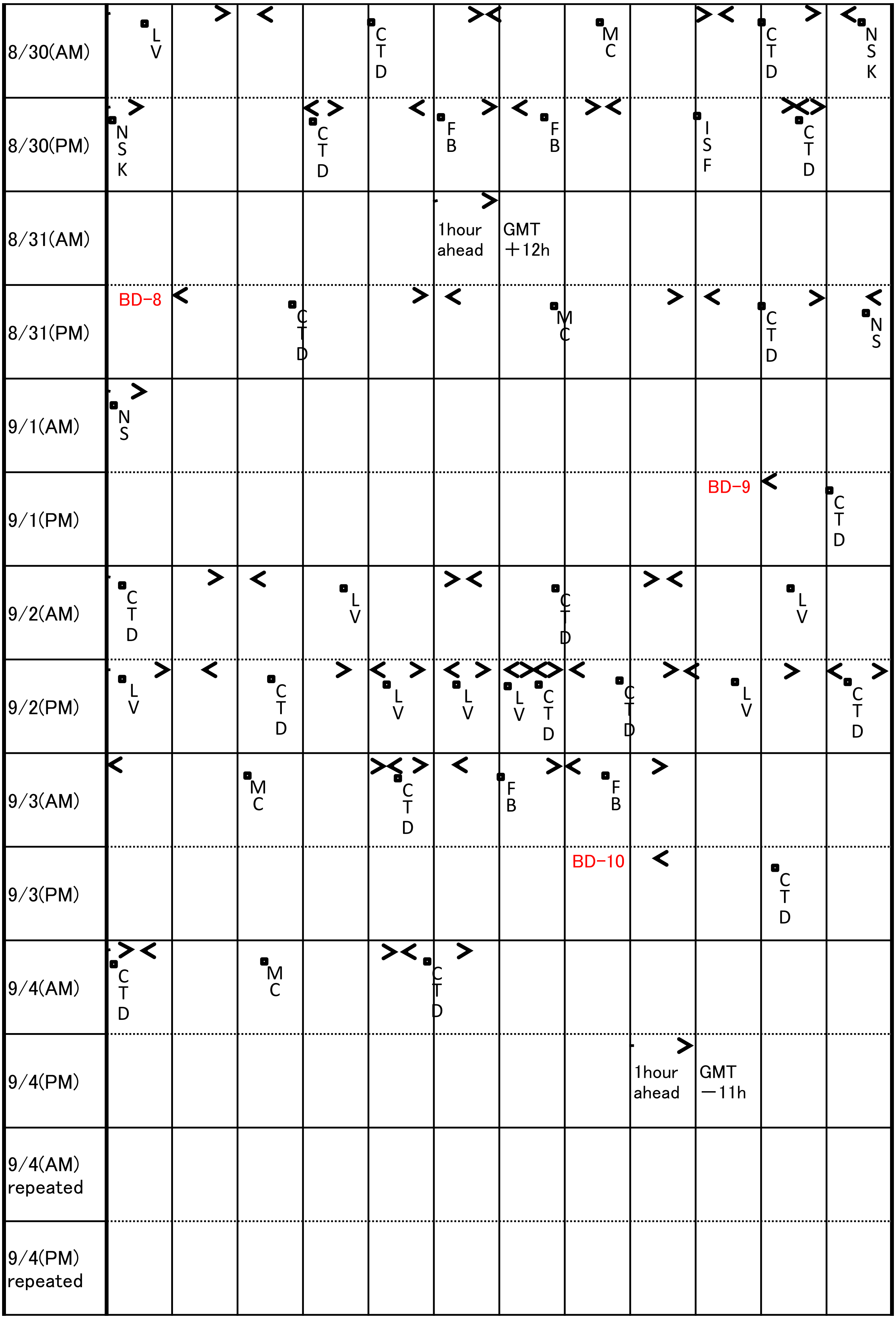
4.1. List of stations

KH-09-5	Station	Location	Location	Depth	Dates	CTD	Kevlar	Ti wire	GAMOS	In situ	Large	Multiple	Flux Buoy	Remarks
	No.	(Latitude)	(Longitude)	(m)		Hydrocast	Hydrocast	Hydrocast		Filtration	Volume	Coring	Observation	
	Tokyo	36°N	140°E											
(Leg-1)	BD-1	36°00'N	141°01'E		23 Aug.	○					○	○		Tansei-K2
	BD-2	37°20'N	141°27'E		24 Aug.	○					○	○		Mirai-D2
	BD-3	37°35'N	141°31'E		24 Aug.	○					○	○		Mirai-D1
	BD-4	37°49'N	143°54'E	7058	24-25 Aug.	○					○	○		TR-17 (KH-11-7)
	BD-5	40°50'N	150°00'E	5247	26 Aug.	○					○	○		
	BD-6	44°00'N	155°00'E	5300	27 Aug.	○						○		KNOT
	BD-7	47°00'N	160°05'E	5238	28-30 Aug.	○	○			○	○	○	○	K2
	BD-8	47°10'N	165°00'E	5918	31 Aug.	○		○				○	○	
	BD-9	47°00'N	170°35'E	6288	1-2 Sep.	○					○	○	○	GEOSECS-220, DR9
	BD-10	44°12'N	169°44'E	5836	3 Sep.	○						○		DR7
	BD-11	47°00'N	180°00'E	5586	5-7 Sep.	○	○	○		○	○	○	○	
	BD-12	50°26'N	176°35'W	7228	7-8 Sep.	○						○		GEOSECS-218
	BD-13	47°02'N	174°56'W	5297	9 Sep.	○						○	○	
	BD-14	47°00'N	170°00'W	5493	10-11 Sep.	○					○	○		
	Dutch Harbor	53°53'N	166°32'W											
(Leg-2)	BD-15	50°50'N	160°00'W	4853	19-20 Sep.	○					○	○		Free Fall (No.2 winch)
	BD-16	50°24'N	155°59'W	5142	20-21 Sep.	○						○		DR20
	BD-17	43°00'N	132°40'W	3732	27-28 Sep.	○	○	○	○	○	○	○	○	
	BD-18	44°41'N	130°30'W	2610	29 Sep.	○			○			○		Southern Juan de Fuca
	BD-19	45°00'N	132°00'W	3678	29 Sep.	○						○		
	BD-20M	45°39'N	130°21'W	2733	29 Sep.							○		
	BD-20	45°58'N	130°02'W	1600	30 Sep.	○								Axial Volcano
	BD-21	48°27'N	128°43'W	2438	30 Sep.- 1 Oct.	○						○		Mddle Valley
	BD-22	48°30'N	127°00'W	2411	1 Oct.	○						○		
	Vancouver	49°N	122°W											
Total						22	3	3	2	3	11	22	6	

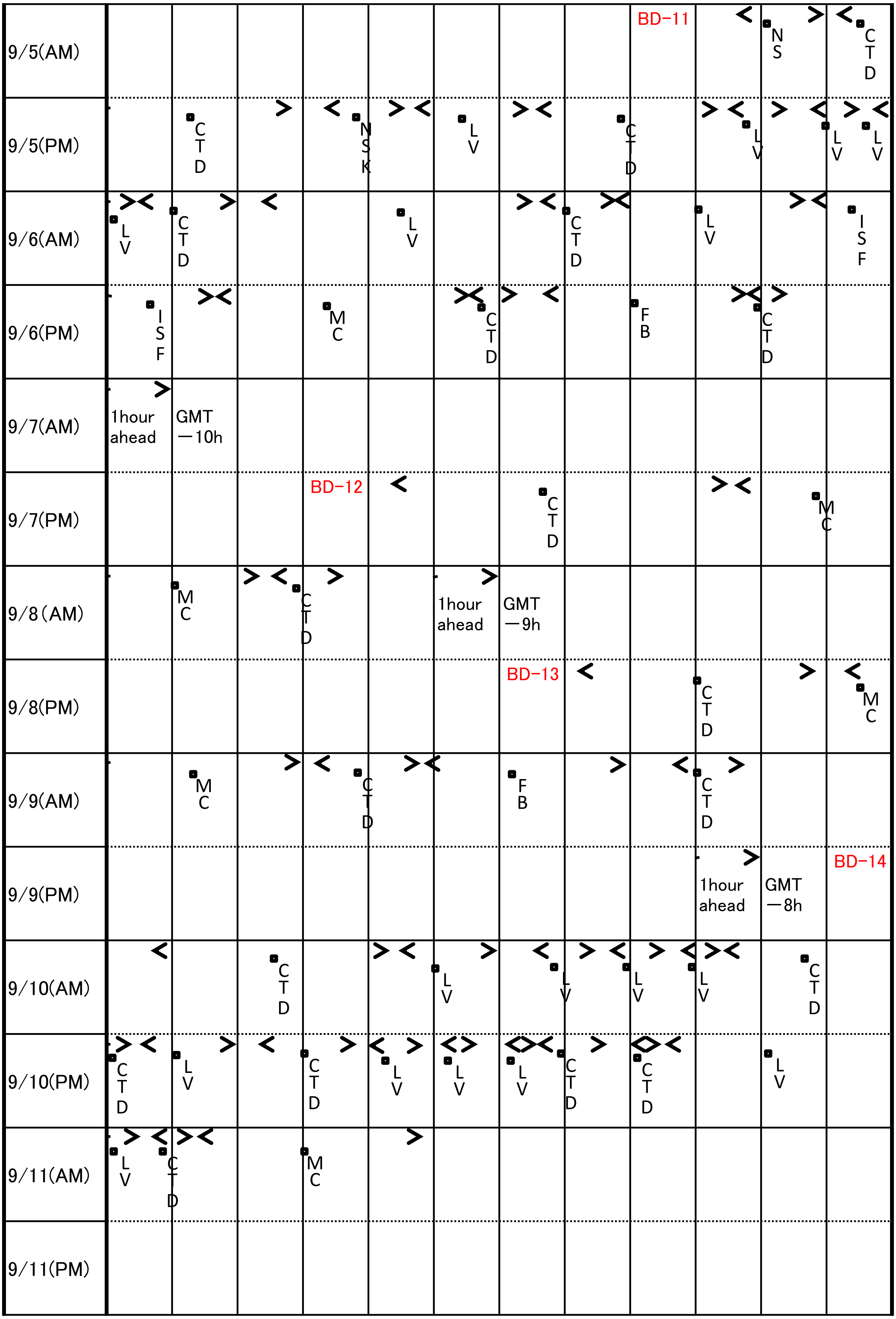

KH−12−4_Leg1,2
60°N
50°N
40°N
30°N
130°E
140°E
150°E
160°E
170°E
180°
170°W
160°W
150°W
140°W
130°W
120°W
TOKYO
BD−1
BD−2
BD−3
BD−4
BD−5
BD−6
BD−7
BD−8
BD−9
BD−10
BD−11
BD−12
BD−13
BD−14
DUTCH HARBOR
BD−15
BD−16
BD−17
BD−18
BD−19
BD20M
BD−20
BD−21
BD−22
VANCOUVER

5. Event log

	0	1	2	3	4	5	6	7	8	9	10	11
8/23(PM)	Harumi											
8/24(AM)	BD-1	< ■ LV	> < ■ CTD	> ◇ ■ LV	<> ■ MC					BD-2	< ■ LV	>< > ■ CTD
8/24(PM)	< > ■ MC	BD-3	< > ■ LV	< ■ CTD > ◇ ■ MC								BD-4
8/25(AM)	<			■ CTD		>	<	■ LV >	< > ■ LV	<	■ CTD	>
8/25(PM)	< > ■ LV	< ■ CTD	> <			■ MC		>		1hour ahead >	GMT +10h	
8/26(AM)												
8/26(PM)						BD-5	<		■ CTD		> <	■ LV >
8/27(AM)	< > ■ LV	< >< ■ LV	■ CTD >	<	■ MC		>					
8/27(PM)												
8/28(AM)		1hour ahead >	BD-6 GMT +11h	<	■ CTD		>	<	■ MC		> <	■ CTD >
8/28(PM)												
8/29(AM)							BD-7	<		■ CTD	>	< ■ LV >
8/29(PM)	< > ■ LV	◇◇ ■ LV ■ CTD			< ■ LV	> <	■ CTD >	<	■ LV		> < ■ CTD	> < ■ LV



8/30(AM)
8/30(PM)
8/31(AM)
8/31(PM)
9/1(AM)
9/1(PM)
9/2(AM)
9/2(PM)
9/3(AM)
9/3(PM)
9/4(AM)
9/4(PM)
9/4(AM) repeated
9/4(PM) repeated
1hour ahead
GMT +12h
BD-8
BD-9
BD-10
1hour ahead
GMT −11h
LV
CTD
MC
NSK
FB
ISF
NS


9/5(AM)
BD−11
NS
CTD
9/5(PM)
CTD
NSK
LV
CTD
LV
LV
LV
9/6(AM)
LV
CTD
LV
CTD
LV
ISF
9/6(PM)
ISF
MC
CTD
FB
CTD
9/7(AM)
1hour ahead
GMT −10h
9/7(PM)
BD−12
CTD
MC
9/8(AM)
MC
CTD
1hour ahead
GMT −9h
9/8(PM)
BD−13
CTD
MC
9/9(AM)
MC
CTD
FB
CTD
9/9(PM)
1hour ahead
GMT −8h
BD−14
9/10(AM)
CTD
LV
V
LV
LV
CTD
9/10(PM)
CTD
LV
CTD
LV
LV
LV
CTD
CTD
LV
9/11(AM)
LV
CTD
MC
9/11(PM)

9/12(AM)												
9/12(PM)												
9/13(AM)											Dutch Harbor	

- CTD: CTD
- LV: Large Volume Sampling
- MC: Multiple Corer
- NS: Niskin Sampling
- NSK: Niskin Sampling By Kevlar
- FB: Flux Buoy
- ISF: In–Situ Filtration

	0	1	2	3	4	5	6	7	8	9	10	11
9/17(AM)	Dutch Harbor											
9/17(PM)												
9/18(AM)												
9/18(PM)						BD-15		FF			CTD	
9/19(AM)	CTD		LV		CTD		LV	LV	LV	CTD		LV
9/19(PM)	LV		CTD		LV		CTD		MC		CTD	
9/20(AM)									BD-16		CTD	
9/20(PM)	CTD		MC			CTD						
9/21(AM) ～ 9/26(PM)	bad sea condition											
9/27(AM)		1hour ahead	GMT −7h					BD-17	NS		CTD	
9/27(PM)	NSK			LV	CTD	LV	CTD		LV		FB	
9/28(AM)	CTD	ISF			MC			GMS				
9/28(PM)							BD-18		CTD			GMS

9/29(AM)	GMS	MC						BD-19		CTD		MC
9/29(PM)	MC		CTD					BD-20M		MC		BD-20
9/30(AM)		CTD		GMS								
9/30(PM)			BD-21		CTD		MC					BD-22
10/1(AM)		CTD		MC								
10/1(PM)												
10/2(AM)												
10/2(PM)					Vancouver							

- FF No.2 Winch Free Fall
- FB Flux Buoy
- CTD CTD
- ISF In-Situ Filtration
- LV Large Volume Sampling
- GMS GAMOS
- MC Multiple Corer
- NS Niskin Sampling
- NSK Niskin Sampling By Kevlar

6. Explanatory notes

6.1. Research Vessel Hakuho-Maru

The Hakuho Maru (Japan Agency for Marine-Earth Science and Technology (JAMSTEC)) is equipped with the most up-to-date facilities for various researches in physical oceanography, chemical oceanography, marine biology, marine geology and geophysics, and fisheries, as well as the deck machinery for handling large observational tools and sampling gears. Main winches are housed under the working deck. The propulsion is dual with Diesel CPP and electric motor drives, which enables a cruising speed of 16 knot and precise maneuvering with use of bow and stern thrusters. Particulars of the Hakuho Maru are as follows:

Keel laid	9.May.88	Research equipment	
Launching	28.Oct.88	7 Winches (swell compensator for Nos. 1 & 2 Winches)	
Completion	1.May.89		No.1 Winch: 14f x15,000 m
Length (overall)	100.00 m		No.2 Winch: 8.15f x12,000 m (Titanium armoured)
Length (p.p.)	90.00 m		No.3 Winch: 6.4f x12,000 m (Titanium)
Breadth (molded)	16.20 m		No.4, 5, 7, 8 Winches
Depth (molded)	8.90 m	10 Laboratories	
Gross tonnage (JG)	3,987 T		No.1 & 3: Dry lab., No.2: RI lab., No.7: Wet lab.
Propulsion system	diesel/electric-motor driven		No.4: Clean room, No.5 & 6: Semi-dry lab.
Main engine	1,900 ps x 4 sets		No.10: Cold lab, etc.
Prop. Generator	1,085 kw x 2 sets	11 ton gantry	
Twin propellers, twin rudders		11 ton bean crane & 3 ton deck crane	
Main generator	715 KVA x 3 sets	Instruments	
Bow thruster	4.2 T x 2 sets		Seabeam, Subbottom profiler,
Stern thruster	6.8T x 1 set		Oceanfloor imaging system,
Cruising speed	16.0 kn		Air gun compressor,
Endurance	12,000 n.m.		Marine meteorological observation system,
Complement	89 (include. sci. 35)		Acoustic biomass investigation system,
Builder			Meteorological satellite receiving system,
Shimonoseki Shipyard & Engine Works			CTD/DO, Precise gyrocompass,
Mitsubishi Heavy Industries, Ltd.			Data processing system, etc.

Just before sailing from Pier Harumi, Tokyo Port, on Aug. 23, 2012.

6.2. Sampling technologies
6.2.1. Water sampling
6.2.1.1. CTD Carousel multi sampling (CTD-CMS)

The CTD-CMS (CTD-Carousel Multi Sampling System) used during the KH-12-4 cruise consists of the following instruments.

CTD fishes (Seabird, Model SBE-9-plus, pressure rating of 6800m or 10,000 m)
Five optional sensors:
- DO sensor (Seabird, SBE-43)
- Turbidity meter (SeaPoint)
- Fluorometer (Chelsea, Aquatracka Mk III)
- Carousel sampling system (Seabird, SBE-32)
- Altimeter (Teledyne Benthos, Model PSA-916T)

24 Niskin-X bottles (General Oceanics, 12-liter type)
Pinger (Benthos, 2216)

One of the two CTD fishes with different pressure ratings was properly chosen according to bottom depths of the stations. At stations BD-4 and BD-12, where the depths exceed 6,800 m, we used the fish with the pressure rating of 10,000 m. In this case, no optional sensor was attached to the fish because all the optional sensors have their maximum usable depths of 6,000 m. At other stations, the fish with the pressure rating of 6,800 m were used with full optional sensors except for station BD-9 where the depth exceeds 6,000 m.

The CTD-CMS system, attached at the end of the titanium armored cable (8mm o.d.) from the No.2 winch of R.V. *Hakuho Maru*, was controlled on board the ship by a CTD deck unit (Seabird, Model 11plus) connected with a WINDOWS desktop computer. CTD data were acquired and calculated using the software “SEASOFT” (Sea-bird Electronics, Inc.).

The Carousel array frame has a capability to hold 24 Niskin-X bottles with a volume of 12 liters. A pinger and an altimeter were installed on the CTD-CMS system to monitor the distance above the sea bottom. The deepest sample was usually taken at a depth of ~10 meters above the bottom. Water samples were taken by triggering the Niskin-X bottles at appropriate depths while the system was coming up to the surface.

In order to reduce the contamination level as low as possible, Niskin-X bottles were cleaned before the cruise, by filling the bottles with 1.5% Extran MA01 (1 day), 0.1M HCl (pH=1, 1day), and Milli-Q water (more than 2 days), successively. Teflon spigots were pre-washed by soaking in 1% of Extran MA02 (1 day) and 1M HCl(1 day), and cleaned by heating in conc.$HClO_4$:conc.H_2SO_4:conc.HNO_3=1:1:1 mixture (120ºC, 3 hrs), 6M HCl

(120ºC, 3 hrs), and Milli-Q water (100ºC, 3 hrs), successively. Viton O-rings were pre-washed by soaking in 1% of Extran MA02 (1 day) and 0.1M HCl (1 day), and cleaned by heating in 0.1M HCl (at 60°C, 12hrs), and Milli-Q water (at 68°C, 12 hrs).

All the zinc anodes on the Carousel frame (except for those on the CTD housings) were replaced by aluminum anodes, in order to avoid Zn contamination.

Collected samples were separately distributed to sub-samples for routine analyses of salinity, dissolved oxygen, pH, alkalinity, nutrients (Si, PO_4, NO_2, and NO_3), and chlorophyll-a as explained in section 6.3. In addition to these routine measurements, various chemical components were or will be measured on board the ship or in shorebased laboratories in charge. Their brief reports on objectives and methods are shown in the following chapters.

According to a GEOTRACES recommendation, sub-sampling for trace element analyses was done inside a clean space, called “BUBBLE”, in the 7th laboratory on board R/V Hakuho Maru. This space has a volume of about 10 m^3 (2500 x 2000 x 2000), into which clean air is introduced from outside through two HEPA filter units. Up to 8 Niskin-X bottles can be hold vertically on wooden frames in the BUBBLE. Compressed clean air was provided from the top air vent of each Niskin-X bottle, in order to take filtrated seawater samples inside the BUBBLE. Filtration was done using “polyethersulfone membrane filters” (Acropak Filter (pore size: 0.2 μm)).

6.2.1.2. Hydrocasts using Kevlar and titanium wires

Clean hydrocast group

For a comparison of trace metal clean sampling, we collected seawater samples with X-type Niskin samplers attached Kevlar wire and Titanium wire (No. 3 winch). One thousand of the Kevlar wire (6mmϕ) was loaded in the No. 5 winch of R.V. *Hakuho Maru*. Six Niskin samplers were attached to the Kevlar wire and closed with Teflon messengers. Seawater samples were collected at the depths of 25 m, 50 m, 200 m, 400 m, 600 m and 800 m at stations BD-7, 11 and 17. Two depth sensors (MDS Mark 5, Alec Electronics) were attached to the samplers (200m and 800m). At stations BD-8, 11 and 17, six Niskin samplers were attached to the Titanium wire (No. 3 winch) and closed with stainless messengers. Seawater samples were collected at the same depths as Kevler wire. After sampling, the Niskin samplers were brought into the "Bubble", and then the seawater samples were filtered in a clean condition.

6.2.2. Large volume water sampling system

There is an increasing need for the collection of large volume seawater samples from all depths for the determination of isotopes (Nd ICs and Ce ICs), and cosmogenic (^{7}Be, ^{10}Be) and artificial radio-nuclides (Cs-134, Cs-137, Sr-90, I-129, U-236, Pu, Np). During the KH12-4 Big Dipper cruise, large volume water sampling was carried out as follows.

Large volume (300ℓ) surface seawater samples were obtained from the underway sampler of R.V. Hakuho-Maru. About 260ℓof seawater from a range of depths, from 10 m deep down to 6000m, were collected using a large-volume water sampler. The specially constructed large-volume water sampler （model N12-1000, Nichiyu-Giken-Kohgyo Co. Ltd., Japan; Table 1, Fig. 1） was first used on the KH96-5 cruise and is equipped with the following units: (i) four rigid-PVC (poly(vinyl chloride)) sampling tubes, each of which has a 250 ℓ nominal capacity and bears a Compact-TD sensor (ALEC) (<2000m depth) or a reversing digital thermometer and digital manometer couple (>2000m depth) in a thermometer frame, (ii) a motor-driven trigger unit for stepwise closure of sampling tube, (iii) an acoustic unit which feeds electric power to the motor-driven trigger unit on receiving an acoustic command from the ship and sends an acoustic signal back to the ship immediately after each sampling and (iv) a battery unit (24 V and 12 V). On sending an acoustic command from the ship to the sampler at the sampling depth, the acoustic unit of the sampler feeds electric power to the motor-driven trigger unit. On triggering with the motor, hinged lids, fitted with strong rubber springs

Table 1 Specification of the large-volume water sampler used in the KH-12-4 cruise.

Maximum permissible operating depth	7000 m	
Construction materials	・Frame:	stainless steel (SUS304) aluminium alloy (A7075-T6) titanium alloy (TITA 1)
	・Sampling tube:	rigid PVC (poly(vinyl chloride)) (482 mm i.d.)
Outer dimensions	1650 mm (W) × 1650 mm (D) × 2571 mm (H)	
Weight	715 kgf (in air), 538 kgf (in water)	
Sampling capacity	1,000ℓ (250ℓ / tube × 4 tubes)	
Mode of control	controlled by acoustic transmission	
Trigger	motor-driven trigger	
Electric power supply	24 V and 12 V from 24 of 1.5 V dry cell	

and rubber gaskets, are snapped into place at each end of a sampling tube and the thermometer frame rotates. By repeating the operational procedure, four 250ℓ seawater samples per cast can be obtained.

Fig. 1 Photograph of the large-volume water sampler used in the KH-12-4 cruise.

Seawater samples were filtered with 0.5 μm-pore size wind-cartridge filter (Advantec) on the ship deck and separated common samples (20L for deep water (>1000m depth) and 160 – 250L for shallow water) for analysis of Nd ICs, cosmogenic Be isotopes and U-236 and specified samples for other artificial nuclides of Cs (20L), Sr-90 (20L), I-129 (1L or 20L), Pu (20L), and Np (20L). Samples for salinity (100mL) and stable Be isotope (Be-9, 250 mL), and U-238 (100mL) samples were also routinely collected.

Common samples were transferred to 20L or 200L tanks by using a monoflex pump and preconcentration by Fe-coprecipitation method on the deck. Filtered shallow water were acidified by 250 mL of conc. HCl (EL grade, Kanto chemicals) and added Be carrier (2mg) and 2g (0.5g) Fe carrier. After isotope equilibrium (>3hr), 250 mL of

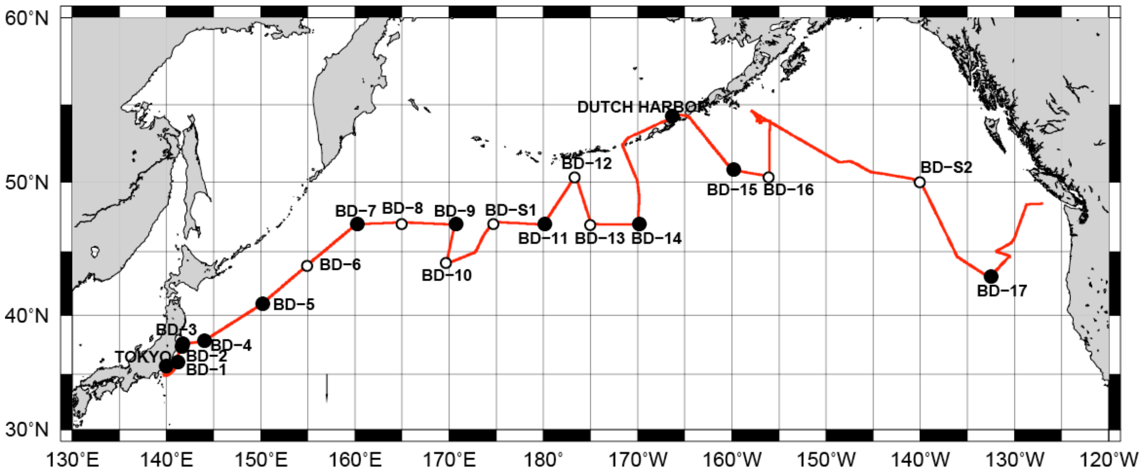


Fig. 2 Locations for large volume sampling

NH_4OH (30 mL) were added to pH>9. Settled Fe precipitates were collected and filtered out by the qualitative filter paper (ϕ500mm: No.2, Advantec) and dryness for LV samples and cut down supernatant by decantation for deep samples, respectively. Then, samples were brought back to land based laboratory for further analysis.

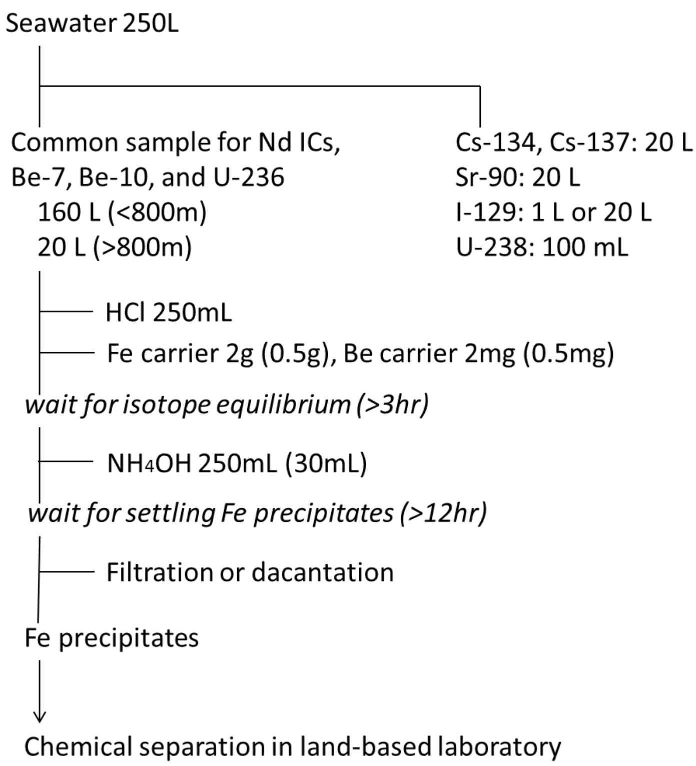


Fig. 2 Schematic flow chart of large volume samples

6.2.3. Multiple core sampling

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Hideki Minami and Kazuya Sawazaki
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During KH12-4 *R/V* Hakuho-maru cruise (Big Dipper Expedition, one of GEOTRACES section studies), we obtained surface sediments at more than 20 sites mainly along the 47ºN transect in the Subarctic North Pacific (See details in Section 7.4. Multiple core samples) using a multiple-corer (AORI, 450 kg weight) with eight 60 cm polycarbonate core tubes (9 cm diameter, see Fig. 1). The coring sites were determined based on the ETOPO1 bathymetry data and sea-floor topographic survey by 3.5 kHz sub-bottom profiler (BATHY2000). Core samples were once reserved in a cold room (about 4°C) after recovery, and the sediment samples were sliced 0.5 cm or 1 cm thick throughout the core within 12 hours, and kept in the cold room (4ºC) during the cruise. One of the MC taken at each site, we cut into half and took a photograph and visually described the sediment feature onboard. At some sites, we used a specific polycarbonate core tube (1 cm thickness) for collecting sediment pore waters for He isotopes.

Fig. 1. A mutiple-corer.

6.2.4. Atmospheric sampling

Comprehensive cryogenic moisture sampler (CCMS)

High Volume Air sampler (HVA) is widely used and good for grab sampling but number of target chemicals is limited. Performance of passive air sampling is limited for global scale monitoring because it's uncertainty / variability of result depends on variable climates (temperature, humidity and so.).

To find out better solution to monitor wide variety of chemicals according to the Stockholm Convention (POPs criteria), "Comprehensive cryogenic moisture sampler (CCMS)" enable "complete collection of all chemicals" in atmosphere was newly developed by SIBATA Co. and AIST. It was tested in KH12-04. Schematic picture of CCMS is presented as bellow.

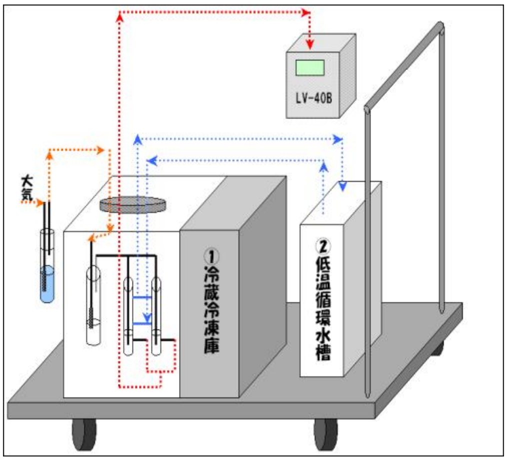

Figure 1. Comprehensive cryogenic moisture sampler (CCMS)

Open Ocean air was introduced into a bubbler through polypropylene tube hanged at the top of compass deck only during ship is moving. CCMS is not HVA but highly quantitative, small & transportable and suitable for degradable PBDE and PFCs. Possible targets of chemicals can be collected using CCMS are all CFCs/halocarbons/VOCs/dioxins/BFRs/PFASs/ pesticides and traditional POPs as single sample.

Detailed information of CCMS is patent pending by SIBATA Co. and AIST (2012).

6.3. Routine analysis

6.3.1. Salinity (Hajime Obata & Salinity group)

Salinity was measured with the Autosal (Model 8400B, Guildline Instruments Ltd., Canada) laboratory salinometer. Sampling bottles for salinity were prepared according to JGOFS protocols. The Autosal was standardized using the IAPSO standard seawater. To control air temperature, the measurement carried out in the 5th laboratory of Hakuho-Maru.

6.3.2. Dissolved oxygen

Noriko Nakayama & DO-measurement Group

The dissolved oxygen concentrations were measured using the Winkler titration method, employing an automatic titrator (806 Titrando^{R}; Metrohm AG). The method was followed the Dickson DOE Handbook of Methods; Version 1.01, "Determination of dissolved oxygen on sea water by Winkler titration". The precision of O_2 measurements was ±0.1%, as determined through replicate analyses. Standardization of sodium thiosulfate titrant was calibrated by using CSK standard of 0.0100M potassium iodate (KIO_3) solution (WAKO Pure Chemical Industries, LTD., LOT No. TCK8678).

6.3.3. Nutrients (Yuzuru Nakaguchi, Koichi Takeda)

6.3.3.1. Method

An aliquots of 10 cm^3 were used for analysis. Nutrient analysis was based on spectrophotometric determination.

Nitrate+nitrite (Nitrite): Nitrate is reduced quantitatively to nitrite by cadmium metal in the form of an open tubular cadmium reactor (OTCR). The sample system with its equivalent nitrite is treated with an acidic sulfanilamide reagent and the nitrite forms nitrous acid which reacts with the sulfanilamide to produce a diazonium ion. N-1-naphthylethylenediamine added to the sample system then couples with the diazonium ion to produce a red azo dye (absorbance maxima at 550 nm). With reduction of the nitrate to nitrite, both nitrate and nitrite react and are measured. Without reduction, only nitrite reacts. The nitrate concentration is calculated by subtracting the nitrite concentration from the summed nitrite and nitrate concentrations.

Phosphate: Phosphate reacts with molybdenum (VI) and antimony (III) in an acid medium to form a phosphoantimonylmolybdenum complex which is subsequently reduced by ascorbic acid to a heteropolyblue with an absorbance maximum at 880 nm.

Silicate: β-molybdosilicic acid is formed by the reaction of silicate with molybdeate at pH of 1 to 1.8. The β-molybdosilicic acid is reduced by tin(II) to form molybdenum blue with an absorbance maximum at 630 nm.

6.3.3.2. Apparatus

Nutirents are analyzed by an auto analyzer SWAAT (BLTEC Japan). All analytical data (nitrate, nitrite, phosphate and silicate) were corrected by using seawater reference material of nutrients (KANSO)

6.3.4. pH

Sub-samples for the pH measurement were aliquoted from 12L-Niskin X bottles, mounted on the CTD carousel, by transferring the collected seawaters into 100 mL dry plastic bottles after ~100% overflow of the samples with no air bubbles, in order to avoid any exchange of CO_2 with the atmosphere during the sub-sampling. The sample bottles were temporally stored in the 6th laboratory of R/V *Hakuho Maru* at room temperature. For the pH measurement, the sample was transferred to a specially designed glass cylindrical cell with overflow. The cell has a double structure, the inner ~20 mL space for sample seawater and a surrounding space where thermostated water (by using a constant temperature circulator CLH400 (Yamato Scientific Co. Ltd.)) is circulated to hold the temperature of the inner seawater sample at 24.9±0.1°C. Below the cell was a magnetic stirrer. The pH measurement was conducted using a PHM93 Reference pH Meter (Radiometer Copenhagen) within a day after sampling. A combined pH electrode (Radiometer, GK2401C) and a temperature sensor (Radiometer, T901) were tightly inserted into the inner space of the pH cell through two tapered joints. The pH measurement was therefore conducted in a completely closed environment with a constant temperature of 24.9±0.1°C.

Analysis time of each seawater sample is about 3 minutes. Two buffer solutions: TRIS (Artificial Seawater (2-Amino-2-hydroxymethyl-1,3-propanediol), Lot. WEK8350, Wako pure chemical industries, 287-77321) and AMP (Artificial Seawater (2-Aminopyridine), Lot. WEK8351, Wako pure chemical industries, 284-77321) were used for calibration. The e.m.f. values (mV) of the pH electrode were measured for the two buffers both at the beginning and the end of each series of measurements (usually 20 to 30 samples at each station). The e.m.f. values (mV) of the unknown seawater samples were converted to pH(X) values according to the equations in the manual SOP 6 (Determination of the pH of sea water using a glass/reference electrode cell, August 30, 1996). The RSD of duplicate or triplicate analyses for surface seawater samples was less than 0.005.

Thanks are due to Dr. Kiminori Shitashima (Kyushu Univ.), who has provided a set of the pH meter and the pH cell for this cruise.

6.3.5. Total alkalinity (TA)

Sub-samples for the TA measurement were aliquoted from 12L-Niskin X bottles, mounted on the CTD carousel, by transferring the collected seawaters into 250 mL dry plastic bottles after ~100% overflow of the samples. The sample bottles were temporally stored in the 6th laboratory of R/V *Hakuho Maru* at room temperature. For the TA measurement, the stored sample was transferred to a 100 mL glass bottle similar to the WOCE-type oxygen bottle, whose volume had been precisely determined before the cruise. The volume-determined sample was transferred to a 150 mL glass beaker for open-cell titration. Below the beaker was a magnetic stirrer. A Total Alkalinity titration analyzer ATT-05, Kimoto Electric Co. Ltd, was used for titration. In the beaker were inserted a combined pH electrode (Radiometer, GK2401C), a temperature sensor (ATT-05), and two thin Teflon tubes, one for addition of the titrant (0.1N HCl solution, Wako N/10 Hydrochloric Acid, 083-01115, Lot. WEL4206, Wako Pure Chemical Industries, Ltd.) and the other for purging air introduction. TA values were obtained according to K. Okamura, H. Kimoto et al. "Potentiometric open-cell titration for seawater alkalinity with consideration of temperature dependence of titrant density and Nernst response of pH electorde," to be submitted to EST, and to Dickson et al. (eds.), Guide to best practices for ocean CO_2 measurements. PICES Special Publication 3, 191pp. (2007).

Analysis time of each seawater sample is about 17 minutes. The basic calibrations were performed at the beginning and at the end of the cruise using the international reference material for oceanic CO_2 measurements (Batch 104, bottled on June 11, 2010) prepared by Dr. A.G. Dickson. Surface seawater collected at station BD02 at 10 m depth was used as the working standard, which was measured at the beginning and the end of each series of measurements. The deviation of the pH electrode response from the ideal Nernst value was corrected using the two buffer solutions: TRIS (Artificial Seawater (2-Amino-2-hydroxymethyl-1,3-propanediol), Lot. WEK8350, Wako pure chemical industries, 287-77321) and AMP (Artificial Seawater (2-Aminopyridine), Lot. WEK8351, Wako pure chemical industries, 284-77321) (Okamura, Kimoto et al., to be submitted). The precision was estimated to be less than ±2 μmol/kg from replicate analyses of the working standard. The final TA values were corrected by using the authorized TA value of 2222.61 μmol/kg of the international reference material.

Thanks are due to Dr. Kei Okamura (Kochi University) and Mr. Hideshi Kimoto (Kimoto Electric Co. Ltd.) for their kind technological support before the cruise.

6.3.6. Chlorophyll a

The fluorometric method was used for the quantitative analysis of chlorophyll *a*. Water samples (0–200 m depths) were collected from Niskin-X bottles into 300 ml amber polyethylene bottles. Samples (290 ml) were immediately filtered through 25 mm Whatman GF/F glass fiber filters maintaining vacuum levels of 0.02 MPa or less. Filters were placed in polypropylene vials and extracted in 6.0 ml N, N-dimethylformamide. The samples are allowed to extract for 1–2 days in a freezer (–20ºC). After removal from the cold, extracted samples were placed in a 13 mm glass cuvette and read on the Turner Designs 10-AU field fluorometer with a chlorophyll optical kit for the non-acidification method (Welschmeyer, 1994, Limnology and Oceanography 39, 1985–1992). The concentrations of chlorophyll *a* in the sample (µg l^{-1}) were calculated from the reading using the calibration and scaling factors. The fluorometer was calibrated at the beginning of leg. 1 and the end of leg. 3 with a commercially available chlorophyll *a* standard (from *Anacystis nidulans* algae, Sigma Chemical Co.). Serial dilutions are prepared and linear calibration factors are calculated for each analytical range.

6. 4. In situ measurements using GAMOS

Hajime Obata (Atmosphere and Ocean Research Institute, University of Tokyo)

An in-situ flow-through chemical analyzer, "GAMOS", was attached at the end of the titanium cable from the No.3 winch of R.V. *Hakuho Maru*. This analyzer was originally developed for a continuous measurement of dissolved manganese using a luminol-hydrogen peroxide chemiluminescence method (Okamura et al., 2001). During this cruise, subnanomolar of Fe(II) in seawater was measured from the sea surface to a depth near the bottom every 1 second (1 m/sec). The details of this instrument were described in Takahashi et al. in this report. Briefly, the GAMOS consists of an acrylic, oil- or water-filled pressure-compensated vessel containing a flow-through analyzing system and an aluminum pressure housing for electronic modules. Seawater sample or standard seawater is mixed with a reagent (aqueous ammonia and luminol solution), and finally introduced into the CL cell through the reaction coil. The Fe(II) concentration is determined by the measurement of the CL intensity at 1 s interval.

6.5. Particulate matter collection by in-situ filtration system in the North Pacific

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Particulate matter collections by in-situ filtration system

To investigate concentrations of suspended leachable particulate trace metals in the intermediate water (~800 m) of the North Pacific Ocean. Samples were collected onboard Hakuho-maru at stations BD 7 and BD 11 by using in-situ filtration system (Mclane, WTS 6-1-142 LV Samplers) which was hanged on to titanium wire. Particles were collected onto 1 mm Nucrepore filter (142 mm diameter). The samples were immediately stored in freezer (-70ºC).

Trace metals ratio in the particles will be analyzed onshore laboratory with using acid digestion method.

7.1. CTD data for standard depths and triggering

KH-12-4		BD-1-1	Depth	–	
Date:	2012/8/23		Lat.	35	59.98N
Time:	17:32		Long.	141	01.08E
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	ml·l⁻¹	ug/l
	5	27.254	33.817	4.52	0.17
	10	26.157	33.841	4.78	0.22
	20	21.865	34.198	4.91	0.55
	30	19.190	34.416	4.23	5.62
	40	18.375	34.654	4.04	1.09
	50	18.189	34.674	4.02	0.76
	75	16.605	34.621	3.97	0.37
	100	15.187	34.545	3.77	0.13
	125	13.768	34.491	3.63	0.10
	150	12.569	34.433	3.54	0.08
	175	11.613	34.359	3.91	0.07
	200	10.322	34.264	3.93	0.07
	250	8.906	34.220	3.33	0.07
	266	8.435	34.184	3.30	0.07

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l⁻¹	ug/l
Sur.	0	***	27.8	***	***	***
1	263	265	8.414	34.179	3.30	0.08
2	249	251	8.807	34.209	3.29	0.07
3	198	200	10.314	34.256	3.96	0.07
4	149	150	12.376	34.421	3.52	0.08
5	100	100	14.970	34.530	3.74	0.17
6	74	74	16.714	34.628	3.97	0.29
7	49	50	17.851	34.636	3.98	0.67
8	30	30	20.070	34.396	4.65	6.62
9	20	20	22.316	34.151	4.96	0.54
10	10	10	25.118	33.921	4.85	0.27
11	263	265	8.383	34.176	3.30	0.08
12	248	250	8.768	34.208	3.30	0.08
13	198	200	10.305	34.257	3.97	0.07
14	148	149	12.416	34.422	3.53	0.08
15	99	100	14.981	34.530	3.73	0.15
16	74	75	16.708	34.629	3.97	0.30
17	49	50	17.848	34.637	3.96	0.72
18	30	30	20.064	34.401	4.68	5.38
19	20	20	22.315	34.151	4.96	0.44
20	10	10	25.321	33.912	4.79	0.25
21	10	10	25.415	33.909	4.81	0.25
22	10	10	25.455	33.907	4.80	0.24
23	10	10	25.464	33.906	4.79	0.28
24	10	10	25.506	33.906	4.79	0.24

KH-12-4		BD-2-1	Depth	–	
Date:	2012/8/24		Lat.	37	19.88N
Time:	02;26		Long.	141	27.21E

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	ml·l⁻¹	ug/l
	5	24.197	33.806	4.36	0.12
	10	23.865	33.818	4.26	0.13
	20	21.647	33.972	4.66	0.18
	30	20.556	33.933	4.80	0.23
	40	20.399	34.061	4.56	0.26
	50	17.595	34.332	5.20	0.49
	75	14.378	34.383	4.97	0.95
	100	10.712	34.301	5.05	0.26
	125	9.817	34.100	4.86	0.15
	140	9.539	34.063	5.18	0.12

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l⁻¹	ug/l
Sur.	0	***	26.2	***	***	***
1	133	134	9.499	34.044	5.24	0.12
2	134	135	9.475	34.050	5.19	0.12
3	99	100	10.669	34.033	5.45	0.27
4	74	75	15.041	34.014	5.86	2.18
5	49	50	18.692	34.040	5.60	0.37
6	30	30	19.756	34.066	5.41	0.29
7	20	20	20.450	33.991	5.36	0.23
8	10	10	21.398	33.764	5.31	0.17
9	134	135	9.465	34.040	5.21	0.12
10	133	134	9.294	34.017	5.28	0.11
11	99	100	10.972	34.029	5.51	0.30
12	75	75	15.061	34.012	5.86	2.45
13	50	50	18.603	34.029	5.63	0.35
14	30	30	19.327	34.071	5.45	0.30
15	20	20	20.480	33.975	5.36	0.23
16	10	10	21.430	33.757	5.31	0.17
17	10	10	21.384	33.768	5.31	0.17
18	10	10	21.415	33.758	5.31	0.17
19	10	10	21.397	33.763	5.32	0.17
20	10	10	21.424	33.762	5.31	0.16
21	10	10	21.274	33.797	5.31	0.17
22	10	10	21.260	33.794	5.32	0.16
23	10	10	21.317	33.778	5.32	0.16
24	10	10	21.307	33.786	5.31	0.17

KH-12-4		BD-3-1		Depth	–	
Date:	2012/8/24			Lat.	37	35.07N
Time:	06:08			Long.	141	30.94E
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml・l^{-1}	ug/l
		5	23.680	33.697	5.06	0.20
		10	21.517	33.563	5.38	0.24
		20	19.043	33.646	5.76	0.39
		30	16.846	33.752	5.97	0.69
		40	15.359	33.847	6.00	1.81
		50	14.642	33.887	5.81	2.55
		75	12.436	34.034	5.48	0.69
		100	11.089	34.135	5.16	0.19
		125	9.272	33.967	5.39	0.12
		125	9.272	33.967	5.39	0.12
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml・l^{-1}	ug/l
Sur.	0	***	25.7	***	***	***
1	125	126	9.267	33.964	5.41	0.13
2	99	100	10.964	34.122	5.21	0.16
3	74	75	12.188	34.057	5.26	0.61
4	50	50	14.112	33.919	5.61	1.71
5	30	30	16.743	33.749	5.93	0.67
6	20	20	20.017	33.540	5.65	0.37
7	10	10	23.093	33.632	5.16	0.21
8	125	126	9.266	33.963	5.41	0.13
9	100	101	11.008	34.125	5.18	0.17
10	74	75	12.199	34.055	5.29	0.63
11	50	51	14.105	33.920	5.60	1.72
12	30	30	17.679	33.686	5.89	0.61
13	20	20	20.322	33.574	5.54	0.32
14	10	10	23.003	33.641	5.13	0.20
15	10	10	22.947	33.634	5.13	0.21
16	10	10	22.862	33.631	5.14	0.23
17	10	10	22.819	33.625	5.16	0.20
18	10	10	22.881	33.632	5.17	0.21
19	10	10	22.894	33.633	5.16	0.21
20	10	10	22.694	33.614	5.16	0.21
21	10	10	22.693	33.613	5.16	0.21
22	10	10	22.706	33.614	5.16	0.20
23	10	11	22.666	33.610	5.17	0.21
24	10	10	22.679	33.611	5.17	0.20

KH-12-4		BD-4-1		Depth	7058m	
Date:	2012/8/24			Lat.	37	49.28N
Time:	15:27			Long.	143	53.69E
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml・l^{-1}	ug/l
		2	28.653	33.957	–	–
		5	28.685	33.945	–	–
		10	28.005	34.148	–	–
		20	26.133	34.356	–	–
		30	24.180	34.459	–	–
		40	22.890	34.633	–	–
		50	21.656	34.731	–	–
		75	19.453	34.766	–	–
		100	18.182	34.743	–	–
		125	17.156	34.668	–	–
		150	15.359	34.594	–	–
		175	14.200	34.524	–	–
		200	N.D.	N.D.	–	–
		250	11.484	34.384	–	–
		300	10.192	34.276	–	–
		400	8.482	34.279	–	–
		500	6.517	34.119	–	–
		600	5.137	34.053	–	–
		700	4.446	34.097	–	–
		800	3.788	34.129	–	–
		900	3.835	34.286	–	–
		1000	3.378	34.327	–	–
		1200	2.953	34.412	–	–
		1500	2.540	34.496	–	–
		2000	2.052	34.579	–	–
		2500	1.779	34.627	–	–
		3000	1.610	34.655	–	–
		3500	1.543	34.669	–	–
		4000	1.509	34.678	–	–
		4500	1.504	34.685	–	–
		5000	1.530	34.688	–	–
		5500	1.571	34.690	–	–
		6000	1.629	34.692	–	–
		6500	1.695	34.692	–	–
		7000	1.768	34.693	–	–
		7337	1.819	34.693	–	–
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml・l^{-1}	ug/l
Sur.	0	***	28.2	***	***	***
1	7167	7343	1.821	34.693	–	–
2	7168	7344	1.821	34.693	–	–
3	6355	6499	1.695	34.693	–	–
4	5874	6000	1.630	34.692	–	–
5	5389	5500	1.572	34.691	–	–
6	4905	5000	1.529	34.689	–	–
7	4419	4500	1.506	34.685	–	–
8	3933	3999	1.504	34.679	–	–
9	6836	6999	1.768	34.693	–	–
10	6836	6999	1.768	34.693	–	–
11	6836	6999	1.768	34.693	–	–
12	6596	6749	1.732	34.693	–	–
13	6355	6499	1.696	34.693	–	–
14	6115	6250	1.662	34.692	–	–
15	5874	6000	1.630	34.692	–	–
16	5630	5748	1.600	34.692	–	–
17	5390	5500	1.572	34.691	–	–
18	5148	5250	1.547	34.691	–	–
19	4906	5000	1.529	34.689	–	–
20	4663	4750	1.513	34.688	–	–
21	4176	4250	1.502	34.682	–	–
22	3931	3998	1.504	34.679	–	–
23	3688	3749	1.518	34.674	–	–
24	3445	3499	1.541	34.669	–	–

KH-12-4		BD-4-2		Depth	7020m	
Date:	2012/8/25			Lat.	37	48.55N
Time:	00:18			Long.	143	52.43E
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml·l⁻¹	ug/l
		5	28.451	33.992	4.37	0.10
		10	28.198	33.991	4.41	0.10
		20	25.061	34.432	4.64	0.13
		30	23.784	34.583	4.60	0.19
		40	22.285	34.719	4.62	0.69
		50	21.739	34.746	4.43	1.03
		75	19.270	34.755	4.21	0.29
		100	18.257	34.719	4.17	0.11
		125	17.162	34.670	4.04	0.08
		150	16.145	34.627	3.99	0.06
		175	14.615	34.544	3.86	0.06
		200	13.774	34.497	3.72	0.06
		250	11.739	34.380	3.60	0.06
		300	10.775	34.336	3.41	0.06
		400	8.821	34.258	3.01	0.07
		500	6.500	34.087	3.01	0.07
		600	4.858	33.963	2.69	0.07
		700	4.472	34.087	1.78	0.08
		800	3.682	34.122	1.13	0.08
		900	3.859	34.277	1.12	0.08
		1000	3.396	34.325	0.95	0.08
		1200	3.016	34.415	0.91	0.08
		1500	2.501	34.491	0.95	0.08
		2000	2.051	34.578	1.51	0.08
		2500	1.758	34.628	2.16	0.08
		3000	1.607	34.654	2.60	0.07
		3255	1.560	34.662	2.77	0.07
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l⁻¹	ug/l
Sur.	0	***	27.7	***	***	***
1	2956	3000	1.611	34.654	2.56	0.07
2	2467	2500	1.760	34.628	2.13	0.08
3	1976	2000	2.056	34.577	1.50	0.08
4	1483	1500	2.523	34.486	0.94	0.08
5	1238	1251	2.908	34.425	0.89	0.08
6	990	1000	3.370	34.327	0.93	0.09
7	793	800	3.802	34.145	1.15	0.08
8	822	830	3.548	34.160	0.97	0.09
9	594	599	4.948	33.998	2.50	0.08
10	397	400	8.841	34.278	2.86	0.07
11	3199	3248	1.562	34.662	2.71	0.07
12	2956	2999	1.611	34.654	2.56	0.07
13	2712	2750	1.681	34.642	2.36	0.08
14	2468	2501	1.760	34.628	2.14	0.08
15	2221	2250	1.902	34.605	1.81	0.08
16	1976	2001	2.055	34.578	1.50	0.08
17	1729	1749	2.260	34.541	1.22	0.08
18	1484	1501	2.522	34.486	0.94	0.08
19	1239	1252	2.907	34.425	0.89	0.08
20	991	1001	3.368	34.327	0.93	0.09
21	793	801	3.854	34.154	1.18	0.09
22	594	599	4.940	33.998	2.50	0.08
23	397	400	8.835	34.277	2.87	0.07
24	298	300	10.456	34.292	3.53	0.07

KH-12-4		BD-4-3		Depth	7018m	
Date:	2012/8/25			Lat.	37	48.76N
Time:	04:31			Long.	143	52.73E
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml·l⁻¹	ug/l
		5	28.466	34.030	4.41	0.10
		10	27.904	34.083	4.47	0.11
		20	25.214	34.415	4.60	0.14
		30	23.720	34.598	4.60	0.19
		40	22.225	34.712	4.53	1.25
		50	21.287	34.760	4.36	1.29
		75	19.671	34.764	4.15	0.31
		100	18.396	34.726	4.13	0.12
		125	17.121	34.719	4.69	0.06
		150	16.439	34.654	4.21	0.06
		175	14.937	34.561	3.96	0.06
		200	13.960	34.507	3.83	0.06
		210	13.436	34.478	3.77	0.06
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l⁻¹	ug/l
Sur.	0	***	30.4	***	***	***
1	41	41	22.311	34.708	4.60	1.02
2	199	200	13.846	34.500	3.83	0.06
3	149	150	16.466	34.658	4.29	0.06
4	99	100	18.643	34.737	4.14	0.15
5	50	50	21.231	34.762	4.34	1.20
6	25	25	24.149	34.555	4.63	0.18
7	10	11	27.929	34.075	4.45	0.12
8	10	10	27.885	34.083	4.45	0.11
9	10	10	27.897	34.081	4.44	0.12
10	10	10	27.866	34.094	4.45	0.11
11	10	11	27.861	34.100	4.45	0.11
12	10	10	27.764	34.124	4.46	0.12
13	10	10	27.601	34.157	4.49	0.12
14	10	10	27.726	34.128	4.47	0.12
15	10	10	27.801	34.111	4.46	0.12
16	10	10	27.865	34.096	4.46	0.13
17	10	10	27.855	34.099	4.47	0.12
18	41	41	22.344	34.705	4.62	1.16
19	199	200	13.836	34.500	3.82	0.06
20	149	150	16.463	34.659	4.30	0.06
21	99	100	18.633	34.738	4.15	0.16
22	50	50	21.596	34.753	4.35	1.20
23	25	25	24.742	34.500	4.56	0.17
24	10	10	27.984	34.075	4.44	0.11

KH-12-4		BD-5-1		Depth	5247m	
Date:	2012/8/26			Lat.	40	50.01N
Time:	08:51			Long.	150	00.13E
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml･l^{-1}	ug/l
		5	23.363	32.621	5.07	1.15
		10	19.754	32.808	5.82	1.16
		20	14.111	33.001	7.04	1.07
		30	5.719	32.924	7.99	2.82
		40	4.261	32.976	7.70	2.42
		50	2.634	33.037	7.39	2.44
		75	1.377	33.108	6.81	0.31
		100	1.253	33.175	6.41	0.10
		125	1.325	33.244	5.94	0.09
		150	1.349	33.316	5.53	0.08
		175	1.442	33.365	5.11	0.08
		200	1.691	33.434	4.60	0.08
		250	2.279	33.575	3.45	0.08
		300	2.608	33.687	2.61	0.08
		400	3.245	33.920	1.49	0.09
		500	3.378	34.062	0.98	0.09
		600	3.474	34.197	0.88	0.09
		700	3.257	34.262	0.79	0.09
		800	3.018	34.311	0.76	0.09
		900	2.849	34.355	0.76	0.09
		1000	2.751	34.404	0.82	0.09
		1200	2.531	34.467	0.90	0.08
		1500	2.231	34.529	1.11	0.08
		2000	1.896	34.600	1.70	0.08
		2500	1.680	34.638	2.27	0.08
		3000	1.558	34.659	2.67	0.07
		3500	1.492	34.672	2.96	0.07
		4000	1.463	34.680	3.18	0.07
		4500	1.472	34.685	3.28	0.07
		5000	1.516	34.686	3.33	0.07
		5340	1.548	34.688	3.36	0.07
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml･l^{-1}	ug/l
Sur.	0	***	23.8	***	***	***
1	5230	5337	1.547	34.688	3.23	0.07
2	4904	5000	1.516	34.687	3.24	0.07
3	4418	4499	1.470	34.686	3.21	0.07
4	3932	4000	1.465	34.681	3.11	0.07
5	3444	3499	1.486	34.673	2.93	0.07
6	2955	2999	1.551	34.660	2.64	0.07
7	2465	2499	1.672	34.639	2.26	0.08
8	1974	1999	1.902	34.599	1.68	0.08
9	1482	1499	2.239	34.526	1.10	0.08
10	5230	5337	1.547	34.688	3.24	0.07
11	4904	5000	1.516	34.687	3.24	0.07
12	4661	4749	1.490	34.687	3.24	0.07
13	4418	4499	1.470	34.686	3.22	0.07
14	4175	4249	1.465	34.683	3.19	0.07
15	3932	4000	1.464	34.681	3.11	0.07
16	3688	3750	1.472	34.677	3.03	0.07
17	3443	3499	1.487	34.673	2.93	0.07
18	3200	3249	1.511	34.668	2.80	0.07
19	2956	3000	1.551	34.661	2.64	0.07
20	2711	2750	1.604	34.651	2.46	0.08
21	2465	2499	1.672	34.640	2.26	0.08
22	2220	2249	1.769	34.622	1.97	0.08
23	1974	1999	1.902	34.599	1.67	0.08
24	1728	1749	2.057	34.568	1.37	0.08

KH-12-4		BD-5-2		Depth	5246m	
Date:	2012/8/26			Lat.	40	50.03N
Time:	15:34			Long.	150	00.00E
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml･l^{-1}	ug/l
		5	21.802	32.731	5.34	1.10
		10	20.557	32.822	5.71	1.08
		20	7.145	32.886	7.91	2.66
		30	4.200	32.978	7.74	2.44
		40	2.862	33.024	7.35	2.78
		50	2.093	33.064	6.92	0.98
		75	1.244	33.119	6.97	0.28
		100	1.351	33.174	6.63	0.12
		125	1.285	33.228	6.05	0.09
		150	1.359	33.296	5.60	0.08
		175	1.449	33.352	5.25	0.08
		200	1.621	33.417	4.78	0.08
		250	2.125	33.543	3.76	0.08
		300	2.351	33.641	3.05	0.08
		400	3.093	33.889	1.51	0.09
		500	3.284	34.042	0.93	0.09
		600	3.440	34.180	0.86	0.09
		700	3.253	34.253	0.78	0.09
		800	3.050	34.310	0.77	0.09
		900	2.852	34.353	0.75	0.09
		1000	2.749	34.395	0.80	0.09
		1200	2.524	34.466	0.90	0.09
		1256	2.400	34.472	0.94	0.08
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml･l^{-1}	ug/l
Sur.	0	***	22.3	***	***	***
1	772	780	3.047	34.303	0.76	0.09
2	1237	1251	2.408	34.472	0.94	0.08
3	990	1000	2.754	34.400	0.81	0.09
4	792	800	3.031	34.313	0.76	0.09
5	595	601	3.372	34.181	0.79	0.09
6	396	400	3.232	33.926	1.40	0.09
7	198	200	1.741	33.435	4.52	0.08
8	150	151	1.457	33.317	5.42	0.08
9	38	38	3.801	32.984	7.71	2.69
10	100	101	1.473	33.194	6.48	0.11
11	49	49	1.974	33.065	6.84	0.89
12	26	26	8.581	32.864	7.73	2.96
13	10	10	17.953	33.069	6.07	1.07
14	773	780	3.051	34.302	0.76	0.09
15	990	1000	2.753	34.398	0.81	0.09
16	595	600	3.369	34.182	0.80	0.09
17	396	400	3.229	33.924	1.40	0.09
18	297	300	2.556	33.681	2.71	0.09
19	199	200	1.737	33.434	4.53	0.08
20	36	37	4.243	32.972	7.78	2.77
21	99	99	1.470	33.191	6.54	0.12
22	51	51	2.092	33.055	6.84	1.17
23	26	26	8.254	32.874	7.72	3.10
24	10	10	18.046	33.078	6.08	1.07

KH-12-4	BD-6-1		Depth	5300m	
Date:	2012/8/27		Lat.	44	00.18N
Time:	16:15		Long.	154	59.97E

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	$ml\cdot l^{-1}$	ug/l
	10	17.523	32.313	5.62	1.27
	20	14.285	32.532	6.40	2.05
	30	7.170	32.842	7.43	3.64
	40	4.819	32.937	7.70	2.36
	50	3.438	32.970	7.62	1.61
	75	1.331	33.069	7.16	0.36
	100	1.210	33.120	7.02	0.15
	125	1.527	33.238	6.12	0.09
	150	2.160	33.425	4.50	0.08
	175	2.840	33.619	2.71	0.08
	200	3.053	33.701	2.08	0.09
	250	3.258	33.827	1.30	0.09
	300	3.361	33.928	0.86	0.09
	400	3.350	34.048	0.70	0.09
	500	3.293	34.156	0.51	0.09
	600	3.148	34.234	0.45	0.09
	700	2.982	34.293	0.51	0.09
	800	2.845	34.343	0.53	0.09
	900	2.680	34.382	0.54	0.09
	1000	2.562	34.419	0.64	0.09
	1200	2.361	34.476	0.85	0.09
	1500	2.141	34.534	1.11	0.08
	2000	1.843	34.604	1.71	0.08
	2500	1.635	34.642	2.31	0.08
	3000	1.523	34.663	2.74	0.07
	3500	1.470	34.674	2.99	0.07
	4000	1.459	34.681	3.18	0.07
	4500	1.474	34.685	3.28	0.07
	5000	1.518	34.686	3.34	0.07
	5398	1.565	34.687	3.30	0.07

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	$ml\cdot l^{-1}$	ug/l
Sur.	0	***	17.8	***	***	***
1	5287	5397	1.565	34.687	3.18	0.07
2	4903	5000	1.518	34.687	3.22	0.07
3	4417	4499	1.473	34.686	3.23	0.07
4	3932	4001	1.455	34.682	3.14	0.07
5	3443	3500	1.465	34.675	2.97	0.07
6	2955	3000	1.517	34.664	2.72	0.07
7	2466	2500	1.632	34.643	2.29	0.08
8	1975	2000	1.843	34.605	1.71	0.08
9	1483	1500	2.134	34.532	1.12	0.08
10	1235	1249	2.312	34.481	0.86	0.09
11	5287	5397	1.565	34.687	3.19	0.07
12	4902	5000	1.518	34.687	3.22	0.07
13	4660	4750	1.493	34.686	3.23	0.07
14	4417	4500	1.473	34.686	3.22	0.07
15	4174	4250	1.461	34.684	3.19	0.07
16	3931	4001	1.455	34.682	3.13	0.07
17	3687	3750	1.457	34.679	3.06	0.07
18	3200	3250	1.486	34.670	2.86	0.07
19	2955	3000	1.517	34.664	2.73	0.07
20	2710	2750	1.569	34.655	2.51	0.07
21	2220	2250	1.720	34.627	2.01	0.08
22	1974	2000	1.842	34.605	1.70	0.08
23	1729	1750	1.988	34.576	1.43	0.08
24	1482	1500	2.134	34.532	1.12	0.08

KH-12-4	BD-6-2		Depth	5306m	
Date:	2012/8/27		Lat.	44	00.14N
Time:	23:38		Long.	155	00.04E

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	$ml\cdot l^{-1}$	ug/l
	5	17.240	32.354	5.67	0.38
	10	17.258	32.345	5.69	0.40
	20	8.855	32.867	7.21	1.95
	30	5.649	32.959	7.33	1.72
	40	4.269	32.974	7.69	1.78
	50	2.524	33.015	7.43	1.67
	75	1.269	33.071	7.16	0.37
	100	1.101	33.138	6.91	0.11
	125	1.489	33.250	5.96	0.09
	150	2.427	33.511	3.69	0.08
	175	2.810	33.641	2.60	0.08
	200	2.974	33.718	2.13	0.09
	250	3.210	33.842	1.37	0.09
	300	3.360	33.932	0.84	0.09
	400	3.357	34.077	0.61	0.09
	500	3.270	34.170	0.49	0.09
	600	3.115	34.243	0.47	0.09
	700	2.954	34.304	0.49	0.09
	800	2.824	34.350	0.60	0.09
	900	2.674	34.386	0.54	0.09
	1000	2.559	34.421	0.64	0.09
	1002	2.556	34.422	0.64	0.09

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	$ml\cdot l^{-1}$	ug/l
Sur.	0	***	18.4	***	***	***
1	990	1001	2.556	34.422	0.64	0.09
2	551	556	3.178	34.213	0.45	0.09
3	792	800	2.821	34.350	0.59	0.09
4	594	600	3.100	34.248	0.47	0.09
5	395	399	3.349	34.077	0.61	0.09
6	198	199	3.046	33.735	1.90	0.09
7	149	150	2.367	33.495	3.83	0.09
8	22	22	8.480	32.800	7.16	3.48
9	99	99	1.143	33.122	6.90	0.13
10	49	49	3.232	32.987	7.42	1.91
11	24	25	8.297	32.808	7.25	3.48
12	9	9	14.895	32.496	6.22	0.82
13	991	1001	2.556	34.422	0.64	0.09
14	552	557	3.178	34.213	0.45	0.09
15	594	600	3.101	34.248	0.47	0.09
16	395	399	3.349	34.077	0.61	0.09
17	298	301	3.363	33.948	0.81	0.09
18	198	200	3.039	33.733	1.92	0.09
19	149	150	2.200	33.468	3.74	0.09
20	22	22	8.653	32.804	7.18	3.30
21	99	100	1.146	33.118	6.91	0.14
22	49	49	3.682	32.965	7.60	1.85
23	24	25	8.315	32.822	7.28	3.51
24	11	11	15.747	32.450	6.01	0.65

KH-12-4		BD-7-1		Depth	5238m	
Date:	2012/8/28			Lat.	47	00.05N
Time:	20:23			Long.	160	05.13E
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml·l⁻¹	ug/l
		5	14.776	32.410	5.99	1.80
		10	14.481	32.407	6.10	2.05
		20	12.207	32.459	6.48	3.65
		30	4.952	32.885	7.50	2.62
		40	3.144	32.973	7.47	1.73
		50	2.124	33.007	7.37	1.61
		75	1.067	33.072	7.05	0.31
		100	0.851	33.110	7.05	0.16
		125	0.799	33.148	6.91	0.09
		150	1.163	33.274	5.98	0.08
		175	2.750	33.577	3.09	0.08
		200	3.474	33.767	1.47	0.08
		250	3.693	33.904	0.71	0.09
		300	3.702	33.993	0.45	0.09
		400	3.577	34.103	0.35	0.09
		500	3.397	34.180	0.33	0.09
		600	3.239	34.252	0.29	0.09
		700	3.069	34.302	0.32	0.09
		800	2.899	34.348	0.35	0.09
		900	2.746	34.386	0.37	0.09
		1000	2.593	34.423	0.44	0.09
		1200	2.334	34.482	0.65	0.09
		1500	2.079	34.544	1.01	0.08
		2000	1.792	34.610	1.74	0.08
		2500	1.620	34.645	2.35	0.07
		3000	1.513	34.664	2.76	0.07
		3500	1.469	34.674	3.02	0.07
		4000	1.461	34.681	3.18	0.07
		4500	1.479	34.685	3.26	0.07
		5000	1.525	34.686	3.30	0.07
		5336	1.554	34.687	3.32	0.07
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l⁻¹	ug/l
Sur.	0	***	15.4	***	***	***
1	5228	5337	1.554	34.687	3.21	0.07
2	5228	5337	1.554	34.687	3.19	0.07
3	5229	5338	1.554	34.687	3.19	0.07
4	4901	5000	1.524	34.686	3.21	0.07
5	4901	5000	1.524	34.686	3.20	0.07
6	4901	5000	1.524	34.686	3.22	0.07
7	4416	4500	1.479	34.685	3.20	0.07
8	4416	4500	1.479	34.685	3.20	0.07
9	4416	4500	1.479	34.685	3.21	0.07
10	3930	4000	1.461	34.681	3.13	0.07
11	3929	4000	1.461	34.681	3.12	0.07
12	3930	4000	1.461	34.681	3.13	0.07
13	3442	3500	1.472	34.675	2.97	0.07
14	3443	3500	1.472	34.675	2.98	0.07
15	3442	3500	1.472	34.675	2.97	0.07
16	5228	5337	1.554	34.687	3.21	0.07
17	4901	5000	1.524	34.686	3.20	0.07
18	4658	4749	1.500	34.686	3.22	0.07
19	4416	4500	1.479	34.685	3.22	0.07
20	4173	4250	1.464	34.684	3.17	0.07
21	3930	4000	1.461	34.681	3.13	0.07
22	3687	3750	1.459	34.679	3.06	0.07
23	3442	3500	1.472	34.675	2.97	0.07
24	3199	3250	1.493	34.670	2.86	0.07

KH-12-4		BD-7-2		Depth	5237m	
Date:	2012/8/29			Lat.	46	59.96N
Time:	02:48			Long.	160	04.99E
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml·l⁻¹	ug/l
		5	14.591	32.429	6.12	0.62
		10	14.241	32.401	6.17	0.82
		20	12.994	32.425	6.43	2.36
		30	6.807	32.769	7.48	3.57
		40	4.253	32.940	7.55	1.84
		50	2.635	32.996	7.39	1.58
		75	1.187	33.065	7.07	0.43
		100	0.883	33.115	7.04	0.15
		125	0.805	33.153	6.89	0.09
		150	0.980	33.237	6.31	0.08
		175	2.462	33.515	3.63	0.08
		200	3.364	33.729	1.80	0.08
		250	3.632	33.892	0.70	0.09
		300	3.705	33.993	0.45	0.09
		400	3.546	34.121	0.35	0.09
		500	3.349	34.201	0.32	0.09
		600	3.217	34.257	0.30	0.09
		700	3.054	34.307	0.32	0.09
		800	2.911	34.346	0.33	0.09
		900	2.774	34.380	0.37	0.09
		1000	2.633	34.414	0.41	0.09
		1200	2.400	34.468	0.58	0.09
		1500	2.131	34.533	0.94	0.08
		2000	1.835	34.602	1.62	0.08
		2500	1.638	34.642	2.30	0.08
		3000	1.530	34.662	2.71	0.07
		3001	1.530	34.662	2.71	0.07
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l⁻¹	ug/l
Sur.	0	***	16.7	***	***	***
1	2955	3001	1.530	34.662	2.67	0.07
2	2955	3001	1.530	34.662	2.67	0.07
3	2955	3001	1.530	34.662	2.68	0.07
4	2955	3001	1.530	34.662	2.66	0.07
5	2464	2499	1.636	34.642	2.28	0.08
6	2464	2499	1.636	34.642	2.28	0.08
7	2464	2499	1.636	34.642	2.27	0.08
8	1974	2000	1.828	34.603	1.63	0.08
9	1974	2000	1.828	34.603	1.63	0.08
10	1975	2001	1.828	34.603	1.64	0.08
11	1974	2000	1.827	34.604	1.63	0.08
12	1482	1500	2.113	34.536	0.97	0.08
13	1483	1500	2.113	34.536	0.97	0.08
14	1483	1500	2.113	34.536	0.97	0.08
15	1236	1250	2.326	34.483	0.67	0.08
16	1236	1250	2.326	34.484	0.67	0.08
17	2955	3001	1.530	34.662	2.67	0.07
18	2710	2750	1.578	34.653	2.49	0.07
19	2464	2500	1.636	34.642	2.28	0.07
20	2219	2250	1.723	34.626	1.98	0.08
21	1975	2001	1.827	34.604	1.63	0.08
22	1728	1750	1.957	34.575	1.34	0.08
23	1483	1501	2.112	34.536	0.97	0.08
24	1236	1250	2.326	34.484	0.67	0.09

KH-12-4	BD-7-3		Depth	5238m	
Date:	2012/8/29		Lat.	47	00.01N
Time:	06:48		Long.	160	05.00E

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	ml·l⁻¹	ug/l
	5	15.014	32.408	6.01	1.69
	10	14.308	32.407	6.19	2.26
	20	13.337	32.417	6.42	2.86
	30	7.686	32.742	7.29	4.44
	40	4.045	32.944	7.56	1.85
	50	2.483	32.992	7.45	1.94
	75	1.146	33.067	7.08	0.48
	100	0.903	33.110	7.05	0.15
	125	0.908	33.144	6.96	0.11
	150	0.850	33.207	6.56	0.08
	175	2.063	33.438	4.33	0.08
	200	3.080	33.656	2.29	0.08
	250	3.605	33.874	0.78	0.09
	300	3.713	33.976	0.48	0.09
	400	3.589	34.097	0.35	0.09
	500	3.382	34.187	0.32	0.09
	600	3.235	34.253	0.29	0.09
	700	3.063	34.303	0.32	0.09
	800	2.899	34.348	0.36	0.09
	900	2.752	34.385	0.37	0.09
	1000	2.609	34.420	0.44	0.09
	1005	2.605	34.421	0.44	0.08

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l⁻¹	ug/l
Sur.	0	***	17.1	***	***	***
1	600	606	3.236	34.251	0.29	0.09
2	600	605	3.236	34.252	0.28	0.09
3	990	1000	2.608	34.420	0.44	0.09
4	990	1000	2.608	34.420	0.44	0.09
5	990	1000	2.608	34.420	0.44	0.09
6	792	800	2.903	34.346	0.35	0.09
7	792	800	2.906	34.346	0.35	0.09
8	792	800	2.906	34.346	0.35	0.09
9	594	600	3.244	34.246	0.30	0.09
10	594	600	3.244	34.246	0.30	0.09
11	595	600	3.244	34.246	0.30	0.09
12	397	400	3.595	34.092	0.34	0.09
13	397	400	3.595	34.092	0.34	0.09
14	397	400	3.595	34.092	0.34	0.09
15	198	200	3.285	33.703	1.84	0.09
16	198	200	3.213	33.685	2.18	0.09
17	198	200	3.170	33.671	2.20	0.08
18	600	606	3.236	34.252	0.29	0.09
19	990	1001	2.608	34.420	0.44	0.09
20	792	800	2.906	34.346	0.35	0.09
21	595	601	3.244	34.247	0.30	0.09
22	397	401	3.595	34.092	0.34	0.09
23	297	300	3.710	33.980	0.45	0.09
24	199	200	3.094	33.653	2.22	0.09

KH-12-4	BD-7-4		Depth	5239m	
Date:	2012/8/29		Lat.	46	59.97N
Time:	11:47		Long.	160	05.13E

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	ml·l⁻¹	ug/l
	5	15.211	32.411	5.98	1.94
	10	14.473	32.409	6.16	2.47
	20	11.786	32.517	6.60	3.77
	30	4.986	32.913	7.44	2.54
	40	2.907	32.979	7.51	1.85
	50	1.928	33.009	7.31	1.64
	75	0.931	33.084	7.07	0.26
	100	0.911	33.121	7.03	0.18
	125	0.849	33.155	6.89	0.08
	150	1.039	33.243	6.23	0.08
	153	1.083	33.252	6.11	0.08

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l⁻¹	ug/l
Sur.	0	***	15.4	***	***	***
1	150	151	1.176	33.267	5.99	0.08
2	150	151	1.193	33.267	5.90	0.08
3	149	150	1.195	33.270	5.91	0.08
4	26	27	5.465	32.892	7.49	3.02
5	26	27	5.605	32.884	7.48	2.98
6	100	101	0.926	33.130	6.98	0.14
7	100	101	0.926	33.130	6.99	0.14
8	100	101	0.925	33.130	6.98	0.13
9	49	50	1.571	33.033	7.13	1.01
10	50	51	1.601	33.031	7.15	1.01
11	51	51	1.601	33.030	7.16	1.28
12	25	25	6.552	32.821	7.42	3.86
13	25	25	6.501	32.824	7.38	3.65
14	25	25	6.184	32.870	7.40	3.91
15	10	10	14.112	32.399	6.26	2.69
16	10	10	15.064	32.403	6.12	2.20
17	10	10	14.878	32.408	6.06	2.40
18	150	151	1.194	33.270	5.91	0.08
19	27	27	5.662	32.882	7.48	2.98
20	100	101	0.927	33.130	6.98	0.13
21	51	51	1.588	33.032	7.15	1.13
22	25	25	6.029	32.877	7.41	3.56
23	10	10	14.153	32.425	6.32	2.51
24	5	5	15.305	32.408	5.96	2.06

KH-12-4		BD-7-5		Depth	5242m	
Date:	2012/8/29			Lat.	47	00.22N
Time:	15:18			Long.	160	05.12E
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml・l⁻¹	ug/l
		5	14.770	32.415	6.06	2.04
		10	14.147	32.404	6.23	2.16
		20	12.257	32.461	6.56	3.35
		30	5.367	32.871	7.50	2.91
		40	3.435	32.985	7.47	1.82
		50	2.158	33.004	7.36	1.56
		75	1.028	33.072	7.05	0.31
		100	0.907	33.118	7.03	0.16
		125	0.889	33.153	6.92	0.09
		150	1.063	33.248	6.21	0.08
		175	2.518	33.521	3.57	0.08
		200	3.325	33.722	1.87	0.08
		250	3.635	33.897	0.71	0.09
		300	3.707	33.989	0.45	0.09
		400	3.557	34.113	0.35	0.09
		500	3.358	34.201	0.32	0.09
		600	3.211	34.259	0.30	0.09
		700	3.046	34.308	0.32	0.09
		800	2.909	34.345	0.35	0.09
		900	2.763	34.383	0.37	0.09
		1000	2.612	34.419	0.44	0.09
		1200	2.379	34.472	0.62	0.08
		1500	2.112	34.537	0.98	0.08
		2000	1.824	34.604	1.64	0.08
		2500	1.634	34.643	2.32	0.08
		3000	1.529	34.662	2.71	0.07
		3500	1.477	34.674	3.00	0.07
		4000	1.461	34.681	3.17	0.07
		4500	1.480	34.684	3.25	0.07
		5000	1.527	34.686	3.31	0.07
		5337	1.559	34.687	3.33	0.07
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml・l⁻¹	ug/l
Sur.	0	***	15.2	***	***	***
1	5227	5337	1.559	34.687	3.18	0.07
2	5228	5337	1.559	34.687	3.19	0.07
3	5228	5337	1.559	34.687	3.18	0.07
4	5228	5337	1.559	34.687	3.19	0.07
5	4900	4999	1.526	34.686	3.19	0.07
6	4900	4999	1.526	34.686	3.20	0.07
7	4900	4999	1.526	34.686	3.22	0.07
8	4416	4500	1.479	34.685	3.20	0.07
9	3930	4000	1.458	34.682	3.12	0.07
10	3930	4000	1.458	34.682	3.13	0.07
11	3930	4000	1.458	34.682	3.14	0.07
12	3930	4000	1.458	34.682	3.13	0.07
13	3442	3500	1.473	34.675	2.98	0.07
14	2953	2999	1.518	34.664	2.71	0.07
15	2953	2999	1.519	34.664	2.71	0.07
16	2953	2999	1.519	34.664	2.71	0.07
17	2464	2500	1.626	34.644	2.32	0.08
18	5228	5337	1.559	34.687	3.19	0.07
19	4901	4999	1.526	34.686	3.21	0.07
20	4415	4499	1.478	34.685	3.20	0.07
21	3930	4000	1.458	34.682	3.14	0.07
22	3442	3500	1.472	34.675	2.96	0.07
23	2953	2999	1.519	34.664	2.71	0.07
24	2465	2500	1.627	34.644	2.32	0.08

KH-12-4		BD-7-6		Depth	5242m	
Date:	2012/8/29			Lat.	47	00.06N
Time:	22:21			Long.	160	05.07E
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml・l⁻¹	ug/l
		5	15.281	32.410	5.91	1.02
		10	14.679	32.406	6.10	1.48
		20	10.593	32.529	6.84	3.51
		30	4.154	32.931	7.59	2.21
		40	2.263	32.998	7.38	1.80
		50	1.781	33.015	7.25	1.42
		75	1.078	33.086	7.04	0.26
		100	0.897	33.125	6.97	0.15
		125	0.715	33.148	6.90	0.09
		150	0.641	33.191	6.71	0.08
		175	2.180	33.455	4.17	0.08
		200	3.242	33.692	2.09	0.08
		250	3.616	33.866	0.84	0.09
		300	3.712	33.970	0.49	0.09
		400	3.580	34.102	0.35	0.09
		500	3.409	34.188	0.30	0.09
		600	3.218	34.256	0.30	0.09
		700	3.052	34.307	0.31	0.09
		800	2.883	34.352	0.35	0.09
		900	2.713	34.394	0.39	0.09
		1000	2.584	34.425	0.45	0.09
		1200	2.340	34.480	0.64	0.08
		1500	2.076	34.545	1.00	0.08
		2000	1.798	34.609	1.73	0.08
		2001	1.796	34.609	1.74	0.08
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml・l⁻¹	ug/l
Sur.	0	***	15.8	***	***	***
1	1974	2000	1.799	34.608	1.70	0.08
2	1974	2000	1.800	34.608	1.70	0.08
3	1974	2000	1.800	34.608	1.70	0.08
4	1482	1499	2.093	34.541	1.00	0.08
5	989	999	2.605	34.420	0.44	0.09
6	988	999	2.605	34.420	0.44	0.09
7	988	999	2.605	34.420	0.44	0.09
8	792	800	2.888	34.350	0.34	0.09
9	594	599	3.197	34.262	0.29	0.09
10	594	599	3.198	34.262	0.30	0.09
11	395	399	3.561	34.111	0.33	0.09
12	396	399	3.562	34.111	0.33	0.09
13	396	399	3.562	34.111	0.33	0.09
14	197	199	3.392	33.739	1.64	0.09
15	197	199	3.364	33.731	1.67	0.09
16	197	199	3.335	33.721	1.76	0.08
17	1974	2000	1.799	34.608	1.70	0.08
18	1482	1500	2.092	34.541	1.00	0.08
19	1235	1250	2.311	34.487	0.67	0.08
20	989	999	2.605	34.420	0.44	0.09
21	791	799	2.888	34.350	0.34	0.09
22	594	599	3.198	34.262	0.29	0.09
23	396	399	3.562	34.110	0.33	0.09
24	197	199	3.331	33.720	1.75	0.08

KH-12-4	BD-7-7	Depth	5240m
Date:	2012/8/30	Lat.	47 00.07N
Time:	04:04	Long.	160 05.07E

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	ml·l^{-1}	ug/l
	5	15.305	32.411	6.01	0.96
	10	14.310	32.409	6.22	1.39
	20	13.376	32.422	6.43	2.49
	30	5.031	32.888	7.66	2.74
	40	2.729	32.992	7.49	1.87
	50	1.976	33.015	7.33	1.62
	75	1.209	33.071	7.09	0.39
	100	0.895	33.116	7.00	0.14
	125	0.683	33.153	6.88	0.09
	150	0.775	33.219	6.53	0.08
	151	0.784	33.221	6.49	0.09

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l^{-1}	ug/l
Sur.	0	***	15.9	***	***	***
1	149	150	0.771	33.216	6.52	0.08
2	99	100	0.892	33.110	7.02	0.15
3	99	100	0.896	33.103	7.02	0.17
4	100	101	0.902	33.106	7.01	0.14
5	50	51	1.903	33.015	7.31	1.80
6	50	50	1.969	33.009	7.31	1.91
7	25	25	9.937	32.622	6.83	3.72
8	10	10	14.317	32.413	6.18	1.90
9	10	10	14.641	32.405	6.16	1.80
10	10	10	14.630	32.408	6.14	1.70
11	10	11	14.573	32.408	6.15	1.79
12	11	11	14.529	32.406	6.17	1.68
13	11	11	14.732	32.397	6.14	1.64
14	10	10	14.615	32.408	6.17	1.81
15	11	11	14.593	32.407	6.16	1.70
16	10	10	14.683	32.407	6.14	1.63
17	10	10	14.668	32.408	6.14	1.71
18	11	11	14.516	32.412	6.15	1.65
19	10	10	14.625	32.407	6.17	1.64
20	99	100	0.898	33.104	7.01	0.14
21	49	50	2.013	33.007	7.30	1.84
22	24	24	10.922	32.533	7.04	3.58
23	11	11	14.620	32.409	6.12	1.59
24	5	5	15.055	32.407	6.08	1.26

KH-12-4	BD-7-EX	Depth	5247m
Date:	2012/8/30	Lat.	47 01.56N
Time:	11:36	Long.	160 06.54E

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	ml·l^{-1}	ug/l
	5	15.029	32.410	6.00	2.18
	10	13.952	32.400	6.31	2.61
	20	7.913	32.779	7.22	3.96
	30	4.473	32.931	7.58	2.72
	40	2.536	32.986	7.46	1.84
	50	1.697	33.035	7.19	1.08
	51	1.715	33.035	7.18	1.00

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l^{-1}	ug/l
Sur.	0	***	15.4	***	***	***
1	50	50	1.921	33.023	7.28	1.35
2	50	50	1.927	33.022	7.27	1.45
3	50	50	1.941	33.022	7.28	1.44
4	50	50	1.952	33.021	7.29	1.41
5	49	50	2.008	33.018	7.28	1.54
6	50	50	2.054	33.014	7.30	1.72
7	49	50	2.117	33.007	7.35	1.72
8	50	50	2.127	33.014	7.37	1.99
9	49	50	2.187	33.006	7.38	1.85
10	25	25	7.358	32.782	7.29	4.04
11	25	25	7.300	32.804	7.31	4.00
12	25	25	7.238	32.790	7.31	3.90
13	25	25	7.314	32.803	7.37	3.90
14	25	25	6.966	32.819	7.35	3.96
15	25	25	6.908	32.826	7.35	3.90
16	25	25	6.899	32.827	7.35	4.11
17	50	50	2.204	33.003	7.39	2.05
18	50	50	2.210	33.002	7.38	1.86
19	25	26	6.753	32.841	7.34	4.12
20	25	25	7.000	32.802	7.38	3.98
21	10	10	14.054	32.402	6.30	2.71
22	10	10	14.382	32.401	6.19	2.52
23	5	5	14.900	32.413	6.03	2.23
24	6	6	15.135	32.408	5.98	2.15

KH-12-4		BD-8-1		Depth	5918m	
Date:	2012/8/31			Lat.	47	10.08N
Time:	01:06			Long.	165	00.37E
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml·l^{-1}	ug/l
		10	14.801	32.521	6.09	2.19
		20	7.984	32.947	7.19	1.74
		30	6.296	33.052	7.21	1.68
		40	4.145	33.062	7.29	1.55
		50	2.668	33.052	7.32	1.28
		75	2.335	33.102	7.08	0.44
		100	2.642	33.182	6.84	0.19
		125	2.711	33.301	6.16	0.10
		150	3.494	33.513	5.04	0.10
		175	3.153	33.583	3.70	0.08
		200	3.227	33.660	2.95	0.08
		250	3.355	33.771	2.13	0.08
		300	3.459	33.865	1.48	0.09
		400	3.522	34.011	0.97	0.09
		500	3.440	34.106	0.72	0.09
		600	3.333	34.202	0.63	0.09
		700	3.158	34.267	0.53	0.09
		800	3.001	34.317	0.55	0.09
		900	2.855	34.360	0.61	0.09
		1000	2.697	34.396	0.74	0.08
		1200	2.468	34.453	0.76	0.08
		1500	2.203	34.520	0.94	0.08
		2000	1.881	34.595	1.53	0.08
		2500	1.668	34.637	2.18	0.08
		3000	1.550	34.659	2.63	0.07
		3500	1.492	34.671	2.94	0.07
		4000	1.478	34.679	3.11	0.07
		4500	1.495	34.683	3.23	0.07
		5000	1.529	34.685	3.31	0.07
		5500	1.582	34.686	3.33	0.07
		6000	1.649	34.686	3.34	0.07
		6027	1.653	34.687	3.35	0.07
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l^{-1}	ug/l
Sur.	0	***	16.0	***	***	***
1	5897	6030	1.653	34.687	3.17	0.07
2	5897	6030	1.653	34.687	3.15	0.07
3	5385	5500	1.581	34.687	3.23	0.07
4	5386	5500	1.581	34.687	3.22	0.07
5	4902	5001	1.528	34.686	3.23	0.07
6	4416	4500	1.495	34.684	3.17	0.07
7	4416	4500	1.495	34.684	3.18	0.07
8	3930	4000	1.480	34.679	3.06	0.07
9	3443	3500	1.496	34.672	2.88	0.07
10	2954	3000	1.557	34.659	2.58	0.07
11	2954	3000	1.557	34.659	2.58	0.07
12	5897	6030	1.653	34.687	3.16	0.07
13	5386	5501	1.581	34.687	3.22	0.07
14	5143	5250	1.552	34.687	3.24	0.07
15	4902	5001	1.528	34.686	3.24	0.07
16	4658	4750	1.509	34.685	3.20	0.07
17	4415	4500	1.495	34.684	3.17	0.07
18	4173	4250	1.484	34.682	3.12	0.07
19	3930	4000	1.480	34.679	3.06	0.07
20	3686	3750	1.483	34.676	2.98	0.07
21	3443	3500	1.497	34.672	2.87	0.07
22	3199	3250	1.521	34.667	2.75	0.07
23	2954	3000	1.557	34.659	2.58	0.07
24	2709	2749	1.610	34.649	2.37	0.08

KH-12-4		BD-8-2		Depth	5935m	
Date:	2012/8/31			Lat.	47	09.98N
Time:	09:10			Long.	165	00.09E
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml·l^{-1}	ug/l
		5	15.422	32.533	5.88	2.97
		10	15.435	32.533	5.88	3.01
		20	14.591	32.551	6.13	3.35
		30	7.474	32.965	7.19	2.16
		40	5.673	33.050	7.13	1.91
		50	3.724	33.058	7.29	1.57
		75	2.311	33.083	7.15	0.55
		100	2.578	33.166	6.93	0.30
		125	2.643	33.279	6.25	0.12
		150	3.016	33.466	4.84	0.10
		175	3.139	33.600	3.52	0.09
		200	3.177	33.663	2.90	0.08
		250	3.393	33.796	2.03	0.08
		300	3.447	33.880	1.53	0.09
		400	3.566	34.027	0.95	0.09
		500	3.427	34.133	0.71	0.09
		600	3.288	34.212	0.65	0.09
		700	3.144	34.273	0.56	0.09
		800	2.976	34.325	0.57	0.09
		900	2.824	34.365	0.63	0.09
		1000	2.692	34.398	0.73	0.09
		1200	2.466	34.453	0.78	0.09
		1500	2.202	34.520	0.94	0.09
		2000	1.865	34.598	1.58	0.08
		2500	1.663	34.637	2.18	0.08
		2500	1.663	34.637	2.18	0.08
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l^{-1}	ug/l
Sur.	0	***	15.8	***	***	***
1	2467	2502	1.663	34.637	2.16	0.08
2	1974	2000	1.868	34.597	1.54	0.08
3	1974	2000	1.867	34.597	1.54	0.08
4	1483	1500	2.194	34.520	0.91	0.09
5	1235	1249	2.416	34.465	0.80	0.09
6	989	1000	2.701	34.396	0.66	0.09
7	990	1000	2.701	34.396	0.66	0.09
8	614	620	3.277	34.225	0.55	0.09
9	792	800	2.982	34.321	0.57	0.09
10	792	800	2.981	34.321	0.57	0.09
11	594	600	3.309	34.211	0.57	0.09
12	396	400	3.468	34.010	0.99	0.09
13	396	400	3.467	34.010	0.99	0.10
14	2467	2503	1.663	34.637	2.15	0.08
15	2219	2250	1.754	34.620	1.87	0.08
16	1974	2000	1.867	34.597	1.54	0.08
17	1729	1751	2.016	34.563	1.20	0.08
18	1483	1501	2.194	34.521	0.91	0.09
19	1236	1250	2.416	34.465	0.80	0.09
20	990	1000	2.701	34.396	0.65	0.09
21	614	620	3.278	34.225	0.55	0.09
22	793	801	2.981	34.321	0.57	0.09
23	594	600	3.304	34.210	0.54	0.09
24	397	400	3.480	34.012	1.00	0.09

KH-12-4		BD-9-1		Depth	6288m	
Date:	2012/9/1			Lat.	47	00.01N
Time:	10:03			Long.	170	34.96E
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml·l^{-1}	ug/l
		10	14.016	32.616	5.92	1.93
		20	13.655	32.631	6.16	2.04
		30	9.733	32.832	6.75	2.59
		40	6.454	32.945	7.00	2.18
		50	4.918	32.991	7.09	1.29
		75	3.223	33.054	6.99	0.59
		100	2.968	33.160	6.30	0.30
		125	3.446	33.549	3.17	0.14
		150	3.781	33.822	1.13	0.12
		175	3.800	33.893	0.72	0.11
		200	3.775	33.932	0.50	0.10
		250	3.744	34.013	0.36	0.09
		300	3.681	34.066	0.44	0.09
		400	3.527	34.155	0.38	0.09
		500	3.377	34.217	0.33	0.09
		600	3.208	34.272	0.33	0.09
		700	3.066	34.314	0.36	0.09
		800	2.907	34.358	0.40	0.09
		900	2.725	34.400	0.44	0.09
		1000	2.585	34.432	0.51	0.09
		1200	2.324	34.490	0.67	0.09
		1500	2.067	34.549	1.05	0.09
		2000	1.787	34.609	1.70	0.08
		2500	1.614	34.643	2.27	0.08
		3000	1.521	34.662	2.68	0.08
		3500	1.467	34.674	2.99	0.07
		4000	1.461	34.680	3.15	0.07
		4500	1.490	34.683	3.23	0.07
		5000	1.537	34.685	3.26	0.07
		5500	1.596	34.685	3.29	0.07
		6000	1.662	34.685	3.30	0.07
		6001	1.662	34.685	3.29	0.07
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l^{-1}	ug/l
Sur.	0	***	14.3	***	***	***
1	5868	6000	1.662	34.685	3.12	0.07
2	5869	6000	1.662	34.685	3.13	0.07
3	5868	6000	1.662	34.685	3.14	0.07
4	5869	6000	1.662	34.685	3.14	0.07
5	5869	6000	1.662	34.685	3.14	0.07
6	5385	5500	1.595	34.685	3.19	0.07
7	5385	5500	1.595	34.686	3.20	0.07
8	5386	5500	1.595	34.686	3.19	0.07
9	5385	5500	1.595	34.686	3.21	0.07
10	4901	5000	1.536	34.685	3.22	0.07
11	4901	5000	1.536	34.685	3.20	0.07
12	4902	5000	1.536	34.685	3.21	0.07
13	4902	5000	1.536	34.685	3.21	0.07
14	4902	5000	1.536	34.685	3.22	0.07
15	5869	6000	1.662	34.685	3.15	0.07
16	5869	6000	1.662	34.685	3.13	0.07
17	5869	6000	1.662	34.685	3.14	0.07
18	5627	5750	1.628	34.685	3.18	0.07
19	5385	5500	1.595	34.686	3.21	0.07
20	5386	5500	1.595	34.686	3.20	0.07
21	5143	5250	1.564	34.686	3.21	0.07
22	4902	5001	1.536	34.685	3.21	0.07
23	4902	5001	1.536	34.685	3.21	0.07
24	4658	4749	1.510	34.685	3.21	0.07

KH-12-4		BD-9-2		Depth	6288m	
Date:	2012/9/1			Lat.	47	00.01N
Time:	17:36			Long.	170	35.11E
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml·l^{-1}	ug/l
		20	11.749	32.703	6.60	1.96
		30	8.077	32.902	6.87	2.27
		40	6.442	32.938	6.96	1.89
		50	4.796	32.996	7.11	1.18
		75	3.204	33.061	6.99	0.66
		100	2.961	33.127	6.54	0.32
		125	3.268	33.422	4.15	0.15
		150	3.741	33.781	1.38	0.13
		175	3.790	33.877	0.76	0.11
		200	3.782	33.931	0.53	0.10
		250	3.748	34.002	0.37	0.09
		300	3.695	34.061	0.43	0.11
		400	3.527	34.154	0.38	0.09
		500	3.358	34.223	0.33	0.09
		600	3.205	34.273	0.32	0.09
		700	3.054	34.318	0.35	0.09
		800	2.903	34.360	0.39	0.09
		900	2.766	34.391	0.42	0.09
		1000	2.617	34.425	0.49	0.09
		1200	2.376	34.480	0.63	0.09
		1500	2.093	34.543	1.01	0.08
		2000	1.798	34.607	1.67	0.08
		2500	1.627	34.641	2.25	0.08
		3000	1.524	34.661	2.67	0.07
		3500	1.468	34.674	2.99	0.07
		4000	1.462	34.680	3.14	0.07
		4500	1.490	34.683	3.25	0.07
		4507	1.490	34.683	3.26	0.07
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l^{-1}	ug/l
Sur.	0	***	14.0	***	***	***
1	4417	4501	1.490	34.683	3.13	0.07
2	4416	4500	1.490	34.683	3.13	0.07
3	4416	4500	1.490	34.683	3.14	0.07
4	3930	4000	1.461	34.681	3.09	0.07
5	3930	4000	1.461	34.681	3.10	0.07
6	3930	4000	1.461	34.681	3.10	0.07
7	3930	4000	1.461	34.681	3.09	0.07
8	3930	4000	1.461	34.681	3.10	0.07
9	3443	3501	1.468	34.674	2.95	0.07
10	3443	3501	1.468	34.674	2.95	0.07
11	3443	3501	1.467	34.674	2.94	0.07
12	534	539	3.293	34.242	0.33	0.09
13	534	539	3.292	34.243	0.32	0.09
14	534	539	3.293	34.243	0.32	0.09
15	4416	4501	1.490	34.683	3.14	0.07
16	4416	4500	1.490	34.683	3.13	0.07
17	4173	4250	1.472	34.682	3.13	0.07
18	3930	4000	1.461	34.681	3.09	0.07
19	3930	4000	1.461	34.681	3.09	0.07
20	3686	3750	1.457	34.678	3.05	0.07
21	3443	3501	1.468	34.674	2.95	0.07
22	3443	3501	1.467	34.674	2.94	0.07
23	3198	3250	1.491	34.669	2.82	0.08
24	534	540	3.292	34.243	0.32	0.09

KH-12-4		BD-9-3		Depth	6288m	
Date:		2012/9/2		Lat.	46	59.91N
Time:		01:33		Long.	170	35.00E
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml・l⁻¹	ug/l
		20	11.621	32.743	6.55	1.99
		30	8.276	32.897	6.88	2.48
		40	6.730	32.940	6.95	2.18
		50	4.740	32.999	7.12	1.46
		75	3.259	33.054	7.03	0.84
		100	2.946	33.154	6.34	0.29
		125	3.371	33.495	3.57	0.15
		150	3.774	33.815	1.22	0.12
		175	3.797	33.902	0.67	0.10
		200	3.767	33.948	0.45	0.09
		250	3.736	34.015	0.36	0.09
		300	3.675	34.071	0.44	0.09
		400	3.525	34.156	0.37	0.09
		500	3.364	34.221	0.32	0.09
		600	3.183	34.280	0.33	0.09
		700	3.031	34.324	0.35	0.09
		800	2.883	34.364	0.37	0.09
		900	2.735	34.398	0.44	0.09
		1000	2.583	34.432	0.51	0.09
		1200	2.329	34.489	0.67	0.09
		1500	2.067	34.549	1.05	0.08
		2000	1.787	34.609	1.69	0.08
		2500	1.619	34.642	2.26	0.08
		3000	1.518	34.662	2.70	0.07
		3002	1.517	34.662	2.70	0.08
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml・l⁻¹	ug/l
Sur.	0	***	14.2	***	***	***
1	2953	2999	1.517	34.662	2.65	0.07
2	2953	2999	1.517	34.662	2.65	0.08
3	2954	2999	1.517	34.662	2.65	0.07
4	2953	2999	1.518	34.662	2.65	0.08
5	2953	2999	1.517	34.662	2.65	0.07
6	2953	2999	1.517	34.662	2.65	0.07
7	2953	2999	1.517	34.662	2.66	0.08
8	2953	2999	1.517	34.662	2.65	0.08
9	2464	2500	1.615	34.643	2.25	0.08
10	2464	2500	1.615	34.643	2.25	0.08
11	2465	2500	1.615	34.643	2.25	0.08
12	1974	2000	1.784	34.609	1.70	0.08
13	1974	2000	1.784	34.609	1.69	0.08
14	1974	2000	1.784	34.609	1.69	0.08
15	1973	1999	1.784	34.609	1.69	0.08
16	1973	1999	1.784	34.609	1.69	0.08
17	1974	2000	1.784	34.609	1.69	0.08
18	2953	2999	1.517	34.662	2.65	0.08
19	2709	2750	1.565	34.653	2.46	0.08
20	2465	2500	1.615	34.643	2.25	0.08
21	2219	2250	1.686	34.629	2.01	0.08
22	1973	1999	1.784	34.609	1.69	0.08
23	1973	1999	1.784	34.609	1.69	0.08
24	1728	1750	1.915	34.582	1.36	0.08

KH-12-4		BD-9-EX		Depth	6287m	
Date:		2012/9/2		Lat.	46	59.92N
Time:		06:31		Long.	170	35.09E
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml・l⁻¹	ug/l
		10	13.994	32.623	5.90	1.91
		20	13.302	32.645	5.90	1.87
		30	8.739	32.863	6.83	2.62
		40	6.541	32.933	6.98	2.02
		50	4.479	33.006	7.06	1.20
		51	4.699	33.010	7.18	1.19
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml・l⁻¹	ug/l
Sur.	0	***	14.0	***	***	***
1	7	7	13.994	32.622	5.90	1.78
2	10	10	13.980	32.615	5.93	1.93
3	10	10	13.983	32.619	5.90	1.96
4	10	10	13.981	32.620	5.90	1.86
5	10	11	13.981	32.620	5.90	1.86
6	10	10	13.989	32.621	5.91	1.83
7	10	10	13.987	32.622	5.90	1.81
8	10	10	13.974	32.623	5.90	1.87
9	10	10	13.932	32.626	5.90	1.89
10	10	10	13.994	32.621	5.89	1.88
11	10	11	13.996	32.622	5.90	1.78
12	10	10	13.999	32.622	5.90	1.85
13	10	10	13.997	32.622	5.90	1.91
14	10	10	13.987	32.622	5.90	1.84
15	10	10	13.988	32.622	5.90	1.81
16	10	10	13.994	32.622	5.90	1.80
17	50	50	4.766	32.998	7.11	1.26
18	49	50	4.781	32.997	7.11	1.17
19	49	50	4.793	32.997	7.12	1.27
20	25	25	9.362	32.843	6.87	2.84
21	10	10	13.984	32.622	5.90	1.87
22	9	9	13.983	32.622	5.90	1.82
23	25	26	9.830	32.828	6.83	2.68
24	5	5	14.016	32.622	5.90	1.83

KH-12-4	BD-9-4		Depth	6288m	
Date:	2012/9/2		Lat.	46	59.95N
Time:	07:17		Long.	170	34.98E

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	ml·l⁻¹	ug/l
	20	13.454	32.640	6.09	1.84
	30	9.514	32.867	6.75	2.63
	40	7.496	32.922	6.91	2.38
	50	5.329	32.974	7.04	1.56
	75	3.219	33.050	6.99	0.65
	100	2.967	33.119	6.60	0.36
	125	3.314	33.450	3.92	0.17
	150	3.752	33.790	1.33	0.14
	175	3.791	33.879	0.76	0.12
	200	3.777	33.930	0.52	0.09
	250	3.748	33.998	0.37	0.09
	300	3.719	34.056	0.41	0.09
	400	3.557	34.134	0.40	0.09
	500	3.395	34.211	0.32	0.09
	600	3.219	34.269	0.33	0.09
	700	3.050	34.319	0.35	0.09
	800	2.889	34.361	0.37	0.09
	900	2.731	34.399	0.43	0.10
	1000	2.587	34.431	0.51	0.09
	1200	2.365	34.482	0.63	0.09
	1500	2.083	34.545	1.03	0.08
	1502	2.082	34.545	1.01	0.08

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l⁻¹	ug/l
Sur.	0	***	14.0	***	***	***
1	1482	1500	2.084	34.545	1.03	0.08
2	1482	1500	2.083	34.545	1.03	0.08
3	1482	1500	2.083	34.545	1.03	0.08
4	1483	1500	2.083	34.545	1.03	0.08
5	1236	1251	2.307	34.494	0.69	0.09
6	1236	1250	2.309	34.493	0.69	0.09
7	989	1000	2.587	34.431	0.50	0.09
8	989	1000	2.587	34.431	0.51	0.09
9	989	1000	2.587	34.431	0.50	0.09
10	989	1000	2.588	34.431	0.50	0.09
11	792	800	2.872	34.364	0.37	0.09
12	793	801	2.874	34.364	0.37	0.09
13	594	599	3.184	34.279	0.33	0.09
14	594	599	3.184	34.279	0.32	0.09
15	593	599	3.184	34.278	0.32	0.09
16	594	600	3.185	34.278	0.33	0.09
17	1482	1500	2.083	34.545	1.03	0.08
18	1482	1500	2.084	34.545	1.03	0.08
19	1236	1250	2.310	34.493	0.69	0.09
20	989	1000	2.589	34.431	0.51	0.09
21	989	1000	2.589	34.431	0.51	0.09
22	791	799	2.879	34.363	0.37	0.09
23	594	599	3.184	34.279	0.33	0.09
24	594	599	3.184	34.278	0.32	0.09

KH-12-4	BD-9-5		Depth	6289m	
Date:	2012/9/2		Lat.	47	00.01N
Time:	11:03		Long.	170	34.94E

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	ml·l⁻¹	ug/l
	20	13.981	32.628	5.88	1.98
	30	9.775	32.822	6.74	2.47
	40	7.845	32.922	6.90	2.66
	50	5.673	32.964	7.01	1.56
	75	3.283	33.038	7.03	0.87
	100	3.004	33.103	6.70	0.44
	125	3.215	33.384	4.45	0.18
	150	3.634	33.684	2.11	0.15
	175	3.800	33.859	0.90	0.11
	200	3.800	33.909	0.67	0.10
	250	3.744	33.983	0.38	0.09
	300	3.702	34.044	0.35	0.09
	400	3.536	34.150	0.37	0.09
	404	3.530	34.154	N.D.	0.09

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l⁻¹	ug/l
Sur.	0	***	14.0	***	***	***
1	397	401	3.532	34.152	0.37	0.09
2	397	401	3.531	34.152	0.37	0.09
3	397	400	3.531	34.152	0.37	0.09
4	398	401	3.531	34.152	0.37	0.09
5	398	401	3.531	34.152	0.37	0.09
6	200	201	3.798	33.911	0.60	0.10
7	198	200	3.798	33.910	0.61	0.10
8	199	201	3.798	33.910	0.62	0.10
9	199	200	3.798	33.909	0.62	0.10
10	151	152	3.746	33.778	1.43	0.13
11	149	150	3.748	33.780	1.30	0.13
12	150	151	3.759	33.792	1.35	0.13
13	99	100	2.961	33.125	6.45	0.41
14	100	100	2.956	33.128	6.36	0.31
15	98	99	2.967	33.130	6.46	0.35
16	99	100	2.957	33.124	6.48	0.43
17	398	402	3.530	34.153	0.37	0.09
18	398	401	3.531	34.152	0.37	0.09
19	298	300	3.697	34.049	0.35	0.09
20	199	201	3.798	33.910	0.61	0.10
21	198	200	3.797	33.909	0.61	0.10
22	149	150	3.749	33.782	1.33	0.12
23	100	101	2.948	33.131	6.49	0.37
24	98	99	2.963	33.122	6.47	0.35

KH-12-4	BD-9-6	Depth	6287m
Date:	2012/9/2	Lat.	46 59.83N
Time:	16:26	Long.	170 35.13E

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	ml･l⁻¹	ug/l
	5	13.971	32.626	5.87	1.86
	10	13.974	32.626	5.86	1.79
	20	12.048	32.705	6.53	2.13
	30	8.862	32.884	6.88	2.74
	40	6.512	32.947	7.00	2.35
	50	4.507	33.006	7.13	1.13
	75	3.248	33.041	7.01	0.63
	100	2.992	33.106	6.69	0.36
	125	3.293	33.439	4.04	0.17
	150	3.743	33.780	1.46	0.13
	175	3.796	33.889	0.74	0.10
	200	3.778	33.928	0.52	0.10
	202	3.778	33.929	N.D.	0.10

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml･l⁻¹	ug/l
Sur.	0	***	13.9	***	***	***
1	29	29	8.024	32.896	6.86	2.49
2	29	29	8.199	32.896	6.87	2.52
3	29	29	8.228	32.894	6.87	2.51
4	49	50	4.668	32.997	7.09	1.32
5	49	50	4.622	32.999	7.10	1.08
6	49	50	4.600	33.001	7.11	1.14
7	49	50	4.640	32.999	7.10	1.18
8	49	50	4.628	33.000	7.10	1.11
9	24	25	9.418	32.848	6.82	2.48
10	24	24	9.453	32.850	6.80	2.46
11	25	25	9.608	32.843	6.80	2.68
12	29	30	8.239	32.894	6.87	2.52
13	10	10	13.920	32.621	5.88	1.96
14	10	10	13.922	32.623	5.87	2.03
15	10	10	13.960	32.623	5.87	1.80
16	10	10	13.964	32.624	5.87	2.02
17	10	10	13.971	32.624	5.87	1.77
18	10	10	13.972	32.624	5.86	1.74
19	49	50	4.616	32.998	7.10	1.10
20	49	50	4.608	33.000	7.11	1.20
21	24	25	9.602	32.840	6.83	2.51
22	10	10	13.955	32.626	5.86	1.85
23	10	10	13.949	32.626	5.86	1.82
24	6	6	13.970	32.625	5.86	1.78

KH-12-4	BD-10-1	Depth	5836m
Date:	2012/9/3	Lat.	44 12.17N
Time:	08:13	Long.	169 44.14E

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	ml･l⁻¹	ug/l
	10	18.571	32.835	5.38	2.18
	20	11.899	33.082	6.81	2.98
	30	9.752	33.241	6.72	2.32
	40	8.458	33.361	6.61	2.02
	50	7.061	33.339	6.66	1.59
	75	4.086	33.230	6.86	0.68
	100	3.738	33.242	6.81	0.41
	125	3.651	33.297	6.63	0.16
	150	4.002	33.408	6.29	0.11
	175	3.892	33.532	4.94	0.09
	200	4.097	33.676	3.99	0.08
	250	4.542	33.833	3.11	0.08
	300	3.822	33.828	2.46	0.08
	400	4.086	34.023	1.64	0.08
	500	3.681	34.087	1.10	0.09
	600	3.516	34.179	0.86	0.09
	700	3.356	34.242	0.76	0.09
	800	3.104	34.285	0.67	0.09
	900	2.995	34.340	0.71	0.09
	1000	2.824	34.382	0.71	0.09
	1200	2.544	34.449	0.77	0.09
	1500	2.293	34.507	0.96	0.09
	2000	1.949	34.584	1.44	0.08
	2500	1.721	34.630	2.07	0.08
	3000	1.590	34.654	2.54	0.08
	3500	1.508	34.669	2.87	0.08
	4000	1.485	34.677	3.10	0.07
	4500	1.497	34.682	3.20	0.07
	5000	1.530	34.685	3.30	0.07
	5500	1.581	34.686	3.35	0.07
	5972	1.639	34.687	3.38	0.07

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml･l⁻¹	ug/l
Sur.	0	***	18.5	***	***	***
1	5842	5971	1.639	34.687	3.19	0.07
2	5386	5499	1.580	34.687	3.23	0.07
3	4902	5000	1.528	34.686	3.24	0.07
4	4416	4499	1.495	34.684	3.17	0.07
5	3929	3999	1.480	34.679	3.06	0.07
6	3443	3500	1.498	34.671	2.87	0.07
7	2956	3001	1.570	34.656	2.54	0.08
8	2465	2500	1.704	34.631	2.08	0.08
9	1975	2000	1.916	34.590	1.51	0.08
10	1483	1500	2.265	34.514	0.98	0.09
11	1237	1251	2.525	34.461	0.79	0.09
12	989	1000	2.861	34.376	0.72	0.09
13	5842	5971	1.639	34.687	3.20	0.07
14	5144	5249	1.552	34.687	3.24	0.07
15	4659	4749	1.511	34.684	3.21	0.07
16	4417	4500	1.495	34.683	3.17	0.07
17	4174	4250	1.482	34.682	3.13	0.07
18	3686	3749	1.485	34.676	2.97	0.07
19	3198	3249	1.531	34.665	2.73	0.07
20	2709	2749	1.631	34.646	2.34	0.08
21	2220	2250	1.795	34.613	1.81	0.08
22	1729	1751	2.108	34.551	1.16	0.08
23	1483	1501	2.265	34.514	0.98	0.08
24	990	1000	2.860	34.376	0.72	0.09

KH-12-4		BD-10-2		Depth	5800m	
Date:	2012/9/3			Lat.	44	10.74N
Time:	16:25			Long.	169	46.53E

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	ml·l⁻¹	ug/l
	20	18.420	32.827	5.36	1.71
	30	11.674	33.123	6.77	2.64
	40	8.512	33.268	6.69	2.02
	50	6.578	33.196	6.81	1.61
	75	4.548	33.273	6.83	0.75
	100	4.068	33.272	6.77	0.38
	125	3.974	33.334	6.63	0.22
	150	4.150	33.425	6.31	0.11
	175	4.763	33.608	5.25	0.08
	200	4.713	33.711	4.16	0.08
	250	4.325	33.783	3.26	0.08
	300	4.361	33.880	2.61	0.08
	400	3.944	33.974	1.72	0.08
	500	3.934	34.096	1.29	0.09
	600	3.693	34.189	0.97	0.09
	700	3.370	34.237	0.77	0.09
	800	3.132	34.294	0.70	0.09
	900	2.988	34.343	0.70	0.09
	1000	2.834	34.389	0.71	0.09
	1001	2.830	34.390	0.72	0.09

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l⁻¹	ug/l
Sur.	0	***	18.4	***	***	***
1	793	800	3.131	34.295	0.70	0.09
2	595	600	3.649	34.188	0.94	0.09
3	398	402	3.882	33.956	1.72	0.09
4	199	200	4.880	33.710	4.28	0.08
5	149	150	4.056	33.389	6.45	0.13
6	910	919	2.942	34.354	0.69	0.09
7	29	29	11.421	33.110	6.79	2.45
8	99	100	4.186	33.265	6.74	0.44
9	49	50	6.781	33.196	6.76	1.68
10	25	25	13.895	33.010	6.48	2.58
11	10	10	18.437	32.814	5.36	1.69
12	793	801	3.131	34.294	0.70	0.09
13	595	601	3.669	34.189	0.95	0.09
14	397	400	3.866	33.953	1.73	0.09
15	297	300	4.167	33.859	2.56	0.08
16	199	200	4.881	33.710	4.28	0.08
17	150	151	4.058	33.389	6.44	0.14
18	910	919	2.944	34.353	0.70	0.09
19	30	30	11.336	33.111	6.80	2.44
20	100	101	4.197	33.272	6.74	0.42
21	50	50	6.903	33.185	6.78	1.78
22	25	25	14.030	33.007	6.45	2.56
23	10	10	18.436	32.814	5.37	1.71
24	6	6	18.437	32.814	5.35	1.67

KH-12-4		BD-11-1		Depth	5586m	
Date:	2012/9/5			Lat.	47	00.09N
Time:	22:11			Long.	179	59.67W

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	ml·l⁻¹	ug/l
	10	12.510	32.725	6.01	1.62
	20	12.469	32.725	6.02	2.46
	30	12.453	32.726	6.01	2.70
	40	7.634	33.033	6.73	2.12
	50	6.561	33.053	6.83	1.73
	75	4.973	33.135	6.81	0.66
	100	4.335	33.193	6.75	0.35
	125	2.981	33.160	6.81	0.20
	150	3.674	33.374	5.48	0.11
	175	3.874	33.562	4.30	0.09
	200	3.538	33.627	3.69	0.08
	250	3.534	33.710	3.01	0.08
	300	3.733	33.814	2.36	0.09
	400	3.792	33.970	1.50	0.09
	500	3.629	34.069	0.94	0.09
	600	3.503	34.153	0.78	0.09
	700	3.357	34.237	0.67	0.09
	800	3.138	34.292	0.64	0.09
	900	2.966	34.338	0.60	0.09
	1000	2.826	34.375	0.62	0.09
	1200	2.580	34.439	0.67	0.09
	1500	2.266	34.510	0.88	0.09
	2000	1.939	34.583	1.41	0.08
	2500	1.714	34.628	1.98	0.08
	3000	1.584	34.653	2.46	0.07
	3500	1.505	34.669	2.85	0.07
	4000	1.477	34.678	3.06	0.07
	4500	1.492	34.683	3.20	0.07
	5000	1.541	34.685	3.23	0.07
	5500	1.600	34.685	3.28	0.07
	5873	1.647	34.685	3.24	0.07

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l⁻¹	ug/l
Sur.	0	***	12.8	***	***	***
1	5746	5874	1.647	34.685	3.10	0.07
2	5747	5874	1.647	34.685	3.11	0.07
3	5746	5874	1.648	34.685	3.13	0.07
4	5747	5874	1.648	34.685	3.12	0.07
5	5386	5500	1.599	34.685	3.16	0.07
6	5385	5500	1.599	34.685	3.15	0.07
7	4901	5000	1.540	34.685	3.15	0.07
8	4901	5000	1.540	34.685	3.16	0.07
9	4901	5000	1.540	34.685	3.17	0.07
10	4901	5000	1.540	34.685	3.16	0.07
11	4416	4500	1.492	34.684	3.14	0.07
12	4416	4500	1.491	34.684	3.15	0.07
13	4416	4500	1.491	34.684	3.15	0.07
14	5747	5874	1.647	34.685	3.11	0.07
15	5746	5873	1.647	34.685	3.12	0.07
16	5386	5501	1.599	34.685	3.14	0.07
17	5385	5500	1.599	34.685	3.16	0.07
18	5144	5250	1.569	34.685	3.17	0.07
19	4901	5000	1.540	34.685	3.16	0.07
20	4901	5000	1.540	34.685	3.17	0.07
21	4659	4750	1.512	34.685	3.16	0.07
22	4417	4501	1.492	34.684	3.13	0.07
23	4416	4500	1.492	34.684	3.16	0.07
24	4173	4250	1.478	34.682	3.11	0.07

KH-12-4	BD-11-2	Depth	5624m	
Date:	2012/9/6	Lat.	46	59.96N
Time:	05:36	Long.	179	59.92E

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	$ml \cdot l^{-1}$	ug/l
	5	12.631	32.730	6.05	2.59
	10	12.629	32.730	6.03	2.64
	20	12.478	32.726	6.05	3.22
	30	11.712	32.776	6.17	3.09
	40	7.431	33.049	6.73	2.06
	50	6.535	33.076	6.75	1.53
	75	5.008	33.147	6.74	0.60
	100	3.281	33.149	6.86	0.29
	125	2.946	33.167	6.73	0.16
	150	3.509	33.342	5.74	0.10
	175	3.843	33.542	4.36	0.09
	200	3.548	33.610	3.82	0.08
	250	3.640	33.750	2.80	0.08
	300	3.639	33.829	2.13	0.09
	400	3.804	33.978	1.46	0.09
	500	3.613	34.084	0.88	0.09
	600	3.451	34.170	0.69	0.09
	700	3.346	34.249	0.70	0.09
	800	3.156	34.289	0.66	0.09
	900	2.990	34.330	0.59	0.09
	1000	2.843	34.374	0.62	0.09
	1200	2.585	34.439	0.67	0.09
	1500	2.274	34.509	0.87	0.09
	2000	1.916	34.587	1.45	0.08
	2500	1.706	34.629	2.00	0.08
	3000	1.581	34.653	2.46	0.08
	3500	1.508	34.669	2.83	0.07
	4000	1.482	34.678	3.06	0.07
	4000	1.482	34.678	3.06	0.07

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	$ml \cdot l^{-1}$	ug/l
Sur.	0	***	12.7	***	***	***
1	3931	4002	1.482	34.678	2.98	0.07
2	3931	4001	1.482	34.678	2.97	0.07
3	3931	4001	1.482	34.678	2.98	0.07
4	3931	4001	1.482	34.678	2.98	0.07
5	3442	3500	1.507	34.669	2.79	0.07
6	3443	3500	1.508	34.669	2.79	0.07
7	3443	3501	1.508	34.669	2.78	0.07
8	2954	3000	1.580	34.653	2.45	0.08
9	2954	3000	1.580	34.653	2.44	0.08
10	2955	3001	1.581	34.653	2.44	0.08
11	2955	3001	1.581	34.653	2.44	0.08
12	2465	2500	1.703	34.630	2.00	0.08
13	2465	2500	1.705	34.629	1.99	0.08
14	2465	2500	1.705	34.629	1.99	0.08
15	3932	4002	1.482	34.678	2.97	0.07
16	3932	4002	1.482	34.678	2.99	0.07
17	3686	3750	1.491	34.674	2.90	0.07
18	3442	3500	1.508	34.669	2.79	0.07
19	3443	3500	1.508	34.669	2.79	0.07
20	3200	3251	1.537	34.662	2.64	0.07
21	2955	3001	1.581	34.653	2.44	0.08
22	2709	2749	1.635	34.643	2.24	0.08
23	2465	2500	1.705	34.629	1.99	0.08
24	2524	2560	1.686	34.633	2.05	0.08

KH-12-4	BD-11-3	Depth	5718m	
Date:	2012/9/6	Lat.	46	59.94N
Time:	11:29	Long.	179	59.96E

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	$ml \cdot l^{-1}$	ug/l
	5	12.471	32.731	6.03	3.06
	10	12.473	32.731	6.03	3.02
	20	12.471	32.729	6.03	2.84
	30	12.440	32.728	6.01	3.24
	40	7.649	33.006	6.73	2.19
	50	6.853	33.079	6.75	1.69
	75	4.755	33.132	6.77	0.49
	100	3.842	33.182	6.76	0.30
	125	2.859	33.153	6.82	0.18
	150	3.472	33.331	5.81	0.10
	175	3.551	33.480	4.60	0.09
	200	3.701	33.629	3.80	0.08
	250	3.660	33.727	3.01	0.08
	300	3.697	33.794	2.49	0.08
	400	3.828	33.968	1.54	0.09
	500	3.617	34.065	0.92	0.09
	600	3.516	34.144	0.79	0.09
	700	3.337	34.215	0.53	0.09
	800	3.193	34.279	0.66	0.09
	900	3.003	34.327	0.59	0.09
	1000	2.859	34.367	0.61	0.09
	1200	2.607	34.434	0.66	0.09
	1500	2.284	34.507	0.86	0.09
	2000	1.946	34.582	1.39	0.08
	2000	1.946	34.582	1.39	0.08

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	$ml \cdot l^{-1}$	ug/l
Sur.	0	***	12.5	***	***	***
1	1974	2000	1.948	34.582	1.38	0.08
2	1974	2000	1.947	34.582	1.38	0.08
3	1974	2000	1.946	34.582	1.38	0.08
4	1974	2000	1.947	34.582	1.38	0.08
5	1482	1500	2.281	34.507	0.86	0.08
6	1482	1500	2.280	34.507	0.86	0.09
7	1482	1500	2.281	34.507	0.86	0.09
8	1236	1250	2.535	34.450	0.68	0.09
9	1236	1250	2.535	34.450	0.68	0.09
10	989	1000	2.827	34.376	0.62	0.09
11	989	1000	2.841	34.375	0.62	0.09
12	989	1000	2.845	34.374	0.62	0.09
13	989	1000	2.851	34.374	0.62	0.09
14	694	701	3.394	34.232	0.72	0.09
15	37	37	7.817	33.000	6.73	2.19
16	37	37	8.456	32.965	6.67	2.31
17	1974	2000	1.947	34.582	1.38	0.08
18	1728	1750	2.098	34.549	1.11	0.08
19	1482	1500	2.282	34.507	0.86	0.09
20	1236	1250	2.534	34.450	0.68	0.09
21	989	1000	2.852	34.374	0.62	0.09
22	989	1000	2.852	34.374	0.62	0.09
23	693	700	3.390	34.232	0.72	0.09
24	37	38	9.078	32.939	6.53	2.53

KH-12-4	BD-11-4		Depth	5725m	
Date:	2012/9/6		Lat.	47	00.01N
Time:	17:43		Long.	179	59.94W

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	ml·l⁻¹	ug/l
	5	12.505	32.727	6.00	2.89
	10	12.505	32.727	5.99	3.04
	20	12.507	32.727	6.00	2.96
	30	7.786	33.045	6.78	2.15
	40	6.626	33.085	6.80	1.69
	50	5.641	33.098	6.87	1.19
	75	4.131	33.169	6.76	0.42
	100	3.036	33.155	6.83	0.20
	125	2.942	33.188	6.63	0.12
	150	3.531	33.444	4.89	0.09
	175	3.936	33.631	3.91	0.08
	200	3.801	33.688	3.43	0.08
	250	3.690	33.788	2.57	0.08
	300	3.751	33.868	2.00	0.08
	400	3.798	34.008	1.35	0.09
	500	3.629	34.097	0.93	0.09
	600	3.437	34.177	0.61	0.09
	700	3.320	34.247	0.67	0.09
	800	3.130	34.296	0.65	0.09
	801	3.129	34.297	0.65	0.09

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l⁻¹	ug/l
Sur.	0	***	12.3	***	***	***
1	793	801	3.129	34.297	0.66	0.09
2	791	799	3.129	34.296	0.66	0.09
3	792	801	3.129	34.297	0.66	0.09
4	593	599	3.436	34.167	0.63	0.09
5	594	600	3.435	34.166	0.64	0.09
6	594	599	3.437	34.166	0.63	0.09
7	595	601	3.435	34.165	0.64	0.09
8	397	400	3.843	33.992	1.43	0.09
9	396	400	3.842	33.992	1.43	0.09
10	396	400	3.844	33.991	1.44	0.09
11	396	400	3.845	33.991	1.44	0.09
12	199	201	3.655	33.627	3.63	0.08
13	197	199	3.685	33.627	3.65	0.08
14	199	200	3.668	33.627	3.64	0.08
15	198	200	3.672	33.626	3.64	0.09
16	150	151	3.675	33.410	5.15	0.09
17	149	151	3.672	33.412	5.19	0.10
18	150	151	3.677	33.410	5.23	0.09
19	792	800	3.130	34.296	0.66	0.09
20	593	599	3.438	34.165	0.64	0.09
21	495	500	3.629	34.085	0.91	0.09
22	396	399	3.845	33.991	1.44	0.09
23	199	201	3.662	33.627	3.63	0.08
24	148	149	3.681	33.406	5.25	0.09

KH-12-4	BD-11-5		Depth	5719m	
Date:	2012/9/6		Lat.	46	59.98N
Time:	04:31		Long.	179	59.95W

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	ml·l⁻¹	ug/l
	5	12.634	32.731	6.06	2.38
	10	12.659	32.731	6.06	2.48
	20	12.477	32.732	6.08	3.19
	30	12.169	32.741	6.13	3.46
	40	7.810	33.061	6.68	2.42
	50	6.858	33.075	6.72	1.70
	75	4.861	33.118	6.86	0.61
	100	3.951	33.177	6.70	0.26
	125	2.817	33.142	6.84	0.19
	150	3.398	33.303	6.08	0.11
	175	3.696	33.516	4.47	0.09
	200	3.628	33.638	3.55	0.08
	250	3.685	33.751	2.85	0.08
	300	3.588	33.820	2.18	0.08
	301	3.625	33.828	N.D.	0.09

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l⁻¹	ug/l
Sur.	0	***	13.4	***	***	***
1	99	100	3.293	33.151	6.82	0.31
2	99	100	3.229	33.152	6.80	0.26
3	99	100	3.264	33.153	6.79	0.26
4	99	100	3.214	33.155	6.79	0.29
5	99	100	3.205	33.149	6.80	0.30
6	50	51	6.463	33.074	6.81	1.71
7	50	51	6.496	33.077	6.80	1.76
8	51	51	6.482	33.081	6.79	1.57
9	50	51	6.543	33.076	6.78	1.65
10	25	25	12.451	32.724	6.07	3.73
11	25	25	12.434	32.728	6.07	3.62
12	25	25	12.450	32.728	6.06	3.80
13	9	9	12.705	32.729	6.07	2.57
14	9	9	12.710	32.729	6.07	2.55
15	10	10	12.707	32.729	6.07	2.60
16	10	10	12.708	32.729	6.07	2.59
17	10	10	12.714	32.729	6.07	2.51
18	10	10	12.709	32.729	6.07	2.57
19	298	301	3.661	33.836	2.13	0.08
20	99	100	3.291	33.153	6.82	0.25
21	49	50	6.609	33.076	6.79	1.74
22	25	25	12.451	32.728	6.07	3.78
23	10	10	12.710	32.729	6.08	2.56
24	5	6	12.707	32.729	6.07	2.45

KH-12-4	BD-11-EX	Depth	5736m
Date:	2012/9/7	Lat.	47 00.72N
Time:	08:55	Long.	179 57.06W

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	$ml \cdot l^{-1}$	ug/l
	5	12.688	32.726	6.04	2.70
	10	12.683	32.726	6.07	2.90
	20	12.480	32.727	6.08	3.68
	30	11.943	32.762	6.17	3.51
	40	7.243	33.029	6.78	2.41
	50	6.045	33.070	6.84	1.37
	51	6.038	33.069	6.79	1.40

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	$ml \cdot l^{-1}$	ug/l
Sur.	0	***	13.0	***	***	***
1	9	9	12.680	32.725	6.05	3.40
2	10	10	12.676	32.725	6.06	3.34
3	10	10	12.681	32.725	6.06	3.36
4	10	10	12.683	32.725	6.05	3.47
5	10	10	12.685	32.725	6.05	3.48
6	10	10	12.676	32.725	6.05	3.16
7	10	10	12.680	32.725	6.06	3.47
8	10	10	12.680	32.725	6.05	3.33
9	10	10	12.682	32.725	6.04	3.34
10	10	10	12.682	32.725	6.06	3.42
11	11	11	12.684	32.725	6.06	3.22
12	10	10	12.684	32.725	6.06	3.33
13	9	9	12.683	32.725	6.06	3.34
14	9	9	12.681	32.725	6.06	3.27
15	10	10	12.671	32.726	6.06	3.22
16	9	9	12.675	32.725	6.06	3.28
17	50	50	6.127	33.069	6.83	1.40
18	50	50	6.130	33.068	6.83	1.43
19	24	24	12.446	32.724	6.07	3.64
20	25	26	12.453	32.726	6.08	4.03
21	10	11	12.682	32.725	6.05	3.11
22	10	10	12.682	32.725	6.05	3.39
23	5	5	12.685	32.725	6.05	3.34
24	5	5	12.685	32.725	6.04	3.24

KH-12-4	BD-12-1	Depth	7228m
Date:	2012/9/7	Lat.	50 26.04N
Time:	02:27	Long.	176 34.69W

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	$ml \cdot l^{-1}$	ug/l
	2	9.728	32.580	–	–
	5	9.725	32.580	–	–
	10	9.724	32.580	–	–
	20	9.705	32.582	–	–
	30	9.677	32.585	–	–
	40	9.448	32.601	–	–
	50	6.734	32.699	–	–
	75	3.453	32.875	–	–
	100	3.349	33.095	–	–
	125	3.637	33.494	–	–
	150	3.786	33.693	–	–
	175	3.831	33.827	–	–
	200	3.846	33.900	–	–
	250	N.D.	N.D.	–	–
	300	N.D.	N.D.	–	–
	400	N.D.	N.D.	–	–
	500	3.433	34.224	–	–
	600	3.252	34.278	–	–
	700	3.092	34.320	–	–
	800	2.908	34.364	–	–
	900	2.754	34.400	–	–
	1000	2.608	34.432	–	–
	1200	2.356	34.487	–	–
	1500	2.085	34.546	–	–
	2000	1.807	34.604	–	–
	2500	1.621	34.641	–	–
	3000	1.524	34.662	–	–
	3500	1.466	34.676	–	–
	4000	1.451	34.684	–	–
	4500	1.473	34.688	–	–
	5000	1.513	34.691	–	–
	5500	1.567	34.692	–	–
	6000	1.635	34.692	–	–
	6500	1.706	34.692	–	–
	7000	1.780	34.692	–	–
	7491	1.857	34.692	–	–

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	$ml \cdot l^{-1}$	ug/l
Sur.	0	***	10.1	***	***	***
1	7300	7491	1.857	34.692	–	–
2	6829	7000	1.780	34.692	–	–
3	6349	6501	1.705	34.692	–	–
4	5866	6000	1.635	34.692	–	–
5	5384	5500	1.567	34.692	–	–
6	4900	5000	1.514	34.690	–	–
7	4414	4500	1.474	34.688	–	–
8	3928	4000	1.452	34.684	–	–
9	3441	3500	1.462	34.676	–	–
10	2953	3000	1.521	34.661	–	–
11	2464	2500	1.620	34.641	–	–
12	7300	7490	1.857	34.692	–	–
13	1973	2000	1.807	34.604	–	–
14	1482	1500	2.097	34.543	–	–
15	5867	6000	1.635	34.692	–	–
16	989	1000	2.654	34.422	–	–
17	791	800	2.942	34.355	–	–
18	4900	5000	1.514	34.690	–	–
19	594	600	3.245	34.279	–	–
20	397	401	3.649	34.141	–	–
21	198	200	3.846	33.924	–	–
22	100	101	3.479	33.271	–	–
23	50	51	4.335	32.765	–	–
24	9	10	9.710	32.590	–	–

KH-12-4		BD-12-2	Depth	7213m		
Date:	2012/9/8		Lat.	50	23.41N	
Time:	12:36		Long.	176	36.22W	
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml･l⁻¹	ug/l
		20	9.693	32.588	6.34	3.29
		30	9.683	32.588	6.33	3.01
		40	9.640	32.589	6.32	2.67
		50	5.349	32.704	6.87	0.89
		75	3.336	32.884	6.61	0.27
		100	3.325	33.029	6.03	0.20
		125	3.455	33.258	4.58	0.16
		150	3.727	33.609	2.46	0.11
		175	3.837	33.797	1.27	0.09
		200	3.821	33.882	0.77	0.09
		250	3.814	33.972	0.42	0.10
		300	3.765	34.043	0.38	0.09
		400	3.626	34.143	0.36	0.09
		500	3.481	34.212	0.31	0.09
		600	3.290	34.269	0.32	0.09
		700	3.075	34.324	0.34	0.09
		800	2.916	34.363	0.35	0.09
		900	2.753	34.400	0.39	0.09
		1000	2.615	34.430	0.45	0.09
		1200	2.368	34.483	0.62	0.09
		1500	2.092	34.543	0.96	0.08
		2000	1.796	34.604	1.60	0.08
		2000	1.796	34.604	1.60	0.08
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml･l⁻¹	ug/l
Sur.	0	***	10.2	***	***	***
1	1972	1999	1.795	34.604	1.59	0.08
2	1482	1500	2.084	34.544	0.96	0.09
3	1236	1251	2.297	34.498	0.69	0.09
4	989	1000	2.607	34.431	0.45	0.09
5	456	460	3.547	34.183	0.32	0.09
6	792	800	2.886	34.368	0.35	0.09
7	594	600	3.279	34.270	0.31	0.09
8	396	400	3.629	34.139	0.35	0.09
9	198	199	3.822	33.877	0.78	0.10
10	148	150	3.737	33.621	2.10	0.12
11	37	37	9.374	32.594	6.27	2.22
12	99	100	3.325	33.016	5.97	0.24
13	50	50	4.053	32.803	6.86	0.69
14	24	24	9.684	32.586	6.30	2.82
15	10	10	9.695	32.586	6.31	2.94
16	1728	1750	1.923	34.578	1.28	0.08
17	989	1000	2.606	34.431	0.45	0.09
18	455	460	3.547	34.184	0.31	0.09
19	298	301	3.772	34.035	0.36	0.09
20	198	200	3.826	33.872	0.75	0.09
21	37	37	9.381	32.587	6.30	1.96
22	99	100	3.320	32.986	6.17	0.21
23	50	50	3.983	32.781	6.83	0.71
24	10	10	9.693	32.586	6.31	2.95

KH-12-4		BD-13-1	Depth	5297m		
Date:	2012/9/9		Lat.	47	01.91N	
Time:	04:10		Long.	174	55.78W	
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml･l⁻¹	ug/l
		5	12.548	32.765	6.04	0.92
		10	12.547	32.764	6.05	0.99
		20	12.106	32.763	6.08	1.84
		30	11.836	32.763	6.08	2.51
		40	7.350	32.954	6.81	2.53
		50	6.287	33.004	6.86	2.24
		75	5.123	33.025	6.78	0.63
		100	4.256	33.048	6.78	0.27
		125	4.129	33.135	6.46	0.13
		150	4.025	33.452	5.03	0.10
		175	4.057	33.631	4.03	0.09
		200	3.880	33.668	3.60	0.08
		250	3.607	33.745	2.70	0.08
		300	3.669	33.844	1.95	0.09
		400	3.762	34.004	1.32	0.09
		500	3.673	34.109	0.97	0.09
		600	3.428	34.184	0.69	0.09
		700	3.288	34.244	0.59	0.09
		800	3.125	34.294	0.57	0.09
		900	2.990	34.339	0.58	0.09
		1000	2.838	34.379	0.58	0.09
		1200	2.545	34.446	0.66	0.09
		1500	2.261	34.511	0.86	0.09
		2000	1.920	34.586	1.43	0.08
		2500	1.698	34.630	2.00	0.08
		3000	1.573	34.654	2.47	0.08
		3500	1.499	34.669	2.83	0.07
		4000	1.479	34.678	3.06	0.07
		4500	1.496	34.682	3.16	0.07
		5000	1.547	34.684	3.21	0.07
		5500	1.607	34.684	3.22	0.07
		5903	1.660	34.684	3.23	0.07
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml･l⁻¹	ug/l
Sur.	0	***	12.8	***	***	***
1	5774	5902	1.660	34.684	3.07	0.07
2	5774	5902	1.659	34.684	3.08	0.07
3	4901	5000	1.546	34.684	3.13	0.07
4	4901	5000	1.546	34.684	3.13	0.07
5	4415	4499	1.495	34.683	3.11	0.07
6	4415	4499	1.495	34.683	3.12	0.07
7	3930	4000	1.479	34.678	3.01	0.07
8	3930	4000	1.479	34.678	3.01	0.07
9	3442	3499	1.506	34.669	2.78	0.07
10	2953	2999	1.584	34.653	2.41	0.08
11	2464	2500	1.709	34.629	1.95	0.08
12	5774	5902	1.659	34.684	3.06	0.07
13	4901	4999	1.546	34.684	3.13	0.07
14	4658	4749	1.519	34.684	3.10	0.07
15	4415	4499	1.495	34.683	3.11	0.07
16	4173	4250	1.482	34.681	3.07	0.07
17	3930	4000	1.479	34.678	3.01	0.07
18	3686	3749	1.483	34.675	2.92	0.07
19	3442	3500	1.506	34.669	2.77	0.07
20	3198	3250	1.538	34.662	2.61	0.08
21	2954	3000	1.585	34.653	2.41	0.08
22	2709	2749	1.635	34.643	2.22	0.08
23	2464	2500	1.712	34.628	1.95	0.08
24	2219	2250	1.800	34.610	1.72	0.08

KH-12-4	BD-13-2	Depth	5772m
Date:	2012/9/9	Lat.	47 01.96N
Time:	12:15	Long.	174 55.88W

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	$ml \cdot l^{-1}$	ug/l
	5	12.447	32.766	6.03	1.70
	10	12.452	32.766	6.03	1.62
	20	12.443	32.766	6.04	1.71
	30	12.217	32.764	6.06	2.06
	40	9.228	32.839	6.63	2.30
	50	6.549	32.968	6.87	2.37
	75	5.557	32.984	6.81	1.00
	100	4.214	33.035	6.79	0.30
	125	4.269	33.227	6.05	0.11
	150	4.123	33.549	4.56	0.09
	175	4.026	33.650	3.87	0.09
	200	3.852	33.679	3.49	0.09
	250	3.594	33.731	2.81	0.08
	300	3.606	33.819	2.08	0.08
	400	3.739	33.988	1.31	0.09
	500	3.698	34.096	1.02	0.09
	600	3.460	34.164	0.69	0.09
	700	3.320	34.233	0.62	0.09
	800	3.147	34.288	0.58	0.09
	900	2.981	34.339	0.58	0.09
	1000	2.851	34.375	0.58	0.09
	1200	2.595	34.436	0.63	0.09
	1500	2.300	34.503	0.84	0.09
	2000	1.935	34.584	1.39	0.08
	2000	1.935	34.584	1.39	0.08

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	$ml \cdot l^{-1}$	ug/l
Sur.	0	***	12.5	***	***	***
1	1975	2001	1.935	34.584	1.38	0.08
2	1975	2001	1.935	34.584	1.39	0.08
3	1975	2001	1.934	34.584	1.39	0.08
4	1482	1500	2.287	34.505	0.84	0.09
5	1483	1500	2.288	34.505	0.84	0.09
6	1236	1250	2.522	34.452	0.67	0.09
7	1236	1250	2.522	34.452	0.67	0.09
8	990	1001	2.846	34.375	0.58	0.09
9	990	1001	2.846	34.375	0.58	0.09
10	990	1000	2.846	34.375	0.58	0.09
11	792	800	3.133	34.291	0.58	0.09
12	792	800	3.136	34.291	0.58	0.09
13	594	600	3.451	34.166	0.67	0.09
14	594	600	3.450	34.165	0.66	0.09
15	396	400	3.729	33.982	1.29	0.09
16	396	400	3.729	33.982	1.30	0.09
17	1975	2001	1.935	34.584	1.39	0.08
18	1729	1751	2.088	34.551	1.10	0.08
19	1482	1500	2.288	34.505	0.84	0.09
20	1236	1250	2.521	34.452	0.67	0.09
21	990	1001	2.845	34.376	0.58	0.09
22	792	801	3.136	34.291	0.58	0.09
23	595	600	3.448	34.165	0.65	0.09
24	396	400	3.732	33.981	1.30	0.09

KH-12-4	BD-13-3	Depth	5773m
Date:	2012/9/9	Lat.	47 02.05N
Time:	17:42	Long.	174 55.82W

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	$ml \cdot l^{-1}$	ug/l
	5	12.442	32.767	6.01	1.58
	10	12.441	32.767	6.01	1.56
	20	12.330	32.766	6.04	1.70
	30	12.048	32.764	6.07	2.09
	40	7.932	32.904	6.67	1.88
	50	6.755	32.989	6.85	2.25
	75	5.179	33.017	6.80	0.72
	100	4.219	33.028	6.80	0.32
	125	3.936	33.055	6.72	0.16
	150	3.871	33.348	5.44	0.10
	175	3.728	33.564	4.26	0.09
	200	3.876	33.663	3.64	0.08
	250	3.567	33.714	2.93	0.08
	300	3.545	33.787	2.29	0.08
	400	3.696	33.958	1.37	0.09
	500	3.690	34.097	1.00	0.09
	600	3.440	34.176	0.66	0.09
	700	3.285	34.243	0.59	0.09
	800	3.119	34.296	0.58	0.09
	801	3.116	34.297	0.59	0.09

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	$ml \cdot l^{-1}$	ug/l
Sur.	0	***	12.7	***	***	***
1	200	201	3.955	33.648	3.74	0.09
2	200	201	3.957	33.648	3.76	0.09
3	148	150	4.251	33.253	5.62	0.11
4	148	149	4.249	33.254	5.87	0.13
5	667	674	3.345	34.218	0.61	0.10
6	667	674	3.345	34.218	0.61	0.09
7	36	36	7.991	32.926	6.66	1.92
8	36	36	8.179	32.914	6.64	1.97
9	100	101	4.674	33.070	6.70	0.36
10	100	101	4.709	33.072	6.70	0.31
11	50	51	6.553	32.969	6.82	2.20
12	26	26	12.044	32.758	6.06	2.18
13	26	26	12.049	32.760	6.05	2.07
14	11	11	12.181	32.764	6.05	1.76
15	11	11	12.211	32.764	6.04	1.82
16	297	300	3.562	33.770	2.39	0.08
17	200	201	3.949	33.649	3.76	0.08
18	148	149	4.250	33.255	5.87	0.11
19	667	674	3.345	34.218	0.61	0.09
20	36	36	8.302	32.906	6.61	1.88
21	100	101	4.718	33.073	6.70	0.33
22	51	51	6.567	32.969	6.84	2.17
23	26	26	12.040	32.761	6.06	2.15
24	10	11	12.216	32.764	6.05	1.81

KH-12-4	BD-14-1		Depth	5493m	
Date:	2012/9/10		Lat.	46	59.99N
Time:	08:46		Long.	169	59.81W
CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	ml·l⁻¹	ug/l
	5	12.981	32.616	5.97	1.69
	10	12.889	32.626	5.99	1.67
	20	12.815	32.627	6.00	1.75
	30	10.367	32.683	6.54	2.71
	40	7.099	32.800	6.90	2.30
	50	6.247	32.854	6.91	1.74
	75	5.190	32.881	6.84	0.82
	100	4.382	32.898	6.79	0.31
	125	3.919	32.937	6.72	0.15
	150	3.766	33.372	5.10	0.10
	175	3.619	33.581	3.98	0.09
	200	3.521	33.656	3.27	0.09
	250	3.529	33.768	2.34	0.08
	300	3.617	33.848	1.86	0.09
	400	3.617	33.985	1.18	0.09
	500	3.532	34.090	0.80	0.09
	600	3.441	34.177	0.65	0.09
	700	3.272	34.247	0.56	0.09
	800	3.143	34.301	0.57	0.09
	900	2.972	34.348	0.57	0.09
	1000	2.830	34.384	0.58	0.09
	1200	2.560	34.448	0.64	0.09
	1500	2.254	34.514	0.87	0.09
	2000	1.923	34.585	1.37	0.08
	2500	1.702	34.629	1.94	0.08
	3000	1.571	34.654	2.45	0.08
	3500	1.499	34.669	2.81	0.07
	4000	1.474	34.678	3.05	0.07
	4500	1.495	34.683	3.15	0.07
	5000	1.550	34.683	3.17	0.07
	5500	1.604	34.684	3.20	0.07
	5604	1.610	34.685	3.27	0.07

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l⁻¹	ug/l
Sur.	0	***	13.1	***	***	***
1	5487	5605	1.610	34.685	3.10	0.07
2	5487	5605	1.610	34.685	3.12	0.07
3	5487	5605	1.610	34.685	3.11	0.07
4	5487	5605	1.610	34.685	3.13	0.07
5	5386	5500	1.604	34.684	3.10	0.07
6	5386	5501	1.604	34.685	3.11	0.07
7	5386	5501	1.604	34.684	3.11	0.07
8	4902	5000	1.549	34.684	3.09	0.07
9	4901	5000	1.549	34.684	3.10	0.07
10	4901	5000	1.549	34.684	3.11	0.07
11	4902	5000	1.549	34.684	3.10	0.07
12	4416	4500	1.494	34.684	3.10	0.07
13	4416	4500	1.494	34.684	3.10	0.07
14	4416	4500	1.494	34.684	3.10	0.07
15	5487	5605	1.610	34.685	3.12	0.07
16	5487	5605	1.610	34.685	3.11	0.07
17	5386	5501	1.604	34.684	3.10	0.07
18	5144	5250	1.576	34.684	3.10	0.07
19	4902	5001	1.549	34.684	3.10	0.07
20	4902	5000	1.549	34.684	3.10	0.07
21	4659	4750	1.521	34.684	3.09	0.07
22	4416	4500	1.494	34.684	3.10	0.07
23	4416	4500	1.494	34.684	3.11	0.07
24	4173	4250	1.477	34.682	3.08	0.07

KH-12-4	BD-14-2		Depth	5492m	
Date:	2012/9/10		Lat.	47	00.00N
Time:	17:25		Long.	169	59.96W
CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	ml·l⁻¹	ug/l
	5	12.947	32.572	5.95	1.41
	10	12.947	32.574	5.96	1.44
	20	12.823	32.629	6.00	1.55
	30	11.941	32.639	6.24	1.75
	40	8.570	32.752	6.65	2.54
	50	6.204	32.816	6.90	1.77
	75	5.031	32.885	6.81	0.55
	100	4.185	32.896	6.82	0.28
	125	3.888	33.089	6.15	0.11
	150	3.776	33.518	4.46	0.10
	175	3.536	33.602	3.73	0.09
	200	3.475	33.659	3.18	0.09
	250	3.538	33.748	2.51	0.08
	300	3.610	33.838	1.90	0.09
	400	3.624	33.977	1.20	0.09
	500	3.576	34.085	0.86	0.09
	600	3.438	34.178	0.64	0.09
	700	3.276	34.249	0.57	0.09
	800	3.113	34.307	0.57	0.09
	900	2.963	34.349	0.57	0.09
	1000	2.818	34.387	0.58	0.09
	1200	2.562	34.447	0.65	0.09
	1500	2.262	34.512	0.86	0.09
	2000	1.934	34.584	1.34	0.08
	2500	1.722	34.626	1.89	0.08
	3000	1.576	34.654	2.43	0.08
	3500	1.496	34.670	2.83	0.07
	4000	1.471	34.679	3.06	0.07
	4002	1.471	34.679	3.07	0.07

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l⁻¹	ug/l
Sur.	0	***	13.3	***	***	***
1	3930	4000	1.471	34.679	2.98	0.07
2	3930	4000	1.471	34.679	2.98	0.07
3	3930	4001	1.471	34.679	2.99	0.07
4	3931	4001	1.471	34.679	2.99	0.07
5	3443	3500	1.498	34.670	2.77	0.07
6	3443	3501	1.498	34.670	2.78	0.07
7	3443	3500	1.498	34.670	2.77	0.07
8	2954	3000	1.578	34.654	2.39	0.08
9	2954	3000	1.578	34.654	2.40	0.07
10	2954	3000	1.578	34.654	2.39	0.08
11	2954	3000	1.578	34.654	2.39	0.08
12	2464	2499	1.725	34.626	1.86	0.08
13	2464	2499	1.725	34.626	1.86	0.08
14	2464	2499	1.725	34.626	1.86	0.08
15	3931	4001	1.471	34.679	2.99	0.07
16	3931	4002	1.471	34.679	2.98	0.07
17	3686	3750	1.477	34.675	2.91	0.07
18	3443	3500	1.498	34.670	2.77	0.07
19	3198	3250	1.534	34.662	2.60	0.08
20	2954	3000	1.578	34.654	2.39	0.08
21	2954	3000	1.578	34.654	2.39	0.08
22	2709	2749	1.643	34.642	2.14	0.08
23	2464	2499	1.726	34.626	1.86	0.08
24	2218	2249	1.823	34.607	1.59	0.08

KH-12-4		BD-14-3		Depth	5493m	
Date:		2012/9/10		Lat.	46	59.95N
Time:		22:19		Long.	169	59.92W
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml·l⁻¹	ug/l
		10	12.907	32.600	5.98	1.35
		20	12.813	32.626	6.00	1.43
		30	9.914	32.700	6.56	2.47
		40	7.129	32.805	6.84	2.33
		50	5.919	32.846	6.92	1.46
		75	4.977	32.881	6.83	0.51
		100	4.187	32.890	6.82	0.28
		125	3.886	32.990	6.52	0.13
		150	3.742	33.394	4.97	0.11
		175	3.590	33.601	3.79	0.09
		200	3.464	33.656	3.20	0.08
		250	3.564	33.784	2.27	0.08
		300	3.616	33.861	1.76	0.09
		400	3.605	33.997	1.11	0.09
		500	3.538	34.104	0.80	0.09
		600	3.427	34.184	0.63	0.09
		700	3.270	34.250	0.56	0.09
		800	3.123	34.304	0.57	0.09
		900	2.971	34.348	0.56	0.09
		1000	2.822	34.386	0.58	0.09
		1200	2.550	34.450	0.65	0.09
		1500	2.248	34.515	0.88	0.08
		2000	1.908	34.588	1.39	0.08
		2001	1.908	34.588	1.40	0.08
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l⁻¹	ug/l
Sur.	0	***	13.0	***	***	***
1	1975	2001	1.909	34.588	1.38	0.08
2	1975	2001	1.909	34.588	1.39	0.08
3	1975	2001	1.909	34.588	1.38	0.08
4	1975	2001	1.909	34.588	1.38	0.08
5	1482	1499	2.252	34.514	0.87	0.08
6	1482	1500	2.252	34.514	0.87	0.08
7	1482	1500	2.253	34.514	0.87	0.09
8	1236	1250	2.488	34.462	0.67	0.09
9	1236	1250	2.487	34.462	0.67	0.09
10	989	1000	2.820	34.386	0.59	0.09
11	989	1000	2.821	34.386	0.58	0.09
12	989	1000	2.821	34.386	0.58	0.09
13	989	1000	2.820	34.386	0.59	0.09
14	989	1000	2.819	34.386	0.58	0.09
15	703	710	3.252	34.255	0.55	0.09
16	703	710	3.251	34.255	0.54	0.09
17	1975	2001	1.909	34.588	1.38	0.08
18	1975	2001	1.909	34.588	1.38	0.08
19	1728	1750	2.067	34.555	1.11	0.08
20	1482	1500	2.253	34.514	0.87	0.08
21	1236	1250	2.487	34.462	0.67	0.09
22	989	1000	2.819	34.387	0.58	0.09
23	989	1000	2.820	34.386	0.58	0.09
24	703	711	3.250	34.255	0.54	0.09

KH-12-4		BD-14-4		Depth	5493m	
Date:		2012/9/11		Lat.	46	59.96N
Time:		02:35		Long.	169	59.98W
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml·l⁻¹	ug/l
		2	12.890	32.605	5.98	1.36
		5	12.893	32.605	5.99	1.13
		10	12.893	32.605	5.99	1.43
		20	12.888	32.605	5.99	1.55
		30	12.674	32.622	6.03	1.82
		40	9.769	32.699	6.65	2.80
		50	6.947	32.813	6.84	2.21
		75	5.216	32.878	6.85	0.89
		100	4.165	32.867	6.82	0.38
		125	3.752	32.926	6.76	0.17
		150	3.816	33.365	5.08	0.09
		175	3.667	33.581	4.04	0.09
		200	3.514	33.624	3.53	0.08
		250	3.550	33.749	2.51	0.08
		300	3.607	33.834	1.93	0.09
		400	3.610	33.986	1.15	0.09
		500	3.563	34.093	0.84	0.09
		600	3.424	34.184	0.63	0.09
		700	3.261	34.256	0.57	0.09
		800	3.087	34.314	0.56	0.09
		800	3.087	34.314	0.56	0.09
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l⁻¹	ug/l
Sur.	0	***	13.1	***	***	***
1	793	801	3.084	34.314	0.56	0.09
2	793	802	3.083	34.314	0.56	0.09
3	794	802	3.083	34.314	0.56	0.09
4	595	601	3.434	34.181	0.63	0.09
5	595	601	3.435	34.181	0.63	0.09
6	595	600	3.435	34.181	0.63	0.09
7	595	601	3.435	34.181	0.63	0.09
8	397	401	3.616	33.983	1.15	0.09
9	397	400	3.616	33.982	1.15	0.09
10	397	400	3.616	33.982	1.16	0.09
11	397	401	3.616	33.983	1.16	0.09
12	198	200	3.485	33.628	3.37	0.09
13	198	200	3.483	33.628	3.37	0.09
14	199	200	3.488	33.629	3.39	0.09
15	199	201	3.494	33.631	3.38	0.09
16	199	201	3.510	33.635	3.38	0.09
17	41	42	7.738	32.785	6.78	2.61
18	41	42	7.755	32.783	6.80	2.50
19	793	801	3.083	34.314	0.56	0.09
20	595	601	3.434	34.181	0.63	0.09
21	397	401	3.613	33.984	1.16	0.09
22	296	299	3.613	33.836	1.88	0.09
23	199	201	3.503	33.636	3.36	0.09
24	41	41	7.771	32.781	6.81	2.40

KH-12-4		BD-14-EX	Depth	5493m	
Date:	2012/9/11		Lat.	46	59.98N
Time:	04:01		Long.	170	00.02W

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	ml・l^{-1}	ug/l
	5	12.886	32.607	5.99	1.60
	10	12.888	32.606	5.99	1.63
	20	12.885	32.607	5.99	1.63
	30	11.307	32.659	6.36	2.32
	40	8.393	32.754	6.79	3.03
	50	6.571	32.830	6.90	2.10
	50	6.571	32.830	6.90	2.10

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml・l^{-1}	ug/l
Sur.	0	***	13.0	***	***	***
1	10	10	12.860	32.607	6.00	1.66
2	10	10	12.864	32.607	5.98	1.64
3	11	11	12.879	32.606	5.98	1.64
4	10	11	12.880	32.606	5.99	1.66
5	10	10	12.867	32.607	5.98	1.64
6	10	11	12.882	32.607	5.99	1.65
7	10	10	12.882	32.607	5.98	1.66
8	10	10	12.881	32.607	5.98	1.64
9	10	10	12.880	32.607	5.98	1.64
10	10	11	12.883	32.606	5.99	1.64
11	10	10	12.874	32.607	5.99	1.63
12	10	10	12.878	32.607	5.99	1.64
13	10	10	12.877	32.607	5.99	1.64
14	10	10	12.877	32.607	5.99	1.64
15	10	10	12.877	32.607	5.99	1.62
16	10	11	12.882	32.606	5.99	1.64
17	50	51	6.462	32.830	6.90	2.12
18	50	50	6.443	32.831	6.90	2.09
19	25	25	10.459	32.700	6.45	2.56
20	24	25	11.745	32.628	6.13	2.10
21	10	10	12.882	32.607	5.99	1.61
22	11	11	12.882	32.606	5.99	1.64
23	5	5	12.884	32.606	5.99	1.61
24	5	5	12.884	32.606	5.99	1.61

KH-12-4		BD-14-5	Depth	5494m	
Date:	2012/9/11		Lat.	46	59.95N
Time:	08:41		Long.	169	59.81W

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	ml・l^{-1}	ug/l
	5	12.906	32.605	5.97	1.83
	10	12.905	32.606	5.96	2.04
	20	12.720	32.625	6.07	1.96
	30	7.975	32.778	6.85	3.08
	40	6.359	32.838	6.91	1.97
	50	5.777	32.847	6.94	1.42
	75	4.939	32.888	6.80	0.46
	100	4.423	32.917	6.75	0.23
	125	4.003	32.974	6.61	0.15
	150	3.850	33.282	5.42	0.10
	151	3.819	33.307	5.32	0.09

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml・l^{-1}	ug/l
Sur.	0	***	12.6	***	***	***
1	149	151	3.862	33.278	5.43	0.09
2	149	151	3.865	33.277	5.43	0.10
3	149	151	3.865	33.277	5.43	0.10
4	99	100	4.485	32.919	6.74	0.25
5	99	100	4.488	32.920	6.74	0.27
6	100	101	4.477	32.922	6.74	0.26
7	99	100	4.487	32.921	6.74	0.24
8	50	50	5.808	32.840	6.93	1.18
9	50	50	5.816	32.839	6.93	1.45
10	49	50	5.732	32.846	6.93	1.51
11	25	25	10.292	32.679	6.52	3.00
12	25	25	10.409	32.683	6.53	2.83
13	25	25	10.057	32.702	6.52	2.79
14	10	10	12.906	32.602	5.96	1.76
15	10	10	12.910	32.602	5.96	1.94
16	10	10	12.910	32.603	5.96	2.00
17	10	10	12.909	32.602	5.96	2.03
18	10	10	12.915	32.602	5.96	1.95
19	150	151	3.865	33.278	5.45	0.10
20	100	101	4.477	32.921	6.75	0.26
21	49	50	5.760	32.845	6.93	1.45
22	25	25	10.116	32.694	6.56	2.94
23	10	10	12.915	32.603	5.96	1.89
24	4	5	12.919	32.604	5.96	1.77

KH-12-4		BD-15-1		Depth	4853m	
Date:		2012/9/19		Lat.	50	50.02N
Time:		05:53		Long.	160	00.02W
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml･l⁻¹	ug/l
		5	10.429	32.473	6.18	2.77
		10	10.423	32.474	6.17	2.99
		20	10.419	32.476	6.17	2.84
		30	10.409	32.488	6.16	2.61
		40	7.946	32.559	6.55	1.15
		50	4.164	32.726	6.72	0.57
		75	3.214	32.894	6.12	0.21
		100	3.756	33.460	3.43	0.13
		125	3.974	33.685	2.17	0.11
		150	3.740	33.749	1.85	0.10
		175	3.787	33.815	1.38	0.09
		200	3.769	33.865	1.06	0.09
		250	3.811	33.943	0.68	0.09
		300	3.800	34.009	0.54	0.09
		400	3.704	34.106	0.45	0.09
		500	3.545	34.188	0.37	0.09
		600	3.383	34.251	0.34	0.09
		700	3.216	34.290	0.39	0.09
		800	3.053	34.335	0.36	0.09
		900	2.876	34.373	0.43	0.09
		1000	2.736	34.403	0.48	0.09
		1200	2.491	34.458	0.58	0.09
		1500	2.225	34.517	0.80	0.09
		2000	1.900	34.588	1.34	0.08
		2500	1.700	34.628	1.89	0.08
		3000	1.574	34.652	2.39	0.08
		3500	1.498	34.669	2.77	0.07
		4000	1.488	34.677	2.99	0.07
		4500	1.513	34.681	3.08	0.07
		4926	1.545	34.684	3.16	0.07
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml･l⁻¹	ug/l
Sur.	0	***	10.8	***	***	***
1	4828	4926	1.545	34.684	3.04	0.07
2	4828	4926	1.545	34.684	3.03	0.07
3	4828	4926	1.545	34.684	3.03	0.07
4	4828	4926	1.545	34.684	3.04	0.07
5	4828	4926	1.545	34.684	3.03	0.07
6	4828	4926	1.545	34.684	3.03	0.07
7	4828	4926	1.545	34.684	3.04	0.07
8	4828	4926	1.545	34.684	3.04	0.07
9	4415	4500	1.512	34.682	3.02	0.07
10	4415	4500	1.512	34.682	3.02	0.07
11	4415	4500	1.512	34.682	3.01	0.07
12	3927	3999	1.486	34.678	2.93	0.07
13	3928	4000	1.486	34.678	2.93	0.07
14	3928	4000	1.486	34.678	2.93	0.07
15	3928	4000	1.486	34.678	2.92	0.07
16	4828	4926	1.545	34.684	3.04	0.07
17	4828	4926	1.545	34.684	3.06	0.07
18	4828	4927	1.545	34.684	3.05	0.07
19	4828	4926	1.545	34.684	3.04	0.07
20	4657	4750	1.530	34.683	3.04	0.07
21	4415	4500	1.512	34.682	3.02	0.07
22	4171	4250	1.497	34.680	2.98	0.07
23	3928	4000	1.486	34.678	2.93	0.07
24	3928	4000	1.486	34.678	2.93	0.07

KH-12-4		BD-15-2		Depth	4853m	
Date:		2012/9/19		Lat.	50	50.00N
Time:		11:10		Long.	160	00.00W
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml･l⁻¹	ug/l
		2	10.455	32.355	6.16	2.53
		5	10.455	32.359	6.17	2.48
		10	10.428	32.475	6.16	2.51
		20	10.420	32.477	6.15	2.75
		30	10.401	32.487	6.15	2.38
		40	8.527	32.549	6.23	1.12
		50	5.095	32.688	6.86	0.84
		75	3.585	32.763	6.49	0.42
		100	3.482	33.276	4.30	0.13
		125	3.986	33.646	2.45	0.11
		150	3.766	33.768	1.72	0.09
		175	3.816	33.832	1.27	0.09
		200	3.772	33.873	1.00	0.09
		250	3.813	33.951	0.65	0.09
		300	3.767	34.013	0.56	0.09
		400	3.695	34.119	0.43	0.09
		500	3.549	34.185	0.37	0.09
		600	3.300	34.232	0.41	0.09
		700	3.202	34.295	0.38	0.09
		800	3.032	34.338	0.38	0.09
		900	2.874	34.371	0.44	0.09
		1000	2.732	34.404	0.48	0.09
		1200	2.472	34.462	0.60	0.09
		1500	2.191	34.524	0.83	0.09
		2000	1.895	34.589	1.35	0.08
		2500	1.708	34.627	1.89	0.08
		3000	1.569	34.653	2.40	0.08
		3500	1.507	34.668	2.76	0.08
		3751	1.489	34.673	N.D.	0.07
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml･l⁻¹	ug/l
Sur.	0	***	10.6	***	***	***
1	3441	3499	1.506	34.668	2.69	0.07
2	3440	3499	1.506	34.668	2.71	0.07
3	3441	3500	1.506	34.668	2.70	0.07
4	2953	3000	1.571	34.653	2.36	0.08
5	2953	3000	1.571	34.653	2.37	0.08
6	2953	3000	1.571	34.653	2.37	0.08
7	2953	3000	1.571	34.653	2.37	0.08
8	2464	2500	1.707	34.628	1.87	0.08
9	2464	2500	1.707	34.628	1.87	0.08
10	2464	2500	1.707	34.628	1.87	0.08
11	1973	2000	1.899	34.589	1.34	0.08
12	1973	1999	1.899	34.589	1.34	0.08
13	1973	1999	1.899	34.589	1.34	0.08
14	1972	1999	1.899	34.589	1.34	0.08
15	3685	3751	1.489	34.673	2.82	0.07
16	3441	3500	1.506	34.668	2.70	0.07
17	3197	3250	1.534	34.661	2.55	0.08
18	2953	3000	1.571	34.653	2.36	0.08
19	2953	3000	1.571	34.653	2.37	0.08
20	2708	2750	1.631	34.642	2.13	0.08
21	2464	2500	1.707	34.628	1.86	0.08
22	2219	2250	1.792	34.611	1.60	0.08
23	1973	1999	1.898	34.589	1.34	0.08
24	1973	1999	1.898	34.589	1.34	0.08

KH-12-4		BD-15-3		Depth	4853m	
Date:		2012/9/19		Lat.	50	50.01N
Time:		16:56		Long.	160	00.00W
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml･l⁻¹	ug/l
		5	10.462	32.315	6.14	2.63
		10	10.462	32.292	6.13	2.60
		20	10.467	32.325	6.14	2.66
		30	10.463	32.481	6.14	2.31
		40	9.974	32.508	6.20	1.36
		50	6.896	32.609	6.68	0.93
		75	3.313	32.832	6.30	0.35
		100	3.530	33.285	4.30	0.14
		125	3.948	33.668	2.34	0.11
		150	3.790	33.750	1.84	0.09
		175	3.769	33.807	1.44	0.09
		200	3.780	33.854	1.13	0.09
		250	3.798	33.936	0.72	0.09
		300	3.813	34.010	0.54	0.09
		400	3.694	34.108	0.45	0.09
		500	3.542	34.188	0.37	0.09
		600	3.357	34.248	0.38	0.09
		700	3.216	34.291	0.39	0.09
		800	3.066	34.333	0.37	0.09
		900	2.894	34.370	0.41	0.09
		1000	2.753	34.400	0.47	0.09
		1200	2.515	34.453	0.57	0.09
		1500	2.230	34.516	0.79	0.08
		1752	2.052	34.556	1.05	0.08
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml･l⁻¹	ug/l
Sur.	0	***	10.8	***	***	***
1	1482	1501	2.230	34.516	0.78	0.09
2	1482	1501	2.230	34.516	0.79	0.09
3	1482	1501	2.229	34.516	0.79	0.09
4	1236	1250	2.457	34.465	0.61	0.09
5	1236	1250	2.457	34.465	0.61	0.09
6	989	1000	2.756	34.398	0.47	0.09
7	990	1001	2.756	34.399	0.47	0.09
8	990	1001	2.756	34.399	0.47	0.09
9	990	1001	2.755	34.399	0.47	0.09
10	791	799	3.057	34.334	0.36	0.09
11	791	799	3.057	34.334	0.36	0.09
12	791	799	3.057	34.334	0.36	0.09
13	725	733	3.133	34.301	0.40	0.09
14	726	733	3.133	34.302	0.40	0.09
15	15	15	10.474	32.467	6.12	2.59
16	15	15	10.477	32.464	6.14	2.72
17	1728	1750	2.055	34.556	1.03	0.08
18	1482	1501	2.229	34.516	0.79	0.09
19	1482	1500	2.229	34.516	0.79	0.09
20	1236	1251	2.456	34.465	0.61	0.09
21	990	1001	2.755	34.399	0.47	0.09
22	791	799	3.058	34.334	0.37	0.09
23	725	733	3.134	34.301	0.40	0.09
24	14	14	10.479	32.443	6.14	2.89

KH-12-4		BD-15-4		Depth	4854m	
Date:		2012/9/19		Lat.	50	50.00N
Time:		22:09		Long.	159	59.99W
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml･l⁻¹	ug/l
		10	10.470	32.349	6.17	2.57
		20	10.433	32.477	6.15	2.88
		30	10.414	32.488	6.14	2.31
		40	8.616	32.547	6.32	1.16
		50	5.304	32.668	6.81	0.76
		75	3.587	32.771	6.46	0.49
		100	3.361	33.115	4.93	0.16
		125	4.021	33.650	2.46	0.11
		150	3.718	33.765	1.74	0.09
		175	3.812	33.837	1.28	0.09
		200	3.812	33.886	0.91	0.09
		250	3.819	33.966	0.61	0.09
		300	3.779	34.015	0.54	0.09
		400	3.716	34.109	0.44	0.09
		500	3.564	34.179	0.37	0.09
		600	3.380	34.247	0.36	0.09
		601	3.380	34.247	0.36	0.09
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml･l⁻¹	ug/l
Sur.	0	***	10.6	***	***	***
1	594	600	3.378	34.247	0.36	0.09
2	596	602	3.377	34.247	0.36	0.09
3	595	601	3.375	34.247	0.36	0.09
4	596	602	3.372	34.247	0.36	0.09
5	595	601	3.375	34.247	0.37	0.09
6	395	399	3.681	34.115	0.43	0.09
7	395	399	3.686	34.114	0.43	0.09
8	395	399	3.683	34.115	0.43	0.09
9	395	399	3.685	34.115	0.43	0.09
10	395	399	3.685	34.114	0.43	0.09
11	197	199	3.790	33.888	0.88	0.09
12	197	199	3.792	33.885	0.87	0.09
13	197	199	3.795	33.886	0.88	0.09
14	198	199	3.796	33.886	0.88	0.09
15	148	149	3.766	33.775	1.66	0.09
16	149	150	3.722	33.757	1.69	0.09
17	149	150	3.712	33.754	1.73	0.09
18	594	601	3.374	34.247	0.37	0.09
19	395	399	3.685	34.115	0.43	0.09
20	396	400	3.684	34.116	0.43	0.09
21	298	301	3.758	34.022	0.53	0.09
22	198	199	3.796	33.885	0.88	0.09
23	197	199	3.797	33.885	0.88	0.09
24	148	150	3.715	33.755	1.76	0.09

KH-12-4		BD-15-5		Depth	4855m	
Date:	2012/9/20			Lat.	50	50.02N
Time:	01:51			Long.	160	00.09W
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml･l⁻¹	ug/l
		10	10.467	32.389	6.18	2.63
		20	10.426	32.480	6.14	2.60
		30	10.401	32.489	6.15	2.00
		40	8.341	32.551	6.42	1.00
		50	4.923	32.677	6.66	0.62
		75	3.337	32.838	6.26	0.22
		100	3.564	33.349	3.87	0.13
		100	3.564	33.349	3.87	0.13
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml･l⁻¹	ug/l
Sur.	0	***	10.7	***	***	***
1	99	100	3.563	33.346	3.87	0.13
2	99	100	3.560	33.343	3.88	0.12
3	98	99	3.554	33.339	3.86	0.12
4	98	99	3.556	33.340	3.84	0.13
5	49	49	4.685	32.696	6.76	0.66
6	50	50	4.957	32.690	6.76	0.67
7	49	50	5.065	32.682	6.80	0.74
8	51	51	5.069	32.686	6.83	0.72
9	26	26	10.236	32.493	6.16	1.98
10	25	25	10.291	32.494	6.16	1.96
11	10	10	10.427	32.477	6.16	2.63
12	10	10	10.430	32.476	6.16	2.94
13	10	10	10.434	32.469	6.15	2.76
14	10	10	10.434	32.467	6.16	2.74
15	10	11	10.436	32.465	6.15	3.08
16	11	11	10.435	32.466	6.16	2.72
17	99	100	3.565	33.349	3.87	0.13
18	99	100	3.565	33.346	3.85	0.13
19	50	50	5.006	32.694	6.79	0.64
20	25	25	10.370	32.487	6.15	2.07
21	25	25	10.339	32.488	6.15	1.99
22	10	10	10.432	32.467	6.16	2.79
23	10	10	10.439	32.458	6.15	2.94
24	5	5	10.451	32.426	6.18	2.59

KH-12-4		BD-15-EX		Depth	4860m	
Date:	2012/9/20			Lat.	50	50.12N
Time:	06:06			Long.	160	00.08W
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml･l⁻¹	ug/l
		10	10.465	32.476	6.17	3.31
		20	10.458	32.478	6.15	3.30
		30	10.434	32.489	6.13	2.06
		40	8.461	32.569	6.53	1.19
		50	5.147	32.681	6.80	0.63
		51	5.132	32.686	6.82	0.64
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml･l⁻¹	ug/l
Sur.	0	***	10.6	***	***	***
1	11	11	10.509	32.281	6.17	2.83
2	11	11	10.504	32.299	6.17	2.96
3	11	11	10.509	32.276	6.17	2.81
4	10	10	10.503	32.296	6.17	2.81
5	10	10	10.505	32.286	6.17	2.57
6	10	10	10.505	32.285	6.16	3.02
7	9	9	10.507	32.278	6.17	2.46
8	10	10	10.502	32.289	6.18	2.67
9	10	10	10.497	32.299	6.19	2.71
10	10	10	10.502	32.295	6.18	2.56
11	10	11	10.494	32.355	6.19	2.93
12	10	10	10.504	32.296	6.18	2.87
13	10	10	10.492	32.396	6.20	3.01
14	10	10	10.499	32.331	6.18	2.87
15	10	10	10.500	32.322	6.18	2.88
16	10	10	10.502	32.305	6.17	3.02
17	50	50	4.838	32.695	6.84	0.71
18	51	52	4.751	32.703	6.86	0.72
19	25	26	10.454	32.478	6.14	2.50
20	24	25	10.449	32.479	6.14	2.70
21	11	11	10.504	32.301	6.17	2.72
22	11	11	10.501	32.300	6.17	2.94
23	6	6	10.509	32.270	6.17	2.69
24	5	5	10.506	32.279	6.16	2.65

KH-12-4		BD-16-1		Depth	5142m	
Date:	2012/9/20			Lat.	50	23.90N
Time:	17:53			Long.	155	59.46W
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml·l⁻¹	ug/l
		20	11.222	32.385	6.04	2.56
		30	11.205	32.386	6.05	2.52
		40	7.095	32.557	6.79	1.28
		50	5.413	32.657	7.14	1.02
		75	4.298	32.685	6.85	0.34
		100	3.706	32.718	6.80	0.21
		125	3.459	33.085	5.47	0.15
		150	3.406	33.589	3.05	0.11
		175	3.435	33.707	2.22	0.09
		200	3.583	33.775	1.66	0.09
		250	3.670	33.884	0.96	0.09
		300	3.693	33.970	0.77	0.09
		400	3.652	34.088	0.68	0.09
		500	3.555	34.167	0.54	0.09
		600	3.420	34.229	0.44	0.09
		700	3.249	34.281	0.40	0.09
		800	3.065	34.328	0.43	0.09
		900	2.908	34.368	0.47	0.09
		1000	2.775	34.398	0.50	0.09
		1200	2.531	34.450	0.56	0.09
		1500	2.273	34.508	0.71	0.09
		2000	1.952	34.581	1.13	0.08
		2500	1.729	34.625	1.74	0.08
		3000	1.596	34.650	2.28	0.08
		3500	1.509	34.667	2.72	0.07
		4000	1.491	34.677	2.96	0.07
		4500	1.520	34.681	3.04	0.07
		5000	1.567	34.683	3.09	0.07
		5014	1.569	34.683	3.11	0.07
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l⁻¹	ug/l
Sur.	0	***	11.2	***	***	***
1	4914	5015	1.569	34.683	2.98	0.07
2	4914	5015	1.569	34.683	2.97	0.07
3	4414	4500	1.519	34.681	2.99	0.07
4	3929	4000	1.489	34.677	2.92	0.07
5	3441	3500	1.500	34.669	2.72	0.07
6	2952	2999	1.582	34.652	2.30	0.08
7	2464	2500	1.730	34.625	1.75	0.08
8	1972	1999	1.939	34.583	1.16	0.08
9	1481	1500	2.258	34.511	0.75	0.09
10	1236	1250	2.488	34.459	0.59	0.09
11	4914	5015	1.569	34.683	2.97	0.07
12	4914	5015	1.569	34.683	2.98	0.07
13	4658	4750	1.541	34.682	2.99	0.07
14	4415	4500	1.519	34.681	2.99	0.07
15	4171	4249	1.499	34.680	2.97	0.07
16	3929	4001	1.489	34.677	2.91	0.07
17	3685	3750	1.487	34.674	2.85	0.07
18	3441	3500	1.499	34.669	2.73	0.07
19	3196	3249	1.533	34.662	2.54	0.07
20	2952	2999	1.584	34.652	2.30	0.08
21	2709	2750	1.643	34.641	2.05	0.08
22	2219	2250	1.829	34.606	1.43	0.08
23	1973	2000	1.941	34.583	1.16	0.08
24	1728	1750	2.080	34.552	0.94	0.08

KH-12-4		BD-16-2		Depth	4938m	
Date:	2012/9/21			Lat.	50	23.50N
Time:	01:14			Long.	156	00.02W
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml·l⁻¹	ug/l
		20	11.310	32.377	6.08	2.10
		30	11.288	32.377	6.07	2.66
		40	10.897	32.389	6.11	2.57
		50	5.441	32.630	7.15	0.81
		75	4.078	32.677	6.87	0.54
		100	3.720	32.741	6.74	0.19
		125	3.425	33.151	5.09	0.17
		150	3.413	33.598	2.99	0.10
		175	3.441	33.706	2.22	0.09
		200	3.628	33.796	1.49	0.09
		250	3.654	33.888	0.97	0.09
		300	3.726	33.968	0.69	0.09
		400	3.663	34.077	0.69	0.09
		500	3.554	34.166	0.54	0.09
		600	3.399	34.238	0.44	0.09
		700	3.211	34.290	0.42	0.09
		800	3.050	34.331	0.45	0.09
		900	2.908	34.368	0.47	0.09
		1000	2.759	34.401	0.50	0.09
		1002	2.756	34.402	0.49	0.09
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l⁻¹	ug/l
Sur.	0	***	11.8	***	***	***
1	992	1003	2.755	34.402	0.49	0.09
2	791	800	3.062	34.328	0.45	0.09
3	593	599	3.402	34.236	0.43	0.09
4	396	400	3.659	34.077	0.68	0.09
5	198	200	3.644	33.801	1.43	0.09
6	148	150	3.407	33.613	2.79	0.10
7	659	666	3.285	34.271	0.39	0.09
8	37	38	6.425	32.596	7.07	0.97
9	100	101	3.479	32.765	6.53	0.15
10	49	49	4.748	32.665	7.06	0.56
11	25	26	11.249	32.376	6.06	2.95
12	9	10	11.322	32.378	6.08	2.16
13	10	10	11.317	32.379	6.08	2.20
14	10	10	11.310	32.379	6.08	2.19
15	992	1003	2.755	34.402	0.50	0.09
16	396	400	3.662	34.074	0.68	0.09
17	297	300	3.715	33.964	0.63	0.09
18	198	200	3.641	33.799	1.43	0.09
19	659	666	3.291	34.270	0.39	0.09
20	37	38	6.700	32.570	7.11	1.19
21	100	101	3.487	32.751	6.60	0.18
22	50	51	4.794	32.665	7.08	0.77
23	25	25	11.240	32.377	6.06	2.93
24	9	9	11.312	32.379	6.07	2.15

KH-12-4		BD-17-1		Depth	3732m	
Date:	2012/9/27			Lat.	42	59.97N
Time:	16:18			Long.	132	39.98W
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml·l⁻¹	ug/l
		5	17.231	32.785	5.39	0.52
		10	17.189	32.781	5.41	0.67
		20	16.818	32.777	5.45	0.73
		30	16.420	32.796	5.52	1.40
		40	13.214	32.785	6.45	2.89
		50	11.692	32.848	6.45	2.68
		75	10.203	32.886	5.97	0.68
		100	9.342	32.931	5.63	0.24
		125	8.585	33.092	5.53	0.10
		150	8.135	33.338	5.36	0.08
		175	8.062	33.639	4.88	0.08
		200	8.020	33.834	4.37	0.07
		250	7.119	33.902	3.47	0.08
		300	6.431	33.920	3.08	0.08
		400	5.449	33.960	1.79	0.08
		500	4.806	34.030	1.10	0.08
		600	4.399	34.105	0.62	0.09
		700	4.246	34.196	0.32	0.09
		800	4.031	34.280	0.20	0.09
		900	3.729	34.337	0.18	0.09
		1000	3.478	34.388	0.20	0.09
		1200	3.021	34.456	0.32	0.09
		1500	2.486	34.518	0.56	0.09
		2000	1.963	34.594	1.31	0.08
		2500	1.745	34.630	1.81	0.08
		3000	1.617	34.651	2.24	0.08
		3500	1.564	34.664	2.50	0.07
		3758	1.562	34.669	2.54	0.08
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l⁻¹	ug/l
Sur.	0	***	17.4	***	***	***
1	3695	3758	1.562	34.669	2.48	0.08
2	2955	3000	1.615	34.652	2.21	0.08
3	2956	3000	1.615	34.652	2.21	0.08
4	3695	3758	1.562	34.669	2.49	0.08
5	3695	3758	1.562	34.669	2.47	0.07
6	3695	3758	1.562	34.669	2.49	0.07
7	3445	3501	1.563	34.664	2.45	0.07
8	3445	3501	1.563	34.664	2.45	0.07
9	2956	3000	1.614	34.652	2.21	0.08
10	2955	3000	1.614	34.652	2.21	0.08
11	2956	3000	1.614	34.652	2.21	0.08
12	2955	3000	1.614	34.652	2.22	0.08
13	2466	2500	1.743	34.631	1.80	0.08
14	2465	2500	1.743	34.631	1.81	0.08
15	1975	2001	1.953	34.595	1.33	0.08
16	1975	2000	1.954	34.595	1.32	0.08
17	1975	2000	1.954	34.595	1.32	0.08
18	1975	2000	1.953	34.595	1.32	0.08
19	1975	2000	1.952	34.595	1.32	0.08
20	1975	2000	1.953	34.595	1.33	0.08
21	3695	3758	1.562	34.669	2.49	0.08
22	2955	3000	1.614	34.652	2.22	0.08
23	2956	3001	1.614	34.652	2.21	0.08
24	1975	2000	1.953	34.595	1.33	0.08

KH-12-4		BD-17-EX		Depth	3730m	
Date:	2012/9/27			Lat.	43	00.02N
Time:	23:29			Long.	132	39.86W
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml·l⁻¹	ug/l
		5	17.281	32.773	5.41	0.43
		10	17.230	32.772	5.41	0.48
		20	16.907	32.772	5.44	0.61
		30	16.590	32.803	5.49	1.10
		40	15.893	32.783	5.82	2.04
		50	13.159	32.834	6.57	3.18
		75	10.665	32.886	6.12	1.29
		100	9.579	32.892	5.77	0.32
		125	8.853	33.066	5.50	0.12
		150	8.130	33.365	5.34	0.08
		175	8.027	33.696	4.73	0.07
		200	8.044	33.846	4.35	0.08
		201	8.026	33.846	4.32	0.07
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l⁻¹	ug/l
Sur.	0	***	17.8	***	***	***
1	199	200	8.072	33.861	4.34	0.08
2	99	100	9.552	32.896	5.72	0.27
3	50	50	13.666	32.801	6.43	3.21
4	25	25	16.802	32.768	5.47	1.19
5	10	10	17.257	32.770	5.42	0.47
6	10	10	17.234	32.769	5.44	0.52
7	10	10	17.230	32.769	5.43	0.46
8	10	10	17.234	32.770	5.42	0.57
9	10	10	17.272	32.769	5.42	0.47
10	9	10	17.237	32.770	5.43	0.55
11	10	10	17.264	32.770	5.42	0.52
12	10	11	17.267	32.771	5.42	0.56
13	10	10	17.252	32.768	5.42	0.50
14	10	10	17.246	32.771	5.42	0.50
15	10	10	17.308	32.772	5.42	0.50
16	10	10	17.284	32.771	5.42	0.47
17	50	50	13.876	32.787	6.42	3.04
18	50	50	13.851	32.789	6.43	3.03
19	25	25	16.817	32.772	5.47	0.86
20	25	25	16.813	32.773	5.47	0.87
21	10	10	17.285	32.771	5.42	0.51
22	10	10	17.296	32.772	5.42	0.54
23	5	5	17.299	32.772	5.42	0.48
24	5	5	17.297	32.772	5.42	0.47

KH-12-4	BD-17-2	Depth	3732m
Date:	2012/9/28	Lat.	43 00.00N
Time:	01:21	Long.	132 39.89W

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	$ml \cdot l^{-1}$	ug/l
	5	17.273	32.776	5.43	0.56
	10	17.311	32.777	5.43	0.56
	20	16.968	32.772	5.45	0.67
	30	16.745	32.783	5.48	1.11
	40	16.565	32.804	5.49	1.23
	50	14.104	32.768	6.36	2.79
	75	10.406	32.866	6.02	1.17
	100	9.443	32.913	5.69	0.23
	125	8.267	33.214	5.43	0.08
	150	8.175	33.504	5.17	0.08
	175	8.039	33.739	4.60	0.07
	200	7.906	33.858	4.21	0.08
	250	7.482	33.915	3.80	0.08
	300	6.653	33.915	3.24	0.08
	400	5.613	33.945	2.16	0.08
	500	4.980	34.013	1.16	0.08
	600	4.485	34.111	0.57	0.08
	700	4.204	34.220	0.27	0.08
	800	4.005	34.280	0.20	0.09
	900	3.750	34.337	0.17	0.09
	1000	3.538	34.376	0.19	0.09
	1200	3.050	34.451	0.30	0.09
	1500	2.515	34.514	0.54	0.08
	1501	2.514	34.515	0.54	0.08

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	$ml \cdot l^{-1}$	ug/l
Sur.	0	***	17.7	***	***	***
1	1483	1501	2.511	34.514	0.54	0.09
2	1484	1501	2.511	34.515	0.54	0.08
3	990	1000	3.543	34.372	0.19	0.09
4	989	1000	3.539	34.374	0.19	0.09
5	989	1000	3.544	34.373	0.19	0.09
6	989	1000	3.543	34.373	0.19	0.09
7	990	1000	3.542	34.373	0.19	0.09
8	989	999	3.542	34.373	0.19	0.09
9	990	1000	3.542	34.373	0.19	0.09
10	792	800	4.000	34.281	0.19	0.09
11	792	800	4.005	34.281	0.19	0.09
12	594	600	4.460	34.117	0.54	0.09
13	594	600	4.457	34.118	0.53	0.09
14	396	400	5.604	33.942	2.11	0.08
15	397	400	5.613	33.941	2.12	0.08
16	396	400	5.606	33.942	2.14	0.08
17	397	401	5.614	33.942	2.14	0.08
18	55	55	11.961	32.852	6.41	2.42
19	1484	1501	2.511	34.515	0.54	0.09
20	989	999	3.541	34.373	0.19	0.09
21	792	800	4.005	34.281	0.19	0.09
22	594	600	4.459	34.118	0.54	0.09
23	396	400	5.612	33.942	2.14	0.08
24	55	55	11.949	32.851	6.42	2.47

KH-12-4	BD-17-3	Depth	3732m
Date:	2012/9/28	Lat.	42 59.98N
Time:	07:05	Long.	132 39.94W

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	$ml \cdot l^{-1}$	ug/l
	5	17.442	32.857	5.38	0.77
	10	17.432	32.856	5.39	0.74
	20	17.365	32.848	5.40	0.82
	30	16.739	32.810	5.53	1.36
	40	13.901	32.760	6.40	2.93
	50	12.013	32.857	6.43	2.42
	75	10.083	32.861	5.95	0.71
	100	9.144	32.828	5.86	0.25
	125	8.631	32.926	5.74	0.12
	150	8.308	33.201	5.47	0.09
	175	8.146	33.485	5.18	0.07
	200	7.963	33.677	4.60	0.07
	201	7.963	33.672	4.62	0.08

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	$ml \cdot l^{-1}$	ug/l
Sur.	0	***	17.8	***	***	***
1	198	199	7.964	33.681	4.55	0.08
2	198	199	7.965	33.687	4.56	0.08
3	198	200	7.968	33.697	4.57	0.08
4	198	200	7.965	33.689	4.54	0.08
5	198	199	7.965	33.689	4.53	0.08
6	198	200	7.967	33.693	4.53	0.08
7	99	100	9.169	32.835	5.83	0.24
8	100	100	9.166	32.827	5.84	0.28
9	99	100	9.171	32.827	5.85	0.30
10	99	100	9.179	32.828	5.84	0.27
11	49	49	11.624	32.865	6.40	2.04
12	51	51	11.653	32.866	6.36	2.06
13	26	26	16.745	32.795	5.53	1.40
14	26	26	16.748	32.799	5.53	1.41
15	11	11	17.461	32.859	5.38	0.73
16	11	11	17.459	32.859	5.37	0.76
17	11	11	17.466	32.860	5.36	0.71
18	11	11	17.469	32.860	5.37	0.73
19	199	201	7.971	33.714	4.55	0.08
20	99	100	9.167	32.826	5.84	0.27
21	50	50	11.677	32.865	6.38	2.18
22	25	26	16.740	32.801	5.53	1.26
23	11	11	17.472	32.860	5.37	0.70
24	4	5	17.467	32.860	5.37	0.70

KH-12-4	BD-18-1	Depth	2610m
Date:	2012/9/29	Lat.	44 40.96N
Time:	02:22	Long.	130 30.04W

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	ml·l^{-1}	ug/l
	10	16.954	32.461	5.40	0.40
	20	16.978	32.476	5.41	0.43
	30	16.690	32.638	5.56	1.27
	40	14.472	32.641	6.10	4.00
	50	11.706	32.657	6.27	4.55
	75	9.150	32.710	6.21	0.88
	100	8.359	32.754	5.97	0.23
	125	7.996	32.901	5.55	0.13
	150	7.785	33.343	4.50	0.10
	175	7.596	33.658	3.86	0.09
	200	7.351	33.819	3.64	0.08
	250	6.571	33.888	3.06	0.08
	300	6.001	33.912	2.40	0.09
	400	5.241	33.977	1.34	0.08
	500	4.768	34.057	0.80	0.08
	600	4.498	34.146	0.43	0.09
	700	4.095	34.217	0.28	0.09
	800	3.840	34.282	0.21	0.09
	900	3.599	34.335	0.19	0.09
	1000	3.365	34.398	0.22	0.09
	1200	3.029	34.462	0.34	0.09
	1500	2.518	34.526	0.68	0.09
	2000	1.949	34.595	1.34	0.08
	2500	1.784	34.625	1.72	0.08
	2593	1.753	34.630	1.81	0.08

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l^{-1}	ug/l
Sur.	0	***	17.0	***	***	***
1	2541	2577	1.752	34.630	1.79	0.08
2	2367	2400	1.806	34.621	1.65	0.08
3	2171	2200	1.861	34.610	1.51	0.08
4	2072	2100	1.895	34.604	1.44	0.08
5	1974	2000	1.952	34.594	1.34	0.08
6	1877	1901	2.023	34.583	1.21	0.08
7	1679	1700	2.225	34.556	0.95	0.08
8	1187	1200	3.053	34.457	0.34	0.09
9	595	601	4.516	34.145	0.41	0.09
10	298	300	5.964	33.912	2.31	0.09
11	98	99	8.197	32.779	5.85	0.19
12	10	10	16.935	32.465	5.40	0.44
13	2541	2578	1.752	34.630	1.78	0.08
14	2367	2400	1.807	34.621	1.64	0.08
15	2170	2200	1.861	34.610	1.51	0.08
16	2073	2100	1.895	34.604	1.44	0.08
17	1974	2000	1.952	34.594	1.33	0.08
18	1877	1901	2.023	34.583	1.21	0.08
19	1680	1701	2.226	34.556	0.95	0.09
20	1188	1201	3.050	34.458	0.34	0.09
21	595	601	4.515	34.145	0.41	0.09
22	298	301	5.961	33.912	2.31	0.08
23	99	100	8.204	32.776	5.87	0.22
24	10	11	16.923	32.465	5.40	0.48

KH-12-4	BD-19-1	Depth	3678m
Date:	2012/9/29	Lat.	45 00.04N
Time:	15:33	Long.	132 00.08W

CTD data (LAY)	Pres.	Temp.	Sal	DO	Flu.
	db	℃	(psu)	ml·l^{-1}	ug/l
	10	16.597	32.675	5.48	0.84
	20	16.593	32.675	5.49	0.95
	30	16.562	32.674	5.49	0.95
	40	13.787	32.687	6.00	2.81
	50	12.140	32.694	6.24	2.62
	75	9.549	32.736	6.18	0.73
	100	8.435	32.716	6.17	0.32
	125	7.918	32.790	5.94	0.13
	150	7.775	33.168	5.06	0.10
	175	7.662	33.568	4.30	0.09
	200	7.511	33.773	3.80	0.08
	250	6.915	33.877	3.05	0.08
	300	6.218	33.894	2.91	0.08
	400	5.359	33.951	1.68	0.08
	500	4.748	34.047	0.86	0.08
	600	4.430	34.127	0.49	0.09
	700	4.178	34.199	0.30	0.09
	800	3.948	34.270	0.21	0.09
	900	3.770	34.330	0.18	0.09
	1000	3.540	34.371	0.19	0.09
	1200	3.082	34.445	0.30	0.09
	1500	2.552	34.511	0.58	0.08
	2000	1.942	34.592	1.29	0.08
	2500	1.764	34.626	1.73	0.08
	3000	1.627	34.648	2.17	0.08
	3500	1.546	34.666	2.54	0.07
	3702	1.542	34.669	N.D.	0.08

CTD data (BTL)

BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l^{-1}	ug/l
Sur.	0	***	16.8	***	***	***
1	3642	3703	1.542	34.670	2.52	0.07
2	3641	3703	1.542	34.670	2.52	0.07
3	2953	2999	1.628	34.648	2.13	0.08
4	2465	2500	1.771	34.625	1.71	0.08
5	1975	2000	1.954	34.591	1.28	0.08
6	1483	1500	2.543	34.512	0.59	0.09
7	1236	1250	2.952	34.455	0.33	0.09
8	990	1000	3.540	34.371	0.20	0.09
9	990	1000	3.543	34.370	0.20	0.09
10	792	800	3.962	34.266	0.21	0.09
11	920	930	3.709	34.344	0.18	0.09
12	920	930	3.724	34.340	0.18	0.09
13	3642	3704	1.542	34.670	2.53	0.07
14	2953	2998	1.629	34.648	2.14	0.08
15	2710	2750	1.686	34.638	1.95	0.08
16	2465	2500	1.771	34.625	1.71	0.08
17	2220	2250	1.845	34.611	1.51	0.08
18	1974	1999	1.954	34.590	1.28	0.08
19	1729	1751	2.187	34.555	0.94	0.08
20	1482	1500	2.543	34.512	0.59	0.09
21	1236	1250	2.951	34.455	0.34	0.09
22	989	999	3.542	34.371	0.19	0.09
23	792	800	3.962	34.266	0.21	0.09
24	920	930	3.727	34.339	0.18	0.09

KH-12-4		BD-19-2		Depth	3679m	
Date:	2012/9/29			Lat.	44	59.96N
Time:	20:48			Long.	131	59.90W
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml·l^{-1}	ug/l
		5	16.660	32.670	5.49	0.27
		10	16.632	32.671	5.49	0.35
		20	16.614	32.671	5.48	0.61
		30	16.062	32.688	5.59	1.21
		40	13.726	32.708	6.07	2.71
		50	11.840	32.695	6.25	2.84
		75	9.299	32.716	6.18	0.66
		100	8.097	32.723	6.09	0.23
		125	7.823	32.936	5.55	0.11
		150	7.712	33.260	4.82	0.09
		175	7.597	33.681	4.04	0.08
		200	7.373	33.849	3.71	0.08
		250	6.695	33.890	3.31	0.08
		300	6.128	33.901	2.73	0.09
		400	5.389	33.956	1.61	0.08
		500	4.838	34.026	0.99	0.08
		600	4.453	34.098	0.59	0.09
		601	4.456	34.100	0.58	0.09
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l^{-1}	ug/l
Sur.	0	***	16.7	***	***	***
1	594	599	4.459	34.101	0.59	0.09
2	396	399	5.349	33.957	1.55	0.08
3	396	400	5.363	33.957	1.57	0.08
4	199	201	7.372	33.845	3.74	0.09
5	199	201	7.384	33.845	3.74	0.08
6	149	150	7.728	33.214	4.88	0.12
7	44	44	11.590	32.692	6.27	2.66
8	44	44	11.645	32.694	6.26	2.60
9	100	100	8.091	32.730	6.06	0.23
10	100	100	8.054	32.732	6.05	0.21
11	49	49	10.466	32.702	6.26	1.74
12	24	24	16.389	32.669	5.52	1.01
13	11	11	16.620	32.670	5.49	0.68
14	10	10	16.639	32.670	5.49	0.66
15	593	599	4.458	34.101	0.58	0.09
16	396	400	5.372	33.958	1.56	0.08
17	298	301	6.098	33.896	2.67	0.08
18	198	200	7.415	33.841	3.73	0.08
19	149	151	7.728	33.214	4.85	0.10
20	44	44	11.650	32.695	6.26	2.72
21	100	100	8.082	32.730	6.06	0.21
22	50	50	10.634	32.700	6.28	2.03
23	24	24	16.263	32.678	5.51	0.91
24	10	10	16.644	32.670	5.49	0.62

KH-12-4		BD-20-1		Depth	1600m	
Date:	2012/9/30			Lat.	45	58.01N
Time:	07:38			Long.	130	01.92W
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	ml·l^{-1}	ug/l
		5	16.745	32.033	5.44	0.30
		10	16.742	32.034	5.43	0.30
		20	16.624	32.041	5.45	0.37
		30	12.025	32.397	6.65	2.40
		40	10.007	32.595	6.42	1.78
		50	8.929	32.633	5.98	0.74
		75	7.856	32.715	5.83	0.20
		100	7.348	32.857	5.61	0.13
		125	7.580	33.358	4.28	0.08
		150	7.435	33.739	3.26	0.09
		175	7.204	33.838	3.01	0.09
		200	6.860	33.875	2.97	0.08
		250	6.415	33.917	2.34	0.08
		300	5.999	33.946	1.86	0.08
		400	5.354	34.013	1.08	0.09
		500	4.814	34.108	0.54	0.08
		600	4.626	34.178	0.33	0.09
		700	4.374	34.241	0.23	0.09
		800	4.004	34.322	0.19	0.09
		900	3.589	34.355	0.20	0.09
		1000	3.282	34.390	0.23	0.09
		1200	2.922	34.450	0.33	0.08
		1500	2.467	34.517	0.66	0.08
		1582	2.431	34.524	0.70	0.09
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	ml·l^{-1}	ug/l
Sur.	0	***	16.8	***	***	***
1	1563	1582	2.429	34.524	0.71	0.08
2	1563	1582	2.429	34.524	0.70	0.08
3	1532	1550	2.444	34.521	0.69	0.08
4	1532	1550	2.440	34.522	0.69	0.08
5	1482	1500	2.463	34.517	0.66	0.08
6	1482	1500	2.463	34.517	0.66	0.08
7	1433	1450	2.473	34.515	0.65	0.08
8	1433	1450	2.477	34.514	0.65	0.08
9	1383	1399	2.580	34.498	0.55	0.09
10	1383	1399	2.604	34.496	0.53	0.08
11	1285	1300	2.763	34.474	0.42	0.09
12	1285	1300	2.762	34.475	0.42	0.09
13	1187	1200	2.905	34.451	0.34	0.09
14	1187	1200	2.907	34.451	0.34	0.09
15	989	1000	3.294	34.386	0.22	0.09
16	989	1000	3.299	34.385	0.22	0.09
17	594	600	4.615	34.175	0.32	0.09
18	594	600	4.616	34.176	0.32	0.09
19	299	301	5.963	33.944	1.80	0.09
20	299	301	5.962	33.945	1.79	0.08
21	99	100	7.335	32.844	5.32	0.13
22	99	100	7.349	32.848	5.56	0.13
23	10	10	16.657	32.031	5.43	0.30
24	10	10	16.696	32.025	5.42	0.31

KH-12-4		BD-21-1		Depth	2438m	
Date:	2012/9/30			Lat.	48	27.22N
Time:	22:52			Long.	128	42.78W
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	$ml \cdot l^{-1}$	ug/l
		10	15.001	31.944	5.78	2.03
		20	14.981	31.943	5.78	2.12
		30	13.370	32.015	5.53	3.48
		40	10.910	32.512	5.74	0.57
		50	8.932	32.596	5.81	0.38
		75	7.408	32.749	5.73	0.12
		100	7.197	32.999	5.02	0.09
		125	7.446	33.437	3.84	0.08
		150	7.253	33.771	2.99	0.08
		175	6.962	33.855	2.75	0.10
		200	6.769	33.885	2.59	0.09
		250	6.195	33.913	2.33	0.08
		300	5.771	33.959	1.66	0.08
		400	5.264	34.038	0.93	0.09
		500	4.928	34.112	0.55	0.09
		600	4.685	34.195	0.33	0.09
		700	4.407	34.249	0.24	0.09
		800	4.015	34.303	0.20	0.09
		900	3.679	34.349	0.20	0.09
		1000	3.474	34.392	0.23	0.09
		1200	3.036	34.445	0.32	0.09
		1500	2.492	34.510	0.60	0.09
		2000	1.946	34.587	1.27	0.08
		2434	1.758	34.625	1.70	0.08
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	$ml \cdot l^{-1}$	ug/l
Sur.	0	***	15.6	***	***	***
1	2399	2434	1.758	34.625	1.69	0.08
2	2399	2434	1.758	34.625	1.69	0.08
3	2367	2400	1.777	34.621	1.64	0.08
4	2366	2400	1.777	34.621	1.63	0.08
5	2268	2300	1.824	34.616	1.57	0.08
6	2268	2300	1.824	34.616	1.57	0.08
7	2170	2200	1.835	34.608	1.49	0.08
8	2170	2200	1.836	34.608	1.49	0.08
9	2072	2101	1.884	34.597	1.39	0.08
10	2071	2099	1.884	34.597	1.38	0.08
11	1974	2001	1.932	34.588	1.29	0.08
12	1974	2000	1.931	34.589	1.28	0.08
13	1777	1799	2.071	34.565	1.05	0.08
14	1777	1800	2.081	34.565	1.04	0.08
15	1186	1199	3.035	34.445	0.32	0.09
16	1186	1200	3.041	34.444	0.32	0.09
17	594	599	4.673	34.195	0.32	0.09
18	594	600	4.673	34.195	0.32	0.09
19	298	300	5.779	33.954	1.65	0.09
20	298	301	5.766	33.949	1.71	0.09
21	98	99	7.159	33.042	4.80	0.10
22	100	101	7.160	33.043	4.90	0.09
23	10	10	14.915	31.941	5.79	2.29
24	11	11	14.960	31.943	5.78	2.23

KH-12-4		BD-22-1		Depth	2411m	
Date:	2012/10/1			Lat.	48	30.07N
Time:	07:50			Long.	127	00.14W
CTD data (LAY)		Pres.	Temp.	Sal	DO	Flu.
		db	℃	(psu)	$ml \cdot l^{-1}$	ug/l
		5	14.510	31.782	5.80	2.13
		10	14.464	31.784	5.80	2.58
		20	13.963	31.838	5.61	1.72
		30	10.160	32.453	5.46	0.36
		40	9.134	32.573	5.56	0.30
		50	8.316	32.646	5.90	0.22
		75	7.407	32.726	5.86	0.11
		100	7.175	32.936	5.27	0.09
		125	7.694	33.497	3.50	0.08
		150	7.316	33.755	3.44	0.08
		175	7.013	33.858	3.04	0.10
		200	6.650	33.883	3.08	0.09
		250	6.102	33.894	2.66	0.08
		300	5.708	33.918	2.09	0.08
		400	5.288	34.049	0.93	0.09
		500	4.442	34.058	0.80	0.09
		600	4.374	34.159	0.40	0.09
		700	4.001	34.221	0.29	0.09
		800	3.800	34.289	0.22	0.09
		900	3.648	34.340	0.19	0.09
		1000	3.406	34.382	0.21	0.09
		1200	2.975	34.444	0.32	0.09
		1500	2.509	34.520	0.66	0.09
		2000	1.937	34.592	1.28	0.08
		2455	1.798	34.624	1.55	0.08
CTD data (BTL)						
BTL	Depth	Pres.	Temp.	Sal	DO	Flu.
No.	m	db	℃	(psu)	$ml \cdot l^{-1}$	ug/l
Sur.	0	***	14.8	***	***	***
1	2420	2455	1.800	34.624	1.52	0.08
2	2365	2399	1.789	34.625	1.53	0.08
3	2267	2299	1.797	34.620	1.53	0.08
4	2169	2199	1.824	34.612	1.48	0.08
5	2071	2099	1.873	34.602	1.39	0.08
6	1974	2000	1.935	34.591	1.28	0.08
7	1777	1800	2.099	34.565	1.03	0.09
8	1186	1199	2.985	34.442	0.32	0.09
9	595	601	4.365	34.160	0.38	0.09
10	298	301	5.611	33.913	2.06	0.09
11	100	100	7.333	33.095	4.65	0.08
12	10	10	14.538	31.774	5.78	1.95
13	2420	2455	1.800	34.624	1.53	0.08
14	2366	2399	1.792	34.625	1.53	0.08
15	2267	2299	1.797	34.620	1.54	0.08
16	2169	2199	1.824	34.612	1.49	0.08
17	2071	2099	1.873	34.602	1.39	0.08
18	1973	2000	1.933	34.592	1.30	0.08
19	1777	1800	2.105	34.564	1.02	0.08
20	1185	1199	2.980	34.442	0.32	0.09
21	595	601	4.366	34.161	0.38	0.09
22	297	300	5.609	33.914	2.00	0.09
23	100	100	7.333	33.094	4.73	0.08
24	9	9	14.533	31.772	5.77	2.13

7.2. Bottle data for CTD hydrocast

BD-1

CMS	GT-ID	Pressure (db)	BottleIDNo.	open/close	leakage	remark	Routine Salinity	Routine DO	Routine Nutrients	Routine pH/Alkalinity	Routine Chl.a	AORI Ooki Tritium	niv. Toyam Roy Andreas Trace Metals	niv. Toyam Roy Andreas Chl.a	JAEA Iodine-129	AIST Yamashita PFASs	okkaido Un Nishioka CDOM	Kochi Pref Univ Isshiki Cr	Total
				Bottle Status															
25	BD0010	bucket	–	–	–		0.8	1.2	0.2	1	0.6				1.5	1			6.3
24	X	10	12126	open															0
23	X	10	12139	close															0
22	X	10	12131	close															0
21	X	10	12136	close															0
20	BD0009	10	12117	close	OK	Substitute for No.10													0
19	X	20	12113	close															0
18	X	30	12099	open															0
17	X	50	12079	close															0
16	X	75	12137	close															0
15	X	100	12135	close															0
14	X	150	12077	close															0
13	X	200	12115	close															0
12	X	250	12124	open															0
11	BD0008	Bottom	12089	close	OK	Substitute for No.1													0
10	X	10	12138	open			0.8	1.2	0.2	1	0.6	1	0.5	0.6		1	0.2	0.1	7.2
9	BD0007	20	12122	close	OK		0.8	1.2	0.2	1	0.6					1		0.1	4.9
8	X	30	12103	open			0.8	1.2	0.2	1	0.6		0.5	0.6			0.2	0.1	5.2
7	BD0006	50	12121	close	OK		0.8	1.2	0.2	1	0.6				1.5	1	0.2	0.1	6.6
6	BD0005	75	12128	close	OK		0.8	1.2	0.2	1	0.6			0.6				0.1	4.5
5	BD0004	100	12109	close	OK		0.8	1.2	0.2	1	0.6				1.5	1	0.2	0.1	6.6
4	BD0003	150	12118	close	OK		0.8	1.2	0.2	1	0.6		0.5	0.6	1.5		0.2	0.1	6.7
3	BD0002	200	12105	close	OK		0.8	1.2	0.2	1	0.6					1	0.2	0.1	5.1
2	BD0001	250	12078	close	unknown		0.8	1.2	0.2	1								0.1	3.3
1	X	Bottom	12119	close	L		0.8	1.2	0.2	1			0.5	0.6	1.5	1	0.2	0.1	7.1

remark
All Niskin bottles are of Normal type(not clean).

BD-2

CMS	GT-ID	Affiliation Person in charge of the sample Pressure (db)	BottleIDNo.	open/close	leakage	remark	Routine Salinity	Routine DO	Routine Nutrients	Routine pH/Alkalinity	Routine Chl.a	AORI Ooki Tritium	niv. Toyam Roy Andreas Trace Metals	niv. Toyam Roy Andreas Chl.a	JAEA Iodine-129	AIST Yamashita PFASs	okkaido Univ Nishioka CDOM	Total
25	BD0019	bucket	–	–	–		0.8	1.2	0.2	1	0.6				1.5	1		6.3
24	X	10	12126	close														0
23	X	10	12139	close														0
22	X	10	12131	close														0
21	X	10	12136	close														0
20	X	10	12117	close														0
19	X	10	12113	close														0
18	X	10	12099	close														0
17	X	10	12079	close														0
16	X	10	12137	close														0
15	BD0018	20	12135	close	OK	Substitute for No.7												0
14	X	30	12077	close														0
13	X	50	12115	close														0
12	BD0017	75	12124	close	OK	Substitute for No.4												0
11	X	100	12089	open														0
10	X	150	12138	close														0
9	X	Bottom	12122	close														0
8	BD0016	10	12103	close	OK		0.8	1.2	0.2	1	0.6	1	0.5	0.6		1	0.2	7.1
7	X	20	12121	close	X		0.8	1.2	0.2	1	0.6				1.5	1		6.3
6	BD0015	30	12128	close	OK		0.8	1.2	0.2	1	0.6		0.5	0.6			0.2	5.1
5	BD0014	50	12109	close	OK		0.8	1.2	0.2	1	0.6				1.5	1	0.2	6.5
4	X	75	12118	close	X		0.8	1.2	0.2	1	0.6			0.6			0.2	4.6
3	BD0013	100	12105	close	OK		0.8	1.2	0.2	1	0.6				1.5	1	0.2	6.5
2	BD0012	150	12078	close	OK		0.8	1.2	0.2	1	0.6		0.5	0.6		1	0.2	6.1
1	BD0011	Bottom	12119	close	OK		0.8	1.2	0.2	1			0.5	0.6	1.5	1	0.2	7

remark
All Niskin bottles are of Normal type(not clean).

BD-3

CMS	GT-ID	Affiliation Person in charge of the sample Pressure (db)	Bottle Status BottleIDNo.	open/close	leakage	remark	Routine Salinity	Routine DO	Routine Nutrients	Routine pH/Alkalinity	Routine Chl.a	AORI Ooki Tritium	Univ. Toyama Roy Andreas Trace Metals	Univ. Toyama Roy Andreas Chl.a	AIST Yamashita PFASs	Hokkaido Univ Nishioka CDOM	Total
25	BD0027	bucket	–	–	–		0.8	1.2	0.2	1	0.6				1		4.8
24	X	10	12126	close													0
23	X	10	12139	close													0
22	X	10	12131	close													0
21	X	10	12136	close													0
20	X	10	12117	close													0
19	X	10	12113	close													0
18	X	10	12099	close													0
17	BD0026	10	12079	close	OK	Substitute for No.7											0
16	X	10	12137	close													0
15	X	10	12135	close													0
14	X	10	12077	close													0
13	X	10	12115	close													0
12	X	10	12124	close													0
11	X	10	12089	close													0
10	X	10	12138	close													0
9	X	10	12122	close													0
8	X	10	12103	close													0
7	X	10	12121	close	L		0.8	1.2	0.2	1	0.6	1	0.5	0.6		0.2	6.1
6	BD0025	20	12128	close	OK		0.8	1.2	0.2	1	0.6					0.2	4
5	BD0024	30	12109	close	OK		0.8	1.2	0.2	1	0.6		0.5	0.6		0.2	5.1
4	BD0023	50	12118	close	OK		0.8	1.2	0.2	1	0.6					0.2	4
3	BD0022	75	12105	close	OK		0.8	1.2	0.2	1	0.6			0.6		0.2	4.6
2	BD0021	100	12078	close	OK		0.8	1.2	0.2	1	0.6					0.2	4
1	BD0020	Bottom	12119	close	OK		0.8	1.2	0.2	1	0.6		0.5	0.6		0.2	5.1

DOは各ボトル2本ずつ採取した。

remark

All Niskin bottles are of Normal type(not clean).

BD-4 Cast-1

CMS	GT-ID	BottleIDNo. (Bottle Status)	open/close (Bottle Status)	leakage (Bottle Status)	remark (Bottle Status)	N/C	Pressure (db)	Normal Routine Salinity	Normal Routine DO**	Normal Routine Nutrients*	Normal Routine pH/Alkalinity	Normal Routine Chl.a	Normal AORI Ooki Helium	Normal AORI Ooki Tritium	Normal Univ. Toyama Roy Andreas Chl-a	Normal Tokai Kato Ba	Normal AIST Yamashita PFASs	Clean AORI Obata Fe(II)	Clean AORI Obata Trace Metal	Clean AORI Obata Archive	Clean Univ. Toyama Roy Andreas Trace Metals	Clean Hokkaido Univ ILTS Nishioka Dissolved Fe	Clean Kochi Pref Univ Isshiki Cr	Clean Kyoto Konagaya BTM. filt	Clean Kyoto Konagaya BTM. unfilt	Clean Nagasaki Univ. Naoe (Takeda) Fe-speciation (Filtered)	Clean Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filtered)	Clean Nagasaki Univ. Mukae (Takeda) Bottole Incubation	Clean Nagasaki Univ. Mukae (Takeda) Bottole Incubation	Total
																		Filt	Filt	Filt		Filt	Unfilt	Filt	Unfilt	Filt	Filt	Unfilt	Unfilt	
24	BD0049	12126	close	OK		N	3500	0.8	1.2	0.2	1		1			0.2														4.4
23	BD0048	12139	close	OK		N	3750									0.2														0.2
22	BD0047	12131	close	OK		N	4000	0.8	1.2	0.2	1		1			0.2	1													5.4
21	BD0046	12136	close	OK		N	4250									0.2														0.2
20	BD0045	12117	close	OK		N	4750									0.2														0.2
19	BD0044	12113	close	OK		N	5000	0.8	1.2	0.2	1		1			0.2	1													5.4
18	BD0043	12099	close	OK		N	5250									0.2														0.2
17	BD0042	12079	close	OK		N	5500	0.8	1.2	0.2	1		1			0.2														4.4
16	BD0041	12137	close	OK		N	5750									0.2														0.2
15	BD0040	12135	close	OK		N	6000	0.8	1.2	0.2	1		1			0.2	1													5.4
14	BD0039	12077	close	OK		N	6250									0.2														0.2
13	BD0038	12115	close	OK		N	6500	0.8	1.2	0.2	1		1			0.2														4.4
12	BD0037	12124	close	OK		N	6750									0.2														0.2
11	BD0036	12089	close	OK		N	7000	0.8	1.2	0.2	1		1			0.2	1													5.4
10	X	12138	close	OK	unknown depth sam	N	Bottom	0.8	1.2	0.2	1		1		0*	0.2	1													5.4
9	X	12130	open	-		C	3500												0.7	0.7		0.2	0.2	0.35	0.35					2.5
8	BD0035	12088	close	?		C	4000												0.7	0.7		0.2	0.2	0.35	0.35					2.5
7	BD0034	12110	close	OK		C	4500	0.8	1.2	0.2	1		1			0.2			0.7	0.7	0.5	0.2	0.2	0.35	0.35					7.4
6	BD0033	12101	close	?		C	5000												0.7	0.7		0.2	0.2	0.35	0.35					2.5
5	BD0032	12107	close	?		C	5500												0.7	0.7		0.2	0.2	0.35	0.35					2.5
4	BD0031	12093	close	?		C	6000												0.7	0.7		0.2	0.2	0.35	0.35					2.5
3	BD0030	12108	close	?		C	6500												0.7	0.7		0.2	0.2	0.35	0.35					2.5
2	BD0029	12116	close	OK	sampled at Bottom	C	7000	0.8	1.2	0.2	1		1		1	0.2	1		0.7	0.7		0.2	0.2	0.35	0.35					8.9
1	BD0028	12112	close	?		C	Bottom												0.7	0.7	0.5	0.2	0.2	0.35	0.35					3

remark
*Samples for Nutrients were taken from the bottles for Salinity.
**2 DO bottles were taken from each Niskin bottle.

BD-4 Cast-2

CMS	GT-ID	BottleIDNo.	open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO**	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	Chl-a	Ba	PFASs	Fe(II)	Trace Metal	Archive	Trace Metals	Dissolved Fe	Cr	BTM. filt	BTM. unfilt	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Bottole Incubation	Bottole Incubation	Total
		Bottle Status						Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	Univ. Toyama	Tokai	AIST	AORI	AORI	AORI	Univ. Toyama	Hokkaido Univ ILTS	Kochi Pref Univ	Kyoto	Kyoto	Nagasaki Univ.	Nagasaki Univ.	Nagasaki Univ.	Nagasaki Univ.	
													Ooki	Ooki	Roy Andreas	Kato	Yamashita	Obata	Obata	Obata	Roy Andreas	Nishioka	Isshiki	Konagaya	Konagaya	Naoe (Takeda)	Naoe (Takeda)	Mukae (Takeda)	Mukae (Takeda)	
																		Filt	Filt	Filt		Filt	Unfilt	Filt	Unfilt	Filt	Filt	Unfilt	Unfilt	
24	BD0073	12126	close	little	Upper lid no	N	300									0.2	1													1.2
23	BD0072	12139	close	OK		N	400	0.8	1.2	0.2	1		1	1	0.6	0.2														6
22	BD0071	12131	close	OK		N	600	0.8	1.2	0.2	1					0.2	1													4.4
21	BD0070	12136	close	OK		N	800	0.8	1.2	0.2	1					0.2														3.4
20	BD0069	12117	close	OK		N	1000	0.8	1.2	0.2	1		1	1		0.2	1													6.4
19	BD0068	12113	close	OK		N	1250	0.8	1.2	0.2	1					0.2														3.4
18	BD0067	12099	close	OK		N	1500	0.8	1.2	0.2	1		1			0.2														4.4
17	BD0066	12079	close	OK		N	1750									0.2														0.2
16	BD0065	12137	close	OK		N	2000	0.8	1.2	0.2	1		1			0.2	1													5.4
15	BD0064	12135	close	OK		N	2250									0.2														0.2
14	BD0063	12077	close	OK		N	2500	0.8	1.2	0.2	1		1			0.2														4.4
13	BD0062	12115	close	OK		N	2750									0.2														0.2
12	BD0061	12124	close	OK		N	3000	0.8	1.2	0.2	1		1			0.2	1													5.4
11	BD0060	12089	close	OK		N	3250									0.2														0.2
10	BD0059	12132	close	OK		C	400											0.3	0.7	0.7	0.5	0.2	0.2	0.35	0.35					3.3
9	BD0058	12130	open	–		C	600											0.3	0.7	0.7		0.2	0.2	0.35	0.35					2.8
8	BD0057	12088	close	OK		C	O2 min*	0.8	1.2	0.2	1	0.6			1.6	0.2***		~~0.3~~	0.7	0.7	0.5	0.2	0.2	0.35	0.35					8.7
7	BD0056	12110	close	?		C	800											0.3	0.7	0.7		0.2	0.2	0.35	0.35					2.8
6	BD0055	12101	close	OK		C	1000											0.3	0.7	0.7		0.2	0.2	0.35	0.35					2.8
5	BD0054	12107	close	?		C	1250												0.7	0.7		0.2	0.2	0.35	0.35					2.5
4	BD0053	12093	close	OK		C	1500												0.7	0.7		0.2	0.2	0.35	0.35					2.5
3	BD0052	12108	close	OK		C	2000												0.7	0.7		0.2	0.2	0.35	0.35					2.5
2	BD0051	12116	close	?		C	2500												0.7	0.7		0.2	0.2	0.35	0.35					2.5
1	BD0050	12112	close	OK		C	3000												0.7	0.7		0.2	0.2	0.35	0.35					2.5

remark *O2 min depth=830 m (db)
**2 DO bottles were taken from each Niskin bottle.
***
Sample was taken in a bubble.

BD-4 Cast-3

CMS	GT-ID	BottleIDNo. (Bottle Status)	open/close (Bottle Status)	leakage (Bottle Status)	remark (Bottle Status)	N/C	Pressure (db)	Normal Routine Salinity	Normal Routine DO**	Normal Routine Nutrients	Normal Routine pH/Alkalinity	Normal Routine Chl.a	Normal AORI Ooki Helium	Normal AORI Ooki Tritium	Normal Univ. Toyama Roy Andreas Chl-a	Normal Tokai Kato Ba	Normal AIST Yamashita PFASs	Clean AORI Obata Fe(II)	Clean AORI Obata Trace Metal	Clean AORI Obata Archive	Clean Univ. Toyama Roy Andreas Trace Metals	Clean Hokkaido Univ ILTS Nishioka Dissolved Fe	Clean Kochi Pref Univ Isshiki Cr	Clean Kyoto Konagaya BTM. filt	Clean Kyoto Konagaya BTM. unfilt	Clean Nagasaki Univ. Naoe (Takeda) Fe-speciation (Filtered)	Clean Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filtered)	Clean Nagasaki Univ. Mukae (Takeda) Bottole Incubation	Clean Nagasaki Univ. Mukae (Takeda) Bottole Incubation	Total
																		Filt	Filt	Filt		Filt	Unfilt	Filt	Unfilt	Filt	Filt	Unfilt	Unfilt	
25	BD0088	–	–	–	****	–	bucket	0.8	1.2	0.2	1	0.6					1													4.8
24	BD0087	12126	close	OK		N	10	0.8	1.2	0.2	1	0.6			0.6	0.2	1													5.6
23	BD0086	12139	close	OK		N	25	0.8	1.2	0.2	1	0.6				0.2														4
22	BD0085	12131	close	OK		N	50	0.8	1.2	0.2	1	0.6			0.6	0.2	1													5.6
21	BD0084	12136	close	OK		N	100	0.8	1.2	0.2	1	0.6				0.2	1													5
20	BD0083	12117	close	OK		N	150	0.8	1.2	0.2	1	0.6				0.2														4
19	BD0082	12113	close	OK		N	200	0.8	1.2	0.2	1	0.6				0.2	1													5
18	BD0081	12099	close	OK		N	Chla max***	0.8	1.2	0.2	1	0.6			1.6	0.2	1													6.6
17	BD0080	92001*	close	?		C	10											0.3	0.7	0.7	~~0.5~~	0.2	0.2	0.35	0.35					3.3
16	X	12123	close		All samplin	C	10																					~~12~~		12
15	X	12120	close		All samplin	C	10																					~~12~~		12
14	X	12092	close		All samplin	C	10																					~~12~~		12
13	X	12081	close		All samplin	C	10																					~~12~~		12
12	X	12102	close		All samplin	C	10																						~~12~~	12
11	X	12125	close		All samplin	C	10																						~~12~~	12
10	X	12132	close		All samplin	C	10																						~~12~~	12
9	X	12130	close		All samplin	C	10																						~~12~~	12
8	X	12088	close		All samplin	C	10																						~~12~~	12
7	X	12110	close		No sample	C	10																							0
6	BD0079	12101	close	?		C	25											0.3	0.7	0.7	0.5	0.2	0.2	0.35	0.35					3.3
5	BD0078	12107	close	OK		C	50											0.3	0.7	0.7		0.2	0.2	0.35	0.35					2.8
4	BD0077	12093	close	OK		C	100											0.3	0.7	0.7		0.2	0.2	0.35	0.35					2.8
3	BD0076	12108	close	?		C	150											0.3	0.7	0.7		0.2	0.2	0.35	0.35					2.8
2	BD0075	12116	close	?		C	200											0.3	0.7	0.7		0.2	0.2	0.35	0.35					2.8
1	BD0074	12112	close	?		C	Chla max***											0.3	0.7	0.7	0.5	0.2	0.2	0.35	0.35					3.3

remark * Bottle serial number tentatively assigned.

**2 DO bottles were taken from each Niskin bottle.

*** Chl-a max depth=41 m (db)

**** 正体不明の粒子状浮遊物の中に突っ込んだため，採水を中断。CTD揚収直前にNut,Chl-a,PFASを採水した。

BD-5 Cast-1

CMS	GT-ID	BottleIDNo.	Bottle Status open/close	Bottle Status leakage	remark	N/C	Pressure (db)	Normal Routine Salinity	Normal Routine DO	Normal Routine Nutrients	Normal Routine pH/Alkalinity*	Normal Routine Chl.a	Normal AORI Ooki Helium	Normal AORI Ooki Tritium	Normal Univ. Toyama Roy Andreas Chl-a	Normal Tokai Kato Ba	Normal AIST Yamashita PFASs	Clean AORI Obata Fe(II)	Clean AORI Obata Trace Metal	Clean AORI Obata Archive	Clean Univ. Toyama Roy Andreas Trace Metals	Clean Hokkaido Univ ILTS Nishioka Dissolved Fe	Hokkaido Univ ILTS Nishioka CDOM	Clean Kochi Pref Univ Isshiki Cr	Clean Kyoto Konagaya BTM. filt	Clean Kyoto Konagaya BTM. unfilt	Clean Nagasaki Univ. Naoe (Takeda) Fe-speciation (Filtered)	Clean Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filtered)	Clean ETH Wetzel (Gamo) Si isotope	Total
																		Filt	Filt	Filt		Filt	Unfilt	Unfilt	Filt	Unfilt	Filt	Filt	Filt	
24	BD0112	12126	close	OK		N	1750									0.2														0.2
23	BD0111	12139	close	OK		N	2000	0.8	1.2	0.2	1		1			0.2	1													5.4
22	BD0110	12131	close	OK		N	2250									0.2														0.2
21	BD0109	12136	close	OK		N	2500	0.8	1.2	0.2	1		1			0.2														4.4
20	BD0108	12117	close	OK		N	2750									0.2														0.2
19	BD0107	12113	close	OK		N	3000	0.8	1.2	0.2	1		1			0.2	1													5.4
18	BD0106	12099	close	OK		N	3250									0.2														0.2
17	BD0105	12079	close	OK		N	3500	0.8	1.2	0.2	1		1			0.2														4.4
16	BD0104	12137	close	OK		N	3750									0.2														0.2
15	BD0103	12135	close	OK		N	4000	0.8	1.2	0.2	1		1			0.2	1													5.4
14	BD0102	12077	close	OK		N	4250									0.2														0.2
13	BD0101	12115	close	OK		N	4500	0.8	1.2	0.2	1		1			0.2														4.4
12	BD0100	12124	close	OK		N	4750									0.2														0.2
11	BD0099	12089	close	OK		N	5000	0.8	1.2	0.2	1		1			0.2	1													5.4
10	BD0098	12138	close	OK		N	Bottom	0.8	1.2	0.2	1		1			0.2	1													5.4
9	BD0097	12130	close	?		C	1500	0.8	1.2	0.2	1		1			0.2**			0.7	0.7		0.2	0.2						0.2	6.2
8	BD0096	12088	close	OK		C	2000												0.7	0.7		0.2	0.2						0.2	2
7	BD0095	12110	close	OK		C	2500												0.7	0.7		0.2							0.2	1.8
6	BD0094	12101	close	OK		C	3000												0.7	0.7		0.2	0.2						0.2	2
5	BD0093	12107	close	OK		C	3500												0.7	0.7		0.2								1.6
4	BD0092	12093	close	OK		C	4000												0.7	0.7		0.2							0.2	1.8
3	BD0091	12108	close	OK		C	4500												0.7	0.7	0.5	0.2								2.1
2	BD0090	12116	close	OK		C	5000												0.7	0.7		0.2							0.2	1.8
1	BD0089	12112	close	OK		C	Bottom												0.7	0.7	0.5	0.2							0.2	2.3

BD-5 Cast-2

								Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Clean	Clean	Clean	Clean	Clean		Clean	Clean	Clean	Clean	Clean	Clean	
								Routine	Routine	Routine	Routine	Routine	AORI Ooki	AORI Ooki	Univ. Toyama Roy Andreas	Tokai Kato	AIST Yamashita	AORI Obata	AORI Obata	AORI Obata	Univ. Toyama Roy Andreas	Hokkaido Univ ILTS Nishioka	Hokkaido Univ ILTS Nishioka	Kochi Pref Univ Isshiki	Kyoto Konagaya	Kyoto Konagaya	Nagasaki Univ. Naoe (Takeda)	Nagasaki Univ. Naoe (Takeda)	ETH Wetzel (Gamo)	
CMS	GT-ID	Bottle Status BottleID No.	open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity*	Chl.a	Helium	Tritium	Chl-a	Ba	PFASs	Fe(II)	Trace Metal	Archive	Trace Metals	Dissolved Fe	CDOM	Cr	BTM. filt	BTM. unfilt	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Si isotope	Total
																		Filt	Filt	Filt		Filt	Unfilt	Unfilt	Filt	Unfilt	Filt	Filt	Filt	
25	BD0137	–	–	–		–	bucket	0.8	1.2	0.2	1	0.6					1													4.8
24	BD0136	12126	close	X		N	10	0.8	1.2	0.2	1	0.6			0.6	0.2	1													5.6
23	BD0135	12139	close	OK		N	25	0.8	1.2	0.2	1	0.6				0.2														4
22	BD0134	12131	close	OK		N	50	0.8	1.2	0.2	1	0.6			0.6	0.2	1													5.6
21	BD0133	12136	close	OK		N	100	0.8	1.2	0.2	1	0.6				0.2	1													5
20	BD0132	12117	close	OK		N	Chla max	0.8	1.2	0.2	1	0.6			1.6	0.2	1													6.6
19	BD0131	12113	close	OK		N	200	0.8	1.2	0.2	1	0.6				0.2	1													5
18	BD0130	12099	close	OK		N	300									0.2	1													1.2
17	BD0129	12079	close	OK		N	400	0.8	1.2	0.2	1		1	1	0.6	0.2														6
16	BD0128	12137	close	OK		N	600	0.8	1.2	0.2	1					0.2	1													4.4
15	BD0127	12135	close	OK		N	1000	0.8	1.2	0.2	1		1	1		0.2	1													6.4
14	BD0126	12077	close	OK		N	02 min	0.8	1.2	0.2	1	0.6			1.6	0.2														5.6
13	BD0125	12081	close	OK		C	10											0.3	0.7	0.7	0.5	0.2							0.2	2.6
12	BD0124	12102	close	OK		C	25											0.3	0.7	0.7		0.2								1.9
11	BD0123	12125	close	OK		C	50											0.3	0.7	0.7		0.2	0.2							2.1
10	BD0122	12132	close	OK		C	100											0.3	0.7	0.7		0.2	0.2						0.2	2.3
9	BD0121	12130	close	OK		C	Chla max											0.3	0.7	0.7	0.5	0.2								2.4
8	BD0120	12088	close	OK		C	150	0.8	1.2	0.2	1	0.6				0.2**		~~0.3~~	0.7	0.7		0.2							0.2	5.9
7	BD0119	12110	close	OK		C	200											0.3	0.7	0.7		0.2							0.2	2.1
6	BD0118	12101	close	OK		C	400											0.3	0.7	0.7	0.5	0.2	0.2						0.2	2.8
5	BD0117	12107	close	OK		C	600											0.3	0.7	0.7		0.2							0.2	2.1
4	BD0116	12093	close	OK		C	800	0.8	1.2	0.2	1					0.2**		~~0.3~~	0.7	0.7		0.2								5.1
3	BD0115	12108	close	OK		C	1000											0.3	0.7	0.7		0.2	0.2						0.2	2.3
2	BD0114	12116	close	OK		C	1250	0.8	1.2	0.2	1					0.2**		~~0.3~~	0.7	0.7		0.2								5.1
1	BD0113	12112	close	OK		C	O2 min											0.3	0.7	0.7	0.5	0.2								2.4

BD-6 Cast-1

CMS	GT-ID	BottleIDNo.	Bottle Status: open/close	leakage	remark	N/C	Pressure (db)	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Total
								Routine	Routine	Routine	Routine	Routine	Univ. Toyama	Tokai	AIST	AORI	AORI	Univ. Toyama	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Nagasaki Univ.	Nagasaki Univ.	Kochi Pref Univ	Kyoto	Kyoto	
													Roy Andreas	Kato	Yamashita	Obata	Obata	Roy Andreas	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Isshiki	Konagaya	Konagaya	
								Salinity	DO	Nutrients	pH/Alkalinity*	Chl.a	Chl-a	Ba	PFASs	Trace Metal	Archive	Trace Metals	Dissolved Fe	CDOM	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Cr	BTM. filt	BTM. unfilt	
																Filt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Unfilt	Filt	Unfilt	
24	BD0161	12126	close	OK		N	1500	0.8	1.2	0.2	1															3.2
23	BD0160	12139	close	OK		N	1750			0.2				0.2												0.4
22	BD0159	12131	close	OK		N	2000	0.8	1.2	0.2	1				1					0.2						4.4
21	BD0158	12136	close	OK		N	2250			0.2				0.2												0.4
20	BD0157	12117	close	OK		N	2750			0.2				0.2												0.4
19	BD0156	12113	close	OK		N	3000	0.8	1.2	0.2	1				1					0.2						4.4
18	BD0155	12099	close	OK		N	3250			0.2				0.2												0.4
17	BD0154	12079	close	OK		N	3750			0.2				0.2												0.4
16	BD0153	12137	close	OK		N	4000	0.8	1.2	0.2	1				1											4.2
15	BD0152	12135	close	OK		N	4250			0.2				0.2												0.4
14	BD0151	12077	close	OK		N	4500	0.8	1.2	0.2	1															3.2
13	BD0150	12115	close	OK		N	4750			0.2				0.2												0.4
12	BD0149	12124	close	OK		N	5000	0.8	1.2	0.2	1				1											4.2
11	BD0148	12089	close	OK		N	Bottom	0.8	1.2	0.2	1				1											4.2
10	BD0147	12132	close	OK		C	1250	0.8	1.2	0.2	1			0.2**		0.7	0.7		0.2				0.2			5
9	BD0146	12130	close	OK		C	1500							0.2**		0.7	0.7		0.2				0.2			1.8
8	BD0145	12088	close	OK		C	2000							0.2**		0.7	0.7		0.2	0.2			0.2			2
7	BD0144	12110	close	little	Upper lid	C	2500	0.8	1.2	0.2	1			0.2**		0.7	0.7		0.2				0.2			5
6	BD0143	12101	close	OK		C	3000							0.2**		0.7	0.7		0.2	0.2			0.2			2
5	BD0142	12107	close	OK		C	3500	0.8	1.2	0.2	1			0.2**		0.7	0.7		0.2				0.2			5
4	BD0141	12093	close	OK		C	4000							0.2**		0.7	0.7		0.2				0.2			1.8
3	BD0140	12108	close	OK		C	4500							0.2**		0.7	0.7	0.5	0.2				0.2			2.3
2	BD0139	12116	close	OK		C	5000							0.2**		0.7	0.7		0.2				0.2			1.8
1	BD0138	12112	close	OK		C	Bottom							0.2**		0.7	0.7	0.5	0.2				0.2			2.3

remar *Sampling for Alkalinity has been omitted in this cast.

**Sample was taken in a bubble.

BD-6 Cast-2

								Normal	Normal	Normal	Normal	Normal	Normal	Normal	Normal	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	
		Bottle Status						Routine	Routine	Routine	Routine	Routine	Univ. Toyama	Tokai	AIST	AORI	AORI	AORI	Univ. Toyama	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Nagasaki Univ.	Nagasaki Univ.	Kochi Pref Univ	Kyoto	Kyoto	
													Roy Andreas	Kato	Yamashita	Obata	Obata	Obata	Roy Andreas	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Isshiki	Konagaya	Konagaya	
CMS	GT-ID	BottleID No.	open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Chl-a	Ba	PFASs	Fe(II)	Trace Metal	Archive	Trace Metals	Dissolved Fe	CDOM	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Cr	BTM. filt	BTM. unfilt	Total
																Filt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Unfilt	Filt	Unfilt	
25	BD0184	bucket	close	OK		–	0	0.8	1.2	0.2	1	0.6			1												4.8
24	BD0183	12126	close	OK		N	10	0.8	1.2	0.2	1	0.6	0.6	0.2	1												5.6
23	BD0182	12139	close	OK		N	25	0.8	1.2	0.2	1	0.6		0.2													4
22	BD0181	12131	close	OK		N	50	0.8	1.2	0.2	1	0.6	0.6	0.2	1												5.6
21	BD0180	12136	close	OK		N	100	0.8	1.2	0.2	1	0.6		0.2	1												5
20	BD0179	12117	close	OK		N	Chla max	0.8	1.2	0.2	1	0.6	1.6	0.2	1												6.6
19	X	12113	open		Trigger	N	150	0.8	1.2	0.2	1	0.6		0.2													4
18	BD0178	12099	close	OK		N	200	0.8	1.2	0.2	1	0.6		0.2	1												5
17	BD0177	12079	close	OK		N	300							0.2	1												1.2
16	BD0176	12137	close	OK		N	400	0.8	1.2	0.2	1		0.6	0.2													4
15	BD0175	12135	close	OK		N	600	0.8	1.2	0.2	1			0.2	1												4.4
14	BD0174	12077	close	OK		N	O2 min	0.8	1.2	0.2	1	0.6	1.6	0.2													5.6
13	BD0173	12115	close	OK		N	1000	0.8	1.2	0.2	1			0.2	1												4.4
12	BD0172	12102	close	OK		C	10									0.3	0.7	0.7	0.5	0.2				0.2			2.6
11	BD0171	12125	close	OK		C	25									0.3	0.7	0.7		0.2				0.2			2.1
10	BD0170	12132	close	OK		C	50									0.3	0.7	0.7		0.2	0.2			0.2			2.3
9	BD0169	12130	close	OK		C	100									0.3	0.7	0.7		0.2	0.2			0.2			2.3
8	BD0168	12088	close	OK		C	Chla max									0.3	0.7	0.7	0.5	0.2				0.2			2.6
7	X	12110	open		Trigger	C	150									0.3	0.7	0.7		0.2				0.2			2.1
6	BD0167	12101	close	OK		C	200									0.3	0.7	0.7		0.2				0.2			2.1
5	BD0166	12107	close	OK		C	400									0.3	0.7	0.7	0.5	0.2	0.2			0.2			2.8
4	BD0165	12093	close	OK		C	600									0.3	0.7	0.7		0.2				0.2			2.1
3	BD0164	12108	close	OK		C	800	0.8	1.2	0.2	1			0.2**		0.3	0.7	0.7		0.2				0.2			5.3
2	BD0163	12116	close	OK		C	O2 min									0.3	0.7	0.7	0.5	0.2	0.2			0.2			2.8
1	BD0162	12112	close	OK		C	1000									0.3	0.7	0.7		0.2	0.2			0.2			2.3

remar *Sampling for Alkalinity has been omitted in this cast.

**Sample was taken in a bubble.

BD-7 Cast-1

CMS	GT-ID	BottleID No.	Bottle Status open/close	Bottle Status leakage	Bottle Status remark	N/C	Pressure (db)	Routine Salinity	Routine DO	Routine Nutrients	Routine pH/Alkalinity	Routine Chl.a	AORI Ooki Helium	AORI Ooki Tritium	Univ. Toyama Roy Andreas Chl-a	Tokai Kato Ba	AIST Yamashita PFASs	JAEA Otosaka (Obata) Iodine-129	NIES Omori DO(Δ17O)	JAMSTEC Kumamoto (Gamo) C-13	AORI Nakayama N-15	AORI Takahashi Fe(II) Filt	AORI Obata Trace Metal Filt	AORI Obata Archive Filt	AORI Kim Speciation Filt	AORI Suzuki Pt&REE Filt	U. Vic Cullen (Obata) Canada GEOTRACES Filt	Univ. Toyama Roy Andreas Trace Metals Unfilt	Hokkaido Univ ILTS Nishioka Dissolved Fe Filt	Hokkaido Univ ILTS Nishioka Total dissolvable Fe Unfilt	Hokkaido Univ ILTS Nishioka CDOM Unfilt	Nagasaki Univ. Naoe (Takeda) Fe-speciation (Filtered) Filt	Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filtered) Filt	Kochi Pref Univ Isshiki Cr Unfilt	Kyoto Konagaya BTM. filt Filt	Kyoto Konagaya BTM. unfilt Unfilt	Kyoto Takano Mo (3側点のみ).filt Filt	Kyoto Takano Cu. Filt Filt	Kyoto Takano Pb.filt Filt	Intercalibration Takano Pb.filt Filt	Kyoto Takano Bi.filt Filt	Kyoto Takano Zr, Hf, Nb, Ta, filt Filt	Kyoto Takano Zr, Hf, Nb, Ta, unfilt Unfilt	Kinki Takeda Se Filt	ETH Wetzel (Gamo) Si isotope Filt	Intercalibration Trace metals Filt	Total
24	BD0208	12126	close	OK		N	3250			0.2						0.2																															0.4
23	BD0207	12139	close	OK		N	3500	0.8	1.2	0.2	1					0.2																															3.4
22	BD0206	12131	close	OK		N	3750			0.2						0.2																															0.4
21	BD0205	12136	close	OK		N	4000	0.8	1.2	0.2	1		1			0.2	1			1.5	~~0.3~~																										7.2
20	BD0204	12117	close	OK		N	4250			0.2						0.2																															0.4
19	BD0203	12113	close	OK		N	4500	0.8	1.2	0.2	1					0.2																															3.4
18	BD0202	12099	close	OK		N	4750			0.2						0.2																															0.4
17	BD0201	12079	close	OK		N	5000	0.8	1.2	0.2	1		1			0.2	1			1.5	~~0.3~~																										7.2
16	BD0200	12137	close	OK		N	Bottom	0.8	1.2	0.2	1					0.2	1			1.5	~~0.3~~																										6.2
15	BD0199	12120	close	little		C	3500																0.7	0.7	0.7	3.5	0.7		0.2	0.2																	6.7
14	BD0198	12092	close	OK		C	3500																											0.6	0.35	0.35	0.35	2.2			0.35	0.35	0.35			0.7	5.6
13	BD0197	12081	close	OK		C	3500																																2.2	2.2							4.4
12	BD0196	12102	close	OK		C	4000														0.3		0.7	0.7	0.7	3.5	0.7		0.2	0.2																	7
11	BD0195	12125	close	?		C	4000																											0.6	0.35	0.35	0.35	2.2			0.35	0.35	0.35	0.5	0.2	0.7	6.3
10	BD0194	12132	close	OK		C	4000																																2.2	2.2							4.4
9	BD0193	12130	close	OK		C	4500																0.7	0.7	0.7	3.5	0.7	0.5	0.2	0.2																	7.2
8	BD0192	12088	close	OK		C	4500																											0.6	0.35	0.35	0.35	2.2			0.35	0.35	0.35			0.7	5.6
7	BD0191	12110	close	OK		C	4500																																2.2	2.2							4.4
6	BD0190	12101	close	OK		C	5000														0.3		0.7	0.7	0.7	3.5	0.7		0.2	0.2																	7
5	BD0189	12107	close	OK		C	5000																											0.6	0.35	0.35	0.35	2.2			0.35	0.35	0.35	0.5	0.2	0.7	6.3
4	BD0188	12093	close	OK		C	5000																																2.2	2.2							4.4
3	BD0187	12108	close	OK		C	Bottom														0.3		0.7	0.7	0.7	3.5	0.7	0.5	0.2	0.2		0.6	0.2														8.3
2	BD0186	12116	close	OK		C	Bottom																											0.6	0.35	0.35	0.35	2.2			0.35	0.35	0.35	0.5	0.2	0.7	6.3
1	BD0185	12112	close	OK		C	Bottom																																2.2	2.2							4.4

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BD-7 Cast-2

	GT-ID	BottleID No.	Bottle Status open/close	Bottle Status leakage	Bottle Status remark	N/C	Pressure (db)	Routine Salinity	Routine DO	Routine Nutrients	Routine pH/Alkalinity	Routine Chl.a	AORI Ooki Helium	AORI Ooki Tritium	Univ. Toyama Roy Andreas Chl-a	Tokai Kato Ba	AIST Yamashita PFASs	JAEA Otosaka (Obata) Iodine-129	NIES Omori DO(Δ17O)	JAMSTEC Kumamoto (Gamo) C-13	AORI Nakayama N-15	AORI Takahashi Fe(II) Filt	AORI Obata Trace Metal Filt	AORI Obata Archive Filt	AORI Kim Speciation Filt	AORI Suzuki Pt&REE Filt	U. Vic Cullen (Obata) Canada GEOTRACES Filt	Univ. Toyama Roy Andreas Trace Metals Unfilt	Hokkaido Univ ILTS Nishioka Dissolved Fe Filt	Hokkaido Univ ILTS Nishioka Total dissolvable Fe Unfilt	Hokkaido Univ ILTS Nishioka CDOM Unfilt	Nagasaki Univ. Naoe (Takeda) Fe-speciation (Filtered) Filt	Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filtered) Filt	Kochi Pref Univ Isshiki Cr Unfilt	Kyoto Konagaya BTM. filt Filt	Kyoto Konagaya BTM. unfilt Unfilt	Kyoto Takano Mo (3側点のみ).filt Filt	Kyoto Takano Cu. Filt Filt	Kyoto Takano Pb.filt Filt	Intercalibration Takano Pb.filt Filt	Kyoto Takano Bi.filt Filt	Kyoto Takano Zr, Hf, Nb, Ta, filt Filt	Kyoto Takano Zr, Hf, Nb, Ta, unfilt Unfilt	Kinki Takeda Se Filt	ETH Wetzel (Gamo) Si isotope Filt	Intercalibration Trace metals Filt	Total
24	BD0230	12126	close	OK		N	1250	0.8	1.2	0.2	1					0.2																															3.4
23	BD0229	12139	close	OK		N	1500	0.8	1.2	0.2	1					0.2		1.5		1.5	~~0.3~~																										6.7
22	BD0228	12131	close	OK		N	1750			0.2						0.2																															0.4
21	BD0227	12136	close	OK		N	2000	0.8	1.2	0.2	1		1			0.2	1			1.5	~~0.3~~																										7.2
20	BD0226	12117	close	OK		N	2250			0.2						0.2																															0.4
19	BD0225	12113	close	OK		N	2500	0.8	1.2	0.2	1					0.2																															3.4
18	BD0224	12099	close	OK		N	2750			0.2						0.2																															0.4
17	BD0223	12079	close	OK		N	3000	0.8	1.2	0.2	1		1			0.2	1			1.5	~~0.3~~																										7.2
16	BD0222	12123	close	OK		C	1250																0.7	0.7	0.7		0.7		0.2	0.2				0.6	0.35	0.35	0.35				0.35	0.35	0.35	0.5			6.4
15	BD0221	12120	close	OK		C	1250																															2.2	2.2							0.7	5.1
14	BD0220	12092	close	?		C	1500														0.3		0.7	0.7	0.7	3.5	0.7		0.2	0.2																	7
13	BD0219	12081	close	?		C	1500																											0.6	0.35	0.35	0.35	2.2			0.35	0.35	0.35	0.5	0.2	0.7	6.3
12	BD0218	12102	close	OK		C	1500																																2.2	2.2							4.4
11	BD0217	12125	close	OK		C	2000														0.3		0.7	0.7	0.7	3.5	0.7		0.2	0.2	0.2																7.2
10	BD0216	12132	close	OK		C	2000																											0.6	0.35	0.35	0.35	2.2			0.35	0.35	0.35	0.5	0.2	0.7	6.3
9	BD0215	12130	close	OK		C	2000																																2.2	2.2							4.4
8	X	12088	close	–		C	2000																																								0
7	BD0214	12110	close	OK		C	2500																0.7	0.7	0.7	3.5	0.7		0.2	0.2																	6.7
6	BD0213	12101	close	OK		C	2500																											0.6	0.35	0.35	0.35	2.2			0.35	0.35	0.35		0.2	0.7	5.8
5	BD0212	12107	close	OK		C	2500																																2.2	2.2							4.4
4	BD0211	12093	close	OK		C	3000														0.3		0.7	0.7	0.7	3.5	0.7		0.2	0.2	0.2	0.6	0.2														8
3	BD0210	12108	close	OK		C	3000																											0.6	0.35	0.35	0.35	2.2			0.35	0.35	0.35	0.5	0.2	0.7	6.3
2	BD0209	12116	close	OK		C	3000																																2.2	2.2							4.4
1	X	12112	close	–		C	3000																																								0

BD-7 Cast-3

CMS	GT-ID	BottleID No.	open/close	leakage	remark	N/C	Pressure (db)	Routine Salinity	Routine DO	Routine Nutrients	Routine pH/Alkalinity	Routine Chl.a	AORI Ooki Helium	AORI Ooki Tritium	Univ. Toyama Roy Andreas Chl-a	Tokai Kato Ba	AIST Yamashita PFASs	JAEA Otosaka (Obata) Iodine-129	NIES Omori DO(Δ17O)	JAMSTEC Kumamoto (Gamo) C-13	AORI Nakayama N-15	AORI Takahashi Fe(II)	AORI Obata Trace Metal	AORI Obata Archive	AORI Kim Speciation	AORI Suzuki Pt&REE	U. Vic Cullen (Obata) Canada GEOTRACES	Univ. Toyama Roy Andreas Trace Metals	Hokkaido Univ ILTS Nishioka Dissolved Fe	Hokkaido Univ ILTS Nishioka Total dissolvable Fe	Hokkaido Univ ILTS Nishioka CDOM	Nagasaki Univ. Naoe (Takeda) Fe-speciation (Filtered)	Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filtered)	Kochi Pref Univ Isshiki Cr	Kyoto Konagaya BTM. filt	Kyoto Konagaya BTM. unfilt	Kyoto Takano Mo (3側点のみ).filt	Kyoto Takano Cu. Filt	Kyoto Takano Pb.filt	Intercalibration Takano Pb.filt	Kyoto Takano Bi.filt	Kyoto Takano Zr, Hf, Nb, Ta, filt	Kyoto Takano Zr, Hf, Nb, Ta, unfilt	Kinki Takeda Se	ETH Wetzel (Gamo) Si isotope	Intercalibration Trace metals	Total
																						Filt	Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Unfilt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Filt	Filt	
24	BD0254	12126	close	OK		N	200	0.8	1.2	0.2	1	0.6				0.2	1	1.5		1.5	~~0.3~~																										8.3
23	BD0253	12139	close	OK		N	300			0.2						0.2	1																																1.4
22	BD0252	12131	close	OK		N	400	0.8	1.2	0.2	1		1	1	0.6	0.2		1.5		1.5	~~0.3~~																										9.3
21	BD0251	12136	close	OK		N	600	0.8	1.2	0.2	1					0.2	1	1.5		1.5	~~0.3~~																										7.7
20	BD0250	12117	close	OK		N	800	0.8	1.2	0.2	1					0.2		1.5																															4.9
19	BD0249	12113	close	OK		N	1000	0.8	1.2	0.2	1		1	1		0.2	1	1.5		1.5	~~0.3~~																										9.7
18	BD0248	12099	close	OK		N	O2 min	0.8	1.2	0.2	1	0.6			1.6	0.2																															5.6
17	BD0247	12133	close	OK		C	200														0.3	0.3	0.7	0.7	0.7	3.5	0.7		0.2	0.2		0.6	0.2														8.1
16	BD0246	12123	close	OK		C	200																											0.6	0.35	0.35	0.35	2.2			0.35	0.35	0.35	0.5	0.2	0.7	6.3
15	BD0245	12120	close	OK		C	200																																2.2	2.2							4.4
14	BD0244	12092	close	OK		C	400														0.3	0.3	0.7	0.7	0.7	3.5	0.7	0.5	0.2	0.2	0.2	0.6	0.2														8.8
13	BD0243	12081	close	OK		C	400																											0.6	0.35	0.35	0.35	2.2			0.35	0.35	0.35	0.5	0.2	0.7	6.3
12	BD0242	12102	close	OK		C	400																																2.2	2.2							4.4
11	BD0241	12125	close	OK		C	600														0.3	0.3	0.7	0.7	0.7	3.5	0.7		0.2	0.2																	7.3
10	BD0240	12132	close	OK		C	600																											0.6	0.35	0.35	0.35	2.2			0.35	0.35	0.35	0.5	0.2	0.7	6.3
9	BD0239	12130	close	OK		C	600																																2.2	2.2							4.4
8	BD0238	12088	close	OK		C	800															0.3	0.7	0.7	0.7	3.5	0.7		0.2	0.2																	7
7	BD0237	12110	close	OK		C	800																											0.6	0.35	0.35	0.35	2.2			0.35	0.35	0.35	0.5		0.7	6.1
6	BD0236	12101	close	OK		C	800																																2.2	2.2							4.4
5	BD0235	12107	close	OK		C	1000														0.3	0.3	0.7	0.7	0.7	3.5	0.7		0.2	0.2	0.2																7.5
4	BD0234	12093	close	OK		C	1000																									0.6	0.2	0.6	0.35	0.35	0.35	2.2			0.35	0.35	0.35	0.5	0.2	0.7	7.1
3	BD0233	12108	close	OK		C	1000																																2.2	2.2							4.4
2	BD0232	12116	close	OK		C	O2 min															0.3	0.7	0.7	0.7			0.5	0.2	0.2	0.2			0.6	0.35	0.35	0.35	2.2			0.35	0.35	0.35	0.5			8.9
1	BD0231	12112	close	OK		C	O2 min																																2.2	2.2							4.4

remark *Samples were taken from Clean Niskin Bottles.

BD-7 Cast-4

	GT-ID	BottleID No.	open/close	leakage	remark	N/C	Pressure (db)	Routine Salinity	Routine DO	Routine Nutrients	Routine pH/Alkalinity	Routine Chl.a	AORI Ooki Helium	AORI Ooki Tritium	Univ. Toyama Roy Andreas Chl-a	Tokai Kato Ba	AIST Yamashita PFASs	JAEA Otosaka (Obata) Iodine-129	NIES Omori DO(Δ17O)	JAMSTEC Kumamoto (Gamo) C-13	AORI Nakayama N-15	AORI Takahashi Fe(II)	AORI Obata Trace Metal	AORI Obata Archive	AORI Kim Speciation	AORI Suzuki Pt&REE	U. Vic Cullen (Obata) Canada GEOTRACES	Univ. Toyama Roy Andreas Trace Metals	Hokkaido Univ ILTS Nishioka Dissolved Fe	Hokkaido Univ ILTS Nishioka Total dissolvable Fe	Hokkaido Univ ILTS Nishioka CDOM	Nagasaki Univ. Naoe (Takeda) Fe-speciation (Filtered)	Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filtered)	Kochi Pref Univ Isshiki Cr	Kyoto Konagaya BTM. filt	Kyoto Konagaya BTM. unfilt	Kyoto Takano Mo (3側点のみ).filt	Kyoto Takano Cu. Filt	Kyoto Takano Pb.filt	Intercalibration Takano Pb.filt	Kyoto Takano Bi.filt	Kyoto Takano Zr, Hf, Nb, Ta, filt	Kyoto Takano Zr, Hf, Nb, Ta, unfilt	Kinki Takeda Se	ETH Wetzel (Gamo) Si isotope	Intercalibration Trace metals	Total
																						Filt	Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Unfilt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Filt	Filt	
25	BD0279	–	–	–			bucket	0.8	1.2	0.2	1	0.6					1	1.5																										0.5			6.8
24	BD0278	12126	close	L	ほんの少	N	5	0.8	1.2	0.2	1	0.6							1																												4.8
23	BD0277	12139	close	OK		N	10	0.8	1.2	0.2	1	0.6			0.6	0.2	1		1	1.5	~~0.3~~																										8.4
22	BD0276	12131	close	OK		N	25	0.8	1.2	0.2	1	0.6				0.2			1																												5
21	BD0275	12136	close	OK		N	50	0.8	1.2	0.2	1	0.6			0.6	0.2	1	1.5	1																												8.1
20	BD0274	12117	close	OK		N	100	0.8	1.2	0.2	1	0.6				0.2	1	1.5		1.5	~~0.3~~																										8.3
19	BD0273	12113	close	OK		N	Chla max	0.8	1.2	0.2	1	0.6			1.6	0.2	1																														6.6
18	BD0272	12099	close	OK		N	150	0.8	1.2	0.2	1	0.6				0.2		1.5																													5.5
17	BD0271	12133	close	OK		C	10														0.3	0.3	0.7	0.7	0.7	3.5	0.7	0.5	0.2	0.2		0.6	0.2														8.6
16	BD0270	12123	close	OK		C	10																											0.6	0.35	0.35	0.35	2.2			0.35	0.35	0.35	0.5	0.2	0.7	6.3
15	BD0269	12120	close	OK		C	10																																2.2	2.2							4.4
14	BD0268	12092	close	OK		C	25															0.3	0.7	0.7	0.7		0.7		0.2	0.2																	3.5
13	BD0267	12081	close	OK		C	25																											0.6	0.35	0.35	0.35	2.2			0.35	0.35	0.35	0.5		0.7	6.1
12	BD0266	12102	close	OK		C	25																																2.2	2.2							4.4
11	BD0265	12125	close	OK		C	50															0.3	0.7	0.7	0.7	3.5	0.7		0.2	0.2	0.2																7.2
10	BD0264	12132	close	OK		C	50																											0.6	0.35	0.35	0.35	2.2			0.35	0.35	0.35	0.5		0.7	6.1
9	BD0263	12130	close	OK		C	50																																2.2	2.2							4.4
8	BD0262	12088	close	OK		C	100														0.3	0.3	0.7	0.7	0.7	3.5	0.7		0.2	0.2	0.2	0.6	0.2														8.3
7	BD0261	12110	close	OK		C	100																											0.6	0.35	0.35	0.35	2.2			0.35	0.35	0.35	0.5	0.2	0.7	6.3
6	BD0260	12101	close	OK		C	100																																2.2	2.2							4.4
5	BD0259	12107	close	OK		C	Chla max															0.3	0.7	0.7	0.7			0.5	0.2	0.2		0.6	0.2	0.6	0.35	0.35	0.35	2.2			0.35	0.35	0.35	0.5			9.5
4	BD0258	12093	close	OK		C	Chla max																																2.2	2.2							4.4
3	BD0257	12108	close	OK		C	150															0.3	0.7	0.7	0.7		0.7		0.2	0.2																	3.5
2	BD0256	12116	close	OK		C	150																											0.6	0.35	0.35	0.35	2.2			0.35	0.35	0.35	0.5	0.2	0.7	6.3
1	BD0255	12112	close	OK		C	150																																2.2	2.2							4.4

BD-7 Cast-5

CMS	GT-ID	BottleID No.	Bottle Status open/close	leakage	remark	N/C	Pressure (db)	Tokai Univ Minami SS	Tokai Minami SPM	JAEA Okubo (Kim) Th&Pa	Intercalibration Th&Pa	Nagasaki Univ. Mukae (Takeda) Bottole Incubation	Nagasaki Univ. Mukae (Takeda) Bottole Incubation	Total
										Filt	Filt			
24	BD0301	12126	close	OK		N	2500	2						2
23	BD0300	12139	close	OK		N	3000	2						2
22	BD0299	12131	close	OK		N	3500	5						5
21	BD0298	12136	close	OK		N	4000	5						5
20	BD0297	12117	close	OK		N	4500	5						5
19	BD0296	12113	close	OK		N	5000	5						5
18	BD0295	12099	close	OK		N	Bottom	5						5
17	BD0294	12133	close	OK		C	2500			10				10
16	BD0293	12123	close	?		C	3000		10					10
15	BD0292	12120	close	OK		C	3000			10				10
14	BD0291	12092	close	?		C	3000				10			10
13	BD0290	12081	close	OK		C	3500			10				10
12	X	12102	close	?		C	4000							0
11	BD0289	12125	close	?		C	4000		10					10
10	BD0288	12132	close	OK		C	4000			10				10
9	BD0287	12130	close	OK		C	4000				10			10
8	BD0286	12088	close	OK		C	4500			10				10
7	BD0285	12110	close	?		C	5000		10					10
6	BD0284	12101	close	OK		C	5000			10				10
5	BD0283	12107	close	OK		C	5000				10			10
4	X	12093	close	?		C	Bottom							0
3	BD0282	12108	close	?		C	Bottom		10					10
2	BD0281	12116	close	OK		C	Bottom			10				10
1	BD0280	12112	close	OK		C	Bottom				10			10

BD-7 Cast-6

CMS	GT-ID	BottleID No.	Bottle Status open/close	leakage	remark	N/C	Pressure (db)	Tokai Univ Minami SS	Tokai Minami SPM	JAEA Okubo (Kim) Th&Pa	Intercalibration Th&Pa	Nagasaki Univ. Mukae (Takeda) Bottole Incubation	Nagasaki Univ. Mukae (Takeda) Bottole Incubation	Total
										Filt	Filt			
24	BD0325	12126	close	OK		N	200	1						1
23	BD0324	12139	close	OK		N	400	1						1
22	BD0323	12131	close	OK		N	600	1						1
21	BD0322	12136	close	OK		N	800	1						1
20	BD0321	12117	close	OK		N	1000	1						1
19	BD0320	12113	close	OK		N	1250	1						1
18	BD0319	12099	close	OK		N	1500	1						1
17	BD0318	12079	close	OK		N	2000	2						2
16	BD0317	12123	close			C	200		10					10
15	BD0316	12120	close	OK		C	200			10				10
14	BD0315	12092	close	?		C	200				10			10
13	BD0314	12081	close			C	400		10					10
12	BD0313	12102	close	?		C	400			10				10
11	BD0312	12125	close	OK		C	400				10			10
10	BD0311	12132	close			C	600		10					10
9	BD0310	12130	close	OK		C	600			10				10
8	BD0309	12088	close			C	800		10					10
7	BD0308	12110	close			C	1000		10					10
6	BD0307	12101	close	OK		C	1000			10				10
5	BD0306	12107	close	OK		C	1000				10			10
4	BD0305	12093	close	OK		C	1500			10				10
3	BD0304	12108	close			C	2000		10					10
2	BD0303	12116	close	OK		C	2000			10				10
1	BD0302	12112	close	OK		C	2000				10			10

BD-7 Cast-7

	GT-ID	BottleIDNo.	open/close	leakage	remark	N/C	Pressure (db)	Tokai Univ Minami SS	Tokai Minami SPM	JAEA Okubo (Kim) Th&Pa Filt	Intercalibration Th&Pa Filt	Nagasaki Univ. Mukae (Takeda) Bottole Incubation	Nagasaki Univ. Mukae (Takeda) Bottole Incubation	NIES Omori DO(Δ17O)	Total
		Bottle Status													
25	BD0350	–	–	–			bucket	1							1
24	BD0349	12126	close	OK		N	5							1	1
23	BD0348	12139	close	OK		N	10	1						1	2
22	BD0347	12131	close	OK		N	25	1						1	2
21	BD0346	12136	close	OK		N	50	1						1	2
20	BD0345	12117	close	OK		N	100	1						1	2
19	BD0344	12111	close	L	わずかに	C	10		10						10
18	BD0343	12098	close	OK		C	10			10					10
17	BD0342	12133	close	OK		C	10				10				10
16	BD0341	12123	close	OK		C	10					12			12
15	BD0340	12120	close	OK		C	10					12			12
14	BD0339	12092	close	OK		C	10					12			12
13	BD0338	12081	close	OK		C	10					12			12
12	BD0337	12102	close	OK		C	10						12		12
11	BD0336	12125	close	OK		C	10						12		12
10	BD0335	12132	close	OK		C	10						12		12
9	BD0334	12130	close	OK		C	10						12		12
8	BD0333	12088	close	OK		C	10						12		12
7	BD0332	12110	close	OK		C	25		10						10
6	BD0331	12101	close	OK		C	50		10						10
5	BD0330	12107	close	OK		C	50			10					10
4	BD0329	12093	close	OK		C	100		10						10
3	BD0328	12108	close	OK		C	100			10					10
2	BD0327	12116	close	OK		C	100				10				10
1	BD0326	12112	close	OK		C	150	1	10						11

BD-7 Ex-1, 2

	GT-ID	BottleIDNo.	open/close	leakage	remark	N/C	Pressure (db)	Routine DO	NIES Omori DO(Δ17O)	Total
		Bottle Status								
							bucket			0
24	BD0354	12126	close	OK		N	5	1.2	1	2.2
23	X	12139	open		Trigger no	N	5			0
22	BD0353	12131	close	OK		N	10	1.2	1	2.2
21	X	12136	close			N	10			0
20	BD0352	12117	close	OK		N	25	1.2	1	2.2
19	X	12113	close			N	25			0
18	BD0351	12099	close	OK		N	50	1.2	1	2.2
17	X	12079	close			N	50			0
16	X	12123	close			C	25			0
15	X	12120	close			C	25			0
14	X	12092	close			C	25			0
13	X	12081	close			C	25			0
12	X	12102	close			C	25			0
11	X	12125	close			C	25			0
10	X	12132	close			C	25			0
9	X	12130	close			C	50			0
8	X	12088	close			C	50			0
7	X	12110	close			C	50			0
6	X	12101	close			C	50			0
5	X	12107	close			C	50			0
4	X	12093	close			C	50			0
3	X	12108	close			C	50			0
2	X	12116	close			C	50			0
1	X	12112	close			C	50			0

BD-8 Cast-1

	GT-ID	BottleID No.	Bottle Status open/close	leakage	remark	N/C	Pressure (db)	Routine Salinity	Routine DO	Routine Nutrients	Routine pH/Alkalinity	Routine Chl.a	AORI Ooki Helium	AORI Ooki Tritium	Univ. Toyama Roy Andreas Chl-a	Tokai Kato Ba	AIST Yamashita PFASs	AORI Obata Fe(II)	AORI Obata Trace Metal	AORI Obata Archive	Univ. Toyama Roy Andreas Trace Metals	Hokkaido Univ ILTS Nishioka Dissolved Fe	Hokkaido Univ ILTS Nishioka CDOM	Hokkaido Univ ILTS Nishioka Bottole Incubation	Nagasaki Univ. Naoe (Takeda) Fe-speciation (Filtered)	Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filtered)	Kochi Pref Univ Isshiki Cr	Kyoto Konagaya BTM. filt	Kyoto Konagaya BTM. unfilt	Kyoto Takano Pd, Pt, Au(3側点のみ).filt	Total
																		Filt	Filt	Filt	Unfilt	Filt	Unfilt	Unfilt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	
24	BD0375	12126	close	OK		N	2750			0.2						0.2															0.4
23	BD0374	12139	close	OK		N	3000	0.8	1.2	0.2	1					0.2															3.4
22	BD0373	12131	close	OK		N	3250			0.2						0.2															0.4
21	BD0372	12136	close	OK		N	3500	0.8	1.2	0.2	1					0.2															3.4
20	BD0371	12117	close	OK		N	3750			0.2						0.2															0.4
19	BD0370	12113	close	OK		N	4000	0.8	1.2	0.2	1					0.2															3.4
18	BD0369	12099	close	OK		N	4250			0.2						0.2															0.4
17	BD0368	12079	close	OK		N	4500	0.8	1.2	0.2	1					0.2															3.4
16	BD0367	12137	close	OK		N	4750			0.2						0.2															0.4
15	BD0366	12135	close	OK		N	5000	0.8	1.2	0.2	1					0.2															3.4
14	BD0365	12077	close	OK		N	5250			0.2						0.2															0.4
13	BD0364	12115	close	OK		N	5500	0.8	1.2	0.2	1					0.2															3.4
12	BD0363	12124	close	OK		N	Bottom	0.8	1.2	0.2	1					0.2															3.4
11	BD0362	12125	close	OK		C	3000												0.7	0.7		0.2	0.2				0.2	0.35	0.35	4.2	6.9
10	X	12132	close			C	3000																								0
9	BD0361	12130	close	OK		C	3500												0.7	0.7		0.2					0.2	0.35	0.35	4.2	6.7
8	BD0360	12088	close	OK		C	4000												0.7	0.7		0.2					0.2	0.35	0.35	4.2	6.7
7	BD0359	12110	close	OK		C	4500												0.7	0.7	~~0.5~~	0.2					0.2	0.35	0.35	4.2	7.2
6	X	12101	close			C	4500																								0
5	X	12107	open	–	Trigger r	C	5000												0.7	0.7		0.2					0.2	0.35	0.35	4.2	6.7
4	BD0358	12093	close	OK		C	5500												0.7	0.7	~~0.5~~	0.2					0.2	0.35	0.35		3
3	BD0357	12108	close	OK		C	5500																							4.2	4.2
2	BD0356	12116	close	OK		C	Bottom												0.7	0.7	~~0.5~~	0.2					0.2	0.35	0.35		3
1	BD0355	12112	close	OK		C	Bottom																							4.2	4.2

BD-8 Cast2

	GT-ID	BottleID No.	Bottle Status open/close	leakage	remark	N/C	Pressure (db)	Routine Salinity	Routine DO	Routine Nutrients	Routine pH/Alkalinity	Routine Chl.a	AORI Ooki Helium	AORI Ooki Tritium	Univ. Toyama Roy Andreas Chl-a	Tokai Kato Ba	AIST Yamashita PFASs	AORI Obata Fe(II)	AORI Obata Trace Metal	AORI Obata Archive	Univ. Toyama Roy Andreas Trace Metals	Hokkaido Univ ILTS Nishioka Dissolved Fe	Hokkaido Univ ILTS Nishioka CDOM	Hokkaido Univ ILTS Nishioka Bottole Incubation	Nagasaki Univ. Naoe (Takeda) Fe-speciation (Filtered)	Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filtered)	Kochi Pref Univ Isshiki Cr	Kyoto Konagaya BTM. filt	Kyoto Konagaya BTM. unfilt	Kyoto Takano Pd, Pt, Au(3側点のみ).filt	Total
																		Filt	Filt	Filt	Unfilt	Filt	Unfilt	Unfilt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	
24	BD0395	12126	close	OK		N	400	0.8	1.2	0.2	1				0.6	0.2															4
23	BD0394	12139	close	OK		N	600	0.8	1.2	0.2	1					0.2															3.4
22	BD0393	12131	close	OK		N	800	0.8	1.2	0.2	1					0.2															3.4
21	BD0392	12136	close	OK		N	O2 min	0.8	1.2	0.2	1				1.6	0.2															5
20	BD0391	12117	close	OK		N	1000	0.8	1.2	0.2	1					0.2															3.4
19	BD0390	12113	close	OK		N	1250	0.8	1.2	0.2	1					0.2															3.4
18	BD0389	12099	close	OK		N	1500	0.8	1.2	0.2	1					0.2															3.4
17	BD0388	12079	close	OK		N	1750			0.2						0.2															0.4
16	BD0387	12137	close	OK		N	2000	0.8	1.2	0.2	1					0.2															3.4
15	BD0386	12135	close	OK		N	2250			0.2						0.2															0.4
14	BD0385	12077	close	OK		N	2500	0.8	1.2	0.2	1					0.2															3.4
13	BD0384	12081	close			C	400											0.3	0.7	0.7	~~0.5~~	0.2	0.2				0.2	0.35	0.35	4.2	7.7
12	X	12102	close			C	400																								0
11	BD0383	12125	close			C	600											0.3	0.7	0.7		0.2					0.2	0.35	0.35	4.2	7
10	BD0382	12132	close			C	800											0.3	0.7	0.7		0.2					0.2	0.35	0.35	4.2	7
9	X	12130	close			C	800																								0
8	BD0381	12088	close			C	O2 min											0.3	0.7	0.7	~~0.5~~	0.2	0.2				0.2	0.35	0.35	4.2	7.7
7	BD0380	12110	close			C	1000											0.3	0.7	0.7		0.2	0.2		0.6	0.2	0.2	0.35	0.35	4.2	8
6	X	12101	close			C	1000																								0
5	BD0379	12107	close			C	1250												0.7	0.7		0.2					0.2	0.35	0.35	4.2	6.7
4	BD0378	12093	close			C	1500												0.7	0.7		0.2					0.2	0.35	0.35	4.2	6.7
3	BD0377	12108	close			C	2000												0.7	0.7		0.2	0.2				0.2	0.35	0.35	4.2	6.9
2	X	12116	close			C	2000																								0
1	BD0376	12112	close			C	2500												0.7	0.7		0.2					0.2	0.35	0.35	4.2	6.7

BD-8 Cast3

	GT-ID	Bottle Status: BottleID No.	Bottle Status: open/close	Bottle Status: leakage	Bottle Status: remark	N/C	Pressure (db)	Routine Salinity	Routine DO	Routine Nutrients	Routine pH/Alkalinity	Routine Chl.a	AORI Ooki Helium	AORI Ooki Tritium	Univ. Toyama Roy Andreas Chl-a	Tokai Kato Ba	AIST Yamashita PFASs	AORI Obata Fe(II)	AORI Obata Trace Metal	AORI Obata Archive	Univ. Toyama Roy Andreas Trace Metals	Hokkaido Univ ILTS Nishioka Dissolved Fe	Hokkaido Univ ILTS Nishioka CDOM	Hokkaido Univ ILTS Nishioka Bottole Incubation	Nagasaki Univ. Naoe (Takeda) Fe-speciation (Filtered)	Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filtered)	Kochi Pref Univ Isshiki Cr	Kyoto Konagaya BTM. filt	Kyoto Konagaya BTM. unfilt	Kyoto Takano Pd, Pt, Au(3側点のみ).filt	Total
																		Filt	Filt	Filt	Unfilt	Filt	Unfilt	Unfilt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	
25	BD0402	–	–	–			bucket	0.8	1.2	0.2	1	0.6																			3.8
24	X					N	5	0.8	1.2	0.2	1	0.6																			3.8
23	BD0401	92004	close	OK		C*	10	0.8	1.2	0.2	1	0.6			0.6	0.2															4.6
22	BD0400	92002	close	OK		C*	25	0.8	1.2	0.2	1	0.6				0.2															4
21	BD0399	92003	close	OK		C*	50	0.8	1.2	0.2	1	0.6			0.6	0.2															4.6
20	BD0398	12114	close	OK		C*	100	0.8	1.2	0.2	1	0.6				0.2															4
19	X					N	Chla max	0.8	1.2	0.2	1	0.6			1.6	0.2															5.6
18	BD0397	12086	close	L	大量のリ	C*	150	0.8	1.2	0.2	1	0.6				0.2															4
17	BD0396	92001	close	OK		C*	200	0.8	1.2	0.2	1	0.6				0.2															4
16	X					N	300									0.2															0.2
15	BD0401	92004	close	OK		C	10											~~0.3~~	0.7	0.7	~~0.5~~	0.2			0.6	0.2	0.2	0.35	0.35	4.2	8.3
14	X					C	10																								0
13	X					C	10																	10							10
12	X					C	10																	10							10
11	X					C	25											~~0.3~~	0.7	0.7		0.2					0.2	0.35	0.35	4.2	7
10	BD0400	92002	close	OK		C	25																								0
9	X					C	50											~~0.3~~	0.7	0.7		0.2	0.2				0.2	0.35	0.35	4.2	7.2
8	X					C	50																								0
7	BD0399	92003	close	OK		C	100											~~0.3~~	0.7	0.7		0.2	0.2				0.2	0.35	0.35	4.2	7.2
6	X					C	100																								0
5	X					C	Chla max											~~0.3~~	0.7	0.7	~~0.5~~	0.2			0.6	0.2	0.2	0.35	0.35	4.2	8.3
4	X					C	Chla max																								0
3	BD0398	12114	close	OK		C	150											~~0.3~~	0.7	0.7		0.2					0.2	0.35	0.35	4.2	7
2	X					C	150																								0
1	BD0396	92001	close	OK		C	200											~~0.3~~	0.7	0.7		0.2					0.2	0.35	0.35	4.2	7

BD-9 Cast-1

CMS	GT-ID	BottleID No.	open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	Chl-a	Ba	PFASs	Iodine-129	DO(Δ17O)	C-13	SS	SPM	Fe(II)	Trace Metal	Archive	Speciation	Pt&REE	N-15	Th&Pa	Trace Metals	Trace Metals	Dissolved Fe	dissolvable Fe	CDOM	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Cr	BTM. filt	BTM. unfilt	Cu. Filt	Pb.filt	Bi.filt	Zr, Hf, Nb, Ta, filt	Zr, Hf, Nb, Ta, unfilt	Se	Si isotope	10&Nd IC & U-236	Total
			Bottle Status					Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	Univ. Toyama	Tokai	AIST	JAEA	NIES	JAMSTEC	Tokai Univ	Tokai	AORI	AORI	AORI	AORI	AORI	AORI	JAEA	Univ. Toyama	Univ. Toyama	do Univ ILTS	do Univ ILTS	do Univ ILTS	Nagasaki Univ.	Nagasaki Univ.	Kochi Pref Univ	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kinki	ETH	Hirosaki Univ	
													Ooki	Ooki	Roy Andreas	Kato	Yamashita	Otosaka (Obata)	Omori	Kumamoto (Gamo)	Minami	Minami	Takahashi	Obata	Obata	Kim	Suzuki	Nakayama	Okubo (Kim)	Roy Andreas	Roy Andreas	Nishioka	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Isshiki	Konagaya	Konagaya	Takano	Takano	Takano	Takano	Takano	Takeda	Wetzel (Gamo)	Tazoe	
																						Unfilt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Unfilt	Unfilt	Fillt	Fillt	Unfilt	Fillt	Unfilt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Fillt	Filt	
24	BD0425	12126	close	OK		N	4750			0.2						0.2																																0.4
23	BD0424	12139	close	OK		N	5000	0.8	1.2	0.2	1		1			0.2	1			1.5																												6.9
22	BD0423	12131	close	OK		N	5000														5																											5
21	BD0422	12136	close	OK		N	5250			0.2						0.2																																0.4
20	BD0421	12117	close	OK		N	5500	0.8	1.2	0.2	1		0*			0.2																																3.4
19	BD0420	12113	close	OK		N	5500														5																											5
18	BD0419	12099	close	OK		N	5750			0.2						0.2																																0.4
17	BD0418	12079	close	OK		N	6000	0.8	1.2	0.2	1		1		1	0.2																																5.4
16	BD0417	12137	close	OK		N	6000										1			1.5																												2.5
15	BD0416	12135	close	OK		N	6000														5																											5
14	BD0415	12092	close	?		C	5000															10																										10
13	BD0414	12081	close	OK		C	5000																	0.7	0.7	0.7	3.5	0.3				0.2	0.2															6.3
12	BD0413	12102	close	OK		C	5000																						10																			10
11	BD0412	12125	close	OK		C	5000																														0.6	0.35	0.35			0.35	0.35	0.35	0.5	0.2		3.05
10	BD0411	12132	close	OK		C	5000																																	2.2	2.2							4.4
9	BD0410	12130	close	OK		C	5500																	0.7	0.7	0.7	3.5			~~0.5~~	~~0.5~~	0.2	0.2															7
8	BD0409	12088	close	OK		C	5500																						10																			10
7	BD0408	12110	close	OK		C	5500																														0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35				6.75
6	X	12101	close			C	5500																																									0
5	BD0407	12107	close	OK		C	6000															10																										10
4	BD0406	12093	close	OK		C	6000																	0.7	0.7	0.7	3.5	0.3		0.5	0.5	0.2	0.2		0.6	0.2												8.1
3	BD0405	12108	close	OK		C	6000																						10																			10
2	BD0404	12116	close	OK		C	6000																														0.6	0.35	0.35			0.35	0.35	0.35	0.5	0.2		3.05
1	BD0403	12112	close	OK		C	6000																																	2.2	2.2							4.4

*"0" means the cancelation of sampling.

BD-9 Cast-2

	GT-ID	BottleID No.	open/close	leakage	remark		Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	Chl-a	Ba	PFASs	Iodine-129	DO(Δ17O)	C-13	SS	SPM	Fe(II)	Trace Metal	Archive	Speciation	Pt&REE	N-15	Th&Pa	Trace Metals	Trace Metals	Dissol ved Fe	Total dissolvable Fe	CDOM	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Cr	BTM. filt	BTM. unfilt	Cu. Filt	Pb.filt	Bi.filt	Zr, Hf, Nb, Ta, filt	Zr, Hf, Nb, Ta, unfilt	Se	Si isotope	Be-10&Nd IC & U-236	Total
			Bottle Status					Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	Univ. Toyama	Tokai	AIST	JAEA	NIES	JAMSTEC	Tokai Univ	Tokai	AORI	AORI	AORI	AORI	AORI	AORI	JAEA	Univ. Toyama	Univ. Toyama	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Nagasaki Univ.	Nagasaki Univ.	Kochi Pref Univ	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kinki	ETH	Hirosaki Univ	
													Ooki	Ooki	Roy Andreas	Kato	Yamashita	Otosaka (Obata)	Omori	Kumamoto (Gamo)	Minami	Minami	Takahashi	Obata	Obata	Kim	Suzuki	Nakayama	Okubo (Kim)	Roy Andreas	Roy Andreas	Nishioka	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Isshiki	Konagaya	Konagaya	Takano	Takano	Takano	Takano	Takano	Takeda	Wetzel (Gamo)	Tazoe	
																						Unfilt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Unfilt	Unfilt	Fillt	Fillt	Unfilt	Fillt	Unfilt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Fillt	Filt	
24	BD0449	12126	close	OK		N	O2 min	0.8	1.2	0.2	1	0.6			1.6	0.2																																5.6
23	BD0448	12139	close	OK		N	3250			0.2						0.2																																0.4
22	BD0447	12131	close	OK		N	3500	0.8	1.2	0.2	1		0*			0.2																																3.4
21	BD0446	12136	close	OK		N	3500														5																											5
20	BD0445	12117	close	OK		N	3750			0.2						0.2																																0.4
19	BD0444	12113	close	OK		N	4000	0.8	1.2	0.2	1		1			0.2	1			1.5																												6.9
18	BD0443	12099	close	OK		N	4000														5																											5
17	BD0442	12079	close	OK		N	4250			0.2						0.2																																0.4
16	BD0441	12137	close	OK		N	4500	0.8	1.2	0.2	1		0*			0.2																																3.4
15	BD0440	12135	close	OK		N	4500														5																											5
14	BD0439	12092	close	OK		C	O2 min																0.3	0.7	0.7	0.7				0.5	0.5	0.2	0.2	0.2														4
13	BD0438	12081	close	OK		C	O2 min																														0.6	0.35	0.35				0.35	0.35	0.5			2.5
12	BD0437	12102	close	OK		C	O2 min																																	2.2								2.2
11	BD0436	12125	close	OK		C	3500																	0.7	0.7	0.7	3.5					0.2	0.2															6
10	BD0435	12132	close	OK		C	3500																						10																			10
9	BD0434	12130	close	OK		C	3500																														0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35				6.75
8	BD0433	12088	close	OK		C	4000															10																										10
7	BD0432	12110	close	OK		C	4000																	0.7	0.7	0.7	3.5	0.3				0.2	0.2															6.3
6	BD0431	12101	close	OK		C	4000																						10																			10
5	BD0430	12107	close	OK		C	4000																														0.6	0.35	0.35			0.35	0.35	0.35	0.5	0.2		3.05
4	BD0429	12093	close	OK		C	4000																																	2.2	2.2							4.4
3	BD0428	12108	close	OK		C	4500																	0.7	0.7	0.7	3.5			0.5	0.5	0.2	0.2															7
2	BD0427	12116	close	OK		C	4500																						10																			10
1	BD0426	12112	close	OK		C	4500																														0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35				6.75

*"0" means the cancelation of sampling.

BD-9 Cast-3

No.	GT-ID	BottleID No.	open/close (Bottle Status)	leakage (Bottle Status)	remark (Bottle Status)		Pressure (db)	Deck Routine Salinity	Deck Routine DO	Deck Routine Nutrients	Deck Routine pH/Alkalinity	Deck Routine Chl.a	Deck AORI Ooki Helium	Deck AORI Ooki Tritium	Deck Univ. Toyama Roy Andreas Chl-a	Deck Tokai Kato Ba	Deck AIST Yamashita PFASs	Deck JAEA Otosaka (Obata) Iodine-129	Deck NIES Omori DO(Δ17O)	Deck JAMSTEC Kumamoto (Gamo) C-13	Deck Tokai Univ Minami SS	Deck Tokai Minami SPM	Bubble AORI Takahashi Fe(II)	Bubble AORI Obata Trace Metal	Bubble AORI Obata Archive	Bubble AORI Kim Speciation	Bubble AORI Suzuki Pt&REE	Bubble AORI Nakayama N-15	Bubble JAEA Okubo (Kim) Th&Pa	Bubble Univ. Toyama Roy Andreas Trace Metals	Bubble Univ. Toyama Roy Andreas Trace Metals	Bubble Hokkaido Univ Nishioka Dissolved Fe	Bubble Hokkaido Univ Nishioka Total dissolvable	Bubble Hokkaido Univ Nishioka CDOM	Bubble Nagasaki Univ. Naoe (Takeda) Fe-speciation	Bubble Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filter	Bubble Kochi Pref Univ Isshiki Cr	Bubble Kyoto Konagaya BTM. filt	Bubble Kyoto Konagaya BTM. unfilt	Bubble Kyoto Takano Cu. Filt	Bubble Kyoto Takano Pb.filt	Bubble Kyoto Takano Bi.filt	Bubble Kyoto Takano Zr, Hf, Nb, Ta, filt	Bubble Kyoto Takano Zr, Hf, Nb, Ta, unfilt	Bubble Kinki Takeda Se	Bubble ETH Wetzel (Gamo) Si isotope	Bubble Hirosaki Univ Tazoe Be-10&Nd IC &	Total	
																						Unfilt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Unfilt	Unfilt	Fillt	Fillt	Unfilt	Fillt	Unfilt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Fillt	Fillt		
24	BD0472	12126	close	OK		N	1750			0.2						0.2																																0.4	1
23	BD0471	12139	close	OK		N	2000	0.8	1.2	0.2	1		1			0.2	1			1.5																												6.9	
22	BD0470	12131	close	OK		N	2000														5	10																										15	
21	BD0469	12136	close	OK		N	2250			0.2						0.2																																0.4	1
20	BD0468	12117	close	OK		N	2500	0.8	1.2	0.2	1		0*			0.2					5																											8.4	
19	BD0467	12113	close	OK		N	2750			0.2						0.2																																0.4	1
18	BD0466	12099	close	OK		N	3000	0.8	1.2	0.2	1		1			0.2	1			1.5	5																											11.9	
17	BD0465	12133	close	OK		C	2000																	0.7	0.7	0.7	3.5	0.3				0.2	0.2	0.2														6.5	
16	BD0464	12123	close	OK		C	2000																						10																			10	
15	BD0463	12120	close	OK		C	2000																														0.6	0.35	0.35			0.35	0.35	0.35	0.5	0.2		3.05	5
14	BD0462	12092	close	OK		C	2000																																	2.2	2.2							4.4	
13	BD0461	12081	close	OK		C	2000																																								12	12	
12	BD0460	12102	close	OK		C	2000																																								12	12	
11	BD0459	12125	close	OK		C	2500																	0.7	0.7	0.7	3.5					0.2	0.2															6	
10	BD0458	12132	close	OK		C	2500																						10																			10	
9	BD0457	12130	close	OK		C	2500																														0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35		0.2		6.95	3
8	BD0456	12088	close	OK		C	3000														0*	10																										10	
7	BD0455	12110	close	OK		C	3000																	0.7	0.7	0.7	3.5	0.3				0.2	0.2	0.2	0.6	0.2												7.3	
6	BD0454	12101	close	OK		C	3000																						10																			10	
5	BD0453	12107	close	OK		C	3000																														0.6	0.35	0.35			0.35	0.35	0.35	0.5	0.2		3.05	5
4	BD0452	12093	close	OK		C	3000																																	2.2	2.2							4.4	
3	BD0451	12108	close	OK		C	3000																																								12	12	
2	BD0450	12116	close	OK		C	3000																																								12	12	
1	X	12112	close	?		C	3000																																								0	0	
																																															15

*"0" means the cancelation of sampling.

BD-9 Cast-4

No.	GT-ID	BottleID No.	open/close (Bottle Status)	leakage (Bottle Status)	remark (Bottle Status)		Pressure (db)	Deck Routine Salinity	Deck Routine DO	Deck Routine Nutrients	Deck Routine pH/Alkalinity	Deck Routine Chl.a	Deck AORI Ooki Helium	Deck AORI Ooki Tritium	Deck Univ. Toyama Roy Andreas Chl-a	Deck Tokai Kato Ba	Deck AIST Yamashita PFASs	Deck JAEA Otosaka (Obata) Iodine-129	Deck NIES Omori DO(Δ17O)	Deck JAMSTEC Kumamoto (Gamo) C-13	Deck Tokai Univ Minami SS	Deck Tokai Minami SPM	Bubble AORI Takahashi Fe(II)oxidn	Bubble AORI Takahashi Fe(II)	Bubble AORI Obata Trace Metal	Bubble AORI Obata Archive	Bubble AORI Kim Speciation	Bubble AORI Suzuki Pt&REE	Bubble AORI Nakayama N-15	Bubble JAEA Okubo (Kim) Th&Pa	Bubble Univ. Toyama Roy Andreas Trace Metals	Bubble Univ. Toyama Roy Andreas Trace Metals	Bubble Hokkaido Univ ILTS Nishioka Dissolved Fe	Bubble Hokkaido Univ ILTS Nishioka Total dissolvable Fe	Bubble Hokkaido Univ ILTS Nishioka CDOM	Bubble Nagasaki Univ. Naoe (Takeda) Fe-speciation (Filtered)	Bubble Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filtered)	Bubble Kochi Pref Univ Isshiki Cr	Bubble Kyoto Konagaya BTM. filt	Bubble Kyoto Konagaya BTM. unfilt	Bubble Kyoto Takano Cu. Filt	Bubble Kyoto Takano Pb.filt	Bubble Kyoto Takano Bi.filt	Bubble Kyoto Takano Zr, Hf, Nb, Ta, filt	Bubble Kyoto Takano Zr, Hf, Nb, Ta, unfilt	Bubble Kinki Takeda Se	Bubble ETH Wetzel (Gamo) Si isotope	Bubble Hirosaki Univ Tazoe Be-10&Nd IC & U-236	Total
																						Unfilt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Unfilt	Unfilt	Fillt	Fillt	Unfilt	Fillt	Unfilt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Fillt	Filt	
24	BD0496	12126	close	X		N	600	0.8	1.2	0.2	1					0.2																																		3.4
23	BD0495	12139	close	OK		N	600										1	1.5		1.5	2																													6
22	BD0494	12131	close	OK		N	800	0.8	1.2	0.2	1					0.2		1.5			2																													6.9
21	BD0493	12136	close	OK		N	1000	0.8	1.2	0.2	1					0.2				1.5	5																													9.9
20	BD0492	12117	close	OK		N	1000						1	1			1	1.5																																4.5
19	BD0491	12113	close	OK		N	1250	0.8	1.2	0.2	1					0.2					5																													8.4
18	BD0490	12099	close	OK		N	1500	0.8	1.2	0.2	1		0*			0.2																																		3.4
17	BD0489	12079	close	OK		N	1500											1.5		1.5	5																													8
16	BD0488	12123	close	OK		C	600															10																												10
15	BD0487	12120	close	OK		C	600																	0.3	0.7	0.7	0.7	3.5	0.3				0.2	0.2																6.6
14	BD0486	12092	close	OK		C	600																							10																				10
13	BD0485	12081	close	OK		C	600																															0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2		7.45
12	BD0484	12102	close	OK		C	800																	0.3	0.7	0.7	0.7	3.5					0.2	0.2																6.3
11	BD0483	12125	close	OK		C	800																															0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5			7.25
10	BD0482	12132	close	OK		C	1000															10																												10
9	BD0481	12130	close	OK		C	1000																0.7	0.3	0.7	0.7	0.7	3.5	0.3				0.2	0.2	0.2	0.6	0.2													8.3
8	BD0480	12088	close	OK		C	1000																							10																				10
7	BD0479	12110	close	OK		C	1000																															0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2		7.45
6	BD0478	12101	close	OK		C	1250																		0.7	0.7	0.7						0.2	0.2																2.5
5	BD0477	12107	close	OK		C	1250																															0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5			7.25
4	BD0476	12093	close	OK		C	1500																		0.7	0.7	0.7	3.5	0.6				0.2	0.2																6.6
3	BD0475	12108	close	OK		C	1500																							10																				10
2	BD0474	12116	close	OK		C	1500																															0.6	0.35	0.35			0.35	0.35	0.35	0.5	0.2		3.05
1	BD0473	12112	close	OK		C	1500																																		2.2	2.2							4.4

*"0" means the cancelation of sampling.

BD-9 Cast-5

CMS	GT-ID	BottleID No.	Bottle Status open/close	leakage	remark	N/C	Pressure (db)	Deck Routine Salinity	Deck Routine DO	Deck Routine Nutrients	Deck Routine pH/Alkalinity	Deck Routine Chl.a	Deck AORI Ooki Helium	Deck AORI Ooki Tritium	Deck Univ. Toyama Roy Andreas Chl-a	Deck Tokai Kato Ba	Deck AIST Yamashita PFASs	Deck JAEA Otosaka (Obata) Iodine-129	Deck NIES Omori DO(Δ17O)	Deck JAMSTEC Kumamoto (Gamo) C-13	Deck Tokai Univ Minami SS	Deck Tokai Minami SPM	Bubble AORI Takahashi Fe(II)oxidn	Bubble AORI Takahashi Fe(II)	Bubble AORI Obata Trace Metal	Bubble AORI Obata Archive	Bubble AORI Kim Speciation	Bubble AORI Suzuki Pt&REE	Bubble AORI Nakayama N-15	Bubble JAEA Okubo (Kim) Th&Pa	Bubble Univ. Toyama Roy Andreas Trace Metals	Bubble Univ. Toyama Roy Andreas Trace Metals	Bubble Hokkaido Univ Nishioka Dissolved Fe	Bubble Hokkaido Univ Nishioka Total dissolvable	Bubble Hokkaido Univ Nishioka CDOM	Bubble Nagasaki Univ. Naoe (Takeda) Fe-speciation	Bubble Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filter	Bubble Kochi Pref Univ Isshiki Cr	Bubble Kyoto Konagaya BTM. filt	Bubble Kyoto Konagaya BTM. unfilt	Bubble Kyoto Takano Cu. Filt	Bubble Kyoto Takano Pb.filt	Bubble Kyoto Takano Bi.filt	Bubble Kyoto Takano Zr, Hf, Nb, Ta, filt	Bubble Kyoto Takano Zr, Hf, Nb, Ta, unfilt	Bubble Kinki Takeda Se	Bubble ETH Wetzel (Gamo) Si isotope	Bubble Hirosaki Univ Tazoe Be-10&Nd IC &	Total
																						Unfilt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Unfilt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Filt	Filt	Unfilt	Filt	Filt	Filt	
24	BD0520	12126	close	?		N	100	0.8	1.2	0.2	1	0.6				0.2																																	4
23	BD0519	12139	close	OK		N	100										1	1.5		1.5	1																												5
22	BD0518	12131	close	?		N	150	0.8	1.2	0.2	1	0.6				0.2		1.5			1																												6.5
21	BD0517	12136	close	?		N	200	0.8	1.2	0.2	1	0.6				0.2																																	4
20	BD0516	12117	close	OK		N	200										1	1.5		1.5	1																												5
19	BD0515	12113	close	OK		N	300			0.2						0.2	1							~~0.3~~																									1.7
18	BD0514	12099	close	OK		N	400	0.8	1.2	0.2	1				0.6	0.2																																	4
17	BD0513	12079	close	OK		N	400						1	1				1.5		1.5	2																												7
16	BD0512	12123	close	OK		C	100															10																											10
15	BD0511	12120	close	OK		C	100																	0.3	0.7	0.7	0.7	3.5	0.3				0.2	0.2	0.2	0.6	0.2												7.6
14	BD0510	12092	close	OK		C	100																							10																			10
13	BD0509	12081	close	OK		C	100																															0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2		7.45
12	BD0508	12102	close	OK		C	150															10																											10
11	BD0507	12125	close	OK		C	150																	0.3	0.7	0.7	0.7						0.2	0.2												0.5	0.2		3.5
10	BD0506	12132	close	OK		C	150																															0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35				6.75
9	BD0505	12130	close	?		C	200															10																											10
8	BD0504	12088	close	OK		C	200																0.7	0.3	0.7	0.7	0.7	3.5	0.3				0.2	0.2		0.6	0.2												8.1
7	BD0503	12110	close	OK		C	200																							10																			10
6	BD0502	12101	close	OK		C	200																															0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2		7.45
5	BD0501	12107	close	OK		C	400															10																											10
4	BD0500	12093	close	OK		C	400																	0.3	0.7	0.7	0.7	3.5	0.3		0.5	0.5	0.2	0.2	0.2	0.6	0.2												8.6
3	BD0499	12108	close	OK		C	400																							10																			10
2	BD0498	12116	close	OK		C	400																															0.6	0.35	0.35			0.35	0.35	0.35	0.5	0.2		3.05
1	BD0497	12112	close	OK		C	400																																		2.2	2.2							4.4

BD-9 Cast-6

CMS	GT-ID	BottleID No.	Bottle Status open/close	leakage	remark	N/C	Pressure (db)	Deck Routine Salinity	Deck Routine DO	Deck Routine Nutrients	Deck Routine pH/Alkalinity	Deck Routine Chl.a	Deck AORI Ooki Helium	Deck AORI Ooki Tritium	Deck Univ. Toyama Roy Andreas Chl-a	Deck Tokai Kato Ba	Deck AIST Yamashita PFASs	Deck JAEA Otosaka (Obata) Iodine-129	Deck NIES Omori DO(Δ17O)	Deck JAMSTEC Kumamoto (Gamo) C-13	Deck Tokai Univ Minami SS	Deck Tokai Minami SPM	Bubble AORI Takahashi Fe(II)oxidn	Bubble AORI Takahashi Fe(II)	Bubble AORI Obata Trace Metal	Bubble AORI Obata Archive	Bubble AORI Kim Speciation	Bubble AORI Suzuki Pt&REE	Bubble AORI Nakayama N-15	Bubble JAEA Okubo (Kim) Th&Pa	Bubble Univ. Toyama Roy Andreas Trace Metals	Bubble Univ. Toyama Roy Andreas Trace Metals	Bubble Hokkaido Univ ILTS Nishioka Dissolved Fe	Bubble Hokkaido Univ ILTS Nishioka Total dissolvable Fe	Bubble Hokkaido Univ ILTS Nishioka CDOM	Bubble Nagasaki Univ. Naoe (Takeda) Fe-speciation (Filtered)	Bubble Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filtered)	Bubble Kochi Pref Univ Isshiki Cr	Bubble Kyoto Konagaya BTM. filt	Bubble Kyoto Konagaya BTM. unfilt	Bubble Kyoto Takano Cu. Filt	Bubble Kyoto Takano Pb.filt	Bubble Kyoto Takano Bi.filt	Bubble Kyoto Takano Zr, Hf, Nb, Ta, filt	Bubble Kyoto Takano Zr, Hf, Nb, Ta, unfilt	Bubble Kinki Takeda Se	Bubble ETH Wetzel (Gamo) Si isotope	Bubble Hirosaki Univ Tazoe Cs&Nd	Total
																						Unfilt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Unfilt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Filt	Filt	Unfilt	Filt	Filt	Filt	
25	BD0544	–	–	–			bucket	0.8	1.2	0.2	1	0.6					1	1.5			1																									0.5			7.8
24	BD0543	12126	close	OK		N	5	0.8	1.2	0.2	1	0.6							1																														4.8
23	BD0542	12139	close	OK		N	10	0.8	1.2	0.2	1	0.6			0.6	0.2																																	4.6
22	BD0541	12131	close	OK		N	10										1		1	1.5	1																												4.5
21	BD0540	12136	close	OK		N	25	0.8	1.2	0.2	1	0.6				0.2			1		1																												6
20	BD0539	12117	close	OK		N	50	0.8	1.2	0.2	1	0.6			0.6	0.2																																	4.6
19	BD0538	12113	close	OK		N	50										1	1.5	1		1																												4.5
18	BD0537	12098	close	OK		C	10															10																											10
17	BD0536	12133	close	OK		C	10																0.7	0.3	0.7	0.7	0.7	3.5					0.2	0.2		0.6	0.2												7.8
16	BD0535	12123	close	OK		C	10																							10																			10
15	BD0534	12120	close	OK		C	10																								0.5	0.5						0.6	0.35	0.35			0.35	0.35	0.35	0.5	0.2		4.05
14	BD0533	12092	close	OK		C	10																																		2.2	2.2							4.4
13	BD0532	12081	close	OK		C	10																																										0
12	BD0531	12102	close	OK		C	Chla max	0.8	1.2	0.2	1	0.6			1.6	0.2	1																																6.6
11	BD0530	12125	close	OK		C	25															10																											10
10	BD0529	12132	close	OK		C	25																	0.3	0.7	0.7	0.7		0.3				0.2	0.2												0.5			3.6
9	BD0528	12130	close	OK		C	25																															0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35				6.75
8	BD0527	12088	close	OK		C	50															10																											10
7	BD0526	12110	close	OK		C	50																	0.3	0.7	0.7	0.7	3.5					0.2	0.2	0.2														6.5
6	BD0525	12101	close	OK		C	50																							10																			10
5	BD0524	12107	close	OK		C	50																															0.6	0.35	0.35			0.35	0.35	0.35	0.5			2.85
4	BD0523	12093	close	OK		C	50																																		2.2	2.2							4.4
3	BD0522	12108	close	OK		C	Chla max																	0.3	0.7	0.7	0.7				0.5	0.5	0.2	0.2		0.6	0.2												4.6
2	BD0521	12116	close	OK		C	Chla max																															0.6	0.35	0.35	2.2			0.35	0.35	0.5			4.7
1	X	12112	close	?		C	Chla max																																										0

BD-9 Ex-1

			Bottle Status					Routine	NIES Omori	Hokkaido Univ ILTS Nishioka		
	GT-ID	BottleID No.	open/close	leakage	remark	N/C	Pressure (db)	DO	DO(Δ17O)	Bottole Incubation	Total	
										Unfilt		
	X						bucket				0	
24	BD0564	12126	close	OK		N	5	1.2	1		2.2	5
23	X	12139	close			N	25				0	5
22	BD0563	12131	close	OK		N	10	1.2	1		2.2	10
21	X	12136	close			N	10				0	10
20	BD0562	12117	close	OK		N	25	1.2	1		2.2	25
19	X	12113	close			N	50				0	25
18	BD0561	12099	close	OK		N	50	1.2	1		2.2	50
17	X	12079	close			N	50				0	50
16	BD0560	12123	close			C	10			12	12	10
15	BD0559	12120	close			C	10			12	12	10
14	BD0558	12092	close			C	10			12	12	10
13	BD0557	12081	close			C	10			12	12	10
12	BD0556	12102	close			C	10			12	12	10
11	BD0555	12125	close			C	10			12	12	10
10	BD0554	12132	close			C	10			12	12	10
9	BD0553	12130	close			C	10			12	12	10
8	BD0552	12088	close			C	10			12	12	10
7	BD0551	12110	close			C	10			12	12	10
6	BD0550	12101	close			C	10			12	12	10
5	BD0549	12107	close			C	10			12	12	10
4	BD0548	12093	close	OK		C	10			12	12	10
3	BD0547	12108	close	OK		C	10			12	12	10
2	BD0546	12116	close	OK		C	10			12	12	10
1	BD0545	12112	close			C	7			12	12	10

BD-10 Cast-1

CMS	GT-ID	BottleID No.	Bottle Status open/close	Bottle Status leakage	Bottle Status remark	N/C	Pressure (db)	Deck Routine Salinity	Deck Routine DO	Deck Routine Nutrients	Deck Routine pH/Alkalinity	Deck Routine Chl.a	Deck AORI Ooki Helium	Deck AORI Ooki Tritium	Deck Univ. Toyama Roy Andreas Chl-a	Deck Tokai Kato Ba	Deck AIST Yamashita PFASs	Bubble AORI Obata Fe(II)	Bubble AORI Obata Fe(II) Oxidation	Bubble AORI Obata Trace Metal	Bubble AORI Obata Archive	Bubble Univ. Toyama Roy Andreas Trace Metals	Bubble Univ. Toyama Roy Andreas Trace Metals (Unfilt)	Bubble Hokkaido Univ ILTS Nishioka Dissolved Fe	Bubble Hokkaido Univ ILTS Nishioka CDOM	Bubble Nagasaki Univ. Naoe (Takeda) Fe-speciation (Filtered)	Bubble Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filtered)	Bubble Nagasaki Univ. Mukae (Takeda) Bottole Incubation	Bubble Nagasaki Univ. Mukae (Takeda) Bottole Incubation	Bubble Kochi Pref Univ Isshiki Cr	Bubble Kyoto Konagaya BTM. filt	Bubble Kyoto Konagaya BTM. unfilt	Total
																		Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Unfilt	Unfilt	Unfilt	Filt	Unfilt	
24	BD0588	12126	close	OK		N	1000	0.8	1.2	0.2	1		0*	0*		0.2																	3.4
23	BD0587	12139	close	OK		N	1500	0.8	1.2	0.2	1		0*			0.2																	3.4
22	BD0586	12131	close	OK		N	1750			0.2						0.2																	0.4
21	BD0585	12136	close	OK		N	2250			0.2						0.2																	0.4
20	BD0584	12117	close	OK		N	2750			0.2						0.2																	0.4
19	BD0583	12113	close	OK		N	3250			0.2						0.2																	0.4
18	BD0582	12099	close	OK		N	3750			0.2						0.2																	0.4
17	BD0581	12079	close	OK		N	4250			0.2						0.2																	0.4
16	BD0580	12137	close	OK		N	4500	0.8	1.2	0.2	1		0*			0.2																	3.4
15	BD0579	12135	close	OK		N	4750			0.2						0.2																	0.4
14	BD0578	12077	close	OK		N	5250			0.2						0.2																	0.4
13	BD0577	12115	close	OK		N	Bottom	0.8	1.2	0.2	1		0*			0.2																	3.4
12	BD0576	12102	close	OK		C	1000											0.3	0.5	0.7	0.7			0.2	0.2	0.6	0.2			0.2	0.35	0.35	4.3
11	BD0575	12125	close	OK		C	1250	0.8	1.2	0.2	1					0.2				0.7	0.7			0.2						0.2	0.35	0.35	5.9
10	BD0574	12132	close	OK		C	1500													0.7	0.7			0.2						0.2	0.35	0.35	2.5
9	BD0573	12130	close	OK		C	2000	0.8	1.2	0.2	1		0*			0.2				0.7	0.7			0.2	0.2					0.2	0.35	0.35	6.1
8	BD0572	12088	close	OK		C	2500	0.8	1.2	0.2	1		0*			0.2				0.7	0.7			0.2						0.2	0.35	0.35	5.9
7	BD0571	12110	close	OK		C	3000	0.8	1.2	0.2	1		0*			0.2				0.7	0.7			0.2	0.2					0.2	0.35	0.35	6.1
6	BD0570	12101	close	OK		C	3500	0.8	1.2	0.2	1		0*			0.2				0.7	0.7			0.2						0.2	0.35	0.35	5.9
5	BD0569	12107	close	OK		C	4000	0.8	1.2	0.2	1		0*			0.2				0.7	0.7			0.2						0.2	0.35	0.35	5.9
4	BD0568	12093	close	OK		C	4500													0.7	0.7		0.5	0.2						0.2	0.35	0.35	3
3	BD0567	12108	close	OK		C	5000	0.8	1.2	0.2	1		0*			0.2				0.7	0.7			0.2						0.2	0.35	0.35	5.9
2	BD0566	12116	close	OK		C	5500	0.8	1.2	0.2	1		0*			0.2				0.7	0.7			0.2						0.2	0.35	0.35	5.9
1	BD0565	12112	close	OK		C	Bottom													0.7	0.7		0.5	0.2						0.2	0.35	0.35	3

*"0" means the cancelation of sampling.

BD-10 Cast-2

CMS	GT-ID	BottleID No.	Bottle Status open/close	Bottle Status leakage	Bottle Status remark	N/C	Pressure (db)	Deck Routine Salinity	Deck Routine DO	Deck Routine Nutrients	Deck Routine pH/Alkalinity	Deck Routine Chl.a	Deck AORI Ooki Helium	Deck AORI Ooki Tritium	Deck Univ. Toyama Roy Andreas Chl-a	Deck Tokai Kato Ba	Deck AIST Yamashita PFASs	Bubble AORI Obata Fe(II)	Bubble AORI Obata Fe(II) Oxidation	Bubble AORI Obata Trace Metal	Bubble AORI Obata Archive	Bubble Univ. Toyama Roy Andreas Trace Metals	Bubble Univ. Toyama Roy Andreas Trace Metals (Unfilt)	Bubble Hokkaido Univ ILTS Nishioka Dissolved Fe	Bubble Hokkaido Univ ILTS Nishioka CDOM	Bubble Nagasaki Univ. Naoe (Takeda) Fe-speciation (Filtered)	Bubble Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filtered)	Bubble Nagasaki Univ. Mukae (Takeda) Bottole Incubation	Bubble Nagasaki Univ. Mukae (Takeda) Bottole Incubation	Bubble Kochi Pref Univ Isshiki Cr	Bubble Kyoto Konagaya BTM. filt	Bubble Kyoto Konagaya BTM. unfilt	Total
																		Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Unfilt	Unfilt	Unfilt	Filt	Unfilt	
25	BD0613	–	–	–	bucket		0	0.8	1.2	0.2	1	0.6																					3.8
24	BD0612	12126	close	OK		N	5	0.8	1.2	0.2	1	0.6																					
23	BD0611	12139	close	OK		N	10	0.8	1.2	0.2	1	0.6			0.6	0.2																	4.6
22	BD0610	12131	close	OK		N	25	0.8	1.2	0.2	1	0.6				0.2																	4
21	BD0609	12136	close	OK		N	50	0.8	1.2	0.2	1	0.6			0.6	0.2																	4.6
20	BD0608	12117	close	OK		N	100	0.8	1.2	0.2	1	0.6				0.2																	4
19	BD0607	12113	close	OK		N	Chla max	0.8	1.2	0.2	1	0.6			1.6	0.2																	5.6
18	BD0606	12099	close	OK		N	O2 min	0.8	1.2	0.2	1	0.6			1.6	0.2																	5.6
17	BD0605	12079	close	OK		N	150	0.8	1.2	0.2	1	0.6				0.2																	4
16	BD0604	12137	close	OK		N	200	0.8	1.2	0.2	1	0.6				0.2																	4
15	BD0603	12135	close	OK		N	300									0.2																	0.2
14	BD0602	12077	close	OK		N	400	0.8	1.2	0.2	1		0*	0*	0.6	0.2																	4
13	BD0601	12115	close	OK		N	600	0.8	1.2	0.2	1					0.2																	3.4
12	BD0600	12124	close	OK		N	800	0.8	1.2	0.2	1					0.2																	3.4
11	BD0599	12125	close	OK		C	10											0.3	0.5	0.7	0.7		0.5	0.2		0.6	0.2			0.2	0.35	0.35	4.6
10	BD0598	12132	close	OK		C	25											0.3		0.7	0.7			0.2						0.2	0.35	0.35	2.8
9	BD0597	12130	close	OK		C	50											0.3		0.7	0.7			0.2	0.2					0.2	0.35	0.35	3
8	BD0596	12088	close	OK		C	100											0.3		0.7	0.7			0.2	0.2					0.2	0.35	0.35	3
7	BD0595	12110	close	OK		C	Chla max											0.3		0.7	0.7		0.5	0.2		0.6	0.2			0.2	0.35	0.35	4.1
6	BD0594	12101	close	OK		C	O2 min											0.3		0.7	0.7		0.5	0.2	0.2					0.2	0.35	0.35	3.5
5	BD0593	12107	close	OK		C	150											0.3		0.7	0.7			0.2						0.2	0.35	0.35	2.8
4	BD0592	12093	close	OK		C	200											0.3	0.5	0.7	0.7			0.2						0.2	0.35	0.35	3.3
3	BD0591	12108	close	OK		C	400											0.3		0.7	0.7		0.5	0.2	0.2					0.2	0.35	0.35	3.5
2	BD0590	12116	close	OK		C	600											0.3		0.7	0.7			0.2						0.2	0.35	0.35	2.8
1	BD0589	12112	close	OK		C	800											0.3		0.7	0.7			0.2						0.2	0.35	0.35	2.8

*"0" means the cancelation of sampling.

KH-09-5 Kevlar/Niskin Sampling Log Sheet

DATE (MM/DD/YYYY） */*/2012 Station ID: **BD-11** Cast # : **1** Watch: Obata, Nishioka Bottle closure method: Messenger ** min

1	Cast Start :	end :		Messenger in :	
	Latitude	N / Longitude	W	Bottom Depth	m

Cast#	Depth [m]	Bottle No.	Leak check	Sample No.	Salinity	AlMnFe	Trace metlas	Archive	Dissolved Fe		Depth (TD) [m]	Temp(TD)[oC]	Temp (RV) [°C]	Pressure(RV) [db]	Remarks
1	25	92002	OK	BD_TN0006	x				x						
1	50	92003	OK	BD_TN0005	x				x						
1	200	92004	OK	BD_TN0004	x				x						
1	400	12114	OK	BD_TN0003	x										
1	600	12086	OK	BD_TN0002	x										
1	800	92001	OK	BD_TN0001	x										

MEMO:

BD-11 Cast-1

CMS	GT-ID	BottleID No.	open/close	leakage	remark	N/C	Pressure (db)	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Total
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	Univ. Toyama	Tokai	AIST	JAEA	NIES	JAMSTEC	Tokai Univ	Tokai	AORI	AORI	AORI	AORI	AORI	AORI	AORI	JAEA	Univ. Toyama	Univ. Toyama	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Nagasaki Univ.	Nagasaki Univ.	Nagasaki Univ.	Kochi Pref Univ	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kinki	ETH	
			Bottle Status										Ooki	Ooki	Roy Andreas	Kato	Yamashita	Otosaka (Obata)	Omori	Kumamoto (Gamo)	Minami	Minami	Takahashi	Takahashi	Obata	Obata	Kim	Suzuki	Nakayama	Okubo (Kim)	Roy Andreas	Roy Andreas	Nishioka	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Mukae (Takeda)	Isshiki	Konagaya	Konagaya	Takano	Takano	Takano	Takano	Takano	Takeda	Wetzel (Gamo)	
								Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	Chl-a	Ba	PFASs	Iodine-129	DO(Δ17O)	C-13	SS	SPM	Fe(II)	Fe(II) Oxidation	Trace Metal	Archive	Speciation	Pt&REE	N-15	Th&Pa	Trace Metals (Filtered)	Trace Metals (Unfiltered)	Dissolved Fe	Total dissolvable Fe	CDOM	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Bottole Incubation	Cr	BTM. filt	BTM. unfilt	Cu. Filt	Pb.filt	Bi.filt	Zr, Hf, Nb, Ta, filt	Zr, Hf, Nb, Ta, unfilt	Se	Si isotope	
																							Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Unfilt	Filt	Filt	Unfilt	Unfilt	Filt	Unfilt	Filt	Filt	Filt	Filt	Unfilt	Filt	Filt	
24	BD0637	12126	close	OK		N	4250			0.2						0.2																																	0.4
23	BD0636	12139	close	OK		N	4500	0.8	1.2	0.2	1					0.2																																	3.4
22	BD0635	12131	close	OK		N	4500														5																												5
21	BD0634	12136	close	OK		N	4750			0.2						0.2																																	0.4
20	BD0633	12117	close	OK		N	5000	0.8	1.2	0.2	1					0.2	1			1.5																													5.9
19	BD0632	12113	close	OK		N	5000														5																												5
18	BD0631	12099	close	OK		N	5250			0.2						0.2																																	0.4
17	BD0630	12079	close	OK		N	5500	0.8	1.2	0.2	1					0.2																																	3.4
16	BD0629	12137	close	OK		N	5500														5																												5
15	BD0628	12135	close	OK		N	Bottom	0.8	1.2	0.2	1					0.2	1			1.5																													5.9
14	BD0627	12077	close	OK		N	Bottom														5																												5
13	BD0626	12081	close	OK		C	4500																		0.7	0.7	0.7	3.5			0.5		0.2	0.2															6.5
12	BD0625	12102	close	OK		C	4500																							10																			10
11	BD0624	12125	close	OK		C	4500																																0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35			6.75
10	BD0623	12132	close	OK		C	5000															10																											10
9	BD0622	12130	close	OK		C	5000																		0.7	0.7	0.7	3.5	0.3				0.2	0.2															6.3
8	BD0621	12088	close	X		C	5000																							10																			10
7	BD0620	12110	close	OK		C	5000																																0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	7.45
6	BD0619	12101	close	OK		C	5500																		0.7	0.7	0.7	3.5			0.5		0.2	0.2															6.5
5	BD0618	12107	close	OK		C	5500																																0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35			6.75
4	BD0617	12093	close	OK		C	Bottom															10																											10
3	BD0616	12108	close	OK		C	Bottom																		0.7	0.7	0.7	3.5	0.3		0.5		0.2	0.2													0.5	0.2	7.5
2	BD0615	12116	close	OK		C	Bottom																							10																			10
1	BD0614	12112	close	OK		C	Bottom																													0.6	0.2		0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35			7.55

BD-11 Cast-2

CMS	GT-ID	BottleID No.	open/close	leakage	remark	N/C	Pressure (db)	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Total
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	Univ. Toyama	Tokai	AIST	JAEA	NIES	JAMSTEC	Tokai Univ	Tokai	AORI	AORI	AORI	AORI	AORI	AORI	AORI	JAEA	Univ. Toyama	Univ. Toyama	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Nagasaki Univ.	Nagasaki Univ.	Nagasaki Univ.	Kochi Pref Univ	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kinki	ETH	
			Bottle Status										Ooki	Ooki	Roy Andreas	Kato	Yamashita	Otosaka (Obata)	Omori	Kumamoto (Gamo)	Minami	Minami	Takahashi	Takahashi	Obata	Obata	Kim	Suzuki	Nakayama	Okubo (Kim)	Roy Andreas	Roy Andreas	Nishioka	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Mukae (Takeda)	Isshiki	Konagaya	Konagaya	Takano	Takano	Takano	Takano	Takano	Takeda	Wetzel (Gamo)	
								Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	Chl-a	Ba	PFASs	Iodine-129	DO(Δ17O)	C-13	SS	SPM	Fe(II)	Fe(II) Oxidation	Trace Metal	Archive	Speciation	Pt&REE	N-15	Th&Pa	Trace Metals (Filtered)	Trace Metals (Unfiltered)	Dissolved Fe	Total dissolvable Fe	CDOM	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Bottole incubation	Cr	BTM. filt	BTM. unfilt	Cu. Filt	Pb.filt	Bi.filt	Zr, Hf, Nb, Ta, filt	Zr, Hf, Nb, Ta, unfilt	Se	Si isotope	
																							Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Unfilt	Filt	Filt	Unfilt	Unfilt	Filt	Unfilt	Filt	Filt	Filt	Filt	Unfilt	Filt	Filt	
24	BD0661	12126	close	OK		N	2560			0.2						0.2																																	0.4
23	BD0660	12139	close	OK		N	2500	0.8	1.2	0.2	1					0.2					2																												5.4
22	BD0659	12131	close	OK		N	2750			0.2						0.2																																	0.4
21	BD0658	12136	close	OK		N	3000	0.8	1.2	0.2	1					0.2	1			1.5	5																												10.9
20	BD0657	12117	close	OK		N	3250			0.2						0.2																																	0.4
19	BD0656	12113	close	OK		N	3500	0.8	1.2	0.2	1					0.2																																	3.4
18	BD0655	12099	close	OK		N	3500														5																												5
17	BD0654	12079	close	OK		N	3750			0.2						0.2																																	0.4
16	BD0653	12137	close	OK		N	4000	0.8	1.2	0.2	1					0.2	1			1.5																													5.9
15	BD0652	12135	close	OK		N	4000														5																												5
14	BD0651	12092	close	OK		C	2500																		0.7	0.7	0.7	3.5					0.2	0.2															6
13	BD0650	12081	close	OK		C	2500																							10																			10
12	BD0649	12102	close	OK		C	2500																																0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35		0.2	6.95
11	BD0648	12125	close	OK		C	3000														2	10																											12
10	BD0647	12132	close	OK		C	3000																		0.7	0.7	0.7	3.5	0.3				0.2	0.2	0.2														6.5
9	BD0646	12130	close	OK		C	3000																							10																			10
8	BD0645	12088	close	OK		C	3000																													0.6	0.2		0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	8.25
7	BD0644	12110	close	OK		C	3500																		0.7	0.7	0.7	3.5					0.2	0.2															6
6	BD0643	12101	close	OK		C	3500																							10																			10
5	BD0642	12107	close	OK		C	3500																																0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35			6.75
4	BD0641	12093	close	OK		C	4000															10																											10
3	BD0640	12108	close	OK		C	4000																		0.7	0.7	0.7	3.5	0.3				0.2	0.2															6.3
2	BD0639	12116	close	OK		C	4000																							10																			10
1	BD0638	12112	close	OK		C	4000																																0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	7.45

BD-11 Cast-3

CMS	GT-ID	Bottle Status BottleIDNo.	open/close	leakage	remark	N/C	Pressure (db)	Deck Routine Salinity	Deck Routine DO	Deck Routine Nutrients	Deck Routine pH/Alkalinity	Deck Routine Chl.a	Deck AORI Ooki Helium	Deck AORI Ooki Tritium	Deck Univ. Toyama Roy Andreas Chl-a	Deck Tokai Kato Ba	Deck AIST Yamashita PFASs	Deck JAEA Otosaka (Obata) Iodine-129	Deck NIES Omori DO(Δ17O)	Deck JAMSTEC Kumamoto (Gamo) C-13	Deck Tokai Univ Minami SS	Deck Tokai Minami SPM	Bubble AORI Takahashi Fe(II)	Bubble AORI Takahashi Fe(II) Oxidation	Bubble AORI Obata Trace Metal	Bubble AORI Obata Archive	Bubble AORI Kim Speciation	Bubble AORI Suzuki Pt&REE	Bubble AORI Nakayama N-15	Bubble JAEA Okubo (Kim) Th&Pa	Bubble Univ. Toyama Roy Andreas Trace Metals (Filtered)	Bubble Univ. Toyama Roy Andreas Trace Metals (Unfiltered)	Bubble Hokkaido Univ ILTS Nishioka Dissolved Fe	Bubble Hokkaido Univ ILTS Nishioka Total dissolvable Fe	Bubble Hokkaido Univ ILTS Nishioka CDOM	Bubble Nagasaki Univ. Naoe (Takeda) Fe-speciation (Filtered)	Bubble Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filtered)	Bubble Nagasaki Univ. Mukae (Takeda) Bottole Incubation	Bubble Kochi Pref Univ Isshiki Cr	Bubble Kyoto Konagaya BTM. filt	Bubble Kyoto Konagaya BTM. unfilt	Bubble Kyoto Takano Cu. Filt	Bubble Kyoto Takano Pb.filt	Bubble Kyoto Takano Bi.filt	Bubble Kyoto Takano Zr, Hf, Nb, Ta, filt	Bubble Kyoto Takano Zr, Hf, Nb, Ta, unfilt	Bubble Kinki Takeda Se	Bubble ETH Wetzel (Gamo) Si isotope	Total
																							Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Unfilt	Filt	Filt	Unfilt	Unfilt	Filt	Unfilt	Filt	Filt	Filt	Filt	Unfilt	Filt	Filt	
24	BD0685	12126	close	OK		N	Chla max	0.8	1.2	0.2	1	0.6			1.6	0.2	1																																	6.6
23	BD0684	12139	close	OK		N	O2 min	0.8	1.2	0.2	1	0.6			1.6	0.2																																		5.6
22	BD0683	12131	close	OK		N	1000	0.8	1.2	0.2	1																																							3.2
21	BD0682	12136	close	OK		N	1000									0.2	1	1.5		1.5	1																													5.2
20	BD0681	12117	close	OK		N	1250	0.8	1.2	0.2	1					0.2					1																													4.4
19	BD0680	12113	close	OK		N	1500	0.8	1.2	0.2	1					0.2		1.5		1.5	1																													7.4
18	BD0679	12099	close	OK		N	1750			0.2						0.2																																		0.4
17	BD0678	12079	close	OK		N	2000	0.8	1.2	0.2	1					0.2	1			1.5																														5.9
16	BD0677	12123	close	OK		C	Chla max																0.3		0.7	0.7	0.7				~~0.5~~	0.5	0.2	0.2																3.8
15	BD0676	12120	close	OK		C	Chla max																													0.6	0.2		0.6	0.35	0.35	2.2			0.35	0.35	0.5		5.5
14	BD0675	12092	close	OK		C	O2 min																0.3		0.7	0.7	0.7				~~0.5~~	0.5	0.2	0.2	0.2				0.6	0.35	0.35	2.2			0.35	0.35	0.5		8.7
13	BD0674	12081	close	OK		C	1000															10																											10
12	BD0673	12102	close	OK		C	1000																0.3	0.7	0.7	0.7	0.7	3.5	0.3				0.2	0.2	0.2														7.5
11	BD0672	12125	close	OK		C	1000																							10																			10
10	BD0671	12132	close	OK		C	1000																													0.6	0.2		0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	8.25
9	BD0670	12130	close	OK		C	1250																		0.7	0.7	0.7						0.2	0.2															2.5
8	BD0669	12088	close	OK		C	1250																																0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5		7.25
7	BD0668	12110	close	OK		C	1500																		0.7	0.7	0.7	3.5	0.3				0.2	0.2															6.3
6	BD0667	12101	close	OK		C	1500																							10																			10
5	BD0666	12107	close	OK		C	1500																																0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	7.45
4	BD0665	12093	close	OK		C	2000														2	10																											12
3	BD0664	12108	close	OK		C	2000																		0.7	0.7	0.7	3.5	0.3				0.2	0.2	0.2														6.5
2	BD0663	12116	close	OK		C	2000																							10																			10
1	BD0662	12112	close	OK		C	2000																																0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	7.45

BD-11 Cast-4

CMS	GT-ID	Bottle Status BottleIDNo.	open/close	leakage	remark	N/C	Pressure (db)	Deck Routine Salinity	Deck Routine DO	Deck Routine Nutrients	Deck Routine pH/Alkalinity	Deck Routine Chl.a	Deck AORI Ooki Helium	Deck AORI Ooki Tritium	Deck Univ. Toyama Roy Andreas Chl-a	Deck Tokai Kato Ba	Deck AIST Yamashita PFASs	Deck JAEA Otosaka (Obata) Iodine-129	Deck NIES Omori DO(Δ17O)	Deck JAMSTEC Kumamoto (Gamo) C-13	Deck Tokai Univ Minami SS	Deck Tokai Minami SPM	Bubble AORI Takahashi Fe(II)	Bubble AORI Takahashi Fe(II) Oxidation	Bubble AORI Obata Trace Metal	Bubble AORI Obata Archive	Bubble AORI Kim Speciation	Bubble AORI Suzuki Pt&REE	Bubble AORI Nakayama N-15	Bubble JAEA Okubo (Kim) Th&Pa	Bubble Univ. Toyama Roy Andreas Trace Metals (Filtered)	Bubble Univ. Toyama Roy Andreas Trace Metals (Unfiltered)	Bubble Hokkaido Univ ILTS Nishioka Dissolved Fe	Bubble Hokkaido Univ ILTS Nishioka Total dissolvable Fe	Bubble Hokkaido Univ ILTS Nishioka CDOM	Bubble Nagasaki Univ. Naoe (Takeda) Fe-speciation (Filtered)	Bubble Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filtered)	Bubble Nagasaki Univ. Mukae (Takeda) Bottole Incubation	Bubble Kochi Pref Univ Isshiki Cr	Bubble Kyoto Konagaya BTM. filt	Bubble Kyoto Konagaya BTM. unfilt	Bubble Kyoto Takano Cu. Filt	Bubble Kyoto Takano Pb.filt	Bubble Kyoto Takano Bi.filt	Bubble Kyoto Takano Zr, Hf, Nb, Ta, filt	Bubble Kyoto Takano Zr, Hf, Nb, Ta, unfilt	Bubble Kinki Takeda Se	Bubble ETH Wetzel (Gamo) Si isotope	Total
																							Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Unfilt	Filt	Filt	Unfilt	Unfilt	Filt	Unfilt	Filt	Filt	Filt	Filt	Unfilt	Filt	Filt	
24	BD0709	12126	close	OK		N	150	0.8	1.2	0.2	1	0.6				0.2		1.5			1																													6.5
23	BD0708	12139	close	OK		N	200	0.8	1.2	0.2	1	0.6				0.2	1	1.5		1.5																														8
22	BD0707	12131	close	OK		N	400	0.8	1.2	0.2	1				0.6	0.2		1.5		1.5	1																													8
21	BD0706	12136	close	OK		N	500			0.2						0.2	1																																	1.4
20	BD0705	12117	close	OK		N	600	0.8	1.2	0.2	1					0.2	1	1.5		1.5																														7.4
19	BD0704	12113	close	OK		N	800	0.8	1.2	0.2	1					0.2		1.5			1																													5.9
18	BD0703	12098	close	OK		C	150															10																											10
17	BD0702	12133	close	OK		C	150																0.3		0.7	0.7	0.7						0.2	0.2															2.8
16	BD0701	12123	close	OK		C	150																																0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	7.45
15	BD0700	12120	close	OK		C	200														1	10																											11
14	BD0699	12092	close	OK		C	200																0.3	0.7	0.7	0.7	0.7	3.5	0.3				0.2	0.2															7.3
13	BD0698	12081	close	OK		C	200																							10																			10
12	BD0697	12102	close	OK		C	200																													0.6	0.2		0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	8.25
11	BD0696	12125	close	OK		C	400															10																											10
10	BD0695	12132	close	OK		C	400																0.3		0.7	0.7	0.7	3.5	0.3		~~0.5~~	0.5	0.2	0.2	0.2														7.8
9	BD0694	12130	close	OK		C	400																							10																			10
8	BD0693	12088	close	OK		C	400																													0.6	0.2		0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	8.25
7	BD0692	12110	close	OK		C	600														1	10																											11
6	BD0691	12101	close	OK		C	600																0.3		0.7	0.7	0.7	3.5	0.3				0.2	0.2															6.6
5	BD0690	12107	close	OK		C	600																							10																			10
4	BD0689	12093	close	OK		C	600																																0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	7.45
3	BD0688	12108	close	OK		C	800															10																											10
2	BD0687	12116	close	OK		C	800																0.3		0.7	0.7	0.7	3.5					0.2	0.2															6.3
1	BD0686	12112	close	OK		C	800																																0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5		7.25

BD-11 Cast-5

								Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	Univ. Toyama	Tokai	AIST	JAEA	NIES	JAMSTEC	Tokai Univ	Tokai	AORI	AORI	AORI	AORI	AORI	AORI	AORI	JAEA	Univ. Toyama	Univ. Toyama	Hokkaido Univ	Hokkaido Univ	Hokkaido Univ	Nagasaki Univ.	Nagasaki Univ.	Nagasaki Univ.	Kochi Pref Univ	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kinki	ETH	
		Bottle Status											Ooki	Ooki	Roy Andreas	Kato	Yamashita	Otosaka (Obata)	Omori	Kumamoto (Gamo)	Minami	Minami	Takahashi	Takahashi	Obata	Obata	Kim	Suzuki	Nakayama	Okubo (Kim)	Roy Andreas	Roy Andreas	Nishioka	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Mukae (Takeda)	Isshiki	Konagaya	Konagaya	Takano	Takano	Takano	Takano	Takano	Takeda	Wetzel (Gamo)	
CMS	GT-ID	BottleIDNo.	open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	Chl-a	Ba	PFASs	Iodine-129	DO(Δ17O)	C-13	SS	SPM	Fe(II)	Fe(II) Oxidation	Trace Metal	Archive	Speciation	Pt&REE	N-15	Th&Pa	Trace Metals (Filter	Trace Metals (Unfilt	Dissolved Fe	Total dissolvable	CDOM	Fe-speciation	Dissolved Fe (Filter	Bottole Incuba	Cr	BTM. filt	BTM. unfilt	Cu. Filt	Pb.filt	Bi.filt	Zr, Hf, Nb, Ta, filt	Zr, Hf, Nb, Ta, unfilt	Se	Si isotope	Total
																							Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Unfilt	Filt	Filt	Unfilt	Unfilt	Filt	Unfilt	Filt	Filt	Filt	Filt	Unfilt	Filt	Filt	
25	BD0733	–	–	–		bucke	0	0.8	1.2	0.2	1	0.6					1	1.5			1																										0.5		7.8
24	BD0732	12126	close	OK		N	5	0.8	1.2	0.2	1	0.6							1																														4.8
23	BD0731	12139	close	OK		N	10	0.8	1.2	0.2	1	0.6			0.6	0.2	1		1	1.5																													8.1
22	BD0730	12131	close	OK		N	25	0.8	1.2	0.2	1	0.6				0.2			1		1																												6
21	BD0729	12136	close	OK		N	50	0.8	1.2	0.2	1	0.6			0.6	0.2	1	1.5	1																														8.1
20	BD0728	12117	close	OK		N	100	0.8	1.2	0.2	1	0.6				0.2	1	1.5		1.5																													8
19	BD0727	12113	close	OK		N	300			0.2						0.2	1																																1.4
18	BD0726	12098	close	OK		C	10														1	10																											11
17	BD0725	12133	close	OK		C	10																0.3	0.7	0.7	0.7	0.7	3.5	0.3		~~0.5~~	0.5	0.2	0.2				0.2											8.5
16	BD0724	12123	close	OK		C	10																							10																			10
15	BD0723	12120	close	OK		C	10																													0.6	0.2		0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	8.25
14	BD0722	12092	close	OK		C	10																															12											12
13	BD0721	12081	close	OK		C	10																															12											12
12	BD0720	12102	close	OK		C	25															10																											10
11	BD0719	12125	close	OK		C	25																0.3		0.7	0.7	0.7						0.2	0.2															2.8
10	BD0718	12132	close	OK		C	25																																0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5		7.25
9	BD0717	12130	close	OK		C	50														1	10																											11
8	BD0716	12088	close	OK		C	50																0.3		0.7	0.7	0.7	3.5					0.2	0.2	0.2														6.5
7	BD0715	12110	close	OK		C	50																							10																			10
6	BD0714	12101	close	OK		C	50																																0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5		7.25
5	BD0713	12107	close	OK		C	100														1	10																											11
4	BD0712	12093	close	OK		C	100																0.3		0.7	0.7	0.7	3.5	0.3				0.2	0.2	0.2														6.8
3	BD0711	12108	close	OK		C	100																							10																			10
2	BD0710	12116	close	OK		C	100																													0.6	0.2		0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	8.25
1	X	12112	close	OK		C	100																																										0

BD-11 Ex-1

								Routine	NIES	Hokkaido Univ ILTS	
		Bottle Status							Omori	Nishioka	
	GT-ID	BottleIDNo.	open/close	leakage	remark	N/C	Pressure (db)	DO	DO(Δ17O)		Total
							bucket				0
24	BD0737	12126	close	OK		N	5	1.2	1		2.2
23	X	12139	close			N	5				0
22	BD0736	12131	close	OK		N	10	1.2	1		2.2
21	X	12136	close			N	10				0
20	BD0735	12117	close	OK		N	25	1.2	1		2.2
19	X	12113	close			N	25				0
18	BD0734	12099	close	OK		N	50	1.2	1		2.2
17	X	12079	close			N	50				0
16	X	12137	close			N	10				12
15	X	12135	close			N	10				12
14	X	12077	close			N	10				12
13	X	12115	close			N	10				12
12	X	12124	close			N	10				12
11	X	12125	close			C	10			~~12~~	12
10	X	12132	close			C	10			~~12~~	12
9	X	12130	close			C	10			~~12~~	12
8	X	12088	close			C	10			~~12~~	12
7	X	12110	close			C	10			~~12~~	12
6	X	12101	close			C	10			~~12~~	12
5	X	12107	close			C	10			~~12~~	12
4	X	12093	close			C	10			~~12~~	12
3	X	12108	close			C	10			~~12~~	12
2	X	12116	close			C	10			~~12~~	12
1	X	12112	close			C	10			~~12~~	12

BD-12 Cast-1

CMS	GT-ID	BottleID No.	open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	Chl-a	Ba	PFASs	Fe(II)	Fe(II) Oxidation	Trace Metal	Archive	Trace Metals	Trace Metals (Unfilt)	Dissolved Fe	CDOM	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Bottole Incubation	Bottole Incubation	Cr	BTM. filt	BTM. unfilt	Total
		Bottle Status						Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	Univ. Toyama	Tokai	AIST	AORI	AORI	AORI	AORI	Univ. Toyama	Univ. Toyama	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Nagasaki Univ.	Nagasaki Univ.	Nagasaki Univ.	Nagasaki Univ.	Kochi Pref Univ	Kyoto	Kyoto	
													Ooki	Ooki	Roy Andreas	Kato	Yamashita	Takahashi	Takahashi	Obata	Obata	Roy Andreas	Roy Andreas	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Mukae (Takeda)	Mukae (Takeda)	Isshiki	Konagaya	Konagaya	
																		Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Unfilt	Unfilt	Unfilt	Filt	Unfilt	
25	BD0762	–	–	–	–	bucke	0	0.8	1.2	0.2	1	0.6																					
24	BD0761	12126	close	OK	2-24	N	10	0.8	1.2	0.2	1	0.6				0.2	1																5
23	BD0760	12139	close	OK	2-23	N	50	0.8	1.2	0.2	1	0.6				0.2	1																5
22	BD0759	12131	close	OK	2-22	N	100	0.8	1.2	0.2	1	0.6				0.2	1																5
21	BD0758	12136	close	OK	2-20	N	200	0.8	1.2	0.2	1	0.6				0.2	1																5
20	BD0757	12117	close	OK	2-8	N	400	0.8	1.2	0.2	1					0.2																	3.4
19	BD0756	12113	close	OK	2-7	N	600	0.8	1.2	0.2	1					0.2	1																4.4
18	BD0755	12099	close	OK		N	5000	0.8	1.2	0.2	1					0.2	1																4.4
17	BD0754	12079	close	OK	2-6	N	800	0.8	1.2	0.2	1					0.2																	3.4
16	BD0753	12137	close	OK	2-17	N	1000	0.8	1.2	0.2	1					0.2	1																4.4
15	BD0752	12135	close	OK		N	6000	0.8	1.2	0.2	1					0.2	1																4.4
14	BD0751	12077	close	OK	2-2	N	1500	0.8	1.2	0.2	1					0.2																	3.4
13	BD0750	12115	close	OK	2-1	N	2000	0.8	1.2	0.2	1					0.2	1																4.4
12	BD0749	12124	close	OK		N	Bottom	0.8	1.2	0.2	1					0.2	1																4.4
11	BD0748	12125	close	OK		C	2500	0.8	1.2	0.2	1					0.2				0.7	0.7			0.2						0.2	~~0.35~~	~~0.35~~	5.9
10	BD0747	12132	close	OK		C	3000	0.8	1.2	0.2	1					0.2	1			0.7	0.7			0.2	0.2					0.2	~~0.35~~	~~0.35~~	7.1
9	BD0746	12130	close	OK		C	3500	0.8	1.2	0.2	1					0.2				0.7	0.7			0.2						0.2	~~0.35~~	~~0.35~~	5.9
8	BD0745	12088	close	OK		C	4000	0.8	1.2	0.2	1					0.2	1			0.7	0.7			0.2						0.2	~~0.35~~	~~0.35~~	6.9
7	BD0744	12110	close	OK		C	4500	0.8	1.2	0.2	1					0.2				0.7	0.7		0.5	0.2						0.2	~~0.35~~	~~0.35~~	6.4
6	BD0743	12101	close			C	5000												0.7	0.7	0.7			0.2						0.2	~~0.35~~	~~0.35~~	3.2
5	BD0742	12107	close	OK		C	5500	0.8	1.2	0.2	1					0.2				0.7	0.7			0.2						0.2	~~0.35~~	~~0.35~~	5.9
4	BD0741	12093	close			C	6000													0.7	0.7			0.2						0.2	~~0.35~~	~~0.35~~	2.5
3	BD0740	12108	close	OK		C	6500	0.8	1.2	0.2	1					0.2				0.7	0.7			0.2						0.2	~~0.35~~	~~0.35~~	5.9
2	BD0739	12116	close	OK		C	7000	0.8	1.2	0.2	1					0.2	1		0.7	0.7	0.7			0.2						0.2	~~0.35~~	~~0.35~~	7.6
1	BD0738	12112	close			C	Bottom												0.7	0.7	0.7		0.5	0.2						0.2	~~0.35~~	~~0.35~~	3.7

BD-12 Cast-2

CMS	GT-ID	BottleID No.	open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	Chl-a	Ba	PFASs	Fe(II)	Fe(II) Oxidation	Trace Metal	Archive	Trace Metals	Trace Metals (Unfilt)	Dissolved Fe	CDOM	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Bottole Incubation	Bottole Incubation	Cr	BTM. filt	BTM. unfilt	Total
		Bottle Status						Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	Univ. Toyama	Tokai	AIST	AORI	AORI	AORI	AORI	Univ. Toyama	Univ. Toyama	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Nagasaki Univ.	Nagasaki Univ.	Nagasaki Univ.	Nagasaki Univ.	Kochi Pref Univ	Kyoto	Kyoto	
													Ooki	Ooki	Roy Andreas	Kato	Yamashita	Takahashi	Takahashi	Obata	Obata	Roy Andreas	Roy Andreas	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Mukae (Takeda)	Mukae (Takeda)	Isshiki	Konagaya	Konagaya	
																		Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Unfilt	Unfilt	Unfilt	Filt	Unfilt	
25	X					bucke	0	~~0.8~~	~~1.2~~	~~0.2~~	~~1~~	~~0.6~~					~~1~~																4.8
24	BD0783	12126	close	X		N	10	~~0.8~~	~~1.2~~	~~0.2~~	~~1~~	~~0.6~~			0.6	~~0.2~~	~~1~~																5.6
23	BD0782	12139	close	OK		N	50	~~0.8~~	~~1.2~~	~~0.2~~	~~1~~	~~0.6~~			0.6	~~0.2~~	~~1~~																5.6
22	X	12131	close	OK		N	100	~~0.8~~	~~1.2~~	~~0.2~~	~~1~~	~~0.6~~				~~0.2~~	~~1~~																5
21	BD0781	12136	close	OK		N	Chla max	0.8	1.2	0.2	1	0.6			1.6	0.2	1																6.6
20	X	12117	close	OK		N	200	~~0.8~~	~~1.2~~	~~0.2~~	~~1~~	~~0.6~~				~~0.2~~	~~1~~																5
19	BD0780	12113	close	OK		N	300									0.2	1																1.2
18	BD0779	12099	close	OK		N	O2 min	0.8	1.2	0.2	1	0.6			1.6	0.2																	5.6
17	X	12079	close	OK		N	1000	~~0.8~~	~~1.2~~	~~0.2~~	~~1~~	~~0.6~~				~~0.2~~	~~1~~																5
16	BD0778	12137	close	OK		N	1750			0.2						0.2																	0.4
15	BD0777	12120	close	OK		C	10											0.3	0.7	0.7	0.7		~~0.5~~	0.2						0.2	~~0.35~~	~~0.35~~	4
14	BD0776	12092	close	OK		C	25	0.8	1.2	0.2	1	0.6				0.2		~~0.3~~		0.7	0.7			0.2						0.2	~~0.35~~	~~0.35~~	6.8
13	BD0775	12081	close	OK		C	50											0.3		0.7	0.7			0.2	0.2					0.2	~~0.35~~	~~0.35~~	3
12	BD0774	12102	close	OK		C	100											0.3		0.7	0.7			0.2	0.2					0.2	~~0.35~~	~~0.35~~	3
11	BD0773	12125	close	OK		C	Chla max											0.3		0.7	0.7		0.5	0.2						0.2	~~0.35~~	~~0.35~~	3.3
10	BD0772	12132	close	OK		C	150	0.8	1.2	0.2	1	0.6				0.2		~~0.3~~		0.7	0.7			0.2						0.2	~~0.35~~	~~0.35~~	6.8
9	BD0771	12130	close	OK		C	200											0.3	0.7	0.7	0.7			0.2						0.2	~~0.35~~	~~0.35~~	3.5
8	BD0770	12088	close	OK		C	400	~~0.8~~	~~1.2~~	~~0.2~~	~~1~~				0.6	0.2		0.3		0.7	0.7		~~0.5~~	0.2	0.2					0.2	~~0.35~~	~~0.35~~	7.5
7	BD0769	12110	close	OK		C	600	~~0.8~~	~~1.2~~	~~0.2~~	~~1~~					0.2	1	0.3		0.7	0.7			0.2						0.2	~~0.35~~	~~0.35~~	7.2
6	BD0768	12101	close	OK		C	800	~~0.8~~	~~1.2~~	~~0.2~~	~~1~~					0.2		0.3		0.7	0.7			0.2						0.2	~~0.35~~	~~0.35~~	6.2
5	BD0767	12107	close	OK		C	O2 min											0.3		0.7	0.7		0.5	0.2	0.2					0.2	~~0.35~~	~~0.35~~	3.5
4	BD0766	12093	close	L		C	1000											0.3	0.7	0.7	0.7			0.2	0.2					0.2	~~0.35~~	~~0.35~~	3.7
3	BD0765	12108	close	OK		C	1250	0.8	1.2	0.2	1					0.2				0.7	0.7			0.2						0.2	~~0.35~~	~~0.35~~	5.9
2	BD0764	12116	close	L		C	1500	~~0.8~~	~~1.2~~	~~0.2~~	~~1~~					~~0.2~~				0.7	0.7			0.2						0.2	~~0.35~~	~~0.35~~	5.9
1	BD0763	12112	close	OK		C	2000	~~0.8~~	~~1.2~~	~~0.2~~	~~1~~					~~0.2~~	~~1~~			0.7	0.7			0.2	0.2					0.2	~~0.35~~	~~0.35~~	7.1

BD-13 Cast-1

CMS	GT-ID	Bottle Status: BottleIDNo.	Bottle Status: open/close	Bottle Status: leakage	Bottle Status: remark	N/C	Pressure (db)	Deck Routine Salinity	Deck Routine DO	Deck Routine Nutrients	Deck Routine pH/Alkalinity	Deck Routine Chl.a	Deck AORI Ooki Helium	Deck AORI Ooki Tritium	Deck Univ. Toyama Roy Andreas Chl-a	Deck Tokai Kato Ba	Deck AIST Yamashita PFASs	Bubble AORI Takahashi Fe(Ⅱ)	Bubble AORI Takahashi Fe(Ⅱ) Oxidation	Bubble AORI Obata Trace Metal	Bubble AORI Obata Archive	Bubble Univ. Toyama Roy Andreas Trace Metals	Bubble Univ. Toyama Roy Andreas Trace Metals (Unfilt)	Bubble Hokkaido Univ ILTS Nishioka Dissolved Fe	Bubble Hokkaido Univ ILTS Nishioka CDOM	Bubble Nagasaki Univ. Naoe (Takeda) Fe-speciation (Filtered)	Bubble Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filtered)	Bubble Nagasaki Univ. Mukae (Takeda) Bottole Incubation	Bubble Nagasaki Univ. Mukae (Takeda) Bottole Incubation	Bubble Kochi Pref Univ Isshiki Cr	Bubble Kyoto Konagaya BTM. filt	Bubble Kyoto Konagaya BTM. unfilt	Bubble Kyoto Takano Mo (3側点のみ).filt	Bubble Kyoto Takano Pd, Pt, Au(3側点のみ).filt	Bubble ETH Wetzel (Gamo) Si isotope	Total
																		Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Unfilt	Unfilt	Unfilt	Filt	Unfilt	Filt	Filt	Filt	
24	BD0804	12126	close	OK		N	2250			0.2						0.2																				0.4
23	BD0803	12139	close	OK		N	2500	0.8	1.2	0.2	1					0.2																				3.4
22	BD0802	12131	close	OK		N	2750			0.2						0.2																				0.4
21	BD0801	12136	close	OK		N	3000	0.8	1.2	0.2	1					0.2																				3.4
20	BD0800	12117	close	OK		N	3250			0.2						0.2																				0.4
19	BD0799	12113	close	OK		N	3500	0.8	1.2	0.2	1					0.2																				3.4
18	BD0798	12099	close	OK		N	3750			0.2						0.2																				0.4
17	BD0797	12079	close	OK		N	4000	0.8	1.2	0.2	1					0.2																				3.4
16	BD0796	12137	close	OK		N	4250			0.2						0.2																				0.4
15	BD0795	12135	close	OK		N	4500	0.8	1.2	0.2	1					0.2																				3.4
14	BD0794	12077	close	OK		N	4750			0.2						0.2																				0.4
13	BD0793	12115	close	OK		N	5000	0.8	1.2	0.2	1					0.2																				3.4
12	X	12124	open	−	Trigger	N	Bottom	~~0.8~~	~~1.2~~	~~0.2~~	~~1~~					~~0.2~~																				3.4
11	BD0792	12125	close	OK		C	2500													0.7	0.7			0.2						0.2	0.35	0.35	0.35	4.2	0.2	7.25
10	BD0791	12132	close	OK		C	3000													0.7	0.7			0.2	0.2					0.2	0.35	0.35	0.35	4.2	0.2	7.45
9	BD0790	12130	close	OK		C	3500													0.7	0.7			0.2						0.2	0.35	0.35	0.35	4.2		7.05
8	X	12088	close	OK		C	4000													0.7	0.7			0.2												1.6
7	BD0789	12110	close	OK		C	4000													~~0.7~~	~~0.7~~			~~0.2~~						0.2	0.35	0.35	0.35	4.2	0.2	7.25
6	BD0788	12101	close	OK		C	4500													0.7	0.7			0.2												1.6
5	BD0787	12107	close	OK		C	4500																							0.2	0.35	0.35	0.35	4.2		5.45
4	X	12093	close	OK		C	5000													~~0.7~~	~~0.7~~			~~0.2~~												1.6
3	BD0786	12108	close	OK		C	5000													0.7	0.7			0.2						0.2	0.35	0.35	0.35	4.2	0.2	7.25
2	BD0785	12116	close	OK		C	Bottom											0.3	0.7	0.7	0.7			0.2						0.2	0.35	0.35	0.35	4.2	0.2	8.25
1	BD0784	12112	close	OK		C	Bottom	0.8	1.2	0.2	1					0.2														~~0.2~~	~~0.35~~	~~0.35~~	~~0.35~~	~~4.2~~	~~0.2~~	9.05

BD-13 Cast-2

CMS	GT-ID	Bottle Status: BottleIDNo.	Bottle Status: open/close	Bottle Status: leakage	Bottle Status: remark	N/C	Pressure (db)	Deck Routine Salinity	Deck Routine DO	Deck Routine Nutrients	Deck Routine pH/Alkalinity	Deck Routine Chl.a	Deck AORI Ooki Helium	Deck AORI Ooki Tritium	Deck Univ. Toyama Roy Andreas Chl-a	Deck Tokai Kato Ba	Deck AIST Yamashita PFASs	Bubble AORI Takahashi Fe(Ⅱ)	Bubble AORI Takahashi Fe(Ⅱ) Oxidation	Bubble AORI Obata Trace Metal	Bubble AORI Obata Archive	Bubble Univ. Toyama Roy Andreas Trace Metals	Bubble Univ. Toyama Roy Andreas Trace Metals (Unfilt)	Bubble Hokkaido Univ ILTS Nishioka Dissolved Fe	Bubble Hokkaido Univ ILTS Nishioka CDOM	Bubble Nagasaki Univ. Naoe (Takeda) Fe-speciation (Filtered)	Bubble Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filtered)	Bubble Nagasaki Univ. Mukae (Takeda) Bottole Incubation	Bubble Nagasaki Univ. Mukae (Takeda) Bottole Incubation	Bubble Kochi Pref Univ Isshiki Cr	Bubble Kyoto Konagaya BTM. filt	Bubble Kyoto Konagaya BTM. unfilt	Bubble Kyoto Takano Mo (3側点のみ).filt	Bubble Kyoto Takano Pd, Pt, Au(3側点のみ).filt	Bubble ETH Wetzel (Gamo) Si isotope	Total
																		Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Unfilt	Unfilt	Unfilt	Filt	Unfilt	Filt	Filt	Filt	
24	BD0819	12126	close	OK		N	400	0.8	1.2	0.2	1				0.6	0.2																				4
23	BD0818	12139	close	OK		N	600	0.8	1.2	0.2	1					0.2																				3.4
22	BD0817	12131	close	OK		N	800	0.8	1.2	0.2	1					0.2																				3.4
21	BD0816	12136	close	OK		N	1000	0.8	1.2	0.2	1					0.2																				3.4
20	BD0815	12117	close	OK		N	1250	0.8	1.2	0.2	1					0.2																				3.4
19	BD0814	12113	close	OK		N	1500	0.8	1.2	0.2	1					0.2																				3.4
18	BD0813	12099	close	OK		N	1750			0.2						0.2																				0.4
17	BD0812	12079	close	OK		N	2000	0.8	1.2	0.2	1					0.2																				3.4
16	BD0811	12123	close	OK		C	400											0.3		0.7	0.7			0.2	0.2					0.2	0.35	0.35	0.35	4.2	0.2	7.75
15	X	12120	close			C	400																							~~0.2~~	~~0.35~~	~~0.35~~	~~0.35~~	~~4.2~~	~~0.2~~	5.65
14	BD0810	12092	close	OK		C	600											0.3		0.7	0.7			0.2						0.2	0.35	0.35	0.35	4.2	0.2	7.55
13	X	12081	close			C	600																							~~0.2~~	~~0.35~~	~~0.35~~	~~0.35~~	~~4.2~~	~~0.2~~	5.65
12	BD0809	12102	close	OK		C	800											0.3		0.7	0.7			0.2						0.2	0.35	0.35	0.35	4.2	0.2	7.55
11	X	12125	close			C	800																							~~0.2~~	~~0.35~~	~~0.35~~	~~0.35~~	~~4.2~~	~~0.2~~	5.65
10	BD0808	12132	close	OK		C	1000											0.3	0.7	0.7	0.7			0.2	0.2	0.6	0.2			0.2	0.35	0.35	0.35	4.2	0.2	9.25
9	X	12130	close			C	1000																							~~0.2~~	~~0.35~~	~~0.35~~	~~0.35~~	~~4.2~~	~~0.2~~	5.65
8	X	12088	close			C	1000																													0
7	BD0807	12110	close	OK		C	1250													0.7	0.7			0.2						0.2	0.35	0.35	0.35	4.2	0.2	7.25
6	X	12101	close			C	1250																							~~0.2~~	~~0.35~~	~~0.35~~	~~0.35~~	~~4.2~~	~~0.2~~	5.65
5	BD0806	12107	close	OK		C	1500													0.7	0.7			0.2						0.2	0.35	0.35	0.35	4.2	0.2	7.25
4	X	12093	close			C	1500																							~~0.2~~	~~0.35~~	~~0.35~~	~~0.35~~	~~4.2~~	~~0.2~~	5.65
3	BD0805	12108	close	OK		C	2000													0.7	0.7			0.2	0.2					0.2	0.35	0.35	0.35	4.2	0.2	7.45
2	X	12116	close			C	2000																													0
1	X	12112	close			C	2000																							~~0.2~~	~~0.35~~	~~0.35~~	~~0.35~~	~~4.2~~	~~0.2~~	5.65

BD-13 Cast-3

CMS	GT-ID	BottleID No.	open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	Chl-a	Ba	PFASs	Fe(II)	Fe(II) Oxidation	Trace Metal	Archive	Trace Metals	Trace Metals (Unfilt)	Dissolved Fe	CDOM	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Bottole Incubation	Bottole Incubation	Cr	BTM. filt	BTM. unfilt	Mo (3側点のみ).filt	Pd, Pt, Au(3側点のみ).filt	Si isotope	Total
		Bottle Status						Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	Univ. Toyama	Tokai	AIST	AORI	AORI	AORI	AORI	Univ. Toyama	Univ. Toyama	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Nagasaki Univ.	Nagasaki Univ.	Nagasaki Univ.	Nagasaki Univ.	Kochi Pref Univ	Kyoto	Kyoto	Kyoto	Kyoto	ETH	
													Ooki	Ooki	Roy Andreas	Kato	Yamashita	Takahashi	Takahashi	Obata	Obata	Roy Andreas	Roy Andreas	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Mukae (Takeda)	Mukae (Takeda)	Isshiki	Konagaya	Konagaya	Takano	Takano	Wetzel (Gamo)	
																		Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Unfilt	Unfilt	Unfilt	Filt	Unfilt	Filt	Filt	Filt	
25	BD0837	–	–	–		–	bucket	0.8	1.2	0.2	1	0.6																								3.8
24	BD0836	12126	close	OK		N	10	0.8	1.2	0.2	1	0.6			0.6	0.2																				4.6
23	BD0835	12139	close	OK		N	25	0.8	1.2	0.2	1	0.6				0.2																				4
22	BD0834	12131	close	OK		N	50	0.8	1.2	0.2	1	0.6			0.6	0.2																				4.6
21	BD0833	12136	close	OK		N	100	0.8	1.2	0.2	1	0.6				0.2																				4
20	BD0832	12117	close	OK		N	Chla max	0.8	1.2	0.2	1	0.6			1.6	0.2																				5.6
19	BD0831	12113	close	OK		N	O2 min	0.8	1.2	0.2	1	0.6			1.6	0.2																				5.6
18	BD0830	12099	close	OK		N	150	0.8	1.2	0.2	1	0.6				0.2																				4
17	BD0829	12079	close	OK		N	200	0.8	1.2	0.2	1	0.6				0.2																				4
16	BD0828	12137	close	OK		N	300			0.2						0.2																				0.4
15	BD0827	12120	close	OK		C	10											0.3	0.7	0.7	0.7			0.2		0.6	0.2			0.2	0.35	0.35	0.35	4.2	0.2	9.05
14	X	12092	close			C	10																							~~0.2~~	~~0.35~~	~~0.35~~	~~0.35~~	~~4.2~~	~~0.2~~	5.65
13	BD0826	12081	close	OK		C	25											0.3		0.7	0.7			0.2						0.2	0.35	0.35	0.35	4.2		7.35
12	X	12102	close			C	25																							~~0.2~~	~~0.35~~	~~0.35~~	~~0.35~~	~~4.2~~		5.45
11	BD0825	12125	close	OK		C	50											0.3		0.7	0.7			0.2	0.2					0.2	0.35	0.35	0.35	4.2		7.55
10	BD0824	12132	close	OK		C	100											0.3		0.7	0.7			0.2	0.2					0.2	0.35	0.35	0.35	4.2	0.2	7.75
9	X	12130	close			C	100																							~~0.2~~	~~0.35~~	~~0.35~~	~~0.35~~	~~4.2~~	~~0.2~~	5.65
8	BD0823	12088	close	OK		C	Chla max											0.3		0.7	0.7			0.2		0.6	0.2			0.2	0.35	0.35	0.35	4.2		8.15
7	X	12110	close			C	Chla max																							~~0.2~~	~~0.35~~	~~0.35~~	~~0.35~~	~~4.2~~		5.45
6	BD0822	12101	close	OK	800m	C	O2 min											0.3		0.7	0.7			0.2	0.2					0.2	0.35	0.35	0.35	4.2		7.55
5	X	12107	close		800m	C	O2 min																							~~0.2~~	~~0.35~~	~~0.35~~	~~0.35~~	~~4.2~~		5.45
4	BD0821	12093	close	OK		C	150											0.3		0.7	0.7			0.2						0.2	0.35	0.35	0.35	4.2	0.2	7.55
3	X	12108	close			C	150																							~~0.2~~	~~0.35~~	~~0.35~~	~~0.35~~	~~4.2~~	~~0.2~~	5.65
2	BD0820	12116	close	OK		C	200											0.3	0.7	0.7	0.7			0.2						0.2	0.35	0.35	0.35	4.2	0.2	8.25
1	X	12112	close			C	200																							~~0.2~~	~~0.35~~	~~0.35~~	~~0.35~~	~~4.2~~	~~0.2~~	5.65

BD-14 Cast-1

CMS	GT-ID	BottleID No.	Bottle Status open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	Chl-a	Ba	PFASs	Iodine-129	DO(Δ17O)	C-13	SS	SPM	Fe(II)	Fe(II) Oxidation	Trace Metal	Archive	Speciation	Pt&REE	Th&Pa	Trace Metals	Trace Metals	Dissolved Fe	Total dissolvable Fe	CDOM	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Cr	BTM. filt	BTM. unfilt	Cu. Filt	Pb.filt	Bi.filt	Zr, Hf, Nb, Ta, filt	Zr, Hf, Nb, Ta, unfilt	Se	Si isotope	N-15	Total
								Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	Univ. Toyama	Tokai	AIST	JAEA	NIES	JAMSTEC	Tokai Univ	Tokai	AORI	AORI	AORI	AORI	AORI	AORI	JAEA	Univ. Toyama	Univ. Toyama	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Nagasaki Univ.	Nagasaki Univ.	Kochi Pref Univ	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kinki	ETH	AORI	
													Ooki	Ooki	Roy Andreas	Kato	Yamashita	Otosaka (Obata)	Omori	Kumamoto (Gamo)	Minami	Minami	Takahashi	Takahashi	Obata	Obata	Kim	Suzuki	Okubo (Kim)	Roy Andreas	Roy Andreas	Nishioka	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Isshiki	Konagaya	Konagaya	Takano	Takano	Takano	Takano	Takano	Takeda	Wetzel (Gamo)	Nakayama	
																					Unfilt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Fillt	Unfilt	Unfilt	Fillt	Fillt	Unfilt	Fillt	Unfilt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Fillt	Filt	
24	BD0861	12126	close	OK		N	4250			0.2						0.2																																0.4
23	BD0860	12139	close	OK		N	4500	0.8	1.2	0.2	1					0.2																																3.4
22	BD0859	12131	close	OK		N	4500														5																											5
21	BD0858	12136	close	OK		N	4750			0.2						0.2																																0.4
20	BD0857	12117	close	OK		N	5000	0.8	1.2	0.2	1		1			0.2	1			1.5																												6.9
19	BD0856	12113	close	OK		N	5000														5																											5
18	BD0855	12099	close	OK		N	5250			0.2						0.2																																0.4
17	BD0854	12079	close	OK		N	5500	0.8	1.2	0.2	1					0.2					5																											8.4
16	BD0853	12137	close	OK		N	Bottom	0.8	1.2	0.2	1		1		~~1~~	0.2	1			1.5																												7.9
15	BD0852	12135	close	OK		N	Bottom														5																											5
14	BD0851	12092	close	L		C	4500																		0.7	0.7	0.7	3.5		0.5	0.5	0.2	0.2															7
13	BD0850	12081	close	L		C	4500																						10																			10
12	BD0849	12102	close	OK		C	4500																														0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35				6.75
11	BD0848	12125	close	OK		C	5000															~~10~~																										10
10	BD0847	12132	close	OK		C	5000																		0.7	0.7	0.7	3.5				0.2																5.8
9	BD0846	12130	close	OK		C	5000																						10																			10
8	BD0845	12088	close	OK		C	5000																														0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	0.3	7.75
7	BD0844	12110	close	OK		C	5500																		0.7	0.7	0.7	3.5				0.2	0.2					0.35		2.2	2.2	0.35	0.35					11.45
6	BD0843	12101	close	OK		C	5500																						10																			10
5	BD0842	12107	close	OK	Water Te	C	5500	0.8																													~~0.6~~	~~0.35~~	~~0.35~~	~~2.2~~	~~2.2~~	~~0.35~~	~~0.35~~	~~0.35~~				7.55
4	BD0841	12093	close	OK		C	Bottom															~~10~~																										10
3	BD0840	12108	close	OK		C	Bottom																0.3	0.7	0.7	0.7	0.7	3.5		0.5	0.5	0.2	0.2		0.6	0.2												8.8
2	BD0839	12116	close	OK		C	Bottom																						10																			10
1	BD0838	12112	close	OK		C	Bottom																														0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	0.3	7.75

BD-14 Cast-2

CMS	GT-ID	BottleID No.	Bottle Status open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	Chl-a	Ba	PFASs	Iodine-129	DO(Δ17O)	C-13	SS	SPM	Fe(II)	Fe(II) Oxidation	Trace Metal	Archive	Speciation	Pt&REE	Th&Pa	Trace Metals	Dissolved Fe	Total dissolvable Fe	CDOM	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Cr	BTM. filt	BTM. unfilt	Cu. Filt	Pb.filt	Bi.filt	Zr, Hf, Nb, Ta, filt	Zr, Hf, Nb, Ta, unfilt	Se	Si isotope	N-15	Total
								Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	Univ. Toyama	Tokai	AIST	JAEA	NIES	JAMSTEC	Tokai Univ	Tokai	AORI	AORI	AORI	AORI	AORI	AORI	JAEA	Univ. Toyama	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Nagasaki Univ.	Nagasaki Univ.	Kochi Pref Univ	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kinki	ETH	AORI	
													Ooki	Ooki	Roy Andreas	Kato	Yamashita	Otosaka (Obata)	Omori	Kumamoto (Gamo)	Minami	Minami	Takahashi	Takahashi	Obata	Obata	Kim	Suzuki	Okubo (Kim)	Roy Andreas	Nishioka	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Isshiki	Konagaya	Konagaya	Takano	Takano	Takano	Takano	Takano	Takeda	Wetzel (Gamo)	Nakayama	
																					Unfilt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Unfilt	Unfilt	Fillt	Fillt	Unfilt	Fillt	Unfilt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Fillt	Filt	
24	BD0885	12126	close	OK		N	2250			0.2						0.2																															0.4
23	BD0884	12139	close	OK		N	2500	0.8	1.2	0.2	1					0.2					2																										5.4
22	BD0883	12131	close	OK		N	2750			0.2						0.2																															0.4
21	BD0882	12136	close	OK		N	3000	0.8	1.2	0.2	1		1			0.2	1			1.5																											6.9
20	BD0881	12117	close	OK		N	3000														2																										2
19	BD0880	12113	close	OK		N	3250			0.2						0.2																															0.4
18	BD0879	12099	close	OK		N	3500	0.8	1.2	0.2	1					0.2					5																										8.4
17	BD0878	12079	close	OK		N	3750			0.2						0.2																															0.4
16	BD0877	12137	close	OK		N	4000	0.8	1.2	0.2	1		1			0.2	1			1.5																											6.9
15	BD0876	12135	close	OK		N	4000														5																										5
14	BD0875	12092	close	OK		C	2500																		0.7	0.7	0.7	3.5			0.2	0.2															6
13	BD0874	12081	close	OK		C	2500																						10																		10
12	BD0873	12102	close	OK		C	2500																													0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35		~~0.2~~		6.95
11	BD0872	12125	close	OK		C	3000															10																									10
10	BD0871	12132	close	OK		C	3000																		0.7	0.7	0.7	3.5			0.2	0.2	0.2	0.6	0.2												7
9	BD0870	12130	close	OK		C	3000																						10																		10
8	BD0869	12088	close	OK		C	3000																													0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	~~0.2~~	0.3	7.75
7	BD0868	12110	close	OK		C	3500																		0.7	0.7	0.7	3.5			0.2	0.2															6
6	BD0867	12101	close	OK		C	3500																						10																		10
5	BD0866	12107	close	OK		C	3500																													0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35				6.75
4	BD0865	12093	close	OK		C	4000															10																									10
3	BD0864	12108	close	OK		C	4000																		0.7	0.7	0.7	3.5		~~0.2~~	0.2	0.2															6.2
2	BD0863	12116	close	OK		C	4000																						10																		10
1	BD0862	12112	close	OK		C	4000																													0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	~~0.2~~	0.3	7.75

BD-14 Cast-3

CMS	GT-ID	BottleID No.	open/close	leakage	remark	N/C	Pressure (db)	Deck Routine Salinity	Deck Routine DO	Deck Routine Nutrients	Deck Routine pH/Alkalinity	Deck Routine Chl.a	Deck AORI Ooki Helium	Deck AORI Ooki Tritium	Deck Univ. Toyama Roy Andreas Chl-a	Deck Tokai Kato Ba	Deck AIST Yamashita PFASs	Deck JAEA Otosaka (Obata) Iodine-129	Deck NIES Omori DO(Δ17O)	Deck JAMSTEC Kumamoto (Gamo) C-13	Deck Tokai Univ Minami SS	Deck Tokai Minami SPM	Bubble AORI Takahashi Fe(II)	Bubble AORI Takahashi Fe(II) Oxidation	Bubble AORI Obata Trace Metal	Bubble AORI Obata Archive	Bubble AORI Kim Speciation	Bubble AORI Suzuki Pt&REE	Bubble JAEA Okubo (Kim) Th&Pa	Bubble Univ. Toyama Roy Andreas Trace Metals	Bubble Univ. Toyama Roy Andreas Trace Metals	Bubble Hokkaido Univ ILTS Nishioka Dissolved Fe	Bubble Hokkaido Univ ILTS Nishioka Total dissolvable Fe	Bubble Hokkaido Univ ILTS Nishioka CDOM	Bubble Nagasaki Univ. Naoe (Takeda) Fe-speciation (Filtered)	Bubble Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filtered)	Bubble Kochi Pref Univ Isshiki Cr	Bubble Kyoto Konagaya BTM. filt	Bubble Kyoto Konagaya BTM. unfilt	Bubble Kyoto Takano Cu. Filt	Bubble Kyoto Takano Pb.filt	Bubble Kyoto Takano Bi.filt	Bubble Kyoto Takano Zr, Hf, Nb, Ta, filt	Bubble Kyoto Takano Zr, Hf, Nb, Ta, unfilt	Bubble Kinki Takeda Se	Bubble ETH Wetzel (Gamo) Si isotope	Bubble AORI Nakayama N-15	Total
																					Unfilt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Unfilt	Filt	Fillt	Unfilt	Unfilt	Fillt	Fillt	Unfilt	Fillt	Unfilt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Fillt	Filt	
24	BD0907	12126	close	OK		N	O2 min	0.8	1.2	0.2	1	0.6			1.6	0.2																																5.6
23	BD0906	12139	close	OK		N	1000	0.8	1.2	0.2	1					0.2	1	1.5		1.5																												7.4
22	BD0905	12131	close	OK		N	1000						1	1							1																											3
21	BD0904	12136	close	OK		N	1250	0.8	1.2	0.2	1					0.2					1																											4.4
20	BD0903	12117	close	OK		N	1500	0.8	1.2	0.2	1					0.2		1.5		1.5	1																											7.4
19	BD0902	12113	close	OK		N	1750			0.2						0.2																																0.4
18	BD0901	12099	close	OK		N	2000	0.8	1.2	0.2	1		1			0.2	1			1.5																												6.9
17	BD0900	12079	close	OK		N	2000														2																											2
16	BD0899	12123	close	OK		C	O2 min																0.3		0.7	0.7	0.7			0.5	0.5	0.2	0.2	0.2														4
15	BD0898	12120	close	OK		C	O2 min																														0.6	0.35	0.35	2.2		~~0.35~~	0.35	0.35	0.5			5.05
14	BD0897	12092	close	OK		C	1000															10																										10
13	BD0896	12081	close	OK		C	1000																0.3	0.5	0.7	0.7	0.7	3.5				0.2	0.2	0.2	0.6	0.2												7.8
12	BD0895	12102	close	OK		C	1000																						10																			10
11	X	12125	close	OK		C	1000																														~~0.6~~	~~0.35~~	~~0.35~~			~~0.35~~	~~0.35~~	~~0.35~~	~~0.5~~	~~0.2~~	~~0.3~~	3.35
10	BD0894	12132	close	OK		C	1000																														0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5		0.3	7.55
9	BD0893	12130	close	OK		C	1250																		0.7	0.7	0.7					0.2	0.2															2.5
8	BD0892	12088	close	OK		C	1250																														0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5			7.25
7	BD0891	12110	close	OK		C	1500																		0.7	0.7	0.7	3.5				0.2	0.2															6
6	BD0890	12101	close	OK		C	1500																						10																			10
5	BD0889	12107	close	OK		C	1500																														0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	~~0.2~~	0.3	7.75
4	BD0888	12093	close	OK		C	2000															10																										10
3	X	12108	open	–	Trigger r	C	2000																		~~0.7~~	~~0.7~~	~~0.7~~	~~3.5~~				~~0.2~~	~~0.2~~	~~0.2~~														6.2
2	BD0887	12116	close	OK		C	2000																						10																			10
1	BD0886	12112	close	OK		C	2000																		0.7	0.7	0.7	3.5				0.2	0.2	0.2			0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	~~0.2~~	0.3	13.95

BD-14 Cast-4

CMS	GT-ID	BottleID No.	open/close	leakage	remark	N/C	Pressure (db)	Deck Routine Salinity	Deck Routine DO	Deck Routine Nutrients	Deck Routine pH/Alkalinity	Deck Routine Chl.a	Deck AORI Ooki Helium	Deck AORI Ooki Tritium	Deck Univ. Toyama Roy Andreas Chl-a	Deck Tokai Kato Ba	Deck AIST Yamashita PFASs	Deck JAEA Otosaka (Obata) Iodine-129	Deck NIES Omori DO(Δ17O)	Deck JAMSTEC Kumamoto (Gamo) C-13	Deck Tokai Univ Minami SS	Deck Tokai Minami SPM	Bubble AORI Takahashi Fe(II)	Bubble AORI Takahashi Fe(II) Oxidation	Bubble AORI Obata Trace Metal	Bubble AORI Obata Archive	Bubble AORI Kim Speciation	Bubble AORI Suzuki Pt&REE	Bubble JAEA Okubo (Kim) Th&Pa	Bubble Univ. Toyama Roy Andreas Trace Metals	Bubble Univ. Toyama Roy Andreas Trace Metals	Bubble Hokkaido Univ ILTS Nishioka Dissolved Fe	Bubble Hokkaido Univ ILTS Nishioka Total dissolvable Fe	Bubble Hokkaido Univ ILTS Nishioka CDOM	Bubble Nagasaki Univ. Naoe (Takeda) Fe-speciation (Filtered)	Bubble Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filtered)	Bubble Kochi Pref Univ Isshiki Cr	Bubble Kyoto Konagaya BTM. filt	Bubble Kyoto Konagaya BTM. unfilt	Bubble Kyoto Takano Cu. Filt	Bubble Kyoto Takano Pb.filt	Bubble Kyoto Takano Bi.filt	Bubble Kyoto Takano Zr, Hf, Nb, Ta, filt	Bubble Kyoto Takano Zr, Hf, Nb, Ta, unfilt	Bubble Kinki Takeda Se	Bubble ETH Wetzel (Gamo) Si isotope	Bubble AORI Nakayama N-15	Total
																					Unfilt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Unfilt	Filt	Fillt	Unfilt	Unfilt	Fillt	Fillt	Unfilt	Fillt	Unfilt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Fillt	Filt	
24	BD0930	12126	close	OK		N	Chla max	0.8	1.2	0.2	1	0.6			1.6	0.2	1																															6.6
23	BD0929	12139	close	OK		N	200	0.8	1.2	0.2	1	0.6				0.2	1	1.5		1.5																												8
22	BD0928	12131	close	OK		N	300			0.2						0.2	1																															1.4
21	BD0927	12136	close	OK		N	400	0.8	1.2	0.2	1		1	1	0.6	0.2				1.5	1																											8.5
20	BD0926	12117	close	OK		N	600	0.8	1.2	0.2	1					0.2	1	1.5		1.5																												7.4
19	BD0925	12113	close	OK		N	800	0.8	1.2	0.2	1					0.2		1.5			1																											5.9
18	BD0924	12098	close	OK		C	Chla max																0.3	0.5	0.7	0.7	0.7			0.5	0.5	0.2	0.2		0.6	0.2												5.1
17	BD0923	12133	close	OK		C	Chla max																														0.6	0.35	0.35	2.2		~~0.35~~	0.35	0.35	0.5			5.05
16	BD0922	12123	close	OK		C	200														1	10																										11
15	BD0921	12120	close	OK		C	200																0.3	0.5	0.7	0.7	0.7	3.5				0.2	0.2		0.6	0.2												7.6
14	BD0920	12092	close	OK		C	200																						10																			10
13	BD0919	12081	close	OK		C	200																														0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	~~0.2~~	0.3	7.75
12	X	12102	close			C	200																																	~~2.2~~	~~2.2~~							4.4
11	BD0918	12125	close	OK		C	400											1.5				10																										11.5
10	BD0917	12132	close	OK		C	400																0.3		0.7	0.7	0.7	3.5		0.5	0.5	0.2	0.2	0.2	0.6	0.2												8.3
9	BD0916	12130	close	OK		C	400																						10																			10
8	BD0915	12088	close	OK		C	400																														0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	~~0.2~~	0.3	7.75
7	BD0914	12110	close	OK		C	600														1	10																										11
6	BD0913	12101	close	OK		C	600																0.3		0.7	0.7	0.7	3.5				0.2	0.2															6.3
5	BD0912	12107	close	OK		C	600																						10																			10
4	BD0911	12093	close	OK		C	600																														0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	~~0.2~~	0.3	7.75
3	BD0910	12108	close	OK		C	800															10																										10
2	BD0909	12116	close	OK		C	800																0.3		0.7	0.7	0.7	3.5				0.2	0.2															6.3
1	BD0908	12112	close	OK		C	800																														0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5			7.25

BD-14 Cast-5

CMS	GT-ID	BottleIDNo.	open/close	leakage	remark	N/C	Pressure (db)	Deck Routine Salinity	Deck Routine DO	Deck Routine Nutrients	Deck Routine pH/Alkalinity	Deck Routine Chl.a	Deck AORI Ooki Helium	Deck AORI Ooki Tritium	Deck Univ. Toyama Roy Andreas Chl-a	Deck Tokai Kato Ba	Deck AIST Yamashita PFASs	Deck JAEA Otosaka (Obata) Iodine-129	Deck NIES Omori DO(Δ17O)	Deck JAMSTEC Kumamoto (Gamo) C-13	Deck Tokai Univ Minami SS	Deck Tokai Minami SPM	Bubble AORI Takahashi Fe(II)	Bubble AORI Takahashi Fe(II) Oxidation	Bubble AORI Obata Trace Metal	Bubble AORI Obata Archive	Bubble AORI Kim Speciation	Bubble AORI Suzuki Pt&REE	Bubble JAEA Okubo (Kim) Th&Pa	Bubble Univ. Toyama Roy Andreas Trace Metals	Bubble Univ. Toyama Roy Andreas Trace Metals	Bubble Hokkaido Univ ILTS Nishioka Dissolved Fe	Bubble Hokkaido Univ ILTS Nishioka Total dissolvable Fe	Bubble Hokkaido Univ ILTS Nishioka CDOM	Bubble Nagasaki Univ. Naoe (Takeda) Fe-speciation (Filter	Bubble Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filtered)	Bubble Kochi Pref Univ Isshiki Cr	Bubble Kyoto Konagaya BTM. filt	Bubble Kyoto Konagaya BTM. unfilt	Bubble Kyoto Takano Cu. Filt	Bubble Kyoto Takano Pb.filt	Bubble Kyoto Takano Bi.filt	Bubble Kyoto Takano Zr, Hf, Nb, Ta, filt	Bubble Kyoto Takano Zr, Hf, Nb, Ta, unfilt	Bubble Kinki Takeda Se	Bubble ETH Wetzel (Gamo) Si isotope	Bubble AORI Nakayama N-15	Total
																					Unfilt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Unfilt	Filt	Fillt	Unfilt	Unfilt	Fillt	Fillt	Unfilt	Fillt	Unfilt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Fillt	Filt	
25	BD0956	–	–	–		–	bucket	0.8	1.2	0.2	1	0.6					1	1.5			1																										0.5			7.8
24	BD0955	12126	close	OK		N	5	0.8	1.2	0.2	1	0.6							1																															4.8
23	BD0954	12139	close	OK		N	10	0.8	1.2	0.2	1	0.6			0.6	0.2	1		1	1.5																														8.1
22	BD0953	12131	close	OK		N	25	0.8	1.2	0.2	1	0.6				0.2			1		1																													6
21	BD0952	12136	close	OK		N	50	0.8	1.2	0.2	1	0.6			0.6	0.2	1	1.5	1																															8.1
20	BD0951	12117	close	OK		N	100	0.8	1.2	0.2	1	0.6				0.2	1	1.5		1.5																														8
19	BD0950	12113	close	OK		N	150	0.8	1.2	0.2	1	0.6				0.2		1.5			1																													6.5
18	BD0949	12098	close	OK		C	10														1	10																												11
17	BD0948	12133	close	OK		C	10																0.3	0.5	0.7	0.7	0.7	3.5				0.2	0.2		0.6	0.2												7.6
16	BD0947	12123	close	OK		C	10																						10																			10
15	BD0946	12120	close	OK		C	10																							0.5	0.5						0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	~~0.2~~	0.3	8.75
14	X	12092	close			C	10																																	~~2.2~~	~~2.2~~							4.4
13	BD0945	12081	close	OK		C	25															10																										10
12	BD0944	12102	close	OK		C	25																0.3		0.7	0.7	0.7					0.2	0.2				0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5			10.05
11	X	12125	close			C	25																														~~0.6~~	~~0.35~~	~~0.35~~	~~2.2~~	~~2.2~~	~~0.35~~	~~0.35~~	~~0.35~~	~~0.5~~			7.25
10	BD0943	12132	close	OK		C	50														1	10																										11
9	BD0942	12130	close	OK		C	50																0.3		0.7	0.7	0.7	3.5				0.2	0.2	0.2														6.5
8	BD0941	12088	close	OK		C	50																														0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5			7.25
7	BD0940	12110	close	OK		C	100														1	10																										11
6	BD0939	12101	close	OK		C	100																0.3		0.7	0.7	0.7	3.5				0.2	0.2	0.2	0.6	0.2												7.3
5	BD0938	12107	close	OK		C	100																						10																			10
4	BD0937	12093	close	OK		C	100																														0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	~~0.2~~	0.3	7.75
3	X	12108	open		Trigger rel	C	150															~~10~~																										10
2	BD0936	12116	close	OK		C	150																0.3		0.7	0.7	0.7					0.2	0.2				0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5			10.05
1	BD0935	12112	close	OK		C	150															10															~~0.6~~	~~0.35~~	~~0.35~~	~~2.2~~	~~2.2~~	~~0.35~~	~~0.35~~	~~0.35~~	~~0.5~~	~~0.2~~		17.45

BD-14 Ex-1

	GT-ID	BottleIDNo.	open/close	leakage	remark	N/C	Pressure (db)	Routine DO	NIES Omori DO(Δ17O)	Total
							bucket			0
24	BD0934	12126	close	OK		N	5	1.2	1	2.2
23	X	12139	close			N	5			0
22	BD0933	12131	close	OK		N	10	1.2	1	2.2
21	X	12136	close			N	10			0
20	BD0932	12117	close	OK		N	25	1.2	1	2.2
19	X	12113	close			N	25			0
18	BD0931	12099	close	OK		N	50	1.2	1	2.2
17	X	12079	close			N	50			0
16	X	12123	close			C	10			0
15	X	12135	close			N	10			0
14	X	12077	close			N	10			0
13	X	12115	close			N	10			0
12	X	12124	close			N	10			0
11	X	12125	close			C	10			0
10	X	12138	close			N	10			0
9	X	12122	close			N	10			0
8	X	12103	close			N	10			0
7	X	12110	close			C	10			0
6	X	12128	open		Trigger rel	N	10			0
5	X	12109	close			N	10			0
4	X	12118	close			N	10			0
3	X	12108	close			C	10			0
2	X	12078	close			N	10			0
1	X	12119	close			N	10			0

BD-15 Cast-1

CMS	GT-ID	Bottle ID No.	open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	18O	H2S	Chl-a	Ba	PFASs	Iodine-129	DO(Δ17O)	C-13	SS	SPM	Fe(II)	Fe(II) Oxidation	Trace Metal	Archive	Speciation	Pt&REE	Th&Pa	Trace Metals	Dissolved Fe	Total dissolvable Fe	CDOM	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Cr	BTM. filt	BTM. unfilt	Cu. Filt	Pb.filt	Bi.filt	Zr, Hf, Nb, Ta, filt	Zr, Hf, Nb, Ta, unfilt	Se	Si isotope	N-15	Total
		Bottle Status	Bottle Status	Bottle Status				Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	AORI	AORI	Univ. Toyama	Tokai	AIST	JAEA	NIES	JAMSTEC	Tokai Univ	Tokai	AORI	AORI	AORI	AORI	AORI	AORI	JAEA	Univ. Toyama	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Nagasaki Univ.	Nagasaki Univ.	Kochi Pref Univ	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kinki	ETH	AORI	
													Ooki	Ooki	Nakayama	Nakayama	Roy Andreas	Kato	Yamashita	Otosaka (Obata)	Omori	Kumamoto (Gamo)	Minami	Minami	Takahashi	Takahashi	Obata	Obata	Kim	Suzuki	Okubo (Kim)	Roy Andreas	Nishioka	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Isshiki	Konagaya	Konagaya	Takano	Takano	Takano	Takano	Takano	Takeda	Wetzel (Gamo)	Nakayama	
																								Unfilt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Unfilt	Unfilt	Fillt	Fillt	Unfilt	Fillt	Unfilt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Fillt	Fillt	
24	BD0955		close	OK		N	4000	0.8	1.2	0.2	1				0.8	0.8		0.2	1			1.5																											7.5
23	BD0954		close	OK		N	4000																5																										5
22	BD0953		close	OK		N	4250			0.2								0.2																																	0.4
21	BD0952		close	OK		N	4500	0.8	1.2	0.2	1							0.2					5																												8.4
20	BD0951		close	OK		N	4750			0.2								0.2																																	0.4
19	BD0950		close	OK		N	5000	0.8	1.2	0.2	1				0.8	~~0.8~~		0.2	1			1.5																											7.5
18	BD0949		close	OK		N	5000									0.8							~~5~~																												5.8
17	BD0948		close	OK		N	Bottom	0.8	1.2	0.2	1						~~1~~	0.2	1			1.5																											6.9
16	BD0947		close	OK		N	Bottom																5																										5
15	BD0946		close	OK		C	4000																	10																									10
14	BD0945	12092	close	leak		C	4000																				0.7	0.7	0.7	3.5			0.2	0.2															6
13	BD0944	12081	close	OK		C	4000																															0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	0.3	7.75
12	BD0943	12102	close	OK		C	4000																								10																		10
11	BD0942	12125	close	OK		C	4500																				0.7	0.7	0.7	3.5		0.5	0.2	0.2															6.5
10	BD0941	12132	close	OK		C	4500																															0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35				6.75
9	BD0940	12130	close	OK		C	4500																								10																		10
8	–				No sampling	C	~~5000~~ (Bottom)																	~~10~~																									10
7	–				No sampling	C	~~5000~~ (Bottom)																				~~0.7~~	~~0.7~~	~~0.7~~	~~3.5~~			~~0.2~~	~~0.2~~															6
6	–				No sampling	C	~~5000~~ (Bottom)																															~~0.6~~	~~0.35~~	~~0.35~~	~~2.2~~	~~2.2~~	~~0.35~~	~~0.35~~	~~0.35~~	~~0.5~~	~~0.2~~	~~0.3~~	7.75
5	–				No sampling	C	~~5000~~ (Bottom)																								~~10~~																		10
4	BD0939		close	OK		C	Bottom																	10																									10
3	BD0938	12108	close	OK		C	Bottom																		0.3	0.7	0.7	0.7	0.7	3.5		0.5	0.2	0.2		0.6	0.2												8.3
2	BD0937	12116	close	OK		C	Bottom																															0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	0.3	7.75
1	BD0936	12112	close	OK		C	Bottom																								10																		10

BD-15 Cast-2

CMS	GT-ID	Bottle ID No.	open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	18O	H2S	Chl-a	Ba	PFASs	Iodine-129	DO(Δ17O)	C-13	SS	SPM	Fe(II)	Fe(II) Oxidation	Trace Metal	Archive	Speciation	Pt&REE	Th&Pa	Trace Metals	Dissolved Fe	Total dissolvable Fe	CDOM	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Cr	BTM. filt	BTM. unfilt	Cu. Filt	Pb.filt	Bi.filt	Zr, Hf, Nb, Ta, filt	Zr, Hf, Nb, Ta, unfilt	Se	Si isotope	N-15	Total
		Bottle Status	Bottle Status	Bottle Status				Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	AORI	AORI	Univ. Toyama	Tokai	AIST	JAEA	NIES	JAMSTEC	Tokai Univ	Tokai	AORI	AORI	AORI	AORI	AORI	AORI	JAEA	Univ. Toyama	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Nagasaki Univ.	Nagasaki Univ.	Kochi Pref Univ	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kinki	ETH	AORI	
													Ooki	Ooki	Nakayama	Nakayama	Roy Andreas	Kato	Yamashita	Otosaka (Obata)	Omori	Kumamoto (Gamo)	Minami	Minami	Takahashi	Takahashi	Obata	Obata	Kim	Suzuki	Okubo (Kim)	Roy Andreas	Nishioka	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Isshiki	Konagaya	Konagaya	Takano	Takano	Takano	Takano	Takano	Takeda	Wetzel (Gamo)	Nakayama	
																								Unfilt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Unfilt	Unfilt	Fillt	Fillt	Unfilt	Fillt	Unfilt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Fillt	Fillt	
24	BD00978		close	OK		N	2000	0.8	1.2	0.2	1																																						3.2
23	BD00977		close	OK		N	2000											0.2	1			1.5	2																										4.7
22	BD00976		close	OK		N	2250			0.2								0.2																																	0.4
21	BD00975		close	OK		N	2500	0.8	1.2	0.2	1							0.2					2																												5.4
20	BD00974		close	OK		N	2750			0.2								0.2																																	0.4
19	BD00973		close	OK		N	3000	0.8	1.2	0.2	1				0.8																																		4
18	BD00972		close	OK		N	3000											0.2	1			1.5	2																										4.7
17	BD00971		close	OK		N	3250			0.2								0.2																																	0.4
16	BD00970		close	OK		N	3500	0.8	1.2	0.2	1							0.2					5																												8.4
15	BD00969		close	OK		N	3750			0.2								0.2																																	0.4
14	BD00968		close	OK		C	2000																	10																									10
13	BD00967	12081	close	OK		C	2000																				0.7	0.7	0.7	3.5			0.2	0.2	0.2														6.2
12	BD00966	12102	close	OK		C	2000																															0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	0.3	7.75
11	BD00965	12125	close	OK		C	2000																								10																		10
10	BD00964	12132	close	OK		C	2500																				0.7	0.7	0.7	3.5			0.2	0.2															6
9	BD00963	12130	close	OK		C	2500																															0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35		0.2		6.95
8	BD00962	12088	close	OK		C	2500																								10																		10
7	BD00961		close	OK		C	3000																	10																									10
6	BD00960	12101	close	OK		C	3000																				0.7	0.7	0.7	3.5			0.2	0.2	0.2	0.6	0.2												7
5	BD00959	12107	close	OK		C	3000																															0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	0.3	7.75
4	BD00958	12093	close	OK		C	3000																								10																		10
3	–		open		No sampling	C	3500																				~~0.7~~	~~0.7~~	~~0.7~~	~~3.5~~			~~0.2~~	~~0.2~~															6
2	BD00957	12116	close	OK		C	3500																				0.7	0.7	0.7	3.5			0.2					0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35				12.55
1	BD00956	12112	close	OK		C	3500																								10			0.2															10.2

BD-15 Cast-3

								Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	AORI	AORI	Univ. Toyama	Tokai	AIST	JAEA	NIES	JAMSTEC	Tokai Univ	Tokai	AORI	AORI	AORI	AORI	AORI	AORI	JAEA	Univ. Toyama	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Nagasaki Univ.	Nagasaki Univ.	Kochi Pref Univ	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kinki	ETH	AORI	
			Bottle Status										Ooki	Ooki	Nakayama	Nakayama	Roy Andreas	Kato	Yamashita	Otosaka (Obata)	Omori	Kumamoto (Gamo)	Minami	Minami	Takahashi	Takahashi	Obata	Obata	Kim	Suzuki	Okubo (Kim)	Roy Andreas	Nishioka	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Isshiki	Konagaya	Konagaya	Takano	Takano	Takano	Takano	Takano	Takeda	Wetzel (Gamo)	Nakayama	
CMS	GT-ID	BottleIDNo.	open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	18O	H2S	Chl-a	Ba	PFASs	Iodine-129	DO(Δ17O)	C-13	SS	SPM	Fe(II)	Fe(II) Oxidation	Trace Metal	Archive	Speciation	Pt&REE	Th&Pa	Trace Metals	Dissolved Fe	Total dissolvable Fe	CDOM	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Cr	BTM. filt	BTM. unfilt	Cu. Filt	Pb.filt	Bi.filt	Zr, Hf, Nb, Ta, filt	Zr, Hf, Nb, Ta, unfilt	Se	Si isotope	N-15	Total
																								Unfilt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Unfilt	Unfilt	Filt	Fillt	Unfilt	Fillt	Unfilt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Fillt	Fillt	
24	BD00998		close	OK		N	Chla max	0.8	1.2	0.2	1	0.6					1.6	0.2	1																														6.6
23	BD00997		close	OK		N	O2 min	0.8	1.2	0.2	1	0.6					1.6	0.2																															5.6
22	BD00996		close	OK		N	800	0.8	1.2	0.2	1				0.8			0.2		1.5			1																										6.7
21	BD00995		close	OK		N	1000	0.8	1.2	0.2	1				0.8	0.8		0.2	1	1.5		1.5	1																										10
20	BD00994		close	OK		N	1250	0.8	1.2	0.2	1							0.2					1																										4.4
19	BD00993		close	OK		N	1500	0.8	1.2	0.2	1																																						3.2
18	BD00992		close	OK		N	1500											0.2		1.5		1.5	1																										4.2
17	BD00991		close	OK		N	1750			0.2								0.2																															0.4
16	BD00990	12123	close	OK		C	Chla max																		0.3	0.5	0.7	0.7	0.7			0.5	0.2	0.2		0.6	0.2	0.6	0.35	0.35	2.2			0.35	0.35	0.5			9.3
15	–				no sampling	C	Chla max																															~~0.6~~	~~0.35~~	~~0.35~~	~~2.2~~			~~0.35~~	~~0.35~~	~~0.5~~			4.7
14	BD00989	12092	close	OK		C	O2 min																		0.3	0.5	0.7	0.7	0.7			0.5	0.2	0.2	0.2			0.6	0.35	0.35	2.2			0.35	0.35	0.5			8.7
13	–				no sampling	C	O2 min																															~~0.6~~	~~0.35~~	~~0.35~~	~~2.2~~			~~0.35~~	~~0.35~~	0.5			4.7
12	–		open		no sampling	C	800																	~~10~~																									10
11	BD00988	12125	close	OK		C	800																	10	0.3		0.7	0.7	0.7	3.5			0.2	~~0.2~~				0.6	0.35		2.2	2.2	0.35	0.35		0.5			22.85
10	BD00987	12132	close	OK		C	800																											0.2				~~0.6~~	~~0.35~~	0.35	~~2.2~~	~~2.2~~	~~0.35~~	~~0.35~~	0.35	~~0.5~~			7.45
9	BD00986		close	OK		C	1000																	10																									10
8	BD00985	12088	close	OK		C	1000																		0.3	0.7	0.7	0.7	0.7	3.5			0.2	0.2	0.2	0.6	0.2												8
7	BD00984	12110	close	OK		C	1000																															0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	0.3	7.75
6	BD00983	12101	close	OK		C	1000																								10																		10
5	BD00982	12107	close	OK		C	1250																				0.7	0.7	0.7				0.2	0.2				0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5			9.75
4	–				no sampling	C	1250																																										0
3	BD00981	12108	close	OK		C	1500																				0.7	0.7	0.7	3.5			0.2	0.2															6
2	BD00980	12116	close	OK		C	1500																															0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	0.3	7.75
1	BD00979	12112	close	OK		C	1500																								10																		10

BD-15 Cast-4

								Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	AORI	AORI	Univ. Toyama	Tokai	AIST	JAEA	NIES	JAMSTEC	Tokai Univ	Tokai	AORI	AORI	AORI	AORI	AORI	AORI	JAEA	Univ. Toyama	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Nagasaki Univ.	Nagasaki Univ.	Kochi Pref Univ	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kinki	ETH	AORI	
			Bottle Status										Ooki	Ooki	Nakayama	Nakayama	Roy Andreas	Kato	Yamashita	Otosaka (Obata)	Omori	Kumamoto (Gamo)	Minami	Minami	Takahashi	Takahashi	Obata	Obata	Kim	Suzuki	Okubo (Kim)	Roy Andreas	Nishioka	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Isshiki	Konagaya	Konagaya	Takano	Takano	Takano	Takano	Takano	Takeda	Wetzel (Gamo)	Nakayama	
CMS	GT-ID	BottleIDNo.	open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	18O	H2S	Chl-a	Ba	PFASs	Iodine-129	DO(Δ17O)	C-13	SS	SPM	Fe(II)	Fe(II) Oxidation	Trace Metal	Archive	Speciation	Pt&REE	Th&Pa	Trace Metals	Dissolved Fe	Total dissolvable Fe	CDOM	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Cr	BTM. filt	BTM. unfilt	Cu. Filt	Pb.filt	Bi.filt	Zr, Hf, Nb, Ta, filt	Zr, Hf, Nb, Ta, unfilt	Se	Si isotope	N-15	Total
																								Unfilt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Unfilt	Unfilt	Filt	Fillt	Unfilt	Fillt	Unfilt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Fillt	Fillt	
24	BD01019		close	OK		N	150	0.8	1.2	0.2	1	0.6						0.2		1.5			1																										6.5
23	BD01018		close	OK		N	200	0.8	1.2	0.2	1	0.6			0.8	0.8																																	5.4
22	BD01017		close	OK		N	200											0.2	1	1.5		1.5	1																										5.2
21	BD01016		close	OK		N	300			0.2								0.2	1																														1.4
20	BD01015		close	OK		N	400	0.8	1.2	0.2	1				0.8	0.8	0.6																																5.4
19	BD01014		close	OK		N	400											0.2		1.5		1.5	1																										4.2
18	BD01013		close	OK		N	600	0.8	1.2	0.2	1							0.2	1	1.5		1.5	1																										8.4
17	BD01012		close	OK		C	150																	10																									10
16	BD01011	12123	close	OK		C	150																		0.3		0.7	0.7	0.7				0.2	0.2				0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2		10.25
15	–				no sampling	C	150																															~~0.6~~	~~0.35~~	~~0.35~~	~~2.2~~	~~2.2~~	~~0.35~~	~~0.35~~	~~0.35~~	~~0.5~~	~~0.2~~		7.45
14	BD01010		close	OK		C	200																	10																									10
13	BD01009	12081	close	OK		C	200																		0.3	0.7	0.7	0.7	0.7	3.5			0.2	0.2		0.6	0.2												7.8
12	BD01008	12102	close	OK		C	200																															0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	0.3	7.75
11	BD01007	12125	close	OK		C	200																								10																		10
10	BD01006		close	OK		C	400																	10																									10
9	BD01005	12130	close	OK		C	400																		0.3		0.7	0.7	0.7	3.5		0.5	0.2	0.2	0.2	0.6	0.2												7.8
8	BD01004	12088	close	OK		C	400																															0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	0.3	7.75
7	BD01003	12110	close	OK		C	400																								10																		10
6	–				no sampling	C	400																																										0
5	BD01002		close	OK		C	600																	10																									10
4	BD01001	12093	close	OK		C	600																		0.3		0.7	0.7	0.7	3.5			0.2	0.2															6.3
3	BD01000	12108	close	OK		C	600																															0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	0.3	7.75
2	BD00999	12116	close	OK		C	600																								10																		10
1	–				no sampling	C	600																																										0

BD-15 Cast-5

CMS	GT-ID	BottleID No.	Bottle Status: open/close	Bottle Status: leakage	Bottle Status: remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	18O	H2S	Chl-a	Ba	PFASs	Iodine-129	DO(Δ17O)	C-13
								Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	AORI	AORI	Univ. Toyama	Tokai	AIST	JAEA	NIES	JAMSTEC
													Ooki	Ooki	Nakayama	Nakayama	Roy Andreas	Kato	Yamashita	Otosaka (Obata)	Omori	Kumamoto (Gamo)
25	BD01044						bucket	0.8	1.2	0.2	1	0.6							1	1.5		
24	BD01043					N	5	0.8	1.2	0.2	1	0.6									1	
23	BD01042					N	10	0.8	1.2	0.2	1	0.6			0.8	0.8						
22	BD01041					N	10										0.6	0.2	1		1	1.5
21	BD01040					N	25	0.8	1.2	0.2	1	0.6				0.8		0.2			1	
20	BD01039					N	25															
19	BD01038					N	50	0.8	1.2	0.2	1	0.6				0.8	0.6	0.2	1	1.5	1	
18	BD01037		close	leak	from a bottom lid	N	100	0.8	1.2	0.2	1	0.6			0.8	0.8						
17	BD01036		close	OK		N	100											0.2	1	1.5		1.5
16	BD01035		close	OK		C	10															
15	BD01034	12120	close	OK		C	10															
14	BD01033	12092	close	leak		C	10															
13	BD01032	12081	close	OK		C	10															
12	BD01031		close	OK		C	10															
11	BD01030		close	OK		C	10															
10	BD01029	12132	close	OK		C	25															
9	BD01028					C	25															
8	BD01027		close	OK		C	50															
7	BD01026	12110	close	OK		C	50															
6	BD01025	12101	close	OK		C	50															
5	BD01024	12107	close	OK		C	50															
4	BD01023		close	OK		C	100															
3	BD01022	12108	close	OK		C	100															
2	BD01021	12116	close	OK		C	100															
1	BD01020	12112	close	OK		C	100															

CMS	SS	SPM	Fe incubation	Fe(II)	Fe(II) Oxidation	Trace Metal	Archive	Speciation	Pt&REE	Th&Pa	Trace Metals	Dissolved Fe	Total dissolvable Fe	CDOM	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Cr	BTM. filt	BTM. unfilt	Cu. Filt	Pb.filt	Bi.filt	Zr, Hf, Nb, Ta, filt	Zr, Hf, Nb, Ta, unfilt	Se	Si isotope	N-15	Total
	Deck	Deck	Deck	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	
	Tokai Univ	Tokai	Nagasaki Univ.	AORI	AORI	AORI	AORI	AORI	AORI	JAEA	Univ. Toyama	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Nagasaki Univ.	Nagasaki Univ.	Kochi Pref Univ	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kinki	ETH	AORI	
	Minami	Minami	Mukae(Takeda)	Takahashi	Takahashi	Obata	Obata	Kim	Suzuki	Okubo (Kim)	Roy Andreas	Nishioka	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Isshiki	Konagaya	Konagaya	Takano	Takano	Takano	Takano	Takano	Takeda	Wetzel (Gamo)	Nakayama	
		Unfilt	Unfilt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Fillt	Unfillt	Fillt	Unfilt	Unfilt	Fillt	Fillt	Unfilt	Fillt	Unfilt	Fillt	Fillt	Fillt	Fillt	Unfilt	Fillt	Fillt	Fillt	
25	1																								0.5			7.8
24																												4.8
23																												5.4
22																												4.3
21																												5.8
20	1	5																										6
19																												8.9
18																												5.4
17																												4.2
16	1	5																										6
15				0.3	0.7	0.7	0.7	0.7	3.5		0.5	0.2	0.2		0.6	0.2		0.35					0.35					9
14																	0.6	~~0.35~~	0.35	2.2	2.2	0.35	~~0.35~~	0.35	0.5	0.2	0.3	7.75
13										10																		10
12			12																									12
11			12																									12
10				0.3		0.7	0.7	0.7				0.2	0.2															2.8
9																	0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5			7.25
8	1	5																										6
7				0.3		0.7	0.7	0.7	3.5			0.2	0.2	0.2														6.5
6																	0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5			7.25
5										10																		10
4	1	5																										6
3				0.3		0.7	0.7	0.7	3.5			0.2	0.2	0.2	0.6	0.2												7.3
2																	0.6	0.35	0.35	2.2	2.2	0.35	0.35	0.35	0.5	0.2	0.3	7.75
1										10																		10

BD-15 Ex-1

CMS	GT-ID	BottleID No.	Bottle Status: open/close	Bottle Status: leakage	Bottle Status: remark	N/C	Pressure (db)	Routine DO	NIES Omori DO(Δ17O)	Total	
25	–						bucket			0	
24	BD01049		close	OK		N	5	1.2	1	2.2	
23	BD01048		close	OK		N	5			0	2l of PC bottle x2 & 500ml of umber bottle
22	BD01047		close	OK		N	10	1.2	1	2.2	
21	–		close	OK		N	10			0	
20	–		close	OK		N	25	1.2	1	2.2	
19	BD01046		close	OK		N	25			0	
18	–		close	leak	from a bottom lid	N	50	~~1.2~~	~~1~~	2.2	
17	BD01045	BD0104	close	OK		N	50	1.2	1	0	
16	–		close	OK		C	10			12	
15	–		close	OK		C	10			12	
14	–		close	OK		C	10			12	
13	–		close	OK		C	10			12	
12	–		close	OK		C	10			12	
11	–		close	OK		C	10			12	
10	–		close	OK		C	10			12	
9	–		close	OK		C	10			12	
8	–		close	OK		C	10			12	
7	–		close	OK		C	10			12	
6	–		close	OK		C	10			12	
5	–		close	OK		C	10			12	
4	–		close	OK		C	10			12	
3	–	BD01047	close	OK		C	10			12	
2	–	BD01046	close	OK		C	10			12	
1	–	BD01045	close	OK		C	10			12	

BD-16 Cast-1

CMS	GT-ID	BottleIDNo.	open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	18O	H2S	Chl-a	Ba	PFASs	Fe(II)	Fe(II) Oxidation	Trace Metal	Archive	Trace Metals	Trace Metals (Unfilt)	Dissolved Fe	CDOM	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Bottole Incubation	Bottole Incubation	Cr	BTM. filt	BTM. unfilt	Total
		Bottle Status						Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	AORI	AORI	Univ. Toyama	Tokai	AIST	AORI	AORI	AORI	AORI	Univ. Toyama	Univ. Toyama	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Nagasaki Univ.	Nagasaki Univ.	Nagasaki Univ.	Nagasaki Univ.	Kochi Pref Univ	Kyoto	Kyoto	
													Ooki	Ooki	Nakayama	Nakayama	Roy Andreas	Kato	Yamashita	Takahashi	Takahashi	Obata	Obata	Roy Andreas	Roy Andreas	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Mukae (Takeda)	Mukae (Takeda)	Isshiki	Konagaya	Konagaya	
																				Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Unfilt	Unfilt	Unfilt	Filt	Unfilt	
24	BD0169		close	OK		N	1750			0.2								0.2																	0.4
23	-		close	leak	from a bottom lid	N	2000	~~0.8~~	~~1.2~~	~~0.2~~	~~1~~							~~0.2~~																	3.4
22	BD0168		close	OK		N	2250			0.2								0.2																	0.4
21	BD0167		close	OK		N	2750			0.2								0.2																	0.4
20	BD0166		close	OK		N	3000	0.8	1.2	0.2	1							0.2																	3.4
19	BD0165		close	OK		N	3250			0.2								0.2																	0.4
18	-		close	leak	from a bottom lid	N	3500	~~0.8~~	~~1.2~~	~~0.2~~	~~1~~							~~0.2~~																	3.4
17	BD0164		close	OK		N	3750			0.2								0.2																	0.4
16	BD0163		close	OK		N	4000	0.8	1.2	0.2	1							0.2																	3.4
15	BD0162		close	OK		N	4250			0.2								0.2																	0.4
14	BD0161		close	OK		N	4500	0.8	1.2	0.2	1							0.2																	3.4
13	BD0160		close	OK		N	4750			0.2								0.2																	0.4
12	-		close	OK		N	~~5000 (Bottom)~~	~~0.8~~	~~1.2~~	~~0.2~~	~~1~~							~~0.2~~																	3.4
11	BD0159		close	OK		N	Bottom	0.8	1.2	0.2	1							0.2																	3.4
10	BD0158	12132	close	OK		C	1250	0.8	1.2	0.2	1							0.2				0.7	0.7			0.2						0.2	0.35	0.35	5.9
9	BD0157	12130	close	OK		C	1500	0.8	1.2	0.2	1							0.2				0.7	0.7			0.2						0.2	0.35	0.35	5.9
8	BD0156	12088	close	OK		C	2000	0.8	1.2	0.2	1							0.2				0.7	0.7			0.2	0.2					0.2	0.35	0.35	6.1
7	BD0155	12110	close	OK		C	2500	0.8	1.2	0.2	1							0.2				0.7	0.7			0.2						0.2	0.35	0.35	5.9
6	BD0154	12101	close	OK		C	3000															0.7	0.7			0.2	0.2					0.2	0.35	0.35	2.7
5	BD0153	12107	close	OK		C	3500	0.8	1.2	0.2	1							0.2				0.7	0.7			0.2						0.2	0.35	0.35	5.9
4	BD0152	12093	close	OK		C	4000															0.7	0.7			0.2						0.2	0.35	0.35	2.5
3	BD0151	12108	close	OK		C	4500															0.7	0.7		0.5	0.2						0.2	0.35	0.35	3
2	BD0150	12116	close	OK		C	5000															0.7	0.7			0.2						0.2	0.35	0.35	2.5
1	BD0149	12112	close	OK		C	Bottom															0.7	0.7		0.5	0.2						0.2	0.35	0.35	3

0

BD-16 Cast-2

CMS	GT-ID	BottleIDNo.	open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	18O	H2S	CDOM	CDOM	Chl-a	Ba	PFASs	Fe(II)	Fe(II) Oxidation	Trace Metal	Archive	Trace Metals	Trace Metals (Unfilt)	Dissolved Fe	CDOM	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Bottole Incubation	Bottole Incubation	Cr	BTM. filt	BTM. unfilt	Total
		Bottle Status						Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Bubble	Bubble	Deck	Deck	Deck	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	AORI	AORI	NIES	NIES	Univ. Toyama	Tokai	AIST	AORI	AORI	AORI	AORI	Univ. Toyama	Univ. Toyama	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Nagasaki Univ.	Nagasaki Univ.	Nagasaki Univ.	Nagasaki Univ.	Kochi Pref Univ	Kyoto	Kyoto	
													Ooki	Ooki	Nakayama	Nakayama	Oomori	Oomori	Roy Andreas	Kato	Yamashita	Takahashi	Takahashi	Obata	Obata	Roy Andreas	Roy Andreas	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Mukae (Takeda)	Mukae (Takeda)	Isshiki	Konagaya	Konagaya	
																	Filt	Unfilt				Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Unfilt	Unfilt	Unfilt	Filt	Unfilt	
25	BD0193						bucket	0.8	1.2	0.2	1	0.6																									3.8
24	BD0192		close	OK		N	10	0.8	1.2	0.2	1	0.6				0.8	0.6	0.6	0.6	0.2																	6.6
23	BD0191	12119	close	OK		N	25	0.8	1.2	0.2	1	0.6				0.8				0.2																	4.8
22	BD0190		close	OK		N	50	0.8	1.2	0.2	1	0.6							0.6	0.2																	4.6
21	BD0189		close	OK		N	100	0.8	1.2	0.2	1	0.6				0.8				0.2																	4.8
20	BD0188		close	OK		N	Chla max	0.8	1.2	0.2	1	0.6				0.8			1.6	0.2																	6.4
19	BD0187		close	OK		N	O2 min	0.8	1.2	0.2	1	0.6							1.6	0.2																	5.6
18	BD0186	12078	close	OK		N	200	0.8	1.2	0.2	1	0.6				0.8				0.2																	4.8
17	BD0185		close	OK		N	300			0.2										0.2																	0.4
16	BD0184		close	OK		N	400	0.8	1.2	0.2	1								0.6	0.2																	4
15	BD0183		close	OK		N	1000	0.8	1.2	0.2	1									0.2																	3.4
14	BD0182	12092	close	OK		C	10										0.3	0.3				0.3	0.7	0.7	0.7		0.5	0.2		0.6	0.2			0.2	0.35	0.35	5.4
13	–				no sampling	C	10																														0
12	–				no sampling	C	10																														0
11	BD0181	12125	close	OK		C	25															0.3		0.7	0.7			0.2						0.2	0.35	0.35	2.8
10	BD0180	12132	close	OK		C	50															0.3		0.7	0.7			0.2	0.2					0.2	0.35	0.35	3
9	BD0179	12130	close	OK		C	100															0.3		0.7	0.7			0.2	0.2					0.2	0.35	0.35	3
8	BD0178	12088	close	OK		C	Chla max															0.3		0.7	0.7		0.5	0.2		0.6	0.2			0.2	0.35	0.35	4.1
7	BD0177	12110	close	OK		C	O2 min															0.3		0.7	0.7		0.5	0.2	0.2					0.2	0.35	0.35	3.5
6	BD0176	12101	close	OK		C	150	0.8	1.2	0.2	1	0.6								0.2		0.3		0.7	0.7			0.2						0.2	0.35	0.35	6.8
5	BD0175	12107	close	OK		C	200															0.3	0.7	0.7	0.7			0.2						0.2	0.35	0.35	3.5
4	BD0174	12093	close	OK		C	400															0.3		0.7	0.7		0.5	0.2	0.2					0.2	0.35	0.35	3.5
3	BD0173	12108	close	OK		C	600	0.8	1.2	0.2	1									0.2		0.3		0.7	0.7			0.2						0.2	0.35	0.35	6.2
2	BD0172	12116	close	OK		C	800	0.8	1.2	0.2	1									0.2		0.3		0.7	0.7			0.2						0.2	0.35	0.35	6.2
1	BD0171	12112	close	OK		C	1000															0.3	0.7	0.7	0.7			0.2	0.2	0.6	0.2			0.2	0.35	0.35	4.5

BD-17 Cast-1

CMS	GT-ID	Bottle ID No.	open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	18O	H2S	DO(Δ17O)	Chl-a	Ba	C-13	PFASs	Iodine-129	SS	SPM	Fe(II)	Fe(II) Oxidation	Trace Metal	Archive	Speciation	Pt&REE	Th&Pa	Nd IC	Canada GEOTRACES	Trace Metals	Dissolved Fe	Total dissolvable Fe	size-fraction colloidal Fe	CDOM	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Cr	BTM. filt	BTM. unfilt	Cu. Filt	Pb.filt	Bi.filt	Se	Trace metals	Th&Pa	Pb.filt	N-15	Total
		Bottle Status						Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	AORI	AORI	NIES	Univ. Toyama	Tokai	JAMSTEC	AIST	JAEA	Tokai Univ	Tokai	AORI	AORI	AORI	AORI	AORI	AORI	JAEA	Hirosaki Univ	U. Vic	Univ. Toyama	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Nagasaki Univ.	Nagasaki Univ.	Kochi Pref Univ	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kinki	Intercalibration	Intercalibration	Intercalibration	AORI	
													Ooki	Ooki	Nakayama	Nakayama	Omori	Roy Andreas	Kato	Kumamoto (Gamo)	Yamashita	Otosaka (Obata)	Minami	Minami	Takahashi	Takahashi	Obata	Obata	Kim	Suzuki	Okubo (Kim)	Tazoe	Cullen (Obata)	Roy Andreas	Nishioka	Nishioka	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Isshiki	Konagaya	Konagaya	Takano	Takano	Takano	Takeda				Nakayama	
																									Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Unilt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	
24	BD0217		close	OK		N	2000	0.8	1.2	0.2	1		1		0.8	1.6			0.2	1.5	1		2																													11.3
23	BD0216		close	OK		N	3000	0.8	1.2	0.2	1		1						0.2	1.5	1		2																													8.9
22	BD0215		close	OK		N	3000																5																													5
21	BD0214		close	OK		N	Bottom	0.8	1.2	0.2	1		1		0.8	1.6			0.2	1.5	1																															9.3
20	BD0213	12106	close	OK		C	2000																				0.7	0.7	0.7	3.5			0.7		0.2	0.2	0.4	0.3														7.4
19	BD0212	12111	close	OK		C	2000																																		0.6	0.35	0.35	2.2	2.2	0.35	0.5	0.7		2.2	0.3	9.75
18	BD0211	12098	close	OK		C	2000																								10																					10
17	BD0210	12133	close	OK		C	2000																									10																				10
16	BD0209	12123	close	OK		C	2000																									10																				10
15	BD0208	12120	close	OK		C	2000																																										10			10
14	BD0207	12092	close	OK		C	2500	0.8	1.2	0.2	1								0.2								0.7	0.7	0.7	3.5					0.2	0.2	0.4															9.8
13	BD0206	12081	close	OK		C	2500																																		0.6	0.35	0.35	2.2	2.2	0.35	0.5	0.7				7.25
12	BD0205	12102	close	OK		C	3000																				0.7	0.7	0.7	3.5			0.7		0.2	0.2	0.4	0.3	0.6	0.2												8.2
11	BD0204	12125	close	OK		C	3000																																		0.6	0.35	0.35	2.2	2.2	0.35	0.5	0.7		2.2	0.3	9.75
10	BD0203	12132	close	OK		C	3000																								10																					10
9	BD0202	12130	close	OK		C	3000																																										10			10
8	BD0201	12088	close	OK		C	3500	0.8	1.2	0.2	1								0.2								0.7	0.7	0.7	3.5					0.2	0.2	0.4															9.8
7	BD0200	12110	close	OK		C	3500																																0.6	0.2	0.6	0.35	0.35	2.2	2.2	0.35	0.5	0.7				8.05
6	BD0199	12101	close	OK		C	Bottom																		0.3	0.7	0.7	0.7	0.7	3.5			0.7	0.6	0.2	0.2	0.4															8.7
5	BD0198	12107	close	OK		C	Bottom																																		0.6	0.35	0.35	2.2	2.2	0.35	0.5	0.7		2.2	0.3	9.75
4	BD0197	12093	close	OK		C	Bottom																								10																					10
3	BD0196	12108	close	OK		C	3000																									10																				10
2	BD0195	12116	close	OK		C	3000																									10																				10
1	BD0194	12112	close	OK		C	Bottom																																										10			10

BD-17 Cast-2

CMS	GT-ID	Bottle ID No.	open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	18O	H2S	DO(Δ17O)	Chl-a	Ba	C-13	PFASs	Iodine-129	SS	SPM	Fe(II)	Fe(II) Oxidation	Trace Metal	Archive	Speciation	Pt&REE	Th&Pa	Nd IC	Canada GEOTRACES	Trace Metals	Dissolved Fe	Total dissolvable Fe	size-fraction colloidal Fe	CDOM	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Cr	BTM. filt	BTM. unfilt	Cu. Filt	Pb.filt	Bi.filt	Se	Trace metals	Th&Pa	Pb.filt	N-15	Total
		Bottle Status						Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	AORI	AORI	NIES	Univ. Toyama	Tokai	JAMSTEC	AIST	JAEA	Tokai Univ	Tokai	AORI	AORI	AORI	AORI	AORI	AORI	JAEA	Hirosaki Univ	U. Vic	Univ. Toyama	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Nagasaki Univ.	Nagasaki Univ.	Kochi Pref Univ	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	Kinki	Intercalibration	Intercalibration	Intercalibration	AORI	
													Ooki	Ooki	Nakayama	Nakayama	Omori	Roy Andreas	Kato	Kumamoto (Gamo)	Yamashita	Otosaka (Obata)	Minami	Minami	Takahashi	Takahashi	Obata	Obata	Kim	Suzuki	Okubo (Kim)	Tazoe	Cullen (Obata)	Roy Andreas	Nishioka	Nishioka	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Isshiki	Konagaya	Konagaya	Takano	Takano	Takano	Takeda				Nakayama	
																									Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Unilt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	
24	BD0241		close	OK		N	Chla max	0.8	1.2	0.2	1	0.6				0.8		1.6	0.2		1		1																													8.4
23	BD0240		close	OK		N	400	0.8	1.2	0.2	1		1	0.5		0.8		0.6	0.2	1.5	1	1.5																														10.3
22	BD0239		close	OK		N	600	0.8	1.2	0.2	1				0.8	0.8			0.2	1.5	1	1.5	1																													10
21	BD0238		close	OK		N	800	0.8	1.2	0.2	1								0.2			1.5	1																													5.9
20	BD0237		close	OK		N	1000	0.8	1.2	0.2	1		1	0.5	0.8	0.8			0.2	1.5	1	1.5																														10.5
19	BD0236		close	OK		N	1500	0.8	1.2	0.2	1								0.2	1.5			1																													5.9
18	BD0235	12098	close	OK		C	Chla max																		0.3	0.7	0.7	0.7	0.7					0.5	0.2	0.2	0.4		0.6	0.2	0.6	0.35	0.35	2.2			0.5					9.2
17	BD0234	12133	close	OK		C	400																		0.3		0.7	0.7	0.7	3.5			0.7	0.5	0.2	0.2	0.4	0.3	0.6	0.2												9
16	BD0233	12123	close	OK		C	400																																		0.6	0.35	0.35	2.2	2.2	0.35	0.5	0.7		2.2	0.3	9.75
15	BD0232	12120	close	OK		C	400																								10																					10
14	BD0231	12092	close	OK		C	400																																										10			10
13	BD0230	12081	close	OK		C	600																		0.3		0.7	0.7	0.7	3.5			0.7		0.2	0.2	0.4				0.6	0.35	0.35				0.5	0.7			0.3	10.2
12	BD0229	12102	close	OK		C	600																								10																					10
11	BD0228	12125	close	OK		C	800																		0.3		0.7	0.7	0.7	3.5			0.7		0.2	0.2	0.4															7.4
10	BD0227	12132	close	leak		C	800	0.8																																	0.6	0.35	0.35	2.2	2.2	0.35	0.5	0.7		2.2		10.25
9	BD0226		close	OK		C	1000																1	10																													11
8	BD0225	12088	close	OK		C	1000																		0.3	0.7	0.7	0.7	0.7	3.5			0.7		0.2	0.2	0.4	0.3	0.6	0.2												9.2
7	BD0224	12110	close	OK		C	1000																																		0.6	0.35	0.35	2.2	2.2	0.35	0.5	0.7		2.2	0.3	9.75
6	BD0223	12101	close	OK		C	1000																								10																					10
5	BD0222	12107	close	OK		C	1000																									10																				10
4	BD0221	12093	close	OK		C	1000																									10																				10
3	BD0220	12108	close	OK		C	1000																																										10			10
2	BD0219	12116	close	OK		C	1500																				0.7	0.7	0.7	3.5			0.7		0.2	0.2	0.4				0.6	0.35	0.35				0.5	0.7			0.3	9.9
1	BD0218	12112	close	OK		C	1500																								10																					10

BD-17 Cast-3

CMS	GT-ID	Bottle No.	open/close	leakage	remark	N/C	Pressure (db)	Deck Routine Salinity	Deck Routine DO	Deck Routine Nutrients	Deck Routine pH/Alkalinity	Deck Routine Chl.a	Deck AORI Ooki Helium	Deck AORI Ooki Tritium	Deck AORI Nakayama 18O	Deck AORI Nakayama H2S	Deck NIES Omori DO(Δ17O)	Deck Univ. Toyama Roy Andreas Chl-a	Deck Tokai Kato Ba	Deck JAMSTEC Kumamoto (Gamo) C-13	Deck AIST Yamashita PFASs	Deck JAEA Otosaka (Obata) Iodine-129	Deck Tokai Univ Minami SS	Deck Tokai Minami SPM	Bubble AORI Takahashi Fe(II)	Bubble AORI Takahashi Fe(II) Oxidation	Bubble AORI Obata Trace Metal	Bubble AORI Obata Archive	Bubble AORI Kim Speciation	Bubble AORI Suzuki Pt&REE	Bubble JAEA Okubo (Kim) Th&Pa	Bubble Hirosaki Univ Tazoe Nd IC	Bubble U. Vic Cullen (Obata) Canada GEOTRACES	Bubble Univ. Toyama Roy Andreas Trace Metals	Bubble Hokkaido Univ ILTS Nishioka Dissolved Fe	Bubble Hokkaido Univ ILTS Nishioka Total dissolvable Fe	Bubble Hokkaido Univ ILTS Nishioka size-fraction colloidal Fe	Bubble Hokkaido Univ ILTS Nishioka CDOM	Bubble Nagasaki Univ. Naoe (Takeda) Fe-speciation (Filtered)	Bubble Nagasaki Univ. Naoe (Takeda) Dissolved Fe (Filtered)	Bubble Kochi Pref Univ Isshiki Cr	Bubble Kyoto Konagaya BTM. filt	Bubble Kyoto Konagaya BTM. unfilt	Bubble Kyoto Takano Cu. Filt	Bubble Kyoto Takano Pb.filt	Bubble Kyoto Takano Bi.filt	Bubble Kinki Takeda Se	Bubble Intercalibration Trace metals	Bubble Intercalibration Th&Pa	Bubble Intercalibration Pb.filt	Bubble AORI Nakayama N-15	Total
																									Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Unilt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	
	BD0266						bucket	0.8	1.2	0.2	1	0.6									1	1.5	1																									0.5					7.8
24	BD0265		close	OK		N	5	0.8	1.2	0.2	1	0.6					1																																				4.8
23	BD0264		close	OK		N	10	0.8	1.2	0.2	1	0.6			0.8	0.8	1	0.6	0.2	1.5	1		1																														10.7
22	BD0263		close	OK		N	25	0.8	1.2	0.2	1	0.6				0.8	1		0.2				1																														6.8
21	BD0262		close	OK		N	50	0.8	1.2	0.2	1	0.6			0.8	0.8	1	0.6	0.2		1	1.5	1																														10.7
20	BD0261		close	OK		N	100	0.8	1.2	0.2	1	0.6			0.8	0.8			0.2	1.5	1	1.5	1																														10.6
19	BD0260		close	OK		N	200	0.8	1.2	0.2	1	0.6			0.8	0.8			0.2	1.5	1	1.5	1																														10.6
18	BD0259	12098	close	OK		C	10																		0.3	0.7	0.7	0.7	0.7	3.5			0.7	0.5	0.2	0.2	0.4		0.6	0.2												9.4
17	BD0258	12133	close	OK		C	10																																		0.6	0.35	0.35	2.2	2.2	0.35	0.5	0.7		2.2	0.3	9.75
16	BD0257	12123	close	OK		C	10																								10																					10
15	BD0256	12120	close	OK		C	10																																										10			10
14	BD0255	12092	close	OK		C	25																		0.3		0.7	0.7	0.7				0.7		0.2	0.2	0.4															3.9
13	BD0254	12081	close	OK		C	25																																		0.6	0.35	0.35	2.2	2.2	0.35	0.5	0.7		2.2		9.45
12	BD0253	12102	close	OK		C	50																		0.3		0.7	0.7	0.7	3.5			0.7		0.2	0.2	0.4	0.3														7.7
11	BD0252	12125	close	OK		C	50																																		0.6	0.35	0.35	2.2	2.2	0.35	0.5	0.7				7.25
10	BD0251	12132	close	OK		C	100																		0.3		0.7	0.7	0.7	3.5			0.7		0.2	0.2	0.4	0.3	0.6	0.2												8.5
9	BD0250	12130	close	OK		C	100																																		0.6	0.35	0.35	2.2	2.2	0.35	0.5	0.7		2.2	0.3	9.75
8	BD0249	12088	close	OK		C	100																								10																					10
7	BD0248	12110	close	OK		C	100																																										10			10
6	BD0247	12101	close	OK		C	200																		0.3	0.7	0.7	0.7	0.7	3.5			0.7		0.2	0.2	0.4		0.6	0.2												8.9
5	BD0246	12107	close	OK		C	200																																		0.6	0.35	0.35	2.2	2.2	0.35	0.5	0.7		2.2	0.3	9.75
4	BD0245	12093	close	OK		C	200																								10																					10
3	BD0244	12108	close	OK		C	200																									10																				10
2	BD0243	12116	close	OK		C	200																									10																				10
1	BD0242	12112	close	OK		C	200																																										10			10

BD-17 Ex-1

CMS	GT-ID	Bottle No.	open/close	leakage	remark	N/C	Pressure (db)	Routine DO	NIES Omori DO(Δ17O)	Nagasaki Univ. Mukae (Takeda) Bottole Incubation	Nagasaki Univ. Mukae (Takeda) Bottole Incubation	Tokai Minami SPM	Total
	–						bucket						0
24	BD0290		close	OK		N	5	1.2	1				2.2
23	BD0289		close	OK		N	5						0
22	BD0288		close	OK		N	10	1.2	1				2.2
21	BD0287		close	OK		N	10						0
20	BD0286		close	OK		N	25	1.2	1				2.2
19	BD0285		close	OK		N	25						0
18	BD0284		close	OK		N	50	1.2	1				2.2
17	BD0283		close	OK		N	50						0
16	BD0282		close	OK		C	10			12			12
15	BD0281		close	OK		C	10			12			12
14	BD0280		close	OK		C	10			12			12
13	BD0279		close	OK		C	10			12			12
12	BD0278		close	OK		C	10				12		12
11	BD0277		close	OK		C	10				12		12
10	BD0276		close	OK		C	10				12		12
9	BD0275		close	OK		C	10				12		12
8	BD0274		close	OK		C	10				12		12
7	BD0273		close	OK		C	10				12		12
6	BD0272		close	OK		C	10				12		12
5	BD0271		close	OK		C	10					10	10
4	BD0270		close	OK		C	25					10	10
3	BD0269		close	OK		C	50					10	10
2	BD0268		close	OK		C	100					10	10
1	BD0267		close	OK		C	200					10	10

BD-18

CMS	GT-ID	BottleID No.	open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	18O	H2S	Chl-a	Ba	Fe(II)	Fe(II) Oxidation	Trace Metal	Archive	Dissolved Fe	Total dissolvable Fe	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Cr	BTM. filt	BTM. unfilt	Bi	Total
		Bottle Status						Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	AORI	AORI	Univ. Toyama	Tokai	AORI	AORI	AORI	AORI	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Nagasaki Univ.	Nagasaki Univ.	Kochi Pref Univ	Kyoto	Kyoto	Kyoto	
													Ooki	Ooki	Nakayama	Nakayama	Roy Andreas	Kato	Takahashi	Takahashi	Obata	Obata	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Isshiki	Konagaya	Konagaya	Takano	
																			Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	
25	BD0315		close	OK			bucket	0.8	1.2	0.2	1	0.6																			3.8
24	BD0314		close	OK		N	10	0.8	1.2	0.2	1	0.6					0.6	0.2													4.6
23	BD0313		close	OK		N	100	0.8	1.2	0.2	1	0.6						0.2													4
22	BD0312		close	OK		N	300	0.8	1.2	0.2	1	0.6	1	1			0.6	0.2													6.6
21	BD0311		close	OK		N	600	0.8	1.2	0.2	1		1	1				0.2													5.4
20	BD0310		close	OK		N	1200	0.8	1.2	0.2	1		1	1				0.2													5.4
19	BD0309		close	OK		N	1700	0.8	1.2	0.2	1		1					0.2													4.4
18	BD0308		close	OK		N	1900	0.8	1.2	0.2	1		1					0.2													4.4
17	BD0307		close	OK		N	2000	0.8	1.2	0.2	1		1					0.2													4.4
16	BD0306		close	OK		N	2100	0.8	1.2	0.2	1		1					0.2													4.4
15	BD0305		close	OK		N	2200	0.8	1.2	0.2	1		1					0.2													4.4
14	BD0304		close	OK		N	2400	0.8	1.2	0.2	1		1					0.2													4.4
13	BD0303		close	OK		N	Bottom	0.8	1.2	0.2	1		1				~~1~~	0.2													5.4
12	BD0302	12102	close	OK		C	10												0.3	0.7	0.7	0.7	0.2				0.2	0.35	0.35	0.35	3.85
11	BD0301	12125	close	OK		C	100												0.3		0.7	0.7	0.2				0.2	0.35	0.35	0.35	3.15
10	BD0300	12132	close	OK		C	300												0.3	0.7	0.7	0.7	0.2				0.2	0.35	0.35	0.35	3.85
9	BD0299	12130	close	OK		C	600												0.3		0.7	0.7	0.2				0.2	0.35	0.35	0.35	3.15
8	BD0298	12088	close	OK		C	1200												0.3	~~0.7~~	0.7	0.7	0.2				0.2	0.35	0.35	0.35	3.85
7	BD0297	12110	close	OK		C	1700												0.3		0.7	0.7	0.2				0.2	0.35	0.35	0.35	3.15
6	BD0296	12101	close	OK		C	1900												0.3	0.7	0.7	0.7	0.2				0.2	0.35	0.35	0.35	3.85
5	BD0295	12107	close	OK		C	2000												0.3		0.7	0.7	0.2				0.2	0.35	0.35	0.35	3.15
4	BD0294	12093	close	OK		C	2100												0.3		0.7	0.7	0.2				0.2	0.35	0.35	0.35	3.15
3	BD0293	12108	close	OK		C	2200												0.3		0.7	0.7	0.2				0.2	0.35	0.35	0.35	3.15
2	BD0292	12116	close	OK		C	2400												0.3	0.7	0.7	0.7	0.2				0.2	0.35	0.35	0.35	3.85
1	BD0291	12112	close	OK		C	Bottom												0.3	0.7	0.7	0.7	0.2				0.2	0.35	0.35	0.35	3.85

BD-19 Cast-1

								Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble		Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	AORI	AORI	Univ. Toyama	Tokai	AIST	AORI	AORI	AORI	AORI	Univ. Toyama	Univ. Toyama	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Nagasaki Univ.	Nagasaki Univ.		Kochi Pref Univ	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	ETH	
		Bottle Status											Ooki	Ooki	Nakayama	Nakayama	Roy Andreas	Kato	Yamashita	Takahashi	Takahashi	Obata	Obata	Roy Andreas	Roy Andreas	Nishioka	Nishioka	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Isshiki	Isshiki	Konagaya	Konagaya	Takano	Takano	Takano	Wetzel (Gamo)	
CMS	GT-ID	Bottle No.	open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	^{18}O	H_2S	Chl-a	Ba	PFASs	Fe(II)	Fe(II) Oxidation	Trace Metal	Archive	Trace Metals	Trace Metals (Unfilt)	Dissolved Fe	Total Dissolvable Fe	size-fraction colloidal Fe	CDOM	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Cr	Cr	BTM. filt	BTM. unfilt	Mo (3側点のみ).filt	Pd, Pt, Au(3側点のみ).filt	Bi	Si isotope	Total
																				Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Filt	Filt	
24	BD0339		close	OK		N	O2 min	0.8	1.2	0.2	1	0.6					1.6	0.2																						5.6
23	BD0338					N	800	0.8	1.2	0.2	1					~~0.8~~		0.2	1																					5.2
22	BD0337					N	1000	0.8	1.2	0.2	1		1	0.5	~~0.8~~	~~0.8~~		0.2	1																					7.5
21	BD0336					N	1250	0.8	1.2	0.2	1		1					0.2																						4.4
20	BD0335					N	1500	0.8	1.2	0.2	1		1					0.2																						4.4
19	BD0334					N	1750			0.2			1					0.2																					0.2	1.6
18	BD0333					N	2000	0.8	1.2	0.2	1		1		~~0.8~~	~~0.8~~		0.2	1																					7
17	BD0332					N	2250			0.2			1					0.2																					0.2	1.6
16	BD0331					N	2500	0.8	1.2	0.2	1		1					0.2																						4.4
15	BD0330					N	2750			0.2			1					0.2																						1.4
14	BD0329					N	3000	0.8	1.2	0.2	1		1		~~0.8~~	~~0.8~~		0.2	1																					7
13	BD0328					N	Bottom	0.8	1.2	0.2	1		1			~~0.8~~		0.2																						5.2
12	BD0327				no sampling	C	O2 min													~~0.3~~	~~0.7~~	~~0.7~~	~~0.7~~	~~0.5~~	~~0.5~~	~~0.2~~	~~0.2~~	~~0.4~~												4.2
11	BD0326		close	OK		C	O2 min													0.3	0.7	0.7	0.7	0.5	0.5	0.2						0.2	0.2	0.35	0.35	0.35	4.2	0.35		9.6
10	BD0325		close	OK		C	800													0.3		0.7	0.7			0.2	~~0.2~~	~~0.4~~				0.2	0.2	0.35	0.35	0.35	4.2	0.35		8.5
9	BD0324		close	OK		C	1000													0.3	0.7	0.7	0.7			0.2	~~0.2~~	~~0.4~~	0.3	0.6	0.2	0.2	0.2	0.35	0.35	0.35	4.2	0.35	0.2	10.5
8	BD0323			OK	no sampling	C	1000																										~~0.2~~	~~0.35~~	~~0.35~~	~~0.35~~	~~4.2~~	~~0.35~~	~~0.2~~	6
7	BD0322		close	OK		C	1250															0.7	0.7			0.2	~~0.2~~	~~0.4~~				0.2	0.2	0.35	0.35	0.35	4.2	0.35		8.2
6	BD0321		close	OK		C	1500															0.7	0.7			0.2	~~0.2~~	~~0.4~~				0.2	0.2	0.35	0.35	0.35	4.2	0.35	0.2	8.4
5	BD0320		close	OK		C	2000															0.7	0.7			0.2	~~0.2~~	~~0.4~~	0.3			0.2	0.2	0.35	0.35	0.35	4.2	0.35	0.2	8.7
4	BD0319		close	OK		C	2500															0.7	0.7			0.2	~~0.2~~	~~0.4~~				0.2	0.2	0.35	0.35	0.35	4.2	0.35	0.2	8.4
3	BD0318		close	OK		C	3000															0.7	0.7			0.2	~~0.2~~	~~0.4~~	0.3	0.6	0.2	0.2	0.2	0.35	0.35	0.35	4.2	0.35	0.2	9.5
2	BD0317		close	OK		C	Bottom													0.3		0.7	0.7	0.5	0.5	0.2	~~0.2~~	~~0.4~~		0.6	0.2	0.2		0.35		0.35	4.2	0.35		9.75
1	BD0316		close	OK		C	Bottom																							~~0.6~~	~~0.2~~		0.2	~~0.35~~	0.35	~~0.35~~	~~4.2~~	~~0.35~~		6.6

BD-19 Cast-2

								Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble		Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	AORI	AORI	Univ. Toyama	Tokai	AIST	AORI	AORI	AORI	AORI	Univ. Toyama	Univ. Toyama	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Nagasaki Univ.	Nagasaki Univ.		Kochi Pref Univ	Kyoto	Kyoto	Kyoto	Kyoto	Kyoto	ETH	
		Bottle Status											Ooki	Ooki	Nakayama	Nakayama	Roy Andreas	Kato	Yamashita	Takahashi	Takahashi	Obata	Obata	Roy Andreas	Roy Andreas	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Isshiki	Isshiki	Konagaya	Konagaya	Takano	Takano	Takano	Wetzel (Gamo)	
CMS	GT-ID	Bottle No.	open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	^{18}O	H_2S	Chl-a	Ba	PFASs	Fe(II)	Fe(II) Oxidation	Trace Metal	Archive	Trace Metals	Trace Metals (Unfilt)	Dissolved Fe	CDOM	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Cr	Cr	BTM. filt	BTM. unfilt	Mo (3側点のみ).filt	Pd, Pt, Au(3側点のみ).filt	Bi	Si isotope	Total
																				Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Filt	Filt	
25	BD0364						bucket	0.8	1.2	0.2	1	0.6							1																			4.8
24	BD0363		close	OK		N	10	0.8	1.2	0.2	1	0.6			~~0.8~~	~~0.8~~	0.6	0.2	1																			7.2
23	BD0362					N	25	0.8	1.2	0.2	1	0.6				~~0.8~~		0.2																				4.8
22	BD0361					N	50	0.8	1.2	0.2	1	0.6				~~0.8~~	0.6	0.2	1																			6.4
21	BD0360					N	100	0.8	1.2	0.2	1	0.6			~~0.8~~	~~0.8~~		0.2	1																			6.6
20	BD0359					N	Chla max	0.8	1.2	0.2	1	0.6			~~0.8~~	~~0.8~~	1.6	0.2	1																			8.2
19	BD0358					N	150	0.8	1.2	0.2	1	0.6						0.2																				4
18	BD0357					N	200	0.8	1.2	0.2	1	0.6			~~0.8~~	~~0.8~~		0.2	1																			6.6
17	BD0356					N	300			0.2								0.2																				0.4
16	BD0355					N	400	0.8	1.2	0.2	1		1	0.5	~~0.8~~	~~0.8~~	0.6	0.2	1																			8.1
15	BD0354					N	600	0.8	1.2	0.2	1							0.2	1																			4.4
14	BD0353		close	OK		C	10													0.3	0.7	0.7	0.7	0.5	0.5	0.2		0.6	0.2	0.2	0.2	0.35	0.35	0.35	4.2	0.35	0.2	10.6
13	BD0352				no sampling	C	10																								~~0.2~~	~~0.35~~	~~0.35~~	~~0.35~~	~~4.2~~	~~0.35~~	~~0.2~~	6
12	BD0351		close	OK		C	25													0.3		0.7	0.7			0.2				0.2	0.2	0.35	0.35	0.35	4.2	0.35		7.9
11	BD0350		close	OK		C	50													0.3		0.7	0.7			0.2	0.3			0.2	0.2	0.35	0.35	0.35	4.2	0.35		8.2
10	BD0349		close	OK		C	100													0.3		0.7	0.7			0.2	0.3	0.6	0.2	0.2	0.2	0.35	0.35	0.35	4.2	0.35	0.2	9.2
9	BD0348				no sampling	C	100																															0
8	BD0347				no sampling	C	Chla max													~~0.3~~	~~0.7~~	~~0.7~~	~~0.7~~	~~0.5~~	~~0.5~~	~~0.2~~		~~0.6~~	~~0.2~~									4.4
7	BD0346		close	OK		C	Chla max													0.3	0.7	0.7	0.7	0.5	0.5	0.2		0.6	0.2	0.2	0.2	0.35	0.35	0.35	4.2	0.35		10.4
6	BD0345		close	OK		C	150													0.3		0.7	0.7			0.2				0.2	0.2	0.35	0.35	0.35	4.2	0.35	0.2	8.1
5	BD0344		close	OK		C	200													0.3	0.7	0.7	0.7			0.2		0.6	0.2	0.2	0.2	0.35	0.35	0.35	4.2	0.35	0.2	9.6
4	BD0343				no sampling	C	200																															0
3	BD0342		close	OK		C	400													0.3		0.7	0.7	0.5	0.5	0.2	0.3	0.6	0.2	0.2	0.2	0.35	0.35	0.35	4.2	0.35	0.2	10.2
2	BD0341				no sampling	C	400																								~~0.2~~	~~0.35~~	~~0.35~~	~~0.35~~	~~4.2~~	~~0.35~~	~~0.2~~	6
1	BD0340		close	OK		C	600													0.3		0.7	0.7			0.2				0.2	0.2	0.35	0.35	0.35	4.2	0.35	0.2	8.1

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								Routine	Routine	Routine	Routine	Routine	AORI	AORI	AORI	AORI	Univ. Toyama	Tokai	AIST	AORI	AORI	AORI	AORI	AORI	AORI	AORI	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Kochi Pref Univ	Kyoto	Kyoto	Kyoto	
		Bottle Status											Ooki	Ooki	Nakayama	Nakayama	Roy Andreas	Kato	Yamashita	Takahashi	Takahashi	Kim	Obata	Obata	Obata	Suzuki	Nishioka	Nishioka	Nishioka	Isshiki	Takano	Takano	Takano	
CMS	GT-ID	BottleIDNo.	open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	18O	H2S	Chl-a	Ba	PFASs	Fe(II)	Fe(II) Oxidation	Sulfide	Trace Metal	Archive	Speciation	PGE&REE	Dissolved Fe	Total dissolvable Fe	size-fraction colloidal Fe	Cr	Bi	Pb isotope (if possible)	Cu IR (if possible	Total
																				Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Filt	
25	BD0389		close	OK			bucket	0.8	1.2	0.2	1	0.6																						3.8
24	BD0388	92004	close	OK		C	10	0.8	1.2	0.2	1	0.6			0.8	0.8	0.6	0.2	1													~~2.2~~	2.2	11.6
23	BD0387	12114	close	OK		C	10													0.3	0.7	0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	2.2	~~2.2~~	12.65
22	BD0386	12086	close	OK		C	100	0.8	1.2	0.2	1	0.6			0.8	0.8		0.2	1													2.2	2.2	11
21	BD0385	12097	close	OK		C	100													0.3		0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	~~2.2~~	~~2.2~~	11.95
20	BD0384		close	OK		C	300	0.8	1.2	0.2	1	0.6	1	1	~~0.8~~	0.8	0.6	0.2	1													~~2.2~~	~~2.2~~	13.6
19	BD0383		close	OK		C	300													0.3	0.7	0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	2.2	~~2.2~~	12.65
18	BD0382		close	OK		C	600	0.8	1.2	0.2	1		1	1	0.8	~~0.8~~		0.2	1													~~2.2~~	2.2	12.4
17	BD0381		close	OK		C	600													0.3		0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	2.2	~~2.2~~	11.95
16	BD0380		close	OK		C	1000	0.8	1.2	0.2	1		1	1	0.8	0.8		0.2	1													~~2.2~~	2.2	12.4
15	BD0379		close	OK		C	1000													0.3	0.7	0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	2.2	~~2.2~~	12.65
14	BD0378		close	OK		C	1200	0.8	1.2	0.2	1		1		~~0.8~~	~~0.8~~		0.2														~~2.2~~	2.2	10.4
13	BD0377		close	OK		C	1200													0.3		0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	2.2	~~2.2~~	11.95
12	BD0376		close	OK		C	1300	0.8	1.2	0.2	1		1		~~0.8~~	~~0.8~~		0.2														~~2.2~~	2.2	10.4
11	BD0375		close	OK		C	1300													0.3		0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	2.2	~~2.2~~	11.95
10	BD0374		close	OK		C	1400	0.8	1.2	0.2	1		1		~~0.8~~	0.8		0.2														2.2	2.2	10.4
9	BD0373		close	OK		C	1400													0.3	0.7	0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	~~2.2~~	~~2.2~~	12.65
8	BD0372		close	OK		C	1450	0.8	1.2	0.2	1		1		~~0.8~~	0.8		0.2														~~2.2~~	2.2	10.4
7	BD0371		close	OK		C	1450													0.3		0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	2.2	~~2.2~~	11.95
6	BD0370		close	OK		C	1500	0.8	1.2	0.2	1		1		0.8	0.8		0.2	1													~~2.2~~	2.2	11.4
5	BD0369		close	OK		C	1500													0.3		0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	2.2	~~2.2~~	11.95
4	BD0368		close	OK		C	1550	0.8	1.2	0.2	1		1		~~0.8~~	0.8		0.2														~~2.2~~	2.2	10.4
3	BD0367		close	OK		C	1550													0.3		0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	2.2	~~2.2~~	11.95
2	BD0366		close	OK		C	Bottom	0.8	1.2	0.2	1		1		0.8	0.8	1	0.2	1													2.2	2.2	12.4
1	BD0365		close	OK		C	Bottom													0.3	0.7	0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	2.2	2.2	12.65

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								Routine	Routine	Routine	Routine	Routine	AORI	AORI	AORI	AORI	Univ. Toyama	Tokai	AIST	AORI	AORI	AORI	AORI	AORI	AORI	AORI	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Kochi Pref Univ	Kyoto	Kyoto	Kyoto	
		Bottle Status											Ooki	Ooki	Nakayama	Nakayama	Roy Andreas	Kato	Yamashita	Takahashi	Takahashi	Kim	Obata	Obata	Obata	Suzuki	Nishioka	Nishioka	Nishioka	Isshiki	Takano	Takano	Takano	
CMS	GT-ID	BottleIDNo.	open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	18O	H2S	Chl-a	Ba	PFASs	Fe(II)	Fe(II) Oxidation	Sulfide	Trace Metal	Archive	Speciation	PGE&REE	Dissolved Fe	Total dissolvable Fe	size-fraction colloidal Fe	Cr	~~Bi~~ BTM	Pb isotope (if possible)	Cu IR (if possible	Total
																				Filt	Filt	Filt	Filt	Filt	Filt	Filt	Filt	Unfilt	Filt	Unfilt	Filt	Filt	Filt	
25	BD0414		close	OK			bucket	0.8	1.2	0.2	1	0.6																						3.8
24	BD0413		close	OK		C	10	0.8	1.2	0.2	1	0.6			~~0.8~~	~~0.8~~	0.6	0.2	1													2.2	2.2	11.6
23	BD0412		close	OK		C	10													0.3	0.7	0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	~~2.2~~	~~2.2~~	12.65
22	BD0411		close	OK		C	100	0.8	1.2	0.2	1	0.6			~~0.8~~	~~0.8~~		0.2	1													2.2	2.2	11
21	BD0410		close	OK		C	100													0.3		0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	~~2.2~~	~~2.2~~	11.95
20	BD0409		close	OK		C	300	0.8	1.2	0.2	1	0.6	1	1	~~0.8~~	~~0.8~~	0.6	0.2	1													2.2	~~2.2~~	13.6
19	BD0408		close	OK		C	300													0.3	0.7	0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	~~2.2~~	2.2	12.65
18	BD0407		close	OK		C	600	0.8	1.2	0.2	1		1	1	~~0.8~~	~~0.8~~		0.2	1													2.2	2.2	12.4
17	BD0406		close	OK		C	600													0.3		0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	~~2.2~~	~~2.2~~	11.95
16	BD0405		close	OK		C	1200	0.8	1.2	0.2	1		1	1	~~0.8~~	~~0.8~~		0.2	1													2.2	~~2.2~~	12.4
15	BD0404		close	OK		C	1200													0.3	0.7	0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	~~2.2~~	2.2	12.65
14	BD0403		close	OK		C	1800	0.8	1.2	0.2	1		1		~~0.8~~	~~0.8~~		0.2														~~2.2~~	~~2.2~~	10.4
13	BD0402		close	OK		C	1800													0.3		0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	2.2	2.2	11.95
12	BD0401		close	OK		C	2000	0.8	1.2	0.2	1		1		~~0.8~~	0.8		0.2	1													~~2.2~~	~~2.2~~	11.4
11	BD0400		close	OK		C	2000													0.3		0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	2.2	2.2	11.95
10	BD0399		close	OK		C	2100	0.8	1.2	0.2	1		1		~~0.8~~	~~0.8~~		0.2														2.2	~~2.2~~	10.4
9	BD0398		close	OK		C	2100													0.3	0.7	0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	~~2.2~~	2.2	12.65
8	BD0397		close	OK		C	2200	0.8	1.2	0.2	1		1		~~0.8~~	0.8		0.2														2.2	~~2.2~~	10.4
7	BD0396		close	OK		C	2200													0.3		0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	~~2.2~~	2.2	11.95
6	BD0395		close	OK		C	2300	0.8	1.2	0.2	1		1		~~0.8~~	0.8		0.2														2.2	~~2.2~~	10.4
5	BD0394		close	OK		C	2300													0.3		0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	~~2.2~~	2.2	11.95
4	BD0393		close	OK		C	2400	0.8	1.2	0.2	1		1		~~0.8~~	0.8		0.2	1													2.2	~~2.2~~	11.4
3	BD0392		close	OK		C	2400													0.3		0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	~~2.2~~	2.2	11.95
2	BD0391		close	OK		C	Bottom	0.8	1.2	0.2	1		1		~~0.8~~	0.8	~~1~~	0.2														2.2	~~2.2~~	11.4
1	BD0390		close	OK		C	Bottom													0.3	0.7	0.3	0.7	0.7	0.7	3.5	0.2	0.2	0.4	0.2	0.35	~~2.2~~	2.2	12.65

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								Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Deck	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	Bubble	
								Routine	Routine	Routine	Routine	Routine	AORI	AORI	AORI	AORI	Univ. Toyama	Tokai	AORI	AORI	AORI	AORI	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Hokkaido Univ ILTS	Nagasaki Univ.	Nagasaki Univ.	Kochi Pref Univ	Kyoto	ETH	
		Bottle Status											Ooki	Ooki	Nakayama	Nakayama	Roy Andreas	Kato	Takahashi	Takahashi	Obata	Obata	Nishioka	Nishioka	Nishioka	Naoe (Takeda)	Naoe (Takeda)	Isshiki	Takano	Wetzel (Gamo)	
CMS	GT-ID	BottleIDNo	open/close	leakage	remark	N/C	Pressure (db)	Salinity	DO	Nutrients	pH/Alkalinity	Chl.a	Helium	Tritium	18O	H2S	Chl-a	Ba	Fe(II)	Fe(II) Oxidation	Trace Metal	Archive	Dissolved Fe	Total dissolvable Fe	size-fraction colloidal Fe	Fe-speciation (Filtered)	Dissolved Fe (Filtered)	Cr	Bi	Si isotope	Total
																			Filt	Filt	Filt	Filt	Filt	Unfilt	Unfilt	Filt	Filt	Unfilt	Filt	Filt	
25	BD0439		close	OK			bucket	0.8	1.2	0.2	1	0.6																			3.8
24	BD0438		close	OK		N	10	0.8	1.2	0.2	1	0.6					0.6	0.2													4.6
23	BD0437		close	OK		N	100	0.8	1.2	0.2	1	0.6						0.2													4
22	BD0436		close	OK		N	300	0.8	1.2	0.2	1	0.6					0.6	0.2													4.6
21	BD0435		close	OK		N	600	0.8	1.2	0.2	1		1	1				0.2													5.4
20	BD0434		close	OK		N	1200	0.8	1.2	0.2	1		1	1				0.2													5.4
19	BD0433		close	OK		N	1800	0.8	1.2	0.2	1		1					0.2													4.4
18	BD0432		close	OK		N	2000	0.8	1.2	0.2	1		1					0.2													4.4
17	BD0431		close	OK		N	2100	0.8	1.2	0.2	1		1					0.2													4.4
16	BD0430		close	OK		N	2200	0.8	1.2	0.2	1		1					0.2													4.4
15	BD0429		close	OK		N	2300	0.8	1.2	0.2	1		1					0.2													4.4
14	BD0428		close	OK		N	2400	0.8	1.2	0.2	1		1					0.2													4.4
13	BD0427		close	OK		N	Bottom	0.8	1.2	0.2	1		1					0.2													4.4
12	BD0426		close	OK		C	10												0.3	0.7	0.7	0.7	0.2	0.2	~~0.4~~	~~0.6~~	~~0.2~~	0.2	0.35	0.2	4.75
11	BD0425		close	OK		C	100												0.3		0.7	0.7	0.2	0.2	~~0.4~~	~~0.6~~	~~0.2~~	0.2	0.35	0.2	4.05
10	BD0424		close	OK		C	300												0.3	0.7	0.7	0.7	0.2	0.2	~~0.4~~	~~0.6~~	~~0.2~~	0.2	0.35	0.2	4.75
9	BD0423		close	OK		C	600												0.3		0.7	0.7	0.2	0.2	~~0.4~~	~~0.6~~	~~0.2~~	0.2	0.35	0.2	4.05
8	BD0422		close	OK		C	1200												0.3	0.7	0.7	0.7	0.2	0.2	~~0.4~~	~~0.6~~	~~0.2~~	0.2	0.35	0.2	4.75
7	BD0421		close	OK		C	1800												0.3		0.7	0.7	0.2	0.2	~~0.4~~			0.2	0.35	0.2	3.25
6	BD0420		close	OK		C	2000												0.3	~~0.7~~	0.7	0.7	0.2	0.2	~~0.4~~			0.2	0.35	0.2	3.95
5	BD0419		close	OK		C	2100												0.3		0.7	0.7	0.2	0.2	~~0.4~~			0.2	0.35	0.2	3.25
4	BD0418		close	OK		C	2200												0.3	0.7	0.7	0.7	0.2	0.2	~~0.4~~	~~0.6~~	~~0.2~~	0.2	0.35	0.2	4.75
3	BD0417		close	OK		C	2300												0.3		0.7	0.7	0.2	0.2	~~0.4~~			0.2	0.35	0.2	3.25
2	BD0416		close	OK		C	2400												0.3		0.7	0.7	0.2	0.2	~~0.4~~			0.2	0.35	0.2	3.25
1	BD0415		close	OK		C	Bottom												0.3	0.7	0.7	0.7	0.2	0.2	~~0.4~~	~~0.6~~	~~0.2~~	0.2	0.35	0.2	4.75

7.3. Routine data for CTD hydrocast samples

Station BD01 (35°59.98'N, 141°01.08'E; Depth= N.D. m); Aug. 23, 2012, 17:32 ~ Aug 23, 2012, 18:16; Bottom altitude: N.D. m)

Cast No.	Sample No.	Niskin No.	Depth (m)	Pressure (decibar)	Temp. (°C) (CTD)	Pot.Temp	Sigma-th	Salinity (CTD)	Salinity (Routine)	QF	Oxygen (μmol/L)	Oxygen (μmol/kg)	QF	Chlorophyll a (μg/L)	QF	NO3+NO2 (μmol/L)	NO3+NO2 (μmol/kg)	QF	NO2 (μmol/L)	QF	SiO2 (μmol/L)	SiO2 (μmol/kg)	QF	PO4 (μmol/L)	PO4 (μmol/kg)	QF	pH(X)	QF	Alkalinity (μmol/kg)	QF
1	BD0010	25	######	N.D.	27.8000	#VALUE!	#VALUE!	N.D.	33.814	1	216.76		1	0.209	1	0.82		1	0.000	1	0.00		1	0.04		1				
1	BD0009	20	#REF!	10.0	25.3206	25.318	22.424	33.912	33.940	1	227.12	222.14	1	0.291	1	0.94	0.92	1	0.000	1	0.00	0.00	1	0.55	0.54	1	8.081	1	2239.0	1
1	BD0008	11	#REF!	264.7	8.3828	8.355	26.574	34.176	34.175	1	158.33	154.23	1			4.18	4.07	1	0.040	1	44.51	43.36	1	1.77	1.72	1	7.642	1	2288.4	1
1	BD0007	9	#REF!	19.9	22.3157	22.312	23.487	34.151	34.194	4	232.04	226.71	1	0.686	1	0.87	0.85	1	0.000	1	0.00	0.00	1	0.09	0.09	1	8.048	1	2260.4	1
1	BD0006	7	#REF!	49.8	17.8511	17.843	25.033	34.636	34.643	1	188.47	183.87	1	0.598	1	0.86	0.84	1	0.070	1	6.36	6.20	1	0.50	0.49	1	7.922	1	2279.1	1
1	BD0005	6	#REF!	74.4	16.7144	16.702	25.300	34.628	34.629	1	188.17	183.53	1	0.233	1	0.92	0.90	1	0.030	1	7.47	7.29	1	0.56	0.55	1	7.897	1	2281.1	1
1	BD0004	5	#REF!	100.5	14.9697	14.955	25.620	34.530	34.528	1	177.32	172.89	1	0.107	1	0.96	0.94	1	0.020	1	15.33	14.95	1	0.84	0.82	1	7.846	1	2279.1	1
1	BD0003	4	#REF!	150.4	12.3760	12.356	26.071	34.421	34.421	1	168.20	163.92	1	0.033	1	0.98	0.96	1	0.010	1	24.63	24.00	1	1.18	1.15	1	7.770	1	2280.4	1
1	BD0002	3	#REF!	200.0	10.3143	10.291	26.322	34.256	34.257	1	188.49	183.65	1	0.019		1.17	1.14	1	0.020	1	27.43	26.73	1	1.29	1.26	1	7.741	1	2278.9	1
1	BD0001	2	#REF!	250.5	8.8071	8.780	26.534	34.209	34.208	1	157.82	153.74	1			2.16	2.10	1	0.040	1	43.43	42.31	1	1.69	1.65	1	7.658	1	2288.7	1

Station BD02 (37°19.88'N, 141°27.21'E; Depth= N.D. m); Aug. 24, 2012, 02:26 ~ Aug 24, 2012, 02:55; Bottom altitude: 15 m)

Cast No.	Sample No.	Niskin No.	Depth (m)	Pressure (decibar)	Temp. (°C) (CTD)	Pot.Temp	Sigma-th	Salinity (CTD)	Salinity (Routine)	QF	Oxygen (μmol/L)	Oxygen (μmol/kg)	QF	Chlorophyll a (μg/L)	QF	NO3+NO2 (μmol/L)	NO3+NO2 (μmol/kg)	QF	NO2 (μmol/L)	QF	SiO2 (μmol/L)	SiO2 (μmol/kg)	QF	PO4 (μmol/L)	PO4 (μmol/kg)	QF	pH(X)	QF	Alkalinity (μmol/kg)	QF
1	BD0019	25	######	N.D.	26.200	#VALUE!	#VALUE!	N.D.	33.741	1	225.97		1	0.158	1	0.04		1	0.010		0.00		1	0.00		1				
1	BD0018	15	20	20.2	20.480	20.476	23.856	33.975	34.034	4	253.57	247.66	1	0.258	1	0.01	0.01	1	0.010		0.00	0.00	1	0.00	0.00	1	8.030	1	2258.9	1
1	BD0017	12	75	75.2	15.061	15.050	25.200	34.012	34.050	4	268.56	261.96	1	1.043	1	2.45	2.39	1	0.150		2.87	2.80	1	0.24	0.23	1	7.966	1	2262.7	1
1	BD0016	8	10	10.4	21.398	21.396	23.447	33.764	33.773	1	250.56	244.82	1	0.198	1	0.01	0.01	1	0.00		0.00	0.00	1	0.01	0.01	1	8.031	1	2248.9	1
1	BD0015	6	30	29.9	19.756	19.751	24.116	34.066	34.052	1	254.03	248.05	1	0.238	1	0.00	0.00	1	0.000		0.00	0.00	1	0.02	0.02	1	8.024	1	2260.2	1
1	BD0014	5	49	49.8	18.692	18.683	24.368	34.040	34.046	1	249.09	243.16	4	0.260	1	0.00	0.00	1	0.010		0.00	0.00	1	0.04	0.04	1	8.020	1	2260.1	1
1	BD0013	3	99	99.9	10.669	10.657	26.084	34.033	34.025	1	259.99	253.38	1	0.131	1	7.46	7.27	1	0.020		7.20	7.02	1	0.58	0.57	1	7.878	1	2260.6	1
1	BD0012	2	134	134.6	9.475	9.460	26.300	34.050	34.053	1	244.72	238.45	1	0.045	1	11.99	11.68	1	0.020		15.16	14.77	1	0.89	0.87	1	7.816	1	2266.1	1
1	BD0011	1	133	134.4	9.499	9.484	26.291	34.044	34.031	1	246.72	240.40	1			11.59	11.29	1	0.030		14.24	13.88	1	0.87	0.85	1	7.820	1	2266.0	1

Station BD03 (37°35.07'N, 141°30.94'E; Depth= N.D. m); Aug. 24, 2012, 06:08 ~ Aug 24, 2012, 06:03; Bottom altitude: 13.773 m)

Cast No.	Sample No.	Niskin No.	Depth (m)	Pressure (decibar)	Temp. (°C) (CTD)	Pot.Temp	Sigma-th	Salinity (CTD)	Salinity (Routine)	QF	Oxygen (μmol/L)	Oxygen (μmol/kg)	QF	Chlorophyll a (μg/L)	QF	NO3+NO2 (μmol/L)	NO3+NO2 (μmol/kg)	QF	NO2 (μmol/L)	QF	SiO2 (μmol/L)	SiO2 (μmol/kg)	QF	PO4 (μmol/L)	PO4 (μmol/kg)	QF	pH(X)	QF	Alkalinity (μmol/kg)	QF
1	BD0027	25	######	N.D.	25.700	#VALUE!	#VALUE!	N.D.	33.731	1	234.15		1	0.248	1	0.23		1	0.01	1	0.00		1	0.04		1				
1	BD0026	17	#REF!	10.0	22.819	22.817	22.945	33.625	33.621	1	245.39	239.89	1	0.221	1	0.01	0.01	1	0.00	1	0.00	0.00	1	0.02	0.02	1	8.033	1	2241.0	1
1	BD0025	6	#REF!	20.2	20.017	20.013	23.646	33.540	33.589	4	263.38	257.30	1	0.328	1	0.00	0.00	1	0.00	1	0.00	0.00	1	0.00	0.00	1	8.032	1	2239.7	1
1	BD0024	5	#REF!	30.2	16.743	16.738	24.617	33.749	33.733	1	278.41	271.72	1	0.485	1	0.10	0.10	1	0.01	1	0.00	0.00	1	0.06	0.06	1	8.015	1	2247.7	1
1	BD0023	4	#REF!	50.4	14.112	14.105	25.330	33.919	33.921	1	263.56	257.05	1	0.956	1	2.17	2.12	1	0.34	1	1.76	1.72	1	0.23	0.22	1	7.952	1	2258.6	1
1	BD0022	3	#REF!	74.9	12.188	12.178	25.823	34.057	34.051	1	252.40	246.05	1	0.326	1	6.96	6.79	1	0.07	1	6.83	6.66	1	0.55	0.54	1	7.894	1	2263.8	1
1	BD0021	2	#REF!	99.7	10.964	10.952	26.101	34.122	34.120	1	243.51	237.32	1	0.101	1	9.27	9.03	1	0.03	1	9.95	9.70	1	0.71	0.69	1	7.855	1	2269.0	1
1	BD0020	1	#REF!	125.7	9.267	9.254	26.267	33.964	33.960	1	255.90	249.35	1	0.076	1	10.51	10.24	1	0.02	1	13.42	13.08	1	0.83	0.81	1	7.827	1	2260.2	1

Notes:

QF(Good=1, Questionable=4)
Time is expressed as UTC.
Position and depth are those when the deepest sample was taken.
Temp (°C) at Pressure zero was that of seawater obtained by bucket sampling.
Data marked by blue color are calculated values.

Station BD04 (37°49.28'N, 143°53.69'E; Depth=7058 m); Aug. 24, 2012, 15:27 ~ Aug 25, 2012, 05:14; Bottom altitude: 19.414 m)

	Cast No.	Sample No.	Niskin No.	Depth (m)	Pressure (decibar)	Temp. (°C) (CTD)	Pot.Temp	Sigma-th	Salinity (CTD)	Salinity (Routine)	QF	Oxygen (µmol/L)	Oxygen (µmol/kg)	QF	Chlorophyll a (µg/L)	QF	NO3+NO2 (µmol/L)	NO3+NO2 (µmol/kg)	QF	NO2 (µmol/L)	QF	SiO2 (µmol/L)	SiO2 (µmol/kg)	QF	PO4 (µmol/L)	PO4 (µmol/kg)	QF	pH(X)	QF	Alkalinity (µmol/kg)	QF
0	3	BD0088	25	######	N.D.	28.200	#VALUE!	#VALUE!	N.D.	34.057	1	205.44		1	0.140	1	0.08		1	0.019	1	0.00		1	0.02		1	8.092	1	2243.2	1
10	3	BD0087	24	10	10.5	27.984	27.982	21.707	34.075	34.094	1	210.08	205.62	1	0.131	1	0.03	0.03	1	0.009	1	0.00	0.00	1	0.01	0.01	1	8.096	1	2239.5	1
25	3	BD0086	23	25	25.1	24.742	24.737	23.045	34.500	34.525	1	217.38	212.48	1	0.176	1	0.03	0.03	1	0.000	1	0.00	0.00	1	0.03	0.03	1	8.068	1	2264.5	1
chlamax	3	BD0081	18	41	41.1	22.344	22.335	23.901	34.705	34.713	1	216.58	211.53	1	0.581	1	0.35	0.35	1	0.047	1	0.00	0.00	1	0.05	0.05	1	8.042	1	2275.4	1
50	3	BD0085	22	50	50.0	21.596	21.586	24.147	34.753	34.759	1	205.55	200.70	1	0.690	1	1.90	1.86	1	0.114	1	0.08	0.08	1	0.15	0.14	1	8.024	1	2278.3	1
100	3	BD0084	21	99	100.0	18.633	18.616	24.919	34.738	34.734	1	195.89	191.13	1	0.075	1	5.12	5.00	1	0.038	1	2.77	2.70	1	0.35	0.34	1	7.960	1	2274.8	1
150	3	BD0083	20	149	150.2	16.463	16.439	25.385	34.659	34.646	1	199.75	194.80	1	0.011	1	7.53	7.35	1	0.028	1	5.71	5.57	1	0.52	0.51	1	7.919	1	2274.5	1
200	3	BD0082	19	199	200.4	13.836	13.807	25.841	34.500	34.763	4	205.97	200.78	1	0.692	4	2.00	1.95	1	0.133	1	0.00	0.00	1	0.15	0.14	1	8.015	1	2276.7	1
400	2	BD0072	23	397	400.1	8.835	8.792	26.585	34.277	34.280	1	136.97	133.42	1			25.67	25.00	1	0.009	1	48.26	47.01	1	1.89	1.84	1	7.629	1	2292.4	1
600	2	BD0071	22	594	599.1	4.940	4.893	26.893	33.998	34.021	1	117.62	114.54	1			33.21	32.34	1	0.000	1	76.05	74.06	1	2.51	2.45	1	7.469	1	2296.1	1
800	2	BD0070	21	793	800.6	3.854	3.796	27.134	34.154	34.143	1	55.71	54.23	1			39.58	38.53	1	0.000	1	108.85	105.98	1	2.94	2.86	1	7.346	1	2329.7	1
O2min	2	BD0057	8	822	830.2	3.548	3.490	27.169	34.160	34.154	1	47.68	46.42	1	0.008	1	39.86	38.80	1	0.009	1	117.09	114.00	1	3.07	2.99	1	7.310	1	2332.6	1
1000	2	BD0069	20	991	1000.5	3.368	3.297	27.320	34.327	34.329	1	45.43	44.22	1			40.48	39.40	1	0.000	1	128.11	124.70	1	3.04	2.96	1	7.355	1	2358.4	1
1250	2	BD0068	19	1239	1251.9	2.907	2.820	27.443	34.425	34.427	1	44.18	43.00	1			41.19	40.09	1	0.000	1	141.72	137.94	1	3.10	3.02	1	7.370	1	2377.2	1
1500	2	BD0067	18	1484	1500.5	2.522	2.419	27.526	34.486	34.487	1	46.89	45.64	1			41.41	40.30	1	0.000	1	152.38	148.30	1	3.09	3.01	1	7.362	1	2385.3	1
2000	2	BD0065	16	1976	2000.7	2.055	1.918	27.640	34.578	34.578	1	74.39	72.39	1			40.24	39.16	1	0.000	1	160.19	155.88	1	2.96	2.89	1	7.429	1	2405.8	1
2500	2	BD0063	14	2468	2501.3	1.760	1.584	27.706	34.628	34.627	1	106.53	103.66	1			38.52	37.48	1	0.009	1	159.24	154.95	1	2.83	2.75	1	7.503	1	2412.8	1
3000	2	BD0061	12	2956	2999.5	1.611	1.391	27.740	34.654	34.654	1	128.16	124.70	1			37.05	36.05	1	0.009	1	155.37	151.17	1	2.72	2.65	1	7.518	1	2412.8	1
3500	1	BD0049	24	3445	3499.4	1.541	1.273	27.761	34.669	34.668	1	142.84	138.98	1			36.25	35.27	1	0.000	1	152.71	148.59	1	2.59	2.52	1	7.539	1	2415.7	1
4000	1	BD0047	22	3931	3997.6	1.504	1.185	27.775	34.679	34.673	1	152.82	148.69	1			35.59	34.63	1	0.019	1	151.242	147.16	1	2.57	2.50	1	7.558	1		
4500	1	BD0034	7	4419	4499.7	1.506	1.130	27.783	34.685	34.681	1	160.15	155.82	1			35.10	34.15	1	0.019	1	148.744	144.72	1	2.54	2.48	1	7.571	1	2411.8	1
5000	1	BD0044	19	4906	5000.4	1.529	1.093	27.789	34.689	34.685	1	165.31	160.84	1			34.91	33.97	1	0.019	1	147.266	143.28	1	2.51	2.45	1			2410.2	1
5500	1	BD0042	17	5390	5499.9	1.572	1.073	27.792	34.691	34.686	1	168.94	164.37	1			34.68	33.75	1	0.000	1	145.105	141.18	1	2.50	2.43	1	7.577	1	2404.6	1
6000	1	BD0040	15	5874	6000.5	1.630	1.063	27.794	34.692	34.688	1	170.16	165.56	1			34.47	33.54	1	0.019	1	143.736	139.85	1	2.52	2.46	1	7.585	1		
6500	1	BD0038	13	6355	6499.4	1.696	1.057	27.795	34.693	34.686	1	170.45	165.84	1			34.66	33.72	1	0.019	1	143.49	139.61	1	2.50	2.43	1	7.582	1	2409.4	1
7000	1	BD0036	11	6836	6998.6	1.768	1.055	27.795	34.693	34.690	1	171.36	166.73	1			34.59	33.65	1	0.000	1	143.60	139.71	1	2.50	2.43	1	7.585	1	2413.1	1
Bottom	1	BD0029	2	7168	7343.8	1.821	1.055	27.795	34.693	34.681	1	171.50	166.87	1			34.46	33.53	1	0.000	1	142.57	138.71	1	2.50	2.44	1				

Station BD05 (40°50.01'N, 150°00.13'E; Depth=5247 m); Aug. 26, 2012, 08:51; ~ Aug 26, 2012, 16:59; Bottom altitude: 18.217 m)

	Cast No.	Sample No.	Niskin No.	Depth (m)	Pressure (decibar)	Temp. (°C) (CTD)	Pot.Temp	Sigma-th	Salinity (CTD)	Salinity (Routine)	QF	Oxygen (µmol/L)	Oxygen (µmol/kg)	QF	Chlorophyll a (µg/L)	QF	NO3+NO2 (µmol/L)	NO3+NO2 (µmol/kg)	QF	NO2 (µmol/L)	QF	SiO2 (µmol/L)	SiO2 (µmol/kg)	QF	PO4 (µmol/L)	PO4 (µmol/kg)	QF	pH(X)	QF	Alkalinity	QF
0	2	BD0137	25	######	N.D.	23.800	#VALUE!	#VALUE!	N.D.	32.716	1	252.75		1	0.276	1	0.67		1	0.01	1	0.00		1	0.28		1	8.015	1		
10	2	BD0136	24	10	10.5	18.046	18.044	23.791	33.078	33.040	1	289.56	282.83	1	0.256	1	0.23	0.22	1	0.01	1	0.00	0.00	1	0.25	0.24	1	8.018	1		
25	2	BD0135	23	26	26.4	8.254	8.252	25.568	32.874	32.873	1	363.17	354.12	1	0.827	1	9.60	9.36	1	0.14	1	5.53	5.39	1	1.11	1.09	1	7.915	1		
50	2	BD0134	22	51	51.4	2.092	2.090	26.407	33.055	33.058	1	328.74	320.28	1	0.682	1	22.45	21.87	1	0.73	1	31.49	30.68	1	1.89	1.84	1	7.671	1		
100	2	BD0133	21	99	99.3	1.470	1.465	26.560	33.191	33.191	1	311.00	302.95	1	0.048	1	25.82	25.15	1	0.02	1	43.69	42.56	1	2.06	2.00	1	7.607	1		
Chla max	2	BD0132	20	36	36.6	4.243	4.240	26.149	32.972	32.975	1	368.33	358.94	1	0.889	1	14.96	14.58	1	0.02	1	14.51	14.14	1	1.46	1.42	1	7.820	1		
150	2	BD0120	8	150	150.9	1.457	1.450	26.663	33.317	33.316	1	258.29	251.58	1	0.035	1	29.21	28.45	1	0.01	1	58.30	56.79	1	2.30	2.24	1	7.525	1		
200	2	BD0131	19	199	200.2	1.737	1.727	26.737	33.434	33.435	1	216.82	211.18	1	0.030	1	32.38	31.54	1	0.29	1	68.11	66.34	1	2.52	2.46	1	7.468	1		
400	2	BD0129	17	396	400.0	3.229	3.203	27.008	33.924	33.934	1	67.25	65.48	1			40.72	39.65	1	0.01	1	102.72	100.01	1	3.02	2.94	1	7.323	1		
600	2	BD0128	16	595	600.5	3.369	3.328	27.202	34.182	34.185	1	40.73	39.65	1			41.66	40.55	1	0.01	1	122.28	119.04	1	3.10	3.02	1	7.328	1		
800	2	BD0116	4	792	799.9	3.031	2.978	27.338	34.313	34.314	1	38.07	37.05	1			41.68	40.57	1	0.00	1	136.73	133.09	1	3.08	3.00	1	7.341	1		
1000	2	BD0127	15	990	1000.2	2.753	2.687	27.432	34.398	34.399	1	40.37	39.30	1			41.84	40.72	1	0.01	1	145.31	141.43	1	3.12	3.04	1	7.363	1		
02 min	2	BD0126	14	773	780.3	3.051	2.999	27.328	34.302	34.303	1	37.32	36.33	1	0.004	1	42.01	40.89	1	0.01	1	135.84	132.23	1	3.14	3.06	1	7.344	1		
1250	2	BD0114	2	1237	1250.7	2.408	2.326	27.522	34.472	34.473	1	45.97	44.74	1			41.60	40.49	1	0.00	1	156.22	152.03	1	3.08	3.00	1	7.383	1		
1500	1	BD0097	9	1482	1499.1	2.239	2.140	27.581	34.526	34.525	1	54.08	52.63	1			41.39	40.28	1	0.01	1	160.42	156.11	1	3.06	2.98	1	7.396	1		
2000	1	BD0111	23	1974	1999.3	1.902	1.767	27.669	34.599	34.599	1	82.73	80.50	1			39.74	38.67	1	0.00	1	162.86	158.48	1	2.89	2.81	1	7.460	1		
2500	1	BD0109	21	2465	2498.9	1.672	1.498	27.721	34.640	34.640	1	111.97	108.95	1			38.19	37.16	1	0.00	1	160.03	155.71	1	2.77	2.69	1	7.512	1		
3000	1	BD0107	19	2956	3000.2	1.551	1.333	27.750	34.661	34.661	1	132.12	128.56	1			37.02	36.02	1	0.01	1	156.85	152.61	1	2.68	2.61	1	7.551	1		
3500	1	BD0105	17	3443	3499.0	1.487	1.221	27.768	34.673	34.671	1	146.71	142.74	1			36.23	35.25	1	0.00	1	153.844	149.69	1	2.59	2.52	1	7.576	1		
4000	1	BD0103	15	3932	4000.1	1.464	1.146	27.779	34.681	34.678	1	156.47	152.24	1			35.65	34.69	1	0.00	1	151.113	147.03	1	2.54	2.47	1	7.591	1		
4500	1	BD0101	13	4418	4499.2	1.470	1.096	27.786	34.686	34.686	1	164.05	159.62	1			35.10	34.15	1	0.00	1	150.666	146.59	1	2.54	2.47	1	7.605	1		
5000	1	BD0099	11	4904	4999.5	1.516	1.081	27.788	34.687	34.686	1	165.57	161.10	1			35.10	34.16	1	0.00	1	150.568	146.50	1	2.50	2.43	1	7.610	1		
Bottom	1	BD0098	10	5230	5336.6	1.547	1.070	27.790	34.688	34.690	1	166.97	162.45	1			34.97	34.03	1	0.01	1	150.82	146.74	1	2.51	2.44	1	7.611	1		

Notes:

QF(Good=1, Questionable=4)

Time is expressed as UTC.

Position and depth are those when the deepest sample was taken.

Temp (°C) at Pressure zero was that of seawater obtained by bucket sampling.

Data marked by blue color are calculated values.

Station BD06 (44°00.18'N, 154°59.97'E; Depth=5300 m); Aug. 27, 2012, 16:15; ~ Aug 27, 2012, 00:47; Bottom altitude: 13.236 m)

	Cast No.	Sample No.	Niskin No.	Depth (m)	Pressure (decibar)	Temp. (°C) (CTD)	Pot.Temp	Sigma-th	Salinity (CTD)	Salinity (Routine)	QF	Oxygen (µmol/L)	Oxygen (µmol/kg)	QF	Chlorophyll a (µg/L)	QF	NO3+NO2 (µmol/L)	NO3+NO2 (µmol/kg)	QF	NO2 (µmol/L)	QF	SiO2 (µmol/L)	SiO2 (µmol/kg)	QF	PO4 (µmol/L)	PO4 (µmol/kg)	QF	pH(X)	QF	Alkalinity	QF
0	2	BD0184	25	######	N.D.	17.800	#VALUE!	#VALUE!	N.D.	32.338	1	263.62		1	0.265	1	6.50		1	0.11	1	0.94		1	0.85		1	7.956	1		
10	2	BD0183	24	11	10.9	15.747	15.745	23.845	32.450	32.452	1	282.56	275.98	1	0.313	1	6.75	6.59	1	0.12	1	1.93	1.89	1	0.88	0.86	1	7.957	1		
25	2	BD0182	23	24	24.7	8.315	8.313	25.518	32.822	32.849	1	343.78	335.22	1	1.079	1	12.51	12.19	1	0.14	1	14.92	14.55	1	1.30	1.27	1	7.874	1		
50	2	BD0181	22	49	49.1	3.682	3.679	26.199	32.965	32.992	1	356.69	347.58	1	0.663	1	18.05	17.59	1	0.42	1	22.81	22.23	1	1.65	1.61	1	7.782	1		
100	2	BD0180	21	99	99.9	1.146	1.141	26.523	33.118	33.116	1			1	0.080	1	25.76	25.10	1	0.00	1	40.94	39.88	1	2.04	1.99	1				
Chla max	2	BD0179	20	22	21.8	8.653	8.650	25.453	32.804	32.826	1	342.04	333.55	1	0.996	1	11.94	11.65	1	0.14	1	14.29	13.94	1	1.26	1.23	1	7.878	1		
200	2	BD0178	18	198	199.7	3.039	3.027	26.871	33.733	33.734	1	93.91	91.45	1	0.019	1	40.05	39.00	1	0.00	1	90.20	87.84	1	2.99	2.91	1	7.304	1		
300	2	BD0177	17	298	300.9	3.363	3.344	27.014	33.948								42.73	41.61	1	0.00	1	106.68	103.88	1	3.15	3.07	1				
400	2	BD0176	16	395	399.0	3.349	3.323	27.118	34.077	34.080	1	30.84	30.03	1			42.56	41.44	1	0.00	1	117.44	114.34	1	3.17	3.09	1	7.277	1		
600	2	BD0175	15	594	599.8	3.101	3.062	27.279	34.248	34.251	1	24.12	23.48	1			42.78	41.64	1	0.00	1	136.12	132.51	1	3.17	3.08	1	7.307	1		
O2 min	2	BD0174	14	552	556.9	3.178	3.141	27.244	34.213	34.215	1	22.88	22.27	1	0.005	1	42.88	41.75	1	0.00	1	130.96	127.49	1	3.18	3.09	1	7.288	1		
800	2	BD0164	3	792	800.3	2.821	2.769	27.387	34.350	34.353	1	29.66	28.87	1			41.52	40.41	1	0.00	1	145.25	141.38	1	3.14	3.06	1	7.327	1		
1000	2	BD0173	13	991	1001.1	2.556	2.491	27.468	34.422	34.420	1	32.51	31.64	1			42.24	41.11	1	0.00	1	155.74	151.57	1	3.14	3.06	1	7.338	1		
1250	1	BD0147	10	1235	1249.2	2.312	2.232	27.538	34.481	34.485	1	44.11	42.93	1			40.85	39.76	1	0.00	1	161.31	156.99	1	3.09	3.01	1	7.367	1		
1500	1	BD0161	24	1482	1499.7	2.134	2.036	27.594	34.532	34.534	1	56.04	54.54	1			41.21	40.10	1	0.00	1	165.31	160.88	1	3.01	2.93	1	7.396	1		
1750	1	BD0160	23	1729	1749.8	1.988	1.873	27.642	34.576				0.00				40.16	39.08	1	0.00	1	165.05	160.61	1	2.95	2.87	1				
2000	1	BD0159	22	1974	1999.9	1.842	1.707	27.678	34.605	34.608	1	84.83	82.55	1			39.69	38.62	1	0.00	1	165.73	161.27	1	2.88	2.81	1	7.449	1		
2250	1	BD0158	21	2220	2250.3	1.720	1.567	27.706	34.627								38.77	37.72	1	0.00	1	160.35	156.03	1	2.76	2.69	1				
2500	1	BD0144	7	2466	2500.5	1.632	1.458	27.727	34.643	34.647	1	114.24	111.15	1			37.89	36.86	1	0.00	1	162.17	157.79	1	2.77	2.70	1	7.514	1		
2750	1	BD0157	20	2710	2750.0	1.569	1.374	27.742	34.655								37.11	36.10	1	0.00	1	159.69	155.38	1	2.72	2.65	1				
3000	1	BD0156	19	2955	3000.2	1.517	1.299	27.755	34.664	34.656	1	126.44	123.03	1			37.35	36.34	1	0.00	1	160.47	156.13	1	2.71	2.64	1	7.579	1		
3250	1	BD0155	18	3200	3250.3	1.486	1.245	27.764	34.670								36.27	35.29	1	0.00	1	155.27	151.07	1	2.60	2.53	1				
3500	1	BD0142	5	3443	3499.5	1.465	1.199	27.771	34.675	34.677	1	149.99	145.93	1			35.92	34.95	1	0.00	1	152.95	148.81	1	2.57	2.50	1	7.567	1		
3750	1	BD0154	17	3687	3749.9	1.457	1.165	27.776	34.679								35.42	34.47	1	0.00	1	152.44	148.32	1	2.56	2.49	1				
4000	1	BD0153	16	3931	4000.6	1.455	1.137	27.780	34.682	34.686	1	158.56	154.28	1			35.27	34.32	1	0.00	1	151.42	147.33	1	2.53	2.46	1	7.589	1		
4250	1	BD0152	15	4174	4250.1	1.461	1.115	27.784	34.684								35.30	34.35	1	0.00	1	150.30	146.24	1	2.49	2.42	1				
4500	1	BD0151	14	4417	4499.9	1.473	1.099	27.786	34.686	34.688	1	164.39	159.95	1			34.91	33.97	1	0.00	1	149.92	145.86	1	2.51	2.44	1	7.595	1		
4750	1	BD0150	13	4660	4750.2	1.493	1.089	27.787	34.686								34.91	33.97	1	0.00	1	150.33	146.27	1	2.51	2.44	1				
5000	1	BD0149	12	4902	4999.8	1.518	1.083	27.788	34.687	34.692	1	166.14	161.65	1			34.87	33.93	1	0.00	1	151.30	147.21	1	2.50	2.43	1	7.600	1		
Bottom	1	BD0148	11	5287	5397.3	1.565	1.079	27.788	34.687	34.691	1	166.24	161.74	1			34.87	33.93	1	0.00	1	151.54	147.44	1	2.50	2.43	1	7.598	1		

Station BD07 (47°00.05'N, 160°05.13'E; Depth=5238 m); Aug. 28, 2012, 20:23; ~ Aug 30, 2012, 11:51; Bottom altitude: 13.919 m)

	Cast No.	Sample No.	Niskin No.	Depth (m)	Pressure (decibar)	Temp. (°C) (CTD)	Pot.Temp	Sigma-th	Salinity (CTD)	Salinity (Routine)	QF	Oxygen (µmol/L)	Oxygen (µmol/kg)	QF	Chlorophyll a (µg/L)	QF	NO3+NO2 (µmol/L)	NO3+NO2 (µmol/kg)	QF	NO2 (µmol/L)	QF	SiO2 (µmol/L)	SiO2 (µmol/kg)	QF	PO4 (µmol/L)	PO4 (µmol/kg)	QF	pH(X)	QF	Alkalinity (µmol/kg)	QF
0	4	BD0279	25	######	N.D.	15.400	#VALUE!	#VALUE!	N.D.	32.417	1	280.95		1	0.558	1	2.37		1	0.06	1	8.08		1	0.53		1	8.011	1		
5	4	BD0278	24	5	5.1	15.305	15.305	23.909	32.408	32.415	1	283.96	277.33	1	0.596	1	2.33	2.27	1	0.06	1	7.98	7.79	1	0.54	0.53	1	8.011	1		
10	4	BD0277	23	10	9.7	14.153	14.151	24.167	32.425	32.415	1	288.36	281.56	1	0.695	1	2.33	2.27	1	0.06	1	7.88	7.69	1	0.54	0.53	1	8.012	1	2214.8	1
25	4	BD0276	22	25	25.2	6.029	6.027	25.872	32.877	32.827	4	350.71	341.87	1	1.221	1	11.29	11.00	1	0.13	1	14.88	14.50	1	1.21	1.18	1	7.891	1		
50	4	BD0275	21	51	51.0	1.588	1.586	26.425	33.032	33.031	1	340.35	331.59	1	0.670	1	23.84	23.23	1	1.05	1	28.60	27.86	1	1.93	1.88	1	7.654	1		
100	4	BD0274	20	100	101.3	0.927	0.923	26.546	33.130	33.132	1	332.81	324.20	1	0.067	1	26.88	26.18	1	0.01	1	41.86	40.77	1	2.14	2.09	1	7.608	1	2235.0	1
Chla max	4	BD0273	19	27	26.9	5.662	5.660	25.920	32.882	32.891	1	354.66	345.70	1	0.889	1	14.00	13.65	1	0.15	1	19.77	19.27	1	1.38	1.35	1	7.843	1		
150	4	BD0272	18	150	151.1	1.194	1.187	26.642	33.270	33.267	1	284.10	276.73	1	0.031	1	30.32	29.54	1	0.00	1	54.96	53.53	1	2.36	2.30	1	7.545	1		
200	3	BD0254	24	199	200.5	3.094	3.082	26.803	33.653	33.668	1	103.56	100.86	1	0.014	1	39.87	38.83	1	0.00	1	83.16	80.99	1	2.97	2.90	1	7.328	1	2274.3	1
300	3	BD0253	23	297	299.9	3.710	3.690	27.006	33.980								43.38		1	0.00	1	105.37		1	3.26		1				
400	3	BD0252	22	397	400.5	3.595	3.568	27.107	34.092	34.098	1	17.84	17.37	1			43.39	42.24	1	0.00	1	115.56	112.51	1	3.21	3.13	1	7.265	1	2321.9	1
600	3	BD0251	21	595	600.6	3.244	3.204	27.265	34.247	34.249	1	16.20	15.77	1			43.01	41.87	1	0.00	1	133.04	129.50	1	3.20	3.12	1	7.290	1	2346.8	1
800	3	BD0250	20	792	800.2	2.906	2.854	27.376	34.346	34.349	1	18.67	18.17	1			42.94	41.80	1	0.00	1	145.83	141.94	1	3.21	3.13	1	7.310	1		
1000	3	BD0249	19	990	1000.6	2.608	2.543	27.462	34.420	34.422	1	22.57	21.97	1			42.76	41.62	1	0.00	1	156.21	152.03	1	3.19	3.11	1	7.325	1	2374.5	1
O2 min	3	BD0248	18	600	605.7	3.236	3.195	27.270	34.252	34.258	1	15.08	14.68	1	0.006	1	43.44	42.28	1	0.00	1	134.39	130.82	1	3.25	3.16	1	7.275	1		
1250	2	BD0230	24	1236	1250.3	2.326	2.245	27.538	34.484	34.487	1	33.35	32.46	1			42.14	41.01	1	0.00	1	165.04	160.62	1	3.15	3.07	1	7.348	1		
1500	2	BD0229	23	1483	1500.8	2.112	2.014	27.599	34.536	34.541	1	48.47	47.17	1			41.46	40.34	1	0.00	1	169.50	164.95	1	3.07	2.99	1	7.388	1	2394.0	1
1750	2	BD0228	22	1728	1749.7	1.957	1.842	27.643	34.575								40.53	39.44	1	0.00	1	169.31	164.76	1	2.99	2.91	1				
2000	2	BD0227	21	1975	2000.6	1.827	1.693	27.678	34.604	34.608	1	81.63	79.43	1			39.66	38.59	1	0.00	1	170.20	165.62	1	2.97	2.89	1	7.453	1	2404.5	1
2250	2	BD0226	20	2219	2250.1	1.723	1.570	27.705	34.626								38.66	37.62	1	0.00	1	164.78	160.34	1	2.80	2.73	1				
2500	2	BD0225	19	2464	2499.6	1.636	1.462	27.726	34.642	34.646	1	114.05	110.97	1			37.81	36.79	1	0.00	1	162.75	158.36	1	2.73	2.66	1	7.511	1		
2750	2	BD0224	18	2710	2750.5	1.578	1.383	27.740	34.653								37.17	36.17	1	0.00	1	160.04	155.72	1	2.68	2.61	1				
3000	2	BD0223	17	2955	3001.1	1.530	1.313	27.752	34.662	34.665	1	134.60	130.96	1			36.78	35.79	1	0.00	1	157.37	153.12	1	2.68	2.61	1	7.554	1	2411.8	1
3250	1	BD0208	24	3199	3250.3	1.493	1.252	27.763	34.670								35.20	34.25	1	0.00	1	154.74	150.56	1	2.59	2.52	1				
3500	1	BD0207	23	3442	3499.9	1.472	1.207	27.770	34.675	34.676	1	147.77	143.77	1			35.69	34.72	1	0.00	1	153.75	149.59	1	2.55	2.48	1	7.568	1		
3750	1	BD0206	22	3687	3750.3	1.459	1.168	27.776	34.679								35.43	34.47	1	0.00	1	153.56	149.41	1	2.55	2.48	1				
4000	1	BD0205	21	3930	4000.3	1.461	1.143	27.780	34.681	34.686	1	158.28	154.00	1			35.30	34.34	1	0.00	1	151.40	147.31	1	2.55	2.48	1	7.582	1	2410.3	1
4250	1	BD0204	20	4173	4250.2	1.464	1.119	27.783	34.684								35.20	34.25	1	0.00	1	152.11	147.99	1	2.52	2.46	1				
4500	1	BD0203	19	4416	4500.1	1.479	1.105	27.785	34.685	34.690	1	162.92	158.52	1			35.03	34.09	1	0.00	1	151.74	147.64	1	2.49	2.43	1	7.599	1		
4750	1	BD0202	18	4658	4749.3	1.500	1.095	27.786	34.686								34.58	33.65	1	0.00	1	151.19	147.10	1	2.51	2.45	1				
5000	1	BD0201	17	4901	5000.1	1.524	1.089	27.787	34.686	34.691	1	165.24	160.77	1			34.83	33.88	1	0.00	1	153.24	149.09	1	2.46	2.40	1	7.587	1	2408.9	1
Bottom	1	BD0200	16	5228	5337.4	1.554	1.076	27.789	34.687	34.692	1	166.58	162.08	1			34.68	33.75	1	0.00	1	151.52	147.42	1	2.50	2.44	1	7.595	1	2406.9	1

Notes:

QF(Good=1, Questionable=4)
Time is expressed as UTC.
Position and depth are those when the deepest sample was taken.
Temp (°C) at Pressure zero was that of seawater obtained by bucket sampling.
Data marked by blue color are calculated values.

Station BD08 (47°10.08'N, 165°00.37'E; Depth=5918 m); Aug. 31, 2012, 01:06; ~ Aug 31, 2012, 11:02; Bottom altitude: N.D. m)

	Cast No.	Sample No.	Niskin No.	Depth (m)	Pressure (decibar)	Temp. (°C) (CTD)	Pot.Temp	Sigma-th	Salinity (CTD)	Salinity (Routine)	QF	Oxygen (µmol/L)	Oxygen (µmol/kg)	QF	Chlorophyll a (µg/L)	QF	NO3+NO2 (µmol/L)	NO3+NO2 (µmol/kg)	QF	NO2 (µmol/L)	QF	SiO2 (µmol/L)	SiO2 (µmol/kg)	QF	PO4 (µmol/L)	PO4 (µmol/kg)	QF	pH(X)	QF	Alkalinity	QF
0	3	BD0402	25	######	N.D.	16.000	#VALUE!	#VALUE!	N.D.	32.540		275.90		1	0.777	1	11.82		1	0.16	1	21.52		1	1.14		1	7.918	1		
10	3	BD0401	23	######	N.D.	N.D.	#VALUE!	#VALUE!	N.D.	32.545			#VALUE!	4	0.809	1	11.93	#VALUE!	1	0.15	1	21.58	#VALUE!	1	1.14	#VALUE!	1	7.912	1		
25	3	BD0400	22	######	N.D.	N.D.	#VALUE!	#VALUE!	N.D.	32.960			#VALUE!	4	0.542	1	16.34	#VALUE!	1	0.15	1	25.17	#VALUE!	1	1.54	#VALUE!	1	7.804	1		
50	3	BD0399	21	######	N.D.	N.D.	#VALUE!	#VALUE!	N.D.	33.057			#VALUE!	4	0.510	1	20.31	#VALUE!	1	0.48	1	31.72	#VALUE!	1	1.73	#VALUE!	1	7.711	1		
100	3	BD0398	20	######	N.D.	N.D.	#VALUE!	#VALUE!	N.D.	33.155			#VALUE!	4	0.131	1	23.24	#VALUE!	1	0.01	1	35.57	#VALUE!	1	1.84	#VALUE!	1	7.664	1		
150	3	BD0397	18	######	N.D.	N.D.	#VALUE!	#VALUE!	N.D.	33.487			#VALUE!	4	0.026	1	27.93	#VALUE!	1	0.00	1	51.65	#VALUE!	1	2.12	#VALUE!	1	7.561	1		
200	3	BD0396	17	######	N.D.	N.D.	#VALUE!	#VALUE!	N.D.	33.660			#VALUE!	4	0.011	1	36.86	#VALUE!	1	0.00	1	78.14	#VALUE!	1	2.76	#VALUE!	1	7.386	1		
400	2	BD0395	24	397	400.3	3.480	3.454	27.055	34.012	34.025	1	47.97	46.71	1			41.57	40.48	1	0.00	1	106.76	103.95	1	3.07	2.99	1	7.307	1		
600	2	BD0394	23	594	599.9	3.304	3.264	27.230	34.210	34.214	1	29.74	28.95	1			42.46	41.33	1	0.00	1	126.18	122.84	1	3.05	2.97	1	7.312	1		
800	2	BD0393	22	793	800.8	2.981	2.928	27.350	34.321	34.328	1	27.60	26.87	1			42.59	41.46	1	0.00	1	140.24	136.51	1	3.11	3.03	1	7.332	1		
O2 min	2	BD0392	21	614	620.2	3.278	3.236	27.245	34.225	34.229	1	26.57	25.87	1			42.32	41.20	1	0.00	1	128.78	125.37	1	3.13	3.05	1	7.317	1		
1000	2	BD0391	20	990	1000.4	2.701	2.635	27.435	34.396	34.400	1	36.37	35.40	1			42.37	41.24	1	0.00	1	149.35	145.36	1	3.10	3.02	1	7.340	1		
1250	2	BD0390	19	1236	1249.9	2.416	2.334	27.516	34.465	34.469	1	40.26	39.19	1			41.99	40.86	1	0.00	1	158.09	153.86	1	3.08	3.00	1	7.357	1		
1500	2	BD0389	18	1483	1500.7	2.194	2.095	27.580	34.521	34.523	1	47.31	46.04	1			40.83	39.73	1	0.00	1	165.87	161.42	1	3.04	2.96	1	7.377	1		
1750	2	BD0388	17	1729	1750.6	2.016	1.900	27.630	34.563				0.00				40.96	39.86	1	0.00	1	168.35	163.82	1	2.99	2.91	1				
2000	2	BD0387	16	1974	2000.1	1.867	1.733	27.669	34.597	34.600	1	76.99	74.92	1			40.06	38.98	1	0.00	1	167.87	163.35	1	2.91	2.83	1	7.464	1		
2250	2	BD0386	15	2219	2249.6	1.754	1.600	27.698	34.620				0.00				39.35	38.29	1	0.00	1	166.66	162.17	1	2.84	2.76	1				
2500	2	BD0385	14	2467	2502.7	1.663	1.488	27.720	34.637	34.642	1	107.28	104.38	1			38.36	37.32	1	0.00	1	164.03	159.61	1	2.77	2.69	1	7.511	1		
2750	1	BD0375	24	2709	2749.3	1.610	1.414	27.735	34.649				0.00				37.63	36.62	1	0.00	1	161.23	156.88	1	2.72	2.65	1				
3000	1	BD0374	23	2954	3000.2	1.557	1.339	27.748	34.659	34.664	1	128.28	124.81	1			37.16	36.16	1	0.00	1	159.96	155.64	1	2.69	2.62	1	7.549	1		
3250	1	BD0373	22	3199	3250.5	1.521	1.279	27.758	34.667				0.00				36.62	35.63	1	0.00	1	157.24	152.99	1	2.63	2.56	1				
3500	1	BD0372	21	3443	3500.4	1.497	1.230	27.766	34.672	34.676	1	144.88	140.97	1			36.03	35.06	1	0.00	1	155.10	150.91	1	2.57	2.50	1	7.574	1		
3750	1	BD0371	20	3686	3749.7	1.483	1.191	27.772	34.676				0.00				18.41	17.92	4	0.27	4	29.22	28.43	4	1.64	1.60	4				
4000	1	BD0370	19	3930	4000.3	1.480	1.162	27.777	34.679	34.680	1	153.62	149.47	1			35.55	34.59	1	0.00	1	153.33	149.18	1	2.45	2.38	1				
4250	1	BD0369	18	4173	4250.1	1.484	1.138	27.780	34.682				0.00				35.52	34.56	1	0.00	1	152.45	148.33	1	2.51	2.45	1	7.588	1		
4500	1	BD0368	17	4415	4499.5	1.495	1.120	27.783	34.684	34.685	1	159.60	155.29	1			35.43	34.48	1	0.00	1	146.97	143.00	1	2.50	2.44	1	7.602	1		
4750	1	BD0367	16	4659	4749.8	1.509	1.104	27.785	34.685				0.00				35.23	34.28	1	0.00	1	150.96	146.88	1	2.50	2.43	1				
5000	1	BD0366	15	4902	5000.8	1.528	1.093	27.787	34.686	34.686	1	163.16	158.75	1			35.00	34.06	1	0.00	1	151.06	146.98	1	2.50	2.44	1	7.610	1		
5250	1	BD0365	14	5143	5250.0	1.552	1.085	27.788	34.687				0.00				35.15	34.20	1	0.01	1	151.34	147.25	1	2.50	2.44	1				
5500	1	BD0364	13	5386	5500.6	1.581	1.081	27.789	34.687	34.692	1	164.92	160.46	1			35.13	34.18	1	0.00	1	153.70	149.55	1	2.51	2.45	1	7.607	1		
Bottom	1	BD0363	12	5897	6030.1	1.653	1.081	27.788	34.687	34.690	1	164.83	160.37	1			35.06	34.11	1	0.01	1	152.72	148.59	1	2.51	2.45	1	7.607	1		

Station BD09 (47°00.01'N, 170°34.96'E; Depth=6288 m); Sep. 1, 2012, 10:03 ~ Sep. 2, 2012, 16::51; Bottom altitude: N.D. m)

	Cast No.	Sample No.	Niskin No.	Depth (m)	Pressure (decibar)	Temp. (°C) (CTD)	Pot.Temp	Sigma-th	Salinity (CTD)	Salinity (Routine)	QF	Oxygen (µmol/L)	Oxygen (µmol/kg)	QF	Chlorophyll a (µg/L)	QF	NO3+NO2 (µmol/L)	NO3+NO2 (µmol/kg)	QF	NO2 (µmol/L)	QF	SiO2 (µmol/L)	SiO2 (µmol/kg)	QF	PO4 (µmol/L)	PO4 (µmol/kg)	QF	pH(X)	QF	Alkalinity (µmol/kg)	QF
0	6	BD0544	25	######	N.D.	14.300	#VALUE!	#VALUE!	N.D.	32.633	1	277.52		1	0.562	1	16.46		1	0.20	1	24.73		1	1.44		1	7.880	1		
5	6	BD0543	24	6	5.6	13.970	13.970	24.359	32.625	32.627	1	277.84	271.23	1	0.495	1	16.39	16.00	1	0.20	1	24.76	24.17	1	1.46	1.42	1	7.877	1		
10	6	BD0542	23	10	9.6	13.949	13.948	24.364	32.626	34.461	4	277.99	271.38	1	0.534	1	16.49	16.10	1	0.20	1	24.62	24.04	1	1.45	1.41	1	7.879	1	2207.6	1
25	6	BD0540	21	24	24.6	9.602	9.599	25.332	32.840	32.848	1	323.06	315.08	1	0.611	1	18.26	17.80	1	0.16	1	26.31	25.66	1	1.61	1.58	1	7.818	1		
50	6	BD0539	20	49	49.5	4.608	4.604	26.133	33.000	32.991	1	337.34	328.75	1	0.379	1	21.23	20.69	1	0.24	1	33.00	32.16	1	1.84	1.80	1	7.732	1		
Chla max	6	BD0531	12	29	29.5	8.239	8.236	25.586	32.894	32.899	1	326.43	318.29	1	0.755	1	19.09	18.61	1	0.17	1	26.58	25.92	1	1.67	1.63	1	7.792	1		
100	5	BD0520	24	98	99.3	2.963	2.957	26.390	33.122	33.120	1	309.79	301.82	1	0.177	1	26.81	26.13	1	0.01	1	42.71	41.61	1	2.11	2.06	1	7.628	1	2235.5	1
150	5	BD0518	22	149	149.9	3.749	3.739	26.843	33.782	33.775	1	66.03	64.30	1	0.036	1	42.07	40.97	1	0.01	1	85.59	83.35	1	3.11	3.03	1	7.301	1		
200	5	BD0517	21	198	200.2	3.797	3.784	26.940	33.909	33.906	1	30.54	29.74	1	0.015	1	44.03	42.87	1	0.00	1	95.27	92.77	1	3.25	3.16	1	7.264	1	2294.1	1
300	5	BD0515	19	298	300.3	3.697	3.676	27.062	34.049								43.92	42.77	1	0.00	1	108.59	105.72	1	3.22	3.14	1				
400	5	BD0514	18	398	401.3	3.531	3.504	27.161	34.152	34.149	1	18.29	17.81	1			43.39	42.24	1	0.00	1	119.45	116.29	1	3.20	3.12	1	7.300	1	2330.0	1
600	4	BD0496	24	594	599.5	3.184	3.145	27.296	34.278	34.278	1	17.08	16.62	1			43.32	42.17	1	0.00	1	135.09	131.50	1	3.19	3.11	1	7.320	1	2351.8	1
800	4	BD0494	22	791	798.8	2.879	2.827	27.392	34.363	34.362	1	17.50	17.03	1			43.40	42.24	1	0.00	1	146.29	142.39	1	3.23	3.14	1	7.331	1		
1000	4	BD0493	21	989	999.9	2.589	2.524	27.473	34.431	34.430	1	25.40	24.72	1			43.07	41.92	1	0.00	1	155.02	150.88	1	3.16	3.08	1	7.353	1	2382.2	1
1250	4	BD0491	19	1236	1250.0	2.310	2.229	27.547	34.493	34.494	1	34.58	33.65	1			41.87	40.75	1	0.00	1	164.75	160.33	1	3.16	3.08	1	7.375	1		
1500	4	BD0490	18	1482	1500.2	2.084	1.986	27.608	34.545	34.542	1	50.40	49.05	1			41.69	40.57	1	0.00	1	168.04	163.53	1	3.08	3.00	1	7.409	1	2399.9	1
1750	3	BD0472	24	1728	1750.1	1.915	1.800	27.652	34.582								40.83	39.73	1	0.00	1	169.45	164.89	1	2.99	2.91	1				
2000	3	BD0471	23	1973	1999.4	1.784	1.651	27.685	34.609	34.609	1	84.42	82.15	1			39.83	38.75	1	0.00	1	170.58	165.98	1	2.92	2.84	1	7.478	1	2409.3	1
2250	3	BD0469	21	2219	2250.0	1.686	1.533	27.710	34.629								38.81	37.77	1	0.00	1	167.38	162.87	1	2.86	2.78	1				
2500	3	BD0468	20	2465	2500.1	1.615	1.441	27.728	34.643	34.644	1	113.00	109.95	1			38.37	37.34	1	0.00	1	165.27	160.81	1	2.77	2.70	1	7.534	1		
2750	3	BD0467	19	2709	2749.7	1.565	1.370	27.741	34.653								37.53	36.52	1	0.00	1	164.47	160.03	1	2.70	2.63	1				
3000	3	BD0466	18	2953	2998.6	1.517	1.300	27.753	34.662	34.662	1	133.03	129.44	1			36.98	35.98	1	0.00	1	162.08	157.71	1	2.63	2.56	1	7.568	1	2414.3	1
O2 min	2	BD0449	24	534	539.6	3.292	3.257	27.257	34.243	34.246	1	16.42	15.98	1	0.004	1	42.46	41.34	1	0.00	1	132.46	128.94	1	3.17	3.09	1	7.306	1		
3250	2	BD0448	23	3198	3250.1	1.491	1.250	27.762	34.669								36.39	35.40	1	0.00	1	158.77	154.48	1	2.61	2.54	1	7.577	1		
3500	2	BD0447	22	3443	3500.8	1.467	1.202	27.770	34.674	34.674	1	148.42	144.41	1			36.03	35.06	1	0.00	1	157.53	153.27	1	2.56	2.49	1				
3750	2	BD0445	20	3686	3750.2	1.457	1.166	27.776	34.678								35.85	34.88	1	0.00	1	155.96	151.75	1	2.55	2.48	1				
4000	2	BD0444	19	3930	4000.0	1.461	1.143	27.779	34.681	34.679	1	156.82	152.58	1			35.68	34.72	1	0.00	1	154.75	150.57	1	2.55	2.48	1	7.587	1	2410.0	1
4250	2	BD0442	17	4173	4250.3	1.472	1.126	27.782	34.682								35.55	34.59	1	0.00	1	154.27	150.10	1	2.49	2.42	1				
4500	2	BD0441	16	4416	4500.2	1.490	1.115	27.783	34.683	34.685	1	161.05	156.69	1			35.19	34.24	1	0.00	1	154.15	149.98	1	2.52	2.45	1	7.593	1		
4750	1	BD0425	24	4658	4749.1	1.510	1.106	27.785	34.685								35.32	34.36	1	0.00	1	154.21	150.05	1	2.52	2.45	1				
5000	1	BD0424	23	4902	5000.9	1.536	1.100	27.786	34.685	34.687	1	162.45	158.06	1			35.20	34.25	1	0.00	1	153.82	149.67	1	2.49	2.42	1	7.593	1	2409.7	1
5250	1	BD0422	21	5143	5250.0	1.564	1.097	27.786	34.686								35.20	34.25	1	0.00	1	153.80	149.64	1	2.50	2.43	1				
5500	1	BD0421	20	5386	5500.2	1.595	1.095	27.786	34.686	34.687	1	163.42	159.01	1			35.26	34.31	1	0.00	1	154.13	149.96	1	2.50	2.43	1	7.590	1		
5750	1	BD0419	18	5627	5750.0	1.628	1.094	27.786	34.685								35.21	34.26	1	0.00	1	154.10	149.93	1	2.50	2.43	1				
6000	1	BD0418	17	5869	6000.2	1.662	1.094	27.786	34.685	34.686	1	163.61	159.18	1			35.18	34.23	1	0.00	1	153.62	149.47	1	2.52	2.45	1	7.580	1	2412.5	1
5	EX	BD0564	24	5	5.0	14.016	14.015	24.348	32.622									0.00					0.00			0.00					
10	EX	BD0563	22	9	9.2	13.983	13.982	24.355	32.622									0.00					0.00			0.00					
25	EX	BD0562	20	25	24.8	9.362	9.359	25.373	32.843									0.00					0.00			0.00					
50	EX	BD0561	18	49	49.9	4.781	4.778	26.112	32.997									0.00					0.00			0.00					

Station BD10 (44°12.17'N, 169°44.14'E; Depth=5836 m); Sep. 3, 2012, 08:13; ~ Sep. 3, 2012, 17:28; Bottom altitude: N.D. m)

	Cast No.	Sample No.	Niskin No.	Depth (m)	Pressure (decibar)	Temp. (°C) (CTD)	Pot.Temp	Sigma-th	Salinity (CTD)	Salinity (Routine)	QF	Oxygen (µmol/L)	Oxygen (µmol/kg)	QF	Chlorophyll a (µg/L)	QF	NO3+NO2 (µmol/L)	NO3+NO2 (µmol/kg)	QF	NO2 (µmol/L)	QF	SiO2 (µmol/L)	SiO2 (µmol/kg)	QF	PO4 (µmol/L)	PO4 (µmol/kg)	QF	pH(X)	QF	Alkalinity	QF
0	2	BD0613	25	######	N.D.	18.500	#VALUE!	#VALUE!	N.D.	32.835	1	253.21		1	0.336	1	8.01		1	0.103	1	12.96		1	0.84		1	7.952	1	2215.7	1
5	2	BD0612	24	6	5.7	18.437	18.436	23.493	32.814	32.817	1	254.49	248.65	1	0.364	1	8.07	7.89	1	0.103	1	13.61	13.29	1	0.83	0.81	1	7.953	1	2214.9	1
10	2	BD0611	23	10	9.6	18.436	18.434	23.493	32.814	32.817	1	254.87	249.02	1	0.357	1	8.06	7.87	1	0.103	1	13.63	13.32	1	0.84	0.82	1	7.953	1	2214.6	1
25	2	BD0610	22	25	25.1	14.030	14.026	24.642	33.007	33.066	1	313.04	305.52	1	0.557	1	10.62	10.36	1	0.103	1	16.93	16.53	1	1.05	1.02	1	7.888	1	2231.2	1
50	2	BD0609	21	50	49.9	6.903	6.899	26.003	33.185	33.211	1	322.85	314.66	1	0.436	1	15.05	14.67	1	0.231	1	21.32	20.78	1	1.41	1.37	1	7.775	1	2239.0	1
100	2	BD0608	20	100	100.9	4.197	4.190	26.393	33.272	33.272	1	322.06	313.78	1	0.208	1	18.90	18.42	1	0.013	1	25.43	24.78	1	1.55	1.51	1	7.708	1	2238.4	1
Chla max	2	BD0607	19	30	30.0	11.336	11.333	25.246	33.111	33.133	1	322.48	314.53	1	0.510	1	11.74	11.45	1	0.109	1	18.37	17.92	1	1.15	1.12	1	7.860	1	2234.7	1
O2 min	2	BD0606	18	910	919.0	2.944	2.883	27.379	34.353	34.353	1	35.63	34.68	1	0.002	1	42.07	40.95	1	0.000	1	138.30	134.61	1	3.10	3.02	1	7.339	1	2366.7	1
150	2	BD0605	17	150	150.9	4.058	4.048	26.500	33.389	33.393	1	306.99	299.06	1	0.053	1	20.09	19.57	1	0.000	1	28.78	28.04	1	1.60	1.56	1	7.690	1	2246.1	1
200	2	BD0604	16	199	200.2	4.881	4.866	26.668	33.710	33.711	1	204.99	199.67	4	0.012	1	26.81	26.11	1	0.000	1	48.97	47.70	1	2.05	2.00	1	7.570	1	2270.0	1
300	2	BD0603	15	297	300.1	4.167	4.146	26.864	33.859								35.22	34.30	1	0.000	1	75.79	73.81	1	2.64	2.57	1				
400	2	BD0602	14	397	400.5	3.866	3.838	26.969	33.953	33.952	1	83.77	81.57	1			38.50	37.49	1	0.000	1	92.14	89.72	1	2.87	2.79	1	7.362	1	2301.1	1
600	2	BD0601	13	595	600.6	3.669	3.627	27.179	34.189	34.187	1	45.54	44.33	1			40.86	39.78	1	0.000	1	115.82	112.75	1	3.04	2.96	1	7.343	1	2336.1	1
800	2	BD0600	12	793	800.7	3.131	3.077	27.315	34.294	34.296	1	35.09	34.16	1			42.03	40.91	1	0.000	1	132.03	128.52	1	3.12	3.04	1	7.337	1	2355.5	1
1000	1	BD0588	24	990	1000.3	2.860	2.793	27.406	34.376	34.377	1	36.15	35.18	1			42.19	41.07	1	0.000	1	144.97	141.10	1	3.14	3.06	1	7.349	1	2367.0	1
1250	1	BD0575	11	1237	1251.2	2.525	2.442	27.504	34.461	34.461	1	38.80	37.76	1			42.03	40.90	1	0.000	1	152.54	148.46	1	3.12	3.04	1	7.377	1	2381.4	1
1500	1	BD0587	23	1483	1500.7	2.265	2.166	27.569	34.514	34.515	1	48.48	47.18	1			41.74	40.62	1	0.000	1	160.38	156.08	1	3.09	3.01	1	7.389	1	2398.4	1
1750	1	BD0586	22	1729	1750.6	2.108	1.991	27.613	34.551								41.36	40.25	1	0.000	1	163.58	159.18	1	3.03	2.95	1				
2000	1	BD0573	9	1975	2000.5	1.916	1.781	27.660	34.590	34.590	1	76.01	73.96	1			40.41	39.32	1	0.000	1	168.25	163.73	1	2.95	2.87	1	7.451	1	2403.5	1
2250	1	BD0585	21	2220	2250.2	1.795	1.641	27.690	34.613								39.56	38.49	1	0.000	1	167.97	163.44	1	2.90	2.82	1				
2500	1	BD0572	8	2465	2500.1	1.704	1.529	27.712	34.631	34.631	1	103.44	100.65	1			38.87	37.82	1	0.000	1	162.43	158.05	1	2.81	2.73	1	7.502	1	2412.0	1
2750	1	BD0584	20	2709	2749.1	1.631	1.435	27.731	34.646								37.24	36.23	1	0.000	1	160.00	155.69	1	2.77	2.70	1				
3000	1	BD0571	7	2956	3001.1	1.570	1.351	27.745	34.656	34.658	1	127.06	123.63	1			37.30	36.29	1	0.000	1	160.10	155.78	1	2.72	2.65	1	7.549	1	2412.2	1
3250	1	BD0583	19	3198	3249.1	1.531	1.289	27.756	34.665								36.75	35.75	1	0.000	1	154.89	150.70	1	2.65	2.58	1				
3500	1	BD0570	6	3443	3499.8	1.498	1.231	27.765	34.671	34.673	1	143.87	139.99	1			36.24	35.26	1	0.000	1	158.03	153.76	1	2.63	2.55	1	7.570	1	2416.3	1
3750	1	BD0582	18	3686	3749.2	1.485	1.194	27.772	34.676								35.99	35.02	1	0.000	1	154.26	150.09	1	2.58	2.51	1				
4000	1	BD0569	5	3929	3998.5	1.480	1.162	27.776	34.679	34.680	1	154.16	150.00	1			35.87	34.90	1	0.000	1	156.33	152.11	1	2.57	2.50	1	7.592	1	2412.1	1
4250	1	BD0581	17	4174	4249.9	1.482	1.136	27.781	34.682								35.68	34.71	1	0.000	1	153.21	149.07	1	2.55	2.48	1				
4500	1	BD0580	16	4417	4499.5	1.495	1.120	27.783	34.683	34.684	1	160.54	156.20	1			35.40	34.44	1	0.000	1	153.52	149.37	1	2.55	2.48	1	7.596	1	2411.4	1
4750	1	BD0579	15	4659	4749.0	1.511	1.106	27.785	34.684								35.08	34.13	1	0.000	1	152.10	147.98	1	2.54	2.47	1				
5000	1	BD0567	3	4902	4999.7	1.528	1.093	27.787	34.686	33.239	4	319.54	310.90	4			11.99	11.66	4	0.116	4	18.21	17.71	4	1.16	1.13	4	7.847	4	2236.6	4
5250	1	BD0578	14	5144	5249.3	1.552	1.085	27.788	34.687								35.00	34.05	1	0.000	1	151.66	147.56	1	2.54	2.47	1				
5500	1	BD0566	2	5386	5499.1	1.580	1.080	27.788	34.687	34.689	1	165.91	161.43	1			34.56	33.62	1	0.000	1	153.52	149.37	1	2.51	2.44	1	7.594	1	2413.8	1
Bottom	1	BD0577	13	5842	5971.4	1.639	1.076	27.789	34.687	34.687	1	166.42	161.92	1			35.11	34.16	1	0.000	1	151.88	147.77	1	2.52	2.45	1	7.609	1	2409.3	1

Station BD11 (47°00.09'N, 179°59.67'E; Depth=5586 m); Sep. 5, 2012, 22:11; ~ Sep. 7, 2012, 09:11; Bottom altitude: 14.847 m)

	Cast No.	Sample No.	Niskin No.	Depth (m)	Pressure (decibar)	Temp. (°C) (CTD)	Pot.Temp	Sigma-th	Salinity (CTD)	Salinity (Routine)	QF	Oxygen (µmol/L)	Oxygen (µmol/kg)	QF	Chlorophyll a (µg/L)	QF	NO3+NO2 (µmol/L)	NO3+NO2 (µmol/kg)	QF	NO2 (µmol/L)	QF	SiO2 (µmol/L)	SiO2 (µmol/kg)	QF	PO4 (µmol/L)	PO4 (µmol/kg)	QF	pH(X)	QF	Alkalinity (µmol/kg)	QF
0	5	BD0733	25	######	N.D.	12.800	#VALUE!	#VALUE!	N.D.	32.744	1	287.12		1	0.816	1	14.48		1	0.14	1	24.98		1	1.33		1	7.866	1		
5	5	BD0732	24	5	5.5	12.707	12.706	24.692	32.729	32.734	1	287.11	280.19	1	0.905	1	14.40	14.05	1	0.14	1	24.03	23.45	1	1.29	1.26	1	7.878	1		
10	5	BD0731	23	10	9.7	12.710	12.709	24.692	32.729	32.732	1	287.91	280.97	1	0.830	1	14.46	14.11	1	0.14	1	24.70	24.10	1	1.31	1.28	1	7.871	1	2211.2	1
25	5	BD0730	22	25	25.4	12.451	12.448	24.741	32.728	32.736	1	288.04	281.09	1	1.030	1	14.46	14.11	1	0.14	1	24.62	24.03	1	1.31	1.28	1	7.872	1		
50	5	BD0729	21	49	49.7	6.609	6.605	25.956	33.076	33.078	1	321.87	313.73	1	0.450	1	15.03	14.65	1	0.15	1	22.69	22.11	1	1.42	1.38	1	7.780	1	2227.8	1
100	5	BD0728	20	99	99.6	3.291	3.285	26.386	33.153	33.156	1	323.67	315.35	1	0.128	1	22.79	22.20	1	0.02	1	35.17	34.26	1	1.83	1.78	1	7.679	1	2235.5	1
150	4	BD0709	24	148	149.0	3.681	3.671	26.551	33.406	33.407	1	252.28	245.75	1	0.027	1	26.14	25.46	1	0.00	1	44.93	43.76	1	2.04	1.99	1	7.656	1		
200	4	BD0708	23	199	200.7	3.662	3.649	26.729	33.627	33.628	1	173.72	169.20	1	0.012	1	32.04	31.21	1	0.00	1	64.45	62.77	1	2.46	2.39	1	7.475	1	2268.3	1
300	5	BD0727	19	298	300.9	3.661	3.641	26.896	33.836								37.60	36.62	1	0.00	1	85.60	83.36	1	2.83	2.75	1				
400	4	BD0707	22	396	399.3	3.845	3.818	27.002	33.991	33.991	1	69.75	67.91	1			39.37	38.34	1	0.00	1	96.98	94.43	1	2.92	2.85	1	7.356	1	2307.4	1
500	4	BD0706	21	495	499.7	3.629	3.595	27.099	34.085								41.29	40.20	1	0.00	1	111.40	108.46	1	3.07	2.99	1				
600	4	BD0705	20	593	598.9	3.438	3.398	27.181	34.165	34.164	1	31.41	30.58	1			42.43	41.31	1	0.00	1	118.97	115.83	1	3.11	3.03	1	7.313	1	2335.4	1
800	4	BD0704	19	792	800.1	3.130	3.076	27.316	34.296	34.296	1	31.47	30.63	1			42.14	41.02	1	0.00	1	136.32	132.69	1	3.12	3.04	1	7.344	1	2355.5	1
Chla max	3	BD0685	24	37	37.6	9.078	9.074	25.493	32.939	32.915	1	310.04	302.33	1	0.764	1	14.76	14.40	1	0.13	1	22.04	21.49	1	1.37	1.34	1	7.800	1		
O2 min	3	BD0684	23	693	700.0	3.390	3.342	27.240	34.232	34.236	1	34.55	33.63	1	0.004	1	41.83	40.72	1	0.00	1	123.54	120.26	1	3.12	3.04	1	7.336	1		
1000	3	BD0683	22	989	999.9	2.852	2.785	27.404	34.374	34.374	1	30.54	29.72	1			42.38	41.25	1	0.00	1	147.30	143.37	1	3.08	3.00	1	7.341	1	2368.2	1
1250	3	BD0681	20	1236	1250.2	2.534	2.451	27.495	34.450	34.452	1	33.65	32.75	1			42.43	41.29	1	0.00	1	155.61	151.45	1	3.18	3.09	1				
1500	3	BD0680	19	1482	1499.9	2.282	2.182	27.562	34.507	34.508	1	42.79	41.64	1			42.21	41.08	1	0.00	1	159.05	154.79	1	3.11	3.03	1	7.351	1	2395.1	1
1750	3	BD0679	18	1728	1749.9	2.098	1.980	27.612	34.549								41.49	40.37	1	0.00	1	166.79	162.31	1	3.05	2.97	1				
2000	3	BD0678	17	1974	1999.7	1.947	1.811	27.651	34.582	34.582	1	68.81	66.96	1			40.85	39.75	1	0.00	1	168.11	163.58	1	3.02	2.94	1	7.435	1	2406.1	1
2560	2	BD0661	24	2524	2560.2	1.686	1.506	27.715	34.633								38.84	37.79	1	0.00	1	172.48	167.83	1	2.84	2.76	1				
2500	2	BD0660	23	2465	2500.3	1.705	1.530	27.710	34.629	34.631	1	98.75	96.09	1			39.15	38.09	1	0.00	1	172.07	167.43	1	2.84	2.76	1	7.484	1		
2750	2	BD0659	22	2709	2749.5	1.635	1.439	27.728	34.643								38.18	37.15	1	0.00	1	165.83	161.36	1	2.81	2.73	1				
3000	2	BD0658	21	2955	3000.9	1.581	1.362	27.742	34.653	34.655	1	122.07	118.78	1			37.51	36.50	1	0.00	1	167.91	163.38	1	2.74	2.67	1	7.517	1	2412.0	1
3250	2	BD0657	20	3200	3251.2	1.537	1.295	27.754	34.662								36.98	35.98	1	0.00	1	161.42	157.06	1	2.68	2.61	1				
3500	2	BD0656	19	3443	3500.2	1.508	1.241	27.763	34.669	34.670	1	140.15	136.36	1			36.72	35.73	1	0.00	1	163.12	158.72	1	2.65	2.58	1	7.550	1		
3750	2	BD0654	17	3686	3750.0	1.491	1.198	27.770	34.674								36.28	35.30	1	0.00	1	160.17	155.84	1	2.60	2.53	1				
4000	2	BD0653	16	3932	4001.9	1.482	1.163	27.775	34.678	34.679	1	151.46	147.37	1			36.00	35.03	1	0.00	1	155.39	151.19	1	2.59	2.52	1	7.577	1	2412.2	1
4250	1	BD0637	24	4173	4250.1	1.478	1.132	27.781	34.682								35.69	34.73	1	0.00	1	154.87	150.68	1	2.58	2.51	1				
4500	1	BD0636	23	4416	4500.3	1.492	1.117	27.783	34.684	34.685	1	157.92	153.65	1			35.50	34.54	1	0.00	1	156.29	152.06	1	2.58	2.51	1	7.575	1	2410.5	1
4750	1	BD0634	21	4659	4750.2	1.512	1.108	27.785	34.685								35.51	34.55	1	0.00	1	156.50	152.27	1	2.57	2.50	1				
5000	1	BD0633	20	4901	4999.9	1.540	1.104	27.785	34.685	34.687	1	159.22	154.92	1			35.63	34.67	1	0.00	1	157.27	153.02	1	2.58	2.51	1	7.571	1	2417.7	1
5250	1	BD0631	18	5144	5250.4	1.569	1.101	27.786	34.685								35.66	34.69	1	0.00	1	159.96	155.63	1	2.55	2.48	1				
5500	1	BD0630	17	5385	5499.8	1.599	1.099	27.786	34.685	34.687	1	161.74	157.37	1			35.42	34.47	1	0.00	1	155.75	151.54	1	2.56	2.49	1	7.593	1	2416.5	1
Bottom	1	BD0628	15	5746	5873.5	1.647	1.097	27.786	34.685	34.689	1	161.51	157.14	1			35.43	34.47	1	0.00	1	158.35	154.07	1	2.56	2.49	1	7.586	1	2413.1	1
5	EX	BD0737	24	5	5.1	12.685	12.684	24.693	32.725				0.00					0.00					0.00			0.00					
10	EX	BD0736	22	10	10.2	12.682	12.681	24.694	32.725				0.00					0.00					0.00			0.00					
25	EX	BD0735	20	25	25.6	12.453	12.450	24.739	32.726				0.00					0.00					0.00			0.00					
50	EX	BD0734	18	50	50.1	6.130	6.126	26.011	33.068				0.00					0.00					0.00			0.00					

Station BD12 (50°26.04'N, 176°34.69'W; Depth=7228 m); Sep. 7, 2012, 02:27; ~ Sep. 8, 2012, 14:10; Bottom altitude: 14.212 m)

*Container Number		Cast No.	Sample No.	Niskin No.	Depth (m)	Pressure (decibar)	Temp. (°C) (CTD)	Pot.Temp	Sigma-th	Salinity (CTD)	Salinity (Routine)	QF	Oxygen (μmol/L)	Oxygen (μmol/kg)	QF	Chlorophyll a (μg/L)	QF	NO3+NO2 (μmol/L)	NO3+NO2 (μmol/kg)	QF	NO2 (μmol/L)	QF	SiO2 (μmol/L)	SiO2 (μmol/kg)	QF	PO4 (μmol/L)	PO4 (μmol/kg)	QF	pH(X)	QF	Alkalinity (μmol/kg)	QF
-	0	1	BD0762	25	######	N.D.	10.100	#VALUE!	#VALUE!	N.D.	32.601	1	300.27		1	1.030	1	14.74		1	0.21	1	22.27		1	1.82		1	7.822	1	2203.5	1
2-24	10	1	BD0761	24	9	9.5	9.710	9.709	25.119	32.590	32.595	1	301.00	293.62	1	1.030	1	14.57	14.21	1	0.18	1	21.65	21.12	1	1.34	1.31	1	7.836	1	2199.5	1
	25	2	BD0776	14	24	24.4	9.684	9.681	25.120	32.586	32.590	1	300.37	293.01	1	0.996	1	14.64	14.28	1	0.21	1	21.95	21.41	1	1.30	1.27	1	7.833	1	2199.7	1
2-23	50	1	BD0760	23	50	50.5	4.335	4.332	25.975	32.765	32.783	1	327.98	319.68	1	0.369	1	19.06	18.58	1	0.63	1	25.04	24.41	1	1.71	1.67	1	7.727	1	2210.5	1
	Chla max	2	BD0781	21	37	37.2	9.381	9.377	25.170	32.587	32.618	1	304.77	297.29	1	0.667	1	15.12	14.75	1	0.31	1	21.10	20.58	1	1.36	1.33	1	7.815	1	2202.0	1
2-22	100	1	BD0759	22	100	101.1	3.479	3.472	26.462	33.271	33.371	1	181.26	176.59	1	0.052	1	33.62	32.75	1	0.02	1	59.05	57.53	1	2.58	2.51	1	7.460	1	2249.0	1
	150	2	BD0772	10	148	149.8	3.737	3.728	26.716	33.621	33.673	1	96.97	94.45	1	0.032	1	39.34	38.31	1	0.00	1	77.41	75.40	1	2.75	2.68	1	7.334	1	2273.5	1
2-20	200	1	BD0758	21	198	199.9	3.846	3.833	26.947	33.924	33.931	1	24.48	23.84	1	0.009	1	44.32	43.15	1	0.01	1	93.03	90.59	1	3.26	3.17	1	7.245	1	2298.7	1
	300	2	BD0780	19	298	300.6	3.772	3.752	27.044	34.035								43.54	42.39	1	0.00	1	104.60	101.85	1	3.19	3.11	1				
2-8	400	1	BD0757	20	397	400.5	3.649	3.622	27.141	34.141	34.146	1	17.06	16.61	1			43.36	42.22	1	0.02	1	120.14	116.97	1	3.20	3.11	1	7.287	1	2330.3	1
2-7	600	1	BD0756	19	594	600.2	3.245	3.205	27.291	34.279	34.283	1	16.22	15.79	1			43.24	42.09	1	0.01	1	138.30	134.62	1	3.21	3.12	1	7.309	1	2353.5	1
2-6	800	1	BD0754	17	791	799.8	2.942	2.889	27.380	34.355	34.356	1	21.30	20.73	1			43.10	41.95	1	0.01	1	147.89	143.95	1	3.19	3.10	1	7.326	1	2368.6	1
	O2 min	2	BD0779	18	455	459.9	3.547	3.516	27.185	34.184	34.188	1	16.04	15.61	1	0.008	1	43.00	41.86	1	0.00	1	120.78	117.58	1	3.17	3.09	1	7.291	1	2337.7	1
2-17	1000	1	BD0753	16	989	1000.3	2.654	2.589	27.460	34.422	34.423	1	23.02	22.41	1			42.89	41.75	1	0.01	1	158.61	154.37	1	3.18	3.09	1	7.336	1	2380.6	1
	1250	2	BD0765	3	1236	1250.7	2.297	2.216	27.552	34.498	34.499	1	34.63	33.70	1			42.49	41.35	1	0.00	1	162.86	158.49	1	3.10	3.02	1	7.364	1	2394.6	1
2-2	1500	1	BD0751	14	1482	1500.0	2.097	1.999	27.605	34.543	34.543	1	47.84	46.56	1			41.74	40.62	1	0.01	1	172.51	167.88	1	3.07	2.99	1	7.393	1	2400.8	1
	1750	2	BD0778	16	1728	1750.3	1.923	1.808	27.649	34.578								40.87	39.77	1	0.00	1	169.47	164.91	1	2.98	2.90	1				
2-1	2000	1	BD0750	13	1973	2000.2	1.807	1.673	27.679	34.604	34.605	1	78.03	75.93	1			40.08	39.00	1	0.01	1	173.30	168.63	1	2.94	2.87	1	7.455	1	2409.7	1
	2500	1	BD0748	11	2464	2499.8	1.620	1.447	27.726	34.641	34.640	1	106.87	103.99	1			38.40	37.36	1	0.01	1	170.92	166.31	1	2.82	2.74	1	7.505	1	2412.9	1
	3000	1	BD0747	10	2953	2999.6	1.521	1.304	27.753	34.661	34.661	1	130.09	126.57	1			37.05	36.05	1	0.01	1	169.77	165.18	1	2.73	2.66	1	7.548	1	2414.3	1
	3500	1	BD0746	9	3441	3500.0	1.462	1.197	27.771	34.676	34.674	1	147.66	143.67	1			35.96	34.99	1	0.01	1	162.25	157.87	1	2.63	2.56	1	7.595	1	2412.8	1
	4000	1	BD0745	8	3928	3999.9	1.452	1.134	27.782	34.684	34.681	1	155.95	151.74	1			35.28	34.33	1	0.01	1	156.62	152.39	1	2.56	2.49	1	7.596	1	2414.7	1
	4500	1	BD0744	7	4414	4499.8	1.474	1.100	27.788	34.688	34.686	1	161.67	157.30	1			34.89	33.95	1	0.01	1	158.37	154.09	1	2.49	2.42	1	7.601	1	2412.5	1
	5000	1	BD0755	18	4900	5000.2	1.514	1.079	27.791	34.690	34.688	1	163.96	159.52	1			34.91	33.96	1	0.01	1	155.16	150.96	1	2.53	2.46	1	7.607	1	2411.1	1
	5500	1	BD0742	5	5384	5500.4	1.567	1.068	27.793	34.692	34.688	1	167.25	162.72	1			34.80	33.86	1	0.01	1	151.02	146.94	1	2.54	2.47	1	7.608	1	2409.3	1
	6000	1	BD0752	15	5867	6000.2	1.635	1.068	27.793	34.692	34.688	1	n.d.	#VALUE!	4			34.75	33.81	1	0.01	1	150.89	146.81	1	2.52	2.45	1	7.607	1	2410.2	1
	6500	1	BD0740	3	6349	6500.6	1.705	1.067	27.793	34.692	34.689	1	167.01	162.49	1			34.62	33.68	1	0.00	1	152.64	148.51	1	2.53	2.46	1	7.610	1	2409.7	1
	7000	1	BD0739	2	6829	6999.5	1.780	1.067	27.793	34.692	34.689	1	168.76	164.19	1			34.53	33.60	1	0.00	1	149.25	145.21	1	2.50	2.43	1	7.601	1	2410.5	1
	Bottom	1	BD0749	12	7300	7490.5	1.857	1.067	27.793	34.692			167.74	163.21	1			34.55	33.62	1	0.00	1	153.98	149.82	1	2.48	2.41	1	7.607	1	2409.0	1

Notes:

QF(Good=1, Questionable=4)
Time is expressed as UTC.
Position and depth are those when the deepest sample was taken.
Temp (°C) at Pressure zero was that of seawater obtained by bucket sampling.
Data marked by blue color are calculated values.

*Some of the cast2 samples were taken during the cast1.
The sample with a label of "BD12-2-24" was taken using the No.24 Niskin bottle during the cast1.

Station BD13 (47°01.91'N, 174°55.78'W; Depth=5297 m); Sep. 9, 2012, 04:10 ~ Sep 9, 2012, 18:36; Bottom altitude: 13.211 m)

	Cast No.	Sample No.	Niskin No.	Depth (m)	Pressure (decibar)	Temp. (°C) (CTD)	Pot.Temp	Sigma-th	Salinity (CTD)	Salinity (Routine)	QF	Oxygen (µmol/L)	Oxygen (µmol/kg)	QF	Chlorophyll a (µg/L)	QF	NO3+NO2 (µmol/L)	NO3+NO2 (µmol/kg)	QF	NO2 (µmol/L)	QF	SiO2 (µmol/L)	SiO2 (µmol/kg)	QF	PO4 (µmol/L)	PO4 (µmol/kg)	QF	pH(X)	QF	Alkalinity	QF
bucket	3	BD0837	25	######	N.D.	12.800	#VALUE!	#VALUE!	N.D.	32.780	1	285.06		1	0.535	1	13.61		1	0.24	1	18.55		1	1.24		1	7.846	1		
10	3	BD0836	24	10	10.6	12.216	12.215	24.813	32.764	32.768	1	287.83	280.86	1	0.537	1	13.44	13.11	1	0.24	1	18.50	18.05	1	1.20	1.17	1	7.848	1		
25	3	BD0835	23	26	26.1	12.040	12.037	24.845	32.761	32.778	1	290.66	283.61	1	0.538	1	13.47	13.14	1	0.24	1	18.62	18.17	1	1.21	1.18	1	7.846	1		
50	3	BD0834	22	51	51.0	6.567	6.563	25.877	32.969	32.984	1	325.16	316.95	1	0.409	1	13.99	13.64	1	0.20	1	21.10	20.56	1	1.27	1.24	1	7.787	1		
100	3	BD0833	21	100	100.8	4.718	4.711	26.180	33.073	33.075	1	321.19	313.00	1	0.186	1	17.61	17.16	1	0.00	1	24.02	23.41	1	1.46	1.42	1	7.735	1		
Chla max	3	BD0832	20	36	36.2	8.302	8.298	25.586	32.906	34.540	4	315.85	307.97	1	0.476	1	14.03	13.68	1	0.19	1	19.63	19.14	1	1.30	1.27	1	7.801	1		
O2 min	3	BD0831	19	667	674.1	3.345	3.299	27.233	34.218	34.219	1	29.86	29.06	1	0.003	1	42.10	40.98	1	0.00	1	123.07	119.80	1	3.12	3.04	1	7.316	1		
150	3	BD0830	18	148	149.5	4.250	4.239	26.374	33.255	33.287	1	275.54	268.46	1	0.030	1	22.68	22.10	1	0.00	1	36.37	35.43	1	1.79	1.74	1	7.656	1		
200	3	BD0829	17	200	201.4	3.949	3.935	26.718	33.649	33.650	1	177.54	172.92	1	0.012	1	31.04	30.23	1	0.00	1	59.27	57.73	1	2.35	2.29	1	7.494	1		
300	3	BD0828	16	297	300.0	3.562	3.542	26.853	33.770								36.82	35.86	1	0.00	1	79.50	77.42	1	2.77	2.70	1				
400	2	BD0819	24	396	400.2	3.732	3.705	27.006	33.981	33.988	1	61.54	59.92	1			40.25	39.20	1	0.00	1	96.69	94.14	1	2.98	2.90	1	7.332	1		
600	2	BD0818	23	595	600.4	3.448	3.407	27.181	34.165	34.171	1	33.18	32.31	1			42.01	40.89	1	0.00	1	122.22	118.99	1	3.12	3.04	1	7.317	1		
800	2	BD0817	22	792	800.5	3.136	3.082	27.312	34.291	34.297	1	30.23	29.43	1			41.97	40.85	1	0.00	1	134.09	130.53	1	3.13	3.05	1	7.332	1		
1000	2	BD0816	21	990	1000.7	2.845	2.779	27.407	34.376	34.379	1	29.23	28.45	1			42.43	41.30	1	0.00	1	144.55	140.70	1	3.13	3.05	1	7.342	1		
1250	2	BD0815	20	1236	1250.2	2.521	2.439	27.497	34.452	34.453	1	33.47	32.57	1			42.21	41.08	1	0.00	1	155.48	151.32	1	3.10	3.02	1	7.361	1		
1500	2	BD0814	19	1482	1500.2	2.288	2.188	27.560	34.505	34.507	1	42.71	41.56	1			41.94	40.82	1	0.00	1	162.57	158.21	1	3.07	2.99	1	7.378	1		
1750	2	BD0813	18	1729	1750.7	2.088	1.971	27.614	34.551								41.30	40.19	1	0.00	1	162.93	158.55	1	3.02	2.93	1				
2000	2	BD0812	17	1975	2001.2	1.935	1.799	27.654	34.584	34.584	1	68.68	66.83	1			40.44	39.35	1	0.00	1	167.69	163.18	1	2.96	2.88	1	7.434	1		
2250	1	BD0804	24	2219	2249.9	1.800	1.646	27.687	34.610								39.85	38.78	1	0.00	1	168.69	164.14	1	2.87	2.79	1				
2500	1	BD0803	23	2464	2499.8	1.712	1.537	27.709	34.628	34.630	1	97.22	94.59	1			39.22	38.16	1	0.00	1	167.26	162.75	1	2.86	2.78	1	7.485	1		
2750	1	BD0802	22	2709	2749.5	1.635	1.438	27.728	34.643								38.37	37.34	1	0.00	1	166.28	161.80	1	2.77	2.70	1				
3000	1	BD0801	21	2954	2999.6	1.585	1.366	27.741	34.653	34.654	1	120.37	117.12	1			37.76	36.74	1	0.00	1	164.76	160.31	1	2.73	2.66	1	7.532	1		
3250	1	BD0800	20	3198	3249.6	1.538	1.295	27.754	34.662								37.08	36.08	1	0.00	1	159.19	154.89	1	2.68	2.61	1				
3500	1	BD0799	19	3442	3499.5	1.506	1.240	27.763	34.669	34.670	1	140.17	136.38	1			36.25	35.27	1	0.00	1	160.36	156.03	1	2.59	2.52	1	7.565	1		
3750	1	BD0798	18	3686	3749.3	1.483	1.191	27.771	34.675								36.17	35.19	1	0.00	1	159.82	155.50	1	2.60	2.53	1				
4000	1	BD0797	17	3930	4000.2	1.479	1.161	27.776	34.678	34.679	1	151.65	147.55	1			36.15	35.18	1	0.00	1	154.87	150.68	1	2.59	2.52	1	7.583	1		
4250	1	BD0796	16	4173	4249.8	1.482	1.136	27.780	34.681								35.66	34.69	1	0.00	1	158.85	154.55	1	2.55	2.48	1				
4500	1	BD0795	15	4415	4499.3	1.495	1.120	27.783	34.683	34.683	1	157.48	153.23	1			35.45	34.49	1	0.00	1	160.92	156.57	1	2.56	2.49	1	7.600	1		
4750	1	BD0794	14	4658	4749.1	1.519	1.114	27.784	34.684								35.41	34.46	1	0.00	1	157.49	153.23	1	2.54	2.47	1				
5000	1	BD0793	13	4901	4999.5	1.546	1.110	27.784	34.684	34.685	1	158.81	154.52	1			35.37	34.41	1	0.00	1	158.67	154.39	1	2.51	2.44	1	7.601	1		
Bottom	1	BD0784	1	5774	5902.2	1.660	1.104	27.785	34.684	34.685	1	160.68	156.34	1			34.73	33.79	1	0.00	1	157.50	153.24	1	2.54	2.47	1	7.601	1		

Station BD14 (46°59.99'N, 169°59.81'W; Depth=5493 m); Sep. 10, 2012, 08:46 ~ Sep. 11, 2012, 09:09; Bottom altitude: 15.140 m)

	Cast No.	Sample No.	Niskin No.	Depth (m)	Pressure (decibar)	Temp. (°C) (CTD)	Pot.Temp	Sigma-th	Salinity (CTD)	Salinity (Routine)	QF	Oxygen (µmol/L)	Oxygen (µmol/kg)	QF	Chlorophyll a (µg/L)	QF	NO3+NO2 (µmol/L)	NO3+NO2 (µmol/kg)	QF	NO2 (µmol/L)	QF	SiO2 (µmol/L)	SiO2 (µmol/kg)	QF	PO4 (µmol/L)	PO4 (µmol/kg)	QF	pH(X)	QF	Alkalinity (µmol/kg)	QF
0	5	BD0956	25	######	N.D.	13.100	#VALUE!	#VALUE!	N.D.	32.620	1	283.44		1	0.444	1	13.21		1	0.13	1	18.30		1	1.27		1	7.859	1		
5	5	BD0955	24	4	4.5	12.919	12.918	24.554	32.604	32.605	1	283.98	277.17	1	0.388	1	13.12	12.80	1	0.13	1	18.15	17.72	1	1.17	1.15	1	7.864	1		
10	5	BD0954	23	10	10.1	12.915	12.913	24.554	32.603	32.606	1	283.77	276.97	1	0.440	1	13.01	12.70	1	0.13	1	17.87	17.44	1	1.16	1.13	1	7.865	1	2201.3	1
25	5	BD0953	22	25	25.2	10.116	10.113	25.133	32.694	32.712	1	313.23	305.55	1	0.629	1	13.86	13.52	1	0.12	1	18.88	18.42	1	1.23	1.20	1	7.831	1		
50	5	BD0952	21	49	49.7	5.760	5.756	25.879	32.845	32.845	1	329.61	321.30	1	0.330	1	15.19	14.81	1	0.15	1	22.36	21.79	1	1.36	1.32	1	7.779	1		
100	5	BD0951	20	100	100.8	4.477	4.470	26.084	32.921	32.920	1	321.39	313.22	1	0.116	1	17.69	17.24	1	0.01	1	23.72	23.12	1	1.44	1.41	1	7.736	1	2214.2	1
150	5	BD0950	19	150	150.8	3.865	3.855	26.431	33.278	33.273	1	259.60	252.91	1	0.020	1	25.18	24.53	1	0.00	1	40.70	39.65	1	1.92	1.87	1	7.615	1		
Chla max	4	BD0930	24	41	41.2	7.771	7.767	25.565	32.781	32.792	1	325.16	317.06	1	0.487	1	14.42	14.06	1	0.12	1	20.45	19.94	1	1.32	1.29	1	7.803	1	2212.4	1
200	4	BD0929	23	199	201.1	3.503	3.490	26.751	33.636	33.633	1	161.76	157.54	1	0.009	1	33.81	32.93	1	0.00	1	66.47	64.74	1	2.53	2.47	1	7.444	1	2270.6	1
300	4	BD0928	22	296	299.1	3.613	3.593	26.900	33.836								39.15	38.12	1	0.00	1	86.56	84.29	1	2.85	2.77	1				
400	4	BD0927	21	397	401.2	3.613	3.586	27.019	33.984	33.982	1	56.22	54.74	1			41.48	40.39	1	0.00	1	101.46	98.79	1	3.00	2.92	1	7.320	1	2312.7	1
600	4	BD0926	20	595	600.8	3.434	3.393	27.195	34.181	34.181	1	31.17	30.35	1			42.42	41.30	1	0.00	1	122.61	119.36	1	3.07	2.99	1	7.313	1	2340.4	1
800	4	BD0925	19	793	801.2	3.083	3.030	27.335	34.314	34.313	1	27.83	27.09	1			42.89	41.75	1	0.00	1	138.51	134.82	1	3.11	3.03	1	7.332	1	2360.1	1
O2 min	3	BD0907	24	703	710.5	3.250	3.202	27.272	34.255	34.260	1	28.26	27.51	1	0.002	1	42.76	41.63	1	0.00	1	131.84	128.34	1	3.11	3.03	1	7.320	1	2356.8	1
1000	3	BD0906	23	989	999.7	2.820	2.753	27.417	34.386	34.386	1	33.34	32.45	1			42.89	41.75	1	0.00	1	147.89	143.94	1	3.11	3.03	1	7.347	1	2375.2	1
1000	3	BD0905	22	989	1000.0	2.819	2.752	27.418	34.387									0.00	1		1		0.00	1		0.00	1				
1250	3	BD0904	21	1236	1250.0	2.487	2.405	27.508	34.462	34.465	1	n.d.	#VALUE!	4			42.41	41.28	1	0.00	1	154.89	150.75	1	3.11	3.03	1	7.365	1		
1500	3	BD0903	20	1482	1499.8	2.253	2.153	27.570	34.514	34.516	1	43.55	42.38	1			42.36	41.23	1	0.00	1	164.47	160.06	1	3.07	2.99	1	7.383	1	2399.3	1
1750	3	BD0902	19	1728	1749.9	2.067	1.951	27.619	34.555								41.61	40.49	1	0.00	1	168.19	163.67	1	3.01	2.93	1				
2000	3	BD0901	18	1975	2000.9	1.909	1.773	27.659	34.588	34.588	1	68.93	67.07	1			41.14	40.04	1	0.00	1	167.42	162.91	1	2.95	2.87	1	7.435	1	2411.6	1
2250	2	BD0885	24	2218	2248.9	1.823	1.668	27.682	34.607								40.53	39.44	1	0.00	1	170.97	166.36	1	2.92	2.84	1				
2500	2	BD0884	23	2464	2499.2	1.726	1.551	27.706	34.626	34.627	1	91.93	89.45	1			39.67	38.60	1	0.00	1	171.33	166.71	1	2.84	2.76	1	7.481	1		
2750	2	BD0883	22	2709	2749.3	1.643	1.447	27.726	34.642								38.89	37.84	1	0.00	1	169.89	165.31	1	2.77	2.70	1				
3000	2	BD0882	21	2954	3000.3	1.578	1.359	27.742	34.654	34.655	1	119.39	116.17	1			38.21	37.18	1	0.00	1	162.48	158.09	1	2.72	2.65	1	7.543	1	2418.6	1
3250	2	BD0880	19	3198	3250.0	1.534	1.292	27.754	34.662								37.22	36.22	1	0.00	1	164.90	160.45	1	2.67	2.59	1				
3500	2	BD0879	18	3443	3500.5	1.498	1.232	27.764	34.670	34.684	1	139.27	135.51	1			36.86	35.87	1	0.00	1	163.36	158.95	1	2.61	2.54	1	7.573	1		
3750	2	BD0878	17	3686	3750.0	1.477	1.185	27.772	34.675								36.38	35.40	1	0.00	1	156.05	151.83	1	2.58	2.51	1				
4000	2	BD0877	16	3931	4001.6	1.471	1.153	27.777	34.679	34.684	1	151.48	147.39	1			36.20	35.22	1	0.00	1	160.58	156.24	1	2.56	2.49	1	7.593	1	2419.7	1
4250	1	BD0861	24	4173	4250.3	1.477	1.131	27.781	34.682								36.11	35.13	1	0.00	1	157.20	152.95	1	2.52	2.45	1				
4500	1	BD0860	23	4416	4499.7	1.494	1.119	27.783	34.684	34.685	1	155.94	151.72	1			36.04	35.07	1	0.00	1	156.96	152.72	1	2.54	2.47	1	7.597	1		
4750	1	BD0858	21	4659	4750.0	1.521	1.116	27.784	34.684								35.59	34.62	1	0.00	1	163.49	159.07	1	2.54	2.47	1				
5000	1	BD0857	20	4902	5000.5	1.549	1.112	27.784	34.684	34.686	1	157.01	152.76	1			35.73	34.76	1	0.00	1	164.14	159.71	1	2.51	2.44	1	7.605	1	2420.9	1
5250	1	BD0855	18	5144	5250.3	1.576	1.108	27.784	34.684								35.70	34.74	1	0.00	1	157.48	153.22	1	2.53	2.46	1				
5500	1	BD0854	17	5386	5500.8	1.604	1.103	27.785	34.684	34.688	1	159.49	155.18	1			35.59	34.62	1	0.00	1	160.90	156.55	1	2.52	2.45	1	7.591	1		
Bottom	1	BD0853	16	5487	5604.9	1.610	1.096	27.786	34.685	34.688	1	161.24	156.88	1			35.56	34.60	1	0.00	1	158.36	154.08	1	2.51	2.44	1	7.594	1	2419.1	1
5	EX	BD0934	24	5	4.7	12.884	12.884	24.563	32.606			285.035	278.20	1				0.00					0.00			0.00					
10	EX	BD0933	22	11	10.6	12.882	12.880	24.563	32.606			285.01	278.18	1				0.00					0.00			0.00					
25	EX	BD0932	20	24	24.5	11.745	11.742	24.795	32.628			306.14	298.73	1				0.00					0.00			0.00					
50	EX	BD0931	18	50	50.4	6.443	6.439	25.784	32.831			328.09	319.84	1				0.00					0.00			0.00					

Station BD15 (50°50.02'N, 160°00.02'W; Depth=4853 m); Sep. 19, 2012, 05:53 ~ Sep 20, 2012, 06:06; Bottom altitude: 13.529 m)

	Cast No.	Sample No.	Niskin No.	Depth (m)	Pressure (decibar)	Temp. (°C) (CTD)	Pot.Temp	Sigma-th	Salinity (CTD)	Salinity (Routine)	QF	Oxygen (µmol/L)	Oxygen (µmol/kg)	QF	Chlorophyll a (µg/L)	QF	NO3+NO2 (µmol/L)	NO3+NO2 (µmol/kg)	QF	NO2 (µmol/L)	QF	SiO2 (µmol/L)	SiO2 (µmol/kg)	QF	PO4 (µmol/L)	PO4 (µmol/kg)	QF	pH(X)	QF	Alkalinity (µmol/kg)	QF
bucket	5	BD01044	25	#VALUE!	N.D.	11.800	#VALUE!	#VALUE!	N.D.	32.250	1	318.1		1	1.202	1	7.23			0.13		5.91			0.92			7.886	1	2187.1	1
5	5	BD01043	24	5	4.9	10.451	10.451	24.867	32.426	32.429	1	315.7	308.02	1	1.069	1	7.20	7.03	1	0.11	1	5.71	5.57	1	0.84	0.82	1	7.900	1	2197.2	1
10	5	BD01042	23	10	10.1	10.439	10.438	24.894	32.458	32.466	1	330.6	322.52	1	1.061	1	7.22	7.04	1	0.12	1	5.88	5.74	1	0.85	0.83	1	7.900	1	2198.3	1
25	5	BD01040	21	25	25.3	10.339	10.336	24.935	32.488	32.491	1	311.4	303.81	1	0.813	1	7.22	7.04	1	0.12	1	5.96	5.81	1	0.87	0.85	1	7.896	1	2202.0	1
50	5	BD01038	19	50	50.4	5.006	5.002	25.847	32.694	32.682	1	354.6	345.65	1	0.369	1	12.87	12.54	1	0.33	1	12.28	11.97	1	1.39	1.36	1	7.796	1	2211.7	1
100	5	BD01037	18	99	99.9	3.565	3.559	26.514	33.346	33.335	4	205.9	200.56	4	0.039	4	32.59	31.74	1	0.02	1	54.64	53.23	1	2.44	2.38	1	7.472	4	2245.2	4
150	4	BD01019	24	148	149.8	3.715	3.705	26.825	33.755	33.756	1	90.8	88.41	1	0.016	1	39.92	38.88	1	0.00	1	78.78	76.72	1	2.94	2.86	1	7.334	1	2282.2	1
200	4	BD01018	23	197	199.3	3.797	3.784	26.921	33.885	33.885	1	47.7	46.41	1	0.007	1	42.63	41.51	1	0.00	1	89.81	87.45	1	3.14	3.06	1	7.287	1	2293.4	1
300	4	BD01016	21	298	300.6	3.758	3.738	27.035	34.022								43.24	42.11	1	0.00	1	103.06	100.35	1	3.17	3.08	1				
400	4	BD01015	20	396	399.7	3.684	3.657	27.117	34.116	34.113	1	23.2	22.60	1			43.21	42.06	1	0.00	1	112.46	109.49	1	3.17	3.08	1	7.302	1	2328.5	1
600	4	BD01013	18	594	600.5	3.374	3.333	27.253	34.247	34.246	1	19.0	18.45	1			42.77	41.64	1	0.00	1	127.44	124.06	1	3.19	3.10	1	7.326	1	2353.9	1
Chla max	3	BD00998	24	14	14.3	10.479	10.477	24.876	32.443	32.457	1	323.2	315.35	1	1.144	1	7.26	7.08	1	0.10	1	5.52	5.38	1	0.85	0.83	1	7.887	1	2197.0	1
O2 min	3	BD00997	23	725	732.9	3.134	3.085	27.319	34.301	34.301	1	21.8	21.19	1	0.005	1	42.96	41.81	1	0.00	1	136.78	133.14	1	3.20	3.11	1	7.334	1	2362.6	1
800	3	BD00996	22	791	799.3	3.058	3.005	27.353	34.334	34.334	1	19.7	19.21	1			43.05	41.91	1	0.00	1	139.03	135.33	1	3.20	3.11	1	7.320	1	2372.4	1
1000	3	BD00995	21	990	1000.7	2.755	2.689	27.433	34.399	34.398	1	26.2	25.52	1			42.93	41.78	1	0.00	1	149.24	145.25	1	3.18	3.09	1	7.342	1	2380.0	1
1250	3	BD00994	20	1236	1250.7	2.456	2.374	27.513	34.465	34.465	1	33.4	32.49	1			42.86	41.71	1	0.00	1	158.433	154.19	1	3.16	3.07	1	7.364	1	2395.1	1
1500	3	BD00993	19	1482	1500.4	2.229	2.130	27.574	34.516	34.516	1	43.0	41.86	1			42.38	41.24	1	0.00	1	163.78	159.39	1	3.11	3.02	1	7.382	1	2402.1	1
1750	3	BD00991	17	1728	1750.1	2.055	1.938	27.620	34.556								41.96	40.83	1	0.00	1	167.67	163.16	1	3.06	2.98	1				
2000	2	BD00978	24	1973	1999.2	1.898	1.763	27.661	34.589	34.591	1	72.7	70.74	1			40.88	39.78	1	0.00	1	170.63	166.04	1	2.99	2.91	1	7.426	1	2417.2	1
2250	2	BD00976	22	2219	2250.0	1.792	1.637	27.688	34.611								40.32	39.23	1	0.00	1	169.49	164.93	1	2.94	2.86	1				
2500	2	BD00975	21	2464	2500.1	1.707	1.531	27.709	34.628	34.629	1	103.8	101.02	1			39.31	38.25	1	0.00	1	170.59	165.99	1	2.89	2.81	1	7.480	1	2417.6	1
2750	2	BD00974	20	2708	2750.0	1.631	1.435	27.728	34.642								38.46	37.42	1	0.00	1	169.12	164.55	1	2.80	2.72	1				
3000	2	BD00973	19	2953	2999.9	1.571	1.352	27.743	34.653	34.655	1	126.8	123.37	1			37.70	36.69	1	0.00	1	167.70	163.17	1	2.76	2.69	1	7.529	1	2421.3	1
3250	2	BD00971	17	3197	3249.6	1.534	1.292	27.753	34.661								37.34	36.33	1	0.00	1	165.45	160.98	1	2.69	2.62	1				
3500	2	BD00970	16	3441	3499.6	1.506	1.239	27.762	34.668	34.669	1	148.4	144.42	1			36.87	35.87	1	0.00	1	164.85	160.39	1	2.67	2.60	1	7.561	1	2422.6	1
3750	2	BD00969	15	3685	3750.6	1.489	1.197	27.770	34.673								36.11	35.13	1	0.00	1	164.26	159.82	1	2.63	2.56	1				
4000	1	BD0955	24	3928	3999.9	1.486	1.168	27.775	34.678	34.678	1	163.0	158.60	1			36.21	35.23	1	0.00	1	163.76	159.33	1	2.59	2.52	1	7.579	1	2426.0	1
4250	1	BD0953	22	4171	4249.8	1.497	1.150	27.778	34.680								35.85	34.88	1	0.00	1	164.44	160.00	1	2.59	2.52	1				
4500	1	BD0952	21	4415	4500.4	1.512	1.136	27.780	34.682	34.684	1	165.3	160.82	1			35.68	34.71	1	0.00	1	164.30	159.86	1	2.58	2.51	1	7.586	1	2423.5	1
4750	1	BD0951	20	4657	4749.8	1.530	1.125	27.782	34.683								35.73	34.76	1	0.00	1	160.95	156.60	1	2.57	2.50	1				
5000	1	BD0950	19	4828	4926.2	1.545	1.118	27.783	34.684	34.686	1	157.4	153.15	1			35.59	34.63	1	0.00	1	164.67	160.22	1	2.55	2.48	1	7.596	1	2424.0	1
Bottom	1	BD0948	17	4828	4926.2	1.545	1.118	27.783	34.684	34.682	1	173.7	169.05	1			35.69	34.72	1	0.00	1	165.26	160.79	1	2.52	2.45	1	7.593	1	2427.2	1
5	EX	BD01049	24	5	5.4	10.506	10.506	24.744	32.279			311.8	304.26	1				0.00					0.00			0.00					
10	EX	BD01047	22	11	11.1	10.501	10.499	24.760	32.300			317.9	310.20	1				0.00					0.00			0.00					
25	EX	BD01046	20	24	24.6	10.449	10.446	24.909	32.479			310.5	303.00	1				0.00					0.00			0.00					
50	EX	BD01045	17	50	50.2	4.838	4.834	25.866	32.695			318.9	310.86	1				0.00					0.00			0.00					

Station BD16 (50°23.90'N, 155°59.46'W; Depth=5142 m); Sep. 20, 2012, 17:53 ~ Sep 21, 2012, 01:14; Bottom altitude: 14.701 m)

	Cast No.	Sample No.	Niskin No.	Depth (m)	Pressure (decibar)	Temp. (°C) (CTD)	Pot.Temp	Sigma-th	Salinity (CTD)	Salinity (Routine)	QF	Oxygen (µmol/L)	Oxygen (µmol/kg)	QF	Chlorophyll a (µg/L)	QF	NO3+NO2 (µmol/L)	NO3+NO2 (µmol/kg)	QF	NO2 (µmol/L)	QF	SiO2 (µmol/L)	SiO2 (µmol/kg)	QF	PO4 (µmol/L)	PO4 (µmol/kg)	QF	pH(X)	QF	Alkalinity (µmol/kg)	QF
bucket	2	BD0193	25	#VALUE!	N.D.	11.200	#VALUE!	#VALUE!	N.D.	32.378	1	302.8		1	0.827	1	11.44		1	0.18	1	17.11		1	1.10		1	7.871	1		
10	2	BD0192	24	9	9.5	11.312	11.311	24.680	32.379	32.381	1	314.9	307.29	1	0.920	1	11.51	11.23	1	0.17	1	17.21	16.80	1	1.12	1.10	1	7.870	1		
25	2	BD0191	23	25	25.4	11.240	11.237	24.692	32.377	32.382	1	300.5	293.23	1	0.970	1	11.44	11.17	1	0.18	1	16.92	16.51	1	1.09	1.07	1	7.863	1		
50	2	BD0190	22	50	50.5	4.794	4.791	25.847	32.665	32.665	1	369.6	360.29	1	0.291	1	16.15	15.74	1	0.23	1	25.34	24.70	1	1.52	1.48	1	7.757	1		
100	2	BD0189	21	100	100.8	3.487	3.481	26.047	32.751	32.760	1	347.3	338.51	1	0.064	1	20.92	20.39	1	0.01	1	32.90	32.06	1	1.72	1.67	1	7.684	1		
Chla max	2	BD0188	20	37	37.6	6.700	6.697	25.545	32.570	32.564	1	355.8	346.98	1	0.505	1	13.78	13.43	1	0.18	1	17.87	17.42	1	1.32	1.29	1	7.809	1		
O2 min	2	BD0187	19	659	665.9	3.291	3.246	27.280	34.270	34.273	1	21.1	20.52	1	0.005	1	42.91	41.77	1	0.00	1	131.02	127.54	1	3.17	3.08	1	7.313	1		
150	2	BD0176	6	148	149.6	3.407	3.397	26.742	33.613	33.615	1	149.8	145.87	1	0.026	1	36.66	35.70	1	0.00	1	69.41	67.60	1	2.75	2.68	1	7.389	1		
200	2	BD0186	18	198	200.0	3.641	3.628	26.868	33.799	34.185	4	74.2	72.26	1	0.010	1	41.06	39.99	1	0.00	1	83.82	81.63	1	3.03	2.95	1	7.298	1		
300	2	BD0185	17	297	299.5	3.715	3.695	26.993	33.964								42.88	41.75	1	0.00	1	99.42	96.81	1	3.14	3.06	1				
400	2	BD0184	16	396	400.0	3.662	3.635	27.086	34.074	34.077	1	35.5	34.54	1			42.11	41.00	1	0.00	1	109.66	106.76	1	3.13	3.05	1	7.300	1		
600	2	BD0173	3	593	599.3	3.402	3.361	27.242	34.236	34.237	1	22.1	21.56	1			42.64	41.51	1	0.00	1	127.65	124.27	1	3.16	3.07	1	7.315	1		
800	2	BD0172	2	791	799.9	3.062	3.008	27.348	34.328	34.328	1	25.0	24.29	1			42.55	41.42	1	0.00	1	137.44	133.78	1	3.17	3.08	1	7.332	1		
1000	2	BD0183	15	992	1002.7	2.755	2.689	27.435	34.402	34.401	1	27.4	26.67	1			42.49	41.35	1	0.00	1	147.11	143.19	1	3.17	3.08	1	7.340	1		
1250	1	BD0158	10	1236	1250.1	2.488	2.405	27.505	34.459	34.458	1	31.3	30.42	1			42.38	41.25	1	0.00	1	160.69	156.39	1	3.18	3.09	1	7.352	1		
1500	1	BD0157	9	1481	1499.7	2.258	2.159	27.567	34.511	34.512	1	39.4	38.30	1			42.39	41.25	1	0.00	1	164.15	159.75	1	3.14	3.05	1	7.372	1		
1750	1	BD0169	24	1728	1750.3	2.080	1.963	27.616	34.552								42.05	40.92	1	0.00	1	170.09	165.52	1	3.09	3.01	1				
2000	1	BD0156	8	1972	1999.1	1.939	1.803	27.653	34.583	34.582	1	67.7	65.84	1			41.50	40.38	1	0.00	1	173.31	168.64	1	3.04	2.96	1	7.415	1		
2250	1	BD0168	22	2219	2250.0	1.829	1.674	27.681	34.606								40.63	39.54	1	0.00	1	170.65	166.06	1	2.97	2.89	1				
2500	1	BD0155	7	2464	2500.1	1.730	1.555	27.705	34.625	34.625	1	95.3	92.75	1			39.44	38.38	1	0.00	1	168.79	164.24	1	2.90	2.82	1	7.447	1		
2750	1	BD0167	21	2709	2750.2	1.643	1.446	27.726	34.641								38.94	37.89	1	0.00	1	172.16	167.51	1	2.84	2.76	1				
3000	1	BD0166	20	2952	2999.0	1.584	1.365	27.741	34.652	34.651	1	127.5	124.07	1			38.00	36.98	1	0.00	1	166.90	162.40	1	2.78	2.71	1	7.522	1		
3250	1	BD0165	19	3196	3248.8	1.533	1.291	27.754	34.662								37.45	36.44	1	0.00	1	163.33	158.92	1	2.71	2.64	1				
3500	1	BD0153	5	3441	3499.9	1.500	1.233	27.764	34.669	34.669	1	149.4	145.37	1			36.95	35.95	1	0.00	1	166.41	161.92	1	2.65	2.58	1	7.561	1		
3750	1	BD0164	17	3685	3749.9	1.487	1.195	27.770	34.674								36.37	35.39	1	0.00	1	166.33	161.84	1	2.64	2.57	1				
4000	1	BD0163	16	3929	4000.6	1.489	1.170	27.775	34.677	34.677	1	159.1	154.78	1			36.32	35.34	1	0.00	1	163.20	158.79	1	2.60	2.53	1	7.580	1		
4250	1	BD0162	15	4171	4249.2	1.499	1.153	27.778	34.680								36.02	35.05	1	0.00	1	167.31	162.79	1	2.47	2.41	1				
4500	1	BD0161	14	4415	4500.4	1.519	1.143	27.779	34.681	34.682	1	149.0	145.00	1			36.00	35.03	1	0.00	1	169.18	164.61	1	2.59	2.52	1	7.588	1		
4750	1	BD0160	13	4658	4750.4	1.541	1.136	27.781	34.682								35.88	34.91	1	0.00	1	165.86	161.38	1	2.59	2.52	1				
Bottom	1	BD0159	11	4914	5015.2	1.569	1.130	27.782	34.683	34.684	1	165.4	160.95	1			35.84	34.87	1	0.00	1	170.16	165.56	1	2.58	2.51	1	7.588	1		

Notes:

QF(Good=1, Questionable=4)
Time is expressed as UTC.
Position and depth are those when the deepest sample was taken.
Temp (°C) at Pressure zero was that of seawater obtained by bucket sampling.
Data marked by blue color are calculated values.

Station BD17 (42°59.97'N, 132°39.98'W; Depth=3732 m); Sep. 27, 2012, 16:18 ~ Sep 28, 2012, 07:31; Bottom altitude: 14.896 m)

	Cast No.	Sample No.	Niskin No.	Depth (m)	Pressure (decibar)	Temp. (°C (CTD)	Pot.Temp	Sigma-th	Salinity (CTD)	Salinity (Routine)	QF	Oxygen (μmol/L)	Oxygen (μmol/kg)	QF	hlorophyll (μg/L)	QF	NO3+NO2 (μmol/L)	NO3+NO2 (μmol/kg)	QF	NO2 (μmol/L)	QF	SiO2 (μmol/L)	SiO2 (μmol/kg)	QF	PO4 (μmol/L)	PO4 (μmol/kg)	QF	pH(X)	QF	Alkalinity (μmol/kg)	QF
bucket	3	BD0266	25	#VALUE!	N.D.	17.400	#VALUE!	#VALUE!	N.D.	32.861	1	264.6	#VALUE!	1	0.129	1	0.06	#VALUE!	1	0.01	1	0.00	#VALUE!	1	0.35	#VALUE!	1	7.959	1	2205.8	1
5	3	BD0265	24	4	4.527	17.467	17.466	23.764	32.860	32.862	1	278.4	271.98	1	0.134	1	0.03	0.03	1	0.01	1	0.00	0.00	1	0.33	0.32	1	7.959	1	2205.8	1
10	3	BD0264	23	11	10.815	17.472	17.470	23.763	32.860	32.666	1	280.6	274.12	1	0.131	1	0.03	0.03	1	0.01	1	0.00	0.00	1	0.33	0.32	1	7.960	1	2205.0	1
25	3	BD0263	22	25	25.576	16.740	16.736	23.889	32.801	32.807	1	284.6	277.97	1	0.257	1	1.17	1.14	1	0.04	1	0.00	0.00	1	0.46	0.45	1	7.963	1	2203.4	1
50	3	BD0262	21	50	49.925	11.677	11.671	24.993	32.865	32.869	1	318.8	311.04	1	0.581	1	0.24	0.23	1	0.01	1	0.00	0.00	1	0.36	0.35	1	7.914	1	2200.2	1
100	3	BD0261	20	99	100.143	9.167	9.157	25.392	32.826	32.831	1	298.2	290.77	1	0.132	1	8.67	8.45	1	0.68	1	6.06	5.91	1	0.92	0.89	1	7.814	1	2196.9	1
200	3	BD0260	19	199	200.679	7.971	7.951	26.271	33.714	33.693	1	239.0	232.84	1	0.011	1	18.76	18.28	1	0.01	1	20.50	19.98	1	1.39	1.36	1	7.689	1	2240.6	1
Chla max	2	BD0241	24	55	55.055	11.949	11.942	24.932	32.851	32.851	1	328.2	320.19	1	0.640	1	1.06	1.04	1	0.04	1	0.00	0.00	1	0.45	0.44	1	7.916	1		
400	2	BD0240	23	396	399.854	5.612	5.579	26.769	33.942	33.947	1	107.6	104.82	1			34.29	33.39	1	0.01	1	62.17	60.54	1	2.50	2.44	1	7.441	1	2287.5	1
600	2	BD0239	22	594	599.774	4.459	4.414	27.041	34.118	34.119	1	28.4	27.62	1			41.50	40.41	1	0.01	1	95.62	93.10	1	3.10	3.02	1	7.318	1	2319.8	1
800	2	BD0238	21	792	800.269	4.005	3.946	27.220	34.281	34.286	1	11.0	10.72	1			42.89	41.75	1	0.00	1	115.18	112.13	1	3.27	3.18	1	7.316	1	2350.0	1
1000	2	BD0237	20	989	999.475	3.541	3.469	27.341	34.373	34.375	1	10.3	10.03	1			43.03	41.89	1	0.00	1	128.84	125.41	1	3.28	3.19	1	7.327	1	2366.5	1
1500	2	BD0236	19	1484	1500.881	2.511	2.408	27.549	34.515	34.515	1	29.1	28.34	1			42.96	41.81	1	0.00	1	159.19	154.92	1	3.20	3.11	1	7.364	1	2402.6	1
2000	1	BD0217	24	1975	2000.056	1.953	1.817	27.662	34.595	34.598	1	72.1	70.17	1			40.51	39.42	1	0.00	1	172.56	167.92	1	3.02	2.94	1	7.438	1	2421.4	1
2500	1	BD0207	14	2466	2500.017	1.743	1.567	27.709	34.631	34.632	1	96.8	94.17	1			39.10	38.05	1	0.00	1	175.72	170.98	1	2.89	2.81	1	7.486	1	2426.1	1
3000	1	BD0216	23	2956	3000.885	1.614	1.395	27.738	34.652	34.652	1	117.8	114.64	1			38.22	37.19	1	0.00	1	172.78	168.12	1	2.80	2.72	1	7.524	1	2427.9	1
3000	1	BD0215	22	2955	3000.181	1.614	1.395	27.738	34.652									0.00					0.00			0.00					
3500	1	BD0201	8	3445	3500.920	1.563	1.295	27.755	34.664	34.665	1	121.5	118.22	1			37.60	36.58	1	0.00	1	174.08	169.38	1	2.74	2.67	1	7.549	1	2432.1	1
Bottom	1	BD0214	21	3695	3757.784	1.562	1.268	27.761	34.669	34.669	1	137.0	133.30	1			37.44	36.43	1	0.00	1	177.51	172.72	1	2.72	2.65	1	7.558	1	2439.8	1
5	Ex	BD0290	24	5	5.066	17.297	17.296	23.736	32.772			274.4	268.02	1				0.00					0.00			0.00					
10	Ex	BD0288	22	10	10.144	17.296	17.294	23.736	32.772			265.3	259.11	1				0.00					0.00			0.00					
25	Ex	BD0286	20	25	24.702	16.813	16.809	23.851	32.773			281.3	274.75	1				0.00					0.00			0.00					

Station BD18 (44°40.96'N, 130°30.04'W; Depth=2610 m); Sep. 29, 2012, 02:22 ~ Sep 29, 2012, 04:20; Bottom altitude: 13.382 m)

	Cast No.	Sample No.	Niskin No.	Depth (m)	Pressure (decibar)	Temp. (°C (CTD)	Pot.Temp	Sigma-th	Salinity (CTD)	Salinity (Routine)	QF	Oxygen (μmol/L)	Oxygen (μmol/kg)	QF	hlorophyll (μg/L)	QF	NO3+NO2 (μmol/L)	NO3+NO2 (μmol/kg)	QF	NO2 (μmol/L)	QF	SiO2 (μmol/L)	SiO2 (μmol/kg)	QF	PO4 (μmol/L)	PO4 (μmol/kg)	QF	pH(X)	QF	Alkalinity (μmol/kg)	QF
bucket	1	BD0315	25	#VALUE!	N.D.	17.000	#VALUE!	#VALUE!	N.D.	32.474	1	272.4	#VALUE!	1	0.143	1	0.05	#VALUE!	1	0.00	1	1.40	#VALUE!	1	0.28	#VALUE!	1	7.953	1		
10	1	BD0314	24	10	10.5	16.923	16.922	23.588	32.465	32.467	1	268.1	261.89	1	0.126	1	0.00	0.00	1	0.00	1	1.31	1.28	1	0.29	0.28	1	7.965	1		
100	1	BD0313	23	99	100.2	8.204	8.194	25.499	32.776	32.781	1	303.8	296.21	1	0.078	1	9.89	9.64	1	0.03	1	9.96	9.71	1	0.99	0.97	1	7.782	1		
300	1	BD0312	22	298	300.6	5.961	5.935	26.701	33.912	33.916	1	115.3	112.29	1	0.004	1	33.20	32.33	1	0.00	1	53.54	52.15	1	2.40	2.34	1	7.451	1		
600	1	BD0311	21	595	601.0	4.515	4.469	27.057	34.145	34.151	1	21.4	20.79	1			42.02	40.91	1	0.00	1	97.17	94.61	1	3.12	3.04	1	7.313	1		
1200	1	BD0310	20	1188	1200.9	3.050	2.966	27.455	34.458	34.459	1	17.4	16.95	1			43.43	42.27	1	0.00	1	143.91	140.07	1	3.23	3.14	1	7.347	1		
1700	1	BD0309	19	1680	1700.6	2.226	2.111	27.607	34.556	34.558	1	46.4	45.14	1			41.73	40.61	1	0.00	1	166.00	161.54	1	3.07	2.99	1	7.408	1		
1900	1	BD0308	18	1877	1900.6	2.023	1.894	27.646	34.583	34.583	1	65.6	63.80	1			41.30	40.19	1	0.00	1	172.10	167.47	1	3.00	2.92	1	7.432	1		
2000	1	BD0307	17	1974	1999.6	1.952	1.816	27.661	34.594	34.596	1	71.0	69.08	1			40.46	39.37	1	0.00	1	176.32	171.57	1	2.96	2.88	1	7.442	1		
2100	1	BD0306	16	2073	2100.2	1.895	1.751	27.674	34.604	34.605	1	74.0	72.01	1			40.69	39.60	1	0.00	1	175.18	170.46	1	2.96	2.88	1	7.461	1		
2200	1	BD0305	15	2170	2199.7	1.861	1.709	27.682	34.610	34.612	1	75.9	73.84	1			40.40	39.31	1	0.00	1	173.70	169.02	1	2.94	2.86	1	7.460	1		
2400	1	BD0304	14	2367	2400.0	1.807	1.639	27.696	34.621	34.623	1	89.5	87.07	1			39.90	38.82	1	0.00	1	178.35	173.55	1	2.91	2.83	1	7.479	1		
Bottom	1	BD0303	13	2541	2577.7	1.752	1.569	27.708	34.630	34.632	1	96.3	93.68	1			39.32	38.26	1	0.00	1	178.51	173.70	1	2.86	2.78	1	7.484	1		

Notes:

QF(Good=1, Questionable=4)
Time is expressed as UTC.
Position and depth are those when the deepest sample was taken.
Temp (°C) at Pressure zero was that of seawater obtained by bucket sampling.
Data marked by blue color are calculated values.

Station BD19 (45°00.04'N, 132°00.08'W; Depth=3678 m); Sep. 29, 2012, 15:33 ~ Sep 29, 2012, 21:33; Bottom altitude: 14.701 m)

	Cast No.	Sample No.	Niskin No.	Depth (m)	Pressure (decibar)	Temp. (°C) (CTD)	Pot.Temp	Sigma-th	Salinity (CTD)	Salinity (Routine)	QF	Oxygen (µmol/L)	Oxygen (µmol/kg)	QF	Chlorophyll a (µg/L)	QF	NO3+NO2 (µmol/L)	NO3+NO2 (µmol/kg)	QF	NO2 (µmol/L)	QF	SiO2 (µmol/L)	SiO2 (µmol/kg)	QF	PO4 (µmol/L)	PO4 (µmol/kg)	QF	pH(X)	QF	Alkalinity (µmol/kg)	QF
bucket	2	BD0364	25	#VALUE!	N.D.	16.800	#VALUE!	#VALUE!	N.D.	32.674	1	280.6	#VALUE!	1	0.149	1	0.21	#VALUE!	1	0.00	1	0.57	#VALUE!	1	0.37	#VALUE!	1	7.972	1		
10	2	BD0363	24	10	10.4	16.644	16.642	23.811	32.670	32.672	1	280.4	273.84	1	0.200	1	0.11	0.10	1	0.00	1	0.00	0.00	1	0.37	0.37	1	7.972	1		
25	2	BD0362	23	24	23.8	16.263	16.260	23.905	32.678	32.690	1	288.6	281.91	1	0.363	1	0.60	0.59	1	0.01	1	0.00	0.00	1	0.42	0.41	1	7.960	1		
50	2	BD0361	22	50	50.3	10.634	10.628	25.051	32.700	32.712	1	326.4	318.44	1	0.588	1	5.08	4.95	1	0.11	1	0.68	0.66	1	0.79	0.77	1	7.861	1		
100	2	BD0360	21	100	100.4	8.082	8.072	25.481	32.730	32.730	1	317.7	309.76	1	0.088	1	10.13	9.88	1	0.75	1	10.19	9.93	1	1.02	1.00	1	7.793	1		
Chla max	2	BD0359	20	44	44.1	11.650	11.644	24.865	32.695	32.699	1	321.5	313.67	1	0.741	1	3.64	3.55	1	0.06	1	0.00	0.00	1	0.69	0.67	1	7.889	1		
150	2	BD0358	19	149	150.6	7.728	7.714	25.913	33.214	33.350	4	246.7	240.43	1	0.020	1	18.55	18.08	1	0.00	1	19.77	19.27	1	1.48	1.44	1	7.667	1		
200	2	BD0357	18	198	200.0	7.415	7.396	26.451	33.841	33.841	1	194.7	189.65	1	0.011	1	24.27	23.64	1	0.00	1	31.81	30.99	1	1.78	1.73	1	7.599	1		
300	2	BD0356	17	298	300.5	6.098	6.072	26.671	33.896								31.76	30.94	1	0.00	1	51.87	50.52	1	2.28	2.22	1				
400	2	BD0355	16	396	399.8	5.372	5.339	26.810	33.958	33.957	1	81.8	79.69	1			37.15	36.18	1	0.00	1	68.39	66.60	1	2.69	2.62	1	7.382	1		
600	2	BD0354	15	593	598.5	4.458	4.413	27.028	34.101	34.099	1	34.1	33.19	1			41.69	40.59	1	0.00	1	94.52	92.04	1	3.07	2.99	1	7.308	1		
O2 min	1	BD0339	24	920	929.7	3.727	3.659	27.295	34.339	34.343	1	9.8	9.54	1	0.002	1	43.21	42.06	1	0.00	1	124.97	121.65	1	3.28	3.20	1	7.316	1		
800	1	BD0338	23	792	799.8	3.962	3.903	27.212	34.266	34.268	1	14.4	14.02	1			43.08	41.94	1	0.00	1	113.02	110.03	1	3.25	3.16	1	7.305	1		
1000	1	BD0337	22	989	999.3	3.542	3.470	27.339	34.371	34.371	1	9.8	9.57	1			43.77	42.61	1	0.00	1	130.17	126.71	1	3.28	3.20	1	7.315	1		
1250	1	BD0336	21	1236	1249.7	2.951	2.864	27.462	34.455	34.457	1	19.0	18.54	1			43.40	42.24	1	0.00	1	148.44	144.47	1	3.24	3.15	1	7.335	1		
1500	1	BD0335	20	1482	1499.8	2.543	2.441	27.545	34.512	34.513	1	32.5	31.65	1			42.72	41.57	1	0.00	1	155.45	151.28	1	3.18	3.09	1	7.361	1		
1750	1	BD0334	19	1729	1750.6	2.187	2.068	27.610	34.555								41.99	40.86	1	0.00	1	165.41	160.97	1	3.10	3.01	1				
2000	1	BD0333	18	1974	1999.4	1.954	1.818	27.658	34.590	34.592	1	70.3	68.41	1			41.16	40.05	1	0.00	1	170.876	166.28	1	3.01	2.93	1	7.430	1		
2250	1	BD0332	17	2220	2249.7	1.845	1.689	27.684	34.611								40.43	39.34	1	0.00	1	172.61	167.96	1	2.96	2.88	1				
2500	1	BD0331	16	2465	2500.2	1.771	1.595	27.702	34.625	34.626	1	n.d.	#VALUE!	4			40.06	38.98	1	0.00	1	173.75	169.07	1	2.92	2.84	1	7.475	1		
2750	1	BD0330	15	2710	2749.8	1.686	1.489	27.721	34.638								39.43	38.37	1	0.00	1	178.18	173.37	1	2.86	2.78	1				
3000	1	BD0329	14	2953	2998.5	1.629	1.409	27.734	34.648	34.650	1	126.4	123.00	1			38.67	37.62	1	0.00	1	172.47	167.82	1	2.81	2.74	1	7.515	1		
Bottom	1	BD0328	13	3642	3703.6	1.542	1.253	27.763	34.670	34.673	1	140.9	137.07	1			37.82	36.80	1	0.00	1	180.97	176.09	1	2.71	2.64	1	7.552	1		

Station BD20 (45°58.01'N, 130°01.92'W; Depth=1600 m); Sep. 30, 2012, 07:38 ~ Sep 30, 2012, 08:54; Bottom altitude: 15.189 m)

	Cast No.	Sample No.	Niskin No.	Depth (m)	Pressure (decibar)	Temp. (°C) (CTD)	Pot.Temp	Sigma-th	Salinity (CTD)	Salinity (Routine)	QF	Oxygen (µmol/L)	Oxygen (µmol/kg)	QF	Chlorophyll a (µg/L)	QF	NO3+NO2 (µmol/L)	NO3+NO2 (µmol/kg)	QF	NO2 (µmol/L)	QF	SiO2 (µmol/L)	SiO2 (µmol/kg)	QF	PO4 (µmol/L)	PO4 (µmol/kg)	QF	pH(X)	QF	Alkalinity (µmol/kg)	QF
bucket	1	BD0389	25	#VALUE!	N.D.	16.800	#VALUE!	#VALUE!	N.D.	32.036	1	283.4	#VALUE!	1	0.196	1	0.03	#VALUE!	1	0.00	1	1.25	#VALUE!	1	0.23	#VALUE!	1	7.979	1		
10	1	BD0388	24	10	9.7	16.696	16.695	23.304	32.025	32.036	1	275.1	268.82	1	0.241	1	0.03	0.03	1	0.00	1	0.96	0.94	1	0.25	0.24	1	7.979	1		
100	1	BD0386	22	99	99.7	7.349	7.340	25.678	32.848	32.938	1	266.3	259.66	1	0.034	1	15.81	15.42	1	0.01	1	17.51	17.07	1	1.36	1.33	1	7.711	1		
300	1	BD0384	20	299	301.4	5.962	5.936	26.727	33.945	33.946	1	94.4	91.97	1	0.006	1	35.10	34.18	1	0.00	1	57.23	55.75	1	2.54	2.47	1	7.413	1		
600	1	BD0382	18	594	599.9	4.616	4.570	27.070	34.176	34.180	1	18.3	17.78	1			42.04	40.94	1	0.01	1	97.05	94.49	1	3.19	3.10	1	7.317	1		
1000	1	BD0380	16	989	999.9	3.299	3.228	27.373	34.385	34.386	1	12.9	12.53	1			43.60	42.44	1	0.00	1	135.55	131.94	1	3.25	3.16	1	7.334	1		
1200	1	BD0378	14	1187	1199.9	2.907	2.824	27.463	34.451	34.452	1	19.0	18.52	1			43.35	42.20	1	0.00	1	144.46	140.59	1	3.23	3.14	1	7.346	1		
1300	1	BD0376	12	1285	1299.8	2.762	2.673	27.495	34.475	34.473	1	23.0	22.42	1			43.20	42.05	1	0.00	1	152.59	148.51	1	3.21	3.12	1	7.351	1		
1400	1	BD0374	10	1383	1398.7	2.604	2.508	27.526	34.496	34.499	1	31.5	30.63	1			42.55	41.41	1	0.00	1	157.75	153.52	1	3.17	3.08	1	7.357	1		
1450	1	BD0372	8	1433	1450.3	2.477	2.379	27.552	34.514	34.516	1	33.7	32.82	1			42.52	41.38	1	0.01	1	160.90	156.59	1	3.13	3.05	1	7.361	1		
1500	1	BD0370	6	1482	1499.9	2.463	2.361	27.556	34.517	34.518	1	36.0	34.99	1			42.45	41.32	1	0.00	1	162.21	157.86	1	3.14	3.05	1	7.364	1		
1550	1	BD0368	4	1532	1550.2	2.440	2.334	27.562	34.522	34.523	1	35.8	34.88	1			42.41	41.27	1	0.00	1	164.13	159.73	1	3.03	2.95	1	7.364	1		
Bottom	1	BD0366	2	1563	1581.8	2.429	2.321	27.565	34.524	34.525	1	38.4	37.42	1			42.21	41.07	1	0.00	1	163.69	159.30	1	3.09	3.01	1	7.366	1		

Notes:

QF(Good=1, Questionable=4)

Time is expressed as UTC.

Position and depth are those when the deepest sample was taken.

Temp (°C) at Pressure zero was that of seawater obtained by bucket sampling.

Data marked by blue color are calculated values.

Station BD21 (48°27.22'N, 128°42.78'W; Depth=2438 m); Sep. 30, 2012, 22:52 ~ Oct. 1, 2012, 00:40; Bottom altitude: 14.139 m)

	Cast No.	Sample No.	Niskin No.	Depth (m)	Pressure (decibar)	Temp. (°C) (CTD)	Pot.Temp	Sigma-th	Salinity (CTD)	Salinity (Routine)	QF	Oxygen (µmol/L)	Oxygen (µmol/kg)	QF	Chlorophyll a (µg/L)	QF	NO3+NO2 (µmol/L)	NO3+NO2 (µmol/kg)	QF	NO2 (µmol/L)	QF	SiO2 (µmol/L)	SiO2 (µmol/kg)	QF	PO4 (µmol/L)	PO4 (µmol/kg)	QF	pH(X)	QF	Alkalinity (µmol/kg)	QF
bucket	1	BD0414	25	#VALUE!	N.D.	15.600	#VALUE!	#VALUE!	N.D.	31.948	1	301.2	#VALUE!	1	0.926	1	0.04	#VALUE!	1	0.01	1	0.10	#VALUE!	1	0.38	#VALUE!	1	7.971	1		
10	1	BD0413	24	11	10.6	14.960	14.958	23.626	31.943	31.956	1	297.4	290.55	1	1.134	1	0.19	0.18	1	0.01	1	0.08	0.08	1	0.37	0.36	1	7.969	1		
100	1	BD0411	22	100	101.3	7.160	7.151	25.857	33.043	33.037	1	237.3	231.33	1	0.050	1	18.34	17.88	1	0.01	1	22.28	21.72	1	1.56	1.52	1	7.661	1		
300	1	BD0409	20	298	300.6	5.766	5.741	26.754	33.949	33.957	1	90.2	87.85	1	0.014	1	35.63	34.70	1	0.01	1	62.57	60.94	1	2.63	2.57	1	7.391	1		
600	1	BD0407	18	594	600.4	4.673	4.627	27.079	34.195	34.196	1	20.1	19.60	1			41.35	40.26	1	0.00	1	98.13	95.54	1	3.16	3.08	1	7.304	1		
1200	1	BD0405	16	1186	1200.0	3.041	2.957	27.445	34.444	34.446	1	22.2	21.60	1			42.86	41.71	1	0.00	1	146.82	142.90	1	3.22	3.13	1	7.331	1		
1800	1	BD0403	14	1777	1799.7	2.081	1.959	27.626	34.565	34.567	1	56.2	54.71	1			41.63	40.52	1	0.00	1	169.83	165.27	1	3.05	2.96	1	7.401	1		
2000	1	BD0401	12	1974	2000.1	1.931	1.795	27.658	34.589	34.591	1	69.4	67.51	1			40.90	39.80	1	0.00	1	176.60	171.85	1	2.99	2.91	1	7.422	1		
2100	1	BD0399	10	2071	2099.3	1.884	1.740	27.669	34.597	34.599	1	76.4	74.38	1			40.70	39.60	1	0.00	1	177.81	173.03	1	2.97	2.89	1	7.429	1		
2200	1	BD0397	8	2170	2200.1	1.836	1.685	27.682	34.608	34.610	1	80.8	78.62	1			40.41	39.32	1	0.00	1	179.11	174.28	1	2.93	2.85	1	7.444	1		
2300	1	BD0395	6	2268	2300.2	1.824	1.664	27.690	34.616	34.618	1	84.9	82.59	1			40.25	39.17	1	0.00	1	181.91	177.01	1	2.91	2.83	1	7.447	1		
2400	1	BD0393	4	2366	2399.9	1.777	1.610	27.698	34.621	34.624	1	89.0	86.61	1			39.71	38.64	1	0.00	1	182.49	177.58	1	2.92	2.84	1	7.462	1		
Bottom	1	BD0391	2	2399	2433.9	1.758	1.588	27.703	34.625	34.627	1	92.2	89.76	1			39.66	38.59	1	0.00	1	178.24	173.43	1	2.89	2.81	1	7.467	1		

Station BD22 (48°30.07'N, 127°00.14'W; Depth=2411 m); Oct. 1, 2012, 07:50 ~ Oct 1, 2012, 09:38; Bottom altitude: 17.9 m)

	Cast No.	Sample No.	Niskin No.	Depth (m)	Pressure (decibar)	Temp. (°C) (CTD)	Pot.Temp	Sigma-th	Salinity (CTD)	Salinity (Routine)	QF	Oxygen (µmol/L)	Oxygen (µmol/kg)	QF	Chlorophyll a (µg/L)	QF	NO3+NO2 (µmol/L)	NO3+NO2 (µmol/kg)	QF	NO2 (µmol/L)	QF	SiO2 (µmol/L)	SiO2 (µmol/kg)	QF	PO4 (µmol/L)	PO4 (µmol/kg)	QF	pH(X)	QF	Alkalinity (µmol/kg)	QF
bucket	1	BD0439	25	#VALUE!	N.D.	14.800	#VALUE!	#VALUE!	N.D.	31.784	1	283.5	#VALUE!	1	0.985	1	0.24	#VALUE!	1	0.03	1	4.01	#VALUE!	1	0.45	#VALUE!	1	7.964	1		
10	1	BD0438	24	9	9.3	14.533	14.531	23.584	31.772	31.812	1	296.5	289.63	1	1.043	1	0.94	0.92	1	0.03	1	4.19	4.09	1	0.50	0.49	1	7.954	1		
100	1	BD0437	23	100	100.4	7.333	7.324	25.873	33.094	33.197	1	222.4	216.77	1	0.037	1	20.38	19.86	1	0.00	1	22.98	22.40	1	1.64	1.60	1	7.633	1		
300	1	BD0436	22	297	300.0	5.609	5.585	26.745	33.914	33.923	1	97.2	94.63	1	0.010	1	35.41	34.48	1	0.00	1	60.38	58.81	1	2.55	2.48	1	7.410	1		
600	1	BD0435	21	595	600.9	4.366	4.321	27.085	34.161	34.162	1	19.9	19.38	1			42.69	41.56	1	0.00	1	101.42	98.75	1	3.10	3.02	1	7.304	1		
1200	1	BD0434	20	1185	1198.9	2.980	2.897	27.449	34.442	34.444	1	17.3	16.84	1			43.96	42.79	1	0.00	1	147.33	143.39	1	3.19	3.10	1	7.336	1		
1800	1	BD0433	19	1777	1800.3	2.105	1.984	27.623	34.564	34.566	1	54.2	52.78	1			42.25	41.12	1	0.00	1	171.87	167.25	1	3.03	2.95	1	7.407	1		
2000	1	BD0432	18	1973	1999.8	1.933	1.797	27.660	34.592	34.593	1	69.5	67.67	1			40.38	39.29	1	0.00	1	179.48	174.65	1	3.07	2.99	1	7.429	1		
2100	1	BD0431	17	2071	2099.2	1.873	1.730	27.674	34.602	34.604	1	73.8	71.80	1			40.02	38.94	1	0.00	1	180.61	175.74	1	3.02	2.94	1	7.443	1		
2200	1	BD0430	16	2169	2198.6	1.824	1.673	27.686	34.612	34.613	1	80.8	78.67	1			39.65	38.58	1	0.00	1	182.47	177.56	1	2.97	2.89	1				
2300	1	BD0429	15	2267	2299.3	1.797	1.638	27.695	34.620	34.622	1	83.1	80.83	1			39.26	38.20	1	0.00	1	184.86	179.88	1	2.99	2.91	1	7.462	1		
2400	1	BD0428	14	2366	2399.4	1.792	1.624	27.700	34.625	34.626	1	84.9	82.60	1			39.28	38.22	1	0.00	1	189.27	184.17	1	3.01	2.93	1	7.465	1		
Bottom	1	BD0427	13	2420	2455.1	1.800	1.627	27.699	34.624	34.624	1	81.6	79.42	1			39.04	37.99	1	0.00	1	187.77	182.71	1	3.00	2.92	1	7.464	1		

Notes:

QF(Good=1, Questionable=4)
Time is expressed as UTC.
Position and depth are those when the deepest sample was taken.
Temp (°C) at Pressure zero was that of seawater obtained by bucket sampling.
Data marked by blue color are calculated values.

7.4. Large volume water samples

Station	Cast#	Position	Depth [m]	Sample No.	Latitude			Longitude			WaterDepth [m]	Wire out [m]	Acoustic [m]	Acoustic [m]	Temp (RV) [°C]	Pressure (RV) [db]	Temp (TD) [°C]	Depth (TD) [m]	Salinity	Nd IC/Be-7/Be-10/U	Nd IC/Be-10/U (kg)	Be-9	Intercalibration for Nd IC & REE conc.	Cs-134, Cs-137	Cs (Hiroshima Univ.)	Sr-90	I -129	Pu	Np	U-236	U-238	Radiogenic Ce & Nd IC	Ce & Nd Stable isotope fractionations
BD01	2	4	20	BD_LV0008	35	60.0	N	141	1.0	E	266	20	18	18			21.95	22.2	34.183					20		20	1						
BD01	2	3	50	BD_LV0007	35	60.0	N	141	1.0	E	266	50	55	55			17.59	52.0	34.595					20		20	1						
BD01	2	2	75	BD_LV0006	35	60.0	N	141	1.0	E	266	75	77	77			16.33	76.9	34.613					20		20	1						
BD01	2	1	100	BD_LV0005	35	60.0	N	141	1.0	E	266	100	101	101			14.70	101.9	34.520					20		20	1						
BD01	1	4	150	BD_LV0004	36	0.4	N	141	0.7	E	266	150		****			12.49	152.3	34.424					20		20	1						
BD01	1	3	200	BD_LV0003	36	0.4	N	141	0.7	E	266	200	207	207			10.26	202.5	34.929					20		20	1						
BD01	1	2	250	BD_LV0002	36	0.4	N	141	0.7	E	266	250	255	255			8.72	258.5	34.198					20		20	1						
BD01	1	1	B-10	BD_LV0001	36	0.4	N	141	0.7	E	266	250	232	232			8.73	258.5	34.535					20		20	1						
BD02	1	4	20	BD_LV0012	37	19.8	N	141	27.6	E	149	20	64	64			21.51	22.1	33.740					20		20	1	20	20				
BD02	1	3	50	BD_LV0011	37	19.8	N	141	27.6	E	149	50	204	****			15.03	53.4	34.178					20		20	1	20	20				
BD02	1	2	100	BD_LV0010	37	19.8	N	141	27.6	E	149	100	280	****			10.52	101.2	34.033					20		20	1	20	20				
BD02	1	1	B-10	BD_LV0009	37	19.8	N	141	27.6	E	149	135	395	****			9.45	134.7	34.048					20		20	1	20	20				
BD03	1	4	20	BD_LV0016	37	35.2	N	141	30.9	E	138	20	126	****			18.87	22.5	33.643					20		20	1						
BD03	1	3	50	BD_LV0015	37	35.2	N	141	30.9	E	138	50	103	****			14.64	53.5	33.885					20		20	1						
BD03	1	2	100	BD_LV0014	37	35.2	N	141	30.9	E	138	100	169	****			11.13	102.2	34.131					20		20	1						
BD03	1	1	B-10	BD_LV0013	37	35.2	N	141	30.9	E	138	****	138	138			9.27	131.6	33.970					20		20	1						
BD04	3	1	20	BD_LV0025	37	48.5	N	143	52.5	E	7037	20	35	35			25.69	21.9	34.352					20		20	1	20	20				
BD04	2	4	50	BD_LV0024	37	48.5	N	143	52.5	E	7035	50	60	60			21.46	51.6	34.754					20		20	1	20	20				
BD04	2	3	100	BD_LV0023	37	48.5	N	143	52.5	E		100	1080	****			17.94	101.4	34.691					20		20	1	20	20				
BD04	2	2	200	BD_LV0022	37	48.5	N	143	52.5	E		200	366	****			13.67	200.6	34.492					20		20	1	20	20				
BD04	2	1	300	BD_LV0021	37	48.5	N	143	52.5	E		300	304	304			10.69	298.5	34.319					20		20	1	20	20				
BD04	1	4	400	BD_LV0020	37	48.5	N	143	52.5	E	7037	400	401	401			8.90	394.3	34.276					20		20	1	20	20				
BD04	1	3	500	BD_LV0019	37	48.5	N	143	52.5	E		500	483	483			6.65	493.7	34.111					20		20	1	20	20				
BD04	1	2	600	BD_LV0018	37	48.5	N	143	52.5	E		600	598	598			4.81	597.6	33.999					20		20	1	20	20				
BD04	1	1	1000	BD_LV0017	37	48.5	N	143	52.5	E		1000	1088	1088			3.35	1003.1	34.325					20		20	20						
BD05	3	1	20	BD_LV0034	40	50.0	N	149	60.0	E	5247	20	40	40			7.17	22.1	32.898					20		20	1						
BD05	2	4	50	BD_LV0033	40	50.1	N	150	0.1	E	5247	50	54	54			2.07	51.0	33.068					20		20	1						
BD05	2	3	100	BD_LV0032	40	50.1	N	150	0.1	E		100	109	109			1.42	100.9	33.176					20		20	1						
BD05	2	2	200	BD_LV0031	40	50.1	N	150	0.1	E		200	200	200			1.63	201.4	33.414					20		20	1						
BD05	2	1	300	BD_LV0030	40	50.1	N	150	0.1	E		300	310	310			2.43	300.1	33.653					20		20	1						
BD05	1	4	400	BD_LV0029	40	50.0	N	149	59.9	E	5248	400	407	407			3.23	399.6	33.941					20		20	1						
BD05	1	3	500	BD_LV0028	40	50.0	N	149	59.9	E		500	508	508			3.39	498.5	34.091					20		20	1						
BD05	1	2	600	BD_LV0027	40	50.0	N	149	59.9	E		600	616	616			3.29	599.5	34.184					20		20	1						
BD05	1	1	1000	BD_LV0026	40	50.0	N	149	59.9	E		1000	1015	1015			2.74	1001.5	34.402					20		20	20						
BD07	3	4	10	BD_LV0046	47	0.0	N	160	5.1	E	5239	10	34	34			13.11	12.0	32.426	262		0.25									0.1		
BD07	3	3	20	BD_LV0045	47	0.0	N	160	5.1	E		20	44	44			10.14	21.6	32.615	210		0.25		20		20	1			1	0.1		
BD07	3	2	40	BD_LV0044	47	0.0	N	160	5.1	E		40	180	****			2.66	41.9	32.996	259		0.25									0.1		
BD07	3	1	60	BD_LV0043	47	0.0	N	160	5.1	E		60	68	68			1.55	62.1	35.000	215		0.25		20		20	1			1	0.1		
BD07	2	4	80	BD_LV0042	46	60.0	N	160	5.0	E	5237	80	147	****			0.95	82.1	33.092	261		0.25									0.1		
BD07	2	3	100	BD_LV0041	46	60.0	N	160	5.0	E		100	110	110			0.92	102.1	33.127	185		0.25		20		20	1	20	20		0.1		
BD07	2	2	150	BD_LV0040	46	60.0	N	160	5.0	E		150	1016	****			1.27	152.5	33.270	260		0.25								1	0.1		
BD07	2	1	200	BD_LV0039	46	60.0	N	160	5.0	E		200	200	200			3.42	202.6	33.739	205		0.25		20		20	1				0.1		
BD07	1	4	300	BD_LV0038	47	0.0	N	160	5.0	E	5237	300	305	305			3.70	302.3	34.003	180		0.25		20		20	1	20	20	1	0.1		
BD07	1	3	400	BD_LV0037	47	0.0	N	160	5.0	E		400	405	405			3.53	403.2	34.123	220		0.25		20		20	1				0.1		
BD07	1	2	500	BD_LV0036	47	0.0	N	160	5.0	E		500	507	507			3.36	503.6	34.201	215		0.25		20		20	1			1	0.1		
BD07	1	1	600	BD_LV0035	47	0.0	N	160	5.0	E		600	611	611			3.21	604.2	34.250	180		0.25		20		20	1	20	20		0.1		
BD07	4	4	800	BD_LV0050	47	0.0	N	160	4.9	E	5238	800	815	815			2.90	796.7	34.350		20	0.25									0.1		
BD07	4	3	1000	BD_LV0049	47	0.0	N	160	4.9	E		1000	1015	1015	2.6046	998.4	2.62	996.4	34.419		19.62	0.25		20		20	20	20	20	1	0.1		
BD07	4	2	1250	BD_LV0048	47	0.0	N	160	4.9	E		1250	1268	1268	2.3208	1249	2.32	1250.4	34.489		19.9	0.25									0.1		
BD07	4	1	1500	BD_LV0047	47	0.0	N	160	4.9	E		1500	1525	1525	2.1006	1498	2.11	1503.1	34.540		20.38	0.25								1	0.1		
BD07	6	4	2000	BD_LV0058	47	0.0	N	160	5.0	E	5239	2000	2023	2023	1.799	2018			34.607		20.16	0.25		20		20	20	20	20	1	0.1		
BD07	6	3	2500	BD_LV0057	47	0.0	N	160	5.0	E		2500	2522	2522	1.6201	2524.5			34.640		20.25	0.25								1	0.1		
BD07	6	2	3000	BD_LV0056	47	0.0	N	160	5.0	E		3000	3147	3147	1.5303	3035			34.663		20.4	0.25		20		20	20	20	20	1	0.1		
BD07	6	1	3500	BD_LV0055	47	0.0	N	160	5.0	E		3500	3517	3517	1.4674	3539			34.675		20.2	0.25								1	0.1		
BD07	5	4	4000	BD_LV0054	47	0.0	N	160	5.0	E	5239	4000	3018	****	1.4527				34.684		20.4	0.25		20		20	20	20	20	1	0.1		
BD07	5	3	4500	BD_LV0053	47	0.0	N	160	5.0	E		4500	1766	****	1.4753	4566.6			34.689		20.1	0.25								1	0.1		
BD07	5	2	5000	BD_LV0052	47	0.0	N	160	5.0	E		5000	4981	4981	1.5428	5089			34.685		20.39	0.25		20		20	20	20	20	1	0.1		
BD07	5	1	B	BD_LV0051	47	0.0	N	160	5.0	E		5235	2630	****	1.5499	5331			34.688		19.82	0.25		20		20	20	20	20	1	0.1		
BD09	5	4	10	BD_LV0078	46	60.0	N	170	35.0	E	6288	10	24	24			13.78	11.6	32.628	265		0.25									0.1		
BD09	5	3	20	BD_LV0077	46	60.0	N	170	35.0	E		20	37	37			10.56	21.5	32.775	195		0.25		20		20	1				0.1		
BD09	5	2	40	BD_LV0076	46	60.0	N	170	35.0	E		40	49	49			5.96	41.2	32.953	260		0.25									0.1		
BD09	5	1	60	BD_LV0075	46	60.0	N	170	35.0	E		60	72	72			3.57	61.7	33.019	200		0.25		20		20	1			1	0.1		
BD09	4	4	80	BD_LV0074	46	60.0	N	170	35.0	E	6288	80	93	93			3.19	80.5	33.061	265		0.25									0.1		
BD09	4	3	100	BD_LV0073	46	60.0	N	170	35.0	E		100	111	111			2.95	100.7	34.304	200		0.25		20		20	1			1	0.1		
BD09	4	2	150	BD_LV0072	46	60.0	N	170	35.0	E		150	150	150			3.75	150.7	33.783	260		0.25									0.1		
BD09	4	1	200	BD_LV0071	46	60.0	N	170	35.0	E		200	206	206			3.78	200.6	33.919	190		0.25		20		20	1				0.1		
BD09	3	4	300	BD_LV0070	46	60.0	N	170	35.2	E	6288	300	315	315			3.68	301.5	34.062	215		0.25		20		20	1			1	0.1		
BD09	3	3	400	BD_LV0069	46	60.0	N	170	35.2	E		400	401	401			3.54	401.6	34.146	200		0.25		20		20	1				0.1		
BD09	3	2	500	BD_LV0068	46	60.0	N	170	35.2	E		500	662	****			3.37	500.2	34.218	220		0.25		20		20	1			1	0.1		
BD09	3	1	600	BD_LV0067	46	60.0	N	170	35.2	E		600	606	606			3.22	594.9	34.267	200		0.25		20		20	1				0.1		
BD09	6	4	800	BD_LV0082	47	0.0	N	170	35.0	E	6294	800	810	810			2.87	803.2	34.366		21.2	0.25									0.1		
BD09	6	3	1000	BD_LV0081	47	0.0	N	170	35.0	E		1000	1020	1020			2.58	1003.5	34.434		20.5	0.25		20		20	20			1	0.1		
BD09	6	2	1250	BD_LV0080	47	0.0	N	170	35.0	E		1221	1215	1215			2.30	1224.0	34.491		20.59	0.25									0.1		
BD09	6	1	1500	BD_LV0079	47	0.0	N	170	35.0	E		1500	1552	1552			2.07	1508.0	34.551		20.6	0.25								1	0.1		
BD09	1	4	2500	BD_LV0062	47	0.0	N	170	35.2	E	6288	2500	2524	2524	1.6163	2527			34.643		20.4	0.25								1	0.1		
BD09	1	3	3500	BD_LV0061	47	0.0	N	170	35.2	E		3500	3517	3517	1.4582	3541.7			34.674		20.56	0.25									0.1		
BD09	1	2	4000	BD_LV0060	47	0.0	N	170	35.2	E		4000	4012	4012	1.4744	4059			34.681		20.5	0.25								1	0.1		
BD09	1	1	4500	BD_LV0059	47	0.0	N	170	35.2	E		4500	4504	4504	1.4917	4569			34.683		20.7	0.25									0.1		
BD09	2	4	5000	BD_LV0066	46	60.0	N	170	35.0	E	6288	5000	4998	4998	1.5407	5083			34.686		20.2	0.25									0.1		
BD09	2	3	5500	BD_LV0065	46	60.0	N	170	35.0	E		5500	5497	5497	1.5992	5584.8			34.686		20.9	0.25									0.1		
BD09	2	2	6000	BD_LV0064	46	60.0	N	170	35.0	E		6000	6058	6058	1.6856	6116			34.687		20.1	0.25									0.1		
BD09	2	1	B	BD_LV0063	46	60.0	N	170	35.0	E		6325	6343	6343	1.7221	6454			34.685		20.3	0.25								1	0.1		
BD11	4	4	20	BD_LV0098	47	0.0	N	179	59.9	W		20	37	37			12.48	21.8	32.735	203		0.25		20		20	1				0.1		
BD11	4	3	40	BD_LV0097	47	0.0	N	179	59.9	W		40	54	54			7.66	42.0	33.035	260		0.25									0.1		
BD11	4	2	60	BD_LV0096	47	0.0	N	179	59.9	W		60	73	73			5.69	62.0	33.089	203		0.25		20		20	1			1	0.1		
BD11	4	1	80	BD_LV0095	47	0.0	N	179	59.9	W		80	413	****			4.31	81.8	33.117	255		0.25									0.1		
BD11	3	4	100	BD_LV0094	46	60.0	N	179	60.0	W		100	103	103			3.49	101.6	33.164	203		0.25		20		20	1				0.1		
BD11	3	3	150	BD_LV0093	46	60.0	N	179	60.0	W		150	158	158			3.66	151.3	33.407	265		0.25								1	0.1		

BD11	3	2	200	BD_LV0092	46	60.0	N	179	60.0	W		200	1472	****			3.77	201.0	33.666	185		0.25		20		20	1	20	20		0.1		
BD11	3	1	300	BD_LV0091	46	60.0	N	179	60.0	W		300	306	306			3.67	301.4	33.824	217		0.25		20		20	1			1	0.1		
BD11	2	4	400	BD_LV0090	47	0.1	N	179	59.9	E	5727	400	407	407			3.83	400.9	33.976	202		0.25		20		20	1				0.1		
BD11	2	3	500	BD_LV0089	47	0.1	N	179	59.9	E		500	510	510			3.61	500.1	34.069	178		0.25		20		20	1	20	20	1	0.1		
BD11	2	2	600	BD_LV0088	47	0.1	N	179	59.9	E		600	611	611			3.43	599.9	34.166	220		0.25		20		20	1				0.1		
BD11	2	1	800	BD_LV0087	47	0.1	N	179	59.9	E		800	812	812			3.10	801.2	34.304	255		0.25									0.1		
BD11	1	4	1000	BD_LV0086	46	60.0	N	179	60.0	E	5727	1000	1016	1016			2.83	1006.0	34.382		19.8	0.25		20		20	20	20	20	1	0.1		
BD11	1	3	1250	BD_LV0085	46	60.0	N	179	60.0	E		1250	1268	1268			2.51	1257.1	34.457		19	0.25									0.1		
BD11	1	2	1500	BD_LV0084	46	60.0	N	179	60.0	E		1500	1519	1519			2.28	1510.1	34.508		19.2	0.25								1	0.1		
BD11	1	1	2000	BD_LV0083	46	60.0	N	179	60.0	E		2000	2023	2023			1.95	2016.8	34.585		19.6	0.25		20		20	20	20	20		0.1		
BD11	6	4	2500	BD_LV0106	47	0.0	N	179	59.9	E	5721	2500	2523	2523	1.6952	2525			34.632		19.7	0.25								1	0.1		
BD11	6	3	3000	BD_LV0105	47	0.0	N	179	59.9	E		3000	3022	3022	1.5637	3031.9			34.655		19.8	0.25		20		20	20	20	20		0.1		
BD11	6	2	3500	BD_LV0104	47	0.0	N	179	59.9	E		3500	3511	3511	1.5105	3547			34.670		19.2	0.25									0.1		
BD11	6	1	4000	BD_LV0103	47	0.0	N	179	59.9	E		4000	4009	4009	1.4736	4046			34.679		19.15	0.25		20		20	20	20	20	1	0.1		
BD11	5	4	4500	BD_LV0102	47	0.1	N	179	59.9	W	5761	4500	1921	****	1.4922	4575			34.685		20.4	0.25									0.1		
BD11	5	3	5000	BD_LV0101	47	0.1	N	179	59.9	W		5000	979	****	1.5421	5081.7			34.688		19.6	0.25		20		20	20	20	20		0.1		
BD11	5	2	5500	BD_LV0100	47	0.1	N	179	59.9	W		5500	9188	****	1.62	5586			34.686		19.1	0.25									0.1		
BD11	5	1	B	BD_LV0099	47	0.1	N	179	59.9	W		5725	32816	****	1.6373	5833			34.689		20.3	0.25		20		20	20	20	20	1	0.1		
BD14	4	4	100	BD_LV0114	47	0.0	N	170	0.0	W	5492	100	101	101			4.07	101.9															200
BD14	4	3	100		47	0.0	N	170	0.0	W		100	106	106			4.06	101.8														300	
BD14	4	2	100	BD_LV0113	47	0.0	N	170	0.0	W		100	112	112			4.03	102.0														270	
BD14	4	1	100		47	0.0	N	170	0.0	W		100	108	108			4.03	102.1														240	
BD14	3	4	500	BD_LV0112	47	0.4	N	169	59.7	W		500	501	501			3.53	500.7															200
BD14	3	3	500		47	0.4	N	169	59.7	W		500	509	509			3.53	500.4														300	
BD14	3	2	500	BD_LV0111	47	0.4	N	169	59.7	W		500	504	504			3.53	500.7														265	
BD14	3	1	500		47	0.4	N	169	59.7	W		500	508	508			3.53	501.1														245	
BD14	2	4	1000	BD_LV0110	47	0.2	N	169	59.9	W	5490	1000	1014	1014			2.79	1003.7															200
BD14	2	3	1000		47	0.2	N	169	59.9	W		1000	999	999			2.79	1003.6														300	
BD14	2	2	1000	BD_LV0109	47	0.2	N	169	59.9	W		1000	1008	1008			2.79	1003.8														270	
BD14	2	1	1000		47	0.2	N	169	59.9	W		1000	1006	1006			2.79	1003.8														245	
BD14	1	4	2000	BD_LV0108	46	60.0	N	170	0.1	W	5492	2000	2015	2015			1.93	2014.6															200
BD14	1	3	2000		46	60.0	N	170	0.1	W		2000	2016	2016			1.93	2014.6														300	
BD14	1	2	2000	BD_LV0107	46	60.0	N	170	0.1	W		2000	2016	2016			1.93	2014.4														280	
BD14	1	1	2000		46	60.0	N	170	0.1	W		2000	2023	2023			1.93	2014.6														240	
BD14	8	4	10	BD_LV0130	46	59.9	N	169	59.9	W	5494	10	28	28			12.87	11.5	32.605	263		0.25									0.1		
BD14	8	3	20	BD_LV0129	46	59.9	N	169	59.9	W		20	35	35			12.80	21.3	32.614	200		0.25		20		20	1				0.1		
BD14	8	2	40	BD_LV0128	46	59.9	N	169	59.9	W		40	51	51			8.76	40.9	32.749	265		0.25									0.1		
BD14	8	1	60	BD_LV0127	46	59.9	N	169	59.9	W		60	65	65			5.61	61.0	32.866	200		0.25		20		20	1			1	0.1		
BD14	7	4	80	BD_LV0126	46	60.0	N	169	60.0	W	5494	80	86	86			4.89	81.8	32.885	267		0.25									0.1		
BD14	7	3	100	BD_LV0125	46	60.0	N	169	60.0	W		100	105	105			4.15	101.8	32.891	200		0.25		20		20	1				0.1		
BD14	7	2	150	BD_LV0124	46	60.0	N	169	60.0	W		150	154	154			3.76	152.2	33.477	260		0.25								1	0.1		
BD14	7	1	200	BD_LV0123	46	60.0	N	169	60.0	W		200	199	199			3.47	202.0	33.664	200		0.25		20		20	1				0.1		
BD14	6	4	300	BD_LV0122	47	0.0	N	169	60.0	W	5493	300	296	296			3.61	302.0	33.866	200		0.25		20		20	1			1	0.1		
BD14	6	3	400	BD_LV0121	47	0.0	N	169	60.0	W		400	401	401			3.60	402.8	34.007	262		0.25									0.1		
BD14	6	2	600	BD_LV0120	47	0.0	N	169	60.0	W		600	605	605			3.39	603.6	34.197	200		0.25		20		20	1			1	0.1		
BD14	6	1	800	BD_LV0119	47	0.0	N	169	60.0	W		800	807	807			3.09	805.2	34.311	261		0.25									0.1		
BD14	5	4	1000	BD_LV0118	47	0.0	N	170	0.4	W	5492	1000	1009	1009			2.83	1004.0	34.387		21.4	0.25		20		20	1			1	0.1		
BD14	5	3	1250	BD_LV0117	47	0.0	N	170	0.4	W		1250	1262	1262			2.50	1256.6	34.461		22.1	0.25									0.1		
BD14	5	2	1500	BD_LV0116	47	0.0	N	170	0.4	W		1500	1513	1513			2.25	1509.2	34.516		21.2	0.25								1	0.1		
BD14	5	1	2000	BD_LV0115	47	0.0	N	170	0.4	W		2000	2017	2017			1.93	2015.5	34.588		21.6	0.25									0.1		
BD14	9	4	3000	BD_LV0134	47	0.0	N	170	0.0	W	5492	3000	3027	3027	1.556	3036			34.657		21.2	0.25								1	0.1		
BD14	9	3	4000	BD_LV0133	47	0.0	N	170	0.0	W		4000	4009	4009	N.D.	4056			34.680		21.23	0.25								1	0.1		
BD14	9	2	5000	BD_LV0132	47	0.0	N	170	0.0	W		5000	5001	5001	1.567	5093			34.685		21.15	0.25									0.1		
BD14	9	1	B	BD_LV0131	47	0.0	N	170	0.0	W		5495	4771	****	N.D.	N.D.			34.686		21.4	0.25								1	0.1		
BD15	1	1	1250	BD_LV0135	50	49.9	N	159	60.0	W	4839	1250	1265	1265			2.44	1229.9	34.463			0.25									0.1		
BD15	1	2	1000	BD_LV0136	50	49.9	N	159	60.0	W		1000	1016	1016			2.75	980.0	34.398			0.25		20	20	20	1	20	20	1	0.1		
BD15	1	3	600	BD_LV0137	50	49.9	N	159	60.0	W		600	615	615			3.36	594.3				0.25											
BD15	1	4	600	BD_LV0138	50	49.9	N	159	60.0	W		600	605	605			3.36	594.3	34.229			0.25		20	20	20	1	20	20	1	0.1		
BD15	2	1	800	BD_LV0139	50	49.9	N	160	0.1	W	4846	800	180	****			3.02	802.6	34.336			0.25									0.1		
BD15	2	2	400	BD_LV0140	50	49.9	N	160	0.1	W		400	777	****			3.62	400.1	34.104			0.25									0.1		
BD15	2	3	300	BD_LV0141	50	49.9	N	160	0.1	W		300	158	****			3.81	299.8				0.25											
BD15	2	4	300	BD_LV0142	50	49.9	N	160	0.1	W		300	0	****			3.81	299.7	34.003			0.25		20	20	20	1	20	20	1	0.1		
BD15	3	1	200	BD_LV0139	50	50.0	N	159	59.9	W	4858	200	203	****			3.79	201.5	33.828			0.25		20		20	1				0.1		
BD15	3	2	150	BD_LV0140	50	50.0	N	159	59.9	W		150	1480	****			3.88	151.4	33.713			0.25			20						0.1		
BD15	3	3	100	BD_LV0141	50	50.0	N	159	59.9	W		100	101	****			3.44	101.4	33.181			0.25		20		20	1	20	20	1	0.1		
BD15	3	4	80	BD_LV0142	50	50.0	N	159	59.9	W		80	78	****			3.25	81.3	32.849			0.25									0.1		
BD15	4	1	60	BD_LV0139	50	50.0	N	159	60.0	W	4854	60	69	****			3.97	62.8	32.739			0.25		20	20	20	1			1	0.1		
BD15	4	2	40	BD_LV0140	50	50.0	N	159	60.0	W		40	56	****			8.44	42.7	32.558			0.25									0.1		
BD15	4	3	20	BD_LV0141	50	50.0	N	159	60.0	W		20	56	****			10.45	22.6	32.480			0.25		20	20	20	1				0.1		
BD15	4	4	10	BD_LV0142	50	50.0	N	159	60.0	W		10	38	****			10.45	12.7	32.476			0.25									0.1		
BD15	5	1	Bottom	BD_LV0139	50	50.1	N	160	0.0	W	4937		2097	****	1.542	4924			34.682			0.25		20	20	20	1	20	20	1	0.1		
BD15	5	2	4500	BD_LV0140	50	50.1	N	160	0.0	W		4500	4502	4502	1.527	4573			34.679			0.25			20						0.1		
BD15	5	3	4000	BD_LV0141	50	50.1	N	160	0.0	W		4000	4117	****	N.D.	N.D.			34.676			0.25		20	20	20	1	20	20	1	0.1		
BD15	5	4	3500	BD_LV0142	50	50.1	N	160	0.0	W		3500	3521	3521	1.493	3542			34.668			0.25			20						0.1		
BD15	6	1	3000	BD_LV0139	50	49.9	N	160	0.3	W	4838	3000	3024	3024	1.557	2015			34.625			0.25		20	20	20	1	20	20	1	0.1		
BD15	6	2	2500	BD_LV0140	50	49.9	N	160	0.3	W		2500	2517	2517	1.704	2521			34.652			0.25			20						0.1		
BD15	6	3	2000	BD_LV0141	50	49.9	N	160	0.3	W		2000	2023	2023	1.884	2012			34.586			0.25		20	20	20	1	20	20		0.1		
BD15	6	4	1500	BD_LV0142	50	49.9	N	160	0.3	W		1500	1521	1521	2.214	1506			34.516			0.25			20					1	0.1		
BD17	1	1	Bottom	BD_LV0139	43	0.1	N	132	39.9	W	3732		3878	3878	1.558	3743			34.665			0.25	40							1	0.1		
BD17	1	2	3000	BD_LV0140	43	0.1	N	132	39.9	W		3000	2990	2990	1.620	N.D.			34.652			0.25	40							1	0.1		
BD17	1	3	2000	BD_LV0141	43	0.1	N	132	39.9	W		2000	1979	1979	1.934	N.D.			34.595			0.25	40							1	0.1		
BD17	1	4	1500	BD_LV0142	43	0.1	N	132	39.9	W		1500	1509	1509	2.506	1512			34.513			0.25								1	0.1		
BD17	2	1	1000	BD_LV0139	43	0.0	N	132	40.0	W	3731	1000	998	998			3.52	1002.9	34.378			0.25	40	20			1			1	0.1		
BD17	2	2	600	BD_LV0140	43	0.0	N	132	40.0	W		600	596	596			4.37	600.8	34.110			0.25	40	20			1			1	0.1		
BD17	2	3	200	BD_LV0141	43	0.0	N	132	40.0	W		200	201	201			7.80	201.2	33.873			0.25	40	20			1				0.1		
BD17	2	4	100	BD_LV0142	43	0.0	N	132	40.0	W		100	438	****			9.41	101.1	32.916			0.25		20			1				0.1		
BD17	3	1	400	BD_LV0139	42	60.0	N	132	40.1	3732	3731	400	403	403			5.53	401.7	33.944			0.25		20			1				0.1		
BD17	3	2	300	BD_LV0140	42	60.0	N	132	40.1	3732		300	292	292			6.55	301.3	33.914			0.25		20			1			1	0.1		
BD17	3	3	150	BD_LV0141	42	60.0	N	132	40.1	3732		150	152	152			8.11	151.8	33.413			0.25		20			1			1	0.1		
BD17	3	4	60	BD_LV0142	42	60.0	N	132	40.1	3732		60	69	****			10.53	62.7	32.871			0.25		20			1			1	0.1		

7.5. Multiple core samples

7.5.1 Introduction

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During KH12-4 *R/V* Hakuho-maru cruise (Big Dipper Expedition, GEOTRACES section study), we obtained surface sediments at 22 sites in the Subarctic North Pacific (Fig. 1) using a multiple-corer (AORI, 450 kg weight) with eight 60 cm polycarbonate core tubes (9 cm diameter). The study area was divided into three according to our research purpose: (1) four sites (BD1–4) off Japan for investigation of nuclides emitted from the Fukushima nuclear power plants; (2) Site BD5–17, 19 are related to GEOTRACES section study; (3) Site BD18, 20–22 are at/around the Juan de Fuca Ridge in the eastern North Pacific.

Detailed information on multiple core sediments and the localities of the core sites can be seen in Tables 1 and 2 and Appendix.

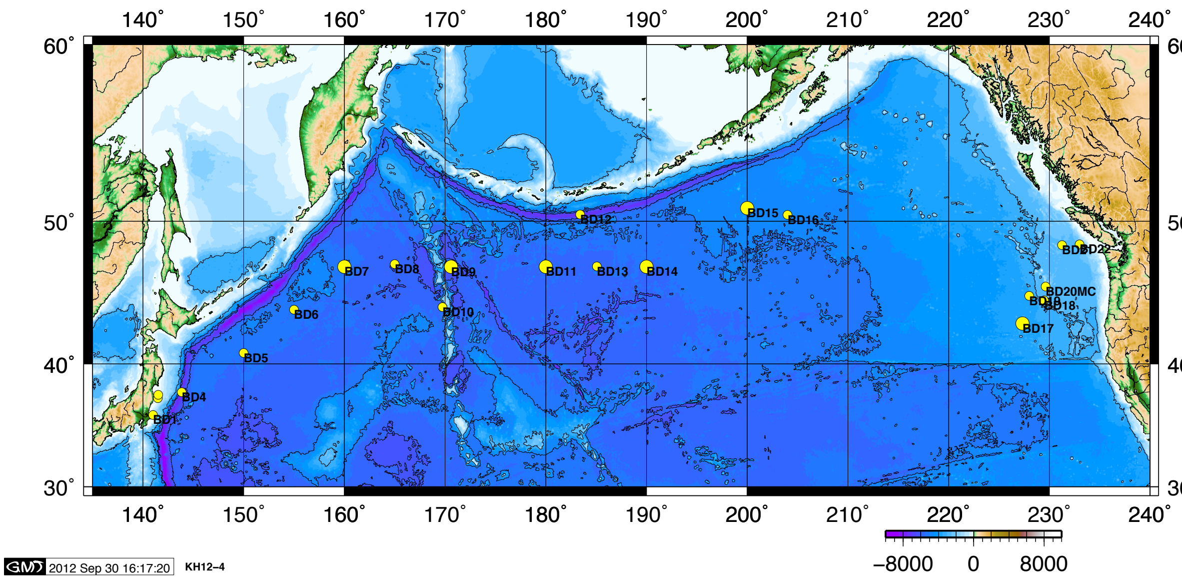


Fig. 1 Site location map of the multiple core sediments.

7.5.2. Table 1. Location of multiple cores obtained during the Big Dipper Expedition of the KH12-4 R/V Hakuho-maru cruise (GEOTRACES section study in the NP).

Research Vasel	Cruise	Leg	Core ID	Date (UTC)	Time (UTC)	Latitude *	Longitude *	PDR_Water depth (m)	W.O.hit (m)	W.O.left (m)	Area	Sites revisited or close to BD stn	Grain size	Sedimentary characteristics
R/V Hakuho-maru	KH12-4	1	BD01-MC	8/23/2012	19:23	35 59.956N	141 00.982E	266	266	266	Off Kashima	KT-11-27_K2	very fine sandy silt	homogenous
R/V Hakuho-maru	KH12-4	1	BD02-MC	8/24/2012	3:33	37 19.763N	141 27.940E	166	166	166	Off Fukushima	MR11-5_D2	very fine sand-fine sand	homogenou including shell fragments
R/V Hakuho-maru	KH12-4	1	BD03-MC	8/24/2012	6:56	37 35.005N	141 30.952E	138	138	138	Off Fukushima	MR11-5_D1	fine sand with coase silt	homogenous
R/V Hakuho-maru	KH12-4	1	BD04-MC	8/25/2012	7:57	37 48.434N	143 52.399E	7167	7167	7147	Japan Trench, Western SANP	KH11-7_TR17	clay	muddy turbidite with laminae (f.silt-clay) at 0-~2cm depth
R/V Hakuho-maru	KH12-4	1	BD05-MC	8/26/2012	19:01	40 49.959N	150 00.034E	5277	5277	5255	Western SANP		clay	14-14.5cm depth Mn concentrated?; below 28.5cm depth seems to be less oxic
R/V Hakuho-maru	KH12-4	1	BD06-MC	8/27/2012	21:43	43 59.972N	155 00.031E	5306	5315	5306	Western SANP	Stn. KNOT	clay	15-22cm depth Mn concentrated?; below 22cm depth seems to be less oxic
R/V Hakuho-maru	KH12-4	1	BD07-MC	8/29/2012	20:29	46 59.970N	160 04.985E	5239	5256	5246	Western SANP	K2, TPS47_39-1 (47ºN, 161º08'E) from Piepgras and Jacobsen (1988)	clay	below 26.5cm depth Mn seems to be accumulated?
R/V Hakuho-maru	KH12-4	1	BD08-MC	8/31/2012	7:04	47 09.978N	164 59.993E	5942	5977	5969	Western SANP		clay	grey ash and scoria at 16-20cm depth?; IRD between 18–26 cm depth
R/V Hakuho-maru	KH12-4	1	BD09-MC	9/2/2012	14:18	47 00.037N	170 34.951E	6310	6345	6336	Western SANP		clay	below 26cm depth Mn seems to be concentrated?
R/V Hakuho-maru	KH12-4	1	BD10-MC	9/3/2012	14:22	44 11.075N	169 46.233E	5803	5842	5837	Western SANP		vf silty clay-clay	vf silty clay in 0-7 cm depth; sharp contact at 13 cm depth; volcanic ash (?) at 14 cm depth
R/V Hakuho-maru	KH12-4	1	BD11-MC	9/7/2012	2:31	47 00.265N	179 59.311W	5746	5778	5772	Central SANP		clay	gravels in the surface sediments; bioturbated throughout the core
R/V Hakuho-maru	KH12-4	1	BD12-MC	9/8/2012	9:57	50 23.915N	176 35.285W	7218	7370	7369	Aleutian Trench, Central SANP	Stn. GS218	clay	Mn seems to be concentrated in 16-18 cm depth; thin turbidites at 20.5-22 cm, 26 cm, and 27.5 cm depths; sediment provenance might change between below and above at 18 cm depth
R/V Hakuho-maru	KH12-4	1	BD13-MC	9/9/2012	10:13	47 01.997N	174 56.057W	5772	5812	5806	Central SANP		clay	laminated with fine grains, Mn seems to be concentrated (?) in 19-20.5 cm depth; gravels at 18-19 cm, 23 cm, and 24.5 cm depths
R/V Hakuho-maru	KH12-4	1	BD14-MC	9/11/2012	11:04	46 59.831N	169 59.950W	5499	5532	5527	Central SANP		clay	gravels (IRD?, ϕ0.5-1cm) in the surface sediments; bioturbated throughout the core; vf tuff and volcanic clastics at 19-20.5cm depth
R/V Hakuho-maru	KH12-4	2	BD15-MC	9/20/2012	4:11	50 49.974N	159 59.957W	4850	4865	4858	Central SANP		clay	gravels (IRD, φ1cm) at 7 cm depth; coase volcanic fragment at 24-26 cm depth
R/V Hakuho-maru	KH12-4	2	BD16-MC	9/20/2012	23:03	50 23.646N	155 56.441W	4930	4938	4933	Central SANP		silty clay-clay	IRD in the surface and 15.5 cm depth; scattered volcanic fragments through the core
R/V Hakuho-maru	KH12-4	2	BD17-MC	9/28/2012	11:39	43 00.031N	132 40.018W	3731	3726	3719	Eastern SANP		clay	weakly lamina with bioturbation was observed in the lower part of the core; alternation of grey and brown sediments;
R/V Hakuho-maru	KH12-4	2	BD18-MC	9/29/2012	8:47	44 40.774N	130 30.522W	2602	2625	2619	Eastern SANP	Juan de Fuca	nd	surface sediments (0-2 cm) were taken, which contain forams
R/V Hakuho-maru	KH12-4	2	BD19-MC	9/29/2012	19:30	44 59.813N	132 00.153W	3678	3670	3667	Eastern SANP		foram-bearing clay	fish-teeth was found in the surface; weakly laminae in 14-20 cm interval; grey clay in the lower part (>20cm)
R/V Hakuho-maru	KH12-4	2	BD20-MC	9/30/2012	4:39	45 39.046N	130 20.955W	2733	2714	2713	Eastern SANP	Juan de Fuca	oxidized clay	carbonate concreation in 17-20 and 25-30 cm intervals; the sediments seems to be influenced by hydrothermal processes
R/V Hakuho-maru	KH12-4	2	BD21-MC	10/01/2012	1:43	48 26.999N	128 42.410W	2442	2429	2426	Eastern SANP	Juan de Fuca	clay	Brown to grey clay, less forams
R/V Hakuho-maru	KH12-4	2	BD22-MC	10/01/2012	10:43	48 29.991N	127 00.045W	2440	2469	2468	Eastern SANP		clay	Brown to grey clay, less forams

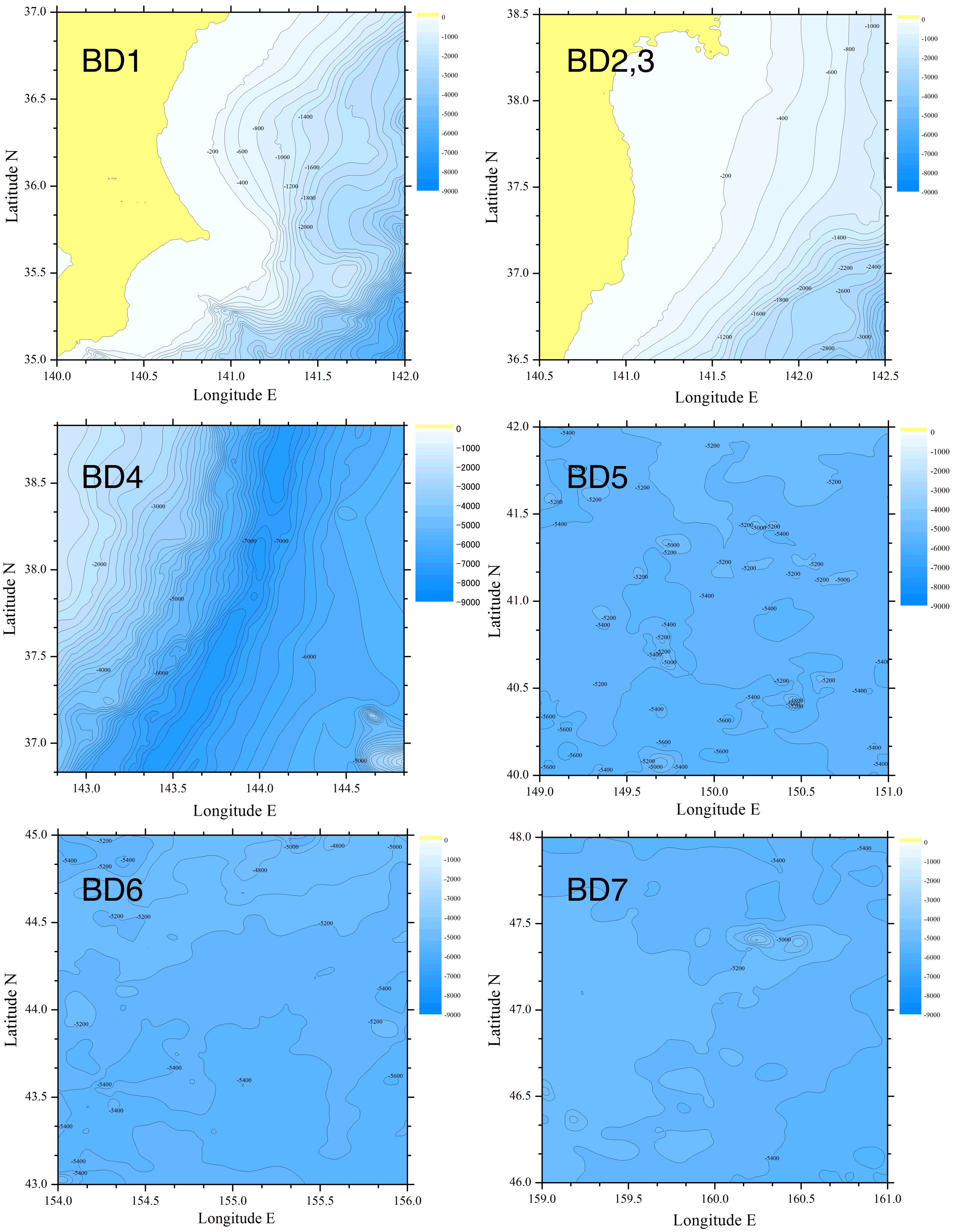
*Positions of MC sites are derived from the ship's eventlog

**Detailed sediment core information can be seen in Table. 2

***Data for color, MSCL, and photo of cores will be conducted in Kochi Core Center. If you need such data, please contact to horikawa@sci.u-toyama.ac.jp

Some gravels found in sediments are rounded, while not-rounded gravels are also found. Not determined either basement rocks or IRD

7.5.3. Bathymetry and photos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36.5
36.0
35.5
35.0
140.0
140.5
141.0
141.5
142.0
Longitude E
BD2,3
Latitude N
38.5
38.0
37.5
37.0
36.5
140.5
141.0
141.5
142.0
142.5
Longitude E
BD4
Latitude N
38.5
38.0
37.5
37.0
143.0
143.5
144.0
144.5
Longitude E
BD5
Latitude N
42.0
41.5
41.0
40.5
40.0
149.0
149.5
150.0
150.5
151.0
Longitude E
BD6
Latitude N
45.0
44.5
44.0
43.5
43.0
154.0
154.5
155.0
155.5
156.0
Longitude E
BD7
Latitude N
48.0
47.5
47.0
46.5
46.0
159.0
159.5
160.0
160.5
161.0
Longitude E
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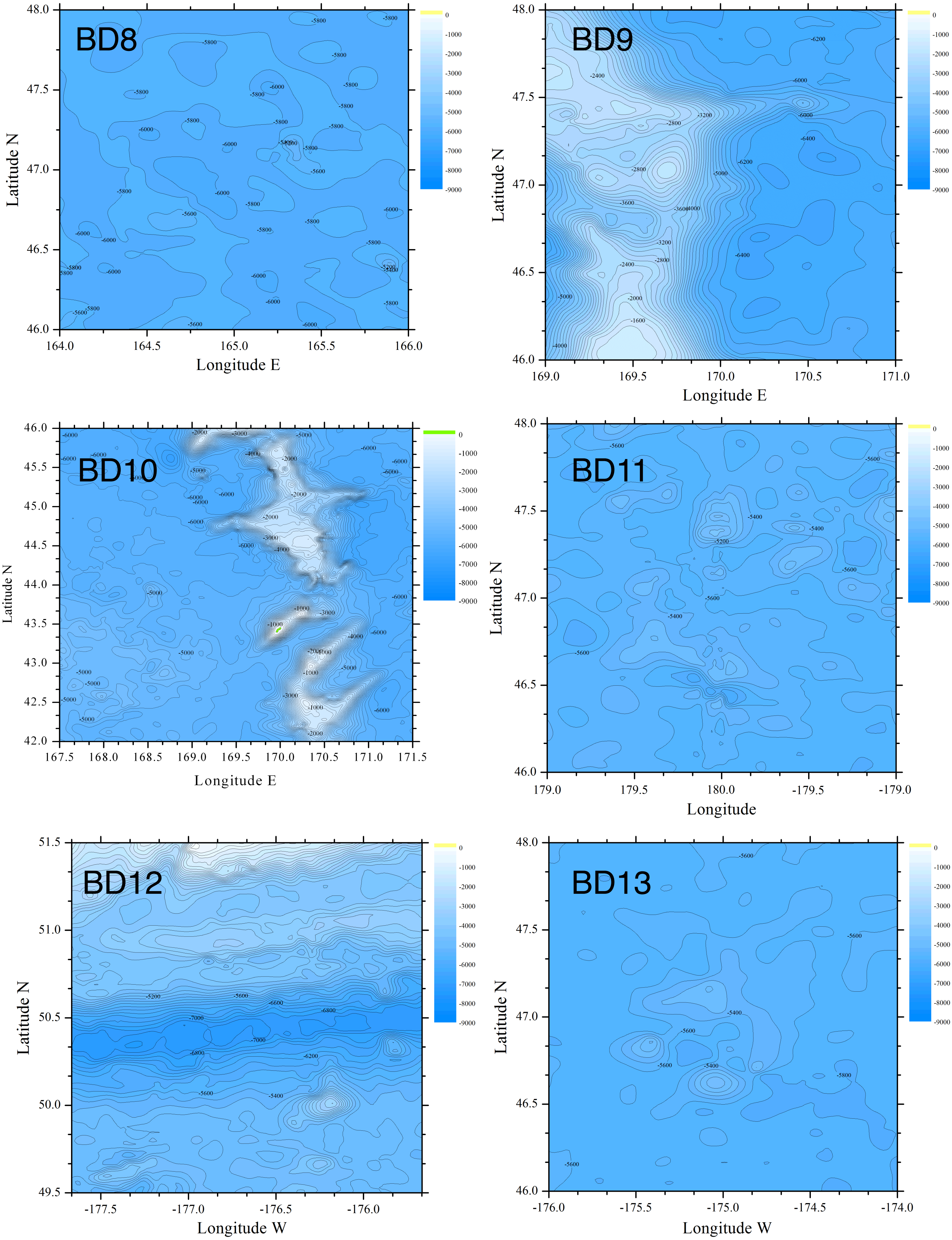
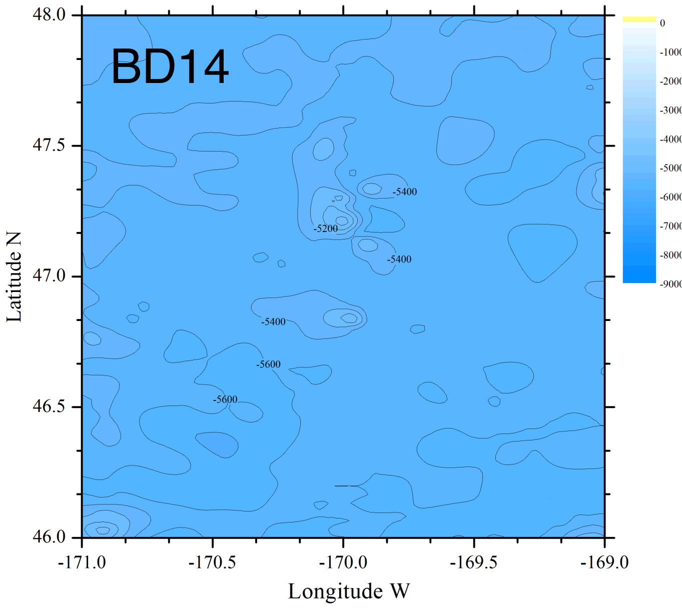
-5000
-6000
-7000
-8000
-9000


BD8
Latitude N
Longitude E
BD9
Latitude N
Longitude E
BD10
Latitude N
Longitude E
BD11
Latitude N
Longitude
BD12
Latitude N
Longitude W
BD13
Latitude N
Longitude W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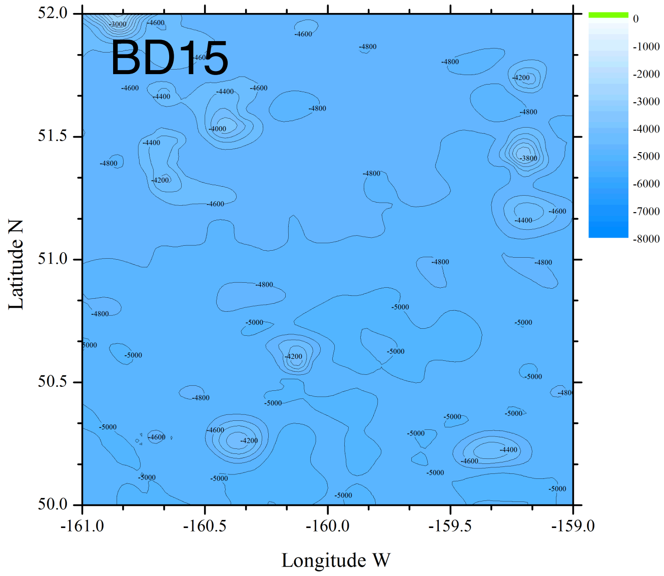
48.0
47.5
47.0
46.5
46.0
Latitude N
-171.0
-170.5
-170.0
-169.5
-169.0
Longitude W
0
-1000
-2000
-3000
-4000
-5000
-6000
-7000
-8000
-9000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51.5
51.0
50.5
50.0
Latitude N
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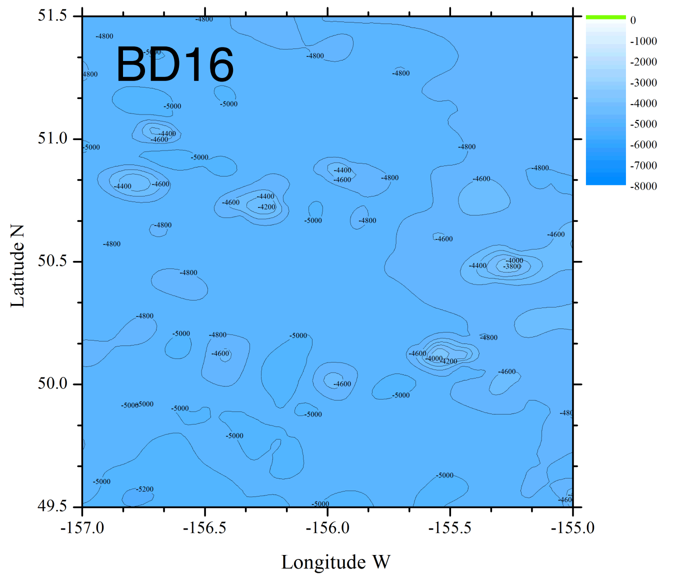
-160.5
-160.0
-159.5
-159.0
Longitude W
0
-1000
-2000
-3000
-4000
-5000
-6000
-7000
-8000


BD16
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51.0
50.5
50.0
49.5
Latitude N
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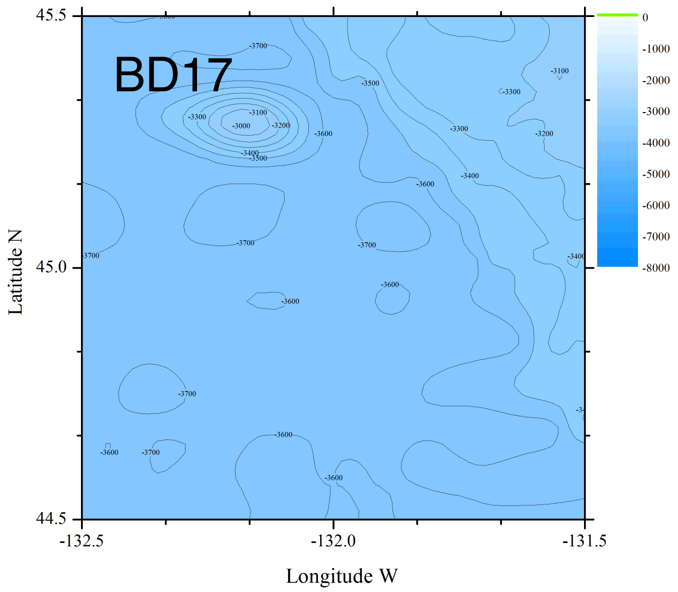
-156.5
-156.0
-155.5
-155.0
Longitude W
0
-1000
-2000
-3000
-4000
-5000
-6000
-7000
-8000


BD17
45.5
45.0
44.5
Latitude N
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-132.0
-131.5
Longitude W
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-3000
-4000
-5000
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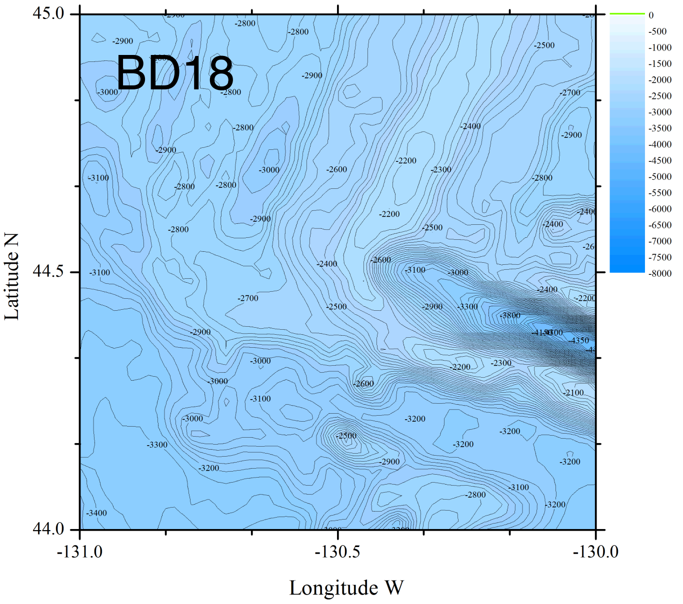
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44.0
Latitude N
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-130.0
Longitude W
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-1500
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-3000
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-4000
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-5000
-5500
-6000
-6500
-7000
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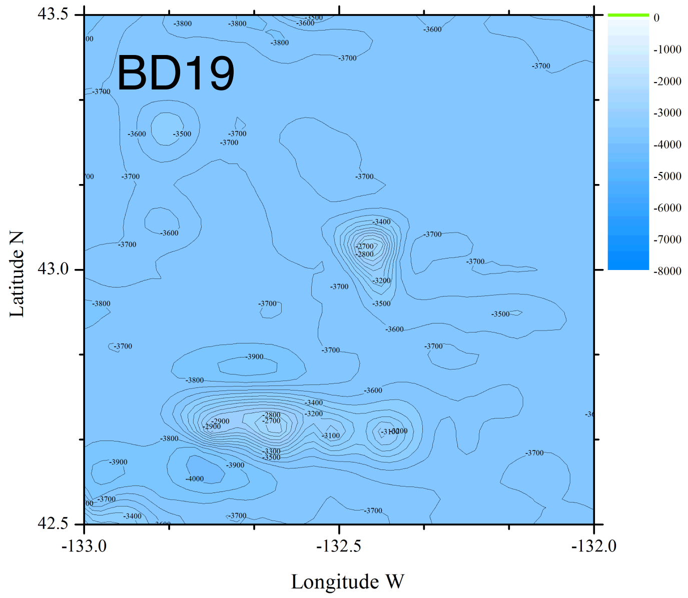
BD19
43.5
43.0
42.5
Latitude N
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-132.5
-132.0
Longitude W
0
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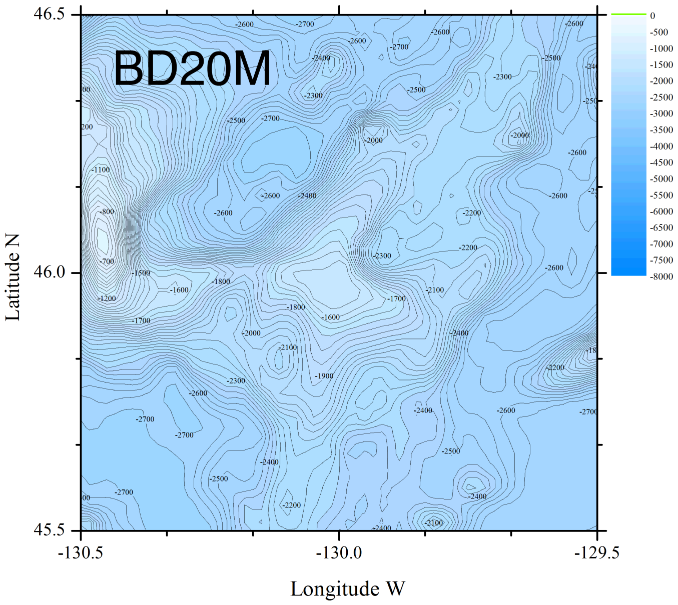
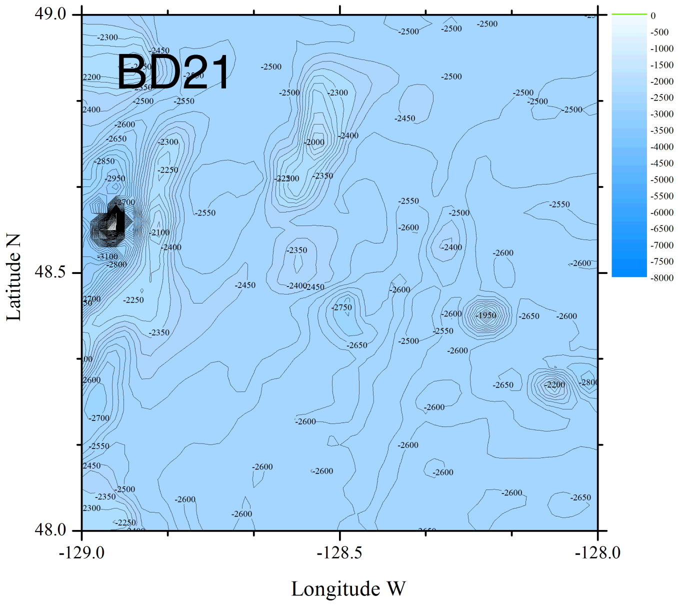
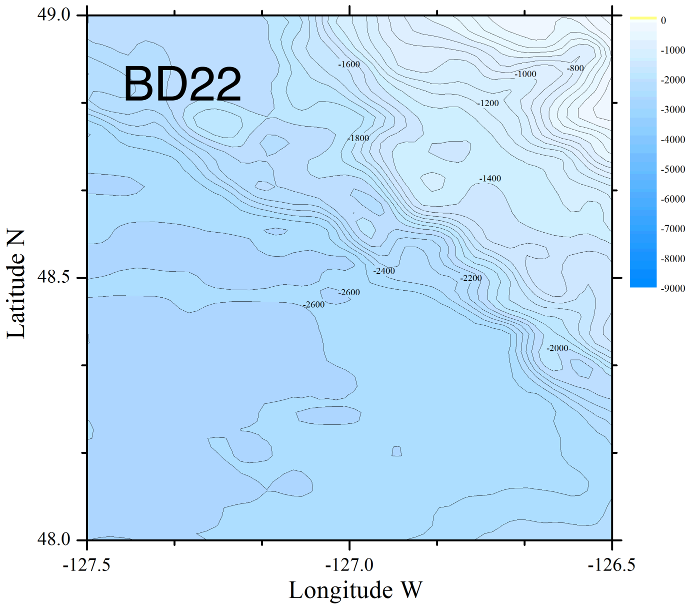
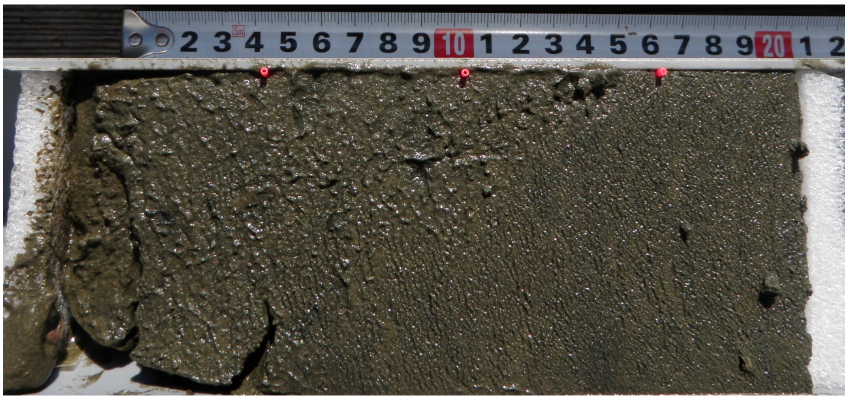
-3000
-4000
-5000
-6000
-7000
-8000


BD20M
Latitude N
46.5
46.0
45.5
Longitude W
-130.5
-130.0
-129.5

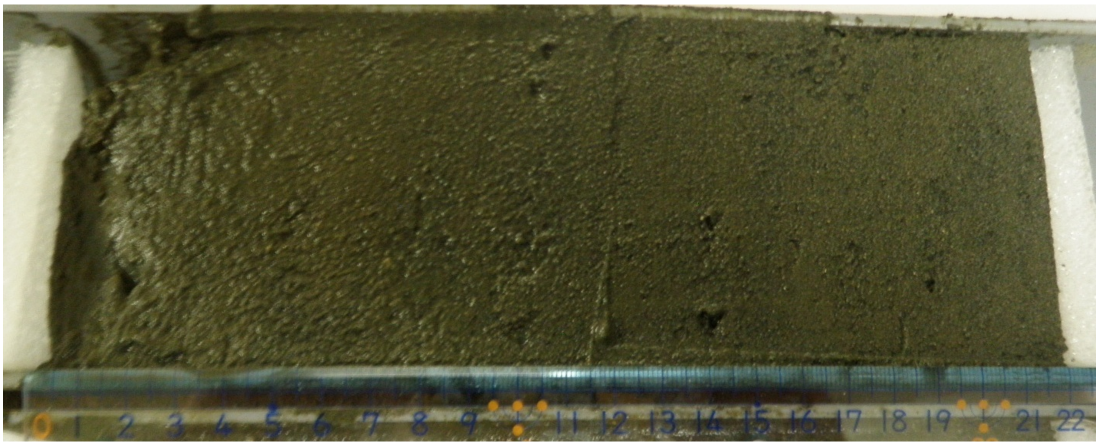

BD21
Latitude N
49.0
48.5
48.0
Longitude W
-129.0
-128.5
-128.0


BD22
Latitude N
49.0
48.5
48.0
Longitude W
-127.5
-127.0
-126.5

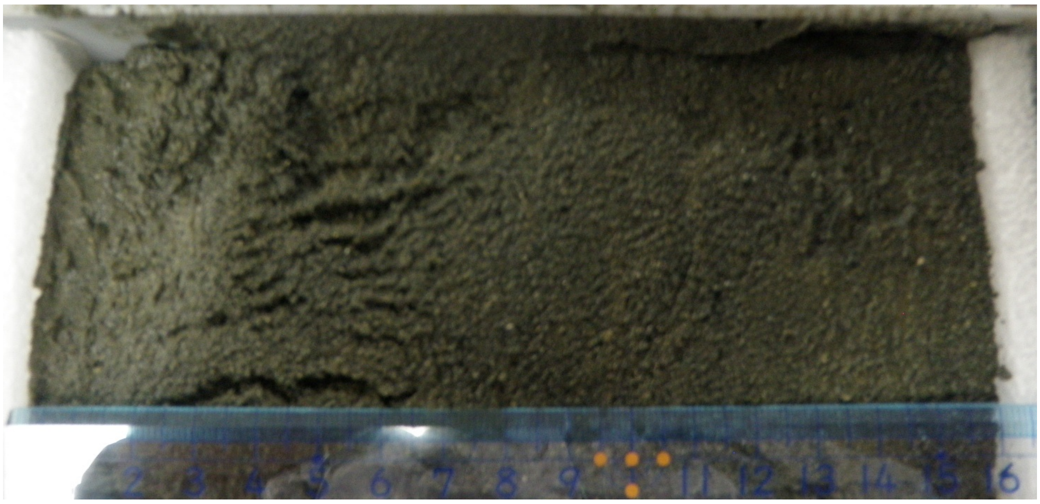
BD1MC



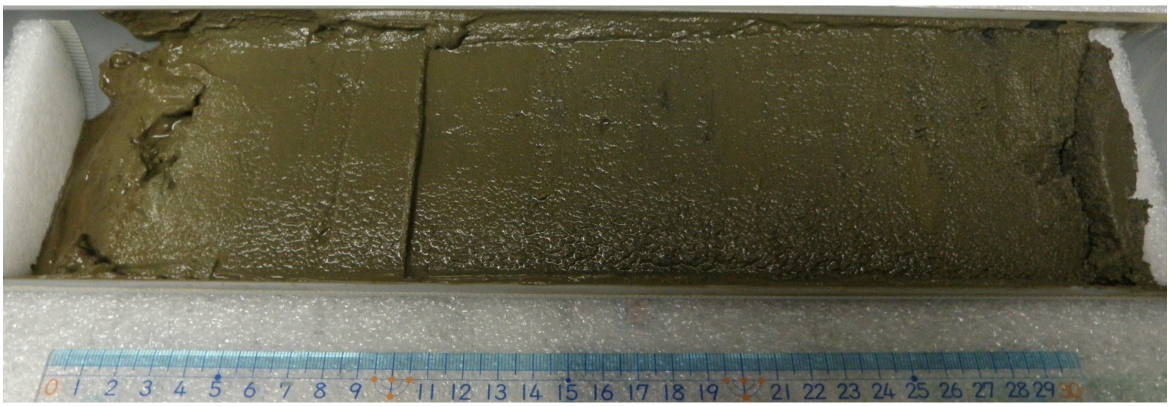
BD2MC



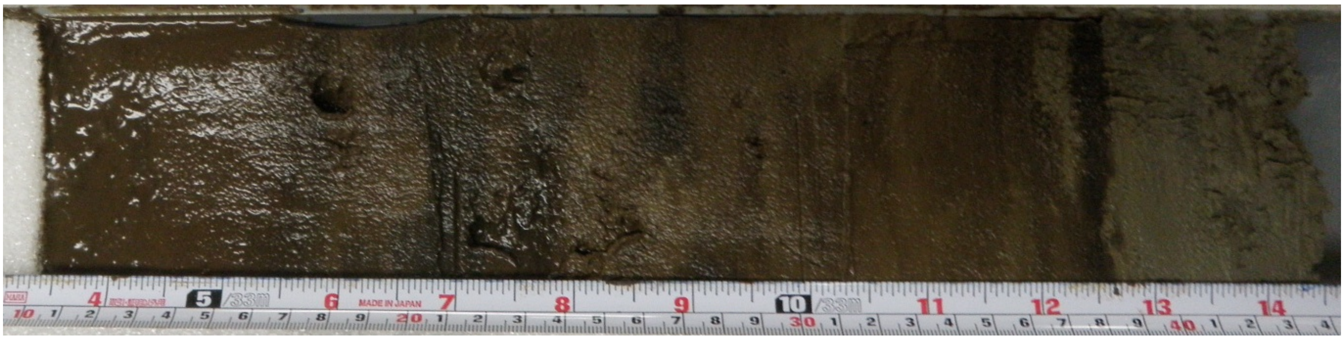
BD3MC



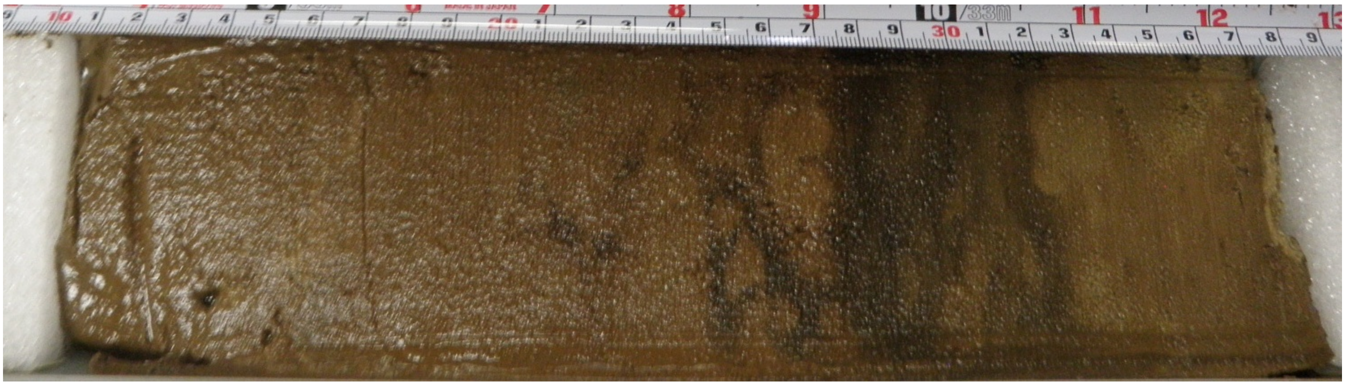
BD4MC



BD5MC



BD6MC

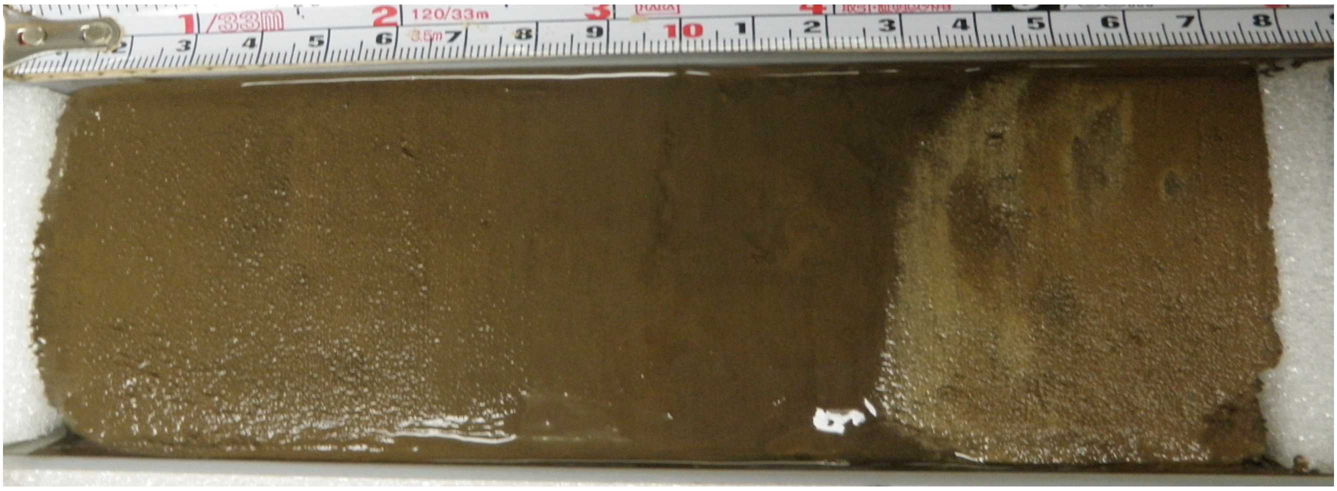


BD7MC

BD8MC

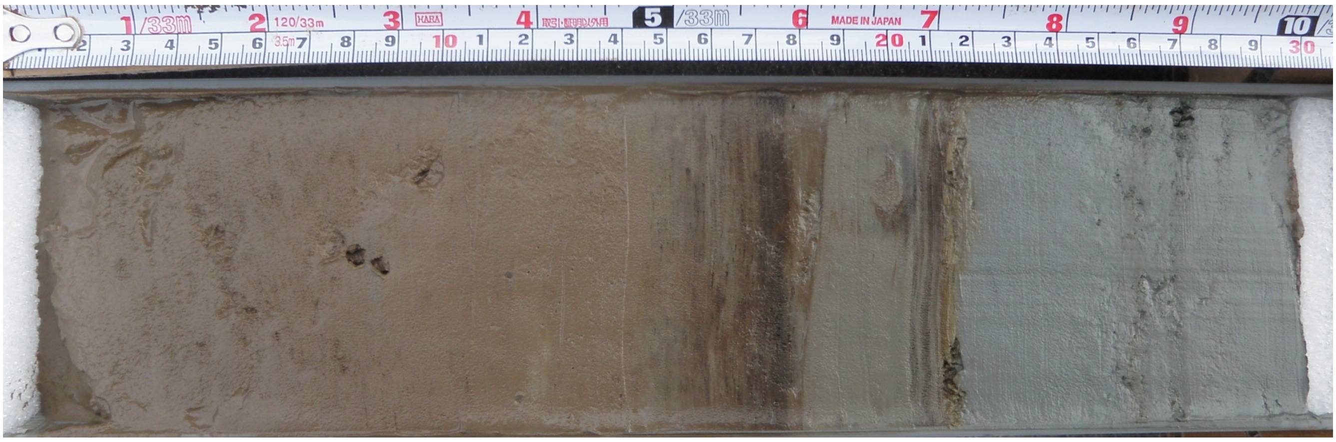
BD9MC

BD10MC



BD11MC

BD12MC



BD13MC

BD14MC

BD15MC

BD16MC

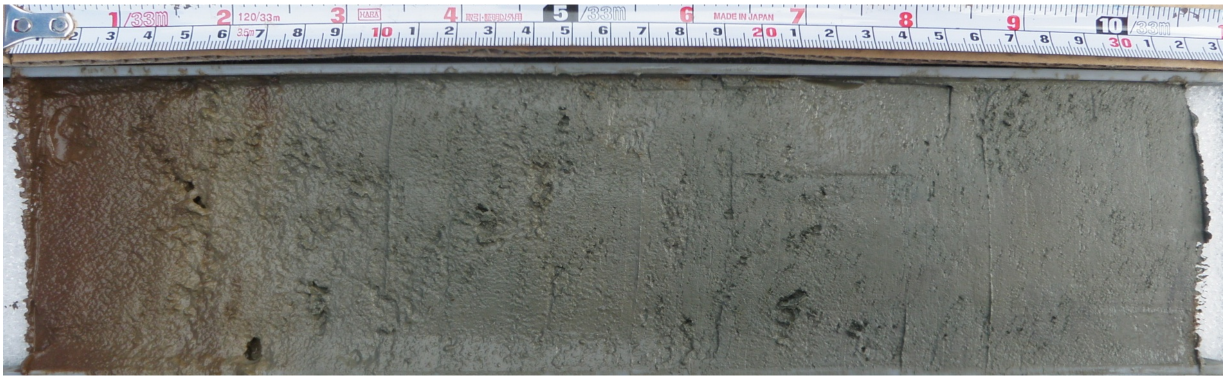
BD16MC

BD17MC

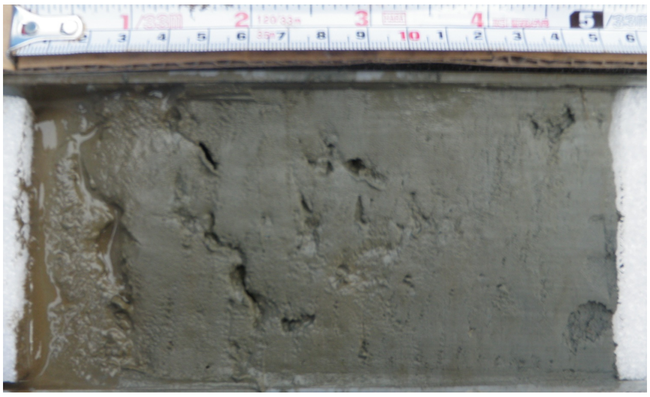
BD19MC

BD20MC

BD21MC



BD22MC



8. Studies on seawater samples

8.1. Intercalibration during the Japanese GEOTRACES Cruise

Hajime Obata[1], Jun Nishioka[2], Tae Jin Kim[1], Hirofumi Tazoe[3], Kazuhiro Norisuye[4], Ayako Okubo[5] and Toshitaka Gamo[1]

1. Atomosphere and Ocean Research Institute, University of Tokyo
2. Institute of Low Temperature Science, Hokkaido University
3. Institute of Radiation Emergency Medicine, Hirosaki University
4. Institute for Chemical Research, Kyoto University
5. Radiochemistry Group, Japan Atomic Energy Agency

1) Introduction

"The process, procedures, and activities used to ensure that the several laboratories engaged in a monitoring program can produce compatible data. When compatible data outputs are achieved and this situation is maintained, the laboratories can be said to be "intercalibrated" (Taylor, 1987)." Intercalibration activity is an important part in the international GEOTRACES program. During the GEOTRACES cruise, we have collected some intercalibration samples to distribute to international community.

2) Methods

Intercalibration samples were collected at BD-7 (47°N, 160°E), called as "K2" (one of Japanese time-series stations), in the western subarctic North Pacific and BD-17 (43°N, 132°40'W) in the eastern North Pacific.

2-1) Comparison of sampling methods

Seawater samples for contamination-prone key parameters were collected with Teflon-coated X-type Niskin samplers, which were precleaned with 1% of detergent (Extran MA01, Merk), 0.1M hydrochloric acid and MQ water successively. Samples were collected at 25 m, 50 m, 200 m, 400 m, 600 m and 800 m with the samplers attached to Kevlar wire and Titanium wire. We also collected seawater samples at the same depths with 24 bottles of X-type Niskin samplers attached to CTD-CMS system. The CTD-CMS system was connected to titanium-armored cable.

We carried the Niskin samplers to a clean area, "bubble" in the laboratory, which was packed with polyethylene sheets. Inside the "bubble", clean air, passing HEPA filters, was flown. All the seawater samples were filtered with a same 0.2μm capsule filter (Acropak, Pall) with compressed air after 1-minute flushing. As a contamination-prone key parameter, we determined iron in seawater with chelating resin preconcentration and chemiluminescence methods (Obata et al., 1993; 1997) and zinc with cathodic stripping voltammetry onboard the ship. Other contamination-prone key parameters, such as Al and Pb, will be determined at land-based laboratories.

Seawater samples for radiogenic key parameters, like ^{230}Th, ^{231}Pa, were collected with X-type Niskin samplers mounted to CTD-CMS system mentioned above. The seawater samples for and Nd isotopes were also collected with a large-volume water sampler (Nichiyu Giken). The samples collected with LV samplers were filtered with 0.5 μm-pore size wind-cartridge filter (Advantec).

2-2) Intercalibration samples for international community

For the purpose of international intercalibration on contamination-prone key parameters, ^{230}Th, ^{231}Pa, Nd isotopes and Pb isotopes in seawater, we collected filtered seawaters to describe a full depth profile. The seawater was filtered with 0.2 μm-pore size Acropak (Pall) and stored in low-density polyethylene bottles. The seawater was acidified with 2 mL of ultrapure 6M hydrochloric acid (Tamapure AA-100) for 500mL sample. One set of the samples for contamination-prone key parameters will be sent to the Canadian GEOTRACES community (P.I. Dr. Cullen, Univ. Victria).

8.2. Thorium-230 and Protoactinium-231 in the subarctic North Pacific

Ayako Okubo[1], Taejin Kim[2], Hajime Obata[2], Toshitaka Gamo[2]

1. Radiochemistry Group, Japan Atomic Energy Agency
2. Marine Inorganic Chemistry Division, Atmosphere and Ocean Research Institute, University of Tokyo

Introduction

Th-230 and Pa-231 are produced in seawater at a constant rate from the decay of dissolved uranium isotopes. Both are rapidly scavenged from the water column into the underlying sediments, resulting in large ^{230}Th and ^{231}Pa deficits in the water column and large excesses in the sediments. ^{230}Th is more particle-reactive with very short residence times in the water column (ranging from <1 yr in surface water to a few decades in deep water) than ^{231}Pa, which limits redistribution by horizontal transport. In contrast, ^{231}Pa, with a larger residence time in water column (up to 200 yr in deep water), is more effectively transported and scavenged in the regions with high productivity and particle flux. In this study we will obtain the vertical profiles of ^{230}Th and ^{231}Pa, and reveal the horizontal transport process and scavenging intensity of both nuclides in this area.

Methods

Seawater samples were collected by X-Niskin samplers installed on the CTD-CMS system and filtered through 0.2 μm cartridge filter (Acropak, Pall) in a "bubble". The filtered samples were transferred into 10L polyethylene bottles and acidified with 68% HNO_3(Tamapure AA-100, Tama chemicals). The water samples will be spiked by ^{229}Th(~50 pg), ^{233}Pa(~500fg) and will be extracted to Th and Pa fractions, respectively. These samples will be measured by Inductively Coupled Plasma-Mass Spectrometer.

References

A.L. Thomas ea al., Earth and Planetary Science Letters 241(2006) 493-504

8.3. Dissolved hydrogen sulfide in seawater measured using a quadruple mass spectrometer in the north Pacific

Noriko Nakayama, Hajime Obata and Toshitaka Gamo
Marine Inorganic Chemistry Division, Atmosphere and Ocean Research Institute, The University of Tokyo

Almost no attention had been paid for the biogeochemical role of dissolved hydrogen sulfide (H_2S) in the marine system especially in the oxic water environment since H_2S is thought to be produced only in anoxic waters and sediments via microbial sulfate reduction. However, Elliott et al. (1987) posed a question and postulated that H_2S may be also produced in oxygenated waters by hydrolysis of carbonyl sulfide (OCS). They also predicted that H_2S concentration in the surface ocean is in the range of picomolar (10^{-12}M) to nanomolar (10^{-9}M). Such sulfide concentration can affect to trace metal complexation as ligand in seawater. The concentrations of dissolved trace metals are in the range of picomolar (10^{-12}M) to nanomolar (10^{-9}M) concentrations in oceanic waters and thought to be essential for phytoplankton growth in open ocean (Cutter and Krahforst, 1988).

In this manner, the existence of hydrogen sulfide has raised interest in, especially, its role in trace metal complexation. Hydrogen sulfide exists as the dissolved gas (H_2S_g), its dissociated ions, bisulfide (HS^-) and sulfide (S^{2-}), and as dissolved metal-sulfide complexes in seawater; total dissolved sulfide (TDS) is the sum of the free(H_2S_{aq}+ HS^-+ S^{2-})and complexed sulfide. Since then, several studies examined and found that TDS exists in oxic surface waters. As an example of reports of TDS, Cutter and Krahforst (1988) found that concentrations of TDS in surface waters ranged from <0.1 to 1.1 nmol/l using gas chromatographic (GC) system. These measurements, however, limited to the mid latitude regions of western North Atlantic, Mediterranean Sea, and Black Sea. And also, it is not yet examined what metal species participate in this complexation in the ocean.

In this GEOTRACES 2012 cruise, we measure TDS and free sulfide from waters in the northern Pacific between 47 and 50N latitude using QMS system to examine the chemical speciation of dissolved sulfide and its concentrations in the north Pacific. Then attempt to examine the relationship between trace metals and dissolved sulfide obtained by observed metal and TDS concentrations.

Method: Seawater samples were collected from X-type Niskin bottles mounted on a CTD/Carousel array. Approximately 200mlseawater samples were taken into 300 ml glass bottles which were first added to 5 ml of 1.5 mol/l phosphoric acid for TDS, no addition for the dissolved gas (H_2S_g), and then both were evacuated prior to the sampling (<10^{-5}mbar). Extracted dissolved gasses to the headspace were purified in high vacuum line, where H_2O was removed by cold traps. The purified sample gasses were injected into the QMS and ion peaks of Ne, N_2, O_2, Ar, H_2S, and SO_4 were simultaneously measured.

Samples: About 8 of seawater samples collected at stations BD15, 16, 17, 20, and 21.

References: Cutter and Krahforst (1988) Sulfide in surface waters of the western Atlantic ocean, *Geophys. Res. Lett.*, **15**(12).1393-1396.

8.4. The $\delta^{18}O$ of dissolved O_2 in the northern North Pacific

Noriko Nakayama and Toshitaka Gamo (on board)
Akira Oka (on land)
Marine Inorganic Chemistry Division, Atmosphere and Ocean Research Institute, The University of Tokyo

Oxygen isotopic ratio ($\delta^{18}O$) of dissolved oxygen is a useful for bioactive tracer of the mesopelagic ocean since it varies nonlinearly related to oxygen consumption via stoichiometry of organic matter decomposition. Therefore, along with global circulation model (GCM), observed $\delta^{18}O$ and their vertical/geographical distribution can be effectively used to quantitatively determine how marine biological and ocean physical processes contribute to varying dissolved oxygen (DO) concentration in the ocean, in particular mesopelagic zone where pronounced biological activity alters DO concentration significantly. In the central north Pacific Ocean and Indian Ocean, including Arabian Sea, vertical profiles of DO and $\delta^{18}O$ were observed so far. In this study, we were obtained the samples for new $\delta^{18}O$ of O_2 data from the northern North Pacific and will estimate rates of respiration and oxygen isotope fractionation for the study region using a GCM model. Estimated respiration rates and the isotope fractionation factor will be compared with previous studies.

Methods

Observations were carried out during the KH-12-04 cruise in September 2012. We occupied 5 stations for isotopic measurements of dissolved O_2 study. Seawater samples were collected by using a CTD-12L Niskin-Xbottles. For isotopic measurements of dissolvedO_2, approximately 150 mL of water from selected depths was transferred from the Niskin bottles to glass bottles which were first added to 250 μl of saturated $HgCl_2$ solution in order to prevent biological activity after collection and then evacuated prior to the sampling. ($<10^{-5}$mbar)[1].During sampling the flasks were filled taking extreme care to avoid introducing atmospheric gas in bubbles. This was accomplished by attaching a 50-cm long polyethylene tube with a Koshin-Rika Inc. Ulta-torr glass valve. The gases extracted from seawater to the headspace were introduced into a vacuum line pumped up to $<10^{-4}$ torr in laboratory on board the ship. Online stable isotopic analyses of oxygen will be performed using gas chromatography-isotope ratio mass spectrometry (GC-IRMS, DeltaPlusXP; Thermo Finnigan) in shore-based laboratory. Our system needs at least around 100 ml of seawater sample for$\delta^{18}O$ determination of dissolved $O_2$with precision of ±0.1% in SD, as determined from replicate analysis. The O_2 concentrations were measured with the Winkler titration method using an automatic titrator. The precision for oxygen measurements was ±0.2%, as determined through replicate titrations.

Samples: About 8 of seawater samples collected at stations BD15, 16, 17, 20, and 21.

Reference: Hamme R. and S. Emerson, *Geophys. Res. Lett.,* **29**(23), 2120, 2002.

8.5. Distributions and their speciation of trace metals in the North Pacific during GEOTRACES section study

Tae Jin Kim, Hajime Obata and Toshitaka Gamo

Marine Inorganic Chemistry Division, Atmosphere Ocean Research Institute, University of Tokyo

1) Distributions of trace metals in the subarctic North Pacific

1-1) Objective

Trace metals, such as Fe, Mn and Zn, are now thought to be essential for phytoplankton growth in the open oceans. However, large-scale distributions of trace metals have not been investigated yet in the subarctic North Pacific. To understand the controlling factors of trace metal concentrations, we need to investigate the detailed distributions of trace metals in the world ocean. In this study, we will study the distributions of dissolved trace metals (Fe, Mn, Zn, Cd etc.) in the subarctic North Pacific, as the international GEOTRACES project.

1-2) Samples

Seawater samples for vertical profiles were collected using Teflon-coated X-type Niskin bottles mounted on a CTD/Carousel array. Filtered samples were obtained through a cleaned 0.2 μm filter cartridge (Acropak, Pall) connected to sampler directly with pressured air. Filtered samples (500mL of PE bottle) are acidified to pH<1.8 with ultra pure HCl (Tamapure AA-100) and stored. Another set of samples is also stored in 500mL of PE bottles as archive samples.

CTD sampling

Station : BD-4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22

Depth (m): 0, 25, 50, 100, 150, 200, 400, 600, 800, 1000, 1250, 1500, 2000, 2500, 3000, 3500, 4000, 4500, 5000, 5500, 6000, Bottom

1-3) Analytical methods

Iron will be determined by a flow analytical system by using chelating resin preconcentration and ICP mass spectrometry, or cathodic stripping voltammetry (CSV) in the land-based laboratory. Manganese concentrations will be determined by a flow analytical system by using electrolytic column preconcentration and chemiluminescence (CL) detection (Nakayama et al., 1989). Zinc will be determined by cathodic stripping voltammetry (Ellwood et al., 2000) in the land-based laboratory. Other trace metals will be determined by using chelating resin preconcentration and ICP mass spectrometry.

2) Trace metal speciation in the subarctic North Pacific

2-1) Introduction

Trace metals, such as Fe and Zn, are essential micronutrients for phytoplankton in the ocean. At low concentration levels, trace metals can limit the growth of marine phytoplankton in culture. Additionally, speciation is also considered to be an important factor of the biological availability of trace metals. However, little is known about the organic complexation of trace metals in open-ocean waters. In this study, we will investigate trace metal speciation in the subarctic North Pacific using cathodic stripping voltammetry (CSV).

2-2) Sample

Seawater samples were collected using Teflon-coated X-type Niskin bottles mounted on a CTD/Carousel array. Filtered samples were obtained through a cleaned 0.2 μm filter cartridge (Acropak, Pall) connected to sampler directly with pressured air. Filtered samples (500mL of PE bottle) are frozen at -18^{o}C and stored.

CTD sampling

Station :BD-7, 9, 11, 14, 17, 20, 21

Depth (m): 0, 25, 50, 100, 150, 200, 400, 600, 800, 1000, 1250, 1500, 2000, 2500, 3000, 3500, 4000, 4500, 5000, 5500, 6000, Bottom

2-3) Methods

On the land-based laboratory, ligand concentrations and conditional stability constants for Zn and Fe will be obtained from a titration using CSV (Ellwood et al., 2000; van den Berg, 2006; Laglera and van den Berg, 2009).

8.6. Determination of Pt and Pd in seawater in the subarctic North Pacific

Asami Suzuki, Hajime Obata and Toshitaka Gamo
Atmosphere and Ocean Research Institute, University of Tokyo

1) Objective

Anthropogenic platinum group elements are increasingly emitted and spread into the environments according to recent industrial uses. However, only few data have been reported on platinum group elements in the oceanic environments. In this study, we will investigate dissolved Pt and Pd concentrations in seawater of the subarctic North Pacific.

2) Method

2-1) Onboard

Seawater samples for vertical profiles were collected using X-type Niskin bottles mounted on a CTD/Carousel array. Seawater from Niskin bottle was passed through the 0.2 μm-pore size capsule filters, Acro Pak200 (Pall), with compressed air in the Bubble. They are acidified to pH<1.8 with ultra pure HCl in the Bubble and carried to the AORI for analysis.

The seawater samples for PGEs determination were collected the following depths.

Depth (m): 10, ~~25,~~ 50, 100, ~~150,~~ 200, 400, 600, 800, 1000, ~~1250,~~ 1500, 2000, 2500, 3000, 3500, 4000, 4500, 5000, 5500, 6000, Bottom

Stations: BD-~~4,~~ 7, 9, 11, 14, 15, 17, 20 and 21

2-2) After the cruise

Using isotope dilution ICP-mass spectrometry (ID-ICPMS), platinum in seawater will be determined (Obata et al., 2006). After adding ^{195}Pt spike and ^{105}Pd spike, Pt and Pd will be preconcentrated with anion-exchange resins. Concentrated samples will be measured using a quadrapole inductivity coupled plasma mass spectrometer. The concentrations of these elements are calculated by the measured isotopic ratios using the equation for isotope dilution method.

8.7. Biogeochemical study of Fe(II) in the subarctic North Pacific

Samiko Takahashi, Hajime Obata, Toshitaka Gamo (onboard)
Marine Inorganic Chemistry Division, Atmosphere and Ocean Research Institute, The University of Tokyo

Kei Okamura (on land)
Center for Advanced Marine Core Research, Kochi University

Recently, the importance of iron on ocean primary production has been well known. Now the iron speciation is a main subject since the iron availability by phytoplankton depends on its speciation in seawater. Especially, Fe(II) is important chemical species for iron acquisition by phytoplankton. However, the biogeochemical cycles of Fe(II) in the ocean are not well known yet because of the analytical difficulty. We have modified conventional analytical method of Fe(II) in seawater by luminol chemiluminescence, and determined dissolved Fe(II) in seawater on board the ship. We have also developed a new method to determine Fe(II) in seawater using an in-situ chemical analyzer (GAMOS) and investigated spatial variations of Fe(II) in the hydrothermal plume at the Juan de Fuca Ridge using the in-situ analyzer during this cruise.

1. Sampling Method

We collected seawater samples from the clean sampling system at the BD-4 – 22. At BD-17, 18, 20 and 21, we have deployed the GAMOS by using a titanium cable (No. 3 winch).

2. Analytical method

2-1. Conventional method

Seawater samples were collected by X-Niskin samplers installed on the CTD-CMS system. Samples were immediately filtered with 0.2 mm cartridge filter (Acropak, Pall) in a "bubble". The seawater samples were injected to the flow analytical system (King and Lounsbury, 1995).

2-2. In-situ analytical method

The conventional luminol chemiluminescence method was adapted to an in-situ flow analytical system, GAMOS (Geochemical Anomalies MOnitering System; Okamura et al., 2001). Sample was taken into the system and mixed with luminol reagent by a peristaltic pump. The mixture was introduced to a photomultiplier in a pressure-compensated vessel, and the CL intensity was recorded in the system. The device was lowered to a depth near the bottom, determining Fe(II) in seawater. After recovering the device onboard, we collected the Fe(II) data in the laboratory.

8.8. Temporal change of carbonate system and ocean acidification in the north Pacific for these several decades

Toshitaka Gamo[1] and Yuichiro Kumamoto[2]

1. Atmosphere and Ocean Research Institute, the University of Tokyo
2. JAMSTEC

The increase of carbon dioxide mixing ratio in the atmosphere due to human activity has caused a significant change in solution chemistry of carbon dioxide and carbon cycles in the global ocean through the net CO_2 invasion from the atmosphere to the ocean. The increase of total dissolved inorganic carbon (DIC), decrease of its $\delta^{13}C$, and accompanying pH decrease have already been demonstrated at several locations in the world oceans. The pH decrease, so-called ocean acidification, is regarded as a serious problem in near future for ocean organisms with hard shells made of $CaCO_3$.

This study aims at elucidating the temporal change of carbonate system and pH in the northern North Pacific by precisely measuring some of the parameters (pH, alkalinity, DIC, and its $\delta^{13}C$) to compare them with the previous data in this area. We will inspect the availability of the database for the following cruises previously conducted in this area: data by R/V Hakuho Maru cruises (KH-70-1, KH-70-2 in 1970; KH-80-2 in 1980; KH-85-4 in 1985; KH-88-3 in 1988), GEOSECS data in 1973-1974, WOCE and CLIVAR data since 1985, etc. Patterns of temporal changes of the parameters could be useful for the prediction of carbonate chemistry and ocean acidification in northern North Pacific.

The measurements of pH and alkalinity have been accomplished as routine analyses during the cruise. Samples for DIC and its $\delta^{13}C$ measurements were collected at stations BD-7, 9, 11, 14, 15, and 17, which will be analyzed using a coulometric method and stable isotope mass spectrometry in shorebased laboratories. Since DIC is also calculated using shipboard pH and alkalinity data, the comparison between the measured and calculated DIC data would raise the reliability of the DIC values.

8.9. Dissolved iron distribution in the North Pacific Ocean: Onboard measurement for vertical section observation in the GEOTRACES program

Jun Nishioka[1] and Hajime Obata[2]

1. Institute of low temperature sciences, Hokkaido University
2. Ocean Research Institute, University of Tokyo

Trace elements serve important roles as regulators of ocean processes, including marine ecosystem dynamics and carbon cycling. Especially, iron plays important roles in the ocean as nutrients, therefore, biogeochemical cycling of iron has direct implication for research. To determine iron distribution in the North Pacific ocean, and to evaluate the sources, sinks, internal cycling of Fe more completely with the physical, chemical and biological processes regulating their distributions, we conducted longitudinal vertical section observation for dissolved Fe along 47-50ºN from the western to the eastern subarctic Pacific region.

Samples for dissolved iron analysis were collected from acid-cleaned Teflon-coated 12-liter Niskin-X bottles placed in a clean-air booth and the sample seawater was filtered through an AcroPak 200 Capsule filter unit having 0.8/0.2 micro-meter pore-size Supor Membrane (Pall) attached directly to the spigot with silicon tubing under a pressure of 1 atm by compressed clean air. Filtered seawater was collected in 125-ml LDPE bottles after rinsing 2 times.

All filtrates collected in 125-ml polyethylene bottle were then added distilled HCl and stored more than 24h. Then the samples were added 10 M formic acid-2.4 M ammonium formate buffer solution and ammonium solution to adjust pH 3.2. Concentrations of Fe (III) in the buffered samples were determined with an automatic Fe (III) analyzer (Kimoto Electric Co. Ltd.) using chelating resin (MAF-8HQ) concentration and chemiluminescence detection (Obata et al., 1993,1997).

All samples were measured onboard with standardizing by SAFe international standard seawater (S and D2).

References

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Obata, H., Karatani, H., Matsui, M., Nakayama, E., 1997. Fundamentalstudies for chemical speciation of iron in seawater with an improved analytical method. Mar. Chem. 56, 97–106.

8.10. Chemical speciation of iron in seawater and related biogeochemical processes in the subarctic North Pacific

Rumi Naoe, Yuichi Mukae and Shigenobu Takeda

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Purpose

Trace elements serve important roles as regulators of marine biogeochemical processes and ecosystem dynamics. Determination of global ocean distribution of trace elements including their concentration, chemical speciation and physical form is one of the major goals for GEOTRACES. Many trace elements in seawater exist predominantly as complexes with strong organic ligands. This complexation will affect both the biological availability of these elements and their removal from water column as sinking particulate aggregates. Iron has been well recognized as a limiting micronutrient for phytoplankton production in the high-nitrate, low-chlorophyll waters of the subarctic North Pacific, while there are considerable differences in atmospheric deposition flux and horizontal transport from the continental shelves between the eastern and western North Pacific (Takeda, 2011). Spatial variability of iron speciation along an East-West transect in the subarctic North Pacific should be studied to understand the fundamental properties of iron, such as its bioavailability and residence time in the ocean.

Recent findings on the role of trace metals as a factor controlling primary productivity and biogeochemical processes in the oceanic waters emphasized the need for better understandings of co-limitation by macro- and micronutrients. In addition, a majority of eukaryotic phytoplankton species require an exogenous source of vitamin B_{12} for growth. A field study in the HNLC region of the Gulf of Alaska showed that vitamin B_{12} alone and in conjunction with Fe significantly altered phytoplankton community composition as well as enhanced algal biomass (Koch et al., 2011). Thus, it is interesting to compare the effects of vitamin B12 on the phytoplankton communities of the eastern and western subarctic North Pacific.

Atmospheric deposition is an important process that transports low-solubility trace elements and macro nutrients, mostly nitrogen, from the continents to the surface waters of the ocean. Atmospheric dust could be a source of the organic ligands to the surface (Gerringa et al., 2006) and, therefore, the organic component of atmospheric aerosol may play a role in determining solubility and biological availability of highly insoluble micronutrient. Organic N exists in gas, particle and dissolved phases and represents a large (ca. 30%) fraction of total airborne nitrogen (Cape et al., 2011), but little information is available for distribution over the North Pacific and variability in time and space.

The present study aimed to clarify the possible difference in the vertical distribution of organic Fe(III)-binding ligands between the eastern and western subarctic North Pacific. In parallel, onboard experiments were conducted to test the potential for micronutrients co-limitation of surface phytoplankton assemblages in these waters. Atmospheric deposition of organic nitrogen was also investigated to understand correlations with trace elements distributions in the subarctic North Pacific.

Methods

Iron speciation:

Water samples were collected using acid-cleaned Teflon-coated 12-liter Niskin-X bottles on a CTD-Carousel system attached at the end of the titanium armored cable (8 mm o.d.) from the No.2 winch. Seawater was obtained from 10 m depth to near bottom (~8 layers) at large stations (stn. 7, 9, 11, 14, 15 and 17) or from 3 layers (10 m, subsurface chlorophyll maximum and 1000 m) at small stations (stn. 8, 10, 13, 16 and 19). After the recovery, Niskin-X bottles were placed in a clean-air booth and the sample seawater was filtered through an AcroPak 200 Capsule filter unit having 0.8/0.2 µm pore-size Supor Membrane (Pall) attached directly to the spigot with silicon tubing under a pressure of <1 atm by compressed clean air. Filtered seawater collected in acid-cleaned 500-ml FLPE bottles were stored frozen under –20ºC for analysis of iron complexing ligands in the onshore laboratory. Samples for analyses of dissolved iron were collected in acid-cleaned 125-ml LDPE bottles and acidified to pH <1.7 with 20% quartz-distilled HCl (TAMAPURE AA-100).

Iron and vitamin B_{12} co-limitation of surface phytoplankton assemblage:

Potentials for iron and vitamin B_{12} co-limitation were examined by onboard bottle incubation experiments using the surface water collected from 10 m depth by acid-cleaned Teflon-coated 12-liter Niskin-X bottles at stations 7, 11, 15 and 17. The surface water prescreened with a 210 μm acid-cleaned Teflon mesh for removal of meso-zooplankton was homogenized in an acid-cleaned 20-1iter polycarbonate carboy, and then the water was dispensed into acid-cleaned polycarbonate incubation bottles. Six 500ml and three 4L bottles were used for each treatment at stations 7 and 17. At stations 11 and 15, 250-ml polycarbonate bottles were used for incubation and thus only limited parameters (Chl *a* and nutrients) were monitored during the incubations. The treatments were additions of iron at 2 nmol/L or vitamin B_{12} at 100 pmol/L, as well as simultaneous additions of iron and vitamin B_{12}. At station 17, ammonium ion was added at 5 μM, instead of iron, because DIN depletion was expected at 43˚N. Samples without addition were treated as controls. The bottles were incubated on deck in a running surface seawater bath to maintain surface seawater temperatures for 6 days. The incubation bath was covered with a neutral density screen, which shaded the ambient light to a 50% level. After 2 and 4 days of incubation, three 500-ml bottles were withdrawn for each treatment from the incubation bath at a time, and submitted to the measurements of nutrients, size-fractionated Chl *a*. Large 4-liter bottles were recovered on day 6 to measure concentrations of nutrients and size-fractionated Chl *a*, and phytoplankton community composition by microscopy and HPLC pigment analysis. Replicate samples were taken from the replicate bottles. Samples at the start of the experiments were collected directly from the 20-1iter carboy for determinations of these parameters as well as concentration of total dissolvable iron (TDFe) and vitamin B_{12}.

The samples (480~500-ml) for size-fractionated Chl *a* measurement were filtered onto 20 μm and 2 μm Nuclepore filters, and Whatman GF/F filter by gentle vacuum filtration (< 200 mm Hg), and Chl *a* was extracted from the filters for more than 24 hr in N,N-dimethylformamide at –20ºC. Extracted Chl *a* was determined onboard by the fluorometric technique with a Turner Designs 10-AU field fluorometer with the chlorophyll optical kit for the non-acidification method (Welschmeyer, 1994). Samples (1~2-liter) for HPLC pigment measurement were filtered onto Whatman GF/F filter by gentle vacuum filtration (< 200 mm Hg), and filters were kept frozen in 5ml tubes filled with nitrogen gas at -80ºC until onshore measurement. Samples for nutrient analysis were collected in 10ml acrylic tubes and stored at –20ºC.

Atmospheric deposition of macro- and micro-nutrients:

Atmospheric aerosol samples were continuously (ca. 24 hours interval) collected using a high-volume virtual dichotomous air sampler (Model AS-9, Kimoto Electric, Co., Ltd.) that was mounted on the upper deck of the ship, 13 m above the sea surface. The virtual impactor separated coarse (diameter, d>2.5 μm) and fine (d<2.5 μm) particles, wherein both the fractions were collected on a single 90 mm Teflon filter (ADVANTEC PF040). These filters were stored at 4˚C for onshore analysis of nutrients (inorganic/organic N) and major ions.

Wet deposition samples were collected using a collector with a 30 cm i.d. acid-cleaned plastic funnel into acid-cleaned 250-ml FLPE bottles. The collector was set up at the front of the upper deck and the funnel was opened only under the against wind condition during the cruise. Collected samples were frozen under –20ºC for onshore analysis of nutrients (inorganic/organic N) and major ions.

Preliminary results and future works

In the subarctic North Pacific Ocean, phytoplankton assemblage at both station 7 and station 11 responded to the additions of iron (Fe or Fe+B_{12}) by increasing their chlorophyll biomass after 2 or 4 days. However, significant difference in chlorophyll between iron and iron+B_{12} treatment was not observed. There was no growth stimulation in bottles enriched with vitamin B_{12} alone Thus, growth of phytoplankton assemblages in these stations seems to be under control by iron availability. Since vitamin B_{12} amendment could have influence on species composition of phytoplankton assemblage, changes in algal community composition will be characterized by light microscopy and HPLC pigment analysis..

Concentrations of natural iron-complexing organic ligands will be measured by competitive ligand exchange-cathodic stripping voltammetry using the 2-(2-Thioazolylazo)-*p*-cresol (TAC) as the competitive ligand (Croot and Johansson, 2000; Kondo et al., 2012). The acidified water samples will be stored for more than three months, and then analysis of iron (III) concentration will be done by a chelating resin concentration and chemiluminescence detection method (Obata *et al*. 1993). Speciation of Iron (III) will be estimated from measured concentrations of total dissolved iron and iron binding organic ligands, and these conditional conditional stability constants.

Water-soluble nutrients in aerosol and wet deposition samples will be determined using a continuous flow analyzing system (AACS IV, BLTEC). Water-soluble total nitrogen will be analyzed by a $NO/NO_2/NO_x$ analyzer (Yanaco ECL-880US) attached to a total organic carbon analyzer (Simadzu, TOC-V_{CSH}), and amounts of organic nitrogen will be estimated from the differences between total and inorganic nitrogen concentrations. Major anions and cations in the samples will be analyzed by an ion chromatography.

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8.11. Distribution of trace metals (Al, Mn, Fe, Co, Ni, Cu, Zn, Cd, Pb, Zr, Hf, Nb, Ta, Mo, W, Pd, Pt, Au, and Bi) and their isotopes (Cu, Mo, and Pb) in seawater

1. Personnel

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2. Introduction and Objectives The distribution of trace metals in seawater is controlled by various physical, chemical, and biological processes. In order to reveal the distribution and behavior of trace metals in the ocean, we have developed multi-elemental determination of trace metals in seawater based on preconcentration by solid phase extraction with chelating resins and detection by inductively coupled plasma mass spectrometry (ICP-MS; Firdaus et al., 2007; Sohrin et al., 2008). In this study, we will reveal the sectional distribution of bioactive trace metals (Al, Mn, Fe, Co, Ni, Cu, Zn, Cd, and Pb), incompatible trace metals (Zr, Nb, Mo, Hf, Ta, and W), platinum group elements (Pd, Pt, and Au), and Bi along 47°N in the subarctic North Pacific Ocean. We will also investigate the isotopic composition of Cu, Mo, and Pb at some stations.

3. Methods Seawater samples were collected using the clean CTD sampling system with Niskin-X bottles. Filtered samples were passed through an AcroPak cartridge filter (Pall Life Sciences) by the pressure of compressed air and transferred to 250 mL LDPE bottoles (Nalge) for bioactive trace metals, incompatible trace metals, Bi, and Mo isotopes, 2 L LDPE bottles for Cu isotopes, 2 L HDPE bottles for Pb isotopes, and 4 L LDPE bottles for platinum group elements. Unfiltered samples were transferred from the Niskin-X bottles to 250 mL LDPE bottles using a silicon tube and bell. The bottling was carried out in a clean booth constructed in the No.7 Lab. The samples were acidified with 20% HCl (Tamapure AA-10, Tama Chemicals) for bioactive trace metals, Bi, and Mo isotopes, with a mixture of 1 M HF-5 M HCl (Tamapure AA-10 and AA-100) for the incompatible trace metals, with 20% HCl (Tamapure AA-100) for Pb isotopes, or with 35% HCl (Ultrapur 100, Kanto chemicals) for Cu isotopes and platinum group elements.

The target metals are going to be preconcentrated by solid phase extraction using columns of chelating resins. The concentration of trace metals will be determined by ICP-MS. The isotopic composition will be measured by multi-collector ICP-MS.

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8.12. Distribution of Total Inorganic Chromium and Chromium(III) in the northern Pacific

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Thermodynamic calculations predict that the predominant oxidation state of chromium should be chromium(VI) in oxygenated seawater at the natural pH(ca. 8.0). According to the results obtained by many researches, however, a few percentage of dissolved inorganic chromium exists in chromium(III), while the predominant species in the oceans are chromium(VI) .

The previous observations have revealed that the typical vertical profile of both chromium(VI) and total inorganic chromium, the sum of chromium(III) and chromium(VI), is almost uniform through the water column, and slightly decreased and fluctuated in the euphotic zones. Nevertheless, the global oceanic distribution of chromium is not yet clear. In the recent observation in the central and northern Pacific, it was found that the distribution pattern of total inorganic chromium indicates the remarkable difference between the central area and the northern area [1].

The purpose of this research is to obtain the regional distribution of total inorganic chromium in the northern Pacific in order to clarify the geochemical significance of chromium in the ocean by discussing the oceanic process affecting the distribution of chromium species. In addition, the vertical profiles of chromium(III) in some stations will be discussed.

Sampling and treatment

Seawater samples were collected by Teflon-coated X-Niskin samplers installed on the CTD-CMS system. All samples were directly taken from each sampler. Samples for the determination of total inorganic chromium were acidified at pH 1.3 by adding hydrochloric acid (Tamapure AA-100 grade).

Analysis [2]

Chromium(III) in the samples was collected onboard as the complex with 8-quinolinol by the solid phase extraction. Total inorganic chromium will be collected in the same manner after the reduction of chromium(VI) to chromium(III). Both chromium species will be determined by graphite furnace atomic absorption spectrometry.

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8.13. *Chemical speciation of selenium in seawater in the North Pacific Ocean*

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Purpose

Selenium exist three chemical forms such as selenite, selenate and organic selenide. Organic selenide was detected at deep water in the marginal seas such as the Sulu, the South China Sea and the Celebes Sea. The form of organic selenide was investigated by researching the relationship between marine humic-like fluorescence and organic selenide. There results confirmed that the organic selenide might be existed in the humic-like substances, and it is present in the deep water of South China Sea. Some results for organic selenide form indicated that the organic selenide might not be existed only seleno-amino acid form but also volatile form and humic-like substances form.

A new international programme in marine geochemistry, "GEOTRACES," was started in 2005. The GEOTRACES mission includes determining the full water column distribution of selected trace elements and evaluating the sources and sinks and internal cycling of these species of the elements. However, the speciation and recycling of selenium in the western Indian Ocean and Antarctic Sea are still not well known. The present study describes the vertical profiles of dissolved selenium species and humic-like substances (fulvic acid) in the the Indian Ocean and Antarctic Sea during the cruise of *R/V Hakuho-Maru* in 2009.

Sampling and Method

Seawater samples were collected by 12 L Teflon-coated Lever-action Niskin Bottles mounted on a 24-position Sea-Bird's 911 plus CTD-rosette, hung from a titanium-armored cable. The Niskin bottles were pre-cleaned successively with distilled HCl and deionized water. After collection, the water samples for selenium speciation were filtered through a 0.45-μm nucleopore filter.

Determination of selenite: A 30-ml sample of filtered water was placed into a 100-ml glass beaker, and 5 ml of 0.1% 2,3-diaminonaphthalene (DAN, Nacalai Tesque Co. Ltd.) -0.1M hydrochloric acid solution and 0.5 ml of 0.1 M ethylenediaminetetraacetic acid-sodium fluoride (EDTA-NaF, Kishida Kagaku Co. Ltd.) solution were added to ask any interfering metal ions. The sample solution was adjusted to pH 1 with 6 M hydrochloric acid, and was warmed at 50°C for 20 min. After cooling, the solution was transferred to a separating funnel and was mechanically shaken with 5 ml of cyclohexane for 10 min. The piaselenol in the cyclohexane was determined by HPLC (high performance liquid chromatography) with a fluorescence detector at Ex. 375nm / Em. 520nm. The detection limit (S/N=2) of the DAN-HPLC method was 1 pM. Determination of selenate: The selenate amount was calculated by subtracting the selenite amount from the summed selenite and selenate amount, which was obtained by the following reduction procedure. A 20-ml filtered water sample was placed into a 100 ml Erlenmeyer flask, and the acidity of the sample solution was adjusted to 1.2 M hydrochloric acid solution. After 2.0 g of potassium bromide was added, the flask was placed in a water bath and the solution was warmed at 85~90°C for 25 min. After cooling, the amount of reduced selenate and selenite in the solution was determined by HPLC. Determination of organic selenide: The amount of organic selenide was estimated by subtracting both the selenite and selenate from the total amount of selenium, which was determined after wet-ashing decomposition with conc. nitric and 60% perchloric acid (analytical grade), followed by HPLC.

8.14. Biogeochemical studies on Ba in seawaters and barite particle in sediment cores from the North Pacific; GEOTRACES section study

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Barite ($BaSO_4$) has been found in suspended and settling particles in seawaters, and also in sea-floor sediments under high productivity regions. It is believed that barite particles are formed in settling particles during the biological process. Therefore, the distribution of barite or biogenic Ba (as the excess amount relative to the crustal abundance) in the sediment core is useful as a proxy for the change of paleo-productivity. While it is important for us to understand the biogeochemical cycles of Ba, the uptake in the euphotic zone and the regeneration in the deep-water. Also, we must know about the early diagenesis of sedimentary Ba through its distribution in the pore water and solid phase of sediment core. The purposes of this research are divided into two categories; (1) to clear the west-east section profile of dissolved Ba in seawaters, and (2) to investigate the longitudinal change of dissolved Ba in pore waters and barite in sediment cores in the subarctic region of the North Pacific.

1. Ba in seawater

It is known that the vertical distribution of Ba in seawater is very like that of silicate. However, the correlation between the two is less than that between Ba and the silicate/nitrate ratio (Si/N). Previously, we have found out the linear relationship between Ba and Si/N in the central Pacific section study from 50°N to 67°S in 2009. There is a possibility of using this relation as a paleoceanographic tool, as well as the case of the linearity of Ba versus alkalinity in the ocean. Our object is to confirm the relation between Ba and Si/N ratio in the Pacific.

Seawater samples were collected at all hydrocast stations and were immediately filtrated, following the GEOTACES protocol. They were stored into 100 ml polypropylene bottles.

2. Dissolved Ba in pore waters and barite in sediments

The objective of this study is to clear the recycle of dissolved Ba in pore water as well as other biophile elements, nitrate, nitrite, phosphate and silicate. And also, we will investigate the origin of the longitudinal change of barite particle included in sediment cores. The following works were carried out on board.

Sediment cores were collected at all BD stations using a multiple corer. Sediment samples were immediately extruded in the glove box, flowing N_2 gas, after collection. Pore waters were squeezed from each extruded sediment sample by pressure filtration using a 0.45 μm porosity membrane filter in another glove box, flowing with N_2 gas. Sediment extruding and pore water extracting were performed within 12 hr in the walk-in refrigerator Lab. 10.

Nutrients in pore waters, nitrate, nitrite, phosphate and silicate, were determined by using an autoanalyzer on board by K. Takeda of Kinki University. A part of each pore water sample was shared to measure dissolved iron etc. and the residue was stored in polypropylene tube for dissolved Ba (acidified pH=1 by HCl)..

The concentration of barite in sediments will be measured, as well as carbonate and opal. The downcore distributions of these biogenic constituents give us the background information to interpret those of the pore water constituents.

8.15. Helium isotopes of seawater in North Pacific Ocean

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Purpose

$^3He/^4He$ ratio is one of the most sensitive and conservative tracer for studying the deep-sea circulation because 1) ^3He in the ocean mainly derived from the mantle, 2) He is chemically inert gas. Even though $^3He/^4He$ ratios are basic and important oceanographic data, there are not enough study in North Pacific Ocean. In this study, deep seawaters are collected in the regions and their $^3He/^4He$ ratios are measured. We discuss the deep-sea circulation based on the excess ^3He.

Sampling method

Seawaters were collected by CTD system and were transferred without exposure to atmosphere from Niskin bottle to ~30 cc copper container for helium isotopic measurement. Both ends of the copper containers were sealed with stainless clamp.

On land experiments

At laboratory, the copper container is connected to a stainless steel high vacuum line and dissolved gases in seawater are extracted in vacuo. Helium in the extracted gases are purified by hot Ti-Zr getters and charcoal traps held at liquid nitrogen temperature. Helium is separated from neon by a cryogenic trap held at 40 K. After purifying and separating of helium, $^3He/^4He$ ratios are measured on a noble gas mass spectrometer (VG 5400, MicroMass. Co.) with double collection mode. A resolving power of ~550 at 1% of peak height was used for the complete separation of ^3He beam from those of H_3^+ and HD^+. The $^3He/^4He$ ratios of the samples are calibrated against atmospheric helium. Analytical error of $^3He/^4He$ ratio is about 1 % estimated by repeated measurements of standard air.

8.16. Chemical composition of suspended particles in the North Pacific

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Purpose

In the ocean, various kinds of particles exist, for example, mineral particles transported from the atmosphere and rivers, anthropogenic particles and particles produced in seawater through biological activities and chemical reactions. Thus the chemical compositions and size of suspended particles in seawater depend on their origins. By studying the chemical composition of suspended particles in seawater, we might understand the origin and the feature of water masses. Also, suspended particles are thought to play important roles in oceanic biogeochemical cycles, e.g., biological pump for carbon and trace elements.

During this cruise, we study the chemical compositions of suspended particles in the North Pacific, and clarify the feature, chemical composition and behavior of particles in this oceanic region.

Sampling

Surface waters were collected by using a polyethylene bucket. Vertical samples were obtained using the CTD-CMS at most sampling stations (BD07, BD09, BD11, BD14, BD17, BD20 and BD21).

Methods （Filtration）

Seawater samples (100-10000ml) were filtered through 25mm diameter, 0.4 μm porosity Nuclepore filters for microscopic analyses, and 47mm diameter, 0.2 μm porosity Supor filters for trace-metal analyses immediately after sampling. The Nuclepore filers were rinsed with 200ml of Milli-Q water.

Analysis

Particles collected on the filters were preserved at 4 ^{o}C in a refrigerator. The shape and size of particles will be observed with the Scanning Electron Microscope (SEM) and the chemical composition of particles will be analyzed with Energy Dispersive Spectroscopy (EDS) or Electron Probe X-ray Micro Analyzer (EPMA) in the laboratory. The Supor filter samples will be degested in a nonsealed Teflon vessel with a mixture of perchloric, nitric and hydrofluoric acids, and trace metals will be determined with ICP-MS.

8.17. DISTRIBUTION AND PATTERN OF SPREAD OF TRACE METALS AS MICRO NUTRIENTS IN THE NORTH PACIFIC OCEAN

Roy Andreas
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Purpose: Generally, dissolved bioactive trace metals are released from the dissolution of particulate matter in the ocean. Some trace metals, such as Al, Mn, Fe, Co, Ni, Cu, Zn, Cd and Pb, might be necessary for the phytoplankton growth in the ocean. Therefore, the bioactive trace metals might be released from the biological particles such as phytoplankton. However, there are a lot of particle with various source in the ocean.

In this study, we research the distribution of trace metals as micro nutrients both dissolved and particle (acid dissolved fraction) by ICP-MS..

Sampling method : Seawater samples were collected at some the CTD stations for bioactive trace metals and incompatible trace metals. Water samples were transferred from Niskin-X bottles to 500-mL polyethylene bottles (LDPE, Nalge) using a clean bell and acid-cleaned silicon tubing in a clean room constructed in the No.7 Lab. Some portions of the samples were filtered through a 0.2-μm polycarbonate membrane filter (Nuclepore) by the pressure of nitrogen gas in a closed filtration system in a clean room. All the filtered and unfiltered samples for trace metals were acidified with 30% HCl (Tamapure AA-100)

On land experiments Samples will be purified by a column of chelating resins and the concentration of trace metals will be determined with ICP-MS. The isotopic composition of some metals will be measured by ICP-MS.

8.18. DISTRIBUTION AND FRACTINATION OF CHLOROPHYLL ON SUB-SURFACE WATER IN THE NORTH PACIFIC OCEAN BY UNDERWAY WATER SAMPLING

Roy Andreas
(Ph.D Student of Graduate School of Science and Engineering, University of Toyama)

Sampling and Analytical Method

Sampling: Sub-surface water samples (6 - 10 m depth) were collected by underway water sampling every 3 hours moving (± 1º longitude) into 1000 ml amber polyethylene bottles. Samples (200 ml) were immediately filtered through 25 mm of variation pore size : Whatman GF/F glass (0.7 µm), millipore 2 µm, millipore 5 µm, and millipore 10 µm maintaining vacuum levels of 0.02 MPa or less. Filters were placed in polypropylene vials and extracted in 7.0 ml N, N-dimethylformamide.

Analytical Method: The fluorometric method was used for the quantitative analysis of chlorophyll *a*. The samples are allowed to extract for 1–2 days in a freezer (–20ºC). After removal from the cold, extracted samples were placed in a 13 mm glass cuvette and read on the Turner Designs 10-AU field fluorometer with a chlorophyll optical kit for the non-acidification method (Welschmeyer, 1994, Limnology and Oceanography 39, 1985–1992). The concentrations of chlorophyll *a* in the sample (µg l^{-1}) were calculated from the reading using the calibration and scaling factors. The fluorometer was calibrated at the beginning of leg. 1 and the end of leg. 3 with a commercially available chlorophyll *a* standard (from *Anacystis nidulans* algae, Sigma Chemical Co.). Serial dilutions are prepared and linear calibration factors are calculated for each analytical range.

8.19. The isotopic ratio of $^{129}I/^{127}I$ in the north Pacific.

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Background and objectives:

Long-lived radioisotope ^{129}I (half life = 1.57 x 10^7yr) is naturally produced cosmogenically and fissiogenically, i.e., by the interaction between cosmic rays and Xe in the atmosphere and by the spontaneous fission of ^{238}U in the crust. However since late 1950's, by the nuclear weapons testing and following waste nuclear fuel reprocessing, enormous amount of ^{129}I has been released into earth surface environment so that nowadays the $^{129}I/^{127}I$ ratio had been several orders higher than before 1950's.

As ^{129}I is radioisotope, some attempts to use this isotope system as a dating tool for the time scale of Myr orders have been tried. Several conditions are required for proper dating using a radioisotope-stable isotope system. Most important is that the initial ratio is constant enough everywhere and every time concerned. In the case of iodine isotope system, residence time in the ocean (to be estimated as about 300 kyr) is much longer than ocean circulation period (1-2 kyr) and much shorter than its half life. Since the exchange time between atmosphere and ocean should be much shorter, atmosphere-ocean system can be regarded as fully open system with respect to the iodine isotope system. Next important issue is to know the initial value. As mentioned above, anthropogenic ^{129}I was severely injected into the earth surface environment, so we cannot now the natural initial $^{129}I/^{127}I$ ratio by measuring environmental sample today. One way to dare this situation is to obtain samples collected before 1950 and preserved well. Another way is to investigate far from surface environment, i.e. deep under the ground or deep in the ocean.

J. Moran et al. (1998) proposed 1.5 x 10^{-12} as the initial ratio by measuring depth profiles of marine sediments off coasts around the north and south America. Recently U. Fehn et al. (2007) also presented iodine isotope data of old seaweeds and supported that initial value. Using this initial value, U. Fehn and his colleague measured several brines or pore water found near the methane hydrates or natural gases and determined their "iodine age". Their results often show large discrepancy between "iodine age" and the age of sediments from which brine or pore water was sampled. Typical example is the case of Mobara, Chiba prefecture, Japan performed by Y. Muramatsu et al. (2001). In Mobara region iodine-rich brine is existent with natural gas in the Kazusa formation which sedimentary age is 1-3 Ma. However average $^{129}I/^{127}I$ ratio in the brine is 1.7 x 10^{-13} which corresponds to about 50 Ma. Situations in the other sites (Blake ridge, Peru margin, Off the coast of New Zealand, etc) are more or less the same, i.e., the "iodine age" is much older than "sedimentary or geologic age". While these results suggest somewhat complicate history of the generation and migration of methane hydrates or natural gas and iodine, on the other hand, we have question whether the initial value proposed by J. Moran et al. is really true or not.

Actually, some layers in the depth profiles in the Moran's paper show obviously lower $^{129}I/^{127}I$ ratio which is interpreted as the mixing with older iodine. Also in the Fehn's paper some seaweeds show significantly lower $^{129}I/^{127}I$ which is interpreted as a local effect.

Here one of motivations of my participation with this research cruise is to measure $^{129}I/^{127}I$ ratio in deep sea water far from continents. It is about a thousand year for a surface water column come to deep sea, so dissolved component of anthropogenic ^{129}I could not yet reach deep sea. Although micro vials would carry modern iodine more quickly from surface to deep sea, they should directly cumulate on to sea floor and it would take much more time to release their iodine back into seawater than several decades. Thus $^{129}I/^{127}I$ ratio in dissolved iodine component in deep sea should reflect the initial value.

My objectives are:

1) To see what an extent anthropogenic ^{129}I is intrude from depth profile from surface to bottom and

2) To re-examine the natural initial value of $^{129}I/^{127}I$ in marine environment as well as its global homogeneity.

Method and sampling strategy:

To determine $^{129}I/^{127}I$ ratio in sea water, there are two methods to treat a sample, using carrier or not. If you have ^{129}I free iodine reagent and target isotopic ratio is high enough compared with the background of Accelerator Mass Spectrometry, it is convenient to use carrier. Though the least isotopic ratio of iodine carrier ever known is 2×10^{-14}, it can be used as a carrier if our target range of isotopic ratio for deep sea is on the order of 10^{-13}. For this method, 1L seawater sample, for each observation point and depth, was collected.

In the case of carrier method, error involved in the final result should be greater as the target ratio is lower. We also try carrier-free method. In this method, 20L seawater is needed for 1mg iodine required by AMS, because the iodine concentration in seawater is typically 55ppb. From 20L seawater AgI-AgCl co-precipitation was collected by addition of $AgNO_3$. Pure AgI extraction from the co-precipitation will be the task after taking back to the laboratory. If this purification is successful, we can determine isotopic ratio of seawater as low as 10^{-14}order.

$^{129}I/^{127}I$ ratio will be measured by Accelerator Mass Spectrometry and iodine concentration by ICP-MS.

8.20. Distributions of radioactive Cs isotopes discharged from Fukushima Daiichi NPP in the north Pacific.

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Purpose

A large amount of radioactive cesium isotopes were discharged from Fukushima Daiichi nuclear power plants (FNPP1) accident caused by the Great East Japan Earthquake on 11 March 2011. The total activities discharged from FNPP1 into the atmosphere by venting from reactors was estimated to 33PBq. And the discharged activities to the sea surface were 2.6, 4.7 and 1.5 x 10^{-4} PBq for fallout from atmosphere, high level leakage water from #2 reactor and low level stored water, respectively. Temporal and spatial distributions of radioactive cesium isotopes were important for assessment of radiation dose for marine biosphere and for geochemical model parameter. In this cruise, we investigate the distribution of radioactive cesium isotopes in North Pacific.

Method

The filtrated 20L seawater sample collected by the large volume sampler was weighed first, then added 0.2 g of stable cesium carrier and acidified for pH 2 by 25 mL of EL glade 60% HNO_3. After 1h stirring by a magnetic stirrer, 4g of ammonium phosphomolybdate (AMP) was added to the sample and stirred for 1h . The AMP-Cs compound was filtrated by a membrane filter (pore size: 0.45 μm) and stored in a polyethylene cup. The AMP-Cs compound was moved to a PTFE beaker and weighed after drying at 100 °C for 12 h. The AMP-Cs compound was transferred into a PTFE tube and subjected to γ –ray counting with a well type HPGe detector.

8.21. Radiogenic and stable isotopic distributions of Nd and Ce in the North Pacific Ocean

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1 Introduction

Nd in the REEs has 7 stable isotopes (^{142}Nd, ^{143}Nd, ^{144}Nd, ^{145}Nd, ^{146}Nd, ^{148}Nd, and ^{150}Nd). ^{143}Nd is radiogenic isotopes derived from α-decay of ^{147}Sm. Ce is also multiple stable isotopes (^{136}Ce, ^{138}Ce, ^{140}Ce, ^{142}Ce) including radiogenic ^{138}Ce. Nd isotopic composition (^{143}Nd/^{144}Nd), one of the useful isotopic tracers in geochemistry, is frequently utilized in the field of marine chemistry, because water masses show characteristic values reflecting the geology of Nd source area. Since the mean residence time of Ce is much shorter than that of Nd and other REEs, the less homogenized isotopic composition of Ce (^{138}Ce/^{142}Ce) is expected to be a strong tracer for horizontal transport from the igneous province, such as the island arcs. Stable isotopes can be fractionated by chemical and physical processes. Particularly, Ce isotopes can be varies larger than Nd isotopes. Stable Ce isotopes In this cruise, we will determine the surface and vertical distribution for radiogenic and stable isotopes for Ce and Nd in the North Pacific Ocean.

2 Methods

2-1. Vertical profiles of Nd isotopic composition

Seawater samples for vertical profiles of Nd IC were collected using a large volume water sampler. Sample volumes were 250L for shallow water (>800m depth) and 20L for deep water. All samples were filtered with 0.5 μm-pore size wind-cartridge filter (Advantec) on the ship deck. Then HCl and Fe carrier (including Be carrier) were added. Nd was precipitated by NH_4OH with $Fe(OH)_3$. The precipitates were filtered out by the qualitative filter paper (ϕ500mm: No.2, Advantec) and dryness for LV samples and cut down supernatant by decantation for deep samples, respectively. Then, samples were brought back to land based laboratory for further analysis.

2-2. Vertical profiles of Ce isotopic composition

Seawater samples for vertical profiles of Ce IC were collected at 5 layers (0m, 100 m, 500 m, 1000m, 2000m) using a large volume water sampler in DB-14

8.22. Fukushima-derived radiostrontium in the North Pacific Ocean

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Introduction

The Great East Japan Earthquake and resulting gigantic tsunami on 11March, 2011, caused the Fukushima Daiichi Nuclear Power Plant accident. The impact of the Fukushima-derived radiostrontium (^{90}Sr) on the North Pacific Ocean has not been well established, although ^{90}Sr concentrations recorded in surface seawater offshore damaged Fukushima Daiichi Nuclear Power Plant were in some areas comparable or even higher (as those in December 2011 with 400kBq m^{-3} of ^{90}Sr) than the ^{137}Cs level. The total amount of ^{90}Sr released to the marine environment in the form of highly radioactive wastewater could reach about 1 PBq. In this study, ^{90}Sr concentration in seawater offshore from Fukushima and in the North Pacific Ocean are measured and the impact from the Fukushima Daiichi Nuclear Power Plant will be investigated.

Analytical Method

Sampling

20L of seawater were collected by large volume sampler and filtrated by 0.5 μm polypropylene wind-cartridge filter. Sr-90 samples for vertical profile were collected station of offshore Fukushima at BD-1, -2, -3, -4, -5and open ocean station BD-7, -9, -11, -14, -15. Sampling depths were focused on shallower depths, 20m, 60m, 100m, 200m 300m, 400m, 500m, 600m. Deep samples also collected at 1000m, 2000m, 3000m, 4000m, 5000m.

Analytical procedures

Filtered seawater weretransferred to the polyethylene container and 50 g of oxalic acid and 50g of NaOH were added. Sr co-precipitates with Ca-precipitates. Typical Sryield is 80 ± 5 %. Precipitates were filtered by 41μm and 10μm nylon mesh filter on the shipboard. CaC_2O_4coprecipitateis dried down at 110°C and decomposed to carbonate at 550°C in the muffle oven. Ca(Sr)-carbonate were dissolved in HCl. Fe (10mg) coprecipitation method is conducted to remove daughter nuclides, ^{90}Y, and other radioactive nuclides. Then, filtrate is dissolved in diluted HCl and Fe (10mg) and Y (5mg) carriers. After radioactive equilibrium (>2 weeks), theFe coprecipitation is conducted again. Fe precipitate is dissolved in 8M HCl and put through successive 2 mL of anion exchange resin and 2mL of Eichrom DGA resin (Eichrom Tec.). Y is selectively adsorbed on DGA resin in 8M HCl and is eluted 0.05M HCl. Purified Y fraction is measured beta-ray by proportional gas flow countor.

(46°59.99N, 169°59.81W, 5493 m). The sample volumes were 750 L for radiogenic Ce isotope and 250 L for stable Ce isotope analysis, respectively.

Collected samples were transferred to 300L PVC tanks settled on the ship deck after filtering 0.5μm pore size wind-cartridge filter (Advantec). Then, they were passed through MnO_2 fiber. Ce and Nd isotopes were strongly adsorbed on MnO_2 fiber. Further chemical separations and isotopic measurement are described in Tazoe et al. (2007).

2-3. Stable fractionation of Ce and Nd

250L of seawater samples were collected by large volume sampler at BD-14. Ce and Nd were preconcentrated by Fe-coprecipitation. Ce (^{136}Ce and ^{138}Ce) and Nd (^{147}Nd and ^{150}Nd) enriched isotope spikes are added. Ce and Nd are concentrated and purified by solvent extraction using HDEHP chelate and standard ion exchange column procedure. Both stable isotopes are measured by thermal ionization mass spectrometer.

2-4. REE concentrations

Seawater samples for vertical profiles were collected using X-type Niskin bottles mounted on a CTD/Carousel array. Seawater from Niskin bottle was passed through the 0.2 μm-pore size capsule filters, Acro Pak200 (Pall), with compressed air in the Bubble. Surface seawater samples were taken third a day from the ship's underway sampler and passed through the 0.5 μm pore size wind-cartridge filter (Advantec). They are acidified to pH<1.8 with ultra pure HCl in the clean room (No.4 Lab.) and carried to the ORI for analysis using solvent extraction and ICP-MS (Shabani et al., 1990).

2-5. Surface distributions of Ce and Nd ICs and REE concentrations

In addition of vertical sampling, surface seawaters were also collected for terrestrial input, such as river and aerosol, and lateral transportation by surface current system. Ce IC requiring large volumes (>1000L) were collected at station, and Nd IC were collected 50 – 100L of seawater every 8 hours during cruise. Surface seawater samples were taken from the underway sampler and passed through the 0.5 μm pore size wind-cartridge filter (Advantec) and by the MnO_2 method mentioned above. Both Ce and Nd isotopes dissolved in seawater were strongly adsorbed on the fiber.

3500, 4000, 4500, 5000, and bottom at station BD14,

0, 10, 20, 40, 60, 80, 100, 150, 200, 300, 400, 600, 800, 1000, 1250, 1500, 2000, 2500, 3000, 3500, 4000, 4500, and bottom at station BD15,

0, 60, 100, 150, 200, 300, 400, 600, 800, 1000, 1500, 2000, 2500, 3000, and bottom at station BD17

As for samples from surface to 1000 m in depth, water volume was about 200 L. The seawater samples are filtrated with cartridge-filtration system which has been used for large volume water sampling. A part of filtrated water (1 L and 100 ml) was subsampled for ^{238}U concentration analysis, and rest water is put into container together with Fe carrier (200 mg) and concentrated HCl (30 ml). After stirring for a while, 30 ml of NH_4OH (28%) was added to make $Fe(OH)_3$ precipitation for the collection of target element (such as U). This Fe precipitation was packed into 250 ml bottle for the sample preparation in laboratory. All reagents in these methods are in analytical grade.

For the comparison the depth profiles between ^{236}U and ^{137}Cs, extra 20 L of samples are collected at station BD15 in the depth of 0, 20, 60, 150, 300, 600, 1000, 1250, 1500, 2000, 2500, 3000, 3500, 4000, 4500 and bottom. These samples are directly packed into the 20 L container to bring them back to the laboratory.

Treatment and measurement (laboratory)

Uranium in $Fe(OH)_3$ precipitation is purified by using anion-exchange resin. This purified U is prepared as Fe oxide cathode target for the measurement of $^{236}U/^{238}U$ with AMS. ^{137}Cs is determined with γ-spectrometry by using Ge semiconductor detector after removing the matrix and interference nuclide, K-40, from the sample with ammonium molybdenum phosphate (AMP) and packed into sample tube. All these procedures for seawater sample preparations and measurements of Cs and U are shown in Sakaguchi et al. (2012).

8.24. Air and water sample collection for Perfluoroalkyl substances (PFASs) analysis in KH12-04.

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Introduction

Environmentally persistent perfluoroalkyl substances (PFASs, shown in figure 1) have appeared as a new class of global pollutants for the last ten years. These compounds in general, and perfluorooctane sulfonate (PFOS) in particular, have recently emerged as a priority environmental pollutant due to its widespread finding in biota including both Arctic and Antarctic species and its persistent and bioaccumulative nature. The physicochemical properties of PFASs are unique in that they have high water solubility despite the low reactivity of carbon-fluorine bond, which also imparts high stability in the environment. However, little is known on the distribution of PFASs in the oceans around the world, so far. We have conducted several international joint cruises, including South China Sea and Sulu Seas (KH-02-4), the central to Eastern Pacific Ocean (KH-03-1), North and middle Atlantic Ocean, Southern Pacific and Antarctic Ocean (KH04-5), Labrador Sea and coastal seawater from Asian countries (Japan, China, Hong Kong, Korea) (1, 2, 3). Vertical profiles of PFASs in the marine water column were associated with the global ocean circulation theory. Vertical profiles of PFASs in water columns from the Labrador Sea reflected the influx of the North Atlantic Current in surface waters, the Labrador Current in subsurface waters, and the Denmark Strait Overflow Water in deep layers below 2000 m. Striking differences in the vertical and spatial distribution of PFASs, depending on the oceans, suggest that these persistent organic acids can serve as useful chemical tracers to allow us to study oceanic transportation by major water currents. The results provide evidence that PFASs concentrations and profiles in the oceans adhere to a pattern consistent with the global ‘‘Broecker’s Conveyor Belt’’ theory (3) of open ocean water circulation. However, it is not well known in the North Pacific Ocean. We collected several samples of air and water in KH12-04 to enable preliminary understand three-dimensional distribution of PFASs in the North Pacific Ocean.

Materials and Methods

Samples: Seawater samples were taken by Conductivity temperature depth profiler-Carousel multiple sampling system (CTD-CMS) attached Niskin samplers of 12 L, together with surface seawater samples taken by stainless bucket at all the water sampling stations. Total number of water samples collected in KH12-04 is around 210 including surface seawaters. Sixteen water columns were subjected for three dimensional models of PFASs in the North Pacific Ocean transect.

At ten transect samples, atmospheric materials taken with air sampler, "Comprehensive cryogenic moisture sampler (CCMS)" newly developed by SIBATA Co. and AIST. The air sampler was operated with a flow rate of 20L/min. Samples were collected during underway to avoid contamination from exhaust gas from ship. Ambient air might be contaminated by exhaust gas from ship was also collected to evaluate possible influence for measurement at some stations during drifting. Water and air samples were stored at below -20°C until chemical analysis in AIST laboratory.

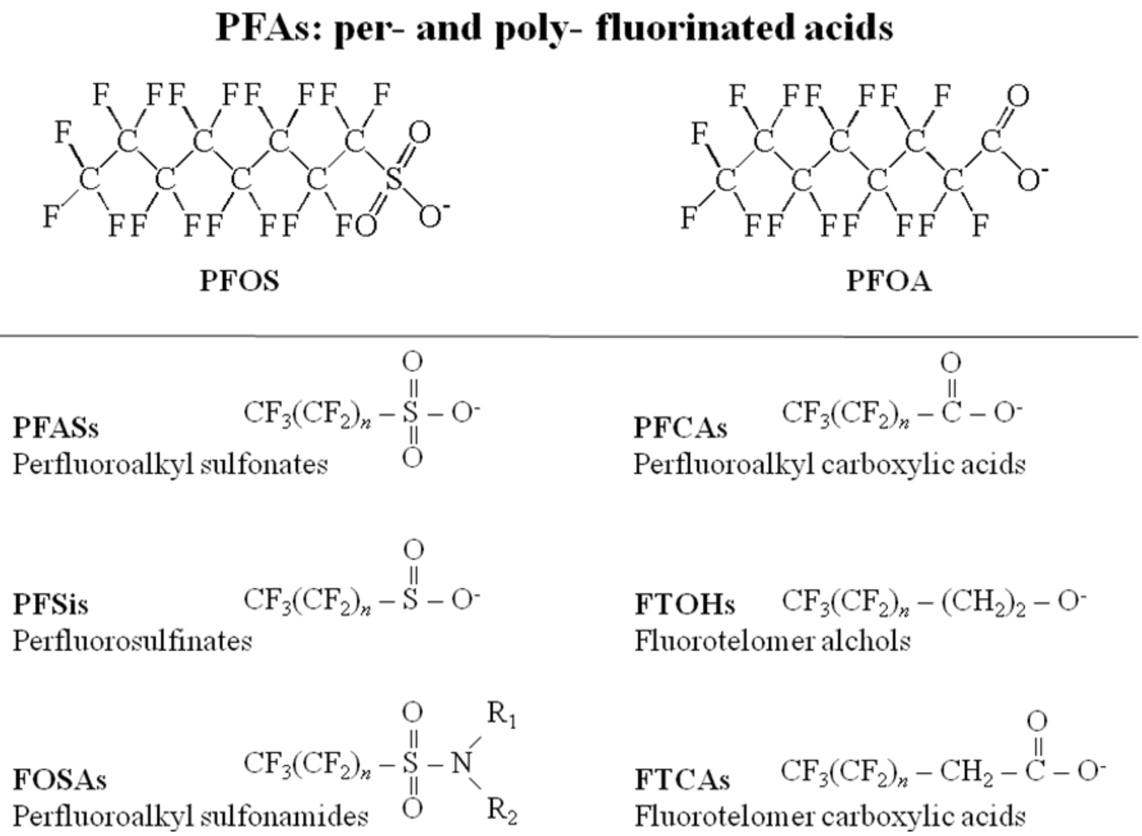


Figure 1. PFOS and related chemicals (perfluoroalkyl substances: PFASs)

***Chemical analysis**:* Water samples were stored in clean 1 L polypropylene bottles and were kept frozen until analysis. Samples were thawed at room temperature, and a solid phase extraction method using WAX® cartridge (Waters Co.) was used for the determination of PFAs by HPLC tandem mass spectrometry (HPLC-MS/MS) as described elsewhere (4,5). Briefly, after preconditioning with 4 mL ammonium hydroxide in methanol, 4 mL methanol, and then 4 mL Millipore water, the cartridges were loaded with 900-1000 mL samples at approximately 1 drop sec-1. The cartridges were then washed with 4mL of 25 mM ammonium acetate buffer (pH 4) in Millipore water and dried by centrifugation at 3000rpmfor 2 min. The elution was then divided into two fractions. The first fraction was carried out with 4 mL methanol and the second with 4 mL 0.1%ammoniumhydroxide in methanol. Both fractions were reduced to 0.5 mL under a nitrogen stream and analyzed separately. HPLC-MS/MS, composed of a HP1100 liquid chromatograph (Agilent Technologies, Palo Alto, CA) interfaced with a Micromass® (Beverly, MA) Quattro Ultima Pt mass spectrometer was operated in the electrospray negative ionization mode.A 5 or 10-µL aliquot of the sample extract was injected into a Betasil C18 column (2.1 mm i.d.×50 mm length, 5μm; Termo Hypersil-Keystone, Bellefonte, PA). The capillary is held at 1.2 kV. Cone-gas and desolvation-gas flows are kept at 60 and 650 L/h, respectively. Source and desolvation temperatures were kept at 120 and 420°C respectively. MS/MS parameters are optimized so as to transmit the [M-K]- or [M-H]- ions.

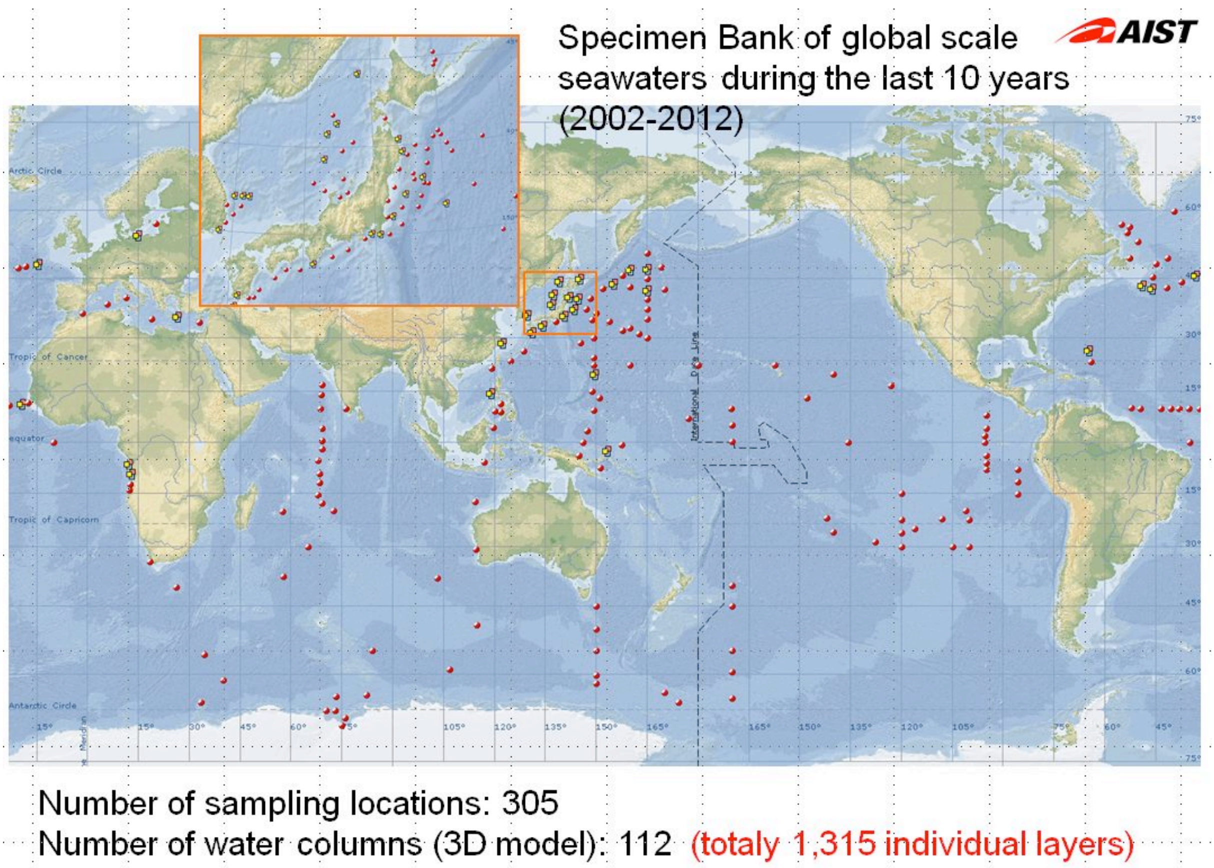
Conclusion

Samples collected in KH12-04 are expected to be analyzed within a year and this data set will be provided to GEORACES and published as a research result of "Chemical Oceanography to Elucidate Global Kinetics of Persistent Perfluorinated Chemicals (PFCs)" project no. B-1106 funded by the Ministry of the Environment, Japan.

To enable possible interpretation expected from sample collection in KH12-04, an example of recent research result was shown as below.

Global Ocean monitoring of PFASs was initiated in 2002 and continued up to now. Total number of sampling locations are 305, totally 1,315 individual samples were analyzed up to 2012 (figure 2).

Concentrations of PFOA and PFOS in western and eastern Pacific Ocean waters ranged from 15 to 62



and from 1.1 to 20 pg/L, in respectively. These concentrations were an order of magnitude lower than the concentrations found in offshore waters, and four orders of magnitude lower than the concentrations measured in Tokyo Bay waters. These values appear to be the background values for remote marine waters far from local sources. The remarkable difference between residue level of PFASs in the Pacific and the Atlantic Ocean seems to be influenced by several local sources in the latter region.

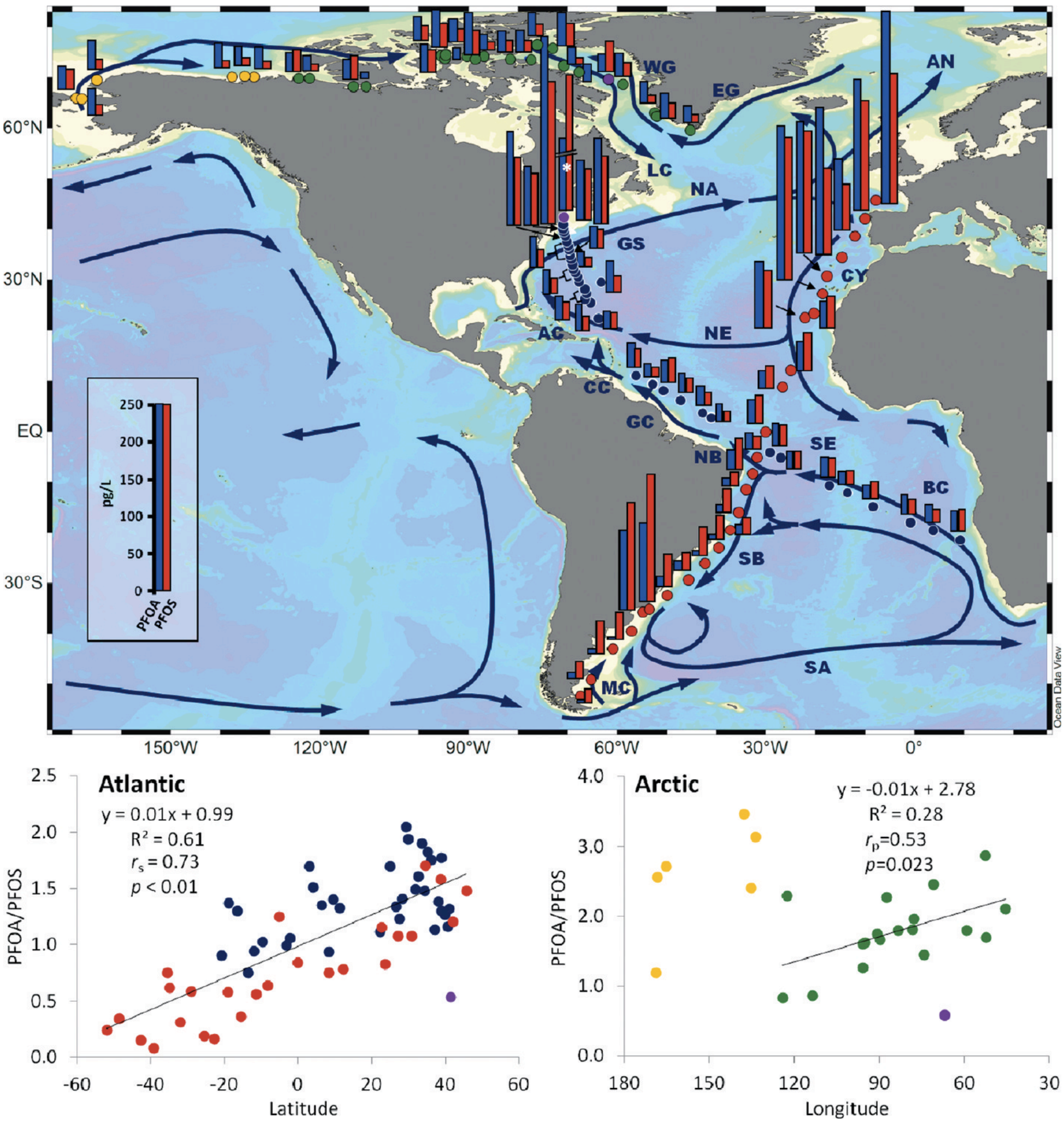


Figure 2. Perfluoroalkyl Acids in the Atlantic and Canadian Arctic Ocean (from J. Benskin dx.doi.org/10.1021/es300578x | Environ. Sci. Technol) .

PFASs in the Atlantic and Canadian Arctic Oceans were surveyed according to the international cooperation between AIST, AORI, University of Alberta and Environment Canada recently (figure 3).

(Upper panel) Concentrations of PFOA and PFOS in the Atlantic and Canadian Arctic archipelago and (lower panel) regressions of PFOA/PFOS ratio versus latitude (Atlantic samples; lower left) and longitude (Arctic samples; lower right). Samples collected west of the Canadian Arctic archipelago (denoted by yellow markers) were not included. Purple markers represent outliers, which were not included in regressions. Surface currents were abbreviated as follows: CY, Canary; NE, North Equatorial; CC, Caribbean; AC, Antilles; GS, Gulf Stream; NA, North Atlantic;

AN, Atlantic Norwegian; EG, East Greenland; WG, West Greenland; LC, Labrador; GC, Guiana; NB, North Brazil; SE, South Equatorial; BC, Bengula; SB, South Brazil; SA, South Atlantic; MC, Malvinas.

Figure 3. Perfluoroalkyl Acids in the Atlantic and Canadian Arctic Ocean (from J. Benskin dx.doi.org/10.1021/es300578x | Environ. Sci. Technol) .

It was cleared that global ocean study of PFASs pollution becoming very hot issue in not only POPs research but also as part of traditional oceanography. However, no analytical result of PFASs in deep water was reported even in this report. AIST is only a laboratory published three-dimensional model of PFASs in combination with the most sensitive analysis of PFASs in open ocean waters. Hence, analytical result of PFASs in several water columns collected in KH12-04 will provide very new understanding of PFASs in the North Pacific Ocean.

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9. Studies on sediment samples

9.1. Accumulation of ^{134}Cs and ^{137}Cs released from the Fukushima Dai-ichi Nuclear Plant in the neighboring seafloor

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The terribly strong earthquake, and subsequent tsunami on March 11 in 2011 caused serious damage to the Fukushima Dai-ichi nuclear plants of Tokyo Electric Power Company. Thereafter, March 12, venting of gases, hydrogen explosions, and the fire in the plant house resulted in the atmospheric releases of Fukushima radionuclide contaminants. In addition to the atmospheric fallout, the highly radioactive contaminated water from the damaged reactor housing was directly discharged into the coastal area. The aim of this study is to investigate the artificial radioisotope pollution in the neighboring coastal seafloor .

Sampling

Sediment cores for the determination of ^{134}Cs and ^{137}Cs were collected at BD1, BD2 and BD3 in the continental self area off Fukushima, and BD4 in the Japan Trench, using a multiple corer.

Sediment samples were immediately extruded every 0.5 cm in the top 2 cm layer, and every 1.0 cm in the deeper layer. There samples were stored in the walk-in refrigerator Lab. 10.

9.2. Remobilization of biophile and metal elements in the North Pacific seafloor.

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Purpose

Marine sediment, which consists of solid sediment and pore water, is a major interface between the seawater and seafloor, and also accumulates continuously products formed within the sea as a record of environmental changes. High productivity in the North Pacific enhances the accumulation of biogenic materials on the seafloor. The mineralization and remobilization of such materials in sediments significantly influence the benthic fluxes of elements through pore waters and across the sediment-seawater interface. Since the North Pacific must play an important role in the carbon cycle in the ocean, it is a major concern to understand the benthic fluxes of dissolved carbon dioxide, nutrient, trace metal and other elements during early diagenesis. During this cruise, we study the remobilization of biophile and metal elemets in the North Pacific, and clarify the benthic fluxes of these elements in this oceanic region seafloor.

Sampling

Surface sediments were collected by using a muti-corer (BD04, BD05, BD06, BD07, BD08, BD09, BD10, BD11, BD12, BD13, BD14, BD15, BD16, BD17 and BD21). One core was cut immediately after recovery at 0.5 cm intervals in the top 2 cm and 1.0 cm intervals in the rest of the core. Pore waters were squeezed from the sectioned sediment samples under N_2 gases conditions at 4 ^{o}C in a refrigerator by pressure filtration through a 0.45μm Millipore filter, using a hydraulic pressure type squeezer.

Analysis

Nutrients in pore water were determined by an auto analyzer SWAAT (BLTEC Japan). All analytical data (nitrate, nitrite, phosphate and silicate) were corrected by using seawater reference material of nutrients (KANSO). Sediment samples will be freeze-dry powder in the laboratory ashore. The powdered sample will be digested in a HNO_3-HCl-$HClO_4$-HF acid mixture in a Teflon bomb, and trace metals will be determined with ICP-MS and AAS.

9.3. Fish teeth Nd isotopes: Proxy-based reconstruction of water mass circulation in the North Pacific

1. Personnel

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2. Introduction and objectives

Fossil fish-teeth (Fig. 1) incorporate neodymium (Nd) dissolved in the bottom seawater, with in equilibrium with Nd isotopes in bottom seawater during the early diagenesis (Horikawa et al., 2011). Therefore, Nd isotopic compositions of fossil fish-teeth can be used as a robust water mass tracer that allows us to reconstruct provenance of water masses and/or changes in water mass circulation in the past (Martin and Scher, 2004).

In this study, we obtained surface sediment samples at 22 sites along the 47ºN transect in the Subarctic North Pacific. Most of the sediments were retrieved from 4000–5000 m water depths, bathed by the Lower Circum Deepwater (LCDW) originated in the Southern Ocean. The LCDW upwells into the upper deep layer and is transformed into North Pacific Deep Water (NPDW, salinity=av. ~34.6, density=av. 27.73σ_θ) (Kawabe and Fujio, 2010; Reid, 1997), which occupies the depth range of ~1500 m to 4000m. The NPDW flows southward in the central and eastern parts of the North Pacific as return flow of LCDW, and crosses the equator in the eastern Pacific. Under the present boundary conditions, water mass circulation/structure in the North Pacific is marked by this southern-component LCDW and its return flow in the North Pacific.

When we use fossil fish-teeth Nd isotope values and discuss changes in water mass circulation/structure in the North Pacific in the past, time-series records of Nd isotope values in the LCDW in the northern North Pacific are required to constrain an end-member value of the northern-component water mass. Yet, at this point there is not much enough information on spatial and temporal variations in Nd isotopes in the LCDW in the northern North Pacific. Herein, we will try to generate new time-series records of LCDW Nd isotopes from the Last Glacial Maximum to the present using sediment cores retrieved at BD stations.

3. Material and method

We obtained multiple core sediments off Fukushima and in the subarctic North Pacific region. Detailed information on multiple corer sediments can be seen in Tables 1 and 2 in Section. 7.4. We will pick fossil fish teeth/debris from sediments of >125μm fraction and then physically clean the teeth/debris using ultrasonification in ultrapure water and methanol to remove sediment particles absorbed onto surfaces. These physically cleaned fish teeth/debris will be dissolved in a 1:1 mixture of optima grade concentrated HNO_3 and HCl in preparation for column chemistry. Bulk rare earth elements (REEs) are separated by a primary column with Mitsubishi resin and 1.7N HCl as an eluent. Nd is then isolated by passing the REEs aliquot through Ln-spec resin with 0.25N HCl as an eluent. Nd isotopes will be measured with VG54-30 TIMS and/or Neptune MC-ICP-MS.

4. Anticipated results and work plan

Preparation and measurements of fish-teeth Nd isotopes will be done in the University of Toyama. We will measure fish-teeth Nd isotopes from all surface sediments obtained in this cruise. Further, using several sediment cores obtained in the western, central, and eastern Subarctic North Pacific, we will analyze downcore changes in fish-teeth Nd isotopes.

5. Data Archive

All of the raw and processed data from the KH-12-4 cruise will follow the General rules of Atmosphere and Ocean Research Institute (AORI), the University of Tokyo, and GEOTRACES Data Policy.

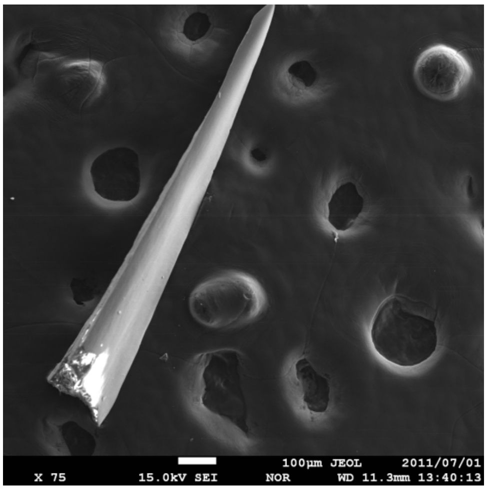

Fig. 1. Fossil fish-teeth in the equatorial Pacific core-top sediment.

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9.4. Helium isotopes of pore-water in the North Pacific Ocean sediments

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Purpose

Helium-3 is the most important parameter of mantle-derived materials and its flux may provide constrains on the source of terrestrial heat flow as well as the mass balance of atmospheric helium. However the direct observation of the helium-3 flux in the ocean floor is not well documented in a literature. We present here the flux estimated by vertical profiles of $^{3}He/^{20}Ne$ ratios of pore water samples in deep sea sediments.

Sampling method

We have collected surface sediment samples by using a standard eight-tubes multiple-corer. Two thick wall acrylic tubes (62 cm length and 10.5 cm external diameter) were set in the corer. There were five holes drilled in the tube wall, which were pre-tapped with 1/4" NPT plugs. When the multiple-corer was recovered onboard, the both ends of the tube were immediately closed by two PVC pistons. Then the tube with a sediment sample was set into a whole core squeezer (Bender et al., 1987). First, the lower-most NPT plug was removed and a standard copper tube container (1/4" diameter with 30 cm long) was connected using a tube fitting. Second, the soft sediment in the tube was squeezed by the machine and it was transferred without exposure to atmosphere into the copper tube. Third, the both ends of the copper tube were sealed by using stainless steel clamps for storage. After the lower-most sample was finished, the second one close to the first was processed. Experimental details are given elsewhere (Pitre et al., 2009).

On land experiments

The copper container with a pore water sample is connected to a stainless steel high vacuum line and dissolved gases are extracted from the sample in vacuo. He and Ne in the exsolved gas are purified using hot titanium getters and charcoal traps at liquid nitrogen temperature. The $^{4}He/^{20}Ne$ ratio is measured by an on-line quadrupole mass spectrometer. He is then separated from Ne using a cryogenic trap held at 40 K. The $^{3}He/^{4}He$ ratio is measured on a conventional noble gas mass spectrometer (VG5400, MicroMass Co.).

10. Studies on atmospheric samples

10.1. Chemical composition of atmospheric aerosol

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Introduction and objectives

Trace elements such as Fe, Cd, Ni, Cu, Zn and Co are called "bioactive trace metal". Most of the particulate matter falling from the surface water is produced initially by photosynthetic phytoplankton in the photic zone. The most of bioactive trace metals are taken up by marine organisms such as phytoplankton and bacteria. Consumption and decomposition of particulate matter sinking from surface water return the bioactive trace metals to solution. On the other hand, some suspended particulate matters come from terrestrial sources transported to the ocean by rivers and by winds in particulate forms. The bulk composition of suspended particulate matter in the various ocean is well known, whereas, the speciation of elements in suspended particle still remains poorly known. Individual particulate analysis can provide detailed information about the source, formation, transport and reactions of suspended particulate matter.
In this study, atmospheric aerosols are collected on the R/V Hakuho-maru during KH-12-04 cruise. The chemical composition and the origin of atmospheric aerosols are investigated by individual particle analysis with SEM-EDX and ICP-MS.

Inventory information for the sampling

Aerosol samples were collected on the R/V Hakuho-maru using by AS-9 aerosol sampler (Kimoto Electric Co.Ltd).

Analysis and method

Aerosol samples collected on the filters were preserved at 4 ℃ in a refrigerator. The shape and size of particles will be observed by individual particle analysis with the Scanning Electron Microscope (SEM) and Energy Dispersive X-ray spectroscopy (EDX) in the laboratory. The filter with the aerosol samples were removed to the Teflon beaker, and then it was decomposed by nitric and perchloric acid solution. After the decomposition, bioactive trace metals were determined by ICP-MS.

Data Archive

All of the raw and processed data from the KH-12-4 cruise will follow the General rules of Atmosphere and Ocean Research Institute (AORI), the University of Tokyo, and GEOTRACES Data Policy.

10.2. Sources Identification of Heavy Metal by Lead Isotope Ratio in Aerosol, the North Pacific Ocean

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1. Introduction

A large part of the North Pacific Ocean is called High Nutrient Low Chlorophyll (HNLC) region. In general, primary production in HNLC regions has been limited by the lack of availability of heavy metal. Therefore, it is recognized that heavy metal is one of the most important nutrients for phytoplankton in this region. The candidate for the main supply of heavy metals to this region can be long distance transported aerosols. Origin of these aerosols shows wide variety, such as Chinese less, anthropogenic sources from continental, volcanic ash, with different solubility to ocean water. To evaluate the availability of these heavy elements as a nutrient in the surface seawater, it is important to identify the species and source of the aerosol.

Lead isotope ratio is one of the useful geochemical tools to identify heavy metal sources because Pb isotope ratios in aerosol remain the sources of Pb emission (Mukai et al., 1993). Actually, Witt et al., (2006, 2010) well identified the sources of heavy metals in aerosol at the Indian Ocean.

Final goal of our study is to precisely evaluate the production rate of primal products with the effect of heavy metals supply to the surface seawater of this area. Here in this study, we attempt to identify the source of aerosols in the region of HNLC, the North Pacific Ocean, by using Pb and other heavy metals isotope compositions.

2. Method

2.1 Sampling

Total suspended particulate (TSP) samples and size-fractionated aerosol samples were collected in this cruise. TSP samples were collected by High volume air sampler (AS-810, Kimoto, Japan) with a flow rate of around 35.0 m3/h on cellulose filter (Whatman 41, 8×10 inch).

Sampling site: the Harumi Harbor-BD2, BD3-5, BD5-7, BD7-10, BD10-12, BD12-14, Dutch Harbor-BD16, BD16-(53.55N 155.57W), (54.33N 157.39W)-(50.03N 140.22W), (50.02N 140.21W)-BD18, and BD18-Vancouver.

Size-fractionated aerosol samples were collected by a low-volume Andersen cascade impactor (AN200, Shibata, Japan) with a flow rate of around 0.0265 m3/min on PTFE filter (PF050 ϕ 90 mm, ADVANTEC, Japan).

Sampling site: BD1-7, BD7-14, Dutch Harbor-(50.03N 140.22W), (49.17N 139.24 W)-Vancouver.

In these cases, all aerosol samples were collected with an automatic wind sector-controlled aerosol sampling system and both samplers were turned off during anchorage at sampling stations.

Furthermore, fly ash of heavy oil combustion from R/V Hakuhomaru was also obtained to confirm the contribution to our aerosol samples.

2.2 Sample treatments

All samples are dissolved with 2 ml 15 M HNO3, 2 ml 6 M HCl, and 1 ml 20 M HF at 90oC for 12 h. The lid of vials opened and acid solution are evaporated to dryness. Then, each sample was dissolved with 4 ml 5% HNO3 and sample solutions heated at 90oC for 3 h. Three milli-liters of this solution is used for the measurements of heavy metal concentration.

One milli-liter of sample solution (5% HNO3) is evaporated to dryness. Then, each sample is dissolved with 0.5 ml 0.5 M HBr. For isotopic measurements, Pb in this solution is purified using 0.1 ml anion exchange resin (Bio-Rad AG 1-X8, 200-400 mesh, Br-form). Other target elements are also purified with some methods.

2.3 Analysis methods

Concentrations of heavy metal, such as Fe, Zn, and Pb so on, are measured by ICP-MS (Agilent 7700, Agilent, Japan).

Lead isotope ratios are measured by MC-ICP-MS (NEPTUNE, Thermo Electron, Germany; Nu plasma, Nu Instrument, UK) with Tl doping technique. NIST SRM 997 (the certified 205Tl/203Tl ratio is 2.3871) standard reference material is used to determine correction factor of mass-dependent discrimination in MC-ICP-MS. Mass-dependent discrimination is corrected using the exponential law. Accuracy of measurement is checked using NIST SRM 981 standard reference material (10 ppb or 200 ppb). Isotopes of other elements, such as Fe and Zn, in the same sample are measured with same instruments.

All sample treatment procedures are carried out in Class-1000 (100) clean room and Class-100 (10) clean draft.

10.3. Measurement of gradient of atmospheric VOC gas and CO_2 concentration

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Micrometeorological methods are expected as crucial for the direct measurement of air-ocean exchange of carbon dioxide (CO_2), dimethyl sulfide (DMS), and other tracer gases. These methods are able to observe temporally and spatially small-scaled flux of tracer gases and will serve for the study on processes controlling air-ocean CO_2 and DMS exchange. The aerodynamic gradient method, which is one of micrometeorological ones, is plain and simple compared with the eddy-covariance method. The author developed a fine buoy system for the measurement of tracer gas concentration profile in the lower atmosphere. Our objectives in the study are;

- Application of the uniquely designed "profiling buoy" (Fig.1) to observational cruise on the open ocean.
- Estimation of CO_2 , DMS, and Acetone gas flux by the aerodynamic gradient (profile) method.
- Process study of controlling factors which affect on air-ocean CO_2, DMS, and Acetone gas exchange.

Air samples drawn from 7 levels (1, 5, 14, 42, 98, 210, 1420 cm above sea surface) in the atmosphere were alternately introduced to the instruments every 60 second by three-way solenoid valves at the rate of about 1.6 L/min. DMS and other Volatile Organic Compounds (VOC) gases were measured by Proton Transfer Reaction Mass Spectrometry (PTR-MS). H_2O and CO_2 concentration were measured with temperature and humidity sensor (Vaisala, HMP45A) and two IRGA detectors (Li-Cor, Li7000 and Li6262), respectively. More than 15 hours of measurements were done at No.7, 9, 11, and 12 observational stations (Table 1). Figure 2 shows an example of emission mode of DMS vertical profiles at Station 7.

Fig.1 The profiling buoy and the aspect of the measurement by use of ship crane.

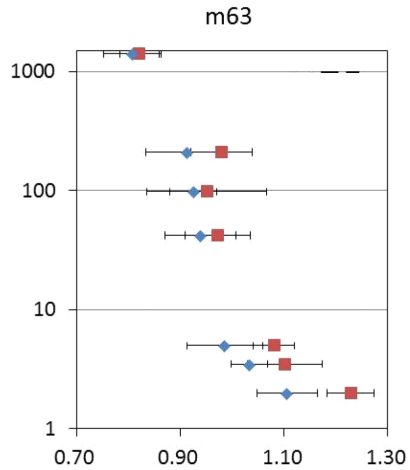

Fig.2　Examples of vertical profile of DMS

Table 1　Summary of measured Station and time

#	stn	cast	start time (GMT)	end time (GMT)	duration
1	7	1	2012/8/30 5:34	2012/8/30 7:00	1:26
2	7	2	2012/8/30 7:10	2012/8/30 8:30	1:20
3	9	1	2012/9/2 17:21	2012/9/2 18:56	1:35
4	9	2	2012/9/2 19:06	2012/9/2 20:25	1:19
5	11	1	2012/9/7 5:37	2012/9/7 8:40	3:03
5	11	1	2012/9/9 13:52	2012/9/9 17:11	3:19
6	12	1	2012/9/28 3:41	2012/9/28 6:45	3:04
					15h06m

10.4. Underway measurements of volatile organic compounds in surface seawater

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1. Introduction

Volatile organic compounds (VOCs) such as dimethyl sulfide (DMS) and acetone are emitted from the ocean surface into the atmosphere, and are believed to have substantial effects on the atmosphere and climate. However, the contribution of VOCs from ocean to atmosphere remains largely unexplored, because there is a little information on distribution of VOCs concentrations in the surface seawater. We recently developed an equilibrator inlet–proton transfer reaction–mass spectrometry (EI-PTR-MS) method for continuous measurement of VOCs concentrations dissolved in seawater (Kameyama et al., 2009; 2010). The purpose of this study is to obtain the distributions of VOCs concentration in the surface seawater and to clarify their controlling factors in the subarctic North Pacific. In addition, we examined the biomass and composition of phytoplankton in the surface seawater which were key parameters controlling the distribution of some VOCs concentration.

2. Sampling and analysis

Underway measurements of VOCs concentrations by EI-PTR-MS method

The EI-PTR-MS system comprised a PTR-MS instrument (PTR-MS-hs, IONICON Analytik, Innsbruck, Austria) and a bubbling-type equilibrator for equilibration between the liquid and gas phases. The equilibrator consisted of brown (to prevent photolysis) vertical glass tubes (water volume: 10 L). For this observation, perfluoroalkoxy tubing and Tygon tubing® (Saint-Gobain, Courbevoie, France) were used for gas and water samples, respectively.

Surface seawater was pumped from a seawater intake on the bottom of the ship (5-m depth), and supplied to the laboratory. The surface seawater was continuously supplied to the equilibrator at a flow rate of >1 L min^{-1}. Ultrapure air flowed as the carrier gas from bottom of the equilibrator at a flow rate of 120 mL min^{-1}. Dissolved VOCs were extracted into the gas phase, and a portion of the gas was continuously directed to the PTR-MS instrument at ambient pressure.

PTR-MS measurements were conducted in multiple ion detection mode at 5 or 10-s integration for each mass per cycle to obtain mass signals at 1-min intervals. We mainly monitored the ion signal intensities of m/z = 33 (methanol), 43 (propene), 45 (acetaldehyde), 59 (acetone), 63(DMS), 69 (isoprene). The detection sensitivity was determined by dynamic dilution of a gravimetrically prepared gas standard (methanol, propene, acetaldehyde, acetone, DMS and isoprene) balanced with ultrapure N_2 (5.08 ppm, Japan Fine Products Co., Kawasaki, Japan). A gas stream containing (5–50 ppb) was produced with a dynamic dilution system consisting of two mass flow controllers.

AMEMBO continuous observation

Continuous recording of environmental parameters and phytoplankton abundance was done with an AMEMBO (Water Strider- AutoMated Environmental Monitor for Biological Oceanography). The AMEMBO consisted of a bubble trap, Chlorophyll WET Star, MBARI-In Situ Ultraviolet Spectrophotometer used as nitrate analyzer (calibrated in Jun 2012) and a Seabird SBE 19 (calibrated in Jul 1999). Seawater was pumped up to bottom of the ship (about 5 m depth) and continuously supplied to the AMEMBO. We monitored temperature, salinity, chl.a and nitrate concentrations in the surface seawater during KH-12-4. Those data obtained by AMEMBO was calibrated by the data from CTD-CMS system at each station.

High-pressure liquid chromatographic analysis of phytoplankton pigments

For the determination of phytoplankton pigment concentrations, the surface seawater pumped from the bottom of the ship (5-m depth) was collected at each station (BD7–17). The seawater samples (1 L) were filtered through a Whatman GF/F filter (25 mm in diameter) under gentle vacuum (<100 mm Hg). The filters were stored in liquid nitrogen until analysis by means of high-performance liquid chromatography according to the procedure described by Suzuki et al. (2002).

References

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10.5. Estimating gas transfer velocity by using triple oxygen isotope

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1. Introduction

Gas transfer velocity is an important factor for determination of the air-sea gas exchange. In the mixed layer, O_2 concentration and isotopic composition is affected by respiration, gas exchange, and photosynthesis. By using the triple oxygen isotope ($\Delta^{17}O \approx \delta^{17}O - 0.52 \times \delta^{18}O$), respiration is ignorable, and we can differentiate gas exchange and photosynthesis. Because there is no photosynthesis at night, we can know the rate of gas exchange and estimate gas transfer velocity by wind speed and $\Delta^{17}O$ of O_2 in the mixed layer.

2. Sampling and analysis

Water samples were taken at sunset and night. Seawater samples were collected by Teflon-coated X-Niskin samplers installed on the CTD-CMS system. Subsamples for analyzing O_2 were transferred to 120 mL vials, poisoned with 3%wt $HgCl_2$ solution, and sealed with septum caps without headspace. Samples were then stored in the cool place (~6°C) for 3 months after the end of the cruise before being analyzed.

To determine the stable isotopic compositions including the $\Delta^{17}O$ values, dissolved air is extracted from subsamples by He purge, purified from N_2 and Ar etc. using our original extraction and purification system using GC and analyzed by Dual Inlet IRMS in the laboratory at Nagoya Univ.

Sampling stations: BD7, 9, 11, 14, 15 and 17
Sampling depths: 5, 10, 25 and 50 m

10.6. THE TRACE METALS CHEMISTRY OF AEROSOL SAMPLES AT NORTH PACIFIC OCEAN

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Sample Collection

A total of 15 aerosol samples were collected using a High-volume Air Sampler HV-1000 (SIBATA Ltd). System incorporating 20.3 x 25.4 cm exposed Whatman 44 filters (poresize : 3 μm). Individual aerosol samples were collected for 24 – 48 hours, unless interrupted by rain when they were withdrawn. Before use, the filters were acid washed and rinsed in deionized water. The aerosol samples were stored in plastic bags in acid-washed petri dishes, prior to analysis.

Sample Analysis

Total trace metal concentrations in the aerosols and cascade impactor samples were determined by dissolving the filters in redistilled HNO and Aristar 3 HF in PTFE beakers. The filter with the aerosol samples were decomposed by nitric and perchloric acid solution. After the decomposition, trace metals were determined by ICP-MS.

Appendix

Group photo (Leg. 1) at Dutch Harbor, USA

Group photo (Leg. 2) at Vancouver, Canada