Preliminary Report
of
The Hakuho Maru Cruise KH-09-5 Leg1,2,3
(The Indian Ocean and the Antarctic Sea)
-ERIDANUS Expedition-

November 6, 2009 -January 9, 2010

Meridional Studies on Biogeochemistry of Trace Elements
and Isotopes in the Indian Ocean (GEOTRACES)

Ocean Research Institute
the University of Tokyo
2010

by
The scientific Members of the Expedition

Edited by
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Introduction

The first three legs of the *Hakuho Maru* KH-09-5 cruise, whose schedules are shown below, were successfully conducted by Ocean Research Institute, the University of Tokyo, and Japan Agency for Marine-Earth Science and Technology (JAMSTEC), from 6 November 2009 to 10 January 2010 (66 days in total) in the north and western Indian Ocean including the Antarctic Sea. We nickname these three legs “ERIDANUS Expedition”.

Leg-1: Tokyo, Japan (6 Nov. 2009) to Cochin, India (24 Nov. 2009)
Leg-2: Cochin, India (27 Nov. 2009) to Port Louis, Mauritius (16 Dec. 2009)
Leg-3: Port Louis, Mauritius (16 Dec. 2009) to Cape Town, South Africa (10 Jan. 2010)

In the original plan, this cruise should have been completed a year earlier (from Nov. 2008 to Jan. 2009), but the cruise was postponed as above due to the rapid increase of oil price at the beginning of FY2008.

This cruise has been internationally authorized as the first GEOTRACES meridional study in the Indian Ocean. GEOTRACES is a “New Wave” of global marine geochemical studies, started in 2005 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) in a global scale. 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 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.

As the GEOTRACES initiative in the Indian Ocean, the main study theme of this cruise was marine geochemical observations in the northern (chiefly in the Bengal Bay) and western Indian Ocean from the Arabian Sea to the Antarctic Sea along a meridional line. It is a pity that we had to slightly modify the planned meridional line along 65°E, because of i) the threat of Somalian pirates in the Arabian Sea, ii) an approaching cyclone in the southern equatorial region, and iii) severe weather condition in the Antarctic Sea. We conducted various observations as described in this report for marine geochemical processes and ocean flux in the Indian 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 Indian Ocean occupies a vast area of the world ocean, but little is known about the marine biogeochemical cycles on TEIs. Thus, it is important to understand the role of the Indian Ocean in the global carbon cycle including its temporal variations recorded in marine sediments. Shipboard observation and sampling of water and sediments were made during the cruise and detailed measurements of major and minor chemical components and their isotopes were partly done on board the ship and will be performed in detail on shore-based laboratories after the cruise.

In addition, we conducted intercalibration studies during the cruise, by comparing the GEOTRACES-recommended Kevlar wire hydrocast with the R/V Hakuho Maru's titanium wire hydrocast. We have established a GEOTRACES baseline station at (20°S, 72°33'E) in the central Indian Basin, taking seawater samples not only for shipboard scientists but also for other international scientists who will measure in future some of the GEOTRACES key parameters for intercomparison with our results.

Forty three scientists (including graduate students) from various universities and research institutes in Japan, three technical supporting staffs from Marine Work Japan Ltd., one scientist from U.S.A., one scientist from Canada, two scientists from China, and three scientists from India, total 53 scientists took part in the cruise 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 its first accomplishment in the Indian Ocean.

It is our great pleasure to thank Captain Ushio Fujita, 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 of the Leg-2 and -3)
Hajime Obata (Chief Scientist of the Leg-1)
and the Shipboard Scientific Party

Scientist List

	Family name	Given name	Affiliation	Leg-1	Leg-2	Leg-3
1	GAMO	Toshitaka	Univ. Tokyo		◎	◎
2	OBATA	Hajime	Univ. Tokyo	◎	○	○
3	AMAKAWA	Hiroshi	Univ. Tokyo			○
4	NAKAYAMA	Noriko	Univ. Tokyo	○	○	○
5	IMAI	Keiri	Univ. Tokyo	○	○	○
6	ISHIGAKI	Hideo	Univ. Tokyo	○	○	○
7	MASE	Akira	Univ. Tokyo	○	○	
8	OGURA	Takeshi	Univ. Tokyo	○	○	
9	TOYOSHIMA	Kosaku	Univ. Tokyo	○		
10	KIM	Tae Jin	Univ. Tokyo	○	○	○
11	SHIOZAKI	Takuhei	Univ. Tokyo	○	○	
12	KODAMA	Taketoshi	Univ. Tokyo	○	○	○
13	SHIRAI	Kotaro	Univ. Tokyo		○	
14	MATSUZAKI	Hiroyuki	Univ. Tokyo		○	
15	NISHIOKA	Jun	Hokkaido Univ.		○	○
16	OHMORI	Kazuto	Hokkaido Univ.		○	○
17	DAITA	Satoko	Hokkaido Univ.		○	○
18	TAKAHASHI	Yuko	Ishinomaki Senshu Univ.			○
19	TAZOE	Hirofumi	Nihon Univ.	○	○	○
20	YAMAGATA	Takeyasu	Nihon Univ.			○
21	SATO	Hiromi	Nihon Univ.	○		
22	HANYU	Tomoko	Grad. Univ. Adv. Studies			○
23	KATO	Yoshihisa	Tokai Univ.			○
24	SAKAMOTO	Midori	Tokai Univ.		○	○
25	MINAMI	Hideki	Tokai Univ.		○	
26	YAMADA	Yukako	Tokai Univ.	○	○	
27	NORISUYE	Kazuhiro	Kyoto Univ.	○	○	
28	FIRDAUS	Lufti Mochamad	Kyoto Univ.			○
29	MORISHIMA	Yui	Kyoto Univ.	○	○	
30	HUONG	Vu Thi Dieu	Kyoto Univ.			○
31	NAKAGUCHI	Yuzuru	Kinki Univ.	○		
32	TAKEUCHI	Makoto	Kinki Univ.	○	○	○
33	ASATANI	Takuya	Kinki Univ.		○	○
34	MURAYAMA	Masafumi	Kochi Univ.		○	○
35	SAKAMOTO	Tetsuhiro	Kochi Univ.	○	○	○
36	TOYOMURA	Katsunori	Kochi Univ.			○
37	TAKEDA	Shigenobu	Nagasaki Univ.	○	○	
38	NOGI	Yoshifumi	Natl. Inst. Polar Res.			○
39	YAMASHITA	Nobuyoshi	Natl. Inst. Adv. Ind. Sci. Tech.		○	○
40	TANIYASU	Sachi	Natl. Inst. Adv. Ind. Sci. Tech.		○	
41	SASANO	Daisuke	Meteorol. Res. Inst.			○
42	OHKI	Atsushi	Natl. Inst. Environ. Sci.	○	○	○
43	KAWAGUCCI	Shinsuke	JAMSTEC		○	
44	KONDO	Yoshiko	Univ. Southern California		○	
45	LI	Qian	Xiamen Univ.	○		
46	ZHENG	Nan	Xiamen Univ.	○		
47	KAWAI	Michiyo	Inst. Ocean Sci., Canada	○		
48	SARMA	V.V.S.S.	Natl. Inst. Oceanogr., India		○	
49	GOSWAMI	Vineet	Phys. Res. Lab., India		○	
50	BHUSHAN	Ravi	Phys. Res. Lab., India			○
51	YOSHIDA	Kazuhiro	Marine Works Japan Ltd.	○		
52	SATO	Yusuke	Marine Works Japan Ltd.		○	
53	TAKETOMO	Yohei	Marine Works Japan Ltd.			○
				24	34	30

KH-09-5	Station No.	Location (Latitude)	Location (Longitude)	Depth (m)	Dates	CTD Hydrocast	Kevlar Hydrocast	GAMOS	Light Intensity	Large Volume	Bathymetric survey	Multiple Coring	Piston Coring	Plankton Sampling	Argo Float	Remarks
	Tokyo	36°N	140°E													
(Leg-1)	ER-1	10°00'N	88°00'E	3430	17 Nov.	○			○	○						
	ER-2	8°31'N	86°02'E	3680	18 Nov.	○		○	○	○						GEOSECS-445
	ER-3	0°00'N	80°00'E	4660	20-22 Nov	○	○	○	○							GEOSECS-448
	Cochin	9°58'N	76°16'E													
(Leg-2)	ER-4	17°17'N	69°04'E	3500	29 Nov.						○	○	○			
	ER-5	16°45'N	69°00'E	3630	29-30 Nov.	○		○	○	○		○				
	ER-6	14°00'N	69°00'E	4090	01-02 Dec.	○			○	○		○				
	ER-7	10°00'N	68°45'E	4510	03-04 Dec.	○			○	○		○				
	ER-8	4°01'N	69°00'E	4130	05 Dec.	○			○	○		○				
	ER-9	5°16'S	67°54'E	3120	07 Dec.	○			○	○		○				
	ER-10	20°00'S	72°33'E	4340	10-13 Dec.	○	○	○	○	○		○				
	Port Louis	20°S	57°E													
(Leg-3)	ER-11	30°00'S	65°00'E	4660	21-22 Dec.	○				○		○		○	○	
	ER-12	37°45'S	57°37'E	5320	23-25 Dec.	○				○		○		○	○	GEOSECS-428
	ER-13	54°00'S	52°00' E		28 Dec.						○					
	ER-14	62°00'S	40°05'E	5200	29-31 Dec.	○				○		○		○		
	ER-15	65°10'S	33°20'E	3200	01 Jan.						○	○	○	○		
	Cape Town	34°S	18°E													
Total						12	2	3	9	11	3	11	2	4	3*	

(*The other one Argo float deployment was performed at (44°20'S, 28°53.5'E) as an underway operation, together with XCTD observation, on 5 Jan. 2010.)

CTD Carousel Multi Sampling (CTD-CMS)

The CTD-CMS (CTD-Carousel Multi Sampling System) used during the KH-09-5 cruise consists of the following instruments.

CTD fish (Seabird, Model SBE-9-plus, 6800m) with a DO sensor (Seabird, SBE-43)
Carousel sampling system (Seabird, SBE-32)
24 Niskin-X bottles (General Oceanics, 12-liter type)
Turbidity meter (SeaPoint) ----- only for the Leg-1 & 2
Fluorometer (Chelsea, Aquatracka Mk III)
Pinger (Benthos, Model BFP-312) ----- only for the Leg-1 & 2
Altimeter (Benthos, Model PSA-916)
DO sensor (JFE ALEC, Model RINKO-III) ---- only for the Leg-3

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. The Carousel array frame has a capability to hold 24 Niskin bottles with a volume of 12 liters. A pinger and an altimeter were installed on the frame to monitor the distance above the sea bottom. During the hydrocasts, the ship stayed at a fixed position, and the system was lowered down to a depth of ~10 m 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, all the Niskin-X bottles were cleaned on Nov. 7-9, 2009, on the ship 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). The spigots were cleaned by heating in conc.HClO4:conc.H2SO4:conc.HNO3=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). The O-rings were cleaned by heating in 0.1M HCl (at 60°C, 12hrs), and Milli-Q water (at 68°C, 12 hrs).

All the Zn anode on the Carousel frame (except for those on the CTD housings) were replaced by Aluminum anode before the cruise, in order to avoid Zn contamination.

Collected samples were separately distributed to sub-samples for routine analyses of salinity, dissolved oxygen, pH, nutrients (Si, PO_4, NO_2, NO_3, NH_4), and chlorophyll-a. 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 the ship. 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 a wooden frame 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.

Hydrocasts using Kevlar wire

For a comparison of trace metal clean sampling, we collected seawater samples with X-type Niskin samplers attached Kevlar wire. One thousand five hundreds of the Kevlar wire (6mmϕ, Hikari-kogyo) 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 20 m, 100 m, 200 m, 400 m, 600 m and 1000 m at stations ER-3 and 10. Three depth sensors (Alec Electronics) were attached to the samplers (200m, 400m, 1000m). After sampling, the Niskin samplers were brought into the "Bubble", and then the seawater samples were filtered in a clean condition.

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 trace elements, isotopes, and natural and artificial radio-nuclides. During the KH04-5 cruise large volume water sampling was carried out as follows.

Large volume （250 ℓ） surface seawater samples were obtained from the pumping system of R.V. Hakuho-Maru. About 260ℓof seawater from a range of depths, from 10 m deep down to 5000m, 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) or a reversing digital thermometer and digital manometer couple 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 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.

Table 1 Specification of the large-volume water sampler used in the KH-09-5 cruise.

maximum permissible operating depth	7000 m	
construction materials	frame:	stainless steel (SUS304) aluminium alloy (A7075-T6) titanium alloy (TITA 1)
	sampling tube: (482 mm i.d.)	rigid PVC (poly(vinyl chloride))
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	24V and 12V from 24 of 1.5V dry cell	

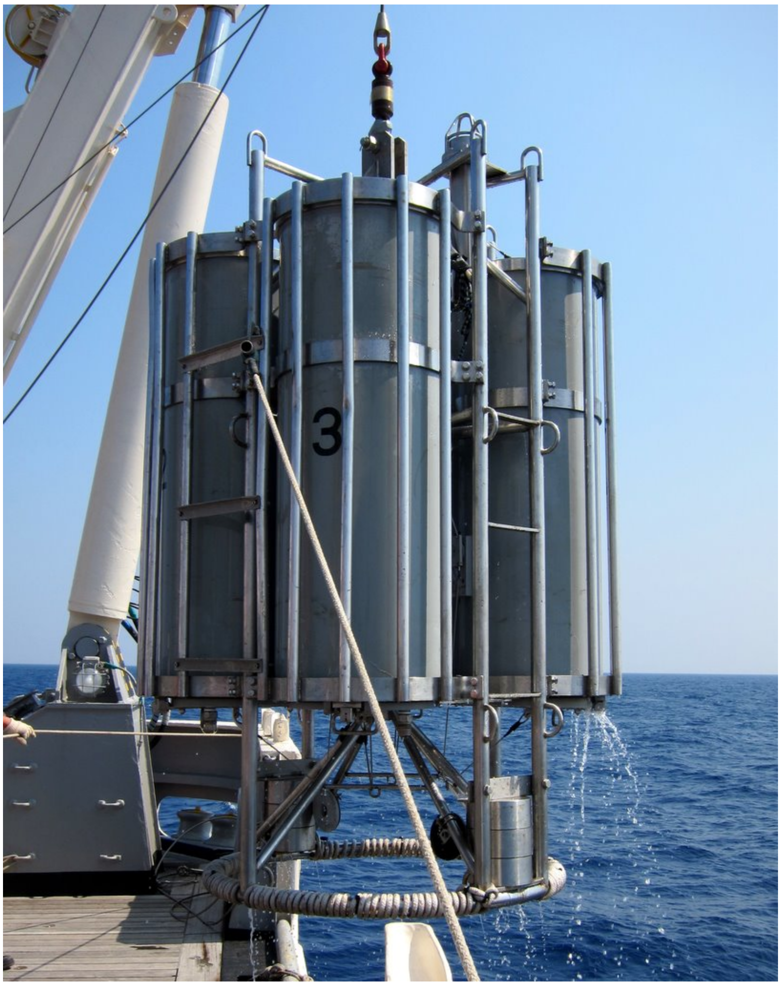

Fig. 1 Photograph of the large-volume water sampler used in the KH-09-5 cruise.

Routine analysis

Salinity

Salinity was measured with the Autosal (Model 8400B, Guildline Instruments Ltd., Canada) 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 8^{th} laboratory of Hakuho-Maru.

Dissolved oxygen

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).

Nutrients

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.

Ammonia nitrogen: Ammonia reacts with phenol and alkaline hypochlorite to form the deep blue color compounds with an absorbance maximum at 630 nm.

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 820 nm.

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)

pH

Seawater samples were collected and sealed in 100 mL dry polyethylene bottles with sufficient overflow (about 100 mL), in order to avoid exchange of CO_2 with the atmosphere during sampling. Samples were temporalily stored in the 6th laboratory of R/V Hakuho Maru at room temperature. The measurement was done within a day after sampling. The sample was transferred to a specially designed ~20 mL cylindrical cell (made by Dr. K. Shitashima, CRIEPI) with overflow. The cell has a double structure, the inner ~20 mL space for sample seawater and a surrounding space where 25°C-constant water is circulated to hold the temperature of the inner seawater sample at 25.0±0.1°C. Below the cell was a magnetic stirrer. The pH measurement was conducted using a Total Alkalinity Titrator ATT-05A (Kimoto Electric Co. Ltd.), which was used as a pH meter for this cruise. A pH electrode (Radiometer, pHC3006) and a temperature sensor (ATT-05) 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 25±0.1°C.

Analysis time of each seawater sample is about 5 minutes. We used the TRIS and AMP buffers for calibration. The buffer solutions were kindly prepared by Dr. Y. Koike (Ceres, Co. Ltd) just before the cruise. The e.m.f. values (mV) of the two buffers and unknown seawater samples were converted to pH 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 0.002.

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.

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 research 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.

Leave Tokyo Port on Nov. 6, 2009.