Preliminary Report
of
The Hakuho Maru Cruise
KH-05-4

17 November ~ 28 December 2005

Tokyo – Shiogama – Tokyo

Ocean Research Institute
The University of Tokyo
2006

Preliminary Report of The Hakuho Maru Cruise KH-05-4

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Cruise for
observations of water masses, circulation, and
turbulence in the Northwest Pacific Basin

by

The Scientific Members of the Cruise

Edited by

Masaki KAWABE

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1. Cruise Narrative

The cruise KH-05-4 of R.V. *Hakuho Maru* was conducted for 42 days between 17 November and 28 December 2005 for study of physical oceanography entitled "Study on ocean circulation and water masses in the subtropical region of the northwestern Pacific". We carried out the surveys in legs 1 and 2 with a port call at Shiogama (11－15 December).

Study subjects of the cruise KH-05-4 were
(1) to study variations of deep circulation currents and distribution of deep water masses (Ocean Research Institute, The University of Tokyo),
(2) to study processes of advection and dissipation of the Subtropical Mode Water (Tohoku University),
(3) to study a coefficient of diffusivity by measuring density ratios and turbulence (Tokyo University of Marine Science and Technology),
(4) to study ocean circulations using an Argo float (Japan Agency for Marine-Earth Science and Technology, JAMSTEC),
(5) to study echo intensity measured with lowered acoustic Doppler current profilers (Ocean Research Institute, The University of Tokyo).

The primary observations were full-depth casts of $CTDO_2$ (conductivity, temperature, depth, oxygen profiler) for measuring water temperature, salinity, and dissolved oxygen, LADCP (lowered acoustic Doppler current profiler) for current velocity and echo intensity of sound pulse, and water sampler with Niskin bottles for chemical parameters. The water sampler frame was equipped with $CTDO_2$ sensors, 24 Niskin bottles, and two LADCPs with batteries. $CTDO_2$ measurement with the sensors was performed during downcast, and sea water was sampled at 24 positions during upcast. Salinity, dissolved oxygen, and nutrients of water samples were measured on board, and the sample values of salinity and oxygen were used for the calibration of sensor values of $CTDO_2$. At all CTD stations, water temperature, salinity, and dissolved oxygen at sea surface were measured by sampling surface water with a bucket, and salinity of the intake water was measured to correct the data of salinograph.

In order to avoid a touch and collision to sea bottom of the underwater instruments, we equipped the water sampler frame with an altimeter and a bottom-touch-switch. The altimeter monitored the distance from sea bottom within approximately 40 m. The bottom-touch-switch hanging a 17-m string and a weight informed us that the instruments reached less than 17 m above bottom, by ringing buzzer in the laboratory of the vessel.

Temperature and salinity data of CTD and XCTD (expendable CTD) were sent to the Japan Meteorological Agency by the TESAC telegram in quasi-real time.

We measured current velocity in a surface layer with shipboard ADCP of Furuno Electric Co., Ltd. and RD Instruments throughout the cruise.

Leg 1 (Tokyo → Shiogama)

We departed from Tokyo at 14:00 on 17 November 2005. The cruise started in bad sea condition, and our vessel rolled largely due to big swells during 17–18 November. Swells fairly weakened afterwards, but still remained when we arrived at the first CTD station on 19 November, and we first performed a turbulence measurement using TURBOMAP.

On 19 and 20 November, we made CTD/LADCP casts (called CTD casts hereafter) at five stations and TURBOMAP casts at two stations along 146°20′E, crossing the Ogasawara Plateau southward. The planned sixth CTD station on this line was canceled because of lack of time, and we moved to the next CTD line running northeastward toward the Shatsky Rise, called the line southwest of the Shatsky Rise hereafter. We started the CTD observations along this line on 21 November, and repeated regularly a recovery of a mooring system in the morning, turbulence observations in the afternoon, and CTD observations during the remaining time from 22 through 27 November, although winds and swells were sometimes strong due to a passage of atmospheric depression. The observations were well performed until early morning of 28 November; by that time, we conducted CTD observations at 26 stations (C001~C026) and turbulence observations at eight stations (TM01~TM08), and recovered six mooring systems M10~M05.

Thereafter, a highly developed depression came, and we evacuated to south and made heave-to for approximately two days from 4:00 on 28 November. We departed at 19:30 on 29 November for the mooring point of M04. In the morning of 30 November, we succeeded in recovery of M04 within a short interval between a passage of atmospheric front and an approach of depression. Recovery of the mooring systems M03 and M02 were made on 1 December. In this work of M03, the mooring rope was cut at a damaged portion, and the lower part of M03 floated away from us. We recovered the remaining part by picking up its top float composed of only two glass spheres. The pickup work required a precise operation of the vessel, but was perfectly done by Captain Fujio Inaba. Thus, all of the nine mooring systems were completely recovered. Our first aim of this cruise was achieved.

The weather was going worse. Still, we made the planned CTD casts successfully along the line southwest of the Shatsky Rise by the evening on 2 December, and deployed a profiling float (an Argo float) at the northernmost CTD station on this line, C034. Moreover, we began a turbulence observation with TURBOMAP at C034, but gave it up immediately due to big swells.

According to the weather forecast, unusually developed depressions would come one after another after the night on 2 December, and wave heights and wind speeds would be too large to conduct any observations in the northern region. We then headed the vessel due south from C034. This is different by 180° from the original plan. Along 158°20′E, we made CTD casts at intervals of 1° latitude, and deployed XCTD probes at the middle point between CTD stations slowing the vessel down to 10 knot. At C035, CTD produced noisy data and failed water sampling, due to leak of electricity which was caused by silicon tape used in the repair of the connection of CTD between the cable and the underwater unit. After the CTD cast at C041, we changed the direction to west and proceeded along 25°50′N towards the Ogasawara Plateau. We favorably performed the CTD and XCTD observations to C044 at 155°20′E. After that, CTD casts became impossible due to strong depressions and were replaced by XCTD casts. The vessel was headed to the Boso Peninsula when reaching east of the Ogasawara Plateau. We continued XCTD casts at intervals of 1° latitude, but gave them up at north of 32°N because of jumbo swells due to strong wind exceeding 19 m s^{-1}. We approached the Boso Peninsula, proceeded northward along the Japanese coast, and arrived at Shiogama at 10:00 on 11 December.

In leg 1, we made CTD casts at 44 stations (C001~C044) and XCTD casts at 28 points (X01~X28), performed turbulence and micro-structure measurements with TURBOMAP at 11 stations (TM01~TM11), and recovered nine mooring systems. Moreover, we prepared for deployment of four mooring systems in leg 2; we produced float units by connecting glass spheres, reeled ropes on the drum of winch, constructed sinkers with used rails, and tested the response and completeness of acoustic releasers in deep water. The "free fall" of the CTD cable was performed twice to remove twists of the cable.

The recovered nine mooring systems had 46 current meters and an ADCP. All of them worked well, except one squashed by water pressure. The length of data from some current meters was a little shorter than the mooring period, because the data memories were filled halfway. Thus, we obtained full or almost full data sets of current velocity from 45 current meters and an ADCP. Such an almost perfect observation with mooring systems was the first experience for us. This was achieved by Mr. Shoji Kitagawa, a senior technician in the Ocean Circulation Group of the Ocean Research Institute (ORI). Moreover, water sampling with 24 Niskin bottles was well performed. All the bottles were perfectly closed by the electric command from the onboard CTD unit. This was also the first achievement for us. We thank Mr. Hideo Ishigaki, a technician in the Office for Cruise Coordination of ORI.

The CTD was in good shape, best shape ever to have been. An only instrumental trouble in leg 1 was that of the mechanical part of the Sea-Bird Electronics Carousel water sampler at C028. It was changed to a spare immediately. On the other hand, the LADCP instruments were in worst condition because of weak echo intensity of sound pulses. Valid data of LADCP were little acquired. We removed the LADCP instruments from the water sampler frame after the cast at C034. Moreover, nine out of the ten moored CTD instruments suffered water leakage and did not work at all. This was a serious trouble in our first use of this instrument. The post-cruise check by Sea-Bird Electronics, Inc. clarified that the flood was due to a weld failure on the pressure sensors.

Leg 2 (Shiogama → Tokyo)

We left Shiogama at 14:00 on 15 December. Initially, we did mooring work, because the weather was forecast to go bad from 18 December. We deployed the mooring systems N1 and N2 on 16 December and N3 and N4 on 17 December, and cast CTD at N1 and N3 and VMPS (vertical multi-layer plankton sampler) four times to a depth of 300 m, 800 m, and 1000 m (twice) at N3. We equipped the water sampler for 36 bottles with two LADCP instruments which were sent from Tokyo to Shiogama urgently. As soon as the deployment of N4 finished, we began to run for Ishinomaki at 12:30 on 17 December, and anchored outside of Ishinomaki Port early morning of 18 December.

On 18 and 19 December, an extremely strong depression brought heavy snow to Honshu, Japan which was extraordinary as for December. We waited until the depression passed, and weighted up anchor at 13:00 on 20 December. Along 38°N, we cast XCTD probes at intervals of 10' longitude from 141°40'E to 142°20'E (X29~X33). At X33, we conducted turbulence observations by 14 casts of TURBOMAP (TM12A~N). At 38°N, 143°25'E, we made a CTD cast and six casts of VMPS to 300 m once, 800 m twice, and 3000 m three times from early morning to evening on 21 December. Then we evacuated to Ishinomaki again and anchored outside of the port early morning on 22 December.

We stayed at Ishinomaki for two days due to strong depression which brought second heavy snowfall this December. We weighted anchor at 6:00 on 24 December, proceeded to 38°N, 142°30'E, and made two sets of a cast of CTD and two casts (300 m, 800 m) of VMPS during the daytime and nighttime. Between the sets of the VMPS casts, we made five TURBOMAP casts (TM13A~E) after waiting for four hours due to strong wind and big swells. Thereafter, we made three CTD casts at 38°N and 37°N on 25 December, and finished the observations in this cruise.

In leg 2, we made CTD casts at eight stations with measurements of salinity, dissolved oxygen, and nutrients of water samples (C045~C052), 19 casts of TURBOMAP at two stations (TM12A~N, TM13A~E), and five casts of XCTD (X29~X33), and 14 casts of VMPS at four stations (four 300 m, five 800 m, five 3000 m), and deployed four mooring systems (N1~N4).

In the KH-05-4 cruise, in total, we made $CTDO_2$ with water sampling at 52 stations, 33 casts of XCTD, 30 casts of TURBOMAP at 13 stations, and 14 casts of VMPS for plankton sampling at four stations. Moreover, we recovered nine moorings and deployed four moorings and a profiling float. Due to bad weather, the number of CTD stations was only 44 % of the original plan, and CTD was little performed in the area east of the Tohoku district.

Acknowledgements

Before the KH-05-4 cruise, I expected severe sea condition since the cruise would be in November and December. In fact, the condition was much worse than I expected. Too strong atmospheric depressions came to our observation field one after another. It was beyond my expectations. However, despite of such conditions, all of the planned recovery and deployment of mooring systems, deployment of a profiling float, and LADCP/VMPS observations were completely performed, and we obtained many valuable data. This was entirely due to devoted work of the people participating in this cruise. I express my gratitude to Captain Fujio Inaba, the crew of R.V. *Hakuho Maru*, and the scientists for their cooperation throughout this cruise.

For the pre-cruise preparation of nutrient measurements, we got a lot of benefit from Dr. Hiroshi Ogawa and the Marine Biogeochemistry Group of ORI, the Office for Cruise Coordination of ORI, JAMSTEC, and the Marine Works Japan Ltd. For the observations in leg 2, LADCPs of the Fisheries Environmental Oceanography Group of ORI and a Sea-Bird Electronics Carousel water sampler of the Marine Inorganic Chemistry Group of ORI were sent to Shiogama urgently by the Office for Cruise Coordination of ORI. Several things were also sent by the Ocean Circulation Group of ORI. I really appreciate for their kind supports.

On 14 December during the port call at Shiogama, we knew sudden death of Mr. Toshiaki Miura, a technician in the Office for Cruise Coordination of ORI. We were astonished at the news extremely. He had well helped our observations on board and land; in this cruise also, he sent a water sampler to Shiogama for us. I mourn his too early death and pray for his soul sincerely.

Chief Scientist

Masaki Kawabe

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2. Summary of the measurement and correction

A. Water Sample

A1. Instrument

Seawater was sampled from 12-liter Niskin bottles mounted at 24 places on a Sea-Bird Electronics Carousel water sampler SBE32 for 24 bottles (Serial Number 10367- 0038 for C001－C028 and S/N 22070-0289 for C029－C044) in leg 1 and SBE32 for 36 bottles (S/N 3234568-0491) in leg 2.

A2. Conductivity

Conductivity of water samples was measured with a salinometer Guildline Portasal Model 8410A (S/N 63893) which was standardized by IAPSO Standard Seawater (Ocean Scientific International Ltd.) of Batch P145 (K_{15} = 0.99981). The measurement was done in Laboratory 5 in which air temperature was controlled to be a little (~ 5°C) lower than water temperature in the salinometer water bath being 27°C.

A3. Dissolved Oxygen

Dissolved oxygen of water samples was measured with an automatic recording titrator Metrohm Shibata 798 MPT Titrion (S/N 03105). We used 0.02 mol l^{-1} Sodium Thiosulfate Solution (Wako Pure Chemical Industries Ltd.) (factor = 1.00) for titration.

A4. Nutrients

We analyzed nitrate, nitrite, silicate, and phosphate using an auto analyzer Bran Luebbe AACS－II. Nitrate, nitrite, and phosphate standard solutions were prepared in laboratory before the cruise. Silicate standard solution was 1,000 ppm Silicon Standard Solution for atomic absorption spectrometry (Wako Pure Chemical Industries, Ltd.). For working standards and baseline solution, we used natural seawater of low nutrients which was filtered and analyzed in laboratory before the cruise.

B. $CTDO_2$

B1. Instrument

The $CTDO_2$ was a Sea-Bird Electronics instrument for 6500 db (SBE9plus). The sensor of conductivity was manufactured by Sea-Bird Electronics, Inc. (SBE4) who claimed a resolution of 0.00004 S m^{-1} (0.0004 mmho cm^{-1}) and an accuracy of ±0.0003 S m^{-1} (±0.003 mmho cm^{-1}). The sensor of water temperature was manufactured by Sea-Bird Electronics, Inc. (SBE3plus) who claimed a resolution of 0.0002°C and an initial accuracy of ±0.001°C. The sensor of pressure was manufactured by Paroscientific Digiquartz (Model 4xK) with a resolution of 0.001% of full scale and an accuracy of ±0.015% of full scale (6000 db range). The sensor of dissolved oxygen was manufactured by Sea-Bird Electronics, Inc. (SBE43) who claimed an accuracy of 2 % of saturation.

We used a set of the $CTDO_2$ underwater instrument (Instrument No. 1). It was CTD SBE9plus (S/N 34562-0750) equipped with conductivity sensor SBE4 (S/N 2732), temperature sensor SBE3plus (S/N 4378), pressure sensor (S/N 89961), oxygen sensor SBE43 (S/N 0775), and pump (S/N 53867).

B2. Data Collection

Full signals of frequency digitized 24 times per second and sent from the underwater CTD unit SBE9plus were received with the onboard unit SBE11plus and converted to output sequences of RS232C. The data were collected with the Sea-Bird Electronics CTD operating software SEASOFT, using an IBM-compatible personal computer EPSON Endeavor MT7500. The operating system of the personal computer has been changed to Windows in 2005, and the Windows version of the software was used. The full signals of frequency were stored in the hard disc during the lowering stage of CTD cast and then were copied in magnetic optical discs at the deepest point of the cast.

B3. Calibration

The sensors of conductivity, temperature, and dissolved oxygen are calibrated by Sea-Bird Electronics, Inc. once a year. The obtained coefficients were used in the CTD operating software SEASOFT.

a. Pressure

Pressure data were corrected by subtracting the pressure-sensor value in the air of 0.1 db.

b. Conductivity

Conductivity data were moreover calibrated using water-sample data. The ratio of conductivity from water sample to that from CTD (*CF*) was calculated. Vertical change of *CF* was expressed with polynomials of pressure *P* (db) such as

$$CF = a + bP + cP^2 + dP^3 + eP^4 + fP^5.$$

The sensor value of conductivity was multiplied by *CF* computed from the above equation and the following coefficients a~f for station groups.

leg 1

1) C007~C023 (used for C001~C023)

a~f = 0.9999657, .2808507E-6, -.2134879E-9, .5040914E-13, -.3772681E-17, 0.0

2) C024~C035

$a \sim f$ = 1.000046, .1269832E-6, -.1179316E-9, .2926014E-13, -.2244333E-17, 0.0

3) C036~C044

$a \sim f$ = 0.9999952, .2328907E-6, -.1606313E-9, .3545878E-13, -.2495395E-17, 0.0

leg 2

4) C045~C052

$a \sim f$ = 1.000110, -.3106965E-7, .3554857E-11, 0.0, 0.0, 0.0

c. Dissolved Oxygen

Oxygen data were obtained with the method in the World Ocean Circulation Experiment (WOCE) Operations Manual, WOCE Hydrographic Programme Office Report WHPO 91-1, WOCE Report No. 68/91.

For SBE43, dissolved oxygen was calculated from the polarographic oxygen sensor electric voltage with the algorithm

$$O_x = \left[A(O_V + B\frac{dO_V}{dt} + E) + C\exp(-0.03\,T) \right] O_x^*(T,S)\ \exp\left[DT + FP\right]$$

where O_x is the concentration of dissolved oxygen (ml l^{-1}), O_V the oxygen electric voltage, T_o the oxygen sensor temperature (°C), T, S, and P are water temperature (°C), salinity (psu), and pressure (db) measured with CTD, $O_x^*(T,S)$ the saturated oxygen for T and S, and t is time (sec).

The six parameters $A \sim F$ were determined with a nonlinear least squares fitting to the oxygen of water samples. The result of the coefficients is as follows. The coefficient B was fixed to zero for SBE43.

leg 1

1) C001~C015

$A \sim F$ = 0.352, 0.0, 0.248, 0.010, -1.114, 0.000131

2) C016~C030

$A \sim F$ = 0.361, 0.0, 0.354, 0.013, -1.381, 0.000128

2) C031~C044

$A \sim F$ = 0.376, 0.0, 0.229, 0.008, -1.047, 0.000128

leg 2

3) C045~C052

$A \sim F$ = 0.377, 0.0, 0.220, 0.010, -1.021, 0.000127

B4. Transmissiometer, Fluorometer

During leg 2, the $CTDO_2$ underwater unit was equipped with a transmissiometer and a fluorometer. The former was C-Star Transmissiometer manufactured by Western Environmental Technology Laboratories, Inc. (WetLabs) (S/N CST-657DR). The latter was Aquatracka III manufactured by Chelsea Instruments Ltd. (S/N 04-4718-001).

C. XCTD

We used probes of TSK XCTD-1. The depth of a falling probe was computed with the equation that

$$z = 3.42543 \cdot t - 0.00047026 \cdot t^2.$$

The data were recorded with TSK MK-130 (Tsurumi Seiki Co., Ltd).

D. Shipboard ADCP

D1. ADCP (Furuno Electric Co., Ltd.)

Current velocities at three depths of 20 m, 50 m, and 100 m were measured at an interval of 15 seconds. The data were averaged for every minute and recorded with Doppler Sonar Current Profiler System CI-20H.

D2. ADCP (RD Instruments)

Current velocities at 64 levels at an interval of 16 m from 32–m depth down to about 1000 m were measured with Broadband 38 kHz ADCP and recorded every two minutes.

Uncertainty of the ship heading direction decreases accuracies of the measured flow direction relative to the ship head and the measured velocity components. The ship heading direction data by the gyrocompass was manually input with a resolution of one degree when the system was switched on. Inaccuracy of this input is a source of measurement error. Another error source is a deviation in direction of the shipboard transducer from the original design.

According to Joyce (1989; *Journal of Atmospheric and Oceanic Technology*, **6**, 169-172), the correct velocity (u_w, v_w) is given from a ship speed (u_s, v_s) and a measured ADCP velocity (u_d, v_d) as

$$u_w = u_s + (1+\beta)(u'_d \cos\alpha - v'_d \sin\alpha)$$

$$v_w = v_s + (1+\beta)(u'_d \sin\alpha + v'_d \cos\alpha),$$

where α is the error in orientation of transducer, and $1+\beta$ is the scale factor.

The values of α and β were estimated by comparing the ship speed obtained from bottom tracking with that from the Global Positioning System. For the comparison, 551 ensemble data were used. The result is

$$\alpha \text{ (rad)} = -0.0040, \quad \beta = -0.0453.$$

The current velocity data from the RDI ADCP should be corrected with the above equations and coefficients.

E. Lowered ADCP

An ADCP instrument of 300 kHz Work Horse manufactured by RD Instruments was attached to the frame of the SBE Carousel water sampler and used as a lowered ADCP in order to obtain vertical profiles of horizontal velocity. Two transducers were set downward at the bottom (master unit) and upward at the top of the water sampler frame (slave unit), and a buttery package was mounted on the frame. The instruments were WH300 (downward: S/N 3381, upward: S/N 831 in leg 1; downward: S/N 835, upward: S/N 1835 in leg 2). We selected 1 ping per a second, 10-meter bins at C001−C004 and 4-meter bins at C005 and later. They worked at C001−C030 (not well at C027−C030), C044 (downward unit only), and C045−C052.

Data were stored in the underwater ADCP unit and recovered on the deck after the cast. Noises and an influence of vertical move and rotation of the ADCP unit must be removed from the original data. Further processes of data should be made after the cruise to obtain correct data of current velocity.

F. Altimeter

An altimeter PSA-916T (S/N 1000) manufactured by BENTHOS was attached to the water sampler frame. It indicated the distance from the sea bottom in 40 m or more above the bottom. Accordingly, we could observe safely to just above the sea bottom.

G. TURBOMAP

TURBOMAP (Turbulence Ocean Microstructure Acquisition Profiler), manufactured by Alec Electronics, Kobe, Japan, is 2.426 m in length, 0.405 m in diameter, 43 kg on deck, and 0.6−0.9 kg in water. This instrument is equipped with two shear probes and FPO7 temperature, conductivity, chlorophyll, turbidity, acceleration and pressure sensors. See the Preliminary Report of KH-04-4 for the details.

TURBOMAP is lowered freely with adjusted ballasts at 0.5−0.4 m/s. Sea cable is attached at an opposite side of sensors, and is connected to the personal computer through the portable winch system. Data is transferred through output sequence of RS485. The sampling rate is 512 Hz, and transferring rate is 115.2 kbps. TURBOMAP should be operated freely without tension, which may contaminate the shear data. When the observation is finished, TURBOMAP is recovered by the portable winch.

The shear data are fitted on to the Nasymth spectral form to check the validity of data quality. The energy dissipation, the scaled dissipation rate, and the eddy diffusivities of heat and salt are calculated by using the shear data as well as the density ratio calculated from the temperature and salinity data.

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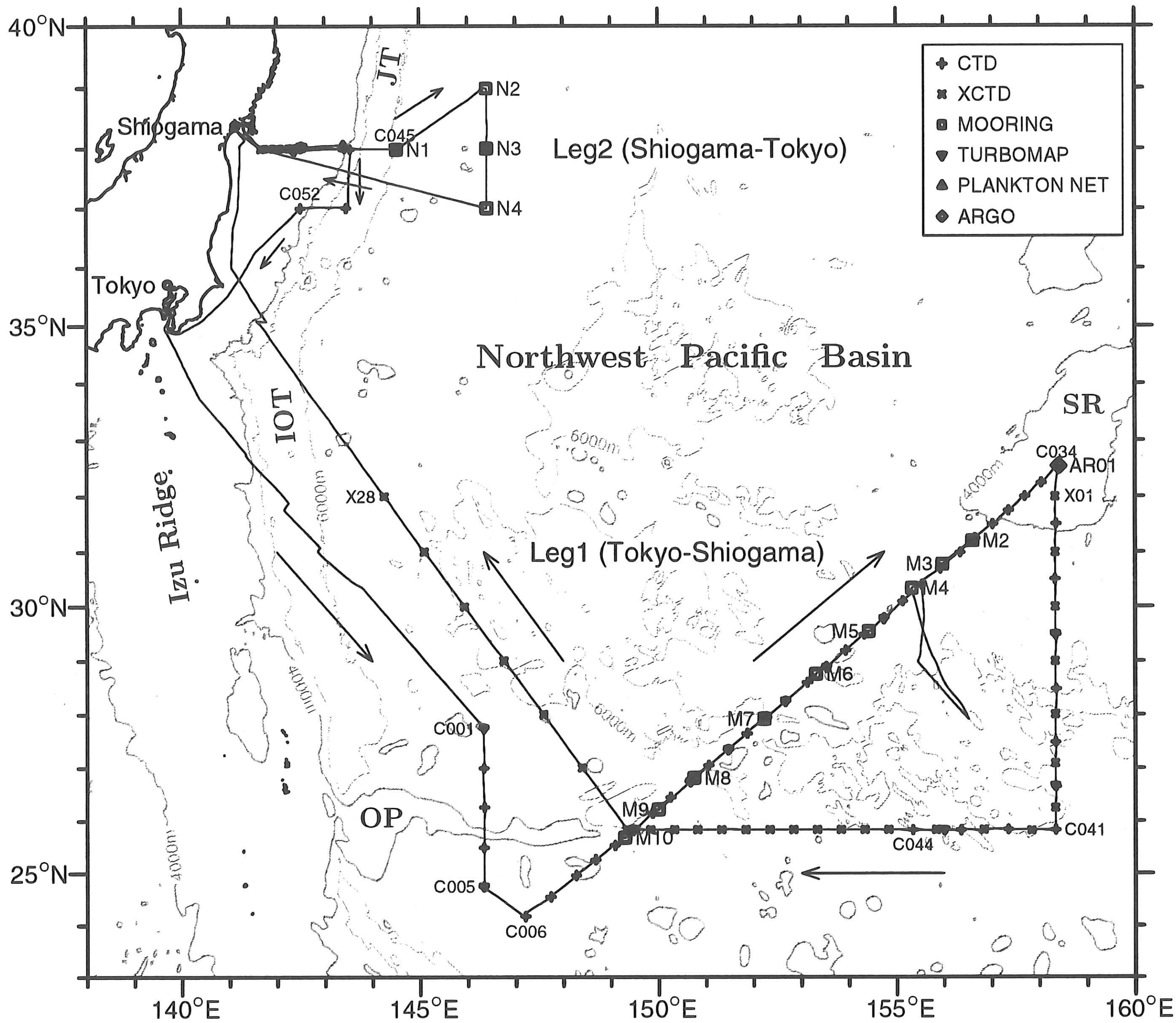
[1]Participating leg 1 only. [2]Participating leg 2 only.

4. Track Chart



SR: Shatsky Rise; **OP**: Ogasawara Plateau

IOT: Izu-Ogasawara Trench; **JT**: Japan Trench

5. Time Table

Leg-1 (Tokyo → Shiogama)

	Date	TIME (JST) 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
1	Nov.17	Tokyo
2	Nov.18	
3	Nov.19	TM01, C001, C002
4	Nov.20	C003, C004, TM02, C005
5	Nov.21	C006, C007, C008, C009
6	Nov.22	C010, M10 recover, TM03, C011, C012
7	Nov.23	C013, M9 recover, TM04, C014, C015
8	Nov.24	C015, M8 recover, TM05, C016, C017
9	Nov.25	C018, M7 recover, TM06, C019, C020
10	Nov.26	C020, M6 recover, C021, TM07, C022
11	Nov.27	C023, M5 recover, C024, TM08, C025
12	Nov.28	C026
13	Nov.29	
14	Nov.30	M4 recover, C027, C028
15	Dec. 1	C029, M2 recover, M3 recover, C030
16	Dec. 2	C031, C032, C033, C034, AR01, X01, C035
17	Dec. 3	X02A, C036, X03, TM09, C037, X04, C038
18	Dec. 4	C038, X05, C039, X06, TM10, C040, X07, C041
19	Dec. 5	C041, X08, C042, X09, TM11, C043, X10
20	Dec. 6	C044, X11, X12, X13, X14, X15, X16
21	Dec. 7	X17, X18, X19, X20, X21, X22, X23
22	Dec. 8	X24, X25, X26, X27
23	Dec. 9	X28
24	Dec.10	
25	Dec.11	Shiogama

Leg-2 (Shiogama → Tokyo)

	Date	TIME (JST) 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
1	Dec.15	↑~~~~~~~~~~~~~~~~~~~~ (14) Shiogama
2	Dec.16	~~~~~~ C045 ~~ N1 deploy ~~~~~~~~~~~~~~~~~~ N2 deploy ~~~~~~~~~~~~ C046 ~ V1
3	Dec.17	V1 ~~ N3 deploy ~~~~~~~~~~ N4 deploy ~~~~~~~~~~~~~~~~~~~~~~~~~~~~
4	Dec.18	~~~~~~
5	Dec.19	~~~~~~
6	Dec.20	~~~~~~↑~↑~↑~↑~↑~ X29 X33 TM12 14 times ~
7	Dec.21	~~~~~~~~~~ C047 V2 ~~~~~~~~~~~~~~~~~~~~~
8	Dec.22	~~~~~~
9	Dec.23	~~~~~~
10	Dec.24	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ V3 ~ C048 ~~~~~~~~~~ TM13 5 times ~~~ C049 V4
11	Dec.25	~~~~~~~~~~ C050 ~~~~~~~~~~~~ C051 ~~~~~~~~ C052 ~~~~~~~~
12	Dec.26	~~~~~~
13	Dec.27	~~~~~~
14	Dec.28	~~~~~~~~~~~~~~~~~~~~~~~~~~~↑ Tokyo

6. Summary of Observation Stations

STN: Station number
TYPE: CTD=CTDO only, ROS=CTDO plus water sampler, MOR=Mooring, XCTD=XCTD, TMAP=Turbomap, NET=Plankton Net
CODE: BE=Beginning of cast or work, EN=End of work, BO=Bottom, DE=Deployment of mooring or XCTD, RE=Recover of mooring
DEPTH: Water depth in meters
MAXP: Maximum pressures in decibars
PARAM: Sampling parameters
1=Salinity, 2=Dissolved Oxygen, 3-6=Nutrients (PO_4,SiO_2,NO_2+NO_3,NO_2)
LADCP=Lowered ADCP
COMMENTS are included in the columns of MAXP/PARAM

KH-05-4 LEG 1

STN	TYPE	DATE	GMT	CODE	LATITUDE	LONGITUDE	DEPTH	MAXPR	PARAM/*COMMENT*
TM01	TMAP	111805	2338	DE	27°45.00′N	146°19.88′E	5451	350	*Turbomap*
C001	ROS	111905	0154	BE	27°44.98′N	146°19.88′E	5445		LADCP
C001	ROS	111905	0333	BO	27°44.84′N	146°19.27′E	5370	5535	1-6 *SBE9p750 CTDO*
C001	ROS	111905	0507	EN	27°44.67′N	146°18.88′E	5386		
C002	ROS	111905	0851	BE	26°59.96′N	146°19.91′E	5455		LADCP
C002	ROS	111905	1036	BO	26°59.79′N	146°19.61′E	5481	5595	1-6 *SBE9p750 CTDO*
C002	ROS	111905	1214	EN	26°59.67′N	146°19.21′E	5482		
C003	ROS	111905	1606	BE	26°15.25′N	146°20.28′E	5353		LADCP
C003	ROS	111905	1741	BO	26°15.40′N	146°20.41′E	5353	5463	1-6 *SBE9p750 CTDO*
C003	ROS	111905	1915	EN	26°15.12′N	146°20.56′E	5370		
C004	ROS	111905	2240	BE	25°29.88′N	146°20.04′E	5661		LADCP
C004	ROS	112005	0027	BO	25°29.70′N	146°19.91′E	5660	5790	1-6 *SBE9p750 CTDO*
C004	ROS	112005	0207	EN	25°29.46′N	146°19.97′E	5659		
TM02	TMAP	112005	0559	DE	24°45.03′N	146°19.95′E	5715	450	*Turbomap*
C005	ROS	112005	0653	BE	24°44.80′N	146°19.95′E	5714		LADCP
C005	ROS	112005	0842	BO	24°44.96′N	146°19.50′E	5714	5847	1-6 *SBE9p750 CTDO*
C005	ROS	112005	1022	EN	24°45.00′N	146°18.85′E	5714		
C006	ROS	112005	1534	BE	24°09.54′N	147°12.10′E	5823		LADCP
C006	ROS	112005	1724	BO	24°10.52′N	147°11.96′E	5827	5963	1-6 *SBE9p750 CTDO*
C006	ROS	112005	1906	EN	24°11.40′N	147°11.98′E	5832		
C007	ROS	112005	2233	BE	24°32.94′N	147°43.69′E	5768		LADCP
C007	ROS	112105	0021	BO	24°33.16′N	147°43.59′E	5768	5908	1-6 *SBE9p750 CTDO*
C007	ROS	112105	0201	EN	24°33.55′N	147°43.77′E	5771		
C008	ROS	112105	0550	BE	24°57.40′N	148°15.66′E	3939		LADCP
C008	ROS	112105	0712	BO	24°57.78′N	148°15.89′E	4170	4223	1-6 *SBE9p750 CTDO*
C008	ROS	112105	0826	EN	24°58.14′N	148°16.18′E	4047		
C009	ROS	112105	1100	BE	25°15.64′N	148°40.26′E	4443		LADCP
C009	ROS	112105	1219	BO	25°15.72′N	148°40.47′E	4483	4548	1-6 *SBE9p750 CTDO*
C009	ROS	112105	1338	EN	25°15.58′N	148°40.94′E	4445		
C010	ROS	112105	1620	BE	25°32.73′N	149°04.32′E	5633		LADCP
C010	ROS	112105	1808	BO	25°32.01′N	149°04.89′E	5643	5772	1-6 *SBE9p750 CTDO*
C010	ROS	112105	1945	EN	25°31.72′N	149°04.91′E	5645		
M10	MOR	112105	2147	BE	25°41.98′N	149°16.51′E	5774		*2 RCM11. 4 CM, 1 MicroCAT*
M10	MOR	112205	0015	RE	25°40.67′N	149°17.40′E	5782		*6 MnFiber. Transmitter 43.528MHz, A/R 3D*
TM03	TMAP	112205	0158	DE	25°50.66′N	149°28.18′E	5814	363	*Turbomap*

STN	TYPE	DATE	GMT	CODE	LATITUDE	LONGITUDE	DEPTH	MAXPR	PARAM/*COMMENT*
C011	ROS	112205	0250	BE	25°49.50′N	149°28.26′E	5795		LADCP
C011	ROS	112205	0435	BO	25°49.18′N	149°28.33′E	5788	5928	1-6 *SBE9p750 CTDO*
C011	ROS	112205	0613	EN	25°48.84′N	149°28.21′E	5792		
C012	ROS	112205	0850	BE	26°08.90′N	149°52.03′E	5850		LADCP
C012	ROS	112205	1035	BO	26°08.70′N	149°51.96′E	5856	5993	1-6 *SBE9p750 CTDO*
C012	ROS	112205	1215	EN	26°08.45′N	149°51.49′E	5853		
C013	ROS	112205	1454	BE	26°26.79′N	150°15.73′E	5825		LADCP
C013	ROS	112205	1645	BO	26°26.81′N	150°15.13′E	5799	5968	1-6 *SBE9p750 CTDO*
C013	ROS	112205	1824	EN	26°27.01′N	150°14.53′E	5772		
M9	MOR	112205	2229	BE	26°14.95′N	150°00.10′E	5920		*3 RCM11, 3 CM, 1 MicroCAT*
M9	MOR	112305	0057	RE	26°12.90′N	149°59.85′E	5900		*Transmitter 43.528, A/R 3B*
TM04	TMAP	112305	0457	DE	26°44.69′N	150°40.05′E	5814	440	*Turbomap*
C014	ROS	112305	0555	BE	26°45.08′N	150°39.97′E	5810		LADCP
C014	ROS	112305	0741	BO	26°44.90′N	150°39.46′E	5812	5955	1-6 *SBE9p750 CTDO*
C014	ROS	112305	0919	EN	26°44.77′N	150°39.31′E	5814		
C015	ROS	112305	1205	BE	27°02.87′N	151°03.23′E	5976		LADCP
C015	ROS	112305	1350	BO	27°03.02′N	151°03.06′E	5990	6150	1-6 *SBE9p750 CTDO*
C015	ROS	112305	1533	EN	27°03.41′N	151°02.93′E	5986		
M8	MOR	112305	2157	BE	26°48.02′N	150°43.96′E	5792		*1 RCM11, 4 CM, 1 3D-ACM, 1 MicroCAT*
M8	MOR	112405	0011	RE	26°48.82′N	150°44.62′E	5785		*Transmitter 43.528MHz, A/R 3G*
TM05	TMAP	112405	0402	DE	27°20.83′N	151°28.02′E	5576	430	*Turbomap*
C016	ROS	112405	0501	BE	27°20.84′N	151°28.11′E	5565		LADCP
C016	ROS	112405	0643	BO	27°20.80′N	151°28.07′E	5577	5698	1-6 *SBE9p750 CTDO*
C016	ROS	112405	0815	EN	27°20.75′N	151°27.71′E	5591		
C017	ROS	112405	1047	BE	27°38.93′N	151°51.91′E	5824		LADCP
C017	ROS	112405	1235	BO	27°38.82′N	151°51.63′E	5819	5966	1-6 *SBE9p750 CTDO*
C017	ROS	112405	1417	EN	27°39.46′N	151°51.46′E	5840		
C018	ROS	112405	1654	BE	27°57.16′N	152°15.90′E	4938		LADCP
C018	ROS	112405	1827	BO	27°57.07′N	152°15.93′E	4869	5139	1-6 *SBE9p750 CTDO*
C018	ROS	112405	1955	EN	27°57.08′N	152°16.29′E	4961		
M7	MOR	112405	2159	BE	27°54.10′N	152°11.86′E	5570		*1 RCM11, 4 CM, 1 3D-ACM, 1 MicroCAT*
M7	MOR	112505	0038	RE	27°55.15′N	152°13.29′E	4818		*Transmitter 43.528MHz, A/R 3E*
TM06	TMAP	112505	0310	DE	28°15.13′N	152°40.12′E	5913	403	*Turbomap*
C019	ROS	112505	0607	BE	28°15.13′N	152°40.02′E	5913		LADCP
C019	ROS	112505	0756	BO	28°14.78′N	152°40.13′E	5915	6067	1-6 *SBE9p750 CTDO*
C019	ROS	112505	0939	EN	28°14.41′N	152°39.98′E	5918		
C020	ROS	112505	1227	BE	28°35.99′N	153°08.02′E	5790		LADCP
C020	ROS	112505	1407	BO	28°35.87′N	153°07.74′E	5799	5936	1-6 *SBE9p750 CTDO*
C020	ROS	112505	1548	EN	28°35.89′N	153°07.47′E	5794		
M6	MOR	112505	2200	BE	28°43.77′N	153°18.17′E	5836		*1 RCM11, 4 CM, 1 3D-ACM, 1 MicroCAT*
M6	MOR	112605	0045	RE	28°45.55′N	153°18.47′E	5835		*Transmitter 43.528MHz, A/R 3E*
C021	ROS	112605	0221	BE	28°53.96′N	153°32.09′E	5881		LADCP
C021	ROS	112605	0407	BO	28°53.50′N	153°31.94′E	5880	6030	1-6 *SBE9p750 CTDO*
C021	ROS	112605	0552	EN	28°53.21′N	153°31.80′E	5886		
TM07	TMAP	112605	0617	DE	28°53.00′N	153°32.14′E	5890	440	*Turbomap*
C022	ROS	112605	0905	BE	29°11.90′N	153°56.10′E	5870		LADCP
C022	ROS	112605	1054	BO	29°11.56′N	153°55.84′E	5868	6023	1-6 *SBE9p750 CTDO*
C022	ROS	112605	1233	EN	29°11.34′N	153°55.20′E	5868		

STN	TYPE	DATE	GMT	CODE	LATITUDE	LONGITUDE	DEPTH	MAXPR	PARAM/*COMMENT*
C023	ROS	112605	1505	BE	29°29.89′N	154°19.93′E	5830		LADCP
C023	ROS	112605	1654	BO	29°29.50′N	154°19.28′E	5838	5983	1-6 *SBE9p750 CTDO*
C023	ROS	112605	1838	EN	29°29.34′N	154°19.10′E	5842		
M5	MOR	112605	2200	BE	29°33.00′N	154°24.64′E	5829		*1 RCM11, 4 CM, 1 3D-ACM, 1 MicroCAT*
M5	MOR	112705	0043	RE	29°32.59′N	154°25.12′E	5824		*6 MnFiber, Transmitter 43.528MHz. A/R 3C*
C024	ROS	112705	0250	BE	29°47.81′N	154°44.38′E	5794		LADCP
C024	ROS	112705	0437	BO	29°47.34′N	154°44.30′E	5792	5935	1-6 *SBE9p750 CTDO*
C024	ROS	112705	0617	EN	29°47.00′N	154°43.96′E	5790		
TM08	TMAP	112705	0636	DE	29°46.73′N	154°44.18′E	5782	414	*Turbomap*
C025	ROS	112705	0926	BE	30°05.96′N	155°08.02′E	5770		LADCP
C025	ROS	112705	1108	BO	30°05.86′N	155°07.93′E	5770	5908	1-6 *SBE9p750 CTDO*
C025	ROS	112705	1247	EN	30°06.01′N	155°07.84′E	5767		
C026	ROS	112705	1517	BE	30°23.98′N	155°32.01′E	5670		LADCP
C026	ROS	112705	1701	BO	30°24.00′N	155°32.16′E	5670	5803	1-6 *SBE9p750 CTDO*
C026	ROS	112705	1841	EN	30°24.07′N	155°32.43′E	5670		
M4	MOR	112905	2157	BE	30°19.05′N	155°18.66′E	5715		*2 RCM11. 3 CM, 1 3D-ACM. 2 MicroCAT*
M4	MOR	113005	0013	RE	30°20.11′N	155°19.45′E	5698		*Transmitter 43.528MHz. A/R 3F*
C027	ROS	113005	0401	BE	30°42.04′N	155°56.19′E	5499		
C027	ROS	113005	0539	BO	30°41.72′N	155°55.90′E	5489	5615	1-6 *SBE9p750 CTDO*
C027	ROS	113005	0714	EN	30°41.59′N	155°55.72′E	5495		
C028	ROS	113005	1008	BE	30°59.35′N	156°20.30′E	4716		LADCP
C028	ROS	113005	1142	BO	30°59.18′N	156°20.71′E	4714	4794	1-6 *SBE9p750 CTDO*
C028	ROS	113005	1305	EN	30°59.00′N	156°21.10′E	4713		
C029	ROS	113005	1557	BE	31°14.72′N	156°39.70′E	4385		LADCP
C029	ROS	113005	1738	BO	31°14.55′N	156°39.39′E	4378	4435	1-6 *SBE9p750 CTDO*
C029	ROS	113005	1854	EN	31°14.43′N	156°39.03′E	4388		
M2	MOR	113005	2059	BE	31°12.80′N	156°36.78′E	4471		*1 RCM11, 2 CM. 1 MicroCAT, 3 MnFiber*
M2	MOR	113005	2245	RE	31°11.88′N	156°36.02′E	4482		*Transmitter 43.528MHz. A/R 3A*
M3	MOR	120105	0139	BE	30°47.51′N	156°00.35′E	5139		*2 RCM11, 2 CM, 1 MicroCAT. 1 ADCP*
M3	MOR	120105	0433	RE	30°46.33′N	155°58.26′E	5448		*Transmitter 43.528MHz. A/R 3F*
C030	ROS	120105	0942	BE	31°29.76′N	157°00.71′E	4013		LADCP
C030	ROS	120105	1101	BO	31°29.76′N	157°01.27′E	4006	4039	1-6 *SBE9p750 CTDO*
C030	ROS	120105	1210	EN	31°29.36′N	157°01.45′E	4007		
C031	ROS	120105	1432	BE	31°44.87′N	157°20.39′E	3742		
C031	ROS	120105	1552	BO	31°44.63′N	157°21.46′E	3832	3870	1-6 *SBE9p750 CTDO*
C031	ROS	120105	1703	EN	31°44.54′N	157°22.03′E	3859		
C032	ROS	120105	1908	BE	31°59.92′N	157°40.57′E	2991		
C032	ROS	120105	2022	BO	31°59.97′N	157°42.18′E	2972	2977	1-6 *SBE9p750 CTDO*
C032	ROS	120105	2118	EN	31°59.96′N	157°43.03′E	2965		
C033	ROS	120105	2354	BE	32°14.48′N	158°00.98′E	2623		
C033	ROS	120205	0105	BO	32°14.64′N	158°02.84′E	2618	2610	1-6 *SBE9p750 CTDO*
C033	ROS	120205	0155	EN	32°14.86′N	158°03.71′E	2609		
C034	ROS	120205	0353	BE	32°30.34′N	158°20.77′E	2492		
C034	ROS	120205	0511	BO	32°31.05′N	158°22.39′E	2449	2444	1-6 *SBE9p750 CTDO*
C034	ROS	120205	0557	EN	32°31.43′N	158°22.90′E	2441		
AR01	FLOAT	120205	0651	DE	32°32.36′N	158°24.86′E	2419		*APEX*
X01	XCTD	120205	0940	DE	31°59.80′N	158°19.98′E	2821		*TSK XCTD-1*
C035	CTD	120205	1247	BE	31°30.00′N	158°20.70′E	3700		

STN	TYPE	DATE	GMT	CODE	LATITUDE	LONGITUDE	DEPTH	MAXPR	PARAM/*COMMENT*
C035	CTD	120205	1401	BO	31°30.32′N	158°21.27′E	3599	3600	*SBE9p750 CTDO*
C035	CTD	120205	1505	EN	31°30.72′N	158°21.57′E	3587		
X02A	XCTD	120205	1734	DE	30°59.52′N	158°19.95′E	4889		*TSK XCTD-1*
C036	ROS	120205	2000	BE	30°30.31′N	158°19.86′E	5317		
C036	ROS	120205	2155	BO	30°30.24′N	158°19.98′E	5318	5415	1-6 *SBE9p750 CTDO*
C036	ROS	120205	2326	EN	30°29.95′N	158°20.17′E	5326		
X03	XCTD	120305	0148	DE	29°59.82′N	158°20.01′E	5593		*TSK XCTD-1*
TM09	TMAP	120305	0405	DE	29°29.87′N	158°20.21′E	5849	380	*Turbomap*
C037	ROS	120305	0455	BE	29°29.56′N	158°20.86′E	5849		
C037	ROS	120305	0653	BO	29°29.15′N	158°20.93′E	5848	5991	1-6 *SBE9p750 CTDO*
C037	ROS	120305	0834	EN	29°28.71′N	158°20.98′E	5846		
X04A	XCTD	120305	1048	DE	28°59.65′N	158°19.99′E	5845		*TSK XCTD-1*
C038	ROS	120305	1326	BE	28°29.53′N	158°21.03′E	5912		
C038	ROS	120305	1529	BO	28°28.74′N	158°21.35′E	5912	6021	1-6 *SBE9p750 CTDO*
C038	ROS	120305	1712	EN	28°28.49′N	158°21.28′E	5998		
X05	XCTD	120305	1924	DE	27°59.91′N	158°19.99′E	5911		*TSK XCTD-1*
C039	ROS	120305	2140	BE	27°29.71′N	158°20.34′E	5959		
C039	ROS	120305	2341	BO	27°29.06′N	158°20.45′E	5958	6108	1-6 *SBE9p750 CTDO*
C039	ROS	120405	0124	EN	27°28.71′N	158°20.37′E	5960		
X06	XCTD	120405	0317	DE	27°05.12′N	158°20.05′E	5940		*TSK XCTD-1*
TM10	TMAP	120405	0507	DE	26°39.79′N	158°20.04′E	5861	440	*Turbomap*
C040	ROS	120405	0604	BE	26°39.14′N	158°21.03′E	5890		
C040	ROS	120405	0805	BO	26°38.78′N	158°21.14′E	5896	6040	1-6 *SBE9p750 CTDO*
C040	ROS	120405	0947	EN	26°38.35′N	158°21.14′E	5914		
X07	XCTD	120405	1135	DE	26°14.67′N	158°20.00′E	5968		*TSK XCTD-1*
C041	ROS	120405	1336	BE	25°49.89′N	158°20.20′E	5862		
C041	ROS	120405	1525	BO	25°49.77′N	158°20.23′E	5862	6005	1-6 *SBE9p750 CTDO*
C041	ROS	120405	1705	EN	25°49.61′N	158°20.29′E	5864		
X08	XCTD	120405	1916	DE	25°48.98′N	157°49.85′E	5954		*TSK XCTD-1*
C042	ROS	120405	2123	BE	25°50.03′N	157°20.23′E	5999		
C042	ROS	120405	2328	BO	25°50.11′N	157°20.57′E	6004	6156	1-6 *SBE9p750 CTDO*
C042	ROS	120505	0112	EN	25°50.24′N	157°20.89′E	6011		
X09A	XCTD	120505	0341	DE	25°49.89′N	156°49.93′E	5886		*TSK XCTD-1*
TM11	TMAP	120505	0620	DE	25°49.76′N	156°00.57′E	5948	330	*Turbomap*
C043	ROS	120505	0705	BE	25°49.81′N	156°21.17′E	5886		
C043	ROS	120505	0913	BO	25°49.33′N	156°21.34′E	5969	6119	1-6 *SBE9p750 CTDO*
C043	ROS	120505	1059	EN	25°49.01′N	156°21.64′E	5974		
X10	XCTD	120505	1332	DE	25°49.93′N	155°50.05′E	5910		*TSK XCTD-1*
C044	ROS	120505	1719	BE	25°50.03′N	155°20.12′E	5907		LADCP
C044	ROS	120505	1920	BO	25°49.60′N	155°20.40′E	5921	6059	1-6 *SBE9p750 CTDO*
C044	ROS	120505	2105	EN	25°49.24′N	155°20.72′E	5902		
X11	XCTD	120505	2339	DE	25°49.97′N	154°49.90′E	5538		*TSK XCTD-1*
X12	XCTD	120605	0241	DE	25°49.90′N	154°19.71′E	5893		*TSK XCTD-1*
X13	XCTD	120605	0609	DE	25°49.98′N	153°50.04′E	5873		*TSK XCTD-1*
X14	XCTD	120605	0911	DE	25°49.98′N	153°19.91′E	5714		*TSK XCTD-1*
X15	XCTD	120605	1144	DE	25°50.03′N	152°49.94′E	5790		*TSK XCTD-1*
X16	XCTD	120605	1423	DE	25°49.98′N	152°19.93′E	5635		*TSK XCTD-1*
X17	XCTD	120605	1654	DE	25°49.98′N	151°49.91′E	5604		*TSK XCTD-1*

STN	TYPE	DATE	GMT	CODE	LATITUDE	LONGITUDE	DEPTH	MAXPR	PARAM/*COMMENT*
X18	XCTD	120605	1933	DE	25°49.98′N	151°19.42′E	5553		*TSK XCTD-1*
X19	XCTD	120605	2159	DE	25°49.98′N	150°49.01′E	5814		*TSK XCTD-1*
X20	XCTD	120705	0027	DE	25°49.96′N	150°19.87′E	5776		*TSK XCTD-1*
X21	XCTD	120705	0311	DE	25°49.98′N	149°49.78′E	5864		*TSK XCTD-1*
X22	XCTD	120705	0522	DE	25°49.97′N	149°20.09′E	5845		*TSK XCTD-1*
X23	XCTD	120705	1211	DE	27°00.18′N	148°23.51′E	5084		*TSK XCTD-1*
X24A	XCTD	120705	1754	DE	28°00.27′N	147°34.60′E	2691		*TSK XCTD-1*
X25	XCTD	120705	2330	DE	29°00.07′N	146°45.33′E	6155		*TSK XCTD-1*
X25A	XCTD	120705	2337	DE	29°00.45′N	146°44.80′E	6156		*TSK XCTD-1*
X26	XCTD	120805	0813	DE	30°00.04′N	145°55.97′E	6097		*TSK XCTD-1*
X27	XCTD	120805	1335	DE	31°00.07′N	145°05.60′E	5934		*TSK XCTD-1*
X28	XCTD	120805	1953	DE	32°00.00′N	144°15.10′E	5652		*TSK XCTD-1*

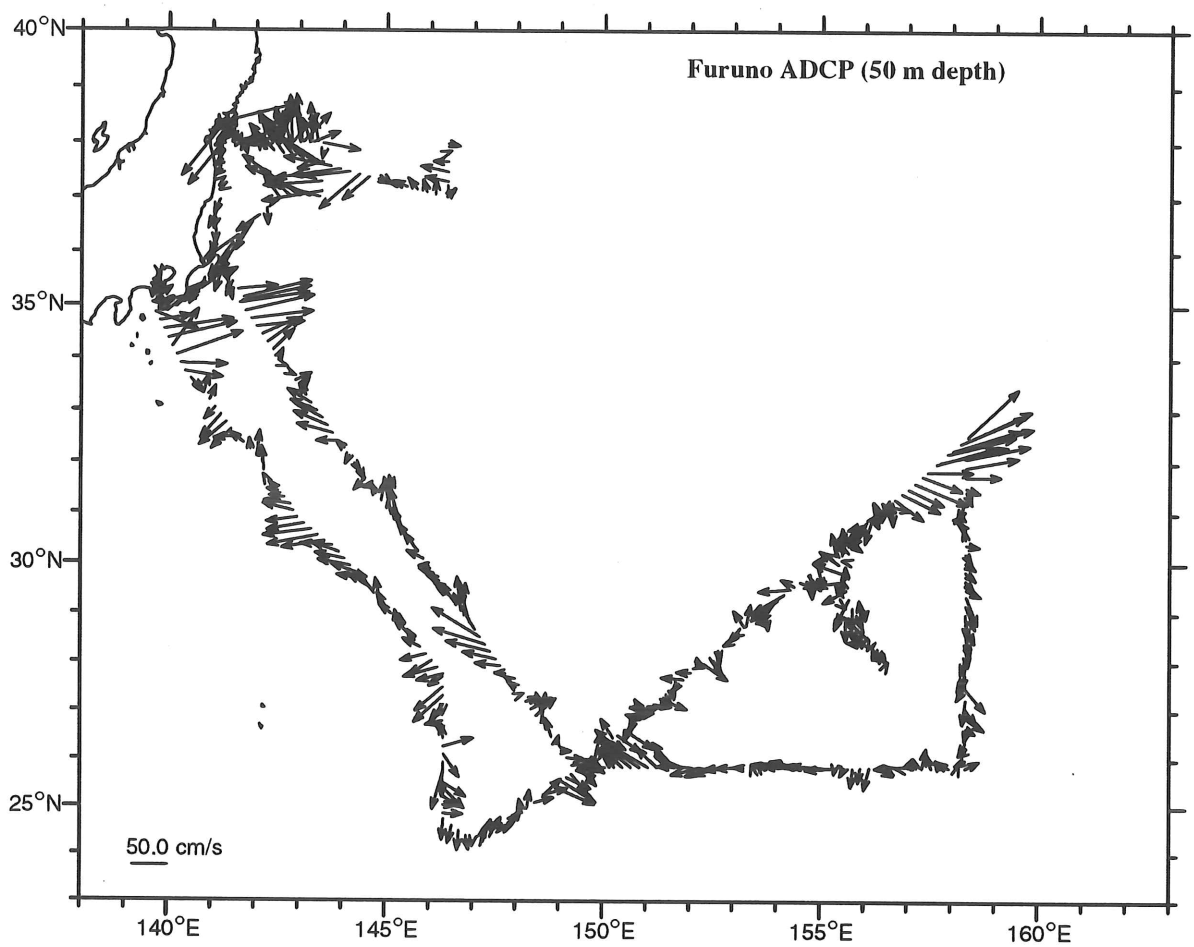
KH-05-4 LEG 2

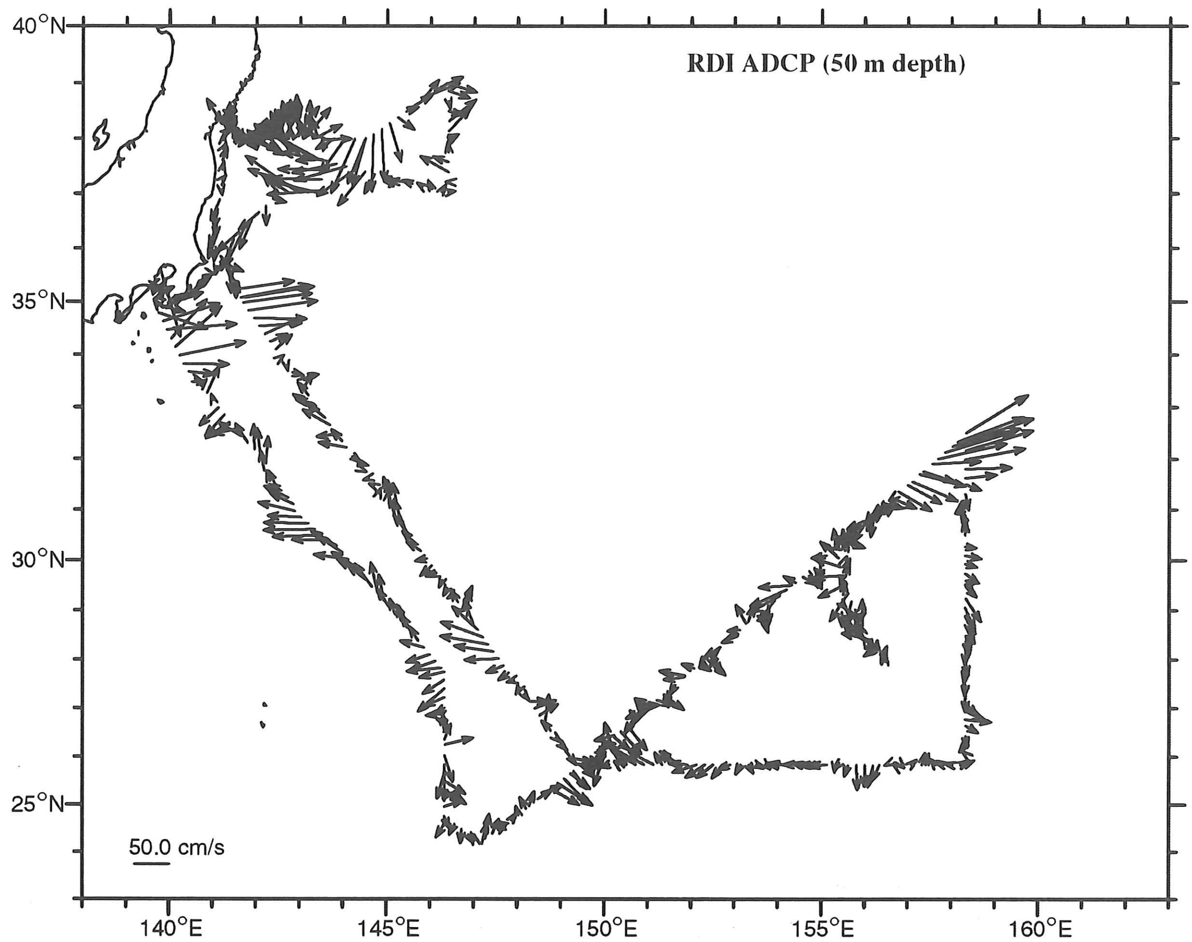
STN	TYPE	DATE	GMT	CODE	LATITUDE	LONGITUDE	DEPTH	MAXPR	PARAM/*COMMENT*
C045	ROS	121505	1742	BE	37°59.74′N	144°29.87′E	5950		LADCP
C045	ROS	121505	1902	BO	37°58.89′N	144°29.41′E	5977	4197	1-6 *SBE9p750 CTDO*
C045	ROS	121505	2018	EN	37°58.60′N	144°28.95′E	5887		
N1	MOR	121505	2120	BE	38°02.00′N	144°28.44′E	5815		*3 RCM11, 3 CM, 2 MicroCAT*
N1	MOR	121505	2251	DE	37°59.00′N	144°30.78′E	5921		*Transmitter 43.528MHz, A/R 1A*
N2	MOR	121605	0558	BE	39°00.03′N	146°20.07′E	5317		*2 RCM11, 1 3D-ACM, 2 CM, 1 MicroCAT*
N2	MOR	121605	0657	DE	38°59.53′N	146°23.87′E	5294		*Transmitter 43.528MHz, A/R 3F*
C046	ROS	121605	1134	BE	38°00.11′N	146°24.52′E	5382		LADCP
C046	ROS	121605	1232	BO	38°00.30′N	146°24.52′E	5394	3201	1-6 *SBE9p750 CTDO*
C046	ROS	121605	1327	EN	38°00.42′N	146°24.61′E	5396		
V1A	NET	121605	1357	BE	38°00.02′N	146°24.45′E	5378		
V1A	NET	121605	1557	EN	38°00.14′N	146°24.43′E	5393		
V1B	NET	121605	1623	BE	38°00.10′N	146°24.51′E	5383		
V1B	NET	121605	1644	EN	38°00.18′N	146°24.56′E	5388		
V1C	NET	121605	1700	BE	38°00.00′N	146°24.54′E	5377		
V1C	NET	121605	1741	EN	38°00.05′N	146°24.54′E	5380		
V1D	NET	121605	1755	BE	37°59.98′N	146°24.56′E	5377		
V1D	NET	121605	1953	EN	37°59.88′N	146°24.50′E	5375		
N3	MOR	121605	2058	BE	37°58.04′N	146°25.29′E	5382		*3 RCM11, 2 CM, 2 MicroCAT*
N3	MOR	121605	2202	DE	38°00.15′N	146°24.08′E	5399		*Transmitter 43.528MHz, A/R 3A*
N4	MOR	121705	0211	BE	37°02.40′N	146°24.55′E	5489		*2 RCM11, 1 3D-ACM, 2 CM, 1 MicroCAT*
N4	MOR	121705	0320	DE	37°00.11′N	146°24.63′E	5500		*Transmitter 43.528MHz, A/R 1B*
X29	XCTD	122005	0619	DE	37°59.78′N	141°40.23′E	145		*TSK XCTD-1*
X30	XCTD	122005	0651	DE	38°00.02′N	141°50.23′E	245		*TSK XCTD-1*
X31	XCTD	122005	0729	DE	38°00.01′N	142°00.23′E	372		*TSK XCTD-1*
X32	XCTD	122005	0803	DE	38°00.02′N	142°10.12′E	730		*TSK XCTD-1*
X33	XCTD	122005	0842	DE	38°00.22′N	142°20.10′E	963		*TSK XCTD-1*
TM12A	TMAP	122005	0911	DE	38°00.05′N	142°20.19′E	960	400	*Turbomap*
TM12B	TMAP	122005	0934	DE	37°59.85′N	142°20.22′E	960	100	*Turbomap*
TM12C	TMAP	122005	0957	DE	37°59.64′N	142°20.39′E	960	142	*Turbomap*
TM12D	TMAP	122005	1020	DE	37°59.40′N	142°20.66′E	962	254	*Turbomap*
TM12E	TMAP	122005	1052	DE	37°59.07′N	142°21.09′E	967	396	*Turbomap*
TM12F	TMAP	122005	1114	DE	37°58.83′N	142°21.34′E	970	386	*Turbomap*
TM12G	TMAP	122005	1137	DE	37°58.59′N	142°21.60′E	974	394	*Turbomap*
TM12H	TMAP	122005	1158	DE	37°58.37′N	142°21.77′E	974	400	*Turbomap*

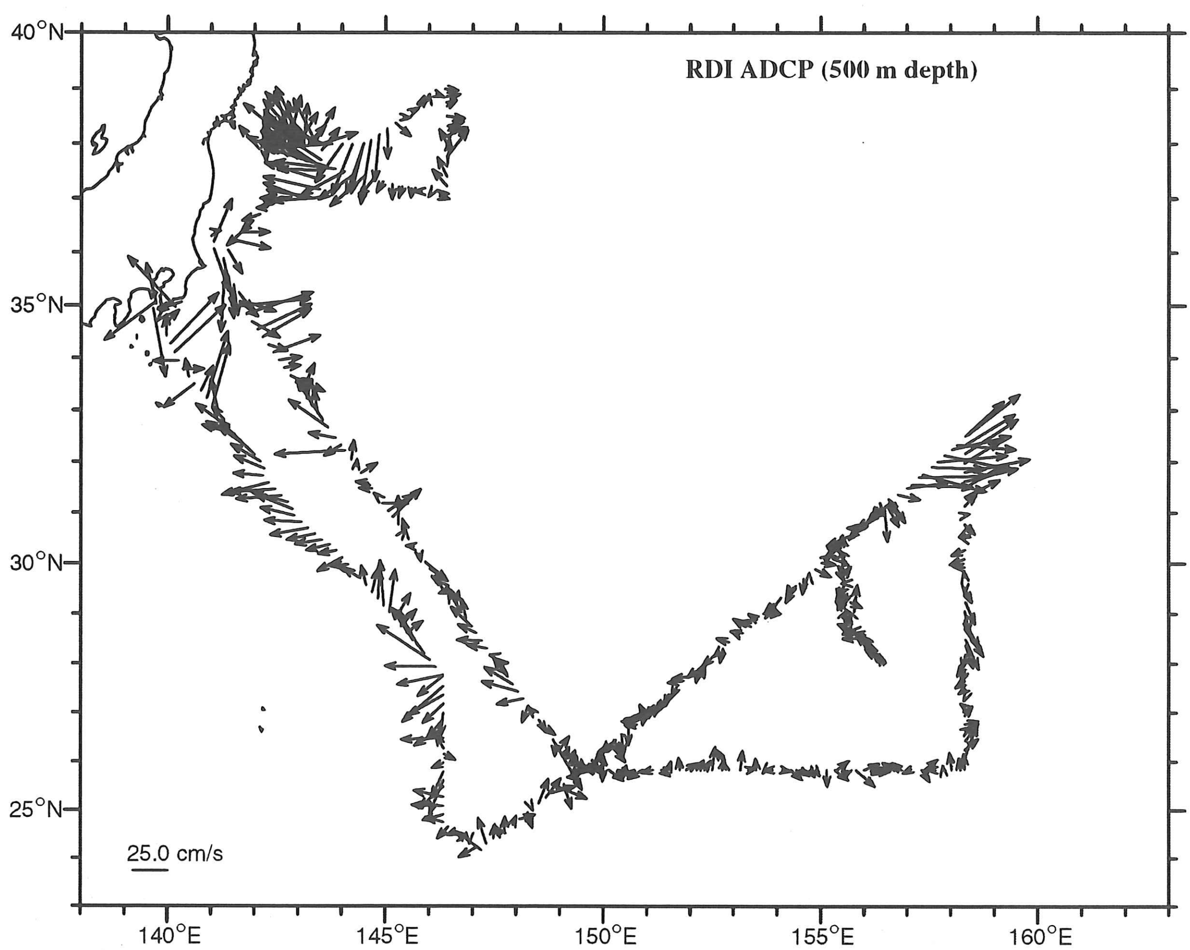
STN	TYPE	DATE	GMT	CODE	LATITUDE	LONGITUDE	DEPTH	MAXPR	PARAM/*COMMENT*
TM12I	TMAP	122005	1220	DE	37°58.21′N	142°21.95′E	973	404	*Turbomap*
TM12J	TMAP	122005	1244	DE	37°58.08′N	142°22.17′E	973	442	*Turbomap*
TM12K	TMAP	122005	1307	DE	37°57.95′N	142°22.27′E	974	456	*Turbomap*
TM12L	TMAP	122005	1330	DE	37°57.83′N	142°22.23′E	973	463	*Turbomap*
TM12M	TMAP	122005	1356	DE	37°57.69′N	142°22.17′E	971	473	*Turbomap*
TM12N	TMAP	122005	1421	DE	37°57.57′N	142°22.10′E	968	503	*Turbomap*
C047	ROS	122005	1902	BE	38°00.06′N	143°25.03′E	4000		LADCP
C047	ROS	122005	2027	BO	38°00.50′N	143°24.85′E	3972	3211	1-6 *SBE9p750 CTDO*
C047	ROS	122005	2124	EN	38°00.48′N	143°24.83′E	3976		
V2A	NET	122005	2137	BE	38°00.65′N	143°24.89′E	3974		
V2A	NET	122005	2227	EN	38°00.82′N	143°24.50′E	3916		
V2B	NET	122005	2248	BE	38°00.92′N	143°24.43′E	3890		
V2B	NET	122005	2336	EN	38°01.00′N	143°24.08′E	3836		
V2C	NET	122005	2349	BE	38°01.05′N	143°24.05′E	3824		
V2C	NET	122105	0008	EN	38°01.17′N	143°24.02′E	3799		
V2D	NET	122105	0035	BE	38°01.21′N	143°24.01′E	3812		
V2D	NET	122105	0233	EN	38°01.65′N	143°23.79′E	3762		
V2E	NET	122105	0250	BE	38°01.48′N	143°23.77′E	3748		
V2E	NET	122105	0459	EN	38°02.53′N	143°23.81′E	3729		
V2F	NET	122105	0513	BE	38°02.59′N	143°23.76′E	3701		
V2F	NET	122105	0713	EN	38°03.29′N	143°23.68′E	3556		
V3A	NET	122405	0210	BE	38°00.12′N	142°30.30′E	1119		
V3A	NET	122405	0230	EN	38°00.30′N	142°30.37′E	1124		
V3B	NET	122405	0240	BE	38°00.44′N	142°30.37′E	1126		
V3B	NET	122405	0328	EN	38°00.78′N	142°30.43′E	1134		
C048	ROS	122405	0407	BE	38°01.18′N	142°30.57′E	1142		LADCP
C048	ROS	122405	0448	BO	38°01.33′N	142°30.43′E	1141	1120	1-6 *SBE9p750 CTDO*
C048	ROS	122405	0510	EN	38°01.33′N	142°30.39′E	1138		
TM13A	TMAP	122405	0916	DE	38°02.31′N	142°30.89′E	1160	386	*Turbomap*
TM13B	TMAP	122405	0940	DE	38°02.23′N	142°31.26′E	1172	403	*Turbomap*
TM13C	TMAP	122405	1003	DE	38°02.21′N	142°31.66′E	1175	405	*Turbomap*
TM13D	TMAP	122405	1027	DE	38°02.21′N	142°31.04′E	1180	425	*Turbomap*
TM13E	TMAP	122405	1050	DE	38°02.26′N	142°32.46′E	1198	377	*Turbomap*
C049	CTD	122405	1214	BE	38°00.23′N	142°30.13′E	1121		LADCP
C049	CTD	122405	1230	BO	38°00.36′N	142°30.26′E	1124	561	*SBE9p750 CTDO*
C049	CTD	122405	1243	EN	38°00.46′N	142°30.28′E	1125		
C049A	ROS	122405	1258	BE	38°00.56′N	142°30.29′E	1128		LADCP
C049A	ROS	122405	1324	BO	38°00.78′N	142°30.46′E	1132	1108	1-6 *SBE9p750 CTDO*
C049A	ROS	122405	1349	EN	38°00.85′N	142°30.61′E	1135		
V4A	NET	122405	1408	BE	38°01.04′N	142°30.94′E	1146		
V4A	NET	122405	1445	EN	38°01.44′N	142°31.23′E	1157		
V4B	NET	122405	1453	BE	38°01.49′N	142°31.40′E	1162		
V4B	NET	122405	1517	EN	38°01.71′N	142°31.52′E	1166		
C050	ROS	122405	1901	BE	37°59.78′N	143°30.95′E	4420		LADCP
C050	ROS	122405	2043	BO	37°59.39′N	143°31.92′E	4409	4469	1-6 *SBE9p750 CTDO*
C050	ROS	122405	2202	EN	37°59.16′N	143°32.38′E	4464		
C051	ROS	122505	0233	BE	36°59.96′N	143°29.79′E	7574		LADCP
C051	ROS	122505	0453	BO	37°00.45′N	143°27.21′E	7321	6015	1-6 *SBE9p750 CTDO*

STN	TYPE	DATE	GMT	CODE	LATITUDE	LONGITUDE	DEPTH	MAXPR	PARAM/*COMMENT*	
C051	ROS	122505	0643	EN	37°01.25′N	143°26.90′E	7316			
C052	ROS	122505	1004	BE	37°00.24′N	142°30.04′E	2881		LADCP	
C052	ROS	122505	1103	BO	37°00.26′N	142°30.06′E	2884	2853	1-6	*SBE9p750 CTDO*
C052	ROS	122505	1154	EN	37°00.17′N	142°30.16′E	2898			

7. Chart of Surface Currents

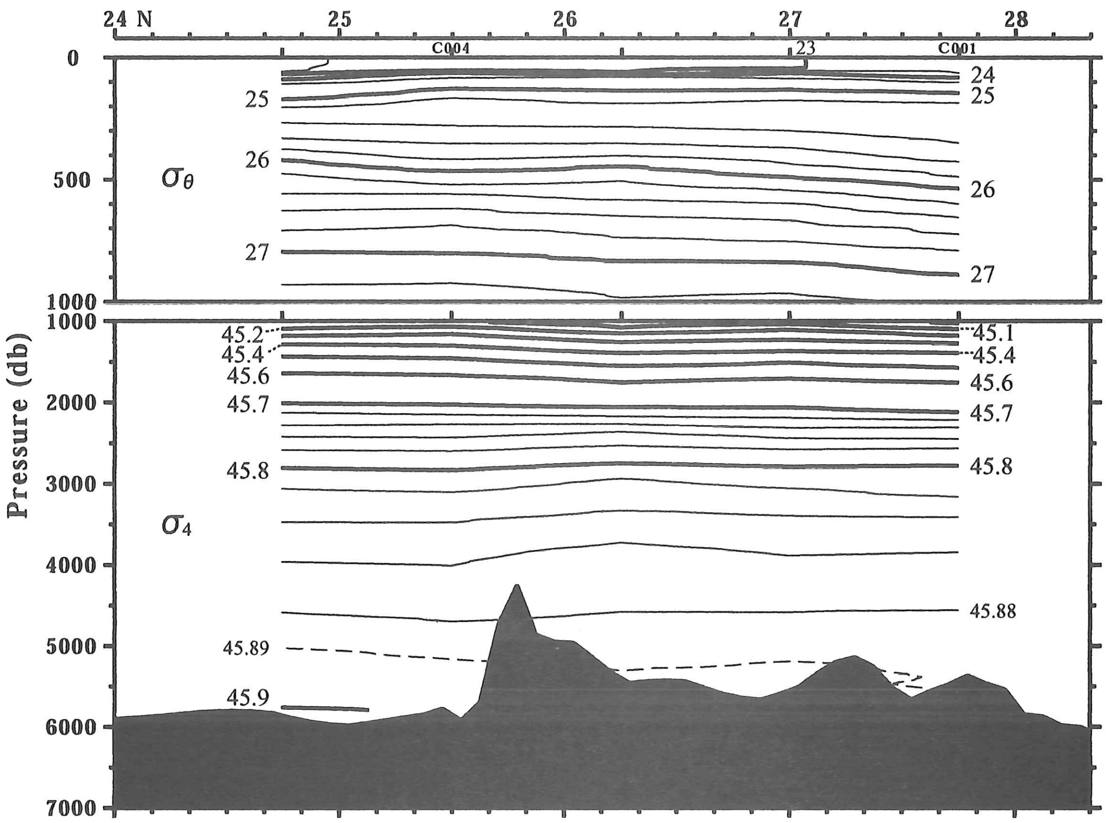



RDI ADCP (50 m depth)
50.0 cm/s
40°N
35°N
30°N
25°N
140°E
145°E
150°E
155°E
160°E

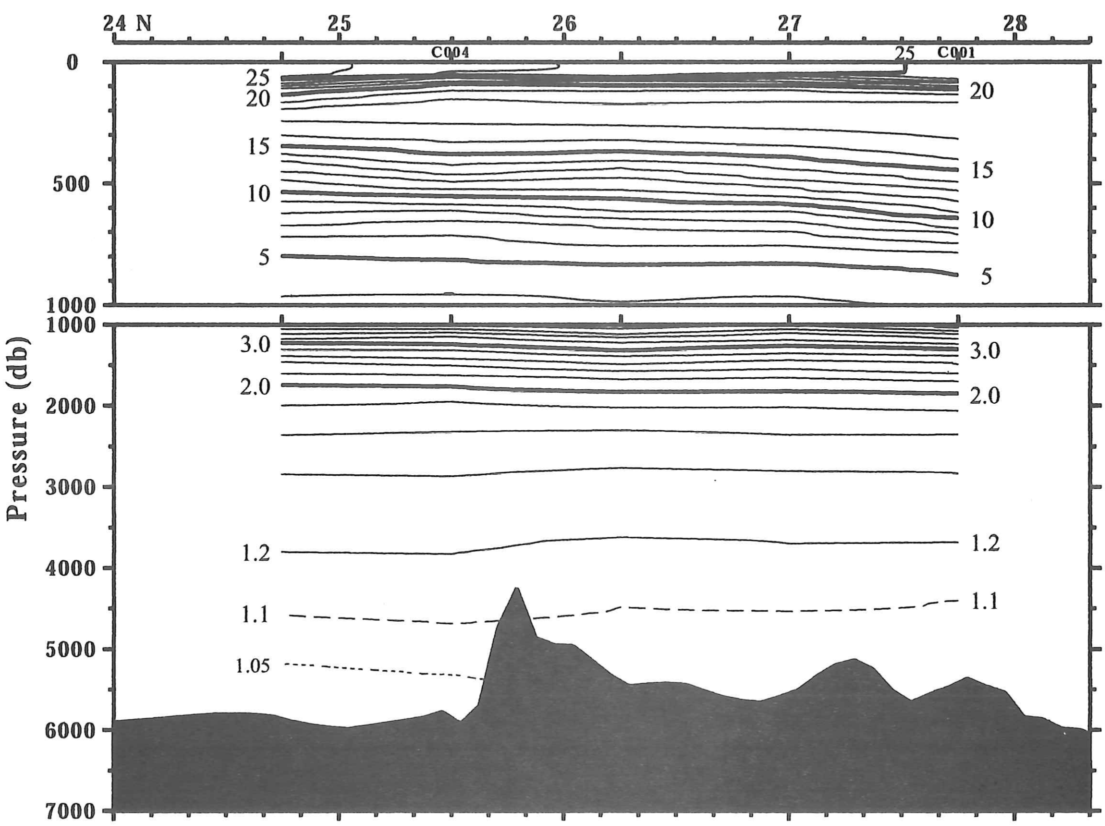

RDI ADCP (500 m depth)
25.0 cm/s
40°N
35°N
30°N
25°N
140°E
145°E
150°E
155°E
160°E

8. Vertical Sections of $CTDO_2$ Data

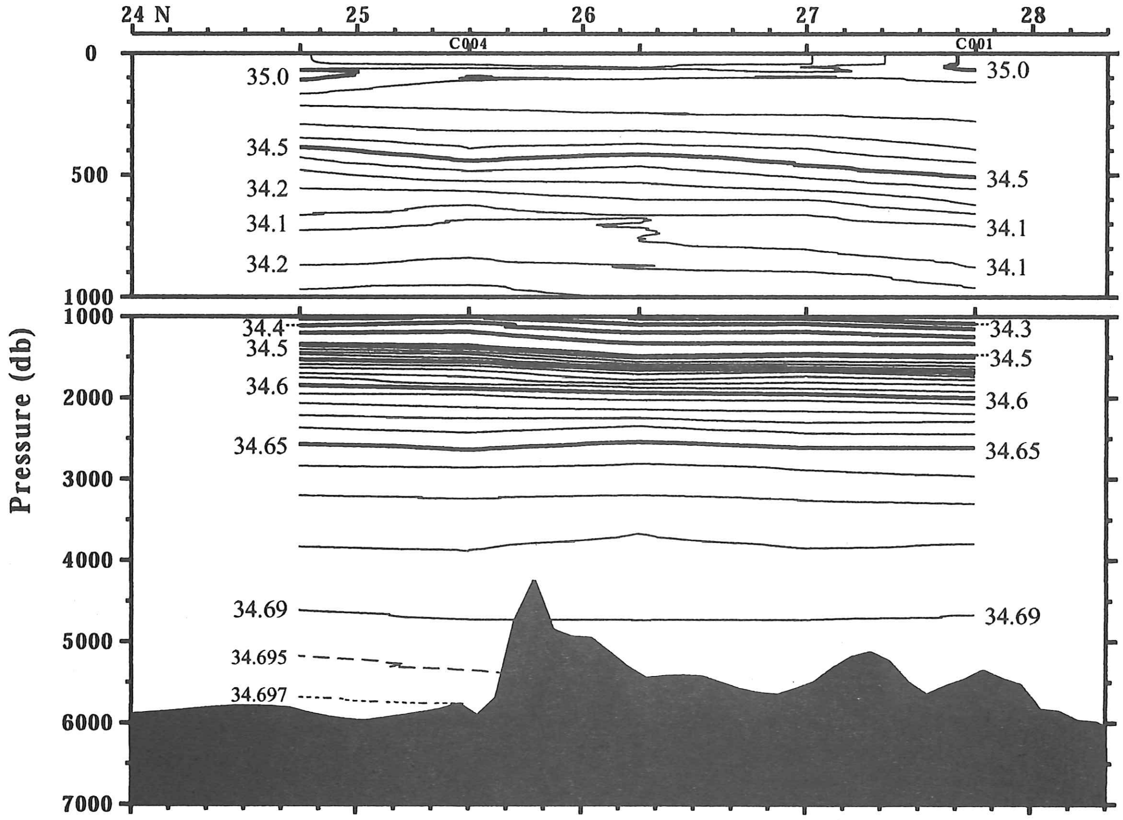
POTENTIAL DENSITY
146.3E line



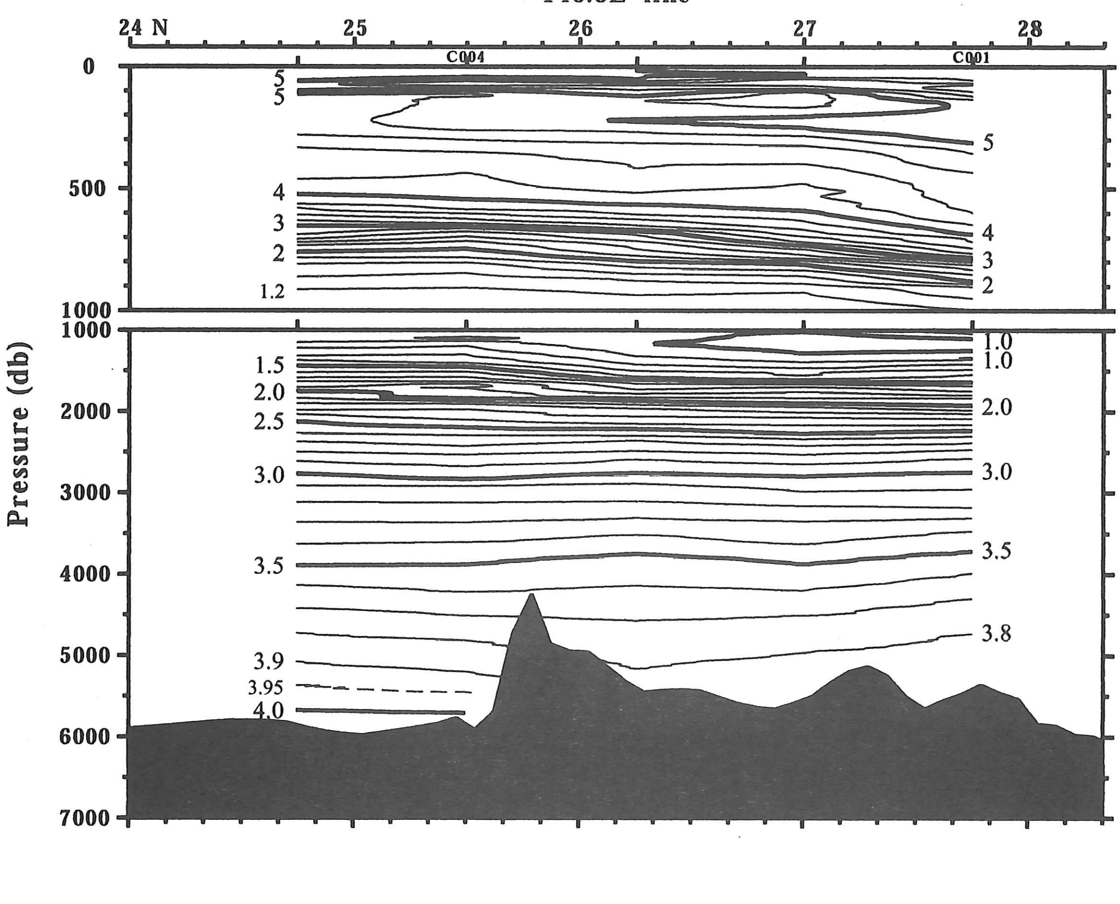
POT. TEMPERATURE (deg C)
146.3E line



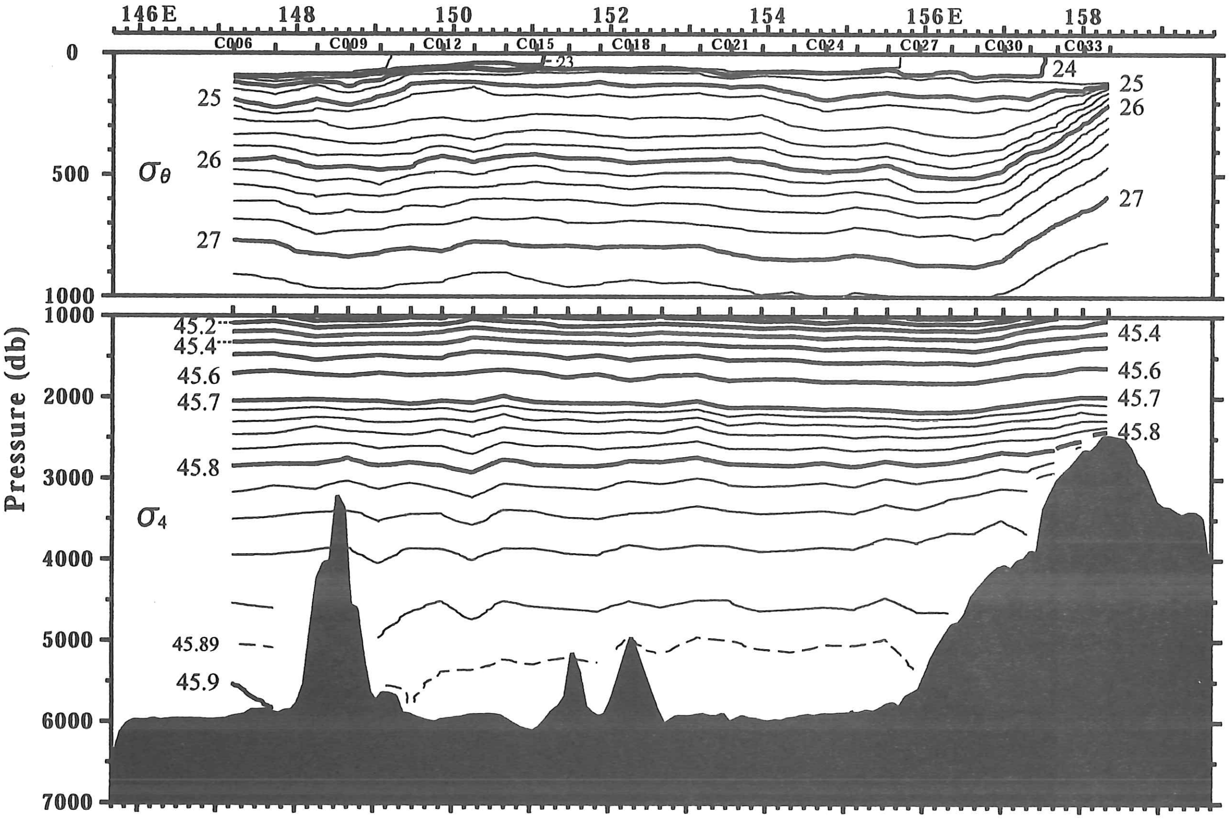
SALINITY (psu)
146.3E line



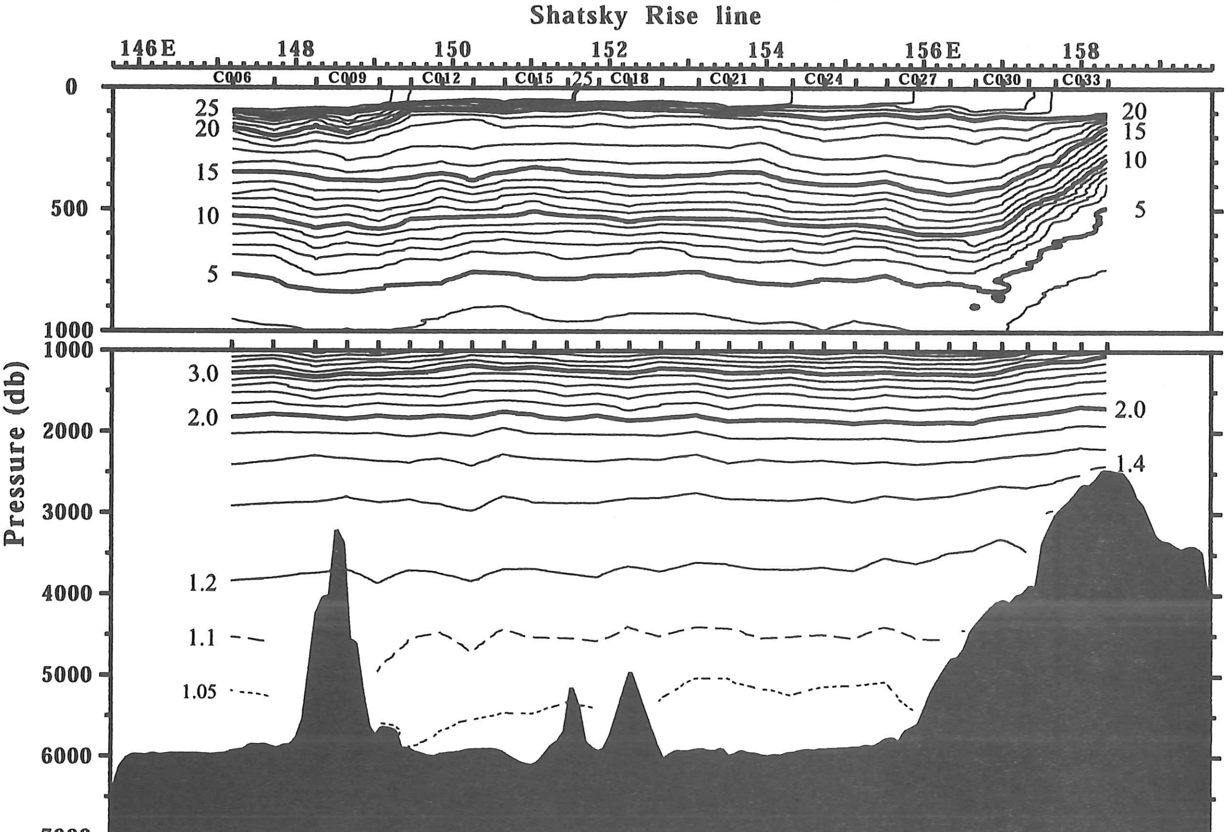
DISSOLVED OXYGEN (ml/l)
146.3E line



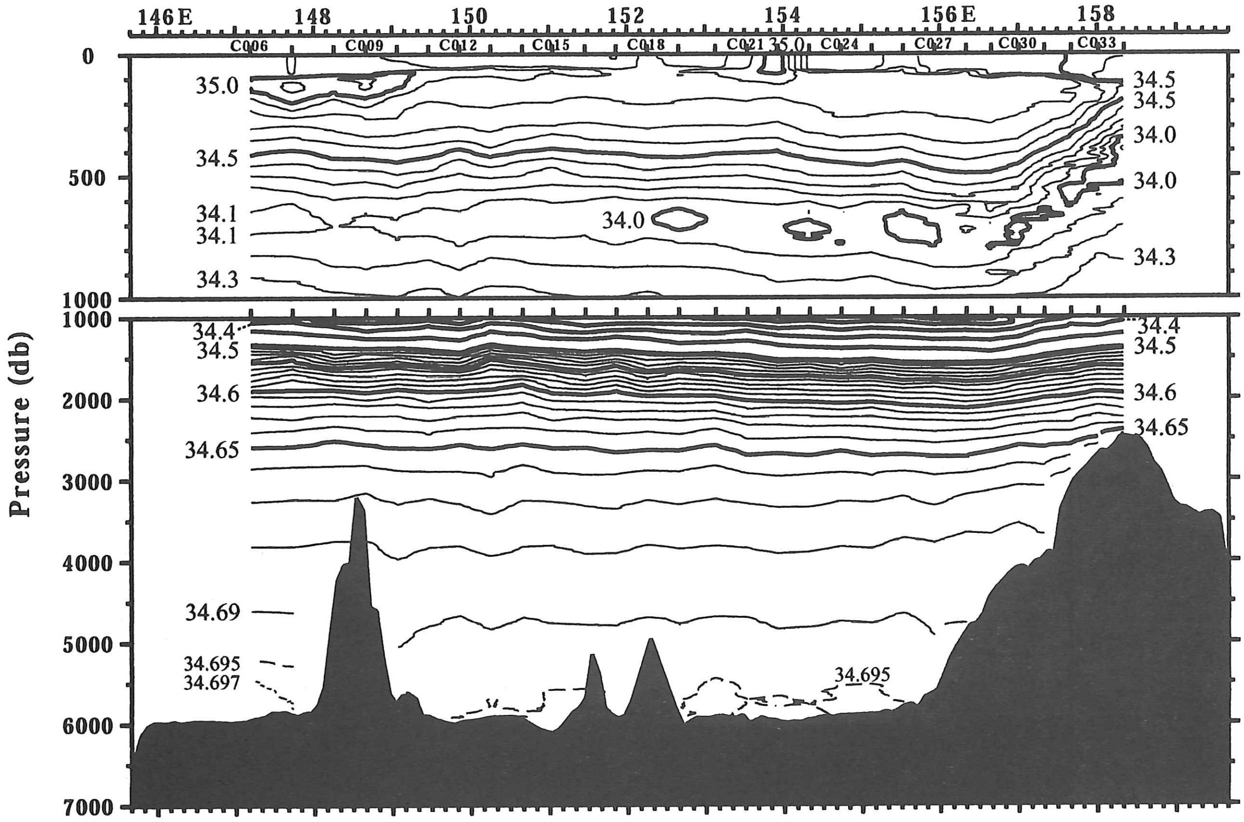
POTENTIAL DENSITY
Shatsky Rise line



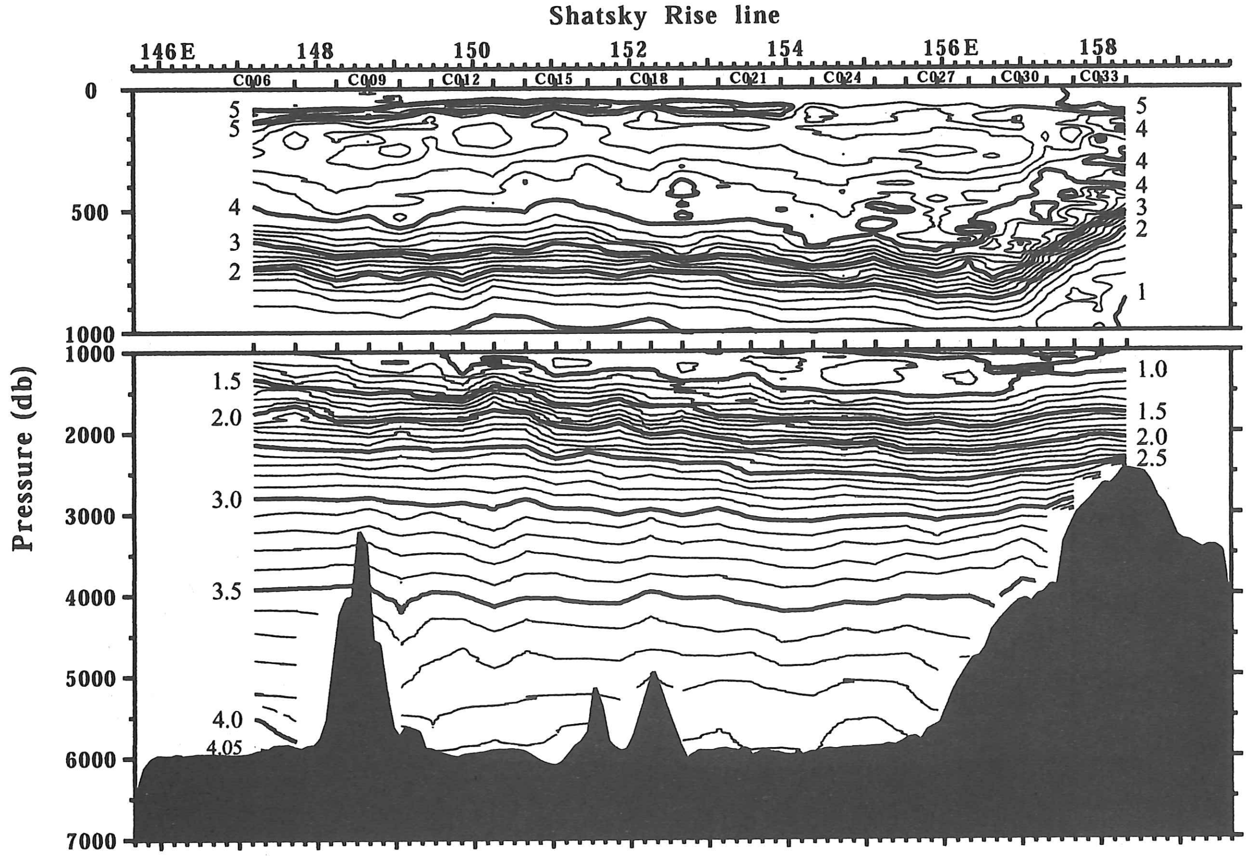
POT. TEMPERATURE (deg C)
Shatsky Rise line



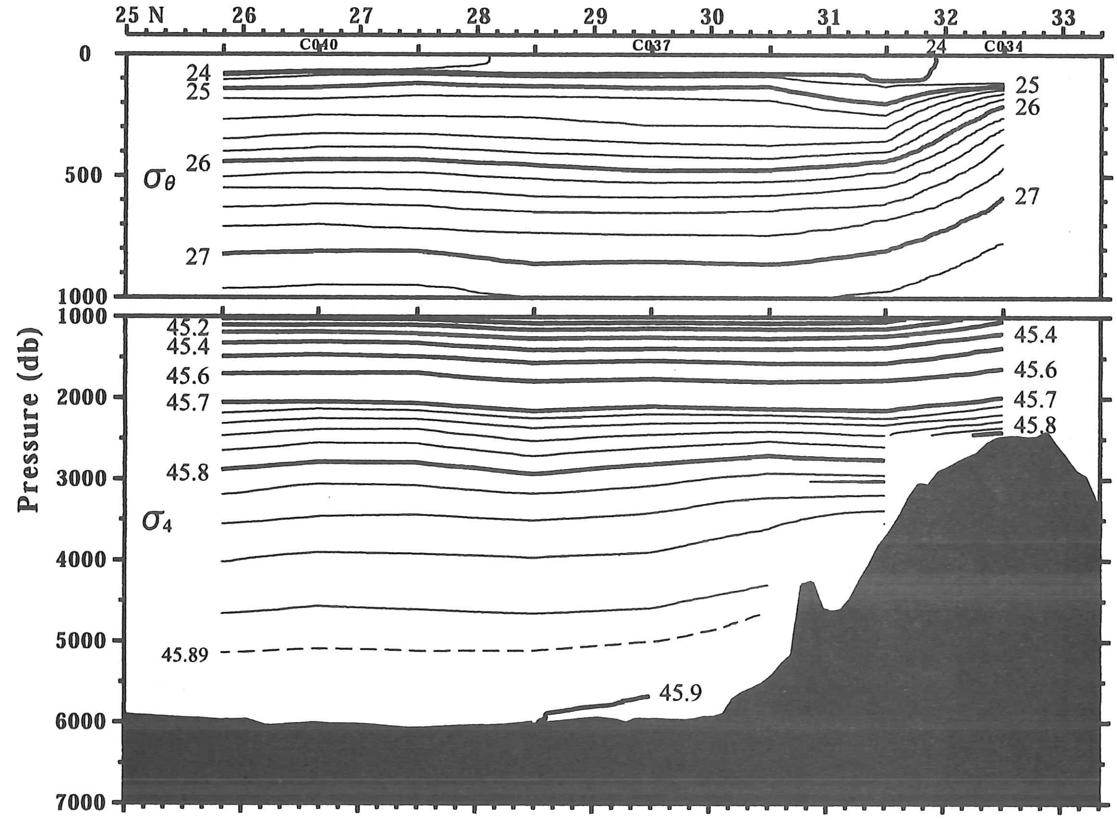
SALINITY (psu)
Shatsky Rise line



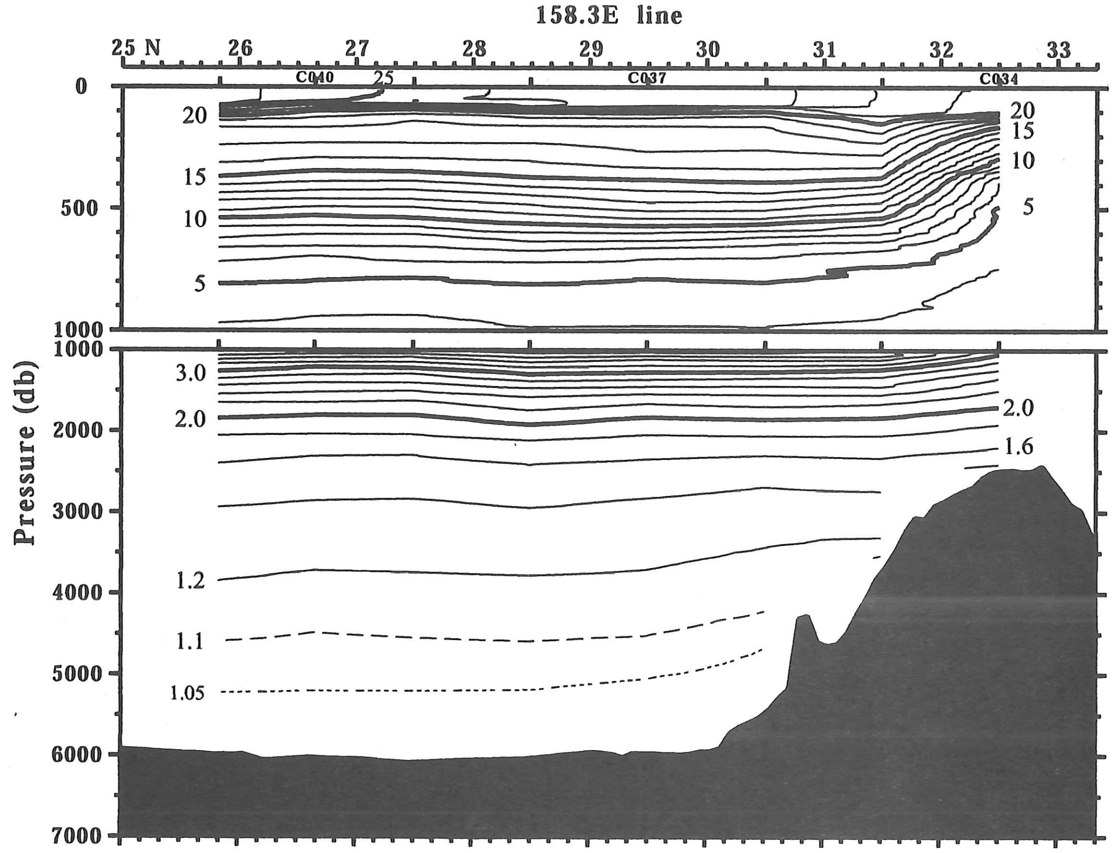
DISSOLVED OXYGEN (ml/l)
Shatsky Rise line



POTENTIAL DENSITY
158.3E line

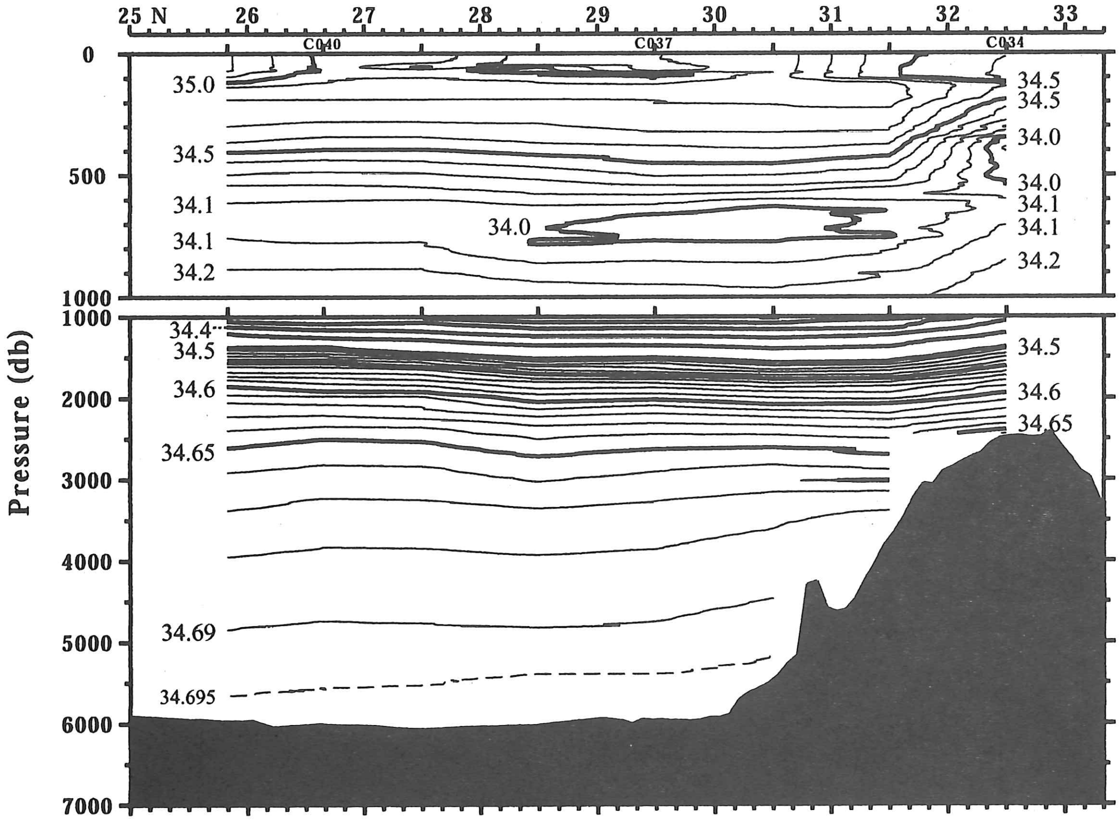


POT. TEMPERATURE (deg C)
158.3E line



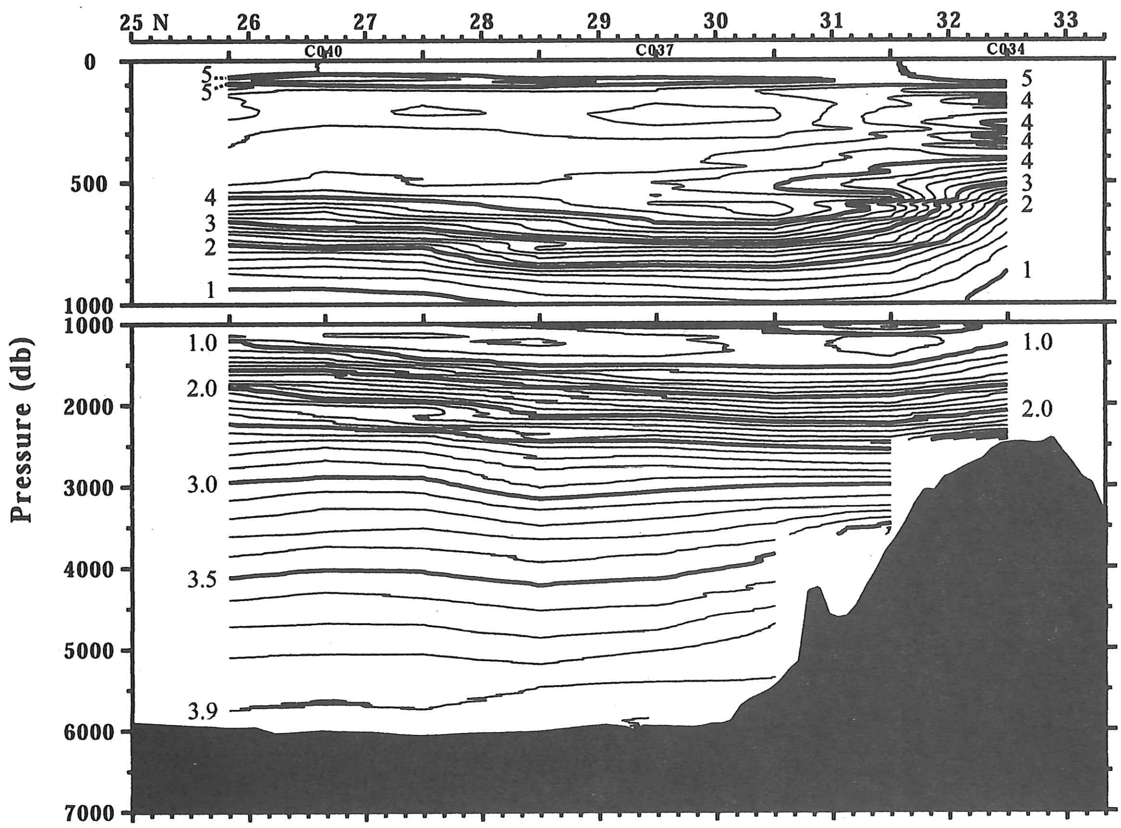
SALINITY (psu)

158.3E line



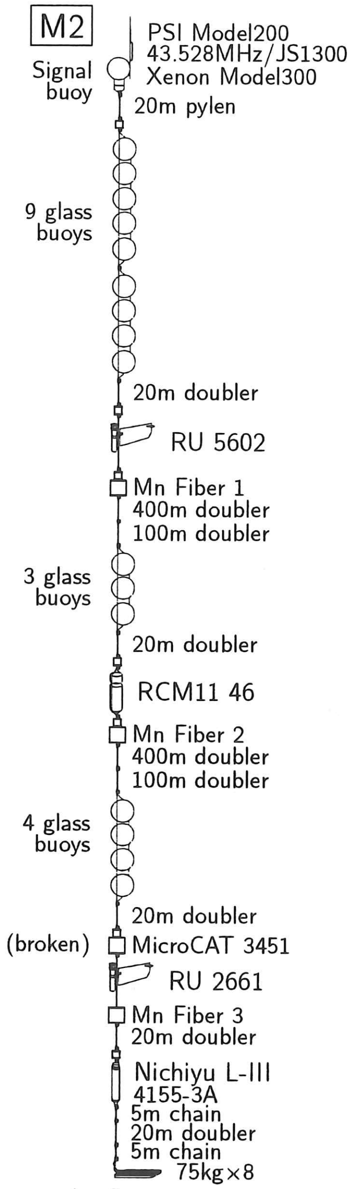
DISSOLVED OXYGEN (ml/l)

158.3E line

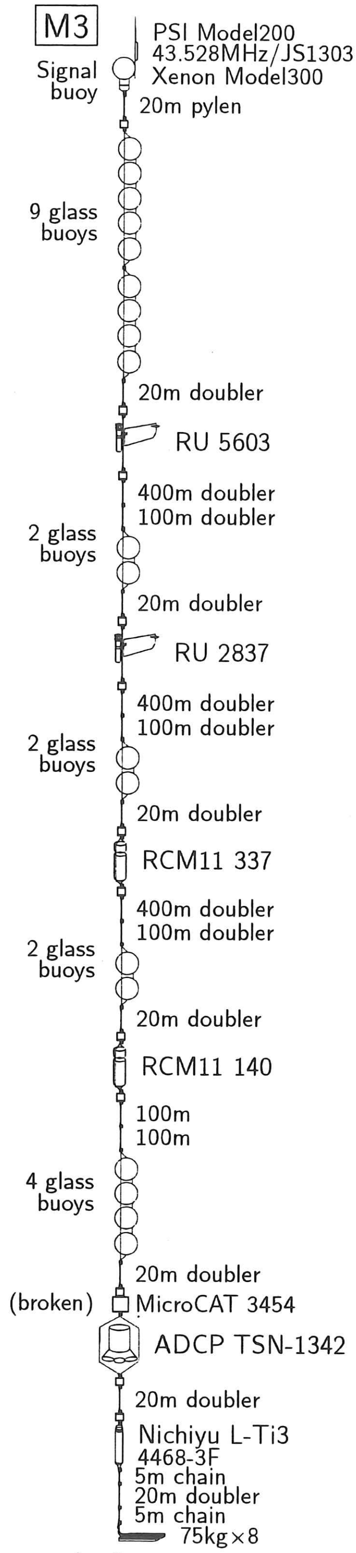


9. Mooring Systems

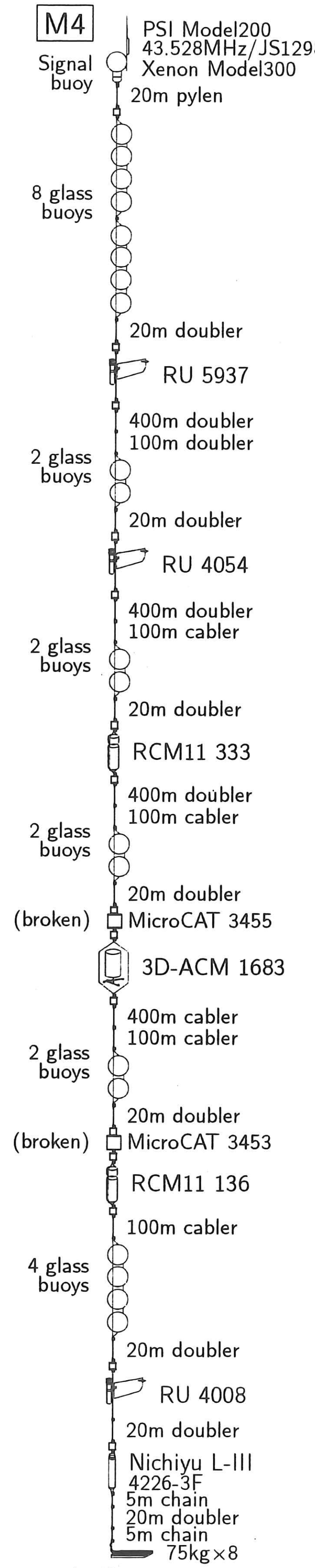
Recovered Systems



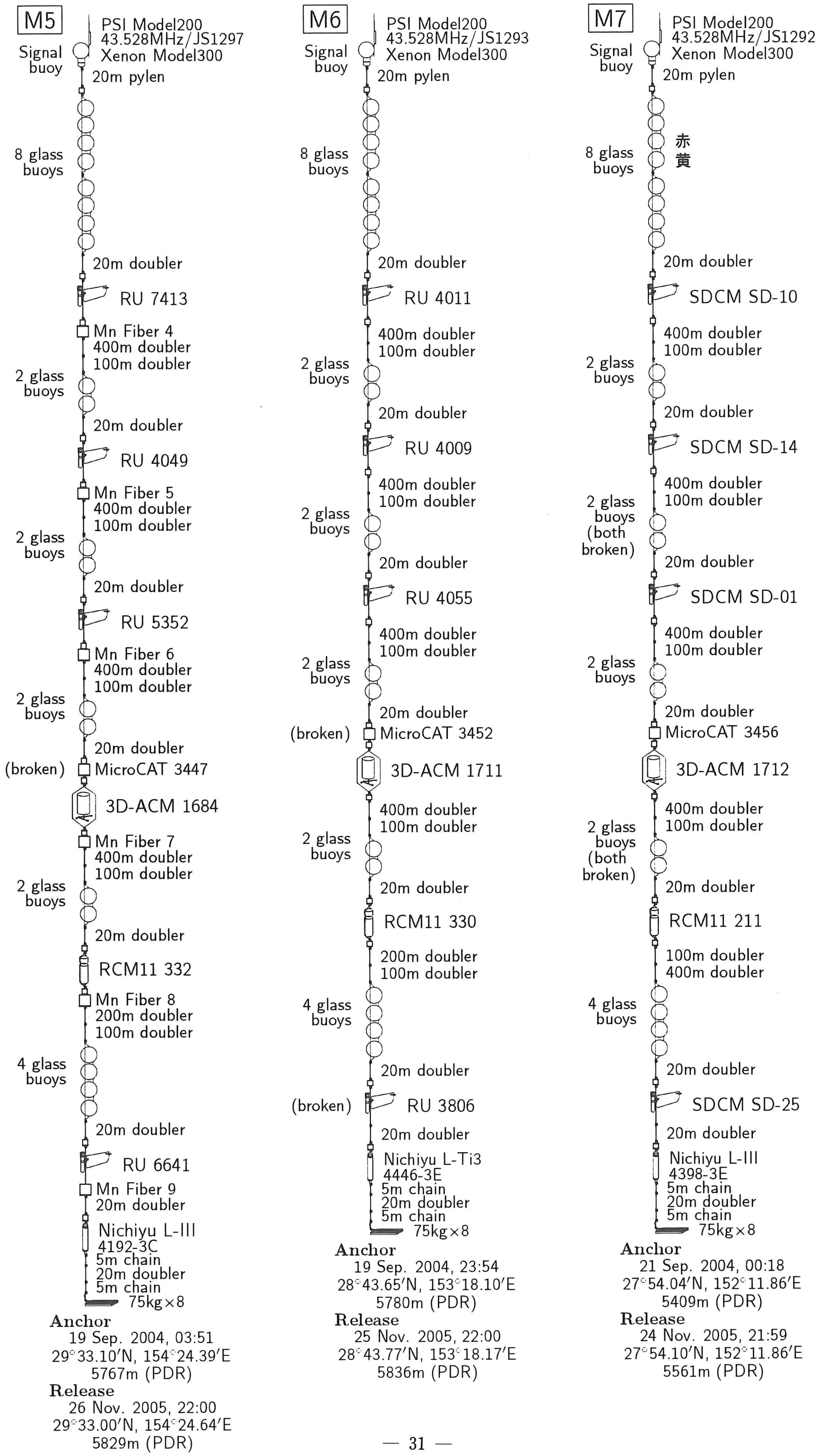
Anchor
15 Sep. 2004, 23:44
31°12.82′N, 156°36.62′E
4432m (PDR)
Release
30 Nov. 2005, 20:59
31°12.80′N, 156°36.78′E
4471m (PDR)

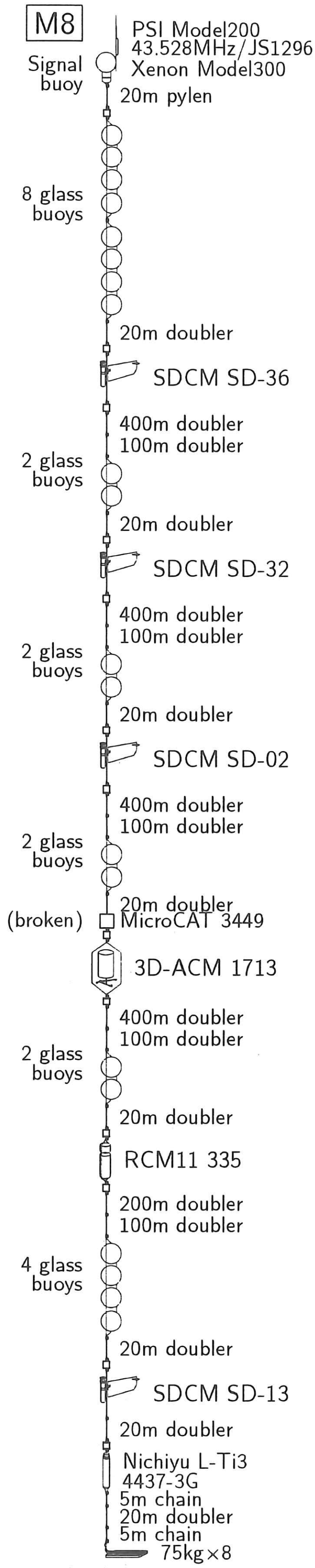


Anchor
17 Sep. 2004, 00:22
30°47.52′N, 156°00.40′E
5086m (PDR)
Release
1 Dec. 2005, 01:39
30°47.51′N, 156°00.35′E
5139m (PDR)

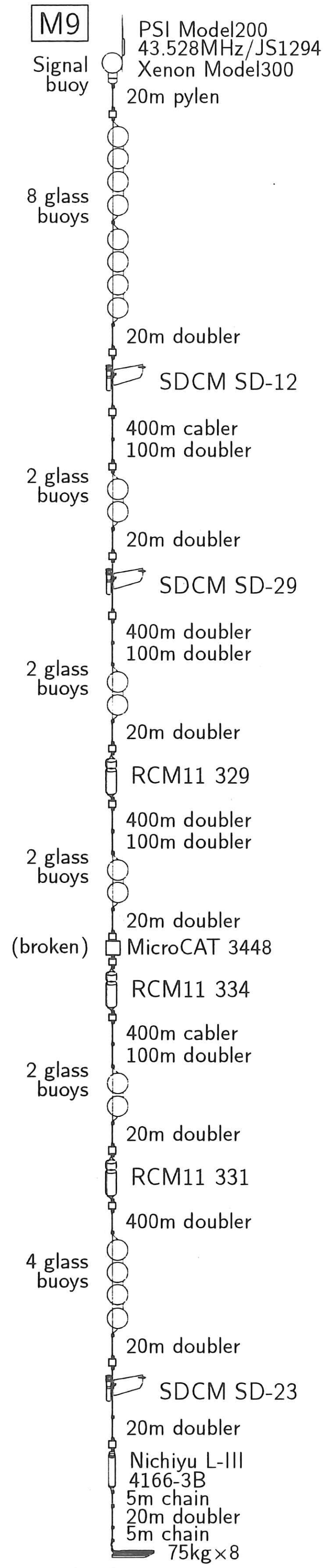


Anchor
18 Sep. 2004, 04:11
30°18.95′N, 155°18.41′E
5659m (PDR)
Release
29 Nov. 2005, 21:57
30°19.05′N, 155°18.66′E
5715m (PDR)

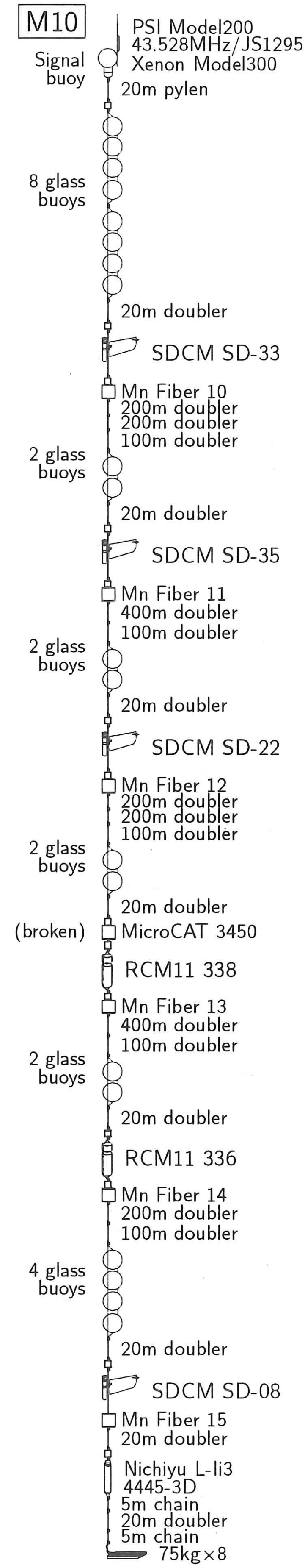

M5
PSI Model200
43.528MHz/JS1297
Signal buoy
Xenon Model300
20m pylen
8 glass buoys
20m doubler
RU 7413
Mn Fiber 4
400m doubler
100m doubler
2 glass buoys
20m doubler
RU 4049
Mn Fiber 5
400m doubler
100m doubler
2 glass buoys
20m doubler
RU 5352
Mn Fiber 6
400m doubler
100m doubler
2 glass buoys
20m doubler
(broken)
MicroCAT 3447
3D-ACM 1684
Mn Fiber 7
400m doubler
100m doubler
2 glass buoys
20m doubler
RCM11 332
Mn Fiber 8
200m doubler
100m doubler
4 glass buoys
20m doubler
RU 6641
Mn Fiber 9
20m doubler
Nichiyu L-III
4192-3C
5m chain
20m doubler
5m chain
75kg×8
Anchor
19 Sep. 2004, 03:51
29°33.10′N, 154°24.39′E
5767m (PDR)
Release
26 Nov. 2005, 22:00
29°33.00′N, 154°24.64′E
5829m (PDR)
M6
PSI Model200
43.528MHz/JS1293
Signal buoy
Xenon Model300
20m pylen
8 glass buoys
20m doubler
RU 4011
400m doubler
100m doubler
2 glass buoys
20m doubler
RU 4009
400m doubler
100m doubler
2 glass buoys
20m doubler
RU 4055
400m doubler
100m doubler
2 glass buoys
20m doubler
(broken)
MicroCAT 3452
3D-ACM 1711
400m doubler
100m doubler
2 glass buoys
20m doubler
RCM11 330
200m doubler
100m doubler
4 glass buoys
20m doubler
(broken)
RU 3806
20m doubler
Nichiyu L-Ti3
4446-3E
5m chain
20m doubler
5m chain
75kg×8
Anchor
19 Sep. 2004, 23:54
28°43.65′N, 153°18.10′E
5780m (PDR)
Release
25 Nov. 2005, 22:00
28°43.77′N, 153°18.17′E
5836m (PDR)
M7
PSI Model200
43.528MHz/JS1292
Signal buoy
Xenon Model300
20m pylen
8 glass buoys
赤
黄
20m doubler
SDCM SD-10
400m doubler
100m doubler
2 glass buoys
20m doubler
SDCM SD-14
400m doubler
100m doubler
2 glass buoys (both broken)
20m doubler
SDCM SD-01
400m doubler
100m doubler
2 glass buoys
20m doubler
MicroCAT 3456
3D-ACM 1712
400m doubler
100m doubler
2 glass buoys (both broken)
20m doubler
RCM11 211
100m doubler
400m doubler
4 glass buoys
20m doubler
SDCM SD-25
20m doubler
Nichiyu L-III
4398-3E
5m chain
20m doubler
5m chain
75kg×8
Anchor
21 Sep. 2004, 00:18
27°54.04′N, 152°11.86′E
5409m (PDR)
Release
24 Nov. 2005, 21:59
27°54.10′N, 152°11.86′E
5561m (PDR)



Anchor
21 Sep. 2004, 23:44
26°47.99′N, 150°43.97′E
5735m (PDR)
Release
23 Nov. 2005, 21:56
26°48.02′N, 150°43.96′E
5912m (PDR)

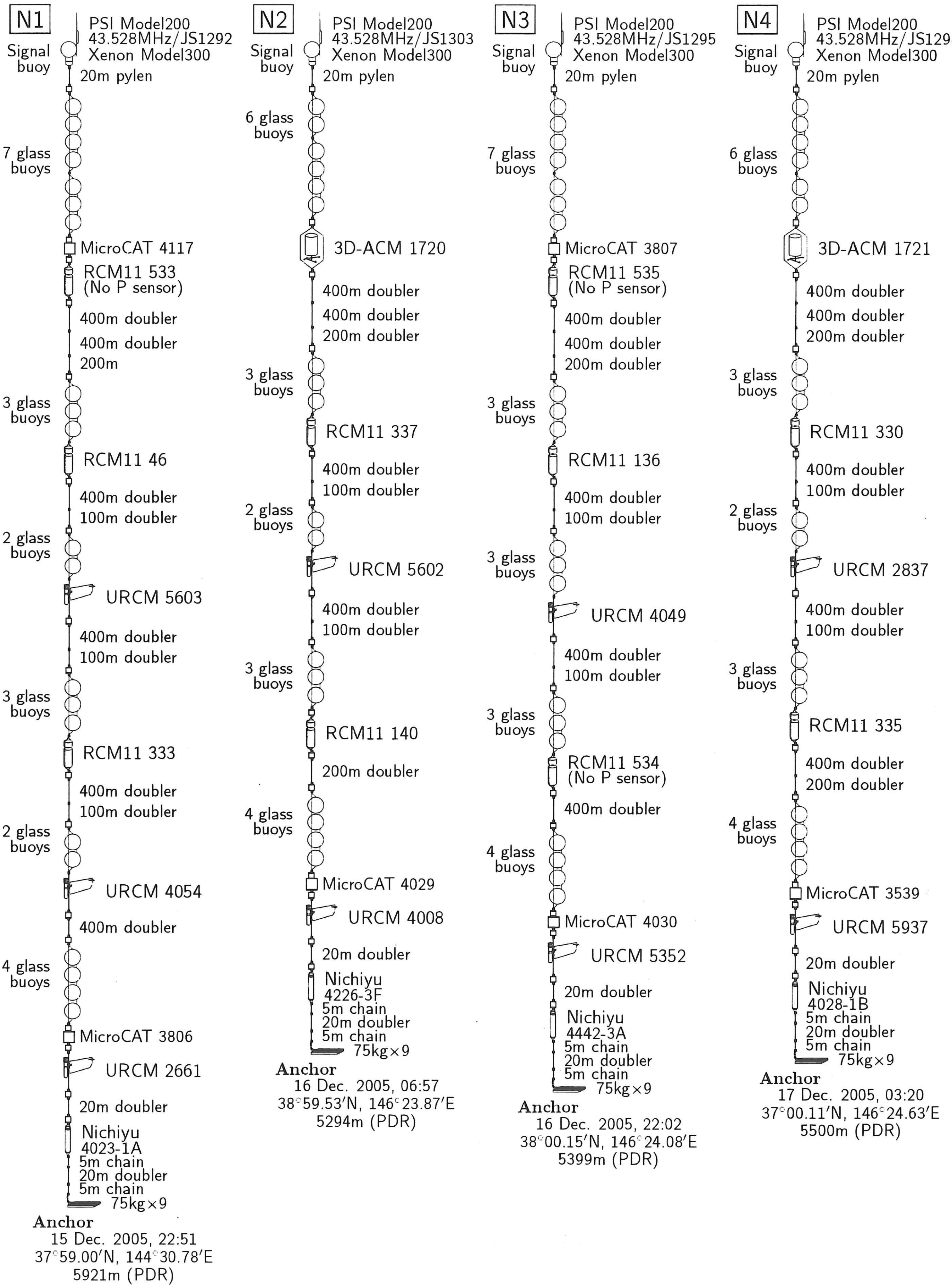


Anchor
22 Sep. 2004, 05:16
26°14.91′N, 149°59.89′E
5863m (PDR)
Release
22 Nov. 2005, 22:29
26°14.95′N, 150°00.10′E
5920m (PDR)



Anchor
23 Sep. 2004, 01:43
25°42.11′N, 149°16.33′E
5718m (PDR)
Release
21 Nov. 2005, 21:47
25°41.98′N, 149°16.51′E
5774m (PDR)

Deployed Systems

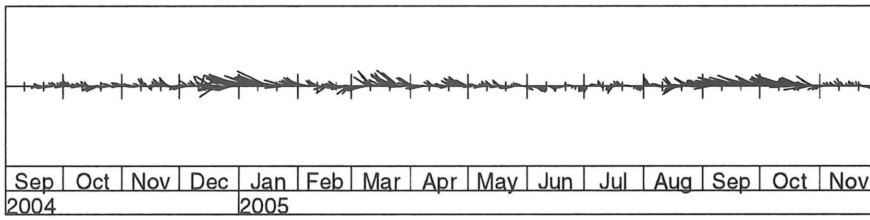


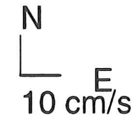
10. Results of Moored Instruments

Current Meters

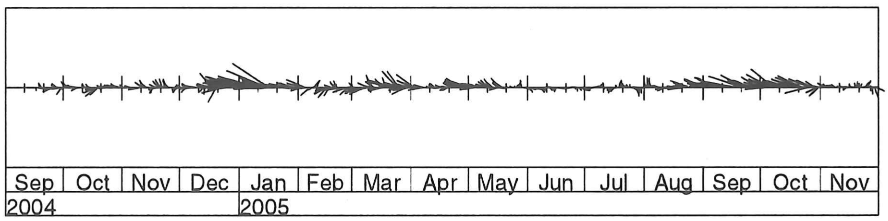
M2 31-12.82N, 156-32.62E, Water depth 4432m

3330m (URCM)
Length 440days
Valid data 100.0%
$\overline{U} = -2.47 \pm 0.64$ cm/s
$\overline{V} = 0.64 \pm 0.17$ cm/s

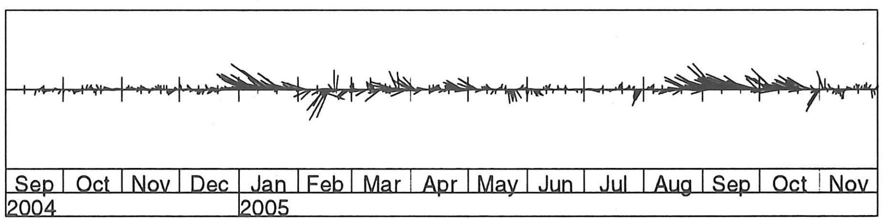




386m (RCM11)
Length 440days
$\overline{U} = -2.49 \pm 0.54$ cm/s
$\overline{V} = 0.54 \pm 0.16$ cm/s
$\overline{P} = 3918.6 \pm 2.6$ dbar
(Equivalent to 3861.4m)

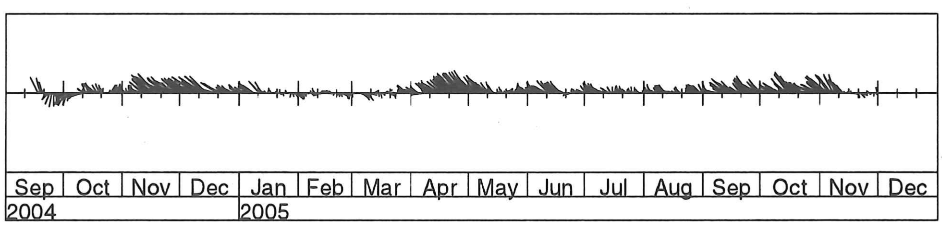


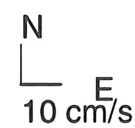
4380m (URCM)
Length 440days
Valid data 99.9%
$\overline{U} = -1.76 \pm 0.61$ cm/s
$\overline{V} = 0.38 \pm 0.23$ cm/s



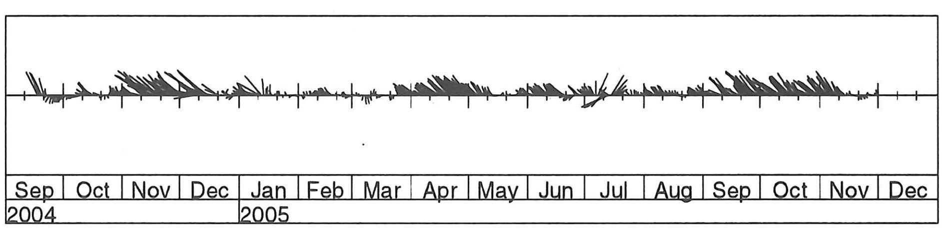
M3 30-47.52N, 156-00.40E, Water depth 5086m

3240m (URCM)
Length 440days
Valid data 97.8%
$\overline{U} = -1.67 \pm 0.39$ cm/s
$\overline{V} = 1.54 \pm 0.37$ cm/s

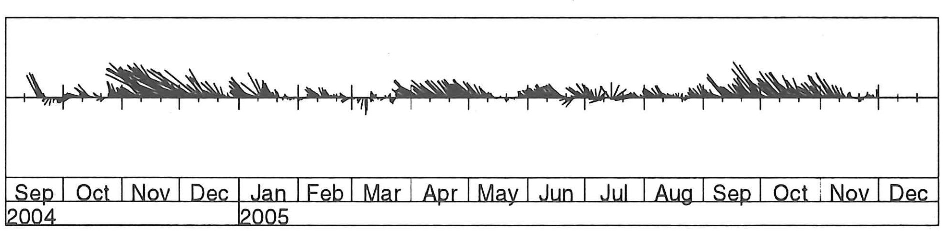




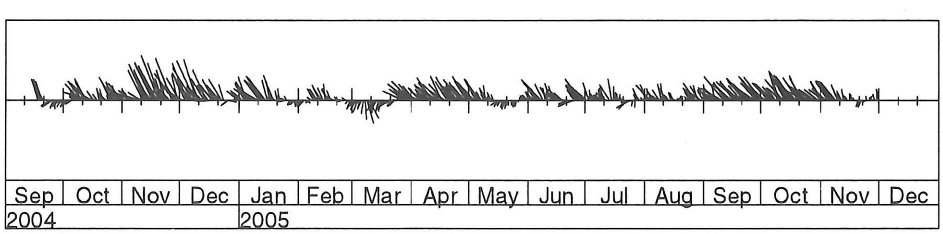
3770m (URCM)
Length 440days
Valid data 99.2%
$\overline{U} = -2.03 \pm 0.46$ cm/s
$\overline{V} = 1.86 \pm 0.36$ cm/s



4290m (RCM11)
Length 440days
$\overline{U} = -2.53 \pm 0.62$ cm/s
$\overline{V} = 2.19 \pm 0.48$ cm/s
$\overline{P} = 4390.3 \pm 1.4$ dbar
(Equivalent to 4321.6m)

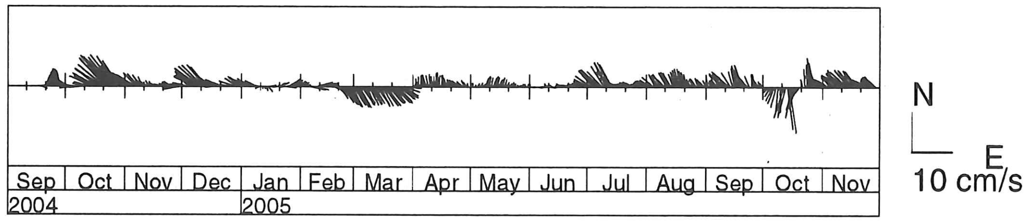


4810m (RCM11)
Length 440days
$\overline{U} = -2.26 \pm 0.31$ cm/s
$\overline{V} = 2.52 \pm 0.56$ cm/s
$\overline{P} = 4982.0 \pm 0.3$ dbar
(Equivalent to 4897.6m)

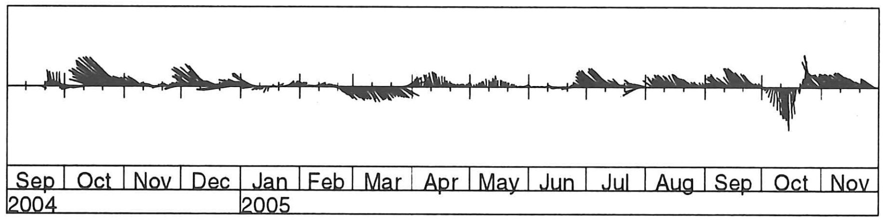


M4 **30-18.95N, 155-18.41E, Water depth 5659m**

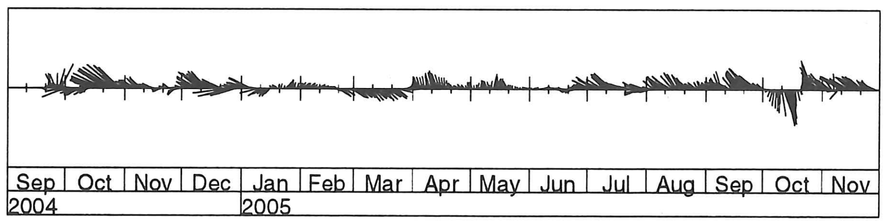
3400m (URCM)
Length 437days
Valid data 99.9%
$\overline{U} = -1.22 \pm 0.88$ cm/s
$\overline{V} = 1.26 \pm 0.56$ cm/s



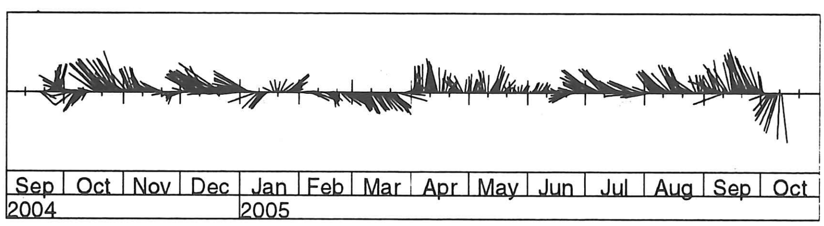
3920m (URCM)
Length 437days
Valid data 99.5%
$\overline{U} = -1.47 \pm 0.83$ cm/s
$\overline{V} = 1.15 \pm 0.44$ cm/s



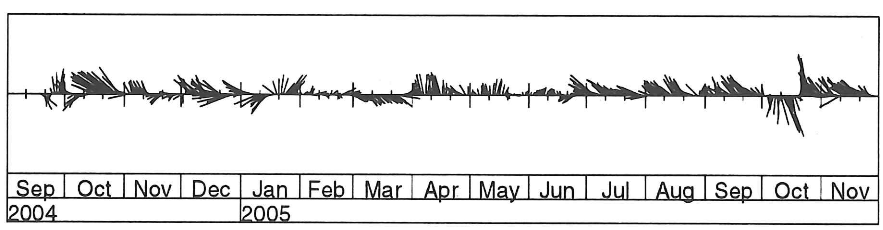
4440m (RCM11)
Length 437days
$\overline{U} = -1.77 \pm 0.81$ cm/s
$\overline{V} = 1.14 \pm 0.39$ cm/s
$\overline{P} = 4490.7 \pm 2.6$ dbar
(Equivalent to 4419.5m)



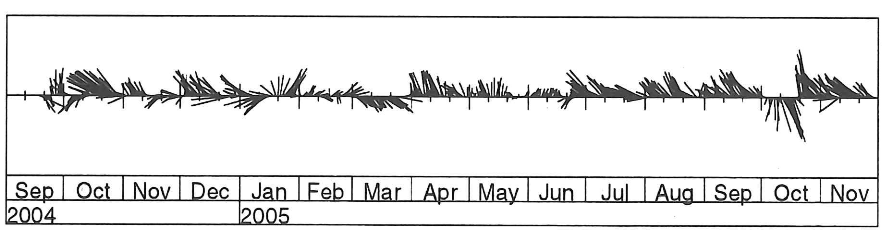
4970m (3D-ACM)
Length 389days
$\overline{U} = -2.08 \pm 1.40$ cm/s
$\overline{V} = -2.21 \pm 0.76$ cm/s



5490m (RCM11)
Length 431days
$\overline{U} = -1.77 \pm 0.79$ cm/s
$\overline{V} = 1.54 \pm 0.41$ cm/s

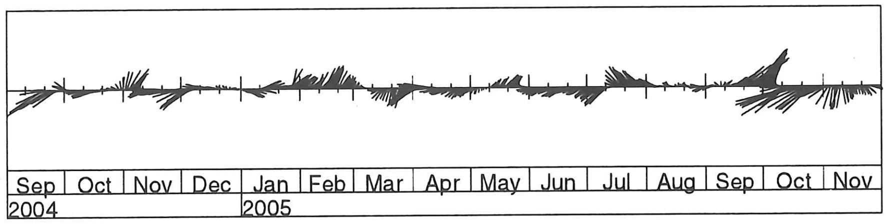


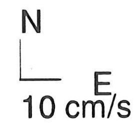
5610m (URCM)
Length 437days
Valid data 100.0%
$\overline{U} = -1.85 \pm 0.81$ cm/s
$\overline{V} = 2.99 \pm 0.50$ cm/s



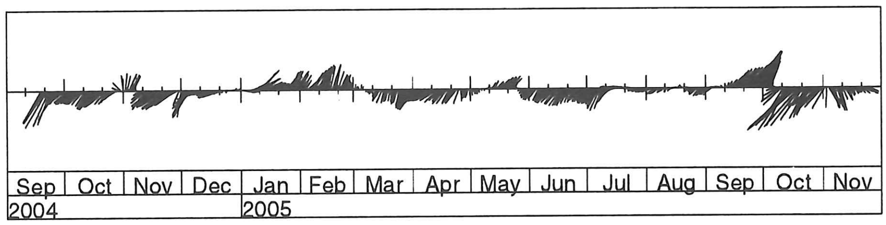
M5 **29-33.10N, 154-24.39E, Water depth 5767m**

3330m (URCM)
Length 433days
Valid data 97.8%
$\overline{U} = -1.70 \pm 0.91$ cm/s
$\overline{V} = 0.00 \pm 0.57$ cm/s

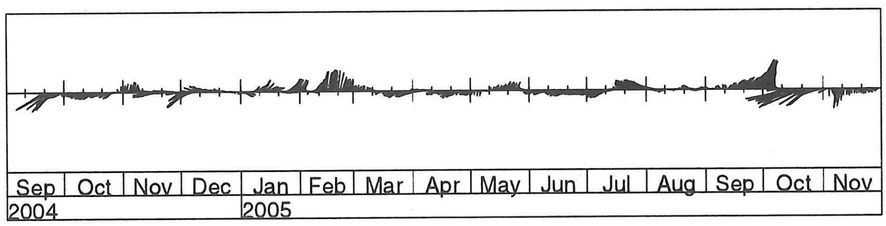




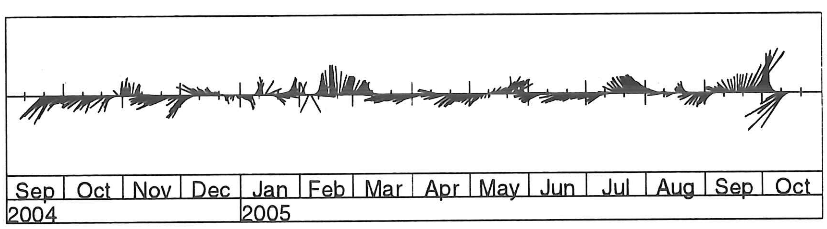
3850m (URCM)
Length 433days
Valid data 99.8%
$\overline{U} = -1.70 \pm 0.82$ cm/s
$\overline{V} = -0.26 \pm 0.64$ cm/s



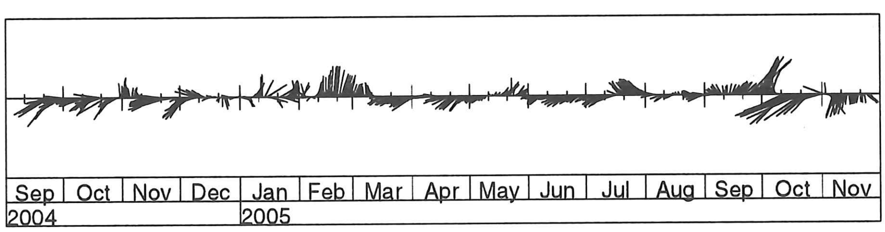
4380m (URCM)
Length 433days
Valid data 99.9%
$\overline{U} = -1.34 \pm 0.55$ cm/s
$\overline{V} = 0.15 \pm 0.40$ cm/s



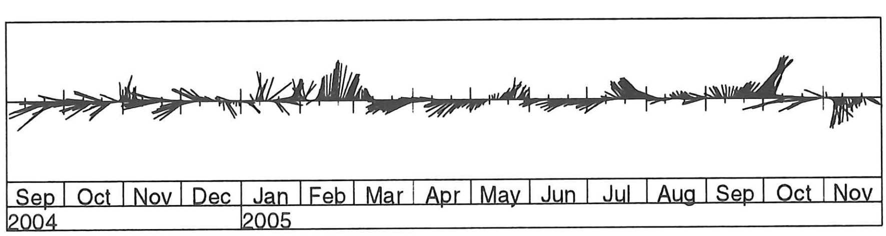
4900m (3D-ACM)
Length 391days
$\overline{U} = -2.10 \pm 0.67$ cm/s
$\overline{V} = 0.34 \pm 0.62$ cm/s



5420m (RCM11)
Length 433days
$\overline{U} = -2.11 \pm 0.70$ cm/s
$\overline{V} = 0.01 \pm 0.61$ cm/s
$\overline{P} = 5567.1 \pm 4.6$ dbar
(Equivalent to 5465.6m)

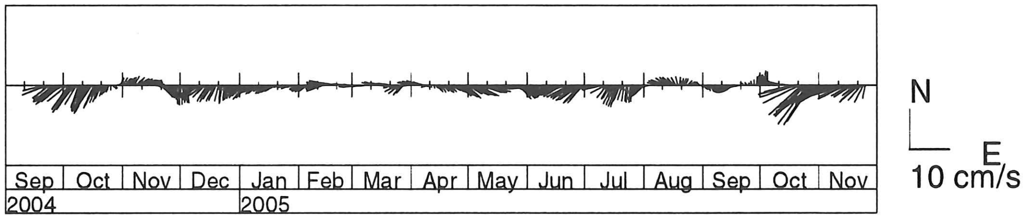


5740m (URCM)
Length 433days
Valid data 100.0%
$\overline{U} = -2.64 \pm 0.86$ cm/s
$\overline{V} = 0.76 \pm 0.65$ cm/s

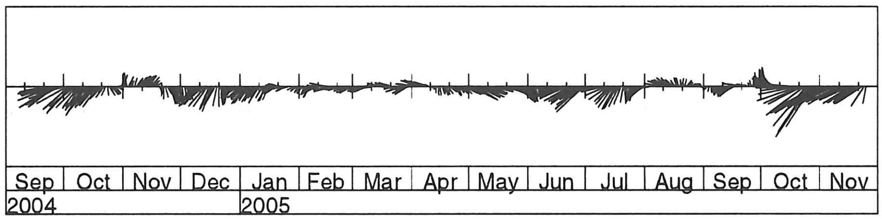


M6 28-43.65N, 153-18.10E, Water depth 5780m

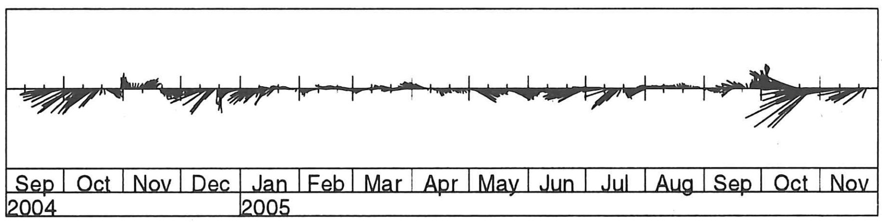
3321m (URCM)
Length 431days
Valid data 99.7%
$\overline{U} = -2.08 \pm 0.94$ cm/s
$\overline{V} = -1.37 \pm 0.44$ cm/s



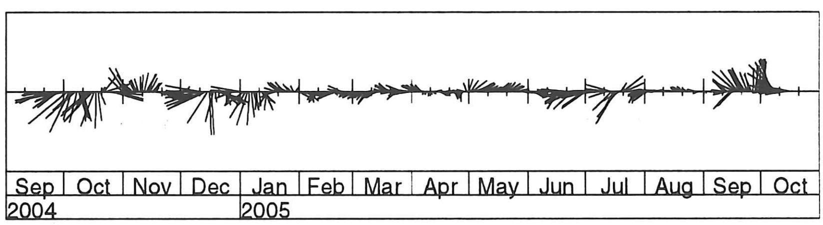
3840m (URCM)
Length 431days
Valid data 99.6%
$\overline{U} = -2.63 \pm 1.02$ cm/s
$\overline{V} = -1.36 \pm 0.48$ cm/s



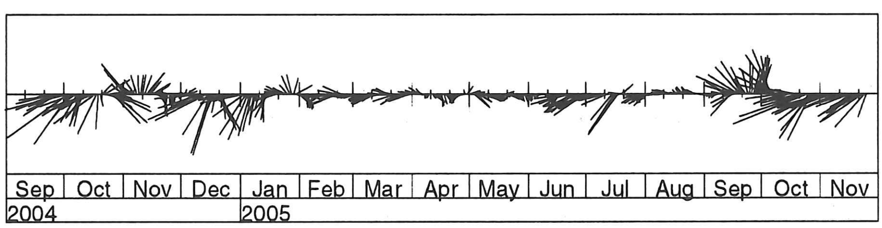
4360m (URCM)
Length 431days
Valid data 99.6%
$\overline{U} = -2.53 \pm 0.94$ cm/s
$\overline{V} = -0.88 \pm 0.41$ cm/s



4880m (3D-ACM)
Length 391days
$\overline{U} = -1.48 \pm 0.65$ cm/s
$\overline{V} = -0.53 \pm 0.64$ cm/s

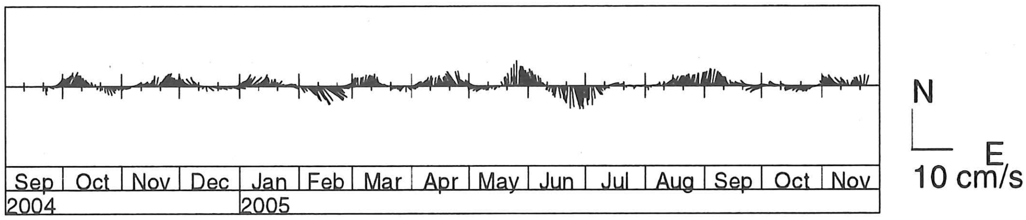


5410m (RCM11)
Length 431days
$\overline{U} = -3.08 \pm 0.94$ cm/s
$\overline{V} = -1.46 \pm 0.73$ cm/s
$\overline{P} = 5567.8 \pm 3.6$ dbar
(Equivalent to 5466.3m)

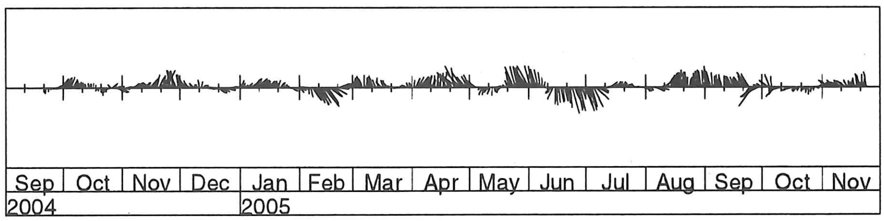


M7 27-54.04N, 152-11.86E, Water depth 5409m

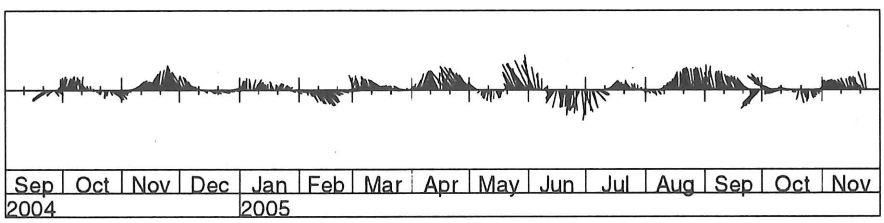
2740m (SDCM)
Length 429days
Valid data 98.6%
$\overline{U} = 0.28 \pm 0.40$ cm/s
$\overline{V} = 0.68 \pm 0.40$ cm/s



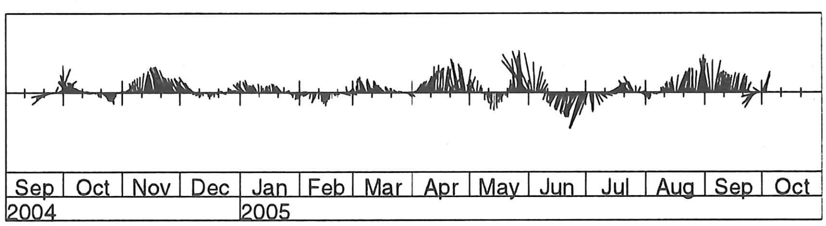
3260m (SDCM)
Length 429days
Valid data 97.1%
$\overline{U} = 0.14 \pm 0.38$ cm/s
$\overline{V} = 0.84 \pm 0.44$ cm/s



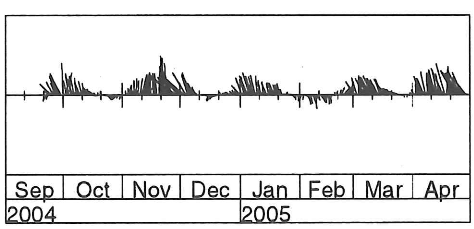
3790m (SDCM)
Length 429days
Valid data 98.4%
$\overline{U} = -0.21 \pm 0.38$ cm/s
$\overline{V} = 1.23 \pm 0.54$ cm/s



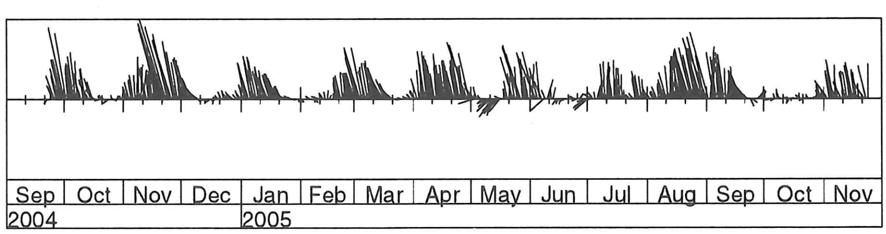
4310m (3D-ACM)
Length 377days
$\overline{U} = -0.24 \pm 0.19$ cm/s
$\overline{V} = 1.67 \pm 0.72$ cm/s



4830m (RCM11)
Length 220days
$\overline{U} = -0.82 \pm 0.26$ cm/s
$\overline{V} = 2.55 \pm 0.73$ cm/s
$\overline{P} = 5116.5 \pm 5.1$ dbar
(Equivalent to 5028.2m)

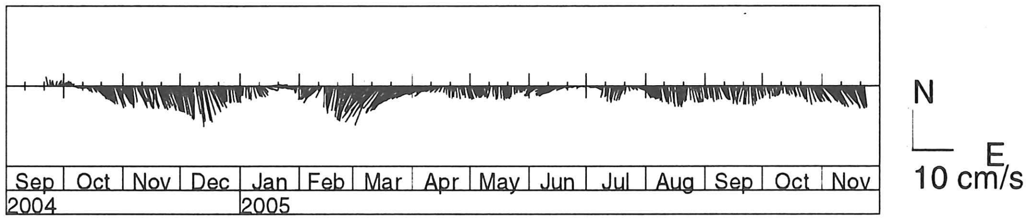


5360m (SDCM)
Length 429days
Valid data 98.5%
$\overline{U} = -1.03 \pm 0.13$ cm/s
$\overline{V} = 5.01 \pm 0.85$ cm/s

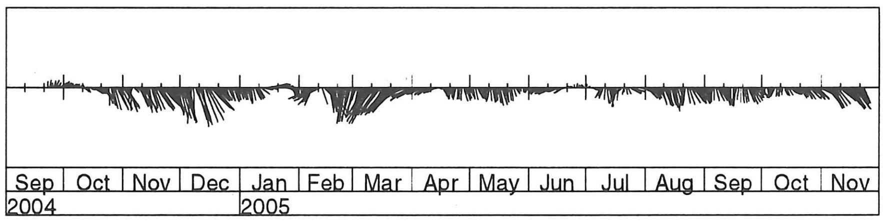


M8 26-47.99N, 150-43.97E, Water depth 5736m

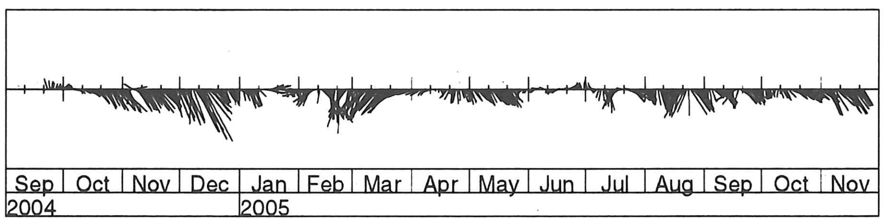
3270m (SDCM)
Length 427days
Valid data 100.0%
$\overline{U} = -0.14 \pm 0.69$ cm/s
$\overline{V} = -3.29 \pm 0.54$ cm/s



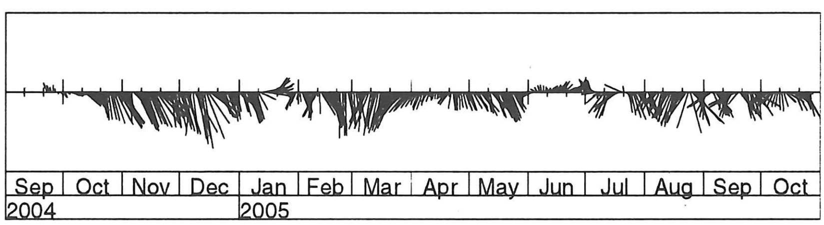
3790m (SDCM)
Length 427days
Valid data 100.0%
$\overline{U} = 0.46 \pm 0.72$ cm/s
$\overline{V} = -3.14 \pm 0.58$ cm/s



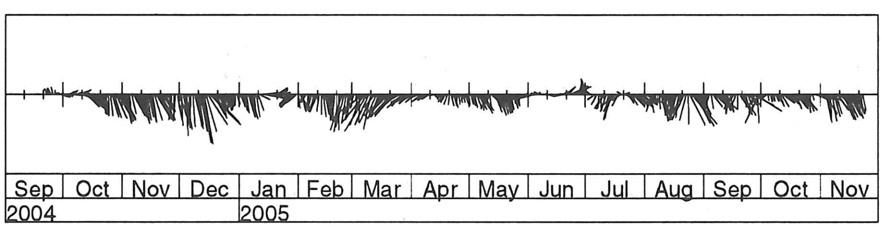
4310m (SDCM)
Length 428days
Valid data 99.9%
$\overline{U} = 0.80 \pm 0.82$ cm/s
$\overline{V} = -3.23 \pm 0.60$ cm/s



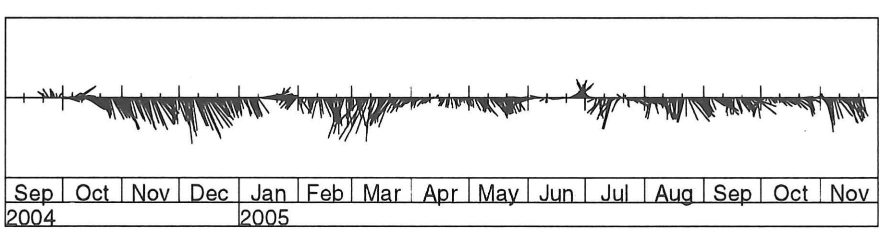
4840m (3D-ACM)
Length 424days
$\overline{U} = 0.85 \pm 0.74$ cm/s
$\overline{V} = -4.70 \pm 0.92$ cm/s



5360m (RCM11)
Length 427days
$\overline{U} = 0.61 \pm 0.57$ cm/s
$\overline{V} = -3.50 \pm 0.64$ cm/s
$\overline{P} = 5523.6 \pm 2.2$ dbar
(Equivalent to 5423.4m)

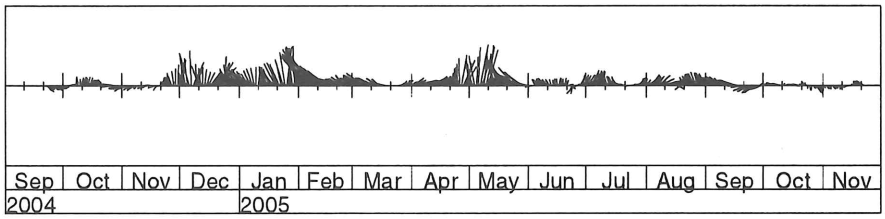


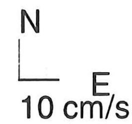
5680m (SDCM)
Length 427days
Valid data 99.6%
$\overline{U} = 0.88 \pm 0.61$ cm/s
$\overline{V} = -3.16 \pm 0.64$ cm/s



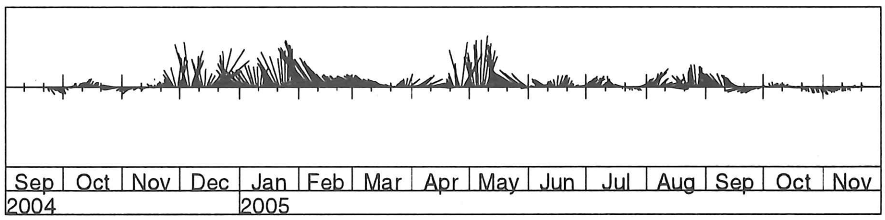
M9 **26-14.91N, 149-59.89E, Water depth 5863m**

3300m (SDCM)
Length 426days
Valid data 99.1%
$\overline{U} = -0.54 \pm 0.43$ cm/s
$\overline{V} = 2.25 \pm 0.71$ cm/s

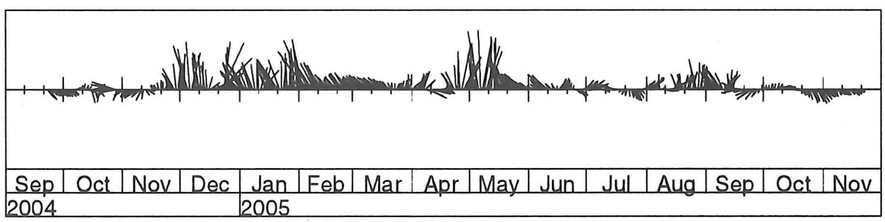




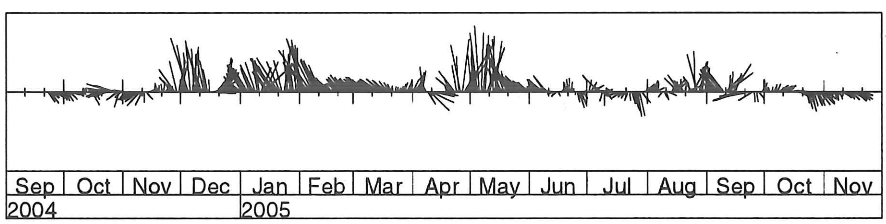
3820m (SDCM)
Length 426days
Valid data 98.7%
$\overline{U} = -0.38 \pm 0.44$ cm/s
$\overline{V} = 2.63 \pm 0.88$ cm/s



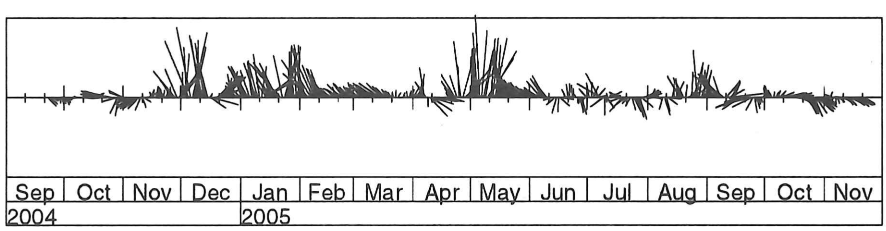
4340m (RCM11)
Length 426days
$\overline{U} = -0.40 \pm 0.44$ cm/s
$\overline{V} = 2.74 \pm 1.07$ cm/s
$\overline{P} = 4447.8 \pm 13.1$ dbar
(Equivalent to 4377.6m)



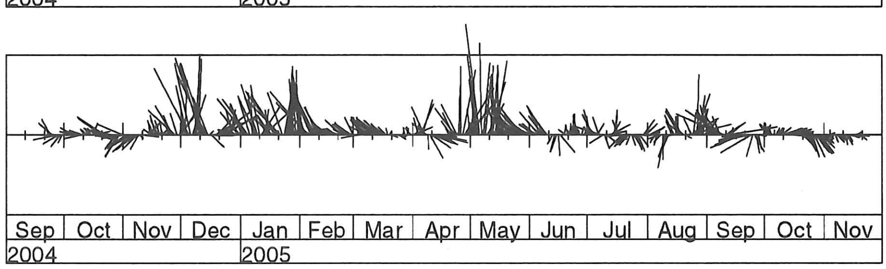
4870m (RCM11)
Length 426days
$\overline{U} = -0.54 \pm 0.45$ cm/s
$\overline{V} = 2.81 \pm 1.15$ cm/s
$\overline{P} = 5017.6 \pm 11.0$ dbar
(Equivalent to 4932.2m)



5390m (RCM11)
Length 426days
$\overline{U} = -0.38 \pm 0.47$ cm/s
$\overline{V} = 3.04 \pm 1.15$ cm/s
$\overline{P} = 5568.6 \pm 6.6$ dbar
(Equivalent to 5467.1m)

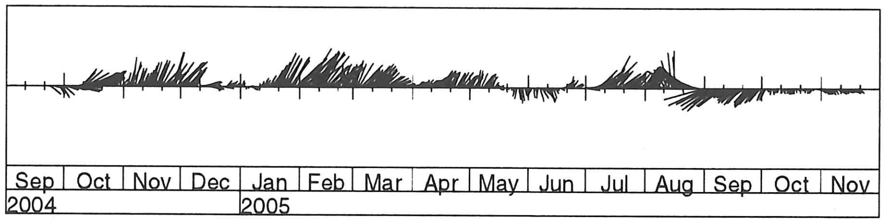


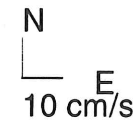
5810m (SDCM)
Length 426days
$\overline{U} = -0.71 \pm 0.49$ cm/s
$\overline{V} = 3.52 \pm 1.24$ cm/s



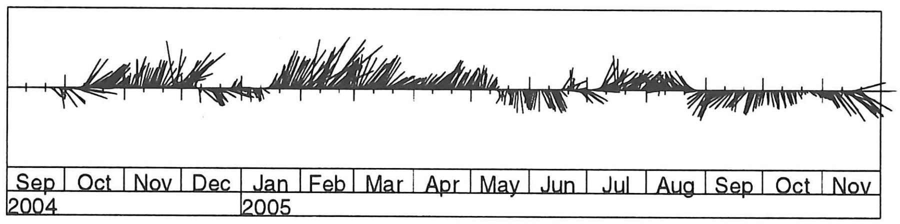
M10 25-42.11N, 149-16.33E, Water depth 5718m

3250m (SDCM)
Length 424days
Valid data 99.1%
$\overline{U} = 1.61 \pm 1.03$ cm/s
$\overline{V} = 1.83 \pm 0.83$ cm/s

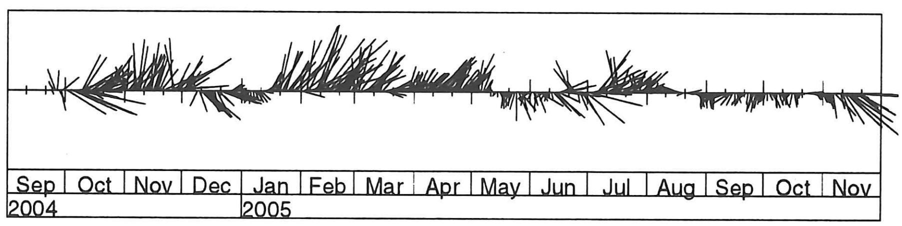




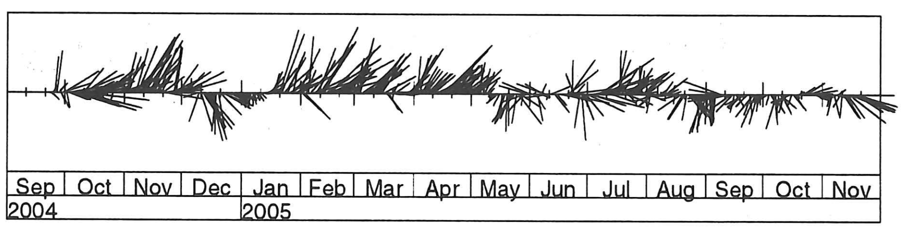
3780m (SDCM)
Length 424days
Valid data 99.4%
$\overline{U} = 2.41 \pm 0.89$ cm/s
$\overline{V} = 1.51 \pm 1.27$ cm/s



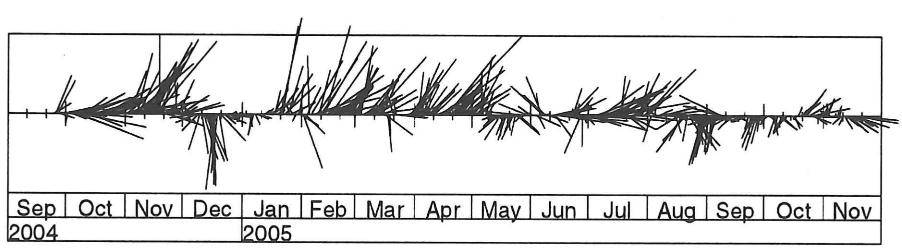
4300m (SDCM)
Length 425days
Valid data 98.7%
$\overline{U} = 3.33 \pm 0.86$ cm/s
$\overline{V} = 1.75 \pm 1.30$ cm/s



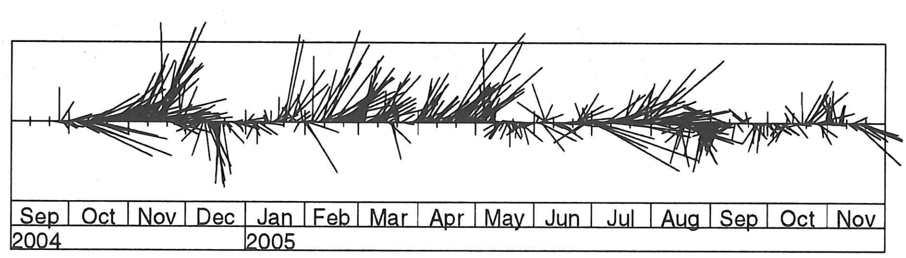
4820m (RCM11)
Length 424days
$\overline{U} = 3.55 \pm 1.08$ cm/s
$\overline{V} = 1.32 \pm 1.33$ cm/s
$\overline{P} = 4942.7 \pm 15.3$ dbar
(Equivalent to 4859.3m)



5340m (RCM11)
Length 424days
$\overline{U} = 4.18 \pm 1.23$ cm/s
$\overline{V} = 2.02 \pm 1.42$ cm/s
$\overline{P} = 5532.6 \pm 8.1$ dbar
(Equivalent to 5432.1m)



5670m (SDCM)
Length 424days
Valid data 99.6%
$\overline{U} = 5.34 \pm 1.42$ cm/s
$\overline{V} = 2.38 \pm 1.43$ cm/s



Moored CTD

M7 27-54.04N, 152-11.86E, Water depth 5409m

4310m (MicroCAT)
Length 429days