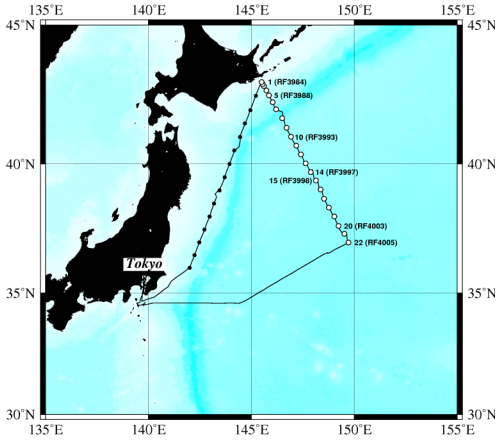
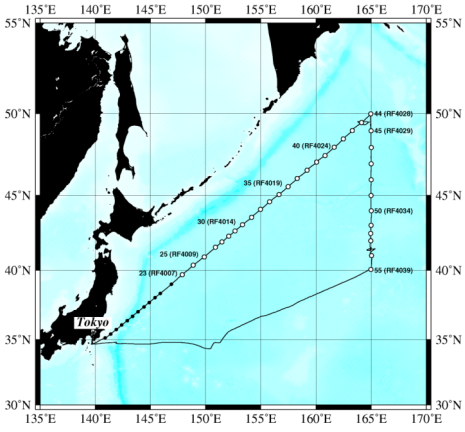
CRUISE REPORT: P13

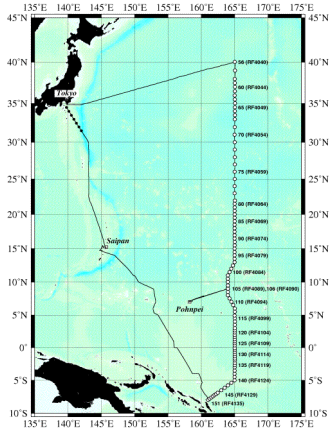
(Updated MAR 2013)



RF11-06



RF11-07



RF11-08

Highlights

Cruise Summary Information

Section Designation	P13		
ExpoCode	49UP20110515		
Alias	RF11-06	RF11-07	RF11-08
Chief Scientists	Toshiya NAKANO / JMA		
Dates	2011 MAY 15 - 2011 MAY 31	2011 JUN 4 - 2011 JUN 27	2011 JUL 5 - 2011 AUG 26
Ship	*R/V Ryofu Maru*		
Ports of call	Tokyo - Tokyo	Tokyo - Tokyo	Tokyo - Pohnpei Pohnpei - Saipan
Geographic Boundaries	50° 0.04' N 145° 29.68' E 165° 2.47' E 7° 58.45' S		
Stations	22	33	96
Floats and drifters deployed	3 floats	5 floats	3 floats
Moorings deployed or recovered	0	0	0

Contact Information:

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Links To Select Topics

Shaded sections are not relevant to this cruise or were not available when this report was compiled.

Cruise Summary Information	Hydrographic Measurements
Description of Scientific Program	**CTD Data:**
Geographic Boundaries	Acquisition
Cruise Track (Figure): PI CCHDO	Processing
Description of Stations	Calibration
Description of Parameters Sampled	Temperature Pressure
Bottle Depth Distributions (Figure)	Salinities Oxygens
Floats and Drifters Deployed	**Bottle Data**
Moorings Deployed or Recovered	Salinity
	Oxygen
Principal Investigators	Nutrients
Cruise Participants	Carbon System Parameters
	CFCs
Problems and Goals Not Achieved	Helium / Tritium
Other Incidents of Note	Radiocarbon
Underway Data Information	**References**
Navigation Bathymetry	
Acoustic Doppler Current Profiler (ADCP)	
Thermosalinograph	
XBT and/or XCTD	
Meteorological Observations	**Acknowledgments**
Atmospheric Chemistry Data	
Data Processing Notes	

Cruise narrative

Highlights

Cruise designation:	RF11-06, RF11-07 and RF11-08（WHP-P13 revisit）	
EXPOCODE:	RF11-06	49UP20110515
	RF11-07	49UP20110604
	RF11-08	49UP20110705

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Ship name:	R/V Ryofu Maru	
Ports of call:	RF11-06	Tokyo - Tokyo
	RF11-07	Tokyo - Tokyo
	RF11-08	Leg1: Tokyo - Pohnpei
		Leg 2: Pohnpei - Saipan
Cruise dates:	RF11-06	15 May 2011 - 31 May 2011
	RF11-07	4 June 2011 - 27 June 2011
	RF11-08	Leg1: 5 July 2011 - 29 July 2011
		Leg2: 2 August 2011 - 26 August 2011
Floats and drifters deployed:	RF11-06	3 floats
	RF11-07	5 floats
	RF11-08	3 floats

Cruise Summary Information

RF11-06, RF11-07 and RF11-08 cruises were carried out during the period from May 15 to September 5, 2011. The observation line along approximately 165°E meridian was observed by Ocean Research Institute, University of Tokyo, Japan in 1991 and 1993, and by National Oceanographic and Atmospheric Administration, USA in 1992. These cruises were carried out as 'WHP-P13', which is a part of WOCE (World Ocean Circulation Experiment) Hydrographic Programme. The stations from Stn.1 (43°N, 145°30'E; RF3984) to Stn.14 (39°40'N, 147°52'E; RF3997) for RF11-06 cruise and from Stn.23 (39°40'N, 147°52'E; RF4007) to Stn.38 (47°N, 160°E) for RF11-07 cruise had been designed as a re-occupation of the WHP-P1 stations observed by Japan Agency for Marine-Earth Science and Technology (JAMSTEC) in 2007.

RF11-06

RF11-06 cruise was carried out during the period from May 15 to May 31, 2011. Before the observation at the first station, all watch standers were drilled in the method of sample drawing and CTD operations near Izu-Oshima (34°40'N, 139°40'E). The cruise started from the coast near Kushiro, Japan, and sailed southeastward. The hydrographic cast of CTDO2 was started at the first station (Stn.1 (43°N, 145°30'E; RF3984)) on May 17. RF11-06 cruise consisted of 22 stations from Stn.1 to Stn.22 (37°N, 149°50'E; RF4005). Cruise track and station location are shown in Figure 1(a).

Three sub-surface profiling floats (ARVOR: nke Instrumentation, France) were deployed along the cruise track. The information of deployed the floats are listed in Table 1.

RF11-07

RF11-07 cruise was carried out during the period from June 4 to June 27, 2011. Before the observation at the first station, all watch standers were drilled in the method of sample drawing and CTD operations near Izu-Oshima (34°40'N, 139°40'E). The cruise started from the east of Honshu, Japan, and sailed northeastward along off the Kuril Islands. The hydrographic cast of CTDO2 was started at the first station (Stn.23 (39°40'N, 147°52'E; RF4007)) on June 6. After observed at Stn.44 (50°N, 165°E; RF4028), she sailed toward south along 165°E meridian. RF11-07 cruise consisted of 33 stations from Stn.23 to Stn.55 (40°N, 165°E; RF4039). Cruise track and station location are shown in Figure 1(b).

Five ARGO floats (PROVOR: nke Instrumentation, France) were deployed at the request of JAMSTEC along the cruise track. The information of deployed floats are listed in Table 1.

RF11-08

RF11-08 cruise was carried out during the period from July 5 to September 5, 2011. In order to ensure a controlled spooling of the armored cable, we rewound the cable at 34°50'N, 142°00'E (about 8000 m depth) before the observation at the first station. The cruise started from 40°N, 165°E, and sailed toward south along approximately 165°E meridian. The hydrographic cast of CTDO2 was started at the first station (Stn.56 (40°00'N, 165°E; RF4040)) on July 9. Leg 1 consisted of 50 stations from Stn.56 to

Stn.105 (9°N, 165°E; RF4089). In order to keep away from the military exercise area, we shifted the nominal longitude of CTDO2 stations westward between Stn.98 (RF4082) and Stn.111 (RF4095). She called for Pohnpei (Federated States of Micronesia) on July 29, 2011 (Leg 1). She left Pohnpei on August 2, 2011 for Saipan (Commonwealth of the Northern Mariana Islands) and arrived on August 26, 2011 (Leg 2). Leg 2 consisted of 46 stations from Stn.106 (9°N, 164°E; RF4090) to Stn.151 (8°S, 161°E; RF4135). Cruise track and station location are shown in Figure 1(c).

Three ARGO floats (PROVOR: nke Instrumentation, France) were deployed at the request of JAMSTEC along the cruise track. The information of deployed floats are listed in Table 1.

A total of 151 stations (22 for RF11-06, 33 for RF11-07 and 96 for RF11-08) was occupied using a Sea-Bird Electronics (SBE) 36 position carousel equipped with 10-liter Niskin water sample bottles, a CTD system (SBE911plus) equipped with SBE35 deep ocean standards thermometer, JFE Advantech oxygen sensor (RINKO III), Teledyne Benthos altimeter, and Teledyne RD Instruments Lowered Acoustic Doppler Current Profiler (L-ADCP). To examine consistency of data, we carried out the observation twice at 39°40'N, 147°52'E (Stn.14 and Stn.23), 40°N, 165°E (Stn.55 and Stn.56) and 9°N, 165°E (Stn.105 and Stn.106), respectively.

At each station, full-depth CTDO2 (temperature, conductivity (salinity) and dissolved oxygen) profile and up to 36 water samples were taken and analyzed. Water samples were obtained from 10 dbar to approximately 10 meters above the bottom. In addition, surface water were sampled by stainless steel bucket at each station. Basic sampling layer is designed as so-called staggered mesh as shown in Table 2. We added the sampling layer selected from 25 m/75 m/125 m/350 m/450 m, according as characteristic of ocean structure and water depth. The bottle depth diagram is shown in Figure 2.

Water samples were analyzed for salinity, dissolved oxygen, nutrients, dissolved inorganic carbon (DIC), total alkalinity (TA), pH, CFC-11, -12 and phytopigment (chlorophyll-a and phaeopigments). Samples for 14C were also collected at the same stations of WHP-P13 in 1992. Underway measurements of partial pressure of carbon dioxide (pCO2), temperature, salinity, chlorophyll-a, subsurface current, bathymetry and meteorological parameters were conducted along the cruise track.

Table 1: Information of deployed floats in RF11-06, RF11-07 and RF11-08.

ARGOS ID	Date and Time of System Reset (UTC)	Date and Time of Deployment (UTC)	Position of deployment	PI	Remark
RF11-06					
064041	May 21, 09:35	May 21, 10:07	39-26.669N, 148-13.147E	JMA	Stn.15 (RF3998)
064213	May 21, 09:31	May 21, 10:08	39-26.613N, 148-13.095E	JMA	Stn.15 (RF3998)
064040	May 22, 00:20	May 22, 01:14	38-43.498N, 148-31.341E	JMA	Stn.17 (RF4000)
RF11-07					
97932	June 4, 16:55	June 4, 17:43	35-10.203N, 141-01.024E	JAMSTEC	
97955	June 5, 04:54	June 5, 06:00	37-08.304N, 144-00.438E	JAMSTEC	
97945	June 17, 21:40	June 17, 22:57	44-00.119N, 165-03.358E	JAMSTEC	Stn.50 (RF4034)
97937	June 19, 01:27	June 19, 02:59	42-02.514N, 164-54.997E	JAMSTEC	Stn.53 (RF4037)
97913	June 21, 21:20	June 21, 22:09	40-07.053N, 165-01.610E	JAMSTEC	Stn.55 (RF4039)
RF11-08					
97951	July 13, 20:20	July 13, 21:31	31-55.845N, 164-59.280E	JAMSTEC	Stn.69 (RF4053)
97939	July 14, 23:12	July 15, 00:27	29-00.311N, 165-00.595E	JAMSTEC	Stn.72 (RF4056)
97943	July 19, 01:05	July 19, 02:10	20-00.022N, 164-58.151E	JAMSTEC	Stn.83 (RF4067)

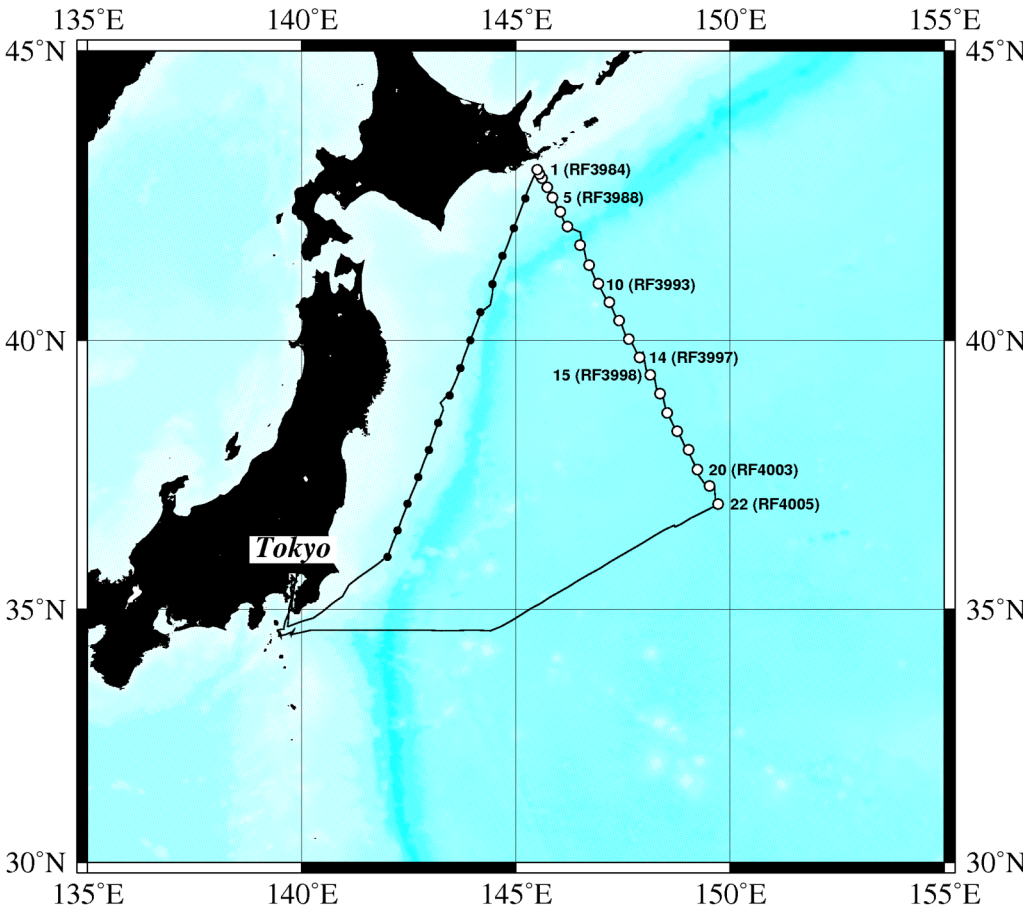

Figure 1(a): *Cruise track of RF11-06. Open and closed circles indicate CTD station and X-BT station, respectively.*

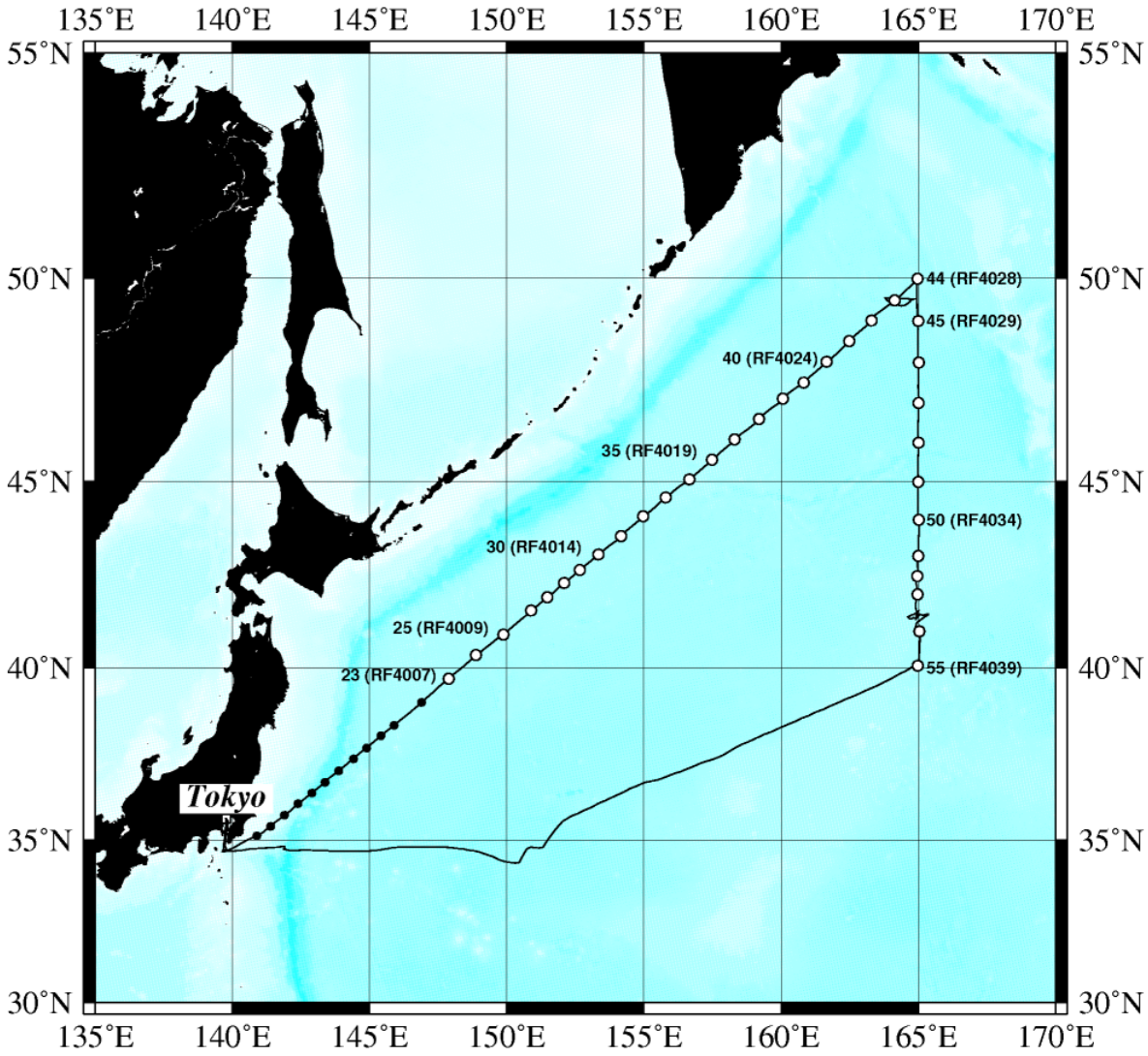

Figure 1(b): *Cruise track of RF11-07. Open and closed circles indicate CTD station and X-BT station, respectively.*

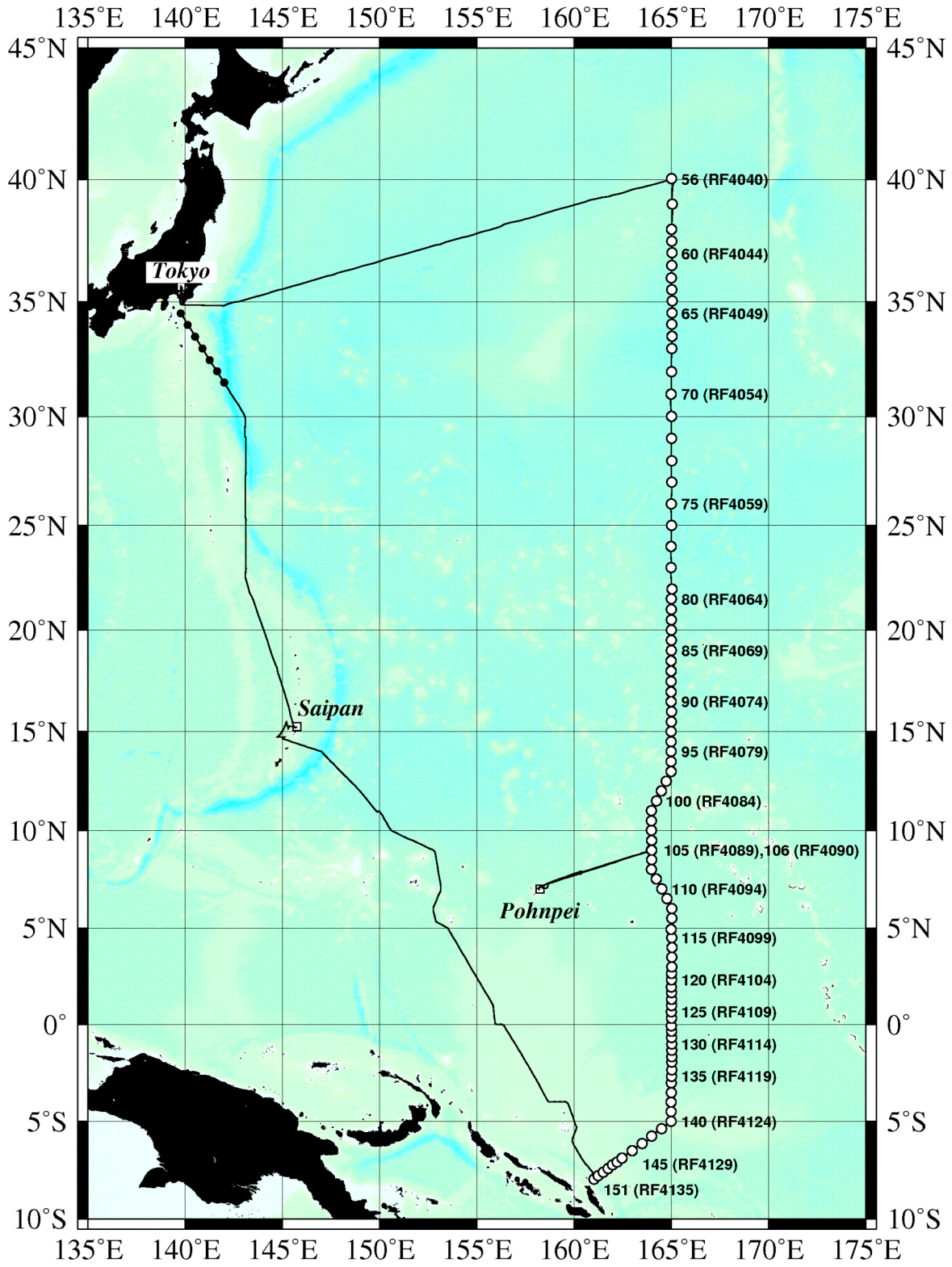

Figure 1(c): *Cruise track of RF11-08. Open and closed circles indicate CTD station and X-BT station, respectively.*

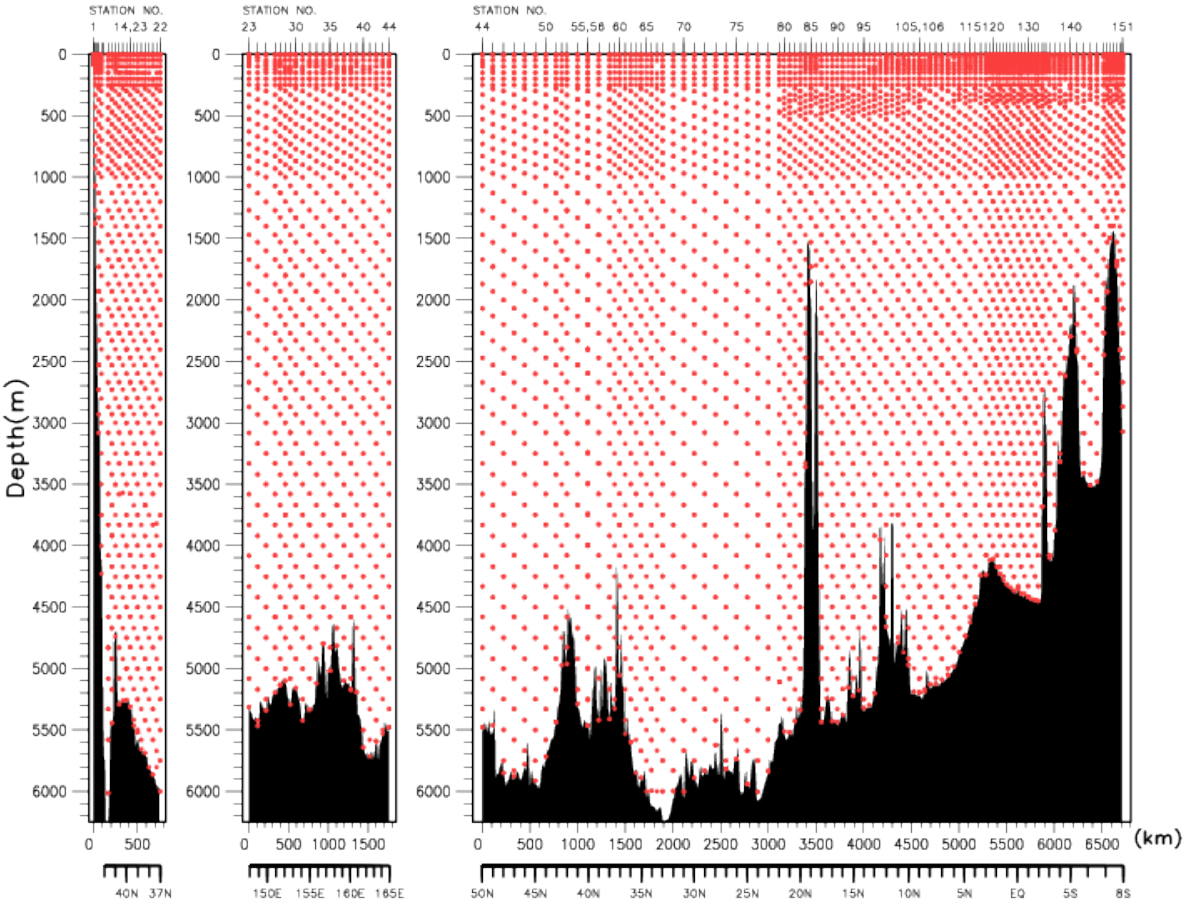

Figure 2: *The bottle depth diagram for WHP-P13 revisit.*

Table 2: *The scheme of sampling layer in meters.*

Bottle count	scheme1	scheme2	scheme3
1	10	10	10
2	50	50	50
3	100	100	100
4	150	150	150
5	200	200	200
6	250	250	250
7	300	330	280
8	400	430	370
9	500	530	470
10	600	630	570
11	700	730	670
12	800	830	770
13	900	930	870
14	1000	1070	970
15	1200	1270	1130
16	1400	1470	1330
17	1600	1670	1530
18	1800	1870	1730
19	2000	2070	1930
20	2200	2270	2130
21	2400	2470	2330
22	2600	2670	2530
23	2800	2870	2730
24	3000	3080	2930
25	3250	3330	3170
26	3500	3580	3420
27	3750	3830	3670
28	4000	4080	3920
29	4250	4330	4170
30	4500	4580	4420
31	4750	4830	4670
32	5000	5080	4920
33	5250	5330	5170
34	5500	5580	5420
35	5750	5830	5670
36	Bottom	Bottom	Bottom

Table 3(a): *Station data of RF11-06 cruise. The 'RF' column indicates the JMA station identification number.*

Leg	Station		Position	
	Stn.	RF	Latitude	Longitude
1	1	3984	42-59.53 N	145-29.82 E
1	2	3985	42-55.25 N	145-32.72 E
1	3	3986	42-50.85 N	145-36.45 E
1	4	3987	42-41.38 N	145-43.70 E
1	5	3988	42-30.90 N	145-51.01 E
1	6	3989	42-16.00 N	146-02.06 E
1	7	3990	42-00.75 N	146-12.13 E
1	8	3991	41-41.35 N	146-29.80 E
1	9	3992	41-20.14 N	146-42.38 E
1	10	3993	41-00.56 N	146-55.31 E
1	11	3994	40-40.84 N	147-10.72 E
1	12	3995	40-21.13 N	147-24.26 E
1	13	3996	40-01.21 N	147-37.85 E
1	14	3997	39-41.56 N	147-52.96 E
1	15	3998	39-22.74 N	148-08.12 E
1	16	3999	39-02.30 N	148-21.66 E
1	17	4000	38-41.11 N	148-31.75 E
1	18	4001	38-20.97 N	148-45.65 E
1	19	4002	38-00.47 N	149-01.63 E
1	20	4003	37-38.34 N	149-13.98 E
1	21	4004	37-20.09 N	149-30.97 E
1	22	4005	36-59.71 N	149-43.09 E

Table 3(b): *Station data of RF11-07 cruise. The 'RF' column indicates the JMA station identification number.*

Leg	Station		Position	
	Stn.	RF	Latitude	Longitude
1	23	4007	39-41.20 N	147-53.53 E
1	24	4008	40-21.01 N	148-52.73 E
1	25	4009	40-55.05 N	149-52.79 E
1	26	4010	41-34.59 N	150-53.38 E
1	27	4011	41-56.44 N	151-29.15 E
1	28	4012	42-19.40 N	152-05.32 E
1	29	4013	42-40.36 N	152-39.91 E
1	30	4014	43-05.50 N	153-20.34 E
1	31	4015	43-34.66 N	154-10.27 E
1	32	4016	44-05.77 N	154-58.35 E
1	33	4017	44-35.31 N	155-47.96 E
1	34	4018	45-03.62 N	156-39.25 E
1	35	4019	45-33.64 N	157-28.74 E
1	36	4020	46-04.60 N	158-18.39 E
1	37	4021	46-35.35 N	159-11.81 E
1	38	4022	47-06.13 N	160-03.89 E
1	39	4023	47-29.69 N	160-49.18 E
1	40	4024	48-00.58 N	161-39.39 E
1	41	4025	48-30.44 N	162-28.67 E
1	42	4026	49-00.23 N	163-17.79 E
1	43	4027	49-29.08 N	164-08.39 E
1	44	4028	49-59.80 N	164-58.50 E
1	45	4029	48-59.46 N	164-59.89 E
1	46	4030	47-59.45 N	165-00.88 E
1	47	4031	46-59.64 N	165-00.51 E
1	48	4032	45-59.68 N	165-00.70 E
1	49	4033	44-59.41 N	164-59.94 E
1	50	4034	44-00.16 N	165-01.11 E
1	51	4035	43-02.99 N	164-59.98 E
1	52	4036	42-30.36 N	164-57.80 E
1	53	4037	42-00.81 N	164-58.36 E
1	54	4038	41-00.33 N	165-02.37 E
1	55	4039	40-03.07 N	164-58.78 E

Table 3(c): *Station data of RF11-08 cruise. The 'RF' column indicates the JMA station identification number.*

Leg	Station		Position		Leg	Station		Position	
	Stn.	RF	Latitude	Longitude		Stn.	RF	Latitude	Longitude
1	56	4040	40-02.05 N	165-00.07 E	1	92	4076	15-28.96 N	164-59.29 E
1	57	4041	39-01.05 N	165-02.24 E	1	93	4077	15-00.00 N	164-58.81 E
1	58	4042	37-59.50 N	164-59.77 E	1	94	4078	14-29.39 N	164-58.65 E
1	59	4043	37-30.89 N	165-00.36 E	1	95	4079	13-59.95 N	164-58.80 E
1	60	4044	37-02.44 N	165-01.39 E	1	96	4080	13-29.27 N	164-58.90 E
1	61	4045	36-30.87 N	165-00.85 E	1	97	4081	12-59.56 N	164-58.25 E
1	62	4046	35-59.47 N	164-59.01 E	1	98	4082	12-29.75 N	164-43.69 E
1	63	4047	35-29.65 N	165-00.53 E	1	99	4083	12-00.16 N	164-28.87 E
1	64	4048	35-01.78 N	165-01.87 E	1	100	4084	11-30.01 N	164-13.86 E
1	65	4049	34-30.71 N	165-01.21 E	1	101	4085	11-00.50 N	163-57.89 E
1	66	4050	34-02.22 N	165-01.04 E	1	102	4086	10-29.30 N	163-58.12 E
1	67	4051	33-31.03 N	165-01.22 E	1	103	4087	10-00.28 N	163-57.98 E
1	68	4052	32-59.22 N	165-00.41 E	1	104	4088	9-29.59 N	163-58.46 E
1	69	4053	31-58.31 N	164-59.89 E	1	105	4089	8-59.64 N	163-58.41 E
1	70	4054	30-59.15 N	164-58.88 E					
1	71	4055	29-59.92 N	165-00.23 E					
1	72	4056	29-00.40 N	165-00.14 E	2	106	4090	9-00.05 N	163-58.09 E
1	73	4057	27-59.11 N	165-00.46 E	2	107	4091	8-30.11 N	163-58.53 E
1	74	4058	27-00.51 N	165-00.70 E	2	108	4092	8-00.44 N	163-58.14 E
1	75	4059	26-00.21 N	164-59.34 E	2	109	4093	7-31.13 N	164-12.97 E
1	76	4060	24-59.77 N	164-59.76 E	2	110	4094	7-00.71 N	164-30.01 E
1	77	4061	24-00.71 N	164-58.58 E	2	111	4095	6-30.55 N	164-45.53 E
1	78	4062	23-00.62 N	164-58.34 E	2	112	4096	6-00.13 N	165-00.52 E
1	79	4063	21-58.73 N	165-01.24 E	2	113	4097	5-30.00 N	165-00.71 E
1	80	4064	21-30.47 N	164-59.61 E	2	114	4098	4-55.06 N	164-58.56 E
1	81	4065	21-00.01 N	164-59.14 E	2	115	4099	4-29.40 N	165-00.59 E
1	82	4066	20-30.07 N	164-59.47 E	2	116	4100	3-59.44 N	165-01.05 E
1	83	4067	19-59.95 N	164-59.41 E	2	117	4101	3-29.25 N	165-00.91 E
1	84	4068	19-30.34 N	164-59.26 E	2	118	4102	2-58.86 N	165-00.94 E
1	85	4069	19-00.25 N	164-59.28 E	2	119	4103	2-38.95 N	165-00.02 E
1	86	4070	18-30.19 N	164-58.75 E	2	120	4104	2-18.95 N	165-00.20 E
1	87	4071	18-00.01 N	164-58.62 E	2	121	4105	1-56.39 N	164-59.37 E
1	88	4072	17-29.29 N	164-58.90 E	2	122	4106	1-39.22 N	165-00.07 E
1	89	4073	16-58.31 N	164-58.93 E	2	123	4107	1-18.47 N	165-00.31 E
1	90	4074	16-29.43 N	164-58.63 E	2	124	4108	0-59.21 N	164-59.87 E
1	91	4075	15-59.41 N	164-59.70 E	2	125	4109	0-39.70 N	164-59.45 E

Leg	Station		Position	
	Stn.	RF	Latitude	Longitude
2	126	4110	0-19.93 N	165-00.12 E
2	127	4111	0-04.15 S	164-59.61 E
2	128	4112	0-20.32 S	164-59.73 E
2	129	4113	0-39.82 S	165-00.21 E
2	130	4114	1-00.12 S	165-00.90 E
2	131	4115	1-19.79 S	165-00.40 E
2	132	4116	1-40.01 S	165-00.78 E
2	133	4117	1-56.30 S	165-00.72 E
2	134	4118	2-20.71 S	165-00.83 E
2	135	4119	2-40.75 S	165-00.22 E
2	136	4120	3-00.68 S	164-59.06 E
2	137	4121	3-30.82 S	164-59.08 E
2	138	4122	4-00.38 S	164-58.79 E
2	139	4123	4-30.02 S	164-58.59 E
2	140	4124	5-00.30 S	164-58.52 E
2	141	4125	5-23.11 S	164-29.01 E
2	142	4126	5-45.90 S	163-58.25 E
2	143	4127	6-08.52 S	163-29.07 E
2	144	4128	6-30.58 S	162-58.61 E
2	145	4129	6-54.00 S	162-26.88 E
2	146	4130	7-05.66 S	162-12.13 E
2	147	4131	7-14.35 S	161-57.94 E
2	148	4132	7-25.98 S	161-44.47 E
2	149	4133	7-36.95 S	161-29.12 E
2	150	4134	7-47.74 S	161-13.89 E
2	151	4135	7-58.40 S	161-00.67 E

List of Principal Investigators for all Measurements

The principal investigator (PI) and the person in charge responsible for major parameters measured on the cruise are listed in Table 4.

Table 4(a): *List of principal investigator and the person in charge on the ship for RF11-06.*

Item	Principal Investigator（PI）	Person in charge on the ship
Hydrography		
CTDO2 / LADCP	Hitomi KAMIYA	Tatsuo NAKAMURA
Salinity	Hitomi KAMIYA	Tatsuo NAKAMURA
Dissolved oxygen	Hitomi KAMIYA	Yusuke TAKATANI
Nutrients	Hitomi KAMIYA	Takahiro KITAGAWA
Phytopigment	Hitomi KAMIYA	Sonoki IWANO
DIC	Hitomi KAMIYA	Shu SAITO
Total Alkalinity	Hitomi KAMIYA	Shu SAITO
pH	Hitomi KAMIYA	Shu SAITO
CFCs	Hitomi KAMIYA	Kazuki ISHIMARU
Underway		
Meteorology	Hitomi KAMIYA	Tatsuo NAKAMURA
Thermo-Salinograph	Hitomi KAMIYA	Shu SAITO
pCO2	Hitomi KAMIYA	Shu SAITO
Chlorophyll-a	Hitomi KAMIYA	Sonoki IWANO
ADCP	Hitomi KAMIYA	Tatsuo NAKAMURA
Bathymetry	Hitomi KAMIYA	Tatsuo NAKAMURA
Floats		
Sub-surface Profiling float	Hitomi KAMIYA	Toshiya NAKANO

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Table 4(b): *List of principal investigator and the person in charge on the ship for RF11-07.*

Item	Principal Investigator（PI）	Person in charge on the ship
Hydrography		
CTDO2 / LADCP	Hitomi KAMIYA	Tetsuya NAKAMURA
Salinity	Hitomi KAMIYA	Tetsuya NAKAMURA
Dissolved oxygen	Hitomi KAMIYA	Shinichiro UMEDA
Nutrients	Hitomi KAMIYA	Naoki NAGAI
phytopigment	Hitomi KAMIYA	Naoki NAGAI
DIC	Hitomi KAMIYA	Shinji MASUDA
Total Alkalinity	Hitomi KAMIYA	Shinji MASUDA
pH	Hitomi KAMIYA	Shinji MASUDA
CFCs	Hitomi KAMIYA	Takayuki TOKIEDA
14C	Yuichiro KUMAMOTO	Shinji MASUDA
Underway		
Meteorology	Hitomi KAMIYA	Tetsuya NAKAMURA
Thermo-Salinograph	Hitomi KAMIYA	Takayuki TOKIEDA
pCO2	Hitomi KAMIYA	Takayuki TOKIEDA
Chlorophyll-a	Hitomi KAMIYA	Naoki NAGAI
ADCP	Hitomi KAMIYA	Tetsuya NAKAMURA
Bathymetry	Hitomi KAMIYA	Tetsuya NAKAMURA
Floats		
ARGO float	Toshio SUGA	Toshiya NAKANO

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Table 4(c): *List of principal investigator and the person in charge on the ship for RF11-08.*

Item	Principal Investigator（PI）	Person in charge on the ship
Hydrography		
CTDO2 / LADCP	Hitomi KAMIYA	Tetsuya NAKAMURA
Salinity	Hitomi KAMIYA	Tetsuya NAKAMURA
Dissolved oxygen	Hitomi KAMIYA	Yusuke TAKATANI
Nutrients	Hitomi KAMIYA	Naoki NAGAI
Phytopigment	Hitomi KAMIYA	Naoki NAGAI
DIC	Hitomi KAMIYA	Shu SAITO
Total Alkalinity	Hitomi KAMIYA	Shu SAITO
pH	Hitomi KAMIYA	Shu SAITO
CFCs	Hitomi KAMIYA	Kazuki ISHIMARU
14C	Yuichiro KUMAMOTO	Shu SAITO
Underway		
Meteorology	Hitomi KAMIYA	Tetsuya NAKAMURA
Thermo-Salinograph	Hitomi KAMIYA	Shu SAITO
pCO2	Hitomi KAMIYA	Shu SAITO
Chlorophyll-a	Hitomi KAMIYA	Naoki NAGAI
ADCP	Hitomi KAMIYA	Tetsuya NAKAMURA
Bathymetry	Hitomi KAMIYA	Tatsuo NAKAMURA
Floats		
ARGO float	Toshio SUGA	Toshiya NAKANO

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Scientific Program and Methods

In recent years, the global environmental issues such as global warming and climate change have become one of the major socio-economic concerns, and it has become apparent that the ocean plays a key role in the climate system. For the better understanding and assessment of global environmental conditions, continuous monitoring of climate variables, concentrations of greenhouse gases both in the ocean and in the atmosphere. To meet those requirements, JMA has been conducting operational oceanographic observations by research vessels in the western North Pacific on a seasonal basis. RF11-06, RF11-07 and RF11-08 cruises are one of these activities. The purposes of this cruise are as follows:

(1) To observe profiles of seawater temperature, salinity, dissolved oxygen, nutrients and carbon parameters, as well as upper ocean current;
(2) To observe concentrations of greenhouse gases both in the ocean and in the atmosphere;
(3) To observe bio-geochemical parameters to study carbon cycle in the ocean.

These activities are expected to contribute to international projects related to global environmental issues such as the World Climate Research Programme (WCRP), IOCCP (International Ocean Carbon Coordination Project) and the Global Atmosphere Watch (GAW).

Major Problems and Goals not Achieved

RF11-06

Since there was a lot of debris on the sea surface east of Japan after the Tohoku earthquake on March 11, 2011, we stopped to sail and drifted one night at about 38°40'N, 143°18'E on May 16. During the observation at Stn.7(42°N, 146°12'E), the armored cable hitched a radio buoy with fishing net, so we gave up the observation below 2000 m depth and water sampling at the station.

RF11-07

Owing to the troubles in CTD winch and the unfavorable sea state due to the storms, insufficient time was available to complete the section as planned, and station spacing increased to 60 nautical miles between 50°N and 43°N, and between 42°N and 40°N.

RF11-08

Because of the trouble in the previous cruise, RF11-07, the first station of this cruise was changed from 38°N to 40°N, and station spacing increased to 60 nautical miles between 40°N and 38°N, and between 33°N and 22°N.

List of Cruise Participants

The cruise participants of the three cruises are listed in Table 5.

Table 5(a): *List of cruise participants for RF11-06.*

Name	Responsibility	Affiliation
Ayumi HASHIZUME	CTDO / ADCP / LADCP / Salinity	GEMD / JMA
Hiroyuki HATAKEYAMA	Carbon Items/CFCs	GEMD / JMA
Yoshikazu HIGASHI	CTDO / ADCP / LADCP / Salinity	GEMD / JMA
Masaya IKEDA	Dissolved Oxygen	GEMD / JMA
Kazuki ISHIMARU	Carbon Items /CFCs	GEMD / JMA
Sonoki IWANO	Nutrients / Phytopigment	GEMD / JMA
Takahiro KITAGAWA	Nutrients	GEMD / JMA
Kiyoshi MURAKAMI	CTDO / ADCP / LADCP / Salinity	GEMD / JMA
Tatsuo NAKAMURA	Meteorology / Bathymetry	GEMD / JMA
Toshiya NAKANO	Chief Scientist	GEMD / JMA
Hidemi OGAHARA	Dissolved Oxygen	GEMD / JMA
Etsuro ONO	Carbon Items/CFCs	GEMD / JMA
Shu SAITO	Carbon Items/CFCs	GEMD / JMA
Ryosuke SAKAKIBARA	Nutrients	GEMD / JMA
Yusuke TAKATANI	Dissolved Oxygen	GEMD / JMA
Shinichiro UMEDA	Dissolved Oxygen / Phytopigment	GEMD / JMA
Koichi WADA	CTDO / ADCP / LADCP / Salinity	GEMD / JMA

GEMD / JMA: Marine Division, Global Environment and Marine Department, JMA

Table 5(b). List of cruise participants for RF11-07.

Name	Responsibility	Affiliation
Kazutaka ENYO	Carbon Items	GEMD / JMA
Hiroyuki FUJIWARA	Nutrients	GEMD / JMA
Sho HIBINO	Dissolved Oxygen	GEMD / JMA
Nobumi KATO	CTDO / ADCP / LADCP	GEMD / JMA
Tomoyuki KITAMURA	CTDO / ADCP / LADCP	GEMD / JMA
Atsushi KOJIMA	Salinity	GEMD / JMA
Shinji MASUDA	Carbon Items	GEMD / JMA
Kiyoshi MURAKAMI	CTDO / ADCP / LADCP	GEMD / JMA
Tetsuya NAKAMURA	Meteorology / Bathymetry	GEMD / JMA
Naoki NAGAI	Nutrients / Phytopigment	GEMD / JMA
Toshiya NAKANO	Chief Scientist	GEMD / JMA
Ryosuke SAKAKIBARA	Dissolved Oxygen	GEMD / JMA
Naoaki SAKAMOTO	CFCs	GEMD / JMA
Daisuke SASANO	Carbon Items	MRI / JMA
Hiroumi SHIGEOKA	Salinity	GEMD / JMA
Yoshihiro SHINODA	CFCs	GEMD / JMA
Takayuki TOKIEDA	CFCs	GEMD / JMA
Tomohiro UEHARA	Nutrients	GEMD / JMA
Shinichiro UMEDA	Dissolved Oxygen	GEMD / JMA
Koichi WADA	Salinity	GEMD / JMA

GEMD / JMA: Marine Division, Global Environment and Marine Department, JMA

MRI / JMA: Geochemical Research Department, Meteorological Research Institute, JMA

Table 5(c). List of cruise participants for RF11-08.

Name	Responsibility	Affiliation
Hiroyuki FUJIWARA	Nutrients	GEMD / JMA
Sho HIBINO	Dissolved Oxygen	GEMD / JMA
Kazuki ISHIMARU	CFCs	GEMD / JMA
Nobumi KATO	CTDO / ADCP / LADCP	GEMD / JMA
Takahiro KITAGAWA	Nutrients	GEMD / JMA
Tomoyuki KITAMURA	CTDO / ADCP / LADCP	GEMD / JMA
Atsushi KOJIMA	Salinity	GEMD / JMA
Shinya MAEDA	Carbon Items	GEMD / JMA
Shinji MASUDA	Carbon Items	GEMD / JMA
Tetsuya NAKAMURA	Meteorology / Bathymetry	GEMD / JMA
Naoki NAGAI	Nutrients / Phytopigment	GEMD / JMA
Toshiya NAKANO	Chief Scientist	GEMD / JMA
Hiroumi SHIGEOKA	Salinity	GEMD / JMA
Etsuro ONO	CFCs	GEMD / JMA
Hidemi OGAHARA	Dissolved Oxygen	GEMD / JMA
Shu SAITO	Carbon Items	GEMD / JMA
Haruka SUEMATSU	CFCs	GEMD / JMA
Yusuke TAKATANI	Dissolved Oxygen	GEMD / JMA
Masahiro TANIGUCHI	CTDO / ADCP / LADCP	GEMD / JMA
Koichi WADA	Salinity	GEMD / JMA

GEMD / JMA: Marine Division, Global Environment and Marine Department, JMA

CCHDO Data Processing Notes

Date	Person	Data Type	Action	Summary
2012-04-03	*Toshiya Nakano*	CTD/SUM/CrsRpt	Submitted	to go online
2012-04-16	*Carolina Berys*	CTD/SUM/CrsRpt	Website Updated	Available under 'Files as received'
	Detailed Notes File 20120314_p13_ct1.zip containing CTD data, submitted by Toshiya Nakano on 2012-04-02, available under 'Files as received', unprocessed by CCHDO. File 20120314_p13su.txt containing SUM data, submitted by Toshiya Nakano on 2012-04-02, available under 'Files as received', unprocessed by CCHDO. File A_cruise_narrative_20120322.doc containing Cruise Report, submitted by Toshiya Nakano on 2012-04-02, available under 'Files as received', unprocessed by CCHDO.			
2013-03-08	*Jerry Kappa*	CrsRpt	Website Updated	Final PDF version online
	I've placed a new PDF version of the cruise report: p13_49UP20110515do.pdf into the directory: co2clivar/pacific/p13/p13_49UP20110515/ . It includes all the reports provided by the cruise PIs, summary pages and CCHDO data processing notes, as well as a linked Table of Contents and links to figures, tables and appendices.			