

Cruise Report



**OS190
LEG 2 and 3
(IPY Cruise 2008)**

June 24 - July 17, 2008

Leg 2: Dutch Harbor – Nome

Leg 3: Nome - Dutch Harbor

1. Preface

The Bering Sea and Chukchi Sea have distinct marine ecosystems that are affected by seasonal sea ice. During the summer, the water column is stratified by melt water from retreating sea ice and phytoplankton is found near the sea surface, where the incoming sunlight is sufficient for photosynthesis. These summer conditions result in the highest primary production in the world's oceans and support high levels of fishery resources. Algae that live on the bottom of sea ice also play an important role in maintaining fishery resources by falling and decomposing on the sea floor in summer. Recently, global climate change has become a cause for concern. The greenhouse effect, produced by increasing anthropogenic CO₂ emissions, has induced increases in atmospheric and seawater temperatures. The effect of such increases on the cryosphere of the Arctic is already visible, and understanding its direct and indirect effects on the physical and chemical environments and the responses of marine ecosystems is critical.

We have conducted researches examining the marine environments in the Bering and Chukchi seas in past. However, the knowledge of most aspects and responses of marine ecosystems to global climate change is still inadequate. Based on results from the T/S Oshoro-Maru research cruises during two years of the International Polar Year (IPY) 2007-2008 and previous research, we will examine the features and mechanisms of the responses of marine ecosystems to global climate change in the Bering and Chukchi seas.

This volume includes the simply notes instruments, methods, and preliminary results obtained on-board of the legs 2 and 3 of OS190 cruises carried out by T/S Oshoro-Maru in the Bering Sea and the Chukchi Sea in summer 2008. The cruise is divided in two legs of which research area are the Bering Sea (from Dutch Harbor to Nome; leg. 2) and the Chukchi Sea (from Nome to Dutch Harbor; leg. 3). Main purpose of this cruise is to understand Marine Ecosystem Responses to Global Climate Change in the Bering and Chukchi Seas.

The observation items are CTD, water collection in the water column, biological and chemical analyses of the water (dissolved oxygen, iron, nutrients, primary productivity and pigments concentration), sediment sampling, fish larvae collection (Bongo net), plankton collection (twin-NORPAC net). We also successfully operated bottom trawling and long-line for fish community study, beam trawling for benthos study, and bio-optical measurements for satellite oceanography. The cetacean sighting survey was also conducted from the upper bridge of T/S Oshoro-maru.

The cruise has been completed almost of what we planed. On behalf of the scientists on-board, I thank all Japanese, American and the other foreign authorities; the Ministry of Education, Culture, Sports, Science, and Technology of Japan, the Japan Aerospace Exploration Agency (JAXA), the Ministries of Foreign Affair of Japan, and USA, the Coast Guard of USA, the National Oceanic and Atmospheric Administration (NOAA), for allowing us to work inside the American EEZ. Without their help, the cruise would have never been realized. I really appreciate captain/professor Meguro, chief officer, Mr. Kajiwara, and crew members for their hard works on board the ship.

This cruise is partly supported by Grant-in-Aid for Scientific Research No.19405002 and the IARC-JAXA (IJIS) program, and authorized as a part of the "Ecosystem Studies of Subarctic and Arctic Regions (ESSAR)" activity for IPY 2007-2008 by ESSAS/GLOBEC (Activity ID No: 155).

OS190 chief scientists,
Sei-Ichi Saitoh and
Toru Hirawake
Faculty of Fisheries Sciences
Hokkaido University

2. Cruise summary

2.1 Ship

T/S Oshoro-Maru
L x B x D 72.85m x 12.60m x 5.7m
International Gross Tonnage 1,792 tons

2.2 Cruise Code

OS190

2.3 Title of the cruise

Study on Marine Ecosystem Responses to Global Climate Change in the Bering and Chukchi Seas
(Oshoro-Maru IPY Cruise 2007-2008)

2.4 IPY Activity ID No: 155

2.4.1 Title of Activity

Ecosystem Studies of Subarctic and Arctic Regions

2.4.2 Short Form Title of Proposed Activity

ESSAR

2.4.3 Activity Leader Details

Kenneth Drinkwater
Institute of Marine Research
Norway

2.4.4 Lead International Organization

Ecosystem of Sub-Arctic Seas (ESSAS)-Regional Program of GLOBEC

2.5 Institute

Faculty of Fisheries Sciences and Faculty of Fisheries
Hokkaido University
3-1-1, Minato-cho
Hakodate, Hokkaido 041-8611
Japan

2.6 Chief Scientist

Sei-Ichi Saitoh (leg 2, Hokkaido University)
Toru Hirawake (leg 3, Hokkaido University)

2.7 Cruise periods and ports of call

Leg 2: June 24, 2008 (Dutch Harbor, USA) to July 4, 2008 (Nome, USA)
Leg 3: July 6, 2008 (Nome, USA) to July 17, 2008 (Dutch Harbor, USA)

(Called in Dutch Harbor, USA for June 21-24 and July 17-20, 2008, and in Nome, USA, for July 4-6, 2008)

2.8 Observation summary

See Tables 1-4 and Figs 1 and 2.

2.9 Data Policy

All data collected during this cruise will be under the control of Faculty of Fisheries, Hokkaido University. Scientist who obtained data has priority to use the data.

Table 1. Position and time at each station of Leg 2.

Station/Port	Oshoro Maru Ser. Num.	Latitude deg min		Longitude deg min			Arrival Date LT	Departure Date LT	
B01	OS08102	55	0.00	N	166	0.10	W	2008/6/24 16:20	2008/6/24 17:40
B02	OS08103	55	30.00	N	166	0.00	W	2008/6/24 20:30	2008/6/24 21:20
B03	OS08104	56	0.00	N	165	59.90	W	2008/6/24 23:55	2008/6/25 00:45
B04	OS08105	56	0.00	N	167	0.00	W	2008/6/25 04:05	2008/6/25 04:45
B05	OS08106	56	0.00	N	168	0.00	W	2008/6/25 07:30	2008/6/25 10:55
B07	OS08107	56	0.00	N	170	0.00	W	2008/6/25 16:15	2008/6/25 16:55
B09	OS08108	56	30.00	N	169	0.90	W	2008/6/25 23:30	2008/6/25 23:50
B10	OS08109	56	29.90	N	168	0.10	W	2008/6/26 04:45	2008/6/26 05:05
B11	OS08110	56	29.90	N	167	0.00	W	2008/6/26 08:35	2008/6/26 09:15
B12	OS08111	56	29.90	N	166	0.00	W	2008/6/26 12:04	2008/6/26 16:15
B13	OS08112	56	58.40	N	166	0.20	W	2008/6/26 19:00	2008/6/26 21:35
B14	OS08113	57	0.00	N	166	58.60	W	2008/6/27 00:20	2008/6/27 01:00
B15	OS08114	57	0.00	N	168	0.00	W	2008/6/27 04:00	2008/6/27 05:35
B06	OS08115	56	0.00	N	169	0.00	W	2008/6/27 11:10	2008/6/27 12:20
Turbo Map	OS08116	55	40.00	N	169	39.80	W	2008/6/27 15:45	2008/6/27 19:10
B09-2	OS08117	56	30.00	N	169	0.00	W	2008/6/28 00:05	2008/6/28 01:05
B16	OS08118	57	0.00	N	169	0.00	W	2008/6/28 04:15	2008/6/28 05:25
B19	OS08119	57	30.00	N	169	0.00	W	2008/6/28 08:15	2008/6/28 09:20
B20	OS08120	57	30.00	N	168	0.00	W	2008/6/28 11:50	2008/6/28 14:25
B21	OS08121	57	30.00	N	167	0.00	W	2008/6/28 17:00	2008/6/28 17:50
B22	OS08122	57	28.80	N	165	58.80	W	2008/6/28 20:30	2008/6/28 23:58
B23	OS08123	58	0.00	N	165	59.80	W	2008/6/29 03:25	2008/6/29 04:30
B25	OS08124	59	0.00	N	166	0.00	W	2008/6/29 09:35	2008/6/29 10:45
E01	OS08125	60	30.00	N	168	0.00	W	2008/6/29 19:45	2008/6/29 20:10
TW1	OS08126	61	51.40	N	173	23.71	W	2008/6/30 10:54	2008/6/30 12:30
B26	OS08127	62	0.00	N	174	0.00	W	2008/6/30 14:10	2008/6/30 15:35
TW2	OS08128	62	9.50	N	174	8.20	W	2008/6/30 15:55	2008/6/30 17:30
B37	OS08129	62	31.10	N	174	28.70	W	2008/6/30 19:25	2008/6/30 20:20
B28	OS08130	62	20.00	N	172	40.00	W	2008/7/1 00:42	2008/7/1 01:30
B40	OS08131	62	56.00	N	173	17.3	W	2008/7/1 06:30	2008/7/1 11:18
B41a	OS08132	63	30.00	N	172	50.0	W	2008/7/1 13:54	2008/7/1 16:50
B41b	OS08133	63	21.00	N	172	30.0	W	2008/7/1 18:10	2008/7/1 18:35
B41c	OS08134	63	10.30	N	172	10.0	W	2008/7/1 20:00	2008/7/1 20:25
B41d	OS08135	62	55.00	N	171	40.0	W	2008/7/1 22:15	2008/7/1 22:50
B33	OS08136	62	38.40	N	171	14.80	W	2008/7/2 06:30	2008/7/2 09:55
B42	OS08137	62	57.00	N	166	45.0	W	2008/7/2 20:20	2008/7/2 21:25
B44	OS08138	63	10.50	N	167	30.0	W	2008/7/2 23:25	2008/7/3 00:25
B46	OS08139	63	52.00	N	167	45.0	W	2008/7/3 04:35	2008/7/3 07:23
B47	OS08140	63	36.00	N	167	0.0	W	2008/7/3 09:35	2008/7/3 10:40
B49	OS08141	63	18.00	N	166	15.0	W	2008/7/3 13:05	2008/7/3 14:10
B50	OS08142	63	39.20	N	165	36.3	W	2008/7/3 16:50	2008/7/3 17:40
B52	OS08143	63	54.00	N	166	12.0	W	2008/7/3 19:30	2008/7/3 20:30
B53	OS08144	64	9.80	N	166	49.6	W	2008/7/3 23:36	2008/7/3 23:53

TW=Trawl

Table 2. Observation items at each station of Leg 2.

Station	Oshoro Maru Ser.	0:10		Kuma		Kanadani		Saitoh		Saitoh		Nagasawa		Saitoh		Sando		Plankton		Salmon		Okaji		Okaji		Tashiro		Salmon		0:30	
		CTD (S)	CTD (D)	0:20	0:15	0:20	0:10	1:00	0:10	0:15	0:20	0:15	0:20	0:20	0:15	0:20	0:20	0:20	2:00	1:00	0:30										
				Kevlar Clean	Sterile Sampler	Optics (ac-s)	Chlorotech	TurboMap	Ekman Birge	Core sampler	NORPAC Net	Bongo Net	Larva Net	Bongo Net	Bottom Trawl	Longline, Fishing	Other														
B01	OS08102	1			1	1						1																			
B02	OS08103	1										1																			
B03	OS08104	1			1						1	2	1	1																	
B04	OS08105	1										1																			
B05	OS08106	2				1						1			1												1				
B07	OS08107	1(M)																													
B09	OS08108	1(M)																													
B10	OS08109	1(M)																													
B11	OS08110	2				1						1																			
B12	OS08111	2				1						1															1				
B13	OS08112	1			1						1	2																		1	
B14	OS08113	1										1			1																
B15	OS08114	1		2	1							1																			
B06	OS08115	2				1						1																			
Turbo Map	OS08116	2		2		1		1				1																			
B09-2	OS08117	1		2								1			1																
B16	OS08118	1									1	1																			
B19	OS08119	2				1						1																			
B20	OS08120	1			1							1															1				
B21	OS08121	1		1								1																			
B22	OS08122	1									1	2																		1(FM CAL)	
B23	OS08123	1		1	1						1	1																			
B25	OS08124	2			1	1					1	1																			
E01	OS08125	1				1						1																			
TW1	OS08126	1																												1	
B26	OS08127	2		1	1	1						1																			
TW2	OS08128	1																												1	
B37	OS08129	1		1								1																			
B28	OS08130	1		1	1							1			1																
B40	OS08131	2		1		1						1															1				
B41a	OS08132	2		2		1						1															1				
B41b	OS08133	1										1																			
B41c	OS08134	1										1																			
B41d	OS08135	1										1																			
B33	OS08136	2		1	1	1		1			1	1															1				
B42	OS08137	1		1	1	1		1		1		2																			
B44	OS08138	1		1	1	1		1		1		1																			
B46	OS08139	1		1	1	1		1		1		1																		1	
B47	OS08140	1		1		1		1			1	1																			
B49	OS08141	2		1	1	1		1			1	1																			
B50	OS08142	1		1	1	1		1			1	1																			
B52	OS08143	2		1	1	1		1			1	1																			
B53	OS08144	1		1	1	1		1			1	1																		1(FM CAL)	

(M):memory CTD

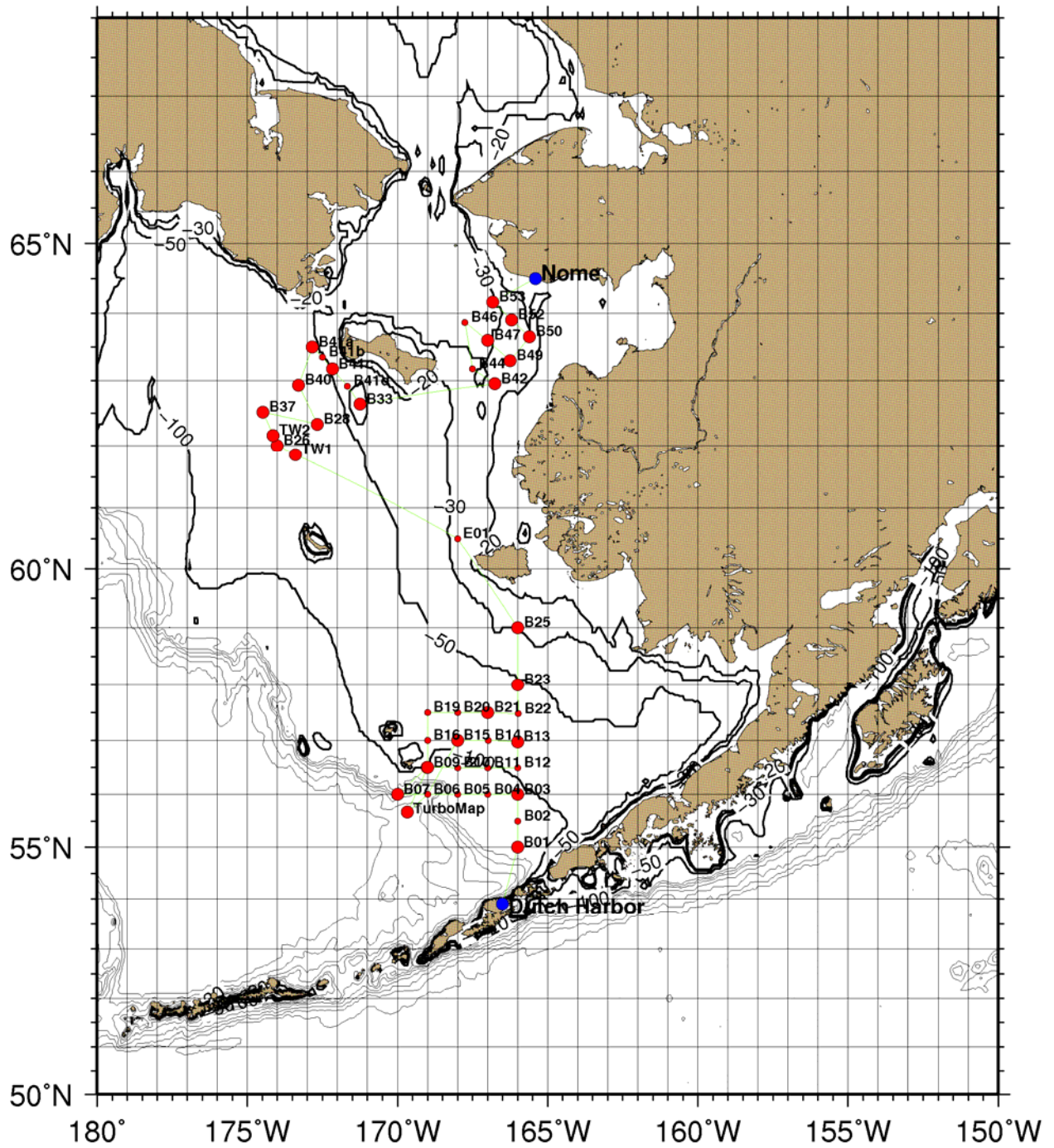


Figure 1. Station map of Leg 2 in the Bering Sea

Table 3. Position and time at each station of Leg 3.

Station/Port	Oshoro Maru	Latitude		Longitude			Arrival	Departure	
	Ser. Num.	deg	min	deg	min		Date LT	Date LT	
P01	OS08145	65	42.3	N	168	15.1	W	2008/7/7 00:30	-
P02	OS08146	65	43.1	N	168	19.9	W	2008/7/7 01:00	-
P03	OS08147	65	45.2	N	168	29.9	W	2008/7/7 01:40	-
P04	OS08148	65	47.3	N	168	40.3	W	2008/7/7 02:25	-
P05	OS08149	65	49.1	N	168	49.8	W	2008/7/7 03:00	2008/7/7 03:10
C01	OS08150	66	10.5	N	168	40.0	W	2008/7/7 04:45	2008/7/7 08:50
C02	OS08151	66	37.8	N	168	40.0	W	2008/7/7 10:40	2008/7/7 12:25
C03	OS08152	67	5.2	N	168	39.9	W	2008/7/7 15:00	2008/7/7 15:35
C04	OS08153	67	32.4	N	168	40.0	W	2008/7/7 18:05	2008/7/7 19:25
E1	OS08154	69	54.4	N	168	29.9	W	2008/7/8 13:25	2008/7/8 16:35
E2	OS08155	69	59.0	N	167	58.0	W	2008/7/8 17:50	2008/7/8 18:10
E3	OS08156	70	4.0	N	167	9.9	W	2008/7/8 20:30	2008/7/8 21:40
E4	OS08157	70	16.0	N	166	57.0	W	2008/7/8 23:10	2008/7/9 00:15
E5	OS08158	70	28.0	N	166	44.0	W	2008/7/9 01:20	2008/7/9 03:10
E6	OS08159	70	40.0	N	166	31.0	W	2008/7/9 04:05	2008/7/9 04:45
E7	OS08160	70	52.0	N	166	17.8	W	2008/7/9 05:55	2008/7/9 07:05
E8	OS08161	71	4.0	N	166	5.1	W	2008/7/9 08:15	2008/7/9 09:30
M04-04	OS08162	70	38.3	N	166	46.4	W	2008/7/9 13:55	2008/7/9 21:20
C22	OS08163	70	34.7	N	166	1.9	W	2008/7/9 22:40	2008/7/10 00:35
C21	OS08164	70	29.8	N	164	45.7	W	2008/7/10 02:30	2008/7/10 04:00
C20	OS08165	70	24.8	N	163	29.6	W	2008/7/10 06:30	2008/7/10 09:05
C19	OS08166	70	0.8	N	163	41.7	W	2008/7/10 11:25	2008/7/10 12:35
C18	OS08167	70	5.8	N	164	57.6	W	2008/7/10 14:33	2008/7/10 17:20
C17	OS08168	70	10.7	N	166	14.0	W	2008/7/10 19:35	2008/7/10 21:20
M03-04	OS08169	69	50.0	N	168	49.5	W	2008/7/11 02:45	2008/7/11 09:20
C31	OS08170	69	30.0	N	167	0.1	W	2008/7/11 12:53	2008/7/11 15:45
C10	OS08171	68	52.3	N	166	45.4	W	2008/7/12 02:05	2008/7/12 02:50
C12	OS08172	68	52.3	N	167	50.0	W	2008/7/12 04:50	2008/7/12 05:50
C15	OS08173	68	52.3	N	168	40.1	W	2008/7/12 07:25	2008/7/12 10:00
C14	OS08174	68	30.6	N	168	34.5	W	2008/7/12 11:55	2008/7/12 15:15
C09	OS08175	68	11.4	N	167	12.9	W	2008/7/12 18:30	2008/7/12 19:30
C04R	OS08176	67	32.5	N	168	39.7	W	2008/7/12 23:55	2008/7/13 01:35
S1 (salmon)	OS08177	66	46.9	N	167	16.7	W	2008/7/13 05:58	2008/7/13 10:00
C02R	OS08178	66	37.8	N	168	39.9	W	2008/7/13 12:40	2008/7/13 15:45
P05	OS08179	65	49.2	N	168	49.7	W	2008/7/13 20:55	2008/7/13 21:05
P04	OS08180	65	47.3	N	168	40.3	W	2008/7/13 21:40	2008/7/13 21:48
P03	OS08181	65	45.2	N	168	29.9	W	2008/7/13 22:26	2008/7/13 22:35
P02	OS08182	65	43.1	N	168	19.9	W	2008/7/13 23:18	2008/7/13 23:28
P01	OS08183	65	42.3	N	168	15.1	W	2008/7/13 23:52	2008/7/13 23:59

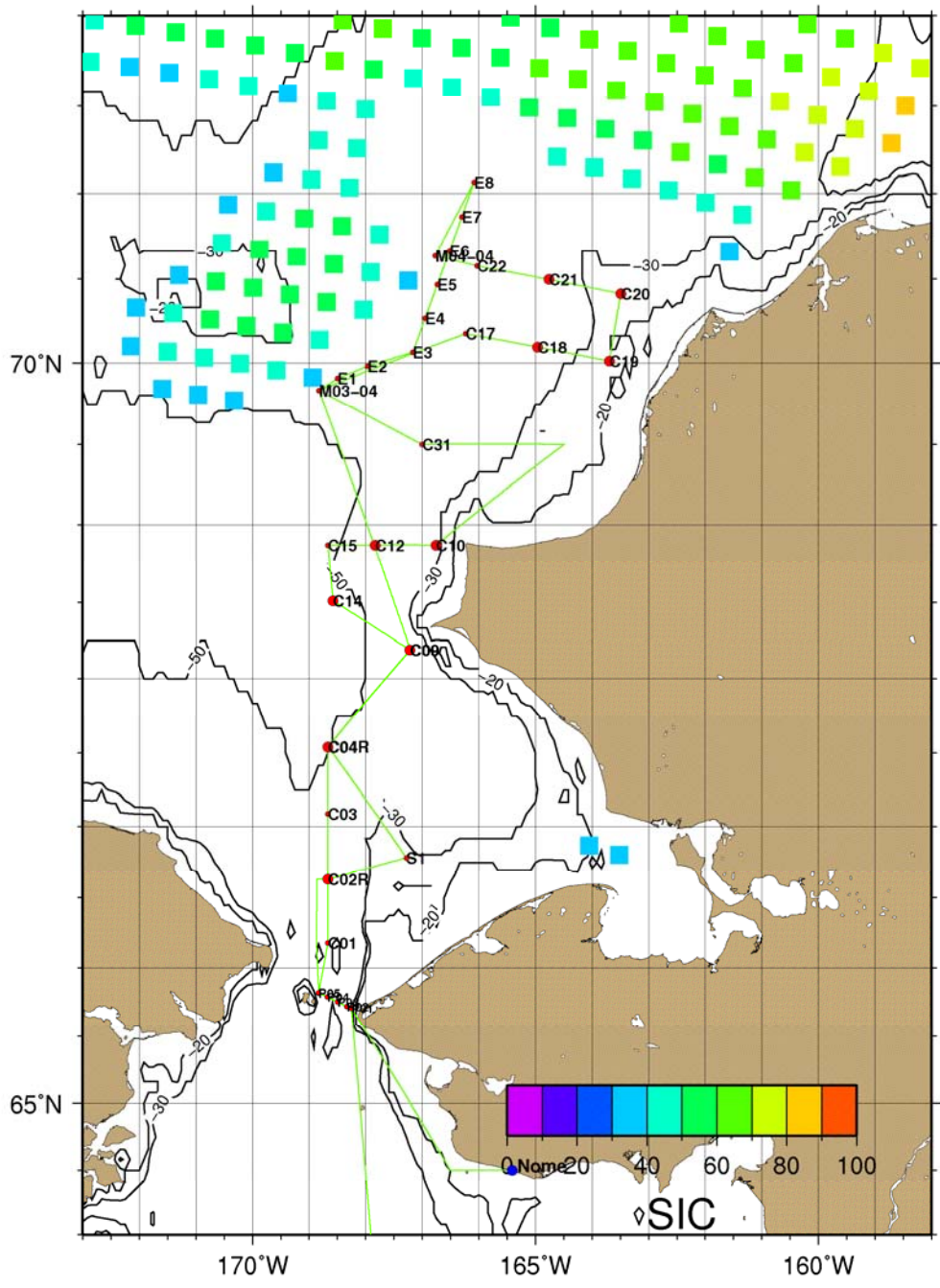


Figure 2. Station map of Leg 3 in the Chukchi Sea. Sea ice concentration (SIC) is the data of SSMI/DMSP on July 11, 2008.

3. Participants

Table 5. Participants list during Legs 2 and 3.

Name	Affiliation	Occupation	F/M Leg 2	F/M Leg 3	Group	Instruments/sampling gear
Haruka Shibata	Hokkaido Univ.	Undergraduate Student	F	F	Physical	CTD/RMS
Hirotohi Makihara	Hokkaido Univ.	Graduate Student	M	M		XCTD, XBT
Koji Shimada	Tokyo Univ. Mar. Sci. Tech.	Associate Professor		M		ADCP
Kohei Mizobata	Tokyo Univ. Mar. Sci. Tech.	Research Scientist		M		
Jia Wang	NOAA	Professor		M		
Maki Nagasawa	Univ. Tokyo	Research Scientist	F		Micro structure	TurboMap
Kanako Yokota	Univ. Tokyo	Graduate Student	F			
Kyoko Tanaka	Univ. Tokyo	Graduate Student	F			
Keisuke Okaji	Hokkaido Univ.	Graduate Student	M	M	Fish ecology,	Larva net
Chigusa Watanabe	Hokkaido Univ.	Undergraduate Student	F	F	physiology	Bongo net
Yukari Kurihara	Hokkaido Univ.	Undergraduate Student	F	F		ROV
Fumihito Tashiro	Hokkaido Univ.	Graduate Student	M	M		Bottom trawl
Takahito Kojima	Nihon Univ.	Associate Professor	M			
Yuta Nagai	Hokkaido Univ.	Undergraduate Student	M	M	Salmon	Fishing, long-line
Kohei Matsuda	Hokkaido Univ.	Undergraduate Student	M	M		
Keiko Sekiguchi	Hawai Univ.	Professor	F	F	Cetacean	Observation from Bridge
Takashi Uyama	Hokkaido Univ.	Graduate Student	M	M		
Seiichi Saito	Hokkaido Univ.	Professor	M		Satellite, optical	HyperPro
Toru Hirawake	Hokkaido Univ.	Associate Professor		M		ac-s
Amane Fujiwara	Hokkaido Univ.	Graduate Student	M	M		VSF
Hajime Detobata	Hokkaido Univ.	Undergraduate Student	M	M		Quanta
Kohei Suzuki	Hokkaido Univ.	Undergraduate Student	M	M		CTD/RMS
Keitaro Matsumoto	Hokkaido Univ.	Undergraduate Student	M	M		
Kensi Kuma	Hokkaido Univ.	Professor	M	M	Chemical,	Clean sampling (Kevlar)
Satomi Ushizaka	Hokkaido Univ.	Graduate Student	F	F	micro nutrients	CTD/RMS
Aya Omata	Hokkaido Univ.	Graduate Student	F	F		
Shotaro Nishimura	Hokkaido Univ.	Graduate Student	M	M		
Satoko Ishikawa	Hokkaido Univ.	Graduate Student	F	F		
Sayo Demura	Hokkaido Univ.	Undergraduate Student	F	F		
Masaki Koizumi	Hokkaido Univ.	Undergraduate Student	F	F		
Ren Uchida	Hokkaido Univ.	Undergraduate Student	M	M		
Ryu Sando	Hokkaido Univ.	Undergraduate Student	M	M	Chemical	NORPAC, Corer
Grant Humphries	UAF	Graduate Student	M		Atmosphere	Seabird distribution
Luke Nolan Corrothers	UAF	Graduate Student		M	Benthos	Beam trawl
Kirsten Baltz	UAF	Graduate Student		F		
Jonathan Richar	UAF	Graduate Student		M		
Brenda A. Holladay	UAF	Research Technician		F		
Yuka Onishi	Hokkaido Univ.	Undergraduate Student	F	F	Plankton	NORPAC
Kohei Ohgi	Hokkaido Univ.	Undergraduate Student	M	M		80cm Ring
Tomoe Homma	Hokkaido Univ.	Undergraduate Student	F	F		Closing NORPAC
Robin Green	Kent State Univ.	Undergraduate Student		F	Plankton	1m (63um mesh) net, d180
Yoshio Kanadani	Hokkaido Univ.	Graduate Student	M	M	Bacteria	CTD/RMS
			F	14	14	
			M	19	22	