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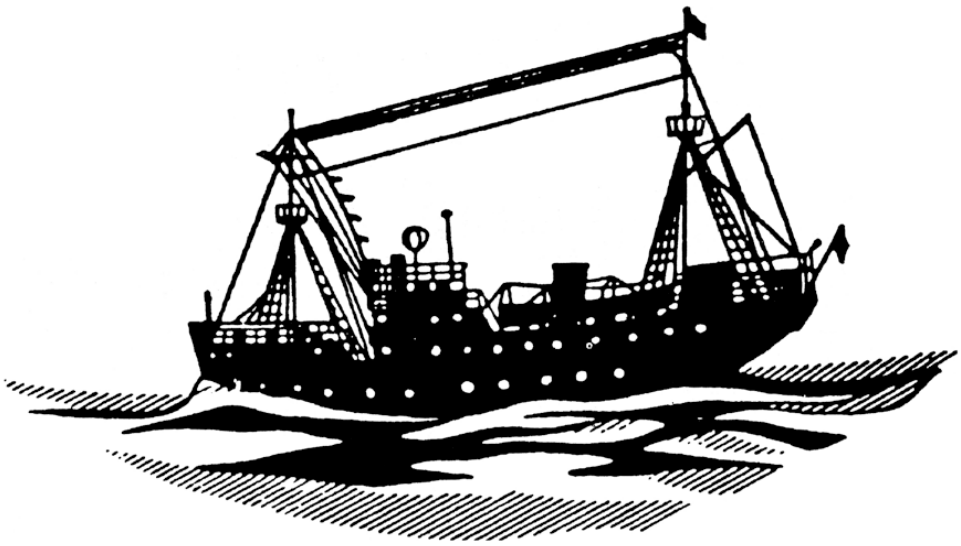
DATA RECORD OF OCEANOGRAPHIC OBSERVATIONS AND EXPLORATORY FISHING

No.61

海 洋 調 査 漁 業 試 験 要 報 第

61 号



GRADUATE SCHOOL OF FISHERIES SCIENCES AND
FACULTY OF FISHERIES SCIENCES
HOKKAIDO UNIVERSITY HAKODATE,
JAPAN
MARCH 2021

北海道大学大学院水産科学研究院・水産学部 函館市
令和３年３月

NOTICE

This publication is being undertaken for the sake of making available to interested persons, as soon as possible, some preliminary data derived from oceanographic, biological or exploratory fishing researches carried out on the regular or occasional cruises of the training ships of Faculty of Fisheries Sciences, Hokkaido University.

The priority of these data belongs to the research scientists and officers on board. Please ask for permission to the Chief Editor of this volume, when you quote the data from this “Data Record”

本学部練習船を用いて行われた海洋観測，生物調査，漁業試験の結果が，各研究担当者によって研究論文として 纏められ，印刷公表されるまでにはかなりの時日を要し，且研究論文には個々の測定値が表示されない場合が多い ことを考慮し，練習船の調査航海毎に調査成果を本要報として逐次刊行し，各方面の参考に供することとした。

本要報のデータは乗船研究者並びに士官に帰属している。本報に掲載されたデータを引用する場合は編集委員長 に許可を求められたい。

CONTENTS

PART Ⅰ OSHORO MARU CRUISES FROM FEBRUARY TO DECEMBER 2017

CREW'S LIST and Particulars.....2

1 THE " OSHORO MARU " CRUISE 036 to SANRIKU OFF IN FEBRUARY 2017
1. Cruise Itinerary.....4
2. Vessel Personnel.....5
3. Items of Research 5

2 THE " OSHORO MARU " CRUISE 038 to SEA OF JAPAN and TRURUGA-WAN IN APRIL 2017
1. Cruise Itinerary.....7
2. Vessel Personnel.....9

3 THE " OSHORO MARU " CRUISE 039 to THE WESTERN NORTH PACIFIC OCEAN IN MAY 2017
1. Cruise Itinerary.....11
2. Vessel Personnel.....12
3. Items of Research 12
4. Data on Temperature, Salinity and Pressure.....13
5. Data on drift gillnet research.....15
6. Data on salmon longline and hook-and-line research.....22

4 THE " OSHORO MARU " CRUISE 040 to JAPAN SEA, AND THE NORTHWEST PACIFIC OCEAN, THE BERING SEA and CHUKUCHI SEA IN JUNE - AUGUST 2017
1. Cruise Itinerary.....25
2. Vessel Personnel.....28
3. Items of Research 29
4. Data on salmon longline and hook-and-line research.....30

5 THE " OSHORO MARU " CRUISE 044 to EAST OF THE TSUGARU STRAIT (IBURI/HIDAKA OFF) IN SEPTEMBER 2017
1. Cruise Itinerary.....33
2. Vessel Personnel.....33
3. Items of Research 34

6 THE " OSHORO MARU " CRUISE 045 to EAST OF THE TSUGARU STRAIT (IBURI/HIDAKA OFF) IN OCTOBER 2017
1. Cruise Itinerary.....36
2. Vessel Personnel.....37
3. Items of Research 37
4. Data on Temperature, Salinity and Pressure.....37
5. Data on bottom trawl research.....39

7 THE " OSHORO MARU " CRUISE 046 to TOKACHI OFF IN NOVEMBER 2017
1. Cruise Itinerary.....41
2. Vessel Personnel.....42
3. Items of Research 42

8 THE " OSHORO MARU " CRUISE 047 to KUSHIRO OFF IN NOVEMBER 2017
1. Cruise Itinerary.....44
2. Vessel Personnel.....44

9 THE " OSHORO MARU " CRUISE 048 to SANRIKU OFF IN NOVEMBER 2017
1. Cruise Itinerary.....46
2. Vessel Personnel.....47

10 THE " OSHORO MARU " CRUISE 049 to THE NANPO SHOTO IN DECEMBER 2017
1. Cruise Itinerary 49
2. Vessel Personnel 50
3. Items of Research 50
4. Data on Temperature, Salinity and Pressure 51
5. Data on vertical longline research 52

11 THE " OSHORO MARU " CRUISE 050 to TATEYAMA-BAY and SAGAMI-NADA IN DECEMBER 2017
1. Cruise Itinerary 54
2. Vessel Personnel 55

PART II USHIO MARU CRUISES FROM JANUARY 2017 TO DECEMBER 2017

CREW'S LIST and Particulars 57

1 THE " USHIO MARU " CRUISE 379, CRUISE 380, CRUISE 381 IN JANUARY - FEBRUARY 2017
1. Cruise Itinerary 59
2. Data on Temperature, Salinity and Pressure 60

2 THE " USHIO MARU " CRUISE 382, CRUISE 383, CRUISE 384 IN FEBRUARY - MARCH 2017
1. Cruise Itinerary 70
2. Data on Temperature, Salinity and Pressure 71

3 THE " USHIO MARU " CRUISE 385, CRUISE 386, CRUISE 387 IN MARCH - APRIL 2017
1. Cruise Itinerary 84
2. Data on Temperature, Salinity and Pressure 85

4 THE " USHIO MARU " CRUISE 388, CRUISE 389, CRUISE 390 IN MAY - JUNE 2017
1. Cruise Itinerary 92
2. Data on Temperature, Salinity and Pressure 94

5 THE " USHIO MARU " CRUISE 391, CRUISE 392, CRUISE 393 IN JUNE - JULY 2017
1. Cruise Itinerary 104
2. Data on Temperature, Salinity and Pressure 106

6 THE " USHIO MARU " CRUISE 394, CRUISE 395, CRUISE 396 IN AUGUST – SEPTEMBER 2017
1. Cruise Itinerary 114
2. Data on Temperature, Salinity and Pressure 115

7 THE " USHIO MARU " CRUISE 397, CRUISE 398, CRUISE 399 IN SEPTEMBER -OCTOBER 2017
1. Cruise Itinerary 121
2. Data on Temperature, Salinity and Pressure 122

8 THE " USHIO MARU " CRUISE 400, CRUISE 401, CRUISE 402 IN OCTOBER - NOVEMBER 2017
1. Cruise Itinerary 130
2. Data on Temperature, Salinity and Pressure 131

9 THE " USHIO MARU " CRUISE 403, CRUISE 404, CRUISE 405, IN NOVEMBER - DECEMBER 2017
1. Cruise Itinerary 138
2. Data on Temperature, Salinity and Pressure 139

PART I

OSHORO MARU CRUISE
FROM FEBRURY TO DECEMBER 2017

I. Crew list

Captain:		Shogo Takagi
Crew:	Chief Officer	Keiichiro Sakaoka
	First Officer	Yoshiyuki Kajiwara
	Second Officer	Naoki Hoshi
	Jr. Second Officer	Maki Ohwada
	Third Officer	Taichi Sato
	Deck Cadet	Inagaki Yusuke
	Chief Engineer	Kazuya Sawanaka
	First Engineer	Kenichi Shindoh (- C038)
	First Engineer	Jyunpei Shimura (C039 -)
	Second Engineer	Akira Sugihara
	Third Engineer	Hiroyuki Uno
	Chief Radio Operator	Satoshi Ishigaki
	Science Officer	Keiri Imai
	Boatswain	Yoshitaka Yoshida
	Jr. Boatswain	Yoshihiro Onodera
	Quartermaster	Naoyuki Eda
	Quartermaster	Daisuke Sasaki
	Quartermaster	Takahiro Kanazawa
	Sailor	Yukio Tabata
	Sailor	Kohta Idomukai
	No.1 Oiler	Kohya Nakamura
	Jr. No.1 Oiler	Konichi Tomosugi
	Oiler	Tohru Murakami
	Fireman	Takuya Murata
	Fireman	Toshiki Nohsho (C038-)
	Chief Steward	Hajime Morihiro
	Jr. Chief Steward	Hiroshi Nakamura
	Steward	Hiroshi Tamagawa
	Mess Man	Tsutomu Takahashi
	Mess Man	Ryoma Aki
	Mess Man	Toshiki Nohsho (- C037)
	Mess Man	Teruki Tomita (C039-)
	Marine Technician	Kenji Oguma
	Marine Technician	Kohki Sawada

II. Particulars

Length (o.a.)	78.27m
Length (p.p.)	70.00m
Breadth (mid)	13.00m
Depth(mid)	5.80m
Gross tonnage	1598 tons
International gross tonnage	1998 tons
Main engine(Three-Phase induction motor ×2)	1000kw×88.5min^{-1} , 300kw×88.5min^{-1}
Call sign	7JRM

1

THE "OSHORO MARU" CRUISE 036
TO SANRIKU OFF

IN FEBRUARY 2017

Cruise 036

Departure from Hakodate	Feb.	22, 2017
Start hydrographic research		23
Finish hydrographic research		26
Return to Hakodate		27

Total coverage 498.1 miles

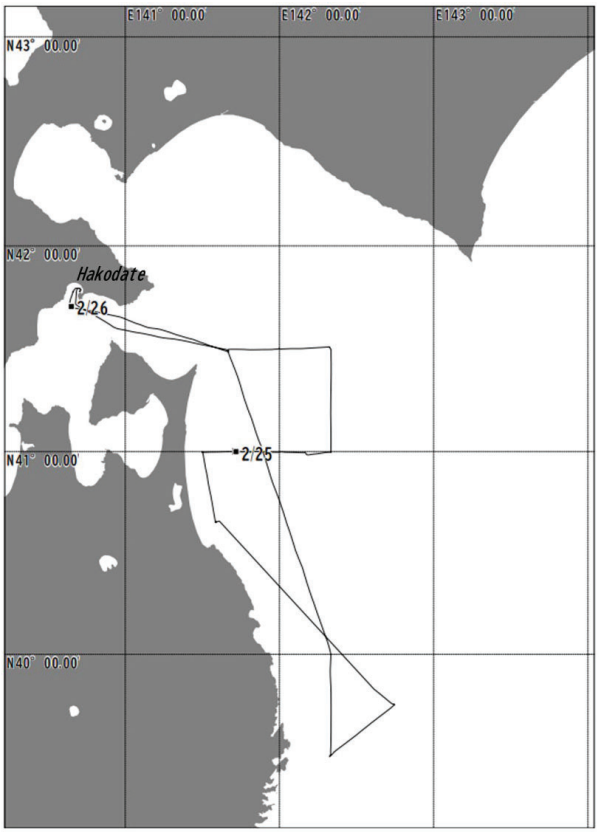


Fig. 1: Noon Position

2. Vessel Personnel

Crew: Captain: Associate Professor Shogo Takagi

And 31 persons

Undergraduate instructor:

Associate Professor (Laboratory of Marine Environmental Science, Hokkaido University)

Yutaka Isoda

Associate Professor (Laboratory of Marine Environment and Resource Sensing, Hokkaido University)

Toru Hirawake

Assistant Professor (Laboratory of Marine Environmental Science, Hokkaido University)

Hiroji Onishi

Instructor (Department of Marine Science, Faculty of Fisheries, Kasetsart University)

Charuay Sukhsangchan

Instructor (Department of Marine Science, Faculty of Fisheries, Kasetsart University)

Yaowaluk Monthum

Teaching Assistant: 4 persons

Undergraduate Student: 28 persons

3. Items of Research

A short cruise to conduct shipboard training in hydrographic observations for undergraduate students in the department of marine bioresource and environmental science.

Hydrographic observations: Temperature and salinity were measured by CTD (Seabird SBE-9Plus and SBE-19Plus).

Dynamic computations were made using a desk-top computer aboard the "*Oshoromaru*".

2

THE "OSHORO MARU" CRUISE 038
TO SEA OF JAPAN and TSURUGA-WAN

IN APRIL 2017

Cruise 038

Departure from Yura and arrival at Kobe	Apr.	14, 2017
Departure from Kobe		16
Arrival at Fukui		20
Departure from Fukui and start hydrographic research (Leg2)		21
Finish hydrographic research		22
Return to Fukui and departure from Fukui (Leg3)		23
Return to Fukui and departure from Fukui		24
Return to Hakodate		26

Total coverage 1161.7 miles

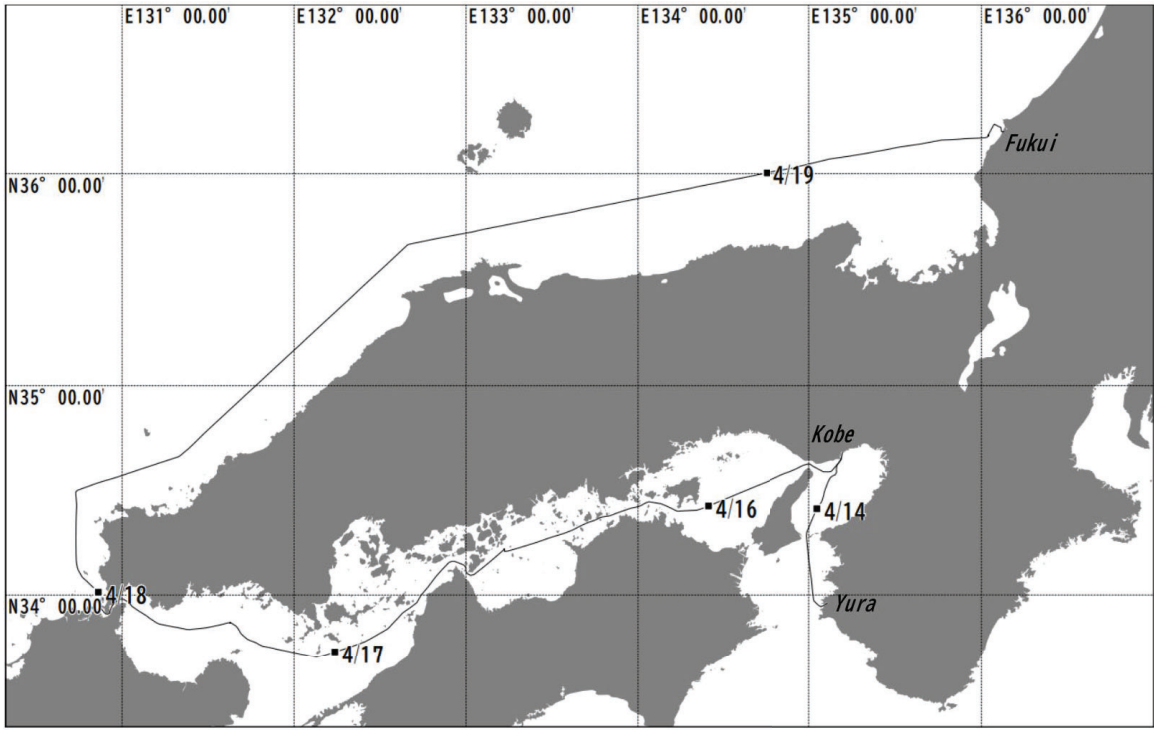


Fig. 1-1: Noon Position

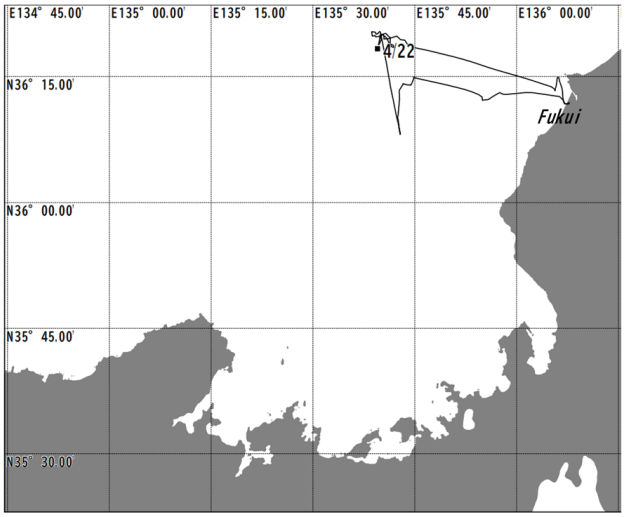


Fig. 1-2: Noon Position

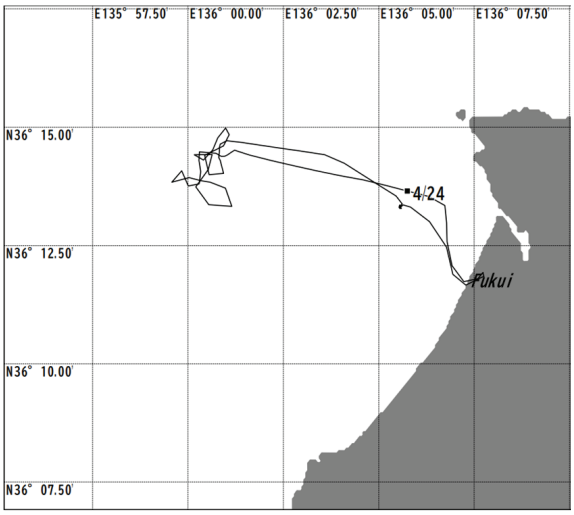


Fig. 1-3: Noon Position

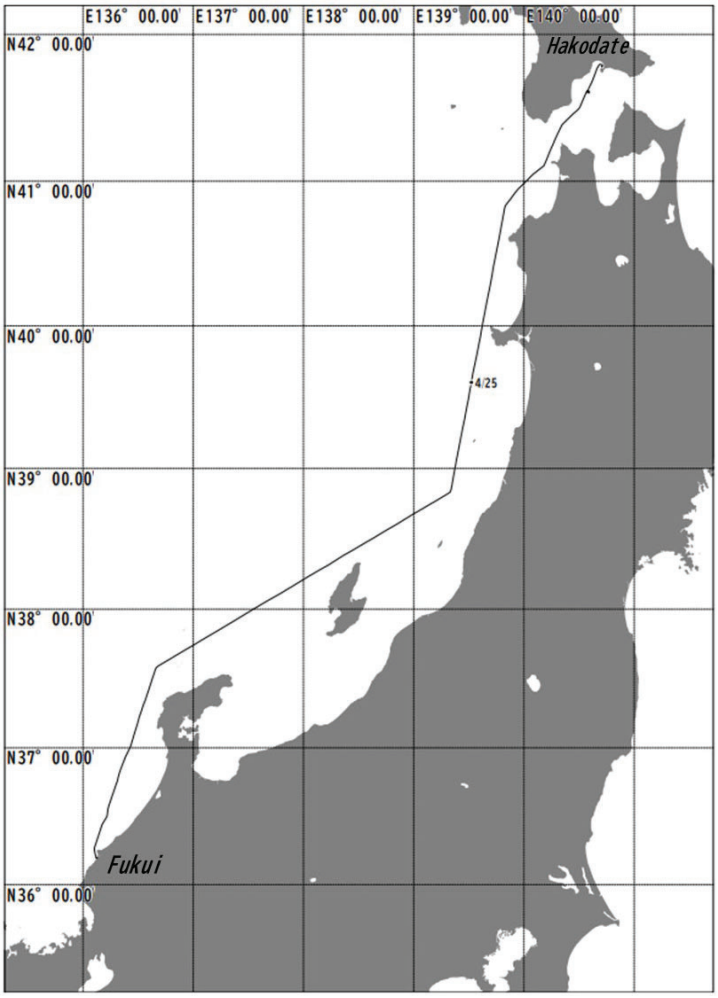


Fig. 1-4: Noon Position

2. Vessel Personnel

Crew: Captain: Associate Professor Shogo Takagi

And 32 persons

(Leg2)

Undergraduate instructor:

Professor (Faculty of Marine Bioscience, Fukui Prefectural University)

Ryuji Kondo

Professor (Faculty of Marine Bioscience, Fukui Prefectural University)

Tooru Ooizumi

Associate Professor (Faculty of Marine Bioscience, Fukui Prefectural University)

Atsushi Kaneda

Associate Professor (Faculty of Marine Bioscience, Fukui Prefectural University)

Yoshitake Takao

Associate Professor (Faculty of Marine Bioscience, Fukui Prefectural University)

Hiroaki Shuetake

Instructor (Faculty of Marine Bioscience, Fukui Prefectural University)

Takafumi Kataoka

Teaching Assistant: 4 persons

Undergraduate Student: 50 persons

(Leg3)

Undergraduate instructor:

Emeritus Professor (Faculty of Marine Bioscience, Fukui Prefectural University)

Tadahisa Seikai

Professor (Faculty of Marine Bioscience, Fukui Prefectural University)

Osamu Tominaga

Associate Professor (Faculty of Marine Bioscience, Fukui Prefectural University)

Yoko Shimizu

Lecturer (Faculty of Marine Bioscience, Fukui Prefectural University)

Sayaka Matsumoto

Teaching staff (Faculty of Marine Bioscience, Fukui Prefectural University)

Kazuhiko Sugimura

Researcher (Faculty of Marine Bioscience, Fukui Prefectural University)

Yasushi Miyamoto

Teaching Assistant: 6 persons

Undergraduate Student:28 persons

3

THE "OSHORO MARU" CRUISE 039
TO THE WESTERN NORTH PACIFIC OCEAN

IN MAY 2017

1. Cruise Itinerary

Cruise 039

Departure from Hakodate	May.	12, 2017
Start hydrographic research and gillnet research (OSG1701)		15
Finish hydrographic research		18
Finish gillnet research (OSG1704)		19
Return to Hakodate		22

Total coverage .1599.4miles

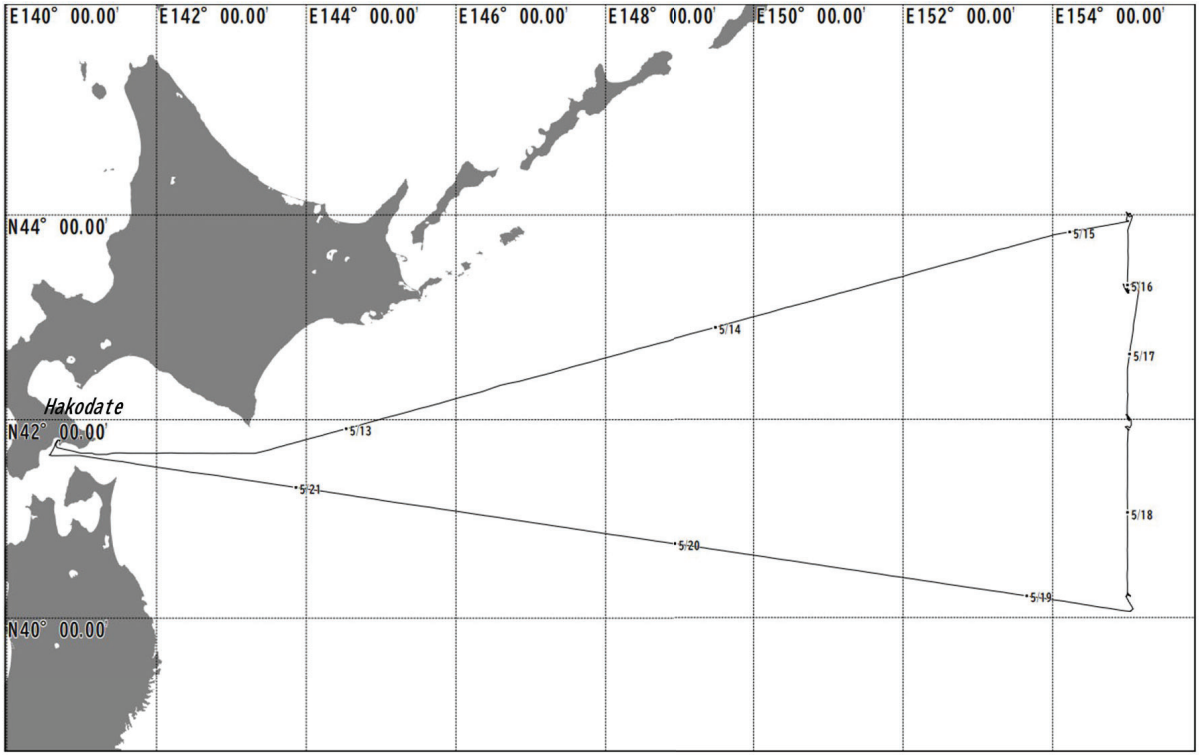


Fig. 1 Noon Position

2. Vessel Personnel

Crew: Captain: Associate Professor Shogo Takagi

And 33 persons

Undergraduate instructor:

Associate Professor (Laboratory of Marine Bioresource and Environmental Science, Hokkaido University)

Hideaki Kudo

Associate Professor (Laboratory of Marine Bioresource Science, Hokkaido University)

Orio Yamamura

Assistant Professor (Field Science Center for Northern Biosphere, Hokkaido University)

Daiki Nomura

Research stuff:

Associate Professor (Laboratory of Marine Biodiversity, Hokkaido University)

Atsushi Yamaguchi

Postdoctoral Researcher (Laboratory of Marine Environmental Science, Hokkaido University)

Bungo Nishizawa

Graduate Student: 5 persons

Undergraduate Student: 51 persons

3. Items of Research

Hydrographic observations: Hydrographic work on deck and the data processing were made by Science officer, the deck officers, crews, research staff and cadets of the "*Oshoromaru*".Temperature and salinity were measured by CTD (Seabird SBE-9Plus, SBE-19Plus and XCTD).Dynamic computations were made using a desk-top computer aboard the "*Oshoromaru*".

Water sampling were also carried out at almost every hydrographic stations. Table 1, 2

Biological research for fishes caught by non-selective drift gillnets, surface longline and Hook-and-Line, those were performed during this cruise. The gillnet was composed of different mesh size, and extended from the surface to 6 meters depth. The operations were supervised by the captain, and were conducted by deck officers, crews, research staff and cadets. Table 3-9

4. Data on temperature, salinity and computed dynamic depth anomaly

Table 1. List of Oceanographic station

Station	Lat.	Long.	Date (GMT)	Hour (GMT)	T.Z.	Depth	Col.	Tr.	SST	Wr.	Gear
OS17020	44-00.02N	155-00.14E	5/15	8:48	10	5300	-	-	4.0	o	Sea-Bird SBE9
OS17021	44-00.00N	155-00.04E	5/15	13:41	10	5300	-	-	4.0	o	Sea-Bird SBE9
OS17022	43-15.01N	154-59.98E	5/16	5:06	10	5400	-	-	7.0	o	Sea-Bird SBE9
OS17023	42-30.00N	154-49.99E	5/17	4:22	10	5200	-	-	7.4	o	XCTD-4
OS17024	42-00.70N	155-00.61E	5/17	8:55	10	5400	-	-	6.9	o	Sea-Bird SBE9
OS17025	41-45.12N	154-59.99E	5/17	22:51	10	5500	-	-	7.5	o	XCTD-4
OS17026	40-59.98N	154-59.98E	5/18	3:30	10	5500	-	-	8.6	bc	XCTD-4
OS17027	40-14.83N	155-00.03E	5/18	8:55	10	5550	-	-	13.0	o	Sea-Bird SBE9

T.Z.: Time difference between Greenwich Mean Time (G.M.T.) and Ship's Mean Time (S.M.T.)
Col.: Water color in Forel-Ule scale
Tr.: Transparency in meters with Secchi disc
SST: Sea Surface temperature
Wr.: Weather in WMO Code 4501

Table 2. Oceanographic data

Station OS17020
Latitude 44-00.20 N
Longitude 155-00.14 E
Depth(m) 5300

Press.	Temp.	Sal.	SIG-T
5	4.020	33.028	26.216
10	4.013	33.028	26.216
20	3.881	33.027	26.228
30	3.840	33.024	26.230
40	3.784	33.021	26.233
50	2.779	33.062	26.357
75	3.063	33.194	26.438
100	3.138	33.258	26.482
125	2.297	33.292	26.581
150	2.318	33.407	26.671
175	3.207	33.583	26.735
200	2.817	33.607	26.789
250	3.354	33.793	26.889
300	3.486	33.892	26.955
400	3.464	34.038	27.074
500	3.611	34.172	27.166
600	3.282	34.225	27.241
700	3.151	34.296	27.309
800	3.034	34.346	27.360
900	2.770	34.362	27.396
1000	2.595	34.400	27.442
1200	2.480	34.464	27.503
1500	2.227	34.530	27.577
2000	1.895	34.600	27.659
2500	1.661	34.642	27.711
3000	1.543	34.663	27.737
3500	1.487	34.675	27.750
4000	1.465	34.683	27.758
4500	1.477	34.688	27.761
5000	1.517	34.690	27.760

Station OS17021
Latitude 44-00.00 N
Longitude 155-00.04 E
Depth(m) 5300

Press.	Temp.	Sal.	SIG-T
5	3.963	33.027	26.220
10	3.963	33.027	26.220
20	3.848	33.022	26.228
30	3.808	33.021	26.231
40	2.492	33.032	26.357
50	2.226	33.085	26.420
75	2.063	33.089	26.436
100	1.690	33.083	26.459
125	1.502	33.153	26.528
150	2.030	33.359	26.655
175	2.829	33.539	26.734
200	3.715	33.713	26.790

Station OS17022
Latitude 43-15.01 N
Longitude 154-59.98 E
Depth(m) 5400

Press.	Temp.	Sal.	SIG-T
5	7.115	33.716	26.391
10	7.119	33.715	26.390
20	7.089	33.718	26.397
30	7.072	33.718	26.399
40	7.052	33.717	26.401
50	7.014	33.711	26.402
75	6.989	33.708	26.402
100	6.987	33.781	26.460
125	7.064	33.846	26.501
150	7.301	33.901	26.512
175	7.174	33.894	26.524
200	7.081	33.883	26.528
250	6.140	33.794	26.582
300	5.002	33.784	26.711
400	4.309	33.880	26.863
500	3.977	33.986	26.982
600	3.912	34.123	27.098
700	3.665	34.206	27.189
800	3.433	34.282	27.271
900	3.121	34.320	27.331
1000	2.928	34.364	27.384

Station OS17023
Latitude 42-30.00 N
Longitude 154-49.99 E
Depth(m) 5200

Depth	Temp.	Sal.	SIG-T
5	7.466	33.691	-
10	7.476	33.701	-
20	7.457	33.708	-
30	7.438	33.709	-
40	7.332	33.712	-
50	7.312	33.726	-
75	6.548	33.731	-
100	7.225	33.863	-
125	7.274	33.886	-
150	6.994	33.853	-
175	7.090	33.871	-
200	6.761	33.822	-
250	5.710	33.679	-
300	5.543	33.737	-
400	5.229	33.962	-
500	4.220	34.007	-
600	4.063	34.135	-
700	3.611	34.193	-
800	3.420	34.271	-
900	3.175	34.332	-
1000	2.896	34.366	-
1200	2.612	34.455	-
1500	2.317	34.524	-

Station OS17024
Latitude 42-00.70 N
Longitude 155-00.61 E
Depth(m) 5400

Press.	Temp.	Sal.	SIG-T
5	6.996	33.628	26.338
10	7.006	33.629	26.338
20	6.907	33.640	26.360
30	6.826	33.648	26.377
40	6.759	33.651	26.389
50	6.466	33.651	26.428
75	5.844	33.660	26.513
100	5.764	33.664	26.526
125	5.717	33.672	26.538
150	5.677	33.677	26.547
175	5.588	33.683	26.562
200	5.341	33.691	26.598
250	4.607	33.734	26.716
300	4.378	33.798	26.791
400	4.266	33.944	26.918
500	3.981	34.053	27.035
600	3.730	34.150	27.138
700	3.522	34.229	27.221
800	3.346	34.284	27.282
900	3.129	34.335	27.343
1000	2.952	34.376	27.391

Station OS17025
Latitude 41-45.12 N
Longitude 154-59.99 E
Depth(m) 5500

Depth	Temp.	Sal.	SIG-T
5	7.607	33.670	-
10	7.597	33.679	-
20	7.597	33.690	-
30	7.597	33.701	-
40	7.616	33.707	-
50	7.576	33.715	-
75	7.407	33.849	-
100	5.909	33.659	-
125	5.936	33.681	-
150	5.723	33.666	-
175	5.645	33.678	-
200	5.331	33.653	-
250	4.897	33.739	-
300	4.702	33.837	-
400	4.352	33.953	-
500	4.114	34.074	-
600	3.724	34.163	-
700	3.553	34.252	-
800	3.318	34.304	-
900	3.080	34.354	-
1000	2.888	34.401	-
1200	2.604	34.468	-
1500	2.302	34.541	-

Station OS17026
Latitude 40-59.98 N
Longitude 154-59.98 E
Depth(m) 5500

Depth	Temp.	Sal.	SIG-T
5	8.658	33.853	-
10	8.572	33.864	-
20	8.524	33.868	-
30	8.429	33.863	-
40	8.343	33.881	-
50	8.314	33.884	-
75	7.605	33.857	-
100	7.243	33.842	-
125	6.409	33.733	-
150	6.074	33.710	-
175	5.900	33.713	-
200	5.871	33.723	-
250	5.235	33.744	-
300	4.900	33.800	-
400	4.405	33.945	-
500	4.097	34.039	-
600	3.741	34.150	-
700	3.508	34.223	-
800	3.317	34.290	-
900	3.166	34.339	-
1000	2.965	34.390	-
1200	2.651	34.443	-
1500	2.336	34.510	-

Station OS17027
Latitude 40-14.83 N
Longitude 155-00.03 E
Depth(m) 5550

Press.	Temp.	Sal.	SIG-T
5	13.068	34.463	25.963
10	13.057	34.469	25.970
20	13.019	34.503	26.004
30	12.936	34.568	26.071
40	12.918	34.567	26.074
50	12.568	34.440	26.045
75	11.527	34.359	26.180
100	11.254	34.357	26.228
125	11.029	34.342	26.258
150	10.800	34.322	26.283
175	10.335	34.253	26.311
200	9.626	34.146	26.348
250	7.316	33.800	26.430
300	6.523	33.750	26.498
400	3.985	33.669	26.729
500	4.885	34.017	26.909
600	4.338	34.096	27.032
700	3.915	34.163	27.129
800	3.682	34.230	27.206
900	3.484	34.306	27.286
1000	3.263	34.348	27.340

Table 3. Position and research conditions of surface drift gillnet sampling at each station during the Oshoro maru Cruise #039 2017.

Station	Date and Time (S.M.T.*1)		T.D.*2	Set Position		D.S.*3	bottom depth(m)	Wr*4	Wind (Force)	S.T.*5 (℃)
	Net set	Net haul		Lat.	Long.					
OSG 1701	May 15 1750-1812	May 16 0457-0601	+10h	43-56.0N	155-00.0 E	300	5329	o	NE-4	5.6
OSG 1702	May 16 1755-1820	May 17 0500-0627	+10h	43-15.0N	155-00.4 E	030	5465	o	SE-6	7.0
OSG 1703	May 17 1800-1823	May 18 0458-0609	+10h	42-00.3N	155-00.1 E	140	5407	o	WNW-5	6.9
OSG 1704	May 18 1752-1813	May 19 0456-0552	+10h	40-14.2N	155-00.2 E	115	5545	o	WNW-4	12.9

*1 S.M.T. : Ship's Mean Time.
*2 T.D. : Time Difference between Greenwich Mean Time (G.M.T.) and Ship's Mean Time (S.M.T.).
*3 D.S. : Direction of net set.
*4 Wr : Weather (o: 100% clouded).
*5 S.T. : Surface temperature

Table 4. The gillnet configuration

Stations	net	A-Gear		C-gear										Total
	Mesh size (mm)	112	115	48	55	63	72	82	93	106	121	138	157	
OSG1701-04	Number of tan	6	6	3	3	3	5	6	5	3	3	3	3	49

Table 5. The number of organisms caught by drift gillnet during the Oshoro maru Cruise # 039, in May 2017. CPUE and (%) indicate mumerical catch per tan and percentage of total catch by C-gear gillnet at the station, respectively.

Common name	Scientific name (Station / Gear)	OSG 1701					OSG 1702					OSG 1703					OSG 1704				
		C	CPUE	(%)	A	Total	C	CPUE	(%)	A	Total	C	CPUE	(%)	A	Total	C	CPUE	(%)	A	Total
Sockeye salmon	*Oncorhynchus nerka*	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0
Chum salmon	*Oncorhynchus keta*	12	0.4	(1.6)	3	15	8	0.3	(1.5)	5	13	12	0.4	(1.9)	5	17	1	0.0	(0.3)	3	4
Pink salmon	*Oncorhynchus gorbuscha*	736	24.5	(97.9)	6	742	541	18.0	(98.2)	1	542	611	20.4	(97.4)	1	612	0	0.0	(0.0)	0	0
Coho salmon	*Oncorhynchus kisutch*	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0
Chinook salmon	*Oncorhynchus tshawytscha*	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0
Steelhead	*Oncorhynchus mykiss*	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0
Tufted Puffin	*Fratercula cirrhata*	0	0.0	(0.0)	1	1	1	0.0	(0.2)	0	1	2	0.1	(0.3)	0	2	0	0.0	(0.0)	0	0
Boreal clubhook squid	*Onychoteuthis borealijaponica*	0	0.0	(0.0)	0	0	1	0.0	(0.2)	0	1	0	0.0	(0.0)	0	0	23	0.8	(7.7)	0	23
Boreopacific gonate squid	*Gonatopsis borealis*	4	0.133	(0.5)	0	4	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	2	0.1	(0.7)	0	2
Neon flying squid	*Ommastrephes bartramii*	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	0	0.0	(0.0)	1	1
Pacific pomfret	*Brama japonica*	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	29	0.967	(9.7)	2	31
Albacore tuna	*Thunnus alalunga*	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0
Blue shark	*Prionace glauca*	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	1	0.033	(0.3)	0	1
Shortfin mako shark	*Isurus oxyrinchus*	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0
Salmon shark	*Lamna ditropis*	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	0	0.0	(0.0)	1	1
Club mackerel	*Scomber japonicus*	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	2	0.067	(0.3)	0	2	240	8.0	(80.5)	5	245
Spotline sardine	*Sardinops melanostictus*	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	0	0.0	(0.0)	0	0	2	0.067	(0.7)	0	2

Table 6. Biological characteristics of salmonids caught by drift gillnet research

Chum salmon

St.	Gear	F.L. (mm)	B.W. (g)	Sex	G.W. (g)
G01	A115	510	1580	2	4
G01	A118	493	1240		
G01	A121	495	1540	1	29
G01	C72	442	880	2	
G01	C82	443	930	2	3
G01	C93	445	990	2	3
G01	C121	547	1640	1	16
G01	C121	523	1680	2	6
G01	C106	476	1120	2	7
G01	C106	522	1680	1	8
G01	C106	456	1080	1	13
G01	C106	505	1280	2	1
G01	C106	455	980	1	12
G01	C106	482	1205	1	7
G01	C106	450	980	2	3
G02	C63	272	202	2	1
G02	C93	448	980	1	8
G02	C93	500	1520	1	24
G02	C93	532	1690	2	7
G02	C93	470	1080	2	4
G02	C93	466	1130	1	10
G02	C106	470	1060	1	10
G02	C106	476	1070	1	11
G02	A112	520	1610	1	40
G02	A112	512	1570	1	20
G02	A115	528	1740	2	6
G02	A115	481	1205	1	10
G02	A118	538	1780	1	23
G03	C93	468	1120	1	22
G03	C93	495	1390	1	14
G03	C93	500	1310	1	22
G03	C93	496	1340	2	3
G03	C93	526	1470	1	14
G03	C93	504	1550	2	7
G03	C93	524	1580	1	24
G03	C93	431	920	2	5
G03	C93	485	1220	1	11
G03	A112	519	1460	1	17
G03	A112	489	1380	1	24
G03	A115	506	1670	2	4
G03	A115	506	1540	1	30
G03	A115	465	1320	2	10
G04	C106	551	2050	2	16
G04	A115	559	2200	2	35
G04	A115	587	2420	2	4
G04	A115	-	-	-	-

Pink salmon

St.	Gear	F.L. (mm)	B.W. (g)	Sex	G.W. (g)
G01	A112	455	990	2	6
G01	A112	430	920	2	3
G01	A112	409	820	2	6
G01	A112	407	830	2	11
G01	A115	460	1160	2	4
G01	A118	432	1060	2	6
G01	C48	414	820	1	35
G01	C48	408	710	1	11
G01	C63	380	580	2	6
G01	C63	388	640	2	7
G01	C63	394	670	1	5
G01	C63	392	680	1	13
G01	C63	384	560	2	4
G01	C63	400	690	2	6
G01	C63	410	650	1	21
G01	C63	374	570	1	5
G01	C63	390	670	1	21
G01	C63	412	690	2	3
G01	C63	393	580	1	16
G01	C63	412	730	2	6
G01	C63	383	-	2	3
G01	C63	392	600	1	18
G01	C63	376	-	1	12
G01	C63	379	630	1	20
G01	C63	372	550	2	2
G01	C63	378	510	1	7
G01	C72	424	760	2	2
G01	C72	418	690	2	4
G01	C72	400	680	1	17
G01	C72	394	570	2	3
G01	C72	375	590	1	18
G01	C72	400	660	1	18
G01	C72	423	730	1	21
G01	C72	375	570	1	15
G01	C72	415	760	2	5
G01	C72	390	590	1	11
G01	C72	384	650	2	2
G01	C72	404	690	2	5
G01	C72	386	560	1	5
G01	C72	408	730	2	4
G01	C72	389	570	1	13
G01	C72	409	740	2	6
G01	C72	391	580	2	2
G01	C72	387	560	2	3
G01	C72	402	730	1	18
G01	C72	369	530	1	10
G01	C72	404	690	1	13
G01	C72	406	690	1	8
G01	C72	387	605	1	17
G01	C72	391	590	1	17
G01	C72	395	670	1	22
G01	C72	392	615	2	6
G01	C72	397	640	2	4
G01	C72	399	700	2	4
G01	C72	395	690	2	4
G01	C72	396	640	2	3
G01	C72	402	690	2	3
G01	C72	408	640	1	21
G01	C72	415	760	2	4
G01	C72	395	710	-	-
G01	C72	389	690	1	10
G01	C72	391	680	1	27
G01	C72	388	560	1	12
G01	C72	401	640	2	4

Pink salmon

St.	Gear	F.L. (mm)	B.W. (g)	Sex	G.W. (g)
G01	C72	384	640	1	15
G01	C72	412	700	1	24
G01	C72	405	690	2	5
G01	C72	394	670	2	6
G01	C72	409	680	1	28
G01	C72	394	620	1	14
G01	C72	355	440	2	2
G01	C72	392	620	1	18
G01	C72	394	680	1	10
G01	C72	400	660	2	3
G01	C72	408	680	1	23
G01	C72	386	640	1	13
G01	C72	490	680	2	7
G01	C72	495	650	1	19
G01	C72	382	-	1	5
G01	C72	386	620	2	6
G01	C72	384	630	2	9
G01	C72	374	560	1	6
G01	C72	396	630	1	16
G01	C72	429	980	2	8
G01	C72	385	-	1	7
G01	C72	396	710	2	4
G01	C72	388	650	2	3
G01	C72	393	640	1	13
G01	C72	388	605	2	5
G01	C72	405	710	1	25
G01	C72	374	530	2	3
G01	C72	392	610	2	4
G01	C72	354	490	2	2
G01	C72	395	690	2	3
G01	C72	393	610	2	2
G01	C72	390	615	2	3
G01	C72	388	610	1	18
G01	C72	396	650	2	3
G01	C72	394	640	2	5
G01	C72	408	750	1	22
G01	C72	364	515	1	8
G01	C72	404	690	1	17
G01	C72	406	680	1	23
G01	C72	406	580	2	5
G01	C72	390	590	2	3
G01	C72	385	605	2	4
G01	C72	391	660	1	22
G01	C72	394	610	2	5
G01	C72	387	650	1	9
G01	C72	385	630	1	14
G01	C72	370	550	1	18
G01	C72	403	690	2	3
G01	C72	398	690	1	20
G01	C72	400	690	2	8
G01	C72	380	-	1	7
G01	C72	404	640	2	3
G01	C72	392	630	2	3
G01	C72	410	720	2	4
G01	C72	391	670	2	3
G01	C72	396	680	1	6
G01	C72	390	660	1	17
G01	C72	412	690	1	7
G01	C93	409	740	2	7
G01	C93	440	880	2	5
G01	C93	410	820	2	3
G01	C93	439	880	1	13
G01	C93	408	800	2	4
G01	C93	418	760	2	1
G01	C93	411	740	1	22
G01	C93	404	720	2	2
G01	C93	412	740	2	6
G01	C93	444	880	2	4
G01	C93	420	680	2	2
G01	C93	371	540	2	2
G01	C93	488	620	2	3
G01	C93	380	610	1	10
G01	C93	388	610	1	11
G01	C93	384	600	2	4
G01	C93	406	680	2	2
G01	C93	390	610	2	3
G01	C93	410	740	2	6
G01	C93	420	710	2	2
G01	C93	379	560	1	11
G01	C93	406	710	2	1
G01	C93	420	760	2	5
G01	C93	437	820	1	7
G01	C93	409	680	2	2
G01	C93	406	710	2	4
G01	C93	455	1020	2	4
G01	C93	396	680	2	4
G01	C93	400	660	2	3
G01	C93	419	810	1	8
G01	C93	386	680	2	2
G01	C93	409	715	1	8
G01	C93	410	680	2	6
G01	C93	431	880	1	26
G01	C93	401	700	2	4
G01	C93	394	680	1	15
G01	C93	324	910	2	3
G01	C93	385	580	2	4
G01	C93	401	720	2	2
G01	C93	389	620	2	5
G01	C93	402	710	2	9
G01	C93	445	940	2	1
G01	C93	416	720	2	2
G01	C93	411	740	2	2
G01	C93	399	640	2	3
G01	C93	444	910	2	5
G01	C93	412	770	1	10
G01	C93	401	650	2	5
G01	C93	465	1040	2	6
G01	C93	441	860	1	7
G01	C93	416	740	1	32
G01	C93	412	780	1	18
G01	C93	409	750	2	4
G01	C93	407	760	2	4
G01	C93	412	690	2	4
G01	C93	442	830	1	28
G01	C93	417	780	1	26
G01	C93	414	770	2	3
G01	C93	403	690	2	2
G01	C93	424	770	1	27
G01	C93	404	750	1	22
G01	C93	403	715	2	2
G01	C93	399	680	1	14
G01	C93	391	720	2	4
G01	C93	432	815	2	4
G01	C93	406	715	2	4
G01	C93	385	610	2	4
G01	C93	416	720	1	17
G01	C93	410	690	2	2
G01	C93	412	810	2	5
G01	C93	428	805	1	27
G01	C93	412	715	1	20
G01	C93	393	630	2	3
G01	C93	408	715	2	2

Pink salmon

St.	Gear	F.L. (mm)	B.W. (g)	Sex	G.W. (g)
G01	C93	408	700	1	17
G01	C93	396	690	2	4
G01	C93	327	850	2	5
G01	C93	412	740	1	13
G01	C93	421	830	2	7
G01	C93	420	780	1	17
G01	C93	403	770	1	31
G01	C93	404	730	2	4
G01	C93	397	650	1	7
G01	C93	394	710	2	4
G01	C93	418	720	1	25
G01	C93	415	770	1	7
G01	C93	406	760	2	3
G01	C93	418	805	2	3
G01	C93	425	860	2	5
G01	C93	415	780	2	5
G01	C93	402	730	-	-
G01	C93	415	750	2	10
G01	C93	429	780	2	8
G01	C93	416	805	1	25
G01	C93	414	790	2	4
G01	C93	420	770	1	28
G01	C93	401	750	2	4
G01	C93	416	800	1	34
G01	C93	392	690	1	16
G01	C93	393	630	1	18
G01	C93	392	670	1	32
G01	C93	422	830	1	34
G01	C93	402	710	2	4
G01	C93	400	670	1	17
G01	C93	414	715	1	8
G01	C93	404	705	2	5
G01	C93	418	750	2	2
G01	C93	433	850	2	10
G01	C93	394	650	1	25
G01	C93	419	805	2	3
G01	C93	416	715	1	27
G01	C93	402	715	2	5
G01	C93	392	630	1	20
G01	C93	373	580	1	7
G01	C93	420	790	2	4
G01	C93	422	830	2	6
G01	C93	393	690	1	19
G01	C93	428	805	2	10
G01	C93	429	890	2	4
G01	C93	433	900	1	11
G01	C93	408	750	2	4
G01	C93	389	680	1	7
G01	C93	390	650	2	2
G01	C106	412	840	2	6
G01	C106	425	840	2	3
G01	C106	421	830	2	8
G01	C106	427	860	2	6
G01	C106	439	920	2	4
G01	C106	437	970	1	28
G01	C106	445	930	2	4
G01	C106	435	980	2	6
G01	C106	439	890	2	4
G01	C106	404	690	1	32
G01	C106	436	915	1	11
G01	C106	437	930	2	3
G01	C106	388	720	2	3
G01	C106	423	930	1	38
G01	C106	421	850	1	28
G01	C106	430	760	2	6
G01	C106	450	910	2	4
G01	C106	437	930	2	20
G01	C106	438	980	2	6
G01	C121	459	1180	2	16
G02	C63	388	680	1	26
G02	C63	374	540	1	16
G02	C63	390	630	2	2
G02	C63	392	615	1	22
G02	C63	400	960	2	2
G02	C63	388	580	2	5
G02	C63	396	605	1	14
G02	C63	386	640	1	15
G02	C63	384	590	1	12
G02	C63	392	570	1	18
G02	C63	386	590	2	3
G02	C63	384	605	2	4
G02	C63	376	540	1	16
G02	C63	380	540	2	4
G02	C63	380	-	1	19
G02	C63	412	640	1	21
G02	C63	400	605	2	4
G02	C63	398	650	1	8
G02	C63	396	660	2	6
G02	C63	396	670	2	6
G02	C63	378	570	1	16
G02	C63	380	570	1	24
G02	C63	396	580	1	18
G02	C72	386	640	1	11
G02	C72	386	605	1	26
G02	C72	400	660	2	8
G02	C72	410	650	2	6
G02	C72	390	630	2	2
G02	C72	366	560	1	12
G02	C72	392	570	1	5
G02	C72	395	620	1	21
G02	C72	368	540	1	5
G02	C72	396	580	2	1
G02	C72	438	770	2	2
G02	C72	390	615	1	16
G02	C72	388	570	1	17
G02	C72	396	610	1	16
G02	C72	398	625	2	3
G02	C72	350	470	2	2
G02	C72	374	560	2	2
G02	C72	410	720	1	20
G02	C72	394	610	1	21
G02	C72	398	620	2	1
G02	C72	380	560	1	13
G02	C72	382	630	1	20
G02	C72	402	640	1	18
G02	C72	392	605	1	11
G02	C72	404	660	1	8
G02	C72	396	680	1	5
G02	C72	382	560	1	7
G02	C72	394	630	1	18
G02	C72	400	620	2	4
G02	C72	370	540	2	2
G02	C72	404	740	1	22
G02	C72	402	660	2	2
G02	C72	440	840	2	2
G02	C72	398	610	2	4
G02	C72	402	690	1	20
G02	C72	400	690	1	23
G02	C72	380	615	1	18
G02	C72	400	590	1	15
G02	C72	410	680	2	3
G02	C72	388	615	1	15

Pink salmon

St.	Gear	F.L. (mm)	B.W. (g)	Sex	G.W. (g)
G02	C72	390	590	1	7
G02	C72	406	670	1	25
G02	C72	380	530	1	23
G02	C72	404	615	1	8
G02	C72	376	680	2	5
G02	C72	408	690	2	5
G02	C72	386	590	2	8
G02	C72	388	580	1	28
G02	C72	392	630	1	26
G02	C72	412	705	1	19
G02	C72	382	580	2	4
G02	C72	406	760	2	6
G02	C72	402	660	2	2
G02	C72	388	600	1	15
G02	C72	378	610	1	15
G02	C72	396	610	1	20
G02	C72	372	570	2	2
G02	C72	410	730	1	27
G02	C72	372	550	1	21
G02	C72	352	480	1	12
G02	C82	414	750	1	44
G02	C82	416	690	2	3
G02	C82	400	605	1	12
G02	C82	402	590	1	9
G02	C82	398	695	2	6
G02	C82	374	610	1	9
G02	C82	400	670	2	5
G02	C82	380	595	2	4
G02	C82	396	630	2	3
G02	C82	422	740	2	7
G02	C82	388	615	2	2
G02	C82	390	590	2	7
G02	C82	408	680	2	3
G02	C82	390	615	2	3
G02	C82	392	615	1	12
G02	C82	400	650	1	21
G02	C82	388	630	1	17
G02	C82	398	715	2	6
G02	C82	382	605	1	21
G02	C82	388	680	1	36
G02	C82	380	550	2	3
G02	C82	382	560	1	8
G02	C82	424	840	2	5
G02	C82	414	710	1	24
G02	C82	396	620	2	3
G02	C82	392	590	2	2
G02	C82	410	710	1	14
G02	C82	404	670	2	5
G02	C82	408	715	2	5
G02	C82	432	770	2	5
G02	C82	406	710	2	3
G02	C82	388	595	2	5
G02	C82	396	605	1	7
G02	C82	426	720	2	2
G02	C82	386	640	1	13
G02	C82	392	595	1	22
G02	C82	394	570	1	20
G02	C82	380	580	1	9
G02	C82	396	615	1	13
G02	C82	400	605	2	4
G02	C82	384	590	2	3
G02	C82	392	625	2	7
G02	C82	384	570	2	3
G02	C82	388	610	1	14
G02	C82	372	590	1	18
G02	C82	378	550	1	7
G02	C82	414	680	2	4
G02	C82	400	630	1	11
G02	C82	410	670	2	2
G02	C82	384	550	2	3
G02	C82	420	695	2	4
G02	C82	394	605	1	17
G02	C82	380	590	1	22
G02	C82	406	650	2	2
G02	C82	390	640	1	19
G02	C82	388	610	1	16
G02	C82	380	620	1	17
G02	C82	412	720	2	4
G02	C82	420	690	2	8
G02	C82	372	540	1	20
G02	C93	404	710	1	26
G02	C93	414	780	1	16
G02	C93	406	680	1	37
G02	C93	412	700	1	14
G02	C93	444	780	2	6
G02	C93	406	710	2	3
G02	C93	412	705	2	3
G02	C93	412	690	2	5
G02	C93	424	790	2	3
G02	C93	442	930	2	5
G02	C93	404	670	2	2
G02	C93	410	790	1	17
G02	C93	404	740	2	3
G02	C93	406	680	2	4
G02	C93	398	660	1	17
G02	C93	394	660	1	21
G02	C93	400	650	2	3
G02	C93	408	700	2	4
G02	C93	388	690	1	22
G02	C93	424	730	2	5
G02	C93	422	810	2	3
G02	C93	398	690	1	21
G02	C93	426	770	2	10
G02	C93	412	750	2	6
G02	C93	478	1080	2	6
G02	C93	380	640	2	4
G02	C93	414	740	1	28
G02	C93	408	710	2	4
G02	C93	412	680	1	15
G02	C93	426	805	2	5
G02	C93	414	750	2	5
G02	C93	432	780	2	4
G02	C93	402	730	1	17
G02	C93	420	740	1	13
G02	C93	416	730	1	30
G02	C93	416	740	1	23
G02	C93	414	730	1	33
G02	C93	392	630	1	16
G02	C93	396	615	1	20
G02	C93	404	610	1	13
G02	C93	442	780	2	3
G02	C93	418	715	1	13
G02	C93	408	740	2	4
G02	C93	416	715	1	32
G02	C93	440	660	2	3
G02	C93	412	680	1	8
G02	C93	410	730	2	3
G02	C93	406	690	2	3
G02	C93	406	705	2	4
G02	C93	412	730	1	33
G02	C93	400	690	2	5
G02	C93	408	750	2	5

Pink salmon

St.	Gear	F.L. (mm)	B.W. (g)	Sex	G.W. (g)
G02	C93	404	670	1	6
G02	C93	414	705	1	21
G02	C93	396	670	1	26
G02	C93	420	760	2	5
G02	C93	406	690	2	5
G02	C93	428	780	2	6
G02	C93	422	760	2	3
G02	C93	400	680	2	5
G02	C106	438	940	2	2
G02	C106	440	940	2	8
G02	C106	430	860	2	2
G02	A121	412	710	1	9
G03	C63	391	605	2	3
G03	C63	392	610	1	14
G03	C63	371	550	1	27
G03	C63	370	590	1	14
G03	C63	370	550	1	6
G03	C63	353	470	1	11
G03	C63	370	490	1	12
G03	C63	347	470	2	4
G03	C63	375	510	2	2
G03	C63	388	570	1	6
G03	C63	376	550	1	7
G03	C63	370	525	1	5
G03	C63	403	660	1	12
G03	C63	394	610	2	4
G03	C63	422	750	2	6
G03	C63	384	570	2	3
G03	C63	388	560	1	18
G03	C63	389	580	1	7
G03	C63	395	590	2	2
G03	C63	421	740	2	2
G03	C63	388	610	1	18
G03	C63	382	560	2	3
G03	C63	382	555	1	12
G03	C63	394	640	2	5
G03	C63	382	540	2	2
G03	C63	366	515	2	6
G03	C63	375	570	1	8
G03	C63	400	615	1	19
G03	C63	375	530	1	13
G03	C63	390	640	1	12
G03	C63	423	760	2	3
G03	C63	407	630	1	8
G03	C63	398	620	1	11
G03	C63	387	520	2	2
G03	C63	367	490	1	11
G03	C63	365	540	2	2
G03	C63	382	515	1	6
G03	C63	380	510	1	5
G03	C63	400	640	1	15
G03	C63	388	610	1	19
G03	C72	374	560	2	2
G03	C72	403	630	2	2
G03	C72	418	720	2	2
G03	C72	400	610	2	3
G03	C72	362	470	2	2
G03	C72	370	480	2	2
G03	C72	390	515	2	3
G03	C72	416	660	1	5
G03	C72	390	630	1	6
G03	C72	380	540	1	5
G03	C72	361	510	1	18
G03	C72	398	580	2	3
G03	C72	400	610	2	4
G03	C72	366	540	1	17
G03	C72	406	610	1	17
G03	C72	397	620	1	15
G03	C72	384	550	1	13
G03	C72	380	530	1	13
G03	C72	396	600	2	2
G03	C72	390	580	1	5
G03	C72	396	610	1	9
G03	C72	405	620	1	7
G03	C72	368	510	1	9
G03	C72	384	570	1	14
G03	C72	368	505	2	3
G03	C72	374	515	2	2
G03	C72	409	670	1	14
G03	C72	368	560	1	10
G03	C72	402	640	2	5
G03	C72	429	780	1	11
G03	C72	391	630	1	30
G03	C72	356	460	2	2
G03	C72	381	490	1	4
G03	C72	388	520	1	6
G03	C72	386	580	2	1
G03	C72	400	620	2	3
G03	C72	382	550	2	2
G03	C72	382	590	2	3
G03	C72	409	620	2	4
G03	C72	388	590	2	3
G03	C72	395	610	1	16
G03	C72	379	490	1	6
G03	C72	391	640	2	4
G03	C72	389	520	1	6
G03	C72	402	620	2	4
G03	C72	392	580	1	5
G03	C72	382	510	1	6
G03	C72	377	570	2	4
G03	C72	376	540	2	3
G03	C72	401	650	2	2
G03	C72	380	590	2	1
G03	C72	364	550	1	16
G03	C72	396	595	2	4
G03	C72	386	590	1	19
G03	C72	394	550	1	18
G03	C72	392	640	1	13
G03	C72	402	630	2	3
G03	C72	377	540	1	5
G03	C72	348	440	2	2
G03	C72	376	580	1	17
G03	C82	495	1380	2	6
G03	C82	385	640	1	23
G03	C82	400	705	1	15
G03	C82	384	625	2	3
G03	C82	404	690	2	5
G03	C82	392	580	1	14
G03	C82	385	580	2	6
G03	C82	398	610	1	23
G03	C82	357	480	1	8
G03	C82	375	550	1	15
G03	C82	412	670	1	13
G03	C82	402	650	2	4
G03	C82	385	560	1	18
G03	C82	393	660	2	3
G03	C82	385	530	1	7
G03	C82	396	630	2	5
G03	C82	387	540	1	12
G03	C82	376	570	2	2
G03	C82	400	650	1	12
G03	C82	375	570	1	14

Pink salmon

St.	Gear	F.L. (mm)	B.W. (g)	Sex	G.W. (g)	St.	Gear	F.L. (mm)	B.W. (g)	Sex	G.W. (g)
G03	C82	382	540	1	6	G03	C93	396	640	1	11
G03	C82	401	570	2	3	G03	C93	428	760	2	2
G03	C82	400	580	2	4	G03	C93	437	830	2	2
G03	C82	386	550	2	3	G03	C93	412	710	2	3
G03	C82	393	590	2	3	G03	C93	452	880	2	3
G03	C82	410	670	2	6	G03	C93	394	710	2	2
G03	C82	396	560	1	7	G03	C93	416	730	1	18
G03	C82	402	630	1	26	G03	C93	392	660	2	8
G03	C82	387	590	1	7	G03	C93	413	705	2	4
G03	C82	375	530	1	12	G03	C93	415	740	2	3
G03	C82	374	495	1	6	G03	C93	397	640	2	3
G03	C82	400	730	1	20	G03	C93	396	670	1	32
G03	C82	417	670	2	5	G03	C93	322	770	2	4
G03	C82	391	610	1	15	G03	C93	415	720	1	15
G03	C82	377	570	1	8	G03	C93	400	680	2	2
G03	C82	387	560	1	14	G03	C93	402	760	1	30
G03	C82	389	560	2	6	G03	C93	409	690	1	15
G03	C82	410	680	2	4	G03	C93	412	670	2	3
G03	C82	394	605	1	6	G03	C93	417	705	2	2
G03	C82	387	570	1	25	G03	C93	406	630	2	3
G03	C82	369	495	2	3	G03	C93	402	680	2	4
G03	C82	373	555	1	12	G03	C93	391	630	2	3
G03	C82	394	620	1	23	G03	C93	392	620	1	19
G03	C82	392	610	1	6	G03	C93	391	690	1	13
G03	C82	420	750	1	19	G03	C93	417	640	2	6
G03	C82	390	620	1	12	G03	C93	439	840	1	35
G03	C82	375	515	2	4	G03	C93	400	660	1	16
G03	C82	369	540	2	3	G03	C93	411	690	2	4
G03	C82	403	650	1	9	G03	C93	427	850	2	6
G03	C82	372	505	1	11	G03	C93	411	670	2	8
G03	C82	371	560	2	4	G03	C93	408	685	2	3
G03	C82	406	630	1	12	G03	C93	402	750	1	11
G03	C82	385	630	1	27	G03	C93	409	690	1	11
G03	C82	368	490	2	3	G03	C93	413	740	1	8
G03	C82	378	500	1	7	G03	C93	410	710	1	31
G03	C82	397	590	2	3	G03	C93	398	680	2	5
G03	C82	397	610	2	4	G03	C93	426	750	1	13
G03	C82	399	640	2	7	G03	C93	412	715	1	15
G03	C82	378	590	1	21	G03	C93	396	620	2	2
G03	C82	394	580	1	25	G03	C93	403	650	1	22
G03	C82	405	690	1	14	G03	C93	412	715	1	13
G03	C93	420	740	1	14	G03	C93	415	710	1	30
G03	C93	436	750	2	4	G03	C93	437	830	2	3
G03	C93	370	615	1	20	G03	C93	406	710	1	10
G03	C93	430	860	1	12	G03	C93	404	650	2	3
G03	C93	400	720	2	2	G03	C93	411	740	2	9
G03	C93	429	840	2	1	G03	C93	346	630	2	4
G03	C93	403	690	1	9	G03	C93	407	690	2	5
G03	C93	423	760	2	1	G03	C93	385	560	1	13
G03	C93	428	770	2	6	G03	C93	411	670	2	3
G03	C93	466	1040	2	2	G03	A121	476	1330	2	8

6. Data on salmon longline and hook-and-line research

Table 7. Position and research conditions of surface longline and hook-and-line sampling at each station.

Station	Date and Time (S.M.T.*1)				T.D.*2	Set Position		D.S.*3	Number of baskets	bottom depth(m)	Wr*4	Wind (Force)	S.T.*5 (℃)
	Line set		Line haul			Lat.	Long.						
OSSL1701	May 18	0400-0430	May 18	0632-0746	+10h	41-55.0N	155-01.6E	310	20	5425	o	NW-5	6.8
OSHL1701	May 15	2000	May 16	0300	+10h	44-00.0N	155-00.0E	-	-	5285	o	ESE-2	4.0
OSHL1702	May 16	2055	May 17	0400	+10h	43-14.7N	155-00.3E	-	-	5469	r	ESE-6	7.1
OSHL1703	May 17	2200	May 18	0300	+10h	42-02.8N	154-59.2E	-	-	5507	o	WNW-5	6.8
OSHL1704	May 18	2000	May 19	0400	+11h	40-14.2N	155-00.4E	-	-	5545	o	NW-4	13.0

*1 S.M.T. : Ship's Mean Time.
*2 T.D. : Time Difference between Greenwich Mean Time (G.M.T.) and Ship's Mean Time (S.M.T.).
*3 D.S. : Direction of line set.
*4 Wr. : Weather (f: fog, o: 100% clouded, r: rain).
*5 S.T. : Surface temperature

Table 8. The catch number of each salmonid at each station where salmonids were collected by hook-and-line gear and surface longline.

Station Name	Sampling gear	Species name						Total
		Sockeye	Chum	Pink	Coho	Chinook	Stellhead	
OSSL 1701	Surface longline	0	4	77	0	0	0	81
OSHL 1701	Hook-and-line	0	1	12	0	0	0	13
OSHL 1702	Hook-and-line	0	0	29	0	0	0	29
OSHL 1703	Hook-and-line	0	9	285	0	0	0	294
OSHL 1704	Hook-and-line	0	5	0	0	0	0	5
	Total	0	19	403	0	0	0	422

Table 9. Biological characteristics of salmonids caught by hook-and-line gear and surface longline research

Chum salmon

St.	Gear	F.L. (mm)	B.W. (g)	Sex	G.W. (g)	St.	Gear	F.L. (mm)	B.W. (g)	Sex	G.W. (g)
HL01	O000	542	1800	1	21	HL03	O000	489	1140	2	2
SL01	B000	526	1960			HL03	O000	549	1810	1	38
SL01	B000	540	2000	1	49	HL03	O000	485	1260	2	1
SL01	B000	503	1500	1	12	HL03	O000	430	815	1	17
SL01	B000	635	2900	2	5	HL04	O000	474	1240	1	11
HL03	O000	475	1240	1	9	HL04	O000	538	1770	2	1
HL03	O000	524	1550	1	17	HL04	O000	518	1420	2	4
HL03	O000	548	2000	2	12	HL04	O000	519	1560	1	55
HL03	O000	435	980	1	8	HL04	O000	512	1600	2	2
HL03	O000	520	1280	2	4						

Pink salmon

St.	Gear	F.L. (mm)	B.W. (g)	Sex	G.W. (g)	St.	Gear	F.L. (mm)	B.W. (g)	Sex	G.W. (g)
HL01	O000	398	700	-	-	HL02	O000	380	610	-	-
HL01	O000	418	860	-	-	HL02	O000	407	660	-	-
HL01	O000	410	710	-	-	HL02	O000	422	780	-	-
HL01	O000	410	760	-	-	HL02	O000	390	690	-	-
HL01	O000	412	810	-	-	HL02	O000	391	670	-	-
HL01	O000	414	780	-	-	HL02	O000	400	670	-	-
HL01	O000	422	810	-	-	HL02	O000	430	1050	-	-
HL01	O000	392	710	-	-	HL02	O000	418	730	-	-
HL01	O000	420	740	-	-	HL02	O000	390	605	-	-
HL01	O000	416	710	-	-	HL02	O000	389	590	-	-
HL01	O000	406	700	-	-	HL02	O000	411	690	-	-
HL01	O000	400	710	-	-	HL02	O000	391	650	-	-
HL02	O000	398	630	-	-	HL02	O000	385	640	-	-
HL02	O000	372	550	-	-	HL02	O000	397	620	-	-
HL02	O000	378	605	-	-	HL02	O000	431	790	-	-

Pink salmon

St.	Gear	F.L. (mm)	B.W. (g)	Sex	G.W. (g)
HL02	O000	443	950	-	-
HL02	O000	389	630	-	-
HL02	O000	409	670	-	-
HL02	O000	419	830	1	32
HL02	O000	407	770	2	3
HL02	O000	404	720	1	31
HL02	O000	456	1190	2	7
HL02	O000	406	660	2	6
HL02	O000	414	680	1	9
HL02	O000	402	630	2	1
HL02	O000	420	830	1	23
SL01	B000	358	490	1	6
SL01	B000	393	680	1	16
SL01	B000	374	570	2	4
SL01	B000	407	650	2	3
SL01	B000	412	680	2	4
SL01	B000	381	540	1	7
SL01	B000	381	570	2	3
SL01	B000	406	650	1	26
SL01	B000	380	530	2	4
SL01	B000	416	640	2	5
SL01	B000	398	630	2	3
SL01	B000	389	580	2	3
SL01	B000	384	550	1	13
SL01	B000	418	660	2	5
SL01	B000	394	630	1	10
SL01	B000	405	650	1	8
SL01	B000	391	595	1	8
SL01	B000	388	580	1	15
SL01	B000	368	530	2	3
SL01	B000	358	460	2	3
SL01	B000	401	640	1	30
SL01	B000	398	610	1	25
SL01	B000	420	710	2	8
SL01	B000	399	640	1	12
SL01	B000	395	680	1	15
SL01	B000	379	590	2	7
SL01	B000	397	640	1	10
SL01	B000	393	630	1	14
SL01	B000	384	495	1	7
SL01	B000	407	640	2	3
SL01	B000	400	640	2	4
SL01	B000	388	540	2	4
SL01	B000	391	570	1	10
SL01	B000	393	605	1	6
SL01	B000	415	630	2	2
SL01	B000	374	540	1	12
SL01	B000	376	515	1	6
SL01	B000	394	640	1	27
SL01	B000	391	580	1	12
SL01	B000	387	560	2	2
SL01	B000	425	850	2	6
SL01	B000	413	740	1	13
SL01	B000	366	510	2	3
SL01	B000	416	670	2	3
SL01	B000	435	950	2	6
SL01	B000	423	750	2	3
SL01	B000	391	630	1	14
SL01	B000	396	640	1	10
SL01	B000	343	430	2	3
SL01	B000	374	530	2	6
SL01	B000	412	710	1	15
SL01	B000	395	620	1	16
SL01	B000	402	630	1	8
SL01	B000	393	610	1	10
SL01	B000	406	690	2	4
SL01	B000	417	740	2	2
SL01	B000	419	710	2	3
SL01	B000	390	580	1	9
SL01	B000	394	620	2	5
SL01	B000	393	590	2	3
HL03	O000	392	620	2	4
HL03	O000	383	625	1	15
HL03	O000	432	850	1	25
HL03	O000	402	660	1	15
HL03	O000	400	630	1	7
HL03	O000	411	710	2	1
HL03	O000	399	700	2	3
HL03	O000	400	670	2	2
HL03	O000	408	680	2	1
HL03	O000	398	660	2	1
HL03	O000	408	685	1	6
HL03	O000	365	550	1	7
HL03	O000	394	690	1	6
HL03	O000	395	700	1	7
HL03	O000	405	710	1	22
HL03	O000	374	525	2	1
HL03	O000	394	610	1	20
HL03	O000	353	475	2	2
HL03	O000	388	650	1	8
HL03	O000	395	620	2	1
HL03	O000	384	650	1	6
HL03	O000	389	570	1	13
HL03	O000	393	610	1	18
HL03	O000	458	1180	2	14
HL03	O000	395	590	2	1
HL03	O000	392	610	2	2
HL03	O000	383	550	2	7
HL03	O000	460	960	2	4
HL03	O000	392	550	1	6
HL03	O000	363	440	1	2
HL03	O000	405	700	2	3
HL03	O000	398	650	2	3
HL03	O000	414	710	1	8
HL03	O000	394	610	1	7
HL03	O000	386	560	1	9
HL03	O000	402	700	1	14
HL03	O000	413	700	1	28
HL03	O000	360	465	1	5
HL03	O000	379	580	1	27
HL03	O000	377	580	1	12
HL03	O000	396	570	2	2
HL03	O000	383	540	2	1
HL03	O000	357	470	1	10
HL03	O000	419	680	1	7
HL03	O000	369	550	1	17
HL03	O000	356	530	2	3
HL03	O000	406	660	2	2
HL03	O000	405	680	2	5
HL03	O000	382	580	1	14
HL03	O000	375	520	2	1
HL03	O000	400	650	1	7
HL03	O000	367	515	1	9
HL03	O000	381	590	1	12
HL03	O000	390	580	1	5
HL03	O000	383	520	1	4
HL03	O000	398	680	2	3
HL03	O000	396	640	2	3
HL03	O000	397	660	2	3
HL03	O000	382	550	1	6
HL03	O000	400	670	1	6

4

THE "OSHORO MARU" CRUISE 040
TO JAPAN SEA, AND
THE NORTHWEST PACIFIC OCEAN, THEBERING SEA and CHUKCHI SEA

IN JUNE TO AUGUST 2017

Cruise 040

Departure from Hakodate (Leg1)	June.	05, 2017
Start hydrographic research		06
Finish hydrographic research		09
Return to Hakodate		10
Departure from Hakodate (Leg2)		12
Arrival at Tokyo		15
Departure from Tokyo (Leg3)		18
Start hydrographic research		24
Date change, repeat June 27th		27
Finish hydrographic research	July,	02
Arrival at Dutch Harbor		03
Departure from Dutch Harbor (Leg4)		06
Start hydrographic research		09
Finish hydrographic research and arrival at Nome		14
Departure from Nome and start hydrographic research (Leg5)		16
Date change, skip July 25th		25
Finish hydrographic research		30
Return to Hakodate	August,	01

Total coverage 8487.7miles

(Leg1: 530.5n.m., Leg2: 672.8n.m., Leg3: 3382.5n.m., Leg4: 1053.4n.m., Leg5: 2848.5n.m.)

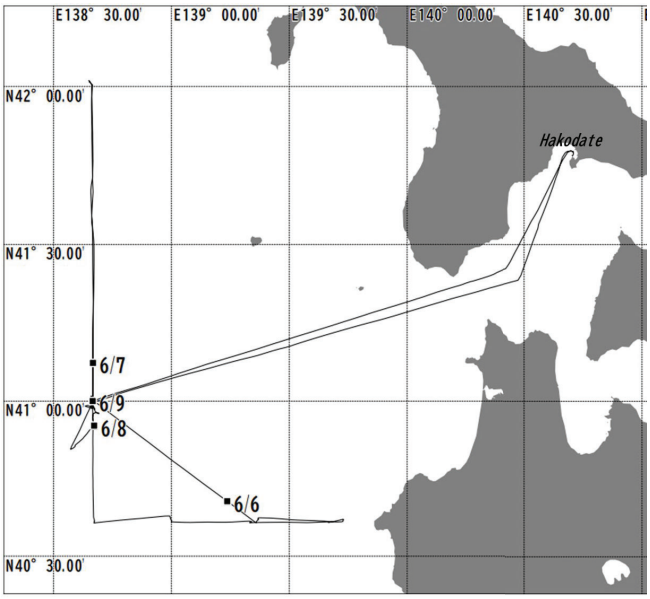


Fig. 1-1: Noon Position

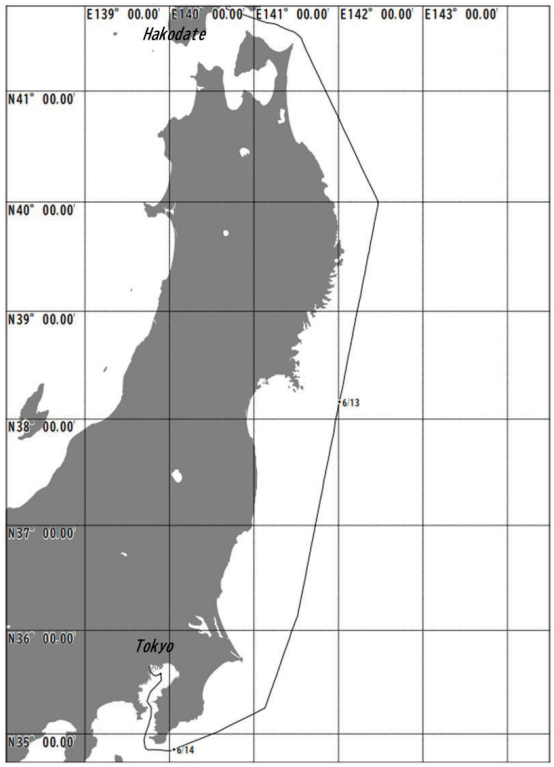


Fig. 1-2: Noon Position

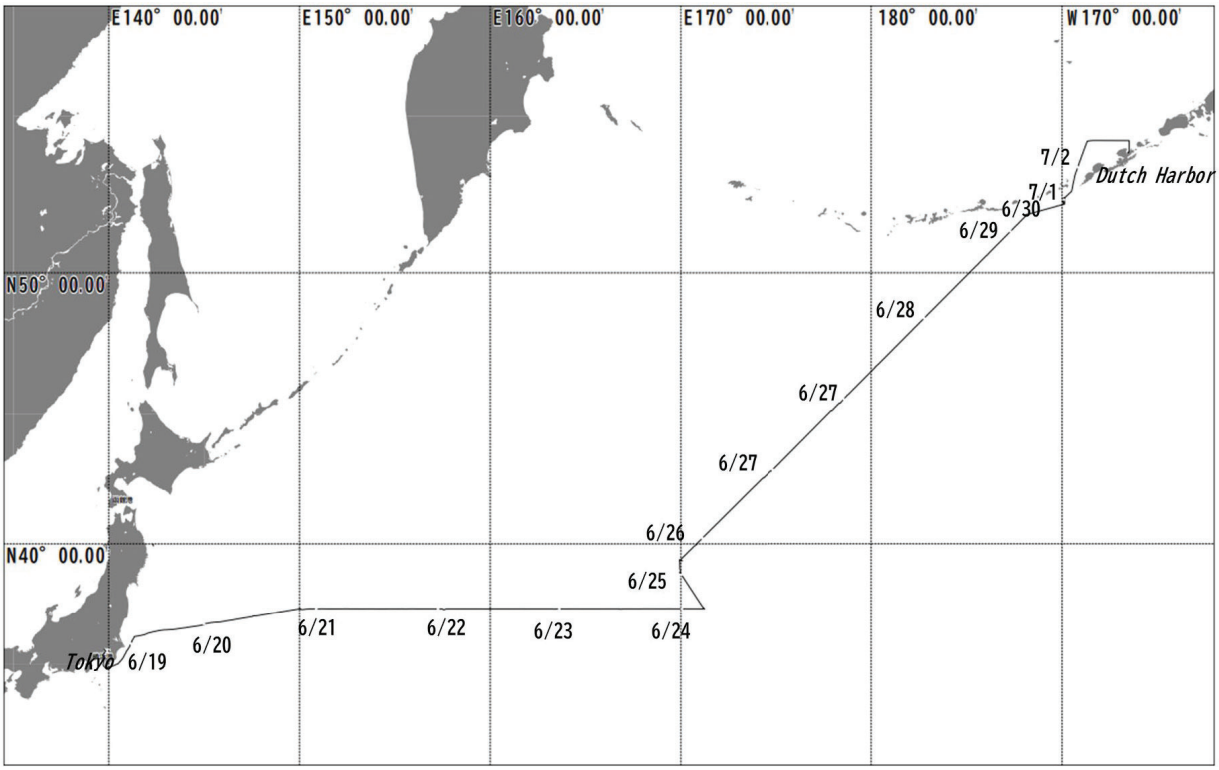


Fig. 1-3: Noon Position

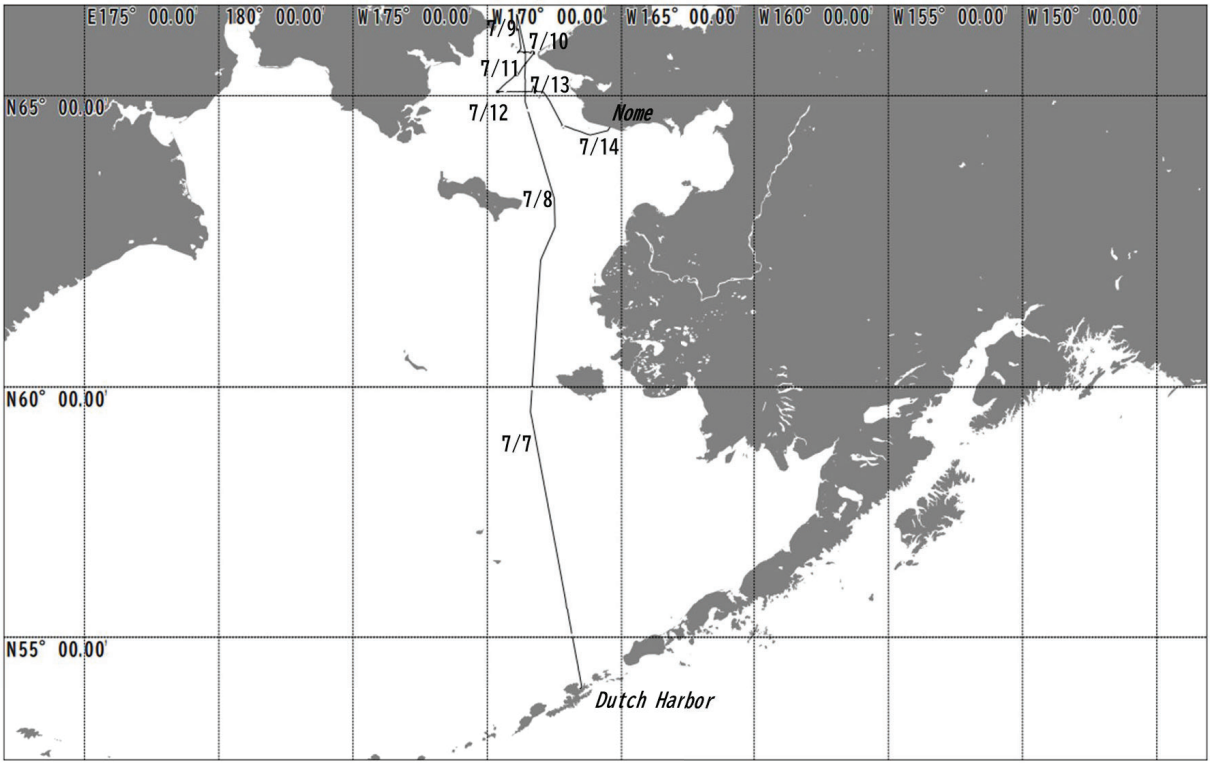


Fig. 1-4: Noon Position

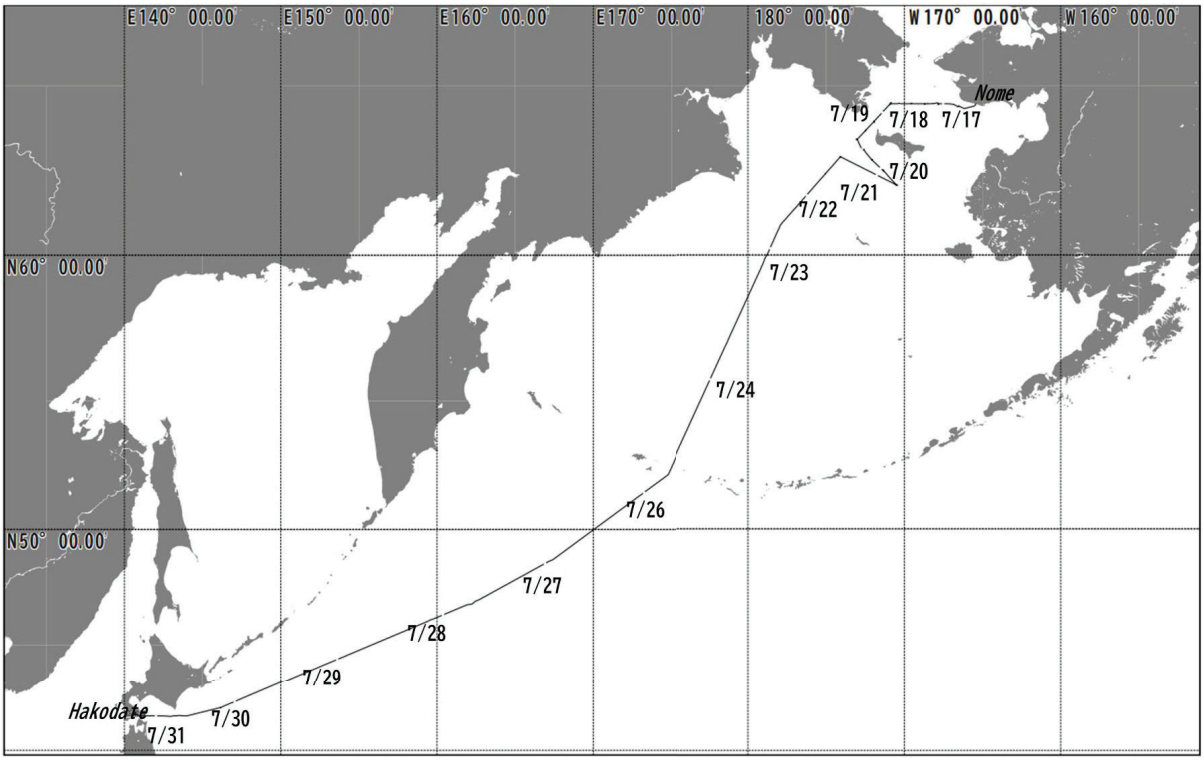


Fig. 1-5: Noon Position

2. Vessel Personnel

Crew: Captain: Associate Professor Shogo Takagi

And 31 persons

(Leg1)

Research Staff:

Associate Professor (Laboratory of Marine Environmental Science, Hokkaido University)

Hakodate -Hakodate Yutaka Isoda

Associate Professor (Earth Environment Dynamics Research Institute for Applied Mechanics, Kyushu University)

Hakodate -Hakodate Tomoharu Senjyu

Research Fellow (Earth Environment Dynamics Research Institute for Applied Mechanics, Kyushu University)

Hakodate - Hakodate Tsutsumi Eisuke

Technical Support Staff (Earth Environment Dynamics Research Institute for Applied Mechanics, Kyushu University)

Hakodate - Hakodate Ryosuke Sakemi

Associate Professor (Faculty of Science, Department of Environmental Science, Niigata University)

Hakodate - Hakodate Kazuhiro Norisuye

Assistant Professor (Institute of Nature and Environmental Technology, Kanazawa University)

Hakodate - Hakodate Shinya Ochiai

Assistant Professor (Hydrospheric Atmospheric Science, Nagoya University)

Hakodate - Hakodate Masanori Ito

Senior Researcher (Center for Global Environmental Research, National Institute for Environmental Studies)

Hakodate - Hakodate Takafumi Aramaki

Other:

Cameraman (National Institute for Environmental Studies)

Hakodate - Hakodate Seizi Narita

Senior Researcher (Global Ocean Observation Research Center, JMSTEC)

Hakodate - Hakodate Yuichiro Kumamoto

Research Technician (Global Ocean Observation Research Center, JMSTEC)

Hakodate - Hakodate Kazuhiko Matsumoto

Research Technician (Earth Surface System Research Center, JMSTEC)

Hakodate - Hakodate Sasaoka Kosei

Director (NHK) Hakodate - Hakodate Syunsuke Maeda

Cameraman (NHK) Hakodate - Hakodate Tomohiro Kawasaki

Technician (Sanyo Techno Marine) Hakodate - Hakodate Yu Takabayashi

Graduate Student: 5 persons

Undergraduate Student: 4 persons

(Leg3 – Leg5)

Research Staff:

Associate Professor (Laboratory of Marine Environmental Science, Hokkaido University)

Tokyo - Hakodate Atsushi Ooki

Lecturer (Pan-Okhotsk Research Center, Institute of Low Temperature Science, Hokkaido University)

Tokyo - Dutch Harbor Tomohiro Nakamura

Associate Professor (Field Science Center for Northern Biosphere, Hokkaido University)

Tokyo - Nome Yoko Mitani

Assistant Professor (Ocean Circulation Group, Atmosphere and Ocean Research Institute)

Tokyo - Dutch Harbor Daigo Yanagimoto

Senior Researcher (Research Institute for Global Change Global Ocean Observation Research Center, JAMSTEC)

Tokyo - Dutch Harbor Yoshimi Kawai

Professor (Field Science Center for Northern Biosphere, Hokkaido University)

Dutch Harbor - Nome Masahiro Nakaoka

Associate Professor (Laboratory of Marine Environmental Science, Hokkaido University)

Dutch Harbor - Nome Hiromichi Ueno

Associate Professor (Laboratory of Marin Biology and Marine Biodiversity, Hokkaido University)

Dutch Harbor - Hakodate Atsushi Yamaguchi

Associate Professor (Laboratory of Marine Environment and Resource Sensing, Hokkaido University)

Dutch Harbor - Nome Toru Hirawake

Specially Appointed Assistant Professor (Faculty of Fisheries Sciences, Hokkaido University)

Dutch Harbor - Hakodate Makoto Sampei

Associate Professor (Laboratory of Marine Bioresource Science, Hokkaido University)

Nome - Hakodate Orio Yamamura

Postdoctoral Researcher (Laboratory of Marine Environmental Science, Hokkaido University)

Nome - Hakodate Bungo Nishizawa

Graduate Student: 9 persons

Undergraduate Student: 10 persons

3. Items of Research

Hydrographic observations: Temperature and salinity were measured by CTD (Seabird SBE-9Plus, SBE-19Plus, XCTD and XBT).Dynamic computations were made using a desk-top computer aboard the "*Oshoromaru*".Water sampling were also carried out at almost every hydrographic stations.

Net sampling by MOHT, LARVA NET, CLOSING NET and BONGO NET for plankton collection, and NEUSTON NET for floating trash collection.

Bottom sampling by SEDIMENT MULTIPLE CORER and SMITH-MACINTYRE BOTTOM SAMPLER.

Upper-air observation using radiosondes

Set and retrieve the sediment trap mooring

Optical observation using compact optical profiling system and backscattering sensor

Marine mammals and seabird sighting survey

Biological research for fishes caught by surface longline and Hook-and-Line Table 1-3

4. Data on salmon longline and hook-and-line research

Table 1. Position and research conditions of surface longline and hook-and-line sampling at each station.

Station	Date and Time (S.M.T.*1)				T.D.*2	Set Position		D.S.*3	Number of baskets	bottom depth(m)	Wr*4	Wind (Force)	S.T.*5 (℃)
	Line set		Line haul			Lat.	Long.						
OSHL1705	Jun. 29	2230	Jun. 30	0230	-12h, -11h	51-56.1N	171-45.9W	-	-		d	South-2	6.7
OSHL1706	Jul. 02	0100	Jul. 02	0505	-10h	52-25.1N	169-53.9W	-	-		o	SW-4	8.9
OSHL1707	Jul. 21	0000	Jul. 21	0300	-11h	62-10.0N	170-30.2W	-	-	47	f	West-2	9.7
OSSL1702	Jul. 21	0350-0420	Jul. 21	0550-0715	-11h	62-09.9N	170-31.3W	110	30	47	f	West-2	9.7

*1 S.M.T. : Ship's Mean Time.
*2 T.D. : Time Difference between Greenwich Mean Time (G.M.T.) and Ship's Mean Time (S.M.T.).
*3 D.S. : Direction of line set.
*4 Wr. : Weather (d: drizzle or fine rain, f: fog, o: 100% clouded).
*5 S.T. : Surface temperature

Table 2. The catch number of each salmonid at each station where salmonids were collected by hook-and-line gear, surface longline .

Station Name	Sampling gear	Species name						Total
		Sockeye	Chum	Pink	Coho	Chinook	Stellhead	
OSHL 1705	Hook-and-line	3	0	16	0	0	0	19
OSHL 1706	Hook-and-line	9	3	28	1	0	0	41
OSHL 1707	Hook-and-line	0	0	4	0	0	0	4
OSSL 1702	Surface longline	9	3	9	2	1	0	24
	Total	21	6	57	3	1	0	88

Table 3. Biological characteristics of salmonids caught by hook-and-line gear and surface longline research

Sockeye salmon

St.	Gear	F.L. (mm)	B.W. (g)	Sex	G.W. (g)
HL05	O000	498	1260	1	11
		494	1520	1	37
		502	1610	1	36
HL06	O000	576	2450	1	210
		442	1110	2	34
		576	2300	2	33
		574	2150	1	98
		586	2150	2	13
		578	2040	1	93
		604	2750	2	28
		582	2380	1	85
		540	1880	1	88

St.	Gear	F.L. (mm)	B.W. (g)	Sex	G.W. (g)
SL02	B000	550	2050	1	195
		474	1250	2	1
		513	1460	2	1
		536	1740	2	1
		572	2360	1	195
		481	1330	1	16
		516	1530	2	1
		482	1360	1	15
		569	2380	1	200

Chum salmon

St.	Gear	F.L. (mm)	B.W. (g)	Sex	G.W. (g)
HL06	O000	410	660	1	5
		416	800	1	8
		433	840	1	12

St.	Gear	F.L. (mm)	B.W. (g)	Sex	G.W. (g)
SL02	B000	635	3400	2	255
		624	3260	1	280
		604	2850	2	1

Pink salmon

St.	Gear	F.L. (mm)	B.W. (g)	Sex	G.W. (g)
HL05	O000	516	1640	1	110
		430	880	1	30
		468	1180	2	53
		466	1180	1	88
		450	1260	2	66
		460	1310	1	75
		473	1260	1	63
		474	1350	2	50
		480	1340	1	78
		488	1410	2	56
		428	1240	2	14
		416	810	1	70
		461	1220	1	73
		480	1420	2	37
		442	1040	1	75
		421	920	2	32
HL06	O000	503	1650	1	85
		448	958	1	45
		470	1180	1	55
		466	1110	2	10
		442	1070	2	75
		493	1380	2	15
		450	1130	2	20
		480	1300	2	10
		486	1290	1	100
		437	1040	2	70
		431	920	1	80
		536	1750	2	40
		452	1070	1	40

St.	Gear	F.L. (mm)	B.W. (g)	Sex	G.W. (g)
HL06	O000	496	1580	1	35
		494	1340	1	150
		508	1400	2	50
		468	1210	1	65
		476	1220	1	85
		448	980	1	30
		491	1340	2	30
		434	870	2	10
		473	1170	2	45
		476	1260	2	25
		458	1350	2	40
		452	1130	1	50
		475	1230	2	25
		461	1170	1	70
		443	1090	1	75
HL07 SL02	O000 B000	482	1540	2	155
		428	920	2	24
		450	1140	1	130
		442	1150	1	125
		592	2250	2	190
		500	1480	2	150
		504	1490	1	185
		444	1020	1	126
		459	1330	2	109
		455	1220	2	89
		510	1540	2	125
		518	1580	2	110
		487	1320	2	135

Coho salmon

St.	Gear	F.L. (mm)	B.W. (g)	Sex	G.W. (g)
HL06	O000	596	2420	1	40
SL02	B000	590	2640	1	265
SL02	B000	619	3200	2	215

Chinook salmon

St.	Gear	F.L. (mm)	B.W. (g)	Sex	G.W. (g)
SL02	B000	678	3150	2	1

5

THE "OSHORO MARU" CRUISE 044
TO EAST OF THE TSUGARU STRAIT
(IBURI / HIDAKA OFFING)

IIN SEPTEMBER 2017

1. Cruise Itinerary

Cruise 044

Departure from Hakodate and start hydrographic research	Sep.	25, 2017
Finish hydrographic research		28
Return to Hakodate		29

Total coverage 511.0 miles

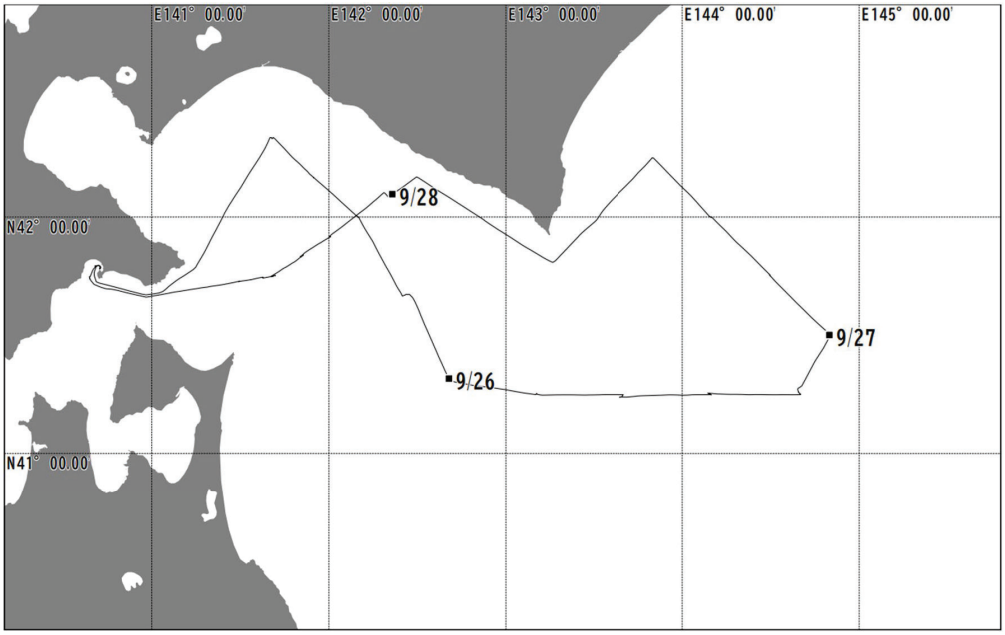


Fig.-1: Noon Position

2. Vessel Personnel

Crew: Captain: Associate Professor Shogo Takagi

And 32 persons

Undergraduate instructor:

Associate Professor (Laboratory of Marine Environmental Science, Hokkaido University)

Yutaka Isoda

Associate Professor (Laboratory of Marine Environment and Resource Sensing, Hokkaido University)

Tohru Hirawake

Teaching Assistant: 4 persons

Undergraduate Student: 29 persons

Research assistant: 3 persons

3. Items of Research

A short cruise to conduct shipboard training in hydrographic observations and floating marine debris research for undergraduate students in the department of marine bioresource and environmental science.

Hydrographic observations: Temperature and salinity were measured by CTD (Seabird SBE-9Plus).Dynamic computations were made using a desk-top computer aboard the "*Oshoromaru*".Water sampling were also carried out at almost every hydrographic stations.

Floating marine debris research: Sighting survey and collection using neuston net

6

THE "OSHORO MARU" CRUISE 045
TO EAST OF THE TSUGARU STRAIT
(IBURI / HIDAKA OFFING)

IN OCTOBER 2017

Cruise 045

Departure from Hakodate	Oct.	17, 2017
Start hydrographic research and bottom trawl research (OST1701)		18
Finish hydrographic research		21
Return to Hakodate		22

Total coverage 634.1nm

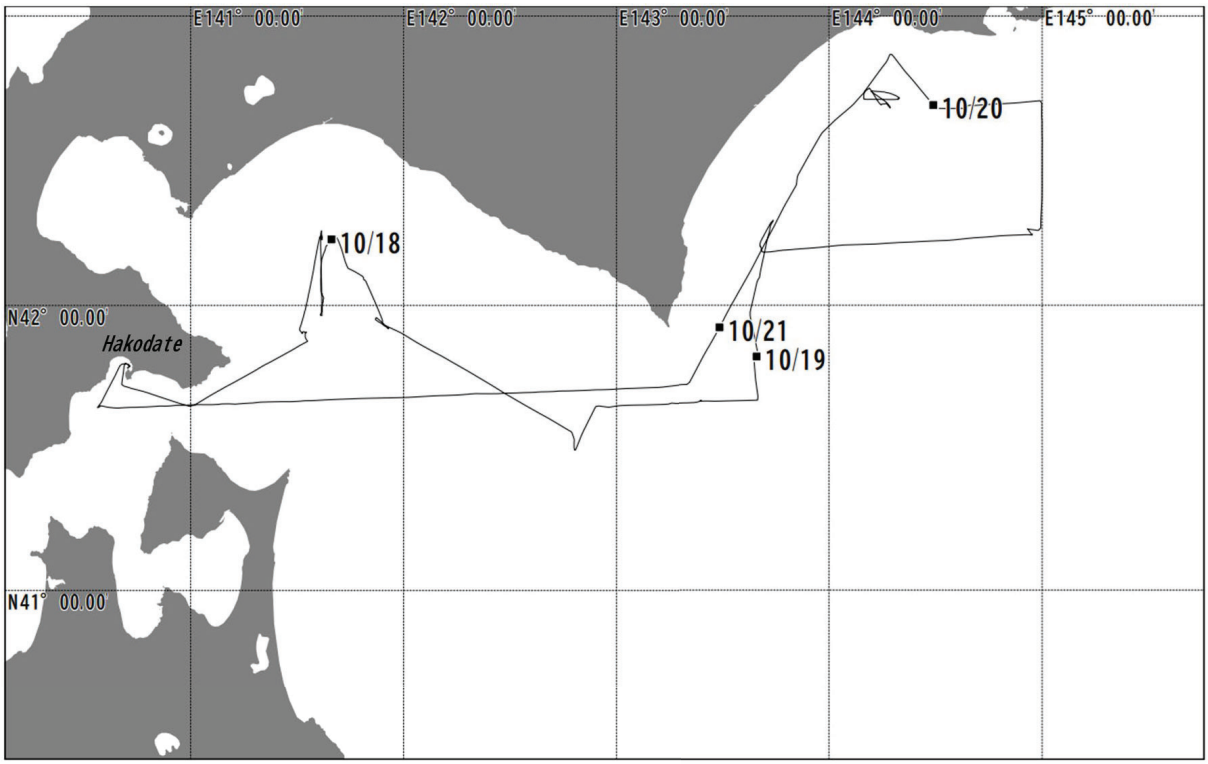


Fig. 1 Noon Position

2. Vessel Personnel

Crew: Captain: Associate Professor Shogo Takagi

And 32 persons

Undergraduate instructor:

Professor (Laboratory of Marine Biology and Biodiversity, Hokkaido University)

Hisashi Imamura

Professor (Laboratory of Marine Bio-resource science, Hokkaido University)

Takashi Matsuishi

Associate Professor (Laboratory of Marine Environmental Science, Hokkaido University)

Atsushi Ooki

Associate Professor (Laboratory of Marine Bio-resource science, Hokkaido University)

Orio Yamamura

Teaching Assistant: 6 persons

Undergraduate Student: 48 persons

Research assistant: 3 persons

3.Items of Research

A short cruise to conduct shipboard training in hydrographic observations, net samplings, sighting survey of marine mammals and floating marine debris, and biological processing of trawl for undergraduate students in the department of marine biological science.

Hydrographic observations: Temperature and salinity were measured by CTD (Seabird SBE-9Plus). Dynamic computations were made using a desk-top computer aboard the "*Oshoromaru*". Water sampling were also carried out at almost every hydrographic stations.

Table 1, 2

Bottom trawl observations: One operations of the stern otter bottom trawl were carried out. These operations were supervised by the captain, Deck officer, Science officer, crew, research staff, and cadets were engaged in the work. Table 3, 4

Net sampling: MOHT, and NNORPAC NET for plankton collection, and NEUSTON NET for floating trash collection

4. Data on temperature, salinity and computed dynamic depth anomaly

Table 1. List of Oceanographic station

Station	Lat.	Long.	Date (GMT)	Hour (GMT)	T.Z.	Depth	Col.	Tr.	SST	Wr.	Gear
OS17311	41-55.25N	141-55.69E	10/18	7:53	9		-	-	15.9	bc	Sea-Bird SBE9
OS17312	41-40.08N	143-24.06E	10/18	23:44	9	182	-	-	13.6	bc	Sea-Bird SBE9
OS17313	42-17.61N	143-44.2E	10/19	7:24	9	374	-	-	13.8	bc	Sea-Bird SBE9
OS17314	42-42.85N	144-19.5E	10/20	7:04	9	897	-	-	14.0	c	Sea-Bird SBE9

T.Z.: Time difference between Greenwich Mean Time (G.M.T.) and Ship's Mean Time (S.M.T.)
Col.: Water color in Forel-Ule scale
Tr.: Transparency in meters with Secchi disc
SST: Sea Surface temperature
Wr.: Weather in WMO Code 4501

Table 2. Oceanographic data

Station OS17311
Latitude 41-55.25 N
Longitude 141-55.69 E
Depth(m)

Press.	Temp.	Sal.	SIG-T
5	15.961	33.912	24.920
10	15.974	33.911	24.916
20	15.949	33.913	24.923
30	15.951	33.912	24.922
40	15.970	33.912	24.918
50	15.929	33.918	24.932
75	13.923	34.132	25.532
100	12.296	34.113	25.844
125	11.029	34.049	26.030
150	9.643	33.934	26.179
175	8.224	33.842	26.331
200	6.850	33.690	26.407
250	3.547	33.402	26.559
300	2.712	33.528	26.735
400	3.424	33.873	26.946
500	3.567	34.036	27.063
600	3.442	34.138	27.155
700	3.419	34.234	27.235
800	3.196	34.310	27.316
900	3.007	34.358	27.372

Station OS17312
Latitude 41-40.08 N
Longitude 143-24.06 E
Depth(m) 182

Press.	Temp.	Sal.	SIG-T
5	13.658	32.990	24.704
10	13.651	32.990	24.706
20	13.612	32.994	24.717
30	12.234	33.118	25.084
40	10.670	33.175	25.412
50	8.629	33.619	26.095
75	4.239	33.327	26.431
100	4.176	33.397	26.493
125	2.855	33.285	26.529
150	2.337	33.313	26.594

Station OS17313
Latitude 42-17.61 N
Longitude 143-44.20 E
Depth(m) 374

Press.	Temp.	Sal.	SIG-T
5	13.794	32.850	24.568
10	13.789	32.877	24.590
20	13.647	32.918	24.651
30	11.322	33.063	25.210
40	7.656	33.148	25.869
50	4.985	33.136	26.199
75	4.140	33.192	26.334
100	3.122	33.205	26.441
125	2.435	33.238	26.527
150	2.649	33.345	26.594
175	2.506	33.336	26.599
200	2.450	33.371	26.632
250	2.574	33.472	26.702
300	2.622	33.506	26.725

Station OS17314
Latitude 42-42.85 N
Longitude 144-19.50 E
Depth(m) 897

Press.	Temp.	Sal.	SIG-T
5	14.008	33.038	24.670
10	13.987	33.035	24.672
20	13.001	33.123	24.939
30	12.467	33.188	25.093
40	10.542	33.467	25.662
50	9.313	33.405	25.820
75	9.738	33.989	26.207
100	8.382	33.855	26.318
125	6.991	33.732	26.421
150	5.790	33.603	26.475
175	5.523	33.604	26.508
200	4.947	33.562	26.541
250	2.936	33.376	26.595
300	2.772	33.420	26.643
400	2.969	33.615	26.782
500	3.560	33.857	26.921
600	3.653	34.020	27.041
700	3.522	34.123	27.136
800	3.269	34.208	27.228

5. Data on bottom trawl research

Table 3. Data on Bottom trawl research during the Oshoromaru Cruise#045

No. of research	Date and time of net tow (S.M.T*1)	Position Lat. (N)	Position Long. (E)	T.D.*2	D.S.*3	Speed of tow (Kt)	Bottom depth (m)	Wr.*4	Wind	SST*5 (℃)
OST1701	Oct. 10 0819-1119	42-01.6	141-37.5	+9h	000°	3.3	716	bc	N6-3	16.7

*1 S.M.T.: Ship's Mean Time.
*2 T.D.: Time difference between Greenwich Mean Time (G.M.T.) and S.M.T.
*3 D.S.: Direction of tow
*4 Wr.: Weather in WMO Code 4501(bc: 25-75% clouded, o: 100% clouded)
*5 SST: Sea Surface temperature

Table 4. Data on catches by Bottom trawl research

Japanese name	Scientific name	OST1701	
		Number	Weight (kg)
Kichiji	*Sebastolobus macrochir*	89	20.4
Osaga	*Sebastes iracundus*	1	4.7
Sokoganpiei spp.	*Bathyraja spp.*	3	1.497
Munedara	*Coryphaenoides pectoralis*	1	0.53
Karafutosokodara	*Coryphaenoides cinereus*	4	0.78
Kurosokoiwashi	*Pseudobathylagus milleri*	2	0.12
Yasesokoiwashi	*Bathylagus pacificus*	6	0.185
Ika	Squids	59	6.81
Kobushikazika	*Malacocottus zonurus*	1	0.07
Ganko	*Dasycottus setiger*	3	0.3
Kanadadara	*Antimora microlepis*	11	1.6
Karasudara	*Halargyreus johnsonii*	6	1.55
Hadakahoteieso	*Tactostoma macropus*	2	0.185
Hadakaeso sp.	*Paralepididae sp.*	1	0.045
Togariochimonziiwashi	*Leuroglossus schmidti*	2	0.02
Norogenge	*Bothrocara hollandi*	1	0.02
Mamehadaka	*Lampanyctus jordani*	16	0.33
Ookuchiiwashi	*Notoscopelus japonicus*	7	0.155
Higashihouraieso	*Chauliodus macouni*	5	0.03
Yokoeso	*Sigmops gracile*	2	0.01
Tako	Octopuses	38	11.5
Kai	Shellfish	114	5
Yukihoraanago	*Ilyophis nigeli*	3	0.09
Kohirehadaka	*Stenobrachius leucopsarus*	2	0.015
Hadakaiwashi sp	*Myctophidae sp.*	3	0.03
Ishoginntyaku	*Sea anemones*	25	2.55
Benizuwaigani	*Chionoecetes japonicus*	1	0.74
Irakoanago	*Synaphobranchus kaupii*	7	0.7
Shirogenge	*Bothrocara zestum*	146	51.25
Kantengennge	*Bothrocara tanakae*	2	1.55
Nezumiginnpo	*Lumpenella longirostris*	22	1.37
Itohikidara	*Laemonema longipes*	23	9.25
Yadokari	*Paguroidea*	10	0.17

7

THE "OSHORO MARU" CRUISE 046
TO TOKACHI OFF, PACIFIC OCEAN

IN NOVEMBER 2017

Cruise 046

Departure from Hakodate	Nov.	6, 2017
Arrival at Kushiro		7
Departure from Kushiro and start hydrographic research		8
Finish hydrographic research and arrival at Kushiro		10

Total coverage 551.7miles

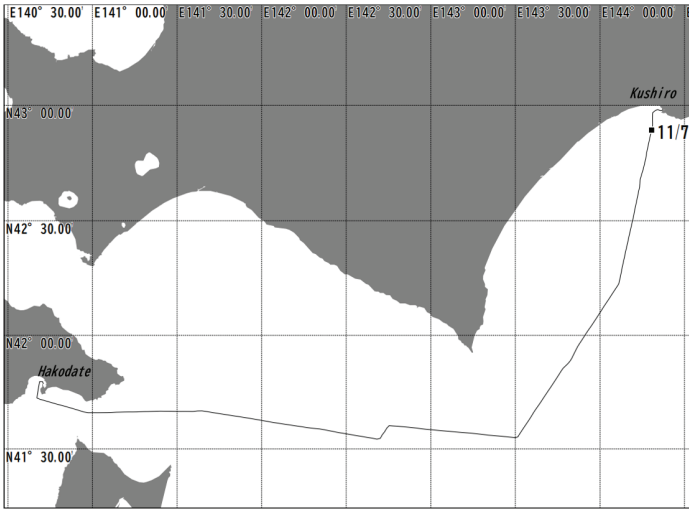


Fig. 1-1: Noon Position

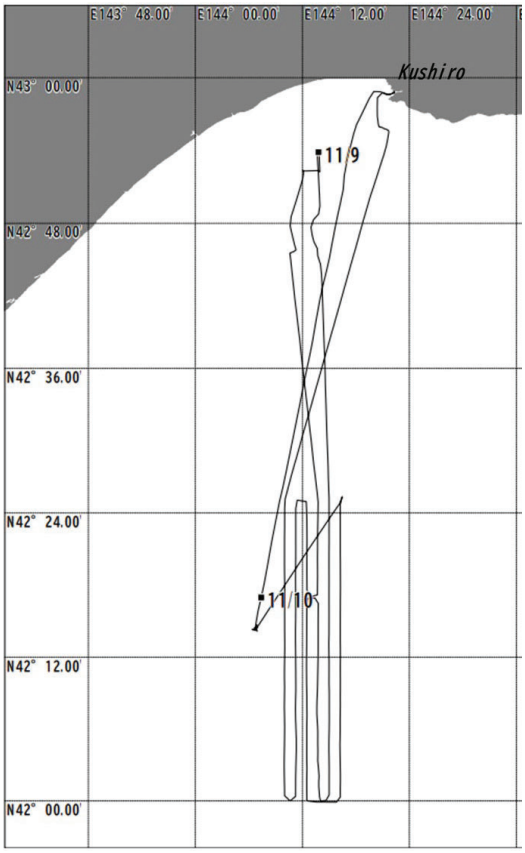


Fig. 1-2: Noon Position

2. Vessel Personnel

Crew: Captain: Associate Professor Shogo Takagi

And 32 persons

Research Staff:

Professor (Civil and Environmental Engineering, Kitami Institute of Technology)

Satoshi Yamashita

Professor (Environmental and Energy Resource Research center, Kitami Institute of Technology)

Akihiro Hachikubo

Associate Professor (Biotechnology and Environmental Chemistry, Kitami Institute of Technology)

Masaaki Konishi

Associate Professor (Civil and Environmental Engineering, Kitami Institute of Technology)

Kazutaka Tateyama

Assistant Professor (Materials Science and Engineering, Kitami Institute of Technology)

Hirotoshi Sakagami

Assistant Professor (Civil and Environmental Engineering, Kitami Institute of Technology)

Shintaro Yamasaki

Technical Staff (New Energy Resources Research Center, Kitami Institute of Technology)

Kinji Hyakutake

Assistant Professor (Department of Civil Engineering, Kobe University)

Satuki Kataoka

Assistant Professor (Graduate School of Advanced Science of Matter, Hiroshima University)

Takahisa Tajima

Graduate Student: 8 persons

Undergraduate Student: 34 persons

3. Items of Research

A short cruise to conduct shipboard training in hydrographic observations and research of methane hydrate for undergraduate students in Kitami Institute of Technology.

Hydrographic observations: Temperature and salinity were measured by CTD (Seabird SBE-9Plus and XCTD). Dynamic computations were made using a desk-top computer aboard the "*Oshoromaru*". Water sampling were also carried out at almost every hydrographic stations.

Methane hydrate research: Bottom sampling by SEDIMENT MULTIPLE CORER and PISTONE CORE SAMPLER, and bottom survey using quantitative echo sounder and narrow multi beam echo sounder.

8

THE "OSHORO MARU" CRUISE 047
TO KUSHIRO OFF

IN NOVEMBER 2017

1. Cruise Itinerary

Cruise 047

Departure from Kushiro Nov. 12, 2017

Do hydrographic research after Return to Kushiro 13

Total coverage 31.8 miles

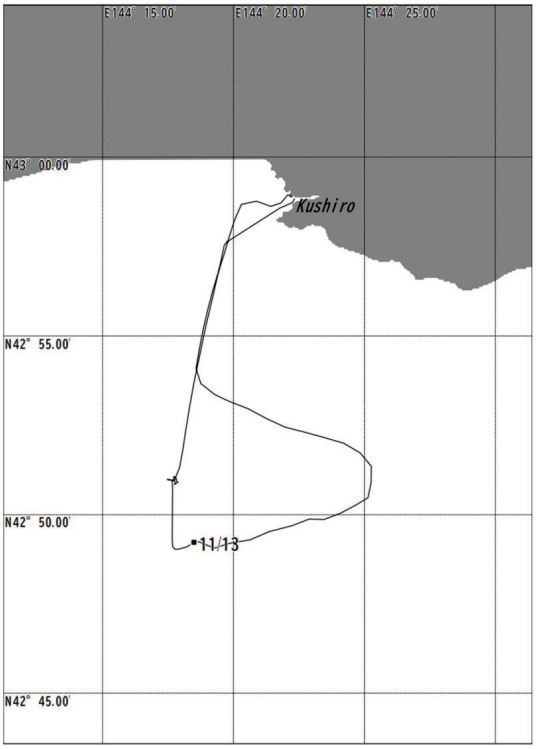


Fig. 1: Noon Position

2. Vessel Personnel

Crew: Captain: Associate Professor Shogo Takagi

And 33 persons

Undergraduate instructor:

Professor (Aqua Bioscience and Industry, Tokyo University of Agriculture)

Kushiro-Kushiro Akihiro Shiomoto

Specially Appointed Assistant Professor (School of Fisheries Sciences, Hokkaido University)

Kushiro-Kushiro Mitsuhiro Nakaya

Undergraduate Student: 25 persons

9

THE "OSHORO MARU" CRUISE 048
TO SANRIKU OFF

IN NOVEMBER 2017

Cruise 048

Departure from Kushiro and start survey	Nov.	14, 2017
Finish survey after arrival at Miyako		15
Departure from Miyako		17
Start hydrographic research		18
Finish hydrographic research and Arrival at Kamaishi		19
Departure from Kamaishi		20
Return to Hakodate		21

Total coverage 547 miles

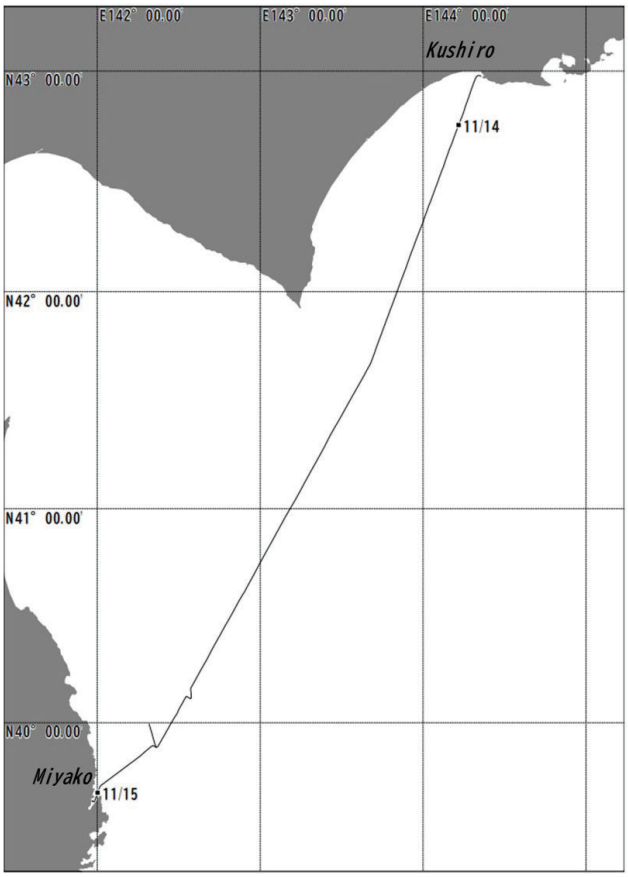


Fig. 1-1: Noon Position

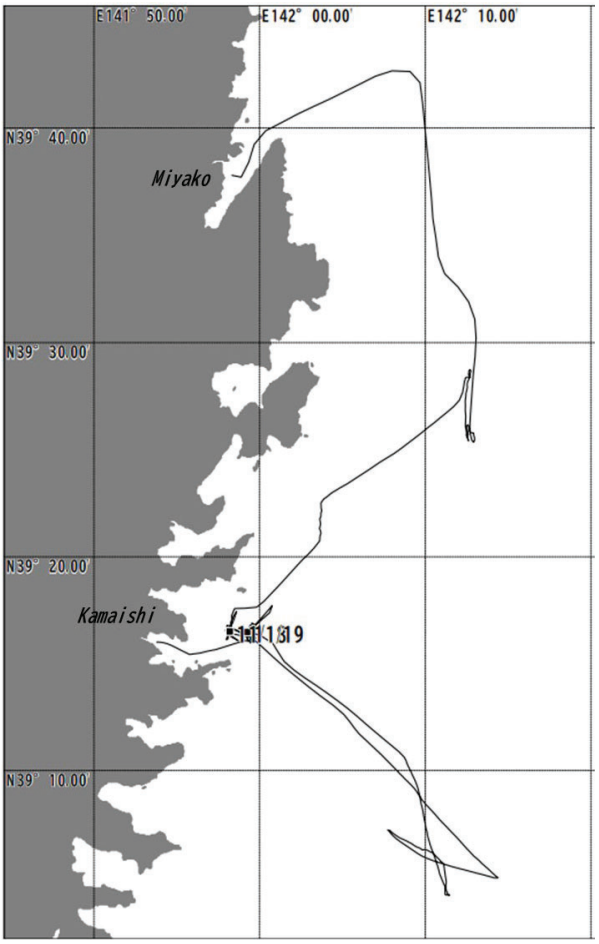


Fig. 1-2: Noon Position

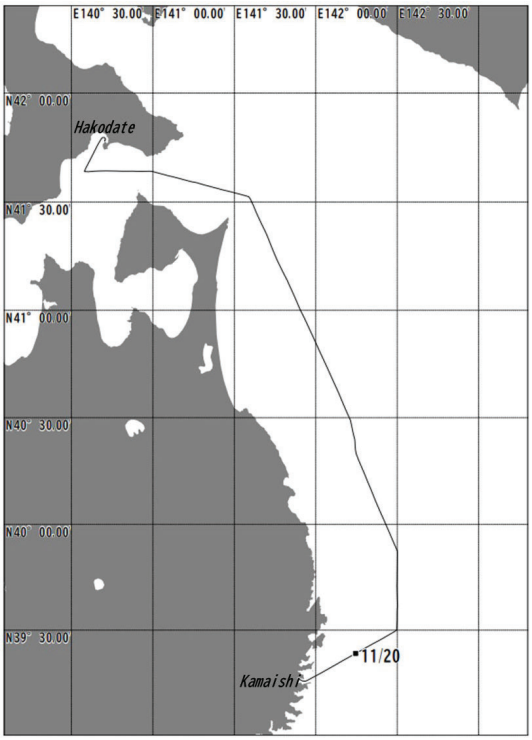


Fig. 1-3: Noon Position

2. Vessel Personnel

Crew: Captain: Associate Professor Shogo Takagi

And 31 persons

Research staff:

Technical Assistant (Tokyo University of Marine Science and Technology)

Kushiro-Miyako Chika Namaizawa

Undergraduate instructor:

Professor (Sanriku Fisheries Research Center, Iwate University)

Miyako-Kamaishi Niriyuki Tanaka

Assistant Professor (Sanriku Fisheries Research Center, Iwate University)

Miyako-Kamaishi Tomoaki Goto

Associate Professor (Sanriku Fisheries Research center, Iwate University)

Miyako-Kamaishi Hideharu Tukagoshi

Specially Appointed Assistant Professor (School of Fisheries Sciences, Hokkaido University)

Miyako-Hakodate Mitsuhiro Nakaya

Teaching Assistant: 2 persons

Undergraduate Student: 22 persons

10

THE "OSHORO MARU" CRUISE 049
TO THE NANPO SHOTO

IN DECEMBER 2017

Cruise 049

Departure from Hakodate (Leg1)	Dec.	01, 2017
Arrival at Tokyo		04
Departure from Tokyo (Leg2)		07
Start vertical long-line research (OSVL1701) and hydrographic research		09
Finish vertical long-line research (OSVL1705) and hydrographic research		11
Arrival at Yokohama		13

Total coverage 1417.7 miles

Fig. 1-1: Noon Position

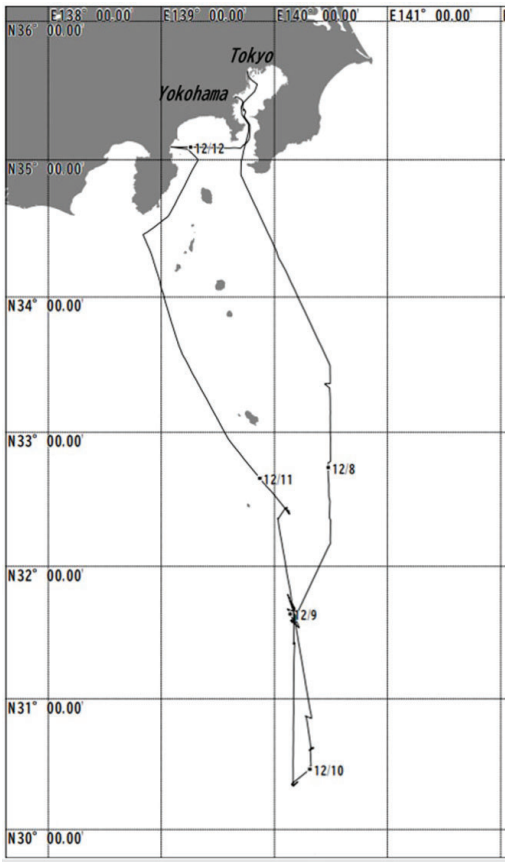


Fig. 1-2: Noon Position

2. Vessel Personnel

Crew: Captain: Associate Professor Shogo Takagi

And 31 persons

Undergraduate instructor:

Professor (Department of Marine Science and Resources, Nihon University)

Tokyo-Yokohama Takahito Kojima

Assistant Professor (Department of Marine Science and Resources, Nihon University)

Tokyo-Yokohama Yuya Makiguchi

Professor (Teikyo University of Science and Technology)

Tokyo-Yokohama Kyoichi Mori

Teaching Assistant: 1 person

Undergraduate Student: 44 persons

3. Items of Research

A short cruise to conduct shipboard training in hydrographic observations, plankton samplings, sighting survey of marine mammals and biological processing of vertical long-line for undergraduate students in Nihon University and Teikyo University of Science and Technology.

Hydrographic observations:

Hydrographic work on deck and the data processing were made by Science officer, the deck officers, crews, research staff and cadets of the "*Oshoromaru*".Temperature and salinity were measured by CTD (Seabird SBE-9Plus and SBE-19Plus).Dynamic computations were made using a desk-top computer aboard the "*Oshoromaru*".Water sampling were also carried out at almost every hydrographic stations. Table 1, 2

Biological research for fishes caught by vertical long-line:

Six operations using a vertical long-line were performed. The gear comprised by two types of main line (500, 600m) with a weight attached to one end, a buoy attached to the other end, and six branch lines (18m for tuna and 4m for squid) attached to main line. Table 3

4. Data on temperature, salinity and computed dynamic depth anomaly

Table 1 List of Oceanographic station

Station	Lat.	Long.	Date (GMT)	Hour (GMT)	T.Z.	Depth (m)	Col.	Tr.	SST	Wr.	Gear
OS17322	31-34.31N	140-10.62E	12/8	22:16	9	1254	-	-	22.8	c	Sea-Bird SBE19p
OS17323	31-35.81N	140-09.53E	12/9	2:07	9	1372	-	-	22.7	bc	Sea-Bird SBE9
OS17324	31-40.77N	140-10.27E	12/9	13:44	9	1654	-	-	22.6	bc	Sea-Bird SBE19p
OS17325	30-20.50N	140-10.31E	12/9	22:04	9	1649	-	-	21.8	o	Sea-Bird SBE9
OS17326	30-37.52N	140-20.78E	12/10	4:42	9	949	-	-	22.4	c	Sea-Bird SBE9
OS17327	32-25.86N	140-05.65E	12/10	20:33	9	1345	-	-	22.7	c	Sea-Bird SBE9

T.Z.: Time difference between Greenwich Mean Time (G.M.T.) and Ship's Mean Time (S.M.T.)
Col.: Water color in Forel-Ule scale
Tr.: Transparency in meters with Secchi disc
SST: Sea Surface temperature
Wr.: Weather in WMO Code 4501

Table 2 Oceanographic data

Station OS17322
Latitude 31-34.31 N
Longitudel 40-10.62 E
Depth(m) 1254

Press.	Temp.	Sal.	SIG-T
5	22.831	34.686	23.744
10	22.849	34.709	23.756
20	22.856	34.710	23.755
30	22.858	34.710	23.755
50	22.857	34.711	23.756
75	22.866	34.712	23.754
100	22.862	34.712	23.755
150	21.445	34.871	24.274
200	19.075	34.859	24.894
300	16.622	34.697	25.371
400	13.359	34.471	25.911
500	10.410	34.341	26.367
600	8.672	34.279	26.606
700	6.001	34.258	26.966
800	4.854	34.263	27.108
900	3.835	34.353	27.288

Station OS17323
Latitude 31-35.81 N
Longitudel 40-09.53 E
Depth(m) 1372

Press.	Temp.	Sal.	SIG-T
20	22.768	34.675	23.753
30	22.780	34.672	23.748
40	22.781	34.672	23.748
50	22.781	34.671	23.747
75	22.795	34.675	23.746
100	22.799	34.676	23.746
125	21.558	34.876	24.247
150	20.751	34.846	24.444
175	20.166	34.820	24.580
200	19.434	34.842	24.789

Station OS17324
Latitude 31-40.77 N
Longitudel 40-10.27 E
Depth(m) 1654

Press.	Temp.	Sal.	SIG-T
5	22.619	34.633	23.765
10	22.620	34.633	23.764
20	22.623	34.634	23.764
30	22.625	34.634	23.763
50	22.622	34.631	23.762
75	22.610	34.626	23.762
100	22.600	34.623	23.762
150	22.568	34.631	23.777
200	19.717	34.790	24.676
300	17.352	34.734	25.226
400	12.994	34.461	25.976
500	10.192	34.333	26.398
600	7.854	34.257	26.712
700	5.960	34.231	26.950
800	4.765	34.295	27.143
900	3.896	34.336	27.268

Station OS17325
Latitude 30-20.50 N
Longitudel 40-10.31 E
Depth(m) 1649

Press.	Temp.	Sal.	SIG-T
5	21.866	34.728	24.048
10	21.868	34.728	24.048
20	21.875	34.728	24.046
30	21.880	34.728	24.044
40	21.846	34.730	24.056
50	21.836	34.729	24.058
75	21.840	34.728	24.056
100	21.826	34.725	24.058
125	21.821	34.733	24.065
150	20.689	34.873	24.481
175	19.461	34.894	24.822
200	18.562	34.842	25.011
250	17.392	34.773	25.246
300	16.488	34.715	25.416
400	13.802	34.482	25.828
500	10.988	34.294	26.228
600	8.250	34.195	26.604
700	5.815	34.122	26.882
800	4.934	34.184	27.036
900	4.283	34.248	27.159
1000	3.882	34.292	27.235

Station OS17326
Latitude 30-37.52 N
Longitudel 40-20.78 E
Depth(m) 949

Press.	Temp.	Sal.	SIG-T
5	22.460	34.762	23.908
10	22.468	34.762	23.905
20	22.460	34.760	23.906
30	22.400	34.749	23.914
40	22.185	34.721	23.954
50	22.141	34.718	23.964
75	22.060	34.711	23.982
100	21.882	34.699	24.022
125	21.852	34.700	24.031
150	21.819	34.714	24.051
175	20.483	34.895	24.553
200	19.102	34.876	24.901
250	17.074	34.760	25.312
300	16.579	34.734	25.409
400	14.343	34.528	25.750
500	11.600	34.339	26.151
600	8.847	34.190	26.508
700	6.780	34.160	26.787
800	5.766	34.190	26.942
900	4.865	34.235	27.084

Station OS17327
Latitude 32-25.86 N
Longitudel 40-05.65 E
Depth(m) 1345

Press.	Temp.	Sal.	SIG-T
5	22.775	34.796	23.844
10	22.771	34.796	23.845
20	22.777	34.793	23.841
30	22.726	34.786	23.850
40	22.666	34.777	23.860
50	22.506	34.752	23.887
75	22.318	34.728	23.922
100	22.294	34.720	23.922
125	22.249	34.706	23.924
150	21.759	34.644	24.014
175	20.421	34.768	24.473
200	19.229	34.779	24.794
250	17.185	34.700	25.240
300	15.726	34.626	25.522
400	12.157	34.426	26.113
500	9.314	34.325	26.539
600	7.123	34.277	26.832
700	5.375	34.271	27.054
800	4.775	34.302	27.148
900	3.815	34.367	27.302
1000	3.345	34.410	27.382

5. Data on vertical long line research

Table 3 Data on vertical long line research

No. of research		OSVL 1701-01	OSVL 1701-02	OSVL 1701-03	OSVL 1701-04
Date		9-Dec			
position of line set	Lat. (N)	31-35.4	31-55.1	31-34.8	31-34.6
	Long. (E)	140-08.8	140-09.2	140-09.5	140-09.9
Time (S.M.T.)	Line set	0627	0633	0638	0643
	Line haul	0905-1042			
Length of main line(m)		500	500	500	600
Depth(m)		1260-1374			
Surface temp. (°C)		22.6			
Wether		bc			
Wind		NW-5			
Sickle pomfret			1		

No. of research		OSVL 1702-01	OSVL 1702-02	OSVL 1702-03	OSVL 1702-04	OSVL 1702-05	OSVL 1702-06
Date		9-Dec					
position of line set	Lat. (N)	31-40.6	31-40.4	31-40.2	31-40.0	31-39.9	31-39.7
	Long. (E)	140-07.3	140-07.7	140-08.2	140-08.8	140-09.3	140-09.8
Time (S.M.T.)	Line set	1227	1232	1237	1241	1246	1251
	Line haul	1445-1654					
Length of main line(m)		400	400	500	500	500	500
Depth(m)		1646-1656					
Surface temp. (°C)		22.5					
Wether		bc					
Wind		WNW-5					
Flying squid			1				1
Swordfish						1	

No. of research		OSVL 1703-01	OSVL 1703-02	OSVL 1703-03	OSVL 1703-04	OSVL 1703-05
Date		10-Dec				
position of line set	Lat. (N)	30-21.8	30-21.5	30-21.3	30-21.0	30-20.7
	Long. (E)	140-12.1	140-11.7	140-11.3	140-10.9	140-10.5
Time (S.M.T.)	Line set	0624	0629	0634	0639	0643
	Line haul	0903-1046				
Length of main line(m)		400	400	400	500	500
Depth(m)		1420-1569				
Surface temp. (°C)		21.7				
Wether		c				
Wind		NE-3				
Flying squid					1	1
Sickle pomfret				2		

No. of research		OSVL 1704-01	OSVL 1704-02	OSVL 1704-03	OSVL 1704-04
Date		10-Dec			
position of line set	Lat. (N)	30-36.5	30-36.7	30-37.1	30-37.5
	Long. (E)	140-19.2	140-19.3	140-19.5	140-19.7
Time (S.M.T.)	Line set	1255	1259	1303	1308
	Line haul	1506-1612			
Length of main line(m)		400	400	500	500
Depth(m)		923-988			
Surface temp. (°C)		21.7			
Wether		c			
Wind		SE-3			
Flying squid				1	1
Sickle pomfret					1

No. of research		OSVL 1705-01	OSVL 1705-02	OSVL 1705-03	OSVL 1705-04	OSVL 1705-05	OSVL 1705-06
Date		11-Dec					
position of line set	Lat. (N)	32-22.0	32-22.2	32-22.7	32-23.4	32-23.4	32-23.8
	Long. (E)	140-02.6	140-02.7	140-03.1	140-03.4	14-03.7	140-03.9
Time (S.M.T.)	Line set	0421	0427	0432	0437	0441	0445
	Line haul	0757-0952					
Length of main line(m)		300	500	500	400	400	300
Depth(m)		1295-1463					
Surface temp. (°C)		22.7					
Wether		bc					
Wind		SW-5					
Flying squid				1			
Escolra			1				
Atlantic mako shark						1	

S.M.T. : Ship's Mean Time.

Weather (bc: 25-75% clouded, c: over 75-99% clouded).

11

THE "OSHORO MARU" CRUISE 050
TO TATEYAMA-BAY and SAGAMI-NADA

IN DECEMBER 2017

Cruise 050

Departure from Yokohama and start hydrographic research	Dec.	15,2017
Finish hydrographic research		16
Arrival at Yokohama		17
Departure from Yokohama		18
Return to Hakodate		21

Total coverage 714.7 miles

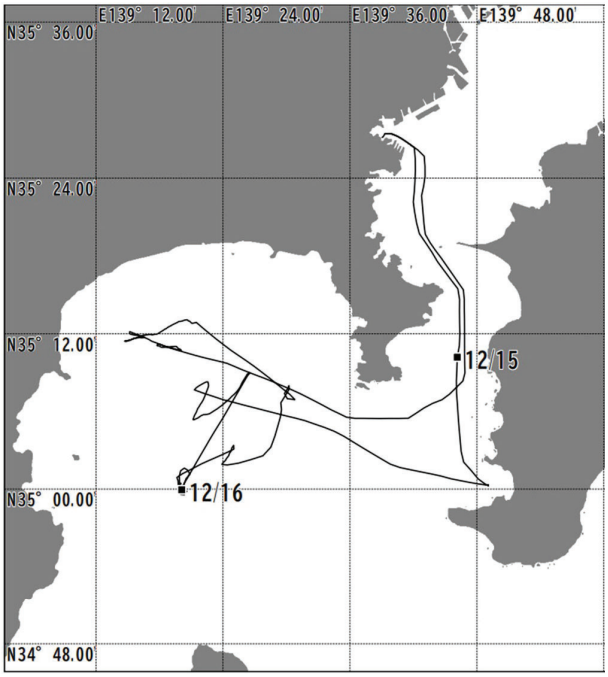


Fig. 1-1: Noon Position

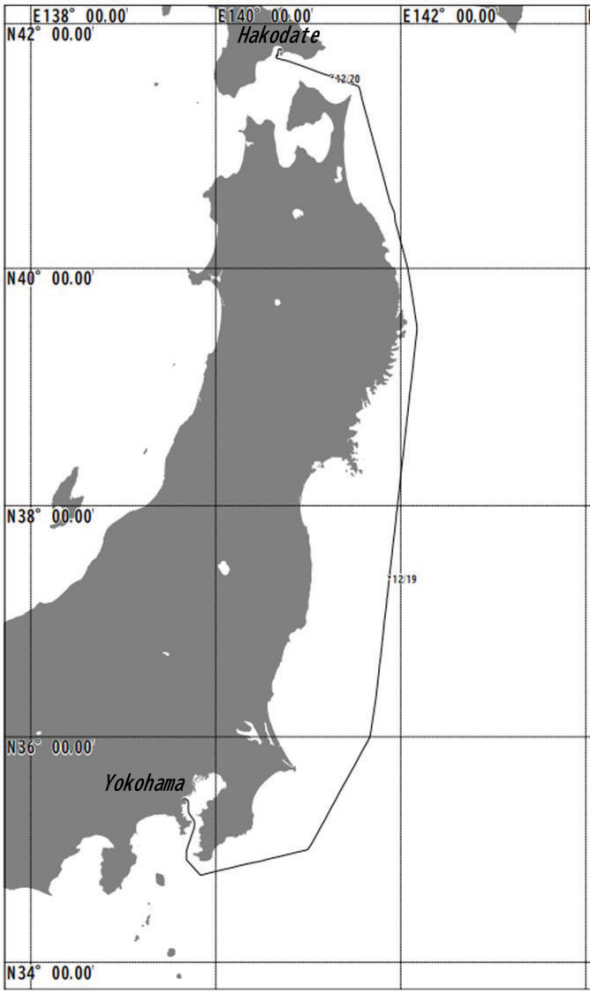


Fig. 1-2: Noon Position

2. Vessel Personnel

Crew:	Captain:	Associate Professor	Shogo Takagi
			And 31 persons

Undergraduate instructor:

Junior Associate Professor (School of Marine Bioscience, Kitasato University)

Noriko Amiya

Assistant Professor (School of Marine Bioscience, Kitasato University)

Masaya Furukawa

Specially Appointed Assistant Professor (School of Fisheries Sciences, Hokkaido University)

Mitsuhiro Nakaya

Teaching Assistant:	4 persons
Undergraduate Student:	39persons

PART Ⅱ

USHIO MARU CRUISES FROM JANUARY TO DECEMBER IN 2017

Ⅰ. Crew's List

Captain :		**Yoshihiko Kamei**
Crew :	**Chief Officer**	**Naoto Kobayashi**
	Second Officer	**Takahiro Iida**
	Chief Engineer	**Fumio Fujimoto**
	First Engineer	**Junpei Shimura**
		(- Cruise 385)
		Shindo Ken-ichi
		(Cruise 386 -)
	Second Engineer	**Yutaka Yokokawa**
	Chief Radio Officer	**Nagahide Yamane**
	Boatswain	**Sen Sunakoma**
	Jr. Boatswain	**Yutaka Takeda**
	Quartermaster	**Tadashi Mishims**
	Sailor	**Taishi Hama**
		(- Cruise 382)
		Daigo Narita
		(- Cruise 386)
	No.1 Oiler	**Nobuyuki Sawada**
	No.2 Oiler	**Takuya Takano**
	Oiler	**Yasuhiro Yamamoto**
	Chief Steward	**Kazuo Ishikawa**
	Steward	**Fumiya Honma**

Ⅱ. Particulars

Length (R.L.)	**33.74 m**
Length (O.L.)	**39.39 m**
Breadth (mid)	**6.50 m**
Depth (mid)	**3.00 m**
Gross Tonnage (Domestic)	**179 tons**
International Gross Tonnage	**286 tons**
Main engine	**735 kw**
Call Sign	**JD2672**

1

THE " USHIO MARU "

CRUISE 379
CRUISE 380
CRUISE 381

IN JANUARY 2017
IN FEBRUARY 2017

1. Cruise Itinerary

Cruise 379

Departure from Hakodate	Jan.	11, 2017
Start hydrographic research (US17001)		11
Arrival at Hakodate		11
Depart from Hakodate		13
Finish hydrographic research (US17019)		14
Return to Hakodate		15

Total coverage 229.1 miles

Cruise 380

Departure from Hakodate	Jan.	23, 2017
Start hydrographic research (US17020)		23
Finish hydrographic research (US17055)		26
Return to Hakodate		26

Total coverage 344.4 miles

Cruise 381

Departure from Hakodate	Feb.	5, 2017
Start hydrographic research (US17056)		5
Finish hydrographic research (US17072)		6
Return to Hakodate		7

Total coverage 132.5 miles

2. Data on Temperature, Salinity and Pressure

Hydrographic work on deck and the data processing were made by the deck officers, crews, research staff and cadets of the “Ushio Maru”. Temperature, salinity and pressure were measured by CTD (Seabird SBE-19Plus and SBE-19).

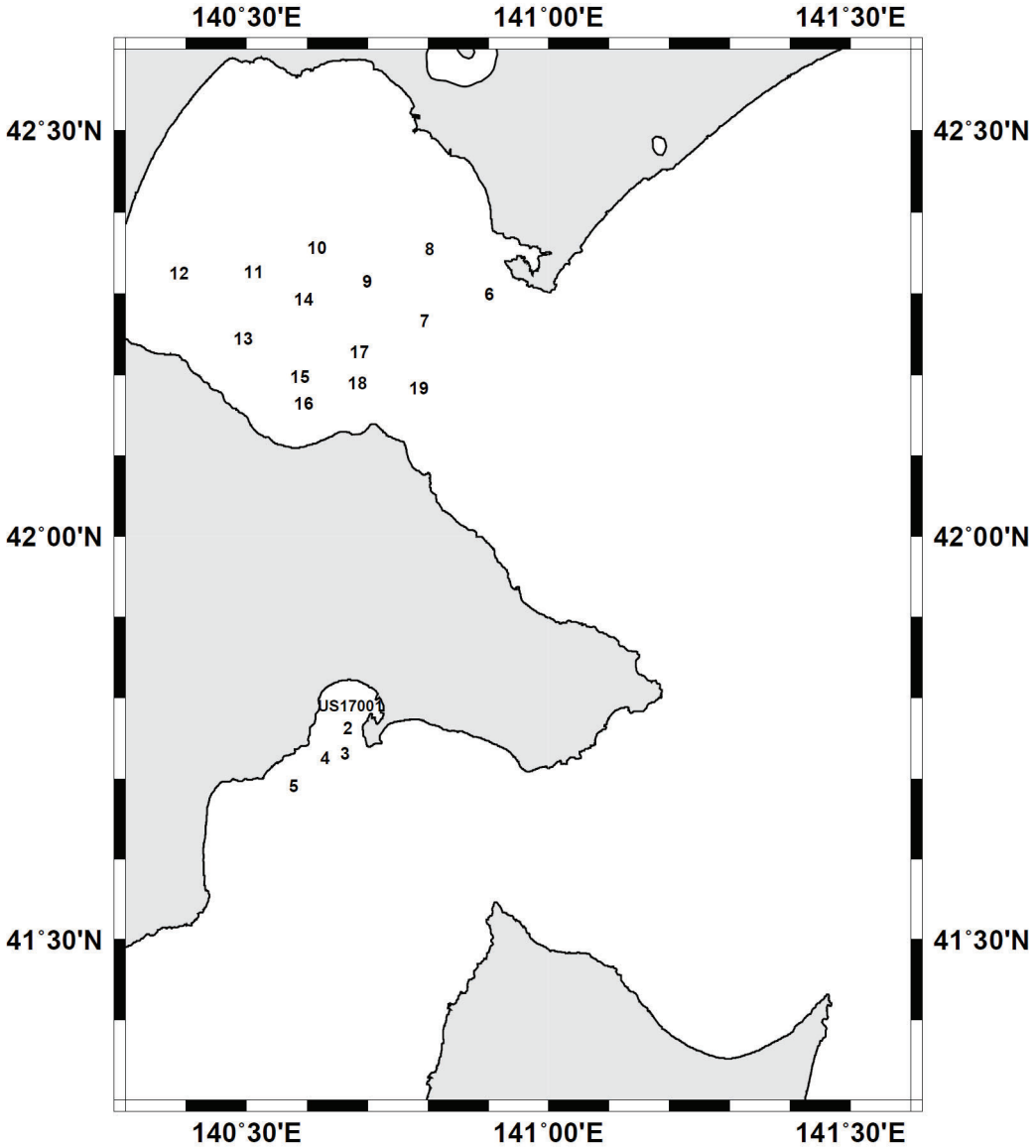


Figure 1. Oceanographic stations (Cruise 379)

Figure 2. Oceanographic stations (Cruise 380-1)

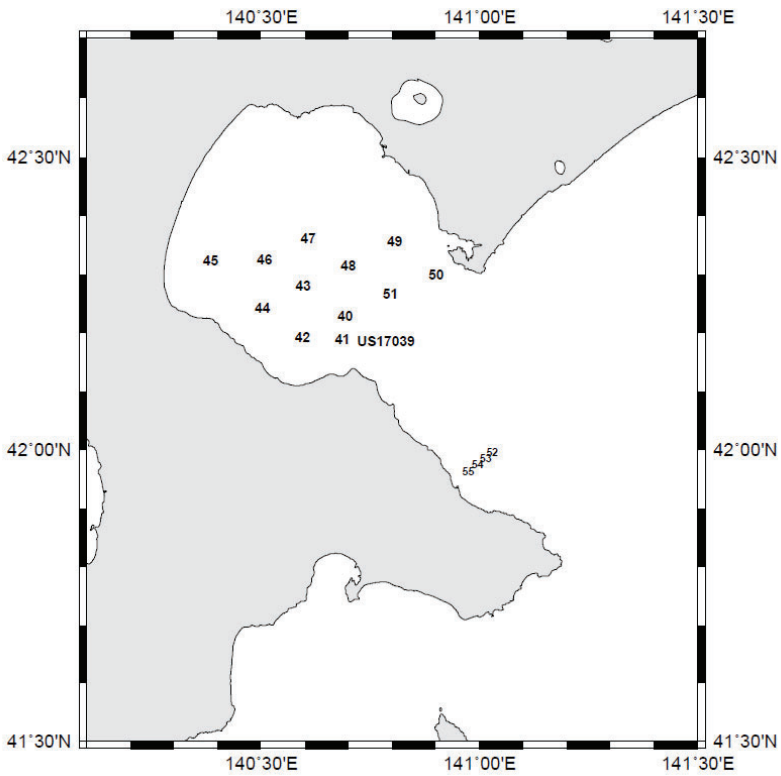


Figure 3. Oceanographic stations (Cruise 380-2)

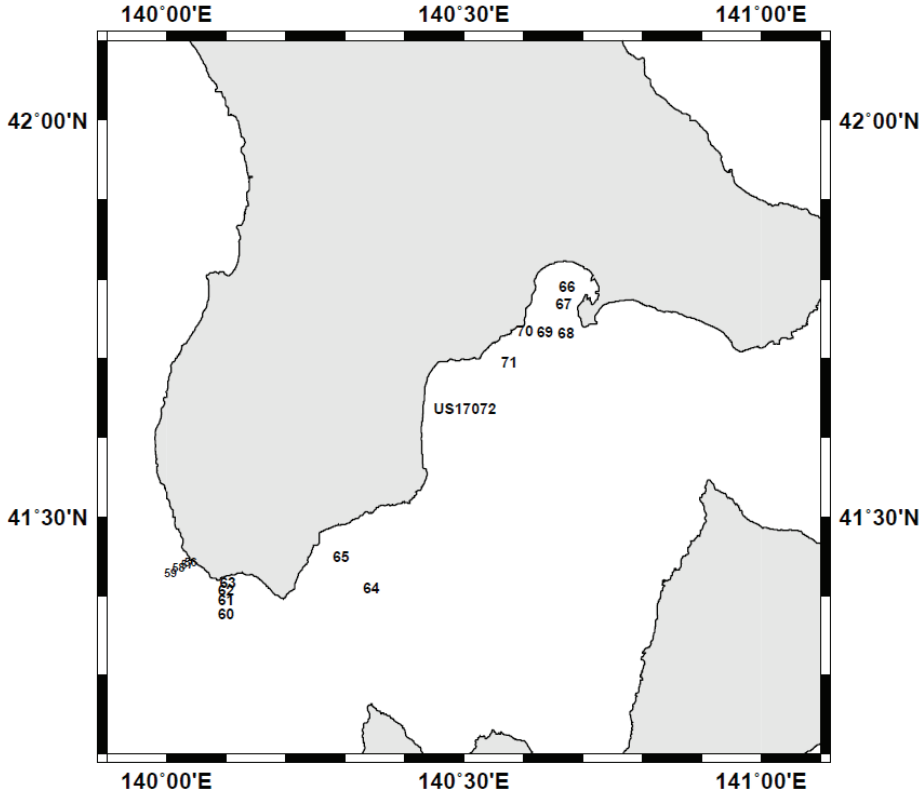


Figure 4. Oceanographic stations (Cruise 381)

Table 1. List of Oceanographic Station

Crs379

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17001	41-47.0	140-40.3	1/11	0855-0900	20	NW-2	SSW-1	NW-4	-6.3	8.2	s	1011.2
US17002	41-45.3	140-40.1	1/11	0920-0925	43	NW-2	SSW-1	NW-3	-6.6	9.5	s	1011.1
US17003	41-43.4	140-39.8	1/11	0957-1003	66	WNW-3	SSW-1	WNW-4	-6.2	9.7	s	1011.1
US17004	41-43.1	140-37.8	1/11	1036-1042	61	West-3	SSW-1	West-4	-6.1	9.8	s	1010.7
US17005	41-41.0	140-34.7	1/11	1120-1125	44	West-3	SSW-1	West-4	-6.2	9.7	s	1010.5
US17006	42-17.5	140-54.1	1/13	1432-1438	57	WNW-3	NW-1	WNW-4	-3.3	7.3	c	1004.1
US17007	42-15.5	140-47.7	1/13	1521-1528	71	NW-2	NW-1	NW-4	-3.6	8.1	s	1004.6
US17008	42-20.8	140-48.2	1/13	1614-1619	53	WNW-2	NW-1	WNW-4	-3.4	7	c	1005.1
US17009	42-18.4	140-42.0	1/14	0711-0716	66	WNW-3	NW-1	WNW-5	-4.1	6	c	1003.7
US17010	42-20.9	140-37.0	1/14	0756-0803	86	NNW-3	NW-1	NNW-4	-4.6	6.6	c	1003.4
US17011	42-19.1	140-30.7	1/14	0848-0855	93	North-3	NW-1	North-4	-4.2	6.2	c	1003.5
US17012	42-19.0	140-23.3	1/14	0949-0954	54	North-2	North-1	North-3	-4.5	6.5	c	1003.4
US17013	42-14.2	140-29.7	1/14	1051-1055	76	ENE-2	North-1	ENE-2	-4.8	6.4	s	1002.7
US17014	42-17.1	140-35.7	1/14	1148-1155	91	NNE-2	North-1	NNE-2	-4.1	7.4	c	1001.6
US17015	42-11.4	140-35.3	1/14	1250-1255	81	North-2	NNW-1	North-2	-3.4	5.1	o	1000.4
US17016	42-09.4	140-35.7	1/14	1320-1324	70	SSE-2	North-1	SSE-3	-3.8	7.1	s	1000.5
US17017	42-13.2	140-41.2	1/14	1420-1427	89	NE-2	North-1	NE-3	-3.2	8.7	s	1000.7
US17018	42-10.9	140-41.0	1/14	1452-1458	89	NE-2	North-1	NE-4	-2.8	8.6	s	1000.6
US17019	42-10.5	140-47.1	1/14	1546-1553	92	North-3	North-1	North-5	-4.9	8.4	s	1001

Table 1. List of Oceanographic Station (continued)

Crs380

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17020	41-47.0	140-40.1	1/23	0853-0857	20	NNW-3	NNW-1	NNW-5	0.7	6.7	bc	1007.2
US17021	41-45.6	140-40.1	1/23	0916-0921	35	NNW-3	NNW-1	NNW-5	0.9	8.2	bc	1007.7
US17022	41-43.7	140-40.1	1/23	0951-0957	63	NNW-3	NNW-1	NNW-5	0.7	9	bc	1008.2
US17023	41-43.5	140-38.1	1/23	1034-1041	58	NNW-3	NNW-1	NNW-5	0.6	9	bc	1008.6
US17024	41-43.7	140-36.4	1/23	1117-1122	32	NNW-3	NNW-1	NNW-5	0.6	8.8	bc	1008.6
US17025	41-41.1	140-34.4	1/23	1159-1205	42	North-3	NNW-1	North-5	-0.2	8.7	bc	1009
US17026	41-37.0	140-30.0	1/23	1245-1249	32	NNW-3	NNW-1	NNW-5	0.8	8.6	bc	1009.3
US17027	41-37.7	140-27.9	1/23	1311-1315	18	NNW-3	NNW-1	NNW-5	0.3	8.2	bc	1009.5
US17028	41-38.0	140-26.5	1/23	1332-1336	15	NNW-3	WNW-1	NNW-5	0.6	7.6	bc	1009.7
US17029	41-34.9	140-33.3	1/23	1423-1429	61	NNW-3	NNW-1	NNW-5	0.1	8.8	bc	1010.1
US17030	41-34.9	140-29.8	1/23	1455-1500	45	NNW-3	NNW-1	NNW-5	0.1	8.8	bc	1010.6
US17031	41-35.1	140-26.6	1/23	1525-1527	12	Notrh-3	NNW-1	North-5	0.1	7.6	bc	1011.2
US17032	41-28.9	140-20.5	1/24	0717-0724	61	NW-2	SW-1	NW-4	-3.8	7.4	c	1016.6
US17033	41-27.8	140-16.4	1/24	0753-0757	29	NW-2	South-1	NW-4	-3.3	7	bc	1017.1
US17034	41-26.7	140-17.3	1/24	0819-0825	61	NNW-2	South-1	NNW-3	-3.7	7.2	bc	1018
US17035	41-24.3	140-20.7	1/24	0859-0906	97	Notrh-2	South-1	Notrh-3	-2.7	7.1	c	1018.5
US17036	41-24.3	140-06.2	1/24	1024-1030	63	WNW-2	WSW-1	WNW-3	-3.5	6.5	c	1019.2
US17037	41-24.1	140-05.4	1/24	1044-1050	73	WNW-2	West-1	WNW-3	-3	6.7	c	1019.2
US17038	41-24.1	140-04.2	1/24	1107-1113	87	NW-1	WSW-1	NW-3	-3.6	7	s	1019.1
US17039	42-10.6	140-47.1	1/25	0655-0700	92	West-3	NW-1	West-5	-2.5	5.2	o	1023.6
US17040	42-13.2	140-41.5	1/25	0752-0758	89	NW-3	West-1	NW-4	-2.5	5.1	c	1024.1
US17041	42-10.8	140-41.1	1/25	0829-0835	88	WNW-3	West-1	WNW-4	-2.8	5.5	c	1024.5
US17042	42-11.0	140-35.6	1/25	0917-0923	80	West-3	West-1	West-4	-2.7	5.5	bc	1024.6
US17043	42-16.3	140-35.7	1/25	1014-1020	91	West-3	West-1	West-4	-2.2	6	c	1024.7
US17044	42-14.0	140-30.1	1/25	1108-1113	78	NW-3	WNW-1	NW-5	-1.9	6	c	1024.5
US17045	42-18.9	140-23.0	1/25	1214-1218	53	WNW-3	WNW-1	WNW-4	-2.3	6.5	s	1024.3
US17046	42-19.0	140-30.4	1/25	1306-1313	93	West-3	West-1	West-5	-1.6	5.6	bc	1024
US17047	42-21.1	140-36.4	1/25	1401-1407	88	NW-2	West-1	NW-4	-0.5	6.2	c	1023.5
US17048	42-18.4	140-41.9	1/25	1450-1456	67	West-3	West-1	West-5	-1.1	6	c	1023.6
US17049	42-20.9	140-48.3	1/25	1538-1542	52	West-3	West-1	West-4	-1.4	4.7	s	1023.4
US17050	42-17.5	140-54.0	1/25	1625-1629	57	WNW-3	West-1	WNW-5	-1.1	4.2	s	1023.4
US17051	42-15.5	140-47.7	1/26	0728-0733	71	NW-3	West-1	NW-5	0.4	4.6	bc	1024.2
US17052	41-59.4	141-01.7	1/26	0942-0948	100	West-2	NW-1	West-4	1.2	3.4	bc	1024.5
US17053	41-58.7	141-00.8	1/26	0955-1000	96	West-2	NW-1	West-4	1.1	3.5	bc	1024.8
US17054	41-58.1	140-59.7	1/26	1008-1013	88	West-2	NW-1	West-4	1.2	3.9	bc	1025
US17055	41-57.4	140-58.4	1/26	1021-1026	79	WNW-2	NW-1	WNW-4	1.1	3.8	bc	1025

Crs381

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17056	41-26.2	140-02.4	2/5	1210-1216	35	ESE-1	WSW-1	ESE-2	5.5	8.5	bc	1014.0
US17057	41-26.1	140-02.1	2/5	1233-1239	45	East-1	WSW-1	East-3	5.1	9.1	bc	1013.2
US17058	41-25.8	140-01.2	2/5	1256-1303	84	ESE-1	WSW-1	ESE-3	5.9	9.7	bc	1013.2
US17059	41-25.4	140-00.4	2/5	1322-1329	102	ESE-1	West-1	ESE-3	6.0	10.0	bc	1013.1
US17060	41-22.2	140-06.0	2/5	1419-1428	119	East-1	West-1	East-3	5.8	8.5	o	1012.1
US17061	41-23.3	140-06.0	2/5	1445-1453	98	East-1	West-1	East-3	5.8	8.8	c	1011.6
US17062	41-24.0	140-06.0	2/5	1506-1513	78	East-1	West-1	East-3	5.6	9.0	c	1011.6
US17063	41-24.6	140-06.2	2/5	1518-1524	48	East-1	West-1	East-3	5.7	8.7	c	1011.7
US17064	41-24.2	140-20.7	2/5	1642-1649	97	NNE-1	SW-1	NNE-3	6.4	9.5	o	1011.1
US17065	41-26.6	140-17.6	2/5	1723-1729	65	NNE-1	SW-1	NNE-3	5.5	8.2	o	1011.0
US17066	41-47.0	140-40.4	2/6	1135-1141	20	North-2	NNW-1	North-4	2.8	8.8	s	999.7
US17067	41-45.7	140-40.1	2/6	1158-1202	34	NW-3	SE-1	NW-5	2.2	8.9	s	999.6
US17068	41-43.5	140-40.3	2/6	1237-1242	67	NW-3	SE-1	NNW-6	2.8	9.1	o	999.2
US17069	41-43.6	140-38.2	2/6	1311-1318	58	NNW-3	SE-1	NNW-6	2.9	9.2	o	999.0
US17070	41-43.7	140-36.2	2/6	1338-1344	26	North-3	East-1	North-5	3.1	8.7	o	999.1
US17071	41-41.3	140-34.6	2/6	1414-1419	43	North-2	East-1	North-4	3.1	9.1	o	999.6
US17072	41-37.8	140-30.1	2/6	1512-1517	28	NW-3	East-1	NW-5	2.7	8.9	o	1001.1

Table 2. Oceanographic data

STATION US17001
LATITUDE 41-47.0 N
LONGITUDI 140-40.3 E
DEPTH (m) 20

Press.	Temp.	Salinity	Sigma-T
5	8.3706	33.5306	26.0647
10	8.6962	33.627	26.0905
19	9.2627	33.791	26.1295

STATION US17002
LATITUDE 41-45.3 N
LONGITUDI 140-40.1 E
DEPTH (m) 43

Press.	Temp.	Salinity	Sigma-T
5	10.0655	33.9631	26.1312
10	10.0685	33.9622	26.13
20	10.0655	33.9617	26.13
30	10.0763	33.962	26.1285
40	9.7888	33.9492	26.1669
43	9.737	33.948	26.175

STATION US17003
LATITUDE 41-43.4 N
LONGITUDI 140-39.8 E
DEPTH (m) 66

Press.	Temp.	Salinity	Sigma-T
5	10.0483	33.944	26.1192
10	9.9035	33.9285	26.1316
20	9.8681	33.9357	26.1431
30	9.8772	33.9306	26.1376
40	9.8691	33.9296	26.1382
50	9.881	33.9339	26.1395
64	9.7221	33.9633	26.189

STATION US17004
LATITUDE 41-43.1 N
LONGITUDI 140-37.8 E
DEPTH (m) 61

Press.	Temp.	Salinity	Sigma-T
5	10.093	33.957	26.122
10	10.084	33.958	26.124
20	10.059	33.955	26.126
30	10.038	33.953	26.128
40	10.031	33.956	26.132
50	10.009	33.957	26.136
61	9.937	33.960	26.151

STATION US17005
LATITUDE 41-41.0 N
LONGITUDI 140-34.7 E
DEPTH (m) 44

Press.	Temp.	Salinity	Sigma-T
5	9.9692	33.9554	26.1414
10	9.9625	33.9554	26.1426
20	9.9837	33.9546	26.1384
30	9.9766	33.9533	26.1386
40	9.9698	33.9522	26.1389
45	9.936	33.968	26.157

STATION US17006
LATITUDE 42-17.5 N
LONGITUDI 140-54.1 E
DEPTH (m) 57

Press.	Temp.	Salinity	Sigma-T
5	7.8013	34.0108	26.5261
10	7.8165	34.01	26.5234
20	7.7943	34.0049	26.5225
30	7.6687	33.9872	26.5268
40	7.2037	33.9499	26.5634
50	6.884	33.927	26.589
55	6.871	33.930	26.594

STATION US17007
LATITUDE 42-15.5 N
LONGITUDI 140-47.7 E
DEPTH (m) 71

Press.	Temp.	Salinity	Sigma-T
5	8.3433	33.9622	26.4073
10	8.347	33.961	26.4059
20	8.3391	33.9582	26.4049
30	8.0815	33.9489	26.4362
40	7.3952	33.9158	26.5097
50	7.1892	33.9202	26.5421
69	7.2476	33.9588	26.5644

STATION US17008
LATITUDE 42-20.8 N
LONGITUDI 140-48.2 E
DEPTH (m) 53

Press.	Temp.	Salinity	Sigma-T
5	7.2548	33.973	26.5745
10	7.2554	33.9735	26.5748
20	7.2547	33.9692	26.5716
30	7.081	33.951	26.581
40	6.987	33.938	26.584
50	6.601	33.889	26.597
52	6.568	33.886	26.599

STATION US17009
LATITUDE 42-18.4 N
LONGITUDI 140-42.0 E
DEPTH (m) 66

Press.	Temp.	Salinity	Sigma-T
5	6.9117	33.928	26.5864
10	6.9148	33.928	26.5859
20	6.893	33.9256	26.587
30	6.792	33.913	26.590
40	6.678	33.905	26.600
50	6.617	33.896	26.601
64	6.584	33.895	26.604

STATION US17010
LATITUDE 42-20.9 N
LONGITUDI 140-37.0 E
DEPTH (m) 86

Press.	Temp.	Salinity	Sigma-T
5	6.8996	33.9217	26.583
10	6.9062	33.9234	26.5834
20	6.4465	33.8669	26.6001
30	6.3413	33.8588	26.6074
40	6.366	33.864	26.608
50	6.366	33.864	26.608
75	6.290	33.854	26.610
84	6.243	33.848	26.612

STATION US17011
LATITUDE 42-19.1 N
LONGITUDI 140-30.7 E
DEPTH (m) 93

Press.	Temp.	Salinity	Sigma-T
5	6.3372	33.8633	26.6115
10	6.3466	33.8629	26.6099
20	6.3546	33.8626	26.6087
30	6.3563	33.8619	26.6079
40	6.3565	33.8618	26.6078
50	6.3562	33.8619	26.6079
75	6.3593	33.8617	26.6074
90	6.3589	33.8621	26.6078

STATION US17012
LATITUDE 42-19.0 N
LONGITUDI 140-23.3 E
DEPTH (m) 54

Press.	Temp.	Salinity	Sigma-T
5	6.8312	33.9219	26.5924
10	6.8265	33.9213	26.5926
20	6.836	33.921	26.5911
30	6.8283	33.9212	26.5923
40	6.8267	33.9212	26.5925
50	6.7988	33.9214	26.5964
53	6.7981	33.922	26.5969

STATION US17013
LATITUDE 42-14.2 N
LONGITUDI 140-29.7 E
DEPTH (m) 76

Press.	Temp.	Salinity	Sigma-T
5	6.6444	33.9038	26.6032
10	6.6483	33.9041	26.6029
20	6.6484	33.9038	26.6026
30	6.6507	33.9038	26.6024
40	6.6474	33.9035	26.6025
50	6.6456	33.9032	26.6025
75	6.648	33.904	26.603

STATION US17014
LATITUDE 42-17.1 N
LONGITUDI 140-35.7 E
DEPTH (m) 91

Press.	Temp.	Salinity	Sigma-T
5	7.7799	33.932	26.4673
10	7.7862	33.9316	26.4661
20	7.5389	33.9323	26.5023
30	7.082	33.899	26.540
40	6.698	33.870	26.569
50	6.265	33.822	26.588
75	6.257	33.834	26.599
89	6.270	33.839	26.601

STATION US17015
LATITUDE 42-11.4 N
LONGITUDI 140-35.3 E
DEPTH (m) 81

Press.	Temp.	Salinity	Sigma-T
5	7.3788	33.9107	26.5081
10	7.3819	33.9082	26.5056
20	5.9939	33.7675	26.5795
30	5.9093	33.7728	26.5942
40	5.9084	33.7786	26.5989
50	5.8761	33.7763	26.6011
75	5.4579	33.7347	26.6189
79	5.5013	33.7421	26.6196

STATION US17016
LATITUDE 42-09.4 N
LONGITUDI 140-35.7 E
DEPTH (m) 70

Press.	Temp.	Salinity	Sigma-T
5	7.1971	33.9111	26.5338
10	7.1537	33.9091	26.5382
20	6.3335	33.8049	26.5659
30	6.1678	33.8047	26.587
40	6.1703	33.8097	26.5906
50	6.1451	33.8091	26.5933
69	6.0487	33.7977	26.5965

STATION US17017
LATITUDE 42-13.2 N
LONGITUDI 140-41.2 E
DEPTH (m) 89

Press.	Temp.	Salinity	Sigma-T
5	8.8149	34.0132	26.3746
10	8.8314	34.013	26.3719
20	8.836	34.012	26.3703
30	8.7944	34.0078	26.3736
40	8.7209	33.9996	26.3786
50	8.591	33.9862	26.3882
75	7.0858	33.9237	26.5591
87	7.0345	33.9302	26.5713

STATION US17018
LATITUDE 42-10.9 N
LONGITUDI 140-41.0 E
DEPTH (m) 89

Press.	Temp.	Salinity	Sigma-T
5	8.9887	34.0257	26.357
10	8.9708	34.0215	26.3566
20	8.9947	34.0246	26.3552
30	8.7617	33.9918	26.3661
40	8.5016	33.974	26.3924
50	8.3955	33.9782	26.412
75	7.4038	33.9252	26.5159
87	6.4302	33.834	26.5763

STATION US17019
LATITUDE 42-10.5 N
LONGITUDI 140-47.1 E
DEPTH (m) 92

Press.	Temp.	Salinity	Sigma-T
5	8.7443	34.0127	26.3853
10	8.745	34.0123	26.3848
20	8.7891	34.0179	26.3823
30	8.7684	34.0186	26.3861
40	8.2752	33.9752	26.4278
50	8.089	33.9565	26.4411
75	6.7183	33.8013	26.5125
90	6.4855	33.8239	26.5611

STATION US17020
LATITUDE 41-47.0 N
LONGITUDI 140-40.1 E
DEPTH (m) 20

Press.	Temp.	Salinity	Sigma-T
5	7.2308	33.4037	26.1298
10	7.8108	33.7001	26.2806
19	8.5226	33.8839	26.3187

STATION US17021
LATITUDE 41-45.6 N
LONGITUDI 140-40.1 E
DEPTH (m) 35

Press.	Temp.	Salinity	Sigma-T
5	8.6702	33.927	26.3297
10	8.7081	33.9311	26.327
20	8.696	33.9266	26.3253
30	8.6676	33.921	26.3253
34	8.6815	33.9239	26.3255

STATION US17022
LATITUDE 41-43.7 N
LONGITUDI 140-40.1 E
DEPTH (m) 63

Press.	Temp.	Salinity	Sigma-T
5	9.3111	33.9974	26.2832
10	9.3167	33.9966	26.2816
20	9.2983	33.9949	26.2833
30	9.189	33.9889	26.2962
40	9.1181	33.9838	26.3036
50	9.0044	33.9839	26.3217
62	8.9582	33.9848	26.3298

STATION US17023
LATITUDE 41-43.5 N
LONGITUDI 140-38.1 E
DEPTH (m) 58

Press.	Temp.	Salinity	Sigma-T
5	9.2204	33.9966	26.2971
10	9.2213	33.996	26.2965
20	9.2226	33.9938	26.2946
30	9.1637	33.984	26.2964
40	9.1125	33.9752	26.2977
50	9.0437	33.9712	26.3056
57	8.9789	33.9688	26.3139

STATION US17024
LATITUDE 41-43.7 N
LONGITUDI 140-36.4 E
DEPTH (m) 32

Press.	Temp.	Salinity	Sigma-T
5	8.9138	33.9753	26.3294
10	8.9308	33.9746	26.3261
20	8.9203	33.9734	26.3268
30	8.8852	33.9669	26.3273
31	8.8807	33.9671	26.3282

STATION US17025
LATITUDE 41-41.1 N
LONGITUDI 140-34.4 E
DEPTH (m) 42

Press.	Temp.	Salinity	Sigma-T
5	8.9696	33.9786	26.3232
10	8.9717	33.9781	26.3224
20	8.9645	33.9782	26.3237
30	8.9611	33.9767	26.323
40	8.9629	33.9768	26.3228
41	8.9628	33.977	26.323

STATION US17026
LATITUDE 41-37.0 N
LONGITUDI 140-30.0 E
DEPTH (m) 32

Press.	Temp.	Salinity	Sigma-T
5	8.8073	33.9772	26.3476
10	8.8116	33.9777	26.3473
20	8.6661	33.9643	26.3595
30	8.5527	33.9565	26.3709
30	8.5527	33.9565	26.3709

STATION US17027
LATITUDE 41-37.7 N
LONGITUDI 140-27.9 E
DEPTH (m) 18

Press.	Temp.	Salinity	Sigma-T
5	7.9882	33.9246	26.431
10	7.9931	33.924	26.4298
17	7.9961	33.9231	26.4286

STATION US17028
LATITUDE 41-38.0 N
LONGITUDI 140-26.5 E
DEPTH (m) 15

Press.	Temp.	Salinity	Sigma-T
5	7.2406	33.7961	26.4373
10	7.2391	33.7954	26.4369
14	7.2258	33.7954	26.4387

STATION US17029
LATITUDE 41-34.9 N
LONGITUDI 140-33.3 E
DEPTH (m) 61

Press.	Temp.	Salinity	Sigma-T
5	9.0802	33.9857	26.3111
10	9.0801	33.9855	26.311
20	9.1041	33.9843	26.3062
30	9.1005	33.9841	26.3066
40	9.0833	33.983	26.3085
50	8.9562	33.9821	26.328
59	8.4663	33.9678	26.393

STATION US17030
LATITUDE 41-34.9 N
LONGITUDI 140-29.8 E
DEPTH (m) 45

Press.	Temp.	Salinity	Sigma-T
5	9.0208	33.989	26.3231
10	9.0184	33.9879	26.3227
20	9.0236	33.9881	26.322
30	8.9179	33.9798	26.3322
40	8.7818	33.9715	26.3471
43	8.7381	33.9698	26.3528

STATION US17031
LATITUDE 41-35.1 N
LONGITUDI 140-26.6 E
DEPTH (m) 12

Press.	Temp.	Salinity	Sigma-T
5	7.8396	33.8952	26.4297
10	7.8443	33.8958	26.4295
12	7.8224	33.8938	26.4311

STATION US17032
LATITUDE 41-28.9 N
LONGITUDI 140-20.5 E
DEPTH (m) 61

Press.	Temp.	Salinity	Sigma-T
5	7.5676	33.9963	26.5485
10	7.5722	33.9967	26.5482
20	7.4884	33.9933	26.5575
30	6.6837	33.9826	26.6601
40	6.2468	33.988	26.7216
50	6.1967	33.9884	26.7283
58	6.189	33.9909	26.7313

STATION US17033
LATITUDE 41-27.8 N
LONGITUDI 140-16.4 E
DEPTH (m) 29

Press.	Temp.	Salinity	Sigma-T

STATION US17034
LATITUDE 41-26.7 N
LONGITUDI 140-17.3 E
DEPTH (m) 61

Press.	Temp.	Salinity	Sigma-T
5	7.3608	33.9981	26.5794
10	7.3704	33.9965	26.5768
20	7.1974	33.9914	26.597
30	6.783	33.9813	26.6457
40	6.7125	33.991	26.6629
50	6.7134	33.9922	26.6637
59	6.7159	33.9924	26.6635

STATION US17035
LATITUDE 41-24.3 N
LONGITUDI 140-20.7 E
DEPTH (m) 97

Press.	Temp.	Salinity	Sigma-T
5	7.2659	33.9978	26.5924
10	7.1742	33.9897	26.5989
20	6.9223	33.9881	26.6323
30	6.225	33.9914	26.7271
40	6.0512	33.9894	26.7476
50	5.966	33.993	26.761
71	5.867	33.992	26.773

STATION US17036
LATITUDE 41-24.3 N
LONGITUDI 140-06.2 E
DEPTH (m) 63

Press.	Temp.	Salinity	Sigma-T
5	6.6958	33.996	26.6691
10	6.1984	33.9778	26.7197
20	5.7996	33.9909	26.7802
30	5.7082	33.9974	26.7966
40	5.6539	33.9953	26.8016
50	5.5676	33.9883	26.8065
61	5.2384	33.9958	26.8516

STATION US17037
LATITUDE 41-24.1 N
LONGITUDI 140-05.4 E
DEPTH (m) 73

Press.	Temp.	Salinity	Sigma-T
5	7.181	34.0013	26.607
10	7.1842	34.0008	26.6062
20	6.3989	33.9929	26.7058
30	6.251	33.992	26.724
40	5.703	33.990	26.792
50	5.563	33.998	26.815
71	5.049	33.998	26.875

STATION US17038
LATITUDE 41-24.1 N
LONGITUDI 140-04.2 E
DEPTH (m) 87

Press.	Temp.	Salinity	Sigma-T
5	7.1791	33.9986	26.6052
10	6.5479	33.9948	26.6877
20	6.4697	33.9987	26.7011
30	6.629	34.000	26.681
40	6.591	34.002	26.687
50	6.173	33.958	26.708
75	5.068	33.998	26.873
79	5.086	34.000	26.872

STATION US17039
LATITUDE 42-10.6 N
LONGITUDI 140-47.1 E
DEPTH (m) 92

Press.	Temp.	Salinity	Sigma-T
5	5.4145	33.1661	26.174
10	5.4155	33.1664	26.1741
20	5.5224	33.1984	26.1869
30	6.2055	33.7906	26.571
40	6.2075	33.8963	26.6542
50	6.2144	33.8975	26.6543
75	5.9921	33.8823	26.6704
90	5.8786	33.8808	26.6834

STATION US17040
LATITUDE 42-13.2 N
LONGITUDI 140-41.5 E
DEPTH (m) 89

Press.	Temp.	Salinity	Sigma-T
5	5.4729	33.283	26.2597
10	5.479	33.2833	26.2592
20	6.228	33.8472	26.6128
30	6.2414	33.8807	26.6375
40	6.2296	33.8947	26.6502
50	6.1896	33.8903	26.6518
75	6.158	33.889	26.655
87	5.9725	33.8816	26.6723

STATION US17041
LATITUDE 42-10.8 N
LONGITUDI 140-41.1 E
DEPTH (m) 88

Press.	Temp.	Salinity	Sigma-T
5	5.737	33.7895	26.6287
10	5.811	33.8224	26.6456
20	5.9561	33.899	26.6882
30	5.940	33.907	26.696
40	5.930	33.906	26.697
50	5.929	33.907	26.698
75	5.928	33.907	26.698
86	5.9219	33.9068	26.6986

STATION US17042
LATITUDE 42-11.0 N
LONGITUDI 140-35.6 E
DEPTH (m) 80

Press.	Temp.	Salinity	Sigma-T
5	5.8776	33.8964	26.6959
10	5.8853	33.8959	26.6945
20	5.8869	33.8956	26.694
30	5.8834	33.8957	26.6946
40	5.8856	33.896	26.6946
50	5.8843	33.8957	26.6945
75	5.6614	33.8781	26.7079
78	5.5651	33.8814	26.7222

STATION US17043
LATITUDE 42-16.3 N
LONGITUDI 140-35.7 E
DEPTH (m) 91

Press.	Temp.	Salinity	Sigma-T
5	6.1782	33.7244	26.5222
10	6.1937	33.7281	26.5232
20	6.2503	33.8652	26.6242
30	6.1656	33.864	26.6341
40	6.123	33.875	26.648
50	6.126	33.879	26.651
75	6.111	33.887	26.659
89	6.1082	33.888	26.6604

STATION US17044
LATITUDE 42-14.0 N
LONGITUDI 140-30.1 E
DEPTH (m) 78

Press.	Temp.	Salinity	Sigma-T
5	6.4321	33.9378	26.658
10	6.4307	33.9378	26.6581
20	6.4116	33.9349	26.6583
30	6.2906	33.921	26.663
40	6.2505	33.9209	26.6681
50	6.1812	33.9145	26.672
75	5.978	33.909	26.693
76	5.9593	33.9085	26.6953

STATION US17045
LATITUDE 42-18.9 N
LONGITUDI 140-23.0 E
DEPTH (m) 53

Press.	Temp.	Salinity	Sigma-T
5	6.7895	33.9236	26.5994
10	6.7986	33.9246	26.599
20	6.8086	33.925	26.5979
30	6.8101	33.9239	26.5969
40	6.8229	33.9253	26.5963
50	6.8081	33.9266	26.5992
51	6.8049	33.9262	26.5993

STATION US17046
LATITUDE 42-19.0 N
LONGITUDI 140-30.4 E
DEPTH (m) 93

Press.	Temp.	Salinity	Sigma-T
5	5.9473	33.8814	26.6753
10	5.9446	33.8826	26.6766
20	5.9449	33.8824	26.6765
30	5.948	33.883	26.6765
40	5.9509	33.8837	26.6767
50	5.9502	33.8833	26.6764
75	5.948	33.8831	26.6766
91	5.9484	33.8835	26.6769

STATION US17047
LATITUDE 42-21.1 N
LONGITUDI 140-36.4 E
DEPTH (m) 88

Press.	Temp.	Salinity	Sigma-T
5	6.5425	33.6846	26.4438
10	6.5483	33.6844	26.4429
20	6.5569	33.686	26.443
30	6.7441	33.8425	26.5415
40	6.9922	33.9464	26.5899
50	6.7238	33.9292	26.6126
75	6.4554	33.9149	26.6369
86	6.3007	33.9049	26.6491

STATION US17048
LATITUDE 42-18.4 N
LONGITUDI 140-41.9 E
DEPTH (m) 67

Press.	Temp.	Salinity	Sigma-T
5	6.4421	33.5619	26.3601
10	6.4613	33.5706	26.3645
20	6.427	33.5753	26.3726
30	6.3981	33.5831	26.3825
40	6.4036	33.5886	26.3861
50	6.4259	33.5974	26.3902
66	6.691	33.9152	26.606

STATION US17049
LATITUDE 42-20.9 N
LONGITUDI 140-48.3 E
DEPTH (m) 52

Press.	Temp.	Salinity	Sigma-T
5	4.9222	33.0201	26.1144
10	4.9209	33.0206	26.1149
20	4.9028	33.0157	26.1131
30	4.8244	33.0072	26.1149
40	5.2287	33.1079	26.1494
50	5.9983	33.2807	26.1943
51	6.0636	33.2916	26.1948

STATION US17050
LATITUDE 42-17.5 N
LONGITUDI 140-54.0 E
DEPTH (m) 57

Press.	Temp.	Salinity	Sigma-T
5	4.3373	32.8559	26.0467
10	4.3412	32.8568	26.047
20	4.376	32.8622	26.0477
30	4.518	32.8936	26.0577
40	5.4097	33.0616	26.0919
50	4.9554	33.0757	26.1548
56	5.0096	33.098	26.1665

STATION US17051
LATITUDE 42-15.5 N
LONGITUDI 140-47.7 E
DEPTH (m) 71

Press.	Temp.	Salinity	Sigma-T
5	4.8203	33.0085	26.1164
10	4.825	33.0101	26.1172
20	4.8377	33.0105	26.1161
30	4.8948	33.0225	26.1193
40	6.5958	33.5505	26.331
50	6.8598	33.7639	26.4641
69	6.2137	33.8858	26.6452

STATION US17052
LATITUDE 41-59.4 N
LONGITUDI 141-01.7 E
DEPTH (m) 100

Press.	Temp.	Salinity	Sigma-T
5	3.7143	32.7269	26.0059
10	3.736	32.7337	26.0093
20	4.1143	32.816	26.0377
30	4.5506	32.9064	26.0645
40	5.7053	33.1724	26.1445
50	6.1667	33.2595	26.1565
75	7.6049	33.5848	26.2197
92	6.1521	33.8167	26.5984

STATION US17053
LATITUDE 41-58.7 N
LONGITUDI 141-00.8 E
DEPTH (m) 96

Press.	Temp.	Salinity	Sigma-T
5	3.9543	32.7784	26.0236
10	4.0043	32.7846	26.0236
20	4.4355	32.8825	26.0576
30	5.0668	33.0344	26.1095
40	6.0465	33.2488	26.1632
50	6.597	33.3563	26.1777
75	7.3421	33.5856	26.2575
89	5.9869	33.8697	26.6611

STATION US17054
LATITUDE 41-58.1 N
LONGITUDI 140-59.7 E
DEPTH (m) 88

Press.	Temp.	Salinity	Sigma-T
5	4.2251	32.8396	26.0452
10	4.2395	32.8416	26.0454
20	5.3591	33.1246	26.1476
30	6.2261	33.2868	26.1707
40	6.423	33.3223	26.1735
50	6.5669	33.3662	26.1895
75	5.954	33.853	26.652
83	5.9122	33.8533	26.6575

STATION US17055
LATITUDE 41-57.4 N
LONGITUDI 140-58.4 E
DEPTH (m) 79

Press.	Temp.	Salinity	Sigma-T
5	4.3963	32.9124	26.0854
10	5.066	33.0956	26.1582
20	6.6546	33.4722	26.2615
30	6.7099	33.4891	26.2675
40	6.746	33.5111	26.2801
50	6.7356	33.5375	26.3023
75	5.9095	33.7476	26.5743
75	5.9095	33.7476	26.5743

STATION US17056
LATITUDE 41-26.2 N
LONGITUDI 140-02.4 E
DEPTH (m) 35

Press.	Temp.	Salinity	Sigma-T
5	9.0417	33.9959	26.3252
10	8.8325	33.995	26.3576
20	8.4124	33.9963	26.4236
30	8.2522	33.9959	26.4476
34	7.8505	34.0029	26.513

STATION US17057
LATITUDE 41-26.1 N
LONGITUDI 140-02.1 E
DEPTH (m) 45

Press.	Temp.	Salinity	Sigma-T
5	8.9976	34.0011	26.3363
10	8.9333	34.0028	26.3478
20	8.597	33.9959	26.3949
30	8.3208	33.9985	26.4392
40	8.0951	33.9918	26.4679
42	7.9598	33.9946	26.4902

STATION US17058
LATITUDE 41-25.8 N
LONGITUDI 140-01.2 E
DEPTH (m) 84

Press.	Temp.	Salinity	Sigma-T
5	10.0355	34.002	26.1667
10	9.9541	33.998	26.1773
20	9.7192	33.9902	26.2106
30	9.2393	33.9935	26.2917
40	9.0061	34.0059	26.3387
50	7.9772	33.971	26.469
75	6.9708	33.9988	26.6341
80	6.9622	34.0016	26.6375

STATION US17059
LATITUDE 41-25.4 N
LONGITUDI 140-00.4 E
DEPTH (m) 102

Press.	Temp.	Salinity	Sigma-T
5	10.2466	34.0029	26.1314
10	10.1445	33.9974	26.1445
20	10.0385	33.9995	26.1642
30	9.8274	33.9932	26.1948
40	9.4189	33.9931	26.2622
50	8.3875	33.9906	26.4229
75	7.1143	34	26.6153
99	5.5	33.9959	26.8207

STATION US17060
LATITUDE 41-22.2 N
LONGITUDI 140-06.0 E
DEPTH (m) 119

Press.	Temp.	Salinity	Sigma-T
5	8.5573	34.0019	26.4057
10	8.5253	34.0051	26.4132
20	8.4905	34.0045	26.4181
30	8.4853	34.0042	26.4187
40	8.4639	34.0041	26.4219
50	8.4403	34.003	26.4247
75	7.890	34.001	26.505
100	6.315	33.995	26.718
114	5.684	33.992	26.796

STATION US17061
LATITUDE 41-23.3 N
LONGITUDI 140-06.0 E
DEPTH (m) 98

Press.	Temp.	Salinity	Sigma-T
5	9.0923	33.9972	26.3181
10	8.8781	33.993	26.3488
20	8.72	33.9972	26.3769
22	8.7401	33.999	26.3752

STATION US17062
LATITUDE 41-24.0 N
LONGITUDI 140-06.0 E
DEPTH (m) 78

Press.	Temp.	Salinity	Sigma-T
5	9.1058	33.9907	26.3109
10	8.9342	33.9916	26.3389
20	8.6852	33.9887	26.3757
30	8.5862	33.9982	26.3984
40	8.535	33.9996	26.4074
50	8.551	33.9994	26.4047
66	8.5232	33.9986	26.4084

STATION US17063
LATITUDE 41-24.6 N
LONGITUDI 140-06.2 E
DEPTH (m) 48

Press.	Temp.	Salinity	Sigma-T
5	8.864	33.9966	26.3539
10	8.853	33.9956	26.3548
20	8.7833	33.9967	26.3666
30	8.7799	33.9966	26.3671
40	8.743	33.9966	26.3728
46	8.7441	33.997	26.373

STATION US17064
LATITUDE 41-24.2 N
LONGITUDI 140-20.7 E
DEPTH (m) 97

Press.	Temp.	Salinity	Sigma-T
5	9.6373	34.0043	26.2351
10	9.5946	34.0043	26.2422
20	9.4547	34.0021	26.2635
30	9.4285	34.0024	26.268
40	9.0178	33.9937	26.3273
50	8.3968	33.9781	26.4116
75	7.3589	33.999	26.5803
92	7.1591	34.0008	26.6097

STATION US17065
LATITUDE 41-26.6 N
LONGITUDI 140-17.6 E
DEPTH (m) 65

Press.	Temp.	Salinity	Sigma-T
5	8.6846	34.0035	26.3873
10	8.5718	34.0025	26.404
20	8.3402	34.002	26.4391
30	8.2006	34.0036	26.4614
40	8.1412	34.0038	26.4705
50	8.0937	34.0041	26.4777
63	8.0368	34.0041	26.4862

STATION US17066
LATITUDE 41-47.0 N
LONGITUDI 140-40.4 E
DEPTH (m) 20

Press.	Temp.	Salinity	Sigma-T
5	9.0814	33.981	26.3072
10	9.0511	33.975	26.3074
20	8.7396	33.927	26.3189
20	8.7396	33.927	26.3189

STATION US17067
LATITUDE 41-45.7 N
LONGITUDI 140-40.1 E
DEPTH (m) 34

Press.	Temp.	Salinity	Sigma-T
5	9.1875	33.9863	26.2944
10	9.1823	33.9853	26.2944
20	9.1923	33.9864	26.2937
30	9.1478	33.9838	26.2988
33	9.1161	33.9803	26.3011

STATION US17068
LATITUDE 41-43.5 N
LONGITUDI 140-40.3 E
DEPTH (m) 67

Press.	Temp.	Salinity	Sigma-T
5	9.4432	34.0003	26.2639
10	9.4429	33.9994	26.2633
20	9.4637	34.0011	26.2612
30	9.4704	34.0017	26.2605
40	9.451	33.9983	26.2611
50	9.3354	33.9864	26.2706
64	9.3144	33.9838	26.2719

STATION US17069
LATITUDE 41-43.6 N
LONGITUDI 140-38.2 E
DEPTH (m) 58

Press.	Temp.	Salinity	Sigma-T
5	9.3616	33.9927	26.2713
10	9.3636	33.9924	26.2707
20	9.367	33.9921	26.2699
30	9.3228	33.988	26.2739
40	9.2933	33.9883	26.2789
50	9.268	33.9874	26.2823
57	8.2774	33.8438	26.3245

STATION US17070
LATITUDE 41-43.7 N
LONGITUDI 140-36.2 E
DEPTH (m) 26

Press.	Temp.	Salinity	Sigma-T
5	8.1188	33.6423	26.19
10	9.2462	33.9953	26.292
20	9.3518	33.9946	26.2743
27	9.2975	33.9884	26.2783

STATION US17071
LATITUDE 41-41.3 N
LONGITUDI 140-34.6 E
DEPTH (m) 43

Press.	Temp.	Salinity	Sigma-T
5	9.4481	33.9951	26.259
10	9.4478	33.995	26.259
20	9.4513	33.9946	26.2581
30	9.442	33.9941	26.2592
40	9.077	33.9661	26.2962
45	9.0629	33.9675	26.2996

STATION US17072
LATITUDE 41-37.8 N
LONGITUDI 140-30.1 E
DEPTH (m) 28

Press.	Temp.	Salinity	Sigma-T
5	9.1203	33.9895	26.3076
10	9.1326	33.9893	26.3056
20	9.1203	33.9877	26.3063

2

THE " USHIO MARU "

CRUISE 382
CRUISE 383
CRUISE 384

IN FEBRUARY 2017
IN MARCH 2017

1. Cruise Itinerary

Cruise 382

Departure from Hakodate	Feb.	11, 2017
Start hydrographic research (US17073)		11
Retrieval ADCP mooring system		11
Set ADCP mooring system		12
Arrival at Usujiri		12
Depart from Usujiri		13
Sampling by bottom trawl net		13
Arrival at Muroran		13
Depart from Muroran		14
Sampling by bottom trawl net		14
Arrival at Usujiri		14
Depart from Usujiri		15
Sampling by bottom long-line		15
Arrival at Hakodate		16
Depart from Hakodate		19
Finish hydrographic research (US17107)		20
Return to Hakodate		20

Total coverage 405.2 miles

Cruise 383

Departure from Hakodate	Feb.	24, 2017
Towing larva net		24
Start hydrographic research (US17108)		25
Arrival at Muroran		25
Depart from Muroran		26
Finish hydrographic research (US17128)		26
Return to Hakodate		27

Total coverage 270.5 miles

Cruise 384

Departure from Hakodate	Mar.	9, 2017
Arrival at Usujiri		9
Depart from Usujiri		9
Start hydrographic research (US17129)		9
Arrival at Usujiri		10
Depart from Usujiri		11
Arrival at Usujiri		11
Depart from Usujiri		12
Arrival at Hakodate		13
Depart from Hakodate		15
Finish hydrographic research (US17168)		15
Return to Hakodate		16

Total coverage 496.3 miles

2. Data on Temperature, Salinity and Pressure

Hydrographic work on deck and the data processing were made by the deck officers, crews, research staff and cadets of the “Ushio Maru”. Temperature, salinity and pressure were measured by CTD (Seabird SBE-19Plus and SBE-19).

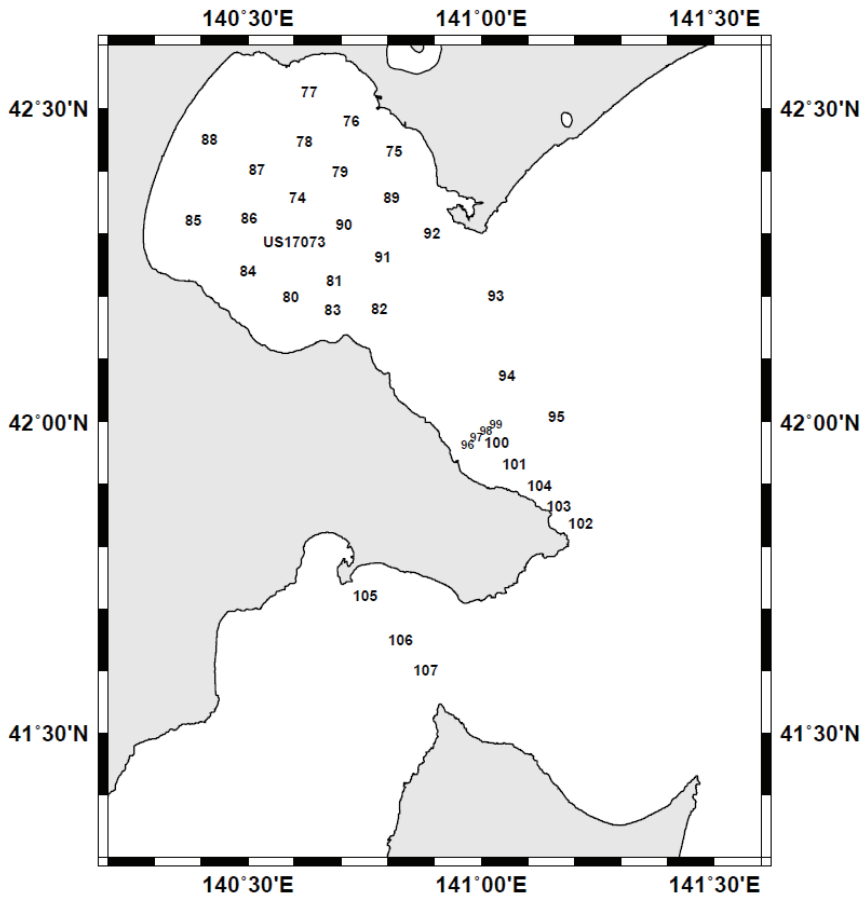


Figure 1. Oceanographic stations (Cruise 382)

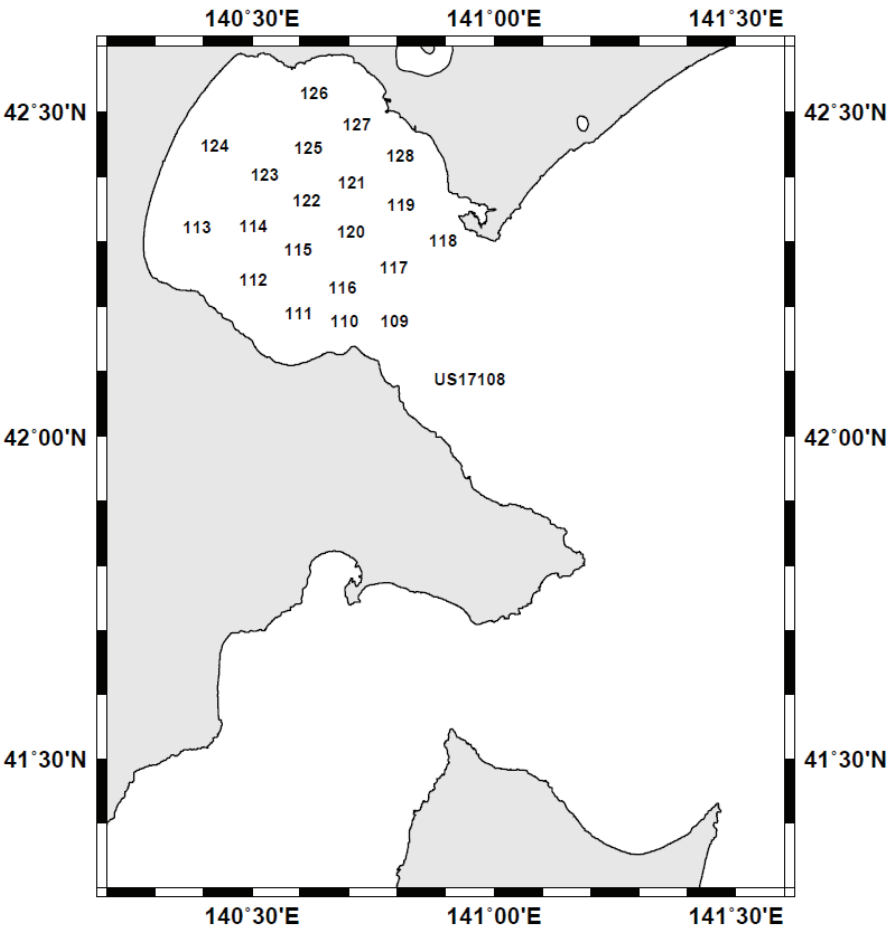


Figure 2. Oceanographic stations (Cruise 383)

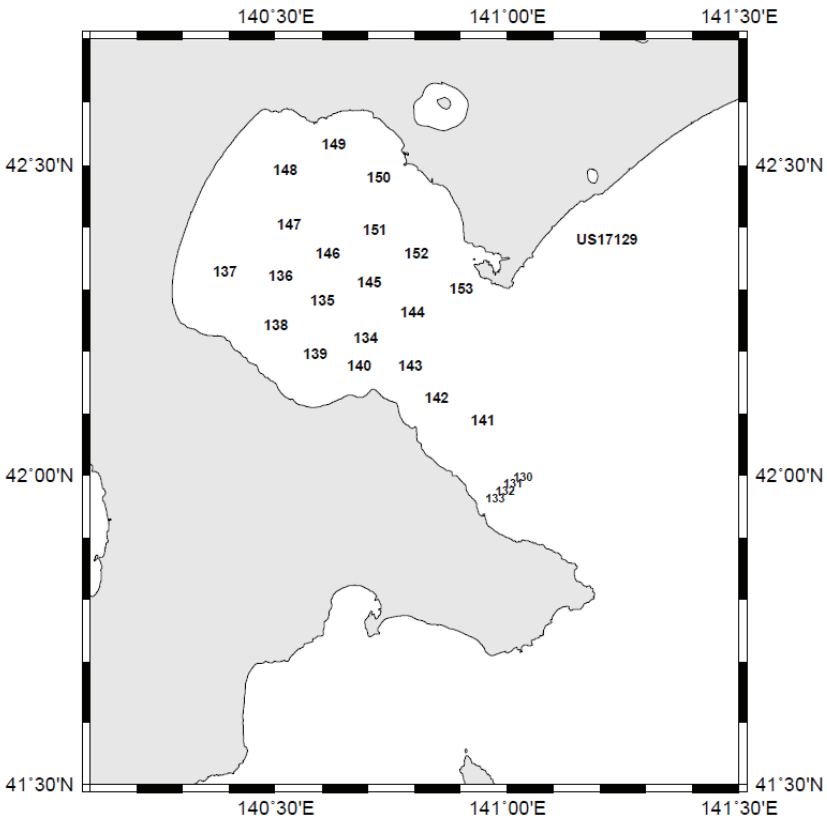


Figure 3. Oceanographic stations (Cruise 384-1)

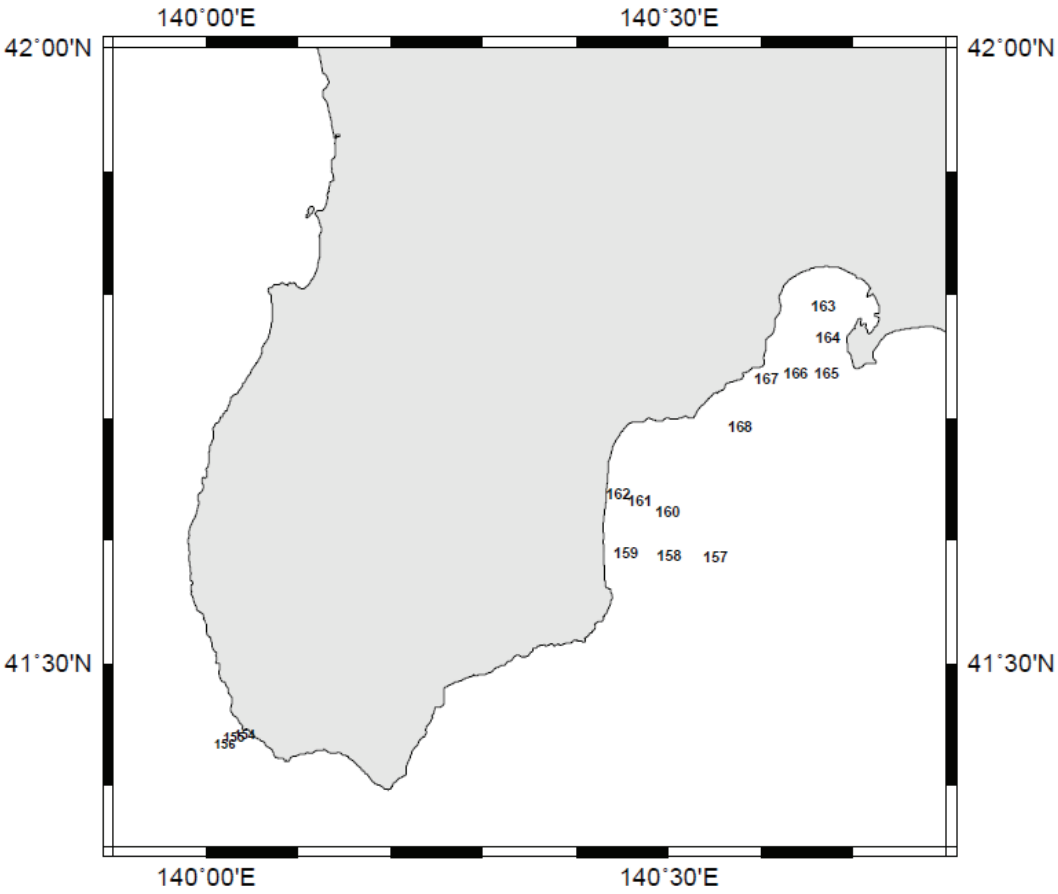


Figure 4. Oceanographic stations (Cruise 384-2)

Table 1. List of Oceanographic Station

Crs382

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17073	42-16.7	140-36.0	2/11	1548-1555	92	NNW-3	NW-1	NNW-5	2.8	5.2	c	1004.2
US17074	42-20.9	140-36.4	2/11	1648-1654	89	NNW-3	NW-1	NNW-4	2.5	6.0	c	1005.1
US17075	42-25.4	140-48.8	2/12	0640-0645	44	NNW-3	NNW-1	NNW-5	3.4	5.2	o	1009.5
US17076	42-28.3	140-43.3	2/12	0725-0730	59	NNW-3	NNW-1	NNW-4	3.3	5.3	o	1010.4
US17077	42-31.0	140-37.9	2/12	0806-0811	61	NNW-2	NW-1	NNW-4	3.4	5.2	o	1010.8
US17078	42-26.3	140-37.3	2/12	0904-0909	82	NW-2	NW-1	NW-4	3.5	4.9	o	1011.8
US17079	42-23.4	140-41.9	2/12	0949-0954	65	NW-3	NW-1	NW-5	4.0	6.2	o	1012.0
US17080	42-11.4	140-35.5	2/12	1142-1148	82	NNW-3	NW-1	NNW-4	3.8	4.7	o	1013.0
US17081	42-13.0	140-41.1	2/12	1257-1302	90	NW-3	NW-1	NW-4	4.6	6.1	o	1012.6
US17082	42-10.3	140-46.9	2/12	1353-1359	95	NW-3	NW-1	NW-5	4.1	5.9	o	1012.6
US17083	42-10.2	140-40.9	2/13	0757-0803	85	West-3	WNW-1	West-5	2.8	5.0	c	1021.0
US17084	42-13.9	140-30.0	2/13	0912-0917	77	West-2	WNW-1	West-4	2.8	4.8	c	1021.5
US17085	42-18.8	140-23.0	2/13	1016-1021	53	West-1	West-1	West-2	3.2	4.8	o	1022.0
US17086	42-19.0	140-30.2	2/13	1136-1142	92	NNW-3	NW-1	NNW-5	3.3	5.4	c	1021.6
US17087	42-23.6	140-31.2	2/13	1231-1238	95	NW-3	NW-1	NW-5	3.7	4.7	bc	1021.0
US17088	42-26.5	140-25.1	2/13	1356-1401	61	NW-3	NW-1	NW-6	3.1	5.0	bc	1021.5
US17089	42-20.9	140-48.5	2/14	0723-0728	52	WNW-3	West-1	WNW-5	1.2	5.7	c	1023.2
US17090	42-18.4	140-42.4	2/14	0810-0816	63	WNW-3	West-1	WNW-5	1.7	5.6	c	1023.6
US17091	42-15.3	140-47.4	2/14	0940-0945	71	WNW-3	WNW-1	WNW-5	2.4	5.7	c	1023.8
US17092	42-17.5	140-53.7	2/14	1026-1030	56	WNW-3	WNW-1	WNW-5	2.7	6.3	s	1023.5
US17093	42-11.6	141-01.9	2/14	1137-1143	79	WNW-2	WNW-1	WNW-4	2.6	6.1	bc	1023.9
US17094	42-03.9	141-03.3	2/14	1317-1323	97	NW-2	WNW-1	NW-4	1.9	6.1	s	1022
US17095	42-00.0	141-09.7	2/14	1501-1508	135	WNW-3	WNW-1	WNW-5	2.0	5.6	o	1022.2
US17096	41-57.4	140-58.2	2/15	0942-0947	74	North-3	NW-1	North-4	3.2	5.4	c	1023
US17097	41-58.1	140-59.4	2/15	0957-1003	86	North-2	NW-1	North-4	3.7	5.5	c	1023.1
US17098	41-58.7	141-00.6	2/15	1012-1018	93	NNW-2	NW-1	NNW-4	3.1	5.4	c	1023.2
US17099	41-59.4	141-01.9	2/15	1028-1034	101	NW-3	NW-1	NW-5	3.0	5.5	c	1023.1
US17100	41-57.5	141-02.0	2/15	1049-1055	102	NW-3	NW-1	NW-5	2.5	5.9	o	1023.2
US17101	41-55.4	141-04.3	2/15	1115-1121	110	NW-3	NW-1	NW-5	2.2	5.5	s	1023.1
US17102	41-49.7	141-12.8	2/15	1303-1312	150	NW-3	NW-1	NW-4	3.4	5.4	c	1022.5
US17103	41-51.4	141-10.0	2/15	1330-1338	104	WNW-3	NW-1	WNW-4	4.0	5.5	o	1022.0
US17104	41-53.3	141-07.5	2/15	1356-1403	94	WNW-3	NW-1	WNW-4	3.5	5.4	c	1021.9
US17105	41-42.8	140-45.1	2/20	0402-0411	85	NNE-2	SW-1	NNE-3	-1.3	8.3	s	1011.6
US17106	41-38.5	140-49.6	2/20	0447-0504	324	North-2	SW-1	North-3	-0.3	9.3	s	1011.4
US17107	41-35.6	140-52.9	2/20	0600-0606	45	ENE-2	West-1	ENE-3	0.1	9.3	s	1010.5

Crs383

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17108	42-04.7	140-57.0	2/25	0628-0634	84	WSW-2	WNW-1	WSW-4	-1.3	5.7	c	1014.8
US17109	42-10.1	140-47.7	2/25	0743-0750	92	WSW-1	West-1	WSW-3	-0.3	4.9	bc	1014.6
US17110	42-10.1	140-41.5	2/25	0831-0838	83	SSW-2	West-1	SSW-4	-1.0	4.4	o	1014.9
US17111	42-10.8	140-35.8	2/25	0919-0926	79	South-2	SSW-1	South-3	-1.9	4.5	s	1014.8
US17112	42-13.9	140-30.2	2/25	1015-1021	78	SSW-2	SSW-1	SSW-3	1.0	4.5	bc	1014.1
US17113	42-18.8	140-23.2	2/25	1122-1126	54	West-3	WSW-1	West-6	1.3	4.6	o	1013.8
US17114	42-18.9	140-30.2	2/25	1213-1220	92	West-2	West-1	West-4	1.1	4.7	bc	1013.5
US17115	42-16.7	140-35.7	2/25	1308-1315	92	SW-2	West-1	SW-4	1.5	4.6	bc	1013.0
US17116	42-13.2	140-41.2	2/25	1406-1413	90	SW-2	West-1	SW-4	1.4	4.6	c	1012.8
US17117	42-15.1	140-47.6	2/25	1502-1508	72	SW-3	WSW-1	SW-5	1.8	4.9	s	1013.0
US17118	42-17.5	140-53.7	2/25	1552-1557	57	WSW-3	WSW-1	WSW-6	2.6	5.3	c	1013.0
US17119	42-20.8	140-48.5	2/26	0730-0735	52	West-3	WNW-1	West-5	-1.9	5.3	bc	1019.0
US17120	42-18.4	140-42.3	2/26	0817-0822	64	West-3	WNW-1	West-5	-2.3	4.8	bc	1019.2
US17121	42-22.9	140-42.4	2/26	0901-0907	62	WNW-3	WNW-1	WNW-4	-2.3	4.9	c	1019.3
US17122	42-21.2	140-36.8	2/26	0946-0952	86	West-3	WNW-1	West-4	-2.2	4.8	o	1019.5
US17123	42-23.6	140-31.6	2/26	1033-1041	96	West-3	WNW-1	West-4	-1.4	4.6	o	1019.2
US17124	42-26.3	140-25.4	2/26	1126-1131	64	West-2	West-1	West-3	-1.6	4.4	o	1019.0
US17125	42-26.1	140-37.0	2/26	1234-1239	83	NW-2	West-1	NW-4	-0.9	4.6	s	1018.6
US17126	42-31.1	140-37.7	2/26	1321-1326	62	NW-3	WNW-1	NW-6	-1.8	4.7	s	1018.6
US17127	42-28.3	140-43.0	2/26	1407-1412	61	WNW-3	West-1	NW-5	-1.6	4.7	bc	1018.7
US17128	42-25.4	140-48.4	2/26	1453-1457	45	NW-3	West-1	NW-5	-1.0	4.9	bc	1019.1

Table 1. List of Oceanographic Station (continued)

Crs384

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17129	42-22.3	141-12.9	3/9	1807-1813	75	West-2	West-1	WSW-3	2.1	5.1	o	1003.2
US17130	41-59.5	141-02.0	3/10	1304-1311	102	NW-2	NW-1	NW-4	2.8	6.4	c	1007.6
US17131	41-58.8	141-00.7	3/10	1321-1328	95	NW-2	NW-1	NW-4	2.6	6.4	c	1007.9
US17132	41-58.1	140-59.7	3/10	1338-1343	88	NW-2	NW-1	NW-4	2.4	6.4	c	1007.8
US17133	41-57.4	140-58.4	3/10	1352-1358	80	NW-2	NW-1	NW-4	2.3	6.0	c	1008.1
US17134	42-12.8	140-41.6	3/11	0755-0801	90	SW-2	West-1	SW-3	1.4	4.5	b	1021.7
US17135	42-16.4	140-36.0	3/11	0906-0913	91	West-1	West-1	West-3	2.8	4.6	bc	1021.7
US17136	42-18.8	140-30.6	3/11	1013-1020	93	West-1	West-1	West-2	3.7	4.6	bc	1022.0
US17137	42-19.2	140-23.4	3/11	1109-1115	55	SSE-1	West-1	SSE-2	5.0	4.9	bc	1022.0
US17138	42-14.0	140-30.0	3/11	1214-1220	78	NE-1	NW-1	NE-3	4.0	4.9	bc	1021.8
US17139	42-11.3	140-35.1	3/11	1306-1312	81	NNE-1	NW-1	NNE-3	4.5	4.2	bc	1021.2
US17140	42-10.1	140-40.8	3/11	1437-1442	85	NW-1	NW-1	NW-3	6.6	4.8	bc	1021.7
US17141	42-04.8	140-56.8	3/12	0644-0650	84	WSW-1	SW-1	WSW-3	1.1	4.4	bc	1026.1
US17142	42-07.0	140-50.8	3/12	0735-0740	74	NW-1	NW-1	NW-3	1.8	4.5	bc	1026.4
US17143	42-10.1	140-47.4	3/12	0818-0825	94	WNW-1	East-1	WNW-3	2.0	4.5	bc	1026.6
US17144	42-15.3	140-47.7	3/12	0910-0915	71	East-1	East-1	East-2	3.2	4.5	bc	1026.7
US17145	42-18.2	140-42.1	3/12	0958-1003	64	Calm	East-1	Calm	3.6	4.5	b	1026.9
US17146	42-21.0	140-36.7	3/12	1107-1113	87	Calm	East-1	Calm	4.0	5.0	b	1026.9
US17147	42-23.7	140-31.7	3/12	1154-1200	96	SSE-1	East-1	SSE-2	3.3	4.7	b	1026.5
US17148	42-29.0	140-31.2	3/12	1244-1249	74	South-1	ESE-1	South-3	4.0	5.0	bc	1025.6
US17149	42-31.4	140-37.5	3/12	1332-1337	60	South-1	ESE-1	South-3	3.7	4.8	b	1025.2
US17150	42-28.3	140-43.3	3/12	1420-1425	60	South-1	SE-1	South-3	3.6	5.2	b	1025.0
US17151	42-23.2	140-42.8	3/12	1508-1512	61	SSE-1	SE-1	SSE-2	4.5	5.2	b	1024.7
US17152	42-21.0	140-48.2	3/12	1551-1555	52	SSE-1	SE-1	SSE-2	3.9	4.8	b	1025.0
US17153	42-17.6	140-54.0	3/12	1640-1646	57	ESE-1	ESE-1	ESE-3	3.8	5.0	b	1025.0
US17154	41-26.3	140-02.5	3/13	0623-0627	29	East-1	SSE-1	East-4	3.9	8.1	b	1023.4
US17155	41-26.1	140-01.8	3/13	0642-0647	54	East-2	SSE-1	East-4	3.8	8.2	b	1022.4
US17156	41-25.8	140-01.2	3/13	0700-0707	85	East-2	SSE-1	East-4	4.2	8.3	b	1023.0
US17157	41-34.9	140-33.0	3/13	1133-1138	58	East-2	SE-1	East-3	8.1	6.5	bc	1022.6
US17158	41-35.0	140-30.0	3/13	1203-1208	44	East-2	SE-1	East-3	6.6	8.4	bc	1022.5
US17159	41-35.1	140-27.2	3/13	1224-1227	21	ENE-2	SE-1	ENE-3	6.4	8.3	bc	1021.6
US17160	41-37.1	140-29.9	3/13	1306-1309	29	ENE-2	SE-1	ENE-4	5.8	8.4	bc	1021.0
US17161	41-37.7	140-28.1	3/13	1331-1334	20	ENE-2	East-1	ENE-5	5.1	8.1	bc	1020.8
US17162	41-38.0	140-26.7	3/13	1343-1347	16	East-2	East-1	East-4	5.3	6.8	bc	1020.6
US17163	41-47.2	140-40.0	3/15	1256-1259	19	North-1	SSE-1	North-3	6.3	7.8	bc	1013.6
US17164	41-45.6	140-40.3	3/15	1324-1333	34	SSW-1	SSE-1	SSW-3	5.7	7.8	bc	1013.6
US17165	41-43.9	140-40.2	3/15	1406-1412	62	South-1	SSE-1	South-3	5.5	8.6	bc	1013.6
US17166	41-43.9	140-38.2	3/15	1444-1449	55	SSW-1	SE-1	SSW-3	5.8	8.6	bc	1013.6
US17167	41-43.6	140-36.3	3/15	1512-1516	31	SSW-1	SE-1	SSW-2	5.4	7.9	bc	1013.6
US17168	41-41.3	140-34.6	3/15	1550-1555	43	SSW-1	SSE-1	SSW-2	5.8	8.4	bc	1013.5

Table 2. Oceanographic data

STATION US17073
LATITUDE 42-16.7 N
LONGITUI 140-36.0 E
DEPTH (m) 92

Press.	Temp.	Salinity	Sigma-T
5	5.7328	33.644	26.5141
10	5.4892	33.6026	26.5106
20	4.8534	33.5873	26.5717
30	4.8839	33.6011	26.5793
40	5.3005	33.7054	26.6143
50	5.4602	33.7315	26.6161
75	5.6286	33.7975	26.6482
90	5.9046	33.8753	26.6758

STATION US17074
LATITUDE 42-20.9 N
LONGITUI 140-36.4 E
DEPTH (m) 89

Press.	Temp.	Salinity	Sigma-T
5	6.2899	33.6246	26.4292
10	6.2915	33.6248	26.4292
20	6.2913	33.6278	26.4315
30	6.4435	33.7049	26.4727
40	6.3039	33.6895	26.4786
50	5.6373	33.6966	26.5673
75	5.5924	33.7914	26.6477
83	5.7094	33.8205	26.6566

STATION US17075
LATITUDE 42-25.4 N
LONGITUI 140-48.8 E
DEPTH (m) 44

Press.	Temp.	Salinity	Sigma-T
5	6.0743	33.5464	26.3948
10	6.0661	33.5478	26.3969
20	6.0919	33.5501	26.3955
30	6.1235	33.5587	26.3983
40	6.2707	33.615	26.424
43	6.0868	33.6225	26.4533

STATION US17076
LATITUDE 42-28.3 N
LONGITUI 140-43.3 E
DEPTH (m) 59

Press.	Temp.	Salinity	Sigma-T
5	5.532	33.5408	26.4567
10	5.5312	33.5399	26.4561
20	5.7041	33.5941	26.4782
30	5.7377	33.6041	26.482
40	5.7313	33.6031	26.482
50	5.7175	33.6059	26.4859
57	5.5766	33.5952	26.4946

STATION US17077
LATITUDE 42-31.0 N
LONGITUI 140-37.9 E
DEPTH (m) 61

Press.	Temp.	Salinity	Sigma-T
5	6.2993	33.6905	26.48
10	6.3044	33.6901	26.479
20	6.3088	33.6958	26.483
30	6.2886	33.7011	26.4897
40	5.5877	33.6105	26.5051
50	5.4676	33.7618	26.6392
59	5.4875	33.7762	26.6482

STATION US17078
LATITUDE 42-26.3 N
LONGITUI 140-37.3 E
DEPTH (m) 82

Press.	Temp.	Salinity	Sigma-T
5	4.9235	33.6073	26.5798
10	4.9265	33.6083	26.5803
20	4.9254	33.6092	26.5811
30	4.9301	33.6204	26.5894
40	4.9461	33.6283	26.5938
50	5.0069	33.6422	26.598
75	5.9674	33.8823	26.6735
79	5.968	33.884	26.675

STATION US17079
LATITUDE 42-23.4 N
LONGITUI 140-41.9 E
DEPTH (m) 65

Press.	Temp.	Salinity	Sigma-T
5	6.3436	33.6259	26.4233
10	6.345	33.6261	26.4233
20	6.2638	33.6152	26.4251
30	5.9511	33.586	26.4414
40	5.8421	33.6013	26.467
50	5.7236	33.5958	26.4771
63	5.5933	33.7699	26.6306

STATION US17080
LATITUDE 42-11.4 N
LONGITUI 140-35.5 E
DEPTH (m) 82

Press.	Temp.	Salinity	Sigma-T
5	5.012	33.6017	26.5653
10	4.9997	33.6025	26.5674
20	4.9928	33.604	26.5694
30	4.9576	33.6193	26.5855
40	4.9123	33.6212	26.592
50	4.8721	33.6184	26.5943
75	5.4228	33.7435	26.6301
80	5.6505	33.8006	26.6479

STATION US17081
LATITUDE 42-13.0 N
LONGITUI 140-41.1 E
DEPTH (m) 90

Press.	Temp.	Salinity	Sigma-T
5	6.2931	33.679	26.4717
10	6.293	33.6795	26.4721
20	6.0368	33.65	26.4813
30	5.1978	33.6258	26.5632
40	5.1417	33.6375	26.5789
50	5.5301	33.7484	26.6212
75	5.8168	33.8523	26.6686
88	5.9496	33.8868	26.6793

STATION US17082
LATITUDE 42-10.3 N
LONGITUI 140-46.9 E
DEPTH (m) 95

Press.	Temp.	Salinity	Sigma-T
5	6.0524	33.6384	26.4702
10	5.9199	33.6311	26.4809
20	5.2571	33.6412	26.5685
30	5.0052	33.6427	26.5986
40	5.0116	33.6484	26.6024
50	5.0816	33.6654	26.608
75	5.8326	33.8501	26.6649
93	5.8602	33.8568	26.6667

STATION US17083
LATITUDE 42-10.2 N
LONGITUI 140-40.9 E
DEPTH (m) 85

Press.	Temp.	Salinity	Sigma-T
5	5.0772	33.6356	26.5848
10	5.0806	33.6363	26.585
20	5.0538	33.6338	26.5861
30	5.046	33.6343	26.5873
40	5.041	33.6349	26.5883
50	5.0367	33.6352	26.5891
75	5.162	33.6809	26.611
84	5.307	33.7131	26.6197

STATION US17084
LATITUDE 42-13.9 N
LONGITUI 140-30.0 E
DEPTH (m) 77

Press.	Temp.	Salinity	Sigma-T
5	4.9764	33.6507	26.6082
10	4.9373	33.6401	26.6042
20	4.9645	33.6485	26.6078
30	4.9658	33.6469	26.6064
40	4.9554	33.6451	26.6062
50	4.9773	33.6513	26.6086
75	5.1305	33.6861	26.6187
75	5.131	33.686	26.619

STATION US17085
LATITUDE 42-18.8 N
LONGITUI 140-23.0 E
DEPTH (m) 53

Press.	Temp.	Salinity	Sigma-T
5	4.8956	33.5046	26.5015
10	4.8877	33.5159	26.5113
20	4.854	33.5545	26.5457
30	4.9491	33.6308	26.5955
40	4.9828	33.6433	26.6017
50	5.4686	33.7868	26.659
50	5.4686	33.7868	26.659

STATION US17086
LATITUDE 42-19.0 N
LONGITUI 140-30.2 E
DEPTH (m) 92

Press.	Temp.	Salinity	Sigma-T
5	5.6249	33.6381	26.5225
10	5.6157	33.6387	26.5241
20	5.4302	33.6282	26.538
30	5.2396	33.6258	26.5583
40	5.2922	33.6721	26.5889
50	5.3622	33.6926	26.5969
75	5.789	33.8114	26.6396
89	5.893	33.844	26.653

STATION US17087
LATITUDE 42-23.6 N
LONGITUI 140-31.2 E
DEPTH (m) 95

Press.	Temp.	Salinity	Sigma-T
5	5.062	33.6506	26.5984
10	5.0563	33.6509	26.5993
20	5.0515	33.6501	26.5992
30	5.0475	33.6505	26.6
40	5.0391	33.6515	26.6017
50	5.0406	33.652	26.602
75	5.0987	33.6687	26.6086
93	5.934	33.873	26.671

STATION US17088
LATITUDE 42-26.5 N
LONGITUI 140-25.1 E
DEPTH (m) 61

Press.	Temp.	Salinity	Sigma-T
5	5.1597	33.4577	26.4344
10	5.158	33.4581	26.4349
20	5.1552	33.4618	26.4382
30	5.1176	33.5165	26.4858
40	5.4766	33.7589	26.6358
50	5.7205	33.8275	26.6608
59	5.6807	33.8214	26.6608

STATION US17089
LATITUDE 42-20.9 N
LONGITUI 140-48.5 E
DEPTH (m) 52

Press.	Temp.	Salinity	Sigma-T
5	5.9179	33.4985	26.3764
10	5.9251	33.4987	26.3757
20	5.9189	33.498	26.3759
30	5.9228	33.4982	26.3756
40	5.9099	33.4976	26.3767
50	6.0157	33.5449	26.401

STATION US17090
LATITUDE 42-18.4 N
LONGITUI 140-42.4 E
DEPTH (m) 63

Press.	Temp.	Salinity	Sigma-T
5	5.774	33.6568	26.5192
10	5.7366	33.6546	26.522
20	5.6203	33.6508	26.5332
30	5.6009	33.6525	26.5368
40	5.2491	33.637	26.5661
50	5.1115	33.653	26.5947
62	5.66	33.7994	26.6459

STATION US17091
LATITUDE 42-15.3 N
LONGITUI 140-47.4 E
DEPTH (m) 71

Press.	Temp.	Salinity	Sigma-T
5	5.8767	33.4828	26.3691
10	5.877	33.4828	26.369
20	5.8824	33.4839	26.3693
30	6.0165	33.516	26.378
40	6.0068	33.5137	26.3774
50	6.2173	33.6041	26.4223
70	5.9577	33.8788	26.6719

STATION US17092
LATITUDE 42-17.5 N
LONGITUI 140-53.7 E
DEPTH (m) 56

Press.	Temp.	Salinity	Sigma-T
5	6.5147	33.5527	26.3434
10	6.5216	33.5542	26.3437
20	6.5264	33.5538	26.3427
30	6.5174	33.5528	26.3431
40	6.381	33.5327	26.3449
50	6.0815	33.4872	26.3472
54	5.6885	33.4374	26.3561

STATION US17093
LATITUDE 42-11.6 N
LONGITUI 141-01.9 E
DEPTH (m) 79

Press.	Temp.	Salinity	Sigma-T
5	6.3105	33.5313	26.3529
10	6.3118	33.5319	26.3532
20	6.3126	33.532	26.3531
30	6.2859	33.5258	26.3517
40	6.2694	33.5264	26.3543
50	6.4445	33.5737	26.3691
75	6.4776	33.5777	26.3679
77	6.478	33.578	26.368

STATION US17094
LATITUDE 42-03.9 N
LONGITUI 141-03.3 E
DEPTH (m) 97

Press.	Temp.	Salinity	Sigma-T
5	6.285	33.5593	26.3782
10	6.2928	33.5602	26.378
20	6.2951	33.56	26.3775
30	6.297	33.5606	26.3777
40	6.298	33.5604	26.3775
50	6.2985	33.5603	26.3773
75	6.2631	33.6079	26.4194
95	5.6511	33.7852	26.6357

STATION US17095
LATITUDE 42-00.0 N
LONGITUI 141-09.7 E
DEPTH (m) 135

Press.	Temp.	Salinity	Sigma-T
5	5.8616	33.371	26.2826
10	5.8642	33.3703	26.2817
20	5.8647	33.3709	26.2821
30	5.9304	33.3838	26.2842
40	6.1403	33.4315	26.2957
50	6.4664	33.4854	26.2966
75	7.1712	33.6126	26.3025
100	7.1228	33.6334	26.3255
125	7.2424	33.6973	26.3593
129	7.2035	33.697	26.3644

STATION US17096
LATITUDE 41-57.4 N
LONGITUI 140-58.2 E
DEPTH (m) 74

Press.	Temp.	Salinity	Sigma-T
5	5.7522	33.4021	26.3205
10	5.7669	33.4074	26.3229
20	6.7406	33.6168	26.3641
30	6.7398	33.6182	26.3654
40	6.5336	33.622	26.3956
50	5.6039	33.6127	26.5049
70	4.8244	33.5532	26.5479

STATION US17097
LATITUDE 41-58.1 N
LONGITUI 140-59.4 E
DEPTH (m) 86

Press.	Temp.	Salinity	Sigma-T
5	5.7089	33.3735	26.3031
10	5.7108	33.3737	26.3031
20	5.8645	33.4302	26.329
30	6.5802	33.5975	26.3701
40	6.6632	33.6166	26.3743
50	6.6066	33.6144	26.38
75	4.7981	33.5512	26.5493
82	4.7985	33.5542	26.5516

STATION US17098
LATITUDE 41-58.7 N
LONGITUI 141-00.6 E
DEPTH (m) 93

Press.	Temp.	Salinity	Sigma-T
5	5.7439	33.3756	26.3006
10	5.7456	33.3757	26.3004
20	5.7343	33.3771	26.3029
30	6.5054	33.5734	26.3609
40	6.731	33.6243	26.3714
50	6.703	33.6252	26.3757
75	4.7869	33.541	26.5424
89	4.826	33.570	26.561

STATION US17099
LATITUDE 41-59.4 N
LONGITUI 141-01.9 E
DEPTH (m) 101

Press.	Temp.	Salinity	Sigma-T
5	5.7369	33.3733	26.2996
10	5.7362	33.373	26.2994
20	5.7226	33.3736	26.3015
30	6.1004	33.4876	26.345
40	6.7004	33.6232	26.3745
50	6.4955	33.597	26.3808
75	5.3323	33.5795	26.5109
97	4.917	33.599	26.574

STATION US17100
LATITUDE 41-57.5 N
LONGITUI 141-02.0 E
DEPTH (m) 102

Press.	Temp.	Salinity	Sigma-T
5	6.0586	33.4218	26.2983
10	6.0592	33.4214	26.298
20	6.0726	33.4245	26.2987
30	6.1193	33.4349	26.3011
40	6.221	33.454	26.3033
50	6.252	33.4605	26.3045
75	6.5199	33.6531	26.4219
95	4.917	33.6105	26.5831

STATION US17101
LATITUDE 41-55.4 N
LONGITUI 141-04.3 E
DEPTH (m) 110

Press.	Temp.	Salinity	Sigma-T
5	5.7819	33.3803	26.2997
10	5.7579	33.3803	26.3026
20	5.748	33.3832	26.306
30	5.7549	33.3878	26.3089
40	5.7721	33.3937	26.3114
50	5.7927	33.3999	26.3138
75	6.3282	33.5587	26.3722
100	5.1449	33.6585	26.5952
101	5.1446	33.6593	26.5959

STATION US17102
LATITUDE 41-49.7 N
LONGITUI 141-12.8 E
DEPTH (m) 150

Press.	Temp.	Salinity	Sigma-T
5	5.3652	33.285	26.2739
10	5.4065	33.2937	26.276
20	5.4516	33.3052	26.2798
30	5.7466	33.362	26.2895
40	5.7587	33.3598	26.2863
50	5.766	33.363	26.2879
75	6.9967	33.6052	26.3205
100	7.239	33.6549	26.3263
125	7.061	33.6369	26.3367
130	6.9315	33.6242	26.3443

STATION US17103
LATITUDE 41-51.4 N
LONGITUI 141-10.0 E
DEPTH (m) 104

Press.	Temp.	Salinity	Sigma-T
5	5.8207	33.3749	26.2906
10	5.8182	33.3747	26.2908
20	5.8416	33.3809	26.2928
30	5.8232	33.3774	26.2923
40	5.7926	33.3748	26.294
50	6.2416	33.476	26.318
75	5.9171	33.4298	26.3222
100	6.3921	33.5217	26.3348
100	6.3921	33.5217	26.3348

STATION US17104
LATITUDE 41-53.3 N
LONGITUI 141-07.5 E
DEPTH (m) 94

Press.	Temp.	Salinity	Sigma-T
5	5.7695	33.3775	26.299
10	5.9147	33.4224	26.3167
20	6.1064	33.4957	26.3507
30	6.5168	33.5938	26.3756
40	6.455	33.5904	26.3809
50	6.379	33.5938	26.3934
75	5.8585	33.63	26.4876
90	5.465	33.640	26.543

STATION US17105
LATITUDE 41-42.8 N
LONGITUI 140-45.1 E
DEPTH (m) 85

Press.	Temp.	Salinity	Sigma-T
NO CTD DATA			

STATION US17106
LATITUDE 41-38.5 N
LONGITUI 140-49.6 E
DEPTH (m) 324

Press.	Temp.	Salinity	Sigma-T
5	9.5376	33.9259	26.1903
10	9.5397	33.9256	26.1897
20	9.5401	33.9302	26.1933
30	9.5324	33.9414	26.2033
40	9.529	33.9479	26.2089
50	9.5282	33.9517	26.212
75	9.4593	33.9503	26.2222
100	9.5009	33.9549	26.2189
125	9.3977	33.9504	26.2323
150	9.3418	33.9519	26.2425
175	9.3411	33.9514	26.2423
200	9.2755	33.9518	26.2532
250	9.2905	33.9507	26.25
288	8.504	33.962	26.3827

STATION US17107
LATITUDE 41-35.6 N
LONGITUI 140-52.9 E
DEPTH (m) 45

Press.	Temp.	Salinity	Sigma-T
NO CTD DATA			

STATION US17108
LATITUDE 42-04.7 N
LONGITUI 140-57.0 E
DEPTH (m) 84

Press.	Temp.	Salinity	Sigma-T
5	5.9133	33.5642	26.4288
10	5.92	33.5654	26.429
20	5.9391	33.568	26.4287
30	5.9348	33.5678	26.4291
40	5.9323	33.5677	26.4293
50	5.9466	33.5698	26.4291
75	5.9506	33.5704	26.4292
82	5.9541	33.571	26.4292

STATION US17109
LATITUDE 42-10.1 N
LONGITUI 140-47.7 E
DEPTH (m) 92

Press.	Temp.	Salinity	Sigma-T
5	5.1681	33.5611	26.5153
10	5.1664	33.5608	26.5153
20	5.1697	33.5605	26.5147
30	5.171	33.561	26.515
40	5.184	33.564	26.516
50	5.203	33.570	26.519
75	5.174	33.579	26.529
91	5.081	33.613	26.567

STATION US17110
LATITUDE 42-10.1 N
LONGITUI 140-41.5 E
DEPTH (m) 83

Press.	Temp.	Salinity	Sigma-T
5	4.5592	33.4914	26.5278
10	4.558	33.494	26.5301
20	4.5563	33.4927	26.5292
30	4.5434	33.4922	26.5302
40	4.4911	33.4983	26.5407
50	4.5395	33.5108	26.5454
75	4.599	33.5546	26.5737
82	4.6094	33.5537	26.5718

STATION US17111
LATITUDE 42-10.8 N
LONGITUI 140-35.8 E
DEPTH (m) 79

Press.	Temp.	Salinity	Sigma-T
5	4.6843	33.5856	26.589
10	4.6934	33.5869	26.5891
20	4.6944	33.5868	26.5889
30	4.6954	33.5874	26.5892
40	4.695	33.588	26.589
50	4.679	33.587	26.590
75	4.662	33.586	26.592
77	4.662	33.586	26.592

STATION US17112
LATITUDE 42-13.9 N
LONGITUI 140-30.2 E
DEPTH (m) 78

Press.	Temp.	Salinity	Sigma-T
5	4.8728	33.5715	26.557
10	4.8632	33.575	26.5609
20	4.8616	33.576	26.5619
30	4.862	33.577	26.562
40	4.864	33.578	26.563
50	4.882	33.583	26.565
75	5.010	33.694	26.639
77	5.025	33.696	26.638

STATION US17113
LATITUDE 42-18.8 N
LONGITUI 140-23.2 E
DEPTH (m) 54

Press.	Temp.	Salinity	Sigma-T
5	4.8214	33.6075	26.5913
10	4.8028	33.6064	26.5925
20	4.7763	33.6055	26.5947
30	4.7772	33.6084	26.5969
40	5.0886	33.7182	26.649
50	5.5506	33.8122	26.6692
53	5.7648	33.8415	26.6663

STATION US17114
LATITUDE 42-18.9 N
LONGITUI 140-30.2 E
DEPTH (m) 92

Press.	Temp.	Salinity	Sigma-T
5	4.8578	33.5955	26.5778
10	4.8541	33.5954	26.5781
20	4.8488	33.5952	26.5785
30	4.8206	33.5955	26.5818
40	4.8346	33.6041	26.5872
50	4.820	33.607	26.591
75	4.985	33.651	26.608
91	5.7254	33.8387	26.669

STATION US17115
LATITUDE 42-16.7 N
LONGITUI 140-35.7 E
DEPTH (m) 92

Press.	Temp.	Salinity	Sigma-T
5	4.8705	33.5324	26.5263
10	4.8702	33.5329	26.5268
20	4.8966	33.5828	26.5633
30	4.8622	33.6065	26.586
40	4.8678	33.6101	26.5882
50	4.8898	33.6171	26.5913
75	4.9646	33.6406	26.6015
90	5.5456	33.7888	26.6513

STATION US17116
LATITUDE 42-13.2 N
LONGITUI 140-41.2 E
DEPTH (m) 90

Press.	Temp.	Salinity	Sigma-T
5	4.8559	33.5337	26.5289
10	4.8462	33.5328	26.5293
20	4.8114	33.5298	26.5308
30	4.7649	33.5287	26.5351
40	4.7584	33.529	26.536
50	4.7534	33.5292	26.5367
75	4.6055	33.5743	26.5887
88	4.588	33.571	26.5879

STATION US17117
LATITUDE 42-15.1 N
LONGITUI 140-47.6 E
DEPTH (m) 72

Press.	Temp.	Salinity	Sigma-T
5	5.1778	33.5616	26.5146
10	5.1603	33.5611	26.5163
20	5.0974	33.5654	26.5269
30	5.0222	33.5749	26.543
40	4.9698	33.5913	26.5619
50	4.971	33.603	26.571
71	4.997	33.612	26.575

STATION US17118
LATITUDE 42-17.5 N
LONGITUI 140-53.7 E
DEPTH (m) 57

Press.	Temp.	Salinity	Sigma-T
5	5.5313	33.5161	26.4372
10	5.5297	33.515	26.4365
20	5.5163	33.5135	26.4369
30	5.512	33.513	26.437
40	5.508	33.513	26.438
50	5.401	33.524	26.459
56	5.1452	33.5799	26.5329

STATION US17119
LATITUDE 42-20.8 N
LONGITUI 140-48.5 E
DEPTH (m) 52

Press.	Temp.	Salinity	Sigma-T
5	5.4844	33.607	26.5147
10	5.4919	33.6073	26.5141
20	5.4884	33.6081	26.5151
30	5.3605	33.6134	26.5344
40	5.1397	33.6573	26.5949
50	5.1154	33.6625	26.6017
51	5.1155	33.6626	26.6018

STATION US17120
LATITUDE 42-18.4 N
LONGITUI 140-42.3 E
DEPTH (m) 64

Press.	Temp.	Salinity	Sigma-T
5	4.9159	33.5511	26.5361
10	4.9285	33.5509	26.5345
20	4.9281	33.5508	26.5344
30	4.9195	33.5513	26.5358
40	4.8562	33.5495	26.5415
50	4.5866	33.5651	26.5834
62	4.8123	33.6084	26.593

STATION US17121
LATITUDE 42-22.9 N
LONGITUI 140-42.4 E
DEPTH (m) 62

Press.	Temp.	Salinity	Sigma-T
5	5.0407	33.5708	26.5376
10	5.0424	33.5709	26.5375
20	5.0394	33.5702	26.5372
30	5.0443	33.5722	26.5383
40	5.1494	33.6175	26.5622
50	4.9607	33.6381	26.6
59	5.3505	33.7199	26.6199

STATION US17122
LATITUDE 42-21.2 N
LONGITUI 140-36.8 E
DEPTH (m) 86

Press.	Temp.	Salinity	Sigma-T
5	5.0208	33.5726	26.5413
10	5.0195	33.5725	26.5414
20	5.0201	33.5731	26.5417
30	5.0271	33.5744	26.542
40	5.0387	33.579	26.5443
50	4.9999	33.5879	26.5557
75	5.5488	33.7837	26.6469
83	5.6403	33.8029	26.651

STATION US17123
LATITUDE 42-23.6 N
LONGITUI 140-31.6 E
DEPTH (m) 96

Press.	Temp.	Salinity	Sigma-T
5	4.7652	33.6191	26.6067
10	4.7606	33.6185	26.6068
20	4.769	33.6215	26.6082
30	4.7724	33.622	26.6082
40	4.7762	33.6231	26.6087
50	4.7896	33.6266	26.6099
75	4.9753	33.6614	26.6169
94	5.0678	33.6816	26.6223

STATION US17124
LATITUDE 42-26.3 N
LONGITUI 140-25.4 E
DEPTH (m) 64

Press.	Temp.	Salinity	Sigma-T
5	4.5588	33.5972	26.6119
10	4.5468	33.6006	26.6159
20	4.5608	33.6044	26.6174
30	4.6099	33.6138	26.6195
40	4.612	33.6162	26.6212
50	4.6215	33.6188	26.6223
62	5.3946	33.781	26.6631

STATION US17125
LATITUDE 42-26.1 N
LONGITUI 140-37.0 E
DEPTH (m) 83

Press.	Temp.	Salinity	Sigma-T
5	4.9704	33.5698	26.5448
10	4.907	33.5769	26.5575
20	4.8985	33.5807	26.5614
30	4.8924	33.5884	26.5683
40	4.876	33.5969	26.5769
50	4.8759	33.6005	26.5797
75	5.1658	33.6953	26.622
82	5.3051	33.7294	26.6327

STATION US17126
LATITUDE 42-31.1 N
LONGITUI 140-37.7 E
DEPTH (m) 62

Press.	Temp.	Salinity	Sigma-T
5	4.9062	33.6584	26.6223
10	4.9062	33.6582	26.6221
20	4.9011	33.6585	26.6228
30	4.8993	33.6593	26.6237
40	4.8813	33.6589	26.6254
50	4.9051	33.664	26.6268
61	5.0144	33.69	26.6351

STATION US17127
LATITUDE 42-28.3 N
LONGITUI 140-43.0 E
DEPTH (m) 61

Press.	Temp.	Salinity	Sigma-T
5	4.8847	33.6313	26.6032
10	4.8921	33.6335	26.6041
20	4.8911	33.6355	26.6057
30	4.8982	33.6375	26.6065
40	4.9059	33.64	26.6077
50	4.9075	33.6408	26.6081
61	4.9153	33.6419	26.6082

STATION US17128
LATITUDE 42-25.4 N
LONGITUI 140-48.4 E
DEPTH (m) 45

Press.	Temp.	Salinity	Sigma-T
5	4.9415	33.5792	26.5555
10	4.9386	33.5788	26.5555
20	4.9319	33.5787	26.5561
30	4.9182	33.5793	26.5582
40	4.9143	33.5814	26.5603
44	4.91	33.583	26.562

STATION US17129
LATITUDE 42-22.3 N
LONGITUI 141-12.9 E
DEPTH (m) 75

Press.	Temp.	Salinity	Sigma-T
5	5.0346	33.3781	26.3856
10	5.0367	33.3798	26.3867
20	5.0729	33.3901	26.3907
30	5.1132	33.4036	26.3969
40	5.3827	33.4629	26.4126
50	5.8014	33.5551	26.4354
71	5.998	33.5674	26.4209

STATION US17130
LATITUDE 41-59.5 N
LONGITUI 141-02.0 E
DEPTH (m) 102

Press.	Temp.	Salinity	Sigma-T
5	6.7951	33.7267	26.4435
10	6.785	33.7247	26.4433
20	6.7673	33.7266	26.4471
30	6.6681	33.701	26.4401
40	5.6692	33.5687	26.4623
50	5.7158	33.5978	26.4797
75	5.0815	33.5537	26.5194
97	5.0678	33.5668	26.5313

STATION US17131
LATITUDE 41-58.8 N
LONGITUI 141-00.7 E
DEPTH (m) 95

Press.	Temp.	Salinity	Sigma-T
5	6.3802	33.6982	26.4757
10	6.3719	33.6951	26.4743
20	6.3061	33.6723	26.4648
30	6.0658	33.6587	26.4846
40	6.0512	33.6605	26.4878
50	6.0298	33.6616	26.4913
75	5.0772	33.5644	26.5283
90	5.0695	33.5688	26.5327

STATION US17132
LATITUDE 41-58.1 N
LONGITUI 140-59.7 E
DEPTH (m) 88

Press.	Temp.	Salinity	Sigma-T
5	6.2216	33.6575	26.4639
10	6.2671	33.6691	26.4672
20	6.3777	33.692	26.4711
30	6.1979	33.6265	26.4424
40	6.1285	33.6615	26.4788
50	5.9228	33.5856	26.4446
75	5.0987	33.5594	26.522
84	5.069	33.5624	26.5278

STATION US17133
LATITUDE 41-57.4 N
LONGITUI 140-58.4 E
DEPTH (m) 80

Press.	Temp.	Salinity	Sigma-T
5	6.3667	33.6772	26.4608
10	6.3888	33.6931	26.4705
20	6.5105	33.7111	26.4689
30	6.4496	33.7027	26.4702
40	6.2821	33.6683	26.4647
50	6.1911	33.6664	26.4747
75	5.5159	33.5661	26.4786

STATION US17134
LATITUDE 42-12.8 N
LONGITUI 140-41.6 E
DEPTH (m) 90

Press.	Temp.	Salinity	Sigma-T
5	4.75	33.4832	26.5006
10	4.7264	33.4877	26.5068
20	4.3654	33.5609	26.6037
30	4.3538	33.5707	26.6127
40	4.3797	33.5885	26.6241
50	4.4329	33.5969	26.6251
75	4.6084	33.6465	26.6457
87	4.636	33.656	26.650

STATION US17135
LATITUDE 42-16.4 N
LONGITUI 140-36.0 E
DEPTH (m) 91

Press.	Temp.	Salinity	Sigma-T
5	4.5941	33.6078	26.6165
10	4.5675	33.6123	26.6229
20	4.556	33.6159	26.627
30	4.5451	33.6174	26.6294
40	4.5464	33.618	26.6297
50	4.5474	33.6176	26.6293
75	4.5303	33.6154	26.6294
90	4.675	33.650	26.641

STATION US17136
LATITUDE 42-18.8 N
LONGITUI 140-30.6 E
DEPTH (m) 93

Press.	Temp.	Salinity	Sigma-T
5	4.6178	33.6288	26.6306
10	4.6098	33.6325	26.6344
20	4.6107	33.6335	26.6351
30	4.6122	33.6335	26.635
40	4.6106	33.633	26.6347
50	4.6139	33.6339	26.6351
75	4.6148	33.6338	26.6349
92	4.651	33.643	26.638

STATION US17137
LATITUDE 42-19.2 N
LONGITUI 140-23.4 E
DEPTH (m) 55

Press.	Temp.	Salinity	Sigma-T
5	4.6684	33.6113	26.6111
10	4.5764	33.6032	26.6147
20	4.5737	33.617	26.626
30	4.6292	33.6278	26.6286
40	4.6256	33.6244	26.6263
50	4.6136	33.6313	26.633
54	4.6929	33.65	26.6393

STATION US17138
LATITUDE 42-14.0 N
LONGITUI 140-30.0 E
DEPTH (m) 78

Press.	Temp.	Salinity	Sigma-T
5	4.6804	33.5921	26.5946
10	4.5736	33.6279	26.6347
20	4.5698	33.6329	26.639
30	4.5713	33.6326	26.6386
40	4.599	33.6383	26.6402
50	4.634	33.646	26.643
75	4.647	33.649	26.644
76	4.647	33.650	26.644

STATION US17139
LATITUDE 42-11.3 N
LONGITUI 140-35.1 E
DEPTH (m) 81

Press.	Temp.	Salinity	Sigma-T
5	4.1344	33.499	26.5785
10	4.1285	33.5175	26.5938
20	4.2334	33.544	26.6041
30	4.542	33.6159	26.6285
40	4.4177	33.5847	26.617
50	4.3741	33.5863	26.6229
75	4.4517	33.6117	26.6349
78	4.480	33.626	26.643

STATION US17140
LATITUDE 42-10.1 N
LONGITUI 140-40.8 E
DEPTH (m) 85

Press.	Temp.	Salinity	Sigma-T
5	4.9577	33.4648	26.4629
10	4.9173	33.4745	26.4752
20	4.8106	33.5128	26.5174
30	5.0444	33.5373	26.5106
40	4.954	33.5329	26.5174
50	4.7615	33.5802	26.5763
75	4.6383	33.6274	26.6273
84	4.6556	33.6408	26.6359

STATION US17141
LATITUDE 42-04.8 N
LONGITUI 140-56.8 E
DEPTH (m) 84

Press.	Temp.	Salinity	Sigma-T
5	4.6216	33.3993	26.448
10	4.633	33.4037	26.4503
20	4.6179	33.4399	26.4807
30	4.6906	33.4676	26.4947
40	4.8262	33.5199	26.5213
50	4.865	33.5507	26.5414
75	4.8088	33.5716	26.5642
82	4.8092	33.5709	26.5636

STATION US17142
LATITUDE 42-07.0 N
LONGITUI 140-50.8 E
DEPTH (m) 74

Press.	Temp.	Salinity	Sigma-T
5	4.6748	33.4403	26.4748
10	4.673	33.4395	26.4743
20	4.6746	33.4425	26.4765
30	4.6982	33.4496	26.4796
40	4.801	33.5062	26.5132
50	5.0528	33.5644	26.5311
72	4.8234	33.5667	26.5587

STATION US17143
LATITUDE 42-10.1 N
LONGITUI 140-47.4 E
DEPTH (m) 94

Press.	Temp.	Salinity	Sigma-T
5	4.7439	33.4525	26.4769
10	4.7265	33.4531	26.4793
20	4.7062	33.4529	26.4814
30	5.0471	33.5367	26.5099
40	4.7646	33.5057	26.5169
50	4.966	33.5653	26.5417
75	4.5277	33.6038	26.6205
92	4.5636	33.6385	26.6441

STATION US17144
LATITUDE 42-15.3 N
LONGITUI 140-47.7 E
DEPTH (m) 71

Press.	Temp.	Salinity	Sigma-T
5	4.7044	33.4738	26.4981
10	4.7546	33.471	26.4904
20	4.7003	33.4751	26.4996
30	4.7194	33.4879	26.5077
40	4.6629	33.5436	26.5581
50	4.6395	33.559	26.5728
70	4.567	33.5877	26.6034

STATION US17145
LATITUDE 42-18.2 N
LONGITUI 140-42.1 E
DEPTH (m) 64

Press.	Temp.	Salinity	Sigma-T
5	4.5185	33.4811	26.5241
10	4.5159	33.4781	26.522
20	4.5005	33.5209	26.5576
30	4.5125	33.5403	26.5717
40	4.5316	33.6088	26.624
50	4.451	33.6083	26.6322
63	4.7068	33.6685	26.6523

STATION US17146
LATITUDE 42-21.0 N
LONGITUI 140-36.7 E
DEPTH (m) 87

Press.	Temp.	Salinity	Sigma-T
5	4.7717	33.5634	26.5618
10	4.7208	33.5615	26.566
20	4.6345	33.5788	26.5891
30	4.5599	33.5945	26.6097
40	4.5272	33.5968	26.6149
50	4.496	33.596	26.618
75	4.526	33.609	26.625
84	4.570	33.639	26.644

STATION US17147
LATITUDE 42-23.7 N
LONGITUI 140-31.7 E
DEPTH (m) 96

Press.	Temp.	Salinity	Sigma-T
5	4.7531	33.5193	26.529
10	4.5592	33.5601	26.5824
20	4.6301	33.6034	26.6091
30	4.6921	33.6229	26.6178
40	4.6749	33.6231	26.6198
50	4.6549	33.6355	26.6319
75	4.6356	33.6385	26.6363
94	4.702	33.663	26.649

STATION US17148
LATITUDE 42-29.0 N
LONGITUI 140-31.2 E
DEPTH (m) 74

Press.	Temp.	Salinity	Sigma-T
5	5.1878	33.5342	26.4917
10	4.7454	33.5873	26.5837
20	4.6973	33.5978	26.5973
30	4.687	33.5994	26.5997
40	4.6766	33.6052	26.6055
50	4.6583	33.6263	26.6242
73	4.977	33.703	26.650

STATION US17149
LATITUDE 42-31.4 N
LONGITUI 140-37.5 E
DEPTH (m) 60

Press.	Temp.	Salinity	Sigma-T
5	4.731	33.1984	26.2768
10	4.6657	33.4746	26.503
20	4.6895	33.5278	26.5426
30	4.7494	33.5837	26.5804
40	4.8272	33.6245	26.6041
50	5.0233	33.6724	26.6201
58	5.1793	33.7091	26.6313

STATION US17150
LATITUDE 42-28.3 N
LONGITUI 140-43.3 E
DEPTH (m) 60

Press.	Temp.	Salinity	Sigma-T
5	5.4916	33.434	26.3769
10	4.9088	33.5191	26.5114
20	4.8521	33.5325	26.5285
30	4.8398	33.5452	26.5398
40	4.9988	33.621	26.5821
50	5.0264	33.6563	26.607
58	5.033	33.6733	26.6197

STATION US17151
LATITUDE 42-23.2 N
LONGITUI 140-42.8 E
DEPTH (m) 61

Press.	Temp.	Salinity	Sigma-T
5	4.9644	33.5181	26.5045
10	4.7056	33.5309	26.5433
20	4.6796	33.5424	26.5552
30	4.7018	33.5722	26.5765
40	4.6901	33.6053	26.6041
50	4.8358	33.641	26.6163
60	4.6803	33.6239	26.6199

STATION US17152
LATITUDE 42-21.0 N
LONGITUI 140-48.2 E
DEPTH (m) 52

Press.	Temp.	Salinity	Sigma-T
5	4.7732	33.3218	26.3701
10	4.6957	33.3287	26.384
20	4.8474	33.4066	26.4291
30	4.9036	33.4154	26.4298
40	4.7814	33.4627	26.4809
50	4.865	33.5341	26.5283
51	4.886	33.5428	26.5328

STATION US17153
LATITUDE 42-17.6 N
LONGITUI 140-54.0 E
DEPTH (m) 57

Press.	Temp.	Salinity	Sigma-T
5	4.8925	33.3469	26.3768
10	4.892	33.3557	26.3838
20	4.6408	33.3549	26.4107
30	4.5217	33.3565	26.4248
40	4.8004	33.4474	26.4667
50	5.0723	33.4992	26.4773
54	5.0789	33.5012	26.4781

STATION US17154
LATITUDE 41-26.3 N
LONGITUI 140-02.5 E
DEPTH (m) 29

Press.	Temp.	Salinity	Sigma-T
5	8.1915	33.957	26.4261
10	8.22	33.9521	26.4181
20	8.1173	33.9626	26.4417
28	8.114	33.9607	26.4406

STATION US17155
LATITUDE 41-26.1 N
LONGITUI 140-01.8 E
DEPTH (m) 54

Press.	Temp.	Salinity	Sigma-T
5	8.3667	33.957	26.3997
10	8.2955	33.9469	26.4026
20	8.2111	33.9608	26.4262
30	8.2095	33.9611	26.4267
40	8.1484	33.9563	26.4321
50	8.1316	33.9657	26.442
54	8.1346	33.966	26.4417

STATION US17156
LATITUDE 41-25.8 N
LONGITUI 140-01.2 E
DEPTH (m) 85

Press.	Temp.	Salinity	Sigma-T
5	8.3173	33.9614	26.4107
10	8.416	33.9617	26.3959
20	8.3727	33.9637	26.404
30	8.3832	33.962	26.4012
40	8.3899	33.9608	26.3992
50	7.9844	33.9643	26.4627
75	7.5433	33.9822	26.541
83	7.298	33.988	26.580

STATION US17157
LATITUDE 41-34.9 N
LONGITUI 140-33.0 E
DEPTH (m) 58

Press.	Temp.	Salinity	Sigma-T
5	8.7001	33.9774	26.3645
10	8.6637	33.9547	26.3523
20	8.4553	33.967	26.3941
30	8.3425	33.9699	26.4135
40	8.2991	33.9742	26.4235
50	8.2613	33.9791	26.433
57	8.261	33.9798	26.4336

STATION US17158
LATITUDE 41-35.0 N
LONGITUI 140-30.0 E
DEPTH (m) 44

Press.	Temp.	Salinity	Sigma-T
5	8.6279	33.9651	26.366
10	8.4981	33.9676	26.3879
20	8.4911	33.9726	26.393
30	8.4847	33.9758	26.3965
40	8.4688	33.9775	26.4002
43	8.4696	33.9776	26.4002

STATION US17159
LATITUDE 41-35.1 N
LONGITUI 140-27.2 E
DEPTH (m) 21

Press.	Temp.	Salinity	Sigma-T
5	8.3744	33.9141	26.3649
10	8.3368	33.9497	26.3985
20	8.3056	33.9483	26.4022
21	8.3076	33.9498	26.403

STATION US17160
LATITUDE 41-37.1 N
LONGITUI 140-29.9 E
DEPTH (m) 29

Press.	Temp.	Salinity	Sigma-T
5	8.4116	33.9299	26.3716
10	8.3918	33.9361	26.3795
20	8.3579	33.9549	26.3994
29	7.3879	33.7631	26.3909

STATION US17161
LATITUDE 41-37.7 N
LONGITUI 140-28.1 E
DEPTH (m) 20

Press.	Temp.	Salinity	Sigma-T
5	7.4137	33.7388	26.368
10	7.4141	33.7901	26.4082
18	7.4078	33.8143	26.4281

STATION US17162
LATITUDE 41-38.0 N
LONGITUI 140-26.7 E
DEPTH (m) 16

Press.	Temp.	Salinity	Sigma-T
5	7.3231	33.7217	26.3672
10	7.5361	33.8022	26.4004
15	7.5478	33.8267	26.4181

STATION US17163
LATITUDE 41-47.2 N
LONGITUI 140-40.0 E
DEPTH (m) 19

Press.	Temp.	Salinity	Sigma-T
5	7.9418	33.8145	26.3514
10	7.7805	33.8464	26.4
19	7.7275	33.8447	26.4064

STATION US17164
LATITUDE 41-45.6 N
LONGITUI 140-40.3 E
DEPTH (m) 34

Press.	Temp.	Salinity	Sigma-T
5	8.2299	33.8924	26.3697
10	8.3196	33.9474	26.3993
20	8.2765	33.9354	26.3964
30	7.8661	33.8502	26.3906
34	7.8239	33.8614	26.4055

STATION US17165
LATITUDE 41-43.9 N
LONGITUI 140-40.2 E
DEPTH (m) 62

Press.	Temp.	Salinity	Sigma-T
5	8.5998	33.9452	26.3548
10	8.5644	33.9557	26.3684
20	8.5349	33.9582	26.375
30	8.5208	33.9582	26.3772
40	8.5091	33.9591	26.3796
50	8.5019	33.9593	26.3809
60	8.5027	33.9593	26.3808

STATION US17166
LATITUDE 41-43.9 N
LONGITUI 140-38.2 E
DEPTH (m) 55

Press.	Temp.	Salinity	Sigma-T
5	8.6665	33.9376	26.3385
10	8.4394	33.9374	26.3733
20	8.4048	33.9472	26.3863
30	8.3929	33.9493	26.3897
40	8.3672	33.9497	26.3939
50	8.3588	33.9516	26.3967
54	8.3573	33.952	26.3972

STATION US17167
LATITUDE 41-43.6 N
LONGITUI 140-36.3 E
DEPTH (m) 31

Press.	Temp.	Salinity	Sigma-T
5	8.1401	33.3283	25.9404
10	8.2621	33.5867	26.125
20	8.3947	33.9539	26.393
30	8.3678	33.9583	26.4006

STATION US17168
LATITUDE 41-41.3 N
LONGITUI 140-34.6 E
DEPTH (m) 43

Press.	Temp.	Salinity	Sigma-T
5	8.4585	33.9392	26.3718
10	8.4369	33.9448	26.3794
20	8.3305	33.9468	26.3973
30	8.318	33.9494	26.4012
40	8.3095	33.951	26.4037
43	8.3003	33.9521	26.4059

3

THE " USHIO MARU "

CRUISE 385
CRUISE 386
CRUISE 387

IN MARCH 2017
IN APRIL 2017

1. Cruise Itinerary

Cruise 385

Departure from Hakodate	Mar.	21, 2017
Start hydrographic research (US17169)		21
Finish hydrographic research (US17171)		21
Return to Hakodate		22

Total coverage 150.9 miles

Cruise 386

Departure from Hakodate	Apr.	11, 2017
Start hydrographic research (US17172)		11
Arrival at Usujiri		11
Depart from Usujiri		14
Towing frame twawl net		14
Twoing frame trawl net		15
Arrival at Usujiri		15
Depart from Usujiri		16
Towing frame twawl net		16
Finish hydrographic research (US17199)		16
Arrival at Usujiri		16
Depart from Usujiri		17
Observation by underwater camera		17
Return to Hakodate		17

Total coverage 306.7 miles

Cruise 387

Departure from Hakodate	Apr.	24, 2017
Start hydrographic research (US17200)		24
Calibration of echo sounder ER-60		24
Hook and line jigging research for pointhead flounder		25
Echo sounding research by ER-60		25
Towing frame trawl net		26
Hook and line jigging research for pointhead flounder		26
Echo sounding research by ER-60		26
Finish hydrographic research (US17203)		26
Echo sounding research by ER-60		27
Return to Hakodate		27

Total coverage 377.8 mile

2. Data on Temperature, Salinity and Pressure

Hydrographic work on deck and the data processing were made by the deck officers, crews, research staff and cadets of the “Ushio Maru”. Temperature, salinity and pressure were measured by CTD (Seabird SBE-19Plus and SBE-19).

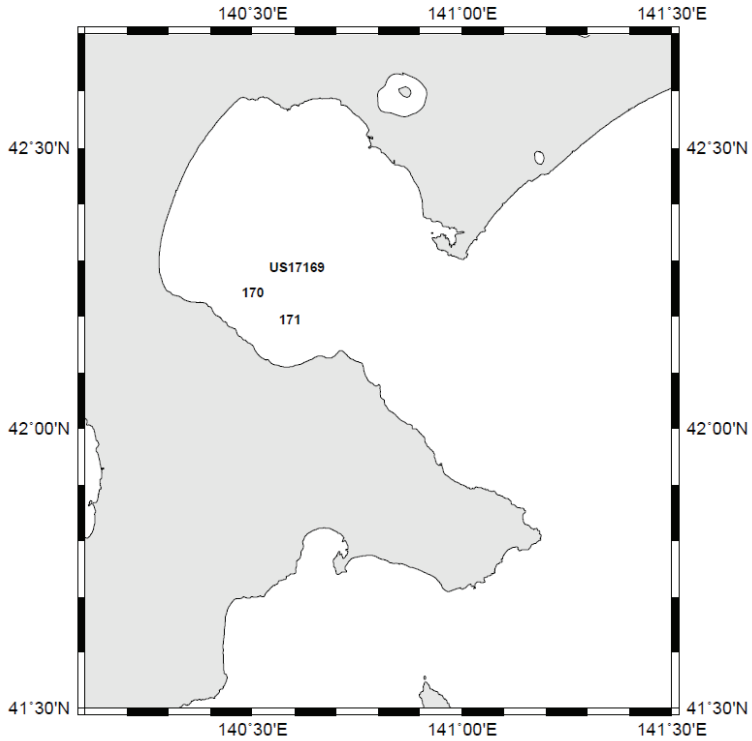


Figure 1. Oceanographic stations (Cruise 385)

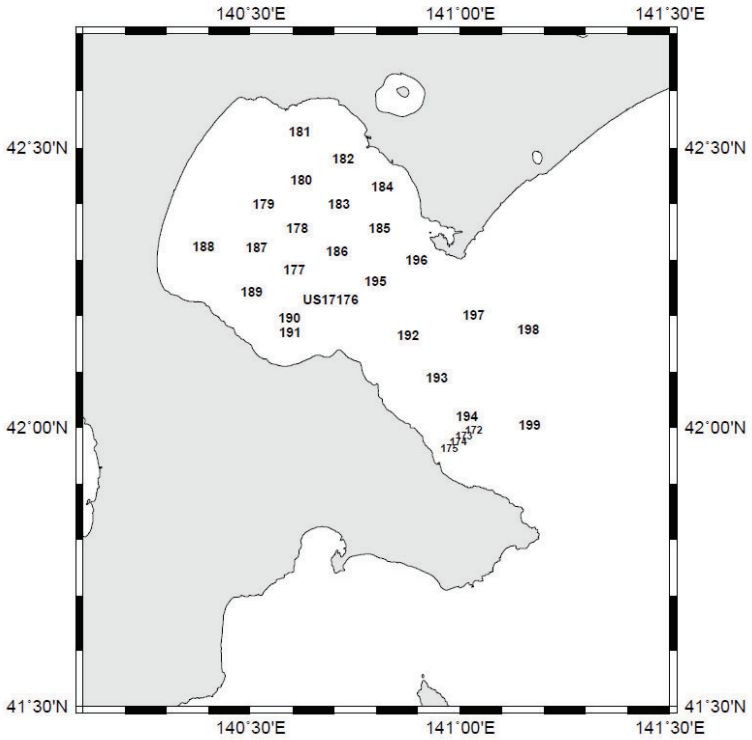


Figure 2. Oceanographic stations (Cruise 386)

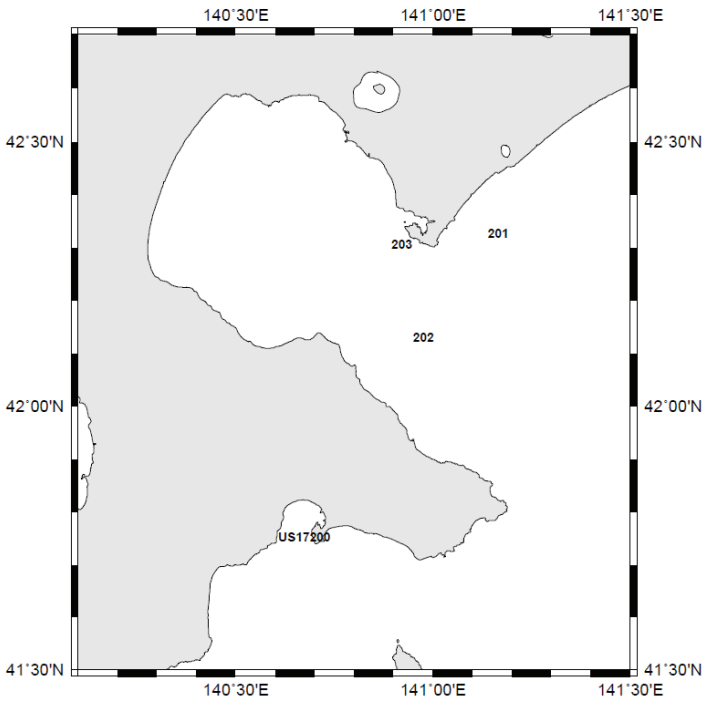


Figure 3. Oceanographic stations (Cruise 387)

Table 1. List of Oceanographic Station

Crs385

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17169	42-16.7	140-36.3	3/21	1433-1440	91	ESE-4	ESE-1	ESE-6	4.8	4.3	o	1007.7
US17170	42-14.0	140-30.0	3/21	1541-1548	78	ESE-4	ESE-1	ESE-6	5.1	4.8	o	1007.3
US17171	42-11.1	140-35.3	3/21	1641-1647	80	East-4	East-1	East-6	4.4	4.8	o	1007.0

Crs386

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17172	41-59.4	141-01.9	4/11	1230-1236	101	East-3	East-1	East-5	5.2	2.0	o	1010.6
US17173	41-58.7	141-00.5	4/11	1246-1253	93	East-3	East-1	East-4	5.7	2.0	o	1010.4
US17174	41-58.1	140-59.7	4/11	1301-1306	88	ESE-2	East-1	ESE-4	5.7	1.6	o	1010.1
US17175	41-57.4	140-58.4	4/11	1316-1322	80	ESE-2	East-1	ESE-4	5.9	1.9	o	1009.7
US17176	42-13.2	140-41.4	4/14	0711-0718	90	WSW-3	West-1	WSW-4	7.7	2.6	bc	1010.3
US17177	42-16.4	140-36.2	4/14	0815-0825	91	WSW-3	West-1	WSW-5	8.3	2.6	bc	1010.0
US17178	42-20.9	140-36.6	4/14	0932-0939	87	WSW-3	WSW-1	WSW-4	9.4	3.2	bc	1009.8
US17179	42-23.4	140-31.8	4/14	1032-1040	95	WSW-3	WSW-1	WSW-4	9.1	3.0	bc	1009.1
US17180	42-26.0	140-37.2	4/14	1136-1143	84	WSW-3	WSW-1	WSW-6	8.7	2.8	bc	1007.7
US17181	42-31.1	140-37.0	4/14	1210-1226	62	WSW-3	WSW-1	WSW-6	9.9	2.5	bc	1007.1
US17182	42-28.3	140-43.2	4/14	1325-1330	61	SSW-3	SW-1	SSW-5	9.5	2.8	bc	1007.7
US17183	42-23.4	140-42.6	4/14	1508-1513	62	SSW-3	SW-1	SSW-4	10.0	2.9	bc	1007.0
US17184	42-25.3	140-48.8	4/14	1604-1608	43	WSW-2	SW-1	WSW-3	10.2	3.2	bc	1007.1
US17185	42-20.8	140-48.4	4/14	1640-1645	53	WNW-2	SW-1	WNW-3	8.5	2.8	bc	1006.8
US17186	42-18.4	140-42.3	4/15	0456-0502	65	SSW-2	WSW-1	SSW-4	7.8	2.9	c	1006.2
US17187	42-18.8	140-30.8	4/15	0700-0708	94	SW-2	WSW-1	SW-4	7.9	3.0	c	1006.3
US17188	42-18.9	140-23.2	4/15	0753-0758	54	SSW-3	SW-1	SSW-4	10.8	3.3	c	1006.5
US17189	42-14.0	140-30.1	4/15	0904-0911	79	SSW-3	SSW-1	SSW-5	10.8	3.6	bc	1007.1
US17190	42-11.3	140-35.5	4/15	1005-1011	81	SSW-2	SSW-1	SSW-3	9.6	3.9	c	1007.8
US17191	42-09.7	140-35.6	4/15	1029-1038	71	SW-3	SSW-1	SW-4	10.7	3.8	bc	1007.6
US17192	42-09.4	140-52.5	4/15	1240-1246	77	NNE-1	SE-1	NNE-3	8.4	3.6	c	1007.3
US17193	42-04.8	140-56.6	4/15	1347-1352	84	West-2	SE-1	West-3	11.4	3.3	c	1007.1
US17194	42-00.7	141-00.9	4/15	1452-1458	91	NW-1	SE-1	NW-2	11.9	3.9	c	1006.6
US17195	42-15.2	140-47.8	4/16	0856-0902	72	SSW-2	WSW-1	SSW-3	12.7	4.1	c	1004.5
US17196	42-17.4	140-53.7	4/16	0959-1004	57	West-3	WSW-1	West-4	12	3.9	c	1005.1
US17197	42-11.6	141-01.9	4/16	1111-1118	80	SSW-2	WNW-1	SSW-4	9.2	2.5	bc	1003.8
US17198	42-10.0	141-09.7	4/16	1220-1228	121	NNW-1	SW-1	NNW-3	10.9	1.7	c	1003.6
US17199	41-59.8	141-09.9	4/16	1419-1428	138	SW-3	SW-1	SW-5	7.6	1.8	bc	1004.1

Crs387

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17200	41-44.6	140-40.4	4/24	1043-1049	57	ESE-1	SE-1	ESE-3	8.4	9.1	bc	1029
US17201	42-19.1	141-09.9	4/25	0753-0800	78	ENE-3	ESE-1	ENE-3	5.1	3.8	o	1026
US17202	42-07.3	140-58.5	4/25	1620-1625	86	ENE-3	ESE-1	ENE-4	5.2	4.6	o	1020.2
US17203	42-17.9	140-55.2	4/26	1106-1111	56	East-2	East-2	East-3	8	4.8	o	1014.6

Table 2. Oceanographic data

STATION US17169
LATITUDE 42-16.7 N
LONGITUI 140-36.3 E
DEPTH (m) 91

Press.	Temp.	Salinity	Sigma-T
5	4.6551	33.2206	26.3026
10	4.6578	33.2293	26.3092
20	4.9116	33.3971	26.4145
30	4.6831	33.5808	26.5854
40	4.6611	33.5961	26.5999
50	4.6501	33.61	26.6121
75	4.6068	33.6157	26.6213
86	4.649	33.659	26.651

STATION US17170
LATITUDE 42-14.0 N
LONGITUI 140-30.0 E
DEPTH (m) 78

Press.	Temp.	Salinity	Sigma-T
5	4.9981	33.5928	26.5599
10	4.9992	33.5926	26.5596
20	4.959	33.5917	26.5634
30	4.7645	33.6152	26.6037
40	4.7343	33.6183	26.6095
50	4.7364	33.6195	26.6103
75	4.7409	33.622	26.6117
76	4.741	33.622	26.612

STATION US17171
LATITUDE 42-11.1 N
LONGITUI 140-35.3 E
DEPTH (m) 80

Press.	Temp.	Salinity	Sigma-T
5	4.9498	33.6092	26.5783
10	4.9497	33.6105	26.5793
20	4.929	33.6156	26.5857
30	4.793	33.6208	26.6051
40	4.7872	33.6227	26.6072
50	4.7242	33.6199	26.6118
75	4.6767	33.6204	26.6175
78	4.671	33.622	26.619

STATION US17172
LATITUDE 41-59.4 N
LONGITUI 141-01.9 E
DEPTH (m) 101

Press.	Temp.	Salinity	Sigma-T
5	2.3462	32.532	25.9686
10	2.4366	32.6565	26.0611
20	2.6765	32.9686	26.2912
30	3.6835	33.1786	26.3684
40	4.7163	33.3685	26.4134
50	5.834	33.5708	26.4438
75	6.0093	33.5603	26.4139
97	5.7017	33.5493	26.443

STATION US17173
LATITUDE 41-58.7 N
LONGITUI 141-00.5 E
DEPTH (m) 93

Press.	Temp.	Salinity	Sigma-T
5	1.8876	32.3721	25.8748
10	2.1828	32.7421	26.1492
20	3.0191	32.9715	26.2643
30	4.2321	33.378	26.4724
40	5.155	33.4302	26.4132
50	5.6799	33.5217	26.4239
75	6.0959	33.6213	26.4512
89	6.1745	33.6162	26.4372

STATION US17174
LATITUDE 41-58.1 N
LONGITUI 140-59.7 E
DEPTH (m) 88

Press.	Temp.	Salinity	Sigma-T
5	1.9853	32.3074	25.8159
10	1.9185	32.3052	25.8189
20	2.4973	32.7834	26.1578
30	1.977	32.874	26.2702
40	2.8653	33.1015	26.3814
50	5.7069	33.5428	26.4372
75	5.9819	33.5797	26.4326
84	5.978	33.6001	26.4492

STATION US17175
LATITUDE 41-57.4 N
LONGITUI 140-58.4 E
DEPTH (m) 80

Press.	Temp.	Salinity	Sigma-T
5	5.0886	32.6311	25.7877
10	4.9783	32.6073	25.781
20	4.6404	32.7447	25.9266
30	1.5499	32.4438	25.9554
40	2.2387	32.8791	26.2546
50	4.4388	33.4586	26.5146
75	5.3994	33.5431	26.4742
77	5.306	33.535	26.478

STATION US17176
LATITUDE 42-13.2 N
LONGITUI 140-41.4 E
DEPTH (m) 90

Press.	Temp.	Salinity	Sigma-T
5	2.8043	32.4731	25.8848
10	2.7891	32.4738	25.8866
20	2.776	32.4838	25.8957
30	2.9045	32.5435	25.9326
40	3.6577	32.9378	26.1792
50	4.0295	33.0608	26.2408
75	4.8645	33.4564	26.4667
88	4.7644	33.5693	26.5673

STATION US17177
LATITUDE 42-16.4 N
LONGITUI 140-36.2 E
DEPTH (m) 91

Press.	Temp.	Salinity	Sigma-T
5	2.9923	32.5447	25.926
10	2.9591	32.5473	25.931
20	2.9237	32.5497	25.9359
30	2.803	32.5545	25.9499
40	3.1249	32.778	26.1007
50	4.5459	33.1561	26.2632
75	4.8688	33.4615	26.4703
85	4.8053	33.5757	26.5679

STATION US17178
LATITUDE 42-20.9 N
LONGITUI 140-36.6 E
DEPTH (m) 87

Press.	Temp.	Salinity	Sigma-T
5	3.1675	32.5924	25.9489
10	3.155	32.5964	25.9532
20	3.1291	32.5976	25.9564
30	2.7016	32.8335	26.1812
40	3.6463	33.1168	26.3228
50	4.4354	33.3161	26.4018
75	4.756	33.6283	26.6151
85	4.7578	33.6271	26.6139

STATION US17179
LATITUDE 42-23.4 N
LONGITUI 140-31.8 E
DEPTH (m) 95

Press.	Temp.	Salinity	Sigma-T
5	3.0267	32.3938	25.8027
10	3.0867	32.4488	25.8414
20	3.3052	32.5784	25.9255
30	3.0989	32.6916	26.0341
40	4.364	33.2474	26.3548
50	4.827	33.4595	26.4733
75	4.7726	33.624	26.6098
92	4.7532	33.6331	26.6191

STATION US17180
LATITUDE 42-26.0 N
LONGITUI 140-37.2 E
DEPTH (m) 84

Press.	Temp.	Salinity	Sigma-T
5	3.0878	32.4043	25.8059
10	2.9894	32.4061	25.8158
20	2.8221	32.4165	25.8381
30	3.2476	32.6009	25.9486
40	2.9613	32.6929	26.047
50	3.6314	33.0764	26.292
75	4.8245	33.5217	26.5229
81	4.7998	33.5581	26.5545

STATION US17181
LATITUDE 42-31.1 N
LONGITUI 140-37.0 E
DEPTH (m) 62

Press.	Temp.	Salinity	Sigma-T
5	2.7626	32.3972	25.8277
10	2.7487	32.3994	25.8306
20	2.637	32.4319	25.8656
30	2.4348	32.534	25.9633
40	2.6136	32.724	26.1009
50	4.4919	33.2211	26.3205
55	4.5719	33.5569	26.5784

STATION US17182
LATITUDE 42-28.3 N
LONGITUI 140-43.2 E
DEPTH (m) 61

Press.	Temp.	Salinity	Sigma-T
5	2.9191	32.3168	25.7504
10	2.8512	32.3151	25.7548
20	2.5916	32.322	25.7814
30	2.6073	32.5879	25.9927
40	3.2577	33.0795	26.3291
50	4.6199	33.4441	26.4838
59	4.8927	33.4751	26.4784

STATION US17183
LATITUDE 42-23.4 N
LONGITUI 140-42.6 E
DEPTH (m) 62

Press.	Temp.	Salinity	Sigma-T
5	3.4301	32.4853	25.84
10	3.3852	32.4867	25.8452
20	3.412	32.4959	25.8501
30	3.0774	32.6568	26.0081
40	4.1105	33.1976	26.3413
50	4.3829	33.2113	26.3242
61	4.3715	33.298	26.3942

STATION US17184
LATITUDE 42-25.3 N
LONGITUI 140-48.8 E
DEPTH (m) 43

Press.	Temp.	Salinity	Sigma-T
5	3.3081	32.2637	25.6745
10	2.8702	32.214	25.6725
20	2.6119	32.2942	25.7577
30	3.2985	32.934	26.2094
40	3.8809	33.1942	26.3617
41	4.0152	33.2523	26.3945

STATION US17185
LATITUDE 42-20.8 N
LONGITUI 140-48.4 E
DEPTH (m) 53

Press.	Temp.	Salinity	Sigma-T
5	3.0132	32.3787	25.7918
10	2.898	32.3712	25.7956
20	2.6016	32.4082	25.8496
30	2.5042	32.4436	25.8856
40	1.8377	32.7144	26.1525
50	3.3357	33.1557	26.3828
52	3.4814	33.1342	26.3523

STATION US17186
LATITUDE 42-18.4 N
LONGITUI 140-42.3 E
DEPTH (m) 65

Press.	Temp.	Salinity	Sigma-T
5	3.1593	32.4664	25.8491
10	3.2651	32.5684	25.9211
20	3.4922	32.5796	25.9095
30	3.2492	32.6136	25.9585
40	4.3511	33.1138	26.2501
50	4.5478	33.2265	26.3188
63	4.6003	33.2914	26.3647

STATION US17187
LATITUDE 42-18.8 N
LONGITUI 140-30.8 E
DEPTH (m) 94

Press.	Temp.	Salinity	Sigma-T
5	3.2332	32.3739	25.7689
10	3.2214	32.3779	25.7732
20	3.1827	32.4457	25.8306
30	3.4411	32.6212	25.9473
40	3.7359	32.9597	26.1891
50	4.4775	33.3262	26.4054
75	4.8054	33.5959	26.5839
91	4.7532	33.6227	26.6109

STATION US17188
LATITUDE 42-18.9 N
LONGITUI 140-23.2 E
DEPTH (m) 54

Press.	Temp.	Salinity	Sigma-T
5	3.4188	32.3312	25.7183
10	3.3201	32.3553	25.7464
20	3.1296	32.348	25.7573
30	2.7367	32.5006	25.9124
40	4.0921	33.2117	26.3544
50	4.5528	33.3819	26.4417
53	4.7274	33.5191	26.5316

STATION US17189
LATITUDE 42-14.0 N
LONGITUI 140-30.1 E
DEPTH (m) 79

Press.	Temp.	Salinity	Sigma-T
5	3.6542	32.3039	25.6749
10	3.2893	32.3494	25.7444
20	2.8927	32.4889	25.8901
30	2.8309	32.5037	25.9071
40	2.8118	32.6661	26.0383
50	3.574	33.1628	26.3662
75	4.7637	33.6268	26.613
76	4.764	33.6266	26.6128

STATION US17190
LATITUDE 42-11.3 N
LONGITUI 140-35.5 E
DEPTH (m) 81

Press.	Temp.	Salinity	Sigma-T
5	3.7316	32.3249	25.6844
10	3.6589	32.3256	25.6917
20	2.9574	32.4698	25.8693
30	3.006	32.5271	25.9108
40	3.0282	32.5864	25.9563
50	3.3721	32.7792	26.0795
75	4.8003	33.5279	26.5305
78	4.8046	33.5481	26.5462

STATION US17191
LATITUDE 42-09.7 N
LONGITUI 140-35.6 E
DEPTH (m) 71

Press.	Temp.	Salinity	Sigma-T
5	4.003	32.2267	25.5802
10	3.7506	32.2846	25.6505
20	3.1506	32.4408	25.8295
30	3.0136	32.4995	25.8882
40	3.0275	32.545	25.9233
50	3.5437	32.7971	26.0779
65	4.7548	33.4832	26.5001

STATION US17192
LATITUDE 42-09.4 N
LONGITUI 140-52.5 E
DEPTH (m) 77

Press.	Temp.	Salinity	Sigma-T
5	3.5237	32.3951	25.7597
10	3.5156	32.4656	25.8165
20	3.3531	32.4978	25.857
30	3.3656	32.4999	25.8575
40	3.1393	32.6204	25.9737
50	4.21	33.283	26.3991
74	5.2547	33.5041	26.4602

STATION US17193
LATITUDE 42-04.8 N
LONGITUI 140-56.6 E
DEPTH (m) 84

Press.	Temp.	Salinity	Sigma-T
5	3.2608	32.3504	25.7478
10	3.1127	32.3657	25.7729
20	2.6902	32.3828	25.8221
30	2.205	32.4113	25.8829
40	2.0288	32.4807	25.9515
50	3.8044	33.0998	26.2939
75	5.2464	33.5415	26.4908
82	5.2527	33.541	26.4897

STATION US17194
LATITUDE 42-00.7 N
LONGITUI 141-00.9 E
DEPTH (m) 91

Press.	Temp.	Salinity	Sigma-T
5	3.163	32.3226	25.7342
10	2.5112	32.4034	25.8529
20	2.502	32.5238	25.9499
30	2.4306	32.6223	26.0343
40	2.5927	33.0261	26.344
50	5.963	33.6178	26.465
75	5.894	33.567	26.433
88	4.968	33.530	26.513

STATION US17195
LATITUDE 42-15.2 N
LONGITUI 140-47.8 E
DEPTH (m) 72

Press.	Temp.	Salinity	Sigma-T
5	3.672	32.24	25.6224
10	3.4106	32.2782	25.6768
20	2.9044	32.2966	25.7356
30	1.6197	32.3622	25.8854
40	2.6189	32.672	26.0589
50	3.8587	33.0614	26.2582
70	4.692	33.354	26.404

STATION US17196
LATITUDE 42-17.4 N
LONGITUI 140-53.7 E
DEPTH (m) 57

Press.	Temp.	Salinity	Sigma-T
5	3.8273	32.2714	25.6328
10	3.306	32.296	25.7004
20	2.8736	32.3316	25.7661
30	2.5601	32.4071	25.852
40	2.4768	32.5948	26.0086
50	3.7213	33.3051	26.4654
54	4.784	33.430	26.454

STATION US17197
LATITUDE 42-11.6 N
LONGITUI 141-01.9 E
DEPTH (m) 80

Press.	Temp.	Salinity	Sigma-T
5	2.2186	32.4086	25.8797
10	1.8969	32.4579	25.9428
20	2.1837	32.5996	26.0352
30	2.048	32.7606	26.1742
40	2.7149	33.0237	26.3319
50	4.1622	33.2699	26.3936
75	5.4051	33.544	26.4742
78	5.4065	33.5406	26.4713

STATION US17198
LATITUDE 42-10.0 N
LONGITUI 141-09.7 E
DEPTH (m) 121

Press.	Temp.	Salinity	Sigma-T
5	3.279	32.4165	25.7988
10	2.3697	32.377	25.8429
20	1.796	32.4258	25.9242
30	1.7107	32.4647	25.9613
40	1.44	32.5091	26.0151
50	0.8872	32.5827	26.1085
75	4.3507	33.2693	26.3736
100	5.6795	33.5445	26.4419
117	5.5081	33.5533	26.4694

STATION US17199
LATITUDE 41-59.8 N
LONGITUI 141-09.9 E
DEPTH (m) 138

Press.	Temp.	Salinity	Sigma-T
5	1.8605	32.3586	25.8658
10	1.8335	32.364	25.8721
20	0.9179	32.3601	25.9278
30	0.7803	32.4373	25.9978
40	2.3067	32.8883	26.2567
50	2.6987	32.9323	26.2603
75	3.8305	33.2425	26.405
100	5.2303	33.4843	26.4474
125	5.477	33.5374	26.4605
134	5.2052	33.5176	26.4766

STATION US17200
LATITUDE 41-44.6 N
LONGITUI 140-40.4 E
DEPTH (m) 57

Press.	Temp.	Salinity	Sigma-T
5	9.1713	33.8429	26.1848
10	9.0622	33.8562	26.2126
20	8.9578	33.8583	26.2308
30	8.8888	33.875	26.2547
40	8.7971	33.8796	26.2727
50	8.8004	33.9191	26.3031
54	8.7655	33.9268	26.3147

STATION US17201
LATITUDE 42-19.1 N
LONGITUI 141-09.9 E
DEPTH (m) 78

Press.	Temp.	Salinity	Sigma-T
5	3.8011	32.2515	25.6194
10	3.6932	32.2516	25.6296
20	3.0261	32.3181	25.7424
30	2.7249	32.3924	25.8269
40	2.8439	32.6887	26.0536
50	3.7746	32.9548	26.1815
71	3.8641	33.0345	26.2362

STATION US17202
LATITUDE 42-07.3 N
LONGITUI 140-58.5 E
DEPTH (m) 86

Press.	Temp.	Salinity	Sigma-T
5	4.2744	32.2815	25.5969
10	3.6831	32.2108	25.598
20	2.2291	32.4905	25.9445
30	2.4599	32.6653	26.0663
40	3.6463	33.1413	26.3423
50	4.9346	33.5631	26.5434
75	4.9612	33.4622	26.4605
80	4.9577	33.463	26.4615

STATION US17203
LATITUDE 42-17.9 N
LONGITUI 140-55.2 E
DEPTH (m) 56

Press.	Temp.	Salinity	Sigma-T
5	4.8615	32.0649	25.3639
10	4.6341	32.1098	25.4237
20	4.6511	32.1714	25.4707
30	4.1628	32.1828	25.5297
40	3.4472	32.3423	25.7245
50	3.2822	32.623	25.9631
50	3.2822	32.623	25.9631

4

THE " USHIO MARU "

CRUISE 388
CRUISE 389
CRUISE 390

IN MAY 2017
IN JUNE 2017

1. Cruise Itinerary

Cruise 388

Departure from Hakodate	May	9, 2017
Start hydrographic research (US17204)		9
Towing frame trawl net		9
Aarrival at Usujiri		9
Departure from Usujiri		10
Towing frame trawl net		10
Retrieving mooring ADCP system		10
Arrival at Muroran		10
Departure from Muroran		11
Towing frame trawl net		11
Setting mooring ADCP system		11
Aarrival at Usujiri		11
Departure from Usujiri		12
Sampling by mid-water trawl net		12
Aarrival at Muroran		12
Departure from Muroran		12
Finish hydrographic research (US17227)		12
Return to Hakodate		13

Total coverage 374.6 miles

Cruise 389

Departure from Hakodate	May.	19, 2017
Aarrival at Usujiri		19
Departure from Usujiri		19
Start hydrographic research (US17228)		19
Hook and line jigging for pointhead flounder		20
Towing frame trawl net		20
Echo sounding research by EK-60		21
Aarrival at Usujiri		21
Departure from Usujiri		21
Towing frame trawl net		21
Towing frame trawl net		22
Observation by underwater camera		22
Aarrival at Hakodate		23
Departure from Hakodate		24
Finish hydrographic research (US17250)		26
Return to Hakodate		26

Total coverage 514.8 miles

Cruise 390

Departure from Hakodate	May.	29, 2017
Start hydrographic research (US17251)		29
Sampling by bottom trawl net		29
Arrival at Aomori		29
Depature from Aomori		30
Sampling by bottom trawl net		30
Arrival ar Noheji		30
Depature from Noheji		31
Sampling by bottom trawl net		31
Arrival at Ominato		31
Depature from Ominato	Jun.	1, 2017
Finish hydrographic research (US17274)		1
Return to Hakodate		2

Total coverage 212.2 miles

2. Data on Temperature, Salinity and Pressure

Hydrographic work on deck and the data processing were made by the deck officers, crews, research staff and cadets of the “Ushio Maru”. Temperature, salinity and pressure were measured by CTD (Seabird SBE-19Plus and SBE-19).

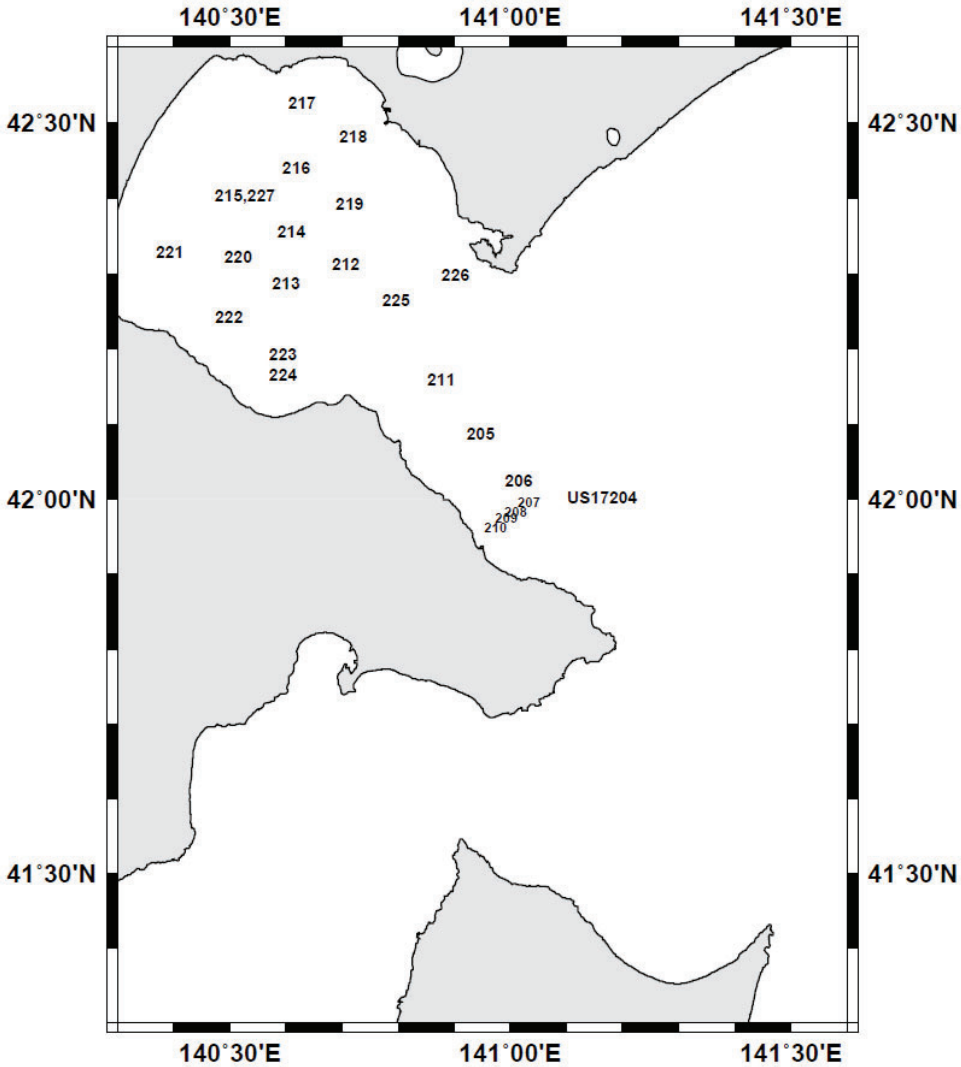


Figure 1. Oceanographic stations (Cruise 388)

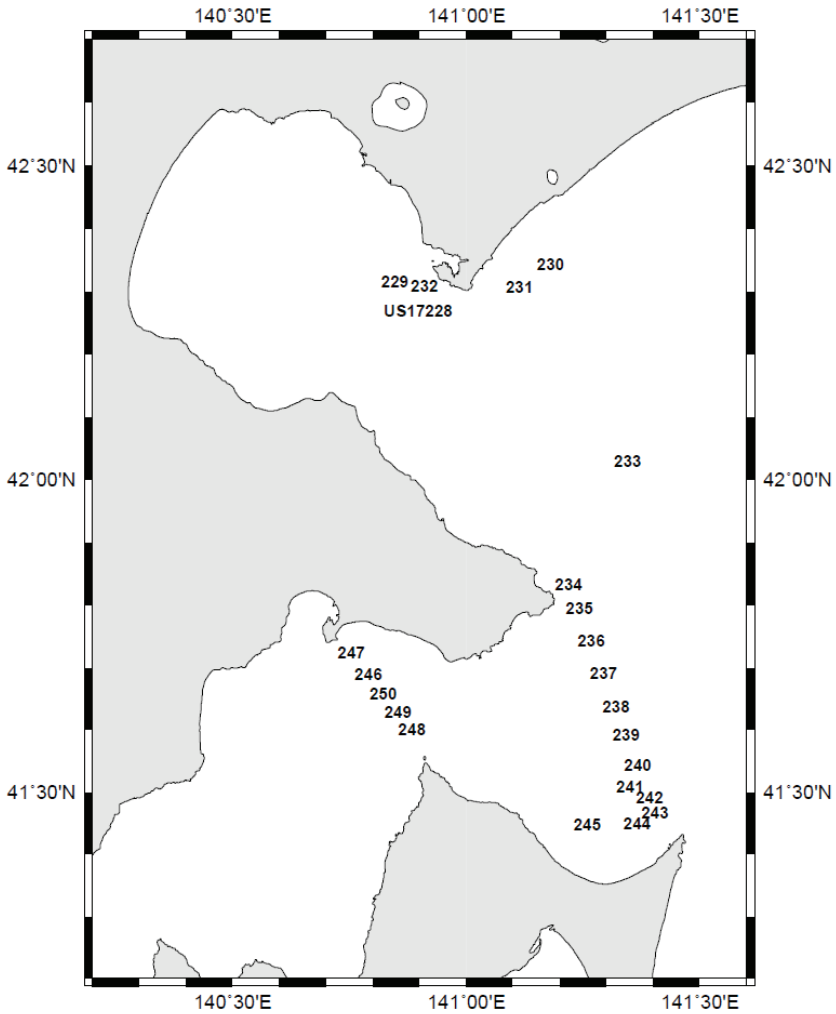


Figure 2. Oceanographic stations (Cruise 389)

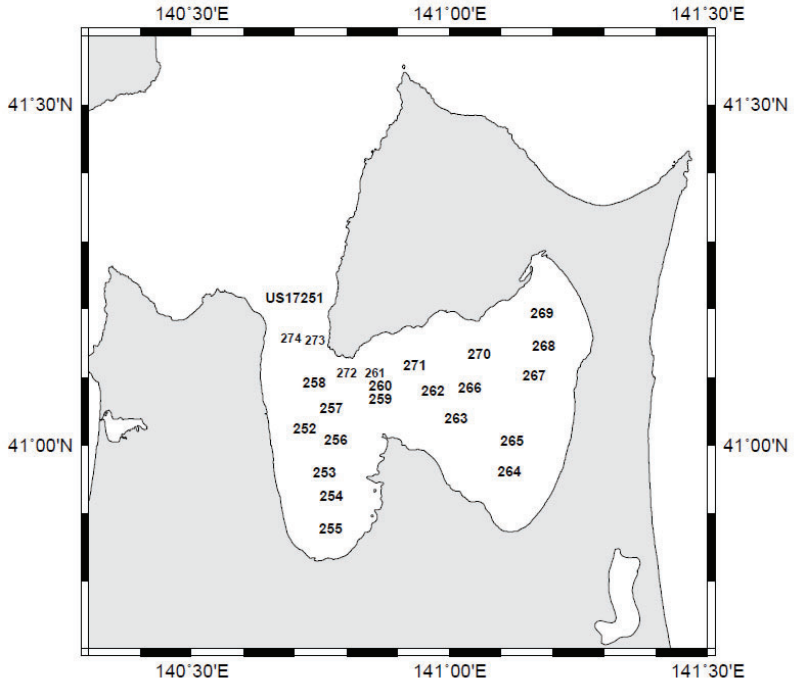


Figure 3. Oceanographic stations (Cruise 390)

Table 1. List of Oceanographic Station

Crs388

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17204	41-59.7	141-09.8	5/9	1154-1204	137	South-2	South-1	South-2	10.1	6.1	b	1019.3
US17205	42-04.8	140-56.8	5/9	1325-1333	84	SE-2	ESE-1	SE-3	12.4	6.7	b	1018.2
US17206	42-01.0	141-00.9	5/9	1433-1441	91	Calm	ESE-1	Calm	11.6	6.6	b	1018.2
US17207	41-59.4	141-02.0	5/9	1514-1523	102	Calm	ESE-1	Calm	15.8	7.3	b	1018.4
US17208	41-58.6	141-00.6	5/9	1534-1541	94	Calm	ESE-1	Calm	13.8	5.9	b	1018.4
US17209	41-58.1	140-59.6	5/9	1549-1557	87	ESE-1	ESE-1	ESE-2	13.2	7.5	b	1018.3
US17210	41-57.4	140-58.4	5/9	1605-1610	80	SE-1	ESE-1	SE-2	14.8	7.7	b	1018.3
US17211	42-09.1	140-52.6	5/10	0615-0620	78	ENE-2	ENE-1	ENE-4	7.8	6.5	c	1017.3
US17212	42-18.3	140-42.4	5/10	0743-0750	62	ESE-2	ESE-1	ESE-4	8.9	7.7	o	1017
US17213	42-16.8	140-36.0	5/10	0904-0913	90	ESE-3	ESE-1	ESE-5	9.3	7.7	o	1016.1
US17214	42-20.9	140-36.6	5/10	1013-1021	82	East-3	East-1	East-5	9.6	7.5	o	1016.2
US17215	42-23.7	140-31.6	5/10	1106-1112	94	East-3	East-1	East-5	9.6	7.7	o	1017.2
US17216	42-26.0	140-37.1	5/10	1158-1206	86	ESE-3	ESE-1	ESE-5	9.3	7.5	o	1014.8
US17217	42-31.1	140-37.7	5/10	1237-1246	61	SE-3	ESE-1	SE-4	9.4	7.4	o	1014.6
US17218	42-28.4	140-43.2	5/10	1336-1342	60	SSE-3	SE-1	SSE-5	9.4	6.5	o	1014
US17219	42-23.1	140-42.8	5/10	1436-1442	60	ESE-3	SE-1	ESE-5	10.1	7.3	o	1012.5
US17220	42-18.9	140-30.9	5/11	0830-0838	93	SSE-2	ESE-1	SSE-3	8.1	7.5	r	1005.8
US17221	42-19.3	140-23.6	5/11	0912-0918	56	South-1	ESE-1	South-2	8.3	7.6	r	1005.5
US17222	42-14.1	140-29.9	5/11	1023-1028	77	Calm	ESE-1	Calm	8.3	7.7	m	1005.7
US17223	42-11.1	140-35.7	5/11	1129-1135	80	Calm	ESE-1	Calm	8.6	7.7	m	1005.6
US17224	42-09.5	140-35.7	5/11	1154-1202	70	Calm	ESE-1	Calm	8.4	7.7	m	1005.6
US17225	42-15.4	140-47.8	5/11	1325-1330	71	Calm	ESE-1	Calm	9.6	7.7	m	1005.6
US17226	42-17.4	140-54.1	5/12	0756-0801	56	East-1	SE-1	East-3	8.1	7.6	o	1015.6
US17227	42-23.8	140-31.3	5/12	1157-1204	95	ESE-2	SE-1	ESE-4	9.8	8	bc	1016.8

Crs389

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17228	42-15.6	140-53.8	5/19	1953-1957	60	Calm	ESE-1	Calm	14.2	11.2	bc	1013.6
US17229	42-18.4	140-50.8	5/19	2051-2054	59	NW-1	SE-1	NW-3	14.1	11.8	bc	1013.6
US17230	42-20.0	141-10.8	5/20	1041-1048	78	ENE-2	ESE-1	ENE-3	10.7	7.8	bc	1013.4
US17231	42-17.9	141-06.8	5/20	1113-1118	71	Calm	ESE-1	Calm	13.5	8.2	bc	1013.3
US17232	42-18.0	140-54.6	5/20	1540-1547	56	Calm	SE-1	Calm	17.2	10.2	bc	1013
US17233	42-01.2	141-20.7	5/21	1615-1635	324	ESE-2	SE-1	ESE-4	9.3	7.7	bc	1014.7
US17234	41-49.4	141-13.1	5/24	1124-1139	169	East-1	East-1	East-2	9.8	7.6	o	1010.6
US17235	41-47.1	141-14.5	5/24	1249-1307	199	West-2	East-1	West-3	14.8	7.9	o	1010.5
US17236	41-44.0	141-16.0	5/24	1333-1352	230	SSW-2	SE-1	SSW-3	13	7.4	o	1010.5
US17237	41-40.9	141-17.6	5/24	1416-1433	232	WSW-2	SE-1	WSW-3	12.1	8.7	o	1010.5
US17238	41-37.7	141-19.2	5/24	1456-1513	214	WSW-2	East-1	WSW-4	12.7	9.4	o	1010.5
US17239	41-34.9	141-20.5	5/24	1532-1554	323	West-2	ESE-1	West-4	13.7	12.1	o	1010.7
US17240	41-32.0	141-22.0	5/24	1615-1632	255	ESE-2	SE-1	ESE-4	13.6	11.9	o	1010.7
US17241	41-29.9	141-21.0	5/24	1737-1756	226	SSE-2	SE-1	SSE-3	13.2	12.1	o	1010.7
US17242	41-28.9	141-23.5	5/24	1811-1820	93	East-2	SE-1	East-3	13.3	12.2	o	1010.8
US17243	41-27.4	141-24.2	5/25	0701-0706	48	NNE-2	NNE-1	NNE-4	11.2	12.1	f	1012.6
US17244	41-26.4	141-21.9	5/25	0727-0734	67	NNE-1	NNE-1	NNE-3	11.1	12	f	1012.1
US17245	41-26.3	141-15.5	5/25	0801-0808	78	NNE-1	NNE-1	NNE-2	10.7	12.1	m	1012.1
US17246	41-40.8	140-47.4	5/25	1143-1200	225	East-1	ENE-1	East-4	13	12	o	1011.9
US17247	41-42.8	140-45.2	5/25	1220-1227	84	ESE-2	East-1	ESE-4	13.4	11.7	o	1011.2
US17248	41-35.5	140-53.0	5/26	0328-0333	43	East-3	East-1	East-5	12.7	13.6	o	1018.8
US17249	41-37.1	140-51.2	5/26	0352-0401	101	East-3	East-1	East-5	12.5	13.1	o	1019.1
US17250	41-38.9	140-49.3	5/26	0417-0442	343	East-3	East-1	East-4	12.6	13.8	o	1019.3

Table 1. List of Oceanographic Station (continued)

Crs390

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17251	41-12.5	140-41.9	5/29	1146-1152	76	West-3	WNW-1	West-5	18.7	13.7	bc	1011.6
US17252	41-01.0	140-43.1	5/29	1328-1336	55	West-3	West-1	West-5	19.2	13.3	bc	1011.1
US17253	40-57.1	140-45.4	5/29	1408-1414	46	West-3	West-1	West-5	19.4	13.5	bc	1011.5
US17254	40-55.1	140-46.2	5/29	1458-1503	40	West-3	West-1	West-4	20.1	13.8	bc	1010.5
US17255	40-52..2	140-46.1	5/29	1527-1531	29	West-3	West-1	West-4	19.5	13.8	bc	1010.7
US17256	41-00.0	140-46.7	5/30	0755-0804	51	Calm	NW-1	Calm	18	13.5	o	1010.1
US17257	41-02.8	140-46.2	5/30	0900-0903	52	Calm	NW-1	Calm	17.5	13.7	o	1010.1
US17258	41-05.1	140-44.2	5/30	0934-0938	60	Calm	NNW-1	Calm	17.4	13.7	o	1009.8
US17259	41-03.6	140-51.9	5/30	1105-1109	50	Calm	WNW-1	Calm	17.4	13.5	c	1009.6
US17260	41-04.8	140-51.9	5/30	1127-1131	51	Calm	WNW-1	Calm	16.5	13.4	c	1009.8
US17261	41-06.0	140-51.3	5/30	1142-1146	51	ESE-1	SSW-1	ESE-2	17.4	13.6	c	1009.6
US17262	41-04.3	140-58.0	5/30	1314-1317	49	Calm	SSW-1	Calm	21.6	14.5	bc	1009.1
US17263	41-01.9	141-00.7	5/30	1338-1342	47	WSW-1	SSW-1	WSE-2	20.2	14.2	bc	1009
US17264	40-57.2	141-06.9	5/30	1430-1435	36	NW-1	NW-1	NW-4	23.8	15.2	bc	1008.5
US17265	40-59.9	141-07.2	5/31	0735-0739	42	South-1	SW-1	South-2	16.9	14.2	c	1007
US17266	41-04.6	141-02.3	5/31	0841-0845	47	South-1	SW-1	South-2	16.2	14.1	bc	1006.8
US17267	41-05.7	141-09.8	5/31	0949-0953	38	West-1	SW-1	West-2	19.4	14.4	bc	1006.5
US17268	41-08.3	141-10.9	5/31	1013-1016	34	NW-3	SW-1	NW-3	18.6	14.4	bc	1006.4
US17269	41-11.2	141-10.7	5/31	1042-1044	28	West-1	SW-1	West-2	19.9	14.4	bc	1006.3
US17270	41-07.6	141-03.4	6/1	0802-0806	38	NE-3	NE-1	NE-5	14.4	14	o	1004.7
US17271	41-06.6	140-55.9	6/1	0848-0852	46	ENE-3	NE-1	ENE-5	14.6	14.5	o	1004.5
US17272	41-06.0	140-48.0	6/1	0929-0935	45	ENE-3	NE-1	ENE-4	15.4	14.3	o	1003.7
US17273	41-08.8	140-44.3	6/1	1004-1016	63	NE-2	ESE-1	NE-4	15.1	13.2	o	1003.2
US17274	41-09.0	140-41.5	6/1	1035-1040	52	East-2	ESE-1	East-3	15.3	14	o	1003.2

Table 2. Oceanographic data

STATION US17204
LATITUDE 41-59.7 N
LONGITUI 141-09.8 E
DEPTH (m) 137

Press.	Temp.	Salinity	Sigma-T
5	5.6078	32.5226	25.6424
10	5.4457	32.5264	25.6643
20	4.8861	32.478	25.6887
30	2.6539	32.7835	26.1452
40	3.2984	32.9858	26.2509
50	2.9912	33.0727	26.3475
75	4.5758	33.4277	26.4756
100	4.9433	33.5612	26.5409
125	4.6346	33.5223	26.5442
132	4.6033	33.5265	26.551

STATION US17205
LATITUDE 42-04.8 N
LONGITUI 140-56.8 E
DEPTH (m) 84

Press.	Temp.	Salinity	Sigma-T
5	6.4018	32.3894	25.4404
10	5.9314	32.3413	25.4604
20	3.7467	32.3086	25.6698
30	3.043	32.6523	26.0076
40	3.4689	32.8667	26.1403
50	3.5794	33.0873	26.3055
75	4.916	33.4238	26.4351
81	4.9056	33.4331	26.4436

STATION US17206
LATITUDE 42-01.0 N
LONGITUI 141-00.9 E
DEPTH (m) 91

Press.	Temp.	Salinity	Sigma-T
5	5.5085	32.6083	25.7217
10	4.8871	32.5921	25.779
20	4.2158	32.5248	25.7961
30	2.9821	32.9367	26.2397
40	4.273	33.1198	26.2629
50	5.2268	33.449	26.4198
75	4.8107	33.4294	26.4512
88	4.6413	33.4796	26.5096

STATION US17207
LATITUDE 41-59.4 N
LONGITUI 141-02.0 E
DEPTH (m) 102

Press.	Temp.	Salinity	Sigma-T
5	5.7179	32.5543	25.6544
10	5.3576	32.6077	25.7388
20	4.6299	32.5713	25.7902
30	3.2243	32.6789	26.0127
40	4.7911	33.2348	26.2991
50	4.4098	33.3094	26.3992
75	5.2089	33.5046	26.4659
97	4.6569	33.4917	26.5175

STATION US17208
LATITUDE 41-58.6 N
LONGITUI 141-00.6 E
DEPTH (m) 94

Press.	Temp.	Salinity	Sigma-T
5	6.0447	32.2133	25.3457
10	5.2523	32.2847	25.495
20	5.0653	32.5294	25.7097
30	3.6368	32.8873	26.141
40	4.4368	33.0558	26.195
50	5.236	33.4271	26.4014
75	4.9162	33.4783	26.4783
89	4.5612	33.4962	26.5315

STATION US17209
LATITUDE 41-58.1 N
LONGITUI 140-59.6 E
DEPTH (m) 87

Press.	Temp.	Salinity	Sigma-T
5	6.7688	32.2158	25.2565
10	5.5347	32.2875	25.465
20	5.0692	32.4437	25.6414
30	4.5876	32.3345	25.6066
40	3.5359	33.1052	26.3239
50	4.7035	33.3035	26.3631
75	4.5588	33.4761	26.5158
83	4.52	33.4922	26.5327

STATION US17210
LATITUDE 41-57.4 N
LONGITUI 140-58.4 E
DEPTH (m) 80

Press.	Temp.	Salinity	Sigma-T
5	7.7365	32.019	24.9707
10	6.8196	32.1449	25.1941
20	6.2374	32.2255	25.3317
30	4.9945	32.3292	25.5588
40	3.9497	32.9915	26.1936
50	4.5296	33.2093	26.3071
73	4.4563	33.4776	26.5279

STATION US17211
LATITUDE 42-09.1 N
LONGITUI 140-52.6 E
DEPTH (m) 78

Press.	Temp.	Salinity	Sigma-T
5	6.6327	32.2467	25.2985
10	6.6104	32.2562	25.3088
20	6.2104	32.286	25.3827
30	4.873	32.368	25.6029
40	2.9581	32.586	25.962
50	2.8075	32.7751	26.1257
71	4.8564	33.3642	26.3945

STATION US17212
LATITUDE 42-18.3 N
LONGITUI 140-42.4 E
DEPTH (m) 62

Press.	Temp.	Salinity	Sigma-T
5	7.7871	32.0868	25.0169
10	7.4684	32.0717	25.0495
20	6.0518	32.0257	25.1965
30	3.1346	32.3892	25.7898
40	2.9539	32.5737	25.9525
50	3.0869	32.6144	25.9735
59	3.5476	32.9767	26.2209

STATION US17213
LATITUDE 42-16.8 N
LONGITUI 140-36.0 E
DEPTH (m) 90

Press.	Temp.	Salinity	Sigma-T
5	7.8631	32.1505	25.0562
10	7.74	32.1446	25.069
20	5.3953	32.1359	25.3607
30	3.5328	32.4364	25.7916
40	3.3972	32.5672	25.9083
50	3.5111	32.6864	25.9928
75	4.7917	33.5377	26.5393
87	4.792	33.611	26.598

STATION US17214
LATITUDE 42-20.9 N
LONGITUI 140-36.6 E
DEPTH (m) 82

Press.	Temp.	Salinity	Sigma-T
5	7.7555	32.1405	25.0636
10	7.7488	32.1395	25.0638
20	5.3976	32.0334	25.2794
30	3.3275	32.4438	25.8162
40	3.4985	32.5843	25.9126
50	3.3479	32.6965	26.0157
75	4.7912	33.5296	26.5329
82	4.8044	33.5955	26.5837

STATION US17215
LATITUDE 42-23.7 N
LONGITUI 140-31.6 E
DEPTH (m) 94

Press.	Temp.	Salinity	Sigma-T
5	7.8057	32.079	25.0082
10	7.648	32.0361	24.9967
20	3.7735	32.3201	25.6765
30	3.5741	32.4979	25.8368
40	3.079	32.5604	25.9311
50	3.5685	32.7846	26.0656
75	4.7903	33.5707	26.5656
82	4.7974	33.6082	26.5946

STATION US17216
LATITUDE 42-26.0 N
LONGITUI 140-37.1 E
DEPTH (m) 86

Press.	Temp.	Salinity	Sigma-T
5	7.736	32.0819	25.0203
10	7.6136	32.0702	25.0282
20	3.6965	32.4274	25.7693
30	3.576	32.4999	25.8383
40	3.5931	32.5519	25.878
50	3.5372	32.75	26.041
72	4.7238	33.4126	26.4474

STATION US17217
LATITUDE 42-31.1 N
LONGITUI 140-37.7 E
DEPTH (m) 61

Press.	Temp.	Salinity	Sigma-T
5	7.3118	32.096	25.09
10	6.8761	32.1085	25.158
20	4.4698	32.3088	25.5986
30	3.4308	32.4895	25.8433
40	3.3331	32.5952	25.9364
50	4.4451	33.2598	26.3562
57	4.7462	33.3491	26.3946

STATION US17218
LATITUDE 42-28.4 N
LONGITUI 140-43.2 E
DEPTH (m) 60

Press.	Temp.	Salinity	Sigma-T
5	6.8355	32.1195	25.172
10	6.616	32.099	25.1842
20	3.812	32.2997	25.6567
30	3.4085	32.5008	25.8544
40	3.3762	32.5855	25.9248
50	3.8293	33.0533	26.2545
57	4.5084	33.2617	26.3509

STATION US17219
LATITUDE 42-23.1 N
LONGITUI 140-42.8 E
DEPTH (m) 60

Press.	Temp.	Salinity	Sigma-T
5	7.5304	32.0985	25.062
10	7.505	32.0906	25.0593
20	5.2187	32.1904	25.4241
30	3.3769	32.4641	25.828
40	3.4639	32.5399	25.8805
50	3.4563	32.6329	25.9552
56	3.5638	32.874	26.1372

STATION US17220
LATITUDE 42-18.9 N
LONGITUI 140-30.9 E
DEPTH (m) 93

Press.	Temp.	Salinity	Sigma-T
5	7.4909	32.0897	25.0605
10	7.3644	32.0878	25.0764
20	3.702	32.2866	25.657
30	3.5403	32.5622	25.8911
40	3.2827	32.5921	25.9384
50	3.1244	32.7501	26.0785
75	4.7956	33.5856	26.5768
91	4.7983	33.5964	26.5851

STATION US17221
LATITUDE 42-19.3 N
LONGITUI 140-23.6 E
DEPTH (m) 56

Press.	Temp.	Salinity	Sigma-T
5	7.8094	32.0174	24.9593
10	7.3666	31.9626	24.9776
20	3.6033	32.4052	25.7603
30	3.339	32.5207	25.8765
40	3.4664	32.6274	25.9499
50	3.4964	32.828	26.1069
55	4.1341	33.1172	26.2751

STATION US17222
LATITUDE 42-14.1 N
LONGITUI 140-29.9 E
DEPTH (m) 77

Press.	Temp.	Salinity	Sigma-T
5	7.6248	32.0488	25.0099
10	7.547	32.1117	25.07
20	4.6384	32.1162	25.4281
30	3.4645	32.5204	25.8649
40	3.0917	32.7028	26.0436
50	3.9734	33.1116	26.2867
74	4.7779	33.5252	26.5308

STATION US17223
LATITUDE 42-11.1 N
LONGITUI 140-35.7 E
DEPTH (m) 80

Press.	Temp.	Salinity	Sigma-T
5	7.7303	32.042	24.9898
10	7.6428	32.058	25.0146
20	4.1658	32.1843	25.5306
30	3.531	32.5108	25.851
40	3.5646	32.6616	25.968
50	3.7123	32.8549	26.108
75	4.7374	33.4695	26.4911
76	4.7342	33.4691	26.4911

STATION US17224
LATITUDE 42-09.5 N
LONGITUI 140-35.7 E
DEPTH (m) 70

Press.	Temp.	Salinity	Sigma-T
5	7.727	32.0847	25.0238
10	6.1653	32.1654	25.2927
20	3.5184	32.4477	25.802
30	3.5734	32.5675	25.8923
40	3.5519	32.7004	26.0001
50	4.0836	33.0422	26.2206
66	4.6099	33.3487	26.4091

STATION US17225
LATITUDE 42-15.4 N
LONGITUI 140-47.8 E
DEPTH (m) 71

Press.	Temp.	Salinity	Sigma-T
5	7.6655	32.1366	25.0731
10	7.4486	32.1399	25.1058
20	6.7863	32.0158	25.0967
30	3.7884	32.4501	25.7786
40	3.3973	32.528	25.877
50	3.3966	32.6207	25.951
68	4.3729	33.2725	26.3738

STATION US17226
LATITUDE 42-17.4 N
LONGITUI 140-54.1 E
DEPTH (m) 56

Press.	Temp.	Salinity	Sigma-T
5	7.691	31.8267	24.8262
10	7.032	31.8359	24.9229
20	3.51	32.4311	25.7896
30	3.3691	32.7339	26.0436
40	3.7951	32.9372	26.1655
50	3.8838	33.033	26.2331
54	4.019	33.1032	26.2756

STATION US17227
LATITUDE 42-23.8 N
LONGITUI 140-31.3 E
DEPTH (m) 95

Press.	Temp.	Salinity	Sigma-T
5	8.2775	32.0187	24.893
10	7.295	32.0206	25.033
20	4.8055	32.1468	25.4347
30	3.6033	32.469	25.8111
40	2.9951	32.431	25.8351
50	3.443	32.7406	26.0422
75	4.7875	33.5301	26.5337
92	4.8007	33.6117	26.5969

STATION US17228
LATITUDE 42-15.6 N
LONGITUI 140-53.8 E
DEPTH (m) 60

Press.	Temp.	Salinity	Sigma-T
5	8.5158	31.6405	24.5614
10	7.1881	32.0057	25.0357
20	5.4534	32.0258	25.2674
30	4.9649	32.3315	25.5639
40	4.277	32.4318	25.716
50	2.9562	32.5393	25.9249
55	3.7596	32.6911	25.9731

STATION US17229
LATITUDE 42-18.4 N
LONGITUI 140-50.8 E
DEPTH (m) 59

Press.	Temp.	Salinity	Sigma-T
5	8.6709	31.6433	24.5404
10	6.8525	31.8393	24.9491
20	6.5309	32.0295	25.1403
30	5.5034	32.1651	25.3718
40	2.9251	32.3737	25.7953
50	2.8639	32.4441	25.8566
53	2.915	32.4586	25.864

STATION US17230
LATITUDE 42-20.0 N
LONGITUI 141-10.8 E
DEPTH (m) 78

Press.	Temp.	Salinity	Sigma-T
5	6.1172	32.6506	25.682
10	6.2039	32.631	25.6558
20	6.8228	32.8453	25.7453
30	5.68	32.6003	25.6952
40	5.2419	32.7116	25.8341
50	3.2437	32.7441	26.0631
73	1.6311	32.7844	26.2233

STATION US17231
LATITUDE 42-17.9 N
LONGITUI 141-06.8 E
DEPTH (m) 71

Press.	Temp.	Salinity	Sigma-T
5	7.5071	32.219	25.1599
10	6.5436	32.6649	25.6396
20	5.6526	32.5782	25.681
30	5.0992	32.7184	25.8556
40	6.6735	33.0302	25.9107
50	3.9919	32.7014	25.9587
65	1.5072	32.7574	26.2099

STATION US17232
LATITUDE 42-18.0 N
LONGITUI 140-54.6 E
DEPTH (m) 56

Press.	Temp.	Salinity	Sigma-T
5	5.4463	32.1443	25.3618
10	4.7958	32.2669	25.5311
20	4.6357	32.4514	25.6944
30	4.0481	32.4401	25.7455
40	3.99	32.441	25.7519
50	3.8192	32.4614	25.7846

STATION US17233
LATITUDE 42-01.2 N
LONGITUI 141-20.7 E
DEPTH (m) 324

Press.	Temp.	Salinity	Sigma-T
5	8.0699	32.3594	25.1905
10	7.8537	32.3099	25.1826
20	6.9921	32.4115	25.3812
30	5.4617	32.4248	25.582
40	6.0643	33.0833	26.0297
50	4.1475	33.1226	26.278
75	4.2142	33.3686	26.4666
100	5.704	33.6015	26.484
125	3.9654	33.3999	26.5168
150	4.1069	33.457	26.548
175	4.1144	33.5014	26.5825
200	4.1475	33.4997	26.5777
250	3.0106	33.4125	26.6169
297	2.964	33.4434	26.6457

STATION US17234
LATITUDE 41-49.4 N
LONGITUI 141-13.1 E
DEPTH (m) 169

Press.	Temp.	Salinity	Sigma-T
5	7.0336	32.2241	25.2282
10	6.6447	32.2397	25.2914
20	5.6078	32.7135	25.7933
30	4.2504	32.6404	25.8844
40	3.496	32.8888	26.1554
50	4.0507	33.134	26.2968
75	5.0194	33.4208	26.4211
100	4.7021	33.4369	26.4692
125	4.2816	33.4545	26.5279
150	3.765	33.439	26.568
151	3.762	33.439	26.568

STATION US17235
LATITUDE 41-47.1 N
LONGITUI 141-14.5 E
DEPTH (m) 199

Press.	Temp.	Salinity	Sigma-T
5	6.924	32.2509	25.2638
10	6.1692	32.334	25.4257
20	5.3101	32.6094	25.7454
30	3.8824	32.5075	25.8152
40	3.3228	32.6758	26.0015
50	3.4515	32.7492	26.0483
75	4.2327	33.2026	26.3328
100	4.6108	33.3706	26.4265
125	4.7018	33.4422	26.4734
150	4.2244	33.4527	26.5325
175	3.841	33.4591	26.5763
185	3.7257	33.4617	26.5897

STATION US17236
LATITUDE 41-44.0 N
LONGITUI 141-16.0 E
DEPTH (m) 230

Press.	Temp.	Salinity	Sigma-T
5	7.0826	32.2049	25.2066
10	5.4092	32.4054	25.5727
20	4.6434	32.4694	25.7079
30	5.2177	32.7345	25.855
40	6.6373	33.1598	26.0174
50	6.56	33.2366	26.0881
75	4.2389	33.1641	26.3016
100	4.0939	33.2714	26.4017
125	4.684	33.428	26.464
150	4.542	33.463	26.507
175	3.678	33.403	26.547
200	3.573	33.437	26.585
220	3.257	33.447	26.622

STATION US17237
LATITUDE 41-40.9 N
LONGITUI 141-17.6 E
DEPTH (m) 232

Press.	Temp.	Salinity	Sigma-T
5	10.6282	33.6314	25.7755
10	10.3326	33.7532	25.9217
20	10.0316	33.8845	26.0756
30	9.5999	33.94	26.191
40	9.5038	33.9444	26.2103
50	9.2099	33.9252	26.243
75	8.0215	33.8471	26.3652
100	7.5411	33.8089	26.405
125	5.8092	33.6661	26.5222
150	4.3239	33.5359	26.5882
175	3.5228	33.488	26.6302
200	3.1472	33.5153	26.6867
221	2.96	33.5057	26.6958

STATION US17238
LATITUDE 41-37.7 N
LONGITUI 141-19.2 E
DEPTH (m) 214

Press.	Temp.	Salinity	Sigma-T
5	11.3419	33.5471	25.5826
10	11.5214	33.801	25.7471
20	10.4346	33.659	25.8307
30	10.4891	33.883	25.9958
40	10.2873	33.9484	26.0818
50	9.9979	33.965	26.1441
75	8.9028	33.8875	26.2623
100	7.6939	33.8024	26.3779
125	6.596	33.729	26.471
150	5.741	33.695	26.553
175	4.723	33.657	26.641
200	3.840	33.593	26.683

STATION US17239
LATITUDE 41-34.9 N
LONGITUI 141-20.5 E
DEPTH (m) 323

Press.	Temp.	Salinity	Sigma-T
5	12.4773	33.8256	25.5857
10	12.4669	33.8251	25.5873
20	12.4816	33.825	25.5843
30	12.5083	33.8227	25.5774
40	12.4244	33.817	25.5892
50	12.214	33.8227	25.6341
75	11.0217	33.9206	25.931
100	10.953	33.920	25.943
125	10.324	33.958	26.083
150	8.961	33.946	26.299
175	8.142	33.850	26.350
200	7.584	33.824	26.411
250	5.702	33.741	26.594
300	3.029	33.579	26.748
310	3.085	33.606	26.765

STATION US17240
LATITUDE 41-32.0 N
LONGITUI 141-22.0 E
DEPTH (m) 255

Press.	Temp.	Salinity	Sigma-T
5	12.1011	33.8668	25.6898
10	12.0642	33.8393	25.6755
20	11.9734	33.8258	25.6821
30	11.9189	33.8307	25.6962
40	11.9365	33.8316	25.6936
50	11.9454	33.83	25.6907
75	11.782	33.838	25.728
100	11.225	33.897	25.876
125	10.431	33.937	26.048
150	9.630	34.015	26.245
175	9.545	34.018	26.261
200	9.383	34.022	26.291
230	9.025	34.014	26.342

STATION US17241
LATITUDE 41-29.9 N
LONGITUI 141-21.0 E
DEPTH (m) 226

Press.	Temp.	Salinity	Sigma-T
5	12.3749	33.7581	25.5531
10	12.3566	33.7302	25.535
20	12.2688	33.739	25.5587
30	11.9676	33.7857	25.6522
40	11.8059	33.8089	25.7005
50	11.5703	33.8524	25.7781
75	11.1566	33.8906	25.8834
100	10.5899	33.9288	26.014
125	9.708	33.9948	26.216
150	9.6799	34.0023	26.2265
175	9.5424	33.9985	26.2462
200	9.4702	34.013	26.2694
210	9.2834	34.0169	26.3029

STATION US17242
LATITUDE 41-28.9 N
LONGITUI 141-23.5 E
DEPTH (m) 93

Press.	Temp.	Salinity	Sigma-T
5	12.4375	33.7241	25.5146
10	12.3821	33.7228	25.5243
20	12.3136	33.7287	25.5421
30	12.2766	33.7365	25.5552
40	11.99	33.7895	25.6509
50	11.9462	33.7978	25.6655
75	11.821	33.8156	25.7029
79	11.6844	33.8334	25.7422

STATION US17243
LATITUDE 41-27.4 N
LONGITUI 141-24.2 E
DEPTH (m) 48

Press.	Temp.	Salinity	Sigma-T
5	12.0352	33.6367	25.5237
10	12.0354	33.7356	25.6004
20	11.6978	33.818	25.7277
30	11.2164	33.897	25.8775
40	10.8655	33.9349	25.9701
41	10.8389	33.9379	25.9772

STATION US17244
LATITUDE 41-26.4 N
LONGITUI 141-21.9 E
DEPTH (m) 67

Press.	Temp.	Salinity	Sigma-T
5	12.0638	33.7212	25.5839
10	12.1077	33.7393	25.5896
20	11.5116	33.8646	25.7985
30	11.2658	33.8972	25.8688
40	11.1249	33.9098	25.9041
50	10.9008	33.927	25.9577
61	9.8131	33.9816	26.1883

STATION US17245
LATITUDE 41-26.3 N
LONGITUI 141-15.5 E
DEPTH (m) 78

Press.	Temp.	Salinity	Sigma-T
5	12.1637	33.7087	25.5552
10	11.8796	33.8034	25.6824
20	11.4612	33.8417	25.7899
30	10.9909	33.897	25.9182
40	10.405	33.937	26.052
50	9.906	33.973	26.166
70	9.474	34.015	26.270

STATION US17246
LATITUDE 41-40.8 N
LONGITUI 140-47.4 E
DEPTH (m) 225

Press.	Temp.	Salinity	Sigma-T
5	11.9165	34.0521	25.8687
10	11.6158	33.9808	25.8695
20	11.0001	33.931	25.9431
30	10.4132	33.9568	26.0666
40	10.1188	33.9686	26.1264
50	9.5938	33.977	26.221
75	9.142	34.024	26.331
100	8.906	34.030	26.373
125	8.892	34.033	26.378
150	8.851	34.032	26.383
175	8.687	34.026	26.405
200	8.445	34.024	26.441

STATION US17247
LATITUDE 41-42.8 N
LONGITUI 140-45.2 E
DEPTH (m) 84

Press.	Temp.	Salinity	Sigma-T
5	12.4762	33.993	25.7157
10	12.3007	33.9848	25.7433
20	11.0976	33.9525	25.9422
30	9.6223	33.9803	26.2188
40	8.8363	34.0076	26.3669
50	8.6875	34.0156	26.3964
71	8.6036	34.0209	26.4135

STATION US17248
LATITUDE 41-35.5 N
LONGITUI 140-53.0 E
DEPTH (m) 43

Press.	Temp.	Salinity	Sigma-T
5	13.186	33.4814	25.1795
10	12.0166	33.8499	25.6928
20	11.2149	33.956	25.9237
30	10.9366	33.9792	25.9919

STATION US17249
LATITUDE 41-37.1 N
LONGITUI 140-51.2 E
DEPTH (m) 101

Press.	Temp.	Salinity	Sigma-T
5	13.5871	33.4963	25.1101
10	13.8324	33.6268	25.1607
20	12.2624	33.8627	25.6558
30	11.6916	33.9019	25.7941
40	11.6068	33.9076	25.8142
50	11.1705	33.95	25.9272
75	10.518	34.020	26.098
91	10.281	34.026	26.143

STATION US17250
LATITUDE 41-38.9 N
LONGITUI 140-49.3 E
DEPTH (m) 343

Press.	Temp.	Salinity	Sigma-T
5	13.6436	33.9592	25.4566
10	13.6271	34.006	25.4961
20	12.5806	34.0112	25.7095
30	11.3854	33.9607	25.8963
40	10.9939	33.9686	25.9734
50	10.8049	34.0126	26.0414
75	10.0965	34.0336	26.1809
100	9.638	34.0377	26.2611
125	9.4921	34.0364	26.2842
150	9.2664	34.0379	26.322
175	9.1531	34.0371	26.3396
200	9.1383	34.0361	26.3412
250	8.8524	34.0259	26.3786
300	8.7262	34.0275	26.3997
321	8.6661	34.0287	26.41

STATION US17251
LATITUDE 41-12.5 N
LONGITUI 140-41.9 E
DEPTH (m) 76

Press.	Temp.	Salinity	Sigma-T
5	13.4241	33.3533	25.0326
10	13.4156	33.3541	25.0349
20	13.0479	33.507	25.2268
30	12.2556	33.6769	25.513
40	11.5989	33.8052	25.7362
50	11.2111	33.8758	25.8621
67	10.3725	33.9879	26.0979

STATION US17252
LATITUDE 41-01.0 N
LONGITUI 140-43.1 E
DEPTH (m) 55

Press.	Temp.	Salinity	Sigma-T
5	13.4984	33.2812	24.9619
10	13.4763	33.2866	24.9705
20	12.7165	33.5049	25.2905
30	11.5585	33.6974	25.6598
40	10.2204	33.6024	25.8233
50	9.9904	33.7811	26.0018
55	10.0066	33.7859	26.0028

STATION US17253
LATITUDE 40-57.1 N
LONGITUI 140-45.4 E
DEPTH (m) 46

Press.	Temp.	Salinity	Sigma-T
5	13.5637	33.2556	24.9288
10	13.5272	33.2567	24.937
20	13.2628	33.2694	25.0001
30	10.5631	33.3817	25.5923
40	10.1031	33.4002	25.6855

STATION US17254
LATITUDE 40-55.1 N
LONGITUI 140-46.2 E
DEPTH (m) 40

Press.	Temp.	Salinity	Sigma-T
5	13.7359	33.3634	24.977
10	13.5407	33.2482	24.9277
20	12.2202	33.3636	25.2766
30	10.8857	33.3735	25.5294
39	10.4391	33.556	25.7497

STATION US17255
LATITUDE 40-52..2 N
LONGITUI 140-46.1 E
DEPTH (m) 29

Press.	Temp.	Salinity	Sigma-T
5	14.3861	33.2395	24.7461
10	13.9832	33.1808	24.785
20	11.7746	33.2753	25.2919
28	11.1637	33.3775	25.4829

STATION US17256
LATITUDE 41-00.0 N
LONGITUI 140-46.7 E
DEPTH (m) 51

Press.	Temp.	Salinity	Sigma-T
5	13.4033	33.2771	24.9779
10	13.4294	33.3085	24.9969
20	12.4677	33.5873	25.4027
30	11.2383	33.512	25.5741
40	10.0802	33.5608	25.8147
50	9.8586	33.798	26.0372

STATION US17257
LATITUDE 41-02.8 N
LONGITUI 140-46.2 E
DEPTH (m) 52

Press.	Temp.	Salinity	Sigma-T
5	13.3594	33.2205	24.9429
10	12.7663	33.2716	25.1
20	11.827	33.2489	25.2615
30	10.3769	33.4853	25.7052
40	9.7637	33.604	25.9014
50	9.9729	33.8094	26.0268

STATION US17258
LATITUDE 41-05.1 N
LONGITUI 140-44.2 E
DEPTH (m) 60

Press.	Temp.	Salinity	Sigma-T
5	13.4001	33.2989	24.9954
10	13.1279	33.2327	24.9986
20	11.9284	33.3272	25.3035
30	11.2191	33.7041	25.727
40	10.1514	33.5206	25.7712
50	9.7108	33.6581	25.9524
58	9.9753	33.8524	26.06

STATION US17259
LATITUDE 41-03.6 N
LONGITUI 140-51.9 E
DEPTH (m) 50

Press.	Temp.	Salinity	Sigma-T
5	13.1454	33.1726	24.9486
10	12.8811	33.284	25.0871
20	12.0423	33.1938	25.1785
30	10.8319	33.2821	25.4677
40	10.2606	33.5047	25.7402
48	9.6561	33.6074	25.9219

STATION US17260
LATITUDE 41-04.8 N
LONGITUI 140-51.9 E
DEPTH (m) 51

Press.	Temp.	Salinity	Sigma-T
5	13.1534	33.243	25.0015
10	12.985	33.2524	25.0422
20	11.403	33.225	25.3211
30	10.5815	33.3311	25.5496
40	10.1178	33.4029	25.6851
49	9.5739	33.6161	25.9422

STATION US17261
LATITUDE 41-06.0 N
LONGITUI 140-51.3 E
DEPTH (m) 51

Press.	Temp.	Salinity	Sigma-T
5	12.5306	33.2599	25.1367
10	12.3758	33.3353	25.225
20	11.3044	33.2791	25.3809
30	10.469	33.3486	25.5827
40	9.7018	33.444	25.7867
49	9.6657	33.5826	25.9009

STATION US17262
LATITUDE 41-04.3 N
LONGITUI 140-58.0 E
DEPTH (m) 49

Press.	Temp.	Salinity	Sigma-T
5	13.5322	33.154	24.8566
10	12.5884	33.1091	25.0087
20	11.6217	33.2387	25.2917
30	10.5342	33.3291	25.5563
40	10.1984	33.4863	25.7366
45	9.0412	33.4411	25.891

STATION US17263
LATITUDE 41-01.9 N
LONGITUI 141-00.7 E
DEPTH (m) 47

Press.	Temp.	Salinity	Sigma-T
5	13.7183	33.1778	24.8372
10	13.389	33.1559	24.8869
20	12.8456	33.1675	25.0039
30	11.6795	33.2079	25.257
40	10.3064	33.3384	25.6027
45	8.9604	33.4812	25.9353

STATION US17264
LATITUDE 40-57.2 N
LONGITUI 141-06.9 E
DEPTH (m) 36

Press.	Temp.	Salinity	Sigma-T
5	14.378	33.1289	24.6625
10	13.8699	33.1664	24.7972
20	13.1637	33.1992	24.9656
30	10.6614	33.2509	25.4733
34	10.3348	33.3527	25.609

STATION US17265
LATITUDE 40-59.9 N
LONGITUI 141-07.2 E
DEPTH (m) 42

Press.	Temp.	Salinity	Sigma-T
5	13.6539	33.1147	24.8015
10	12.9814	33.1723	24.9809
20	12.5497	33.2009	25.0873
30	11.578	33.211	25.2781
40	9.7919	33.3557	25.7028

STATION US17266
LATITUDE 41-04.6 N
LONGITUI 141-02.3 E
DEPTH (m) 47

Press.	Temp.	Salinity	Sigma-T
5	13.9146	33.1419	24.7691
10	13.7666	33.1469	24.8034
20	13.0726	33.1882	24.9752
30	12.12	33.2199	25.1841
40	10.6439	33.3577	25.5595
45	9.994	33.1935	25.5423

STATION US17267
LATITUDE 41-05.7 N
LONGITUI 141-09.8 E
DEPTH (m) 38

Press.	Temp.	Salinity	Sigma-T
5	14.0011	33.1893	24.7879
10	12.9658	33.1818	24.9914
20	11.2337	33.298	25.4084
30	10.8268	33.3113	25.4913
36	10.4106	33.3523	25.5957

STATION US17268
LATITUDE 41-08.3 N
LONGITUI 141-10.9 E
DEPTH (m) 34

Press.	Temp.	Salinity	Sigma-T
5	12.4597	33.0677	25.0011
10	11.5439	33.2561	25.3195
20	11.1615	33.3129	25.433
30	10.2483	33.3282	25.6047
33	9.9198	33.3643	25.6883

STATION US17269
LATITUDE 41-11.2 N
LONGITUI 141-10.7 E
DEPTH (m) 28

Press.	Temp.	Salinity	Sigma-T
5	14.2365	33.1163	24.6825
10	12.4716	33.1753	25.0825
20	11.2543	33.2588	25.3742
25	10.4914	33.3338	25.5674

STATION US17270
LATITUDE 41-07.6 N
LONGITUI 141-03.4 E
DEPTH (m) 38

Press.	Temp.	Salinity	Sigma-T
5	14.2732	33.1727	24.7184
10	14.1471	33.1346	24.7152
20	12.5372	33.1611	25.0589
30	10.7028	33.313	25.5144
36	10.2079	33.3681	25.6428

STATION US17271
LATITUDE 41-06.6 N
LONGITUI 140-55.9 E
DEPTH (m) 46

Press.	Temp.	Salinity	Sigma-T
5	14.4901	33.1725	24.6725
10	13.5147	33.1384	24.8482
20	11.7707	33.2005	25.2344
30	10.524	33.3424	25.5684
40	9.9727	33.4181	25.7214
44	9.9788	33.4262	25.7267

STATION US17272
LATITUDE 41-06.0 N
LONGITUI 140-48.0 E
DEPTH (m) 45

Press.	Temp.	Salinity	Sigma-T
5	13.8106	33.2699	24.8894
10	13.8041	33.2697	24.8905
20	12.7273	33.2999	25.1295
30	10.6642	33.3313	25.5354
40	9.7089	33.4732	25.8083
42	9.7412	33.6486	25.94

STATION US17273
LATITUDE 41-08.8 N
LONGITUI 140-44.3 E
DEPTH (m) 63

Press.	Temp.	Salinity	Sigma-T
5	13.5624	33.3078	24.9694
10	12.7144	33.3289	25.1545
20	11.2152	33.3716	25.4691
30	10.4124	33.3653	25.6056
40	10.1155	33.5109	25.7697
50	10.2733	33.6574	25.8572
61	9.8779	33.7483	25.9951

STATION US17274
LATITUDE 41-09.0 N
LONGITUI 140-41.5 E
DEPTH (m) 52

Press.	Temp.	Salinity	Sigma-T
5	14.4641	33.758	25.1297
10	14.1954	33.7688	25.1948
20	13.6489	33.8071	25.3378
30	13.4432	33.8211	25.3906
40	13.0048	33.7989	25.4614
50	12.4141	33.798	25.5764

5

THE " USHIO MARU "

CRUISE 391
CRUISE 392
CRUISE 393

IN JUNE 2017
IN JULY 2017

1. Cruise Itinerary

Cruise 391

Departure from Hakodate	Jun.	6, 2017
Start hydrographic research (US17275)		6
Calibration of EK-80		6
Noise test for EK-80 and EK-60		7
Sampling by plankton net		7
Arrival at Hakodate		8
Departure from Hakodate		9
Sampling by bottom trawl net		9
Arrival at Muroran		9
Departure from Muroran		9
Sampling by bottom trawl net		10
Arrival at Muroran		10
Departure from Muroran		11
Sampling by bottom trawl net		11
Arrival at Muroran		11
Departure from Muroran		12
Sampling by bottom trawl net		12
Retrieval ADCP mooring system		12
Arrival at Mori		12
Departure from Mori		13
Set ADCP mooring system		13
Finish hydrographic research (US17297)		13
Return to Hakodate		14

Total coverage 483.7 miles

Cruise 392

Departure from Hakodate	Jun.	19, 2017
Start hydrographic research (US17298)		19
Arrival at Ominato		19
Departure from Ominato		20
Finish hydrographic research (US17314)		20
Return to Hakodate		21

Total coverage 167.5 miles

Cruise 393

Departure from Hakodate	Jul.	28, 2017
Start ADCP and echo sounding research		28
Start hydrographic research (US17315)		29
Finish ADCP and echo sounding research		30
Arrival at Hakodate		31
Departure from Hakodate	Aug.	1, 2017
Arrival at Hakodate		3
Departure from Hakodate		5
Calibration of EK-60 and EK-80		5
Hook and line sampling for squid		6
Calibration of EK-60 and EK-80		6
Finish hydrographic research (US17323)		6
Return to Hakodate		7

Total coverage 809.4 miles

2. Data on Temperature, Salinity and Pressure

Hydrographic work on deck and the data processing were made by the deck officers, crews, research staff and cadets of the “Ushio Maru”. Temperature, salinity and pressure were measured by CTD (Seabird SBE-19Plus and SBE-19).

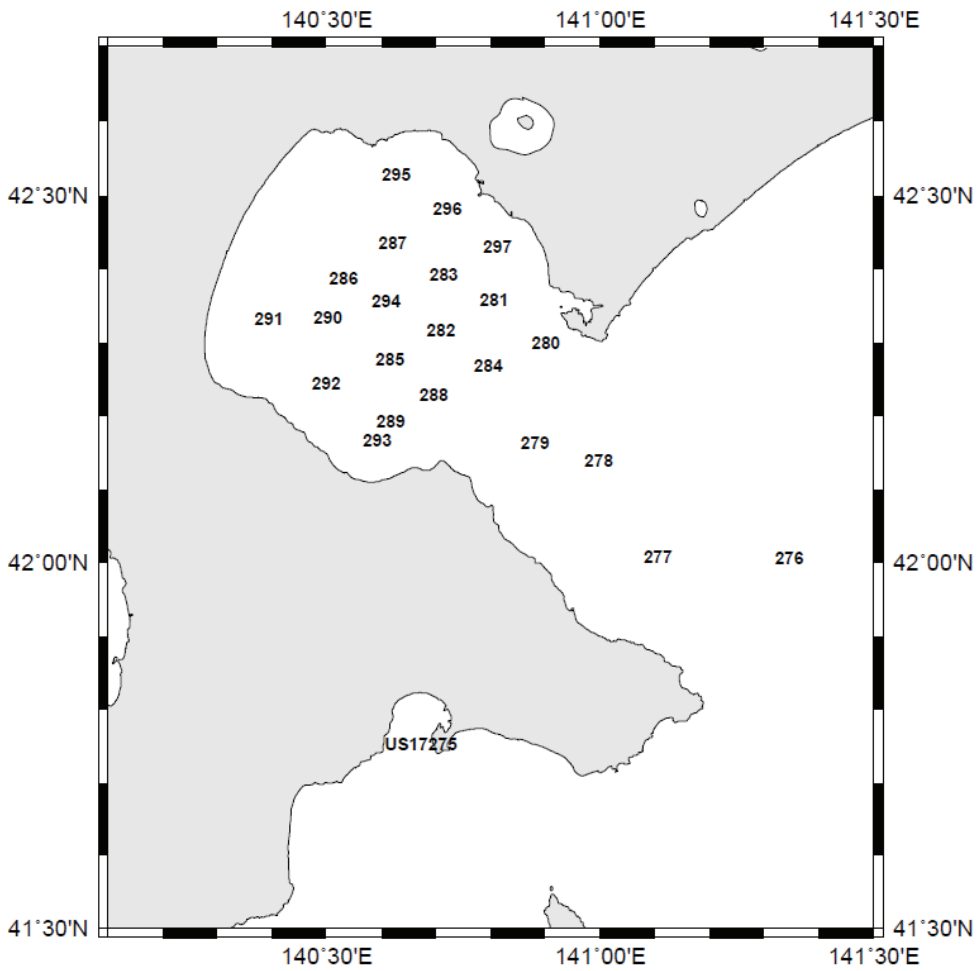


Figure 1. Oceanographic stations (Cruise 391)

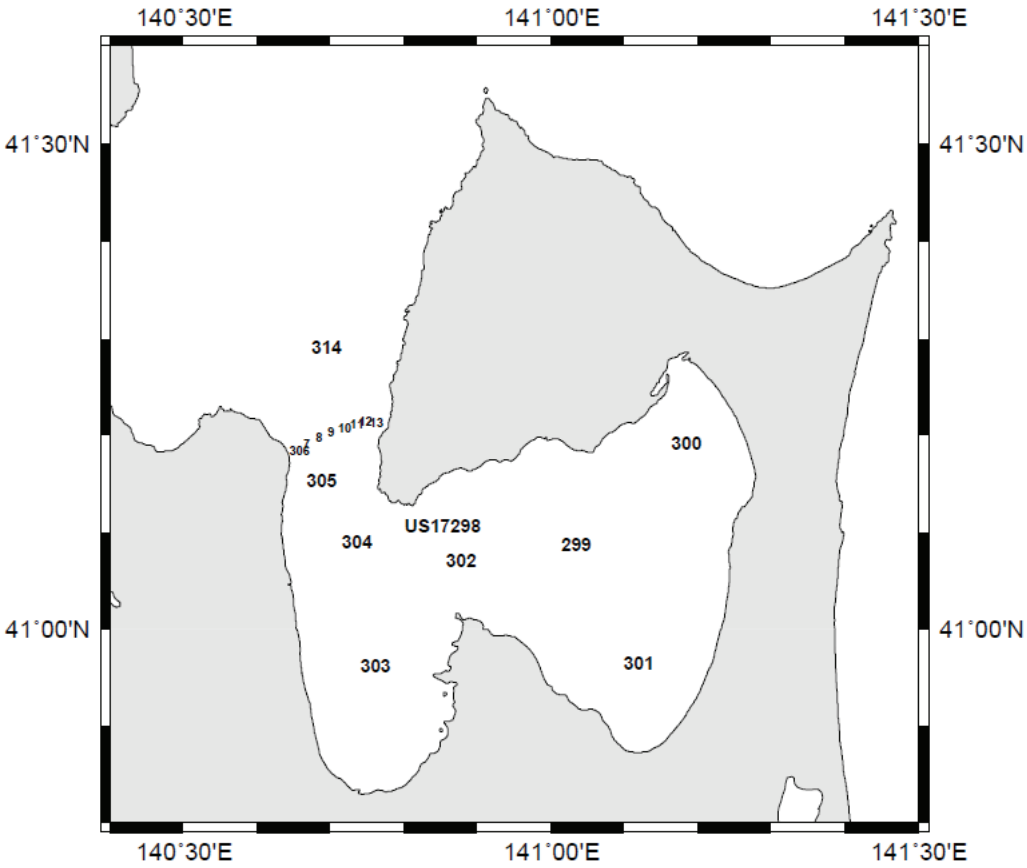


Figure 2. Oceanographic stations (Cruise 392)

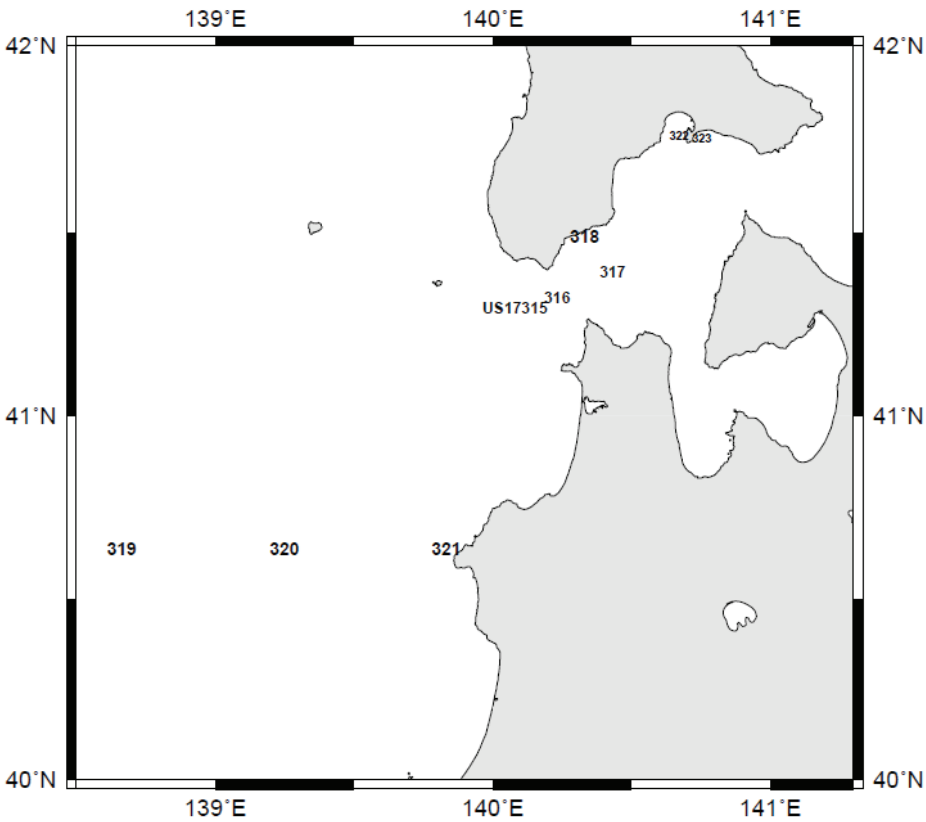


Figure 3. Oceanographic stations (Cruise 393)

Table 1. List of Oceanographic Station

Crs391

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17275	41-44.6	140-40.3	6/6	0908-0914	58	South-1	SSE-1	South-3	13.1	13.2	bc	1021.7
US17276	41-59.9	141-20.7	6/6	1900-1925	323	Calm	SSE-1	Calm	13.6	11.8	b	1019.6
US17277	42-00.0	141-06.3	6/9	1114-1122	120	SSW-3	SE-1	SSW-5	15.9	9.9	bc	1005.6
US17278	42-07.8	140-59.8	6/9	1306-1314	83	SSE-3	SE-1	SSE-4	16.7	10.3	bc	1005
US17279	42-09.3	140-52.8	6/9	1441-1447	78	NE-2	SE-1	NE-3	15.9	11.7	r	1005.5
US17280	42-17.5	140-54.0	6/9	1538-1544	57	East-2	SE-1	East-3	15.1	11.8	o	1004.5
US17281	42-21.0	140-48.3	6/10	1239-1245	51	East-2	East-1	East-4	12.8	10.9	r	1000.7
US17282	42-18.5	140-42.5	6/10	1317-1324	62	East-2	East-1	East-4	12.4	11.7	o	999.5
US17283	42-23.0	140-42.8	6/10	1427-1434	56	East-2	East-1	East-3	12.3	11.6	o	999.6
US17284	42-15.6	140-47.7	6/11	0754-0801	70	West-2	East-1	West-4	11.8	10.3	bc	1006.2
US17285	42-16.1	140-36.9	6/11	0851-0900	89	WNW-2	East-1	WNW-4	13	11.9	bc	1006.6
US17286	42-22.7	140-31.8	6/11	1047-1054	96	NW-2	East-1	NW-3	13.7	12.3	c	1007.1
US17287	42-25.6	140-37.2	6/11	1256-1301	83	WNW-2	NW-1	WNW-4	14.5	12.1	c	1007.1
US17288	42-13.2	140-41.7	6/12	0835-0841	89	SSE-2	SE-1	SSE-4	11	11.3	o	1013.2
US17289	42-11.0	140-37.0	6/12	0909-0917	81	ESE-2	SE-1	ESE-3	12.7	11.9	o	1013.6
US17290	42-19.5	140-30.1	6/12	1119-1127	92	South-2	SE-1	South-3	16.2	12.6	bc	1014
US17291	42-19.4	140-23.6	6/12	1200-1205	56	ESW-2	SE-1	ESE-3	15.7	13.5	bc	1013.9
US17292	42-14.1	140-29.9	6/12	1343-1348	77	SSE-1	SE-1	SSE-2	15.7	13.5	bc	1013.5
US17293	42-09.5	140-35.5	6/12	1433-1438	70	SSE-2	SE-1	SSE-2	17.3	13.1	bc	1013.2
US17294	42-20.8	140-36.5	6/13	0908-0914	87	NW-2	SE-1	NW-2	13	12.6	b	1016.3
US17295	42-31.1	140-37.6	6/13	1027-1035	61	SSW-2	SE-1	SSW-2	17.2	13.5	b	1016.1
US17296	42-28.4	140-43.2	6/13	1109-1114	59	Calm	SE-1	Calm	13.7	13.4	bc	1015.8
US17297	42-25.3	140-48.7	6/13	1146-1150	42	NNW-1	SE-1	NNW-2	14.9	13.5	bc	1015.5

Crs392

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17298	41-06.0	140-51.1	6/19	1226-1233	52	East-3	East-1	East-4	18.3	16.8	c	1013.7
US17299	41-04.8	140-02.0	6/19	1326-1332	47	ESE-3	East-1	ESE-5	18.2	16.6	o	1013.8
US17300	41-11.1	141-11.0	6/19	1538-1543	29	East-2	East-1	East-3	17.9	17.4	c	1014
US17301	40-57.5	141-07.1	6/20	0741-0749	36	Calm	NNE-1	Calm	16	16.7	bc	1014.3
US17302	41-03.8	140-52.6	6/20	0908-0914	50	Calm	NNE-1	Calm	17.4	15.8	bc	1014.5
US17303	40-57.3	140-45.6	6/20	1009-1015	50	NE-2	NNE-1	NE-2	20.8	17.5	bc	1014.5
US17304	41-05.0	140-44.1	6/20	1133-1140	59	NE-2	NNE-1	NE-2	18.6	17.3	bc	1014.3
US17305	41-08.8	140-41.2	6/20	1208-1214	48	North-2	NNE-1	North-3	18	17.4	bc	1014
US17306	41-10.8	140-39.4	6/20	1234-1239	39	North-2	North-1	North-3	17.8	17.3	bc	1013.9
US17307	41-11.2	140-40.0	6/20	1251-1256	54	North-2	North-1	North-3	19.3	16.8	bc	1013.7
US17308	41-11.6	140-41.0	6/20	1307-1313	66	North-2	North-1	North-3	19.2	16.7	bc	1013.6
US17309	41-11.9	140-42.0	6/20	1321-1328	74	North-2	North-1	North-3	18.6	17.6	bc	1013.6
US17310	41-12.2	140-43.1	6/20	1336-1344	72	North-2	North-1	North-4	20.8	17.5	bc	1013.6
US17311	41-12.4	140-44.1	6/20	1352-1359	70	North-2	North-1	North-3	21.6	17.6	bc	1013.6
US17312	41-12.6	140-44.8	6/20	1406-1416	67	North-2	North-1	North-3	20.6	17.9	bc	1013.6
US17313	41-12.5	140-45.7	6/20	1424-1430	55	North-2	North-1	North-3	21.8	18	bc	1013.6
US17314	41-17.0	140-41.6	6/20	1505-1516	147	North-2	North-1	North-3	19.2	17.6	bc	1013.6

Crs393

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17315	41-16.7	140-04.8	7/29	1333-1349	281	NE-1	ENE-1	NE-3	26.1	24.5	bc	1012.1
US17316	41-18.3	140-13.9	7/29	1432-1446	256	NE-1	ENE-1	NE-3	24.5	24.2	bc	1011.8
US17317	41-22.6	140-25.9	7/29	1534-1551	251	East-1	ENE-1	East-2	25	24.6	bc	1011.8
US17318	41-28.2	140-19.8	7/29	1717-1723	62	East-1	ENE-1	East-2	23.5	19.8	bc	1011.7
US17319	40-37.0	138-39.8	8/1	1912-1936	3267	North-2	NNE-1	North-4	25	25.8	bc	1011.7
US17320	40-37.0	139-14.9	8/2	0004-0029	2785	NE-2	NNE-1	NE-4	24.3	24.5	bc	1012.1
US17321	40-37.1	139-49.9	8/2	0653-0704	115	NE-2	North-1	NE-2	26.9	25.2	bc	1012.6
US17322	41-44.8	140-40.3	8/5	0920-0925	54	Calm	SE-1	Calm	23.2	22.4	o	1012
US17323	41-44.5	140-45.2	8/6	0650-0655	56	East-2	East-1	East-4	22.3	22.3	o	1010.1

Table 2. Oceanographic data

STATION US17275
LATITUDI 41-44.6 N
LONGITU 140-40.3 E
DEPTH (m 58

Press.	Temp.	Salinity	Sigma-T
5	13.1519	33.8526	25.4737
10	12.3905	33.8535	25.624
20	11.625	34.0139	25.8935
30	10.8845	34.066	26.0688
40	10.7364	34.0497	26.0825
50	10.3108	34.0755	26.1769
54	10.273	34.0773	26.1848

STATION US17276
LATITUDI 41-59.9 N
LONGITU 141-20.7 E
DEPTH (m 323

Press.	Temp.	Salinity	Sigma-T
5	11.1294	32.2666	24.6248
10	9.9933	32.2401	24.7986
20	6.6142	32.5747	25.5588
30	4.8072	32.8538	25.9952
40	5.9832	33.2382	26.1627
50	6.1942	33.3709	26.2411
75	5.7722	33.5256	26.4157
100	5.4991	33.5276	26.4501
125	4.239	33.4078	26.4953
150	3.6127	33.3843	26.539
175	3.4412	33.4086	26.5746
200	3.3978	33.413	26.5822
250	2.7787	33.3934	26.6219
297	2.8039	33.4735	26.6837

STATION US17277
LATITUDI 42-00.0 N
LONGITU 141-06.3 E
DEPTH (m 120

Press.	Temp.	Salinity	Sigma-T
5	10.1948	32.1643	24.7061
10	9.7039	32.1228	24.7545
20	9.2338	32.6557	25.2461
30	5.8168	32.5935	25.6736
40	4.7955	32.8795	26.0168
50	4.7951	33.0095	26.12
75	5.0714	33.3167	26.3328
100	5.0188	33.3707	26.3815
116	4.926	33.403	26.417

STATION US17278
LATITUDI 42-07.8 N
LONGITU 140-59.8 E
DEPTH (m 83

Press.	Temp.	Salinity	Sigma-T
5	9.8208	31.8099	24.4911
10	8.7923	32.0143	24.8128
20	6.7559	32.42	25.419
30	5.5144	32.6447	25.7498
40	4.916	32.684	25.8487
50	4.686	32.737	25.916
75	4.690	32.984	26.111
80	4.816	33.106	26.194

STATION US17279
LATITUDI 42-09.3 N
LONGITU 140-52.8 E
DEPTH (m 78

Press.	Temp.	Salinity	Sigma-T
5	11.1885	32.1009	24.4854
10	10.0517	32.2838	24.823
20	8.4523	32.4114	25.1747
30	6.4648	32.717	25.6907
40	5.7796	32.7208	25.7786
50	5.3208	32.7315	25.8409
75	4.1067	33.3421	26.4566
75	4.1067	33.3421	26.4566

STATION US17280
LATITUDI 42-17.5 N
LONGITU 140-54.0 E
DEPTH (m 57

Press.	Temp.	Salinity	Sigma-T
5	10.3378	31.4808	24.1494
10	9.6503	31.9481	24.6268
20	8.504	32.3013	25.0809
30	6.7543	32.5946	25.5568
40	6.408	32.7426	25.7181
50	5.7195	32.6955	25.7659
55	5.1711	32.7367	25.862

STATION US17281
LATITUDI 42-21.0 N
LONGITU 140-48.3 E
DEPTH (m 51

Press.	Temp.	Salinity	Sigma-T
5	10.4069	31.548	24.1902
10	10.4084	31.6666	24.2823
20	10.0417	32.0675	24.656
30	7.3304	32.1449	25.1257
40	6.0843	32.5796	25.6301
48	5.3407	32.6894	25.8053

STATION US17282
LATITUDI 42-18.5
LONGITU 140-42.5
DEPTH (m 62

Press.	Temp.	Salinity	Sigma-T
5	11.2963	31.5742	24.057
10	11.0845	31.6662	24.1659
20	9.9483	32.2846	24.8408
30	5.4209	32.2675	25.4622
40	4.1328	32.4378	25.7352
50	3.6714	32.5543	25.8726
60	3.192	32.7541	26.0757

STATION US17283
LATITUDI 42-23.0 N
LONGITU 140-42.8 E
DEPTH (m 56

Press.	Temp.	Salinity	Sigma-T
5	11.7652	31.4784	23.8984
10	11.525	31.6271	24.0572
20	10.7726	31.7257	24.2663
30	6.2994	32.3294	25.4059
40	5.018	32.4759	25.6725
50	5.4184	32.7209	25.8213
59	5.1554	32.7062	25.8396

STATION US17284
LATITUDI 42-15.6 N
LONGITU 140-47.7 E
DEPTH (m 70

Press.	Temp.	Salinity	Sigma-T
5	10.5983	31.7135	24.2867
10	10.3651	32.1396	24.6582
20	6.9334	32.1514	25.1839
30	6.0763	32.5383	25.5985
40	4.1161	32.5352	25.8143
50	3.493	32.637	25.9551
66	3.786	33.0978	26.2942

STATION US17285
LATITUDI 42-16.1 N
LONGITU 140-36.9 E
DEPTH (m 89

Press.	Temp.	Salinity	Sigma-T
5	11.9792	31.6239	23.9721
10	11.8611	31.6037	23.9781
20	9.9737	31.8115	24.4676
30	6.2081	32.0994	25.2356
40	4.6912	32.4554	25.6918
50	4.3511	32.4899	25.7546
75	4.052	33.0871	26.2594
85	4.7275	33.485	26.5045

STATION US17286
LATITUDI 42-22.7 N
LONGITU 140-31.8 E
DEPTH (m 96

Press.	Temp.	Salinity	Sigma-T
5	12.0562	31.1183	23.5658
10	10.6302	31.38	24.0216
20	8.0721	31.8768	24.8115
30	5.8371	32.1929	25.3546
40	4.181	32.4144	25.7119
50	3.7137	32.5574	25.8711
75	4.6331	33.3894	26.4389
92	4.7296	33.462	26.486

STATION US17287
LATITUDI 42-25.6 N
LONGITU 140-37.2 E
DEPTH (m 83

Press.	Temp.	Salinity	Sigma-T
5	12.2417	31.4081	23.7561
10	11.3541	31.663	24.1157
20	7.512	31.958	24.9542
30	6.0773	32.082	25.238
40	5.3078	32.2731	25.4796
50	4.0029	32.4171	25.7316
75	3.6089	32.9535	26.1963
80	3.7279	33.0791	26.2849

STATION US17288
LATITUDI 42-13.2 N
LONGITU 140-41.7 E
DEPTH (m 89

Press.	Temp.	Salinity	Sigma-T
5	11.0524	31.6263	24.1405
10	10.5776	31.968	24.4884
20	6.7713	32.0093	25.0933
30	5.2159	32.2825	25.4974
40	3.9415	32.4685	25.7785
50	3.6065	32.5636	25.8861
75	4.6264	33.3486	26.4073
84	4.6263	33.3972	26.4459

STATION US17289
LATITUDI 42-11.0 N
LONGITU 140-37.0 E
DEPTH (m 81

Press.	Temp.	Salinity	Sigma-T
5	12.1581	31.6173	23.9339
10	12.1049	31.6169	23.9434
20	9.4637	31.8344	24.5677
30	6.5205	32.0681	25.172
40	4.6527	32.3576	25.6182
50	3.6348	32.5124	25.8427
75	3.2793	32.9316	26.2094
79	3.848	33.116	26.303

STATION US17290
LATITUDI 42-19.5 N
LONGITU 140-30.1 E
DEPTH (m 92

Press.	Temp.	Salinity	Sigma-T
5	12.6645	31.1552	23.4805
10	11.8135	31.3352	23.7782
20	7.465	31.9172	24.9281
30	5.6225	32.2412	25.4181
40	4.916	32.4369	25.6529
50	3.5798	32.5236	25.8568
75	4.102	33.082	26.250
89	4.5922	33.3821	26.4376

STATION US17291
LATITUDI 42-19.4 N
LONGITU 140-23.6 E
DEPTH (m 56

Press.	Temp.	Salinity	Sigma-T
5	13.5908	30.6875	22.9389
10	12.3813	31.2949	23.6423
20	7.8963	31.9474	24.892
30	5.4876	32.2254	25.4213
40	4.2715	32.4281	25.7137
50	3.7359	32.5374	25.8531
54	3.6983	32.5434	25.8614

STATION US17292
LATITUDI 42-14.1 N
LONGITU 140-29.9 E
DEPTH (m 77

Press.	Temp.	Salinity	Sigma-T
5	12.5949	31.2071	23.534
10	12.0578	31.2987	23.7053
20	8.3098	31.8503	24.7562
30	5.8522	32.156	25.3236
40	5.268	32.4504	25.6243
50	4.2382	32.4978	25.7723
74	4.0818	33.1272	26.2883

STATION US17293
LATITUDI 42-09.5 N
LONGITU 140-35.5 E
DEPTH (m 70

Press.	Temp.	Salinity	Sigma-T
5	12.2768	31.5756	23.8794
10	12.1534	31.6028	23.9235
20	9.7175	31.7769	24.4822
30	6.7981	32.0148	25.0943
40	4.8738	32.2897	25.5408
50	4.2743	32.5248	25.7901
68	3.6817	32.8521	26.1087

STATION US17294
LATITUDI 42-20.8 N
LONGITU 140-36.5 E
DEPTH (m 87

Press.	Temp.	Salinity	Sigma-T
5	12.6071	31.3828	23.6677
10	10.6936	31.54	24.1354
20	10.0309	32.1036	24.686
30	6.2932	32.0842	25.2132
40	4.8334	32.3076	25.5593
50	4.2056	32.5422	25.8109
75	4.0569	33.1007	26.2698
82	4.6438	33.385	26.4343

STATION US17295
LATITUDI 42-31.1 N
LONGITU 140-37.6 E
DEPTH (m 61

Press.	Temp.	Salinity	Sigma-T
5	12.7647	31.0421	23.3739
10	11.1965	31.5832	24.0816
20	6.5196	32.0569	25.1633
30	5.1877	32.3129	25.5246
40	4.1802	32.4404	25.7325
50	3.674	32.5505	25.8694
57	3.6436	32.6457	25.948

STATION US17296
LATITUDI 42-28.4 N
LONGITU 140-43.2 E
DEPTH (m 59

Press.	Temp.	Salinity	Sigma-T
5	12.5854	31.5427	23.7957
10	12.1557	31.5706	23.8981
20	7.4994	31.9651	24.9615
30	5.9784	32.1587	25.3106
40	4.8496	32.4427	25.6646
50	3.8472	32.4934	25.8075
53	3.9796	32.5234	25.8184

STATION US17297
LATITUDI 42-25.3 N
LONGITU 140-48.7 E
DEPTH (m 42

Press.	Temp.	Salinity	Sigma-T
5	12.726	31.4218	23.6753
10	12.1691	31.5337	23.867
20	8.3065	32.2563	25.0751
30	7.1125	32.4788	25.4181
38	4.4583	32.547	25.7889

STATION US17298
LATITUDI 41-06.0 N
LONGITU 140-51.1 E
DEPTH (m 52

Press.	Temp.	Salinity	Sigma-T
5	16.7676	33.2359	24.215
10	16.226	33.281	24.3744
20	14.8003	33.4616	24.8292
30	13.7153	33.5423	25.1195
40	12.3226	33.5037	25.3657
48	10.2778	33.3805	25.6404

STATION US17299
LATITUDI 41-04.8 N
LONGITU 140-02.0 E
DEPTH (m 47

Press.	Temp.	Salinity	Sigma-T
5	16.4467	33.0584	24.153
10	16.1809	33.0596	24.2145
20	15.3793	33.2899	24.5709
30	13.1724	33.137	24.9157
40	11.4969	33.3001	25.3623
43	10.6966	33.3698	25.5597

STATION US17300
LATITUDI 41-11.1 N
LONGITU 141-11.0 E
DEPTH (m 29

Press.	Temp.	Salinity	Sigma-T
5	15.7821	33.0946	24.3313
10	15.5176	33.0802	24.379
20	14.7467	33.0458	24.5201
25	14.2755	33.2663	24.7902

STATION US17301
LATITUDI 40-57.5 N
LONGITU 141-07.1 E
DEPTH (m 36

Press.	Temp.	Salinity	Sigma-T
5	16.5136	32.954	24.0574
10	16.3288	32.9645	24.1078
20	14.2658	33.2871	24.8082
30	13.2584	33.5261	25.1996
32	13.3026	33.5654	25.2211

STATION US17302
LATITUDI 41-03.8 N
LONGITU 140-52.6 E
DEPTH (m 50

Press.	Temp.	Salinity	Sigma-T
5	15.612	33.398	24.603
10	15.589	33.4091	24.6163
20	14.79	33.5385	24.8907
30	14.3575	33.5726	25.0092
40	13.5115	33.6074	25.2114
46	12.1819	33.717	25.5582

STATION US17303
LATITUDI 40-57.3 N
LONGITU 140-45.6 E
DEPTH (m 50

Press.	Temp.	Salinity	Sigma-T
5	16.4973	33.1486	24.2104
10	15.0774	33.3796	24.706
20	14.518	33.5461	24.9548
30	14.1395	33.6415	25.1082
40	13.2708	33.6749	25.3123
46	12.7136	33.7466	25.4784

STATION US17304
LATITUDI 41-05.0 N
LONGITU 140-44.1 E
DEPTH (m 59

Press.	Temp.	Salinity	Sigma-T
5	16.7261	33.2216	24.2137
10	16.4107	33.2599	24.3159
20	14.8275	33.5527	24.8936
30	14.5608	33.6503	25.026
40	12.0955	33.7118	25.5705
50	10.9743	33.8375	25.8749
54	10.7441	34.0631	26.0915

STATION US17305
LATITUDI 41-08.8 N
LONGITUI 140-41.2 E
DEPTH (m 48

Press.	Temp.	Salinity	Sigma-T
5	16.572	33.3209	24.3256
10	16.2763	33.3337	24.4034
20	14.777	33.6122	24.9503
30	13.2326	33.7464	25.3753
40	11.2143	33.7719	25.7806
45	11.0728	33.9758	25.9649

STATION US17306
LATITUDI 41-10.8 N
LONGITUI 140-39.4 E
DEPTH (m 39

Press.	Temp.	Salinity	Sigma-T
5	15.706	33.5783	24.7203
10	15.4616	33.6058	24.7959
20	15.3549	33.623	24.8328
30	15.1057	33.6421	24.9021
34	14.9178	33.6566	24.9541

STATION US17307
LATITUDI 41-11.2 N
LONGITUI 140-40.0 E
DEPTH (m 54

Press.	Temp.	Salinity	Sigma-T
5	15.8185	33.5795	24.6961
10	15.4631	33.6092	24.7982
20	14.5503	33.7299	25.0897
30	14.0201	33.7587	25.2237
40	12.6615	33.8054	25.5341
50	12.0123	33.9701	25.7871

STATION US17308
LATITUDI 41-11.6 N
LONGITUI 140-41.0 E
DEPTH (m 66

Press.	Temp.	Salinity	Sigma-T
5	16.8915	33.2135	24.1689
10	16.4226	33.3306	24.3675
20	15.3913	33.5288	24.7522
30	14.6715	33.6256	24.9833
40	14.1371	33.6629	25.1253
50	13.2859	33.739	25.3589
62	11.237	33.9237	25.8946

STATION US17309
LATITUDI 41-11.9 N
LONGITUI 140-42.0 E
DEPTH (m 74

Press.	Temp.	Salinity	Sigma-T
5	16.4449	33.1392	24.2153
10	16.203	33.1976	24.3156
20	16.1155	33.2855	24.4029
30	13.834	33.6076	25.1455
40	12.7135	33.6512	25.4044
50	11.4327	33.8007	25.7633
70	10.5825	34.0854	26.1374

STATION US17310
LATITUDI 41-12.2 N
LONGITUI 140-43.1 E
DEPTH (m 72

Press.	Temp.	Salinity	Sigma-T
5	16.5387	33.1132	24.1738
10	16.3289	33.1646	24.2615
20	15.1618	33.2923	24.6203
30	14.1645	33.5969	25.0685
40	12.4652	33.7202	25.5062
50	11.202	34.0353	25.9878
68	10.73	34.0797	26.107

STATION US17311
LATITUDI 41-12.4 N
LONGITUI 140-44.1 E
DEPTH (m 70

Press.	Temp.	Salinity	Sigma-T
5	16.4752	33.1093	24.1855
10	16.2899	33.1475	24.2572
20	15.2301	33.4859	24.7546
30	13.3948	33.6582	25.2744
40	11.8093	33.7599	25.6617
50	11.5133	33.9803	25.8881
66	10.7259	34.0792	26.1073

STATION US17312
LATITUDI 41-12.6 N
LONGITUI 140-44.8 E
DEPTH (m 67

Press.	Temp.	Salinity	Sigma-T
5	16.7669	33.0891	24.1025
10	16.3132	33.1104	24.2234
20	15.3484	33.6455	24.8515
30	12.519	33.6353	25.43
40	11.6707	33.8219	25.7358
50	11.4704	33.8608	25.8031
63	10.7082	34.0801	26.1111

STATION US17313
LATITUDI 41-12.5 N
LONGITUI 140-45.7 E
DEPTH (m 55

Press.	Temp.	Salinity	Sigma-T
5	16.452	33.1143	24.1946
10	16.294	33.1648	24.2695
20	14.8983	33.5803	24.8995
30	12.5839	33.655	25.4327
40	11.9709	33.713	25.595
50	10.7773	34.0583	26.0819
51	10.8223	34.062	26.0768

STATION US17314
LATITUDI 41-17.0 N
LONGITUI 140-41.6 E
DEPTH (m 147

Press.	Temp.	Salinity	Sigma-T
5	17.1629	33.3095	24.1787
10	16.4425	33.3323	24.3642
20	15.768	33.5887	24.7145
30	14.2218	33.8326	25.2385
40	12.6641	34.0065	25.6895
50	11.9136	34.1484	25.944
75	11.2595	34.1256	26.0476
100	10.9121	34.1222	26.1077
125	10.5444	34.1132	26.1657
138	10.4191	34.1108	26.1856

STATION US17315
LATITUDI 41-16.7 N
LONGITUI 140-04.8 E
DEPTH (m 281

Press.	Temp.	Salinity	Sigma-T
5	24.419	33.786	22.599
10	24.1848	33.8381	22.7074
20	22.4839	34.186	23.4635
30	18.9	34.5544	24.706
40	16.8607	34.6094	25.2474
50	15.9733	34.6271	25.4668
75	12.8206	34.4027	25.9658
100	12.0802	34.3414	26.0623
125	11.0582	34.2243	26.161
150	10.0818	34.1467	26.2717
175	10.0676	34.1464	26.2739
200	9.8511	34.1212	26.2908
250	7.9324	34.0667	26.5509
260	7.5551	34.0533	26.5952

STATION US17316
LATITUDI 41-18.3 N
LONGITUI 140-13.9 E
DEPTH (m 256

Press.	Temp.	Salinity	Sigma-T
5	23.3348	34.199	23.2296
10	21.4468	34.3052	23.843
20	18.9776	34.4735	24.6245
30	18.4961	34.5134	24.7763
40	17.5694	34.5382	25.0234
50	15.4498	34.5387	25.5168
75	13.0775	34.3965	25.9098
100	11.2021	34.2397	26.1469
125	10.445	34.183	26.238
150	9.837	34.126	26.297
175	9.505	34.092	26.326
200	9.517	34.101	26.331
230	9.368	34.086	26.344

STATION US17317
LATITUDI 41-22.6 N
LONGITU 140-25.9 E
DEPTH (m 251

Press.	Temp.	Salinity	Sigma-T
5	24.2342	33.8783	22.7232
10	23.0087	34.0849	23.2372
20	20.8837	34.264	23.9651
30	18.109	34.4493	24.8234
40	15.4364	34.4037	25.4159
50	14.4109	34.4425	25.6693
75	13.8026	34.401	25.7653
100	12.835	34.339	25.913
125	12.563	34.311	25.945
150	12.302	34.294	25.983
175	11.762	34.251	26.052
200	11.369	34.234	26.112
230	11.191	34.236	26.146

STATION US17318
LATITUDI 41-28.2 N
LONGITU 140-19.8 E
DEPTH (m 62

Press.	Temp.	Salinity	Sigma-T
5	19.9887	34.226	24.1744
10	19.601	34.209	24.2625
20	18.5754	34.2222	24.5338
30	16.3037	34.2151	25.0744
40	13.8533	34.2079	25.6055
50	11.5478	34.1789	26.0361
55	11.2004	34.1844	26.1041

STATION US17319
LATITUDI 40-37.0 N
LONGITU 138-39.8 E
DEPTH (m 3267

Press.	Temp.	Salinity	Sigma-T
5	25.8345	33.992	22.3243
10	25.5034	33.94	22.3871
20	22.2186	33.7401	23.1995
30	15.8998	33.8046	24.8508
40	11.9009	33.894	25.7488
50	10.2939	34.0538	26.1628
75	6.8898	34.0079	26.6522
100	4.9473	33.9838	26.8756
125	3.0671	33.9655	27.0532
150	2.4507	33.9955	27.1308
175	1.9333	34.0072	27.1814
200	1.6346	34.0236	27.2168
250	1.2443	34.0354	27.2536
300	1.0098	34.0457	27.2774
301	0.9972	34.0455	27.2781

STATION US17320
LATITUDI 40-37.0 N
LONGITU 139-14.9 E
DEPTH (m 2785

Press.	Temp.	Salinity	Sigma-T
5	24.9546	32.8484	21.7298
10	24.5361	33.5394	22.3771
20	21.0097	34.408	24.0406
30	19.212	34.5476	24.6212
40	17.2228	34.5654	25.1276
50	15.287	34.5253	25.5427
75	13.7858	34.5244	25.8642
100	12.1458	34.3577	26.0624
125	10.8464	34.1446	26.1369
150	10.3355	34.0763	26.1732
175	10.0616	34.0714	26.2164
200	8.9713	34.0464	26.3759
250	4.2705	33.9794	26.9461
300	2.6328	34.0025	27.121

STATION US17321
LATITUDI 40-37.1 N
LONGITU 139-49.9 E
DEPTH (m 115

Press.	Temp.	Salinity	Sigma-T
5	24.5205	33.2532	22.1655
10	23.9922	33.5777	22.5672
20	22.1785	34.0706	23.4619
30	20.9677	34.2235	23.9117
40	18.9316	34.3984	24.5787
50	18.5316	34.4227	24.6982
75	17.3764	34.3901	24.9564
100	12.6841	34.2632	25.8846
106	12.2841	34.2789	25.9746

STATION US17322
LATITUDI 41-44.8 N
LONGITU 140-40.3 E
DEPTH (m 54

Press.	Temp.	Salinity	Sigma-T
5	22.5681	33.6685	23.047
10	22.5199	33.744	23.1179
20	21.7568	33.8227	23.3909
30	18.6388	34.1016	24.4257
40	16.2486	34.18	25.0601
50	13.9638	34.2487	25.6141
50	13.9638	34.2487	25.6141

STATION US17323
LATITUDI 41-44.5 N
LONGITU 140-45.2 E
DEPTH (m 56

Press.	Temp.	Salinity	Sigma-T
5	22.5168	33.8383	23.1904
10	22.4886	33.8734	23.2249
20	21.556	33.9006	23.5055
30	16.6083	34.2099	24.9998
40	14.9933	34.2697	25.4104
50	14.198	34.2979	25.6029
51	14.1505	34.3005	25.615

6

THE " USHIO MARU "

CRUISE 394
CRUISE 395
CRUISE 396

IN AUGUST 2017
IN SEPTEMBER 2017

1. Cruise Itinerary

Cruise 394

Departure from Hakodate	Aug.	22, 2017
Start hydrographic research (US17324)		22
Arrival at Hakodate		23
Departure from Hakodate		24
Retrieval ADCP mooring system		24
Arrival at Usujiri		24
Departure from Usujiri		25
Setting ADCP mooring system		25
Arrival at Usujiri		25
Departure from Usujiri		26
Sampling by bottom trawl net		26
Arrival at Mori		26
Departure from Mori		27
Sampling by bottom trawl net		27
Arrival at Muroran		27
Departure from Muroran		28
Sampling by bottom trawl net		28
Arrival at Muroran		28
Departure from Muroran		29
Sampling by bottom trawl net		29
Arrival at Usujiri		29
Departure from Usujiri		30
Sampling by bottom trawl net		30
Finish hydrographic research (US17363)		30
Return to Hakodate		31

Total coverage 578.8 miles

Cruise 395

Departure from Hakodate	Sep.	4, 2017
Scuba diving research around Kojima Is.		5
Scuba diving research around Kojima Is.		6
Return to Hakodate		7

Total coverage 171.4 miles

Cruise 396

Departure from Hakodate	Sep.	11, 2017
Start whales and dolphines watching research		11
Arrival at Tokachi		12
Departure from Tokachi		14
Arrival at Kushiro		15
Departure from Kushiro		16
Finish whales and dolphines watching research		16
Return to Hakodate		17

Total coverage 496.1 miles

2. Data on Temperature, Salinity and Pressure

Hydrographic work on deck and the data processing were made by the deck officers, crews, research staff and cadets of the “Ushio Maru”. Temperature, salinity and pressure were measured by CTD (Seabird SBE-19Plus and SBE-19).

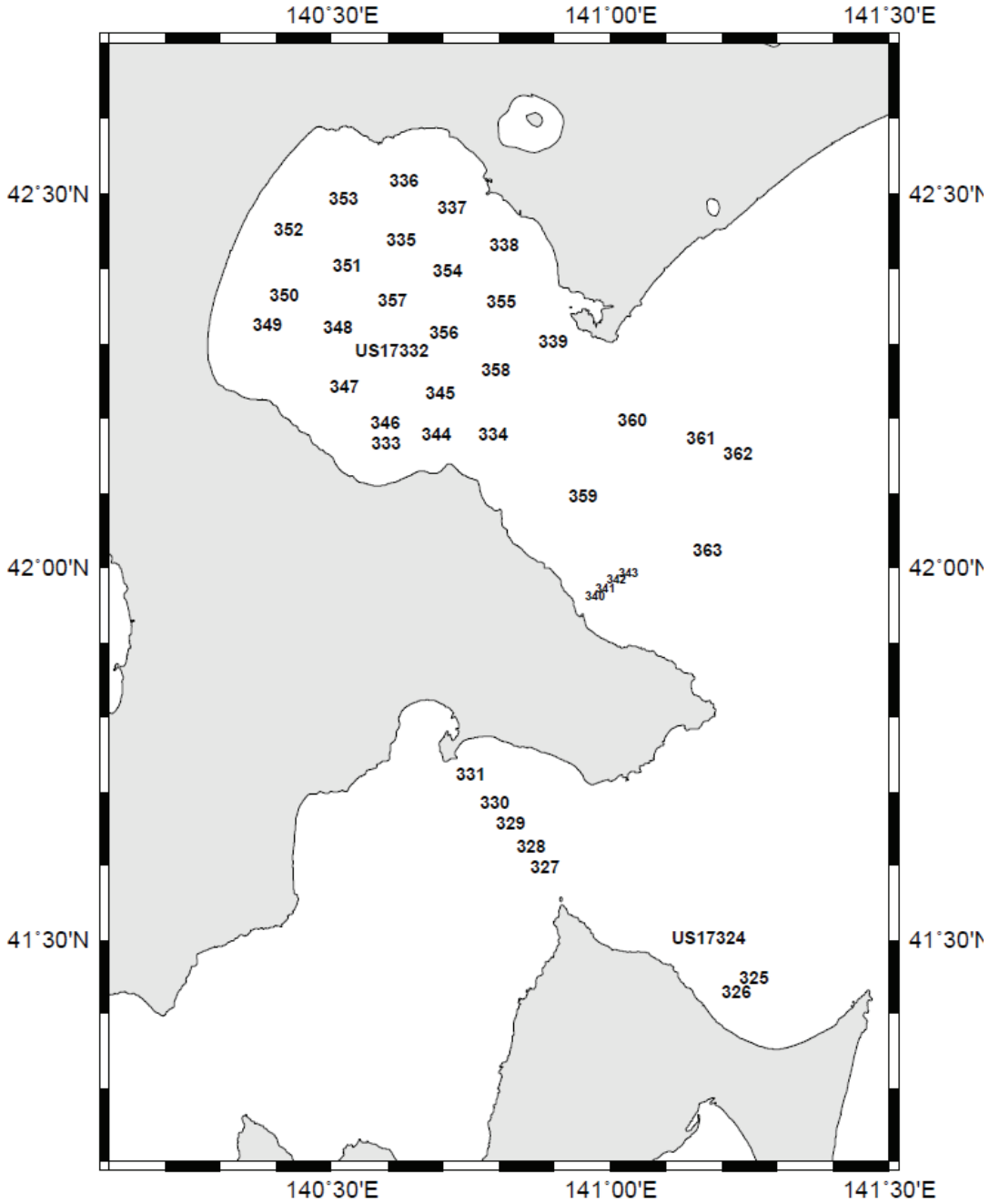


Figure 1. Oceanographic stations (Cruise 394)

able 1. List of Oceanographic Station

Crs394

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17324	41-29.6	141-10.5	8/22	1116-1133	248	SSE-2	ENE-1	SSE-4	20.6	18.5	r	1009.6
US17325	41-26.4	141-15.4	8/22	1306-1314	82	South-2	ENE-1	South-5	21.4	18.2	r	1008.2
US17326	41-25.2	141-13.5	8/23	0405-0410	59	WSW-2	NW-1	WSW-3	23.9	18.7	c	1009.1
US17327	41-35.4	140-52.9	8/23	0620-0625	46	WNW-2	NW-1	WNW-4	24.1	22.2	bc	1010.2
US17328	41-37.0	140-51.4	8/23	0641-0651	99	WNW-2	NW-1	WNW-4	23.3	22.4	bc	1010.2
US17329	41-38.9	140-49.2	8/23	0709-0737	347	WNW-2	NW-1	WNW-4	23.5	21.3	bc	1010.3
US17330	41-40.6	140-47.5	8/23	0811-0832	239	West-2	NW-1	West-4	24.2	23.1	bc	1010.7
US17331	41-42.8	140-44.9	8/23	0854-0903	85	West-2	NW-1	West-4	23.6	21.6	c	1011.3
US17332	42-16.9	140-36.4	8/24	1304-1317	90	SSW-2	East-1	SSW-2	24.8	21.1	o	1002.6
US17333	42-09.5	140-35.8	8/24	1511-1520	72	Calm	East-1	Calm	25.4	21.1	r	1001.4
US17334	42-10.2	140-47.3	8/25	0730-0737	96	NW-3	WNW-1	NW-5	23.3	20.5	bc	999.6
US17335	42-25.8	140-37.4	8/25	0949-0956	84	North-2	West-1	North-4	23	20.7	bc	1001.6
US17336	42-30.5	140-37.7	8/25	1038-1046	65	NW-2	West-1	NW-4	23.8	21.2	bc	1002.1
US17337	42-28.4	140-42.9	8/25	1122-1229	61	WSW-2	West-1	WSW-3	24.4	21.5	bc	1002.8
US17338	42-25.4	140-48.5	8/25	1158-1204	45	West-2	West-1	West-4	23.7	21.4	bc	1003
US17339	42-17.6	140-53.8	8/25	1250-1255	57	West-2	West-1	West-4	22.9	21.2	bc	1003.4
US17340	41-57.4	140-58.3	8/26	0635-0643	80	NNW-2	West-1	NNW-3	22.8	20.2	c	1006
US17341	41-58.0	140-59.4	8/26	0651-0657	87	NNW-2	West-1	NNW-2	23.9	20.1	c	1006.1
US17342	41-58.7	141-00.6	8/26	0706-0713	94	West-2	West-1	West-2	23.4	20	c	1006.2
US17343	41-59.3	141-01.9	8/26	0721-0729	102	SW-2	West-1	SW-3	24.1	20	c	1006.3
US17344	42-10.2	140-41.2	8/26	0919-0926	86	NE-1	West-1	NE-2	22.8	20.9	bc	1006.1
US17345	42-13.5	140-41.6	8/26	0953-1001	89	East-2	ESE-1	East-3	23.3	20.9	bc	1005.8
US17346	42-11.2	140-35.7	8/26	1117-1124	81	SSW-1	East-1	SSW-2	26.4	21.5	bc	1005.1
US17347	42-14.0	140-31.3	8/26	1248-1255	85	WSW-2	West-1	WSW-4	23.5	20.9	bc	1005.5
US17348	42-18.8	140-30.6	8/27	0746-0752	95	West-2	West-1	West-3	22.8	20.3	bc	1016
US17349	42-19.0	140-23.0	8/27	0921-0926	55	West-2	West-1	West-4	23.5	20.5	bc	1016.8
US17350	42-21.4	140-24.8	8/27	1015-1020	69	WNW-2	West-1	WNW-4	24.4	20.6	bc	1016.8
US17351	42-23.7	140-31.6	8/27	1059-1106	97	West-2	West-1	West-4	25.3	20.7	bc	1016.8
US17352	42-22.6	140-25.3	8/27	1220-1224	63	West-2	West-1	West-4	23.7	20.6	bc	1016.5
US17353	42-29.1	140-31.2	8/27	1255-1301	75	WSW-3	WSW-1	WSW-4	26.4	20.9	bc	1016.5
US17354	42-23.3	140-42.4	8/27	1356-1404	63	West-3	WSW-1	West-4	23.1	20.9	bc	1016.4
US17355	42-20.8	140-48.2	8/27	1431-1436	53	West-3	WSW-1	West-4	23.2	20.9	b	1016.4
US17356	42-18.4	140-42.0	8/28	0811-0816	68	ESE-2	ESE-1	ESE-3	21.1	20.6	c	1017.1
US17357	42-20.9	140-36.5	8/28	0920-0925	88	ESE-2	ESE-1	ESE-3	20.5	20.6	o	1017
US17358	42-15.4	140-47.6	8/28	1148-1152	71	ESE-2	ESE-1	ESE-3	21.2	20.5	o	1016.2
US17359	42-05.3	140-57.0	8/30	0724-0729	84	WNW-2	NW-1	WNW-3	19.1	19.9	bc	1013.5
US17360	42-11.4	141-02.3	8/30	0819-0824	82	NW-2	WSW-1	NW-2	18.2	17.1	c	1013.5
US17361	42-09.9	141-09.7	8/30	0945-0953	122	West-2	WSW-1	West-2	20.9	19.8	c	1013.7
US17362	42-08.7	141-13.7	8/30	1102-1111	176	SW-2	WNW-1	SW-2	21.9	19.6	c	1013
US17363	42-00.9	141-10.4	8/30	1206-1213	136	South-2	SSE-1	South-3	19.9	19.9	c	1012.5

Crs395

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
NO CTD obs												

Crs396

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
NO CTD obs												

Table 2. Oceanographic data

STATION US17324
LATITUDE 41-29.6 N
LONGITUI 141-10.5 E
DEPTH (m) 248

Press.	Temp.	Salinity	Sigma-T
5	18.5989	34.0264	24.3782
10	18.4687	34.0107	24.3987
20	17.9613	33.986	24.5051
30	17.9063	34.0286	24.551
40	16.2643	34.0589	24.9632
50	14.923	34.142	25.3272
75	12.7467	34.1699	25.8
100	12.6035	34.1683	25.8268
125	11.8693	34.1425	25.9478
150	10.6748	34.1373	26.1616
175	10.4855	34.1367	26.1944
200	9.3263	33.9837	26.27
236	8.3874	33.8668	26.3258

STATION US17325
LATITUDE 41-26.4 N
LONGITUI 141-15.4 E
DEPTH (m) 82

Press.	Temp.	Salinity	Sigma-T
5	18.3748	34.088	24.4812
10	18.3394	34.0947	24.4951
20	18.3097	34.0964	24.5038
30	18.18	34.0869	24.5286
40	18.1269	34.0871	24.5418
50	16.6845	34.0662	24.8716
70	12.3457	34.1698	25.8781

STATION US17326
LATITUDE 41-25.2 N
LONGITUI 141-13.5 E
DEPTH (m) 59

Press.	Temp.	Salinity	Sigma-T
5	18.9322	34.0034	24.2768
10	18.8184	33.9974	24.3009
20	17.2707	34.0319	24.707
30	15.0547	34.06	25.2352
40	13.6251	34.1347	25.596
50	12.7373	34.0847	25.7358
55	12.3475	34.1705	25.8783

STATION US17327
LATITUDE 41-35.0 N
LONGITUI 140-52.9 E
DEPTH (m) 46

Press.	Temp.	Salinity	Sigma-T
5	21.2852	34.0257	23.6749
10	20.6886	34.0887	23.8842
20	19.2227	34.1622	24.3242
30	19.0555	34.1707	24.3733

STATION US17328
LATITUDE 41-37.0 N
LONGITUI 140-51.4 E
DEPTH (m) 99

Press.	Temp.	Salinity	Sigma-T
5	22.2455	33.9808	23.3749
10	21.3249	34.0085	23.6508
20	20.0555	34.1124	24.0703
30	19.5489	34.1194	24.2076
40	17.9014	34.1984	24.6823
50	17.2207	34.1986	24.8468
75	16.4288	34.2125	25.0435
87	14.586	34.286	25.511

STATION US17329
LATITUDE 41-38.9 N
LONGITUI 140-49.2 E
DEPTH (m) 347

Press.	Temp.	Salinity	Sigma-T
5	21.5072	34.0053	23.5985
10	21.3174	34.0141	23.6572
20	20.5009	34.0711	23.9209
30	15.7438	34.1908	25.1832
40	14.9277	34.2517	25.4108
50	14.5437	34.2673	25.5058
75	13.4774	34.2619	25.7247
100	12.682	34.239	25.866
125	11.783	34.207	26.014
150	11.534	34.199	26.055
175	10.801	34.165	26.161
200	10.563	34.155	26.195
250	10.409	34.144	26.214
300	10.330	34.143	26.226
310	10.283	34.141	26.233

STATION US17330
LATITUDE 41-40.6 N
LONGITUI 140-47.5 E
DEPTH (m) 239

Press.	Temp.	Salinity	Sigma-T
5	22.3433	33.9062	23.2908
10	21.2716	33.9973	23.6569
20	19.4528	34.1854	24.2828
30	16.215	34.195	25.0793
40	15.7028	34.238	25.2287
50	14.9524	34.277	25.4249
75	13.3031	34.18	25.6967
100	11.821	34.211	26.010
125	11.341	34.191	26.084
150	10.523	34.150	26.198
175	10.283	34.136	26.229
200	10.104	34.132	26.256
211	10.057	34.131	26.264

STATION US17331
LATITUDE 41-42.8 N
LONGITUI 140-44.9 E
DEPTH (m) 85

Press.	Temp.	Salinity	Sigma-T
5	21.6542	33.8374	23.4305
10	20.1684	34.0216	23.9713
20	18.6419	34.1296	24.4463
30	17.6274	34.1727	24.7293
40	15.7552	34.1885	25.1788
50	13.8563	34.1697	25.5753
70	11.905	34.160	25.955

STATION US17332
LATITUDE 42-16.9 N
LONGITUI 140-36.4 E
DEPTH (m) 90

Press.	Temp.	Salinity	Sigma-T
5	20.809	32.158	22.383
10	20.7058	32.1697	22.4192
20	19.0499	32.4464	23.058
30	17.1872	32.5561	23.5953
40	10.8946	32.5723	24.9041
50	8.7675	32.8491	25.4689
75	5.1924	33.0661	26.1205
85	4.7255	33.2563	26.3233

STATION US17333
LATITUDE 42-09.5 N
LONGITUI 140-35.8 E
DEPTH (m) 72

Press.	Temp.	Salinity	Sigma-T
5	20.8385	32.0583	22.2992
10	20.2131	32.1642	22.5447
20	18.2385	32.5252	23.3195
30	13.1206	32.5372	24.4618
40	8.7971	32.4024	25.1159
50	6.4002	32.5568	25.5726
66	4.2295	32.7835	26.0002

STATION US17334
LATITUDE 42-10.2 N
LONGITUI 140-47.3 E
DEPTH (m) 96

Press.	Temp.	Salinity	Sigma-T
5	20.464	32.1959	22.503
10	19.5435	32.6287	23.0718
20	19.5828	33.1771	23.4799
30	18.6291	33.5054	23.9724
40	13.9591	33.4233	24.9772
50	11.0001	33.2025	25.3757
75	7.5568	33.5528	26.2014
92	6.8592	33.2553	26.0632

STATION US17335
LATITUDE 42-25.8 N
LONGITUI 140-37.4 E
DEPTH (m) 84

Press.	Temp.	Salinity	Sigma-T
5	20.9759	32.1066	22.2993
10	20.4945	32.141	22.4533
20	19.4486	32.3317	22.8695
30	17.0273	32.4027	23.515
40	10.7423	32.4102	24.804
50	7.1016	32.5466	25.4728
75	5.554	33.2023	26.1863
80	5.6273	33.2263	26.1965

STATION US17336
LATITUDE 42-30.5 N
LONGITUI 140-37.7 E
DEPTH (m) 65

Press.	Temp.	Salinity	Sigma-T
5	21.3722	31.4463	21.6912
10	19.9092	32.2731	22.7066
20	16.2993	32.5521	23.7978
30	11.2963	32.5157	24.7888
40	7.8946	32.7538	25.5253
50	6.4792	32.8079	25.7606
61	4.8993	32.8686	25.9968

STATION US17337
LATITUDE 42-28.4 N
LONGITUI 140-42.9 E
DEPTH (m) 61

Press.	Temp.	Salinity	Sigma-T
5	21.0416	31.7192	21.9872
10	19.7048	32.2441	22.7372
20	16.5672	32.5243	23.7151
30	13.2352	32.6342	24.5141
40	7.0224	32.4016	25.3694
50	5.0969	32.5977	25.7602
57	7.6596	33.2622	25.9584

STATION US17338
LATITUDE 42-25.4 N
LONGITUI 140-48.5 E
DEPTH (m) 45

Press.	Temp.	Salinity	Sigma-T
5	20.0544	32.2319	22.6376
10	19.2009	32.3755	22.9658
20	15.752	32.3934	23.7983
30	10.2769	33.1515	25.4616
40	8.6013	33.0183	25.6281
42	8.8106	33.0742	25.6398

STATION US17339
LATITUDE 42-17.6 N
LONGITUI 140-53.8 E
DEPTH (m) 57

Press.	Temp.	Salinity	Sigma-T
5	21.2498	31.8157	22.0047
10	18.1492	32.5838	23.3861
20	13.2442	32.4668	24.3827
30	9.6917	32.6147	25.1405
40	7.7269	32.8603	25.633
50	8.4037	33.4984	26.0344
53	8.4097	33.4894	26.0265

STATION US17340
LATITUDE 41-57.4 N
LONGITUI 140-58.3 E
DEPTH (m) 80

Press.	Temp.	Salinity	Sigma-T
5	20.38	32.3988	22.6796
10	20.3857	32.4138	22.6895
20	19.7488	32.6308	23.0206
30	16.7756	32.8571	23.9224
40	11.4456	33.5442	25.5613
50	9.393	33.8326	26.141
75	7.9705	33.7742	26.3155
75	7.971	33.774	26.316

STATION US17341
LATITUDE 41-58.0 N
LONGITUI 140-59.4 E
DEPTH (m) 87

Press.	Temp.	Salinity	Sigma-T
5	20.2251	32.4169	22.734
10	20.1985	32.4261	22.7479
20	19.2692	32.7738	23.2524
30	17.3948	33.1796	24.0241
40	12.024	33.8959	25.727
50	10.7124	33.8981	25.9686
75	8.3867	33.7206	26.2113
82	8.203	33.7928	26.2956

STATION US17342
LATITUDE 41-58.7 N
LONGITUI 141-00.6 E
DEPTH (m) 94

Press.	Temp.	Salinity	Sigma-T
5	20.1386	32.5078	22.8258
10	20.0822	32.5002	22.8347
20	19.222	32.8481	23.3212
30	15.1684	33.2661	24.5981
40	12.0714	33.7259	25.5857
50	11.6177	34.1245	25.9809
75	9.4576	33.8843	26.1708
89	8.255	33.7978	26.2917

STATION US17343
LATITUDE 41-59.3 N
LONGITUI 141-01.9 E
DEPTH (m) 102

Press.	Temp.	Salinity	Sigma-T
5	20.3066	32.4622	22.7471
10	20.154	32.4766	22.798
20	19.087	32.8449	23.3529
30	15.2003	33.3743	24.6751
40	12.7579	33.9707	25.6434
50	12.038	34.074	25.8627
75	9.8803	33.9247	26.1325
94	8.336	33.813	26.292

STATION US17344
LATITUDE 42-10.2 N
LONGITUI 140-41.2 E
DEPTH (m) 86

Press.	Temp.	Salinity	Sigma-T
5	21.0124	32.0186	22.2226
10	20.9069	32.0524	22.2765
20	19.6315	33.0217	23.3489
30	16.7017	33.5929	24.5043
40	12.411	33.2764	25.1725
50	9.9915	33.344	25.6603
75	4.8226	33.2389	26.2989
83	4.8075	33.273	26.3276

STATION US17345
LATITUDE 42-13.5 N
LONGITUI 140-41.6 E
DEPTH (m) 89

Press.	Temp.	Salinity	Sigma-T
5	20.7908	32.0889	22.3352
10	20.3674	32.1956	22.5283
20	18.5116	32.4497	23.1947
30	16.2932	32.5608	23.8058
40	10.1071	32.5191	24.9974
50	11.1747	33.2639	25.3919
75	8.0181	33.564	26.1434
87	8.04	33.5727	26.1471

STATION US17346
LATITUDE 42-11.2 N
LONGITUI 140-35.7 E
DEPTH (m) 81

Press.	Temp.	Salinity	Sigma-T
5	20.8926	32.1049	22.3203
10	20.5745	32.1593	22.4461
20	18.9201	32.8466	23.3961
30	17.629	33.5744	24.2705
40	9.9616	32.9567	25.363
50	5.3561	32.5044	25.657
75	4.76	33.2085	26.2816
79	4.6943	33.2313	26.3069

STATION US17347
LATITUDE 42-14.0 N
LONGITUI 140-31.3 E
DEPTH (m) 85

Press.	Temp.	Salinity	Sigma-T
5	21.0406	32.0943	22.2727
10	20.6109	32.1804	22.4525
20	18.9109	32.9046	23.4428
30	12.1932	32.3578	24.5011
40	7.6031	32.3177	25.224
50	5.3708	32.5787	25.7142
75	4.7174	33.1224	26.218
82	4.5722	33.2182	26.3095

STATION US17348
LATITUDE 42-18.8 N
LONGITUI 140-30.6 E
DEPTH (m) 95

Press.	Temp.	Salinity	Sigma-T
5	20.4605	32.1809	22.4926
10	20.4475	32.183	22.4976
20	18.3278	32.4746	23.259
30	13.6621	32.8994	24.6332
40	8.4198	32.2353	25.0416
50	6.5727	32.822	25.7597
75	4.9751	33.0556	26.1367
91	4.6831	33.295	26.3586

STATION US17349
LATITUDE 42-19.0 N
LONGITUI 140-23.0 E
DEPTH (m) 55

Press.	Temp.	Salinity	Sigma-T
5	20.8336	32.1597	22.3777
10	20.7439	32.181	22.4177
20	14.8406	32.3854	23.991
30	8.6285	32.2413	25.015
40	5.937	32.5065	25.5903
50	4.5062	32.6002	25.8261
53	4.4643	32.6228	25.8484

STATION US17350
LATITUDE 42-21.4 N
LONGITUI 140-24.8 E
DEPTH (m) 69

Press.	Temp.	Salinity	Sigma-T
5	20.7639	32.1841	22.4148
10	20.6857	32.1957	22.4444
20	16.505	32.4332	23.6596
30	9.2824	32.338	24.99
40	5.9363	32.5311	25.6099
50	4.696	32.5893	25.7974
66	4.3433	32.8623	26.0512

STATION US17351
LATITUDE 42-23.7 N
LONGITUI 140-31.6 E
DEPTH (m) 97

Press.	Temp.	Salinity	Sigma-T
5	20.9326	32.1967	22.3793
10	20.8437	32.166	22.3797
20	18.3706	32.5929	23.3389
30	13.2263	32.1772	24.1613
40	8.103	32.1812	25.0442
50	6.5818	32.7552	25.7058
75	4.6454	33.2351	26.3151
94	4.762	33.302	26.355

STATION US17352
LATITUDE 42-22.6 N
LONGITUI 140-25.3 E
DEPTH (m) 63

Press.	Temp.	Salinity	Sigma-T
5	20.5559	32.2269	22.5024
10	19.6098	32.2246	22.7465
20	13.7744	32.4224	24.2419
30	10.6197	32.8015	25.1304
40	5.8996	32.534	25.6166
50	4.8513	32.5948	25.7851
61	4.1995	32.7381	25.9671

STATION US17353
LATITUDE 42-29.1 N
LONGITUI 140-31.2 E
DEPTH (m) 75

Press.	Temp.	Salinity	Sigma-T
5	21.0051	32.159	22.3313
10	19.2319	32.4524	23.0167
20	14.6353	32.4498	24.0844
30	8.731	32.1501	24.9277
40	6.278	32.564	25.5937
50	5.2461	32.7773	25.8857
72	5.5712	33.2302	26.2063

STATION US17354
LATITUDE 42-23.3 N
LONGITUI 140-42.4 E
DEPTH (m) 63

Press.	Temp.	Salinity	Sigma-T
5	21.0093	32.1892	22.3531
10	20.8051	32.1652	22.3895
20	18.0989	32.5598	23.38
30	12.7225	32.3724	24.4118
40	6.8335	32.5849	25.5388
50	6.4506	33.1017	25.9959
60	7.0306	33.1918	25.9904

STATION US17355
LATITUDE 42-20.8 N
LONGITUI 140-48.2 E
DEPTH (m) 53

Press.	Temp.	Salinity	Sigma-T
5	21.0307	32.179	22.3397
10	19.6615	32.2656	22.7647
20	18.0064	32.5714	23.4114
30	11.1119	32.4303	24.7551
40	9.2178	32.9403	25.4712
50	8.2005	33.3661	25.9611
52	8.2291	33.4111	25.9922

STATION US17356
LATITUDE 42-18.4 N
LONGITUI 140-42.0 E
DEPTH (m) 68

Press.	Temp.	Salinity	Sigma-T
5	20.8202	32.1814	22.3977
10	20.8	32.183	22.4043
20	19.4021	32.2767	22.8394
30	14.8966	32.3125	23.9226
40	8.7769	32.8837	25.4958
50	11.2096	33.9654	25.9321
66	10.1884	33.9195	26.0762

STATION US17357
LATITUDE 42-20.9 N
LONGITUI 140-36.5 E
DEPTH (m) 88

Press.	Temp.	Salinity	Sigma-T
5	20.8839	32.1756	22.3763
10	20.8812	32.1746	22.3763
20	19.9752	32.1486	22.5945
30	13.4952	32.2868	24.193
40	9.0392	32.3649	25.0489
50	8.1573	33.0702	25.7354
75	7.9748	33.5394	26.1305
85	7.8419	33.5453	26.1545

STATION US17358
LATITUDE 42-15.4 N
LONGITUI 140-47.6 E
DEPTH (m) 71

Press.	Temp.	Salinity	Sigma-T
5	20.8014	32.1777	22.3999
10	20.7295	32.1732	22.4156
20	18.8859	32.4292	23.086
30	15.1062	32.2547	23.8326
40	13.2428	33.9388	25.5221
50	11.1193	33.8659	25.8709
69	9.7156	33.8149	26.0742

STATION US17359
LATITUDE 42-05.3 N
LONGITUI 140-57.0 E
DEPTH (m) 84

Press.	Temp.	Salinity	Sigma-T
5	20.1435	32.2975	22.6643
10	20.1431	32.3115	22.6751
20	19.8501	32.5797	22.9555
30	15.9641	32.9529	24.1812
40	9.727	33.682	25.9685
50	9.4067	33.8217	26.1301
75	8.3855	33.7739	26.2533
81	8.3143	33.7751	26.265

STATION US17360
LATITUDE 42-11.4 N
LONGITUI 141-02.3 E
DEPTH (m) 82

Press.	Temp.	Salinity	Sigma-T
5	16.7649	32.4211	23.5905
10	14.8969	32.1816	23.8212
20	11.8113	33.3246	25.3233
30	12.29	33.8134	25.6123
40	11.0864	33.7298	25.771
50	10.2327	33.7194	25.9125
75	7.3572	33.5481	26.2258
78	7.332	33.577	26.252

STATION US17361
LATITUDE 42-09.9 N
LONGITUI 141-09.7 E
DEPTH (m) 122

Press.	Temp.	Salinity	Sigma-T
5	19.9652	32.3048	22.7163
10	19.5917	32.4858	22.9504
20	15.4223	33.9739	25.0881
30	13.4273	33.884	25.4425
40	12.3684	34.0027	25.7441
50	12.0286	34.0018	25.8083
75	8.1794	33.5711	26.1252
100	8.1527	33.7379	26.26
116	8.0427	33.7564	26.2909

STATION US17362
LATITUDE 42-08.7 N
LONGITUI 141-13.7 E
DEPTH (m) 176

Press.	Temp.	Salinity	Sigma-T
5	19.8595	32.3611	22.7866
10	19.7235	32.3895	22.8432
20	16.0218	33.5437	24.6227
30	14.0809	33.8716	25.2982
40	12.2274	33.9236	25.7098
50	12.3957	34.1009	25.815
75	10.9727	34.0695	26.0558
100	9.9908	33.9544	26.137
125	9.6761	34.0008	26.226
150	9.0497	33.9139	26.2597
169	8.4692	33.8492	26.2996

STATION US17363
LATITUDE 42-00.9 N
LONGITUI 141-10.4 E
DEPTH (m) 136

Press.	Temp.	Salinity	Sigma-T
5	20.0087	32.3801	22.7624
10	19.8586	32.4717	22.871
20	18.2495	32.9587	23.6483
30	16.8686	33.5334	24.4196
40	13.9829	33.7164	25.1988
50	12.8877	34.0884	25.7089
75	11.2352	33.9436	25.9104
100	9.6025	33.9378	26.1889
125	8.292	33.7519	26.2501
130	7.7574	33.7045	26.2918

7

THE " USHIO MARU "

CRUISE 397
CRUISE 398
CRUISE 399

IN SEPTEMBER 2017
IN OCTOBER 2017

1. Cruise Itinerary

Cruise 397

Departure from Hakodate	Sep.	22, 2017
Start hydrographic research (US17364)		22
Arrival at Ominato		22
Depart from Ominato		23
Arrival at Hakodate		24
Depart from Hakodate		25
Sampling by bottom trawl net		25
Arrival at Muroran		25
Departure from Muroran		26
Sampling by bottom trawl net		26
Arrival at Muroran		26
Departure from Muroran		27
Sampling by bottom trawl net		27
Arrival at Muroran		27
Departure from Muroran		28
Finish hydrographic research (US17405)		28
Return to Hakodate		29

Total coverage 483.0 miles

Cruise 398

Departure from Hakodate	Oct.	4, 2017
Start whales and dolphines watching research		4
Arrival at Muroran		7
Departure from Muroran		8
Start hydrographic research (US17406)		8
Finish hydrographic research (US17410)		8
Return to Hakodate		9

Total coverage 661.1 miles

Cruise 399

Departure from Hakodate	Oct.	14, 2017
Hook and line jigging for squid		14
Hook and line jigging for squid		15
Start hydrographic research (US17411)		16
Sampling by tuna long-line		16
Hook and line jigging for squid		16
Sampling by tuna long-line		17
Arrival at Fukushima		17
Departure from Fukushima		18
Hook and line jigging for squid		18
Finish hydrographic research (US17415)		18
Return to Hakodate		19

Total coverage 281.3 miles

2. Data on Temperature, Salinity and Pressure

Hydrographic work on deck and the data processing were made by the deck officers, crews, research staff and cadets of the “Ushio Maru”. Temperature, salinity and pressure were measured by CTD (Seabird SBE-19Plus and SBE-19).

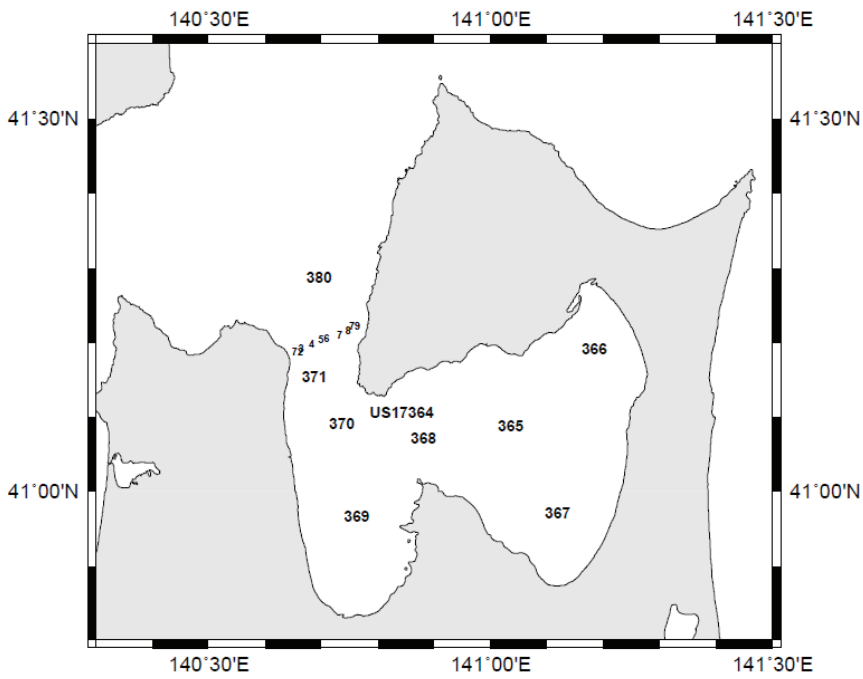


Figure 1. Oceanographic stations (Cruise 397-1)

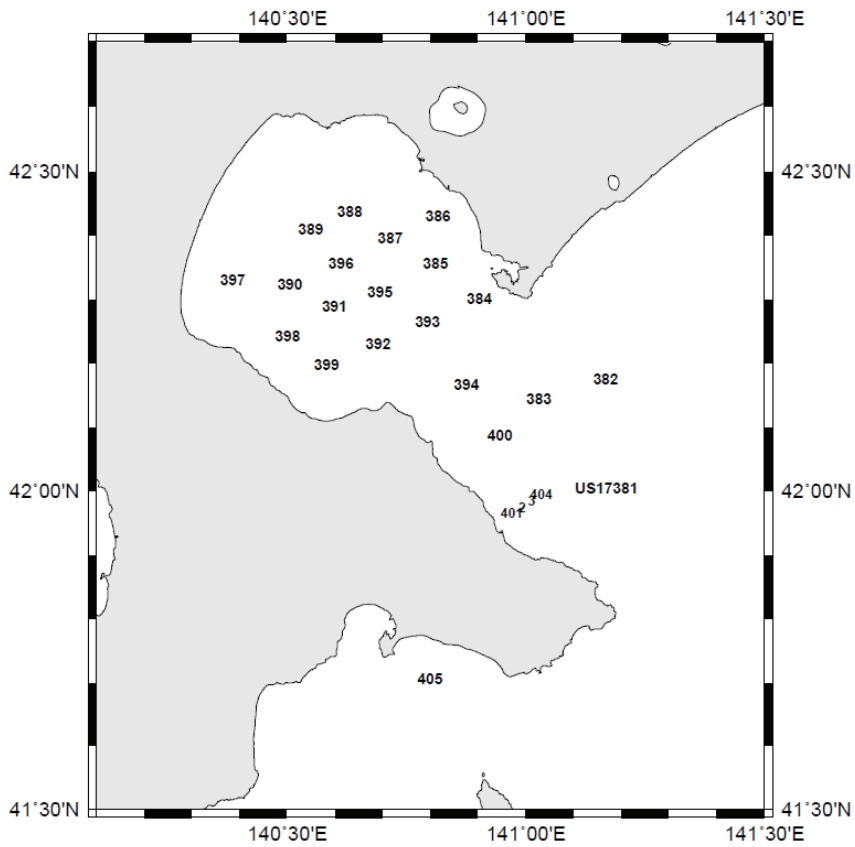


Figure 2. Oceanographic stations (Cruise 397-2)

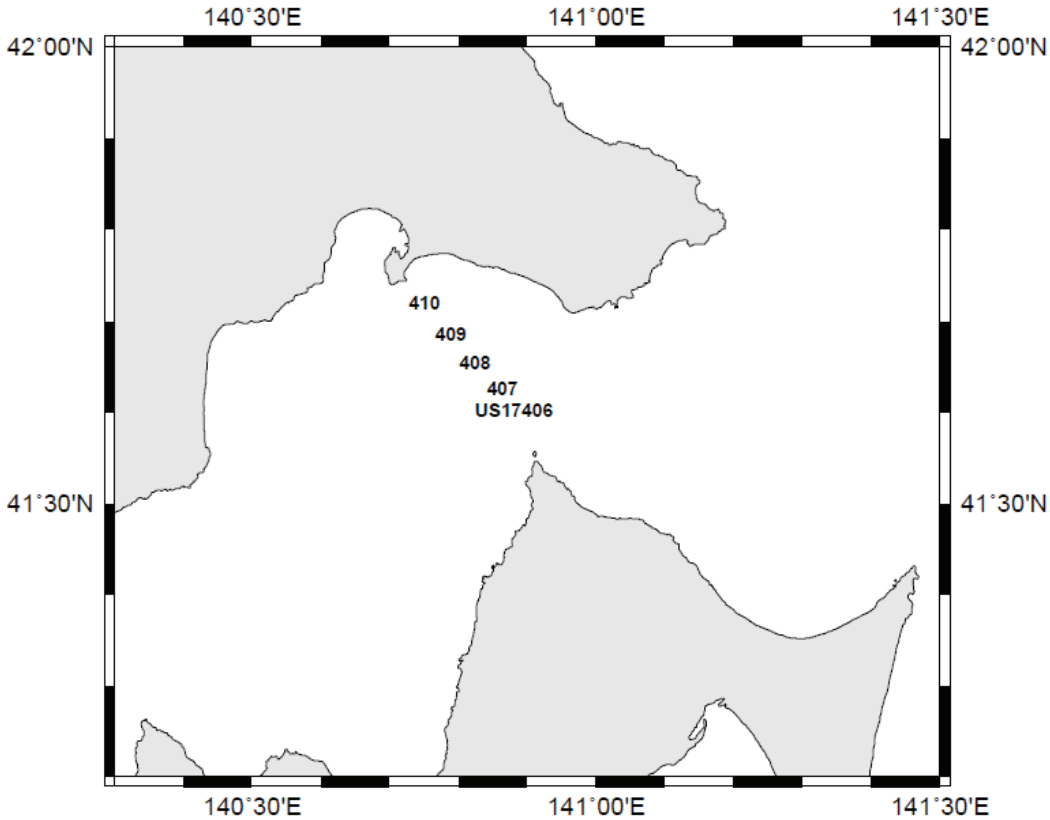


Figure 3. Oceanographic stations (Cruise 398)

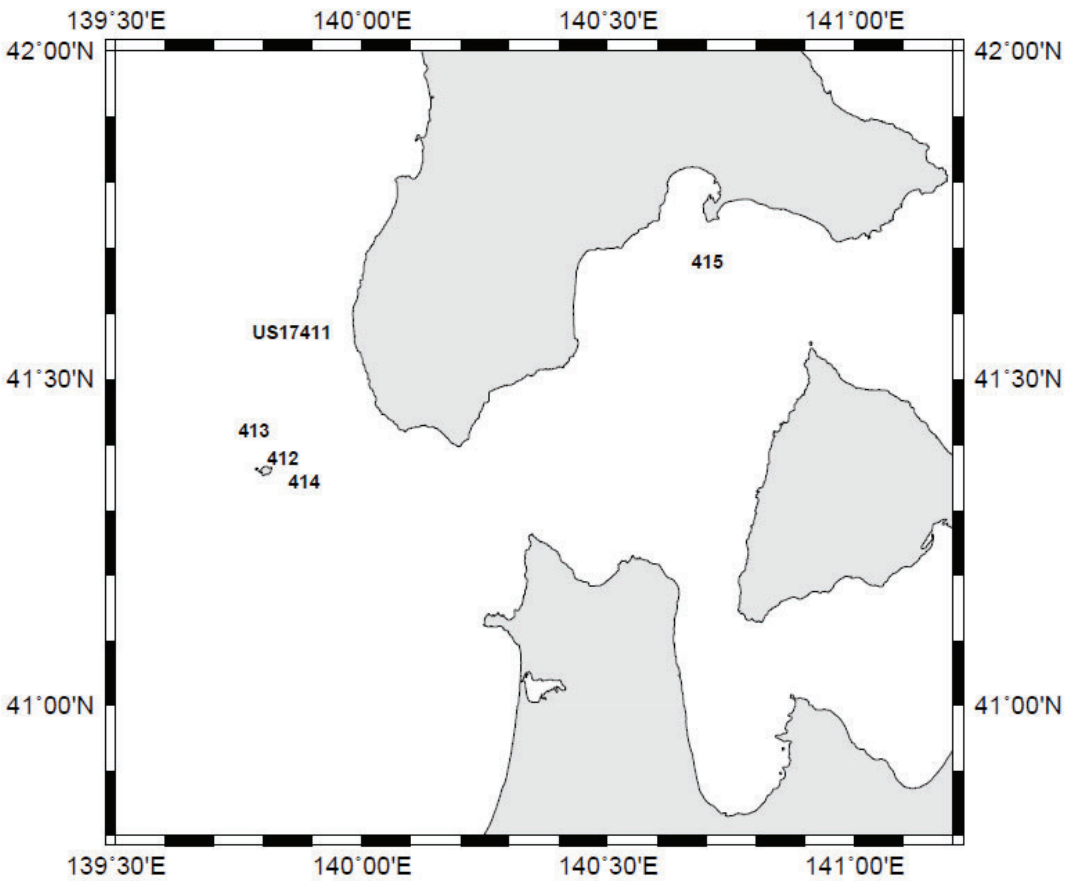


Figure 4. Oceanographic stations (Cruise 399)

Table 1. List of Oceanographic Station

Crs397

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17364	41-05.9	140-50.5	9/22	1225-1232	53	ESE-2	SE-1	ESE-3	21.9	20.6	b	1020
US17365	41-04.8	141-02.1	9/22	1322-1330	48	ENE-2	ESE-1	ENE-2	22	21.5	b	1020
US17366	41-11.0	141-11.0	9/22	1528-1533	31	East-2	SE-1	East-3	22.5	21.7	b	1019.2
US17367	40-57.8	141-07.1	9/23	0820-0829	39	South-1	South-1	South-3	19.4	20.6	bc	1017.2
US17368	41-03.8	140-52.8	9/23	0944-0950	52	Calm	NE-1	Calm	21.1	20.6	bc	1017.6
US17369	40-57.5	140-45.7	9/23	1047-1053	51	ENE-1	NE-1	ENE-2	22.5	20.6	bc	1017.4
US17370	41-05.0	140-44.1	9/23	1205-1212	60	ENE-2	NE-1	ENE-4	21.5	20.7	bc	1016.4
US17371	41-08.8	140-41.2	9/23	1243-1259	49	East-2	ENE-1	East-4	21.6	20.5	bc	1016
US17372	41-10.9	140-39.4	9/23	1316-1322	38	ESE-2	ESE-1	ESE-3	22.6	21.5	bc	1015.6
US17373	41-11.2	140-39.8	9/23	1329-1335	55	NE-1	ESE-1	NE-1	23.2	21.7	bc	1015.5
US17374	41-11.6	140-40.9	9/23	1343-1351	67	NE-1	ESE-1	NE-1	24.4	21.7	bc	1015.5
US17375	41-11.9	140-41.9	9/23	1402-1411	75	Calm	ESE-1	Calm	23.5	22.1	bc	1015.6
US17376	41-12.0	140-42.3	9/23	1420-1428	75	ESE-2	ESE-1	ESE-3	21.7	21.7	bc	1015.5
US17377	41-12.3	140-43.9	9/23	1438-1445	71	East-2	ESE-1	East-4	22.1	20.9	bc	1015.5
US17378	41-12.6	140-44.8	9/23	1451-1458	68	ESE-3	ESE-1	ESE-5	21.4	21	bc	1015.1
US17379	41-13.0	140-45.5	9/23	1504-1511	65	ESE-3	ESE-1	ESE-5	21.4	20.9	bc	1014.6
US17380	41-16.8	140-41.7	9/23	1541-1555	147	SE-3	ESE-1	SE-4	21.8	21.8	c	1014.6
US17381	41-59.8	141-10.1	9/25	1047-1055	138	ENE-2	SE-1	ENE-2	20.4	17.8	c	1017.3
US17382	42-10.0	141-10.0	9/25	1156-1206	122	SSE-2	SE-1	SSE-3	21.1	18.2	bc	1015.3
US17383	42-08.2	141-01.6	9/25	1300-1305	87	SSE-2	SE-1	SSE-3	20.6	18.9	bc	1014.1
US17384	42-17.6	140-54.1	9/25	1438-1445	57	East-2	SE-1	East-2	21	19.2	bc	1013.6
US17385	42-20.8	140-48.6	9/25	1517-1523	53	East-2	SE-1	East-2	20.7	18.5	bc	1013.2
US17386	42-25.3	140-48.9	9/26	0725-0730	43	NNE-2	NNE-1	NNE-4	15	18.3	b	1016.9
US17387	42-23.2	140-42.9	9/26	0801-0807	60	North-1	East-1	North-3	16	18.3	b	1017.1
US17388	42-25.7	140-37.8	9/26	0839-0844	82	NNE-1	East-1	NNE-2	16.6	18.2	b	1017.3
US17389	42-24.0	140-32.9	9/26	0934-0939	95	ESE-1	East-1	ESE-2	17.6	18.2	b	1017.6
US17390	42-18.9	140-30.3	9/26	1058-1106	92	South-1	ESE-1	South-2	18.2	18.8	b	1016.7
US17391	42-16.8	140-35.9	9/26	1135-1141	92	Calm	ESE-1	Calm	19.8	18.6	b	1016.6
US17392	42-13.3	140-41.4	9/26	1256-1302	90	NNE-1	East-1	NNE-1	20.6	19.2	b	1015.7
US17393	42-15.4	140-47.6	9/26	1334-1340	72	Calm	ESE-1	Calm	20.3	19.2	b	1015.7
US17394	42-09.5	140-52.5	9/26	1424-1429	77	WSW-1	ESE-1	WSW-2	20.1	19.4	b	1015.7
US17395	42-18.2	140-41.6	9/27	0754-0758	69	SW-2	ESE-1	SW-2	18.7	18.3	o	1012.2
US17396	42-20.9	140-36.7	9/27	0856-0902	88	Calm	SE-1	Calm	18.5	18.4	c	1012.1
US17397	42-19.3	140-23.1	9/27	1001-1005	55	Calm	SE-1	Calm	19.5	18.5	c	1011.5
US17398	42-14.0	140-30.0	9/27	1118-1123	78	ESE-2	ESE-1	ESE-3	19.8	18.8	c	1009.9
US17399	42-11.4	140-34.9	9/27	1217-1222	81	ESE-2	ESE-1	ESE-4	20.3	18.8	o	1009
US17400	42-04.7	140-56.7	9/28	0849-0856	86	West-1	East-1	West-3	14.2	17.9	o	1007.3
US17401	41-57.5	140-58.2	9/28	0948-0954	79	NW-2	East-1	NW-3	14.8	18	o	1007.6
US17402	41-58.0	140-59.5	9/28	1003-1009	87	NW-2	East-1	NW-3	15.4	18.1	o	1007.6
US17403	41-58.6	141-00.7	9/28	1020-1025	95	WNW-2	East-1	WNW-4	15.2	18.1	o	1007.2
US17404	41-59.3	141-01.9	9/28	1035-1042	101	WNW-2	East-1	WNW-4	15.4	17.8	o	1007.1
US17405	41-41.8	140-47.9	9/28	1640-1650	135	NW-2	East-1	NW-3	16	21.5	bc	1006.1

Crs398

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17406	41-35.7	140-52.8	10/8	1240-1245	45	WSW-2	East-1	WSW-4	19.7	19.1	c	1025.1
US17407	41-37.1	140-51.8	10/8	1308-1318	130	WSW-2	East-1	WSW-4	19.9	19.1	c	1025.1
US17408	41-38.8	140-49.4	10/8	1350-1407	298	WSW-2	East-1	WSW-4	19.7	18.6	c	1025.1
US17409	41-40.7	140-47.3	10/8	1430-1440	237	WSW-2	ESE-1	WSW-4	19.8	18.1	c	1024.9
US17410	41-42.7	140-45.0	10/8	1500-1505	87	WSW-2	ESE-1	WSW-4	20.2	17.1	c	1025

Crs399

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17411	41-33.7	139-51.4	10/16	0817-0825	1417	North-1	NNW-1	North-4	13.5	19.4	c	1031.6
US17412	41-22.1	139-50.3	10/16	1031-1040	334	East-2	NNW-1	East-4	14.3	19.1	o	1031.2
US17413	41-24.7	139-46.8	10/17	0408-0418	1064	West-3	West-1	West-5	12.7	19.5	r	1025.2
US17414	41-20.0	139-52.9	10/17	0530-0538	146	WNW-2	West-1	WNW-3	13.7	19.5	c	1025.3
US17415	41-40.1	140-42.0	10/.18	1521-1530	128	WNW-2	West-1	WNW-4	11.5	16.2	c	1027.5

Table 2. Oceanographic data

STATION US17364
LATITUDE 41-05.9 N
LONGITUI 140-50.5 E
DEPTH (m) 53

Press.	Temp.	Salinity	Sigma-T
5	20.676	33.256	23.254
10	20.556	33.319	23.334
20	20.277	33.450	23.507
30	20.192	33.515	23.579
40	18.764	33.754	24.128
48	16.577	34.163	24.971

STATION US17365
LATITUDE 41-04.8 N
LONGITUI 141-02.1 E
DEPTH (m) 48

Press.	Temp.	Salinity	Sigma-T
5	21.1293	33.4331	23.2666
10	20.9743	33.4595	23.3286
20	20.8914	33.4607	23.3517
30	20.6195	33.3927	23.3728
40	20.4039	33.4552	23.4776
43	19.0431	33.7091	24.0241

STATION US17366
LATITUDE 41-11.0 N
LONGITUI 141-11.0 E
DEPTH (m) 31

Press.	Temp.	Salinity	Sigma-T
5	20.9145	32.8467	22.8785
10	21.0221	33.0966	23.0396
20	21.1415	33.3411	23.1933
26	21.002	33.3829	23.2628

STATION US17367
LATITUDE 40-57.8 N
LONGITUI 141-07.1 E
DEPTH (m) 39

Press.	Temp.	Salinity	Sigma-T
5	20.8499	33.0876	23.079
10	20.8483	33.0936	23.0841
20	21.021	33.3622	23.2419
30	20.1589	33.4084	23.5065
35	19.7888	33.4595	23.6421

STATION US17368
LATITUDE 41-03.8 N
LONGITUI 140-52.8 E
DEPTH (m) 52

Press.	Temp.	Salinity	Sigma-T
5	20.7953	33.5484	23.4443
10	20.7731	33.5498	23.4513
20	20.7817	33.5655	23.4609
30	20.871	33.6534	23.5039
40	19.9388	33.8149	23.874
48	18.3873	34.1253	24.5067

STATION US17369
LATITUDE 40-57.5 N
LONGITUI 140-45.7 E
DEPTH (m) 51

Press.	Temp.	Salinity	Sigma-T
5	21.1776	33.6358	23.4077
10	21.1167	33.6355	23.4239
20	20.9909	33.6668	23.4817
30	20.7225	33.7496	23.6169
40	19.6684	33.8885	24.0004
47	17.3177	34.1063	24.7529

STATION US17370
LATITUDE 41-05.0 N
LONGITUI 140-44.1 E
DEPTH (m) 60

Press.	Temp.	Salinity	Sigma-T
5	20.8863	33.6033	23.4616
10	20.8092	33.6078	23.4857
20	20.6221	33.5946	23.5257
30	20.3636	33.5811	23.5842
40	18.7463	33.8757	24.226
50	17.1114	34.149	24.8347
55	16.2416	34.1836	25.0644

STATION US17371
LATITUDE 41-08.8 N
LONGITUI 140-41.2 E
DEPTH (m) 49

Press.	Temp.	Salinity	Sigma-T
5	21.129	33.7097	23.477
10	21.1977	33.7863	23.5166
20	21.0692	33.8288	23.5838
30	20.2094	33.8867	23.8577
40	18.4111	34.0145	24.4159
44	17.894	34.0726	24.5878

STATION US17372
LATITUDE 41-10.9 N
LONGITUI 140-39.4 E
DEPTH (m) 38

Press.	Temp.	Salinity	Sigma-T
5	21.2536	33.8427	23.5443
10	21.0183	33.8276	23.5967
20	20.9526	33.8491	23.6307
30	20.8089	33.8707	23.6859
34	20.3729	33.9005	23.8253

STATION US17373
LATITUDE 41-11.2 N
LONGITUI 140-39.8 E
DEPTH (m) 55

Press.	Temp.	Salinity	Sigma-T
5	21.1034	33.7959	23.5495
10	21.002	33.7924	23.5743
20	20.8545	33.7864	23.6095
30	20.7796	33.8473	23.676
40	20.1948	33.9186	23.8858
50	19.5251	33.9773	24.1053

STATION US17374
LATITUDE 41-11.6 N
LONGITUI 140-40.9 E
DEPTH (m) 67

Press.	Temp.	Salinity	Sigma-T
5	21.4084	33.795	23.4657
10	21.2702	33.813	23.5172
20	20.7756	33.763	23.6129
30	20.6161	33.7461	23.6427
40	20.3721	33.8227	23.7659
50	19.8602	33.9231	23.977
62	17.8902	34.0907	24.6025

STATION US17375
LATITUDE 41-11.9 N
LONGITUI 140-41.9 E
DEPTH (m) 75

Press.	Temp.	Salinity	Sigma-T
5	21.2207	33.7023	23.4464
10	21.0988	33.7056	23.482
20	21.0619	33.8067	23.569
30	20.6477	33.7135	23.6094
40	20.2053	33.8717	23.8473
50	19.1542	33.9766	24.1999
71	14.3052	34.2661	25.5559

STATION US17376
LATITUDE 41-12.0 N
LONGITUI 140-42.3 E
DEPTH (m) 75

Press.	Temp.	Salinity	Sigma-T
5	20.9781	33.5761	23.4162
10	20.9971	33.6332	23.4545
20	20.7988	33.6221	23.4994
30	20.7333	33.685	23.5648
40	20.5113	33.8176	23.7251
50	17.4033	34.0505	24.6895
71	14.3707	34.2649	25.5408

STATION US17377
LATITUDE 41-12.3 N
LONGITUI 140-43.9 E
DEPTH (m) 71

Press.	Temp.	Salinity	Sigma-T
5	21.0065	33.6446	23.4606
10	20.8434	33.6556	23.5129
20	20.8921	33.7013	23.5347
30	20.8026	33.7428	23.5903
40	19.6539	33.9529	24.0534
50	18.5002	34.0276	24.4038
67	15.2306	34.2107	25.3128

STATION US17378
LATITUDE 41-12.6 N
LONGITUI 140-44.8 E
DEPTH (m) 68

Press.	Temp.	Salinity	Sigma-T
5	21.0721	33.6553	23.4511
10	20.9557	33.7006	23.517
20	20.9705	33.7454	23.547
30	20.3234	33.8185	23.7756
40	19.3154	34	24.1767
50	17.7226	34.0833	24.6377
64	15.0692	34.2416	25.3721

STATION US17379
LATITUDE 41-13.0 N
LONGITUI 140-45.5 E
DEPTH (m) 65

Press.	Temp.	Salinity	Sigma-T
5	21.1086	33.663	23.447
10	20.9776	33.7273	23.5314
20	20.9808	33.7434	23.5427
30	20.0516	33.8927	23.9038
40	18.6405	34.0286	24.3695
50	16.8225	34.1365	24.8933
61	15.5355	34.241	25.2685

STATION US17380
LATITUDE 41-16.8 N
LONGITUI 140-41.7 E
DEPTH (m) 147

Press.	Temp.	Salinity	Sigma-T
5	21.6614	33.7653	23.3738
10	21.5699	33.7962	23.4224
20	18.7725	34.0687	24.3669
30	17.2503	34.2451	24.8754
40	15.940	34.335	25.250
50	15.610	34.342	25.330
75	14.135	34.299	25.617
100	12.751	34.324	25.919
125	12.491	34.316	25.963
139	12.419	34.314	25.976

STATION US17381
LATITUDE 41-59.8 N
LONGITUI 141-10.1 E
DEPTH (m) 138

Press.	Temp.	Salinity	Sigma-T
5	17.8719	33.1647	23.8981
10	17.385	33.5756	24.3299
20	15.8944	33.7304	24.7951
30	15.2144	33.8344	25.0265
40	14.2011	33.9033	25.2974
50	12.799	33.766	25.476
75	11.112	33.978	25.959
100	9.891	33.889	26.103
125	8.828	33.822	26.223
131	8.300	33.757	26.253

STATION US17382
LATITUDE 42-10.0 N
LONGITUI 141-10.0 E
DEPTH (m) 122

Press.	Temp.	Salinity	Sigma-T
5	17.9821	33.3574	24.0188
10	17.9056	33.3562	24.0364
20	17.6066	33.3942	24.1379
30	17.324	33.4441	24.2437
40	16.5951	33.6203	24.5501
50	16.1732	33.7781	24.7684
75	12.2348	33.7655	25.5857
100	7.6502	33.6737	26.2831
117	6.5152	33.6405	26.4126

STATION US17383
LATITUDE 42-08.2 N
LONGITUI 141-01.6 E
DEPTH (m) 87

Press.	Temp.	Salinity	Sigma-T
5	18.8671	32.4872	23.135
10	18.1677	32.6488	23.4314
20	17.7714	32.7727	23.6222
30	16.8973	33.4887	24.3786
40	16.711	33.7401	24.6151
50	14.6044	33.6659	25.0287
75	7.6296	33.4208	26.0868
83	5.6682	33.5239	26.427

STATION US17384
LATITUDE 42-17.6 N
LONGITUI 140-54.1 E
DEPTH (m) 57

Press.	Temp.	Salinity	Sigma-T
5	18.8047	32.5425	23.1928
10	18.4408	32.5818	23.3131
20	17.6738	32.8773	23.7259
30	16.3289	33.085	24.2003
40	14.3707	33.1712	24.6967
50	13.0045	33.5479	25.2672
55	11.7144	33.7038	25.6359

STATION US17385
LATITUDE 42-20.8 N
LONGITUI 140-48.6 E
DEPTH (m) 53

Press.	Temp.	Salinity	Sigma-T
5	18.4247	32.764	23.4564
10	18.2567	32.8208	23.5411
20	17.8746	33.0026	23.7733
30	17.3072	32.9844	23.8953
40	17.6792	33.5675	24.2531
50	12.4602	33.5569	25.3806
52	12.212	33.5985	25.4605

STATION US17386
LATITUDE 42-25.3 N
LONGITUI 140-48.9 E
DEPTH (m) 43

Press.	Temp.	Salinity	Sigma-T
5	18.3915	32.4464	23.2218
10	18.4082	32.6288	23.3571
20	17.2314	32.9995	23.9249
30	14.9291	33.0863	24.5122
40	12.3331	33.1	25.0507

STATION US17387
LATITUDE 42-23.2 N
LONGITUI 140-42.9 E
DEPTH (m) 60

Press.	Temp.	Salinity	Sigma-T
5	18.3946	32.5728	23.3176
10	17.688	32.9223	23.7569
20	17.5505	33.1552	23.9682
30	17.411	33.220	24.051
40	14.795	32.928	24.419
50	13.765	33.413	25.009
58	12.2287	33.5864	25.4479

STATION US17388
LATITUDE 42-25.7 N
LONGITUI 140-37.8 E
DEPTH (m) 82

Press.	Temp.	Salinity	Sigma-T
5	18.3271	32.5408	23.3098
10	18.1325	32.7108	23.4873
20	17.5872	33.0894	23.909
30	17.6621	33.4319	24.1533
40	15.6675	32.936	24.2349
50	14.0605	33.0374	24.6582
75	8.8738	33.5489	26.0017
80	8.6903	33.5121	26.0013

STATION US17389
LATITUDE 42-24.0 N
LONGITUI 140-32.9 E
DEPTH (m) 95

Press.	Temp.	Salinity	Sigma-T
5	18.2542	32.6226	23.3902
10	17.8799	32.6966	23.5379
20	17.3105	32.9216	23.8464
30	16.9026	33.2785	24.2162
40	14.5249	32.901	24.4557
50	11.7519	33.2812	25.3007
75	9.0093	33.4943	25.9376
91	7.143	33.526	26.238

STATION US17390
LATITUDE 42-18.9 N
LONGITUI 140-30.3 E
DEPTH (m) 92

Press.	Temp.	Salinity	Sigma-T
5	18.7312	32.4402	23.133
10	18.4627	32.6125	23.3312
20	16.8584	32.8782	23.9194
30	15.6306	32.8938	24.2106
40	12.380	32.933	24.912
50	11.707	33.323	25.341
75	7.437	33.513	26.187
89	7.136	33.521	26.235

STATION US17391
LATITUDE 42-16.8 N
LONGITUI 140-35.9 E
DEPTH (m) 92

Press.	Temp.	Salinity	Sigma-T
5	18.5574	32.356	23.1118
10	18.4431	32.4238	23.1918
20	16.4211	32.9844	24.1019
30	13.123	32.9168	24.7551
40	11.7248	33.3465	25.3564
50	10.0897	33.242	25.5643
75	8.6459	33.6802	26.14
87	8.3329	33.6724	26.1816

STATION US17392
LATITUDE 42-13.3 N
LONGITUI 140-41.4 E
DEPTH (m) 90

Press.	Temp.	Salinity	Sigma-T
5	18.4429	32.5479	23.2867
10	18.3649	32.5544	23.3109
20	16.749	33.0319	24.0628
30	15.8999	33.0264	24.2525
40	13.1156	33.3135	25.0635
50	12.071	33.476	25.392
75	8.192	33.544	26.102
86	7.6911	33.7067	26.3031

STATION US17393
LATITUDE 42-15.4 N
LONGITUI 140-47.6 E
DEPTH (m) 72

Press.	Temp.	Salinity	Sigma-T
5	18.2917	32.5882	23.3547
10	18.2176	32.6232	23.3995
20	17.0969	32.8655	23.8539
30	16.2635	32.9026	24.0751
40	14.487	32.943	24.4961
50	11.3145	33.1269	25.2608
69	10.0109	33.6997	25.9348

STATION US17394
LATITUDE 42-09.5 N
LONGITUI 140-52.5 E
DEPTH (m) 77

Press.	Temp.	Salinity	Sigma-T
5	18.4943	32.5384	23.2667
10	18.3343	32.5898	23.3454
20	17.7745	33.1207	23.8879
30	17.368	33.2081	24.0524
40	14.1856	32.8397	24.4796
50	13.4665	33.3118	24.9919
74	8.1007	33.7511	26.2781

STATION US17395
LATITUDE 42-18.2 N
LONGITUI 140-41.6 E
DEPTH (m) 69

Press.	Temp.	Salinity	Sigma-T
5	18.2658	32.5601	23.3395
10	18.1199	32.6692	23.4586
20	16.6819	32.8937	23.9723
30	14.4818	33.0729	24.5974
40	12.7523	33.2146	25.0586
50	9.6085	33.3792	25.7514
67	8.2767	33.5524	26.0959

STATION US17396
LATITUDE 42-20.9 N
LONGITUI 140-36.7 E
DEPTH (m) 88

Press.	Temp.	Salinity	Sigma-T
5	18.3223	32.5827	23.3429
10	17.7196	32.8262	23.6757
20	17.6732	33.0841	23.8843
30	17.6592	33.3929	24.1242
40	15.3861	32.9298	24.292
50	10.9666	33.0915	25.2955
75	7.977	33.544	26.134
85	7.280	33.637	26.307

STATION US17397
LATITUDE 42-19.3 N
LONGITUI 140-23.1 E
DEPTH (m) 55

Press.	Temp.	Salinity	Sigma-T
5	18.7475	32.3283	23.0435
10	18.5883	32.5561	23.2571
20	17.253	32.9963	23.9173
30	16.5277	33.0032	24.0919
40	14.3674	33.1142	24.6533
50	10.5907	33.3131	25.5341
53	10.9907	33.4766	25.591

STATION US17398
LATITUDE 42-14.0 N
LONGITUI 140-30.0 E
DEPTH (m) 78

Press.	Temp.	Salinity	Sigma-T
5	18.635	32.4099	23.1337
10	18.2895	32.6362	23.392
20	17.4875	33.0692	23.9174
30	15.9264	32.9106	24.1575
40	13.6078	33.1928	24.8712
50	10.6715	33.144	25.3883
74	7.8737	33.5109	26.1229

STATION US17399
LATITUDE 42-11.4 N
LONGITUI 140-34.9 E
DEPTH (m) 81

Press.	Temp.	Salinity	Sigma-T
5	18.912	32.3973	23.0551
10	18.2894	32.6984	23.4395
20	17.4997	33.0694	23.9147
30	17.1973	33.0868	23.9998
40	14.509	33.0973	24.6104
50	11.0929	32.9545	25.1664
73	7.838	33.5786	26.1812

STATION US17400
LATITUDE 42-04.7 N
LONGITUI 140-56.7 E
DEPTH (m) 86

Press.	Temp.	Salinity	Sigma-T
5	18.0864	32.6477	23.4503
10	18.0222	32.6757	23.4874
20	17.768	32.851	23.683
30	16.6699	33.1535	24.1744
40	13.6883	33.1556	24.8261
50	12.1208	33.4559	25.3671
75	6.3046	33.4385	26.2804
83	5.7777	33.5279	26.4168

STATION US17401
LATITUDE 41-57.5 N
LONGITUI 140-58.2 E
DEPTH (m) 79

Press.	Temp.	Salinity	Sigma-T
5	18.3215	32.4707	23.2575
10	18.3352	32.504	23.2797
20	18.2415	32.6273	23.3969
30	18.2435	32.6865	23.4416
40	15.5739	32.6354	24.0241
50	12.8669	33.1197	24.9627
75	8.0656	33.8021	26.3234

STATION US17402
LATITUDE 41-58.0 N
LONGITUI 140-59.5 E
DEPTH (m) 87

Press.	Temp.	Salinity	Sigma-T
5	18.2149	32.5181	23.3199
10	18.2777	32.554	23.3319
20	18.2627	32.7336	23.473
30	18.2476	32.7814	23.5132
40	17.075	33.215	24.127
50	16.298	33.508	24.532
75	9.246	33.794	26.134
81	8.641	33.791	26.228

STATION US17403
LATITUDE 41-58.6 N
LONGITUI 141-00.7 E
DEPTH (m) 95

Press.	Temp.	Salinity	Sigma-T
5	18.0674	32.6092	23.4255
10	18.0756	32.62	23.4318
20	18.2135	32.8753	23.5934
30	18.1651	33.0699	23.7541
40	17.728	33.4107	24.1212
50	16.191	33.542	24.583
75	9.622	33.747	26.037
90	8.671	33.817	26.243

STATION US17404
LATITUDE 41-59.3 N
LONGITUI 141-01.9 E
DEPTH (m) 101

Press.	Temp.	Salinity	Sigma-T
5	18.007	32.6889	23.5011
10	18.0199	32.6941	23.502
20	18.0736	32.7917	23.5636
30	18.1031	33.3038	23.9482
40	17.7806	33.4271	24.121
50	16.351	33.7283	24.6894
75	10.1482	33.886	26.0569
97	8.5361	33.818	26.2649

STATION US17405
LATITUDE 41-41.8 N
LONGITUI 140-47.9 E
DEPTH (m) 135

Press.	Temp.	Salinity	Sigma-T
5	21.5725	33.873	23.4801
10	21.576	33.8722	23.4785
20	21.5732	33.8706	23.478
30	20.9265	33.9815	23.7385
40	19.669	34.0313	24.1092
50	16.8967	33.9769	24.7533
75	15.2599	34.2096	25.3055
100	12.8515	34.2477	25.8396
125	11.352	34.2134	26.099
126	11.3408	34.2155	26.1027

STATION US17406
LATITUDE 41-35.7 N
LONGITUI 140-52.8 E
DEPTH (m) 45

Press.	Temp.	Salinity	Sigma-T
5	19.4146	34.004	24.1542
10	19.2674	34.0214	24.2052
20	19.2416	34.0237	24.2136
30	19.2407	34.0241	24.2141
40	19.2291	34.0272	24.2194
40	19.2291	34.0272	24.2194

STATION US17407
LATITUDE 41-37.1 N
LONGITUI 140-51.8 E
DEPTH (m) 130

Press.	Temp.	Salinity	Sigma-T
5	19.0723	34.0252	24.2579
10	19.0731	34.0267	24.2588
20	19.1095	34.0364	24.257
30	19.0409	34.0427	24.2792
40	18.8792	34.0561	24.3304
50	15.6886	34.1412	25.1573
75	14.072	34.341	25.663
100	12.180	34.230	25.957
105	11.408	34.192	26.072

STATION US17408
LATITUDE 41-38.8 N
LONGITUI 140-49.4 E
DEPTH (m) 298

Press.	Temp.	Salinity	Sigma-T
5	18.2964	34.0699	24.4868
10	18.2732	34.0736	24.4954
20	18.1438	34.1026	24.5495
30	15.9296	34.2733	25.2046
40	14.8894	34.3142	25.4673
50	14.7339	34.346	25.5255
75	13.884	34.350	25.709
100	12.789	34.241	25.847
125	11.473	34.251	26.106
150	11.469	34.261	26.114
175	10.819	34.206	26.190
200	10.535	34.179	26.218
250	9.993	34.160	26.297
269	9.959	34.164	26.306

STATION US17409
LATITUDE 41-40.7 N
LONGITUI 140-47.3 E
DEPTH (m) 237

Press.	Temp.	Salinity	Sigma-T
5	18.6643	34.0276	24.3628
10	18.0553	34.0819	24.5554
20	17.4019	34.0891	24.7195
30	16.9749	34.1658	24.88
40	16.5744	34.2688	25.0529
50	15.3542	34.3489	25.3919
75	14.1032	34.1511	25.5094
100	13.1326	34.2093	25.7538
125	12.1318	34.2225	25.9601
150	11.6186	34.2108	26.0477
175	11.0818	34.2028	26.14
200	10.6076	34.192	26.216
210	10.5153	34.1966	26.2359

STATION US17410
LATITUDE 41-42.7 N
LONGITUI 140-45.0 E
DEPTH (m) 87

Press.	Temp.	Salinity	Sigma-T
5	17.1143	34.0793	24.7806
10	16.7531	34.0547	24.8468
20	16.1245	34.1172	25.0402
30	15.3496	34.1496	25.2394
40	14.4355	34.1448	25.4343
50	13.5437	34.2105	25.6713
75	12.8821	34.2188	25.8111
82	12.7203	34.2322	25.8535

STATION US17411
LATITUDE 41-33.7 N
LONGITUI 139-51.4 E
DEPTH (m) 1417

Press.	Temp.	Salinity	Sigma-T
5	19.4996	33.8897	24.0451
10	19.5026	33.8868	24.0421
20	19.5008	33.8846	24.0409
30	19.4981	33.8862	24.0428
40	19.5036	33.9037	24.0547
50	17.8107	34.2625	24.7535
75	14.1951	34.2455	25.5631
100	11.0246	34.1918	26.1417
125	9.4387	34.1343	26.3694
148	7.1288	33.9557	26.5784

STATION US17412
LATITUDE 41-22.1 N
LONGITUI 139-50.3 E
DEPTH (m) 334

Press.	Temp.	Salinity	Sigma-T
5	19.1893	33.941	24.1637
10	19.189	33.9413	24.1641
20	19.1129	33.9628	24.1999
30	18.917	33.9967	24.2755
40	18.5393	34.1618	24.4967
50	17.7278	34.4284	24.9009
75	13.7921	34.4676	25.8189
100	10.7818	34.1815	26.1771
125	8.4338	34.0858	26.4905
148	6.4586	34.0266	26.7246

STATION US17413
LATITUDE 41-24.7 N
LONGITUI 139-46.8 E
DEPTH (m) 1064

Press.	Temp.	Salinity	Sigma-T
5	19.6781	33.8868	23.9967
10	19.6818	33.8878	23.9965
20	19.6834	33.8872	23.9957
30	19.6905	33.8866	23.9933
40	18.8291	34.3186	24.5437
50	17.225	34.5396	25.1073
75	14.0895	34.4111	25.7132
100	12.4457	34.2901	25.9521
125	11.6155	34.2554	26.0831
148	10.0645	34.0852	26.2266

STATION US17414
LATITUDE 41-20.0 N
LONGITUI 139-52.9 E
DEPTH (m) 146

Press.	Temp.	Salinity	Sigma-T
5	19.5734	33.8902	24.0264
10	19.5826	33.8883	24.0225
20	19.5827	33.8878	24.0222
30	19.6002	33.974	24.0834
40	18.4719	34.3817	24.6817
50	17.9157	34.5194	24.9246
75	16.1426	34.4878	25.321
100	13.2474	34.3301	25.8241
125	10.0681	34.1075	26.2434
133	9.3595	34.1072	26.3612

STATION US17415
LATITUDE 41-40.1 N
LONGITUI 140-42.0 E
DEPTH (m) 128

Press.	Temp.	Salinity	Sigma-T
5	16.8973	34.107	24.8531
10	16.9049	34.1067	24.8511
20	16.4799	34.1008	24.9458
30	15.0474	34.0542	25.2324
40	14.0327	34.1812	25.5475
50	13.2745	34.2064	25.7229
75	10.8791	34.2043	26.1776
100	10.869	34.2177	26.1898
117	10.8562	34.2174	26.1918

8

THE " USHIO MARU "

CRUISE 400
CRUISE 401
CRUISE 402

IN OCTOBER 2017
IN NOVEMBER 2017

1. Cruise Itinerary

Cruise 400

Departure from Hakodate	Oct.	24, 2017
Start hydrographic research (US17416)		25
Retrieval and setting ADCP mooring system		25
Arrival at Mori		25
Departure from Mori		26
Sampling by bottom trawl net		26
Arrival at Muroran		26
Departure from Muroran		27
Sampling by bottom trawl net		27
Hydrographic research (US17435)		27
Return to Hakodate		28

Total coverage 270.0 miles

Cruise 401

Departure from Hakodate	Nov.	7, 2017
Hydrographic research (US17436)		7
Return to Hakodate		8

Total coverage 115.9 miles

Cruise 402

Departure from Hakodate	Nov.	13, 2017
Start hydrographic research (US17437)		13
Sampling by bottom trawl net		13
Arrival at Muroran		13
Departure from Muroran		14
Sampling by bottom trawl net		14
Arrival at Muroran		14
Departure from Muroran		15
Finish hydrographic research (US17453)		15
Return to Hakodate		16

Total coverage 219.1 miles

2. Data on Temperature, Salinity and Pressure

Hydrographic work on deck and the data processing were made by the deck officers, crews, research staff and cadets of the "Ushio Maru". Temperature, salinity and pressure were measured by CTD (Seabird SBE-19Plus and SBE-19).

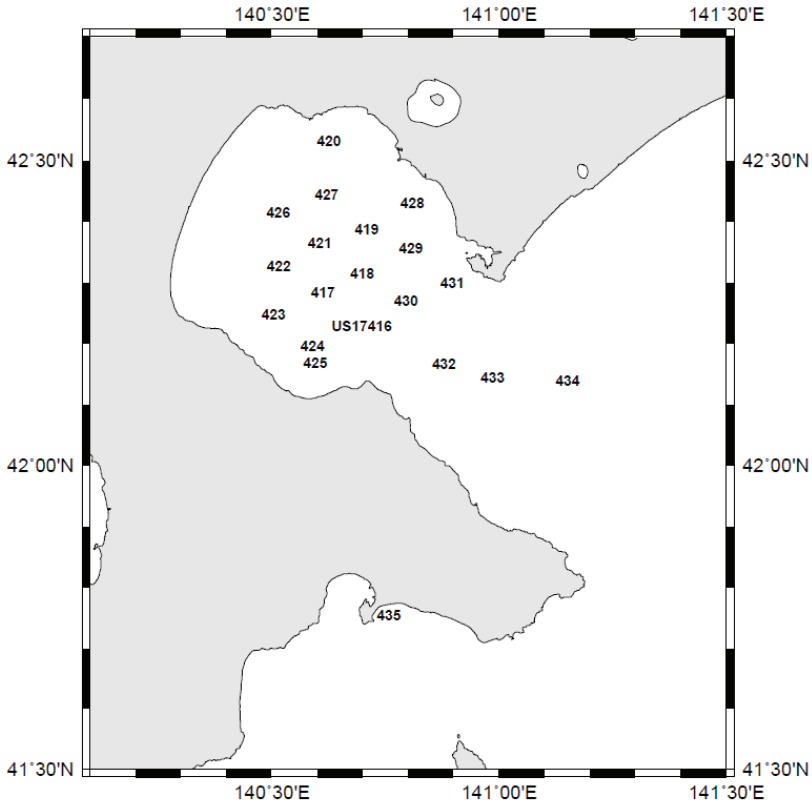


Figure 1. Oceanographic stations (Cruise 400)

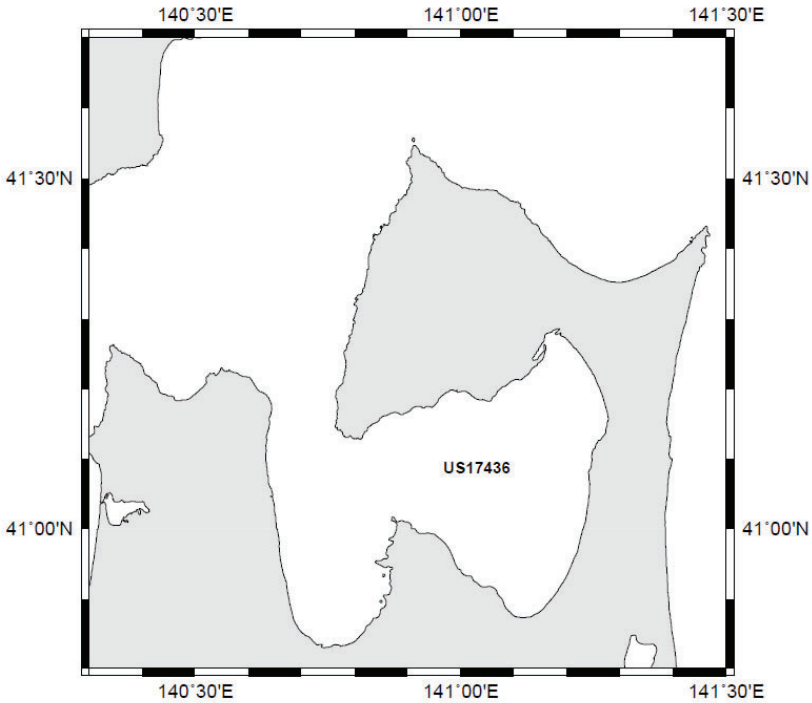


Figure 2. Oceanographic stations (Cruise 401)

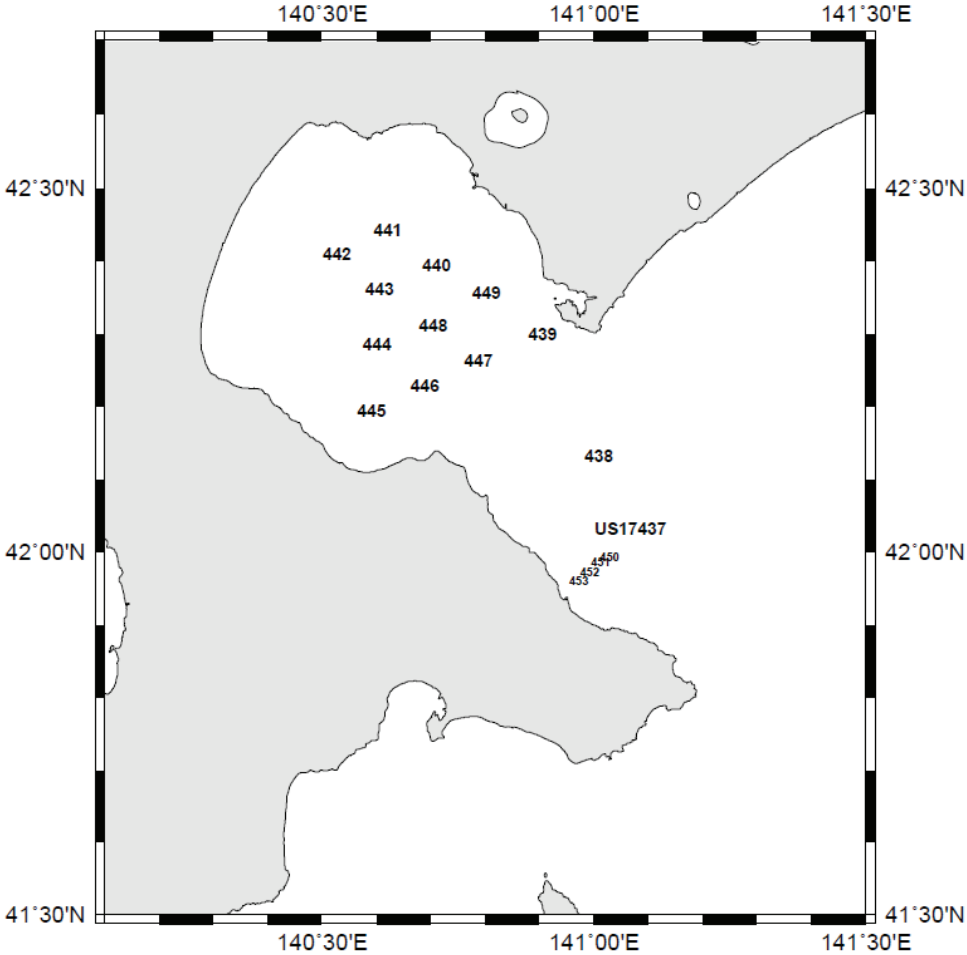


Figure 3. Oceanographic stations (Cruise 402)

Table 1. List of Oceanographic Station

Crs400

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17416	42-13.2	140-41.8	10/25	0550-0558	90	Calm	NE-1	Calm	11.4	14	bc	1021.7
US17417	42-16.5	140-36.7	10/25	0657-0707	91	SSW-1	NNW-1	SSW-2	11.6	14	b	1021.7
US17418	42-18.4	140-41.9	10/25	0757-0804	70	Calm	NNW-1	Calm	12.3	13.6	b	1021.7
US17419	42-22.7	140-42.5	10/25	0831-0837	62	ESE-1	North-1	ESE-1	12.5	13.8	bc	1021.6
US17420	42-31.3	140-37.5	10/25	0934-0940	62	East-1	North-1	East-2	12.5	14.1	bc	1021.6
US17421	42-21.4	140-36.3	10/25	1042-1049	89	North-1	North-1	North-1	14.3	14	bc	1021.5
US17422	42-19.1	140-30.9	10/25	1119-1125	94	WNW-2	NE-1	WNW-3	13.9	14.5	bc	1020.8
US17423	42-14.3	140-30.2	10/25	1238-1245	81	North-2	West-1	North-3	15	14.2	bc	1020.6
US17424	42-11.3	140-35.3	10/25	1317-1323	81	West-1	West-1	West-1	16.5	14.2	b	1019.5
US17425	42-09.6	140-35.7	10/25	1338-1345	72	West-2	West-1	West-4	16.5	14.2	b	1019.4
US17426	42-24.3	140-30.8	10/26	0955-1000	95	North-2	NNW-1	North-4	13.2	13.6	bc	1023.8
US17427	42-26.1	140-37.2	10/26	1113-1118	83	NNW-2	NNW-1	NNW-3	15.1	13.8	bc	1023.6
US17428	42-25.3	140-48.5	10/26	1231-1235	45	West-2	WNW-1	West-3	16.4	14	bc	1022.8
US17429	42-20.9	140-48.3	10/26	1302-1307	53	West-2	WNW-1	West-4	13.9	14	bc	1022.5
US17430	42-15.7	140-47.7	10/26	1338-1343	71	West-2	WNW-1	West-4	13.5	14	bc	1022.3
US17431	42-17.4	140-53.8	10/26	1414-1417	58	WNW-2	WNW-1	WNW-3	14.6	13.6	bc	1022.2
US17432	42-09.5	140-52.7	10/27	0817-0824	77	NW-2	East-1	NW-3	11.4	14.4	bc	1026.6
US17433	42-08.2	140-59.1	10/27	0856-0902	82	WNW-2	East-1	WNW-2	13.1	14	bc	1026.7
US17434	42-07.8	141-09.0	10/27	1048-1055	119	NW-2	East-1	NW-3	12.3	13.5	bc	1026.6
US17435	41-44.7	140-45.4	10/27	1608-1611	55	ESE-2	ESE-1	ESE-3	13.3	14.7	bc	1026.7

Crs401

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17436	41-04.7	141-01.8	11/7	1310-1320	49	West-2	West-1	West-4	18.1	14.9	bc	1020.3

Crs402

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17437	42-01.4	141-04.0	11/13	1156-1202	109	East-2	South-1	East-2	9.9	13.8	o	1019.6
US17438	42-07.4	141-00.5	11/13	1318-1323	85	East-2	NE-1	East-3	9.3	13.3	r	1019.3
US17439	42-17.5	140-54.3	11/13	1501-1505	57	East-2	ENE-1	East-3	8.1	12.1	r	1019.4
US17440	42-23.1	140-42.6	11/14	0740-0745	62	SE-2	SE-1	SE-4	11.9	12.5	bc	1010.5
US17441	42-26.0	140-37.2	11/14	0816-0821	83	SE-3	SE-1	SE-5	12.6	12.4	bc	1009.1
US17442	42-24.0	140-31.6	11/14	0930-0935	95	South-2	East-1	South-3	12.1	12.2	bc	1008.9
US17443	42-21.1	140-36.3	11/14	1037-1043	89	SSW-3	SSW-1	SSW-5	12.7	12.5	r	1008.8
US17444	42-16.6	140-36.0	11/14	1111-1117	92	West-2	SW-1	West-4	13	12.6	c	1008.6
US17445	42-11.2	140-35.4	11/14	1254-1258	81	West-2	WSW-1	West-4	12.5	12.6	c	1008.2
US17446	42-13.2	140-41.3	11/14	1329-1334	90	West-2	WSW-1	West-4	13.3	12.5	c	1008.3
US17447	42-15.3	140-47.2	11/14	1406-1410	73	WSW-2	WSW-1	West-4	12.9	12.5	c	1008.3
US17448	42-18.2	140-42.2	11/14	1441-1445	64	West-2	West-1	West-4	12.3	12.5	bc	1008.3
US17449	42-20.8	140-48.1	11/14	1516-1521	54	West-2	West-1	West-4	11.8	12.5	bc	1008.5
US17450	41-59.3	141-01.7	11/15	1415-1421	101	West-2	WNW-1	West-2	5.6	12.9	bc	1011.6
US17451	41-58.8	141-00.7	11/15	1430-1437	96	Calm	WNW-1	Calm	6.2	13	c	1011.5
US17452	41-58.0	140-59.5	11/15	1448-1455	87	Calm	NW-1	Calm	6.3	12.4	c	1011.5
US17453	41-57.3	140-58.3	11/15	1505-1510	79	Calm	NW-1	Calm	6.4	12.6	c	1011.5

Table 2. Oceanographic data

STATION US17416
LATITUDE 42-13.2 N
LONGITUI 140-41.8 E
DEPTH (m) 90

Press.	Temp.	Salinity	Sigma-T
5	14.2899	33.1041	24.6619
10	14.2909	33.1048	24.6622
20	14.2919	33.1089	24.6652
30	13.9485	33.4115	24.9704
40	13.9429	33.5102	25.0478
50	13.9149	33.6042	25.1262
75	10.281	33.6153	25.8231
88	9.2279	33.7514	26.1041

STATION US17417
LATITUDE 42-16.5 N
LONGITUI 140-36.7 E
DEPTH (m) 91

Press.	Temp.	Salinity	Sigma-T
5	14.2917	33.1153	24.6701
10	14.2912	33.1134	24.6688
20	14.2976	33.1147	24.6684
30	14.3	33.1146	24.6679
40	14.0105	33.2434	24.8277
50	12.5469	33.5818	25.3831
75	9.117	33.7609	26.1293
86	8.7035	33.8028	26.2271

STATION US17418
LATITUDE 42-18.4 N
LONGITUI 140-41.9 E
DEPTH (m) 70

Press.	Temp.	Salinity	Sigma-T
5	14.0323	33.0822	24.6987
10	14.0458	33.1077	24.7156
20	13.8766	33.1914	24.8152
30	13.9797	33.5195	25.0473
40	14.0055	33.5484	25.0643
50	13.2598	33.7218	25.3508
67	11.4929	33.8404	25.783

STATION US17419
LATITUDE 42-22.7 N
LONGITUI 140-42.5 E
DEPTH (m) 62

Press.	Temp.	Salinity	Sigma-T
5	14.0553	33.0773	24.6901
10	14.0437	33.0763	24.6917
20	14.0061	33.1246	24.7368
30	13.9618	33.4877	25.0265
40	13.9678	33.5039	25.0377
50	13.9801	33.5094	25.0394
59	12.3672	33.7386	25.5394

STATION US17420
LATITUDE 42-31.3 N
LONGITUI 140-37.5 E
DEPTH (m) 62

Press.	Temp.	Salinity	Sigma-T
5	14.294	33.0966	24.6552
10	14.2899	33.0975	24.6567
20	14.2812	33.1016	24.6618
30	14.2659	33.1067	24.6689
40	12.7862	33.5174	25.2865
50	11.7759	33.759	25.6674
59	11.24	33.8286	25.8201

STATION US17421
LATITUDE 42-21.4 N
LONGITUI 140-36.3 E
DEPTH (m) 89

Press.	Temp.	Salinity	Sigma-T
5	14.1744	33.0761	24.6644
10	14.163	33.0758	24.6666
20	13.8958	33.1235	24.7587
30	13.7587	33.2593	24.8919
40	13.981	33.5083	25.0384
50	13.6428	33.5716	25.157
75	9.4603	33.7558	26.0699
85	8.5725	33.6659	26.14

STATION US17422
LATITUDE 42-19.1 N
LONGITUI 140-30.9 E
DEPTH (m) 94

Press.	Temp.	Salinity	Sigma-T
5	14.3605	33.1044	24.6472
10	14.3487	33.1078	24.6524
20	14.3321	33.1107	24.6581
30	14.3194	33.1111	24.6611
40	13.4593	33.282	24.9704
50	12.0762	33.5555	25.4529
75	8.4294	33.67	26.1651
89	8.1472	33.7387	26.2615

STATION US17423
LATITUDE 42-14.3 N
LONGITUI 140-30.2 E
DEPTH (m) 81

Press.	Temp.	Salinity	Sigma-T
5	14.4153	33.0869	24.6222
10	14.308	33.0861	24.6442
20	14.284	33.0877	24.6505
30	14.2698	33.0884	24.654
40	12.8458	33.4196	25.1991
50	11.6654	33.7061	25.6468
75	8.0577	33.667	26.2185
78	8.0518	33.677	26.2272

STATION US17424
LATITUDE 42-11.3 N
LONGITUI 140-35.3 E
DEPTH (m) 81

Press.	Temp.	Salinity	Sigma-T
5	14.3089	33.086	24.6439
10	14.3042	33.0957	24.6524
20	14.231	33.0899	24.6632
30	14.2041	33.0879	24.6674
40	12.9922	33.3736	25.1346
50	12.0858	33.6302	25.509
75	8.3239	33.5617	26.0961
78	8.154	33.6375	26.1811

STATION US17425
LATITUDE 42-09.6 N
LONGITUI 140-35.7 E
DEPTH (m) 72

Press.	Temp.	Salinity	Sigma-T
5	14.3621	33.0847	24.6317
10	14.2191	33.0806	24.6586
20	14.1792	33.0849	24.6702
30	14.1673	33.0858	24.6734
40	13.0308	33.4458	25.1828
50	11.8459	33.656	25.5743
65	9.3144	33.5114	25.9024

STATION US17426
LATITUDE 42-24.3 N
LONGITUI 140-30.8 E
DEPTH (m) 95

Press.	Temp.	Salinity	Sigma-T
5	13.9836	32.9646	24.6179
10	14.0594	33.027	24.6504
20	14.2519	33.1001	24.6668
30	14.2471	33.0993	24.6671
40	12.9224	33.2919	25.0851
50	12.5081	33.7448	25.517
75	9.9663	33.8113	26.0294
93	7.7901	33.6795	26.2675

STATION US17427
LATITUDE 42-26.1 N
LONGITUI 140-37.2 E
DEPTH (m) 83

Press.	Temp.	Salinity	Sigma-T
5	14.1321	32.9944	24.6101
10	14.1199	33.0014	24.6181
20	14.2894	33.0915	24.6522
30	13.9131	33.1524	24.7775
40	13.7592	33.5027	25.0799
50	11.9983	33.78	25.6419
75	9.8502	33.6944	25.9576
80	8.9811	33.7543	26.1457

400- STATION US17428
LATITUDE 42-25.3 N
LONGITUI 140-48.5 E
DEPTH (m) 45

Press.	Temp.	Salinity	Sigma-T
5	14.3537	33.1069	24.6506
10	14.3221	33.1044	24.6554
20	14.2736	33.108	24.6683
30	13.4086	33.3537	25.036
40	12.7207	33.711	25.4494
45	12.7063	33.7252	25.4632

STATION US17429
LATITUDE 42-20.9 N
LONGITUI 140-48.3 E
DEPTH (m) 53

Press.	Temp.	Salinity	Sigma-T
5	14.2839	33.1093	24.6672
10	14.269	33.1062	24.6679
20	14.1852	33.1315	24.7049
30	13.9749	33.4723	25.0119
40	13.8411	33.484	25.0486
50	12.9409	33.7133	25.4079
50	12.9409	33.7133	25.4079

STATION US17430
LATITUDE 42-15.7 N
LONGITUI 140-47.7 E
DEPTH (m) 71

Press.	Temp.	Salinity	Sigma-T
5	14.1992	33.1111	24.6863
10	14.1122	33.1143	24.7069
20	13.9063	33.4	24.9702
30	14.3775	33.7155	25.1153
40	14.5601	33.7391	25.0947
50	14.304	33.8789	25.2569
68	12.4286	33.7434	25.5314

STATION US17431
LATITUDE 42-17.4 N
LONGITUI 140-53.8 E
DEPTH (m) 58

Press.	Temp.	Salinity	Sigma-T
5	13.7521	33.1474	24.8067
10	13.7538	33.1706	24.8243
20	14.478	33.7207	25.098
30	14.6004	33.7685	25.1088
40	14.6173	33.8489	25.1672
50	14.2421	33.9138	25.297
55	13.789	33.9341	25.4072

STATION US17432
LATITUDE 42-09.5 N
LONGITUI 140-52.7 E
DEPTH (m) 77

Press.	Temp.	Salinity	Sigma-T
5	14.4241	33.7966	25.168
10	14.6155	33.8707	25.1844
20	14.6492	33.9035	25.2025
30	14.6651	33.913	25.2064
40	14.6649	33.9179	25.2102
50	14.6683	33.9278	25.2171
73	13.2608	33.9438	25.5224

STATION US17433
LATITUDE 42-08.2 N
LONGITUI 140-59.1 E
DEPTH (m) 82

Press.	Temp.	Salinity	Sigma-T
5	14.2847	33.6612	25.093
10	14.7152	33.8872	25.1757
20	14.9621	33.9686	25.1851
30	14.9836	33.9749	25.1853
40	14.9675	33.9605	25.1776
50	14.9255	33.9715	25.1953
75	12.6853	33.9812	25.6658
77	12.68	33.9816	25.6671

STATION US17434
LATITUDE 42-07.8 N
LONGITUI 141-09.0 E
DEPTH (m) 119

Press.	Temp.	Salinity	Sigma-T
5	13.7028	33.6556	25.2097
10	13.6762	33.6568	25.216
20	13.7869	33.7193	25.2416
30	13.6902	33.7027	25.2486
40	13.6223	33.7322	25.2853
50	13.8431	33.8497	25.3307
75	11.4342	34.0361	25.946
100	11.256	34.0385	25.9805
114	10.7458	33.9696	26.0183

STATION US17435
LATITUDE 41-44.7 N
LONGITUI 140-45.4 E
DEPTH (m) 55

Press.	Temp.	Salinity	Sigma-T
5	14.7757	34.04	25.2805
10	14.3764	34.0666	25.3865
20	13.6783	34.0589	25.5265
30	11.965	34.1786	25.9577
40	11.6643	34.1735	26.0102
50	11.61	34.1902	26.0334
53	11.4743	34.1799	26.0504

STATION US17436
LATITUDE 41-04.7 N
LONGITUI 141-01.8 E
DEPTH (m) 49

Press.	Temp.	Salinity	Sigma-T
5	15.4784	33.5674	24.7626
10	15.439	33.5656	24.77
20	15.3035	33.5587	24.7946
30	15.2157	33.5627	24.8169
40	15.207	33.6388	24.8775
45	15.1087	34.1915	25.3249

STATION US17437
LATITUDE 42-01.4 N
LONGITUI 141-04.0 E
DEPTH (m) 109

Press.	Temp.	Salinity	Sigma-T
5	14.1341	33.9783	25.3695
10	14.0938	33.9778	25.3775
20	14.0587	33.9789	25.3858
30	14.0444	33.9775	25.3877
40	14.0035	33.9715	25.3916
50	13.9169	33.962	25.4022
75	9.6272	33.8749	26.1356
100	6.6535	33.5974	26.3604
106	5.0349	33.4685	26.4572

STATION US17438
LATITUDE 42-07.4 N
LONGITUI 141-00.5 E
DEPTH (m) 85

Press.	Temp.	Salinity	Sigma-T
5	13.6279	33.9199	25.4294
10	13.6418	33.9186	25.4255
20	13.7067	33.959	25.4434
30	13.7271	33.9729	25.45
40	13.7393	33.977	25.4506
50	13.7482	33.9823	25.4529
75	10.685	33.9206	25.9909
83	9.5989	33.9015	26.1611

STATION US17439
LATITUDE 42-17.5 N
LONGITUI 140-54.3 E
DEPTH (m) 57

Press.	Temp.	Salinity	Sigma-T
5	12.6973	33.4657	25.2639
10	12.7589	33.5719	25.3342
20	12.6731	33.5595	25.3413
30	12.5933	33.5424	25.3435
40	12.2437	33.6205	25.4715
50	11.5403	33.8079	25.7491
55	10.8352	33.9741	26.0061

STATION US17440
LATITUDE 42-23.1 N
LONGITUI 140-42.6 E
DEPTH (m) 62

Press.	Temp.	Salinity	Sigma-T
5	12.7017	33.5048	25.2934
10	12.701	33.5043	25.2931
20	12.7011	33.5039	25.2928
30	12.6971	33.5029	25.2927
40	12.7196	33.5095	25.2935
50	12.7304	33.5088	25.2909
60	11.0172	33.9087	25.9235

STATION US17441
LATITUDE 42-26.0 N
LONGITUI 140-37.2 E
DEPTH (m) 83

Press.	Temp.	Salinity	Sigma-T
5	12.6701	33.5189	25.3104
10	12.6722	33.5226	25.3129
20	12.6625	33.5177	25.311
30	12.6653	33.5158	25.309
40	12.7207	33.5323	25.3109
50	12.7073	33.534	25.3149
75	10.1617	33.891	26.0585
79	10.1715	33.913	26.074

STATION US17442
LATITUDE 42-24.0 N
LONGITUI 140-31.6 E
DEPTH (m) 95

Press.	Temp.	Salinity	Sigma-T
5	12.5632	33.5516	25.3566
10	12.5555	33.5532	25.3593
20	12.5432	33.5579	25.3653
30	12.5291	33.5563	25.3668
40	12.5221	33.5568	25.3686
50	12.4992	33.5603	25.3757
75	8.8149	33.6666	26.1031
90	8.3722	33.7386	26.2276

STATION US17443
LATITUDE 42-21.1 N
LONGITUI 140-36.3 E
DEPTH (m) 89

Press.	Temp.	Salinity	Sigma-T
5	12.7742	33.5128	25.2853
10	12.7746	33.5135	25.2858
20	12.7688	33.5186	25.2909
30	12.7715	33.539	25.3062
40	12.7689	33.5462	25.3123
50	12.7681	33.546	25.3123
75	12.3585	33.6383	25.4633
86	10.7024	33.9043	25.9751

STATION US17444
LATITUDE 42-16.6 N
LONGITUI 140-36.0 E
DEPTH (m) 92

Press.	Temp.	Salinity	Sigma-T
5	12.8254	33.5109	25.2738
10	12.8219	33.511	25.2746
20	12.8236	33.5118	25.2749
30	12.826	33.5125	25.2749
40	12.8229	33.5126	25.2757
50	12.8233	33.5157	25.278
75	11.2242	33.9006	25.879
89	9.5421	33.8352	26.1188

STATION US17445
LATITUDE 42-11.2 N
LONGITUI 140-35.4 E
DEPTH (m) 81

Press.	Temp.	Salinity	Sigma-T
5	12.5996	33.3873	25.2221
10	12.7071	33.4639	25.2606
20	13.0393	33.6427	25.3336
30	13.3415	33.7439	25.3515
40	13.5014	33.8096	25.3699
50	12.5877	33.6196	25.4045
75	8.5056	33.6962	26.174
79	8.4384	33.7039	26.1903

STATION US17446
LATITUDE 42-13.2 N
LONGITUI 140-41.3 E
DEPTH (m) 90

Press.	Temp.	Salinity	Sigma-T
5	13.1342	33.6385	25.3115
10	13.1274	33.638	25.3124
20	13.145	33.6538	25.3211
30	13.3228	33.7326	25.3465
40	13.4061	33.7889	25.3732
50	13.4234	33.7865	25.3678
75	10.5608	33.9633	26.0459
87	9.3992	33.8367	26.1431

STATION US17447
LATITUDE 42-15.3 N
LONGITUI 140-47.2 E
DEPTH (m) 73

Press.	Temp.	Salinity	Sigma-T
5	12.816	33.5229	25.285
10	12.8209	33.5227	25.2839
20	12.8477	33.5585	25.3063
30	12.7572	33.5643	25.3286
40	13.0334	33.7725	25.4354
50	13.6151	33.8714	25.3945
71	9.5741	33.8246	26.1054

STATION US17448
LATITUDE 42-18.2 N
LONGITUI 140-42.2 E
DEPTH (m) 64

Press.	Temp.	Salinity	Sigma-T
5	12.8698	33.5198	25.272
10	12.8675	33.5197	25.2724
20	12.8724	33.5197	25.2714
30	12.8739	33.5199	25.2713
40	12.8753	33.52	25.2711
50	12.8777	33.5228	25.2728
62	11.9253	33.6542	25.5583

STATION US17449
LATITUDE 42-20.8 N
LONGITUI 140-48.1 E
DEPTH (m) 54

Press.	Temp.	Salinity	Sigma-T
5	12.7714	33.5122	25.2855
10	12.7729	33.512	25.285
20	12.6509	33.5281	25.3213
30	12.3492	33.5055	25.3621
40	12.2029	33.5785	25.4466
50	10.0461	33.8087	26.0139
52	10.0288	33.8341	26.0367

STATION US17450
LATITUDE 41-59.3 N
LONGITUI 141-01.7 E
DEPTH (m) 101

Press.	Temp.	Salinity	Sigma-T
5	13.221	33.8422	25.4518
10	13.2008	33.8595	25.4693
20	13.1067	33.8673	25.4942
30	13.0031	33.8746	25.5204
40	12.9698	33.8956	25.5433
50	11.7401	33.8693	25.7598
75	8.072	33.7524	26.2834
97	5.8068	33.5564	26.4358

STATION US17451
LATITUDE 41-58.8 N
LONGITUI 141-00.7 E
DEPTH (m) 96

Press.	Temp.	Salinity	Sigma-T
5	12.9107	33.8998	25.5583
10	12.9006	33.8988	25.5595
20	12.8017	33.8916	25.5735
30	12.7203	33.8793	25.58
40	11.2801	33.7907	25.7832
50	8.9659	33.7604	26.1528
75	7.3912	33.6824	26.3267
92	6.4128	33.6235	26.4125

STATION US17452
LATITUDE 41-58.0 N
LONGITUI 140-59.5 E
DEPTH (m) 87

Press.	Temp.	Salinity	Sigma-T
5	12.8986	33.8873	25.551
10	12.8969	33.8868	25.5509
20	12.4812	33.8983	25.6413
30	12.2159	33.884	25.6813
40	11.014	33.8181	25.8526
50	10.0842	33.9441	26.1132
75	7.7538	33.6995	26.2884
84	6.2077	33.5783	26.4031

STATION US17453
LATITUDE 41-57.3 N
LONGITUI 140-58.3 E
DEPTH (m) 79

Press.	Temp.	Salinity	Sigma-T
5	12.9351	33.8369	25.5048
10	12.9455	33.8504	25.5132
20	12.959	33.8895	25.5407
30	12.9869	33.94	25.5743
40	12.6353	33.9078	25.6187
50	10.9852	33.9786	25.9828
75	7.0932	33.6776	26.3643

9

THE " USHIO MARU "

CRUISE 403
CRUISE 404
CRUISE 405

IN NOVEMBER 2017
IN DECEMBER 2017

1. Cruise Itinerary

Cruise 403

Departure from Hakodate	Nov.	21, 2017
Start hydrographic research (US17454)		21
Finish hydrographic research (US17458)		21
Return to Hakodate		22

Total coverage 37.6 miles

Cruise 404

Departure from Hakodate	Dec.	13, 2017
Start hydrographic research (US17459)		14
Retrieval ADCP mooring system		15
Finish hydrographic research (US17469)		15
Return to Hakodate		16

Total coverage 203.3 miles

Cruise 405

Departure from Hakodate	Dec.	20, 2017
Start hydrographic research (US17470)		20
Arrival at Fukushima		20
Departure from Fukushima		21
Finish hydrographic research (US17487)		21
Return to Hakodate		22

Total coverage 103.2 miles

2. Data on Temperature, Salinity and Pressure

Hydrographic work on deck and the data processing were made by the deck officers, crews, research staff and cadets of the "Ushio Maru". Temperature, salinity and pressure were measured by CTD (Seabird SBE-19Plus and SBE-19).

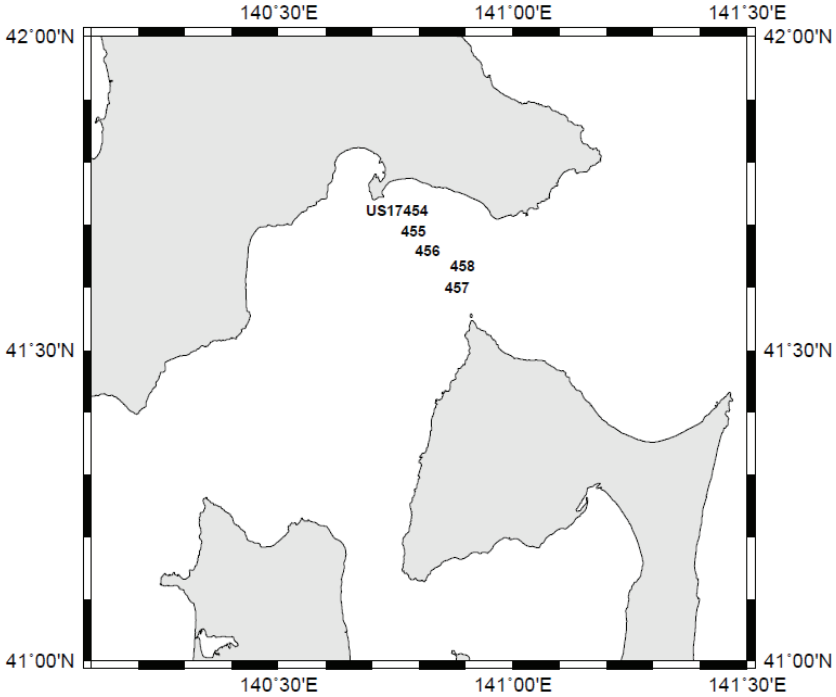


Figure 1. Oceanographic stations (Cruise 403)

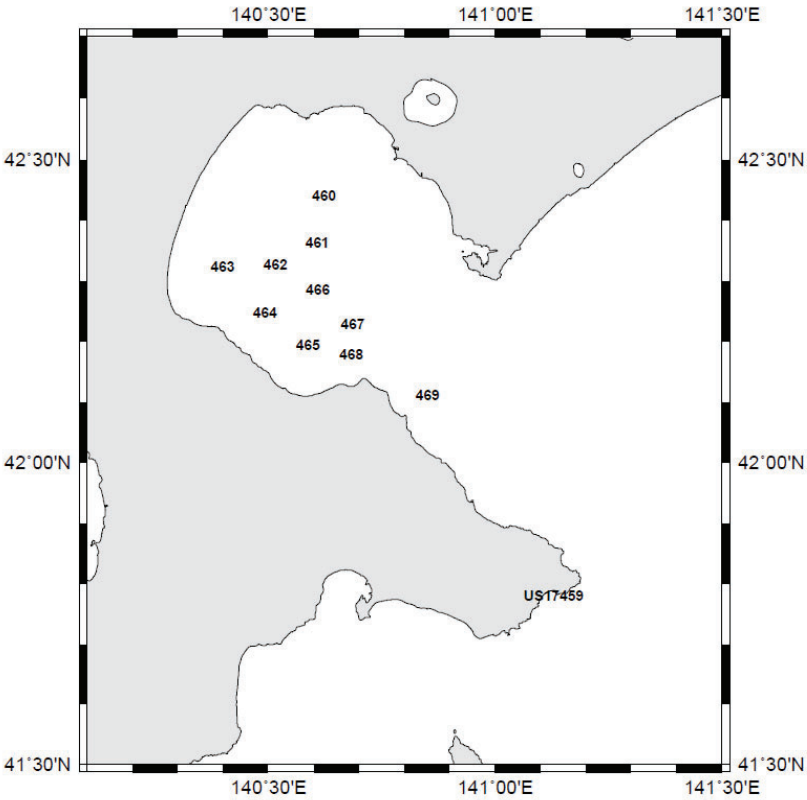


Figure 2. Oceanographic stations (Cruise 404)

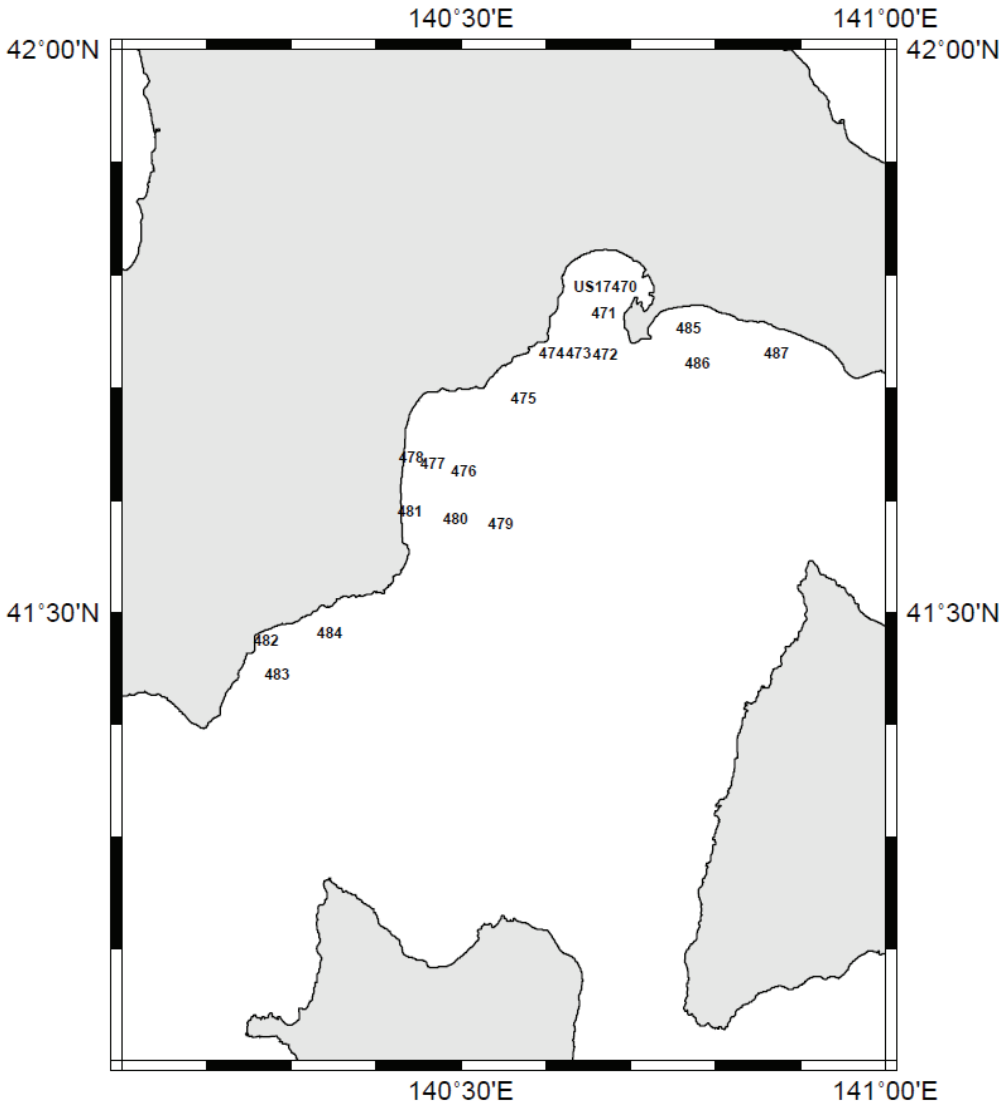


Figure 3. Oceanographic stations (Cruise 405)

Table 1. List of Oceanographic Station

Crs403

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17454	41-42.8	140-45.1	11/21	1539-1547	86	North-2	NW-1	North-3	2.9	14.3	c	1026.6
US17455	41-40.8	140-47.2	11/21	1607-1625	222	WNW-2	NW-1	WNW-3	1.9	14.9	c	1026.6
US17456	41-39.0	140-49.0	11/21	1643-1710	340	NW-2	SW-1	NW-4	2.9	14.5	o	1026.6
US17457	41-35.4	140-53.0	11/21	1755-1757	39	NW-2	SW-1	NW-3	3.1	14.6	c	1027
US17458	41-37.5	140-53.5	11/21	1819-1837	260	NW-2	SW-1	NW-4	3.7	15	bc	1026.8

Crs404

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17459	41-46.3	141-07.7	12/14	1353-1356	44	NNW-2	NNE-1	NNW-4	5.2	12.6	bc	1020.8
US17460	42-25.9	140-37.3	12/15	0703-0710	84	West-3	West-1	West-5	3	8.4	o	1023.1
US17461	42-21.3	140-36.4	12/15	0756-0803	89	West-3	West-1	West-5	3.2	8.3	o	1023.1
US17462	42-19.1	140-30.9	12/15	0845-0851	95	WNW-3	West-1	WNW-5	2.7	8.1	o	1022.8
US17463	42-18.9	140-23.9	12/15	0939-0944	60	WNW-3	West-1	WNW-5	2.9	7.9	o	1023.2
US17464	42-14.3	140-29.5	12/15	1033-1038	77	West-3	West-1	West-5	2.6	7.7	c	1023.2
US17465	42-11.2	140-35.2	12/15	1117-1124	81	WNW-3	West-1	WNW-5	2.9	8	o	1022.8
US17466	42-16.6	140-36.5	12/15	1235-1244	92	WNW-3	West-1	WNW-5	2.9	8.4	o	1022.1
US17467	42-13.2	140-41.1	12/15	1401-1408	90	WNW-3	West-1	WNW-4	3.2	8.3	bc	1021.5
US17468	42-10.2	140-40.9	12/15	1430-1435	86	WNW-3	WNW-1	WNW-5	3.2	8.2	bc	1021.2
US17469	42-06.2	140-51.0	12/15	1555-1601	70	West-2	NW-1	West-4	2.7	9.1	bc	1021.1

Crs405

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17470	41-47.1	140-40.2	12/20	0816-0819	21	West-2	SSW-1	West-4	-3	10.4	s	1024.6
US17471	41-45.7	140-40.1	12/20	0839-0843	31	West-2	SSW-1	West-4	-1.7	11.8	c	1024.8
US17472	41-43.5	140-40.2	12/20	0919-0925	69	West-3	SSW-1	West-5	0	12.4	o	1025
US17473	41-43.6	140-38.3	12/20	0948-0954	59	West-3	SSW-1	West-5	0.2	12.3	c	1025.2
US17474	41-43.6	140-36.4	12/20	1006-1010	36	WSW-3	SW-1	WSW-5	-0.4	12.2	o	1025.6
US17475	41-41.2	140-34.4	12/20	1048-1052	42	West-3	SW-1	West-6	-1.4	12.2	s	1025.5
US17476	41-37.3	140-30.2	12/20	1134-1138	33	West-3	South-1	West-5	-1.2	12.1	s	1025.6
US17477	41-37.7	140-28.0	12/20	1151-1155	21	West-2	South-1	West-4	-2.2	12.2	s	1025.6
US17478	41-38.0	140-26.5	12/20	1205-1208	17	NW-1	South-1	NW-3	-2.5	11.1	s	1025.5
US17479	41-34.5	140-32.8	12/20	1317-1322	67	West-2	SW-1	West-4	-0.9	12.3	o	1025.1
US17480	41-34.7	140-29.6	12/20	1352-1356	45	WNW-2	SW-1	WNW-3	-1.6	12.4	c	1025.1
US17481	41-35.1	140-26.4	12/20	1415-1419	14	WNW-2	SSE-1	WNW-3	-1.6	12.4	s	1025.1
US17482	41-28.2	140-16.2	12/21	0701-0705	18	West-2	South-1	West-4	2.5	11.7	bc	1026.2
US17483	41-26.4	140-17.0	12/21	0740-0745	61	West-2	SSW-1	West-4	2.8	12.2	bc	1026.8
US17484	41-28.6	140-20.7	12/21	0830-0835	63	West-3	SSW-1	West-5	3.7	12.1	bc	1027
US17485	41-44.9	140-46.1	12/21	1114-1118	45	WNW-2	SW-1	WNW-4	2.7	12.3	s	1026.2
US17486	41-43.0	140-46.7	12/21	1142-1149	82	West-3	SW-1	West-5	3.4	12.3	bc	1025.3
US17487	41-43.6	140-52.3	12/21	1226-1230	44	West-3	SW-1	West-6	4	12.5	c	1025

Table 2. Oceanographic data

STATION US17454
LATITUDE 41-42.8 N
LONGITUI 140-45.1 E
DEPTH (m) 86

Press.	Temp.	Salinity	Sigma-T
5	15.0822	33.9946	25.1789
10	15.0943	33.9927	25.1748
20	15.1143	34.0239	25.1944
30	15.0886	34.0577	25.2261
40	15.0739	34.0636	25.2339
50	15.0202	34.0778	25.2565
71	14.6182	34.1032	25.3631

STATION US17455
LATITUDE 41-40.8 N
LONGITUI 140-47.2 E
DEPTH (m) 222

Press.	Temp.	Salinity	Sigma-T
5	14.9827	34.067	25.2564
10	14.9387	34.0813	25.277
20	14.7934	34.1177	25.3365
30	14.7462	34.1277	25.3545
40	14.7497	34.1278	25.3538
50	14.7438	34.1285	25.3556
75	14.669	34.1244	25.3686
100	14.4886	34.1257	25.4083
125	14.2494	34.1411	25.4709
150	14.0491	34.1538	25.5229
175	13.6925	34.1806	25.6176
200	13.7009	34.1864	25.6204
210	13.3411	34.2018	25.7059

STATION US17456
LATITUDE 41-39.0 N
LONGITUI 140-49.0 E
DEPTH (m) 340

Press.	Temp.	Salinity	Sigma-T
5	14.5228	34.1579	25.4258
10	14.5441	34.1562	25.42
20	14.5495	34.1535	25.4167
30	14.5524	34.1586	25.42
40	14.55	34.1646	25.4252
50	14.541	34.1679	25.4296
75	14.5174	34.1716	25.4376
100	14.5092	34.1747	25.4417
125	14.507	34.1761	25.4432
150	14.4455	34.1935	25.4698
175	14.2451	34.1995	25.5169
200	13.9326	34.2227	25.6005
250	13.6632	34.2096	25.6462
300	13.5539	34.2094	25.6684
320	13.4517	34.209	25.689

STATION US17457
LATITUDE 41-35.4 N
LONGITUI 140-53.0 E
DEPTH (m) 39

Press.	Temp.	Salinity	Sigma-T
5	15.2389	33.9969	25.1463
10	15.2511	33.9925	25.1402
20	15.2471	33.9996	25.1466
30	15.0924	34.0559	25.2239

STATION US17458
LATITUDE 41-37.5 N
LONGITUI 140-53.5 E
DEPTH (m) 260

Press.	Temp.	Salinity	Sigma-T
5	15.1126	34.0345	25.203
10	15.118	34.0334	25.201
20	15.07	34.0512	25.2252
30	15.0516	34.0575	25.2341
40	15.0262	34.0641	25.2447
50	15.0152	34.0676	25.2498
75	14.8969	34.0994	25.3
100	14.8841	34.1126	25.313
125	14.8594	34.1261	25.3288
150	14.3934	34.1616	25.4563
175	14.2885	34.1509	25.4703
200	14.112	34.1514	25.5078
250	7.4924	33.7225	26.3439

STATION US17459
LATITUDE 41-46.3 N
LONGITUI 141-07.7 E
DEPTH (m) 44

Press.	Temp.	Salinity	Sigma-T
5	12.5562	33.9849	25.6939
10	11.6292	33.908	25.8104
20	11.1059	33.9145	25.9112
30	10.9931	33.9439	25.9544
40	10.2288	33.8649	26.0267
43	9.7419	33.8915	26.1298

STATION US17460
LATITUDE 42-25.9 N
LONGITUI 140-37.3 E
DEPTH (m) 84

Press.	Temp.	Salinity	Sigma-T
5	8.6495	33.8041	26.2366
10	8.6533	33.806	26.2375
20	8.6624	33.805	26.2352
30	8.6621	33.8042	26.2347
40	8.6611	33.8047	26.2352
50	8.6635	33.8051	26.2351
75	8.6811	33.8121	26.2379
82	8.693	33.815	26.238

STATION US17461
LATITUDE 42-21.3 N
LONGITUI 140-36.4 E
DEPTH (m) 89

Press.	Temp.	Salinity	Sigma-T
5	8.6941	33.8137	26.2372
10	8.6919	33.8114	26.2356
20	8.6963	33.8126	26.236
30	8.6957	33.8123	26.2358
40	8.6843	33.8107	26.2363
50	8.6891	33.8126	26.2371
75	8.6839	33.8101	26.2359
88	8.200	33.770	26.279

STATION US17462
LATITUDE 42-19.1 N
LONGITUI 140-30.9 E
DEPTH (m) 95

Press.	Temp.	Salinity	Sigma-T
5	8.4307	33.808	26.2732
10	8.4288	33.8076	26.2731
20	8.4322	33.8061	26.2714
30	8.4327	33.806	26.2713
40	8.4356	33.8059	26.2708
50	8.4355	33.8062	26.271
75	8.4364	33.8062	26.2708
91	8.4049	33.8018	26.2722

STATION US17463
LATITUDE 42-18.9 N
LONGITUI 140-23.9 E
DEPTH (m) 60

Press.	Temp.	Salinity	Sigma-T
5	8.3287	33.7803	26.2669
10	8.3267	33.7807	26.2675
20	8.338	33.7795	26.2648
30	8.3385	33.7795	26.2648
40	8.3414	33.7793	26.2642
50	8.3362	33.7788	26.2645
58	8.3353	33.7792	26.265

STATION US17464
LATITUDE 42-14.3 N
LONGITUI 140-29.5 E
DEPTH (m) 77

Press.	Temp.	Salinity	Sigma-T
5	8.1393	33.7403	26.2639
10	8.151	33.7501	26.2699
20	8.1705	33.7621	26.2764
30	8.2073	33.7843	26.2883
40	8.2251	33.7985	26.2967
50	8.2193	33.7948	26.2947
74	8.2376	33.8051	26.3001

STATION US17465
LATITUDE 42-11.2 N
LONGITUI 140-35.2 E
DEPTH (m) 81

Press.	Temp.	Salinity	Sigma-T
5	8.5695	33.8631	26.2951
10	8.5809	33.8627	26.293
20	8.5851	33.862	26.2918
30	8.4501	33.8382	26.2939
40	8.3479	33.8311	26.3039
50	8.3493	33.832	26.3043
75	8.3767	33.8345	26.3021
79	8.384	33.836	26.302

STATION US17466
LATITUDE 42-16.6 N
LONGITUI 140-36.5 E
DEPTH (m) 92

Press.	Temp.	Salinity	Sigma-T
5	8.5988	33.81	26.249
10	8.5997	33.8095	26.2485
20	8.6014	33.8094	26.2481
30	8.6035	33.8095	26.2479
40	8.6029	33.8094	26.2479
50	8.5854	33.8082	26.2496
75	8.5589	33.8078	26.2533
86	8.5525	33.8075	26.2541

STATION US17467
LATITUDE 42-13.2 N
LONGITUI 140-41.1 E
DEPTH (m) 90

Press.	Temp.	Salinity	Sigma-T
5	8.5419	33.8202	26.2657
10	8.5477	33.8192	26.264
20	8.5516	33.8193	26.2635
30	8.5528	33.8191	26.2632
40	8.5434	33.8165	26.2626
50	8.5441	33.8178	26.2635
75	8.5108	33.8126	26.2645
87	8.3181	33.8054	26.2882

STATION US17468
LATITUDE 42-10.2 N
LONGITUI 140-40.9 E
DEPTH (m) 86

Press.	Temp.	Salinity	Sigma-T
5	9.2133	33.9277	26.2444
10	9.2333	33.927	26.2406
20	9.2044	33.918	26.2383
30	9.0014	33.8842	26.2442
40	8.7183	33.8715	26.2787
50	8.7091	33.8742	26.2822
75	8.1352	33.7831	26.2981
83	8.0871	33.7833	26.3054

STATION US17469
LATITUDE 42-06.2 N
LONGITUI 140-51.0 E
DEPTH (m) 70

Press.	Temp.	Salinity	Sigma-T
5	9.288	33.9331	26.2366
10	9.2914	33.9326	26.2357
20	9.3036	33.9358	26.2362
30	9.2135	33.8997	26.2225
40	8.9352	33.8842	26.2547
50	8.8596	33.8702	26.2555
67	8.7751	33.8705	26.2691

STATION US17470
LATITUDE 41-47.1 N
LONGITUI 140-40.2 E
DEPTH (m) 21

Press.	Temp.	Salinity	Sigma-T
5	10.6646	33.4202	25.6046
10	11.8736	33.9219	25.7756
20	11.9872	33.8688	25.7129

STATION US17471
LATITUDE 41-45.7 N
LONGITUI 140-40.1 E
DEPTH (m) 31

Press.	Temp.	Salinity	Sigma-T
5	12.3353	33.8972	25.6686
10	12.3598	33.9003	25.6663
20	12.2893	33.8818	25.6655
30	12.0075	33.8215	25.6724

STATION US17472
LATITUDE 41-43.5 N
LONGITUI 140-40.2 E
DEPTH (m) 69

Press.	Temp.	Salinity	Sigma-T
5	12.7749	33.9813	25.6483
10	12.7945	33.9807	25.6439
20	12.799	33.9792	25.6419
30	12.7887	33.9792	25.6439
40	12.7814	33.9773	25.6439
50	12.7617	33.9735	25.6448
68	12.4332	33.9223	25.6692

STATION US17473
LATITUDE 41-43.6 N
LONGITUI 140-38.3 E
DEPTH (m) 59

Press.	Temp.	Salinity	Sigma-T
5	12.5609	33.9527	25.668
10	12.5653	33.9508	25.6657
20	12.5586	33.9509	25.6671
30	12.5574	33.9462	25.6637
40	12.5696	33.9485	25.663
50	12.3282	33.8923	25.6661
56	12.2779	33.887	25.6717

STATION US17474
LATITUDE 41-43.6 N
LONGITUI 140-36.4 E
DEPTH (m) 36

Press.	Temp.	Salinity	Sigma-T
5	12.4908	33.9622	25.689
10	12.4937	33.9619	25.6882
20	12.4897	33.9568	25.685
30	12.4846	33.9564	25.6857
33	12.482	33.9552	25.6853

STATION US17475
LATITUDE 41-41.2 N
LONGITUI 140-34.4 E
DEPTH (m) 42

Press.	Temp.	Salinity	Sigma-T
5	12.508	33.9834	25.702
10	12.5157	33.9811	25.6988
20	12.5234	33.9808	25.6971
30	12.5242	33.9804	25.6966
40	12.5182	33.9786	25.6964

STATION US17476
LATITUDE 41-37.3 N
LONGITUI 140-30.2 E
DEPTH (m) 33

Press.	Temp.	Salinity	Sigma-T
5	12.5228	33.9866	25.7017
10	12.526	33.9849	25.6997
20	12.5272	33.9857	25.7001
30	12.5474	33.987	25.6972
32	12.5473	33.9868	25.6971

STATION US17477
LATITUDE 41-37.7 N
LONGITUI 140-28.0 E
DEPTH (m) 21

Press.	Temp.	Salinity	Sigma-T
5	11.7606	33.8907	25.7725
10	11.6858	33.8721	25.772
20	11.5745	33.8538	25.7784

STATION US17478
LATITUDE 41-38.0 N
LONGITUI 140-26.5 E
DEPTH (m) 17

Press.	Temp.	Salinity	Sigma-T
5	11.0595	33.8093	25.8376
10	11.0634	33.8068	25.835
16	11.1032	33.8121	25.832

STATION US17479
LATITUDE 41-34.5 N
LONGITUI 140-32.8 E
DEPTH (m) 67

Press.	Temp.	Salinity	Sigma-T
5	12.5891	34.0365	25.7275
10	12.5956	34.0362	25.726
20	12.541	34.0405	25.74
30	12.5259	34.0498	25.7501
40	12.4667	34.0579	25.7679
50	12.3844	34.0661	25.7902
63	12.259	34.0765	25.8224

STATION US17480
LATITUDE 41-34.7 N
LONGITUI 140-29.6 E
DEPTH (m) 45

Press.	Temp.	Salinity	Sigma-T
5	12.6307	34.0341	25.7174
10	12.6431	34.0342	25.7151
20	12.6391	34.0352	25.7167
30	12.6427	34.034	25.7151
40	12.4761	34.0526	25.762
44	12.3914	34.0664	25.7891

STATION US17481
LATITUDE 41-35.1 N
LONGITUI 140-26.4 E
DEPTH (m) 14

Press.	Temp.	Salinity	Sigma-T
5	11.8991	33.8681	25.729
10	11.865	33.84	25.7136
13	11.7416	33.7887	25.6968

STATION US17482
LATITUDE 41-28.2 N
LONGITUI 140-16.2 E
DEPTH (m) 18

Press.	Temp.	Salinity	Sigma-T
5	12.0983	34.0485	25.8314
10	12.1119	34.0497	25.8298
19	12.1177	34.0503	25.8291

STATION US17483
LATITUDE 41-26.4 N
LONGITUI 140-17.0 E
DEPTH (m) 61

Press.	Temp.	Salinity	Sigma-T
5	12.3868	34.0517	25.7786
10	12.4151	34.0506	25.7722
20	12.4171	34.0508	25.772
30	12.4161	34.0512	25.7725
40	12.3085	34.0605	25.8005
50	12.2668	34.0604	25.8084
60	12.2609	34.0609	25.81

STATION US17484
LATITUDE 41-28.6 N
LONGITUI 140-20.7 E
DEPTH (m) 63

Press.	Temp.	Salinity	Sigma-T
5	12.3697	34.038	25.7712
10	12.3729	34.0494	25.7795
20	12.3465	34.053	25.7873
30	12.3009	34.0583	25.8002
40	12.282	34.0665	25.8102
50	12.2834	34.0645	25.8084
61	12.281	34.0646	25.8089

STATION US17485
LATITUDE 41-44.9 N
LONGITUI 140-46.1 E
DEPTH (m) 45

Press.	Temp.	Salinity	Sigma-T
5	12.6108	33.991	25.688
10	12.6271	33.99	25.684
20	12.6259	33.99	25.6842
30	12.6322	33.9949	25.6868
40	12.6295	34.0016	25.6926
44	12.6238	34.0085	25.699

STATION US17486
LATITUDE 41-43.0 N
LONGITUI 140-46.7 E
DEPTH (m) 82

Press.	Temp.	Salinity	Sigma-T
5	12.5922	33.9864	25.688
10	12.6078	33.9828	25.6822
20	12.6149	33.9831	25.681
30	12.62	33.985	25.6815
40	12.6204	33.985	25.6814
50	12.6164	33.9863	25.6832
75	12.5272	34.0076	25.7171
79	12.5024	34.0213	25.7326

STATION US17487
LATITUDE 41-43.6 N
LONGITUI 140-52.3 E
DEPTH (m) 44

Press.	Temp.	Salinity	Sigma-T
5	12.6901	33.9797	25.6637
10	12.6959	33.9792	25.6622
20	12.6825	33.9857	25.6698
30	12.5511	34.0056	25.7109
40	12.3924	34.0155	25.7494

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