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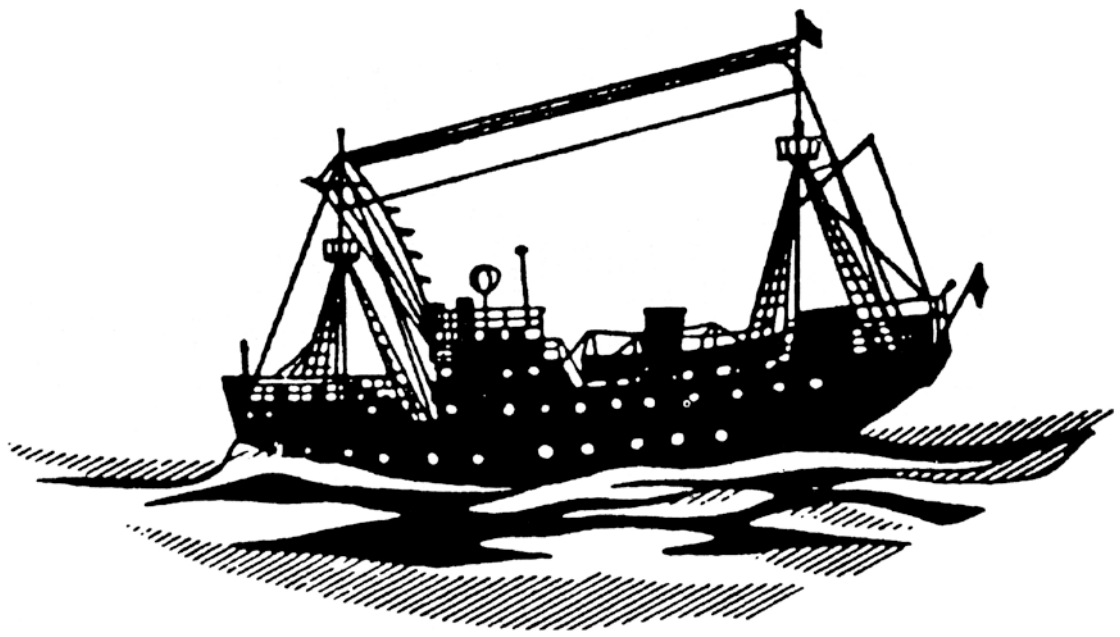
DATA RECORD
OF
OCEANOGRAFHIC OBSERVATIONS AND
EXPLORATORY FISHING

No.58

海　洋　調　査　漁　業　試　験　要　報

第　58　号



GRADUATE SCHOOL OF FISHERIES SCIENCES
AND
FACULTY OF FISHERIES SCIENCES
HOKKAIDO UNIVERSITY
HAKODATE, JAPAN
March 2017

北海道大学大学院水産科学研究院・水産学部
函館市
平成 29 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。

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PART I

OSHORO MARU CRUISES
FROM FEBRUARY 2014 TO DECEMBER 2014

1

THE "OSHORO MARU" CRUISE 266
TO TSUGARU STRAIT, IBURI and HIDAKA OFF, and IWATE OFF

IN FEBRUARY 2014

1. Cruise Itinerary

Cruise 266

Departure from Hakodate and start hydrographic research (OS14001)	February	12	2014
Finish hydrographic research (OS14007)		14	
Return to Hakodate		15	
Departure from Hakodate		17	
Start hydrographic research (OS14008)		18	
Finish hydrographic research (OS14015)		19	
Return to Hakodate		20	
Departure from Hakodate and start hydrographic research (OS14016)		21	
Finish hydrographic research (OS14048)		26	
Return to Hakodate		27	

Total coverage 719.8 miles

2. Vessel Personnel

Crew: Captain: Associate Professor Shogo Takagi

And 28 persons

Research Staff: Leg1

Graduate Students: 2 persons

Undergraduate Students: 5 persons

Leg2

Technical Specialist (Tokyo University of Marine Science and Technology)

Yukari Ito

Leg3

Specially Appointed Associate Professor

(School of Fisheries Sciences, Hokkaido University)

Mituhiro Nakaya

Graduate Students: 2 persons

Undergraduate Students: 9 persons

Total 20 persons

3. Items of Research

Hydrographic observations: (Observation of Temperature, Salinity, and Computed Dynamic Depth Anomaly)

Hydrographic work on deck and the data processing were made by the Science officer, the deck officers, crews, research staff and cadets of the “Oshoro maru”. Temperature and salinity were measured by CTD (Seabird SBE-9Plus) and XCTD.

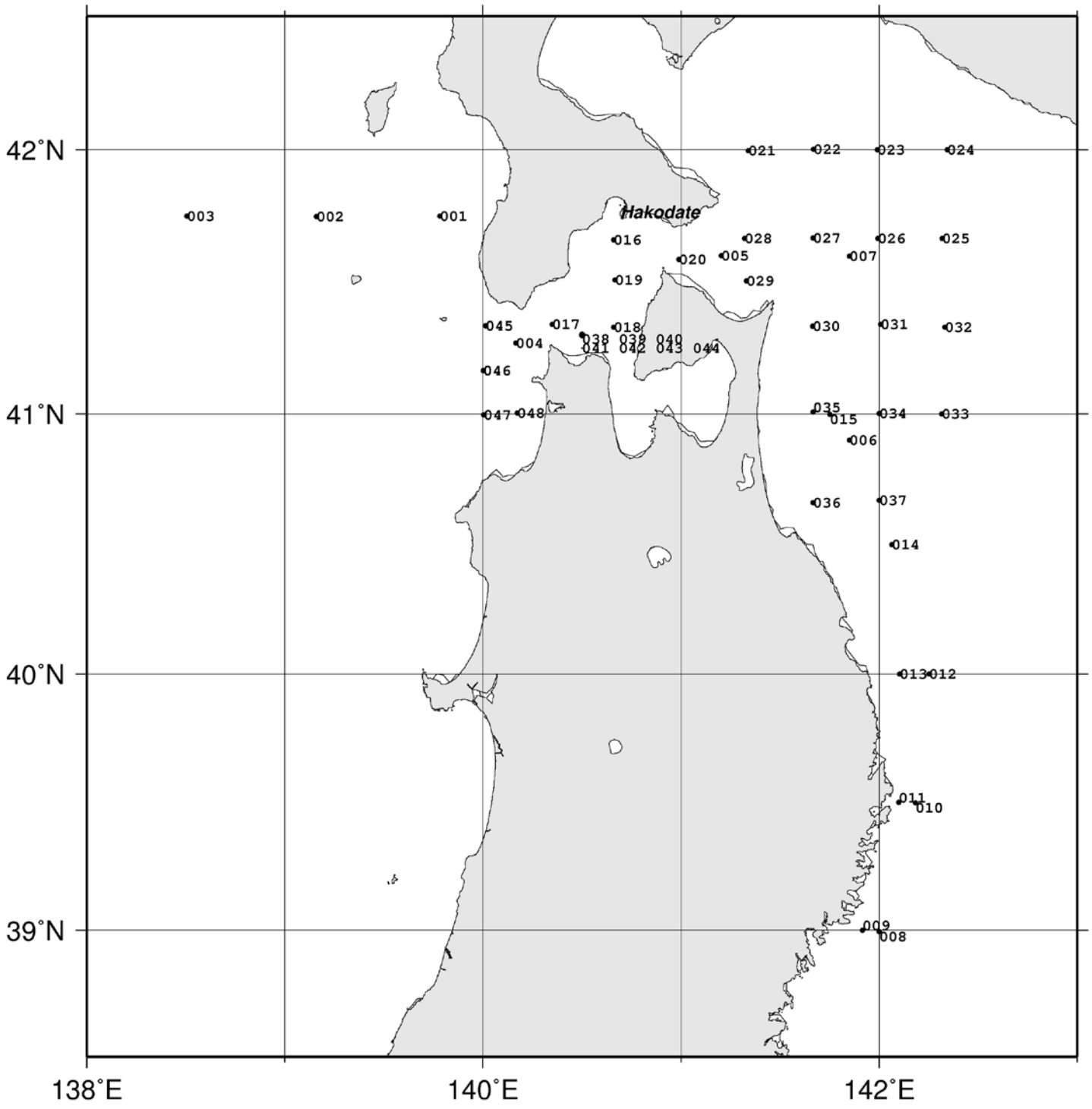

Fig. 1 Oceanographic stations

Table 1. List of Oceanographic station

Station	Lat.	Long.	Date (MGT)	Hour (GMT)	T.Z.	Depth	Col.	Tr.	SST	Wr.	Gear
OS14001	41 45.02 N	139 46.93 E	2/12	7:38	9	1432	-	-	8.6	bc	19p-4636
OS14002	41 44.93 N	139 09.52 E	2/12	12:41	9	2054	-	-	8.5	bc	19p-4636
OS14003	41 45.06 N	138 30.36 E	2/12	17:11	9	3716	-	-	6.8	bc	19p-4636
OS14004	41 16.16 N	140 09.97 E	2/13	0:47	9	151	-	-	8.6	s	19p-4636
OS14005	41 36.03 N	141 12.18 E	2/13	5:42	9	232	-	-	6.3	bc	19p-4636
OS14006	40 54.01 N	141 51.04 E	2/13	22:56	9	384	-	-	5.8	c	19p-4636
OS14007	41 35.90 N	141 50.93 E	2/14	3:41	9	985	-	-	3.0	c	19p-4636
OS14008	38 59.65 N	142 00.03 E	2/18	8:39	9	206	-	-	8.6	bc	19p-4636
OS14009	38 59.96 N	141 54.95 E	2/18	9:28	9	140	-	-	8.4	bc	19p-4636
OS14010	39 29.85 N	142 11.08 E	2/18	12:56	9	238	-	-	8.3	b	19p-4636
OS14011	39 30.02 N	142 05.94 E	2/18	13:55	9	148	-	-	6.9	b	19p-4636
OS14012	39 59.92 N	142 15.07 E	2/18	17:32	9	238	-	-	5.4	bc	19p-4636
OS14013	39 59.95 N	142 06.20 E	2/18	18:59	9	130	-	-	5.6	bc	19p-4636
OS14014	40 29.93 N	142 03.87 E	2/18	22:29	9	253	-	-	6.2	c	XCTD
OS14015	40 59.88 N	141 45.10 E	2/19	2:17	9	495	-	-	5.2	bc	XCTD
OS14016	41 39.61 N	140 39.60 E	2/21	2:21	9	119	-	-	5.5	bc	19p-4636
OS14017	41 20.48 N	140 20.96 E	2/21	5:04	9	185	-	-	7.2	bc	19p-4636
OS14018	41 19.84 N	140 39.62 E	2/21	6:49	9	187	-	-	6.1	bc	19p-4636
OS14019	41 30.52 N	140 40.04 E	2/21	21:17	9	222	-	-	3.6	bc	19p-4636
OS14020	41 35.20 N	140 59.37 E	2/21	23:25	9	299	-	-	1.9	bc	19p-4636
OS14021	41 59.78 N	141 20.31 E	2/22	3:11	9	320	-	-	2.2	b	19p-4636
OS14022	42 00.13 N	141 40.18 E	2/22	5:06	9	844	-	-	1.6	b	19p-4636
OS14023	42 00.05 N	141 59.50 E	2/22	6:54	9	987	-	-	0.6	bc	19p-4636
OS14024	42 00.05 N	142 20.67 E	2/22	8:57	9	980	-	-	0.4	b	19p-4636
OS14025	41 39.98 N	142 19.13 E	2/22	21:15	9	1194	-	-	0.8	c	19p-4636
OS14026	41 39.96 N	141 59.61 E	2/22	22:59	9	1058	-	-	0.5	bc	19p-4636
OS14027	41 40.04 N	141 40.03 E	2/23	0:51	9	579	-	-	1.0	bc	19p-4636
OS14028	41 39.98 N	141 19.29 E	2/23	2:46	9	230	-	-	1.5	b	19p-4636
OS14029	41 30.35 N	141 19.87 E	2/23	4:12	9	249	-	-	1.3	bc	19p-4636
OS14030	41 20.03 N	141 39.85 E	2/23	6:31	9	764	-	-	1.2	bc	19p-4636
OS14031	41 20.42 N	142 00.43 E	2/23	8:23	9	1090	-	-	0.6	c	19p-4636
OS14032	41 19.80 N	142 19.92 E	2/23	21:09	9	1320	-	-	1.0	b	19p-4636
OS14033	40 59.91 N	142 19.00 E	2/23	23:22	9	1338	-	-	1.2	b	19p-4636
OS14034	41 00.10 N	142 00.03 E	2/24	1:11	9	873	-	-	1.8	b	19p-4636
OS14035	41 00.35 N	141 40.05 E	2/24	3:11	9	468	-	-	3.2	b	19p-4636
OS14036	40 39.58 N	141 40.04 E	2/24	5:34	9	79	-	-	4.0	b	19p-4636
OS14037	40 40.15 N	142 00.09 E	2/24	7:19	9	215	-	-	2.7	bc	19p-4636
OS14038	41 18.17 N	140 29.95 E	2/24	23:06	9	148	-	-	6.1	c	19p-4636
OS14039	41 17.86 N	140 29.97 E	2/24	3:03	9	160	-	-	6.1	c	19p-4636
OS14040	41 17.97 N	140 29.99 E	2/25	7:02	9	157	-	-	5.8	bc	19p-4636
OS14041	41 17.98 N	140 29.99 E	2/25	11:02	9	155	-	-	5.9	bc	19p-4636
OS14042	41 17.99 N	140 30.25 E	2/25	15:00	9	161	-	-	6.4	bc	19p-4636
OS14043	41 17.99 N	140 30.01 E	2/25	18:57	9	157	-	-	6.2	bc	19p-4636
OS14044	41 18.02 N	140 29.82 E	2/25	23:01	9	154	-	-	6.1	b	19p-4636
OS14045	41 20.12 N	140 00.86 E	2/26	3:08	9	255	-	-	7.3	bc	19p-4636
OS14046	41 09.85 N	140 00.11 E	2/26	4:45	9	96	-	-	8.7	b	19p-4636
OS14047	40 59.77 N	140 00.20 E	2/26	6:11	9	502	-	-	9.0	b	19p-4636
OS14048	41 00.18 N	140 10.33 E	2/26	7:30	9	107	-	-	9.1	b	19p-4636

T.Z.: Time Difference between G.M.T and S.M.T.

Col.: Water color in Forel-Ule scale

Tr.: Transparency in meters with Secchi disc

SST: Surface temperature

Wr.: Weather in WMO Code 4501

Table 2. Oceanographic data

Station OS14001
Latitude 41-45.02N
Longitude 139-09.52E
Depth(m) 1432

Press.	Temp.	Sal.	SIG-T
10	7.817	33.937	26.466
20	7.802	33.935	26.466
30	7.753	33.932	26.471
50	7.730	33.932	26.475
75	6.279	34.003	26.729
100	4.422	34.003	26.949
150	2.632	34.010	27.127
200	1.465	34.028	27.233
300	0.975	34.051	27.284
400	0.822	34.060	27.301
500	0.701	34.068	27.314
600	0.599	34.070	27.323
700	0.527	34.070	27.327

Station OS14002
Latitude 41-44.93N
Longitude 139-09.52E
Depth(m) 2054

Press.	Temp.	Sal.	SIG-T
10	5.926	33.993	26.767
20	5.763	33.995	26.788
30	4.312	33.987	26.948
50	3.209	34.012	27.078
75	2.930	34.011	27.101
100	2.628	34.010	27.127
150	1.538	34.027	27.226
200	1.150	34.038	27.262
300	0.849	34.054	27.294
400	0.768	34.063	27.307
500	0.703	34.069	27.315
600	0.600	34.072	27.324
700	0.511	34.072	27.329

Station OS14003
Latitude 41-45.06N
Longitude 138-30.36E
Depth(m) 3716

Press.	Temp.	Sal.	SIG-T
10	5.963	34.005	26.771
20	5.849	34.003	26.784
30	2.816	33.974	27.082
50	2.472	34.006	27.137
75	2.350	34.013	27.153
100	2.158	34.017	27.172
150	1.197	34.047	27.266
200	1.034	34.050	27.280
300	0.860	34.060	27.299
400	0.755	34.067	27.311
500	0.668	34.071	27.319
600	0.570	34.072	27.326
700	0.496	34.072	27.330

Station OS14004
Latitude 41-16.16N
Longitude 140-09.97E
Depth(m) 151

Press.	Temp.	Sal.	SIG-T
10	7.779	33.924	26.461
20	7.693	33.929	26.477
30	7.516	33.940	26.511
50	5.931	33.994	26.766
75	5.304	34.010	26.855
100	4.467	34.010	26.950
125	3.594	34.010	27.047

Station OS14005
Latitude 41-36.03N
Longitude 141-12.18E
Depth(m) 232

Press.	Temp.	Sal.	SIG-T
10	7.779	33.924	26.461
20	7.693	33.929	26.477
30	7.516	33.940	26.511
50	5.931	33.994	26.766
75	5.304	34.010	26.855
100	4.467	34.010	26.950
125	3.594	34.019	27.047

Station OS14006
Latitude 40-54.01N
Longitude 141-51.04E
Depth(m) 384

Press.	Temp.	Sal.	SIG-T
10	4.977	33.171	26.228
20	5.440	33.261	26.247
30	6.239	33.400	26.258
50	6.707	33.483	26.263
75	7.275	33.603	26.281
100	7.833	33.735	26.305
150	7.816	33.759	26.327
200	7.763	33.778	26.349
300	5.822	33.583	26.455

Station OS14007
Latitude 41-35.90N
Longitude 141-50.93E
Depth(m) 985

Press.	Temp.	Sal.	SIG-T
10	1.945	32.535	26.002
20	1.947	32.538	26.003
30	2.495	32.635	26.039
50	3.249	32.767	26.081
75	5.615	33.239	26.208
100	6.398	33.388	26.229
150	6.284	33.450	26.292
200	5.476	33.518	26.445
300	3.497	33.484	26.629
400	3.014	33.624	26.785
500	3.337	33.837	26.926
600	3.733	34.011	27.027
700	3.534	34.138	27.147

Station OS14008
Latitude 38-59.65N
Longitude 142-00.03E
Depth(m) 206

Press.	Temp.	Sal.	SIG-T
10	7.859	33.599	26.194
20	7.860	33.597	26.193
30	7.854	33.595	26.192
50	7.847	33.594	26.192
75	7.839	33.593	26.192
100	7.785	33.591	26.199
150	7.285	33.591	26.270

Station OS14009
Latitude 38-59.96N
Longitude 141-54.95E
Depth(m) 140

Press.	Temp.	Sal.	SIG-T
10	7.607	33.602	26.233
20	7.615	33.604	26.233
30	7.613	33.600	26.231
50	7.549	33.594	26.235
75	7.460	33.590	26.244
100	7.471	33.596	26.247

Station OS14010
Latitude 39-29.85N
Longitude 142-11.08E
Depth(m) 238

Press.	Temp.	Sal.	SIG-T
10	7.518	33.575	26.224
20	7.513	33.575	26.225
30	7.514	33.575	26.225
50	7.510	33.574	26.225
75	7.491	33.575	26.228
100	7.184	33.544	26.247
150	6.515	33.460	26.270
200	7.037	33.598	26.309

Station OS14011
Latitude 39-30.02N
Longitude 142-05.94E
Depth(m) 148

Press.	Temp.	Sal.	SIG-T
10	5.966	33.365	26.265
20	5.993	33.367	26.263
30	5.985	33.365	26.263
50	6.099	33.391	26.269
75	6.081	33.410	26.286
100	6.107	33.422	26.292

Station OS14012
Latitude 39-59.92N
Longitude 142-15.07E
Depth(m) 238

Press.	Temp.	Sal.	SIG-T
10	4.391	33.099	26.234
20	4.579	33.135	26.243
30	4.801	33.167	26.244
50	5.294	33.253	26.257
75	5.516	33.294	26.263
100	5.811	33.352	26.274
150	5.893	33.369	26.277
200	5.984	33.388	26.281

Station OS14013
Latitude 39-59.95N
Longitude 142-06.20E
Depth(m) 130

Press.	Temp.	Sal.	SIG-T
10	3.714	32.944	26.179
20	3.713	32.944	26.179
30	3.724	32.944	26.178
50	3.756	32.949	26.179
75	4.984	33.207	26.255
100	6.395	33.494	26.312

Station OS14014
Latitude 40-2993N
Longitude 142-03.87E
Depth(m) 253

Depth	Temp.	Sal.	SIG-T
5	5.168	33.210	-
10	5.178	33.217	-
20	5.326	33.255	-
30	5.519	33.293	-
40	5.605	33.319	-
50	5.635	33.331	-
75	6.067	33.416	-
100	6.288	33.453	-
125	6.319	33.459	-
150	6.339	33.463	-
175	6.358	33.472	-
200	6.532	33.524	-

Station OS14015
Latitude 40-59.88N
Longitude 141-45.10E
Depth(m) 495

Depth	Temp.	Sal.	SIG-T
5	3.674	32.915	-
10	3.658	32.917	-
20	3.669	32.923	-
30	3.679	32.934	-
40	3.679	32.940	-
50	3.837	32.989	-
75	4.977	33.254	-
100	5.445	33.346	-
125	6.013	33.478	-
150	6.324	33.543	-
175	7.020	33.683	-
200	7.033	33.687	-
250	6.550	33.626	-
300	4.803	33.599	-
400	3.557	33.684	-

Station OS14016
Latitude 41-39.61N
Longitude 140-39.60E
Depth(m) 119

Press.	Temp.	Sal.	SIG-T
5	5.414	33.702	26.598
10	5.516	33.910	26.750
20	5.089	33.985	26.860
30	4.928	33.992	26.884
50	4.310	33.982	26.944
75	2.697	34.000	27.113
100	2.122	34.014	27.172

Station OS14017
Latitude 41-20.48N
Longitude 140-20.96E
Depth(m) 185

Press.	Temp.	Sal.	SIG-T
10	7.918	33.952	26.463
20	7.917	33.952	26.463
30	6.751	33.952	26.627
50	5.238	33.991	26.847
75	4.743	33.997	26.909
100	3.320	34.005	27.061
150	2.687	34.020	27.130

Station OS14018
Latitude 41-19.84N
Longitude 140-39.62E
Depth(m) 187

Press.	Temp.	Sal.	SIG-T
10	6.644	33.945	26.636
20	6.637	33.946	26.638
30	6.610	33.948	26.643
50	6.512	33.953	26.659
75	6.131	33.965	26.718
100	5.056	33.978	26.859
150	3.839	33.994	27.002

Station OS14019
Latitude 41-30.52N
Longitude 140-40.04E
Depth(m) 223

Press.	Temp.	Sal.	SIG-T
10	3.441	33.907	26.972
20	3.525	33.936	26.987
30	3.488	33.965	27.013
50	3.102	34.006	27.082
75	2.639	34.018	27.133
100	2.307	34.024	27.166
150	2.029	34.029	27.192

Station OS14020
Latitude 41-35.20N
Longitude 140-59.37E
Depth(m) 299

Press.	Temp.	Sal.	SIG-T
10	1.953	32.598	26.051
20	2.322	32.767	26.159
30	2.462	32.834	26.201
50	2.670	32.955	26.281
75	3.101	33.374	26.578
100	3.145	33.413	26.605

Station OS14021
Latitude 41-59.78N
Longitude 140-20.31E
Depth(m) 320

Press.	Temp.	Sal.	SIG-T
10	2.143	32.606	26.043
20	2.465	32.690	26.086
30	2.733	32.735	26.100
50	3.303	32.833	26.128
75	6.410	33.427	26.258
100	6.316	33.507	26.333
150	4.558	33.457	26.500

Station OS14022
Latitude 42-00.13N
Longitude 141-40.18E
Depth(m) 844

Press.	Temp.	Sal.	SIG-T
10	1.894	32.562	26.026
20	2.231	32.626	26.053
30	2.302	32.634	26.054
50	2.391	32.648	26.058
75	2.486	32.667	26.066
100	3.293	32.854	26.146
150	5.670	33.407	26.334

Station OS14023
Latitude 42-00.05N
Longitude 141-59.50E
Depth(m) 987

Press.	Temp.	Sal.	SIG-T
10	0.579	32.197	25.815
20	0.560	32.196	25.816
30	0.524	32.205	25.825
50	0.564	32.252	25.861
75	0.644	32.345	25.931
100	1.217	32.513	26.033
150	2.198	32.924	26.294

Station OS14024
Latitude 42-00.05N
Longitude 142-20.67E
Depth(m) 980

Press.	Temp.	Sal.	SIG-T
10	0.495	32.177	25.803
20	0.528	32.185	25.809
30	0.562	32.196	25.815
50	0.729	32.253	25.852
75	0.759	32.287	25.878
100	0.756	32.363	25.940
150	1.489	32.597	26.082
200	3.469	33.035	26.275
300	3.886	33.464	26.576
400	2.906	33.554	26.739
500	3.149	33.724	26.853
600	3.577	33.939	26.984
700	3.691	34.084	27.089
800	3.423	34.190	27.199
900	3.215	34.271	27.284

Station OS14025
Latitude 41-39.98N
Longitude 142-19.13E
Depth(m) 1194

Press.	Temp.	Sal.	SIG-T
10	0.582	32.360	25.947
20	1.578	32.633	26.105
30	1.883	32.710	26.146
50	2.150	32.825	26.218
75	3.004	33.052	26.330
100	3.186	33.135	26.380
150	2.992	33.171	26.426

Station OS14026
Latitude 41-39.96N
Longitude 141-59.61E
Depth(m) 1058

Press.	Temp.	Sal.	SIG-T
10	0.809	32.409	25.973
20	1.243	32.509	26.028
30	1.804	32.636	26.092
50	2.205	32.770	26.170
75	2.099	32.886	26.271
100	2.739	33.025	26.331
150	2.729	33.135	26.419

Station OS14027
Latitude 41-40.04N
Longitude 141-40.03E
Depth(m) 579

Press.	Temp.	Sal.	SIG-T
10	0.862	32.326	25.903
20	1.178	32.400	25.944
30	1.318	32.429	25.959
50	1.799	32.531	26.009
75	3.474	32.864	26.138
100	5.552	33.383	26.330
150	4.395	33.473	26.531

Station OS14028
Latitude 41-39.98N
Longitude 141-19.29E
Depth(m) 230

Press.	Temp.	Sal.	SIG-T
10	1.340	32.373	25.913
20	1.262	32.375	25.919
30	1.386	32.398	25.929
50	1.650	32.453	25.956
75	2.901	32.724	26.077
100	3.930	32.918	26.137
150	4.572	33.235	26.323

Station OS14029
Latitude 41-30.35N
Longitude 141-19.87E
Depth(m) 249

Press.	Temp.	Sal.	SIG-T
10	1.198	32.376	25.924
20	4.073	33.048	26.226
30	5.276	33.327	26.317
50	3.828	33.545	26.646
75	4.018	33.687	26.740
100	4.045	33.816	26.840
150	3.474	33.941	26.996

Station OS14030
Latitude 41-20.03N
Longitude 141-39.85E
Depth(m) 764

Press.	Temp.	Sal.	SIG-T
10	1.063	32.379	25.934
20	1.111	32.397	25.946
30	1.770	32.536	26.014
50	4.713	33.201	26.281
75	5.045	33.291	26.315
100	5.002	33.344	26.362
150	3.950	33.385	26.507

Station OS14031
Latitude 41-20.42N
Longitude 142-00.43E
Depth(m) 1090

Press.	Temp.	Sal.	SIG-T
10	0.468	32.239	25.855
20	0.478	32.243	25.857
30	0.442	32.246	25.862
50	0.422	32.253	25.869
75	1.342	32.570	26.070
100	2.067	32.785	26.193
150	2.547	33.145	26.443

Station OS14032
Latitude 41-19.80N
Longitude 142-19.92E
Depth(m) 1320

Press.	Temp.	Sal.	SIG-T
10	1.038	32.400	25.953
20	1.079	32.406	25.955
30	1.220	32.433	25.968
50	2.417	32.713	26.108
75	4.738	33.208	26.284
100	5.220	33.348	26.341
150	3.567	33.331	26.501

Station OS14033
Latitude 40-59.91N
Longitude 142-19.00E
Depth(m) 1338

Press.	Temp.	Sal.	SIG-T
10	2.016	32.862	26.258
20	2.866	33.115	26.392
30	3.025	33.161	26.415
50	3.037	33.172	26.422
75	3.028	33.176	26.427
100	3.149	33.205	26.439
150	2.860	33.257	26.506

Station OS14034
Latitude 41-00.10N
Longitude 142-00.03E
Depth(m) 873

Press.	Temp.	Sal.	SIG-T
10	1.565	32.508	26.006
20	1.637	32.519	26.010
30	1.634	32.519	26.010
50	3.233	32.832	26.134
75	4.942	33.155	26.219
100	7.647	33.678	26.287
150	6.153	33.514	26.359

Station OS14035
Latitude 41-00.35N
Longitude 141-40.05E
Depth(m) 468

Press.	Temp.	Sal.	SIG-T
10	3.017	32.814	26.139
20	3.019	32.821	26.145
30	3.060	32.838	26.155
50	3.763	33.007	26.224
75	4.299	33.150	26.285
100	4.494	33.206	26.309
150	7.169	33.749	26.410

Station OS14036
Latitude 40-39.58N
Longitude 141-40.04E
Depth(m) 79

Press.	Temp.	Sal.	SIG-T
10	4.015	33.067	26.247
20	4.457	33.188	26.298
30	5.222	33.339	26.334
50	5.308	33.355	26.336

Station OS14037
Latitude 40-40.15N
Longitude 141-00.10E
Depth(m) 215

Press.	Temp.	Sal.	SIG-T
10	2.472	32.680	26.077
20	2.884	32.841	26.172
30	3.347	32.975	26.238
50	3.856	33.102	26.290
75	4.410	33.212	26.322
100	4.992	33.347	26.366
150	5.491	33.527	26.451

Station OS14038
Latitude 41-18.17N
Longitude 140-29.95E
Depth(m) 148

Press.	Temp.	Sal.	SIG-T
10	6.083	33.960	26.720
20	6.076	33.959	26.721
30	6.082	33.959	26.720
50	6.064	33.958	26.721
75	5.916	33.954	26.736
100	5.284	33.975	26.829

Station OS14039
Latitude 41-17.86N
Longitude 140-29.97E
Depth(m) 160

Press.	Temp.	Sal.	SIG-T
10	6.006	33.886	26.672
20	6.007	33.887	26.672
30	6.009	33.909	26.690
50	5.958	33.923	26.707
75	5.951	33.929	26.713
100	5.904	33.956	26.739

Station OS14040
Latitude 41-17.97N
Longitude 140-29.99E
Depth(m) 157

Press.	Temp.	Sal.	SIG-T
10	5.657	33.693	26.562
20	5.655	33.698	26.567
30	5.780	33.787	26.621
50	6.096	33.946	26.707
75	6.062	33.959	26.722
100	5.953	33.958	26.735

Station OS14041
Latitude 41-17.98N
Longitude 140-29.99E
Depth(m) 155

Press.	Temp.	Sal.	SIG-T
10	5.987	33.860	26.653
20	6.091	33.945	26.708
30	6.107	33.960	26.717
50	5.957	33.965	26.740
75	5.768	33.966	26.765
100	5.515	33.978	26.805

Station OS14042
Latitude 41-17.99N
Longitude 140-30.25E
Depth(m) 161

Press.	Temp.	Sal.	SIG-T
10	6.427	33.894	26.624
20	5.967	33.947	26.724
30	5.848	33.962	26.751
50	5.717	33.972	26.775
75	5.485	33.979	26.809
100	5.392	33.989	26.828

Station	OS14043
Latitude	41-17.99N
Longitude	140-30.01E
Depth(m)	157

Press.	Temp.	Sal.	SIG-T
10	6.474	33.942	26.655
20	6.369	33.946	26.672
30	6.172	33.955	26.705
50	6.183	33.955	26.704
75	6.108	33.958	26.715
100	5.923	33.968	26.747

Station	OS14044
Latitude	41-18.02N
Longitude	140-29.82E
Depth(m)	154

Press.	Temp.	Sal.	SIG-T
10	6.107	33.931	26.694
20	6.061	33.927	26.697
30	5.982	33.929	26.709
50	5.946	33.936	26.718
75	5.873	33.944	26.734
100	5.819	33.962	26.755

Station	OS14045
Latitude	41-20.12E
Longitude	140-00.86E
Depth(m)	255

Press.	Temp.	Sal.	SIG-T
10	6.314	33.952	26.684
20	3.667	33.932	26.969
30	4.493	33.969	26.914
50	2.978	33.995	27.084
75	3.267	33.994	27.057
100	2.253	34.017	27.164

Station	OS14046
Latitude	41-09.85N
Longitude	140-00.11E
Depth(m)	96

Press.	Temp.	Sal.	SIG-T
10	8.668	33.918	26.323
20	8.511	33.911	26.342
30	8.480	33.912	26.347
50	8.438	33.919	26.359
75	8.351	33.948	26.395

Station	OS14047
Latitude	40-59.77N
Longitude	140-00.20E
Depth(m)	502

Press.	Temp.	Sal.	SIG-T
10	8.927	33.903	26.271
20	8.888	33.905	26.278
30	8.792	33.911	26.298
50	8.744	33.914	26.308
75	8.700	33.914	26.315
100	8.553	33.910	26.335
150	5.270	34.020	26.867

Station	OS14048
Latitude	41-00.18N
Longitude	140-10.33E
Depth(m)	107

Press.	Temp.	Sal.	SIG-T
10	9.074	33.902	26.246
20	8.978	33.900	26.260
30	8.967	33.901	26.263
50	8.957	33.901	26.265
75	8.842	33.905	26.286

2

THE "OSHORO MARU" CRUISE 267
TO NORTHWEST OF THE JAPAN SEA and TOYAMA BAY, and WAKASA BAY

IN APRIL 2014

1. Cruise Itinerary

Cruise 267

Departure from Hakodate	April	8	2014
Start hydrographic research (OS14049)		9	
Finish hydrographic research (OS14053)		10	
Arrive at Tsuruga		11	
Departure from Tsuruga and start hydrographic research (OS14054)		12	
Finish hydrographic research (OS14057) and return to Tsuruga		13	
Departure from Tsuruga		14	
Start hydrographic research (OS14058)		15	
Finish hydrographic research (OS14068)		16	
Return to Hakodate		17	

Total coverage 1207.0 miles

2. Vessel Personnel

Crew: Captain: Associate Professor Shogo Takagi

And 29 persons

Research Staff: Leg1, Leg3

Professor (Laboratory of Marine Environmental Science, Hokkaido University)
Kenshi Kuma

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

Graduate Students: 5 persons

Undergraduate Students: 1 person

Leg1

Professor (Center for Global Environmental Research, National Institute for Environmental studies)
Takafumi Aramaki

Graduate Students: 1 person (Kanazawa University)

Undergraduate instructor: Leg2

Professor (Department of Marine Bioscience, Fukui Prefectural University)
Tatsuo Kato

Professor (Department of Marine Bioscience, Fukui Prefectural University)
Ryuji Kondo

Associate Professor (Department of Marine Bioscience, Fukui Prefectural University)
Masahito Matsukawa

Associate Professor (Department of Marine Bioscience, Fukui Prefectural University)
Atsushi Kaneda

Associate Professor (Department of Marine Bioscience, Fukui Prefectural University)
Yoshitake Takao

Teaching Assistant: 6 persons

Undergraduate Students: 53 persons

Total 74 persons

3. Items of Research

Hydrographic observations: (Observation of Temperature, Salinity, and Computed Dynamic Depth Anomaly)

Hydrographic work on deck and the data processing were made by the Science officer, the deck officers, crews, research staff and cadets of the “Oshoro maru”. Temperature and salinity were measured by CTD (Seabird SBE-9Plus) and XCTD.

Table 1. Oceanographic station

Station	Lat.	Long.	Date (GMT)	Hour (GMT)	T.Z.	Depth	Col.	Tr.	SST	Wr.	Gear
OS14049	38 19.97 N	137 40.07 E	4/9	3:37	9	1998	-	-	9.8	b	9p-0769
OS14050	38 00.01 N	137 50.06 E	4/9	7:16	9	2015	-	-	10.1	b	9p-0769
OS14051	37 39.95 N	137 44.96 E	4/9	10:52	9	1637	-	-	11.4	b	9p-0769
OS14052	37 20.05 N	137 45.04 E	4/9	14:39	9	1205	-	-	11.1	b	9p-0769
OS14053	37 10.04 N	137 29.96 E	4/9	17:30	9	1205	-	-	11.7	b	9p-0769
OS14058	38 40.05 N	137 10.05 E	4/14	16:36	9	1510	-	-	11	bc	9p-0769
OS14059	38 39.90 N	137 25.09 E	4/14	19:06	9	1380	-	-	10.3	bc	9p-0769
OS14060	38 39.92 N	137 44.98 E	4/14	21:45	9	1857	-	-	10.5	b	9p-0769
OS14061	38 40.02 N	138 00.02 E	4/15	0:33	9	1860	-	-	10.4	b	9p-0769
OS14062	39 04.99 N	137 40.06 E	4/15	4:49	9	2326	-	-	10.5	b	9p-0769
OS14063	39 40.06 N	137 20.05 E	4/15	10:34	9	2569	-	-	10.0	b	9p-0769
OS14064	39 32.51 N	137 05.08 E	4/15	14:30	9	2545	-	-	10.3	b	9p-0769
OS14065	39 25.17 N	136 50.22 E	4/15	18:05	9	2580	-	-	10.8	b	9p-0769
OS14066	39 28.79 N	136 57.52 E	4/15	21:10	9	2580	-	-	10.8	b	9p-0769
OS14067	39 30.67 N	137 01.42 E	4/15	23:44	9	2574	-	-	11.0	b	9p-0769
OS14068	39 29.68 N	136 59.47 E	4/16	2:08	9	2570	-	-	11.1	b	9p-0769

T.Z.: Time Difference between G.M.T and S.M.T.

Col.: Water color in Forel-Ule scale

Tr.: Transparency in meters with Secchi disc

SST: Surface temperature

Wr.: Weather in WMO Code 4501

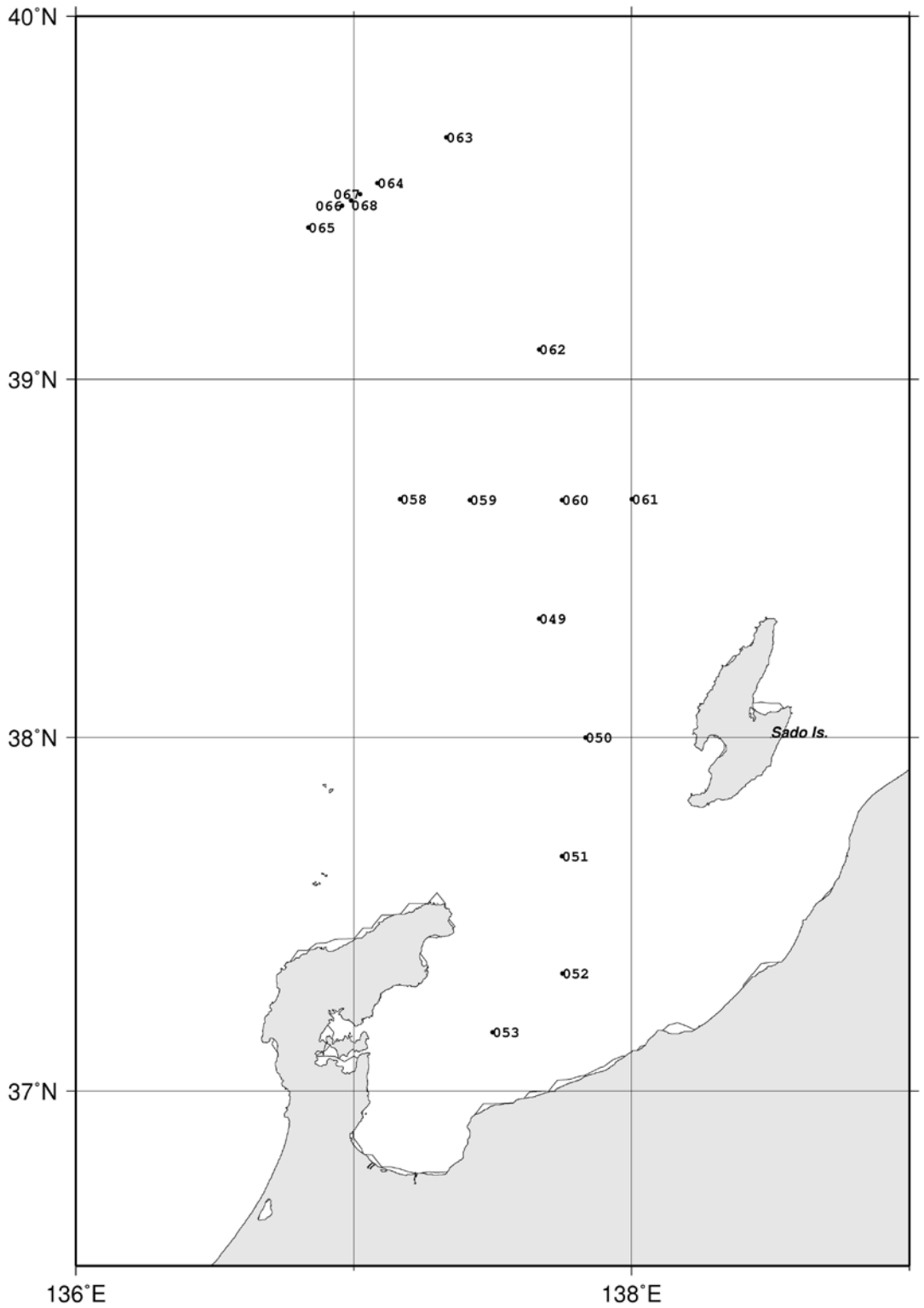

Fig.-1 Oceanographic stations

Table 2. Oceanographic data

Station OS14049
Latitude 38-19.97N
Longitude 137-40.07E
Depth(m) 1998

Press.	Temp.	Sal.	SIG-T
5	8.809	33.999	26.364
10	8.690	34.003	26.386
20	8.546	34.006	26.411
30	8.509	34.007	26.417
40	7.062	34.040	26.654
50	6.471	34.031	26.726
75	5.368	34.017	26.853
100	3.712	34.012	27.029
125	3.004	34.017	27.100
150	2.574	34.029	27.147
175	1.895	34.028	27.201
200	1.662	34.038	27.226
250	1.226	34.047	27.264
300	1.020	34.052	27.281
400	0.751	34.058	27.303
500	0.598	34.060	27.314
600	0.478	34.061	27.322
700	0.424	34.061	27.325
800	0.375	34.060	27.328
900	0.341	34.060	27.329
1000	0.311	34.060	27.331
1200	0.278	34.059	27.332
1500	0.241	34.059	27.334

Station OS14050
Latitude 38-0.01N
Longitude 137-50.06E
Depth(m) 2015

Press.	Temp.	Sal.	SIG-T
5	8.762	34.009	26.380
10	8.718	34.005	26.383
20	8.285	33.996	26.443
30	8.208	34.000	26.457
40	8.156	33.995	26.461
50	8.141	33.994	26.463
75	7.118	34.015	26.626
100	6.078	34.030	26.777
125	4.945	34.019	26.904
150	3.909	34.026	27.021
175	2.675	34.020	27.132
200	2.033	34.028	27.191
250	1.411	34.042	27.248
300	1.047	34.050	27.278
400	0.772	34.056	27.300
500	0.634	34.059	27.311
600	0.513	34.060	27.320
700	0.439	34.060	27.324
800	0.387	34.060	27.327
900	0.341	34.060	27.329
1000	0.312	34.060	27.331
1200	0.273	34.059	27.332
1500	0.240	34.059	27.334

Station OS14051
Latitude 37-39.95N
Longitude 137-44.96E
Depth(m) 1637

Press.	Temp.	Sal.	SIG-T
5	10.392	34.048	26.141
10	10.185	34.075	26.198
20	10.160	34.079	26.206
30	10.052	34.077	26.222
40	9.973	34.075	26.234
50	9.926	34.078	26.245
75	9.803	34.081	26.267
100	9.656	34.110	26.315
125	9.337	34.106	26.364
150	8.532	34.088	26.477
175	7.386	34.030	26.601
200	6.770	34.040	26.694
250	2.601	34.027	27.143
300	1.656	34.037	27.226
400	1.142	34.045	27.268
500	0.906	34.055	27.291
600	0.679	34.058	27.308
700	0.509	34.060	27.320
800	0.414	34.060	27.325
900	0.341	34.060	27.329
1000	0.322	34.060	27.330
1200	0.284	34.059	27.332
1500	0.239	34.058	27.334

Station OS14052
Latitude 37-20.05N
Longitude 137-45.04E
Depth(m) 1205

Press.	Temp.	Sal.	SIG-T
5	9.974	33.279	25.612
10	9.857	33.430	25.750
20	9.612	33.742	26.034
30	9.521	33.796	26.092
40	9.333	33.800	26.125
50	9.363	33.849	26.159
75	9.308	33.927	26.229
100	9.581	34.036	26.269
125	9.487	34.091	26.328
150	9.226	34.090	26.369
175	8.727	34.114	26.467
200	7.925	34.085	26.566
250	3.971	34.006	26.999
300	2.181	34.030	27.180
400	0.875	34.052	27.291
500	0.577	34.057	27.314
600	0.467	34.059	27.321
700	0.409	34.059	27.325
800	0.359	34.060	27.328
900	0.329	34.060	27.330
1000	0.296	34.059	27.331

Station OS14053
Latitude 37-10.04N
Longitude 137-29.96E
Depth(m) 1205

Press.	Temp.	Sal.	SIG-T
5	10.503	33.852	25.969
10	10.448	33.891	26.009
20	10.286	33.896	26.041
30	10.152	33.972	26.123
40	9.578	33.904	26.167
50	9.336	33.882	26.189
75	9.534	33.984	26.236
100	9.182	33.960	26.275
125	9.033	33.993	26.325
150	8.750	34.014	26.386
175	7.969	34.026	26.513
200	6.661	34.039	26.708
250	3.267	34.031	27.087
300	1.728	34.039	27.222
400	1.068	34.050	27.277
500	0.798	34.055	27.298
600	0.651	34.058	27.310
700	0.551	34.059	27.316
800	0.440	34.060	27.323
900	0.379	34.060	27.327
1000	0.336	34.060	27.329

Table 2. Oceanographic data

Station OS14058
Latitude 38-40.05N
Longitude 137-10.05E
Depth(m) 1510

Press.	Temp.	Sal.	SIG-T
5	9.281	34.020	26.306
10	9.192	34.023	26.323
20	9.030	34.085	26.397
30	8.782	34.063	26.419
40	8.310	34.043	26.475
50	7.953	34.025	26.515
75	6.627	34.031	26.706
100	5.489	34.021	26.842
125	4.289	34.018	26.975
150	3.280	34.020	27.077
175	2.344	34.018	27.158
200	1.866	34.025	27.201
250	1.277	34.042	27.257
300	1.020	34.049	27.279
400	0.708	34.056	27.305
500	0.588	34.058	27.314
600	0.467	34.059	27.321
700	0.393	34.059	27.325
800	0.367	34.059	27.327
900	0.354	34.059	27.328
1000	0.327	34.059	27.329
1200	0.276	34.058	27.331

Station OS14059
Latitude 38-39.9N
Longitude 137-25.09E
Depth(m) 1380

Press.	Temp.	Sal.	SIG-T
5	9.296	34.011	26.296
10	9.048	33.997	26.325
20	8.693	33.996	26.380
30	8.421	33.990	26.417
40	8.303	33.993	26.438
50	7.866	33.998	26.507
75	6.110	34.035	26.776
100	4.912	34.012	26.902
125	3.757	34.020	27.031
150	2.854	34.011	27.109
175	1.882	34.024	27.199
200	1.487	34.034	27.236
250	1.092	34.047	27.273
300	0.879	34.052	27.291
400	0.710	34.056	27.305
500	0.600	34.058	27.312
600	0.529	34.059	27.317
700	0.452	34.059	27.322
800	0.406	34.059	27.325
900	0.363	34.058	27.327
1000	0.326	34.058	27.329
1200	0.291	34.058	27.330

Station OS14060
Latitude 38-39.92N
Longitude 137-44.98E
Depth(m) 1857

Press.	Temp.	Sal.	SIG-T
5	9.413	34.013	26.279
10	9.023	34.000	26.332
20	8.702	34.003	26.384
30	8.580	34.000	26.400
40	8.147	33.992	26.460
50	7.097	34.011	26.627
75	5.456	34.013	26.840
100	4.075	34.023	27.002
125	2.866	34.022	27.116
150	2.245	34.030	27.175
175	1.777	34.038	27.218
200	1.446	34.043	27.246
250	1.103	34.050	27.275
300	0.935	34.053	27.288
400	0.689	34.056	27.306
500	0.553	34.058	27.316
600	0.462	34.059	27.321
700	0.392	34.059	27.325
800	0.338	34.059	27.328
900	0.304	34.058	27.330
1000	0.285	34.058	27.331
1200	0.252	34.058	27.332
1500	0.225	34.057	27.333

Station OS14061
Latitude 38-40.02N
Longitude 138-0.02E
Depth(m) 1860

Press.	Temp.	Sal.	SIG-T
5	9.427	34.014	26.277
10	8.970	34.008	26.346
20	8.930	34.011	26.355
30	8.879	34.011	26.363
40	8.617	34.004	26.398
50	7.837	33.990	26.505
75	5.836	34.008	26.789
100	4.499	34.015	26.950
125	3.475	34.017	27.056
150	2.613	34.020	27.136
175	2.055	34.033	27.193
200	1.850	34.039	27.213
250	1.458	34.046	27.248
300	1.260	34.049	27.264
400	0.987	34.053	27.285
500	0.702	34.057	27.306
600	0.545	34.058	27.316
700	0.451	34.059	27.322
800	0.391	34.059	27.325
900	0.350	34.058	27.327
1000	0.313	34.058	27.329
1200	0.263	34.058	27.332
1500	0.234	34.057	27.333

Station OS14062
Latitude 39-4.99N
Longitude 137-40.06E
Depth(m) 2326

Press.	Temp.	Sal.	SIG-T
10	9.382	34.031	26.298
20	9.176	34.065	26.358
30	8.749	34.032	26.400
40	8.604	34.044	26.432
50	8.196	34.026	26.480
75	7.199	34.052	26.644
100	6.353	34.030	26.741
125	5.108	34.017	26.884
150	3.453	34.016	27.058
175	2.625	34.019	27.135
200	2.037	34.035	27.196
250	1.198	34.045	27.265
300	0.950	34.051	27.286
400	0.727	34.057	27.305
500	0.597	34.059	27.314
600	0.487	34.059	27.321
700	0.421	34.059	27.324
800	0.362	34.059	27.327
900	0.313	34.059	27.330
1000	0.285	34.058	27.331
1200	0.255	34.058	27.332
1500	0.224	34.057	27.333
2000	0.222	34.056	27.333

Station OS14063
Latitude 39-40.06N
Longitude 137-20.05E
Depth(m) 2569

Press.	Temp.	Sal.	SIG-T
10	9.062	34.010	26.333
20	9.051	34.011	26.336
30	8.399	34.016	26.441
40	8.017	34.008	26.493
50	7.251	34.017	26.610
75	6.229	34.053	26.775
100	4.613	34.003	26.928
125	3.545	34.012	27.045
150	2.693	34.015	27.126
175	2.082	34.017	27.178
200	1.624	34.024	27.218
250	1.226	34.036	27.255
300	0.955	34.044	27.279
400	0.788	34.052	27.297
500	0.648	34.059	27.310
600	0.549	34.060	27.317
700	0.449	34.060	27.323
800	0.383	34.059	27.326
900	0.331	34.059	27.329
1000	0.301	34.058	27.330
1200	0.263	34.058	27.332
1500	0.232	34.057	27.333
2000	0.221	34.056	27.333
2500	0.241	34.056	27.331

Station OS14064
Latitude 39-32.51N
Longitude 137-5.08E
Depth(m) 2545

Press.	Temp.	Sal.	SIG-T
10	9.373	33.939	26.228
20	9.376	33.939	26.227
30	9.333	33.939	26.234
40	9.050	33.947	26.286
50	8.495	34.014	26.425
75	7.175	34.025	26.626
100	6.338	34.028	26.742
125	4.502	34.018	26.952
150	3.356	34.014	27.065
175	2.584	34.028	27.146
200	2.045	34.027	27.188
250	1.446	34.036	27.240
300	1.045	34.044	27.274
400	0.810	34.053	27.296
500	0.675	34.058	27.308
600	0.562	34.059	27.316
700	0.471	34.060	27.322
800	0.405	34.059	27.325
900	0.357	34.059	27.327
1000	0.315	34.058	27.329
1200	0.266	34.057	27.331
1500	0.234	34.057	27.333
2000	0.225	34.056	27.333
2500	0.242	34.056	27.331

Station OS14065
Latitude 39-25.17N
Longitude 136-50.22E
Depth(m) 2580

Press.	Temp.	Sal.	SIG-T
20	9.860	34.136	26.300
30	9.180	34.075	26.365
40	9.010	34.072	26.390
50	8.764	34.070	26.427
75	7.523	34.018	26.572
100	7.071	34.052	26.662
125	6.653	34.050	26.717
150	5.607	34.031	26.835
175	4.172	34.012	26.983
200	3.025	34.014	27.096
250	1.828	34.024	27.203
300	1.222	34.035	27.255
400	0.873	34.052	27.291
500	0.695	34.057	27.307
600	0.555	34.059	27.316
700	0.455	34.059	27.322
800	0.392	34.059	27.326
900	0.349	34.059	27.328
1000	0.314	34.058	27.329
1200	0.261	34.057	27.332
1500	0.233	34.057	27.333
2000	0.229	34.056	27.332
2500	0.256	34.056	27.331

Station OS14066
Latitude 39-28.79N
Longitude 136-57.52E
Depth(m) 2580

Press.	Temp.	Sal.	SIG-T
10	9.953	34.147	26.294
20	9.947	34.146	26.294
30	9.554	34.129	26.347
40	9.378	34.125	26.372
50	9.240	34.117	26.388
75	7.549	34.069	26.609
100	7.055	34.078	26.685
125	6.057	34.029	26.778
150	4.601	34.015	26.939
175	3.573	34.018	27.048
200	2.444	34.015	27.147
250	1.498	34.023	27.226
300	1.205	34.041	27.261
400	0.789	34.053	27.297
500	0.665	34.057	27.308
600	0.592	34.058	27.313
700	0.530	34.059	27.318
800	0.459	34.059	27.322
900	0.394	34.059	27.325
1000	0.347	34.058	27.327
1200	0.289	34.058	27.330
1500	0.243	34.057	27.332
2000	0.234	34.056	27.332
2500	0.255	34.056	27.330

Station OS14067
Latitude 39-30.67N
Longitude 137-1.42E
Depth(m) 2574

Press.	Temp.	Sal.	SIG-T
5	10.168	34.160	26.267
10	10.118	34.158	26.274
20	10.101	34.157	26.276
30	9.925	34.139	26.292
40	9.167	34.110	26.395
50	8.999	34.106	26.418
75	8.175	34.096	26.537
100	7.321	34.096	26.662
125	5.273	34.022	26.868
150	3.920	34.011	27.008
175	3.044	34.010	27.091
200	2.301	34.018	27.161
250	1.505	34.033	27.233
300	1.112	34.041	27.267
400	0.833	34.053	27.295
500	0.677	34.057	27.307
600	0.558	34.059	27.316
700	0.470	34.059	27.321
800	0.400	34.059	27.325
900	0.354	34.059	27.327
1000	0.326	34.058	27.329
1200	0.273	34.057	27.331
1500	0.234	34.057	27.332
2000	0.224	34.056	27.332
2500	0.242	34.056	27.331

Station OS14068
Latitude 39-29.68N
Longitude 136-59.47E
Depth(m) 2570

Press.	Temp.	Sal.	SIG-T
5	10.100	34.145	26.268
10	10.037	34.146	26.279
20	10.005	34.147	26.285
30	9.973	34.144	26.288
40	9.350	34.111	26.366
50	9.294	34.112	26.376
75	7.732	34.082	26.592
100	7.096	34.071	26.673
125	5.959	34.036	26.796
150	4.284	34.015	26.973
175	3.268	34.017	27.076
200	2.425	34.009	27.144
250	1.562	34.028	27.225
300	1.173	34.042	27.264
400	0.851	34.054	27.294
500	0.684	34.058	27.308
600	0.559	34.059	27.316
700	0.481	34.059	27.321
800	0.420	34.059	27.324
900	0.377	34.059	27.326
1000	0.340	34.058	27.328
1200	0.274	34.057	27.331
1500	0.236	34.057	27.332
2000	0.230	34.056	27.332
2500	0.257	34.056	27.330

3

THE "OSHORO MARU" CRUISE 268
TO IWATE OFF

IN APRIL 2014

1. Cruise Itinerary

Cruise 268

Departure from Hakodate	April	20	2014
Arrival at Kamaishi		21	
Departure from Kamaishi and start hydrographic research (OS14069)		22	
Finish hydrographic research (OS14075)		24	
Arrival at and departure from Miyako,			
and start hydrographic research (OS14076, 77)		25	
Return to Hakodate		26	

Total coverage 571.2 miles

2. Vessel Personnel

Crew: Captain: Associate Professor Shogo Takagi

And 28 persons

Supervising teacher: High school teacher (Iwate prefectural Miyako Fisherise High School)
Takuya Shiota

High school teacher (Iwate prefectural Miyako Fisherise High School)
Yukimasa Hatakekawa

High school teacher (Iwate prefectural Takada High School)
Katumi Yoshida

Teaching Assistant: 2 persons

Senior High School Students:

(Iwate prefectural Miyako Fisherise High School) 30 persons

(Iwate prefectural Takada High School) 7 persons

Total 42 persons

3. Items of Research

Hydrographic observations: (Observation of Temperature, Salinity, and Computed Dynamic Depth Anomaly)

Hydrographic work on deck and the data processing were made by the Science officer, the deck officers, crews, research staff and cadets of the “Oshoro maru”. Temperature and salinity were measured by CTD (Seabird SBE-9Plus) and XCTD.

Table 1. List of Oceanographic station

Station	Lat.	Long.	Date (GMT)	Hour (GMT)	T.Z.	Depth	Col.	Tr.	SST	Wr.	Gear
OS14069	39 30.07 N	142 05.80 E	Apr 22 2014	9:09	9	145	-	-	5.3	bc	9p-0769
OS14070	39 29.83 N	142 11.18 E	Apr 22 2014	10:06	9	238	-	-	3.6	bc	9p-0769
OS14071	38 58.23 N	142 07.30 E	Apr 23 2014	4:04	9	376	-	5	5.4	bc	9p-0769
OS14072	38 41.89 N	142 04.98 E	Apr 24 2014	0:01	9	440	-	4	5.7	b	9p-0769
OS14073	38 50.23 N	142 05.92 E	Apr 24 2014	6:04	9	390	-	5	4.4	b	9p-0769
OS14074	39 00.16 N	142 00.03 E	Apr 24 2014	9:08	9	199	-	-	5.5	bc	9p-0769
OS14075	38 59.86 N	141 54.89 E	Apr 24 2014	11:05	9	139	-	-	6.3	bc	9p-0769
OS14076	39 59.89 N	142 06.29 E	Apr 25 2014	3:06	9	127	-	-	7.1	b	9p-0769
OS14077	39 59.94 N	142 15.12 E	Apr 25 2014	4:12	9	238	-	-	6.8	b	9p-0769

T.Z.: Time Difference between G.M.T and S.M.T.

Col.: Water color in Forel-Ule scale

Tr.: Transparency in meters with Secchi disc

SST: Surface temperature

Wr.: Weather in WMO Code 4501

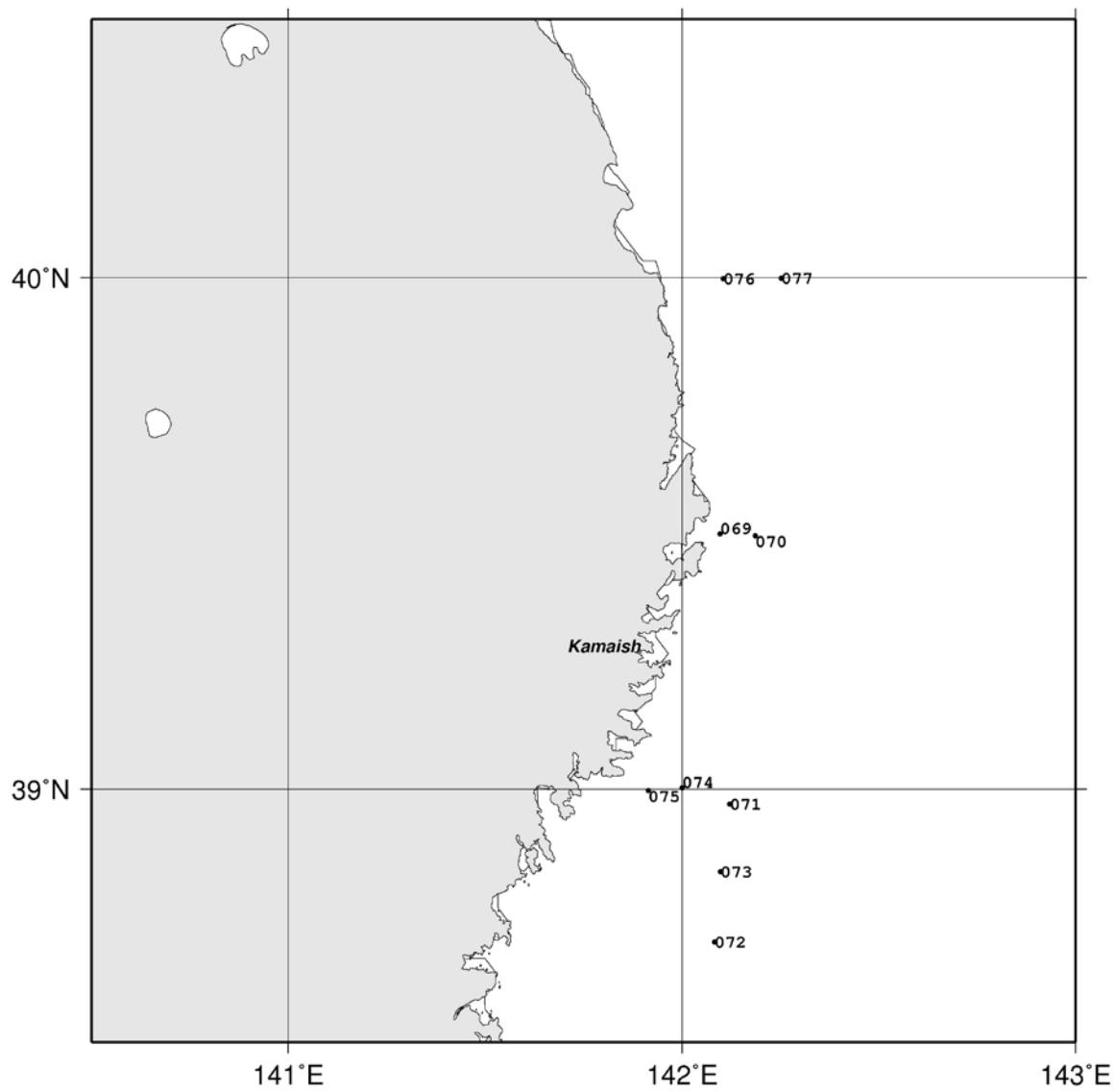

Fig.-1 Oceanographic stations

Table 2. Oceanographic data

Station OS14069
Latitude 39-30.07N
Longitude 142-5.8E
Depth(m) 145

Press.	Temp.	Sal.	SIG-T
5	4.231	32.605	25.858
10	3.762	32.607	25.906
20	3.233	32.628	25.971
30	2.957	32.720	26.069
40	3.793	32.930	26.160
50	3.983	32.981	26.182
75	4.394	33.178	26.297
100	4.691	33.323	26.380
125	5.120	33.440	26.425

Station OS14070
Latitude 39-29.83N
Longitude 142-11.18E
Depth(m) 238

Press.	Temp.	Sal.	SIG-T
5	2.551	32.433	25.874
10	2.126	32.433	25.906
20	1.688	32.456	25.956
30	1.460	32.498	26.005
40	1.472	32.535	26.034
50	1.524	32.549	26.041
75	2.433	32.764	26.147
100	5.888	33.552	26.422
125	6.515	33.702	26.461
150	6.485	33.720	26.479
175	6.482	33.720	26.480
200	6.527	33.728	26.480

Station OS14071
Latitude 38-58.23N
Longitude 142-7.3E
Depth(m) 376

Press.	Temp.	Sal.	SIG-T
5	3.692	32.569	25.883
10	3.709	32.571	25.882
20	3.135	32.602	25.959
30	2.929	32.684	26.043
40	1.412	32.623	26.108
50	2.310	32.872	26.244
75	4.901	33.329	26.361
100	4.532	33.332	26.405
125	4.685	33.364	26.412
150	4.371	33.409	26.483
175	4.389	33.415	26.485
200	4.781	33.493	26.505

Station OS14072
Latitude 38-41.89N
Longitude 142-4.98E
Depth(m) 440

Press.	Temp.	Sal.	SIG-T
5	5.101	32.556	25.727
10	4.416	32.595	25.831
20	3.727	32.751	26.024
30	3.423	32.841	26.124
40	3.554	32.980	26.222
50	3.450	33.024	26.267
75	3.818	33.218	26.386
100	4.757	33.427	26.456
125	5.086	33.497	26.474
150	5.350	33.562	26.495
175	5.419	33.591	26.510
200	5.636	33.651	26.531

Station OS14073
Latitude 38-50.23N
Longitude 142-5.92E
Depth(m) 390

Press.	Temp.	Sal.	SIG-T
5	2.480	32.375	25.833
10	2.015	32.370	25.864
20	0.887	32.386	25.950
30	0.684	32.413	25.983
40	0.562	32.483	26.047
50	0.684	32.578	26.116
75	0.703	32.782	26.279
100	5.935	33.599	26.454
125	6.386	33.693	26.471
150	5.690	33.591	26.478
175	5.460	33.574	26.491
200	5.309	33.556	26.495

Station OS14074
Latitude 39-0.16N
Longitude 142-0.03E
Depth(m) 199

Press.	Temp.	Sal.	SIG-T
5	3.289	32.499	25.864
10	2.461	32.403	25.856
20	1.173	32.510	26.033
30	1.014	32.524	26.054
40	0.872	32.571	26.100
50	0.941	32.578	26.101
75	0.975	32.673	26.176
100	4.087	33.257	26.390
125	4.853	33.386	26.413
150	4.858	33.440	26.454
175	5.629	33.582	26.477

Station OS14075
Latitude 38-59.86N
Longitude 141-54.89E
Depth(m) 139

Press.	Temp.	Sal.	SIG-T
5	4.693	32.668	25.860
10	4.725	32.665	25.854
20	2.156	32.600	26.037
30	2.381	32.657	26.066
40	3.444	32.901	26.170
50	3.876	33.010	26.216
75	4.077	33.118	26.281
100	4.016	33.159	26.320
125	3.919	33.160	26.331

Station OS14076
Latitude 39-59.89N
Longitude 142-6.3E
Depth(m) 127

Press.	Temp.	Sal.	SIG-T
5	5.482	32.687	25.787
10	4.666	32.671	25.866
20	3.174	32.742	26.068
30	3.174	32.884	26.181
40	3.534	33.077	26.302
50	4.862	33.294	26.338
75	6.644	33.610	26.372
100	7.248	33.743	26.395

Station OS14077
Latitude 39-59.93N
Longitude 142-15.11E
Depth(m) 238

Press.	Temp.	Sal.	SIG-T
5	5.920	32.410	25.516
10	5.783	32.456	25.569
20	4.901	32.802	25.944
30	4.956	33.018	26.109
40	5.246	33.168	26.195
50	6.191	33.472	26.322
75	6.722	33.615	26.365
100	7.165	33.729	26.395
125	6.793	33.686	26.412
150	6.637	33.692	26.437
175	5.855	33.591	26.457
200	4.530	33.405	26.463

4

THE "OSHORO MARU" CRUISE 269
TO THE WESTERN NORTH PACIFIC OCEAN

IN MAY 2014

1. Cruise Itinerary

Cruise 269

Departure from Hakodate	May	8	2014
Start hydrographic research (OS14078)		9	
Start surface long-line research (OSSL1401)		11	
Start Gill-net research (OSG1401)		12	
Finish Gill-net research (OSG1401) and surface long-line research (OSSL1403)		13	
Finish hydrographic research (OS14090)		16	
Return to Hakodate		15	

Total coverage 1758.1 miles

2. Vessel Personnel

Crew: Captain: Associate Professor Shogo Takagi

And 28 persons

Research Staff:

Associate Professor (Laboratory of Marine Biodiversity, Hokkaido University)

Atsushi Yamaguchi

Teaching Assistant: 4 persons

Undergraduate Students: 49 persons

3. Items of Research

Hydrographic observations: (Observation of Temperature, Salinity, and Computed Dynamic Depth Anomaly)

Hydrographic work on deck and the data processing were made by the Science officer, the deck officers, crews, research staff and cadets of the “Oshoro maru”. Temperature and salinity were measured by CTD (Seabird SBE-9Plus) and XCTD.

Table 1. List of Oceanographic station

Station	Lat.	Long.	Date (GMT)	Hour (GMT)	T.Z.	Depth	Col.	Tr.	SST	Wr.	Gear
OS14078	41-59.29 N	145-29.52 E	5/9	5:08	9	4724	-	-	5.8	r	9p-0769
OS14079	44-00.05 N	154-59.98 E	5/10	23:07	10	5300	-	-	5.4	o	9p-0769
OS14082	43-30.12 N	154-59.68 E	5/11	10:54	10	5466	-	-	5.7	o	9p-0769
OS14083	43-14.91 N	154-59.95 E	5/11	22:07	10	5486	-	-	5.5	o	9p-0769
OS14084	42-30.14 N	155-00.26 E	5/12	3:53	10	5150	-	-	5.8	o	9p-0769
OS14085	41-52.58 N	154-59.52 E	5/12	9:31	10	5465	-	-	9.2	o	9p-0769
OS14086	41-44.95 N	155-00.01 E	5/12	22:36	10	5553	-	-	10.6	o	9p-0769
OS14087	41-00.61 N	154-59.37 E	5/13	4:24	10	5522	-	-	10.0	o	9p-0769
OS14088	40-15.17 N	154-59.91 E	5/13	11:21	10	5541	-	-	8.9	o	9p-0769
OS14089	39-29.97 N	155-00.09 E	5/13	17:02	10	5615	-	-	13.8	o	9p-0769

T.Z.: Time Difference between G.M.T and S.M.T.

Col.: Water color in Forel-Ule scale

Tr.: Transparency in meters with Secchi disc

SST: Surface temperature

Wr.: Weather in WMO Code 4501

Table 2. Oceanographic data

Station OS14078
Latitude 41-59.29N
Longitude 145-29.52E
Depth(m) 4724

Press.	Temp.	Sal.	SIG-T
5	4.701	32.882	26.029
10	4.621	32.892	26.046
20	4.431	32.929	26.095
30	3.412	32.900	26.172
40	2.698	33.001	26.315
50	2.228	33.005	26.356
75	1.728	33.027	26.410
100	1.304	33.018	26.432
125	1.516	33.169	26.539
150	2.113	33.407	26.687
175	2.220	33.499	26.752
200	2.326	33.560	26.792
250	2.641	33.675	26.859
300	2.821	33.761	26.912
400	3.082	33.945	27.036
500	3.151	34.086	27.142
600	3.042	34.183	27.229
700	2.920	34.268	27.308
800	2.721	34.308	27.357
900	2.693	34.358	27.400
1000	2.579	34.397	27.441
1200	2.377	34.447	27.498
1500	2.166	34.512	27.568

Station OS14079
Latitude 44-0.05N
Longitude 154-59.98E
Depth(m) 5300

Press.	Temp.	Sal.	SIG-T
5	4.351	32.999	26.159
10	4.344	33.000	26.160
20	4.220	32.994	26.169
30	3.742	32.999	26.219
40	3.622	33.025	26.252
50	3.457	33.040	26.279
75	2.930	33.085	26.363
100	3.475	33.206	26.410
125	3.632	33.330	26.494
150	3.767	33.485	26.604
175	3.349	33.548	26.694
200	3.303	33.603	26.742
250	3.866	33.780	26.829
300	4.051	33.899	26.905
400	3.504	33.979	27.023
500	3.441	34.091	27.119
600	3.442	34.207	27.211
700	3.274	34.268	27.276
800	3.104	34.314	27.328
900	2.812	34.347	27.380
1000	2.693	34.382	27.419
1200	2.512	34.453	27.491
1500	2.231	34.509	27.560

Station OS14082
Latitude 43-30.12N
Longitude 154-59.68E
Depth(m) 5466

Press.	Temp.	Sal.	SIG-T
5	4.670	32.977	26.108
10	4.663	32.976	26.108
20	3.715	32.981	26.208
30	3.471	33.020	26.262
40	3.113	33.046	26.316
50	2.806	33.042	26.339
75	3.112	33.171	26.416
100	5.139	33.515	26.482
125	3.121	33.357	26.563
150	3.258	33.542	26.698
175	3.675	33.608	26.711
200	3.794	33.660	26.741
250	3.716	33.752	26.822
300	2.784	33.705	26.871
400	3.552	33.973	27.014
500	3.566	34.090	27.105

Station OS14083
Latitude 43-14.91N
Longitude 154-59.95E
Depth(m) 5486

Press.	Temp.	Sal.	SIG-T
5	4.477	32.952	26.109
10	4.465	32.951	26.109
20	3.129	32.962	26.247
30	2.614	32.993	26.316
40	2.440	32.999	26.335
50	2.266	33.009	26.357
75	2.411	33.081	26.403
100	3.215	33.302	26.510
125	3.387	33.390	26.565
150	2.754	33.397	26.627
175	2.029	33.411	26.696
200	2.893	33.551	26.738
250	2.257	33.555	26.794
300	2.569	33.661	26.853
400	4.236	34.031	26.991
500	3.531	34.056	27.082
600	3.449	34.162	27.175
700	3.105	34.225	27.257
800	3.239	34.317	27.317
900	2.883	34.325	27.357
1000	2.829	34.387	27.411
1200	2.495	34.441	27.483
1500	2.291	34.512	27.557

Station OS14084
Latitude 42-30.14N
Longitude 155-0.26E
Depth(m) 5150

Press.	Temp.	Sal.	SIG-T
5	4.688	32.975	26.104
10	4.679	32.977	26.106
20	4.704	33.016	26.135
30	3.346	33.118	26.352
40	3.050	33.142	26.398
50	4.226	33.325	26.431
75	4.861	33.459	26.469
100	5.764	33.621	26.492
125	5.167	33.574	26.525
150	2.433	33.303	26.578
175	2.428	33.383	26.643
200	3.682	33.615	26.716
250	2.957	33.626	26.792
300	2.553	33.632	26.832
400	4.252	34.011	26.973
500	4.316	34.144	27.073
600	3.197	34.110	27.156
700	3.612	34.271	27.246
800	3.375	34.320	27.308
900	3.118	34.359	27.362
1000	2.827	34.377	27.403
1200	2.581	34.435	27.471
1500	2.314	34.501	27.547

Station OS14085
Latitude 41-52.58N
Longitude 154-59.52E
Depth(m) 5465

Press.	Temp.	Sal.	SIG-T
5	7.921	33.647	26.223
10	8.304	33.778	26.269
20	9.111	34.061	26.365
30	9.101	34.068	26.372
40	9.046	34.073	26.385
50	9.046	34.072	26.384
75	8.035	33.961	26.452
100	8.191	34.006	26.465
125	7.954	33.968	26.470
150	8.110	34.010	26.480
175	7.991	33.997	26.487
200	7.657	33.949	26.499
250	6.281	33.828	26.591
300	3.790	33.590	26.685
400	3.127	33.704	26.839
500	2.984	33.842	26.962
600	3.164	34.000	27.072
700	3.532	34.167	27.170
800	3.375	34.260	27.259
900	3.236	34.321	27.321
1000	3.011	34.357	27.370
1200	2.743	34.422	27.447
1500	2.392	34.492	27.533

Station OS14086
Latitude 41-44.95N
Longitude 155-0.01E
Depth(m) 5553

Press.	Temp.	Sal.	SIG-T
5	9.902	34.149	26.304
10	9.898	34.149	26.304
20	9.895	34.149	26.305
30	9.821	34.138	26.309
40	9.503	34.109	26.339
50	9.335	34.087	26.349
75	8.743	34.007	26.381
100	8.467	34.004	26.422
125	7.984	33.942	26.446
150	7.762	33.923	26.463
175	7.725	33.930	26.473
200	7.743	33.943	26.481
250	7.252	33.874	26.497
300	6.523	33.821	26.554
400	4.178	33.748	26.772
500	4.190	33.918	26.905
600	4.140	34.089	27.047
700	3.234	34.101	27.146
800	3.295	34.237	27.248
900	3.301	34.318	27.312
1000	3.013	34.334	27.353
1200	2.767	34.415	27.439
1500	2.396	34.481	27.524

Station OS14087
Latitude 41-0.61N
Longitude 154-59.37E
Depth(m) 5522

Press.	Temp.	Sal.	SIG-T
5	9.044	33.964	26.300
10	9.024	33.966	26.305
20	8.973	33.969	26.315
30	9.006	33.985	26.322
40	9.037	33.997	26.327
50	9.066	34.009	26.331
75	8.805	34.081	26.429
100	8.647	34.082	26.455
125	8.606	34.081	26.460
150	8.302	34.033	26.469
175	8.194	34.021	26.476
200	8.098	34.014	26.485
250	7.701	33.958	26.500
300	6.639	33.818	26.536
400	4.813	33.816	26.758
500	4.486	33.934	26.887
600	3.826	33.997	27.006
700	4.056	34.146	27.101
800	3.806	34.222	27.187
900	3.474	34.285	27.270
1000	3.277	34.329	27.324
1200	2.875	34.408	27.423
1500	2.480	34.479	27.515

Station OS14088
Latitude 40-15.17N
Longitude 154-59.91E
Depth(m) 5541

Press.	Temp.	Sal.	SIG-T
5	8.903	33.723	26.134
10	8.979	33.788	26.172
20	8.949	33.889	26.256
30	8.889	33.889	26.266
40	8.505	33.904	26.337
50	8.664	34.025	26.407
75	8.119	33.982	26.457
100	7.937	33.967	26.472
125	8.035	34.003	26.486
150	8.082	34.013	26.487
175	8.061	34.010	26.487
200	8.080	34.013	26.487
250	7.382	33.910	26.507
300	6.318	33.766	26.537
400	4.264	33.707	26.731
500	4.831	33.980	26.886
600	4.406	34.100	27.027
700	3.989	34.157	27.116
800	3.712	34.232	27.204
900	3.417	34.286	27.276
1000	3.149	34.336	27.342
1200	2.828	34.402	27.423
1500	2.386	34.484	27.527

Station OS14089
Latitude 39-29.97N
Longitude 155-0.09E
Depth(m) 5615

Press.	Temp.	Sal.	SIG-T
5	12.989	34.402	25.932
10	12.986	34.402	25.932
20	12.911	34.398	25.944
30	12.470	34.342	25.988
40	11.048	34.254	26.186
50	10.680	34.234	26.236
75	10.158	34.179	26.284
100	9.896	34.172	26.323
125	9.406	34.122	26.365
150	8.845	34.062	26.408
175	8.169	33.988	26.454
200	7.754	33.927	26.467
250	7.416	33.892	26.488
300	6.777	33.892	26.576
400	5.237	33.922	26.793
500	4.532	34.001	26.936
600	4.245	34.105	27.049
700	3.985	34.202	27.153
800	3.637	34.267	27.240
900	3.426	34.317	27.300
1000	3.122	34.358	27.362
1200	2.777	34.414	27.437
1500	2.381	34.493	27.535

Drift Gillnet Research

Three gillnet researches were performed during this cruise.

The captain supervised the operations, and were conducted by deck officers, crews, research staff.

One set of drift gillnet was used to collect salmonids and other epipelagic fishes in Figs.2 Details about each operation are shown in Table 3. The gillnet configuration is as follows:

Drift Gillnet Sampling

One set of drift gillnet was used to collect salmonids and other epipelagic fishes [Figs.1 and Table 1.]

Details about each operation are shown in Table 2.The gillnet configuration is as follows:

Stations	net	A-Gear		C-gear										Total
	Mesh size (mm)	112	115	48	55	63	72	82	93	106	121	138	157	
OSG1401	Number of tan	6	6	3	3	3	5	6	5	3	3	3	3	49

The net comprised of total 49 tans of C-Gear gillnet (non-selective varied research mesh, Takagi, 1975), and A-Gear gillnet (commercial mesh). Each tan was 50m long. Gillnet gear was set in the evening, allowed to soak overnight, and retrieved in the following morning. The number of organisms caught was counted by species for mesh size. Catch per unit effort (CPUE) values were calculated as the number of fish caught by C-gear gillnet per tan.

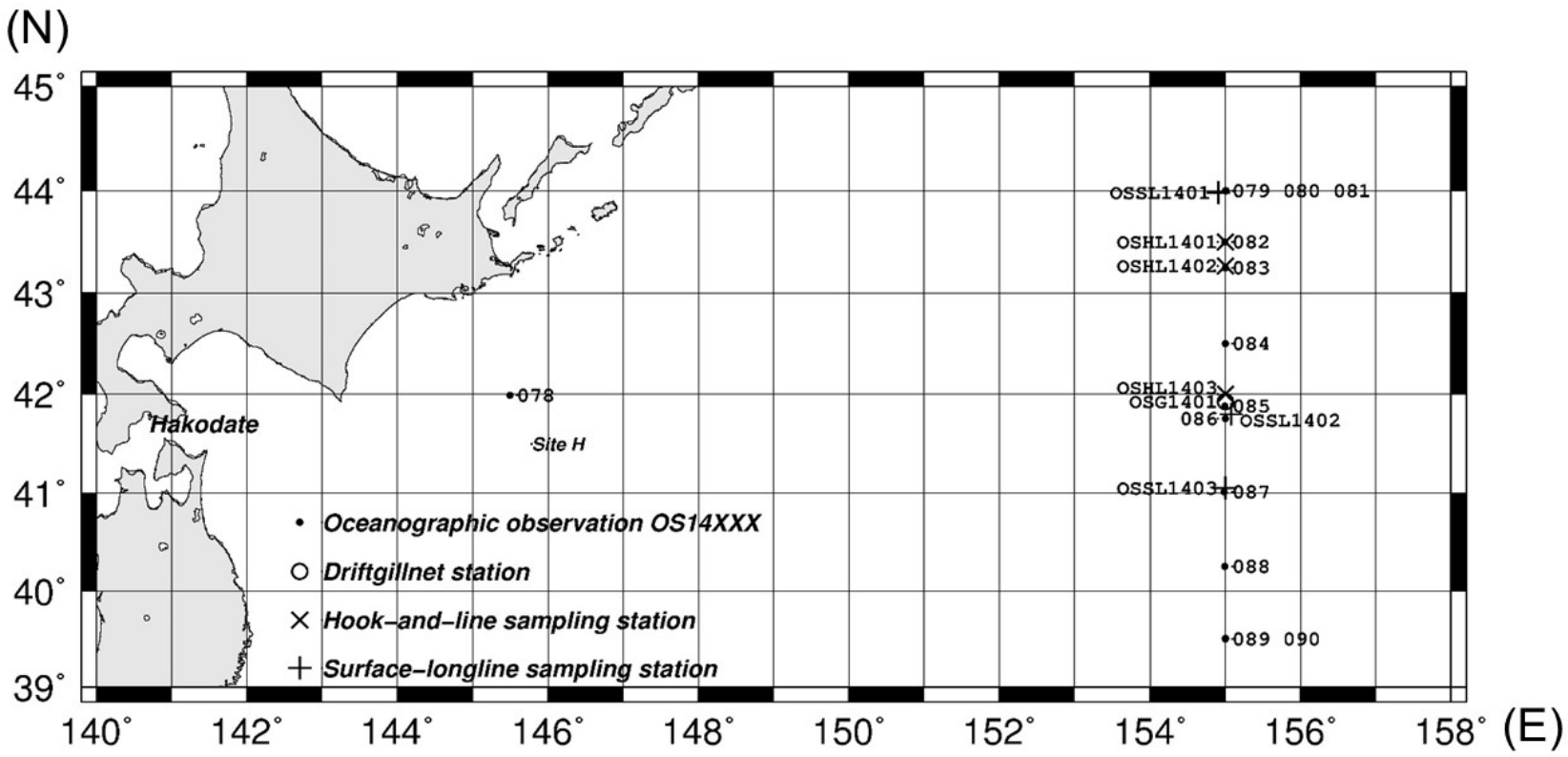

Fig.-2

Table 3. Position and research conditions of surface drift gillnet sampling at each station during the Oshoro maru Cruise #269, 2014.

Station	Date and Time (S.M.T.)		T.D.	Set Position		D.S.*	bottom depth(m)	Wr	Wind (Force)	S.T. (℃)
	Net set	Net haul		Lat.	Long.					
OSG 1401	May 12 1827-1850	May 13 0524-0635	+10h	41-55.4N	155-00.3 E	210	5455	o	NNW-4	6.9

Salmon Hook-and-Line and surface longline Research:

To collect salmons, hook-and-line gears and surface longline were used in Cruise #269. These samplings were mainly conducted with observations when ship was under drifting.

Table 4. Position and research conditions of surface longline and hook-and-line sampling at each station during the Oshoro maru Cruise #269, 2014.

Station	Date and Time (S.M.T.)		T.D.	Set Position		D.S.*	Number of baskets	bottom depth(m)	Wr	Wind (Force)	S.T. (℃)
	Line set	Line haul		Lat.	Long.						
C269											
OSSL1401	May 11 0757-08-25	May 11 1455-1550	+10h	43-58.9N	154-54.5N	080	20	5337	f	ENE-4	4.8
OSSL1402	May 13 0453-0503	May 13 0715-0750	+10h	41-47.9N	155-04.5E	108	10	5480	o	Calm	8.5
OSSL1403	May 13 1340-1353	May 13 1627-1648	+10h	41-03.1N	154-59.8E	215	10	5584	c	SW-4	9.5
OSHL1401	May 11 2130	May 11 2340	+10h	43-30.1N	154-59.7E	-	-	5472	f	NW-4	5.0
OSHL1402	May 12 0100	May 12 0400	+10h	43-16.2N	155-00.3E	-	-	5500	o	NNW-4	5.1
OSHL1403	July 12 2110	July 12 0330	+10h	42-00.2N	155-00.0E	-	-	5465	o	North-2	6.0

D.S.* : Direction of line set.

Table 5. List of oceanographic station during the *Oshoro maru* Cruise #269, 2014.

Station	Date and Time (S.M.T.)		T.D.	Set Position		Remark CTD	CTD depth(db)
				Lat.	Long.		
C269							
OS 14078	May 09	1508	+10h	41-59.3N	145-29.5E	Sea-Bird SBE 9	1500
OS 14079	May 11	0907	+10h	44-00.1N	155-00.0E	Sea-Bird SBE 9	5000
OS 14080	May 11	1624	+10h	44-00.0N	155-00.1E	Sea-Bird SBE 9	800
OS 14081	May 11	1743	+10h	44-00.0N	155-00.5E	Sea-Bird SBE 9	200
OS 14082	May 11	2054	+10h	43-30.1N	154-59.7E	Sea-Bird SBE 9	500
OS 14083	May 12	0807	+10h	43-14.9N	155-00.0E	Sea-Bird SBE 9	1500
OS 14084	May 12	1353	+10h	42-30.1N	155-00.3E	Sea-Bird SBE 9	1500
OS 14085	May 12	1931	+10h	41-52.6N	154-59.5E	Sea-Bird SBE 9	1500
OS 14086	May 13	0836	+10h	41-45.0N	155-00.0E	Sea-Bird SBE 9	1500
OS 14087	May 13	1424	+10h	41-00.6N	154-59.4E	Sea-Bird SBE 9	1500
OS 14088	May 13	2121	+10h	40-15.2N	154-59.9E	Sea-Bird SBE 9	1500
OS 14089	May 13	0302	+10h	39-30.0N	155-00.1E	Sea-Bird SBE 9	1500
OS 14090	May 13	0500	+10h	39-30.2N	155-00.2E	Sea-Bird SBE 9	200

Table 6. The number of organisms caught by drift gillnet during the Oshoro maru Cruise # 269, in May, 2014. CPUE and (%) indicate mumerical catch per tan and percentage of total catch by C-gear gillnet at the station, respectively.

Common name	Station / Gear / Scientific name	OSG 1401				
		C			A	Total
			CPUE	(%)		
Sockeye salmon	*Oncorhynchus nerka*	0	0.0	(0.0)	0	0
Chum salmon	*Oncorhynchus keta*	10	0.3	(2.0)	17	27
Pink salmon	*Oncorhynchus gorbuscha*	481	16.0	(97.2)	7	488
Coho salmon	*Oncorhynchus kisutch*	0	0.0	(0.0)	0	0
Chinook salmon	*Oncorhynchus tshawytscha*	0	0.0	(0.0)	0	0
Steelhead	*Oncorhynchus mykiss*	0	0.0	(0.0)	0	0
						0
Tufted Puffin	*Fratercula cirrhata*	1	0.0	(0.2)	0	1
Boreal clubhook squid	*Onychoteuthis borealijaponicus*	3	0.1	(0.6)	1	4

Table 7. The catch number of each salmonid at each station where salmonids were collected by hook-and-line gear, surface longline in the Oshoro maru Cruise # 269, 2014.

Station Name	Sampling gear	Species name						Total
		Sockeye	Chum	Pink	Coho	Chinook	Stellhead	
C269								
OSSL 1401	Surface longline	1	12	3	0	0	0	16
OSSL 1402	Surface longline	0	0	14	0	0	0	14
OSSL 1403	Surface longline	0	0	5	0	0	0	5
OSHL 1401	Hook-and-line	0	0	0	0	0	0	0
OSHL 1402	Hook-and-line	0	0	0	0	0	0	0
OSHL 1403	Hook-and-line	0	2	26	0	0	0	28
	Total	1	14	48	0	0	0	63

Table. 8 Data on plankton collected by vertical hauls with a twin NORPAC net.

Station no.	Position		S.M.T.		Length of wire (m)	Angle of wire (°)	Depth estimated by wire angle (m)	Kind of cloth	Flowmeter		Estimated volume of water filtered (m^3)	Sample no.
	Lat. (N)	Lon.	Date	Hour					No.	Reading		
OS 14078 (Site H)	41-59	145-29 E	9 May	15:58	152	10	150	GG54	3691	1538	24.46	14001
OS 14079 (Site H)	44-00	154-59 E	11 May	8:54	150	0	150	GG54	3691	1138	18.10	14002
OS 14084 (42-30)	42-30	155-00 E	12 May	13:31	155	15	150	GG54	3691	1377	21.90	14003
OS 14085 (Gill-net 1)	41-52	155-00 E	12 May	19:06	150	0	150	GG54	3691	1420	22.58	14004
OS 14086 (41-45)	41-45	155-00 E	13 May	8:23	160	20	150	GG54	3691	1432	22.77	14005
OS 14087 (41-00)	41-00	155-00 E	13 May	14:10	150	0	150	GG54	3691	1298	20.64	14006

5

THE "OSHORO MARU" CRUISE 270
TO WEST OF HOKKAODO

IN JUNE 2014

1. Cruise Itinerary

Cruise 270

Departure from Hakodate and start hydrographic research (OS14091)	June	10	2014
Finish hydrographic research (OS14094)		14	
Return to Hakodate		15	

Total coverage 804.6 miles

2. Vessel Personnel

Crew:

Captain: Associate Professor Shogo Takagi

And 28 persons

Research Staff:

Professor (Laboratory of Bioresources chemistry, Hokkaido University)
Ryuichi Sakai

Specially Appointed Associate Professor
(Laboratory of Bioresources chemistry, Hokkaido University)
Masaki Fujita

Researcher Fellow
(Marine Life Monitoring Grope, Field Science Center for Northern Biosphere)
Yuichi Tsuda

Technical Staff: 5 persons
Graduate Students: 11 persons
Undergraduate Students: 14 persons

Total 33 persons

3. Items of Research

Hydrographic observations: (Observation of Temperature, Salinity, and Computed Dynamic Depth Anomaly)

Hydrographic work on deck and the data processing were made by the Science officer, the deck officers, crews, research staff and cadets of the “Oshoro maru”. Temperature and salinity were measured by CTD (Seabird SBE-9Plus) and XCTD.

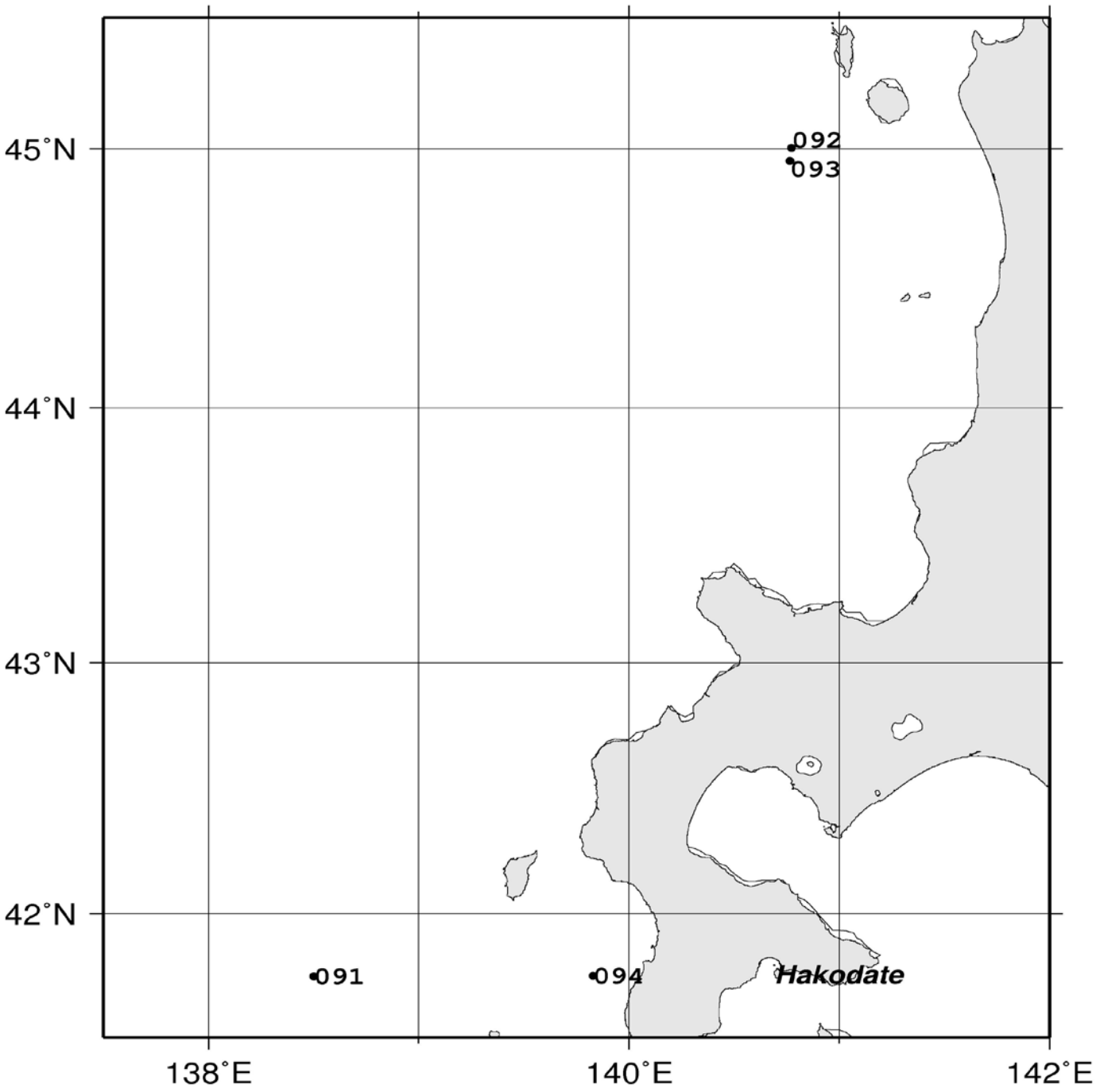

Fig.-10 Oceanographic stations

Table 1. List of Oceanographic station

Station	Lat.	Long.	Date (GMT)	Hour (GMT)	T.Z.	Depth	Col.	Tr.	SST	Wr.	Gear
OS14091	41 44.87 N	138 30.17 E	6/10	14:17	9	3700	-	-	16.0	bc	9p-0769
OS14092	45 00.21 N	140 46.50 E	6/12	8:21	9	171	-	-	13.6	o	XCTD-2
OS14093	44 57.25 N	140 45.91 E	6/12	8:44	9	183	-	-	13.6	o	XCTD-1
OS14094	41 44.98 N	139 49.76 E	6/14	13:36	9	1415	-	-	17.5	bc	9p-0769

T.Z.: Time Difference between G.M.T and S.M.T.

Col.: Water color in Forel-Ule scale

Tr.: Transparency in meters with Secchi disc

SST: Surface temperature

Wr.: Weather in WMO Code 4501

Table 2. Oceanographic data

Station OS14091
Latitude 41-44.87N
Longitude 138-30.17E
Depth(m) 3700

Press.	Temp.	Sal.	SIG-T
5	15.298	33.980	25.121
10	14.756	33.981	25.239
20	9.864	33.962	26.164
30	8.763	34.005	26.376
40	7.532	34.055	26.600
50	6.643	34.051	26.720
75	4.736	34.014	26.923
100	3.468	34.013	27.053
125	2.590	34.015	27.135
150	1.935	34.014	27.187
175	1.474	34.015	27.222
200	1.280	34.014	27.234
250	1.046	34.022	27.256
300	0.942	34.039	27.276
400	0.800	34.048	27.293
500	0.709	34.056	27.304
600	0.618	34.060	27.313
700	0.524	34.060	27.319

Station OS14092
Latitude 45-00.21N
Longitude 140-46.50E
Depth(m) 171

Depth	Temp.	Sal.	SIG-T
5	12.735	33.793	-
10	12.729	33.800	-
20	11.722	33.792	-
30	9.924	33.916	-
40	8.025	33.870	-
50	6.892	33.929	-
75	5.247	33.941	-
100	4.099	34.003	-
125	3.639	34.012	-
150	3.097	34.015	-

Station OS14093
Latitude 44-57.25N
Longitude 140-45.91E
Depth(m) 183

Depth	Temp.		SIG-T
5	12.722	33.787	-
10	12.722	33.801	-
20	12.703	33.812	-
30	10.517	33.940	-
40	9.384	33.952	-
50	7.734	33.951	-
75	5.703	33.954	-
100	4.116	34.009	-
125	3.737	34.011	-
150	3.105	34.033	-
175	2.792	34.044	-

Station OS14094
Latitude 41-44.98N
Longitude 139-49.76E
Depth(m) 1415

Press.	Temp.	Sal.	SIG-T
5	17.264	33.945	24.642
10	17.274	33.946	24.640
20	16.062	34.203	25.121
30	13.977	34.254	25.615
40	12.148	34.118	25.876
50	10.925	34.248	26.204
75	9.154	34.142	26.421
100	7.892	34.106	26.587
125	6.164	34.052	26.783
150	5.301	34.036	26.876
175	3.886	34.009	27.009
200	2.629	34.019	27.135
250	1.667	34.025	27.216
300	1.254	34.031	27.249
400	0.916	34.043	27.282
500	0.751	34.052	27.299
600	0.627	34.057	27.310
700	0.537	34.058	27.316

6

THE "OSHORO MARU" CRUISE 271
TO IWATE OFF AND IBARAKI OFF

IN JUNE 2014

1. Cruise Itinerary

Cruise 271

Departure from Hakodate	June	16	2014
Start hydrographic research (OS14095)		17	
Finish hydrographic research (OS14101)		18	
Arrival at Tamano		21	

Total coverage 906.2 miles

2. Vessel Personnel

Crew: Captain:

Associate Professor Shogo Takagi

And 28 persons

Research Staff:

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

Hiroji Onishi

Technical Staff: 1 person

Undergraduate Students: 1 Person

Total 3 persons

3. Items of Research

Hydrographic observations: (Observation of Temperature, Salinity, and Computed Dynamic Depth Anomaly)

Hydrographic work on deck and the data processing were made by the Science officer, the deck officers, crews, research staff and cadets of the “Oshoro maru”. Temperature and salinity were measured by CTD (Seabird SBE-9Plus) and XCTD.

Table 1. List of Oceanographic station

Station	Lat.	Long.	Date (GMT)	Hour (GMT)	T.Z.	Depth	Col.	Tr.	SST	Wr.	Gear
OS14095	40 00.21 N	142 14.92 E	6/16	18:23	9	230	-	-	13.4	bc	XCTD-1
OS14096	39 30.07 N	142 10.98 E	6/16	20:48	9	230	-	-	16.7	bc	XCTD-1
OS14097	39 00.13 N	142 00.00 E	6/16	23:12	9	196	-	-	14.6	bc	XCTD-1

T.Z.: Time Difference between G.M.T and S.M.T.

Col.: Water color in Forel-Ule scale

Tr.: Transparency in meters with Secchi disc

SST: Surface temperature

Wr.: Weather in WMO Code 4501

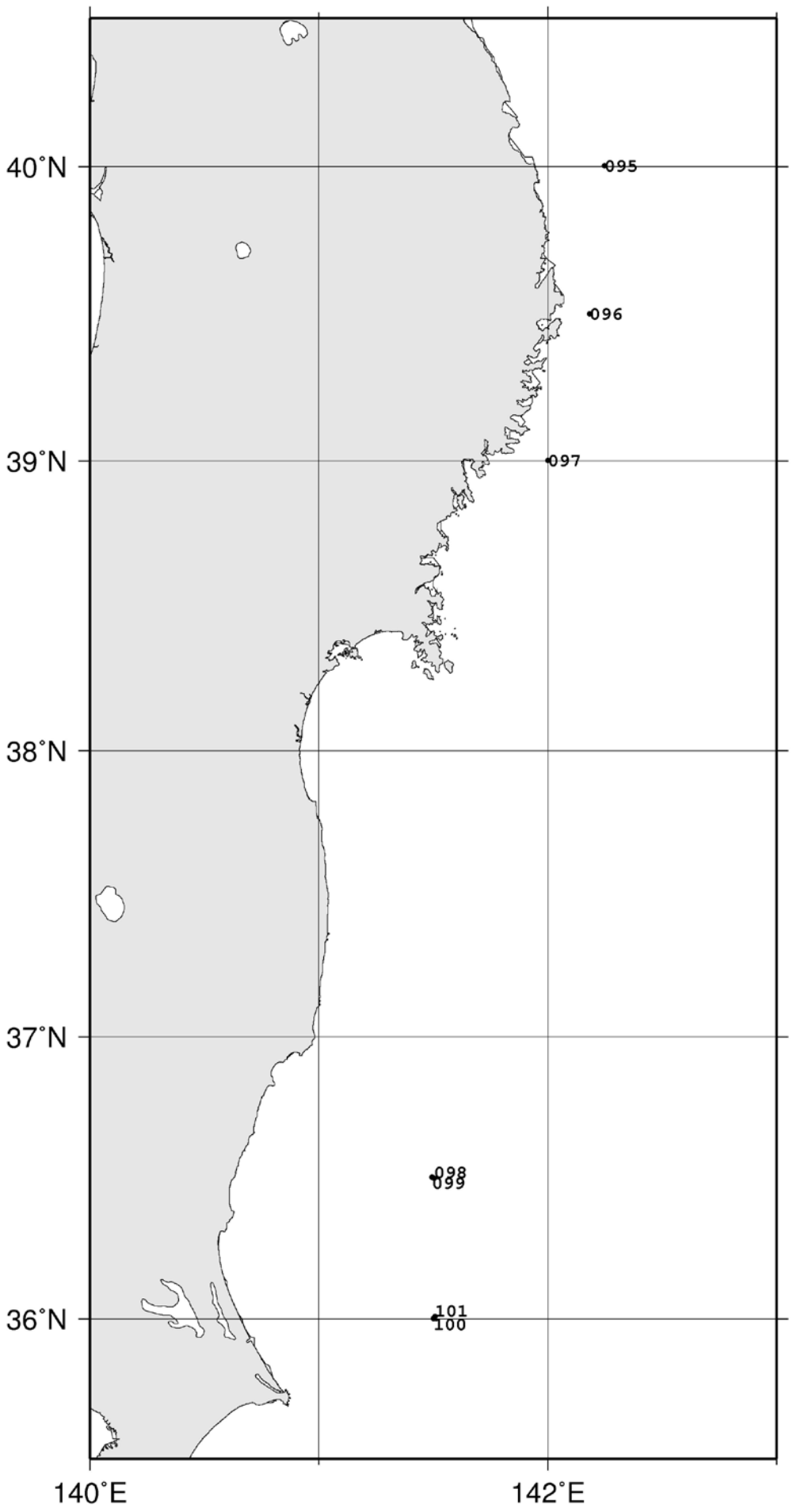

Fig.-1. Oceanographic stations

Table 2. Oceanographic data

Station OS14095
Latitude 40-00.21N
Longitude 142-14.92E
Depth(m) 230

Depth	Temp.	Sal.	SIG-T
5	12.296	33.001	-
10	11.939	33.090	-
20	11.241	33.529	-
30	11.056	33.651	-
40	10.515	33.741	-
50	10.493	33.758	-
75	9.715	33.745	-
100	9.573	33.779	-
125	8.973	33.852	-
150	8.664	33.863	-
175	8.345	33.864	-
200	8.148	33.841	-

Station OS14096
Latitude 39-30.07N
Longitude 142-10.98E
Depth(m) 230

Depth	Temp.	Sal.	SIG-T
5	15.819	33.136	-
10	14.256	33.059	-
20	14.056	33.802	-
30	13.228	33.814	-
40	13.757	34.262	-
50	13.651	34.277	-
75	10.997	33.946	-
100	9.819	33.925	-
125	8.583	33.798	-
150	6.219	33.492	-
175	5.108	33.476	-
200	4.768	33.448	-

Station OS14097
Latitude 39-00.13N
Longitude 142-00.00E
Depth(m) 196

Depth	Temp.	Sal.	SIG-T
5	12.930	33.235	-
10	12.564	33.263	-
20	11.122	33.330	-
30	9.956	33.682	-
40	9.700	33.767	-
50	9.624	33.783	-
75	9.330	33.834	-
100	9.264	33.838	-
125	9.226	33.839	-
150	9.121	33.825	-
175	9.007	33.815	-

7

THE "OSHORO MARU" CRUISE 004
TO IBURI OFF

IN SEPTEMBER - OCTOBER 2014

1. Cruise Itinerary

Cruise 004

Departure from Hakodate	September	30	2014
Surface-trawl research (OSST1401-1402)	October	1	
Return at Hakodate		2	
Departure from Hakodate		3	
Mid-trawl research (OSMT1401)		4	
Return to Hakodate		5	
Departure from Hakodate		6	
Start hydrographic research (OS14122)		7	
Bottom-trawl (OST1401-1402)		8	
Finish hydrographic research (OS14123)		9	
Return to Hakodate		10	

Total coverage 582.0 miles

2. Vessel Personnel

Crew: Captain: Associate Professor Shogo Takagi

And 30 persons

Research Staff: Leg1

Professor (Laboratory of Fishing Production Engineering, Hokkaido University)
Tsutomu Takagi

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

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

Technical Staff: 22 persons

Graduate Students: 3 persons

Leg2

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

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

Associate Professor (Laboratory of Marine Bioresources Ecology, Hokkaido University)
Takashi Matsuishi

Specially Appointed Associate Professor (School of Fisheries Sciences, Hokkaido University)
Mituhiro Nakaya

Technical Staff: 24 persons

Graduate Students: 6 persons

Leg3

Professor (Department of Marine and Earth Science, Tokai University)
Hisashi Narita

Professor (Laboratory of Marine Environmental and Resource Sensing, Hokkaido University)
Koji Iida

Professor (Laboratory of Marine Biodiversity, Hokkaido University)
Mamoru Yabe

Associate Professor (Laboratory of Marine Biodiversity, Hokkaido University)
Hisashi Imamura

Associate Professor (Laboratory of Marine Environment and Resource Sensing, Hokkaido University)	
	Toru Mukai
Technical Staff:	23 persons
raduate Students:	6 persons

3. Items of Research

Hydrographic observations: (Observation of Temperature, Salinity, and Computed Dynamic Depth Anomaly)

Hydrographic work on deck and the data processing were made by the Science officer, the deck officers, crews, research staff and cadets of the “Oshoro maru”. Temperature and salinity were measured by CTD (Seabird SBE-9Plus) and XCTD.

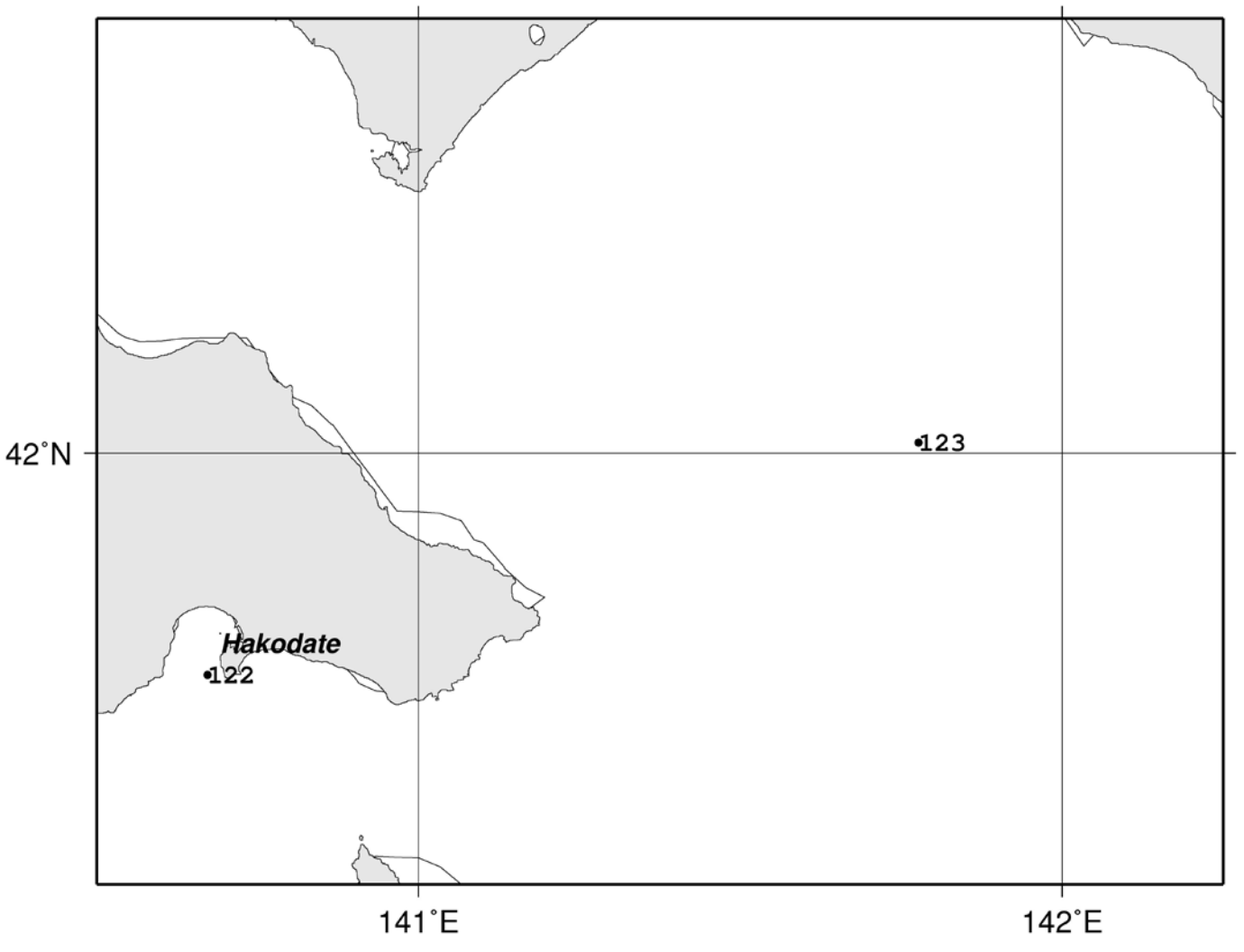

Table 1. List of Oceanographic station

Station	Lat.	Long.	Date (GMT)	Hour (GMT)	T.Z.	Depth	Col.	Tr.	SST	Wr.	Gear
OS14122	41 44.60 N	140 40.32 E	10/6	23:05	9	57	-	-	-	bc	19p-4636
OS14123	42 00.72 N	141 46.59 E	10/9	5:29	9	901	-	-	17.7	b	9p-1171

T.Z.: Time Difference between G.M.T and S.M.T.

Col.: Water color in Forel-Ule scale

Tr.: Transparency in meters with Secchi disc

SST: Surface temperature

Wr.: Weather in WMO Code 4501

Table 2. Oceanographic data

Station	OS14122		
Latitude	41-44.60N		
Longitude	140-40.31E		
Depth(m)	57		
Press.	Temp.	Sal.	SIG-T
10	19.922	33.691	23.784
20	19.123	33.842	24.105
30	18.889	33.874	24.189

Station	OS14123		
Latitude	42-0.72N		
Longitude	141-46.59E		
Depth(m)	901		
Press.	Temp.	Sal.	SIG-T
5	17.269	33.798	24.528
10	17.127	33.781	24.549
20	17.052	33.839	24.611
30	16.716	33.961	24.784
40	15.683	34.087	25.117
50	13.963	34.152	25.539
75	12.728	34.241	25.859
100	11.114	34.087	26.044
125	9.687	34.006	26.228
150	7.102	33.730	26.404
175	4.237	33.425	26.509
200	3.503	33.436	26.590
250	2.947	33.523	26.711
300	2.866	33.644	26.815
400	3.087	33.781	26.904
500	3.336	33.964	27.027
600	3.464	34.126	27.144
700	3.302	34.236	27.247
800	3.147	34.299	27.312

Bottom Trawl Research

2 operations of the stern otter bottom trawl were carried out.

These operations were supervised by the captain, Deck officer, Science officer, crew and research staff were engaged in the work.

Table 3: Data on Bottom trawl research during the Oshoromaru Cruise#004

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 (K't)	Bottom depth (m)	Wr.*4	Wind	S.T.*5 (℃)
OST1401	Oct. 8 0937-1010	41-56.0	141-42.1	+9h	310	3.5	880-900	c	WSW-4	17.5
OST1402	Oct. 8 1409-1440	42-03.5	141-36.8	+9h	350	3.5	740-755	c	WSW-3	17.1

*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 tow.

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

*5 S.T. : Surface temperature

Japanese name	Scientific Name	OST1401		OST1402	
		Number	Weight (kg)	Number	Weight (kg)
Gangiei rui	Rajidae sp.	-	1.35	-	-
Shigiunagi	*Nemichthys scolopaceus*	-	-	1	0.08
Irakoanago	*Synaphobranchus kaupii*	-	2.45	2	0.25
Togariichimonjiiwashi	*Leuroglossus schmidtii*	-	-	-	0.01
Sokoiwashi rui	Bathylagidae	-	0.65	-	0.97
Houraieso rui	Chauliodus sp.	-	-	2	0.08
Hadakaiwashi rui	Myctophidae	17	0.45	-	0.83
Karasudara	*Halargyreus johnsonii*	-	1.8	2	0.33
Kanadadara	*Antimora microlepis*	-	10.1	1	0.55
Itohikidara	*Laemonema longipes*	-	6.7	2	1.15
Karafutosokodara	*Coryphaenoides cinereus*	-	37.2	-	-
Munedara	*Coryphaenoides pectoralis*	-	2.35	-	-
Ibarahige	*Coryphaenoides acrolepis*	-	7.7	-	-
Futasuzinamehadaka	*Lestrolepis intermedia*	-	-	2	0.2
Nezumiginpo	*Lumpenella longirostris*	-	3.95	-	0.53
Shirogenge	*Bothrocara zestum*	-	7.7	-	8.9
Kichiji	*Sebastolobus macrochir*	-	6.7	12	1.45
Nyuudoukajika	*Psychrolutes phrictus*	-	0.3	-	-
Ganko	*Dasycottus setiger*	-	-	2	0.3
Kabutouo	*Poromitra crassiceps*	-	0.1	-	-
Ezobai spp.	Buccinidae spp.	-	2.45	-	-
Benizuwaigani	*Chionoecetes japonicus*	-	2.25	-	-
Ika-rui	Squids	-	-	-	0.1
Dosuika	*Berrytenthis magister*	-	1.25	-	0.95
Yanagidako		-	5.15	-	6.05
Mendako	*Opishoteuthis depressa*	-	0.1	1	0.55
Uncategorized		8baskets		1basket	

Drift Gillnet Research

Three gillnet researches were performed during this cruise.

The captain supervised the operations, and were conducted by deck officers, crews, research staff.

Table 4 Data on floating gill net research during the "Oshoro Maru" Cruise #004

No. of research		OSG1402	OSG1403	OSG1404	OSG1405
Date		30-Oct	30-Oct	31-Oct	31-Oct
position of	Lat. (N)	41-29.0	41-29.7	41-27.9	41-30.0
net set	Long. (E)	142-47.8	142-26.4	143-49.8	144-44.2
Time(S.M.T.)	net set	0940-0945	1305-1308	0652-0656	1332-1335
	net haul	1015-1025	1415-1422	0800-0810	1445-1455
Surface temp. (°C)		17.3	17.5	12.8	11.1
Weather		b	bc	bc	bc
Wind (force)		WNW-3	WNW-4	WNW-3	West-4
Pacific saury		90	12	55	10
Japanese sardine		-	25	1	-
Mackerels		-	-	1	-

S.T. : Surface temperature

Wr.: Weather (r: rain, o: 100% clouded, c:75-99%clouded, bc: 25-75% clouded)

Table 5 Composition of drift Gillnet

Mesh size(mm)	29	33	37	42	48	Total
Number of tan	half	2	2	half	2	7

8

THE "OSHORO MARU" CRUISE 005
TO IBURI OFF and HACHINOHE-KUSHIRO OFF

IN OCTOBER 2014

1. Cruise Itinerary

Cruise 005

Departure from Hakodate and start hydrographic research (OS14124)	October 18	2014
Start bottom-trawl research (OST1403)	19	
Finish Bottom-trawl (OST1406) and hydrographic research (OS14129)	20	
Arrival at Hachinohe	21	
Departure from Hachinohe and start hydrographic research (OS14130)	22	
Finish hydrographic research (OS14131)	23	
Return to Hakodate	25	

Total coverage 708.7 miles

2. Vessel Personnel

Crew: Captain: Associate Professor Shogo Takagi

And 30 persons

(Hakodate-Hachinohe)

Research Staff: Professor (Laboratory of Marine Bioresources Ecology, Hokkaido University)
Tetsuya Takatsu
Associate Professor (Laboratory of Marine Biodiversity, Hokkaido University)
Hisashi Imamura
Associate Professor (Laboratory of Marine Biodiversity, Hokkaido University)
Atsushi Yamaguchi
Teaching Assistant: 10 persons

(Hakodate-Hakodate)

Research Staff: Associate Professor (Laboratory of Marine Bioresources Ecology, Hokkaido University)
Takashi Matsuishi
Associate Professor (Laboratory of Marine Environmental Science, Hokkaido University)
Atsushi Ooki
Undergraduate Students: 47 persons

(Hachinohe-Hakodate)

Technical Staff: 2 persons
Teaching Assistant: 9 persons
Total 67 persons

3. Items of Research

Hydrographic observations: (Observation of Temperature, Salinity, and Computed Dynamic Depth Anomaly)

Hydrographic work on deck and the data processing were made by the Science officer, the deck officers, crews, research staff and cadets of the “Oshoro maru”. Temperature and salinity were measured by CTD (Seabird SBE-9Plus) and XCTD.

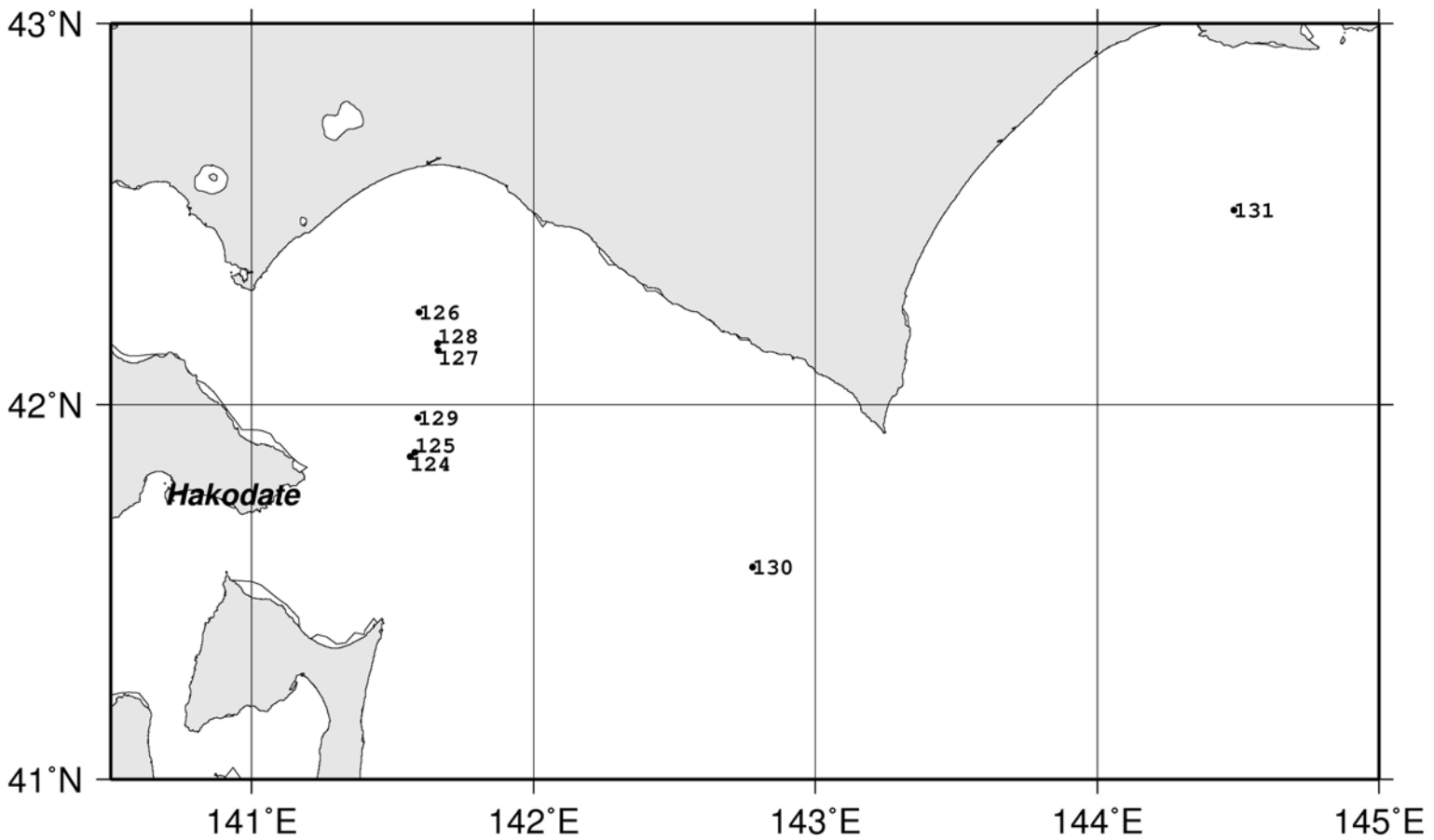

Fig.-1 Oceanographic stations

Table 1. List of Oceanographic station

Station	Lat.	Long.	Date (GMT)	Hour (GMT)	T.Z.	Depth	Col.	Tr.	SST	Wr.	Gear
OS14124	41 51.69 N	141 33.73 E	10/18	10:20	9	595	-	-	16.6	bc	9p-1171
OS14125	41 52.35 N	141 34.82 E	10/18	12:45	9	655	-	-	18.0	bc	9p-1171
OS14126	42 14.64 N	141 35.72 E	10/18	21:08	9	600	-	-	17.9	b	9p-1171
OS14127	42 08.56 N	141 39.68 E	10/19	8:34	9	762	-	-	18.4	bc	9p-1171
OS14128	42 09.71 N	141 39.57 E	10/19	11:04	9	745	-	-	18.3	b	9p-1171
OS14129	41 57.85 N	141 35.40 E	10/19	21:05	9	727	-	-	17.7	c	9p-1171
OS14130	41 34.09 N	142 46.69 E	10/22	7:37	9	1020	-	-	17.1	c	9p-1171
OS14131	42 30.75 N	144 29.17 E	10/23	9:08	9	1479	-	-	11.5	bc	9p-1171

T.Z.: Time Difference between G.M.T and S.M.T.

Col.: Water color in Forel-Ule scale

Tr.: Transparency in meters with Secchi disc

SST: Surface temperature

Wr.: Weather in WMO Code 4501

Table 2. Oceanographic data

Station	OS14124
Latitude	41-51.68N
Longitude	141-33.74E
Depth(m)	595

Press.	Temp.	Sal.	SIG-T
5	16.411	33.906	24.812
10	16.428	33.906	24.808
20	16.424	33.905	24.809
30	16.424	33.905	24.809
40	16.420	33.906	24.810
50	15.060	34.131	25.289
75	13.382	34.158	25.664
100	12.088	34.116	25.886
125	10.150	33.976	26.126
150	8.103	33.787	26.306
175	6.935	33.710	26.411
200	4.526	33.457	26.504
250	2.773	33.421	26.645
300	2.900	33.545	26.732
400	3.097	33.775	26.899
500	3.265	33.908	26.989

Station	OS14125
Latitude	41-52.36N
Longitude	141-34.81E
Depth(m)	655

Press.	Temp.	Sal.	SIG-T
5	17.883	33.936	24.486
10	17.890	33.935	24.483
20	16.689	33.889	24.735
30	16.285	33.883	24.823
40	16.250	33.880	24.829
50	15.931	33.970	24.971
75	13.871	34.169	25.571
100	12.521	34.143	25.823
125	11.306	34.063	25.991
150	9.112	33.904	26.243
175	7.786	33.789	26.354
200	4.725	33.450	26.477
250	2.905	33.429	26.639
300	2.904	33.565	26.748
400	3.143	33.801	26.915
500	3.340	33.956	27.021
600	3.405	34.071	27.106

Station	OS14126
Latitude	42-14.64N
Longitude	141-35.72E
Depth(m)	600

Press.	Temp.	Sal.	SIG-T
5	17.792	33.945	24.515
10	17.791	33.945	24.515
20	17.792	33.945	24.515
30	17.797	33.945	24.514
40	17.799	33.945	24.513
50	17.267	34.060	24.730
75	15.032	34.150	25.310
100	12.978	34.146	25.736
125	9.758	33.949	26.172
150	3.969	33.185	26.345
175	3.581	33.257	26.441
200	3.608	33.351	26.513
250	2.886	33.470	26.674
300	2.862	33.568	26.754
400	3.066	33.747	26.879
500	3.359	33.949	27.013

Station	OS14127
Latitude	42-8.57N
Longitude	141-39.67E
Depth(m)	762

Press.	Temp.	Sal.	SIG-T
5	18.131	33.904	24.400
10	18.132	33.903	24.400
20	18.132	33.903	24.400
30	18.014	33.880	24.411
40	17.933	33.862	24.417
50	17.872	33.849	24.422
75	15.854	34.070	25.065
100	12.661	34.078	25.746
125	11.444	34.070	25.971
150	7.762	33.628	26.231
175	6.061	33.523	26.378
200	6.098	33.654	26.476
250	2.842	33.439	26.653
300	2.872	33.561	26.748
400	3.091	33.752	26.881
500	3.287	33.925	27.001
600	3.400	34.057	27.096
700	3.380	34.167	27.185

Station	OS14128
Latitude	42-9.71N
Longitude	141-39.57E
Depth(m)	745

Press.	Temp.	Sal.	SIG-T
5	18.129	33.912	24.407
10	18.135	33.915	24.408
20	18.142	33.915	24.407
30	18.142	33.915	24.406
40	18.142	33.915	24.406
50	18.145	33.914	24.405
75	16.290	34.053	24.953
100	13.176	34.131	25.684
125	11.435	34.062	25.966
150	5.713	33.306	26.250
175	6.047	33.541	26.394
200	6.077	33.670	26.492
250	2.991	33.448	26.647
300	3.118	33.585	26.745
400	3.096	33.756	26.883
500	3.284	33.917	26.994
600	3.421	34.044	27.083
700	3.394	34.149	27.169

Station	OS14129
Latitude	41-57.85N
Longitude	141-35.39E
Depth(m)	727

Press.	Temp.	Sal.	SIG-T
5	17.515	33.834	24.497
10	17.516	33.834	24.497
20	17.293	33.870	24.578
30	16.481	33.869	24.767
40	16.258	33.878	24.826
50	16.266	33.889	24.833
75	14.220	34.102	25.447
100	12.368	34.123	25.837
125	10.499	34.000	26.085
150	8.599	33.836	26.269
175	6.301	33.599	26.407
200	3.847	33.381	26.514
250	2.576	33.400	26.645
300	2.887	33.547	26.735
400	3.033	33.739	26.876
500	3.458	33.982	27.030
600	3.483	34.104	27.125

	Station	OS14130
	Latitude	41-34.09N
	Longitude	142-46.7E
	Depth(m)	1020

Press.	Temp.	Sal.	SIG-T
5	16.945	33.855	24.649
10	16.951	33.855	24.647
20	16.961	33.864	24.651
30	16.955	33.894	24.676
40	16.902	33.902	24.695
50	16.700	33.923	24.758
75	15.018	34.087	25.264
100	11.899	34.117	25.922
125	11.632	34.141	25.991
150	9.763	33.931	26.157
175	6.812	33.617	26.355
200	4.716	33.450	26.478
250	3.531	33.483	26.625
300	3.229	33.534	26.694
400	2.911	33.647	26.813
500	3.232	33.840	26.938
600	3.396	34.075	27.110
700	3.411	34.147	27.166
800	3.288	34.245	27.256
900	3.117	34.307	27.321
1000	2.898	34.362	27.385

	Station	OS14131
	Latitude	42-30.74N
	Longitude	144-29.16E
	Depth(m)	1479

Press.	Temp.	Sal.	SIG-T
5	11.217	33.104	25.261
10	11.221	33.103	25.259
20	11.123	33.080	25.258
30	11.108	33.083	25.263
40	10.892	33.118	25.330
50	9.042	32.972	25.524
75	6.322	33.092	26.005
100	6.650	33.590	26.355
125	3.795	33.287	26.444
150	3.049	33.250	26.484
175	3.285	33.342	26.536
200	3.265	33.392	26.578
250	2.981	33.505	26.694
300	2.986	33.577	26.750
400	3.216	33.755	26.872
500	3.329	33.921	26.993
600	3.595	34.070	27.087
700	3.332	34.154	27.179
800	3.317	34.255	27.261
900	3.030	34.285	27.311
1000	2.870	34.341	27.371
1200	2.589	34.434	27.469

Bottom Trawl Research

4 operations of the stern otter bottom trawl were carried out.

These operations were supervised by the captain, Deck officer, Science officer, crew and research staff were engaged in the work.

Table 3: Data on Bottom trawl research during the Oshoromaru Cruise#005

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 (K't)	Bottom depth (m)	Wr.*4	Wind	S.T.*5 (℃)
OST1403	Oct. 19 0925-1015	42-08.5	141-35.6	+9h	183	3.5	656	bc	West-2	17.8
OST1404	Oct. 19 1408-1510	42-09.1	141-35.7	+9h	006	3.5	710	bc	South-3	17.9
OST1405	Oct. 20 0920-0950	42-05.6	141-35.6	+9h	010	2.0	713	o	SSW-4	17.3
OST1406	Oct. 20 1255-1355	42-14.9	141-43.2	+9h	095	3.0	645	o	SSW-4	17.5

*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 tow.

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

*5 S.T. : Surface temperature

Japanese name	Scientific Name	OST1403		OST1404		OST1405		OST1406	
		Number	Weight (kg)	Number	Weight (kg)	Number	Weight (kg)	Number	Weight (kg)
Shigiunagi	*Nemichthys scolopaceus*	-	-	-		1	0.02	1	0.07
Irakoanago	*Synaphobranchus kaupii*	24	15.58	25	13.4	7	1.96	35	28
Yukihoraanago	*Ilyophis nigeli*	-	-	2	0.02	2	0.02	1	0.09
Onihige	*Caelorinchus gilberti*	-	-	-	-	-	-	5	3.9
Onagakasube	*Rhinoraja longicauda*	7	0.79	2	0.06	-	-	5	1.12
Gangiei-rui	*Bathyraja* sp.	1	0.61	1	0.39	-	-	-	-
Togariichimonjiiwashi	*Leuroglossus schmidti*	1	0.01	-	-	4	0.055	-	-
Ginsokoiwashi	*Dolicholagus longirostris*	-	-	-	-	-	-	2	0.005
Sokoiwashi	*Lipolagus ochotensis*	-	-	-	-	4	TR	2	0.005
Sokoiwashi rui	*Lipolagus* spp.	7	0.24	7	0.33	11	0.5	7	0.435
Hadakahoteieso	*Tactostoma macropus*	-	-	-	-	3	0.16	2	0.35
Demeiso	*Benthalbella linguidens*			1	0.05	-	-	-	-
Yokoeso	*Gonostoma gracile*	-	-	-	-	14	0.03	1	0.01
Houraieso	*Chauliodus sloani*			1	0.03	3	0.02	2	0.12
Isaribihadaka	*Notoscopelus resplendens*	-	-	-	-	1	0.01		
Kohirehadaka	*Stenobrachius leucospsarus*	-	-	-	-	-	-	2	0.02
Todohadaka	*Diabhus theta*	-	-	-	-	4	0.02		
Mamehadaka	*Lampanyctus jordani*	9	0.2	11	0.24	32	0.75	9	0.34
Mikadohadaka	*Nannobrachium regale*	-	-	1	0.07	-	-	-	-
Nagahadaka	*Symbolophorus californiensis*	1	0.02	2	0.02	-	-	-	-
Sekkihadaka	*Symbolophorus californiensis*	1	0.02	-	-	8	0.0815	4	0.02
Futasuzinamehadaka	*Lestrolepis intermedia*	-	-	-	-	1	0.07	-	-
Karasudara	*Halargyreus johnsonii*	3	0.57	18	5	6	1.62	5	1.57
Kanadadara	*Antimora microlepis*	24	4.35	46	11.25	1	0.05	15	2.69
Itohikidara	*Laemonema longipes*	21	12	58	31.1	8	3.07	38	21
Munedara	*Coryphaenoides pectoralis*	-	-	1	2.65	-	-	-	-
Ibarahige	*Coryphaenoides acrolepis*	1	0.96	-	-	-	-	-	-
Karafutosokodara	*Coryphaenoides cinereus*	28	7.1			2	0.51	10	3.2
Yumeankou	*Oneirodes bullbosus*	1	0.17	-	-	-	-	-	-
Ogurokonnyakuuo	*Careproctus furcellus*	-	-	-	-	-	-	1	0.28
Kantennuo	*Nectoliparis pelagicus*	-	-	-	-	1	0.001	-	-
Hirainkiuo	*Paraliparis grandis Schmidt*	-	-	-	-	-	-	12	4.1
Kantenngenge	*Bothrocara tanakae*	15	8	15	8.6	-	-	7	4.4
Kamuchakkagenge	*Bothrocarina microcephala*	2	0.85	-	-	-	-	-	-
Shirogenge	*Bothrocara molle*	119	69.7	167	101.4	15	7.106	114	54.9
Kichiji	*Sebastolobus macrochir*	121	19.5	93	19.7	14	2.32	94	14.2
Ganko	*Dasycottus setiger*	13	0.9	2	0.7	-	-	4	1.23
Nezumiginpo	*Lumpenella longirostris*	37	3.1	33	2.67	6	0.33	9	0.95
Akadonko	*Ebinania vermiculata*	-	-	1	2	-	-	-	-
Kobushikazika	*Malacocottus zonurus*	6	0.59	2	0.29	-	-	-	-
Aburagarei	*Atheresthes evermanni*	1	0.825	-	-	-	-	2	2.35
Samegarei	*Clidoderma asperrimum*	-	-	2	2.45	-	-	1	2.6
Namako	*Holothurian*	55	3.61	-	1.29	1	0.02	21	2.49
Mendako spp.	*Opisthoteuthis spp.*	27	15.5	21	9.14	-	-	18	10.3
Kokaku rui	*Crustacean*	-	-	-	-	-	-	14	0.19
Ebi rui	*shrimps*			3	0.58	-	-	-	-
Benizuwaigani	*Chionoecetes japonicus*	44	22.85	-	-	-	-	7	2.7
Dosuika	*Berrytenthis magister*	-	-	-	-	6	1.29	115	24
Ika-rui	*Squids*	35	8.05	-	-	-	-	7	0.49
Tako-rui	*Octopuses*	130	46	22	4.9	4	0.43	65	31
Ezobai spp.	*Buccinidae spp.*	57	5.15	73	3.25	1	0.07	66	4.45
Kokonohoshiginzame	*Hydrolagus barbouri*	-	-	-	-	-	-	1	2.15
Kassumizame	*Centroscyllium ritteri*	1	0.5	-	-	-	-	-	-

9

THE "OSHORO MARU" CRUISE 006
TO IBURI OFF and SANRIKU OFF

IN OCTOBER-NOVEMBER 2014

1. Cruise Itinerary

Cruise 006

Departure from Hakodate	October 28	2014
Start hydrographic research (OS14132) and gill net research (OSG1402)	30	
Finish gill net research (OSG1405)	31	
Finish hydrographic research (OS14149)	November 2	
Arrival at Shiogama	4	
Departure from Shiogama and start hydrographic research (OS14150)	7	
Start Bottom-trawl (OST1407)	9	
Finish Bottom-trawl (OST1409)	11	
Finish hydrographic research (OS14157) and return to Hakodate	12	

Total coverage 1122.5 miles

2. Vessel Personnel

Crew: Captain: Associate Professor Shogo Takagi

And 30 persons

(Hakodate-Shiogama)

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

Hiroji Onishi

(Kasetsart University) Khwan Kong and 6 students

(Shiogama-Hakodate)

Research Staff: Professor (Laboratory of Marine Environment and Resource Sensing, Hokkaido University)

Yasuzumi Fujimori

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

Toru Mukai

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

Jun Yamamoto

Technical assistant 10 persons

(Hakodate-Hakodate)

Teaching Assistant: 4 persons

Undergraduate Students: 42 persons

Total 67 persons

3. Items of Research

Hydrographic observations: (Observation of Temperature, Salinity, and Computed Dynamic Depth Anomaly)

Hydrographic work on deck and the data processing were made by the Science officer, the deck officers, crews, research staff and cadets of the “Oshoro maru”. Temperature and salinity were measured by CTD (Seabird SBE-9Plus) and XCTD.

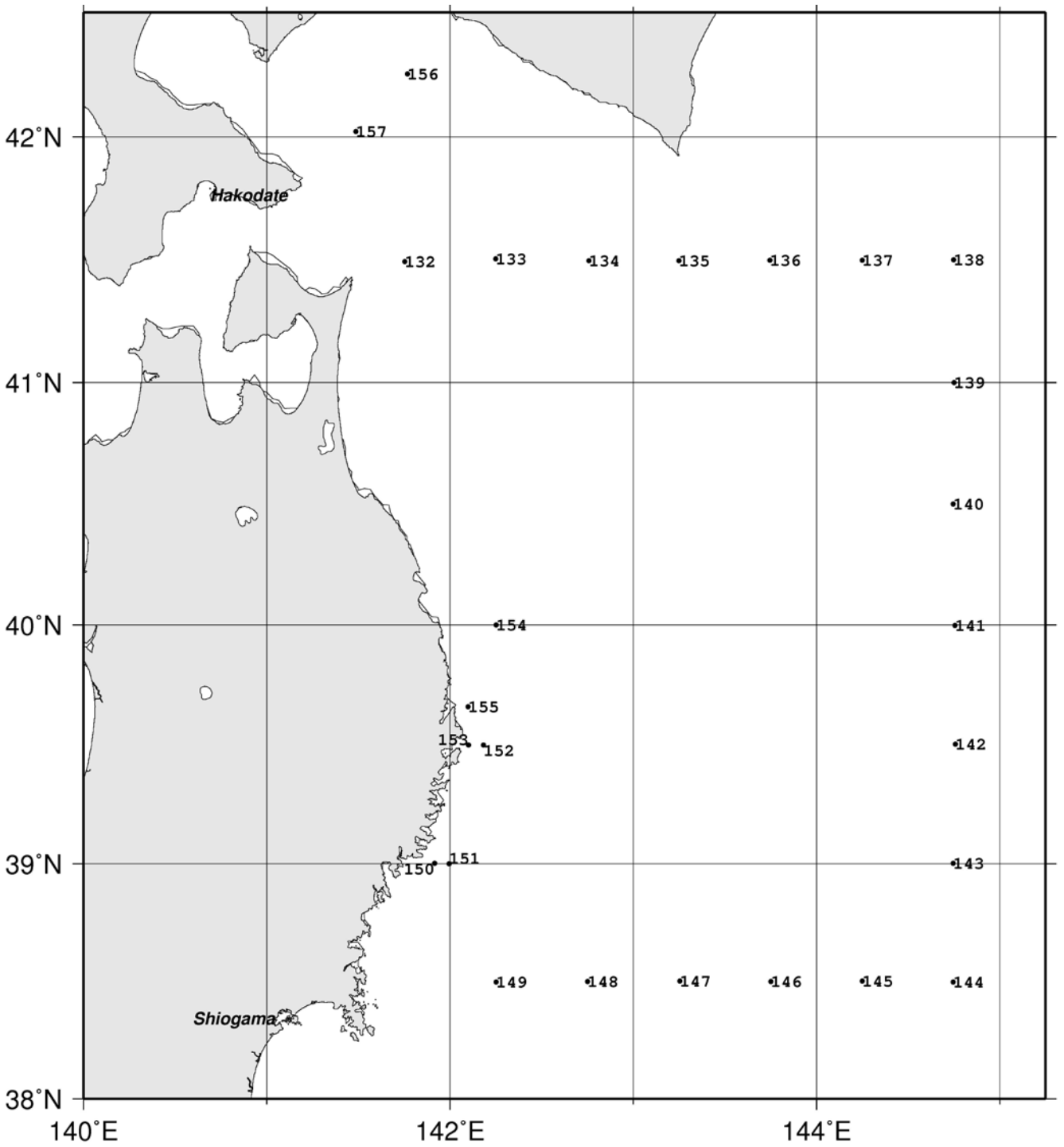

Fig.-1 Oceanographic stations

Table 1. List of Oceanographic station

Station	Lat.	Long.	Date (GMT)	Hour (GMT)	T.Z.	Depth	Col.	Tr.	SST	Wr.	Gear
OS14132	41 29.67 N	141 45.23 E	10/29	15:21	9	872	-	-	15.1	bc	9p-1171
OS14133	41 30.37 N	142 14.93 E	10/29	19:00	9	1196	-	-	16.9	bc	9p-1171
OS14134	41 29.94 N	142 45.51 E	10/29	23:04	9	1160	3	19.4	17.3	b	9p-1171
OS14135	41 29.91 N	143 15.05 E	10/30	7:30	9	1328	3	12.8	15.4	b	9p-1171
OS14136	41 29.98 N	143 44 79 E	10/30	11:32	9	1530	-	-	10.6	b	9p-1171
OS14137	41 30.04 N	144 14.95 E	10/31	1:05	9	2881	4	16.2	11.1	bc	9p-1171
OS14138	41 30.15 N	144 44.92 E	10/31	7:10	9	4565	4	11.1	10.9	b	9p-1171
OS14139	41 00.00 N	144 45.07 E	10/31	12:24	9	6578	-	-	14.1	r	9p-1171
OS14140	40 30.12 N	144 44.76 E	10/31	17:31	9	6575	-	-	13.0	bc	9p-1171
OS14141	39 59.92 N	144 45.39 E	10/31	23:10	9	5979	4	16.5	19.9	bc	9p-1171
OS14142	39 30.09 N	144 45.51 E	11/1	4:31	9	5849	4	9.4	18.4	c	9p-1171
OSI14143	39 00.04 N	144 44.75 E	11/1	9:46	9	5851	-	-	18.6	r	9p-1171
OS14144	38 29.91 N	144 44.82 E	11/1	15:02	9	5583	-	-	16.1	r	9p-1171
OS14145	38 30.16 N	144 15.00 E	11/1	19:23	9	6700	-	-	17.8	r	9p-1171
OS14146	38 30.06 N	143 45.01 E	11/1	23:57	9	5390	4	12.5	17.9	c	9p-1171
OS14147	38 30.15 N	143 15.28 E	11/2	5:06	9	2341	3	13.5	19.8	c	9p-1171
OS14148	38 30.03 N	142 45.01 E	11/2	9:38	9	1484	-	-	13.3	c	9p-1171
OS14149	38 29.87 N	142 15.06 E	11/2	13:54	9	707	-	-	15.9	c	9p-1171
OS14150	39 00.12 N	141 54.99 E	11/7	14:48	9	137	-	-	15.8	bc	19p-4636
OS14151	38 59.98 N	141 59.76 E	11/7	15:38	9	196	-	-	15.9	bc	19p-4636
OS14152	39 29.89 N	142 10.98 E	11/7	19:42	9	234	-	-	15.5	bc	19p-4636
OS14153	39 29.96 N	142 06.03 E	11/7	20:35	9	146	-	-	16.4	bc	19p-4636
OS14154	39 59.99 N	142 15.10 E	11/8	0:32	9	239	-	-	14.0	bc	19p-4636
OS14155	39.59.99 N	142 05.91 E	11/8	1:52	9	126	-	-	16.0	bc	19p-4636
OS14156	42 15.25 N	141 46.05 E	11/9	6:40	9	697	-	-	13.7	bc	19p-4636
OS14157	42 01.34 N	141 29.16 E	11/11	21:54	9	458	-	-	14.3	c	25p-1053

T.Z.: Time Difference between G.M.T and S.M.T.

Col.: Water color in Forel-Ule scale

Tr.: Transparency in meters with Secchi disc

SST: Surface temperature

Wr.: Weather in WMO Code 4501

Table 2. Oceanographic data

Station OS14132
Latitude 41-29.65N
Longitude 141-45.24E
Depth(m) 872

Press.	Temp.	Sal.	SIG-T
5	15.083	34.028	25.204
10	15.090	34.027	25.202
20	15.095	34.027	25.201
30	15.094	34.028	25.202
40	15.074	34.029	25.207
50	15.059	34.030	25.211
75	14.916	34.032	25.244
100	14.230	34.047	25.402
125	13.068	34.113	25.692
150	11.730	34.063	25.912
175	4.956	33.200	26.254
200	2.981	33.143	26.405
250	2.080	33.275	26.584
300	2.784	33.520	26.722
400	2.946	33.734	26.879
500	3.393	33.930	26.995
600	3.479	34.093	27.116
700	3.386	34.174	27.190
800	3.246	34.261	27.272

Station OS14133
Latitude 41-30.39N
Longitude 142-14.95E
Depth(m) 1196

Press.	Temp.	Sal.	SIG-T
5	17.480	33.953	24.597
10	17.484	33.953	24.596
20	17.487	33.953	24.595
30	17.487	33.953	24.595
40	17.487	33.953	24.594
50	17.491	33.953	24.594
75	16.372	33.946	24.852
100	14.121	34.146	25.502
125	12.324	34.149	25.866
150	10.409	34.028	26.123
175	9.852	33.998	26.194
200	7.840	33.748	26.314
250	5.108	33.515	26.486
300	2.743	33.362	26.600
400	2.613	33.544	26.756
500	2.922	33.744	26.890
600	3.348	33.941	27.008
700	3.600	34.107	27.116
800	3.559	34.203	27.197
900	3.253	34.262	27.273
1000	3.028	34.336	27.352

Station OS14134
Latitude 41-29.92N
Longitude 142-45.54E
Depth(m) 1160

Press.	Temp.	Sal.	SIG-T
10	17.374	33.962	24.629
20	17.368	33.963	24.631
30	17.373	33.962	24.629
40	17.373	33.963	24.629
50	17.374	33.963	24.629
75	17.318	33.958	24.639
100	15.373	34.028	25.141
125	13.478	34.081	25.584
150	12.110	34.102	25.871
175	11.212	34.084	26.024
200	10.008	33.974	26.149
250	6.244	33.531	26.361
300	3.568	33.350	26.516
400	2.747	33.503	26.712
500	2.993	33.695	26.844
600	3.328	33.919	26.992
700	3.425	34.106	27.132
800	3.354	34.204	27.217
900	3.119	34.307	27.321
1000	2.873	34.377	27.399

Station OS14135
Latitude 41-29.87N
Longitude 143-15.04E
Depth(m) 1328

Press.	Temp.	Sal.	SIG-T
5	15.556	33.917	25.014
10	15.562	33.917	25.013
20	15.557	33.917	25.014
30	15.564	33.917	25.013
40	15.526	33.914	25.019
50	15.118	33.940	25.129
75	13.916	34.079	25.493
100	12.668	34.124	25.780
125	10.544	34.014	26.088
150	9.045	33.895	26.246
175	7.671	33.778	26.362
200	4.510	33.457	26.506
250	3.182	33.414	26.603
300	2.948	33.513	26.703
400	3.046	33.727	26.865
500	3.304	33.909	26.986
600	3.410	34.040	27.081
700	3.390	34.161	27.179
800	3.306	34.236	27.247
900	3.155	34.295	27.308
1000	2.961	34.340	27.361
1200	2.623	34.430	27.464

Station OS14136
Latitude 41-29.92N
Longitude 143-44.8E
Depth(m) 1530

Press.	Temp.	Sal.	SIG-T
5	10.640	33.208	25.444
10	10.641	33.208	25.444
20	10.628	33.214	25.450
30	9.890	33.231	25.589
40	6.495	33.317	26.160
50	6.136	33.343	26.227
75	5.323	33.372	26.348
100	4.137	33.340	26.452
125	3.546	33.338	26.509
150	3.411	33.402	26.573
175	3.131	33.433	26.622
200	3.002	33.463	26.658
250	3.068	33.543	26.716
300	3.039	33.614	26.775
400	3.190	33.789	26.901
500	3.354	33.952	27.016
600	3.433	34.069	27.102
700	3.377	34.132	27.157
800	3.341	34.240	27.247
900	3.141	34.296	27.310
1000	2.945	34.351	27.372
1200	2.609	34.433	27.467
1500	2.301	34.508	27.553

Station OS14137
Latitude 41-30.04N
Longitude 144-14.96E
Depth(m) 2881

Press.	Temp.	Sal.	SIG-T
10	10.677	32.721	25.058
20	10.665	32.721	25.060
30	10.627	32.719	25.065
40	9.916	32.731	25.194
50	5.785	32.871	25.897
75	2.417	33.081	26.403
100	2.006	33.151	26.490
125	1.849	33.244	26.576
150	1.893	33.306	26.623
175	1.933	33.365	26.667
200	2.058	33.452	26.727
250	2.295	33.578	26.810
300	2.966	33.749	26.889
400	3.011	33.895	27.002
500	3.196	34.057	27.115
600	3.231	34.153	27.188
700	3.246	34.257	27.269
800	3.097	34.312	27.327
900	2.777	34.343	27.380
1000	2.773	34.405	27.431
1200	2.506	34.459	27.497
1500	2.215	34.522	27.571
2000	1.922	34.597	27.655

Station OS14138
Latitude 41-30.15N
Longitude 144-44.92E
Depth(m) 4565

Press.	Temp.	Sal.	SIG-T
5	10.849	32.607	24.939
10	10.862	32.607	24.937
20	10.658	32.595	24.963
30	10.580	32.593	24.975
40	10.376	32.597	25.013
50	5.856	32.933	25.936
75	2.651	33.101	26.399
100	3.110	33.231	26.463
125	3.059	33.301	26.524
150	2.744	33.371	26.607
175	2.788	33.491	26.699
200	2.788	33.556	26.751
250	2.953	33.681	26.836
300	3.202	33.804	26.912
400	3.404	33.986	27.038
500	3.392	34.101	27.131
600	3.243	34.207	27.230
700	3.113	34.278	27.299
800	2.934	34.342	27.366
900	2.791	34.384	27.412
1000	2.645	34.417	27.452
1200	2.425	34.474	27.516
1500	2.210	34.543	27.588
2000	1.883	34.604	27.663

Station OS14139
Latitude 41-0.01N
Longitude 144-45.09E
Depth(m) 6578

Press.	Temp.	Sal.	SIG-T
5	14.038	32.786	24.469
10	14.036	32.787	24.470
20	13.978	32.785	24.480
30	13.962	32.786	24.485
40	13.929	32.787	24.492
50	13.025	32.788	24.675
75	5.346	32.902	25.973
100	2.434	33.056	26.381
125	2.261	33.108	26.436
150	2.180	33.180	26.500
175	2.239	33.284	26.578
200	2.137	33.355	26.643
250	2.259	33.504	26.753
300	2.462	33.615	26.825
400	2.887	33.808	26.944
500	3.091	33.970	27.055
600	3.117	34.142	27.189
700	3.144	34.284	27.300
800	2.823	34.395	27.418
900	2.528	34.452	27.489
1000	2.364	34.489	27.533
1200	2.051	34.562	27.616
1500	1.881	34.597	27.658
2000	1.679	34.635	27.704

Station OS14140
Latitude 40-30.12N
Longitude 144-44.75E
Depth(m) 6575

Press.	Temp.	Sal.	SIG-T
5	12.896	32.793	24.704
10	12.889	32.793	24.705
20	12.717	32.817	24.758
30	12.672	32.861	24.800
40	12.541	32.925	24.875
50	4.903	32.887	26.011
75	2.618	33.101	26.402
100	2.788	33.224	26.486
125	2.708	33.306	26.558
150	2.336	33.368	26.638
175	2.480	33.468	26.706
200	2.792	33.561	26.755
250	2.955	33.679	26.834
300	3.228	33.789	26.898
400	3.334	33.945	27.013
500	3.469	34.112	27.132
600	3.345	34.205	27.219
700	3.171	34.282	27.296
800	3.020	34.335	27.352
900	2.837	34.377	27.402
1000	2.655	34.415	27.449
1200	2.455	34.473	27.513
1500	2.220	34.529	27.577
2000	1.896	34.602	27.661

Station OS14141
Latitude 39-59.92N
Longitude 144-45.41E
Depth(m) 5979

Press.	Temp.	Sal.	SIG-T
5	18.939	34.101	24.350
10	18.922	34.096	24.350
20	18.776	34.056	24.356
30	18.115	33.919	24.416
40	17.338	34.045	24.701
50	17.156	34.242	24.895
75	15.461	34.295	25.327
100	13.632	34.308	25.729
125	10.076	33.785	25.991
150	5.978	33.351	26.252
175	6.464	33.658	26.433
200	3.699	33.352	26.505
250	2.551	33.344	26.602
300	2.732	33.489	26.702
400	2.855	33.677	26.842
500	3.263	33.894	26.978
600	3.299	34.031	27.084
700	3.334	34.160	27.184
800	3.163	34.237	27.261
900	3.117	34.309	27.323
1000	2.962	34.364	27.381
1200	2.681	34.427	27.456
1500	2.345	34.500	27.543
2000	1.982	34.587	27.642

Station OS14142
Latitude 39-30.09N
Longitude 144-45.53E
Depth(m) 5849

Press.	Temp.	Sal.	SIG-T
5	18.329	34.062	24.472
10	18.325	34.062	24.473
20	17.509	34.138	24.731
30	17.212	34.181	24.835
40	16.875	34.212	24.939
50	16.703	34.220	24.986
75	14.065	34.267	25.607
100	11.461	34.164	26.040
125	9.813	34.064	26.252
150	9.163	33.989	26.300
175	8.237	33.865	26.347
200	5.901	33.586	26.448
250	3.855	33.387	26.518
300	2.848	33.320	26.558
400	1.625	33.326	26.658
500	1.780	33.425	26.726
600	2.242	33.578	26.813
700	2.870	33.776	26.919
800	3.388	33.988	27.041
900	3.539	34.166	27.169
1000	3.312	34.256	27.262
1200	2.931	34.363	27.382
1500	2.563	34.473	27.503
2000	2.078	34.572	27.622

Station OS14143
Latitude 39-0.01N
Longitude 144-44.71E
Depth(m) 5851

Press.	Temp.	Sal.	SIG-T
5	18.540	34.058	24.417
10	18.532	34.055	24.417
20	18.599	34.098	24.433
30	18.554	34.104	24.449
40	18.023	34.055	24.543
50	17.924	34.095	24.598
75	15.863	34.323	25.258
100	14.248	34.413	25.681
125	12.150	34.243	25.972
150	10.837	34.146	26.139
175	9.989	34.075	26.232
200	9.449	34.027	26.284
250	7.071	33.765	26.436
300	4.695	33.532	26.546
400	3.524	33.573	26.698
500	3.322	33.706	26.823
600	3.759	33.899	26.934
700	4.146	34.095	27.051
800	4.131	34.225	27.156
900	3.638	34.280	27.250
1000	3.378	34.336	27.320
1200	2.879	34.407	27.423
1500	2.496	34.487	27.520
2000	2.046	34.578	27.630

Station OS14144
Latitude 38-29.83N
Longitude 144-44.77E
Depth(m) 5583

Press.	Temp.	Sal.	SIG-T
5	16.018	33.528	24.612
10	15.999	33.522	24.611
20	17.069	33.931	24.678
30	17.074	33.933	24.678
40	17.077	33.934	24.678
50	17.079	33.935	24.678
75	13.073	34.063	25.653
100	8.899	33.739	26.146
125	6.408	33.506	26.321
150	5.567	33.470	26.396
175	6.397	33.711	26.483
200	3.813	33.366	26.505
250	2.978	33.407	26.615
300	2.941	33.511	26.702
400	3.577	33.787	26.863
500	3.344	33.910	26.984
600	3.837	34.109	27.094
700	3.853	34.219	27.180
800	3.414	34.267	27.261
900	3.126	34.312	27.324
1000	2.990	34.364	27.378
1200	2.660	34.436	27.466
1500	2.341	34.519	27.559
2000	1.967	34.591	27.647

Station OS14145
Latitude 38-30.17N
Longitude 144-14.98E
Depth(m) 6700

Press.	Temp.	Sal.	SIG-T
5	17.724	34.063	24.621
10	17.725	34.063	24.622
20	17.691	34.056	24.625
30	17.617	34.041	24.631
40	17.623	34.044	24.631
50	17.625	34.044	24.631
75	15.495	34.365	25.373
100	13.351	34.370	25.834
125	12.347	34.295	25.975
150	10.747	34.171	26.175
175	9.834	34.083	26.264
200	8.609	33.968	26.371
250	7.203	33.909	26.531
300	6.935	33.956	26.606
400	5.194	33.945	26.816
500	4.649	34.047	26.959
600	4.148	34.115	27.067
700	4.050	34.242	27.178
800	3.591	34.277	27.252
900	3.405	34.342	27.322
1000	3.047	34.374	27.381
1200	2.754	34.446	27.465
1500	2.407	34.507	27.543
2000	2.028	34.582	27.635

Station OS14146
Latitude 38-30.07N
Longitude 143-45.01E
Depth(m) 5390

Press.	Temp.	Sal.	SIG-T
10	17.803	34.229	24.730
20	17.620	34.230	24.775
30	17.398	34.221	24.821
40	17.362	34.226	24.834
50	17.321	34.228	24.845
75	15.373	34.459	25.473
100	12.752	34.302	25.901
125	11.982	34.287	26.039
150	10.948	34.196	26.159
175	10.219	34.130	26.235
200	9.470	34.044	26.294
250	6.826	33.781	26.482
300	5.181	33.689	26.616
400	4.116	33.774	26.799
500	4.558	34.085	26.999
600	3.791	34.101	27.092
700	3.653	34.195	27.181
800	3.501	34.313	27.289
900	3.115	34.379	27.379
1000	2.905	34.416	27.427
1200	2.639	34.452	27.480
1500	2.427	34.496	27.533
2000	2.154	34.561	27.607

Station OS14147
Latitude 38-30.15N
Longitude 143-15.28E
Depth(m) 2341

Press.	Temp.	Sal.	SIG-T
5	19.684	34.116	24.170
10	19.739	34.191	24.213
20	19.636	34.186	24.236
30	19.213	34.089	24.271
40	19.201	34.102	24.284
50	18.485	34.192	24.533
75	13.656	34.005	25.489
100	12.094	34.188	25.940
125	9.544	33.840	26.122
150	9.923	34.142	26.295
175	9.051	34.117	26.418
200	7.233	33.893	26.515
250	7.887	34.176	26.643
300	7.083	34.142	26.731
400	5.367	34.104	26.922
500	4.706	34.172	27.052
600	4.166	34.240	27.164
700	3.844	34.295	27.241
800	3.587	34.352	27.312
900	3.217	34.366	27.359
1000	2.921	34.390	27.405
1200	2.660	34.456	27.481
1500	2.334	34.519	27.559
2000	1.946	34.595	27.651

Station OS14148
Latitude 38-30.03N
Longitude 142-45.02E
Depth(m) 1484

Press.	Temp.	Sal.	SIG-T
5	13.165	32.677	24.561
10	12.753	32.660	24.629
20	13.478	33.252	24.944
30	11.973	33.727	25.606
40	11.512	33.800	25.749
50	10.754	33.790	25.877
75	9.075	33.841	26.199
100	6.064	33.475	26.340
125	3.520	33.308	26.487
150	5.176	33.603	26.548
175	3.297	33.430	26.605
200	4.479	33.614	26.634
250	5.276	33.842	26.726
300	5.301	33.935	26.796
400	4.796	34.069	26.960
500	4.322	34.160	27.084
600	3.862	34.223	27.182
700	3.594	34.277	27.252
800	3.370	34.329	27.315
900	3.080	34.371	27.375
1000	2.903	34.403	27.418
1200	2.550	34.456	27.490

Station OS14149
Latitude 38-29.74N
Longitude 142-15.0E
Depth(m) 707

Press.	Temp.	Sal.	SIG-T
5	15.789	33.806	24.877
10	15.781	33.861	24.921
20	15.695	33.876	24.952
30	15.130	33.823	25.036
40	14.997	33.820	25.063
50	14.889	33.823	25.089
75	8.839	33.199	25.733
100	7.205	33.578	26.271
125	6.278	33.558	26.378
150	4.424	33.385	26.458
175	3.148	33.281	26.500
200	3.201	33.354	26.554
250	2.576	33.405	26.648
300	2.599	33.506	26.727
400	3.198	33.789	26.901
500	3.909	34.063	27.050
600	3.445	34.134	27.153

Station OS14150
Latitude 39-00.12N
Longitude 141-54.99E
Depth(m) 137

Press.	Temp.	Sal.	SIG-T
10	15.576	33.591	24.759
20	15.604	33.648	24.797
30	15.631	33.721	24.847
50	15.627	33.739	24.862
75	15.661	33.756	24.867
100	15.581	33.809	24.926

Station OS14151
Latitude 38-59.98N
Longitude 141-59.76E
Depth(m) 196

Press.	Temp.	Sal.	SIG-T
10	15.592	33.041	24.332
20	15.564	33.109	24.391
30	15.605	33.220	24.467
50	15.728	33.404	24.581
75	15.810	33.568	24.689
100	15.727	33.771	24.864
150	15.269	34.037	25.171

Station OS14152
Latitude 39-29.89N
Longitude 142-10.98E
Depth(m) 234

Press.	Temp.	Sal.	SIG-T
10	15.275	33.990	25.133
20	15.183	33.988	25.151
30	15.116	33.985	25.164
50	14.941	33.973	25.193
75	14.340	33.916	25.278
100	12.943	33.935	25.579
150	12.024	34.063	25.857
200	8.373	33.802	26.277

Station OS14153
Latitude 39-29.96N
Longitude 142-06.03E
Depth(m) 146

Press.	Temp.	Sal.	SIG-T
10	16.202	33.941	24.887
20	16.187	33.939	24.889
30	16.155	33.938	24.896
50	15.494	33.969	25.068
75	15.258	33.977	25.127
100	14.745	33.966	25.230

Station OS14154
Latitude 39-59.99N
Longitude 142-15.10E
Depth(m) 239

Press.	Temp.	Sal.	SIG-T
10	13.995	33.856	25.304
20	13.997	33.858	25.305
30	14.001	33.862	25.307
50	13.945	33.891	25.342
75	13.584	34.016	25.512
100	12.571	34.000	25.703
150	8.512	33.731	26.200
200	4.487	33.407	26.469

Station OS14155
Latitude 39-59.99N
Longitude 142-05.91E
Depth(m) 126

Press.	Temp.	Sal.	SIG-T
10	15.295	33.986	25.126
20	14.883	33.997	25.224
30	14.717	33.999	25.262
50	14.475	33.987	25.305
75	14.299	33.993	25.347
100	14.151	34.003	25.385

Station OS14156
Latitude 42-15.25N
Longitude 141-46.05E
Depth(m) 697

Press.	Temp.	Sal.	SIG-T
10	13.195	33.983	25.566
20	13.072	34.011	25.613
30	13.066	34.024	25.624
50	13.019	34.037	25.643
75	12.781	34.057	25.706
100	11.404	34.087	25.991
150	6.045	33.554	26.404
200	4.819	33.530	26.530
300	2.721	33.463	26.682

Station OS14157
Latitude 42-1.34N
Longitude 141-29.16E
Depth(m) 458

Press.	Temp.	Sal.	SIG-T
10	14.027	33.993	25.403
20	13.683	33.976	25.461
30	13.622	33.971	25.470
40	13.609	33.971	25.473
50	13.611	33.972	25.473
75	13.301	34.069	25.611
100	11.702	34.073	25.925
125	11.140	34.095	26.045
150	10.328	34.044	26.149
175	5.381	33.475	26.422
200	4.965	33.545	26.525
250	3.839	33.558	26.655
300	3.118	33.597	26.755
400	2.974	33.648	26.808

Bottom Trawl Research

4 operations of the stern otter bottom trawl were carried out.

These operations were supervised by the captain, Deck officer, Science officer, crew and research staff were engaged in the work.

Table 3: Data on Bottom trawl research during the Oshoromaru Cruise#006

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 (K't)	Bottom depth (m)	Wr.*4	Wind	S.T.*5 (℃)
OST1407	Nov. 9	0920-1020	42-11.0	141-48.5	+9h	110	3.0	664-823	bc	West-5	13.7
OST1408	Nov. 10	0855-0955	42-09.5	141-37.0	+9h	194	3.0	613	c	SSW-5	13.5
OST1409	Nov. 11	0740-0810	42-11.5	141-44.2	+9h	115	3.3	620-749	b	NE-3	13.2

*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 tow.

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

*5 S.T. : Surface temperature

Japanese name	Scientific Name	OST1407		OST1408		OST1409	
		Number	Weight (kg)	Number	Weight (kg)	Number	Weight (kg)
Gangiei sp.	Bathyraja sp.	4	4.6	4	1.1	2	0.7
Irakoanago	*Synaphobranchus kaupii*	26	20.7	19	18.6	13	9.6
Hadakahoteieso	*Tactostoma macropus*	4	0.7	-	-	2	0.1
Eso rui	Synodontidae	-	-	-	-	1	0.1
Houraieso	*Chauliodus sloani*	1	0.1	-	-	1	0.1
Mamehadaka	*Lampanyctus jordani*	-	-	-	-	4	0.1
Sekkihadaka	*Symbolophorus californiensis*	-	-	-	-	4	0.1
Mizuuodamashi	*Anotopterus nikparini*	1	4.3	-	-	-	-
Hadakaiwashi	*Diaphus watasei*	1	0.1	-	-	-	-
Karasudara	*Halargyreus johnsonii*	1	1.7	-	-	-	-
Kanadadara	*Antimora microlepis*	36	11.5	12	4.7	16	6.7
Itohikidara	*Laemonema longipes*	200	55.9	2	0.1	4	0.2
Ibarahige	*Coryphaenoides acrolepis*	-	-	1	0.3	-	-
Karafutosokodara	*Coryphaenoides cinereus*	-	-	9	3.6	119	34.6
Touzin	*Coelorinchus*	-	-	1	0.9	-	-
Suketoudara	*Theragra chalcogramma* (Pa	3	2.8	-	-	-	-
Onikinme	*Anoplogaster cornuta*	-	-	-	-	1	0.1
Arasukabikunin	*Careproctus colletti*	1	1.5	-	-	-	-
Genge rui	Zoarcidae	153	69.9	101	48	89	38.1
Kichiji	*Sebastolobus macrochir*	111	22.3	139	25.5	74	15.6
Ganko	*Dasycottus setiger*	-	-	8	0.9	1	0.1
Nezumiginpo	*Lumpenella longirostris*	2	0.3	10	0.9	2	0.1
Kazika rui	Cottoidea	3	1.4	-	-	1	0.1
Aburagarei	*Atheresthes evermanni*	-	-	1	1.2	1	0.7
Samegarei	*Clidoderma asperrimum*	-	-	2	1.8	1	1.9
Dosuika	*Berrytenthis magister*	118	26.6	37	8.9	22	3.7
Tako-rui	*Octopuses*	44	15.4	14	15.1	4	1.6
Ezobai spp.	*Buccinidae spp.*	-	-	52	6.6	25	2.1
Kokonohoshiginzan	*Hydrolagus barbouri*	-	-	1	1.4	-	-
Kani sp.	Bracyyura	2	2.7	31	16.6	2	0.3

1 0

THE "OSHORO MARU" CRUISE 009
TO THE OGASAWARA ISLANDS

IN DECEMBER 2014

1. Cruise Itinerary

Cruise 009

Departure from Hakodate		December 3	2014
Arrival at Yokohama		6	
Departure from Yokohama		9	
Start hydrographic research (OS14168)		10	
Start vertical long-line research (OSVL1401)		11	
Finish hydrographic research (OS14174)		12	
Finish vertical long-line research (OSVL141406)	and arrival at Futami	13	
Departure from Futami		14	
Arriveal at Tokyo		17	

Total coverage 1771.9 miles

2. Vessel Personnel

Crew: Captain: Associate Professor Shogo Takagi

And 29 persons

(Hakodate – Yokohama)

Technical staff: 4 persons

(Yokohama –Tokyo)

Guest Scientist: Assistant Professor (Hokkaido University Museum)

Yoshiharu Fujita

Program-Specific Assistant Professor (Kyoto University)

Shunsuke Yamashita

Postdoctoral Fellow (Department of Marine Science and Resources, Nihon University)

Shun Watanabe

Postdoctoral Fellow (Department of Marine Science and Resources, Nihon University)

Ryotaro Manabe

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

Takahito Kojima

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

Yuya Makiguchi

Associate Professor (Department of Animal Science, Teikyo University of Science and Technology)

Kyoichi Mori

Teaching Assistant: 3 persons

Undergraduate Students:

(Nihon University)	31 persons
(Teikyo University of Science Technology)	14 persons

Total 58 persons

3. Items of Research

Hydrographic observations: (Observation of Temperature, Salinity, and Computed Dynamic Depth Anomaly)

Hydrographic work on deck and the data processing were made by the Science officer, the deck officers, crews, research staff and cadets of the “Oshoro maru”. Temperature and salinity were measured by CTD (Seabird SBE-9Plus) and XCTD.

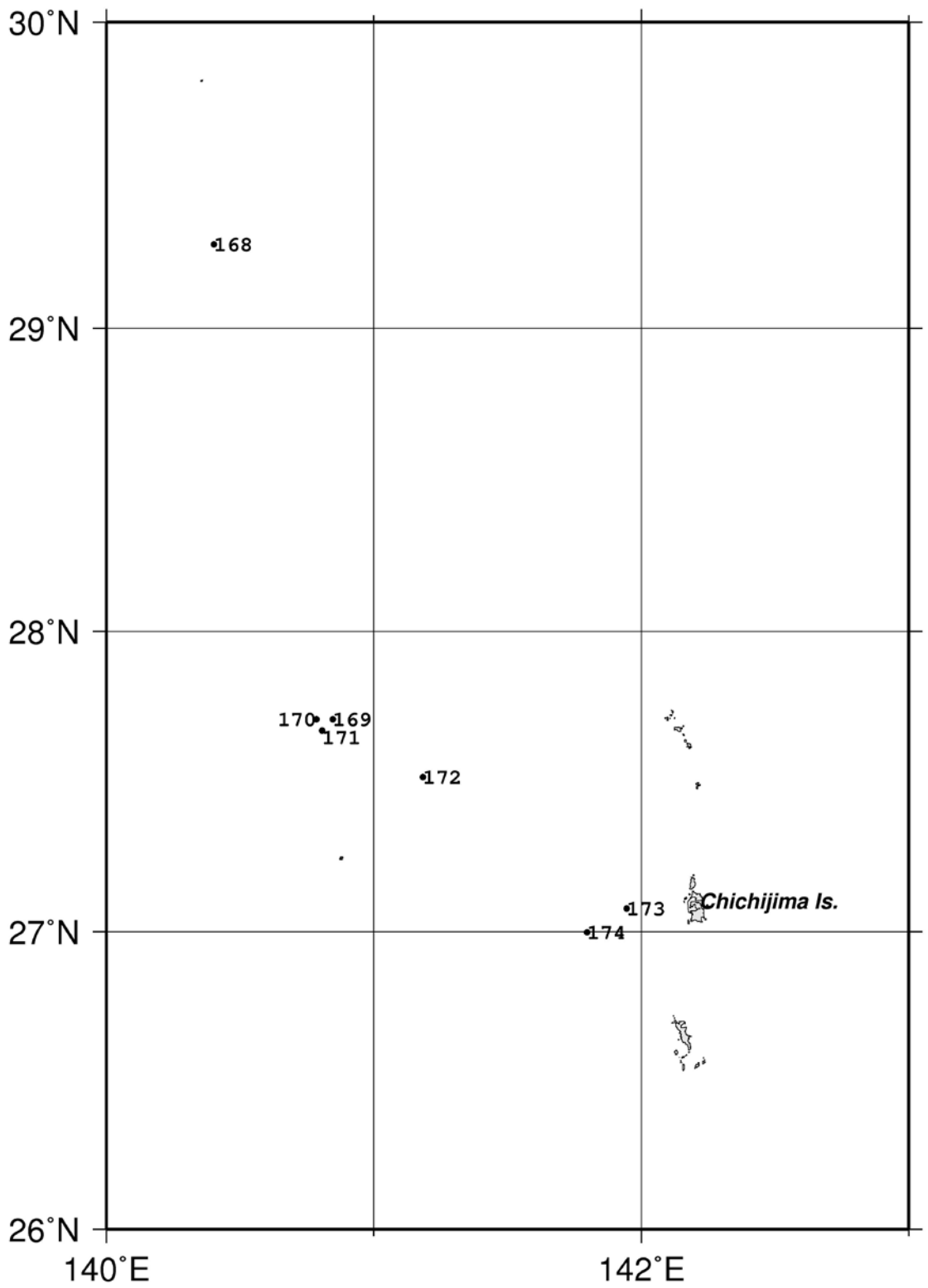

Fig.-1 Oceanographic stations

Table 1. List of Oceanographic station

Station	Lat.	Long.	Date (GMT)	Hour (GMT)	T.Z.	Depth	Col.	Tr.	SST	Wr.	Gear
OS14168	29 16.49 N	140 24.13 E	12/10	10:01	9	2504	-	-	23.2	bc	XCTD-1
OS14169	27 42.56 N	140 50.81 E	12/10	20:54	p	1863	-	-	23.4	c	XCTD-2
OS14170	27 42.51 N	140 47.18 E	12/10	21:55	9	1405	28.2	-	23.3	c	9p-1171
OS14171	27 40.24 N	140 48.40 E	12/11	1:39	9	635	-	-	23.3	c	9p-1171
OS14172	27 31.02 N	141 10.97 E	12/11	10:51	9	4110	-	-	23.5	bc	XCTD-1
OS14173	27 04.70 N	141 56.67 E	12/12	1:52	9	1458	-	-	22.6	bc	XCTD-2
OS14174	26 59.87 N	141 47.78 E	12/12	12:00	9	3810	-	-	22.5	bc	XCTD-2

T.Z.: Time Difference between G.M.T and S.M.T.

Col.: Water color in Forel-Ule scale

Tr.: Transparency in meters with Secchi disc

SST: Surface temperature

Wr.: Weather in WMO Code 4501

Table 2. Oceanographic data

Station OS14168
Latitude 29-16.49N
Longitude 140-24.13E
Depth(m) 2504

Depth	Temp.	Sal.	SIG-T
12	23.061	31.552	-
20	23.069	34.635	-
30	23.069	34.642	-
40	23.069	34.643	-
50	23.069	34.650	-
75	22.783	34.666	-
100	20.377	34.772	-
125	19.015	34.764	-
150	18.505	34.747	-
175	18.176	34.733	-
200	17.386	34.710	-
250	16.776	34.683	-
300	15.988	34.616	-
400	13.713	34.453	-
500	11.278	34.284	-
600	9.049	34.153	-
700	6.268	34.033	-
800	5.330	34.066	-
900	4.671	34.131	-
1000	4.144	34.213	-
1100	3.586	34.312	-

Station OS14169
Latitude 27-42.56N
Longitude 140-50.81E
Depth(m) 1863

Depth	Temp.	Sal.	SIG-T
5	23.320	34.664	-
10	23.320	34.677	-
20	23.320	34.686	-
30	23.320	34.692	-
40	23.300	34.686	-
50	23.301	34.690	-
75	23.194	34.679	-
100	22.273	34.654	-
125	18.746	34.760	-
150	17.840	34.725	-
175	17.386	34.714	-
200	17.115	34.705	-
250	16.862	34.693	-
300	16.646	34.679	-
400	15.671	34.603	-
500	13.612	34.451	-
600	10.513	34.237	-
700	8.018	34.114	-
800	6.163	34.100	-
900	4.819	34.178	-
1000	4.105	34.279	-
1200	3.435	34.395	-
1500	2.464	34.533	-

Station OS14170
Latitude 27-42.51N
Longitude 140-47.18E
Depth(m) 1405

Press.	Temp.	Sal.	SIG-T
5	23.222	34.698	23.641
10	23.218	34.698	23.642
20	23.225	34.698	23.639
30	23.223	34.698	23.640
40	23.225	34.698	23.639
50	23.228	34.698	23.639
75	22.087	34.732	23.990
100	20.269	34.779	24.522
125	18.268	34.754	25.017
150	17.508	34.732	25.187
175	17.202	34.722	25.253
200	17.005	34.715	25.295
250	16.868	34.707	25.321
300	16.773	34.701	25.339
400	15.997	34.633	25.466
500	14.162	34.497	25.764

Vertical long-line Research

Four operations using a vertical long-line were performed.

The gear comprised by three types of main line (400,500,600m) 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 the main line.

These operations were supervised by the captain, Deck officers, Science officer, crews, and under graduate instructor were engaged in the work

Table 3 Data on vertical long line research

No. of research		OSVL 1401-01	OSVL 1401-02	OSVL 1401-03	OSVL 1401-04
Date			11-Dec		
position of	Lat. (N)	27-42.3	27-42.4	27-42.4	27-42.5
line set	Long. (E)	140-49.3	140-48.8	140-48.3	140-47.9
Time	Line set	0619	0625	0630	0635
(S.M.T.)	Line haul		0814-0951		
Length of main line(m)		600	600	500	500
Depth(m)			1051-1380		
Surface temp. (°C)			23.2		
Wether			c		
Wind			East-4		
Flying squid			1		
Diamondback squid					1
Swordfish		1			

No. of research		OSVL 1402-01	OSVL 1402-02	OSVL 1402-03
Date			11-Dec	
position of	Lat. (N)	27-40.4	27-40.4	27-40.4
line set	Long. (E)	140-49.9	140-49.6	140-49.2
Time	Line set	1005	1011	1018
(S.M.T.)	Line haul		1140-1235	
Length of main line(m)		600	600	500
Depth(m)			1160	
Surface temp. (°C)			23.2	
Wether			bc	
Wind			East-5	
			nothing	

No. of research		OSVL 1403-01	OSVL 1403-02	OSVL 1403-03	OSVL 1403-04
Date			11-Dec		
position of	Lat. (N)	27-40.5	27-40.4	27-40.2	27-40.1
line set	Long. (E)	140-52.0	140-52.4	140-52.9	140-53.2
Time	Line set	1253	1259	1304	1309
(S.M.T.)	Line haul		1457-1621		
Length of main line(m)		600	600	500	500
Depth(m)			2711		
Surface temp. (°C)			23.3		
Wether			c		
Wind			SSE-5		
Flying squid				1	
Diamondback squid			1		1
Sickle pomfret					1
Blue shark			1		

Continued

No. of research		OSVL 1404-01	OSVL 1404-02	OSVL 1404-03	OSVL 1404-04	OSVL 1404-05	OSVL 1404-06
Date		12-Dec					
position of	Lat. (N)	27-06.7	27-06.5	27-06.5	27-06.4	27-06.3	27-06.2
line set	Long. (E)	141-56.5	141-57.1	141-57.7	141-58.1	141-58.5	141-58.9
Time	Line set	0619	0625	0631	0636	0642	0646
(S.M.T.)	Line haul	0832-1048					
Length of main line(m)		600	500	600	500	600	500
Depth(m)		1352-1734					
Surface temp. (°C)		22.5					
Wether		bc					
Wind		NW-3					

Bigeye tuna	1
Blue shark	1

No. of research		OSVL 1405-01	OSVL 1405-02	OSVL 1405-03	OSVL 1405-04	OSVL 1405-05	OSVL 1405-06
Date		12-Dec					
position of	Lat. (N)	27-05.5	27-05.6	27-05.8	27-05.9	27-06.0	27-06.1
line set	Long. (E)	141-50.8	141-51.1	141-51.5	141-51.9	141-52.2	141-52.5
Time	Line set	1204	1209	1215	1221	1226	1231
(S.M.T.)	Line haul	1351-1558					
Length of main line(m)		600	600	500	500	500	500
Depth(m)		-					
Surface temp. (°C)		22.4					
Wether		b					
Wind		WSW-3					

Diamondback squid			1		
Bigeye tuna	1	1			
Thresher shark					1

No. of research		OSVL 1406-01	OSVL 1406-02	OSVL 1406-03	OSVL 1406-04	OSVL 1406-05	OSVL 1406-06
Date		13-Dec					
position of	Lat. (N)	27-10.0	27-09.7	27-09.4	27-09.2	27-08.9	27-08.7
line set	Long. (E)	141-54.4	141-54.9	141-54.9	141-55.2	141-55.4	141-55.7
Time	Line set	0611	0617	0622	0627	0632	0637
(S.M.T.)	Line haul	0828-1018					
Length of main line(m)		600	600	600	500	500	500
Depth(m)		2080					
Surface temp. (°C)		22.5					
Wether		c					
Wind		NW-4					

Flying squid	1

S.T. : Surface temperature

Wr.: Weather (r: rain, o: 100% clouded, c: 75-99% clouded, d: drizzling rain, bc: 25-75% clouded)

11

THE "OSHORO MARU" CRUISE 010
TO SAGAMI-WAN, TATEYAMA-WAN, and TOHOKU OFF

IN DECEMBER 2014

1. Cruise Itinerary

Cruise 010

Departure from Tokyo	December 18	2014
Hydrographic research (OS14175-OS14177)	19	
Return to Tokyo	20	
Departure from Tokyo	21	
Hydrographic research (OS14178, OS14179)	22	
Return to Hakodate	24	

Total coverage 786.2 miles

2. Vessel Personnel

Crew: Captain: Associate Professor Shogo Takagi

And 29 persons

Undergraduate instructor: Leg1

Professor (Laboratory of Coastal Marine Biology and ecology, Kitasato University)
Ryusuke Kado

Junior Associate Professor (Department of Marine Biochemical Resources, Kitasato University)
Ko Yasumoto

Specially Appointed Associate Professor (School of Fisheries Sciences, Hokkaido University)
Mituhiro Nakaya

PR manager:	1 person
Teaching Assistant:	3 persons
Undergraduate Students:	58 persons

Undergraduate instructor: Leg2

Professor (Laboratory of Coastal Marine Biology and ecology, Kitasato University)
Ryusuke Kado

Junior Associate Professor (Laboratory of Coastal Marine Biology and ecology, Kitasato University)
Yuichiro Yamada

Teaching Assistant:	2 persons
Undergraduate Students:	39 persons
Technical staff:	2 persons

Total 106 persons

3. Items of Research

Hydrographic observations: (Observation of Temperature, Salinity, and Computed Dynamic Depth Anomaly)

Hydrographic work on deck and the data processing were made by the Science officer, the deck officers, crews, research staff and cadets of the “Oshoro maru”. Temperature and salinity were measured by CTD (Seabird SBE-9Plus) and XCTD.

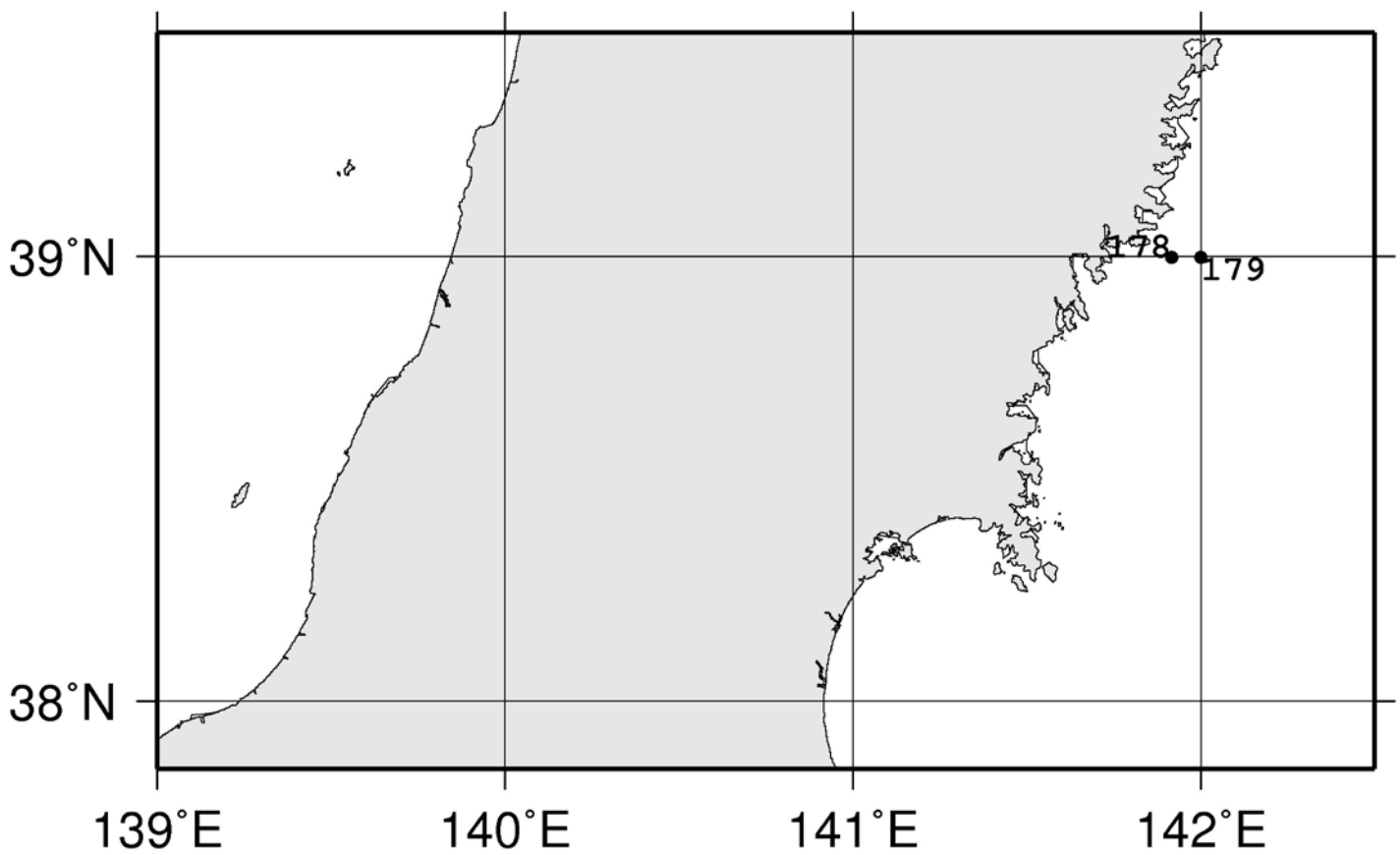

Fig.-1 Oceanographic stations

Table 1. List of Oceanographic station

Station	Lat.	Long.	Date (GMT)	Hour (GMT)	T.Z.	Depth	Col.	Tr.	SST	Wr.	Gear
OS14178	38 59.96 N	141 54.99 E	12/22	21:40	9	139			11.9	s	19p-4636
OS14179	38 59.91 N	141 59.96 E	12/22	22:25	9	201			11.8	s	19p-4636

T.Z.: Time Difference between G.M.T and S.M.T.

Col.: Water color in Forel-Ule scale

Tr.: Transparency in meters with Secchi disc

SST: Surface temperature

Wr.: Weather in WMO Code 4501

Table 2. Oceanographic data

Latitude 38-59.96N
Longitude 141-54.99E
Depth(m) 139.1

Press.	Temp.	Sal.	SIG-T
10	11.733	33.962	25.833
20	11.735	33.962	25.832
30	11.736	33.962	25.832
50	11.749	33.962	25.830
75	11.764	33.963	25.828
100	11.757	33.962	25.829

Station OS14179
Latitude 38-59.91N
Longitude 141-59.96E
Depth(m) 200.5

Press.	Temp.	Sal.	SIG-T
10	11.589	33.972	25.867
20	11.576	33.971	25.869
30	11.571	33.971	25.870
50	11.539	33.969	25.875
75	11.354	33.974	25.913
100	11.247	33.969	25.928
150	11.212	33.961	25.928

PART II

USHIO MARU CRUISES
FROM JANUARY 2014 TO DECEMBER 2014

1

THE " USHIO MARU "

CRUISE 300
CRUISE 301
CRUISE 302

IN JANUARY 2014
IN FEBRUARY 2014

1. Cruise Itinerary

Cruise 300		
Departure from Hakodate	Jan.	7, 2014
Start hydrographic research (US14001)		7
Arrival at and departure from Hakodate		9
Finish hydrographic research (US14034)		10
Return to Hakodate		10
Total coverage 299.0 miles		

Cruise 301		
Departure from Hakodate	Jan.	26, 2014
Start hydrographic research (US14035)		26
Finish hydrographic research (US14062)		29
Return to Hakodate		30
Total coverage 281.6 miles		

Cruise 302		
Departure from Hakodate	Feb.	10, 2014
Start hydrographic research (US14063)		10
Retrieval ADCP mooring system		11
Set ADCP mooring system		12
Arrival at and departure from Usujiri		12
Finish hydrographic research (US14105)		13
Return to Hakodate		14
Total coverage 384.4 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 and salinity were measured by CTD (Seabird SBE-9Plus and SBE-19).

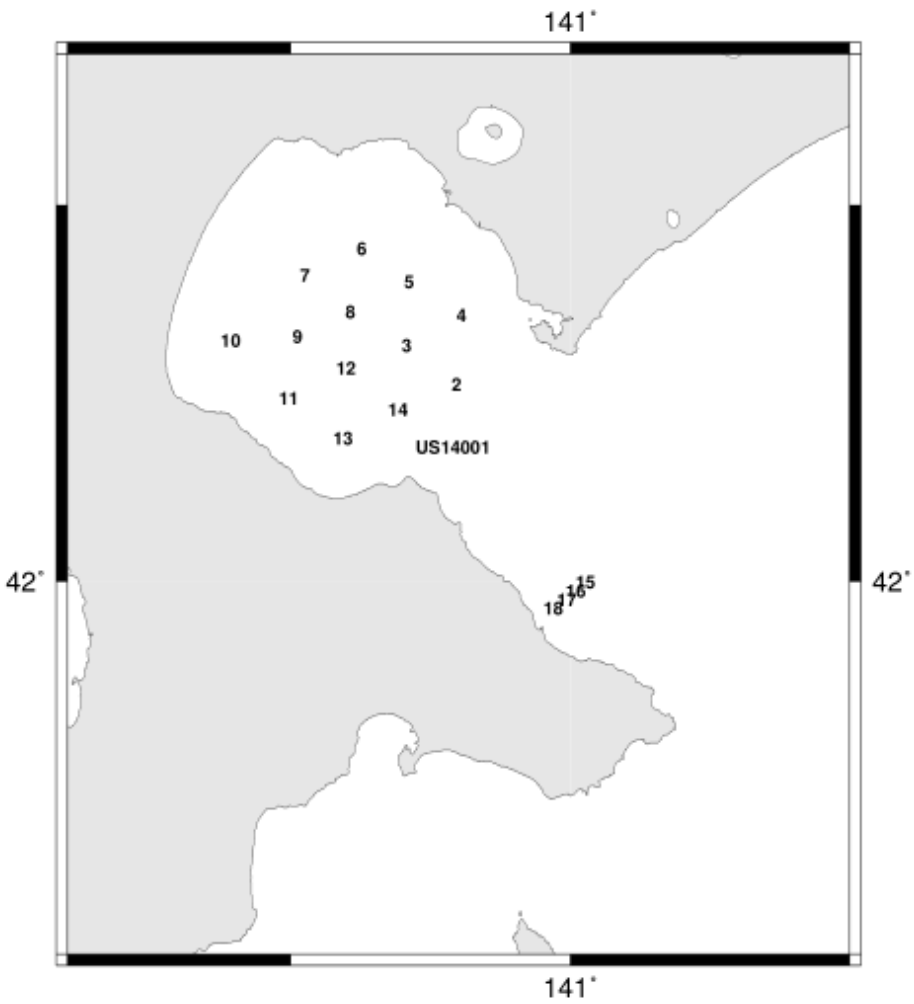

Figure 1. Oceanographic stations (Cruise 300)

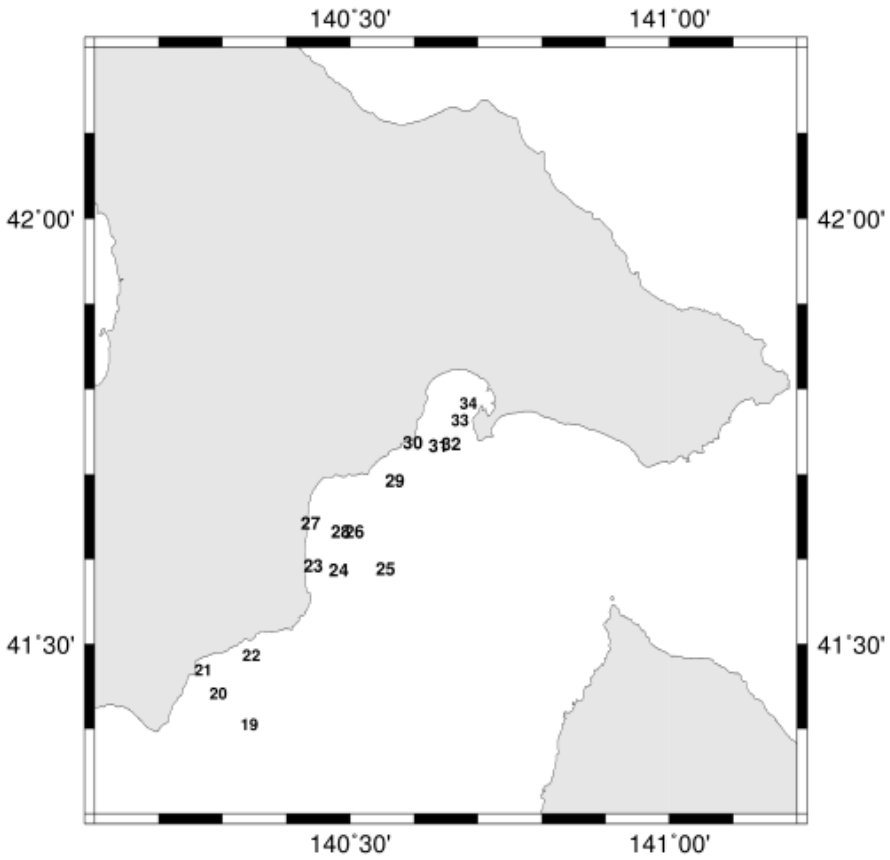

Figure 2. Oceanographic stations (Cruise 300)

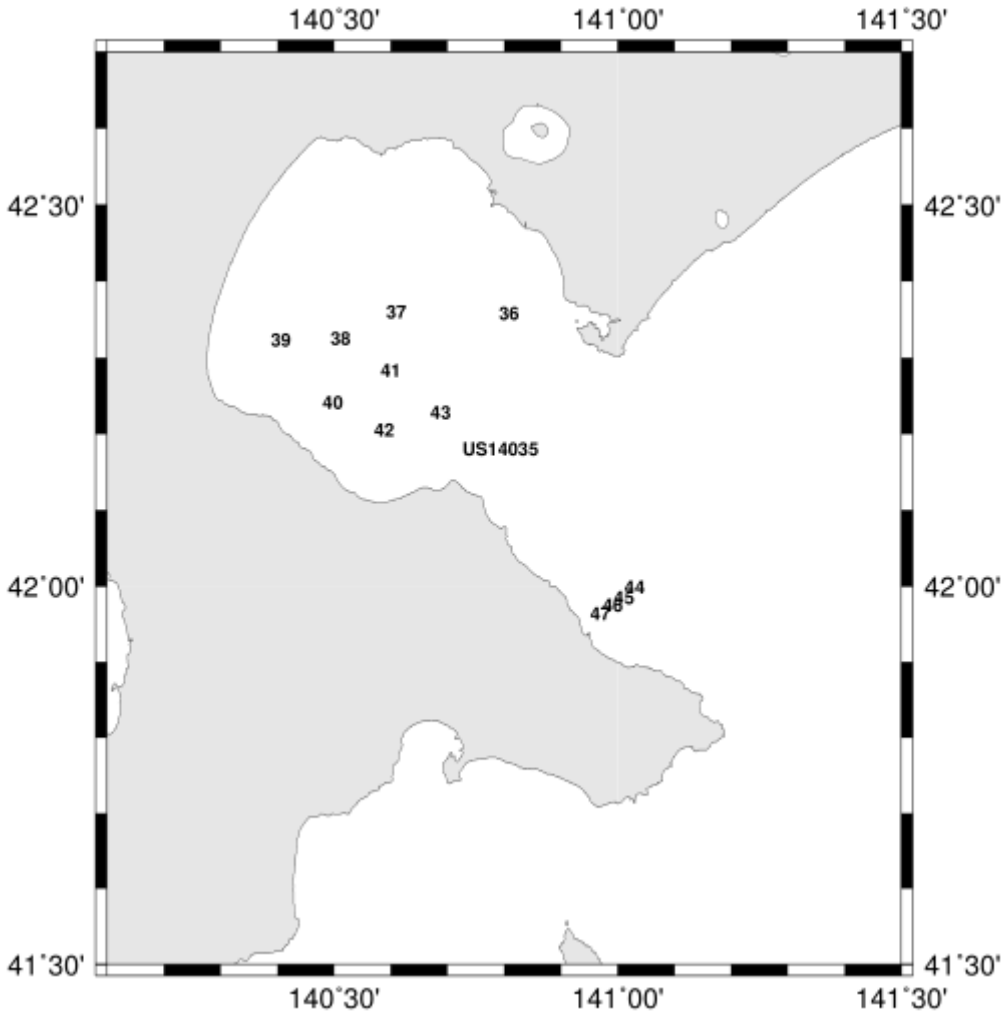

Figure 3. Oceanographic stations (Cruise 301)

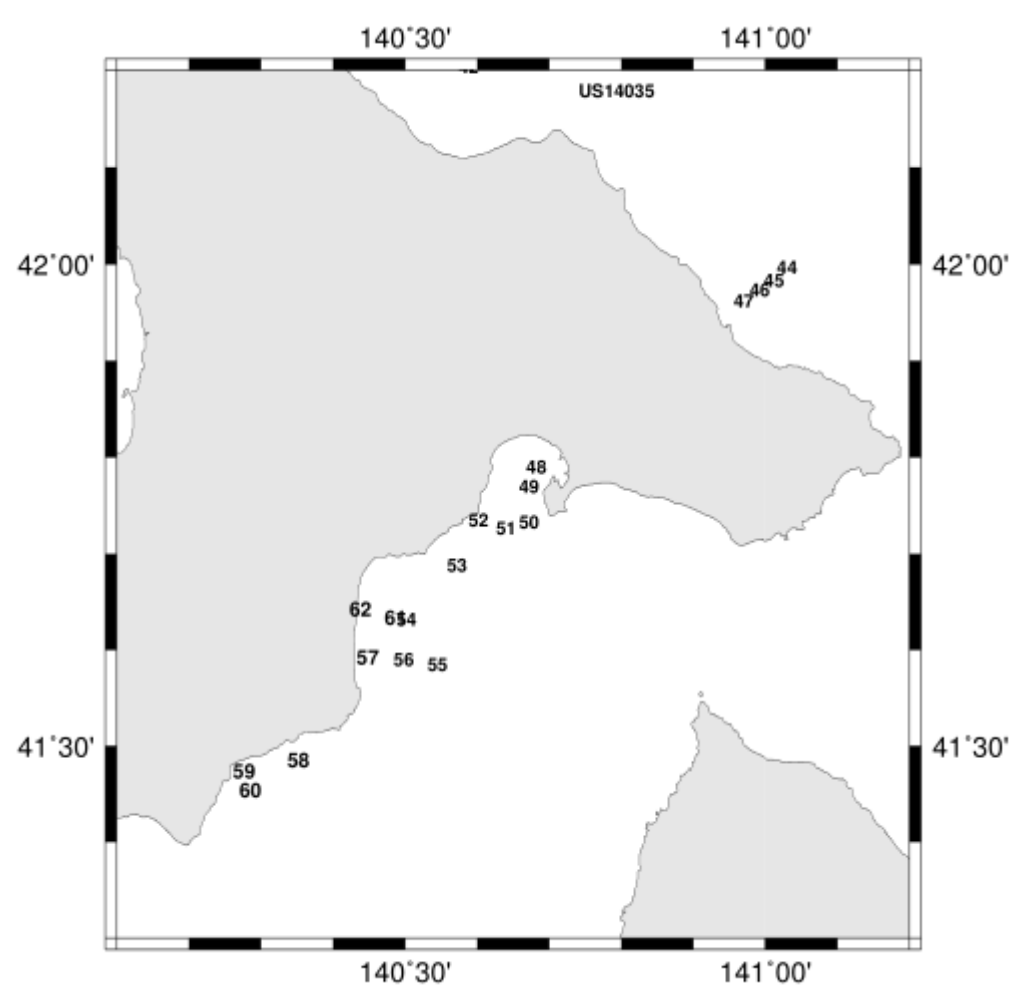

Figure 4. Oceanographic stations (Cruise 301)

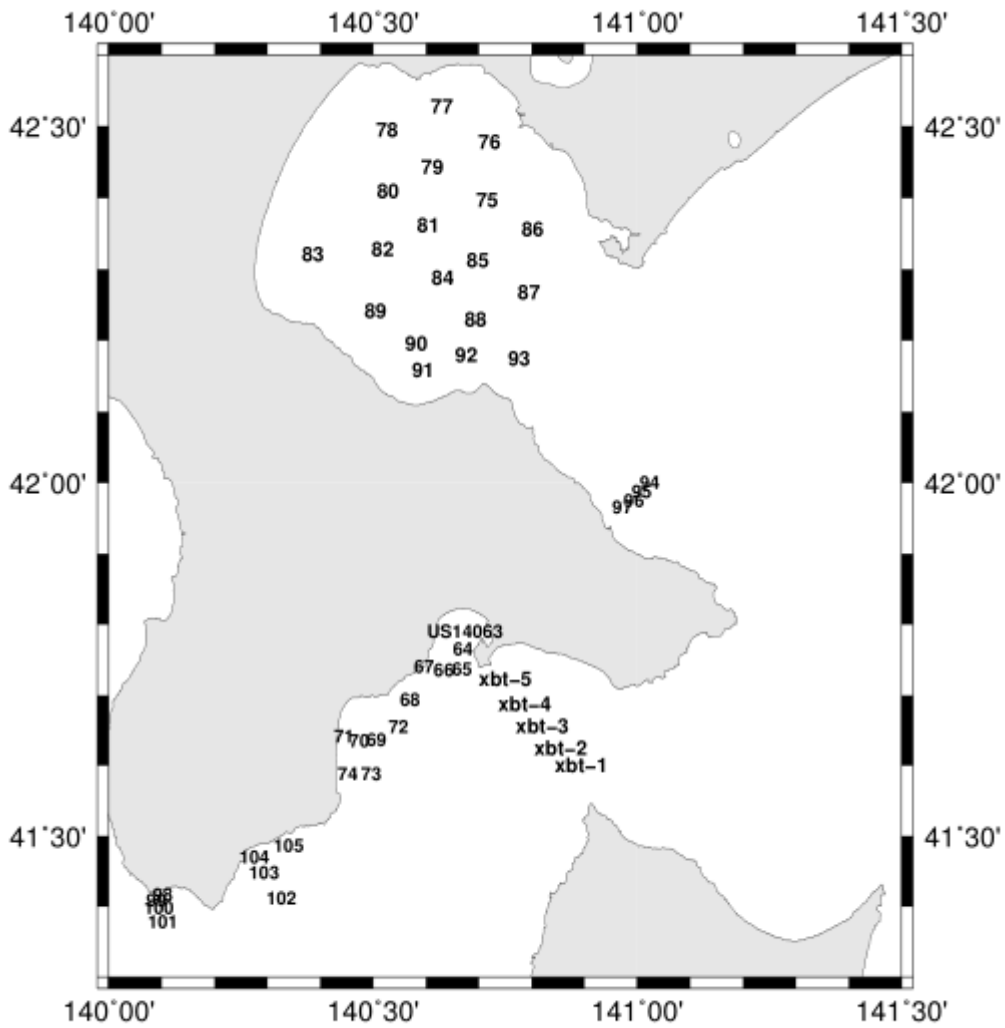

Figure 5. Oceanographic stations (Cruise 302)

Table 1. List of Oceanographic Station

Cruise 300

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14001	42-10.2	140-47.4	1/7	1432-1437	92	SW -2	WNW-1	SW -4	2.8	6.6	c
US14002	42-15.2	140-47.8	1/7	1521-1526	71	WSW-2	West-1	WSW-1	3.4	6.6	o
US14003	42-18.3	140-42.4	1/7	1611-1616	62	SW -2	West-1	SW -4	3.3	6.2	o
US14004	42-20.7	140-48.3	1/8	0645-0650	53	NW -2	NW -1	NW -3	4.1	6.3	o
US14005	42-23.4	140-42.7	1/8	0741-0746	61	NW -2	NW -1	NW -5	4.3	6.2	o
US14006	42-26.0	140-37.6	1/8	0827-0832	82	NW -3	NW -1	NW -5	4.2	6.4	o
US14007	42-23.9	140-31.5	1/8	0917-0923	95	NW -3	NW -1	NW -5	3.8	6.4	o
US14008	42-21.0	140-36.4	1/8	1004-1010	88	NW -2	NW -1	NW -4	3.9	6.3	c
US14009	42-19.0	140-30.7	1/8	1054-1059	93	West-2	NW -1	West-4	4.0	6.4	c
US14010	42-18.7	140-23.5	1/8	1152-1156	55	WNW-3	West-1	WNW-5	3.1	6.5	c
US14011	42-14.1	140-29.7	1/8	1446-1450	76	West-2	West-1	West-4	2.5	6.0	s
US14012	42-16.5	140-35.9	1/8	1336-1341	90	WNW-3	West-1	WNW-5	3.6	6.1	c
US14013	42-10.9	140-35.6	1/8	1439-1444	79	NW -3	West-1	NW -5	2.9	6.3	s
US14014	42-13.2	140-41.5	1/8	1536-1542	89	NW -3	NW -1	NW -5	3.1	6.1	bc
US14015	41-59.4	141-01.6	1/8	1753-1758	99	NW -3	NW -1	NW -5	2.6	6.4	o
US14016	41-58.7	141-00.6	1/8	1806-1811	94	NW -3	NW -1	NW -5	2.7	6.3	o
US14017	41-58.0	140-59.6	1/8	1819-1824	87	NW -3	NW -1	NW -5	2.6	6.4	o
US14018	41-57.3	140-58.2	1/8	1833-1838	77	NW -3	NW -1	NW -5	2.3	6.5	o
US14019	41-23.9	140-20.5	1/9	1129-1134	96	WNW-3	West-1	WNW-5	-1.1	12.1	s
US14020	41-26.1	140-17.6	1/9	1206-1211	71	NW -3	SW -1	NW -5	-1.9	11.1	s
US14021	41-27.8	140-16.2	1/9	1228-1231	24	West-2	SW -1	West-5	-2.6	10.9	s
US14022	41-28.8	140-20.7	1/9	1310-1315	61	NW -3	SW -1	NW -5	-2.3	11.4	s
US14023	41-35.1	140-26.5	1/9	1420-1423	12	NW -2	SE -1	NW -4	-3.0	9.4	s
US14024	41-34.8	140-28.9	1/9	1444-1447	31	West-3	SE -1	West-5	-3.5	10.0	s
US14025	41-34.9	140-33.3	1/9	1518-1522	59	West-3	West-1	West-5	-4.6	10.4	s
US14026	41-37.5	140-30.4	1/10	0733-0737	32	West-2	South-1	West-4	-4.8	10.0	s
US14027	41-38.1	140-26.3	1/10	0804-0806	11	NW -2	SSE-1	NW -5	-6.1	9.9	c
US14028	41-37.5	140-29.1	1/10	0836-0839	24	WNW-3	SSE-1	WNW-5	-6.6	9.9	s
US14029	41-41.1	140-34.2	1/10	0921-0924	41	WNW-3	SW -1	WNW-6	-4.9	9.6	bc
US14030	41-43.8	140-35.9	1/10	0948-0950	17	West-3	SW -1	West-6	-2.8	10.3	bc
US14031	41-43.6	140-38.3	1/10	1018-1023	59	West-3	SW -1	West-5	-3.5	10.5	bc
US14032	41-43.7	140-39.5	1/10	1038-1043	62	NW -3	SW -1	NW -5	-4.4	10.6	s
US14033	41-45.4	140-40.3	1/10	1104-1108	41	West-3	SW -1	West-5	-4.2	10.4	s
US14034	41-46.6	140-41.1	1/10	1126-1129	22	West-2	SW -1	West-4	-4.8	9.0	s

Table 1 (Continued)

Cruise 301

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14036	42-21.0	140-48.5	1/27	0638-0642	52	NNW-2	WNW-1	NNW-5	-3.9	3.8	c
US14037	42-21.1	140-36.6	1/27	0745-0750	88	NW -3	NW -1	NW -5	-4.4	4.4	bc
US14038	42-19.0	140-30.7	1/27	0835-0840	93	NW -2	NW -1	NW -4	-4.5	4.8	bc
US14039	42-18.9	140-24.4	1/27	0926-0930	62	West-2	NW -1	West-4	-4.6	4.5	s
US14040	42-14.0	140-29.9	1/27	1025-1028	77	West-2	NW -1	West-4	-3.4	4.6	bc
US14041	42-16.5	140-36.0	1/27	1115-1120	92	WNW-2	NW -1	WNW-4	-1.3	4.7	s
US14042	42-11.8	140-35.3	1/27	1239-1243	83	West-3	West-1	West-5	-2.9	4.8	bc
US14043	42-13.2	140-41.3	1/27	1326-1330	89	NW -2	NW -1	NW -4	-1.6	4.4	bc
US14044	41-59.4	141-01.8	1/27	1538-1545	100	West-2	NW -1	West-4	-1.1	4.0	bc
US14045	41-58.6	141-00.7	1/27	1553-1558	94	West-2	NW -1	West-4	-1.9	4.3	bc
US14046	41-58.0	140-59.5	1/27	1607-1611	86	West-2	NW -1	West-3	-2.1	4.1	bc
US14047	41-57.3	140-58.2	1/27	1620-1624	78	West-2	NW -1	West-3	-2.1	4.1	bc
US14048	41-47.0	140-40.9	1/28	1217-1219	21	SW -3	SW -1	SW -5	3.5	5.4	s
US14049	41-45.8	140-40.3	1/28	1237-1240	30	West-3	SW -1	West-5	2.0	8.9	s
US14050	41-43.6	140-40.3	1/28	1302-1305	66	NW -2	SW -2	NW -5	1.8	9.1	s
US14051	41-43.2	140-38.4	1/28	1324-1328	63	WSW-2	SW -2	WSW-4	1.7	9.1	s
US14052	41-43.7	140-36.1	1/29	0722-0725	24	NW -3	SW -1	NW -5	-5.6	8.5	s
US14053	41-40.9	140-34.3	1/29	0752-0756	42	West-3	SW -1	West-5	-5.0	8.4	s
US14054	41-37.5	140-30.1	1/29	0831-0835	30	West-3	SSW-1	West-5	-5.0	7.5	s
US14055	41-34.7	140-32.7	1/29	0905-0909	63	West-3	SSW-1	West-5	-5.6	8.0	s
US14056	41-35.0	140-29.9	1/29	0933-0936	44	West-2	South-1	West-4	-4.8	7.8	bc
US14057	41-35.1	140-26.9	1/29	1002-1004	15	West-2	South-1	West-4	-4.8	7.5	bc
US14058	41-28.7	140-21.1	1/29	1102-1105	66	West-3	SW -2	West-5	-4.3	8.2	s
US14059	41-28.0	140-16.6	1/29	1137-1140	31	NW -2	SW -1	NW -4	-4.6	7.9	s
US14060	41-26.8	140-17.1	1/29	1158-1202	57	NW -1	SW -1	NW -3	-4.2	8.2	c
US14061	41-37.6	140-29.2	1/29	1343-1345	26	West-2	SW -1	West-4	-2.7	8.1	s
US14062	41-38.1	140-26.3	1/29	1401-1403	12	West-2	SSW-1	West-4	-4.0	7.3	s

Table 1 (Continued)

Cruise 302

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14063	41-46.9	140-40.4	2/10	0846-0849	21	NW -1	South-1	NW -2	-1.3	5.0	bc
US14064	41-45.4	140-40.2	2/10	0907-0911	40	Calm	South-1	Calm	-0.6	4.7	bc
US14065	41-43.7	140-40.1	2/10	0931-0935	64	West-1	SE -1	West-3	-0.5	4.2	c
US14066	41-43.6	140-38.0	2/10	0952-0956	58	WNW-1	East-1	WNW-3	-0.3	4.7	bc
US14067	41-43.9	140-35.8	2/10	1008-1010	14	NW -1	East-1	NW -3	0.0	4.7	bc
US14068	41-41.1	140-34.2	2/10	1043-1047	41	West-1	East-1	West-3	0.8	5.5	bc
US14069	41-37.7	140-30.4	2/10	1120-1123	33	West-1	East-1	West-3	1.5	5.7	bc
US14070	41-37.6	140-28.4	2/10	1140-1143	24	Calm	East-1	Calm	1.9	5.2	bc
US14071	41-38.0	140-26.7	2/10	1154-1157	16	NW -2	East-1	NW -4	2.0	5.6	bc
US14072	41-38.8	140-32.9	2/10	1248-1252	62	NW -2	East-1	NW -4	2.0	6.4	bc
US14073	41-34.8	140-29.8	2/10	1315-1318	45	West-1	East-1	West-3	2.6	6.0	bc
US14074	41-34.8	140-27.1	2/10	1342-1345	23	West-2	East-1	West-5	2.4	5.6	bc
US14075	42-23.2	140-42.9	2/11	0602-0606	60	North-1	ESE-1	North-3	-1.5	2.8	bc
US14076	42-28.1	140-43.2	2/11	0655-0659	60	North-1	North-1	North-3	-1.8	2.7	bc
US14077	42-31.1	140-37.8	2/11	0747-0751	62	North-1	North-1	North-3	-2.3	2.8	bc
US14078	42-29.1	140-31.6	2/11	0835-0839	75	NW -2	NW -1	NW -4	-1.4	2.7	bc
US14079	42-26.0	140-36.7	2/11	0933-0937	85	WNW-1	NW -1	WNW-3	-0.3	2.8	bc
US14080	42-24.0	140-31.7	2/11	1023-1028	96	NW -1	ESE-1	NW -2	-0.2	2.9	bc
US14081	42-21.1	140-36.3	2/11	1115-1120	89	NW -2	ESE-1	NW -4	0.5	3.0	c
US14082	42-19.1	140-31.1	2/11	1205-1210	94	NW -2	ESE-1	NW -4	-0.1	2.9	bc
US14083	42-18.7	140-23.2	2/11	1305-1308	54	North-1	ESE-1	North-3	-0.1	3.2	s
US14084	42-16.7	140-37.9	2/11	1437-1442	88	NW -2	ESE-1	NW -4	0.3	3.0	bc
US14085	42-18.2	140-41.9	2/11	1538-1542	66	NW -2	NW -1	NW -4	0.1	2.8	c
US14086	42-20.8	140-48.1	2/11	1624-1628	53	NW -3	NW -1	NW -5	0.1	3.1	bc
US14087	42-15.5	140-47.7	2/12	0610-0614	71	West-2	ESE-1	West-4	-1.6	3.0	c
US14088	42-13.2	140-41.6	2/12	0659-0703	89	NW -2	ESE-1	NW -4	-2.0	2.6	bc
US14089	42-13.9	140-30.3	2/12	0834-0838	79	West-1	East-1	West-3	-2.5	2.7	bc
US14090	42-11.2	140-34.9	2/12	0928-0933	80	NW -1	ESE-1	NW -3	-2.2	2.7	bc
US14091	42-08.9	140-35.7	2/12	1032-1036	66	NW -1	East-1	NW -2	-1.5	3.3	bc
US14092	42-10.2	140-40.6	2/12	1112-1116	85	NW -1	East-1	NW -3	0.3	3.2	bc
US14093	42-09.9	140-46.6	2/12	1155-1200	95	NW -1	East-1	NW -3	0.1	2.6	bc
US14094	41-59.5	141-01.4	2/12	1333-1337	98	NW -2	NW -1	NW -4	-0.4	2.9	bc
US14095	41-58.7	141-00.5	2/12	1345-1348	94	NW -2	NW -1	NW -4	-0.2	2.9	bc
US14096	41-58.0	140-59.6	2/12	1355-1359	88	NW -2	NW -1	NW -4	-0.2	3.1	bc
US14097	41-57.4	140-58.3	2/12	1406-1410	80	NW -2	NW -1	NW -4	-0.4	3.2	bc
US14098	41-24.5	140-06.1	2/13	0630-0634	56	NW -2	West-1	NW -4	-0.3	7.1	o
US14099	41-24.0	140-05.4	2/13	0648-0653	79	NW -3	West-2	NW -5	0.8	7.1	o
US14100	41-23.4	140-05.7	2/13	0708-0713	102	NW -3	West-2	NW -5	0.9	7.3	c
US14101	41-22.2	140-06.1	2/13	0734-0740	119	NW -3	SW -1	NW -5	0.4	7.1	s
US14102	41-24.2	140-19.6	2/13	0900-0905	95	NW -1	SW -1	NW -2	0.9	6.6	bc
US14103	41-26.4	140-17.6	2/13	0932-0936	68	NW -1	SW -1	NW -2	0.5	7.7	bc
US14104	41-27.7	140-16.5	2/13	0958-1001	33	NW -2	SW -1	NW -3	1.0	7.2	c
US14105	41-28.7	140-20.4	2/13	1033-1036	61	West-2	SW -1	West-4	0.3	8.5	s

(*): Fixed position by Global Positioning System

S.M.T.: Ship’s mean time

Wr.: Weather in WMO Code 4501

Table 2. Oceanographic data

STATION US14001
LATITUDE 42-10.2 N
LONGITUI 140-47.4 E
DEPTH (m) 92

Press.	Temp.	Salinity	Sigma-T
5	7.033	33.469	26.208
10	7.029	33.468	26.208
20	7.033	33.464	26.205
30	7.033	33.468	26.207
40	6.776	33.454	26.231
50	6.735	33.477	26.255
75	6.896	33.532	26.277

STATION US14002
LATITUDE 42-15.2 N
LONGITUI 140-47.8 E
DEPTH (m) 71

Press.	Temp.	Salinity	Sigma-T
5	6.616	33.516	26.301
10	6.616	33.516	26.301
20	6.617	33.516	26.301
30	6.596	33.513	26.301
40	6.496	33.511	26.313
50	6.463	33.515	26.321

STATION US14003
LATITUDE 42-18.3 N
LONGITUI 140-42.4 E
DEPTH (m) 62

Press.	Temp.	Salinity	Sigma-T
5	6.605	33.517	26.304
10	6.601	33.516	26.304
20	6.612	33.518	26.303
30	6.623	33.528	26.310
40	6.627	33.528	26.309
50	6.638	33.530	26.310

STATION US14004
LATITUDE 42-20.7 N
LONGITUI 140-48.3 E
DEPTH (m) 53

Press.	Temp.	Salinity	Sigma-T
5	6.473	33.534	26.334
10	6.480	33.536	26.335
20	6.488	33.538	26.336
30	6.484	33.539	26.336
40	6.458	33.548	26.347
50	6.432	33.549	26.352

STATION US14005
LATITUDE 42-23.4 N
LONGITUI 140-42.7 E
DEPTH (m) 61

Press.	Temp.	Salinity	Sigma-T
5	6.597	33.572	26.348
10	6.610	33.575	26.349
20	6.651	33.607	26.368
30	6.651	33.610	26.370
40	6.661	33.612	26.371
50	6.665	33.613	26.371

STATION US14006
LATITUDE 42-26.0 N
LONGITUI 140-37.6 E
DEPTH (m) 82

Press.	Temp.	Salinity	Sigma-T
5	6.697	33.612	26.366
10	6.701	33.609	26.364
20	6.699	33.610	26.364
30	6.708	33.613	26.366
40	6.754	33.619	26.364
50	6.748	33.617	26.364
75	6.781	33.621	26.362

STATION US14007
LATITUDE 42-23.9 N
LONGITUI 140-31.5 E
DEPTH (m) 95

Press.	Temp.	Salinity	Sigma-T
5	6.859	33.642	26.369
10	6.860	33.641	26.367
20	6.856	33.641	26.368
30	6.856	33.640	26.367
40	6.836	33.635	26.365
50	6.833	33.634	26.366
75	6.808	33.631	26.366

STATION US14008
LATITUDE 42-21.0 N
LONGITUI 140-36.4 E
DEPTH (m) 88

Press.	Temp.	Salinity	Sigma-T
5	6.611	33.555	26.333
10	6.612	33.553	26.331
20	6.623	33.561	26.336
30	6.746	33.599	26.350
40	6.735	33.609	26.359
50	6.750	33.618	26.364
75	6.764	33.622	26.365

STATION US14009
LATITUDE 42-19.0 N
LONGITUI 140-30.7 E
DEPTH (m) 93

Press.	Temp.	Salinity	Sigma-T
5	6.889	33.646	26.367
10	6.884	33.643	26.366
20	6.876	33.644	26.367
30	6.873	33.643	26.367
40	6.872	33.642	26.367
50	6.870	33.642	26.367
75	6.852	33.641	26.368

STATION US14010
LATITUDE 42-18.7 N
LONGITUI 140-23.5 E
DEPTH (m) 55

Press.	Temp.	Salinity	Sigma-T
5	6.795	33.645	26.379
10	6.793	33.645	26.379
20	6.791	33.645	26.379
30	6.792	33.644	26.379
40	6.793	33.645	26.379
50	6.790	33.644	26.379

STATION US14011
LATITUDE 42-14.1 N
LONGITUI 140-29.7 E
DEPTH (m) 76

Press.	Temp.	Salinity	Sigma-T
5	6.236	33.518	26.352
10	6.218	33.514	26.351
20	6.447	33.568	26.364
30	6.591	33.602	26.372
40	6.604	33.609	26.376
50	6.697	33.624	26.376
75	6.702	33.628	26.378

STATION US14012
LATITUDE 42-16.5 N
LONGITUI 140-35.9 E
DEPTH (m) 90

Press.	Temp.	Salinity	Sigma-T
5	6.543	33.596	26.374
10	6.541	33.597	26.375
20	6.542	33.597	26.375
30	6.556	33.600	26.375
40	6.570	33.604	26.376
50	6.581	33.605	26.376
75	6.472	33.599	26.386

STATION US14013
LATITUDE 42-10.9 N
LONGITUI 140-35.6 E
DEPTH (m) 79

Press.	Temp.	Salinity	Sigma-T
5	6.566	33.512	26.304
10	6.566	33.511	26.304
20	6.573	33.513	26.304
30	6.578	33.514	26.305
40	6.581	33.515	26.305
50	6.591	33.518	26.306
75	6.618	33.532	26.313

STATION US14014
LATITUDE 42-13.2 N
LONGITUI 140-41.5 E
DEPTH (m) 89

Press.	Temp.	Salinity	Sigma-T
5	6.566	33.525	26.315
10	6.573	33.524	26.313
20	6.562	33.525	26.315
30	6.582	33.527	26.315
40	6.585	33.525	26.313
50	6.611	33.537	26.319
75	6.644	33.551	26.325

STATION US14015
LATITUDE 41-59.4 N
LONGITUI 141-01.6 E
DEPTH (m) 99

Press.	Temp.	Salinity	Sigma-T
5	7.111	33.415	26.155
10	7.109	33.415	26.155
20	6.880	33.438	26.204
30	6.740	33.460	26.240
40	6.714	33.464	26.247
50	6.703	33.466	26.250
75	6.411	33.453	26.278

Table 2. (Continued)

STATION US14016
LATITUDE 41-58.7 N
LONGITUI 141-00.6 E
DEPTH (m) 94

Press.	Temp.	Salinity	Sigma-T
5	6.667	33.461	26.251
10	6.661	33.464	26.254
20	6.673	33.463	26.252
30	6.667	33.462	26.252
40	6.664	33.458	26.249
50	6.406	33.442	26.270
75	6.329	33.455	26.290

STATION US14017
LATITUDE 41-58.0 N
LONGITUI 140-59.6 E
DEPTH (m) 87

Press.	Temp.	Salinity	Sigma-T
5	6.832	33.471	26.237
10	6.833	33.470	26.237
20	6.829	33.472	26.238
30	6.773	33.479	26.251
40	6.800	33.500	26.264
50	6.732	33.485	26.262
75	6.573	33.480	26.279

STATION US14018
LATITUDE 41-57.3 N
LONGITUI 140-58.2 E
DEPTH (m) 77

Press.	Temp.	Salinity	Sigma-T
5	7.072	33.470	26.204
10	7.064	33.469	26.204
20	7.071	33.470	26.204
30	7.082	33.472	26.204
40	7.069	33.488	26.219
50	6.967	33.499	26.241

STATION US14019
LATITUDE 41-23.9 N
LONGITUI 140-20.5 E
DEPTH (m) 96

Press.	Temp.	Salinity	Sigma-T
5	12.451	33.826	25.591
10	12.454	33.829	25.593
20	12.407	33.835	25.607
30	12.368	33.842	25.620
40	12.352	33.848	25.628
50	12.310	33.853	25.639
75	10.495	33.894	26.004

STATION US14020
LATITUDE 41-26.1 N
LONGITUI 140-17.6 E
DEPTH (m) 71

Press.	Temp.	Salinity	Sigma-T
5	11.515	33.867	25.800
10	11.515	33.867	25.799
20	11.423	33.866	25.816
30	11.143	33.896	25.890
40	10.912	33.907	25.940
50	10.354	33.851	25.995

STATION US14021
LATITUDE 41-27.8 N
LONGITUI 140-16.2 E
DEPTH (m) 24

Press.	Temp.	Salinity	Sigma-T
5	11.248	33.875	25.855
10	11.265	33.878	25.854
20	11.018	33.882	25.901

STATION US14022
LATITUDE 41-28.8 N
LONGITUI 140-20.7 E
DEPTH (m) 61

Press.	Temp.	Salinity	Sigma-T
5	11.746	33.873	25.761
10	11.741	33.868	25.758
20	11.668	33.866	25.770
30	11.531	33.872	25.801
40	10.659	33.795	25.898
50	10.019	33.900	26.090

STATION US14023
LATITUDE 41-35.1 N
LONGITUI 140-26.5 E
DEPTH (m) 12

Press.	Temp.	Salinity	Sigma-T
5	9.692	33.675	25.969
10	9.846	33.807	26.046

STATION US14024
LATITUDE 41-34.8 N
LONGITUI 140-28.9 E
DEPTH (m) 31

Press.	Temp.	Salinity	Sigma-T
5	10.391	33.909	26.033
10	10.409	33.914	26.034
20	10.429	33.914	26.030
30	10.436	33.915	26.030

STATION US14025
LATITUDE 41-34.9 N
LONGITUI 140-33.3 E
DEPTH (m) 59

Press.	Temp.	Salinity	Sigma-T
5	10.730	33.906	25.971
10	10.745	33.905	25.968
20	10.678	33.899	25.975
30	10.640	33.906	25.987
40	10.576	33.907	25.999
50	10.379	33.923	26.046

STATION US14026
LATITUDE 41-37.5 N
LONGITUI 140-30.4 E
DEPTH (m) 32

Press.	Temp.	Salinity	Sigma-T
5	10.290	33.954	26.085
10	10.292	33.952	26.084
20	10.301	33.954	26.084
30	10.299	33.951	26.082

STATION US14027
LATITUDE 41-38.1 N
LONGITUI 140-26.3 E
DEPTH (m) 11

Press.	Temp.	Salinity	Sigma-T
5	9.563	33.793	26.082
10	9.596	33.791	26.075

STATION US14028
LATITUDE 41-37.5 N
LONGITUI 140-29.1 E
DEPTH (m) 24

Press.	Temp.	Salinity	Sigma-T
5	10.212	33.919	26.072
10	10.226	33.919	26.069
20	10.250	33.919	26.066

STATION US14029
LATITUDE 41-41.1 N
LONGITUI 140-34.2 E
DEPTH (m) 41

Press.	Temp.	Salinity	Sigma-T
5	10.064	33.845	26.039
10	10.072	33.846	26.039
20	10.073	33.846	26.039
30	10.049	33.851	26.047

STATION US14030
LATITUDE 41-43.8 N
LONGITUI 140-35.9 E
DEPTH (m) 17

Press.	Temp.	Salinity	Sigma-T
5	10.110	33.838	26.026
10	10.113	33.838	26.025

Table 2 (Continued)

STATION US14031
LATITUDE 41-43.6 N
LONGITUI 140-38.3 E
DEPTH (m) 59

Press.	Temp.	Salinity	Sigma-T
5	10.828	33.889	25.941
10	10.829	33.890	25.941
20	10.834	33.890	25.940
30	10.835	33.890	25.940
40	10.836	33.889	25.940
50	10.834	33.889	25.940

STATION US14032
LATITUDE 41-43.7 N
LONGITUI 140-39.5 E
DEPTH (m) 62

Press.	Temp.	Salinity	Sigma-T
5	10.883	33.892	25.934
10	10.905	33.889	25.928
20	10.902	33.890	25.929
30	10.856	33.889	25.936
40	10.851	33.892	25.939
50	10.752	33.887	25.953

STATION US14033
LATITUDE 41-45.4 N
LONGITUI 140-40.3 E
DEPTH (m) 41

Press.	Temp.	Salinity	Sigma-T
5	10.152	33.792	25.983
10	10.148	33.789	25.981
20	10.108	33.778	25.980
30	10.035	33.764	25.981
40	10.024	33.760	25.980

STATION US14034
LATITUDE 41-46.6 N
LONGITUI 140-41.1 E
DEPTH (m) 22

Press.	Temp.	Salinity	Sigma-T
5	9.328	33.592	25.964
10	9.356	33.596	25.962
20	9.366	33.597	25.961

STATION US14035
LATITUDE 42-10.3 N
LONGITUI 140-47.6 E
DEPTH (m) 92

Press.	Temp.	Salinity	Sigma-T
5	4.823	33.094	26.184
10	4.842	33.126	26.207
20	4.941	33.352	26.375
30	5.104	33.541	26.507
40	5.227	33.567	26.513
50	5.278	33.577	26.515
75	5.203	33.560	26.511

STATION US14036
LATITUDE 42-21.0 N
LONGITUI 140-48.5 E
DEPTH (m) 52

Press.	Temp.	Salinity	Sigma-T
5	4.265	32.921	26.106
10	4.259	32.922	26.107
20	4.270	32.923	26.107
30	4.693	33.107	26.208
40	5.021	33.219	26.261

STATION US14037
LATITUDE 42-21.1 N
LONGITUI 140-36.6 E
DEPTH (m) 88

Press.	Temp.	Salinity	Sigma-T
5	4.770	33.260	26.321
10	4.768	33.258	26.320
20	4.885	33.366	26.393
30	5.107	33.555	26.517
40	5.149	33.573	26.527
50	5.157	33.580	26.532
75	5.172	33.590	26.538

STATION US14038
LATITUDE 42-19.0 N
LONGITUI 140-30.7 E
DEPTH (m) 93

Press.	Temp.	Salinity	Sigma-T
5	5.105	33.564	26.525
10	5.117	33.564	26.524
20	5.129	33.564	26.522
30	5.127	33.563	26.522
40	5.123	33.561	26.521
50	5.125	33.562	26.521
75	5.129	33.562	26.521

STATION US14039
LATITUDE 42-18.9 N
LONGITUI 140-24.4 E
DEPTH (m) 62

Press.	Temp.	Salinity	Sigma-T
5	4.902	33.521	26.514
10	4.896	33.521	26.515
20	4.903	33.523	26.515
30	4.909	33.523	26.514
40	4.907	33.523	26.515
50	4.910	33.526	26.517

STATION US14040
LATITUDE 42-14.0 N
LONGITUI 140-29.9 E
DEPTH (m) 77

Press.	Temp.	Salinity	Sigma-T
5	5.033	33.565	26.534
10	5.028	33.565	26.535
20	5.027	33.563	26.533
30	5.027	33.563	26.533
40	5.026	33.563	26.533
50	5.026	33.564	26.533
75	5.018	33.564	26.535

STATION US14041
LATITUDE 42-16.5 N
LONGITUI 140-36.0 E
DEPTH (m) 92

Press.	Temp.	Salinity	Sigma-T
5	5.103	33.586	26.543
10	5.112	33.584	26.540
20	5.118	33.583	26.539
30	5.118	33.583	26.539
40	5.116	33.583	26.539
50	5.113	33.583	26.539
75	5.105	33.586	26.542

STATION US14042
LATITUDE 42-11.8 N
LONGITUI 140-35.3 E
DEPTH (m) 83

Press.	Temp.	Salinity	Sigma-T
5	5.021	33.575	26.543
10	5.024	33.575	26.543
20	5.030	33.576	26.543
30	5.032	33.577	26.543
40	5.034	33.576	26.543
50	5.032	33.575	26.542
75	5.045	33.574	26.540

STATION US14043
LATITUDE 42-13.2 N
LONGITUI 140-41.3 E
DEPTH (m) 89

Press.	Temp.	Salinity	Sigma-T
5	4.763	33.223	26.293
10	4.764	33.220	26.291
20	4.772	33.221	26.290
30	4.981	33.461	26.457
40	5.104	33.524	26.493
50	5.113	33.531	26.498
75	5.063	33.565	26.530

STATION US14044
LATITUDE 41-59.4 N
LONGITUI 141-01.8 E
DEPTH (m) 100

Press.	Temp.	Salinity	Sigma-T
5	4.671	33.009	26.133
10	4.673	33.015	26.138
20	4.690	33.016	26.136
30	4.695	33.018	26.137
40	4.697	33.019	26.138
50	4.746	33.065	26.170
75	5.267	33.579	26.518

STATION US14045
LATITUDE 41-58.6 N
LONGITUI 141-00.7 E
DEPTH (m) 94

Press.	Temp.	Salinity	Sigma-T
5	4.524	32.967	26.115
10	4.525	32.971	26.118
20	4.546	32.968	26.114
30	4.541	32.972	26.117
40	4.646	33.040	26.160
50	5.087	33.366	26.370
75	5.251	33.571	26.513

Table 2 (Continued)

STATION US14046
LATITUDE 41-58.0 N
LONGITUI 140-59.5 E
DEPTH (m) 86

Press.	Temp.	Salinity	Sigma-T
5	4.466	32.951	26.109
10	4.475	32.953	26.109
20	4.482	32.959	26.113
30	4.578	33.037	26.165
40	4.883	33.200	26.261
50	4.978	33.382	26.395
75	4.966	33.460	26.459

STATION US14047
LATITUDE 41-57.3 N
LONGITUI 140-58.2 E
DEPTH (m) 78

Press.	Temp.	Salinity	Sigma-T
5	4.416	32.967	26.126
10	4.424	32.969	26.128
20	4.483	33.002	26.148
30	4.705	33.135	26.229
40	4.775	33.206	26.278
50	5.001	33.365	26.379
75	4.869	33.368	26.396

STATION US14048
LATITUDE 41-47.0 N
LONGITUI 140-40.9 E
DEPTH (m) 21

Press.	Temp.	Salinity	Sigma-T
5	7.722	33.674	26.273
10	7.709	33.677	26.277

STATION US14049
LATITUDE 41-45.8 N
LONGITUI 140-40.3 E
DEPTH (m) 30

Press.	Temp.	Salinity	Sigma-T
5	9.145	33.870	26.210
10	9.128	33.870	26.213
20	8.848	33.839	26.233

STATION US14050
LATITUDE 41-43.6 N
LONGITUI 140-40.3 E
DEPTH (m) 66

Press.	Temp.	Salinity	Sigma-T
5	9.424	33.895	26.185
10	9.428	33.896	26.185
20	9.355	33.897	26.198
30	9.048	33.907	26.255
40	8.866	33.918	26.292
50	8.500	33.942	26.368

STATION US14051
LATITUDE 41-43.2 N
LONGITUI 140-38.4 E
DEPTH (m) 63

Press.	Temp.	Salinity	Sigma-T
5	9.412	33.896	26.187
10	9.423	33.896	26.186
20	9.115	33.893	26.233
30	8.921	33.921	26.286
40	8.797	33.917	26.302
50	8.541	33.946	26.365

STATION US14052
LATITUDE 41-43.7 N
LONGITUI 140-36.1 E
DEPTH (m) 24

Press.	Temp.	Salinity	Sigma-T
5	8.703	33.885	26.291
10	8.750	33.893	26.290
20	8.758	33.899	26.294

STATION US14053
LATITUDE 41-40.9 N
LONGITUI 140-34.3 E
DEPTH (m) 42

Press.	Temp.	Salinity	Sigma-T
5	8.689	33.900	26.306
10	8.706	33.902	26.304
20	8.693	33.890	26.297
30	8.261	33.835	26.320
40	8.035	33.842	26.359

STATION US14054
LATITUDE 41-37.5 N
LONGITUI 140-30.1 E
DEPTH (m) 30

Press.	Temp.	Salinity	Sigma-T
5	8.065	33.888	26.391
10	8.073	33.887	26.389
20	8.089	33.889	26.388

STATION US14055
LATITUDE 41-34.7 N
LONGITUI 140-32.7 E
DEPTH (m) 63

Press.	Temp.	Salinity	Sigma-T
5	8.286	33.946	26.403
10	8.287	33.947	26.404
20	8.280	33.950	26.407
30	8.276	33.949	26.407
40	8.272	33.950	26.409
50	8.253	33.956	26.416

STATION US14056
LATITUDE 41-35.0 N
LONGITUI 140-29.9 E
DEPTH (m) 44

Press.	Temp.	Salinity	Sigma-T
5	8.126	33.899	26.390
10	8.132	33.899	26.389
20	8.137	33.900	26.390
30	8.133	33.900	26.390
40	8.139	33.900	26.389

STATION US14057
LATITUDE 41-35.1 N
LONGITUI 140-26.9 E
DEPTH (m) 15

Press.	Temp.	Salinity	Sigma-T
5	7.774	33.803	26.367
10	7.776	33.804	26.367

STATION US14058
LATITUDE 41-28.7 N
LONGITUI 140-21.1 E
DEPTH (m) 66

Press.	Temp.	Salinity	Sigma-T
5	8.344	33.826	26.301
10	8.394	33.951	26.391
20	8.400	33.954	26.392
30	8.353	33.954	26.399
40	8.227	33.938	26.406
50	7.993	33.967	26.463

STATION US14059
LATITUDE 41-28.0 N
LONGITUI 140-16.6 E
DEPTH (m) 31

Press.	Temp.	Salinity	Sigma-T
5	8.430	33.923	26.364
10	8.431	33.929	26.368
20	8.392	33.936	26.380
30	8.391	33.936	26.380

STATION US14060
LATITUDE 41-26.8 N
LONGITUI 140-17.1 E
DEPTH (m) 57

Press.	Temp.	Salinity	Sigma-T
5	8.377	33.943	26.387
10	8.363	33.943	26.390
20	8.890	33.950	26.313
30	9.393	33.904	26.197
40	8.959	33.933	26.289
50	8.355	33.926	26.377

Table 2 (Continued)

STATION US14061
LATITUDE 41-37.6 N
LONGITUI 140-29.2 E
DEPTH (m) 26

Press.	Temp.	Salinity	Sigma-T
5	8.336	33.882	26.346
10	8.339	33.883	26.346
20	8.154	33.869	26.363

STATION US14062
LATITUDE 41-38.1 N
LONGITUI 140-26.3 E
DEPTH (m) 12

Press.	Temp.	Salinity	Sigma-T
5	6.889	33.687	26.400
10	6.875	33.682	26.397

STATION US14063
LATITUDE 41-46.9 N
LONGITUI 140-40.4 E
DEPTH (m) 21

Press.	Temp.	Salinity	Sigma-T
5	5.299	33.224	26.233
10	5.448	33.272	26.254
20	6.548	33.534	26.324

STATION US14064
LATITUDE 41-45.4 N
LONGITUI 140-40.2 E
DEPTH (m) 40

Press.	Temp.	Salinity	Sigma-T
5	5.066	33.163	26.211
10	5.206	33.210	26.233
20	5.255	33.225	26.239
30	5.662	33.304	26.254
40	6.586	33.597	26.369

STATION US14065
LATITUDE 41-43.7 N
LONGITUI 140-40.1 E
DEPTH (m) 64

Press.	Temp.	Salinity	Sigma-T
5	4.598	33.075	26.193
10	4.600	33.079	26.196
20	5.674	33.345	26.285
30	6.386	33.476	26.300
40	7.133	33.663	26.347
50	7.342	33.686	26.336

STATION US14066
LATITUDE 41-43.6 N
LONGITUI 140-38.0 E
DEPTH (m) 58

Press.	Temp.	Salinity	Sigma-T
5	5.315	33.237	26.242
10	5.386	33.246	26.240
20	5.503	33.280	26.253
30	6.027	33.392	26.279
40	6.133	33.406	26.277
50	7.416	33.705	26.341

STATION US14067
LATITUDE 41-43.9 N
LONGITUI 140-35.8 E
DEPTH (m) 14

Press.	Temp.	Salinity	Sigma-T
5	5.183	33.169	26.203
10	5.358	33.239	26.238

STATION US14068
LATITUDE 41-41.1 N
LONGITUI 140-34.2 E
DEPTH (m) 41

Press.	Temp.	Salinity	Sigma-T
5	6.553	33.568	26.350
10	7.163	33.669	26.348
20	7.346	33.675	26.327
30	7.541	33.714	26.330
40	7.688	33.745	26.334

STATION US14069
LATITUDE 41-37.7 N
LONGITUI 140-30.4 E
DEPTH (m) 33

Press.	Temp.	Salinity	Sigma-T
5	5.861	33.335	26.254
10	5.842	33.339	26.260
20	7.137	33.677	26.358
30	7.304	33.719	26.368

STATION US14070
LATITUDE 41-37.6 N
LONGITUI 140-28.4 E
DEPTH (m) 24

Press.	Temp.	Salinity	Sigma-T
5	5.615	33.276	26.237
10	5.666	33.308	26.257
20	6.838	33.752	26.458

STATION US14071
LATITUDE 41-38.0 N
LONGITUI 140-26.7 E
DEPTH (m) 16

Press.	Temp.	Salinity	Sigma-T
5	7.287	33.783	26.420
10	7.227	33.793	26.437

STATION US14072
LATITUDE 41-38.8 N
LONGITUI 140-32.9 E
DEPTH (m) 62

Press.	Temp.	Salinity	Sigma-T
5	8.164	33.866	26.359
10	8.156	33.865	26.360
20	8.128	33.877	26.373
30	8.091	33.877	26.379
40	8.088	33.879	26.380
50	8.086	33.879	26.381

STATION US14073
LATITUDE 41-34.8 N
LONGITUI 140-29.8 E
DEPTH (m) 45

Press.	Temp.	Salinity	Sigma-T
5	6.246	33.417	26.271
10	6.590	33.554	26.334
20	7.305	33.688	26.343
30	7.434	33.737	26.364
40	7.485	33.753	26.369

STATION US14074
LATITUDE 41-34.8 N
LONGITUI 140-27.1 E
DEPTH (m) 23

Press.	Temp.	Salinity	Sigma-T
5	5.927	33.355	26.262
10	6.154	33.483	26.334
20	7.155	33.780	26.437

STATION US14075
LATITUDE 42-23.2 N
LONGITUI 140-42.9 E
DEPTH (m) 60

Press.	Temp.	Salinity	Sigma-T
5	3.228	32.958	26.235
10	3.226	32.960	26.237
20	3.225	32.961	26.238
30	4.088	33.407	26.510
40	4.399	33.451	26.513
50	4.471	33.466	26.517

Table 2 (Continued)

STATION US14076
LATITUDE 42-28.1 N
LONGITUI 140-43.2 E
DEPTH (m) 60

Press.	Temp.	Salinity	Sigma-T
5	3.127	32.931	26.223
10	3.128	32.932	26.224
20	3.165	32.947	26.232
30	3.042	32.977	26.267
40	2.948	33.009	26.301
50	4.550	33.550	26.575

STATION US14077
LATITUDE 42-31.1 N
LONGITUI 140-37.8 E
DEPTH (m) 62

Press.	Temp.	Salinity	Sigma-T
5	2.841	32.748	26.101
10	3.275	32.956	26.229
20	3.472	32.983	26.233
30	3.280	33.000	26.264
40	3.250	33.052	26.308
50	4.311	33.394	26.477

STATION US14078
LATITUDE 42-29.1 N
LONGITUI 140-31.6 E
DEPTH (m) 75

Press.	Temp.	Salinity	Sigma-T
5	2.795	33.024	26.326
10	2.925	33.068	26.350
20	3.074	33.117	26.376
30	3.129	33.161	26.405
40	3.286	33.226	26.443
50	4.372	33.473	26.533
75	4.579	33.508	26.539

STATION US14079
LATITUDE 42-26.0 N
LONGITUI 140-36.7 E
DEPTH (m) 85

Press.	Temp.	Salinity	Sigma-T
5	3.151	33.023	26.294
10	3.127	33.024	26.297
20	3.079	33.044	26.317
30	3.069	33.110	26.370
40	3.215	33.197	26.427
50	3.614	33.293	26.466
75	4.975	33.556	26.533

STATION US14080
LATITUDE 42-24.0 N
LONGITUI 140-31.7 E
DEPTH (m) 96

Press.	Temp.	Salinity	Sigma-T
5	3.080	33.014	26.293
10	3.057	33.022	26.302
20	2.973	33.054	26.334
30	3.034	33.087	26.355
40	4.637	33.453	26.489
50	4.963	33.587	26.559
75	4.931	33.551	26.534

STATION US14081
LATITUDE 42-21.1 N
LONGITUI 140-36.3 E
DEPTH (m) 89

Press.	Temp.	Salinity	Sigma-T
5	3.211	33.061	26.319
10	3.210	33.063	26.320
20	3.221	33.070	26.325
30	3.814	33.248	26.411
40	4.201	33.346	26.450
50	4.346	33.426	26.498
75	4.804	33.537	26.537

STATION US14082
LATITUDE 42-19.1 N
LONGITUI 140-31.1 E
DEPTH (m) 94

Press.	Temp.	Salinity	Sigma-T
5	3.245	33.055	26.311
10	3.233	33.055	26.312
20	3.052	33.099	26.363
30	3.076	33.127	26.383
40	3.502	33.261	26.451
50	4.304	33.428	26.505
75	4.853	33.539	26.534

STATION US14083
LATITUDE 42-18.7 N
LONGITUI 140-23.2 E
DEPTH (m) 54

Press.	Temp.	Salinity	Sigma-T
5	3.589	33.126	26.335
10	3.563	33.120	26.333
20	3.496	33.125	26.344
30	3.768	33.215	26.389
40	4.486	33.373	26.442
50	5.180	33.537	26.495

STATION US14084
LATITUDE 42-16.7 N
LONGITUI 140-37.9 E
DEPTH (m) 88

Press.	Temp.	Salinity	Sigma-T
5	3.272	33.038	26.295
10	3.427	33.272	26.467
20	3.810	33.366	26.505
30	3.746	33.335	26.487
40	3.814	33.357	26.498
50	3.886	33.367	26.499
75	4.465	33.485	26.533

STATION US14085
LATITUDE 42-18.2 N
LONGITUI 140-41.9 E
DEPTH (m) 66

Press.	Temp.	Salinity	Sigma-T
5	3.431	32.939	26.202
10	3.436	32.944	26.205
20	3.598	32.994	26.230
30	3.186	33.006	26.277
40	3.216	33.085	26.337
50	3.235	33.096	26.344

STATION US14086
LATITUDE 42-20.8 N
LONGITUI 140-48.1 E
DEPTH (m) 53

Press.	Temp.	Salinity	Sigma-T
5	3.536	32.941	26.194
10	3.551	32.942	26.193
20	3.550	32.942	26.193
30	3.575	32.973	26.215
40	3.430	32.976	26.231
50	3.160	33.035	26.303

STATION US14087
LATITUDE 42-15.5 N
LONGITUI 140-47.7 E
DEPTH (m) 71

Press.	Temp.	Salinity	Sigma-T
5	3.451	32.850	26.128
10	3.446	32.843	26.124
20	3.436	32.838	26.120
30	3.903	32.999	26.204
40	4.011	33.005	26.198
50	4.564	33.259	26.343

STATION US14088
LATITUDE 42-13.2 N
LONGITUI 140-41.6 E
DEPTH (m) 89

Press.	Temp.	Salinity	Sigma-T
5	3.095	33.009	26.288
10	3.105	33.008	26.286
20	3.549	33.279	26.461
30	3.957	33.394	26.513
40	4.285	33.432	26.510
50	4.327	33.431	26.505
75	4.748	33.507	26.520

STATION US14089
LATITUDE 42-13.9 N
LONGITUI 140-30.3 E
DEPTH (m) 79

Press.	Temp.	Salinity	Sigma-T
5	3.188	33.128	26.374
10	3.177	33.128	26.375
20	3.144	33.149	26.395
30	3.415	33.238	26.441
40	3.664	33.326	26.487
50	3.777	33.368	26.510
75	5.092	33.563	26.526

STATION US14090
LATITUDE 42-11.2 N
LONGITUI 140-34.9 E
DEPTH (m) 80

Press.	Temp.	Salinity	Sigma-T
5	3.081	33.125	26.381
10	3.079	33.123	26.380
20	3.303	33.185	26.409
30	3.367	33.228	26.438
40	3.694	33.311	26.473
50	4.376	33.507	26.559
75	4.800	33.548	26.547

Table 2 (Continued)

STATION US14091
LATITUDE 42-08.9 N
LONGITUI 140-35.7 E
DEPTH (m) 66

Press.	Temp.	Salinity	Sigma-T
5	3.506	33.173	26.381
10	3.475	33.173	26.383
20	3.474	33.183	26.392
30	3.336	33.190	26.410
40	3.299	33.201	26.422
50	3.221	33.207	26.434

STATION US14092
LATITUDE 42-10.2 N
LONGITUI 140-40.6 E
DEPTH (m) 85

Press.	Temp.	Salinity	Sigma-T
5	3.508	33.185	26.391
10	3.469	33.184	26.393
20	3.474	33.194	26.401
30	3.412	33.196	26.408
40	3.370	33.219	26.430
50	3.357	33.242	26.450
75	3.707	33.335	26.490

STATION US14093
LATITUDE 42-09.9 N
LONGITUI 140-46.6 E
DEPTH (m) 95

Press.	Temp.	Salinity	Sigma-T
5	3.020	33.014	26.298
10	3.008	33.017	26.301
20	3.405	33.230	26.436
30	3.492	33.263	26.454
40	3.599	33.290	26.465
50	3.824	33.364	26.502
75	4.936	33.559	26.540

STATION US14094
LATITUDE 41-59.5 N
LONGITUI 141-01.4 E
DEPTH (m) 98

Press.	Temp.	Salinity	Sigma-T
5	3.262	32.782	26.092
10	3.253	32.781	26.092
20	3.445	32.859	26.137
30	3.423	32.863	26.142
40	3.419	32.892	26.165
50	3.500	32.921	26.181
75	4.452	33.172	26.286

STATION US14095
LATITUDE 41-58.7 N
LONGITUI 141-00.5 E
DEPTH (m) 94

Press.	Temp.	Salinity	Sigma-T
5	3.527	32.887	26.151
10	3.532	32.885	26.149
20	3.621	32.929	26.176
30	3.603	32.924	26.174
40	3.602	32.930	26.178
50	3.834	32.985	26.200
75	4.202	33.403	26.495

STATION US14096
LATITUDE 41-58.0 N
LONGITUI 140-59.6 E
DEPTH (m) 88

Press.	Temp.	Salinity	Sigma-T
5	3.462	32.874	26.147
10	3.491	32.890	26.157
20	3.555	32.925	26.178
30	3.585	32.934	26.183
40	3.616	32.946	26.190
50	4.392	33.335	26.421
75	3.838	33.346	26.486

STATION US14097
LATITUDE 41-57.4 N
LONGITUI 140-58.3 E
DEPTH (m) 80

Press.	Temp.	Salinity	Sigma-T
5	3.360	32.864	26.148
10	3.356	32.863	26.148
20	3.126	32.975	26.258
30	3.444	33.210	26.417
40	3.557	33.241	26.430
50	3.419	33.249	26.449
75	3.396	33.255	26.456

STATION US14098
LATITUDE 41-24.5 N
LONGITUI 140-06.1 E
DEPTH (m) 56

Press.	Temp.	Salinity	Sigma-T
5	7.407	33.877	26.477
10	6.462	33.871	26.602
20	5.394	33.958	26.803
30	4.952	33.985	26.876
40	4.691	34.000	26.917
50	4.653	34.004	26.925

STATION US14099
LATITUDE 41-24.0 N
LONGITUI 140-05.4 E
DEPTH (m) 79

Press.	Temp.	Salinity	Sigma-T
5	7.256	33.902	26.518
10	7.040	33.912	26.556
20	6.777	33.968	26.636
30	5.705	33.966	26.772
40	4.975	33.962	26.856
50	4.650	34.011	26.931

STATION US14100
LATITUDE 41-23.4 N
LONGITUI 140-05.7 E
DEPTH (m) 102

Press.	Temp.	Salinity	Sigma-T
5	7.400	33.896	26.494
10	7.401	33.895	26.492
20	7.227	33.910	26.529
30	5.983	33.946	26.722
40	5.412	33.986	26.823
50	4.931	34.003	26.892
75	4.576	34.014	26.941

STATION US14101
LATITUDE 41-22.2 N
LONGITUI 140-06.1 E
DEPTH (m) 119

Press.	Temp.	Salinity	Sigma-T
5	7.400	33.896	26.494
10	7.401	33.895	26.492
20	7.227	33.910	26.529
30	5.983	33.946	26.722
40	5.412	33.986	26.823
50	4.931	34.003	26.892
75	4.576	34.014	26.941

STATION US14102
LATITUDE 41-24.2 N
LONGITUI 140-19.6 E
DEPTH (m) 95

Press.	Temp.	Salinity	Sigma-T
5	6.765	33.931	26.609
10	6.742	33.937	26.616
20	6.705	33.951	26.633
30	6.730	33.938	26.618
40	6.699	33.945	26.629
50	6.656	33.937	26.628
75	4.607	34.004	26.930

STATION US14103
LATITUDE 41-26.4 N
LONGITUI 140-17.6 E
DEPTH (m) 68

Press.	Temp.	Salinity	Sigma-T
5	8.419	33.900	26.347
10	8.307	33.903	26.366
20	7.955	33.916	26.430
30	7.808	33.932	26.463
40	7.774	33.932	26.468
50	7.601	33.924	26.487

STATION US14104
LATITUDE 41-27.7 N
LONGITUI 140-16.5 E
DEPTH (m) 33

Press.	Temp.	Salinity	Sigma-T
5	6.975	33.640	26.351
10	6.973	33.645	26.355
20	6.963	33.650	26.360
30	7.113	33.689	26.371

STATION US14105
LATITUDE 41-28.7 N
LONGITUI 140-20.4 E
DEPTH (m) 61

Press.	Temp.	Salinity	Sigma-T
5	8.770	33.892	26.287
10	8.711	33.885	26.291
20	8.508	33.891	26.327
30	7.988	33.923	26.430
40	7.586	33.929	26.493
50	6.862	33.916	26.584

2

THE " USHIO MARU "

CRUISE 303
CRUISE 304
CRUISE 305

IN FEBRUARY 2014
IN MARCH 2014
IN APRIL 2014

1. Cruise Itinerary

Cruise 303

Departure from Hakodate	Feb.	21, 2014
Start hydrographic research (US14106)		21
Finish hydrographic research (US14127)		22
Return to Hakodate		23

Total coverage 155.4 miles

Cruise 304

Departure from Hakodate	Mar.	3, 2014
Start hydrographic research (US14128)		3
Arrival at and departure from Hakodate		4
Finish hydrographic research (US14148)		5
Return to Hakodate		5

Total coverage 279.3 miles

Cruise 305

Departure from Hakodate	Apr.	12, 2014
Start hydrographic research (US14149)		12
Arrival at and departure from Usujiri		12
Sampling by frame trawl net		13
Arrival at Usujiri		14
Depart from Usujiri		15
Retrieval ADCP mooring system		15
Arrival at Muroran		15
Setting ADCP mooring system		16
Arrival at Usujiri		16
Departure from Usujiri		17
Arrival and departure from Usujiri		18
Finish hydrographic research (US14192)		18
Return to Hakodate		19

Total coverage 456.4 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 and salinity were measured by CTD (Seabird SBE-9Plus and SBE-19).

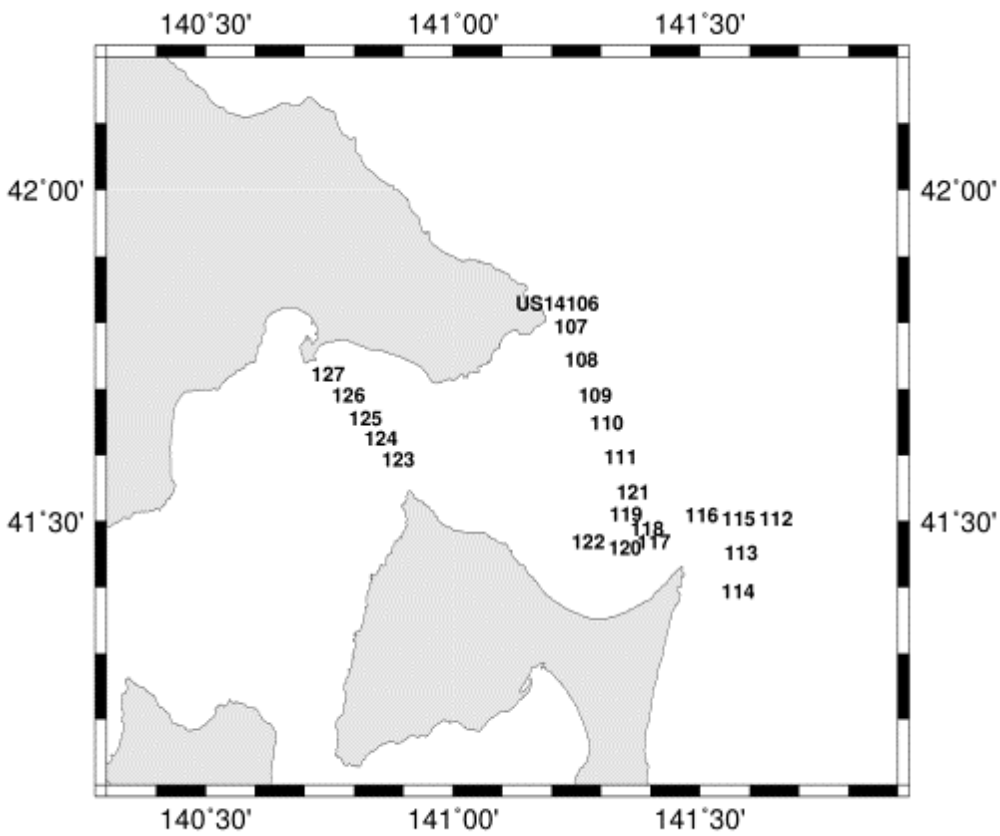

Figure 1. Oceanographic stations (Cruise 303)

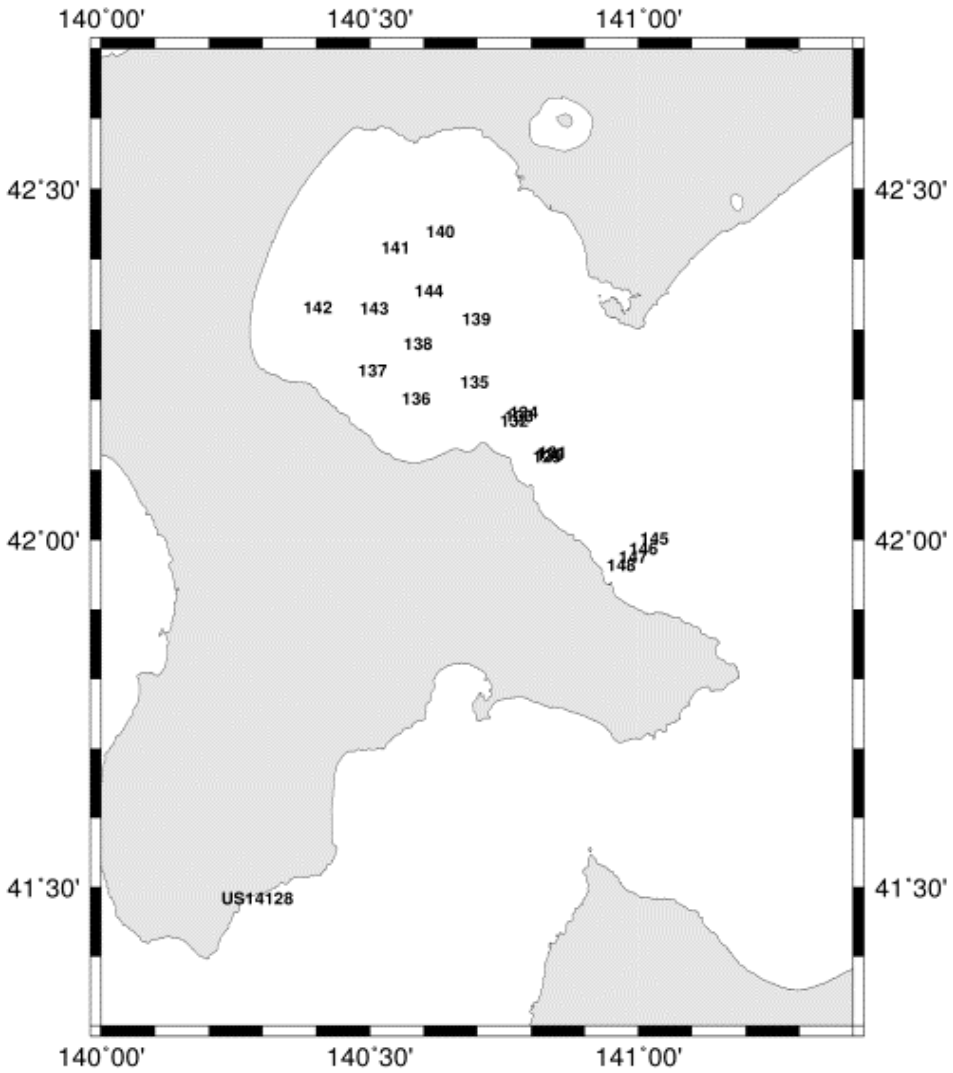

Figure 2. Oceanographic stations (Cruise 304)

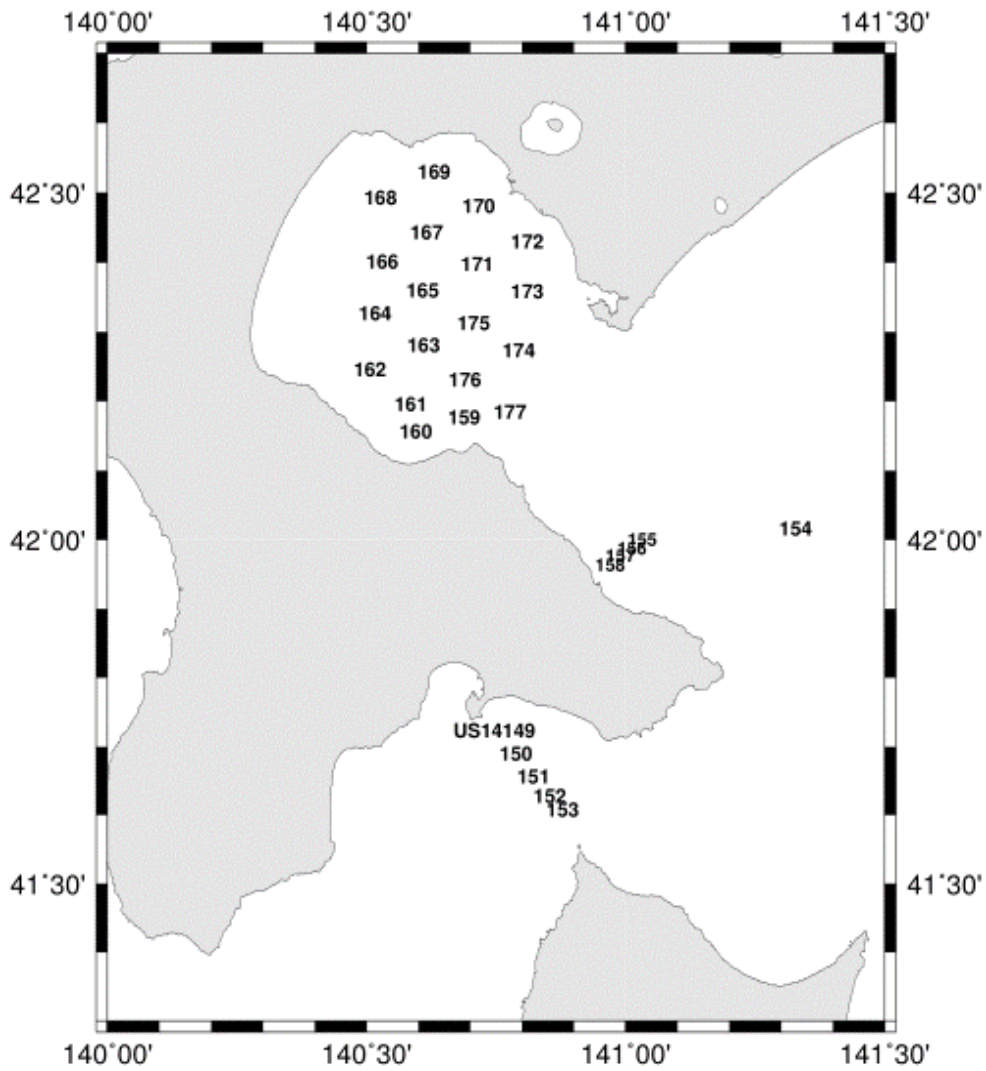

Figure 3. Oceanographic stations (Cruise 305)

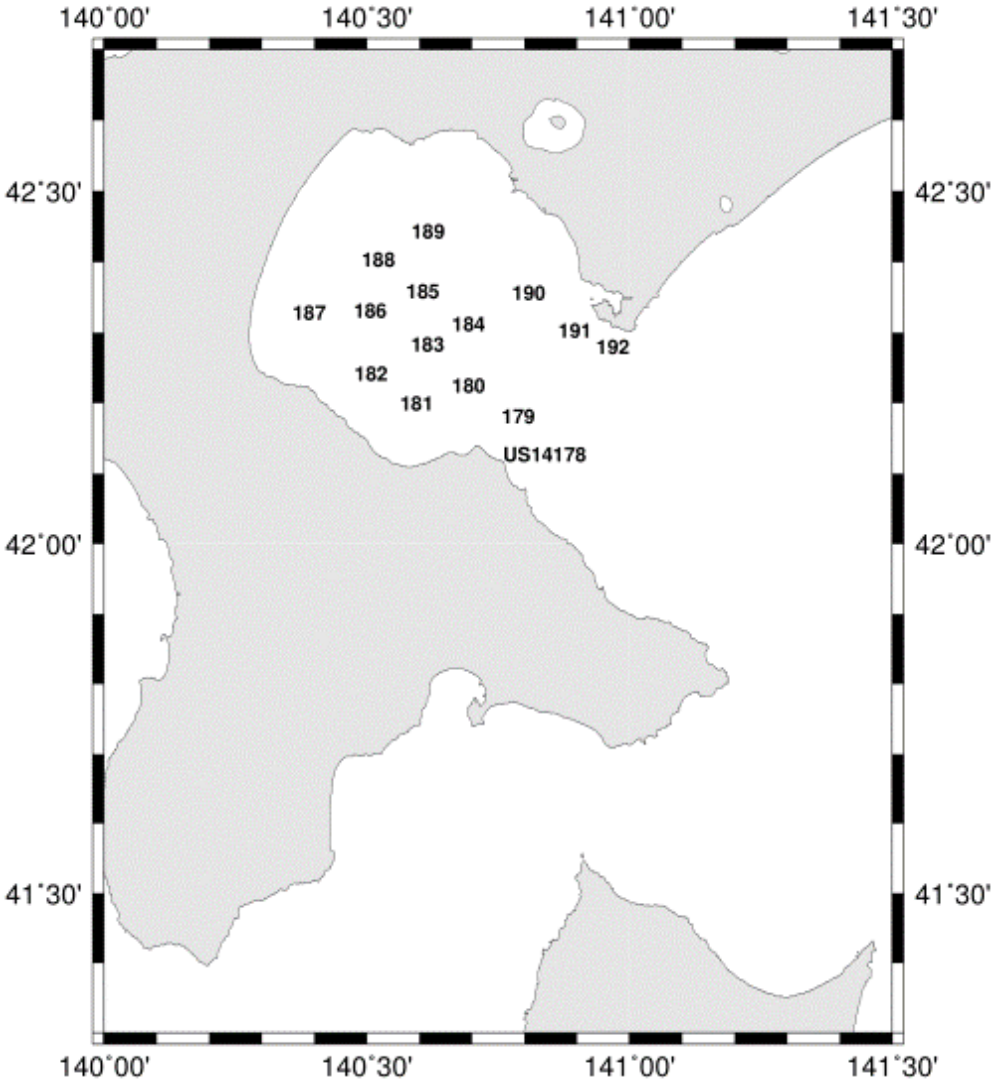

Figure 4. Oceanographic stations (Cruise 305)

Table 1. List of Oceanographic Station

Cruise 303

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14106	41-49.1	141-12.7	2/21	1047-1055	129	NW -3	NW -1	NW -5	-0.1	1.2	bc
US14107	41-47.0	141-14.3	2/21	1150-1202	194	NW -1	NW -1	NW -2	-0.4	1.3	bc
US14108	41-44.0	141-15.6	2/21	1222-1230	227	NW -1	NW -1	NW -3	-1.3	1.6	bc
US14109	41-40.8	141-17.3	2/21	1252-1300	232	West-3	West-1	West-5	-1.0	1.7	s
US14110	41-38.3	141-18.7	2/21	1318-1326	214	West-3	West-1	West-5	-0.5	1.6	bc
US14111	41-35.2	141-20.4	2/21	1348-1400	305	West-3	West-1	West-5	-0.8	1.5	bc
US14112	41-29.6	141-39.2	2/21	1521-1542	598	West-3	West-1	West-5	-0.6	1.4	bc
US14113	41-26.5	141-35.0	2/21	1611-1624	380	West-3	West-1	West-5	-1.3	2.1	bc
US14114	41-23.0	141-34.6	2/21	1647-1700	370	West-3	West-1	West-5	-0.7	1.9	bc
US14115	41-29.6	141-34.7	2/22	0552-0559	141	NW -3	NW -1	NW -5	-1.5	1.1	bc
US14116	41-29.9	141-30.2	2/22	0623-0626	66	NW -3	NW -1	NW -5	-1.6	1.8	bc
US14117	41-27.5	141-24.4	2/22	0658-0702	49	NW -3	NW -1	NW -5	-1.2	1.8	bc
US14118	41-28.7	141-23.6	2/22	0712-0717	86	NW -3	NW -1	NW -5	-0.9	1.6	bc
US14119	41-30.0	141-21.0	2/22	0736-0746	232	NW -3	NW -1	NW -5	-0.9	1.7	bc
US14120	41-27.0	141-20.9	2/22	0811-0818	85	West-2	NW -1	West-5	-0.8	1.8	bc
US14121	41-32.0	141-21.9	2/22	0850-0900	261	West-3	NW -1	West-5	0.1	3.0	bc
US14122	41-27.5	141-16.4	2/22	1027-1034	134	West-3	West-1	West-5	-0.1	1.8	bc
US14123	41-35.0	140-53.4	2/22	1306-1309	41	West-3	West-1	West-5	2.0	6.1	s
US14124	41-36.9	140-51.3	2/22	1329-1335	94	West-3	West-1	West-5	1.8	5.7	bc
US14125	41-38.7	140-49.4	2/22	1352-1405	333	West-3	West-1	West-5	1.5	5.2	bc
US14126	41-40.8	140-47.3	2/22	1424-1433	230	West-2	West-1	West-4	1.7	4.6	bc
US14127	41-42.7	140-44.9	2/22	1451-1455	87	West-3	West-1	West-5	1.7	2.0	bc

Cruise 304

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14128	41-28.5	140-17.4	3/3	1115-1118	33	West-3	SW -1	West-5	-1.2	2.7	bc
US14129	42-06.6	140-49.8	3/4	1213-1216	38	NW -3	NW -1	NW -5	-0.4	1.1	c
US14130	42-06.8	140-50.1	3/4	1229-1232	64	NW -2	NW -1	NW -4	0.1	1.7	c
US14131	42-07.0	140-50.4	3/4	1245-1249	69	NW -2	NW -1	NW -4	0.2	1.5	c
US14132	42-09.7	140-46.1	3/4	1327-1331	92	NW -2	NW -1	NW -4	-0.4	1.3	c
US14133	42-10.1	140-46.7	3/4	1352-1356	96	NW -2	NW -1	NW -4	-0.1	1.3	c
US14134	42-10.4	140-47.2	3/4	1409-1413	92	NW -2	NW -1	NW -4	-0.4	1.3	c
US14135	42-13.0	140-41.7	3/4	1453-1457	90	NW -1	NW -1	NW -3	-1.4	1.4	o
US14136	42-11.6	140-35.2	3/4	1554-1600	83	NE -1	NW -1	NE -3	-2.3	1.5	s
US14137	42-14.0	140-30.3	3/4	1639-1643	81	NE -1	NW -1	NE -3	-2.5	1.7	s
US14138	42-16.3	140-35.4	3/4	1726-1731	92	East-2	NW -1	East-4	-2.9	1.5	s
US14139	42-18.4	140-41.9	3/4	1817-1821	67	East-2	NW -1	East-4	-2.8	1.4	s
US14140	42-25.9	140-37.9	3/5	0616-0620	83	East-1	SE -1	East-3	-0.1	1.2	o
US14141	42-24.5	140-32.9	3/5	0657-0701	95	East-1	SE -1	East-2	0.6	1.2	o
US14142	42-19.4	140-24.2	3/5	0801-0805	62	SE -2	SE -1	SE -4	0.6	1.5	o
US14143	42-19.3	140-30.5	3/5	0847-0851	94	SE -2	SE -1	SE -4	0.6	1.6	o
US14144	42-20.8	140-36.6	3/5	0938-0943	88	SE -2	SE -1	SE -4	0.9	1.4	o
US14145	41-59.6	141-01.8	3/5	1255-1259	100	Calm	SE -1	Calm	1.1	0.2	o
US14146	41-58.7	141-00.6	3/5	1308-1312	94	Calm	SE -1	Calm	1.1	0.2	s
US14147	41-58.0	140-59.4	3/5	1326-1330	87	Calm	SE -1	Calm	1.1	0.3	o
US14148	41-57.3	140-58.1	3/5	1338-1341	77	Calm	SE -1	Calm	1.0	0.3	s

Table 1 (Continued)

Cruise 305

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14149	41-42.8	140-44.8	4/12	0835-0843	84	SW -1	South-1	SW -2	6.3	7.0	bc
US14150	41-40.8	140-47.3	4/12	0902-0911	228	SW -1	South-1	SW -3	6.0	7.0	bc
US14151	41-38.8	140-49.3	4/12	0930-0942	344	SW -1	South-1	SW -2	6.7	8.2	bc
US14152	41-37.1	140-51.2	4/12	0959-1003	98	SW -1	South-1	SW -2	7.3	8.2	bc
US14153	41-35.9	140-52.7	4/12	1015-1018	39	SW -1	South-1	SW -2	7.2	8.2	bc
US14154	42-00.4	141-19.7	4/13	0653-0703	310	NW -2	NW -1	NW -3	2.7	0.9	bc
US14154-2	42-00.0	141-14.4	4/13	0948-0958	225	NW -2	NW -1	NW -3	3.8	1.3	bc
US14154-3	42-00.0	141-19.8	4/13	1155-1205	305	NNW-2	NW -1	NNW-3	6.3	2.0	bc
US14154-4	42-00.0	141-14.2	4/13	1509-1518	223	South-1	NW -1	South-2	6.6	3.0	bc
US14154-5	41-59.9	141-19.9	4/13	1920-1931	305	Calm	WNW-1	Calm	4.9	2.6	bc
US14154-6	42-00.0	141-17.3	4/13	2050-2102	260	Calm	WNW-1	Calm	4.6	2.7	bc
US14154-7	41-59.9	141-19.5	4/13	2131-2145	300	Calm	NW -1	Calm	4.0	2.1	bc
US14154-8	41-59.5	141-15.4	4/13	2340-2351	243	Calm	NW -1	Calm	3.6	2.6	bc
US14155	41-59.5	141-01.9	4/14	0326-0331	102	Calm	NW -1	Calm	2.4	2.5	bc
US14156	41-58.7	141-00.7	4/14	0341-0346	95	Calm	NW -1	Calm	2.1	2.3	bc
US14157	41-58.1	140-59.4	4/14	0355-0400	87	Calm	NW -1	Calm	2.4	2.3	bc
US14158	41-57.3	140-58.2	4/14	0409-0414	79	Calm	NW -1	Calm	2.8	3.4	bc
US14159	42-10.0	140-41.3	4/15	0634-0638	82	Calm	East-1	Calm	6.8	2.8	bc
US14160	42-08.8	140-35.7	4/15	0716-0720	65	West-2	West-1	West-3	9.3	3.3	bc
US14161	42-11.2	140-35.1	4/15	0745-0749	80	SW -2	West-1	SW -3	10.2	3.3	bc
US14162	42-14.2	140-30.4	4/15	0818-0823	81	WSW-3	WSW-1	WSW-5	9.2	3.2	c
US14163	42-16.3	140-36.6	4/15	0904-0909	90	West-1	WSW-1	West-3	9.9	3.9	c
US14164	42-19.0	140-31.0	4/15	1000-1005	94	SW -2	WSW-1	SW -4	9.2	3.8	bc
US14165	42-21.0	140-36.5	4/15	1042-1046	88	SW -1	WSW-1	SW -3	10.3	4.1	c
US14166	42-23.5	140-31.8	4/15	1119-1123	96	SW -4	WSW-1	SW -6	8.6	3.8	c
US14167	42-26.0	140-36.9	4/15	1200-1205	85	SW -3	WSW-1	SW -5	9.1	3.9	c
US14168	42-29.0	140-31.6	4/15	1249-1253	75	SW -3	WSW-1	SW -5	7.9	3.7	o
US14169	42-31.2	140-37.8	4/15	1328-1332	62	SW -3	WSW-1	SW -5	8.1	4.0	o
US14170	42-28.3	140-43.0	4/15	1402-1406	61	SW -3	WSW-1	SW -5	8.2	3.6	o
US14171	42-23.3	140-42.8	4/15	1437-1441	62	West-2	WSW-1	West-3	7.3	3.4	r
US14172	42-25.2	140-48.6	4/15	1510-1513	44	West-2	West-1	West-4	7.6	3.9	o
US14173	42-20.9	140-48.6	4/16	0542-0546	53	WSW-2	West-1	WSW-5	5.3	3.4	bc
US14174	42-15.8	140-47.6	4/16	0620-0623	71	West-3	West-1	West-5	5.4	3.2	bc
US14175	42-18.2	140-42.4	4/16	0653-0557	63	West-3	West-1	West-5	5.9	3.7	bc
US14176	42-13.3	140-41.4	4/16	0757-0802	89	West-3	West-1	West-5	5.9	3.7	bc
US14177	42-10.5	140-46.6	4/16	0830-0836	94	NW -3	West-1	NW -5	5.4	2.8	bc
US14178C	42-06.5	140-49.7	4/17	0610-0613	49	NW -2	NW -1	NW -4	6.0	3.0	bc
US14178B	42-06.8	140-50.1	4/17	0629-0633	62	NW -2	NW -1	NW -4	5.5	2.8	bc
US14178	42-07.0	140-50.3	4/17	0649-0652	70	NW -2	NW -1	NW -4	5.6	2.8	bc
US14179C	42-09.7	140-46.3	4/17	0731-0736	93	West-2	NW -1	West-4	5.7	2.8	bc
US14179B	42-10.1	140-46.9	4/17	0752-0757	95	West-2	NW -1	West-4	5.9	2.9	bc
US14179	42-10.3	140-47.3	4/17	0812-0816	92	NW -2	NW -1	NW -4	5.6	2.9	bc
US14180	42-12.9	140-41.6	4/17	0900-0904	90	NW -1	NW -1	NW -3	6.6	3.7	bc
US14181	42-11.4	140-35.7	4/17	1019-1023	82	NW -1	NW -1	NW -3	7.1	4.0	bc
US14182	42-13.9	140-30.5	4/17	1107-1111	80	NW -3	NW -1	NW -5	8.2	2.8	bc
US14183	42-16.4	140-36.9	4/17	1201-1206	90	West-2	NW -1	West-4	8.8	3.9	bc
US14184	42-18.1	140-41.6	4/17	1250-1253	67	NW -2	NW -1	NW -4	7.9	4.2	bc
US14185	42-20.9	140-36.4	4/17	1333-1338	88	NW -2	NW -1	NW -4	7.0	4.1	bc
US14186	42-19.3	140-30.4	4/17	1416-1420	93	NW -2	NW -1	NW -4	6.6	4.1	bc
US14187	42-19.1	140-23.4	4/17	1506-1509	56	NW -3	NW -1	NW -5	7.5	3.9	bc
US14188	42-23.6	140-31.3	4/17	1608-1613	97	NW -3	NW -1	NW -5	6.9	3.8	bc
US14189	42-26.0	140-37.0	4/17	1656-1702	85	NW -3	NW -1	NW -5	6.5	3.9	bc
US14190	42-20.8	140-48.5	4/18	0501-0505	53	Calm	West-1	Calm	2.8	4.0	bc
US14191	42-17.6	140-53.8	4/18	0551-0554	57	Calm	ESE-1	Calm	3.3	3.1	bc
US14192	42-16.2	140-58.1	4/18	0627-0630	62	WNW-1	ESE-1	WNW-3	3.7	2.5	bc

(*): Fixed position by Global Positioning System

S.M.T.: Ship's mean time

Wr.: Weather in WMO Code 4501

Table 2. Oceanographic data

STATION US14106
LATITUDE 41-49.1 N
LONGITUI 141-12.7 E
DEPTH (m) 129

Press.	Temp.	Salinity	Sigma-T
5	1.613	32.466	25.969
10	1.594	32.464	25.969
20	1.763	32.539	26.018
30	1.992	32.605	26.053
40	2.154	32.640	26.070
50	2.360	32.713	26.112
75	5.897	33.357	26.267
100	5.581	33.303	26.263

STATION US14107
LATITUDE 41-47.0 N
LONGITUI 141-14.3 E
DEPTH (m) 194

Press.	Temp.	Salinity	Sigma-T
5	1.679	32.460	25.959
10	1.619	32.468	25.970
20	1.660	32.490	25.985
30	1.866	32.525	25.999
40	1.958	32.575	26.032
50	2.293	32.652	26.068
75	3.206	32.955	26.234
100	5.824	33.341	26.263
125	6.799	33.507	26.269
150	4.801	33.242	26.304
175	4.372	33.321	26.412

STATION US14108
LATITUDE 41-44.0 N
LONGITUI 141-15.6 E
DEPTH (m) 227

Press.	Temp.	Salinity	Sigma-T
5	1.781	32.490	25.976
10	1.756	32.507	25.992
20	1.889	32.547	26.015
30	2.102	32.590	26.033
40	2.383	32.631	26.045
50	2.695	32.712	26.084
75	5.015	33.226	26.267
100	6.733	33.460	26.242
125	5.428	33.308	26.285
150	4.349	33.331	26.423
175	4.258	33.389	26.478
200	3.754	33.406	26.543

STATION US14109
LATITUDE 41-40.8 N
LONGITUI 141-17.3 E
DEPTH (m) 232

Press.	Temp.	Salinity	Sigma-T
5	2.124	32.575	26.020
10	2.121	32.577	26.021
20	2.190	32.606	26.040
30	2.288	32.637	26.057
40	2.741	32.718	26.085
50	3.255	32.896	26.183
75	6.776	33.472	26.245
100	5.597	33.325	26.278
125	4.044	33.286	26.418
150	3.661	33.434	26.574
175	3.346	33.474	26.635
200	3.283	33.495	26.658

STATION US14110
LATITUDE 41-38.3 N
LONGITUI 141-18.7 E
DEPTH (m) 214

Press.	Temp.	Salinity	Sigma-T
5	2.273	32.616	26.042
10	2.264	32.619	26.045
20	2.262	32.622	26.048
30	2.304	32.644	26.062
40	2.369	32.676	26.082
50	2.492	32.685	26.079
75	3.090	32.848	26.160
100	4.998	33.210	26.257
125	4.616	33.332	26.395
150	4.337	33.407	26.484
175	3.690	33.440	26.576
200	3.536	33.608	26.725

STATION US14111
LATITUDE 41-35.2 N
LONGITUI 141-20.4 E
DEPTH (m) 305

Press.	Temp.	Salinity	Sigma-T
5	2.022	32.562	26.017
10	2.024	32.561	26.016
20	2.022	32.564	26.019
30	2.026	32.567	26.021
40	2.039	32.572	26.024
50	2.065	32.583	26.031
75	3.703	33.038	26.255
100	4.193	33.180	26.319
125	4.625	33.629	26.630
150	4.636	33.646	26.643
175	4.558	33.645	26.650
200	4.322	33.681	26.704
250	4.191	33.928	26.914

STATION US14112
LATITUDE 41-29.6 N
LONGITUI 141-39.2 E
DEPTH (m) 598

Press.	Temp.	Salinity	Sigma-T
5	1.422	32.449	25.968
10	1.420	32.450	25.969
20	1.505	32.488	25.994
30	2.657	32.788	26.148
40	2.791	32.794	
50	3.009	32.888	26.198
75	5.607	33.668	26.548
100	5.840	33.690	26.537
125	5.841	33.698	26.544
150	5.822	33.703	26.550
175	5.832	33.706	26.551
200	5.547	33.653	26.544
250	5.410	33.723	26.615
300	4.503	33.629	26.643
400	2.706	33.557	26.759
500	3.135	33.740	26.867

STATION US14113
LATITUDE 41-26.5 N
LONGITUI 141-35.0 E
DEPTH (m) 380

Press.	Temp.	Salinity	Sigma-T
5	2.476	32.679	26.076
10	2.481	32.681	26.078
20	2.500	32.688	26.081
30	2.497	32.691	26.084
40	2.492	32.690	26.083
50	2.493	32.703	26.094
75	3.587	33.139	26.346
100	4.406	33.395	26.468
125	4.599	33.473	26.509
150	4.611	33.488	26.519
175	4.661	33.516	26.536
200	4.718	33.531	26.542
250	4.783	33.570	26.566
300	4.680	33.624	26.620

STATION US14114
LATITUDE 41-23.0 N
LONGITUI 141-34.6 E
DEPTH (m) 370

Press.	Temp.	Salinity	Sigma-T
5	2.274	32.642	26.062
10	2.277	32.643	26.063
20	2.329	32.661	26.073
30	2.411	32.691	26.091
40	2.615	32.765	26.133
50	2.785	32.875	26.207
75	4.221	33.305	26.416
100	4.704	33.449	26.479
125	4.787	33.483	26.497
150	4.749	33.496	26.511
175	4.918	33.553	26.537
200	5.059	33.590	26.551
250	5.221	33.616	26.553
300	5.451	33.659	26.560

STATION US14115
LATITUDE 41-29.6 N
LONGITUI 141-34.7 E
DEPTH (m) 141

Press.	Temp.	Salinity	Sigma-T
5	1.456	32.470	25.983
10	3.192	33.051	26.312
20	3.781	33.156	26.341
30	3.729	33.139	26.333
40	3.639	33.137	26.340
50	3.678	33.144	26.341
75	3.734	33.217	26.394
100	3.746	33.200	26.380
125	4.275	33.476	26.545

STATION US14116
LATITUDE 41-29.9 N
LONGITUI 141-30.2 E
DEPTH (m) 66

Press.	Temp.	Salinity	Sigma-T
5	2.012	32.603	26.051
10	2.021	32.609	26.055
20	2.394	32.737	26.128
30	3.973	33.578	26.658
40	4.533	33.797	26.773
50	4.542	33.790	26.767

STATION US14117
LATITUDE 41-27.5 N
LONGITUI 141-24.4 E
DEPTH (m) 49

Press.	Temp.	Salinity	Sigma-T
5	2.231	32.724	26.131
10	2.261	32.740	26.142
20	4.502	33.738	26.730
30	4.838	33.867	26.796
40	4.669	33.957	26.885

Table 2. (Continued)

STATION US14118
LATITUDE 41-28.7 N
LONGITUI 141-23.6 E
DEPTH (m) 86

Press.	Temp.	Salinity	Sigma-T
5	1.920	32.636	26.084
10	1.932	32.644	26.089
20	4.027	33.555	26.634
30	4.895	33.753	26.698
40	4.509	33.658	26.666
50	4.519	33.923	26.875
75	4.124	33.974	26.958

STATION US14119
LATITUDE 41-30.0 N
LONGITUI 141-21.0 E
DEPTH (m) 232

Press.	Temp.	Salinity	Sigma-T
5	2.082	32.680	26.107
10	3.145	33.421	26.611
20	4.354	33.585	26.624
30	4.235	33.684	26.715
40	3.807	33.655	26.735
50	3.535	33.713	26.808
75	3.934	33.861	26.887
100	3.690	33.914	26.953
125	3.046	33.957	27.048
150	2.946	33.982	27.078
175	2.955	33.989	27.082

STATION US14120
LATITUDE 41-27.0 N
LONGITUI 141-20.9 E
DEPTH (m) 85

Press.	Temp.	Salinity	Sigma-T
5	2.247	32.725	26.130
10	2.318	32.764	26.156
20	4.005	33.444	26.548
30	4.575	33.737	26.721
40	4.815	33.848	26.783
50	3.973	33.917	26.927
75	3.922	33.938	26.949

STATION US14121
LATITUDE 41-32.0 N
LONGITUI 141-21.9 E
DEPTH (m) 261

Press.	Temp.	Salinity	Sigma-T
5	3.441	33.137	26.358
10	3.807	33.287	26.443
20	4.203	33.425	26.513
30	4.184	33.503	26.577
40	4.052	33.537	26.617
50	3.774	33.532	26.641
75	3.925	33.781	26.824
100	3.501	33.815	26.893
125	3.515	33.905	26.963
150	3.114	33.940	27.028
175	2.785	33.990	27.098
200	2.793	33.994	27.100

STATION US14122
LATITUDE 41-27.5 N
LONGITUI 141-16.4 E
DEPTH (m) 134

Press.	Temp.	Salinity	Sigma-T
5	2.501	32.792	26.165
10	2.511	32.808	26.176
20	2.904	33.064	26.348
30	4.435	33.829	26.809
40	4.053	33.803	26.828
50	3.683	33.867	26.916
75	3.447	33.914	26.977
100	3.102	33.944	27.033
125	3.096	33.949	27.037

STATION US14123
LATITUDE 41-35.0 N
LONGITUI 140-53.4 E
DEPTH (m) 41

Press.	Temp.	Salinity	Sigma-T
5	6.546	33.963	26.663
10	6.336	33.930	26.664
20	5.661	33.960	26.773
30	5.609	33.969	26.786

STATION US14124
LATITUDE 41-36.9 N
LONGITUI 140-51.3 E
DEPTH (m) 94

Press.	Temp.	Salinity	Sigma-T
5	5.894	33.983	26.763
10	5.869	33.973	26.757
20	5.242	33.948	26.813
30	4.807	33.972	26.882
40	4.644	33.984	26.910
50	4.438	33.997	26.943
75	4.265	33.984	26.951

STATION US14125
LATITUDE 41-38.7 N
LONGITUI 140-49.4 E
DEPTH (m) 333

Press.	Temp.	Salinity	Sigma-T
5	5.564	33.999	26.816
10	5.527	33.982	26.806
20	5.366	33.959	26.808
30	5.052	33.977	26.858
40	4.847	33.974	26.879
50	4.598	33.963	26.898
75	4.317	33.998	26.956
100	3.931	34.001	26.998
125	2.889	33.982	27.082
150	2.548	34.014	27.137
175	2.400	34.015	27.150
200	2.436	34.023	27.154
250	2.344	34.021	27.160
300	1.739	34.029	27.214

STATION US14126
LATITUDE 41-40.8 N
LONGITUI 140-47.3 E
DEPTH (m) 230

Press.	Temp.	Salinity	Sigma-T
5	4.429	33.678	26.690
10	4.432	33.682	26.693
20	4.506	33.707	26.705
30	4.612	33.736	26.716
40	4.582	33.821	26.787
50	4.553	33.890	26.845
75	3.760	33.948	26.973
100	3.167	33.971	27.048
125	2.505	33.992	27.124
150	2.145	34.017	27.173
175	1.999	34.023	27.189
200	1.834	34.020	27.199

STATION US14127
LATITUDE 41-42.7 N
LONGITUI 140-44.9 E
DEPTH (m) 87

Press.	Temp.	Salinity	Sigma-T
5	2.065	32.556	26.009
10	2.078	32.580	26.028
20	3.037	33.239	26.476
30	3.212	33.347	26.546
40	3.637	33.574	26.688
50	3.990	33.709	26.760
75	4.257	33.911	26.893

STATION US14128
LATITUDE 41-28.5 N
LONGITUI 140-17.4 E
DEPTH (m) 33

Press.	Temp.	Salinity	Sigma-T
5	3.006	32.899	26.208
10	3.327	33.097	26.337
20	4.386	33.602	26.634
30	4.431	33.611	26.636

STATION US14129
LATITUDE 42-06.6 N
LONGITUI 140-49.8 E
DEPTH (m) 38

Press.	Temp.	Salinity	Sigma-T
5	2.009	32.657	26.094
10	2.007	32.659	26.096
20	2.012	32.661	26.097
30	2.020	32.666	26.101

STATION US14130
LATITUDE 42-06.8 N
LONGITUI 140-50.1 E
DEPTH (m) 64

Press.	Temp.	Salinity	Sigma-T
5	2.019	32.678	26.110
10	2.019	32.680	26.111
20	2.018	32.681	26.112
30	2.041	32.692	26.120
40	2.058	32.698	26.123
50	2.078	32.705	26.127

STATION US14131
LATITUDE 42-07.0 N
LONGITUI 140-50.4 E
DEPTH (m) 69

Press.	Temp.	Salinity	Sigma-T
5	1.821	32.604	26.065
10	1.925	32.676	26.116
20	2.001	32.676	26.110
30	2.044	32.685	26.114
40	2.054	32.692	26.119
50	2.074	32.698	26.122

STATION US14132
LATITUDE 42-09.7 N
LONGITUI 140-46.1 E
DEPTH (m) 92

Press.	Temp.	Salinity	Sigma-T
5	1.530	32.533	26.029
10	1.531	32.534	26.029
20	1.626	32.585	26.063
30	2.139	32.796	26.196
40	2.491	32.885	26.240
50	2.736	32.962	26.281
75	3.143	33.089	26.347

STATION US14133
LATITUDE 42-10.1 N
LONGITUI 140-46.7 E
DEPTH (m) 96

Press.	Temp.	Salinity	Sigma-T
5	1.629	32.558	26.042
10	1.625	32.561	26.044
20	1.735	32.610	26.076
30	1.824	32.641	26.095
40	2.728	32.965	26.284
50	2.782	32.982	26.293
75	3.111	33.101	26.360

STATION US14134
LATITUDE 42-10.4 N
LONGITUI 140-47.2 E
DEPTH (m) 92

Press.	Temp.	Salinity	Sigma-T
5	1.690	32.577	26.053
10	1.694	32.580	26.055
20	1.854	32.649	26.099
30	1.901	32.659	26.104
40	2.672	32.962	26.286
50	2.781	32.986	26.296
75	3.336	33.136	26.367

STATION US14135
LATITUDE 42-13.0 N
LONGITUI 140-41.7 E
DEPTH (m) 90

Press.	Temp.	Salinity	Sigma-T
5	1.762	32.530	26.010
10	1.759	32.530	26.011
20	2.115	32.783	26.187
30	2.416	32.858	26.224
40	2.457	32.870	26.231
50	2.570	32.915	26.257
75	3.344	33.177	26.399

STATION US14136
LATITUDE 42-11.6 N
LONGITUI 140-35.2 E
DEPTH (m) 83

Press.	Temp.	Salinity	Sigma-T
5	1.801	32.618	26.078
10	1.808	32.627	26.085
20	1.987	32.700	26.131
30	2.240	32.810	26.199
40	2.450	32.877	26.236
50	2.783	32.998	26.306
75	4.517	33.493	26.534

STATION US14137
LATITUDE 42-14.0 N
LONGITUI 140-30.3 E
DEPTH (m) 81

Press.	Temp.	Salinity	Sigma-T
5	2.092	32.729	26.146
10	2.192	32.777	26.176
20	2.194	32.794	26.190
30	2.213	32.811	26.202
40	2.334	32.841	26.217
50	2.921	33.011	26.305
75	3.950	33.346	26.475

STATION US14138
LATITUDE 42-16.3 N
LONGITUI 140-35.4 E
DEPTH (m) 92

Press.	Temp.	Salinity	Sigma-T
5	1.757	32.528	26.009
10	1.771	32.532	26.011
20	1.780	32.573	26.043
30	2.526	32.973	26.307
40	3.134	33.106	26.362
50	3.821	33.293	26.446
75	4.547	33.479	26.519

STATION US14139
LATITUDE 42-18.4 N
LONGITUI 140-41.9 E
DEPTH (m) 67

Press.	Temp.	Salinity	Sigma-T
5	1.755	32.495	25.983
10	1.768	32.498	25.984
20	1.779	32.506	25.989
30	1.864	32.615	26.071
40	3.444	33.224	26.428
50	4.483	33.476	26.524

STATION US14140
LATITUDE 42-25.9 N
LONGITUI 140-37.9 E
DEPTH (m) 83

Press.	Temp.	Salinity	Sigma-T
5	1.576	32.437	25.948
10	1.580	32.436	25.947
20	1.590	32.439	25.949
30	1.649	32.460	25.962
40	2.853	33.038	26.332
50	2.956	33.061	26.341
75	4.620	33.532	26.553

STATION US14141
LATITUDE 42-24.5 N
LONGITUI 140-32.9 E
DEPTH (m) 95

Press.	Temp.	Salinity	Sigma-T
5	1.748	32.589	26.058
10	1.750	32.588	26.058
20	1.830	32.641	26.094
30	2.885	33.043	26.333
40	2.895	33.043	26.332
50	2.971	33.062	26.341
75	4.379	33.469	26.529

STATION US14142
LATITUDE 42-19.4 N
LONGITUI 140-24.2 E
DEPTH (m) 62

Press.	Temp.	Salinity	Sigma-T
5	1.825	32.600	26.062
10	1.824	32.601	26.063
20	2.824	32.972	26.282
30	2.958	32.994	26.287
40	2.876	33.057	26.345
50	3.549	33.310	26.486

STATION US14143
LATITUDE 42-19.3 N
LONGITUI 140-30.5 E
DEPTH (m) 94

Press.	Temp.	Salinity	Sigma-T
5	1.857	32.633	26.086
10	1.847	32.634	26.087
20	1.844	32.632	26.086
30	2.616	32.955	26.285
40	2.838	33.044	26.338
50	3.052	33.105	26.368
75	4.549	33.478	26.518

STATION US14144
LATITUDE 42-20.8 N
LONGITUI 140-36.6 E
DEPTH (m) 88

Press.	Temp.	Salinity	Sigma-T
5	1.719	32.501	25.990
10	1.691	32.500	25.991
20	1.687	32.501	25.992
30	1.719	32.515	26.001
40	2.801	33.039	26.337
50	2.922	33.047	26.333
75	3.743	33.306	26.464

Table 2 (Continued)

STATION US14145
LATITUDE 41-59.6 N
LONGITUI 141-01.8 E
DEPTH (m) 100

Press.	Temp.	Salinity	Sigma-T
5	0.572	32.226	25.839
10	0.524	32.229	25.844
20	0.515	32.236	25.850
30	0.508	32.239	25.853
40	0.502	32.248	25.861
50	0.769	32.459	26.016
75	2.171	32.767	26.170

STATION US14146
LATITUDE 41-58.7 N
LONGITUI 141-00.6 E
DEPTH (m) 94

Press.	Temp.	Salinity	Sigma-T
5	0.537	32.215	25.832
10	0.478	32.221	25.840
20	0.494	32.232	25.848
30	0.496	32.235	25.851
40	0.648	32.362	25.944
50	1.717	32.617	26.083
75	2.881	32.926	26.240

STATION US14147
LATITUDE 41-58.0 N
LONGITUI 140-59.4 E
DEPTH (m) 87

Press.	Temp.	Salinity	Sigma-T
5	0.573	32.226	25.839
10	0.526	32.232	25.847
20	0.503	32.234	25.849
30	0.495	32.241	25.856
40	1.029	32.459	26.001
50	1.800	32.762	26.193
75	3.744	33.089	26.292

STATION US14148
LATITUDE 41-57.3 N
LONGITUI 140-58.1 E
DEPTH (m) 77

Press.	Temp.	Salinity	Sigma-T
5	0.657	32.270	25.870
10	0.658	32.271	25.870
20	0.627	32.288	25.886
30	0.707	32.320	25.907
40	1.203	32.490	26.015
50	2.320	32.763	26.155

STATION US14149
LATITUDE 41-42.8 N
LONGITUI 140-44.8 E
DEPTH (m) 84

Press.	Temp.	Salinity	Sigma-T
5	7.282	33.939	26.544
10	7.280	33.945	26.549
20	7.264	33.945	26.551
30	7.240	33.948	26.557
40	7.200	33.950	26.564
50	7.034	33.952	26.589
75	6.990	33.960	26.601

STATION US14150
LATITUDE 41-40.8 N
LONGITUI 140-47.3 E
DEPTH (m) 228

Press.	Temp.	Salinity	Sigma-T
5	8.009	33.922	26.426
10	7.867	33.940	26.461
20	7.725	33.946	26.486
30	7.673	33.951	26.498
40	7.423	33.952	26.534
50	7.257	33.929	26.540
75	6.961	33.949	26.596
100	6.741	33.947	26.625
125	6.618	33.959	26.651
150	6.424	33.964	26.680
175	6.363	33.971	26.693
200	6.362	33.971	26.693

STATION US14151
LATITUDE 41-38.8 N
LONGITUI 140-49.3 E
DEPTH (m) 344

Press.	Temp.	Salinity	Sigma-T
5	8.402	33.854	26.313
10	8.389	33.914	26.363
20	8.257	33.923	26.389
30	8.176	33.923	26.402
40	8.172	33.925	26.404
50	8.153	33.931	26.412
75	7.867	33.941	26.461
100	7.734	33.949	26.487
125	7.567	33.948	26.511
150	7.000	33.958	26.598
175	6.585	33.952	26.649
200	6.169	33.974	26.721
250	5.803	33.960	26.756
300	5.092	33.995	26.868

STATION US14152
LATITUDE 41-37.1 N
LONGITUI 140-51.2 E
DEPTH (m) 98

Press.	Temp.	Salinity	Sigma-T
5	8.403	33.846	26.307
10	8.315	33.876	26.344
20	8.278	33.879	26.352
30	8.213	33.871	26.355
40	8.181	33.880	26.367
50	8.165	33.887	26.376
75	8.130	33.898	26.389

STATION US14153
LATITUDE 41-35.9 N
LONGITUI 140-52.7 E
DEPTH (m) 39

Press.	Temp.	Salinity	Sigma-T
5	8.317	33.856	26.328
10	8.322	33.855	26.327
20	8.289	33.861	26.336
30	8.285	33.863	26.338

STATION US14154
LATITUDE 42-00.4 N
LONGITUI 141-19.7 E
DEPTH (m) 310

Press.	Temp.	Salinity	Sigma-T
5	1.280	32.168	25.752
10	1.274	32.171	25.754
20	1.242	32.239	25.811
30	0.288	32.477	26.056
40	0.962	32.757	26.244
50	1.384	32.969	26.388
75	2.623	33.243	26.514
100	4.427	33.433	26.496
125	4.631	33.492	26.521
150	4.298	33.506	26.567
175	5.143	33.682	26.614
200	4.970	33.656	26.613
250	5.420	33.795	26.671

STATION US14155
LATITUDE 41-59.5 N
LONGITUI 141-01.9 E
DEPTH (m) 102

Press.	Temp.	Salinity	Sigma-T
5	2.594	32.375	25.824
10	2.582	32.374	25.824
20	2.321	32.366	25.838
30	2.150	32.354	25.841
40	1.632	32.386	25.904
50	1.243	32.506	26.025
75	2.625	32.996	26.317

STATION US14156
LATITUDE 41-58.7 N
LONGITUI 141-00.7 E
DEPTH (m) 95

Press.	Temp.	Salinity	Sigma-T
5	2.602	32.388	25.834
10	2.595	32.388	25.834
20	2.191	32.391	25.868
30	2.233	32.386	25.861
40	1.925	32.339	25.846
50	1.273	32.509	26.025
75	2.651	33.035	26.346

Table 2 (Continued)

STATION US14157
LATITUDE 41-58.1 N
LONGITUI 140-59.4 E
DEPTH (m) 87

Press.	Temp.	Salinity	Sigma-T
5	2.144	32.355	25.842
10	2.144	32.356	25.843
20	2.145	32.355	25.842
30	2.156	32.361	25.846
40	2.225	32.390	25.865
50	1.249	32.537	26.050
75	2.954	33.146	26.409

STATION US14158
LATITUDE 41-57.3 N
LONGITUI 140-58.2 E
DEPTH (m) 79

Press.	Temp.	Salinity	Sigma-T
5	4.071	32.057	25.439
10	3.646	32.198	25.592
20	2.724	32.257	25.719
30	2.132	32.331	25.824
40	2.060	32.338	25.835
50	2.161	32.427	25.899
75	3.303	33.237	26.451

STATION US14159
LATITUDE 42-10.0 N
LONGITUI 140-41.3 E
DEPTH (m) 82

Press.	Temp.	Salinity	Sigma-T
5	3.056	32.330	25.749
10	3.026	32.328	25.750
20	2.763	32.344	25.785
30	2.341	32.340	25.816
40	2.574	32.278	25.748
50	1.757	32.585	26.054
75	4.099	33.448	26.541

STATION US14160
LATITUDE 42-08.8 N
LONGITUI 140-35.7 E
DEPTH (m) 65

Press.	Temp.	Salinity	Sigma-T
5	3.876	32.241	25.604
10	3.789	32.261	25.628
20	2.889	32.357	25.785
30	2.629	32.355	25.805
40	2.045	32.634	26.073
50	2.093	32.713	26.133

STATION US14161
LATITUDE 42-11.2 N
LONGITUI 140-35.1 E
DEPTH (m) 80

Press.	Temp.	Salinity	Sigma-T
5	3.383	32.314	25.708
10	3.271	32.321	25.723
20	2.723	32.336	25.782
30	2.519	32.347	25.807
40	2.214	32.362	25.843
50	1.979	32.506	25.975
75	4.375	33.495	26.551

STATION US14162
LATITUDE 42-14.2 N
LONGITUI 140-30.4 E
DEPTH (m) 81

Press.	Temp.	Salinity	Sigma-T
5	3.544	32.366	25.734
10	3.466	32.360	25.737
20	3.040	32.406	25.811
30	3.088	32.504	25.885
40	2.572	32.581	25.990
50	2.189	32.713	26.126
75	4.153	33.422	26.515

STATION US14163
LATITUDE 42-16.3 N
LONGITUI 140-36.6 E
DEPTH (m) 90

Press.	Temp.	Salinity	Sigma-T
5	4.144	32.383	25.691
10	4.082	32.397	25.708
20	3.846	32.445	25.769
30	3.571	32.478	25.821
40	3.473	32.493	25.842
50	2.365	32.584	26.009
75	3.978	33.418	26.530

STATION US14164
LATITUDE 42-19.0 N
LONGITUI 140-31.0 E
DEPTH (m) 94

Press.	Temp.	Salinity	Sigma-T
5	4.070	32.481	25.776
10	4.062	32.481	25.776
20	3.579	32.481	25.823
30	3.546	32.488	25.832
40	2.733	32.534	25.940
50	2.377	32.596	26.018
75	3.595	33.286	26.462

STATION US14165
LATITUDE 42-21.0 N
LONGITUI 140-36.5 E
DEPTH (m) 88

Press.	Temp.	Salinity	Sigma-T
5	4.086	32.458	25.756
10	3.971	32.459	25.768
20	3.890	32.477	25.790
30	2.827	32.561	25.953
40	2.373	32.676	26.081
50	2.537	32.845	26.203
75	3.429	33.170	26.386

STATION US14166
LATITUDE 42-23.5 N
LONGITUI 140-31.8 E
DEPTH (m) 96

Press.	Temp.	Salinity	Sigma-T
5	4.174	32.435	25.729
10	4.169	32.435	25.729
20	3.995	32.452	25.760
30	3.671	32.465	25.801
40	2.895	32.527	25.920
50	2.423	32.654	26.061
75	3.461	33.189	26.398

STATION US14167
LATITUDE 42-26.0 N
LONGITUI 140-36.9 E
DEPTH (m) 85

Press.	Temp.	Salinity	Sigma-T
5	4.212	32.443	25.731
10	4.107	32.445	25.744
20	3.881	32.471	25.786
30	2.995	32.531	25.915
40	2.889	32.558	25.946
50	2.032	32.647	26.084
75	3.837	33.304	26.453

STATION US14168
LATITUDE 42-29.0 N
LONGITUI 140-31.6 E
DEPTH (m) 75

Press.	Temp.	Salinity	Sigma-T
5	4.034	32.475	25.774
10	3.946	32.460	25.772
20	3.690	32.468	25.803
30	3.151	32.454	25.840
40	2.379	32.710	26.108
50	2.580	32.887	26.234

STATION US14169
LATITUDE 42-31.2 N
LONGITUI 140-37.8 E
DEPTH (m) 62

Press.	Temp.	Salinity	Sigma-T
5	4.290	32.352	25.651
10	3.705	32.348	25.705
20	2.682	32.637	26.026
30	2.058	32.651	26.086
40	2.138	32.732	26.144
50	2.557	32.891	26.239

STATION US14170
LATITUDE 42-28.3 N
LONGITUI 140-43.0 E
DEPTH (m) 61

Press.	Temp.	Salinity	Sigma-T
5	3.657	32.511	25.839
10	3.485	32.523	25.865
20	2.741	32.570	25.967
30	2.067	32.642	26.078
40	2.109	32.717	26.135
50	2.327	32.824	26.203

STATION US14171
LATITUDE 42-23.3 N
LONGITUI 140-42.8 E
DEPTH (m) 62

Press.	Temp.	Salinity	Sigma-T
5	3.853	32.380	25.717
10	3.497	32.333	25.713
20	3.119	32.351	25.761
30	1.752	32.492	25.981
40	1.856	32.608	26.066
50	2.540	32.943	26.281

Table 2 (Continued)

STATION US14172
LATITUDE 42-25.2 N
LONGITUI 140-48.6 E
DEPTH (m) 44

Press.	Temp.	Salinity	Sigma-T
5	3.859	32.232	25.599
10	3.592	32.310	25.685
20	2.719	32.339	25.785
30	2.427	32.610	26.025

STATION US14173
LATITUDE 42-20.9 N
LONGITUI 140-48.6 E
DEPTH (m) 53

Press.	Temp.	Salinity	Sigma-T
5	3.765	32.286	25.650
10	3.788	32.339	25.690
20	3.488	32.481	25.831
30	1.966	32.518	25.986
40	2.015	32.682	26.114

STATION US14174
LATITUDE 42-15.8 N
LONGITUI 140-47.6 E
DEPTH (m) 71

Press.	Temp.	Salinity	Sigma-T
5	3.501	32.393	25.760
10	3.492	32.390	25.759
20	3.078	32.381	25.788
30	2.809	32.420	25.842
40	2.464	32.462	25.904
50	2.288	32.739	26.138

STATION US14175
LATITUDE 42-18.2 N
LONGITUI 140-42.4 E
DEPTH (m) 63

Press.	Temp.	Salinity	Sigma-T
5	4.000	32.454	25.761
10	4.000	32.454	25.761
20	3.982	32.454	25.763
30	2.845	32.444	25.858
40	2.073	32.624	26.063
50	2.299	32.767	26.160

STATION US14176
LATITUDE 42-13.3 N
LONGITUI 140-41.4 E
DEPTH (m) 89

Press.	Temp.	Salinity	Sigma-T
5	3.973	32.389	25.712
10	3.957	32.384	25.710
20	3.672	32.387	25.740
30	3.536	32.482	25.828
40	2.897	32.470	25.874
50	2.424	32.689	26.088
75	3.980	33.389	26.506

STATION US14177
LATITUDE 42-10.5 N
LONGITUI 140-46.6 E
DEPTH (m) 94

Press.	Temp.	Salinity	Sigma-T
5	3.072	32.358	25.770
10	3.058	32.357	25.771
20	2.987	32.373	25.790
30	2.555	32.355	25.811
40	2.030	32.408	25.893
50	2.656	32.879	26.221
75	4.316	33.469	26.536

STATION US14178
LATITUDE 42-07.0 N
LONGITUI 140-50.3 E
DEPTH (m) 70

Press.	Temp.	Salinity	Sigma-T
5	3.006	32.362	25.779
10	2.972	32.360	25.780
20	2.867	32.364	25.792
30	2.842	32.363	25.794
40	2.780	32.400	25.828
50	2.766	32.669	26.045

STATION US14179
LATITUDE 42-10.3 N
LONGITUI 140-47.3 E
DEPTH (m) 92

Press.	Temp.	Salinity	Sigma-T
5	3.110	32.374	25.780
10	3.078	32.371	25.780
20	2.649	32.374	25.819
30	2.538	32.384	25.835
40	2.313	32.396	25.862
50	2.357	32.693	26.096
75	3.106	33.177	26.420

STATION US14180
LATITUDE 42-12.9 N
LONGITUI 140-41.6 E
DEPTH (m) 90

Press.	Temp.	Salinity	Sigma-T
5	4.124	32.438	25.737
10	3.983	32.418	25.734
20	3.874	32.407	25.736
30	3.353	32.419	25.795
40	2.255	32.363	25.840
50	2.622	32.519	25.936
75	3.999	33.418	26.528

STATION US14181
LATITUDE 42-11.4 N
LONGITUI 140-35.7 E
DEPTH (m) 82

Press.	Temp.	Salinity	Sigma-T
5	4.150	32.406	25.709
10	3.732	32.387	25.734
20	3.619	32.389	25.746
30	3.238	32.360	25.758
40	2.631	32.441	25.873
50	2.004	32.428	25.911
75	4.306	33.458	26.528

STATION US14182
LATITUDE 42-13.9 N
LONGITUI 140-30.5 E
DEPTH (m) 80

Press.	Temp.	Salinity	Sigma-T
5	3.186	32.350	25.754
10	3.159	32.338	25.747
20	3.097	32.340	25.754
30	2.988	32.343	25.765
40	2.282	32.379	25.852
50	2.259	32.608	26.036
75	4.554	33.489	26.527

STATION US14183
LATITUDE 42-16.4 N
LONGITUI 140-36.9 E
DEPTH (m) 90

Press.	Temp.	Salinity	Sigma-T
5	4.213	32.392	25.691
10	4.123	32.400	25.706
20	3.520	32.439	25.795
30	2.682	32.527	25.938
40	2.185	32.622	26.053
50	2.298	32.770	26.163
75	3.717	33.287	26.452

STATION US14184
LATITUDE 42-18.1 N
LONGITUI 140-41.6 E
DEPTH (m) 67

Press.	Temp.	Salinity	Sigma-T
5	4.201	32.471	25.755
10	3.855	32.450	25.772
20	3.311	32.464	25.834
30	2.769	32.617	26.002
40	2.120	32.654	26.083
50	2.652	32.944	26.274

STATION US14185
LATITUDE 42-20.9 N
LONGITUI 140-36.4 E
DEPTH (m) 88

Press.	Temp.	Salinity	Sigma-T
5	4.388	32.431	25.704
10	4.305	32.424	25.707
20	4.081	32.408	25.717
30	3.782	32.428	25.762
40	2.726	32.585	25.980
50	2.068	32.693	26.118
75	3.904	33.334	26.470

STATION US14186
LATITUDE 42-19.3 N
LONGITUI 140-30.4 E
DEPTH (m) 93

Press.	Temp.	Salinity	Sigma-T
5	4.301	32.453	25.730
10	4.262	32.449	25.731
20	4.215	32.448	25.735
30	4.033	32.419	25.730
40	2.932	32.554	25.939
50	2.469	32.683	26.079
75	3.475	33.264	26.456

Table 2 (Continued)

STATION US14187
LATITUDE 42-19.1 N
LONGITUI 140-23.4 E
DEPTH (m) 56

Press.	Temp.	Salinity	Sigma-T
5	3.968	32.439	25.752
10	3.932	32.443	25.759
20	3.832	32.450	25.774
30	3.443	32.416	25.783
40	2.578	32.571	25.981
50	2.462	32.856	26.219

STATION US14188
LATITUDE 42-23.6 N
LONGITUI 140-31.3 E
DEPTH (m) 97

Press.	Temp.	Salinity	Sigma-T
5	4.170	32.469	25.757
10	4.141	32.467	25.758
20	3.974	32.470	25.776
30	3.758	32.461	25.790
40	2.944	32.536	25.923
50	2.508	32.592	26.004
75	3.205	33.088	26.341

STATION US14189
LATITUDE 42-26.0 N
LONGITUI 140-37.0 E
DEPTH (m) 85

Press.	Temp.	Salinity	Sigma-T
5	4.198	32.431	25.724
10	4.182	32.430	25.724
20	4.046	32.429	25.737
30	3.502	32.464	25.817
40	2.947	32.505	25.898
50	2.160	32.655	26.081
75	3.598	33.253	26.436

STATION US14190
LATITUDE 42-20.8 N
LONGITUI 140-48.5 E
DEPTH (m) 53

Press.	Temp.	Salinity	Sigma-T
5	3.834	32.354	25.698
10	3.850	32.372	25.711
20	2.596	32.376	25.824
30	1.650	32.453	25.956
40	2.027	32.674	26.107
50	2.668	32.933	26.264

STATION US14191
LATITUDE 42-17.6 N
LONGITUI 140-53.8 E
DEPTH (m) 57

Press.	Temp.	Salinity	Sigma-T
5	3.354	32.434	25.806
10	2.710	32.447	25.872
20	2.548	32.575	25.987
30	2.115	32.706	26.126
40	2.475	32.878	26.235
50	2.558	32.922	26.264

STATION US14192
LATITUDE 42-16.2 N
LONGITUI 140-58.1 E
DEPTH (m) 62

Press.	Temp.	Salinity	Sigma-T
5	2.806	32.532	25.932
10	2.823	32.541	25.938
20	2.726	32.574	25.972
30	1.782	32.514	25.996
40	1.618	32.697	26.154
50	2.249	32.851	26.232

3

THE " USHIO MARU "

CRUISE 306
CRUISE 307
CRUISE 308

IN APRIL 2014
IN MAY 2014

1. Cruise Itinerary

Cruise 306			
Departure from Hakodate	Apr.	23, 2014	
Start hydrographic research (US14193)		23	
Finish hydrographic research (US14196)		24	
Return to Hakodate		25	
Total coverage 260.2 miles			
Cruise 307			
Departure from Hakodate	May.	7, 2014	
Arrival at and departure from Usujiri			7
Start hydrographic research (US14197)		7	
Calibration of echo sounder		7	
Arrival at Usujiri		8	
Departure from Usujiri		9	
Sampling by frame trawl net		9	
Sampling by frame trawl net		10	
Arrival ar Usujiri		10	
Departure from Usujiri		11	
Arrival at Muroran		11	
Departure from Muroran		12	
Arrival at and departure from Muroran		12	
Arrival at Usujiri		12	
Departure from Usujiri		13	
Sampling by bottom longline		13	
Arrival at Usujiri		13	
Departure from Usujiri		14	
Arrival at and departure from Usujiri			14
Finish hydrographic research (US14222)		15	
Arrival at and departure from Usujiri			15
Return to Hakodate		15	
Total coverage 543.3 miles			
Cruise 308			
Departure from Hakodate	May.	21, 2014	
Start hydrographic research (US14223)		22	
Finish hydrographic research (US14227)		22	
Return to Hakodate		22	
Total coverage 70.0 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 and salinity were measured by CTD (Seabird SBE-9Plus and SBE-19).

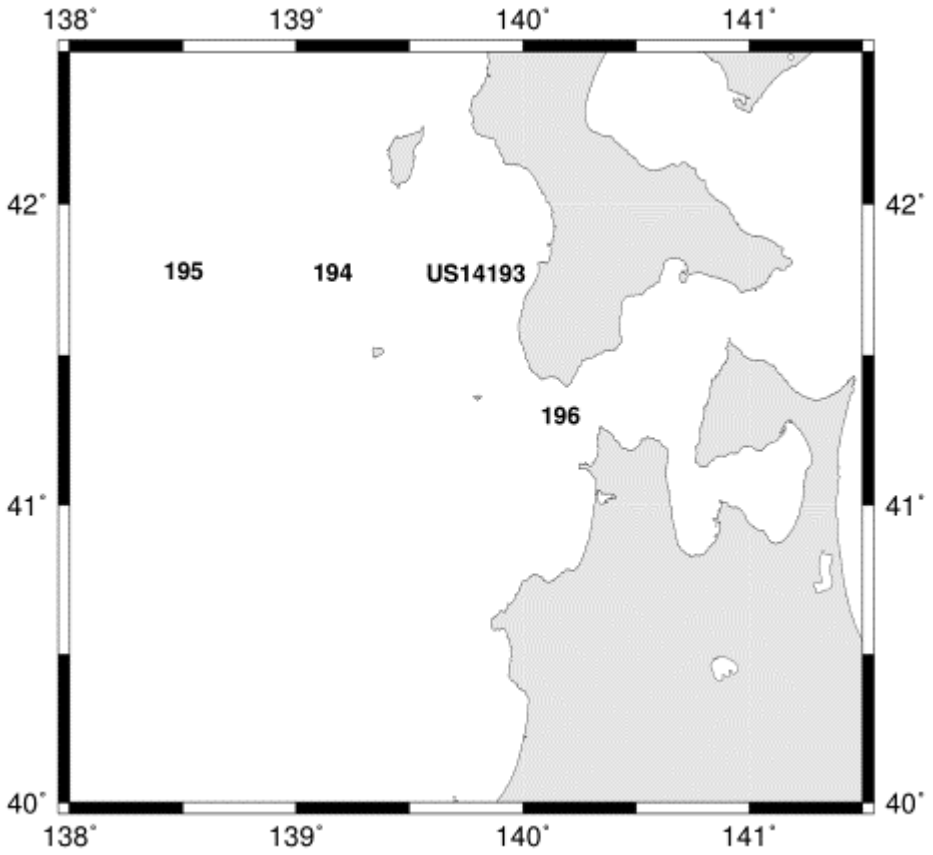

Figure 1. Oceanographic stations (Cruise 306)

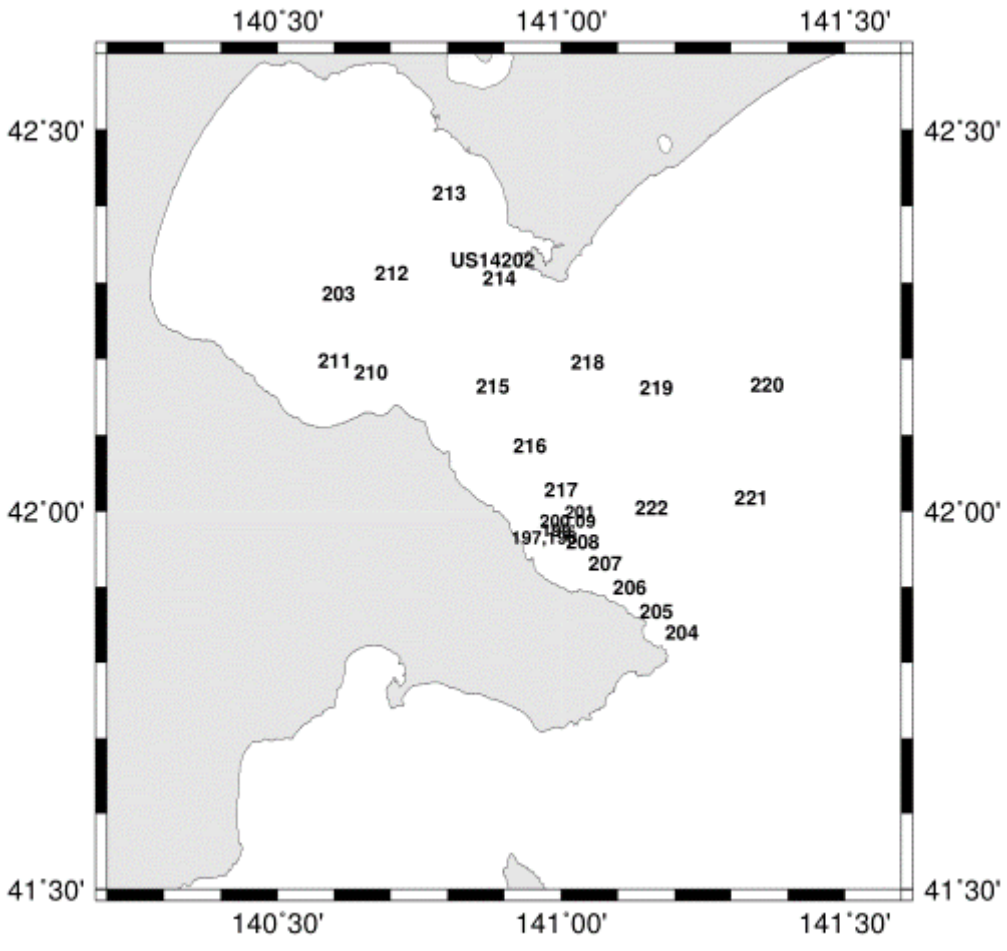

Figure 2. Oceanographic stations (Cruise 307)

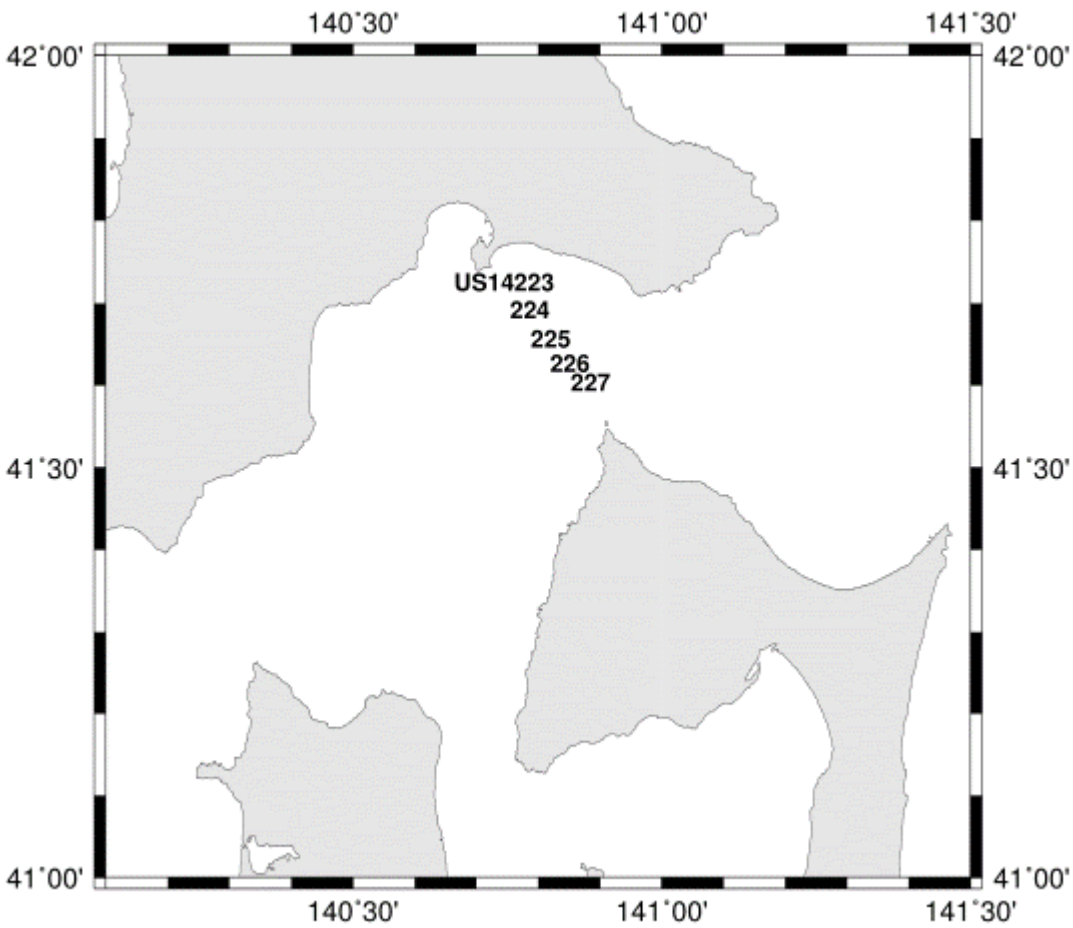

Figure 3. Oceanographic stations (Cruise 308)

Table 1. List of Oceanographic Station

Cruise 306

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14193	41-44.6	139-47.5	4/23	1413-1444	1430	West-1	West-1	West-3	10.1	9.9	bc
US14194	41-44.8	139-09.6	4/23	1829-1904	2065	West-2	West-1	West-4	7.7	9.5	o
US14195	41-45.1	138-30.1	4/23	2259-2332	3704	SW -2	WSW-1	SW -4	7.0	8.2	o
US14196	41-16.3	140-09.9	4/24	1153-1200	151	SW -3	SW -1	SW -5	10.0	9.6	bc

Cruise 307

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14197	41-57.6	140-57.8	5/7	1430-1435	74	South-1	SE -1	South-3	12.8	7.0	c
US14198	41-57.4	140-58.2	5/9	1110-1114	79	SW -2	East-1	SW -4	12.7	7.5	c
US14199	41-58.0	140-59.5	5/9	1122-1126	88	SSW-2	East-1	SSW-4	11.8	6.8	c
US14200	41-58.7	141-00.7	5/9	1134-1138	95	SSW-2	East-1	SSW-4	11.3	6.5	bc
US14201	41-59.4	141-02.0	5/9	1147-1151	102	SSW-2	East-1	SSW-4	11.6	6.1	bc
US14202	42-19.2	140-52.8	5/9	1932-1936	48	Calm	SE -1	Calm	8.3	6.8	bc
US14202-2	42-17.8	140-50.0	5/9	2053-2052	57	Calm	SE -1	Calm	7.9	7.0	bc
US14202-3	42-19.1	140-52.9	5/9	2200-2203	45	Calm	SE -1	Calm	8.3	6.8	bc
US14202-4	42-17.6	140-55.1	5/9	2313-2317	57	Calm	SE -1	Calm	7.7	6.5	bc
US14202-5	42-19.4	140-52.2	5/10	1431-1435	46	West-3	West-1	West-5	12.2	7.0	bc
US14202-6	42-16.4	140-56.9	5/10	1617-1621	60	WNW-3	West-1	WNW-6	12.4	6.9	bc
US14203	42-16.6	140-36.5	5/12	0734-0745	90	Calm	East-1	Calm	10.0	7.7	c
US14204	41-49.8	141-12.8	5/13	0726-0732	162	SSW-2	SE -1	SSW-4	12.3	7.0	c
US14205	41-51.5	141-10.1	5/13	0753-0757	108	SW -2	SE -1	SW -3	14.7	7.9	c
US14206	41-53.4	141-07.3	5/13	0818-0824	95	SW -2	SE -1	SW -3	15.6	8.8	c
US14207	41-55.3	141-04.7	5/13	0948-0953	111	SW -3	SE -1	SW -5	15.1	9.1	c
US14208	41-57.0	141-02.3	5/13	1015-1020	105	SW -2	SE -1	SW -4	14.5	8.1	c
US14209	41-58.8	141-00.0	5/13	1040-1045	89	South-3	SE -1	South-5	14.4	7.9	c
US14210	42-10.4	140-39.9	5/14	0924-0929	83	NE -1	East-1	NE -3	11.6	8.2	bc
US14211	42-11.3	140-36.1	5/14	1015-1019	81	NE -1	East-1	NE -3	11.5	8.8	m
US14203-2	42-16.3	140-36.4	5/14	1058-1106	91	East-1	East-1	East-3	11.6	8.9	m
US14212	42-18.2	140-42.1	5/14	1234-1239	64	East-1	East-1	East-3	12.1	8.8	c
US14213	42-24.5	140-48.2	5/14	1340-1343	46	Calm	East-1	Calm	13.6	9.6	m
US14214	42-17.8	140-53.5	5/14	1441-1445	57	Calm	East-1	Calm	14.6	10.5	m
US14215	42-09.3	140-52.8	5/14	1557-1602	79	Calm	East-1	Calm	14.7	9.2	m
US14216	42-04.6	140-56.7	5/14	1650-1654	86	NNW-3	East-1	NNW-5	12.1	8.4	o
US14217	42-01.1	141-00.0	5/14	1741-1745	87	Calm	East-1	Calm	13.2	9.0	o
US14218	42-11.2	141-02.8	5/15	0455-0500	83	Calm	ESE-1	Calm	8.7	7.3	m
US14219	42-09.2	141-10.1	5/15	0602-0608	127	Calm	ESE-1	Calm	9.4	9.0	m
US14220	42-09.4	141-21.8	5/15	0736-0750	402	Calm	ESE-1	Calm	9.6	7.0	m
US14221	42-00.5	141-20.1	5/15	0950-1000	315	Calm	SE -1	Calm	10.0	7.6	m
US14222	41-59.7	141-09.6	5/15	1111-1118	135	Calm	SE -1	Calm	12.9	7.9	m

Cruise 308

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14223	41-42.9	140-44.7	5/22	0533-0543	83	SW -1	SE -1	SW -2	10.6	10.7	o
US14224	41-40.9	140-47.2	5/22	0604-0623	218	Calm	SE -1	Calm	10.5	11.2	o
US14225	41-38.8	140-49.2	5/22	0644-0710	350	Calm	SE -1	Calm	10.6	11.2	o
US14226	41-37.0	140-51.1	5/22	0733-0743	97	Calm	SE -2	Calm	10.7	11.2	o
US14227	41-35.6	140-53.1	5/22	0803-0810	50	Calm	SE -2	Calm	11.0	11.2	o

(*): Fixed position by Global Positioning System

S.M.T.: Ship's mean time

Wr.: Weather in WMO Code 4501

Table 2. Oceanographic data

STATION US14193
LATITUDE 41-44.6 N
LONGITUI 139-47.5 E
DEPTH (m) 1430

Press.	Temp.	Salinity	Sigma-T
5	9.682	33.817	26.081
10	9.324	33.841	26.159
20	9.040	33.881	26.236
30	8.653	33.945	26.346
40	7.802	34.028	26.540
50	7.580	34.045	26.585
75	6.124	34.013	26.757
100	5.067	34.010	26.883
125	3.708	34.012	27.029
150	2.873	34.017	27.112
175	2.171	34.023	27.176
200	1.813	34.033	27.211
250	1.295	34.041	27.255
300	0.958	34.055	27.289
400	0.785	34.062	27.305
500	0.682	34.067	27.315
600	0.578	34.069	27.322
700	0.504	34.069	27.328

STATION US14194
LATITUDE 41-44.8 N
LONGITUI 139-09.6 E
DEPTH (m) 2065

Press.	Temp.	Salinity	Sigma-T
5	9.889	33.857	26.078
10	9.454	33.864	26.156
20	9.275	33.870	26.190
30	8.627	33.955	26.358
40	8.098	34.016	26.487
50	7.793	34.034	26.545
75	6.731	34.053	26.709
100	4.564	34.027	26.952
125	2.916	34.022	27.112
150	2.360	34.039	27.173
175	1.799	34.036	27.215
200	1.425	34.032	27.239
250	1.058	34.045	27.274
300	0.940	34.053	27.288
400	0.806	34.060	27.301
500	0.725	34.067	27.313
600	0.612	34.070	27.322
700	0.501	34.070	27.328

STATION US14195
LATITUDE 41-45.1 N
LONGITUI 138-30.1 E
DEPTH (m) 3704

Press.	Temp.	Salinity	Sigma-T
5	9.889	33.857	26.078
10	9.454	33.864	26.156
20	9.275	33.870	26.190
30	8.627	33.955	26.358
40	8.098	34.016	26.487
50	7.793	34.034	26.545
75	6.731	34.053	26.709
100	4.564	34.027	26.952
125	2.916	34.022	27.112
150	2.360	34.039	27.173
175	1.799	34.036	27.215
200	1.425	34.032	27.239
250	1.058	34.045	27.274
300	0.940	34.053	27.288
400	0.806	34.060	27.301
500	0.725	34.067	27.313
600	0.612	34.070	27.322
700	0.501	34.070	27.328

STATION US14196
LATITUDE 41-16.3 N
LONGITUI 140-09.9 E
DEPTH (m) 151

Press.	Temp.	Salinity	Sigma-T
5	9.744	33.695	25.976
10	9.652	33.747	26.032
20	9.292	33.867	26.184
30	8.913	33.893	26.265
40	8.553	33.907	26.332
50	8.344	33.930	26.382
75	8.001	33.974	26.468
100	7.301	33.952	26.552
125	6.918	34.000	26.642

STATION US14197
LATITUDE 41-57.6 N
LONGITUI 140-57.8 E
DEPTH (m) 74

Press.	Temp.	Salinity	Sigma-T
5	7.255	32.196	25.176
10	6.150	32.238	25.352
20	3.456	32.408	25.776
30	2.782	32.538	25.939
40	2.582	32.617	26.018
50	2.476	32.708	26.099

STATION US14198
LATITUDE 41-57.4 N
LONGITUI 140-58.2 E
DEPTH (m) 79

Press.	Temp.	Salinity	Sigma-T
5	7.602	32.122	25.071
10	6.993	32.171	25.192
20	4.549	32.338	25.613
30	1.500	32.347	25.881
40	0.821	32.439	25.997
50	1.631	32.633	26.102

STATION US14199
LATITUDE 41-58.0 N
LONGITUI 140-59.5 E
DEPTH (m) 88

Press.	Temp.	Salinity	Sigma-T
5	6.960	32.010	25.069
10	6.447	32.116	25.219
20	2.270	32.154	25.672
30	1.371	32.348	25.891
40	0.885	32.425	25.982
50	0.856	32.489	26.035
75	2.394	32.917	26.273

STATION US14200
LATITUDE 41-58.7 N
LONGITUI 141-00.7 E
DEPTH (m) 95

Press.	Temp.	Salinity	Sigma-T
5	6.509	32.023	25.138
10	5.382	32.049	25.294
20	2.029	32.211	25.735
30	1.943	32.411	25.902
40	1.309	32.439	25.967
50	1.170	32.513	26.035
75	1.128	32.644	26.143

STATION US14201
LATITUDE 41-59.4 N
LONGITUI 141-02.0 E
DEPTH (m) 102

Press.	Temp.	Salinity	Sigma-T
5	6.298	32.111	25.234
10	5.864	32.166	25.330
20	1.863	32.233	25.765
30	0.985	32.300	25.876
40	1.707	32.453	25.952
50	1.263	32.493	26.013
75	1.571	32.697	26.157

STATION US14202
LATITUDE 42-19.2 N
LONGITUI 140-52.8 E
DEPTH (m) 48

Press.	Temp.	Salinity	Sigma-T
5	7.039	31.495	24.654
10	6.877	31.524	24.698
20	5.814	31.733	24.994
30	4.274	32.164	25.504
40	3.112	32.257	25.687

STATION US14203
LATITUDE 42-16.6 N
LONGITUI 140-36.5 E
DEPTH (m) 90

Press.	Temp.	Salinity	Sigma-T
5	7.477	31.604	24.681
10	7.341	31.842	24.886
20	6.921	32.150	25.185
30	4.581	32.216	25.513
40	3.311	32.477	25.845
50	2.620	32.604	26.004
75	3.219	33.054	26.313

STATION US14204
LATITUDE 41-49.8 N
LONGITUI 141-12.8 E
DEPTH (m) 162

Press.	Temp.	Salinity	Sigma-T
5	7.202	31.988	25.020
10	5.770	31.968	25.184
20	1.536	32.222	25.778
30	1.227	32.340	25.893
40	1.221	32.461	25.990
50	0.916	32.524	26.060
75	2.766	32.996	26.306
100	2.650	33.108	26.405
125	5.178	33.545	26.501
150	4.198	33.427	26.514

Table 2. (Continued)

STATION US14205
LATITUDE 41-51.5 N
LONGITUI 141-10.1 E
DEPTH (m) 108

Press.	Temp.	Salinity	Sigma-T
5	7.057	31.914	24.981
10	6.395	31.946	25.091
20	2.191	32.023	25.573
30	1.020	32.207	25.799
40	1.008	32.382	25.940
50	0.674	32.445	26.010
75	1.869	32.759	26.186
100	3.434	33.246	26.446

STATION US14206
LATITUDE 41-53.4 N
LONGITUI 141-07.3 E
DEPTH (m) 95

Press.	Temp.	Salinity	Sigma-T
5	9.068	32.034	24.786
10	8.178	32.038	24.923
20	6.699	32.106	25.179
30	3.163	32.247	25.674
40	2.128	32.554	26.003
50	1.585	32.607	26.084
75	2.509	32.881	26.235

STATION US14207
LATITUDE 41-55.3 N
LONGITUI 141-04.7 E
DEPTH (m) 111

Press.	Temp.	Salinity	Sigma-T
5	6.911	31.979	25.052
10	6.385	32.020	25.151
20	5.874	32.059	25.245
30	0.905	32.135	25.747
40	0.706	32.402	25.974
50	1.980	32.686	26.119
75	2.479	32.842	26.206
100	3.652	33.334	26.495

STATION US14208
LATITUDE 41-57.0 N
LONGITUI 141-02.3 E
DEPTH (m) 105

Press.	Temp.	Salinity	Sigma-T
5	8.222	32.086	24.954
10	6.452	32.007	25.132
20	3.985	32.107	25.486
30	2.702	32.482	25.901
40	2.196	32.582	26.020
50	1.493	32.575	26.064
75	2.243	32.771	26.168
100	3.460	33.198	26.405

STATION US14209
LATITUDE 41-58.8 N
LONGITUI 141-00.0 E
DEPTH (m) 89

Press.	Temp.	Salinity	Sigma-T
5	8.010	31.995	24.913
10	7.205	32.010	25.037
20	3.174	32.206	25.640
30	2.800	32.447	25.864
40	2.262	32.559	25.997
50	2.395	32.641	26.052
75	2.512	32.822	26.187

STATION US14210
LATITUDE 42-10.4 N
LONGITUI 140-39.9 E
DEPTH (m) 83

Press.	Temp.	Salinity	Sigma-T
5	8.322	31.581	24.543
10	6.695	31.635	24.809
20	5.156	32.200	25.438
30	3.274	32.331	25.731
40	1.973	32.461	25.940
50	2.526	32.613	26.019
75	3.601	33.209	26.401

STATION US14211
LATITUDE 42-11.3 N
LONGITUI 140-36.1 E
DEPTH (m) 81

Press.	Temp.	Salinity	Sigma-T
5	8.294	31.826	24.740
10	8.023	32.101	24.994
20	6.420	32.276	25.349
30	3.451	32.299	25.689
40	2.110	32.442	25.915
50	2.532	32.632	26.034
75	3.401	33.138	26.363

STATION US14212
LATITUDE 42-18.2 N
LONGITUI 140-42.1 E
DEPTH (m) 64

Press.	Temp.	Salinity	Sigma-T
5	8.934	31.596	24.464
10	8.561	31.940	24.790
20	5.644	32.118	25.318
30	3.200	32.190	25.625
40	2.366	32.327	25.803
50	1.907	32.432	25.921

STATION US14213
LATITUDE 42-24.5 N
LONGITUI 140-48.2 E
DEPTH (m) 46

Press.	Temp.	Salinity	Sigma-T
5	8.651	31.813	24.676
10	8.724	32.029	24.835
20	7.734	32.205	25.117
30	3.683	32.249	25.629
40	2.700	32.390	25.827

STATION US14214
LATITUDE 42-17.8 N
LONGITUI 140-53.5 E
DEPTH (m) 57

Press.	Temp.	Salinity	Sigma-T
5	8.139	31.243	24.305
10	6.752	31.540	24.726
20	3.729	32.195	25.581
30	2.440	32.285	25.764
40	1.838	32.375	25.881
50	1.869	32.502	25.980

STATION US14215
LATITUDE 42-09.3 N
LONGITUI 140-52.8 E
DEPTH (m) 79

Press.	Temp.	Salinity	Sigma-T
5	6.832	31.693	24.837
10	5.645	31.766	25.040
20	2.216	32.015	25.565
30	1.494	32.203	25.766
40	0.510	32.266	25.874
50	0.466	32.371	25.961
75	1.998	32.868	26.264

STATION US14216
LATITUDE 42-04.6 N
LONGITUI 140-56.7 E
DEPTH (m) 86

Press.	Temp.	Salinity	Sigma-T
5	8.217	31.743	24.686
10	6.486	31.806	24.970
20	2.164	32.058	25.603
30	1.587	32.184	25.744
40	1.245	32.352	25.902
50	1.150	32.438	25.977
75	3.801	33.347	26.491

STATION US14217
LATITUDE 42-01.1 N
LONGITUI 141-00.0 E
DEPTH (m) 87

Press.	Temp.	Salinity	Sigma-T
5	7.983	31.953	24.884
10	7.195	31.959	24.998
20	5.208	32.304	25.515
30	3.414	32.444	25.809
40	2.259	32.520	25.966
50	1.972	32.619	26.067
75	3.379	33.151	26.375

STATION US14218
LATITUDE 42-11.2 N
LONGITUI 141-02.8 E
DEPTH (m) 83

Press.	Temp.	Salinity	Sigma-T
5	5.952	32.046	25.225
10	5.334	32.067	25.314
20	2.069	32.165	25.696
30	0.446	32.292	25.899
40	0.933	32.460	26.007
50	0.850	32.543	26.079
75	1.549	32.838	26.272

STATION US14219
LATITUDE 42-09.2 N
LONGITUI 141-10.1 E
DEPTH (m) 127

Press.	Temp.	Salinity	Sigma-T
5	6.253	32.032	25.177
10	3.360	31.971	25.437
20	1.334	32.193	25.768
30	1.071	32.367	25.925
40	1.209	32.494	26.017
50	1.403	32.600	26.090
75	1.729	32.955	26.353
100	2.334	33.134	26.451

Table 2. (Continued)

STATION US14220
LATITUDE 42-09.4 N
LONGITUI 141-21.8 E
DEPTH (m) 402

Press.	Temp.	Salinity	Sigma-T
5	6.713	31.880	24.999
10	4.923	32.125	25.405
20	1.721	32.278	25.811
30	0.965	32.510	26.045
40	2.020	32.746	26.165
50	1.088	32.713	26.201
75	2.064	33.022	26.382
100	3.911	33.348	26.481
125	4.431	33.433	26.495
150	4.921	33.533	26.521
175	4.523	33.526	26.559
200	4.009	33.488	26.582
250	2.818	33.430	26.648

STATION US14221
LATITUDE 42-00.5 N
LONGITUI 141-20.1 E
DEPTH (m) 315

Press.	Temp.	Salinity	Sigma-T
5	7.444	32.000	24.996
10	5.138	32.099	25.360
20	2.467	32.311	25.783
30	1.596	32.377	25.899
40	1.259	32.466	25.992
50	0.782	32.551	26.089
75	1.213	32.783	26.250
100	2.086	32.998	26.361
125	3.739	33.318	26.474
150	3.589	33.329	26.497
175	4.039	33.465	26.561
200	4.131	33.532	26.605
250	3.592	33.601	26.714

STATION US14222
LATITUDE 41-59.7 N
LONGITUI 141-09.6 E
DEPTH (m) 135

Press.	Temp.	Salinity	Sigma-T
5	7.503	31.948	24.947
10	4.068	32.001	25.393
20	1.625	32.259	25.802
30	1.238	32.368	25.915
40	1.589	32.544	26.033
50	1.205	32.550	26.063
75	2.193	32.992	26.348
100	2.421	33.131	26.442
125	3.296	33.309	26.509

STATION US14223
LATITUDE 41-42.9 N
LONGITUI 140-44.7 E
DEPTH (m) 83

Press.	Temp.	Salinity	Sigma-T
5	10.944	33.587	25.685
10	10.409	33.733	25.893
20	9.815	33.816	26.059
30	9.805	33.825	26.067
40	9.789	33.830	26.073
50	9.602	33.878	26.143
75	8.869	33.986	26.345

STATION US14224
LATITUDE 41-40.9 N
LONGITUI 140-47.2 E
DEPTH (m) 218

Press.	Temp.	Salinity	Sigma-T
5	11.397	33.436	25.486
10	11.114	33.563	25.636
20	11.094	33.587	25.659
30	11.022	33.625	25.701
40	10.367	33.815	25.964
50	9.731	33.909	26.145
75	9.342	33.922	26.219
100	9.069	33.958	26.292
125	8.976	33.970	26.316
150	8.587	33.982	26.386
175	8.171	34.009	26.470
200	8.055	34.016	26.493

STATION US14225
LATITUDE 41-38.8 N
LONGITUI 140-49.2 E
DEPTH (m) 350

Press.	Temp.	Salinity	Sigma-T
5	11.066	33.483	25.582
10	10.794	33.799	25.877
20	9.783	33.838	26.081
30	9.640	33.882	26.139
40	9.534	33.900	26.171
50	9.482	33.907	26.185
75	9.236	33.935	26.246
100	9.069	33.964	26.296
125	9.000	33.974	26.315
150	8.995	33.991	26.329
175	8.962	33.993	26.336
200	8.759	33.992	26.367
250	8.344	34.009	26.444
300	8.038	34.017	26.496

STATION US14226
LATITUDE 41-37.0 N
LONGITUI 140-51.1 E
DEPTH (m) 97

Press.	Temp.	Salinity	Sigma-T
5	11.380	33.310	25.392
10	11.356	33.315	25.399
20	10.904	33.517	25.638
30	9.798	33.829	26.071
40	9.606	33.886	26.148
50	9.392	33.917	26.207
75	9.293	33.944	26.244

STATION US14227
LATITUDE 41-35.6 N
LONGITUI 140-53.1 E
DEPTH (m) 50

Press.	Temp.	Salinity	Sigma-T
5	11.317	33.362	25.443
10	10.450	33.655	25.825
20	10.185	33.744	25.940
30	10.059	33.776	25.986
40	9.982	33.794	26.013

4

THE " USHIO MARU "

CRUISE 309
CRUISE 310
CRUISE 311

IN MAY 2014
IN JUNE 2014

1. Cruise Itinerary

Cruise 309		
Departure from Hakodate	May	27, 2014
Deploy and retrieval ARGOS buoy		28
Deploy and retrieval ARGOS buoy		29
Arrival at Fukushima		29
Departure from Fukushima		30
Return to Hakodate		31
Total coverage 411.5 miles		

Cruise 310		
Departure from Hakodate	Jun.	2, 2014
Sampling by trawl net		2
Start hydrographic research (US14228)		2
Arrival at Wakinosawa		2
Departure from Wakinosawa		3
Sampling by trawl net		3
Arrival at and departure from Aomori		3
Sampling by trawl net		4
Finish hydrographic research (US14251)		4
Arrival at Noheji		4
Departure from Noheji		5
Return to Hakodate		5
Total coverage 216.0 miles		

Cruise 311		
Departure from Hakodate	Jun.	12, 2014
Start hydrographic research (US14252)		12
Arrival at and departure from Hakodate		14
Arrival at and departure from Mori		15
Sampling by frame trawl net		15
Arrival at and departure from Mori		16
Arrival at Muroran		16
Retrieval mooring ADCP system		17
Arrival at Mori		17
Departure from Mori		18
Set mooring ADCP system		18
Arrival at and departure from Mori		18
Finish hydrographic research (US14274)		18
Return to Hakodate		19
Total coverage 406.5 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 and salinity were measured by CTD (Seabird SBE-9Plus and SBE-19).

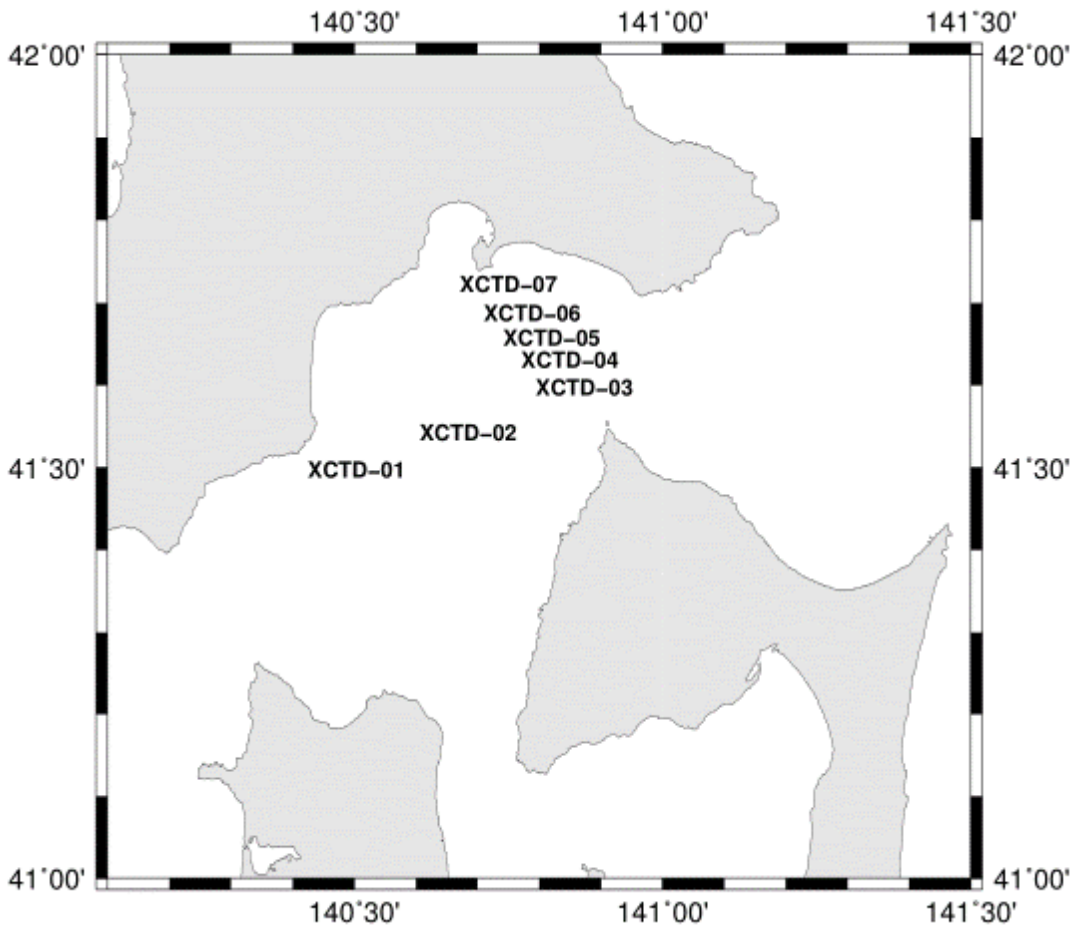

Figure 1. Oceanographic stations (Cruise 309)

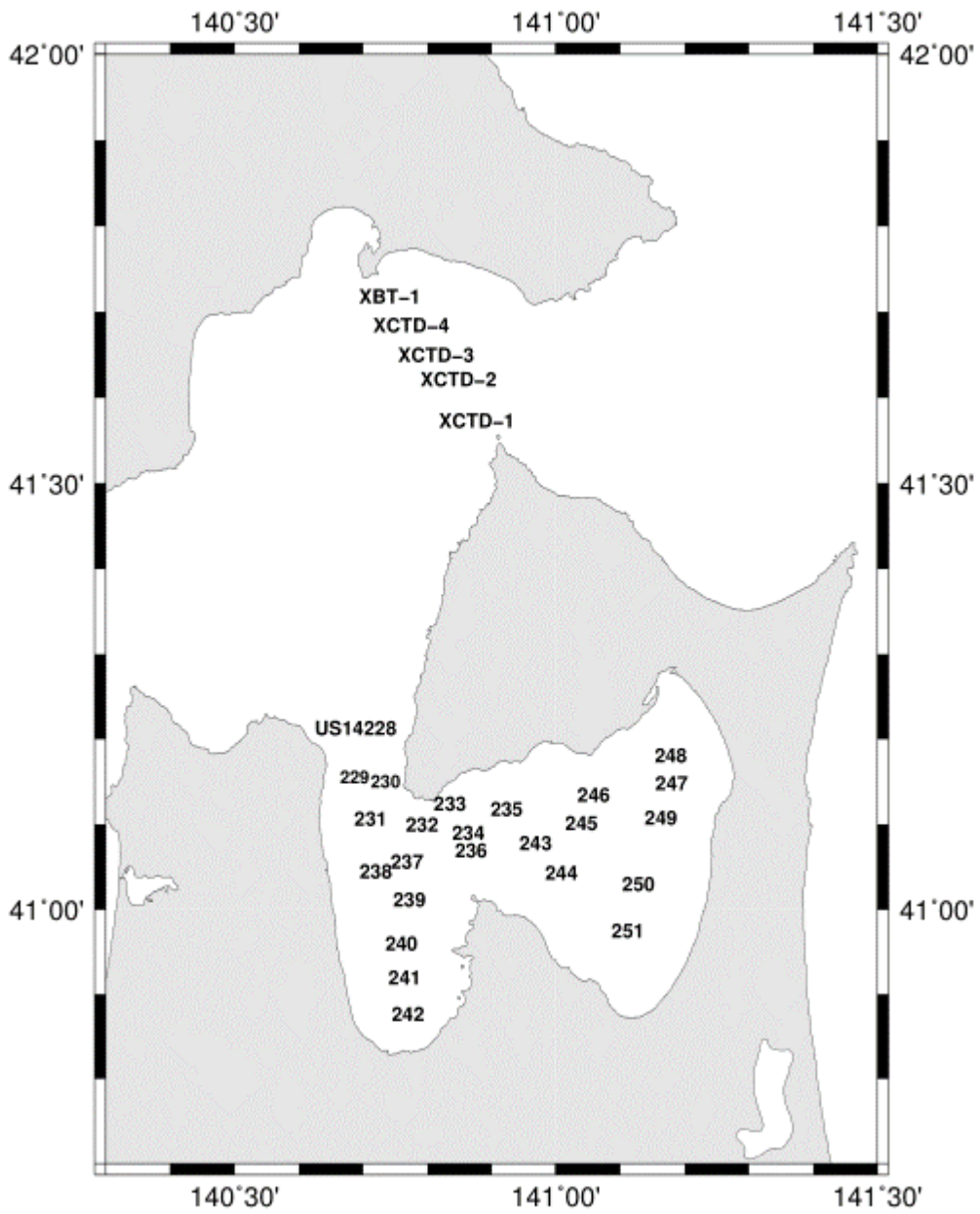

Figure 2. Oceanographic stations (Cruise 310)

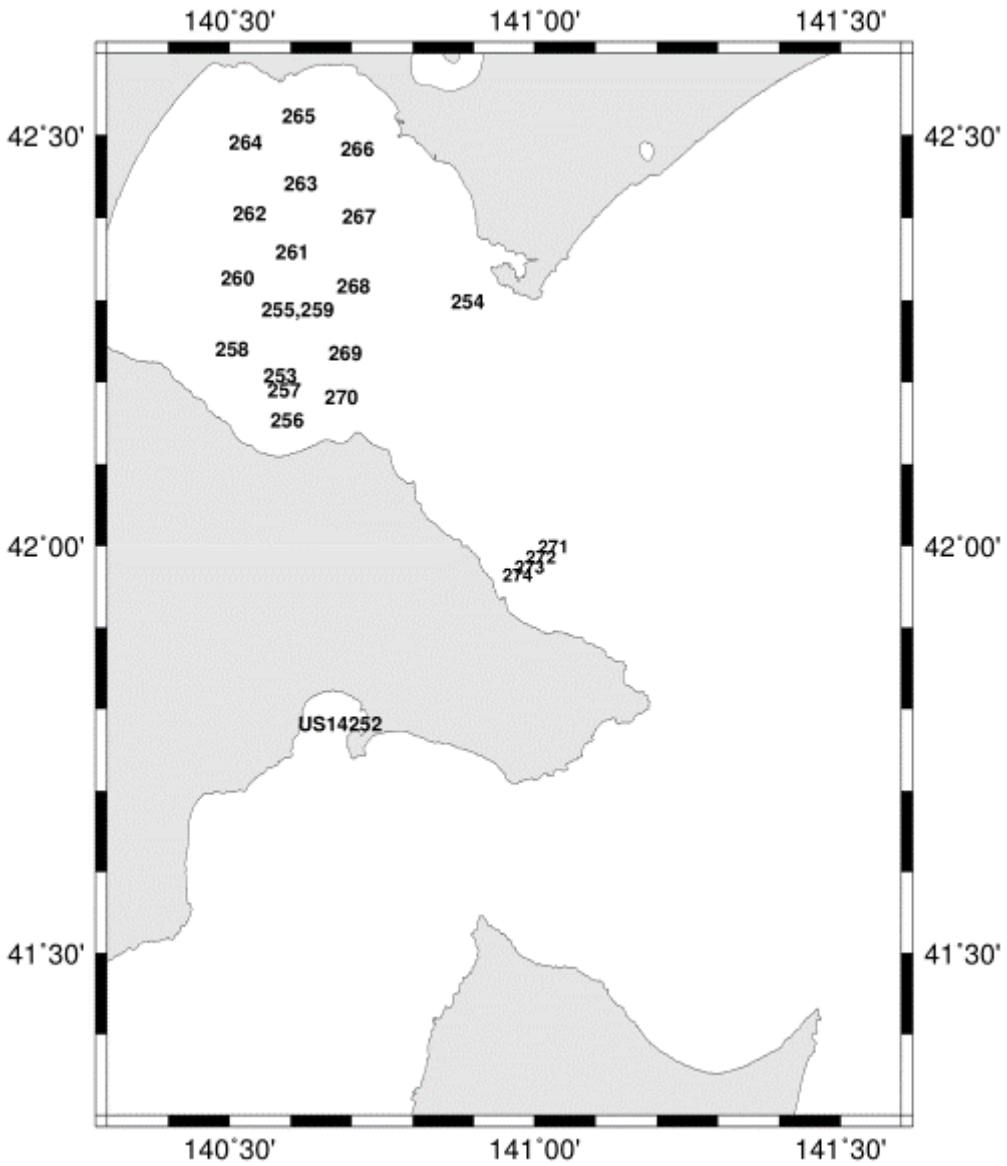

Figure 3. Oceanographic stations (Cruise 311)

Table 1. List of Oceanographic Station

Cruise 309

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
XCTD-01	41-29.3	140-30.2	5/30	0634-0635	160						
XCTD-02	41-32.0	140-41.1	5/30	0723-0724	218						
XCTD-03	41-35.3	140-52.4	5/30	0804-0805	47						
XCTD-04	41-37.3	140-51.0	5/30	0822-0823	98						
XCTD-05	41-38.9	140-49.2	5/30	0834-0835	349						
XCTD-06	41-40.7	140-47.3	5/30	0847-0848	232						
XCTD-07	41-42.8	140-45.0	5/30	0902-0903	84						

Cruise 310

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14228	41-12.3	140-41.3	6/2	1218-1222	77	NW -1	NW -1	NW -2	16.2	15.0	bc
US14229	41-08.9	140-41.2	6/2	1249-1252	46	North-1	North-1	North-3	16.2	15.6	m
US14230	41-08.6	140-44.1	6/2	1314-1318	59	North-1	North-1	North-3	18.2	14.7	bc
US14231	41-05.9	140-42.7	6/2	1336-1340	53	North-1	North-1	North-3	16.4	14.5	bc
US14232	41-05.5	140-47.5	6/2	1452-1456	59	NW -1	NW -1	NW -3	17.2	13.7	bc
US14233	41-07.0	140-50.1	6/3	0559-0602	46	Calm	SW -1	Calm	15.7	14.7	bc
US14234	41-04.9	140-51.8	6/3	0620-0623	52	SE -1	East-1	SE -2	16.6	15.2	bc
US14235	41-06.6	140-55.4	6/3	0653-0657	47	East-1	East-1	East-2	16.4	15.7	bc
US14236	41-03.7	140-52.1	6/3	0802-0806	50	ENE-1	East-1	ENE-2	18.7	16.1	bc
US14237	41-02.9	140-46.1	6/3	0843-0847	52	East-1	East-1	East-2	18.2	14.0	bc
US14238	41-02.2	140-43.2	6/3	0902-0906	57	East-1	East-1	East-2	18.7	14.2	bc
US14239	41-00.2	140-46.3	6/3	1006-1010	52	NE -1	NE -1	NE -3	21.1	14.9	bc
US14240	40-57.1	140-45.6	6/3	1030-1034	49	North-1	NE -1	North-3	20.3	15.3	bc
US14241	40-54.7	140-45.9	6/3	1116-1119	39	North-1	NE -1	North-3	20.1	15.8	bc
US14242	40-52.1	140-46.2	6/3	1136-1139	28	North-1	NE -1	North-3	19.0	16.7	bc
US14243	41-04.2	140-58.1	6/4	0617-0620	49	East-1	East-1	East-3	16.1	15.4	bc
US14244	41-02.1	141-00.5	6/4	0647-0650	48	East-1	East-1	East-3	16.8	15.6	bc
US14245	41-05.6	141-02.4	6/4	0747-0750	46	East-1	East-1	East-3	18.6	15.4	bc
US14246	41-07.6	141-03.5	6/4	0811-0814	38	NE -1	NE -1	NE -3	18.0	16.1	bc
US14247	41-08.4	141-10.8	6/4	0849-0851	35	NE -1	NE -1	NE -3	18.8	16.3	bc
US14248	41-10.4	141-10.7	6/4	0911-0914	31	NE -3	NE -1	NE -5	17.7	15.9	bc
US14249	41-06.0	141-09.8	6/4	1005-1008	38	NNE-3	NNE-1	NNE-5	19.2	15.9	bc
US14250	41-01.3	141-07.7	6/4	1046-1049	42	NNE-2	NNE-1	NNE-3	20.1	16.4	bc
US14251	40-58.0	141-06.7	6/4	1136-1139	39	NE -1	NNE-1	NE -3	21.3	17.1	bc
XCTD-1	41-33.9	140-52.6	6/5	0903-0904	56						
XCTD-2	41-36.8	140-50.9	6/5	0920-0921	80						
XCTD-3	41-38.5	140-48.8	6/5	0933-0934	331						
XCTD-4	41-40.6	140-46.5	6/5	0949-0950	220						
XBT-1	41-42.6	140-44.5	6/5	1003-1004	91						

Table 1 (Continued)

Cruise 311

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14252	41-46.4	140-40.9	6/12	1430-1433	25	East-3	SE -1	East-5	17.3	15.3	r
US14253	42-12.0	140-35.0	6/15	0955-0959	83	East-1	East-1	East-3	12.9	11.4	bc
US14254	42-17.4	140-53.4	6/15	1135-1138	57	East-1	ESE-1	East-3	15.0	12.9	c
US14254-2	42-17.1	140-52.8	6/15	1503-1507	60	Calm	ESE-1	Calm	16.6	12.7	bc
US14254-3	42-16.1	140-50.5	6/15	1945-1949	65	Calm	ESE-1	Calm	15.5	12.9	c
US14254-4	42-17.1	140-55.1	6/15	2335-2340	55	Calm	ESE-1	Calm	14.5	13.3	c
US14255	42-16.8	140-36.7	6/17	0723-0732	90	SE -2	ESE-1	SE -4	13.2	12.2	m
US14256	42-08.7	140-35.7	6/17	1415-1420	63	East-1	East-1	East-2	12.7	11.3	m
US14256-2	42-08.9	140-35.7	6/18	0457-0503	65	Calm	East-1	Calm	12.5	11.6	f
US14257	42-10.9	140-35.4	6/18	0518-0525	79	Calm	East-1	Calm	12.5	12.5	f
US14258	42-13.9	140-30.3	6/18	0558-0603	79	Calm	East-1	Calm	12.5	12.4	f
US14259	42-16.5	140-35.8	6/18	0638-0648	91	Calm	East-1	Calm	12.5	12.5	f
US14260	42-19.1	140-30.8	6/18	0728-0731	94	Calm	East-1	Calm	12.5	12.5	f
US14261	42-21.0	140-36.2	6/18	0801-0808	88	Calm	East-1	Calm	12.8	21.5	f
US14262	42-23.8	140-32.0	6/18	0845-0850	95	Calm	East-1	Calm	12.9	12.4	f
US14263	42-26.0	140-37.0	6/18	0917-0924	83	Calm	East-1	Calm	12.9	12.5	f
US14264	42-29.0	140-31.6	6/18	1003-1007	74	Calm	East-1	Calm	13.8	13.5	f
US14265	42-30.9	140-36.8	6/18	1040-1045	63	East-1	East-1	East-2	14.0	13.5	m
US14266	42-28.5	140-42.6	6/18	1119-1122	58	Calm	East-1	Calm	14.3	13.0	o
US14267	42-23.6	140-42.7	6/18	1153-1156	60	SE -1	East-1	SE -3	14.6	13.1	c
US14268	42-268	140-42.2	6/18	1227-1231	65	SE -1	East-1	SE -3	14.6	12.9	c
US14269	42-13.6	140-41.4	6/18	1302-1306	87	SE -1	East-1	SE -3	14.4	13.4	o
US14270	42-10.4	140-41.0	6/18	1329-1335	85	SE -1	East-1	SE -3	15.3	14.0	o
US14271	41-59.5	141-01.8	6/18	1702-1709	101	SE -1	SE -1	SE -2	13.3	12.9	o
US14272	41-58.7	141-00.6	6/18	1718-1722	94	Calm	SE -1	Calm	13.5	12.7	o
US14273	41-58.0	140-59.5	6/18	1730-1735	87	Calm	SE -1	Calm	13.6	11.9	o
US14274	41-57.4	140-58.3	6/18	1743-1747	79	Calm	SE -1	Calm	13.8	12.9	o

(*): Fixed position by Global Positioning System

S.M.T.: Ship’s mean time

Wr.: Weather in WMO Code 4501

Table 2. Oceanographic data

STATION US14228
LATITUDE 41-12.3 N
LONGITUI 140-41.3 E
DEPTH (m) 77

Press.	Temp.	Salinity	Sigma-T
5	13.452	33.178	24.892
10	13.129	33.188	24.964
20	12.474	33.262	25.149
30	11.642	33.316	25.348
40	10.743	33.355	25.540
50	8.688	33.423	25.932
75	9.629	33.845	26.112

STATION US14229
LATITUDE 41-08.9 N
LONGITUI 140-41.2 E
DEPTH (m) 46

Press.	Temp.	Salinity	Sigma-T
5	13.466	33.065	24.802
10	13.280	33.116	24.878
20	12.870	33.252	25.064
30	12.477	33.365	25.228
40	10.130	33.541	25.791

STATION US14230
LATITUDE 41-08.6 N
LONGITUI 140-44.1 E
DEPTH (m) 59

Press.	Temp.	Salinity	Sigma-T
5	13.451	33.063	24.803
10	13.433	33.077	24.817
20	12.862	33.261	25.073
30	11.252	33.114	25.262
40	10.436	33.304	25.554
50	8.860	33.108	25.659

STATION US14231
LATITUDE 41-05.9 N
LONGITUI 140-42.7 E
DEPTH (m) 53

Press.	Temp.	Salinity	Sigma-T
5	13.719	32.981	24.685
10	13.443	33.061	24.802
20	13.064	33.217	24.999
30	12.736	33.303	25.130
40	11.632	33.318	25.351
50	10.221	33.450	25.705

STATION US14232
LATITUDE 41-05.5 N
LONGITUI 140-47.5 E
DEPTH (m) 59

Press.	Temp.	Salinity	Sigma-T
5	12.943	32.729	24.645
10	12.247	32.846	24.870
20	11.275	32.939	25.121
30	10.193	33.097	25.434
40	9.333	33.092	25.571
50	9.229	33.106	25.599

STATION US14233
LATITUDE 41-07.0 N
LONGITUI 140-50.1 E
DEPTH (m) 46

Press.	Temp.	Salinity	Sigma-T
5	13.322	32.409	24.323
10	12.136	32.498	24.621
20	10.511	32.700	25.070
30	9.988	32.994	25.388
40	9.224	33.138	25.625

STATION US14234
LATITUDE 41-04.9 N
LONGITUI 140-51.8 E
DEPTH (m) 52

Press.	Temp.	Salinity	Sigma-T
5	14.722	32.617	24.195
10	12.998	33.097	24.919
20	12.527	33.138	25.042
30	10.431	33.077	25.377
40	8.950	33.109	25.645
50	8.250	33.212	25.833

STATION US14235
LATITUDE 41-06.6 N
LONGITUI 140-55.4 E
DEPTH (m) 47

Press.	Temp.	Salinity	Sigma-T
5	15.049	32.503	24.037
10	13.095	32.583	24.502
20	11.111	32.879	25.104
30	10.176	33.123	25.457
40	7.261	32.875	25.709

STATION US14236
LATITUDE 41-03.7 N
LONGITUI 140-52.1 E
DEPTH (m) 50

Press.	Temp.	Salinity	Sigma-T
5	14.949	32.497	24.054
10	12.734	32.764	24.713
20	12.058	33.192	25.175
30	12.130	33.431	25.346
40	10.903	33.370	25.523

STATION US14237
LATITUDE 41-02.9 N
LONGITUI 140-46.1 E
DEPTH (m) 52

Press.	Temp.	Salinity	Sigma-T
5	14.095	32.868	24.520
10	13.311	33.008	24.788
20	11.788	32.914	25.009
30	11.297	33.150	25.282
40	10.900	33.454	25.590
50	9.184	33.360	25.805

STATION US14238
LATITUDE 41-02.2 N
LONGITUI 140-43.2 E
DEPTH (m) 57

Press.	Temp.	Salinity	Sigma-T
5	13.978	33.029	24.669
10	13.719	33.019	24.714
20	13.068	33.216	24.998
30	12.819	33.255	25.077
40	12.169	33.435	25.342
50	10.850	33.656	25.756

STATION US14239
LATITUDE 41-00.2 N
LONGITUI 140-46.3 E
DEPTH (m) 52

Press.	Temp.	Salinity	Sigma-T
5	13.440	33.098	24.832
10	13.236	33.128	24.896
20	12.534	33.287	25.157
30	12.407	33.411	25.277
40	11.871	33.406	25.375

STATION US14240
LATITUDE 40-57.1 N
LONGITUI 140-45.6 E
DEPTH (m) 49

Press.	Temp.	Salinity	Sigma-T
5	14.741	32.713	24.265
10	13.969	32.966	24.622
20	13.142	33.175	24.951
30	11.807	33.145	25.185
40	11.999	33.448	25.384

STATION US14241
LATITUDE 40-54.7 N
LONGITUI 140-45.9 E
DEPTH (m) 39

Press.	Temp.	Salinity	Sigma-T
5	14.640	32.460	24.091
10	14.276	32.570	24.252
20	11.777	32.826	24.942
30	11.717	33.026	25.109

STATION US14242
LATITUDE 40-52.1 N
LONGITUI 140-46.2 E
DEPTH (m) 28

Press.	Temp.	Salinity	Sigma-T
5	15.881	32.484	23.839
10	16.195	32.470	23.759
20	12.114	32.933	24.963

STATION US14243
LATITUDE 41-04.2 N
LONGITUI 140-58.1 E
DEPTH (m) 49

Press.	Temp.	Salinity	Sigma-T
5	14.942	32.295	23.900
10	13.783	32.267	24.120
20	11.537	32.948	25.081
30	10.865	33.036	25.270
40	9.556	33.139	25.573

STATION US14244
LATITUDE 41-02.1 N
LONGITUI 141-00.5 E
DEPTH (m) 48

Press.	Temp.	Salinity	Sigma-T
5	13.509	32.254	24.165
10	13.192	32.283	24.252
20	12.012	32.432	24.593
30	10.985	33.105	25.303
40	9.266	33.056	25.554

STATION US14245
LATITUDE 41-05.6 N
LONGITUI 141-02.4 E
DEPTH (m) 46

Press.	Temp.	Salinity	Sigma-T
5	13.868	32.293	24.123
10	13.847	32.300	24.132
20	12.897	32.319	24.337
30	10.584	32.969	25.267
40	7.434	32.898	25.704

Table 2. (Continued)

STATION US14246
LATITUDE 41-07.6 N
LONGITUI 141-03.5 E
DEPTH (m) 38

Press.	Temp.	Salinity	Sigma-T
5	15.279	32.346	23.866
10	14.768	32.389	24.010
20	12.532	32.581	24.610
30	8.840	32.729	25.365

STATION US14247
LATITUDE 41-08.4 N
LONGITUI 141-10.8 E
DEPTH (m) 35

Press.	Temp.	Salinity	Sigma-T
5	15.709	32.356	23.780
10	13.623	32.477	24.315
20	11.260	32.771	24.994
30	8.146	32.748	25.484

STATION US14248
LATITUDE 41-10.4 N
LONGITUI 141-10.7 E
DEPTH (m) 31

Press.	Temp.	Salinity	Sigma-T
5	15.563	32.384	23.833
10	12.954	32.368	24.364
20	11.001	32.680	24.969
30	8.243	32.710	25.441

STATION US14249
LATITUDE 41-06.0 N
LONGITUI 141-09.8 E
DEPTH (m) 38

Press.	Temp.	Salinity	Sigma-T
5	15.677	32.331	23.768
10	14.506	32.407	24.079
20	12.877	32.604	24.562
30	8.461	32.712	25.409

STATION US14250
LATITUDE 41-01.3 N
LONGITUI 141-07.7 E
DEPTH (m) 42

Press.	Temp.	Salinity	Sigma-T
5	15.888	32.222	23.637
10	14.107	32.268	24.055
20	11.562	32.530	24.752
30	9.554	33.022	25.481
40	7.895	33.003	25.721

STATION US14251
LATITUDE 40-58.0 N
LONGITUI 141-06.7 E
DEPTH (m) 39

Press.	Temp.	Salinity	Sigma-T
5	16.293	32.241	23.560
10	12.883	32.297	24.322
20	11.145	32.608	24.888
30	9.333	33.027	25.521

STATION US14252
LATITUDE 41-46.4 N
LONGITUI 140-40.9 E
DEPTH (m) 25

Press.	Temp.	Salinity	Sigma-T
5	14.785	33.540	24.893
10	14.431	33.589	25.006
20	13.787	33.659	25.195

STATION US14253
LATITUDE 42-12.0 N
LONGITUI 140-35.0 E
DEPTH (m) 83

Press.	Temp.	Salinity	Sigma-T
5	10.661	31.153	23.840
10	10.658	31.681	24.251
20	9.650	31.879	24.573
30	7.232	32.060	25.072
40	5.647	32.145	25.339
50	3.624	32.338	25.705
75	2.512	32.755	26.134

STATION US14254
LATITUDE 42-17.4 N
LONGITUI 140-53.4 E
DEPTH (m) 57

Press.	Temp.	Salinity	Sigma-T
5	12.177	31.499	23.839
10	10.409	31.874	24.444
20	8.553	31.998	24.836
30	8.106	32.347	25.175
40	6.233	32.242	25.345
50	3.598	32.266	25.650

STATION US14255
LATITUDE 42-16.8 N
LONGITUI 140-36.7 E
DEPTH (m) 90

Press.	Temp.	Salinity	Sigma-T
5	12.384	31.104	23.494
10	11.688	31.695	24.080
20	11.186	31.748	24.211
30	9.827	31.878	24.543
40	7.338	31.988	25.002
50	5.741	32.108	25.299
75	2.429	32.731	26.122

STATION US14256
LATITUDE 42-08.7 N
LONGITUI 140-35.7 E
DEPTH (m) 63

Press.	Temp.	Salinity	Sigma-T
5	11.240	31.368	23.907
10	10.344	31.369	24.062
20	9.078	31.956	24.723
30	7.173	32.027	25.055
40	5.575	32.156	25.357
50	3.288	32.346	25.742

STATION US14257
LATITUDE 42-10.9 N
LONGITUI 140-35.4 E
DEPTH (m) 79

Press.	Temp.	Salinity	Sigma-T
5	13.009	31.117	23.385
10	12.580	31.216	23.544
20	9.697	31.813	24.513
30	7.524	31.986	24.975
40	5.353	32.144	25.372
50	3.110	32.321	25.737
75	2.884	32.920	26.235

STATION US14258
LATITUDE 42-13.9 N
LONGITUI 140-30.3 E
DEPTH (m) 79

Press.	Temp.	Salinity	Sigma-T
5	12.353	31.475	23.787
10	11.380	31.626	24.082
20	10.978	31.739	24.241
30	9.409	31.922	24.645
40	6.389	32.107	25.219
50	3.728	32.301	25.666
75	2.489	32.716	26.105

STATION US14259
LATITUDE 42-16.5 N
LONGITUI 140-35.8 E
DEPTH (m) 91

Press.	Temp.	Salinity	Sigma-T
5	12.478	31.278	23.611
10	12.508	31.477	23.759
20	11.244	31.809	24.249
30	10.829	31.904	24.395
40	6.831	31.961	25.048
50	5.940	32.091	25.262
75	2.643	32.767	26.133

STATION US14260
LATITUDE 42-19.1 N
LONGITUI 140-30.8 E
DEPTH (m) 94

Press.	Temp.	Salinity	Sigma-T
5	12.409	31.507	23.802
10	11.947	31.497	23.879
20	11.323	31.719	24.165
30	10.237	31.877	24.475
40	8.554	31.973	24.816
50	5.115	32.153	25.406
75	2.610	32.797	26.160

STATION US14261
LATITUDE 42-21.0 N
LONGITUI 140-36.2 E
DEPTH (m) 88

Press.	Temp.	Salinity	Sigma-T
5	12.563	31.444	23.723
10	11.588	31.505	23.951
20	11.371	31.753	24.182
30	10.771	31.826	24.344
40	7.937	31.944	24.883
50	6.568	32.044	25.147
75	2.568	32.726	26.106

STATION US14262
LATITUDE 42-23.8 N
LONGITUI 140-32.0 E
DEPTH (m) 95

Press.	Temp.	Salinity	Sigma-T
5	12.221	31.516	23.843
10	11.835	31.646	24.016
20	10.619	31.636	24.222
30	9.713	31.914	24.590
40	7.700	31.987	24.951
50	5.043	32.175	25.431
75	2.583	32.760	26.132

STATION US14263
LATITUDE 42-26.0 N
LONGITUI 140-37.0 E
DEPTH (m) 83

Press.	Temp.	Salinity	Sigma-T
5	12.305	31.261	23.630
10	11.711	31.681	24.066
20	11.235	31.674	24.145
30	9.815	31.939	24.593
40	8.234	31.971	24.862
50	5.005	32.164	25.427
75	2.529	32.707	26.094

Table 2. (Continued)

STATION US14264
LATITUDE 42-29.0 N
LONGITUI 140-31.6 E
DEPTH (m) 74

Press.	Temp.	Salinity	Sigma-T
5	11.078	31.185	23.793
10	10.358	31.460	24.130
20	9.204	31.927	24.681
30	7.119	32.028	25.062
40	5.643	32.136	25.332
50	4.015	32.279	25.621

STATION US14265
LATITUDE 42-30.9 N
LONGITUI 140-36.8 E
DEPTH (m) 63

Press.	Temp.	Salinity	Sigma-T
5	11.340	31.737	24.176
10	10.781	31.870	24.377
20	9.179	31.918	24.678
30	6.975	32.020	25.075
40	5.651	32.171	25.359
50	3.720	32.328	25.688

STATION US14266
LATITUDE 42-28.5 N
LONGITUI 140-42.6 E
DEPTH (m) 58

Press.	Temp.	Salinity	Sigma-T
5	12.651	31.111	23.449
10	11.765	31.494	23.910
20	10.419	31.868	24.437
30	8.519	32.013	24.852
40	5.694	32.157	25.343
50	3.887	32.307	25.655

STATION US14267
LATITUDE 42-23.6 N
LONGITUI 140-42.7 E
DEPTH (m) 60

Press.	Temp.	Salinity	Sigma-T
5	12.284	31.489	23.811
10	11.577	31.649	24.065
20	10.783	31.627	24.187
30	10.148	31.939	24.538
40	8.020	31.991	24.908
50	4.386	32.250	25.560

STATION US14268
LATITUDE 42-268 N
LONGITUI 140-42.2 E
DEPTH (m) 65

Press.	Temp.	Salinity	Sigma-T
5	12.511	31.113	23.477
10	11.463	31.504	23.972
20	10.957	31.865	24.343
30	10.049	31.923	24.542
40	6.666	32.028	25.121
50	3.394	32.270	25.672

STATION US14269
LATITUDE 42-13.6 N
LONGITUI 140-41.4 E
DEPTH (m) 87

Press.	Temp.	Salinity	Sigma-T
5	12.550	31.251	23.576
10	12.252	31.385	23.736
20	9.152	31.911	24.676
30	6.312	32.068	25.198
40	3.126	32.333	25.746
50	2.442	32.498	25.934
75	2.372	32.704	26.104

STATION US14270
LATITUDE 42-10.4 N
LONGITUI 140-41.0 E
DEPTH (m) 85

Press.	Temp.	Salinity	Sigma-T
5	12.957	31.127	23.403
10	11.392	31.713	24.148
20	9.001	31.950	24.731
30	7.083	32.116	25.137
40	4.705	32.227	25.509
50	2.808	32.385	25.814
75	2.616	32.808	26.168

STATION US14271
LATITUDE 41-59.5 N
LONGITUI 141-01.8 E
DEPTH (m) 101

Press.	Temp.	Salinity	Sigma-T
5	12.271	31.341	23.698
10	9.903	31.741	24.424
20	7.419	31.962	24.970
30	4.537	32.037	25.376
40	4.048	32.194	25.550
50	4.977	32.630	25.800
75	3.092	32.832	26.147

STATION US14272
LATITUDE 41-58.7 N
LONGITUI 141-00.6 E
DEPTH (m) 94

Press.	Temp.	Salinity	Sigma-T
5	10.461	31.646	24.257
10	9.694	31.794	24.500
20	8.704	31.966	24.788
30	5.318	32.005	25.266
40	4.441	32.115	25.448
50	4.903	32.590	25.776
75	3.513	32.948	26.201

STATION US14273
LATITUDE 41-58.0 N
LONGITUI 140-59.5 E
DEPTH (m) 87

Press.	Temp.	Salinity	Sigma-T
5	11.617	31.402	23.866
10	9.687	31.775	24.486
20	9.112	31.911	24.683
30	7.865	32.013	24.948
40	5.229	32.015	25.284
50	4.524	32.100	25.428
75	3.339	33.010	26.266

STATION US14274
LATITUDE 41-57.4 N
LONGITUI 140-58.3 E
DEPTH (m) 79

Press.	Temp.	Salinity	Sigma-T
5	11.807	31.308	23.758
10	9.932	31.738	24.417
20	8.829	31.946	24.754
30	7.851	32.034	24.966
40	6.181	32.024	25.180
50	4.767	32.237	25.510
75	3.964	33.390	26.509

5

THE " USHIO MARU "

CRUISE 312
CRUISE 313
CRUISE 314

IN JUNE 2014
IN JULY 2014

1. Cruise Itinerary

Cruise 312		
Departure from Hakodate	Jun.	22, 2014
Sampling by frame trawl net		22
Start hydrographic research (US14275)		22
Sampling by frame trawl net		23
Finish hydrographic research (US14280)		23
Return to Hakodate		24
Total coverage 203.7 miles		

Cruise 313		
Departure from Hakodate	Jun.	30, 2014
Start plankton net sampling		30
Finish plankton net sampling	Jul.	2
Return to Hakodate		4
Total coverage 684.5 miles		

Cruise 314		
Departure from Hakodate	Jul.	7, 2014
Start hydrographic research (US14281)		8
Arrival at and departure from Nemuro		9
Arrival at Nemuro		10
Departure from Nemuro		12
Start whales and dolphins watching research		12
Arrival at Rausu		13
Departure from Rausu		14
Finish whales and dolphins watching research		14
Finish hydrographic research (US14333)		15
Arrival at Kushiro		15
Departure from Kushiro		16
Return to Hakodate		18
Total coverage 1004.0 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 and salinity were measured by CTD (Seabird SBE-9Plus and SBE-19).

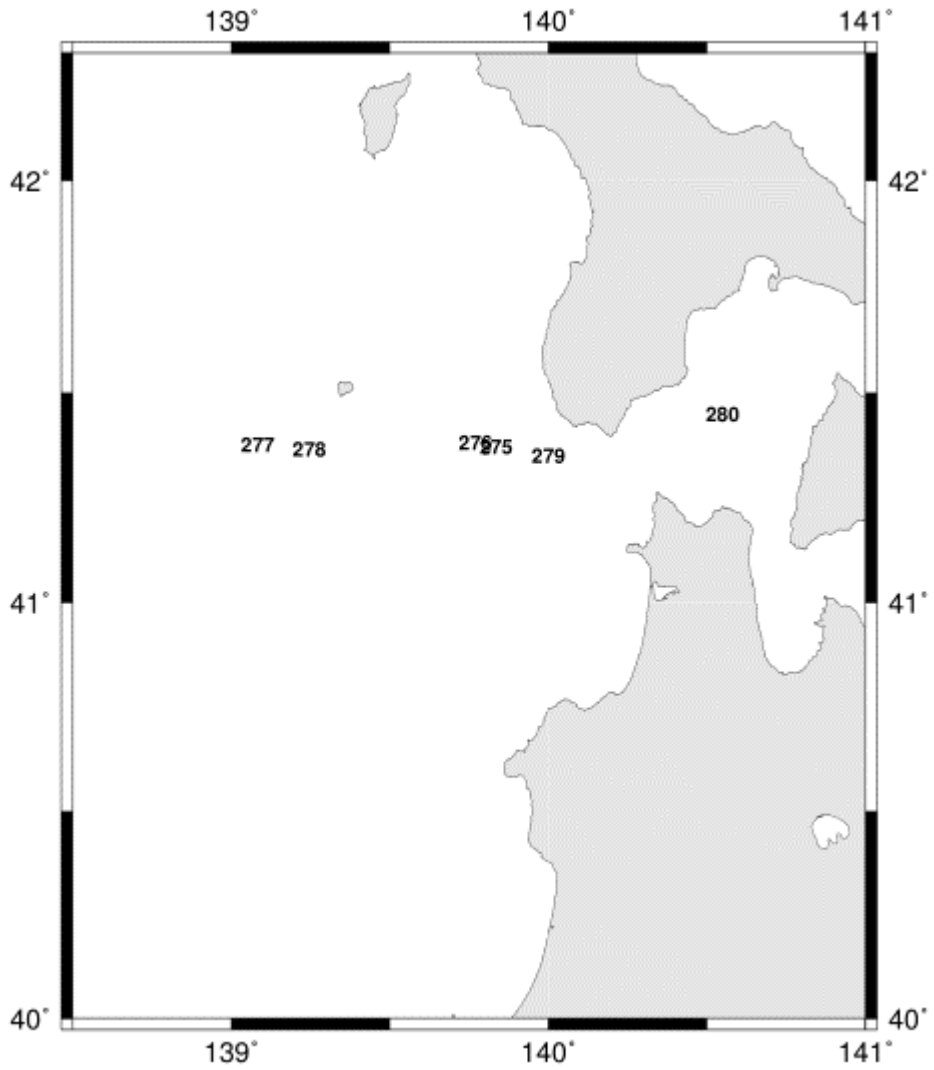

Figure 1. Oceanographic stations (Cruise 312)

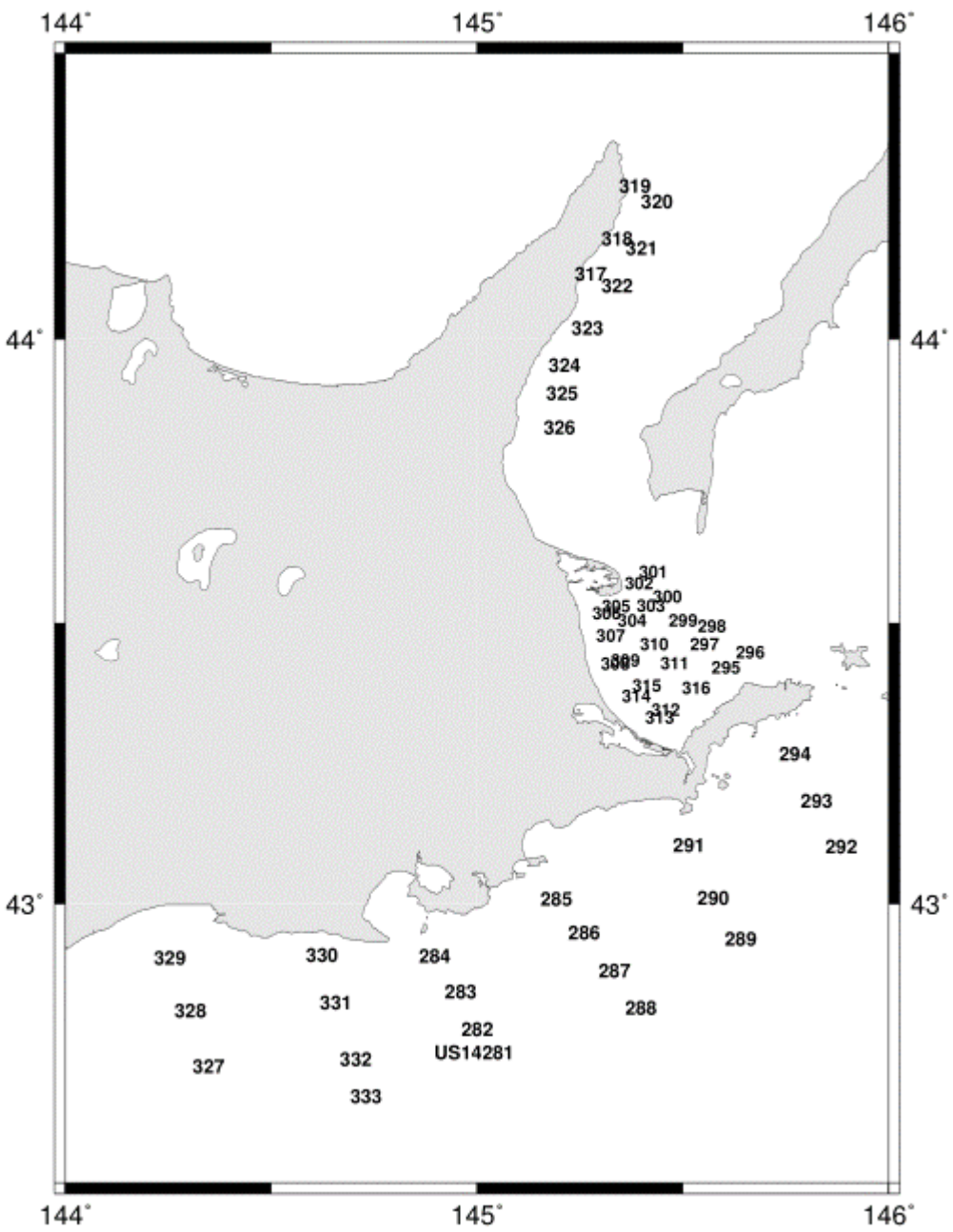

Figure 2. Oceanographic stations (Cruise 314)

Figure 3. Oceanographic stations (Cruise 314)

Table 1. List of Oceanographic Station

Cruise 312

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14275	41-21.3	139-50.1	6/22	1255-1300	112	NNE-2	SE -1	NNE-3	17.9	18.4	bc
US14276	41-21.9	139-46.2	6/22	1450-1456	128	North-3	North-1	North-5	17.6	18.3	bc
US14277	41-21.6	139-05.0	6/23	0825-0841	1344	NW -2	NW -1	NW -4	16.2	18.6	r
US14278	41-28.9	139-14.7	6/23	0945-0959	2007	NW -2	NW -1	NW -4	17.2	18.3	o
US14279	41-20.0	140-00.0	6/23	1324-1333	233	NW -2	NW -1	NW -3	18.5	17.9	o
US14280	41-25.9	140-32.9	6/23	1616-1626	200	SW -3	SW -1	SW -5	17.5	17.2	bc

S.M.T.: Ship’s mean time

Wr.: Weather in WMO Code 4501

Table 1 (Continued)

Cruise 314

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14281	42-43.3	144-59.5	7/8	1555-1601	186	East-2	SE -1	East-4	15.2	16.6	bc
US14282	42-45.8	145-00.0	7/8	1619-1625	149	East-2	SE -1	East-3	15.2	16.3	bc
US14283	42-49.9	144-57.6	7/8	1652-1657	105	East-1	SE -1	East-3	13.7	10.5	bc
US14284	42-53.7	144-53.8	7/8	1726-1729	68	East-2	SE -1	East-3	12.7	10.8	bc
US14285	42-59.8	145-11.5	7/8	1858-1901	51	Calm	SE -1	Calm	11.7	9.8	bc
US14286	42-56.2	145-15.6	7/8	1931-1936	88	East-1	SE -1	East-3	11.4	10.9	bc
US14287	42-52.1	145-20.0	7/8	2011-2019	155	ENE-1	SE -1	ENE-3	12.3	15.0	bc
US14288	42-48.1	145-23.9	7/8	2052-2117	880	Calm	SE -1	Calm	12.3	15.4	c
US14289	42-55.5	145-38.4	7/8	2236-2257	477	Calm	SE -1	Calm	10.7	12.4	f
US14290	42-59.9	145-34.4	7/8	2332-2337	98	Calm	SE -1	Calm	10.9	11.6	f
US14291	43-05.6	145-30.9	7/9	0017-0020	41	Calm	South-1	Calm	10.4	9.8	f
US14292	43-05.4	145-53.1	7/9	0202-0209	140	Calm	SE -1	Calm	10.6	10.0	f
US14293	43-10.3	145-49.5	7/9	0250-0255	87	Calm	SE -1	Calm	10.3	9.0	f
US14294	43-15.3	145-46.3	7/9	0427-0430	47	SE -1	South-1	SE -2	9.7	10.0	f
US14295	43-24.6	145-36.3	7/9	1151-1154	25	SE -1	NE -1	SE -3	13.2	14.3	o
US14296	43-26.2	145-39.8	7/9	1216-1219	29	SE -1	NE -1	SE -3	13.3	14.0	o
US14297	43-27.1	145-33.1	7/9	1303-1306	27	SE -1	NE -1	SE -3	14.8	13.0	o
US14298	43-29.0	145-34.2	7/9	1325-1328	30	SE -2	NE -1	SE -3	13.7	13.3	o
US14299	43-29.6	145-30.0	7/9	1352-1355	23	SE -2	NE -1	SE -3	14.5	13.4	o
US14300	43-32.1	145-27.7	7/9	1418-1420	19	SSE-2	NE -1	SSE-3	14.7	12.6	o
US14301	43-34.8	145-25.7	7/9	1441-1443	10	SSE-2	NE -1	SSE-4	13.8	10.9	o
US14302	43-33.6	145-23.6	7/9	1459-1500	11	SE -2	SE -1	SE -4	13.5	11.0	o
US14303	43-31.2	145-25.3	7/9	1522-1524	14	SE -2	SE -1	SE -4	12.9	14.2	o
US14304	43-29.6	145-22.6	7/9	1551-1553	11	SE -2	SE -1	SE -4	13.7	14.1	o
US14305	43-31.1	145-20.3	7/9	1613-1615	6	SE -2	SE -1	SE -4	13.9	14.5	o
US14306	43-30.4	145-18.9	7/9	1629-1630	6	SE -2	SE -1	SE -4	13.7	14.6	o
US14307	43-28.0	145-19.5	7/9	1652-1653	8	SE -2	SE -1	SE -4	13.1	14.6	o
US14308	43-25.0	145-20.1	7/9	1731-1733	9	SE -2	SE -1	SE -4	13.1	14.5	o
US14309	43-25.4	145-21.6	7/9	1746-1748	10	SE -2	SE -1	SE -4	13.1	14.8	o
US14310	43-27.1	145-25.8	7/9	1813-1815	18	SE -2	SE -1	SE -4	12.6	13.8	o
US14311	43-25.1	145-28.8	7/9	1837-1839	19	SE -2	SE -1	SE -4	12.5	13.9	o
US14312	43-20.1	145-27.5	7/10	0601-0603	13	SE -3	SE -1	SE -5	12.5	12.9	r
US14313	43-19.3	145-26.6	7/10	0620-0622	11	SE -2	SE -1	SE -4	12.8	11.0	r
US14314	43-21.6	145-23.2	7/10	0650-0652	10	SE -2	SE -1	SE -4	12.5	11.3	r
US14315	43-22.7	145-24.7	7/10	0706-0707	12	SE -2	SE -1	SE -4	12.7	11.9	r
US14316	43-22.4	145-31.9	7/10	0743-0745	17	SE -2	SE -1	SE -4	13.3	13.6	r
US14317	44-06.2	145-16.5	7/13	0531-0544	398	SE -1	NE -1	SE -2	13.6	13.0	f
US14318	44-09.9	145-20.4	7/13	0612-0620	240	South-1	NE -1	South-3	14.0	13.5	f
US14319	44-15.4	145-23.0	7/13	0652-1656	87	South-1	NE -1	South-2	14.4	13.3	f
US14320	44-13.8	145-26.2	7/13	0717-0739	1525	South-1	NE -1	South-3	14.2	13.2	f
US14321	44-08.9	145-24.0	7/13	0816-0832	1447	South-2	NE -1	South-4	13.9	13.4	f
US14322	44-04.9	145-20.4	7/13	0904-0919	958	South-1	NE -1	South-1	13.9	13.2	f
US14323	44-00.5	145-16.1	7/14	0407-0422	451	SW -1	South-1	SW -3	13.7	13.5	f
US14324	43-56.6	145-12.7	7/14	0454-0458	83	SSW-1	South-1	SSW-3	13.6	12.9	f
US14325	43-53.6	145-12.4	7/14	0519-0523	67	South-1	South-1	South-3	13.5	13.1	f
US14326	43-50.0	145-12.0	7/14	0548-0551	45	South-1	South-1	South-2	13.6	13.2	o
US14327	42-41.8	144-20.9	7/15	0448-0504	691	Calm	SE -1	Calm	15.9	13.6	f
US14328	42-47.8	144-18.2	7/15	0543-0600	662	Calm	SE -1	Calm	15.8	13.3	f
US14329	42-53.5	144-15.2	7/15	0636-0640	65	Calm	SE -1	Calm	15.2	12.8	f
US14330	42-53.8	144-37.4	7/15	0820-0823	47	Calm	SE -1	Calm	15.4	11.6	f
US14331	42-48.7	144-39.4	7/15	0856-0901	104	Calm	SE -1	Calm	16.3	13.9	f
US14332	42-42.6	144-42.3	7/15	0943-0949	175	WSW-1	SE -1	WSW-2	17.8	17.0	f
US14333	42-38.6	144-43.8	7/15	1017-1034	614	SSW-1	SE -1	SSW-2	18.1	17.9	f
XBT-1	41-58.7	143-00.0	7/17	0323-0324	68						
XBT-2	42-03.8	142-40.0	7/17	0447-0448	122						
XBT-3	42-07.3	142-29.0	7/17	0541-0542	431						
XBT-4	42-08.8	142-20.0	7/17	0613-0614	583						
XBT-5	42-11.3	142-09.2	7/17	0703-0705	732						
XBT-6	42-13.3	142-00.4	7/17	0742-0744	584						
XBT-7	42-15.4	141-50.5	7/17	0827-0829	672						
XBT-8	42-15.7	141-40.3	7/17	0910-0912	633						
XBT-9	42-14.0	141-35.6	7/17	0933-0935	598						
XBT-10	42-10.2	141-30.3	7/17	1005-1007	570						
XBT-11	42-05.5	141-25.4	7/17	1038-1039	414						
XBT-12	42-00.2	141-20.2	7/17	1114-1115	314						
XBT-13	41-55.2	141-15.4	7/17	1150-1151	243						
XBT-14	41-51.0	141-12.0	7/17	1219-1220	155						

(*): Fixed position by Global Positioning System

Table 2. Oceanographic data

STATION US14275
LATITUDE 41-21.3 N
LONGITUDE 139-50.1 E
DEPTH (m) 112

Press.	Temp.	Salinity	Sigma-T
5	18.170	34.053	24.505
10	17.480	34.043	24.665
20	15.460	34.164	25.226
30	13.978	34.263	25.622
40	11.832	34.168	25.975
50	11.703	34.179	26.007
75	9.686	34.105	26.306
100	8.341	34.114	26.526

STATION US14276
LATITUDE 41-21.9 N
LONGITUDE 139-46.2 E
DEPTH (m) 128

Press.	Temp.	Salinity	Sigma-T
5	18.072	33.937	24.440
10	17.377	33.937	24.609
20	13.889	34.085	25.504
30	13.183	34.314	25.825
40	12.185	34.299	26.010
50	11.389	34.235	26.109
75	10.479	34.201	26.245
100	10.013	34.199	26.324

STATION US14277
LATITUDE 41-21.6 N
LONGITUDE 139-05.0 E
DEPTH (m) 1344

Press.	Temp.	Salinity	Sigma-T
5	18.689	34.136	24.440
10	18.687	34.136	24.440
20	15.286	34.242	25.325
30	13.705	34.324	25.726
40	12.554	34.317	25.952
50	11.703	34.288	26.092
75	9.293	34.158	26.412
100	7.344	34.093	26.656
125	5.620	34.044	26.844
150	3.912	34.016	27.012
175	2.694	34.024	27.133
200	1.928	34.026	27.197
250	1.330	34.049	27.258

STATION US14278
LATITUDE 41-28.9 N
LONGITUDE 139-14.7 E
DEPTH (m) 2007

Press.	Temp.	Salinity	Sigma-T
5	18.359	33.933	24.367
10	18.344	33.934	24.371
20	15.325	34.279	25.345
30	13.459	34.274	25.738
40	12.658	34.367	25.970
50	11.776	34.326	26.108
75	10.244	34.223	26.304
100	9.290	34.182	26.431
125	7.855	34.087	26.578
150	6.367	34.059	26.762
175	4.506	34.021	26.954
200	3.199	34.017	27.082
250	1.808	34.062	27.235

STATION US14279
LATITUDE 41-20.0 N
LONGITUDE 140-00.0 E
DEPTH (m) 233

Press.	Temp.	Salinity	Sigma-T
5	18.221	34.090	24.521
10	18.190	34.092	24.530
20	17.524	34.036	24.649
30	16.697	34.212	24.980
40	15.272	34.242	25.328
50	14.288	34.306	25.590
75	12.132	34.347	26.057
100	10.516	34.233	26.264
125	8.976	34.146	26.453
150	8.566	34.127	26.503
175	8.276	34.113	26.536
200	7.960	34.115	26.585

STATION US14280
LATITUDE 41-25.9 N
LONGITUDE 140-32.9 E
DEPTH (m) 200

Press.	Temp.	Salinity	Sigma-T
5	16.309	34.200	25.061
10	14.782	34.253	25.443
20	12.893	34.220	25.810
30	12.583	34.250	25.894
40	11.957	34.238	26.006
50	11.675	34.232	26.054
75	10.800	34.188	26.179
100	10.281	34.164	26.251
125	9.945	34.167	26.311
150	9.915	34.168	26.317
175	9.892	34.168	26.320

STATION US14281
LATITUDE 42-43.3 N
LONGITUDE 144-59.5 E
DEPTH (m) 186

Press.	Temp.	Salinity	Sigma-T
5	15.705	32.708	24.051
10	13.131	32.540	24.461
20	5.408	32.588	25.717
30	4.827	32.805	25.954
40	3.454	32.856	26.133
50	2.739	32.891	26.224
75	1.759	32.942	26.341
100	2.042	33.124	26.465
125	1.419	33.149	26.530
150	3.081	33.411	26.609
175	2.284	33.353	26.630

STATION US14282
LATITUDE 42-45.8 N
LONGITUDE 145-00.0 E
DEPTH (m) 149

Press.	Temp.	Salinity	Sigma-T
5	12.912	32.535	24.498
10	7.640	32.434	25.310
20	4.821	32.614	25.804
30	3.247	32.745	26.064
40	2.483	32.779	26.156
50	2.023	32.849	26.247
75	1.277	32.927	26.361
100	1.129	32.985	26.417
125	0.989	33.019	26.453

STATION US14283
LATITUDE 42-49.9 N
LONGITUDE 144-57.6 E
DEPTH (m) 105

Press.	Temp.	Salinity	Sigma-T
5	8.088	32.495	25.294
10	6.799	32.449	25.437
20	4.621	32.493	25.729
30	3.913	32.546	25.843
40	3.725	32.596	25.900
50	3.070	32.640	25.996
75	2.117	32.713	26.131

STATION US14284
LATITUDE 42-53.7 N
LONGITUDE 144-53.8 E
DEPTH (m) 68

Press.	Temp.	Salinity	Sigma-T
5	9.394	32.432	25.046
10	8.788	32.464	25.166
20	5.643	32.376	25.522
30	4.922	32.476	25.683
40	4.166	32.596	25.858
50	3.047	32.566	25.939

STATION US14285
LATITUDE 42-59.8 N
LONGITUDE 145-11.5 E
DEPTH (m) 51

Press.	Temp.	Salinity	Sigma-T
5	8.766	32.286	25.029
10	6.914	32.375	25.363
20	5.676	32.336	25.487
30	5.083	32.417	25.619
40	4.469	32.445	25.707

STATION US14286
LATITUDE 42-56.2 N
LONGITUDE 145-15.6 E
DEPTH (m) 88

Press.	Temp.	Salinity	Sigma-T
5	10.284	32.578	25.014
10	8.843	32.527	25.206
20	5.891	32.606	25.674
30	3.973	32.710	25.968
40	3.214	32.734	26.058
50	2.891	32.783	26.125
75	2.112	32.835	26.229

Table 2. (Continued)

STATION US14287
LATITUDE 42-52.1 N
LONGITU 145-20.0 E
DEPTH (m 155

Press.	Temp.	Salinity	Sigma-T
5	9.666	32.439	25.007
10	6.835	32.535	25.499
20	3.946	32.646	25.919
30	3.255	32.756	26.071
40	2.463	32.808	26.180
50	1.904	32.859	26.264
75	1.186	32.972	26.403
100	0.981	33.011	26.448
125	0.962	33.021	26.457

STATION US14288
LATITUDE 42-48.1 N
LONGITU 145-23.9 E
DEPTH (m 880

Press.	Temp.	Salinity	Sigma-T
5	15.405	32.827	24.209
10	13.704	32.679	24.454
20	7.646	32.455	25.326
30	6.659	32.875	25.790
40	5.947	33.063	26.028
50	5.725	33.243	26.198
75	3.576	33.210	26.404
100	3.913	33.287	26.432
125	4.094	33.382	26.490
150	3.812	33.424	26.551
175	5.475	33.700	26.589
200	3.788	33.484	26.601
250	2.802	33.362	26.595
300	3.958	33.729	26.779
400	2.671	33.682	26.862

STATION US14289
LATITUDE 42-55.5 N
LONGITU 145-38.4 E
DEPTH (m 477

Press.	Temp.	Salinity	Sigma-T
5	12.619	32.681	24.671
10	10.390	32.593	25.008
20	6.946	32.578	25.518
30	3.862	32.717	25.984
40	2.418	32.856	26.222
50	1.948	32.928	26.315
75	0.647	32.953	26.420
100	0.650	32.998	26.456
125	1.019	33.088	26.507
150	0.975	33.140	26.552
175	0.894	33.171	26.581
200	0.978	33.207	26.605
250	1.247	33.300	26.663
300	1.391	33.364	26.704
400	2.103	33.521	26.779

STATION US14290
LATITUDE 42-59.9 N
LONGITU 145-34.4 E
DEPTH (m 98

Press.	Temp.	Salinity	Sigma-T
5	11.460	32.557	24.791
10	9.748	32.450	25.001
20	5.148	32.705	25.840
30	3.496	32.763	26.055
40	3.107	32.802	26.121
50	2.893	32.845	26.174
75	2.334	32.900	26.264

STATION US14291
LATITUDE 43-05.6 N
LONGITU 145-30.9 E
DEPTH (m 41

Press.	Temp.	Salinity	Sigma-T
5	8.377	32.354	25.141
10	6.274	32.313	25.397
20	5.598	32.460	25.594
30	4.535	32.560	25.791

STATION US14292
LATITUDE 43-05.4 N
LONGITU 145-53.1 E
DEPTH (m 140

Press.	Temp.	Salinity	Sigma-T
5	8.910	32.521	25.191
10	7.951	32.480	25.302
20	5.091	32.552	25.725
30	4.085	32.623	25.887
40	3.028	32.833	26.153
50	2.422	32.878	26.239
75	2.133	32.953	26.322
100	1.330	32.935	26.364
125	1.033	33.011	26.444

STATION US14293
LATITUDE 43-10.3 N
LONGITU 145-49.5 E
DEPTH (m 87

Press.	Temp.	Salinity	Sigma-T
5	8.057	32.565	25.353
10	6.962	32.668	25.587
20	5.200	32.715	25.842
30	4.420	32.835	26.021
40	3.775	32.873	26.117
50	3.653	32.896	26.146
75	3.214	32.900	26.190

STATION US14294
LATITUDE 43-15.3 N
LONGITU 145-46.3 E
DEPTH (m 47

Press.	Temp.	Salinity	Sigma-T
5	8.613	32.401	25.143
10	7.254	32.412	25.346
20	5.923	32.500	25.587
30	5.208	32.569	25.725

STATION US14295
LATITUDE 43-24.6 N
LONGITU 145-36.3 E
DEPTH (m 25

Press.	Temp.	Salinity	Sigma-T
5	13.092	31.414	23.598
10	9.292	31.784	24.555
20	6.541	32.200	25.273

STATION US14296
LATITUDE 43-26.2 N
LONGITU 145-39.8 E
DEPTH (m 29

Press.	Temp.	Salinity	Sigma-T
5	10.662	31.706	24.270
10	9.002	31.917	24.705
20	6.441	32.326	25.385

STATION US14297
LATITUDE 43-27.1 N
LONGITU 145-33.1 E
DEPTH (m 27

Press.	Temp.	Salinity	Sigma-T
5	12.828	31.738	23.900
10	11.275	31.766	24.208
20	4.811	32.130	25.421

STATION US14298
LATITUDE 43-29.0 N
LONGITU 145-34.2 E
DEPTH (m 30

Press.	Temp.	Salinity	Sigma-T
5	10.558	31.765	24.333
10	7.051	31.999	25.049
20	5.379	32.271	25.470

STATION US14299
LATITUDE 43-29.6 N
LONGITU 145-30.0 E
DEPTH (m 23

Press.	Temp.	Salinity	Sigma-T
5	13.408	31.363	23.497
10	8.206	31.967	24.863

STATION US14300
LATITUDE 43-32.1 N
LONGITU 145-27.7 E
DEPTH (m 19

Press.	Temp.	Salinity	Sigma-T
5	11.794	31.784	24.130
10	11.422	31.792	24.204

STATION US14301
LATITUDE 43-34.8 N
LONGITU 145-25.7 E
DEPTH (m 10

Press.	Temp.	Salinity	Sigma-T
5	10.696	31.900	24.415

STATION US14302
LATITUDE 43-33.6 N
LONGITU 145-23.6 E
DEPTH (m 11

Press.	Temp.	Salinity	Sigma-T
5	10.560	31.721	24.299

STATION US14303
LATITUDE 43-31.2 N
LONGITU 145-25.3 E
DEPTH (m 14

Press.	Temp.	Salinity	Sigma-T
5	10.974	31.638	24.162
10	10.025	31.835	24.478

STATION US14304
LATITUDE 43-29.6 N
LONGITU 145-22.6 E
DEPTH (m 11

Press.	Temp.	Salinity	Sigma-T
5	12.827	31.330	23.584

Table 2. (Continued)

STATION US14305
LATITUDE 43-31.1 N
LONGITU 145-20.3 E
DEPTH (m 6

Press.	Temp.	Salinity	Sigma-T
5	10.589	31.456	24.109

STATION US14306
LATITUDE 43-30.4 N
LONGITU 145-18.9 E
DEPTH (m 6

Press.	Temp.	Salinity	Sigma-T
3	14.602	31.087	23.041

STATION US14307
LATITUDE 43-28.0 N
LONGITU 145-19.5 E
DEPTH (m 8

Press.	Temp.	Salinity	Sigma-T
5	13.385	31.176	23.357

STATION US14308
LATITUDE 43-25.0 N
LONGITU 145-20.1 E
DEPTH (m 9

Press.	Temp.	Salinity	Sigma-T
5	13.324	31.404	23.545

STATION US14309
LATITUDE 43-25.4 N
LONGITU 145-21.6 E
DEPTH (m 10

Press.	Temp.	Salinity	Sigma-T
5	12.882	31.347	23.588

STATION US14310
LATITUDE 43-27.1 N
LONGITU 145-25.8 E
DEPTH (m 18

Press.	Temp.	Salinity	Sigma-T
5	13.468	31.405	23.518
10	10.025	31.835	24.478

STATION US14311
LATITUDE 43-25.1 N
LONGITU 145-28.8 E
DEPTH (m 19

Press.	Temp.	Salinity	Sigma-T
5	13.115	31.525	23.680
10	9.238	31.846	24.613

STATION US14312
LATITUDE 43-20.1 N
LONGITU 145-27.5 E
DEPTH (m 13

Press.	Temp.	Salinity	Sigma-T
5	12.462	31.471	23.764
10	7.761	31.714	24.728

STATION US14313
LATITUDE 43-19.3 N
LONGITU 145-26.6 E
DEPTH (m 11

Press.	Temp.	Salinity	Sigma-T
5	10.800	31.594	24.159

STATION US14314
LATITUDE 43-21.6 N
LONGITU 145-23.2 E
DEPTH (m 10

Press.	Temp.	Salinity	Sigma-T
5	11.783	31.449	23.873

STATION US14315
LATITUDE 43-22.7 N
LONGITU 145-24.7 E
DEPTH (m 12

Press.	Temp.	Salinity	Sigma-T
5	11.837	31.508	23.908

STATION US14316
LATITUDE 43-22.4 N
LONGITU 145-31.9 E
DEPTH (m 17

Press.	Temp.	Salinity	Sigma-T
5	13.846	31.177	23.266
10	8.830	31.845	24.675

STATION US14317
LATITUDE 44-06.2 N
LONGITU 145-16.5 E
DEPTH (m 398

Press.	Temp.	Salinity	Sigma-T
5	12.517	31.397	23.696
10	11.721	31.812	24.166
20	10.935	32.293	24.680
30	9.107	32.757	25.346
40	8.469	32.886	25.544
50	8.435	33.130	25.741
75	6.974	33.093	25.920
100	6.720	33.265	26.090
125	4.792	33.079	26.175
150	1.923	33.056	26.420
175	2.939	33.284	26.521
200	2.137	33.236	26.548
250	0.357	33.312	26.726
300	0.373	33.298	26.713

STATION US14318
LATITUDE 44-09.9 N
LONGITU 145-20.4 E
DEPTH (m 240

Press.	Temp.	Salinity	Sigma-T
5	12.473	31.924	24.113
10	11.404	32.300	24.602
20	11.144	32.457	24.770
30	10.192	32.672	25.102
40	8.342	33.095	25.727
50	9.087	33.436	25.880
75	8.031	33.324	25.953
100	6.270	33.230	26.120
125	4.586	33.118	26.229
150	1.632	32.961	26.365
175	2.820	33.198	26.462

STATION US14319
LATITUDE 44-15.4 N
LONGITU 145-23.0 E
DEPTH (m 87

Press.	Temp.	Salinity	Sigma-T
5	11.800	32.013	24.307
10	11.336	32.275	24.595
20	9.374	32.930	25.439
30	8.944	33.238	25.747
40	8.283	33.265	25.869
50	6.154	33.120	26.048

STATION US14320
LATITUDE 44-13.8 N
LONGITU 145-26.2 E
DEPTH (m 1525

Press.	Temp.	Salinity	Sigma-T
5	12.579	32.481	24.524
10	12.467	32.570	24.614
20	11.886	32.811	24.910
30	11.491	33.040	25.161
40	9.752	33.138	25.540
50	8.901	33.217	25.738
75	7.517	33.202	25.931
100	4.779	33.122	26.211
125	2.582	32.937	26.274
150	2.652	33.155	26.442
175	2.779	33.259	26.515
200	1.901	33.288	26.608
250	0.969	33.288	26.671
300	0.403	33.325	26.733
400	1.039	33.513	26.847

STATION US14321
LATITUDE 44-08.9 N
LONGITU 145-24.0 E
DEPTH (m 1447

Press.	Temp.	Salinity	Sigma-T
5	12.853	32.090	24.168
10	12.400	32.633	24.676
20	11.814	33.384	25.369
30	11.812	33.436	25.410
40	11.788	33.505	25.468
50	11.028	33.429	25.547
75	7.612	33.227	25.937
100	6.941	33.327	26.109
125	4.310	33.057	26.209
150	2.900	33.094	26.373
175	2.174	33.252	26.558
200	1.971	33.323	26.631
250	0.337	33.266	26.689
300	0.608	33.339	26.733
400	1.107	33.493	26.827

STATION US14322
LATITUDE 44-04.9 N
LONGITU 145-20.4 E
DEPTH (m 958

Press.	Temp.	Salinity	Sigma-T
5	12.752	31.813	23.973
10	12.620	32.342	24.408
20	11.592	32.948	25.071
30	9.438	32.846	25.362
40	10.632	33.496	25.670
50	9.641	33.348	25.721
75	8.758	33.424	25.922
100	6.351	33.223	26.104
125	4.381	33.114	26.247
150	1.617	32.992	26.390
175	0.887	33.057	26.490
200	0.608	33.127	26.562
250	0.235	33.204	26.645
300	0.335	33.306	26.722
400	1.040	33.514	26.848

Table 2 (Continued)

STATION US14323
LATITUDE 44-00.5 N
LONGITU 145-16.1 E
DEPTH (m 451

Press.	Temp.	Salinity	Sigma-T
5	13.636	31.145	23.283
10	11.746	31.631	24.021
20	10.933	31.927	24.395
30	10.259	32.992	25.341
40	9.672	33.069	25.499
50	8.711	33.111	25.684
75	7.618	33.199	25.915
100	7.125	33.287	26.052
125	4.288	33.081	26.231
150	1.090	33.003	26.434
175	1.031	33.087	26.505
200	0.907	33.146	26.560
250	0.241	33.172	26.619
300	0.222	33.238	26.672
400	0.756	33.411	26.783

STATION US14324
LATITUDE 43-56.6 N
LONGITU 145-12.7 E
DEPTH (m 83

Press.	Temp.	Salinity	Sigma-T
5	12.294	31.557	23.862
10	11.802	31.835	24.169
20	10.213	32.286	24.798
30	8.727	32.986	25.584
40	6.850	32.844	25.740
50	7.676	33.112	25.838

STATION US14325
LATITUDE 43-53.6 N
LONGITU 145-12.4 E
DEPTH (m 67

Press.	Temp.	Salinity	Sigma-T
5	13.615	31.660	23.686
10	12.217	31.722	24.004
20	10.027	32.223	24.779
30	8.916	33.009	25.573
40	7.283	32.940	25.758
50	6.410	32.939	25.873

STATION US14326
LATITUDE 43-50.0 N
LONGITU 145-12.0 E
DEPTH (m 45

Press.	Temp.	Salinity	Sigma-T
5	12.926	31.587	23.765
10	10.588	31.896	24.431
20	8.643	32.755	25.416
30	8.230	33.054	25.712

STATION US14327
LATITUDE 42-41.8 N
LONGITU 144-20.9 E
DEPTH (m 691

Press.	Temp.	Salinity	Sigma-T
5	12.764	32.069	24.169
10	10.517	32.234	24.705
20	4.873	32.388	25.619
30	4.245	32.542	25.807
40	2.878	32.611	25.988
50	2.095	32.701	26.123
75	2.015	32.814	26.219
100	1.517	32.890	26.316
125	1.364	32.986	26.403
150	1.294	33.095	26.495
175	1.735	33.257	26.595
200	1.598	33.284	26.626
250	2.350	33.497	26.740
300	2.035	33.531	26.792
400	3.047	33.769	26.898

STATION US14328
LATITUDE 42-47.8 N
LONGITU 144-18.2 E
DEPTH (m 662

Press.	Temp.	Salinity	Sigma-T
5	10.333	31.897	24.474
10	8.448	32.289	25.079
20	5.590	32.374	25.527
30	4.709	32.533	25.751
40	3.196	32.639	25.984
50	3.028	32.690	26.039
75	2.067	32.744	26.160
100	1.588	32.810	26.247
125	1.398	32.897	26.329
150	1.622	33.025	26.417
175	2.749	33.251	26.510
200	2.241	33.394	26.666
250	2.025	33.517	26.782
300	2.443	33.623	26.834
400	2.771	33.812	26.957

STATION US14329
LATITUDE 42-53.5 N
LONGITU 144-15.2 E
DEPTH (m 65

Press.	Temp.	Salinity	Sigma-T
5	12.019	31.717	24.037
10	10.338	32.252	24.751
20	6.366	32.299	25.374
30	5.501	32.382	25.544
40	4.646	32.520	25.747
50	3.423	32.585	25.920

STATION US14330
LATITUDE 42-53.8 N
LONGITU 144-37.4 E
DEPTH (m 47

Press.	Temp.	Salinity	Sigma-T
5	10.286	31.857	24.452
10	9.587	32.055	24.720
20	7.234	32.395	25.336
30	5.665	32.411	25.547

STATION US14331
LATITUDE 42-48.7 N
LONGITU 144-39.4 E
DEPTH (m 104

Press.	Temp.	Salinity	Sigma-T
5	12.069	32.314	24.491
10	10.286	32.395	24.870
20	6.035	32.636	25.681
30	3.685	32.726	26.008
40	3.371	32.780	26.081
50	3.273	32.800	26.105
75	2.700	32.839	26.185

STATION US14332
LATITUDE 42-42.6 N
LONGITU 144-42.3 E
DEPTH (m 175

Press.	Temp.	Salinity	Sigma-T
5	16.432	32.435	23.678
10	15.223	32.428	23.942
20	6.805	32.524	25.495
30	5.072	32.881	25.987
40	3.844	32.832	26.077
50	2.272	32.811	26.198
75	3.816	33.273	26.430
100	1.109	33.050	26.471
125	1.578	33.157	26.526
150	1.447	33.194	26.564

STATION US14333
LATITUDE 42-38.6 N
LONGITU 144-43.8 E
DEPTH (m 614

Press.	Temp.	Salinity	Sigma-T
5	17.574	32.533	23.486
10	16.276	32.505	23.767
20	5.884	32.548	25.629
30	3.708	32.780	26.049
40	3.238	32.869	26.163
50	2.200	32.878	26.257
75	1.329	33.003	26.419
100	1.368	33.115	26.506
125	1.315	33.183	26.564
150	1.744	33.309	26.636
175	1.862	33.384	26.687
200	1.951	33.431	26.718
250	2.137	33.537	26.789
300	2.018	33.581	26.833
400	2.997	33.816	26.940

6

THE " USHIO MARU "

CRUISE 315
CRUISE 316
CRUISE 317

IN JULY 2014
IN AUGUST 2014

1. Cruise Itinerary

Cruise 315		
Departure from Hakodate	Jul.	22, 2014
Sampling by frame trawl net		22
Arrival at Usujiri		22
Departure from Usujiri		23
Start hydrographic research (US14334)		23
Sampling by frame trawl net		23
Arrival at and departure from Usujiri		23
Sampling by frame trawl net		24
Arrival at Usujiri		25
Departure from Usujiri		26
Arrival at Hakodate		26
Departure from Hakodate		28
Setting mooring ADCP system		28
Arrival at Hakodate		28
Departure from Hakodate		29
Arrival at Aomori		29
Departure from Aomori		30
Finish hydrographic research (US14368)		30
Return to Hakodate		31
Total coverage 605.4 miles		

Cruise 316		
Departure from Hakodate	Aug.	4, 2014
Sampling by trawl net		4
Start hydrographic research (US14369)		4
Sampling by squid jigging		4
Arrival at Hakodate		5
Departure from Hakodate		6
Sampling by sledge net		6
Arrival and departure from Hakodate		6
Sampling by squid jigging		7
Retrieval ADCP mooring system		7
Sampling by squid jigging		7
Finish hydrographic research (US14395)		8
Return to Hakodate		9
Total coverage 397.3 miles		

Cruise 317		
Departure from Hakodate	Aug.	21, 2014
Start hydrographic research (US14396)		22
Observation by echo sounder		22
Finish hydrographic research (US14398)		24
Return to Hakodate		25
Total coverage 649.4 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 and salinity were measured by CTD (Seabird SBE-9Plus and SBE-19).

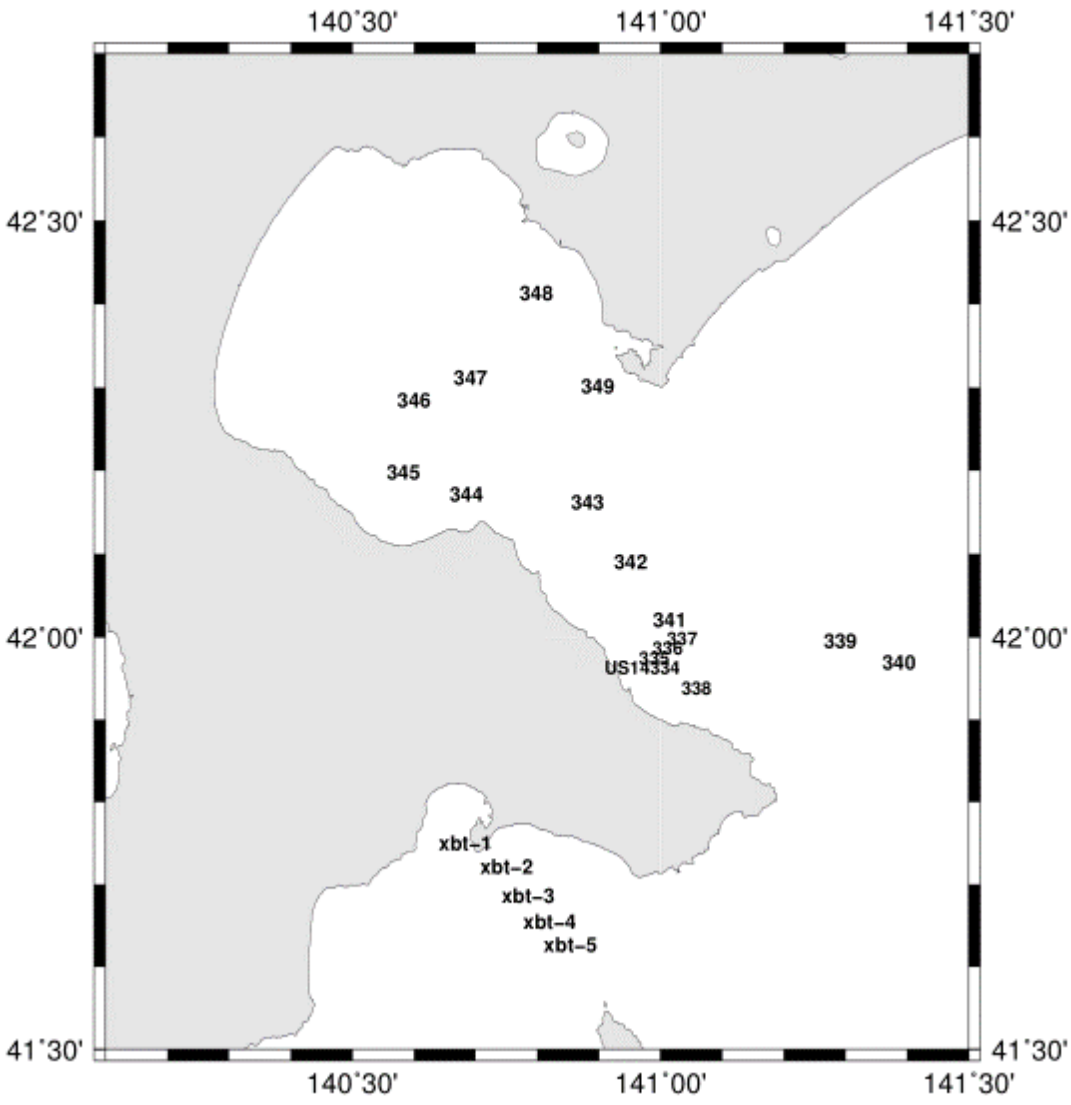

Figure 1. Oceanographic stations (Cruise 315)

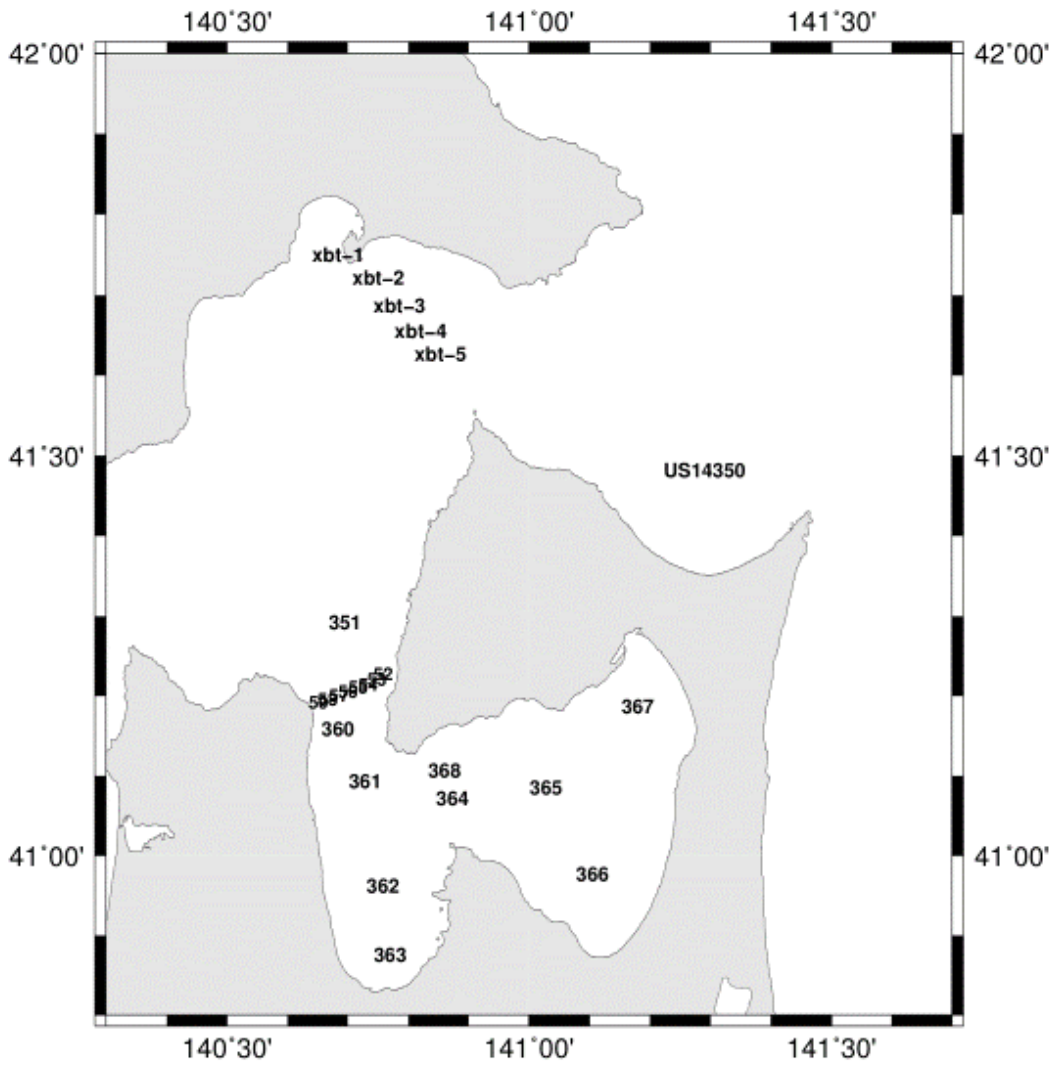

Figure 2. Oceanographic stations (Cruise 315)

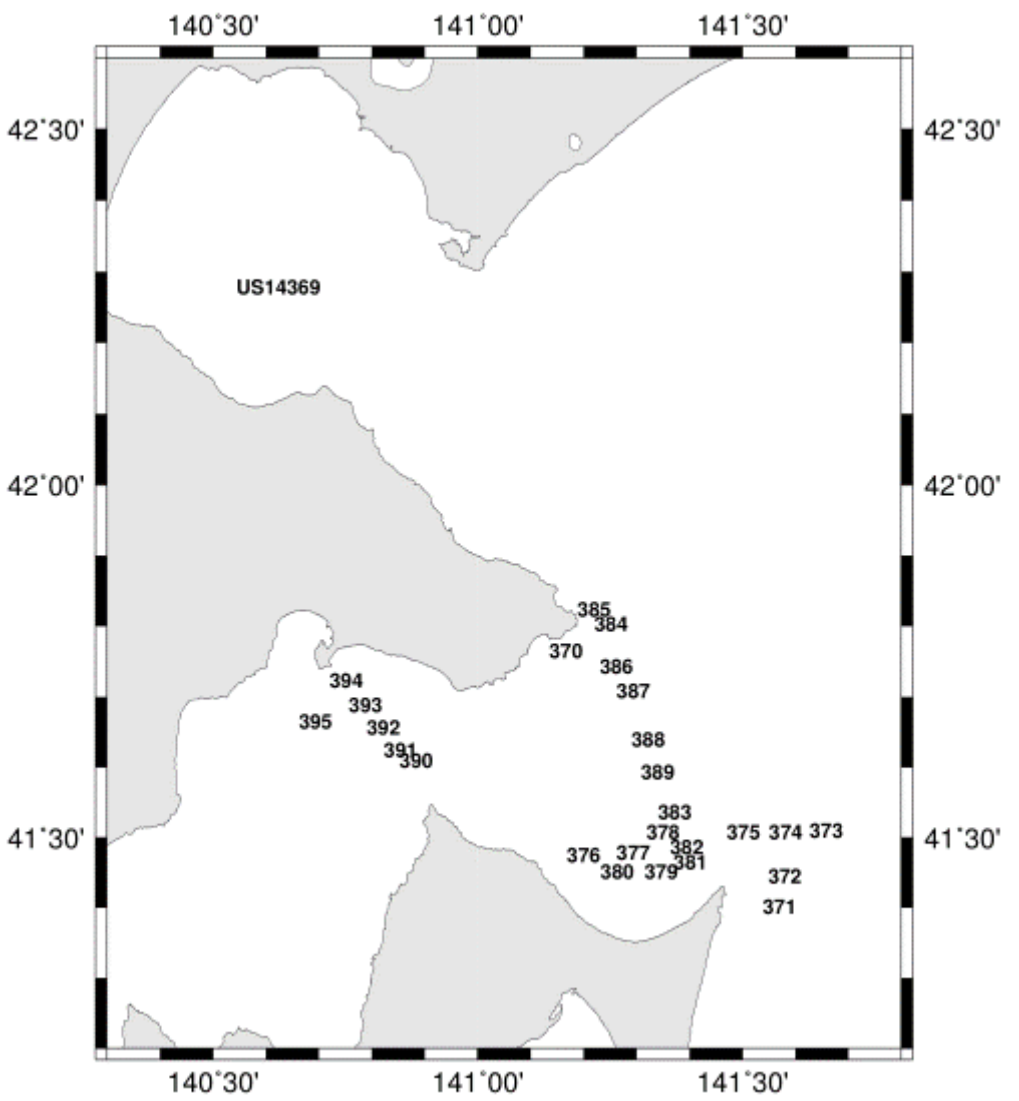

Figure 3. Oceanographic stations (Cruise 316)

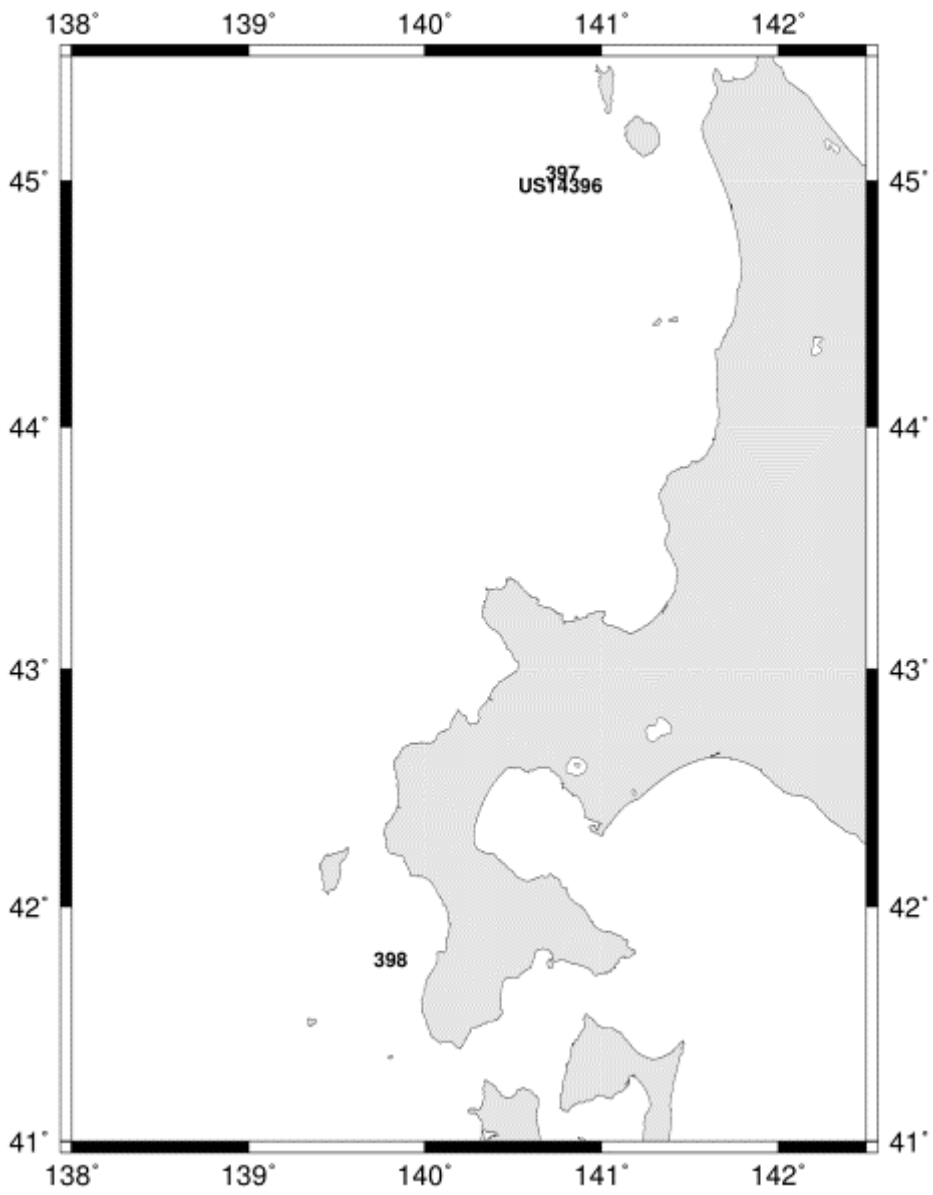

Figure 4. Oceanographic stations (Cruise 317)

Table 1. List of Oceanographic Station

Cruise 315

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14334	41-57.3	140-58.2	7/23	0512-0516	76	NE -1	East-1	NE -2	20.6	18.2	r
US14335	41-58.0	140-59.4	7/23	0524-0529	85	NE -1	East-1	NE -3	21.0	18.5	r
US14336	41-58.7	141-00.7	7/23	0537-0541	93	East-1	East-1	East-3	21.2	18.6	r
US14337	41-59.4	141-02.1	7/23	0551-0557	100	East-1	East-1	East-2	21.7	18.6	r
US14338	41-55.8	141-03.5	7/23	0927-0933	109	WSW-2	East-1	WSW-4	22.9	18.3	r
US14338-2	41-54.0	141-08.3	7/23	1207-1212	117						
US14338-3	41-56.6	140-59.4	7/23	1910-1916	78						
US14338-4	41-55.8	141-03.7	7/23	2205-2211	110						
US14338-5	41-55.3	141-05.2	7/24	0030-0036	111						
US14339	41-59.2	141-17.5	7/24	0723-0733	269	Calm	ESE-1	Calm	20.8	18.5	bc
US14340	41-57.6	141-23.2	7/24	0925-0938	340	Calm	ESE-1	Calm	24.0	18.8	bc
US14339-2	42-00.0	141-17.5	7/24	1902-1913	268						
US14340-2	41-57.6	141-23.5	7/24	2110-2124	340						
US14341	42-00.7	141-00.9	7/26	0428-0433	91	South-1	SE -1	South-3	23.9	20.0	c
US14342	42-04.9	140-57.1	7/26	0537-0541	82	West-1	SE -1	West-3	22.4	29.8	c
US14343	42-09.2	140-52.9	7/26	0626-0630	76	Calm	SE -1	Calm	23.8	20.3	c
US14344	42-09.8	140-41.1	7/26	0745-0750	78	NE -1	SE -1	NE -3	22.0	19.8	o
US14345	42-11.4	140-35.0	7/26	0845-0849	79	East-1	SE -1	East-3	20.9	19.8	o
US14346	42-16.6	140-36.0	7/26	0922-0930	89	SE -1	SE -1	SE -3	21.3	19.5	o
US14347	42-18.2	140-41.5	7/26	1104-1107	70	East-2	SE -1	East-4	21.7	19.6	o
US14348	42-24.3	140-47.9	7/26	1206-1210	44	East-2	SE -1	East-4	20.8	19.9	r
US14349	42-17.6	140-53.9	7/26	1312-1315	56	East-3	SE -1	East-5	21.1	19.3	r
XBT-1	41-44.5	140-41.0	7/28	0700-0701	54						
XBT-2	41-42.8	140-45.0	7/28	0721-0722	84						
XBT-3	41-40.7	140-47.1	7/28	0735-0736	224						
XBT-4	41-38.8	140-49.2	7/28	0749-0750	347						
XBT-5	41-37.1	140-51.2	7/28	0802-0803	98						
XBT-6	41-28.4	141-52.8	7/28	0810-0811	40						
US14350	41-28.4	141-17.4	7/28	1054-1104	221	NW -2	East-1	NW -4	24.0	18.9	bc
US14351	41-17.0	140-41.7	7/29	1012-1021	144	Calm	West-1	Calm	25.4	22.3	bc
US14352	41-13.2	140-45.5	7/29	1051-1056	65	Calm	West-1	Calm	25.7	22.3	bc
US14353	41-12.8	140-44.9	7/29	1103-1107	66	NE -1	West-1	NE -2	25.9	22.1	bc
US14354	41-12.4	140-44.0	7/29	1119-1124	69	NE -1	West-1	NE -2	25.4	22.9	bc
US14355	41-12.2	140-43.0	7/29	1131-1136	71	NE -1	West-1	NE -3	25.8	22.8	bc
US14356	41-11.9	140-42.0	7/29	1144-1149	73	North-1	East-1	North-3	25.9	22.5	bc
US14357	41-11.6	140-41.1	7/29	1157-1202	68	NW -2	East-1	NW -3	25.2	23.1	bc
US14358	41-11.3	140-40.0	7/29	1210-1214	52	NNW-2	East-1	NNW-3	25.1	22.4	bc
US14359	41-11.1	140-39.1	7/29	1219-1222	32	Calm	North-1	Calm	25.8	21.8	bc
US14360	41-09.0	140-41.0	7/29	1239-1243	43	NE -1	East-1	NE -3	26.4	21.2	bc
US14361	41-05.1	140-43.7	7/29	1311-1316	60	NE -2	NE -1	NE -3	27.1	23.3	bc
US14362	40-57.2	140-45.5	7/29	1402-1405	50	North-1	North-1	North-3	27.8	23.7	bc
US14363	40-52.0	140-46.2	7/29	1437-1440	28	NE -1	North-1	NE -3	28.5	23.5	bc
US14364	41-03.8	140-52.4	7/30	0613-0621	51	Calm	North-1	Calm	22.2	23.1	bc
US14365	41-04.6	141-01.7	7/30	0700-0708	47	North-1	North-1	North-1	22.8	22.0	bc
US14366	40-58.1	141-06.3	7/30	0843-0847	39	Calm	North-1	Calm	23.4	22.3	m
US14367	41-10.7	141-10.8	7/30	1003-1007	29	Calm	South-1	Calm	23.8	23.2	m
US14368	41-05.9	140-51.6	7/30	1138-1143	51	Calm	South-1	Calm	25.2	23.0	bc

Table 1 (Continued)

Cruise 316

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14369	42-16.1	140-37.4	8/4	1510-1517	88	NE -1	East-1	NE -2	25.1	23.1	r
US14370	41-45.3	141-10.0	8/4	2307-2313	117	Calm	East-1	Calm	23.1	20.2	f
US14371	41-23.5	141-34.2	8/6	2033-2047	160	South-2	SE -1	South-4	23.4	22.5	o
US14372	41-26.1	141-34.8	8/6	2109-2132	396	South-1	Sout-1	South-3	23.8	22.5	m
US14373	41-30.0	141-39.5	8/6	2202-2234	609	South-1	SE -1	South-3	23.9	22.4	r
US14374	41-29.9	141-34.9	8/6	2303-2314	149	South-1	SE -1	South-3	23.0	22.4	r
US14375	41-29.9	141-30.1	8/6	2344-2351	62	South-2	SE -1	South-4	23.2	22.2	o
US14376	41-27.9	141-12.0	8/7	0125-0130	91	WSW-1	WNW-1	WSW-2	24.5	23.1	o
US14377	41-28.1	141-17.6	8/7	0646-0658	203	Calm	WNW-1	Calm	24.4	21.9	o
US14378	41-29.9	141-21.0	8/7	0723-0738	223	West-1	WNW-1	West-3	24.4	21.0	o
US14379	41-26.5	141-20.8	8/7	0801-0808	70	West-2	East-1	West-4	23.3	21.5	r
US14380	41-26.5	141-15.8	8/7	0831-0838	82	NW -2	East-1	NW -4	22.9	21.9	r
US14380-2	41-26.3	141-16.0	8/7	0855-0903	79						
US14381	41-27.3	141-24.1	8/7	0945-0950	47	SE -1	East-1	SE -3	22.6	21.5	r
US14382	41-28.6	141-23.7	8/7	1005-1015	78	SE -1	East-1	SE -3	23.0	22.1	r
US14383	41-31.6	141-22.3	8/7	1046-1103	238	NE -1	East-1	NE -3	23.4	22.9	c
US14383-2	41-31.3	141-22.7	8/7	1126-1136	215						
US14384	41-47.6	141-15.1	8/7	1342-1356	213	SSE-1	East-1	SSE -3	24.2	20.5	c
US14385	41-48.8	141-13.2	8/7	1413-1425	161	SSE-1	SSE-1	SSE -2	22.5	18.5	c
US14385	41-48.8	141-12.9	8/7	1438-1449	130						
US14386	41-44.0	141-15.7	8/7	1527-1543	225	SSE-2	SSE-1	SSE-4	22.0	19.9	c
US14387	41-41.9	141-17.6	8/7	1611-1627	230	SSE-2	ESE-1	SSE-3	22.4	18.9	o
US14388	41-37.8	141-19.3	8/7	1700-1717	216	SE -3	ESE-1	SE -4	23.1	23.3	o
US14389	41-35.0	141-20.4	8/7	1742-1800	311	SE -2	ESE-1	SE -3	22.4	21.4	o
US14390	41-36.0	140-53.0	8/8	0423-0430	53	East-2	ENE-1	East-3	22.1	22.8	r
US14391	41-36.9	140-51.3	8/8	0450-0458	93	NE-2	NE-1	NE-3	22.6	22.5	r
US14392	41-38.8	140-49.3	8/8	0518-0538	346	NE-2	NE-1	NE-3	22.3	21.6	r
US14393	41-40.7	140-47.3	8/8	0557-0615	231	NE-1	NE-1	NE-3	22.5	22.4	r
US14394	41-42.8	140-45.1	8/8	0631-0642	83	East-1	SSW-1	East-2	22.4	22.7	r
US14395	41-39.3	140-41.6	8/8	1807-1813	132	East-1	ESE-1	East-3	23.9	23.2	c

Cruise 317

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14396	44-57.2	140-46.0	8/22	1301-1312	185	SSE-2	SE-1	SSE-3	24.5	22.8	bc
US14397	45-00.2	140-46.7	8/22	1535-1545	159	SSE-2	SSE-1	SSE-2	24.0	23.3	bc
US14398	41-44.8	139-48.3	8/24	1841-1913	1427	WNW-2	WNW-1	WNW-4	22.1	23.1	c

(*): Fixed position by Global Positioning System

S.M.T.: Ship’s mean time

Wr.: Weather in WMO Code 4501

Table 2. Oceanographic data

STATION US14334
LATITUDE 41-57.3 N
LONGITUI 140-58.2 E
DEPTH (m) 76

Press.	Temp.	Salinity	Sigma-T
5	17.211	31.992	23.158
10	15.169	31.894	23.542
20	13.216	32.061	24.075
30	12.309	31.992	24.196
40	10.487	32.099	24.606
50	7.937	32.292	25.157

STATION US14335
LATITUDE 41-58.0 N
LONGITUI 140-59.4 E
DEPTH (m) 85

Press.	Temp.	Salinity	Sigma-T
5	18.569	32.000	22.837
10	15.991	31.809	23.296
20	13.231	32.103	24.104
30	10.291	32.375	24.854
40	7.708	32.399	25.273
50	7.379	33.045	25.827
75	5.081	33.305	26.322

STATION US14336
LATITUDE 41-58.7 N
LONGITUI 141-00.7 E
DEPTH (m) 93

Press.	Temp.	Salinity	Sigma-T
5	18.390	32.001	22.882
10	16.477	31.871	23.234
20	12.794	32.144	24.221
30	8.514	32.274	25.058
40	6.757	32.619	25.576
50	6.847	33.108	25.949
75	5.424	33.296	26.276

STATION US14337
LATITUDE 41-59.4 N
LONGITUI 141-02.1 E
DEPTH (m) 100

Press.	Temp.	Salinity	Sigma-T
5	18.546	31.993	22.837
10	17.025	31.901	23.131
20	12.342	32.090	24.266
30	9.741	32.925	25.374
40	6.817	32.781	25.696
50	6.776	33.104	25.955
75	7.149	33.616	26.308

STATION US14338
LATITUDE 41-55.8 N
LONGITUI 141-03.5 E
DEPTH (m) 109

Press.	Temp.	Salinity	Sigma-T
5	16.924	31.942	23.186
10	14.673	31.960	23.699
20	12.156	32.105	24.312
30	9.153	32.347	25.017
40	7.996	32.744	25.503
50	4.260	32.756	25.976
75	6.028	33.355	26.249
100	5.456	33.515	26.446

STATION US14339
LATITUDE 41-59.2 N
LONGITUI 141-17.5 E
DEPTH (m) 269

Press.	Temp.	Salinity	Sigma-T
5	18.527	31.708	22.624
10	14.284	31.878	23.717
20	10.213	32.324	24.827
30	9.601	32.943	25.412
40	7.894	33.247	25.913
50	6.170	33.216	26.122
75	4.788	33.325	26.371
100	5.351	33.486	26.435
125	4.520	33.392	26.453
150	4.359	33.467	26.529
175	3.883	33.477	26.586
200	3.694	33.505	26.627
250	2.875	33.523	26.717

STATION US14340
LATITUDE 41-57.6 N
LONGITUI 141-23.2 E
DEPTH (m) 340

Press.	Temp.	Salinity	Sigma-T
5	17.803	32.054	23.064
10	14.695	32.252	23.919
20	11.658	32.459	24.679
30	8.214	32.822	25.533
40	6.448	33.027	25.937
50	5.173	33.123	26.168
75	4.567	33.278	26.357
100	6.005	33.586	26.434
125	5.083	33.500	26.477
150	4.301	33.450	26.523
175	3.843	33.478	26.591
200	3.333	33.508	26.664
250	3.072	33.551	26.722
300	2.919	33.616	26.787

STATION US14341
LATITUDE 42-00.7 N
LONGITUI 141-00.9 E
DEPTH (m) 91

Press.	Temp.	Salinity	Sigma-T
5	20.070	31.620	22.168
10	18.243	31.614	22.622
20	15.038	31.950	23.613
30	8.913	32.290	25.010
40	5.824	32.504	25.602
50	6.283	33.094	26.011
75	6.356	33.514	26.334

STATION US14342
LATITUDE 42-04.9 N
LONGITUI 140-57.1 E
DEPTH (m) 82

Press.	Temp.	Salinity	Sigma-T
5	19.008	31.664	22.472
10	16.517	31.833	23.197
20	14.090	32.153	23.970
30	10.843	32.299	24.701
40	7.411	32.459	25.362
50	5.613	33.247	26.215
75	5.778	33.514	26.406

STATION US14343
LATITUDE 42-09.2 N
LONGITUI 140-52.9 E
DEPTH (m) 76

Press.	Temp.	Salinity	Sigma-T
5	19.261	31.573	22.338
10	16.911	31.802	23.081
20	10.360	32.017	24.563
30	10.301	32.644	25.062
40	6.658	32.694	25.648
50	5.416	32.919	25.978

STATION US14344
LATITUDE 42-09.8 N
LONGITUI 140-41.1 E
DEPTH (m) 78

Press.	Temp.	Salinity	Sigma-T
5	19.881	31.515	22.137
10	19.685	31.538	22.204
20	17.609	31.723	22.858
30	10.590	32.120	24.604
40	5.375	32.228	25.436
50	6.324	32.830	25.798

STATION US14345
LATITUDE 42-11.4 N
LONGITUI 140-35.0 E
DEPTH (m) 79

Press.	Temp.	Salinity	Sigma-T
5	19.861	31.478	22.113
10	19.292	31.501	22.276
20	16.353	31.682	23.116
30	10.449	32.045	24.571
40	5.726	32.294	25.448
50	4.645	32.585	25.800
75	3.338	33.022	26.276

STATION US14346
LATITUDE 42-16.6 N
LONGITUI 140-36.0 E
DEPTH (m) 89

Press.	Temp.	Salinity	Sigma-T
5	19.631	31.469	22.166
10	19.505	31.467	22.196
20	18.504	31.575	22.528
30	12.586	31.772	23.973
40	6.550	32.077	25.175
50	4.132	32.318	25.640
75	3.182	32.983	26.259

STATION US14347
LATITUDE 42-18.2 N
LONGITUI 140-41.5 E
DEPTH (m) 70

Press.	Temp.	Salinity	Sigma-T
5	19.756	31.466	22.131
10	19.638	31.468	22.163
20	17.380	31.541	22.772
30	13.037	31.898	23.983
40	6.731	32.014	25.102
50	4.518	32.575	25.804

STATION US14348
LATITUDE 42-24.3 N
LONGITUI 140-47.9 E
DEPTH (m) 44

Press.	Temp.	Salinity	Sigma-T
5	20.208	31.469	22.017
10	19.753	31.528	22.179
20	14.256	31.799	23.661
30	8.583	32.360	25.115
40	4.657	32.278	25.555

Table 2. (Continued)

STATION US14349
LATITUDE 42-17.6 N
LONGITUI 140-53.9 E
DEPTH (m) 56

Press.	Temp.	Salinity	Sigma-T
5	19.213	31.786	22.513
10	17.073	31.942	23.151
20	11.684	31.931	24.264
30	6.258	32.134	25.257
40	5.341	32.572	25.712
50	6.443	33.229	26.097

STATION US14350
LATITUDE 41-28.4 N
LONGITUI 141-17.4 E
DEPTH (m) 221

Press.	Temp.	Salinity	Sigma-T
5	19.719	33.729	23.866
10	20.197	34.027	23.968
20	20.076	34.045	24.014
30	19.892	34.043	24.060
40	19.307	34.001	24.180
50	18.901	33.996	24.279
75	13.776	34.133	25.563
100	12.451	34.220	25.896
125	11.495	34.226	26.083
150	10.969	34.200	26.158
175	10.918	34.204	26.170

STATION US14351
LATITUDE 41-17.0 N
LONGITUI 140-41.7 E
DEPTH (m) 144

Press.	Temp.	Salinity	Sigma-T
5	21.522	33.897	23.512
10	20.613	33.900	23.761
20	19.110	33.880	24.138
30	18.353	33.969	24.396
40	14.942	33.802	25.061
50	14.781	33.949	25.210
75	14.020	33.949	25.371
100	13.212	34.285	25.797
125	12.049	34.270	26.013

STATION US14352
LATITUDE 41-13.2 N
LONGITUI 140-45.5 E
DEPTH (m) 65

Press.	Temp.	Salinity	Sigma-T
5	21.475	33.852	23.491
10	21.591	33.831	23.443
20	20.706	33.815	23.671
30	18.506	33.583	24.063
40	16.492	33.406	24.410
50	14.186	33.356	24.878

STATION US14353
LATITUDE 41-12.8 N
LONGITUI 140-44.9 E
DEPTH (m) 66

Press.	Temp.	Salinity	Sigma-T
5	21.992	33.275	22.910
10	21.704	33.856	23.431
20	21.114	33.857	23.593
30	19.620	33.728	23.890
40	16.864	33.434	24.345
50	14.973	33.298	24.666

STATION US14354
LATITUDE 41-12.4 N
LONGITUI 140-44.0 E
DEPTH (m) 69

Press.	Temp.	Salinity	Sigma-T
5	22.241	33.883	23.302
10	22.042	33.948	23.407
20	21.153	33.872	23.594
30	19.880	33.790	23.870
40	15.466	33.246	24.518
50	14.152	33.346	24.878

STATION US14355
LATITUDE 41-12.2 N
LONGITUI 140-43.0 E
DEPTH (m) 71

Press.	Temp.	Salinity	Sigma-T
5	22.316	33.814	23.229
10	22.180	33.940	23.362
20	21.877	33.971	23.471
30	20.433	33.911	23.817
40	18.102	33.745	24.286
50	13.905	33.339	24.923

STATION US14356
LATITUDE 41-11.9 N
LONGITUI 140-42.0 E
DEPTH (m) 73

Press.	Temp.	Salinity	Sigma-T
5	22.413	33.782	23.177
10	21.904	33.794	23.328
20	21.790	33.928	23.462
30	20.039	33.871	23.890
40	17.039	33.816	24.596
50	14.635	33.692	25.043

STATION US14357
LATITUDE 41-11.6 N
LONGITUI 140-41.1 E
DEPTH (m) 68

Press.	Temp.	Salinity	Sigma-T
5	21.972	33.804	23.317
10	21.685	33.831	23.417
20	21.563	33.850	23.465
30	20.917	33.908	23.685
40	19.984	33.922	23.944
50	15.052	33.725	24.977

STATION US14358
LATITUDE 41-11.3 N
LONGITUI 140-40.0 E
DEPTH (m) 52

Press.	Temp.	Salinity	Sigma-T
5	21.581	33.827	23.443
10	21.483	33.857	23.492
20	20.156	33.923	23.899
30	19.217	33.967	24.177
40	18.842	33.942	24.253

STATION US14359
LATITUDE 41-11.1 N
LONGITUI 140-39.1 E
DEPTH (m) 32

Press.	Temp.	Salinity	Sigma-T
5	21.676	33.777	23.378
10	21.311	33.829	23.518
20	21.048	33.877	23.626

STATION US14360
LATITUDE 41-09.0 N
LONGITUI 140-41.0 E
DEPTH (m) 43

Press.	Temp.	Salinity	Sigma-T
5	22.154	33.817	23.276
10	21.971	33.795	23.310
20	21.858	33.877	23.404
30	21.180	33.877	23.591
40	19.253	33.948	24.153

STATION US14361
LATITUDE 41-05.1 N
LONGITUI 140-43.7 E
DEPTH (m) 60

Press.	Temp.	Salinity	Sigma-T
5	20.956	32.740	22.786
10	21.229	33.755	23.484
20	20.823	33.791	23.621
30	19.349	33.681	23.925
40	16.459	33.641	24.598
50	14.687	33.765	25.087

STATION US14362
LATITUDE 40-57.2 N
LONGITUI 140-45.5 E
DEPTH (m) 50

Press.	Temp.	Salinity	Sigma-T
5	22.061	33.435	23.012
10	21.648	33.465	23.149
20	21.250	33.619	23.375
30	21.004	33.678	23.487
40	19.263	33.628	23.906

STATION US14363
LATITUDE 40-52.0 N
LONGITUI 140-46.2 E
DEPTH (m) 28

Press.	Temp.	Salinity	Sigma-T
5	23.167	33.407	22.678
10	22.361	33.413	22.911
20	21.780	33.433	23.089

STATION US14364
LATITUDE 41-03.8 N
LONGITUI 140-52.4 E
DEPTH (m) 51

Press.	Temp.	Salinity	Sigma-T
5	22.150	33.465	23.010
10	22.075	33.493	23.052
20	18.847	33.112	23.618
30	19.622	33.659	23.837
40	16.445	33.595	24.566

STATION US14365
LATITUDE 41-04.6 N
LONGITUI 141-01.7 E
DEPTH (m) 47

Press.	Temp.	Salinity	Sigma-T
5	21.351	33.114	22.964
10	21.280	33.328	23.146
20	20.342	33.230	23.323
30	16.254	33.216	24.318
40	15.370	33.363	24.629

STATION US14366
LATITUDE 40-58.1 N
LONGITUI 141-06.3 E
DEPTH (m) 39

Press.	Temp.	Salinity	Sigma-T
5	22.150	32.536	22.306
10	21.888	32.625	22.445
20	21.537	33.502	23.208
30	20.532	33.535	23.504

Table 2. (Continued)

STATION US14367
LATITUDE 41-10.7 N
LONGITUI 141-10.8 E
DEPTH (m) 29

Press.	Temp.	Salinity	Sigma-T
5	23.013	32.265	21.857
10	22.490	32.396	22.104
20	21.377	33.153	22.986

STATION US14368
LATITUDE 41-05.9 N
LONGITUI 140-51.6 E
DEPTH (m) 51

Press.	Temp.	Salinity	Sigma-T
5	22.598	32.366	22.051
10	21.235	32.531	22.552
20	20.419	33.604	23.587
30	16.948	33.111	24.077
40	14.739	33.217	24.654

STATION US14369
LATITUDE 42-16.1 N
LONGITUI 140-37.4 E
DEPTH (m) 88

Press.	Temp.	Salinity	Sigma-T
5	22.730	31.537	21.386
10	20.187	31.480	22.030
20	15.658	31.719	23.301
30	9.108	32.036	24.781
40	7.682	32.599	25.434
50	6.291	32.848	25.816
75	5.487	33.477	26.412

STATION US14370
LATITUDE 41-45.3 N
LONGITUI 141-10.0 E
DEPTH (m) 117

Press.	Temp.	Salinity	Sigma-T
5	17.919	31.790	22.835
10	14.772	32.005	23.713
20	12.786	32.480	24.483
30	11.970	33.092	25.113
40	10.210	33.348	25.627
50	9.807	33.453	25.777
75	7.182	33.233	26.002
100	7.205	33.523	26.227

STATION US14371
LATITUDE 41-23.5 N
LONGITUI 141-34.2 E
DEPTH (m) 160

Press.	Temp.	Salinity	Sigma-T
5	22.208	33.702	23.174
10	21.836	33.888	23.419
20	20.603	33.701	23.612
30	20.763	33.965	23.770
40	19.767	33.989	24.052
50	18.910	34.032	24.304
75	16.573	33.862	24.741
100	15.931	33.897	24.915
125	15.008	33.870	25.099
150	14.590	33.929	25.235

STATION US14372
LATITUDE 41-26.1 N
LONGITUI 141-34.8 E
DEPTH (m) 396

Press.	Temp.	Salinity	Sigma-T
5	22.293	33.448	22.957
10	22.218	33.762	23.217
20	20.863	33.652	23.505
30	19.982	33.563	23.671
40	20.506	33.972	23.844
50	19.564	33.996	24.110
75	17.242	33.925	24.632
100	16.095	33.850	24.841
125	15.290	34.010	25.145
150	14.560	34.061	25.344
175	12.391	33.917	25.673
200	9.545	33.767	26.065
250	5.919	33.689	26.527
300	3.490	33.544	26.678

STATION US14373
LATITUDE 41-30.0 N
LONGITUI 141-39.5 E
DEPTH (m) 609

Press.	Temp.	Salinity	Sigma-T
5	22.507	33.634	23.038
10	22.439	33.749	23.145
20	21.964	33.925	23.412
30	20.447	33.511	23.509
40	20.956	33.966	23.719
50	20.036	33.948	23.950
75	18.225	34.022	24.468
100	16.066	33.823	24.828
125	13.527	33.810	25.365
150	12.736	34.003	25.673
175	11.809	34.094	25.922
200	9.677	33.818	26.083
250	6.343	33.459	26.291
300	3.198	33.422	26.608
400	2.993	33.729	26.871
500	3.284	33.930	27.005

STATION US14374
LATITUDE 41-29.9 N
LONGITUI 141-34.9 E
DEPTH (m) 149

Press.	Temp.	Salinity	Sigma-T
5	22.423	33.446	22.919
10	22.302	33.716	23.158
20	21.651	33.802	23.405
30	20.385	33.490	23.509
40	20.056	33.759	23.801
50	19.089	33.791	24.074
75	17.231	33.771	24.516
100	15.274	34.126	25.238
125	14.303	34.175	25.486

STATION US14375
LATITUDE 41-29.9 N
LONGITUI 141-30.1 E
DEPTH (m) 62

Press.	Temp.	Salinity	Sigma-T
5	21.163	33.274	23.137
10	20.937	33.619	23.460
20	20.644	33.875	23.733
30	20.288	33.923	23.865
40	19.814	33.821	23.911
50	19.255	33.840	24.070

STATION US14376
LATITUDE 41-27.9 N
LONGITUI 141-12.0 E
DEPTH (m) 91

Press.	Temp.	Salinity	Sigma-T
5	21.827	33.798	23.353
10	21.572	33.842	23.457
20	21.486	33.856	23.491
30	21.462	33.861	23.501
40	20.737	33.889	23.719
50	19.746	33.915	24.000
75	13.079	34.217	25.771

STATION US14377
LATITUDE 41-28.1 N
LONGITUI 141-17.6 E
DEPTH (m) 203

Press.	Temp.	Salinity	Sigma-T
5	21.860	33.785	23.334
10	21.584	33.819	23.436
20	20.941	33.908	23.679
30	20.602	33.939	23.793
40	19.183	33.965	24.184
50	16.598	34.028	24.862
75	12.821	34.247	25.845
100	11.884	34.248	26.027
125	11.494	34.239	26.093
150	11.343	34.230	26.114
175	10.957	34.213	26.171

STATION US14378
LATITUDE 41-29.9 N
LONGITUI 141-21.0 E
DEPTH (m) 223

Press.	Temp.	Salinity	Sigma-T
5	21.110	33.844	23.585
10	20.997	33.858	23.626
20	20.426	33.916	23.822
30	19.841	34.009	24.047
40	19.414	34.039	24.181
50	17.442	34.082	24.705
75	15.081	34.224	25.356
100	13.102	34.290	25.823
125	12.526	34.263	25.915
150	12.069	34.227	25.975
175	11.484	34.221	26.080
200	11.465	34.230	26.092

Table 2 (Continued)

STATION US14379
LATITUDE 41-26.5 N
LONGITUI 141-20.8 E
DEPTH (m) 70

Press.	Temp.	Salinity	Sigma-T
5	21.867	33.808	23.349
10	21.787	33.816	23.378
20	19.853	33.818	23.898
30	19.731	33.811	23.925
40	19.155	33.867	24.116
50	15.413	34.087	25.177

STATION US14380
LATITUDE 41-26.5 N
LONGITUI 141-15.8 E
DEPTH (m) 82

Press.	Temp.	Salinity	Sigma-T
5	21.020	33.709	23.506
10	20.860	33.753	23.583
20	20.890	33.792	23.605
30	20.671	33.823	23.686
40	20.184	33.887	23.864
50	18.722	33.947	24.287

STATION US14381
LATITUDE 41-27.3 N
LONGITUI 141-24.1 E
DEPTH (m) 47

Press.	Temp.	Salinity	Sigma-T
5	21.835	33.755	23.318
10	21.820	33.759	23.325
20	21.703	33.779	23.373
30	21.521	33.809	23.446

STATION US14382
LATITUDE 41-28.6 N
LONGITUI 141-23.7 E
DEPTH (m) 78

Press.	Temp.	Salinity	Sigma-T
5	22.481	33.686	23.085
10	22.305	33.714	23.156
20	21.953	33.743	23.276
30	21.481	33.791	23.443
40	21.135	33.839	23.574
50	20.648	33.894	23.747

STATION US14383
LATITUDE 41-31.6 N
LONGITUI 141-22.3 E
DEPTH (m) 238

Press.	Temp.	Salinity	Sigma-T
5	22.429	33.749	23.147
10	22.087	33.785	23.271
20	21.328	33.851	23.530
30	20.768	33.891	23.712
40	20.472	33.925	23.817
50	19.960	33.963	23.982
75	14.745	34.062	25.304
100	13.974	34.249	25.612
125	12.954	34.292	25.853
150	12.215	34.221	25.943
175	11.717	34.230	26.044
200	11.445	34.226	26.091

STATION US14384
LATITUDE 41-47.6 N
LONGITUI 141-15.1 E
DEPTH (m) 213

Press.	Temp.	Salinity	Sigma-T
5	18.502	32.720	23.404
10	17.294	32.783	23.744
20	8.387	32.998	25.644
30	7.165	32.988	25.812
40	6.343	32.959	25.897
50	5.843	33.048	26.030
75	5.222	33.212	26.233
100	4.877	33.214	26.273
125	5.357	33.389	26.357
150	4.966	33.369	26.386
175	5.180	33.435	26.414
200	4.255	33.396	26.484

STATION US14385
LATITUDE 41-48.8 N
LONGITUI 141-13.2 E
DEPTH (m) 161

Press.	Temp.	Salinity	Sigma-T
5	17.844	32.038	23.043
10	16.368	32.247	23.547
20	6.667	32.307	25.341
30	4.330	32.478	25.748
40	7.715	33.359	26.026
50	5.238	33.009	26.070
75	6.112	33.338	26.225
100	5.080	33.202	26.241
125	4.682	33.236	26.312

STATION US14386
LATITUDE 41-44.0 N
LONGITUI 141-15.7 E
DEPTH (m) 225

Press.	Temp.	Salinity	Sigma-T
5	19.657	34.122	24.181
10	17.681	34.132	24.685
20	15.766	34.183	25.172
30	13.097	34.031	25.623
40	11.327	33.794	25.777
50	7.919	33.252	25.913
75	5.583	33.108	26.109
100	6.007	33.346	26.245
125	8.117	33.806	26.319
150	7.231	33.727	26.385
175	4.627	33.414	26.459
200	4.047	33.416	26.521

STATION US14387
LATITUDE 41-41.9 N
LONGITUI 141-17.6 E
DEPTH (m) 230

Press.	Temp.	Salinity	Sigma-T
5	19.784	33.946	24.014
10	19.713	33.949	24.035
20	17.507	33.950	24.587
30	16.352	33.993	24.893
40	16.037	34.084	25.035
50	15.680	34.178	25.187
75	9.496	33.809	26.106
100	8.632	33.692	26.151
125	7.838	33.589	26.190
150	7.754	33.674	26.269
175	7.523	33.717	26.335
200	5.907	33.623	26.476

STATION US14388
LATITUDE 41-37.8 N
LONGITUI 141-19.3 E
DEPTH (m) 216

Press.	Temp.	Salinity	Sigma-T
5	22.599	33.670	23.040
10	21.938	33.725	23.267
20	21.745	33.752	23.341
30	21.254	33.794	23.507
40	20.375	33.887	23.814
50	19.895	33.960	23.996
75	19.491	34.006	24.136
100	15.836	33.956	24.982
125	9.727	33.876	26.120
150	9.255	33.870	26.192
175	9.121	33.872	26.215
200	8.537	33.843	26.284

STATION US14389
LATITUDE 41-35.0 N
LONGITUI 141-20.4 E
DEPTH (m) 311

Press.	Temp.	Salinity	Sigma-T
5	21.143	33.853	23.582
10	21.017	33.864	23.625
20	20.859	33.879	23.679
30	20.750	33.878	23.707
40	18.611	33.960	24.325
50	17.260	34.073	24.741
75	16.450	34.120	24.967
100	15.115	34.189	25.321
125	14.044	34.158	25.527
150	12.722	34.193	25.822
175	12.722	34.233	25.854
200	9.761	34.013	26.221
250	5.552	33.628	26.523
300	3.725	33.655	26.744

STATION US14390
LATITUDE 41-36.0 N
LONGITUI 140-53.0 E
DEPTH (m) 53

Press.	Temp.	Salinity	Sigma-T
5	22.873	33.538	22.862
10	22.863	33.542	22.867
20	19.370	33.985	24.151
30	18.049	34.157	24.614
40	17.716	34.203	24.731

Table 2 (Continued)

STATION US14391
LATITUDE 41-36.9 N
LONGITUI 140-51.3 E
DEPTH (m) 93

Press.	Temp.	Salinity	Sigma-T
5	22.081	33.691	23.201
10	21.813	33.765	23.332
20	19.779	34.036	24.084
30	16.385	34.219	25.058
40	16.045	34.266	25.173
50	15.966	34.276	25.199
75	15.994	34.278	25.193

STATION US14392
LATITUDE 41-38.8 N
LONGITUI 140-49.3 E
DEPTH (m) 346

Press.	Temp.	Salinity	Sigma-T
5	21.106	33.780	23.537
10	20.734	33.816	23.665
20	19.761	33.941	24.016
30	17.144	34.124	24.808
40	15.849	34.218	25.180
50	15.316	34.265	25.335
75	14.436	34.316	25.566
100	14.223	34.320	25.615
125	14.081	34.324	25.647
150	13.617	34.298	25.724
175	12.509	34.282	25.934
200	11.535	34.250	26.094
250	11.126	34.235	26.157
300	10.885	34.228	26.195

STATION US14393
LATITUDE 41-40.7 N
LONGITUI 140-47.3 E
DEPTH (m) 231

Press.	Temp.	Salinity	Sigma-T
5	22.660	33.531	22.917
10	22.633	33.556	22.943
20	21.643	33.798	23.404
30	16.799	34.209	24.955
40	15.245	34.274	25.358
50	14.778	34.326	25.501
75	14.373	34.326	25.588
100	13.945	34.324	25.676
125	13.705	34.318	25.722
150	13.552	34.317	25.752
175	13.364	34.314	25.788
200	12.663	34.290	25.910

STATION US14394
LATITUDE 41-42.8 N
LONGITUI 140-45.1 E
DEPTH (m) 83

Press.	Temp.	Salinity	Sigma-T
5	22.561	33.581	22.982
10	22.071	33.675	23.191
20	21.159	33.845	23.572
30	18.015	34.176	24.638
40	16.497	34.243	25.051
50	15.292	34.300	25.368
75	12.649	34.287	25.910

STATION US14395
LATITUDE 41-39.3 N
LONGITUI 140-41.6 E
DEPTH (m) 132

Press.	Temp.	Salinity	Sigma-T
5	22.684	33.918	23.204
10	22.127	34.058	23.467
20	21.078	34.123	23.805
30	19.673	34.191	24.230
40	18.652	34.237	24.526
50	16.413	34.199	25.037
75	12.327	34.246	25.941
100	11.779	34.246	26.045

STATION US14396
LATITUDE 44-57.2 N
LONGITUI 140-46.0 E
DEPTH (m) 185

Press.	Temp.	Salinity	Sigma-T
5	22.776	33.521	22.876
10	21.821	33.676	23.262
20	21.085	33.786	23.547
30	16.247	33.919	24.860
40	12.661	34.074	25.742
50	10.703	33.987	26.039
75	8.275	34.031	26.472
100	6.604	34.018	26.698
125	4.862	34.000	26.898
150	4.017	34.015	27.001
175	2.682	34.024	27.134

STATION US14397
LATITUDE 45-00.2 N
LONGITUI 140-46.7 E
DEPTH (m) 159

Press.	Temp.	Salinity	Sigma-T
5	22.786	33.360	22.751
10	21.437	33.750	23.424
20	20.640	33.775	23.658
30	16.709	33.867	24.713
40	13.060	33.991	25.599
50	11.639	33.998	25.879
75	8.962	34.066	26.393
100	6.809	34.007	26.663
125	4.820	34.001	26.904
150	4.613	34.013	26.936

STATION US14398
LATITUDE 41-44.8 N
LONGITUI 139-48.3 E
DEPTH (m) 1427

Press.	Temp.	Salinity	Sigma-T
5	23.571	33.770	22.836
10	22.865	33.930	23.161
20	21.693	33.979	23.528
30	17.888	34.264	24.736
40	16.046	34.318	25.213
50	15.424	34.380	25.401
75	12.394	34.280	25.955
100	9.809	34.173	26.339
125	8.216	34.115	26.546
150	5.900	34.046	26.811
175	4.703	34.034	26.943
200	3.484	34.062	27.092
250	2.190	34.067	27.209
300	1.450	34.065	27.263
400	0.883	34.059	27.297
500	0.673	34.069	27.317
600	0.557	34.067	27.322
700	0.460	34.068	27.329

7

THE " USHIO MARU "

CRUISE 318
CRUISE 319
CRUISE 320

IN AUGUST 2014
IN SEPTEMBER 2014

1. Cruise Itinerary

Cruise 318		
Departure from Hakodate	Aug.	28, 2014
Start hydrographic research (US14399)		28
Arrival at Mori		28
Departure from Mori		29
Sampling by trawl net		29
Retrieval ADCP mooring system		29
Sampling by trawl net		30
Arrival at Mori		30
Departure from Mori		31
Setting ADCP mooring system		31
Arrival at Muroran		31
Departure from Muroran	Sep.	1
Arrival at and departure from Mori		1
Arrival at and departure from Hakodate		2
Arrival at Hakodate		3
Departure from Hakodate		6
Sampling by squid jigging		7
Sampling by frame trawl net		8
Sampling by squid jigging		8
Finish hydrographic research (US14457)		8
Return to Hakodate		9
Total coverage 803.7 miles		

Cruise 319		
Departure from Hakodate	Sep.	13, 2014
Start hydrographic research (US14458)		14
Arrival at Nemuro		14
Departure from Nemuro		15
Arrival at Nemuro		16
Departure from Nemuro		17
Finish hydrographic research (US1495)		18
Return to Hakodate		20
Total coverage 994.1 miles		

Cruise 320		
Departure from Hakodate	Sep.	24, 2014
Arrival at Hakodate		25
Departure from Hakodate		26
Start hydrographic research (US14496)		28
Sampling by drift longline		28
Sampling by drift longline		29
Finish hydrographic research (US14504)		29
Return to Hakodate		30
Total coverage 422.2 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 and salinity were measured by CTD (Seabird SBE-9Plus and SBE-19).

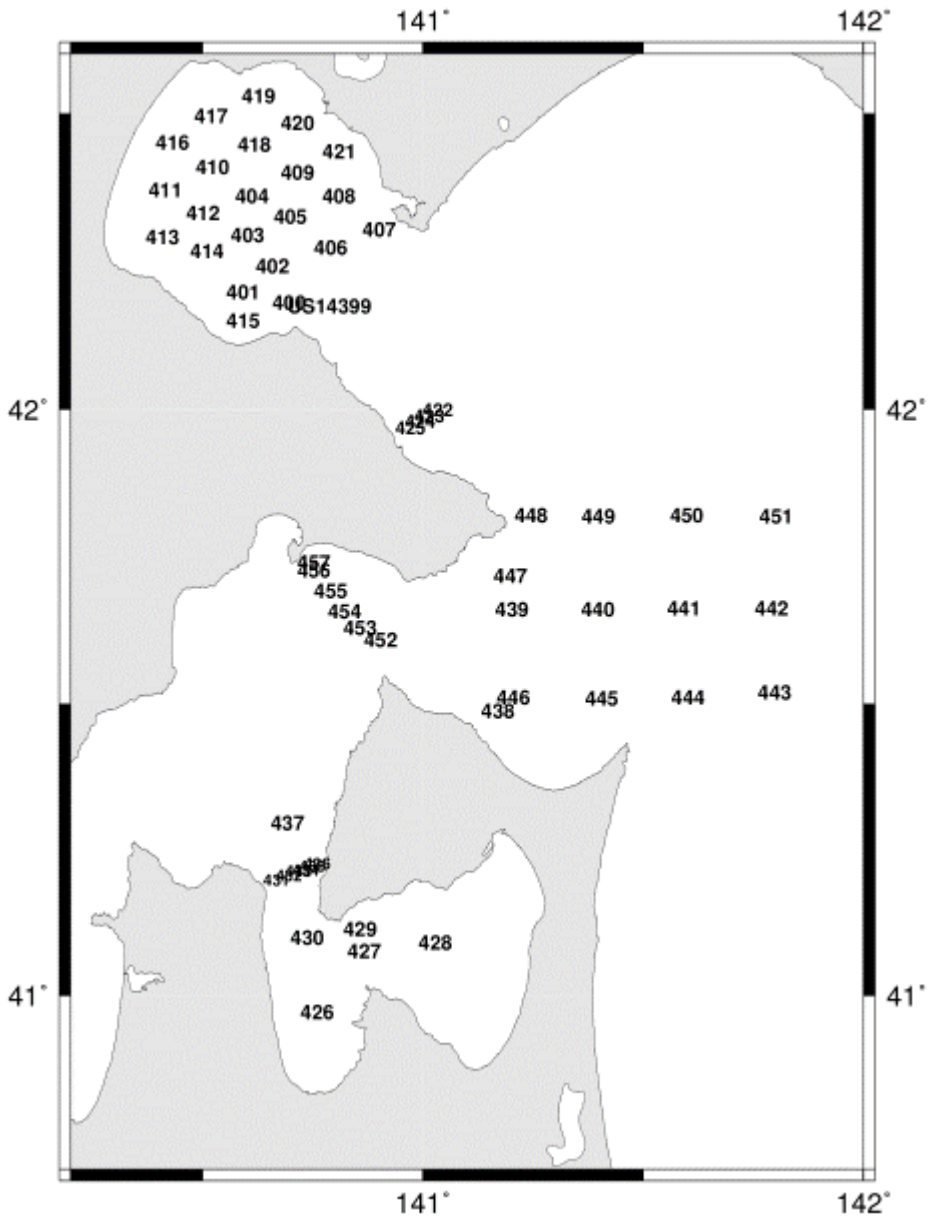

Figure 1. Oceanographic stations (Cruise 318)

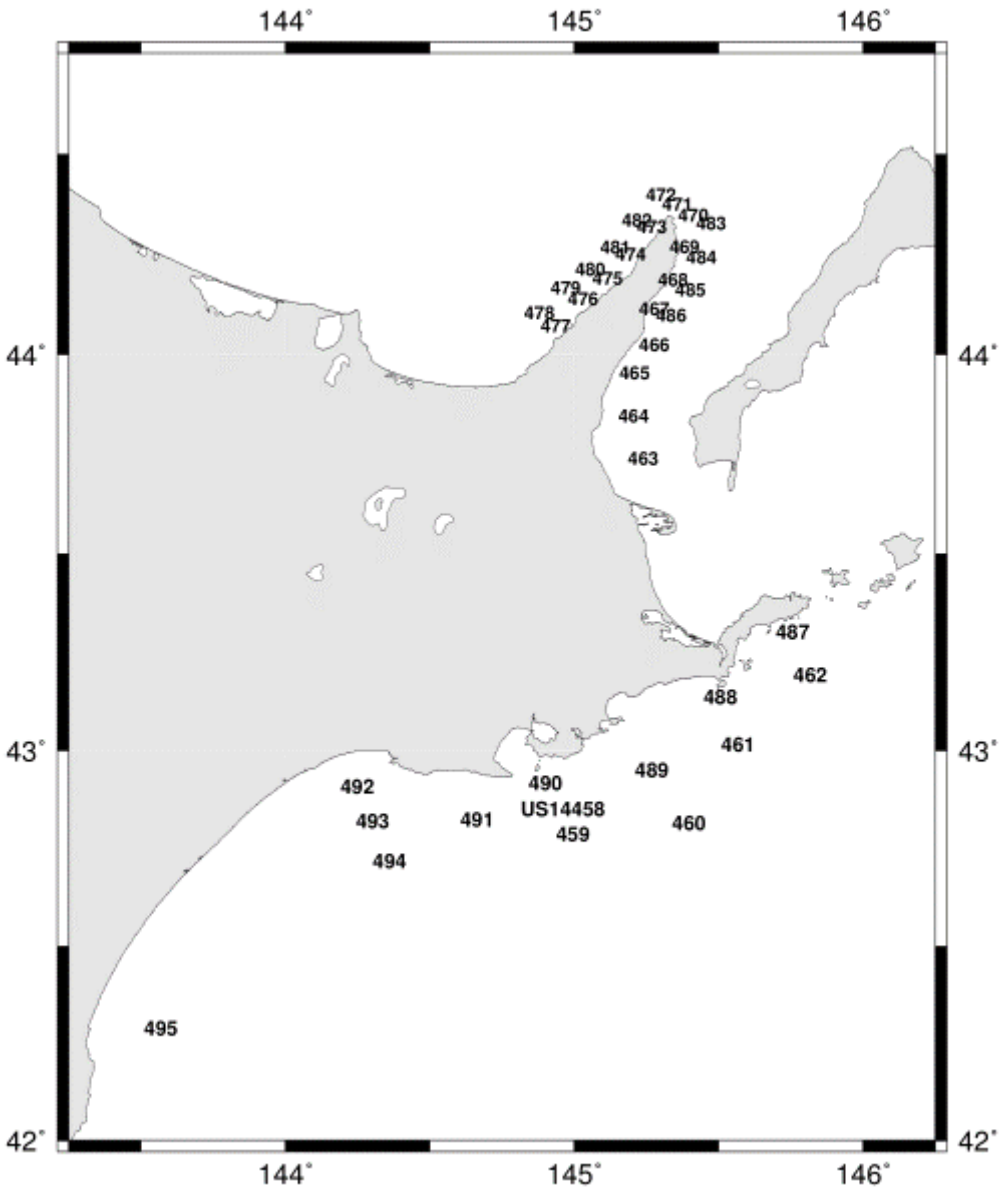

Figure 2. Oceanographic stations (Cruise 319)

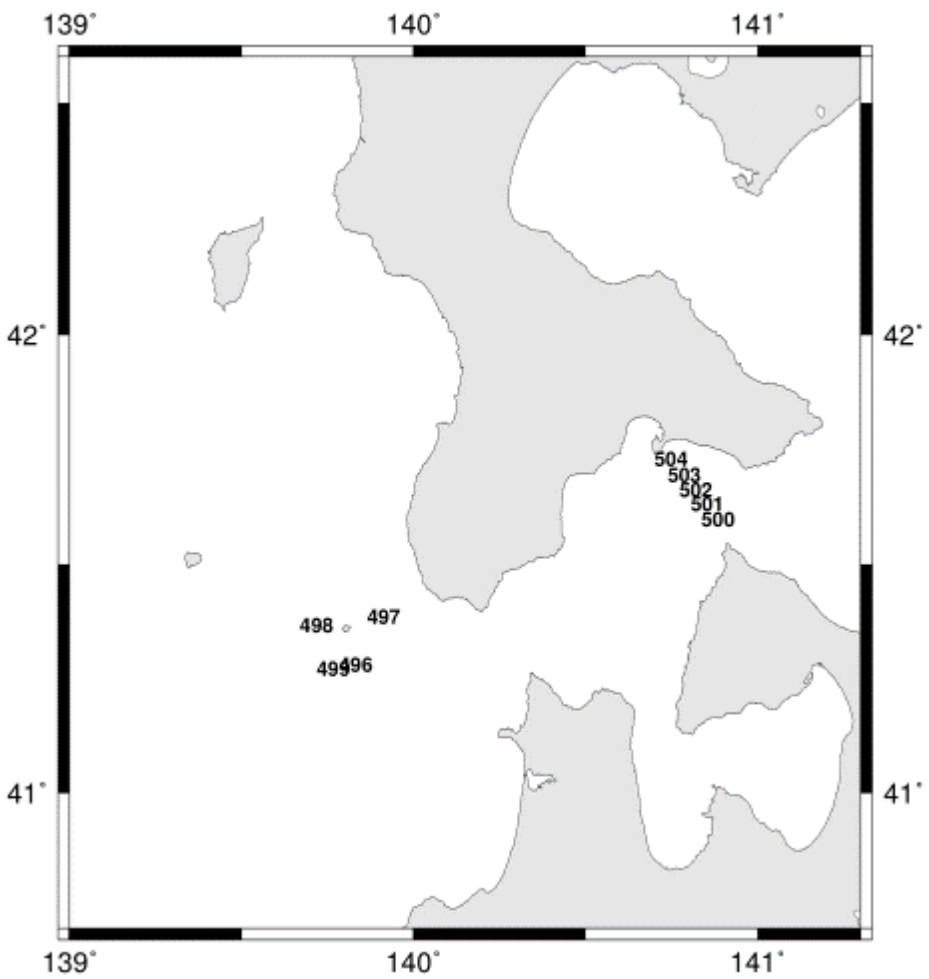

Figure 3. Oceanographic stations (Cruise 320)

Table 1. List of Oceanographic Station

Cruise 318

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14399	42-09.8	140-47.2	8/28	1452-1458	92	SE-1	SE-1	SE-4	21.3	21.0	bc
US14400	42-10.1	140-41.7	8/28	1523-1529	82	SE-1	SE-1	SE-4	20.2	21.2	bc
US14401	42-11.2	140-35.5	8/29	1619-1625	80	East-2	ENE-1	East-4	19.0	20.2	bc
US14402	42-13.8	140-39.5	8/29	0800-0804	87	East-2	East-1	East-3	19.9	20.7	bc
US14403	42-17.0	140-36.1	8/29	0918-0924	89	East-2	East-1	East-4	20.3	20.9	bc
US14404	42-20.9	140-36.7	8/29	1148-1153	85	East-2	ESE-1	East-4	20.3	20.3	bc
US14405	42-18.8	140-41.9	8/29	1314-1317	68	East-2	ESE-1	East-5	21.4	20.8	bc
US14406	42-15.7	140-47.4	8/29	1446-1444	69	East-2	ESE-1	ESE-5	20.7	20.9	c
US14407	42-17.5	140-54.0	8/29	1527-1529	55	East-2	ESE-1	East-5	20.6	21.0	c
US14408	42-20.9	140-48.5	8/30	0533-0536	51	East-2	ESE-1	East-4	20.0	20.7	c
US14409	42-23.3	140-42.9	8/30	0610-0614	59	East-2	ESE-1	East-4	19.9	20.8	c
US14410	42-23.8	140-31.3	8/30	0708-0713	95	East-2	ESE-1	East-4	20.6	20.8	c
US14411	42-21.5	140-24.9	8/30	0842-0845	68	East-2	ESE-1	East-5	21.5	20.7	c
US14412	42-19.2	140-30.0	8/30	1015-1020	91	East-2	ESE-1	East-5	20.8	20.4	c
US14413	42-16.8	140-24.5	8/30	1128-1132	54	SE-2	ESE-1	SE-5	21.2	21.0	c
US14414	42-15.3	140-30.6	8/30	1209-1214	85	ESE-3	East-1	ESE-5	20.8	20.8	c
US14415	42-08.3	140-35.5	8/31	0558-0604	57	Calm	ENE-1	Calm	18.2	19.6	bc
US14401-2	42-10.9	140-35.5	8/31	0623-0630	78	East-2	ENE-1	East-3	20.1	20.0	bc
US14403-2	42-16.5	140-36.1	8/31	0704-0712	89	East-2	ENE-1	East-4	20.6	20.8	bc
US14404-2	42-21.0	140-36.6	8/31	0750-0759	86	East-3	ENE-1	East-4	20.8	20.8	bc
US14416	42-26.3	140-25.9	8/31	0858-0902	67	ESE-2	ESE-1	ESE-3	22.0	20.6	bc
US14417	42-29.0	140-31.1	8/31	0930-0934	73	SE-3	ESE-1	SE-4	21.3	20.6	bc
US14418	42-26.1	140-37.0	8/31	1007-1012	82	SE-3	ESE-1	SE-4	21.7	20.9	bc
US14419	42-31.0	140-37.6	8/31	1049-1053	61	SSE-3	SSE-1	SSE-4	21.3	20.9	bc
US14420	42-28.3	140-42.9	8/31	1124-1127	59	SSE-3	SSE-1	SSE-4	21.8	21.0	bc
US14421	42-25.4	140-48.6	8/31	1158-1200	43	SSE-3	SSE-1	SSE-5	21.8	21.4	bc
US14422	41-59.3	141-02.0	9/1	1211-1216	99	ESE-2	ESE-1	ESE-4	21.5	20.7	c
US14423	41-58.7	141-00.8	9/1	1226-1231	93	ESE-2	ESE-1	ESE-4	22.1	20.7	c
US14424	41-58.1	140-59.6	9/1	1240-1244	86	ESE-2	ESE-1	ESE-4	22.5	20.6	bc
US14425	41-57.5	140-58.3	9/1	1253-1257	78	ESE-2	ESE-1	ESE-4	22.5	20.5	bc
US14426	40-57.5	140-45.6	9/3	0458-0506	50	East-2	East-1	East-4	21.0	22.4	bc
US14427	41-03.8	140-52.0	9/3	0603-0610	50	East-2	East-1	East-4	21.0	22.1	bc
US14428	41-04.7	141-01.7	9/3	0656-0702	47	ESE-2	East-1	ESE-4	21.0	22.5	bc
US14429	41-06.1	140-51.4	9/3	0843-0844	51	East-2	ESE-1	East-4	23.5	22.0	bc
US14430	41-05.2	140-44.2	9/3	0920-0928	59	East-3	ESE-1	East-5	22.1	22.4	bc
US14431	41-11.3	140-40.0	9/3	1007-1013	53	ESE-2	ESE-1	ESE-4	22.0	22.2	bc
US14432	41-11.8	140-41.7	9/3	1025-1031	73	SE-2	ESE-1	SE-4	22.5	22.3	bc
US14433	41-12.2	140-43.0	9/3	1039-1046	72	East-2	ESE-1	East-4	23.0	22.4	bc
US14434	41-12.3	140-44.0	9/3	1053-1101	69	SE-2	ESE-1	SE-4	22.7	22.4	bc
US14435	41-12.7	140-44.9	9/3	1107-1113	66	SE-2	ESE-1	SE-4	23.9	22.5	bc
US14436	41-13.0	140-45.6	9/3	1120-1125	64	SE-2	ESE-1	SE-4	23.1	22.5	bc
US14437	41-17.0	140-41.5	9/3	1158-1209	147	SE-2	SE-1	SE-3	23.8	22.5	c
US14438	41-28.5	141-10.2	9/6	1910-1915	102	WSW-2	WNW-1	WSW-4	22.5	21.5	c
US14439	41-38.9	141-12.1	9/7	0652-0701	202	NW-1	ENE-1	NW-2	21.7	22.3	bc
US14440	41-38.9	141-23.8	9/7	0752-0806	279	West-1	East-1	West-3	23.7	23.1	bc
US14441	41-39.0	141-35.5	9/7	0852-0857	110	NW-1	East-1	NW-3	23.3	22.1	bc
US14442	41-39.0	141-47.5	9/7	0949-1010	1014	West-1	ESE-1	West-3	24.6	22.0	bc
US14443	41-30.4	141-47.9	9/7	1116-1134	910	West-1	ESE-1	West-3	22.4	21.9	bc
US14444	41-29.9	141-36.1	9/7	1234-1246	369	Calm	SSE-1	Calm	24.0	22.0	bc
US14445	41-29.8	141-24.3	9/7	1408-1412	99	East-1	SSE-1	East-2	24.6	23.1	bc
US14446	41-29.9	141-12.3	9/7	1505-1514	262	NW-1	WNW-1	NE-3	25.3	21.9	bc
US14447	41-42.3	141-11.9	9/7	1818-1826	202	NW-1	SW-1	NW-3	19.8	18.7	c
US14448	41-48.5	141-14.7	9/8	0547-0555	207	NW-3	ESE-1	NW-3	20.3	20.9	bc
US14449	41-48.4	141-23.9	9/8	0638-0649	300	NW-3	ESE-1	NW-4	20.6	20.4	bc
US14450	41-48.5	141-35.9	9/8	0742-0803	615	North-2	ESE-1	North-4	20.9	19.3	bc
US14451	41-48.4	141-48.1	9/8	0849-0911	801	North-2	North-2	North-4	21.2	21.2	bc
US14452	41-35.8	140-54.2	9/8	1513-1517	72	East-1	East-1	East-3	23.7	23.4	bc
US14453	41-37.0	140-51.4	9/8	1541-1546	96	East-2	East-1	East-3	23.2	23.6	bc
US14454	41-38.7	140-49.3	9/8	1608-1622	342	East-1	East-1	East-3	23.4	23.7	bc
US14455	41-40.8	140-47.4	9/8	1644-1654	224	East-1	East-1	East-3	23.1	24.5	bc
US14456	41-42.9	140-45.1	9/8	1716-1720	83	East-1	East-1	East-3	22.9	24.7	bc
US14457	41-43.7	140-45.1	9/8	1806-1810	72	ESE-2	SE-1	ESE-2	23.0	24.3	bc

Table 1 (Continued)

Cruise 319

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14458	42-50.0	144-57.6	9/14	0551-0557	103	North-4	East-1	North-4	14.2	15.0	o
US14459	42-46.1	144-59.7	9/14	0625-0630	143	North-2	East-1	North-4	14.6	15.0	c
US14460	42-47.8	145-23.8	9/14	0824-0843	931	NNW-2	ENE-1	NNW-4	15.1	14.1	o
US14461	42-59.9	145-34.0	9/14	1018-1024	97	NE-2	NE-2	NE-4	15.4	14.8	c
US14462	43-10.5	145-49.0	9/14	1206-1210	80	NE-2	NE-2	NE-4	16.6	14.7	c
US14463	43-43.4	145-14.3	9/15	0820-0824	17	SSW-1	NW-1	SSW-2	16.1	17.7	bc
US14464	43-49.8	145-12.3	9/15	0903-0906	44	South-1	NW-1	South-2	17.2	18.2	bc
US14465	43-56.3	145-12.5	9/15	0944-0950	80	South-1	NW-1	South-2	18.1	18.1	bc
US14466	44-00.5	145-16.6	9/15	1024-1040	429	South-1	NW-1	South-3	17.8	18.0	bc
US14467	44-05.9	145-16.6	9/15	1114-1127	385	South-1	South-1	South-3	19.3	17.9	bc
US14468	44-10.3	145-20.5	9/15	1201-1207	151	South-1	South-1	SW-3	19.2	17.9	bc
US14469	44-15.2	145-22.9	9/15	1244-1253	276	South-2	South-1	South-3	20.2	18.3	bc
US14470	44-19.9	145-24.7	9/15	1325-1344	894	South-2	South-1	South-3	19.0	18.3	bc
US14471	44-21.6	145-21.4	9/15	1402-1407	66	SE-2	South-1	SE-4	17.5	18.6	bc
US14472	44-23.0	145-18.0	9/15	1425-1445	689	ESE-2	SE-1	ESE-4	18.3	19.4	bc
US14473	44-18.2	145-16.1	9/15	1522-1528	176	West-1	NNW-1	West-2	19.5	19.0	bc
US14474	44-14.1	145-11.7	9/15	1603-1607	117	SE-2	NNE-1	SE-4	19.7	18.5	bc
US14475	44-10.5	145-06.9	9/15	1642-1647	155	East-2	NNE-1	East-3	19.3	18.9	bc
US14476	44-07.4	145-01.8	9/15	1722-1727	93	SSE-3	NNE-1	SSE-5	18.2	19.1	bc
US14477	44-03.4	144-56.1	9/15	1806-1810	55	East-1	NNE-1	East-2	18.0	19.2	bc
US14478	44-05.3	144-52.7	9/15	1859-1905	186	SE-2	NNE-1	SE-4	17.9	19.0	bc
US14479	44-09.1	144-58.2	9/15	1937-1947	317	SE-2	NNE-1	SE-4	18.2	19.0	bc
US14480	44-11.8	145-03.3	9/15	2011-2026	470	Calm	NNE-1	Calm	17.9	16.9	c
US14481	44-15.1	145-08.5	9/15	2050-2107	475	SE-2	NNE-1	SE-4	17.3	18.6	c
US14482	44-19.2	145-13.0	9/15	2133-2152	725	East-1	NNE-1	East-2	17.7	19.0	c
US14483	44-18.7	145-28.4	9/16	0509-0540	1540	South-4	SE-1	South-4	16.7	18.0	c
US14484	44-13.7	145-26.4	9/16	0633-0649	1578	SSW-2	SSE-1	SSW-4	16.9	18.0	c
US14485	44-08.8	145-24.1	9/16	0723-0740	1479	SSW-3	SE-1	SSW-3	17.0	18.0	c
US14486	44-05.0	145-20.1	9/16	0814-0833	750	SSW-1	SE-1	SSW-3	17.5	18.3	c
US14487	43-17.0	145-45.3	9/17	0755-0758	33	South-2	South-1	South-3	15.7	16.3	bc
US14488	43-07.1	145-30.3	9/17	0934-0937	38	SW-2	South-1	SW-4	16.6	16.3	bc
US14489	42-56.0	145-16.1	9/17	1108-1113	89	SW-3	South-1	SW-4	17.1	15.5	bc
US14490	42-54.0	144-54.0	9/17	1252-1255	63	SW-3	SW-1	SW-4	17.4	16.4	bc
US14491	42-48.4	144-39.8	9/17	1409-1413	105	SW-2	SW-1	SW-3	16.6	16.0	c
US14492	42-53.4	144-14.9	9/17	1608-1612	62	SSW-3	SSW-1	West-4	17.8	17.3	bc
US14493	42-48.1	144-18.1	9/17	1649-1705	612	WSW-2	SSW-1	WSW-3	16.5	15.6	bc
US14494	42-42.0	144-21.6	9/18	0616-0634	658	West-2	West-1	West-3	14.9	16.3	bc
US14495	42-16.2	143-34.1	9/18	1832-1838	101	SSE-1	South-1	SSE-2	17.0	16.5	bc

Cruise 320

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14496	41-15.9	139-49.9	9/28	1032-1040	860	West-3	SW-1	West-4	21.2	22.5	bc
US14497	41-22.2	139-54.8	9/28	1206-1211	123	WSW-2	SW-1	WSW-4	23.6	21.8	bc
US14498	41-21.1	139-43.1	9/29	0947-0953	763	NW-2	NW-1	NW-2	20.2	21.3	c
US14499	41-15.4	139-46.0	9/29	1056-1102	1302	WNW-2	NW-1	WNW-2	20.9	21.3	c
US14500	41-35.0	140-53.1	9/29	1828-1830	38	ENE-1	ENE-1	ENE-2	18.8	21.6	c
US14501	41-37.0	140-51.2	9/29	1846-1850	91	ENE-2	ENE-1	ENE-3	19.2	21.7	c
US14502	41-38.8	140-49.2	9/29	1906-1917	348	ENE-2	ENE-1	East-2	19.3	20.9	c
US14503	41-40.8	140-47.2	9/29	1933-1941	219	Calm	ENE-1	Calm	19.5	21.7	c
US14504	41-42.9	140-44.9	9/29	1958-2002	83	NW-1	ESE-1	NW-2	18.6	22.2	c

(*): Fixed position by Global Positioning System

S.M.T.: Ship's mean time

Wr.: Weather in WMO Code 4501

Table 2. Oceanographic data

STATION US14399
LATITUDE 42-09.8 N
LONGITUI 140-47.2 E
DEPTH (m) 92

Press.	Temp.	Salinity	Sigma-T
5	21.101	31.324	21.671
10	20.743	31.408	21.830
20	17.155	32.358	23.451
30	12.716	32.574	24.569
40	6.394	32.244	25.327
50	5.136	32.394	25.595
75	4.590	32.939	26.086

STATION US14400
LATITUDE 42-10.1 N
LONGITUI 140-41.7 E
DEPTH (m) 82

Press.	Temp.	Salinity	Sigma-T
5	20.778	31.200	21.663
10	20.534	31.432	21.903
20	17.488	32.556	23.524
30	11.589	32.399	24.645
40	7.236	32.136	25.132
50	5.966	32.517	25.595
75	4.708	32.831	25.988

STATION US14401
LATITUDE 42-11.2 N
LONGITUI 140-35.5 E
DEPTH (m) 80

Press.	Temp.	Salinity	Sigma-T
5	20.321	31.258	21.827
10	20.332	31.345	21.890
20	17.116	32.310	23.423
30	11.723	32.054	24.353
40	7.253	32.156	25.145
50	6.496	32.577	25.576
75	4.953	32.935	26.044

STATION US14402
LATITUDE 42-13.8 N
LONGITUI 140-39.5 E
DEPTH (m) 87

Press.	Temp.	Salinity	Sigma-T
5	20.805	31.082	21.566
10	20.813	31.090	21.570
20	19.489	32.352	22.875
30	16.445	32.993	24.103
40	10.982	32.855	25.109
50	7.991	32.785	25.536
75	5.342	33.161	26.178

STATION US14403
LATITUDE 42-17.0 N
LONGITUI 140-36.1 E
DEPTH (m) 89

Press.	Temp.	Salinity	Sigma-T
5	20.882	30.975	21.465
10	20.895	31.182	21.618
20	19.675	31.989	22.550
30	17.906	32.566	23.431
40	7.970	32.039	24.953
50	5.674	32.420	25.553
75	5.510	33.171	26.166

STATION US14404
LATITUDE 42-20.9 N
LONGITUI 140-36.7 E
DEPTH (m) 85

Press.	Temp.	Salinity	Sigma-T
5	20.963	31.198	21.612
10	20.924	31.200	21.624
20	20.589	31.552	21.980
30	16.928	32.334	23.486
40	8.904	32.064	24.835
50	5.924	32.499	25.586
75	5.465	33.107	26.121

STATION US14405
LATITUDE 42-18.8 N
LONGITUI 140-41.9 E
DEPTH (m) 68

Press.	Temp.	Salinity	Sigma-T
5	21.112	31.248	21.610
10	20.959	31.376	21.749
20	20.849	31.447	21.832
30	17.157	32.299	23.405
40	9.500	32.032	24.716
50	8.006	32.733	25.493

STATION US14406
LATITUDE 42-15.7 N
LONGITUI 140-47.4 E
DEPTH (m) 69

Press.	Temp.	Salinity	Sigma-T
5	21.069	31.218	21.599
10	20.929	31.359	21.744
20	18.903	32.257	22.950
30	14.890	32.514	24.080
40	12.801	33.476	25.252
50	9.946	33.288	25.625

STATION US14407
LATITUDE 42-17.5 N
LONGITUI 140-54.0 E
DEPTH (m) 55

Press.	Temp.	Salinity	Sigma-T
5	20.860	31.649	21.983
10	20.290	32.153	22.516
20	17.057	32.891	23.883
30	16.357	33.560	24.558
40	13.443	33.556	25.185
50	11.144	33.417	25.517

STATION US14408
LATITUDE 42-20.9 N
LONGITUI 140-48.5 E
DEPTH (m) 51

Press.	Temp.	Salinity	Sigma-T
5	20.848	31.275	21.701
10	20.849	31.274	21.701
20	20.637	31.404	21.855
30	17.016	32.420	23.531
40	12.753	33.444	25.236
50	10.533	33.413	25.622

STATION US14409
LATITUDE 42-23.3 N
LONGITUI 140-42.9 E
DEPTH (m) 59

Press.	Temp.	Salinity	Sigma-T
5	20.918	31.189	21.618
10	20.903	31.190	21.622
20	20.263	31.628	22.123
30	14.962	32.485	24.042
40	8.152	32.249	25.092
50	10.267	33.365	25.630

STATION US14410
LATITUDE 42-23.8 N
LONGITUI 140-31.3 E
DEPTH (m) 95

Press.	Temp.	Salinity	Sigma-T
5	20.797	31.270	21.711
10	20.805	31.278	21.715
20	19.531	31.973	22.575
30	16.300	32.403	23.682
40	9.538	32.200	24.842
50	6.136	32.586	25.628
75	5.488	33.185	26.180

STATION US14411
LATITUDE 42-21.5 N
LONGITUI 140-24.9 E
DEPTH (m) 68

Press.	Temp.	Salinity	Sigma-T
5	20.769	31.102	21.591
10	20.562	31.434	21.897
20	18.556	32.397	23.143
30	12.652	32.039	24.168
40	10.177	32.726	25.147
50	6.941	32.785	25.682

STATION US14412
LATITUDE 42-19.2 N
LONGITUI 140-30.0 E
DEPTH (m) 91

Press.	Temp.	Salinity	Sigma-T
5	20.707	31.503	21.912
10	20.703	31.501	21.911
20	18.925	32.648	23.243
30	13.168	32.147	24.150
40	8.264	32.346	25.152
50	5.567	32.578	25.691
75	5.147	33.244	26.267

STATION US14413
LATITUDE 42-16.8 N
LONGITUI 140-24.5 E
DEPTH (m) 54

Press.	Temp.	Salinity	Sigma-T
5	21.098	30.787	21.264
10	20.401	31.639	22.096
20	18.011	32.294	23.198
30	11.230	32.045	24.435
40	8.443	32.558	25.292
50	7.003	32.660	25.575

STATION US14414
LATITUDE 42-15.3 N
LONGITUI 140-30.6 E
DEPTH (m) 85

Press.	Temp.	Salinity	Sigma-T
5	20.676	31.189	21.681
10	20.294	31.666	22.144
20	18.723	32.675	23.315
30	13.175	32.187	24.177
40	7.128	32.419	25.369
50	6.506	32.746	25.708
75	4.647	33.187	26.277

STATION US14415
LATITUDE 42-08.3 N
LONGITUI 140-35.5 E
DEPTH (m) 57

Press.	Temp.	Salinity	Sigma-T
5	19.792	31.938	22.481
10	18.932	32.156	22.866
20	16.411	32.120	23.440
30	12.019	32.134	24.360
40	7.584	32.135	25.083
50	6.000	32.297	25.417

STATION US14416
LATITUDE 42-26.3 N
LONGITUI 140-25.9 E
DEPTH (m) 67

Press.	Temp.	Salinity	Sigma-T
5	20.777	31.171	21.641
10	20.742	31.342	21.780
20	19.421	32.141	22.731
30	14.779	32.105	23.788
40	12.230	32.911	24.924
50	8.983	32.898	25.475

Table 2. (Continued)

STATION US14417
LATITUDE 42-29.0 N
LONGITUI 140-31.1 E
DEPTH (m) 73

Press.	Temp.	Salinity	Sigma-T
5	20.815	31.396	21.802
10	20.775	31.412	21.824
20	20.440	31.612	22.065
30	17.808	32.504	23.407
40	11.247	32.267	24.604
50	9.698	33.075	25.499

STATION US14418
LATITUDE 42-26.1 N
LONGITUI 140-37.0 E
DEPTH (m) 82

Press.	Temp.	Salinity	Sigma-T
5	21.069	31.310	21.669
10	20.991	31.308	21.688
20	20.624	31.549	21.969
30	18.542	32.797	23.452
40	11.395	32.043	24.404
50	7.378	32.469	25.374
75	6.043	33.256	26.170

STATION US14419
LATITUDE 42-31.0 N
LONGITUI 140-37.6 E
DEPTH (m) 61

Press.	Temp.	Salinity	Sigma-T
5	21.001	31.252	21.643
10	20.840	31.382	21.785
20	20.566	31.573	22.002
30	16.207	32.528	23.800
40	9.490	32.256	24.893
50	9.298	33.186	25.650

STATION US14420
LATITUDE 42-28.3 N
LONGITUI 140-42.9 E
DEPTH (m) 59

Press.	Temp.	Salinity	Sigma-T
5	21.308	30.951	21.333
10	21.185	30.977	21.385
20	19.848	31.674	22.266
30	18.564	33.151	23.718
40	14.361	33.312	24.808
50	11.911	33.424	25.382

STATION US14421
LATITUDE 42-25.4 N
LONGITUI 140-48.6 E
DEPTH (m) 43

Press.	Temp.	Salinity	Sigma-T
5	21.219	31.012	21.403
10	21.097	31.095	21.498
20	20.053	32.546	22.877
30	16.400	33.007	24.124

STATION US14422
LATITUDE 41-59.3 N
LONGITUI 141-02.0 E
DEPTH (m) 99

Press.	Temp.	Salinity	Sigma-T
5	20.795	32.802	22.877
10	20.666	32.961	23.032
20	19.053	33.157	23.600
30	15.456	33.613	24.803
40	13.271	33.734	25.358
50	12.925	33.965	25.606
75	11.605	33.983	25.873

STATION US14423
LATITUDE 41-58.7 N
LONGITUI 141-00.8 E
DEPTH (m) 93

Press.	Temp.	Salinity	Sigma-T
5	20.727	32.585	22.729
10	20.608	32.617	22.786
20	20.088	33.234	23.392
30	15.804	33.621	24.731
40	14.307	33.800	25.195
50	13.057	33.888	25.520
75	11.494	33.906	25.833

STATION US14424
LATITUDE 41-58.1 N
LONGITUI 140-59.6 E
DEPTH (m) 86

Press.	Temp.	Salinity	Sigma-T
5	20.618	32.578	22.753
10	20.589	32.579	22.762
20	20.268	33.191	23.313
30	15.919	33.531	24.636
40	9.387	32.447	25.059
50	8.189	32.646	25.397
75	5.326	32.850	25.934

STATION US14425
LATITUDE 41-57.5 N
LONGITUI 140-58.3 E
DEPTH (m) 78

Press.	Temp.	Salinity	Sigma-T
5	20.539	32.559	22.760
10	20.366	32.702	22.914
20	19.696	33.181	23.454
30	15.057	33.011	24.426
40	8.971	32.210	24.939
50	6.047	32.410	25.500

STATION US14426
LATITUDE 40-57.5 N
LONGITUI 140-45.6 E
DEPTH (m) 50

Press.	Temp.	Salinity	Sigma-T
5	22.277	33.220	22.789
10	22.295	33.228	22.790
20	21.936	33.539	23.126
30	21.016	34.052	23.768
40	19.522	34.150	24.238

STATION US14427
LATITUDE 41-03.8 N
LONGITUI 140-52.0 E
DEPTH (m) 50

Press.	Temp.	Salinity	Sigma-T
5	21.666	33.259	22.988
10	21.693	33.278	22.995
20	21.723	33.551	23.194
30	20.882	33.889	23.681
40	19.350	34.060	24.213

STATION US14428
LATITUDE 41-04.7 N
LONGITUI 141-01.7 E
DEPTH (m) 47

Press.	Temp.	Salinity	Sigma-T
5	22.634	32.601	22.219
10	22.633	32.614	22.230
20	22.665	32.644	22.243
30	20.435	33.729	23.678
40	17.252	33.751	24.496

STATION US14429
LATITUDE 41-06.1 N
LONGITUI 140-51.4 E
DEPTH (m) 51

Press.	Temp.	Salinity	Sigma-T
5	22.367	33.390	22.893
10	22.372	33.410	22.907
20	21.965	33.523	23.106
30	21.507	33.760	23.413
40	18.927	33.947	24.235

STATION US14430
LATITUDE 41-05.2 N
LONGITUI 140-44.2 E
DEPTH (m) 59

Press.	Temp.	Salinity	Sigma-T
5	22.241	33.124	22.726
10	22.242	33.123	22.725
20	22.294	33.228	22.790
30	19.968	33.976	23.989
40	18.391	34.095	24.483
50	17.145	34.145	24.823

STATION US14431
LATITUDE 41-11.3 N
LONGITUI 140-40.0 E
DEPTH (m) 53

Press.	Temp.	Salinity	Sigma-T
5	22.576	33.319	22.780
10	22.388	33.440	22.925
20	21.728	33.926	23.477
30	20.227	34.145	24.050
40	18.763	34.284	24.534
50	16.753	34.357	25.079

STATION US14432
LATITUDE 41-11.8 N
LONGITUI 140-41.7 E
DEPTH (m) 73

Press.	Temp.	Salinity	Sigma-T
5	22.415	33.240	22.766
10	22.400	33.241	22.770
20	22.452	33.598	23.026
30	20.713	34.023	23.827
40	17.579	34.331	24.862
50	16.627	34.389	25.133

STATION US14433
LATITUDE 41-12.2 N
LONGITUI 140-43.0 E
DEPTH (m) 72

Press.	Temp.	Salinity	Sigma-T
5	22.401	33.164	22.711
10	22.384	33.240	22.774
20	22.361	33.465	22.951
30	20.715	34.071	23.863
40	18.175	34.276	24.675
50	16.282	34.300	25.144

STATION US14434
LATITUDE 41-12.3 N
LONGITUI 140-44.0 E
DEPTH (m) 69

Press.	Temp.	Salinity	Sigma-T
5	22.542	33.176	22.681
10	22.492	33.172	22.692
20	22.067	33.447	23.020
30	20.774	34.084	23.857
40	17.945	34.229	24.695
50	16.302	34.317	25.153

Table 2. (Continued)

STATION US14435
LATITUDE 41-12.7 N
LONGITUI 140-44.9 E
DEPTH (m) 66

Press.	Temp.	Salinity	Sigma-T
5	22.520	33.188	22.696
10	22.524	33.187	22.694
20	22.322	33.157	22.729
30	20.407	33.961	23.862
40	17.718	34.238	24.757
50	16.317	34.304	25.140

STATION US14436
LATITUDE 41-13.0 N
LONGITUI 140-45.6 E
DEPTH (m) 64

Press.	Temp.	Salinity	Sigma-T
5	22.422	33.167	22.708
10	22.351	33.163	22.725
20	22.288	33.237	22.799
30	19.282	34.073	24.241
40	17.284	34.239	24.862
50	16.627	34.242	25.020

STATION US14437
LATITUDE 41-17.0 N
LONGITUI 140-41.5 E
DEPTH (m) 147

Press.	Temp.	Salinity	Sigma-T
5	22.640	33.704	23.054
10	22.653	33.696	23.044
20	21.561	34.037	23.608
30	19.719	34.214	24.235
40	17.670	34.296	24.814
50	16.616	34.374	25.124
75	16.016	34.399	25.282
100	15.114	34.409	25.492
125	13.932	34.357	25.705

STATION US14438
LATITUDE 41-28.5 N
LONGITUI 141-10.2 E
DEPTH (m) 102

Press.	Temp.	Salinity	Sigma-T
5	21.602	33.934	23.518
10	21.556	33.934	23.531
20	21.210	33.935	23.626
30	20.912	33.939	23.710
40	20.651	33.925	23.770
50	20.306	33.885	23.831
75	15.040	34.284	25.411

STATION US14439
LATITUDE 41-38.9 N
LONGITUI 141-12.1 E
DEPTH (m) 202

Press.	Temp.	Salinity	Sigma-T
5	22.454	33.891	23.248
10	22.443	33.889	23.250
20	22.152	33.886	23.329
30	21.985	33.896	23.383
40	19.817	33.998	24.045
50	19.703	34.034	24.103
75	19.122	34.110	24.310
100	13.317	34.086	25.621
125	11.003	33.919	25.933
150	9.126	33.877	26.219
175	6.979	33.666	26.371

STATION US14440
LATITUDE 41-38.9 N
LONGITUI 141-23.8 E
DEPTH (m) 279

Press.	Temp.	Salinity	Sigma-T
5	23.112	33.920	23.082
10	22.156	33.943	23.372
20	21.931	33.955	23.443
30	21.477	33.956	23.570
40	20.517	33.999	23.861
50	20.342	34.015	23.921
75	17.491	34.108	24.712
100	15.728	34.158	25.161
125	12.825	34.011	25.662
150	11.063	34.036	26.014
175	9.871	33.975	26.173
200	7.659	33.769	26.357
250	4.425	33.563	26.599

STATION US14441
LATITUDE 41-39.0 N
LONGITUI 141-35.5 E
DEPTH (m) 110

Press.	Temp.	Salinity	Sigma-T
5	21.510	33.638	23.319
10	21.511	33.737	23.394
20	21.339	33.843	23.521
30	21.306	33.862	23.544
40	21.249	33.899	23.588
50	21.109	33.962	23.674
75	20.592	33.994	23.838
100	17.064	34.188	24.876

STATION US14442
LATITUDE 41-39.0 N
LONGITUI 141-47.5 E
DEPTH (m) 1014

Press.	Temp.	Salinity	Sigma-T
5	21.750	33.939	23.482
10	21.658	33.940	23.507
20	21.629	33.941	23.516
30	21.614	33.942	23.521
40	21.610	33.940	23.521
50	21.395	33.944	23.583
75	19.314	34.094	24.249
100	17.237	34.161	24.814
125	16.416	34.165	25.010
150	15.262	34.192	25.292
175	13.764	34.044	25.497
200	12.161	33.964	25.754
250	6.109	33.503	26.356
300	2.959	33.526	26.712
400	3.239	33.925	27.005
500	3.420	34.100	27.128

STATION US14443
LATITUDE 41-30.4 N
LONGITUI 141-47.9 E
DEPTH (m) 910

Press.	Temp.	Salinity	Sigma-T
5	21.591	33.823	23.437
10	21.521	33.826	23.458
20	21.491	33.831	23.470
30	21.462	33.828	23.476
40	21.442	33.829	23.483
50	21.211	33.815	23.535
75	19.722	33.901	23.997
100	18.322	34.037	24.455
125	14.936	34.063	25.263
150	13.350	33.993	25.542
175	12.461	34.094	25.797
200	11.565	34.043	25.928
250	10.025	34.004	26.170
300	5.108	33.451	26.435
400	3.257	33.723	26.842
500	3.263	33.939	27.014

STATION US14444
LATITUDE 41-29.9 N
LONGITUI 141-36.1 E
DEPTH (m) 369

Press.	Temp.	Salinity	Sigma-T
5	21.824	33.657	23.246
10	21.650	33.721	23.344
20	21.652	33.795	23.399
30	20.864	33.841	23.648
40	20.568	33.895	23.769
50	20.317	33.900	23.839
75	19.638	33.957	24.060
100	17.780	34.068	24.612
125	16.206	34.083	24.995
150	12.705	33.988	25.667
175	9.692	33.895	26.141
200	8.534	33.801	26.252
250	4.968	33.495	26.486
300	2.988	33.637	26.798

STATION US14445
LATITUDE 41-29.8 N
LONGITUI 141-24.3 E
DEPTH (m) 99

Press.	Temp.	Salinity	Sigma-T
5	22.652	33.890	23.192
10	22.381	33.892	23.269
20	22.036	33.889	23.364
30	21.908	33.883	23.395
40	19.323	33.948	24.135
50	17.373	34.160	24.781
75	14.496	34.274	25.521

STATION US14446
LATITUDE 41-29.9 N
LONGITUI 141-12.3 E
DEPTH (m) 262

Press.	Temp.	Salinity	Sigma-T
5	21.126	33.932	23.647
10	21.066	33.937	23.667
20	20.677	33.986	23.809
30	20.387	33.966	23.871
40	18.926	34.020	24.291
50	17.660	34.107	24.671
75	15.344	34.269	25.333
100	15.080	34.323	25.433
125	14.580	34.359	25.568
150	13.662	34.344	25.751
175	12.725	34.301	25.906
200	12.255	34.281	25.982

Table 2 (Continued)

STATION US14447
LATITUDE 41-42.3 N
LONGITUI 141-11.9 E
DEPTH (m) 202

Press.	Temp.	Salinity	Sigma-T
5	18.226	34.139	24.557
10	17.015	34.223	24.914
20	16.348	34.263	25.101
30	15.712	34.267	25.249
40	14.778	34.233	25.429
50	13.334	34.120	25.644
75	9.206	33.904	26.227
100	8.047	33.813	26.335
125	6.356	33.629	26.424
150	4.960	33.508	26.497
175	4.487	33.480	26.527

STATION US14448
LATITUDE 41-48.5 N
LONGITUI 141-14.7 E
DEPTH (m) 207

Press.	Temp.	Salinity	Sigma-T
5	20.757	32.212	22.438
10	20.817	32.348	22.525
20	20.388	32.606	22.835
30	20.771	33.628	23.512
40	17.151	33.738	24.510
50	13.332	33.956	25.518
75	10.826	34.070	26.082
100	9.099	33.862	26.211
125	6.434	33.580	26.375
150	5.441	33.530	26.459
175	4.225	33.427	26.512

STATION US14449
LATITUDE 41-48.4 N
LONGITUI 141-23.9 E
DEPTH (m) 300

Press.	Temp.	Salinity	Sigma-T
5	20.158	34.069	24.010
10	19.538	34.096	24.192
20	16.804	34.233	24.972
30	16.665	34.273	25.035
40	16.335	34.264	25.104
50	14.977	34.167	25.335
75	10.481	33.609	25.784
100	10.675	33.742	25.854
125	10.860	34.017	26.035
150	9.048	33.926	26.269
175	5.879	33.544	26.417
200	3.966	33.425	26.537
250	3.024	33.509	26.693

STATION US14450
LATITUDE 41-48.5 N
LONGITUI 141-35.9 E
DEPTH (m) 615

Press.	Temp.	Salinity	Sigma-T
5	19.578	33.737	23.908
10	17.833	34.093	24.618
20	17.619	34.173	24.732
30	17.546	34.187	24.760
40	17.189	34.190	24.848
50	15.928	34.204	25.151
75	14.449	34.303	25.553
100	12.830	34.206	25.812
125	12.347	34.196	25.898
150	11.121	34.110	26.060
175	10.348	34.007	26.117
200	6.858	33.725	26.433
250	2.982	33.477	26.671
300	2.808	33.578	26.767
400	3.033	33.762	26.894
500	3.279	33.925	27.001

STATION US14451
LATITUDE 41-48.4 N
LONGITUI 141-48.1 E
DEPTH (m) 801

Press.	Temp.	Salinity	Sigma-T
5	21.368	33.926	23.576
10	20.992	34.010	23.743
20	20.588	34.051	23.883
30	20.567	34.060	23.895
40	19.421	34.086	24.215
50	17.702	34.179	24.716
75	15.998	34.259	25.178
100	15.061	34.241	25.373
125	13.866	34.201	25.598
150	11.949	34.103	25.902
175	10.050	33.920	26.100
200	9.021	33.894	26.249
250	3.410	33.338	26.521
300	2.925	33.473	26.673
400	2.978	33.712	26.859
500	3.261	33.924	27.002

STATION US14452
LATITUDE 41-35.8 N
LONGITUI 140-54.2 E
DEPTH (m) 72

Press.	Temp.	Salinity	Sigma-T
5	23.309	33.948	23.047
10	22.486	33.994	23.317
20	20.995	34.104	23.813
30	19.485	34.183	24.273
40	18.415	34.234	24.583
50	18.228	34.256	24.646

STATION US14453
LATITUDE 41-37.0 N
LONGITUI 140-51.4 E
DEPTH (m) 96

Press.	Temp.	Salinity	Sigma-T
5	23.566	33.923	22.953
10	23.307	33.921	23.027
20	22.948	33.943	23.147
30	20.247	34.183	24.074
40	18.547	34.282	24.587
50	18.082	34.304	24.719
75	14.813	34.392	25.544

STATION US14454
LATITUDE 41-38.7 N
LONGITUI 140-49.3 E
DEPTH (m) 342

Press.	Temp.	Salinity	Sigma-T
5	24.382	33.865	22.669
10	24.163	33.901	22.762
20	23.444	33.896	22.969
30	22.316	33.983	23.357
40	19.583	34.085	24.173
50	17.864	34.215	24.704
75	14.663	34.256	25.472
100	13.050	34.322	25.858
125	13.050	34.319	25.855
150	12.763	34.304	25.900
175	13.039	34.326	25.863
200	12.951	34.320	25.876
250	12.864	34.321	25.894
300	12.580	34.317	25.947

STATION US14455
LATITUDE 41-40.8 N
LONGITUI 140-47.4 E
DEPTH (m) 224

Press.	Temp.	Salinity	Sigma-T
5	24.286	33.829	22.670
10	23.846	33.880	22.839
20	23.371	33.928	23.014
30	21.116	34.052	23.741
40	19.621	34.209	24.258
50	17.593	34.325	24.854
75	13.765	34.296	25.692
100	12.811	34.294	25.883
125	11.801	34.270	26.060
150	11.392	34.258	26.127
175	11.222	34.252	26.153
200	10.901	34.242	26.203

STATION US14456
LATITUDE 41-42.9 N
LONGITUI 140-45.1 E
DEPTH (m) 83

Press.	Temp.	Salinity	Sigma-T
5	22.841	33.918	23.159
10	22.730	33.953	23.217
20	21.788	34.008	23.523
30	20.235	34.151	24.053
40	17.705	34.270	24.785
50	16.804	34.307	25.028
75	13.536	34.312	25.751

STATION US14457
LATITUDE 41-43.7 N
LONGITUI 140-45.1 E
DEPTH (m) 72

Press.	Temp.	Salinity	Sigma-T
5	24.048	33.907	22.800
10	23.536	33.892	22.939
20	22.293	33.975	23.357
30	20.982	34.104	23.817
40	18.261	34.254	24.637
50	15.778	34.312	25.269

STATION US14458
LATITUDE 42-50.0 N
LONGITUI 144-57.6 E
DEPTH (m) 103

Press.	Temp.	Salinity	Sigma-T
5	15.626	33.296	24.521
10	15.624	33.296	24.521
20	15.490	33.271	24.532
30	15.111	33.318	24.651
40	14.071	33.316	24.871
50	13.836	33.324	24.926
75	9.563	33.195	25.615

Table 2 (Continued)

STATION US14459
LATITUDE 42-46.1 N
LONGITUI 144-59.7 E
DEPTH (m) 143

Press.	Temp.	Salinity	Sigma-T
5	14.815	32.981	24.456
10	14.994	33.077	24.491
20	14.871	33.291	24.683
30	12.843	33.277	25.089
40	11.914	33.306	25.289
50	10.965	33.293	25.452
75	6.580	33.161	26.026
100	3.345	33.081	26.322
125	2.349	33.187	26.493

STATION US14460
LATITUDE 42-47.8 N
LONGITUI 145-23.8 E
DEPTH (m) 931

Press.	Temp.	Salinity	Sigma-T
5	14.362	32.531	24.205
10	14.288	32.574	24.253
20	13.348	33.169	24.905
30	11.010	33.233	25.398
40	6.735	32.873	25.779
50	4.534	32.806	25.986
75	2.711	32.965	26.285
100	1.852	33.050	26.421
125	1.741	33.115	26.480
150	1.722	33.183	26.536
175	1.838	33.253	26.584
200	1.982	33.322	26.629
250	2.044	33.454	26.730
300	2.213	33.560	26.801
400	2.596	33.729	26.906
500	2.809	33.835	26.972

STATION US14461
LATITUDE 42-59.9 N
LONGITUI 145-34.0 E
DEPTH (m) 97

Press.	Temp.	Salinity	Sigma-T
5	14.996	32.959	24.400
10	14.911	32.956	24.416
20	14.589	33.140	24.626
30	13.386	33.234	24.948
40	12.443	33.275	25.165
50	11.496	33.249	25.323
75	8.641	33.222	25.782

STATION US14462
LATITUDE 43-10.5 N
LONGITUI 145-49.0 E
DEPTH (m) 80

Press.	Temp.	Salinity	Sigma-T
5	14.745	32.929	24.430
10	14.730	32.942	24.444
20	14.582	32.967	24.494
30	14.346	33.272	24.780
40	13.774	33.295	24.916
50	12.750	33.298	25.124
75	11.314	33.263	25.367

STATION US14463
LATITUDE 43-43.4 N
LONGITUI 145-14.3 E
DEPTH (m) 17

Press.	Temp.	Salinity	Sigma-T
5	17.921	33.239	23.943
10	17.925	33.240	23.943

STATION US14464
LATITUDE 43-49.8 N
LONGITUI 145-12.3 E
DEPTH (m) 44

Press.	Temp.	Salinity	Sigma-T
5	18.018	33.184	23.877
10	17.971	33.179	23.885
20	17.775	33.283	24.012
30	17.453	33.388	24.170
40	16.151	33.471	24.537

STATION US14465
LATITUDE 43-56.3 N
LONGITUI 145-12.5 E
DEPTH (m) 80

Press.	Temp.	Salinity	Sigma-T
5	18.214	33.219	23.856
10	18.201	33.220	23.860
20	18.067	33.275	23.935
30	17.886	33.259	23.967
40	17.487	33.412	24.181
50	16.736	33.501	24.425
75	11.919	33.644	25.551

STATION US14466
LATITUDE 44-00.5 N
LONGITUI 145-16.6 E
DEPTH (m) 429

Press.	Temp.	Salinity	Sigma-T
5	17.946	33.187	23.897
10	17.897	33.192	23.913
20	17.875	33.194	23.920
30	17.849	33.281	23.992
40	17.714	33.312	24.049
50	16.767	33.504	24.421
75	12.724	33.664	25.412
100	9.987	33.627	25.882
125	7.822	33.585	26.188
150	5.690	33.494	26.400
175	4.298	33.452	26.524
200	3.716	33.458	26.588
250	2.234	33.407	26.678
300	1.444	33.407	26.735

STATION US14467
LATITUDE 44-05.9 N
LONGITUI 145-16.6 E
DEPTH (m) 385

Press.	Temp.	Salinity	Sigma-T
5	17.992	33.244	23.929
10	17.879	33.315	24.012
20	17.742	33.456	24.153
30	16.906	33.501	24.386
40	16.686	33.546	24.472
50	15.957	33.592	24.674
75	13.624	33.670	25.237
100	11.948	33.698	25.588
125	8.649	33.583	26.064
150	6.423	33.531	26.338
175	4.512	33.528	26.562
200	3.204	33.490	26.662
250	1.846	33.404	26.704
300	1.548	33.417	26.736

STATION US14468
LATITUDE 44-10.3 N
LONGITUI 145-20.5 E
DEPTH (m) 151

Press.	Temp.	Salinity	Sigma-T
5	17.853	33.343	24.039
10	17.629	33.431	24.160
20	17.590	33.505	24.227
30	17.391	33.497	24.268
40	16.702	33.540	24.463
50	15.691	33.614	24.751
75	13.405	33.680	25.289
100	10.933	33.683	25.762

STATION US14469
LATITUDE 44-15.2 N
LONGITUI 145-22.9 E
DEPTH (m) 276

Press.	Temp.	Salinity	Sigma-T
5	18.179	33.421	24.019
10	18.157	33.420	24.024
20	18.057	33.534	24.136
30	17.875	33.646	24.266
40	17.555	33.665	24.358
50	16.543	33.597	24.544
75	15.000	33.617	24.906
100	11.889	33.658	25.568
125	8.415	33.602	26.114
150	6.968	33.554	26.284
175	4.593	33.473	26.509
200	3.567	33.477	26.617

STATION US14470
LATITUDE 44-19.9 N
LONGITUI 145-24.7 E
DEPTH (m) 894

Press.	Temp.	Salinity	Sigma-T
5	18.394	33.437	23.978
10	17.706	33.381	24.104
20	17.579	33.392	24.142
30	17.466	33.419	24.191
40	17.689	33.663	24.324
50	17.546	33.652	24.350
75	13.481	33.628	25.234
100	11.984	33.767	25.634
125	9.702	33.646	25.945
150	1.396	32.985	26.400
175	1.226	33.182	26.570
200	2.451	33.324	26.593
250	0.055	33.242	26.684
300	-0.164	33.286	26.730
400	1.325	33.516	26.831
500	1.435	33.637	26.920

Table 2 (Continued)

STATION US14471
LATITUDE 44-21.6 N
LONGITUI 145-21.4 E
DEPTH (m) 66

Press.	Temp.	Salinity	Sigma-T
5	18.631	33.524	23.986
10	18.595	33.516	23.989
20	18.417	33.540	24.052
30	18.002	33.635	24.226
40	17.778	33.622	24.271
50	17.553	33.621	24.324

STATION US14472
LATITUDE 44-23.0 N
LONGITUI 145-18.0 E
DEPTH (m) 689

Press.	Temp.	Salinity	Sigma-T
5	19.193	33.626	23.922
10	19.030	33.628	23.965
20	18.271	33.646	24.169
30	18.083	33.654	24.221
40	18.015	33.664	24.246
50	16.636	33.604	24.528
75	11.037	33.655	25.722
100	9.192	33.828	26.170
125	8.698	33.814	26.237
150	7.575	33.753	26.356
175	5.858	33.604	26.467
200	4.510	33.634	26.646
250	2.358	33.450	26.702
300	2.063	33.431	26.710
400	1.874	33.522	26.797

STATION US14473
LATITUDE 44-18.2 N
LONGITUI 145-16.1 E
DEPTH (m) 176

Press.	Temp.	Salinity	Sigma-T
5	19.118	33.630	23.945
10	19.034	33.625	23.962
20	18.937	33.621	23.984
30	18.802	33.623	24.019
40	14.897	33.670	24.969
50	12.897	33.718	25.420
75	10.405	33.829	25.969
100	9.825	33.821	26.061
125	7.917	33.709	26.272
150	6.393	33.637	26.426

STATION US14474
LATITUDE 44-14.1 N
LONGITUI 145-11.7 E
DEPTH (m) 117

Press.	Temp.	Salinity	Sigma-T
5	18.644	33.608	24.047
10	18.507	33.613	24.085
20	18.481	33.631	24.105
30	16.038	33.442	24.540
40	13.184	33.666	25.323
50	12.935	33.719	25.414
75	10.373	33.809	25.959

STATION US14475
LATITUDE 44-10.5 N
LONGITUI 145-06.9 E
DEPTH (m) 155

Press.	Temp.	Salinity	Sigma-T
5	19.107	33.635	23.951
10	18.953	33.632	23.988
20	18.584	33.633	24.081
30	16.153	33.625	24.656
40	13.552	33.707	25.280
50	13.106	33.806	25.447
75	11.108	33.750	25.783
100	9.779	33.824	26.071
125	8.789	33.810	26.220

STATION US14476
LATITUDE 44-07.4 N
LONGITUI 145-01.8 E
DEPTH (m) 93

Press.	Temp.	Salinity	Sigma-T
5	19.311	33.641	23.904
10	19.154	33.639	23.943
20	18.536	33.644	24.101
30	18.296	33.655	24.169
40	14.947	33.499	24.826
50	13.816	33.696	25.217
75	11.835	33.840	25.720

STATION US14477
LATITUDE 44-03.4 N
LONGITUI 144-56.1 E
DEPTH (m) 55

Press.	Temp.	Salinity	Sigma-T
5	19.305	33.642	23.906
10	19.296	33.642	23.908
20	18.978	33.652	23.997
30	18.809	33.674	24.057
40	18.533	33.649	24.106

STATION US14478
LATITUDE 44-05.3 N
LONGITUI 144-52.7 E
DEPTH (m) 186

Press.	Temp.	Salinity	Sigma-T
5	19.080	33.640	23.962
10	19.081	33.640	23.961
20	18.824	33.643	24.029
30	18.152	33.684	24.227
40	17.847	33.718	24.328
50	17.155	33.616	24.416
75	14.338	33.764	25.161
100	11.564	33.809	25.745
125	9.871	33.760	26.005
150	9.328	33.855	26.169

STATION US14479
LATITUDE 44-09.1 N
LONGITUI 144-58.2 E
DEPTH (m) 317

Press.	Temp.	Salinity	Sigma-T
5	18.516	33.558	24.041
10	17.652	33.449	24.169
20	17.186	33.429	24.265
30	16.467	33.501	24.488
40	13.739	33.728	25.258
50	12.328	33.795	25.591
75	11.161	33.879	25.874
100	10.465	33.900	26.013
125	5.927	33.181	26.124
150	5.166	33.483	26.453
175	4.984	33.515	26.500
200	2.990	33.340	26.561
250	1.250	33.397	26.740

STATION US14480
LATITUDE 44-11.8 N
LONGITUI 145-03.3 E
DEPTH (m) 470

Press.	Temp.	Salinity	Sigma-T
5	16.548	33.435	24.419
10	16.283	33.452	24.493
20	15.042	33.615	24.895
30	13.749	33.752	25.275
40	13.366	33.773	25.369
50	12.389	33.819	25.598
75	10.658	33.815	25.914
100	2.771	33.081	26.373
125	5.582	33.487	26.408
150	2.336	33.170	26.479
175	2.746	33.425	26.649
200	1.970	33.299	26.611
250	2.235	33.442	26.705
300	2.899	33.565	26.749

STATION US14481
LATITUDE 44-15.1 N
LONGITUI 145-08.5 E
DEPTH (m) 475

Press.	Temp.	Salinity	Sigma-T
5	18.745	33.660	24.062
10	18.430	33.633	24.119
20	16.967	33.551	24.410
30	13.565	33.566	25.168
40	12.991	33.767	25.439
50	12.284	33.822	25.620
75	8.554	33.821	26.264
100	7.992	33.783	26.319
125	7.102	33.714	26.392
150	6.389	33.651	26.437
175	4.846	33.555	26.547
200	2.421	33.379	26.640
250	3.150	33.569	26.729
300	2.565	33.567	26.779

STATION US14482
LATITUDE 44-19.2 N
LONGITUI 145-13.0 E
DEPTH (m) 725

Press.	Temp.	Salinity	Sigma-T
5	19.149	33.648	23.951
10	19.148	33.650	23.952
20	18.400	33.666	24.152
30	17.839	33.726	24.336
40	14.053	33.560	25.063
50	5.977	32.583	25.645
75	7.947	33.708	26.267
100	7.974	33.778	26.318
125	6.100	33.518	26.369
150	5.029	33.538	26.513
175	3.854	33.434	26.555
200	3.658	33.497	26.624
250	2.881	33.567	26.752
300	3.210	33.599	26.748
400	0.980	33.464	26.812

Table 2 (Continued)

STATION US14483
LATITUDE 44-18.7 N
LONGITUI 145-28.4 E
DEPTH (m) 1540

Press.	Temp.	Salinity	Sigma-T
5	18.118	33.488	24.086
10	18.116	33.488	24.086
20	18.088	33.528	24.124
30	17.917	33.599	24.219
40	16.658	33.652	24.560
50	16.111	33.640	24.676
75	12.298	33.654	25.487
100	10.619	33.620	25.768
125	5.205	33.167	26.199
150	0.868	33.003	26.448
175	0.353	33.100	26.555
200	0.185	33.160	26.611
250	1.099	33.261	26.641
300	0.057	33.305	26.735
400	1.226	33.475	26.805
500	1.466	33.655	26.933
600	1.944	33.887	27.084
700	2.208	34.063	27.205
800	2.271	34.154	27.272
900	2.301	34.239	27.338

STATION US14484
LATITUDE 44-13.7 N
LONGITUI 145-26.4 E
DEPTH (m) 1578

Press.	Temp.	Salinity	Sigma-T
5	18.178	33.430	24.026
10	18.175	33.432	24.028
20	17.871	33.630	24.255
30	16.605	33.605	24.536
40	16.254	33.660	24.659
50	15.265	33.643	24.868
75	12.688	33.695	25.443
100	9.368	33.604	25.966
125	3.083	33.008	26.287
150	0.472	33.019	26.483
175	0.119	33.098	26.565
200	-0.041	33.154	26.618
250	-0.142	33.251	26.701
300	1.136	33.358	26.717
400	1.234	33.505	26.828

STATION US14485
LATITUDE 44-08.8 N
LONGITUI 145-24.1 E
DEPTH (m) 1479

Press.	Temp.	Salinity	Sigma-T
5	18.314	33.531	24.070
10	18.307	33.530	24.071
20	18.268	33.527	24.079
30	16.359	33.564	24.561
40	15.570	33.608	24.773
50	14.637	33.648	25.008
75	11.500	33.672	25.651
100	7.691	33.591	26.212
125	6.576	33.567	26.346
150	4.930	33.486	26.483
175	3.981	33.442	26.549
200	3.083	33.443	26.635
250	2.167	33.410	26.685
300	1.427	33.360	26.699
400	1.112	33.487	26.822

STATION US14486
LATITUDE 44-05.0 N
LONGITUI 145-20.1 E
DEPTH (m) 750

Press.	Temp.	Salinity	Sigma-T
5	18.422	33.570	24.073
10	18.418	33.569	24.073
20	18.018	33.594	24.191
30	16.748	33.565	24.472
40	15.967	33.593	24.673
50	15.031	33.608	24.893
75	11.750	33.695	25.623
100	8.420	33.618	26.126
125	6.249	33.509	26.343
150	4.540	33.457	26.503
175	3.501	33.436	26.591
200	3.026	33.439	26.637
250	1.738	33.412	26.719
300	1.431	33.404	26.734
400	1.172	33.480	26.812

STATION US14487
LATITUDE 43-17.0 N
LONGITUI 145-45.3 E
DEPTH (m) 33

Press.	Temp.	Salinity	Sigma-T
5	16.528	33.048	24.126
10	16.430	33.063	24.161
20	16.073	33.099	24.269
30	15.773	33.135	24.364

STATION US14488
LATITUDE 43-07.1 N
LONGITUI 145-30.3 E
DEPTH (m) 38

Press.	Temp.	Salinity	Sigma-T
5	16.333	33.063	24.182
10	16.120	33.119	24.274
20	15.717	33.194	24.422
30	15.114	33.204	24.563

STATION US14489
LATITUDE 42-56.0 N
LONGITUI 145-16.1 E
DEPTH (m) 89

Press.	Temp.	Salinity	Sigma-T
5	15.762	33.246	24.452
10	15.607	33.261	24.498
20	14.722	33.231	24.669
30	14.277	33.270	24.793
40	13.717	33.302	24.933
50	12.721	33.290	25.123
75	7.942	33.167	25.843

STATION US14490
LATITUDE 42-54.0 N
LONGITUI 144-54.0 E
DEPTH (m) 63

Press.	Temp.	Salinity	Sigma-T
5	16.295	33.087	24.209
10	15.374	32.992	24.343
20	15.054	33.020	24.435
30	15.291	33.243	24.554
40	14.343	33.252	24.765
50	12.359	33.248	25.160

STATION US14491
LATITUDE 42-48.4 N
LONGITUI 144-39.8 E
DEPTH (m) 105

Press.	Temp.	Salinity	Sigma-T
5	16.189	33.166	24.295
10	15.944	33.134	24.325
20	15.487	33.202	24.479
30	15.354	33.254	24.549
40	14.738	33.278	24.701
50	13.783	33.300	24.918
75	9.667	33.219	25.616

STATION US14492
LATITUDE 42-53.4 N
LONGITUI 144-14.9 E
DEPTH (m) 62

Press.	Temp.	Salinity	Sigma-T
5	16.713	33.075	24.104
10	16.399	33.234	24.299
20	16.084	33.304	24.425
30	15.796	33.298	24.485
40	15.327	33.333	24.616
50	14.169	33.311	24.847

STATION US14493
LATITUDE 42-48.1 N
LONGITUI 144-18.1 E
DEPTH (m) 612

Press.	Temp.	Salinity	Sigma-T
5	15.741	32.818	24.128
10	16.426	33.194	24.262
20	15.859	33.283	24.459
30	15.603	33.303	24.532
40	14.582	33.313	24.761
50	13.558	33.294	24.960
75	8.948	33.124	25.657
100	6.359	33.338	26.194
125	5.063	33.370	26.376
150	4.091	33.345	26.460
175	3.043	33.306	26.529
200	1.866	33.276	26.600
250	2.259	33.383	26.656
300	2.629	33.565	26.772
400	2.728	33.699	26.870

STATION US14494
LATITUDE 42-42.0 N
LONGITUI 144-21.6 E
DEPTH (m) 658

Press.	Temp.	Salinity	Sigma-T
5	16.325	33.141	24.244
10	16.328	33.141	24.244
20	15.642	33.230	24.467
30	15.297	33.298	24.595
40	14.206	33.323	24.848
50	12.211	33.259	25.197
75	5.351	32.865	25.943
100	4.797	33.247	26.308
125	3.523	33.220	26.417
150	3.358	33.271	26.473
175	3.623	33.380	26.535
200	3.435	33.405	26.572
250	2.469	33.468	26.708
300	2.894	33.578	26.760
400	3.511	33.854	26.923

Table 2 (Continued)

STATION US14495
LATITUDE 42-16.2 N
LONGITUI 143-34.1 E
DEPTH (m) 101

Press.	Temp.	Salinity	Sigma-T
5	16.650	32.911	23.993
10	16.470	33.081	24.165
20	14.337	33.180	24.711
30	11.238	33.185	25.320
40	10.478	33.221	25.482
50	8.736	33.159	25.718
75	6.233	33.327	26.201

STATION US14496
LATITUDE 41-15.9 N
LONGITUI 139-49.9 E
DEPTH (m) 860

Press.	Temp.	Salinity	Sigma-T
5	22.541	33.671	23.056
10	22.523	33.669	23.060
20	22.513	33.669	23.063
30	22.489	33.665	23.067
40	21.067	33.837	23.591
50	17.807	34.169	24.683
75	12.123	34.253	25.985
100	9.104	34.151	26.436
125	7.083	34.068	26.673

STATION US14497
LATITUDE 41-22.2 N
LONGITUI 139-54.8 E
DEPTH (m) 123

Press.	Temp.	Salinity	Sigma-T
5	21.854	33.651	23.234
10	21.793	33.645	23.246
20	21.732	33.647	23.265
30	21.244	33.812	23.524
40	16.297	34.236	25.092
50	14.244	34.341	25.626
75	9.337	34.149	26.397
100	5.093	33.982	26.857

STATION US14498
LATITUDE 41-21.1 N
LONGITUI 139-43.1 E
DEPTH (m) 763

Press.	Temp.	Salinity	Sigma-T
5	21.363	33.640	23.360
10	21.233	33.653	23.406
20	20.971	33.738	23.541
30	20.697	33.789	23.654
40	18.605	33.836	24.231
50	10.474	33.905	26.016
75	6.050	34.007	26.762
100	4.690	34.020	26.933
125	3.418	34.017	27.062

STATION US14499
LATITUDE 41-15.4 N
LONGITUI 139-46.0 E
DEPTH (m) 1302

Press.	Temp.	Salinity	Sigma-T
5	21.599	33.662	23.312
10	21.526	33.655	23.327
20	21.407	33.647	23.353
30	21.397	33.658	23.365
40	20.533	33.932	23.806
50	16.261	34.244	25.106
75	13.058	34.259	25.808
100	7.169	33.975	26.588
125	4.838	34.013	26.911

STATION US14500
LATITUDE 41-35.0 N
LONGITUI 140-53.1 E
DEPTH (m) 38

Press.	Temp.	Salinity	Sigma-T
5	21.817	33.859	23.402
10	21.772	33.865	23.419
20	21.683	33.875	23.451
30	21.581	33.884	23.487

STATION US14501
LATITUDE 41-37.0 N
LONGITUI 140-51.2 E
DEPTH (m) 91

Press.	Temp.	Salinity	Sigma-T
5	21.593	33.842	23.451
10	21.342	33.860	23.533
20	21.142	33.878	23.602
30	19.694	34.043	24.112
40	18.683	34.204	24.493
50	17.659	34.317	24.832
75	15.274	34.360	25.418

STATION US14502
LATITUDE 41-38.8 N
LONGITUI 140-49.2 E
DEPTH (m) 348

Press.	Temp.	Salinity	Sigma-T
5	20.947	33.834	23.620
10	20.886	33.841	23.643
20	20.772	33.860	23.688
30	20.477	33.883	23.784
40	20.060	33.926	23.927
50	17.935	34.075	24.580
75	15.044	34.365	25.473
100	12.671	34.287	25.906
125	11.784	34.254	26.050
150	10.935	34.239	26.194
175	10.386	34.228	26.283
200	10.185	34.217	26.309
250	9.923	34.202	26.342
300	9.705	34.194	26.372

STATION US14503
LATITUDE 41-40.8 N
LONGITUI 140-47.2 E
DEPTH (m) 219

Press.	Temp.	Salinity	Sigma-T
5	22.349	33.796	23.206
10	22.131	33.837	23.298
20	21.134	33.920	23.636
30	20.839	34.059	23.821
40	19.410	34.141	24.260
50	15.462	34.234	25.279
75	13.780	34.278	25.675
100	12.284	34.286	25.980
125	11.751	34.262	26.063
150	11.153	34.241	26.157
175	10.449	34.240	26.281
200	10.037	34.215	26.332

STATION US14504
LATITUDE 41-42.9 N
LONGITUI 140-44.9 E
DEPTH (m) 83

Press.	Temp.	Salinity	Sigma-T
5	22.402	33.808	23.200
10	22.403	33.807	23.198
20	20.992	33.796	23.580
30	19.538	33.915	24.054
40	17.138	34.048	24.751
50	15.911	34.163	25.124
75	11.900	34.217	26.000

8

THE " USHIO MARU "

CRUISE 321
CRUISE 322
CRUISE 323

IN OCTOBER 2014
IN NOVEMBER 2014
IN DECEMBER 2014

1. Cruise Itinerary

Cruise 321		
Departure from Hakodate	Oct.	6, 2014
Arrival at and departure from Hakodate		6
Start hydrographic research (US14505)		7
Sampling by squid jigging		7
Arrival at Hakodate		8
Departure from Hakodate		9
Sampling by trawl net		9
Arrival at Usujiri		9
Departure from Usujiri		11
Retrieval ADCP mooring system		12
Setting ADCP mooring system		12
Finish hydrographic research (US14532)		12
Arrival at and departure from Usujiri		12
Return to Hakodate		13
Total coverage 405.6 miles		
Cruise 322		
Departure from Hakodate	Nov.	25, 2014
Sampling by trawl net		25
Start hydrographic research (US14533)		25
Arrival at Muroran		26
Departure from MUroran		27
Sampling by trawl net		27
Sampling by trawl net		28
Arrival at Hakodate		29
Departure from Hakodate		30
Finish hydrographic research (US14545)		30
Return to Hakodate		30
Total coverage 386.7 miles		
Cruise 323		
Departure from Hakodate	Dec.	13, 2014
Start hydrographic research (US14546)		13
Arrival at Usujiri		13
Departure from and arrival at Usujiri		14
Departure from Usujiri		15
Arrival at Hakodate		16
Departure from Hakodate		19
Finish hydrographic research (US14566)		19
Return to Hakodate		19
Total coverage 265.4 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 and salinity were measured by CTD (Seabird SBE-9Plus and SBE-19).

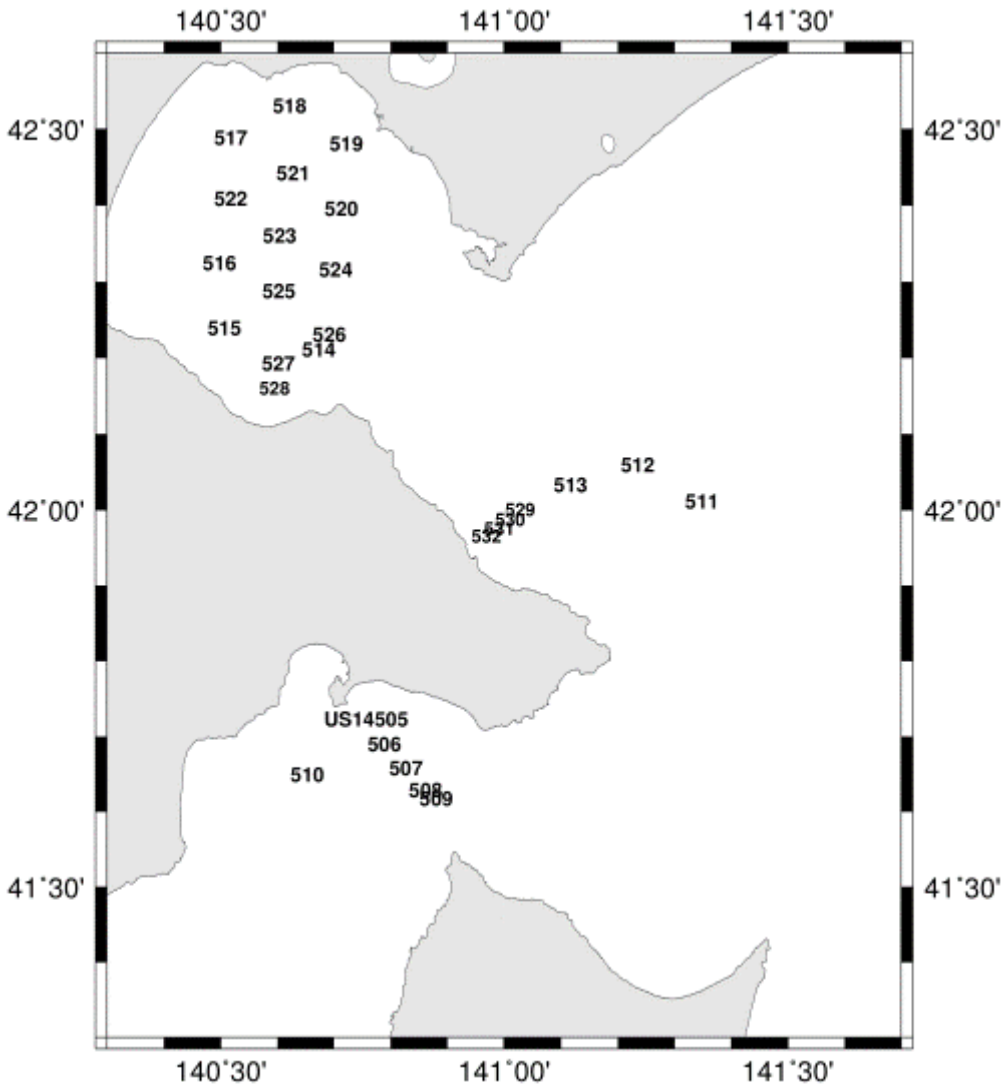

Figure 1. Oceanographic stations (Cruise 321)

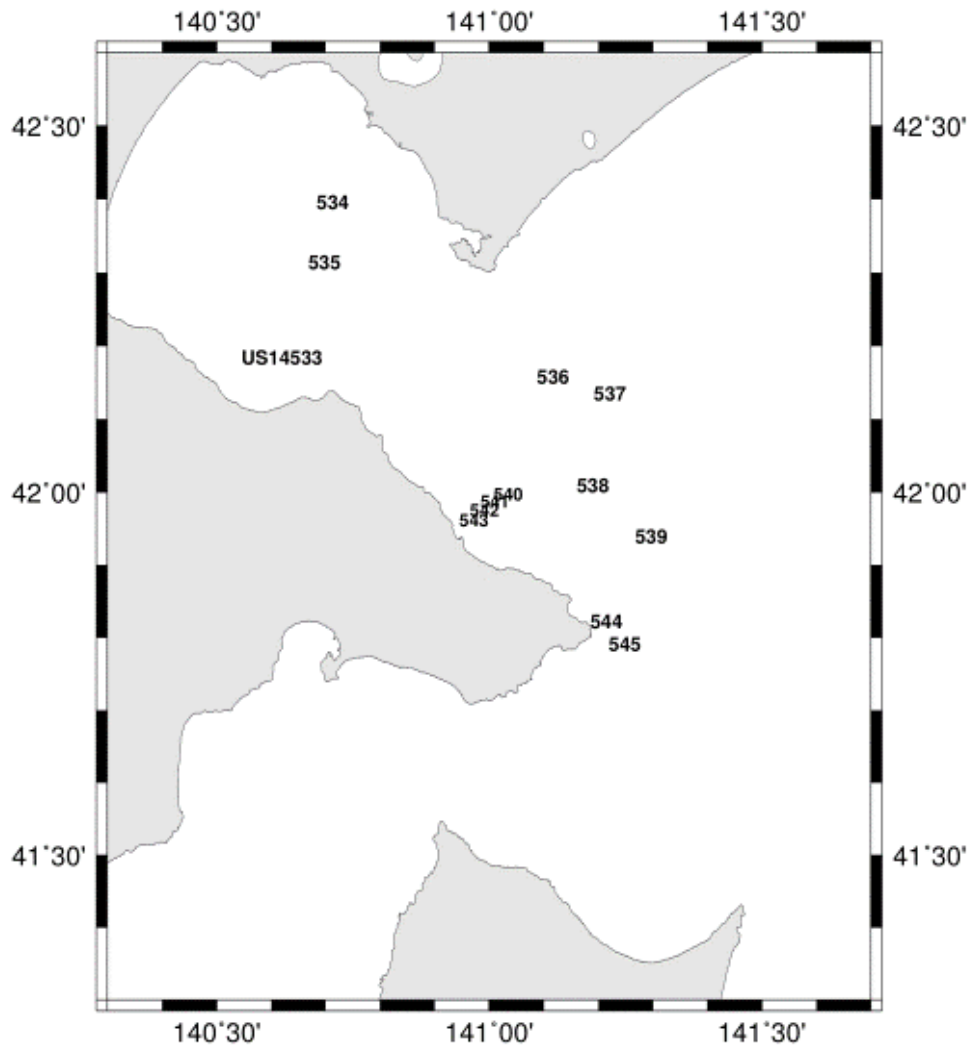

Figure 2. Oceanographic stations (Cruise 322)

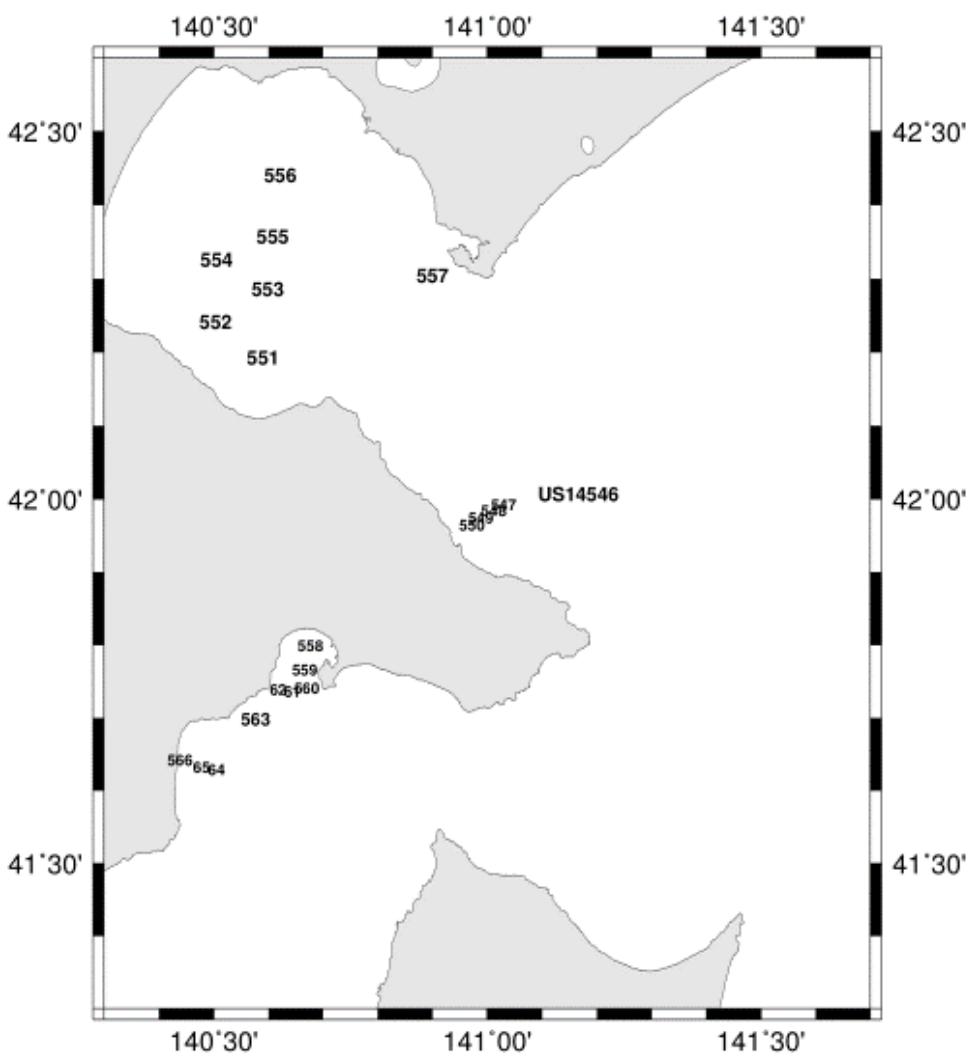

Figure 3. Oceanographic stations (Cruise 323)

Table 1. List of Oceanographic Station

Cruise 321

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14505	41-42.8	140-45.4	10/7	1202-1211	83	NW-2	East-2	NW-2	16.7	20.4	bc
US14506	41-40.8	140-47.3	10/7	1228-1246	219	Calm	ESE-2	Calm	17.3	20.5	bc
US14507	41-38.9	140-49.6	10/7	1304-1317	302	Calm	ESE-2	Calm	16.5	20.4	bc
US14508	41-37.2	140-51.7	10/7	1330-1338	150	Calm	ESE-2	Calm	17.2	19.7	bc
US14509	41-36.5	140-52.8	10/7	1347-1351	63	SSW-2	East-2	SSW-2	17.0	20.3	bc
US14510	41-38.4	140-39.2	10/7	1838-1844	117	NW-2	East-1	NW-4	15.5	17.8	bc
US14511	42-00.1	141-20.9	10/9	1228-1241	323	Calm	ESE-1	Calm	17.3	17.7	bc
US14512	42-03.0	141-14.1	10/9	1418-1427	203	SSE-2	ESE-1	SSE-3	18.3	17.6	bc
US14513	42-01.4	141-07.0	10/9	1550-1555	119	ESE-2	ESE-1	SSE-3	18.1	17.1	bc
US14514	42-12.1	140-40.4	10/11	0810-0814	89	WNW-4	WNW-1	WNW-6	13.1	16.6	bc
US14515	42-13.8	140-30.4	10/11	0910-0914	77	NW-4	NW-1	NW-6	13.0	16.5	bc
US14516	42-18.9	140-29.9	10/11	0950-0954	90	NNW-4	NW-1	NNW-6	13.6	16.6	bc
US14517	42-28.8	140-31.1	10/11	1101-1104	74	NW-3	NW-1	NW-5	14.3	16.3	bc
US14518	42-31.3	140-37.3	10/11	1143-1148	59	NNW-4	NNW-1	NNW-6	15.7	16.8	bc
US14519	42-28.3	140-43.3	10/11	1225-1229	58	North-3	North-1	North-5	15.9	16.8	bc
US14520	42-23.2	140-42.8	10/12	0235-0238	58	NNE-2	NW-1	NNE-3	11.8	16.4	bc
US14521	42-26.0	140-37.7	10/12	0312-0320	80	NNE-2	NW-1	NNE-2	11.9	16.5	bc
US14522	42-24.0	140-31.1	10/12	0409-0413	94	WNW-2	NW-1	WNW-2	11.9	16.3	b
US14523	42-21.1	140-36.3	10/12	0446-0455	87	SW-2	NW-1	SW-2	12.1	16.4	b
US14524	42-18.4	140-42.2	10/12	0535-0537	63	SW-2	NW-1	SW-2	12.1	16.2	b
US14525	42-16.7	140-36.2	10/12	0626-0635	90	South-1	NW-1	South-2	12.4	16.5	bc
US14526	42-13.3	140-41.5	10/12	0714-0717	88	NE-1	ENE-1	Calm	12.6	16.7	b
US14527	42-11.0	140-36.1	10/12	0826-0832	79	SE-1	SSW-1	SE-2	13.0	16.4	b
US14528	42-09.1	140-35.7	10/12	0850-0855	66	East-1	SSE-1	East-2	15.1	16.5	b
US14529	41-59.5	141-01.7	10/12	1217-1221	97	NE-2	ESE-1	NE-2	16.3	17.8	bc
US14530	41-58.7	141-00.6	10/12	1230-1234	92	NE-2	East-1	NE-2	18.5	16.4	bc
US14531	41-58.0	140-59.5	10/12	1242-1246	85	NE-2	ESE-1	ENE-2	18.2	16.5	bc
US14532	41-57.4	140-58.1	10/12	1255-1258	75	East-2	East-1	East-2	18.0	16.4	bc

Table 1 (Continued)

Cruise 322

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14533	42-10.5	140-37.2	11/25	1548-1552	79	NNW-3	NNW-1	NW-2	5.8	10.0	b
US14534	42-23.2	140-42.8	11/27	1106-1110	59	NW-3	SE-1	NW-3	7.8	10.6	o
US14535	42-18.3	140-41.9	11/27	1210-1214	66	NE-1	SE-2	NE-2	8.2	10.6	c
US14536	42-08.9	141-07.0	11/28	0739-0745	103	West-1	ESE-2	West-3	8.6	10.4	bc
US14537	42-07.5	141-13.3	11/28	0932-0939	172	West-3	ESE-2	West-4	9.5	11.4	bc
US14538	42-00.0	141-11.4	11/28	0952-0958	170	NW-1	East-3	NW-2	10.8	11.8	b
US14539	41-55.8	141-17.8	11/28	1240-1253	292	NW-1	East-3	NW-2	11.2	11.9	b
US14540	41-59.3	141-02.1	11/28	1407-1411	101	NW-1	East-2	NW-2	10.6	12.1	bc
US14541	41-58.7	141-00.6	11/28	1422-1427	92	NW-1	East-2	NW-2	10.6	11.9	bc
US14542	41-58.0	140-59.5	11/28	1435-1440	85	NW-1	East-2	NW-2	10.4	11.6	bc
US14543	41-57.2	140-58.3	11/28	1452-1456	77	Calm	East-2	Calm	10.1	10.3	bc
US14544-1	41-48.8	141-12.9	11/30	1035-1049	133	NNW-2	ESE-2	NNW-4	9.1	11.5	o
US14544-2	41-48.8	141-12.9	11/30	1059-1110	125	NNW-2	ESE-2	NNW-4	9.1	11.5	o
US14545	41-46.9	141-14.9	11/30	1135-1150	206	North-2	ESE-2	North-3	9.8	11.9	o

Cruise 323

Station	Lat. (N)*	Long. (E)*	Date	S.M.T.	Depth(m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.
US14546	41-59.8	141-10.0	12/13	1238-1234	136	NW-3	NW-2	NW-5	-1.2	9.7	c
US14547	41-59.1	141-01.8	12/13	1425-1430	99	WNW-3	NW-2	WNW-3	-2.6	10.2	c
US14548	41-58.6	141-00.7	12/13	1451-1455	93	West-2	NW-1	West-3	-2.7	10.2	c
US14549	41-58.0	140-59.3	12/13	1504-1509	84	West-2	NW-1	West-4	-2.4	10.4	s
US14550	41-57.4	140-58.3	12/13	1516-0520	78	WNW-2	NW-1	WNW-4	-2.9	10.3	s
US14551	42-11.0	140-35.4	12/15	1213-1220	79	NW-3	WNW-2	NW-5	0.8	7.8	bc
US14552	42-13.9	140-30.2	12/15	1255-1259	77	WNW-3	WNW-1	WNW-5	1.3	7.7	bc
US14553	42-16.6	140-35.9	12/15	1343-1352	90	WNW-3	WNW-1	WNW-4	3.0	8.0	bc
US14554	42-19.0	140-30.3	12/15	1443-1447	92	NW-3	WNW-1	NNW-5	1.3	7.3	bc
US14555	42-20.9	140-36.5	12/15	1530-1541	86	NW-3	NW-1	NW-4	2.2	7.7	bc
US14556	42-25.9	140-37.3	12/15	1627-1635	82	NW-3	NW-1	NW-5	0.7	7.7	c
US14557	42-17.7	140-54.0	12/15	1820-1824	55	NW-2	NW-1	NW-4	0.6	7.4	bc
US14558	41-47.5	140-40.6	12/19	0720-0722	17	West-1	SSE-1	West-3	1.6	9.1	c
US14559	41-45.5	140-40.0	12/19	0747-0750	40	West-1	SSW-1	West-3	2.2	11.6	c
US14560	41-44.0	140-40.2	12/19	0810-0814	60	West-1	SSW-1	West-3	2.2	11.8	c
US14561	41-43.7	140-38.6	12/19	0845-0848	57	West-3	SW-1	West-3	2.8	11.9	o
US14562	41-43.9	140-37.1	12/19	0903-0906	42	WSW-3	SW-1	WSW-4	2.5	11.9	o
US14563	41-41.4	140-34.6	12/19	0947-0950	42	WSW-4	SSW-1	West-5	2.7	12.1	o
US14564	41-37.3	140-30.3	12/19	1041-1043	32	West-4	SSW-1	West-4	2.4	12.0	c
US14565	41-37.5	140-28.7	12/19	1115-1118	23	West-4	SSW-1	West-4	2.4	12.0	c
US14566	41-38.1	140-26.3	12/19	1132-1134	12	WNW-1	SSE-1	WNW-3	2.5	11.4	bc

(*): Fixed position by Global Positioning System

S.M.T.: Ship’s mean time

Wr.: Weather in WMO Code 4501

Table 2. Oceanographic data

STATION US14505
LATITUDE 41-42.8 N
LONGITUI 140-45.4 E
DEPTH (m) 83

Press.	Temp.	Salinity	Sigma-T
5	20.523	33.774	23.689
10	20.506	33.751	23.676
20	19.636	33.784	23.929
30	19.404	33.819	24.016
40	18.885	33.864	24.182
50	18.484	33.920	24.326
75	14.481	34.135	25.416

STATION US14506
LATITUDE 41-40.8 N
LONGITUI 140-47.3 E
DEPTH (m) 219

Press.	Temp.	Salinity	Sigma-T
5	20.484	33.794	23.715
10	20.405	33.810	23.748
20	20.276	33.830	23.797
30	20.026	33.865	23.890
40	19.710	33.920	24.013
50	18.592	33.947	24.320
75	14.826	34.219	25.408
100	13.306	34.170	25.688
125	10.840	34.139	26.134
150	10.246	34.188	26.276
175	10.126	34.196	26.303
200	9.991	34.193	26.323

STATION US14507
LATITUDE 41-38.9 N
LONGITUI 140-49.6 E
DEPTH (m) 302

Press.	Temp.	Salinity	Sigma-T
5	19.915	33.904	23.948
10	19.854	33.912	23.970
20	19.829	33.916	23.980
30	19.732	33.930	24.015
40	19.370	33.976	24.144
50	17.730	34.187	24.715
75	15.892	34.345	25.268
100	14.366	34.335	25.596
125	12.702	34.283	25.897
150	12.474	34.290	25.946
175	10.947	34.285	26.228
200	10.387	34.292	26.332
250	10.094	34.208	26.317

STATION US14508
LATITUDE 41-37.2 N
LONGITUI 140-51.7 E
DEPTH (m) 150

Press.	Temp.	Salinity	Sigma-T
5	20.315	33.831	23.788
10	20.240	33.838	23.813
20	20.141	33.879	23.870
30	20.141	33.885	23.874
40	20.079	33.887	23.892
50	19.003	33.974	24.236
75	13.305	34.302	25.791
100	12.853	34.319	25.895
125	11.613	34.264	26.091

STATION US14509
LATITUDE 41-36.5 N
LONGITUI 140-52.8 E
DEPTH (m) 63

Press.	Temp.	Salinity	Sigma-T
5	20.336	33.812	23.768
10	20.292	33.817	23.782
20	20.097	33.861	23.868
30	19.628	33.962	24.067
40	18.110	34.115	24.567
50	17.728	34.153	24.690

STATION US14510
LATITUDE 41-38.4 N
LONGITUI 140-39.2 E
DEPTH (m) 117

Press.	Temp.	Salinity	Sigma-T
5	18.458	33.729	24.186
10	18.174	33.738	24.263
20	17.563	33.788	24.450
30	15.352	33.959	25.092
40	14.743	34.125	25.353
50	14.226	34.187	25.511
75	11.942	34.199	25.978
100	11.021	34.226	26.169

STATION US14511
LATITUDE 42-00.1 N
LONGITUI 141-20.9 E
DEPTH (m) 323

Press.	Temp.	Salinity	Sigma-T
5	17.388	33.766	24.475
10	17.374	33.817	24.517
20	17.365	33.832	24.531
30	16.854	33.946	24.739
40	15.270	34.082	25.205
50	14.345	34.149	25.457
75	12.753	34.119	25.759
100	11.487	34.033	25.934
125	8.968	33.830	26.207
150	6.327	33.615	26.417
175	4.582	33.487	26.522
200	3.444	33.508	26.653
250	2.827	33.537	26.732
300	2.849	33.616	26.794

STATION US14512
LATITUDE 42-03.0 N
LONGITUI 141-14.1 E
DEPTH (m) 203

Press.	Temp.	Salinity	Sigma-T
5	17.387	33.787	24.491
10	17.315	33.782	24.505
20	16.691	33.886	24.732
30	14.781	34.174	25.383
40	14.175	34.231	25.556
50	13.721	34.224	25.646
75	12.180	34.104	25.859
100	10.810	34.046	26.067
125	9.387	33.921	26.211
150	7.537	33.714	26.331
175	5.181	33.467	26.439

STATION US14513
LATITUDE 42-01.4 N
LONGITUI 141-07.0 E
DEPTH (m) 119

Press.	Temp.	Salinity	Sigma-T
5	16.945	32.791	23.832
10	16.949	33.184	24.133
20	17.298	33.801	24.524
30	16.759	33.907	24.732
40	14.177	34.148	25.492
50	13.473	34.172	25.656
75	11.846	34.116	25.932
100	10.976	34.058	26.047

STATION US14514
LATITUDE 42-12.1 N
LONGITUI 140-40.4 E
DEPTH (m) 89

Press.	Temp.	Salinity	Sigma-T
5	16.784	32.934	23.979
10	16.786	32.935	23.980
20	16.787	32.935	23.980
30	16.691	32.963	24.024
40	11.729	33.204	25.245
50	10.734	33.699	25.810
75	8.083	33.531	26.108

STATION US14515
LATITUDE 42-13.8 N
LONGITUI 140-30.4 E
DEPTH (m) 77

Press.	Temp.	Salinity	Sigma-T
5	16.658	32.640	23.783
10	16.664	32.641	23.782
20	16.100	32.978	24.170
30	15.331	33.675	24.878
40	14.723	33.913	25.194
50	13.201	33.900	25.501

STATION US14516
LATITUDE 42-18.9 N
LONGITUI 140-29.9 E
DEPTH (m) 90

Press.	Temp.	Salinity	Sigma-T
5	16.686	32.741	23.854
10	16.690	32.739	23.852
20	16.765	33.078	24.095
30	14.710	33.958	25.231
40	12.833	33.958	25.618
50	11.603	33.818	25.745
75	9.113	33.660	26.051

STATION US14517
LATITUDE 42-28.8 N
LONGITUI 140-31.1 E
DEPTH (m) 74

Press.	Temp.	Salinity	Sigma-T
5	16.657	32.794	23.902
10	16.636	32.803	23.914
20	14.416	33.298	24.784
30	12.265	33.731	25.553
40	12.564	34.016	25.716
50	12.115	33.979	25.774

STATION US14518
LATITUDE 42-31.3 N
LONGITUI 140-37.3 E
DEPTH (m) 59

Press.	Temp.	Salinity	Sigma-T
5	16.897	32.668	23.749
10	16.916	32.683	23.756
20	16.295	33.251	24.335
30	10.953	32.927	25.170
40	13.265	34.035	25.592
50	12.672	34.026	25.703

STATION US14519
LATITUDE 42-28.3 N
LONGITUI 140-43.3 E
DEPTH (m) 58

Press.	Temp.	Salinity	Sigma-T
5	16.880	32.801	23.855
10	16.999	33.103	24.059
20	16.938	33.699	24.531
30	13.240	33.476	25.164
40	12.987	34.013	25.631
50	12.792	34.046	25.695

Table 2. (Continued)

STATION US14520
LATITUDE 42-23.2 N
LONGITUI 140-42.8 E
DEPTH (m) 58

Press.	Temp.	Salinity	Sigma-T
5	16.541	33.323	24.335
10	16.554	33.333	24.339
20	16.598	33.486	24.446
30	15.769	33.466	24.620
40	14.368	33.767	25.157
50	13.447	34.012	25.538

STATION US14521
LATITUDE 42-26.0 N
LONGITUI 140-37.7 E
DEPTH (m) 80

Press.	Temp.	Salinity	Sigma-T
5	16.614	33.080	24.131
10	16.626	33.075	24.125
20	16.639	33.090	24.133
30	14.422	33.324	24.804
40	12.103	33.754	25.602
50	12.355	34.018	25.758
75	9.500	33.731	26.044

STATION US14522
LATITUDE 42-24.0 N
LONGITUI 140-31.1 E
DEPTH (m) 94

Press.	Temp.	Salinity	Sigma-T
5	16.408	32.709	23.893
10	16.456	32.731	23.899
20	16.240	33.572	24.595
30	12.461	33.404	25.262
40	11.528	33.788	25.736
50	11.510	33.928	25.848
75	9.973	33.802	26.021

STATION US14523
LATITUDE 42-21.1 N
LONGITUI 140-36.3 E
DEPTH (m) 87

Press.	Temp.	Salinity	Sigma-T
5	16.364	33.241	24.312
10	16.595	33.382	24.367
20	16.556	33.378	24.373
30	14.840	33.303	24.698
40	11.654	33.429	25.433
50	12.450	33.977	25.709
75	7.551	33.473	26.140

STATION US14524
LATITUDE 42-18.4 N
LONGITUI 140-42.2 E
DEPTH (m) 63

Press.	Temp.	Salinity	Sigma-T
5	16.320	33.096	24.211
10	16.351	33.140	24.237
20	16.366	33.228	24.302
30	13.979	33.234	24.827
40	10.240	33.225	25.526
50	9.240	33.407	25.833

STATION US14525
LATITUDE 42-16.7 N
LONGITUI 140-36.2 E
DEPTH (m) 90

Press.	Temp.	Salinity	Sigma-T
5	16.639	32.875	23.968
10	16.634	33.176	24.200
20	16.483	33.258	24.298
30	14.161	33.248	24.800
40	11.765	33.425	25.410
50	8.660	33.269	25.816
75	5.464	33.242	26.228

STATION US14526
LATITUDE 42-13.3 N
LONGITUI 140-41.5 E
DEPTH (m) 88

Press.	Temp.	Salinity	Sigma-T
5	16.683	32.768	23.875
10	16.685	32.767	23.875
20	16.691	32.768	23.873
30	16.153	33.377	24.465
40	11.877	33.205	25.218
50	11.205	33.751	25.766
75	9.121	33.661	26.050

STATION US14527
LATITUDE 42-11.0 N
LONGITUI 140-36.1 E
DEPTH (m) 79

Press.	Temp.	Salinity	Sigma-T
5	16.538	32.691	23.850
10	16.574	32.726	23.868
20	16.575	32.727	23.869
30	15.520	33.601	24.779
40	14.674	33.936	25.222
50	12.684	33.843	25.559
75	8.165	33.486	26.061

STATION US14528
LATITUDE 42-09.1 N
LONGITUI 140-35.7 E
DEPTH (m) 66

Press.	Temp.	Salinity	Sigma-T
5	16.619	32.722	23.855
10	16.617	32.727	23.859
20	16.579	32.771	23.902
30	15.452	33.795	24.943
40	12.454	33.451	25.299
50	12.153	33.729	25.573

STATION US14529
LATITUDE 41-59.5 N
LONGITUI 141-01.7 E
DEPTH (m) 97

Press.	Temp.	Salinity	Sigma-T
5	16.112	33.795	24.795
10	16.123	33.838	24.826
20	16.029	33.819	24.833
30	16.058	33.839	24.841
40	15.329	33.865	25.024
50	14.031	34.024	25.426
75	10.566	33.907	26.001

STATION US14530
LATITUDE 41-58.7 N
LONGITUI 141-00.6 E
DEPTH (m) 92

Press.	Temp.	Salinity	Sigma-T
5	16.427	33.273	24.323
10	16.205	33.672	24.679
20	16.135	33.756	24.760
30	15.916	33.760	24.813
40	15.035	33.914	25.127
50	12.951	33.818	25.487
75	10.240	33.817	25.987

STATION US14531
LATITUDE 41-58.0 N
LONGITUI 140-59.5 E
DEPTH (m) 85

Press.	Temp.	Salinity	Sigma-T
5	16.546	33.159	24.207
10	16.534	33.216	24.254
20	16.321	33.683	24.662
30	16.385	33.776	24.718
40	15.989	33.848	24.864
50	11.656	33.583	25.553
75	9.988	33.770	25.994

STATION US14532
LATITUDE 41-57.4 N
LONGITUI 140-58.1 E
DEPTH (m) 75

Press.	Temp.	Salinity	Sigma-T
5	16.363	32.864	24.023
10	16.348	32.899	24.053
20	16.497	33.452	24.444
30	16.426	33.645	24.608
40	16.421	33.682	24.637
50	13.555	33.543	25.153

STATION US14533
LATITUDE 42-10.5 N
LONGITUI 140-37.2 E
DEPTH (m) 79

Press.	Temp.	Salinity	Sigma-T
5	10.225	33.824	25.996
10	10.234	33.824	25.994
20	10.206	33.821	25.996
30	9.605	33.782	26.066
40	9.260	33.795	26.133
50	8.134	33.757	26.278
75	5.288	33.516	26.465

STATION US14534
LATITUDE 42-23.2 N
LONGITUI 140-42.8 E
DEPTH (m) 59

Press.	Temp.	Salinity	Sigma-T
5	10.858	33.860	25.913
10	10.856	33.860	25.914
20	10.851	33.862	25.916
30	10.848	33.863	25.917
40	10.840	33.863	25.919
50	10.812	33.860	25.921

Table 2. (Continued)

STATION US14535
LATITUDE 42-18.3 N
LONGITUI 140-41.9 E
DEPTH (m) 66

Press.	Temp.	Salinity	Sigma-T
5	10.851	33.853	25.909
10	10.837	33.853	25.911
20	10.802	33.856	25.920
30	10.758	33.858	25.929
40	10.049	33.787	25.996
50	9.648	33.771	26.051

STATION US14536
LATITUDE 42-08.9 N
LONGITUI 141-07.0 E
DEPTH (m) 103

Press.	Temp.	Salinity	Sigma-T
5	11.108	33.981	25.962
10	11.110	33.981	25.962
20	11.105	33.981	25.963
30	11.031	33.970	25.968
40	10.951	33.962	25.976
50	10.812	33.954	25.994
75	10.528	33.922	26.019

STATION US14537
LATITUDE 42-07.5 N
LONGITUI 141-13.3 E
DEPTH (m) 172

Press.	Temp.	Salinity	Sigma-T
5	11.518	33.983	25.889
10	11.508	33.982	25.891
20	11.364	33.977	25.913
30	11.163	33.967	25.941
40	11.001	33.960	25.965
50	10.956	33.960	25.973
75	10.681	33.934	26.002
100	10.304	33.883	26.028
125	10.089	33.922	26.095
150	9.643	33.886	26.142

STATION US14538
LATITUDE 42-00.0 N
LONGITUI 141-11.4 E
DEPTH (m) 170

Press.	Temp.	Salinity	Sigma-T
5	12.043	34.004	25.807
10	12.033	34.004	25.809
20	11.962	33.995	25.816
30	11.853	33.988	25.831
40	11.839	33.991	25.836
50	11.826	33.994	25.841
75	11.568	33.974	25.873
100	11.261	33.958	25.917
125	10.225	33.890	26.047
150	9.332	33.843	26.159

STATION US14539
LATITUDE 41-55.8 N
LONGITUI 141-17.8 E
DEPTH (m) 292

Press.	Temp.	Salinity	Sigma-T
5	12.298	33.996	25.752
10	12.221	33.989	25.762
20	12.105	33.981	25.778
30	12.016	33.968	25.785
40	11.861	33.957	25.805
50	11.297	33.869	25.841
75	10.338	33.740	25.910
100	9.577	33.697	26.005
125	8.634	33.775	26.216
150	6.726	33.592	26.347
175	4.886	33.468	26.474
200	4.301	33.443	26.517
250	3.029	33.409	26.613

STATION US14540
LATITUDE 41-59.3 N
LONGITUI 141-02.1 E
DEPTH (m) 101

Press.	Temp.	Salinity	Sigma-T
5	12.433	34.000	25.730
10	12.430	33.998	25.729
20	12.183	33.980	25.762
30	10.836	33.764	25.842
40	11.390	33.964	25.898
50	11.171	33.941	25.920
75	10.516	33.896	26.001

STATION US14541
LATITUDE 41-58.7 N
LONGITUI 141-00.6 E
DEPTH (m) 92

Press.	Temp.	Salinity	Sigma-T
5	12.138	33.986	25.775
10	11.879	33.970	25.812
20	11.540	33.963	25.869
30	11.151	33.942	25.925
40	10.986	33.938	25.951
50	10.792	33.921	25.973
75	10.083	33.885	26.068

STATION US14542
LATITUDE 41-58.0 N
LONGITUI 140-59.5 E
DEPTH (m) 85

Press.	Temp.	Salinity	Sigma-T
5	11.737	33.960	25.831
10	11.216	33.936	25.908
20	10.733	33.915	25.978
30	10.622	33.918	26.000
40	10.486	33.909	26.016
50	10.388	33.905	26.030
75	9.737	33.869	26.113

STATION US14543
LATITUDE 41-57.2 N
LONGITUI 140-58.3 E
DEPTH (m) 77

Press.	Temp.	Salinity	Sigma-T
5	10.741	33.928	25.987
10	10.503	33.907	26.013
20	10.372	33.902	26.031
30	10.283	33.900	26.045
40	10.040	33.874	26.066
50	9.780	33.851	26.091

STATION US14544
LATITUDE 41-48.8 N
LONGITUI 141-12.9 E
DEPTH (m) 133

Press.	Temp.	Salinity	Sigma-T
5	11.893	33.900	25.755
10	11.911	33.996	25.826
20	11.892	33.992	25.826
30	11.735	33.982	25.848
40	11.293	33.947	25.903
50	11.107	33.940	25.931
75	10.535	33.907	26.006
100	10.311	33.893	26.034

STATION US14545
LATITUDE 41-46.9 N
LONGITUI 141-14.9 E
DEPTH (m) 206

Press.	Temp.	Salinity	Sigma-T
5	11.877	33.906	25.763
10	12.158	34.011	25.791
20	12.108	34.002	25.793
30	11.967	33.992	25.813
40	11.880	33.985	25.824
50	11.718	33.966	25.839
75	10.959	33.903	25.928
100	10.245	33.891	26.044
125	9.835	33.863	26.092
150	9.610	33.848	26.118
175	8.142	33.734	26.258

STATION US14546
LATITUDE 41-59.8 N
LONGITUI 141-10.0 E
DEPTH (m) 136

Press.	Temp.	Salinity	Sigma-T
5	9.938	33.931	26.128
10	9.930	33.931	26.129
20	9.929	33.930	26.129
30	9.912	33.929	26.130
40	9.906	33.929	26.131
50	9.899	33.929	26.133
75	8.313	33.752	26.247
100	7.579	33.704	26.317
125	7.256	33.685	26.348

Table 2 (Continued)

STATION US14547
LATITUDE 41-59.1 N
LONGITUI 141-01.8 E
DEPTH (m) 99

Press.	Temp.	Salinity	Sigma-T
5	10.505	33.970	26.061
10	10.507	33.968	26.059
20	10.513	33.966	26.056
30	10.522	33.966	26.055
40	10.524	33.965	26.054
50	10.501	33.963	26.056
75	9.449	33.913	26.195

STATION US14548
LATITUDE 41-58.6 N
LONGITUI 141-00.7 E
DEPTH (m) 93

Press.	Temp.	Salinity	Sigma-T
5	10.531	33.984	26.067
10	10.545	33.979	26.061
20	10.552	33.975	26.057
30	10.552	33.973	26.055
40	10.551	33.972	26.055
50	10.356	33.950	26.071
75	9.148	33.881	26.218

STATION US14549
LATITUDE 41-58.0 N
LONGITUI 140-59.3 E
DEPTH (m) 84

Press.	Temp.	Salinity	Sigma-T
5	10.553	33.991	26.069
10	10.568	33.989	26.065
20	10.567	33.988	26.064
30	10.576	33.988	26.062
40	10.575	33.987	26.062
50	10.568	33.986	26.062
75	8.355	33.753	26.242

STATION US14550
LATITUDE 41-57.4 N
LONGITUI 140-58.3 E
DEPTH (m) 78

Press.	Temp.	Salinity	Sigma-T
5	10.628	34.012	26.072
10	10.619	34.002	26.066
20	10.618	33.997	26.062
30	10.626	33.994	26.059
40	10.578	33.985	26.060
50	10.034	33.920	26.103

STATION US14551
LATITUDE 42-11.0 N
LONGITUI 140-35.4 E
DEPTH (m) 79

Press.	Temp.	Salinity	Sigma-T
5	8.008	33.837	26.359
10	8.011	33.837	26.359
20	8.016	33.836	26.358
30	8.019	33.836	26.357
40	8.018	33.836	26.357
50	8.019	33.836	26.357
75	7.996	33.839	26.363

STATION US14552
LATITUDE 42-13.9 N
LONGITUI 140-30.2 E
DEPTH (m) 77

Press.	Temp.	Salinity	Sigma-T
5	7.594	33.687	26.302
10	7.602	33.734	26.337
20	7.572	33.727	26.336
30	7.506	33.719	26.339
40	7.459	33.713	26.341
50	7.429	33.708	26.342
75	7.409	33.748	26.376

STATION US14553
LATITUDE 42-16.6 N
LONGITUI 140-35.9 E
DEPTH (m) 90

Press.	Temp.	Salinity	Sigma-T
5	8.274	33.866	26.342
10	8.276	33.865	26.341
20	8.276	33.864	26.341
30	8.265	33.863	26.342
40	8.261	33.863	26.342
50	8.258	33.863	26.342
75	8.258	33.862	26.342

STATION US14554
LATITUDE 42-19.0 N
LONGITUI 140-30.3 E
DEPTH (m) 92

Press.	Temp.	Salinity	Sigma-T
5	7.632	33.775	26.365
10	7.615	33.770	26.363
20	7.605	33.768	26.364
30	7.555	33.762	26.366
40	7.552	33.762	26.367
50	7.528	33.759	26.368
75	7.511	33.758	26.369

STATION US14555
LATITUDE 42-20.9 N
LONGITUI 140-36.5 E
DEPTH (m) 86

Press.	Temp.	Salinity	Sigma-T
5	7.860	33.638	26.225
10	8.005	33.838	26.361
20	8.010	33.837	26.359
30	8.010	33.836	26.358
40	8.017	33.837	26.358
50	8.019	33.837	26.357
75	8.019	33.836	26.357

STATION US14556
LATITUDE 42-25.9 N
LONGITUI 140-37.3 E
DEPTH (m) 82

Press.	Temp.	Salinity	Sigma-T
5	8.053	33.835	26.351
10	8.077	33.832	26.345
20	8.085	33.827	26.340
30	8.093	33.827	26.338
40	8.097	33.826	26.338
50	8.099	33.826	26.337
75	8.106	33.827	26.337

STATION US14557
LATITUDE 42-17.7 N
LONGITUI 140-54.0 E
DEPTH (m) 55

Press.	Temp.	Salinity	Sigma-T
5	7.641	33.783	26.370
10	7.640	33.783	26.370
20	7.636	33.781	26.369
30	7.625	33.777	26.368
40	7.626	33.777	26.368
50	7.637	33.779	26.367

STATION US14558
LATITUDE 41-47.5 N
LONGITUI 140-40.6 E
DEPTH (m) 17

Press.	Temp.	Salinity	Sigma-T
5	10.228	33.134	25.457
10	11.423	33.800	25.765

STATION US14559
LATITUDE 41-45.5 N
LONGITUI 140-40.0 E
DEPTH (m) 40

Press.	Temp.	Salinity	Sigma-T
5	11.837	33.948	25.803
10	11.853	33.951	25.802
20	12.011	34.005	25.814
30	12.047	34.018	25.817

STATION US14560
LATITUDE 41-44.0 N
LONGITUI 140-40.2 E
DEPTH (m) 60

Press.	Temp.	Salinity	Sigma-T
5	11.811	33.926	25.790
10	11.848	33.933	25.789
20	11.798	33.923	25.791
30	11.798	33.920	25.788
40	11.806	33.943	25.805
50	11.922	33.985	25.816

STATION US14561
LATITUDE 41-43.7 N
LONGITUI 140-38.6 E
DEPTH (m) 57

Press.	Temp.	Salinity	Sigma-T
5	11.930	33.958	25.793
10	11.922	33.954	25.791
20	11.939	33.952	25.787
30	11.877	33.935	25.785
40	11.672	33.877	25.778
50	11.879	33.964	25.807

Table 2 (Continued)

STATION US14562
LATITUDE 41-43.9 N
LONGITUI 140-37.1 E
DEPTH (m) 42

Press.	Temp.	Salinity	Sigma-T
5	12.238	34.047	25.803
10	12.238	34.045	25.802
20	12.218	34.040	25.802
30	12.074	34.017	25.812
40	12.047	34.028	25.825

STATION US14563
LATITUDE 41-41.4 N
LONGITUI 140-34.6 E
DEPTH (m) 42

Press.	Temp.	Salinity	Sigma-T
5	12.316	34.043	25.786
10	12.328	34.042	25.783
20	12.329	34.041	25.782
30	12.123	34.037	25.817
40	12.108	34.040	25.823

STATION US14564
LATITUDE 41-37.3 N
LONGITUI 140-30.3 E
DEPTH (m) 32

Press.	Temp.	Salinity	Sigma-T
5	12.144	34.057	25.829
10	12.133	34.056	25.831
20	12.107	34.046	25.828
30	11.931	34.016	25.838

STATION US14565
LATITUDE 41-37.5 N
LONGITUI 140-28.7 E
DEPTH (m) 23

Press.	Temp.	Salinity	Sigma-T
5	11.848	34.024	25.859
10	11.851	34.020	25.856
20	11.854	34.018	25.854

STATION US14566
LATITUDE 41-38.1 N
LONGITUI 140-26.3 E
DEPTH (m) 12

Press.	Temp.	Salinity	Sigma-T
5	11.549	33.883	25.806
10	11.551	33.882	25.805

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