



HOKKAIDO UNIVERSITY

Title	1 THE "OSHORO MARU" CRUISE 011 TO SEA OF JAPAN and TSURUGA-WAN IN APRIL 2015
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**THE "OSHORO MARU" CRUISE 011
TO SEA OF JAPAN and TSURUGA-WAN**

IN APRIL 2015

1. Cruise Itinerary

Cruise 011

Departure from Hakodate (Leg1)	Apr. 13, 2015
Start hydrographic research (OS15001)	14
Arrival at Tsuruga	17
Departure from Tsuruga (Leg2)	17
Return to Tsuruga	19
Departure from Tsuruga (Leg3)	19
Return to Tsuruga	19
Departure from Tsuruga (Leg4)	21
Finish hydrographic research (OS15019)	23
Return to Hakodate	24

Total coverage 1106.7 miles

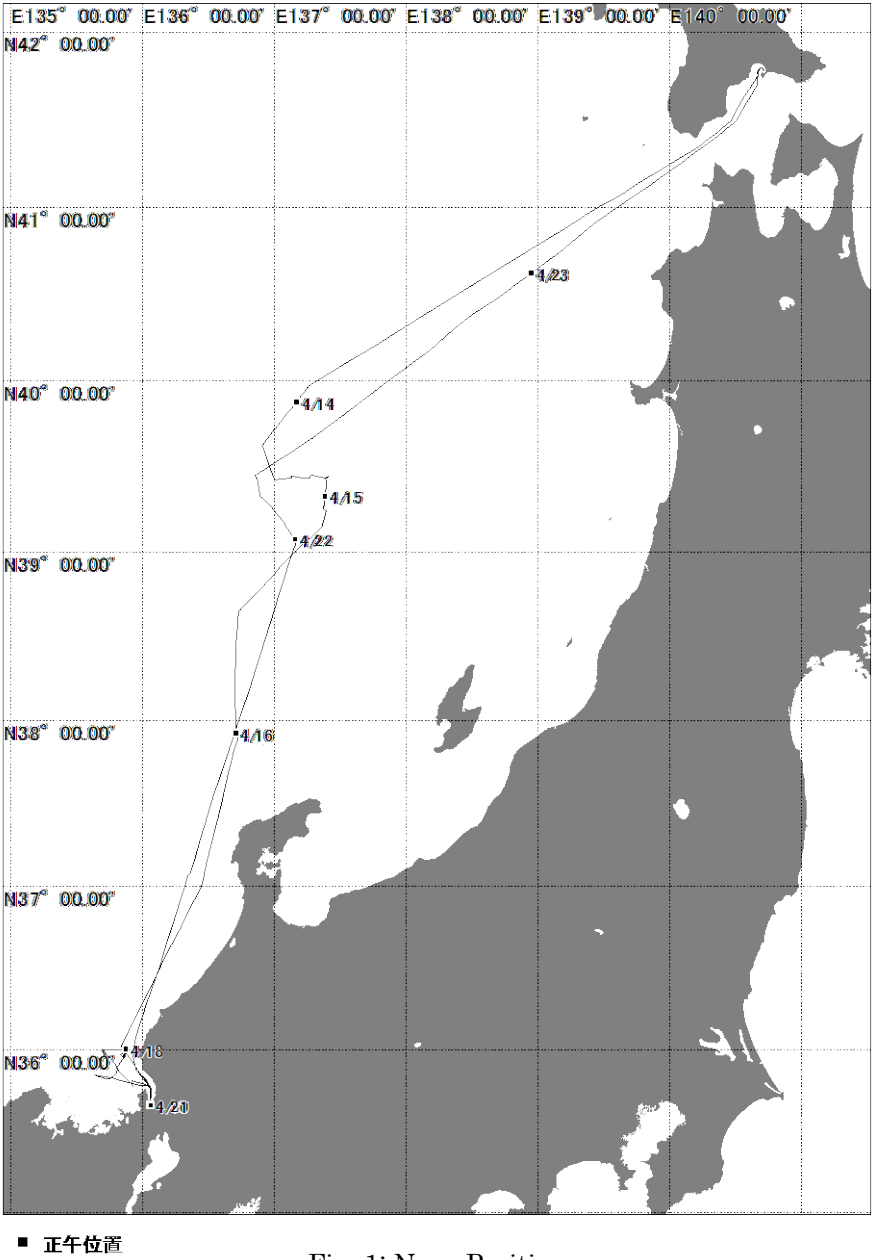


Fig.-1: Noon Position

2. Vessel Personnel

Crew: Captain: Associate Professor Shogo Takagi
And 31 persons

Research Staff: Professor (Laboratory of Marine Environmental Science, Hokkaido University)
Leg1,4 Kenshi Kuma
Associate Professor (Laboratory of Marine Environmental Science, Hokkaido University)
Leg1,4 Yutaka Isoda

Under Graduate instructor: Professor (Faculty of Marine Bioscience, Fukui Prefectural University)
Leg2 Toshiaki Miyadai
Professor (Faculty of Marine Bioscience, Fukui Prefectural University)
Leg2 Ryuji Kondo
Associate Professor (Faculty of Marine Bioscience, Fukui Prefectural University)
Leg2 Daisuke Tahara
Associate Professor (Faculty of Marine Bioscience, Fukui Prefectural University)
Leg2 Atsushi Kaneda
Associate Professor (Faculty of Marine Bioscience, Fukui Prefectural University)
Leg2 Yoshitake Takao

Professor (Faculty of Marine Bioscience, Fukui Prefectural University)
Leg3 Tadahisa Oumi
Professor (Faculty of Marine Bioscience, Fukui Prefectural University)
Leg3 Shigeyuki Hattori
Associate Professor (Faculty of Marine Bioscience, Fukui Prefectural University)
Leg3 Yoko Shimizu
Lecturer (Faculty of Marine Bioscience, Fukui Prefectural University)
Leg3 Ryou Matsumoto
Researcher (Faculty of Marine Bioscience, Fukui Prefectural University)
Leg3 Ryou Nakamura

Teaching Assistant: 4 persons
Under Graduate Student: 51 persons (Leg2)
31 persons (Leg3)

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 Science officer, the deck officers, crews, research staff and cadets of the “Oshoromaru”.

Temperature and salinity were measured by CTD (Seabird SBE-9Plus, SBE-19Plus and XCTD).

Dynamic computations were made using a desk-top computer aboard the “Oshoromaru”.

Water and Plankton sampling were also carried out at almost every hydrographic stations.

Fig.-2,3 Table-1,2

4. Observation of Temperature, Salinity, and Computed Dynamic Depth Anomaly

Hydrographic work on deck and the data processing were made by Science officer, the deck officers, crews, research staff and cadets of the “*Oshoromaru*”. Temperature and salinity were measured by CTD (Seabird SBE-9Plus, SBE-19Plus and XCTD2 or 4). Dynamic computations were made using a desk-top computer aboard the “*Oshoromaru*”. Water and Plankton sampling were also carried out at almost hydrographic stations.

Figure 2 Oceanographic and gillnet stations

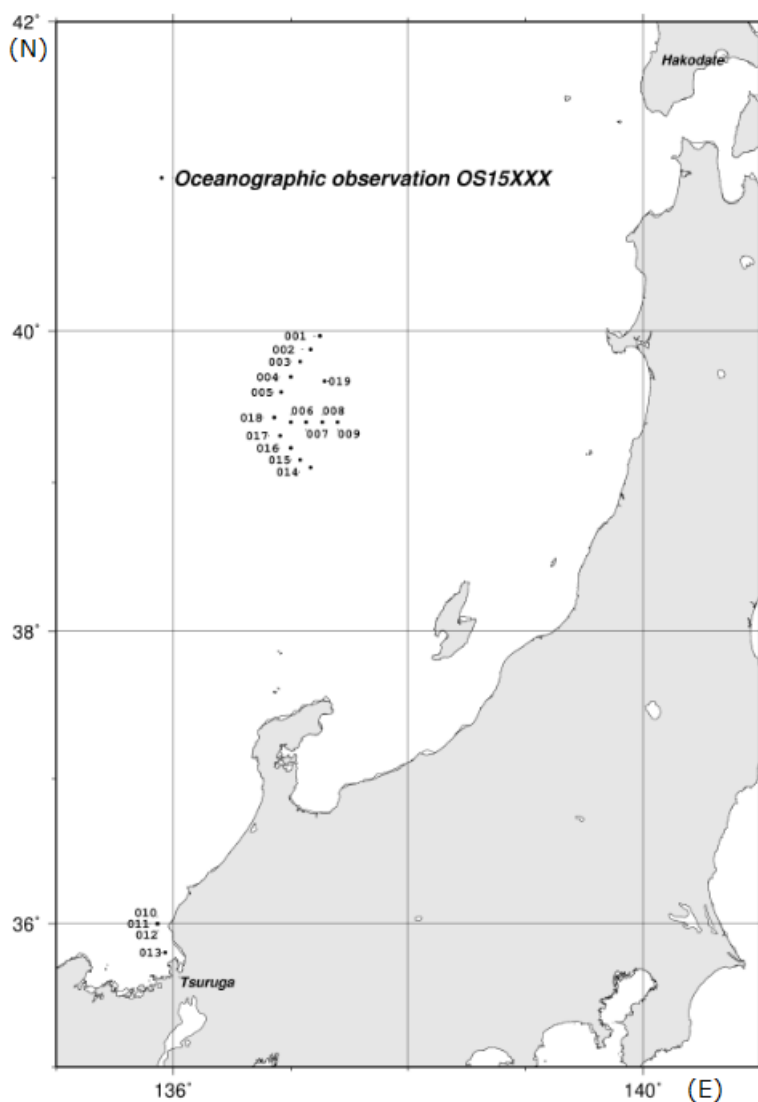


Table 1. List of Oceanographic station.

Station	Lat.	Long.	Date (GMT)	Hour (GMT)	T.Z.	Depth	Col.	Tr.	SST	Wr.	Gear
OS15001	39-57.95N	137-15.29E	4/13	23:08	9	2229	-	-	8.5	bc	9p-1171
OS15002	39-52.93N	137-10.09E	4/14	1:55	9	2406	-	-	8.8	bc	9p-1171
OS15003	39-47.97N	137-05.08E	4/14	4:43	9	2438	-	-	10.3	bc	9p-1171
OS15004	39-42.96N	137-00.04E	4/14	7:23	9	2603	-	-	9.7	bc	9p-1171
OS15005	39-37.89N	136-54.98E	4/14	10:18	9	2605	-	-	9.7	bc	9p-1171
OS15006	39-25.98N	137-00.20E	4/14	13:58	9	2526	-	-	9.5	r	9p-1171
OS15007	39-26.08N	137-07.95E	4/14	17:01	9	2451	-	-	9.6	r	9p-1171
OS15008	39-26.03N	137-16.11E	4/14	19:50	9	2565	-	-	10.0	r	9p-1171
OS15009	39-26.00N	137-24.09E	4/14	22:35	9	2472	-	-	10.2	bc	9p-1171
OS15010	35-57.84N	135-51.43E	4/18	0:37	9	253	3	15	13.0	bc	9p-1171
OS15011	35-57.32N	135-51.69E	4/18	4:07	9	250	3	14	13.3	bc	9p-1171
OS15012	35-59.54N	135-52.10E	4/18	6:03	9	253	3	15	13.3	b	9p-1171
OS15013	35-46.84N	135-55.62E	4/18	23:39	9	81	3	12	13.6	r	9p-1171
OS15014	39-04.16N	137-09.94E	4/22	2:09	9	2416	-	-	10.9	o	9p-1171
OS15015	39-09.24N	137-05.01E	4/22	5:01	9	2414	-	-	11.1	bc	9p-1171
OS15016	39-13.98N	137-00.18E	4/22	7:47	9	2433	-	-	11.3	bc	9p-1171
OS15017	39-18.86N	136-54.89E	4/22	10:11	9	2517	-	-	11.1	bc	9p-1171
OS15018	39-26.08N	136-51.82E	4/22	13:12	9	2600	-	-	9.5	bc	9p-1171
OS15019	39-39.90N	137-17.14E	4/22	18:07	9	2551	-	-	10.0	f	9p-1171

T.Z.: Time difference between Greenwich Mean Time (G.M.T.) and Ship's Mean Time (S.M.T.)

Col.: Water color in Forel-Ule scale

Tr.: Transparency in meters with Secchi disc

SST: Sea Surface temperature

Wr.: Weather in WMO Code 4501

Table 2. Oceanographic data

Station OS15001				Station OS15002				Station OS15003			
Latitude 39-57.95 N				Latitude 39-52.93 N				Latitude 39-47.97 N			
Longitude 137-15.29 E				Longitude 137-10.09 E				Longitude 137-05.08 E			
Depth(m) 2233				Depth(m) 2406				Depth(m) 2438			
Press.	Temp.	Sal.	SIG-T	Press.	Temp.	Sal.	SIG-T	Press.	Temp.	Sal.	SIG-T
5	8.238	34.153	26.573	5	8.514	34.158	26.535	5	10.129	34.217	26.319
10	8.222	34.154	26.576	10	8.395	34.158	26.553	10	9.982	34.215	26.342
20	8.206	34.154	26.578	20	8.356	34.158	26.559	20	8.550	34.163	26.533
30	8.195	34.153	26.580	30	8.020	34.147	26.601	30	8.041	34.153	26.603
40	8.156	34.149	26.582	40	8.004	34.147	26.603	40	7.962	34.150	26.612
50	7.825	34.147	26.629	50	7.970	34.146	26.607	50	7.854	34.146	26.624
75	6.834	34.120	26.748	75	6.860	34.115	26.741	75	7.647	34.140	26.650
100	4.893	34.076	26.955	100	5.600	34.094	26.886	100	5.726	34.087	26.865
125	3.956	34.055	27.039	125	4.551	34.069	26.987	125	4.573	34.069	26.985
150	3.024	34.051	27.126	150	3.724	34.057	27.064	150	3.424	34.050	27.088
175	2.585	34.053	27.166	175	3.129	34.054	27.118	175	2.749	34.050	27.149
200	2.104	34.040	27.195	200	2.194	34.037	27.185	200	2.279	34.034	27.176
250	1.363	34.027	27.239	250	1.320	34.025	27.240	250	1.594	34.028	27.223
300	1.103	34.041	27.268	300	1.225	34.036	27.256	300	1.191	34.042	27.263
400	0.805	34.059	27.301	400	0.950	34.054	27.288	400	0.877	34.054	27.293
500	0.693	34.064	27.312	500	0.747	34.061	27.307	500	0.731	34.063	27.309
600	0.570	34.067	27.321	600	0.632	34.066	27.317	600	0.626	34.067	27.318
700	0.513	34.067	27.325	700	0.543	34.067	27.323	700	0.519	34.067	27.325
800	0.433	34.067	27.329	800	0.474	34.067	27.327	800	0.454	34.067	27.329
900	0.377	34.066	27.332	900	0.410	34.067	27.331	900	0.408	34.067	27.331
1000	0.333	34.066	27.334	1000	0.366	34.066	27.333	1000	0.350	34.066	27.334
1200	0.270	34.065	27.338	1200	0.290	34.066	27.336	1200	0.288	34.066	27.337
1500	0.232	34.065	27.339	1500	0.230	34.065	27.339	1500	0.242	34.065	27.339
2000	0.225	34.065	27.340	2000	0.227	34.065	27.340	2000	0.229	34.065	27.340

Station OS15004			
Latitude 39-42.96 N			
Longitude 137-0.04 E			
Depth(m) 2603			
Press.	Temp.	Sal.	SIG-T
5	9.540	34.181	26.389
10	8.967	34.177	26.479
20	8.672	34.169	26.519
30	8.435	34.162	26.550
40	7.916	34.147	26.616
50	7.568	34.139	26.661
75	6.622	34.102	26.763
100	4.871	34.073	26.955
125	3.497	34.040	27.072
150	2.717	34.030	27.136
175	2.290	34.033	27.174
200	2.001	34.032	27.196
250	1.530	34.035	27.233
300	1.140	34.044	27.267
400	0.825	34.056	27.298
500	0.707	34.064	27.311
600	0.576	34.067	27.321
700	0.487	34.067	27.327
800	0.433	34.067	27.330
900	0.382	34.067	27.332
1000	0.334	34.066	27.335
1200	0.273	34.066	27.337
1500	0.240	34.065	27.339
2000	0.226	34.066	27.340
2500	0.240	34.066	27.340

Station OS15005			
Latitude 39-37.89 N			
Longitude 136-54.98 E			
Depth(m) 2605			
Press.	Temp.	Sal.	SIG-T
5	9.765	34.196	26.364
10	9.767	34.196	26.363
20	9.371	34.196	26.429
30	9.000	34.180	26.476
40	8.589	34.161	26.526
50	8.137	34.155	26.590
75	7.468	34.134	26.671
100	5.172	34.074	26.921
125	3.822	34.045	27.045
150	2.686	34.037	27.144
175	2.247	34.034	27.178
200	1.924	34.042	27.210
250	1.278	34.043	27.257
300	1.053	34.053	27.281
400	0.783	34.062	27.304
500	0.657	34.066	27.315
600	0.555	34.067	27.323
700	0.480	34.067	27.327
800	0.420	34.067	27.331
900	0.373	34.067	27.333
1000	0.329	34.066	27.335
1200	0.274	34.066	27.338
1500	0.237	34.065	27.339
2000	0.229	34.066	27.340
2500	0.243	34.066	27.340

Station OS15006			
Latitude 39-25.98 N			
Longitude 137-0.20 E			
Depth(m) 2526			
Press.	Temp.	Sal.	SIG-T
5	9.555	34.195	26.398
10	9.547	34.193	26.398
20	9.294	34.191	26.437
30	9.002	34.180	26.475
40	8.641	34.166	26.521
50	7.794	34.134	26.624
75	5.478	34.082	26.891
100	4.016	34.051	27.030
125	3.301	34.037	27.089
150	2.699	34.036	27.142
175	2.155	34.030	27.183
200	1.662	34.032	27.222
250	1.147	34.047	27.269
300	0.917	34.052	27.289
400	0.734	34.062	27.308
500	0.625	34.066	27.318
600	0.544	34.067	27.323
700	0.442	34.067	27.329
800	0.399	34.067	27.331
900	0.353	34.066	27.334
1000	0.313	34.066	27.336
1200	0.260	34.066	27.338
1500	0.231	34.065	27.340
2000	0.227	34.066	27.340

Station OS15007			
Latitude 39-06.08 N			
Longitude 137-07.95 E			
Depth(m) 2451			
Press.	Temp.	Sal.	SIG-T
5	9.346	34.136	26.386
10	9.312	34.152	26.404
20	8.951	34.179	26.483
30	8.166	34.147	26.579
40	7.899	34.142	26.615
50	7.619	34.132	26.648
75	5.348	34.077	26.903
100	3.601	34.041	27.063
125	2.837	34.044	27.137
150	2.229	34.042	27.186
175	1.737	34.042	27.224
200	1.491	34.040	27.240
250	1.158	34.049	27.270
300	0.942	34.057	27.291
400	0.725	34.064	27.310
500	0.597	34.066	27.319
600	0.517	34.067	27.325
700	0.428	34.067	27.330
800	0.383	34.066	27.332
900	0.339	34.066	27.334
1000	0.310	34.066	27.336
1200	0.261	34.066	27.338
1500	0.225	34.065	27.340
2000	0.224	34.065	27.340

Station OS15008			
Latitude 39-26.03 N			
Longitude 137-16.11 E			
Depth(m) 2565			
Press.	Temp.	Sal.	SIG-T
5	9.764	34.144	26.323
10	9.752	34.150	26.330
20	9.647	34.205	26.391
30	8.933	34.178	26.485
40	8.171	34.157	26.586
50	7.348	34.129	26.685
75	5.691	34.087	26.870
100	4.343	34.054	26.998
125	3.426	34.040	27.079
150	2.397	34.027	27.161
175	2.027	34.041	27.201
200	1.672	34.043	27.230
250	1.156	34.049	27.271
300	0.950	34.055	27.289
400	0.778	34.062	27.305
500	0.638	34.066	27.317
600	0.501	34.067	27.326
700	0.434	34.067	27.330
800	0.382	34.067	27.332
900	0.345	34.067	27.334
1000	0.304	34.066	27.336
1200	0.260	34.066	27.338
1500	0.229	34.065	27.340
2000	0.226	34.066	27.340
2500	0.253	34.066	27.339

Station OS15009			
Latitude 39-26.00 N			
Longitude 137-24.09 E			
Depth(m) 2472			
Press.	Temp.	Sal.	SIG-T
5	9.998	34.151	26.289
10	9.974	34.154	26.296
20	9.625	34.202	26.391
30	8.893	34.186	26.498
40	8.410	34.169	26.560
50	7.809	34.153	26.637
75	5.794	34.089	26.859
100	4.574	34.067	26.983
125	3.374	34.046	27.089
150	3.020	34.041	27.118
175	2.530	34.036	27.157
200	1.678	34.044	27.230
250	1.196	34.048	27.267
300	0.972	34.054	27.286
400	0.784	34.062	27.305
500	0.649	34.066	27.316
600	0.530	34.067	27.324
700	0.444	34.067	27.329
800	0.387	34.067	27.332
900	0.335	34.066	27.335
1000	0.299	34.066	27.336
1200	0.257	34.066	27.338
1500	0.222	34.065	27.340
2000	0.217	34.066	27.340

Station OS15010
Latitude 35-57.84 N
Longitude 135-51.43 E
Depth(m) 253

Press.	Temp.	Sal.	SIG-T
5	12.819	34.338	25.916
10	12.792	34.341	25.924
20	12.757	34.344	25.933
30	12.704	34.357	25.953
40	12.685	34.372	25.969
50	12.618	34.394	25.999
75	12.252	34.437	26.103
100	12.041	34.453	26.156
125	11.946	34.446	26.169
150	11.735	34.427	26.194
175	11.401	34.412	26.244
200	10.981	34.373	26.290

Station OS15011
Latitude 35-57.32 N
Longitude 135-51.69 E
Depth(m) 250

Press.	Temp.	Sal.	SIG-T
5	12.890	34.317	25.886
10	12.751	34.312	25.910
20	12.590	34.290	25.924
30	12.651	34.327	25.940
40	12.632	34.390	25.993
50	12.630	34.413	26.011
75	12.463	34.462	26.082
100	12.169	34.461	26.138
125	11.805	34.440	26.191
150	11.532	34.411	26.220
175	11.342	34.395	26.242
200	11.039	34.386	26.290

Station OS15012
Latitude 35-59.54 N
Longitude 135-52.10 E
Depth(m) 253

Press.	Temp.	Sal.	SIG-T
5	13.099	34.300	25.831
10	12.712	34.309	25.914
20	12.727	34.335	25.932
30	12.694	34.351	25.950
40	12.646	34.369	25.974
50	12.625	34.387	25.993
75	12.481	34.482	26.094
100	12.329	34.487	26.127
125	11.983	34.455	26.169
150	11.623	34.422	26.211
175	11.484	34.424	26.238
200	10.880	34.366	26.304

Station OS15013
Latitude 35-46.84 N
Longitude 135-55.62 E
Depth(m) 81

Press.	Temp.	Sal.	SIG-T
5	13.144	33.909	25.519
10	12.848	34.117	25.739
20	12.709	34.224	25.849
30	12.604	34.344	25.963
40	12.468	34.428	26.055
50	12.349	34.423	26.074
75	12.282	34.446	26.105

Station OS15014
Latitude 39-04.18 N
Longitude 137-09.94 E
Depth(m) 2416

Press.	Temp.	Sal.	SIG-T
5	10.737	34.107	26.127
10	10.728	34.108	26.129
20	10.651	34.107	26.142
30	10.625	34.108	26.147
40	10.557	34.123	26.172
50	9.983	34.175	26.310
75	9.658	34.185	26.373
100	9.080	34.175	26.459
125	8.180	34.155	26.583
150	6.370	34.108	26.800
175	4.381	34.057	26.996
200	3.181	34.034	27.098
250	1.762	34.039	27.220
300	1.245	34.049	27.265
400	0.864	34.061	27.299
500	0.653	34.066	27.316
600	0.545	34.066	27.322
700	0.459	34.066	27.328
800	0.399	34.067	27.331
900	0.358	34.066	27.333
1000	0.310	34.066	27.336
1200	0.267	34.066	27.338
1500	0.239	34.065	27.339
2000	0.226	34.066	27.340

Station OS15015
Latitude 39-09.24 N
Longitude 137-05.01 E
Depth(m) 2414

Press.	Temp.	Sal.	SIG-T
5	10.843	34.118	26.117
10	10.866	34.118	26.113
20	10.620	34.117	26.156
30	10.588	34.117	26.161
40	10.505	34.130	26.186
50	10.117	34.168	26.282
75	9.598	34.195	26.390
100	7.882	34.139	26.615
125	6.924	34.121	26.736
150	4.948	34.073	26.946
175	3.443	34.037	27.075
200	2.295	34.026	27.168
250	1.526	34.044	27.241
300	1.111	34.053	27.277
400	0.755	34.064	27.308
500	0.595	34.067	27.320
600	0.506	34.067	27.325
700	0.433	34.067	27.330
800	0.375	34.067	27.333
900	0.330	34.066	27.335
1000	0.294	34.066	27.337
1200	0.251	34.065	27.338
1500	0.221	34.065	27.340
2000	0.228	34.066	27.340

Station OS15016
Latitude 39-13.98 N
Longitude 137-00.18 E
Depth(m) 2433

Press.	Temp.	Sal.	SIG-T
5	10.930	34.110	26.095
10	10.851	34.108	26.107
20	10.713	34.105	26.130
30	10.570	34.141	26.183
40	10.115	34.192	26.302
50	9.519	34.212	26.417
75	7.994	34.159	26.614
100	6.459	34.111	26.791
125	5.202	34.077	26.920
150	3.872	34.045	27.040
175	2.986	34.030	27.112
200	2.253	34.029	27.174
250	1.446	34.042	27.245
300	1.177	34.050	27.270
400	0.760	34.063	27.307
500	0.615	34.065	27.317
600	0.511	34.066	27.325
700	0.435	34.067	27.330
800	0.375	34.067	27.333
900	0.336	34.066	27.335
1000	0.305	34.066	27.336
1200	0.263	34.066	27.338
1500	0.229	34.066	27.340
2000	0.228	34.066	27.340

Station OS15017
Latitude 39-18.86 N
Longitude 136-54.89 E
Depth(m) 2517

Press.	Temp.	Sal.	SIG-T
5	10.757	34.116	26.131
10	10.716	34.117	26.138
20	10.460	34.129	26.193
30	10.384	34.129	26.206
40	9.996	34.144	26.284
50	8.357	34.157	26.558
75	6.454	34.117	26.796
100	6.022	34.105	26.842
125	4.862	34.065	26.949
150	3.494	34.039	27.072
175	2.425	34.030	27.160
200	1.959	34.031	27.199
250	1.317	34.042	27.254
300	1.003	34.056	27.286
400	0.754	34.063	27.308
500	0.608	34.066	27.319
600	0.514	34.067	27.325
700	0.444	34.067	27.329
800	0.384	34.067	27.332
900	0.337	34.066	27.334
1000	0.307	34.066	27.336
1200	0.266	34.066	27.338
1500	0.236	34.066	27.339
2000	0.231	34.066	27.340

Station OS15018
Latitude 39-26.08 N
Longitude 136-51.82 E
Depth(m) 2600

Press.	Temp.	Sal.	SIG-T
5	9.147	34.128	26.412
10	8.951	34.127	26.442
20	8.847	34.125	26.457
30	8.836	34.125	26.458
40	8.831	34.125	26.459
50	8.810	34.125	26.463
75	7.988	34.150	26.608
100	6.241	34.107	26.816
125	4.665	34.069	26.975
150	3.616	34.045	27.065
175	2.897	34.032	27.122
200	2.167	34.025	27.178
250	1.617	34.034	27.226
300	1.300	34.035	27.249
400	0.903	34.055	27.292
500	0.719	34.063	27.310
600	0.576	34.067	27.321
700	0.475	34.067	27.327
800	0.406	34.067	27.331
900	0.361	34.067	27.334
1000	0.325	34.066	27.335
1200	0.265	34.066	27.338
1500	0.231	34.065	27.340
2000	0.227	34.066	27.340
2500	0.254	34.066	27.339

Station OS15019
Latitude 39-39.90 N
Longitude 137-17.14 E
Depth(m) 2551

Press.	Temp.	Sal.	SIG-T
5	9.808	34.136	26.309
10	9.735	34.135	26.321
20	9.526	34.138	26.358
30	9.481	34.137	26.364
40	9.309	34.134	26.390
50	8.045	34.143	26.594
75	7.178	34.125	26.705
100	5.692	34.089	26.871
125	4.513	34.059	26.983
150	3.494	34.042	27.074
175	2.589	34.031	27.147
200	2.063	34.035	27.193
250	1.396	34.045	27.251
300	1.137	34.055	27.277
400	0.818	34.062	27.303
500	0.665	34.065	27.315
600	0.535	34.067	27.324
700	0.458	34.067	27.329
800	0.393	34.067	27.332
900	0.339	34.067	27.335
1000	0.314	34.066	27.336
1200	0.259	34.066	27.338
1500	0.226	34.065	27.340
2000	0.223	34.066	27.340
2500	0.240	34.066	27.340