HOKKAIDO UNIVERSITY

Title	PART II -9. THE ” USHIO MARU ” CRUISE 403, CRUISE 404, CRUISE 405, IN NOVEMBER - DECEMBER 2017
Citation	海洋調査漁業試験要報, 61, 137-144
Issue Date	2021-03-31
Doc URL	https://hdl.handle.net/2115/80710
Type	dataset
File Information	Data.Rec.Oceanogr.Obs.Expl.Fish.61.137.pdf

Hokkaido University Collection of Scholarly and Academic Papers : HUSCAP

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THE " USHIO MARU "

CRUISE 403
CRUISE 404
CRUISE 405

IN NOVEMBER 2017
IN DECEMBER 2017

1. Cruise Itinerary

Cruise 403		
Departure from Hakodate	Nov.	21, 2017
Start hydrographic research (US17454)		21
Finish hydrographic research (US17458)		21
Return to Hakodate		22
Total coverage 37.6 miles		

Cruise 404		
Departure from Hakodate	Dec.	13, 2017
Start hydrographic research (US17459)		14
Retrieval ADCP mooring system		15
Finish hydrographic research (US17469)		15
Return to Hakodate		16
Total coverage 203.3 miles		

Cruise 405		
Departure from Hakodate	Dec.	20, 2017
Start hydrographic research (US17470)		20
Arrival at Fukushima		20
Departure from Fukushima		21
Finish hydrographic research (US17487)		21
Return to Hakodate		22
Total coverage 103.2 miles		

2. Data on Temperature, Salinity and Pressure

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

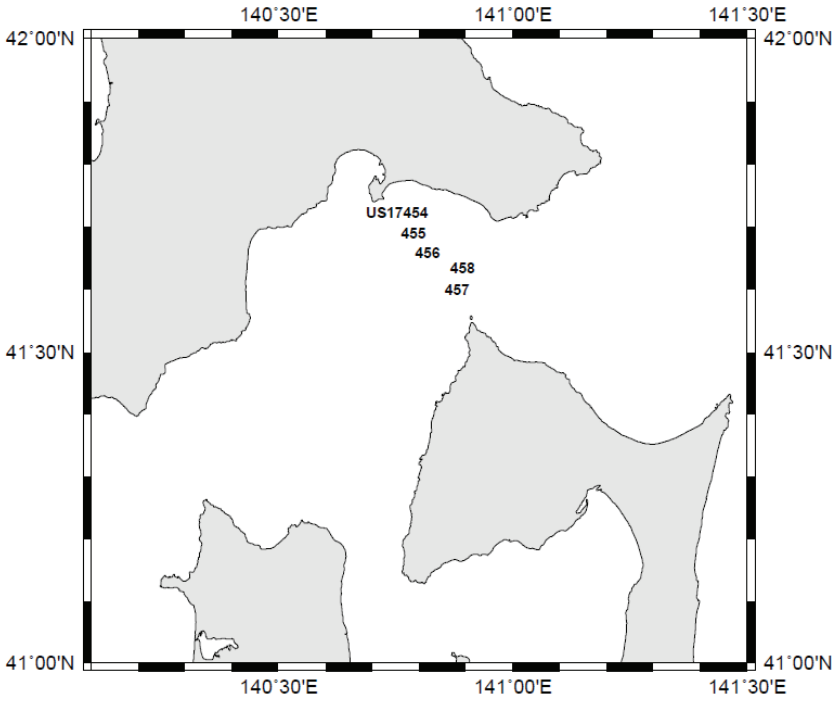

Figure 1. Oceanographic stations (Cruise 403)

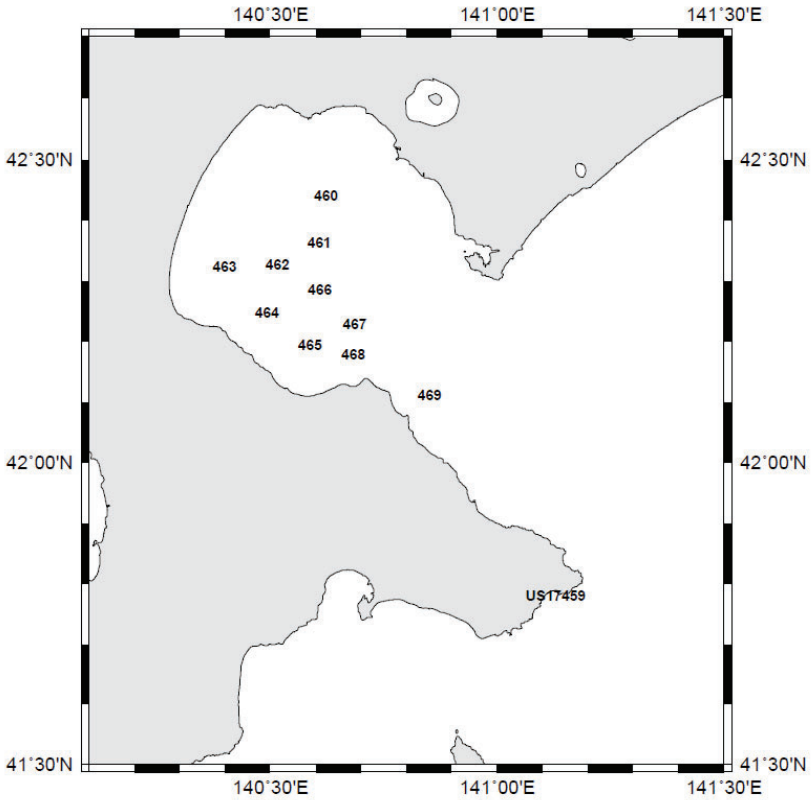

Figure 2. Oceanographic stations (Cruise 404)

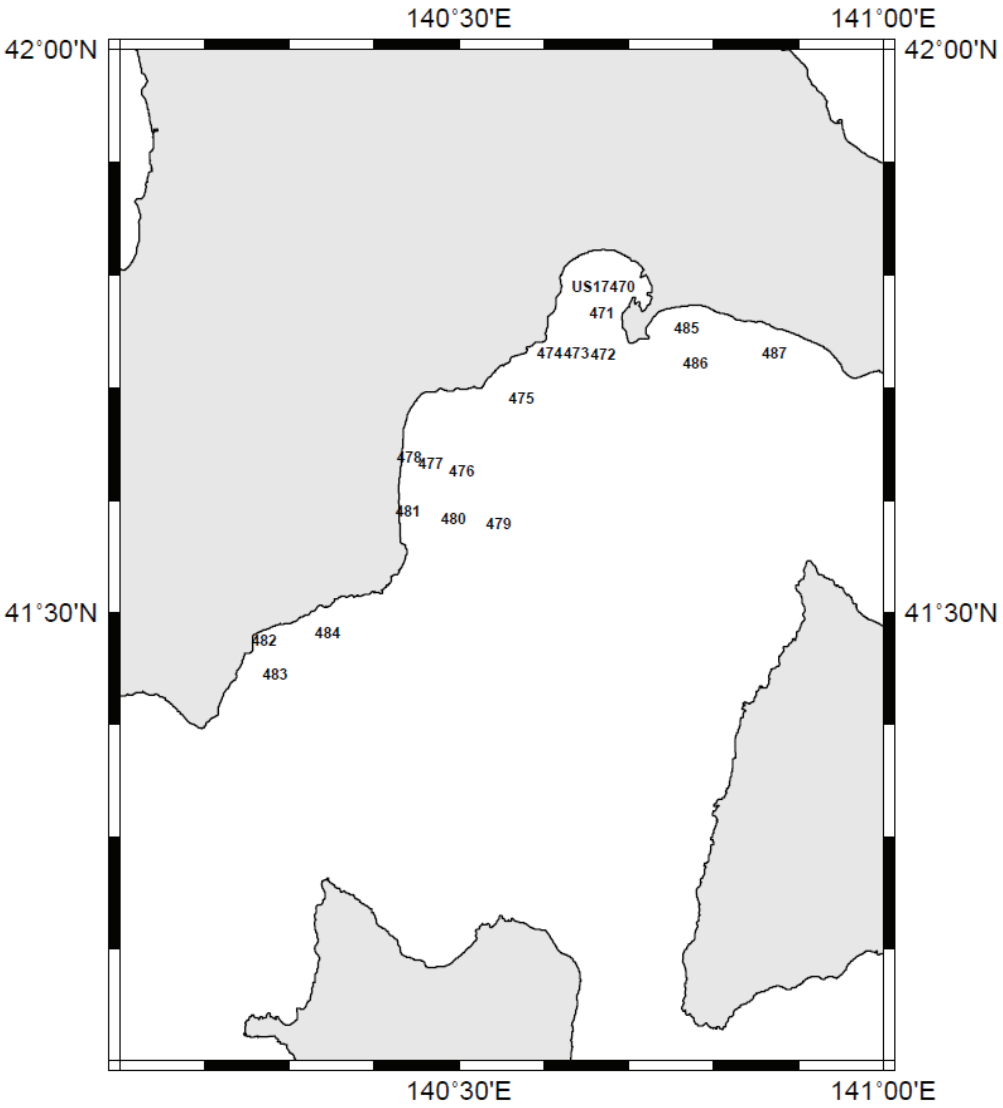

Figure 3. Oceanographic stations (Cruise 405)

Table 1. List of Oceanographic Station

Crs403

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17454	41-42.8	140-45.1	11/21	1539-1547	86	North-2	NW-1	North-3	2.9	14.3	c	1026.6
US17455	41-40.8	140-47.2	11/21	1607-1625	222	WNW-2	NW-1	WNW-3	1.9	14.9	c	1026.6
US17456	41-39.0	140-49.0	11/21	1643-1710	340	NW-2	SW-1	NW-4	2.9	14.5	o	1026.6
US17457	41-35.4	140-53.0	11/21	1755-1757	39	NW-2	SW-1	NW-3	3.1	14.6	c	1027
US17458	41-37.5	140-53.5	11/21	1819-1837	260	NW-2	SW-1	NW-4	3.7	15	bc	1026.8

Crs404

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17459	41-46.3	141-07.7	12/14	1353-1356	44	NNW-2	NNE-1	NNW-4	5.2	12.6	bc	1020.8
US17460	42-25.9	140-37.3	12/15	0703-0710	84	West-3	West-1	West-5	3	8.4	o	1023.1
US17461	42-21.3	140-36.4	12/15	0756-0803	89	West-3	West-1	West-5	3.2	8.3	o	1023.1
US17462	42-19.1	140-30.9	12/15	0845-0851	95	WNW-3	West-1	WNW-5	2.7	8.1	o	1022.8
US17463	42-18.9	140-23.9	12/15	0939-0944	60	WNW-3	West-1	WNW-5	2.9	7.9	o	1023.2
US17464	42-14.3	140-29.5	12/15	1033-1038	77	West-3	West-1	West-5	2.6	7.7	c	1023.2
US17465	42-11.2	140-35.2	12/15	1117-1124	81	WNW-3	West-1	WNW-5	2.9	8	o	1022.8
US17466	42-16.6	140-36.5	12/15	1235-1244	92	WNW-3	West-1	WNW-5	2.9	8.4	o	1022.1
US17467	42-13.2	140-41.1	12/15	1401-1408	90	WNW-3	West-1	WNW-4	3.2	8.3	bc	1021.5
US17468	42-10.2	140-40.9	12/15	1430-1435	86	WNW-3	WNW-1	WNW-5	3.2	8.2	bc	1021.2
US17469	42-06.2	140-51.0	12/15	1555-1601	70	West-2	NW-1	West-4	2.7	9.1	bc	1021.1

Crs405

station	Lat. (N)°	Long. (E)°	Date	Hour (JST)	Depth (m)	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar (hPa)
US17470	41-47.1	140-40.2	12/20	0816-0819	21	West-2	SSW-1	West-4	-3	10.4	s	1024.6
US17471	41-45.7	140-40.1	12/20	0839-0843	31	West-2	SSW-1	West-4	-1.7	11.8	c	1024.8
US17472	41-43.5	140-40.2	12/20	0919-0925	69	West-3	SSW-1	West-5	0	12.4	o	1025
US17473	41-43.6	140-38.3	12/20	0948-0954	59	West-3	SSW-1	West-5	0.2	12.3	c	1025.2
US17474	41-43.6	140-36.4	12/20	1006-1010	36	WSW-3	SW-1	WSW-5	-0.4	12.2	o	1025.6
US17475	41-41.2	140-34.4	12/20	1048-1052	42	West-3	SW-1	West-6	-1.4	12.2	s	1025.5
US17476	41-37.3	140-30.2	12/20	1134-1138	33	West-3	South-1	West-5	-1.2	12.1	s	1025.6
US17477	41-37.7	140-28.0	12/20	1151-1155	21	West-2	South-1	West-4	-2.2	12.2	s	1025.6
US17478	41-38.0	140-26.5	12/20	1205-1208	17	NW-1	South-1	NW-3	-2.5	11.1	s	1025.5
US17479	41-34.5	140-32.8	12/20	1317-1322	67	West-2	SW-1	West-4	-0.9	12.3	o	1025.1
US17480	41-34.7	140-29.6	12/20	1352-1356	45	WNW-2	SW-1	WNW-3	-1.6	12.4	c	1025.1
US17481	41-35.1	140-26.4	12/20	1415-1419	14	WNW-2	SSE-1	WNW-3	-1.6	12.4	s	1025.1
US17482	41-28.2	140-16.2	12/21	0701-0705	18	West-2	South-1	West-4	2.5	11.7	bc	1026.2
US17483	41-26.4	140-17.0	12/21	0740-0745	61	West-2	SSW-1	West-4	2.8	12.2	bc	1026.8
US17484	41-28.6	140-20.7	12/21	0830-0835	63	West-3	SSW-1	West-5	3.7	12.1	bc	1027
US17485	41-44.9	140-46.1	12/21	1114-1118	45	WNW-2	SW-1	WNW-4	2.7	12.3	s	1026.2
US17486	41-43.0	140-46.7	12/21	1142-1149	82	West-3	SW-1	West-5	3.4	12.3	bc	1025.3
US17487	41-43.6	140-52.3	12/21	1226-1230	44	West-3	SW-1	West-6	4	12.5	c	1025

Table 2. Oceanographic data

STATION US17454
LATITUDE 41-42.8 N
LONGITUI 140-45.1 E
DEPTH (m) 86

Press.	Temp.	Salinity	Sigma-T
5	15.0822	33.9946	25.1789
10	15.0943	33.9927	25.1748
20	15.1143	34.0239	25.1944
30	15.0886	34.0577	25.2261
40	15.0739	34.0636	25.2339
50	15.0202	34.0778	25.2565
71	14.6182	34.1032	25.3631

STATION US17455
LATITUDE 41-40.8 N
LONGITUI 140-47.2 E
DEPTH (m) 222

Press.	Temp.	Salinity	Sigma-T
5	14.9827	34.067	25.2564
10	14.9387	34.0813	25.277
20	14.7934	34.1177	25.3365
30	14.7462	34.1277	25.3545
40	14.7497	34.1278	25.3538
50	14.7438	34.1285	25.3556
75	14.669	34.1244	25.3686
100	14.4886	34.1257	25.4083
125	14.2494	34.1411	25.4709
150	14.0491	34.1538	25.5229
175	13.6925	34.1806	25.6176
200	13.7009	34.1864	25.6204
210	13.3411	34.2018	25.7059

STATION US17456
LATITUDE 41-39.0 N
LONGITUI 140-49.0 E
DEPTH (m) 340

Press.	Temp.	Salinity	Sigma-T
5	14.5228	34.1579	25.4258
10	14.5441	34.1562	25.42
20	14.5495	34.1535	25.4167
30	14.5524	34.1586	25.42
40	14.55	34.1646	25.4252
50	14.541	34.1679	25.4296
75	14.5174	34.1716	25.4376
100	14.5092	34.1747	25.4417
125	14.507	34.1761	25.4432
150	14.4455	34.1935	25.4698
175	14.2451	34.1995	25.5169
200	13.9326	34.2227	25.6005
250	13.6632	34.2096	25.6462
300	13.5539	34.2094	25.6684
320	13.4517	34.209	25.689

STATION US17457
LATITUDE 41-35.4 N
LONGITUI 140-53.0 E
DEPTH (m) 39

Press.	Temp.	Salinity	Sigma-T
5	15.2389	33.9969	25.1463
10	15.2511	33.9925	25.1402
20	15.2471	33.9996	25.1466
30	15.0924	34.0559	25.2239

STATION US17458
LATITUDE 41-37.5 N
LONGITUI 140-53.5 E
DEPTH (m) 260

Press.	Temp.	Salinity	Sigma-T
5	15.1126	34.0345	25.203
10	15.118	34.0334	25.201
20	15.07	34.0512	25.2252
30	15.0516	34.0575	25.2341
40	15.0262	34.0641	25.2447
50	15.0152	34.0676	25.2498
75	14.8969	34.0994	25.3
100	14.8841	34.1126	25.313
125	14.8594	34.1261	25.3288
150	14.3934	34.1616	25.4563
175	14.2885	34.1509	25.4703
200	14.112	34.1514	25.5078
250	7.4924	33.7225	26.3439

STATION US17459
LATITUDE 41-46.3 N
LONGITUI 141-07.7 E
DEPTH (m) 44

Press.	Temp.	Salinity	Sigma-T
5	12.5562	33.9849	25.6939
10	11.6292	33.908	25.8104
20	11.1059	33.9145	25.9112
30	10.9931	33.9439	25.9544
40	10.2288	33.8649	26.0267
43	9.7419	33.8915	26.1298

STATION US17460
LATITUDE 42-25.9 N
LONGITUI 140-37.3 E
DEPTH (m) 84

Press.	Temp.	Salinity	Sigma-T
5	8.6495	33.8041	26.2366
10	8.6533	33.806	26.2375
20	8.6624	33.805	26.2352
30	8.6621	33.8042	26.2347
40	8.6611	33.8047	26.2352
50	8.6635	33.8051	26.2351
75	8.6811	33.8121	26.2379
82	8.693	33.815	26.238

STATION US17461
LATITUDE 42-21.3 N
LONGITUI 140-36.4 E
DEPTH (m) 89

Press.	Temp.	Salinity	Sigma-T
5	8.6941	33.8137	26.2372
10	8.6919	33.8114	26.2356
20	8.6963	33.8126	26.236
30	8.6957	33.8123	26.2358
40	8.6843	33.8107	26.2363
50	8.6891	33.8126	26.2371
75	8.6839	33.8101	26.2359
88	8.200	33.770	26.279

STATION US17462
LATITUDE 42-19.1 N
LONGITUI 140-30.9 E
DEPTH (m) 95

Press.	Temp.	Salinity	Sigma-T
5	8.4307	33.808	26.2732
10	8.4288	33.8076	26.2731
20	8.4322	33.8061	26.2714
30	8.4327	33.806	26.2713
40	8.4356	33.8059	26.2708
50	8.4355	33.8062	26.271
75	8.4364	33.8062	26.2708
91	8.4049	33.8018	26.2722

STATION US17463
LATITUDE 42-18.9 N
LONGITUI 140-23.9 E
DEPTH (m) 60

Press.	Temp.	Salinity	Sigma-T
5	8.3287	33.7803	26.2669
10	8.3267	33.7807	26.2675
20	8.338	33.7795	26.2648
30	8.3385	33.7795	26.2648
40	8.3414	33.7793	26.2642
50	8.3362	33.7788	26.2645
58	8.3353	33.7792	26.265

STATION US17464
LATITUDE 42-14.3 N
LONGITUI 140-29.5 E
DEPTH (m) 77

Press.	Temp.	Salinity	Sigma-T
5	8.1393	33.7403	26.2639
10	8.151	33.7501	26.2699
20	8.1705	33.7621	26.2764
30	8.2073	33.7843	26.2883
40	8.2251	33.7985	26.2967
50	8.2193	33.7948	26.2947
74	8.2376	33.8051	26.3001

STATION US17465
LATITUDE 42-11.2 N
LONGITUI 140-35.2 E
DEPTH (m) 81

Press.	Temp.	Salinity	Sigma-T
5	8.5695	33.8631	26.2951
10	8.5809	33.8627	26.293
20	8.5851	33.862	26.2918
30	8.4501	33.8382	26.2939
40	8.3479	33.8311	26.3039
50	8.3493	33.832	26.3043
75	8.3767	33.8345	26.3021
79	8.384	33.836	26.302

STATION US17466
LATITUDE 42-16.6 N
LONGITUI 140-36.5 E
DEPTH (m) 92

Press.	Temp.	Salinity	Sigma-T
5	8.5988	33.81	26.249
10	8.5997	33.8095	26.2485
20	8.6014	33.8094	26.2481
30	8.6035	33.8095	26.2479
40	8.6029	33.8094	26.2479
50	8.5854	33.8082	26.2496
75	8.5589	33.8078	26.2533
86	8.5525	33.8075	26.2541

STATION US17467
LATITUDE 42-13.2 N
LONGITUI 140-41.1 E
DEPTH (m) 90

Press.	Temp.	Salinity	Sigma-T
5	8.5419	33.8202	26.2657
10	8.5477	33.8192	26.264
20	8.5516	33.8193	26.2635
30	8.5528	33.8191	26.2632
40	8.5434	33.8165	26.2626
50	8.5441	33.8178	26.2635
75	8.5108	33.8126	26.2645
87	8.3181	33.8054	26.2882

STATION US17468
LATITUDE 42-10.2 N
LONGITUI 140-40.9 E
DEPTH (m) 86

Press.	Temp.	Salinity	Sigma-T
5	9.2133	33.9277	26.2444
10	9.2333	33.927	26.2406
20	9.2044	33.918	26.2383
30	9.0014	33.8842	26.2442
40	8.7183	33.8715	26.2787
50	8.7091	33.8742	26.2822
75	8.1352	33.7831	26.2981
83	8.0871	33.7833	26.3054

STATION US17469
LATITUDE 42-06.2 N
LONGITUI 140-51.0 E
DEPTH (m) 70

Press.	Temp.	Salinity	Sigma-T
5	9.288	33.9331	26.2366
10	9.2914	33.9326	26.2357
20	9.3036	33.9358	26.2362
30	9.2135	33.8997	26.2225
40	8.9352	33.8842	26.2547
50	8.8596	33.8702	26.2555
67	8.7751	33.8705	26.2691

STATION US17470
LATITUDE 41-47.1 N
LONGITUI 140-40.2 E
DEPTH (m) 21

Press.	Temp.	Salinity	Sigma-T
5	10.6646	33.4202	25.6046
10	11.8736	33.9219	25.7756
20	11.9872	33.8688	25.7129

STATION US17471
LATITUDE 41-45.7 N
LONGITUI 140-40.1 E
DEPTH (m) 31

Press.	Temp.	Salinity	Sigma-T
5	12.3353	33.8972	25.6686
10	12.3598	33.9003	25.6663
20	12.2893	33.8818	25.6655
30	12.0075	33.8215	25.6724

STATION US17472
LATITUDE 41-43.5 N
LONGITUI 140-40.2 E
DEPTH (m) 69

Press.	Temp.	Salinity	Sigma-T
5	12.7749	33.9813	25.6483
10	12.7945	33.9807	25.6439
20	12.799	33.9792	25.6419
30	12.7887	33.9792	25.6439
40	12.7814	33.9773	25.6439
50	12.7617	33.9735	25.6448
68	12.4332	33.9223	25.6692

STATION US17473
LATITUDE 41-43.6 N
LONGITUI 140-38.3 E
DEPTH (m) 59

Press.	Temp.	Salinity	Sigma-T
5	12.5609	33.9527	25.668
10	12.5653	33.9508	25.6657
20	12.5586	33.9509	25.6671
30	12.5574	33.9462	25.6637
40	12.5696	33.9485	25.663
50	12.3282	33.8923	25.6661
56	12.2779	33.887	25.6717

STATION US17474
LATITUDE 41-43.6 N
LONGITUI 140-36.4 E
DEPTH (m) 36

Press.	Temp.	Salinity	Sigma-T
5	12.4908	33.9622	25.689
10	12.4937	33.9619	25.6882
20	12.4897	33.9568	25.685
30	12.4846	33.9564	25.6857
33	12.482	33.9552	25.6853

STATION US17475
LATITUDE 41-41.2 N
LONGITUI 140-34.4 E
DEPTH (m) 42

Press.	Temp.	Salinity	Sigma-T
5	12.508	33.9834	25.702
10	12.5157	33.9811	25.6988
20	12.5234	33.9808	25.6971
30	12.5242	33.9804	25.6966
40	12.5182	33.9786	25.6964

STATION US17476
LATITUDE 41-37.3 N
LONGITUI 140-30.2 E
DEPTH (m) 33

Press.	Temp.	Salinity	Sigma-T
5	12.5228	33.9866	25.7017
10	12.526	33.9849	25.6997
20	12.5272	33.9857	25.7001
30	12.5474	33.987	25.6972
32	12.5473	33.9868	25.6971

STATION US17477
LATITUDE 41-37.7 N
LONGITUI 140-28.0 E
DEPTH (m) 21

Press.	Temp.	Salinity	Sigma-T
5	11.7606	33.8907	25.7725
10	11.6858	33.8721	25.772
20	11.5745	33.8538	25.7784

STATION US17478
LATITUDE 41-38.0 N
LONGITUI 140-26.5 E
DEPTH (m) 17

Press.	Temp.	Salinity	Sigma-T
5	11.0595	33.8093	25.8376
10	11.0634	33.8068	25.835
16	11.1032	33.8121	25.832

STATION US17479
LATITUDE 41-34.5 N
LONGITUI 140-32.8 E
DEPTH (m) 67

Press.	Temp.	Salinity	Sigma-T
5	12.5891	34.0365	25.7275
10	12.5956	34.0362	25.726
20	12.541	34.0405	25.74
30	12.5259	34.0498	25.7501
40	12.4667	34.0579	25.7679
50	12.3844	34.0661	25.7902
63	12.259	34.0765	25.8224

STATION US17480
LATITUDE 41-34.7 N
LONGITUI 140-29.6 E
DEPTH (m) 45

Press.	Temp.	Salinity	Sigma-T
5	12.6307	34.0341	25.7174
10	12.6431	34.0342	25.7151
20	12.6391	34.0352	25.7167
30	12.6427	34.034	25.7151
40	12.4761	34.0526	25.762
44	12.3914	34.0664	25.7891

STATION US17481
LATITUDE 41-35.1 N
LONGITUI 140-26.4 E
DEPTH (m) 14

Press.	Temp.	Salinity	Sigma-T
5	11.8991	33.8681	25.729
10	11.865	33.84	25.7136
13	11.7416	33.7887	25.6968

STATION US17482
LATITUDE 41-28.2 N
LONGITUI 140-16.2 E
DEPTH (m) 18

Press.	Temp.	Salinity	Sigma-T
5	12.0983	34.0485	25.8314
10	12.1119	34.0497	25.8298
19	12.1177	34.0503	25.8291

STATION US17483
LATITUDE 41-26.4 N
LONGITUI 140-17.0 E
DEPTH (m) 61

Press.	Temp.	Salinity	Sigma-T
5	12.3868	34.0517	25.7786
10	12.4151	34.0506	25.7722
20	12.4171	34.0508	25.772
30	12.4161	34.0512	25.7725
40	12.3085	34.0605	25.8005
50	12.2668	34.0604	25.8084
60	12.2609	34.0609	25.81

STATION US17484
LATITUDE 41-28.6 N
LONGITUI 140-20.7 E
DEPTH (m) 63

Press.	Temp.	Salinity	Sigma-T
5	12.3697	34.038	25.7712
10	12.3729	34.0494	25.7795
20	12.3465	34.053	25.7873
30	12.3009	34.0583	25.8002
40	12.282	34.0665	25.8102
50	12.2834	34.0645	25.8084
61	12.281	34.0646	25.8089

STATION US17485
LATITUDE 41-44.9 N
LONGITUI 140-46.1 E
DEPTH (m) 45

Press.	Temp.	Salinity	Sigma-T
5	12.6108	33.991	25.688
10	12.6271	33.99	25.684
20	12.6259	33.99	25.6842
30	12.6322	33.9949	25.6868
40	12.6295	34.0016	25.6926
44	12.6238	34.0085	25.699

STATION US17486
LATITUDE 41-43.0 N
LONGITUI 140-46.7 E
DEPTH (m) 82

Press.	Temp.	Salinity	Sigma-T
5	12.5922	33.9864	25.688
10	12.6078	33.9828	25.6822
20	12.6149	33.9831	25.681
30	12.62	33.985	25.6815
40	12.6204	33.985	25.6814
50	12.6164	33.9863	25.6832
75	12.5272	34.0076	25.7171
79	12.5024	34.0213	25.7326

STATION US17487
LATITUDE 41-43.6 N
LONGITUI 140-52.3 E
DEPTH (m) 44

Press.	Temp.	Salinity	Sigma-T
5	12.6901	33.9797	25.6637
10	12.6959	33.9792	25.6622
20	12.6825	33.9857	25.6698
30	12.5511	34.0056	25.7109
40	12.3924	34.0155	25.7494