



HOKKAIDO UNIVERSITY

Title	9. The "Ushio Maru" Cruise 209, 210 and 211 in November 2010
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THE " USHIO MARU "

CRUISE 209

CRUISE 210

CRUISE 211

IN NOVEMBER 2010

1. Cruise Itinerary

Cruise 209

Departure from Hakodate	Nov.	1 , 2010
Arrival at Hakodate		1
Departure from Hakodate		2
Arrival at Fukushima		2
Departure from Fukushima		3
Arrival at Fukushima		3
Departure from Fukushima		4
Arrival at Fukushima		4
Departure from Fukushima		5
Return to Hakodate		6

Total coverage 176.0 miles

Cruise 210

Departure from Hakodate	Nov.	10 , 2010
Hydrographic research (US10545 - US10563)		11
Return to Hakodate		13

Total coverage 150.7 miles

Cruise 211

Departure from Hakodate	Nov.	17 , 2010
Start hydrographic research (US10564)		17
Arrival at Aomori		17
Departure from Aomori		18
Arrival at Ominato		18
Departure from Ominato		19
Finish hydrographic research (US10577)		19
Return to Hakodate		20

Total coverage 184.4 miles

2. Vessel Personnel

Captain:	Professor	Toshimi Meguro	
Crew:	Chief Officer	Assistant Professor	Osamu Kimura
	Second Officer	Assistant Professor	Naoto Kobayashi
	And 13 men		

Cruise 209

Graduate Students:	Chair of Marine Bioresource Science:	2 persons
	Graduate School of Environmental Science:	2 persons
Under Graduate Students:	Department of Marine Biology:	2 persons

Cruise 210

Research Staff:	Associate Professor	(Laboratory of Marine Bioresource and Environment Sensing)	
		Tohru Hirawake	
	Postdoctoral fellow	(Faculty of Fisheries Sciences)	
		Tomonori Isada	
Guest Scientist (Domestic):		(JAMSTEC)	Kenichi Sasaki
		(JAMSTEC)	Yoshiyuki Tanaka
		(Marine Works Japan .LTD)	Fujio Kobayashi

Graduate Students:	Chair of Marine Bioresource and Environment Sensing:	1 person
Under Graduate Students:	Department of Applied Marine Science:	2 persons

Cruise 211

Research Staff:	Associate Professor	(Laboratory of Marine Environmental Science)	
		Isao Kudo	
Graduate Students:	Graduate School of Environmental Science:	1 person	
Under Graduate Students:	Department of Marine Biology:	4 persons	

3. Data on Temperature, Salinity and Computed Dynamic Depth Anomaly

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 SBE9Plus and SBE-19). Dynamic computations were made using a desk-top computer aboard the “Ushio Maru”.

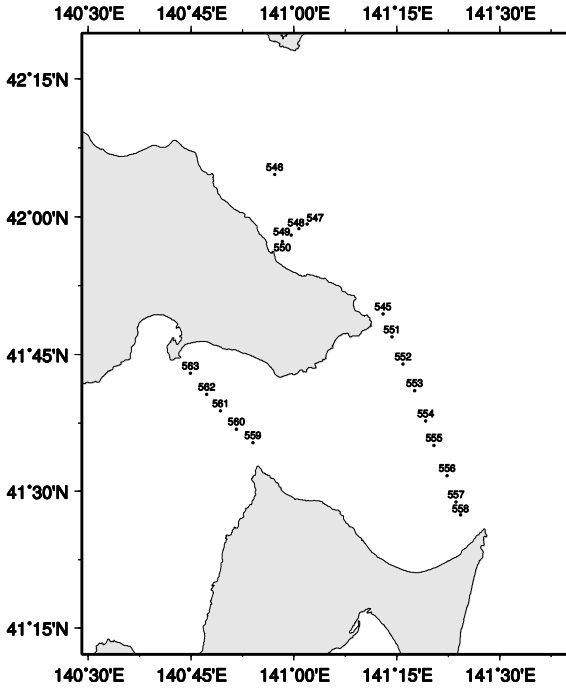


Figure 1: Oceanographic stations (Cruise 210)

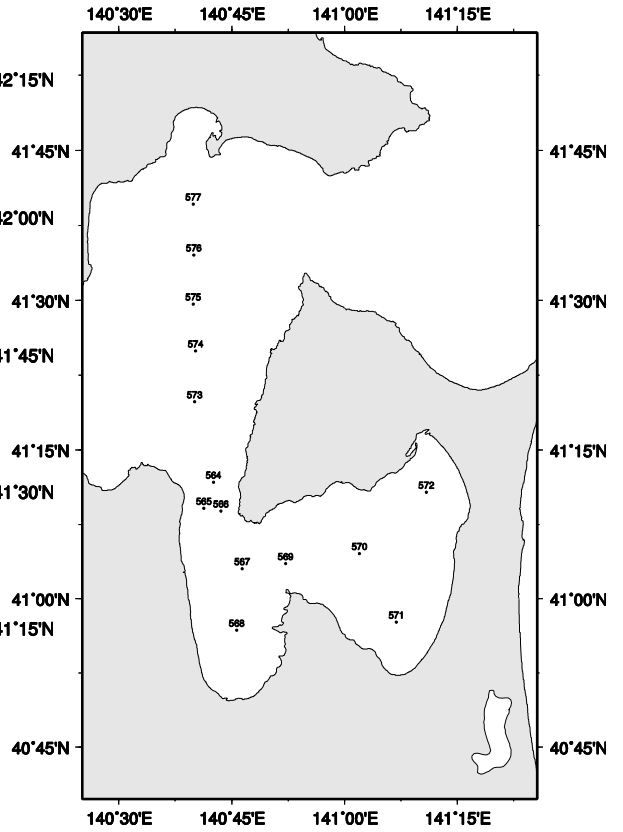


Figure 2: Oceanographic stations (Cruise 211)

Table 1: List of oceanographic stations

Cruise 209

No data

Cruise 210

Station	Lat. (N)*	Long (E)*	Date	S.M.T	Depth	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar. (hPa)
US10545	41-49.5	141-12.9	11/11	0647-0659	144	West-3	NW -1	West-5	6.6	12.9	bc	1015.6
US10546	42-04.7	140-57.1	11/11	0930-0938	84	West-4	NW -1	West-6	7.3	13.6	bc	1017.1
US10547	41-59.3	141-01.8	11/11	1038-1042	100	West-3	NW -1	West-5	8.2	13.5	bc	1018.1
US10548	41-58.8	141-00.6	11/11	1050-1055	94	West-3	NW -1	West-5	8.0	13.5	bc	1017.6
US10549	41-58.1	140-59.5	11/11	1104-1108	86	WNW-3	NW -1	WNW-5	8.2	13.6	bc	1017.7
US10550	41-57.4	140-58.2	11/11	1117-1120	78	WNW-2	NW -1	WNW-4	8.3	13.6	bc	1017.7
US10551	41-47.0	141-14.2	11/11	1313-1327	192	West-2	NW -1	West-4	8.9	13.5	bc	1018.0
US10552	41-44.0	141-15.8	11/11	1348-1401	227	West-2	West-1	West-5	9.3	13.6	bc	1018.0
US10553	41-41.1	141-17.5	11/11	1421-1439	234	West-3	West-1	West-5	9.3	14.6	bc	1018.5
US10554	41-37.8	141-19.1	11/11	1458-1512	217	West-3	West-1	West-5	9.2	14.5	bc	1019.0
US10555	41-35.1	141-20.3	11/11	1530-1549	306	West-3	West-1	West-5	9.2	14.9	bc	1019.6
US10556	41-31.8	141-22.2	11/11	1611-1628	243	West-3	West-1	West-5	9.3	16.5	bc	1019.8
US10557	41-28.9	141-23.5	11/11	1646-1654	89	West-3	West-1	West-5	9.4	16.2	c	1020.2
US10558	41-27.5	141-24.2	11/11	1704-1710	52	West-3	West-1	West-5	9.7	16.2	c	1020.6
US10559	41-35.4	140-53.9	11/11	1932-1935	58	West-3	West-1	West-5	8.3	16.4	bc	1021.6
US10560	41-36.9	140-51.5	11/11	1958-2002	94	WNW-2	West-1	WNW-4	7.9	16.7	bc	1022.0
US10561	41-38.9	140-49.2	11/11	2026-2038	326	NW -2	West-1	NW -4	7.8	16.4	bc	1021.5
US10562	41-40.7	140-47.2	11/11	2056-2104	227	NW -2	West-1	NW -4	7.4	14.8	bc	1021.1
US10563	41-43.0	140-44.8	11/11	2123-2126	83	NW-2	West-1	NW-3	7.3	15.9	bc	1021.5

Cruise 211

Station	Lat. (N)*	Long (E)*	Date	S.M.T	Depth	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar. (hPa)
US10564	41-11.8	140-42.5	11/17	1202-1209	73	SE -1	South-1	SE -3	9.4	17.0	bc	1022.5
US10565	41-09.2	140-41.2	11/17	1228-1232	53	SE -1	SE -1	SE -3	10.0	16.6	bc	1022.2
US10566	41-08.9	140-43.5	11/17	1249-1253	61	East-2	SE -1	East-4	9.8	16.8	bc	1022.1
US10567	41-03.1	140-46.3	11/17	1342-1348	53	East-2	East-1	East-4	9.9	15.7	c	1021.7
US10568	40-56.9	140-45.6	11/18	0706-0712	49	South-1	South-1	South-3	6.9	15.8	bc	1022.7
US10569	41-03.6	140-52.1	11/18	0845-0852	52	ESE-1	NE -1	ESE-3	10.9	15.9	bc	1022.8
US10570	41-04.6	141-01.9	11/18	0942-0949	48	ESE-1	SE -1	ESE-2	11.0	14.4	bc	1023.0
US10571	40-57.7	141-06.8	11/18	1107-1112	39	SE -1	SE -1	SE -3	11.6	14.7	bc	1022.8
US10572	41-10.8	141-10.8	11/18	1231-1238	31	East-1	SE -1	East-2	11.8	14.6	bc	1022.2
US10573	41-19.9	140-40.0	11/19	1001-1007	182	WSW-1	SW -1	WSW-3	12.8	16.7	c	1022.6
US10574	41-25.0	140-40.1	11/19	1040-1047	199	WSW-2	ESE-1	WSW-4	13.0	16.9	c	1022.5
US10575	41-29.7	140-39.8	11/19	1117-1125	213	North-1	ESE-1	North-3	12.5	17.0	c	1022.1
US10576	41-34.6	140-39.9	11/19	1155-1203	176	NE -1	NE -1	NE -3	12.0	15.7	bc	1021.7
US10577	41-39.7	140-39.8	11/19	1234-1238	118	NE -1	SE -1	NE -3	12.1	16.1	bc	1021.6

(*): Fixed position by Global Positioning System

Table 2: Oceanographic data

STATION US10545				STATION US10546				STATION US10547			
LATITUDE 41-49.5 N				LATITUDE 42-04.7 N				LATITUDE 41-59.3 N			
LONGITUDE 141-12.9 E				LONGITUDE 140-57.1 E				LONGITUDE 141-01.8 E			
DEPTH (m) 144				DEPTH (m) 84				DEPTH (m) 100			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	13.679	33.661	25.219	5	13.540	33.343	25.001	5	13.773	33.506	25.079
10	13.682	33.661	25.218	10	13.582	33.355	25.002	10	13.780	33.505	25.077
20	13.491	33.654	25.252	20	13.781	33.430	25.019	20	13.789	33.506	25.077
30	13.450	33.658	25.263	30	13.985	33.522	25.048	30	13.799	33.508	25.076
40	13.452	33.659	25.263	40	13.986	33.532	25.056	40	13.804	33.509	25.075
50	13.443	33.659	25.265	50	13.645	33.499	25.101	50	13.806	33.509	25.075
75	11.426	33.716	25.699	75	8.957	33.521	25.966	75	10.488	33.787	25.922
100	9.022	33.680	26.081								
125	7.909	33.728	26.288								
STATION US10548				STATION US10549				STATION US10550			
LATITUDE 41-58.8 N				LATITUDE 41-58.1 N				LATITUDE 41-57.4 N			
LONGITUDE 141-00.6 E				LONGITUDE 140-59.5 E				LONGITUDE 140-58.2 E			
DEPTH (m) 94				DEPTH (m) 86				DEPTH (m) 78			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	13.902	33.530	25.072	5	13.796	33.549	25.108	5	13.964	33.529	25.058
10	13.902	33.530	25.072	10	13.794	33.549	25.109	10	13.967	33.528	25.057
20	13.909	33.529	25.070	20	13.801	33.548	25.106	20	13.961	33.528	25.057
30	13.911	33.529	25.069	30	13.807	33.547	25.104	30	13.966	33.528	25.057
40	13.907	33.529	25.070	40	13.735	33.564	25.132	40	13.966	33.528	25.056
50	13.562	33.498	25.117	50	13.601	33.572	25.166	50	13.934	33.538	25.071
75	10.014	33.785	26.001	75	9.681	33.579	25.958	75	7.613	33.285	25.983
STATION US10551				STATION US10552				STATION US10553			
LATITUDE 41-47.0 N				LATITUDE 41-44.0 N				LATITUDE 41-41.1 N			
LONGITUDE 141-14.2 E				LONGITUDE 141-15.8 E				LONGITUDE 141-17.5 E			
DEPTH (m) 192				DEPTH (m) 227				DEPTH (m) 234			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	13.820	33.605	25.147	5	13.911	33.613	25.134	5	14.869	33.672	24.977
10	13.819	33.605	25.147	10	13.909	33.612	25.134	10	14.853	33.673	24.981
20	13.824	33.605	25.146	20	13.911	33.612	25.133	20	14.217	33.693	25.132
30	13.828	33.605	25.145	30	13.909	33.613	25.134	30	13.686	33.741	25.279
40	13.776	33.627	25.173	40	13.887	33.616	25.141	40	13.367	33.763	25.361
50	13.756	33.644	25.190	50	13.303	33.675	25.306	50	12.743	33.774	25.494
75	11.785	33.721	25.636	75	12.470	33.885	25.633	75	11.420	33.839	25.795
100	9.066	33.687	26.080	100	10.459	33.920	26.030	100	8.838	33.851	26.244
125	7.706	33.710	26.303	125	8.849	33.872	26.259	125	6.795	33.663	26.394
150	6.880	33.636	26.361	150	7.013	33.674	26.373	150	5.788	33.592	26.467
175	4.768	33.472	26.490	175	4.286	33.444	26.519	175	4.985	33.523	26.506
				200	3.467	33.410	26.573	200	3.703	33.424	26.562
STATION US10554				STATION US10555				STATION US10556			
LATITUDE 41-37.8 N				LATITUDE 41-35.1 N				LATITUDE 41-31.8 N			
LONGITUDE 141-19.1 E				LONGITUDE 141-20.3 E				LONGITUDE 141-22.2 E			
DEPTH (m) 217				DEPTH (m) 306				DEPTH (m) 243			
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	14.654	33.675	25.025	5	15.243	33.571	24.817	5	16.700	33.333	24.306
10	14.655	33.675	25.025	10	15.255	33.578	24.820	10	16.664	33.343	24.321
20	14.644	33.675	25.028	20	15.225	33.565	24.817	20	16.277	33.417	24.467
30	14.526	33.680	25.057	30	15.256	33.588	24.828	30	16.099	33.453	24.535
40	14.214	33.675	25.118	40	15.280	33.584	24.820	40	15.997	33.477	24.577
50	13.669	33.654	25.216	50	15.265	33.582	24.821	50	15.915	33.501	24.614
75	10.160	33.643	25.865	75	15.194	33.633	24.876	75	15.858	33.519	24.641
100	8.123	33.705	26.239	100	13.906	33.739	25.232	100	15.322	33.581	24.808
125	7.654	33.723	26.321	125	12.801	33.714	25.436	125	14.484	33.704	25.084
150	7.526	33.732	26.347	150	12.639	33.715	25.469	150	13.902	33.829	25.303
175	5.356	33.578	26.507	175	11.598	33.703	25.657	175	12.438	33.963	25.700
200	3.996	33.576	26.654	200	10.134	33.646	25.872	200	12.326	33.959	25.718
				250	6.865	33.696	26.410				
				300	5.176	33.638	26.576				

STATION US10557			
LATITUDE 41-28.9 N			
LONGITUDE 141-23.5 E			
DEPTH (m) 89			
Press.	Temp.	Salinity	Sigma-T
5	16.403	33.397	24.423
10	16.410	33.397	24.421
20	16.407	33.399	24.424
30	16.403	33.401	24.426
40	16.401	33.402	24.428
50	16.339	33.419	24.454
75	16.082	33.477	24.558

STATION US10560			
LATITUDE 41-36.9 N			
LONGITUDE 140-51.5 E			
DEPTH (m) 94			
Press.	Temp.	Salinity	Sigma-T
5	16.983	33.263	24.185
10	16.876	33.284	24.226
20	16.002	33.420	24.532
30	15.724	33.482	24.643
40	15.650	33.508	24.679
50	15.633	33.515	24.688
75	15.594	33.535	24.712

STATION US10563			
LATITUDE 41-43.0 N			
LONGITUDE 140-44.8 E			
DEPTH (m) 83			
Press.	Temp.	Salinity	Sigma-T
5	16.242	33.431	24.486
10	16.242	33.426	24.482
20	16.097	33.470	24.549
30	15.427	33.592	24.793
40	14.967	33.701	24.978
50	14.403	33.905	25.256
75	14.193	33.937	25.325

STATION US10566			
LATITUDE 41-08.9 N			
LONGITUDE 140-43.5 E			
DEPTH (m) 61			
Press.	Temp.	Salinity	Sigma-T
5	16.913	32.926	23.943
10	16.979	33.070	24.038
20	16.597	33.154	24.192
30	15.944	33.176	24.358
40	15.634	33.183	24.432
50	15.628	33.195	24.443

STATION US10569			
LATITUDE 41-03.6 N			
LONGITUDE 140-52.1 E			
DEPTH (m) 52			
Press.	Temp.	Salinity	Sigma-T
5	15.994	33.114	24.299
10	16.040	33.191	24.348
20	15.643	33.130	24.390
30	15.294	33.066	24.417
40	15.221	33.055	24.425

STATION US10572			
LATITUDE 41-10.8 N			
LONGITUDE 141-10.8 E			
DEPTH (m) 31			
Press.	Temp.	Salinity	Sigma-T
5	14.609	32.930	24.460
10	14.554	32.932	24.473
20	14.679	32.977	24.482

STATION US10558			
LATITUDE 41-27.5 N			
LONGITUDE 141-24.2 E			
DEPTH (m) 52			
Press.	Temp.	Salinity	Sigma-T
5	16.464	33.382	24.398
10	16.478	33.381	24.393
20	16.449	33.390	24.407
30	16.221	33.443	24.500
40	16.130	33.465	24.538

STATION US10561			
LATITUDE 41-38.9 N			
LONGITUDE 140-49.2 E			
DEPTH (m) 326			
Press.	Temp.	Salinity	Sigma-T
5	15.725	33.349	24.540
10	15.663	33.477	24.652
20	15.482	33.508	24.716
30	15.221	33.564	24.817
40	15.241	33.565	24.813
50	15.072	33.605	24.881
75	13.779	33.871	25.360
100	13.221	34.020	25.589
125	12.907	34.046	25.672
150	12.832	34.056	25.695
175	12.533	34.058	25.755
200	12.528	34.064	25.760
250	12.095	34.078	25.855
300	11.949	34.079	25.883

STATION US10564			
LATITUDE 41-11.8 N			
LONGITUDE 140-42.5 E			
DEPTH (m) 73			
Press.	Temp.	Salinity	Sigma-T
5	17.017	33.028	23.997
10	16.983	33.069	24.037
20	16.899	33.130	24.103
30	16.896	33.159	24.126
40	16.845	33.163	24.141
50	16.443	33.187	24.253

STATION US10567			
LATITUDE 41-03.1 N			
LONGITUDE 140-46.3 E			
DEPTH (m) 53			
Press.	Temp.	Salinity	Sigma-T
5	15.815	33.095	24.324
10	15.880	33.193	24.385
20	15.743	33.195	24.418
30	15.663	33.207	24.445
40	15.595	33.211	24.462

STATION US10570			
LATITUDE 41-04.6 N			
LONGITUDE 141-01.9 E			
DEPTH (m) 48			
Press.	Temp.	Salinity	Sigma-T
5	14.586	32.923	24.460
10	14.581	32.923	24.461
20	14.579	32.923	24.462
30	14.579	32.926	24.464
40	14.588	32.929	24.464

STATION US10573			
LATITUDE 41-19.9 N			
LONGITUDE 140-40.0 E			
DEPTH (m) 182			
Press.	Temp.	Salinity	Sigma-T
5	16.874	33.346	24.275
10	16.864	33.323	24.260
20	16.883	33.347	24.274
30	16.883	33.348	24.274
40	16.922	33.365	24.278
50	16.934	33.367	24.276
75	16.359	33.535	24.539
100	15.888	33.643	24.729
125	15.510	33.716	24.870
150	15.380	33.847	25.000
175	14.407	34.109	25.413

STATION US10559			
LATITUDE 41-35.4 N			
LONGITUDE 140-53.9 E			
DEPTH (m) 58			
Press.	Temp.	Salinity	Sigma-T
5	16.670	33.340	24.318
10	16.576	33.367	24.360
20	16.555	33.376	24.372
30	16.362	33.430	24.458
40	16.356	33.434	24.462
50	16.335	33.440	24.471

STATION US10562			
LATITUDE 41-40.7 N			
LONGITUDE 140-47.2 E			
DEPTH (m) 227			
Press.	Temp.	Salinity	Sigma-T
5	14.408	33.702	25.098
10	14.416	33.702	25.097
20	14.412	33.703	25.098
30	14.392	33.708	25.106
40	14.307	33.724	25.137
50	14.197	33.741	25.173
75	13.578	33.840	25.378
100	13.134	33.935	25.541
125	12.977	33.958	25.590
150	12.675	33.970	25.659
175	12.446	34.031	25.751
200	12.272	34.052	25.801

STATION US10565			
LATITUDE 41-09.2 N			
LONGITUDE 140-41.2 E			
DEPTH (m) 53			
Press.	Temp.	Salinity	Sigma-T
5	16.944	33.120	24.085
10	16.974	33.168	24.115
20	16.924	33.148	24.111
30	16.915	33.144	24.110
40	16.890	33.138	24.111

STATION US10568			
LATITUDE 40-56.9 N			
LONGITUDE 140-45.6 E			
DEPTH (m) 49			
Press.	Temp.	Salinity	Sigma-T
5	16.389	33.190	24.267
10	16.374	33.181	24.264
20	15.064	33.012	24.426
30	15.111	33.054	24.448
40	15.138	33.076	24.459

STATION US10571			
LATITUDE 40-57.7 N			
LONGITUDE 141-06.8 E			
DEPTH (m) 39			
Press.	Temp.	Salinity	Sigma-T
5	14.911	33.029	24.472
10	14.912	33.028	24.471
20	14.871	33.025	24.478
30	14.865	33.025	24.479

STATION US10574			
LATITUDE 41-25.0 N			
LONGITUDE 140-40.1 E			
DEPTH (m) 199			
Press.	Temp.	Salinity	Sigma-T
5	17.100	33.158	24.078
10	17.097	33.159	24.079
20	17.100	33.173	24.089
30	17.048	33.208	24.128
40	16.909	33.344	24.265
50	16.559	33.496	24.463
75	15.847	33.802	24.861
100	15.216	33.938	25.105
125	15.055	33.995	25.185
150	14.971	34.038	25.237
175	14.129	34.113	25.475

STATION		US10575	
LATITUDE		41-29.7	N
LONGITUDE		140-39.8	E
DEPTH (m)		213	
Press.	Temp.	Salinity	Sigma-T
5	17.345	33.131	23.999
10	17.327	33.126	23.999
20	17.112	33.241	24.138
30	16.967	33.302	24.219
40	16.852	33.326	24.265
50	16.715	33.349	24.314
75	16.249	33.420	24.476
100	15.186	33.707	24.935
125	14.488	34.098	25.387
150	13.809	34.169	25.585
175	12.616	34.173	25.828
200	11.946	34.184	25.965

STATION		US10576	
LATITUDE		41-34.6	N
LONGITUDE		140-39.9	E
DEPTH (m)		176	
Press.	Temp.	Salinity	Sigma-T
5	15.904	33.434	24.565
10	15.848	33.476	24.610
20	15.499	33.598	24.781
30	15.046	33.695	24.956
40	14.827	33.750	25.046
50	14.539	33.832	25.171
75	13.868	34.026	25.462
100	13.287	34.060	25.607
125	12.824	34.132	25.755
150	12.804	34.152	25.775

STATION		US10577	
LATITUDE		41-39.7	N
LONGITUDE		140-39.8	E
DEPTH (m)		118	
Press.	Temp.	Salinity	Sigma-T
5	16.394	33.270	24.327
10	16.355	33.276	24.341
20	16.057	33.392	24.498
30	15.838	33.451	24.593
40	15.381	33.578	24.792
50	14.632	33.754	25.090
75	13.678	33.981	25.466
100	12.901	34.129	25.737

