



Title	10. The "Ushio Maru" Cruise 212, 213 and 214 in November - December 2010
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THE " USHIO MARU "

CRUISE 212

CRUISE 213

CRUISE 214

IN NOVEMBER - DECEMBER 2010

1. Cruise Itinerary

Cruise 212

Departure from Hakodate	Nov.	29 ,	2010
Hydrographic research (US10578 - US10587)		29	
Return to Hakodate		29	

Total coverage 44.5 miles

Cruise 213

Departure from Hakodate	Dec.	13 ,	2010
Arrival at and departure from Mori		13	
Retrieval mooring ADCP system		13	
Anchorage at Muroran		13	
Departure from Muroran		14	
Start hydrographic research (US10588)		14	
Set mooring ADCP system		14	
Arrival at Muroran		14	
Departure from Muroran		15	
Finish hydrographic research (US10599)		15	
Return to Hakodate		16	

Total coverage 245.8 miles

Cruise 214

Departure from Hakodate	Dec.	20 ,	2010
Start hydrographic research (US10600)		20	
Arrival at Fukushima		20	
Departure from Fukushima		21	
Finish hydrographic research (US10622)		21	
Return to Hakodate		22	

Total coverage 132.0 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 212

Research Staff:	Professor	(Laboratory of Marine Bioresource Science)	Tetsuya Takatsu
Graduate Students:	Chair of Marine Bioresource Science:		2 persons
Under Graduate Students:	Department of Marine Biology:		2 persons

Cruise 213

Research Staff:	Professor	(Laboratory of Marine Environmental Science)	Kenshi Kuma
	Professor	(Laboratory of Marine Bioresource Science)	Tetsuya Takatsu
Research Students:	Faculty of Fisheries Sciences:		1 person
Graduate Students:	Chair of Marine Bioresource Science:		2 persons
	Graduate School of Environmental Science:		1 person
Under Graduate Students:	Department of Marine Biology:		6 persons

Cruise 214

Research Staff:	Professor	(Laboratory of Marine Bioresource Science)	Tetsuya Takatsu
Graduate Students:	Chair of Marine Bioresource Science:		2 persons
Under Graduate Students:	Department of Marine Biology:		3 persons
	Department of Applied Marine Science:		2 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".

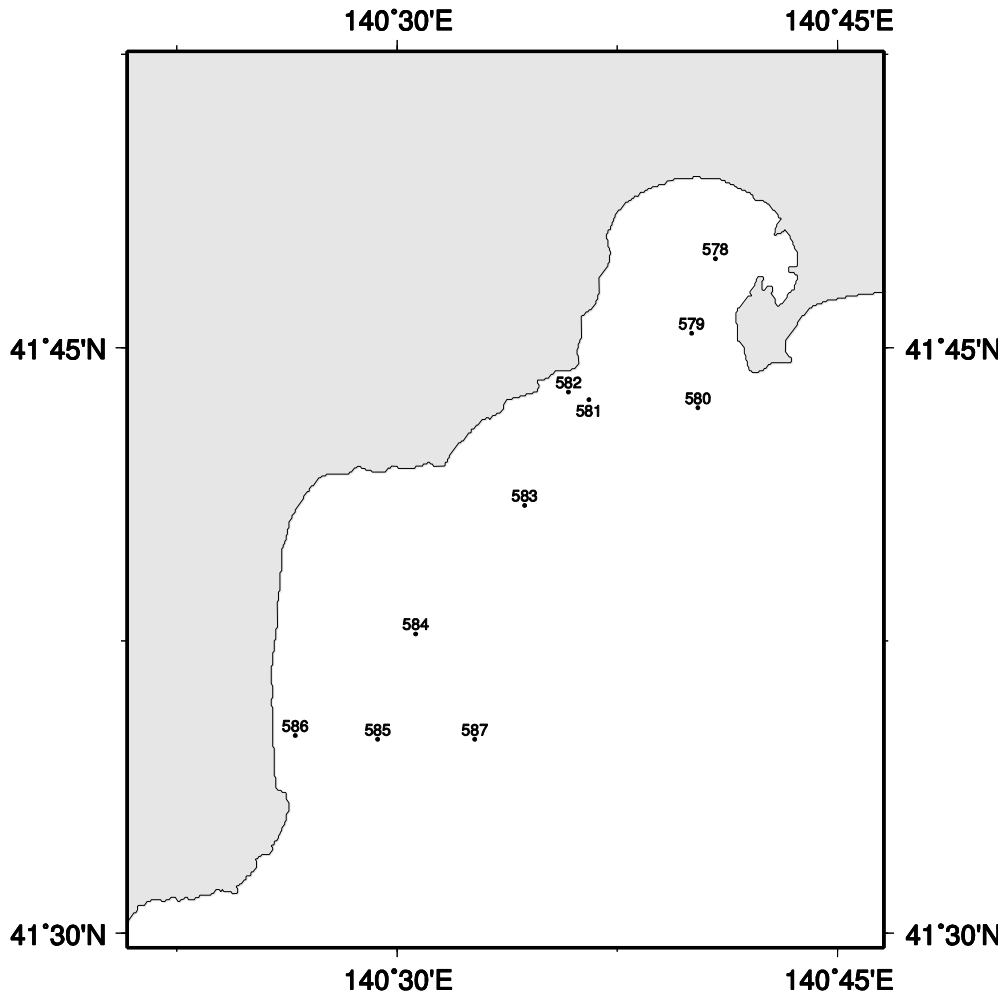


Figure 1: Oceanographic stations (Cruise 212)

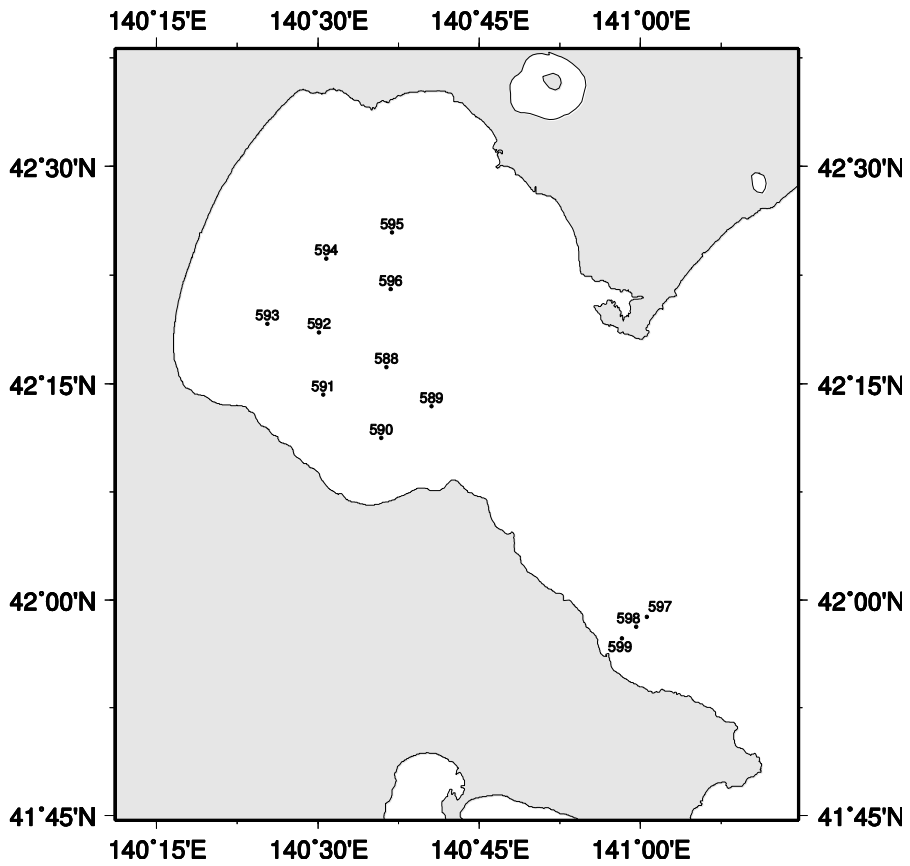


Figure 2: Oceanographic stations (Cruise 213)

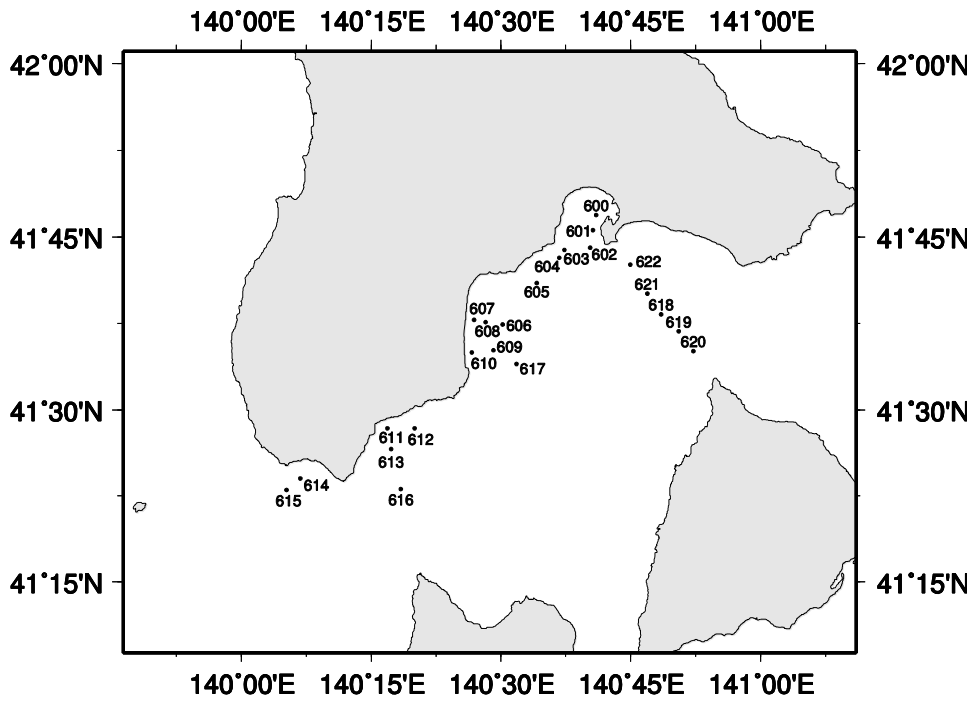


Figure 3: Oceanographic stations (Cruise 214)

Cruise 212

Station	Lat. (N)*	Long (E)*	Date	S.M.T	Depth	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar. (hPa)
US10578	41-47.3	140-40.8	11/29	0857-0859	20	West-1	SW -1	West-3	0.1	11.3	s	1013.6
US10579	41-45.4	140-40.0	11/29	0920-0923	42	West-1	SSW-1	West-3	0.1	13.7	s	1013.6
US10580	41-43.5	140-40.2	11/29	0942-0946	67	WNW-2	SSW-1	WNW-4	-0.2	13.7	s	1013.7
US10581	41-43.7	140-36.5	11/29	1013-1016	34	West-1	SSW-1	West-3	-0.2	13.6	s	1013.7
US10582	41-43.9	140-35.8	11/29	1021-1023	11	WSW-1	SSW-1	WSW-3	-0.2	13.0	s	1013.7
US10583	41-41.0	140-34.3	11/29	1058-1101	43	West-2	SSW-1	West-5	-0.1	13.6	s	1013.7
US10584	41-37.7	140-30.6	11/29	1135-1137	33	West-2	SW -1	West-5	1.5	13.7	s	1013.1
US10585	41-35.0	140-29.3	11/29	1200-1203	33	West-2	SW -1	West-5	1.1	13.7	s	1013.2
US10586	41-35.1	140-26.5	11/29	1225-1227	14	West-1	South-1	West-3	0.2	13.5	s	1013.2
US10587	41-35.0	140-32.6	11/29	1305-1308	55	NW -3	SW -1	NW -5	0.8	13.8	s	1013.4

Cruise 213

Station	Lat. (N)*	Long (E)*	Date	S.M.T	Depth	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar. (hPa)
US10588	42-16.2	140-36.3	12/14	0630-0637	91	NW -2	NW -1	NW -4	5.2	8.8	o	1009.6
US10589	42-13.5	140-40.5	12/14	0818-0822	89	NW -3	NW -1	NW -5	5.8	9.0	o	1008.8
US10590	42-11.3	140-35.8	12/14	0911-0915	82	NW -3	NW -1	NW -5	5.1	9.1	bc	1008.5
US10591	42-14.3	140-30.4	12/14	1012-1016	83	NW -4	NW -1	NW -6	4.8	8.9	bc	1008.0
US10592	42-18.6	140-30.0	12/14	1136-1142	92	NNW-4	NW -1	NNW-6	4.5	8.8	bc	1007.2
US10593	42-19.2	140-25.2	12/14	1249-1252	69	NNW-3	NW -1	NNW-5	4.8	8.6	bc	1005.6
US10594	42-23.7	140-30.7	12/14	1406-1412	95	NW -4	NW -1	NW -6	3.5	8.9	bc	1004.8
US10595	42-25.5	140-36.8	12/14	1519-1523	86	NW -3	NW -1	NW -5	3.3	8.9	c	1005.1
US10596	42-21.6	140-36.7	12/14	1600-1604	88	NW -3	NW -1	NW -5	2.9	8.9	c	1005.6
US10597	41-58.9	141-00.5	12/15	1005-1010	94	West-4	WNW-2	West-5	-2.9	10.9	bc	1003.6
US10598	41-58.2	140-59.5	12/15	1017-1021	88	West-4	WNW-2	West-5	-2.5	10.9	bc	1003.7
US10599	41-57.4	140-58.2	12/15	1030-1035	79	West-4	WNW-2	West-6	-2.9	10.7	bc	1003.5

Cruise 214

Station	Lat. (N)*	Long (E)*	Date	S.M.T	Depth	Wave	Swell	Wind	Air Temp.	Sea Temp.	Wr.	Bar. (hPa)
US10600	41-47.0	140-40.9	12/20	0848-0850	21	SSE-2	South-1	SSE-4	7.1	12.3	r	1007.6
US10601	41-45.7	140-40.5	12/20	0909-0912	31	SSE-3	South-1	SSE-5	7.1	12.5	r	1007.6
US10602	41-44.2	140-40.2	12/20	0931-0934	59	South-3	South-1	South-5	7.6	12.7	r	1007.2
US10603	41-44.0	140-37.2	12/20	1122-1124	41	West-2	South-1	West-4	7.5	12.5	bc	1007.1
US10604	41-43.3	140-36.6	12/20	1147-1150	52	West-3	South-1	West-4	7.4	11.4	bc	1007.0
US10605	41-41.1	140-34.0	12/20	1216-1219	41	WSW-2	South-1	WSW-4	6.8	12.5	r	1006.9
US10606	41-37.5	140-30.1	12/20	1255-1257	31	West-2	SSW-1	West-4	7.6	12.2	r	1007.2
US10607	41-37.9	140-26.8	12/20	1315-1317	17	West-2	South-1	West-5	7.0	11.9	r	1007.5
US10608	41-37.7	140-28.1	12/20	1332-1334	22	West-2	South-1	West-4	6.6	11.6	r	1007.6
US10609	41-35.3	140-29.0	12/20	1411-1413	31	West-2	South-1	West-4	7.3	12.3	r	1008.5
US10610	41-35.1	140-26.5	12/20	1427-1428	14	West-2	South-1	West-4	7.1	12.2	bc	1008.3
US10611	41-28.5	140-16.8	12/21	0709-0710	23	Calm	SSE-1	Calm	5.8	11.8	c	1018.7
US10612	41-28.5	140-19.9	12/21	0737-0740	60	West-1	South-1	West-2	5.8	12.6	bc	1019.1
US10613	41-26.7	140-17.2	12/21	0805-0808	62	West-1	SW -1	West-2	6.1	12.6	bc	1019.2
US10614	41-24.1	140-06.7	12/21	0914-0917	73	WNW-4	WSW-2	WNW-6	7.5	12.4	bc	1020.0
US10615	41-23.1	140-05.1	12/21	0930-0935	111	West-3	WSW-2	West-5	6.8	12.3	bc	1020.5
US10616	41-23.2	140-18.3	12/21	1045-1050	108	West-3	SW -2	West-5	7.6	12.5	bc	1020.1
US10617	41-34.1	140-31.7	12/21	1222-1226	64	NW -3	SW -1	NW -5	6.7	12.4	bc	1019.4
US10618	41-38.4	140-48.4	12/21	1356-1407	328	NW -2	West-1	NW -4	7.8	13.3	bc	1019.3
US10619	41-36.9	140-50.4	12/21	1421-1425	84	NW -2	West-1	NW -4	6.7	13.4	bc	1019.6
US10620	41-35.2	140-52.1	12/21	1442-1445	54	NW -2	West-1	NW -3	6.7	13.3	bc	1019.6
US10621	41-40.2	140-46.8	12/21	1523-1531	246	NW -2	West-1	NW -4	5.9	13.2	bc	1019.8
US10622	41-42.7	140-44.8	12/21	1550-1554	88	NW -2	SW -1	NW -4	5.8	13.4	bc	1020.1

(*): Fixed position by Global Positioning System

Table 2: Oceanographic data

STATION US10578				STATION US10579				STATION US10580			
LATITUDE	41-47.3	N		LATITUDE	41-45.4	N		LATITUDE	41-43.5	N	
LONGITUDE	140-40.8	E		LONGITUDE	140-40.0	E		LONGITUDE	140-40.2	E	
DEPTH (m)	20			DEPTH (m)	42			DEPTH (m)	67		
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	12.562	32.785	24.763	5	13.999	33.609	25.112	5	14.003	33.586	25.093
10	13.254	33.144	24.905	10	14.005	33.605	25.108	10	14.009	33.582	25.090
				20	14.024	33.608	25.107	20	14.014	33.582	25.088
				30	14.042	33.639	25.127	30	14.095	33.690	25.155
				40	14.083	33.682	25.151	40	13.986	33.719	25.200
								50	13.680	33.776	25.307
STATION US10581				STATION US10582				STATION US10583			
LATITUDE	41-43.7	N		LATITUDE	41-43.9	N		LATITUDE	41-41.0	N	
LONGITUDE	140-36.5	E		LONGITUDE	140-35.8	E		LONGITUDE	140-34.3	E	
DEPTH (m)	34			DEPTH (m)	11			DEPTH (m)	43		
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	13.855	33.624	25.154	5	13.189	33.432	25.141	5	13.835	33.577	25.122
10	13.893	33.645	25.163	10	12.937	33.370	25.143	10	13.849	33.575	25.118
20	13.995	33.735	25.210					20	13.862	33.588	25.125
30	13.909	33.746	25.237					30	13.904	33.600	25.125
								40	13.619	33.774	25.319
STATION US10584				STATION US10585				STATION US10586			
LATITUDE	41-37.7	N		LATITUDE	41-35.0	N		LATITUDE	41-35.1	N	
LONGITUDE	140-30.6	E		LONGITUDE	140-29.3	E		LONGITUDE	140-26.5	E	
DEPTH (m)	33			DEPTH (m)	33			DEPTH (m)	14		
Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T	Press.	Temp.	Salinity	Sigma-T
5	13.950	33.614	25.127	5	14.054	33.618	25.108	5	13.866	33.537	25.084
10	13.959	33.618	25.127	10	14.063	33.617	25.105	10	13.940	33.608	25.124
20	13.968	33.624	25.131	20	14.054	33.630	25.117				
30	13.924	33.721	25.214	30	13.981	33.694	25.182				

STATION		US10608	
LATITUDE	41-37.7	N	
LONGITUDE	140-28.1	E	
DEPTH (m)	22		
Press.	Temp.	Salinity	Sigma-T
5	11.539	33.450	25.471
10	11.549	33.475	25.489
20	11.590	33.478	25.483

STATION		US10611	
LATITUDE	41-28.5	N	
LONGITUDE	140-16.8	E	
DEPTH (m)	23		
Press.	Temp.	Salinity	Sigma-T
5	12.665	33.747	25.488
10	12.668	33.704	25.454

STATION		US10614	
LATITUDE	41-24.1	N	
LONGITUDE	140-06.7	E	
DEPTH (m)	73		
Press.	Temp.	Salinity	Sigma-T
5	12.560	33.623	25.412
10	12.285	33.739	25.556
20	12.248	33.770	25.587
30	12.122	33.829	25.656
40	12.060	33.879	25.707
50	11.886	33.961	25.804

STATION		US10617	
LATITUDE	41-34.1	N	
LONGITUDE	140-31.7	E	
DEPTH (m)	64		
Press.	Temp.	Salinity	Sigma-T
5	12.634	33.669	25.434
10	12.637	33.666	25.431
20	12.647	33.667	25.430
30	12.643	33.666	25.430
40	12.587	33.679	25.451
50	12.337	33.727	25.536

STATION		US10620	
LATITUDE	41-35.2	N	
LONGITUDE	140-52.1	E	
DEPTH (m)	54		
Press.	Temp.	Salinity	Sigma-T
5	13.626	33.455	25.070
10	13.640	33.456	25.068
20	13.642	33.457	25.068
30	13.650	33.457	25.067
40	13.651	33.457	25.067
50	13.656	33.459	25.067

STATION		US10609	
LATITUDE	41-35.3	N	
LONGITUDE	140-29.0	E	
DEPTH (m)	31		
Press.	Temp.	Salinity	Sigma-T
5	12.544	33.639	25.428
10	12.548	33.640	25.428
20	12.564	33.667	25.445
30	12.570	33.668	25.445

STATION		US10612	
LATITUDE	41-28.5	N	
LONGITUDE	140-19.9	E	
DEPTH (m)	60		
Press.	Temp.	Salinity	Sigma-T
5	12.859	33.678	25.397
10	12.879	33.739	25.440
20	12.816	33.789	25.491
30	12.617	33.823	25.557
40	11.937	33.897	25.744
50	11.864	33.904	25.764

STATION		US10615	
LATITUDE	41-23.1	N	
LONGITUDE	140-05.1	E	
DEPTH (m)	111		
Press.	Temp.	Salinity	Sigma-T
5	12.536	33.590	25.392
10	12.537	33.603	25.401
20	11.984	33.805	25.664
30	11.738	33.875	25.765
40	11.526	33.939	25.853
50	11.394	33.973	25.904
75	11.310	34.026	25.961
100	11.301	34.035	25.969

STATION		US10618	
LATITUDE	41-38.4	N	
LONGITUDE	140-48.4	E	
DEPTH (m)	328		
Press.	Temp.	Salinity	Sigma-T
10	13.601	33.501	25.111
20	13.606	33.494	25.105
30	13.607	33.495	25.106
40	13.601	33.499	25.109
50	13.575	33.508	25.122
75	13.489	33.535	25.160
100	13.321	33.587	25.234
125	13.000	33.694	25.382
150	12.855	33.730	25.437
175	12.643	33.765	25.507
200	12.551	33.767	25.526
250	12.506	33.784	25.548
300	11.950	33.827	25.688

STATION		US10621	
LATITUDE	41-40.2	N	
LONGITUDE	140-46.8	E	
DEPTH (m)	246		
Press.	Temp.	Salinity	Sigma-T
5	13.520	33.517	25.140
10	13.516	33.518	25.141
20	13.529	33.519	25.140
30	13.513	33.526	25.148
40	13.491	33.533	25.158
50	13.455	33.546	25.175
75	13.301	33.613	25.259
100	13.145	33.648	25.317
125	13.006	33.706	25.390
150	12.580	33.784	25.534
175	12.307	33.803	25.601
200	11.890	33.844	25.712

STATION		US10610	
LATITUDE	41-35.1	N	
LONGITUDE	140-26.5	E	
DEPTH (m)	14		
Press.	Temp.	Salinity	Sigma-T
5	11.843	33.156	25.187
10	12.001	33.540	25.455

STATION		US10613	
LATITUDE	41-26.7	N	
LONGITUDE	140-17.2	E	
DEPTH (m)	62		
Press.	Temp.	Salinity	Sigma-T
5	12.862	33.649	25.374
10	12.870	33.649	25.372
20	12.889	33.733	25.434
30	12.737	33.782	25.501
40	12.560	33.800	25.550
50	12.426	33.835	25.603

STATION		US10616	
LATITUDE	41-23.2	N	
LONGITUDE	140-18.3	E	
DEPTH (m)	108		
Press.	Temp.	Salinity	Sigma-T
5	12.733	33.755	25.481
10	12.746	33.759	25.481
20	12.763	33.754	25.475
30	12.747	33.756	25.479
40	12.622	33.803	25.540
50	12.554	33.814	25.562
75	12.082	33.879	25.703
100	11.815	33.917	25.783

STATION		US10619	
LATITUDE	41-36.9	N	
LONGITUDE	140-50.4	E	
DEPTH (m)	84		
Press.	Temp.	Salinity	Sigma-T
5	13.614	33.493	25.102
10	13.613	33.491	25.101
20	13.632	33.490	25.096
30	13.634	33.490	25.096
40	13.634	33.490	25.095
50	13.636	33.489	25.094
75	13.410	33.544	25.183

STATION		US10622	
LATITUDE	41-42.7	N	
LONGITUDE	140-44.8	E	
DEPTH (m)	88		
Press.	Temp.	Salinity	Sigma-T
5	13.615	33.535	25.134
10	13.624	33.548	25.143
20	13.619	33.559	25.152
30	13.607	33.568	25.161
40	13.570	33.571	25.171
50	13.501	33.574	25.188
75	13.122	33.651	25.324