

Cruise Report
R/V Alpha Helix
Cruise Number: HX284
FOCI Cruise Number: 1HX04

ACTIVITIES: FOCI and GLOBEC May CTD Survey

LOCATION: Gulf of Alaska

DATES: 15-26 May 2004

HX284 was both a GLOBEC CTD (conductivity, temperature and depth) survey of the continental shelf of the Gulf of Alaska and a FOCI cruise to study eddies off the shelf of the Gulf of Alaska. Scientists participating in the cruise were from NOAA's Pacific Marine Environmental Laboratory (PMEL) and Alaska Fisheries Science Center (AFSC), both located in Seattle Washington. Participating scientists were Elaina Jorgensen (AFSC), David Kachel (PMEL), Dylan Righi (PMEL), and Sigrid Salo (PMEL), the Chief Scientist.

The goal of cruise HX284 was to survey hydrographic conditions, collect chlorophyll and nutrient samples, and carry out a small number of bongo tows in the Gulf of Alaska on the shelf east and south of Kodiak Island and in a large eddy. In many years, this eddy forms in late winter near Kayak Island in the eastern Gulf of Alaska. It moves west and by May its center is often near 58° 30'N, 145°W. This year, although there was a weak eddy in this area, a stronger eddy from the previous year had stalled south of Kodiak Island. We had measured conditions in the stronger eddy twice during the previous year when it was farther east, and decided to measure how it had changed over the winter.

We began the cruise with CTD measurements at transect K2, the Gore Point box, transects across Portlock Bank, Chiniak Trough, and Barnabus Trough ([Table 1](#), [Figure 1](#)). These casts were made to 10 m off the bottom. Nutrient samples were taken at every cast, but chlorophyll was sampled only at sites near PMEL moorings. We then carried out a CTD survey from the shelf through the "old" eddy using satellite altimeter data to estimate the location of the center of the eddy. We deployed ARGOS drifters near the estimated center. Using these drifters, and two deployed a few days earlier by NOAA ship *Miller Freeman*, we were able to determine a more precise position for the center of the eddy and pass through this center during a second along-shore transect. In the first pass through the eddy, casts were 10 nautical miles apart and all casts were made to 1500m or 10m off bottom in shallower water. In the second transect through the eddy, spacing was 10 nautical miles at the edges of the eddy, but 5 nautical miles closer to the center. Cast depths were 500m at the edges of the eddy, and alternated between 500m and 1500m near the center. Nutrients and chlorophyll were sampled at all casts during the offshore transect, and at the 1500m casts of the alongshore transect. We took bongo tows at the edges of the eddy on the offshore transect and at the center of the eddy during both passes.

After finishing the second transect through the eddy from 2003, we had time to also complete one transect through the new eddy. Satellite altimetry suggested that there were two eddies in the central Gulf of Alaska, and that the eastern eddy was in the process of engulfing the western one. Although we did not have an accurate position for the center of either eddy, we surveyed a transect just north of 58° N, from 148° W to 143.5° W with CTDs to 750 m and deployed a drifter near the estimated center of the stronger eddy. The final transects of the cruise were just east of Montague Island, just south of Hinchinbrook Entrance to Prince William Sound.

In [Figure 1](#), we plot the locations of all the CTDs, ARGOS drifter deployments, and Bongo tows. We also present preliminary plots of the CTD transects, recognizing that the data are not yet fully processed and de-spiked. The positions and dates of all 158 CTD casts are specified in [Table 1](#), ARGOS deployments are described in [Table 2](#), and Bongo tows are listed in [Table 3](#).

This research cruise was supported by both GLOBEC and FOCI goals. CTDs were done to provide ground truth at a series of moorings deployed off Gore Point and Seward that are part of GLOBEC. CTDs carried out in the eddies support FOCI goals.

We would like to acknowledge that, as always, the crew of *Alpha Helix* were extremely capable and helpful in carrying out the operations of this cruise.

Attachments:

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Table 1: CTD Positions, HX284

Cast#	Date	Position	Depth	CastID
PMEL Moorings near Seward				

001	15 May	2006	59 42.74	149 20.33	234	PMEL M1
002	15 May	2150	59 31.77	149 11.57	219	PMEL M2
003	15 May	2355	59 18.46	148 59.89	186	PMEL M3
004	16 May	0250	59 07.28	148 45.49	149	PMEL M4

Transect K2

005	16 May	0656	59 31.14	149 49.50	199	K2-1
006	16 May	0806	59 24.61	149 42.76	127	K2-2
007	16 May	0920	59 18.13	149 36.60	122	K2-3
008	16 May	1018	59 11.58	149 30.23	138	K2-4
009	16 May	1126	59 05.09	149 23.89	192	K2-5
010	16 May	1235	58 58.50	149 17.64	225	K2-6
011	16 May	1340	58 52.06	149 11.17	205	K2-7
012	16 May	1439	58 45.43	149 04.94	213	K2-8
013	16 May	1559	58 41.00	148 50.63	203	K2-9
014	16 May	1640	58 38.88	148 58.04	134	K2-10
015	16 May	1742	58 32.48	148 52.54	113	K2-11
016	16 May	1845	58 25.93	148 46.22	124	K2-12
017	16 May	1950	58 19.60	148 39.83	141	K2-13
018	16 May	2113	58 13.36	148 33.78	768	K2-14
019	16 May	2255	58 06.82	148 27.81	1080	K2-15
020	17 May	0046	58 00.38	148 21.80	1107	K2-16

Gore Point Transect

021	17 May	1550	59 09.47	151 00.59	68	GPE-1
022	17 May	1628	59 06.05	150 59.40	169	GPE-2
023	17 May	1712	59 01.38	150 57.62	161	GPE-3
024	17 May	1756	58 57.86	150 55.96	139	GPE-4
025	17 May	1840	58 53.36	150 54.44	141	GPE-5
026	17 May	1928	58 49.47	150 53.27	183	GPE-6
027	17 May	2018	58 45.13	150 52.19	177	GPE-7
028	17 May	2105	58 41.27	150 50.03	194	GPE-8
029	17 May	2152	58 37.17	150 48.48	203	GPE-9
030	17 May	2237	58 33.10	150 46.75	153	GPE-10

Southern side Gore Point Box

031	17 May	2319	58 29.16	150 45.10	91	GPS-6
032	18 May	0013	58 28.20	150 56.65	75	GPS-5
033	18 May	0107	58 27.34	151 08.35	99	GPS-4
034	18 May	0201	58 26.51	151 20.14	131	GPS-3
035	18 May	0300	58 25.62	151 31.82	167	GPS-2
036	18 May	0353	58 24.83	151 43.46	162	GPS-1

Cast#	Date		Position	Depth	CastID
Barren Islands, Western side of Gore Point Box					
037	18 May	0641	58 40.26 152 25.63	90	GPW-12

038	18 May	0713	58 42.67	152 24.39	152	GPW-11
039	18 May	0739	58 45.04	152 23.38	124	GPW-10
040	18 May	0804	58 47.33	152 21.97	132	GPW-9
041	18 May	0837	58 49.73	152 20.88	100	GPW-8
042	18 May	0950	58 59.04	152 18.05	92	GPW-7
043	18 May	1022	59 01.65	152 15.90	130	GPW-6
044	18 May	1049	59 04.06	152 12.78	136	GPW-5
045	18 May	1124	59 06.65	152 10.13	158	GPW-4
046	18 May	1150	59 09.16	152 07.38	149	GPW-3
047	18 May	1222	59 11.61	152 04.63	100	GPW-2
048	18 May	1250	59 13.94	152 02.02	85	GPW-1

Portlock Bank

049	18 May	1850	58 38.99	150 33.76	218	PB-1
050	18 May	1902	58 34.42	150 35.43	178	PB-2
051	18 May	1944	58 29.76	150 37.29	89	PB-3
052	18 May	2026	58 25.24	150 39.13	73	PB-4
053	18 May	2108	58 20.66	150 40.78	62	PB-5
054	18 May	2151	58 16.02	150 41.50	66	PB-6
055	18 May	2237	58 11.40	150 44.18	123	PB-7
056	18 May	2324	58 06.77	150 45.91	155	PB-8
057	19 May	0009	58 02.09	150 47.55	145	PB-9
058	19 May	0054	57 57.41	150 49.17	102	PB-10
059	19 May	0135	57 52.78	150 50.96	79	PB-11
060	19 May	0216	57 48.11	150 52.82	78	PB-12
061	19 May	0256	57 43.45	150 54.69	78	PB-13

Chiniak Trough

062	19 May	0352	57 39.71	151 05.87	74	CH-10
063	19 May	0449	57 36.08	151 17.12	67	CH-9
064	19 May	0517	57 34.34	151 21.08	72	CH-8
065	19 May	0555	57 31.53	151 26.54	78	CH-7
066	19 May	0617	57 30.65	151 28.10	144	CH-6
067	19 May	0646	57 29.31	151 30.39	161	CH-5
068	19 May	0713	57 27.96	151 32.60	134	CH-4
069	19 May	0741	57 26.36	151 35.24	67	CH-3
070	19 May	0805	57 24.84	151 38.46	68	CH-2
071	19 May	0838	57 22.66	151 42.81	65	CH-1
072	19 May	0950	57 15.96	151 55.28	72	CB-2
073	19 May	1103	57 09.27	152 07.66	85	CB-1

Cast#	Date	Position	Depth	CastID
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Barnabus Trough

074	19 May	1239	56 54.93	152 09.84	86	BA-7
075	19 May	1328	56 52.80	152 16.58	86	BA-6

076	19 May	1404	56 50.58	152 23.24	150	BA-5
077	19 May	1449	56 48.39	152 29.88	162	BA-4
078	19 May	1527	56 46.20	152 36.63	99	BA-3
079	19 May	1604	56 43.99	152 43.43	76	BA-2
080	19 May	1638	56 41.89	152 50.00	64	BA-1

North-South Transect through 2003 Eddy

081	19 May	1742	56 32.19	152 51.87	71	EDN-1
082	19 May	1908	56 21.13	152 42.02	215	EDN-2
083	19 May	2030	56 19.77	152 40.77	686	EDN-3
084	19 May	2246	56 18.54	152 39.70	1050	EDN-4
085	20 May	0118	56 14.27	152 35.12	2400	EDN-5
086	20 May	0335	56 05.64	152 23.58	4134	EDN-6
087	20 May	0550	55 56.35	152 14.81	5000+	EDN-7
088	20 May	0742	55 47.35	152 07.23	5000+	EDN-8
089	20 May	1153	55 37.93	152 00.13	5000+	EDN-9
090	20 May	1625	55 28.97	151 52.34	5000+	EDN-10
091	20 May	1820	55 19.60	151 43.91	5000+	EDN-11
092	20 May	2104	55 10.91	151 36.09	4088	EDN-12
093	20 May	2332	55 02.10	151 28.37	4010	EDN-13
094	21 May	0246	54 53.07	151 20.70	2405	EDN-14

West-East Transect through 2003 Eddy

095	21 May	1005	55 19.33	153 17.67	5000+	EDW-1
096	21 May	1149	55 24.00	153 01.07	5000+	EDW-2
097	21 May	1320	55 28.44	152 44.46	5000+	EDW-3
098	21 May	1430	55 30.91	152 36.06	5000+	EDW-4
099	21 May	1540	55 32.93	152 27.69	5000+	EDW-5
100	21 May	1729	55 35.45	152 19.49	5000+	EDW-6
101	21 May	1848	55 37.94	152 11.93	5000+	EDW-7
102	21 May	2011	55 40.02	152 02.56	5000+	EDW-8
103	21 May	2132	55 42.42	151 53.83	5000+	EDW-9
104	21 May	2351	55 44.20	151 45.73	5000+	EDW-10
105	22 May	0109	55 46.49	151 37.08	5000+	EDW-11
106	22 May	0232	55 48.79	151 29.38	5000+	EDW-12
107	22 May	0352	55 50.93	151 20.57	5000+	EDW-13
108	22 May	0518	55 53.22	151 12.58	5000+	EDW-14
109	22 May	0614	55 55.42	151 04.23	5000+	EDW-15
110	22 May	0746	55 59.96	150 48.17	5000+	EDW-16
111	22 May	0921	56 04.67	150 31.90	5000+	EDW-17
112	22 May	1057	56 08.25	150 15.37	5000+	EDW-18

Cast#	Date	Position	Depth	CastID
113	22 May	1238	56 13.70 149 58.59	5000+ EDW-19

West-East Transect through 2004 Eddy

114	23 May	0309	58 10.74 147 53.88	2213 ED2W-3
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115	23 May	0430	58 10.75	147 41.96	2541	ED2W-4
116	23 May	0548	58 10.81	147 29.85	2793	ED2W-5
117	23 May	0703	58 10.90	147 17.56	2597	ED2W-6
118	23 May	0815	58 11.12	147 05.44	3800	ED2W-7
119	23 May	0931	58 11.12	146 53.37	4300	ED2W-8
120	23 May	1045	58 11.22	146 41.46	4776	ED2W-9
121	23 May	1206	58 11.23	146 29.17	4800	ED2W-10
122	23 May	1314	58 10.96	146 17.52	4650	ED2W-11
123	23 May	1428	58 10.92	146 05.54	4533	ED2W-12
124	23 May	1543	58 10.88	145 54.07	4371	ED2W-13
125	23 May	1703	58 10.85	145 42.01	4134	ED2W-14
126	23 May	1833	58 10.86	145 30.25	3500	ED2W-15
127	23 May	1959	58 10.91	145 18.14	3953	ED2W-16
128	23 May	2124	58 11.06	145 06.15	3926	ED2W-17
129	23 May	2245	58 11.09	144 53.99	3886	ED2W-18
130	24 May	0007	58 11.03	144 41.78	3834	ED2W-19
131	24 May	0714	58 10.89	144 41.71	3833	ED2W-19
132	24 May	0813	58 10.88	144 30.14	3800	ED2W-20
133	24 May	0950	58 10.81	144 17.98	3722	ED2W-21
134	24 May	1107	58 10.98	144 06.27	3673	ED2W-22
135	24 May	1232	58 11.27	143 54.36	3642	ED2W-23
136	24 May	1401	58 11.15	143 43.05	3652	ED2W-24
137	24 May	1530	58 11.29	143 30.64	3634	ED2W-25

Northern transect, east of Montague Island (Hinchinbrook)

138	25 May	1727	59 49.98	147 20.32	68	HN-1
139	25 May	1803	59 49.87	147 15.51	90	HN-2
140	25 May	1842	59 49.87	147 10.37	211	HN-3
141	25 May	1924	59 49.84	147 05.33	207	HN-4
142	25 May	1956	59 50.04	146 59.99	175	HN-5
143	25 May	2037	59 50.00	146 55.19	91	HN-6
144	25 May	2105	59 50.04	146 50.18	72	HN-7

Central Hinchinbrook Transect

145	25 May	2246	59 34.93	146 50.06	132	HM-7
146	25 May	2322	59 34.97	146 55.03	172	HM-6
147	25 May	2354	59 34.95	147 00.12	215	HM-5
148	26 May	0027	59 34.91	147 05.07	209	HM-4
149	26 May	0100	59 34.92	147 10.11	202	HM-3
150	26 May	0134	59 35.00	147 14.95	204	HM-2
151	26 May	0208	59 34.98	147 19.90	146	HM-1

<u>Cast#</u>	<u>Date</u>	<u>Position</u>	<u>Depth</u>	<u>CastID</u>
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Southern Hinchinbrook Transect

152	26 May	0359	59 20.13	147 19.85	171	HS-1
153	26 May	0433	59 19.95	147 14.78	187	HS-2
154	26 May	0508	59 19.94	147 09.64	194	HS-3

155	26 May	0539	59 19.94	147 04.85	199	HS-4
156	26 May	0613	59 19.88	146 59.77	193	HS-5
157	26 May	0644	59 20.04	146 54.96	193	HS-6
158	26 May	0716	59 20.02	146 50.03	183	HS-7

Table 2: ARGOS Drifter Deployments

CTD#	Date	Position		Depth	Drifter #
001	15 May	2027	59 42.74 149 20.24	232	43727
002	15 May	2206	59 31.78 149 11.68	221	43728
003	16 May	0111	59 17.82 148 55.32	168	43717
004	16 May	0258	59 07.33 148 45.47	149	43718
089	20 May	1344	55 37.73 151 59.97	5000+	43726
103	21 May	2302	55 41.96 151 54.58	5000+	43725
125	23 May	1736	58 10.78 145 39.68	4134	43720

Table 3: Bongo Tows

Bongo#	Date	Position		Depth
001	16 May	0040	59 18.03 148 57.35	187
002	17 May	0121	58 00.71 148 22.40	1091
003	17 May	0302	58 06.06 148 27.13	1100
004	17 May	0513	58 12.76 148 33.44	871
005	19 May	1944	56 21.25 152 42.03	190
006	19 May	2106	56 19.79 152 40.76	625
007	19 May	2328	56 18.20 152 39.99	1137
008	20 May	0906	55 47.51 152 07.02	5000
009	20 May	1239	55 37.88 152 00.68	5000
010	20 May	1450	55 28.59 151 52.53	5000
011	21 May	0026	55 01.64 151 28.51	5000
012	21 May	2018	55 42.16 151 54.22	5000
013	26 May	0825	59 10.76 146 44.74	927
014	26 May	1040	59 04.70 146 50.28	2000+

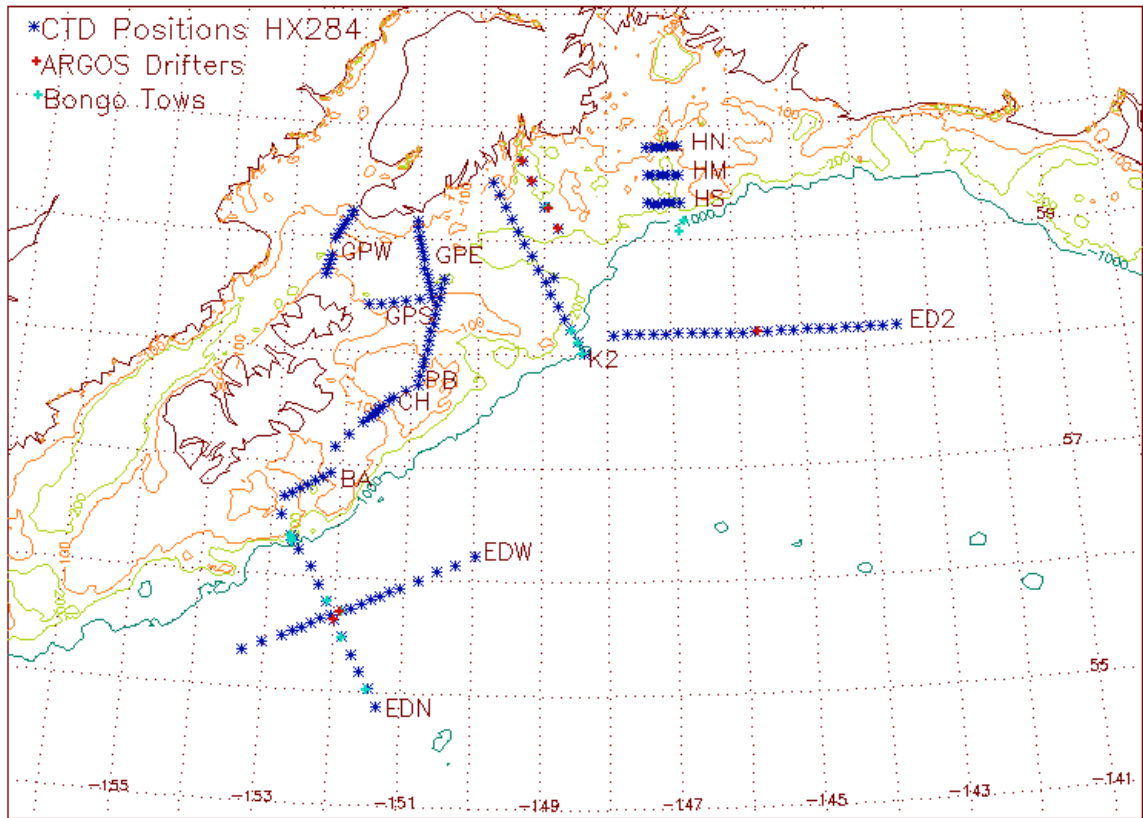


Figure 1: CTD Positions

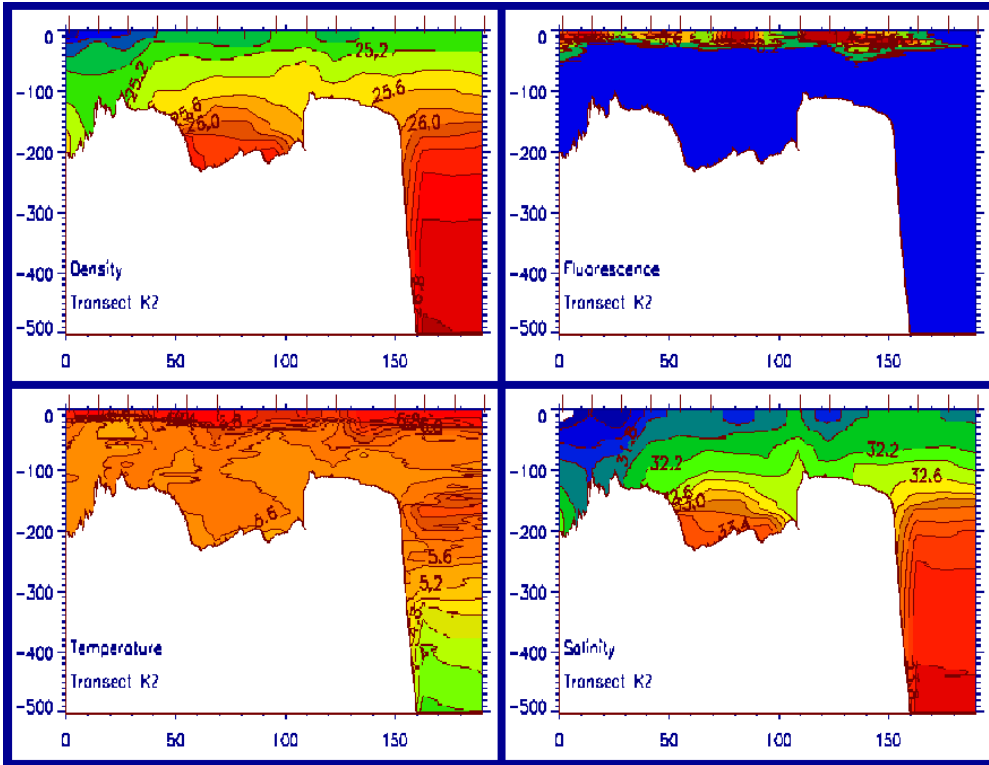


Figure 2: Transect K2

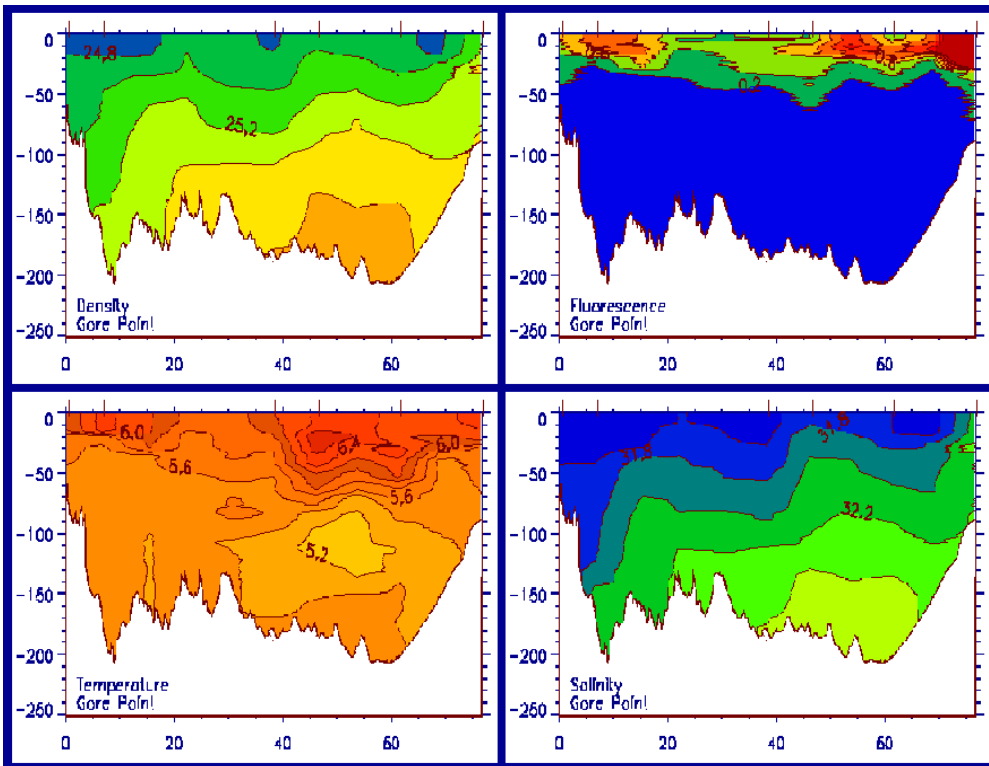


Figure 3: Gore Point

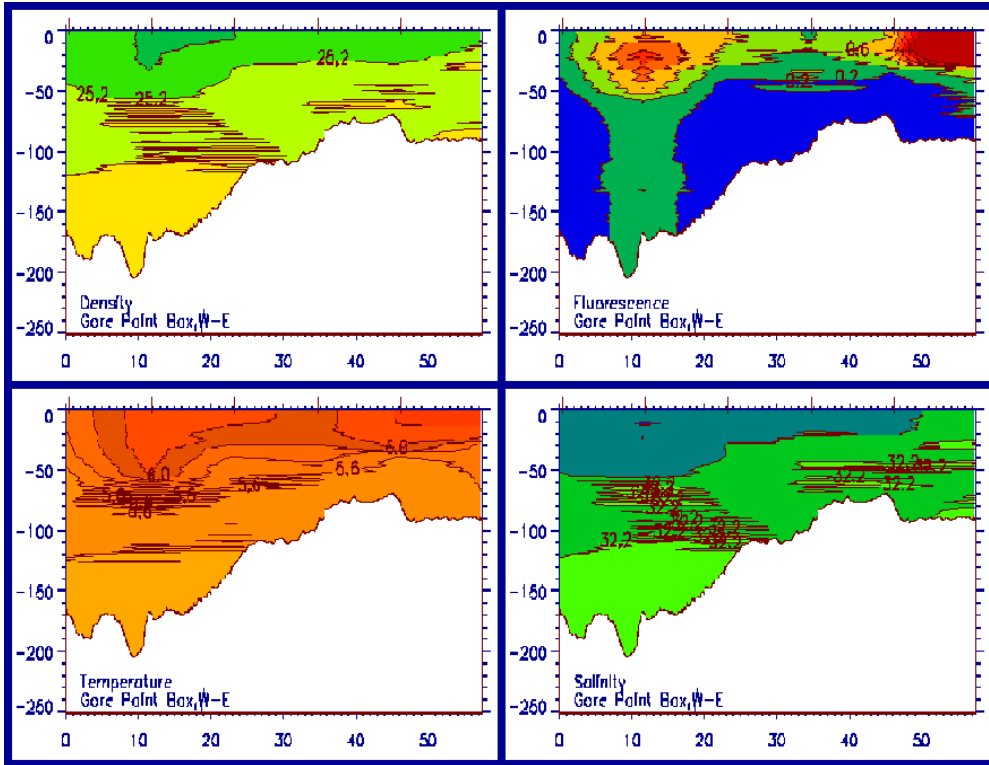


Figure 4: Gore Point South Transect

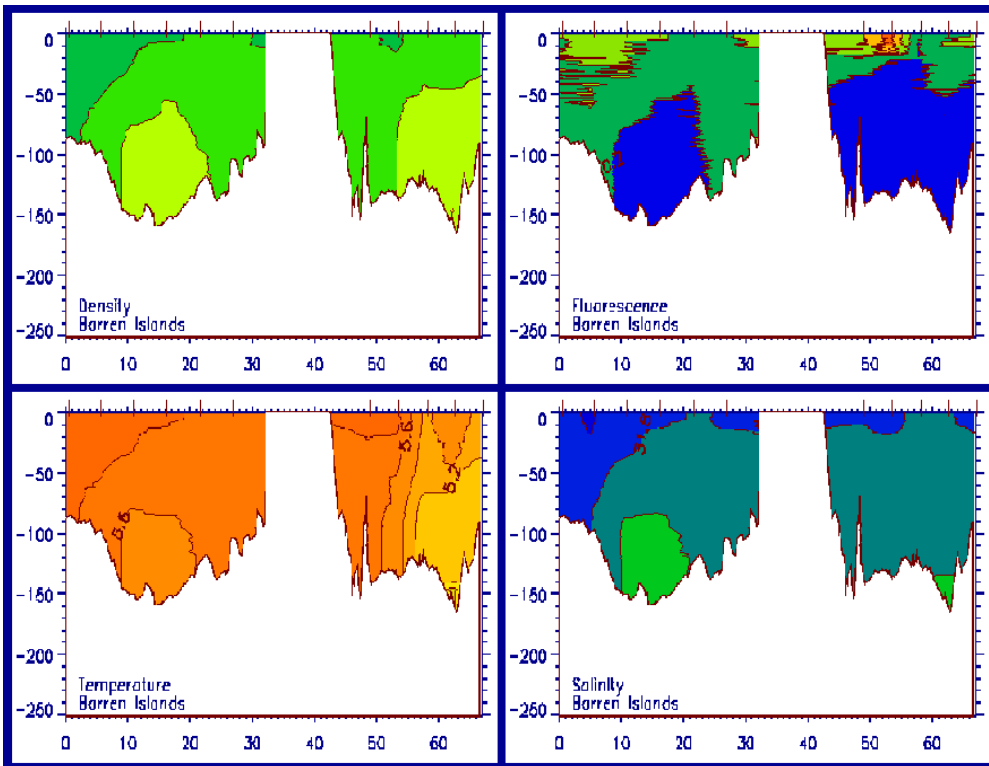


Figure 5: Barren Islands

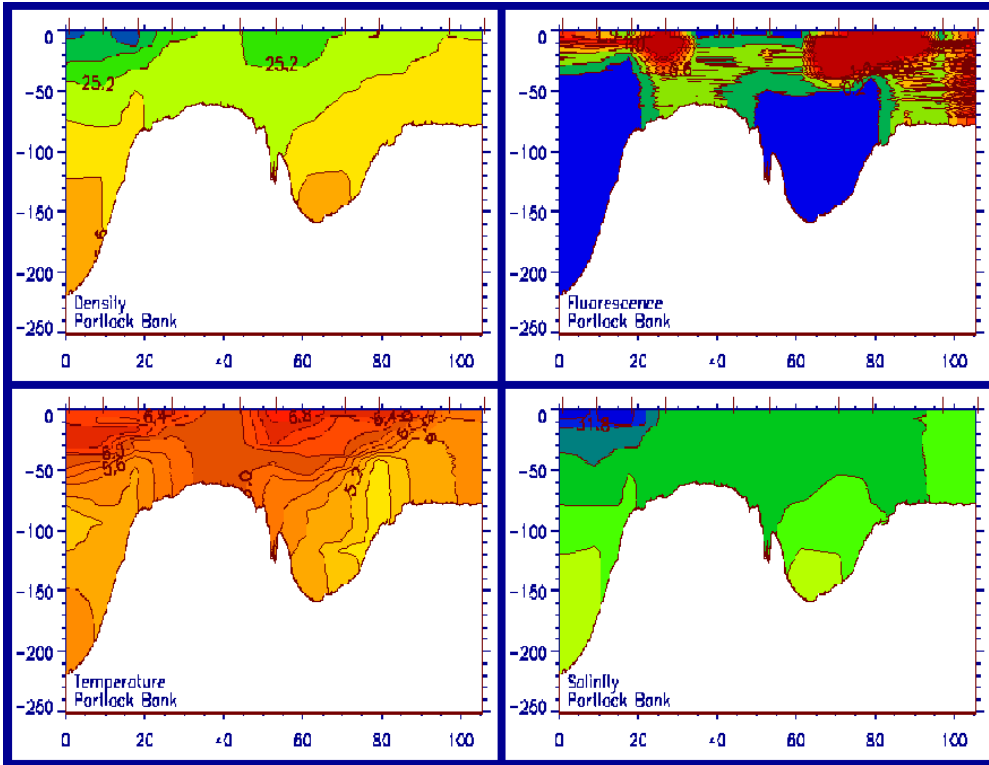


Figure 6: Portlock Bank

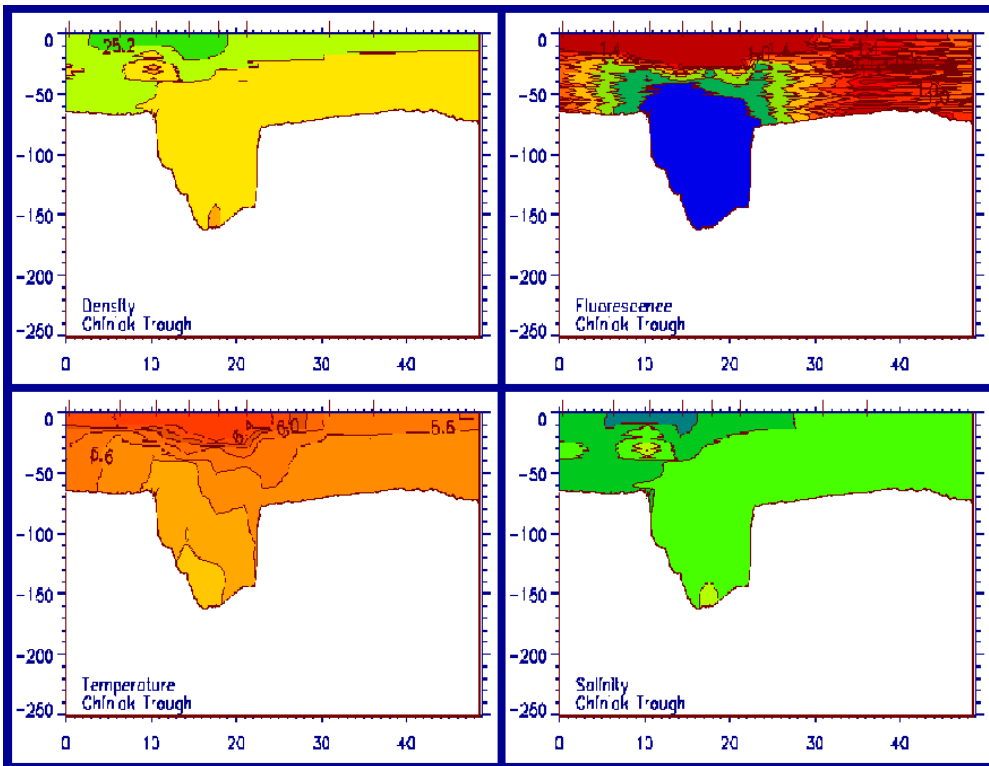


Figure 7: Chiniak Trough

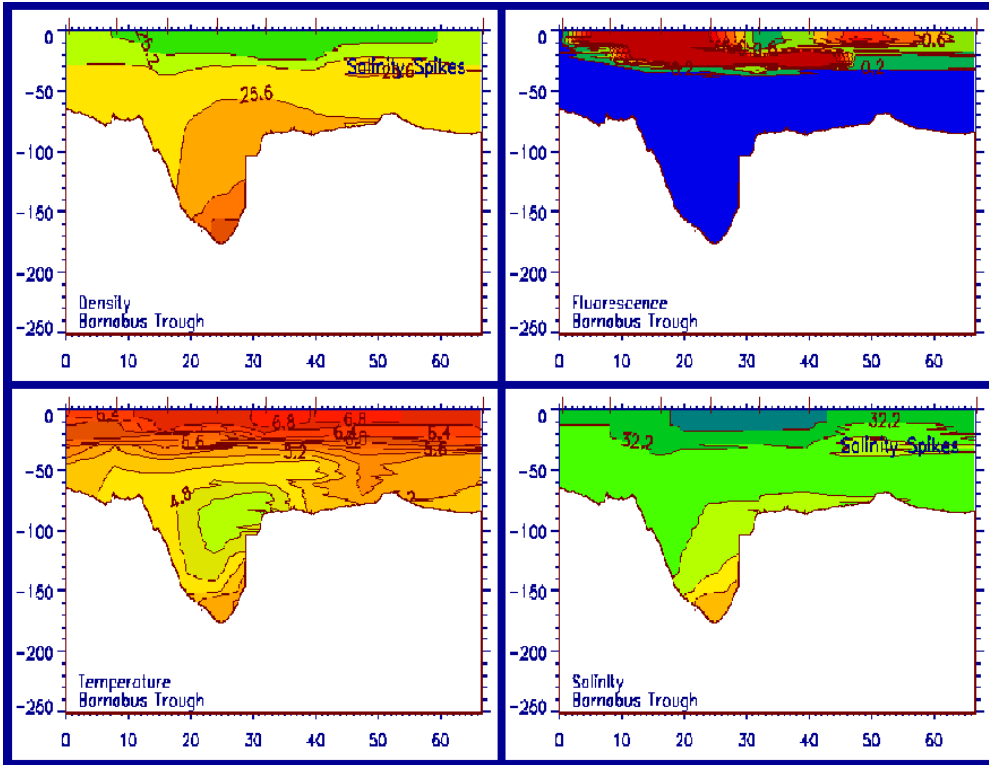


Figure 8: Barnabus Trough

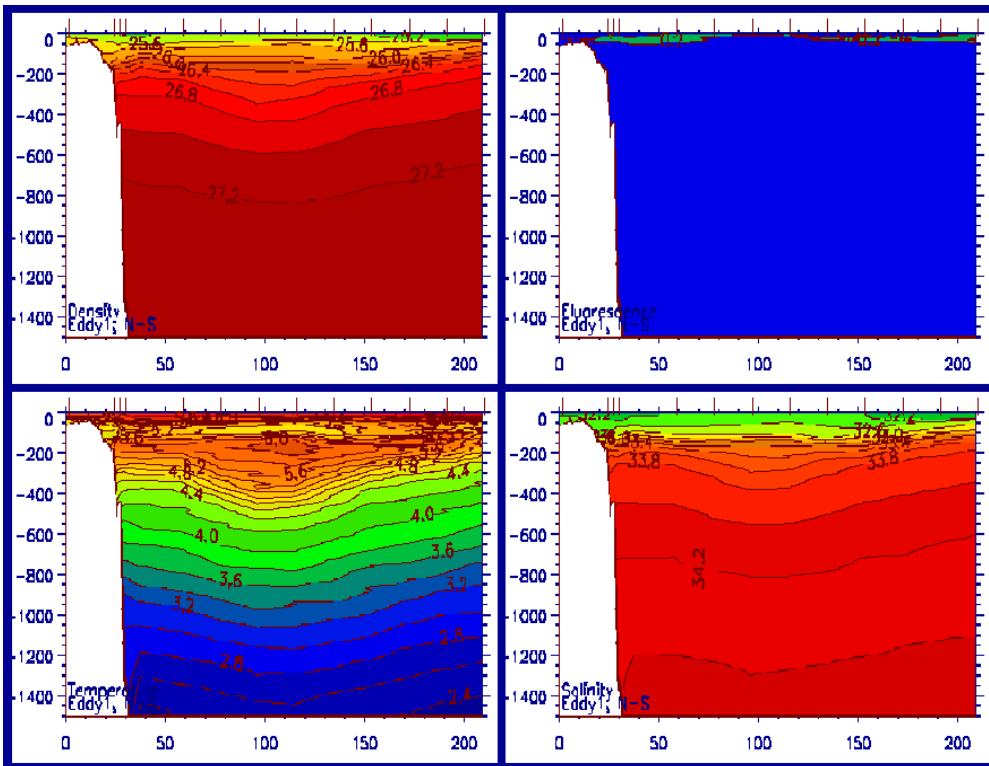


Figure 9: North-South Transect, 2003 Eddy

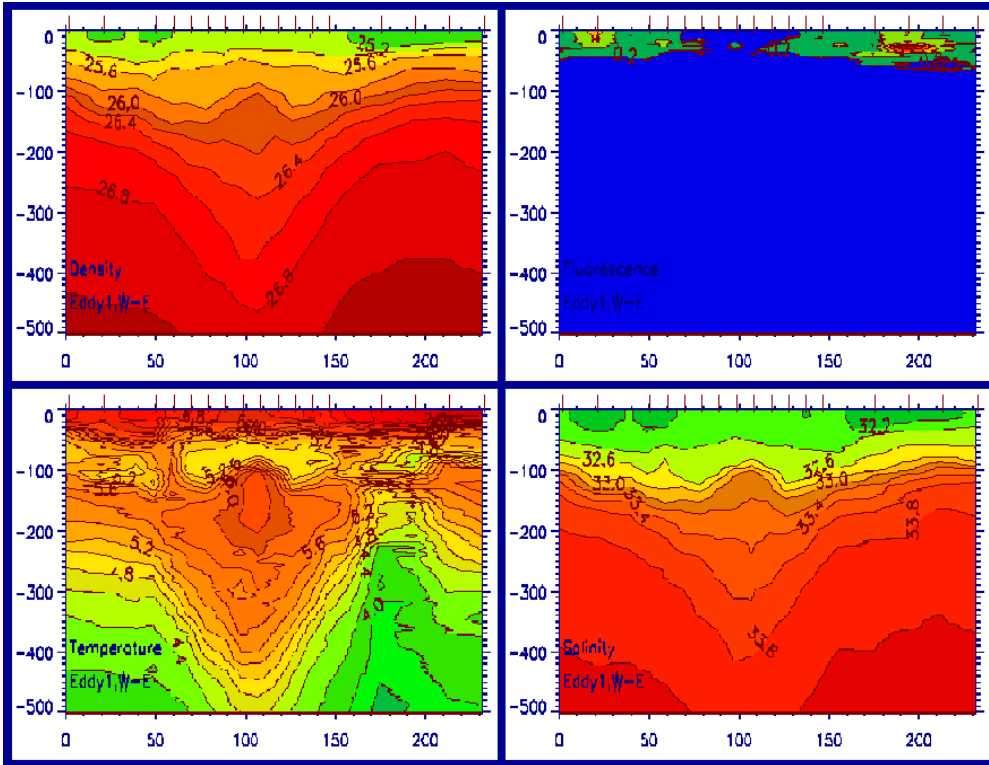


Figure 10: West-East Transect, 2003 Eddy

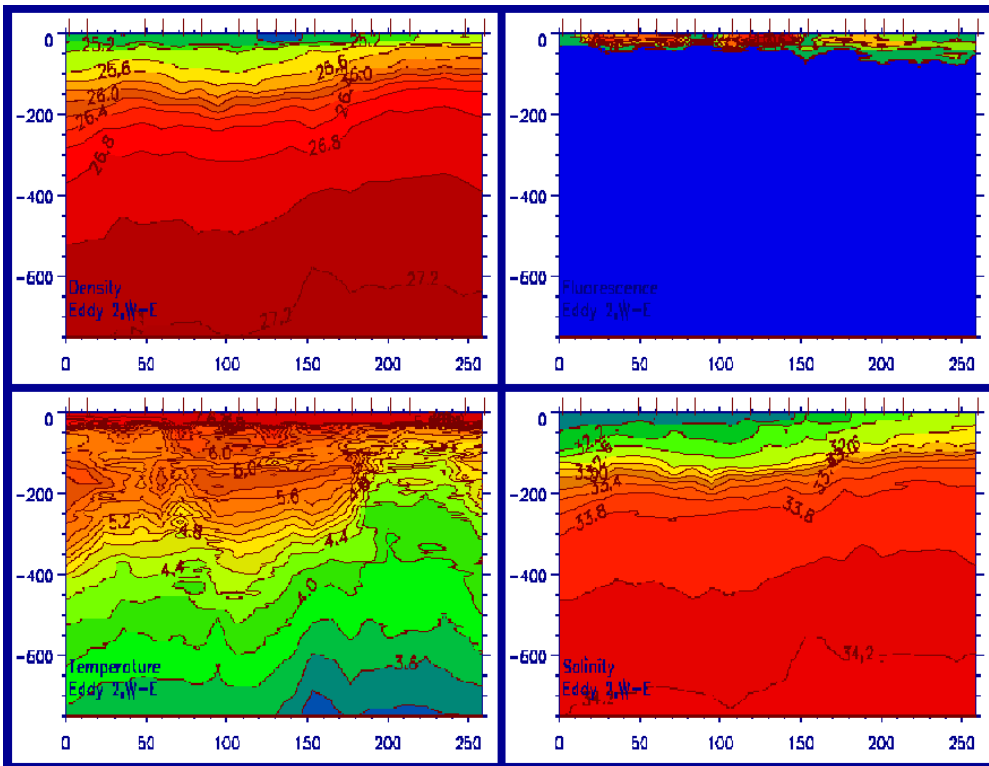


Figure 11: West-East Transect, 2004 Eddy

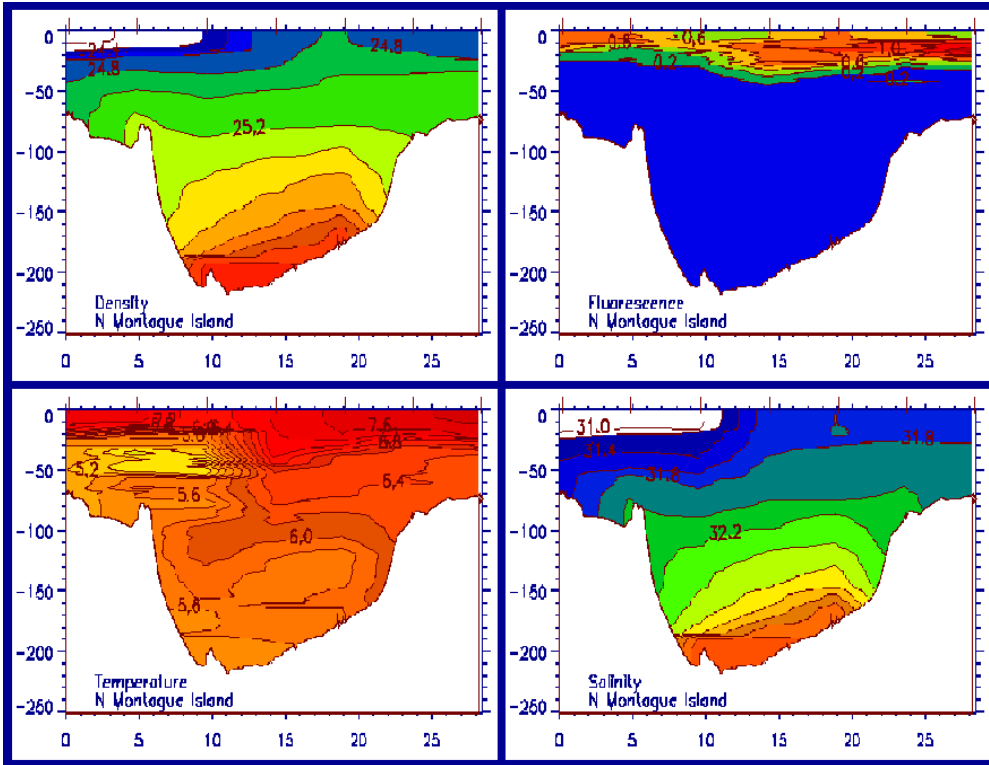


Figure 12: North Montague Island

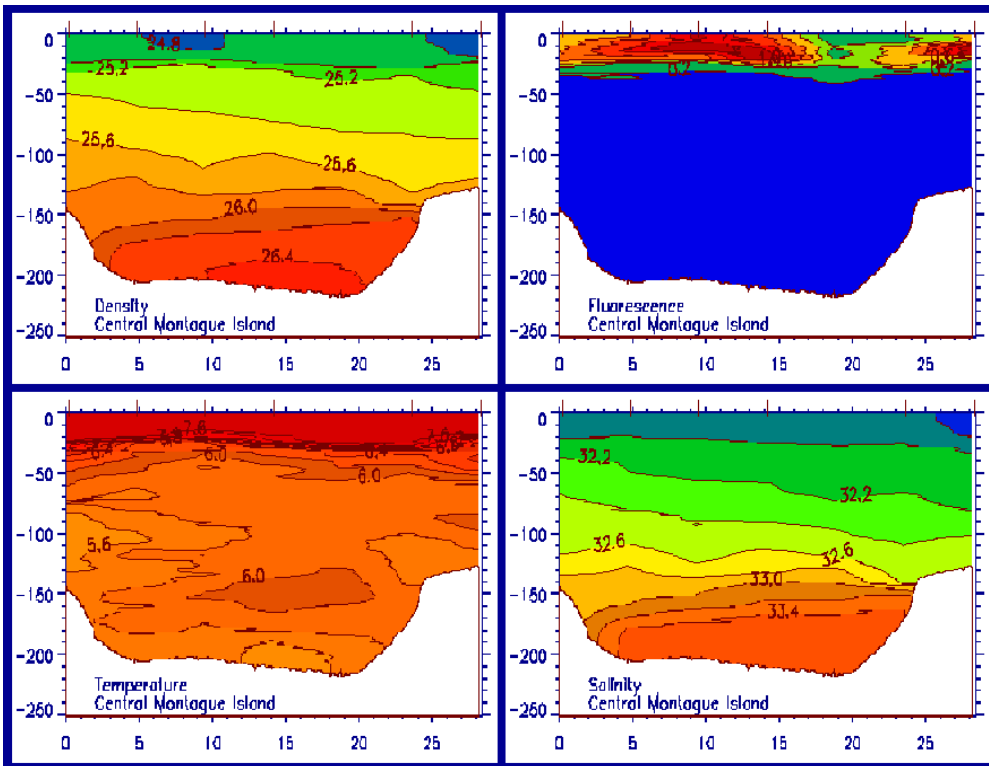


Figure 13: Central Montague Island

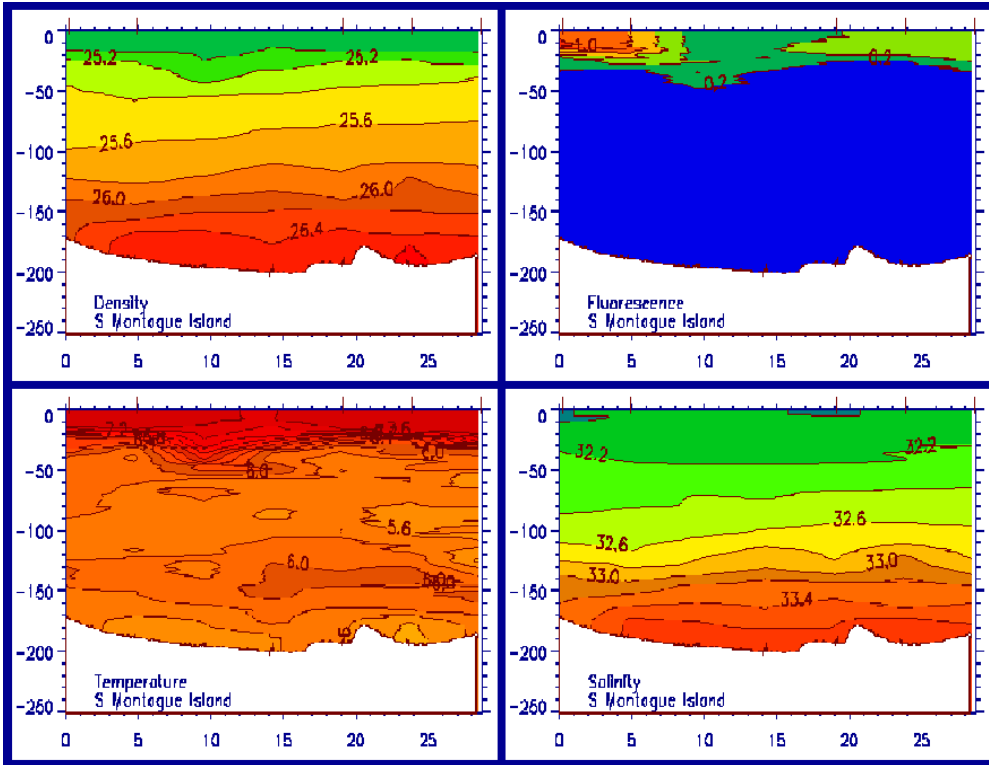


Figure 14: South Montague Island