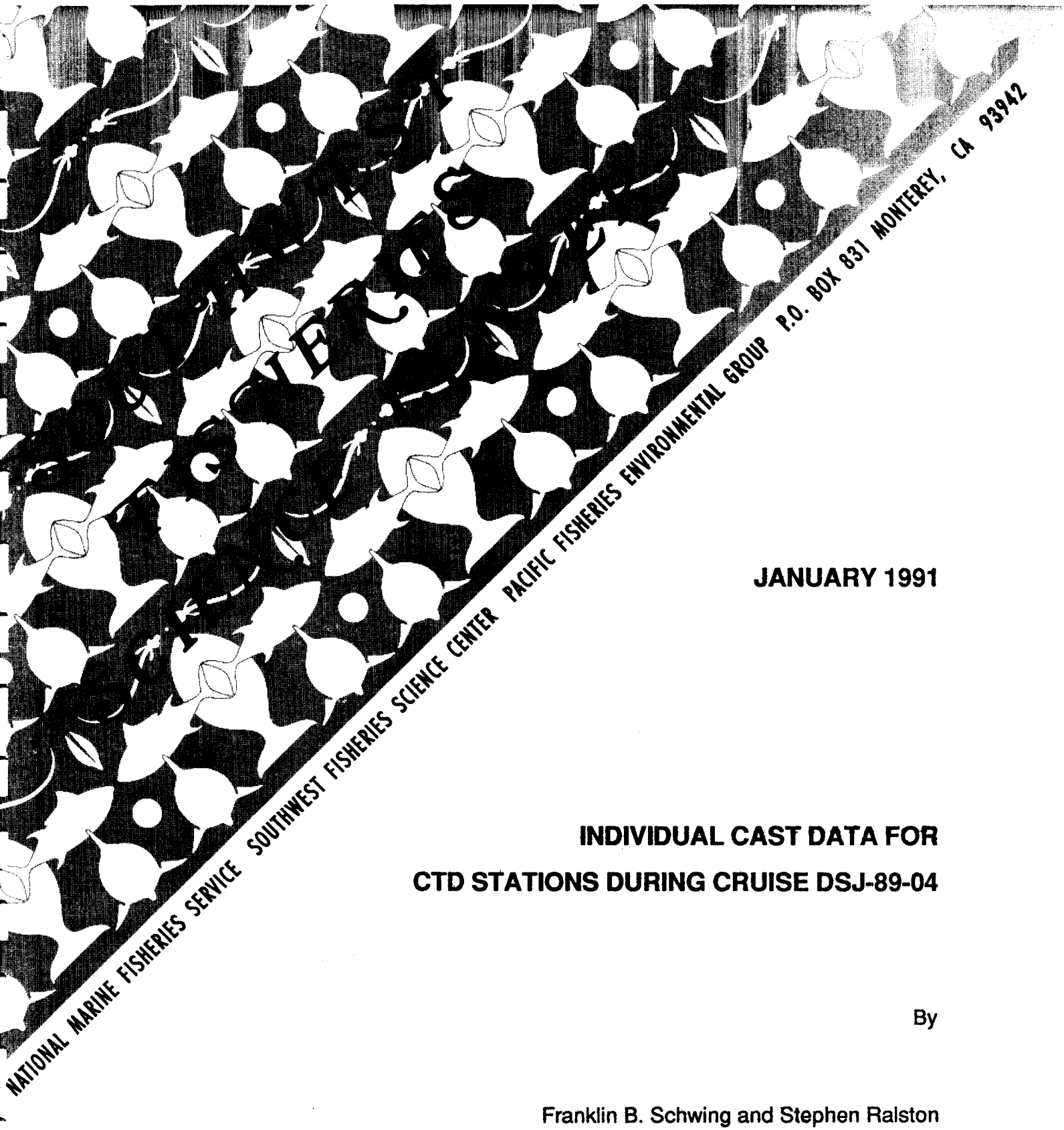

NATIONAL MARINE FISHERIES SERVICE SOUTHWEST FISHERIES SCIENCE CENTER PACIFIC FISHERIES ENVIRONMENTAL GROUP P.O. BOX 831 MONTEREY, CA 93942

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INDIVIDUAL CAST DATA FOR CTD STATIONS DURING CRUISE DSJ-89-04

By

Franklin B. Schwing and Stephen Ralston

ADMINISTRATIVE REPORT PFEG-91-01

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Southwest Fisheries Science Center Administrative Report PFEG-91-01

INDIVIDUAL CAST DATA FOR CTD STATIONS

CONDUCTED DURING CRUISE DSJ-89-04

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INTRODUCTION

In recent years, attempts have been made to integrate the studies of fisheries biologists investigating the recruitment problem (Sissenwine 1984; Rothschild 1986) with those of physical oceanographers studying coastal circulation patterns. This development is due to the widely held perception that spatial and temporal variations in hydrodynamics, on a wide range of scales, have a direct influence on the retention of young-of-the-year in areas favorable for their growth and survival (*e.g.*, Sinclair 1988). This realization has fostered the development of interdisciplinary studies in the area of "recruitment fisheries oceanography" (Wooster 1988; Office of Oceanic and Atmospheric Research 1989[1]).

Along the central California coast, rockfishes of the genus *Sebastes* are a major component of the west coast groundfish fishery (Gunderson and Sample 1980), with annual landings from 1981-88 averaging in excess of 45,000 MT yr^{-1} (Pacific Fishery Management Council 1989). Current management of the rockfish fishery is based largely upon analyses of catch at age data. Such models are usually poorly constrained in the absence of other information (Deriso *et al.* 1985). Auxiliary data, such as an independent recruitment index, have the potential to greatly assist in the management of this fishery.

Research conducted at the Southwest Fisheries Science Center's (SWFSC) Tiburon Laboratory since 1983 has attempted to develop a recruitment index for rockfish. Data obtained during annual midwater trawl surveys have provided information regarding distributional and abundance patterns of young-of-the-year pelagic juveniles in the area between Monterey and Bodega Bay (latitude 36°30'-38°10'N; Wyllie-Echeverria *et al.* 1990). Results of this research show a complex pattern in the spatial distribution of pre-recruits of a variety of commercially significant species (*e.g.*, widow rockfish [*S. entomelas*], chilipepper [*S. goodei*], yellowtail rockfish [*S. flavidus*], bocaccio [*S. paucispinis*] and shortbelly rockfish [*S. jordani*]). Moreover, extreme interannual fluctuations in abundance have occurred, with combined stratified mean catches per haul ranging from 5-1,000 juvenile rockfish/tow (Ralston 1990[2]).

Field studies have shown that the survey region is hydrodynamically complex. The California Current provides the backdrop for large scale, seasonal circulation patterns (Hickey 1979). Coastal upwelling also occurs regionally for most of the year, especially from April-September (Huyer 1983). On the mesoscale (10-100 km), irregularities in the coastline interact with the wind stress field (Kelly 1985), resulting in turbulent jets, eddies and upwelling filaments, all of which are common features along the central California coast

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[1]Office of Oceanic and Atmospheric Research. 1989. Program Development Plan for the NOAA Recruitment Fisheries Oceanography Program. National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Washington, D.C. 28 p.

[2]Ralston, S. (editor). 1990. Progress in rockfish recruitment studies. Southwest Fish. Cent. Admin. Rep. T-90-02, 45 p.

(Mooers and Robinson 1984; Flament *et al.* 1985; Njoku *et al.* 1985). Moreover, wind-driven fluctuations in coastal flow (Chelton *et al.* 1988) and freshwater discharge from the San Francisco Bay tidal plume (Applied Environmental Science Division[3]) add further complexity to the circulation regime.

Realizing that a basic description of the physical environment is necessary to better understand the distribution and abundance of young-of-the-year rockfish, collection of CTD data was initiated in 1987 as part of the Tiburon Laboratory's annual midwater trawl surveys. In the spirit of Wooster (1988), staff of the SWFSC Pacific Fisheries Environmental Group subsequently developed an interest in analyzing the CTD data and were enlisted in this recruitment fisheries oceanography study. Ultimately, it is our goal to determine and forecast the manner in which rockfish year class strength is affected by variations in the physical environment.

This report contains individual traces of temperature, salinity, and density (σ_t) plotted against depth for each CTD cast conducted during the 1989 groundfish survey cruise (DSJ 89-04). It is provided as a supplement to the NOAA-NMFS-SWFSC technical memorandum by Schwing *et al.* (1990), which summarizes the meteorological and hydrographic conditions during the cruise in a series of figures containing coastal meteorological time series, horizontal maps and vertical transects of temperature, salinity, σ_t and other useful hydrographic products, and temperature-salinity plots. Additional reports covering juvenile groundfish cruises during 1987, 1988, and 1990 are currently in preparation. Further scientific analysis of these data, and their linkages to fisheries recruitment, will be compiled in future peer-reviewed scientific publications.

Requests for these data should be addressed to: Dr. Stephen Ralston, National Marine Fisheries Service, Southwest Fisheries Science Center, 3150 Paradise Drive, Tiburon, CA 94920.

MATERIALS AND METHODS

Annual 30-day cruises aboard the NOAA R/V DAVID STARR JORDAN began in 1983 and have been conducted during late spring (May-June), a time when most pelagic-stage juvenile rockfishes are identifiable to species, but prior to their settling to nearshore and benthic habitats. The present sampling design permits three consecutive "sweeps" through a study area bounded by Cypress Pt. (36°35'N) and Pt. Reyes (38°10'N), and from the coast to about 75 km offshore. Starting in 1987, a CTD cast was conducted at each trawl station occupied. In addition, daytime activities were restructured to permit sampling of a new grid of CTD stations (Fig. 1). As an operational goal, 112 casts are planned for each of three sweeps during a cruise. Although each sweep typically lasts approximately 10 days (7 nights of scheduled work plus 3 nights of additional discretionary sampling), adverse weather conditions can extend the completion date of a sweep. Logistical constraints can also restrict

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[3]Applied Environmental Science Division. Final report California seabird ecology study. Volume II. Satellite data analysis. Science Applications International Corporation. Monterey, California.

the number of casts completed. Discretionary sampling typically was focused on specific bathymetric features, such as Cordell Bank or Pioneer Canyon, or devoted to the intense study of oceanic features or processes that may be key to successful recruitment.

All CTD data obtained during the 1989 juvenile rockfish surveys were collected with a Sea-Bird Electronics SEACAT-SBE-19 profiler[4]. This particular unit is rated to a depth of 200 m and contains 64K of memory. Four data channels were used to record pressure (0.05% of full scale range [50-5,000 psia]), temperature (0.01 °C from -5 to +35 °C), and conductivity (0.001 S/m from 0 to 7 S/m) at a baud rate of 9,600. Schwing *et al.* (1990) provide detailed information on the collection and processing of CTD data from this cruise.

The profiler has been recalibrated annually by the manufacturer since its purchase in 1987. The CTD unit aboard the JORDAN was also intercalibrated *a posteriori* with three other CTD units used by personnel from Monterey Bay Aquarium Research Institute, Naval Postgraduate School and UC-Santa Cruz to collect data at selected mutually occupied stations during the time period of this cruise. This intercalibration revealed that the difference between these four CTD systems at the deepest common depths, where natural variability is expected to be lowest, is less than that actually occurring at these stations, based on repeated sampling using the same unit. An independent, concurrent source of CTD hydrographic data was also available. The JORDAN contains a CAMAC unit that provides a continuous data stream of surface temperature and salinity. These data were used to verify CTD observations.

RESULTS

Below are a few brief comments on each of the data products contained in this report, in the order that they appear.

1. Master list of CTD stations during JORDAN Cruise 8904

The station list includes, from left to right; CTD station number, date (month, day, year), time (Pacific Daylight Time), latitude and longitude (degrees, minutes), and total station depth (in meters). Sweep 1 (14-22 May) includes stations 0-138 (135 acceptable casts), sweep 2 (22 May-3 June) includes stations 139-299 (153 casts) and sweep 3 (4-13 June) includes stations 300-393 (92 casts).

2. Bathymetric map of survey region

The bathymetry was determined from CTD station depths from all sweeps. The locations of all 380 acceptable casts from the three sweeps are denoted with an "x". The close coincidence between many of these locations reflects the repeated occupation of CTD station positions during each sweep.

3. Profiles of individual CTD casts

Profiles of temperature (°C), salinity (ppt) and σ_t (kg/m^3) versus depth are presented for individual CTD casts. Two stations are plotted per page. All

[4]Reference to trade names does not imply endorsement by the National Marine Fisheries Service, NOAA.

plots were generated at the same scales to allow intercomparison. The header at the top of each station's plots shows the station number, date and local time (PDT) of the cast, station latitude and longitude, and total depth at the station. The water column was generally sampled to 10 m off the bottom, or to 200 m at stations where the total depth was greater than 200 m. In some instances, the maximum cast depth was less than these ideal depths. Maps showing the location of each CTD station, by sweep, by its last three digits are presented at the beginning of each set of profiles.

Although the data were despiked, smoothed and averaged over 1 m vertical bins, no effort was made for this report to modify the observations; *i.e.*, so that the water column was made stable (*cf.* stations 062, 175, 190). There are frequent examples (*cf.* stations 052, 114, 300) of a succession of density instabilities associated to salinity variations immediately below the mixed layer. The persistence of their location in the water column, their vertical extent over several meters and their wide horizontal scale suggest that they represent real a phenomenon, and are not due to measurement error. Their existence has been documented previously in this region (Chelton and Kosro 1987). However the mechanism responsible for their production and maintenance is an area of active research.

ACKNOWLEDGEMENTS

The authors greatly acknowledge the captain and crew of the R/V DAVID STARR JORDAN, and researchers who participated in the juvenile rockfish survey cruise. Ralph Larson developed many of the programs used to process the CTD data. Keith Sakuma processed the data and Tone Nichols generated the profiles.

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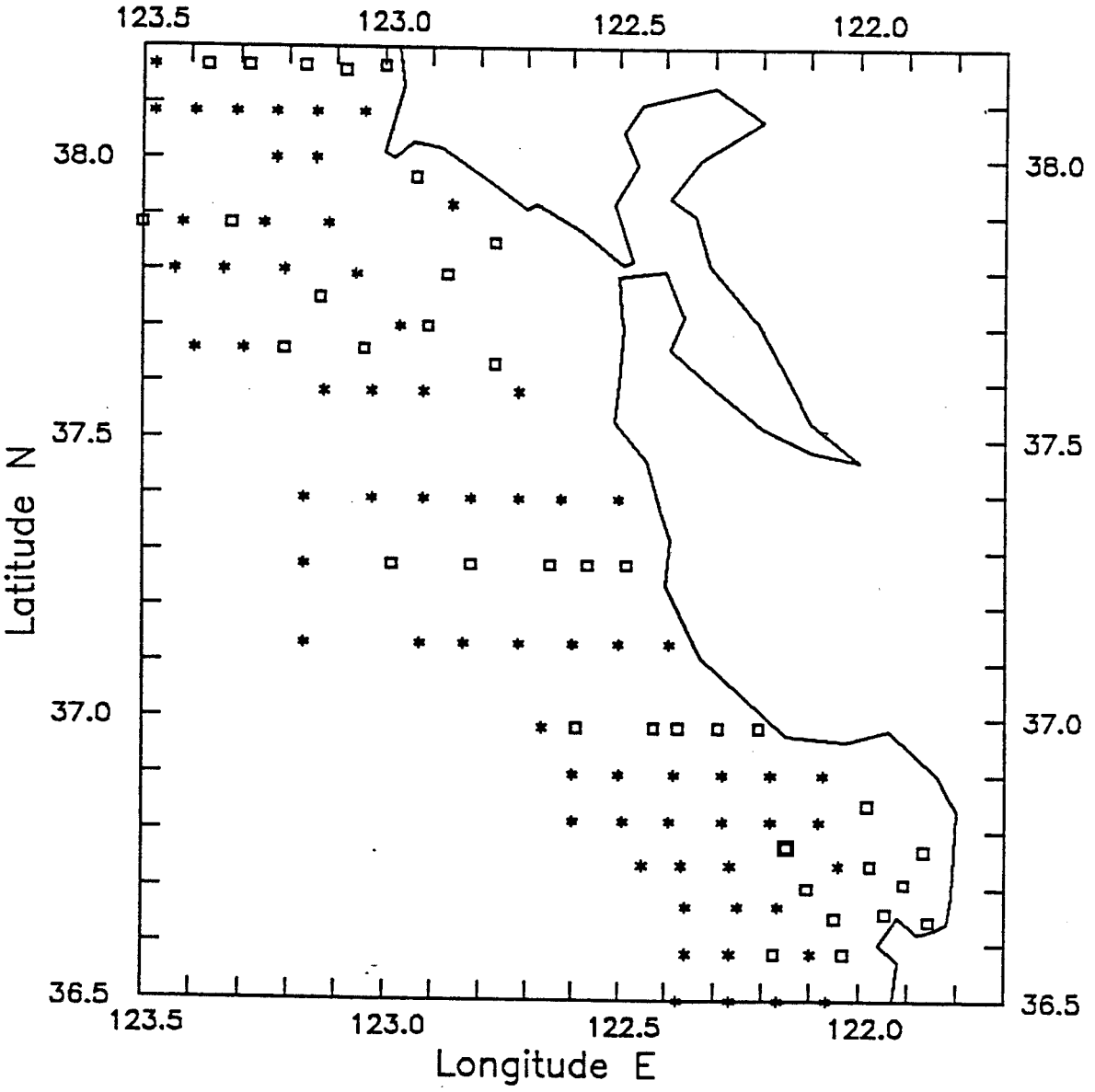


Fig. 1--Map of the juvenile rockfish recruitment study area. Trawl stations are shown as open squares and supplemental CTD stations as asterisks.

APPENDIX 1: MASTER LIST OF CTD STATIONS

STATION	DATE	TIME	LAT		LON		DEPTH
			SWEEP 1				
8904001	051489	1420	36	49.0	122	5.0	106
8904002	051489	1501	36	49.0	122	11.0	494
8904003	051489	1546	36	49.0	122	17.1	1280
8904004	051489	1635	36	53.9	122	17.0	340
8904005	051489	1717	36	54.0	122	10.9	95
8904006	051489	1755	36	54.0	122	4.6	57
8904007	051489	2020	36	50.6	121	59.0	91
8904008	051489	2302	36	45.8	121	52.7	101
8904009	051489	2345	36	44.4	121	58.6	256
8904010	051589	130	36	43.1	121	55.5	97
8904011	051589	213	36	38.5	121	51.4	37
8904012	051589	500	36	40.1	121	58.2	102
8904013	051589	543	36	38.7	122	3.0	808
8904014	051589	632	36	40.0	122	9.9	1106
8904015	051589	710	36	40.0	122	14.9	1353
8904016	051589	751	36	40.0	122	21.5	1646
8904017	051589	837	36	35.0	122	21.5	2195
8904018	051589	919	36	35.0	122	16.0	2195
8904019	051589	1000	36	35.0	122	10.5	2195
8904020	051589	1034	36	35.0	122	6.0	1372
8904021	051589	1105	36	35.0	122	2.0	547
8904022	051589	1150	36	30.0	122	4.0	905
8904023	051589	1300	36	30.0	122	10.1	1280
8904024	051589	1340	36	30.0	122	16.1	1373
8904025	051589	1425	36	29.9	122	22.6	1609
8904026	051589	2030	36	34.8	122	10.5	2195
8904027	051689	30	36	36.2	122	3.1	530
8904028	051689	54	36	38.9	122	2.9	871
8904029	051689	257	36	41.4	122	8.1	1214
8904030	051689	342	36	46.4	122	9.1	1013
8904031	051689	544	36	44.4	122	16.0	958
8904032	051689	632	36	44.4	122	22.0	1591
8904033	051689	707	36	44.4	122	27.0	2012
8904034	051689	748	36	49.0	122	29.5	2103
8904035	051689	830	36	49.0	122	36.0	1829
8904036	051689	925	36	54.0	122	30.1	1070
8904037	051689	1005	36	54.0	122	36.0	1554
8904038	051689	1055	36	58.8	122	40.0	585
8904039	051689	1206	37	8.1	122	36.0	108
8904040	051689	1243	37	8.0	122	29.9	90
8904041	051689	1327	37	8.0	122	23.4	40
8904042	051689	2020	36	58.9	122	12.5	37
8904043	051689	2205	36	58.9	122	17.6	84
8904044	051689	2330	36	59.0	122	22.5	121
8904046	051789	248	36	59.3	122	27.1	139
8904047	051789	310	36	59.0	122	35.5	386
8904048	051789	520	37	0.5	122	43.5	624
8904049	051789	610	37	8.0	122	43.0	230
8904050	051789	701	37	8.0	122	49.9	457
8904051	051789	740	37	8.0	122	55.4	561
8904052	051789	905	37	8.0	123	10.0	1829
8904053	051789	1016	37	16.5	123	10.0	1044
8904054	051789	1113	37	23.5	123	10.0	978
8904055	051789	1206	37	23.5	123	1.5	838

STATION	DATE	TIME	LAT		LON		DEPTH
8904056	051789	1251	37	23.5	122	55.0	450
8904057	051789	1335	37	23.5	122	48.9	110
8904058	051789	1415	37	23.5	122	42.9	90
8904059	051789	1535	37	23.5	122	37.4	75
8904060	051789	1616	37	23.5	122	30.1	44
8904061	051789	2010	37	16.5	122	29.0	53
8904062	051789	2044	37	16.5	122	34.0	88
8904063	051789	2240	37	16.1	122	40.6	102
8904064	051789	2335	37	16.9	122	49.0	181
8904065	051889	410	37	16.4	122	59.0	163
8904066	051889	723	37	35.0	122	55.0	99
8904067	051889	804	37	35.0	123	1.5	271
8904068	051889	847	37	35.0	123	7.5	1079
8904069	051889	1009	37	39.5	123	17.5	1737
8904070	051889	1128	37	48.0	123	12.5	0
8904071	051889	1218	37	48.0	123	20.1	625
8904072	051889	1303	37	47.9	123	25.8	1372
8904073	051889	1448	37	53.0	123	33.1	2213
8904074	051889	2025	37	58.0	122	56.0	53
8904075	051889	2320	37	50.6	122	46.6	44
8904076	051989	0	37	47.4	122	52.1	0
8904077	051989	155	37	42.2	122	56.0	57
8904078	051989	300	37	37.9	122	45.9	55
8904079	051989	545	37	35.0	122	43.0	55
8904080	051989	723	37	42.0	122	58.0	51
8904081	051989	903	37	55.0	122	51.5	49
8904082	051989	1025	37	47.5	123	3.5	75
8904083	051989	1112	37	53.0	123	7.0	93
8904084	051989	1203	37	53.0	123	15.2	101
8904086	051989	2025	37	39.3	123	1.8	102
8904087	051989	2305	37	39.8	123	13.5	1189
8904088	052089	0	37	45.0	123	8.0	66
8904089	052089	250	37	52.6	123	18.9	102
8904090	052089	550	37	52.4	123	30.6	1463
8904091	052089	742	38	5.0	123	28.6	143
8904092	052089	835	38	10.0	123	28.5	364
8904093	052089	930	38	15.0	123	28.5	322
8904094	052089	1008	38	15.0	123	23.5	174
8904095	052089	1044	38	15.0	123	18.5	123
8904096	052089	1117	38	15.0	123	13.5	102
8904097	052089	1148	38	15.0	123	8.5	88
8904098	052089	1239	38	15.0	123	2.3	51
8904099	052089	1344	38	4.9	123	2.5	60
8904100	052089	1424	38	5.0	123	8.6	86
8904101	052089	1459	38	4.9	123	13.6	113
8904102	052089	1534	38	5.0	123	18.5	137
8904103	052089	1613	38	5.0	123	23.5	159
8904104	052089	1805	38	0.0	123	13.6	110
8904105	052089	1839	38	0.0	123	8.6	88
8904106	052089	2047	38	10.0	123	0.0	53
8904107	052089	2317	38	9.6	123	5.4	79
8904108	052089	2350	38	10.0	123	10.0	93
8904109	052189	150	38	9.1	123	15.1	117
8904110	052189	500	38	9.8	123	22.0	187
8904111	052189	1220	36	59.9	123	0.0	2286
8904112	052189	1304	37	0.0	123	6.3	2515

STATION	DATE	TIME	LAT		LON		DEPTH
8904113	052189	1347	36	59.9	123	12.4	2606
8904114	052189	1435	37	0.0	123	18.6	2505
8904115	052189	1518	37	0.0	123	24.8	2761
8904116	052189	1603	37	0.0	123	31.0	3475
8904117	052189	1647	37	0.0	123	37.2	3530
8904118	052189	2100	37	0.0	123	31.0	3475
8904119	052189	2140	37	0.5	123	32.1	3475
8904120	052189	2205	37	0.6	123	31.0	3475
8904121	052189	2256	37	0.3	123	32.1	3475
8904122	052189	2346	37	0.1	123	25.9	3292
8904123	052289	36	37	0.9	123	27.0	3292
8904124	052289	56	37	0.7	123	25.8	3292
8904125	052289	200	37	1.2	123	25.8	3292
8904126	052289	225	37	1.0	123	21.4	3383
8904127	052289	402	37	1.7	123	22.2	3383
8904128	052289	542	37	0.0	123	12.1	2652
8904129	052289	618	37	0.0	123	7.0	2524
8904131	052289	746	37	0.0	122	53.7	1445
8904132	052289	834	37	0.0	122	46.7	1042
8904133	052289	919	37	0.0	122	40.0	494
8904134	052289	1033	36	50.6	122	40.0	2195
8904135	052289	1117	36	50.0	122	46.7	2469
8904136	052289	1159	36	50.0	122	53.4	2743
8904137	052289	1259	36	50.2	123	0.1	2844
8904138	052289	1412	36	49.9	123	10.1	3054

SWEEP 2

8904139	052289	2055	36	59.8	123	11.0	3658
8904140	052289	2120	36	58.3	123	10.4	3658
8904141	052289	2210	37	0.0	123	9.0	2560
8904142	052289	2345	36	59.0	123	9.1	2560
8904143	052389	33	37	0.0	122	59.9	2195
8904144	052389	215	37	0.4	123	1.7	2195
8904145	052389	305	37	0.0	122	53.0	1372
8904146	052389	445	37	0.6	122	54.4	1631
8904147	052389	808	36	40.0	122	40.0	2560
8904148	052389	850	36	40.0	122	45.8	2743
8904149	052389	937	36	40.0	122	51.8	2743
8904150	052389	1012	36	40.0	122	57.8	2926
8904151	052389	1051	36	40.0	123	3.9	3109
8904152	052389	1132	36	40.0	123	10.0	3292
8904153	052389	1201	36	34.9	123	10.0	3292
8904154	052389	1254	36	35.1	123	3.8	3200
8904155	052389	1335	36	35.0	122	57.8	2880
8904156	052389	1415	36	35.0	122	51.8	2926
8904157	052689	1454	36	35.0	122	45.8	2893
8904158	052389	1532	36	35.0	122	39.9	2743
8904159	052389	2100	36	37.0	123	13.4	3292
8904160	052389	2226	36	37.4	123	10.4	3292
8904161	052489	4	36	35.9	123	5.9	3255
8904162	052489	222	36	36.1	123	6.3	3200
8904163	052489	315	36	34.6	122	58.4	2926
8904164	052489	513	36	35.1	122	56.3	2853
8904165	052489	2115	36	50.4	121	59.2	91
8904166	052489	2325	36	46.8	121	53.5	311

STATION	DATE	TIME	LAT		LON		DEPTH
8904167	052589	4	36	44.4	121	58.6	305
8904168	052589	202	36	43.2	121	55.4	99
8904169	052589	255	36	38.5	121	51.5	38
8904170	052589	519	36	40.0	121	57.3	97
8904171	052589	630	36	38.8	122	3.0	914
8904172	052589	720	36	40.0	122	9.9	1134
8904173	052589	759	36	40.0	122	14.9	1353
8904174	052589	848	36	40.0	122	21.5	1646
8904175	052589	928	36	35.0	122	21.5	2195
8904176	052589	1008	36	35.0	122	16.0	2195
8904177	052589	1047	36	35.0	122	10.5	2195
8904178	052589	1121	36	35.0	122	6.0	1372
8904179	052589	1154	36	35.0	122	2.0	622
8904180	052589	1234	36	29.8	122	4.2	878
8904181	052589	1322	36	29.9	122	10.1	1280
8904182	052589	1409	36	30.0	122	16.1	1353
8904183	052589	1501	36	30.1	122	22.6	1609
8904184	052589	2130	36	44.4	122	2.5	741
8904185	052589	2220	36	49.0	122	5.0	106
8904186	052589	2304	36	54.0	122	5.0	57
8904187	052889	2052	36	46.5	122	9.1	914
8904188	052889	2310	36	42.1	122	7.1	1829
8904189	052889	2347	36	38.7	122	3.1	914
8904190	052989	140	36	33.6	122	7.1	823
8904191	052989	459	36	34.8	122	11.7	2323
8904192	052989	713	36	44.4	122	16.0	971
8904193	052989	756	36	44.4	122	16.0	1591
8904194	052989	834	36	44.4	122	26.9	2012
8904195	052989	916	36	49.0	122	29.5	2103
8904196	052989	1001	36	49.0	122	36.0	1829
8904197	052989	1052	36	54.0	122	30.0	1061
8904198	052989	1135	36	54.0	122	35.9	1006
8904199	052989	1225	36	59.0	122	40.1	578
8904200	052989	1335	37	8.0	122	36.1	108
8904201	052989	1413	37	8.0	122	29.9	90
8904202	052989	1453	37	8.0	122	23.4	42
8904203	052989	2112	36	58.6	122	12.9	46
8904204	052989	2250	36	58.9	122	18.5	88
8904205	052989	2320	36	59.0	122	22.5	119
8904206	053089	220	36	59.0	122	26.6	187
8904207	053089	352	36	59.6	122	26.6	371
8904208	053089	554	37	8.0	122	43.0	227
8904209	053089	640	37	8.0	122	50.0	457
8904210	053089	715	37	8.0	122	55.4	558
8904211	053089	842	37	8.0	123	10.0	1829
8904212	053089	950	37	16.5	123	10.0	1097
8904213	053089	1052	37	23.4	123	10.0	978
8904214	053089	1144	37	23.5	123	1.5	805
8904215	053089	1252	37	23.5	122	49.0	110
8904216	053089	1352	37	23.5	122	37.5	75
8904217	053089	1934	37	23.5	122	30.1	46
8904218	053089	2104	37	15.9	122	29.0	53
8904219	053089	2250	37	16.4	122	35.5	93
8904220	053089	2312	37	16.5	122	39.0	99
8904221	053189	229	37	16.1	122	50.1	216
8904222	053189	404	37	16.4	123	0.3	580

STATION	DATE	TIME	LAT		LON		DEPTH
8904223	053189	719	37	35.0	122	55.0	101
8904224	053189	750	37	35.0	123	1.5	280
8904225	053189	831	37	35.0	123	7.5	1189
8904226	053189	942	37	39.5	123	17.5	1737
8904227	053189	1100	37	48.0	123	12.5	82
8904228	053189	1150	37	48.0	123	20.0	768
8904229	053189	1235	37	48.0	123	26.0	1372
8904230	053189	1342	37	53.0	123	33.0	2213
8904231	053189	1432	37	53.0	123	25.0	262
8904232	053189	1530	37	53.0	123	15.1	101
8904233	053189	1627	37	53.0	123	7.1	93
8904235	053189	2100	37	39.3	123	2.7	110
8904237	053189	2359	37	45.0	123	20.5	66
8904238	060189	227	37	53.0	123	20.5	112
8904244	060189	1001	38	15.0	123	13.5	102
8904245	060189	1037	38	15.0	123	8.5	90
8904246	060189	1110	38	15.0	123	2.5	0
8904247	060189	1220	38	5.0	123	2.5	64
8904248	060189	1333	38	5.0	123	13.6	113
8904249	060189	1455	38	5.0	123	23.6	163
8904250	060189	1533	38	5.0	123	28.5	144
8904251	060189	2056	38	9.8	123	22.1	229
8904252	060189	2308	38	9.5	123	15.6	119
8904253	060289	18	38	9.9	123	9.8	95
8904254	060289	153	38	10.7	123	5.2	80
8904255	060289	237	38	10.0	123	0.0	55
8904256	060289	556	38	0.0	123	13.5	108
8904257	060289	640	38	0.0	123	8.5	86
8904258	060289	802	37	52.9	123	15.7	106
8904259	060289	855	37	49.5	123	11.1	75
8904260	060289	940	37	52.2	123	8.2	95
8904261	060289	1135	37	58.0	123	4.8	51
8904262	060289	1320	37	47.1	123	5.5	77
8904263	060289	1356	37	43.9	123	0.5	62
8904264	060289	1538	37	56.4	122	48.6	35
8904265	060289	1613	37	52.7	122	44.3	27
8904266	060289	1857	37	37.8	122	45.1	62
8904267	060289	2104	37	37.8	122	46.0	57
8904268	060289	2312	37	42.7	122	56.0	57
8904269	060389	11	37	47.5	122	52.0	59
8904270	060389	205	37	50.6	122	44.3	37
8904271	060389	326	37	58.0	122	56.0	53
8904272	060389	606	37	58.3	123	21.4	106
8904273	060389	626	37	58.3	123	23.3	86
8904274	060389	642	37	58.3	123	25.0	73
8904275	060389	700	37	58.3	123	27.0	289
8904276	060389	715	38	0.0	123	28.0	128
8904277	060389	750	38	0.0	123	25.3	51
8904278	060389	802	38	0.0	123	24.0	66
8904279	060389	818	38	0.0	123	22.0	102
8904280	060389	840	38	1.5	123	23.0	108
8904281	060389	905	38	1.5	123	25.0	55
8904282	060389	918	38	1.5	123	26.5	49
8904283	060389	935	38	1.5	123	28.5	112
8904284	060389	1000	38	2.5	123	29.0	104
8904285	060389	1022	38	2.5	123	27.0	68

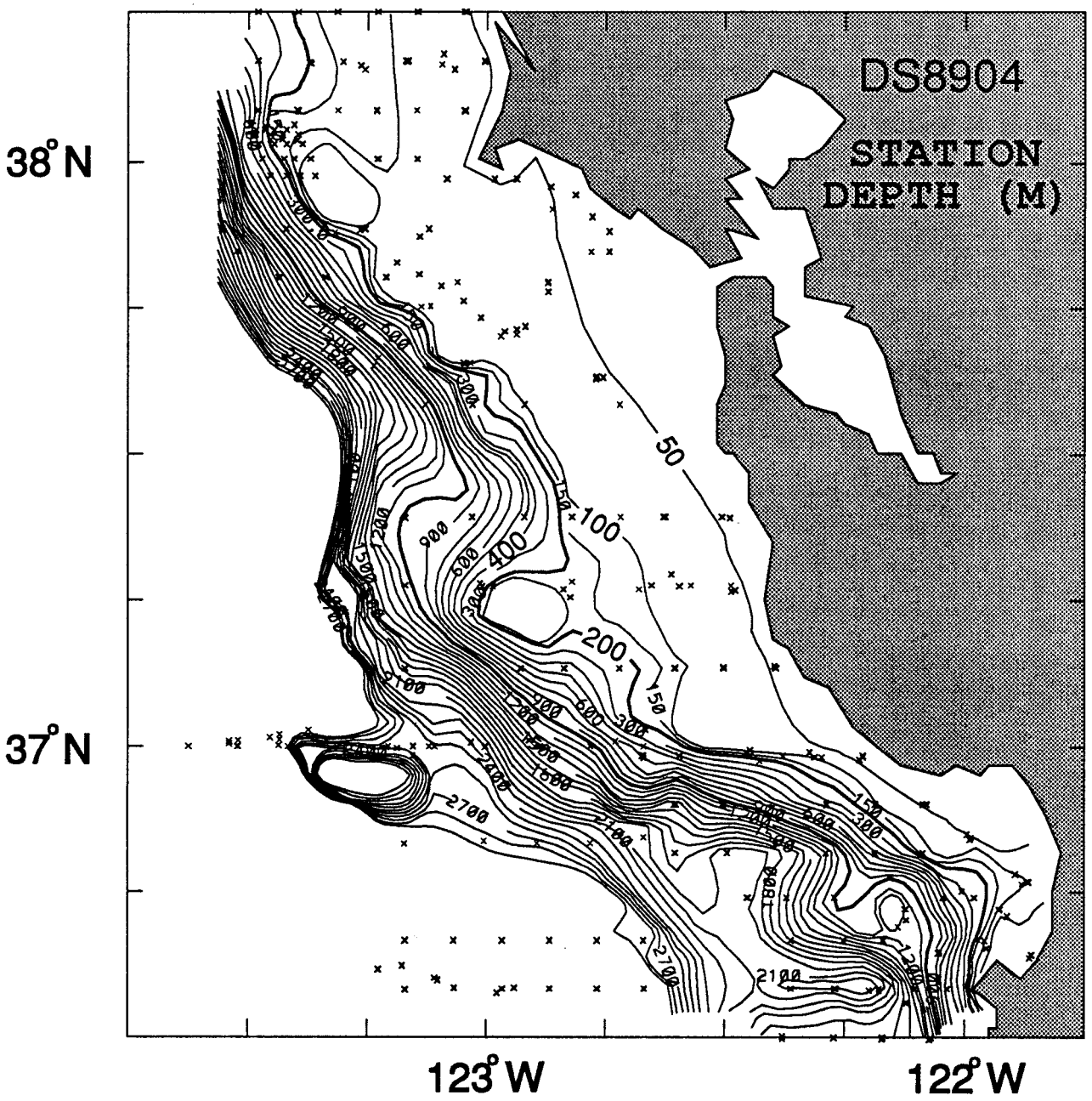
STATION	DATE	TIME	LAT		LON		DEPTH
8904286	060389	1045	38	2.5	123	25.5	69
8904287	060389	1102	38	2.5	123	23.5	113
8904288	060389	1120	38	3.5	123	24.0	126
8904289	060389	1143	38	3.5	123	26.0	113
8904290	060389	1240	38	3.4	123	27.6	91
8904291	060389	1258	38	3.5	123	29.6	132
8904292	060389	1547	38	1.9	123	23.7	104
8904294	060389	1607	38	2.0	123	25.5	71
8904295	060389	1620	38	2.0	123	27.0	80
8904296	060389	1704	38	3.0	123	25.0	106
8904297	060389	1720	38	3.0	123	26.5	82
8904298	060389	1748	38	3.0	123	27.6	84
8904299	060389	1756	38	3.0	123	28.8	104

SWEEP 3

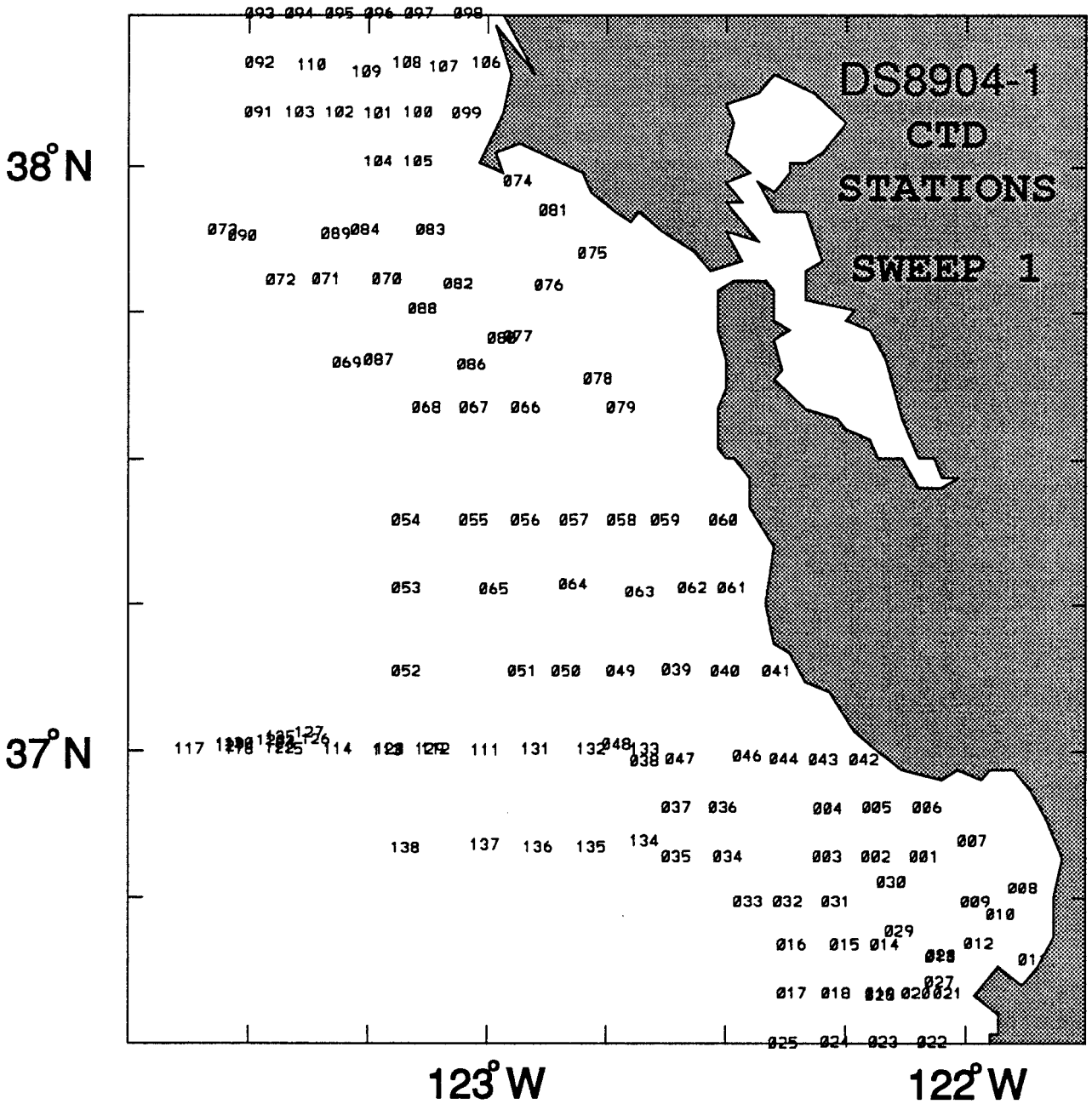
8904300	060489	603	36	44.4	122	16.0	956
8904301	060489	1651	36	40.0	122	10.0	1134
8904302	060489	1717	36	35.0	122	15.9	2286
8904303	060489	1837	36	30.0	122	10.0	1280
8904304	060489	2103	36	35.0	122	10.5	2323
8904305	060589	109	36	35.7	122	3.1	549
8904306	060589	141	36	38.8	122	2.9	914
8904307	060589	318	36	43.2	122	7.2	1920
8904308	060589	354	36	46.5	122	9.2	914
8904309	060589	540	36	44.4	122	2.5	732
8904310	060589	615	36	49.0	122	5.0	108
8904311	060589	620	36	49.0	122	5.0	108
8904312	060589	656	36	48.9	122	11.0	486
8904314	060589	740	36	49.0	122	17.1	1280
8904315	060589	830	36	54.0	122	17.0	274
8904316	060589	1012	36	54.0	122	11.0	97
8904317	060589	1052	36	54.0	122	4.5	59
8904318	060589	1218	36	46.0	121	52.0	79
8904319	060589	2101	36	38.2	121	51.7	38
8904320	060589	2306	36	39.2	121	57.1	99
8904321	060589	2338	36	42.5	121	54.5	88
8904322	060689	113	36	45.1	122	0.2	732
8904323	060689	206	36	46.0	121	51.8	86
8904324	060689	326	36	50.9	121	59.5	88
8904325	060689	646	36	49.0	122	29.5	2103
8904326	060689	750	36	49.0	122	36.0	1829
8904327	060689	827	36	53.9	122	30.0	1134
8904328	060689	913	36	54.0	122	36.2	1554
8904329	060689	1002	36	59.0	122	40.0	563
8904330	060689	1130	37	1.7	122	39.7	375
8904331	060689	1220	37	8.0	122	36.0	110
8904332	060689	1309	37	8.1	122	29.9	91
8904333	060689	1348	37	8.2	122	23.5	42
8904334	060689	2110	36	59.0	122	12.5	40
8904335	060689	2258	36	59.4	122	19.2	117
8904336	060689	2314	36	59.0	122	22.5	143
8904337	060789	214	36	58.5	122	25.4	262
8904338	060789	323	36	59.0	122	35.5	384
8904339	060789	550	37	8.0	122	43.0	223
8904340	060789	636	37	8.0	122	50.0	461

STATION	DATE	TIME	LAT		LON		DEPTH
8904341	060789	715	37	8.0	122	55.5	560
8904342	060789	854	37	16.5	123	10.0	1116
8904343	060789	1008	37	23.5	123	1.6	655
8904344	060789	1056	37	23.5	122	55.0	201
8904345	060789	1136	37	23.5	122	49.0	104
8904346	060789	1209	37	23.5	122	49.0	90
8904347	060789	1243	37	23.5	122	37.3	71
8904348	060789	1330	37	23.5	122	30.0	42
8904349	060789	2103	37	16.0	122	28.5	53
8904350	060789	2243	37	17.6	122	36.5	93
8904351	060789	2304	37	16.5	122	39.0	101
8904352	060889	150	37	15.3	122	49.2	201
8904353	060889	346	37	16.7	123	0.6	574
8904354	060889	618	37	35.0	122	55.0	101
8904355	060889	2108	37	58.0	122	56.0	57
8904356	061089	1203	37	53.0	123	15.1	99
8904357	061089	1339	37	52.8	123	33.0	2213
8904358	061089	1437	37	48.0	123	25.9	1372
8904359	061089	1520	37	48.0	123	20.0	518
8904360	061089	1605	37	48.0	123	12.4	88
8904361	061089	1736	37	39.5	123	17.5	1737
8904362	061089	1844	37	35.0	123	7.5	1079
8904363	061089	2101	37	39.2	123	2.5	115
8904364	061089	2306	37	39.0	123	14.0	1189
8904365	061189	12	37	45.0	123	8.0	66
8904366	061189	244	37	53.4	123	20.1	110
8904367	061189	532	37	50.7	123	31.1	1463
8904368	061189	812	38	5.0	123	28.5	134
8904369	061189	854	38	10.0	123	28.5	362
8904370	061189	939	38	15.0	123	28.5	329
8904371	061189	1038	38	15.0	123	18.6	123
8904372	061189	1131	38	15.0	123	8.4	90
8904373	061189	1210	38	15.0	123	2.4	53
8904374	061189	1316	38	4.9	123	2.5	60
8904375	061189	1415	38	5.0	123	13.5	113
8904376	061189	1516	38	4.9	123	23.5	161
8904377	061189	2059	38	9.7	123	21.9	187
8904378	061289	29	38	9.9	123	17.9	110
8904379	061289	115	38	10.0	123	9.7	93
8904380	061289	257	38	9.1	123	3.8	75
8904381	061289	323	38	9.9	123	0.0	55
8904382	061289	533	38	0.0	123	13.5	110
8904383	061289	604	38	0.0	123	8.5	90
8904384	061289	702	37	58.0	122	58.8	64
8904385	061289	821	37	48.3	123	8.3	84
8904386	061289	900	37	45.6	123	2.7	71
8904387	061289	1035	37	57.2	122	51.7	44
8904388	061289	1109	37	54.2	122	46.5	29
8904389	061289	1334	37	42.5	122	57.5	55
8904391	061289	2114	37	37.6	122	46.0	55
8904392	061289	2342	37	43.0	122	54.9	57
8904393	061389	22	37	46.5	122	52.0	55

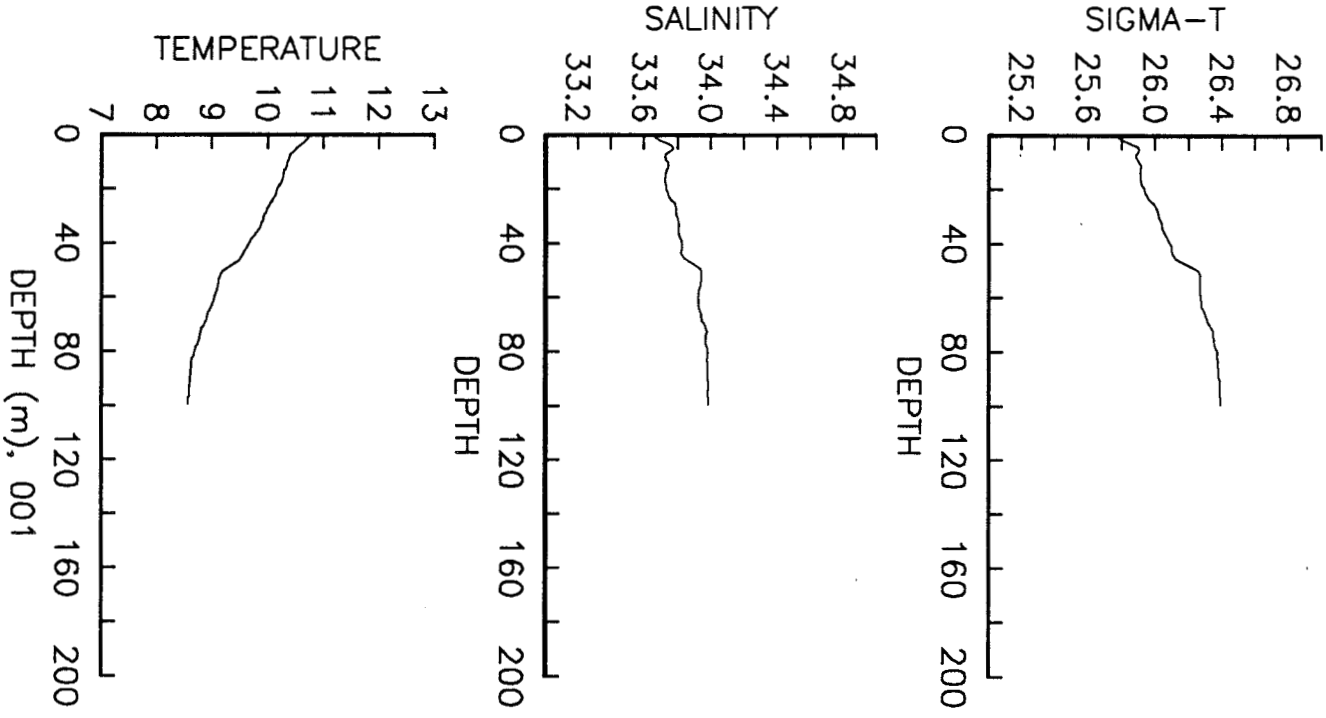
APPENDIX 2: BATHYMETRIC MAP OF SURVEY REGION


DS8904
STATION
DEPTH (M)
38°N
37°N
123°W
122°W
50
100
200
400
150
300
600
900
1200
1500
1800
2100
2400
2700

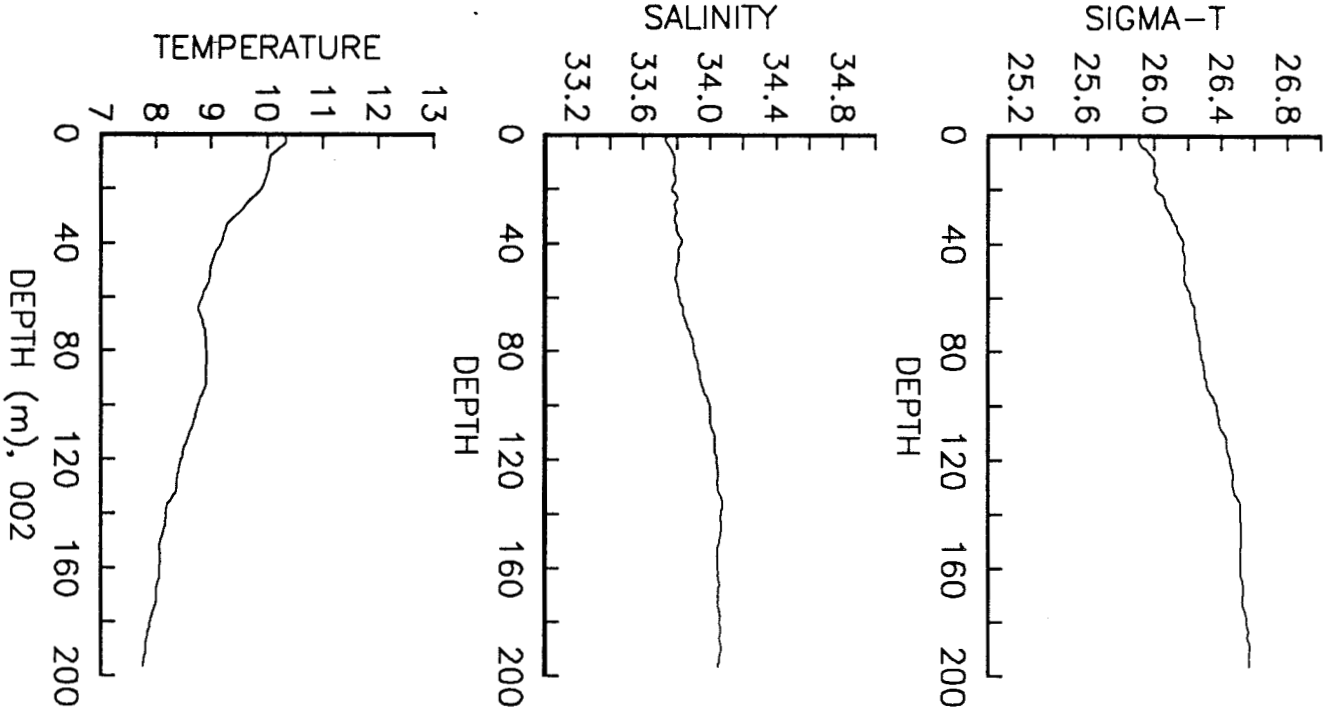
APPENDIX 3.1: PROFILES OF INDIVIDUAL CTD CASTS-SWEEP 1


DS8904-1
CTD
STATIONS
SWEEP 1
38° N
37° N
123° W
122° W

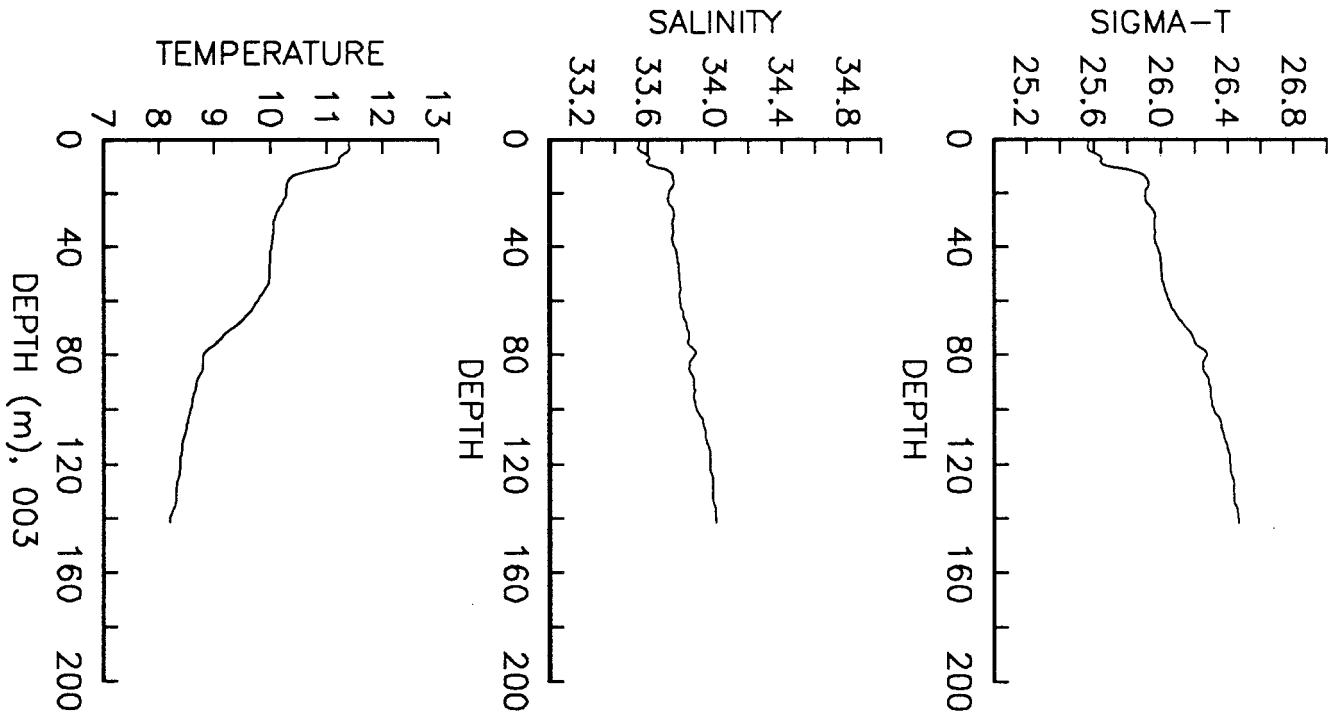
STN 8904.001 14 MAY 1989 1420 PDT
36°49.0'N 122° 5.0'W DEPTH 106 m



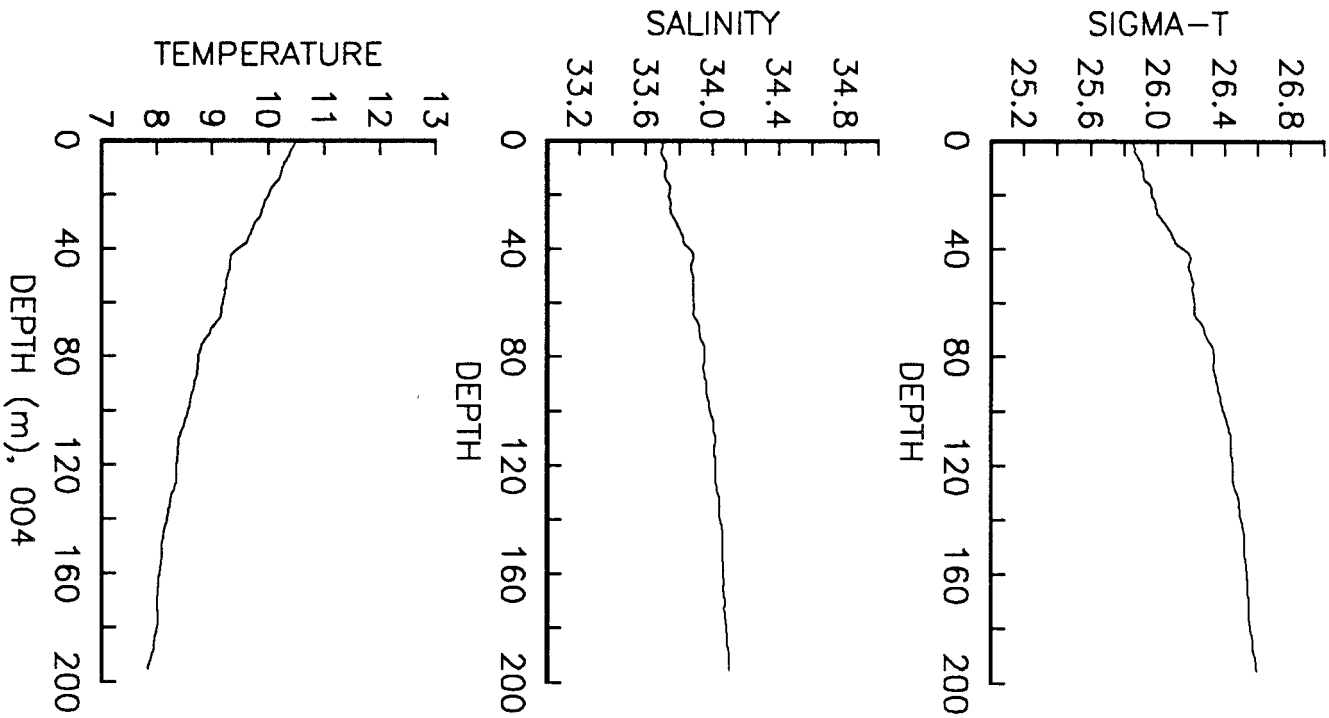
STN 8904.002 14 MAY 1989 1501 PDT
36°49.0'N 122°11.0'W DEPTH 494 m



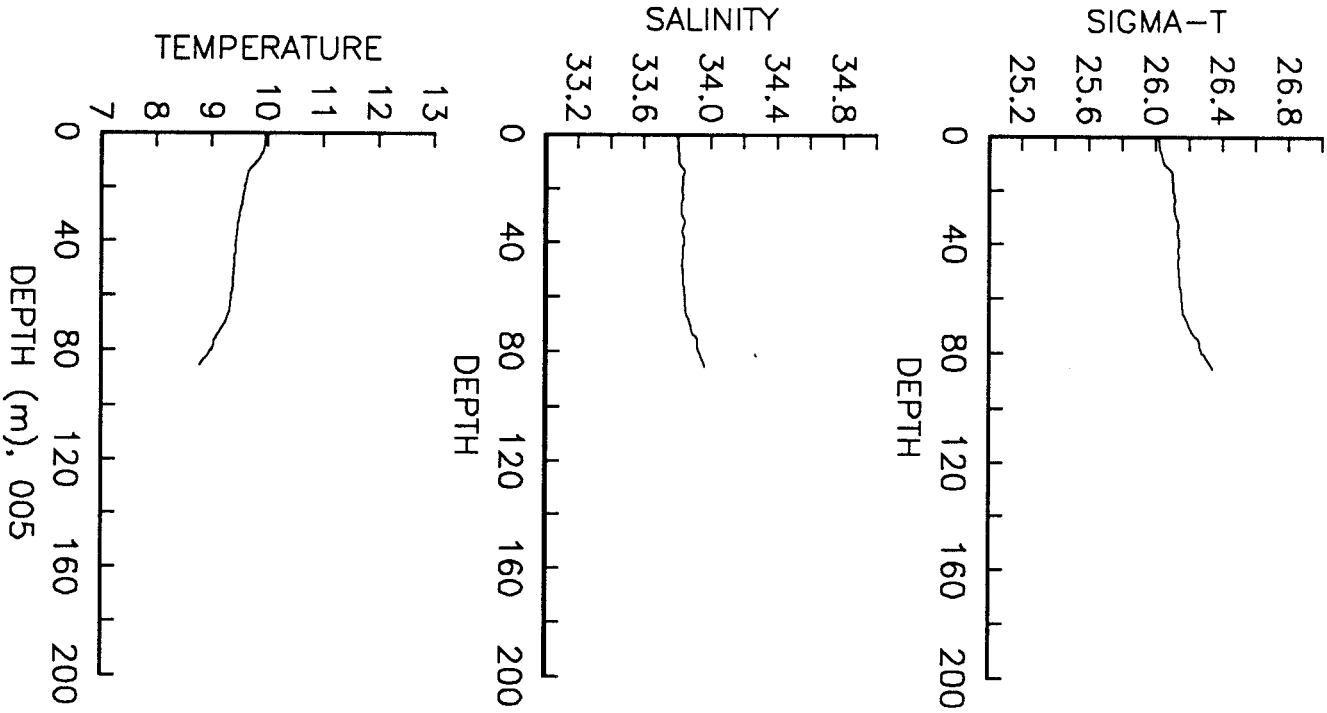
STN 8904.003 14 MAY 1989 1546 PDT
36°49.0'N 122°17.1'W DEPTH 1280 m



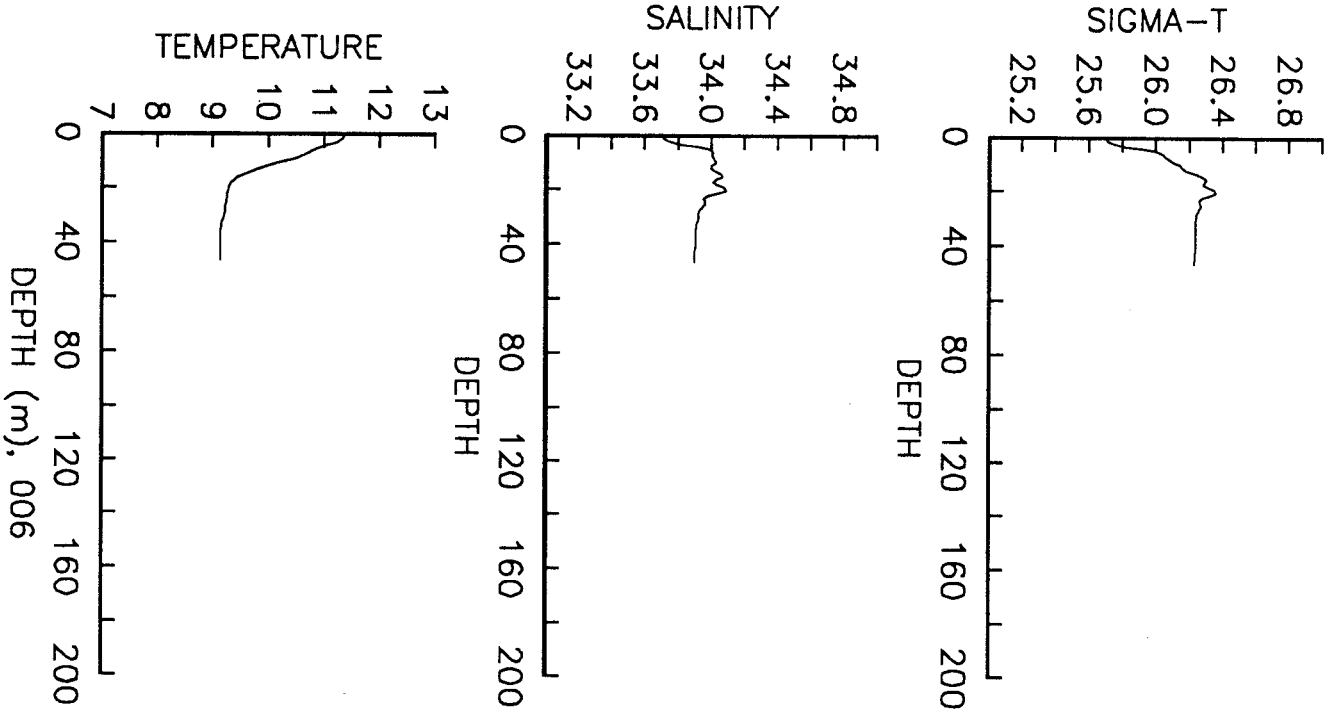
STN 8904.004 14 MAY 1989 1635 PDT
36°53.9'N 122°17.0'W DEPTH 340 m



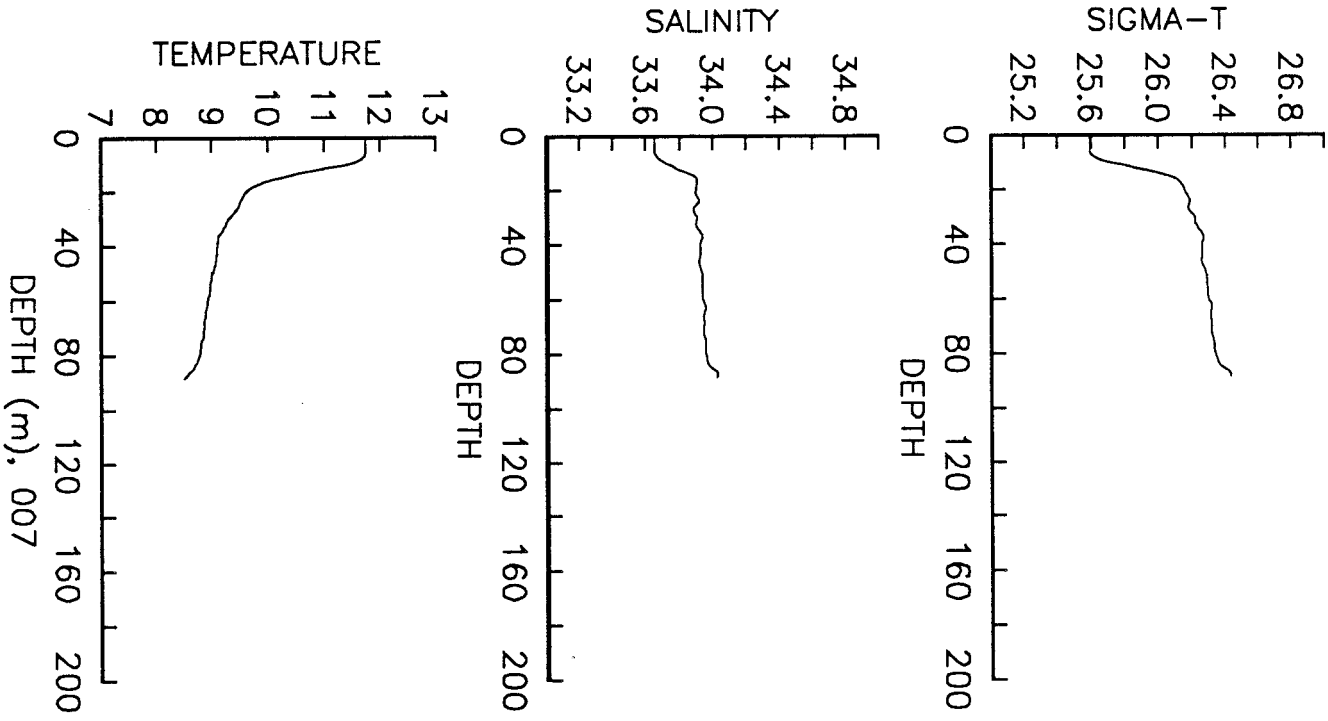
STN 8904.005 14 MAY 1989 1717 PDT
36°54.0'N 122°10.9'W DEPTH 95 m



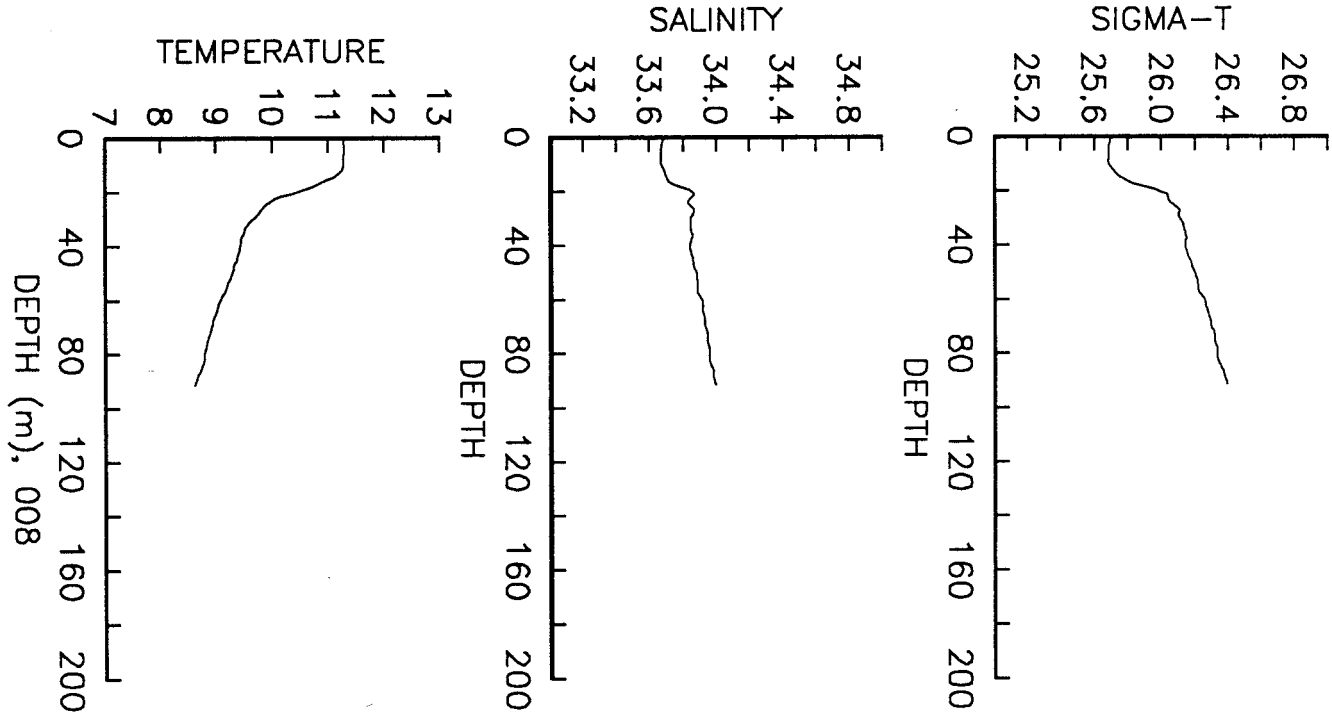
STN 8904.006 14 MAY 1989 1755 PDT
36°54.0'N 122° 4.6'W DEPTH 57 m



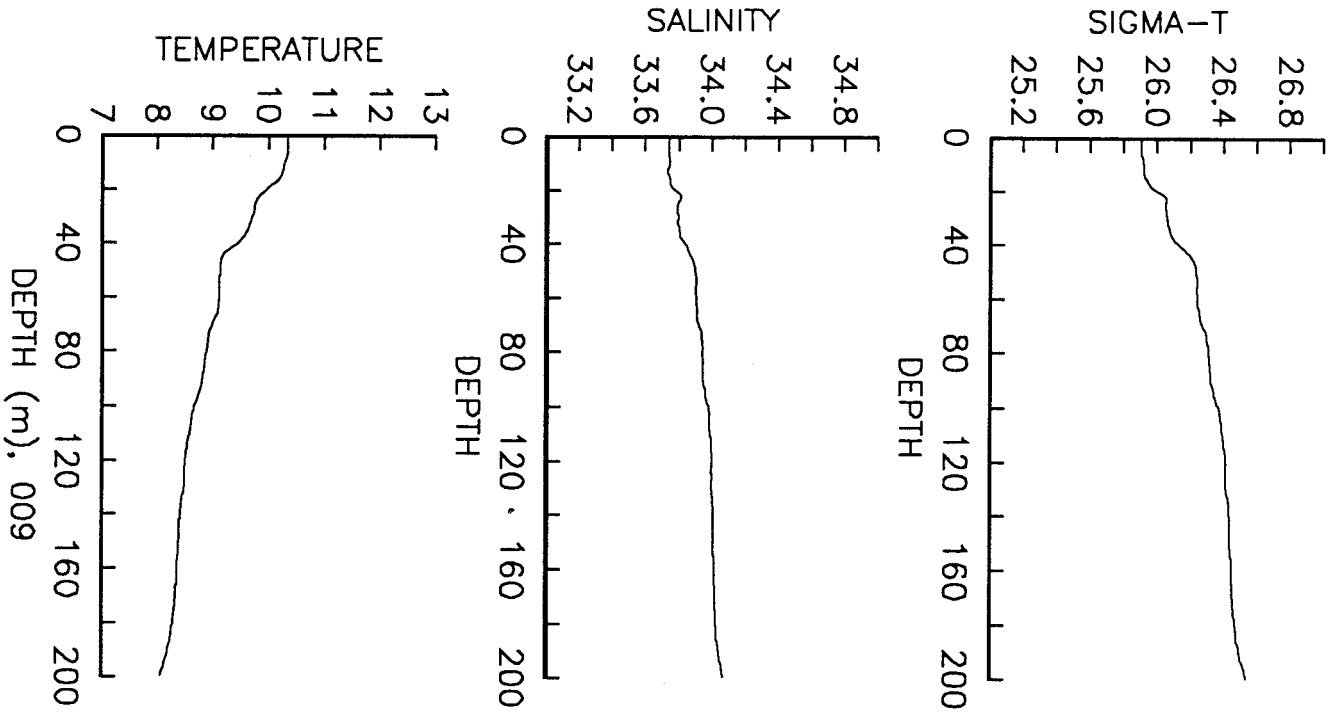
STN 8904.007 14 MAY 1989 2020 PDT
36°50.6'N 121°59.0'W DEPTH 91 m



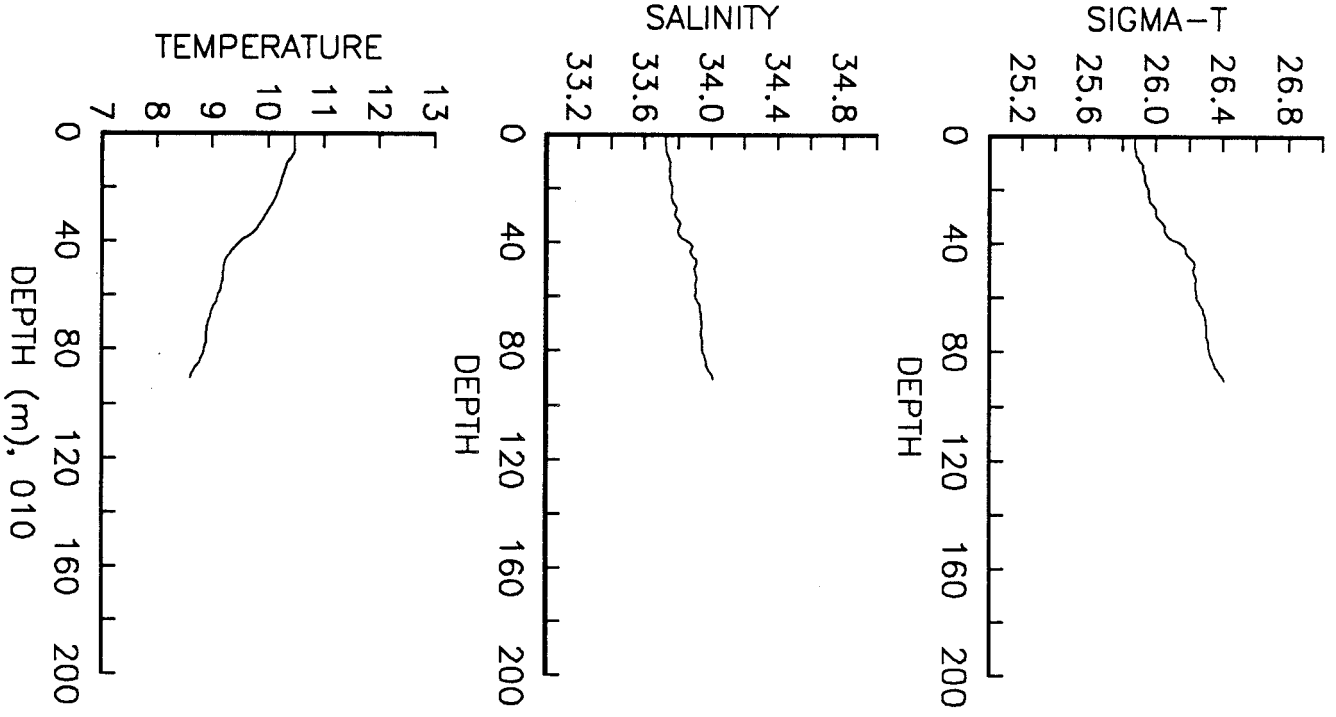
STN 8904.008 14 MAY 1989 2302 PDT
36°45.8'N 121°52.7'W DEPTH 101 m



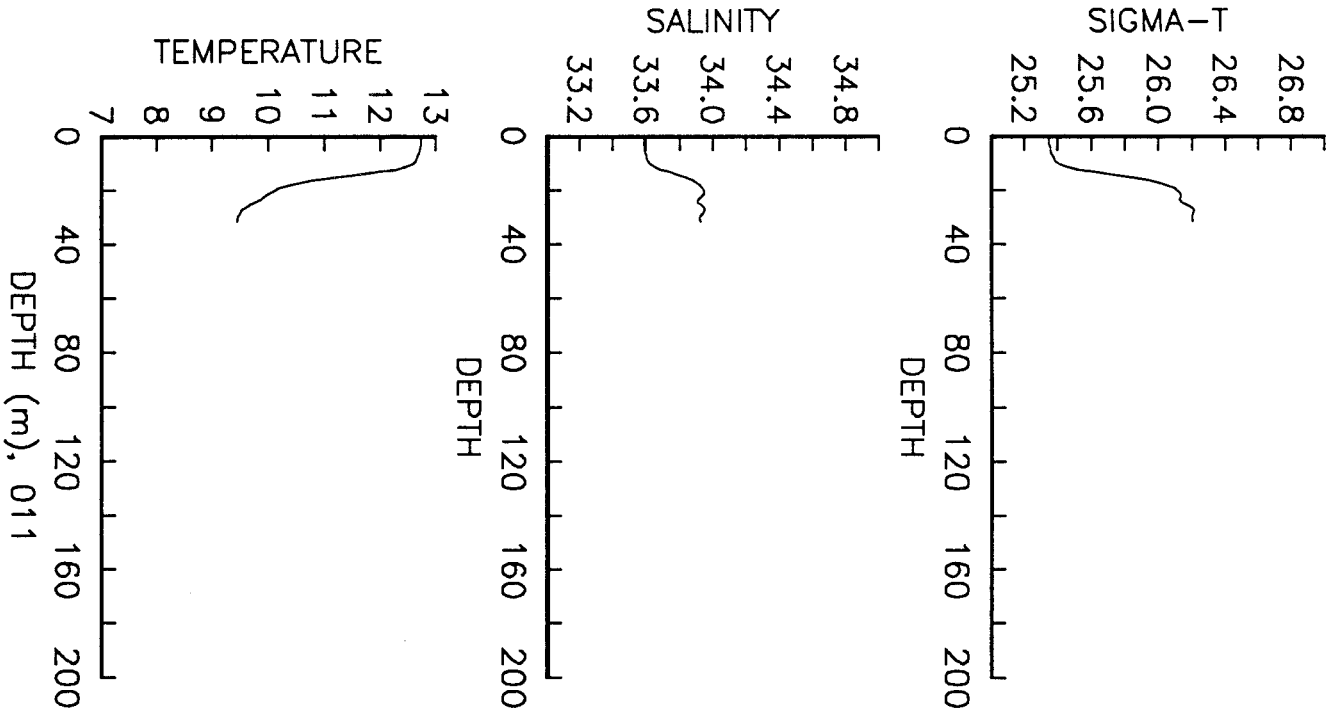
STN 8904.009 14 MAY 1989 2345 PDT
36°44.4'N 121°58.6'W DEPTH 256 m



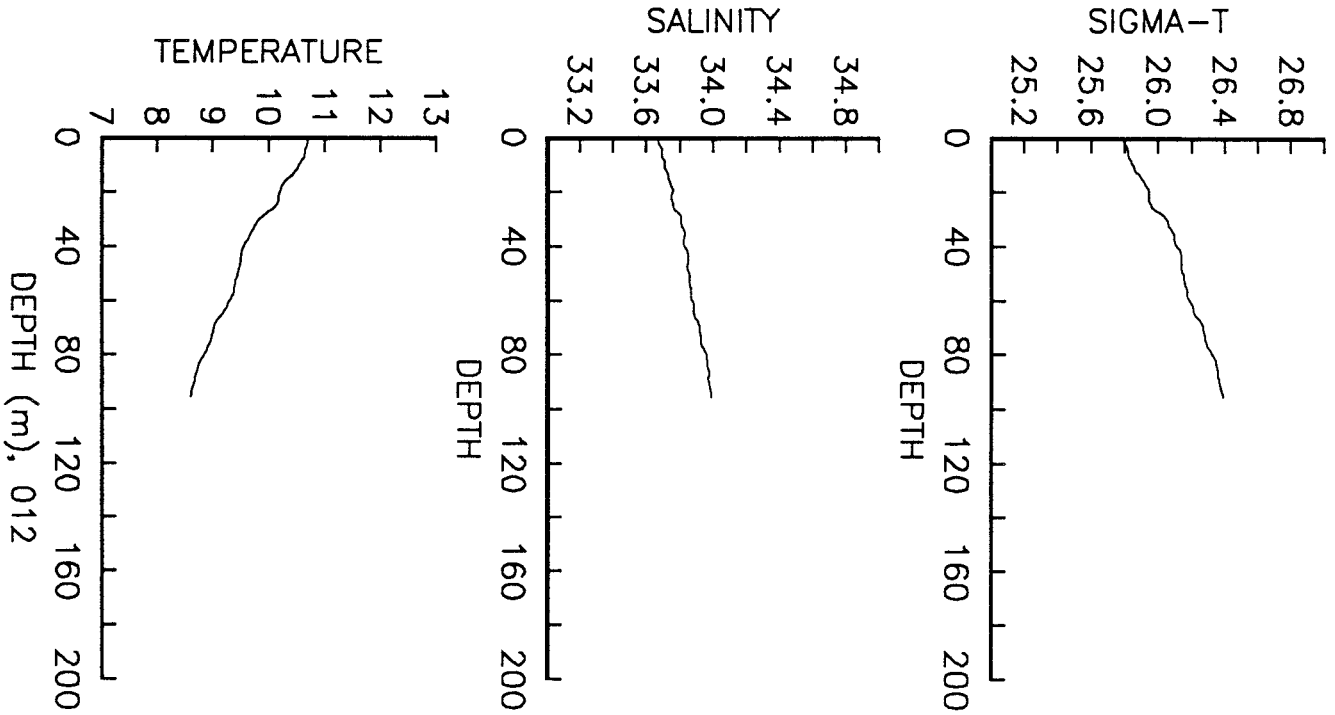
STN 8904.010 15 MAY 1989 0130 PDT
36°43.1'N 121°55.5'W DEPTH 97 m



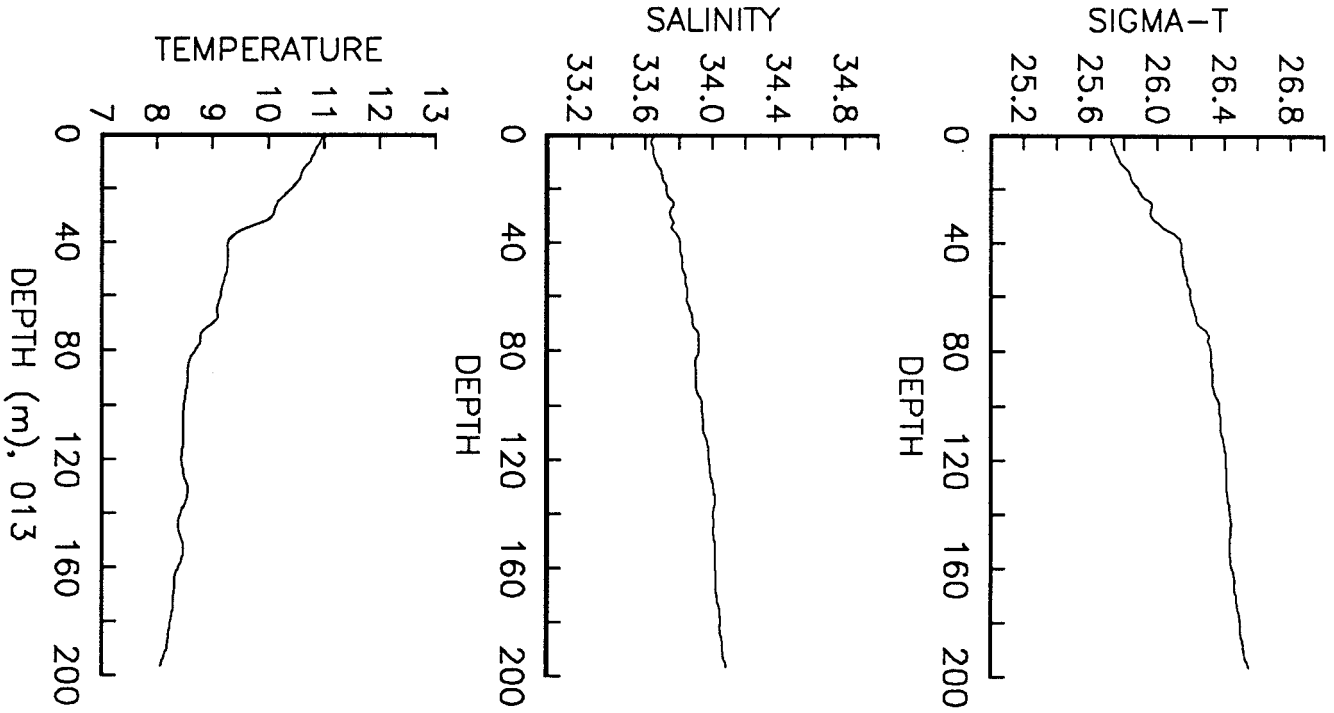
STN 8904.011 15 MAY 1989 0213 PDT
36°38.5'N 121°51.4'W DEPTH 37 m



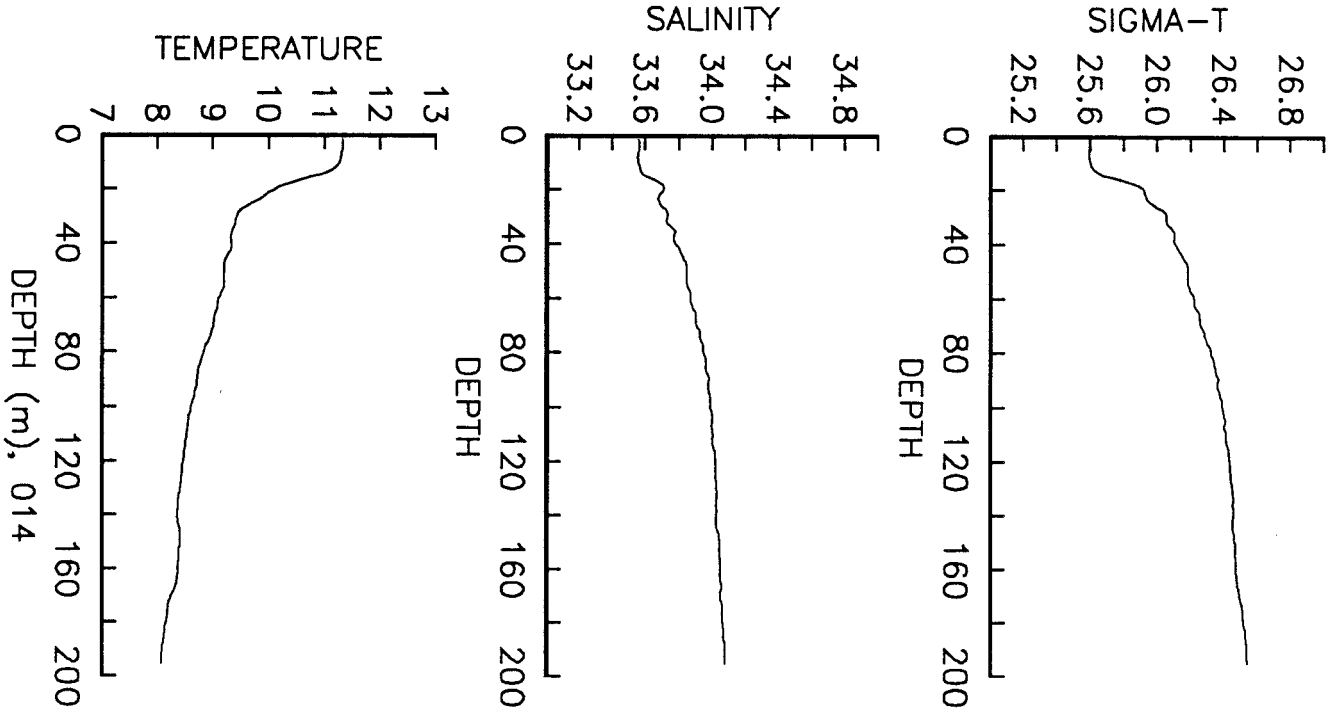
STN 8904.012 15 MAY 1989 0500 PDT
36°40.1'N 121°58.2'W DEPTH 102 m



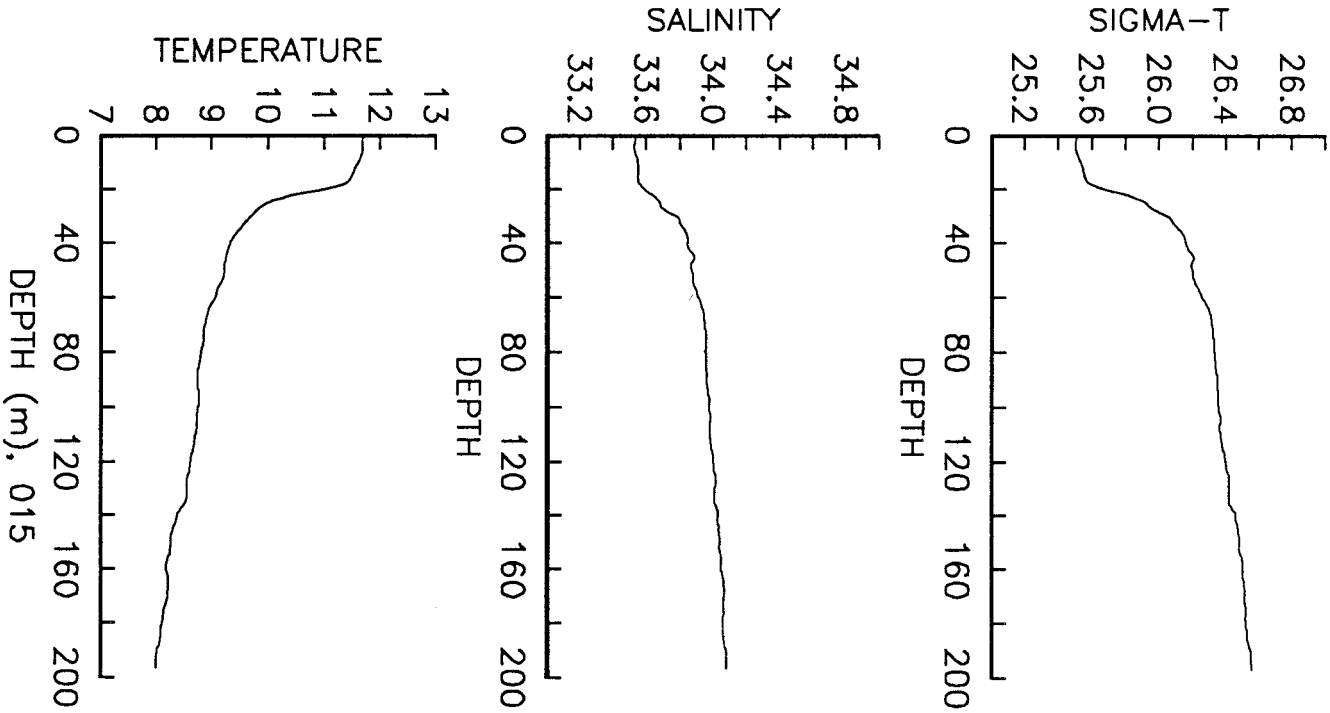
STN 8904.013 15 MAY 1989 0543 PDT
36°38.7'N 122° 3.0'W DEPTH 808 m



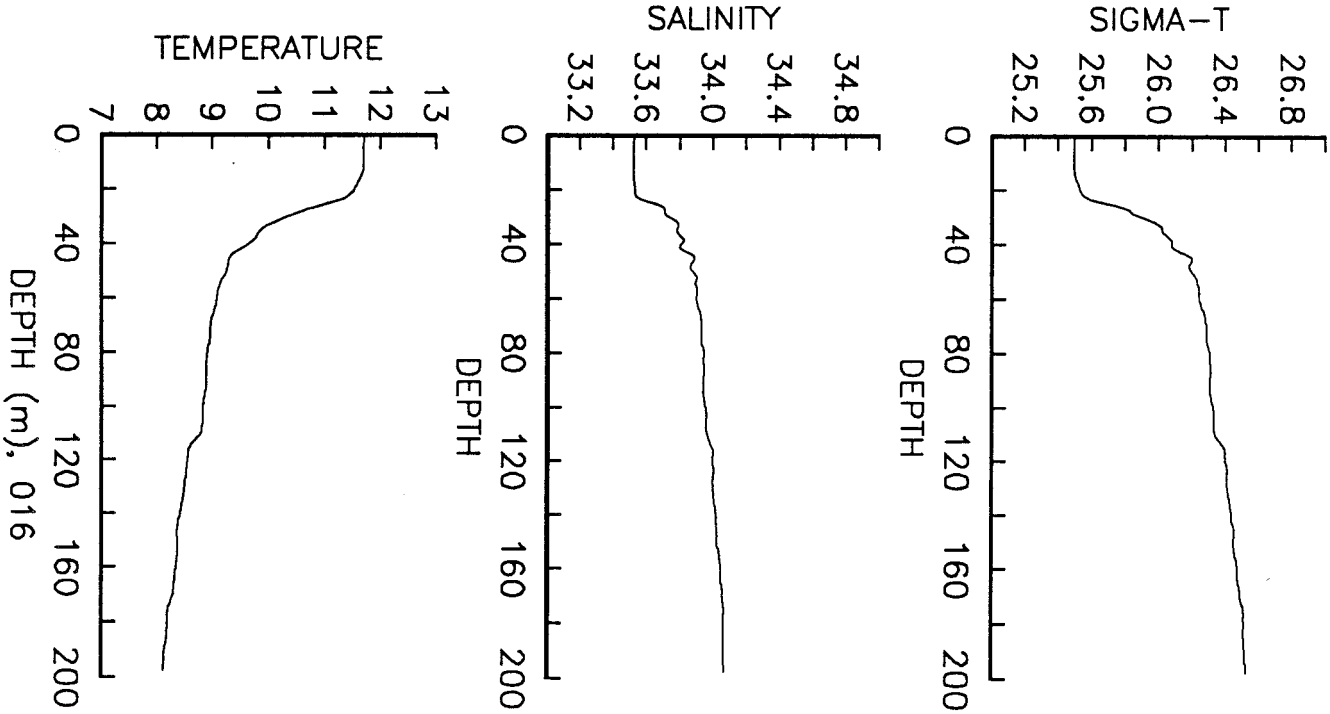
STN 8904.014 15 MAY 1989 0632 PDT
36°40.0'N 122° 9.9'W DEPTH 1106 m



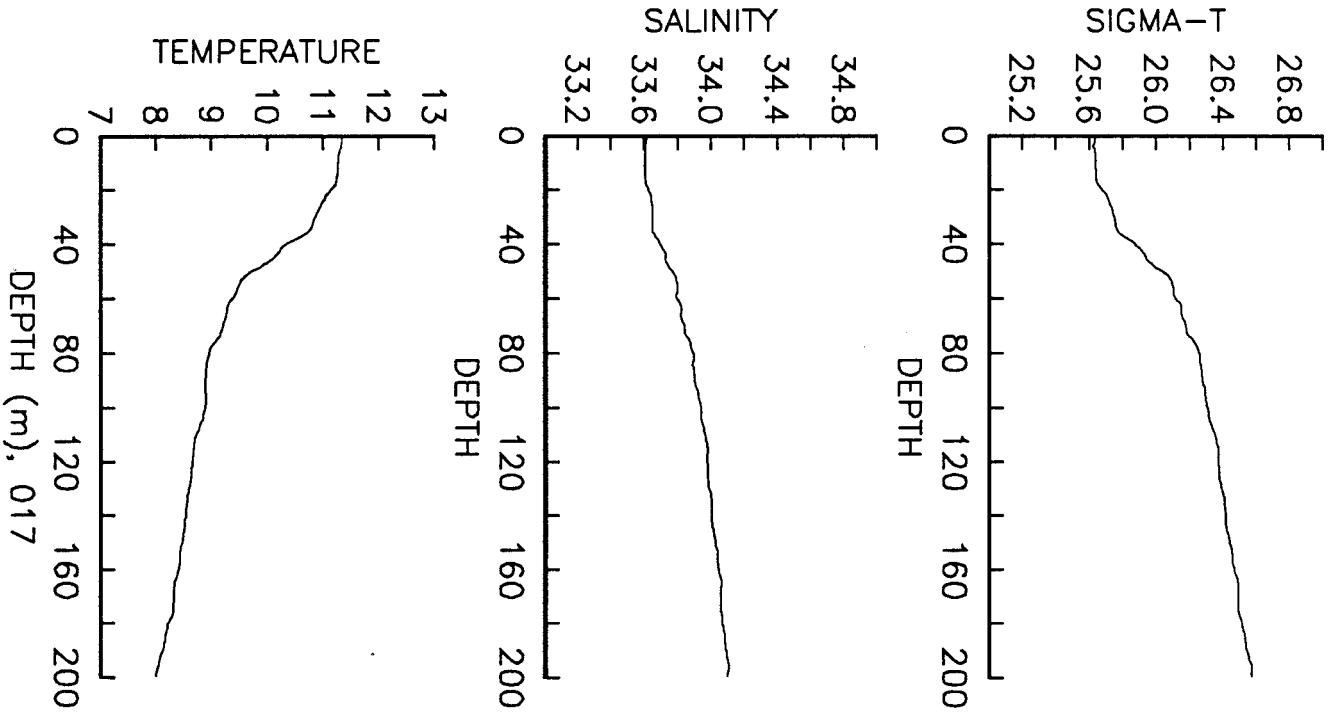
STN 8904.015 15 MAY 1989 0710 PDT
36°40.0'N 122°14.9'W DEPTH 1353 m



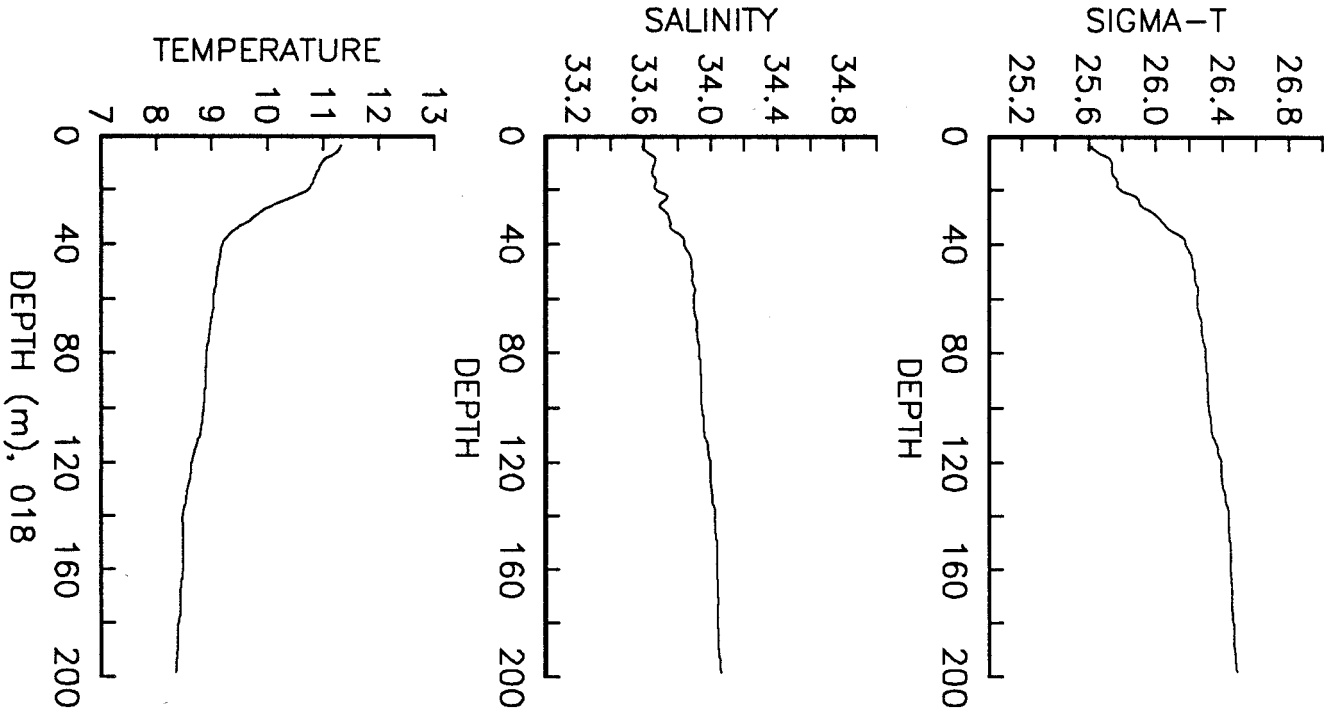
STN 8904.016 15 MAY 1989 0751 PDT
36°40.0'N 122°21.5'W DEPTH 1646 m



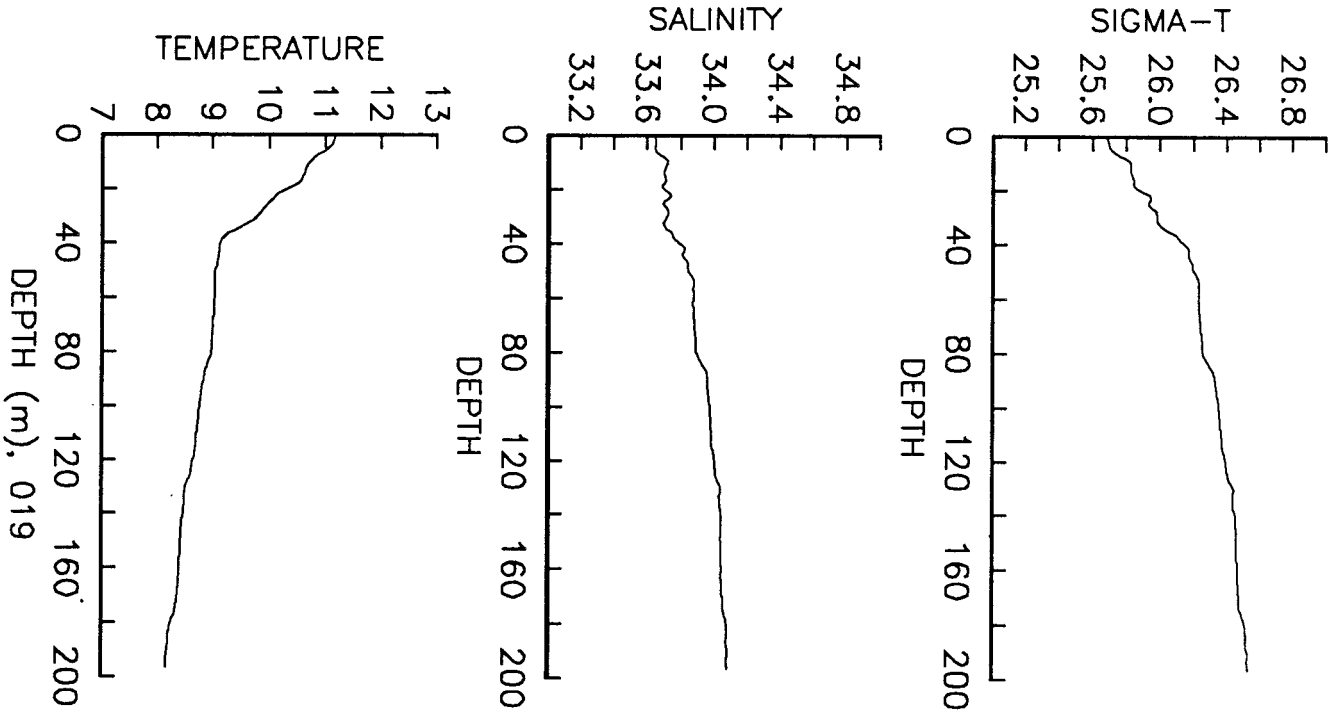
STN 8904.017 15 MAY 1989 0837 PDT
36°35.0'N 122°21.5'W DEPTH 2195 m



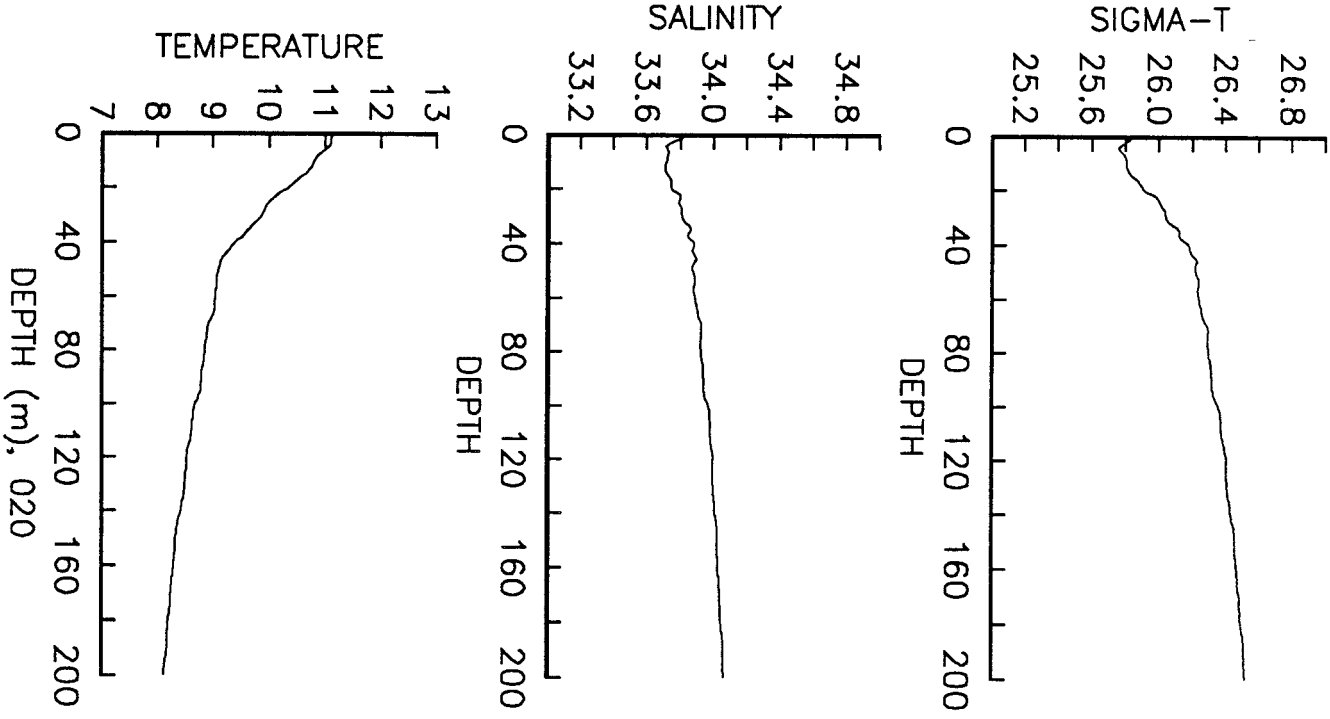
STN 8904.018 15 MAY 1989 0919 PDT
36°35.0'N 122°16.0'W DEPTH 2195 m



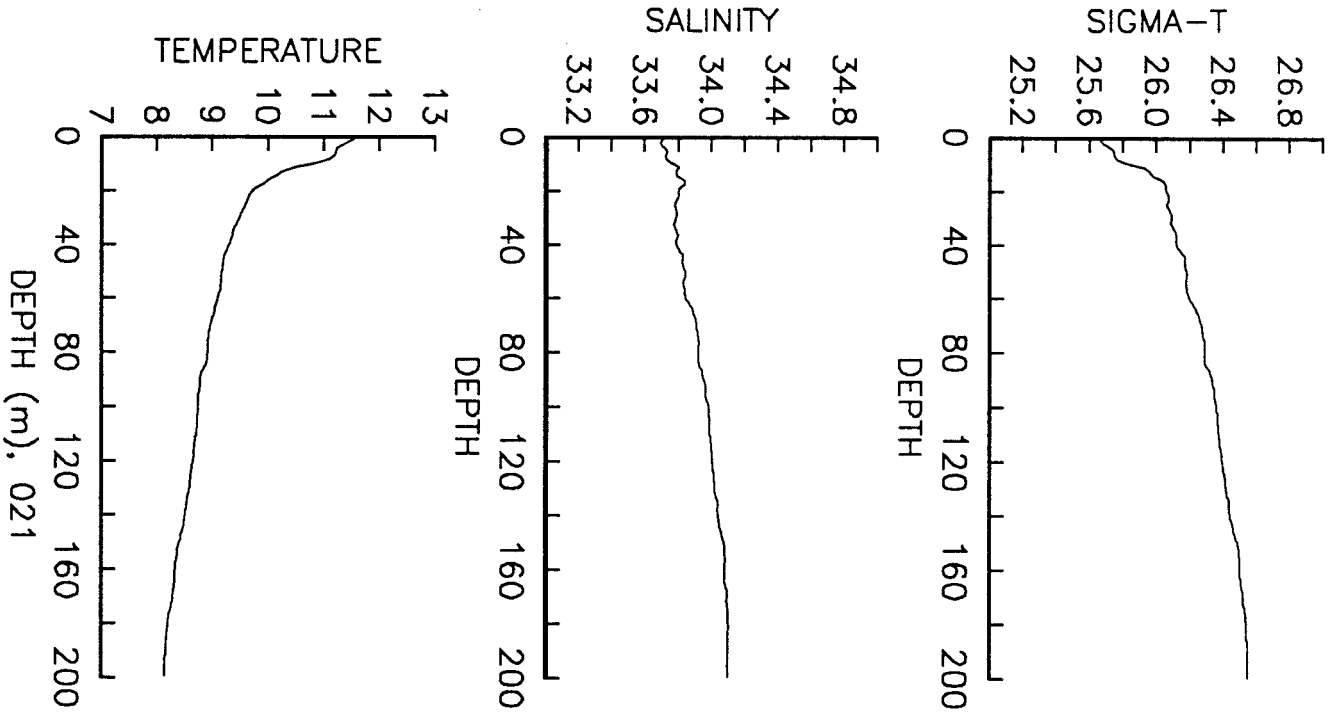
STN 8904.019 15 MAY 1989 1000 PDT
36°35.0'N 122°10.5'W DEPTH 2195 m



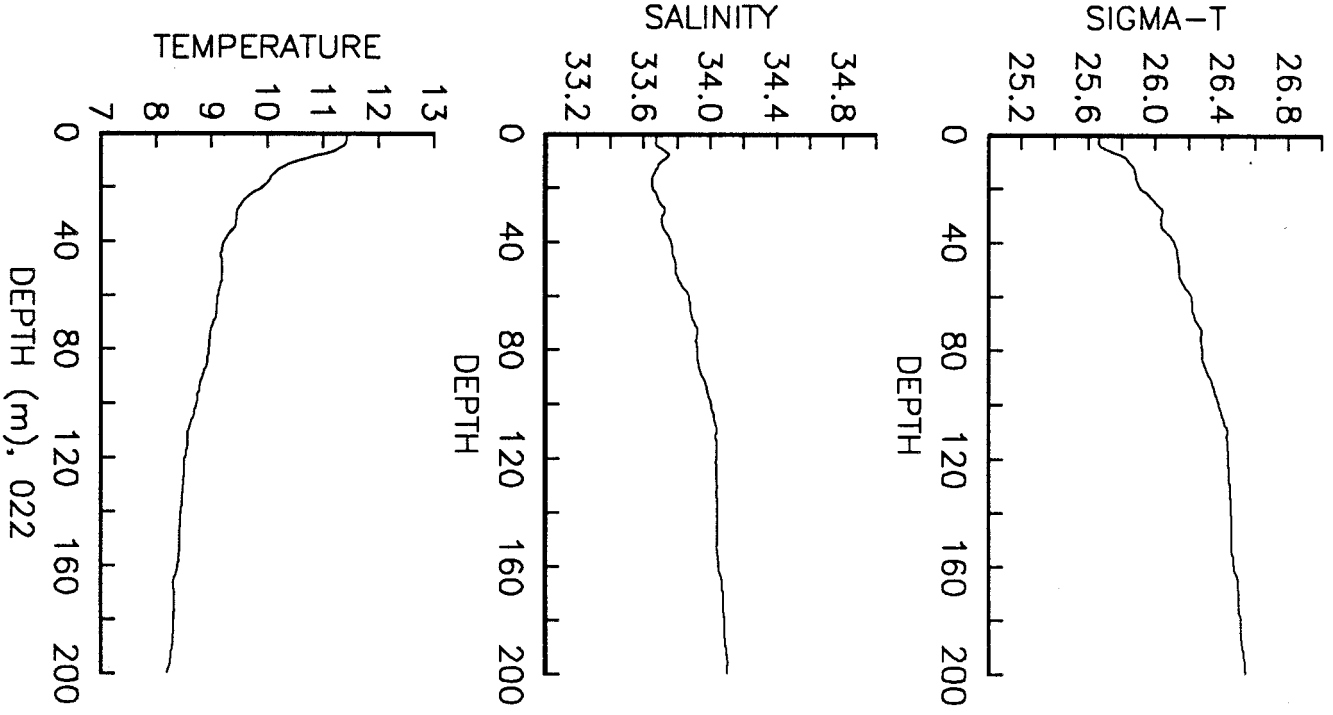
STN 8904.020 15 MAY 1989 1034 PDT
36°35.0'N 122° 6.0'W DEPTH 1372 m



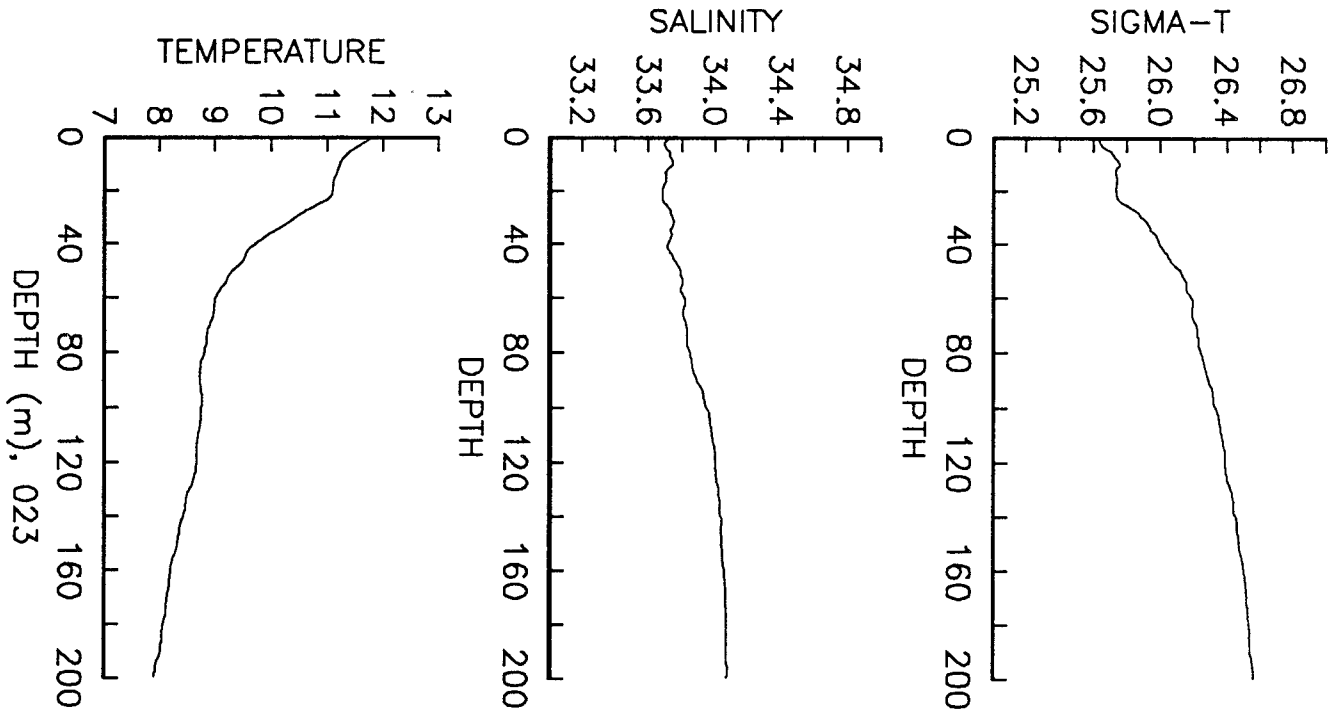
STN 8904.021 15 MAY 1989 1105 PDT
36°35.0'N 122° 2.0'W DEPTH 547 m



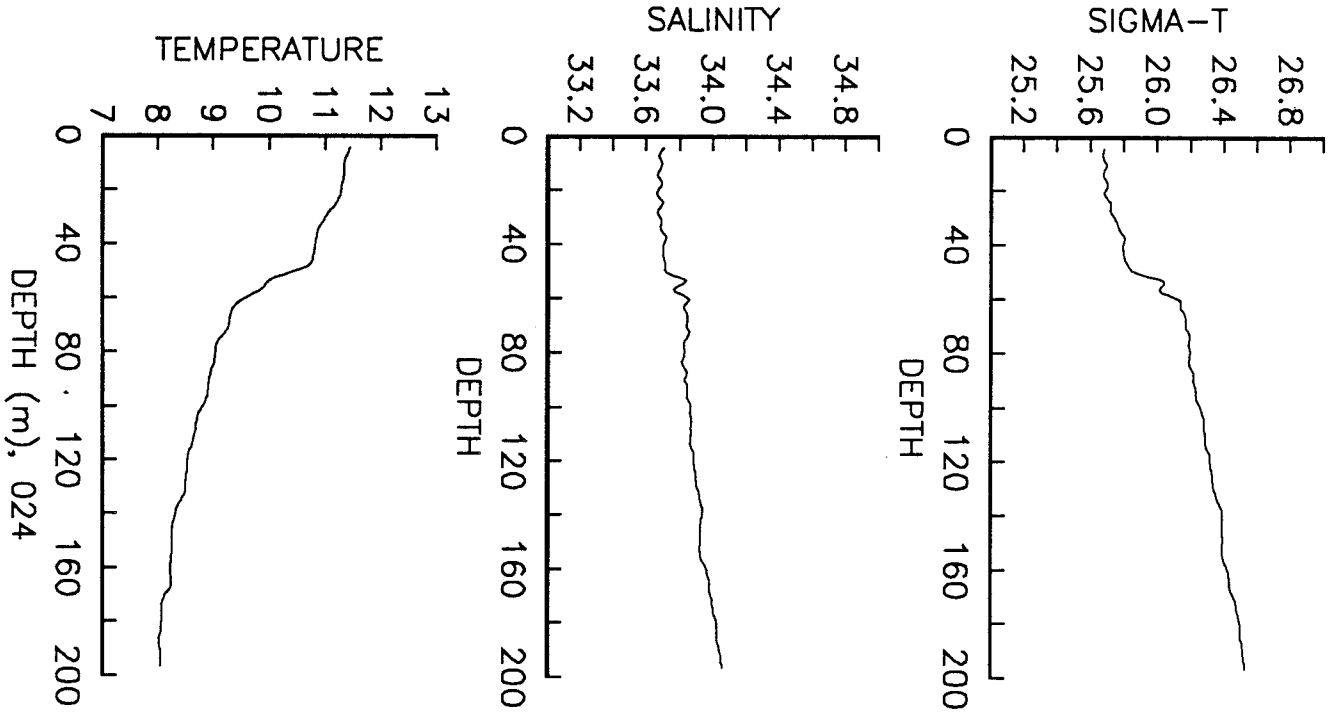
STN 8904.022 15 MAY 1989 1150 PDT
36°30.0'N 122° 4.0'W DEPTH 905 m



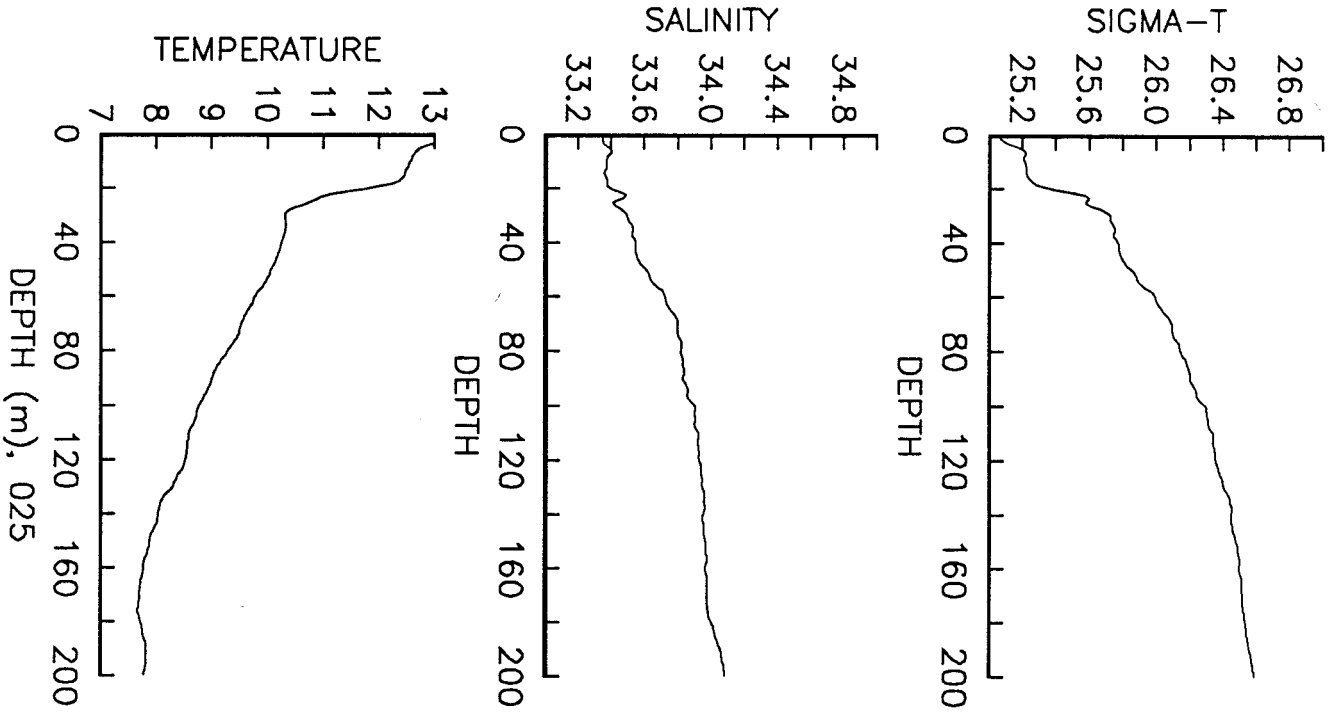
STN 8904.023 15 MAY 1989 1300 PDT
36°30.0'N 122°10.1'W DEPTH 1280 m



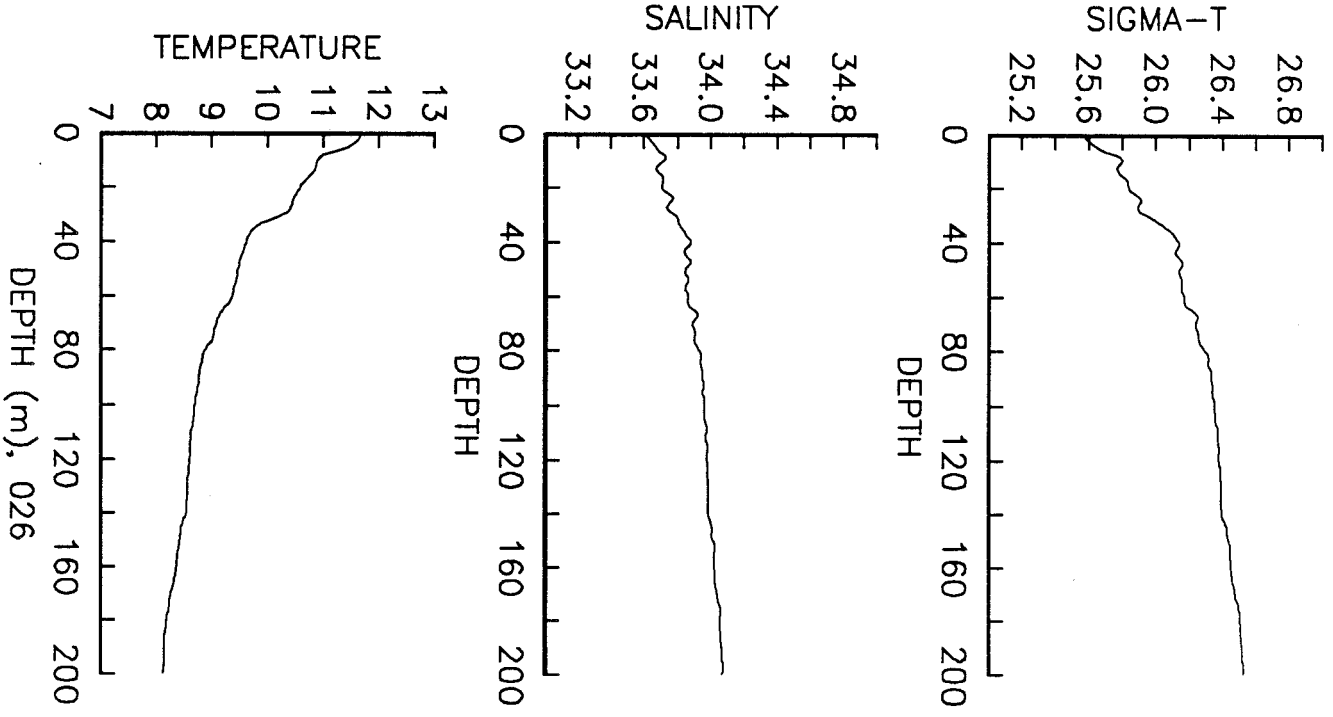
STN 8904.024 15 MAY 1989 1340 PDT
36°30.0'N 122°16.1'W DEPTH 1373 m



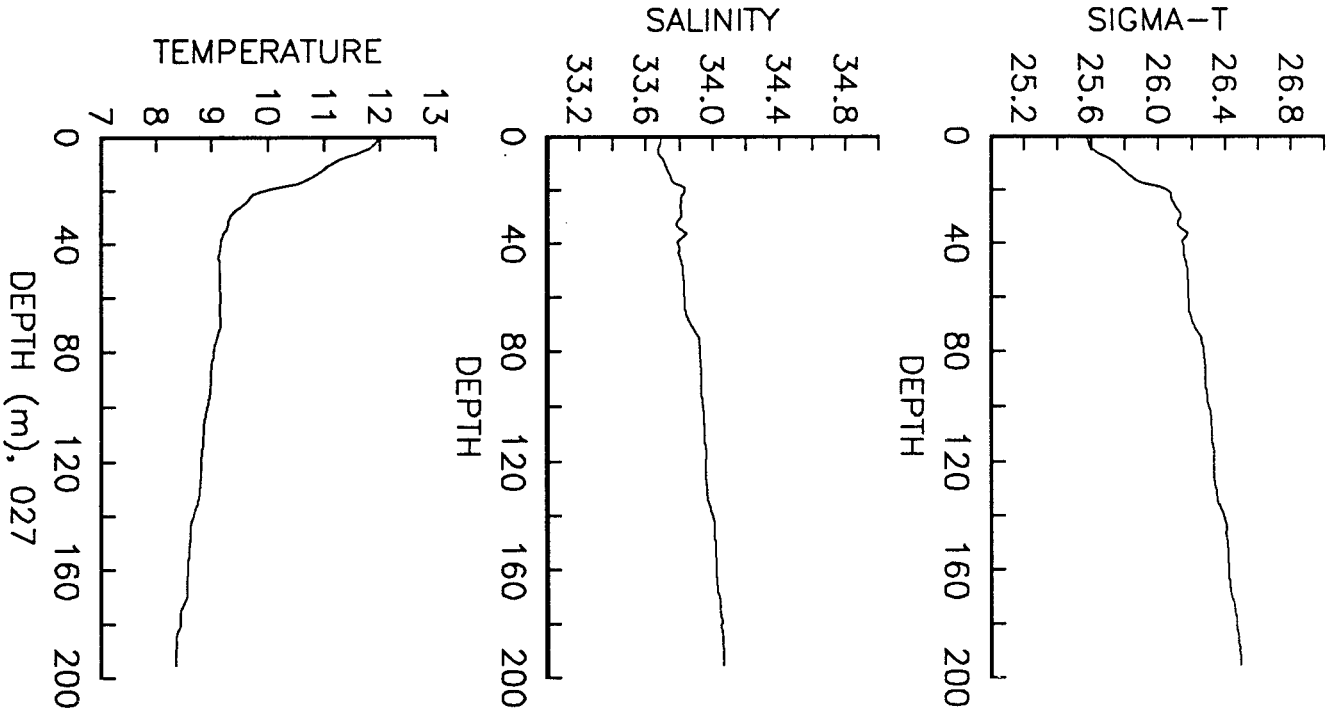
STN 8904.025 15 MAY 1989 1425 PDT
36°29.9'N 122°22.6'W DEPTH 1609 m



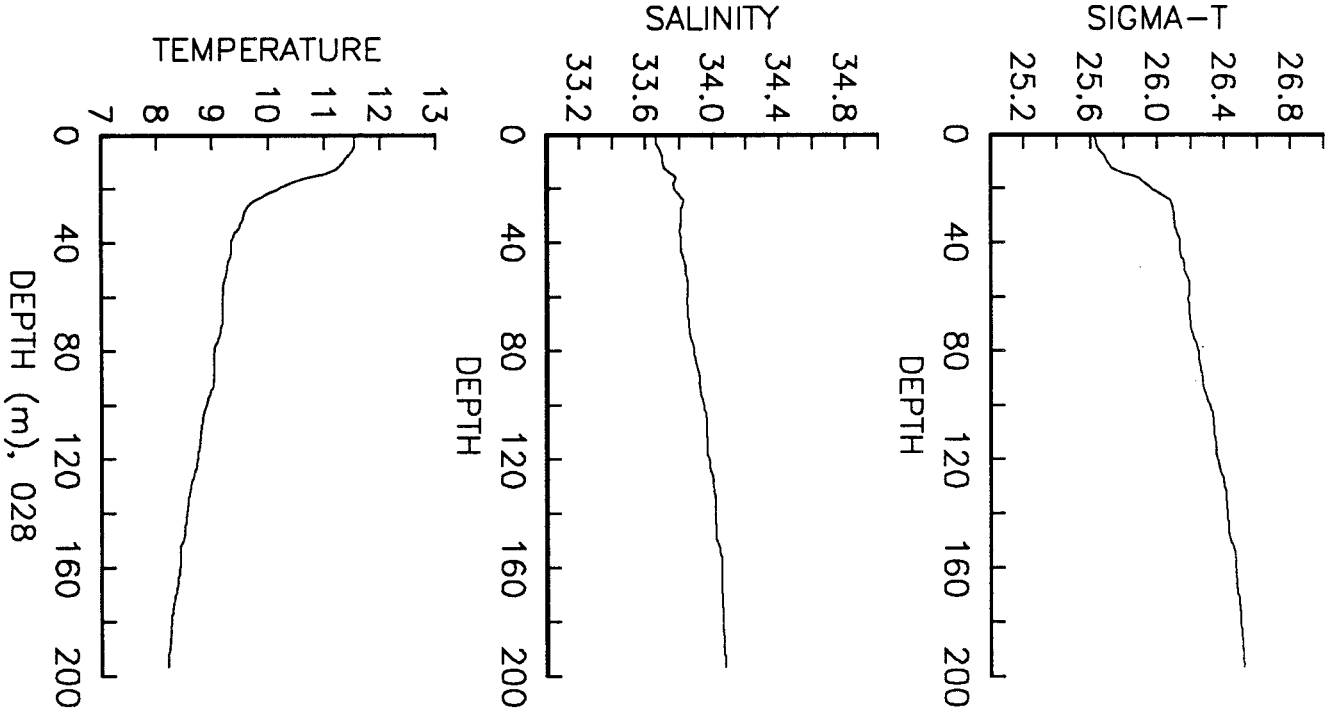
STN 8904.026 15 MAY 1989 2030 PDT
36°34.8'N 122°10.5'W DEPTH 2195 m



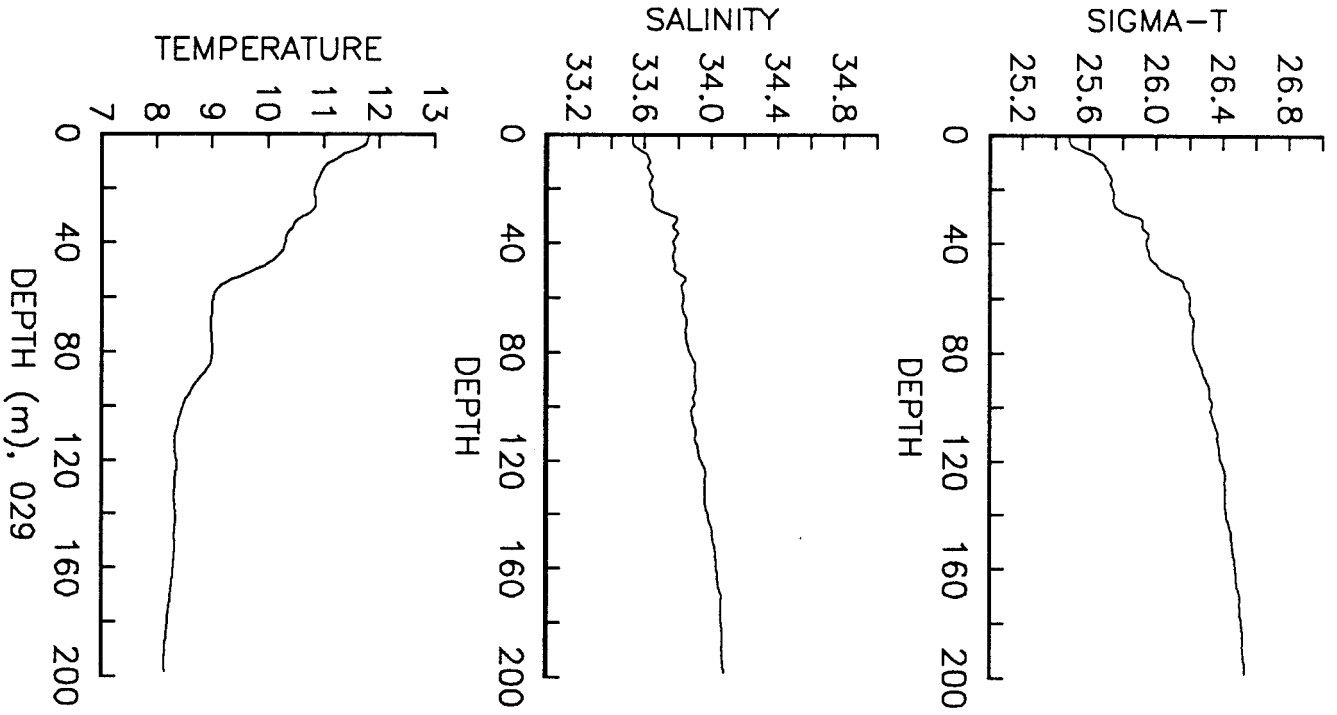
STN 8904.027 16 MAY 1989 0030 PDT
36°36.2'N 122° 3.1'W DEPTH 530 m



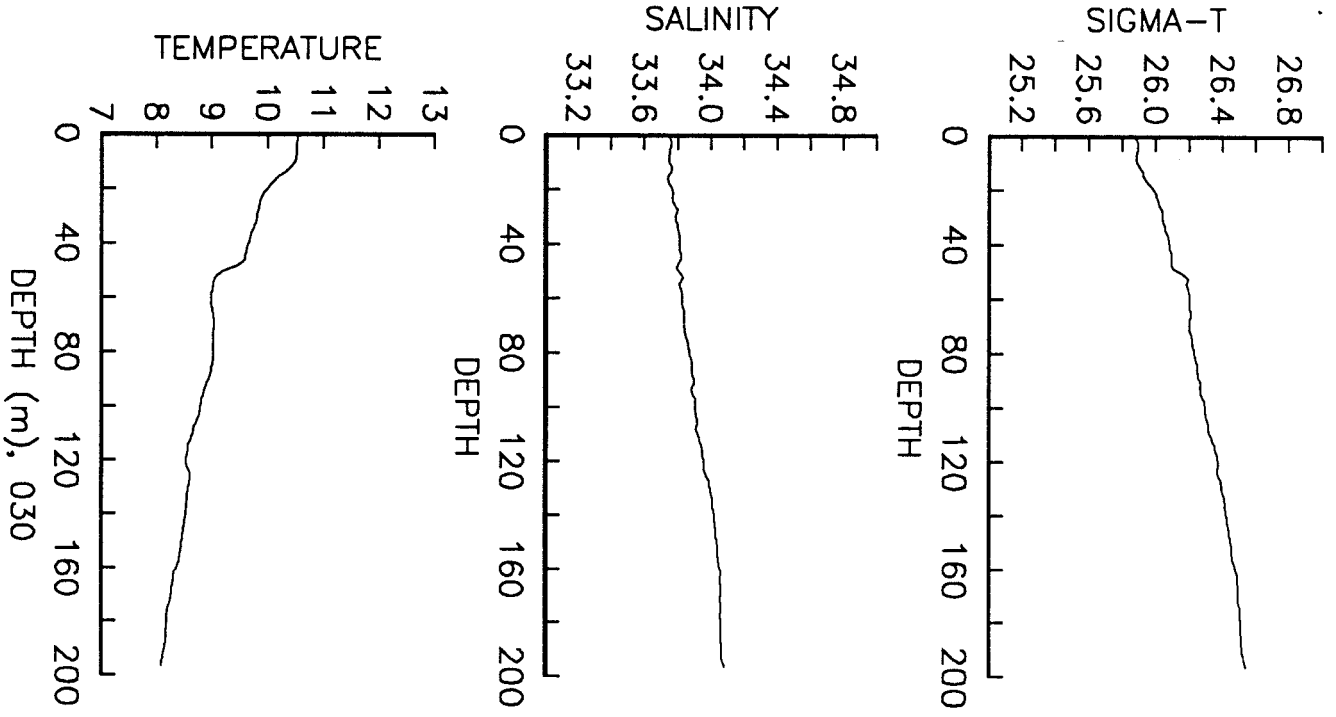
STN 8904.028 16 MAY 1989 0054 PDT
36°38.9'N 122° 2.9'W DEPTH 871 m



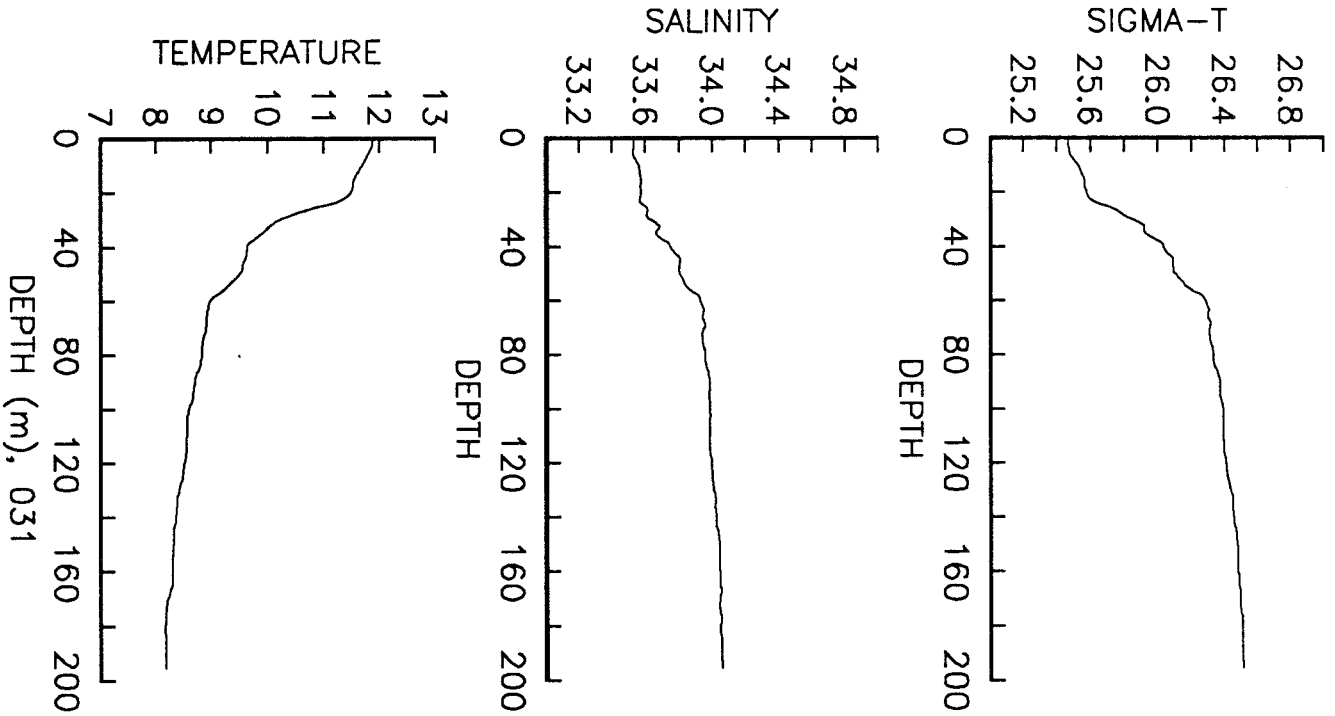
STN 8904.029 16 MAY 1989 0257 PDT
36°41.4'N 122° 8.1'W DEPTH 1214 m



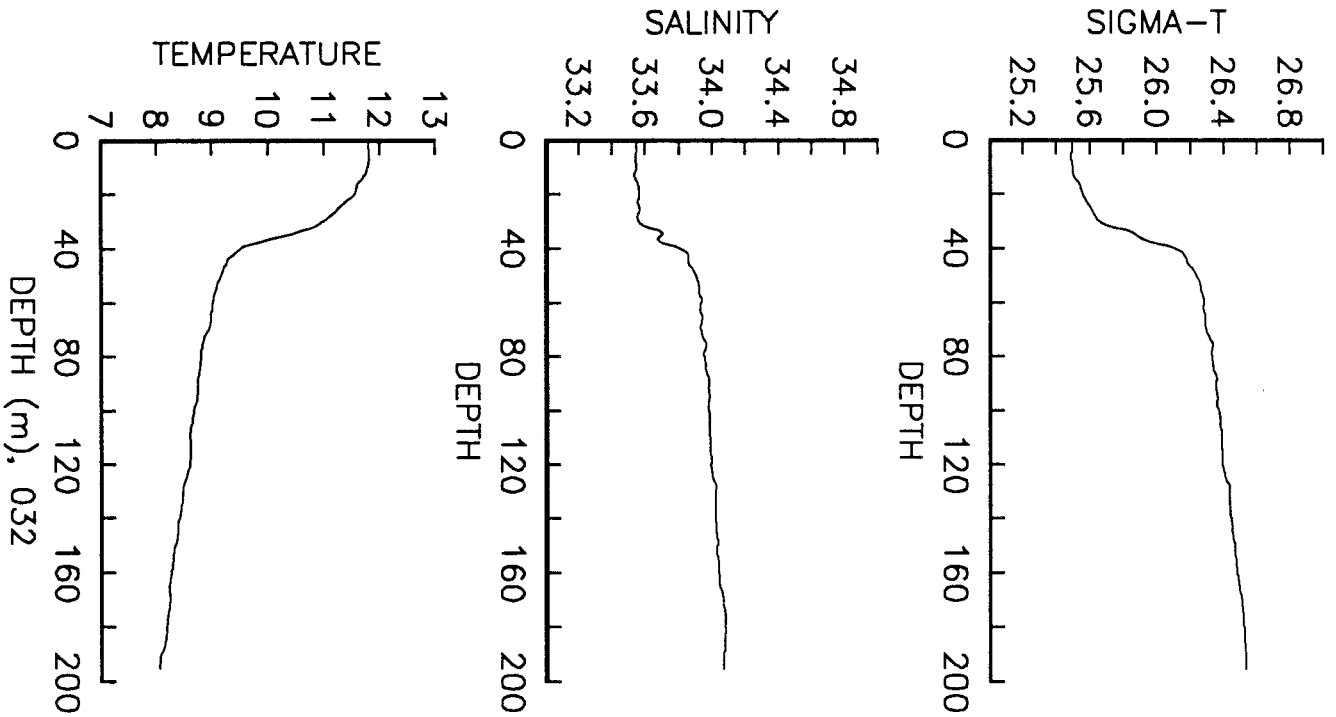
STN 8904.030 16 MAY 1989 0342 PDT
36°46.4'N 122° 9.1'W DEPTH 1013 m



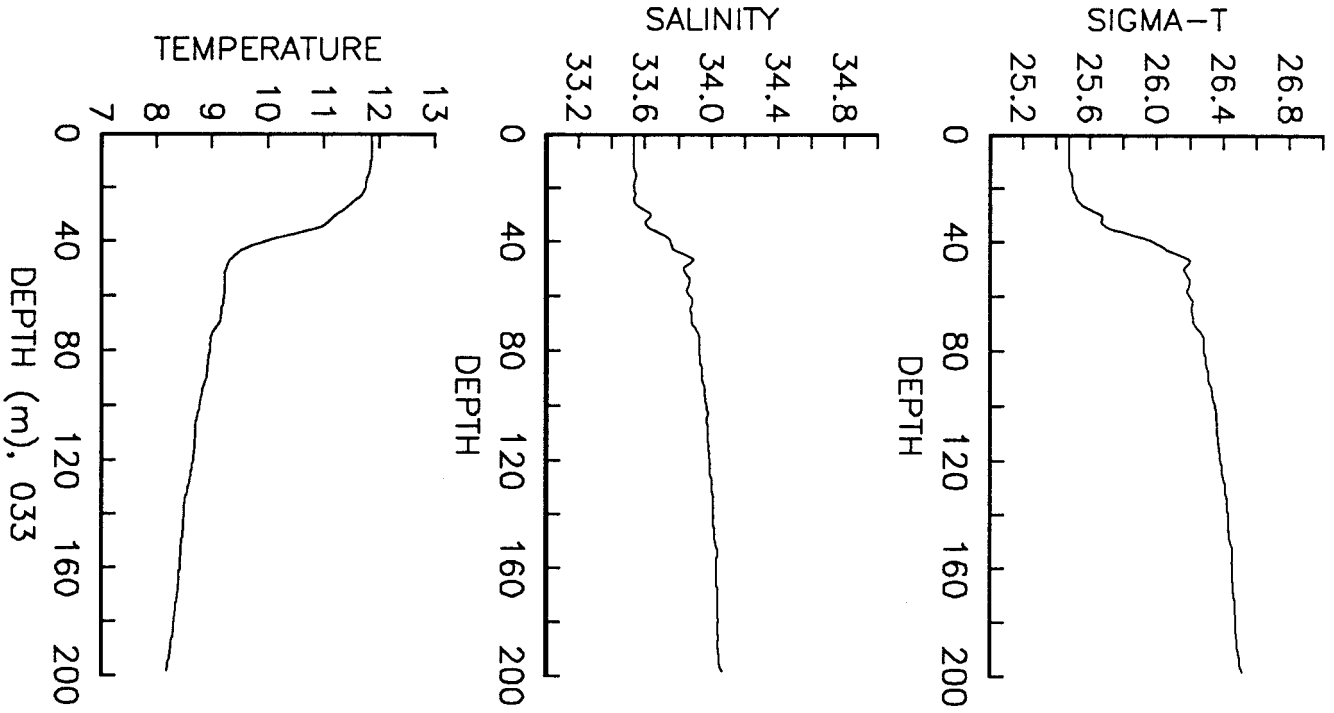
STN 8904.031 16 MAY 1989 0544 PDT
36°44.4'N 122°16.0'W DEPTH 958 m



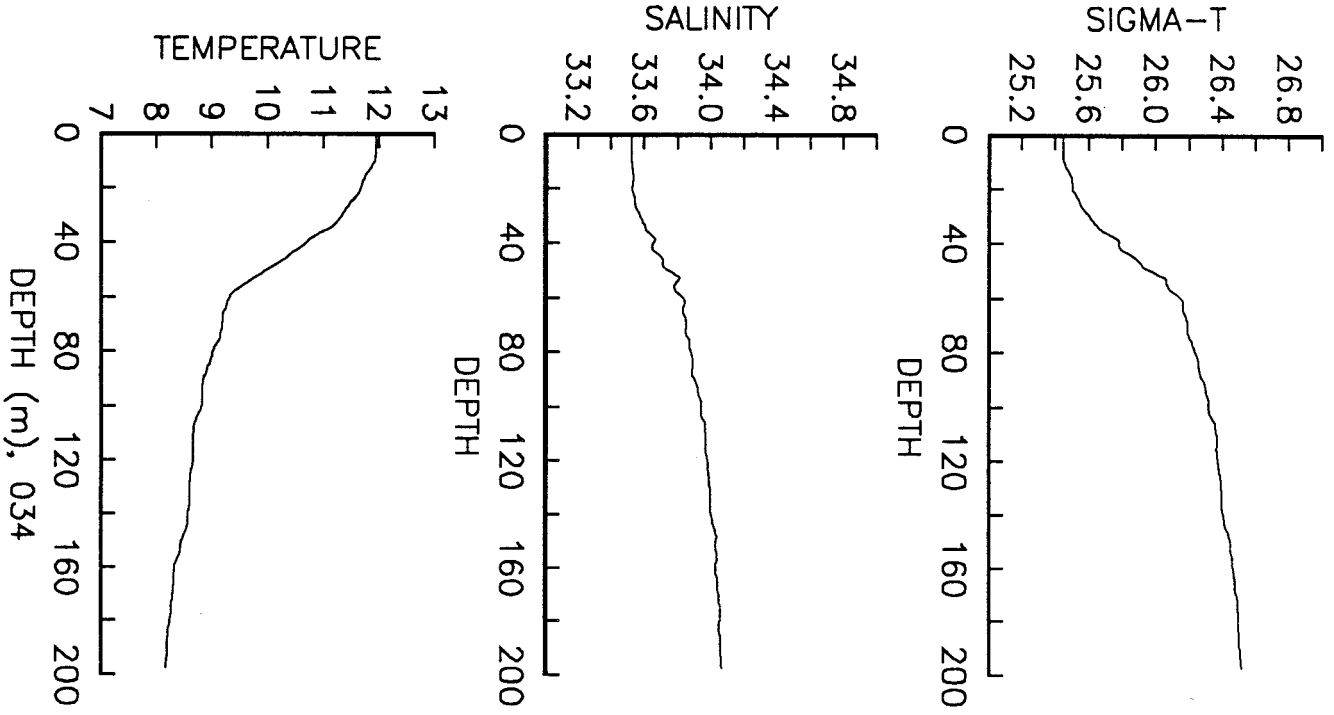
STN 8904.032 16 MAY 1989 0632 PDT
36°44.4'N 122°22.0'W DEPTH 1591 m



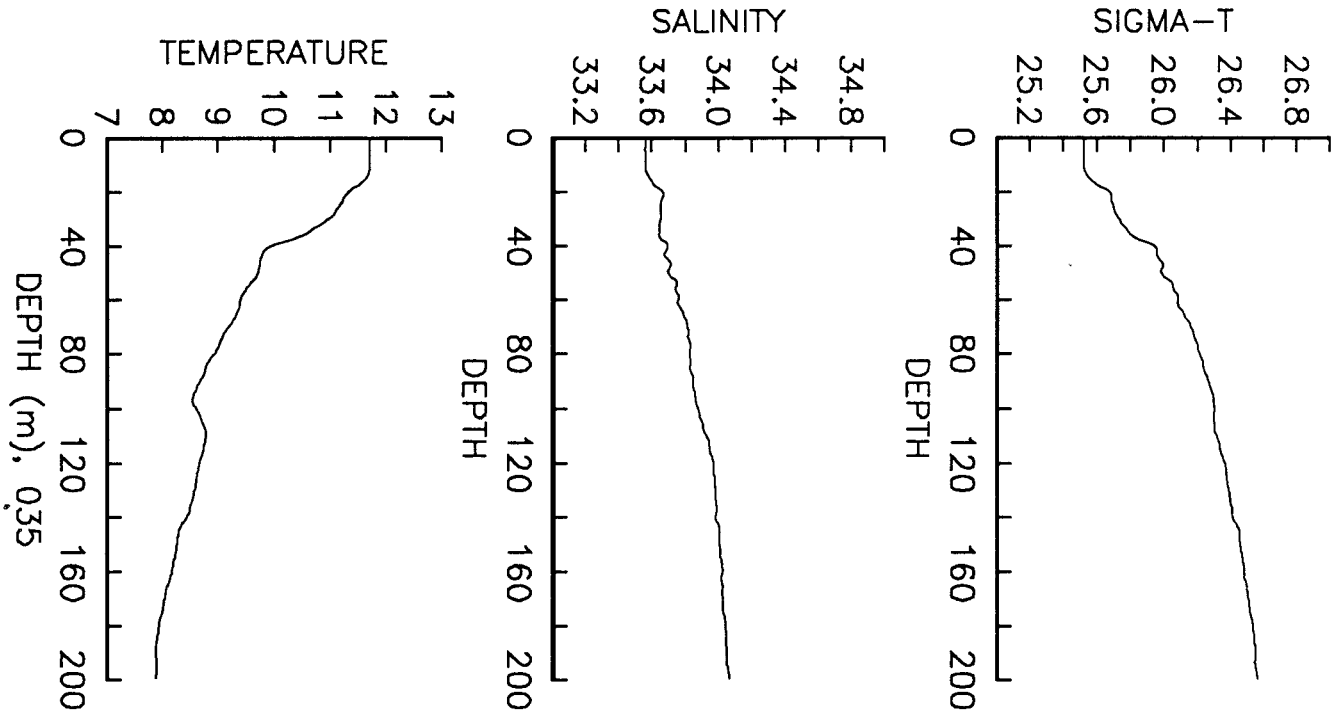
STN 8904.033 16 MAY 1989 0707 PDT
36°44.4'N 122°27.0'W DEPTH 2012 m



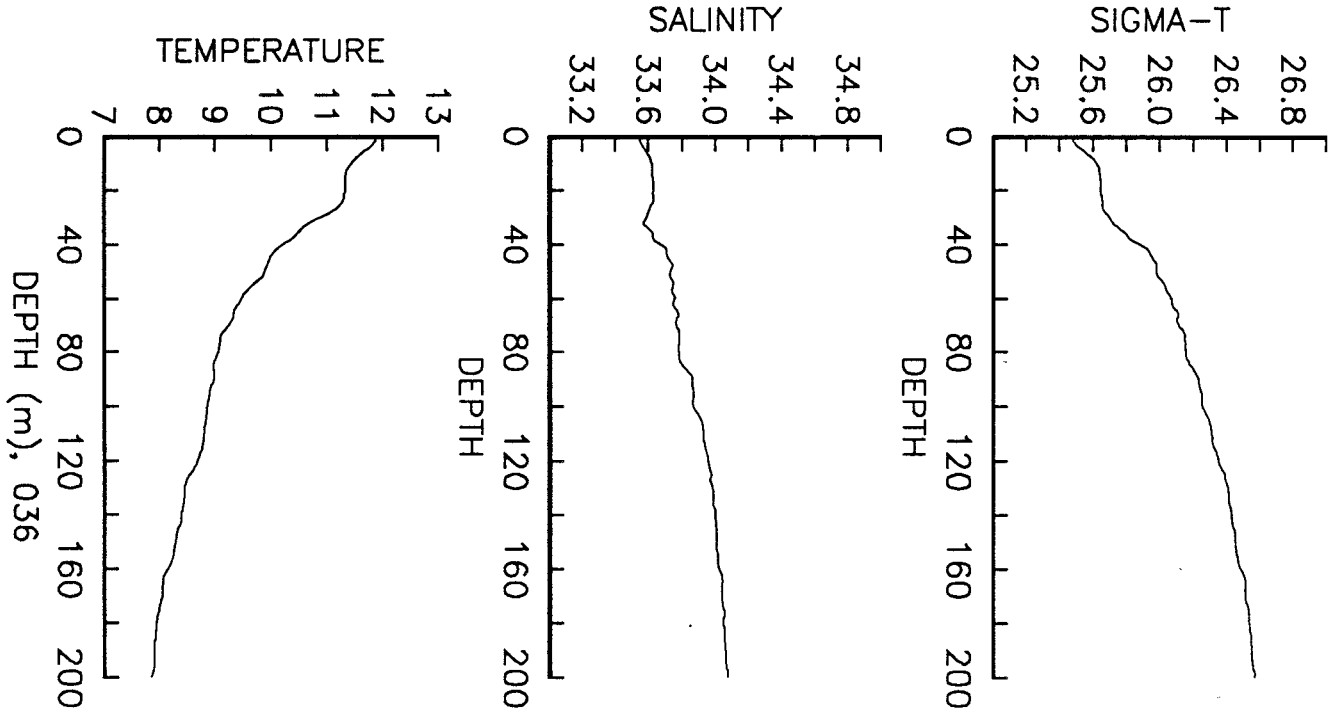
STN 8904.034 16 MAY 1989 0748 PDT
36°49.0'N 122°29.5'W DEPTH 2103 m



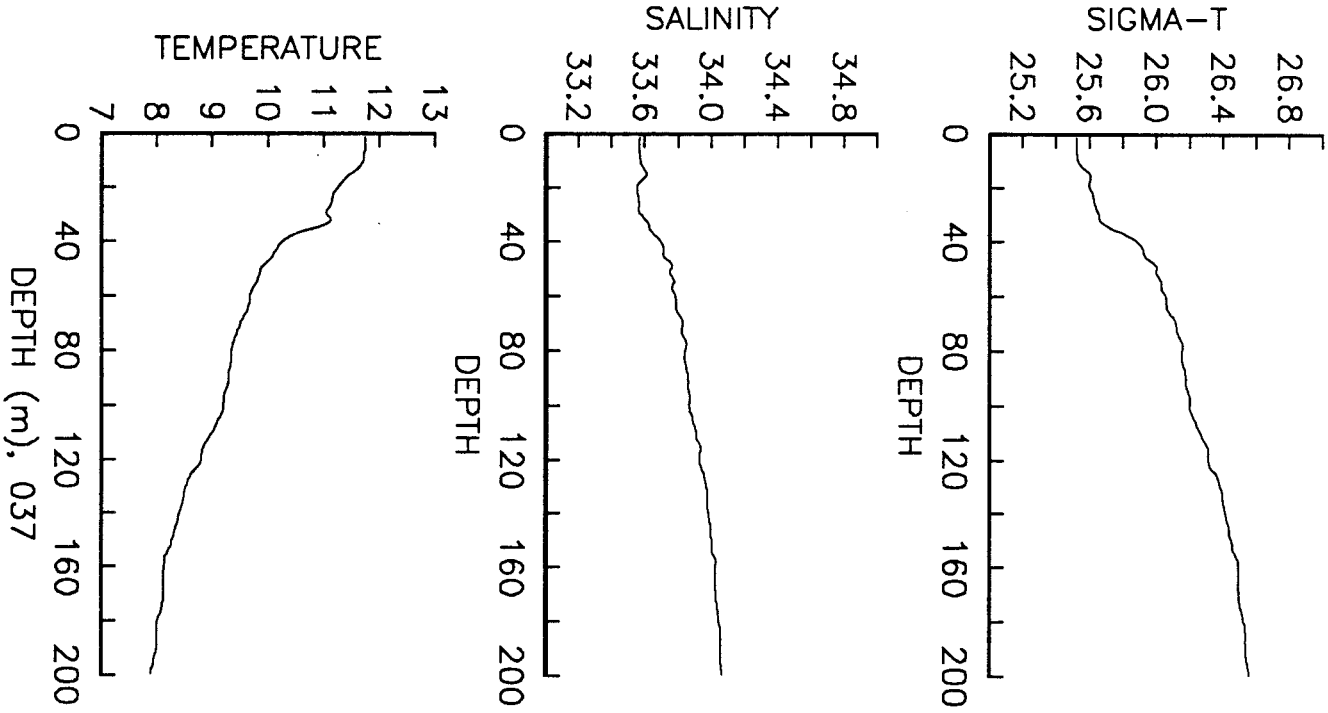
STN 8904.035 16 MAY 1989 0830 PDT
36°49.0'N 122°36.0'W DEPTH 1829 m



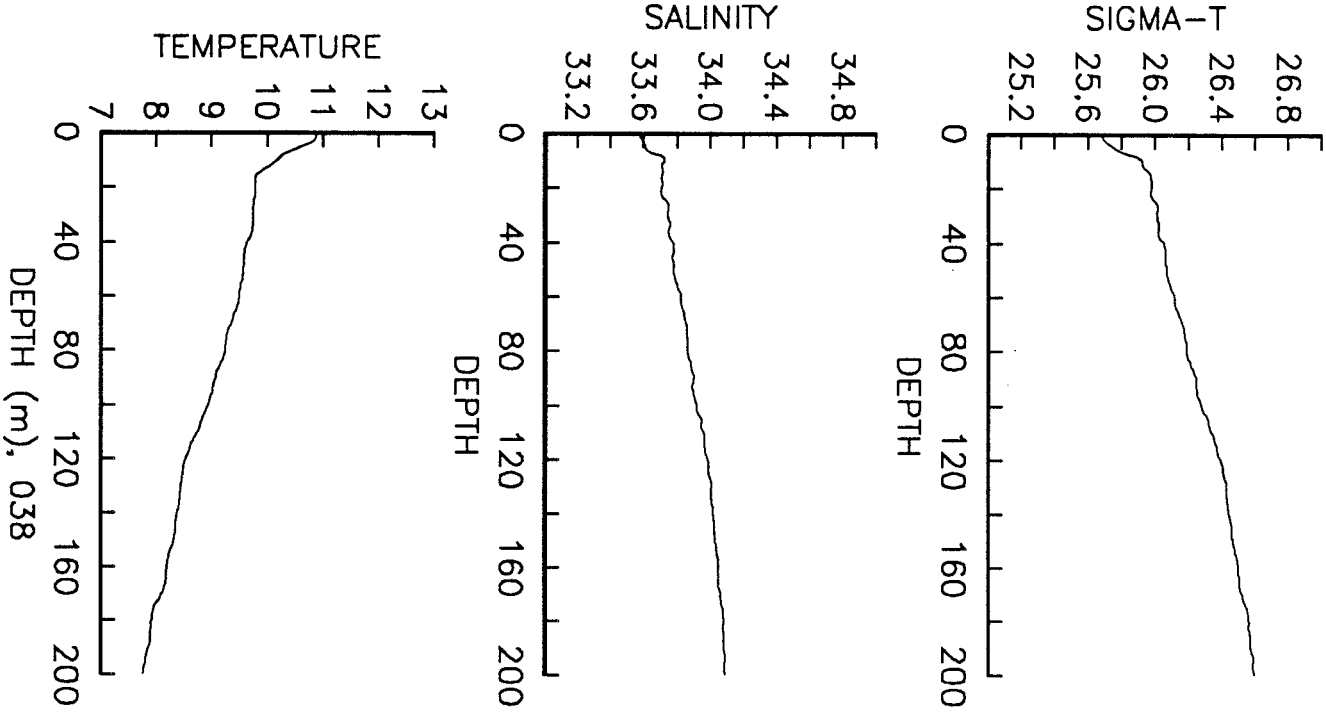
STN 8904.036 16 MAY 1989 0925 PDT
36°54.0'N 122°30.1'W DEPTH 1070 m



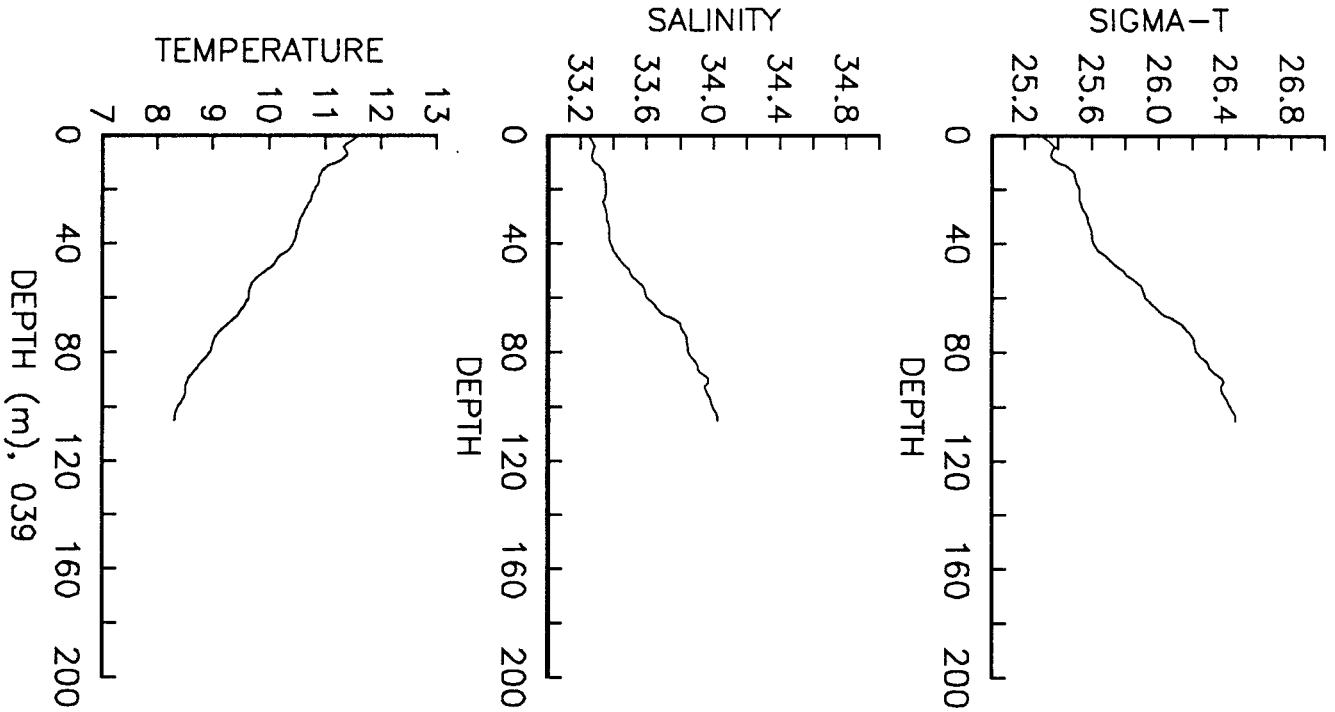
STN 8904.037 16 MAY 1989 1005 PDT
36°54.0'N 122°36.0'W DEPTH 1554 m



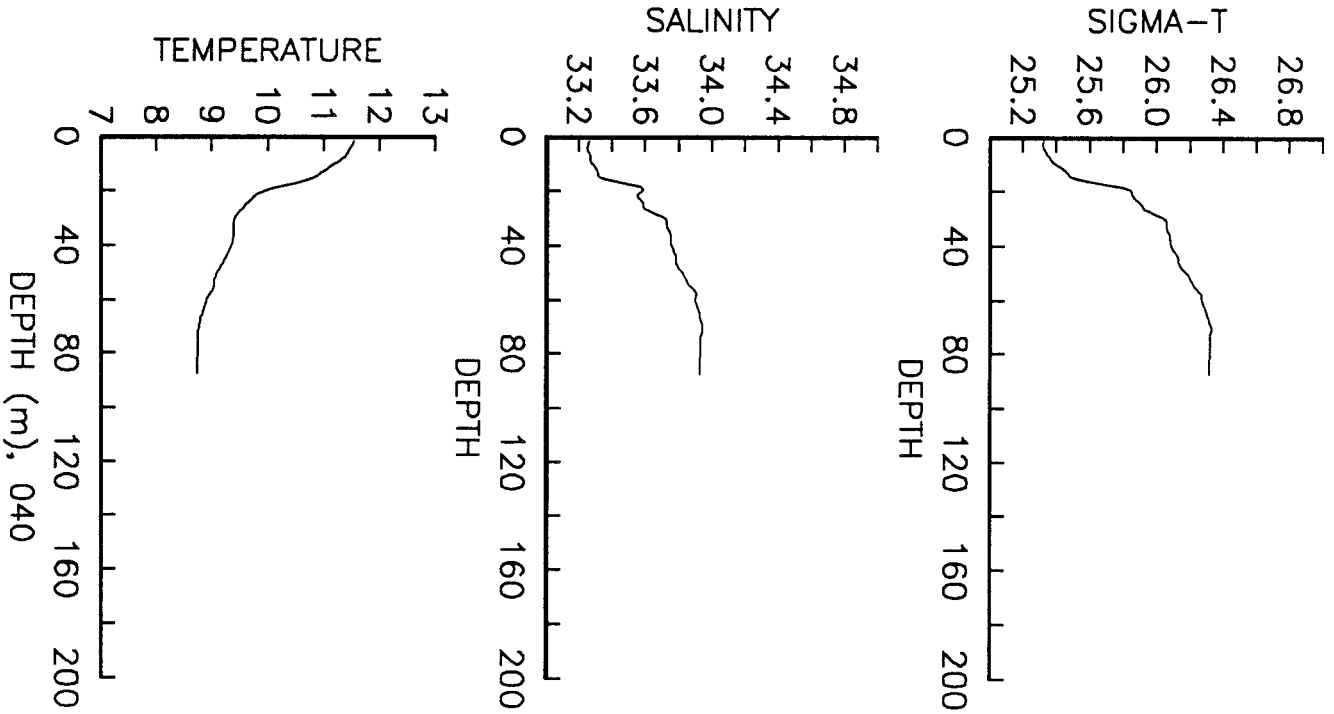
STN 8904.038 16 MAY 1989 1055 PDT
36°58.8'N 122°40.0'W DEPTH 585 m



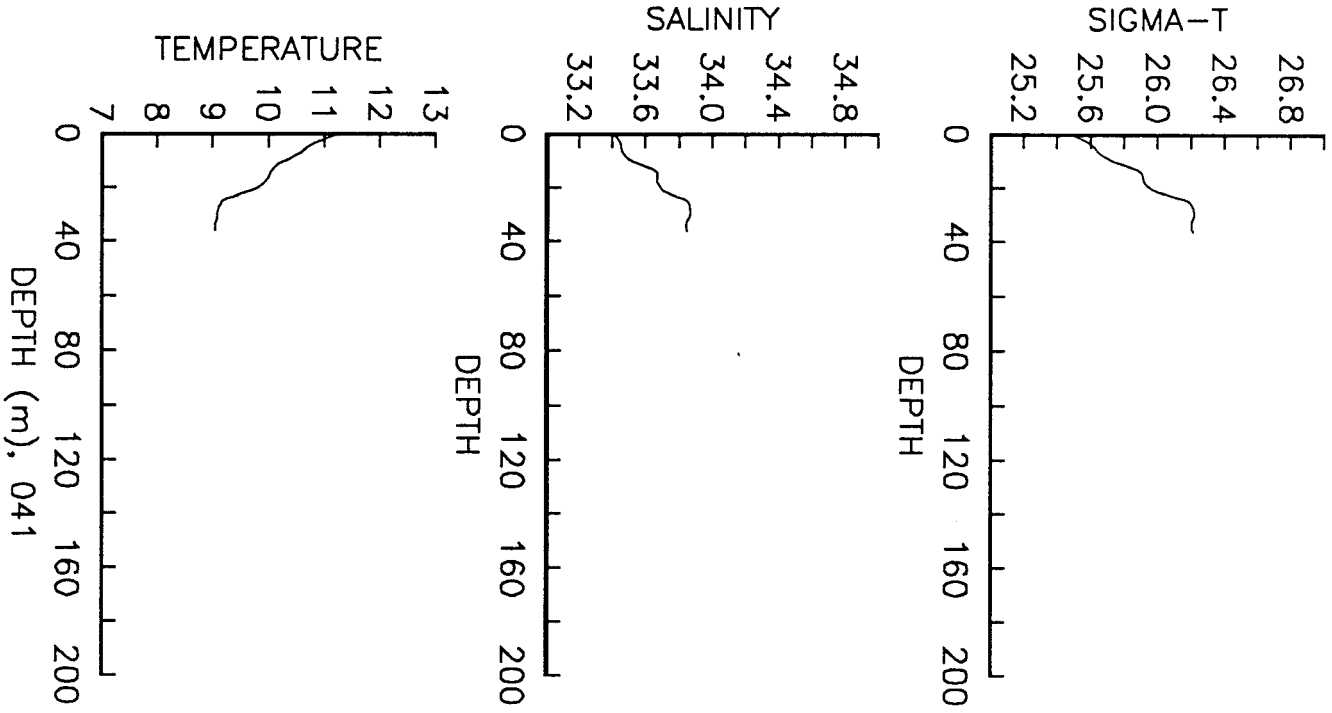
STN 8904.039 16 MAY 1989 1206 PDT
37° 8.1'N 122°36.0'W DEPTH 108 m



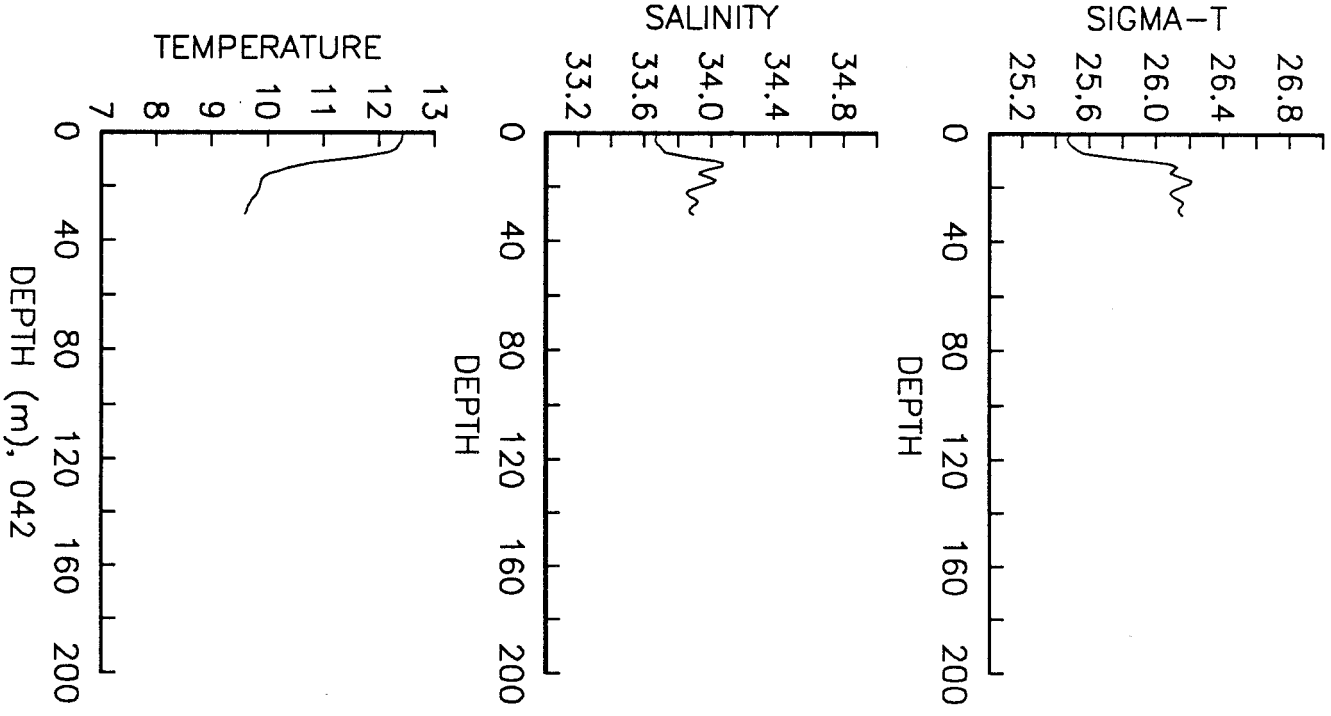
STN 8904.040 16 MAY 1989 1243 PDT
37° 8.0'N 122°29.9'W DEPTH 90 m



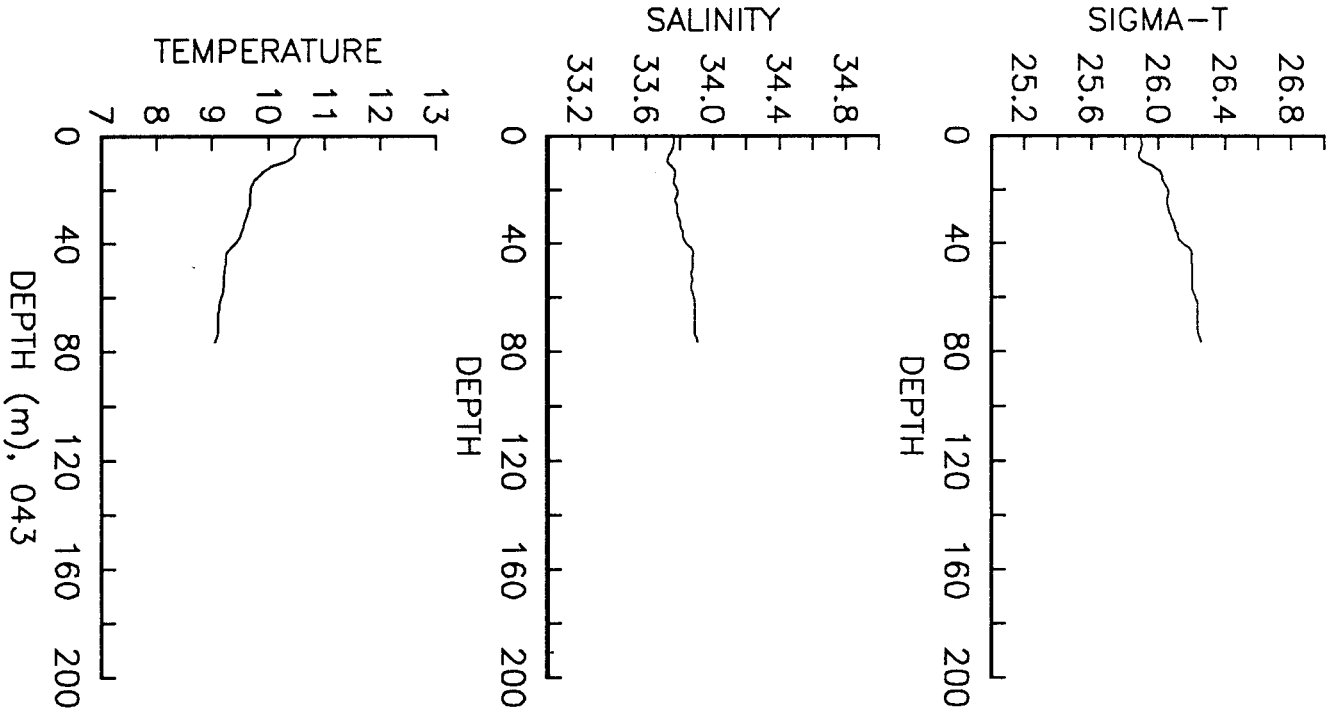
STN 8904.041 16 MAY 1989 1327 PDT
37° 8.0'N 122°23.4'W DEPTH 40 m



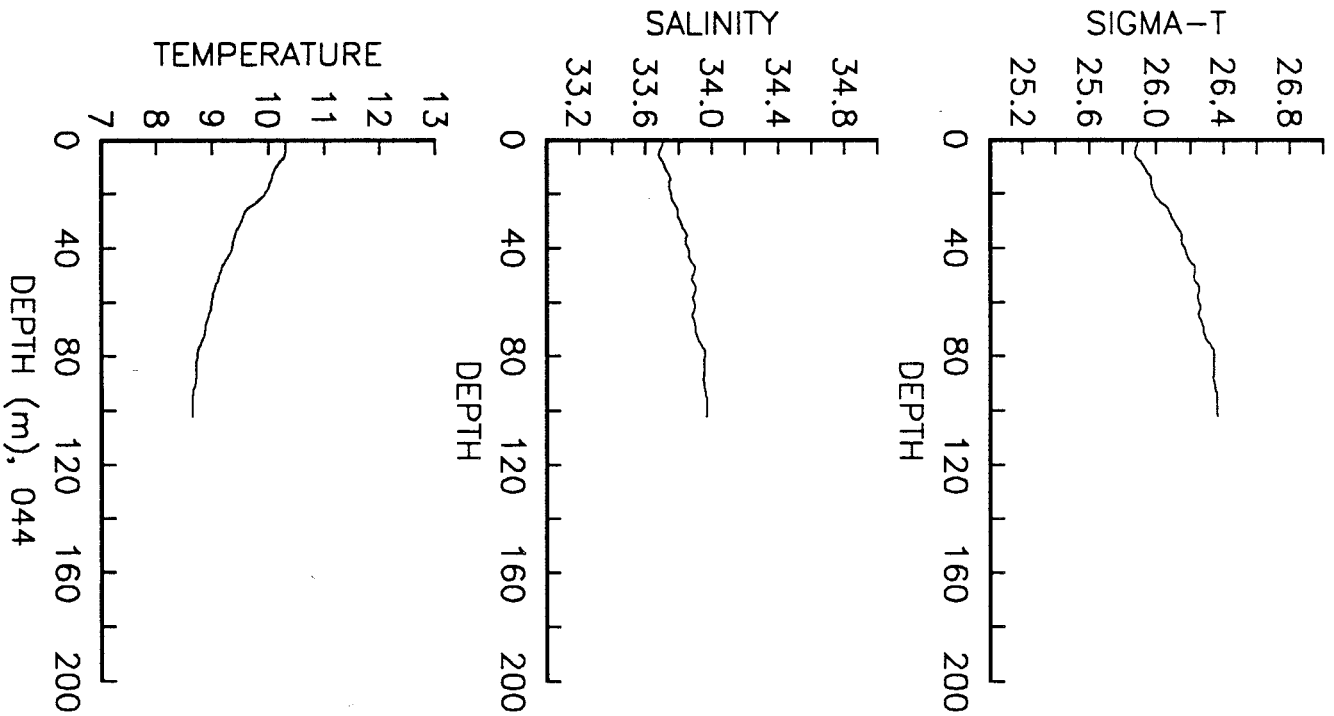
STN 8904.042 16 MAY 1989 2020 PDT
36°58.9'N 122°12.5'W DEPTH 37 m



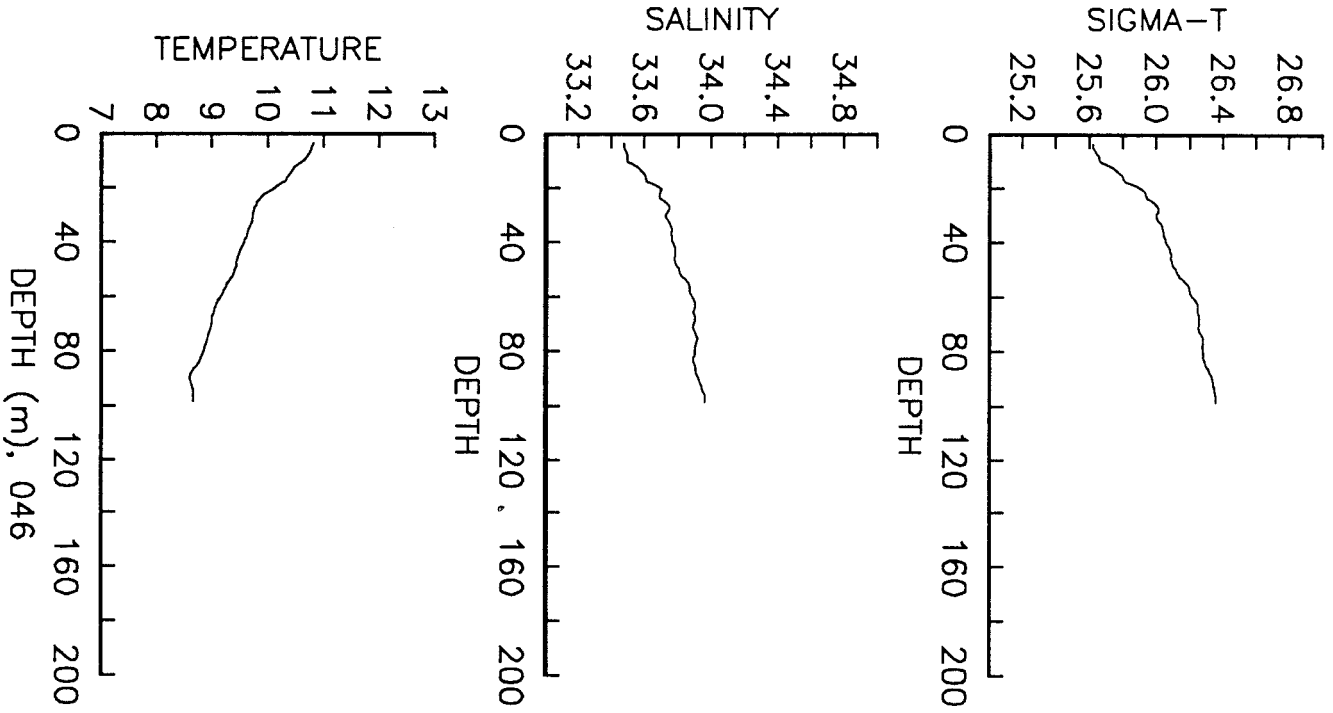
STN 8904.043 16 MAY 1989 2205 PDT
36°58.9'N 122°17.6'W DEPTH 84 m



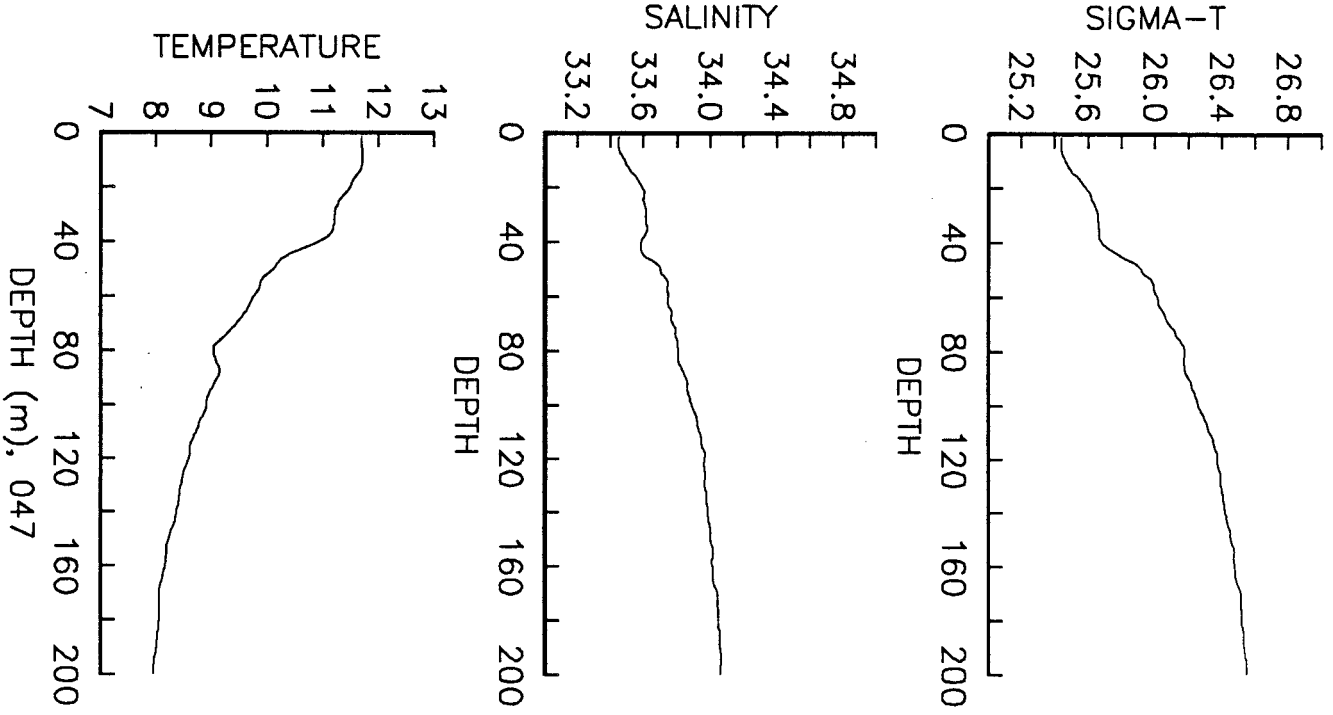
STN 8904.044 16 MAY 1989 2330 PDT
36°59.0'N 122°22.5'W DEPTH 121 m



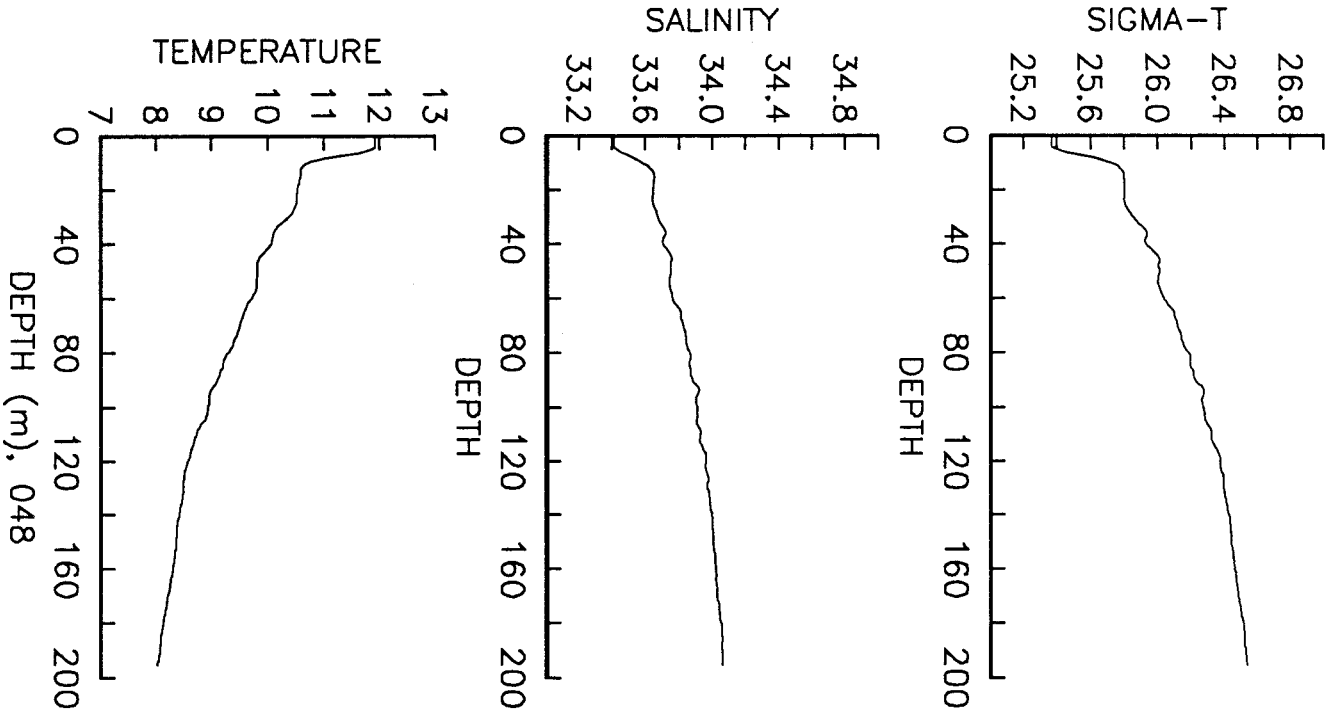
STN 8904.046 17 MAY 1989 0248 PDT
36°59.3'N 122°27.1'W DEPTH 139 m



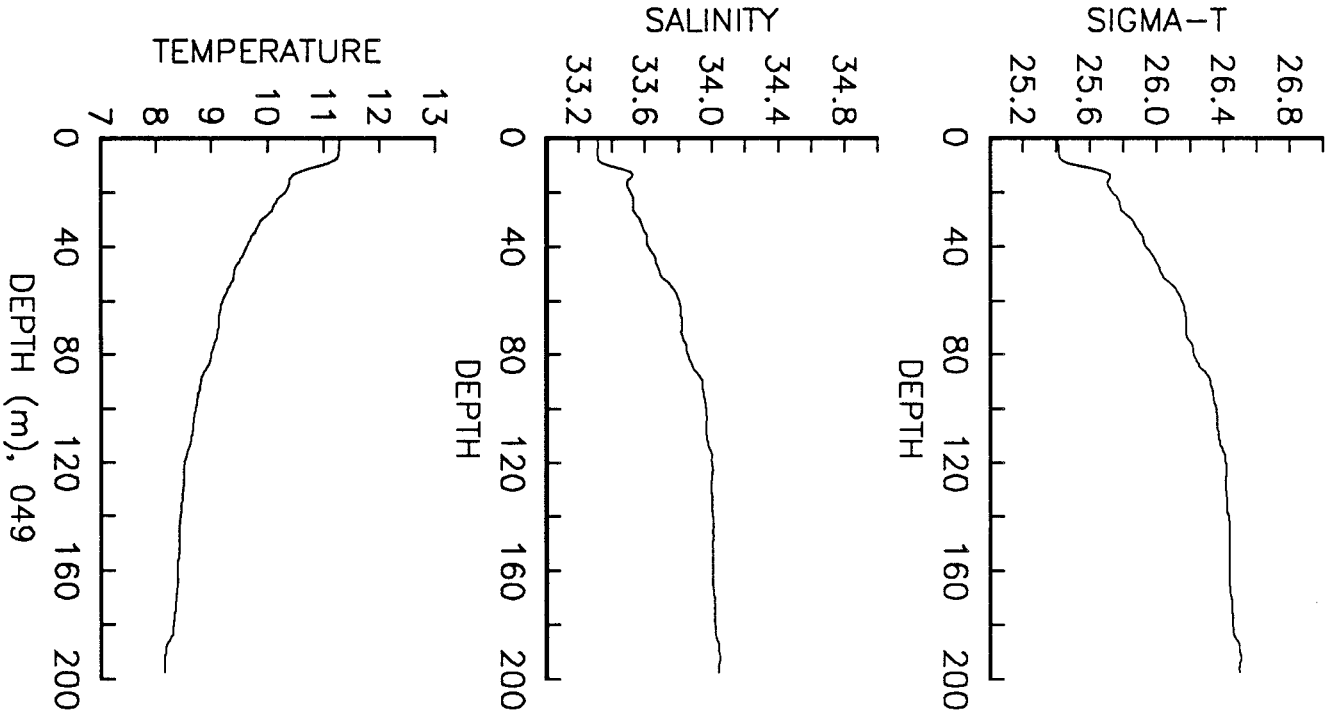
STN 8904.047 17 MAY 1989 0310 PDT
36°59.0'N 122°35.5'W DEPTH 386 m



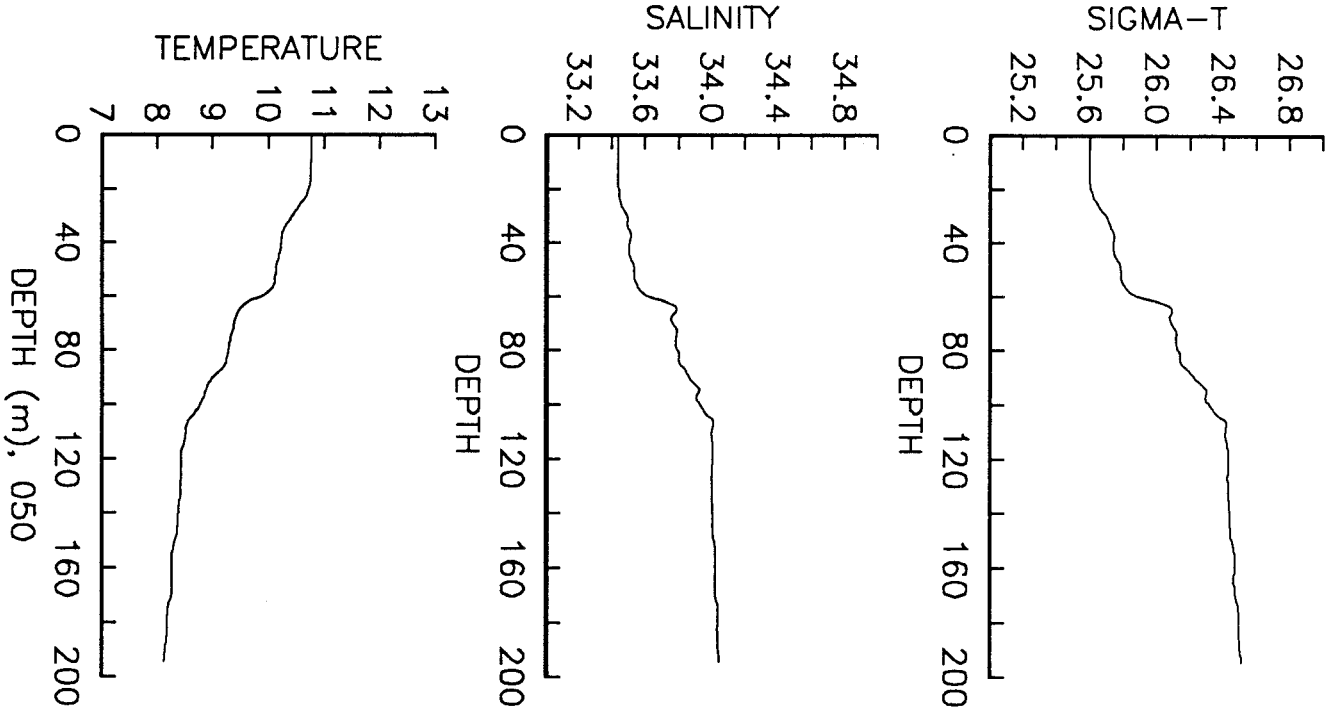
STN 8904.048 17 MAY 1989 0520 PDT
37° 0.5'N 122°43.5'W DEPTH 624 m



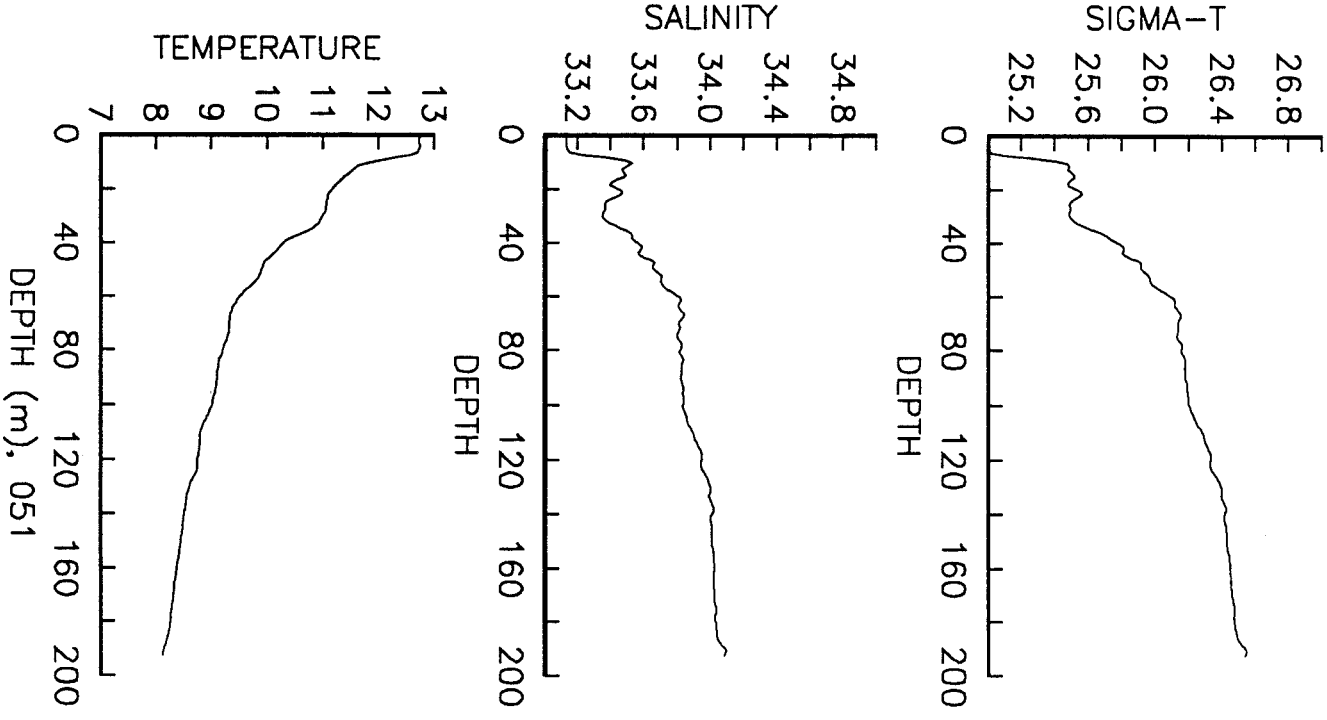
STN 8904.049 17 MAY 1989 0610 PDT
37° 8.0'N 122°43.0'W DEPTH 230 m



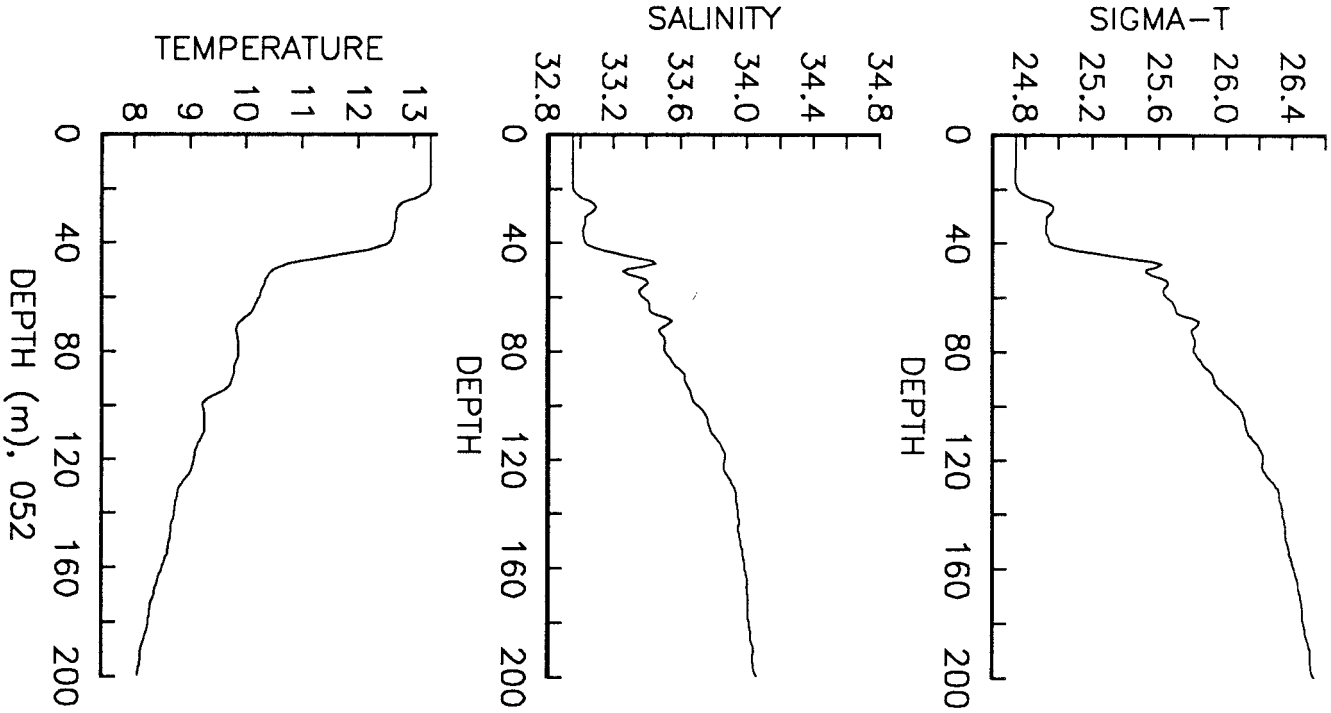
STN 8904.050 17 MAY 1989 0701 PDT
37° 8.0'N 122°49.9'W DEPTH 457 m



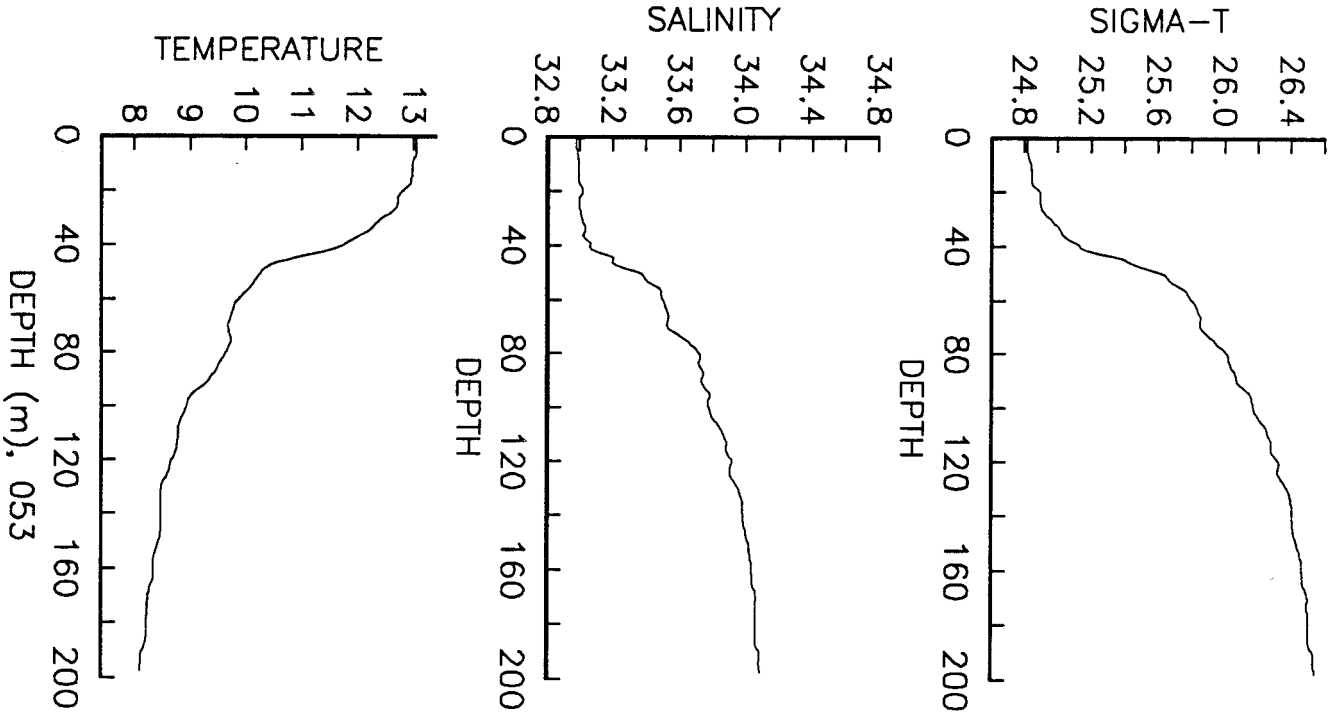
STN 8904.051 17 MAY 1989 0740 PDT
37° 8.0'N 122°55.4'W DEPTH 561 m



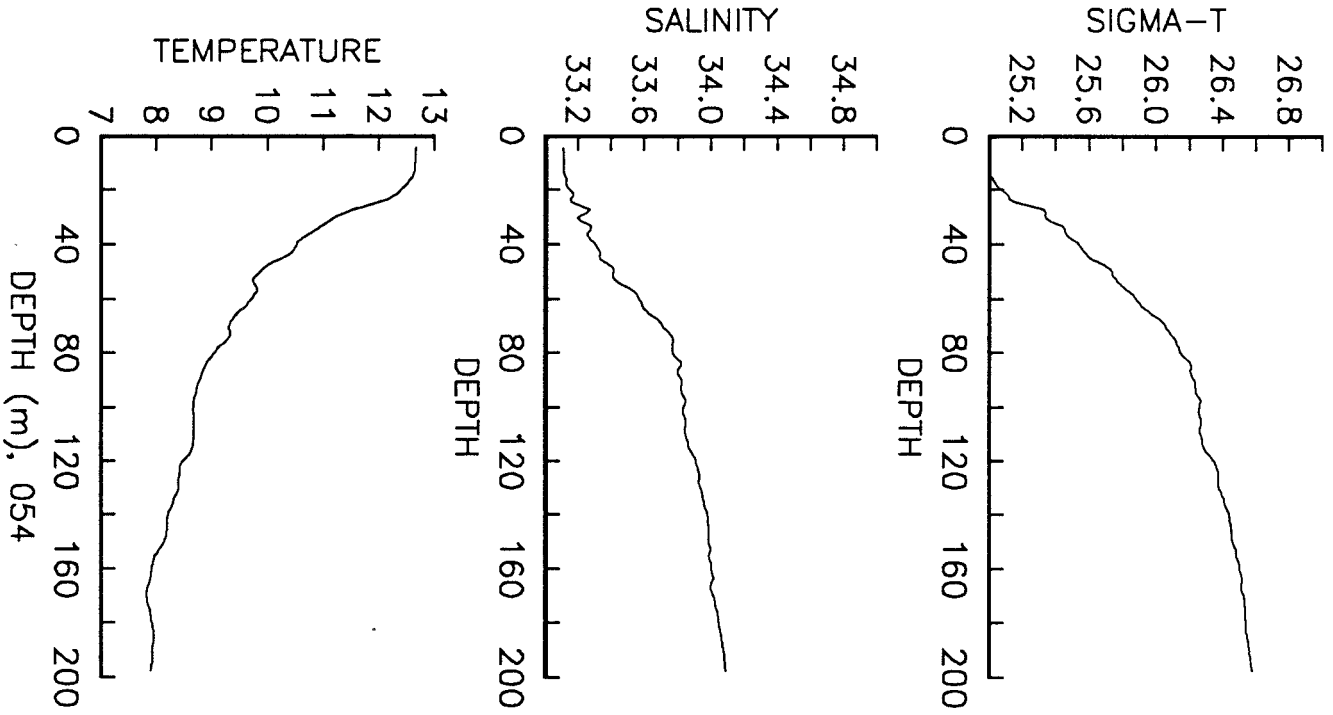
STN 8904.052 17 MAY 1989 0905 PDT
37° 8.0'N 123°10.0'W DEPTH 1829 m



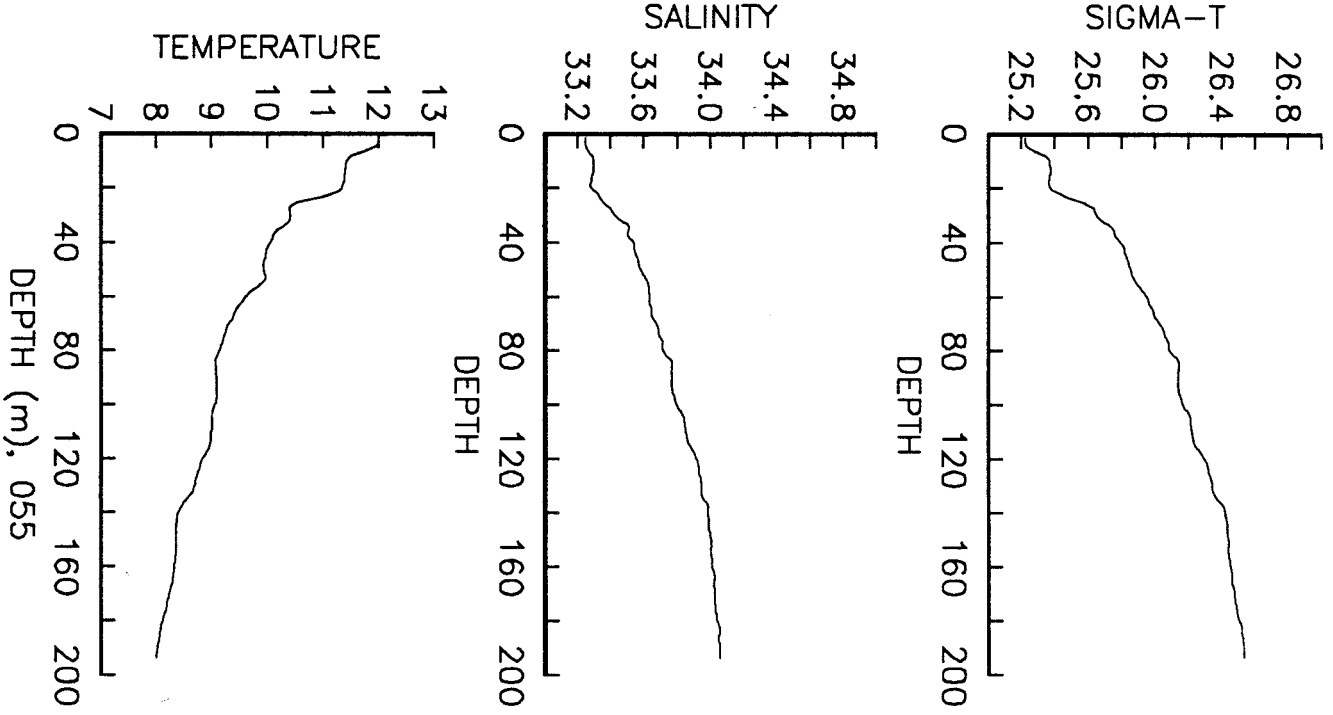
STN 8904.053 17 MAY 1989 1016 PDT
37°16.5'N 123°10.0'W DEPTH 1044 m



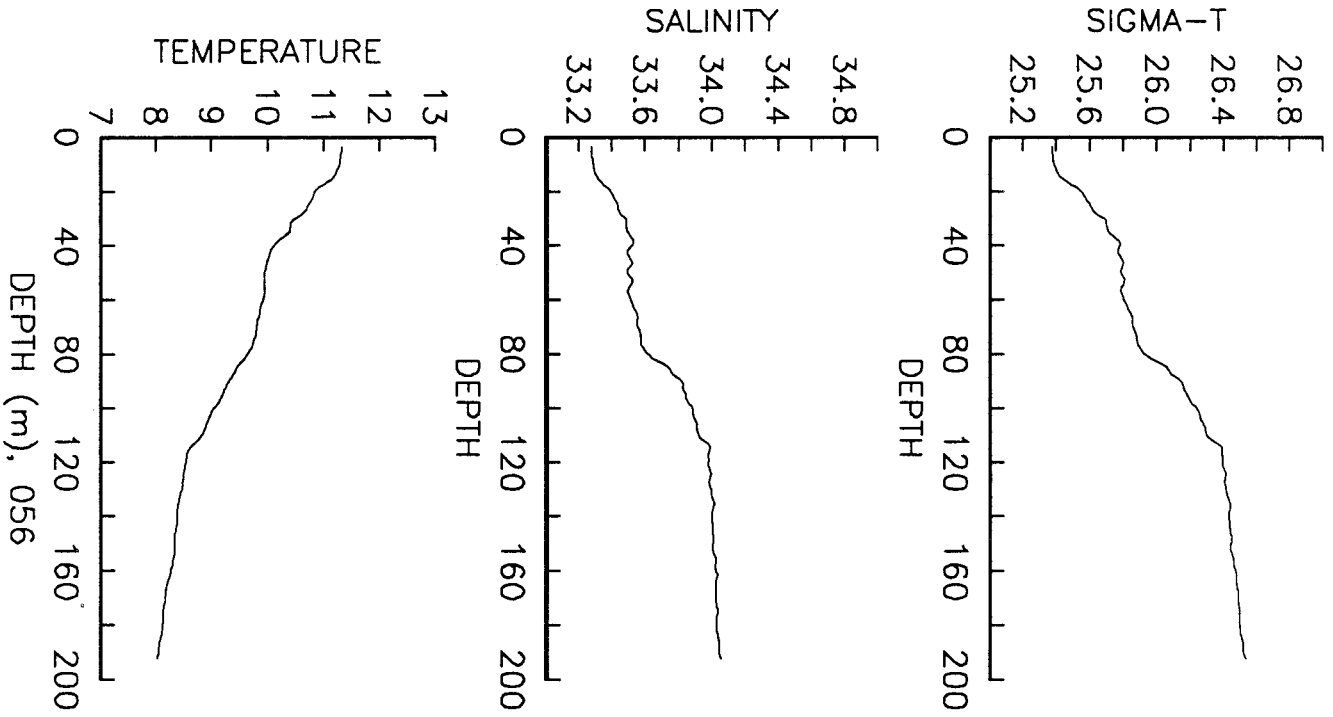
STN 8904.054 17 MAY 1989 1113 PDT
37°23.5'N 123°10.0'W DEPTH 978 m



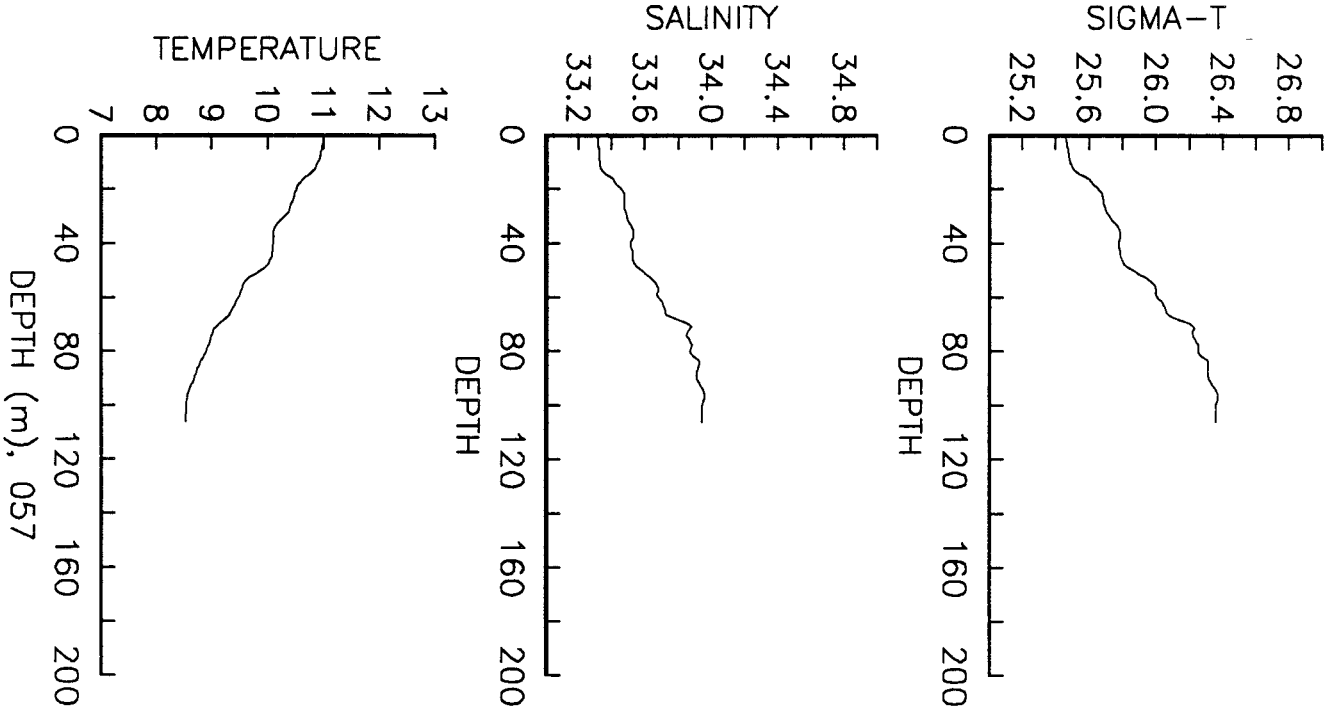
STN 8904.055 17 MAY 1989 1206 PDT
37°23.5'N 123° 1.5'W DEPTH 838 m



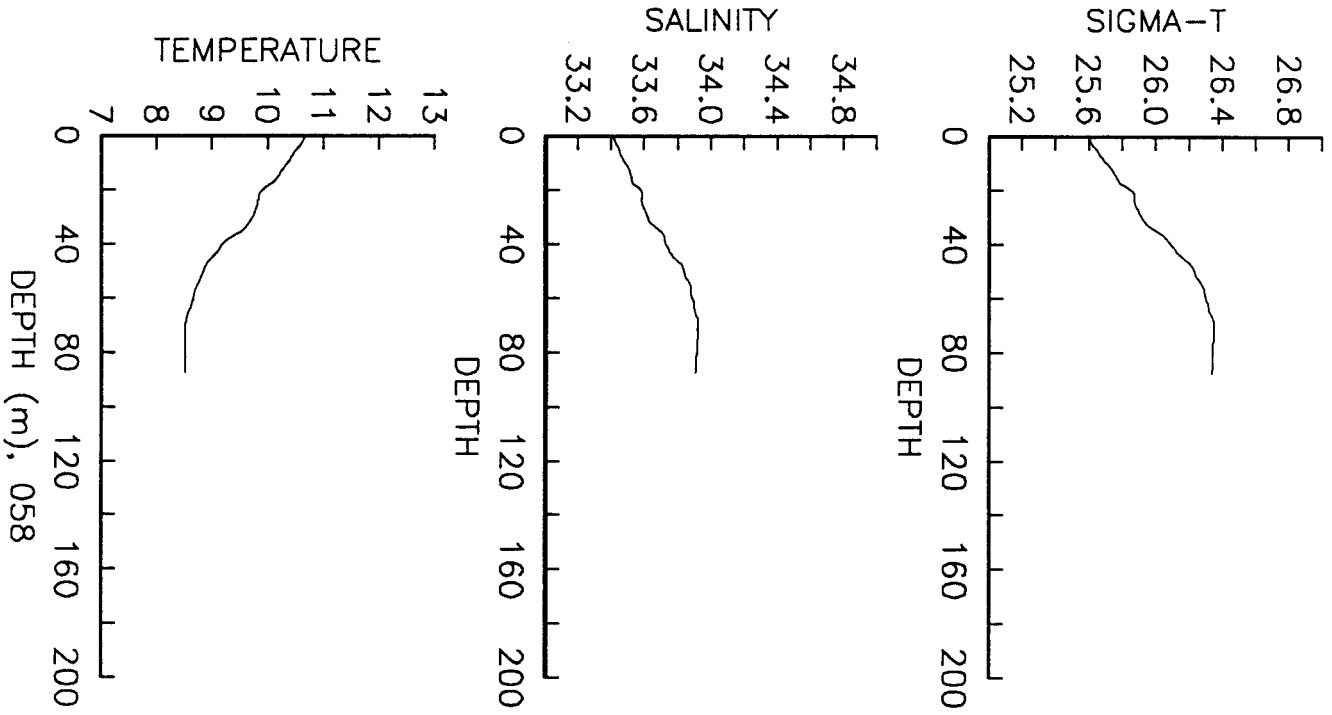
STN 8904.056 17 MAY 1989 1251 PDT
37°23.5'N 122°55.0'W DEPTH 450 m



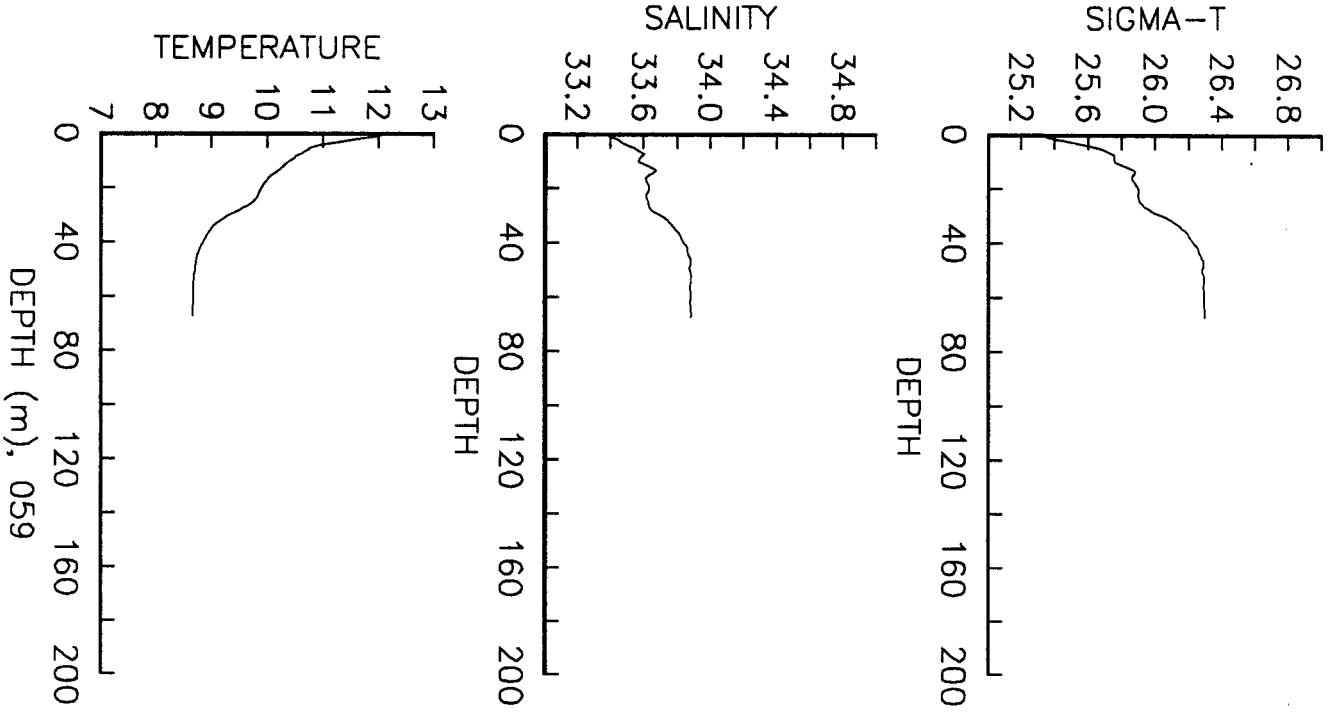
STN 8904.057 17 MAY 1989 1335 PDT
37°23.5'N 122°48.9'W DEPTH 110 m



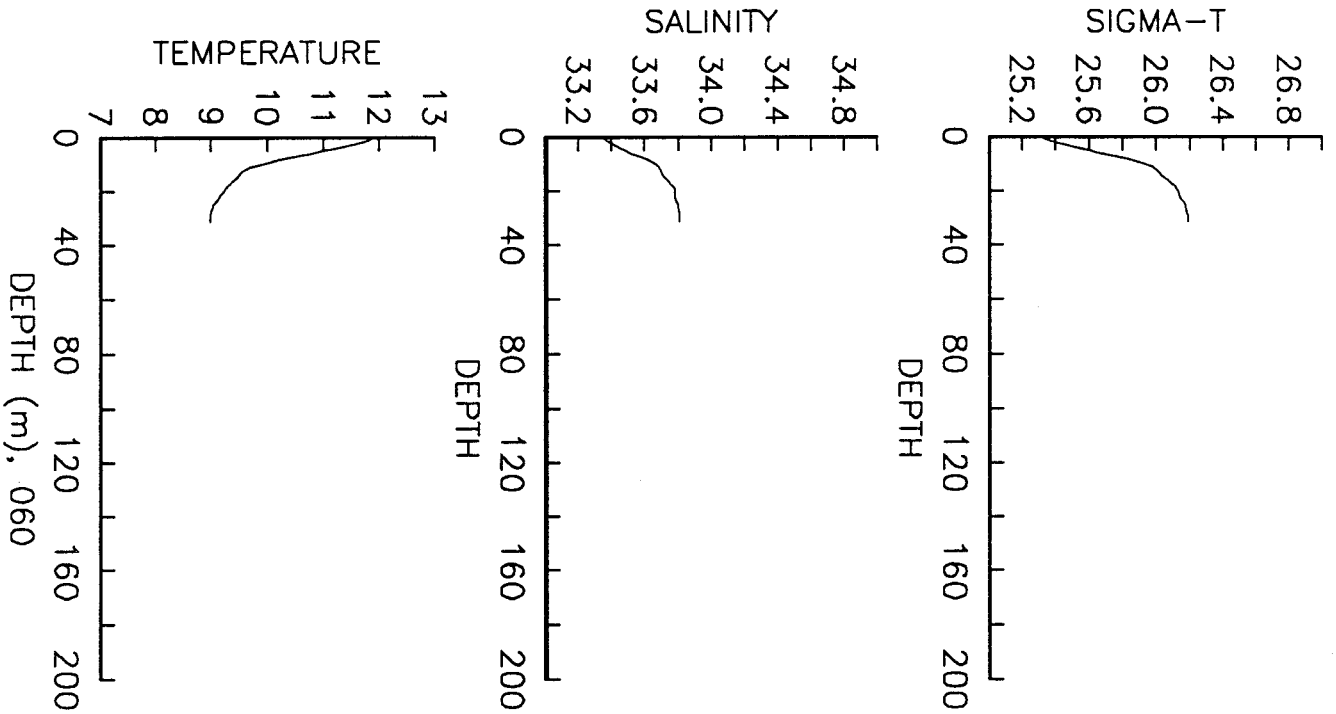
STN 8904.058 17 MAY 1989 1415 PDT
37°23.5'N 122°42.9'W DEPTH 90 m



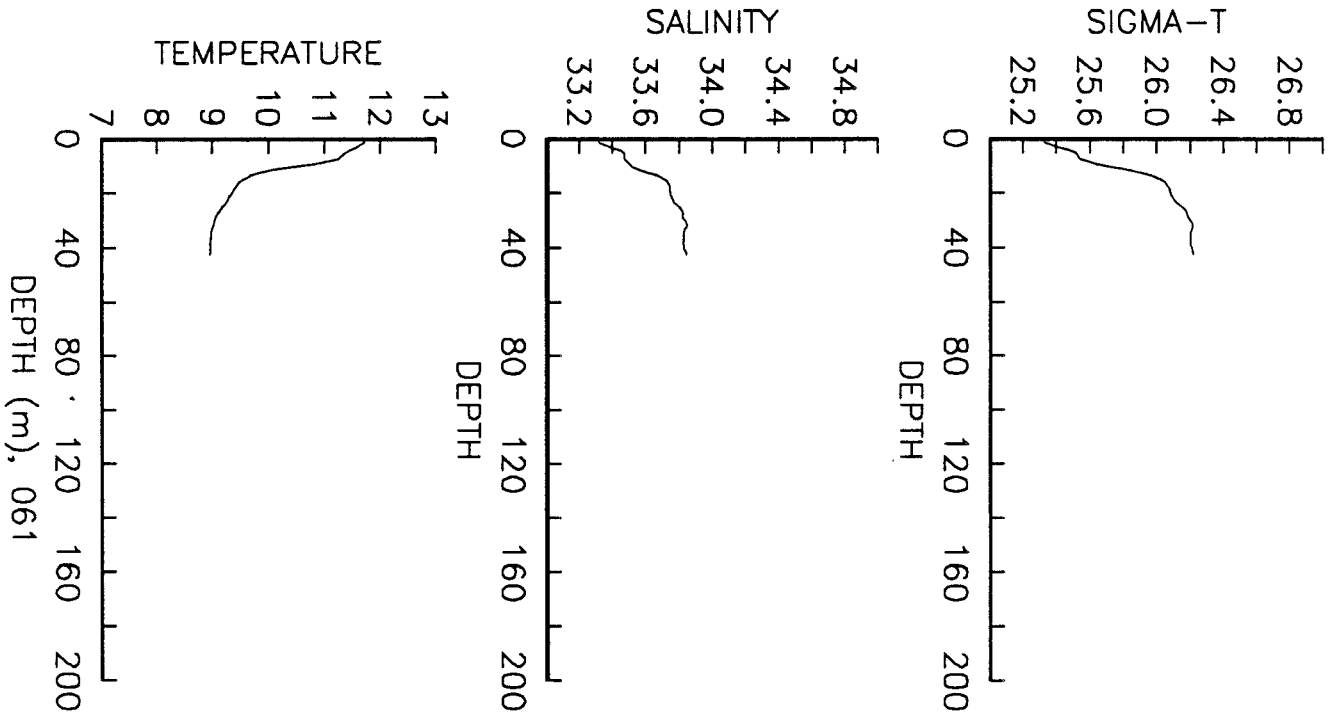
STN 8904.059 17 MAY 1989 1535 PDT
37°23.5'N 122°37.4'W DEPTH 75 m



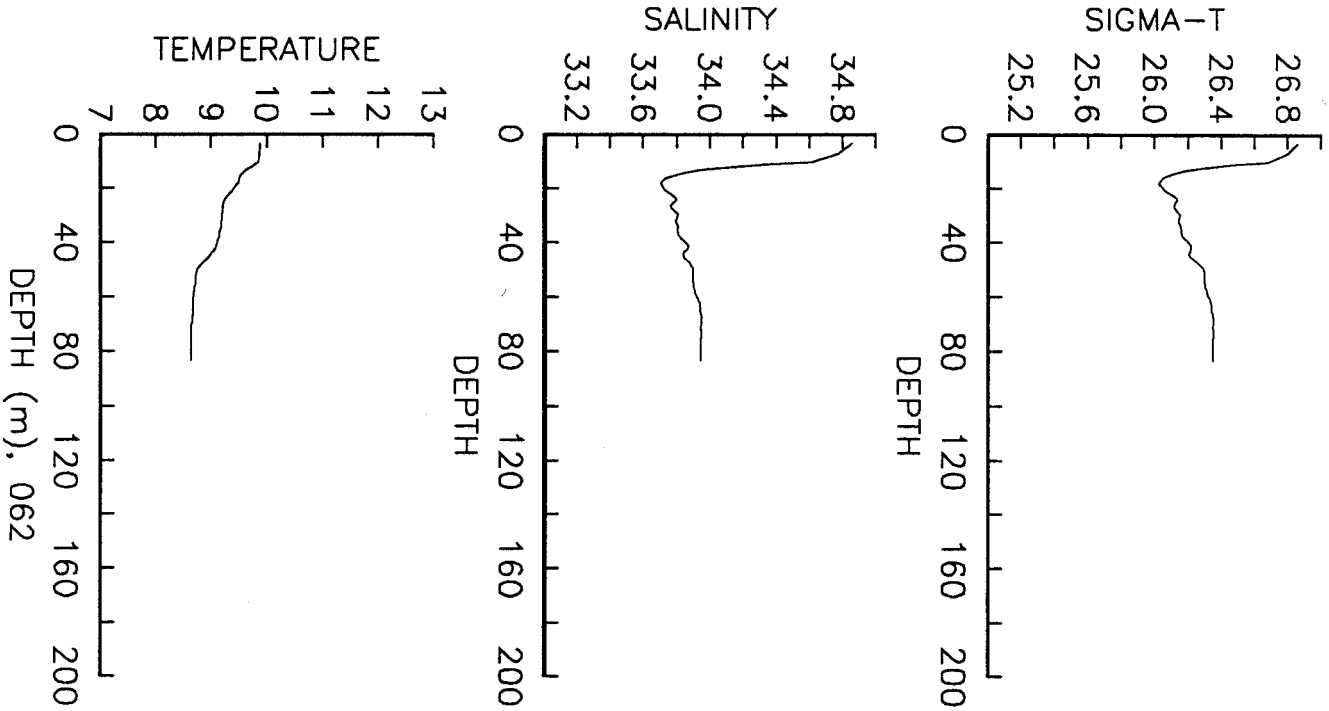
STN 8904.060 17 MAY 1989 1616 PDT
37°23.5'N 122°30.1'W DEPTH 44 m



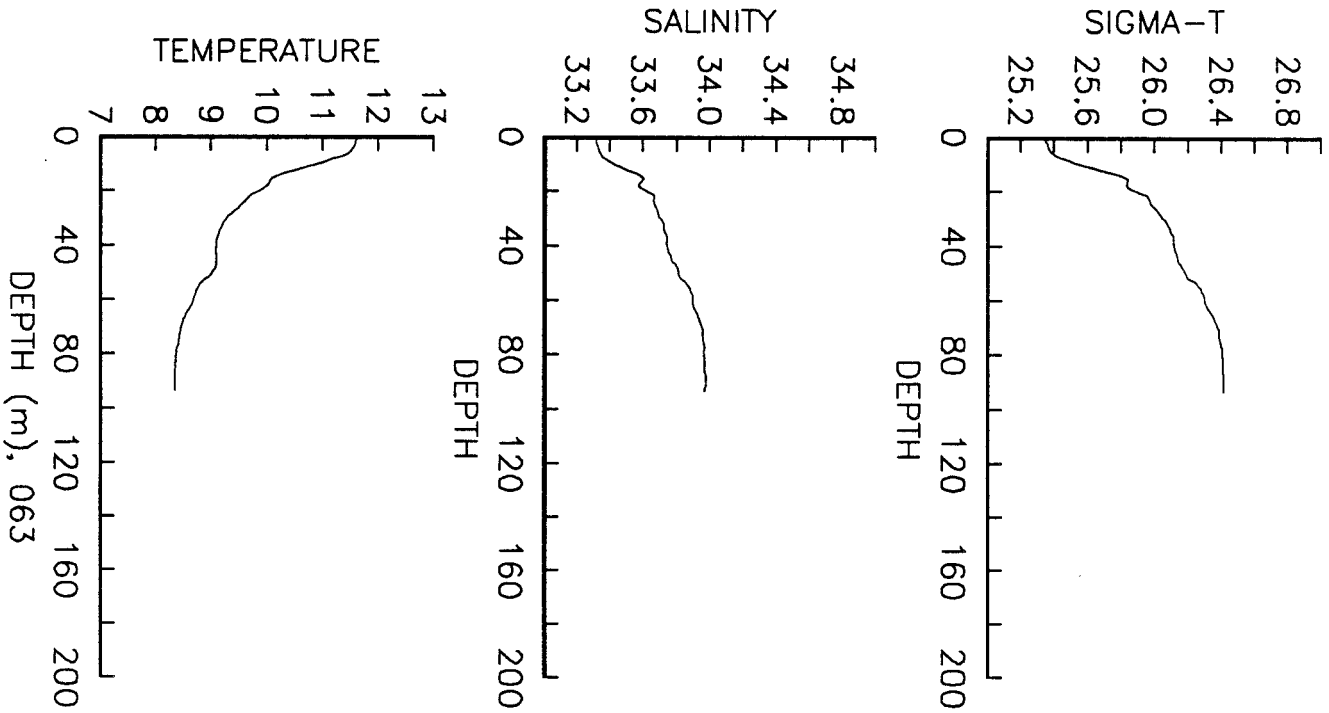
STN 8904.061 17 MAY 1989 2010 PDT
37°16.5'N 122°29.0'W DEPTH 53 m



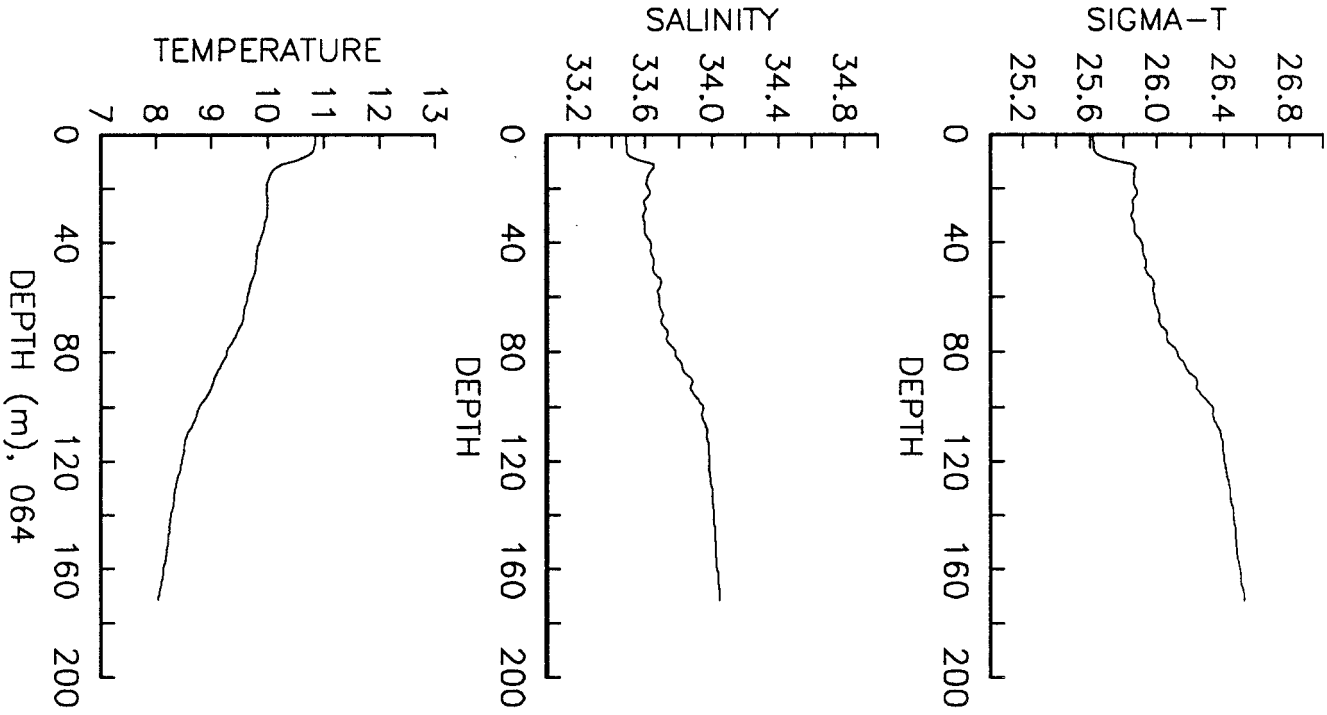
STN 8904.062 17 MAY 1989 2044 PDT
37°16.5'N 122°34.0'W DEPTH 88 m



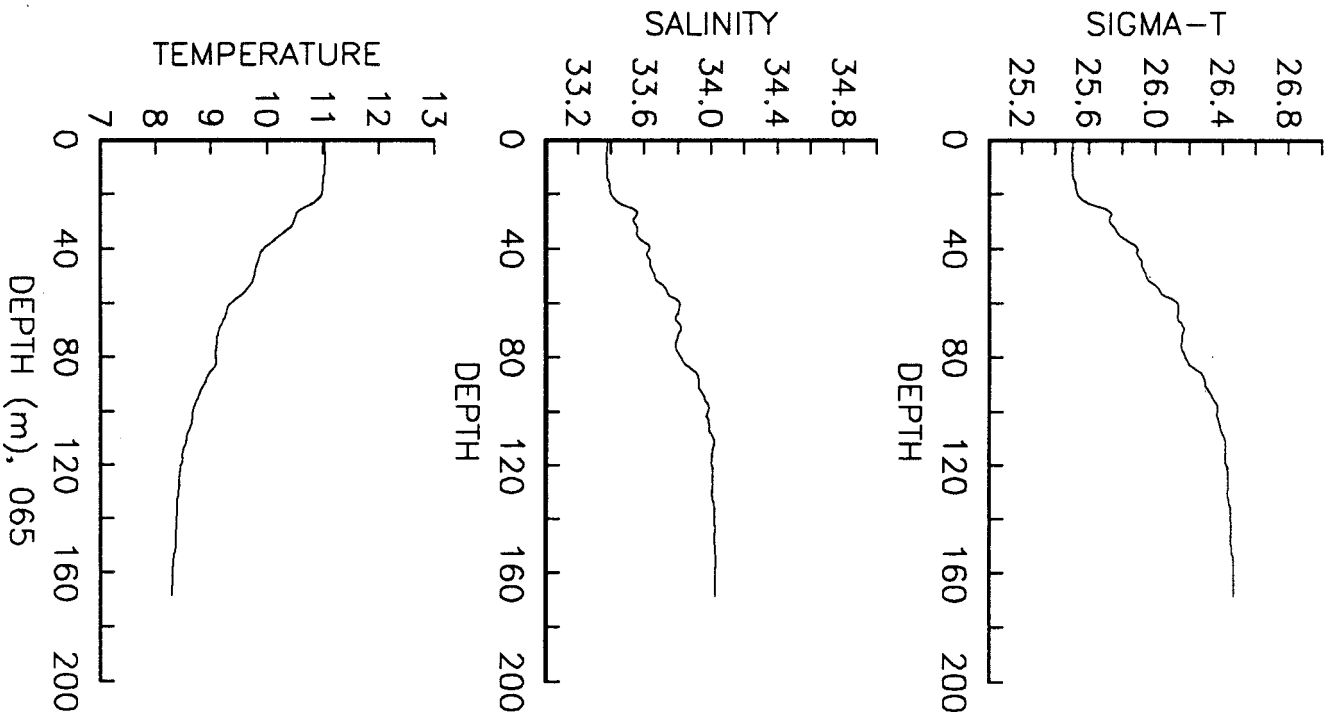
STN 8904.063 17 MAY 1989 2240 PDT
37°16.1'N 122°40.6'W DEPTH 102 m



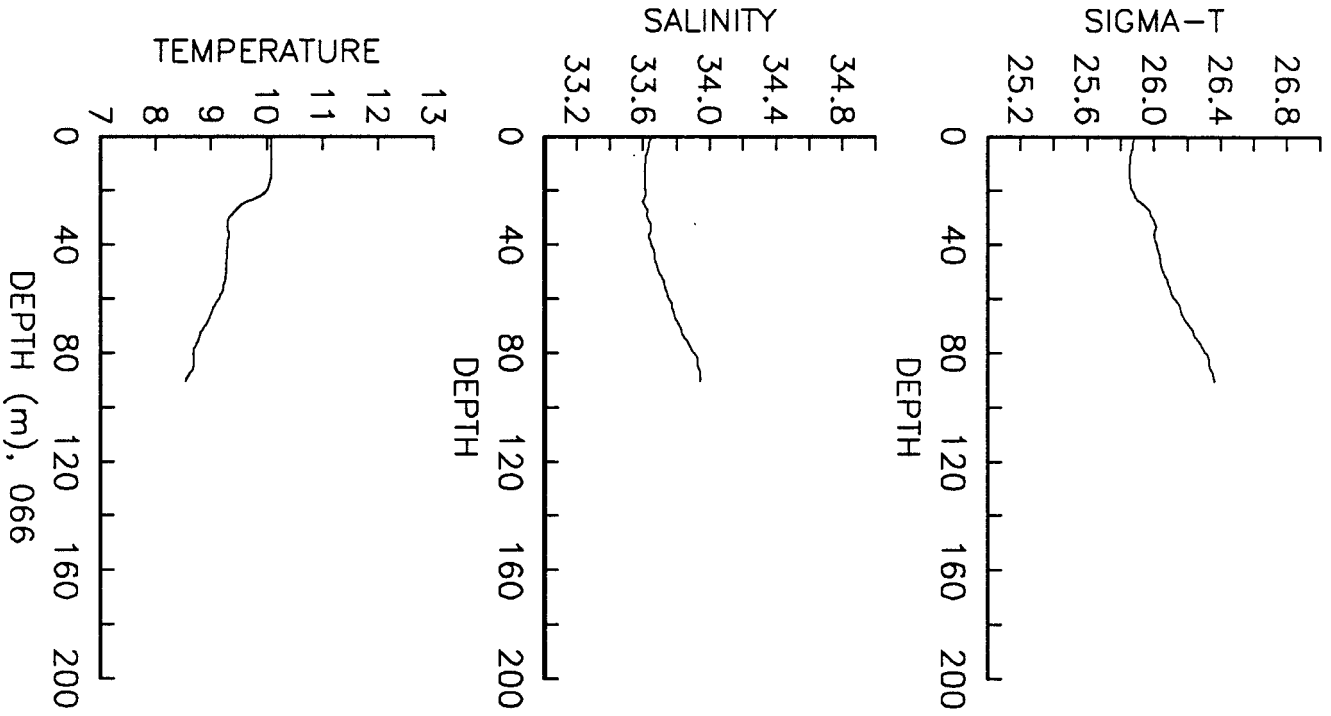
STN 8904.064 17 MAY 1989 2335 PDT
37°16.9'N 122°49.0'W DEPTH 181 m



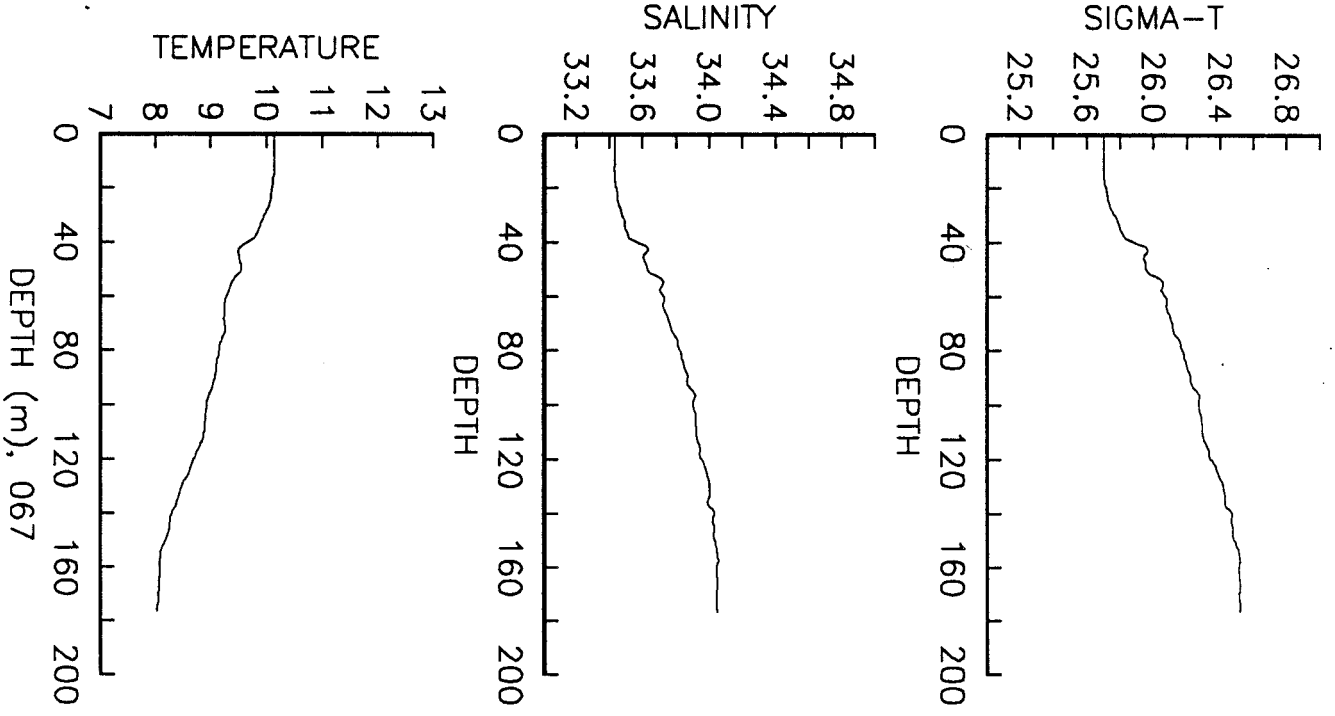
STN 8904.065 18 MAY 1989 0410 PDT
37°16.4'N 122°59.0'W DEPTH 163 m



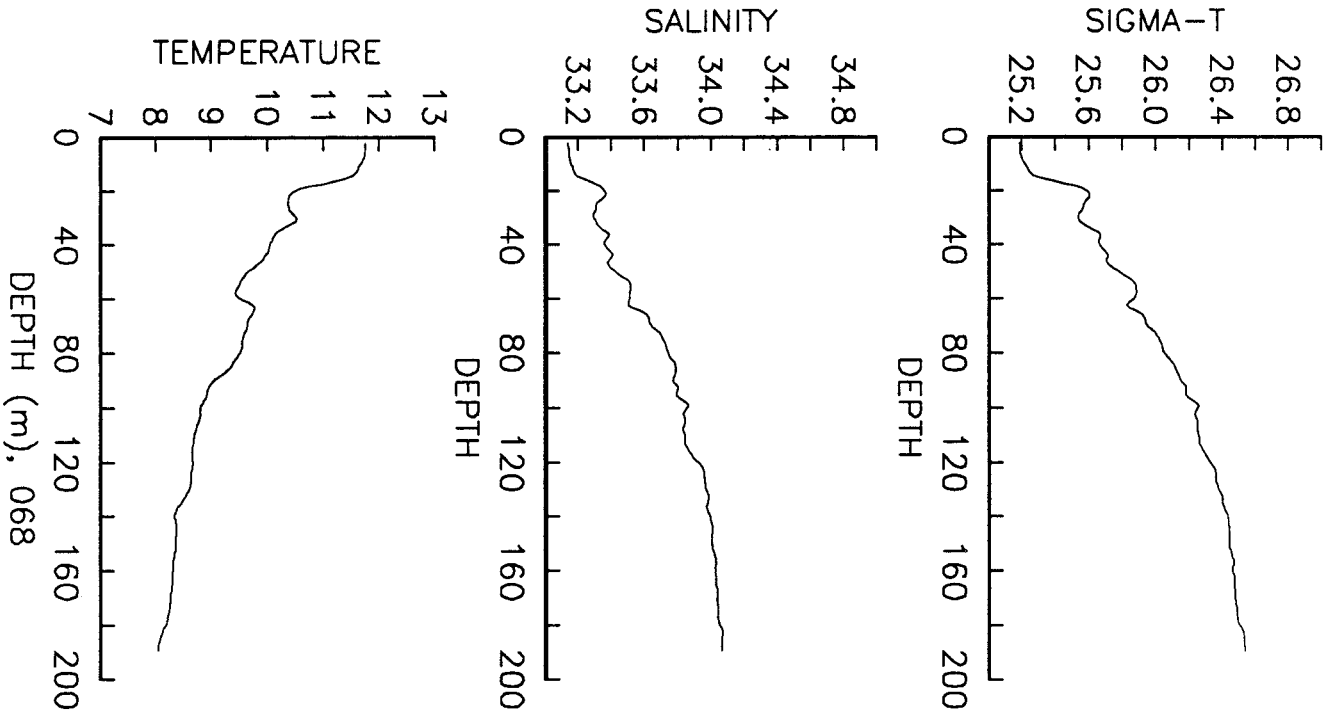
STN 8904.066 18 MAY 1989 0723 PDT
37°35.0'N 122°55.0'W DEPTH 99 m



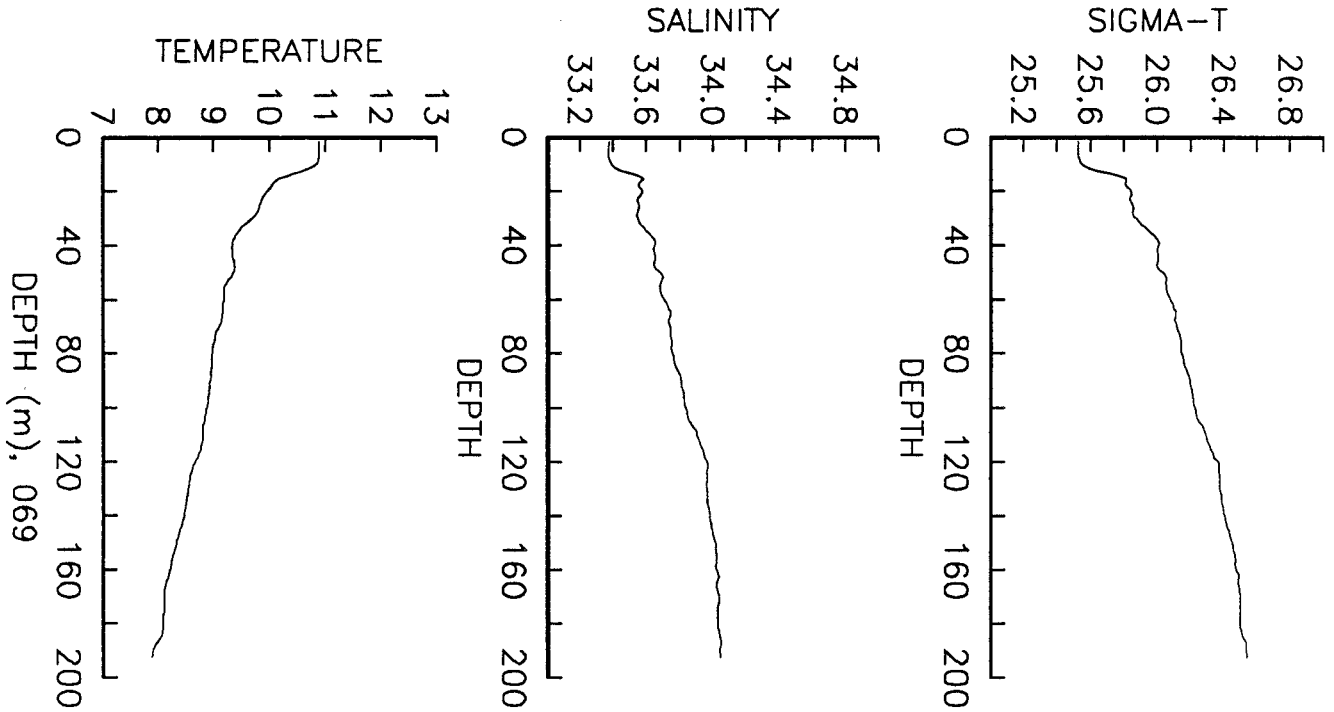
STN 8904.067 18 MAY 1989 0804 PDT
37°35.0'N 123° 1.5'W DEPTH 271 m



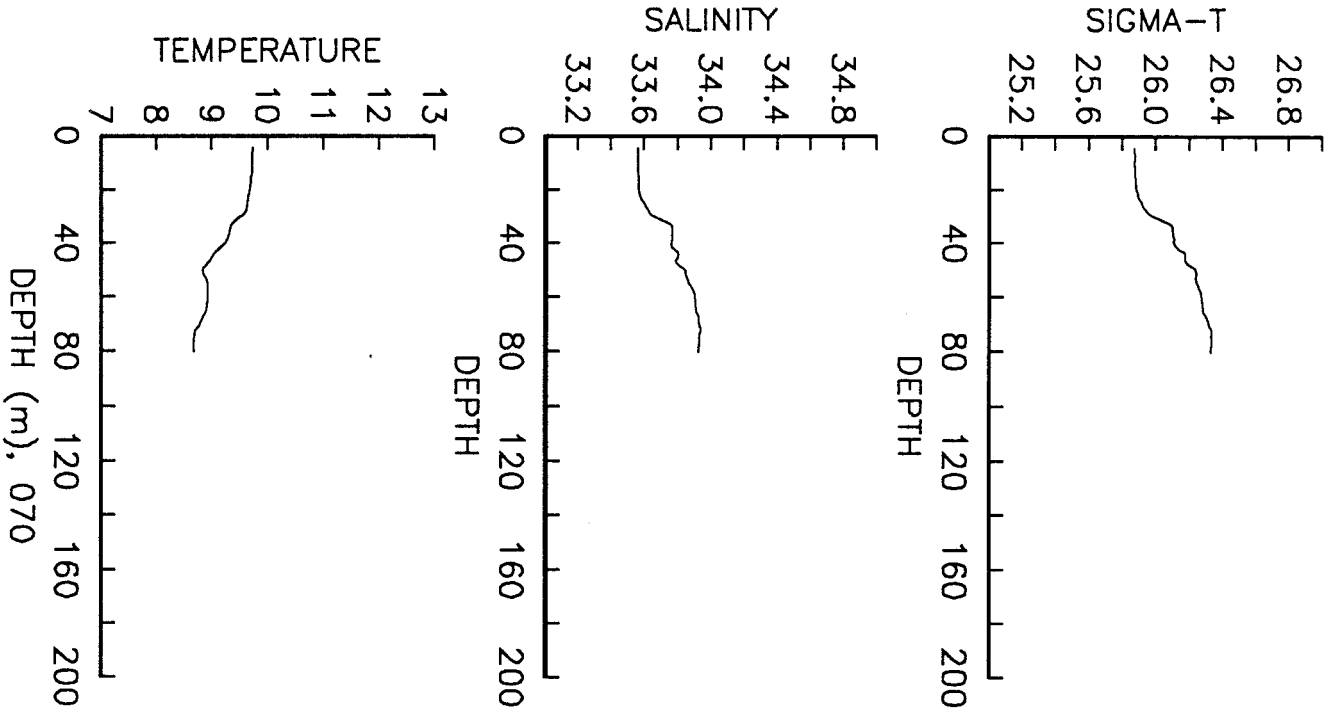
STN 8904.068 18 MAY 1989 0847 PDT
37°35.0'N 123° 7.5'W DEPTH 1079 m



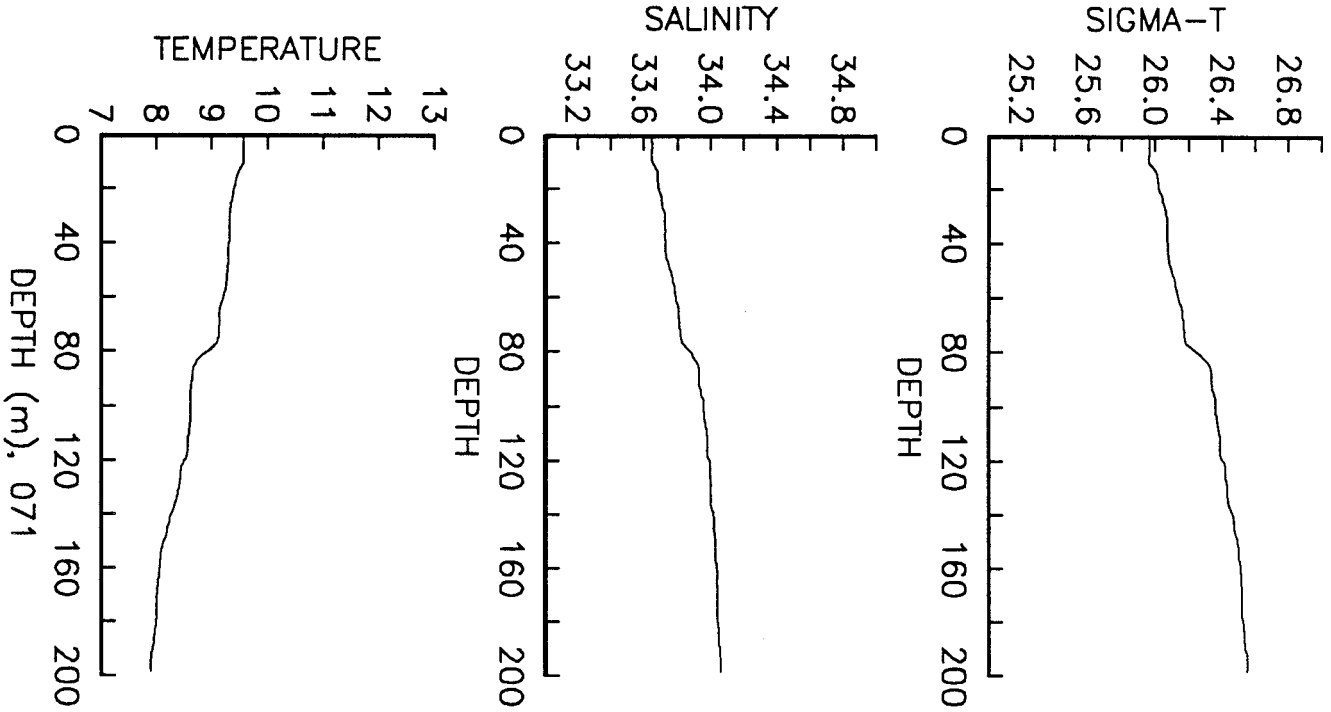
STN 8904.069 18 MAY 1989 1009 PDT
37°39.5'N 123°17.5'W DEPTH 1737 m



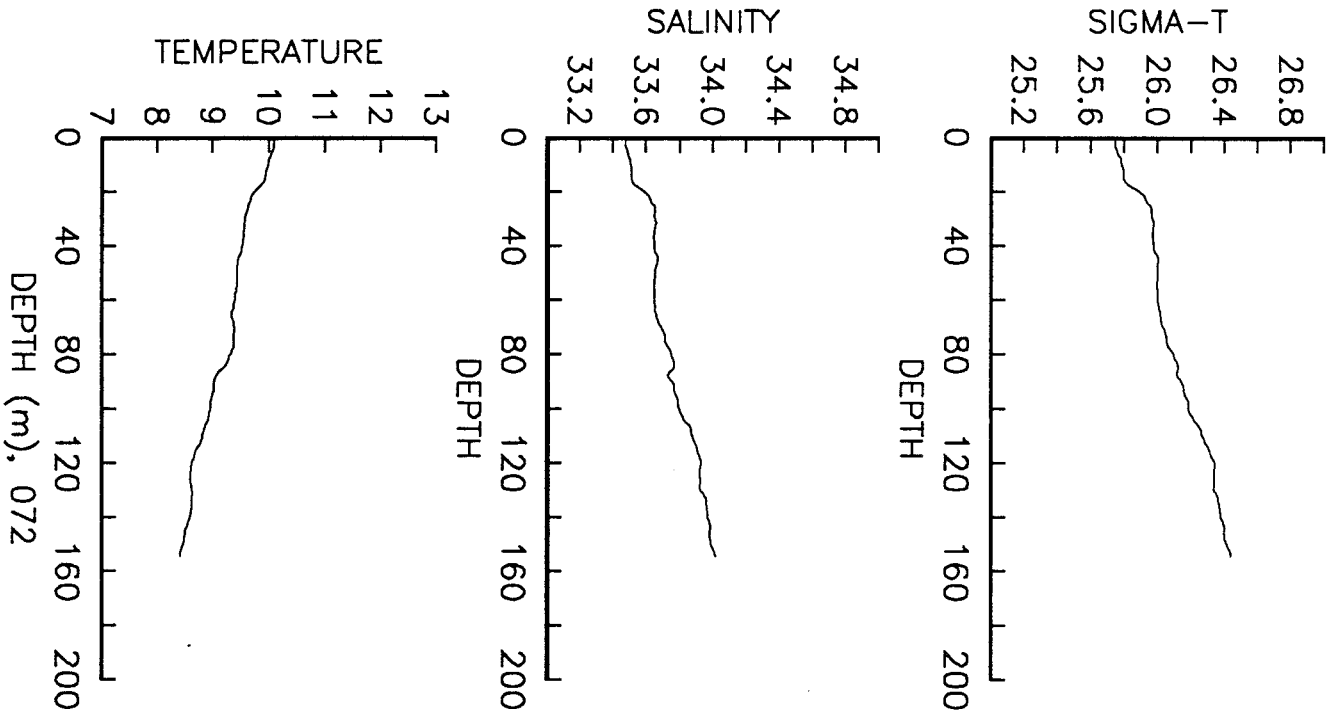
STN 8904.070 18 MAY 1989 1128 PDT
37°48.0'N 123°12.5'W DEPTH 82 m



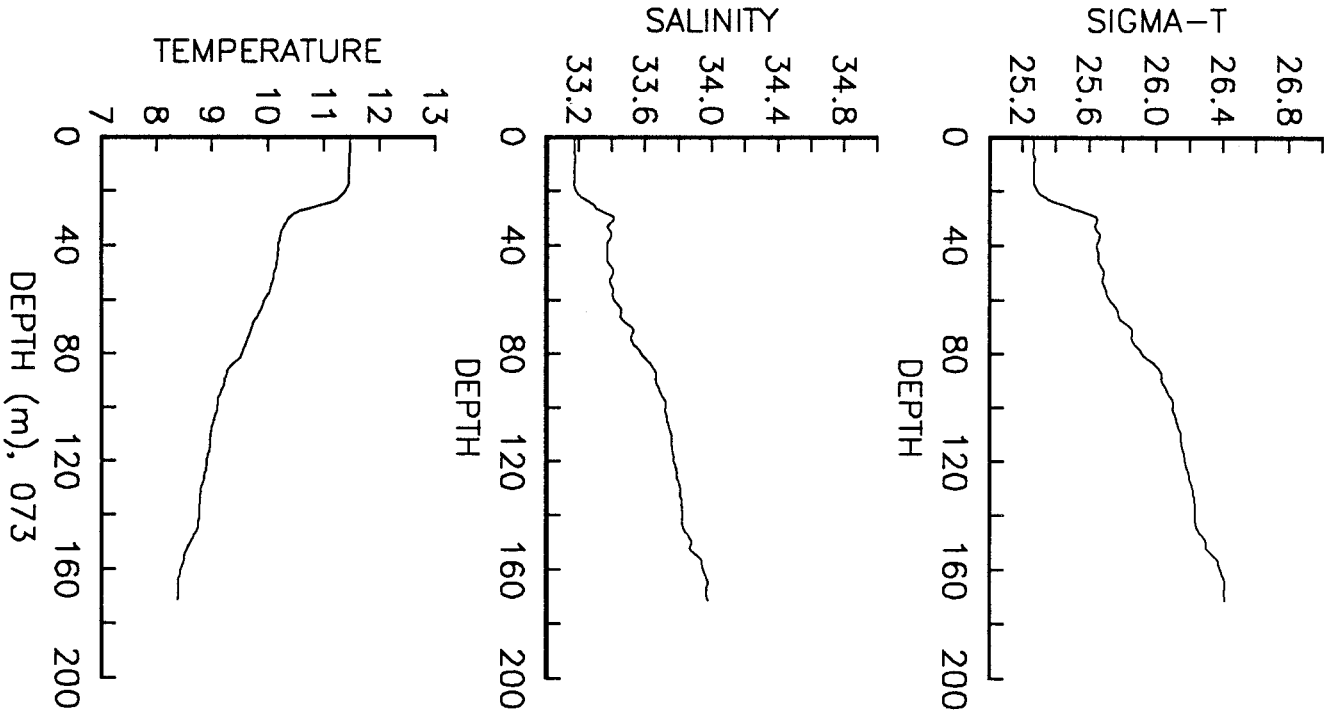
STN 8904.071 18 MAY 1989 1218 PDT
37°48.0'N 123°20.1'W DEPTH 625 m



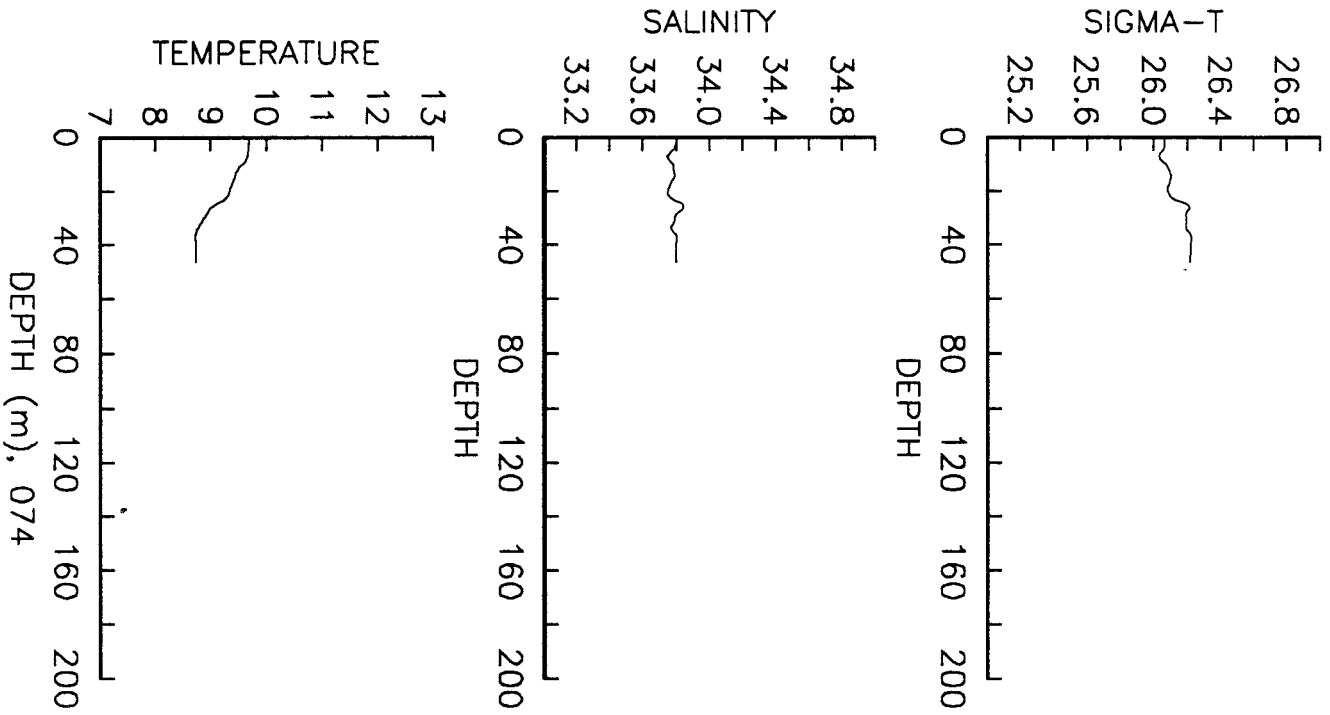
STN 8904.072 18 MAY 1989 1303 PDT
37°47.9'N 123°25.8'W DEPTH 1372 m



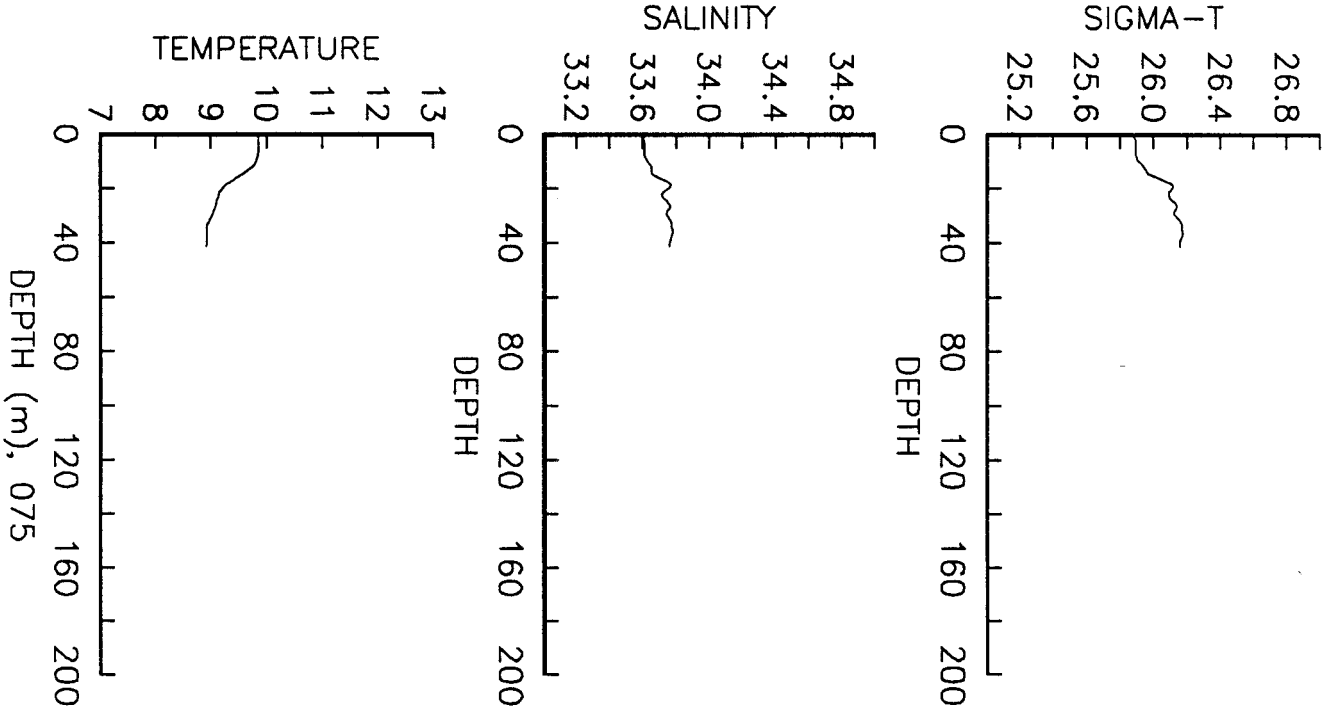
STN 8904.073 18 MAY 1989 1448 PDT
37°53.0'N 123°33.1'W DEPTH 2213 m



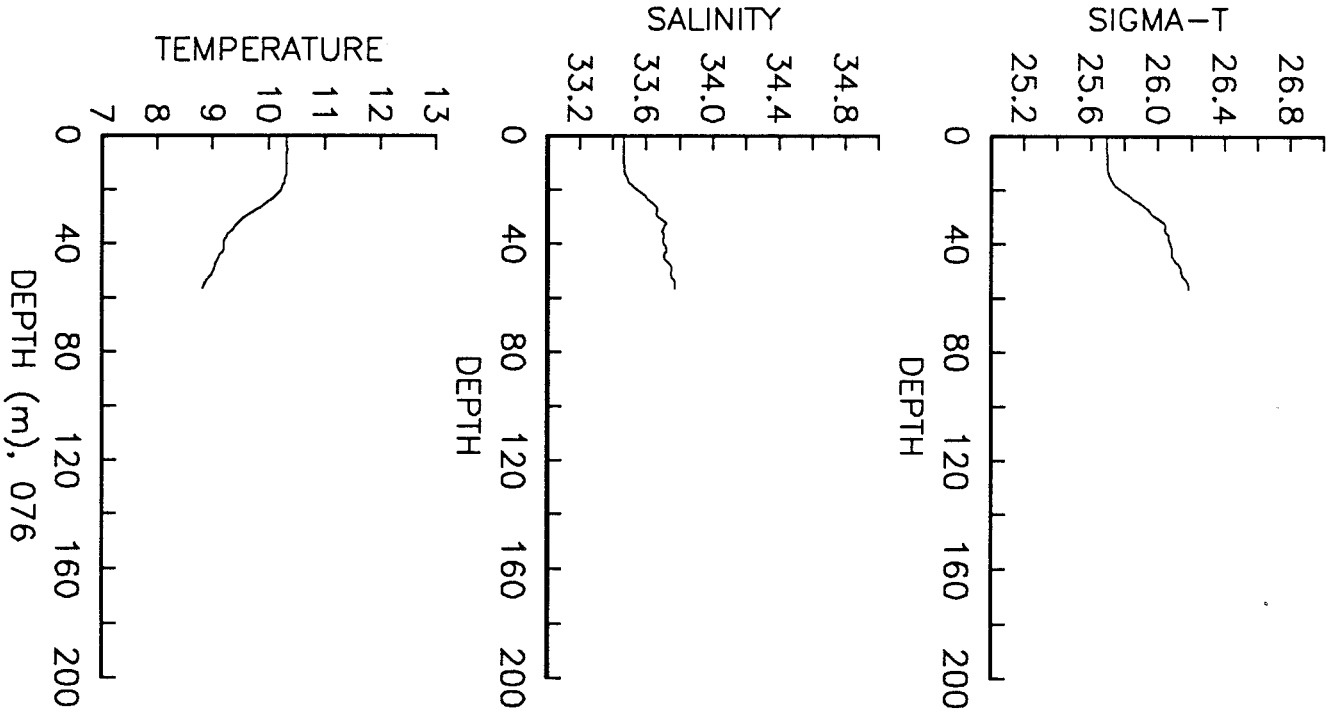
STN 8904.074 18 MAY 1989 2025 PDT
37°58.0'N 122°56.0'W DEPTH 53 m



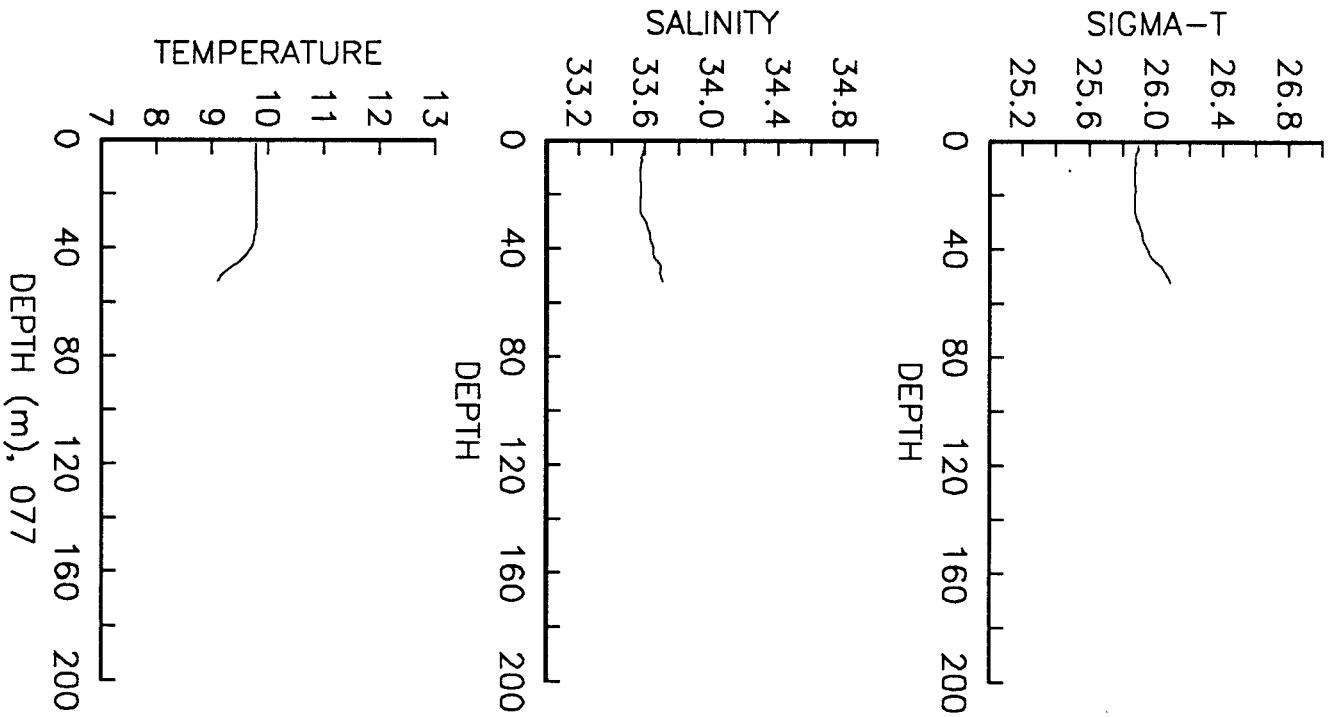
STN 8904.075 18 MAY 1989 2320 PDT
37°50.6'N 122°46.6'W DEPTH 44 m



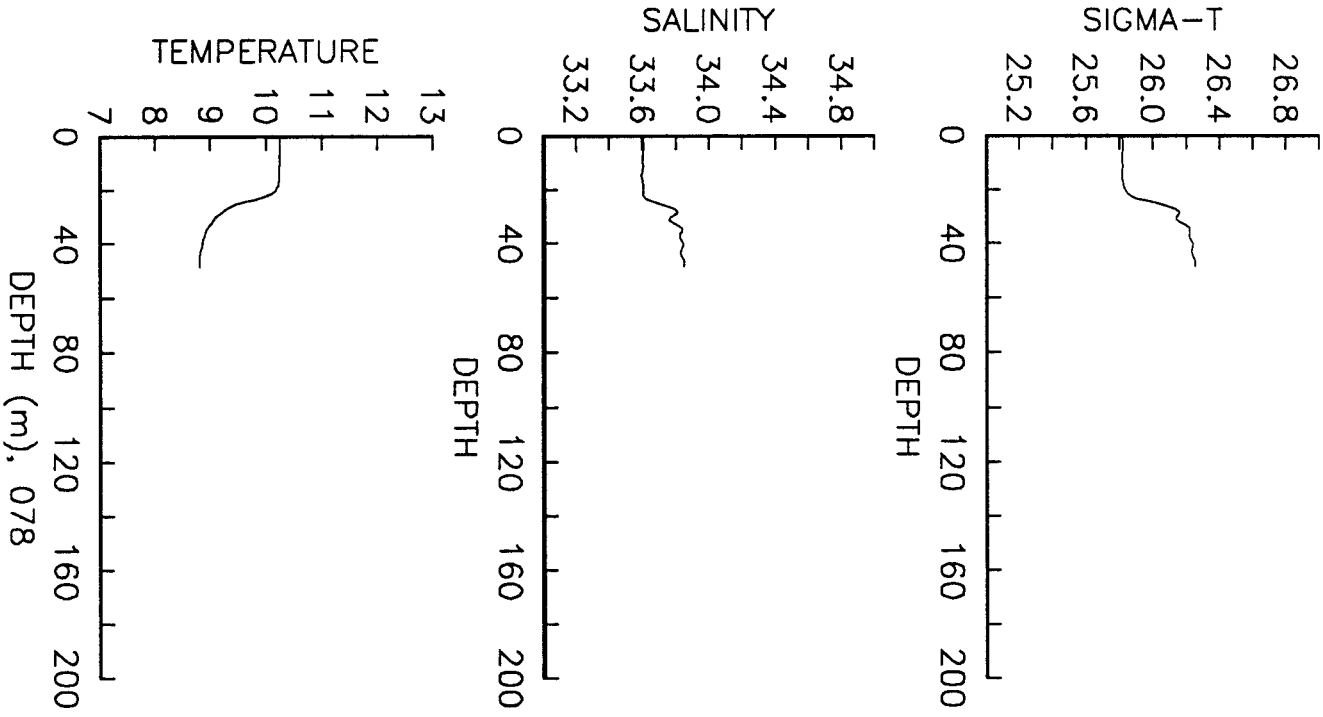
STN 8904.076 19 MAY 1989 0000 PDT
37°47.4'N 122°52.1'W DEPTH 59 m



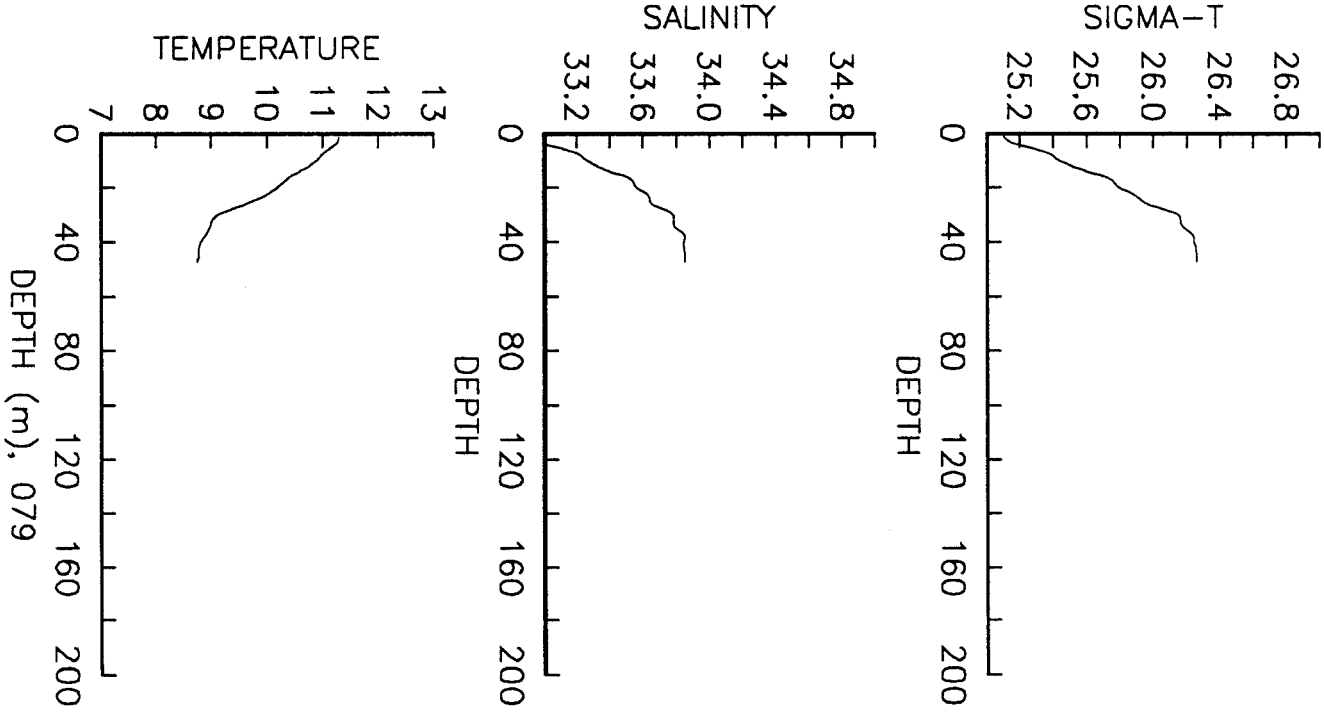
STN 8904.077 19 MAY 1989 0155 PDT
37°42.2'N 122°56.0'W DEPTH 57 m



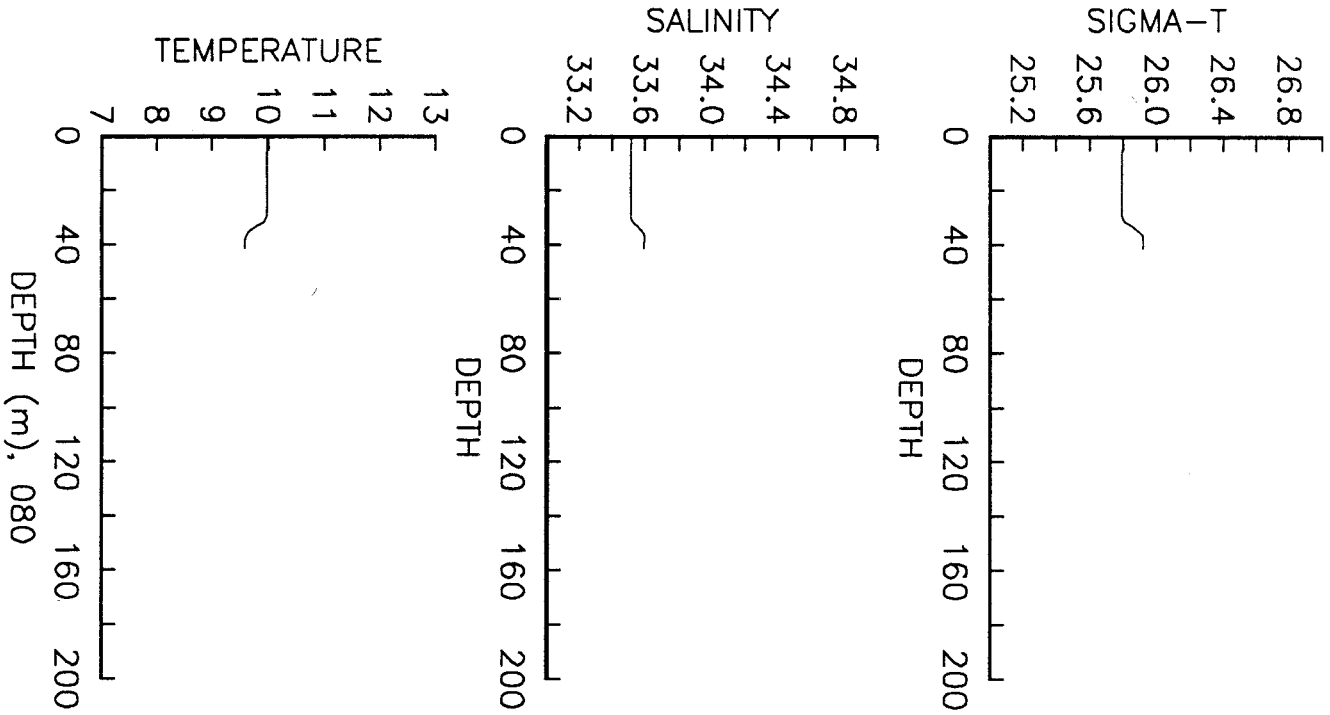
STN 8904.078 19 MAY 1989 0300 PDT
37°37.9'N 122°45.9'W DEPTH 55 m



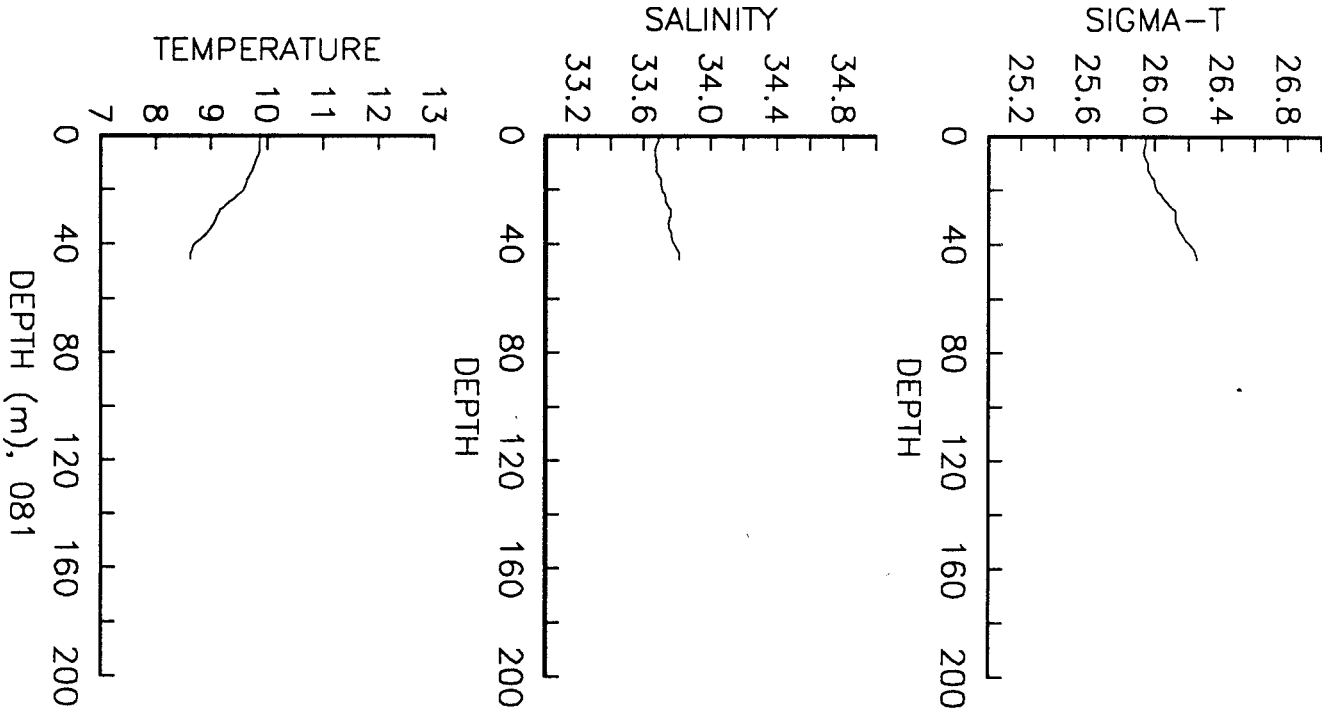
STN 8904.079 19 MAY 1989 0545 PDT
37°35.0'N 122°43.0'W DEPTH 55 m



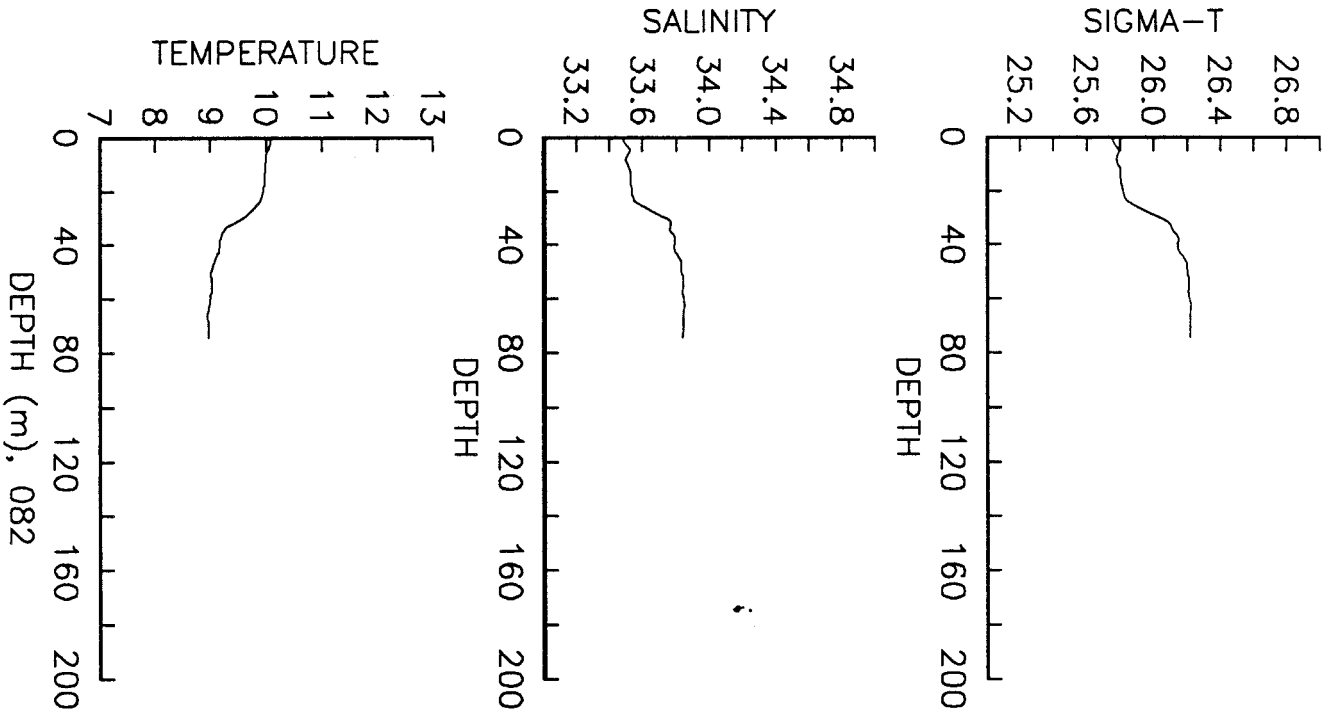
STN 8904.080 19 MAY 1989 0723 PDT
37°42.0'N 122°58.0'W DEPTH 51 m



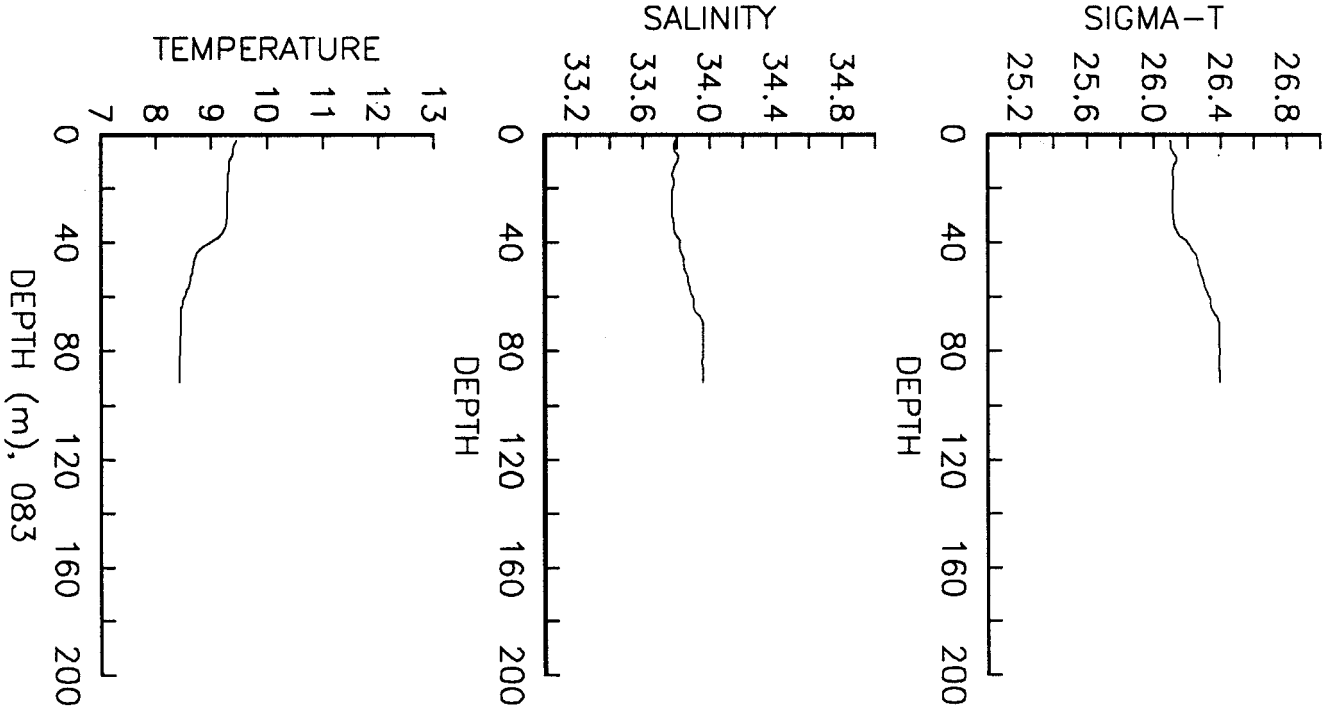
STN 8904.081 19 MAY 1989 0903 PDT
37°55.0'N 122°51.5'W DEPTH 49 m



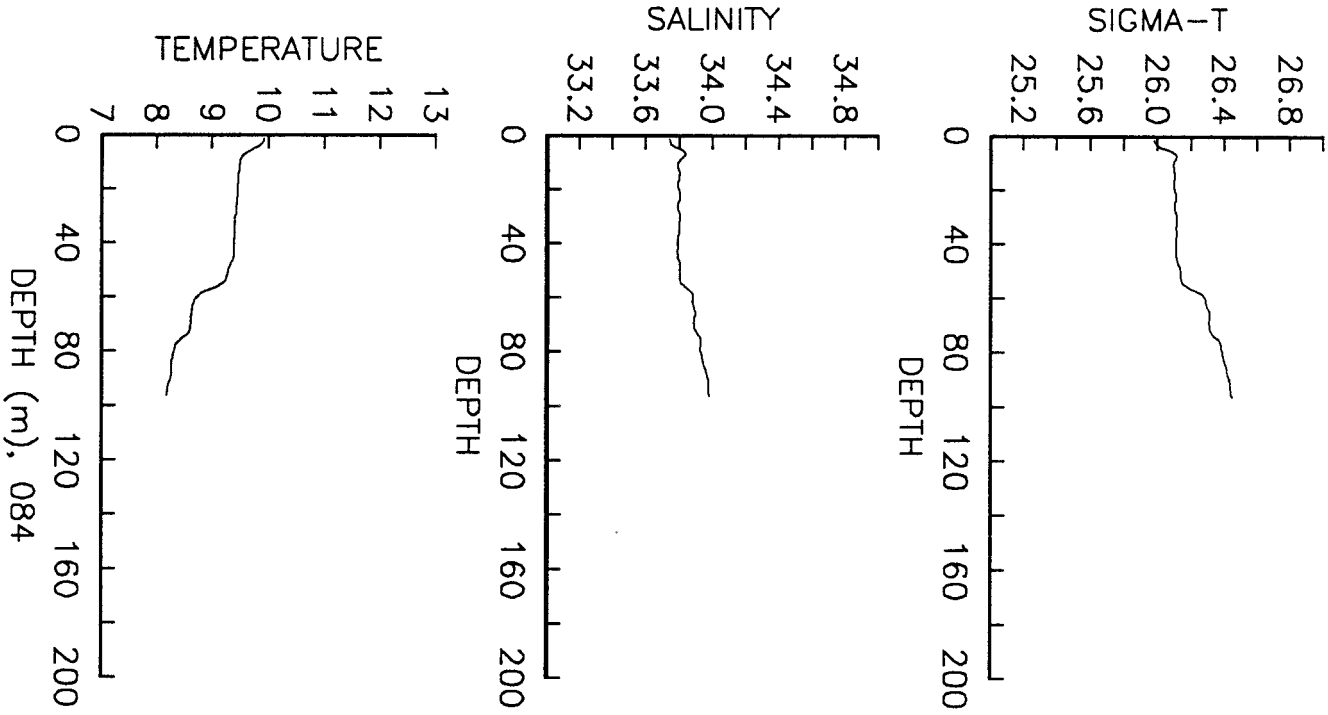
STN 8904.082 19 MAY 1989 1025 PDT
37°47.5'N 123° 3.5'W DEPTH 75 m



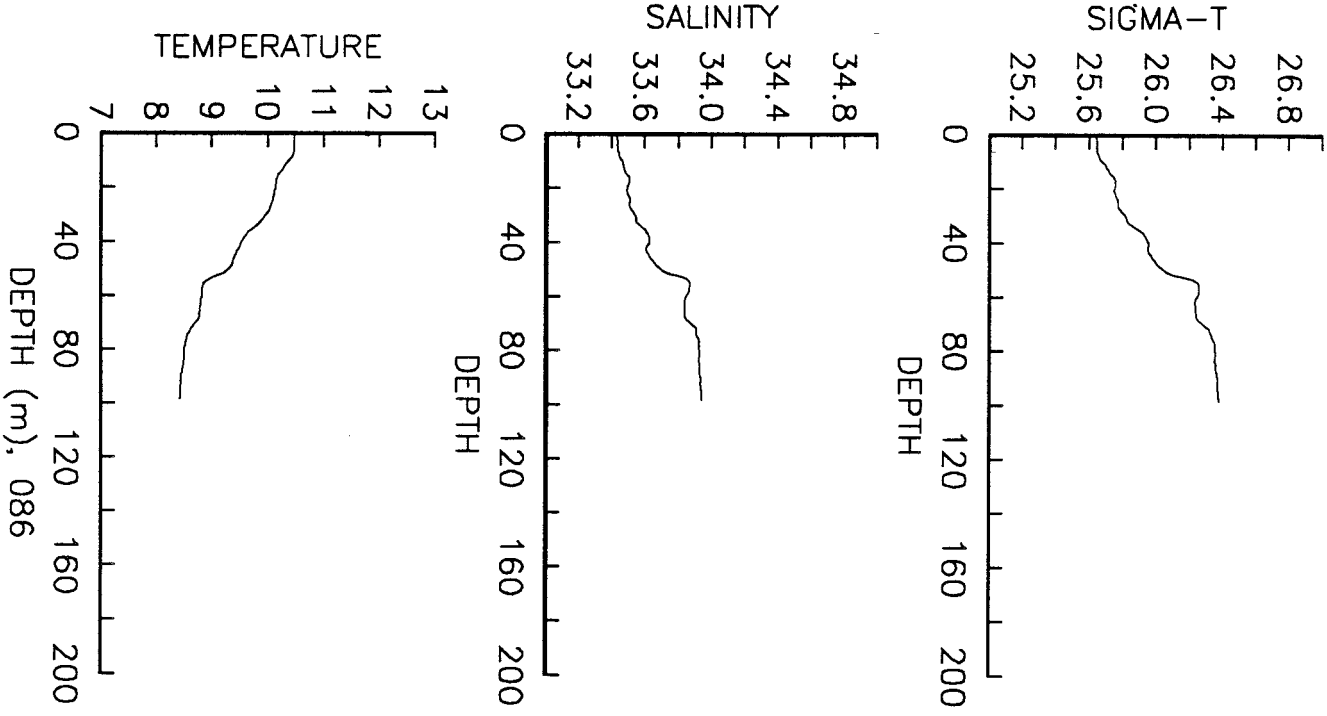
STN 8904.083 19 MAY 1989 1112 PDT
37°53.0'N 123° 7.0'W DEPTH 93 m



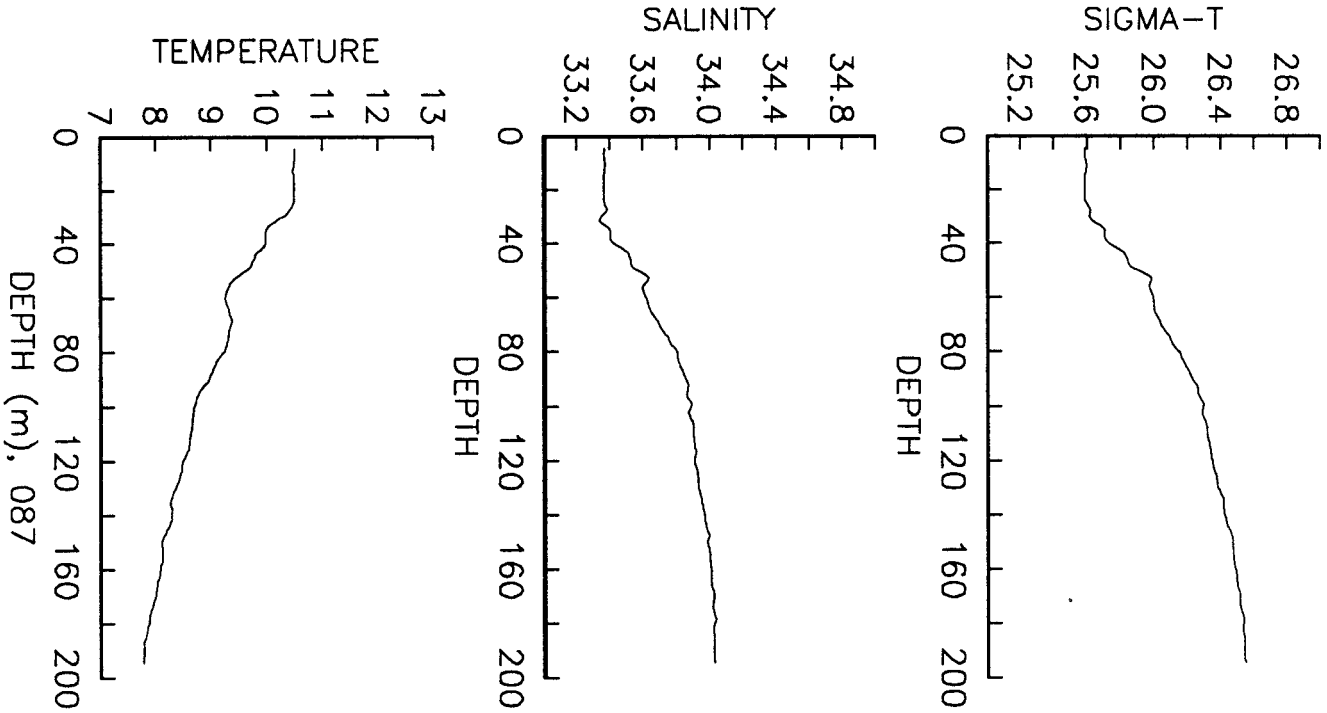
STN 8904.084 19 MAY 1989 1203 PDT
37°53.0'N 123°15.2'W DEPTH 101 m



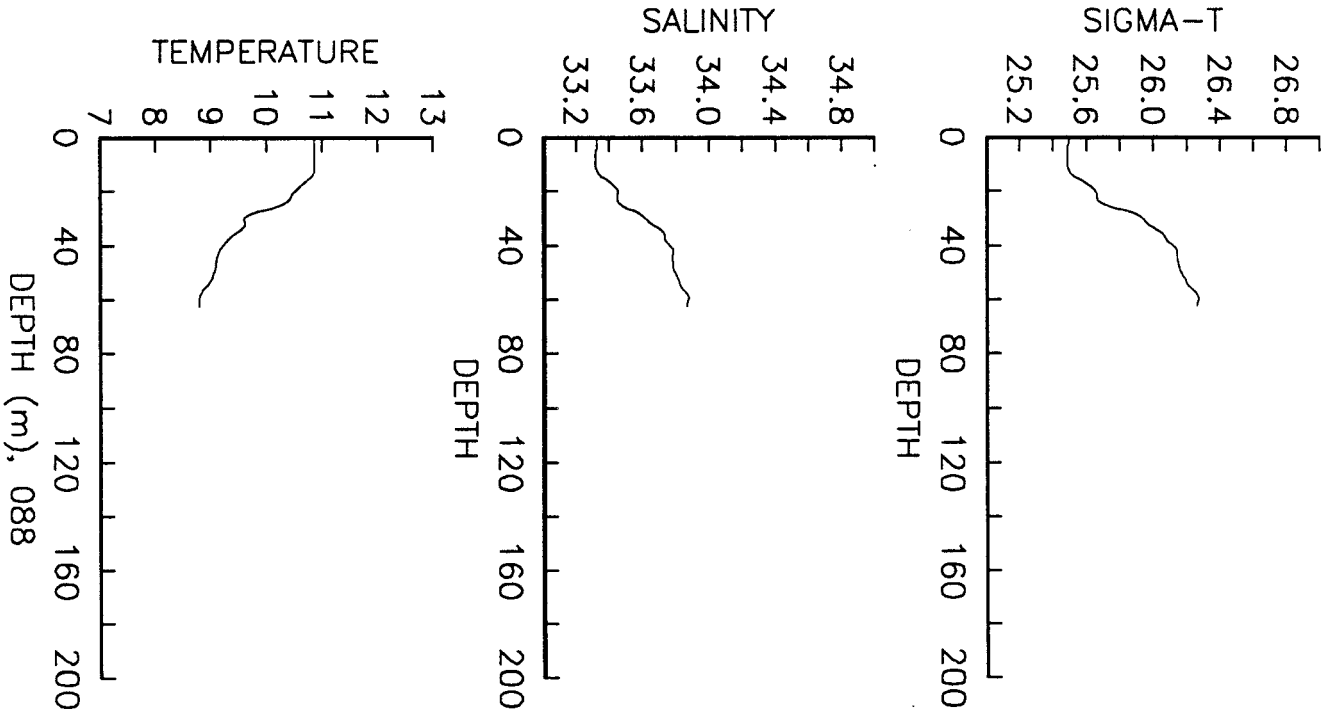
STN 8904.086 19 MAY 1989 2025 PDT
37°39.3'N 123° 1.8'W DEPTH 102 m



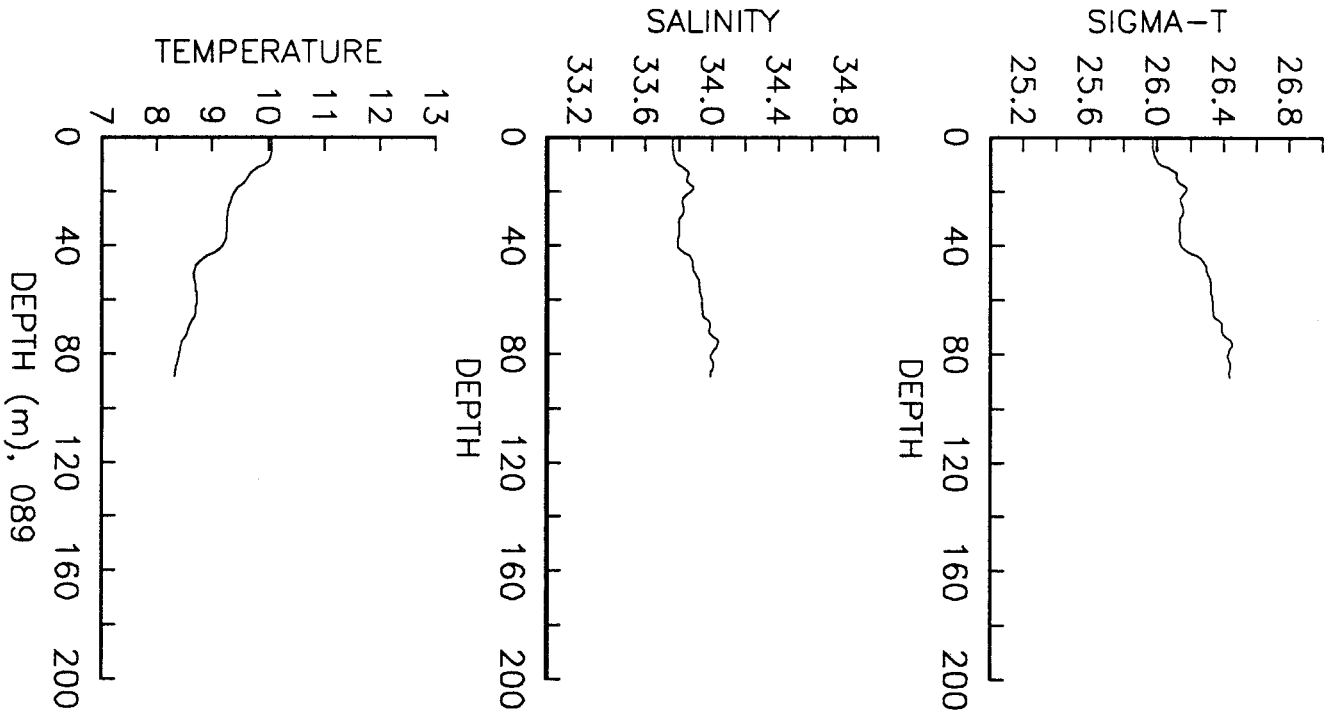
STN 8904.087 19 MAY 1989 2305 PDT
37°39.8'N 123°13.5'W DEPTH 1189 m



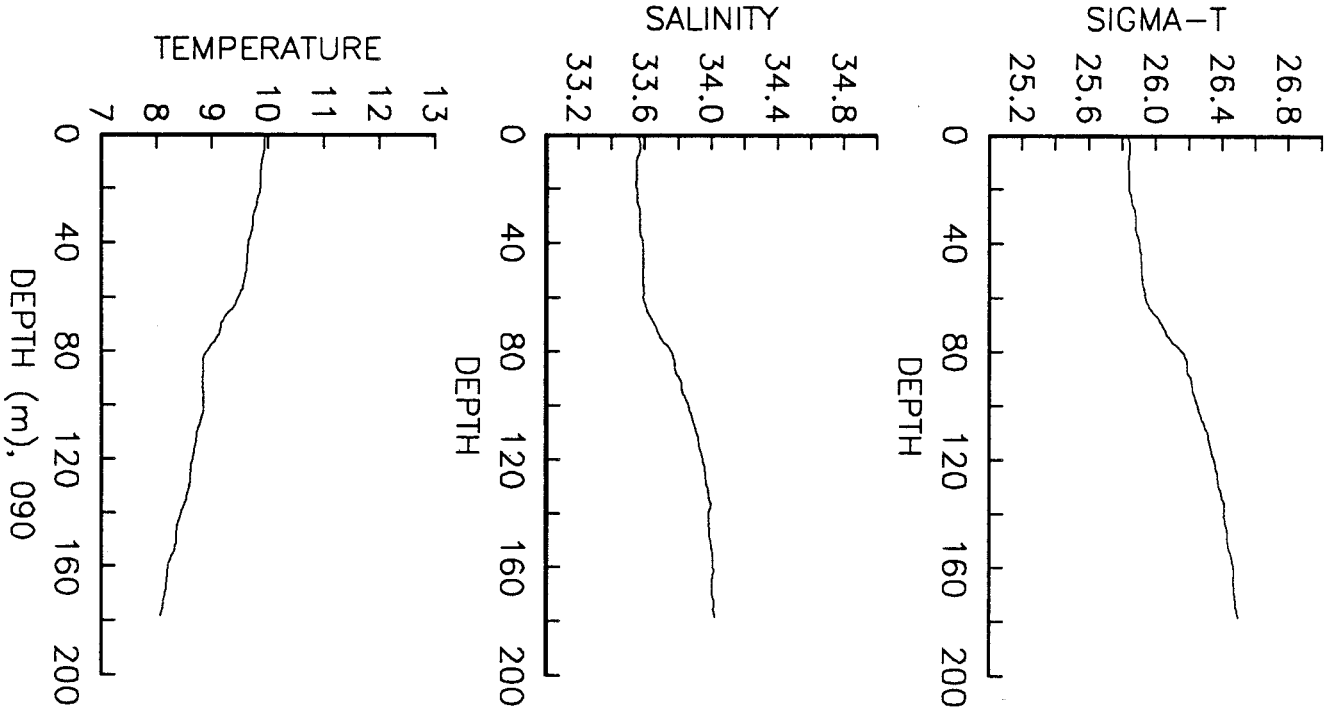
STN 8904.088 20 MAY 1989 0000 PDT
37°45.0'N 123° 8.0'W DEPTH 66 m



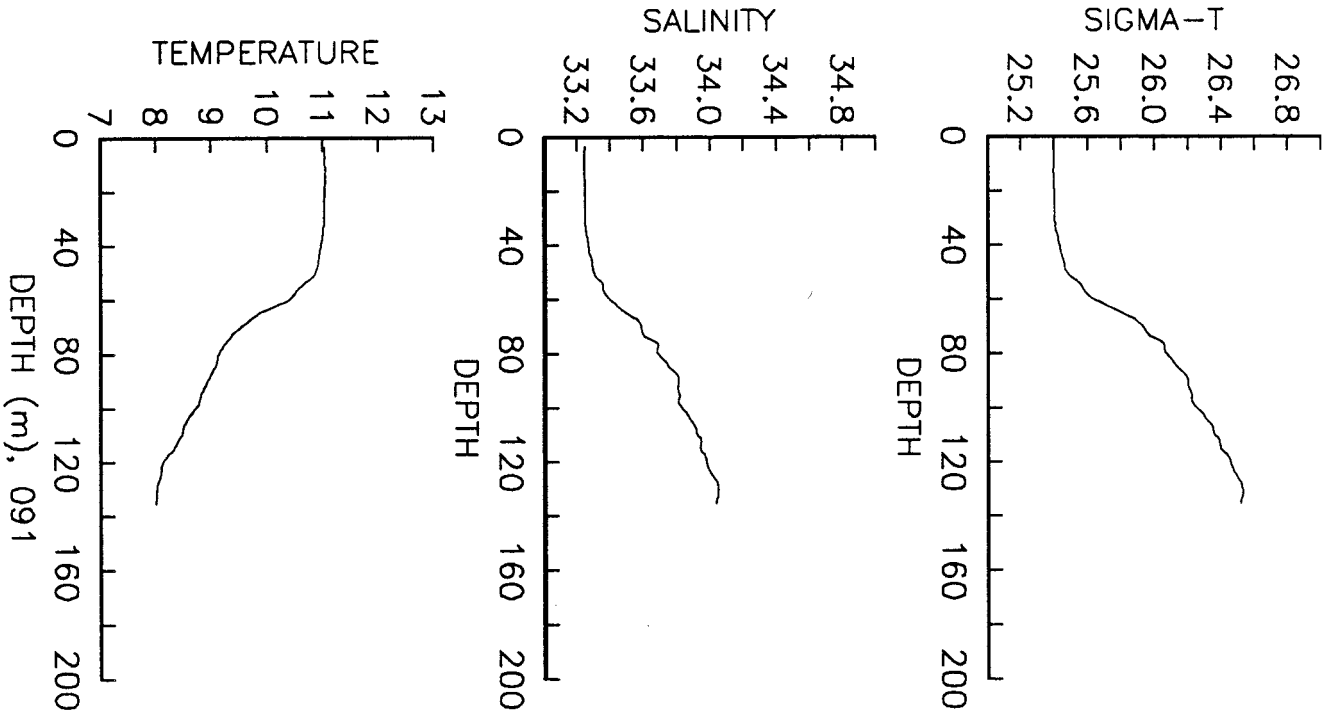
STN 8904.089 20 MAY 1989 0250 PDT
37°52.6'N 123°18.9'W DEPTH 102 m



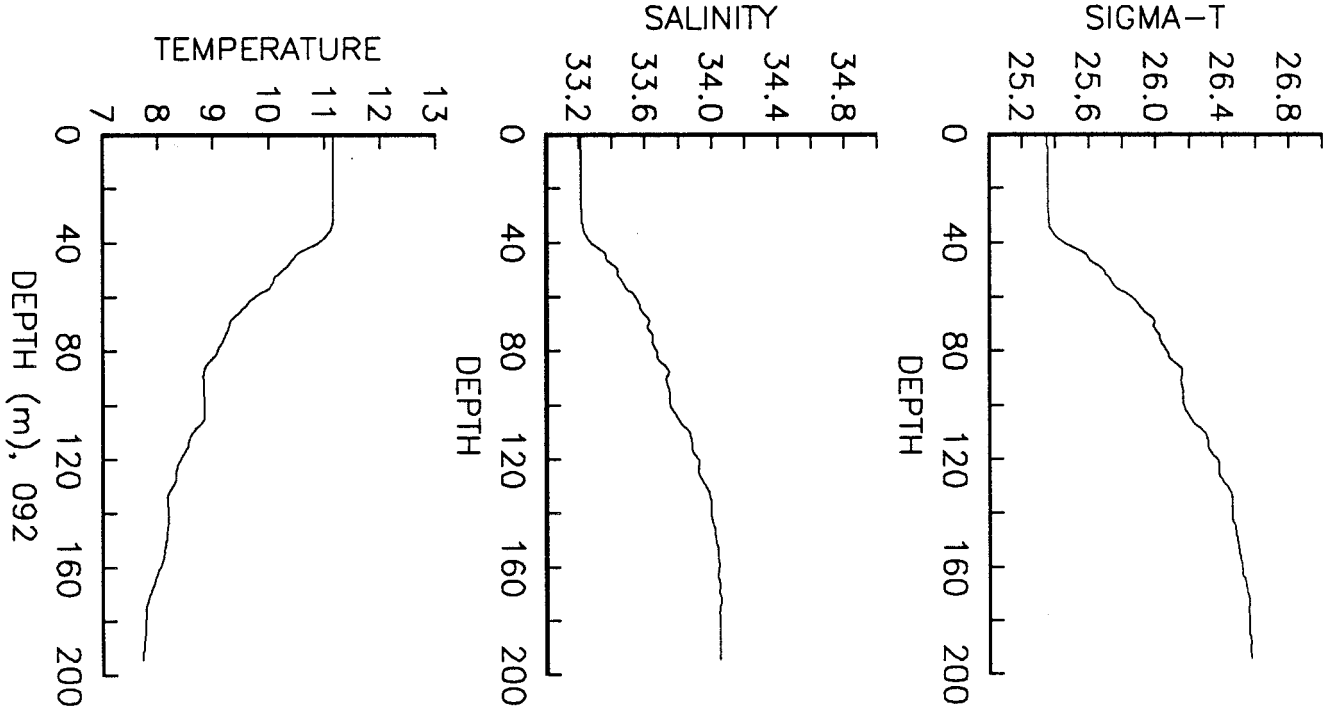
STN 8904.090 20 MAY 1989 0550 PDT
37°52.4'N 123°30.6'W DEPTH 1463 m



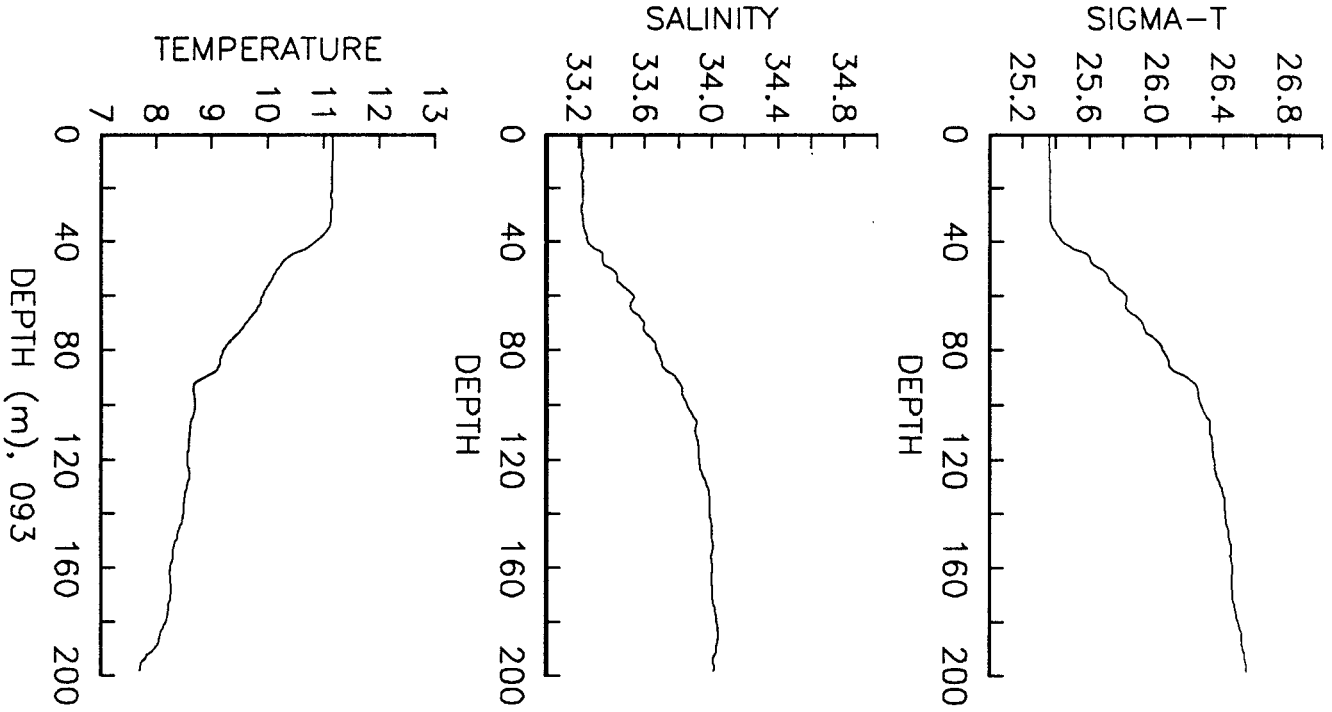
STN 8904.091 20 MAY 1989 0742 PDT
38° 5.0'N 123°28.6'W DEPTH 143 m



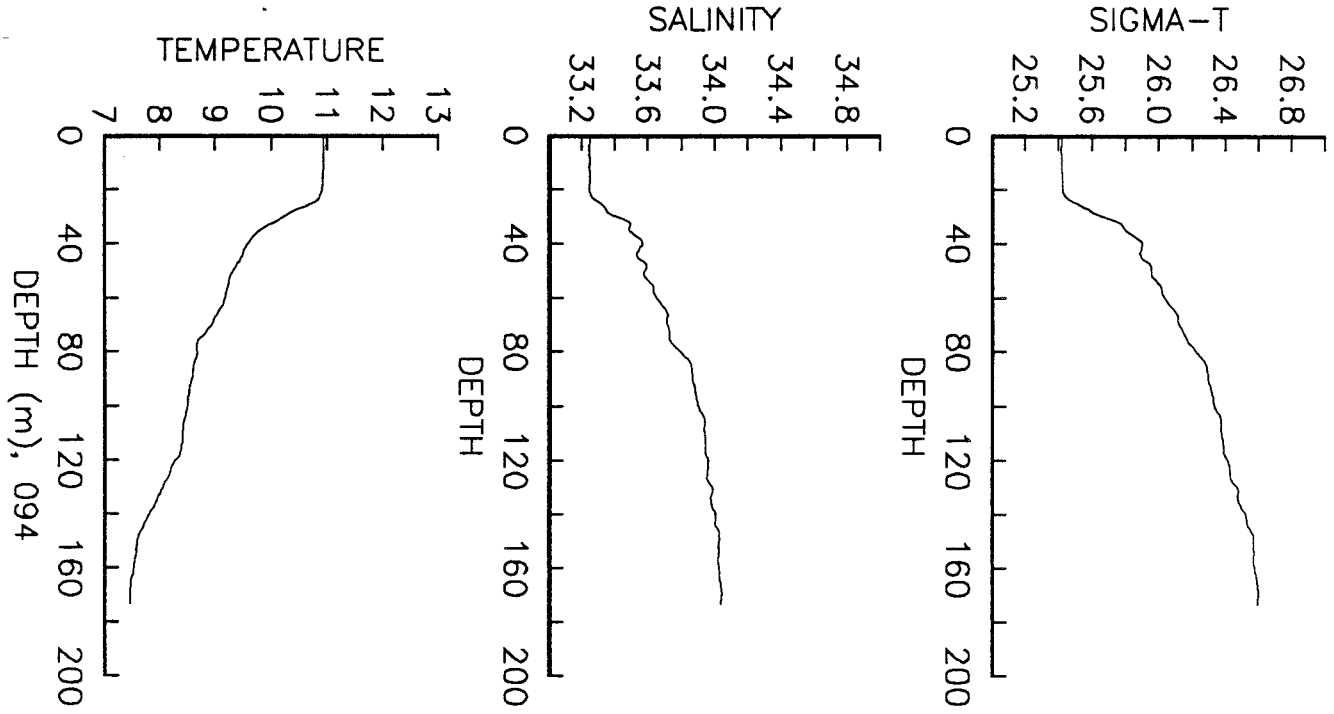
STN 8904.092 20 MAY 1989 0835 PDT
38°10.0'N 123°28.5'W DEPTH 364 m



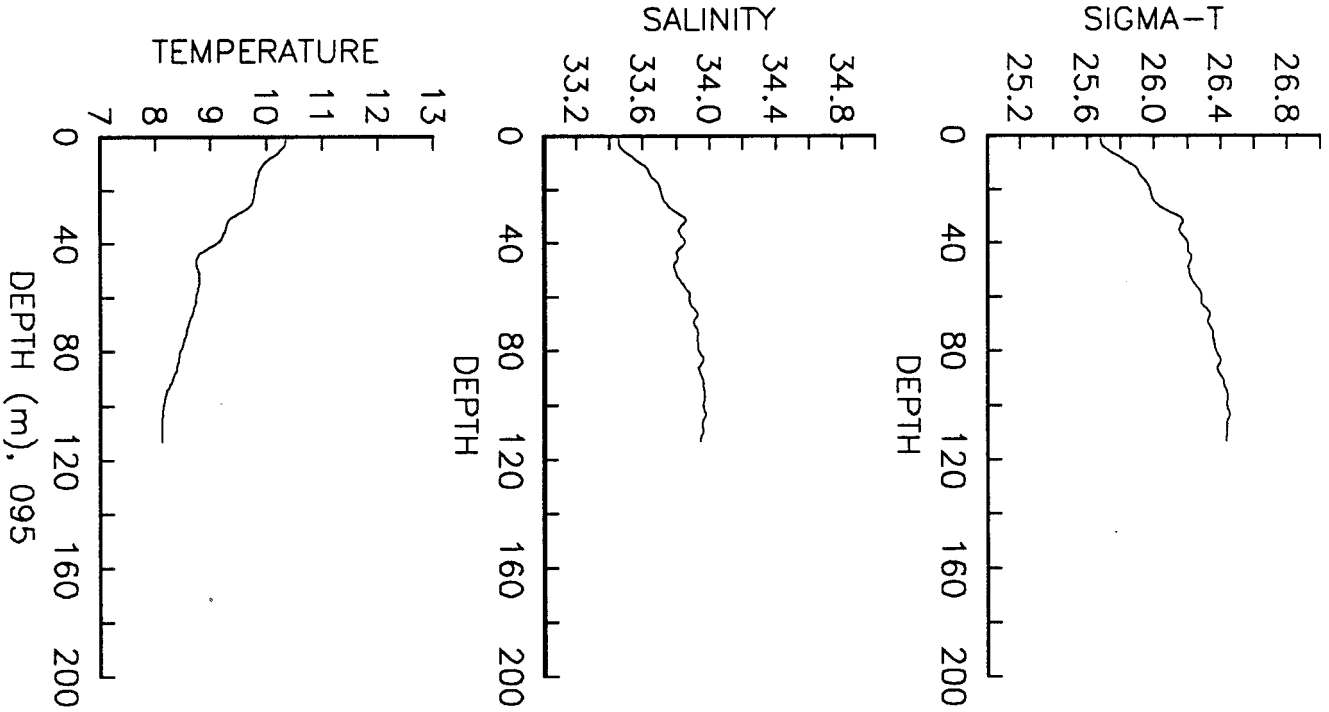
STN 8904.093 20 MAY 1989 0930 PDT
38°15.0'N 123°28.5'W DEPTH 322 m



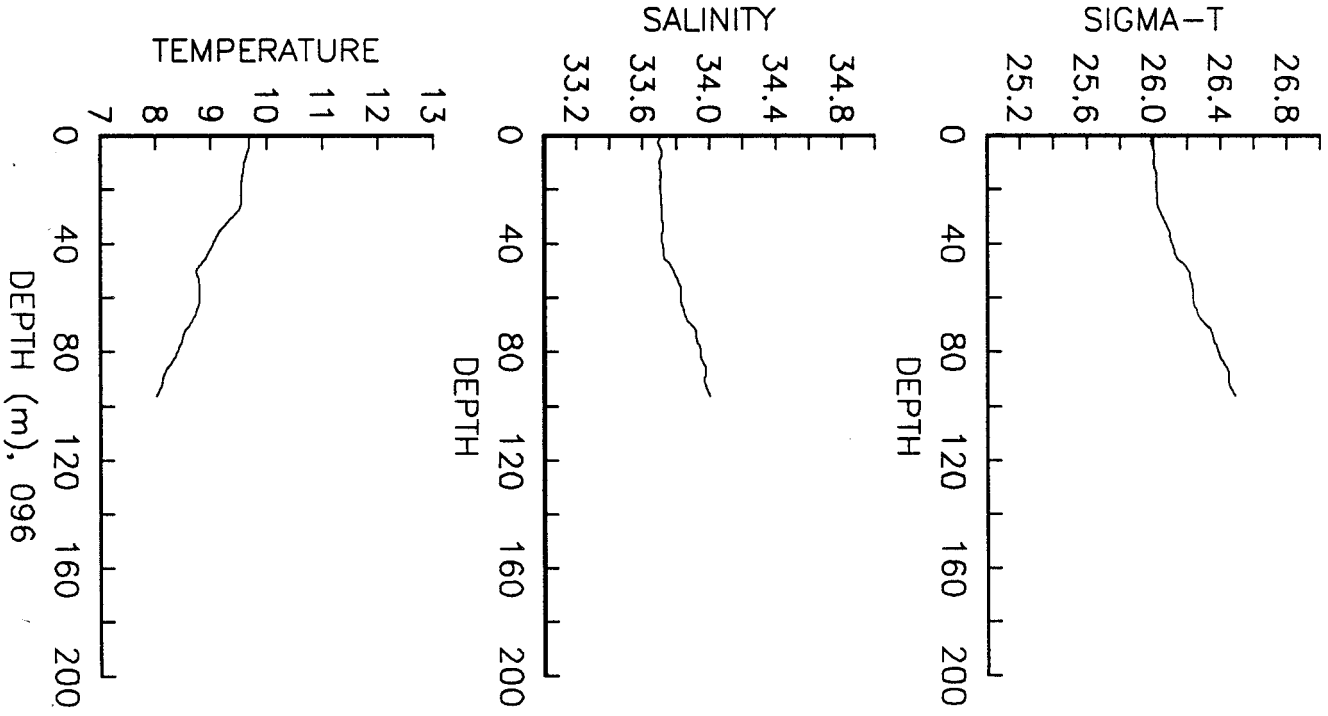
STN 8904.094 20 MAY 1989 1008 PDT
38°15.0'N 123°23.5'W DEPTH 174 m



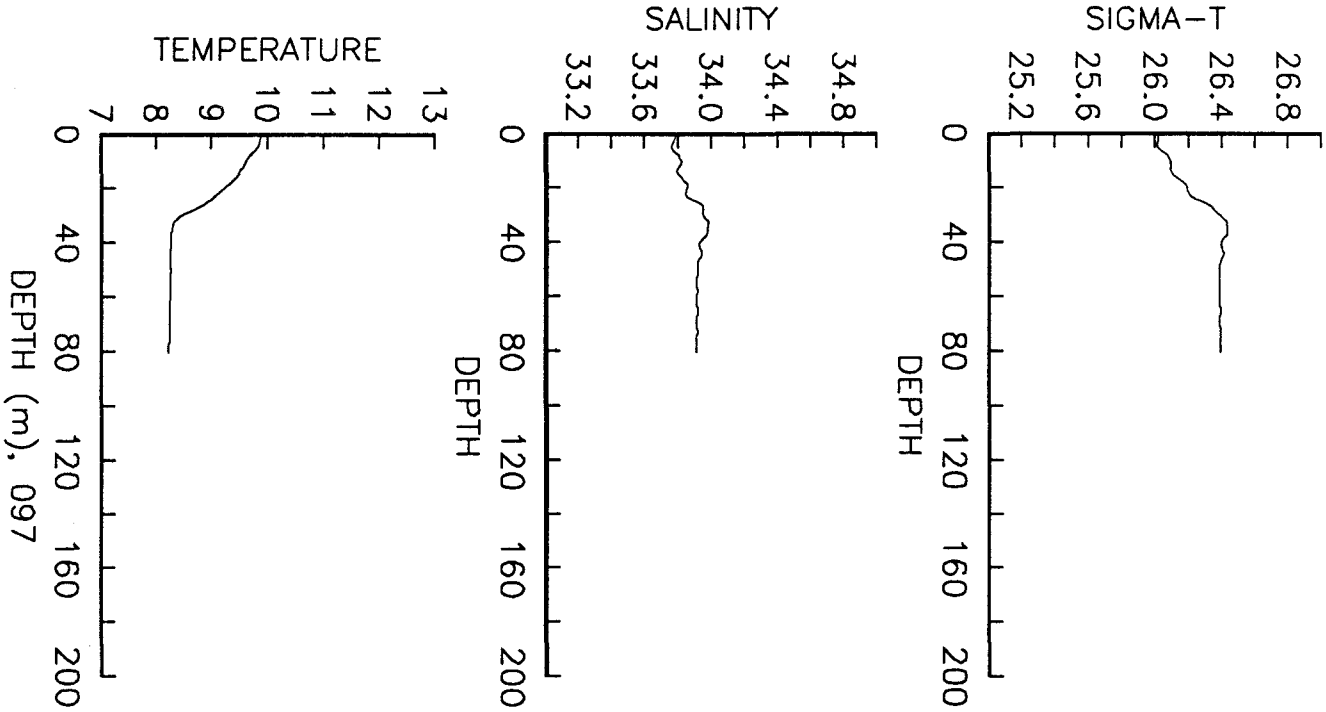
STN 8904.095 20 MAY 1989 1044 PDT
38°15.0'N 123°18.5'W DEPTH 123 m



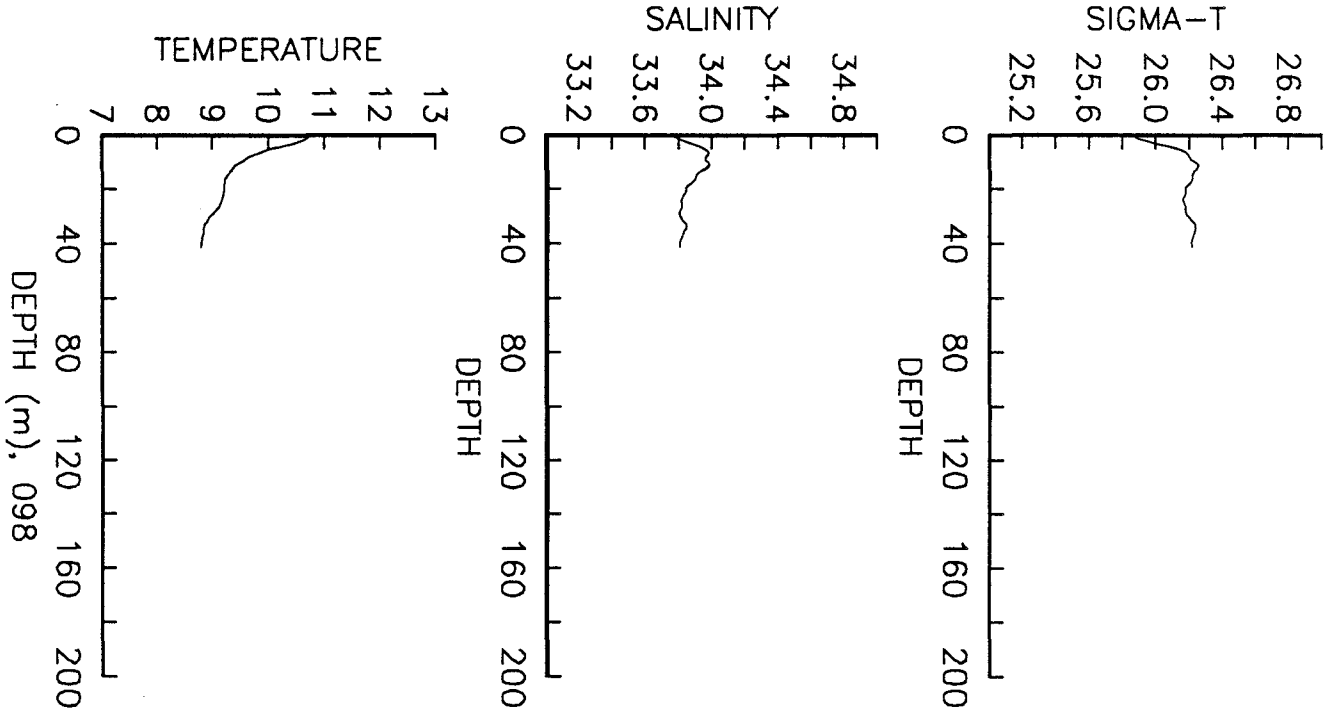
STN 8904.096 20 MAY 1989 1117 PDT
38°15.0'N 123°13.5'W DEPTH 102 m



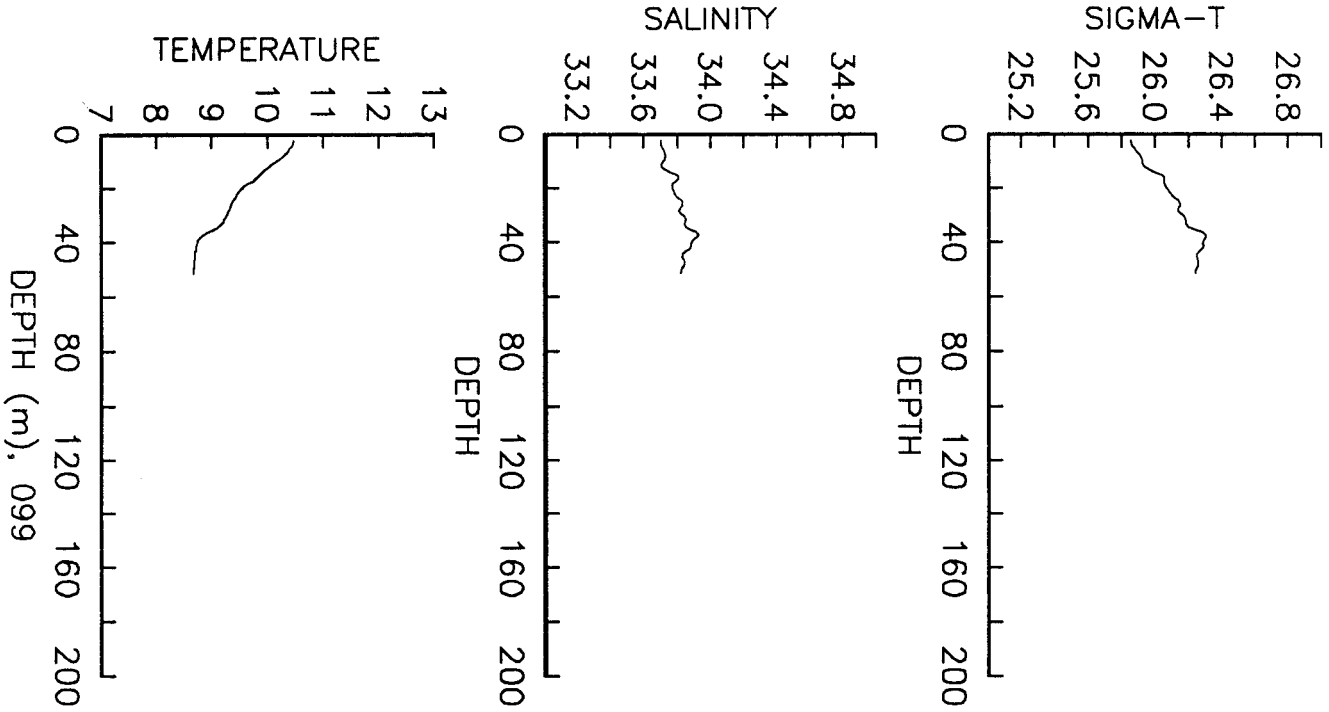
STN 8904.097 20 MAY 1989 1148 PDT
38°15.0'N 123° 8.5'W DEPTH 88 m



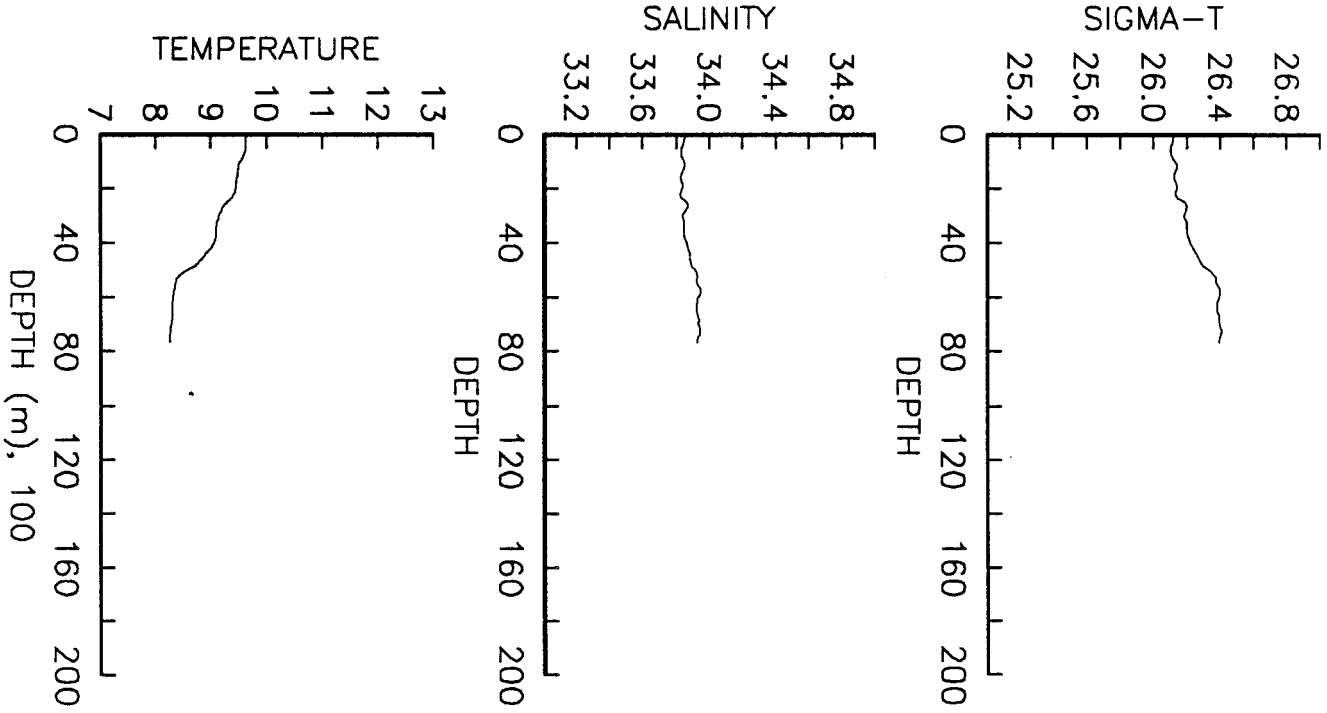
STN 8904.098 20 MAY 1989 1239 PDT
38°15.0'N 123° 2.3'W DEPTH 51 m



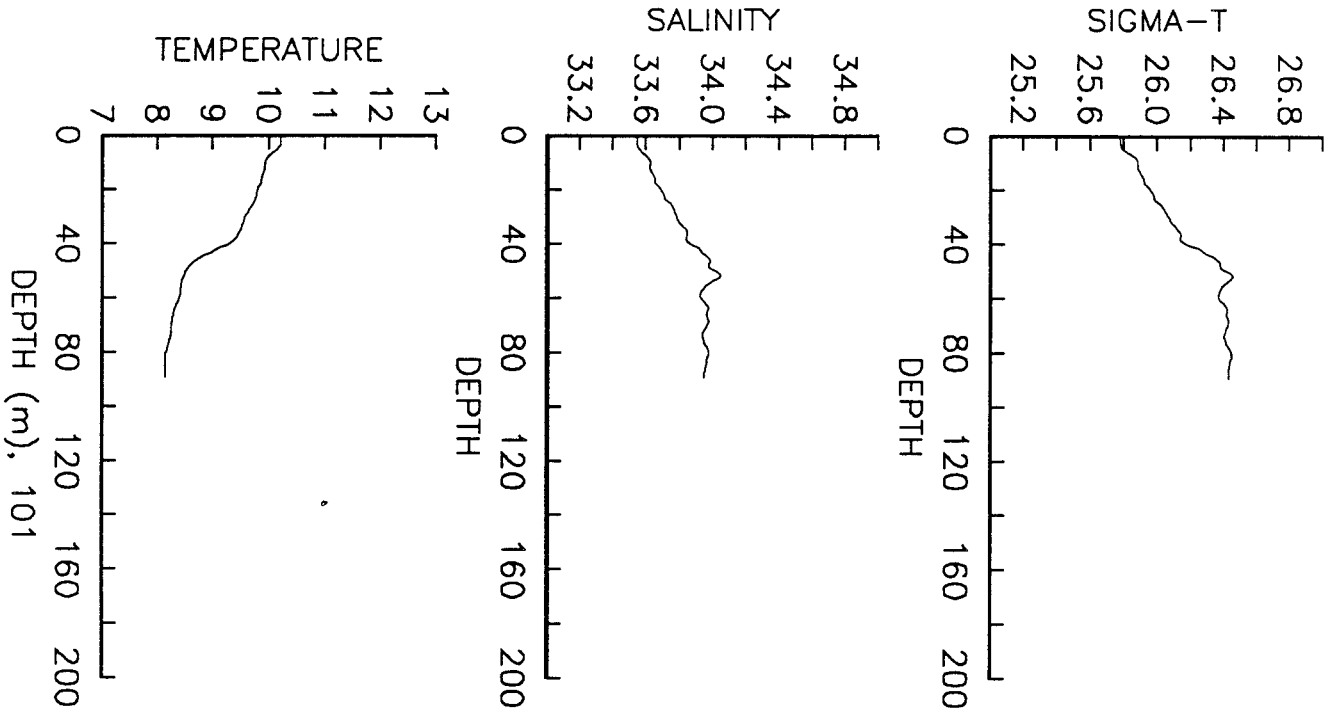
STN 8904.099 20 MAY 1989 1344 PDT
38° 4.9'N 123° 2.5'W DEPTH 60 m



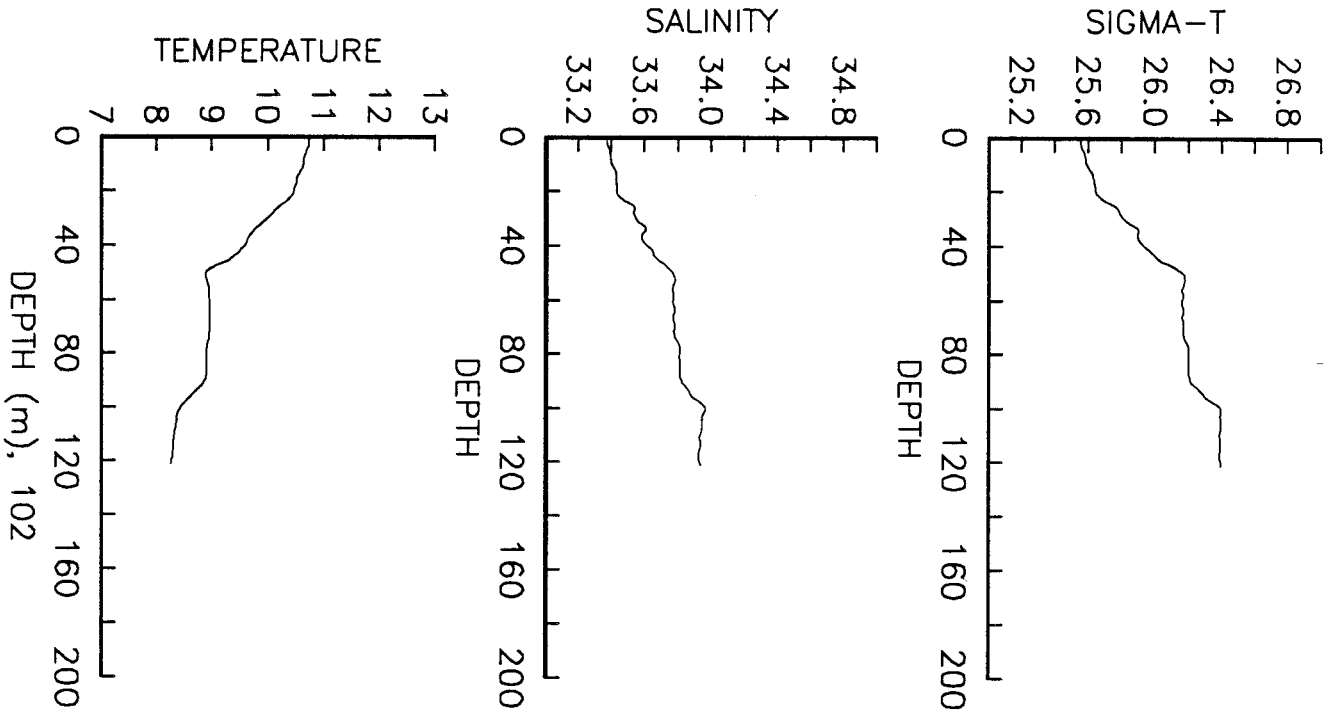
STN 8904.100 20 MAY 1989 1424 PDT
38° 5.0'N 123° 8.6'W DEPTH 86 m



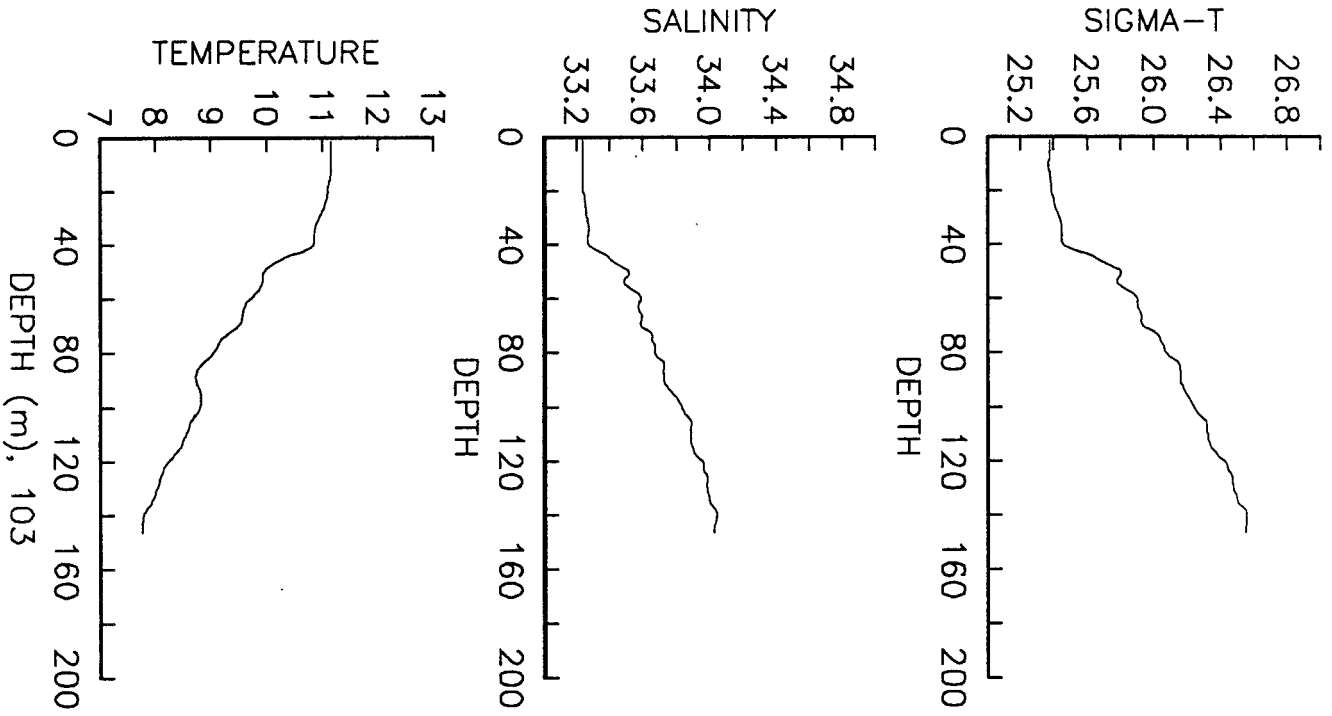
STN 8904.101 20 MAY 1989 1459 PDT
38° 4.9'N 123°13.6'W DEPTH 113 m



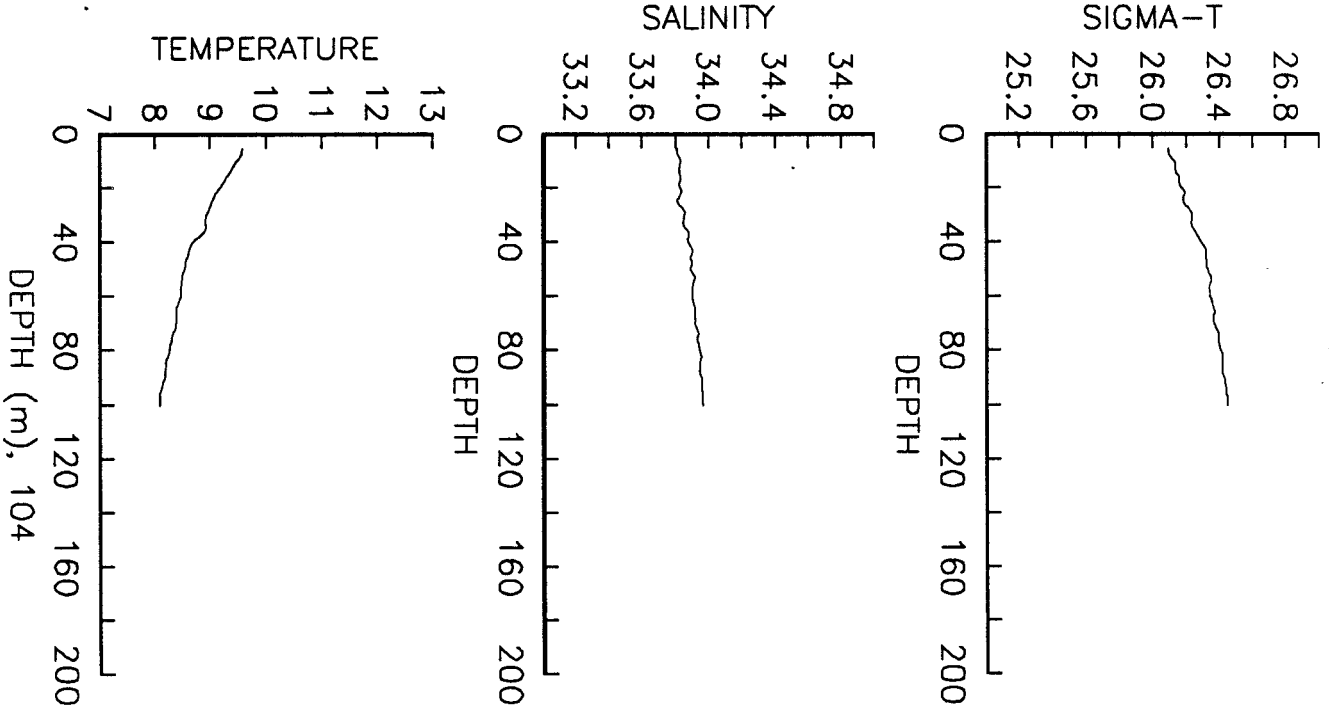
STN 8904.102 20 MAY 1989 1534 PDT
38° 5.0'N 123°18.5'W DEPTH 137 m



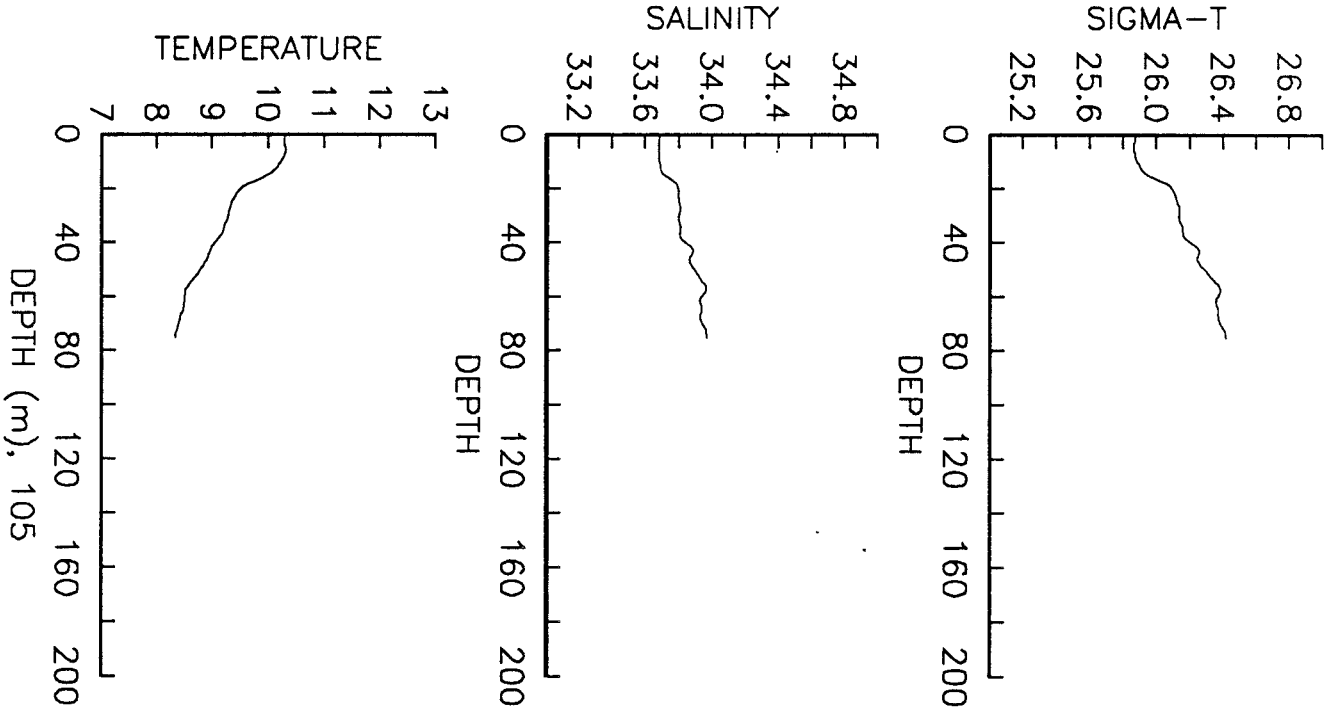
STN 8904.103 20 MAY 1989 1613 PDT
38° 5.0'N 123°23.5'W DEPTH 159 m



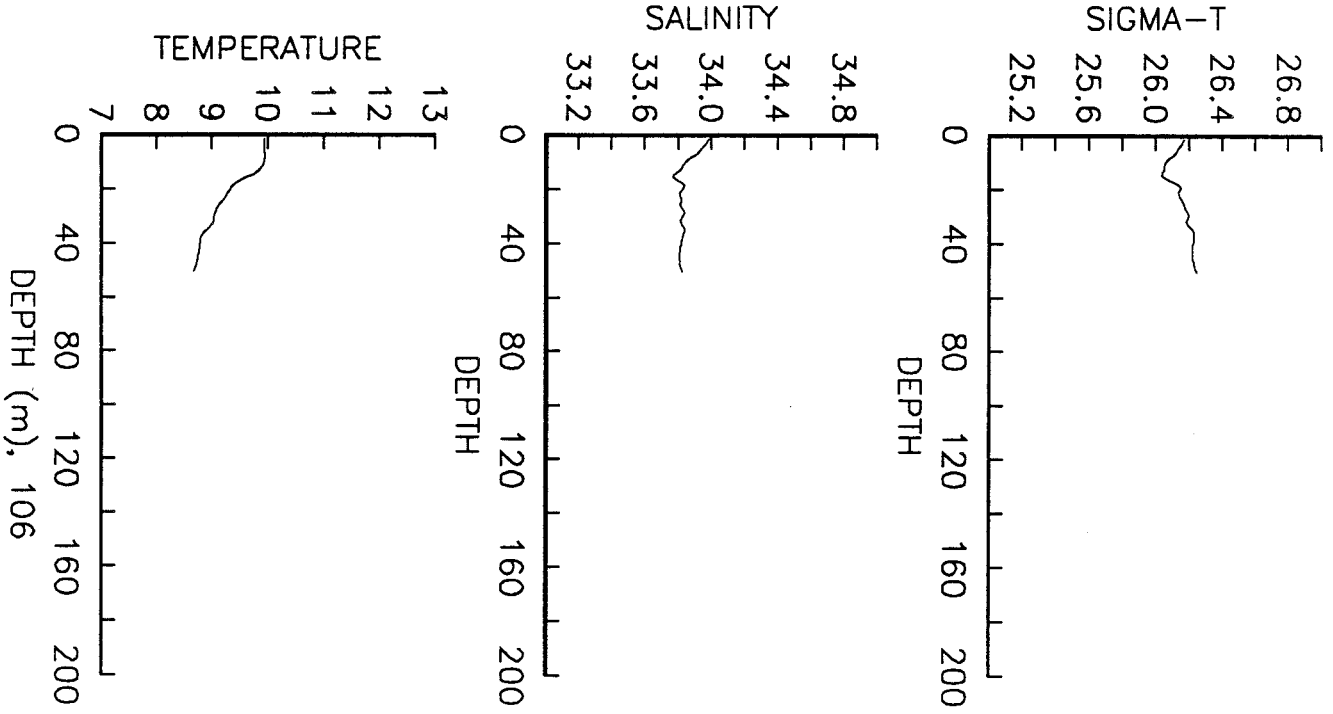
STN 8904.104 20 MAY 1989 1805 PDT
38° 0.0'N 123°13.6'W DEPTH 110 m



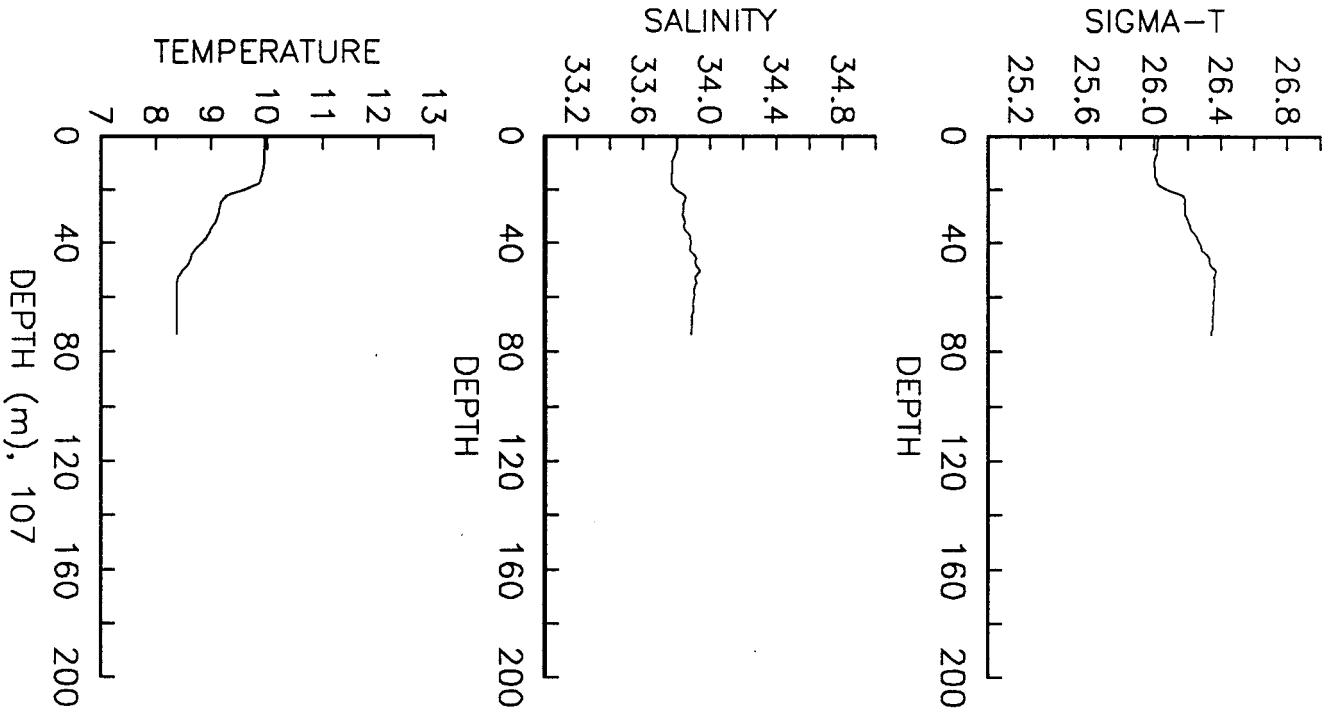
STN 8904.105 20 MAY 1989 1839 PDT
38° 0.0'N 123° 8.6'W DEPTH 88 m



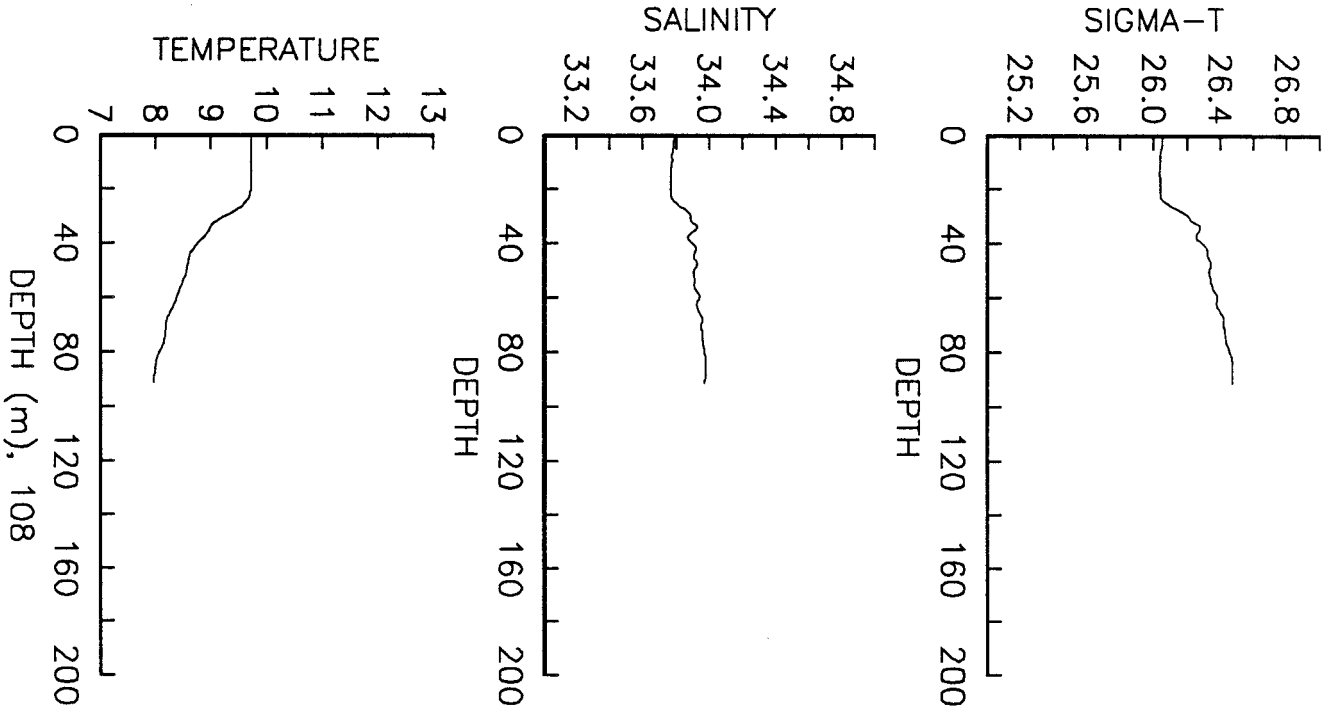
STN 8904.106 20 MAY 1989 2047 PDT
38°10.0'N 123° 0.0'W DEPTH 53 m



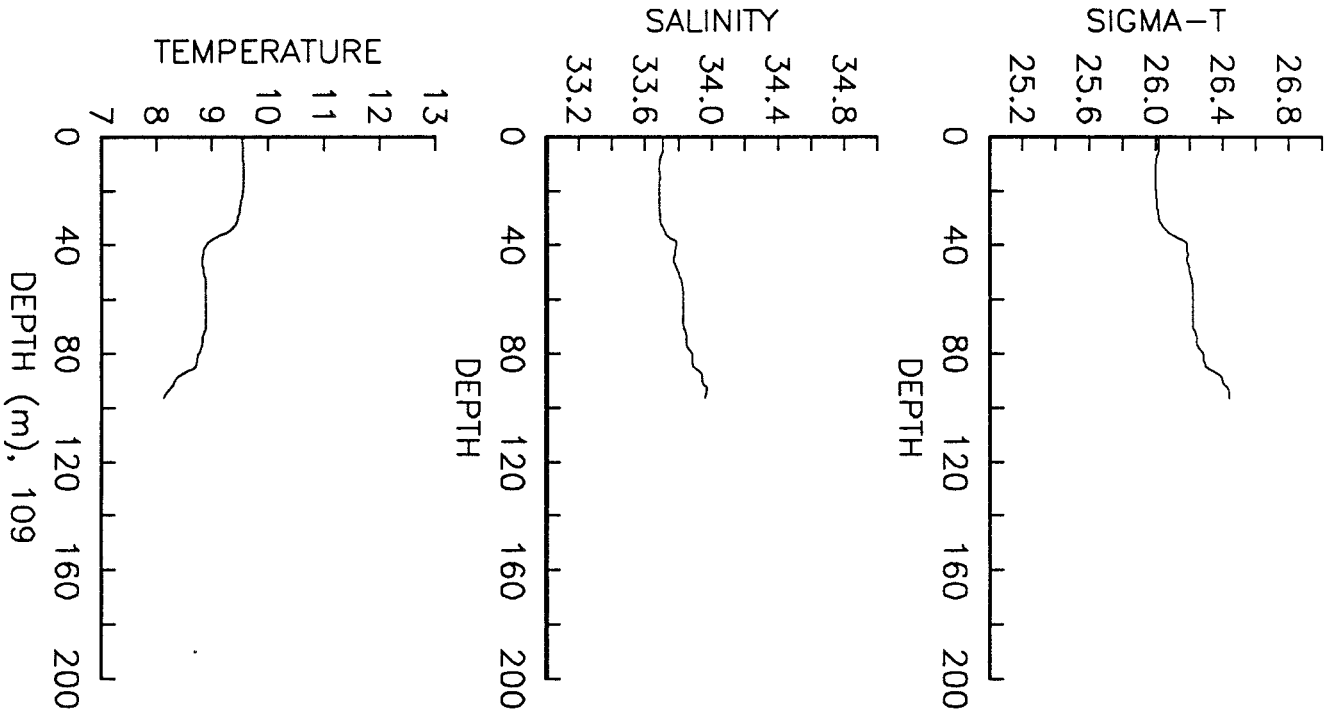
STN 8904.107 20 MAY 1989 2317 PDT
38° 9.6'N 123° 5.4'W DEPTH 79 m



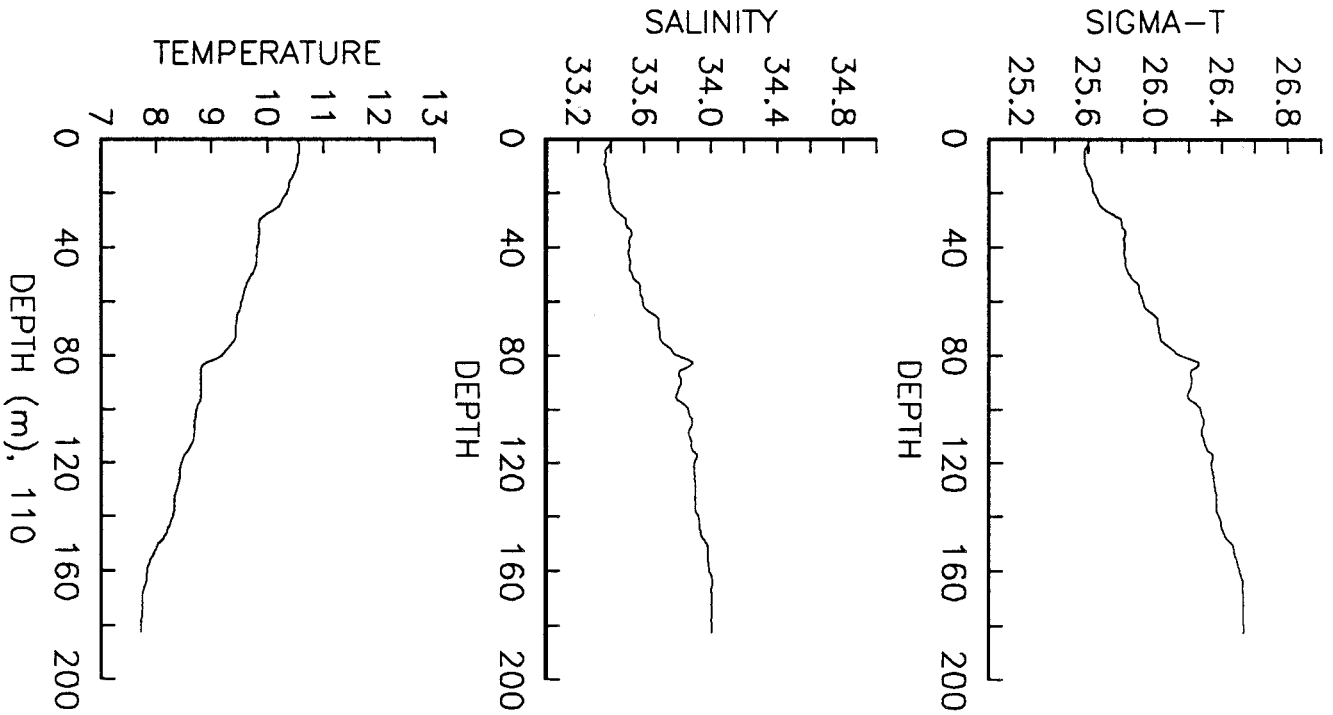
STN 8904.108 20 MAY 1989 2350 PDT
38°10.0'N 123°10.0'W DEPTH 93 m



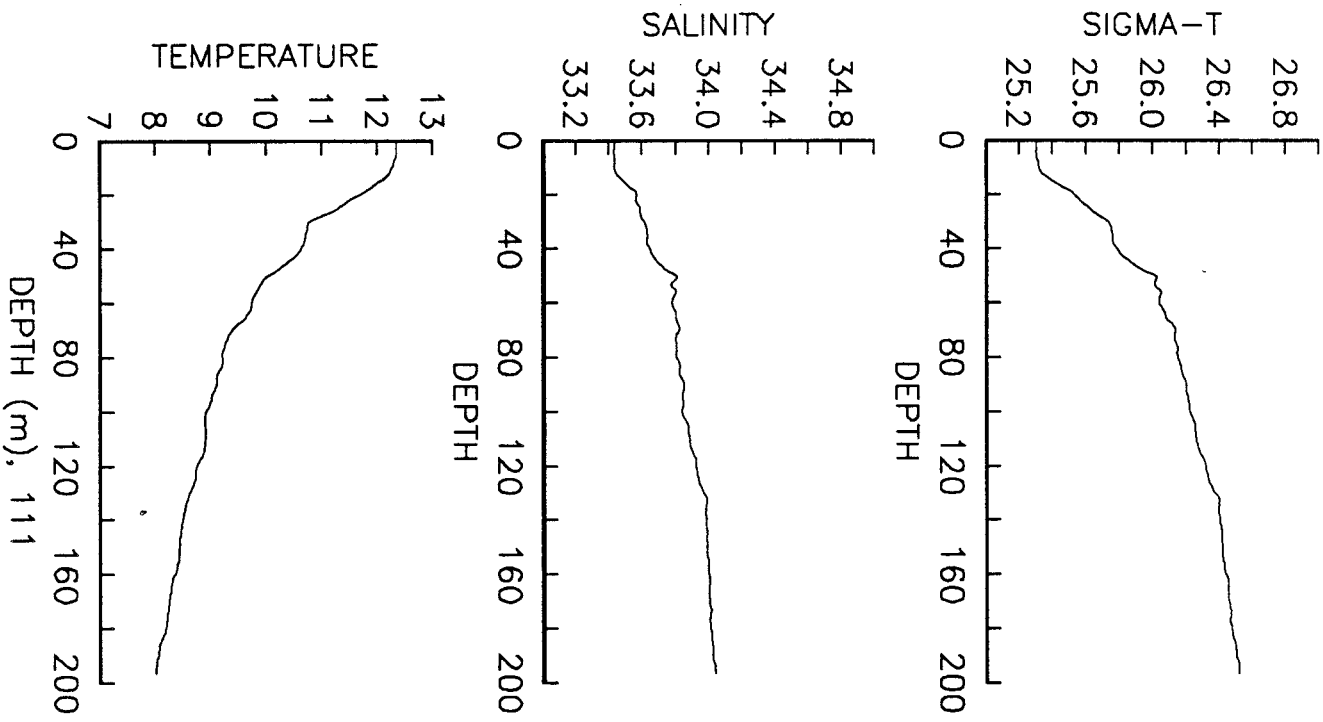
STN 8904.109 21 MAY 1989 0150 PDT
38° 9.1'N 123°15.1'W DEPTH 117 m



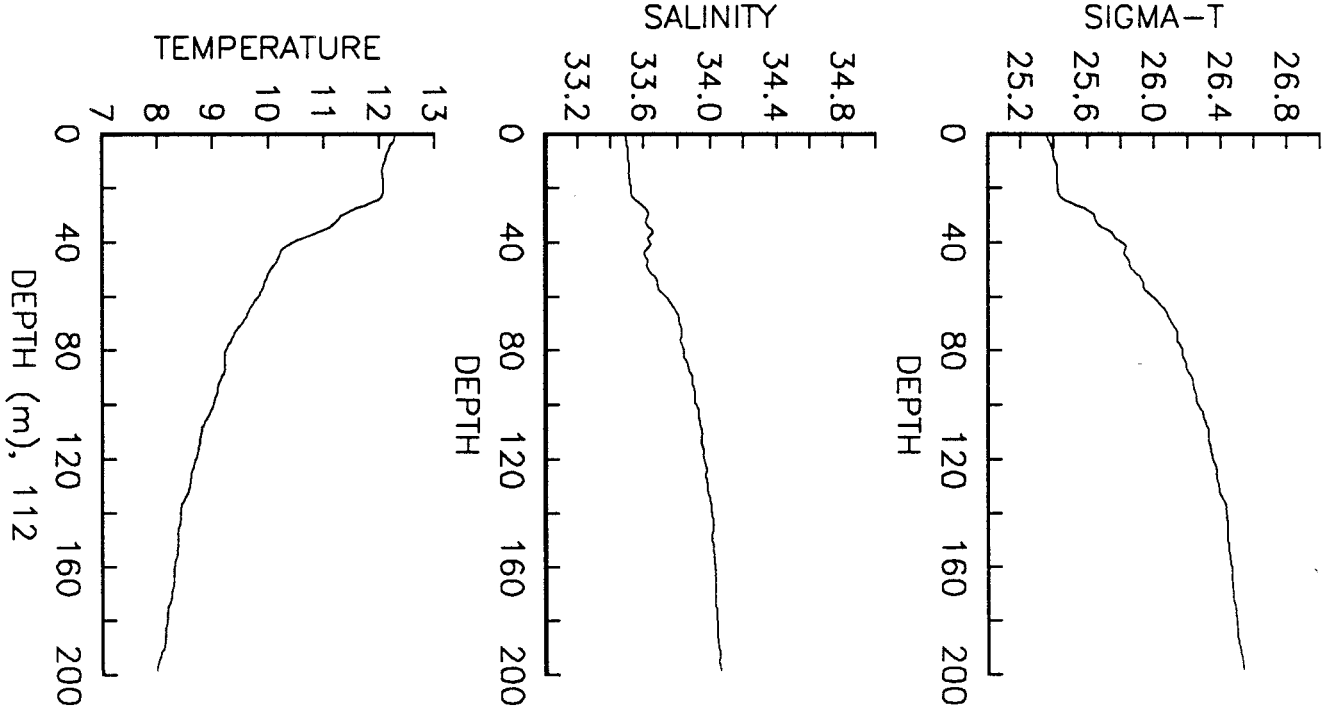
STN 8904.110 21 MAY 1989 0500 PDT
38° 9.8'N 123°22.0'W DEPTH 187 m



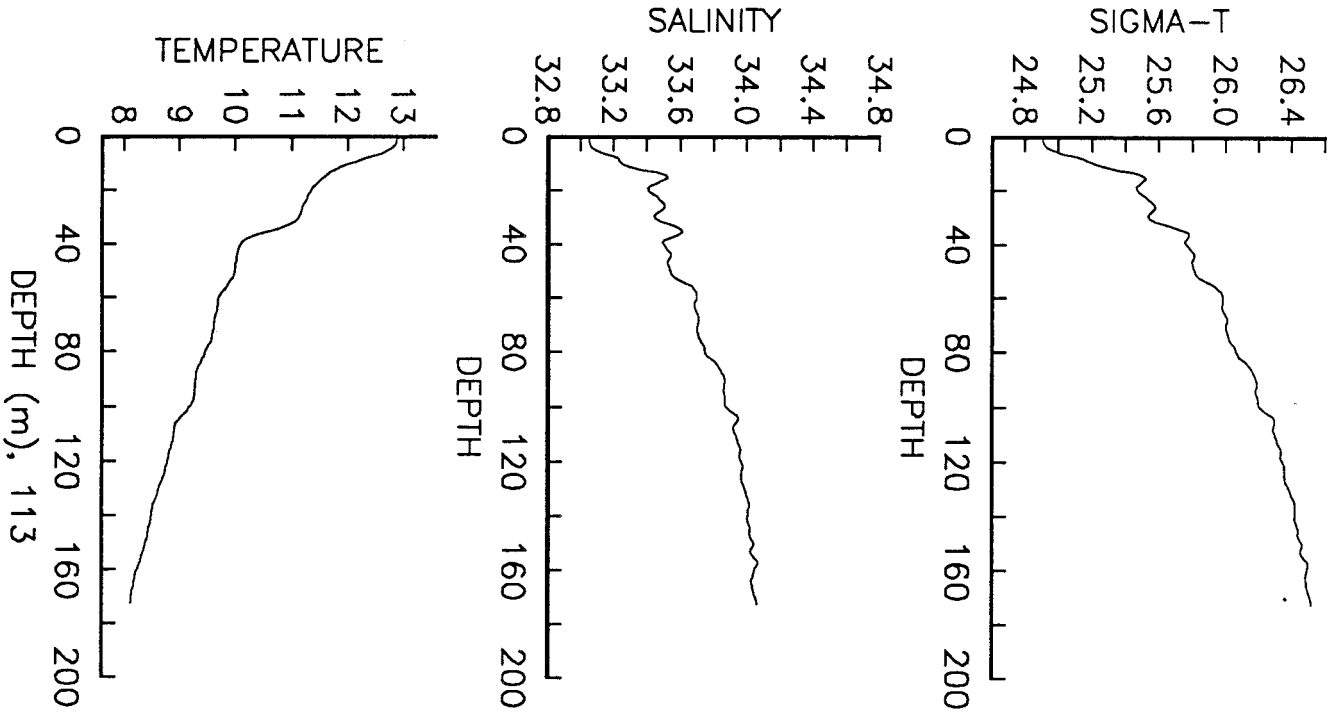
STN 8904.111 21 MAY 1989 1220 PDT
36°59.9'N 123° 0.0'W DEPTH 2286 m



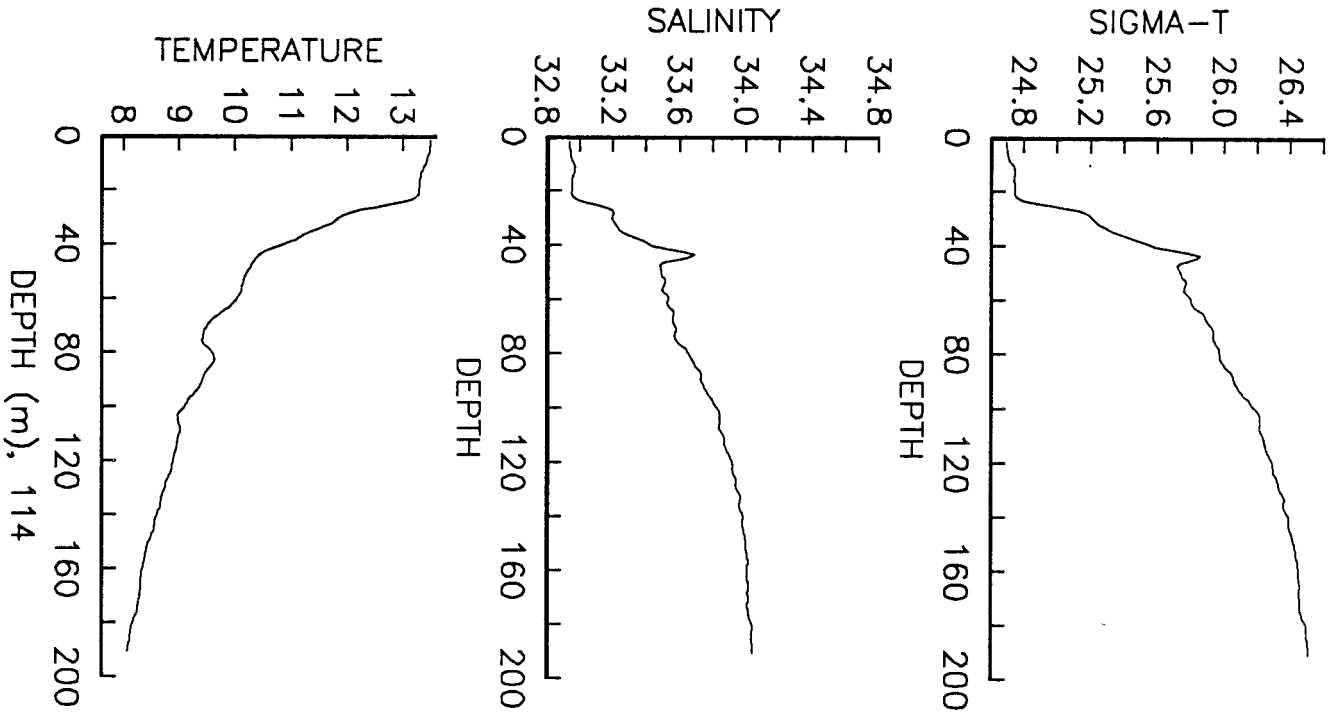
STN 8904.112 21 MAY 1989 1304 PDT
37° 0.0'N 123° 6.3'W DEPTH 2515 m



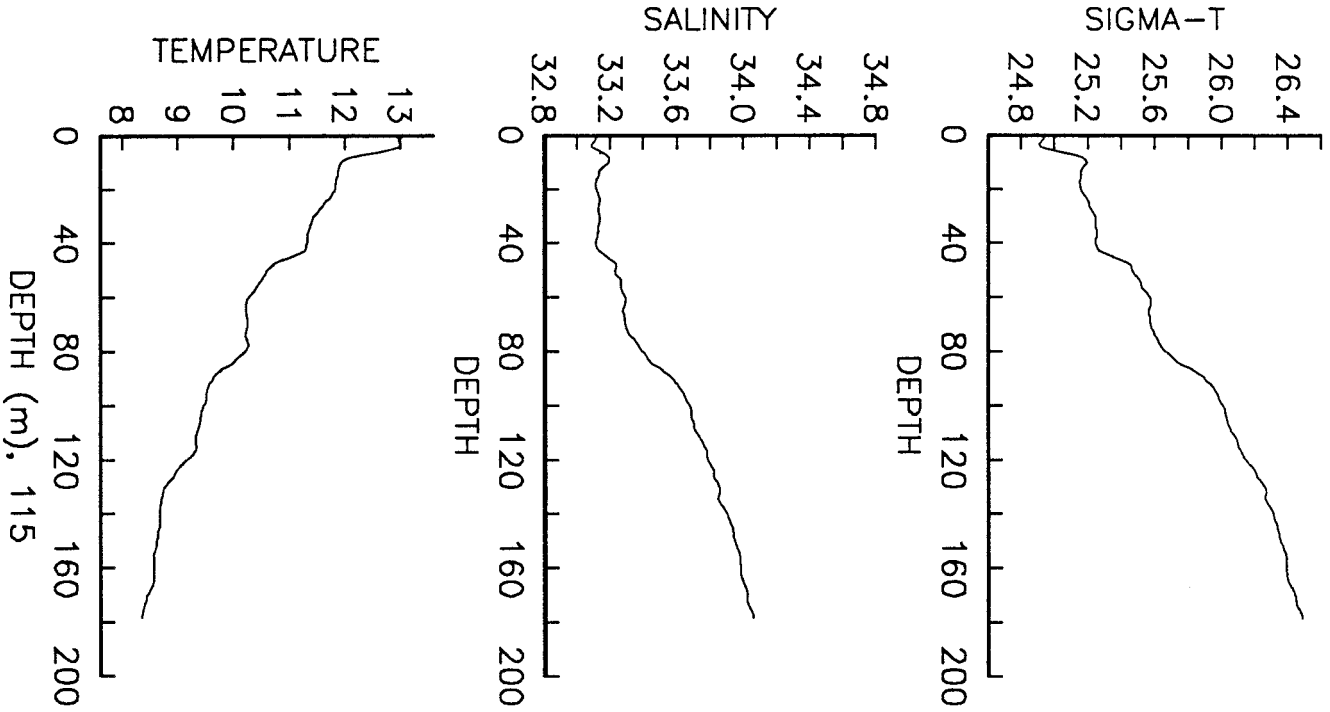
STN 8904.113 21 MAY 1989 1347 PDT
36°59.9'N 123°12.4'W DEPTH 2606 m



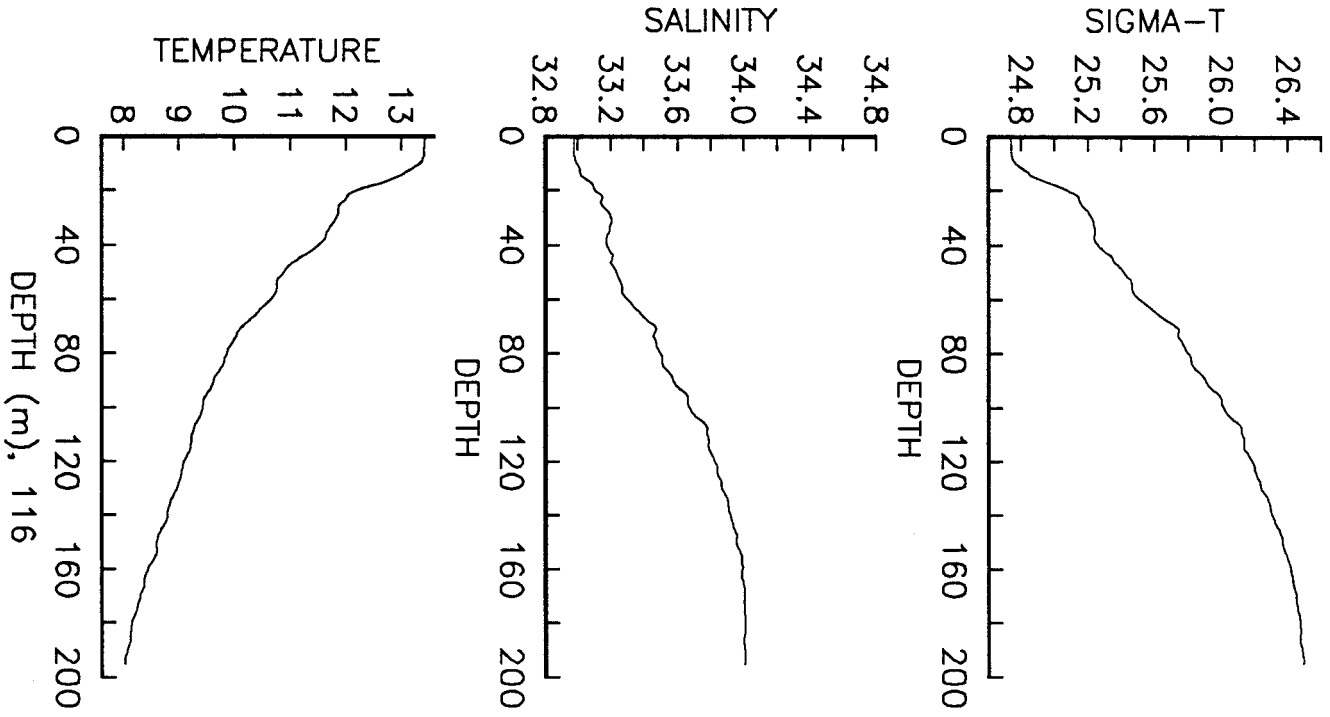
STN 8904.114 21 MAY 1989 1435 PDT
37° 0.0'N 123°18.6'W DEPTH 2505 m



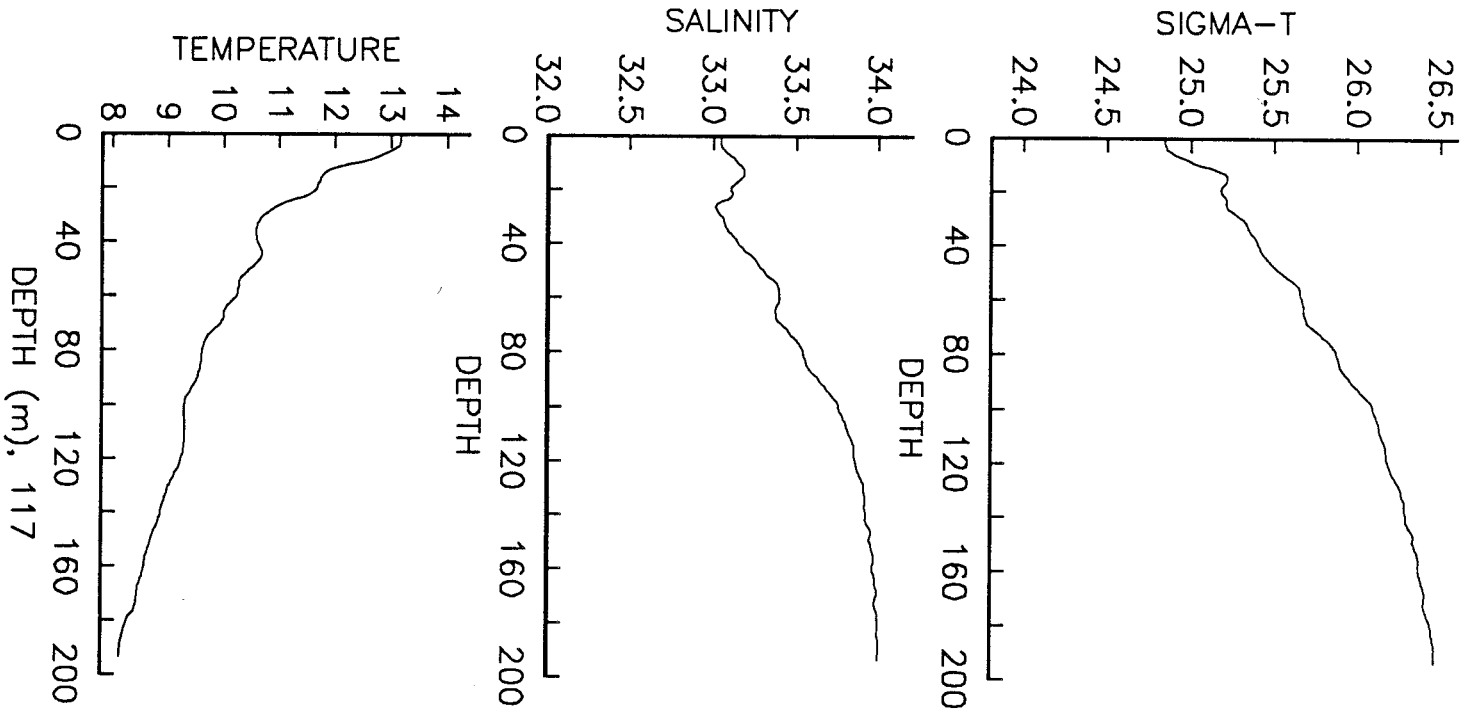
STN 8904.115 21 MAY 1989 1518 PDT
37° 0.0'N 123°24.8'W DEPTH 2761 m



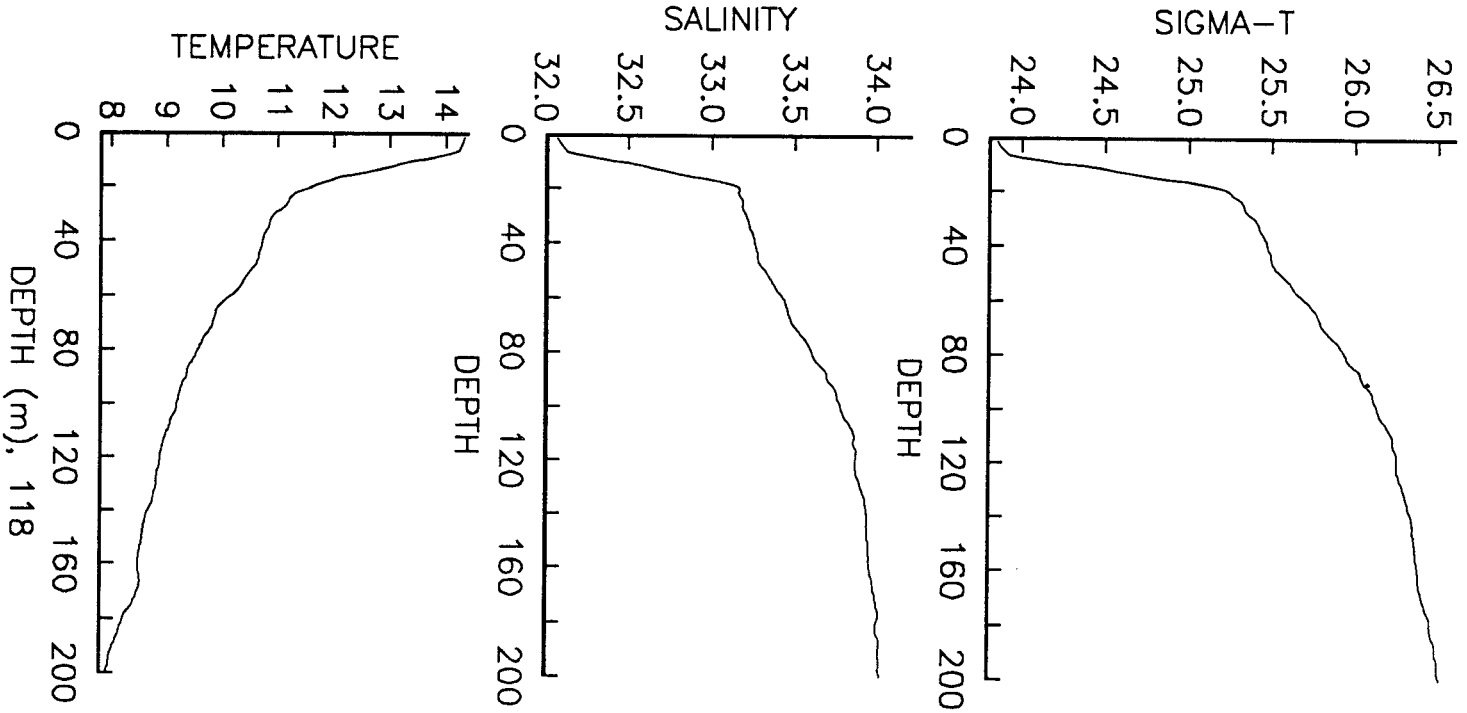
STN 8904.116 21 MAY 1989 1603 PDT
37° 0.0'N 123°31.0'W DEPTH 3475 m



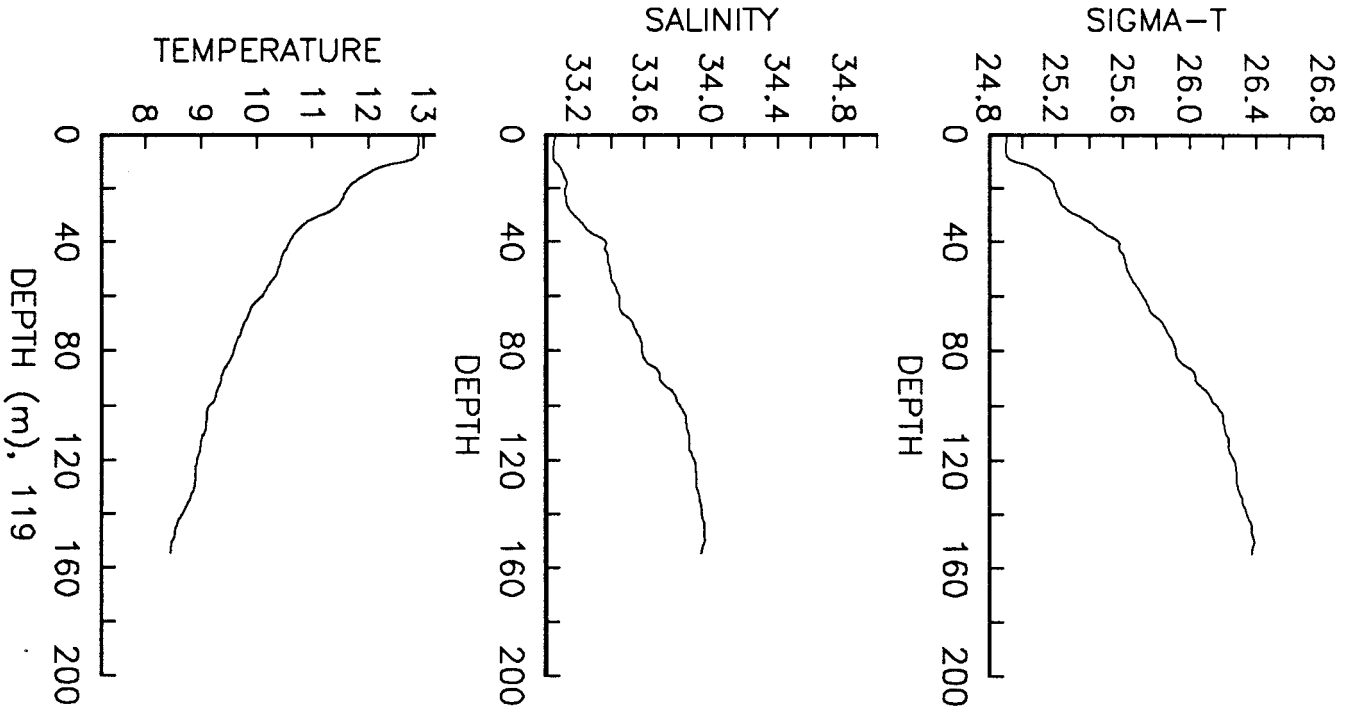
STN 8904.117 21 MAY 1989 1647 PDT
37° 0.0'N 123°37.2'W DEPTH 3530 m



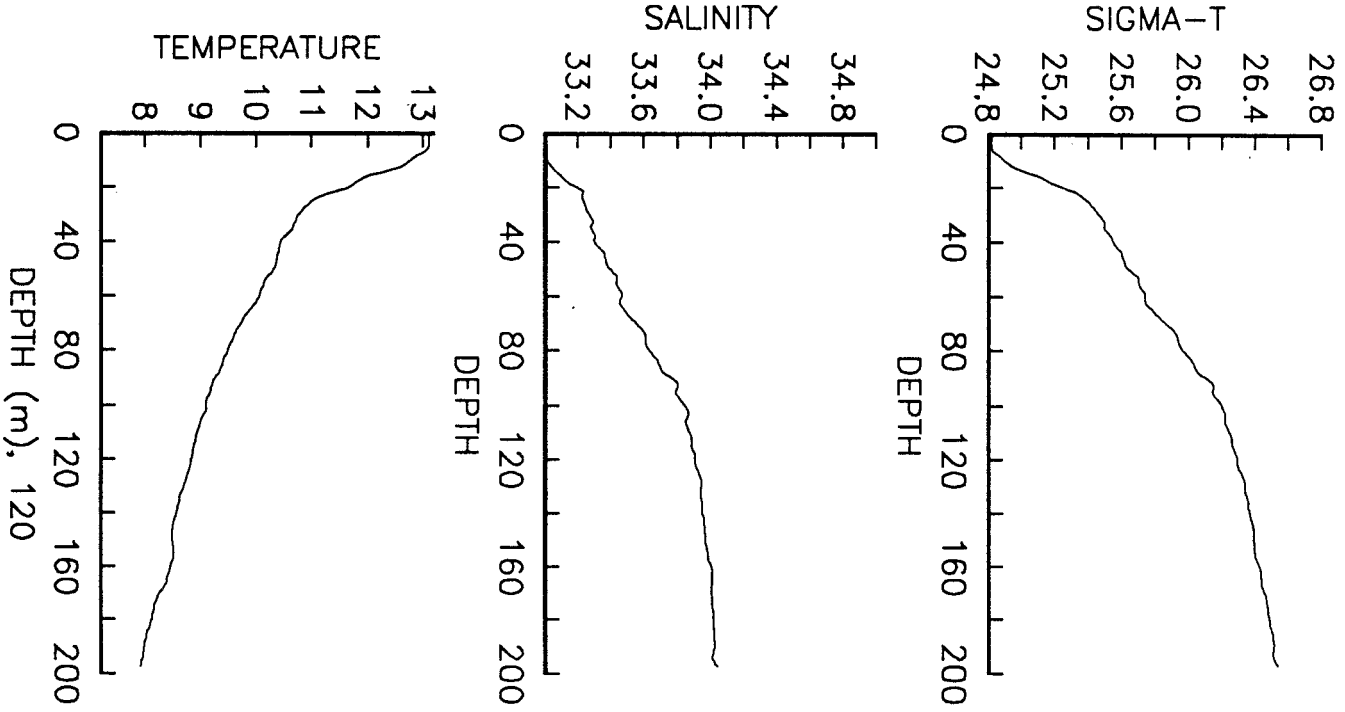
STN 8904.118 21 MAY 1989 2100 PDT
37° 0.0'N 123°31.0'W DEPTH 3475 m



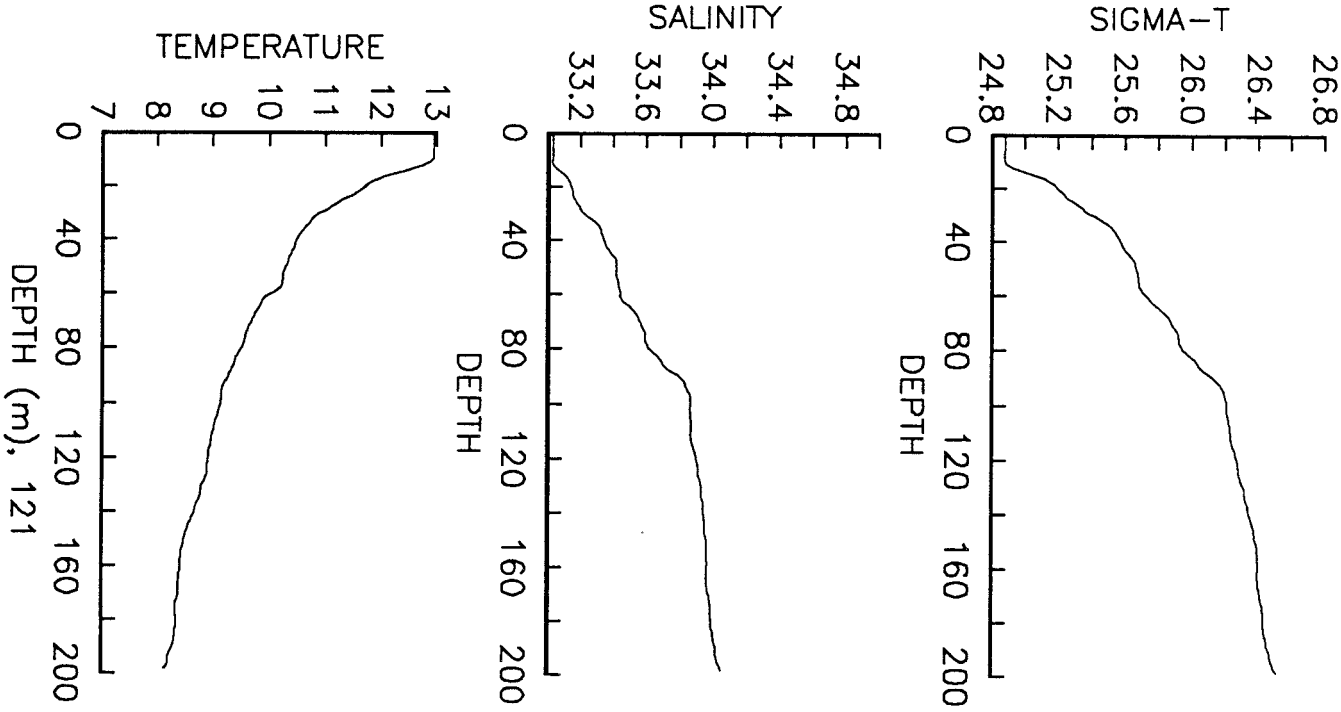
STN 8904.119 21 MAY 1989 2140 PDT
37° 0.5'N 123°32.1'W DEPTH 3475 m



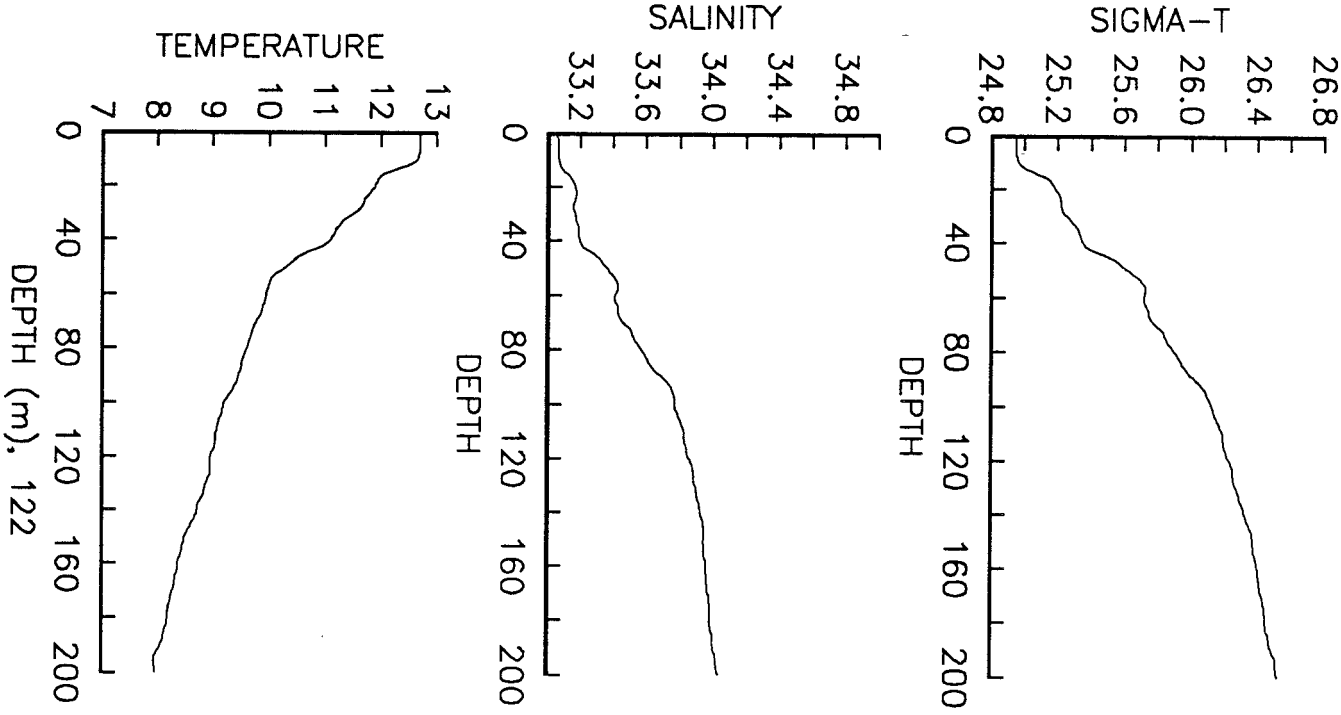
STN 8904.120 21 MAY 1989 2205 PDT
37° 0.6'N 123°31.0'W DEPTH 3475 m



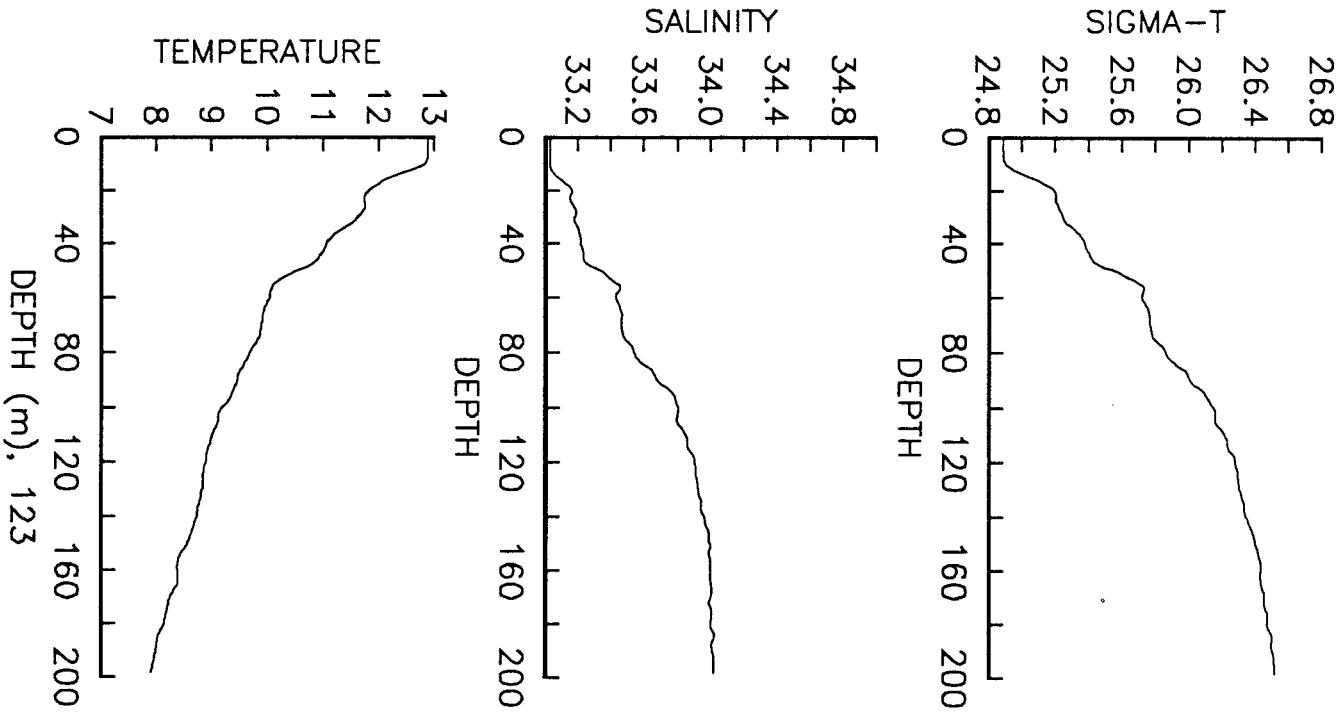
STN 8904.121 21 MAY 1989 2256 PDT
37° 0.3'N 123°32.1'W DEPTH 3475 m



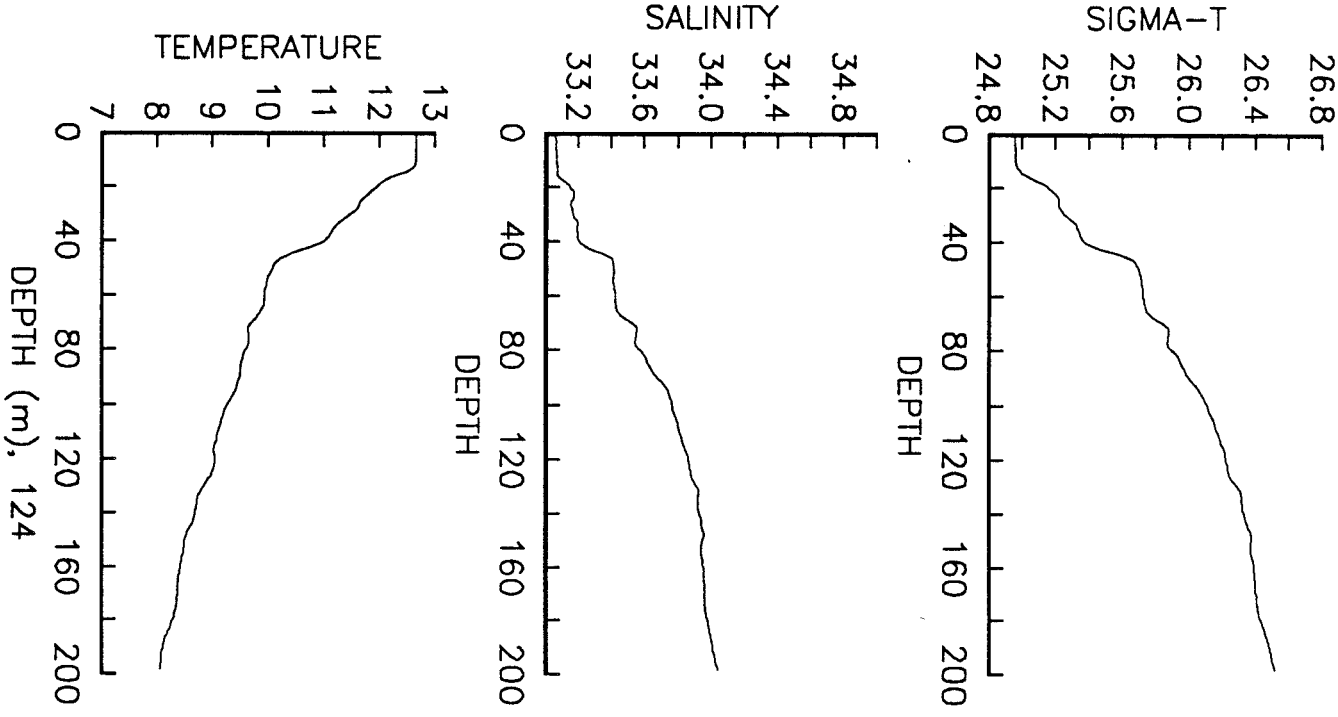
STN 8904.122 21 MAY 1989 2346 PDT
37° 0.1'N 123°25.9'W DEPTH 3292 m



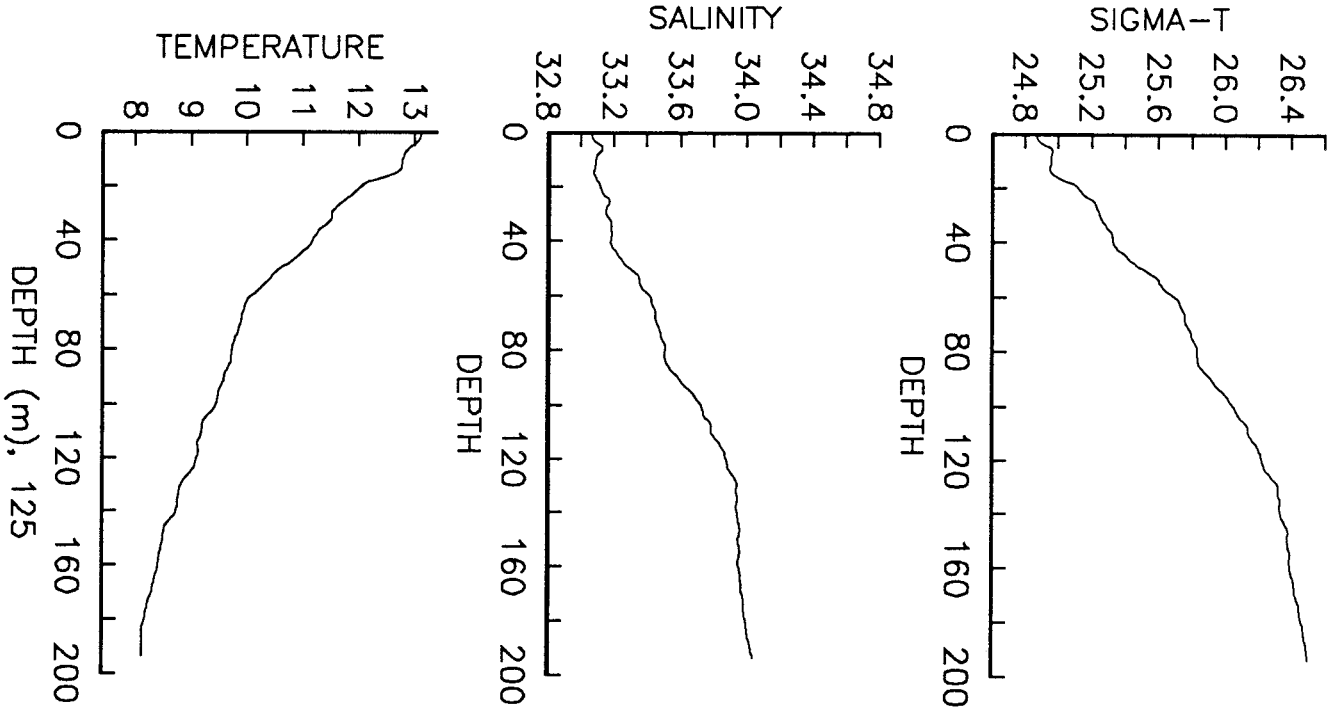
STN 8904.123 22 MAY 1989 0036 PDT
37° 0.9'N 123°27.0'W DEPTH 3292 m



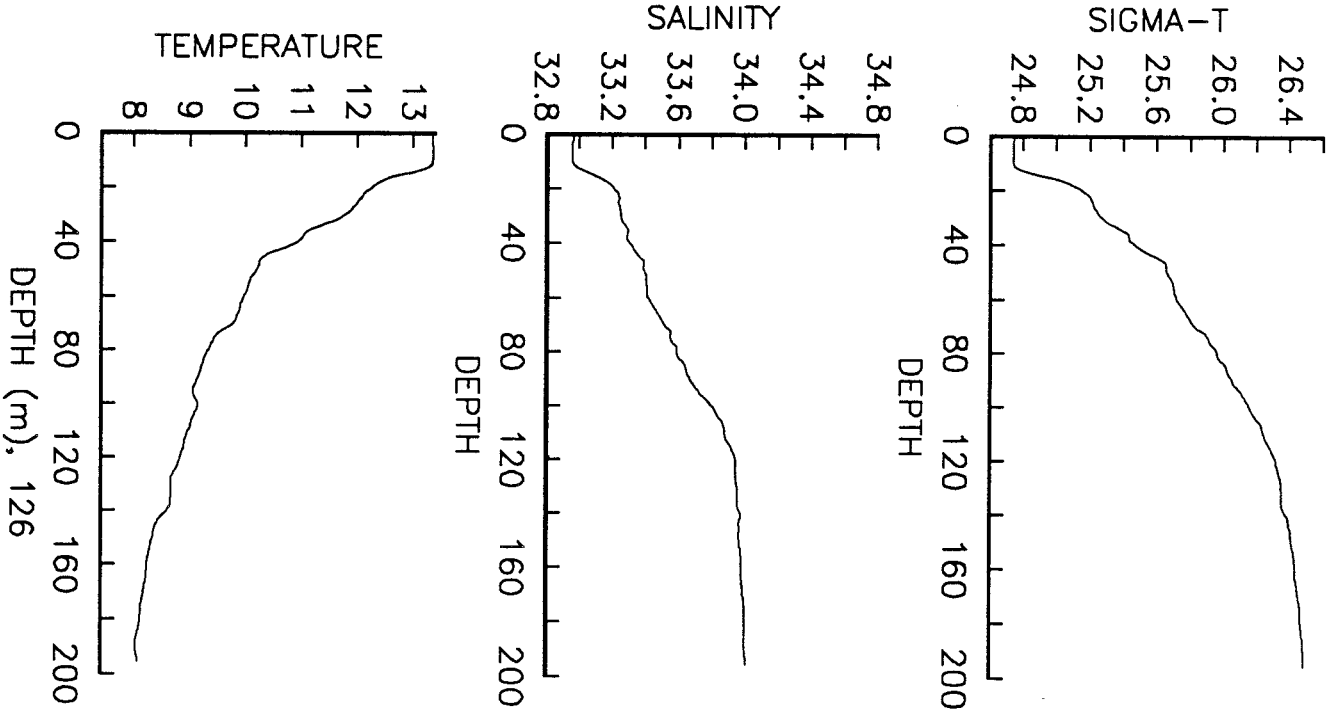
STN 8904.124 22 MAY 1989 0056 PDT
37° 0.7'N 123°25.8'W DEPTH 3292 m



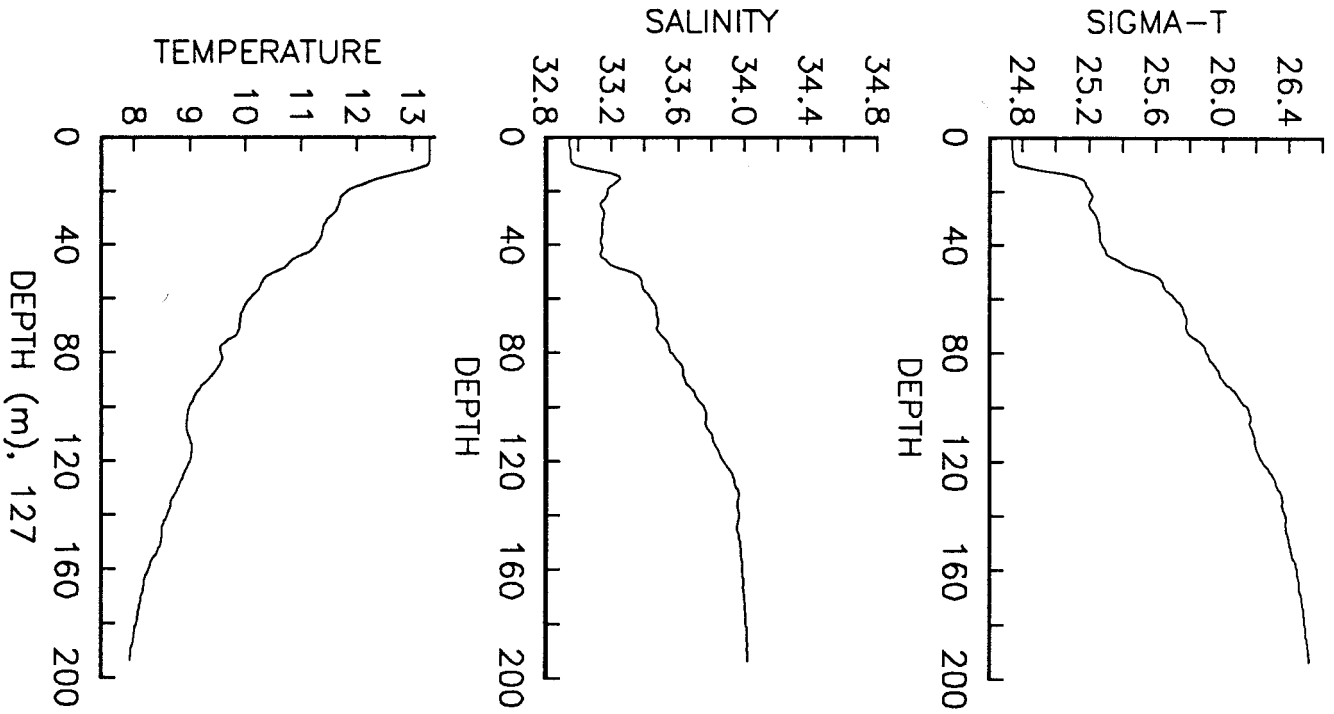
STN 8904.125 22 MAY 1989 0200 PDT
37° 1.2'N 123°25.8'W DEPTH 3292 m



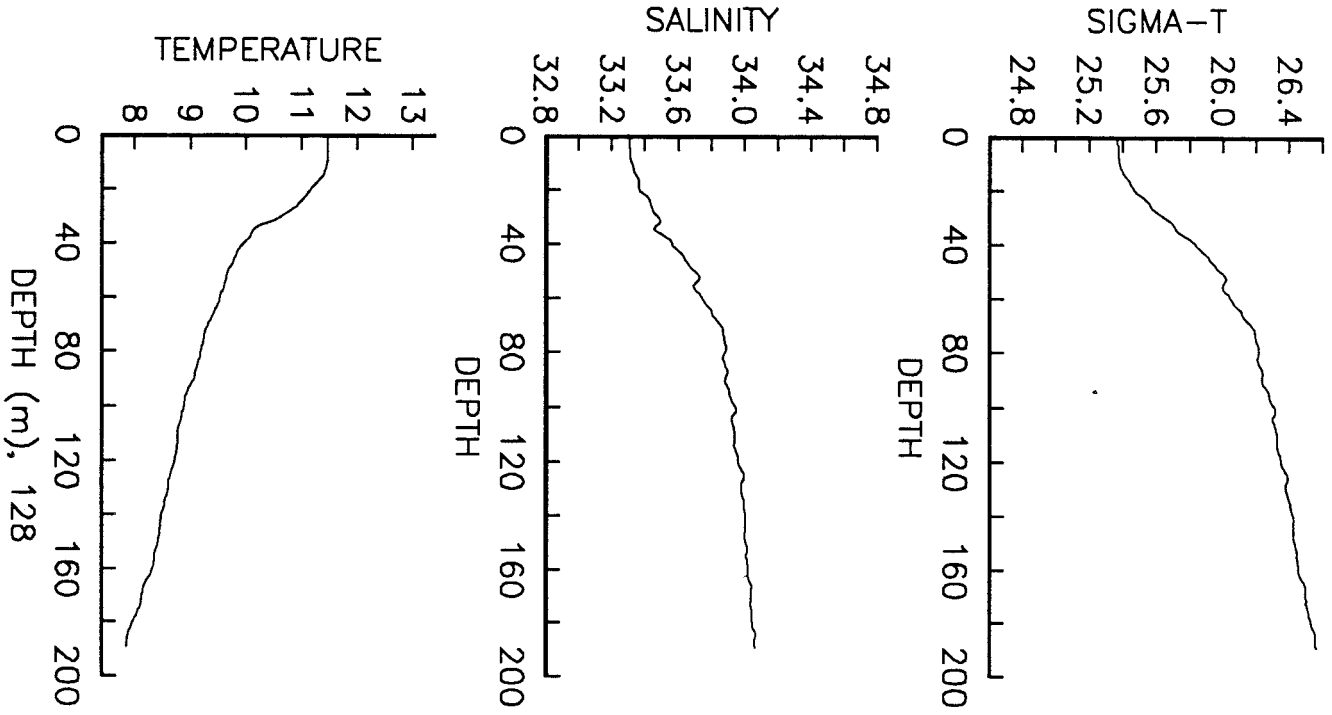
STN 8904.126 22 MAY 1989 0225 PDT
37° 1.0'N 123°21.4'W DEPTH 3383 m



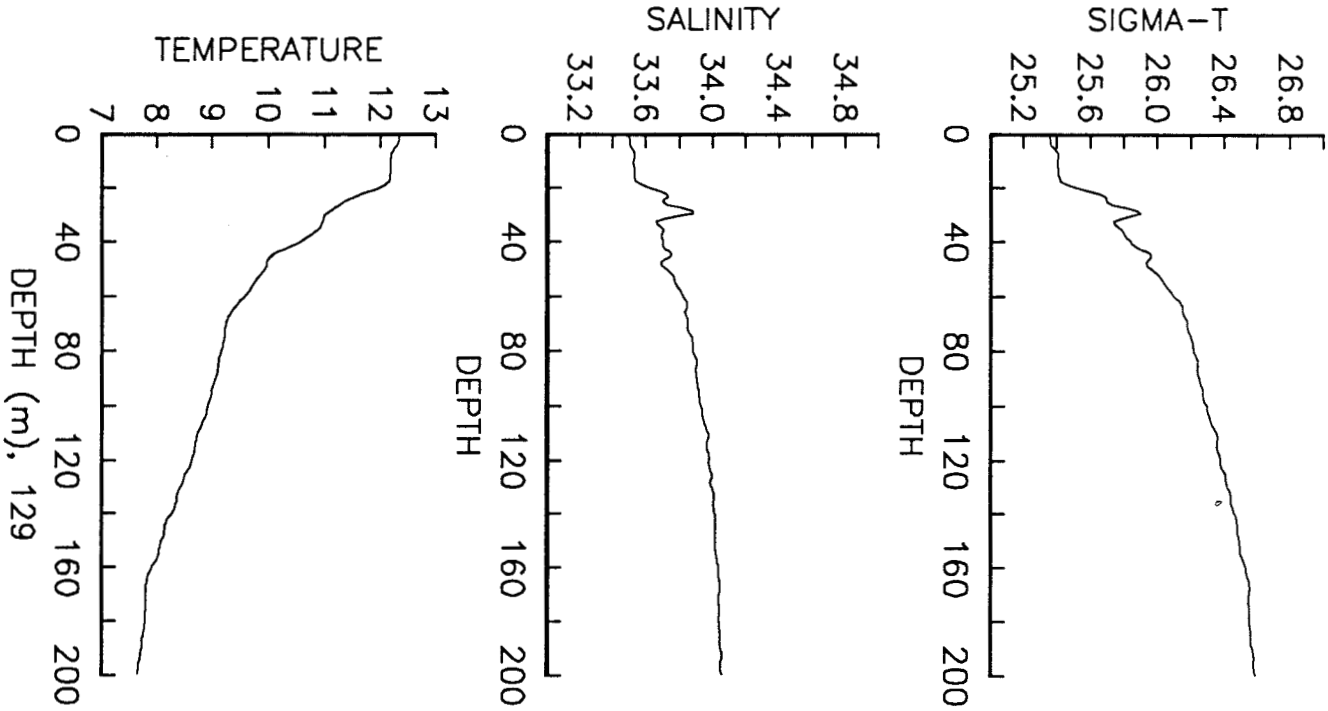
STN 8904.127 22 MAY 1989 0402 PDT
37° 1.7'N 123°22.2'W DEPTH 3383 m



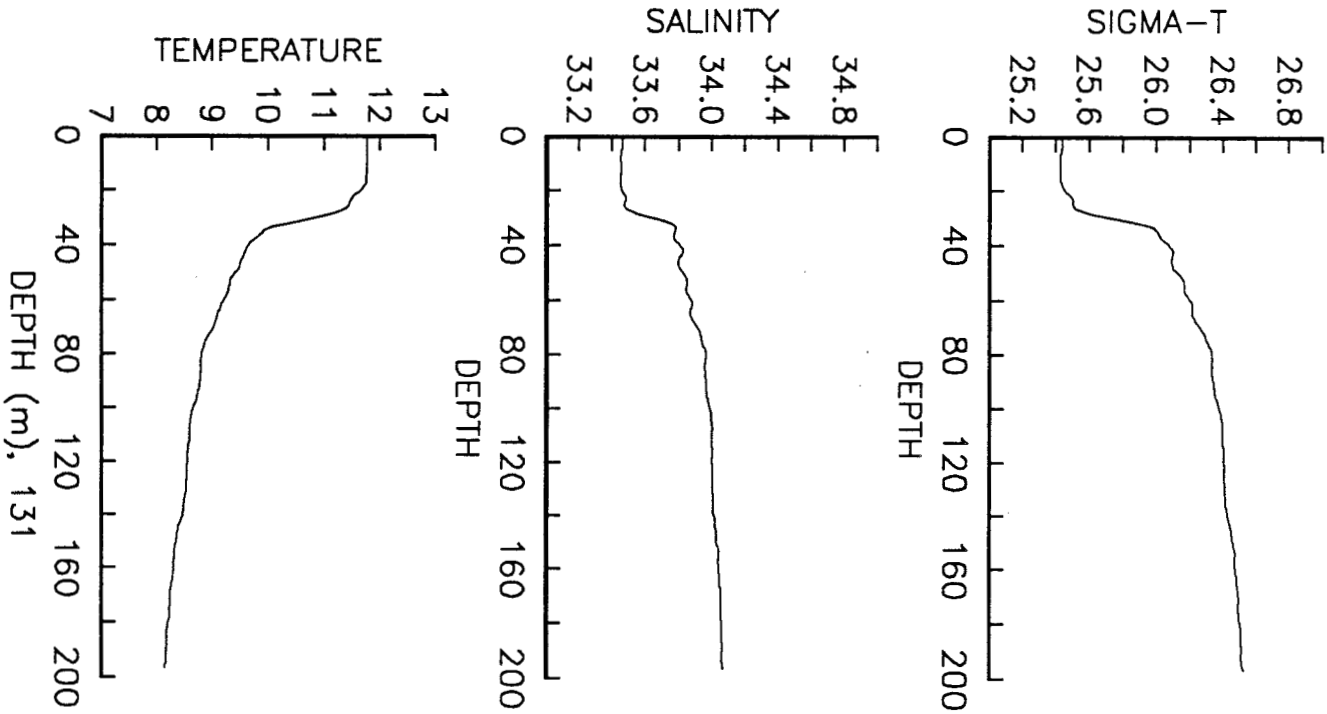
STN 8904.128 22 MAY 1989 0542 PDT
37° 0.0'N 123°12.1'W DEPTH 2652 m



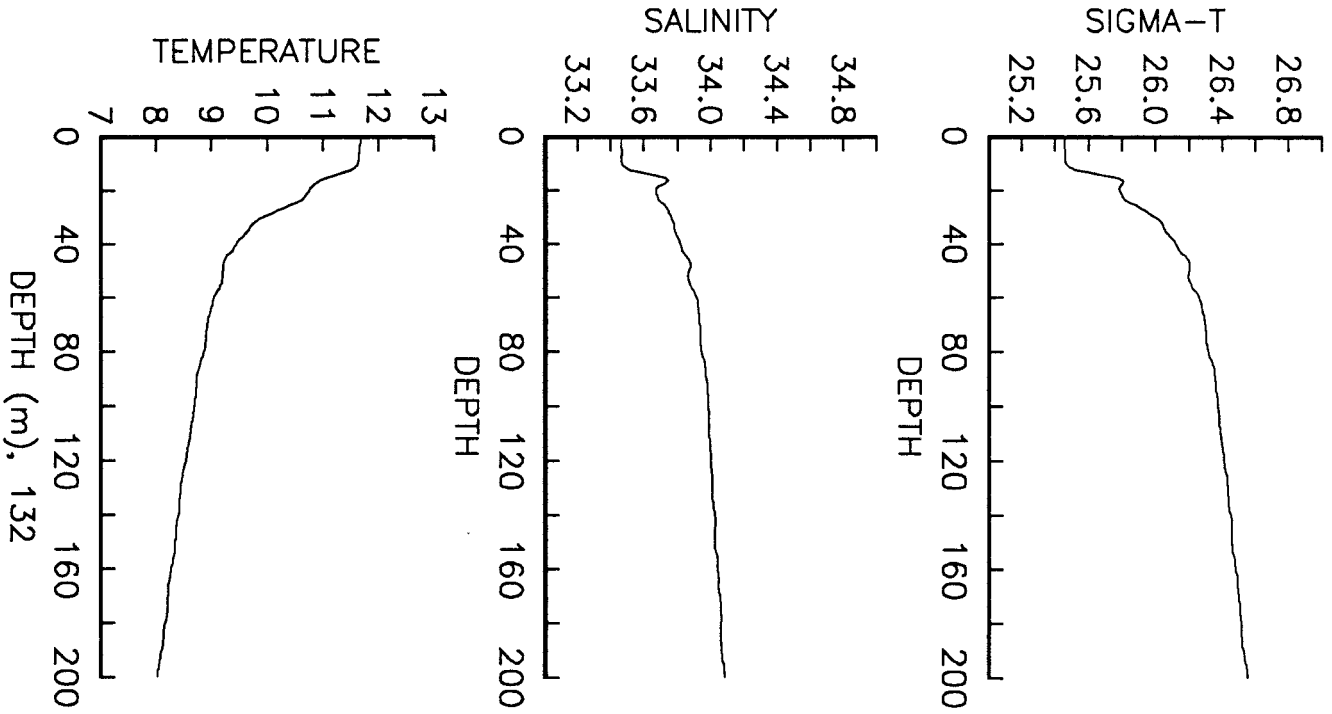
STN 8904.129 22 MAY 1989 0618 PDT
37° 0.0'N 123° 7.0'W DEPTH 2524 m



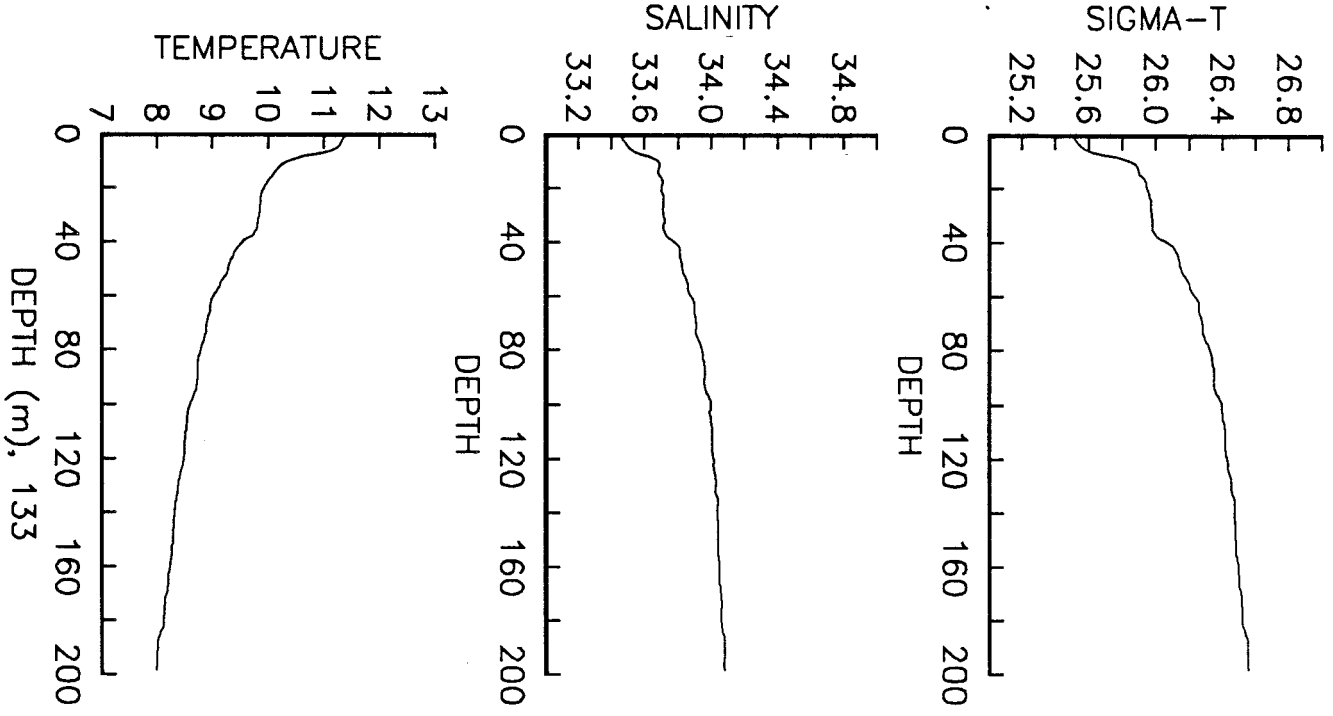
STN 8904.131 22 MAY 1989 0746 PDT
37° 0.0'N 122°53.7'W DEPTH 1445 m



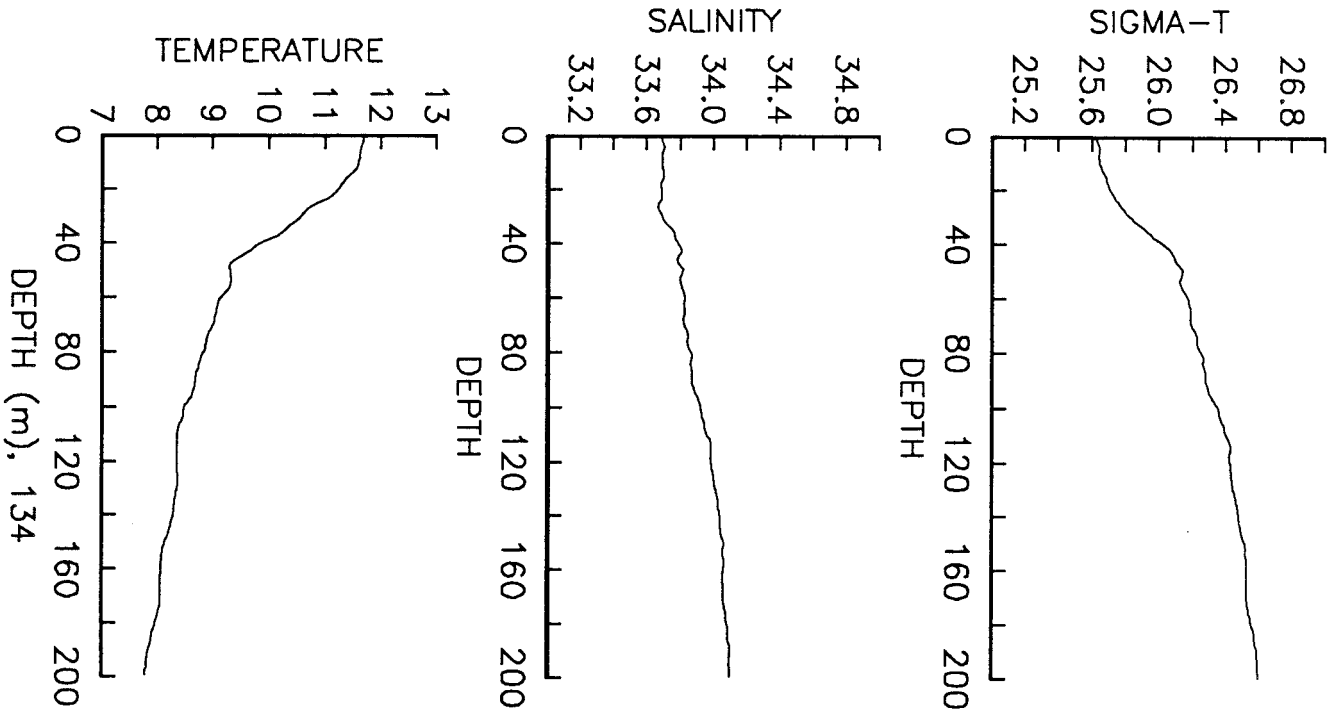
STN 8904.132 22 MAY 1989 0834 PDT
37° 0.0'N 122°46.7'W DEPTH 1042 m



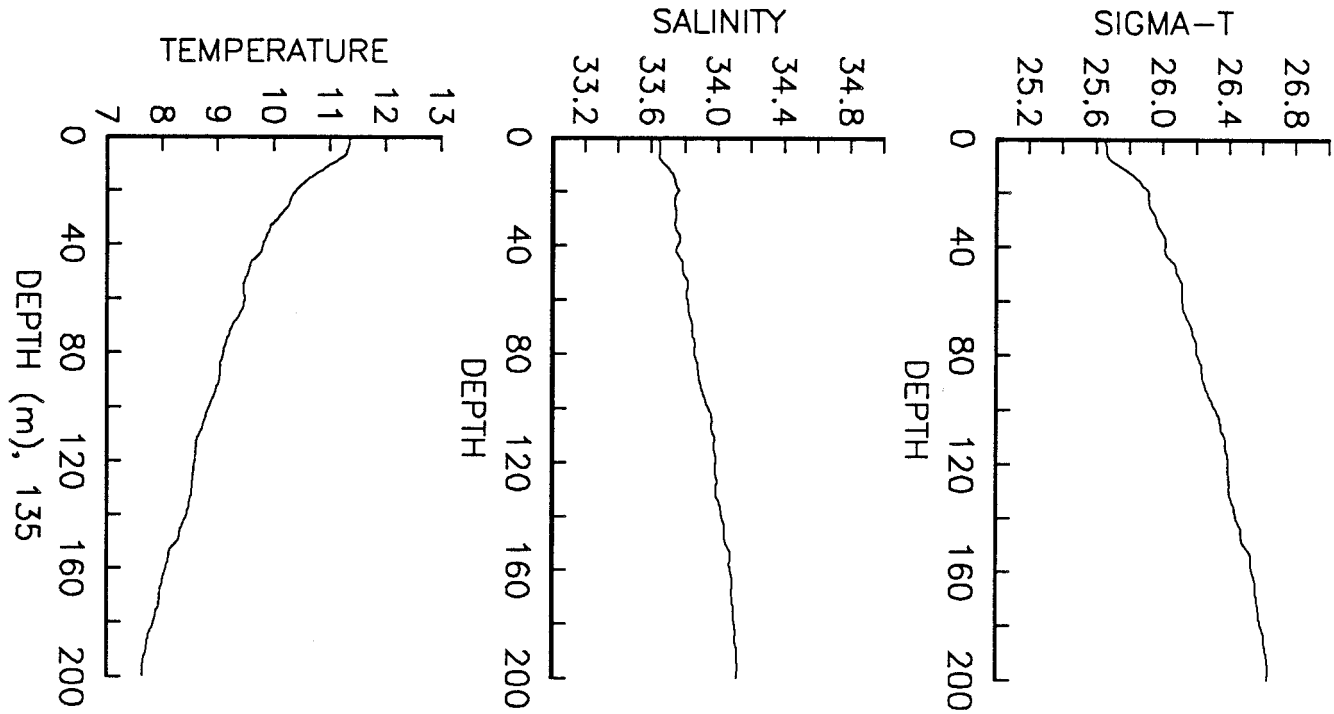
STN 8904.133 22 MAY 1989 0919 PDT
37° 0.0'N 122°40.0'W DEPTH 494 m



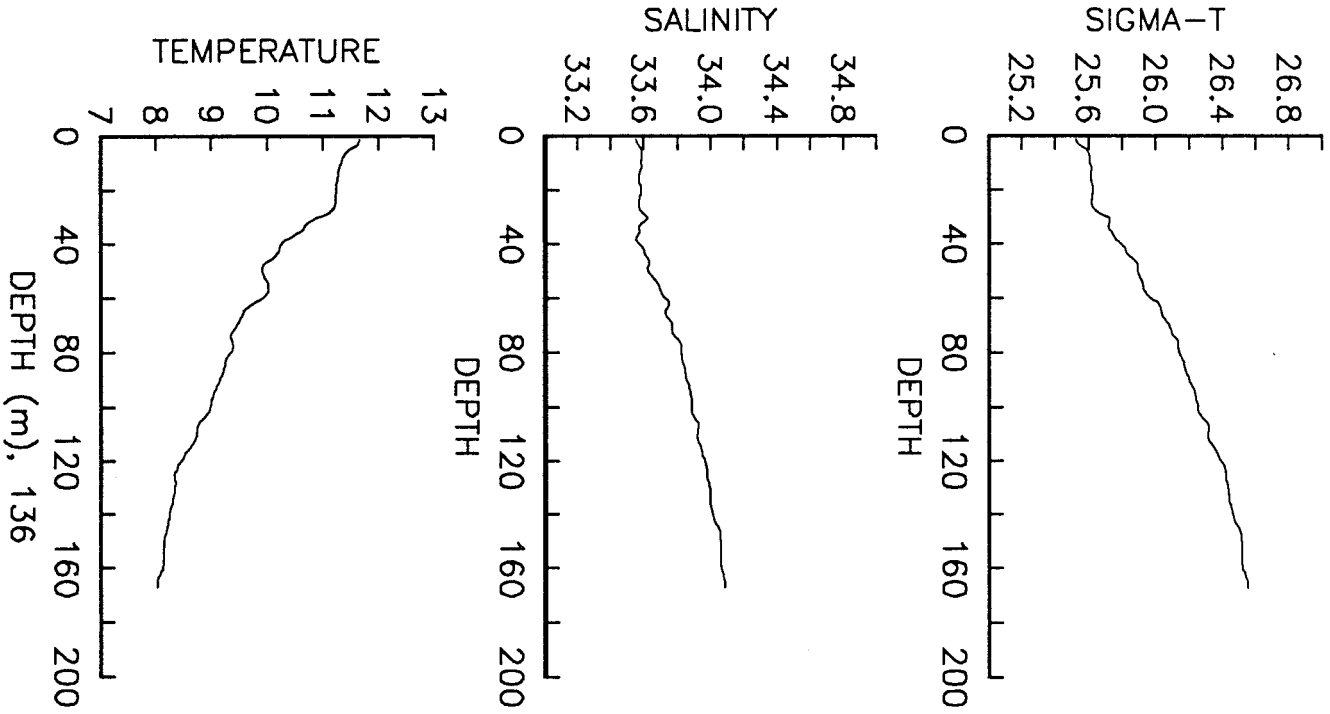
STN 8904.134 22 MAY 1989 1033 PDT
36°50.6'N 122°40.0'W DEPTH 2195 m



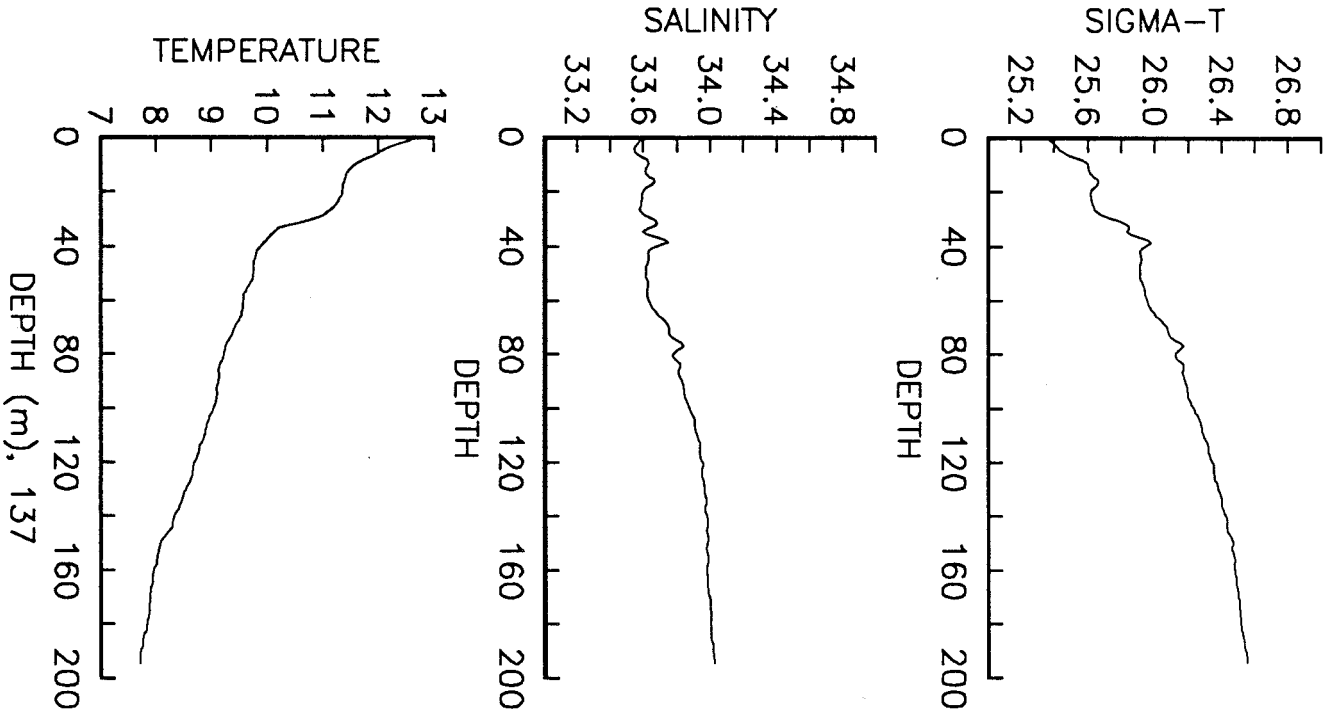
STN 8904.135 22 MAY 1989 1117 PDT
36°50.0'N 122°46.7'W DEPTH 2469 m



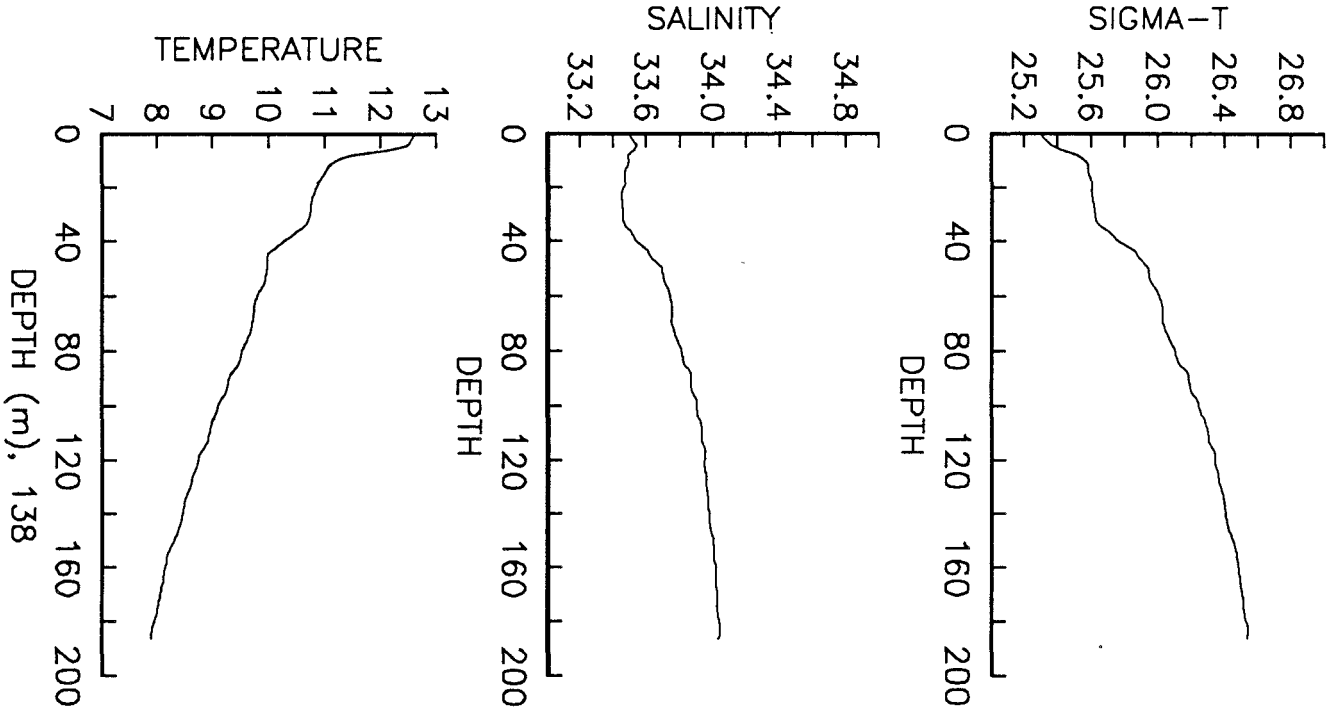
STN 8904.136 22 MAY 1989 1159 PDT
36°50.0'N 122°53.4'W DEPTH 2743 m



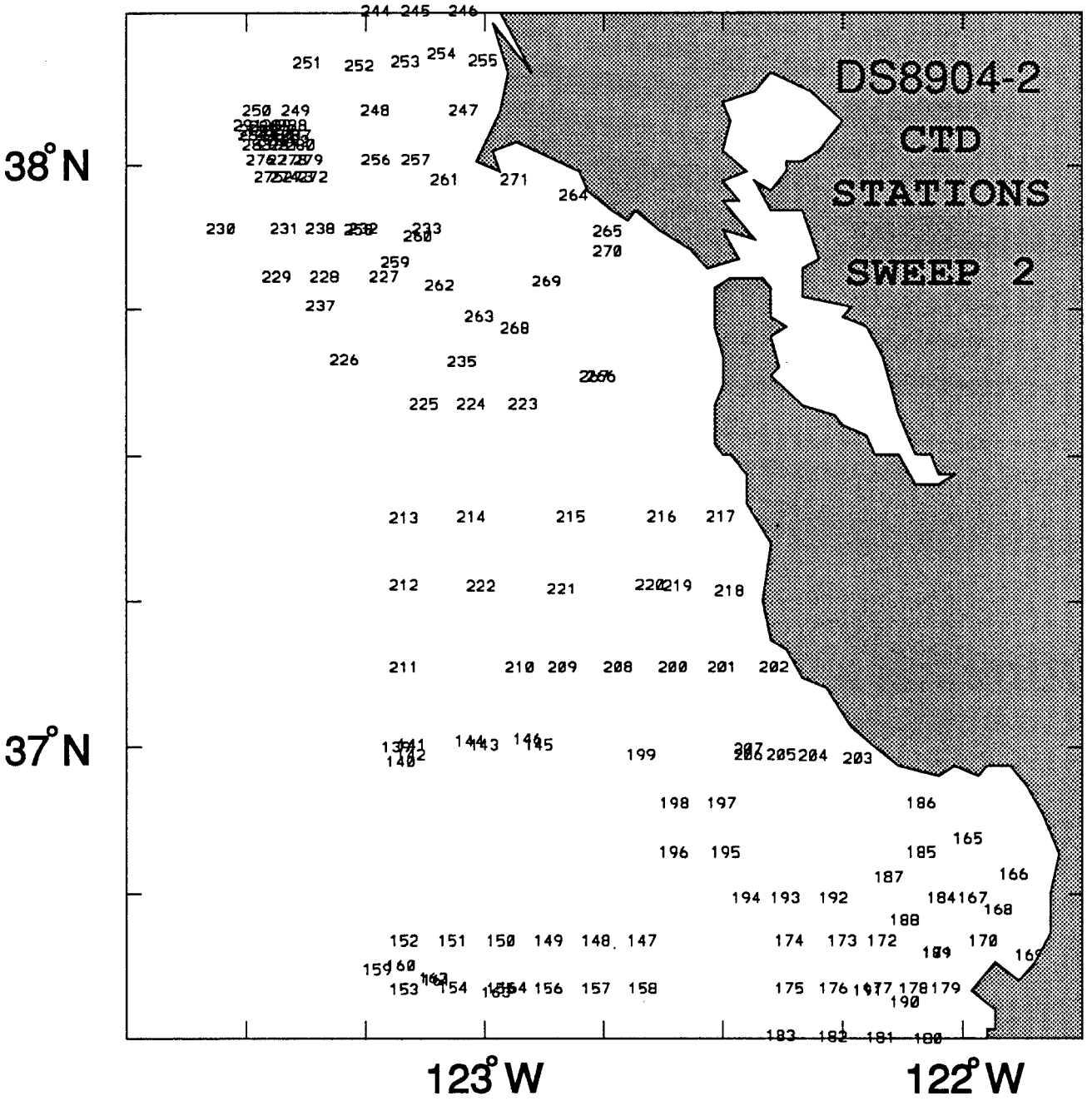
STN 8904.137 22 MAY 1989 1259 PDT
36°50.2'N 123° 0.1'W DEPTH 2844 m



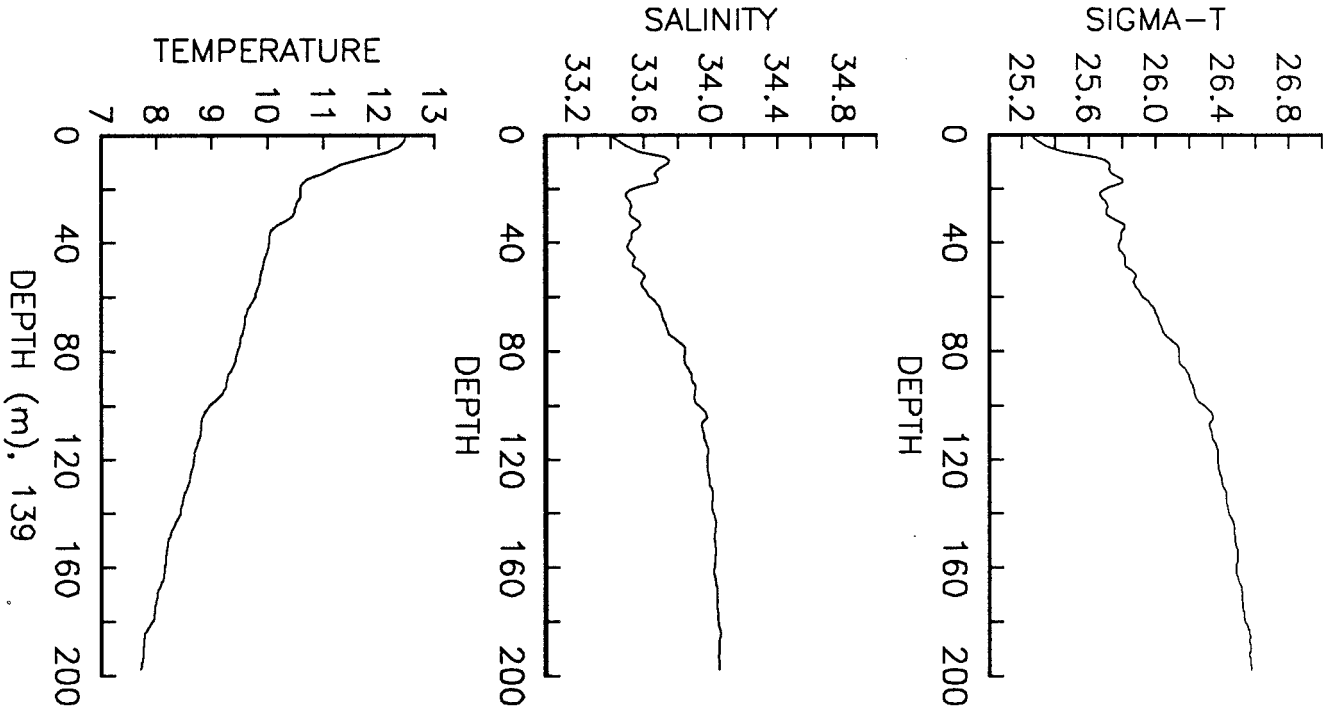
STN 8904.138 22 MAY 1989 1412 PDT
36°49.9'N 123°10.1'W DEPTH 3054 m



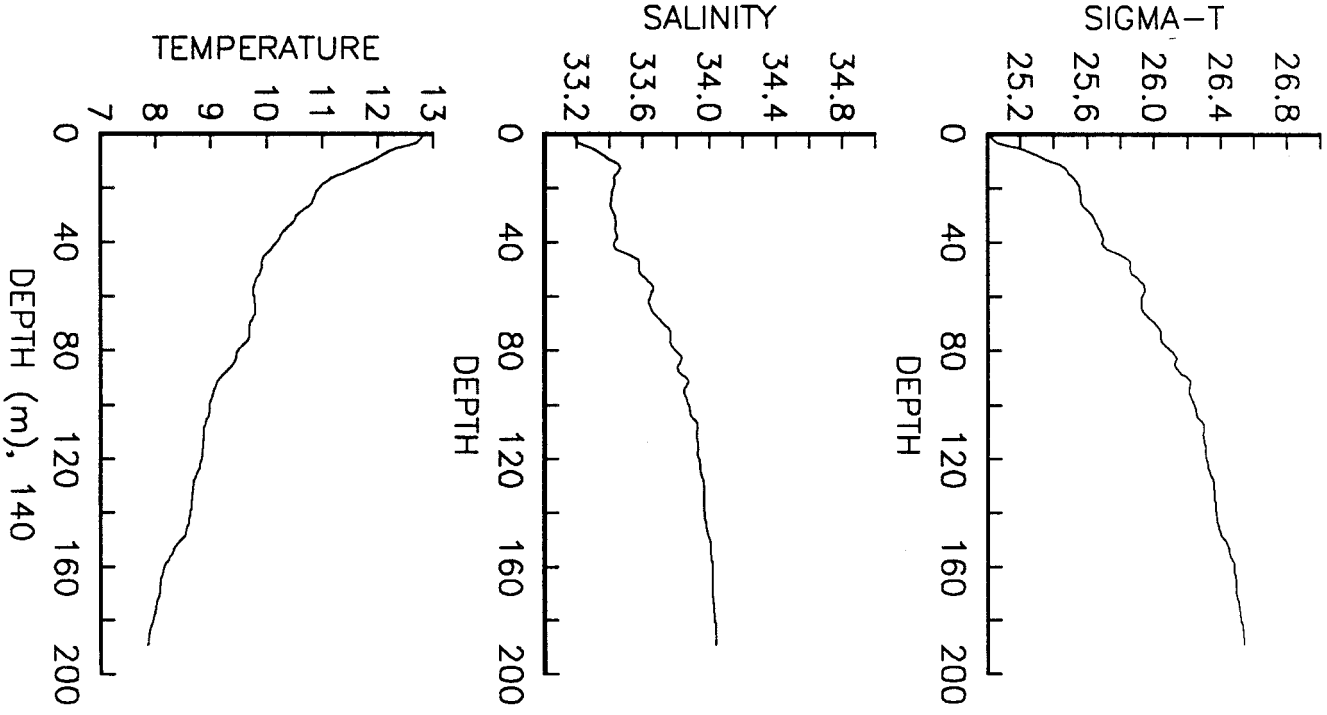
APPENDIX 3.2: PROFILES OF INDIVIDUAL CTD CASTS-SWEEP 2


DS8904-2
CTD
STATIONS
SWEEP 2
38°N
37°N
123°W
122°W

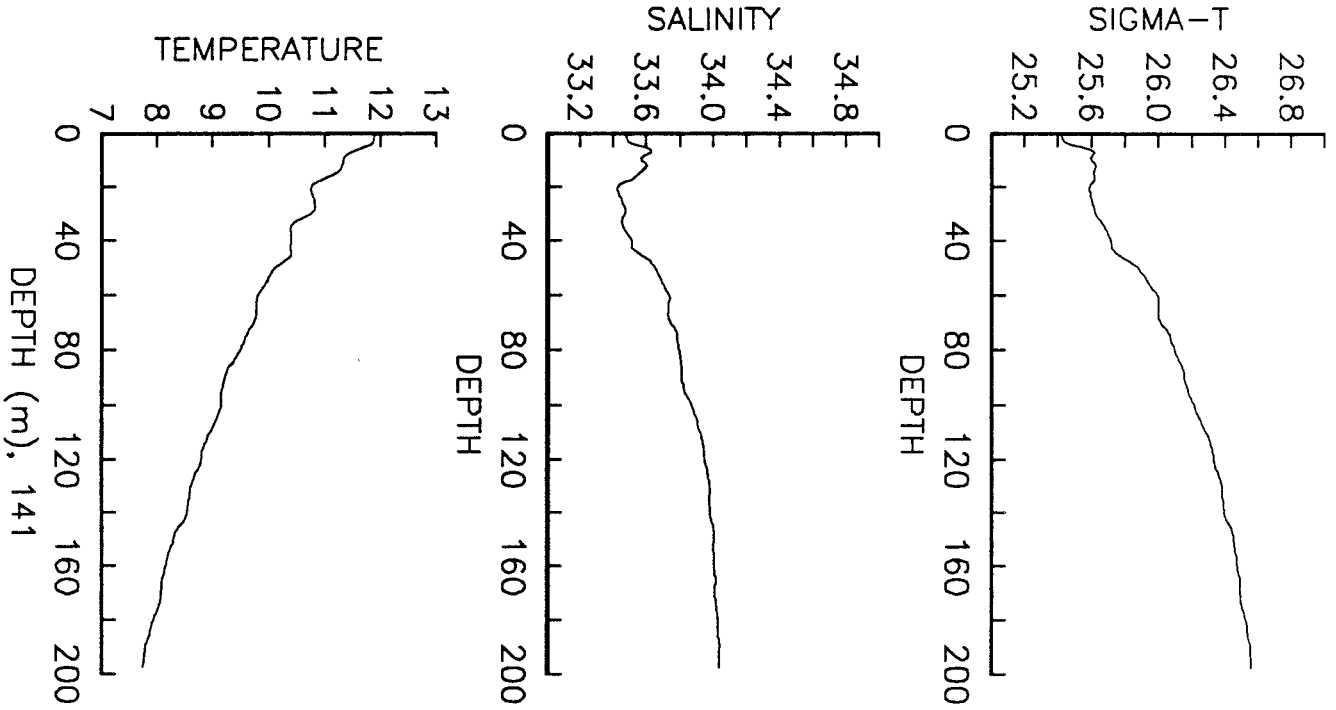
STN 8904.139 22 MAY 1989 2055 PDT
36°59.8'N 123°11.0'W DEPTH 3658 m



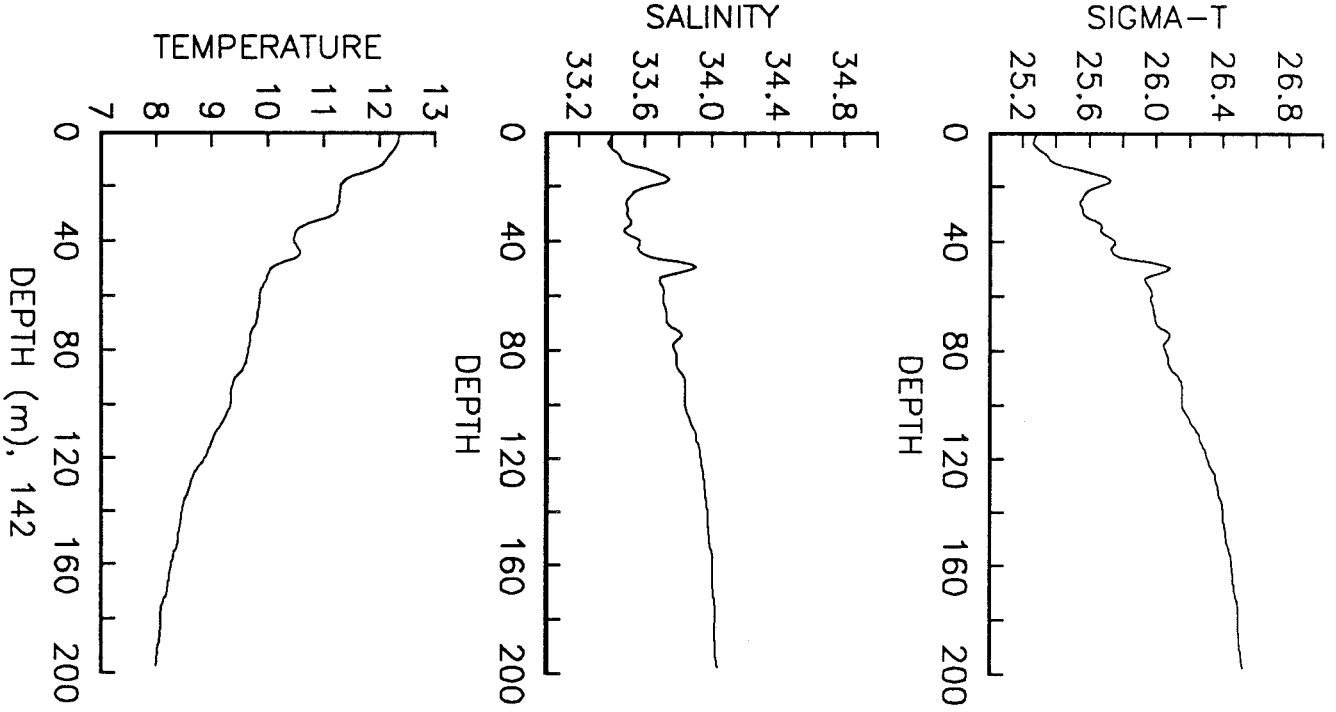
STN 8904.140 22 MAY 1989 2120 PDT
36°58.3'N 123°10.4'W DEPTH 3658 m



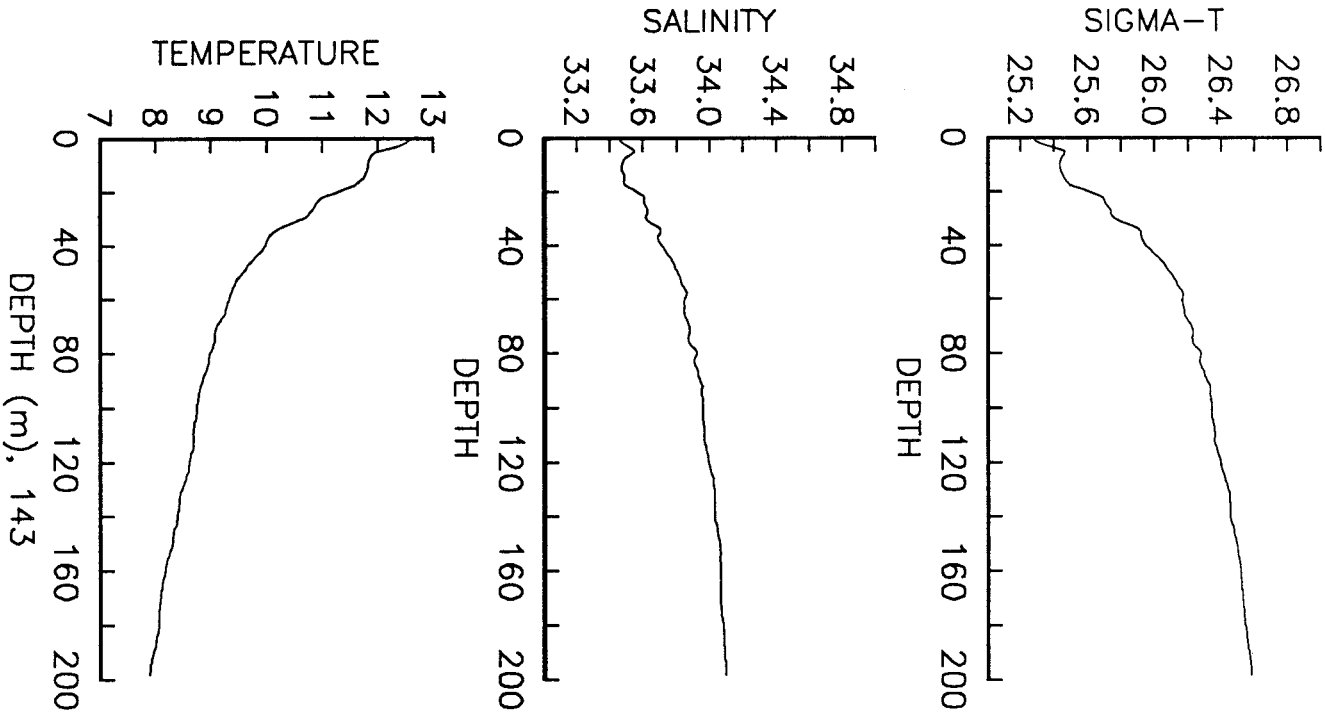
STN 8904.141 22 MAY 1989 2210 PDT
37° 0.0'N 123° 9.0'W DEPTH 2560 m



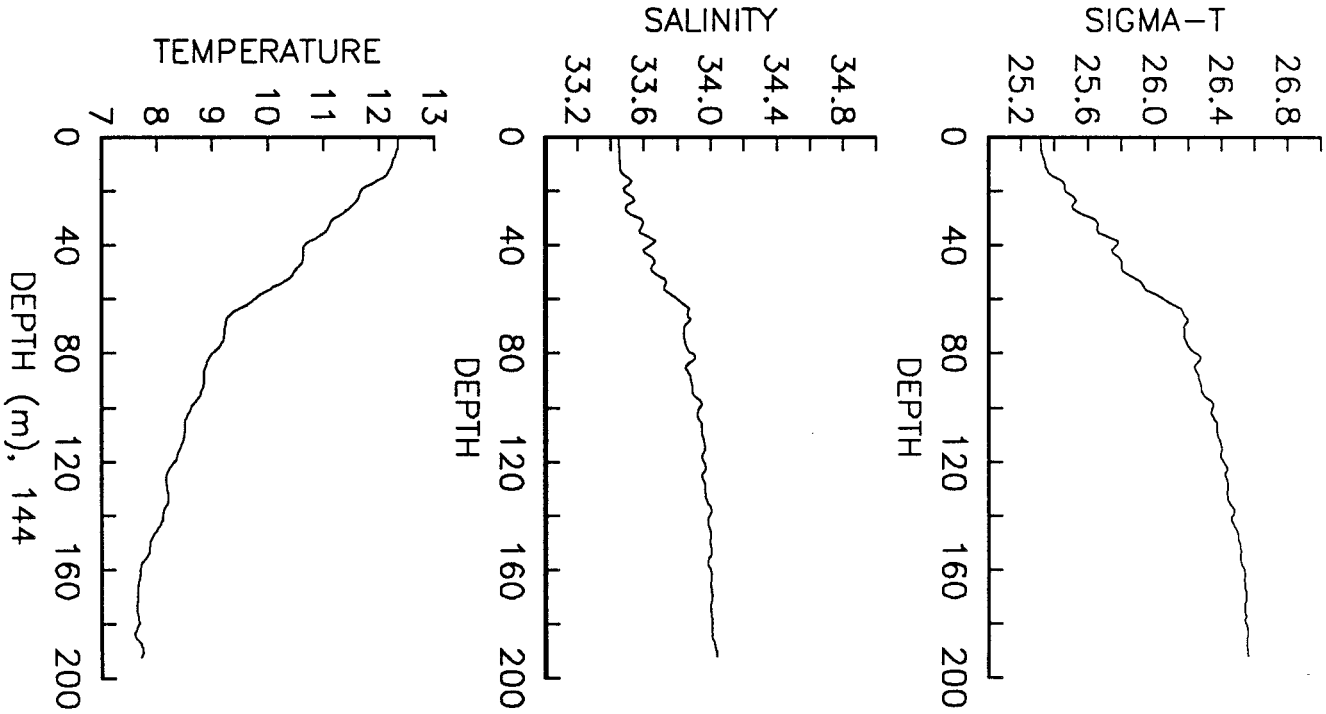
STN 8904.142 22 MAY 1989 2345 PDT
36°59.0'N 123° 9.1'W DEPTH 2560 m



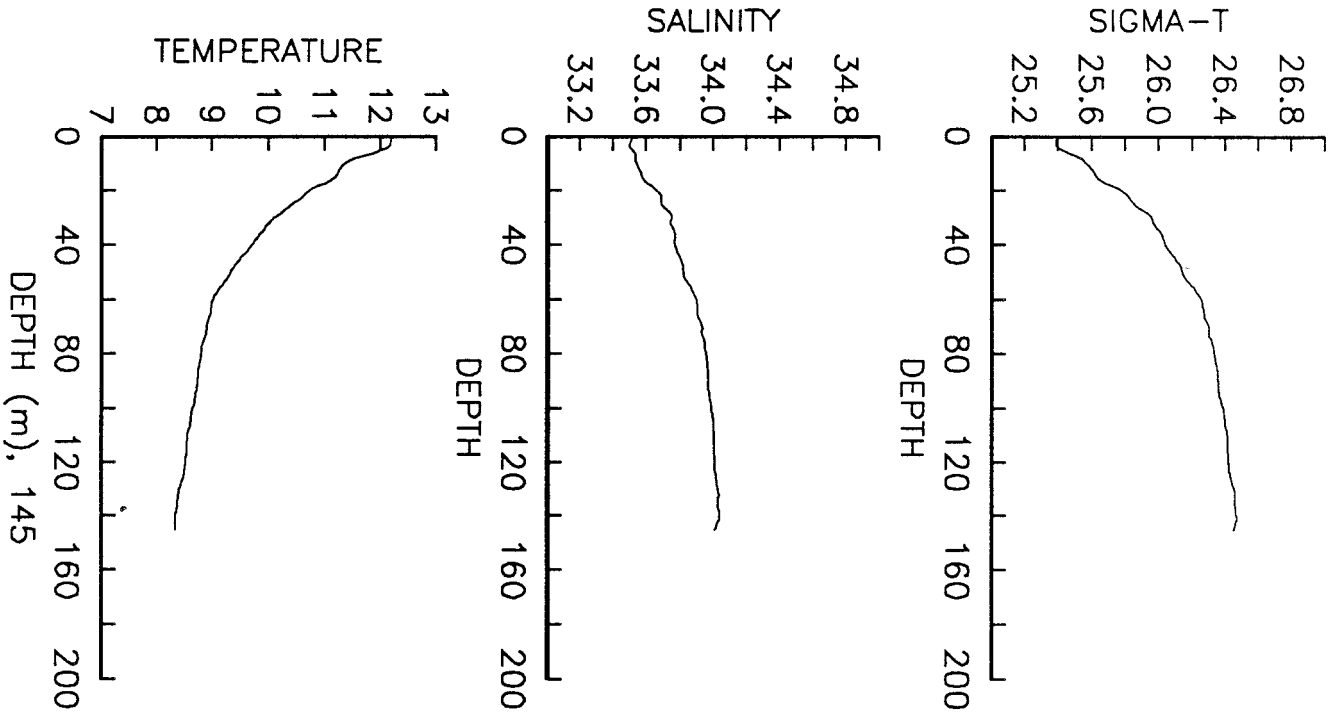
STN 8904.143 23 MAY 1989 0033 PDT
37° 0.0'N 122°59.9'W DEPTH 2195 m



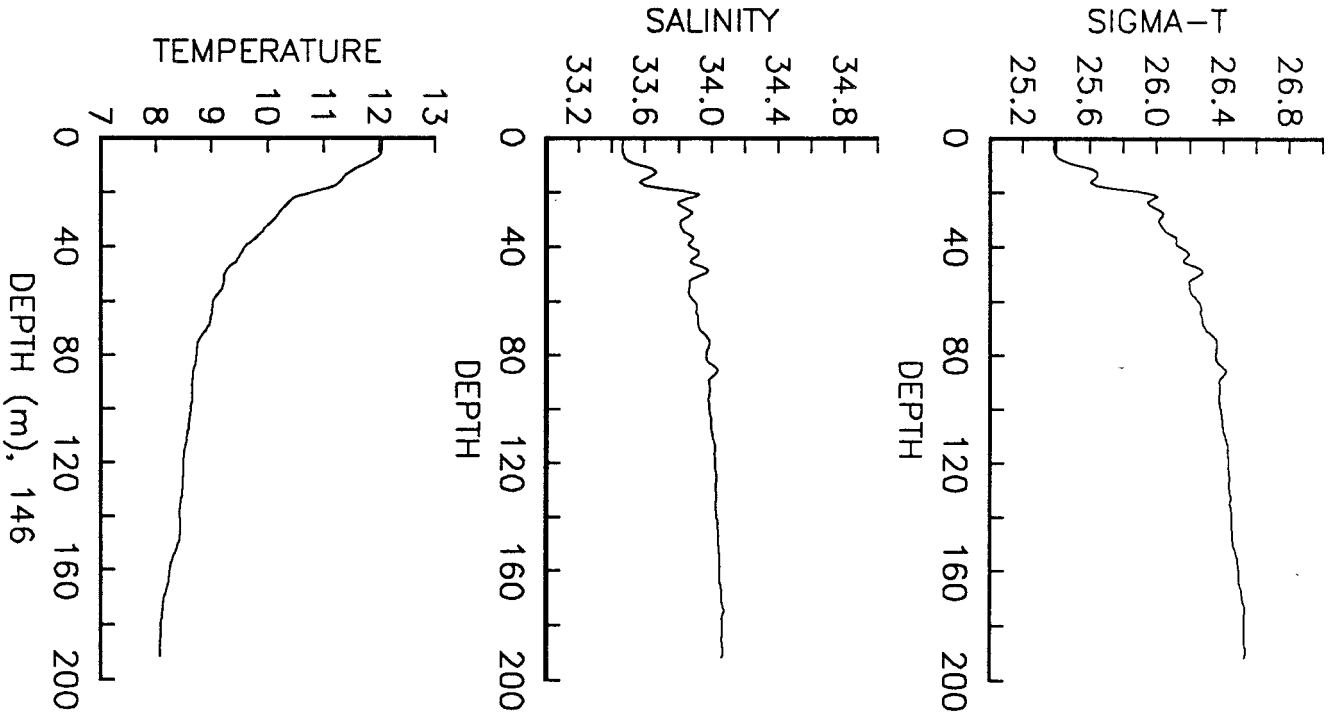
STN 8904.144 23 MAY 1989 0215 PDT
37° 0.4'N 123° 1.7'W DEPTH 2195 m



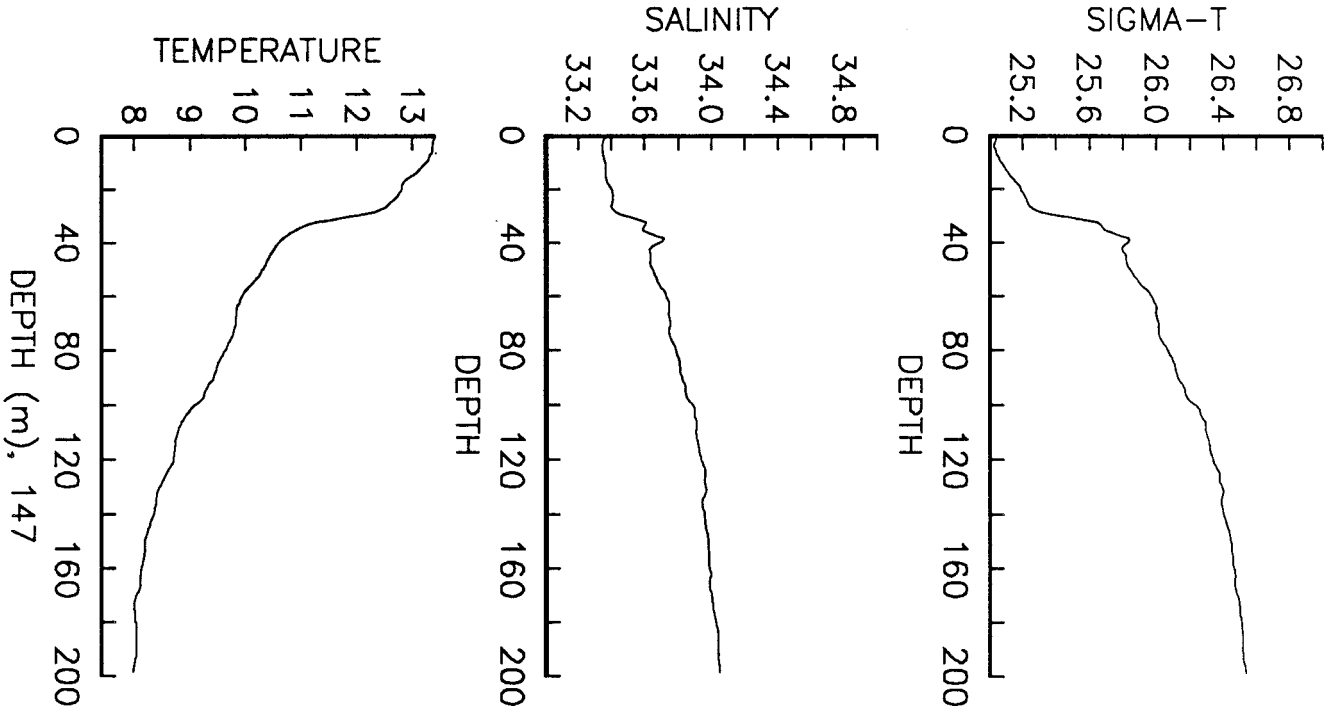
STN 8904.145 23 MAY 1989 0305 PDT
37° 0.0'N 122°53.0'W DEPTH 1372 m



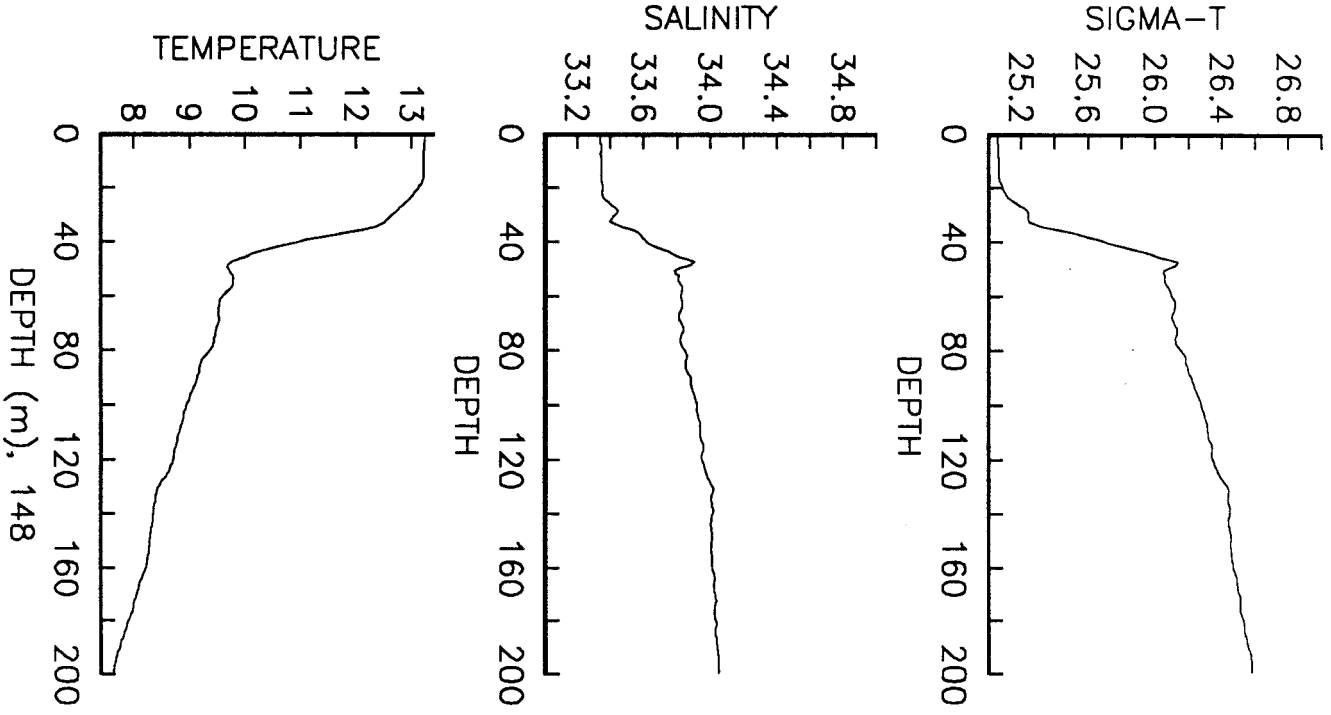
STN 8904.146 23 MAY 1989 0445 PDT
37° 0.6'N 122°54.4'W DEPTH 1631 m



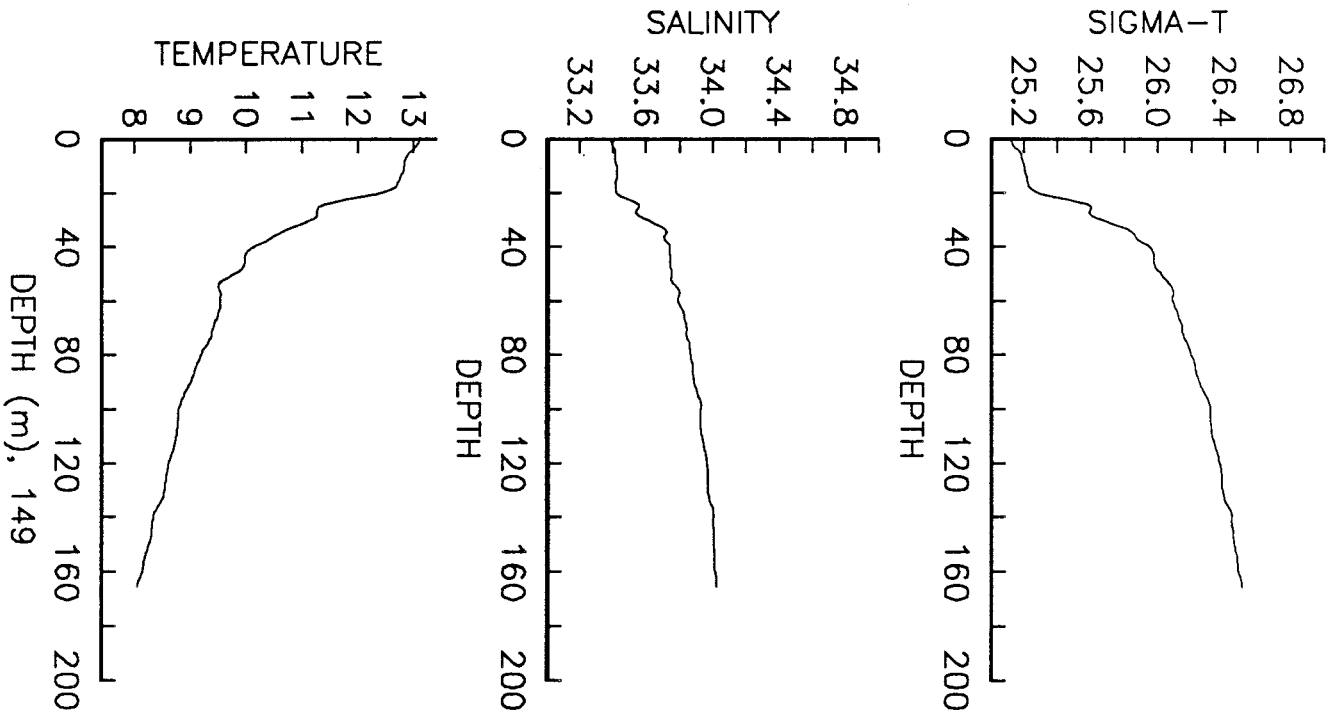
STN 8904.147 23 MAY 1989 0808 PDT
36°40.0'N 122°40.0'W DEPTH 2560 m



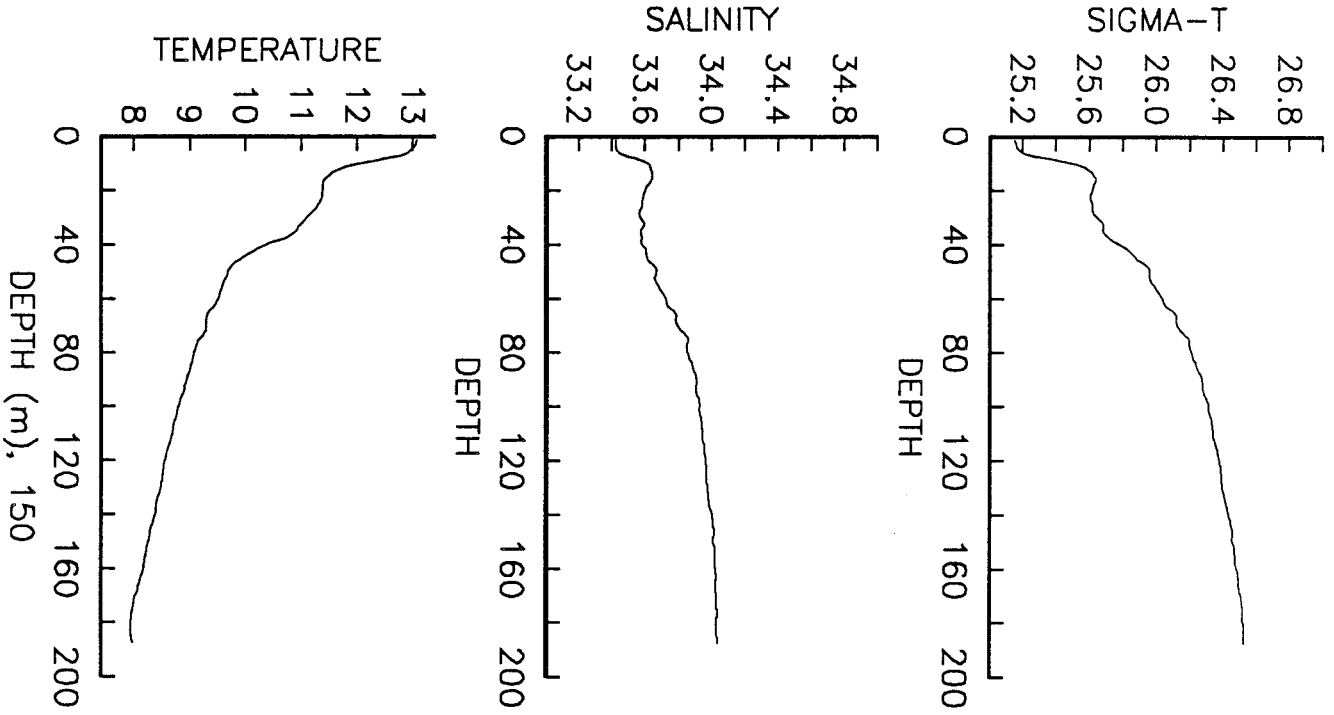
STN 8904.148 23 MAY 1989 0850 PDT
36°40.0'N 122°45.8'W DEPTH 2743 m



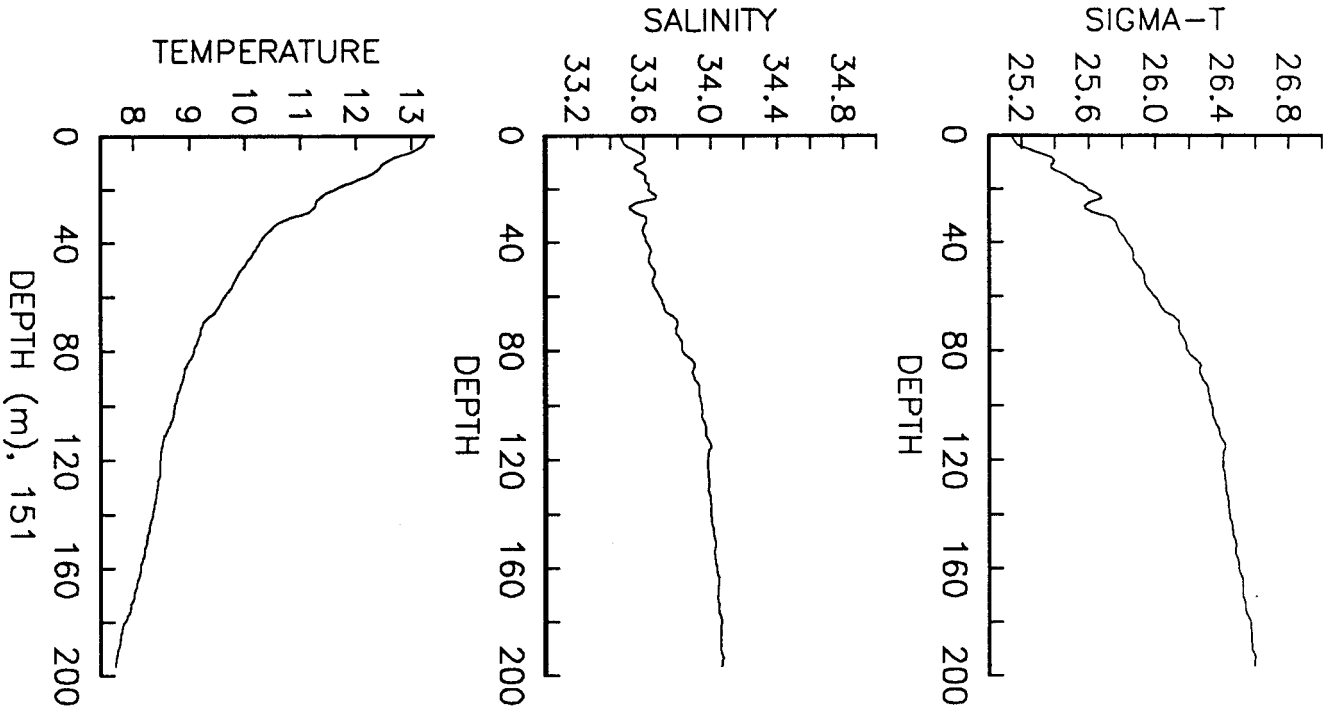
STN 8904.149 23 MAY 1989 0937 PDT
36°40.0'N 122°51.8'W DEPTH 2743 m



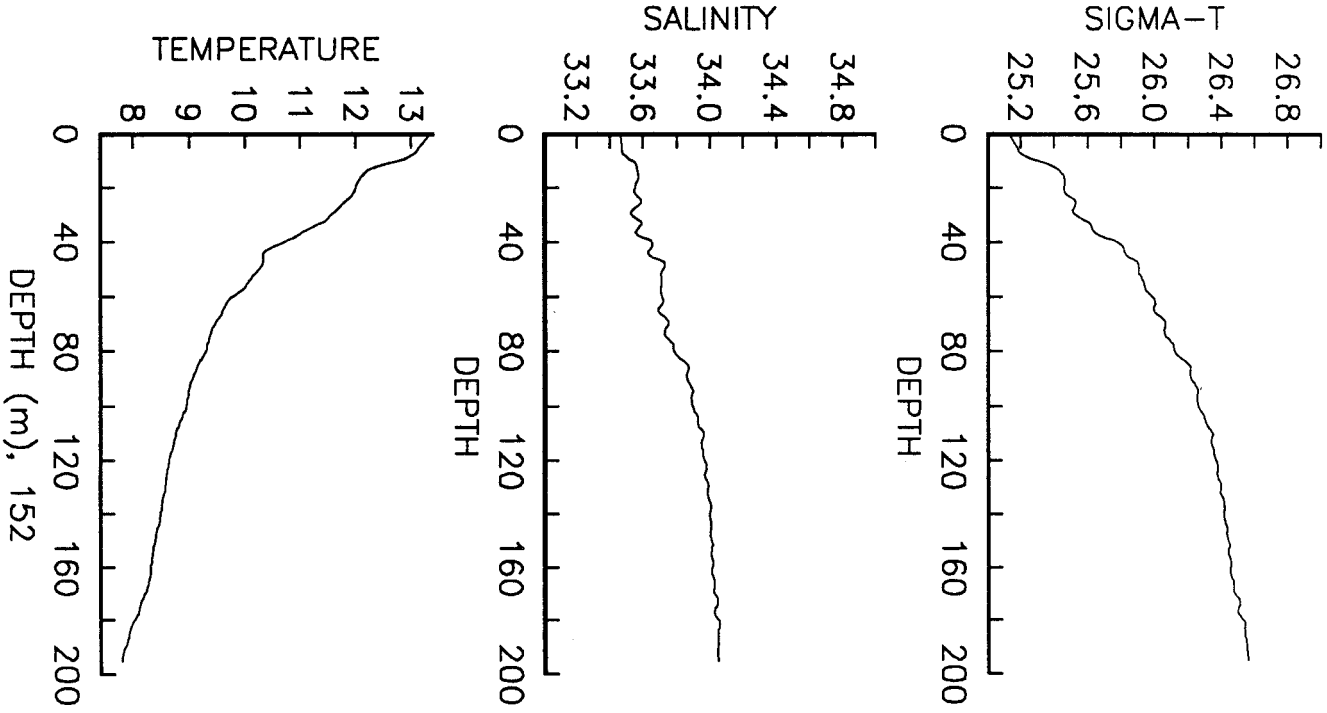
STN 8904.150 23 MAY 1989 1012 PDT
36°40.0'N 122°57.8'W DEPTH 2926 m



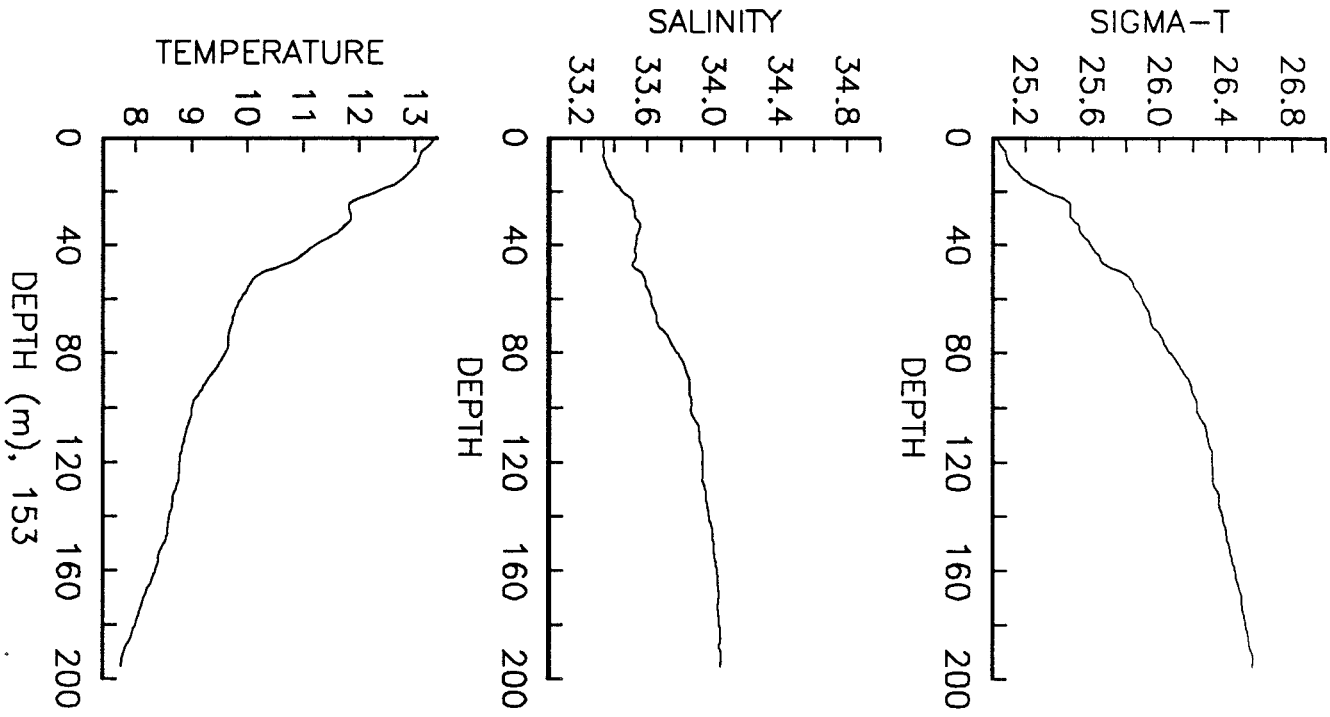
STN 8904.151 23 MAY 1989 1051 PDT
36°40.0'N 123° 3.9'W DEPTH 3109 m



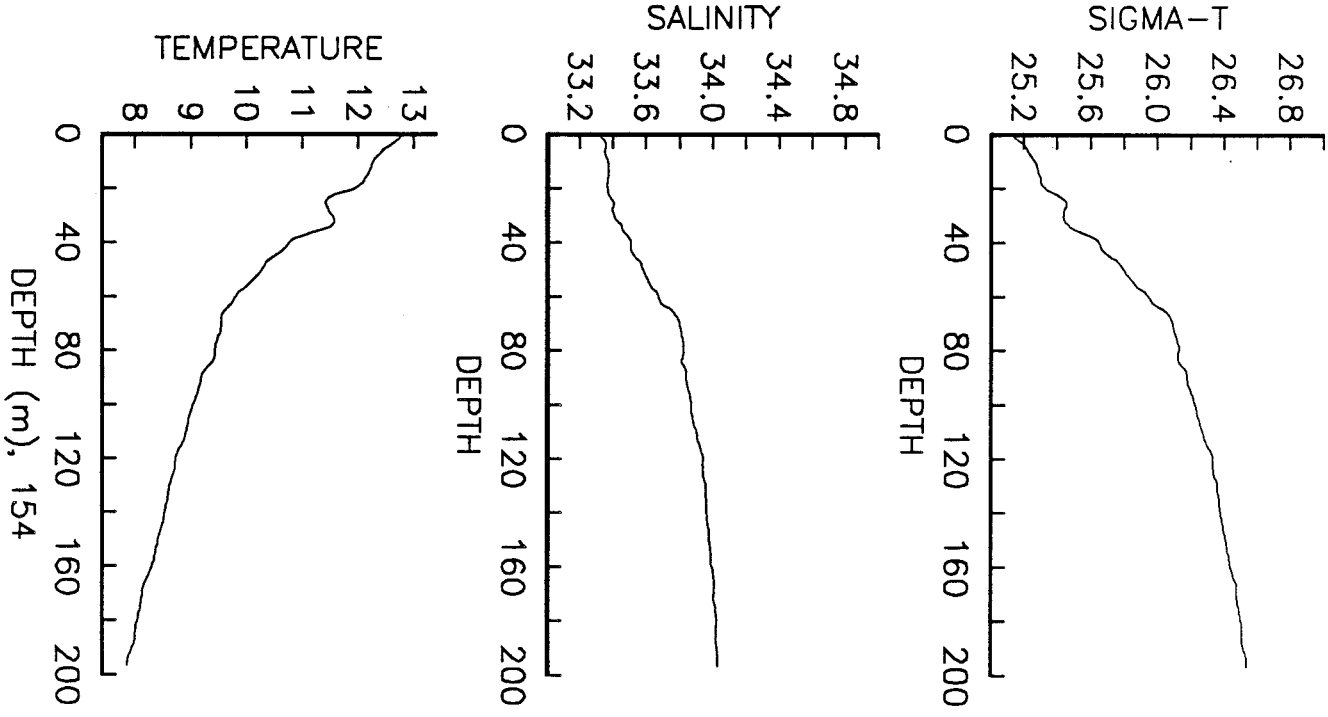
STN 8904.152 23 MAY 1989 1132 PDT
36°40.0'N 123°10.0'W DEPTH 3292 m



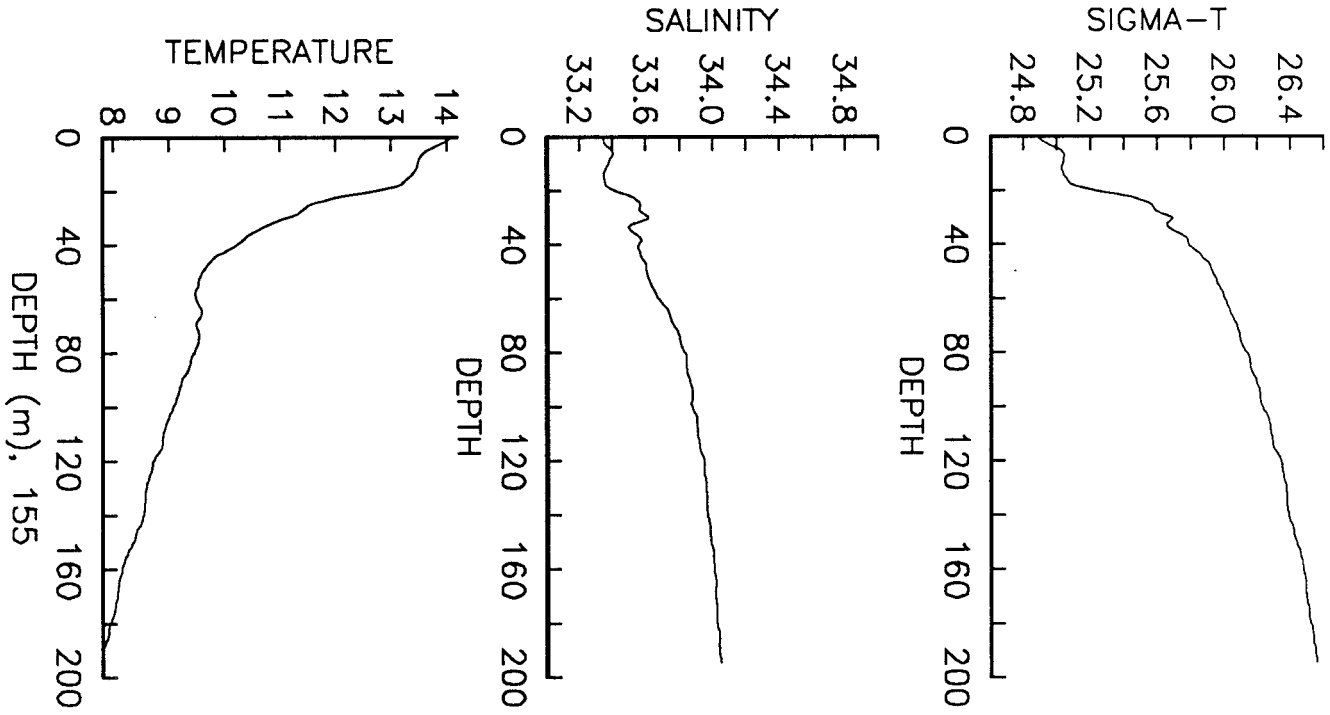
STN 8904.153 23 MAY 1989 1201 PDT
36°34.9'N 123°10.0'W DEPTH 3292 m



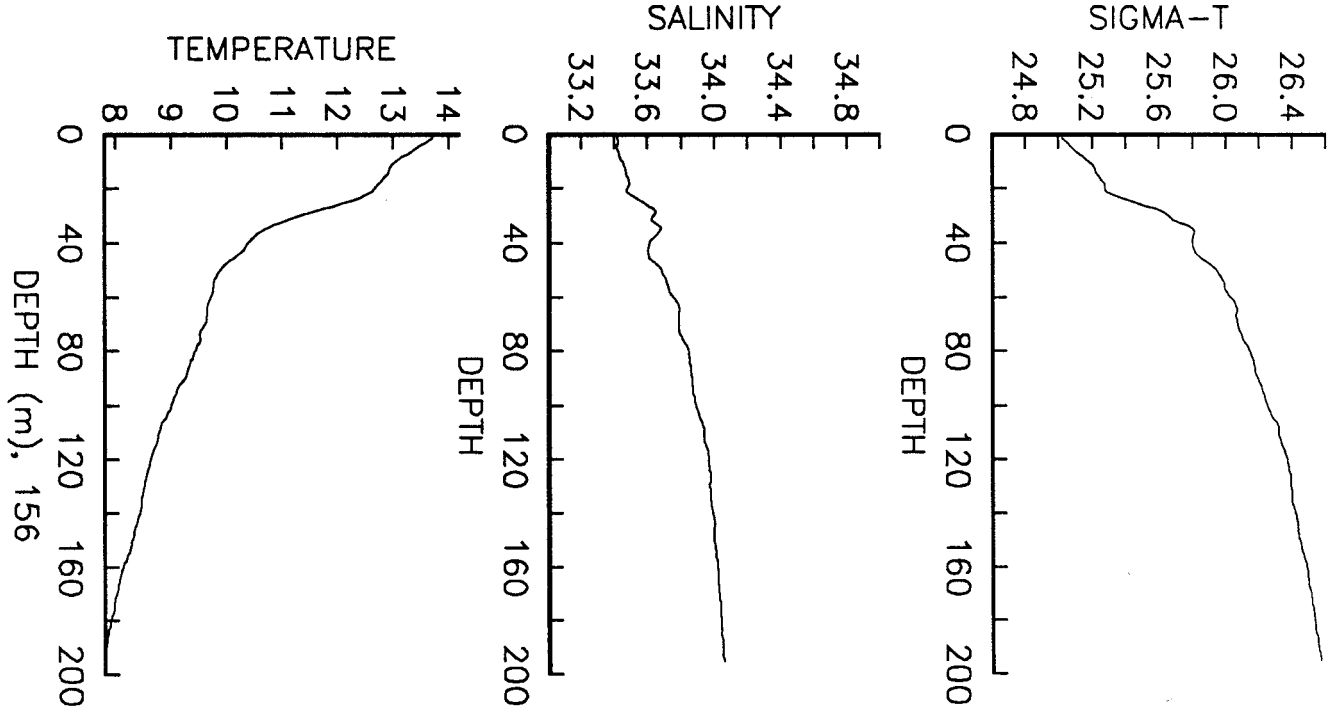
STN 8904.154 23 MAY 1989 1254 PDT
36°35.1'N 123° 3.8'W DEPTH 3200 m



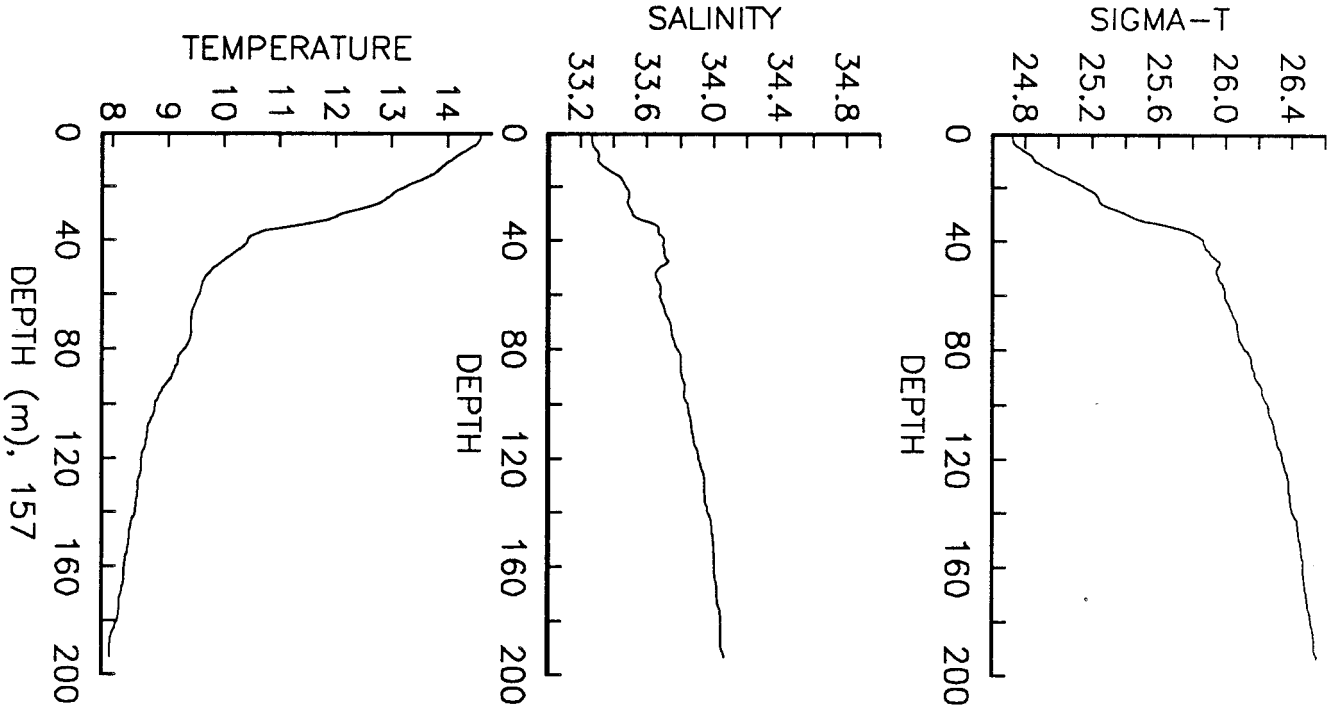
STN 8904.155 23 MAY 1989 1335 PDT
36°35.0'N 122°57.8'W DEPTH 2880 m



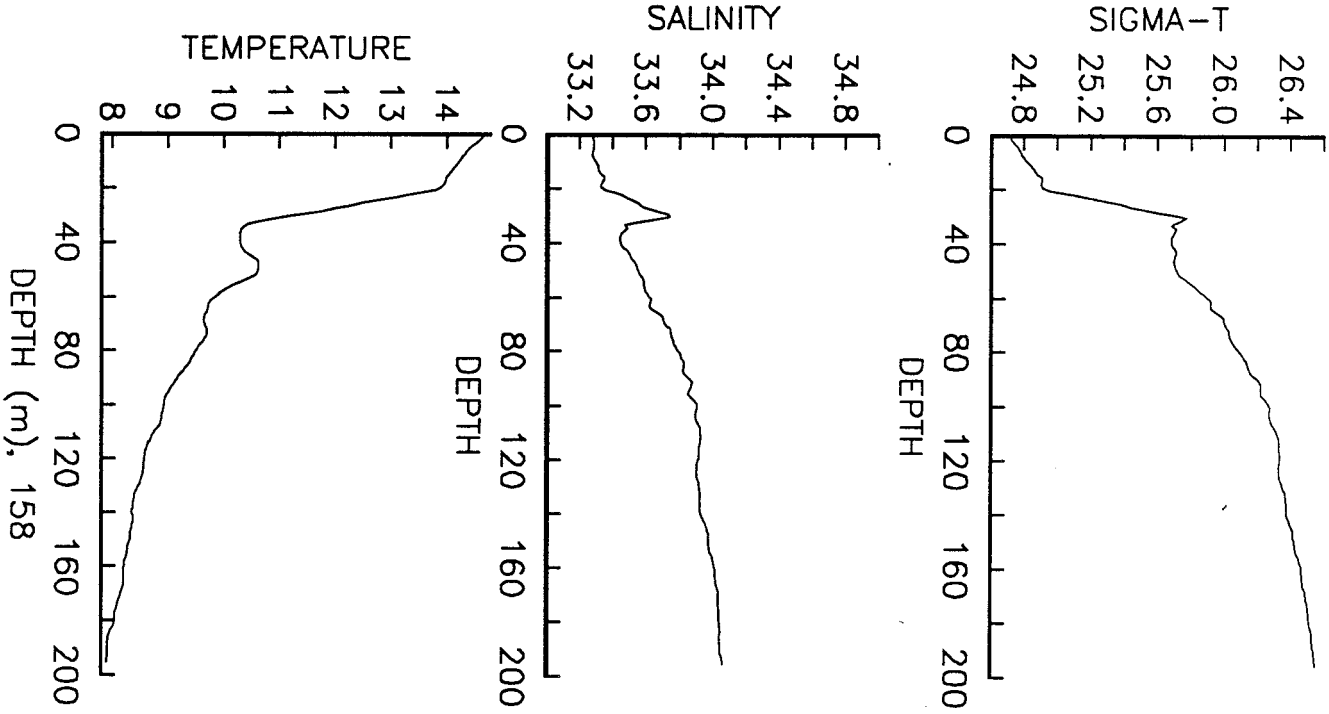
STN 8904.156 23 MAY 1989 1415 PDT
36°35.0'N 122°51.8'W DEPTH 2926 m



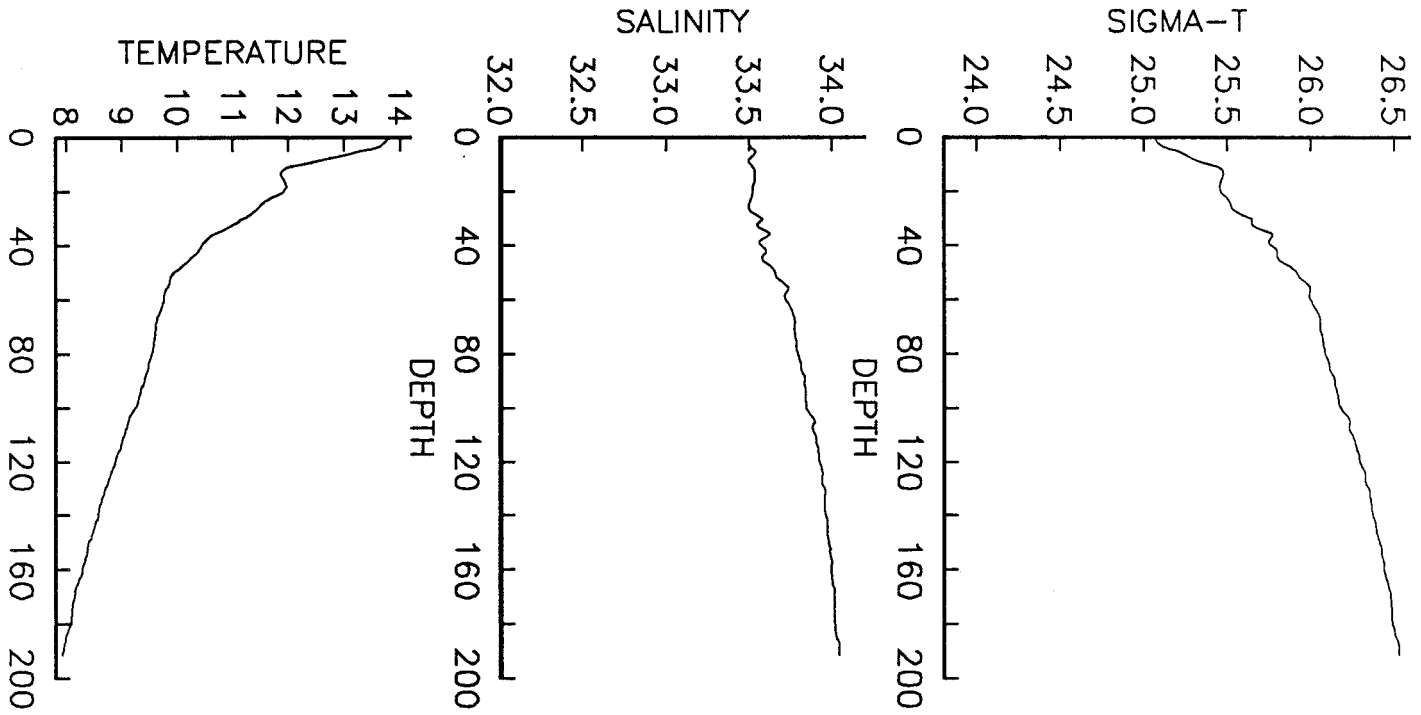
STN 8904.157 23 MAY 1989 1454 PDT
36°35.0'N 122°45.8'W DEPTH 2893 m



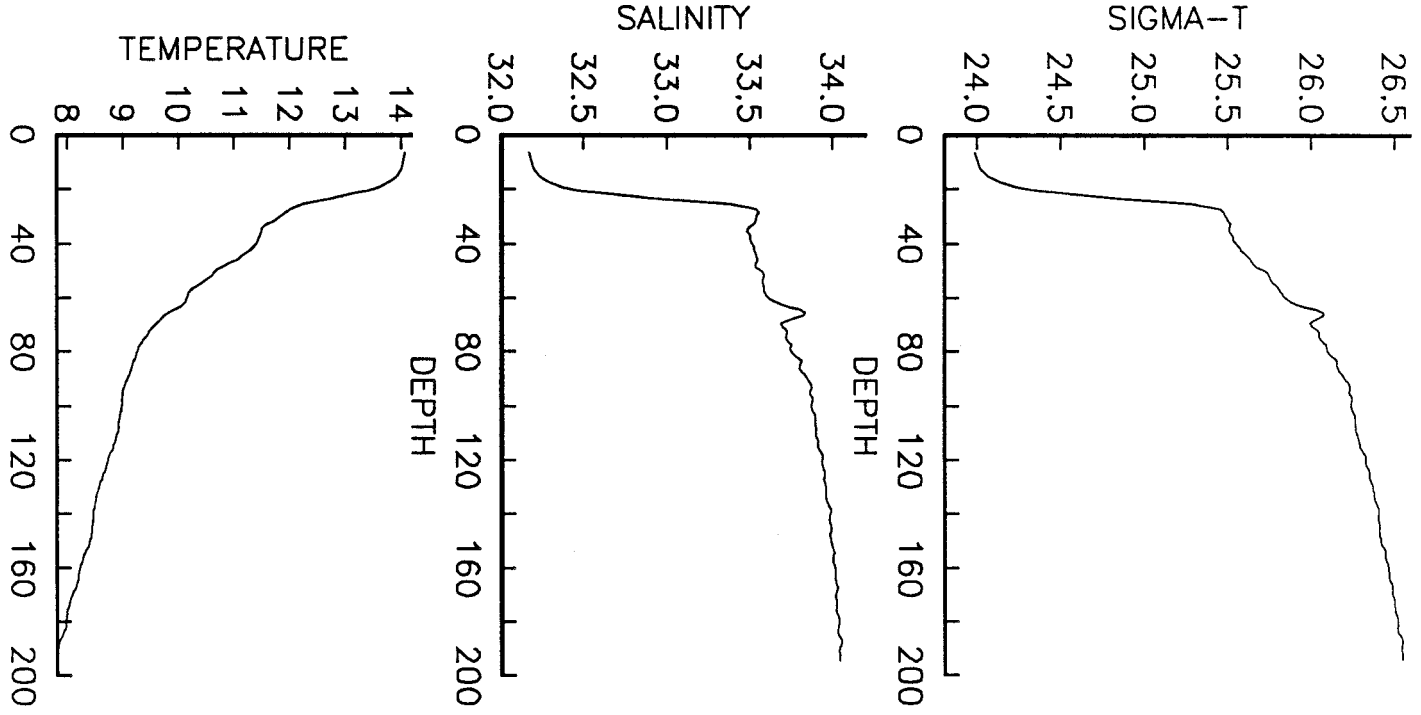
STN 8904.158 23 MAY 1989 1532 PDT
36°35.0'N 122°39.9'W DEPTH 2743 m



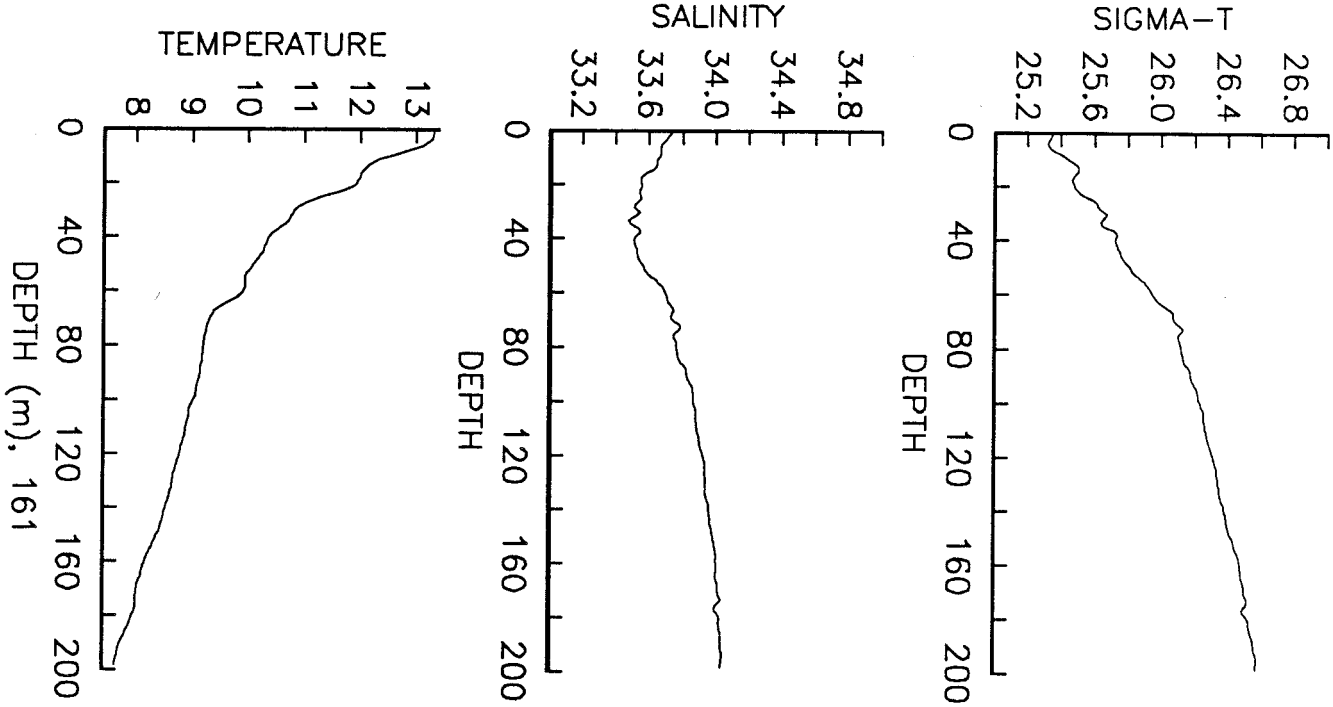
STN 8904.159 23 MAY 1989 2100 PDT
36°37.0'N 123°13.4'W DEPTH 3292 m



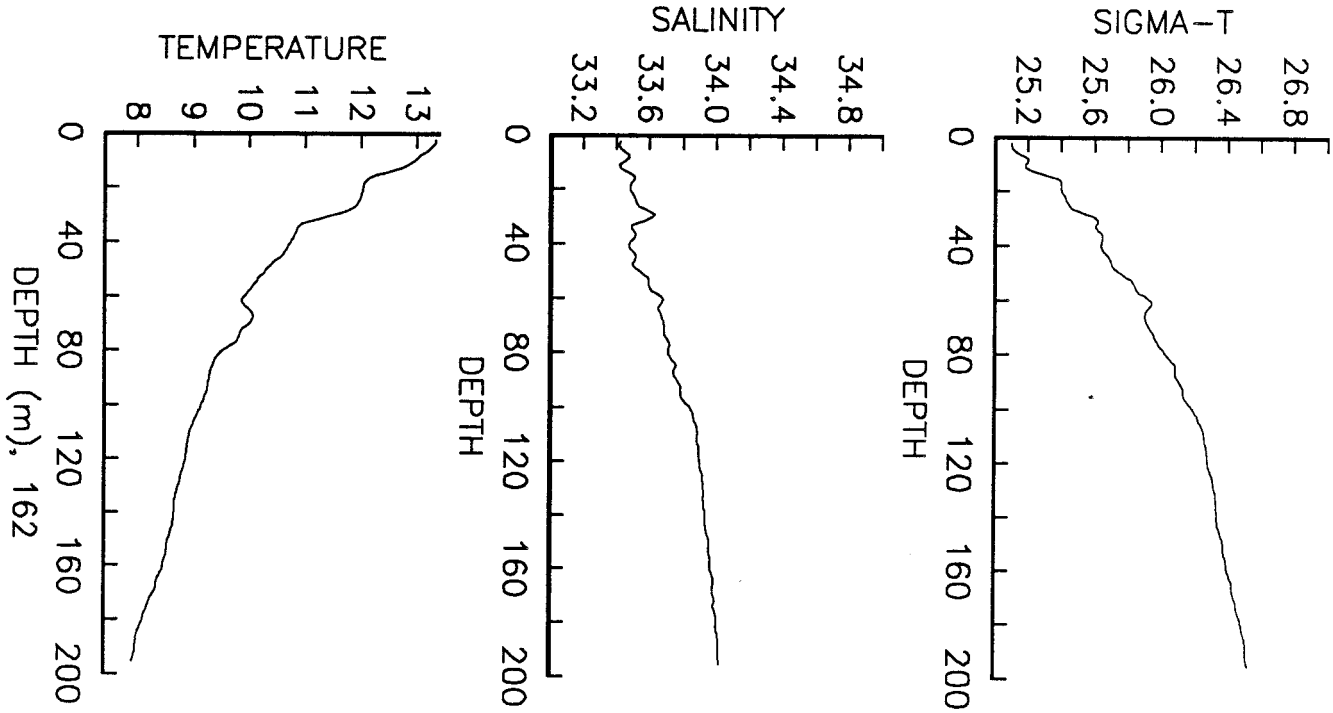
STN 8904.160 23 MAY 1989 2226 PDT
36°37.4'N 123°10.4'W DEPTH 3292 m



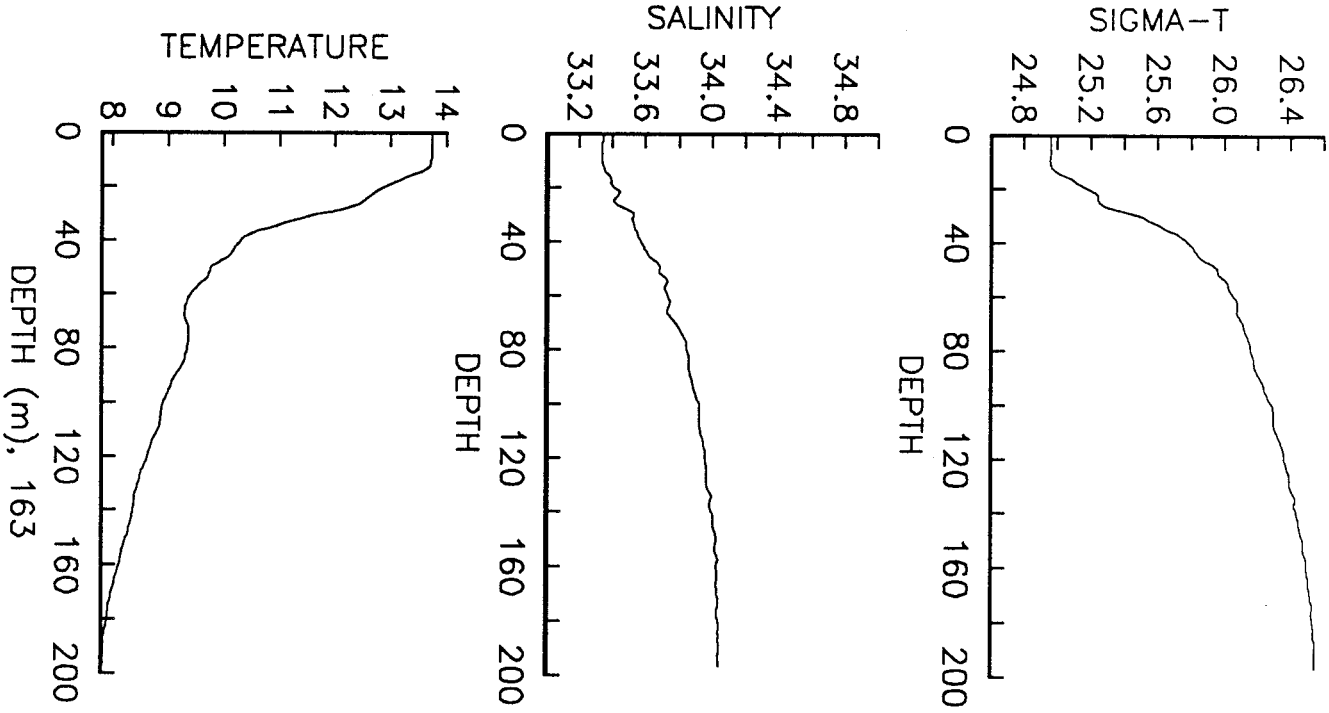
STN 8904.161 24 MAY 1989 0004 PDT
36°35.9'N 123° 5.9'W DEPTH 3255 m



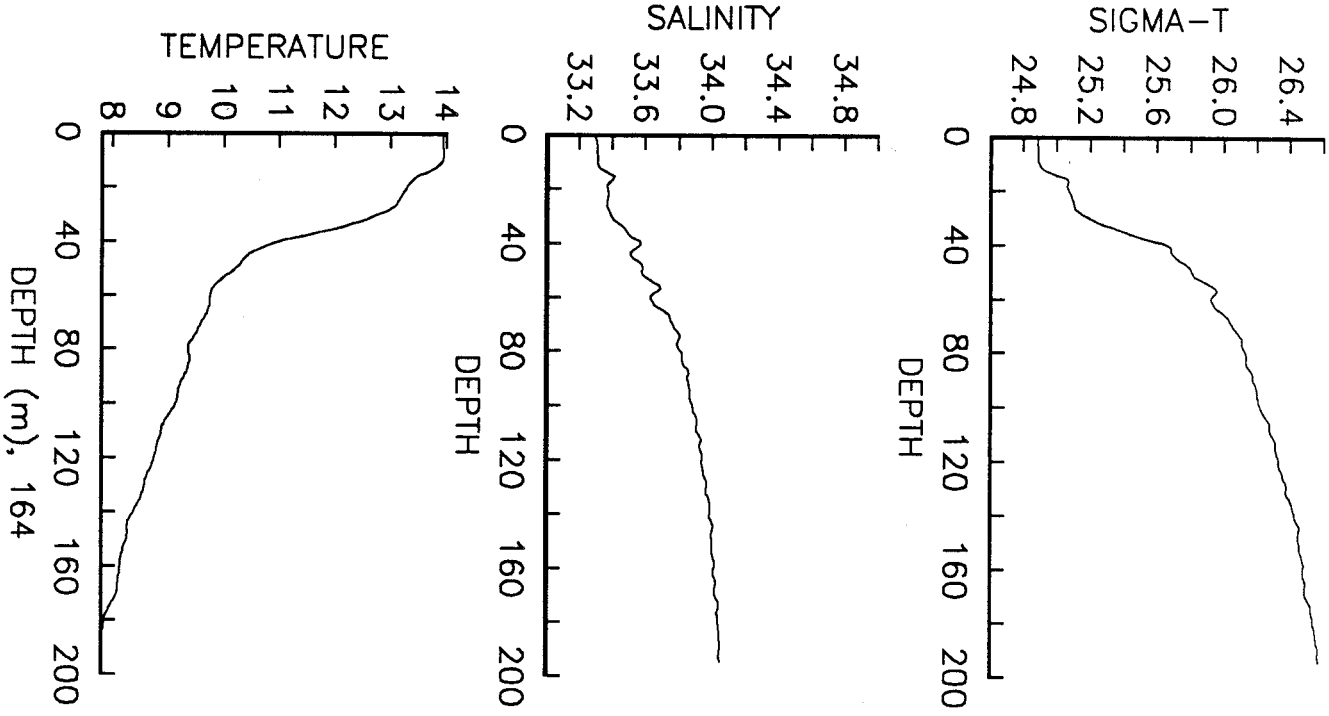
STN 8904.162 24 MAY 1989 0222 PDT
36°36.1'N 123° 6.3'W DEPTH 3200 m



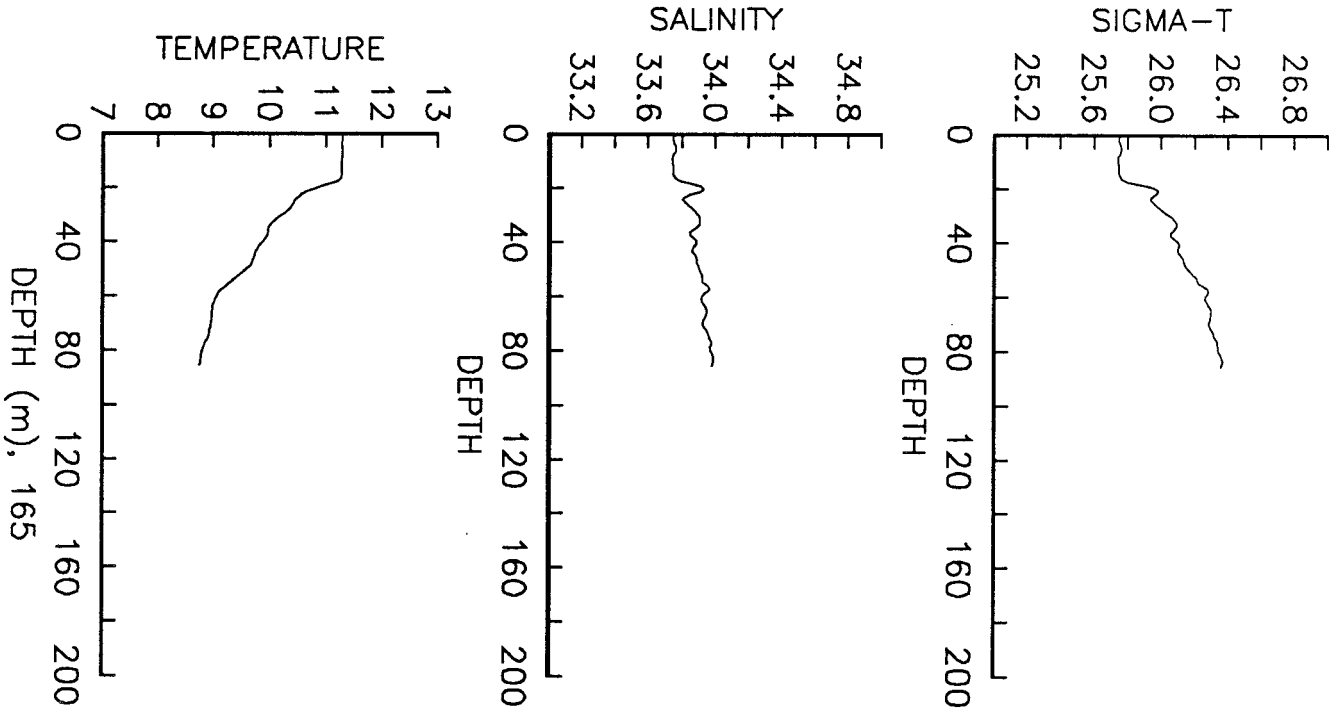
STN 8904.163 24 MAY 1989 0315 PDT
36°34.6'N 122°58.4'W DEPTH 2926 m



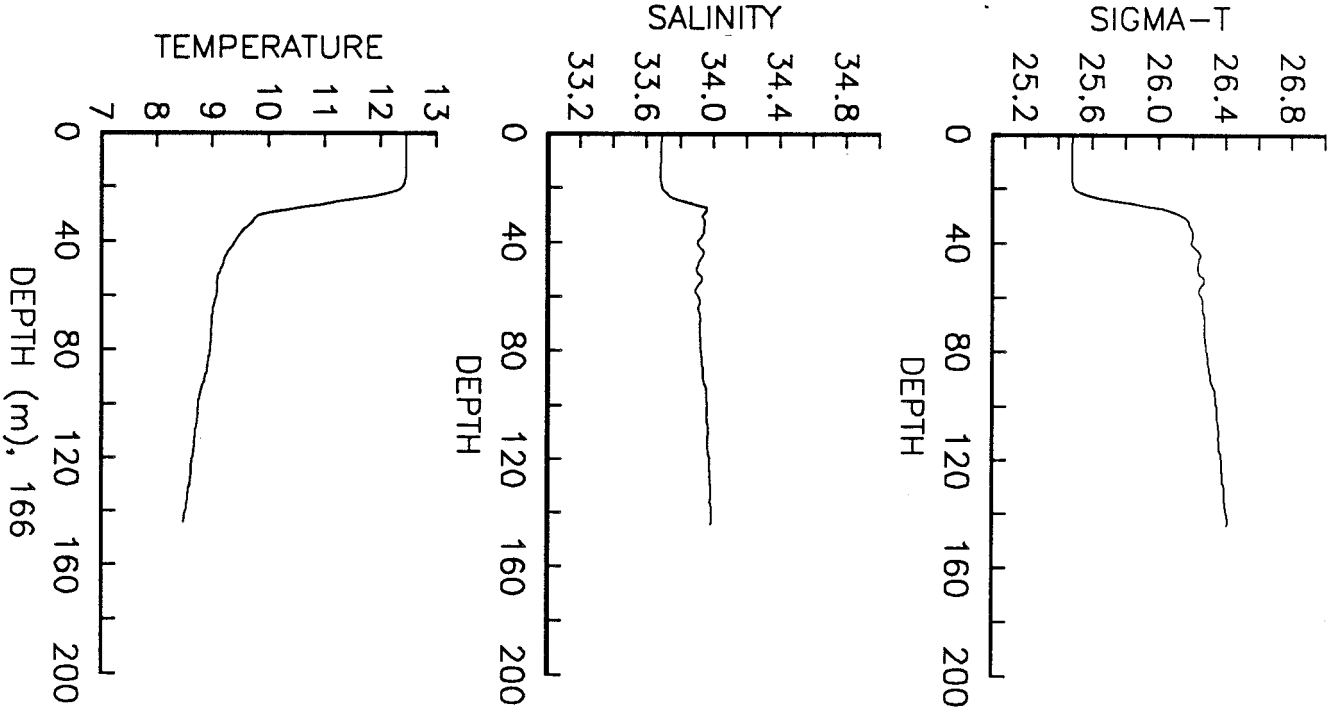
STN 8904.164 24 MAY 1989 0513 PDT
36°35.1'N 122°56.3'W DEPTH 2853 m



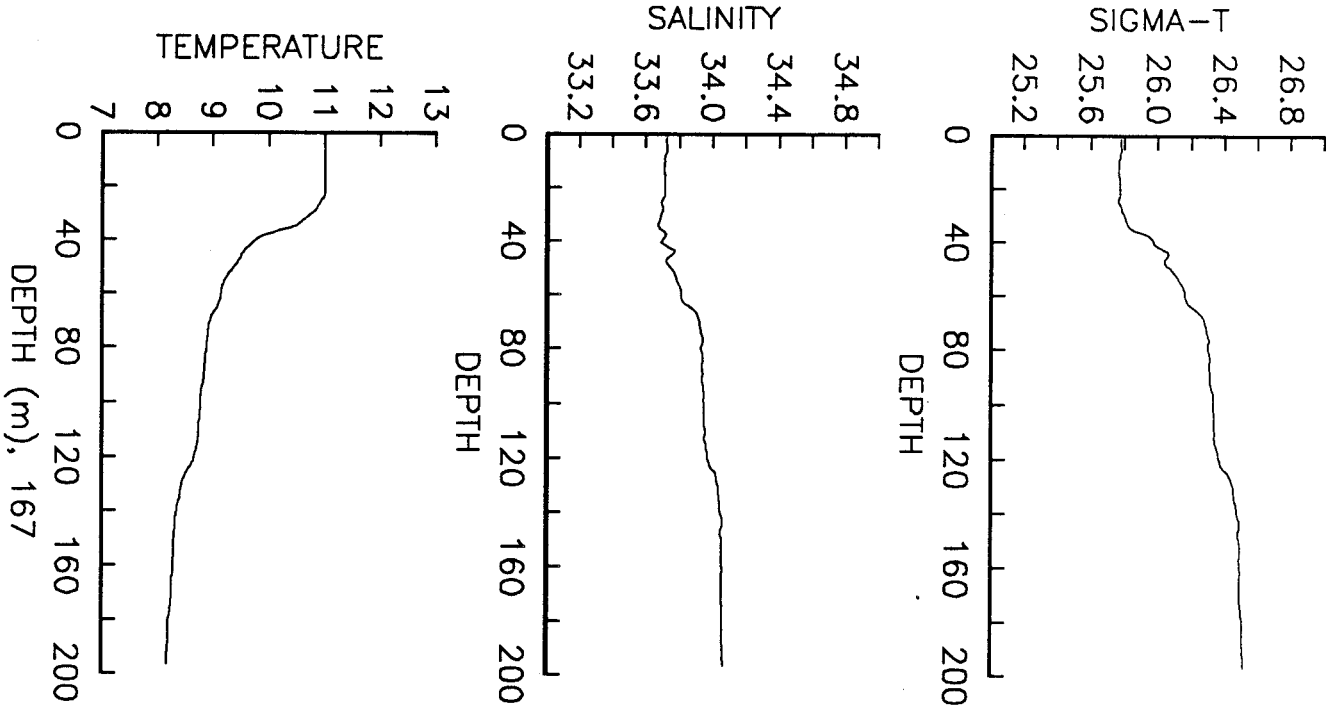
STN 8904.165 24 MAY 1989 2115 PDT
36°50.4'N 121°59.2'W DEPTH 91 m



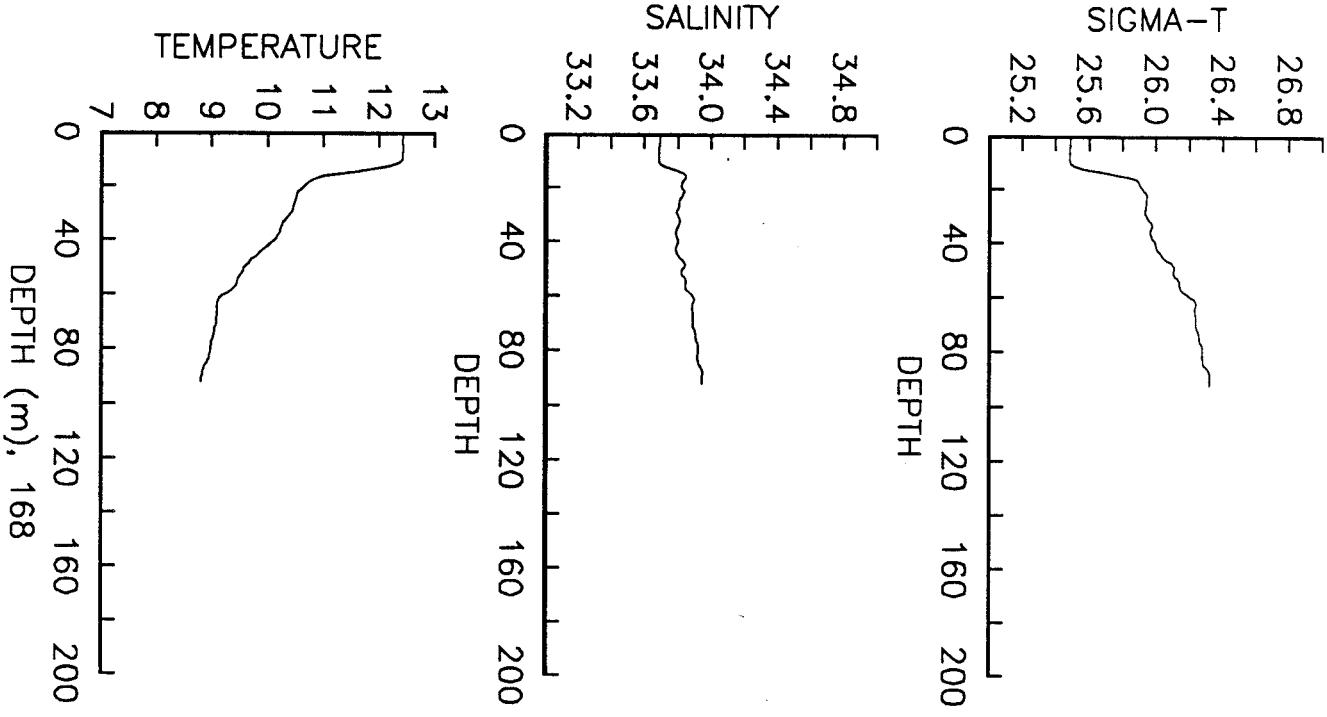
STN 8904.166 24 MAY 1989 2325 PDT
36°46.8'N 121°53.5'W DEPTH 311 m



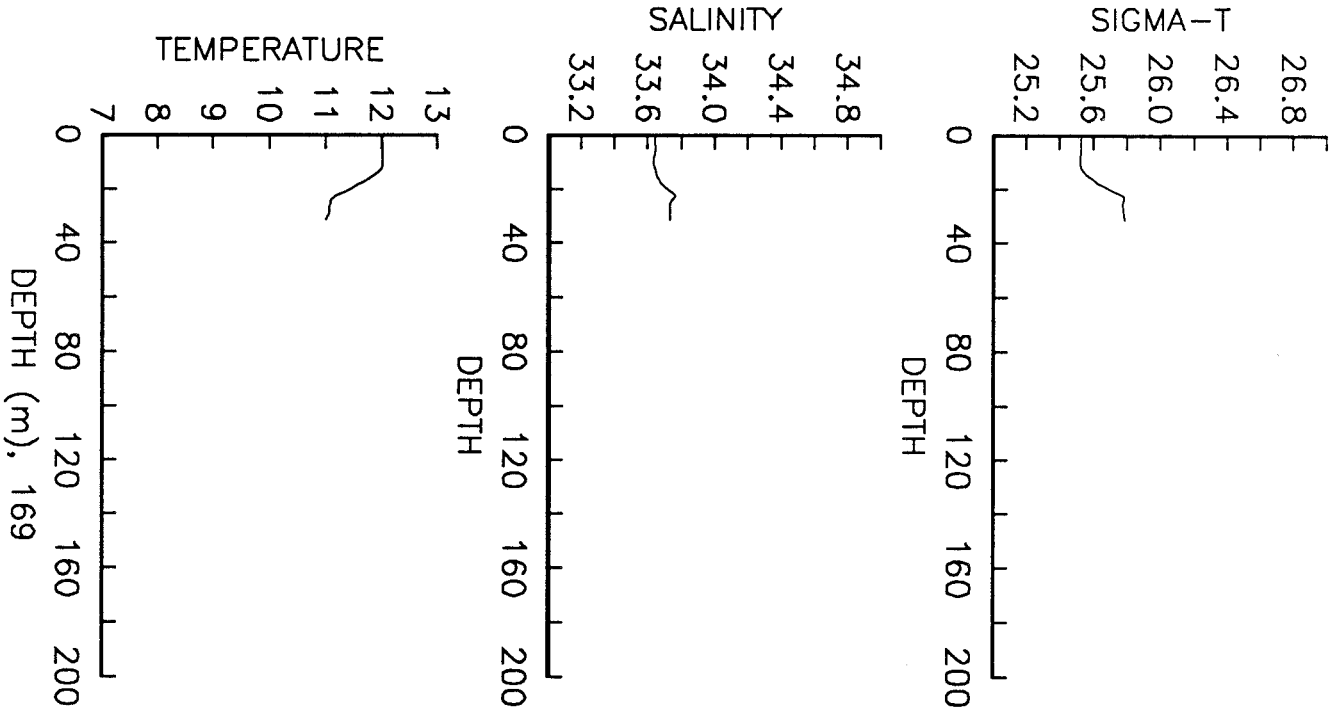
STN 8904.167 25 MAY 1989 0004 PDT
36°44.4'N 121°58.6'W DEPTH 305 m



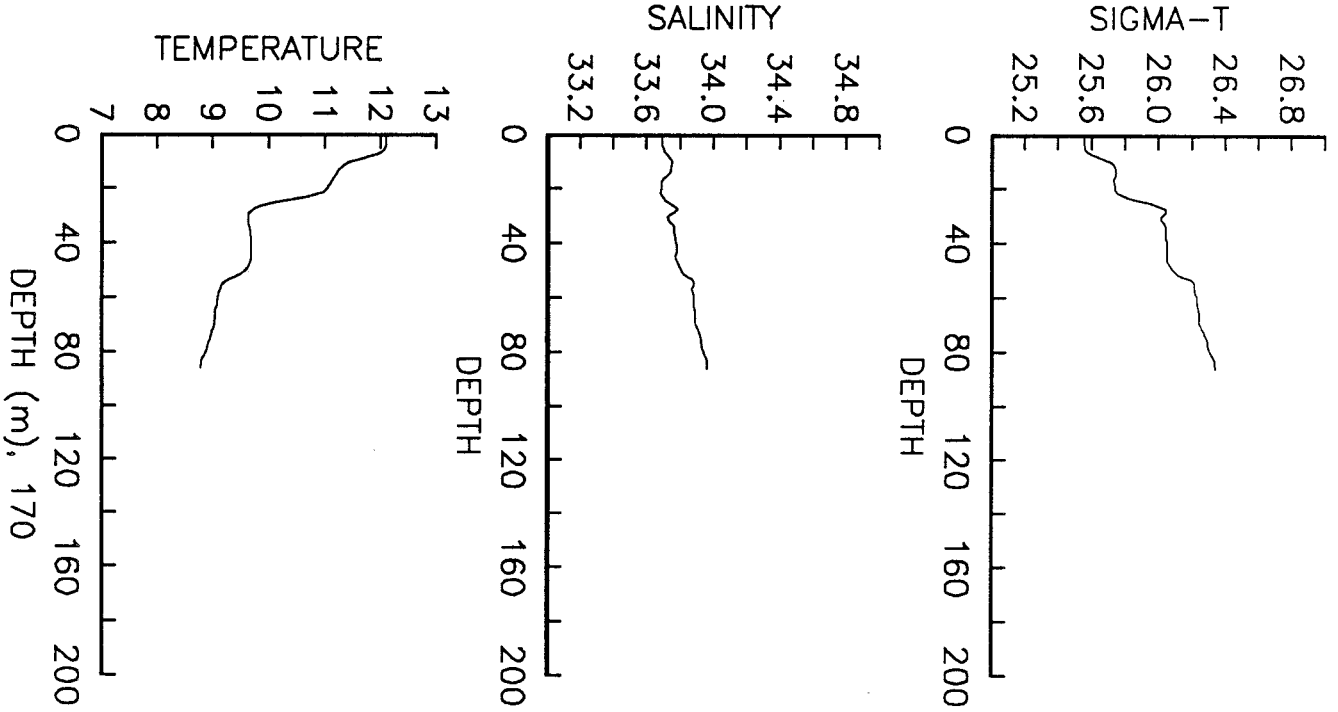
STN 8904.168 25 MAY 1989 0202 PDT
36°43.2'N 121°55.4'W DEPTH 99 m



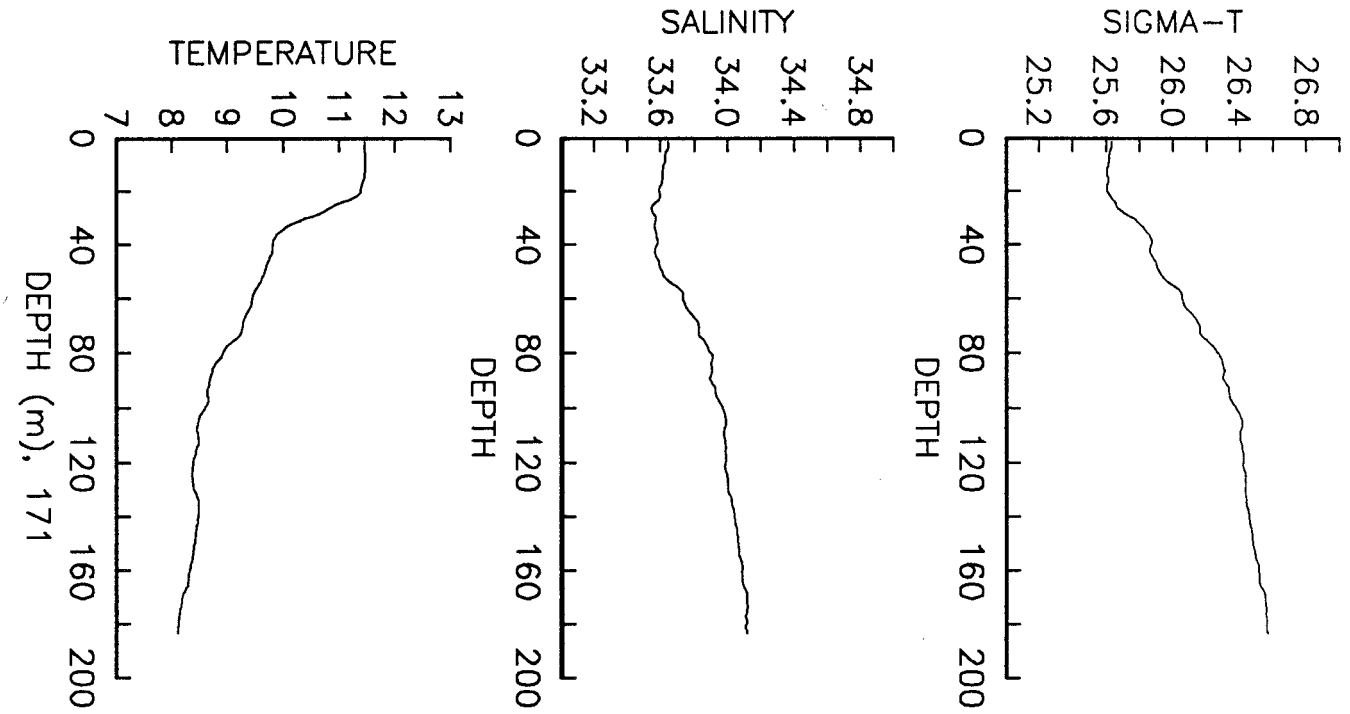
STN 8904.169 25 MAY 1989 0255 PDT
36°38.5'N 121°51.5'W DEPTH 38 m



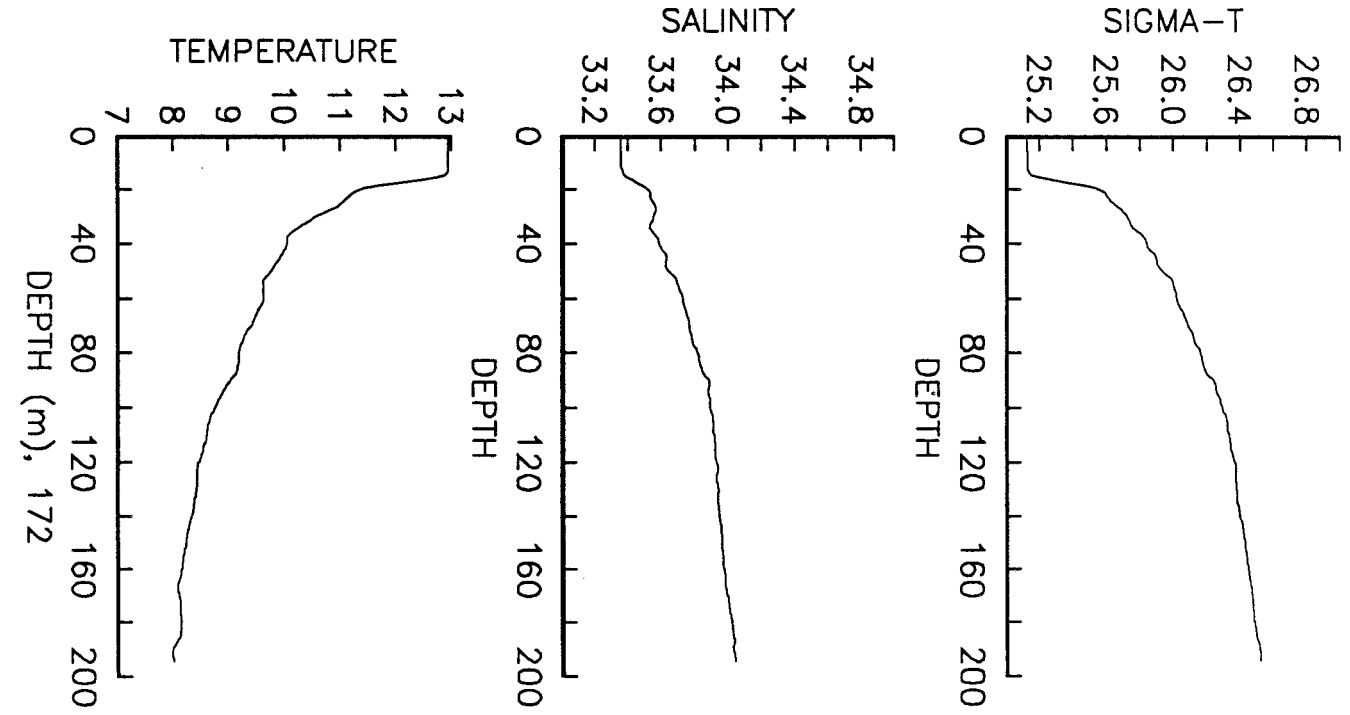
STN 8904.170 25 MAY 1989 0519 PDT
36°40.0'N 121°57.3'W DEPTH 97 m



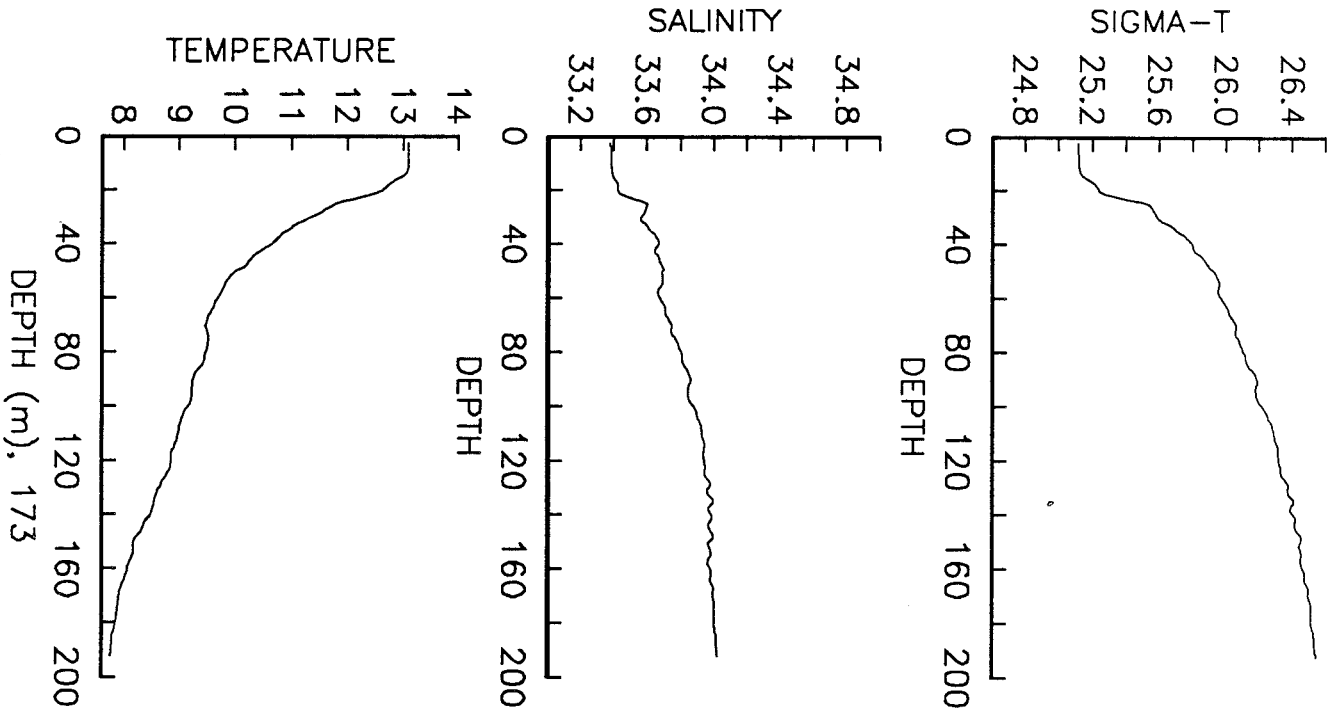
STN 8904.171 25 MAY 1989 0630 PDT
36°38.8'N 122° 3.0'W DEPTH 914 m



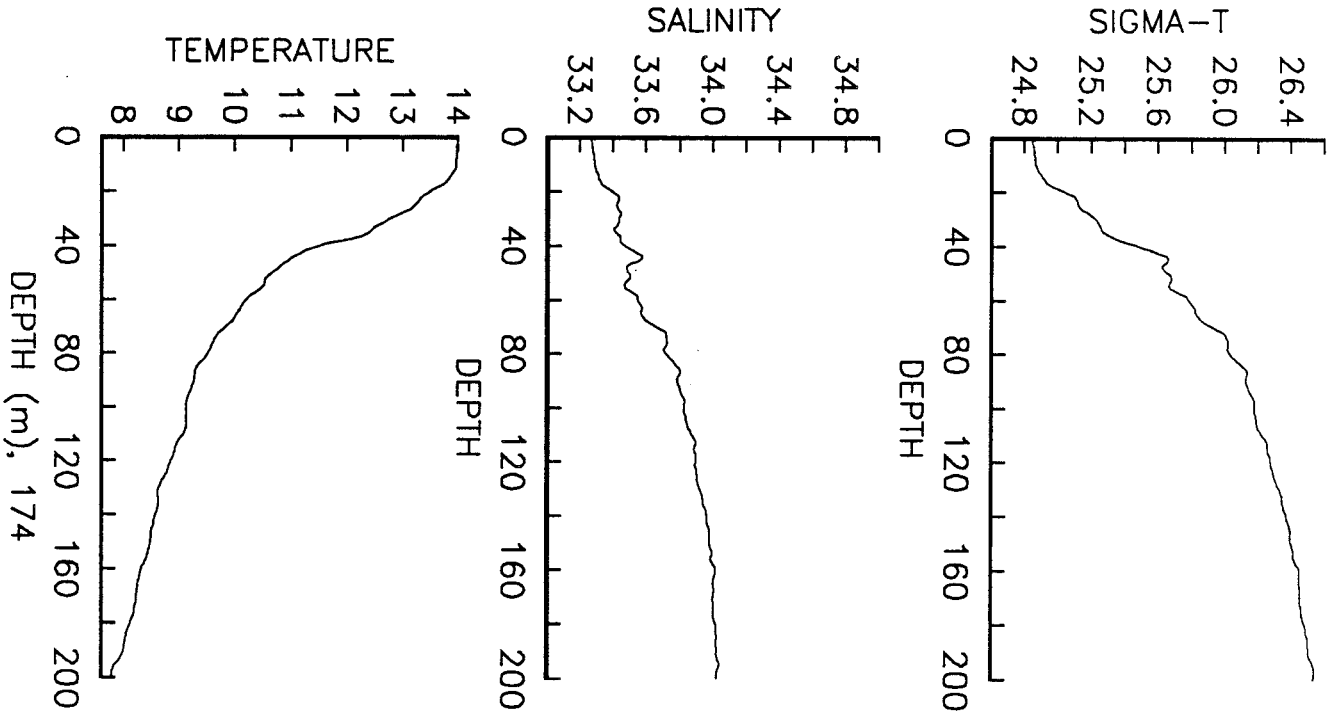
STN 8904.172 25 MAY 1989 0720 PDT
36°40.0'N 122° 9.9'W DEPTH 1134 m



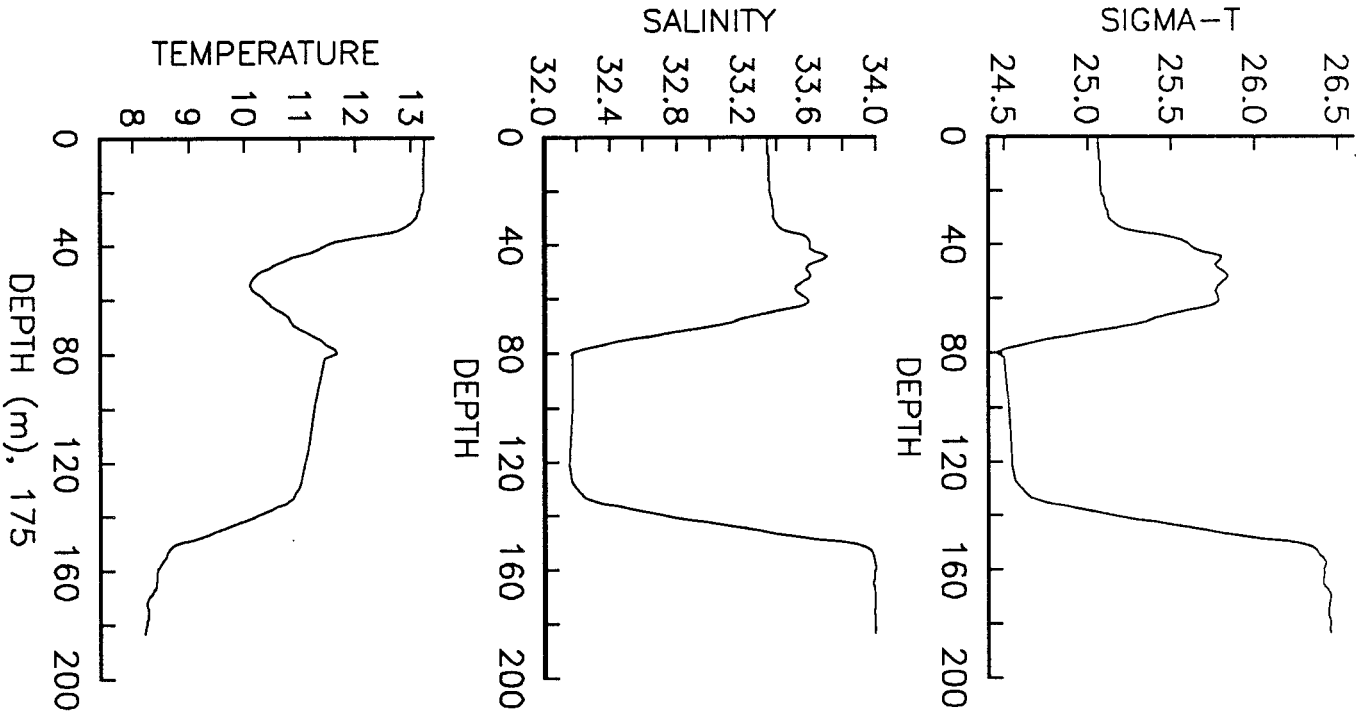
STN 8904.173 25 MAY 1989 0759 PDT
36°40.0'N 122°14.9'W DEPTH 1353 m



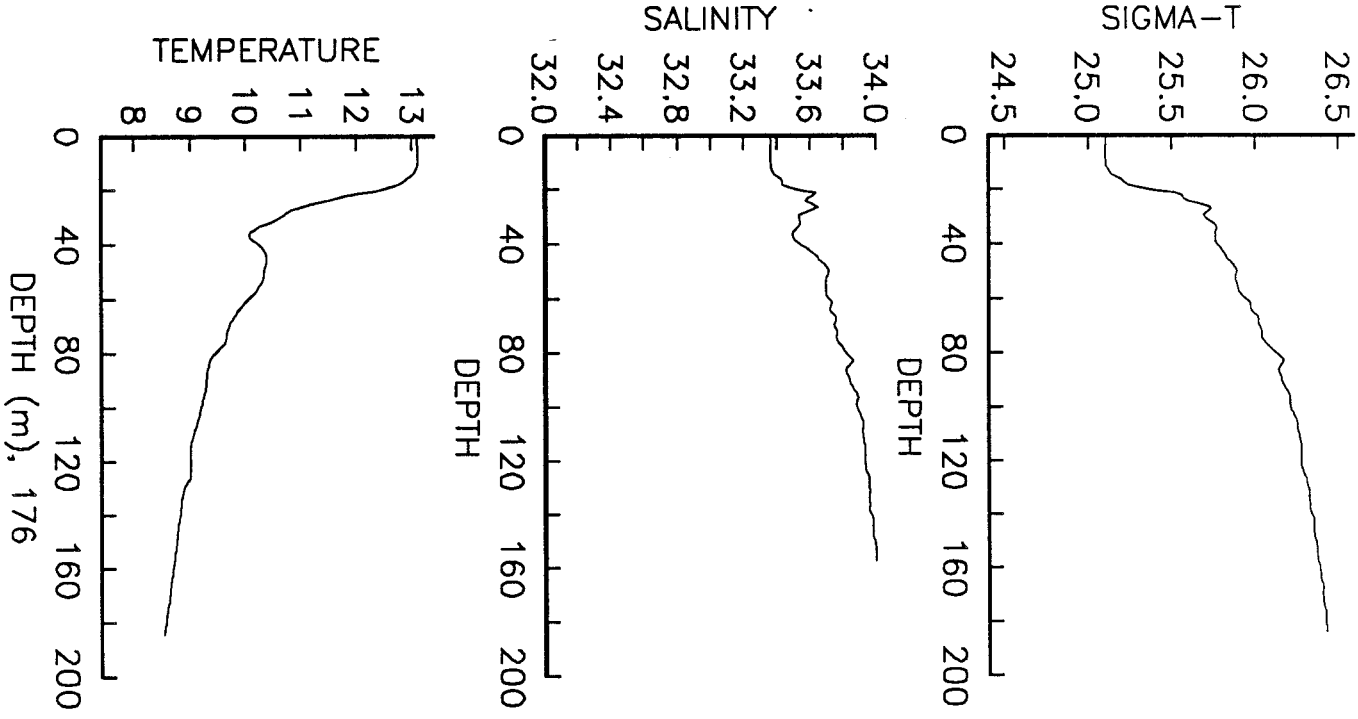
STN 8904.174 25 MAY 1989 0848 PDT
36°40.0'N 122°21.5'W DEPTH 1646 m



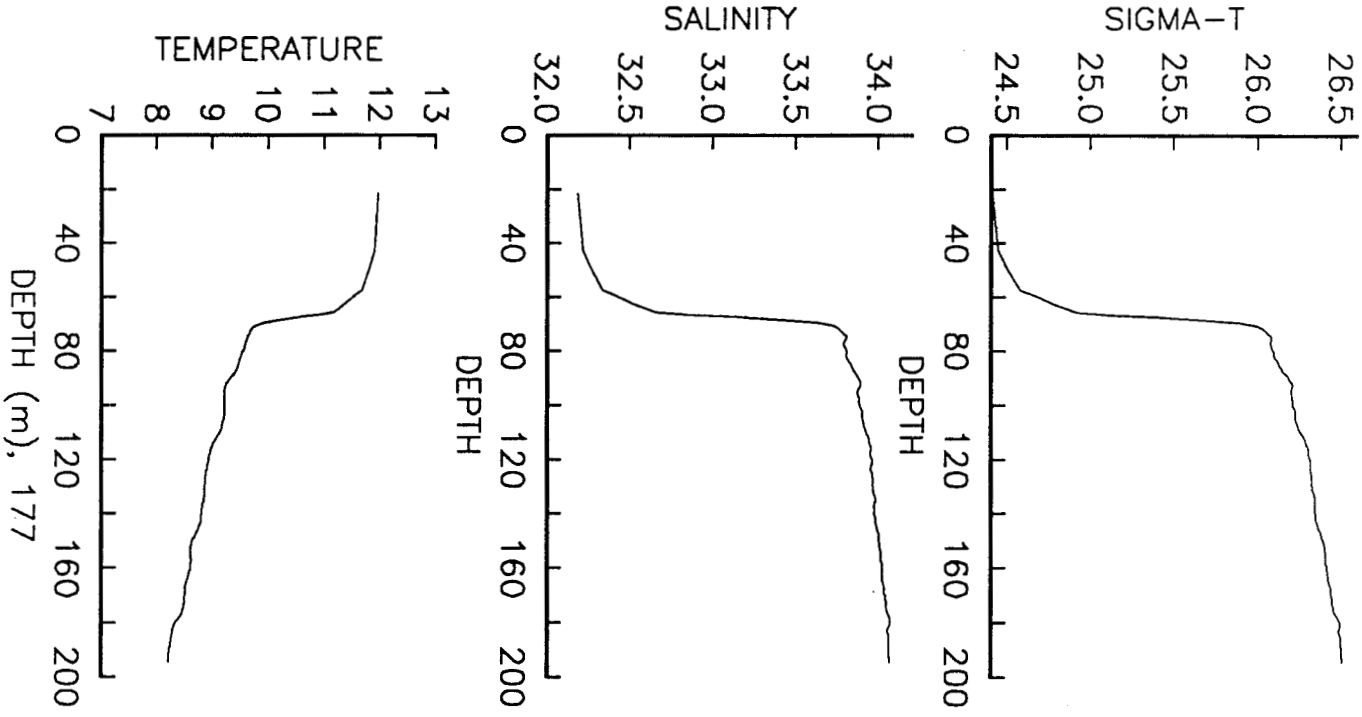
STN 8904.175 25 MAY 1989 0928 PDT
36°35.0'N 122°21.5'W DEPTH 2195 m



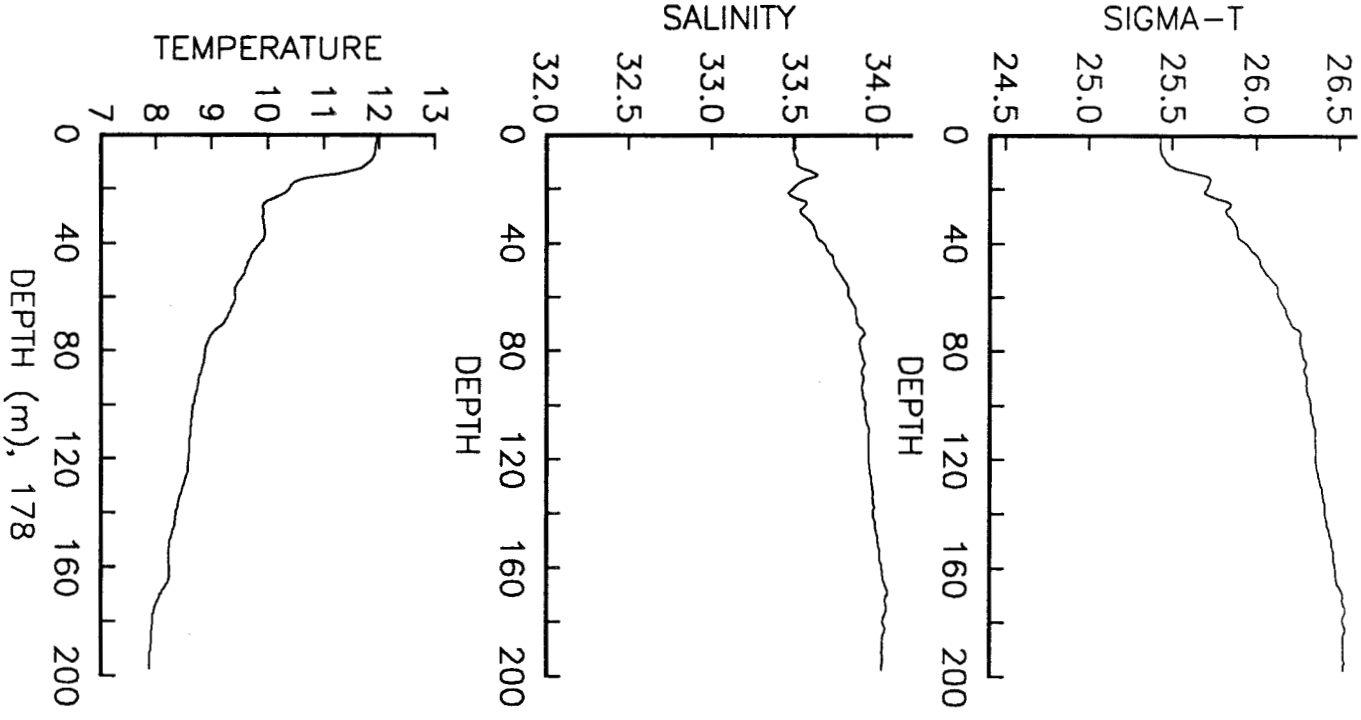
STN 8904.176 25 MAY 1989 1008 PDT
36°35.0'N 122°16.0'W DEPTH 2195 m



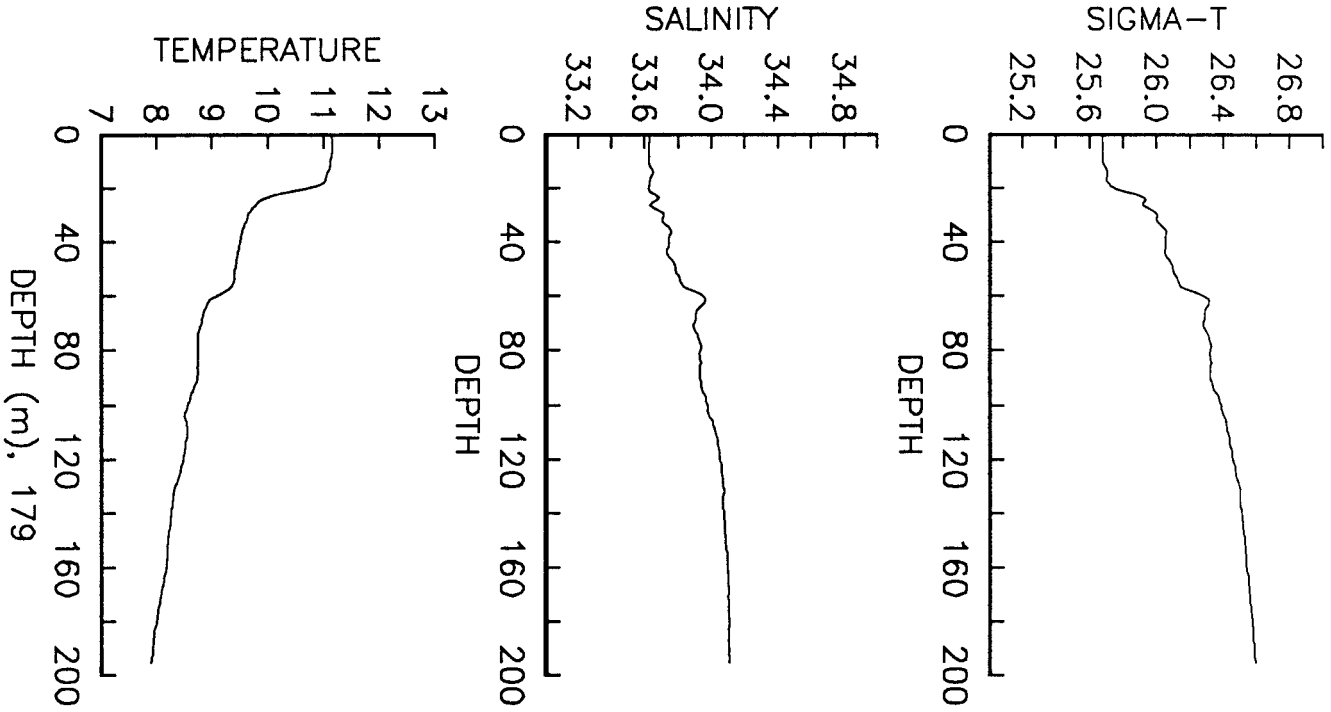
STN 8904.177 25 MAY 1989 1047 PDT
36°35.0'N 122°10.5'W DEPTH 2195 m



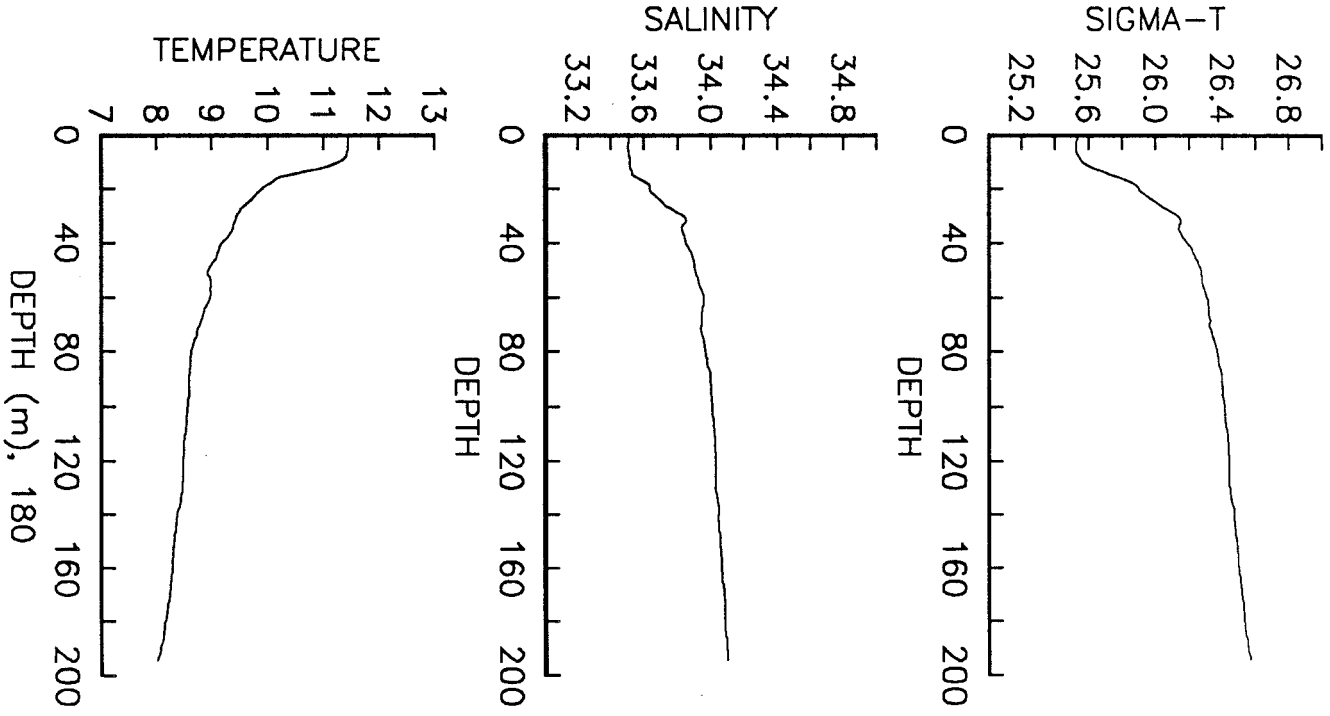
STN 8904.178 25 MAY 1989 1121 PDT
36°35.0'N 122° 6.0'W DEPTH 1372 m



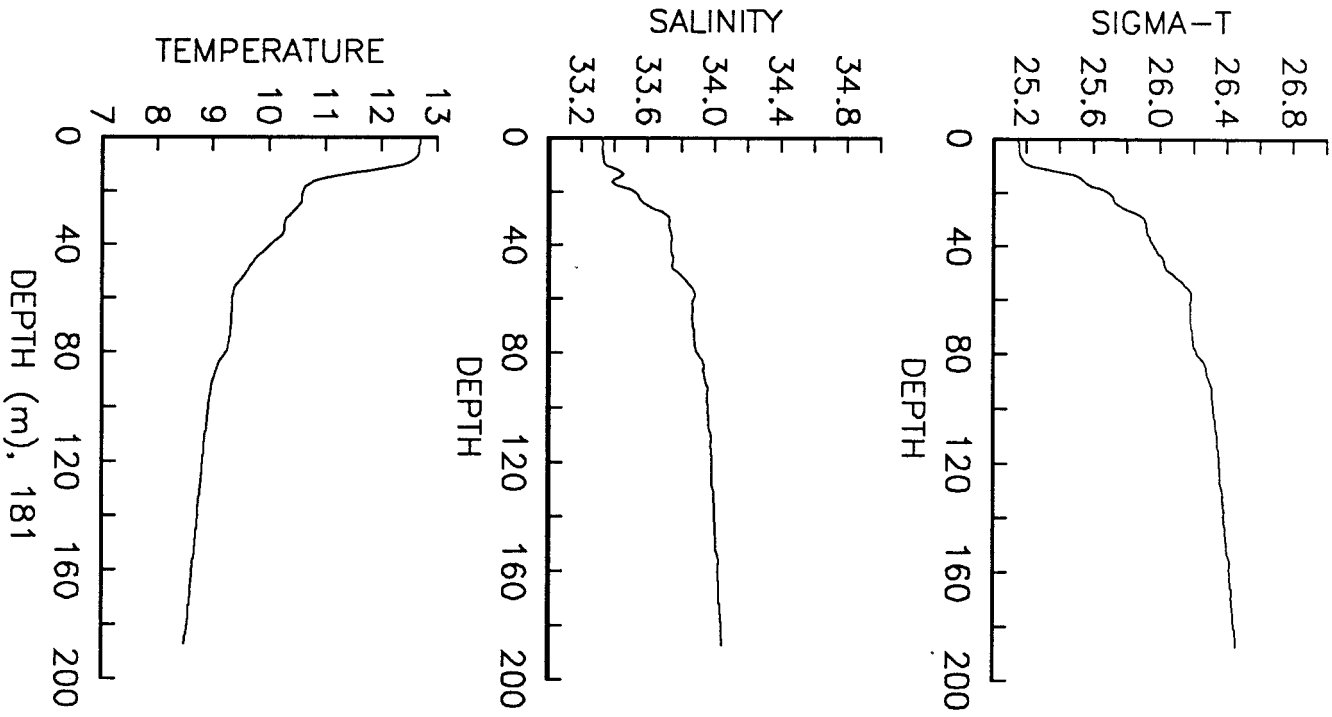
STN 8904.179 25 MAY 1989 1154 PDT
36°35.0'N 122° 2.0'W DEPTH 622 m



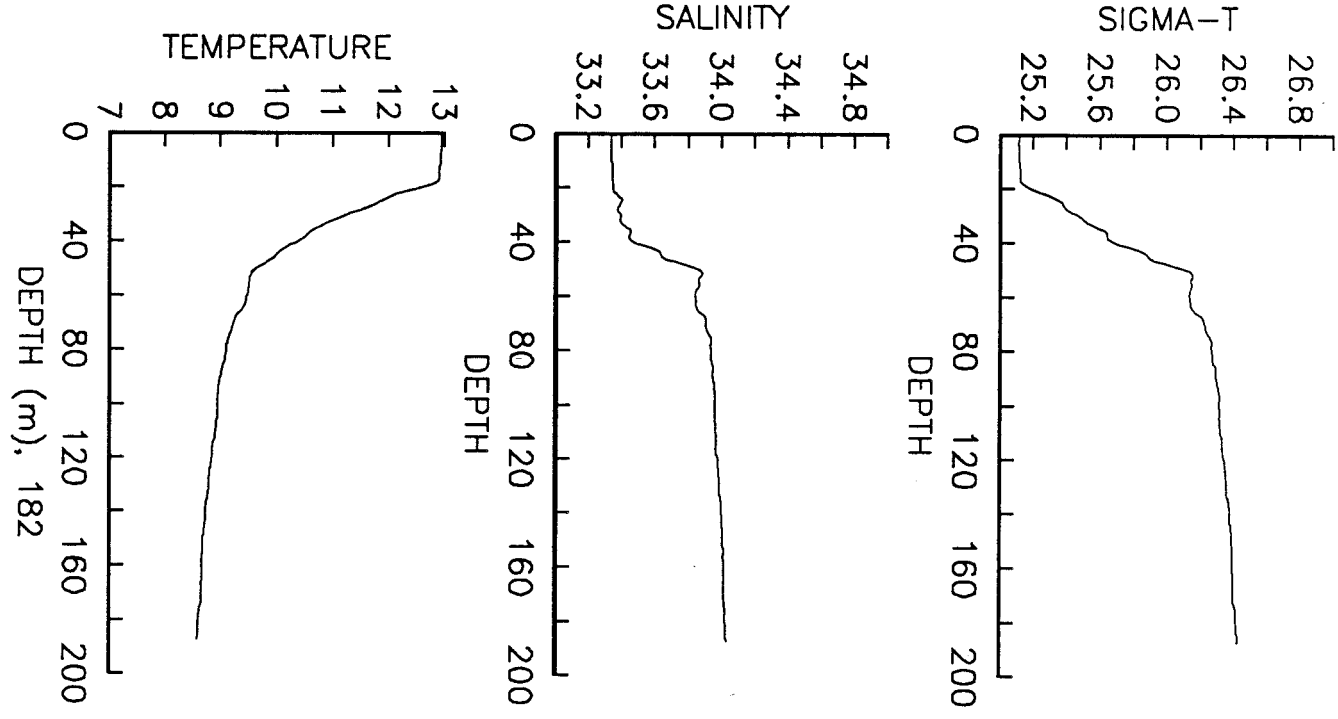
STN 8904.180 25 MAY 1989 1234 PDT
36°29.8'N 122° 4.2'W DEPTH 878 m



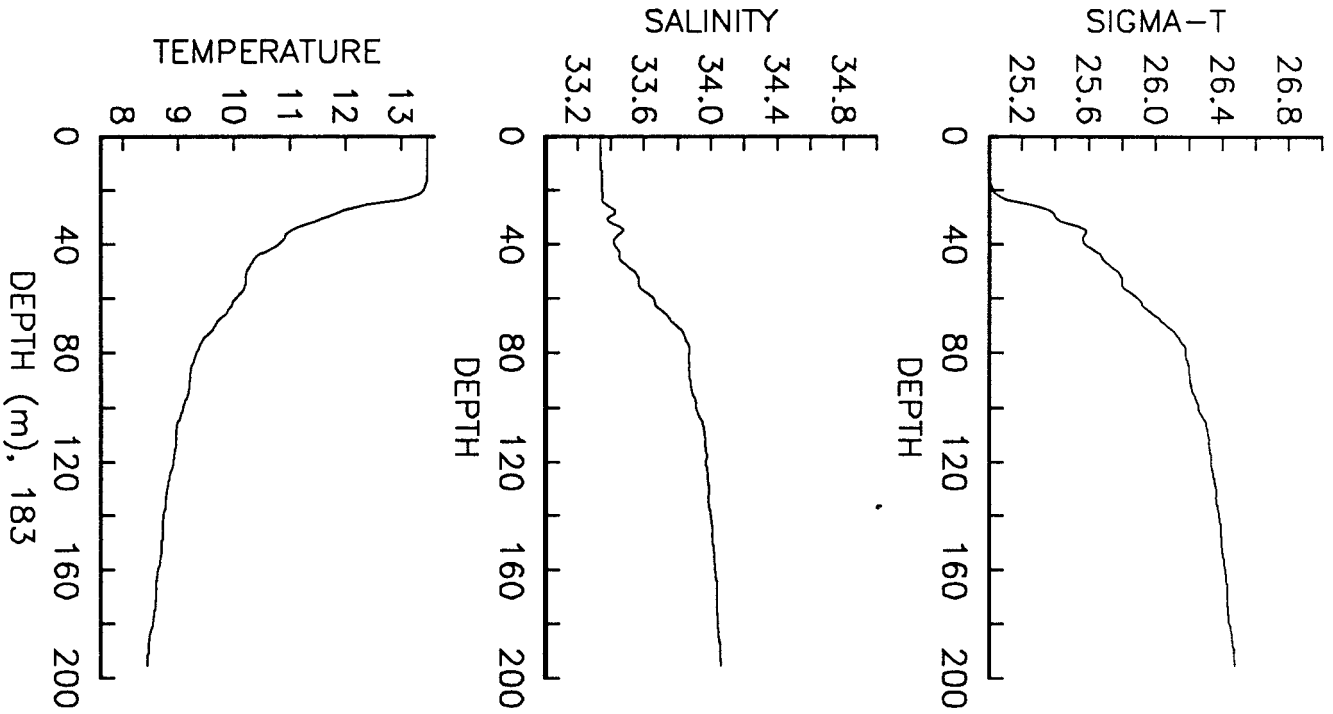
STN 8904.181 25 MAY 1989 1322 PDT
36°29.9'N 122°10.1'W DEPTH 1280 m



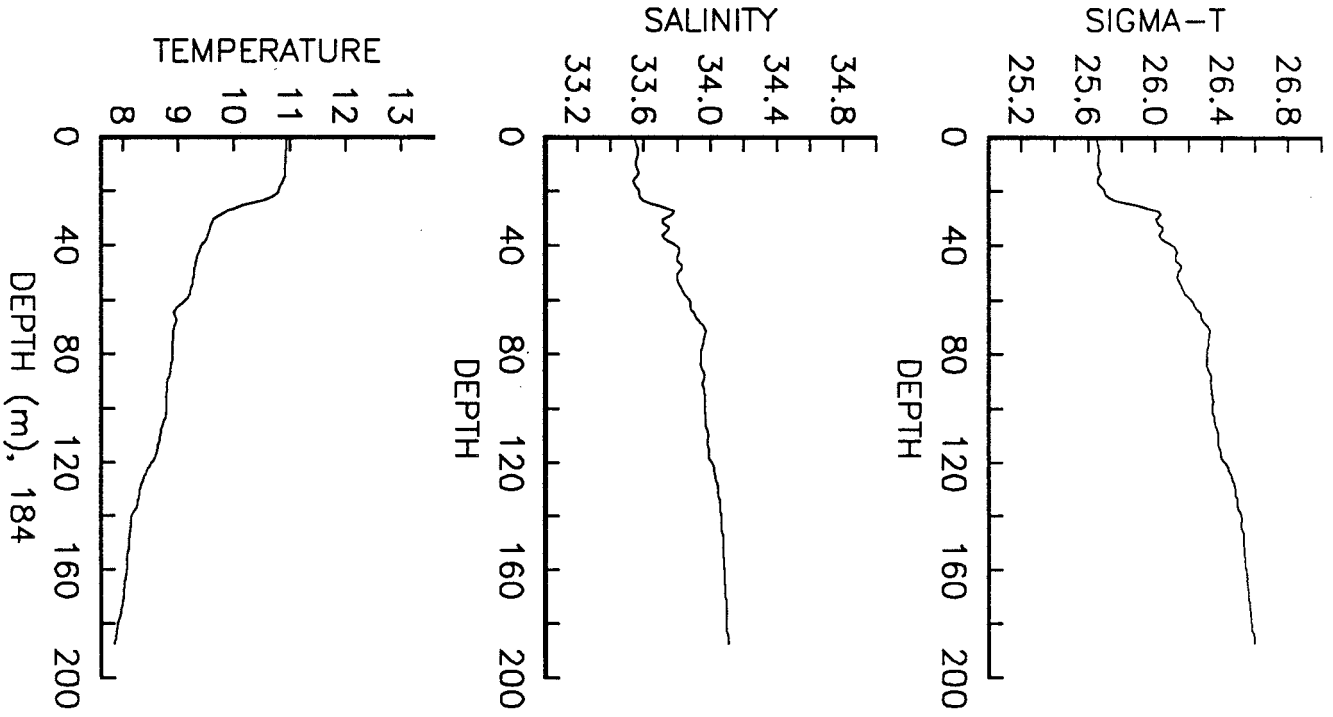
STN 8904.182 25 MAY 1989 1409 PDT
36°30.0'N 122°16.1'W DEPTH 1353 m



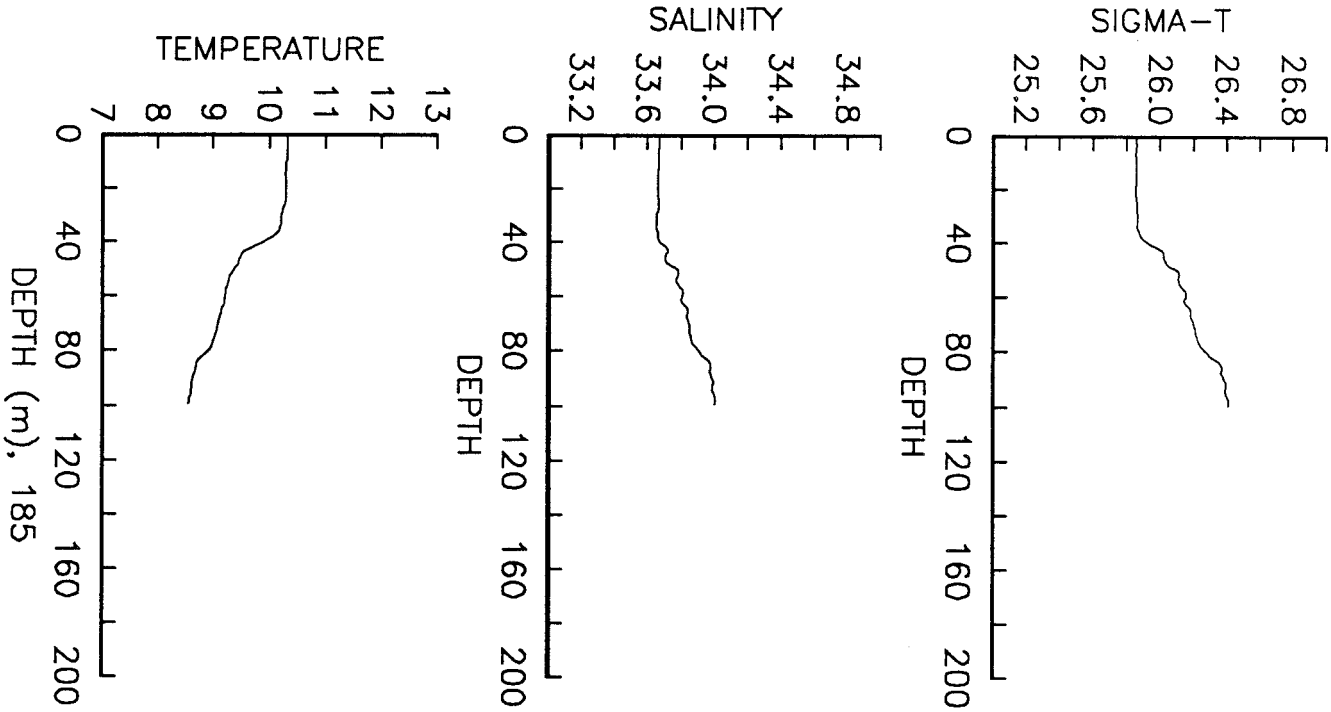
STN 8904.183 25 MAY 1989 1501 PDT
36°30.1'N 122°22.6'W DEPTH 1609 m



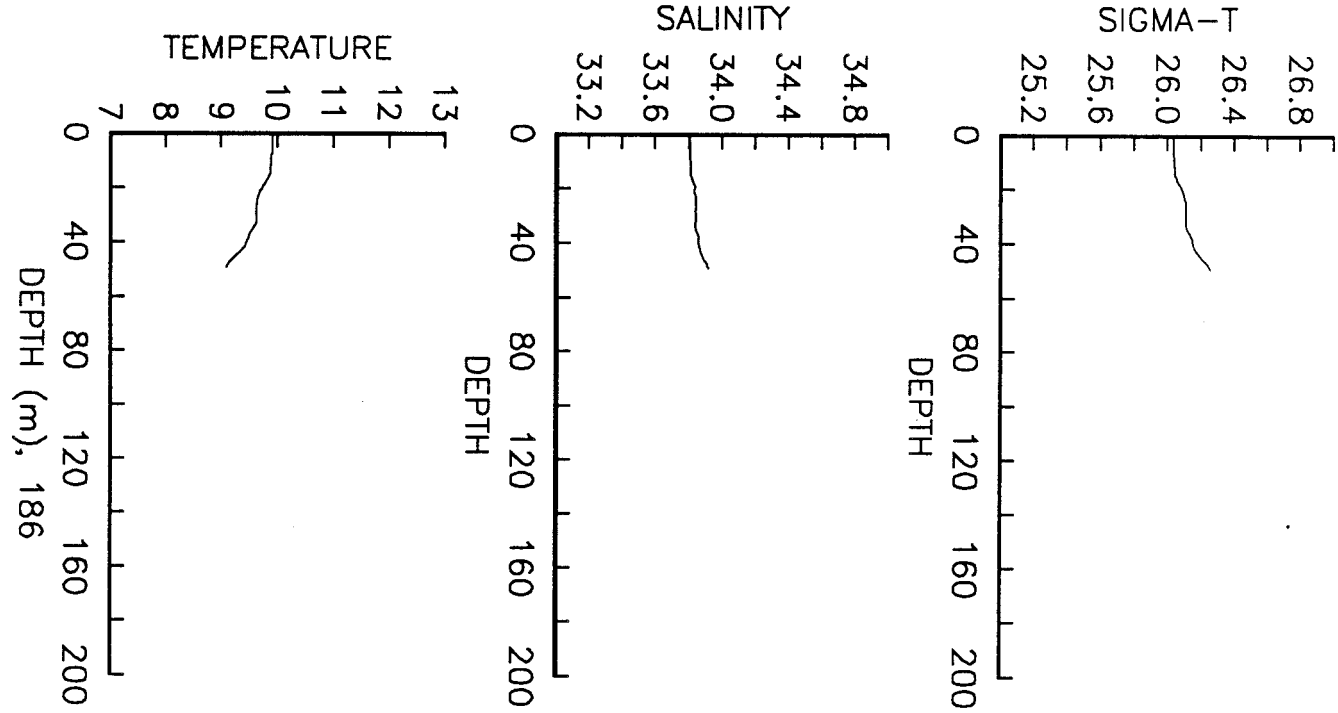
STN 8904.184 25 MAY 1989 2130 PDT
36°44.4'N 122° 2.5'W DEPTH 741 m



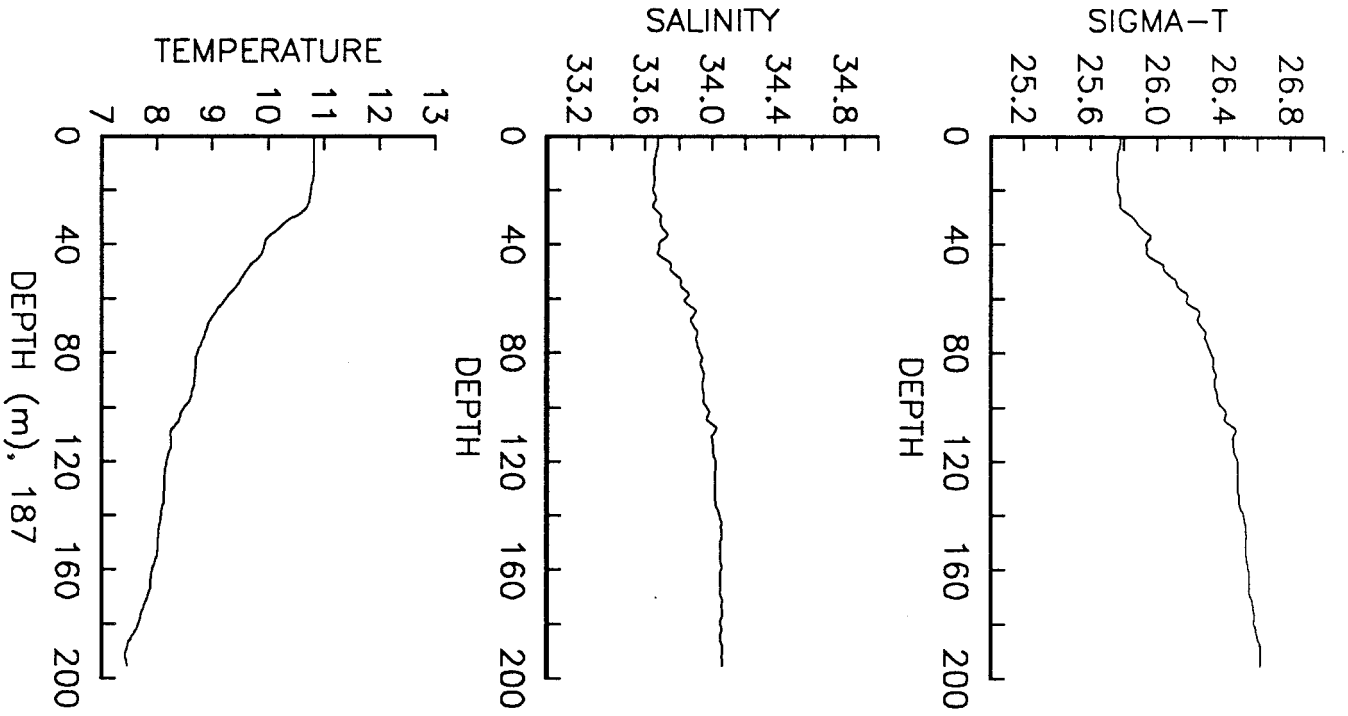
STN 8904.185 25 MAY 1989 2220 PDT
36°49.0'N 122° 5.0'W DEPTH 106 m



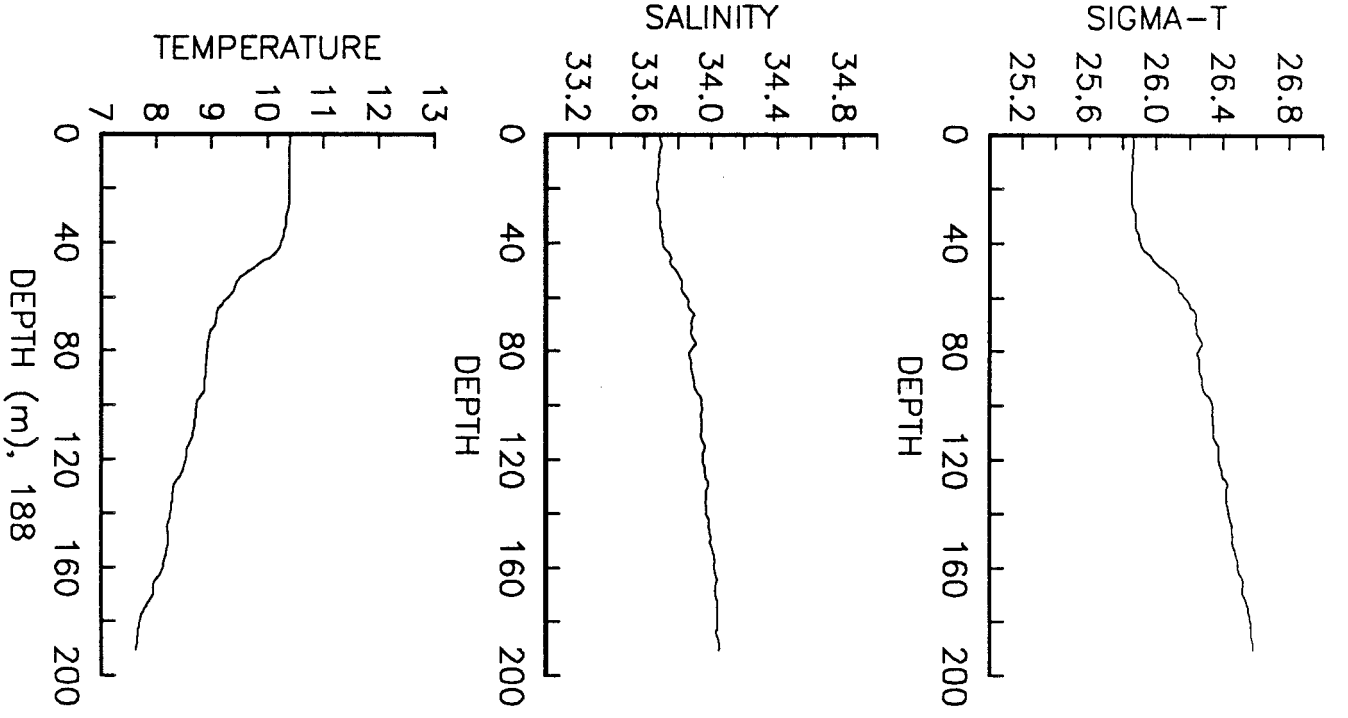
STN 8904.186 25 MAY 1989 2304 PDT
36°54.0'N 122° 5.0'W DEPTH 57 m



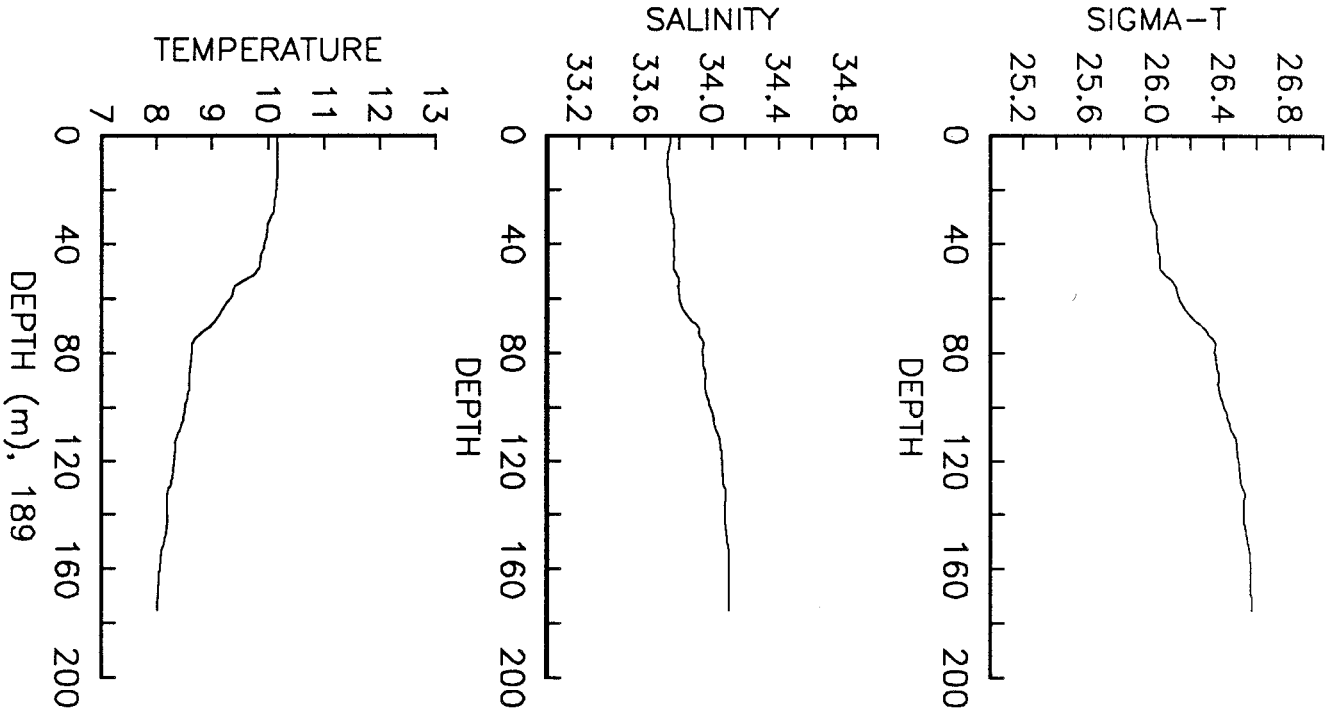
STN 8904.187 28 MAY 1989 2052 PDT
36°46.5'N 122° 9.1'W DEPTH 914 m



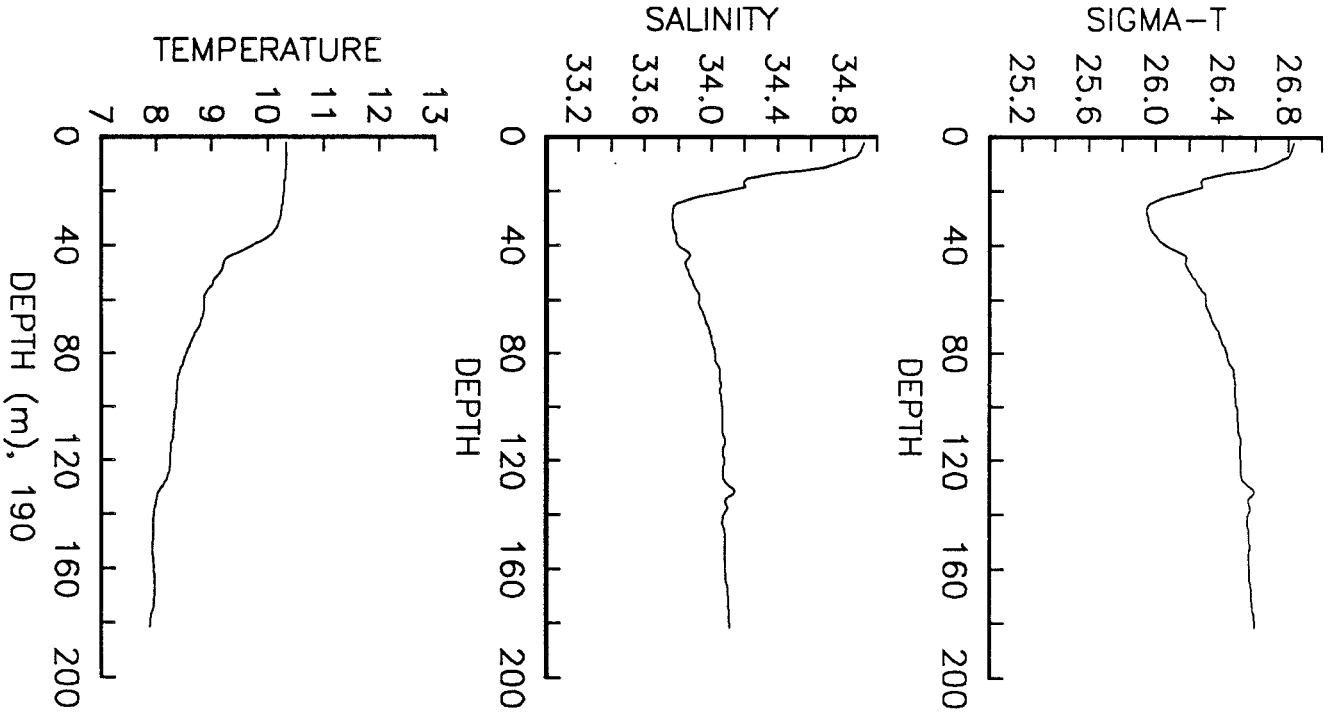
STN 8904.188 28 MAY 89 2310 PDT
36°42.1'N 122° 7.1'W DEPTH 1829 m



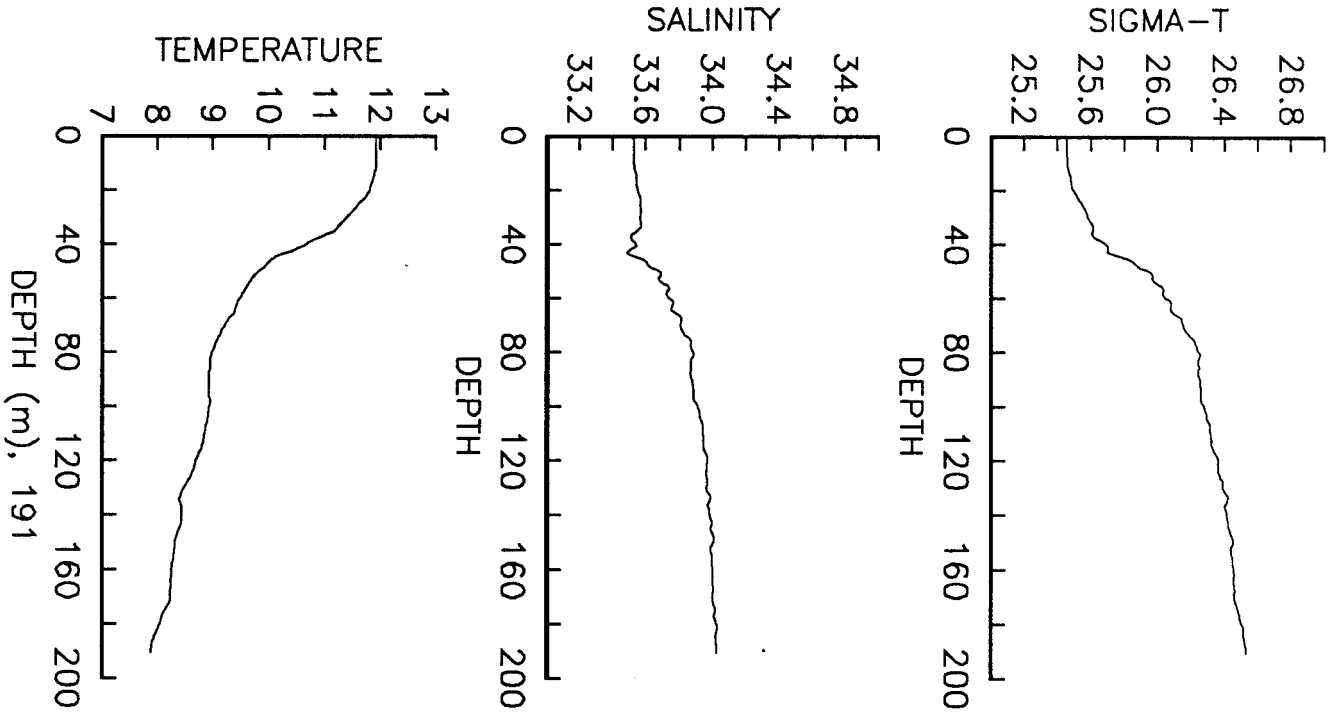
STN 8904.189 28 MAY 1989 2347 PDT
36°38.7'N 122° 3.1'W DEPTH 914 m



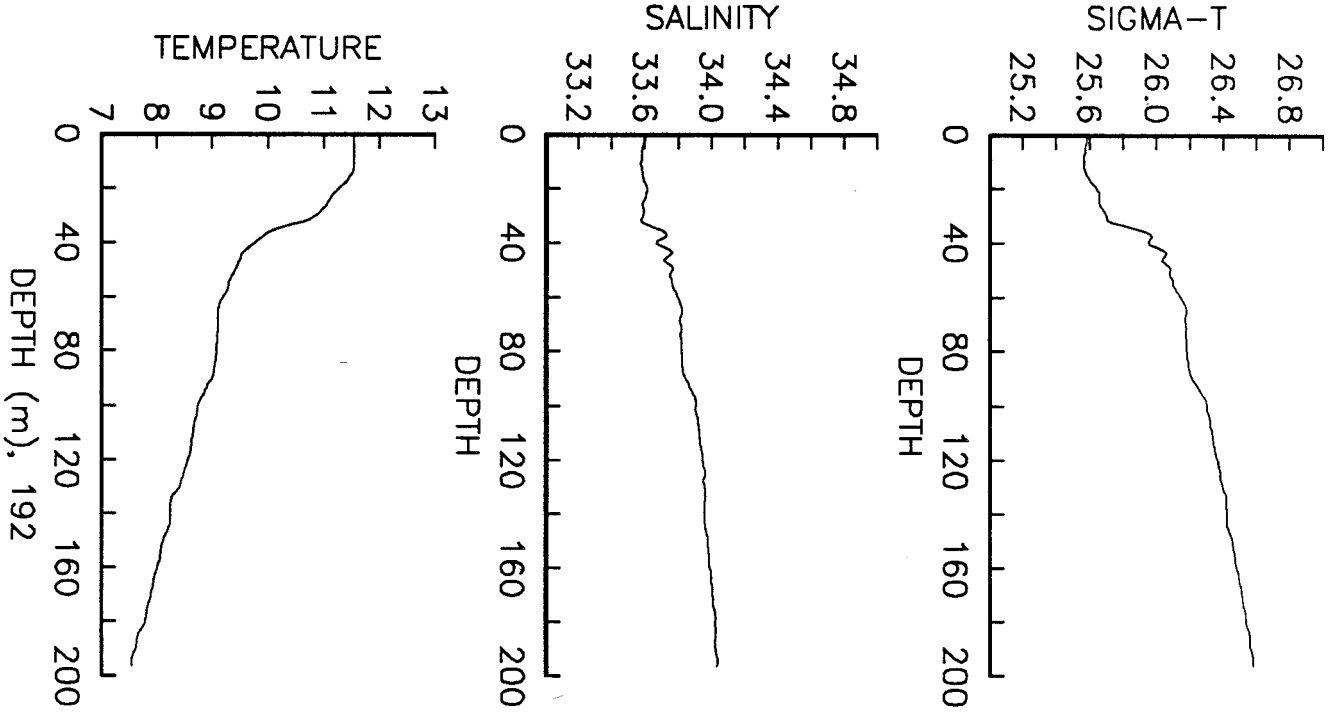
STN 8904.190 29 MAY 1989 0140 PDT
36°33.6'N 122° 7.1'W DEPTH 823 m



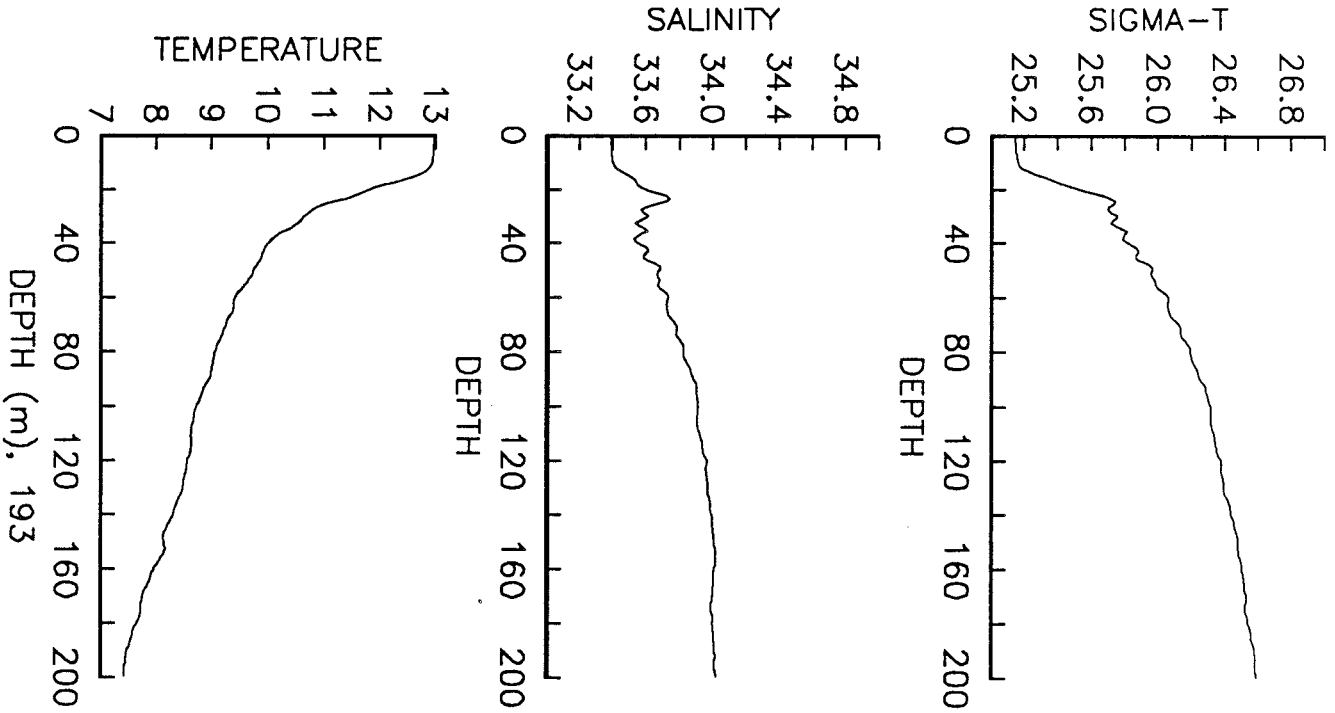
STN 8904.191 29 MAY 1989 0459 PDT
36°34.8'N 122°11.7'W DEPTH 2323 m



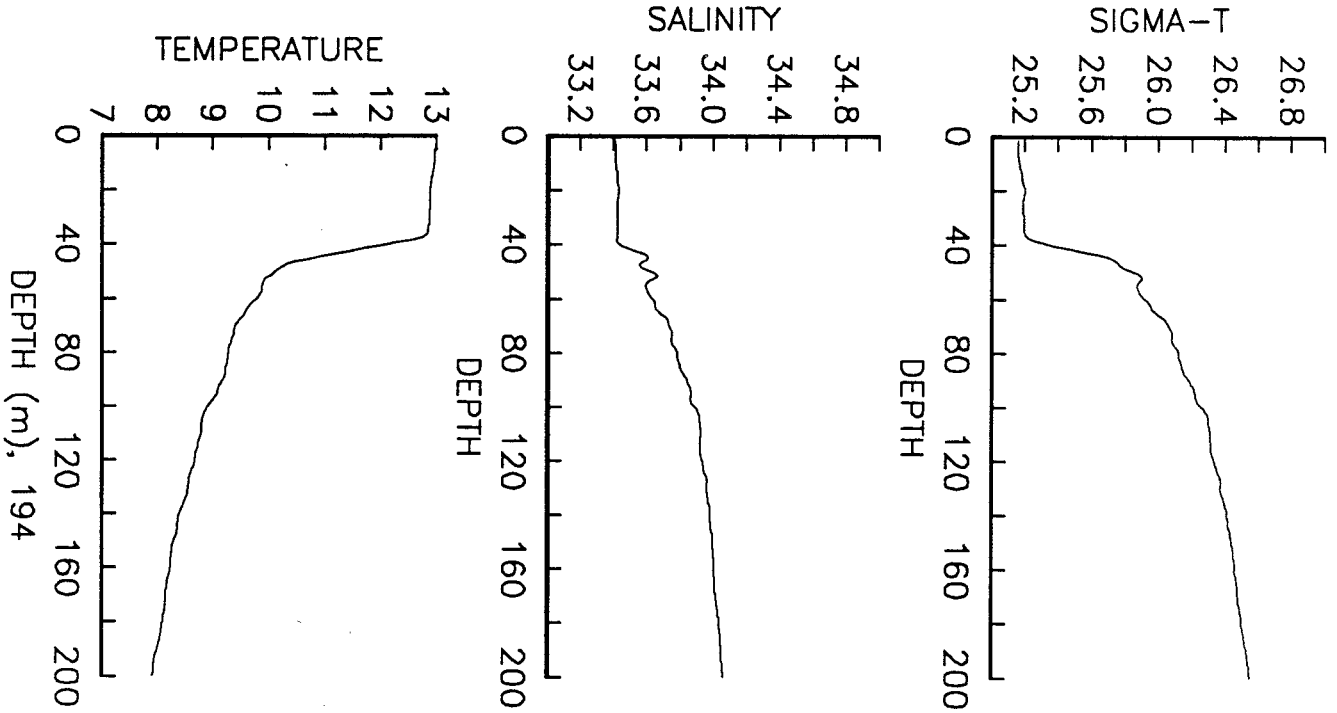
STN 8904.192 29 MAY 1989 0713 PDT
36°44.4'N 122°16.0'W DEPTH 971 m



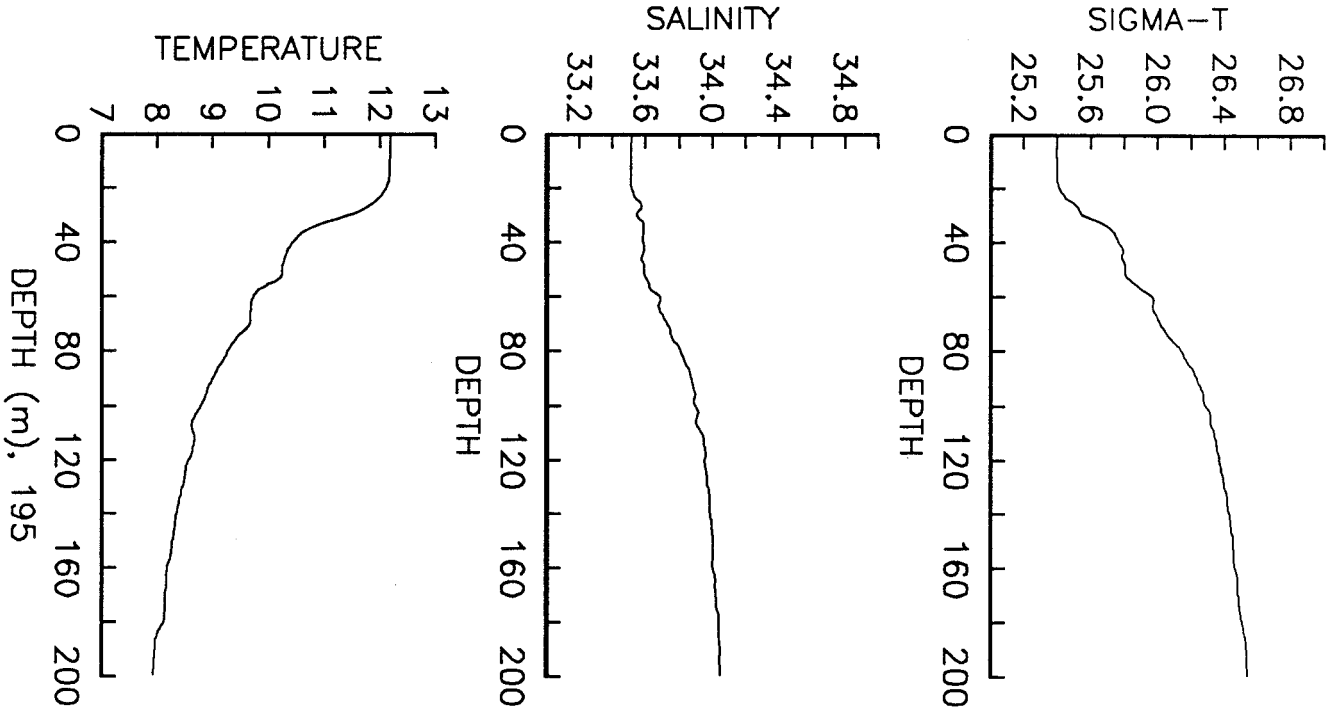
STN 8904.193 29 MAY 1989 0756 PDT
36°44.4'N 122°16.0'W DEPTH 1591 m



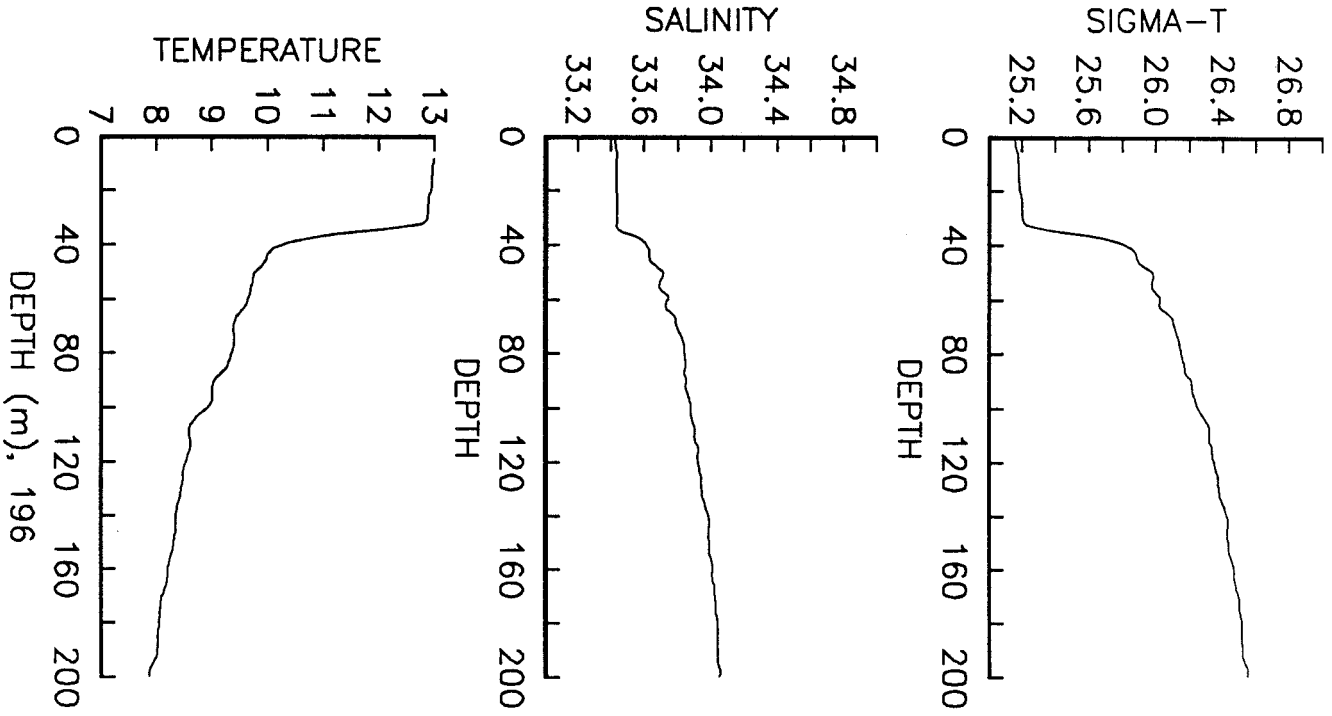
STN 8904.194 29 MAY 1989 0834 PDT
36°44.4'N 122°26.9'W DEPTH 2012 m



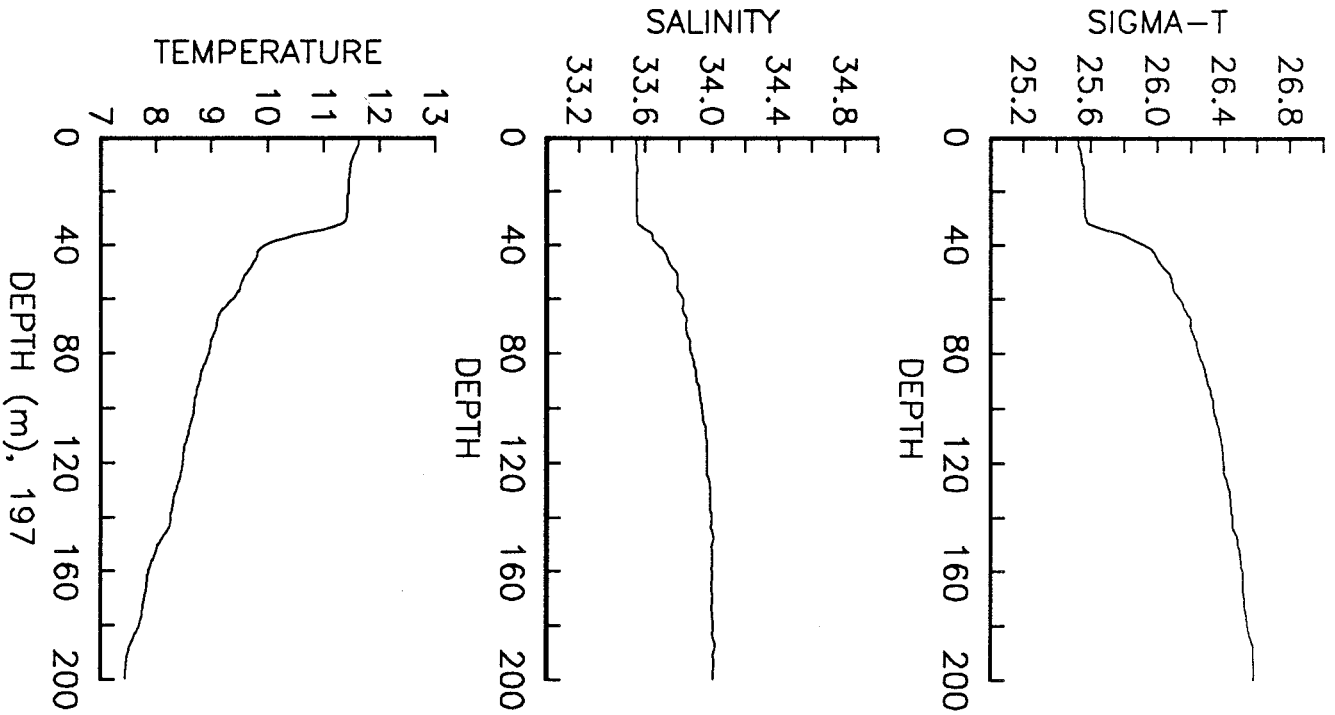
STN 8904.195 29 MAY 1989 0916 PDT
36°49.0'N 122°29.5'W DEPTH 2103 m



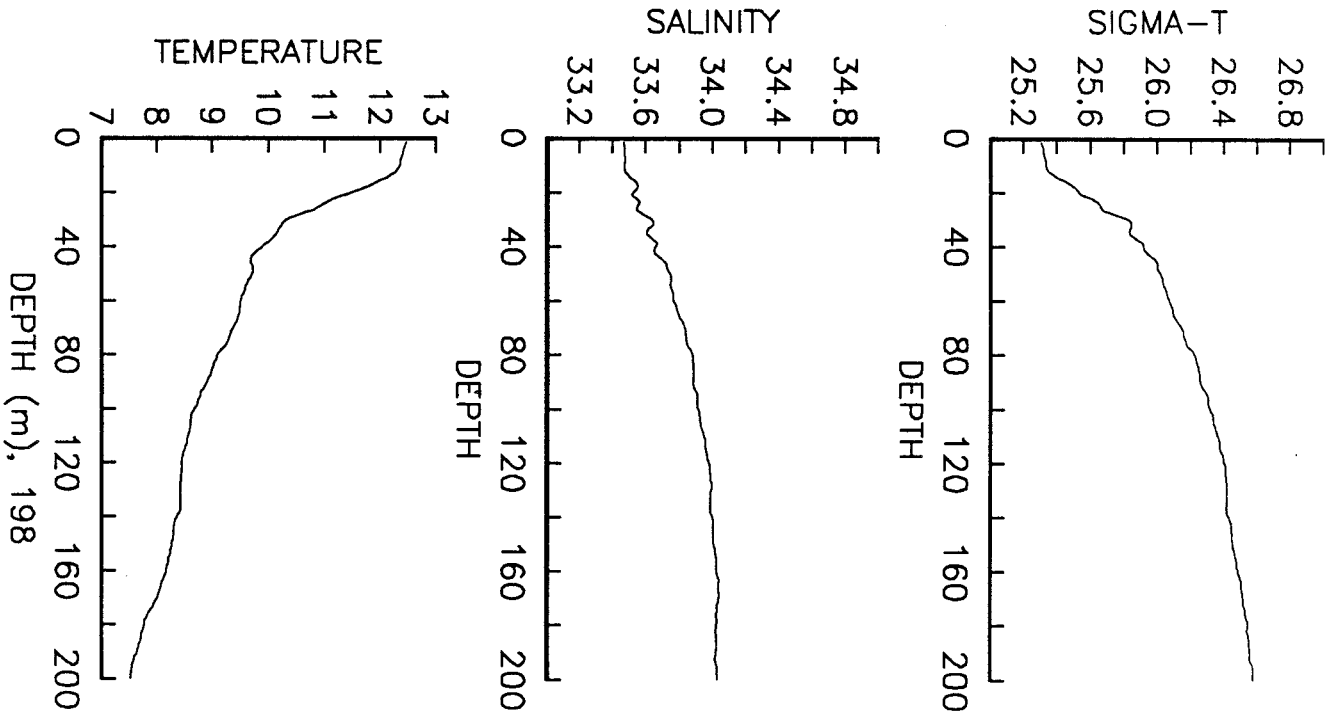
STN 8904.196 29 MAY 1989 1001 PDT
36°49.0'N 122°36.0'W DEPTH 1829 m



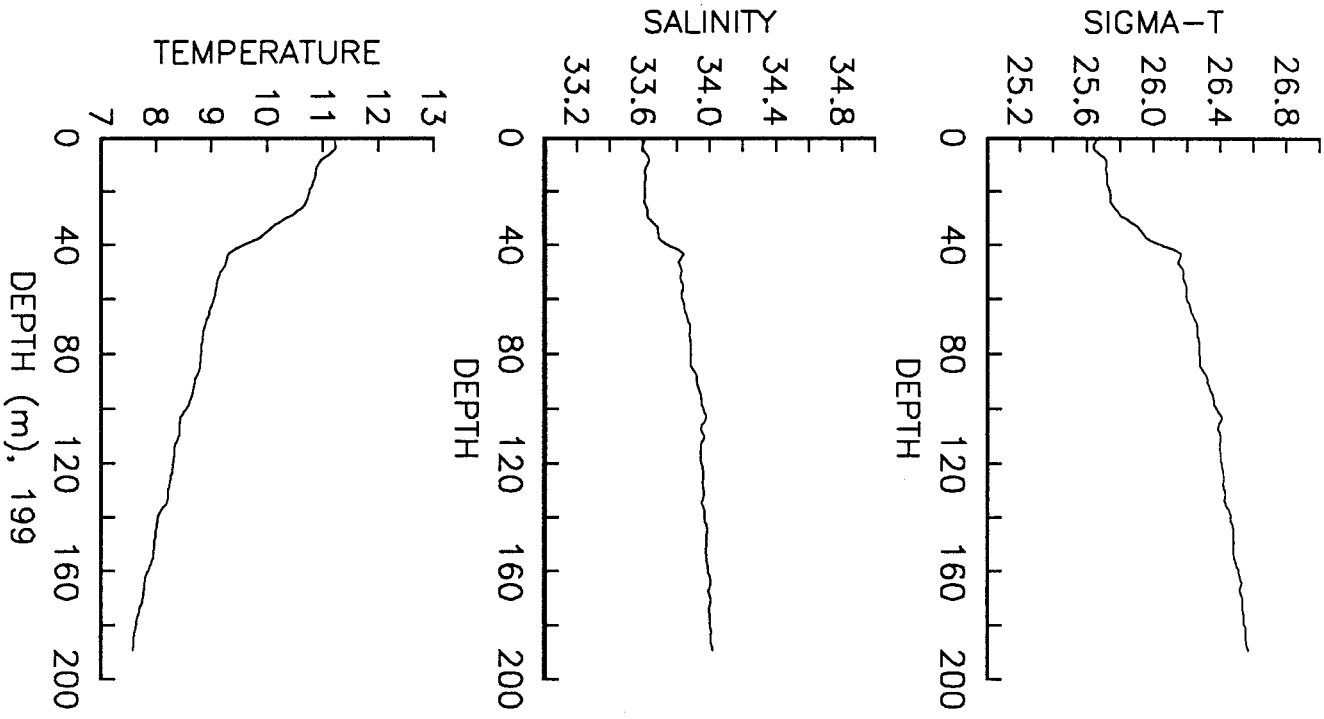
STN 8904.197 29 MAY 1989 1052 PDT
36°54.0'N 122°30.0'W DEPTH 1061 m



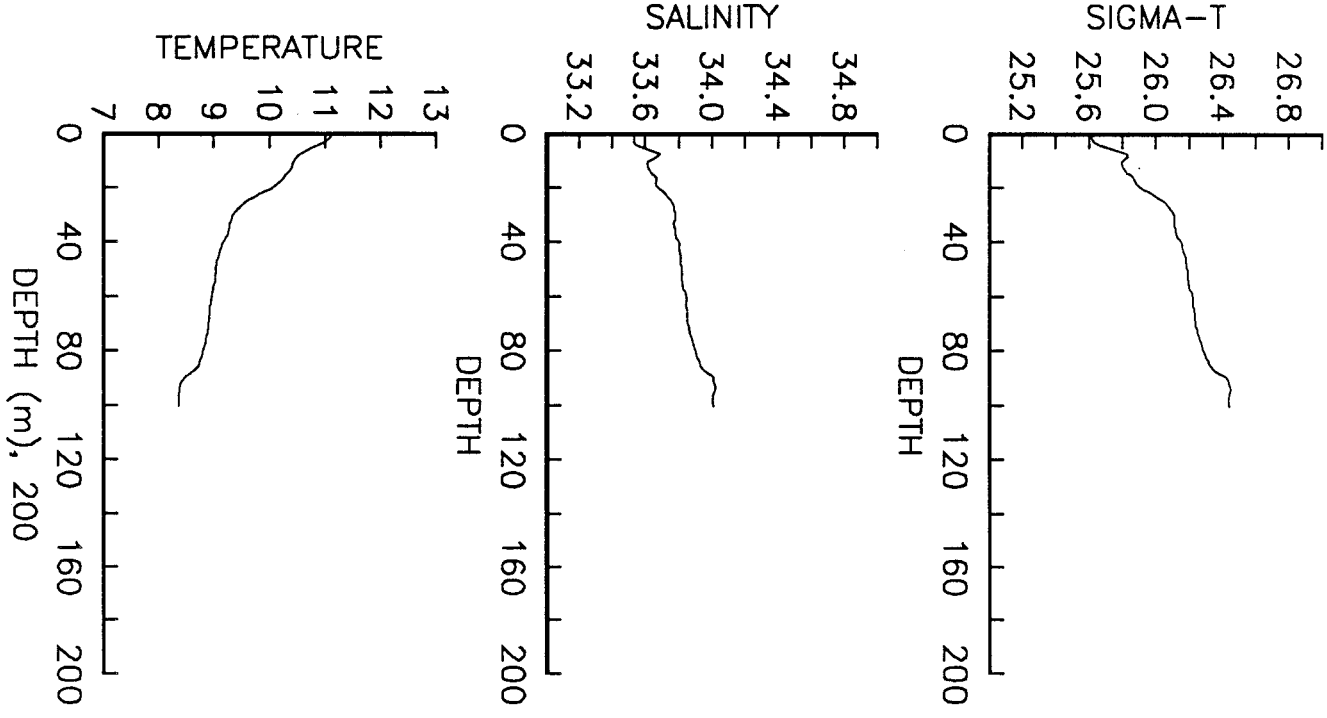
STN 8904.198 29 MAY 1989 1135 PDT
36°54.0'N 122°35.9'W DEPTH 1006 m



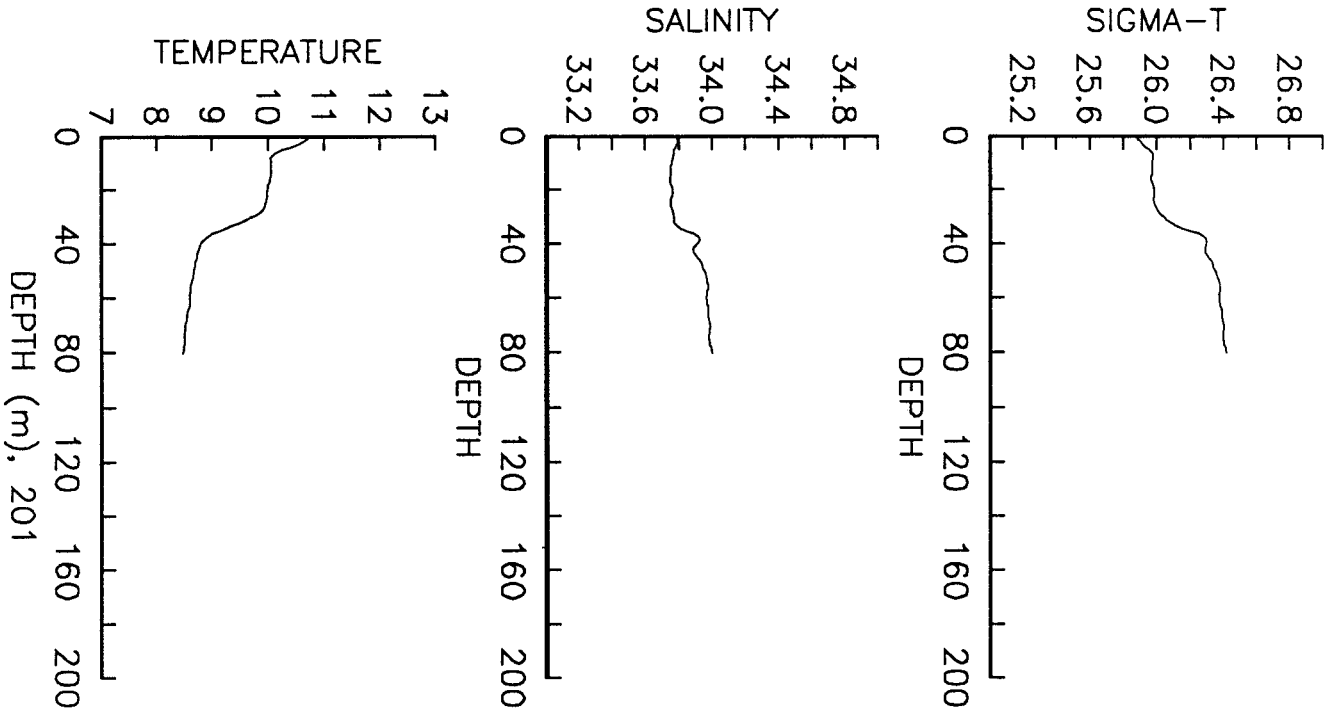
STN 8904.199 29 MAY 1989 1225 PDT
36°59.0'N 122°40.1'W DEPTH 578 m



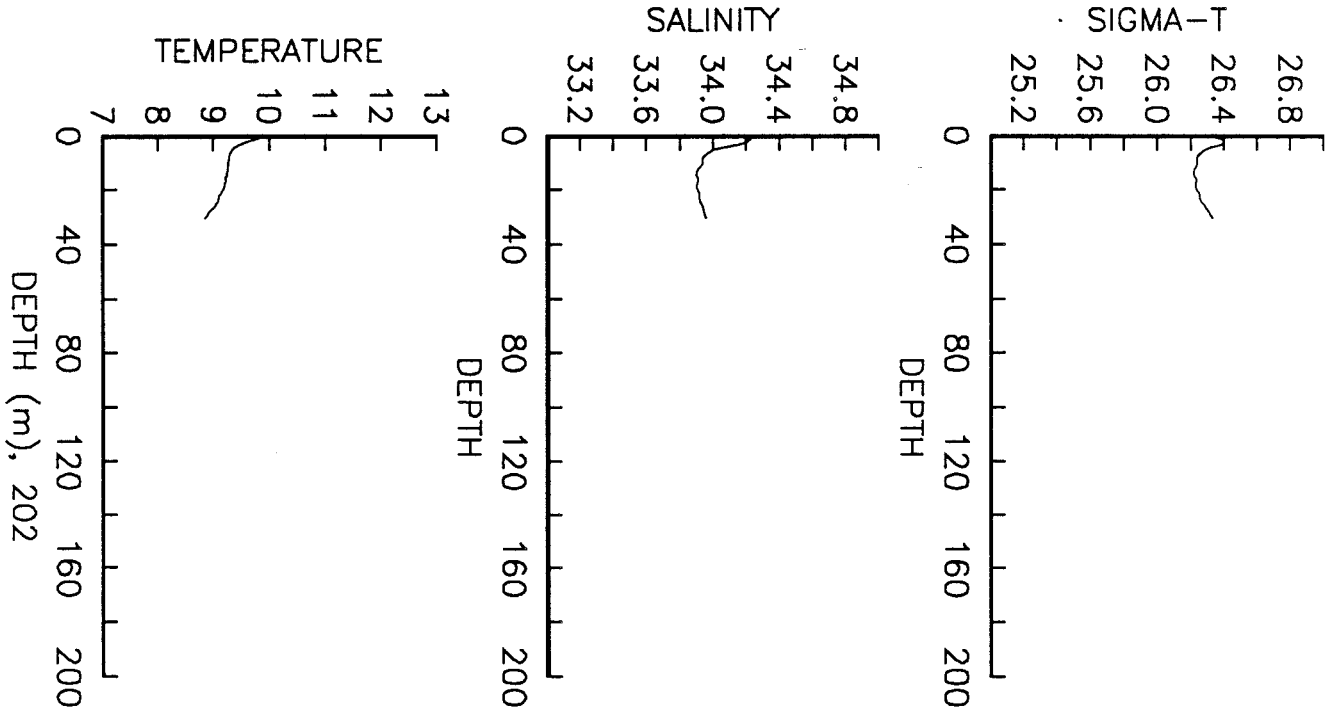
STN 8904.200 29 MAY 1989 1335 PDT
37° 8.0'N 122°36.1'W DEPTH 108 m



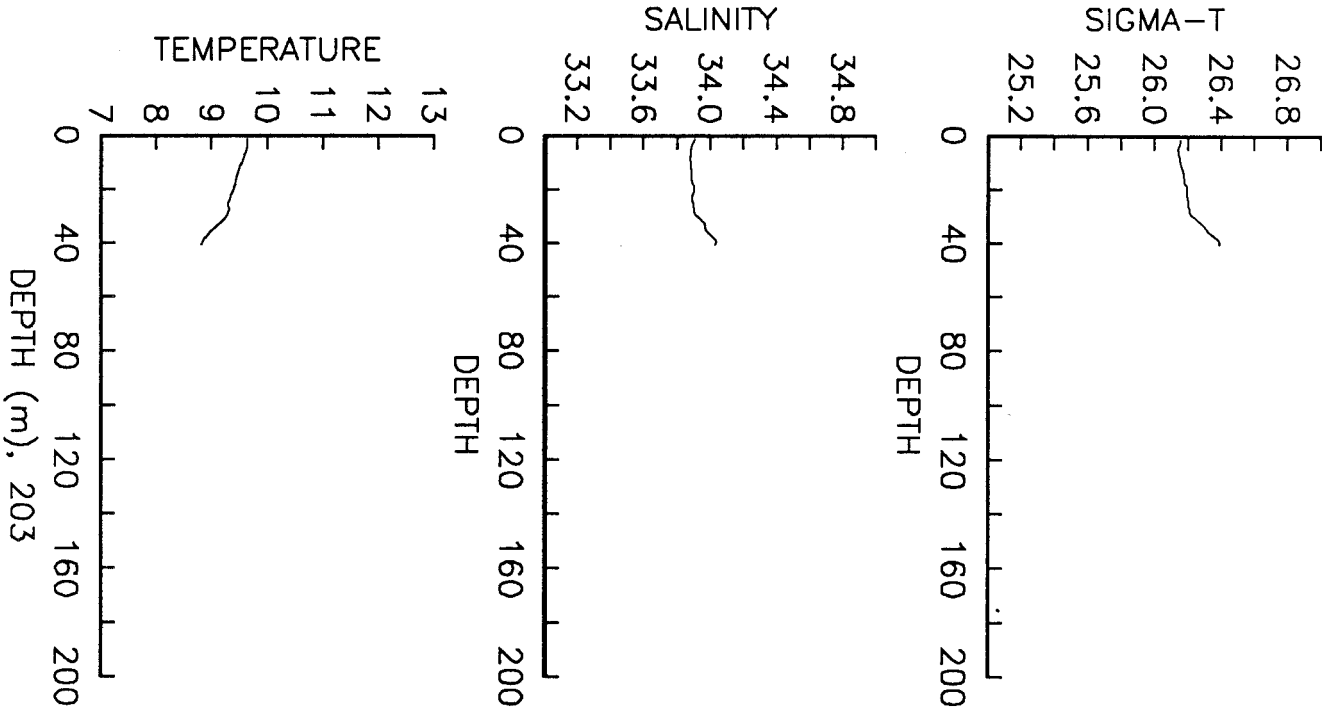
STN 8904.201 29 MAY 1989 1413 PDT
37° 8.0'N 122°29.9'W DEPTH 90 m



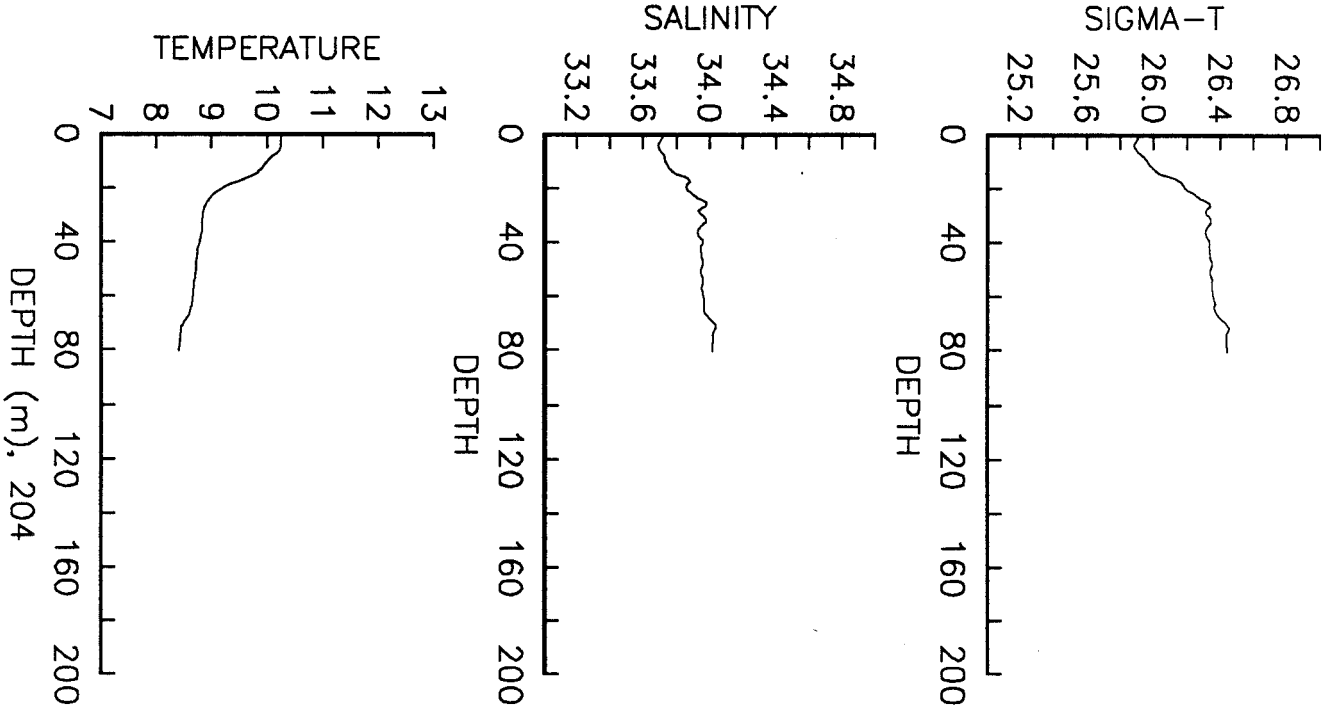
STN 8904.202 29 MAY 1989 1453 PDT
37° 8.0'N 122°23.4'W DEPTH 42 m



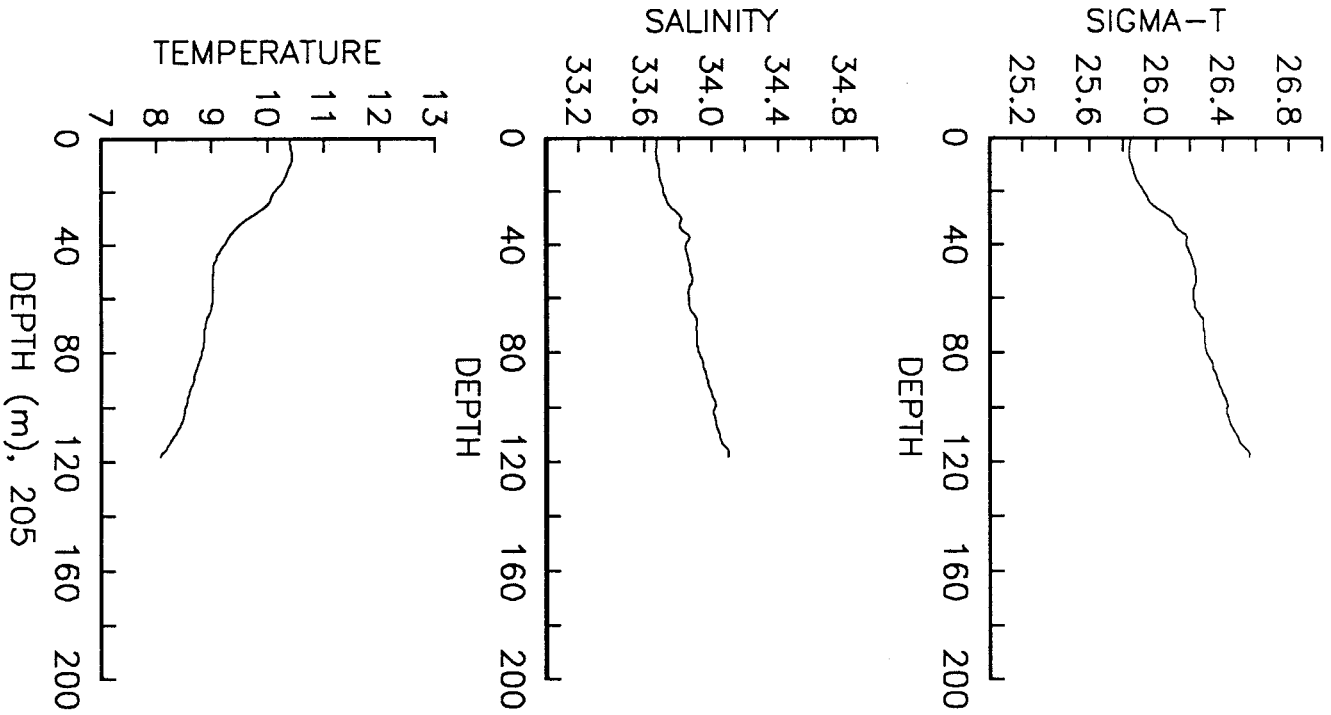
STN 8904.203 29 MAY 1989 2112 PDT
36°58.6'N 122°12.9'W DEPTH 46 m



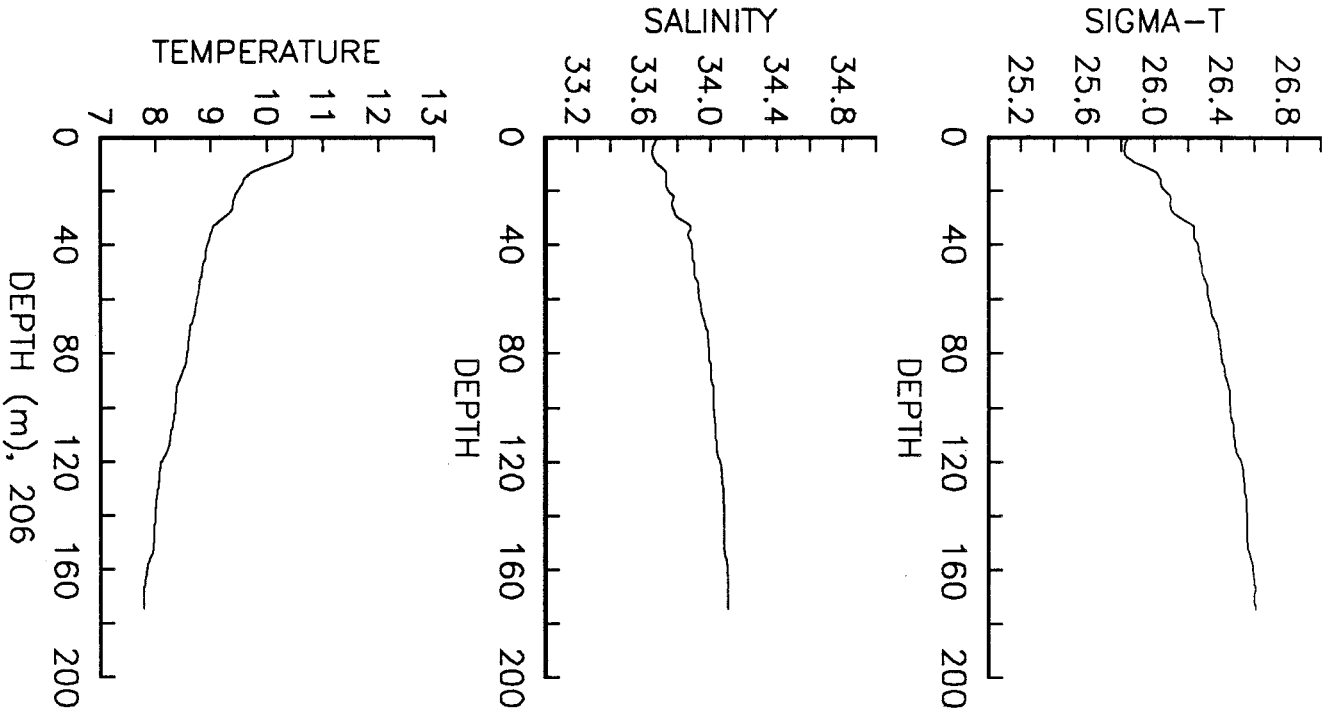
STN 8904.204 29 MAY 1989 2250 PDT
36°58.9'N 122°18.5'W DEPTH 88 m



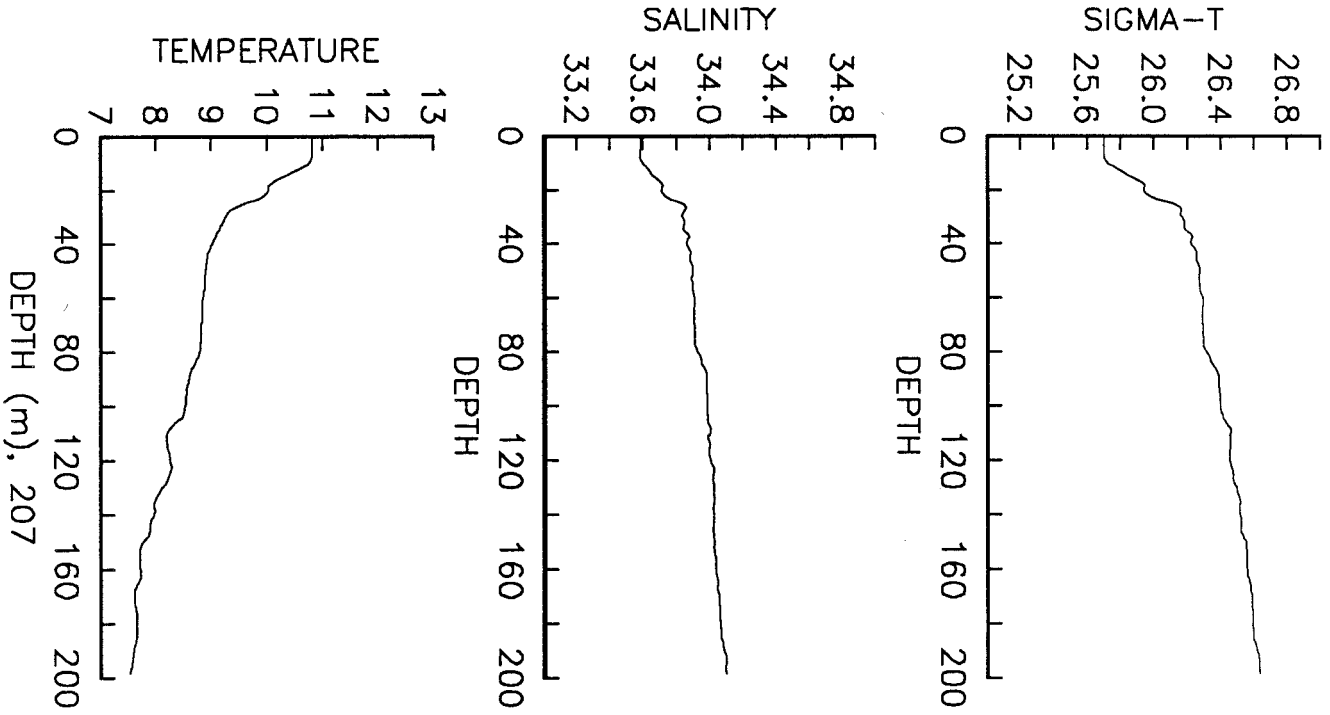
STN 8904.205 29 MAY 1989 2320 PDT
36°59.0'N 122°22.5'W DEPTH 119 m



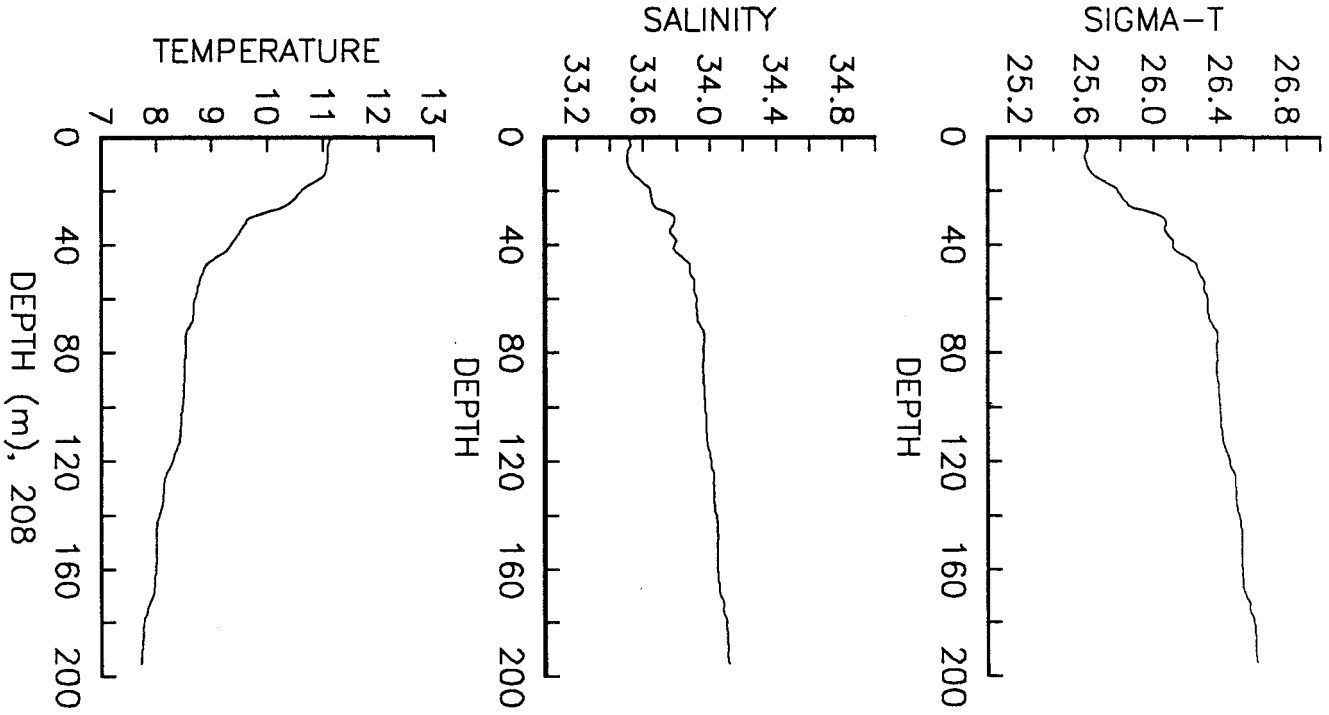
STN 8904.206 30 MAY 1989 0220 PDT
36°59.0'N 122°26.6'W DEPTH 187 m



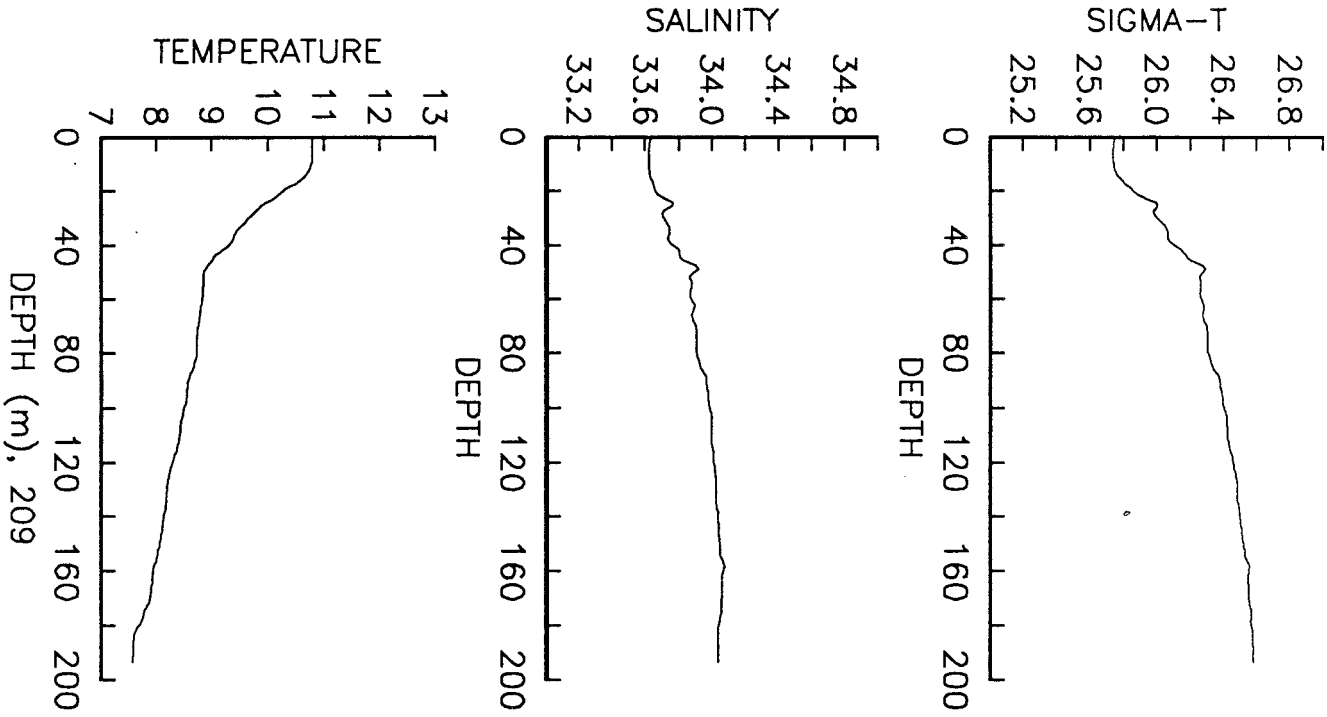
STN 8904.207 30 MAY 1989 0352 PDT
36°59.6'N 122°26.6'W DEPTH 371 m



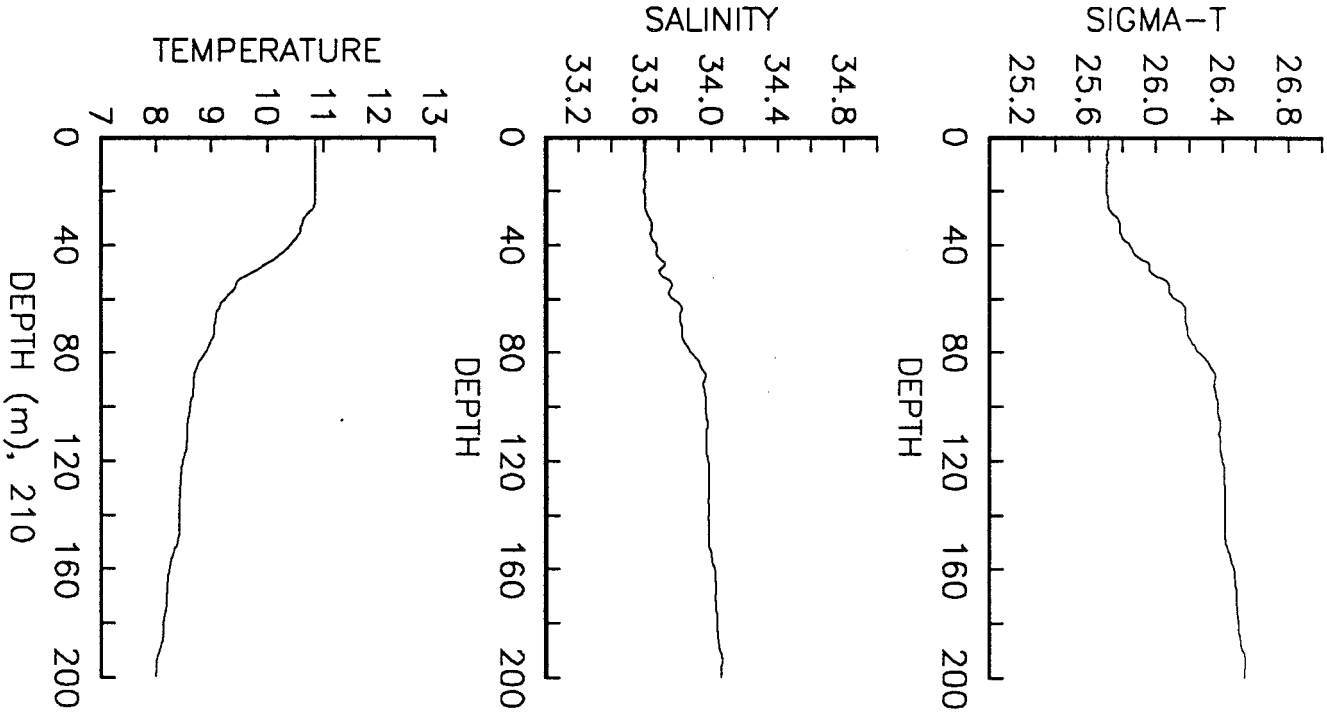
STN 8904.208 30 MAY 1989 0554 PDT
37° 8.0'N 122°43.0'W DEPTH 227 m



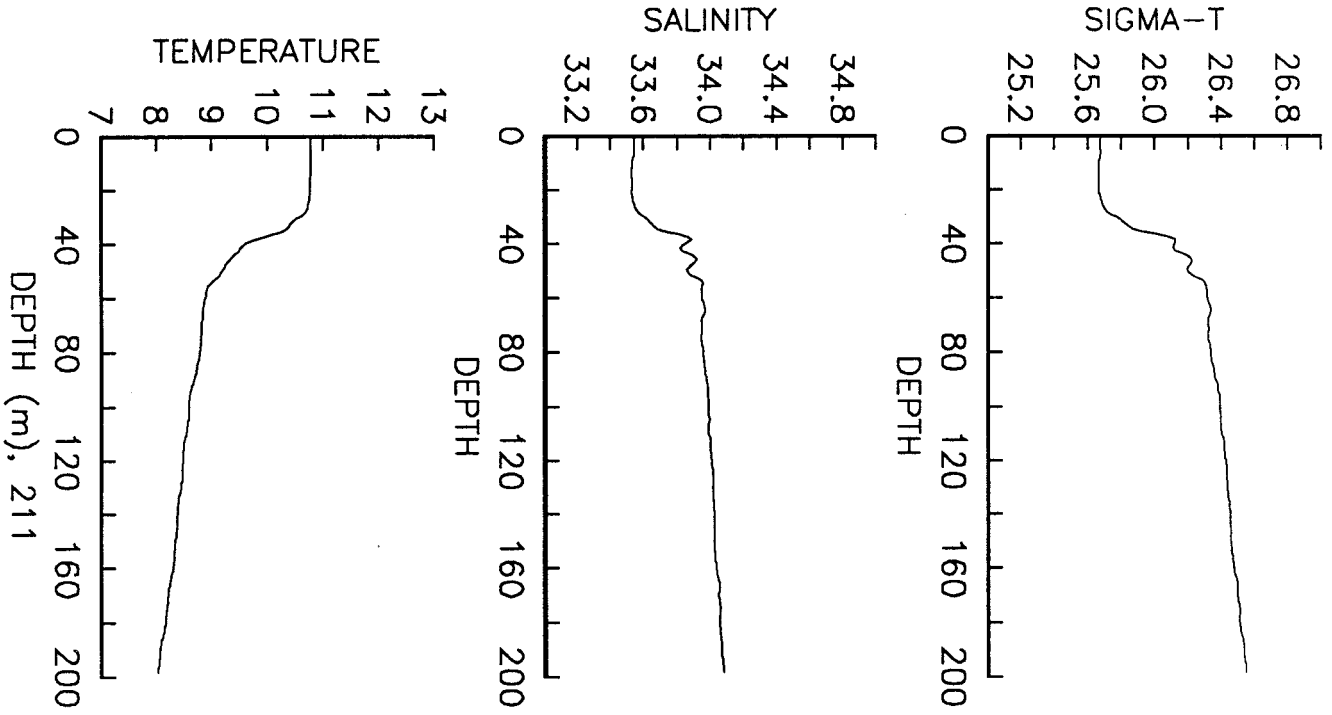
STN 8904.209 30 MAY 1989 0640 PDT
37° 8.0'N 122°50.0'W DEPTH 457 m



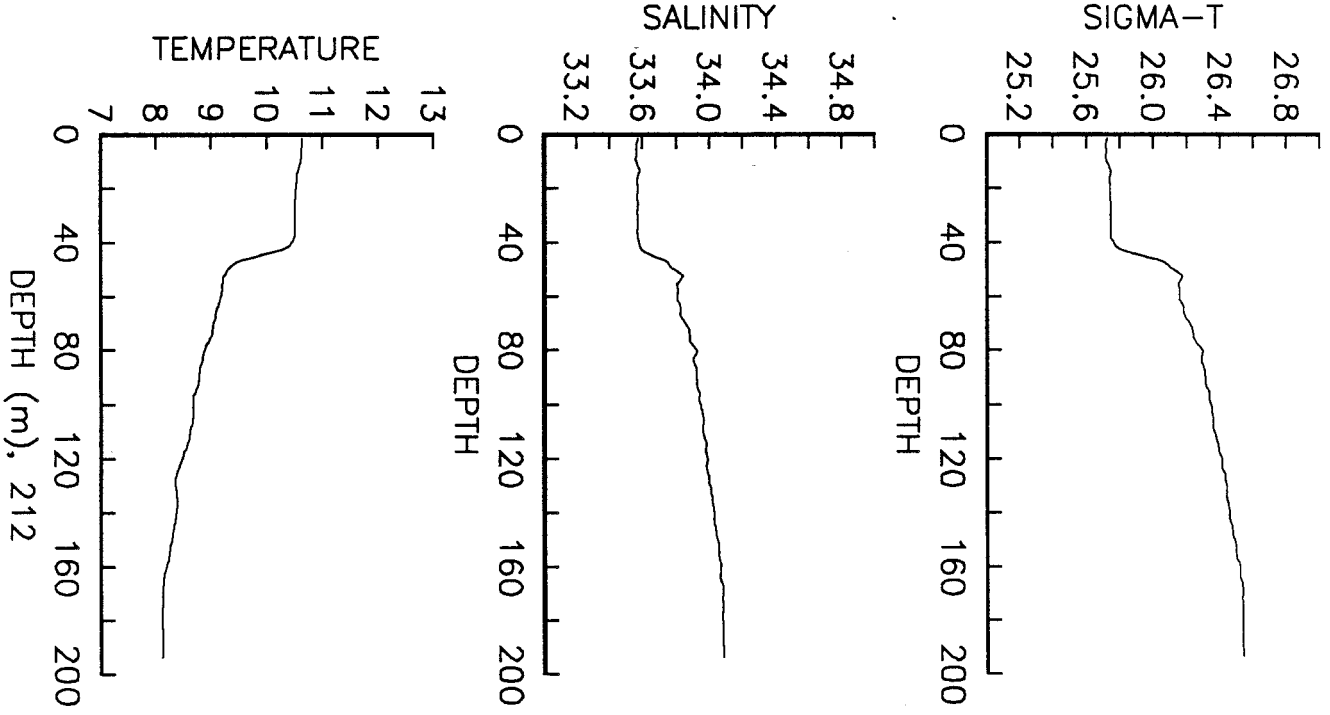
STN 8904.210 30 MAY 1989 0715 PDT
37° 8.0'N 122°55.4'W DEPTH 558 m



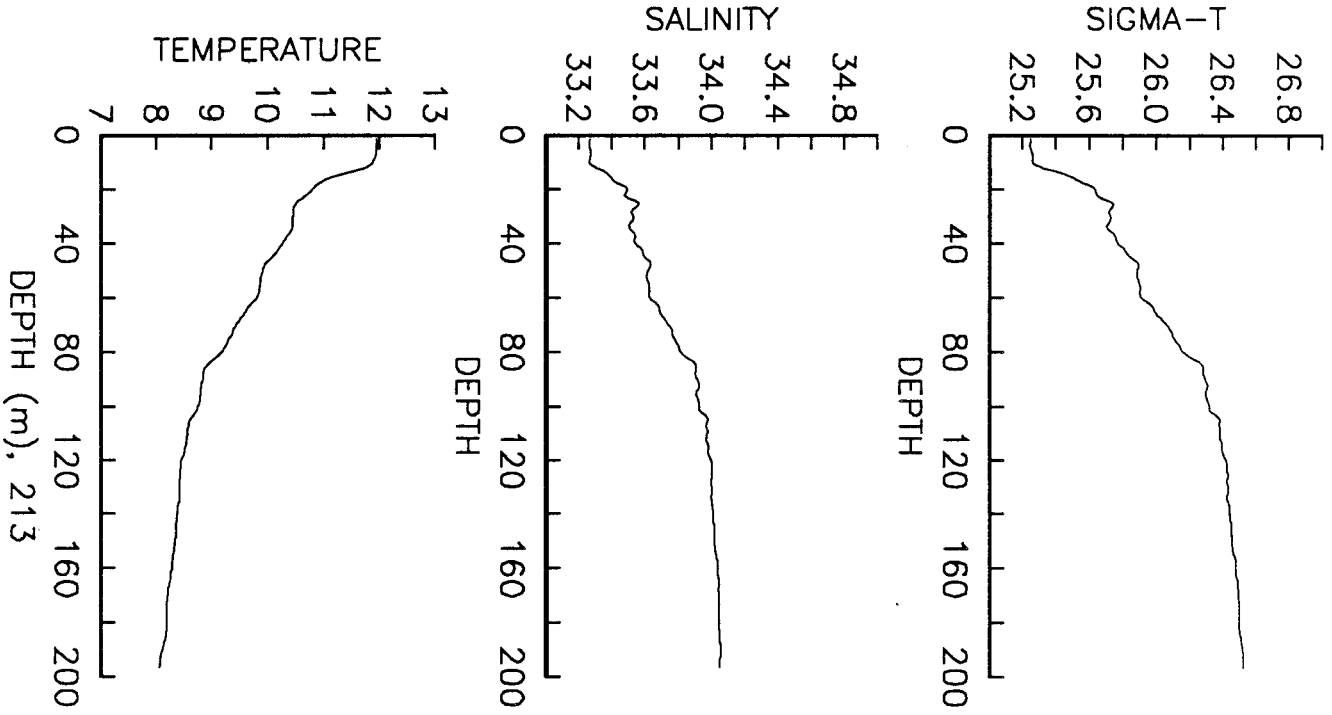
STN 8904.211 30 MAY 1989 0842 PDT
37° 8.0'N 123°10.0'W DEPTH 1829 m



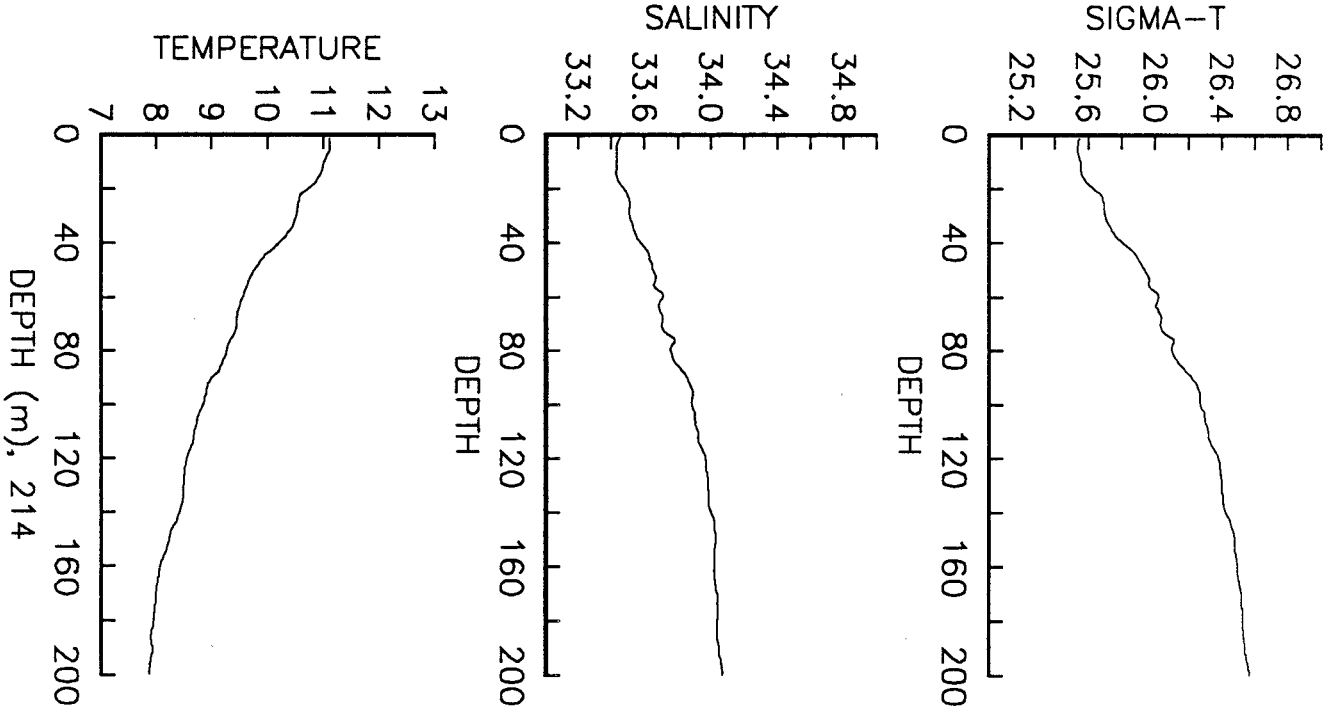
STN 8904.212 30 MAY 1989 0950 PDT
37°16.5'N 123°10.0'W DEPTH 1097 m



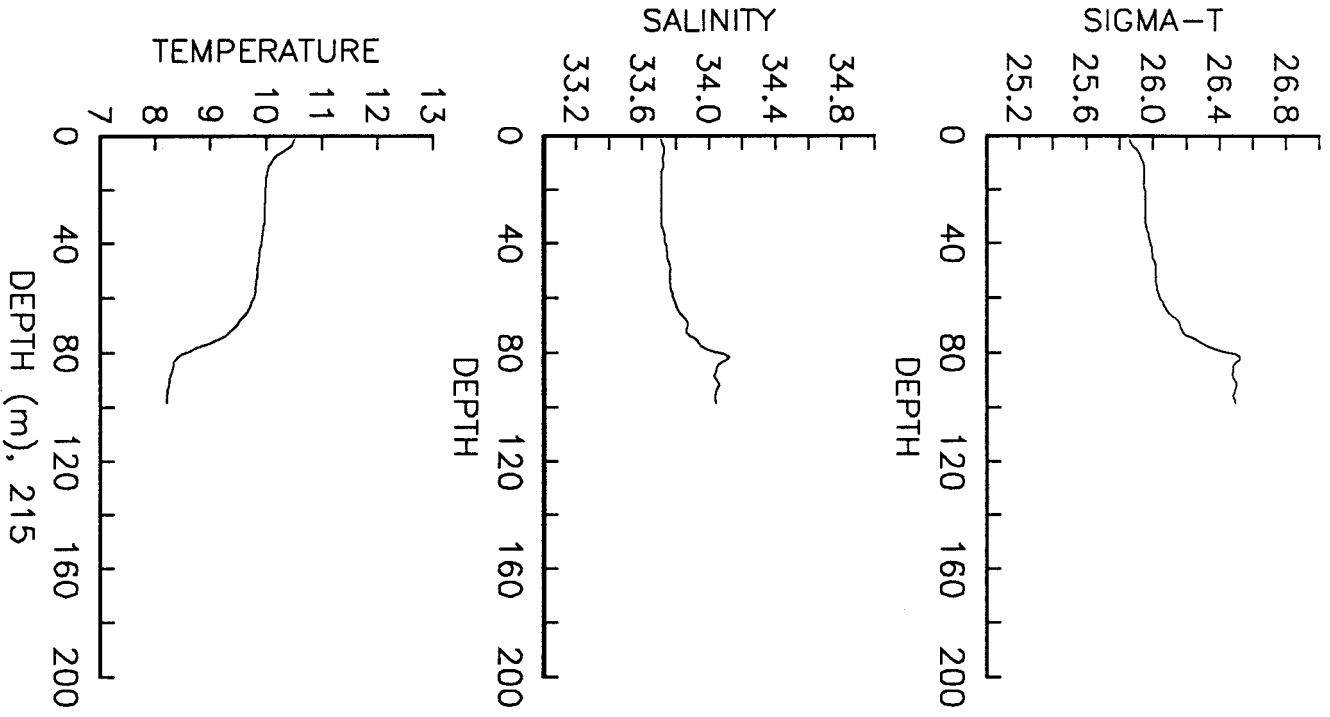
STN 8904.213 30 MAY 1989 1052 PDT
37°23.4'N 123°10.0'W DEPTH 978 m



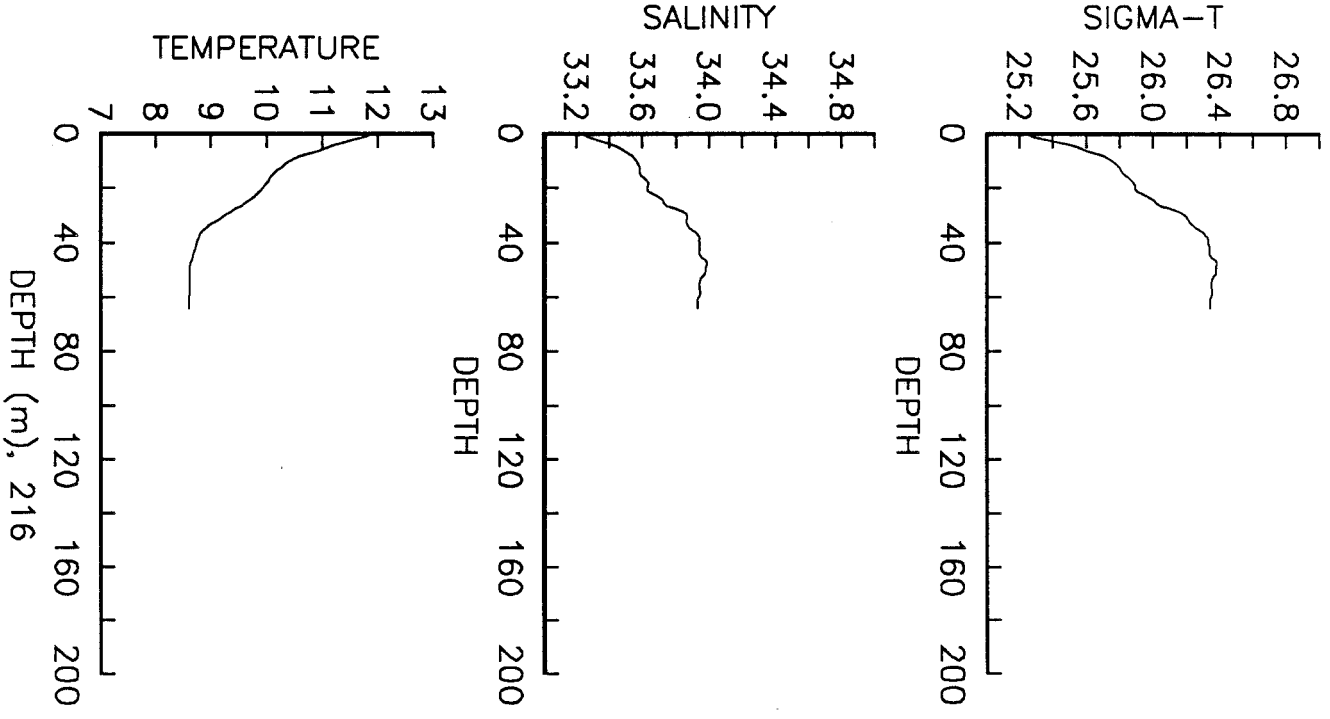
STN 8904.214 30 MAY 1989 1144 PDT
37°23.5'N 123° 1.5'W DEPTH 805 m



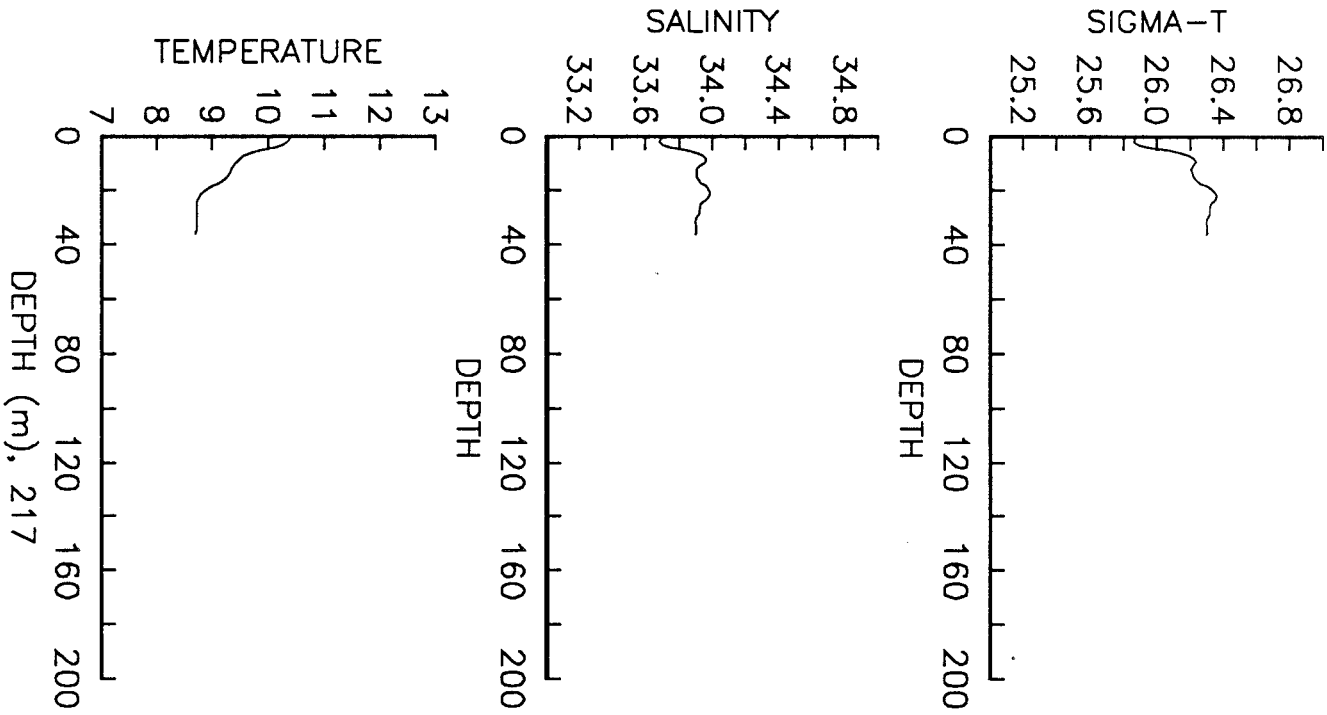
STN 8904.215 30 MAY 1989 1252 PDT
37°23.5'N 122°49.0'W DEPTH 110 m



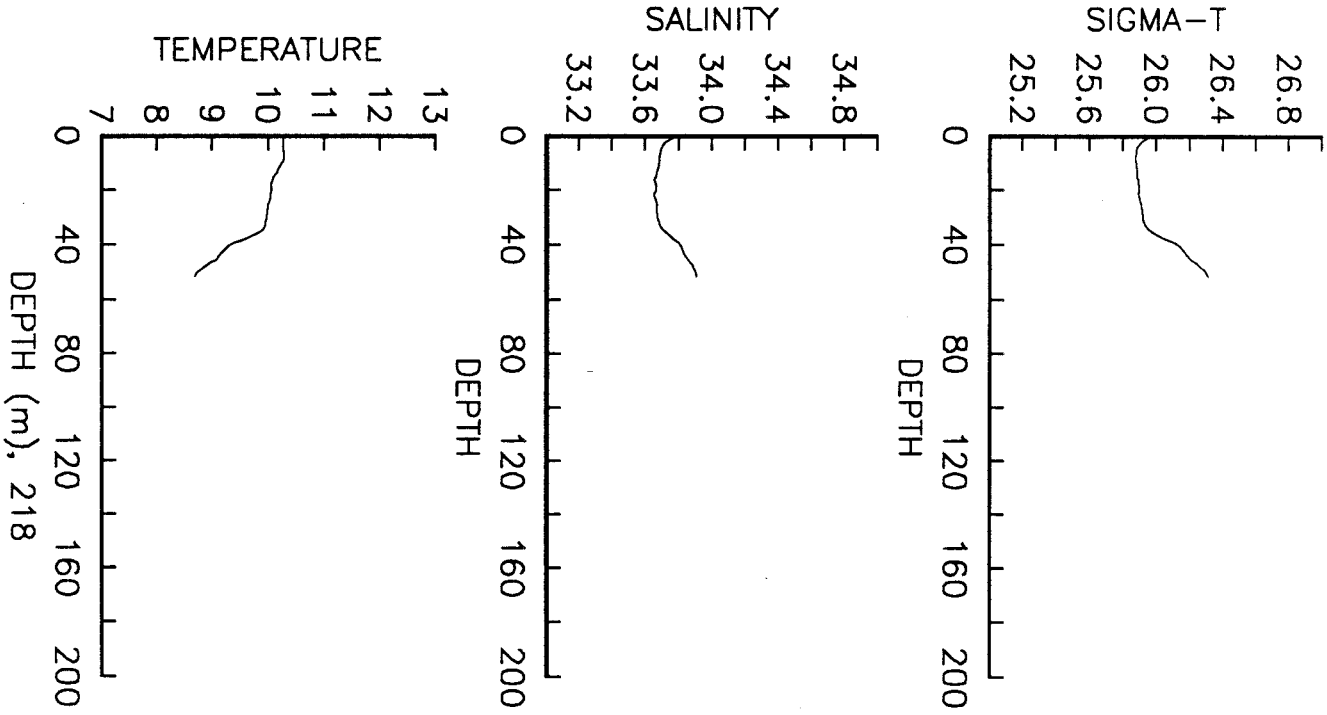
STN 8904.216 30 MAY 1989 1352 PDT
37°23.5'N 122°37.5'W DEPTH 75 m



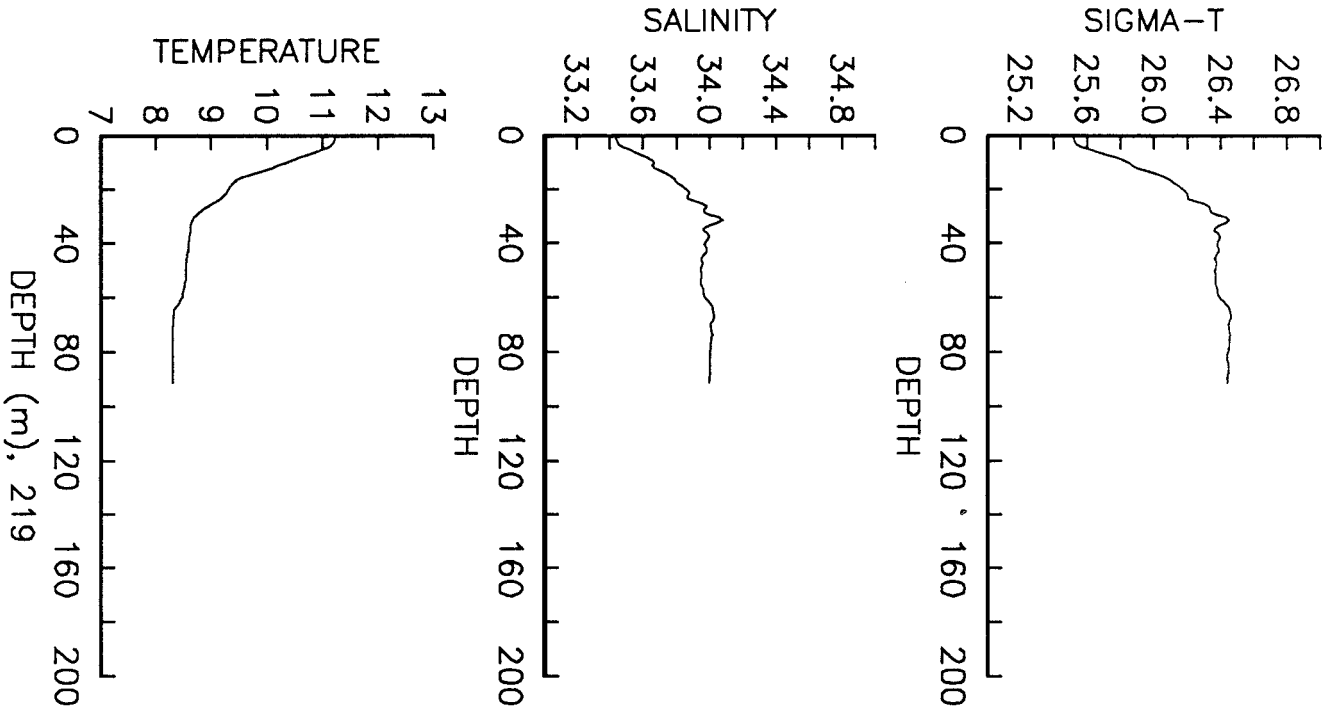
STN 8904.217 30 MAY 1989 1934 PDT
37°23.5'N 122°30.1'W DEPTH 46 m



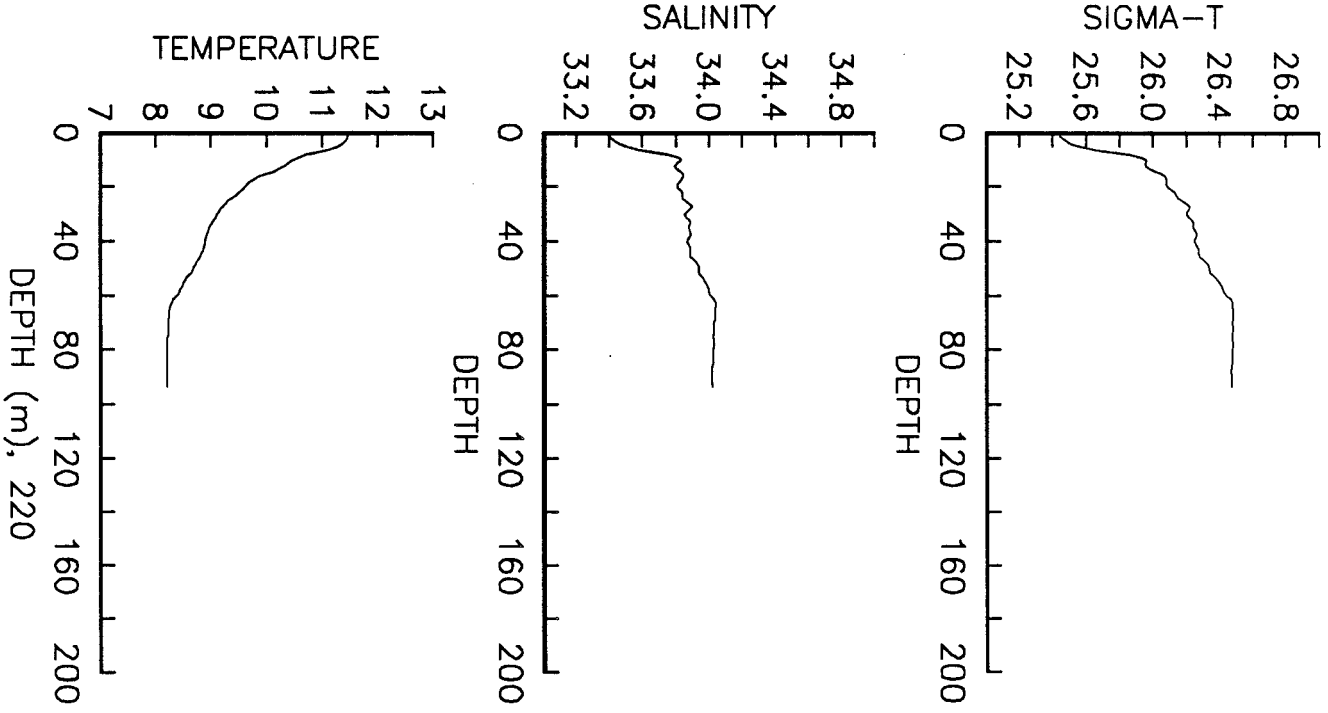
STN 8904.218 30 MAY 1989 2104 PDT
37°15.9'N 122°29.0'W DEPTH 53 m



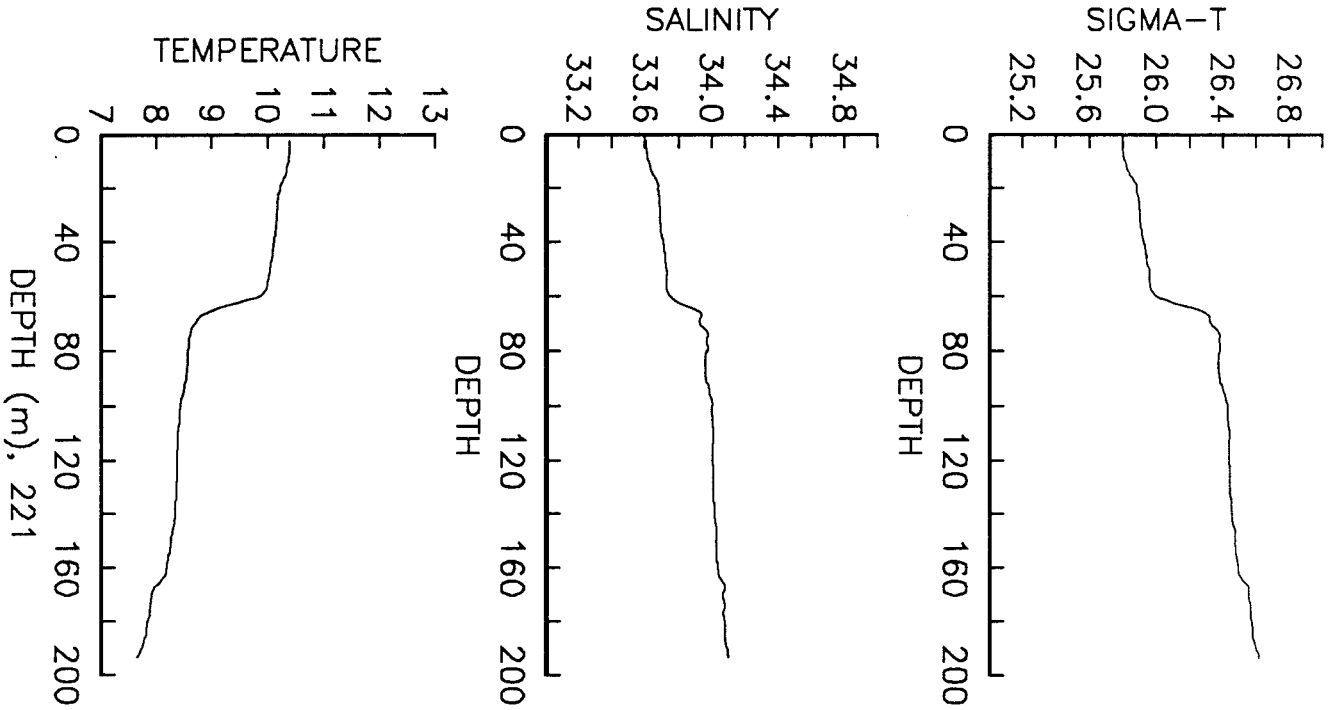
STN 8904.219 30 MAY 1989 2250 PDT
37°16.4'N 122°35.5'W DEPTH 93 m



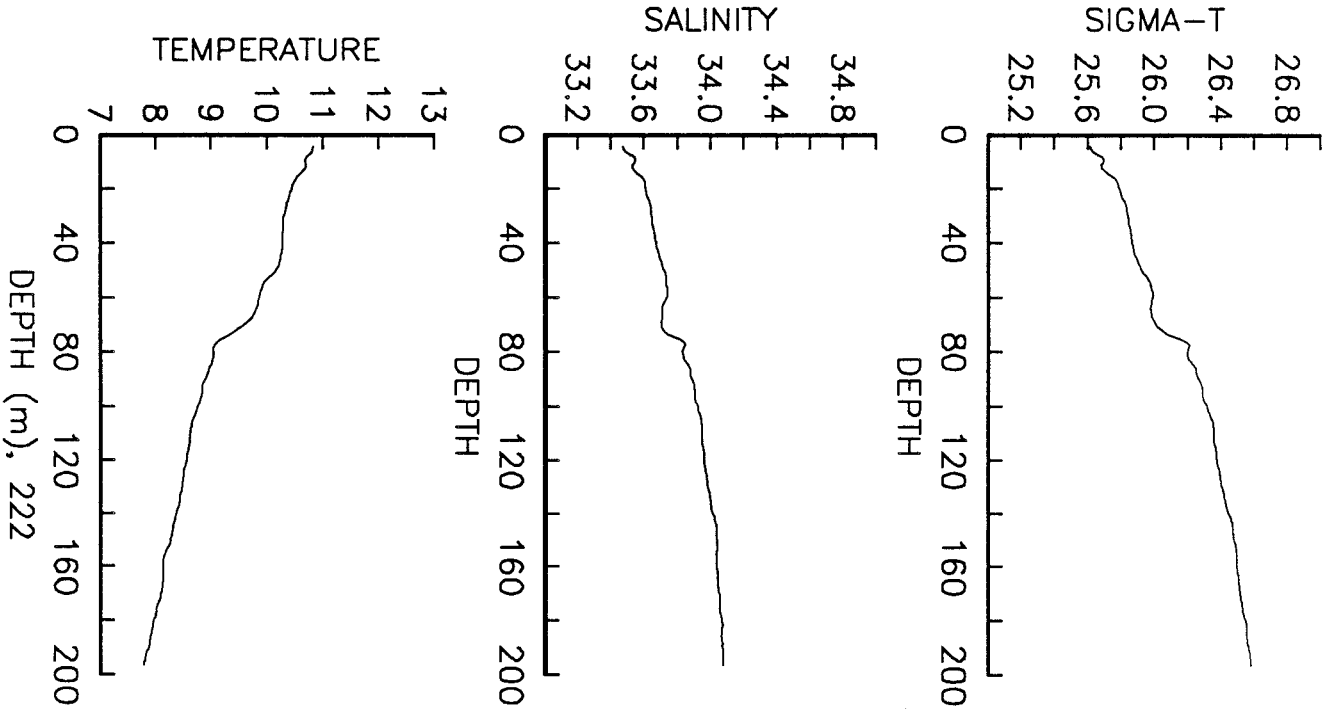
STN 8904.220 30 MAY 1989 2312 PDT
37°16.5'N 122°39.0'W DEPTH 99 m



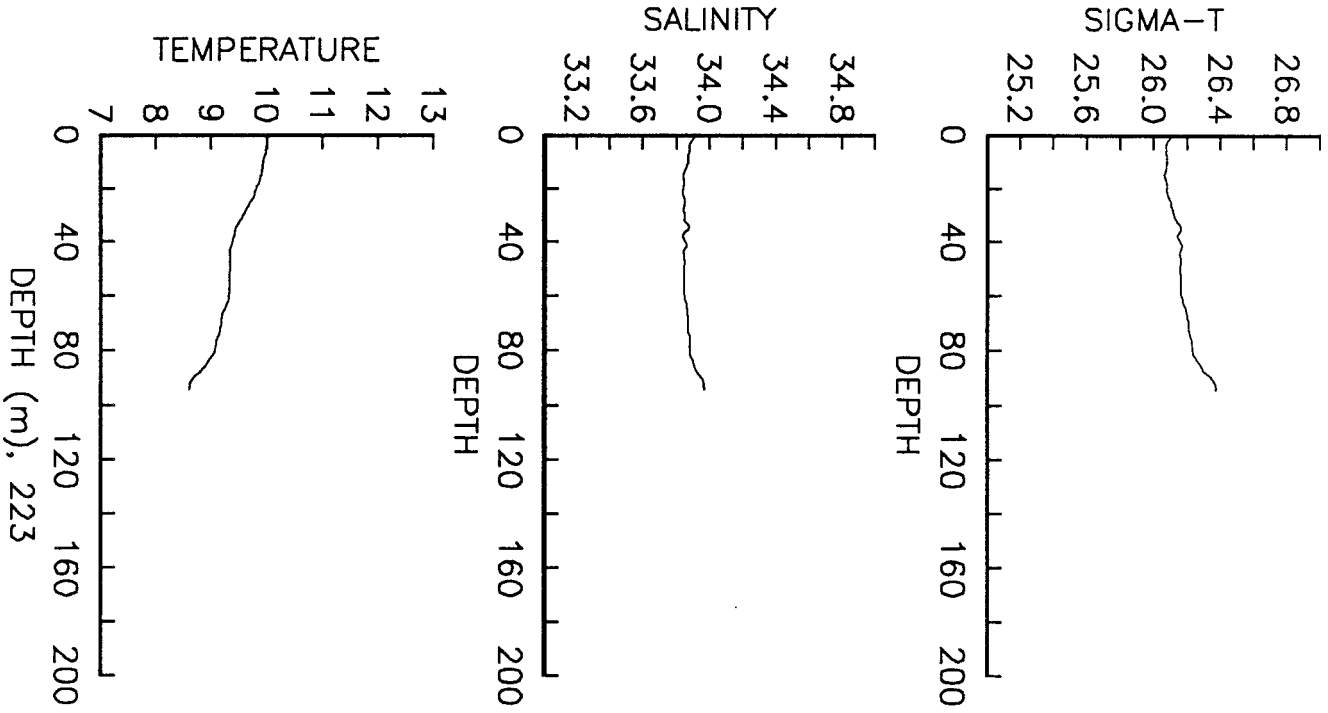
STN 8904.221 31 MAY 1989 0229 PDT
37°16.1'N 122°50.1'W DEPTH 216 m



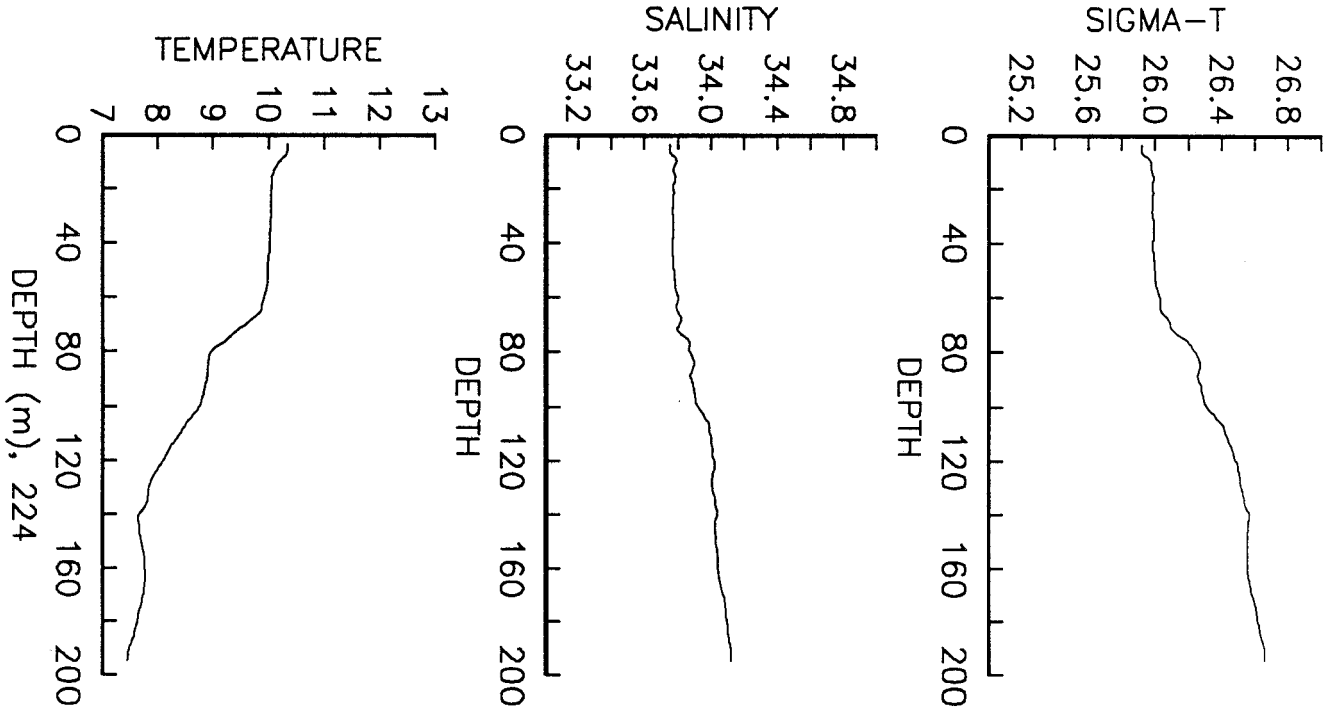
STN 8904.222 31 MAY 1989 0404 PDT
37°16.4'N 123° 0.3'W DEPTH 580 m



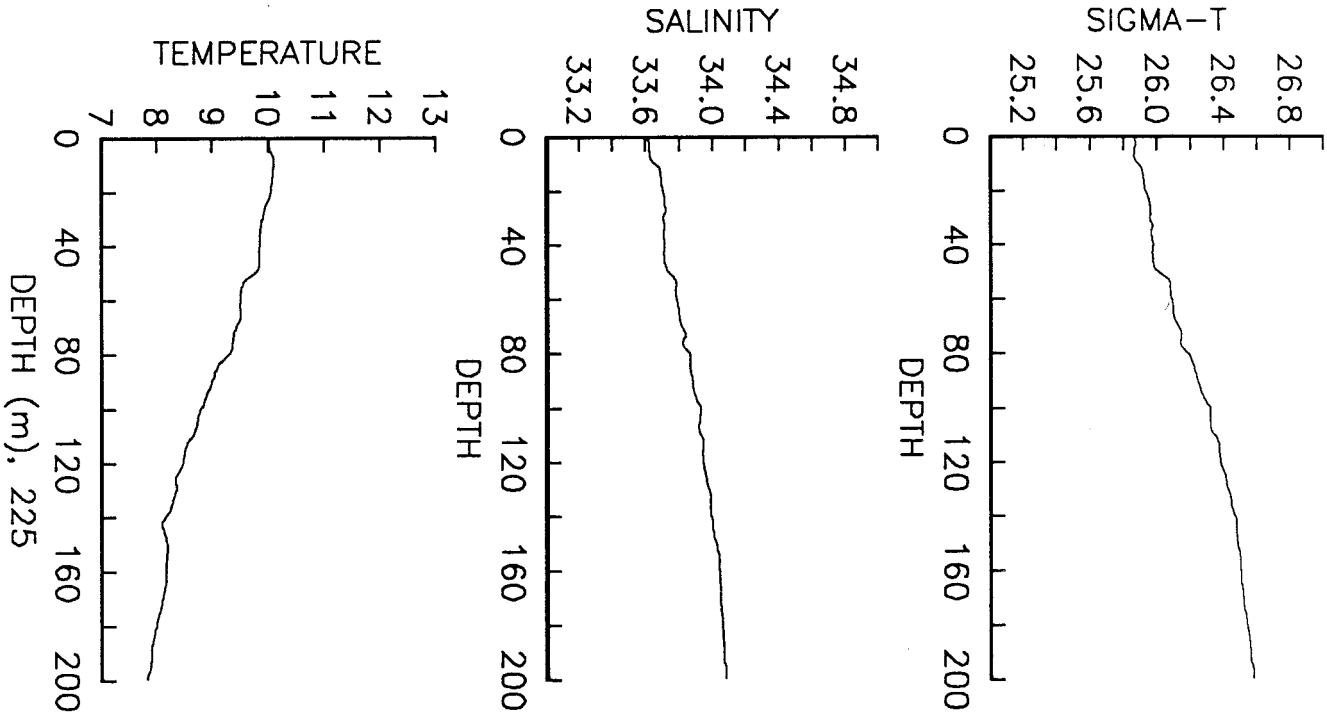
STN 8904.223 31 MAY 1989 0719 PDT
37°35.0'N 122°55.0'W DEPTH 101 m



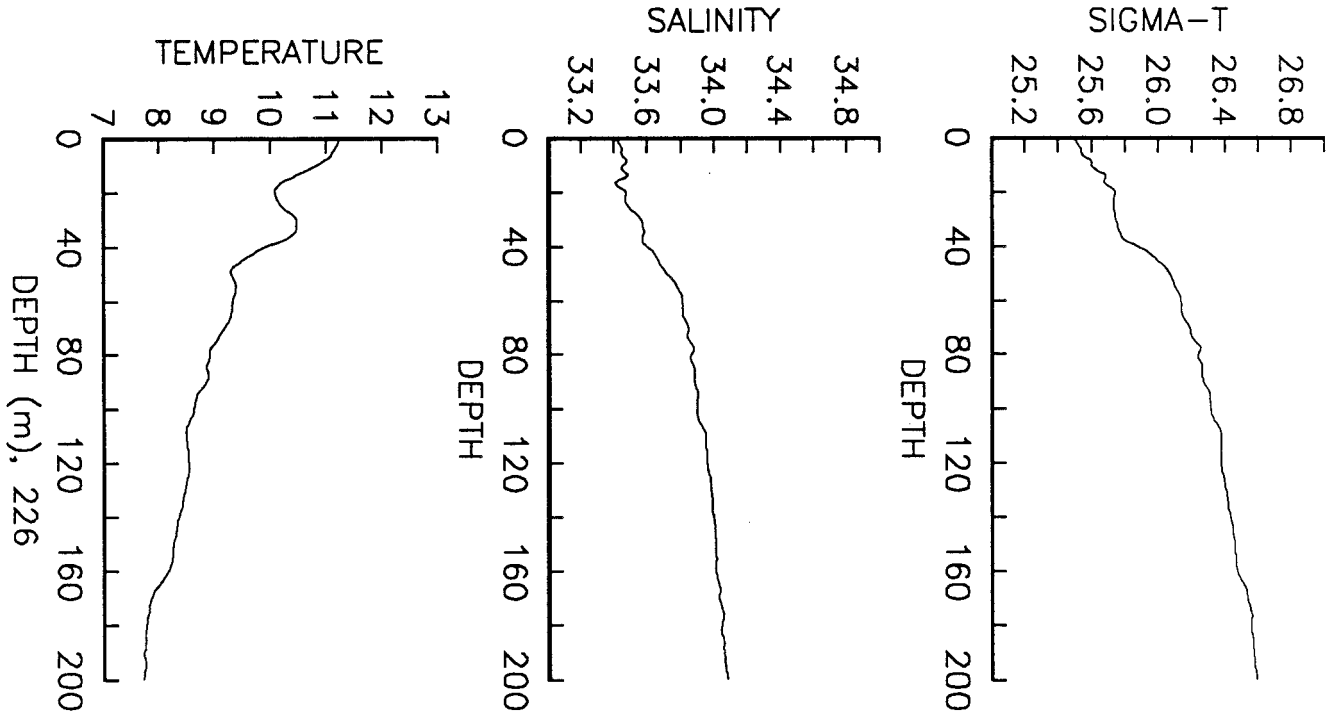
STN 8904.224 31 MAY 1989 0750 PDT
37°35.0'N 123° 1.5'W DEPTH 280 m



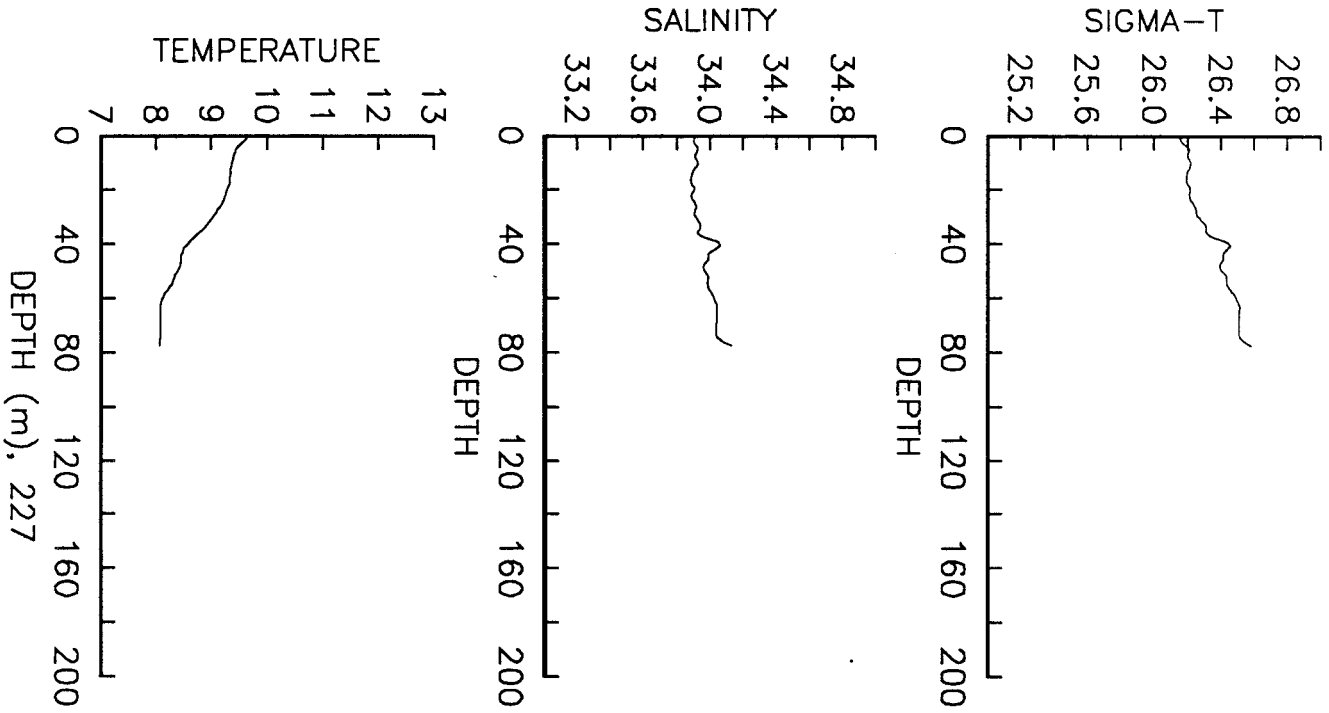
STN 8904.225 31 MAY 1989 0831 PDT
37°35.0'N 123° 7.5'W DEPTH 1189 m



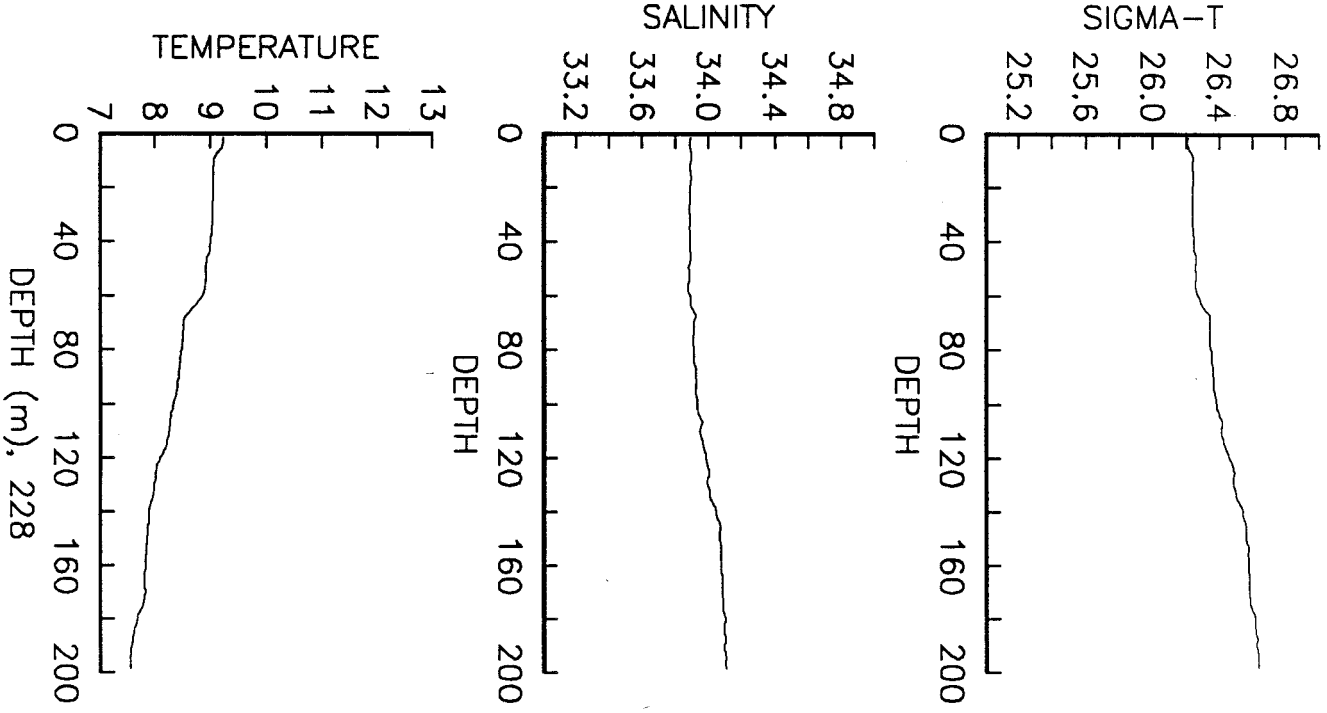
STN 8904.226 31 MAY 1989 0942 PDT
37°39.5'N 123°17.5'W DEPTH 1737 m



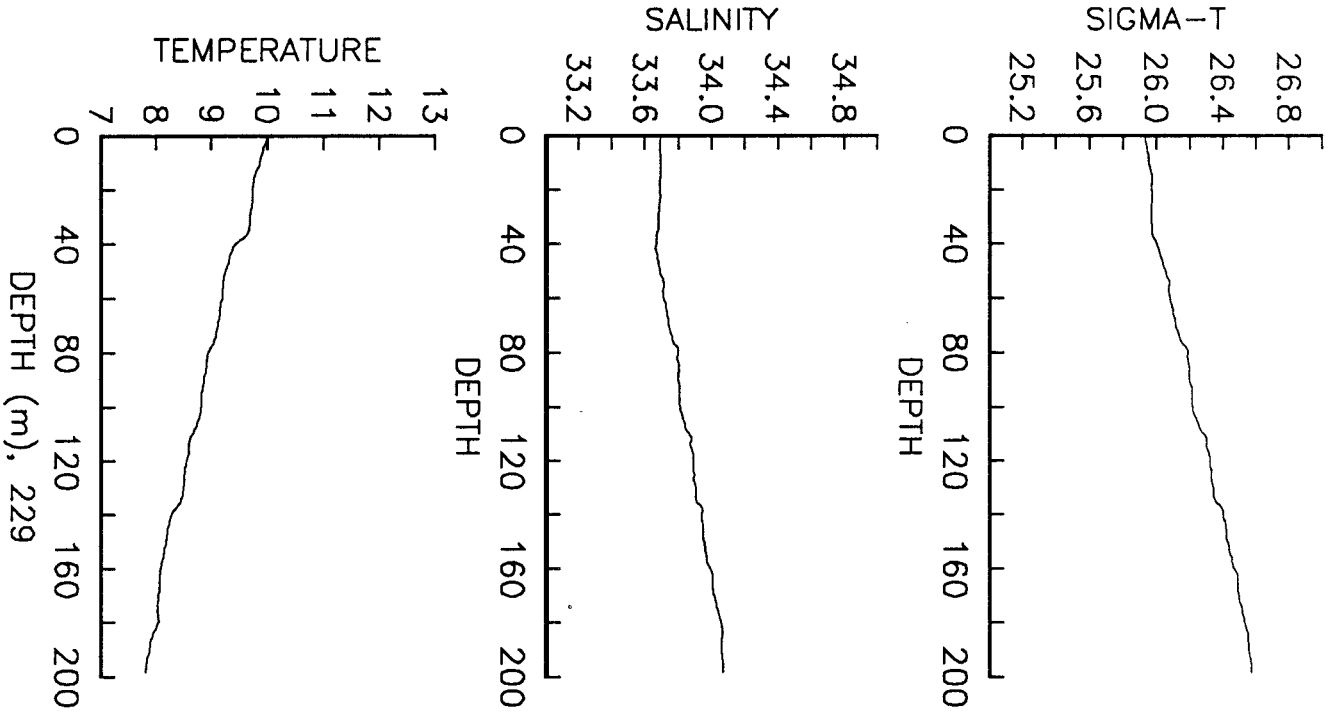
STN 8904.227 31 MAY 1989 1100 PDT
37°48.0'N 123°12.5'W DEPTH 82 m



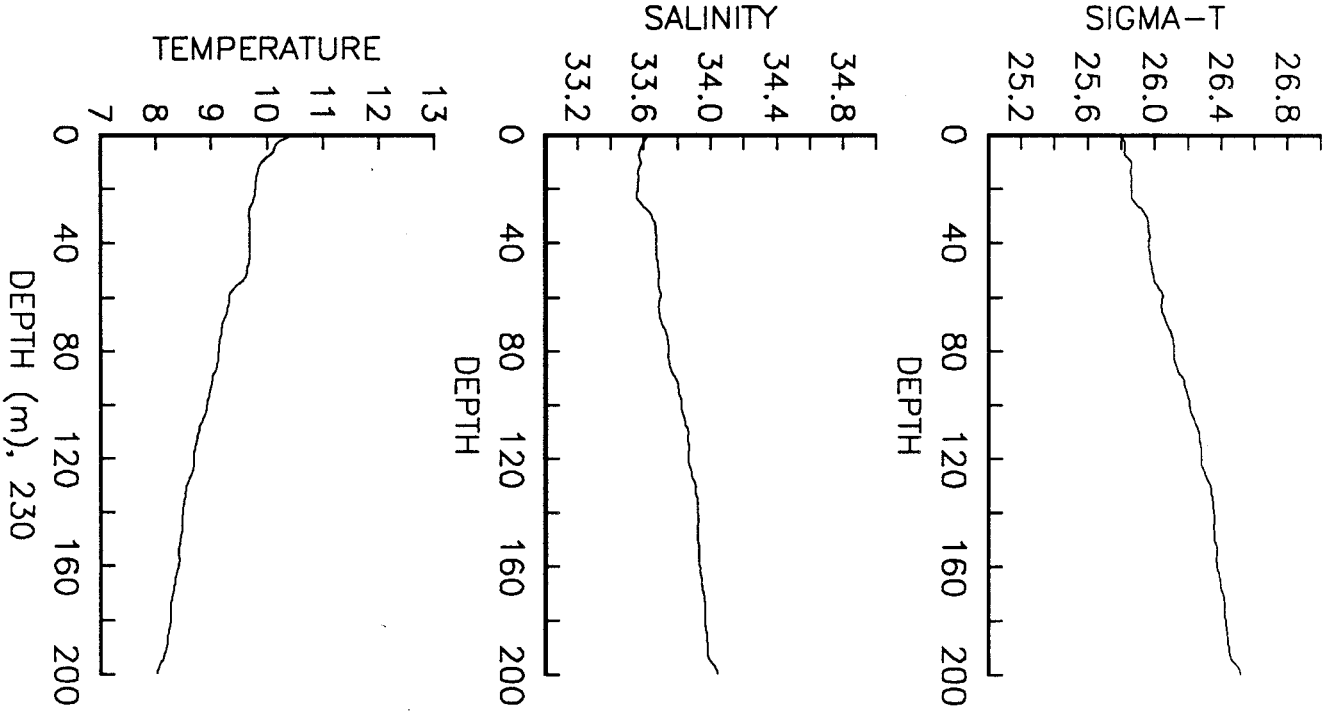
STN 8904.228 31 MAY 1989 1150 PDT
37°48.0'N 123°20.0'W DEPTH 768 m



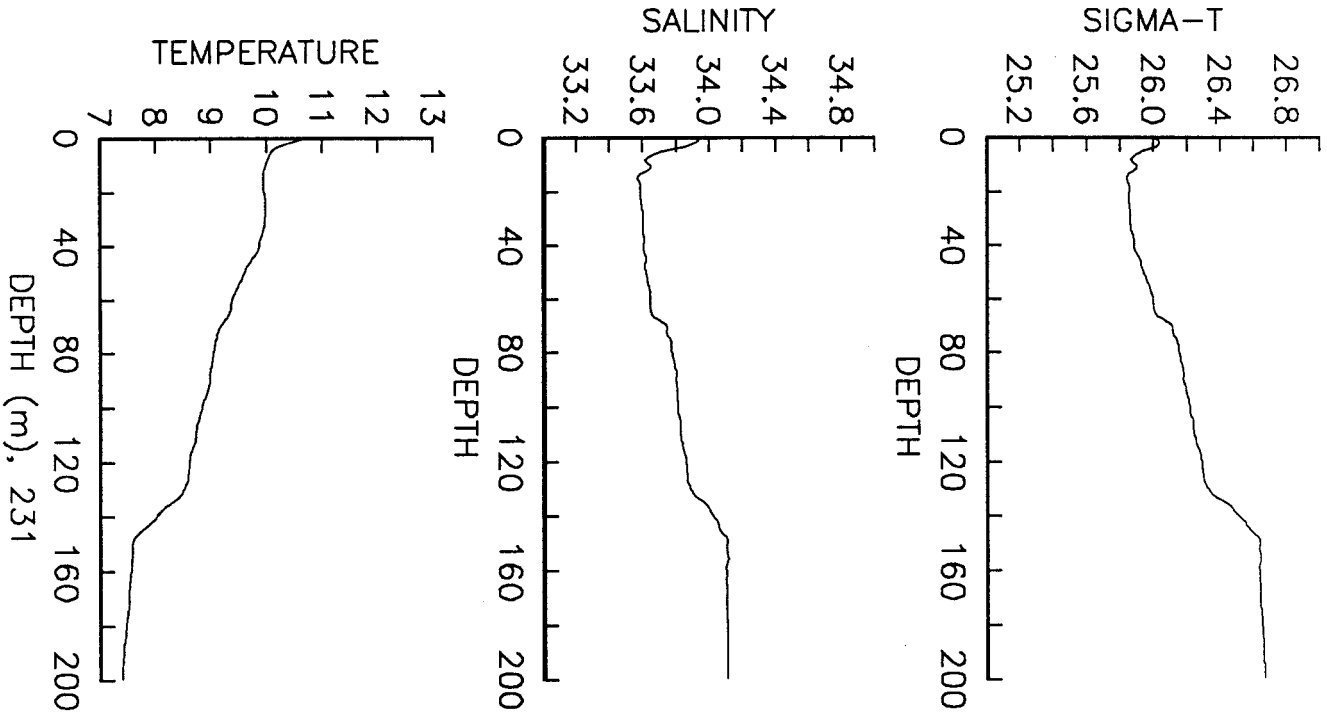
STN 8904.229 31 MAY 1989 1235 PDT
37°48.0'N 123°26.0'W DEPTH 1372 m



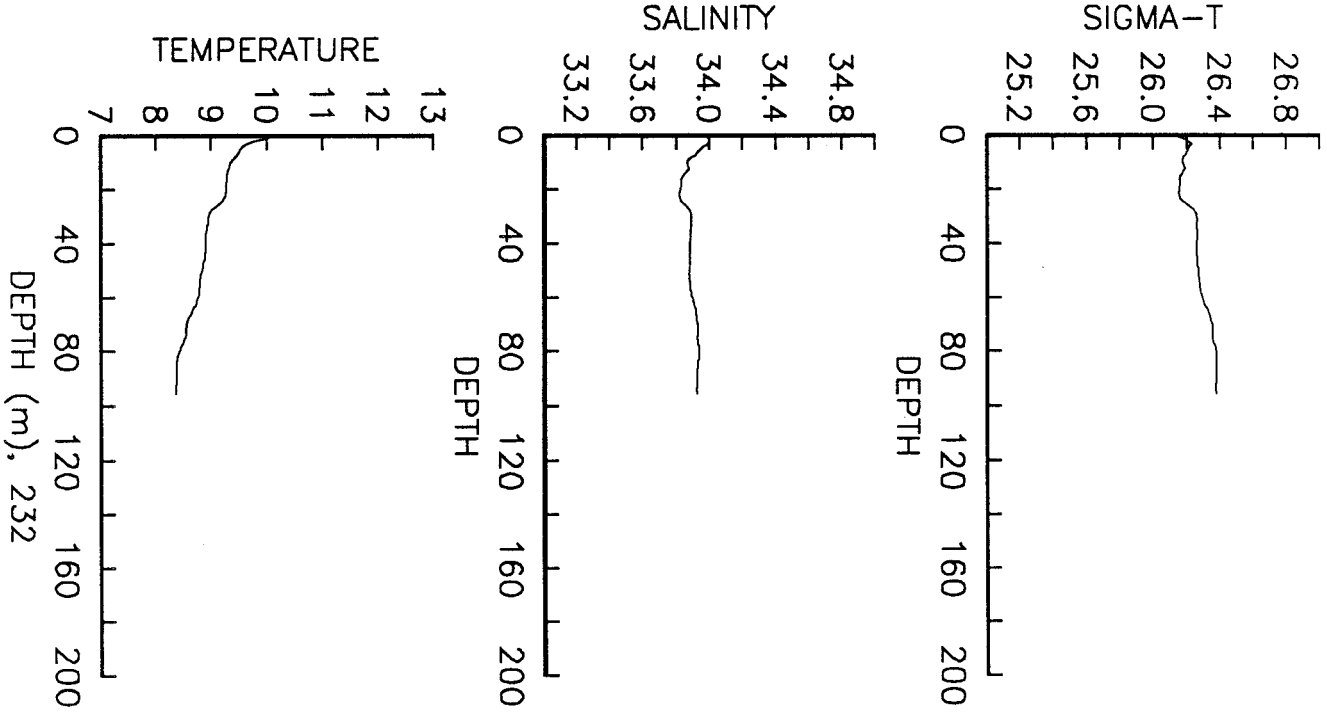
STN 8904.230 31 MAY 1989 1342 PDT
37°53.0'N 123°33.0'W DEPTH 2213 m



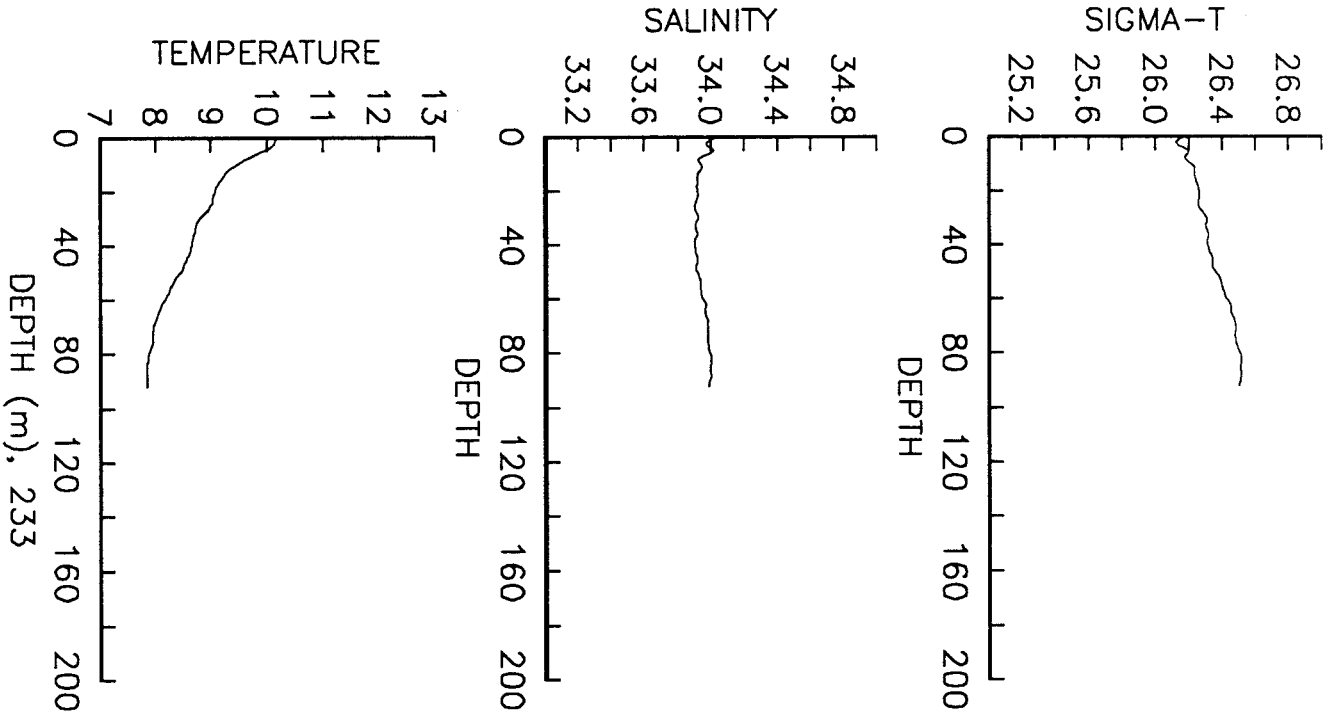
STN 8904.231 31 MAY 1989 1432 PDT
37°53.0'N 123°25.0'W DEPTH 262 m



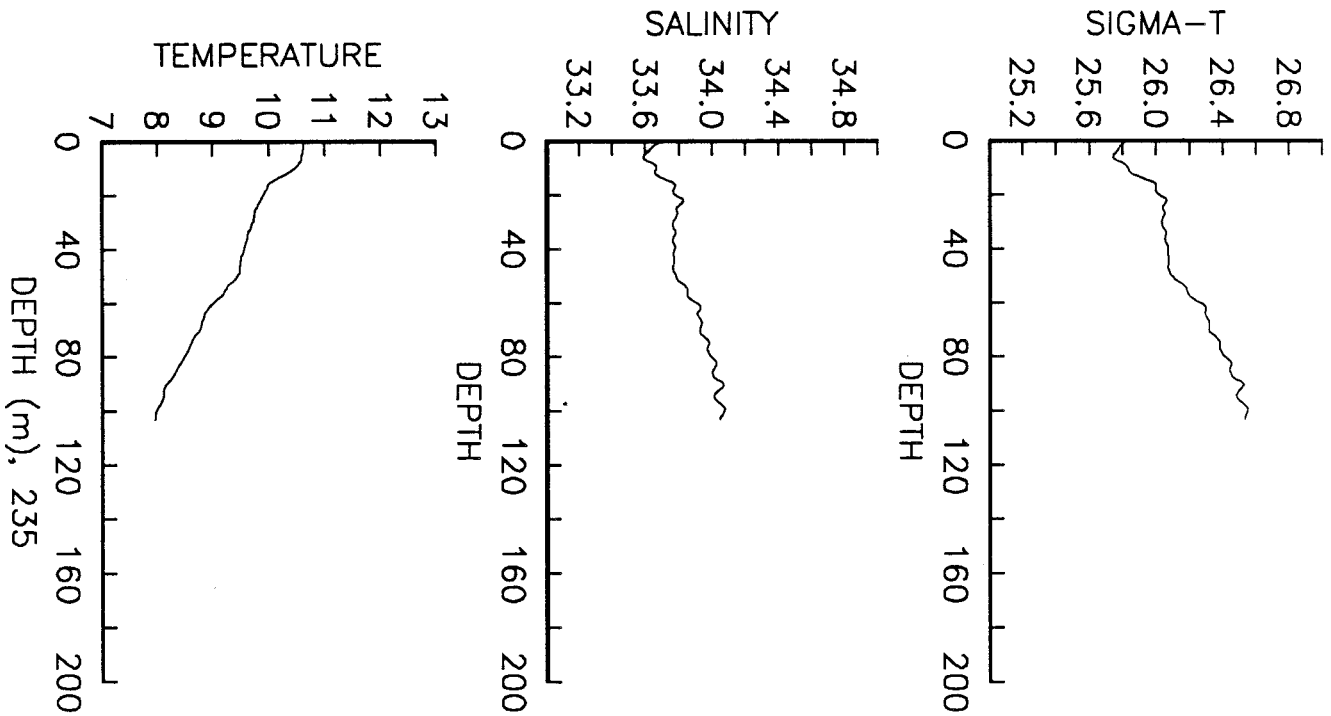
STN 8904.232 31 MAY 1989 1530 PDT
37°53.0'N 123°15.1'W DEPTH 101 m



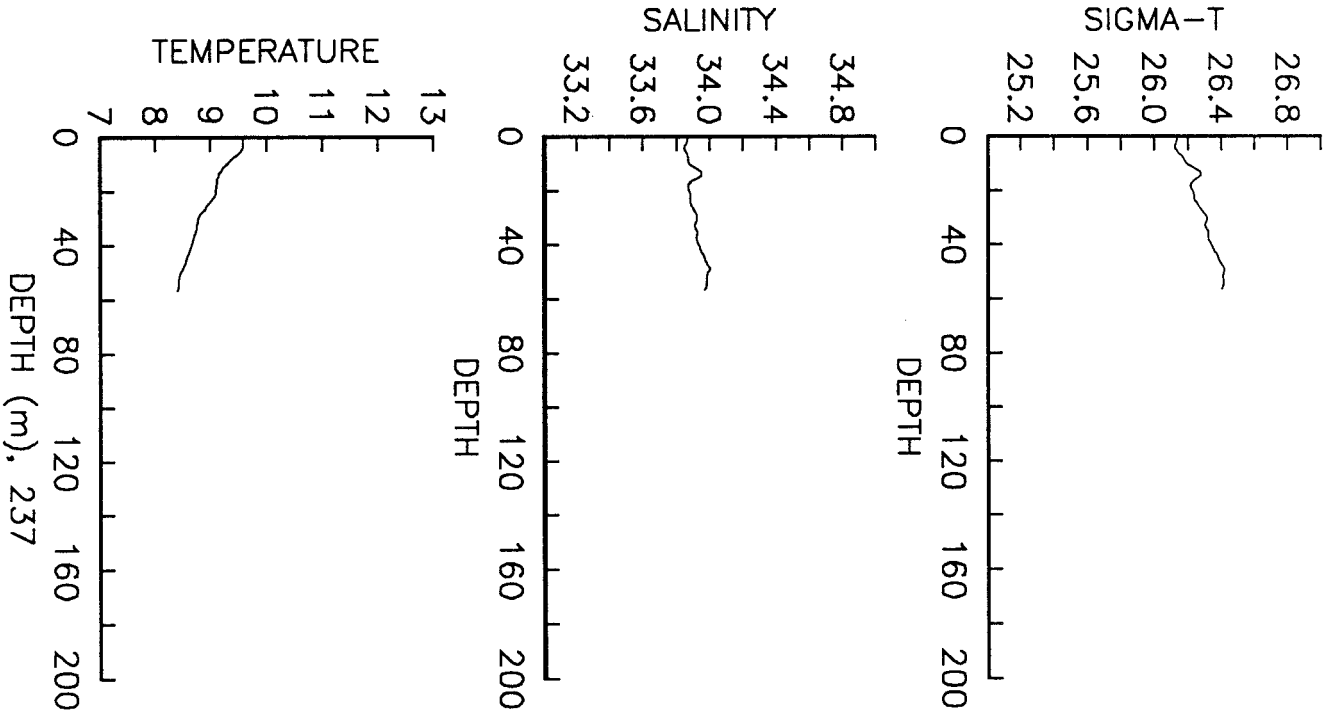
STN 8904.233 31 MAY 1989 1627 PDT
37°53.0'N 123° 7.1'W DEPTH 93 m



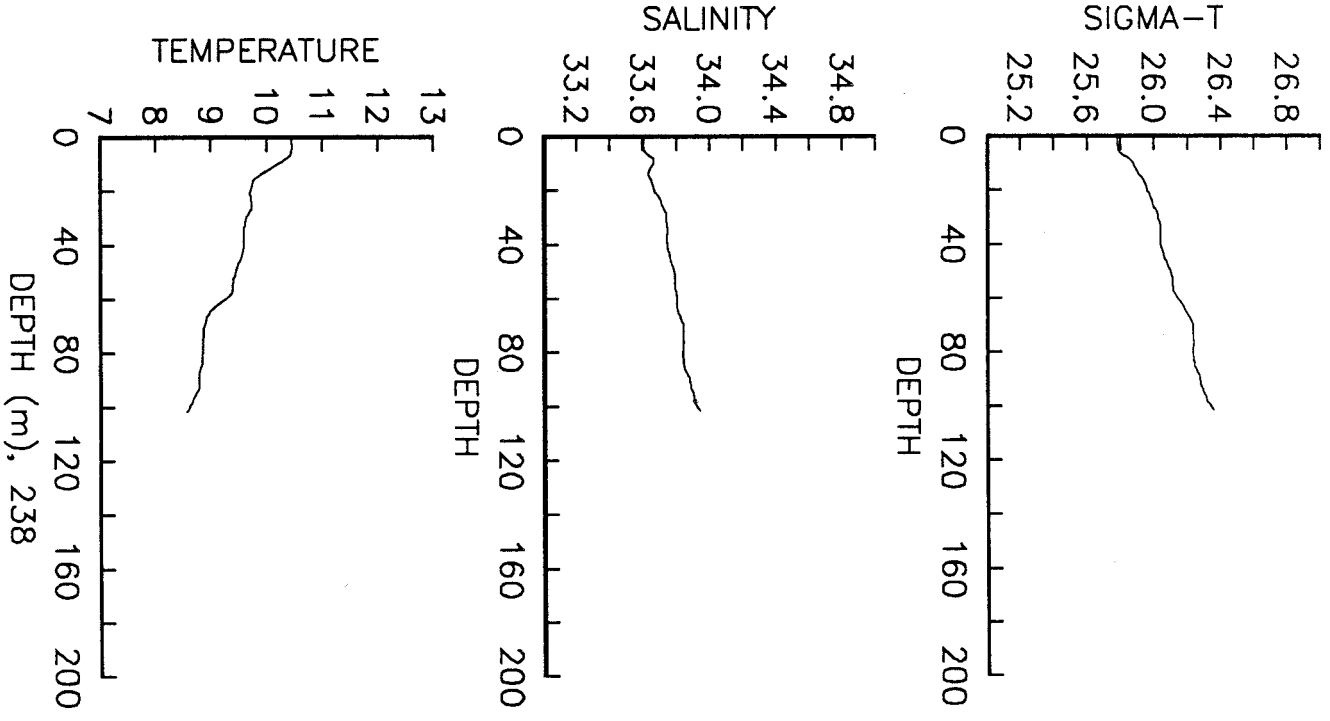
STN 8904.235 31 MAY 1989 2100 PDT
37°39.3'N 123° 2.7'W DEPTH 110 m



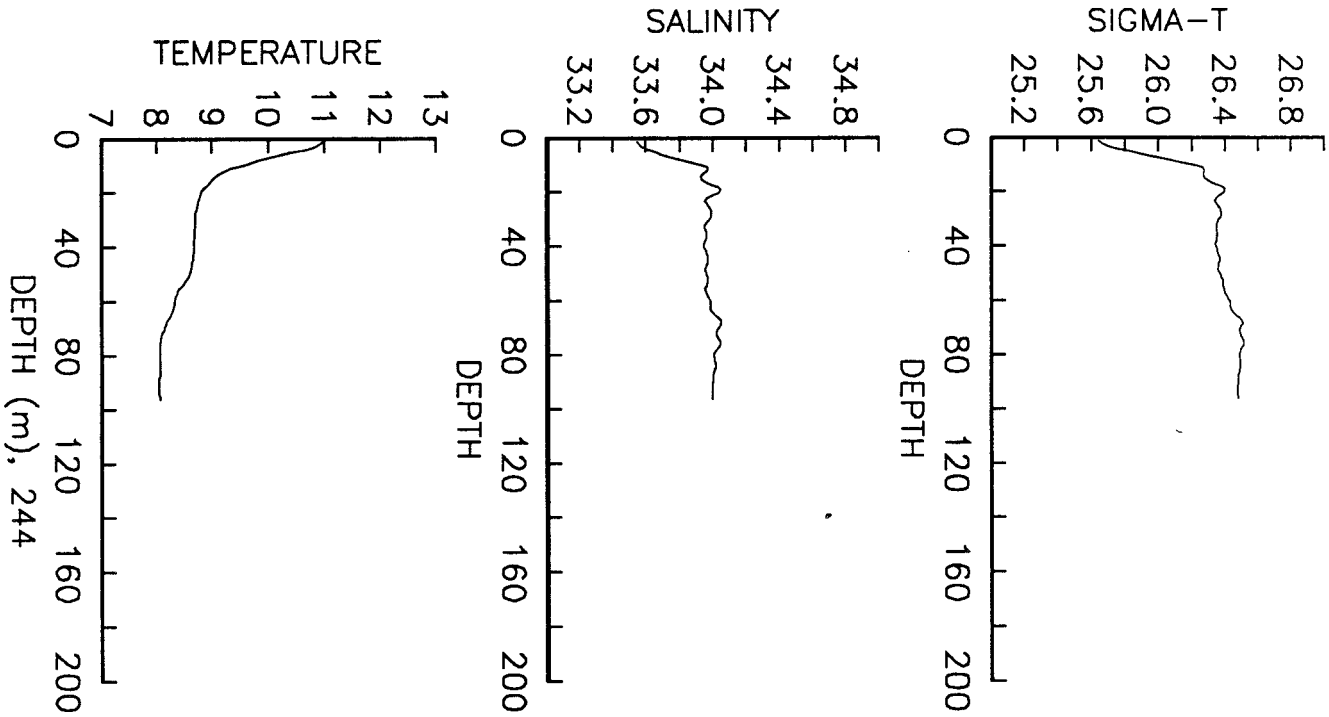
STN 8904.237 31 MAY 1989 2359 PDT
37°45.0'N 123°20.5'W DEPTH 66 m



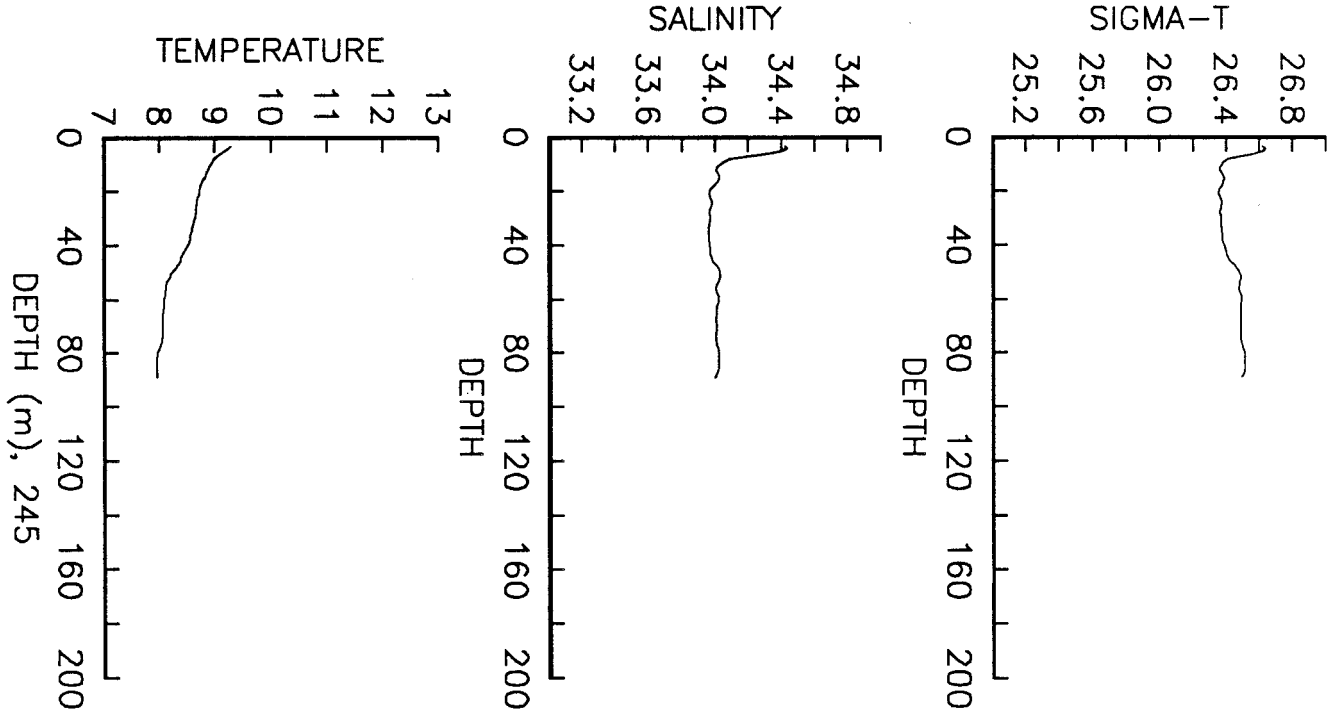
STN 8904.238 1 JUN 1989 0227 PDT
37°53.0'N 123°20.5'W DEPTH 112 m



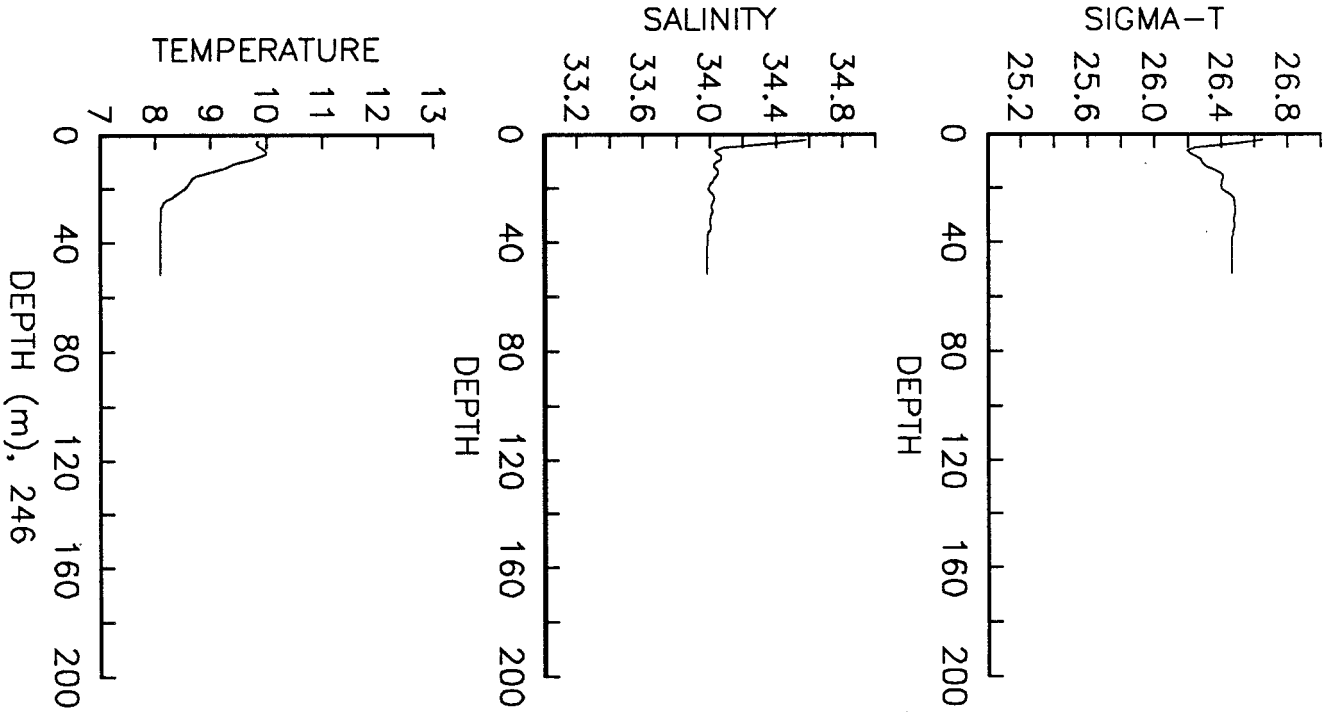
STN 8904.244 1 JUN 1989 1001 PDT
38°15.0'N 123°13.5'W DEPTH 102 m



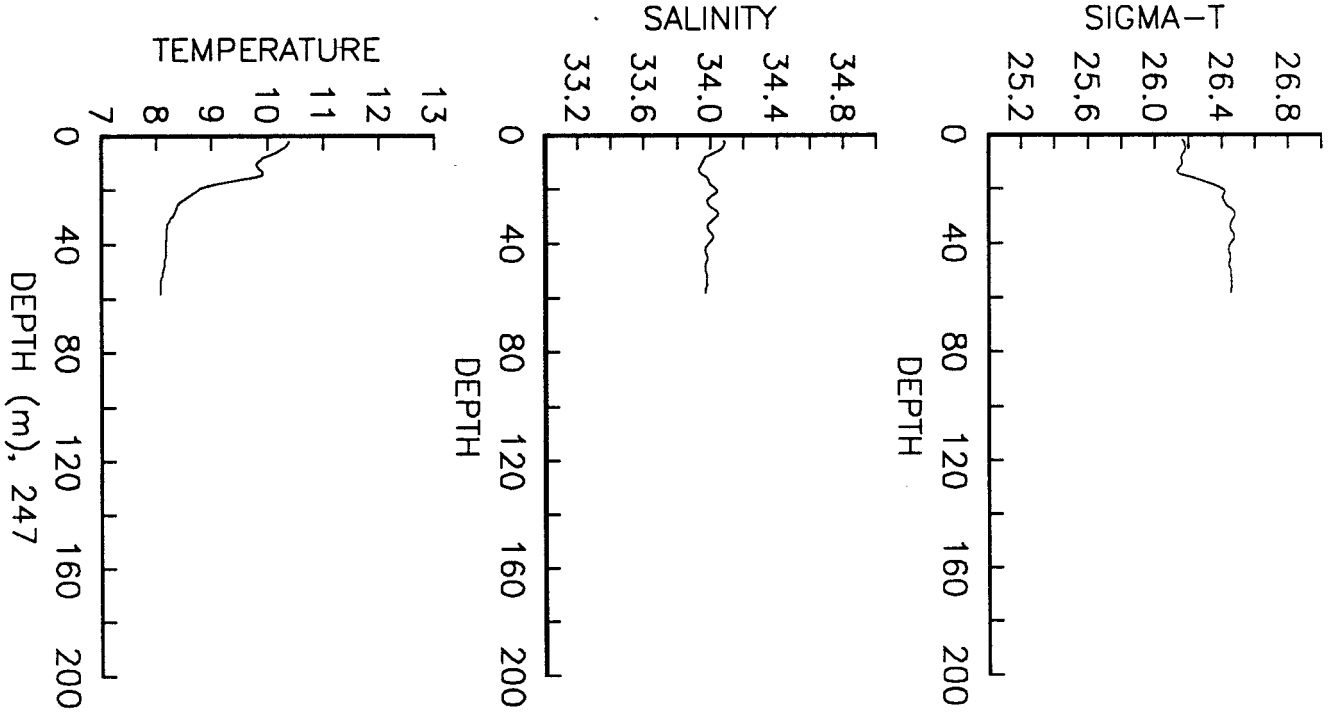
STN 8904.245 1 JUN 1989 1037 PDT
38°15.0'N 123° 8.5'W DEPTH 90 m



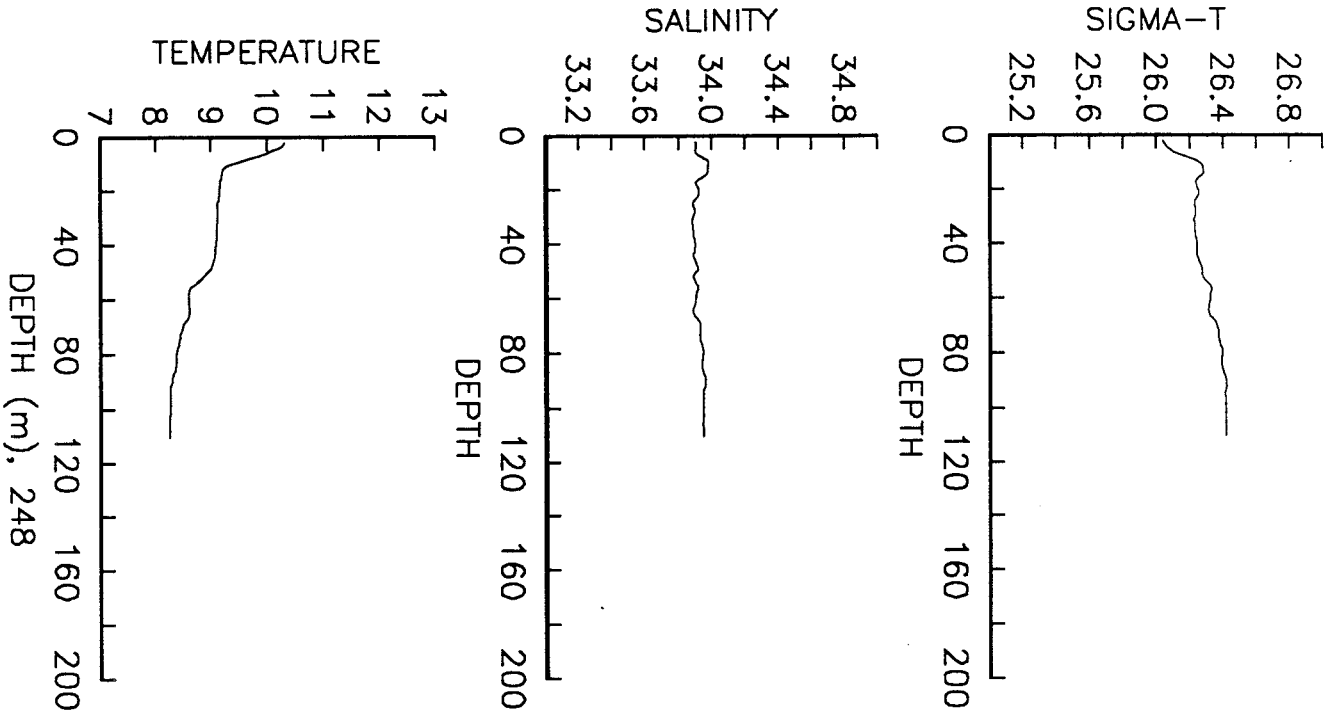
STN 8904.246 1 JUN 1989 1110 PDT
38°15.0'N 123° 2.5'W DEPTH 50 m



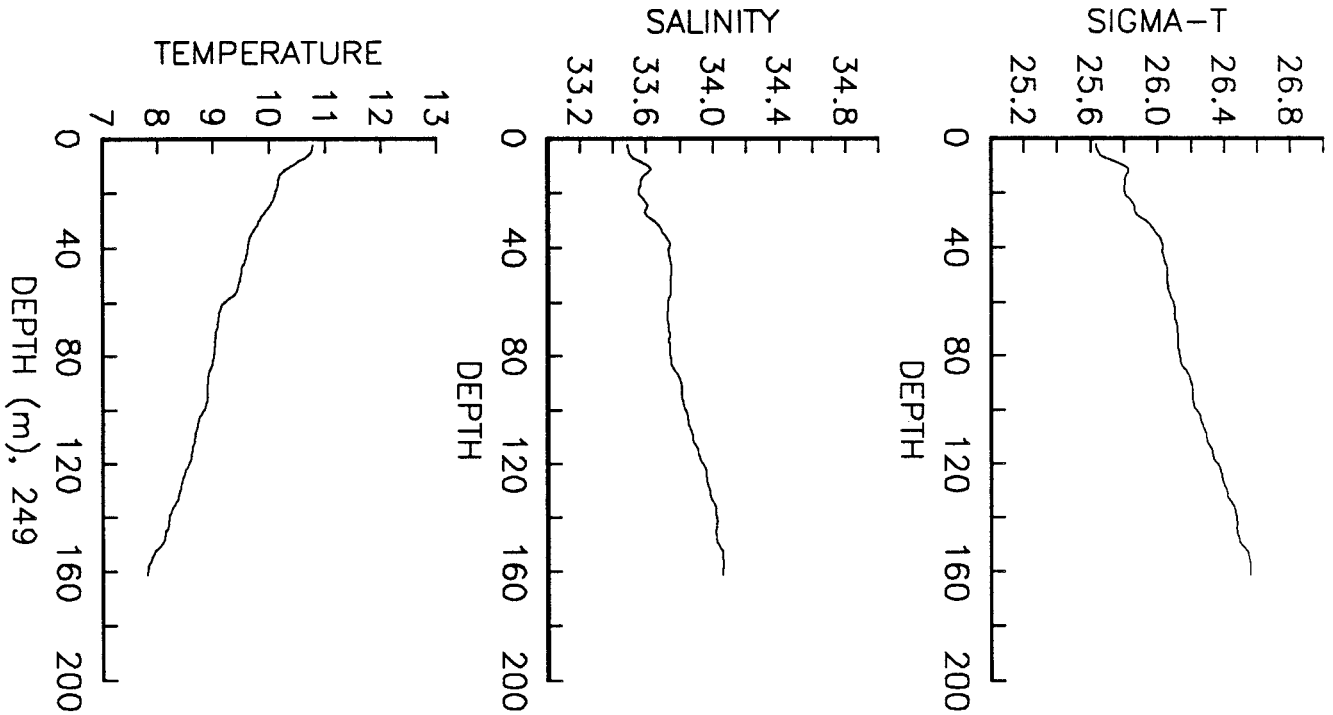
STN 8904.247 1 JUN 1989 1220 PDT
38° 5.0'N 123° 2.5'W DEPTH 64 m



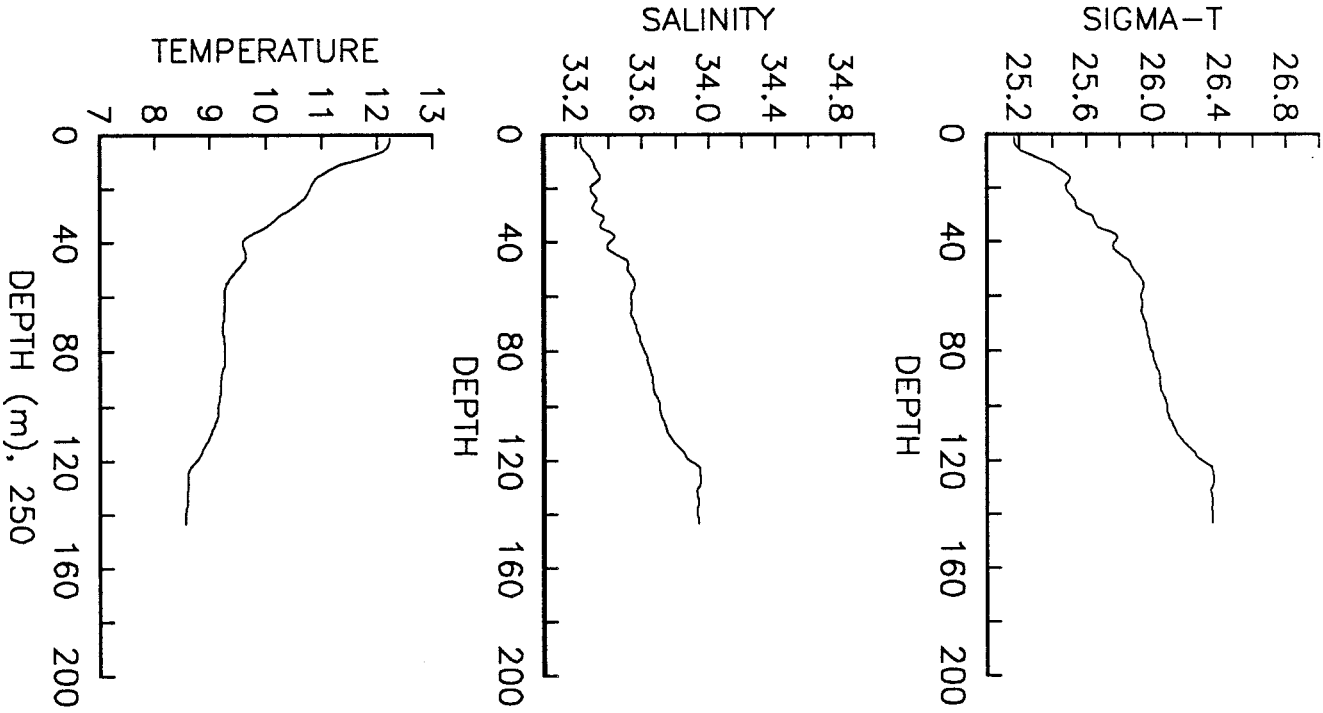
STN 8904.248 1 JUN 1989 1333 PDT
38° 5.0'N 123°13.6'W DEPTH 113 m



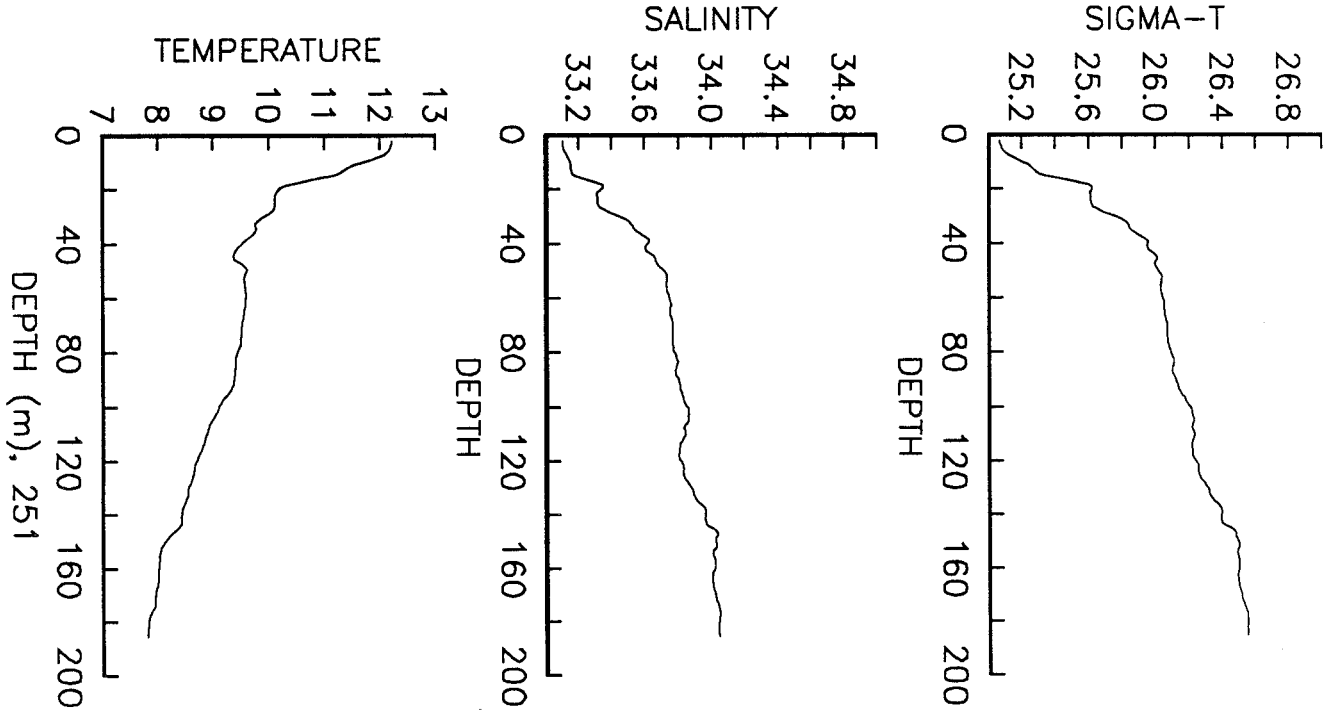
STN 8904.249 1 JUN 1989 1455 PDT
38° 5.0'N 123°23.6'W DEPTH 163 m



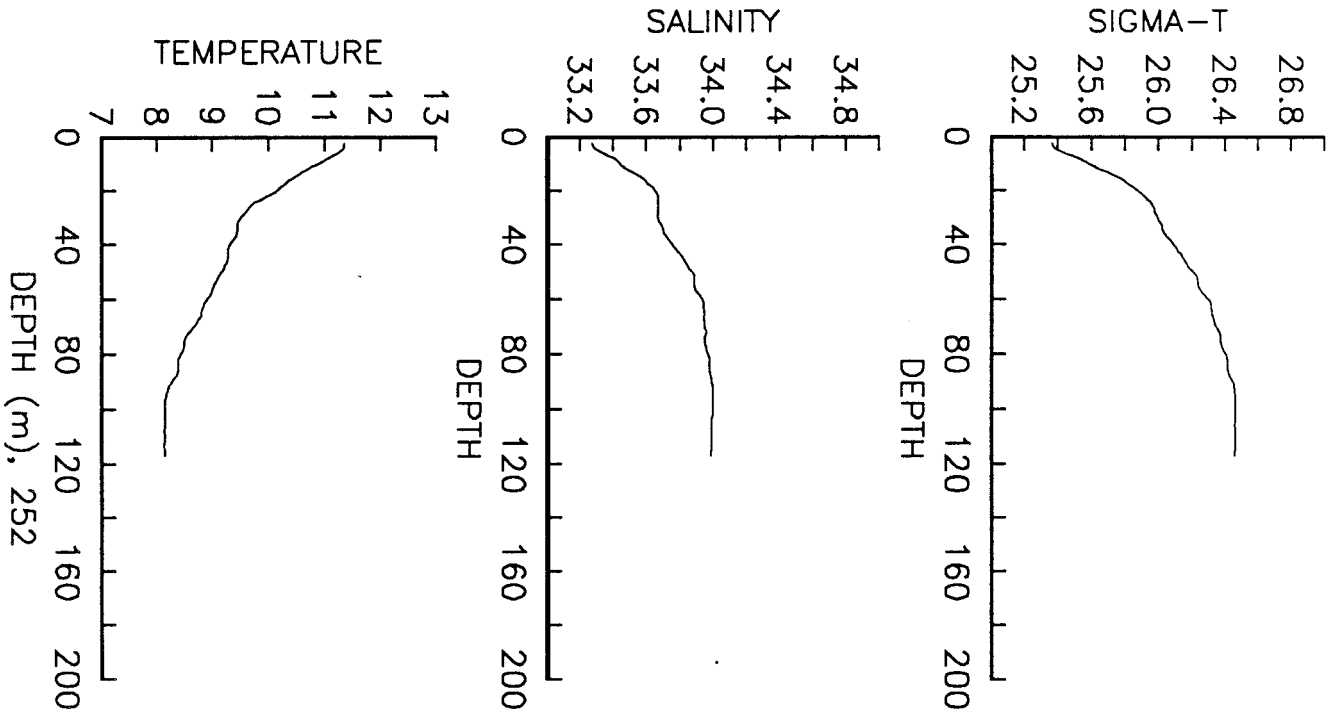
STN 8904.250 1 JUN 1989 1533 PDT
38° 5.0'N 123°28.5'W DEPTH 144 m



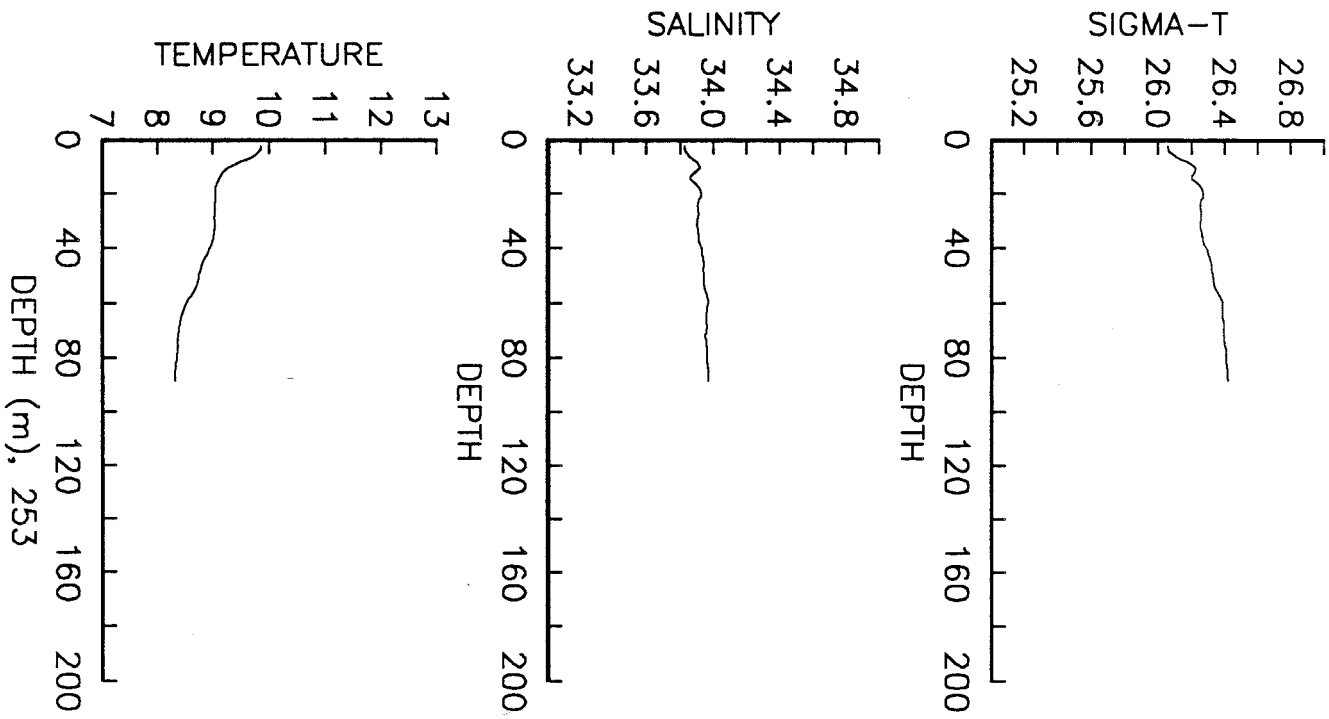
STN 8904.251 1 JUN 1989 2056 PDT
38° 9.8'N 123°22.1'W DEPTH 229 m



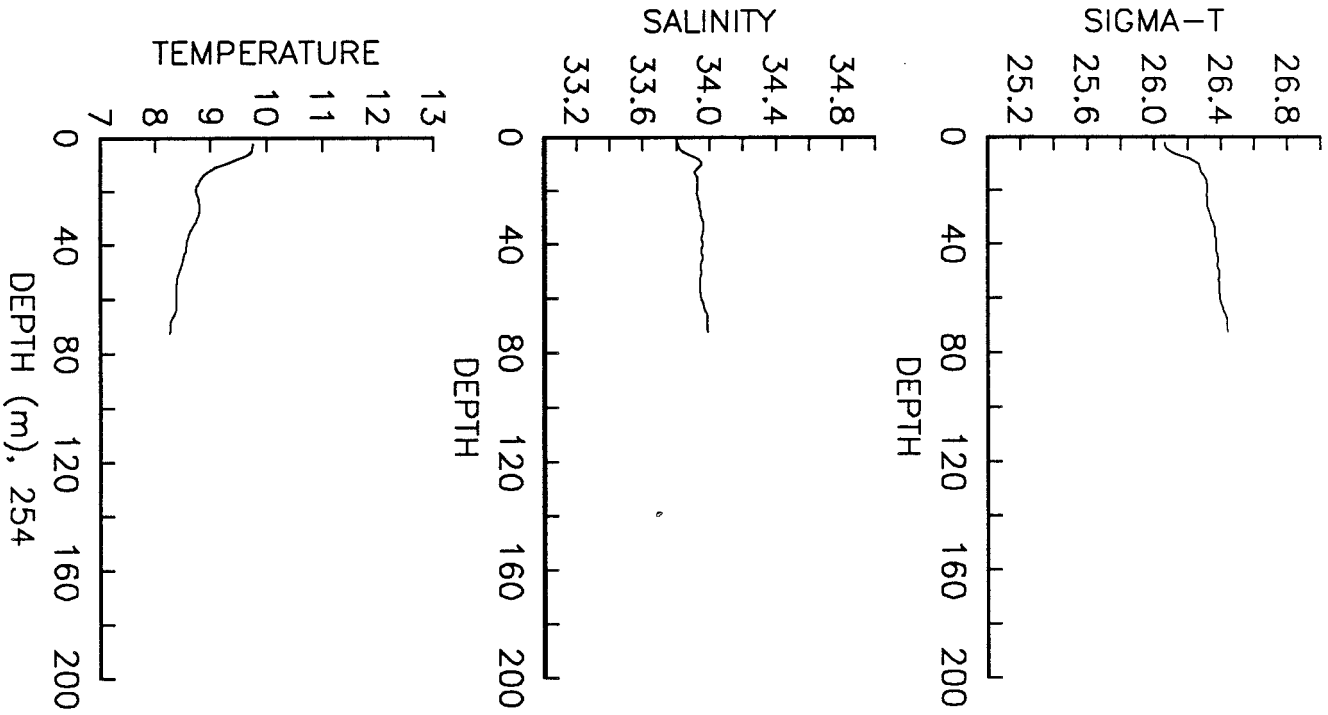
STN 8904.252 1 JUN 1989 2308 PDT
38° 9.5'N 123°15.6'W DEPTH 119 m



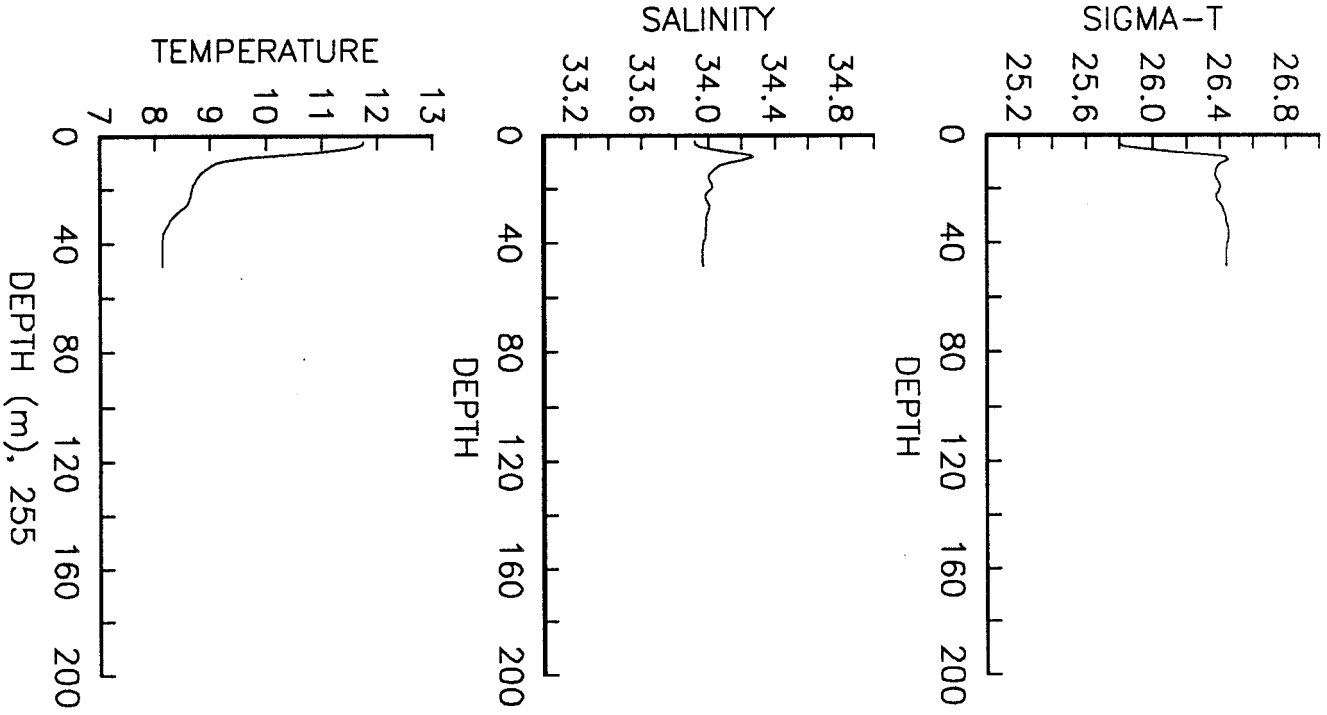
STN 8904.253 2 JUN 1989 0018 PDT
38° 9.9'N 123° 9.8'W DEPTH 95 m



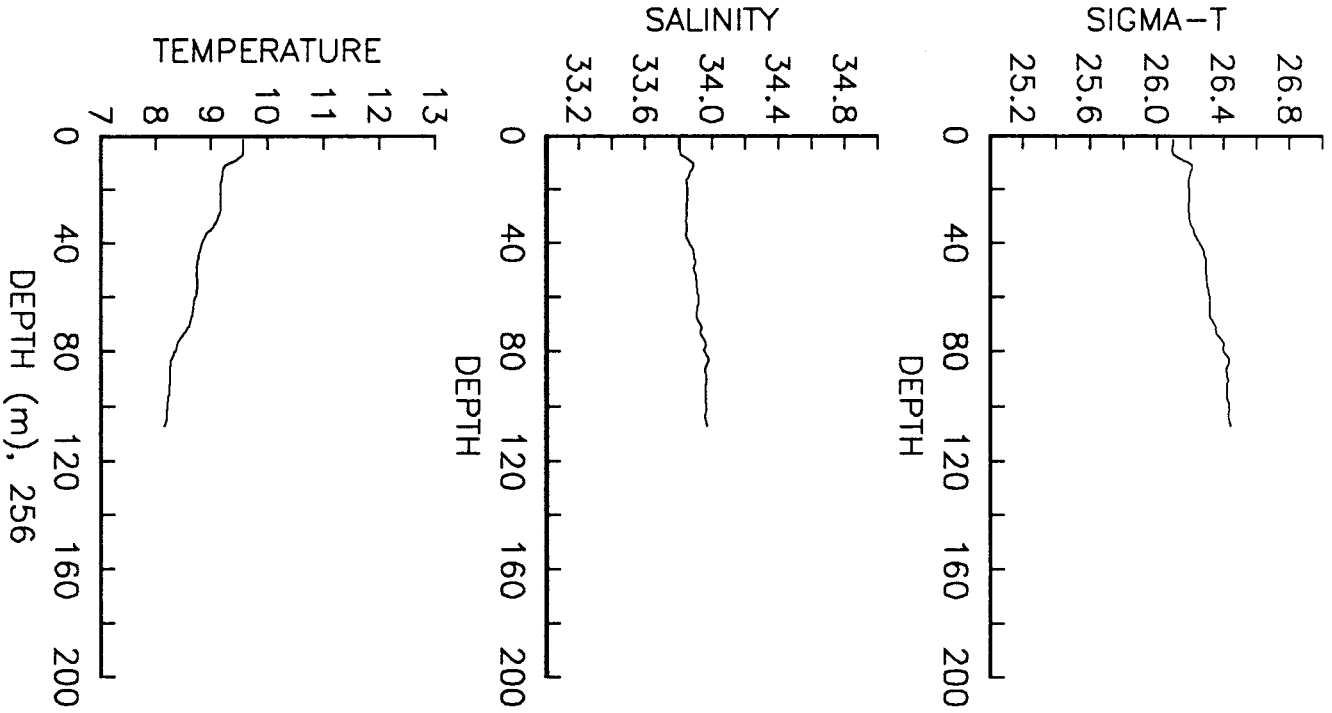
STN 8904.254 2 JUN 1989 0153 PDT
38°10.7'N 123° 5.2'W DEPTH 80 m



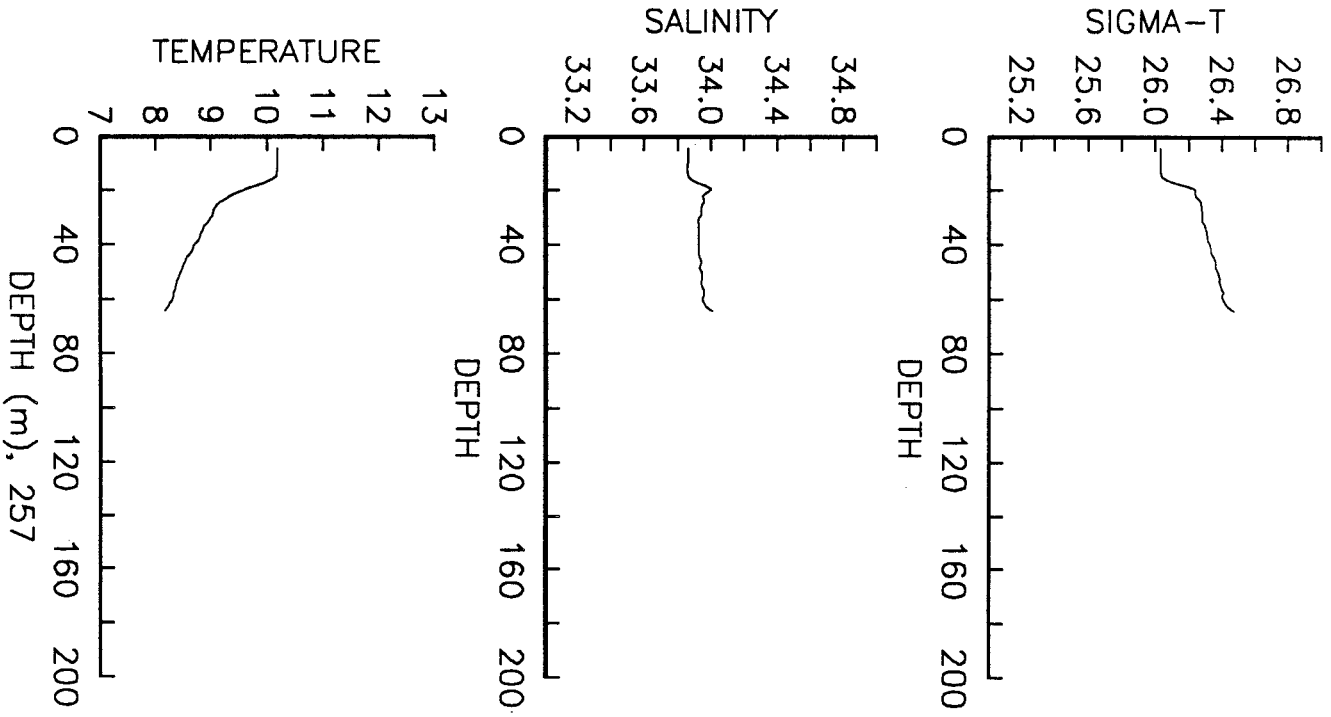
STN 8904.255 2 JUN 1989 0237 PDT
38°10.0'N 123° 0.0'W DEPTH 55 m



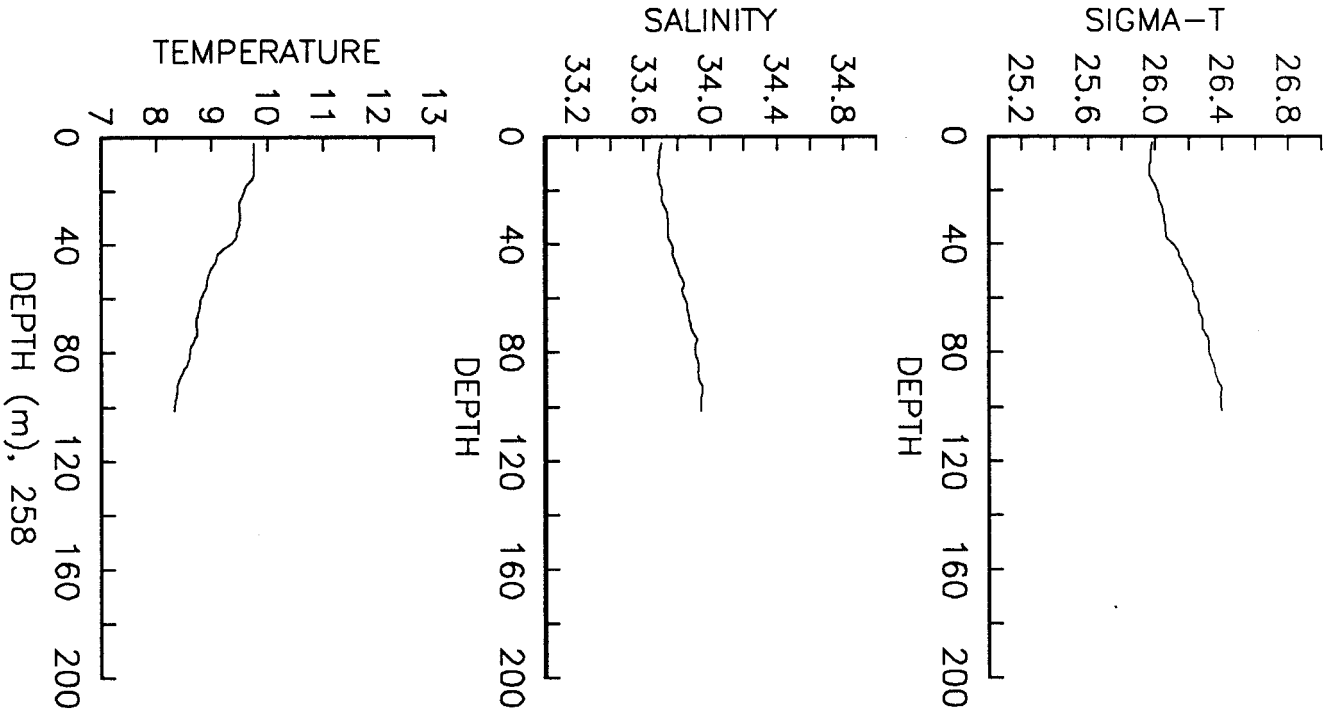
STN 8904.256 2 JUN 1989 0556 PDT
38° 0.0'N 123°13.5'W DEPTH 108 m



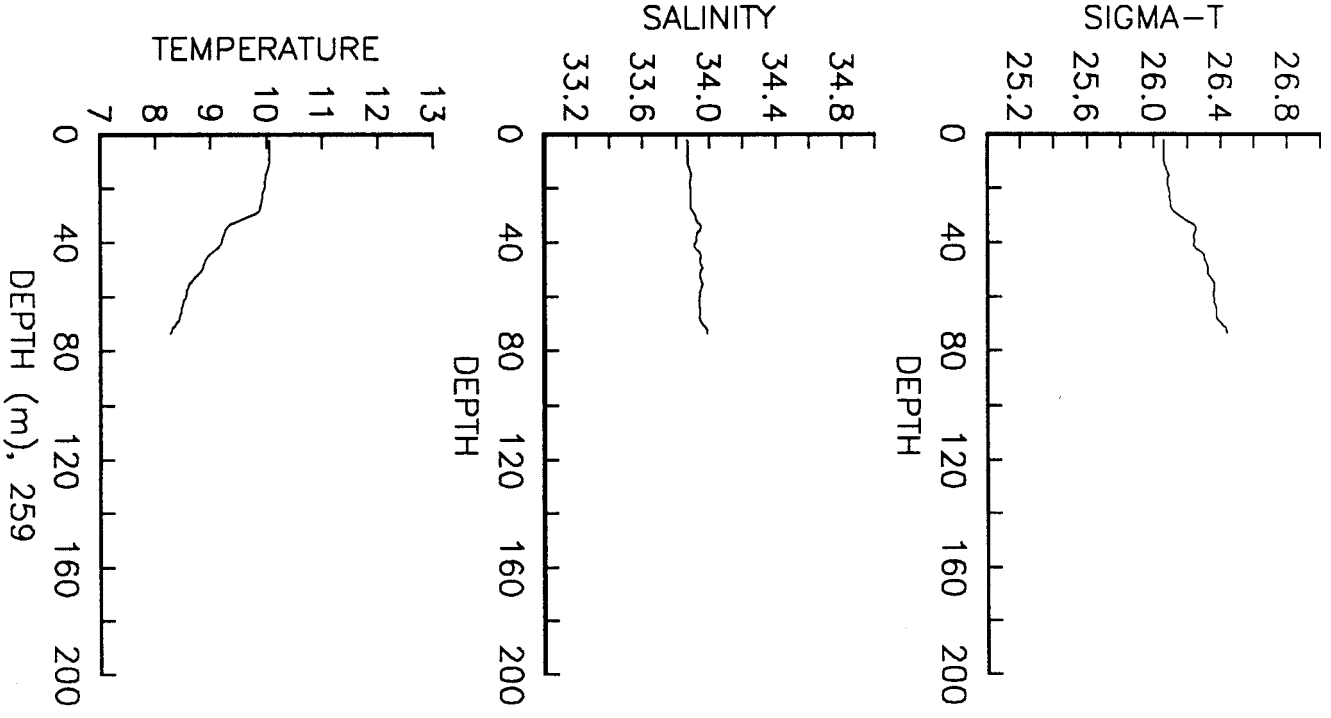
STN 8904.257 2 JUN 1989 0640 PDT
38°0.0'N 123° 8.5'W DEPTH 86 m



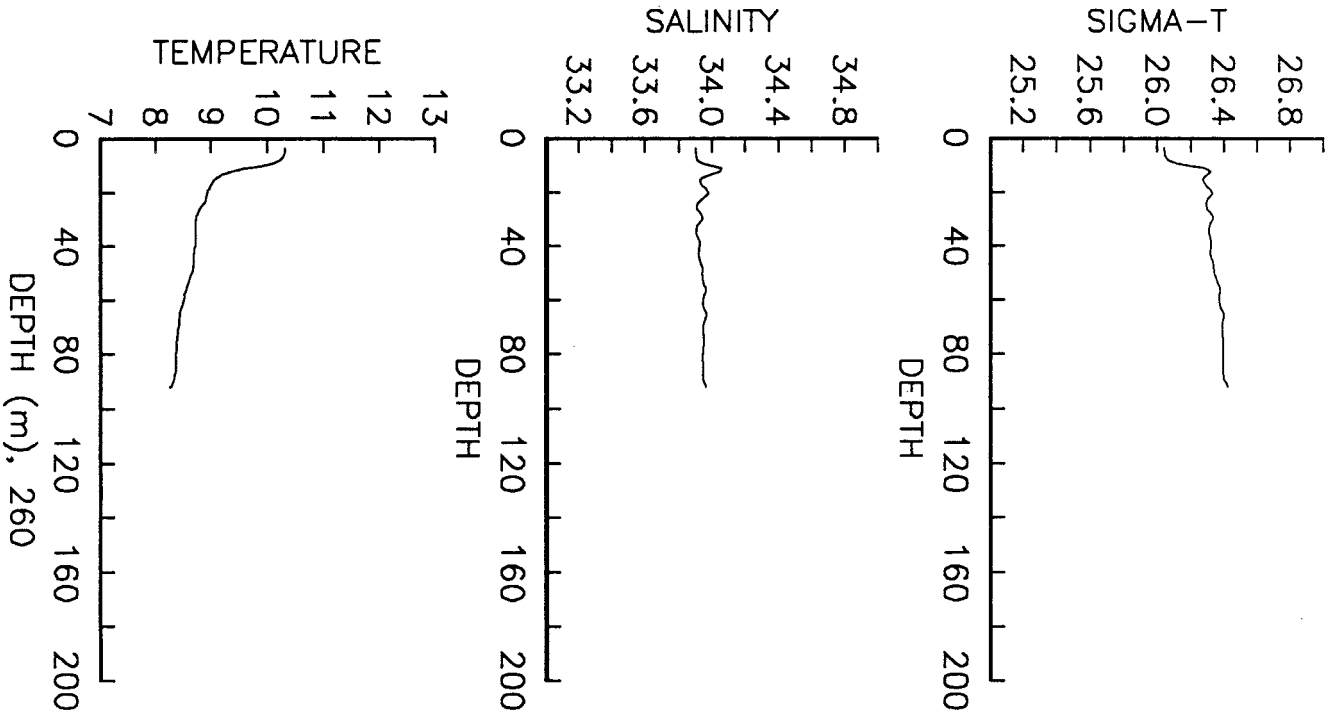
STN 8904.258 2 JUN 1989 0802 PDT
37°52.9'N 123°15.7'W DEPTH 106 m



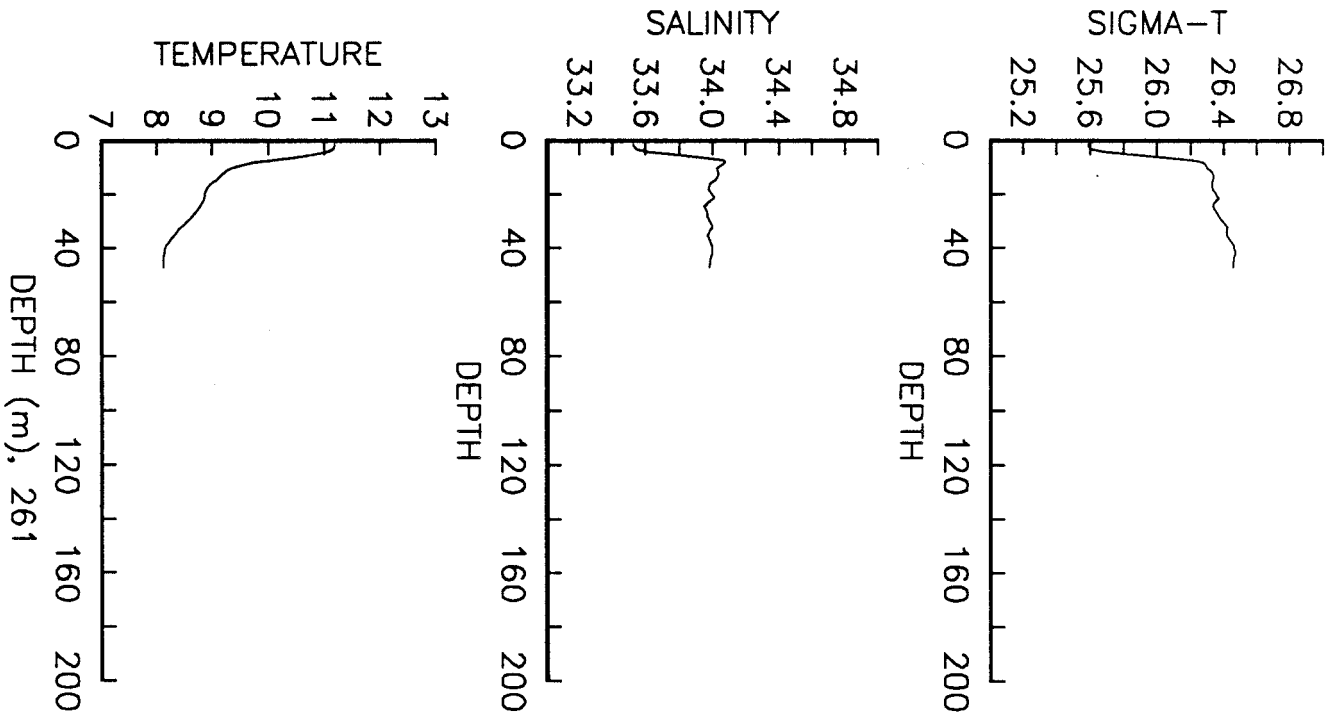
STN 8904.259 2 JUN 1989 0855 PDT
37°49.5'N 123°11.1'W DEPTH 75 m



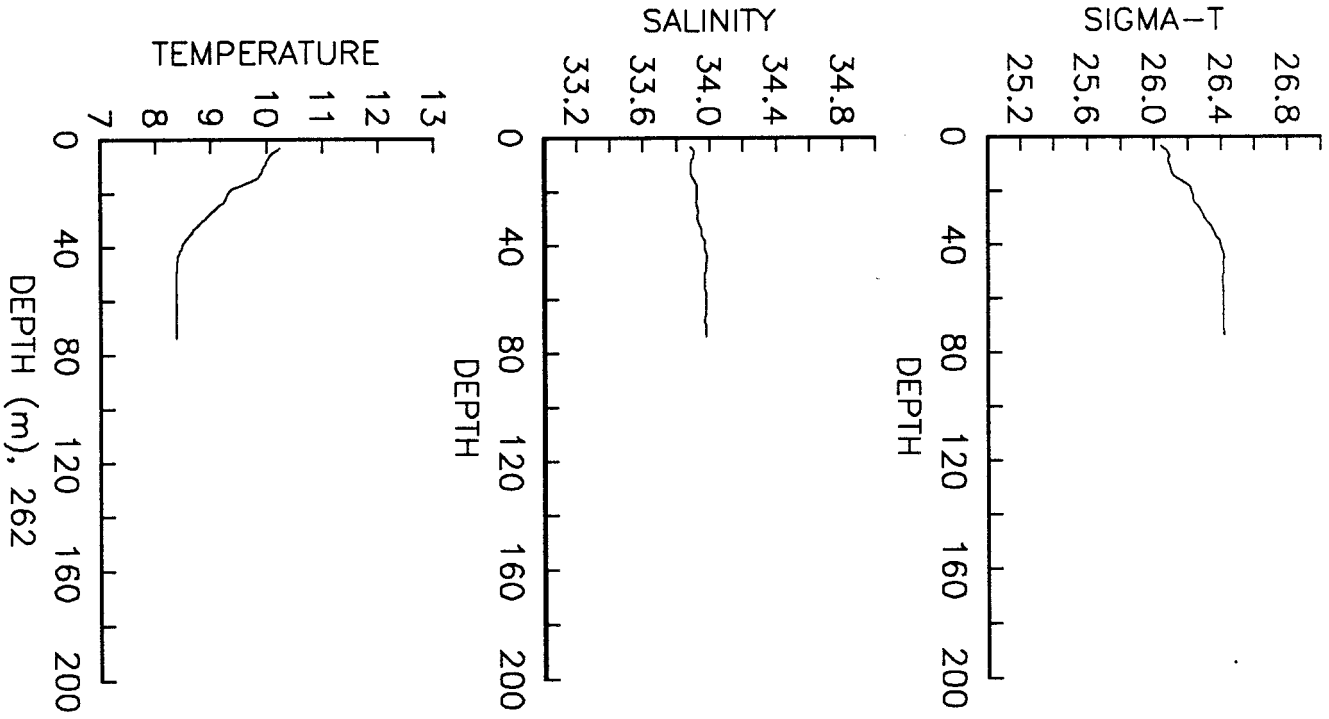
STN 8904.260 2 JUN 1989 0940 PDT
37°52.2'N 123° 8.2'W DEPTH 95 m



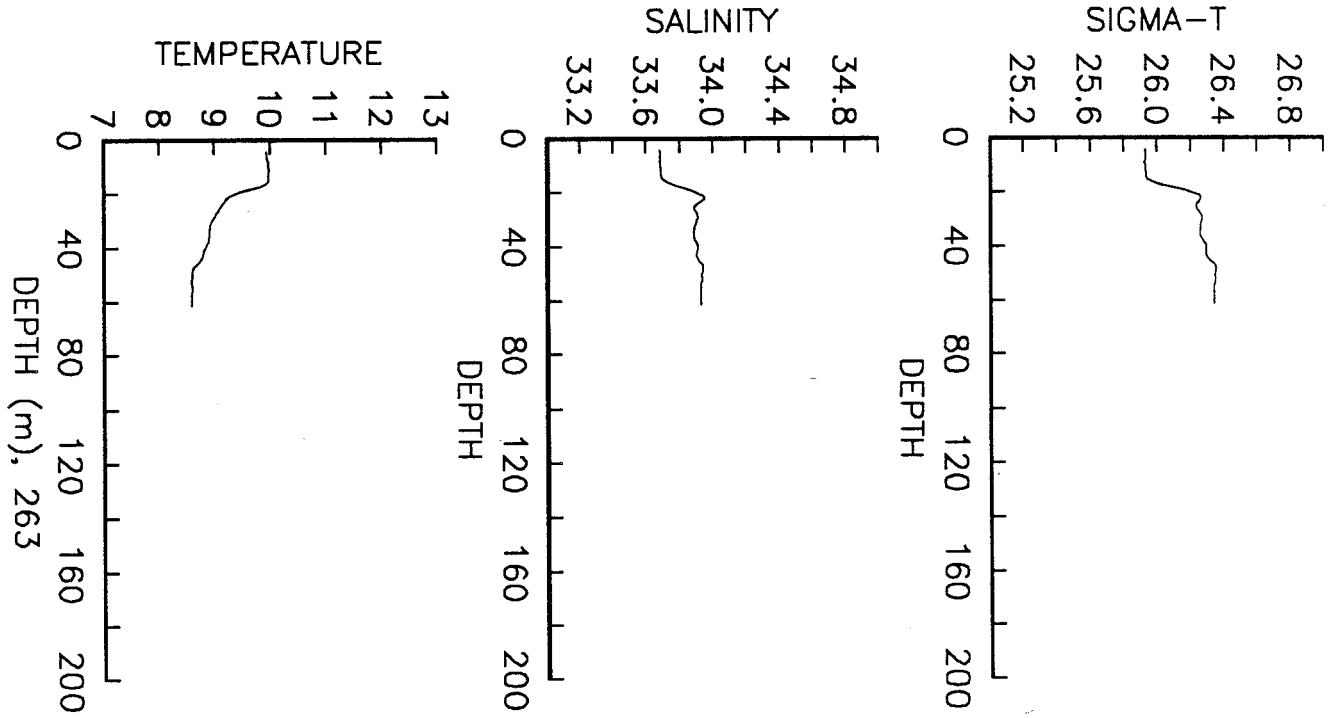
STN 8904.261 2 JUN 1989 1135 PDT
37°58.0'N 123° 4.8'W DEPTH 51 m



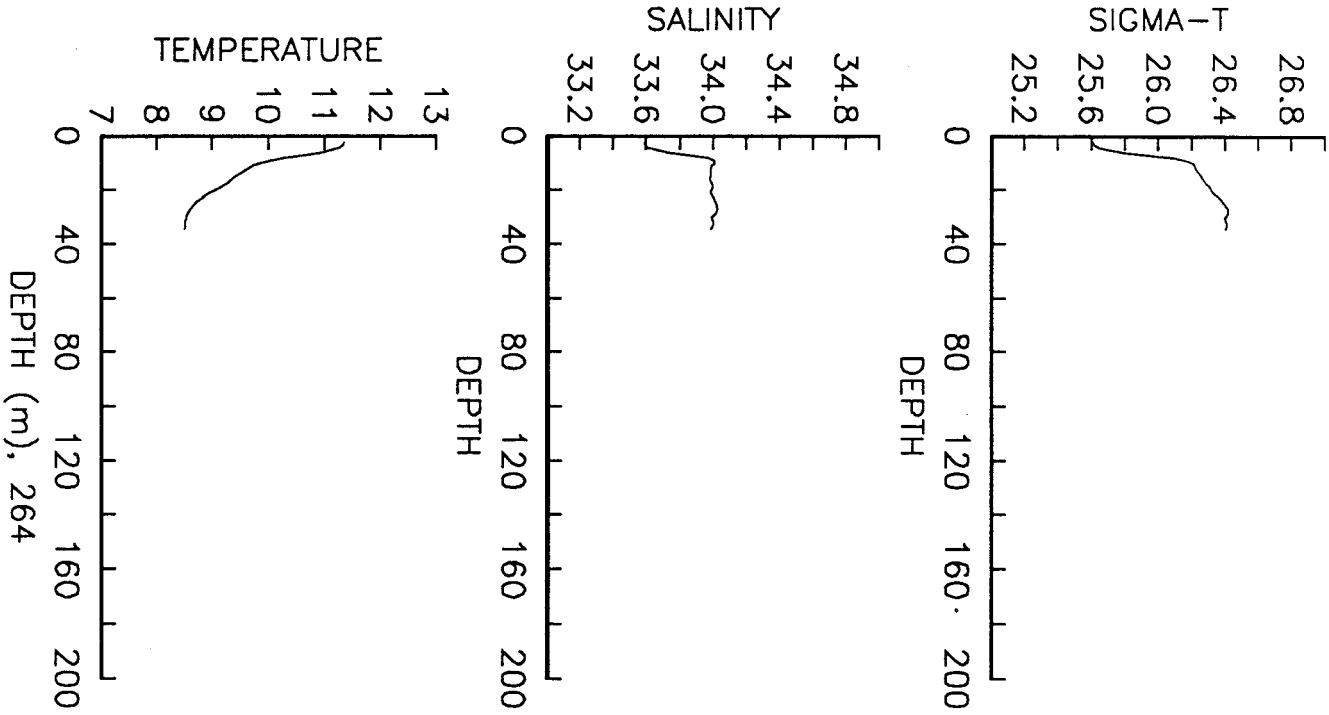
STN 8904.262 2 JUN 1989 1320 PDT
37°47.1'N 123° 5.5'W DEPTH 77 m



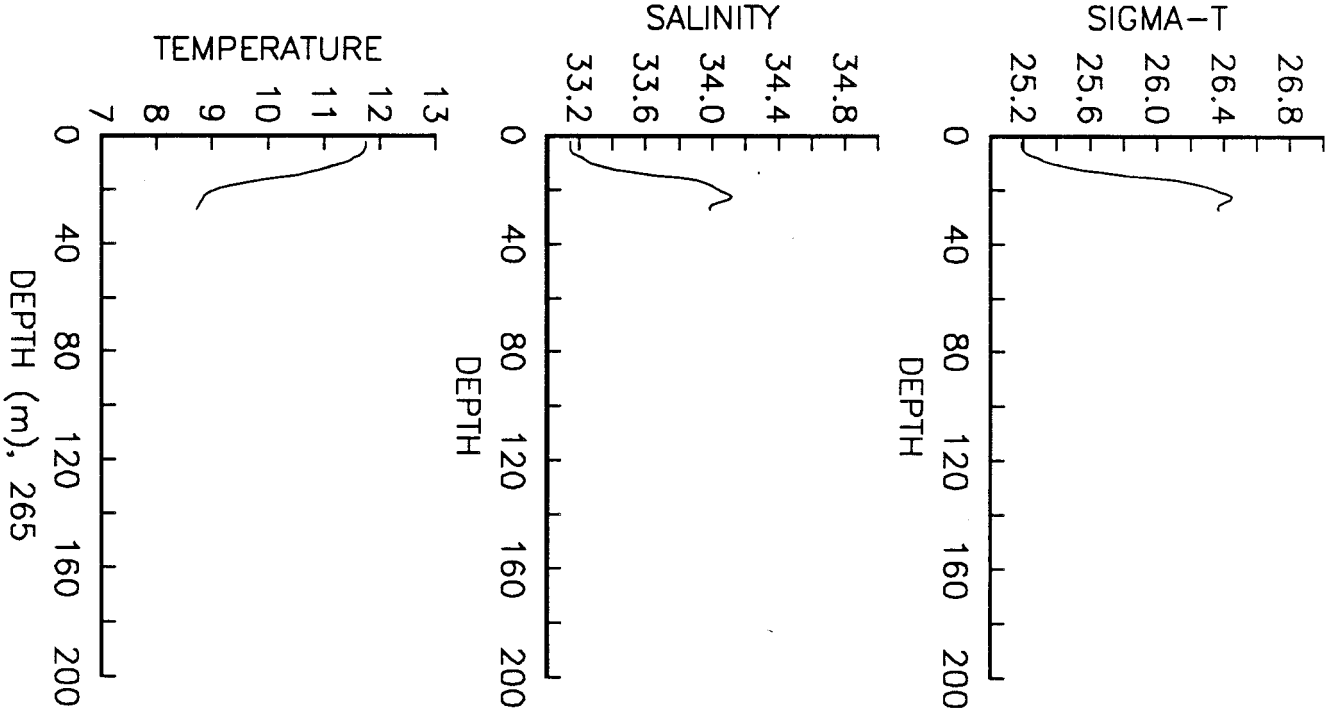
STN 8904.263 2 JUN 1989 1356 PDT
37°43.9'N 123° 0.5'W DEPTH 62 m



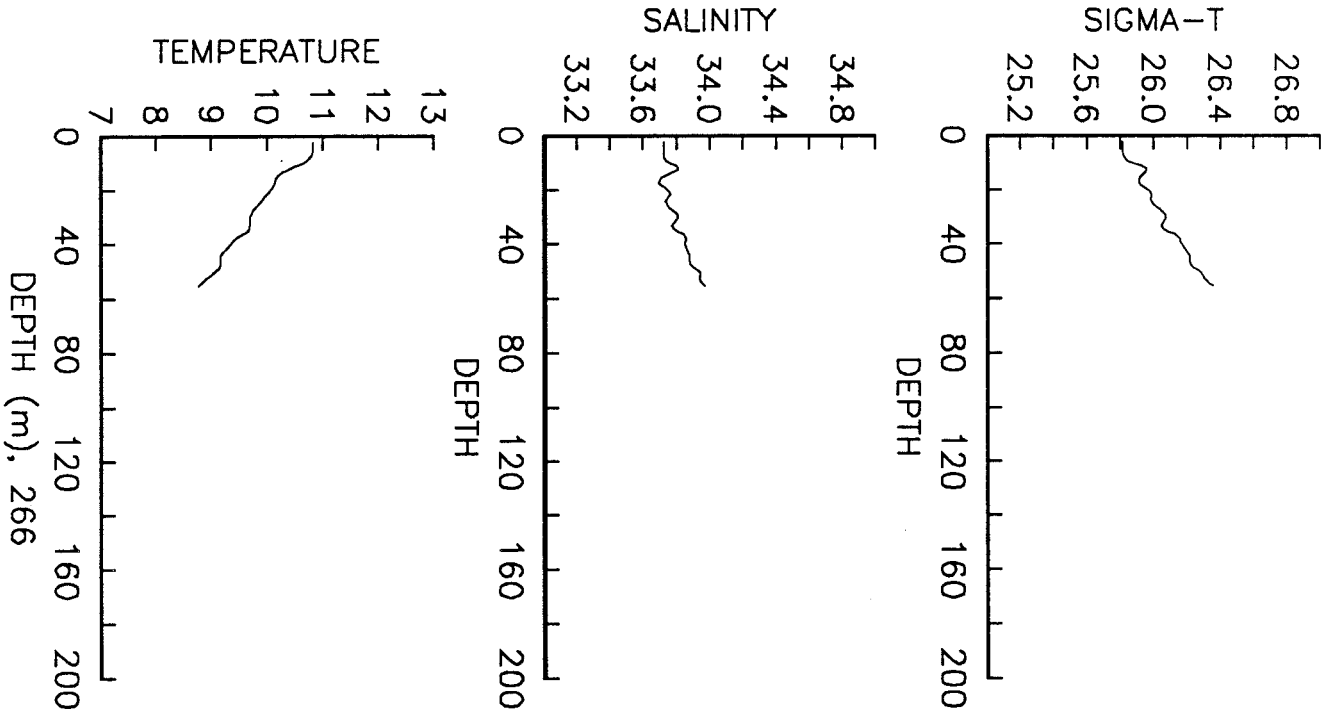
STN 8904.264 2 JUN 1989 1538 PDT
37°56.4'N 122°48.6'W DEPTH 35 m



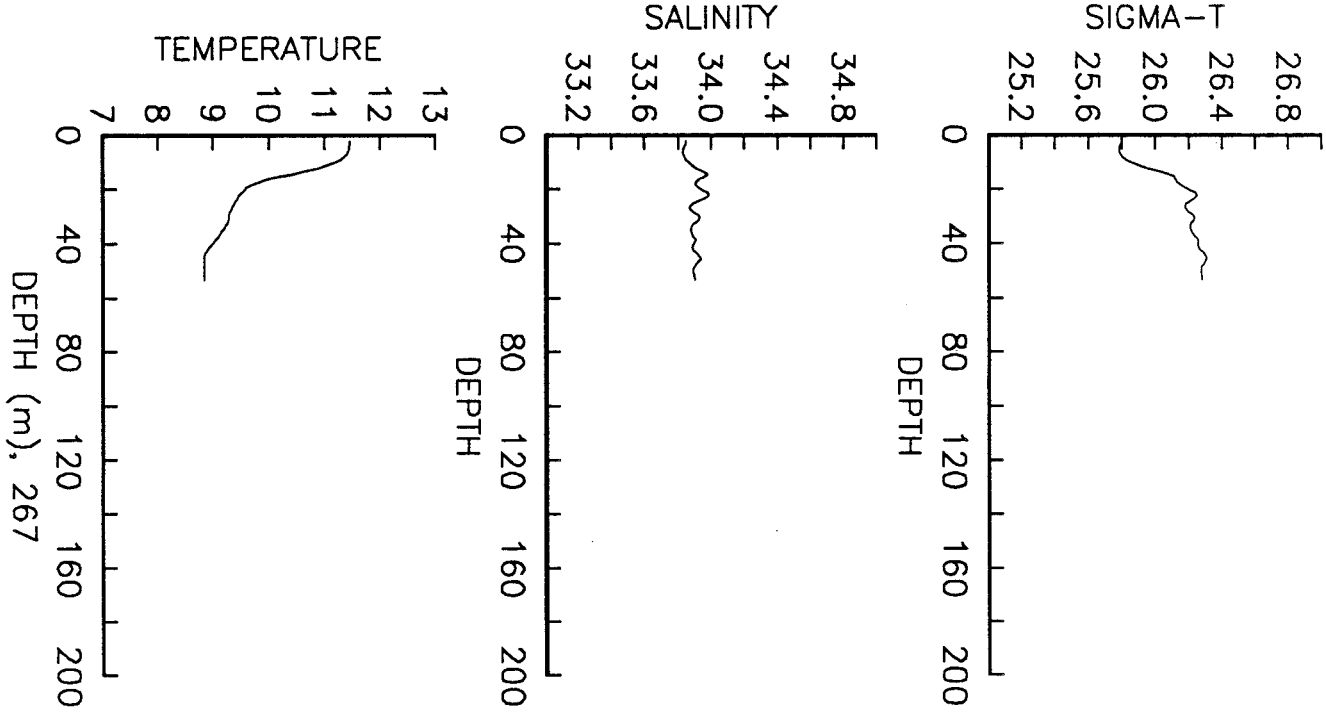
STN 8904.265 2 JUN 1989 1613 PDT
37°52.7'N 122°44.3'W DEPTH 27 m



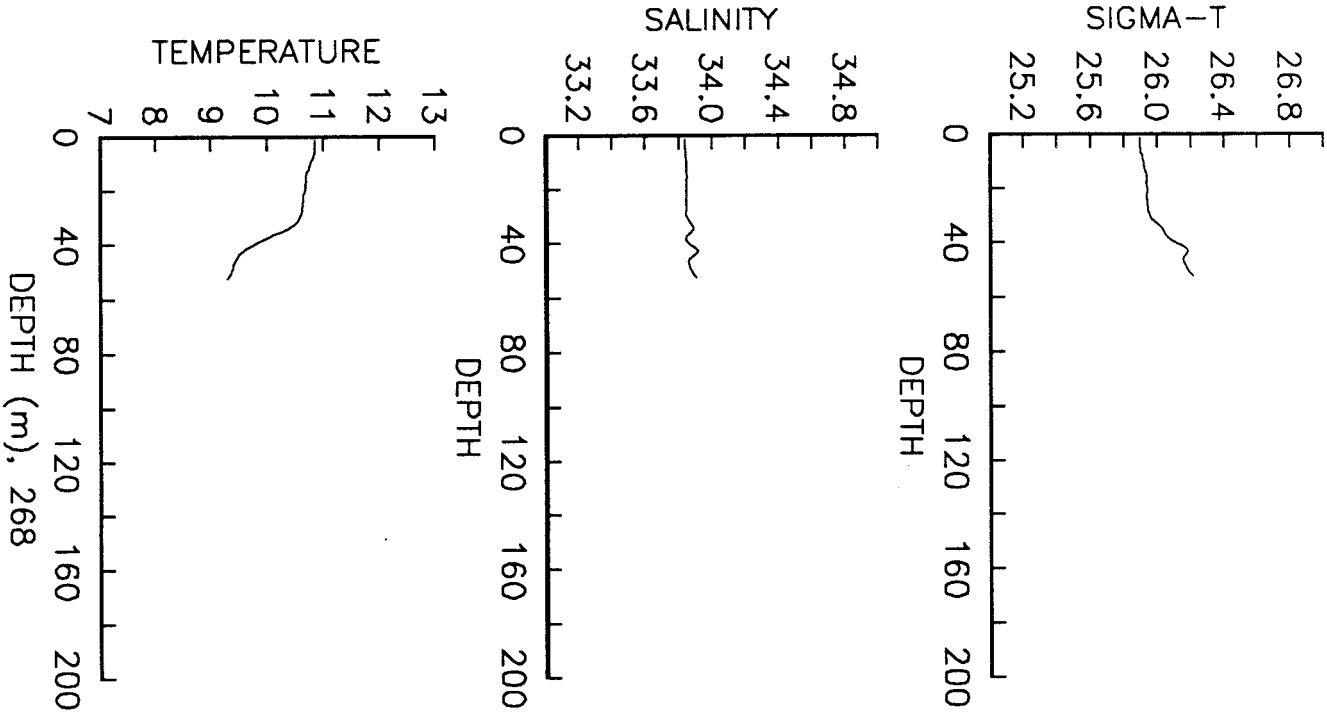
STN 8904.266 2 JUN 1989 1857 PDT
37°37.8'N 122°45.1'W DEPTH 62 m



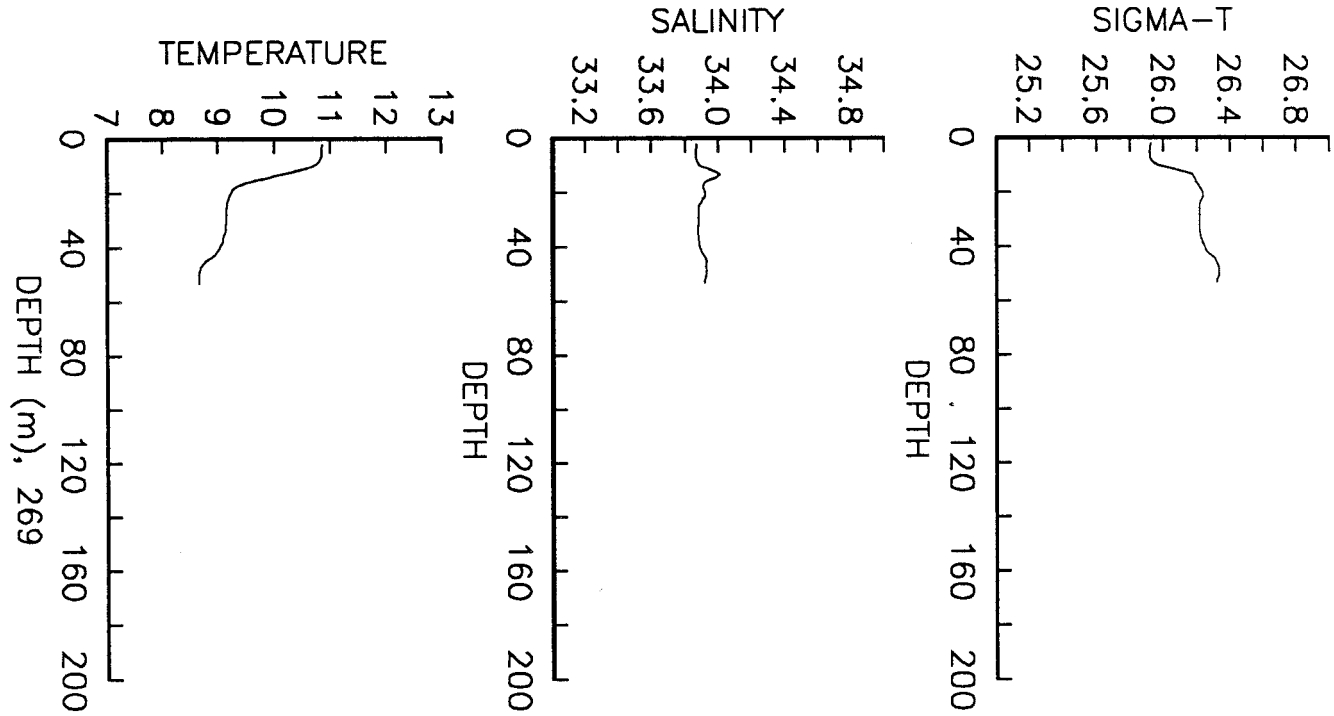
STN 8904.267 2 JUN 1989 2104 PDT
37°37.8'N 122°46.0'W DEPTH 57 m



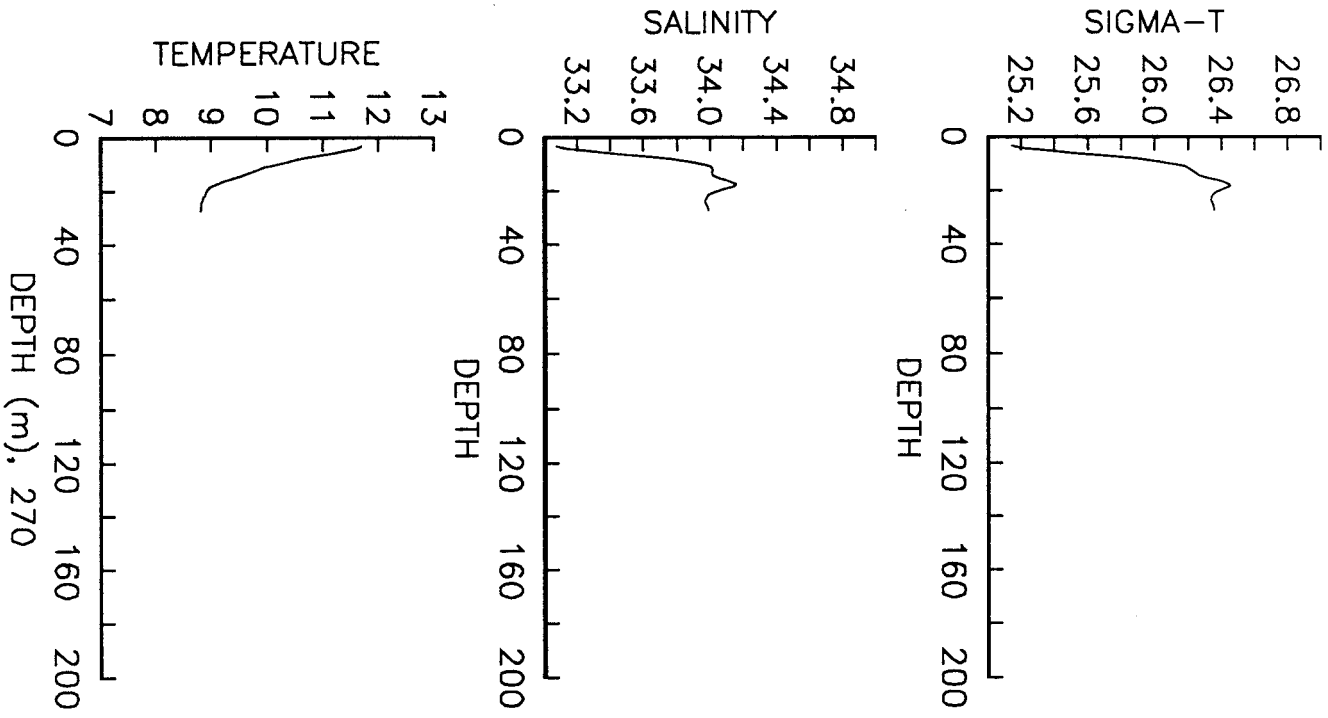
STN 8904.268 2 JUN 1989 2312 PDT
37°42.7'N 122°56.0'W DEPTH 57 m



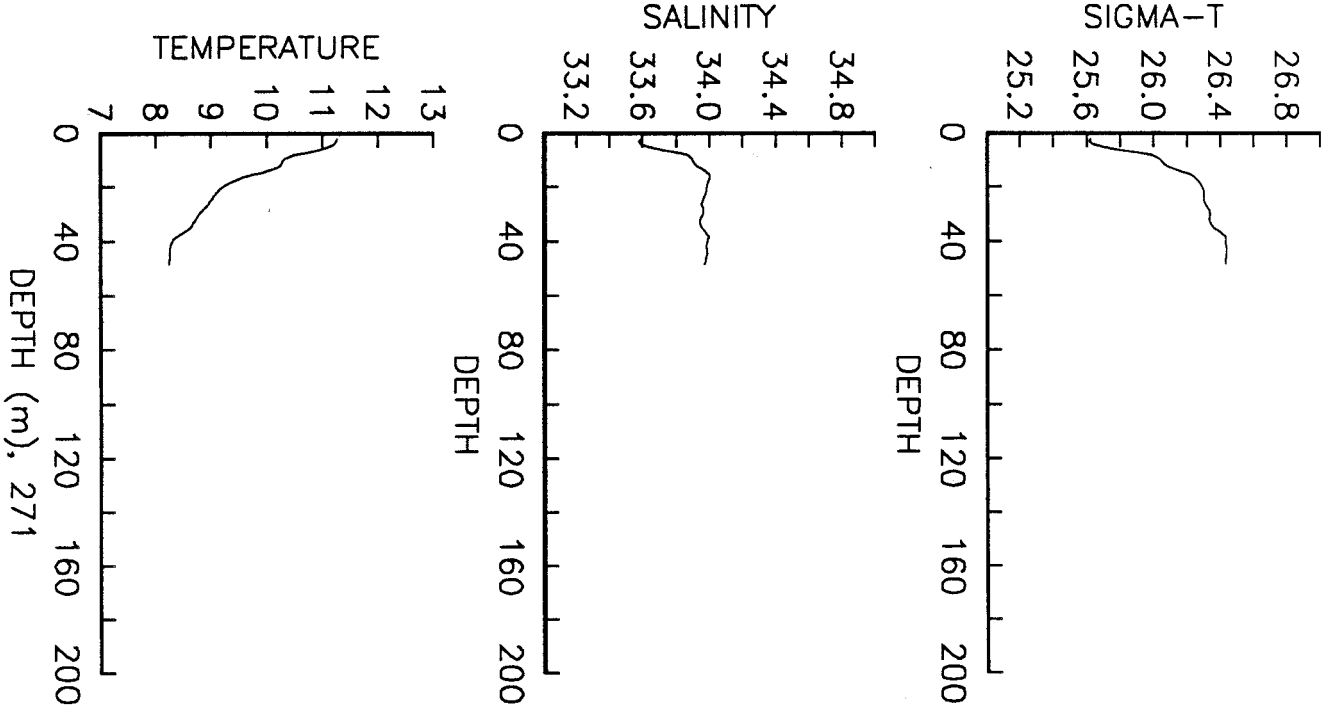
STN 8904.269 3 JUN 1989 0011 PDT
37°47.5'N 122°52.0'W DEPTH 59 m



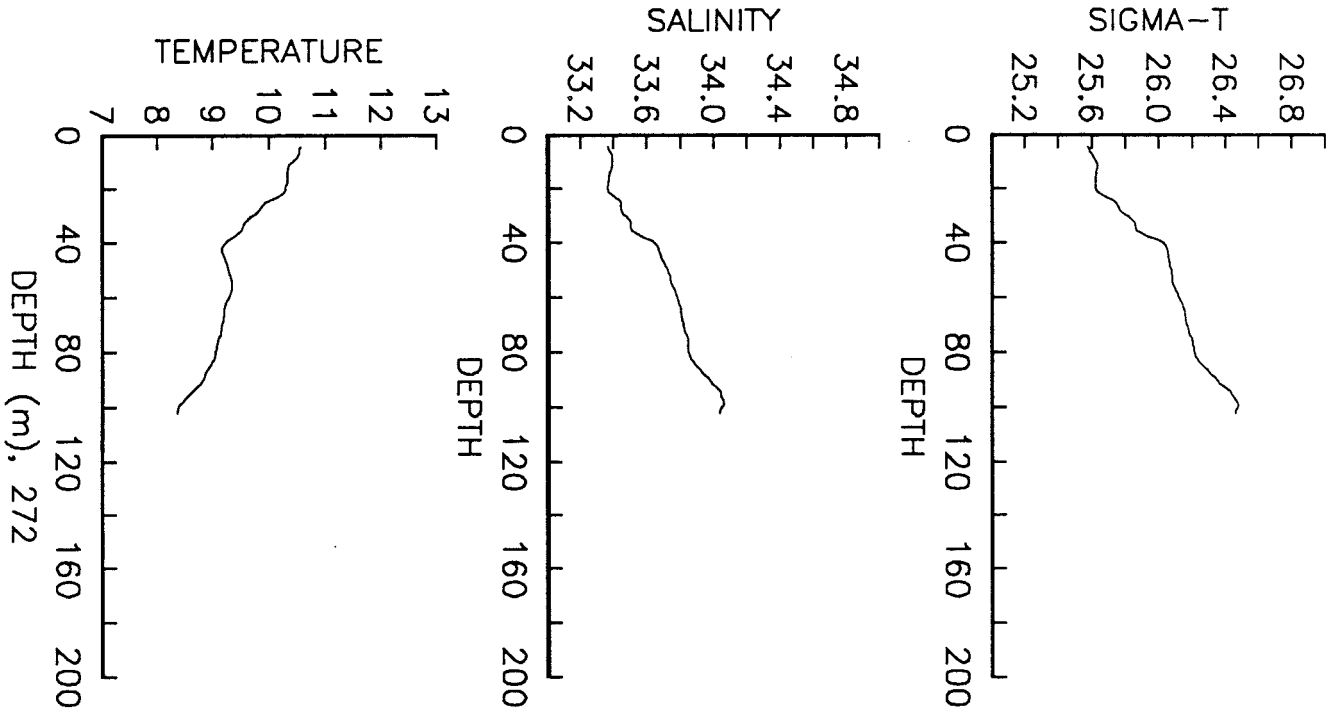
STN 8904.270 3 JUN 1989 0205 PDT
37°50.6'N 122°44.3'W DEPTH 37 m



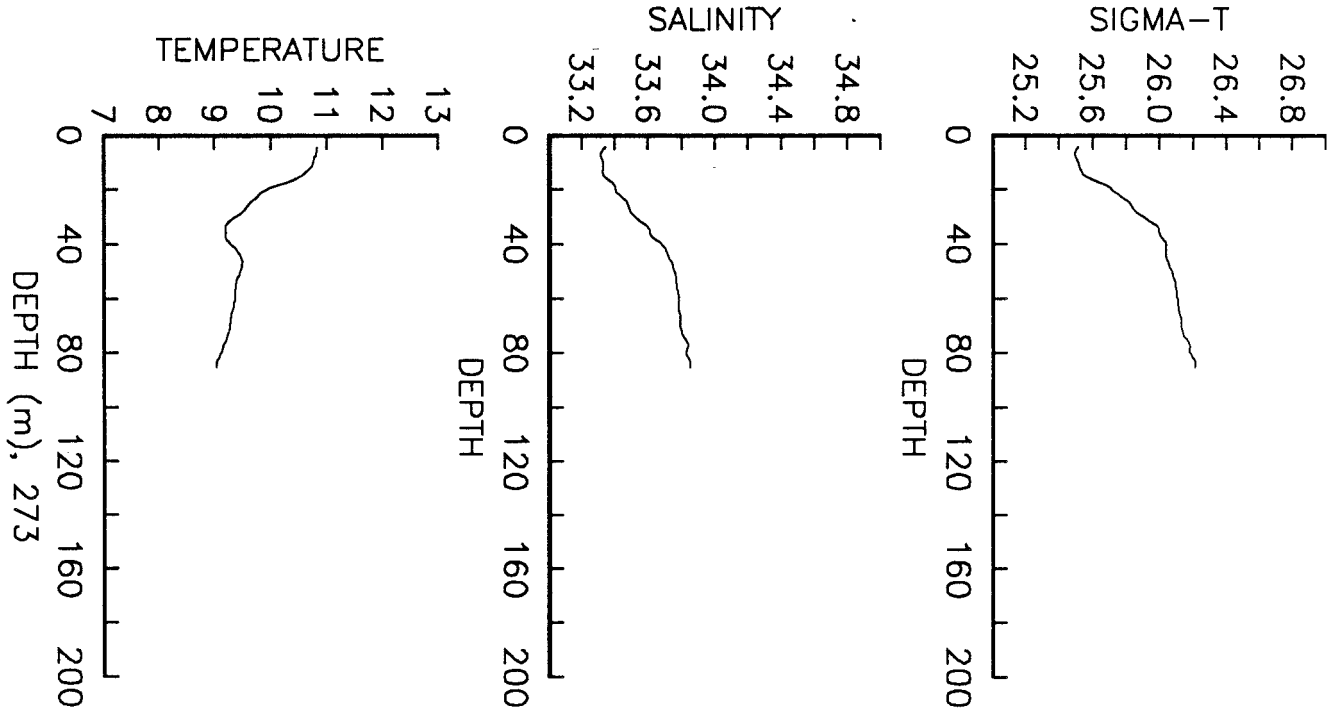
STN 8904.271 3 JUN 1989 0326 PDT
37°58.0'N 122°56.0'W DEPTH 53 m



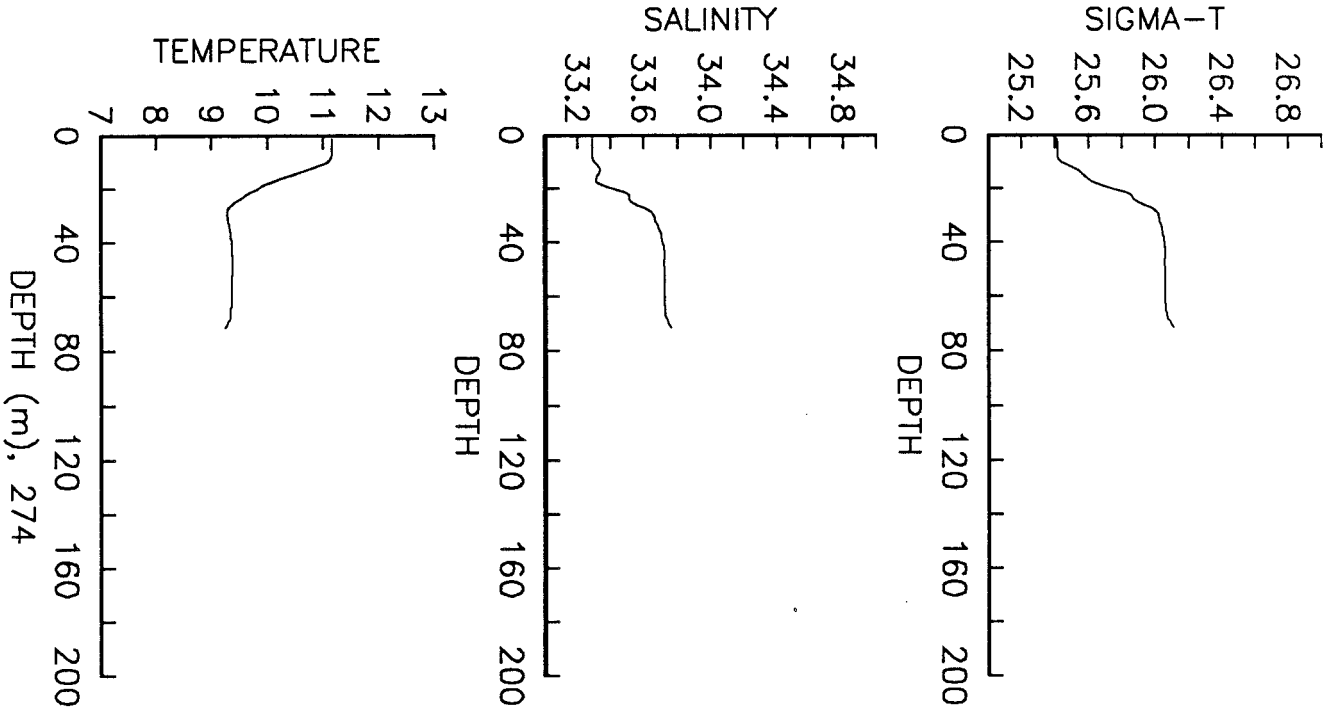
STN 8904.272 3 JUN 1989 0606 PDT
37°58.3'N 123°21.4'W DEPTH 106 m



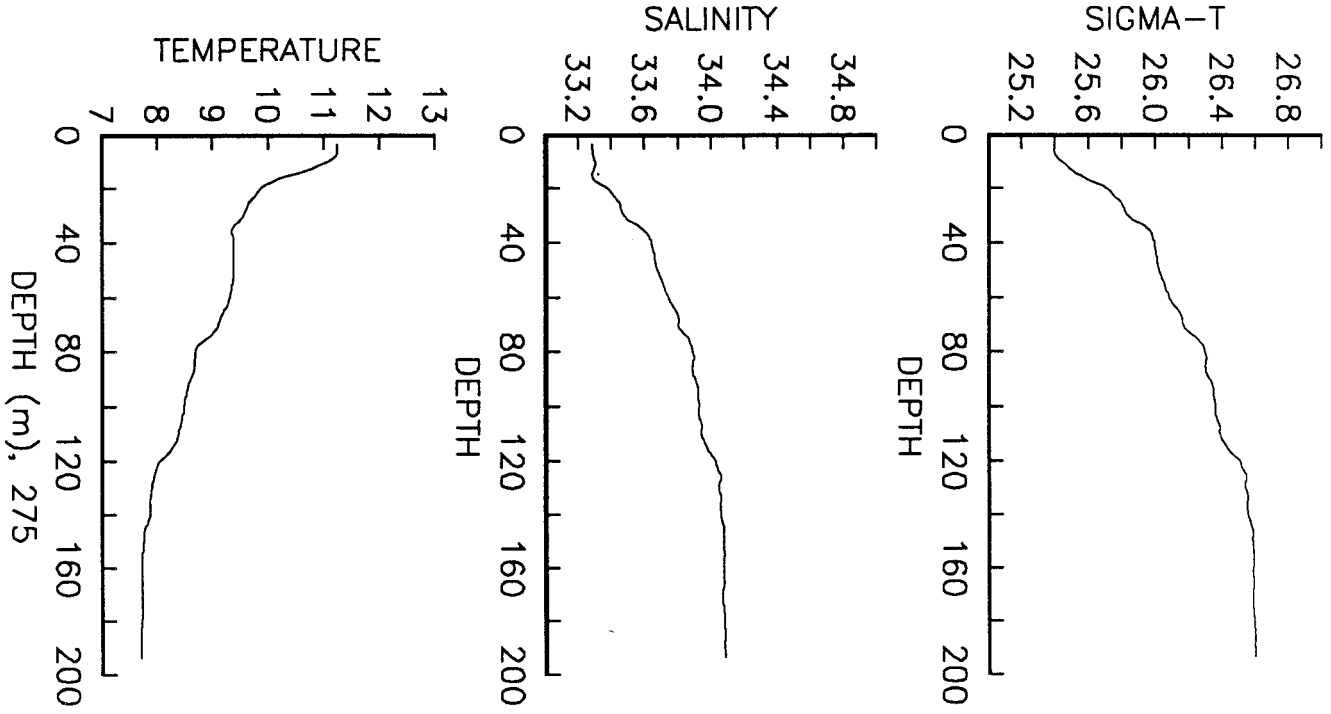
STN 8904.273 3 JUN 1989 0626 PDT
37°58.3'N 123°23.3'W DEPTH 86 m



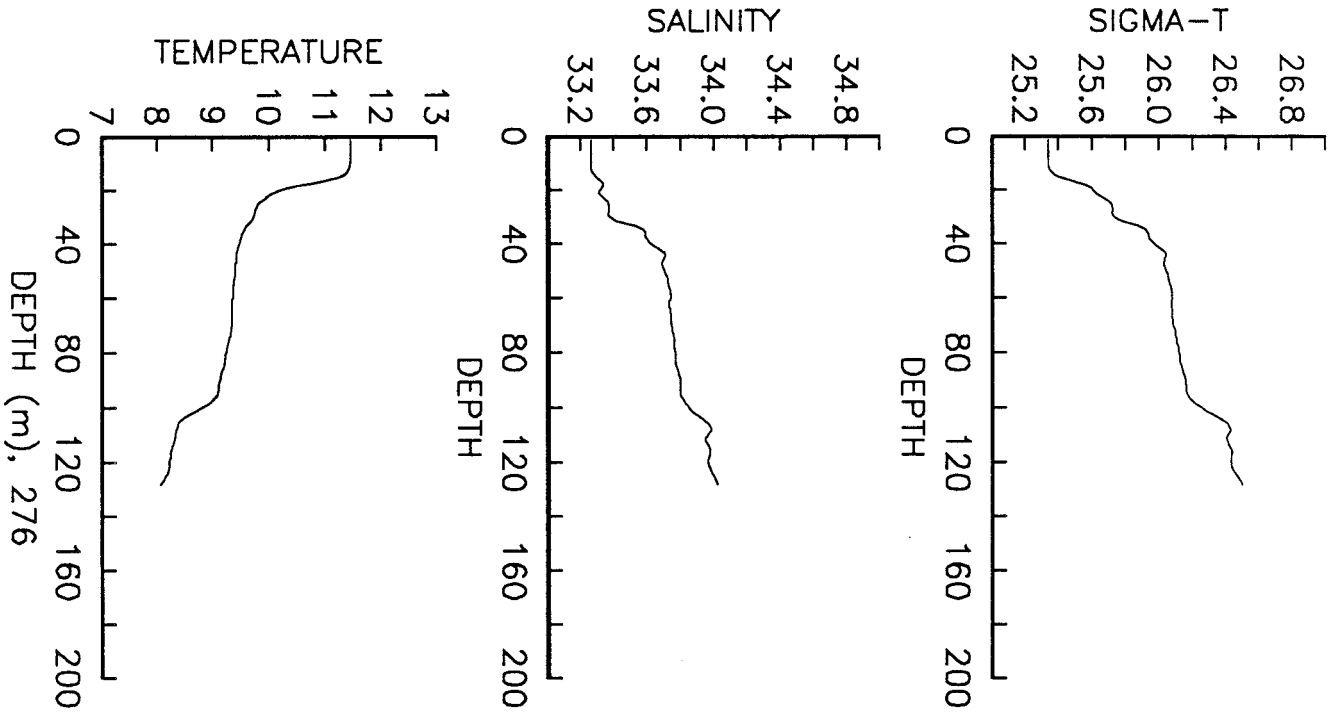
STN 8904.274 3 JUN 1989 0642 PDT
37°58.3'N 123°25.0'W DEPTH 73 m



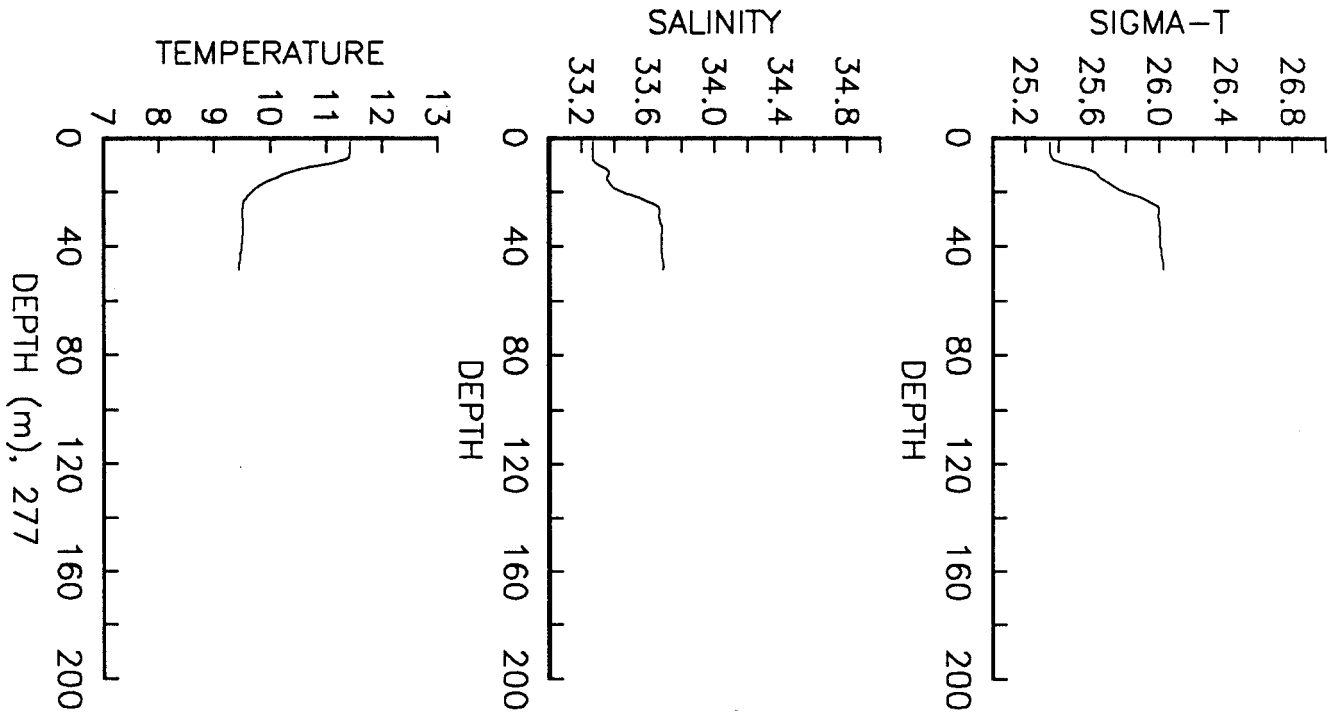
STN 8904.275 3 JUN 1989 0700 PDT
37°58.3'N 123°27.0'W DEPTH 289 m



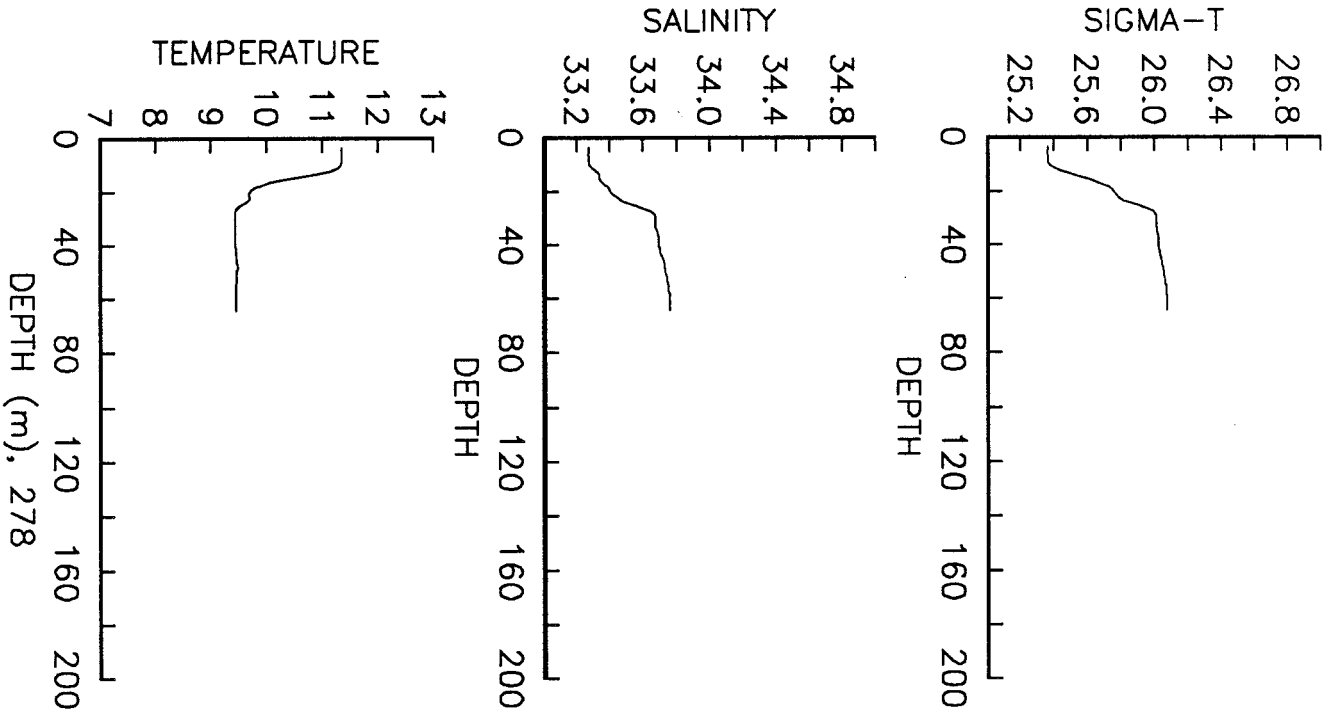
STN 8904.276 3 JUN 1989 0715 PDT
38° 0.0'N 123°28.0'W DEPTH 128 m



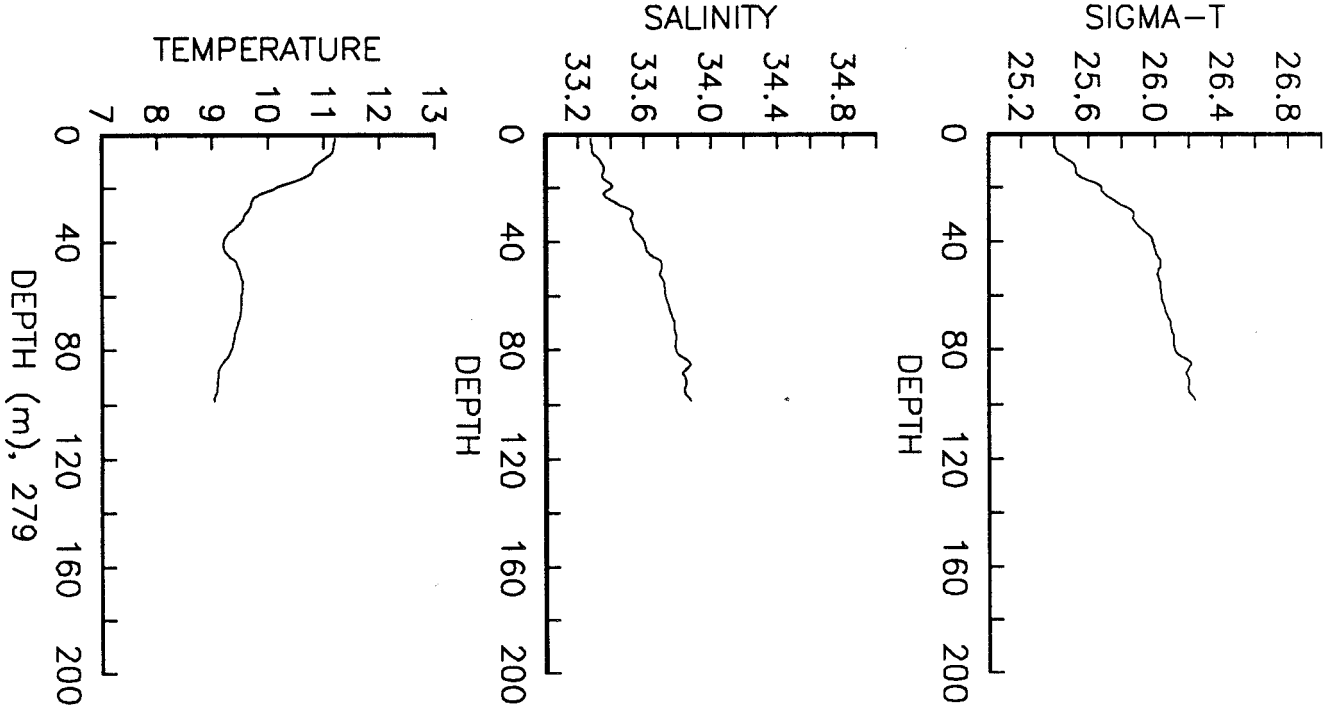
STN 8904.277 3 JUN 1989 0750 PDT
38° 0.0'N 123°25.3'W DEPTH 51 m



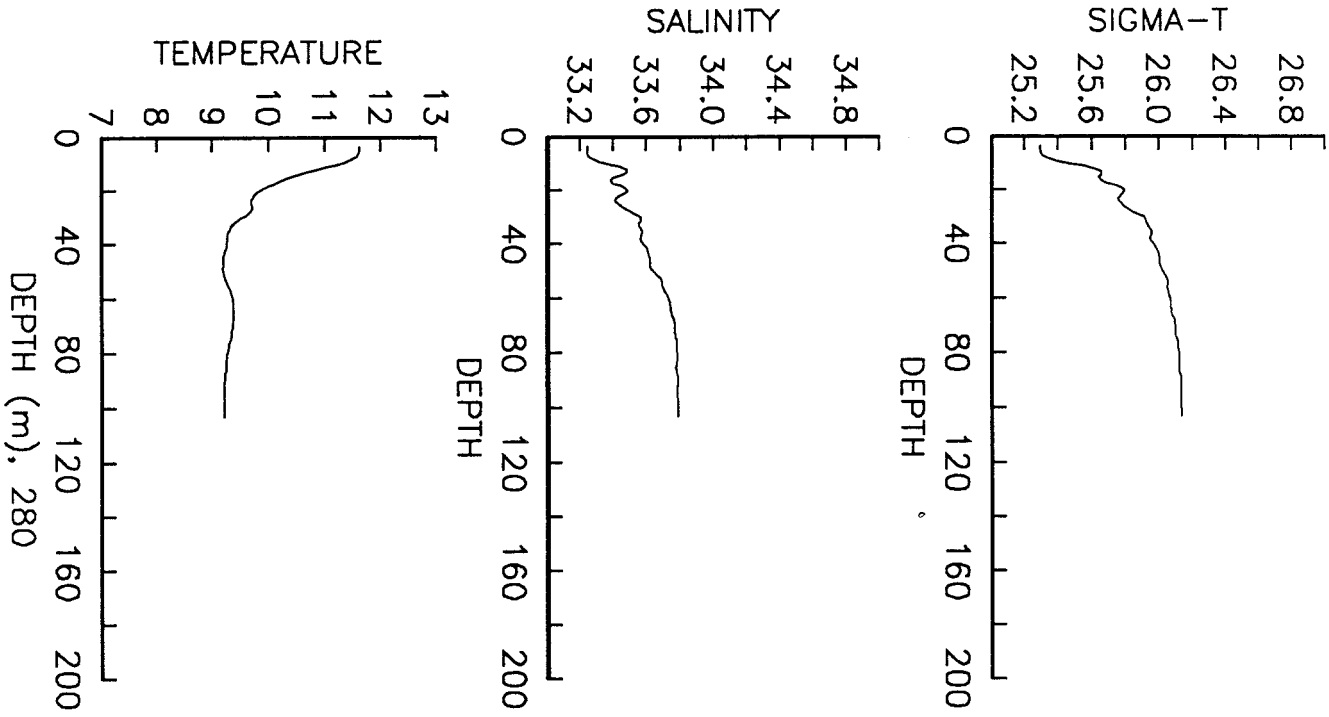
STN 8904.278 3 JUN 1989 0802 PDT
38° 0.0'N 123°24.0'W DEPTH 66 m



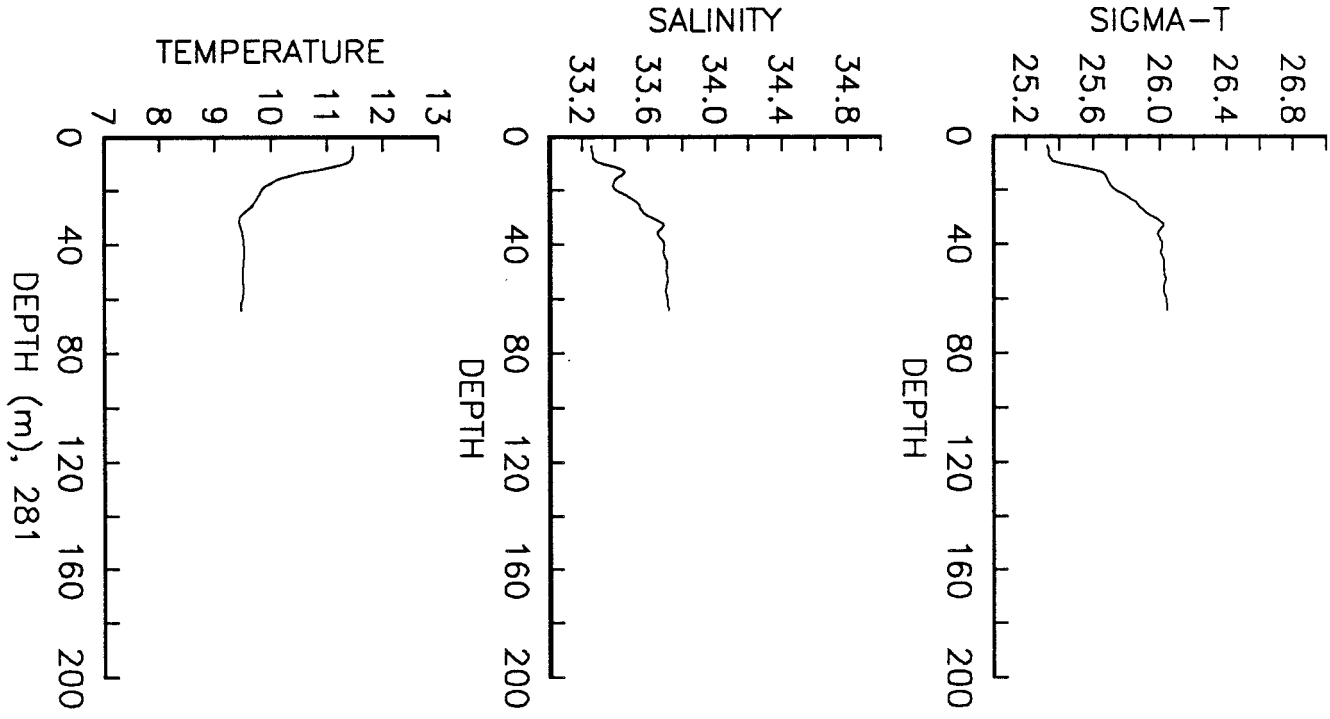
STN 8904.279 3 JUN 1989 0818 PDT
38° 0.0'N 123°22.0'W DEPTH 102 m



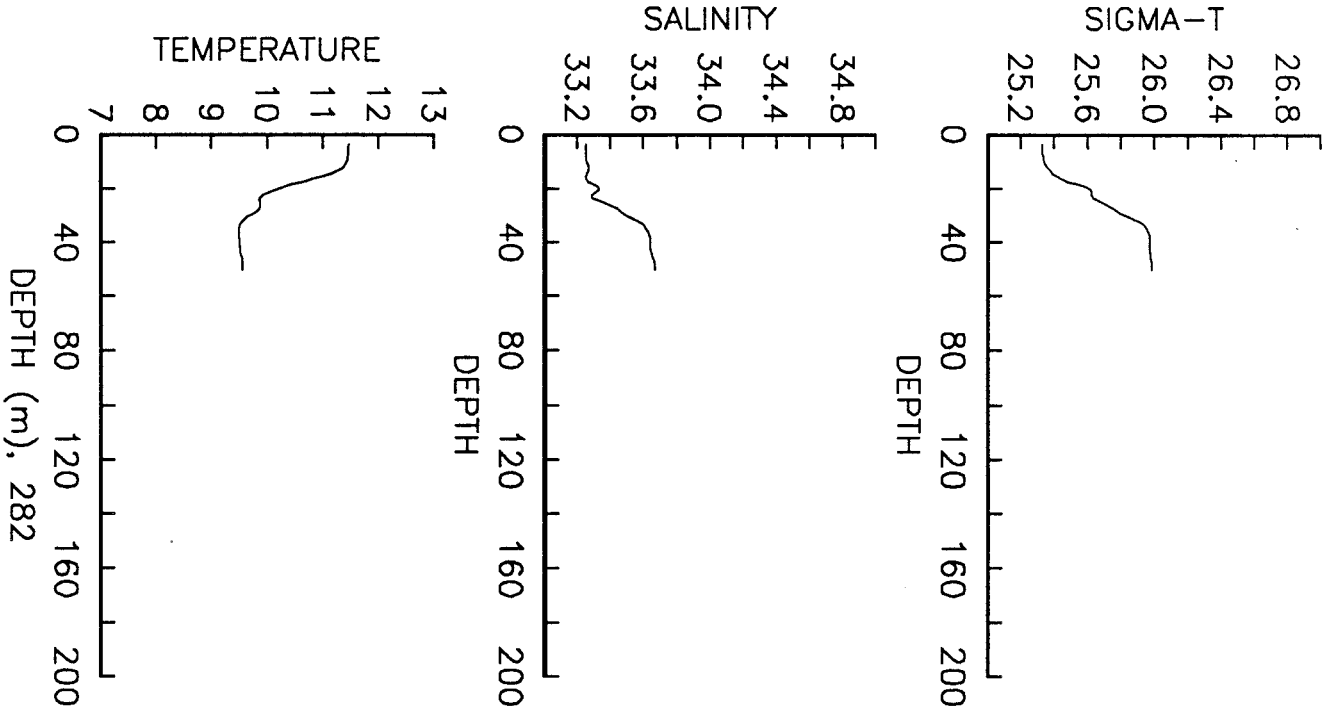
STN 8904.280 3 JUN 1989 0840 PDT
38° 1.5'N 123°23.0'W DEPTH 108 m



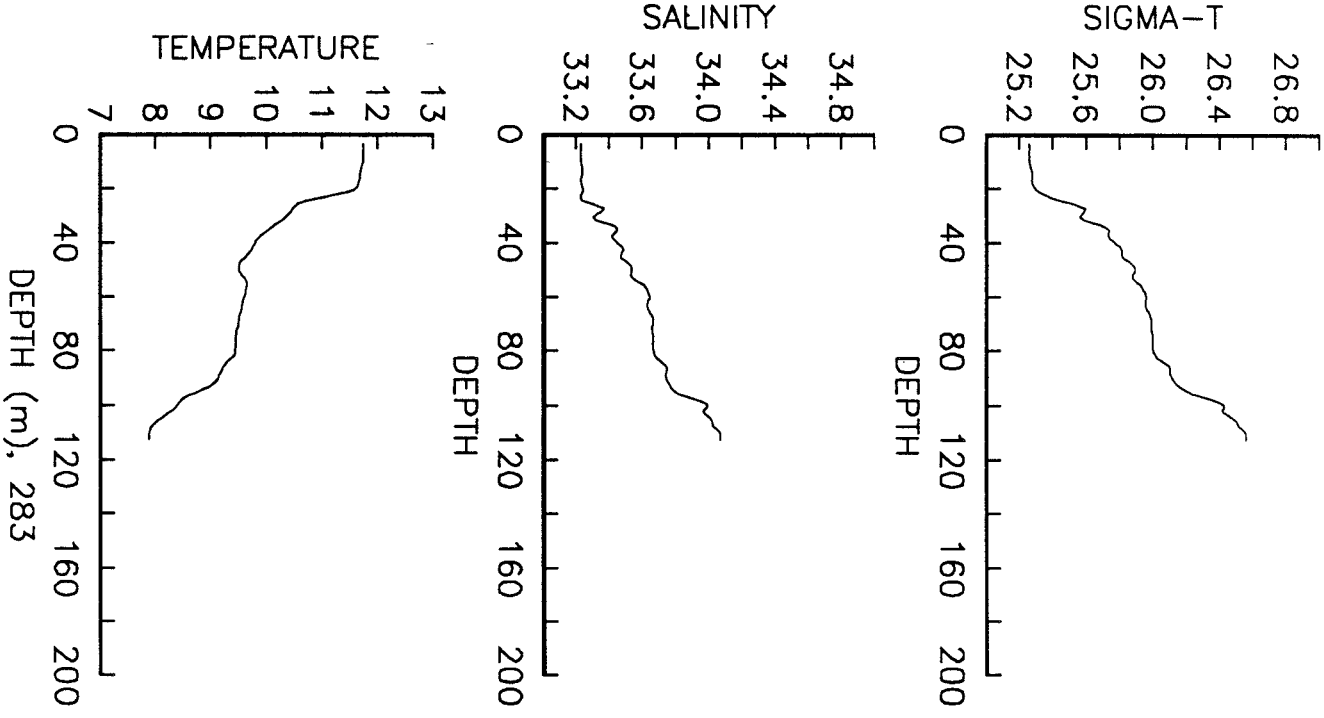
STN 8904.281 3 JUN 1989 0905 PDT
38° 1.5'N 123°25.0'W DEPTH 55 m



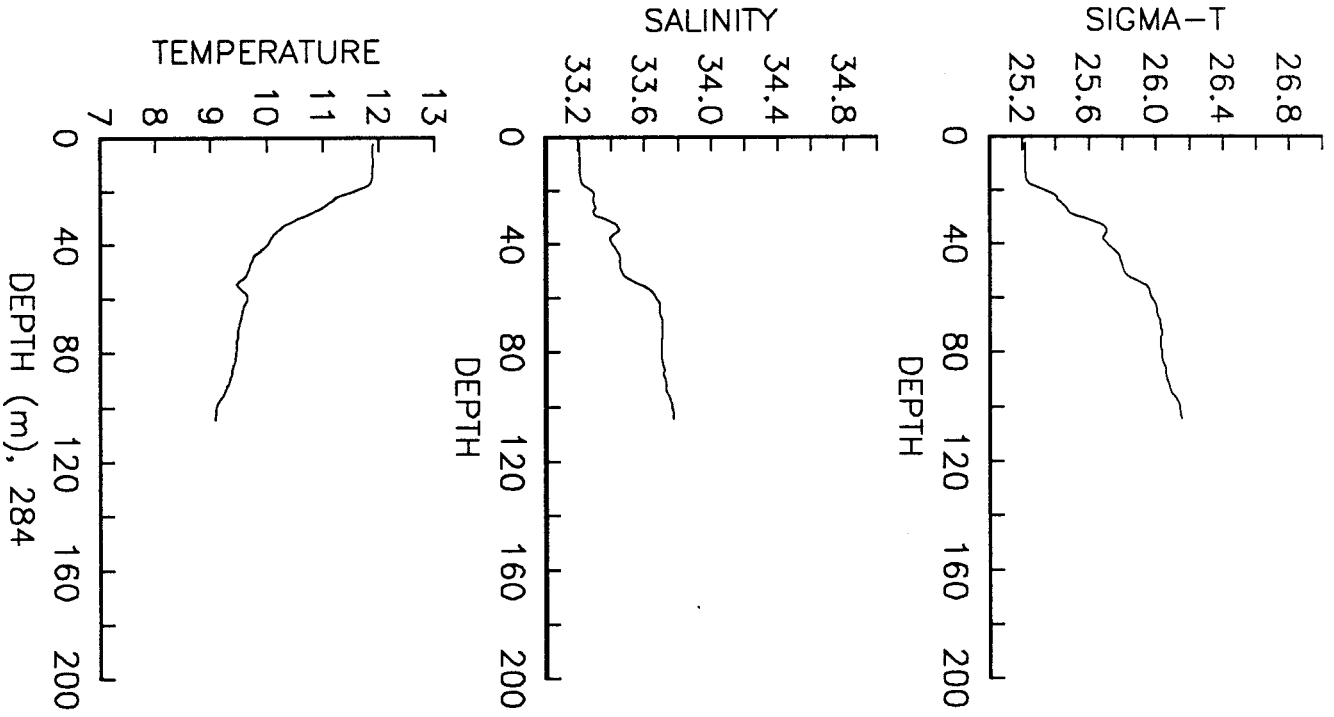
STN 8904.282 3 JUN 1989 0918 PDT
38° 1.5'N 123°26.5'W DEPTH 49 m



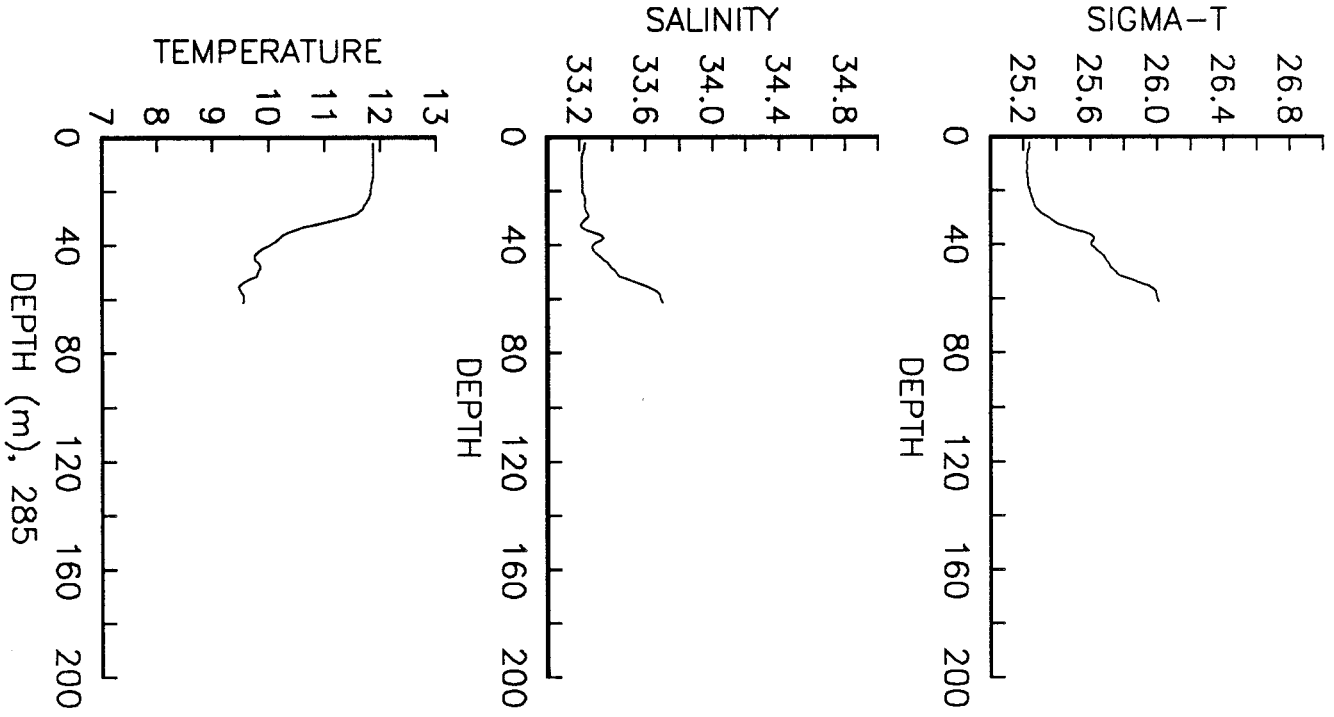
STN 8904.283 3 JUN 1989 0935 PDT
38° 1.5'N 123°28.5'W DEPTH 112 m



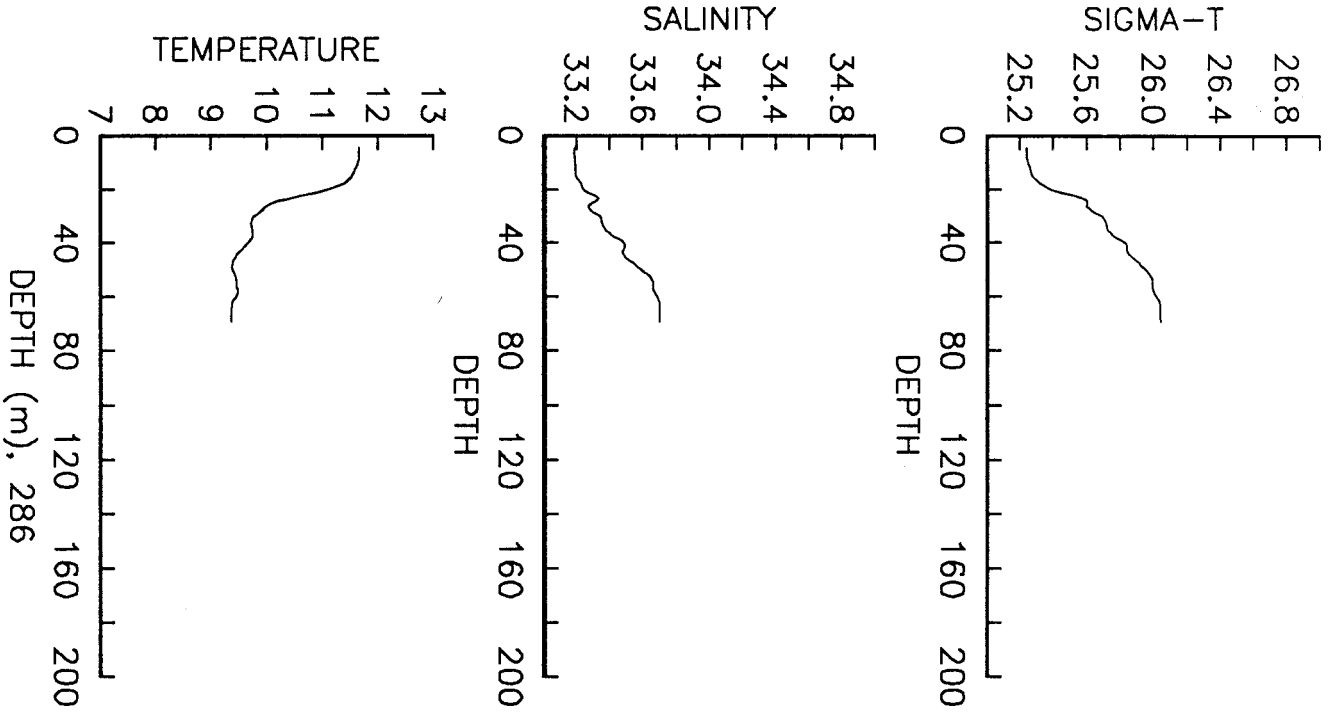
STN 8904.284 3 JUN 1989 1000 PDT
38° 2.5'N 123°29.0'W DEPTH 104 m



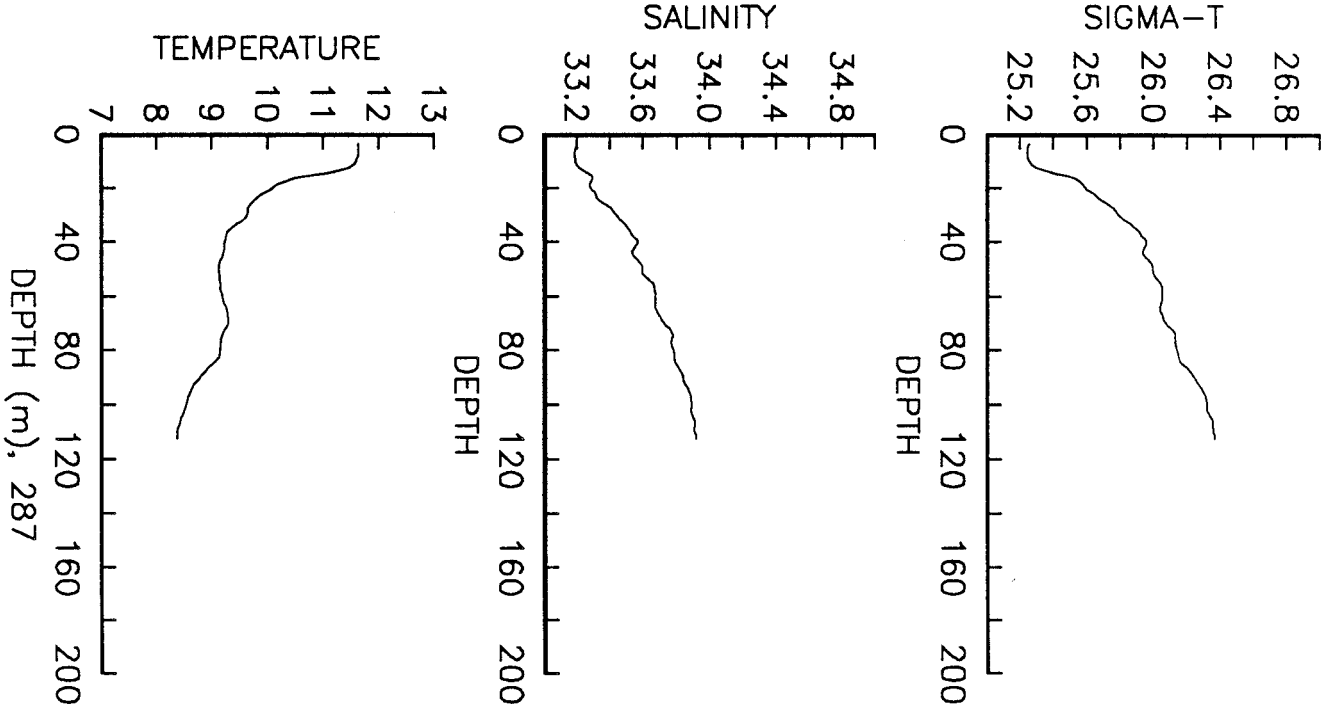
STN 8904.285 3 JUN 1989 1022 PDT
38° 2.5'N 123°27.0'W DEPTH 68 m



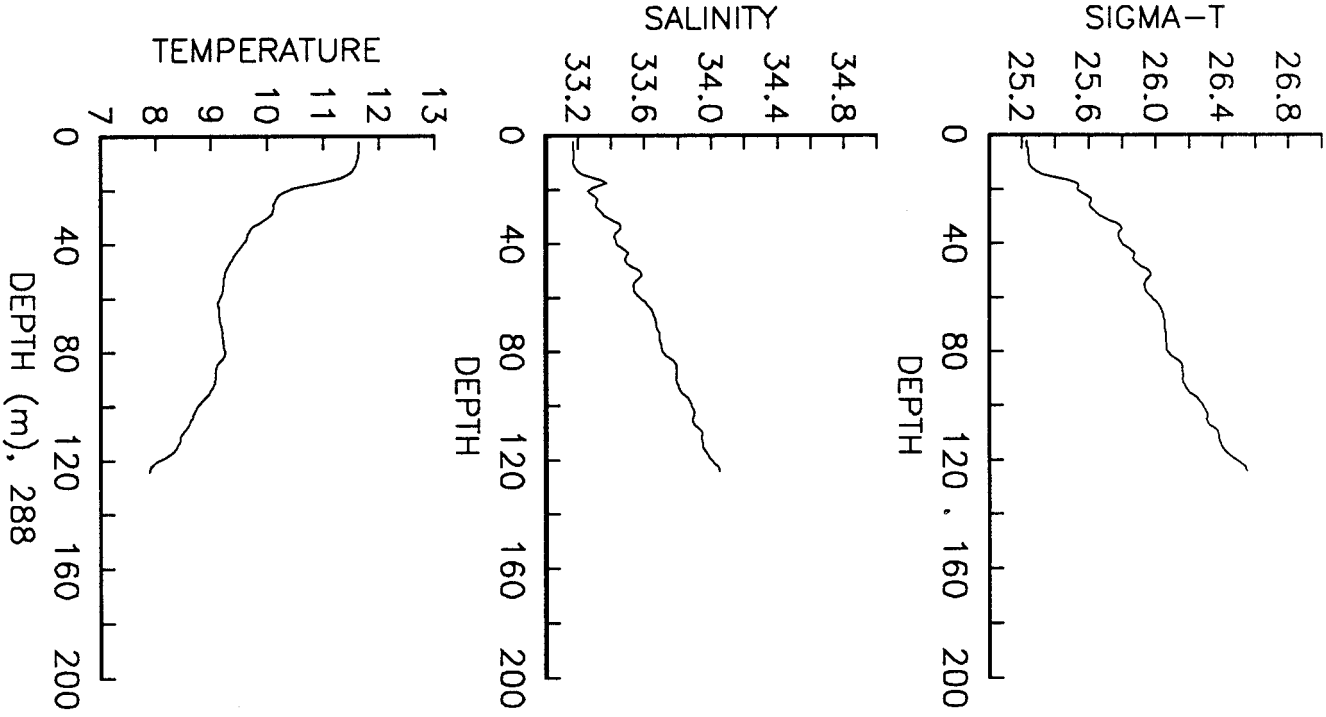
STN 8904.286 3 JUN 1989 1045 PDT
38° 2.5'N 123°25.5'W DEPTH 69 m



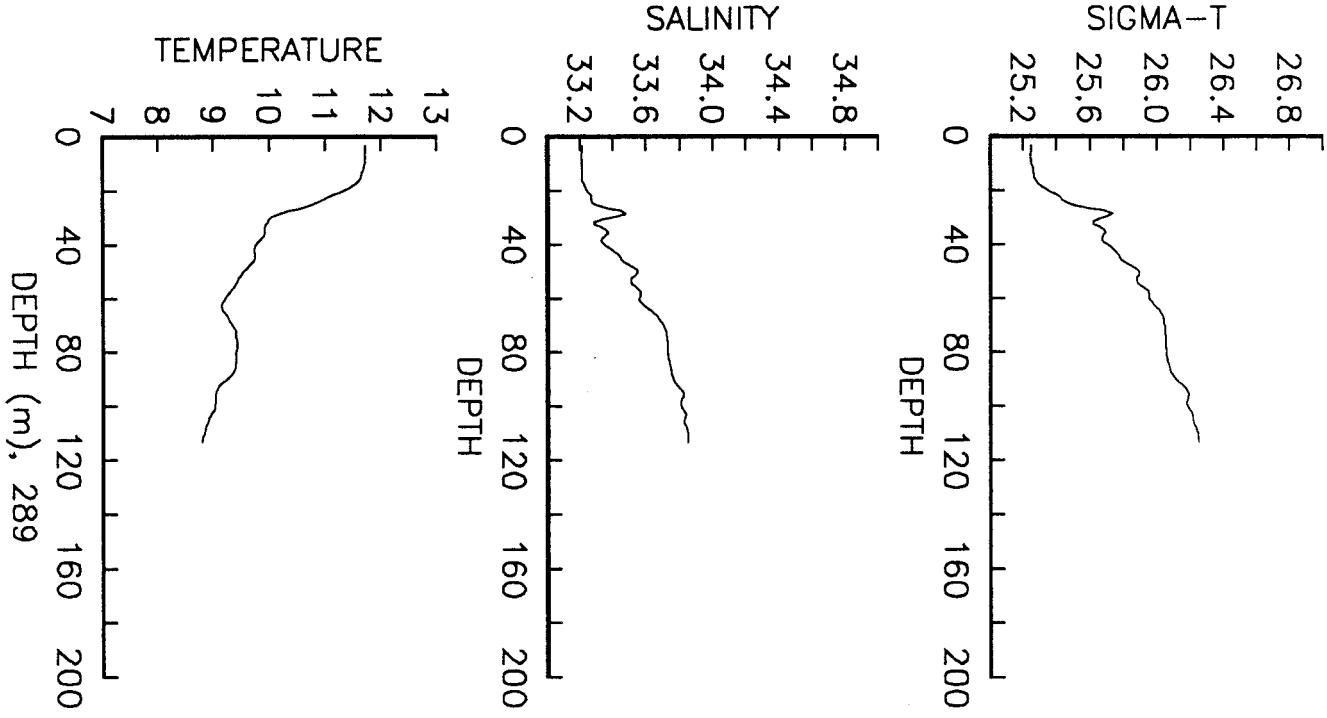
STN 8904.287 3 JUN 1989 1102 PDT
38° 2.5'N 123°23.5'W DEPTH 113 m



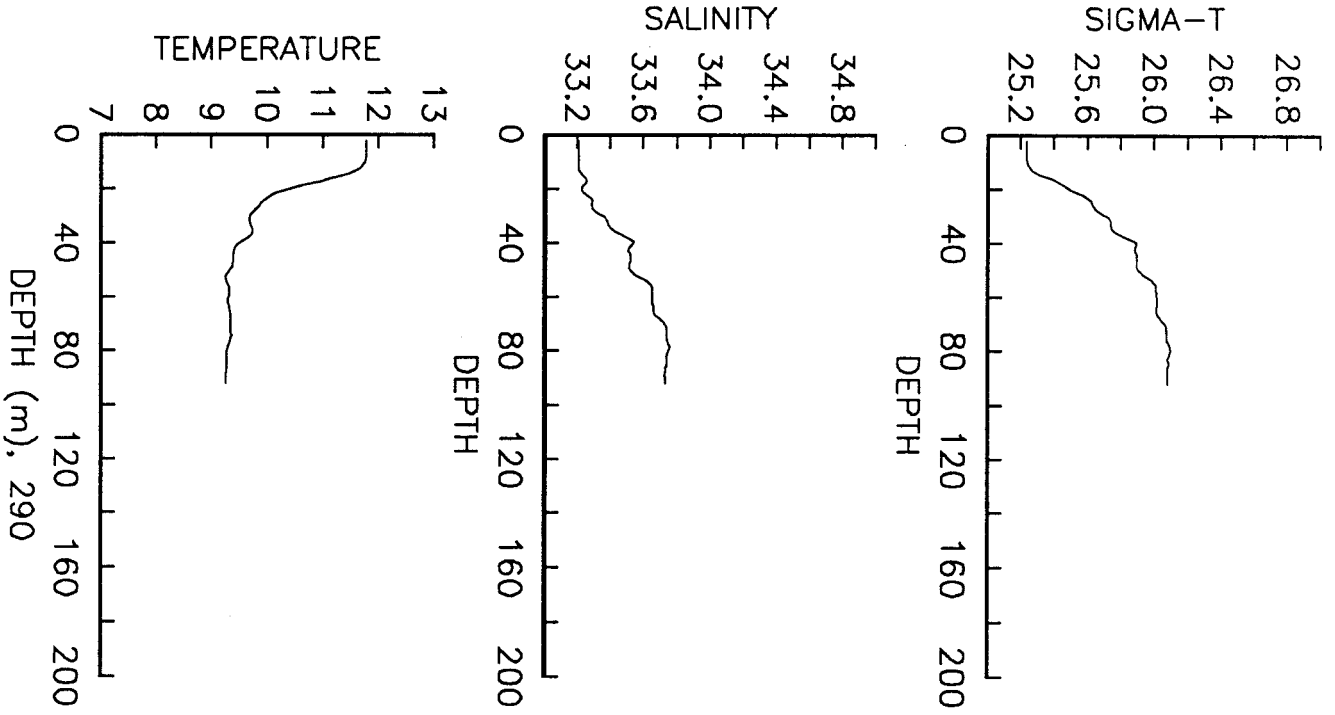
STN 8904.288 3 JUN 1989 1120 PDT
38° 3.5'N 123°24.0'W DEPTH 126 m



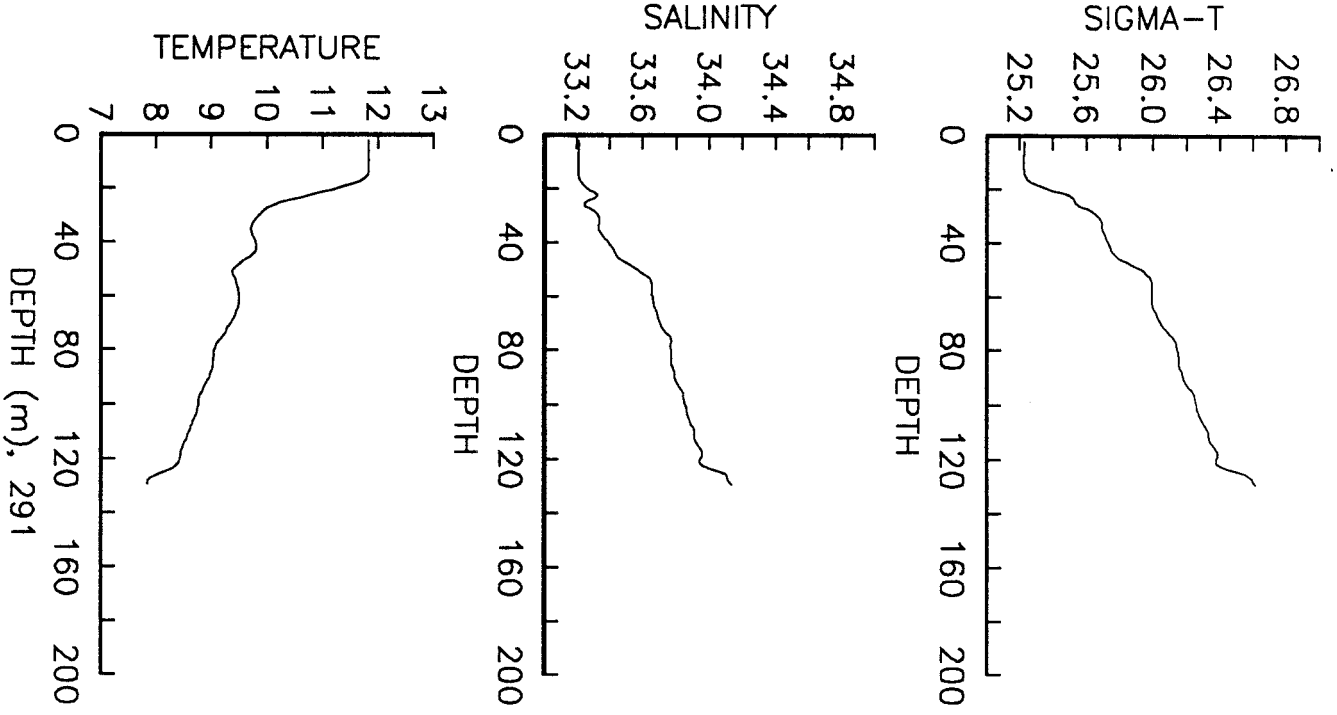
STN 8904.289 3 JUN 1989 1143 PDT
38° 3.5'N 123°26.0'W DEPTH 113 m



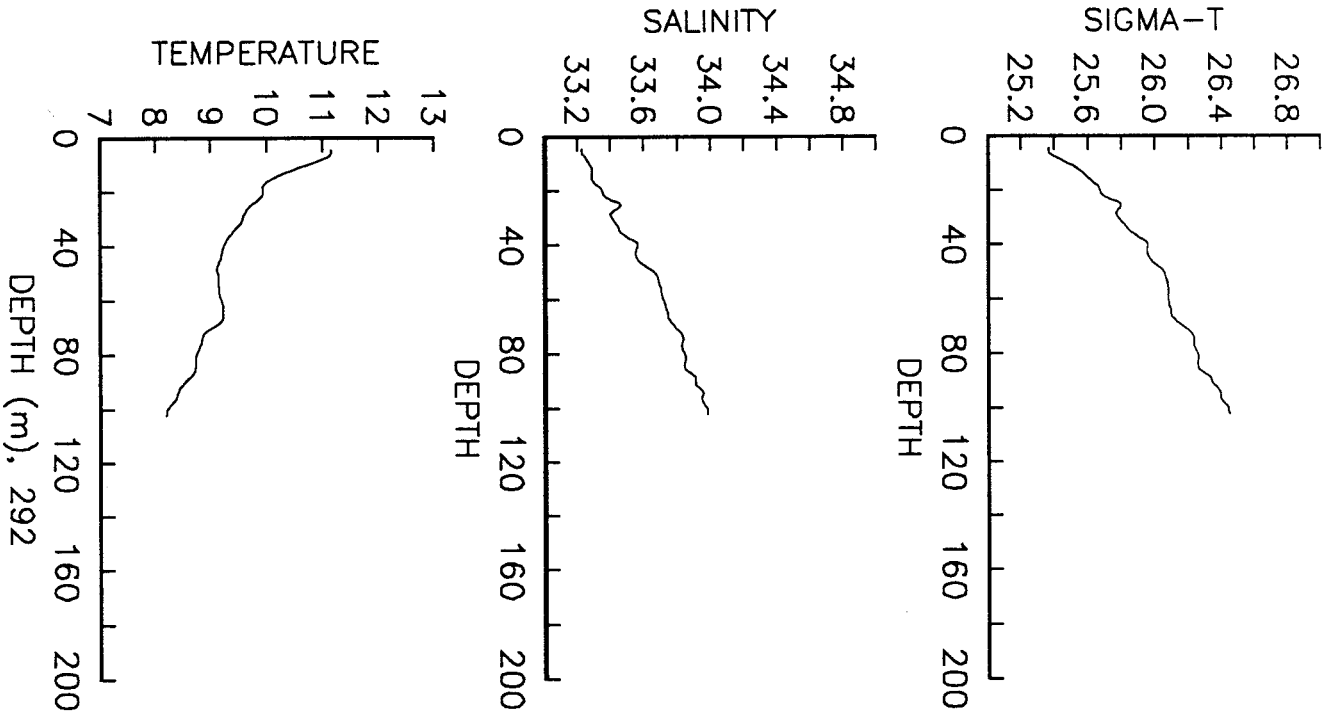
STN 8904.290 3 JUN 1989 1240 PDT
38° 3.4'N 123°27.6'W DEPTH 91 m



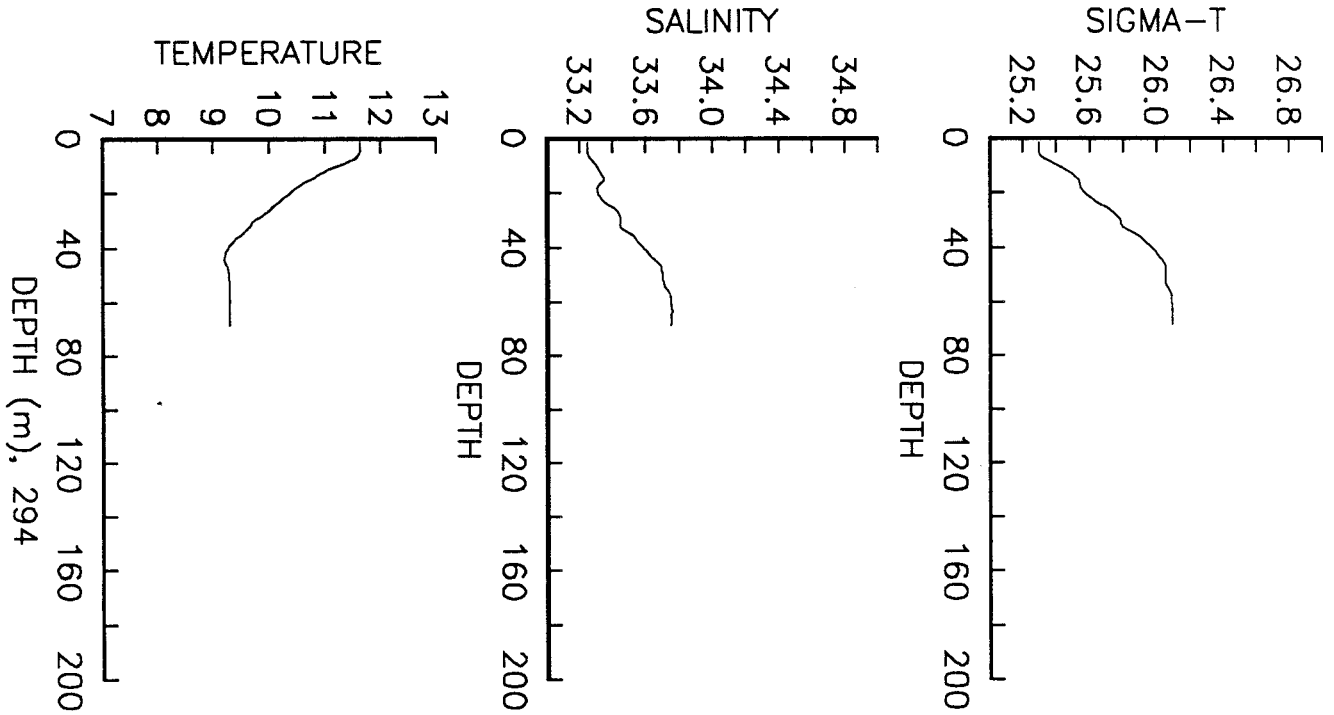
STN 8904.291 3 JUN 1989 1258 PDT
38° 3.5'N 123°29.6'W DEPTH 132 m



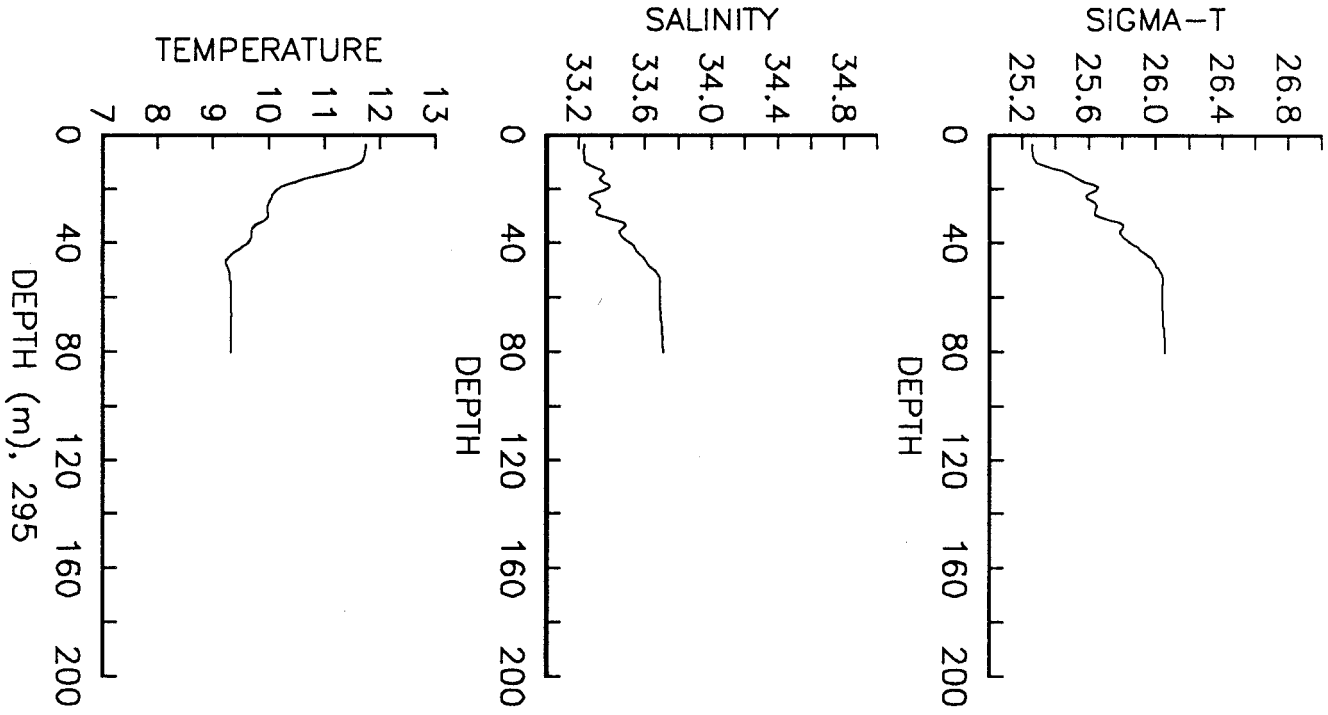
STN 8904.292 3 JUN 1989 1547 PDT
38° 1.9'N 123°23.7'W DEPTH 104 m



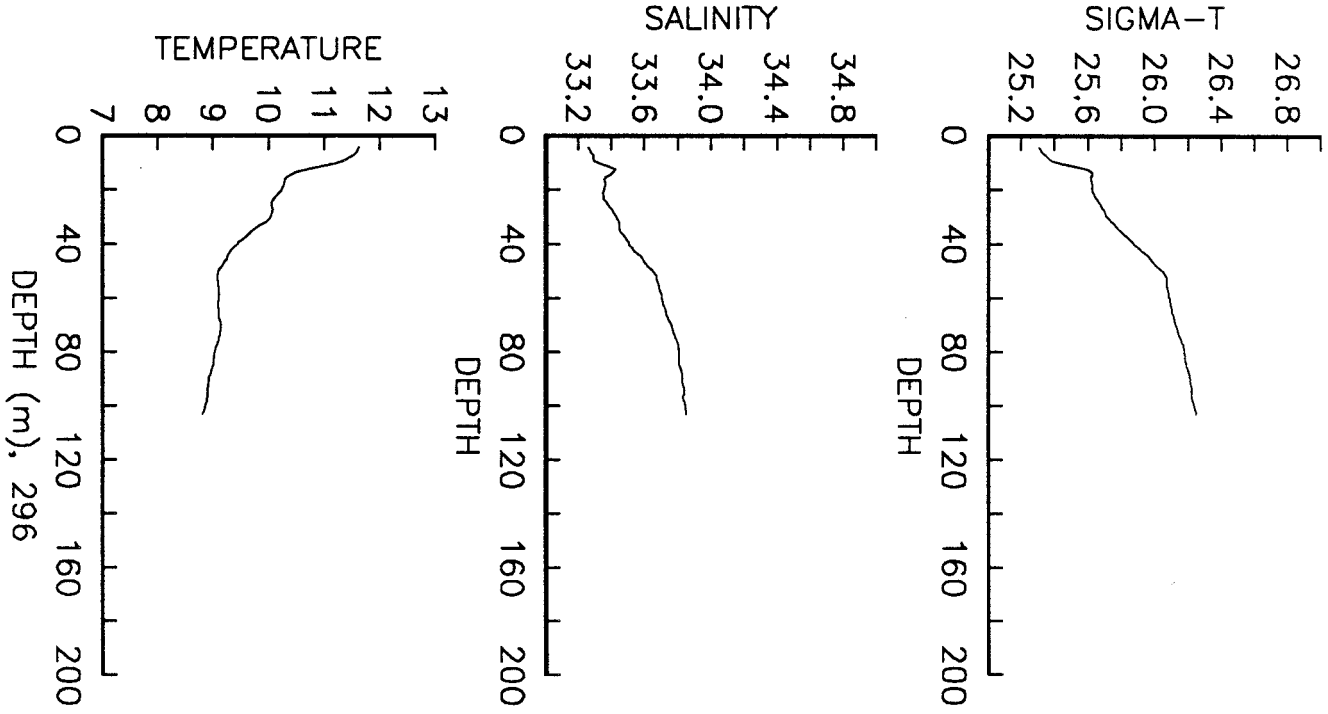
STN 8904.294 3 JUN 1989 1607 PDT
38° 2.0'N 123°25.5'W DEPTH 71 m



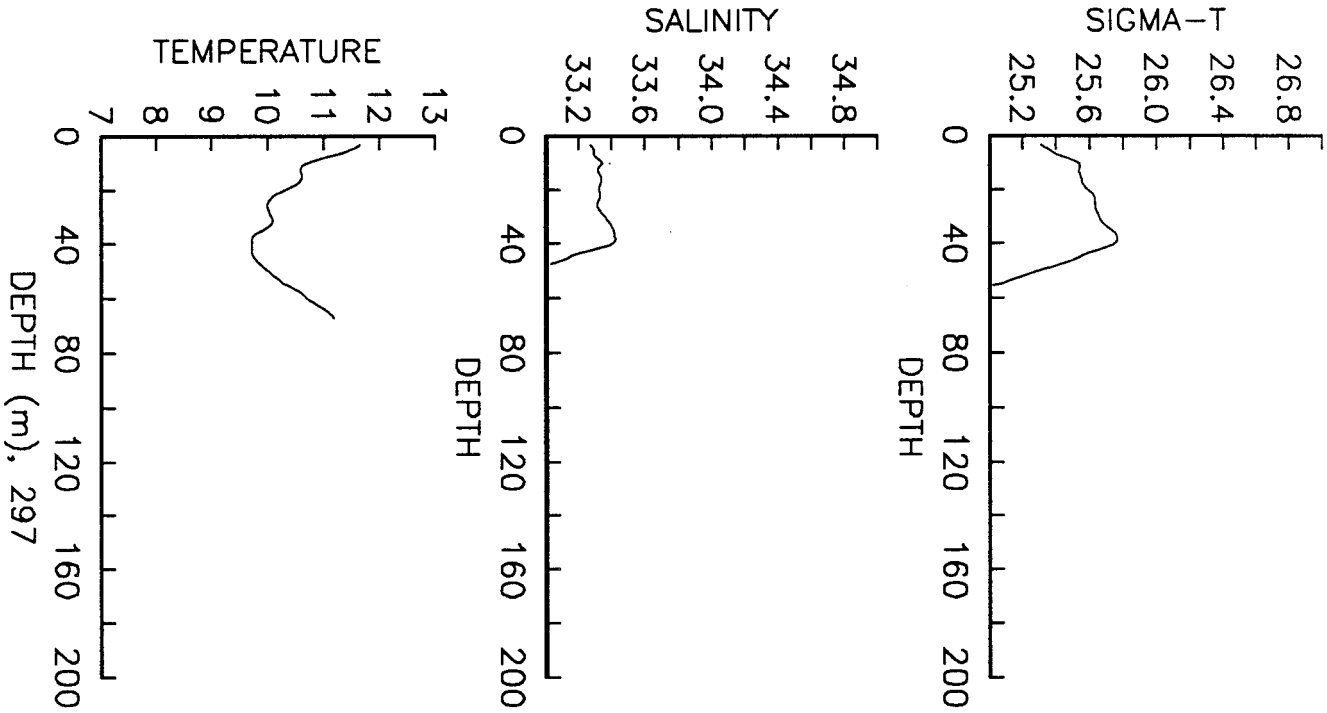
STN 8904.295 3 JUN 1989 1620 PDT
38° 2.0'N 123°27.0'W DEPTH 80 m



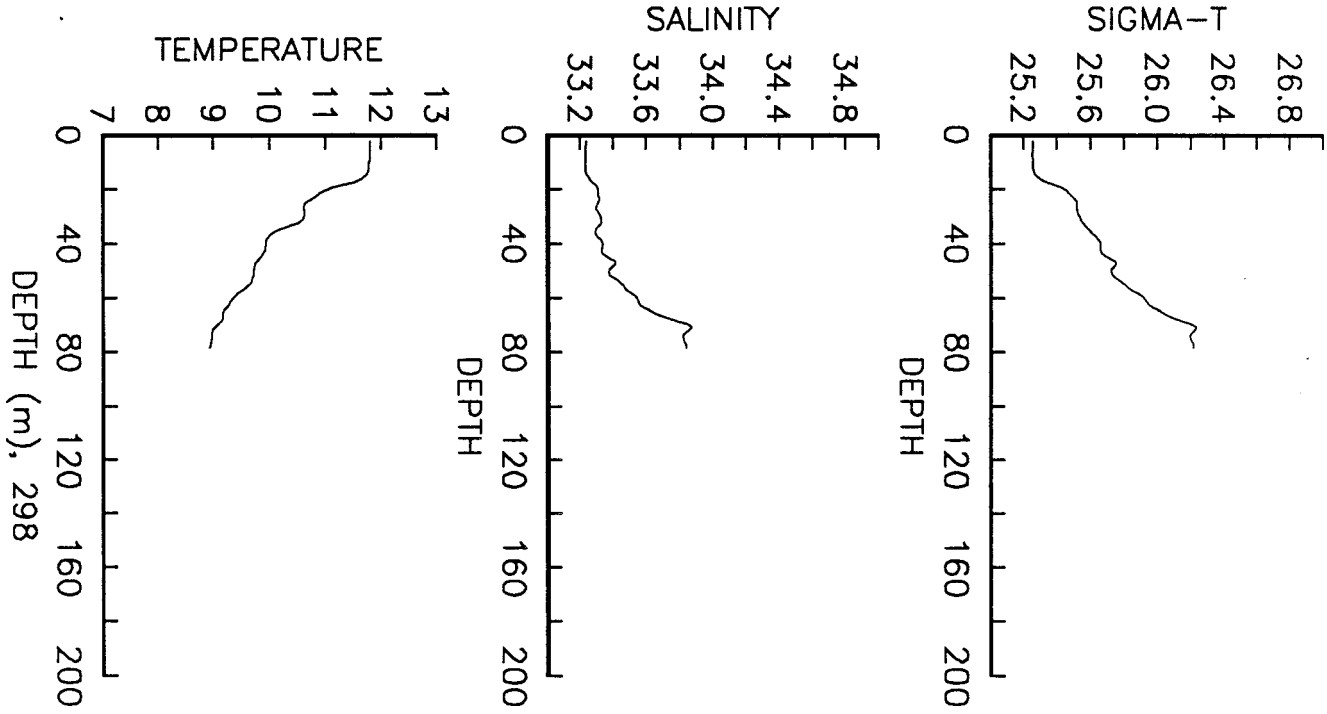
STN 8904.296 3 JUN 1989 1704 PDT
38° 3.0'N 123°25.0'W DEPTH 106 m



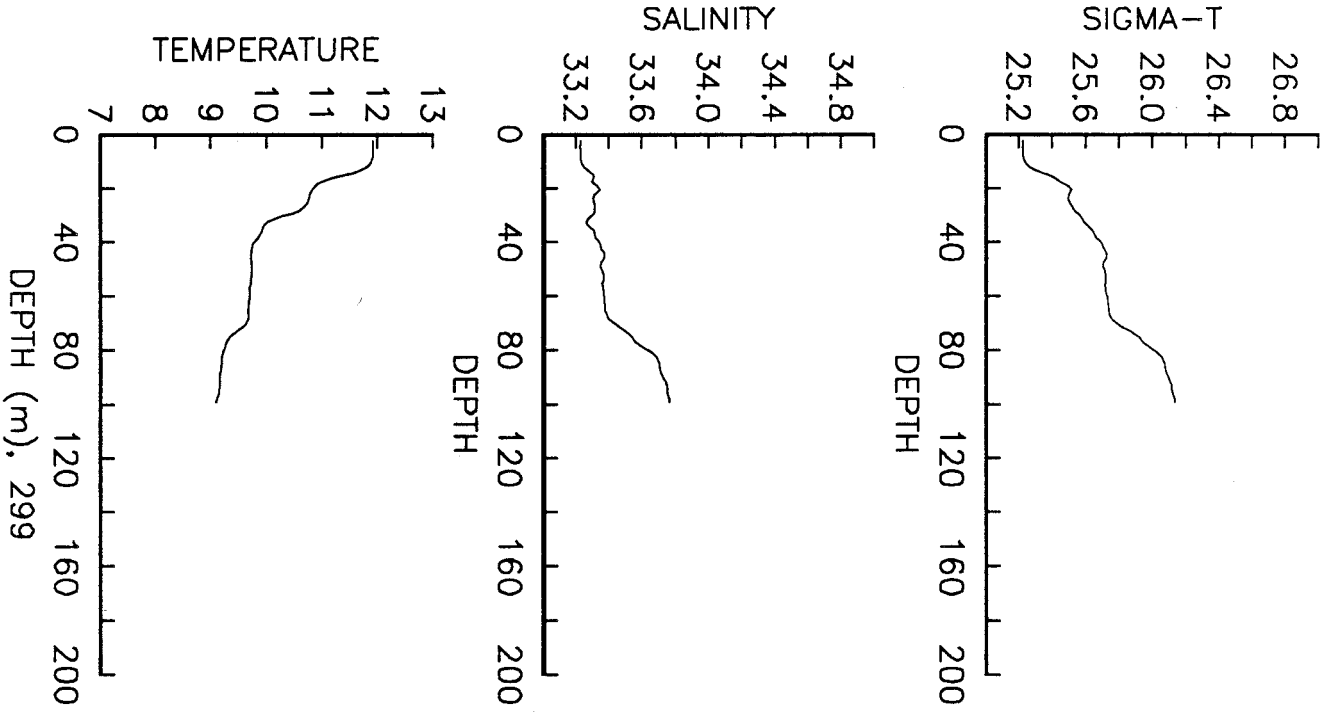
STN 8904.297 3 JUN 1989 1720 PDT
38° 3.0'N 123°26.5'W DEPTH 82 m



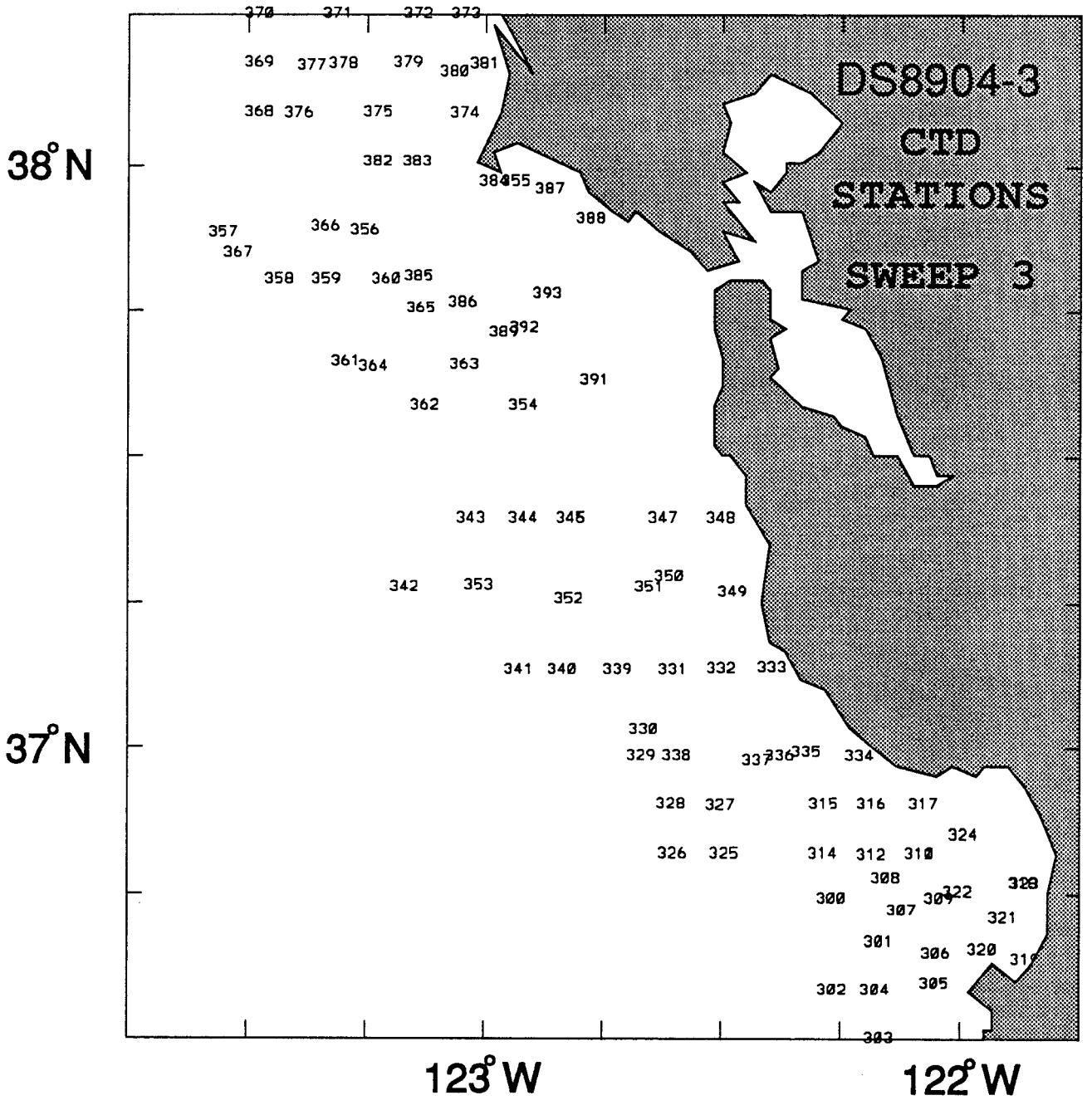
STN 8904.298 3 JUN 1989 1748 PDT
38° 3.0'N 123°27.6'W DEPTH 84 m



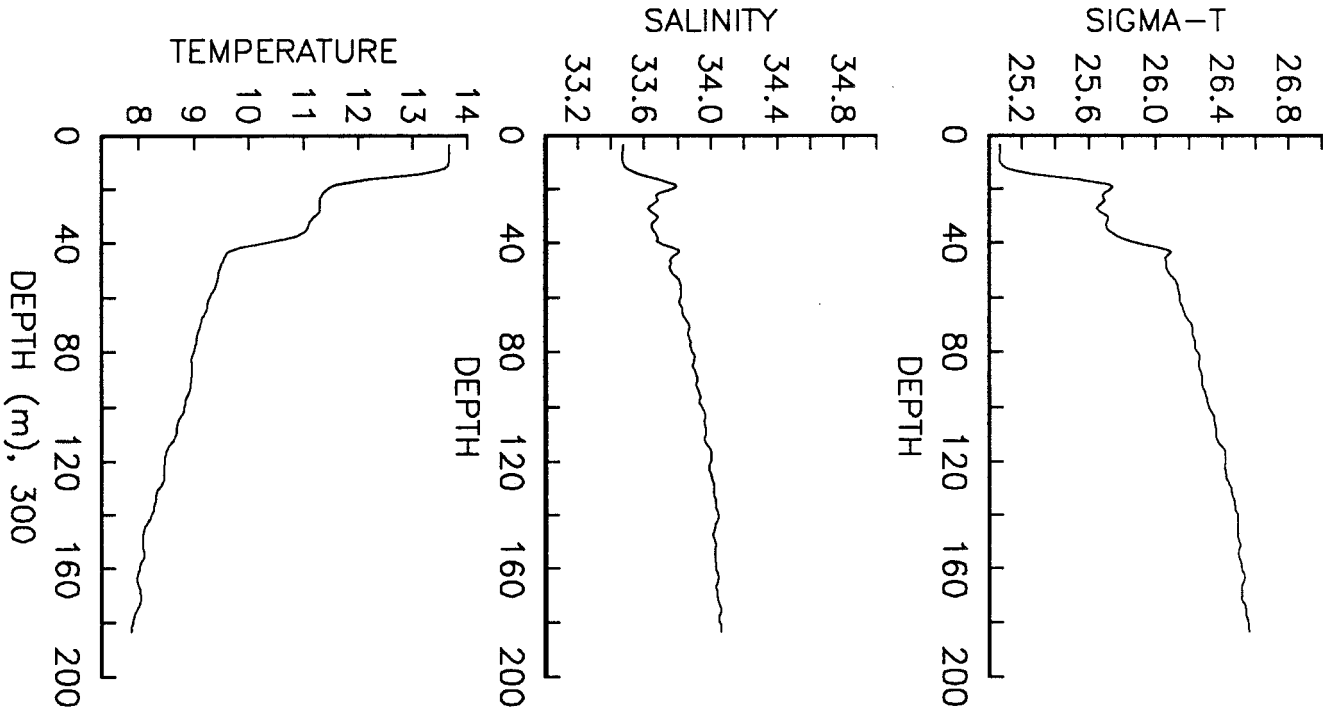
STN 8904.299 3 JUN 1989 1756 PDT
38° 3.0'N 123°28.8'W DEPTH 104 m



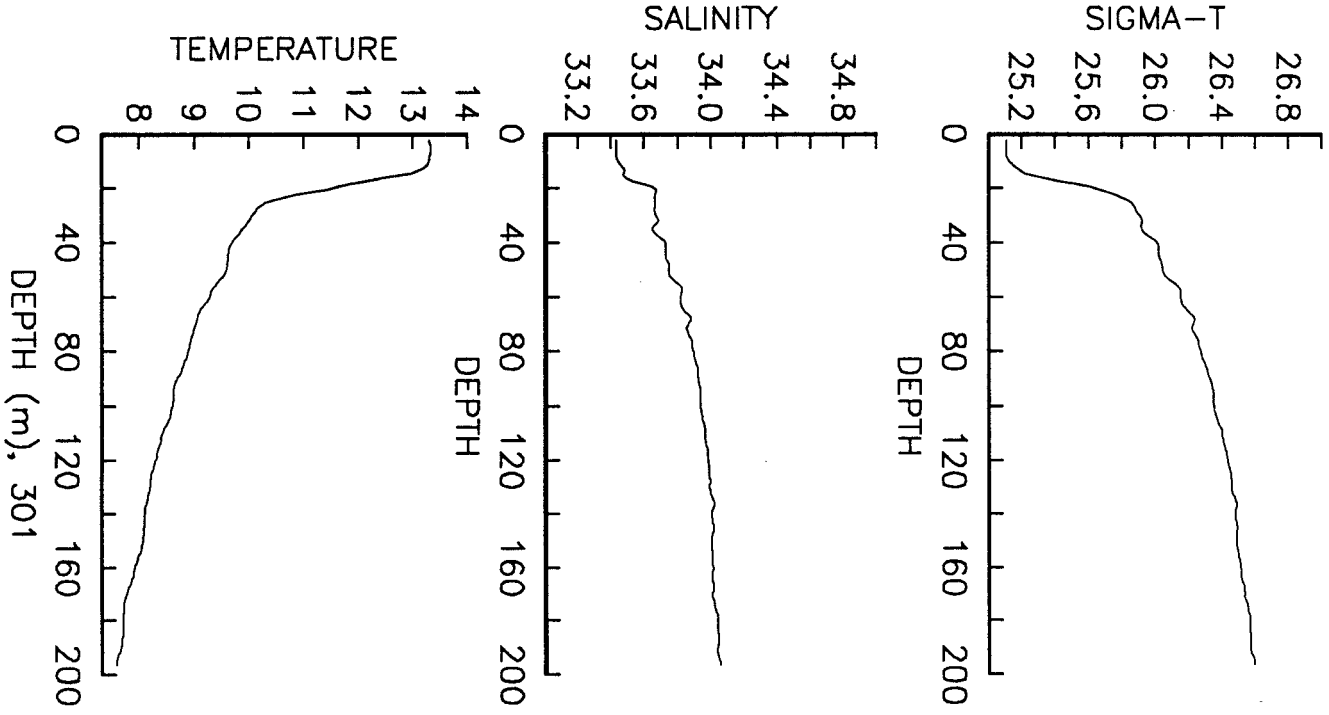
APPENDIX 3.3: PROFILES OF INDIVIDUAL CTD CASTS-SWEEP 3


DS8904-3
CTD
STATIONS
SWEEP 3
38° N
37° N
123° W
122° W

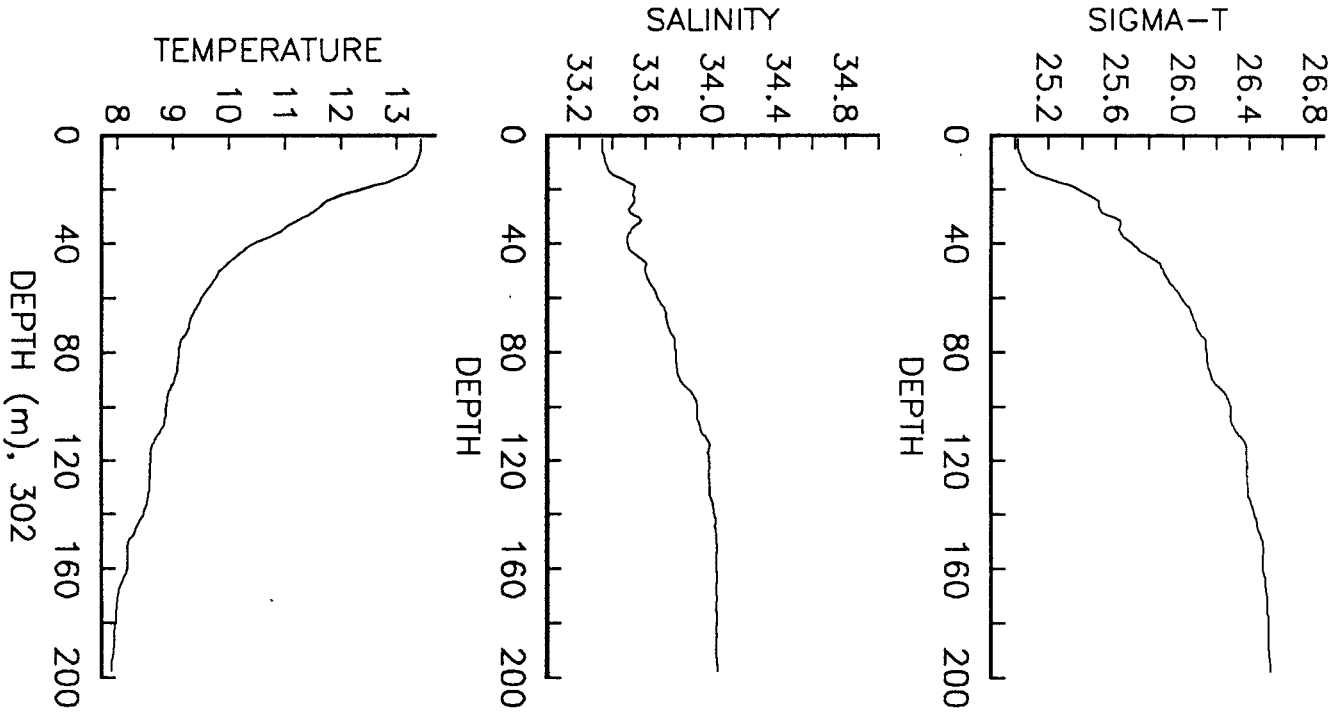
STN 8904.300 4 JUN 1989 0603 PDT
36°44.4'N 122°16.0'W DEPTH 956 m



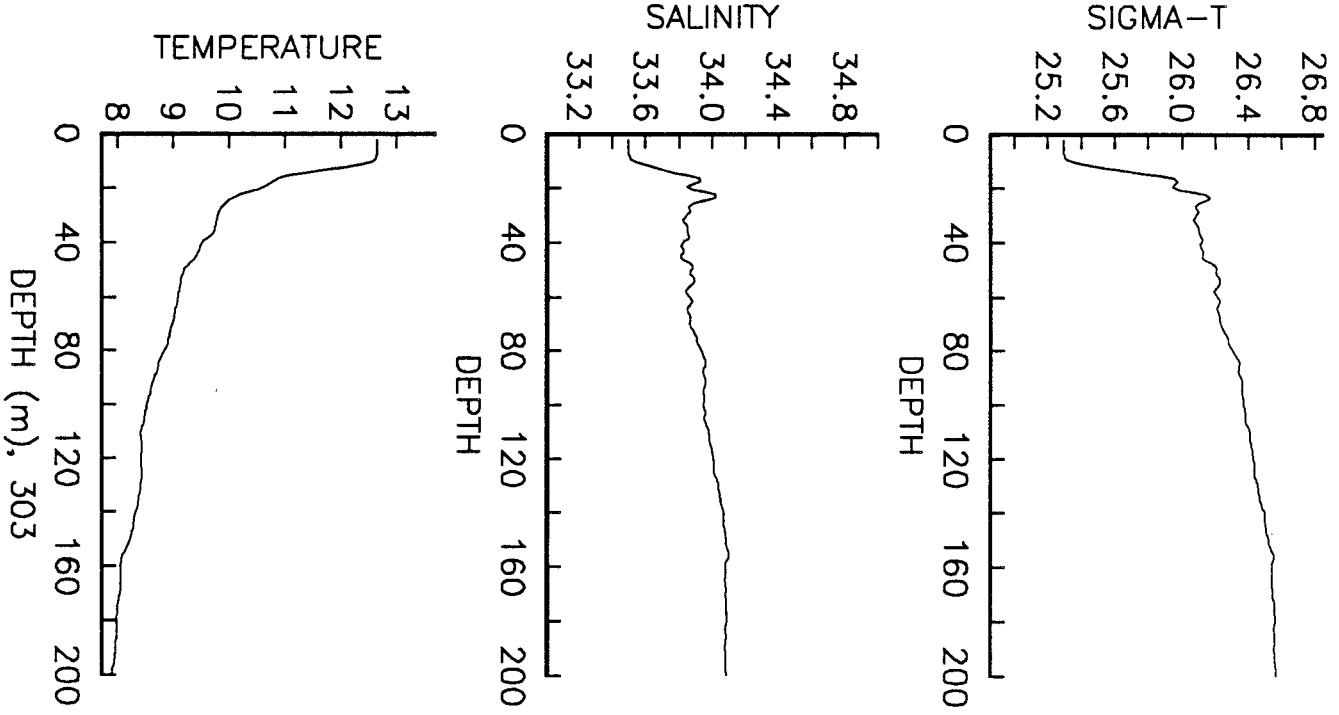
STN 8904.301 4 JUN 1989 1651 PDT
36°40.0'N 122°10.0'W DEPTH 1134 m



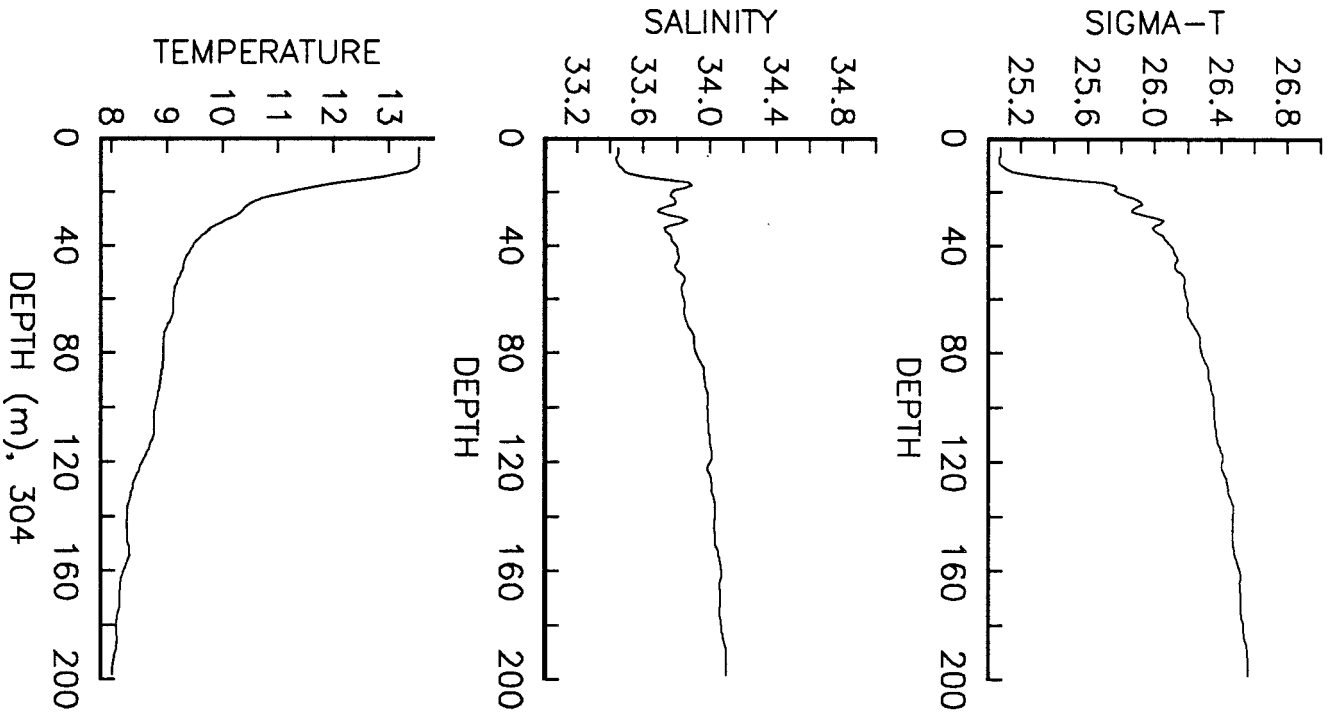
STN 8904.302 4 JUN 1989 1717 PDT
36°35.0'N 122°15.9'W DEPTH 2286 m



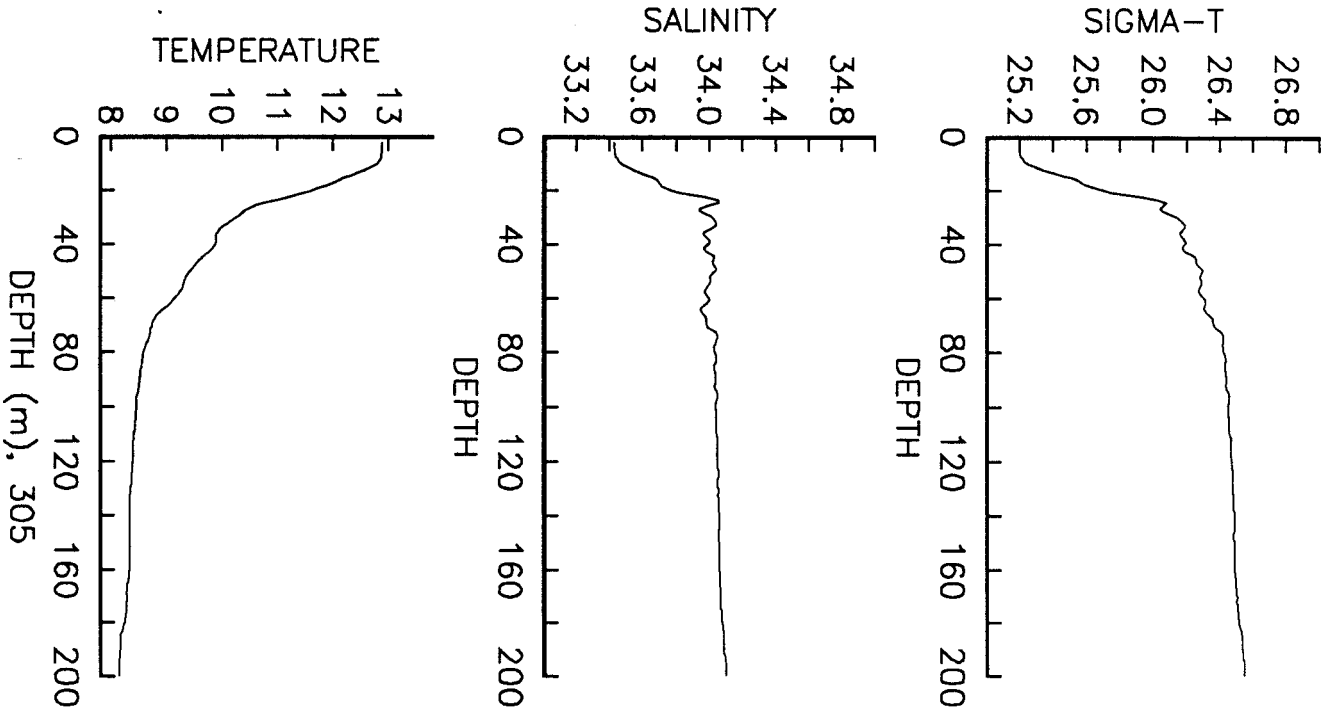
STN 8904.303 4 JUN 1989 1837 PDT
36°30.0'N 122°10.0'W DEPTH 1280 m



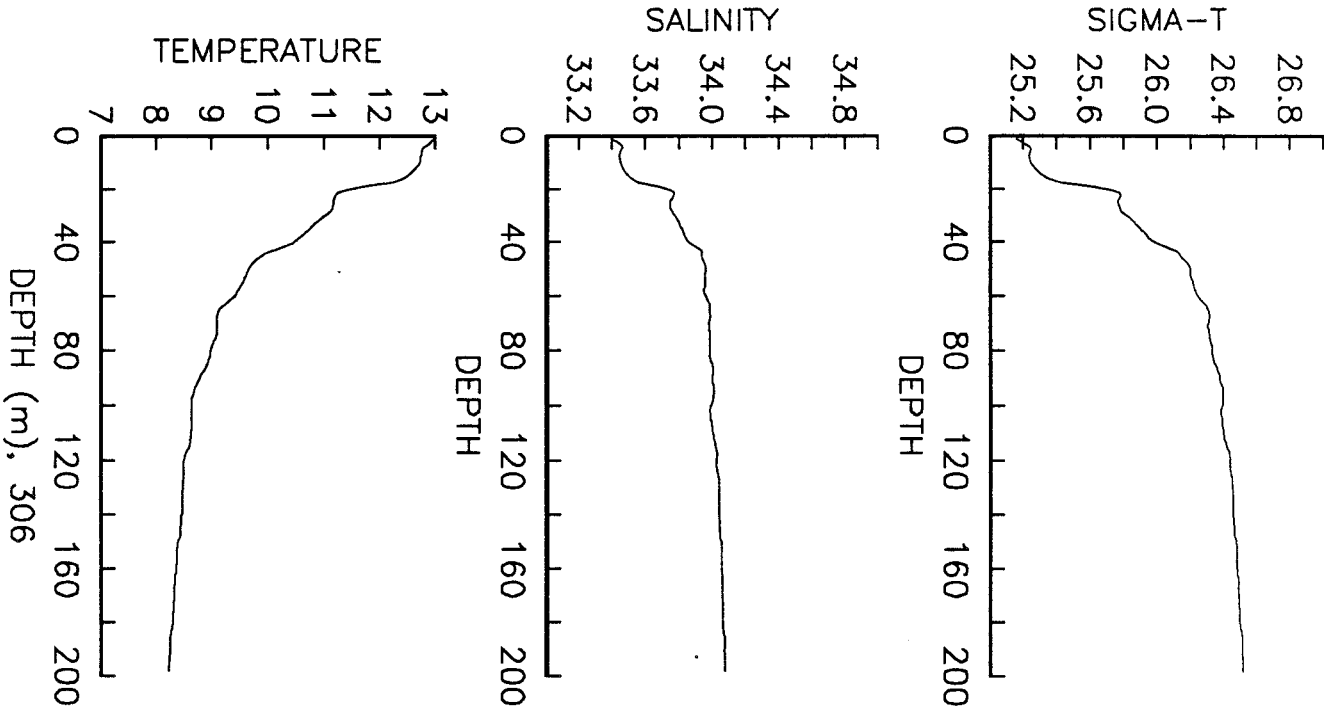
STN 8904.304 4 JUN 1989 2103 PDT
36°35.0'N 122°10.5'W DEPTH 2323 m



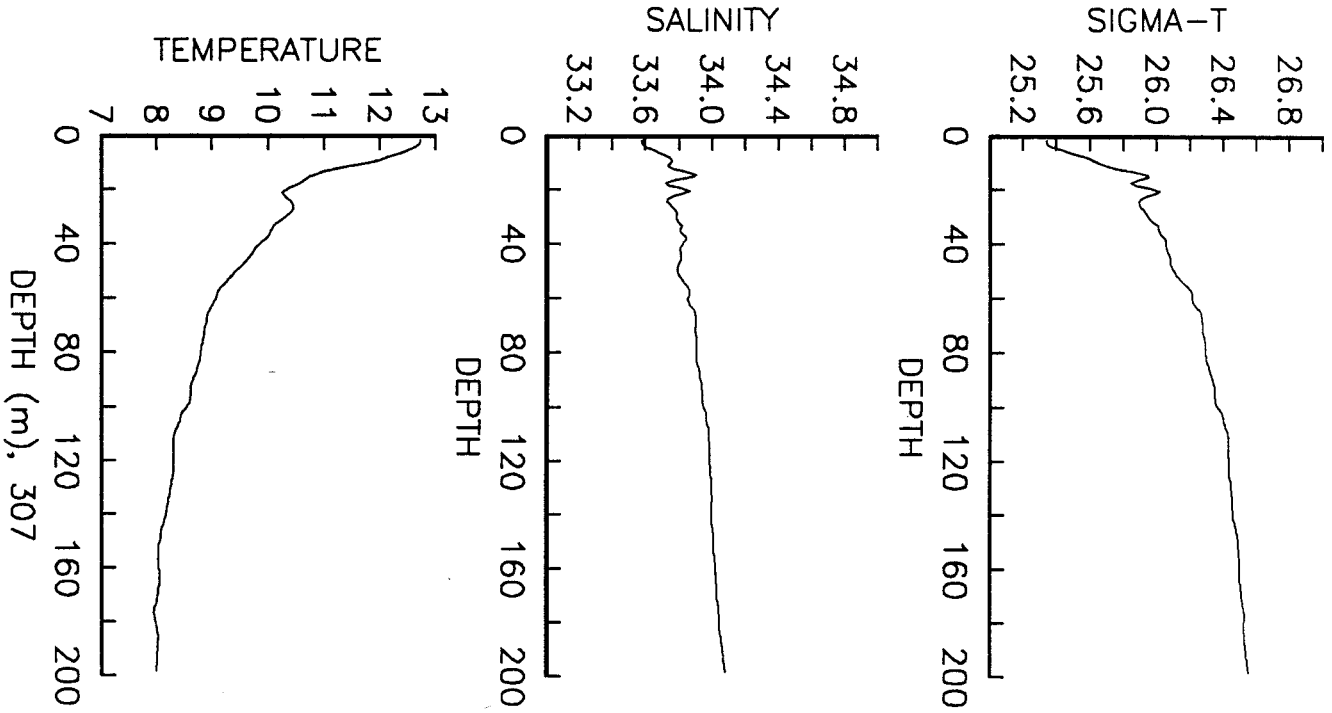
STN 8904.305 5 JUN 1989 0109 PDT
36°35.7'N 122° 3.1'W DEPTH 549 m



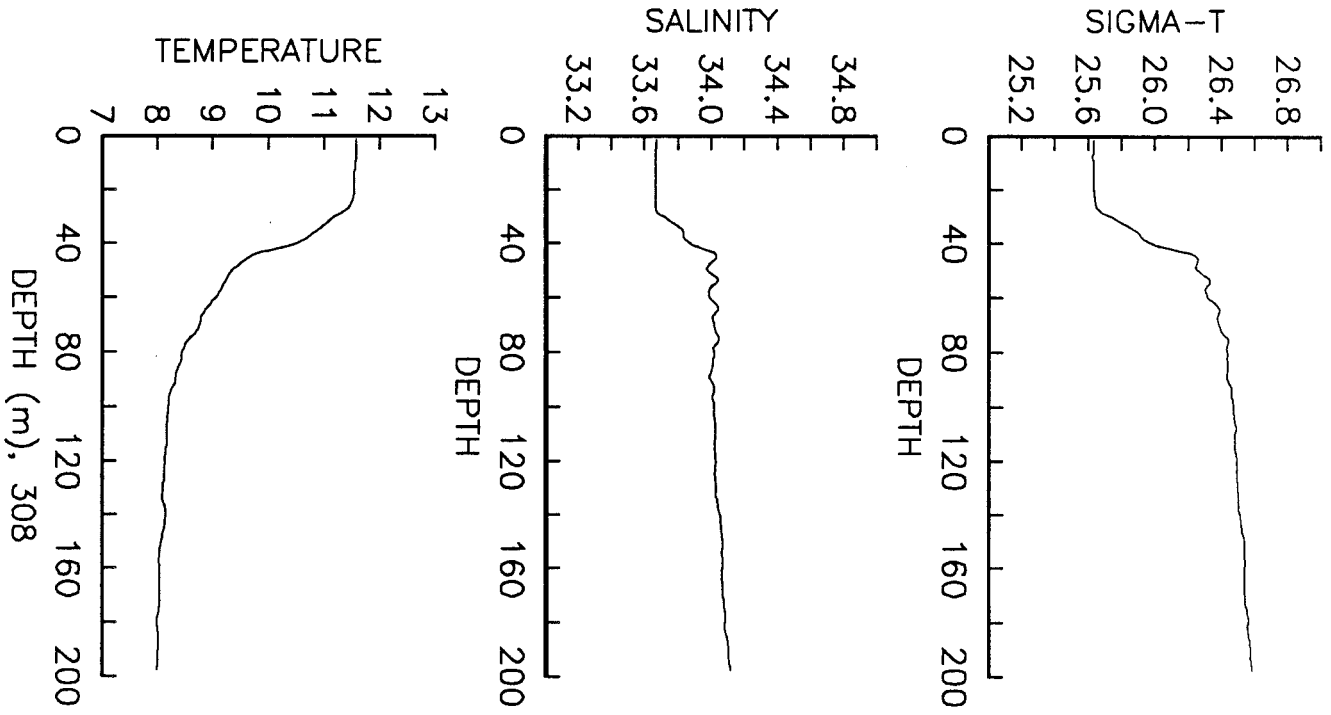
STN 8904.306 5 JUN 1989 0141 PDT
36°38.8'N 122° 2.9'W DEPTH 914 m



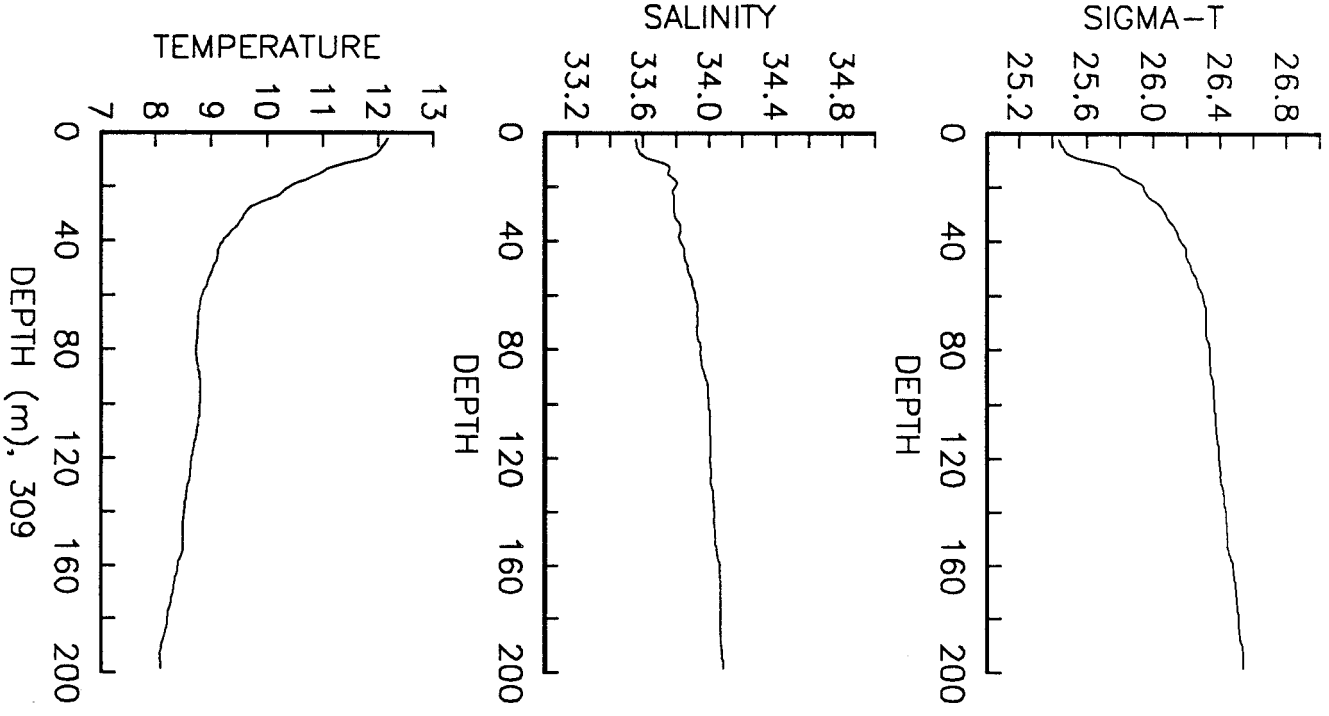
STN 8904.307 5 JUN 1989 0318 PDT
36°43.2'N 122° 7.2'W DEPTH 1920 m



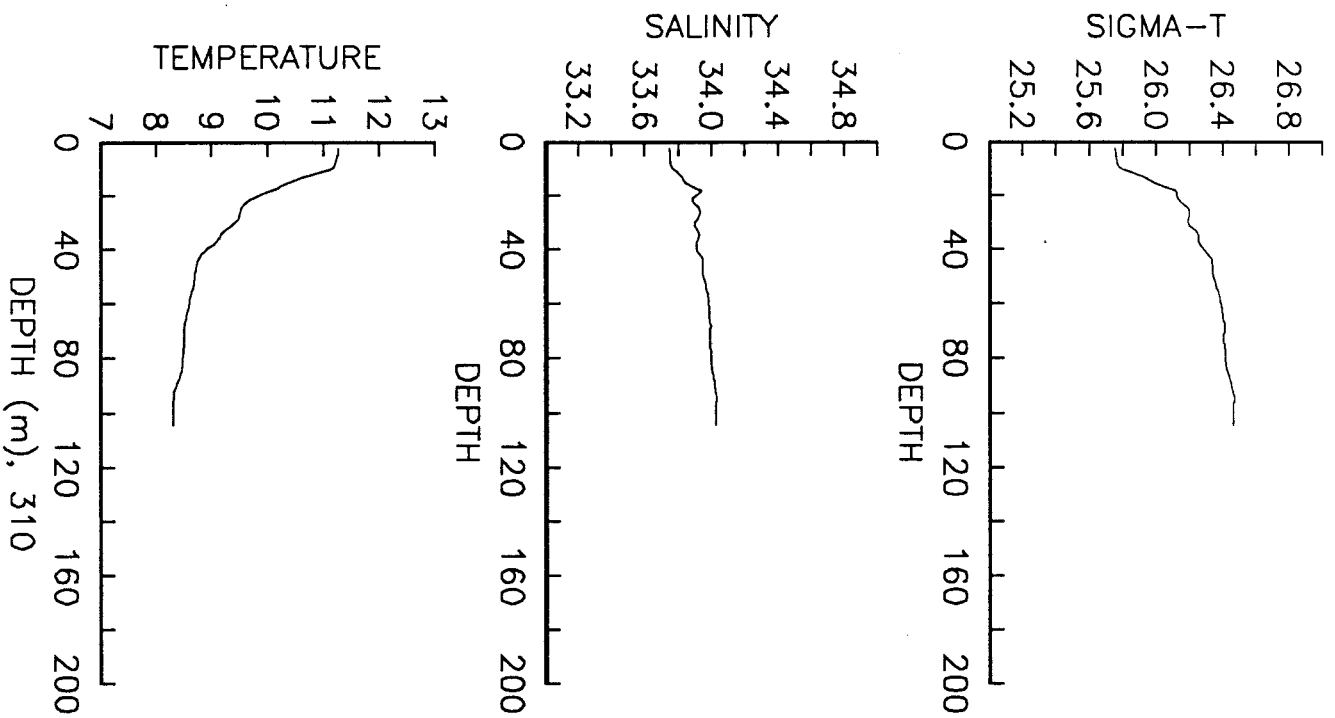
STN 8904.308 5 JUN 1989 0354 PDT
36°46.5'N 122° 9.2'W DEPTH 914 m



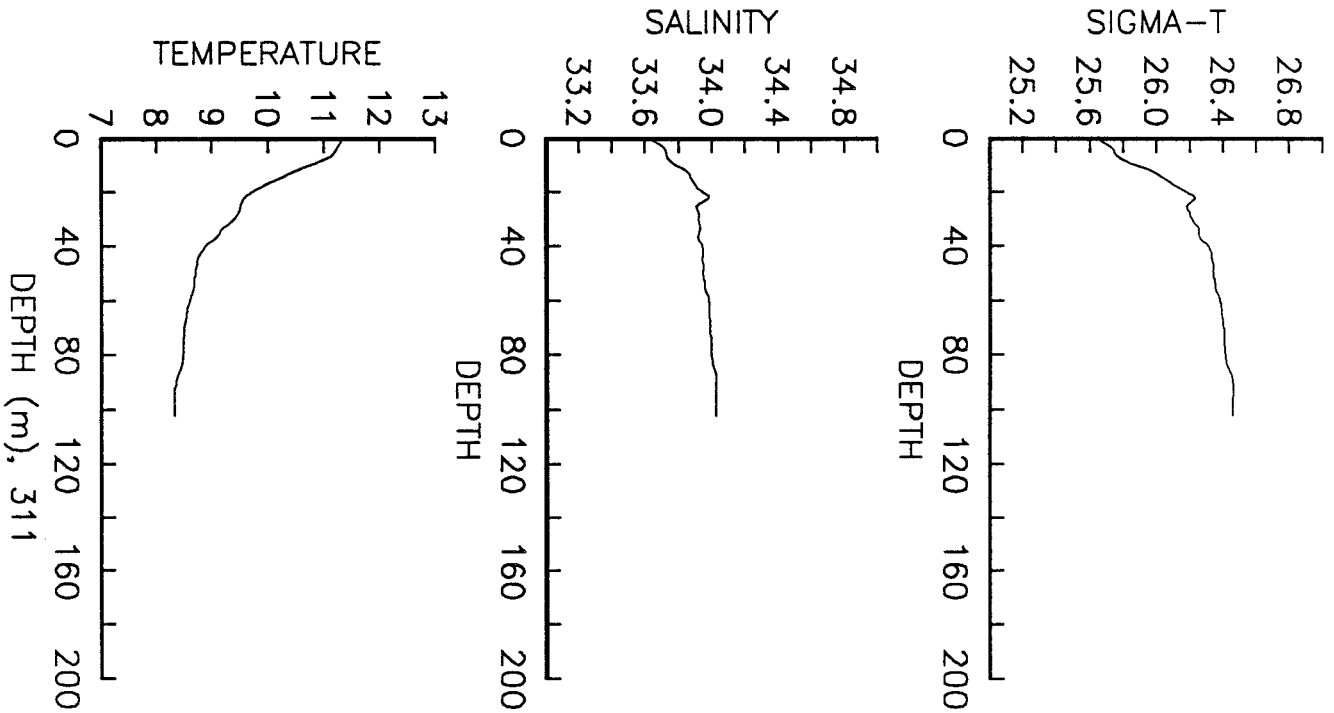
STN 8904.309 5 JUN 1989 0540 PDT
36°44.4'N 122° 2.5'W DEPTH 732 m



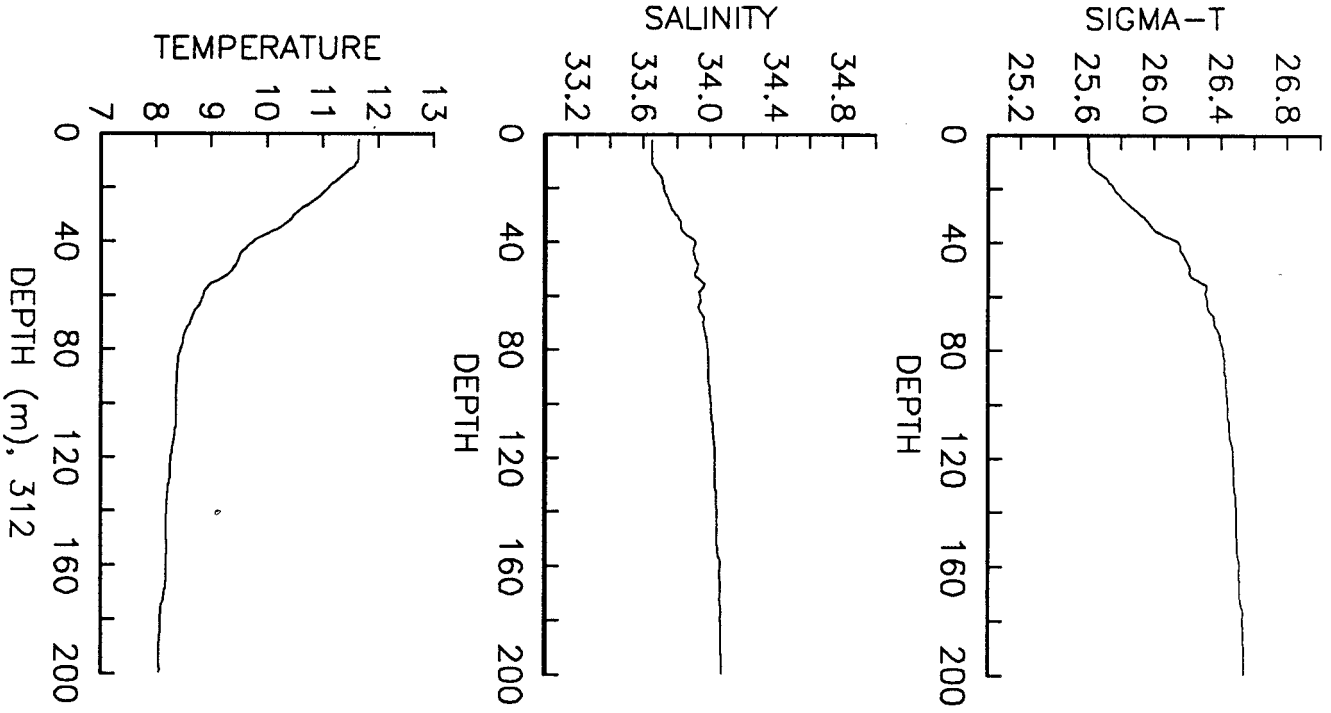
STN 8904.310 5 JUN 1989 0615 PDT
36°49.0'N 122° 5.0'W DEPTH 108 m



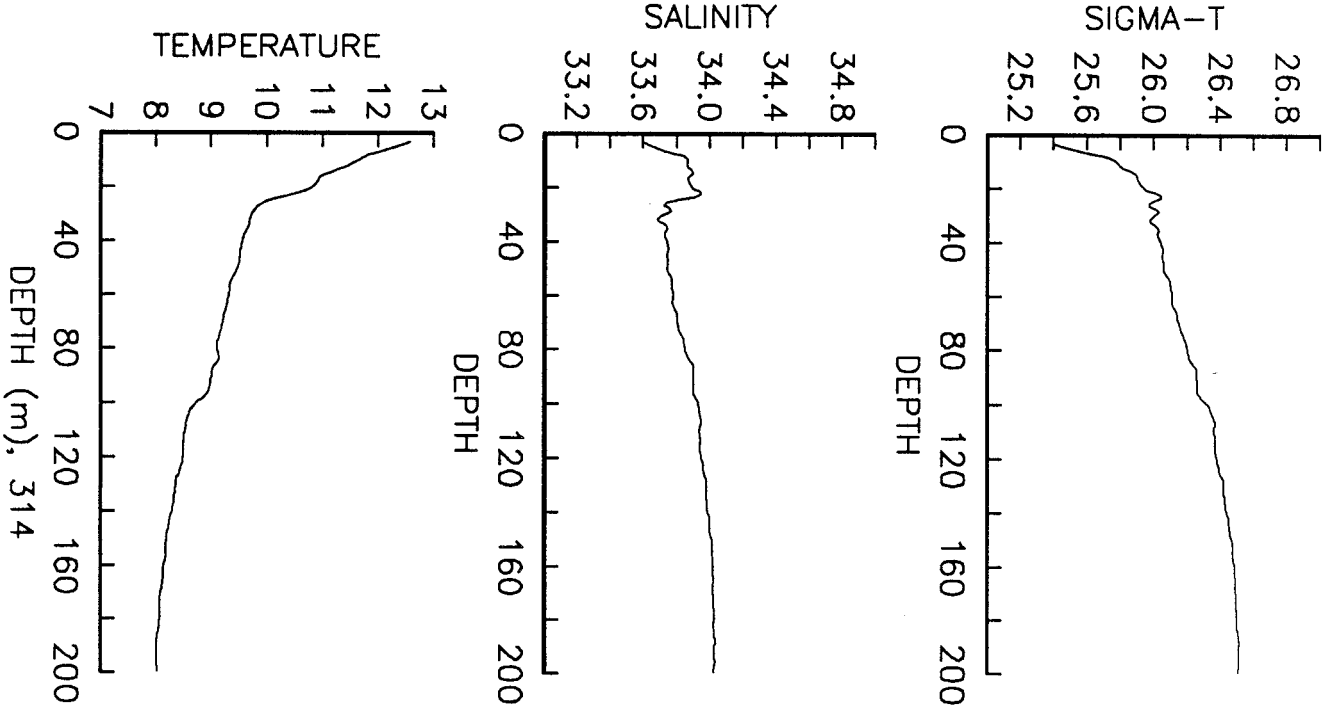
STN 8904.311 5 JUN 1989 0620 PDT
36°49.0'N 122° 5.0'W DEPTH 108 m



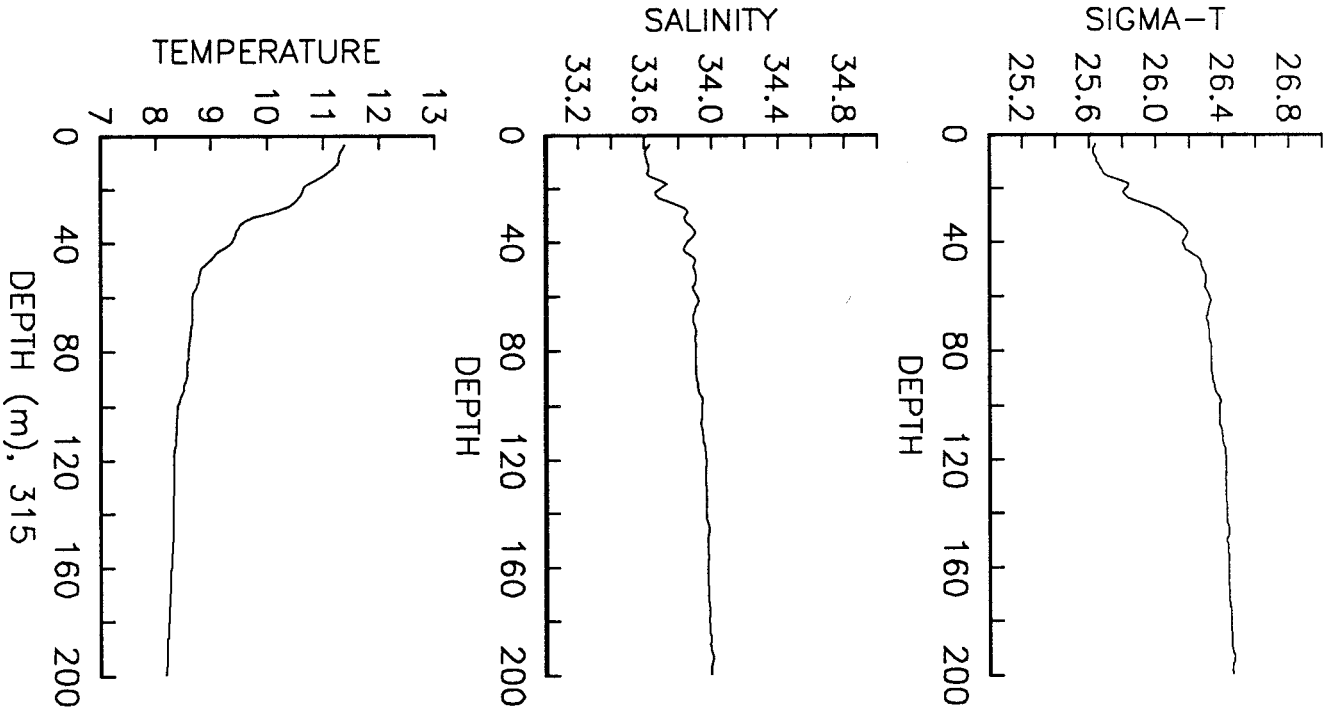
STN 8904.312 5 JUN 1989 0656 PDT
36°48.9'N 122°11.0'W DEPTH 486 m



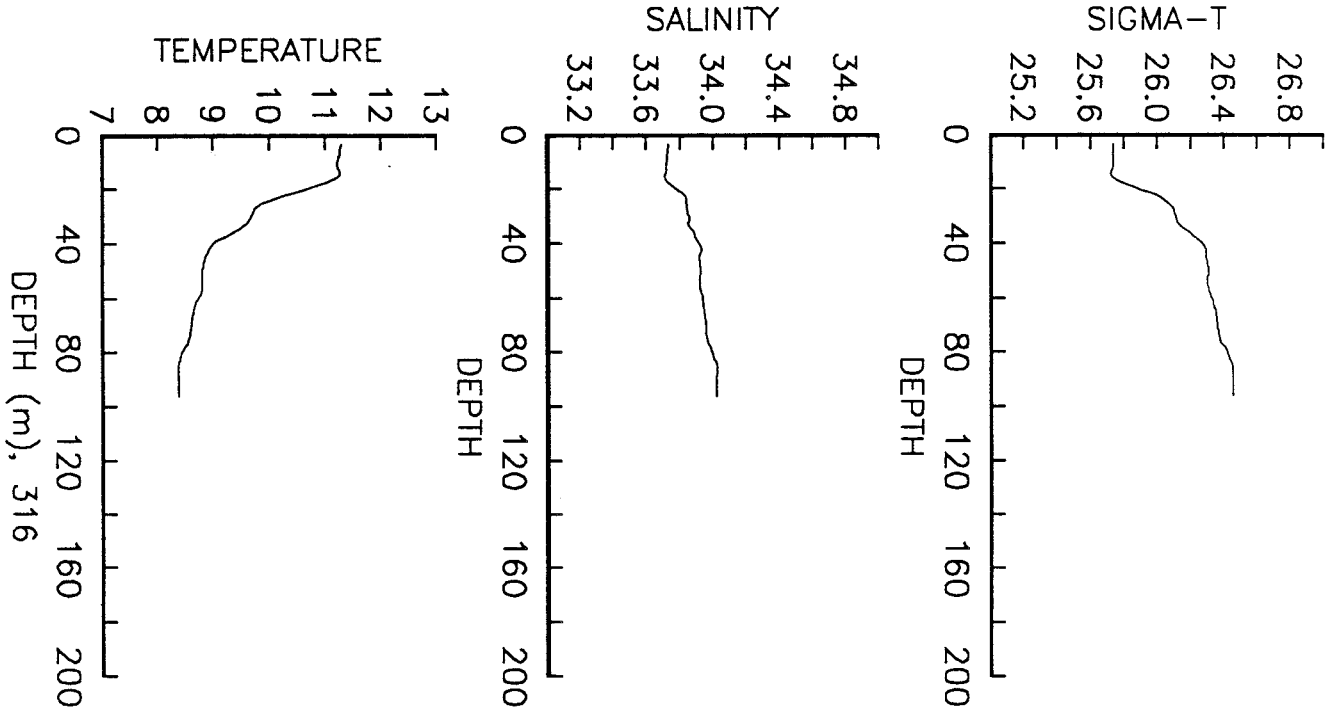
STN 8904.314 5 JUN 1989 0740 PDT
36°49.0'N 122°17.1'W DEPTH 1280 m



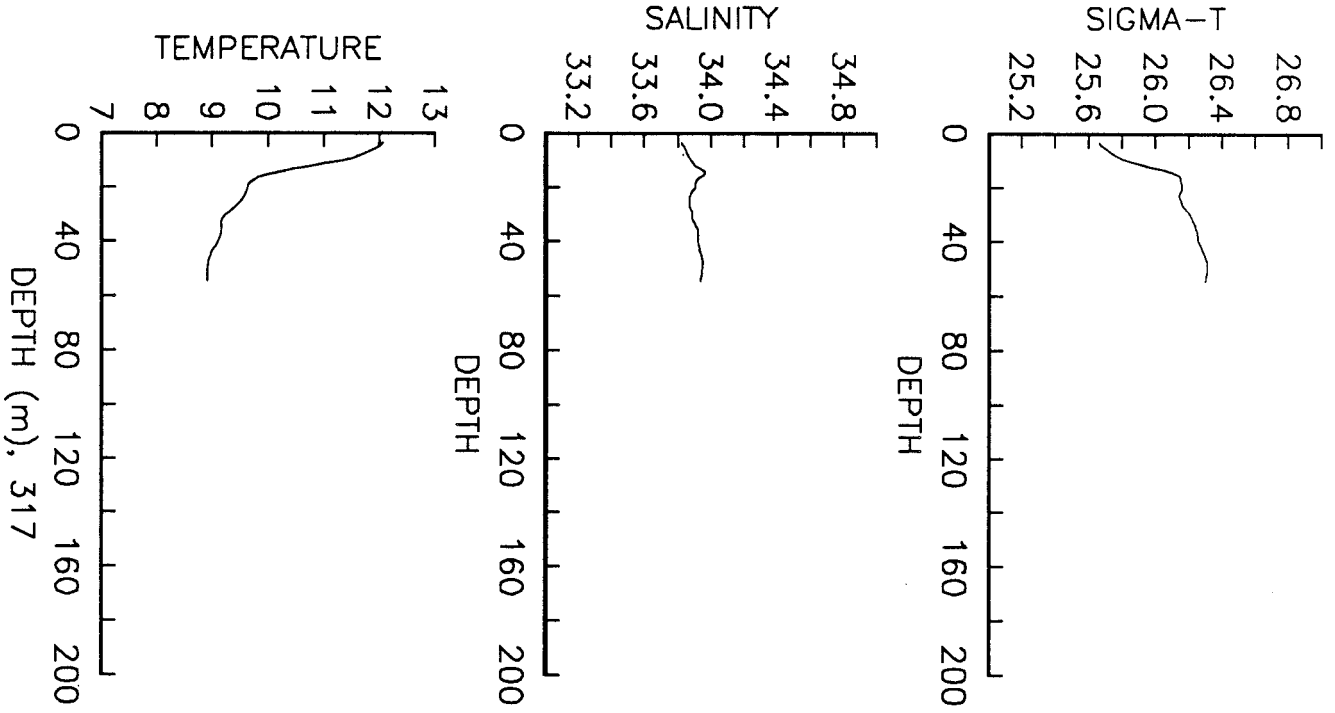
STN 8904.315 5 JUN 1989 0830 PDT
36°54.0'N 122°17.0'W DEPTH 274 m



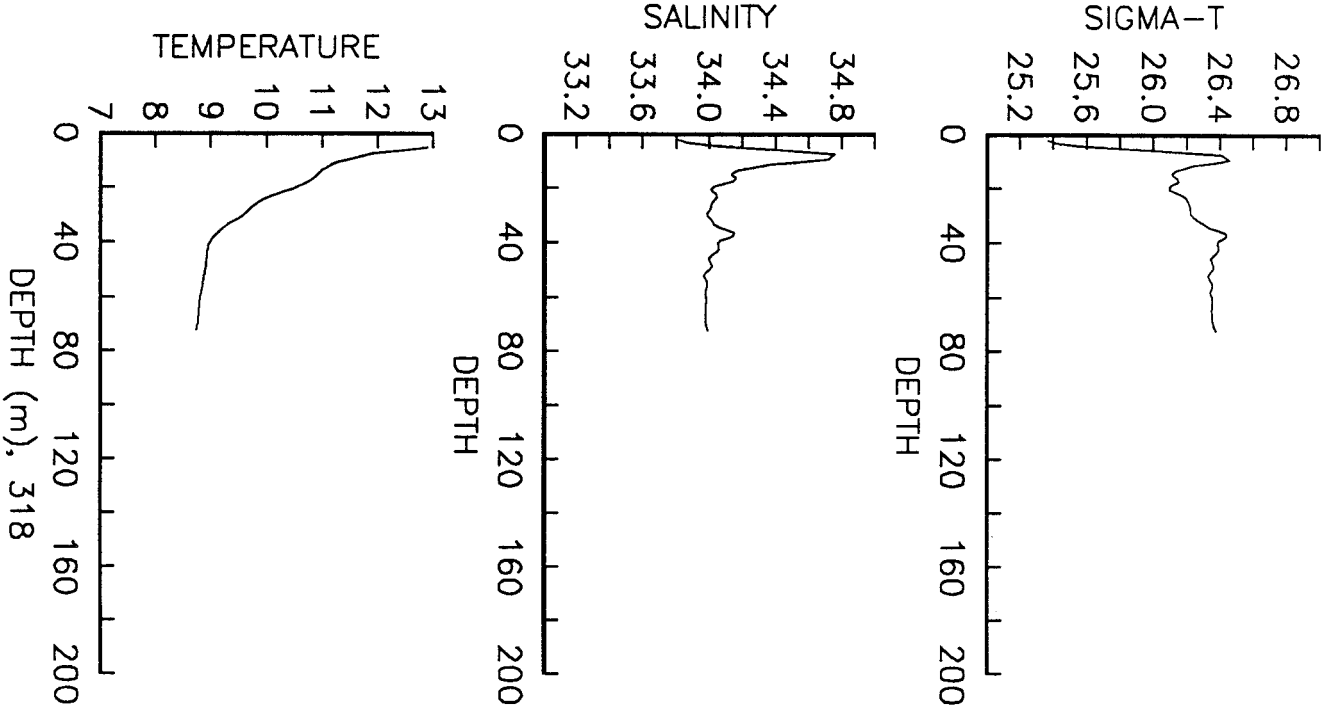
STN 8904.316 5 JUN 1989 1012 PDT
36°54.0'N 122°11.0'W DEPTH 97 m



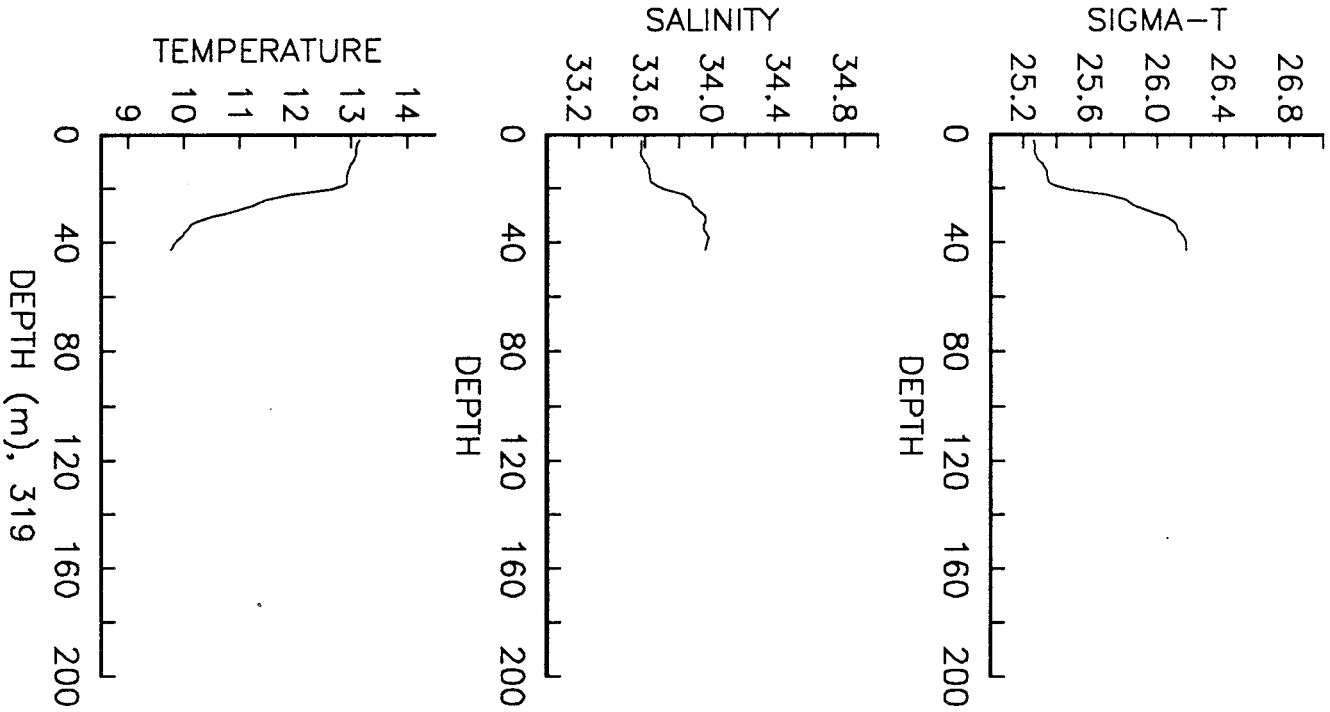
STN 8904.317 5 JUN 1989 1052 PDT
36°54.0'N 122° 4.5'W DEPTH 59 m



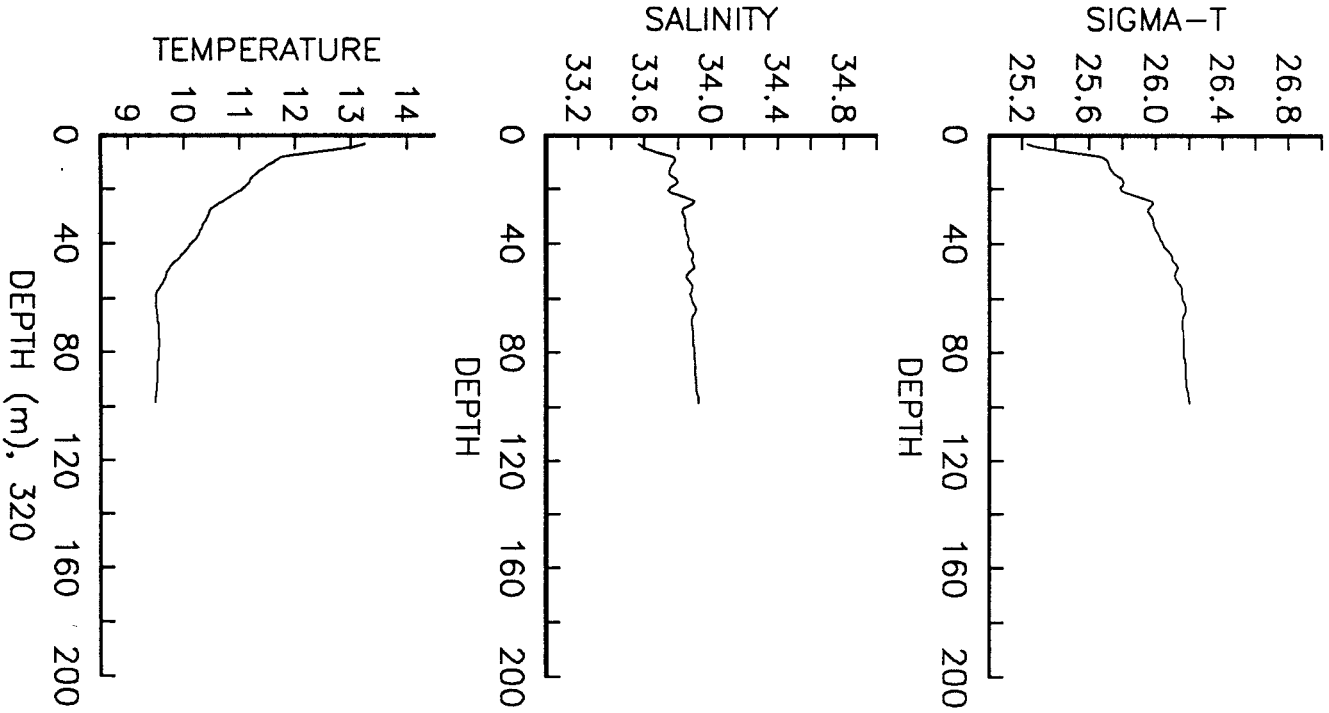
STN 8904.318 5 JUN 1989 1218 PDT
36°46.0'N 121°52.0'W DEPTH 79 m



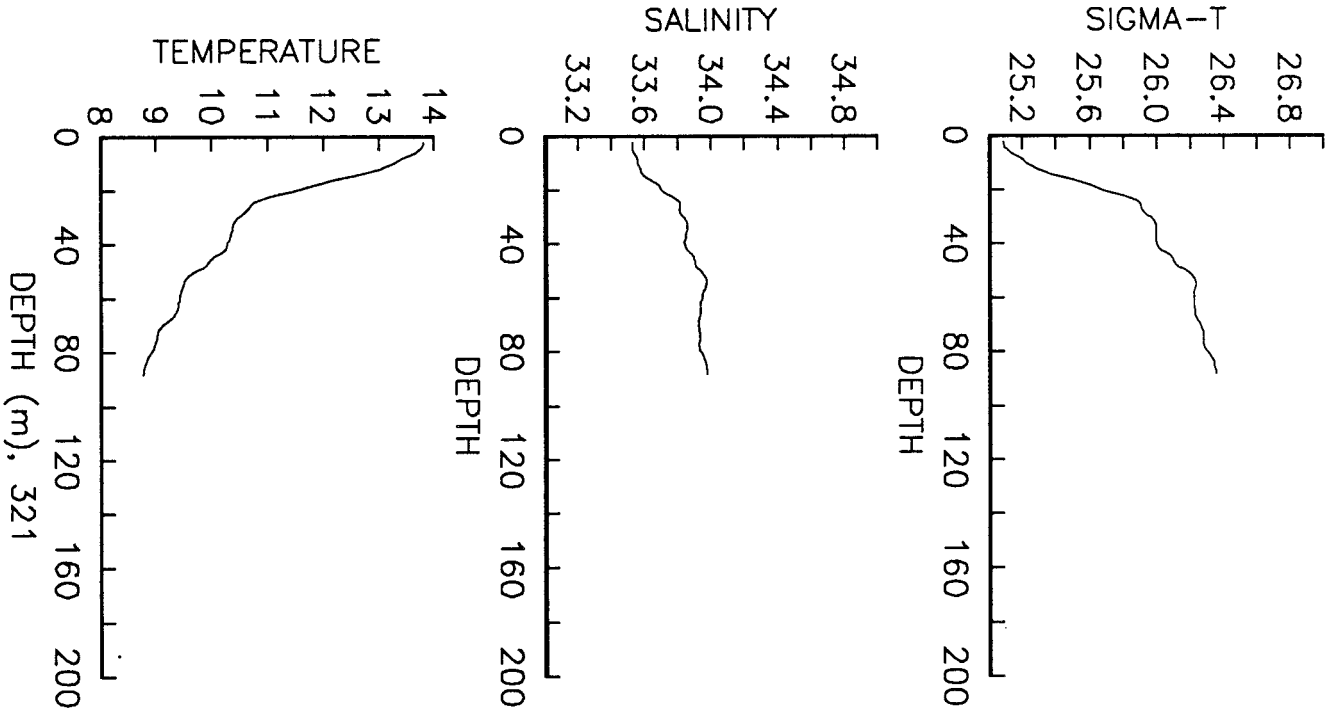
STN 8904.319 5 JUN 1989 2101 PDT
36°38.2'N 121°51.7'W DEPTH 38 m



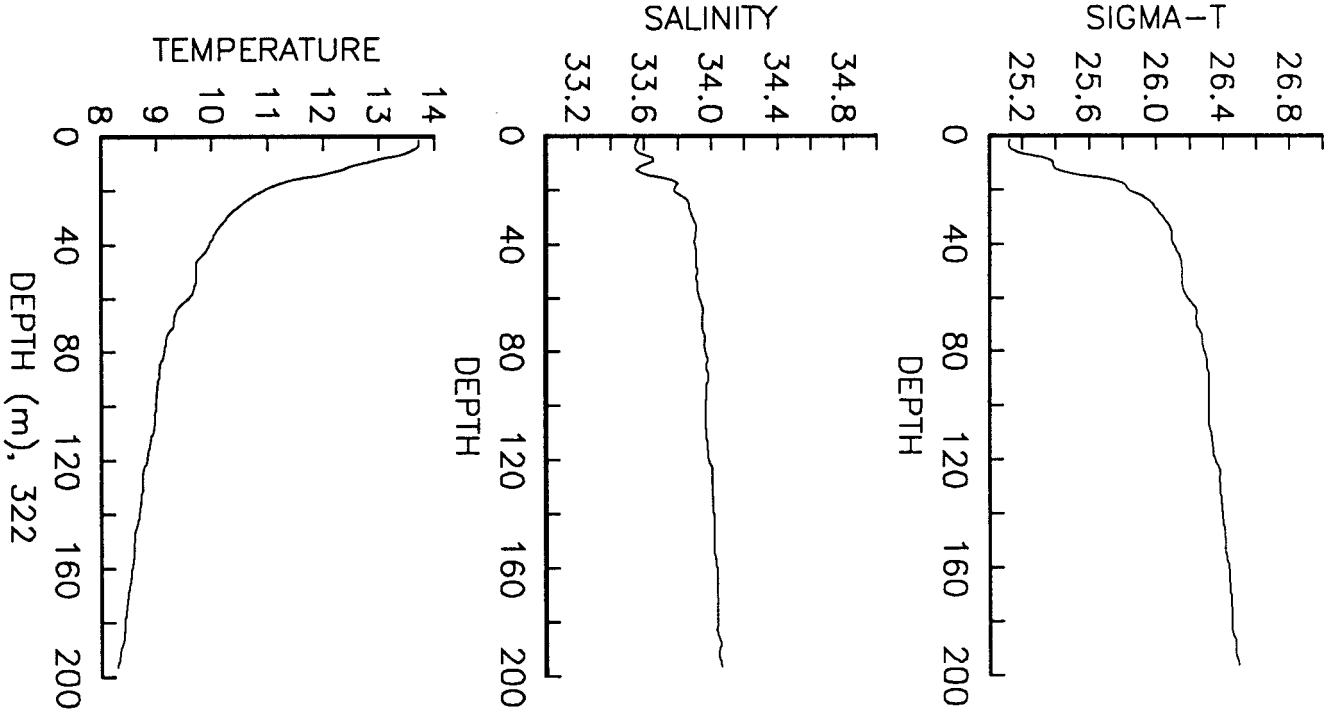
STN 8904.320 5 JUN 1989 2306 PDT
36°39.2'N 121°57.1'W DEPTH 99 m



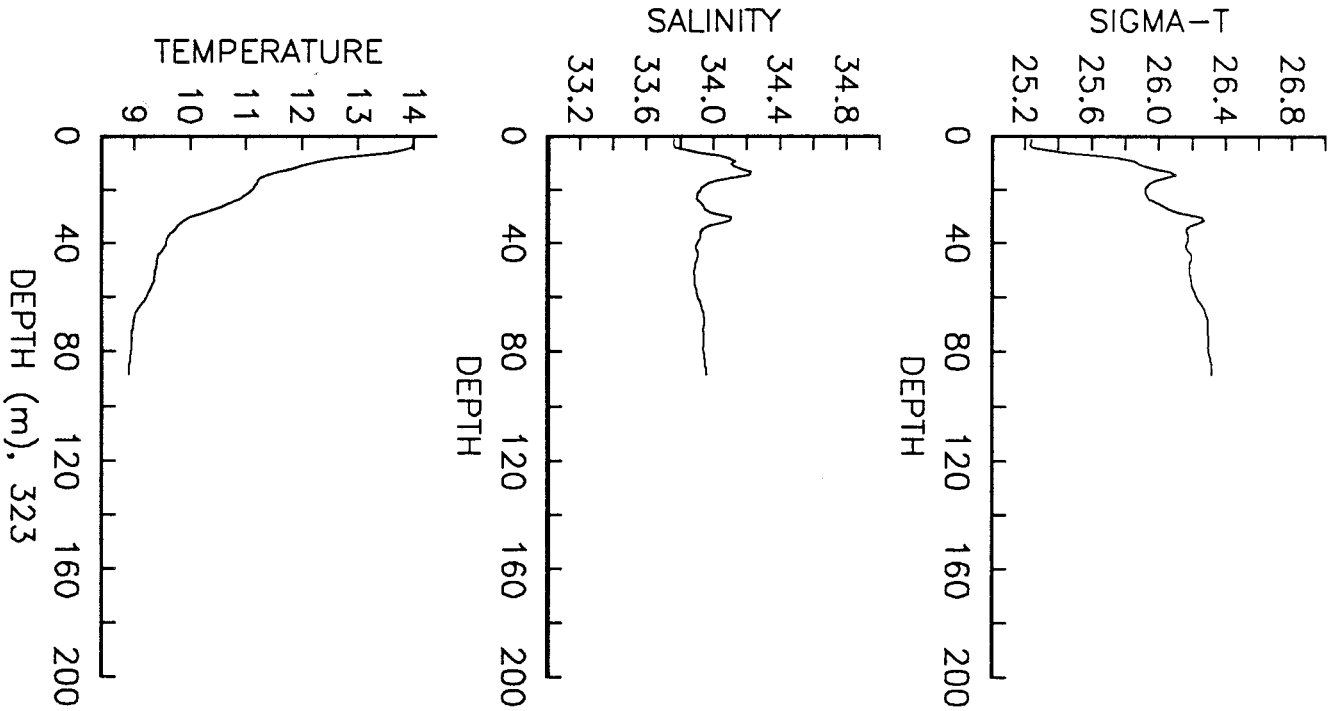
STN 8904.321 5 JUN 1989 2338 PDT
36°42.5'N 121°54.5'W DEPTH 88 m



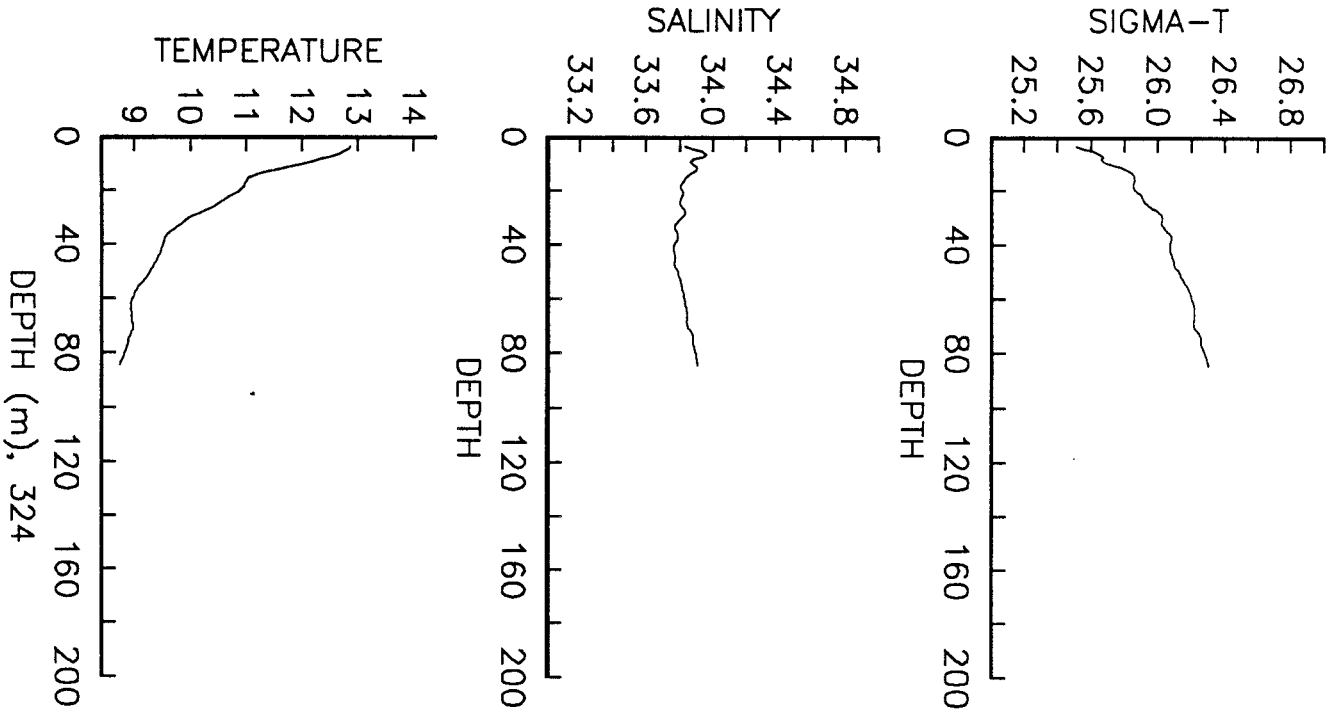
STN 8904.322 6 JUN 1989 0113 PDT
36°45.1'N 122° 0.2'W DEPTH 732 m



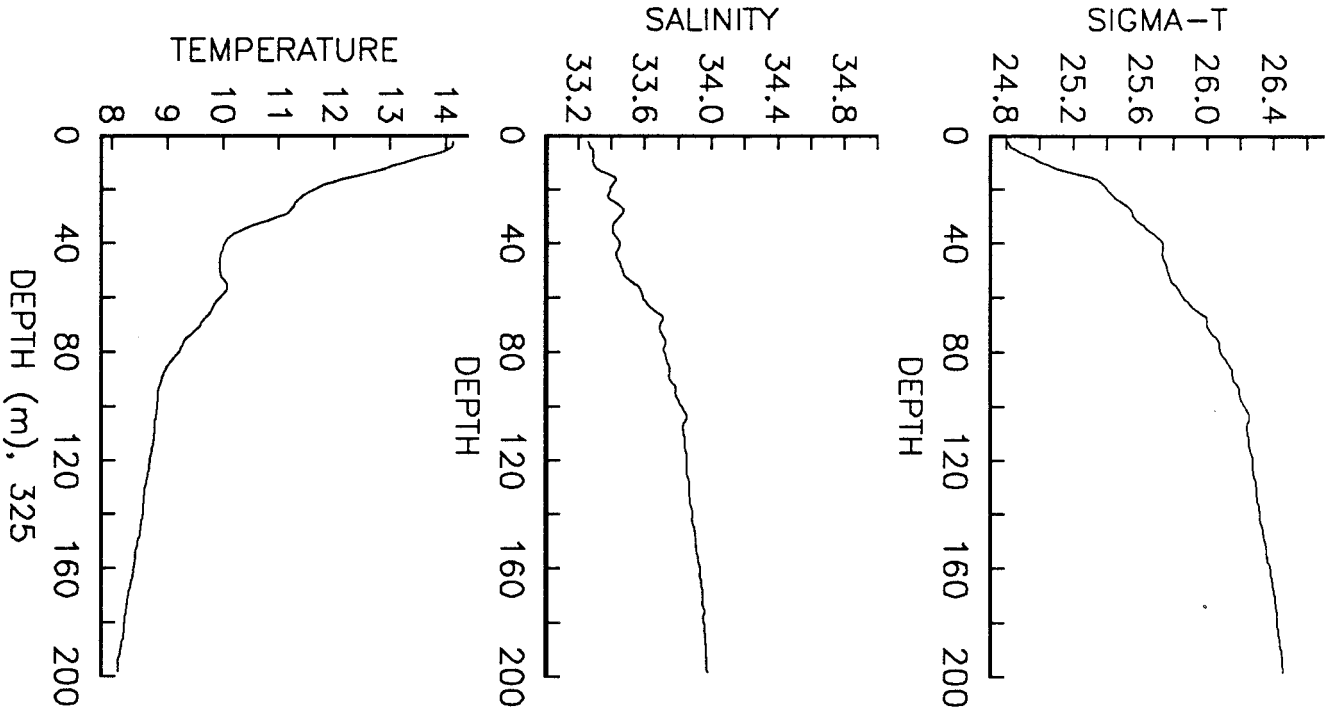
STN 8904.323 6 JUN 1989 0206 PDT
36°46.0'N 121°51.8'W DEPTH 86 m



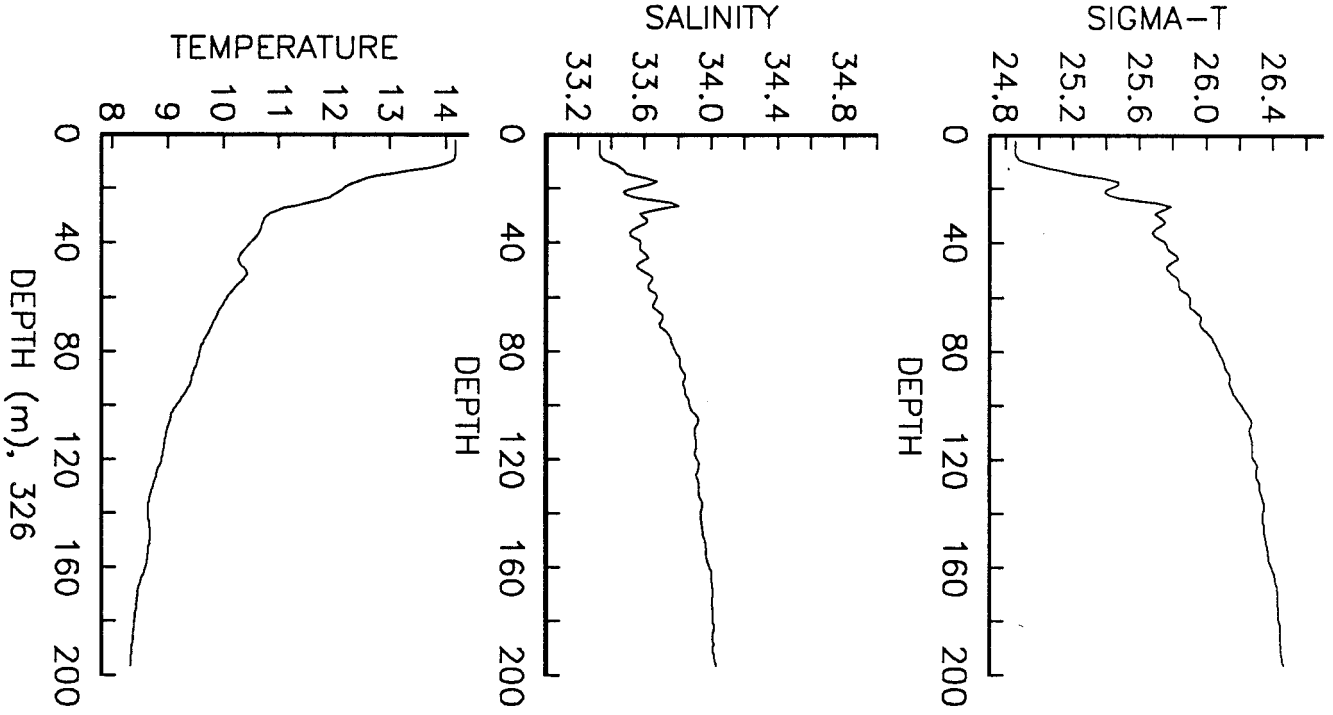
STN 8904.324 6 JUN 1989 0326 PDT
36°50.9'N 121°59.5'W DEPTH 88 m



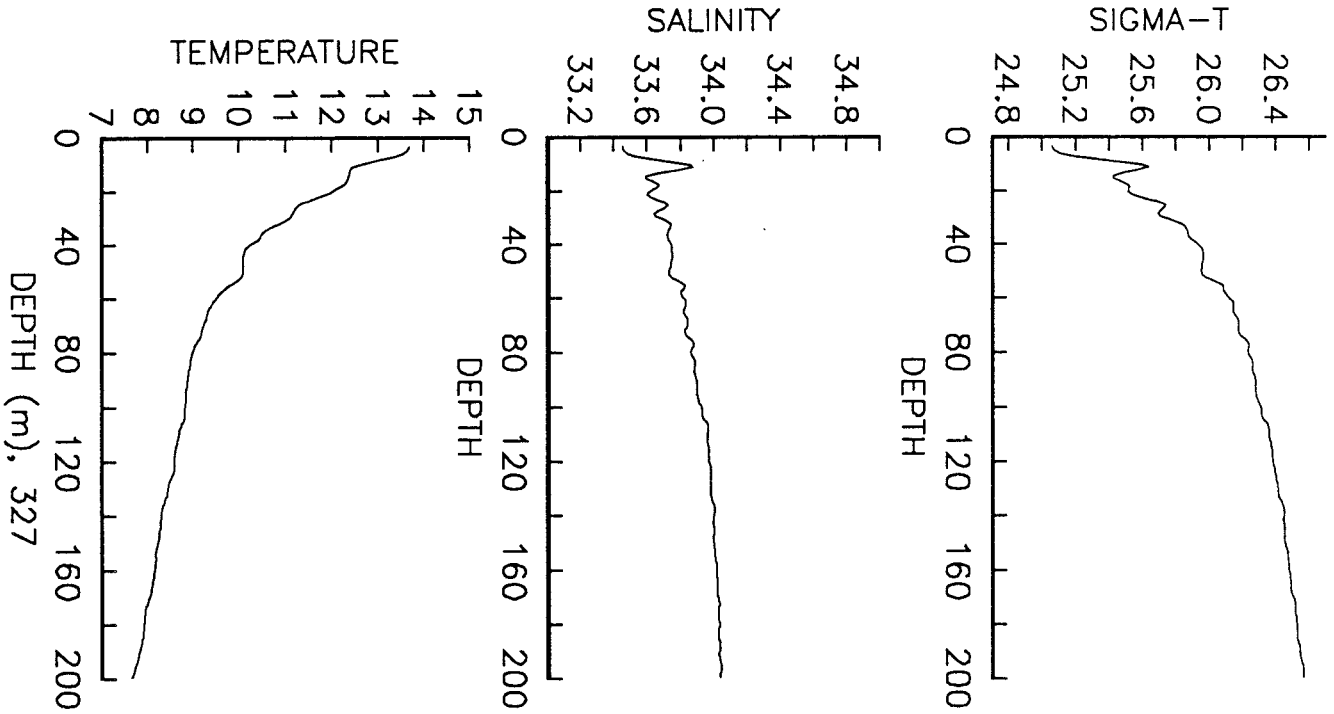
STN 8904.325 6 JUN 1989 0646 PDT
36°49.0'N 122°29.5'W DEPTH 2103 m



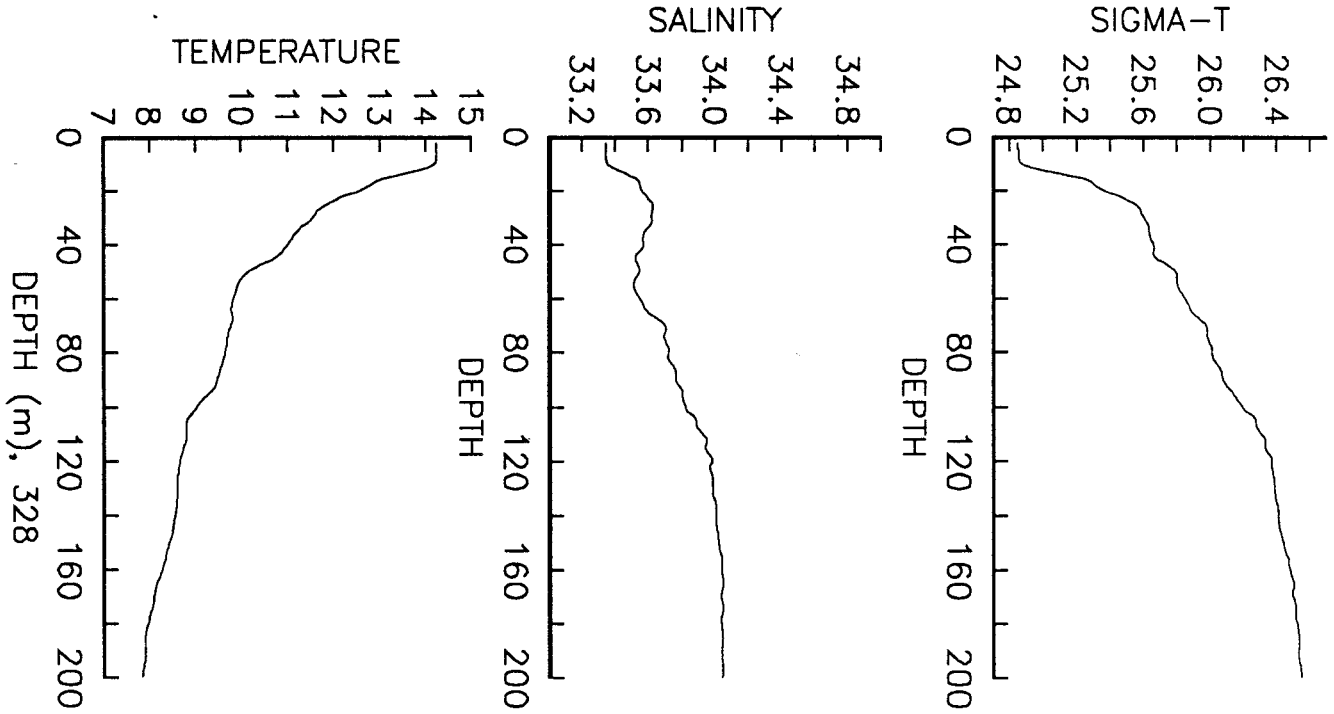
STN 8904.326 6 JUN 1989 0750 PDT
36°49.0'N 122°36.0'W DEPTH 1829 m



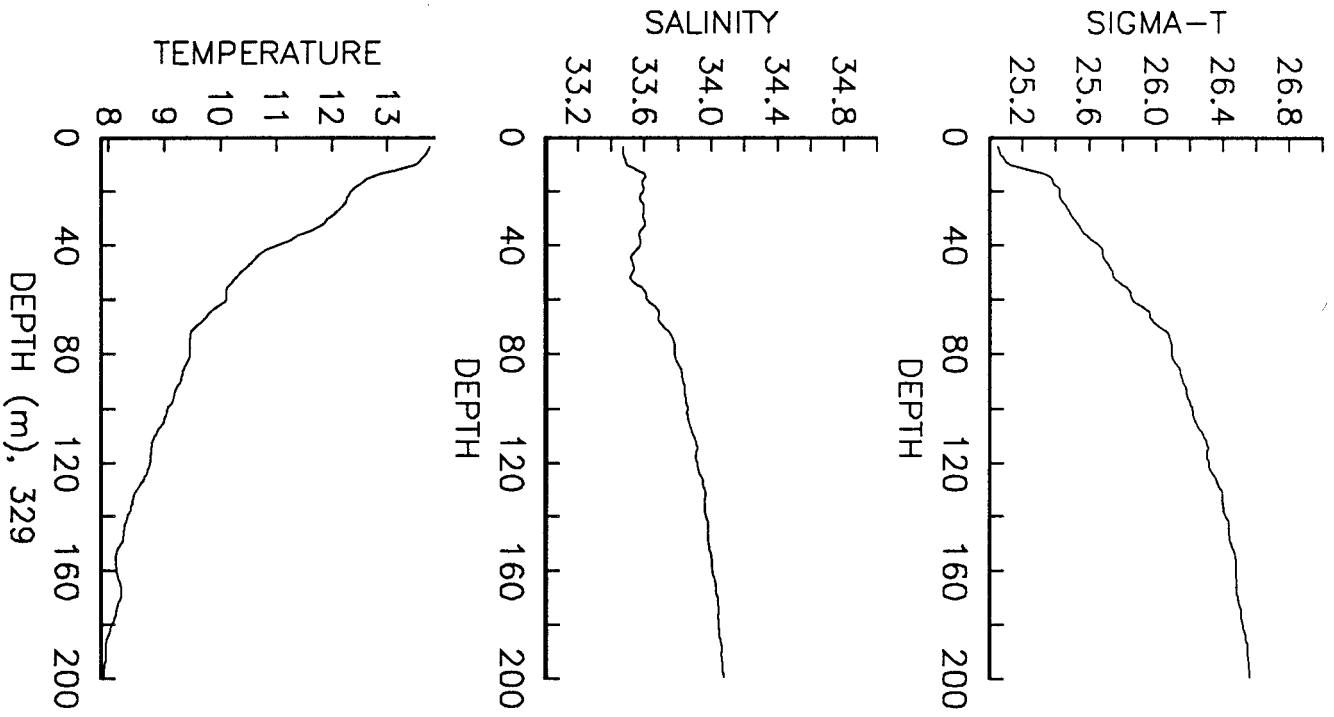
STN 8904.327 6 JUN 1989 0827 PDT
36°53.9'N 122°30.0'W DEPTH 1134 m



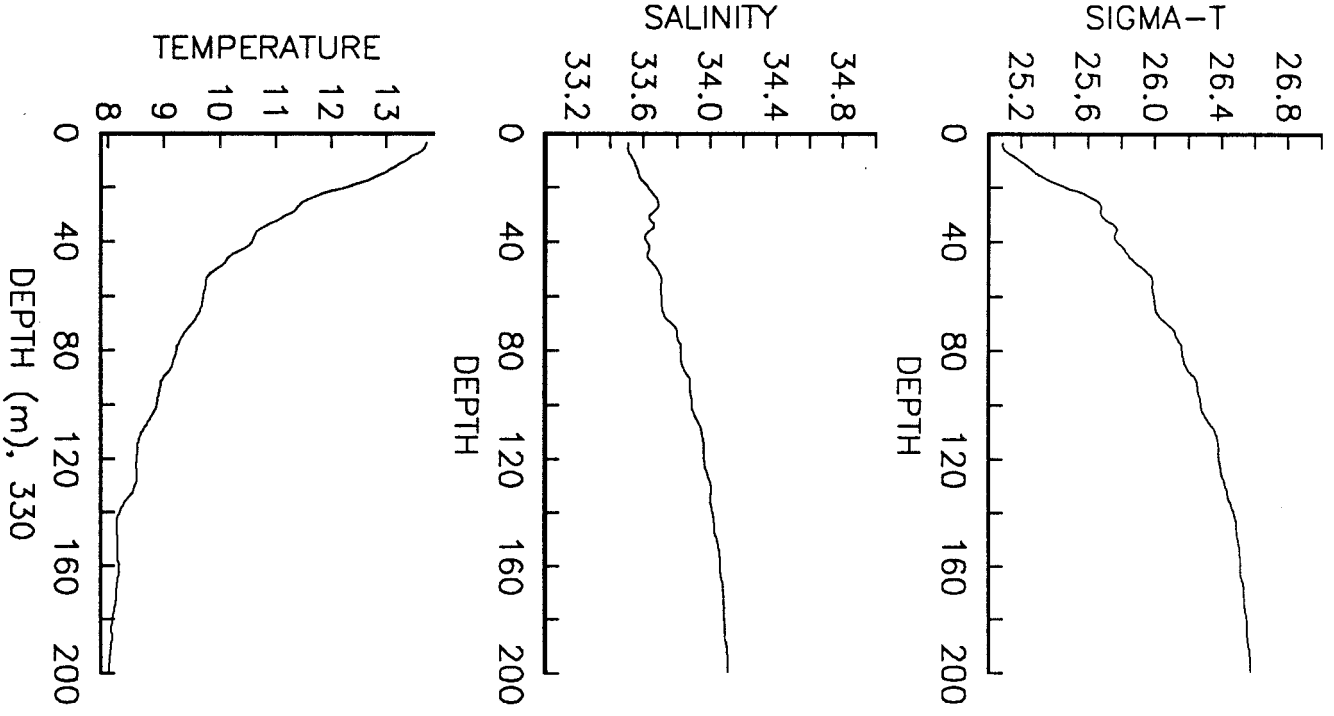
STN 8904.328 6 JUN 1989 0913 PDT
36°54.0'N 122°36.2'W DEPTH 1554 m



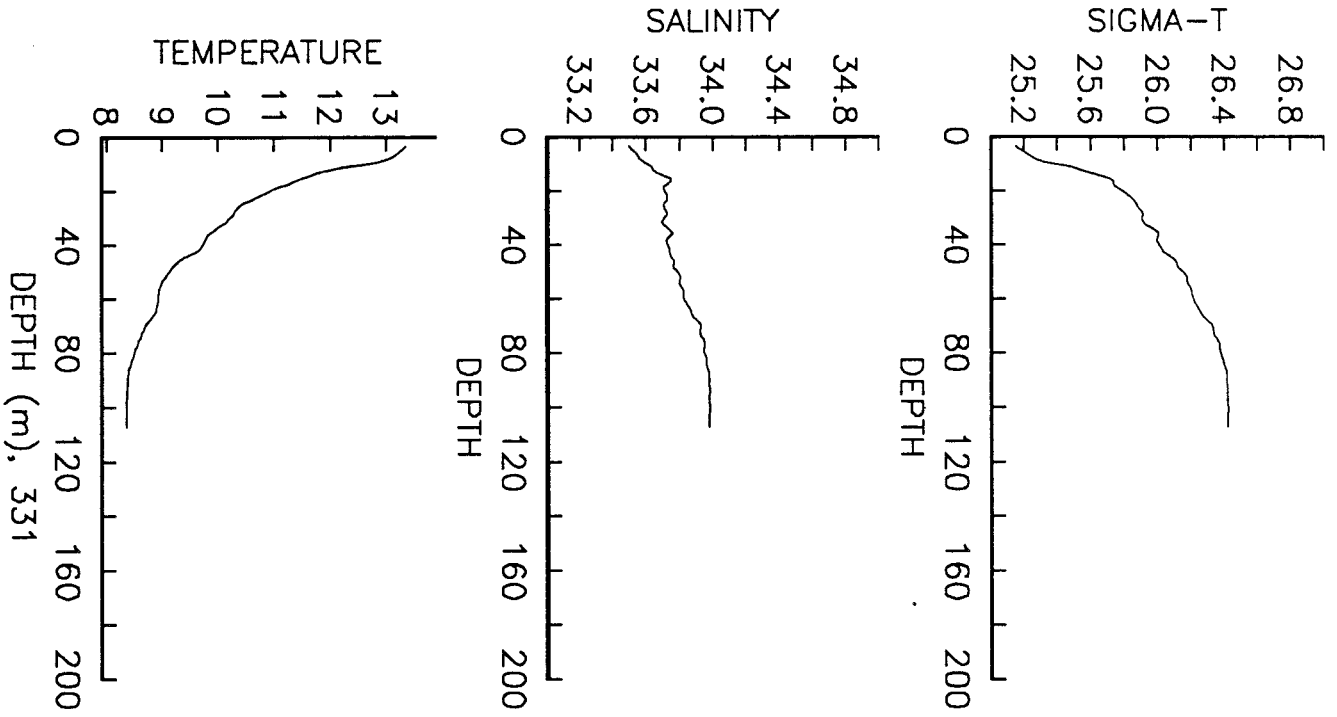
STN 8904.329 6 JUN 1989 1002 PDT
36°59.0'N 122°40.0'W DEPTH 563 m



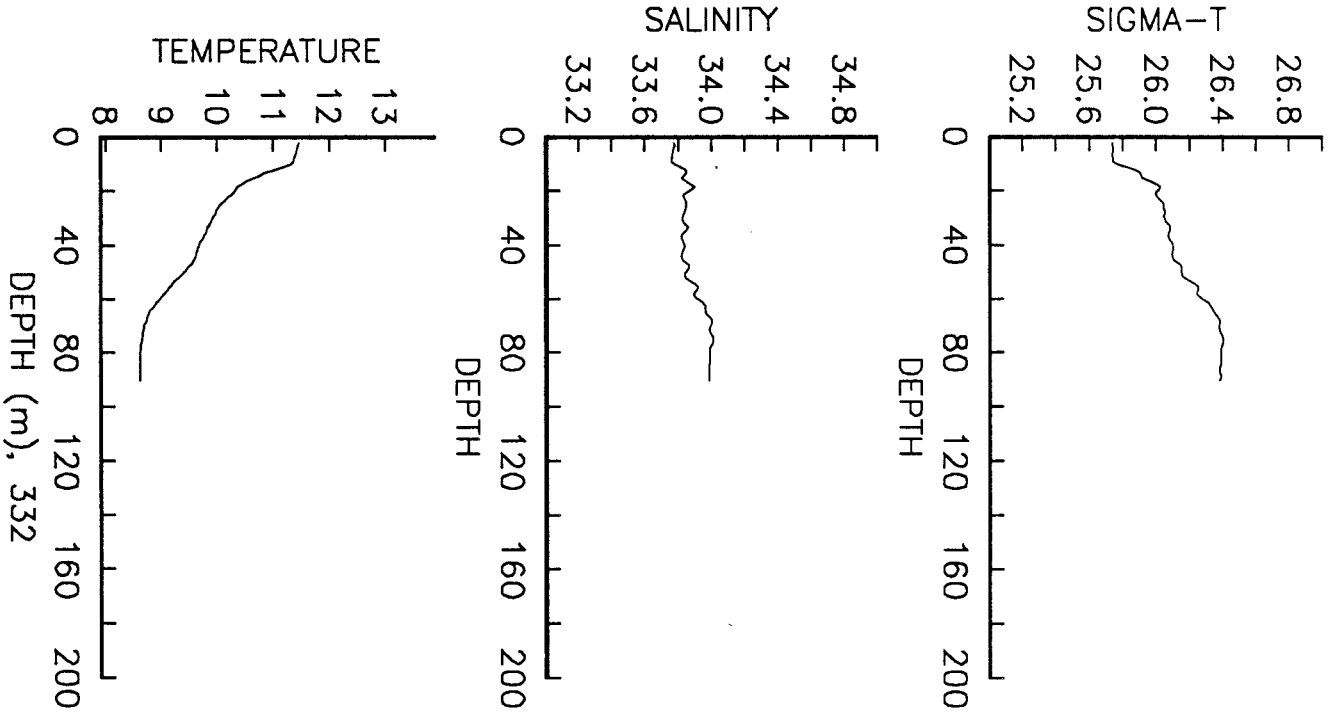
STN 8904.330 6 JUN 1989 1130 PDT
37° 1.7'N 122°39.7'W DEPTH 375 m



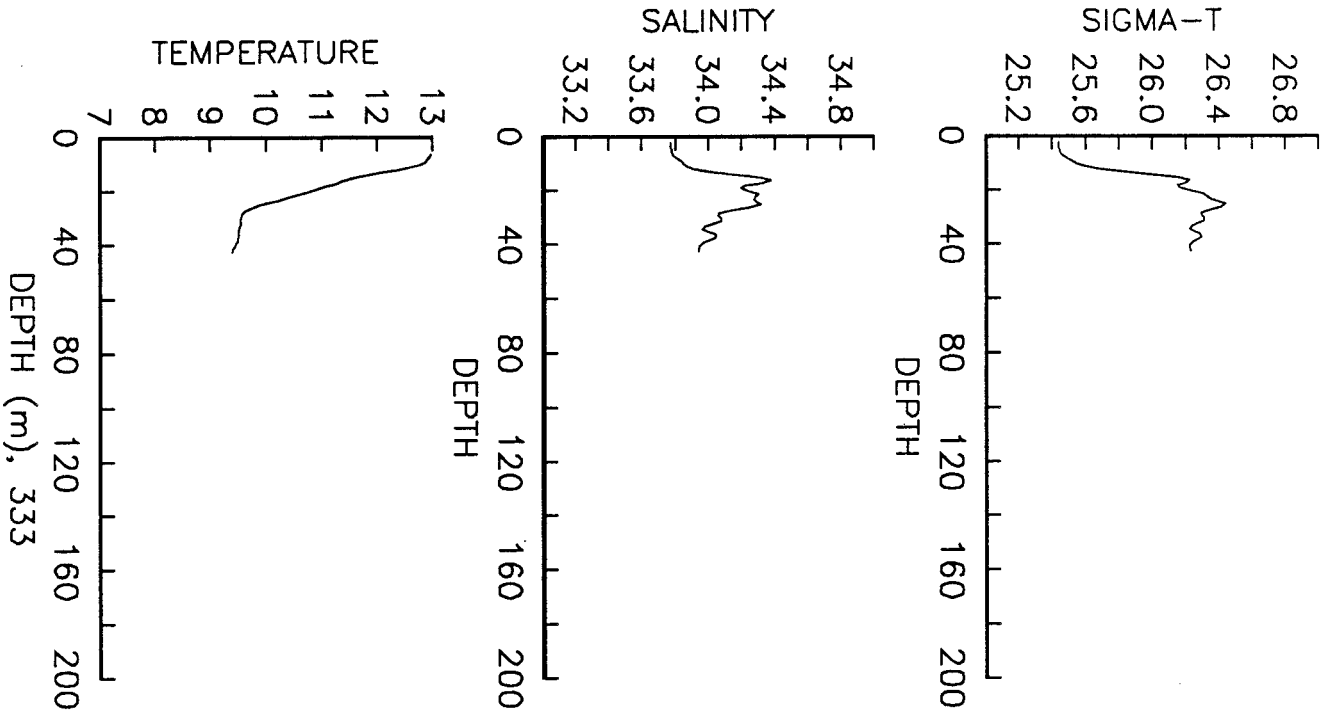
STN 8904.331 6 JUN 1989 1220 PDT
37° 8.0'N 122°36.0'W DEPTH 110 m



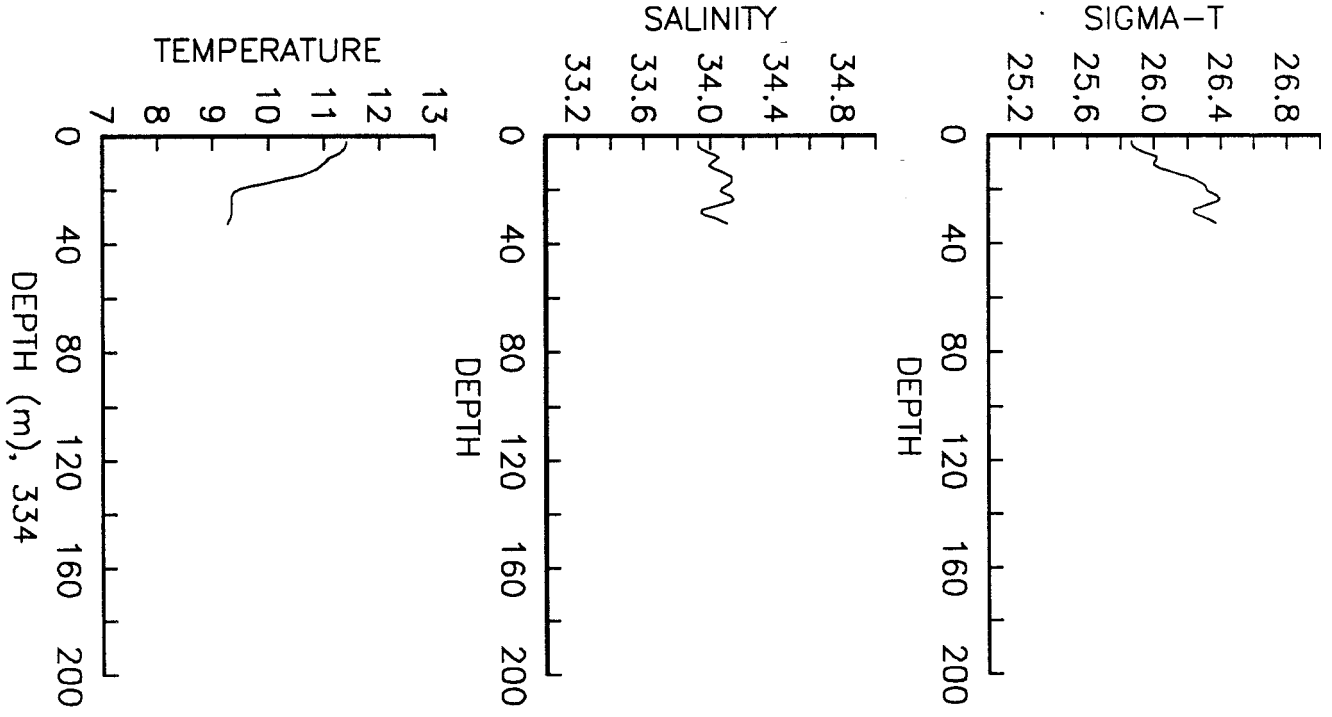
STN 8904.332 6 JUN 1989 1309 PDT
37° 8.1'N 122°29.9'W DEPTH 91 m



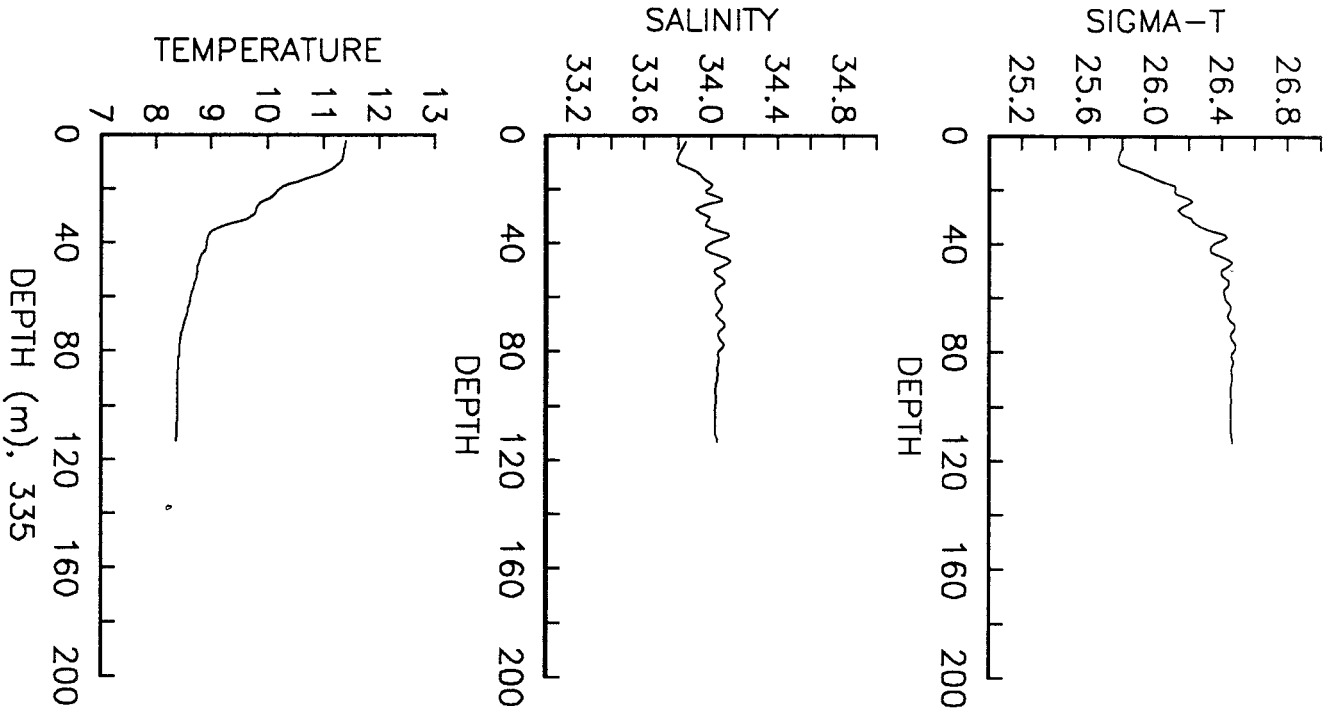
STN 8904.333 6 JUN 1989 1348 PDT
37° 8.2'N 122°23.5'W DEPTH 42 m



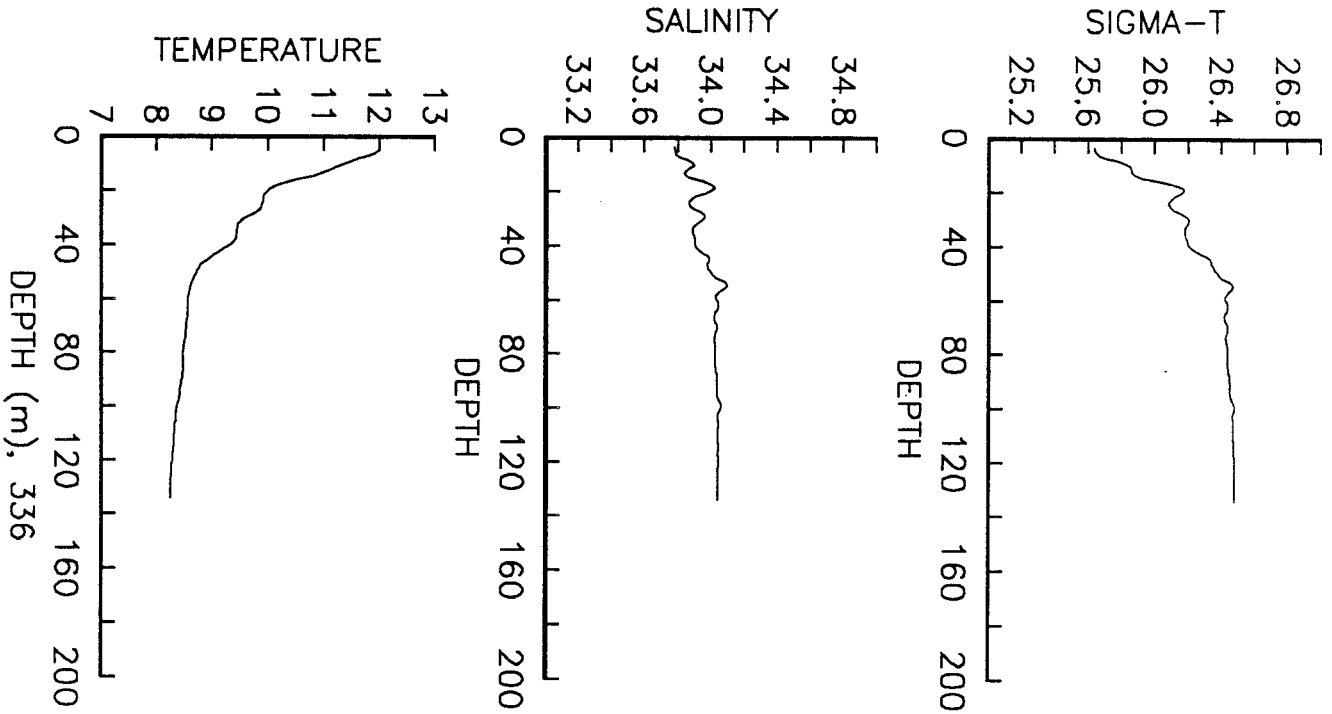
STN 8904.334 6 JUN 1989 2110 PDT
36°59.0'N 122°12.5'W DEPTH 40 m



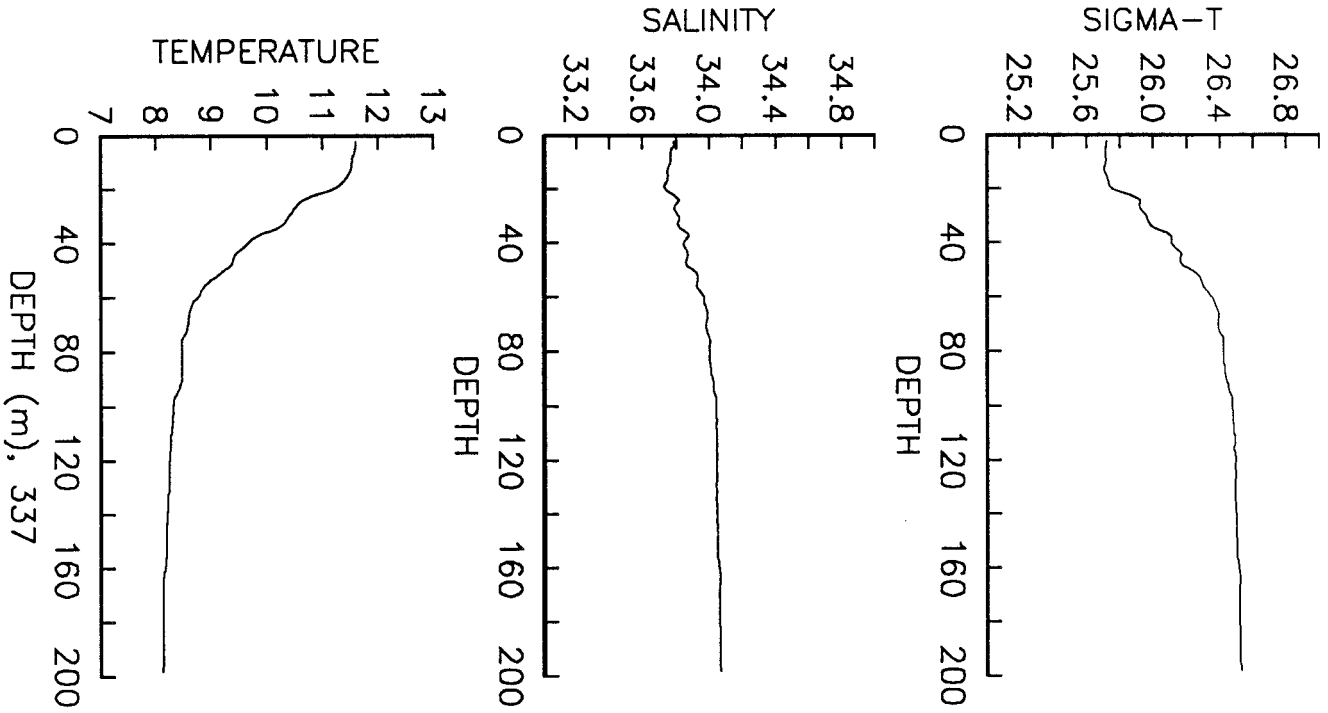
STN 8904.335 6 JUN 1989 2258 PDT
36°59.4'N 122°19.2'W DEPTH 117 m



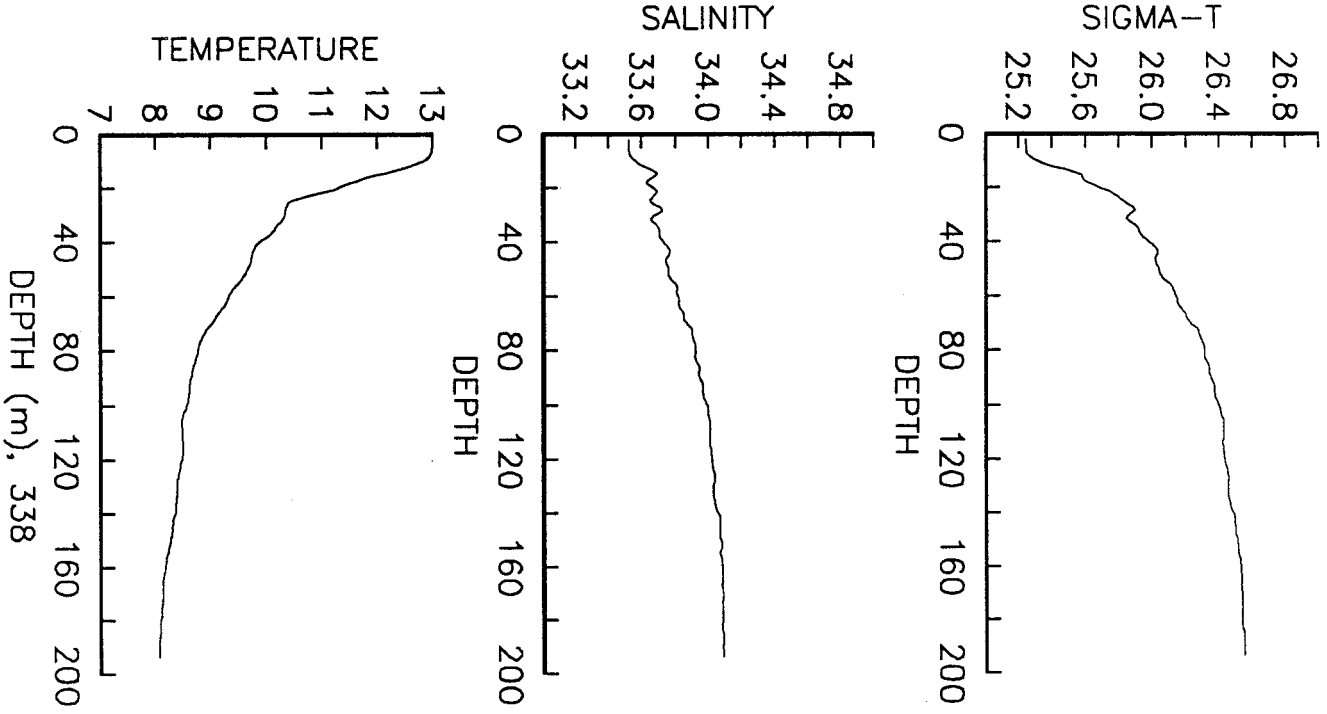
STN 8904.336 6 JUN 1989 2314 PDT
36°59.0'N 122°22.5'W DEPTH 143 m



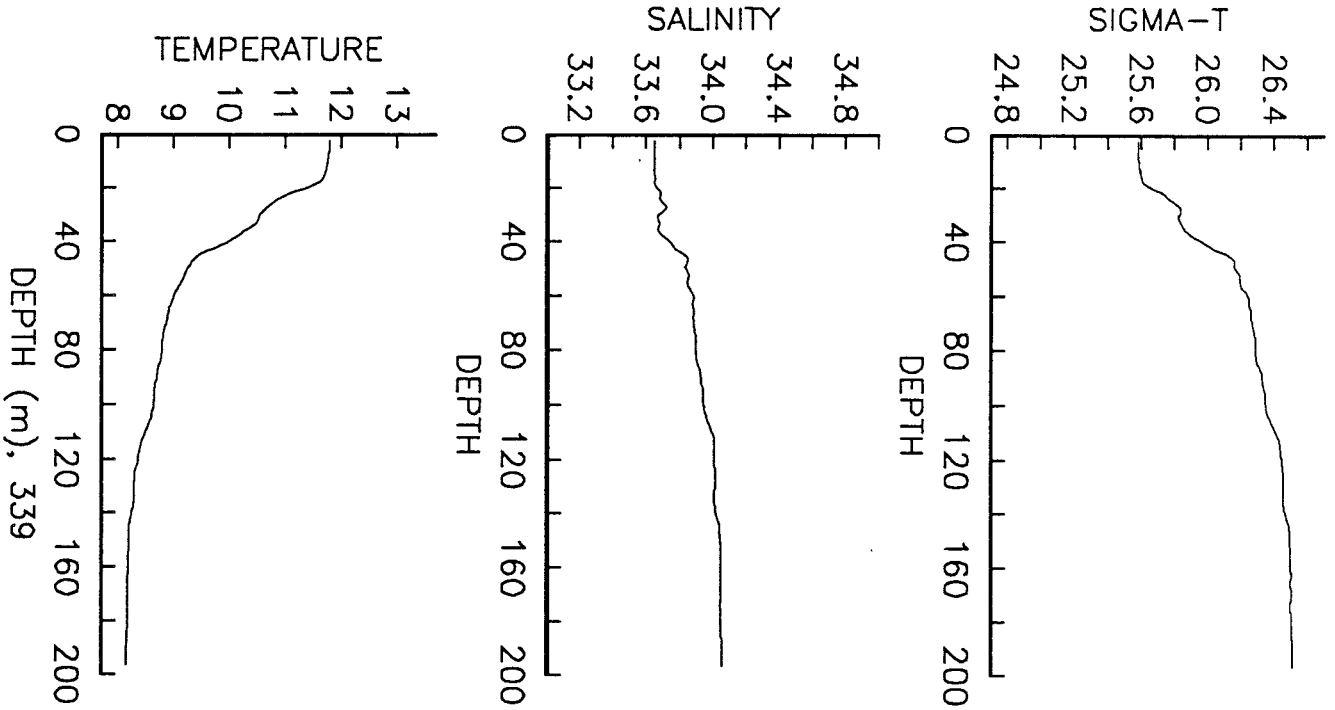
STN 8904.337 7 JUN 1989 0214 PDT
36°58.5'N 122°25.4'W DEPTH 262 m



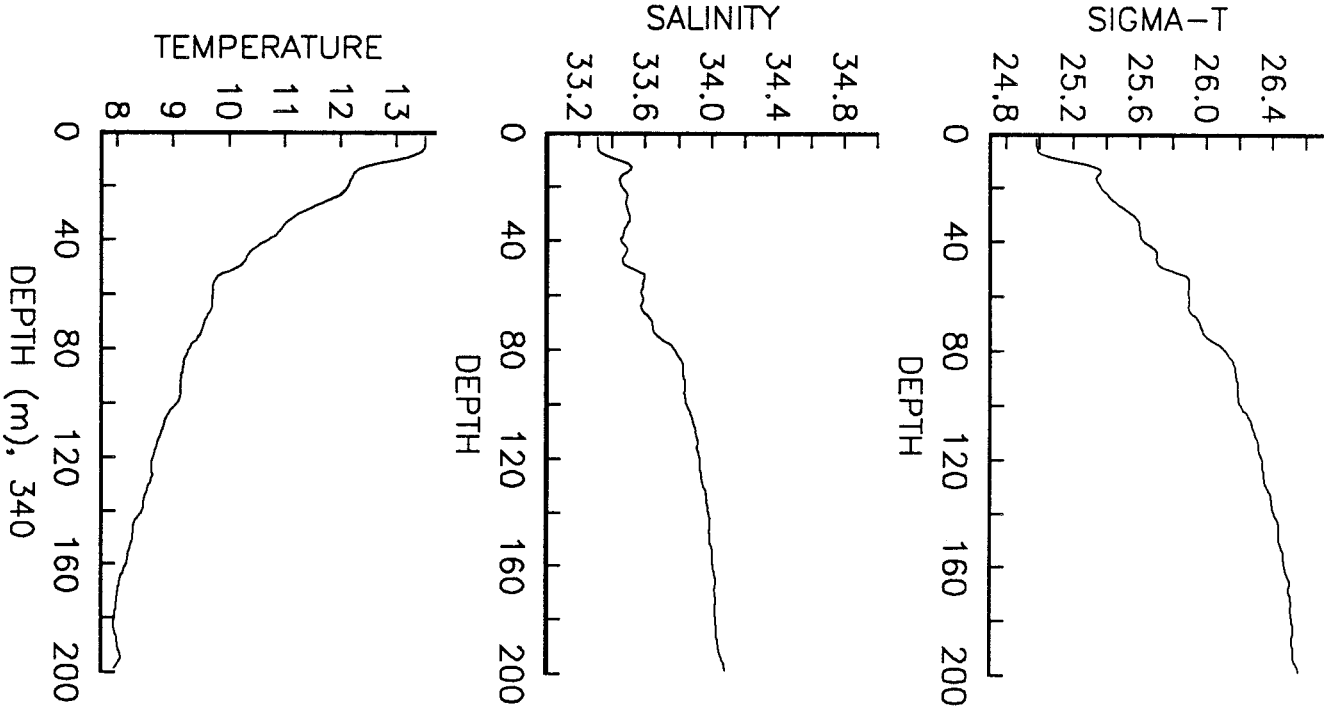
STN 8904.338 7 JUN 1989 0323 PDT
36°59.0'N 122°35.5'W DEPTH 384 m



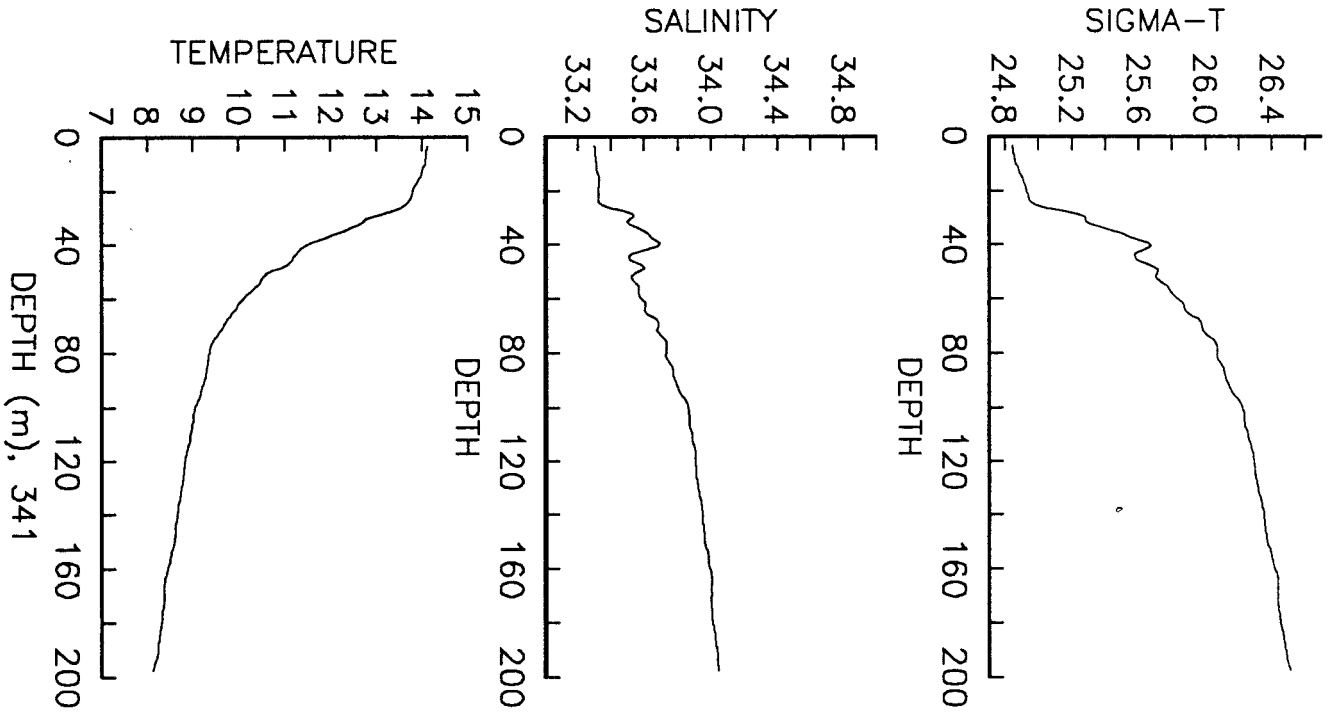
STN 8904.339 7 JUN 1989 0550 PDT
37° 8.0'N 122°43.0'W DEPTH 223 m



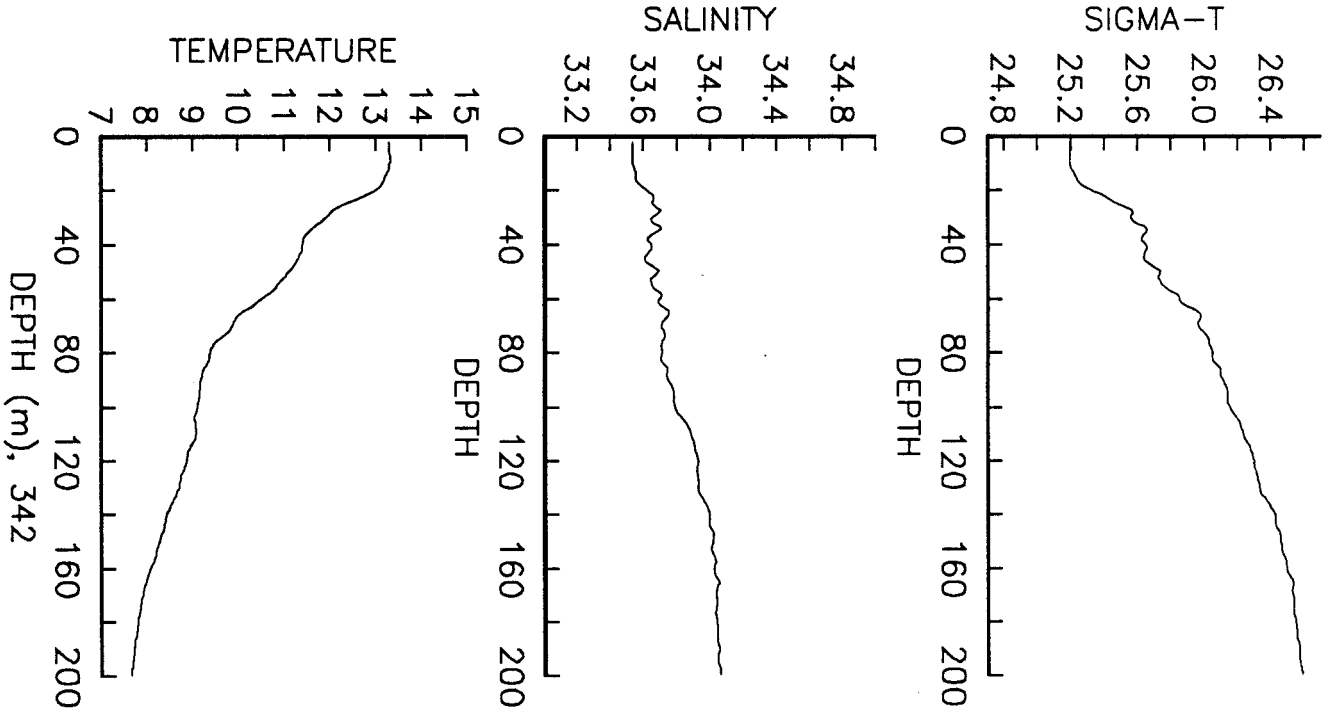
STN 8904.340 7 JUN 1989 0636 PDT
37° 8.0'N 122°50.0'W DEPTH 461 m



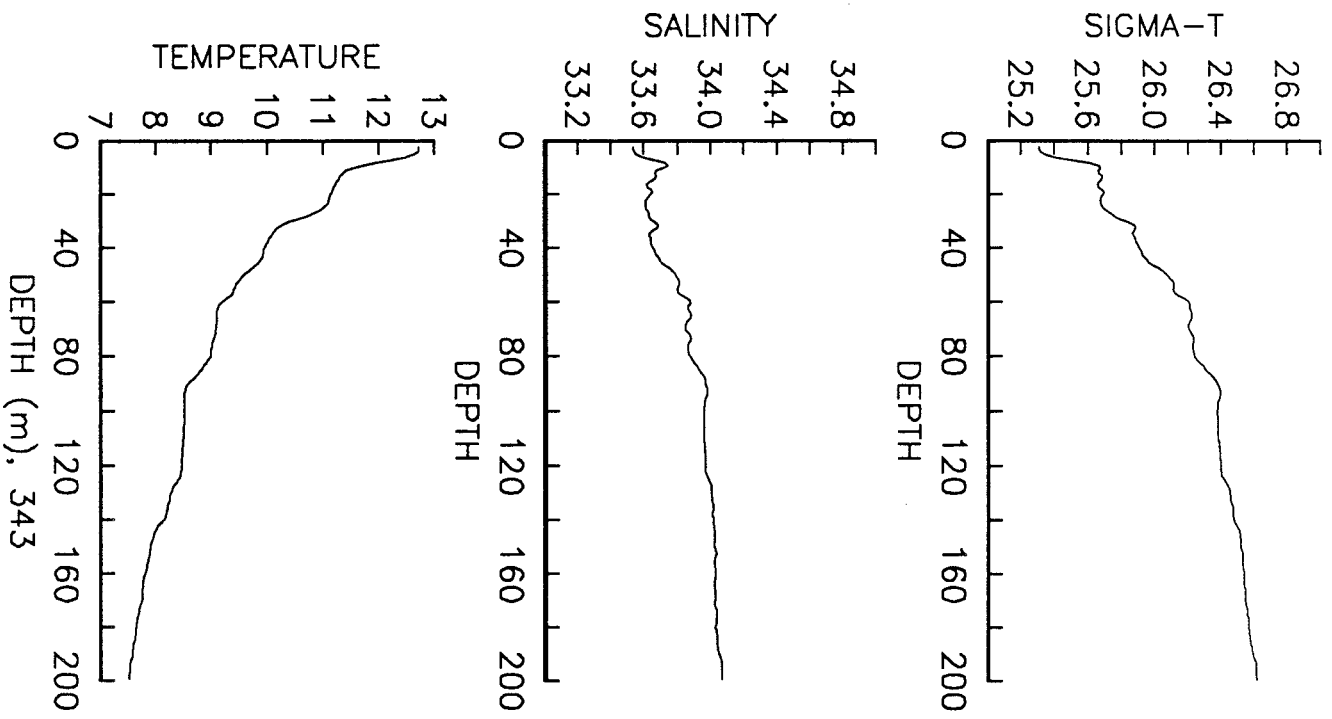
STN 8904.341 7 JUN 1989 0715 PDT
37° 8.0'N 122°55.5'W DEPTH 560 m



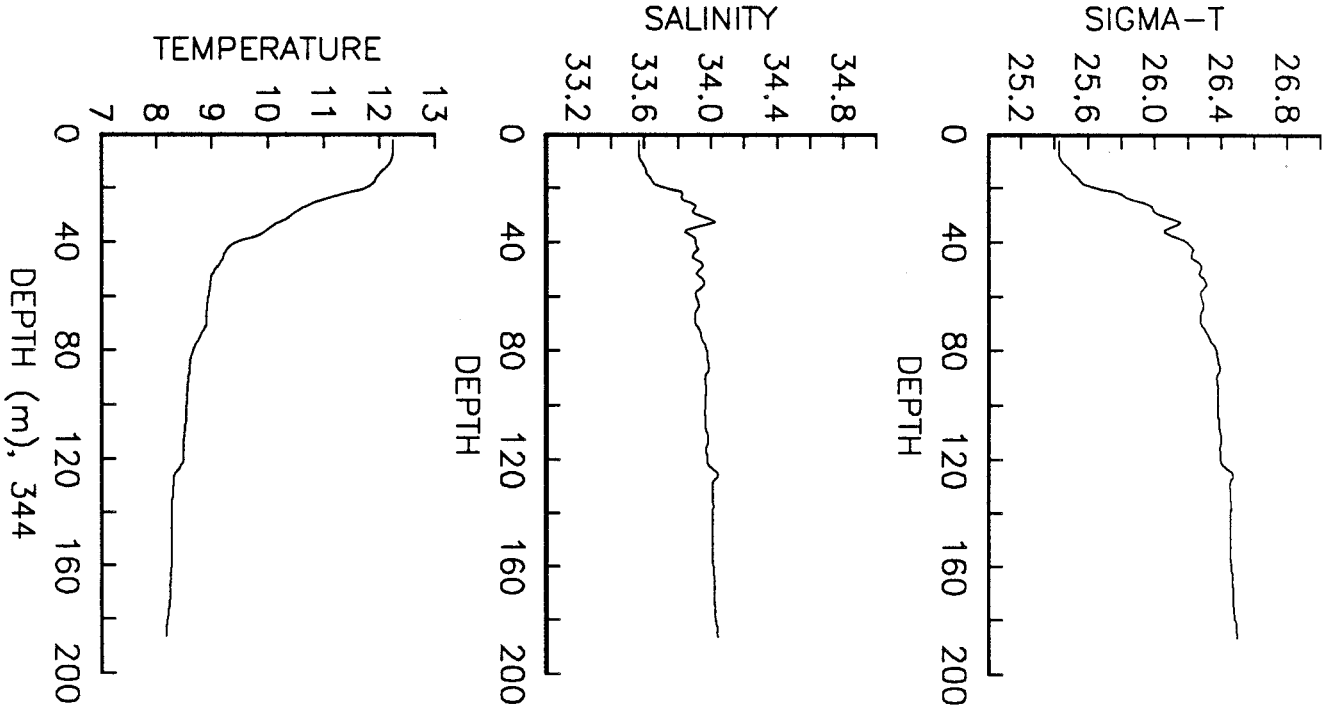
STN 8904.342 7 JUN 1989 0854 PDT
37°16.5'N 123°10.0'W DEPTH 1116 m



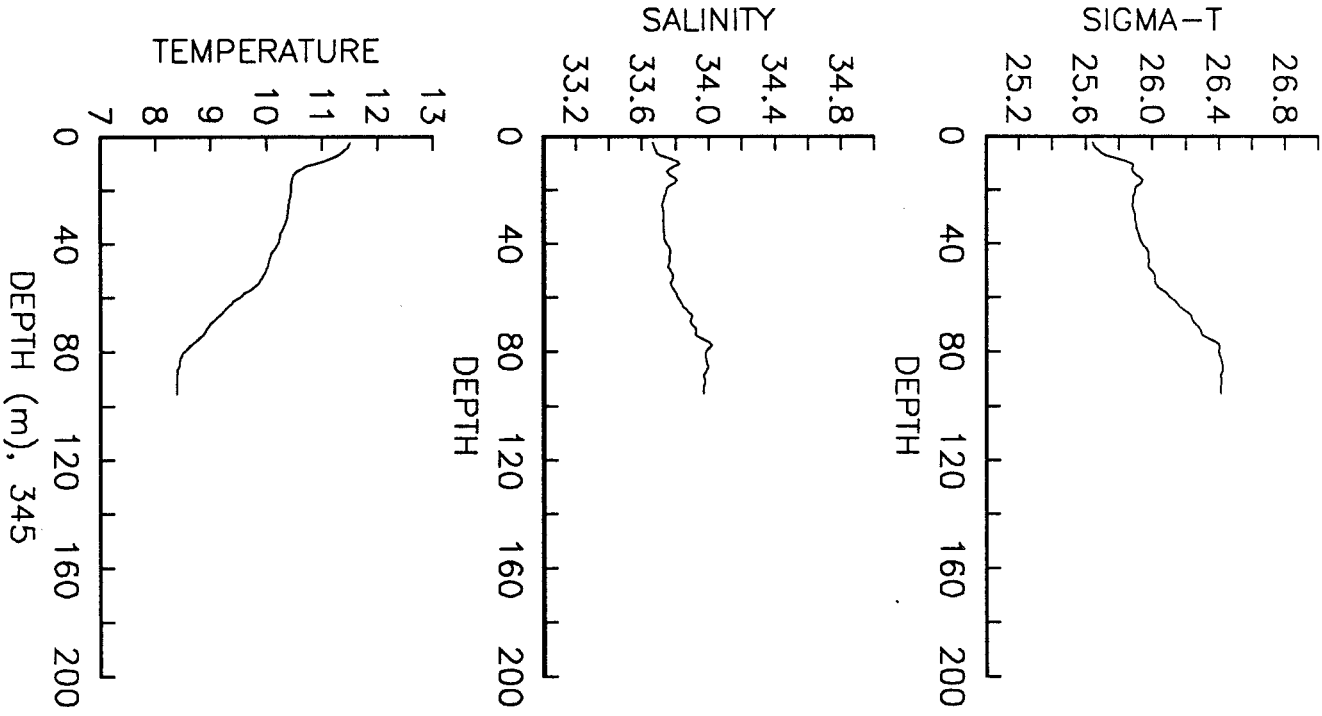
STN 8904.343 7 JUN 1989 1008 PDT
37°23.5'N 123° 1.6'W DEPTH 655 m



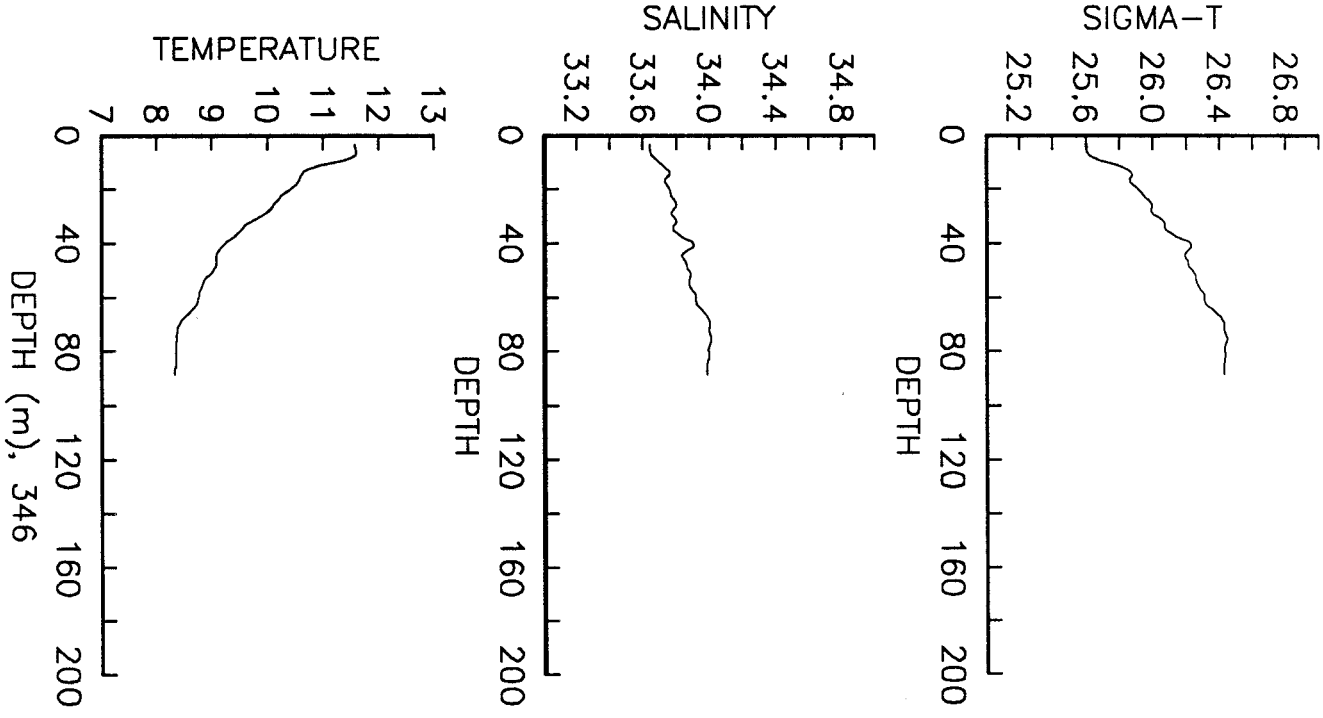
STN 8904.344 7 JUN 1989 1056 PDT
37°23.5'N 122°55.0'W DEPTH 201 m



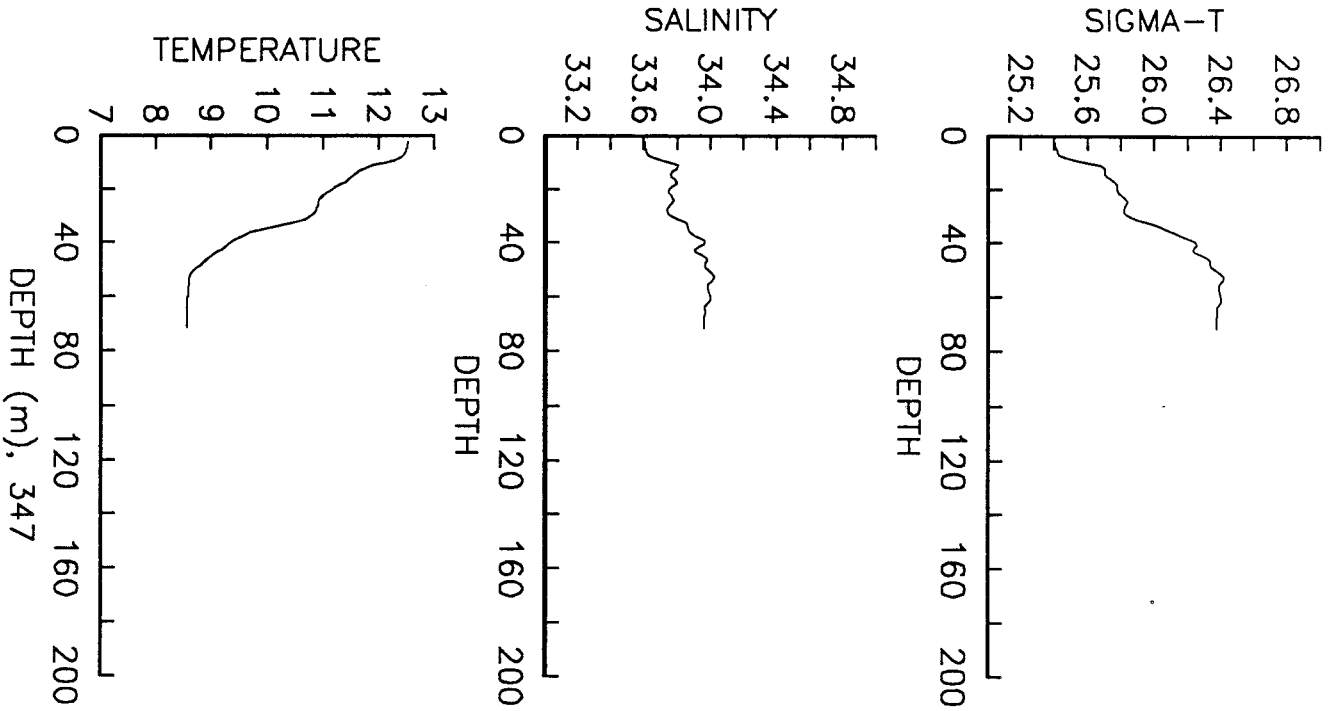
STN 8904.345 7 JUN 1989 1136 PDT
37°23.5'N 122°49.0'W DEPTH 104 m



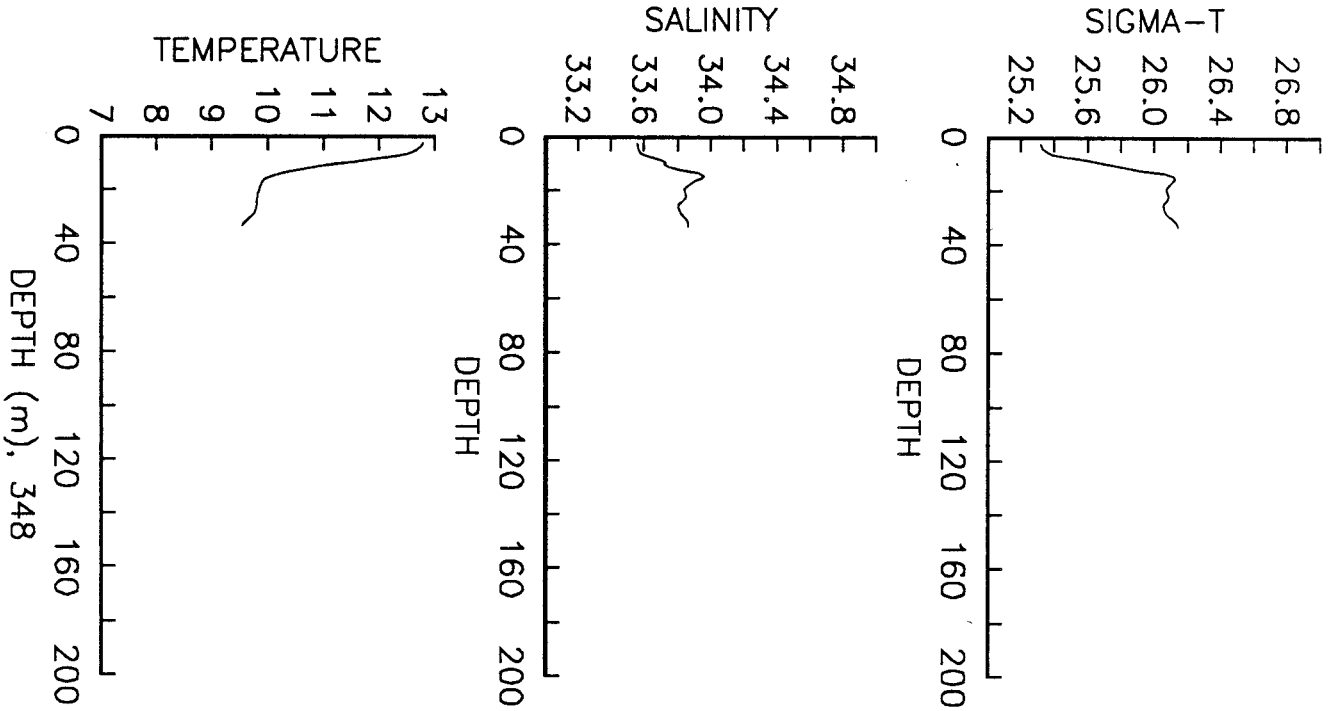
STN 8904.346 7 JUN 1989 1209 PDT
37°23.5'N 122°49.0'W DEPTH 90 m



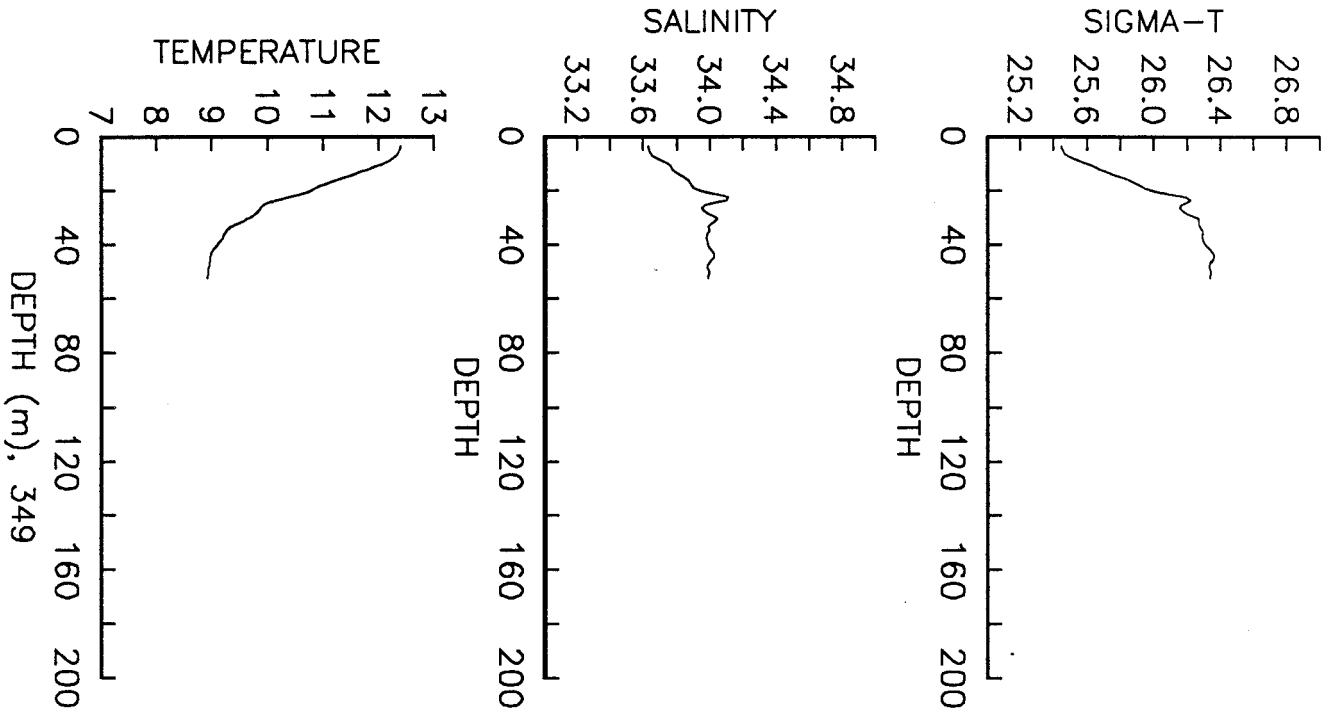
STN 8904.347 7 JUN 1989 1243 PDT
37°23.5'N 122°37.3'W DEPTH 71 m



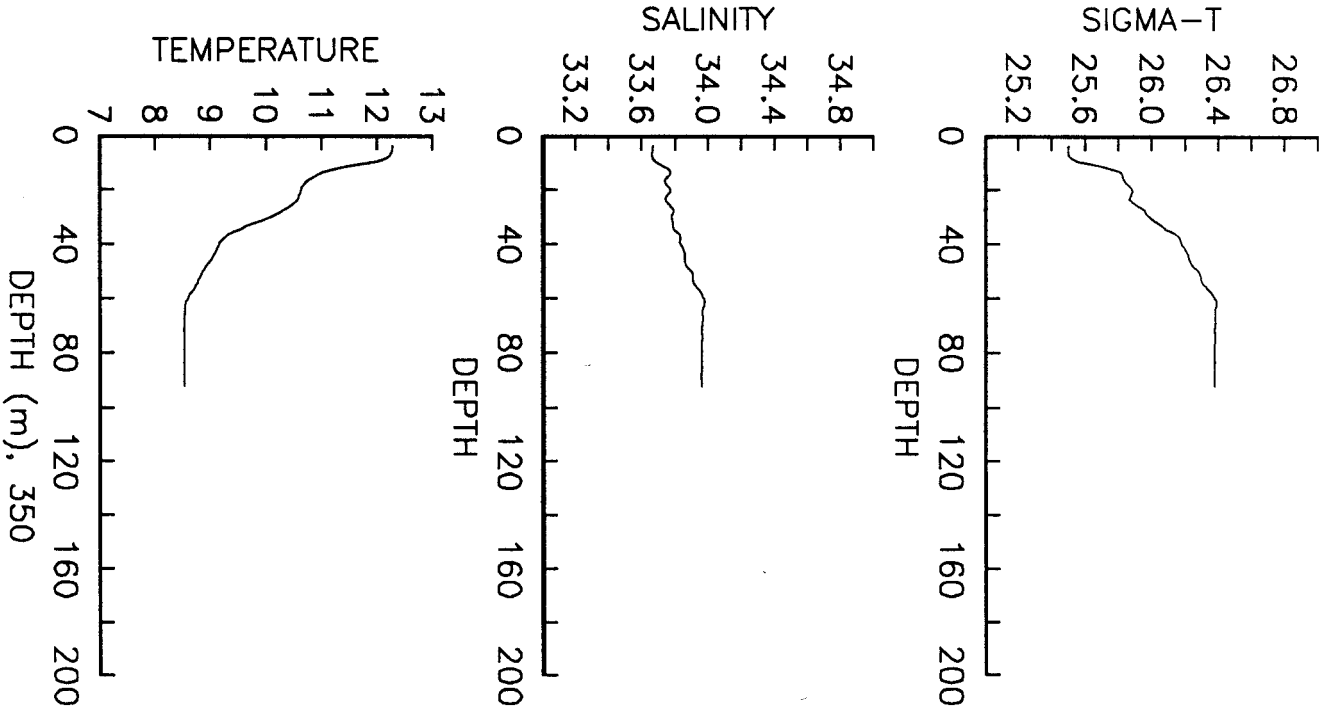
STN 8904.348 7 JUN 1989 1330 PDT
37°23.5'N 122°30.0'W DEPTH 42 m



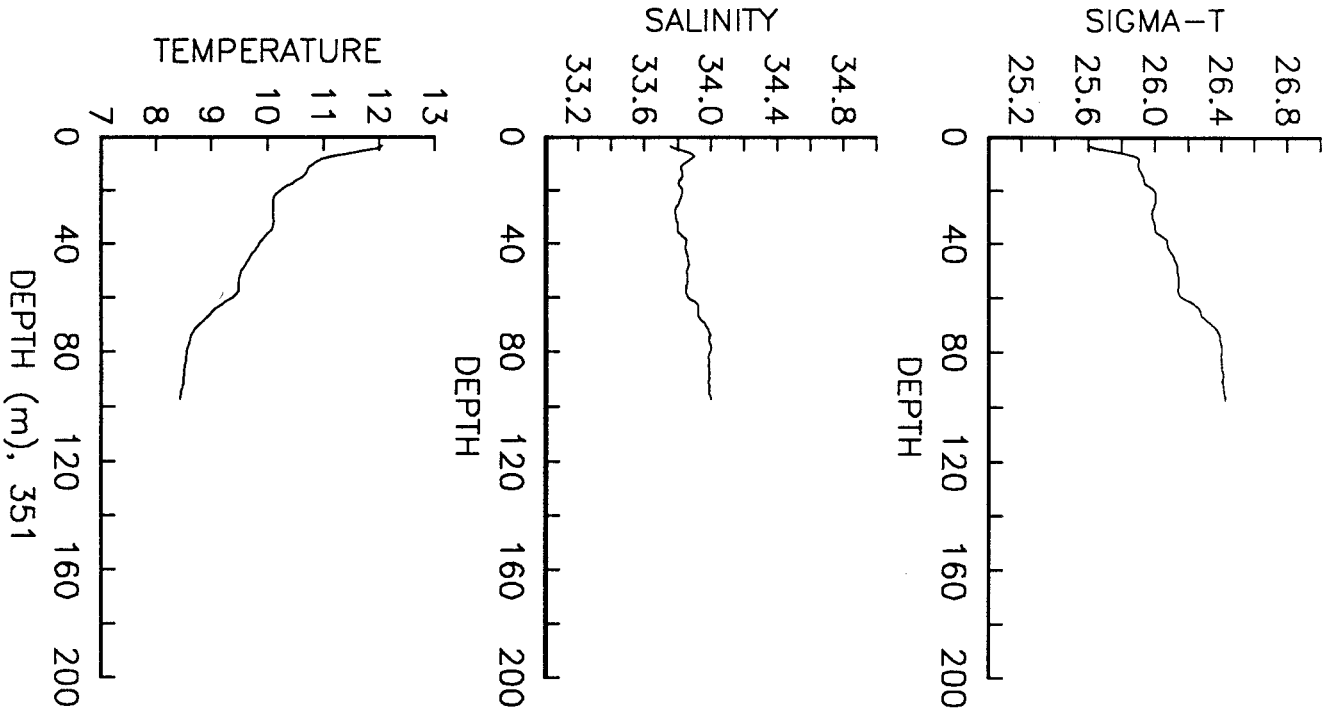
STN 8904.349 7 JUN 1989 2103 PDT
37°16.0'N 122°28.5'W DEPTH 53 m



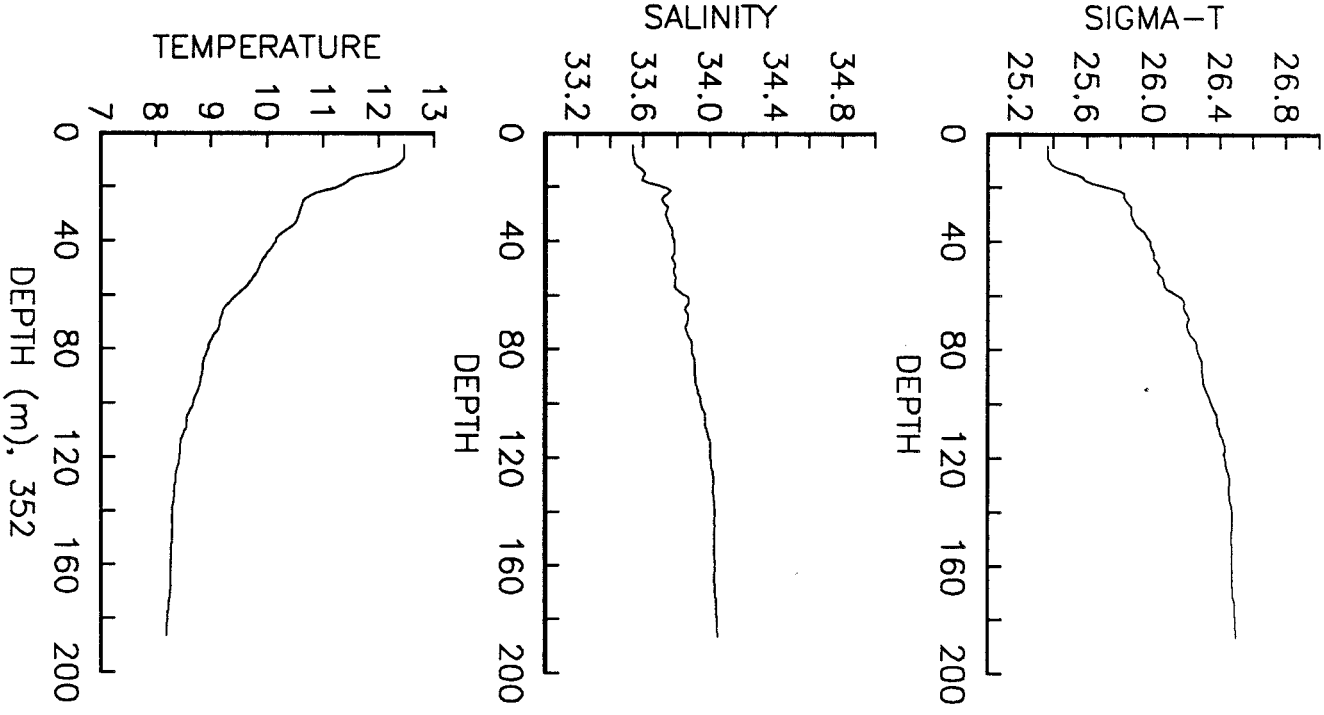
STN 8904.350 7 JUN 1989 2243 PDT
37°17.6'N 122°36.5'W DEPTH 93 m



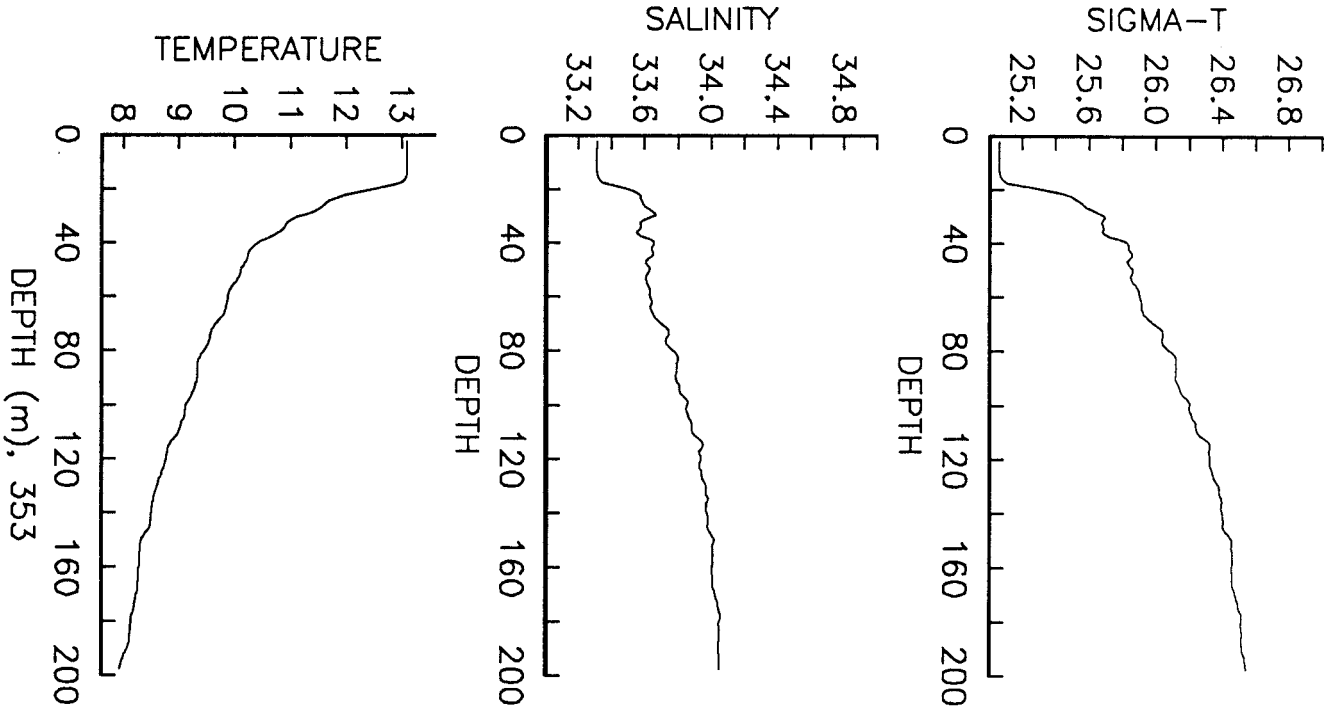
STN 8904.351 7 JUN 1989 2304 PDT
37°16.5'N 122°39.0'W DEPTH 101 m



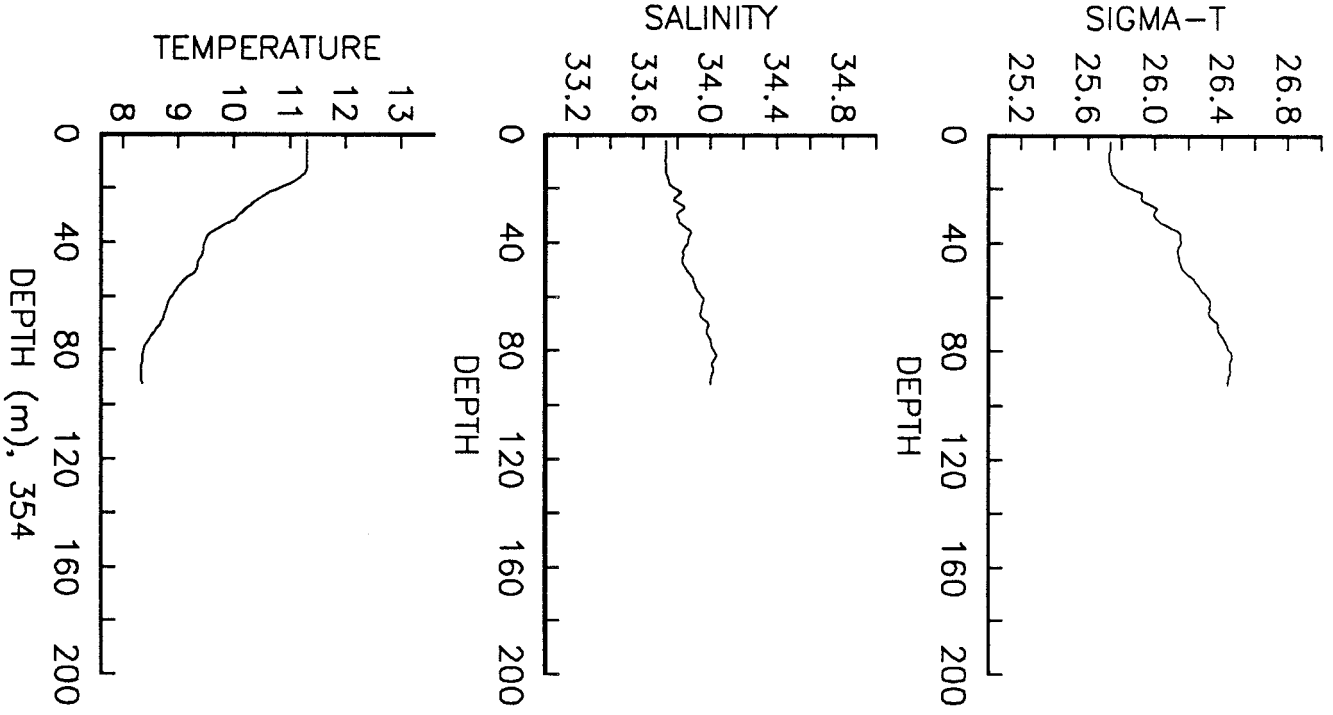
STN 8904.352 8 JUN 1989 0150 PDT
37°15.3'N 122°49.2'W DEPTH 201 m



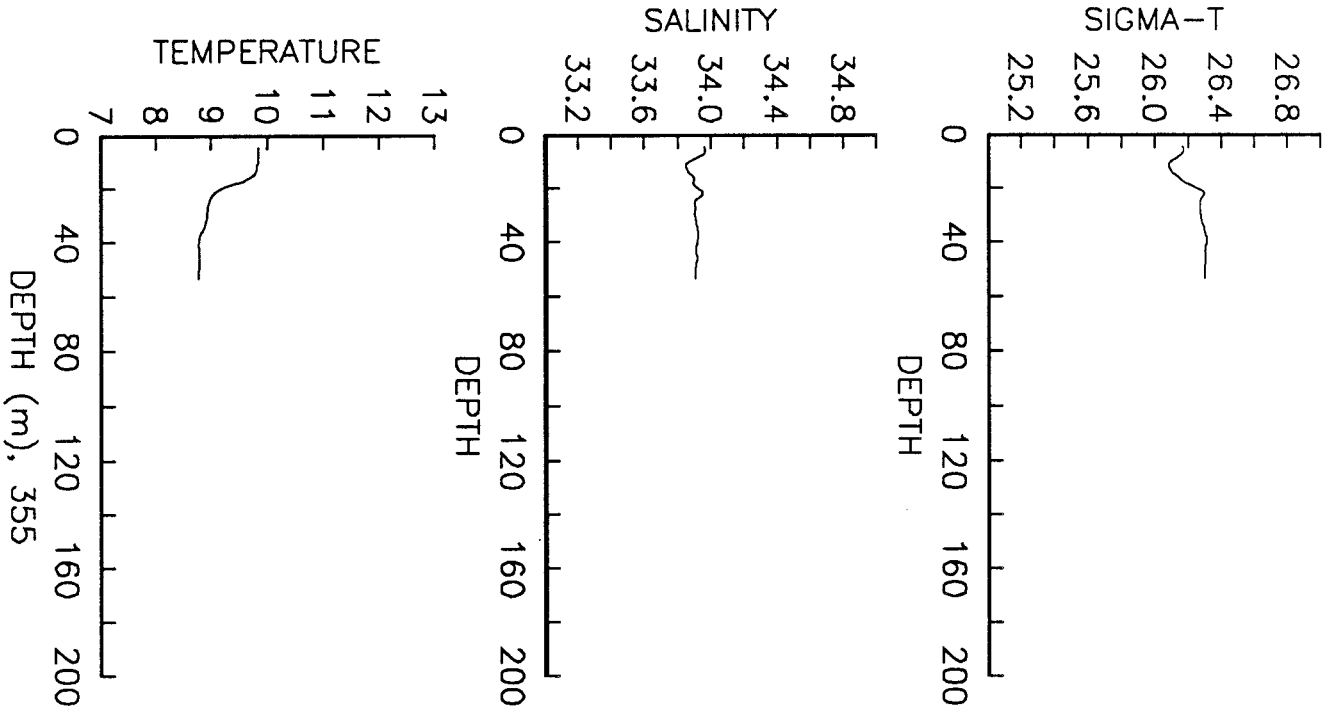
STN 8904.353 8 JUN 1989 0346 PDT
37°16.7'N 123° 0.6'W DEPTH 574 m



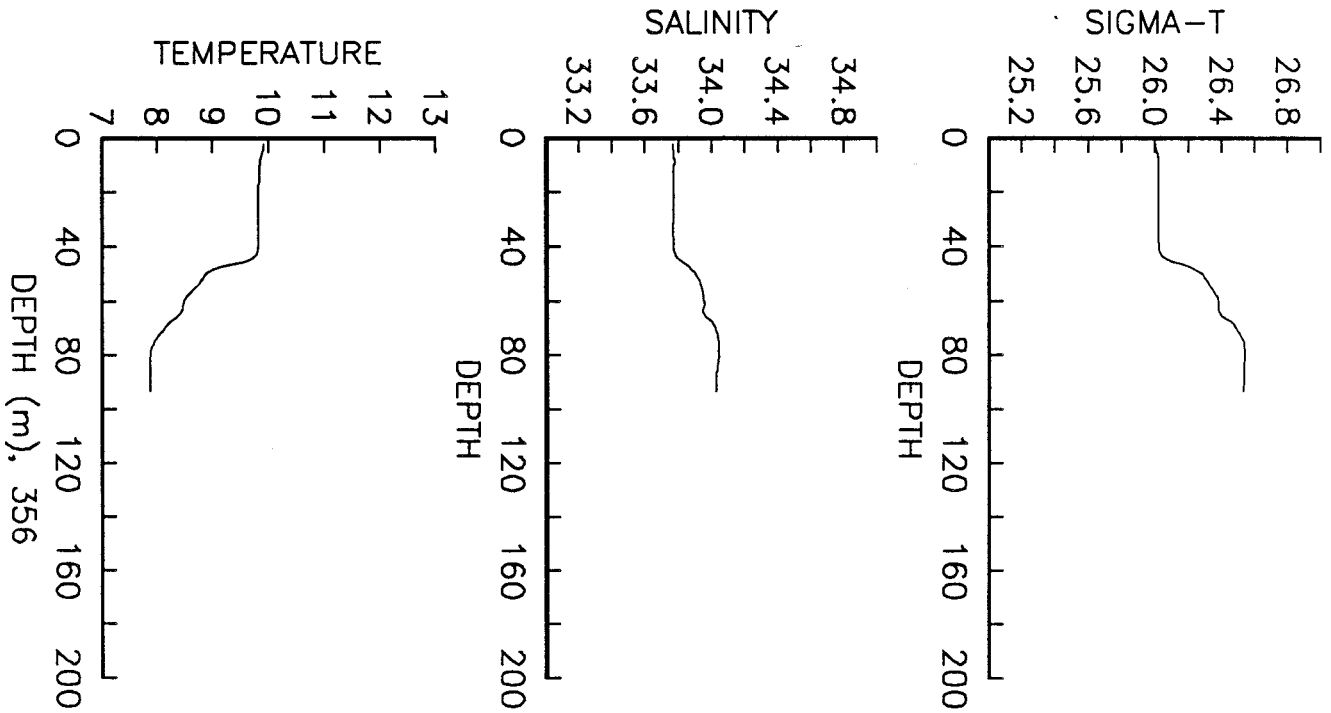
STN 8904.354 8 JUN 1989 0618 PDT
37°35.0'N 122°55.0'W DEPTH 101 m



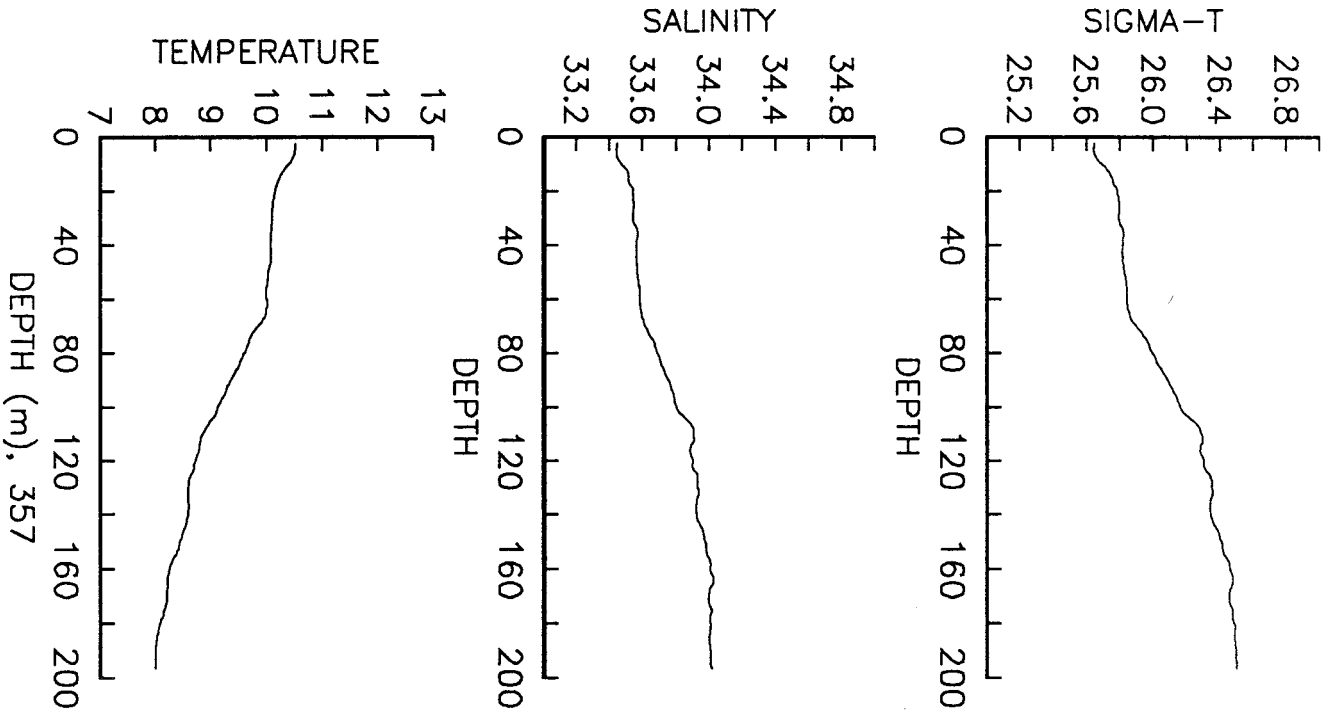
STN 8904.355 8 JUN 1989 2108 PDT
37°58.0'N 122°56.0'W DEPTH 57 m



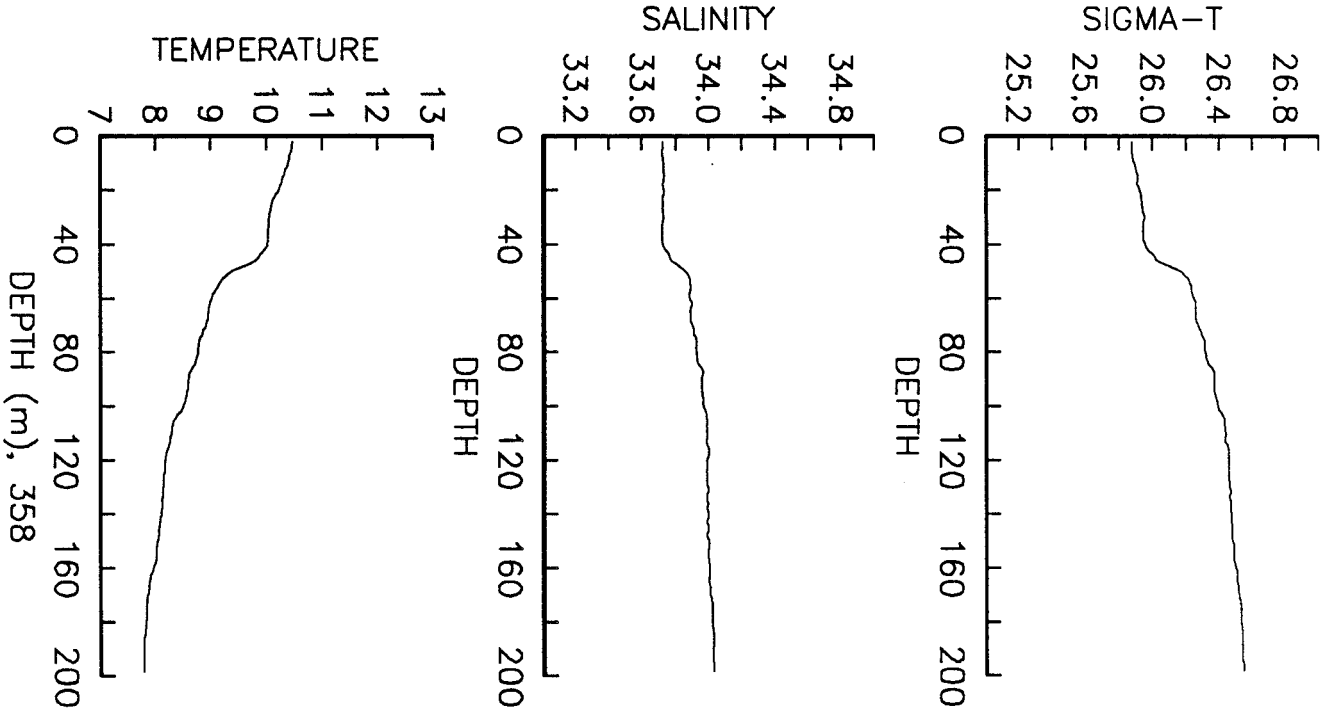
STN 8904.356 10 JUN 1989 1203 PDT
37°53.0'N 123°15.1'W DEPTH 99 m



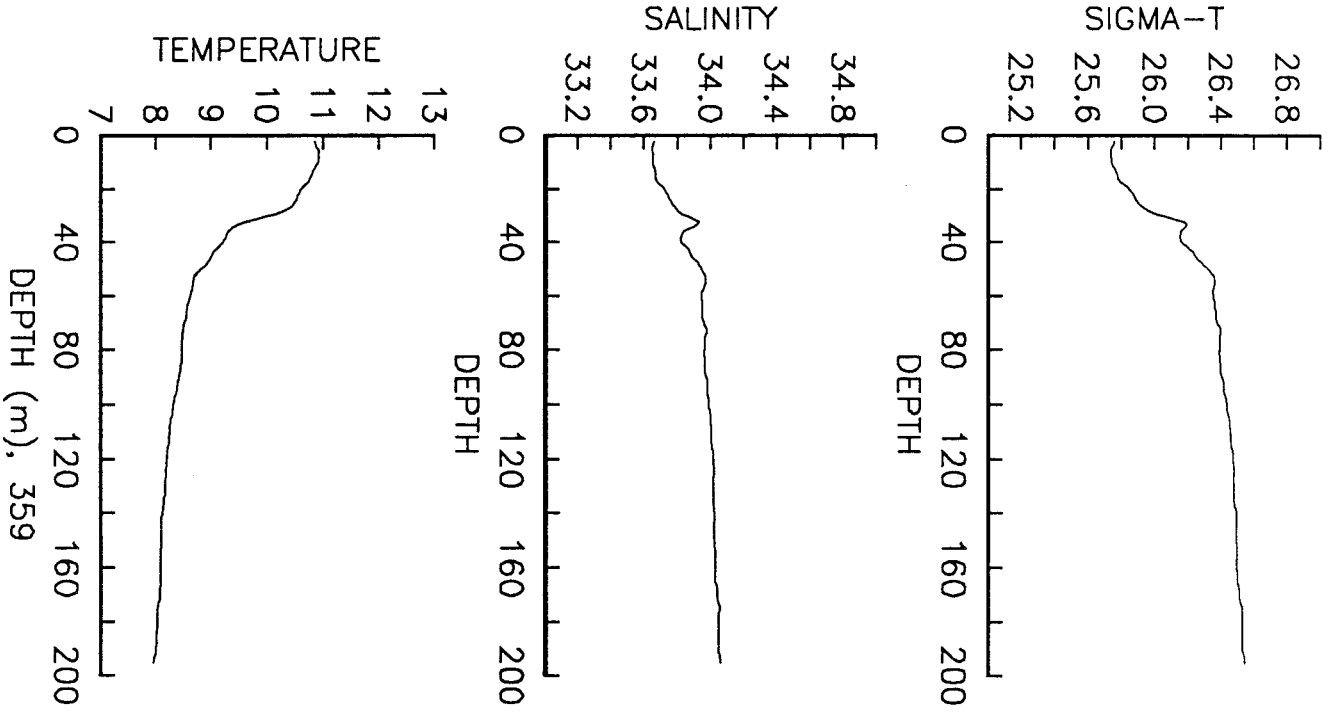
STN 8904.357 10 JUN 1989 1339 PDT
37°52.8'N 123°33.0'W DEPTH 2213 m



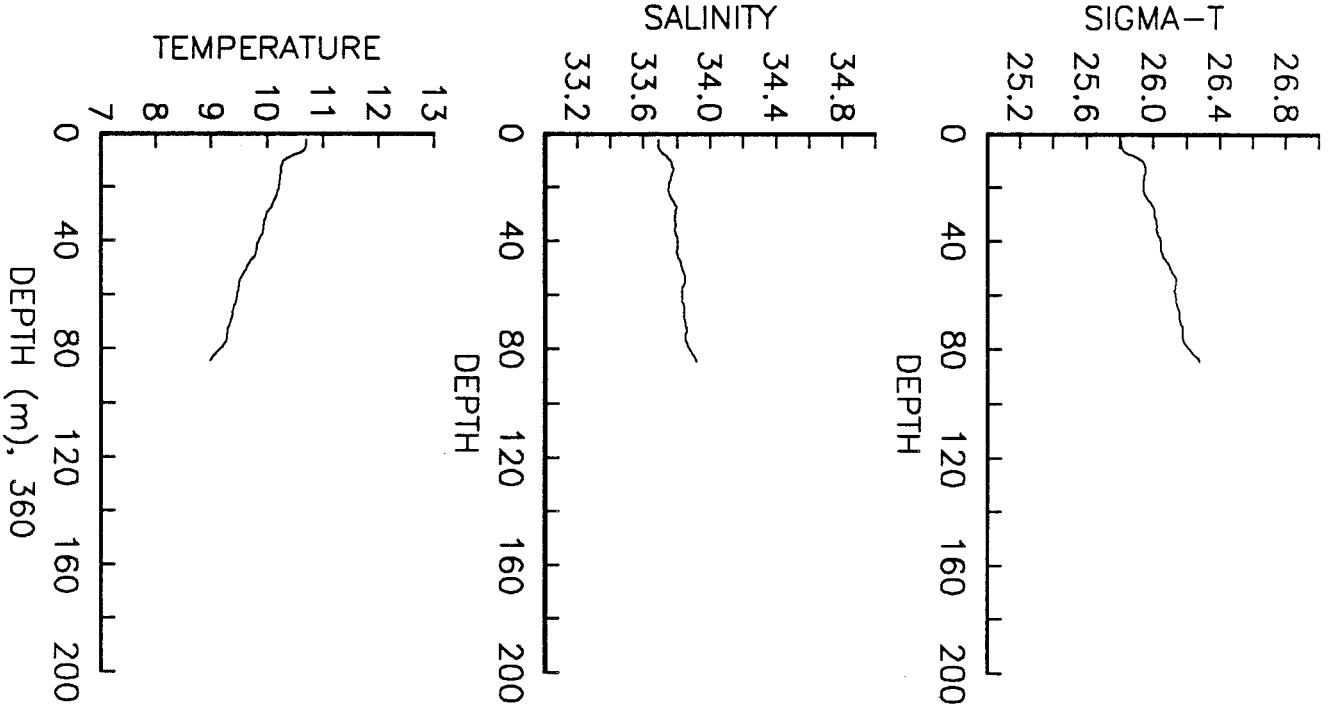
STN 8904.358 10 JUN 1989 1437 PDT
37°48.0'N 123°25.9'W DEPTH 1372 m



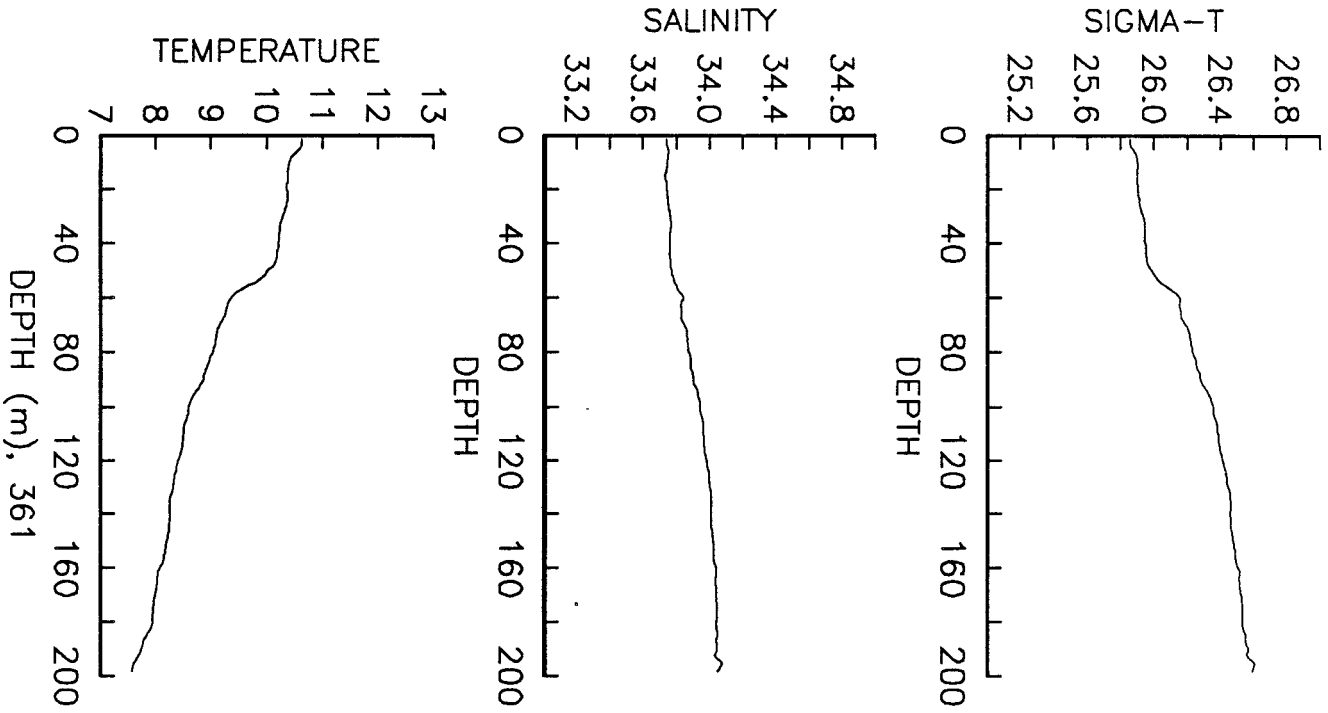
STN 8904.359 10 JUN 1989 1520 PDT
37°48.0'N 123°20.0'W DEPTH 518 m



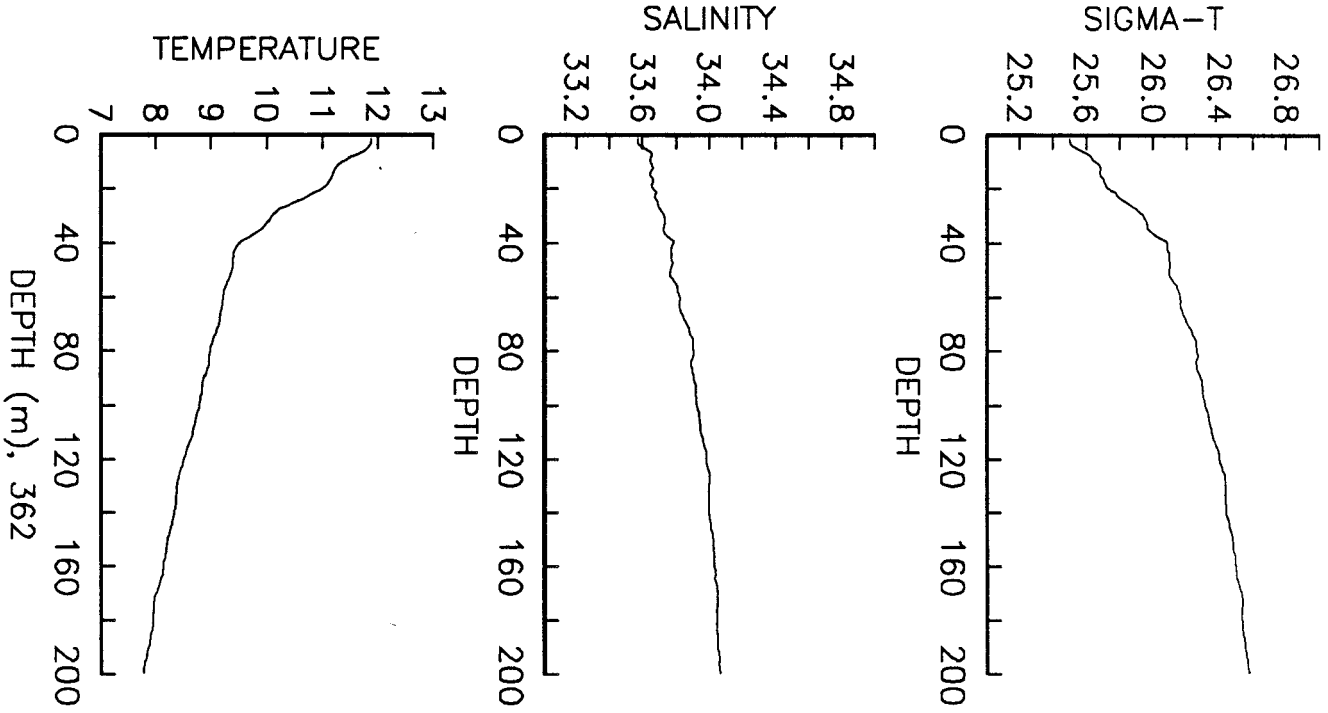
STN 8904.360 10 JUN 1989 1605 PDT
37°48.0'N 123°12.4'W DEPTH 88 m



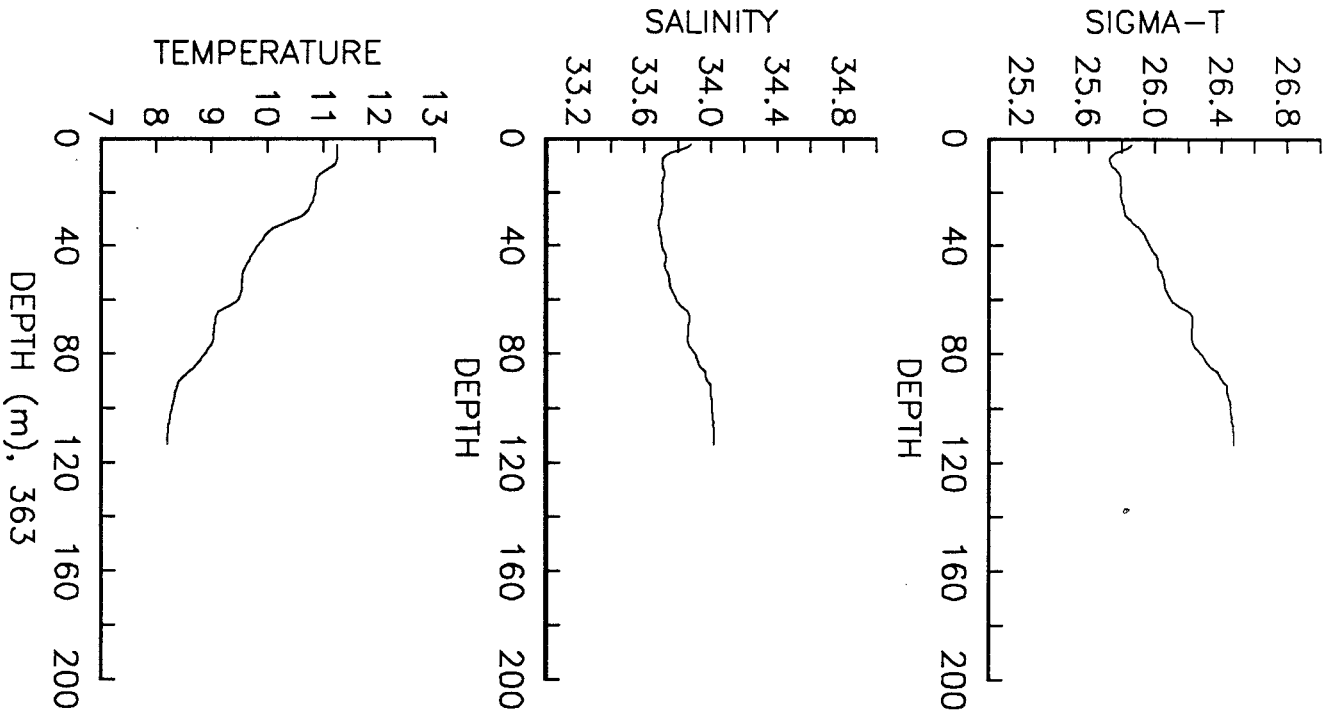
STN 8904.361 10 JUN 1989 1736 PDT
37°39.5'N 123°17.5'W DEPTH 1737 m



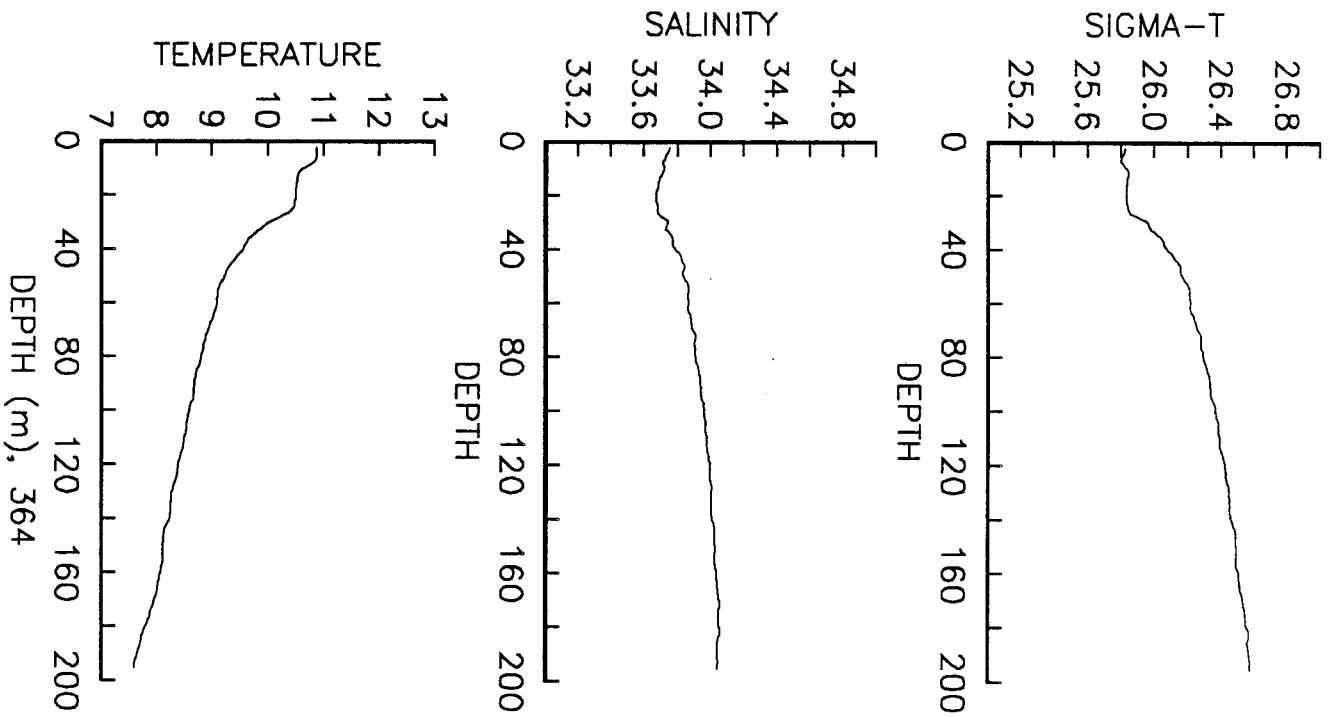
STN 8904.362 10 JUN 1989 1844 PDT
37°35.0'N 123° 7.5'W DEPTH 1079 m



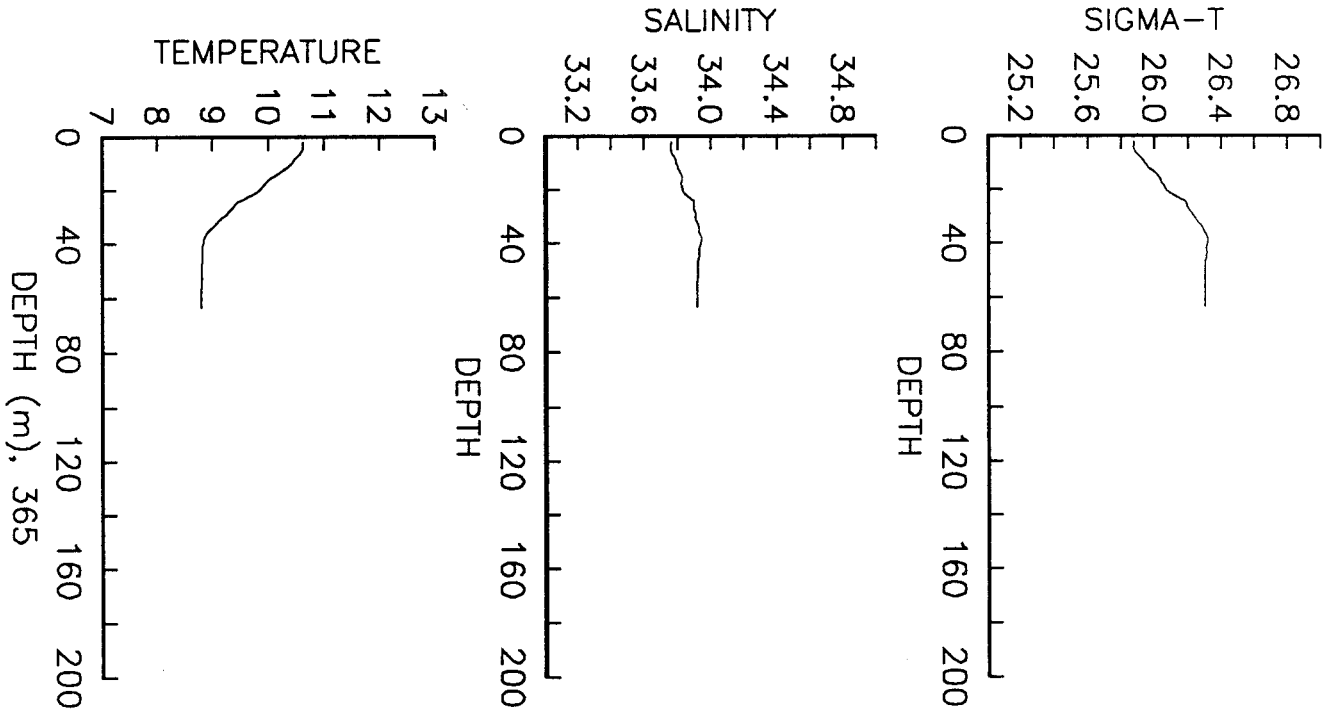
STN 8904.363 10 JUN 1989 2101 PDT
37°39.2'N 123° 2.5'W DEPTH 115 m



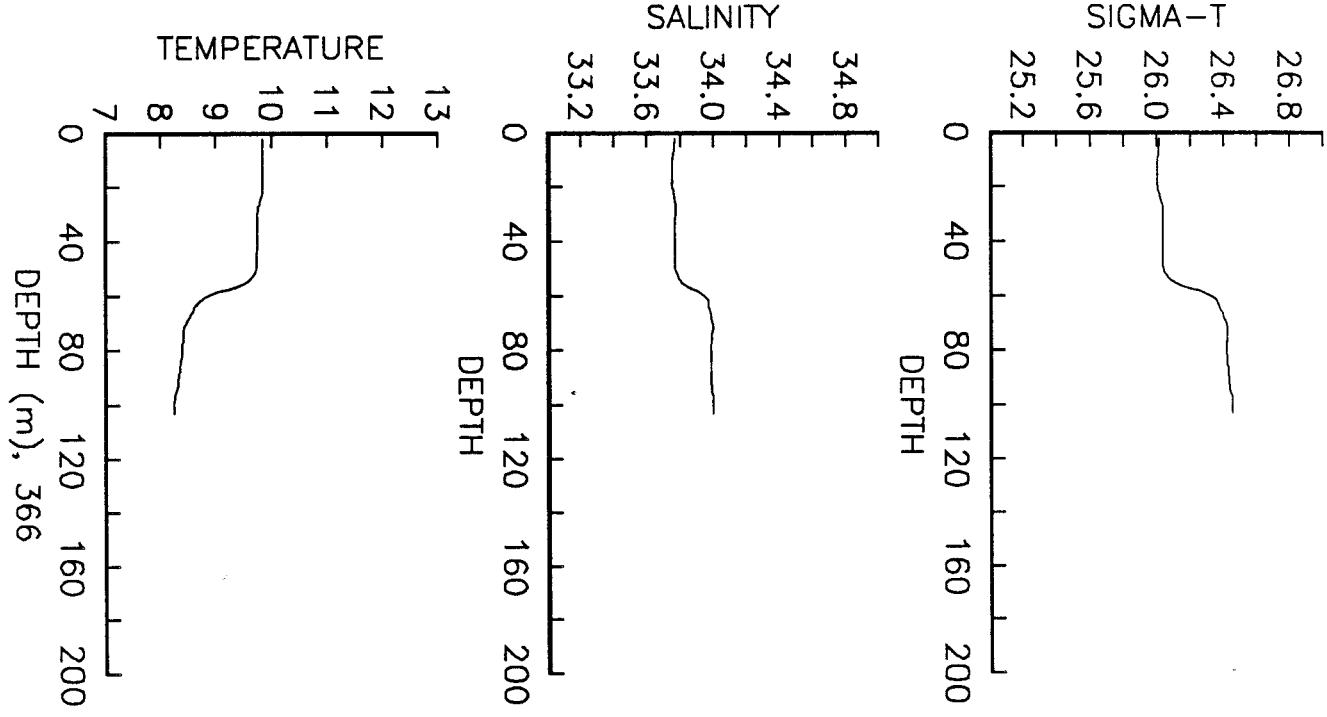
STN 8904.364 10 JUN 1989 2306 PDT
37°39.0'N 123°14.0'W DEPTH 1189 m



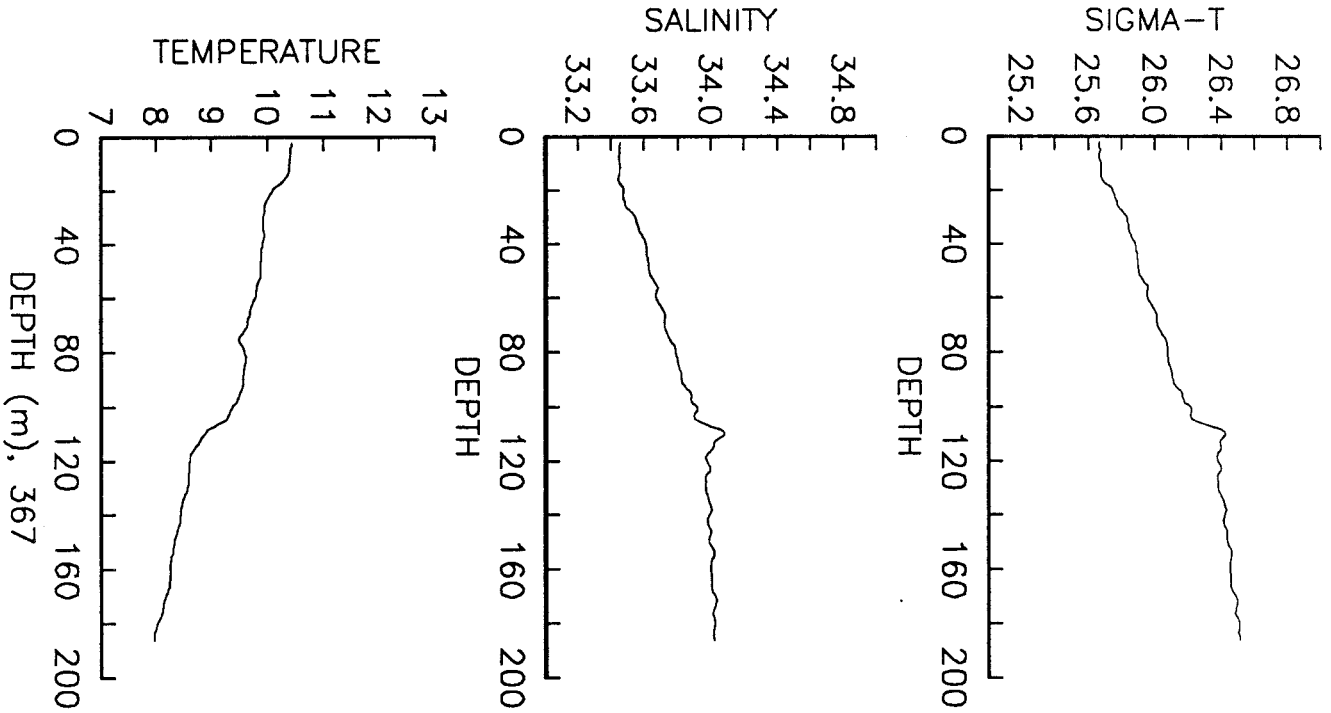
STN 8904.365 11 JUN 1989 0012 PDT
37°45.0'N 123° 8.0'W DEPTH 66 m



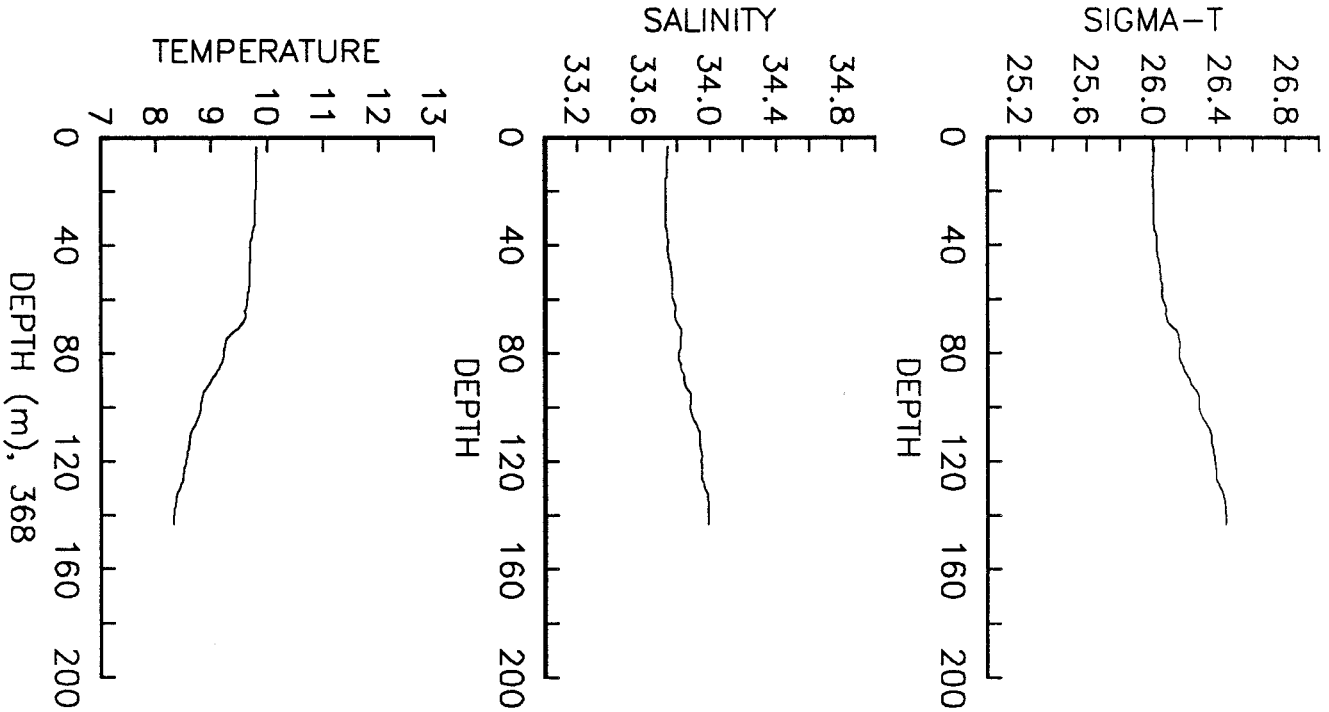
STN 8904.366 11 JUN 1989 0244 PDT
37°53.4'N 123°20.1'W DEPTH 110 m



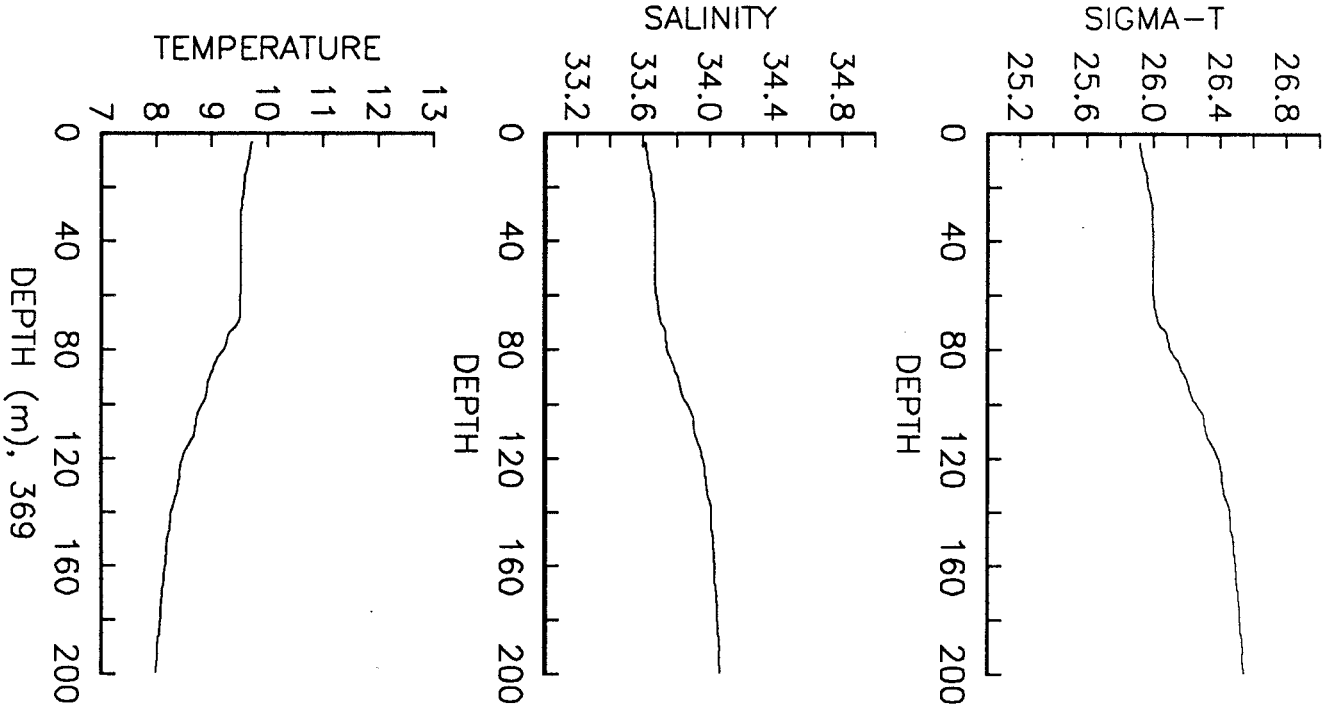
STN 8904.367 11 JUN 1989 0532 PDT
37°50.7'N 123°31.1'W DEPTH 1463 m



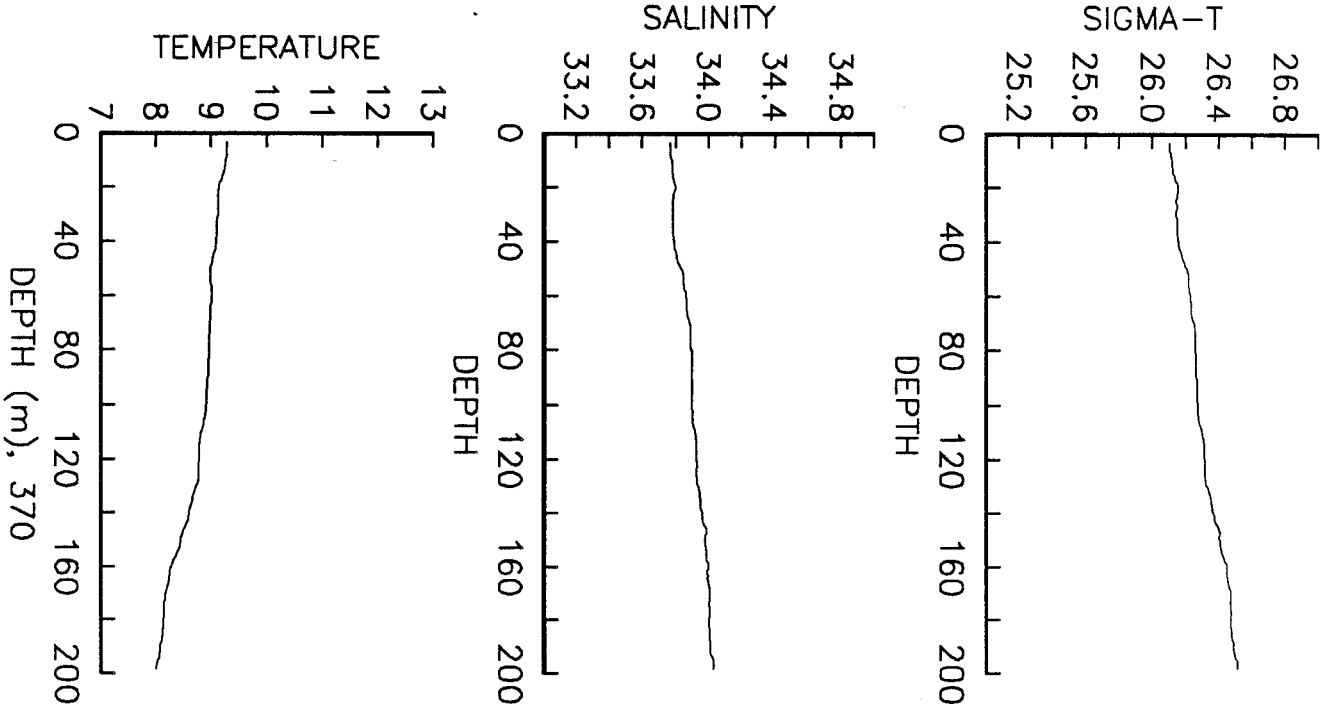
STN 8904.368 11 JUN 1989 0812 PDT
38° 5.0'N 123°28.5'W DEPTH 134 m



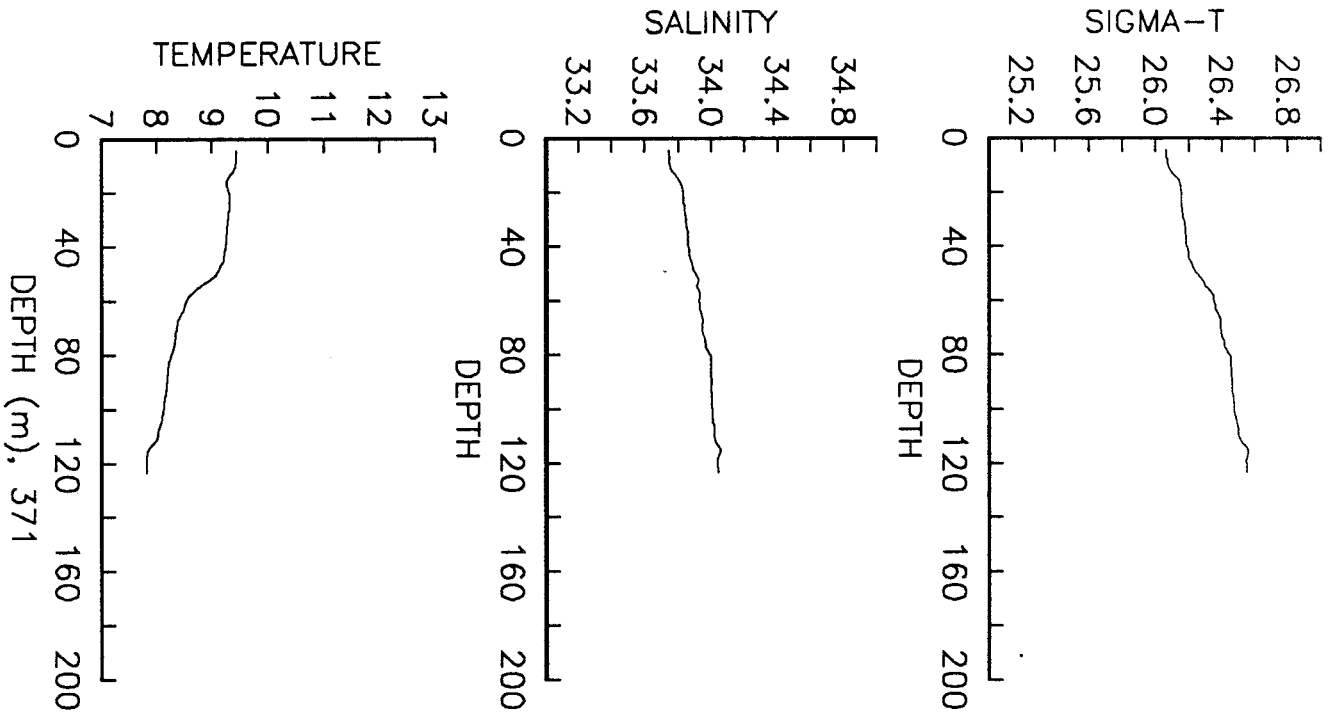
STN 8904.369 11 JUN 1989 0854 PDT
38°10.0'N 123°28.5'W DEPTH 362 m



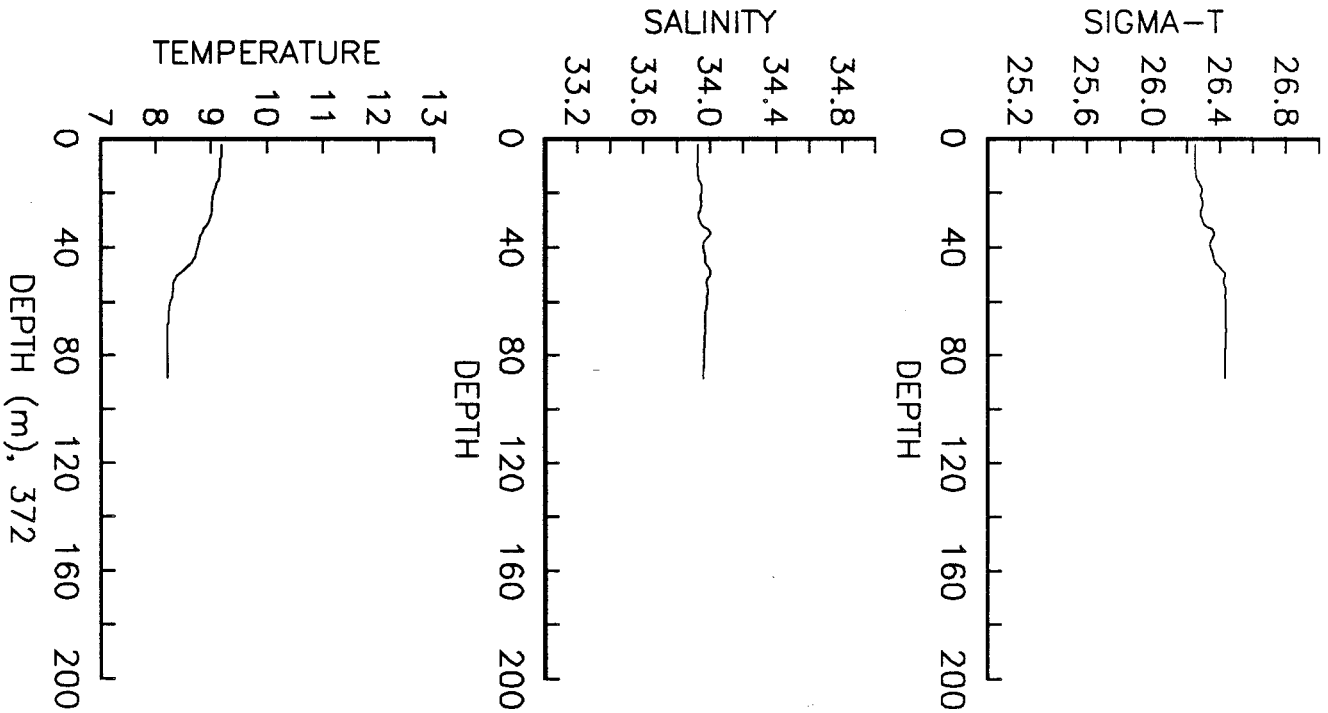
STN 8904.370 11 JUN 1989 0939 PDT
38°15.0'N 123°28.5'W DEPTH 329 m



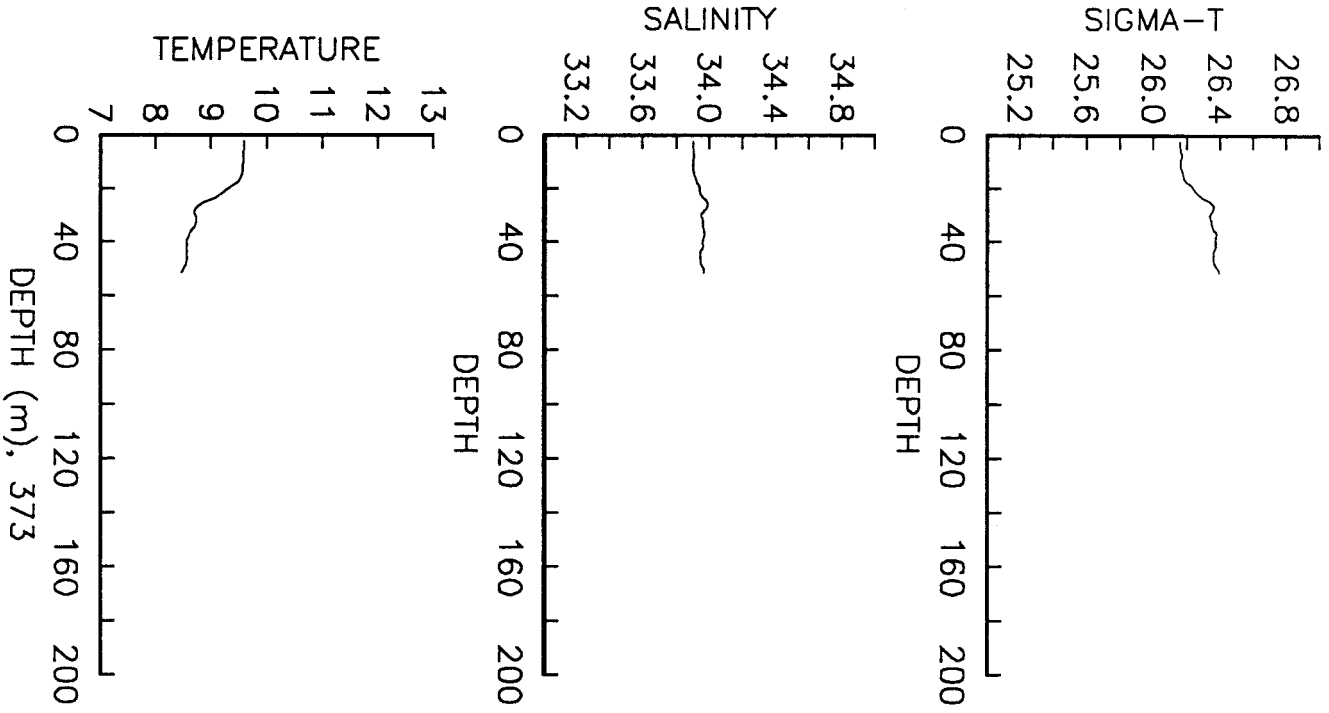
STN 8904.371 11 JUN 1989 1038 PDT
38°15.0'N 123°18.6'W DEPTH 123 m



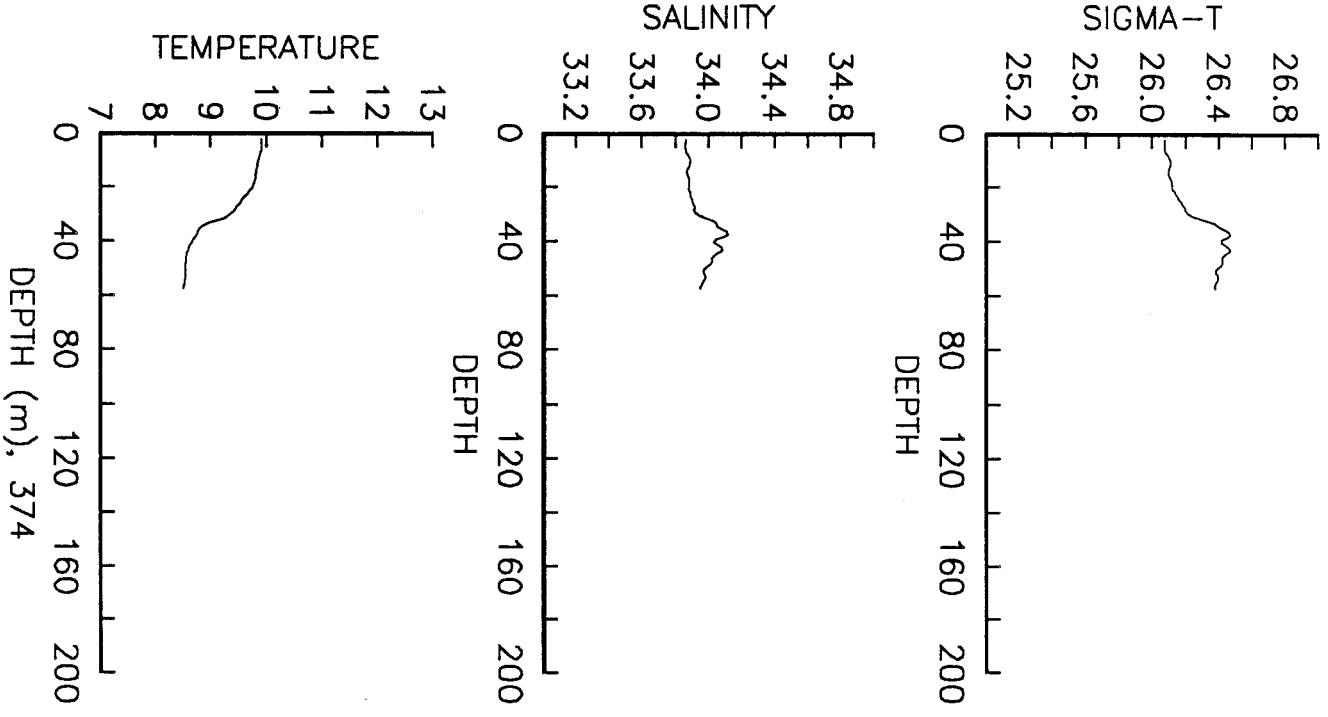
STN 8904.372 11 JUN 1989 1131 PDT
38°15.0'N 123° 8.4'W DEPTH 90 m



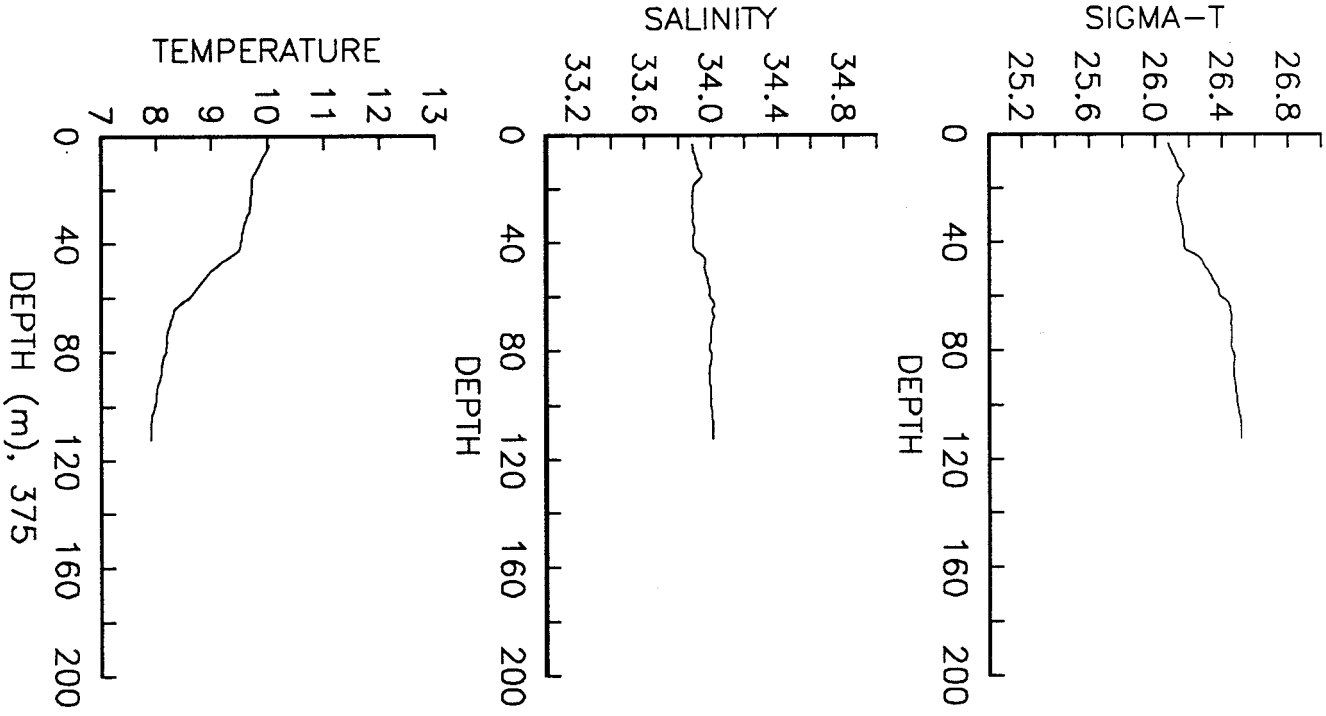
STN 8904.373 11 JUN 1989 1210 PDT
38°15.0'N 123° 2.4'W DEPTH 53 m



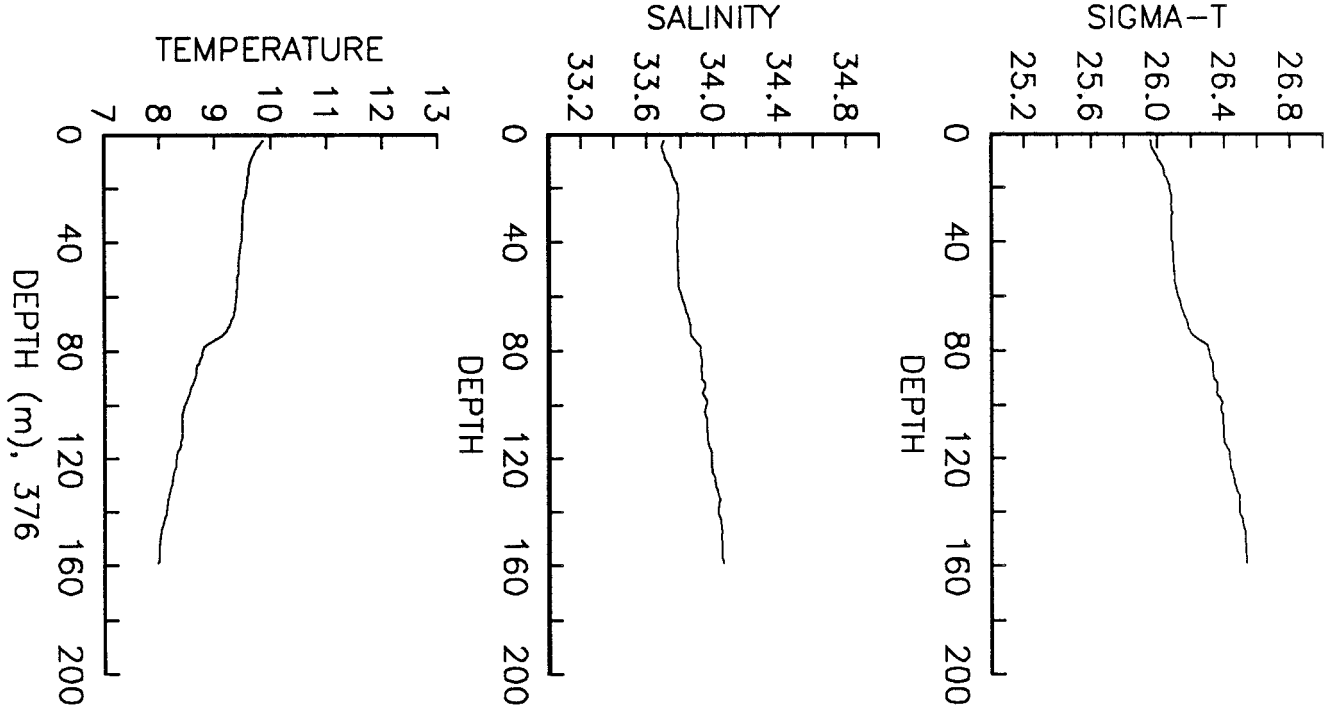
STN 8904.374 11 JUN 1989 1316 PDT
38° 4.9'N 123° 2.5'W DEPTH 60 m



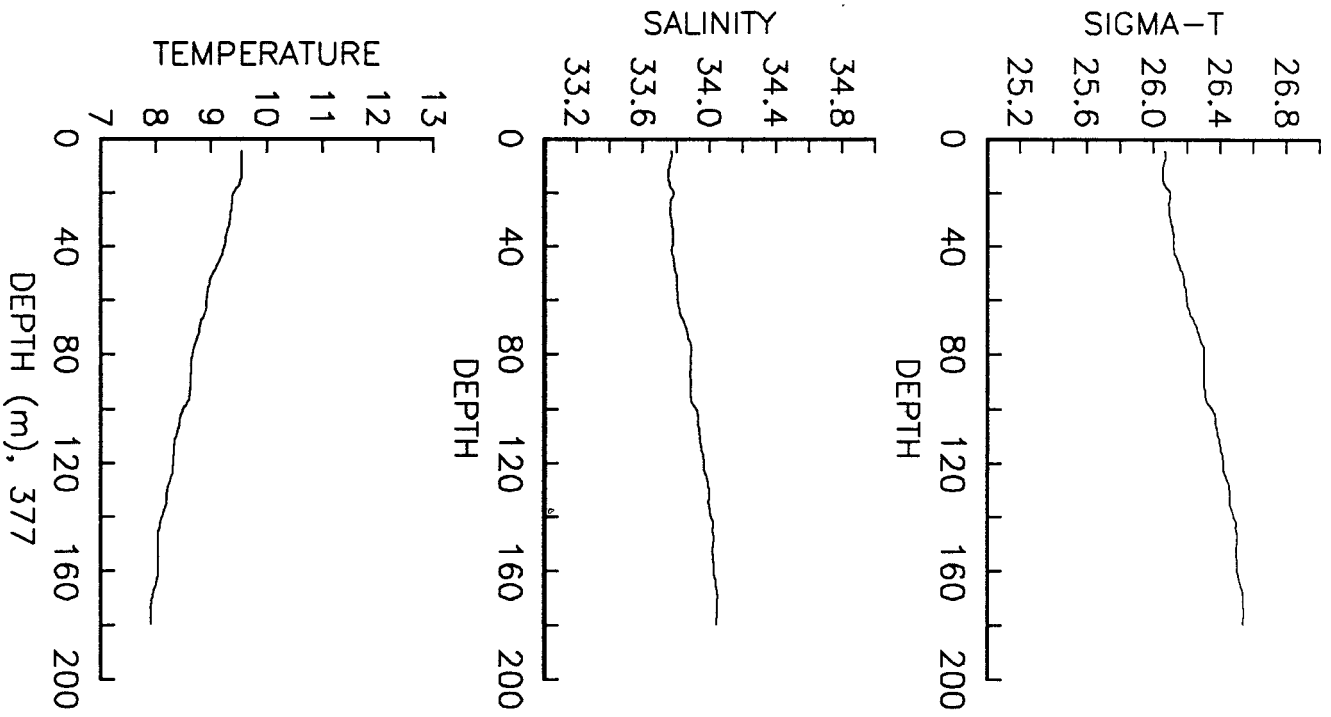
STN 8904.375 11 JUN 1989 1415 PDT
38° 5.0'N 123°13.5'W DEPTH 113 m



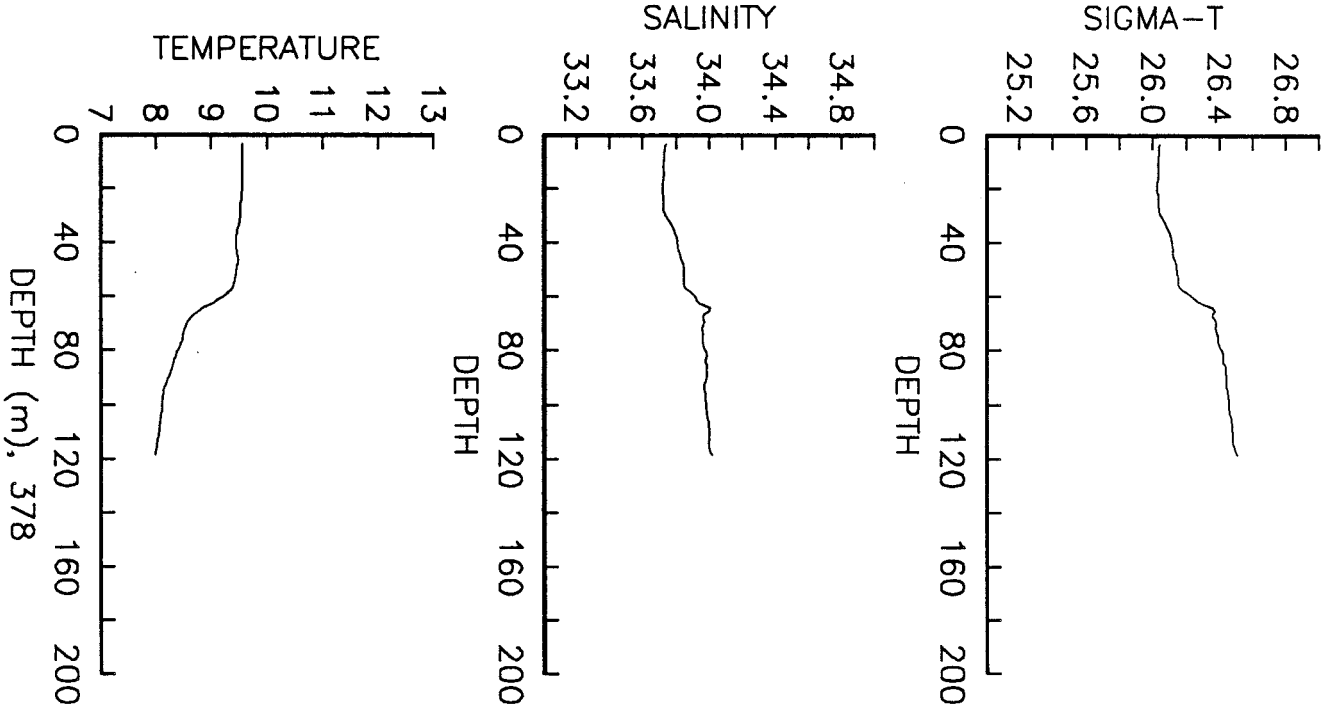
STN 8904.376 11 JUN 1989 1516 PDT
38° 4.9'N 123°23.5'W DEPTH 161 m



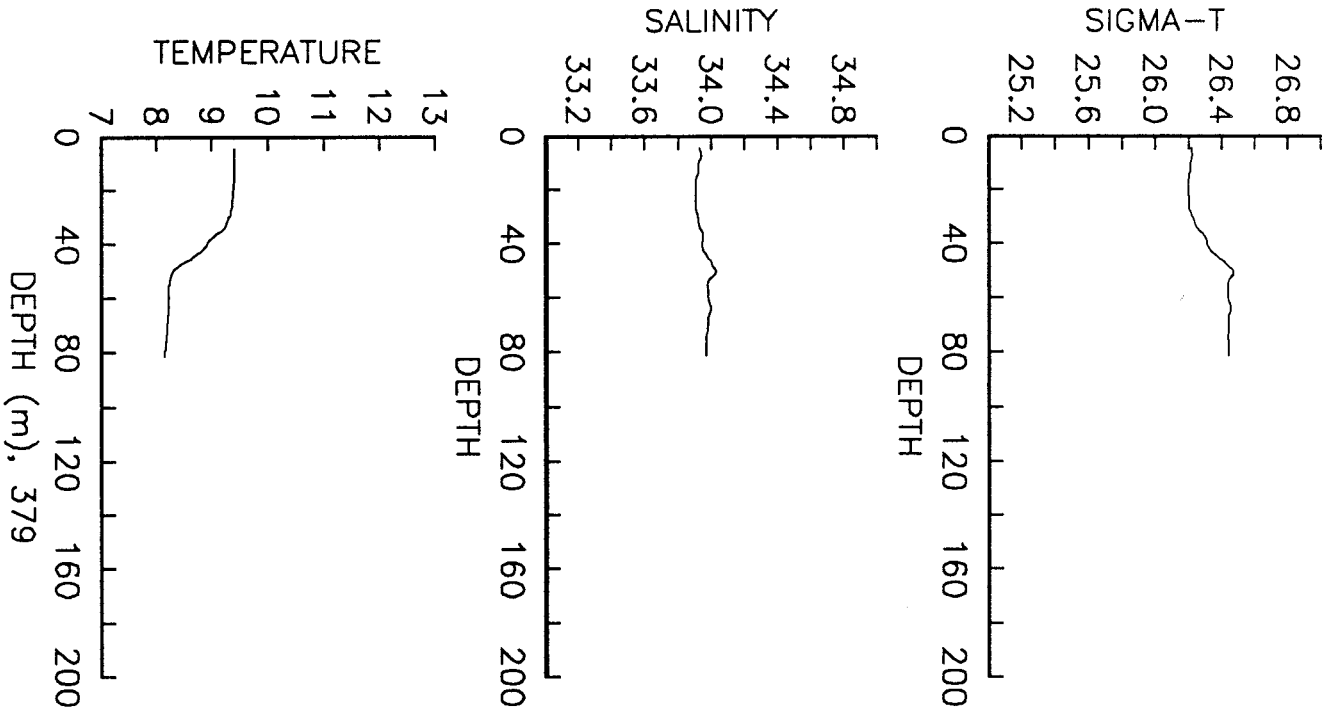
STN 8904.377 11 JUN 1989 2059 PDT
38° 9.7'N 123°21.9'W DEPTH 187 m



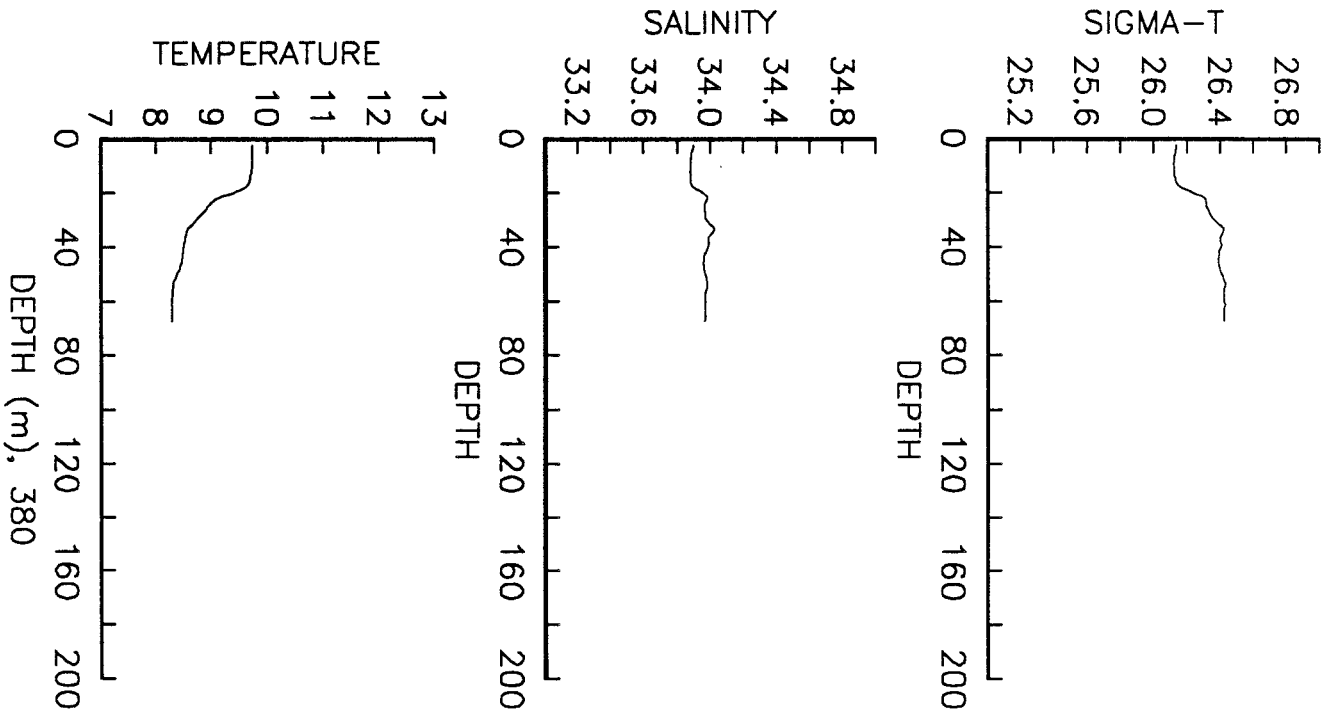
STN 8904.378 12 JUN 1989 0029 PDT
38° 9.9'N 123°17.9'W DEPTH 110 m



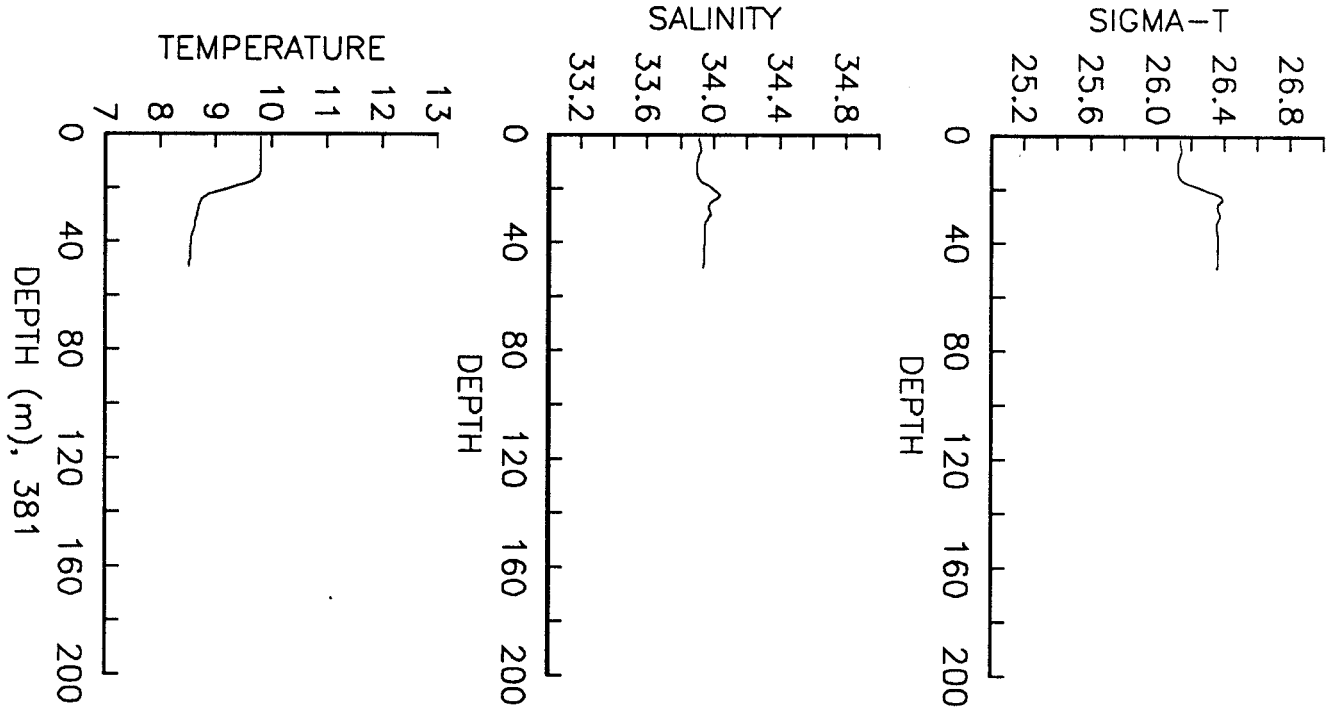
STN 8904.379 12 JUN 1989 0115 PDT
38°10.0'N 123° 9.7'W DEPTH 93 m



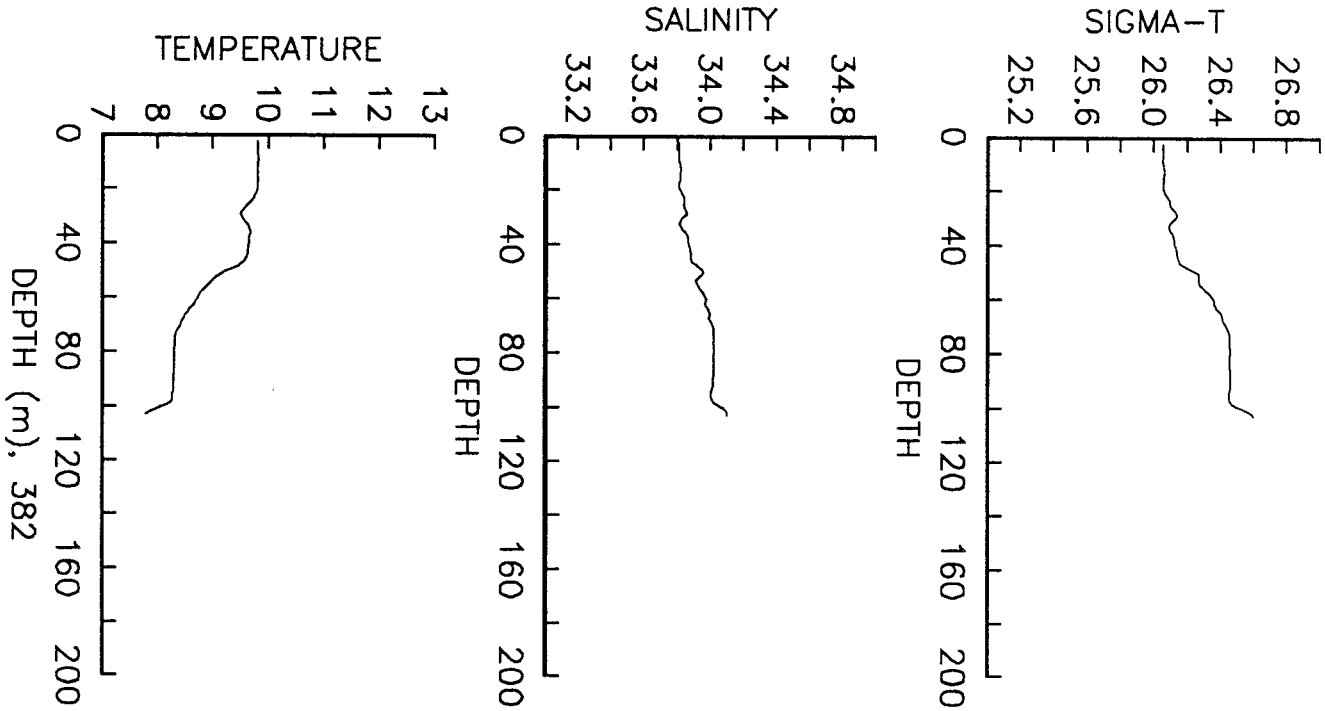
STN 8904.380 12 JUN 1989 0257 PDT
38° 9.1'N 123° 3.8'W DEPTH 75 m



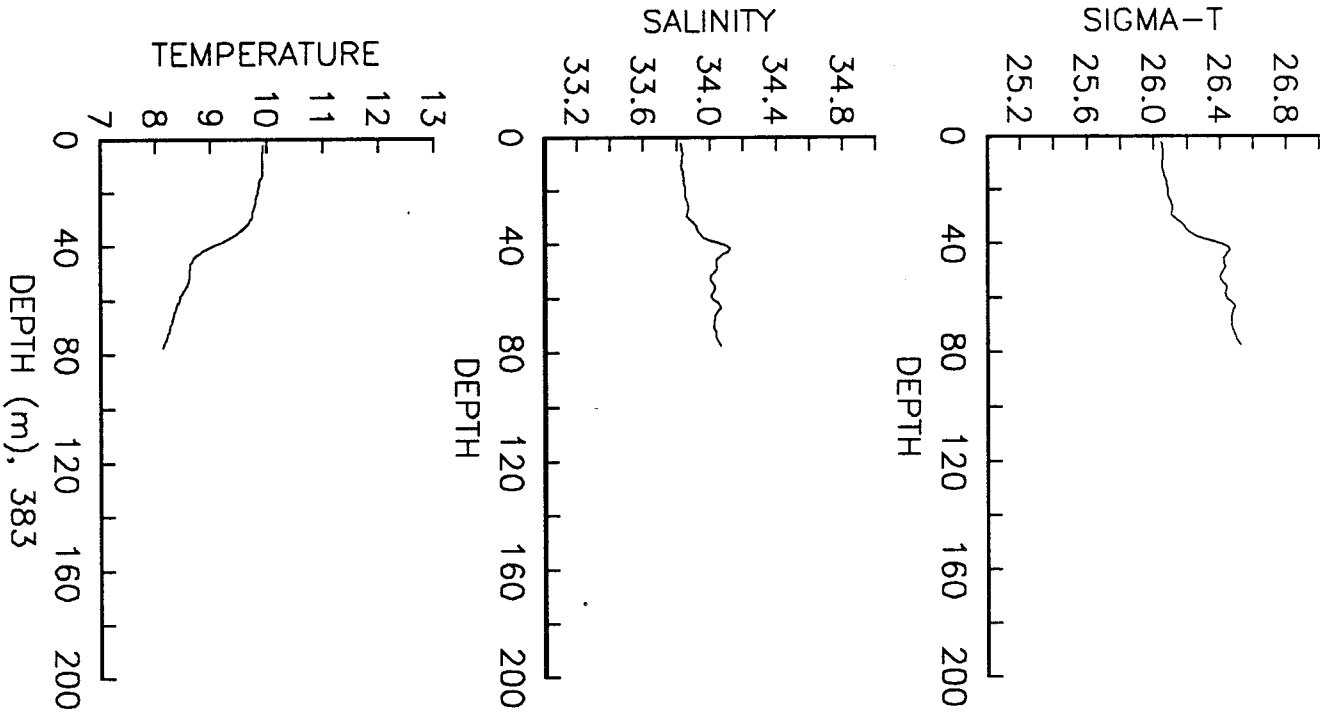
STN 8904.381 12 JUN 1989 0323 PDT
38° 9.9'N 123° 0.0'W DEPTH 55 m



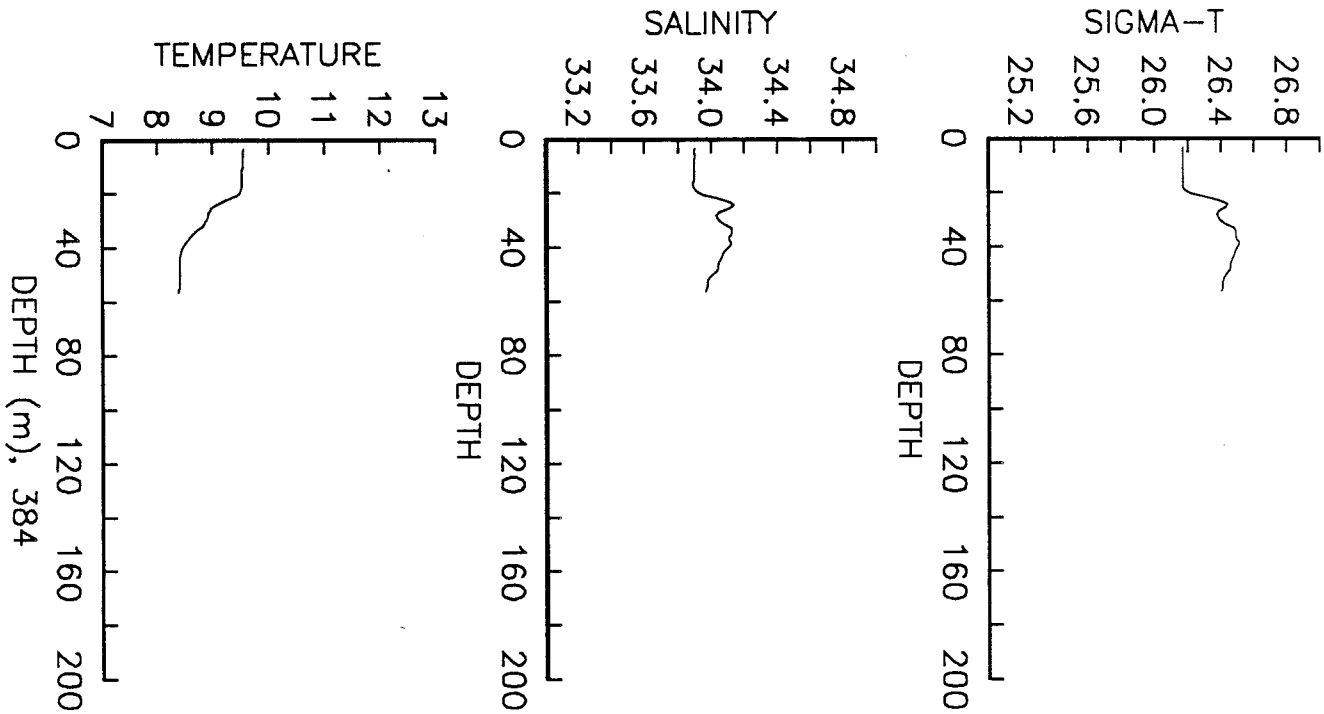
STN 8904.382 12 JUN 1989 0533 PDT
38° 0.0'N 123°13.5'W DEPTH 110 m



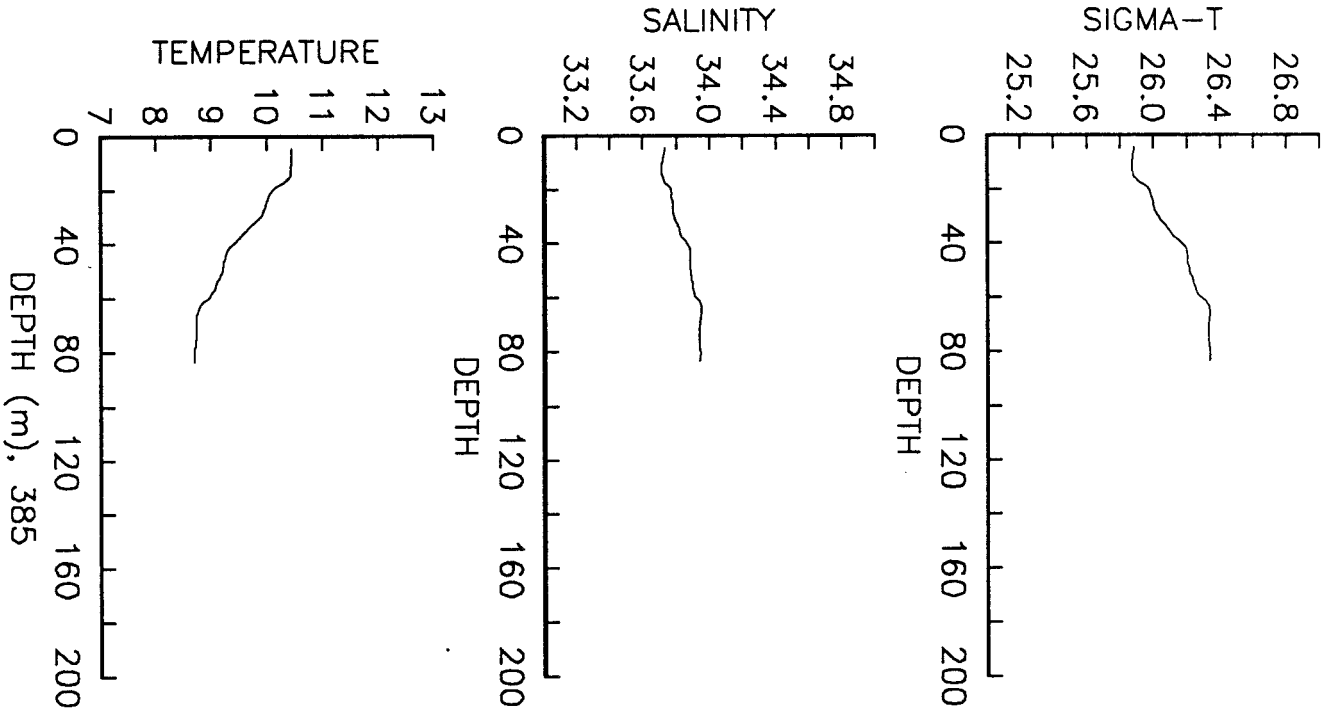
STN 8904.383 12 JUN 1989 0604 PDT
38° 0.0'N 123° 8.5'W DEPTH 90 m



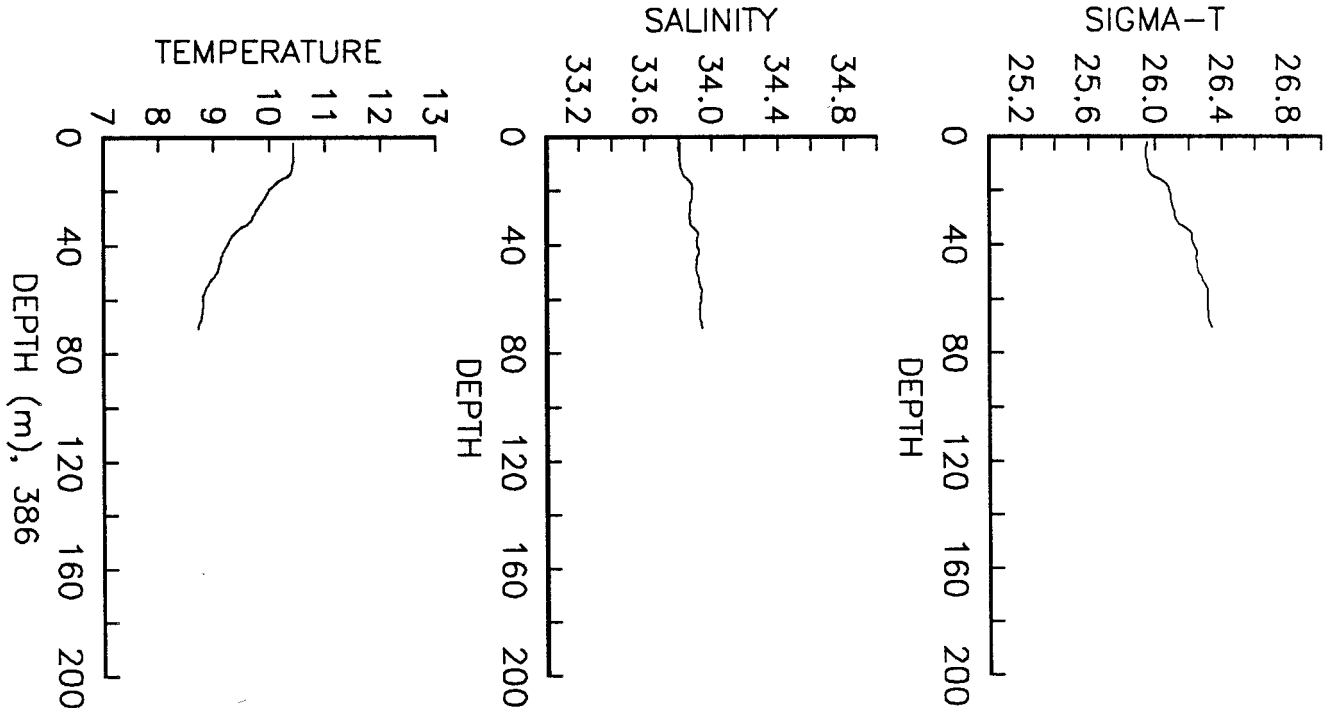
STN 8904.384 12 JUN 1989 0702 PDT
37°58.0'N 122°58.8'W DEPTH 64 m



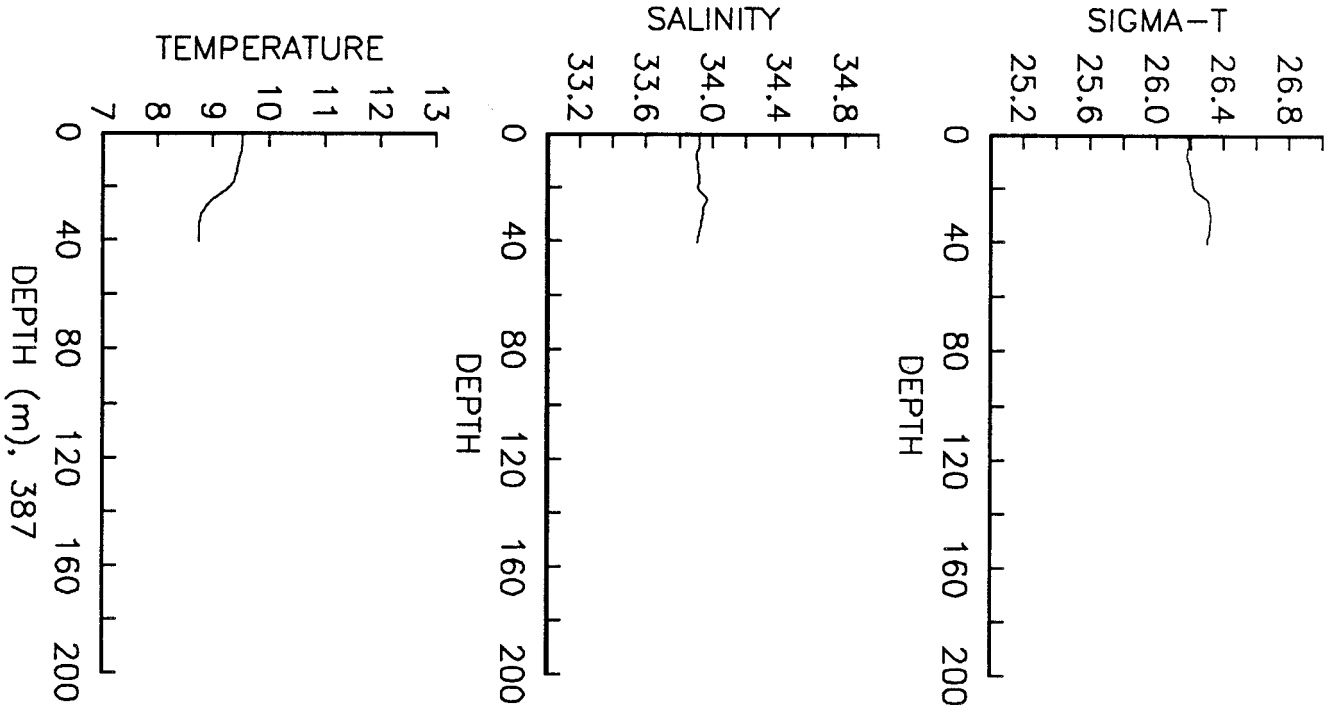
STN 8904.385 12 JUN 1989 0821 PDT
37°48.3'N 123° 8.3'W DEPTH 84 m



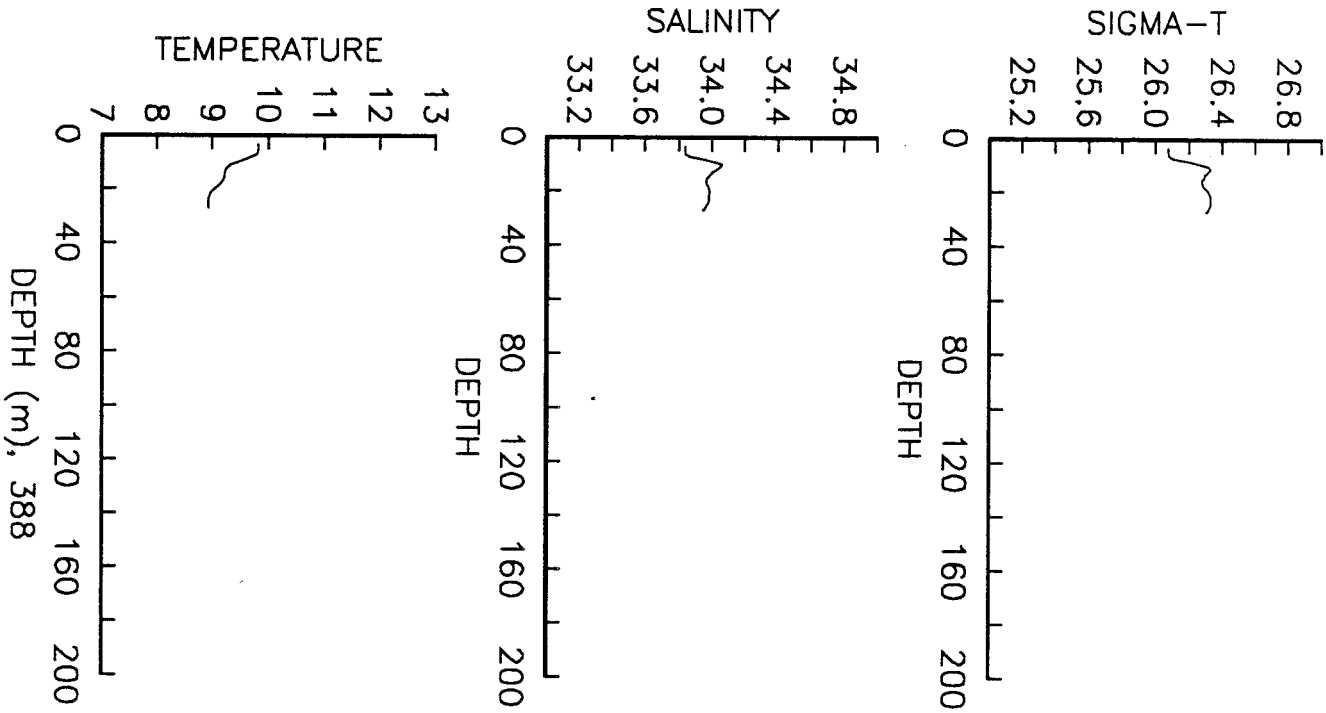
STN 8904.386 12 JUN 1989 0900 PDT
37°45.6'N 123° 2.7'W DEPTH 71 m



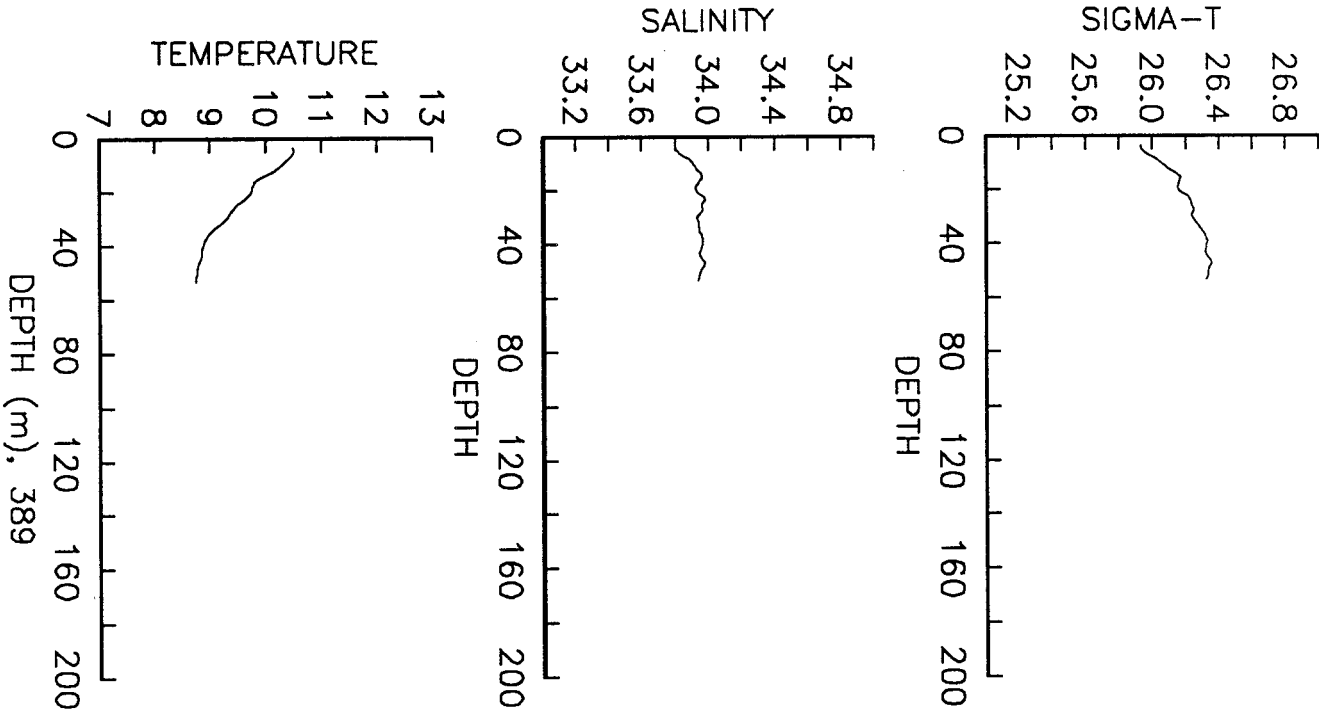
STN 8904.387 12 JUN 1989 1035 PDT
37°57.2'N 122°51.7'W DEPTH 44 m



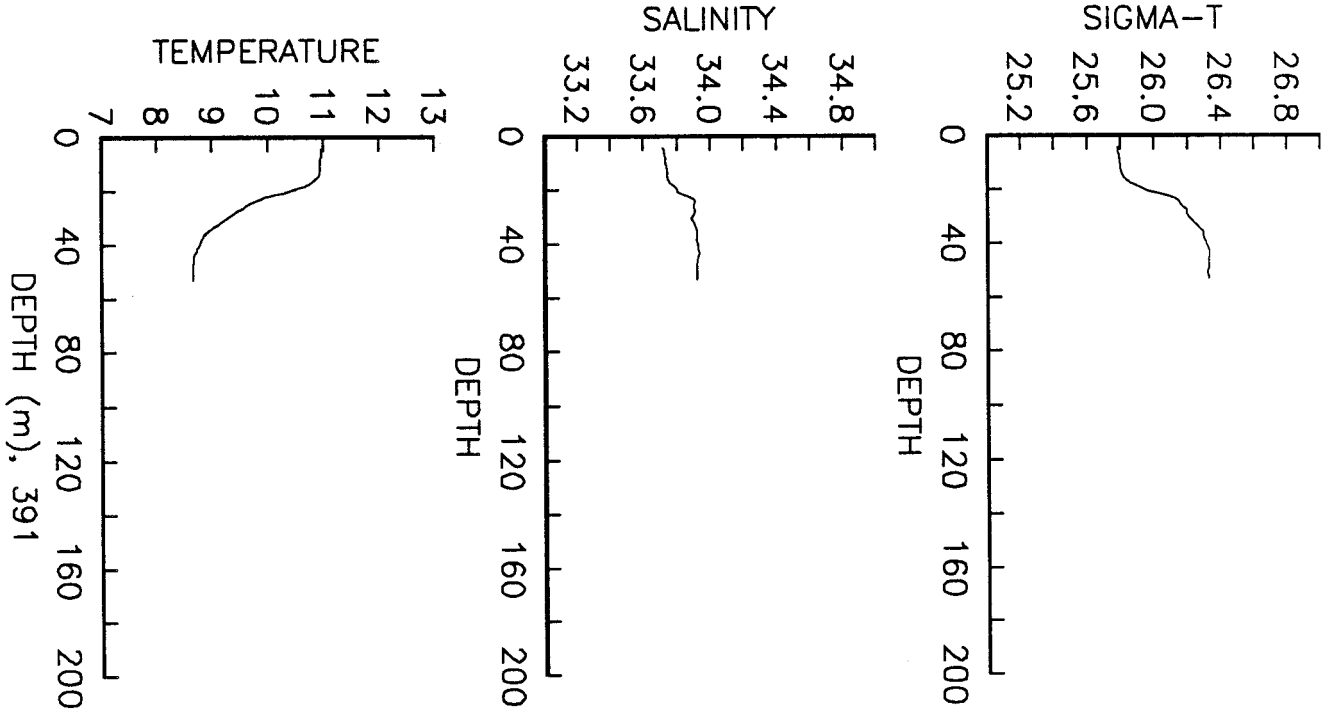
STN 8904.388 12 JUN 1989 1109 PDT
37°54.2'N 122°46.5'W DEPTH 29 m



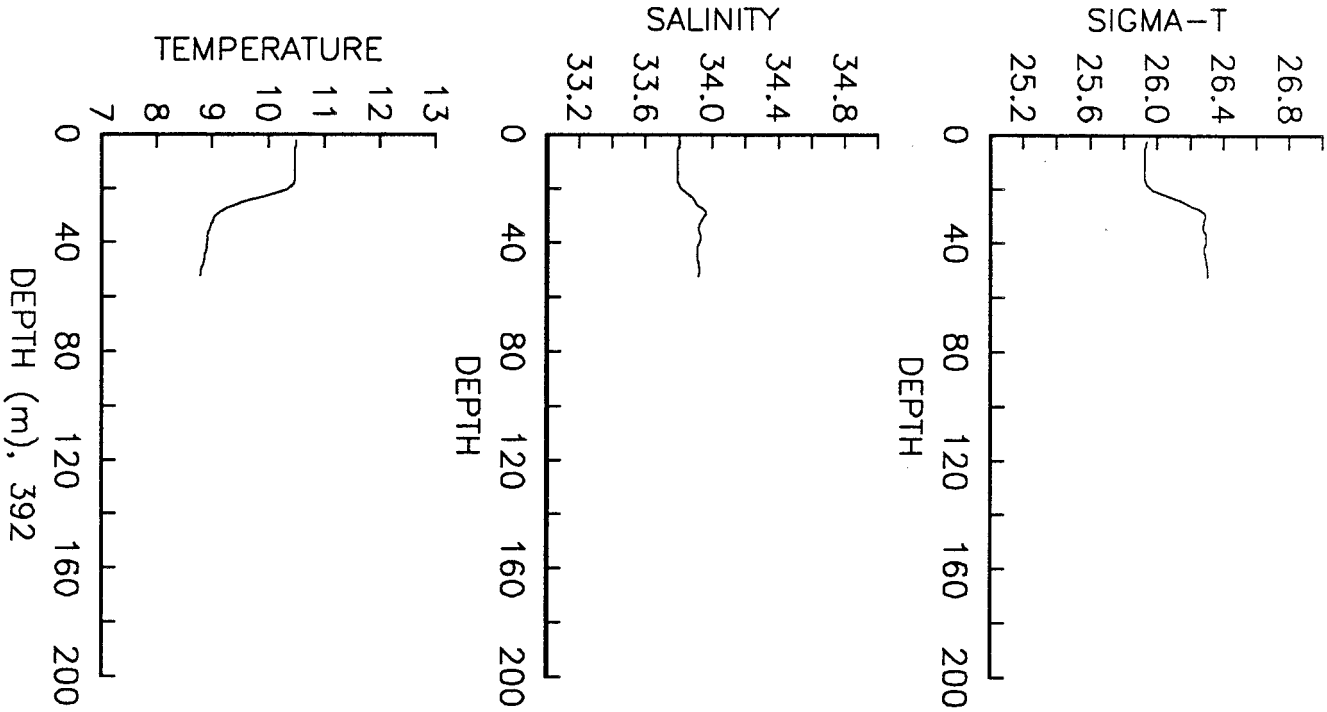
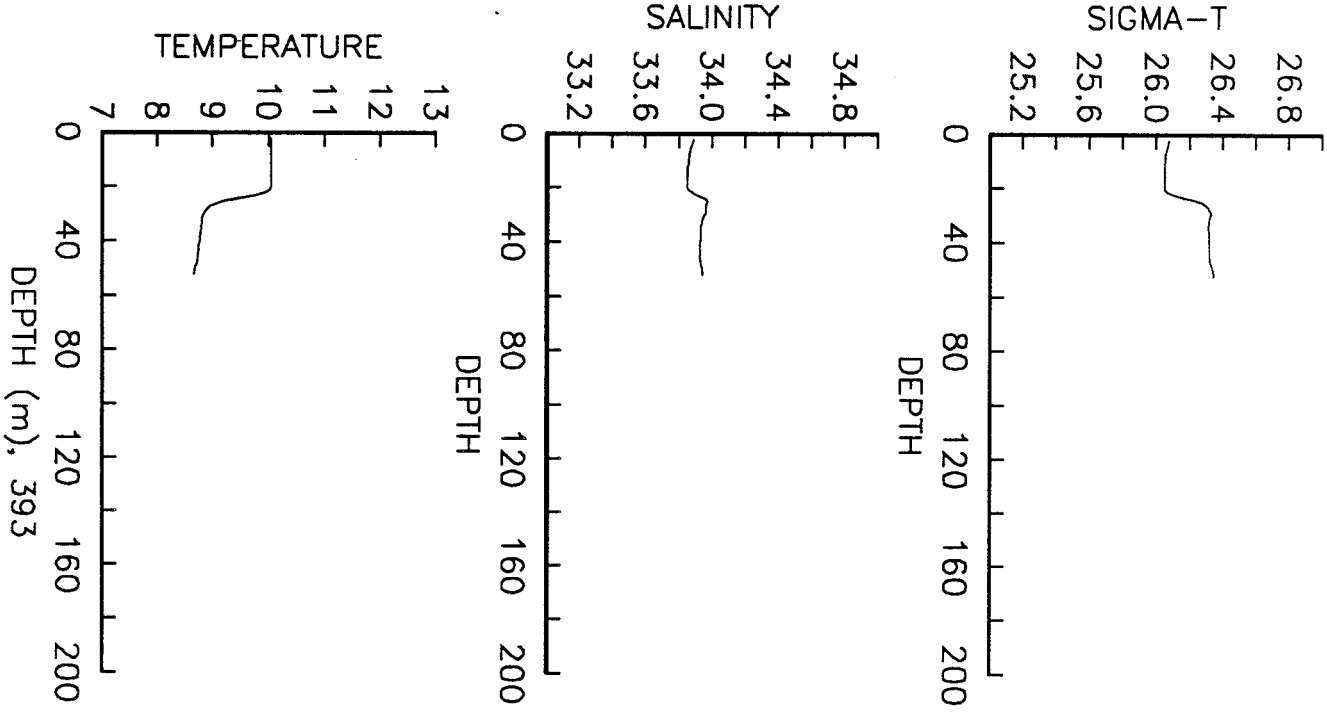
STN 8904.389 12 JUN 1989 1334 PDT
37°42.5'N 122°57.5'W DEPTH 55 m



STN 8904.391 12 JUN 1989 2114 PDT
37°37.6'N 122°46.0'W DEPTH 55 m



STN 8904.392 12 JUN 1989 2342 PDT
37°43.0'N 122°54.9'W DEPTH 57 m



STN 8904.393 13 JUN 1989 0022 PDT
37°46.5'N 122°52.0'W DEPTH 55 m