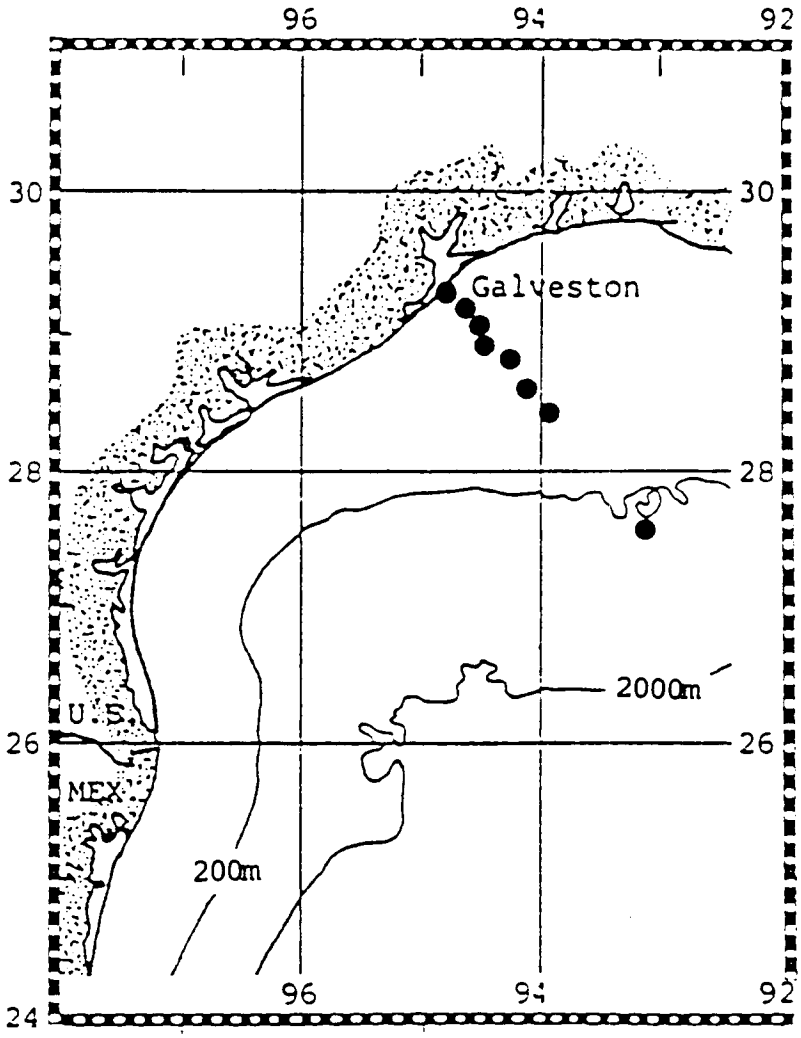
HYDROGRAPHIC DATA FROM THE TEXAS CONTINENTAL SHELF: TEXAS INSTITUTIONS GULF ECOSYSTEM RESEARCH CRUISE 90G-04



Technical Report 90-01-T of the Department of Oceanography
of Texas A&M University, College Station, TX 77843

D.C. Biggs, Technical Editor
Technical Support Services Group

19 April 1990

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CONTENTS

SUMMARY OF SCIENTIFIC PROGRAMS

R/V GYRE cruise 90G-04 was a one week Texas Institutions Gulf Ecosystem Research (TIGER) cruise targeted to investigate carbon cycling on the Texas continental shelf in late winter-early spring (19-24 February). After departing Galveston at 8AM local time on 19 February, a transect of inner shelf stations spaced at 10-15 nautical mile intervals (STA 01 - 07) was made during the first half of the trip along a SE heading from the Galveston Bay sea buoy to a water depth of 50m. GYRE then proceeded to the upper slope, to occupy an oceanic station (STA 08) in a water depth of 534m.

For the second half of the cruise, GYRE returned to the inner shelf and repeated hydrographic work to make STA 09 in the vicinity of STA 03; STA 10 and 11 in the vicinity of STA 01; and STA 12 and 13 in the vicinity of STA 02 and 04, respectively. At STA 14 in the vicinity of STA 07 where water depth was 50m, a free vehicle benthic lander was deployed for 6 hours which measured benthic respiration and nutrient regeneration. In addition to the lander deployment, a drifting sediment trap (suspended 25m below the surface) was also released at STA 14. After the floating trap had been out for 31 hours (and during which time GYRE made a hydrographic STA 15 near the location of previously-occupied STA 05), the material which it had trapped was successfully recovered and the ship returned to Galveston at 2:30AM local time on 24 February.

SCIENTIFIC PARTY

Chief Scientist: Dr. Jim Ammerman (TAMU)

Other Scientists: Dr. Gilbert Rowe; Dr. Luis Cifuentes; Dr. Greta Fryxell (all TAMU); Dr. Alan Price (US EPA)

Technicians: Ken Bottom, Mark Spears, Denise Hudson, Eddie Webb, RV Pittman; Mark Beifuss, Greg Boland (all TAMU)

Students: D Lopez, J Kovacs, M Cruz, K Al-Abdulkader, A Al-Jabr; J Gennett, D Clark, L Mena (all TAMU)

Deck Engineers: Dean Letzring, Dave Barrow, Des Rolf

SUMMARY OF STATION ACTIVITIES, R/V GYRE Training & Research cruise 90G-04:

PART ONE: TRANSECT WORK FROM INNER SHELF TO UPPER SLOPE

Date	GMT	Start Station Work		Finish Station Work		Station : Activity
02-19	1400					departed dock in Galveston
	1500 - 1602	29 21.1	94 44.0	29 21.0	94 43.9	STA 01 : sfc pumping
	1512 - 1519	29 21.1	94 44.0			: 1/4m net tow
	1555 - 1557	29 21.0	94 44.0	29 21.0	94 44.0	: CTD 01
	1627 - 1638	29 20.6	94 43.6	29 20.6	94 42.8	: ZP net tow
	1758 - 1802	29 12.4	94 33.9			STA 02 : 1m net tow
	1803 - 1808	29 12.2	94 34.0			: 1/2m net tow
	1812 - 1818	29 12.1	94 34.1	29 12.0	94 34.2	: CTD 02
	1941 - 1945	29 02.8	94 27.4			STA 03 : 1/4m net tow
	1953 - 1957	29 02.6	94 27.5			: 1/2m net tow
	2030 - 2039	29 03.2	94 27.7	29 03.2	94 27.9	: CTD 03
	2150 -	28 54.3	94 20.9			STA 04 : sfc pumping
	2201 - 2208	28 54.3	94 21.1	28 54.3	94 21.3	: CTD 04A
	2218 - 2224	28 54.2	94 21.3	28 54.2	94 21.3	: CTD 04B
	2224 - 2230	28 54.2	94 21.3			: 1/4m net tow
	2236 - 2248	28 54.0	94 21.3			: 1/4m net tow
	2240 - 2245	28 54.0	94 21.6			: 1/2m net tow
	2308 - 2332	28 53.9	94 21.2			: van Veen grab
	2345 - 2350	28 53.2	94 19.8			: small BoxCore
02-20	0014 - 0032	28 53.4	94 19.2	28 53.2	94 19.1	: ZP net tow
	0137	28 46.3	94 14.6			STA 05: release drifters
	0156 - 0204	28 44.6	94 13.0	28 44.5	94 13.2	: CTD 05
	0418 - 0536	28 35.8	94 05.4	28 36.3	94 04.9	STA 06 : sfc pumping
	0441 - 0458	28 35.8	94 05.4	28 35.6	94 04.8	: ZP net tow
	1334 - 1338	28 22.0	93 55.0			STA 07 : PAR profile
	1345 - 1351	28 23.1	93 56.1			: 1/4m net tow
	1401 - 1413	28 22.7	93 55.6	28 22.8	93 55.5	: ZP net tow
	1421 - 1441	28 22.9	93 55.5	28 23.1	93 55.8	: CTD 07
	1505 - 1518	28 23.7	93 55.1			: fish O/C nets
	1530 - 1536	28 23.3	93 55.7			: fish O/C nets
	1544	28 23.2	93 55.8			: small BoxCore
	1557	28 23.2	93 56.0			: release drifters
	1611 - 1618	28 23.1	93 56.0			: fish O/C nets
	1623 - 1807	28 23.0	93 56.1	28 24.3	93 56.0	: sfc pumping
	1633 - 1639	28 23.0	93 56.1	28 23.1	93 56.1	: fish O/C nets
	1819 - 1839	28 23.0	93 56.0	28 23.2	93 56.3	: box coring
	1852 - 1957	28 23.4	93 56.4	28 24.8	93 56.3	: sfc pumping
02-21	0311 - 0338	27 30.6	93 07.2	27 30.5	93 07.8	STA 08 : CTD 08
	0315 - 0502	27 30.6	93 07.2	27 31.2	93 06.8	: sfc pumping
	0350 - 0357	27 30.5	93 07.3			: 1/4m net tow
	0405 - 0419	27 30.7	93 07.2			: fish O/C nets
	0451 - 0513	27 31.0	93 07.0	27 31.4	93 06.7	: ZP net tow
	0530 - 0615	27 31.8	93 06.6			: box coring

PART TWO: RETURN INSHORE FOR MORE WORK OVER INNER & MIDDLE SHELF

Date	GMT	Start Station Work		Finish Station Work		Station : Activity
	NOTE: Sta 09 was a return to the work area of Sta 03					
02-21	1741 - 1744	29 02.7	94 26.8			STA 09 : 1/4m net tow
	1751 - 1753	29 02.8	94 26.8			: CTD 09
	NOTE: Stas 10 & 11 were repeated in the work area of Sta 01					
	2050 - 2057	29 22.9	94 45.6			STA 10 : sfc pumping
	2055 - 2057	29 22.8	94 45.5			: 1/2m net tow
	2145 - 2157	29 20.4	94 41.8			STA 11 : ZP net tow
	2145 - 2200	29 20.4	94 41.6	29 19.6	94 41.7	: sfc pumping
	NOTE: Sta 12 was a return to the work area of Sta 02					
	2302 - 2320	29 11.2	94 35.2	29 10.8	94 35.0	STA 12 : sfc pumping
	2307 - 2313	29 11.1	94 35.2	29 11.0	94 35.1	: ZP net tow
	NOTE: Sta 13 was a return to the work area of Sta 04					
02-22	0126 - 0320	28 54.0	94 20.9	28 54.5	94 21.7	STA 13 : sfc pumping
	0130 - 0136	28 54.0	94 21.0			: 1/4m net tow
	0153 - 0158	28 54.3	94 20.9			: 1/2m net tow
	0200 - 0214	28 54.5	94 21.0	28 54.7	94 21.2	: ZP net tow
	0218 - 0227	28 54.7	94 21.2	28 54.6	94 21.2	: CTD 13
	0243 - 0248	28 54.8	94 20.9			: fish O/C nets
	0321	28 54.5	94 21.7			: VanVeen grab
	0355	28 54.8	94 22.4			: release drifters
	NOTE: Sta 14 was a return to the work area of Sta 07					
	1220 - 1230	28 22.6	93 55.7			STA 14 : 1/4m net tow
	1233 - 1248	28 22.8	93 55.9	28 22.2	93 56.2	: ZP net tow
	1240 - 1440	28 23.0	93 56.1	28 22.2	93 55.4	: sfc pumping
	1256 - 1307	28 23.8	93 56.6			: PAR profile
	1316 - 1329	28 23.4	93 56.2	28 23.3	93 56.2	: CTD 14A
	1352	28 22.7	93 55.7			: bucket samples
	1410 - 1417	28 22.5	93 55.6			: 1/2m net tow
	1418 - 1436	28 22.4	93 55.5			: fish O/C nets
	1530	28 21.7	93 55.0			deploy drifting trap array
	1547 - 1630	28 21.7	93 55.1	28 21.3	93 54.9	: VanVeen work
	1644 - 1703	28 21.4	93 54.8			: fish O/C nets
	1712	28 21.7	93 54.8			drifting array position
	1756 - 0040	28 21.6	93 54.3	28 22.0	93 54.5	benthic lander deployment
	1815 - 1818	28 21.6	93 54.1	28 21.6	93 54.0	: CTD 14B
	NOTE: Sta 15 was a return to the work area of Sta 05					
02-23	1505 - 1511	28 45.7	94 15.0			STA 15 : 1/4m net tow
	1516 - 1535	28 46.3	94 15.5	28 46.2	94 15.4	: CTD 15
	1541 - 1555	28 46.2	94 15.3			: fish O/C nets
	1559 - 1604	28 46.1	94 15.2	28 46.2	94 15.4	: ZP net tow
	2245	28 15.2	93 46.6			retrieve drifting trap array
02-24	0321	28 45.3	94 15.5			STA 15: release drifters
	0830					docked at Pelican Island

NOAA FORM 72-56 (4-74)

U. S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

FORM APPROVED
O.M.B. No. 41-R2734

MARINE COASTAL WEATHER LOG — SHIP STATION

SHIP NAME: R/V GYRE cruise 90G-04 (page 1 of 2)

RADIO CALL SIGN: KTGL

DATE (month and year): FEB. 1990

(1) DATE	(2) TIME (GMT) (24-hr)	(3) POSITION	(4) PRESENT WEATHER	(5) VISIBILITY (MI)	(6) WIND DIR. (16 pts)	(6) WIND SPEED (Kts)	(7) STATE OF SEA WAVE HEIGHT (Ft)	(7) SWELL DIRECTION (8 Pts)	(7) SWELL HEIGHT (Ft)	(8) SEA WATER TEMP. ☐C ☐F	(9) AIR TEMP. ☐C ☒F	(10) CORR. PRESSURE - .DP (IN)	(11) REMARKS (Icing, etc.)
2-19	1750	29°12'N 94°33'W	OVERCAST	4	NE	10-15	2-4	—	—		60	30.10	HAZE
2-19	2130	28°56'N 94°22'W	OVERCAST	6	NE	10-15	2-3	NE.	3-5		65	30.10	HAZE
2-20	0130	28°44'N 94°13'W	OVERCAST	6	NE	15-20	2-3	NE	3-5		62	30.15	HAZE
2-20	0530	28°36'N 94°04'W	OVERCAST	6	NE	20-25	2-4	NE	4-6		62	30.14	
2-20	0930	28°32'N 94°05'W	CLOUDY	10	ENE	20	2-4	NE	4-6		63	30.10	CLEAR
2-20	1330	28°28'N 93°56'W	OVERCAST	8	ENE	10-15	2-3	NE	2-3		64	30.17	HAZE
2-20	1730	28°23'N 93°56'W	OVERCAST	6	ENE	10-15	2-3	NE	3-4		64	30.13	HAZE
2-20	2130	28°12' N 93°45' W	OVERCAST	6	E	10-15	2-3	E	3-4		68	30.04	HAZE
2-21	0130	27°37' N 93°15' W	Overcast	6	E	10-15	3-4	E	4-6		70°	30.01	LT. HAZE
2-21	0530	27°31'N 93°06 W	OVERCast	6	E	15-20	3-4	E	6-8		71	30.00	LT HAZE
2-21	0930	27°51'N 93°34'W	RAIN	8	E	10-15	3-4	E	5-7		70	29.90	
2-21	1330	28°23'N 94°06'W	Overcast	6	E	10-15	3-4	E	5-7		70°	29.83	LT HAZE
2-21	1745	29°02'N 94°26'W	HEAVY RAIN	1/2	E	10-20	3-5	E	4-6		66	29.78	REDUCED VISIBILITY
2-21	2130	29°22'N 94°43'W	RAIN	1/2-4	N-W	10-20					60	2971	INSIDE GALVESTON JETTY
2-22	0130	28°54'N 94°21'W	Cloudy	10	NW	10-15	2-4	E	4-5		62°	29.75	Clear
2-22	0530	28°48'N 94°17'W	PTLY CLOUDY	10	NW	15-25	4-7	E	4-5		58°	29.85	CLEAR
2-22	0930	28°23'N 93°55'W	Clear	10	NW	10	3-5	CONFUSED			63	2986	Clear

NOAA FORM 72-56 (4-74) SUPERSEDES PREVIOUS EDITION.

MARINE COASTAL WEATHER LOG——SHIP STATION

O.M.B. No. 41-R2734

SHIP NAME: R/V GYRE cruise 90G-04 (page 2 of 2) | RADIO CALL SIGN: KTCL | DATE (month and year): FEB 1990

(1) DATE	(2) TIME (GMT) (EDT)	(3) POSITION	(4) PRESENT WEATHER	(5) VISIBILITY (MI)	(6) WIND DIR. (16 pts)	(6) WIND SPEED (Kts)	(7) STATE OF SEA WAVE HEIGHT (Ft)	(7) STATE OF SEA SWELL DIRECTION (8 Pts)	(7) STATE OF SEA SWELL HEIGHT (Ft)	(8) SEA WATER TEMP. ☐C ☒F	(9) AIR TEMP. ☐C ☒F	(10) CORR. PRESSURE +.08 IN.	(11) REMARKS (Icing, etc.)
22	1330	28°23' N 93°56' W	Ptly cloudy	10	SSW	5	1-3		2-3		63	29.90	Clear
22	1740	28°21'N 93°54'W	Ptly cloudy	10	SW	5	1-2	NW	2-3		69	29.94	CLEAR
22	2130	28 21 N 93 53 W	Cloudy	10	NW	15-20	1-3	W	2-4		66	29.90	Clear
23	0145	28°22 N 93 53 W	3/4 cloud	10+	NW	15-20	2-3	W-NW	3-5		66	29.95	CLEAR
23	0530	28°15'N 94°02'W	CLEAR	10	WNW	25-40	8-12	WNW	8-12		60	30.05	CLEAR
23	0930	28°22' N 94°13' W	CLEAR	10	NNW	25-40	8-12	NW	8-12		60	3002	Clear
23	1330	28°38'N 94°17. W	CLEAR	12+	NNW	20-22	3-4	NW	4-5	64	58	30.15	CLEAR
23	1730	28°-38'N 94°-08'W	CLEAR	10	NW	20	3-4	NW	3-5	63.5	55	30.18	CLEAR
23	2130	28°15'N 93°49'W	CLEAR	10	NW	20	3-4	NW	3-5		66	3015	Clear
24	0130	2834 N 94 05 W	CLEAR	12+	NW	12	1-3	NW	2-3		64	3018	CLEAR

NOAA FORM 72-88 (4-74) SUPERSEDES PREVIOUS EDITION.

CTD + TRANSMISSOMETER DATA

The following pages present tables and plots of 1m-averaged data. Seabird SBE-09 CTD raw data salinities were corrected by +0.035 (CTD 01 - 09) and +0.042 (CTD 13-15), which were the average offsets between bottle salinity [determined aboard ship with our Guildline model 8400 conductive salinometer] and salinity computed by the SBE-09 deck unit from temperature and conductivity data:

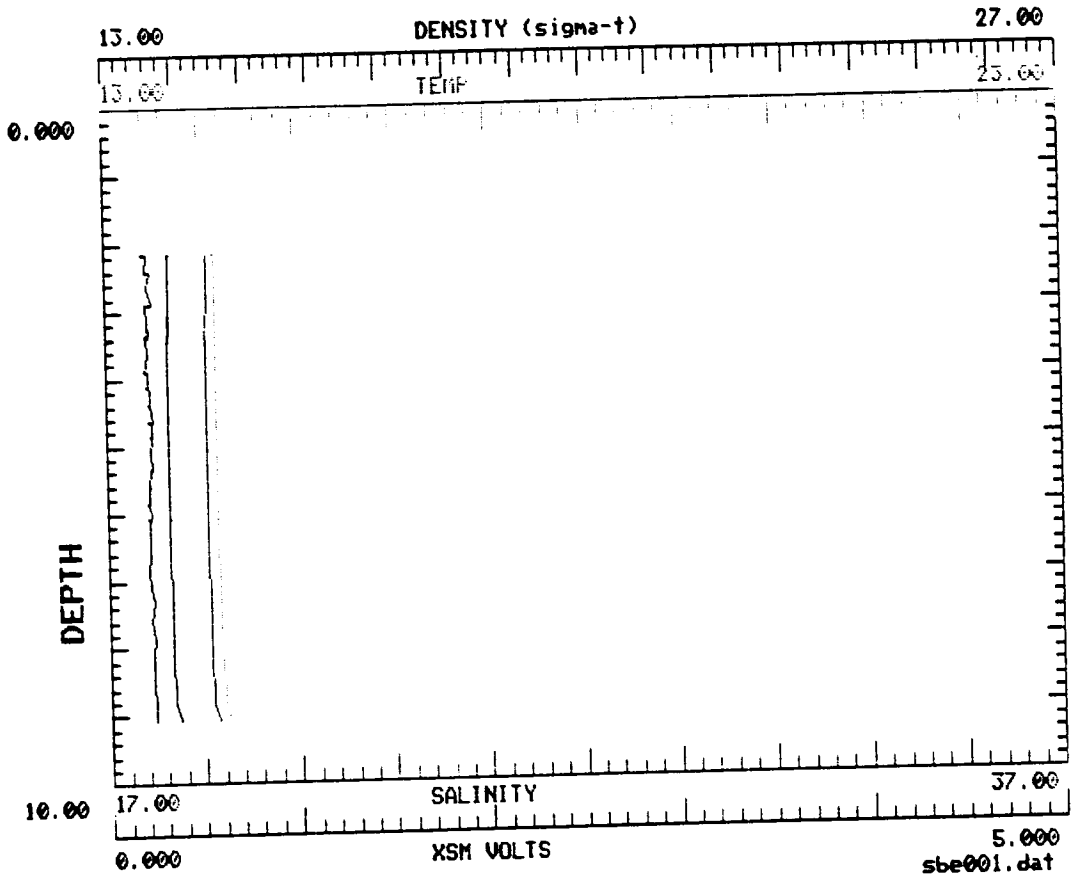
STATION NUMBER	SALINITY OFFSET BOTTLE-CTD	NUMBER OF SAMPLES
CTD 04	0.035 ± .003	(n = 4)
CTD 05	0.034	(n = 1)
CTD 08	0.035 ± .005	(n = 6)
CTD 09	0.035 ± .002	(n = 2)
CTD 13	0.042 ± .001	(n = 4)
CTD 14	0.042 ± .002	(n = 6)
CTD14-2	0.040 ± .001	(n = 2)
CTD 15	0.045 ± .003	(n = 5)

No correction was made to SBE-09 temperature data, which agreed to within ± .03°C with temperature determined by an Applied Microsystems thermosalinograph mounted in the bow of the ship at a depth of 3m.

A 0-5 volt range Seatech 25cm pathlength transmissometer attached to the Seabird SBE-09 CTD provided information about suspended particle concentrations.

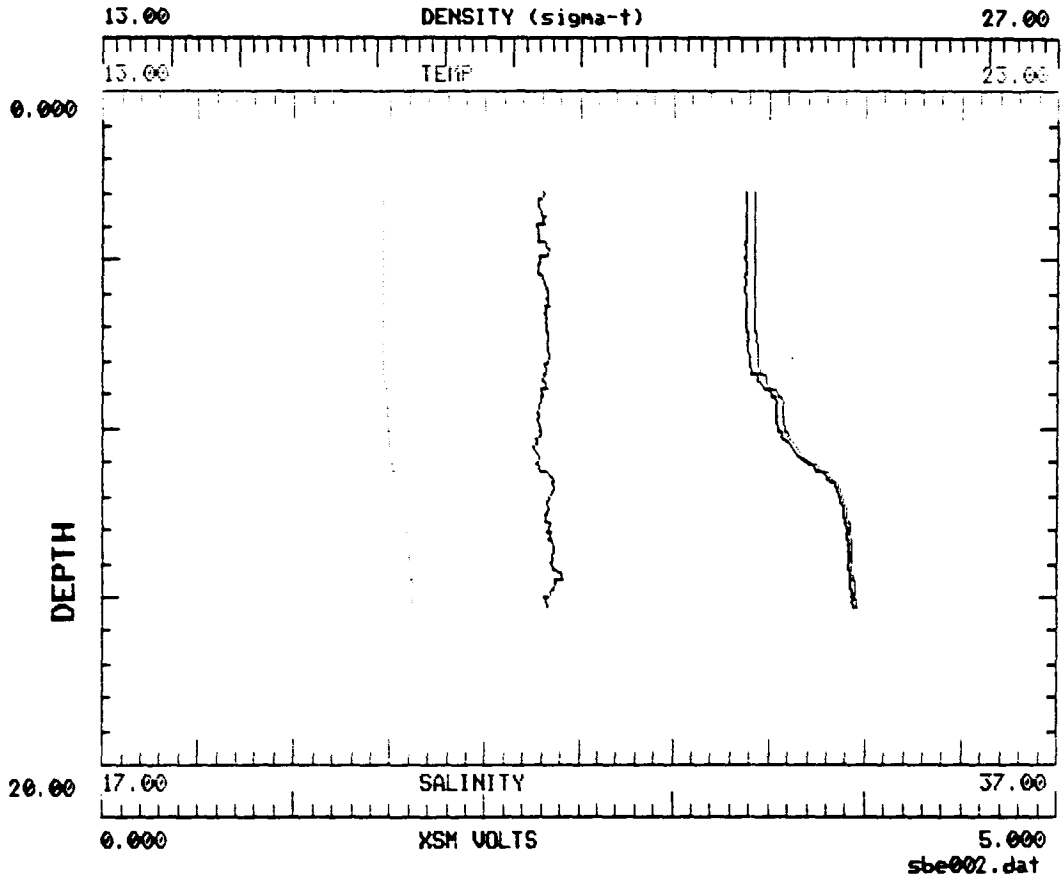
raw data file = sbe001.dat

meters	temp	salinity	volts# 1	sigma-t
2.000	14.1405	19.1698	0.199	13.9394
3.000	14.1519	19.1078	0.224	13.8901
4.000	14.1507	19.1389	0.217	13.9141
5.000	14.1508	19.1287	0.213	13.9063
6.000	14.1577	19.1354	0.221	13.9102
7.000	14.1724	19.1548	0.224	13.9224
8.000	14.1852	19.1774	0.227	13.9374
9.000	14.3980	19.7260	0.278	14.3195



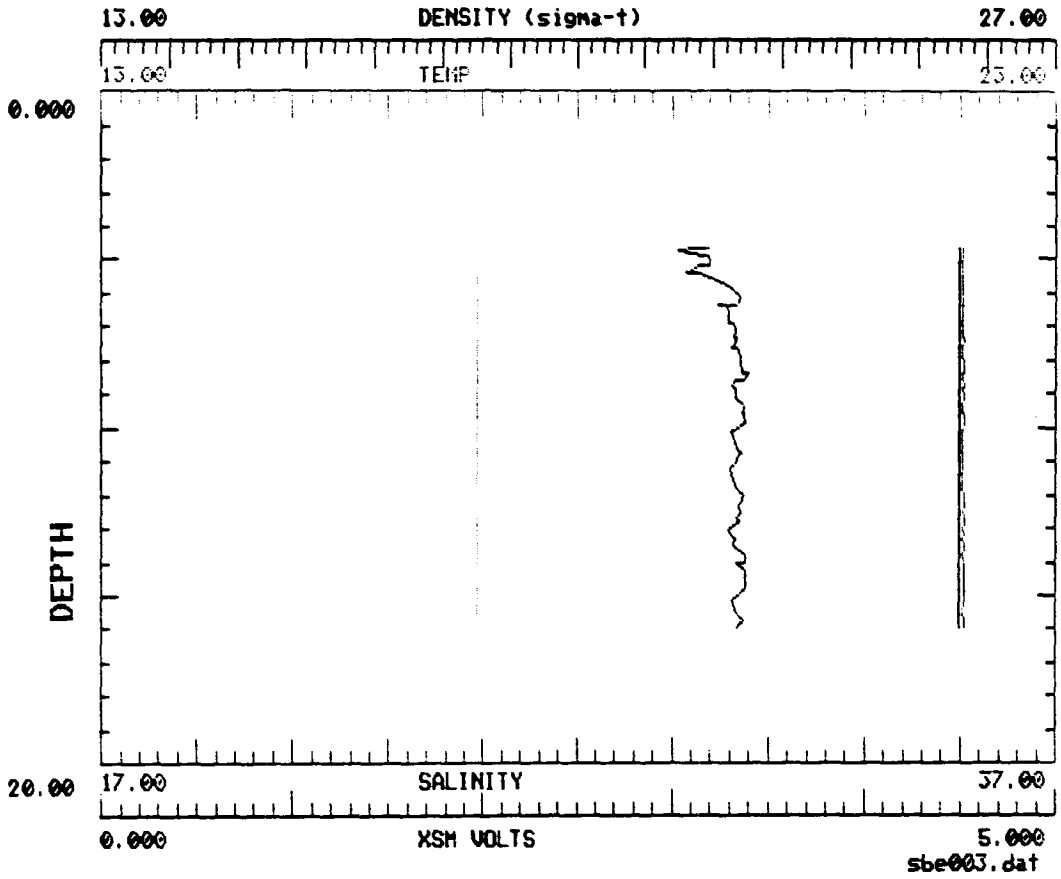
raw data file = sbe002.dat

meters	temp	salinity	volts# 1	sigma-t
3.000	15.9252	30.7334	2.287	22.4590
4.000	15.9251	30.7254	2.288	22.452[illegible]
5.000	15.9248	30.7238	2.309	22.4517
6.000	15.9241	30.7233	2.329	22.4515
7.000	15.9233	30.7365	2.312	22.4618
8.000	15.9258	30.7998	2.326	22.5099
9.000	15.9624	31.1596	2.299	22.7781
10.000	15.9861	31.4041	2.283	22.9606
11.000	16.0208	31.9534	2.293	23.3748
12.000	16.1281	32.5897	2.357	23.8395
13.000	16.1997	32.7554	2.331	23.9506
14.000	16.2244	32.8026	2.380	23.9812
15.000	16.2358	32.8286	2.330	23.9986



raw data file = sbe003.dat

meters	temp	salinity	volts# 1	sigma-t
5.000	16.9374	35.0851	3.097	25.568(
6.000	16.9382	35.0896	3.267	25.5718
7.000	16.9373	35.0908	3.319	25.5730
8.000	16.9381	35.0906	3.267	25.5726
9.000	16.9369	35.0909	3.344	25.5731
10.000	16.9367	35.0907	3.311	25.5730
11.000	16.9370	35.0907	3.322	25.5730
12.000	16.9377	35.0908	3.352	25.5729
13.000	16.9367	35.0910	3.305	25.5733
14.000	16.9367	35.0915	3.357	25.5736
15.000	16.9369	35.0915	3.290	25.5736



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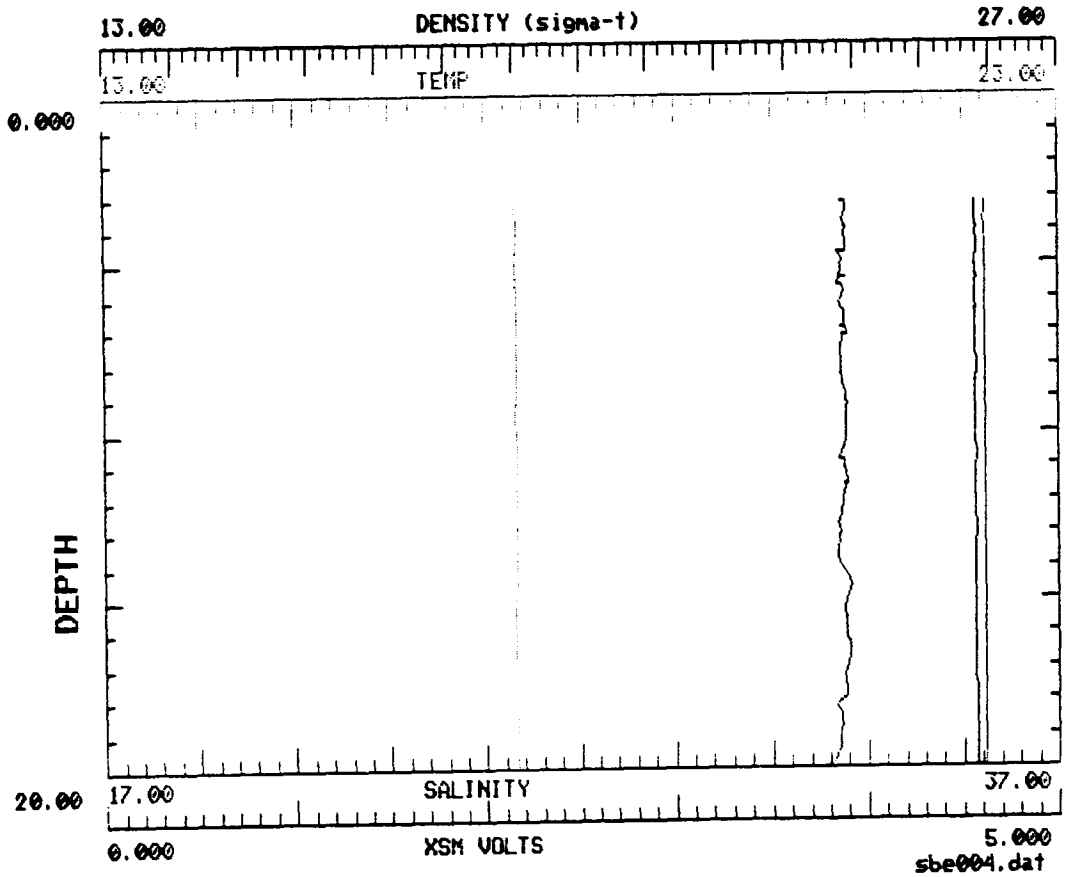
meters	temp	salinity	volts# 1	sigma-t
3.000	17.3186	35.4813	3.869	25.7813
4.000	17.3172	35.4865	3.881	25.7857
5.000	17.3161	35.4858	3.852	25.7855
6.000	17.3172	35.4872	3.866	25.7863
7.000	17.3179	35.4866	3.878	25.7856
8.000	17.3204	35.4884	3.866	25.7864
9.000	17.3175	35.4840	3.878	25.7838
10.000	17.3171	35.4832	3.881	25.7833
11.000	17.3199	35.4878	3.871	25.7862
12.000	17.3195	35.4865	3.881	25.7852
13.000	17.3208	35.4893	3.848	25.7871
14.000	17.3168	35.4830	3.865	25.7832
15.000	17.3168	35.4821	3.866	25.7825
16.000	17.3144	35.4795	3.894	25.7813
17.000	17.3153	35.4799	3.887	25.7817
18.000	17.3249	35.4976	3.857	25.7925
19.000	17.3294	35.5049	3.856	25.7970
20.000	17.3303	35.5058	3.798	25.7975
21.000	17.3303	35.5006	3.809	25.7935



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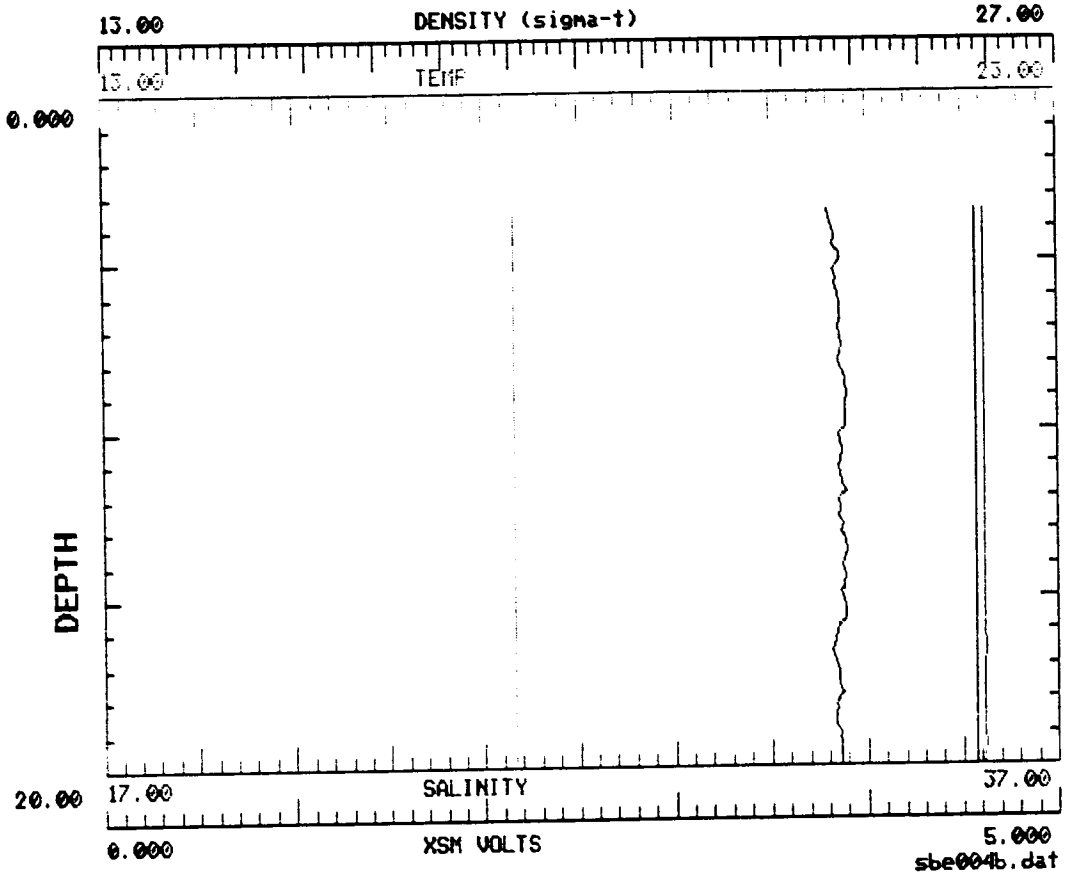
meters	temp	salinity	volts# 1	sigma-t
4.000	17.3242	35.5044	3.831	25.7978
5.000	17.3237	35.5063	3.846	25.7994
6.000	17.3237	35.5061	3.853	25.7993
7.000	17.3236	35.5058	3.863	25.7990
8.000	17.3230	35.5047	3.869	25.7983
9.000	17.3230	35.5045	3.888	25.7981
10.000	17.3247	35.5052	3.876	25.7983
11.000	17.3256	35.5066	3.863	25.7991
12.000	17.3256	35.5055	3.868	25.7983
13.000	17.3256	35.5052	3.876	25.7981
14.000	17.3261	35.5058	3.885	25.7984
15.000	17.3264	35.5061	3.877	25.7986
16.000	17.3285	35.5099	3.858	25.8010
17.000	17.3288	35.5115	3.837	25.8022
18.000	17.3281	35.5088	3.850	25.8003
19.000	17.3288	35.5108	3.849	25.8017
20.000	17.3287	35.5108	3.862	25.8017
21.000	17.3285	35.5083	3.848	25.7998



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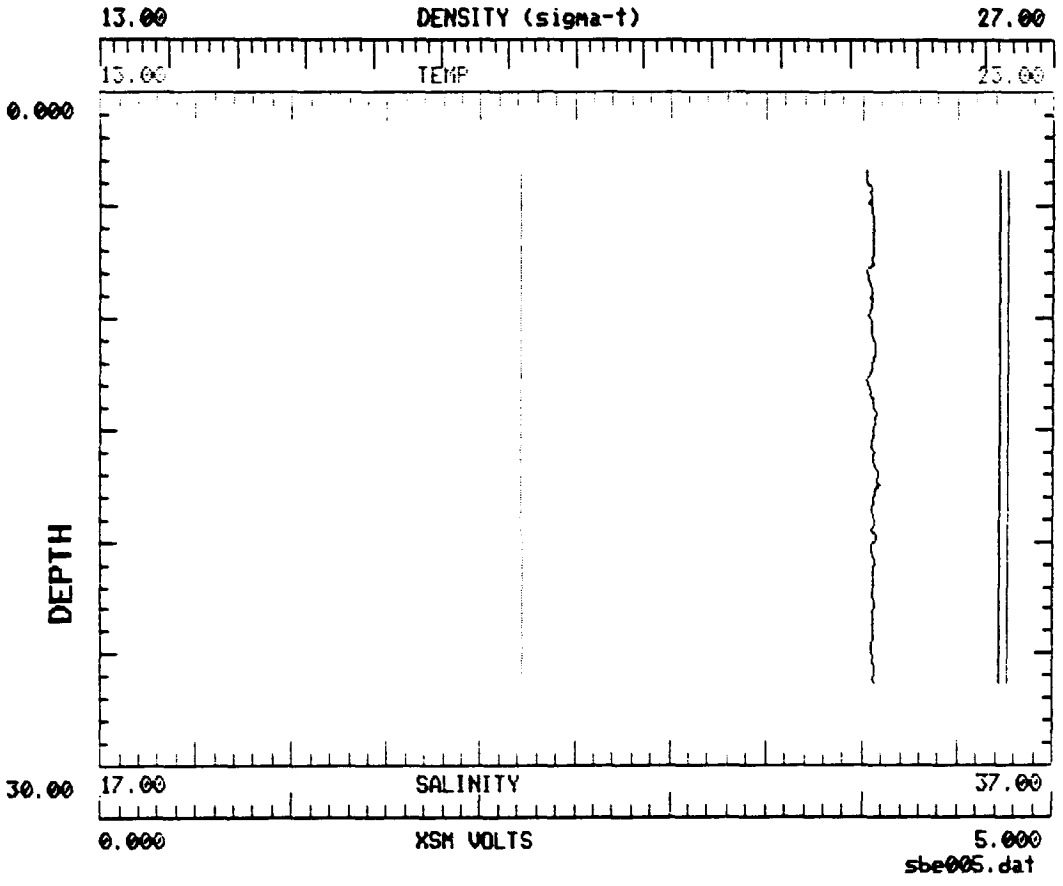
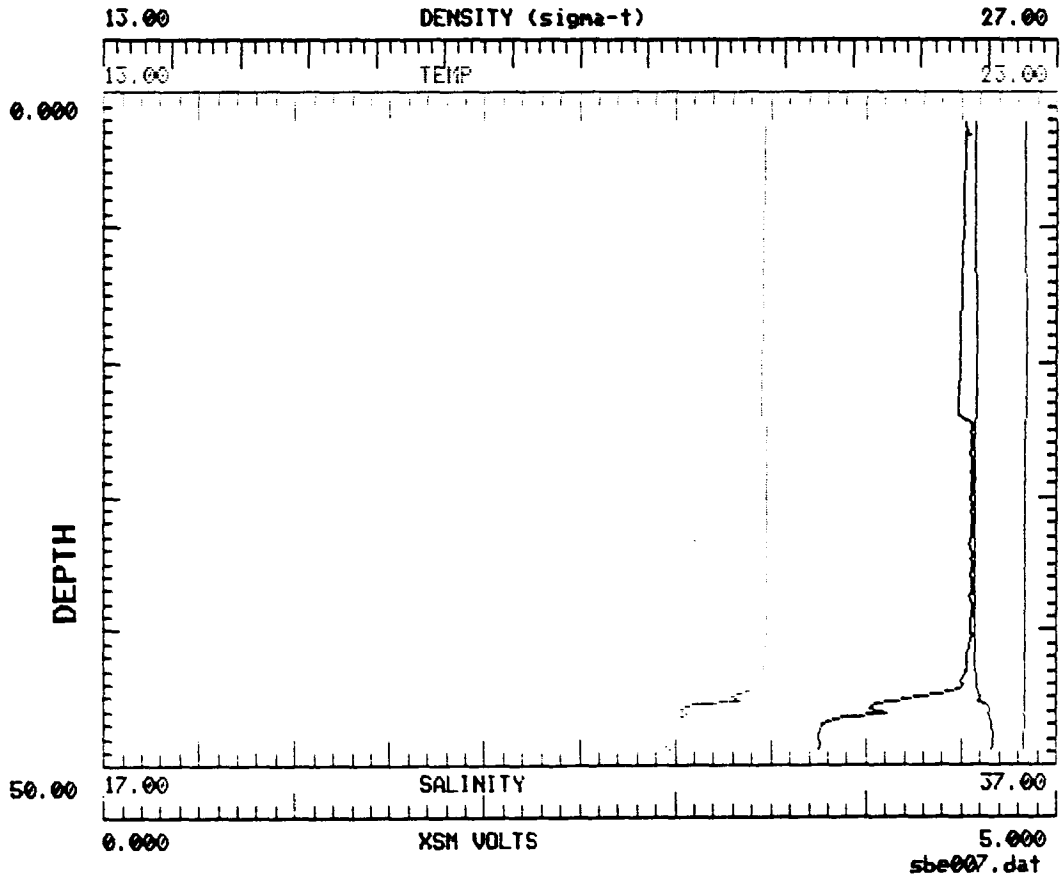
meters	temp	salinity	volts# 1	sigma-t
4.000	17.4266	36.0957	4.025	26.2267
5.000	17.4316	36.0952	4.037	26.2251
6.000	17.4307	36.0964	4.054	26.2263
7.000	17.4354	36.0947	4.040	26.2238
8.000	17.4302	36.0964	4.039	26.2264
9.000	17.4361	36.0955	4.055	26.2243
10.000	17.4340	36.0963	4.042	26.2254
11.000	17.4354	36.0963	4.060	26.2251
12.000	17.4369	36.0960	4.060	26.2245
13.000	17.4347	36.0965	4.037	26.2254
14.000	17.4339	36.0964	4.064	26.2255
15.000	17.4316	36.0963	4.061	26.2260
16.000	17.4305	36.0962	4.057	26.2262
17.000	17.4349	36.0961	4.077	26.225(
18.000	17.4350	36.0964	4.053	26.225(
19.000	17.4378	36.0963	4.055	26.224(
20.000	17.4394	36.0959	4.068	26.2238
21.000	17.4405	36.0972	4.055	26.2245
22.000	17.4405	36.0971	4.056	26.2244
23.000	17.4411	36.0969	4.061	26.2241
24.000	17.4428	36.0960	4.054	26.2230
25.000	17.4410	36.0973	4.052	26.2244
26.000	17.4395	36.0968	4.050	26.2245



raw data file = sbe007.dat

meters	temp	salinity	volts# 1	sigma-t
2.000	19.9431	36.3716	4.525	25.7981
3.000	19.9432	36.3708	4.496	25.7974
4.000	19.9421	36.3521	4.421	25.7834
5.000	19.9428	36.3718	4.523	25.7983
6.000	19.9432	36.3569	4.473	25.7869
8.000	19.9455	36.3719	4.505	25.7977
9.000	19.9451	36.3708	4.510	25.7970
10.000	19.9454	36.3710	4.536	25.7970
11.000	19.9453	36.3717	4.541	25.7976
12.000	19.9452	36.3716	4.537	25.7975
13.000	19.9442	36.3717	4.547	25.7979
14.000	19.9430	36.3715	4.547	25.7980
15.000	19.9436	36.3716	4.546	25.7979
16.000	19.9434	36.3716	4.547	25.798(
17.000	19.9435	36.3717	4.546	25.798:
18.000	19.9439	36.3718	4.550	25.798(
19.000	19.9418	36.3719	4.549	25.7986
20.000	19.9430	36.3717	4.549	25.7982
21.000	19.9430	36.3720	4.552	25.7984
22.000	19.9463	36.3717	4.549	25.7973
23.000	19.9460	36.3716	4.549	25.7974
24.000	19.9467	36.3720	4.549	25.7974
25.000	19.9470	36.3720	4.549	25.7974
26.000	19.9471	36.3716	4.551	25.7971
27.000	19.9470	36.3721	4.549	25.7974
28.000	19.9474	36.3719	4.550	25.7971
29.000	19.9476	36.3720	4.550	25.7972
30.000	19.9473	36.3721	4.549	25.7973
31.000	19.9478	36.3718	4.551	25.7970
32.000	19.9476	36.3720	4.552	25.7972
33.000	19.9473	36.3722	4.549	25.7974
34.000	19.9479	36.3719	4.552	25.7970
35.000	19.9477	36.3728	4.549	25.7970
36.000	19.9463	36.3723	4.549	25.7978
37.000	19.9473	36.3718	4.549	25.7971
38.000	19.9470	36.3718	4.549	25.7972
39.000	19.9465	36.3720	4.549	25.7975
40.000	19.9456	36.3716	4.549	25.7975
41.000	19.9371	36.3716	4.543	25.7997
42.000	19.9190	36.3711	4.536	25.8041
43.000	19.9171	36.3704	4.526	25.8040
44.000	19.8544	36.3690	4.495	25.8195
45.000	19.6171	36.3631	4.271	25.8776
46.000	19.4313	36.3546	4.039	25.9197
47.000	18.8125	36.3535	3.724	26.0790
48.000	19.3887	36.3394	3.912	25.9798



raw data file = sbe008.dat

meters	temp	salinity	volts# 1	sigma-t
3.000	21.1747	36.3617	4.545	25.4575
4.000	21.1771	36.3614	4.544	25.4569
5.000	21.1754	36.3611	4.552	25.4571
6.000	21.1755	36.3620	4.552	25.4578
7.000	21.1766	36.3618	4.554	25.4573
8.000	21.1802	36.3617	4.551	25.4562
9.000	21.1818	36.3616	4.549	25.4557
10.000	21.1832	36.3613	4.552	25.4551
11.000	21.1851	36.3612	4.552	25.4545
12.000	21.1850	36.3612	4.554	25.4545
13.000	21.1848	36.3614	4.547	25.4547
14.000	21.1850	36.3612	4.553	25.4546
15.000	21.1849	36.3616	4.555	25.4548
16.000	21.1849	36.3616	4.559	25.4549
17.000	21.1853	36.3612	4.556	25.4544
18.000	21.1862	36.3613	4.553	25.4542
19.000	21.1866	36.3613	4.557	25.4542
20.000	21.1866	36.3613	4.558	25.4542
21.000	21.1855	36.3614	4.555	25.4545
22.000	21.1828	36.3612	4.559	25.4551
23.000	21.1828	36.3613	4.559	25.4553
24.000	21.1817	36.3613	4.558	25.4555
25.000	21.1822	36.3613	4.559	25.4554
26.000	21.1827	36.3612	4.558	25.4551
27.000	21.1818	36.3614	4.558	25.4556
28.000	21.1775	36.3612	4.559	25.4566
29.000	21.1738	36.3613	4.561	25.4577
30.000	21.1740	36.3611	4.562	25.4575
31.000	21.1800	36.3610	4.559	25.4557
32.000	21.1816	36.3611	4.559	25.4554
33.000	21.1714	36.3615	4.564	25.4585
34.000	21.1369	36.3624	4.569	25.4687
35.000	21.1075	36.3631	4.574	25.4773
36.000	21.0394	36.3663	4.580	25.4984
37.000	20.9224	36.3712	4.599	25.5341
38.000	20.5722	36.3820	4.617	25.6376
39.000	20.5154	36.3718	4.616	25.6452
40.000	20.3131	36.3660	4.620	25.6951
41.000	20.2725	36.3624	4.624	25.7033
42.000	20.2230	36.3602	4.625	25.7148
43.000	20.2132	36.3589	4.626	25.7165
44.000	20.2233	36.3568	4.627	25.7122
45.000	20.1935	36.3558	4.628	25.7194
46.000	20.1762	36.3556	4.630	25.7238
47.000	20.1515	36.3566	4.633	25.7312
48.000	20.1324	36.3572	4.635	25.7368
49.000	20.0898	36.3559	4.633	25.7472
50.000	19.9401	36.3494	4.634	25.7819
51.000	19.9032	36.3481	4.636	25.7907
52.000	19.8814	36.3506	4.638	25.7984
53.000	19.8989	36.3459	4.634	25.7902
54.000	19.7580	36.3419	4.636	25.8244
55.000	19.7443	36.3401	4.637	25.8266
56.000	19.7349	36.3384	4.637	25.8277
57.000	19.7596	36.3389	4.636	25.8216
58.000	19.5643	36.3362	4.639	25.8708
59.000	19.4943	36.3345	4.638	25.8879
60.000	19.4818	36.3325	4.639	25.8896
61.000	19.4369	36.3309	4.639	25.9001
62.000	19.4047	36.3357	4.639	25.9122
63.000	19.3619	36.3335	4.637	25.9216
64.000	19.3164	36.3287	4.637	25.9298
65.000	19.3267	36.3338	4.636	25.9310
66.000	19.2100	36.3365	4.635	25.9633
67.000	19.1706	36.3377	4.635	25.9745
68.000	19.0992	36.3434	4.634	25.9973
69.000	19.0983	36.3404	4.632	25.9952
70.000	19.0554	36.3414	4.628	26.0070
71.000	19.0486	36.3414	4.630	26.0088
72.000	19.0356	36.3415	4.627	26.0122
73.000	19.0236	36.3409	4.626	26.0148
74.000	19.0134	36.3400	4.628	26.0168
75.000	18.9886	36.3398	4.624	26.0230
76.000	18.9756	36.3405	4.626	26.0268
77.000	18.9681	36.3412	4.624	26.0294
78.000	18.9625	36.3415	4.624	26.0310
79.000	18.9489	36.3425	4.622	26.0352
80.000	18.9222	36.3438	4.619	26.0431
81.000	18.9030	36.3456	4.617	26.0494
82.000	18.8809	36.3477	4.613	26.0567
83.000	18.8667	36.3478	4.612	26.0604
84.000	18.8584	36.3468	4.613	26.0617
85.000	18.8529	36.3457	4.611	26.0623
86.000	18.8482	36.3448	4.614	26.0628
87.000	18.8334	36.3467	4.610	26.0681
88.000	18.7913	36.3531	4.598	26.0837
89.000	18.7757	36.3549	4.590	26.0891
90.000	18.7738	36.3556	4.590	26.0901
91.000	18.7661	36.3545	4.589	26.091
92.000	18.7142	36.3489	4.591	26.100
93.000	18.6840	36.3450	4.590	26.104
94.000	18.6725	36.3428	4.589	26.106
95.000	18.6665	36.3433	4.588	26.108
96.000	18.6426	36.3430	4.587	26.113
97.000	18.6044	36.3411	4.590	26.122
98.000	18.5196	36.3372	4.592	26.140
99.000	18.4864	36.3365	4.591	26.148
100.000	18.3922	36.3331	4.602	26.169
101.000	18.4020	36.3313	4.602	26.165
102.000	18.3280	36.3301	4.605	26.183
103.000	18.3162	36.3319	4.607	26.187
104.000	18.3098	36.3332	4.609	26.190
105.000	18.3031	36.3333	4.609	26.192
106.000	18.2900	36.3335	4.611	26.195
107.000	18.2717	36.3312	4.615	26.198
108.000	18.1038	36.3224	4.629	26.233
109.000	18.0161	36.3193	4.633	26.253
110.000	17.9462	36.3171	4.635	26.268
111.000	17.8667	36.3405	4.644	26.306
112.000	17.8396	36.3499	4.645	26.320
113.000	17.8574	36.3416	4.647	26.309
114.000	17.7555	36.3556	4.648	26.345
115.000	17.7317	36.3512	4.650	26.348
116.000	17.6999	36.3491	4.645	26.354
117.000	17.6304	36.3427	4.648	26.366
118.000	17.5462	36.3343	4.649	26.380
119.000	17.4850	36.3246	4.649	26.388
120.000	17.2738	36.3051	4.650	26.424
121.000	17.1986	36.2932	4.652	26.433
122.000	17.2141	36.2907	4.650	26.428
123.000	17.1873	36.2883	4.651	26.432
124.000	17.1427	36.2829	4.651	26.439
125.000	17.1288	36.2805	4.643	26.440
126.000	17.1211	36.2786	4.651	26.441
127.000	17.1266	36.2776	4.652	26.439
128.000	17.0756	36.2726	4.651	26.447
129.000	16.9901	36.2632	4.651	26.460
130.000	16.9144	36.2544	4.652	26.472
131.000	16.7862	36.2406	4.653	26.492
132.000	16.6623	36.2272	4.651	26.511
133.000	16.6204	36.2165	4.654	26.512
134.000	16.6229	36.2156	4.652	26.511
135.000	16.5181	36.2018	4.654	26.525
136.000	16.4792	36.1957	4.657	26.530
137.000	16.4747	36.1939	4.655	26.529
138.000	16.4723	36.1929	4.658	26.529
139.000	16.5022	36.1940	4.653	26.523
140.000	16.4955	36.1937	4.654	26.524
141.000	16.2628	36.1711	4.654	26.561
142.000	16.2137	36.1613	4.657	26.565
143.000	16.2035	36.1581	4.656	26.565
144.000	16.1916	36.1541	4.654	26.565
145.000	16.1855	36.1521	4.655	26.565
146.000	16.2280	36.1551	4.655	26.557
147.000	16.1919	36.1508	4.654	26.562
148.000	16.1764	36.1488	4.657	26.564
149.000	16.1668	36.1476	4.657	26.566
150.000	16.1509	36.1465	4.655	26.569
151.000	16.1287	36.1406	4.654	26.569
152.000	16.1629	36.1439	4.654	26.564
153.000	16.0758	36.1348	4.656	26.577
154.000	15.9365	36.1164	4.660	26.595
155.000	15.9310	36.1139	4.659	26.594
156.000	15.9145	36.1117	4.655	26.596
157.000	15.8563	36.1037	4.658	26.604
158.000	15.9719	36.1131	4.657	26.584
159.000	15.8293	36.0997	4.656	26.607
160.000	15.6813	36.0795	4.658	26.625
161.000	15.5721	36.0632	4.660	26.637
162.000	15.5326	36.0554	4.660	26.640
163.000	15.6100	36.0633	4.661	26.629
164.000	15.4217	36.0365	4.661	26.651
165.000	15.4171	36.0327	4.661	26.649
166.000	15.3855	36.0287	4.660	26.653
167.000	15.3641	36.0241	4.660	26.654
168.000	15.3336	36.0191	4.661	26.657
169.000	15.3245	36.0156	4.660	26.656
170.000	15.3217	36.0144	4.662	26.656
171.000	15.3160	36.0132	4.662	26.656
172.000	15.3021	36.0106	4.660	26.658
173.000	15.2958	36.0091	4.661	26.658
174.000	15.2878	36.0075	4.655	26.658
175.000	15.2611	36.0031	4.661	26.661
176.000	15.2350	35.9991	4.662	26.664
177.000	15.2133	35.9954	4.661	26.666
178.000	15.2038	35.9932	4.663	26.666
179.000	15.1537	35.9872	4.659	26.673
180.000	15.0214	35.9677	4.661	26.687

181.000	14.9515	35.9583	4.660	26.6956
182.000	14.8704	35.9454	4.663	26.7030
183.000	14.8609	35.9427	4.662	26.7036
184.000	14.8487	35.9403	4.663	26.7044
185.000	14.8516	35.9395	4.661	26.7031
186.000	14.7695	35.9290	4.662	26.7131
187.000	14.6812	35.9153	4.665	26.7219
188.000	14.6347	35.9093	4.661	26.7274
189.000	14.5436	35.8977	4.664	26.7382
190.000	14.6074	35.9005	4.662	26.7265
191.000	14.6651	35.9083	4.661	26.7199
192.000	14.4735	35.8857	4.662	26.7441
193.000	14.4169	35.8750	4.664	26.7481
194.000	14.4161	35.8731	4.665	26.7468
195.000	14.4170	35.8712	4.662	26.7451
196.000	14.5201	35.8810	4.662	26.7304
197.000	14.3367	35.8621	4.662	26.7559
198.000	14.2652	35.8514	4.664	26.7625
199.000	14.2171	35.8436	4.663	26.7668
200.000	14.1991	35.8401	4.663	26.7679
201.000	14.1828	35.8362	4.663	26.7684
202.000	14.3830	35.8557	4.662	26.7406
203.000	14.1323	35.8308	4.663	26.7750
204.000	14.0698	35.8198	4.668	26.7798
205.000	14.0463	35.8165	4.664	26.7822
206.000	13.9432	35.8046	4.663	26.7949
207.000	14.0570	35.8119	4.662	26.7764
208.000	14.0016	35.8047	4.663	26.7826
209.000	13.8636	35.7911	4.662	26.8012
210.000	13.8056	35.7793	4.663	26.8043
211.000	13.7969	35.7768	4.662	26.8042
212.000	13.8061	35.7759	4.662	26.8016
213.000	13.8310	35.7765	4.664	26.7968
214.000	13.7377	35.7658	4.665	26.8081
215.000	13.6885	35.7586	4.665	26.8128
216.000	13.6542	35.7533	4.664	26.8158
217.000	13.6512	35.7519	4.664	26.8154
218.000	13.6464	35.7505	4.664	26.8153
219.000	13.6345	35.7482	4.666	26.8160
220.000	13.6211	35.7462	4.664	26.8173
221.000	13.5986	35.7432	4.666	26.8196
222.000	13.5460	35.7367	4.664	26.8255
223.000	13.5506	35.7348	4.665	26.8231
224.000	13.4539	35.7232	4.665	26.8342
225.000	13.4280	35.7185	4.667	26.8358
226.000	13.3979	35.7132	4.665	26.8379
227.000	13.3915	35.7111	4.665	26.8376
228.000	13.3807	35.7087	4.663	26.8380
229.000	13.3576	35.7052	4.665	26.8401
230.000	13.3605	35.7036	4.664	26.8382
231.000	13.3284	35.7006	4.665	26.8425
232.000	13.2957	35.6967	4.665	26.8462
233.000	13.2743	35.6931	4.665	26.8478
234.000	13.2562	35.6910	4.665	26.8498
235.000	13.3005	35.6939	4.664	26.8430
236.000	13.2864	35.6940	4.665	26.8459
237.000	13.2132	35.6851	4.667	26.8541
238.000	13.1643	35.6794	4.665	26.8596
239.000	13.0877	35.6696	4.664	26.8676
240.000	13.0581	35.6625	4.664	26.8681
241.000	13.2062	35.6769	4.664	26.8491
242.000	13.0900	35.6677	4.664	26.8657
243.000	12.9453	35.6488	4.664	26.8803
244.000	12.9130	35.6420	4.664	26.8815
245.000	12.8928	35.6376	4.665	26.8822
246.000	12.9146	35.6395	4.665	26.8793
247.000	12.8442	35.6276	4.665	26.8842
248.000	12.8277	35.6243	4.665	26.8850
249.000	12.8156	35.6216	4.660	26.8853
250.000	12.8111	35.6210	4.663	26.8857
251.000	12.7831	35.6182	4.664	26.8892
252.000	12.7723	35.6161	4.664	26.8896
253.000	12.7893	35.6164	4.664	26.8865
254.000	12.7463	35.6116	4.665	26.8913
255.000	12.7275	35.6084	4.665	26.8927
256.000	12.7114	35.6057	4.664	26.8937
257.000	12.7189	35.6054	4.665	26.8920
258.000	12.6663	35.5988	4.668	26.8974
259.000	12.6361	35.5940	4.666	26.8997
260.000	12.6234	35.5919	4.666	26.9006
261.000	12.6056	35.5890	4.664	26.9018
262.000	12.5813	35.5855	4.664	26.9039
263.000	12.5107	35.5744	4.664	26.9093
264.000	12.5338	35.5781	4.665	26.9076
265.000	12.5133	35.5752	4.662	26.9094
266.000	12.4934	35.5721	4.666	26.9109
267.000	12.4761	35.5696	4.664	26.9124
268.000	12.4701	35.5686	4.664	26.9128
269.000	12.4791	35.5687	4.665	26.9111
270.000	12.4535	35.5653	4.664	26.9135
271.000	12.4164	35.5612	4.665	26.9176
272.000	12.3968	35.5577	4.665	26.9187
273.000	12.3884	35.5564	4.666	26.9194
274.000	12.3792	35.5542	4.665	26.9195
275.000	12.3463	35.5500	4.665	26.9227
276.000	12.3124	35.5451	4.665	26.9255
277.000	12.2962	35.5429	4.664	26.9269
278.000	12.2826	35.5410	4.663	26.9281
279.000	12.2694	35.5388	4.664	26.9289
280.000	12.2566	35.5375	4.665	26.9305
281.000	12.2318	35.5331	4.664	26.9319
282.000	12.2031	35.5285	4.665	26.9339
283.000	12.1974	35.5270	4.663	26.9338
284.000	12.1578	35.5219	4.663	26.9375
285.000	12.1075	35.5155	4.664	26.9423
286.000	12.0951	35.5127	4.665	26.9425
287.000	12.0920	35.5117	4.664	26.9423
288.000	12.0986	35.5117	4.665	26.9411
289.000	12.0786	35.5096	4.663	26.9433
290.000	12.0564	35.5066	4.664	26.9452
291.000	12.0583	35.5059	4.664	26.9444
292.000	12.0449	35.5034	4.664	26.9450
293.000	11.9940	35.4980	4.667	26.9506
294.000	11.9664	35.4951	4.661	26.9536
295.000	11.9323	35.4896	4.664	26.9559
296.000	11.9300	35.4874	4.663	26.9547
297.000	11.9065	35.4857	4.665	26.9578
298.000	11.8505	35.4772	4.665	26.9619
299.000	11.7528	35.4650	4.664	26.9710
300.000	11.7104	35.4590	4.665	26.9744
301.000	11.6880	35.4555	4.664	26.9759
302.000	11.6722	35.4533	4.665	26.9771
303.000	11.7763	35.4610	4.662	26.9635
304.000	11.6876	35.4545	4.667	26.9752
305.000	11.6150	35.4454	4.664	26.9818
306.000	11.6050	35.4430	4.664	26.9818
307.000	11.5785	35.4390	4.664	26.9837
308.000	11.6588	35.4440	4.662	26.9725
309.000	11.6077	35.4412	4.662	26.9800
310.000	11.5147	35.4295	4.662	26.9882
311.000	11.4556	35.4214	4.665	26.9930
312.000	11.3978	35.4119	4.657	26.9964
313.000	11.4135	35.4073	4.655	26.9899
314.000	11.5355	35.4262	4.660	26.9818
315.000	11.3016	35.3981	4.651	27.0035
316.000	11.2962	35.3959	4.649	27.0028
317.000	11.2874	35.3938	4.646	27.0028
318.000	11.2754	35.3918	4.645	27.0034
319.000	11.3522	35.3975	4.645	26.9937
320.000	11.3141	35.3966	4.642	27.0000
321.000	11.2372	35.3876	4.633	27.0073
322.000	11.2039	35.3832	4.632	27.0100
323.000	11.1743	35.3787	4.631	27.0119
324.000	11.2025	35.3795	4.631	27.0073
325.000	11.1633	35.3755	4.632	27.0114
326.000	11.1133	35.3692	4.633	27.0157
327.000	11.1071	35.3672	4.629	27.0153
328.000	11.0926	35.3648	4.631	27.0161
329.000	11.0890	35.3639	4.629	27.0161
330.000	11.0850	35.3631	4.629	27.0161
331.000	11.0895	35.3629	4.630	27.0151
332.000	11.0641	35.3593	4.630	27.0170
333.000	11.0492	35.3571	4.630	27.0180
334.000	11.0414	35.3560	4.628	27.0185
335.000	11.0268	35.3539	4.629	27.0196
336.000	11.0280	35.3535	4.628	27.0190
337.000	11.0272	35.3527	4.629	27.0186
338.000	11.0268	35.3525	4.628	27.0185
339.000	11.0243	35.3523	4.629	27.0188
340.000	11.0221	35.3519	4.629	27.0189
341.000	11.0102	35.3503	4.627	27.0198
342.000	11.0055	35.3496	4.628	27.0201
343.000	10.9953	35.3484	4.628	27.0211
344.000	10.9894	35.3472	4.627	27.0212
345.000	10.9793	35.3458	4.629	27.0219
346.000	10.9571	35.3432	4.630	27.0240
347.000	10.9450	35.3416	4.630	27.0249
348.000	10.9318	35.3400	4.630	27.0260
349.000	10.9473	35.3403	4.629	27.0235
350.000	10.9292	35.3388	4.630	27.0256
351.000	10.9046	35.3359	4.631	27.0278
352.000	10.8910	35.3347	4.631	27.0293
353.000	10.8625	35.3312	4.631	27.0318
354.000	10.8819	35.3312	4.630	27.0282
355.000	10.8530	35.3288	4.633	27.0315
356.000	10.8348	35.3256	4.634	27.0324
357.000	10.8263	35.3240	4.633	27.0326
358.000	10.8000	35.3207	4.633	27.0348
359.000	10.7452	35.3147	4.637	27.0400
360.000	10.7265	35.3117	4.633	27.0410

361.000	10.7185	35.3105	4.634	27.0415
362.000	10.7767	35.3149	4.632	27.0345
363.000	10.6705	35.3054	4.634	27.0461
364.000	10.6406	35.3010	4.635	27.0480
365.000	10.6282	35.2984	4.637	27.0482
366.000	10.6234	35.2969	4.638	27.0479
367.000	10.6414	35.2969	4.636	27.0447
368.000	10.5930	35.2920	4.638	27.0495
369.000	10.5719	35.2888	4.637	27.0507
370.000	10.5554	35.2866	4.637	27.0519
371.000	10.5482	35.2852	4.635	27.0521
372.000	10.5475	35.2846	4.635	27.0518
373.000	10.5459	35.2839	4.637	27.0516
374.000	10.5420	35.2836	4.638	27.0519
375.000	10.5314	35.2823	4.634	27.0528
376.000	10.5284	35.2812	4.637	27.0525
377.000	10.5223	35.2801	4.637	27.0527
378.000	10.4947	35.2770	4.636	27.0552
379.000	10.4824	35.2753	4.634	27.0560
380.000	10.4572	35.2721	4.636	27.0580
381.000	10.4385	35.2694	4.634	27.0592
382.000	10.4374	35.2693	4.637	27.0593
383.000	10.4364	35.2691	4.636	27.0593
384.000	10.4413	35.2687	4.638	27.0581
385.000	10.4374	35.2685	4.637	27.0587
386.000	10.4333	35.2681	4.636	27.0591
387.000	10.4340	35.2680	4.639	27.0589
388.000	10.4343	35.2680	4.637	27.0588
389.000	10.4393	35.2677	4.636	27.0578
390.000	10.4339	35.2678	4.635	27.0587
391.000	10.4326	35.2675	4.638	27.0588
392.000	10.4324	35.2671	4.637	27.0585
393.000	10.4321	35.2671	4.637	27.0585
394.000	10.4329	35.2670	4.637	27.0583
395.000	10.4329	35.2671	4.637	27.0584
396.000	10.4302	35.2672	4.639	27.0589
397.000	10.4280	35.2671	4.635	27.0593
398.000	10.4274	35.2670	4.637	27.0593
399.000	10.4300	35.2665	4.637	27.0585
400.000	10.4255	35.2664	4.634	27.0592
401.000	10.4227	35.2660	4.635	27.0593
402.000	10.3974	35.2646	4.637	27.0627
403.000	10.3652	35.2599	4.635	27.0647
404.000	10.3636	35.2588	4.637	27.0641
405.000	10.3934	35.2611	4.636	27.0607
406.000	10.3847	35.2612	4.635	27.0622
407.000	10.2940	35.2536	4.637	27.0723
408.000	10.2131	35.2420	4.636	27.0773
409.000	10.1937	35.2383	4.636	27.0778
410.000	10.1940	35.2360	4.636	27.0759
411.000	10.2245	35.2378	4.636	27.0720
412.000	10.1969	35.2350	4.636	27.0747
413.000	10.1472	35.2299	4.637	27.0792
414.000	10.1273	35.2264	4.636	27.0800
415.000	10.1198	35.2252	4.635	27.0804
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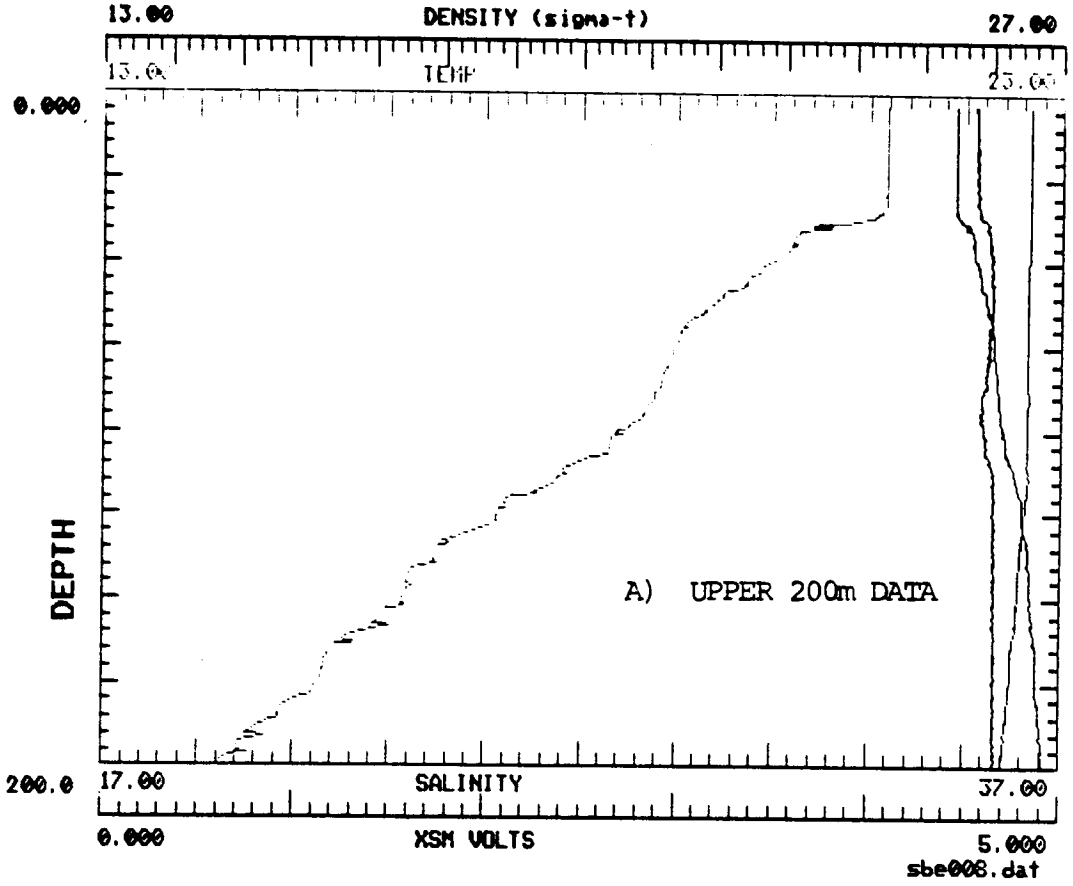
417.000	10.1021	35.2210	4.636	27.0801
418.000	10.1798	35.2298	4.632	27.0735
419.000	10.0992	35.2231	4.634	27.0823
420.000	10.0548	35.2176	4.635	27.0856
421.000	10.0481	35.2154	4.633	27.0851
422.000	10.0404	35.2140	4.634	27.0853
423.000	10.0370	35.2137	4.636	27.0856
424.000	10.0479	35.2130	4.635	27.0832
425.000	10.0425	35.2132	4.636	27.0843
426.000	9.9749	35.2074	4.633	27.0914
427.000	9.9438	35.2023	4.631	27.0927
428.000	9.9374	35.2007	4.634	27.0926
429.000	9.9352	35.1997	4.632	27.0922
430.000	9.9373	35.1992	4.634	27.0914
431.000	9.9633	35.2007	4.636	27.0882
432.000	9.9471	35.2009	4.636	27.0910
433.000	9.8688	35.1939	4.636	27.0989
434.000	9.8434	35.1894	4.636	27.0998
435.000	9.8577	35.1907	4.636	27.0981
436.000	9.8399	35.1863	4.638	27.0980
437.000	9.8388	35.1856	4.639	27.0976
438.000	9.8224	35.1854	4.639	27.1002
439.000	9.7971	35.1806	4.638	27.1007
440.000	9.7824	35.1796	4.636	27.1024
441.000	9.7803	35.1792	4.636	27.1025
442.000	9.7808	35.1786	4.638	27.1020
443.000	9.7795	35.1784	4.640	27.1020
444.000	9.7407	35.1748	4.641	27.1058
445.000	9.6723	35.1682	4.639	27.1122
446.000	9.6498	35.1640	4.643	27.1127
447.000	9.6200	35.1619	4.645	27.1160
448.000	9.5703	35.1565	4.644	27.1201
449.000	9.5526	35.1529	4.645	27.1202
450.000	9.5466	35.1502	4.644	27.1191
451.000	9.5412	35.1493	4.646	27.1193
452.000	9.4934	35.1439	4.646	27.1231
453.000	9.4887	35.1433	4.647	27.1234
454.000	9.4708	35.1417	4.644	27.1251
455.000	9.4583	35.1400	4.644	27.1259
456.000	9.4499	35.1370	4.645	27.1249
457.000	9.4450	35.1360	4.643	27.1249
458.000	9.3640	35.1300	4.643	27.1337
459.000	9.3328	35.1255	4.641	27.1353
460.000	9.3237	35.1230	4.640	27.1347
461.000	9.3226	35.1225	4.640	27.1345
462.000	9.3242	35.1215	4.641	27.1335
463.000	9.3427	35.1217	4.641	27.1306
464.000	9.3312	35.1223	4.640	27.1330
465.000	9.3125	35.1199	4.637	27.1342
466.000	9.3095	35.1198	4.640	27.1346
467.000	9.2962	35.1184	4.635	27.1357
468.000	9.3153	35.1184	4.636	27.1326
469.000	9.3260	35.1200	4.638	27.1321
470.000	9.2515	35.1159	4.637	27.1411
471.000	9.2147	35.1124	4.640	27.1444
472.000	9.1232	35.1068	4.642	27.1548
473.000	9.0946	35.1016	4.643	27.1555
474.000	9.0635	35.0991	4.646	27.1585
475.000	8.9832	35.0915	4.646	27.1656
476.000	8.9347	35.0862	4.645	27.1692
477.000	8.9298	35.0824	4.645	27.1670
478.000	8.9137	35.0805	4.646	27.1680
479.000	8.9035	35.0778	4.644	27.1675
480.000	8.8981	35.0766	4.644	27.1675
481.000	8.8938	35.0757	4.647	27.1675
482.000	8.8889	35.0747	4.647	27.1675
483.000	8.8881	35.0742	4.646	27.1671
484.000	8.8756	35.0739	4.644	27.1690
485.000	8.8508	35.0711	4.647	27.1707
486.000	8.8320	35.0693	4.648	27.1723
487.000	8.7956	35.0665	4.645	27.1759
488.000	8.7752	35.0640	4.645	27.1772
489.000	8.7618	35.0625	4.645	27.1781
490.000	8.7381	35.0583	4.649	27.1786
491.000	8.7326	35.0576	4.645	27.1789
492.000	8.7245	35.0565	4.648	27.1793
493.000	8.7077	35.0548	4.645	27.1806
494.000	8.6483	35.0496	4.646	27.1859
495.000	8.6025	35.0437	4.646	27.1885
496.000	8.5472	35.0387	4.646	27.1933
497.000	8.5145	35.0349	4.645	27.1954
498.000	8.5088	35.0334	4.649	27.1951
499.000	8.5220	35.0334	4.645	27.1930
500.000	8.4548	35.0293	4.649	27.2003
502.000	8.4720	35.0334	4.650	27.2008
503.000	8.4671	35.0314	4.648	27.2000
504.000	8.3823	35.0198	4.648	27.2040

(20m data hiatus)

524.000	8.0141	34.9789	4.655	27.2283
526.000	8.0902	34.9875	4.652	27.2233
527.000	8.0472	34.9865	4.653	27.2290
528.000	8.0733	34.9869	4.651	27.2254
529.000	8.0030	34.9845	4.653	27.2341
530.000	7.9694	34.9817	4.653	27.2369
531.000	8.0142	34.9827	4.650	27.2310
532.000	7.9450	34.9780	4.650	27.2377
533.000	7.9277	34.9751	4.650	27.2380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DENSITY (sigma-t)
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13.0
TEMP
0.000
DEPTH
A) UPPER 200m DATA
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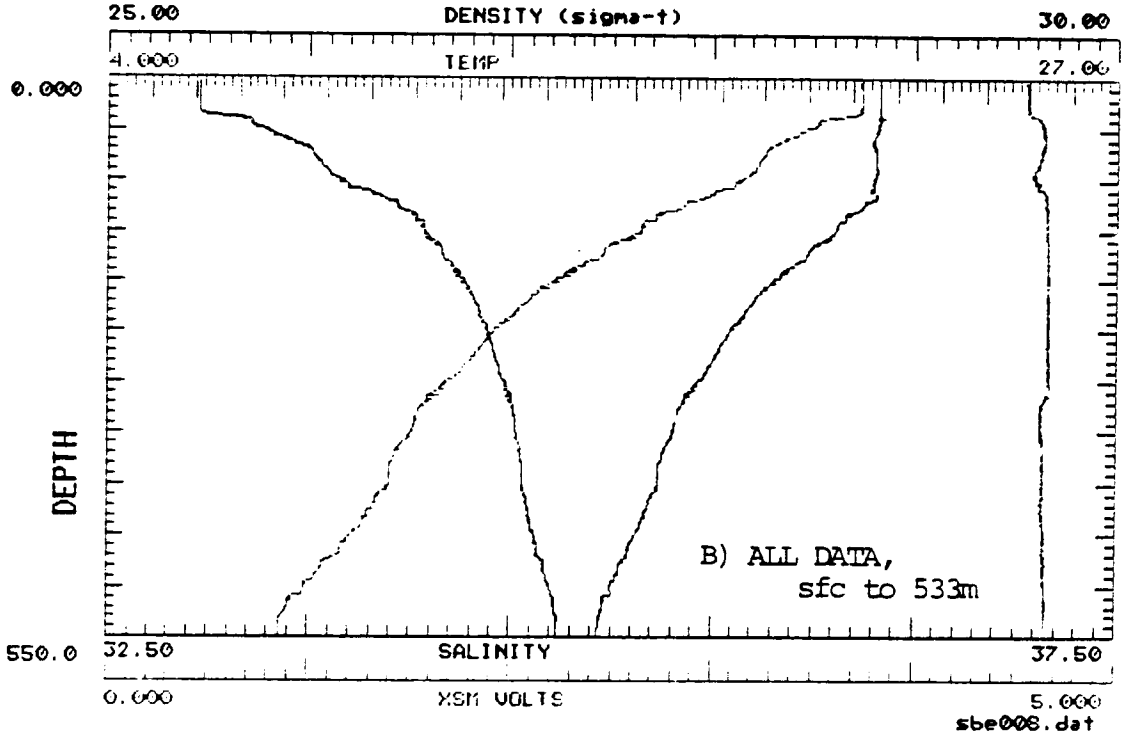
17.00
SALINITY
37.00
0.000
XSM VOLTS
5.000
sbe008.dat


25.00
DENSITY (sigma-t)
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4.000
TEMP
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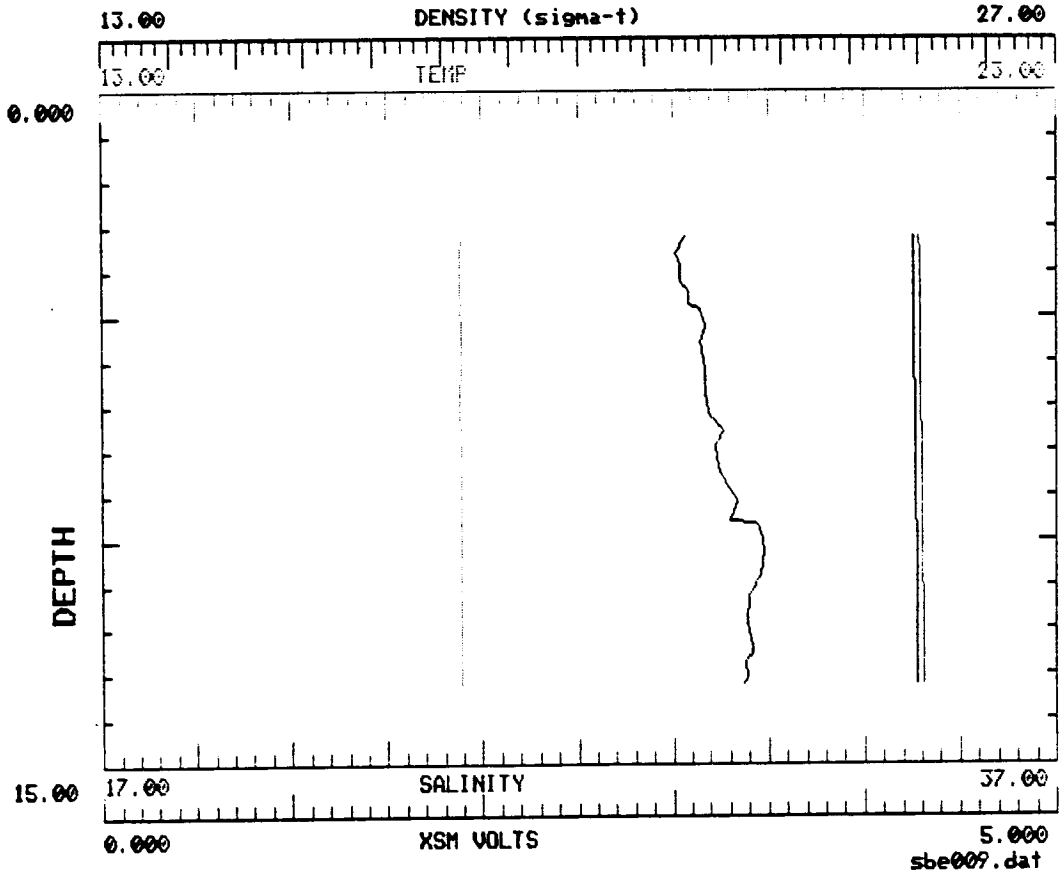
0.000
DEPTH
B) ALL DATA,
sfc to 533m
550.0
32.50
SALINITY
37.50
0.000
XSM VOLTS
5.000
sbe008.dat

(return to work area
of CTD 03)

raw data file = sbe009.dat

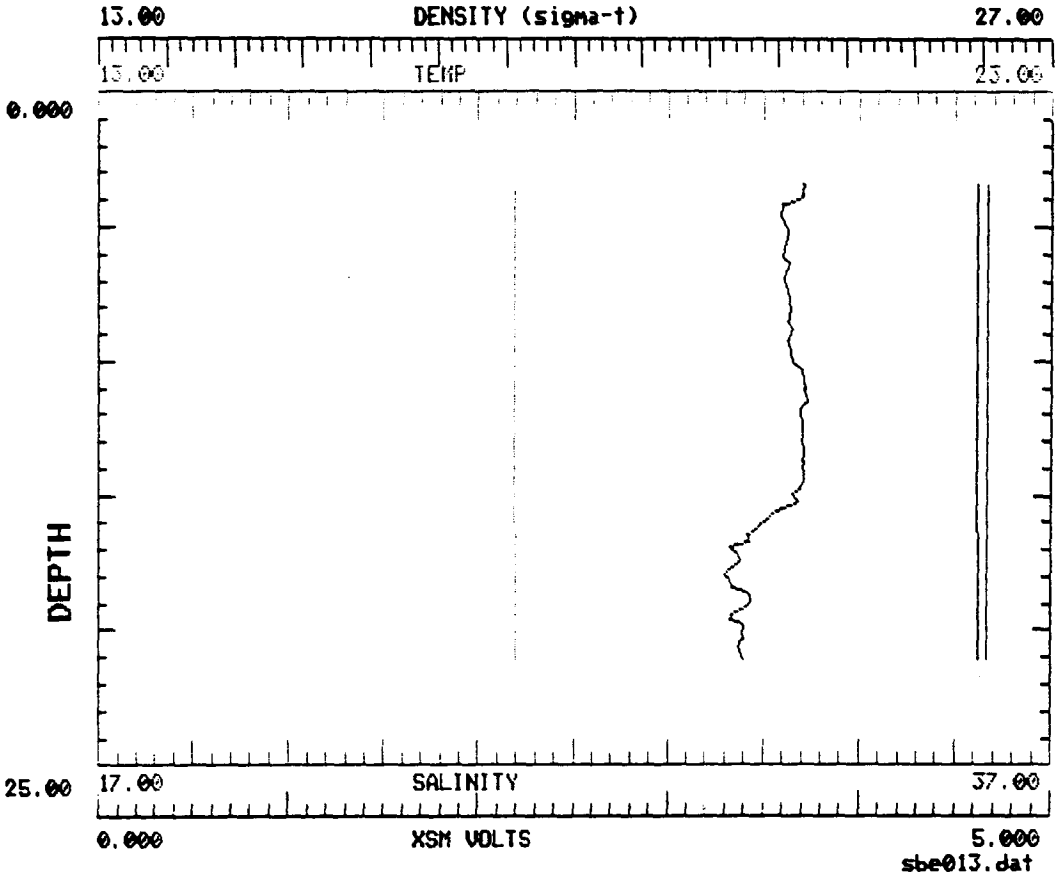
meters	temp	salinity	volts# 1	sigma-t
3.000	16.7738	34.1817	3.024	24.9135
4.000	16.7723	34.1848	3.039	24.9162
5.000	16.7739	34.1831	3.112	24.9146
6.000	16.7733	34.1999	3.152	24.9277
7.000	16.7733	34.2020	3.143	24.9292
8.000	16.7764	34.2274	3.244	24.9480
9.000	16.7806	34.2327	3.307	24.9511
10.000	16.7827	34.2348	3.421	24.9522
11.000	16.7853	34.2516	3.427	24.9645
12.000	16.7846	34.2566	3.404	24.9685
13.000	16.7851	34.2550	3.368	24.9672



CTD 13
(return to work area
of CTD 04 & 04B)

raw data file = sbe013.dat

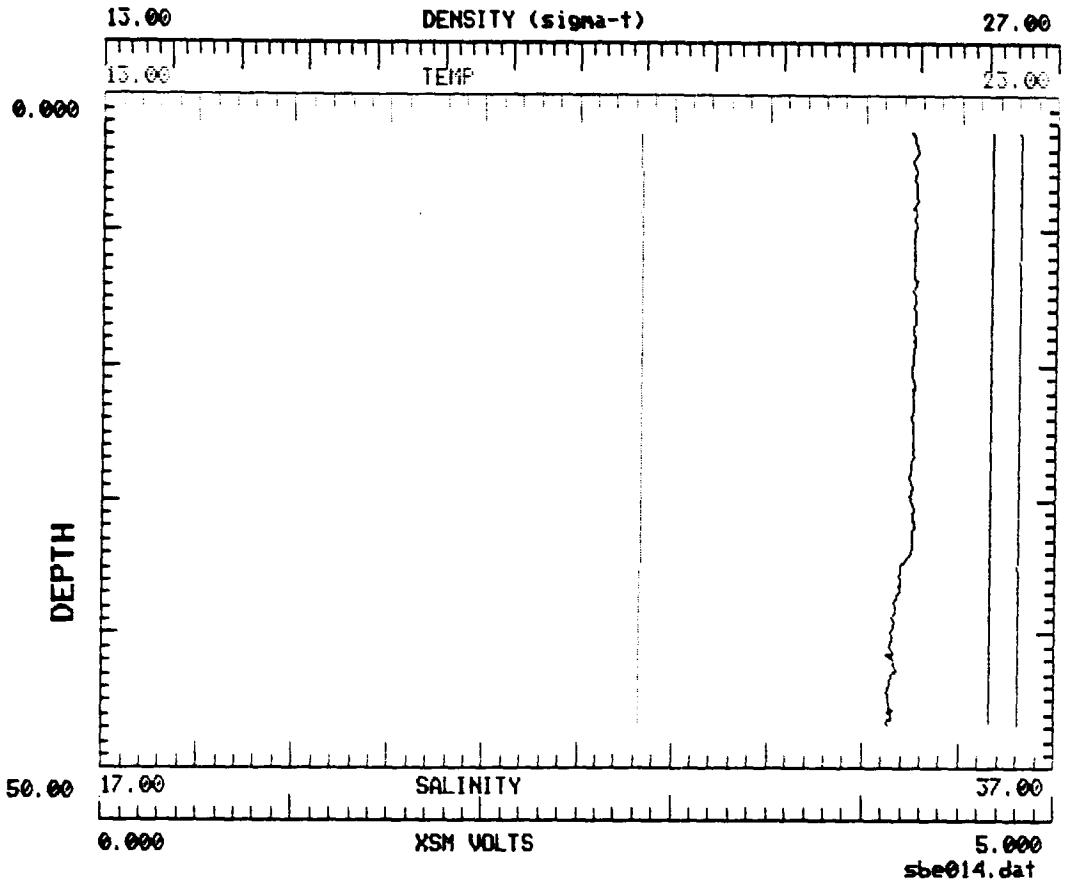
meters	temp	salinity	volts# 1	sigma-t
4.000	17.3799	35.6970	3.624	25.9268
5.000	17.3799	35.6990	3.606	25.9283
6.000	17.3804	35.6985	3.615	25.9278
7.000	17.3813	35.6991	3.618	25.9280
8.000	17.3822	35.6988	3.637	25.9276
9.000	17.3826	35.6986	3.637	25.9273
10.000	17.3819	35.6988	3.668	25.9277
11.000	17.3808	35.6991	3.722	25.9282
12.000	17.3851	35.7001	3.700	25.9279
13.000	17.3845	35.6997	3.705	25.9277
14.000	17.3838	35.6992	3.709	25.9275
15.000	17.3865	35.7013	3.678	25.9285
16.000	17.3873	35.7029	3.494	25.9295
17.000	17.3953	35.7198	3.343	25.9406
18.000	17.3924	35.7159	3.320	25.9383
19.000	17.3930	35.7175	3.388	25.9393
20.000	17.3915	35.7136	3.383	25.9367
21.000	17.3907	35.7129	3.358	25.9363



raw data file = sbe014.dat

meters	temp	salinity	volts# 1	sigma-t
3.000	18.6540	36.2533	4.236	26.0376
4.000	18.6626	36.2548	4.263	26.0359
5.000	18.6604	36.2556	4.247	26.0370
6.000	18.6702	36.2554	4.261	26.0344
7.000	18.6688	36.2553	4.265	26.0347
8.000	18.6675	36.2552	4.262	26.0350
9.000	18.6693	36.2554	4.258	26.0346
10.000	18.6732	36.2553	4.253	26.0336
11.000	18.6737	36.2552	4.254	26.0334
12.000	18.6727	36.2551	4.257	26.0336
13.000	18.6713	36.2552	4.256	26.0340
14.000	18.6728	36.2551	4.257	26.0336
15.000	18.6723	36.2551	4.263	26.0336
16.000	18.6740	36.2556	4.258	26.0336
17.000	18.6759	36.2556	4.254	26.0332
18.000	18.6748	36.2554	4.259	26.0333
19.000	18.6746	36.2557	4.259	26.0336
20.000	18.6755	36.2559	4.253	26.0335
21.000	18.6757	36.2558	4.249	26.0333
22.000	18.6742	36.2554	4.258	26.0335
23.000	18.6713	36.2553	4.256	26.0341
24.000	18.6702	36.2559	4.254	26.0348
25.000	18.6718	36.2555	4.253	26.0341
26.000	18.6718	36.2554	4.257	26.0340
27.000	18.6712	36.2553	4.252	26.0341
28.000	18.6720	36.2557	4.244	26.0342
29.000	18.6726	36.2558	4.248	26.0341
30.000	18.6730	36.2558	4.246	26.0340
31.000	18.6730	36.2555	4.255	26.0338
32.000	18.6720	36.2557	4.263	26.0342
33.000	18.6703	36.2559	4.255	26.0347
34.000	18.6699	36.2556	4.242	26.0346
35.000	18.6643	36.2550	4.203	26.0356
36.000	18.6615	36.2551	4.189	26.0365
37.000	18.6629	36.2553	4.178	26.0362
38.000	18.6588	36.2552	4.168	26.0372
39.000	18.6610	36.2557	4.162	26.0370
40.000	18.6570	36.2556	4.158	26.0379
41.000	18.6570	36.2555	4.152	26.0379
42.000	18.6597	36.2552	4.156	26.0370
43.000	18.6593	36.2554	4.164	26.0372
44.000	18.6567	36.2555	4.135	26.0380
45.000	18.6566	36.2556	4.131	26.0381
46.000	18.6582	36.2554	4.151	26.0375

(return to work area of CTD 07)



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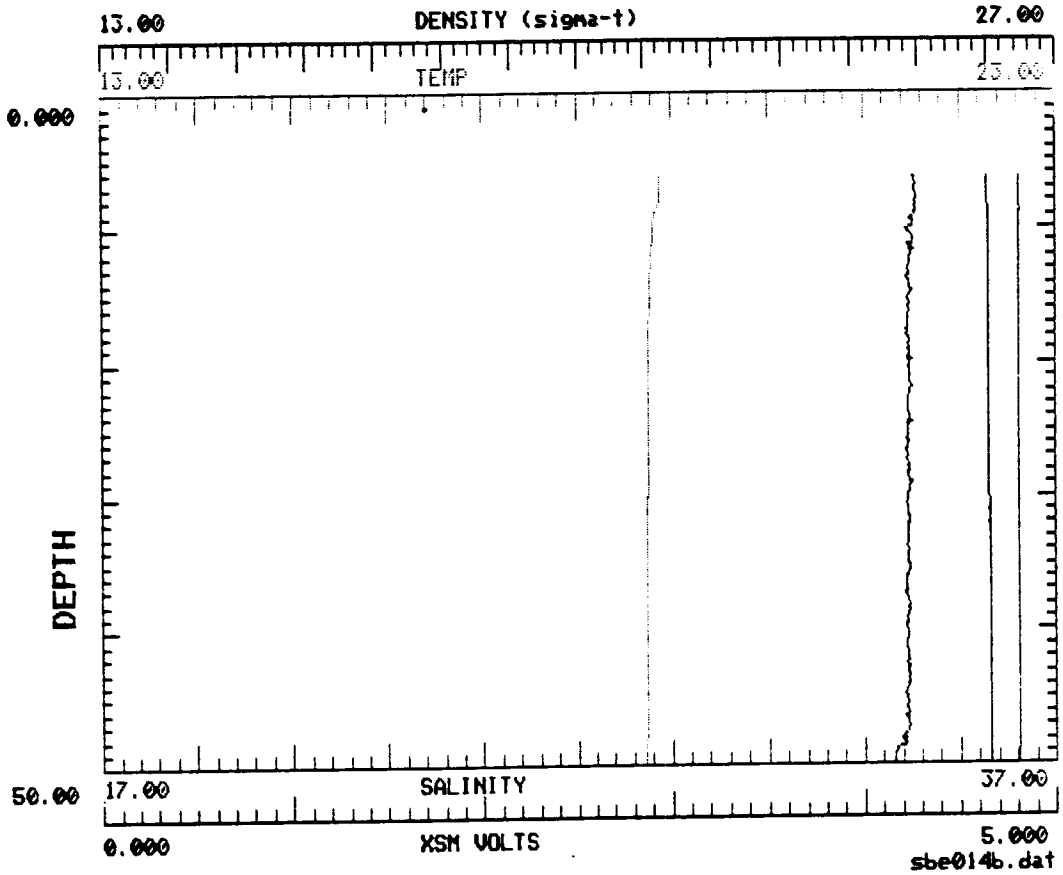
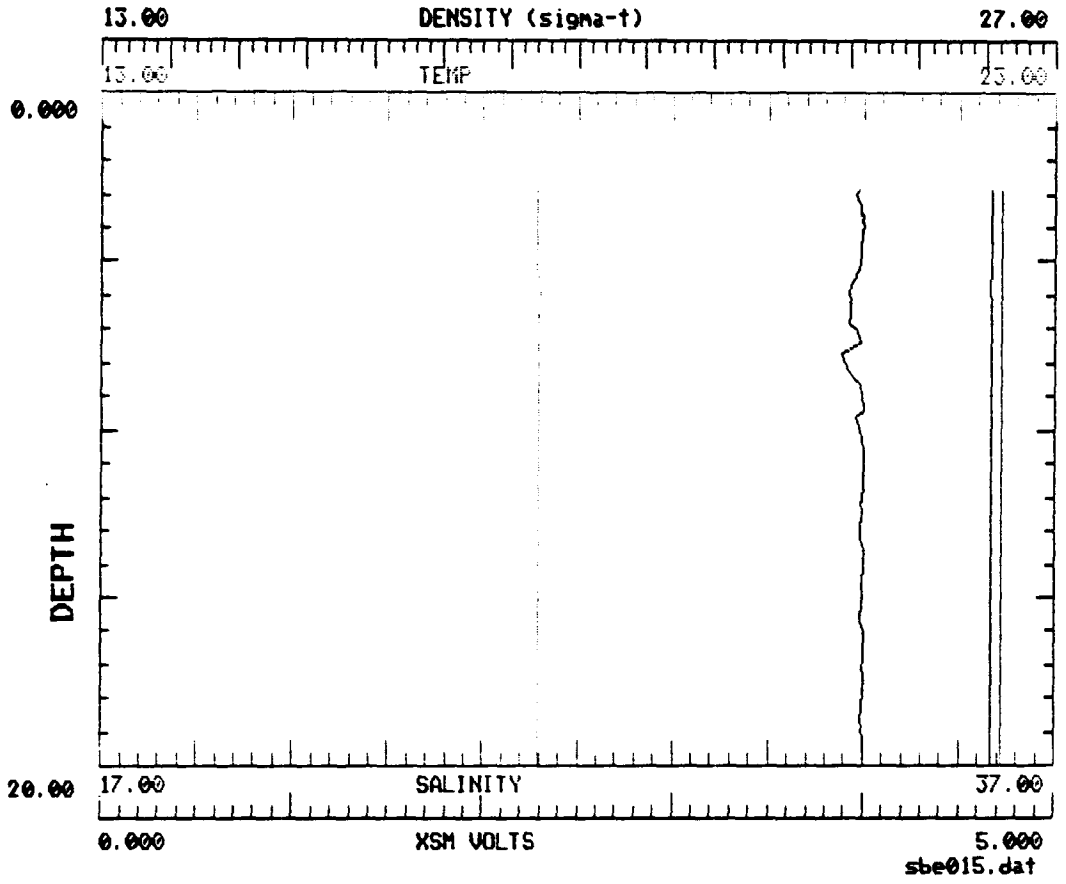
meters	temp	salinity	volts# 1	sigma-t
6.000	18.8829	36.2707	4.257	25.9921
7.000	18.8805	36.2709	4.267	25.9927
8.000	18.8751	36.2727	4.269	25.9954
9.000	18.8366	36.2874	4.261	26.0165
10.000	18.8133	36.2744	4.243	26.0125
11.000	18.8088	36.2757	4.247	26.0146
12.000	18.7910	36.2757	4.243	26.0192
13.000	18.7851	36.2758	4.236	26.0208
14.000	18.7801	36.2758	4.235	26.0220
15.000	18.7808	36.2754	4.234	26.0216
16.000	18.7735	36.2759	4.231	26.0238
17.000	18.7685	36.2756	4.225	26.0249
18.000	18.7677	36.2755	4.231	26.0250
19.000	18.7653	36.2752	4.231	26.0254
20.000	18.7612	36.2748	4.236	26.0261
21.000	18.7574	36.2745	4.238	26.0268
22.000	18.7564	36.2745	4.242	26.0271
23.000	18.7572	36.2743	4.228	26.0268
24.000	18.7540	36.2755	4.234	26.0285
25.000	18.7552	36.2749	4.232	26.0277
26.000	18.7528	36.2766	4.228	26.0296
27.000	18.7536	36.2764	4.224	26.0293
28.000	18.7541	36.2757	4.236	26.0286
29.000	18.7540	36.2756	4.234	26.0285
30.000	18.7517	36.2771	4.233	26.0303
31.000	18.7462	36.2774	4.230	26.0320
32.000	18.7448	36.2777	4.235	26.0325
33.000	18.7433	36.2784	4.231	26.0334
34.000	18.7416	36.2785	4.230	26.0339
35.000	18.7395	36.2785	4.237	26.0345
36.000	18.7389	36.2785	4.229	26.0347
37.000	18.7389	36.2789	4.219	26.0349
38.000	18.7395	36.2783	4.232	26.0343
39.000	18.7405	36.2780	4.231	26.0339
40.000	18.7394	36.2786	4.228	26.0345
41.000	18.7386	36.2784	4.220	26.0346
42.000	18.7382	36.2781	4.235	26.0345
43.000	18.7391	36.2780	4.235	26.0342
44.000	18.7358	36.2781	4.232	26.0351
45.000	18.7355	36.2783	4.224	26.0353
46.000	18.7367	36.2781	4.232	26.0349
47.000	18.7369	36.2774	4.228	26.0343
48.000	18.7349	36.2779	4.215	26.0352
49.000	18.7300	36.2783	4.176	26.0367
50.000	18.7236	36.2780	4.150	26.0382
51.000	18.7218	36.2780	4.153	26.0386
52.000	18.7203	36.2773	4.158	26.0384



CTD 15
(return to work area
of CTD 05)

raw data file = sbe015.dat

meters	temp	salinity	volts# 1	sigma-t
3.000	17.5742	35.9384	3.9790	26.062
4.000	17.5778	35.9397	3.9930	26.063
5.000	17.5780	35.9393	3.9790	26.062
6.000	17.5814	35.9383	3.9330	26.061
7.000	17.5831	35.9392	3.9480	26.061
8.000	17.5802	35.9403	3.9080	26.062
9.000	17.5798	35.9405	3.9860	26.063
10.000	17.5802	35.9411	3.9840	26.063
11.000	17.5802	35.9410	3.9990	26.063
12.000	17.5802	35.9409	3.9940	26.063
13.000	17.5807	35.9402	3.9930	26.062
14.000	17.5807	35.9409	3.9940	26.063
15.000	17.5811	35.9414	3.9950	26.063
16.000	17.5809	35.9410	3.9950	26.063
17.000	17.5813	35.9410	3.9970	26.063
18.000	17.5812	35.9407	3.9970	26.062
19.000	17.5815	35.9406	3.9950	26.062
20.000	17.5814	35.9407	3.9740	26.062
21.000	17.5816	35.9408	3.9950	26.062
22.000	17.5808	35.9406	3.9980	26.063



BOTTLE DATA

At each CTD station, up to twelve 30-liter Niskin bottles were tripped on the upcast and analyzed on board ship for salinity, dissolved oxygen, nutrients, and chlorophyll + acid degradation products. Nutrient analyses for nitrate, nitrite, ammonium, silicate and phosphate were done by autoanalyzer specialist Mark Spears, using TAMU's Technicon TrAAcs-800 autoanalyzer. Salinity and dissolved oxygen was measured by Marine Tech Ken Bottom, using TAMU's model 8400 Guildline conductive salinometer and Manostat ultrapippette Winkler titration rig. Pigments were measured by TAMU graduate students, using the "Turner" fluorometric method (see Parsons et al, 1985) on volumes filtered that ranged in volume from 300 ml (inner shelf) to 1 liter (middle and outer shelf stations).

The following table summarizes salinity, dissolved oxygen, nutrient and chlorophyll concentrations measured on these bottle samples. In the table, Temp = CTD temperature (°C); Sal = bottle salinity (PSU); and DO = dissolved oxygen (ml/liter). Concentrations of nutrients are reported as µmoles/liter, where N03 = nitrate; N02 = nitrite; NH4 = ammonium; Si03 = silicate; and P04 = phosphate. Concentrations of chlorophyll (Chlor) and total phaeopigments (Phaeo) are reported as ug/liter.

CRUISE: 90G04 DATE: 2/19/90 LATITUDE: 28 53.9 water
STATION 4 B GMT: 2222 LONGITUDE: 94 20.2 depth = 22m

Bottle	Depth	Temp	Sal	DO	NO3	NO2	NH4	Urea	SiO3	PO4	Chlor	Phaeo
1	5	17.33	35.503	5.48	<0.1	0.02	0.05		1.3	0.11	0.68	0.16
2	10	17.33	35.509	5.52	<0.1	0.03	0.05	no	1.4	0.12	0.69	0.14
3	16	17.33	35.511	5.43	<0.1	0.02	0.05	data	1.4	0.10	0.63	0.13
4	20	17.33	35.507	5.44	<0.1	0.03	0.10		1.6	0.12	0.68	0.13

CRUISE: 90G04 DATE: 2/20/90 LATITUDE: 28 45.4 water
STATION: 5 GMT: 201 LONGITUDE: 94 13.4 depth = 27m

Bottle	Depth	Temp	Sal	DO	NO3	NO2	NH4	Urea	SiO3	PO4	Chlor	Phaeo
6	3	17.43	36.095	5.44	<0.1	0.02	<0.05	no data	0.1	0.01	0.43	0.04

CRUISE: 90G04 DATE: 2/21/90 LATITUDE: 27 30.5 water
STATION: 8 GMT: 328 LONGITUDE: 93 7.3 depth = 535m

Bottle	Depth	Temp	Sal	DO	NO3	NO2	NH4	Urea	SiO3	PO4	Chlor	Phaeo
12	5	21.18	na	na	na	na	na		na	na	0.46	0.12
11	10	21.18	36.368	5.08	<0.1	0.01	0.05		0.1	0.01	0.46	0.12
9	25	21.18	36.365	5.23	<0.1	0.01	0.10		0.1	0.01	0.43	0.10
7	50	19.94	36.353	4.99	0.2	0.32	0.10	no	0.1	0.02	0.16	0.10
6	75	18.99	36.351	4.98	0.3	0.32	na	data	0.1	0.05	0.17	0.08
5	100	18.39	36.332	4.52	2.8	0.05	0.05		0.3	0.31	0.12	0.07
3	150	16.15	36.323	3.51	9.7	0.01	0.10		2.3	0.49	0.04	0.12
1	536	7.90	34.976	2.63	30.7	0.01	0.10		18.6	1.91	na	na

CRUISE: 90G04 DATE: 2/21/90 LATITUDE: 29 2.8 water
STATION: 9 GMT: 1753 LONGITUDE: 94 26.8 depth = 14m

Bottle	Depth	Temp	Sal	DO	NO3	NO2	NH4	Urea	SiO3	PO4	Chlor	Phaeo
3	3	16.77	34.172	5.48	<0.1	0.15	0.50	no	3.8	0.29	0.65	0.13
2	8	16.78	34.225	5.44	<0.1	0.13	0.25	data	3.8	0.23	0.80	0.25
1	12	16.78	34.248	5.44	<0.1	0.13	0.30		4.0	0.23	0.77	0.27

CRUISE: 90G04 DATE: 2/22/90 LATITUDE: 28 54.0 water
STATION: 13 GMT: 223 LONGITUDE: 94 21.0 depth = 22m

Bottle	Depth	Temp	Sal	DO	NO3	NO2	NH4	Urea	SiO3	PO4	Chlor	Phaeo
8	5	17.38	35.699	5.39	<0.1	0.07	0.25		1.3	0.05	0.64	0.21
7	9	17.38	35.699	5.39	<0.1	0.07	0.20	no	1.3	0.07	0.71	0.16
6	14	17.38	35.700	5.38	<0.1	0.06	0.25	data	1.1	0.07	0.67	0.18
5	20	17.39	35.712	5.39	<0.1	0.11	0.25		1.5	0.17	0.74	0.26

CRUISE: 90G04 DATE: 2/22/90 LATITUDE: 28 23.0 water
STATION: 14 GMT: 1322 LONGITUDE: 93 56.0 depth = 47m

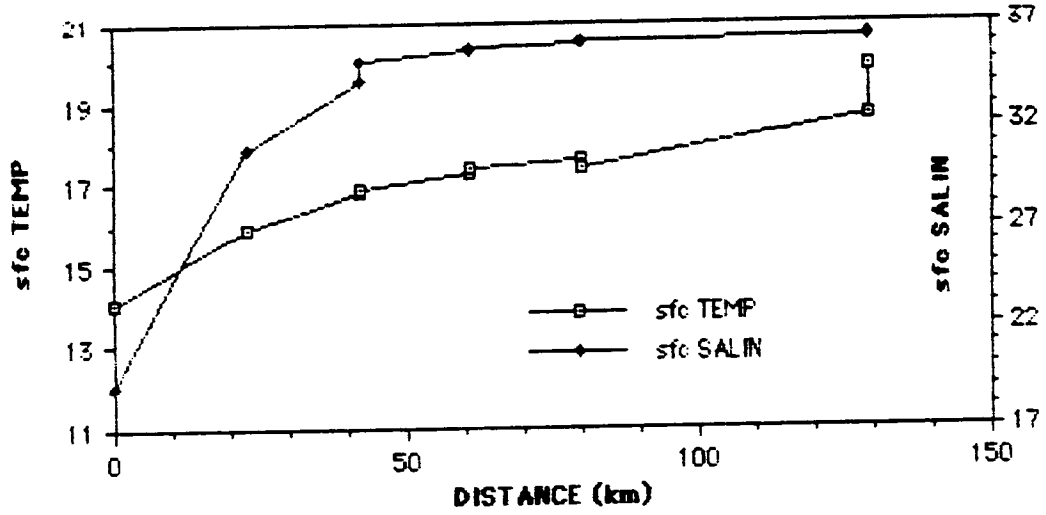
Bottle	Depth	Temp	Sal	DO	NO3	NO2	NH4	Urea	SiO3	PO4	Chlor	Phaeo
7	3	18.65	36.254	5.20	0.2	0.09	0.25		0.3	0.02	0.51	0.10
5	11	18.67	36.256	5.20	0.2	0.09	0.25		0.3	0.02	na	na
3	21	18.67	36.255	5.17	0.2	0.08	na	no	0.5	0.02	na	na
1	31	18.67	36.254	5.19	0.2	0.09	na	data	0.5	0.02	na	na
11	41	18.66	36.254	5.19	<0.1	0.09	0.30		0.3	0.01	na	na
9	46	18.66	36.257	5.17	<0.1	0.07	0.10		0.7	0.05	na	na

CRUISE: 90G04 **DATE:** 2/22/90 **LATITUDE:** 28 51.5 water
STATION: 14-2 **GMT:** 1819 **LONGITUDE:** 93 54.1 depth = 53m

Bottle	Depth	Temp	Sal	DO	NO3	NO2	NH4	Urea	SIO3	PO4	Chlor	Phaeo
6	25	18.76	36.274	5.23	0.1	0.09	0.25	no	0.1	0.01	na	na
1	50	18.73	36.275	5.40	0.1	0.05	0.40	data	0.1	0.02	na	na
-	sfc	18.88									0.59	0.05

CRUISE: 90G04 **DATE:** 2/23/90 **LATITUDE:** 28 46.0 water
STATION: 15 **GMT:** 1525 **LONGITUDE:** 94 15.0 depth = 23m

Bottle	Depth	Temp	Sal	DO	NO3	NO2	NH4	Urea	SIO3	PO4	Chlor	Phaeo
7	5	17.58	35.943	5.38	<0.1	0.04	0.20		0.4	0.07	0.59	0.16
6	8	17.58	35.941	5.34	<0.1	0.03	na	no	0.2	0.09	na	na
5	12	17.58	35.940	5.35	<0.1	0.03	0.20	data	0.3	0.09	na	na
3	16	17.58	35.942	5.35	<0.1	0.03	0.20		0.1	0.07	na	na
1	22	17.58	35.936	5.36	<0.1	0.03	0.25		0.4	0.06	na	na



STA	STA	STA	STA	STA	STA	STA
01	02	03	04	05	06	07
10	12	09	13	15		14
11						

ACKNOWLEDGMENTS

Texas A&M University funds the shiptime and provides partial salary for technical specialists in a Department of Oceanography pool comprised of autoanalyzer technicians, electronics technicians, and other marine technicians who support each of the TIGER Training and Research cruises of R/V GYRE. A cooperative agreement No. 14-35-0001-30501 with the US Minerals Management Service supports the at-sea participation of four TAMU technicians on TIGER cruises and the preparation of technical reports to archive and share the hydrographic data.

and special thanks to:

. . . the crew chartered to staff GYRE from Hornbeck Offshore Services and to TAMU Galveston Marine Operations staff Dean Letzring, David Barrow, and Desmond Rolf, who sailed on 90G-04 to run GYRE's winches, cranes, and A-frames.

The Department of the Interior Mission

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

The Minerals Management Service Mission

As a bureau of the Department of the Interior, the Minerals Management Service's (MMS) primary responsibilities are to manage the mineral resources located on the Nation's Outer Continental Shelf (OCS), collect revenue from the Federal OCS and onshore Federal and Indian lands, and distribute those revenues.

Moreover, in working to meet its responsibilities, the **Offshore Minerals Management Program** administers the OCS competitive leasing program and oversees the safe and environmentally sound exploration and production of our Nation's offshore natural gas, oil and other mineral resources. The MMS **Minerals Revenue Management** meets its responsibilities by ensuring the efficient, timely and accurate collection and disbursement of revenue from mineral leasing and production due to Indian tribes and allottees, States and the U.S. Treasury.

The MMS strives to fulfill its responsibilities through the general guiding principles of: (1) being responsive to the public's concerns and interests by maintaining a dialogue with all potentially affected parties and (2) carrying out its programs with an emphasis on working to enhance the quality of life for all Americans by lending MMS assistance and expertise to economic development and environmental protection.