

CEER - O-070

DATA REPORT
OHER - OTEC CRUISE,
Jan. 27 - Feb. 1, 1980.



CENTER FOR ENERGY AND ENVIRONMENT RESEARCH
UNIVERSITY OF PUERTO RICO - U.S. DEPARTMENT OF ENERGY

DATA REPORT

OHER - OTEC Cruise, Jan. 27 - Feb. 1, 1980

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INTRODUCTION

The ability to detect the effects of an OTEC plant on the marine environment is dependent upon the magnitude of its effects relative to the scale and intensity of variability (pattern) within this ecosystem. The scale of pattern examined in this study is approximately 10 km^2 which has been estimated to be the area whose alteration by the operation of an OTEC plant can be physically measured. The purpose of this cruise was to determine the magnitude of variability of various ecosystem components within and between such areas. Small scale and large scale transects were run to determine the presence of environmental gradients, if any, and the magnitude of between station variability.

Two current meters (InterOcean Model 135) were also moored at depths of 50 and 150 meters at the benchmark buoy during the period of the cruise.

METHODS

Hydrographic Data

Hydrocasts were made with 5 liter Niskin bottles usually lowered to depths of 1000 m. Bottles were placed at nominal depths of 0, 10, 25, 50, 75, 100, 150, 200, 250, 300, 400, 500, 650, 800, 1000 m for determinations of temperature, salinity, oxygen, chlorophyll, phaeopigments and nutrients (nitrate-nitrite, phosphate, ammonia, silicate).

Temperature was measured with paired deep sea reversing thermometers. The thermometers were recently calibrated at the Physical Chemical Oceanographic Data Facility (PCODF) at Scripps Institution of Oceanography and measurements were considered accurate to 0.01°C . Unprotected thermometers were placed on bottles sampling at depths of 100

meters or greater.

Salinity was determined with a Hytech induction salinometer. Readings are considered accurate to 0.003‰ .

Dissolved oxygen was determined by the Winkler method as revised by Carpenter (1965) and modified by Anderson (1971). Measurements are accurate to 0.02 ml/l. Nutrients were measured with a Technicon Autoanalyzer using methods described by Strickland and Parsons (1968). Chlorophyll was measured with a Turner Model 111 fluorometer using methods described by Strickland and Parsons.

Station depths were obtained thru an E.D.O. Depth Recorder permanently installed in the ship or estimated from a chart, NOS Z6659. Sonic depths obtained in Fathoms were converted to meters but were not corrected for speed of sound variations. Chart depths are indicated by (C) and sonic depths by an (S) besides the number. All depths are in meters.

Densities (σ_t) were calculated from a handbook of Oceanographic Tables (Bialek, 1966).

Station times are given in Greenwich Mean Time (GMT), Plankton Tow Times are in local time. Puerto Rico is 4 hours behind G.M.T. A weather code is given in the Appendix.

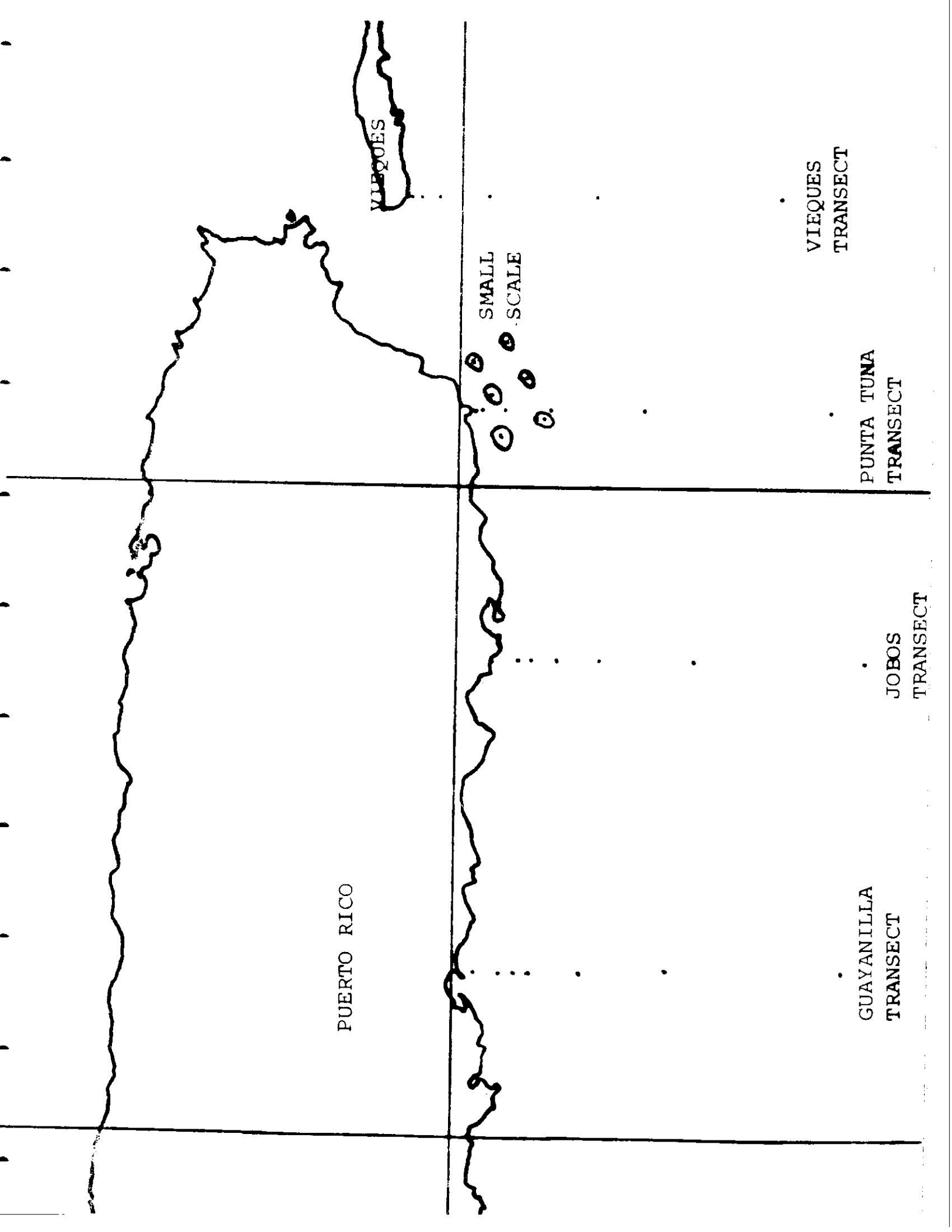
Net Tows

Zooplankton tows were made with a 75 cm opening-closing net equipped with 202 μm mesh. Volume of water filtered was calculated from a flow-meter suspended off center in the mouth of the net.

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- Carpenter, D.H. 1965. The Chesapeake Bay Institute technique for Winkler dissolved oxygen method. Limnol. Oceanogr. 10: 141-143.
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STATION PLAN



PUERTO RICO

VIEQUES

SMALL
SCALE

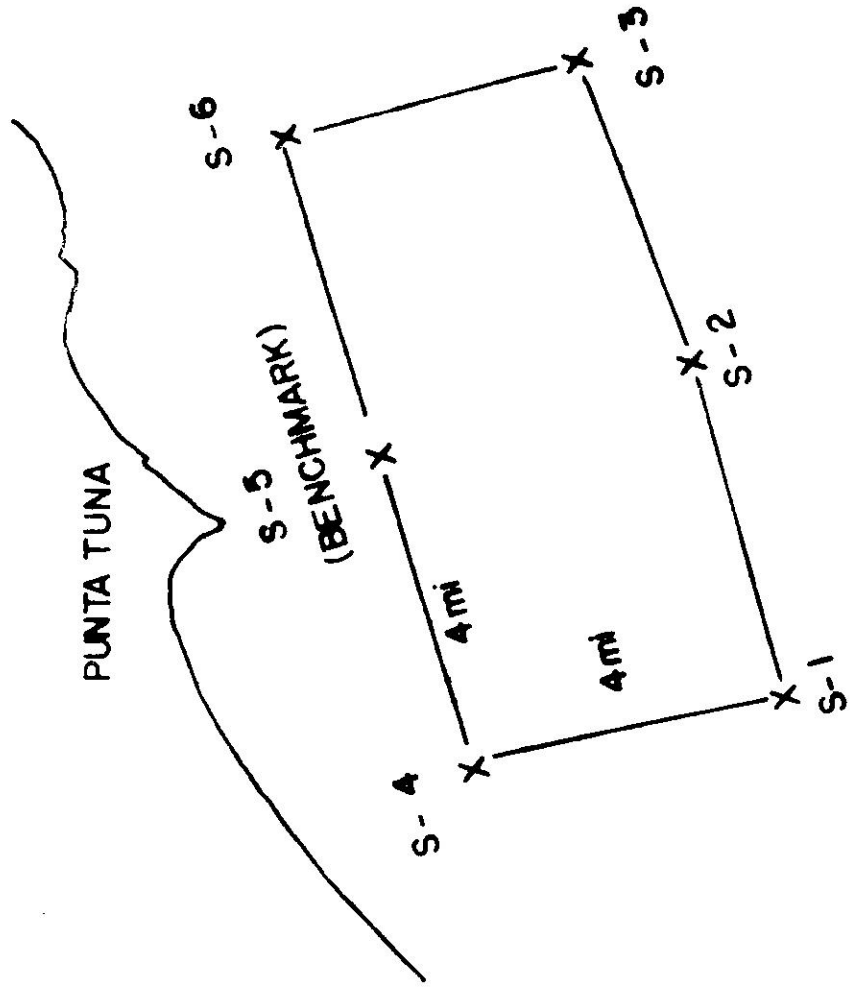
GUAYANILLA
TRANSECT

JOBOS
TRANSECT

PUNTA TUNA
TRANSECT

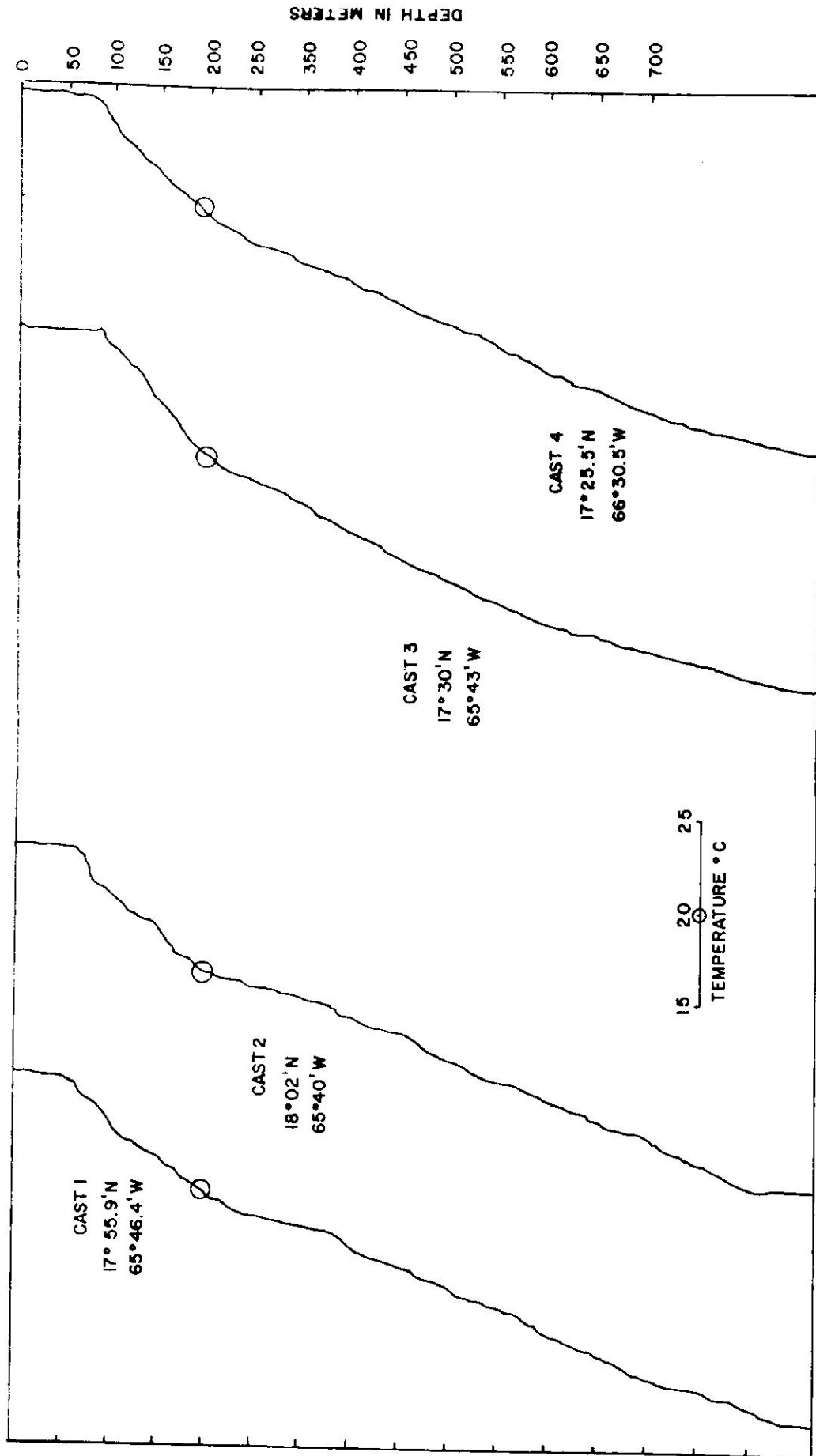
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TRANSECT

SMALL SCALE STUDY



PUNTA TUNA

XBT



HYDROCAST DATA

T, S, O₂, CHLOROPHYLL, NUTRIENTS, σ_t

R/V CRAWFORD

OTEC CRUISE 8401

STATION: Benchmark

Latitude	Longitude	MO/DAY/YR	Messenger Time	Bottom	Wind	Speed	Weather	Dominant Waves	Secchi	
17°57.3N	65°51.5W	1/28/80	0217 (GMT)	1061 m (s)	110° (Dir)	7 (kt)	1	110° 2 ft 5s (Dir) (Ht) (Period)		
Z	T	S	O ₂	NH ₄ -N	N	Si	PO ₄ -3-P	Chla	Phaeo	σ _t
	26.09	35.742	4.67	<.2	0.3	1.6	0.15	.132	.015	23.59
	26.10	35.745	4.68	<.2	3.4	2.1	0.50	.129	.004	23.60
	26.10	35.744	4.68	<.2	2.9	3.4	0.10	.126	.005	23.60
	26.08	35.766	4.65	<.2	0.4	1.3	0.10	.211	.008	23.61
	25.95	35.779	4.63	<.2	5.8	3.5	0.30	.231	.006	23.67
	24.74	36.978	4.71	<.2	0.5	1.7	0.15	.229	.181	24.95
109	23.58	36.951	4.67	<.2	0.4	4.1	0.10	.116	.135	25.26
	20.56	36.766	4.42	<.2	2.4	2.1	<.08	.036	.021	25.98
	19.27	36.637	4.43	0.7	6.8	9.8	0.10	.010	.012	26.23
248	18.32	36.525	4.44	<.2	4.2	4.9	0.22	.003	.011	26.39
	17.11	36.355	4.22	<.2	5.9	8.4	0.30			26.56
	15.01	36.024	3.78	<.2	13.2	16.4	0.30			26.79
586	11.62	35.498	3.26	0.6	19.7	24.9	0.90			27.08
720	8.29	35.024	2.99	<.2	25.2	16.2	1.23			27.28
932	5.92	34.878	3.62	0.8	19.9	23.0	1.25			27.49

* All nutrient concentrations are in ng at -/ℓ

R/V CRAWFORD

OTEC CRUISE ROUTE

STATION: Benchmark

Latitude	Longitude	MO/DAY/YR	Messenger Time	Bottom	Wind	Speed	Weather	Dominant Waves	Secchi	
17°57.3N	65°51.5W	1/28/80	1400 (GMT)		110° (Dir)	4 (Kt)	1	100° 3 ft 6s (Dir) (Ht) (Period)		
Z	T	S	O ₂	NH ₄ -N	N	SI	PO ₄ -3-P	Chla	Phaeo	σ _t
0	26.28	35.719	4.69	<.2	2.0	3.5	0.15	.096	-.001	23.52
8	26.31	35.720	4.69	0.4	3.2	6.7	0.10	.082	.005	23.51
21	26.17	35.731	4.71	<.2	1.2	1.9	0.18	.106	.000	23.56
48	26.16	35.771	4.68	0.2	0.9	1.1	0.22	.201	.018	23.59
66	25.85	35.745	4.65	0.5	0.9	3.9	0.27	.346	.089	23.67
97	24.30	36.967	4.72	0.4	3.5	0.7	0.22	.229	.164	25.07
144	21.52	36.850	4.43	0.3	1.3	1.0	0.22	.050	.053	25.78
193	19.30	36.631	4.41	0.5	2.5	2.8	0.27	<.001	.019	26.22
241	18.33	36.522	4.37	0.6	4.3	3.0	0.29	<.001	.011	26.38
289	17.85	36.453	4.32	0.8	5.8	4.0	0.35	.001	.011	26.45
386	16.14	36.196	3.96	0.2	9.8	3.2	0.65			26.66
483	13.41	35.765	3.52	0.7	16.7	17.8	0.65			26.93
629	10.02	35.245	3.00	1.7	21.0	10.8	1.39			27.18
777	7.53	34.942	3.07	0.8	28.7	15.0	1.64			27.32
979	5.51	34.895	3.91	0.4	18.2	18.0	1.65			27.56

R/V Crawford

OPEC CRUISE 8001

STATION: Benchmark

Latitude	Longitude	MO/DAY/YR	Messenger Time	Bottom	Wind	Speed	Weather	Dominant Waves	Secchi	
17°57.0N	65°51.5W	1/28/80	2212 (GMT)		110° (Dir)	5 (Kt)	1			
Z	T	S	O ₂	NH ₄ -N	N	Si	PO ₄ -3-P	Chla	Phaeo	σ _t
0	26.20	35.718	4.67	0.5	4.5	6.1	0.23	.088	.003	23.55
9	26.20	35.718	4.67	<.2	5.5	15.3*	0.10	.086	.009	23.55
22	26.20	35.718	4.66	<.2	4.6	2.8	0.13	.093	.007	23.55
49	25.97	35.778	4.65	<.2	1.7	20.7*	0.17	.232	.036	23.67
76	25.87	35.791	4.61	<.2	1.0	10.3	0.12	.296	.104	23.71
99	24.25	36.924	4.73	1.4	4.7	5.4	0.40	.237	.098	25.05
148	21.47	36.842	4.44	0.4	6.5	0.8	0.20	.069	.040	25.80
199	19.15									
248	18.27	36.515	4.34	<.2	4.8	15.1	0.30	<.001	.012	26.39
301	17.48	36.406	4.30	0.4	10.2	13.1	0.35	.001	.014	26.51
397	15.40	36.080	3.72	<.2	11.1	5.1	0.45			26.75
496	12.65	35.651	3.41	<.2	16.4	5.1	0.81			26.99
647	9.54	35.179	2.98	1.0	20.7	12.0	1.53			27.19
798	6.91	34.896	3.20	<.2	25.1	13.4	1.47			27.38
1001	5.13	34.936	4.23		22.3	40.7	0.88			27.63

* Strange values

R/V CRAWFORD

OPEC CRUISE 8001

STATION: S-1

Latitude	Longitude	MO/DAY/YR	Messenger Time	Bottom	Wind	Speed	Weather	Dominant Waves	Secchi	
17°52.7N	65°53.9W	1/29/80	0234 (GMT)		110° (Dir)	7 (Kt)	1	100° 3 ft 5s (Dir) (Ht) (Period)		
Z	T	S	O ₂	NH ₄ -N	N	Si	PO ₄ -3-P	Chla	Phaeo	σ _t
0	26.18	35.708	4.67	<.2	3.2	1.2	0.15	.052	.030	23.54
8	26.18	35.707	4.68	<.2	0.4	0.8	0.10	.056	.021	23.54
21	26.17	35.708	4.68	<.2	2.5	1.0	<.08	.065	.004	23.54
46	25.84	35.793	4.62	<.2	0.4	0.8	0.12	.130	.034	23.72
72	25.96	36.641	4.71	<.2	1.1	0.6	0.09	.280	.083	24.32
93	24.59	36.927	4.77	<.2	0.5	1.1	0.10	.232	.143	24.95
139	32.40	36.890	4.52	<.2	1.9	3.0	0.09	.075	.070	25.56
185	20.04	36.711	4.40	0.3	2.2	<.1	0.15	.016	.023	26.08
230	18.90	36.646	4.61							26.33
274	18.03	36.480	4.34	0.5	5.2	0.8	0.25	.002	.009	26.42
357	16.59	36.268	4.21	<.2	8.2	1.4	0.33			26.61
443	13.95	35.851	3.61	<.2	14.9	2.2	0.78			26.89
577	10.91	35.384	3.14	<.2	22.2	4.0	1.20			27.12
717	8.06	34.992	3.02	<.2	23.8	13.0	1.10			27.28
918	5.90	34.875	3.64	0.3	25.6	24.0	1.05			27.50

R/V CRAWFORD

OCEC CRUISE 8001

STATION: Benchmark

Latitude	Longitude	MO/DAY/YR	Messenger Time	Bottom	Wind	Speed	Weather	Dominant Waves	Secchi	
17°57.3N	65°51.5W	1/29/80	1351 (GMT)	1810 3310 (c)	110° (Dir)	09 (Kt)	I	110° 3 ft 6s (Dir) (Ht) (Period)		
Z	T	S	O ₂	NH ₄ -N	N	SI	PO ₄ -3-P	Chla	Phaeo	σ _t
0	26.29	35.746	4.70	<.2	1.0	3.6	0.13	.113	.005	23.54
9	26.31	35.945	4.69	<.2	0.5	2.4	0.14	.100	.012	23.53
26	26.19	35.737	4.69	<.2	0.9	2.8	0.15	.107	.002	23.56
53	26.11	35.774	4.68	<.2	0.7	5.1	0.12	.138	.027	23.61
79	25.52	36.781	4.74	<.2	1.2	5.4	0.20	.346	.201	24.55
105	23.61	36.938	4.64	<.2	2.5	13.0	0.15	.139	.070	25.25
158	20.70	36.785	4.38	<.2	2.8	9.7	0.12	.047	.033	25.96
209	19.31	36.649	4.24	<.2	3.9	31.5	0.20	.001	.014	26.23
260	18.02	36.479	4.47	<.2	5.3	12.4	0.35	.001	.010	26.42
313	17.25	36.3737	4.30	<.2	7.6	3.3	0.40	.001	.009	26.53
415	15.38	36.078	3.73	<.2	11.5	9.9	0.45			26.74
517	12.74	35.663	3.42	<.2	14.6	9.4	1.10			26.98
671	9.37	35.153	2.97	<.2	28.2	14.1	1.75			27.21
818	6.68	34.883	3.26	<.2	24.1	23.8	1.90			27.40
1025	5.04	34.926	4.32	0.21	25.7	20.2	0.85			27.64

R/V CRAWFORD

OTEC CRUISE 8001

STATION: S-3

Latitude	Longitude	MO/DAY/YR	Messenger Time	Bottom	Wind	Speed	Weather	Dominant Waves	Secchi	
17°55.9N	65°46.4W	1/29/80	1829 (GMT)		110° (Dir)	07 (Kt)	1	110° 2 ft 6s (Dir) (Ht) (Period)		
Z	T	S	O ₂	NH ₄ -N	N	Si	PO ₄ -3-P	Chla	Phaeo	σ _t
0	26.26	35.743	4.67	<.2	2.7	2.1	0.16	.057	.015	23.54
9	26.28	35.742	4.68	<.2	0.5	2.5	0.18	.090	-.008	23.53
26	26.18	35.773	4.68	<.2	0.3	1.7	0.22	.083	-.006	23.59
53	26.02	35.790	4.65	<.2	0.3	2.2	0.17	.240	.032	23.65
80	24.71	36.936	4.74	<.2	1.1	7.5	0.22	.253	.233	24.92
107	23.20	36.935	4.61	<.2	0.7	7.9	0.22	.153	.138	25.37
162	20.94	36.823	4.31	<.2	3.7	16.0	0.22	.016	.028	25.93
217	19.20	36.623	4.40	<.2	3.9	9.9	0.24	.005	.016	26.24
273	18.22	36.505	4.45	<.2	7.3	24.9*	0.22	.002	.008	26.39
328	17.63	36.429	4.39	<.2	6.5	6.6	0.25	.004	.006	26.48
434	14.83	35.988	3.59	<.2	12.7	6.0	0.78			26.80
541	12.64	35.601	3.35	<.2	14.9	7.8	1.10			26.96
700	8.82	35.087	2.98	<.2	21.2	14.6	1.69			27.24
855	6.23	34.870	3.43	<.2	21.8	25.1	1.90			27.45
1065	4.90	34.936	4.43	<.2	25.7	22.6	1.82			27.66

R/V CRAWFORD

OTEC CRUISE 8001

STATION: V-1

Latitude	Longitude	MO/DAY/YR	Messenger Time	Bottom	Wind	Speed	Weather	Dominant Waves	Secchi
18°04.4N	65°32.6W	1/30/80	0003 (GMT)	85 ft. 26 m	LTAMS	2 (kt)	1	Calm	
Z	T	S	O ₂	NH ₄ -N	Si	PO ₄ -3-P	Chla	Phaeo	σ _t
0	26.27	35.758	4.64	<.2	2.7	0.35	.081	.030	23.55
14	26.29	35.755	4.67				.093	.034	23.54

R/V CRAWFORDOPEC CRUISE 8001STATION: V-3

Latitude	Longitude	MO/DAY/YR	Messenger Time	Bottom	Wind	Speed	Weather	Dominant Waves	Secchi	
18°01.8N	65°32.7W	1/30/80	0203 (GMT)	640 1170 m (s)		2 (kt)	1	Calm		
Z	T	S	O ₂	NH ₄ -N	N	Si	PO ₄ -3-P	Chla	Phaeo	σ _t
0	26.33	35.740	4.68	<.2	0.1	0.9	0.15	.067	-.006	23.52
9	26.30	35.739	4.70	<.2	0.1	6.5	0.10	.042	.019	23.52
23	26.31	35.738	4.73	<.2	0.1	0.7	0.12	.047	.018	23.52
51	25.97	36.159	4.68	<.2	0.1	1.0	0.10	.100	.047	23.95
79	24.87	36.985	4.67	<.2	0.2	1.9	<.08	.191	.103	24.91
103	23.86	37.003	4.69	<.2	0.3	0.4	0.10	.095	.017	25.22
154	20.60	36.782	4.37	<.2	1.7	0.4	<.08	.016	.033	25.98
207	18.97	36.608	4.26	<.2	2.9	1.4	0.20	.001	.011	26.28
258	18.38	36.524	4.46	<.2	2.8	0.4	0.20	<.001	.013	26.37
310	17.16	36.359	4.20	<.2	5.7	1.3	0.20	<.001	.010	26.54
413	15.52	36.099	3.87	<.2	11.9	3.5	0.50			26.72
518	12.94	35.703	3.47	<.2	14.5	9.2	0.90			26.97
773	9.76	35.214	3.01	<.2	26.1	13.2	2.20			27.19
828	6.97	34.900	3.17	<.2	24.8	18.1	1.10			27.38
1037	5.16	34.922	4.21	<.2	18.0	16.5	2.35			27.62

R/V CRAWFORD

OPEC CRUISE 8001

STATION: V-5

Latitude	Longitude	MO/DAY/YR	Messenger Time	Bottom	Wind	Speed	Weather	Dominant Waves	Secchi	
17°48.5N	65°32.6W	1/30/80	0842 (GMT)		050° (Dir)	10 (Kt)	1	110° 3 ft 6s (Dir) (Ht) (Period)	28m	
Z	T	S	O ₂	NH ₄ -N	N	Si	PO ₄ -3-P	Chla	Phaeo	σ _t
0	26.61	35.754	4.63	<.2	0.6	5.2	0.12	.100	.018	23.44
10	26.53	35.750	4.65	<.2	0.4	3.2	0.15	.097	.020	23.46
27	26.50	35.748	4.66	<.2	0.3	3.4	0.14	.100	.021	23.47
54	26.50	35.751	4.66	<.2	2.8	8.0	0.08	.115	.021	23.47
80	26.33	36.683	4.69	<.2	0.1	0.6	0.12	.217	.040	24.23
107	24.03	36.983	4.71	<.2	0.3	0.6	0.16	.150	.191	25.16
160	21.23	36.850	4.37	<.2	0.6	<.1	0.09	.028	.028	25.87
214	18.67	36.569	4.18	<.2	3.8	5.3	0.20	<.001	.011	26.33
268	17.57	36.424	4.28	<.2	5.2	1.4	0.35	<.001	.013	26.49
323	16.35	36.236	3.99	<.2	8.4	8.6	0.37	<.001	.010	26.65
429 ✓	14.34	35.905	3.53	<.2	12.2	13.1	0.71			26.84
536	11.14	35.380	3.03	<.2	15.2	20.5	0.83			27.07
698	7.57	34.871	2.86	<.2	24.2	23.6	1.54			27.26
*		34.824	3.26	<.2	28.8	33.9	1.51			

* Bottle # 15 did not trip.

R/V CRAWFORD

OTEC CRUISE 8001

STATION: V-6

Latitude	Longitude	MO/DAY/YR	Messenger Time	Bottom	Wind	Speed	Weather	Dominant Waves	Phaeo	Secchi
17°32.5N	65°32.8W	1/30/80	1135 (GMT)		100° (Dir)	12 (Kt)	1	160° 4 ft (Dir) (Ht)		
Z	T	S	O ₂	NH ₄ -N	N	Sl	PO ₄ -3-P	Chla	Phaeo	σ _t
0	26.49	35.750	4.66	<.2	0.2	1.9	0.14	.087	.012	23.48
8	26.45	35.754	4.67	<.2	<.1	1.4	0.10	.100	.012	23.49
23	26.40	35.753	4.67	<.2	<.1	1.1	<.08	.091	.013	23.50
48	26.41	35.751	4.67	<.2	2.6	3.0	0.10	.100	.011	23.50
72	26.41	35.750	4.67	<.2	0.1	1.4	0.09	.111	.019	23.50
96	25.88	36.973	4.63	<.2	<.1	0.7	0.09	.287	.185	24.59
143	22.51	37.022	4.18	<.2	1.4	1.4	0.14	.041	.050	25.63
191	19.96	36.754	3.91	<.2	4.4	1.1	0.28	.004	.017	26.14
239	18.30	36.540	4.14	<.2	5.0	1.6	0.33	<.001	.013	26.41
285	17.36	36.412	4.11	<.2	7.0	2.9	0.38	<.001	.011	26.54
372	15.22	36.055	3.61	<.2	14.6	4.9	0.57			26.76
460	12.98	35.717	3.38	<.2	18.4	2.2	1.10			26.98
592	9.05	35.059	2.78	<.2	28.3	10.1	1.50			27.19
722	7.10	34.839	2.90	<.2	29.9	12.4	2.01			27.30
919	5.60	34.861	3.63	0.4	22.3	20.0	1.30			27.52

R/V CRAWFORD

OTEC CRUISE 8001

STATION: Pt-6

Latitude	Longitude	MO/DAY/YR	Messenger Time	Bottom	Wind	Speed	Weather	Dominant Waves	Secchi	
17°28.0N	65°53.0W	1/30/80	1603 (GMT)	2286 m (s)	100° (Dir)	10 (Kt)	1	150° 3-4 ft 6s (Dir) (Ht) (Period)		
Z	T	S	O ₂	NH ₄ -N	N	Si	PO ₄ -3-P	Chla	Phaeo	σ _t
0	26.53	35.753	4.65	<.2	1.5	1.9	0.20	.108	-.003	23.46
10	26.51	35.747	4.66	<.2	1.3	1.6	0.13	.097	-.001	23.47
27	26.51	35.749	4.67	<.2	<.1	1.4	0.10	.001	.004	23.47
53	26.52	35.790	4.66	<.2	<.1	1.1	0.08	.115	.009	23.50
79	26.57	35.947	4.65	<.2	0.1	1.9	<.08	.207	.047	23.60
104	25.12	37.054	4.25	<.2	0.6	0.8	<.08	.187	.183	24.89
158	22.10	37.008	4.06	<.2	2.0	0.6	0.17	.041	.032	25.74
211	18.96	36.632	4.04	<.2	5.2	1.3	0.30	<.001	.021	26.30
263	17.24	36.392	4.06	<.2	8.4	20.91	0.30	<.001	.012	26.56
316	15.73	36.118	3.40	<.2	11.6	3.3	0.70	<.001	.014	26.69
415	12.84	35.642	3.03	<.2	16.7	11.8	1.20			26.95
518	10.53	35.268	2.83	<.2	24.7	11.8	0.80			27.09
675	7.98	34.945	2.84	<.2	25.5	15.1	1.70			27.26
826	6.71	34.871	3.16	<.2	24.5	23.0	0.63			27.39
1035	5.28	34.943	4.15	<.2	13.3	26.6	1.00			27.62

R/V CRAWFORD

OCEC CRUISE 8001

STATION: Pt-5

Latitude	Longitude	MO/DAY/YR	Messenger Time	Bottom	Wind	Speed	Weather	Dominant Waves	Phaeo	σ_t
17°44.2N	65°53.0W	1/30/80	1931 (GMT)		045° (Dir)	09 (Kt)	1			
Z	T	S	O ₂	NH ₄ -N	N	Si	PO ₄ -3-P	Chla	Phaeo	σ_t
1	26.33	35.754	4.76	<.2	0.2	1.1	0.20	.072	.002	23.53
10	26.33	35.754	4.75	<.2	0.1	1.2	0.22	.069	.002	23.53
28	26.34	35.768	4.77	<.2	0.2	1.2	0.15	.056	.011	23.53
56	26.44	35.984	4.72	<.2	0.1	0.4	0.14	.101	.001	23.67
88	25.11	36.915	4.77	<.2	0.1	<.1	0.16	.293	.152	24.79
111	24.13	37.048	4.64	<.2	0.4	0.2	0.10			25.18
165	20.78	36.829	4.38	<.2	1.4	0.2	0.22	.021	.021	25.97
220	18.65	36.589	4.19	<.2	3.3	0.9	0.37	<.001	.007	26.35
275	17.49	36.433	4.28	<.2	6.3	1.1	0.37	<.001	.007	26.53
331	16.55	26.279	3.82	<.2	10.8	2.6	0.67	<.001	.011	26.63
431	13.43	35.735	3.12	<.2	19.0	6.8	0.93			26.90
550	10.81	35.374	3.06	<.2	23.5	10.2	1.44			27.13
645	9.22	35.170	3.00	<.2	23.8	13.6	1.81			27.24

R/V CRAWFORD

OTEC CRUISE 8001

STATION: Pt-3

Latitude	Longitude	MO/DAY/YR	Messenger Time	Bottom	Wind	Speed	Weather	Dominant Waves	Secchi	
17°56.0N	65°53.0W	1/30/80	2252 (GMT)	1737 (c)	330° (Dir)	09 (Kt)	1	070° 3 ft 6s (Dir) (Ht) (Period)		
Z	T	S	O ₂	NH ₄ -N	N	Si	PO ₄ -3-P	Chla	Phaeo	σ _t
0	26.28	35.727	4.66	<.2	0.2	1.1	0.11	.033	.04	23.52
9	26.28	35.729	4.68	<.2	0.2	1.1	0.08	.034	.026	23.52
22	26.29	35.730	4.68	<.2	0.2	1.1	<.08	.038	.015	23.52
49	26.16	35.795	4.67	<.2	0.2	0.9	<.08	.058	.023	23.61
75	25.08	36.841	4.74	<.2	0.2	0.6	0.09	.193	.089	24.73
98	24.19	36.908	4.69	<.2	0.3	0.6	0.09	.099	.106	25.06
146	21.17	36.841	4.39	<.2	1.4	<.1	<.08	.019	.031	25.88
196	20.03	36.731	4.32	<.2	2.5	0.6	0.13	.005	.019	26.10
244	18.38	36.534	4.34	<.2	4.8	1.0	0.24	.002	.007	26.38
294	17.75	36.452	4.45	<.2	4.4	1.4	0.31	<.001	.019	26.48
391	15.37	36.087	3.65	<.2	13.3	3.3	0.75			26.75
489	12.96	35.699	3.45	<.2	17.4	4.9	0.75			26.97
636	9.59	35.187	2.98	<.2	20.1	11.8	1.67			27.19
784	6.98	34.906	3.17	<.2	28.4	16.5	1.76			27.39
988	5.22	34.920	4.16	<.2	26.7	22.0	1.87			27.61

R/V CRAWFORD

CITEC CRUISE 8001

STATION: Pt-1

Latitude	Longitude	MO/DAY/YR	Messenger Time	Bottom	Wind	Speed	Weather	Dominant Waves	Secchi	
17°58.2N	65°53.0W	1/31/80	0228 (GMT)	~400 732 m (c)	Lite Mns		1	Calm		
Z	T	S	O ₂	NH ₄ -N	N	Si	PO ₄ -3-P	Chla	Phaeo	σ _t
0	26.20	35.749	4.66	<.2	0.3	1.1	0.14	.022	.057	23.57
14	26.19	35.747	4.68	<.2	0.3	0.7	0.11	.074	.015	23.57
24	26.19	35.749	4.68	<.2	0.3	1.1	0.14	.051	.041	23.57

R/V CRAWFORD

OTEC CRUISE 8001

STATION: J-1

Latitude	Longitude	MO/DAY/YR	Messenger Time	Bottom	Wind	Speed	Weather	Dominant Waves	Secchi	
17°54.8N	66°16.0W	1/31/80	0533 (GMT)	68 ft 20.7 m (s)	110° (Dir)	8 (Kt)	1	110° 1 ft 6s (Dir) (Ht) (Period)		
Z	T	S	O ₂	NH ₄ -N	N	Si	PO ₄ -3-P	Chla	Phaeo	σ _t
0		35.667	4.54	<.2	0.2	0.9	0.14	.139	.029	
9		35.664	4.58	<.2	0.9	1.6	0.19	.135	.034	

R/V CRAWFORD

OTEC CRUISE 8001

STATION: J-3

Latitude	Longitude	MO/DAY/YR	Messenger Time	Bottom	Wind	Speed	Weather	Dominant Waves	Secchi	
17°48.7N	66°16.1W	1/31/80	0714 (GMT)		100° (Dir)	09 (Kt)	I	110° 2 ft 6s (Dir) (Ht))Period)		
Z	T	S	O ₂	NH ₄ -N	N	Si	P0 ₄ -3-P	Chla	Phaeo	σ _t
1	26.16	35.756	4.67	<.2	0.5	3.0	0.19	.098	.003	23.58
9	26.12	35.755	4.67	<.2	0.3	4.0	0.11	.092	-.009	23.59
23	26.10	35.755	4.68	<.2	0.4	1.4	<.08	.155	-.007	23.60
49	26.09	35.755	4.68	<.2	0.4	1.2	<.08	.106	-.004	23.60
75	26.06	35.765	4.67	<.2	0.4	1.1	<.08	.146		23.62
98	24.38	36.905	4.65	<.2	0.6	0.7	0.14	.251	.158	25.00
145	22.10	36.896	4.47	<.2	1.1	0.2	<.08	.059	.050	25.66
203	19.40	36.644	4.43	<.2	2.9	0.7	0.14	.005	.019	26.21
239	18.63	36.557	4.44	<.2	3.5	3.0	0.18	<.001	.012	26.33
290	18.08	36.492	4.43	<.2	4.3	3.5	0.17			26.42
390	15.93	36.169	3.92	<.2	9.5	0.9	0.58			26.69
492	13.25	35.749	3.51	<.2	11.4	5.4	0.73			26.94

R/V CRAWFORD

OCEC CRUISE 8001

STATION: J-5

Latitude	Longitude	MO/DAY/YR	Messenger Time	Bottom	Wind	Speed	Weather	Dominant Waves	Secchi	
17°39.7N	66°16.0W	1/31/80	1125 (GMT)		110° (Dir)	9 (Kt)	1	110° 2 ft 6s (Dir) (Ht) (Period)	33 m	
Z	T	S	O ₂	NH ₄ -N	N	Si	PO ₄ -3-P	Chla	Phaeo	σ _t
0	26.38	35.718	4.67	<.2	0.4	1.9	0.09	.143	.012	23.49
9	26.28	35.711	4.69	<.2	0.3	1.8	0.09	.066	-.002	23.51
26	26.19	35.709	4.67	<.2	0.3	2.1	<.08	.061	.010	23.54
52	26.16	35.773	4.70	<.2	0.3	1.8	<.08	.080	.010	23.60
79	26.01	35.865	4.67	<.2	0.6	1.6	<.08	.139	.020	23.71
104	24.75	36.973	4.69	<.2	0.3	1.1	<.08	.220	.189	24.93
156	21.08	36.836	4.38	<.2	1.6	0.7	0.09	.025	.029	25.90
207	19.31	36.638	4.41	<.2	1.7	1.0	0.09	.004	.017	26.22
257	18.15	36.504	4.39	<.2	4.7	1.8	0.24	.007	.006	26.41
309	17.19	36.363	4.22	<.2	7.1	2.3	0.30	<.001	.011	26.54
405	14.75	35.981	3.70	<.2	12.7	4.9	0.55			26.81
505	12.84	35.677	3.42	<.2	10.9	5.7	0.70			26.97
659	9.03	35.113	2.98	<.2	22.2	13.7	1.52			27.23
808	6.58	34.864	3.22	<.2	20.0	19.7	1.00			27.40
1015	5.12	34.933	4.25	<.2	22.4	20.6	1.60			27.63

R/V CRAWFORD

OCEC CRUISE 8001

STATION: J-6

Latitude	Longitude	MO/DAY/YR	Messenger Time	Bottom	Wind	Speed	Weather	Dominant Waves	Secchi	
17°24.5N	66°16.0W	1/31/80	1435 (GMT)		100° (Dir)	07 (Kt)	1	150° 3 ft 6s (Dir) (Ht) (Period)		
Z	T	S	O ₂	NH ₄ -N	N	Si	PO ₄ -3-P	Chla	Phaeo	σ _t
0	26.51	35.659	4.67	<.2	0.4	1.4	0.14	.073	-.008	23.40
10	26.47	35.663	4.69	<.2	0.4	1.9	0.09	.050	.010	23.41
27	26.40	35.656	4.68	<.2	0.9	6.3	0.18	.061	.010	23.43
54	26.41	35.674	4.69	<.2	0.3	1.3	0.09	.075	.010	23.44
81	26.28	36.812	4.72	<.2	0.3	0.8	0.11	.237	.087	24.34
108	24.54	37.045	4.35	<.2	1.2	4.0	0.18	.184	.148	25.05
162	21.99	36.969	4.21	<.2	1.2	0.7	0.17	.032	.029	25.75
215	19.35	36.651	4.27	<.2	1.3	0.4	0.17	.004	.010	26.72
269	18.04	36.492	4.20	<.2	4.8	2.6	0.30	.004	.008	26.43
322	16.50	36.247	3.79	<.2	9.7	3.0	0.65	.006	.004	26.61
427	13.64	35.803	3.56	<.2	13.3	5.4	0.80			26.91
531	11.42	35.459	3.21	<.2	20.7	8.6	1.30			27.08
691	7.93	34.976	2.98	<.2	27.6	16.2	2.03			27.30
845	6.15	34.847	3.38	<.2	15.9	12.3	1.16			27.44
1054	4.95	34.936	4.37	<.2	16.6	12.0	1.04			27.66

R/V CRAWFORD

OTFC CRUISE 8001

STATION: G-6

Latitude	Longitude	MON/DAY/YR	Messenger Time	Bottom	Wind	Speed	Weather	Dominant Waves	Secchi	
17°26.5N	66°45.0W	1/31/80	1923 (GMT)		110° (Dir)	04 (Kt)	0	140° 3 ft 6s (Dir) (Ht) (Period)		
Z	T	S	O ₂	NH ₄ -N	N	Si	PO ₄ -3-P	Chla	Phaeo	σ _t
0	26.22	35.435	4.67	<.2	0.3	1.6	0.16			23.32
9	26.24	35.435	4.68	<.2	0.3	1.1	0.14			23.31
28	26.22	35.436	4.68	<.2	0.4	1.9	0.12			23.32
56	26.20	35.433	4.67	<.2	0.3	1.4	0.14			23.33
84	24.66	36.992	4.67	<.2	0.4	0.2	0.14			24.99
112	23.12	36.952	4.53	<.2	0.8	0.4	0.12			25.40
167	20.25	36.741	4.41	<.2	1.9	0.4	0.14			26.05
223	18.75	36.572	4.44	<.2	2.1	0.1	0.16			26.31
280	17.88	36.464	4.56	<.2	4.8	1.1	0.34			26.45
336	16.57	36.267	4.06	<.2	9.1	2.2	0.55			26.62
448	14.41	35.923	3.69	<.2	13.8	4.2	0.92			26.84
560	11.71	35.518	3.23	<.2	19.7	8.0	1.33			27.07
729	7.86	34.971	3.03	<.2	27.6	17.4	2.05			27.30
890	6.05	34.857	3.49	<.2	22.5	16.2	1.79			27.46
1105	4.87	34.940	4.46	<.2	23.6	20.0	1.84			27.68

R/V CRAWFORD.

OPEC CRUISE 8001

STATION: G-5

Latitude	Longitude	MO/DAY/YR	Messenger Time	Bottom	Wind	Speed	Weather	Dominant Waves	Secchi	
17°41.6N	66°45.0W	1/31/80	2243 (GMT)		110° (Dir)	7 (Kt)	1	140° 3 ft (Dir) (Ht) (Period)		
Z	T	S	O ₂	NH ₄ -N	N	Si	PO ₄ -3-P	Chla	Phaeo	σ _t
0	26.08	35.612	4.68	<.2	0.6	2.2	0.14	.058	.009	23.50
10	26.06	35.614	4.69	<.2	0.6	2.3	0.14	.048	.015	23.51
28	26.04	35.701	4.68	<.2	0.6	2.1	0.14	.063	.002	23.57
56	25.95	35.789	4.68	0.8	2.5	18.8*	0.19	.098	.005	23.67
83	25.78	36.876	4.76	<.2	0.6	1.4	0.12	.189	.051	24.54
111	22.71	36.754	4.43	<.2	1.8	1.1	0.14	.145	.095	25.38
165	20.60	36.772	4.36	<.2	1.6	2.8	0.19	.016	.024	25.98
220	18.77	36.589	4.24	<.2	4.7	1.8	0.30	.004	.007	26.32
275	17.60	36.427	4.42	<.2	6.1	2.2	0.40	.005	.004	26.49
331	16.50	36.261	4.08	<.2	9.2	3.2	0.55	.001	.004	26.62
440	14.25	35.904	3.70	<.2	14.6	5.5	0.96			26.86
550	12.12	35.565	3.30	<.2	19.7	8.8	1.31			27.03
714	7.65	34.919	2.94	<.2	29.3	18.6	2.14			27.29
872	6.25	34.879	3.48	<.2	28.6	21.2	2.14			27.45
1083	4.86	34.941	4.43	<.2	24.4	22.0	1.87			27.68

R/V CRAWFORD

OPEC CRUISE #001

STATION: G-4

Latitude	Longitude	MO/DAY/YR	Messenger Time	Bottom	Wind	Speed	Weather	Dominant Waves	Secchi	
17°49.3N	66°45.0W	2/1/80	0030 (GMT)							
Z	T	S	O ₂	NH ₄ ⁻ N	N	Si	PO ₄ ⁻³ -P	Chla	Phaeo	σ _t
0*	26.19			<.2	0.3	2.3	0.19	.096	.005	
25	26.06			<.2	0.3	2.6	0.14	.090	.002	
50	26.06			<.2	0.4	3.6	0.16	.101	.011	
75	25.97			<.2	0.4	2.1	0.16	.133	.028	
100	25.00			<.2	0.7	4.7	0.17	.274	.075	

* Nominal Depths

R/V CRAWFORD

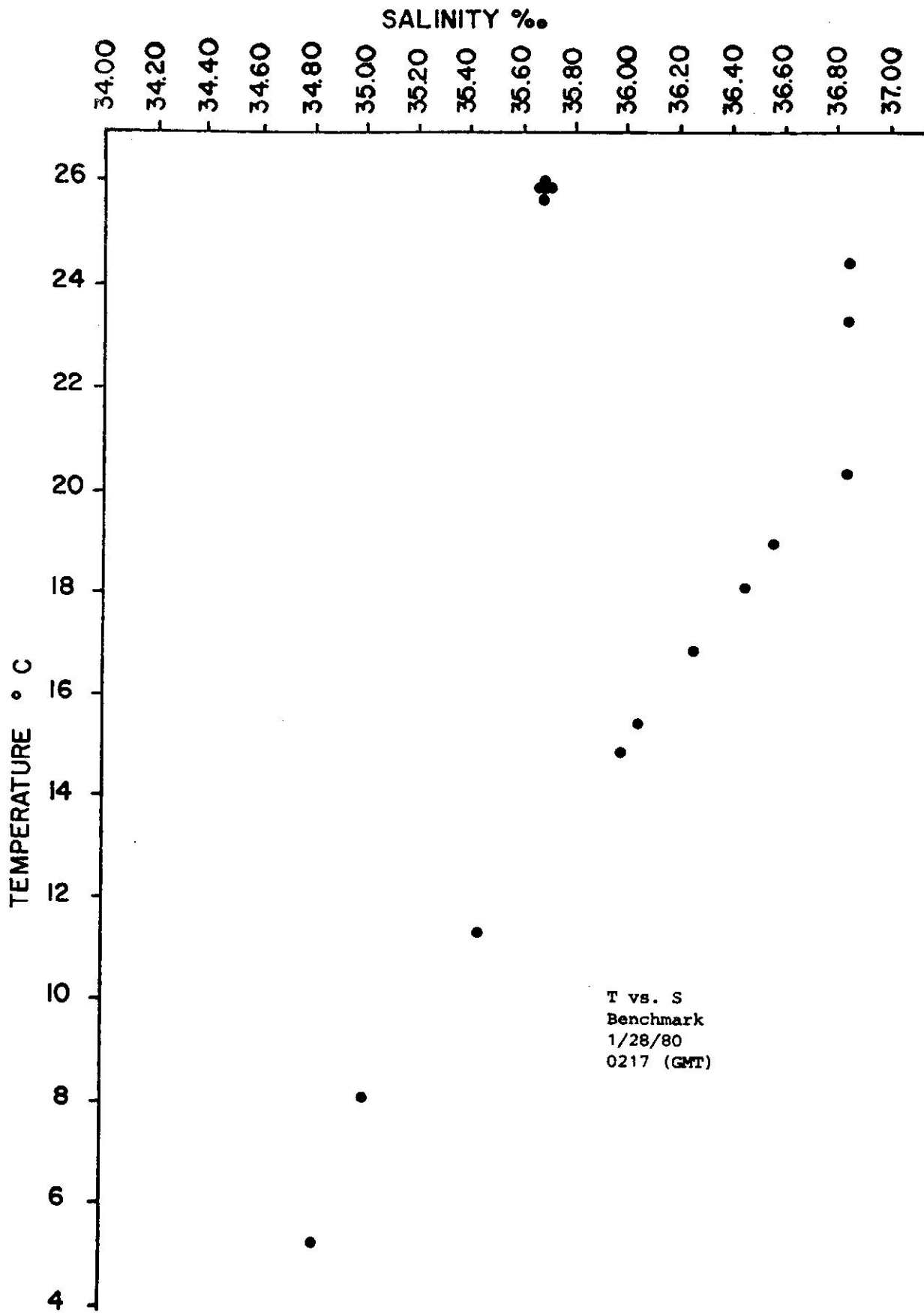
OTEC CRUISE 8001

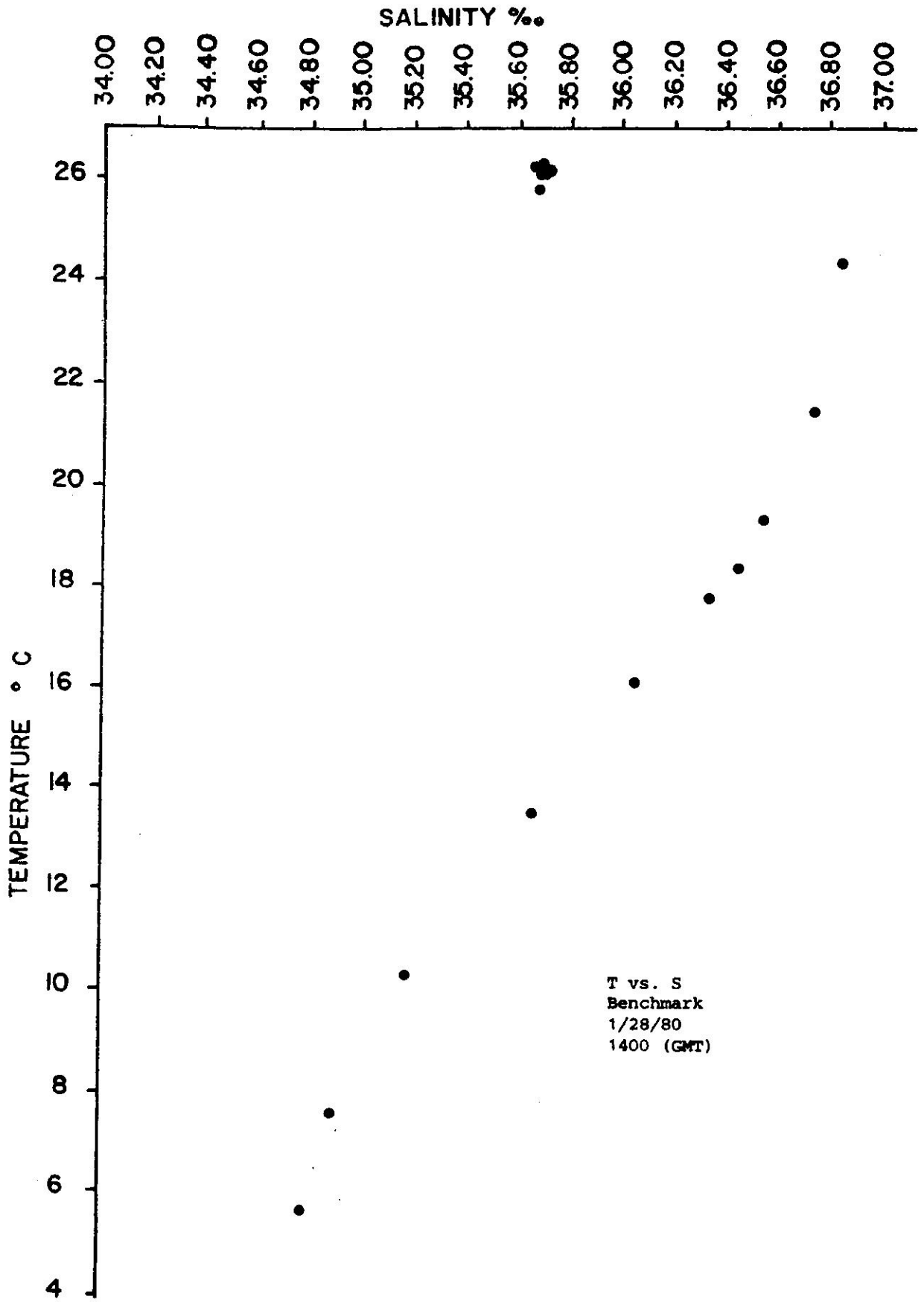
STATION: G-1

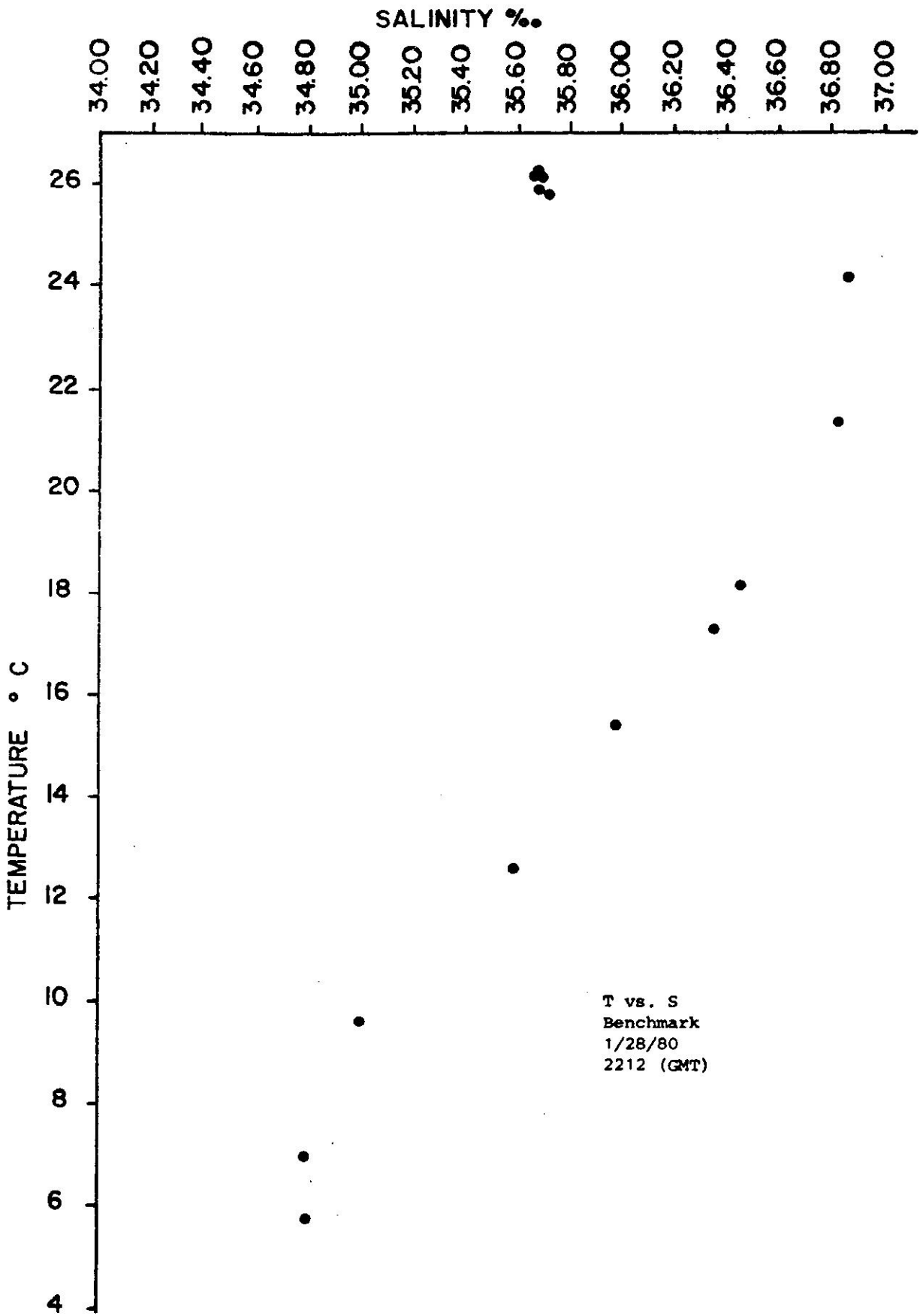
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17°56.0N	66°45.0W	2/1/80							
Z	T	S	O ₂	N	Si	PO ₄ -3-P	Chla	Phaeo	σ _t
0*	26.30		NH ₄ -N	.1	7.5	0.14			
10	26.29		<.2	.1	5.1	0.14			

* Nominal Depths

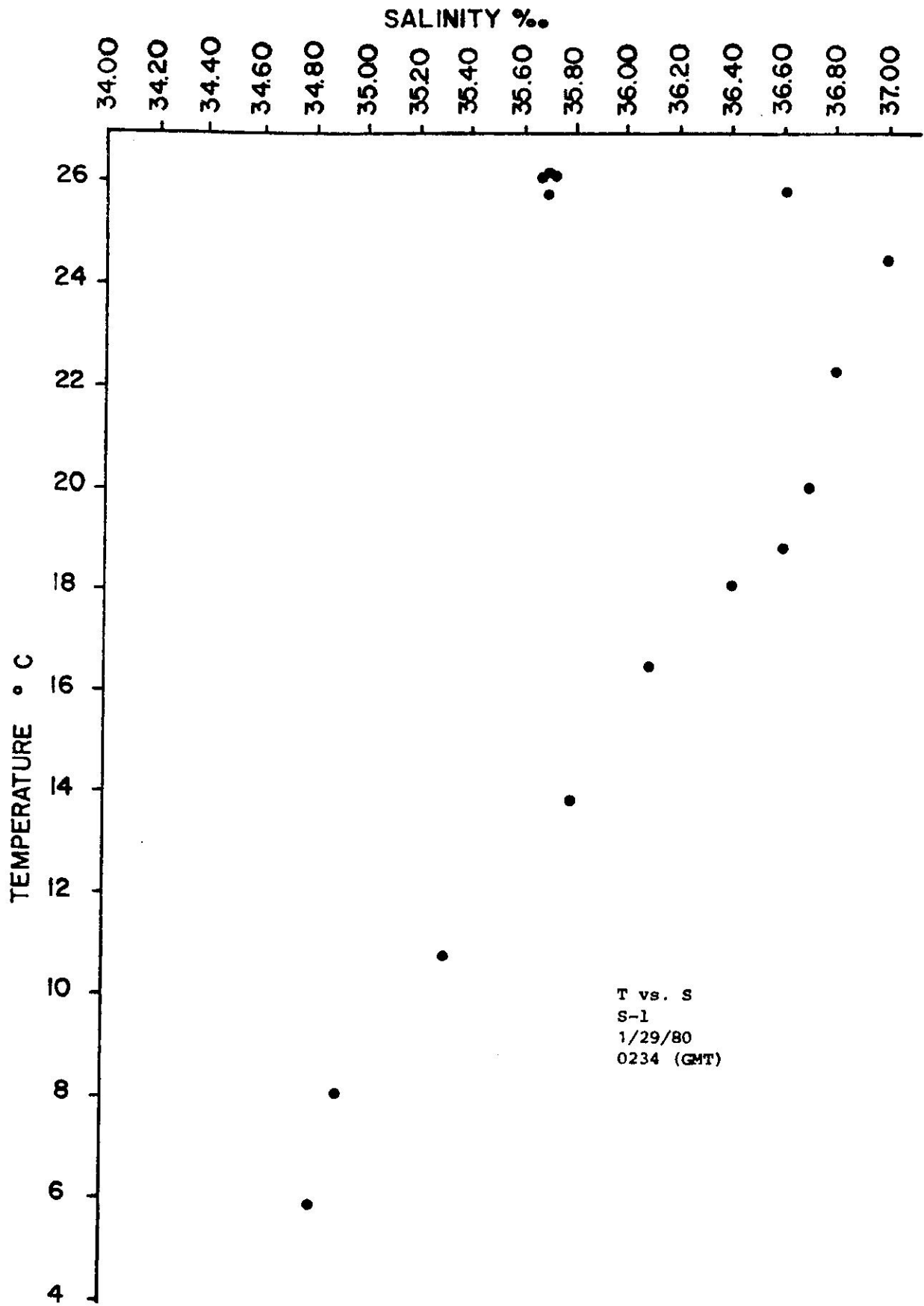
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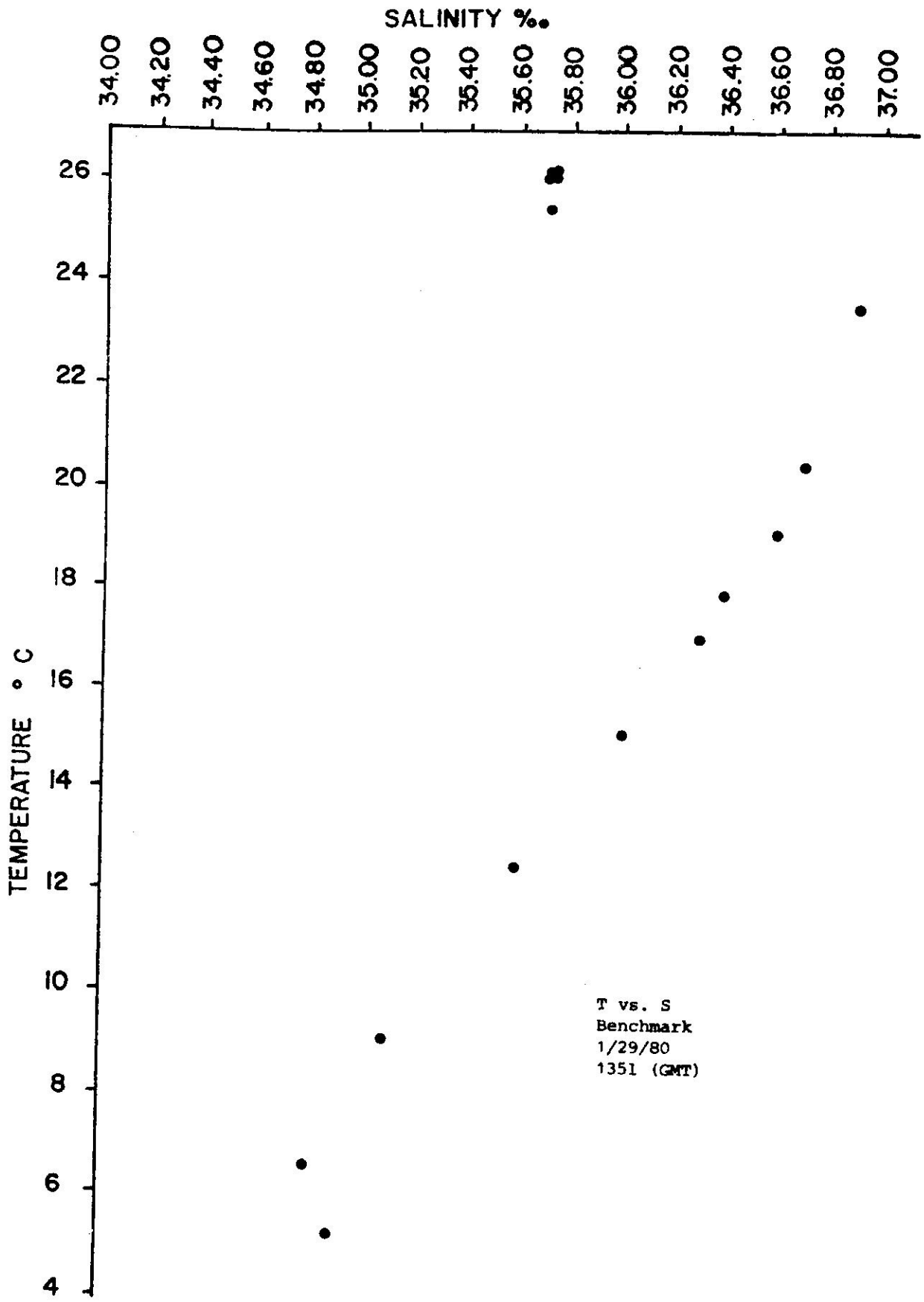




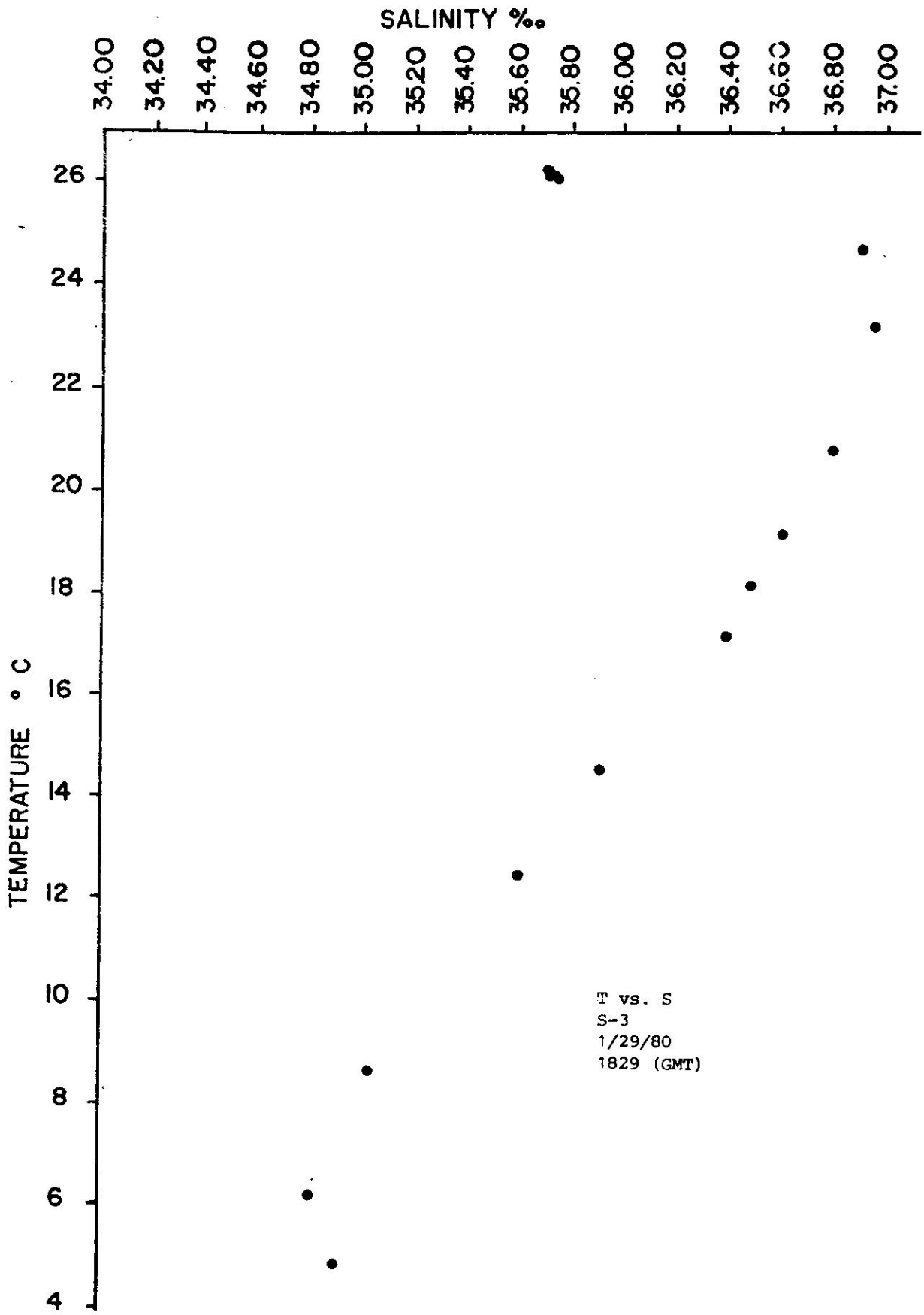


T vs. S
Benchmark
1/28/80
2212 (GMT)

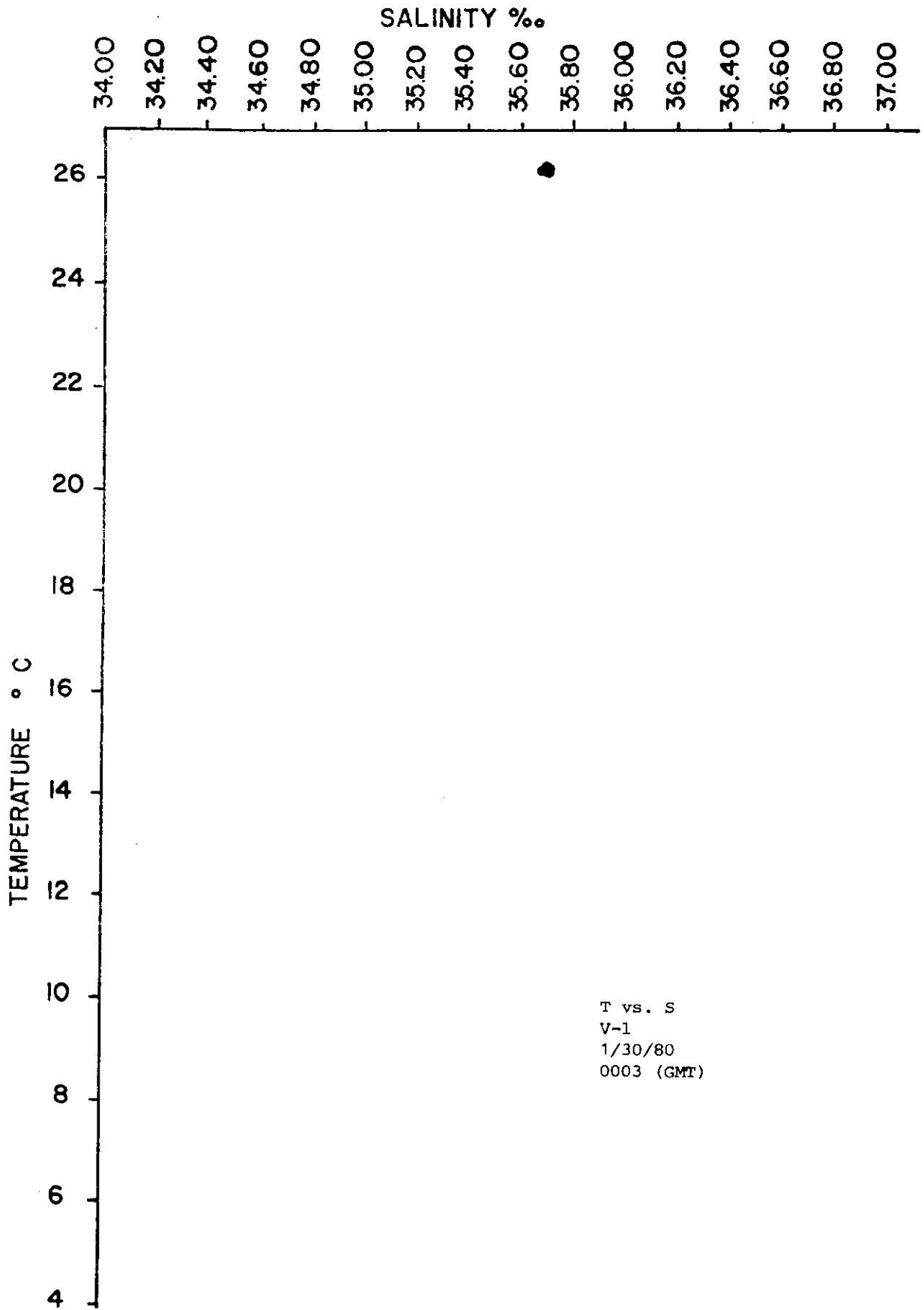




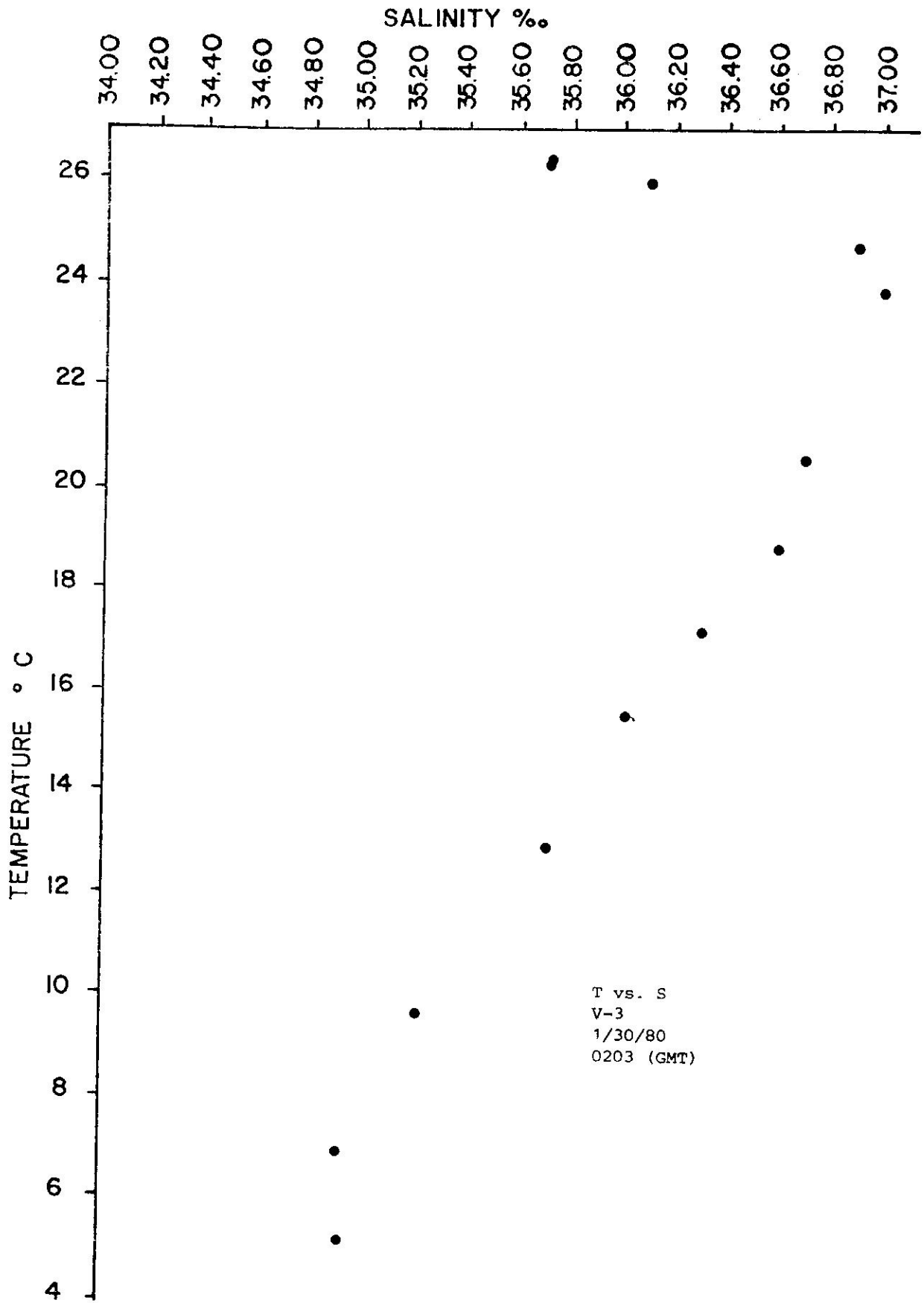
T vs. S
Benchmark
1/29/80
1351 (GMT)

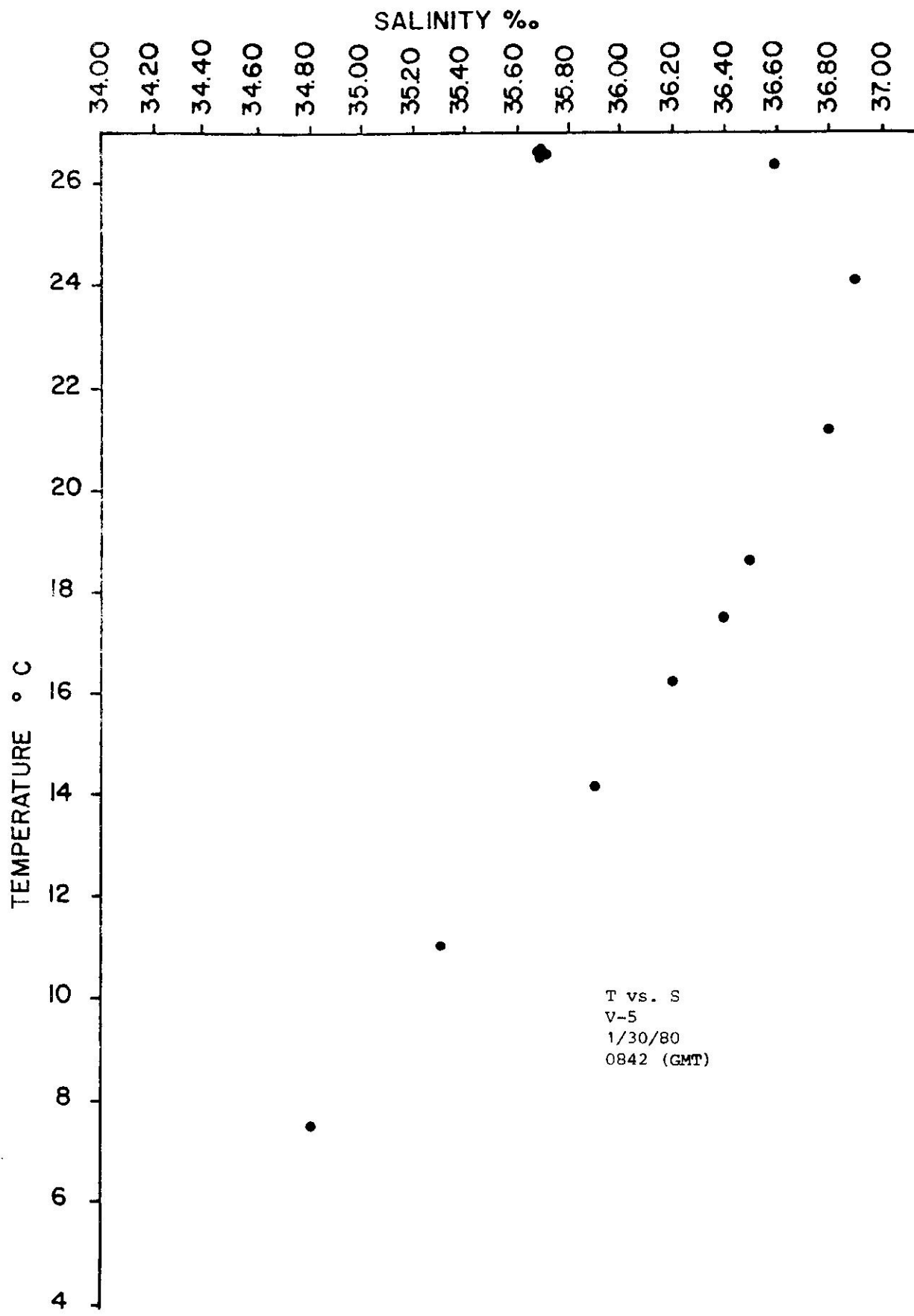


T vs. S
S-3
1/29/80
1829 (GMT)

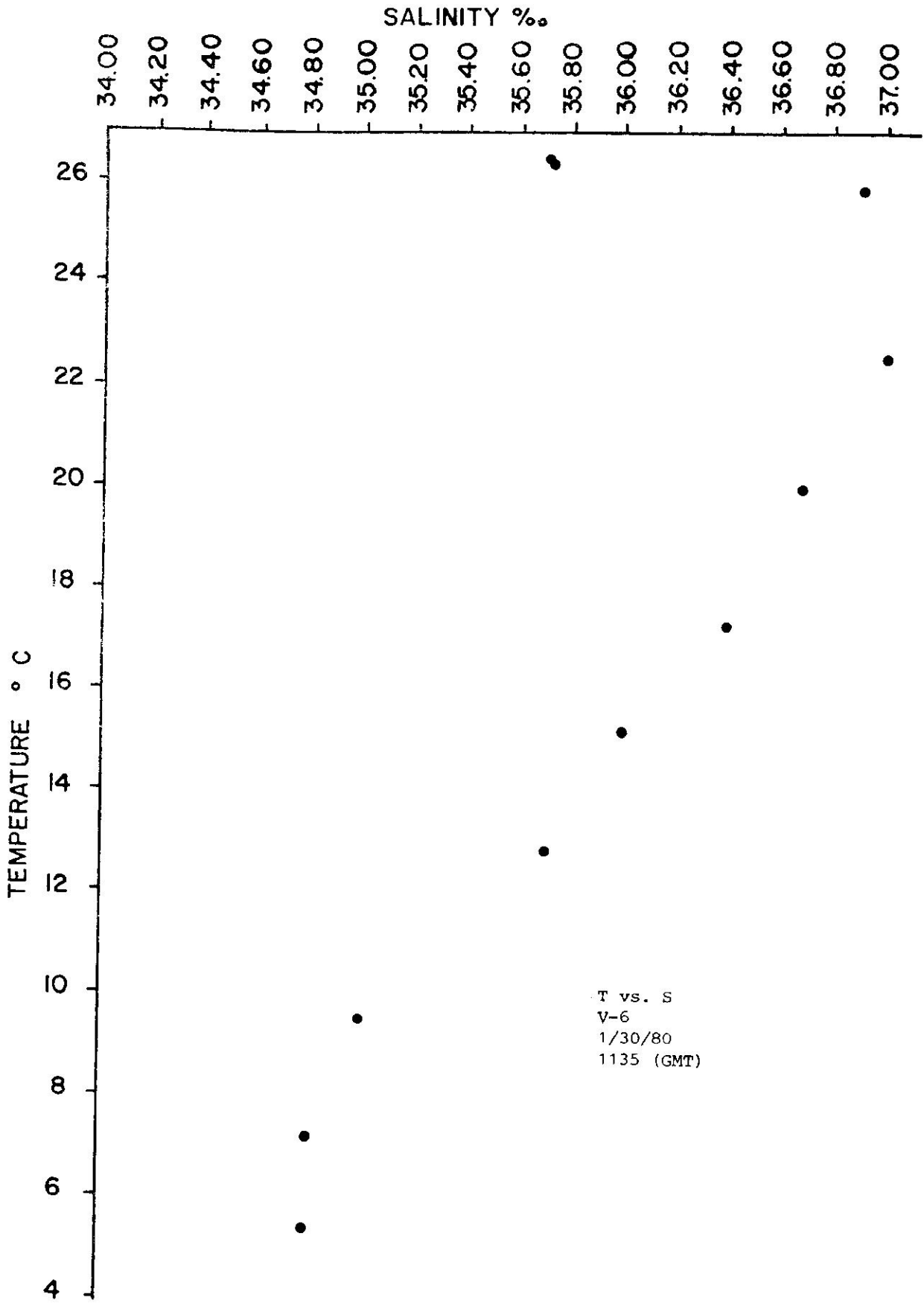


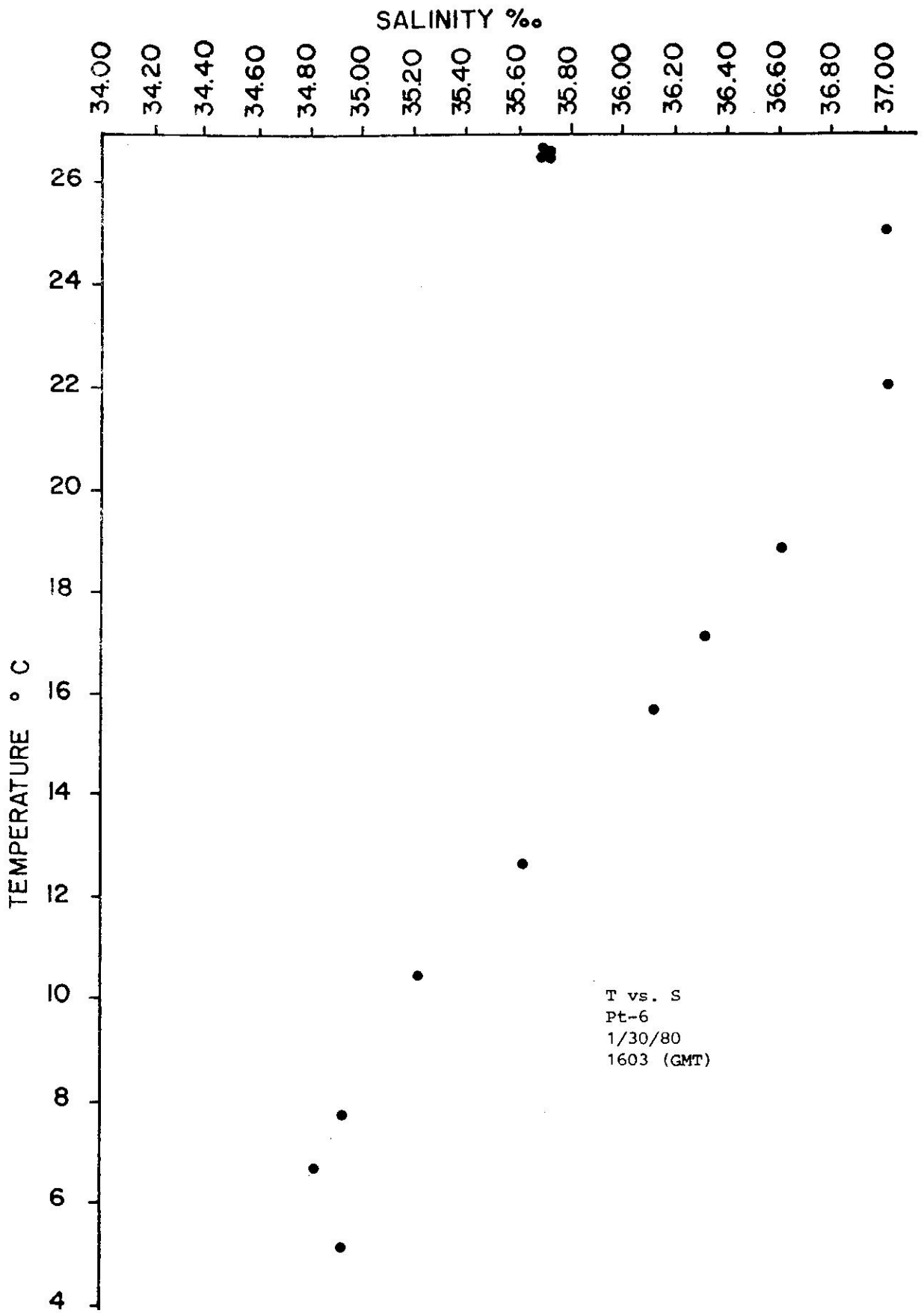
T vs. S
V-1
1/30/80
0003 (GMT)

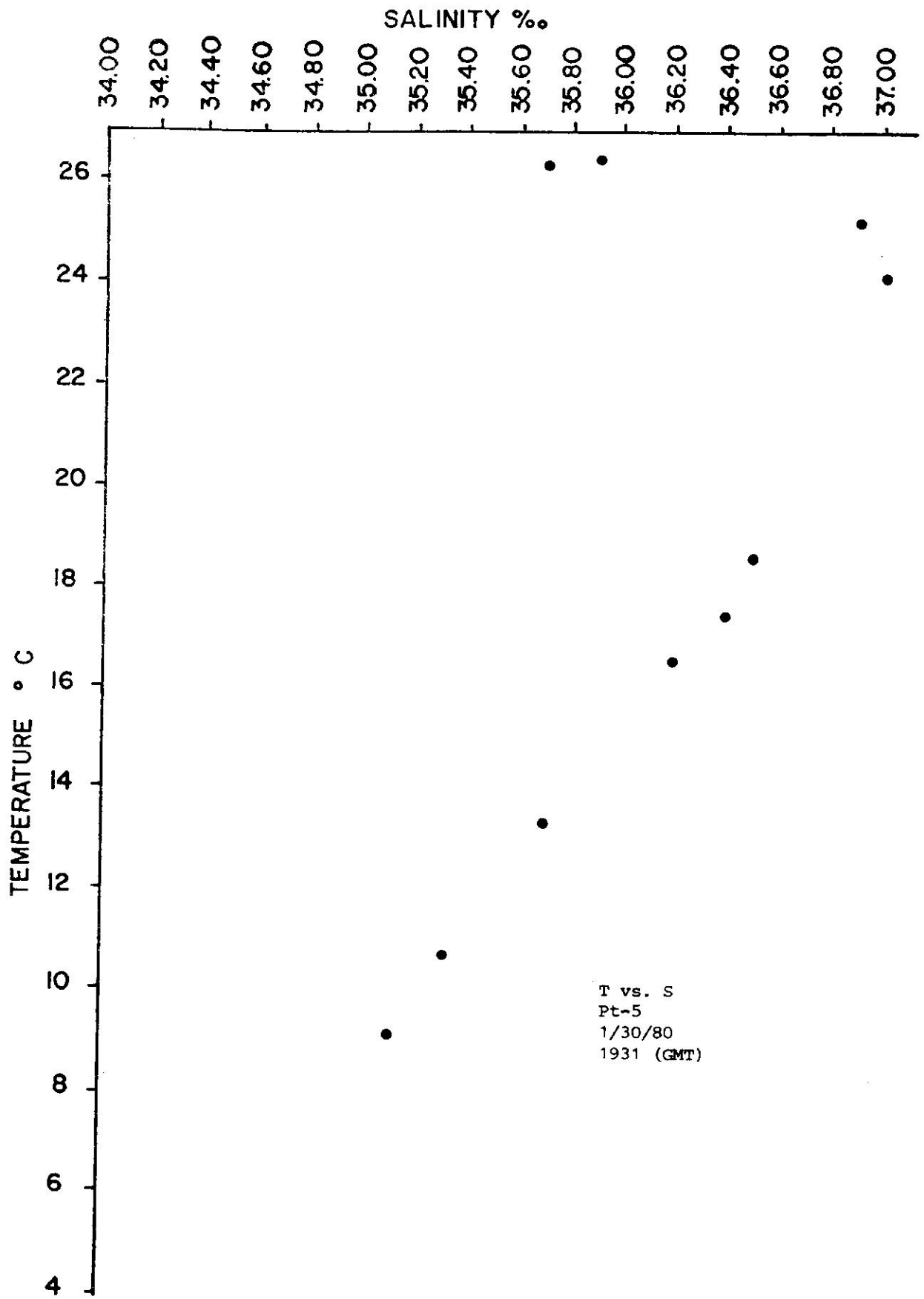


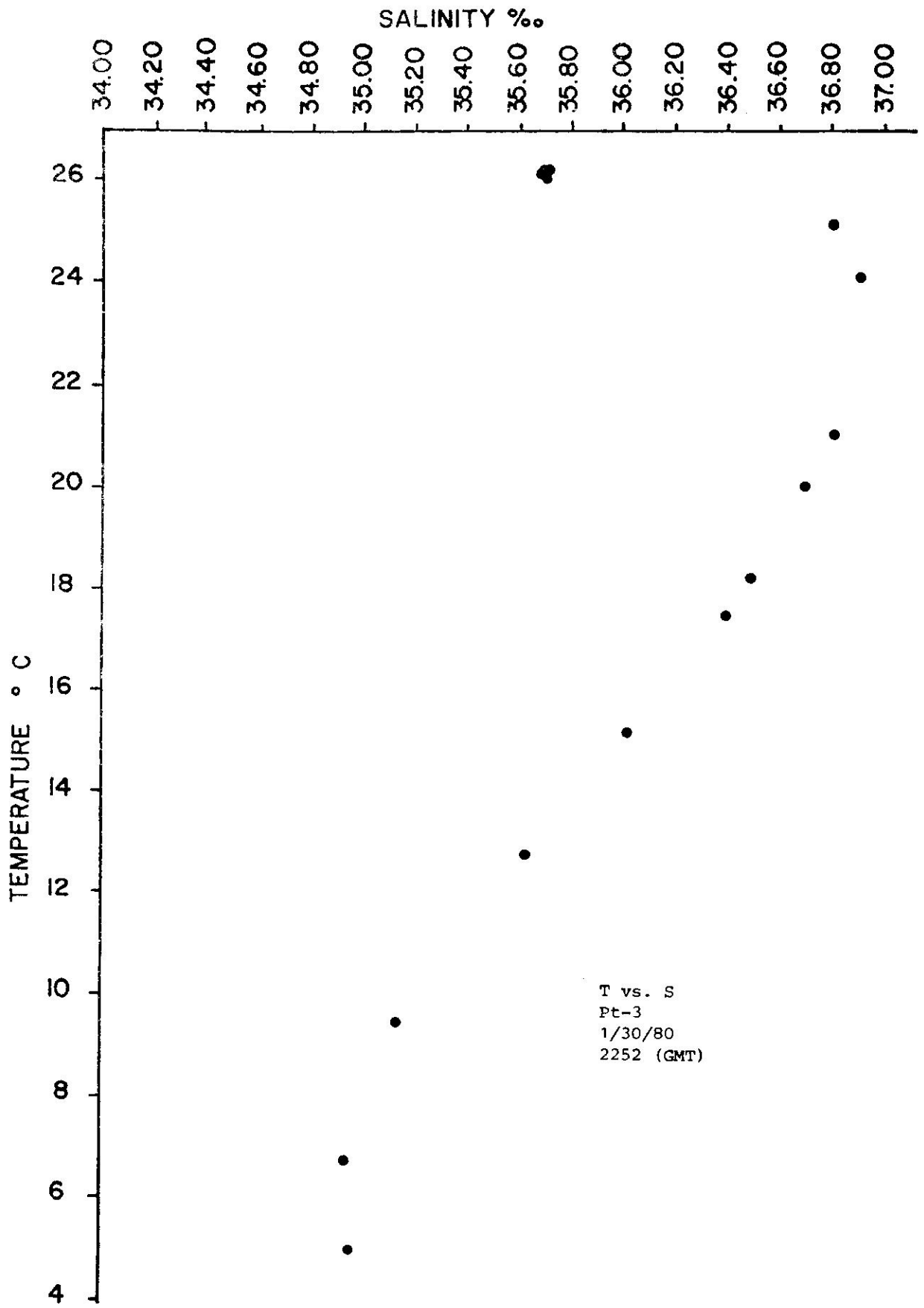


T vs. S
V-5
1/30/80
0842 (GMT)

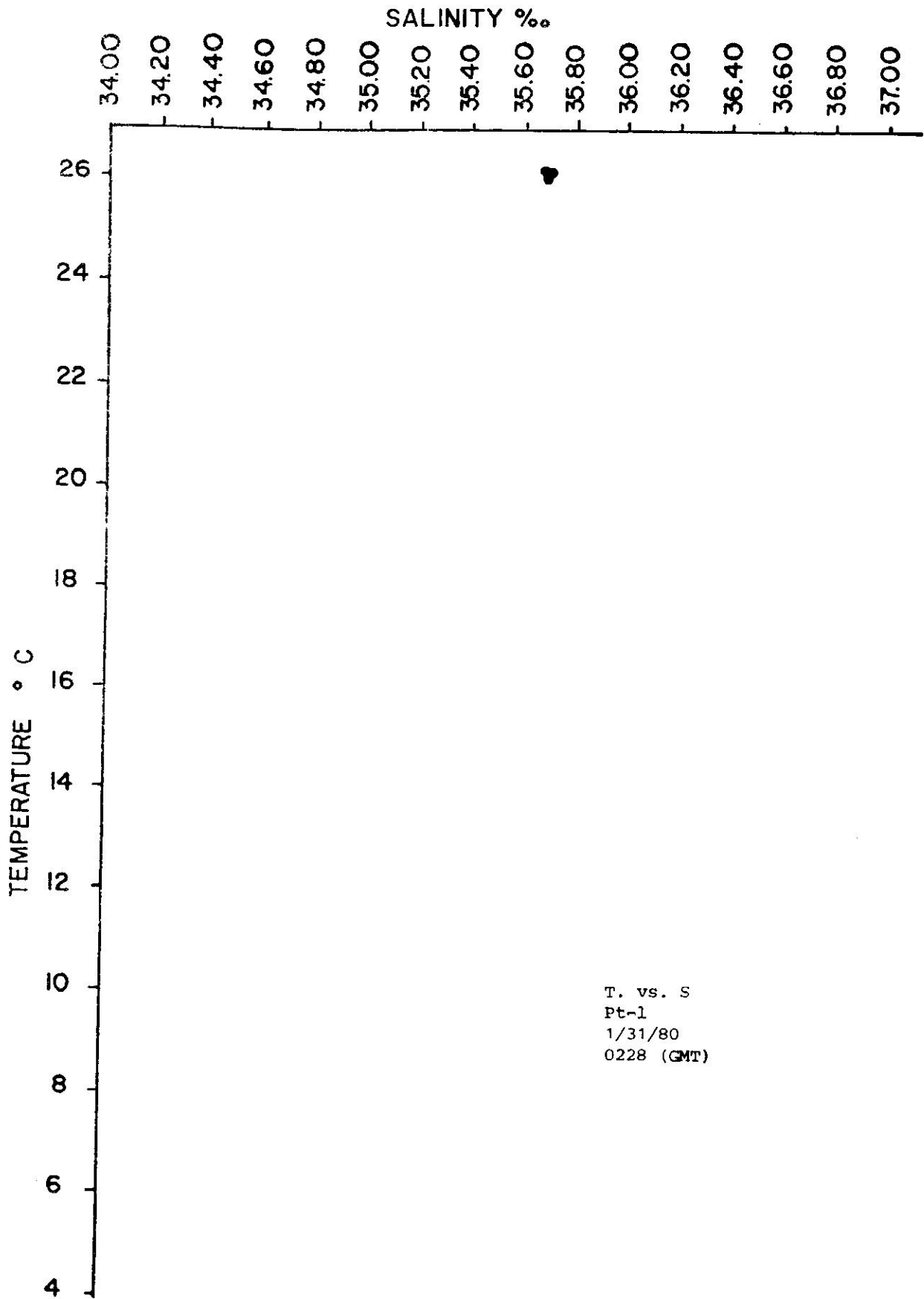


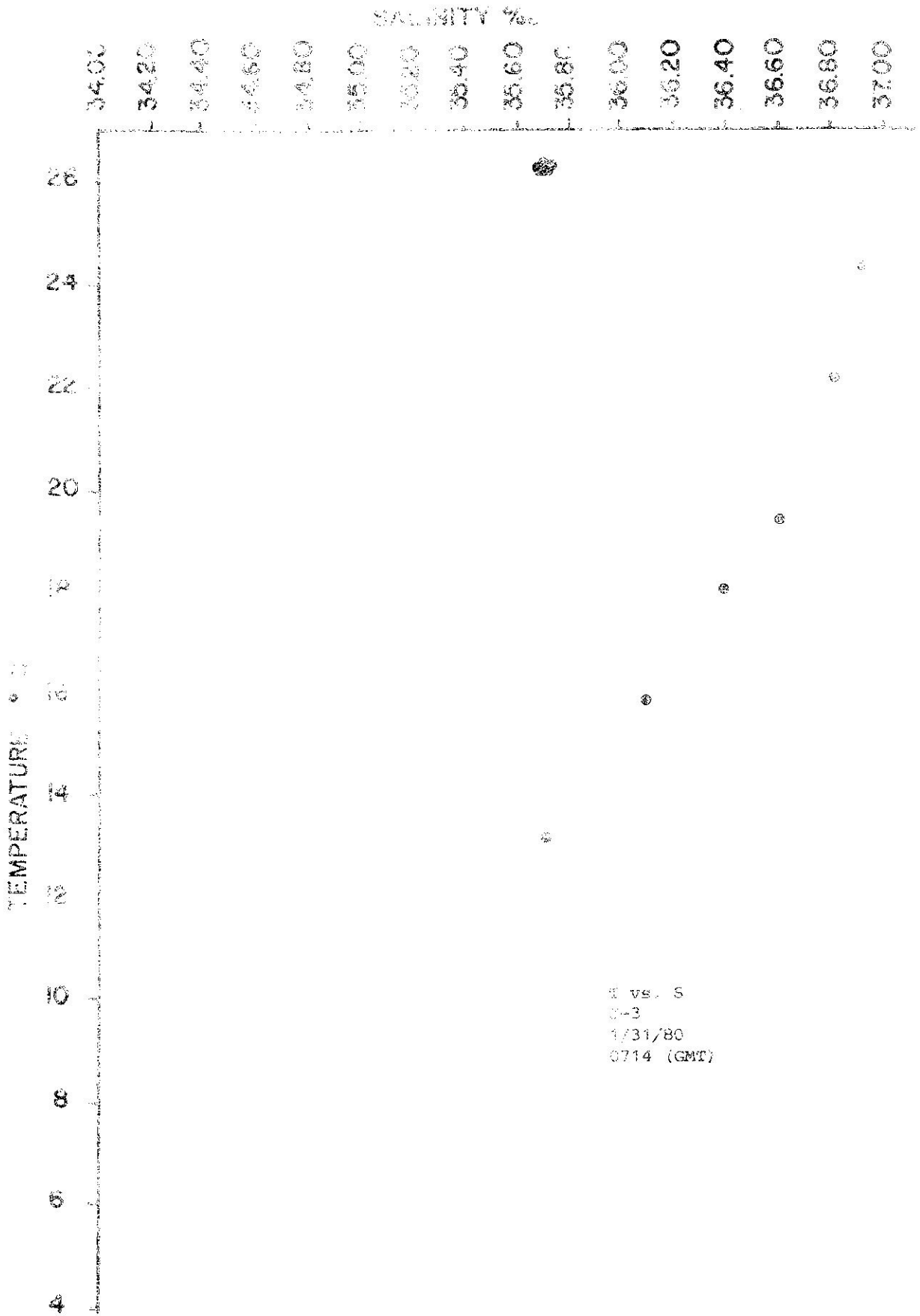




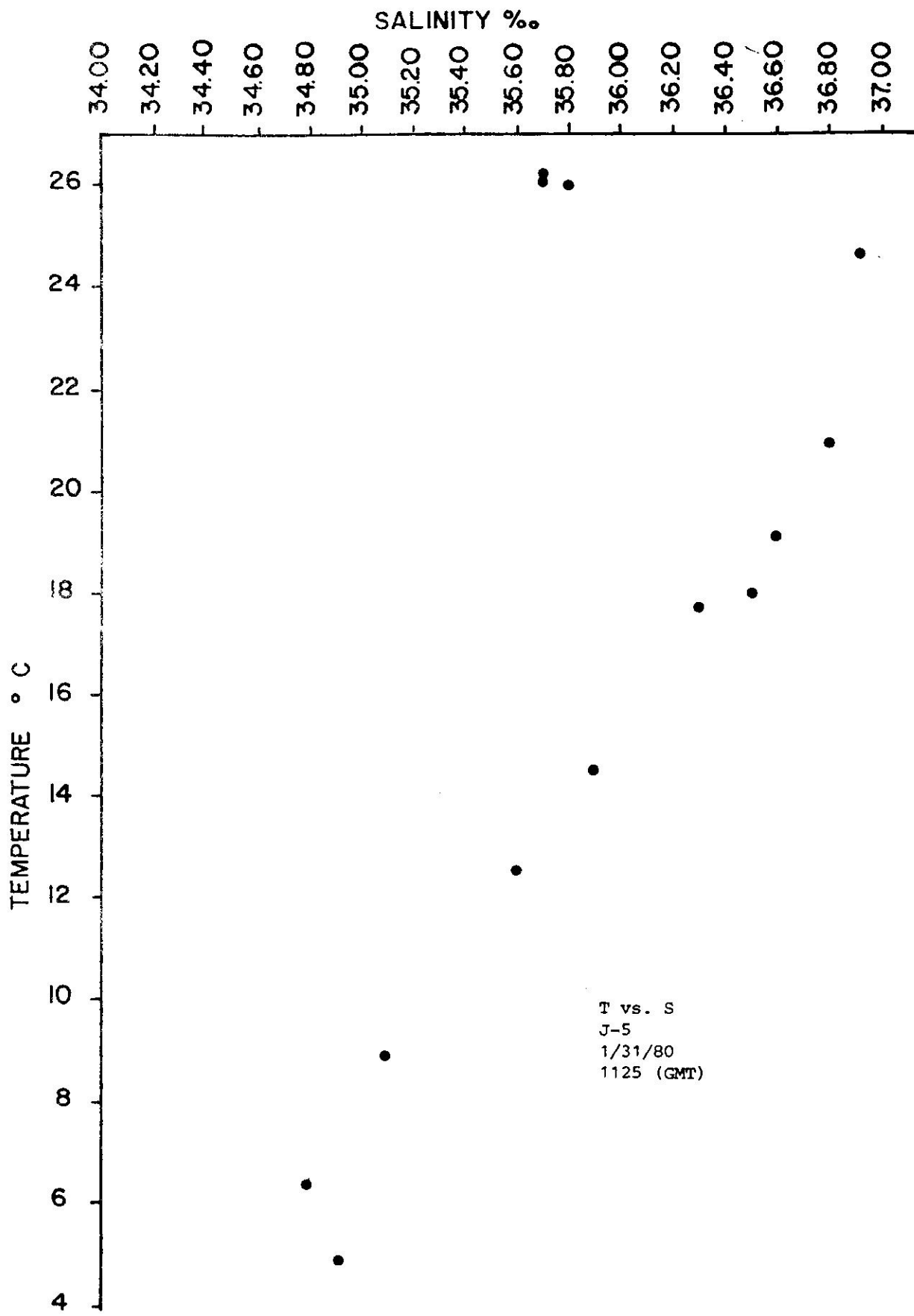


T vs. S
Pt-3
1/30/80
2252 (GMT)

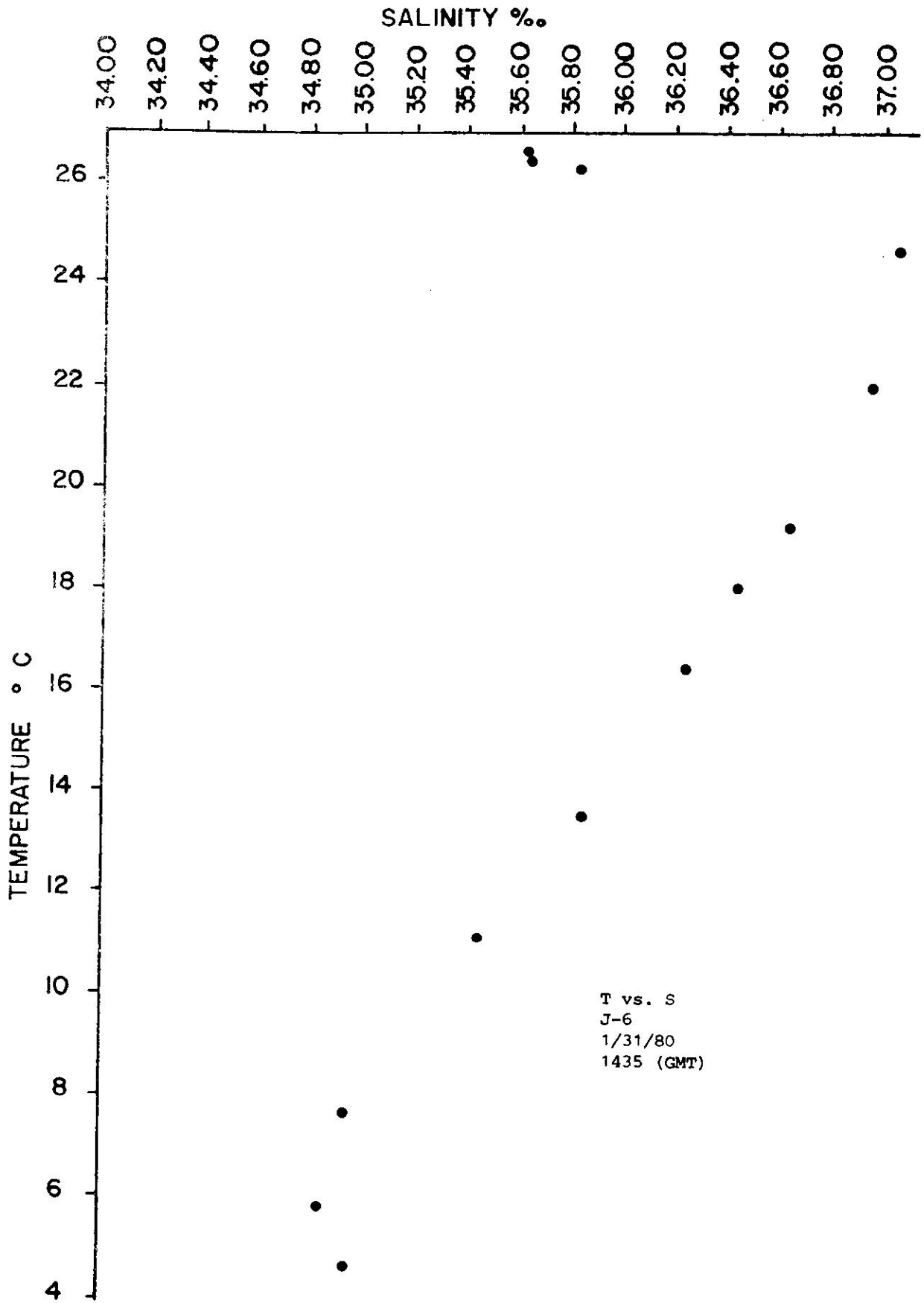


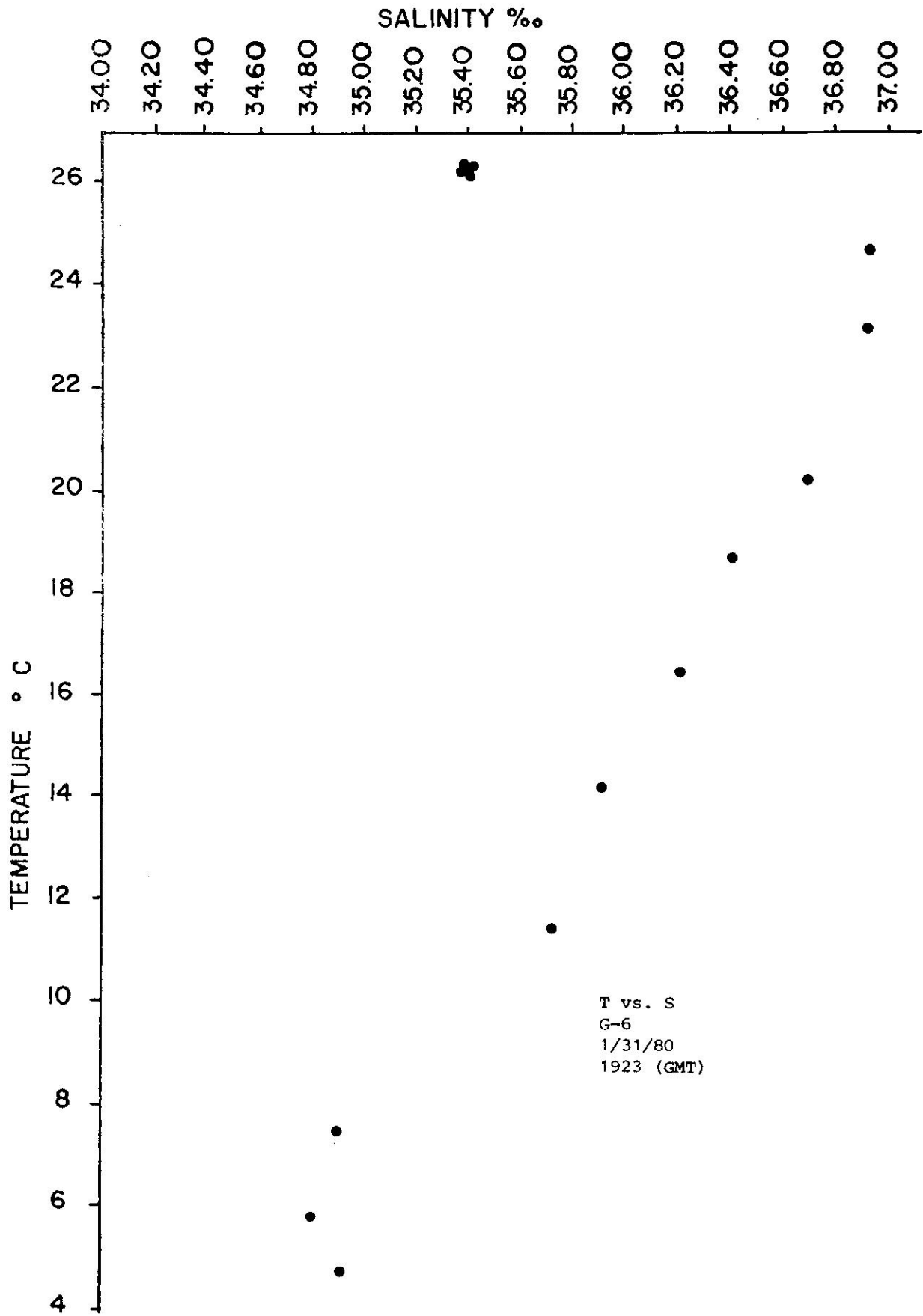


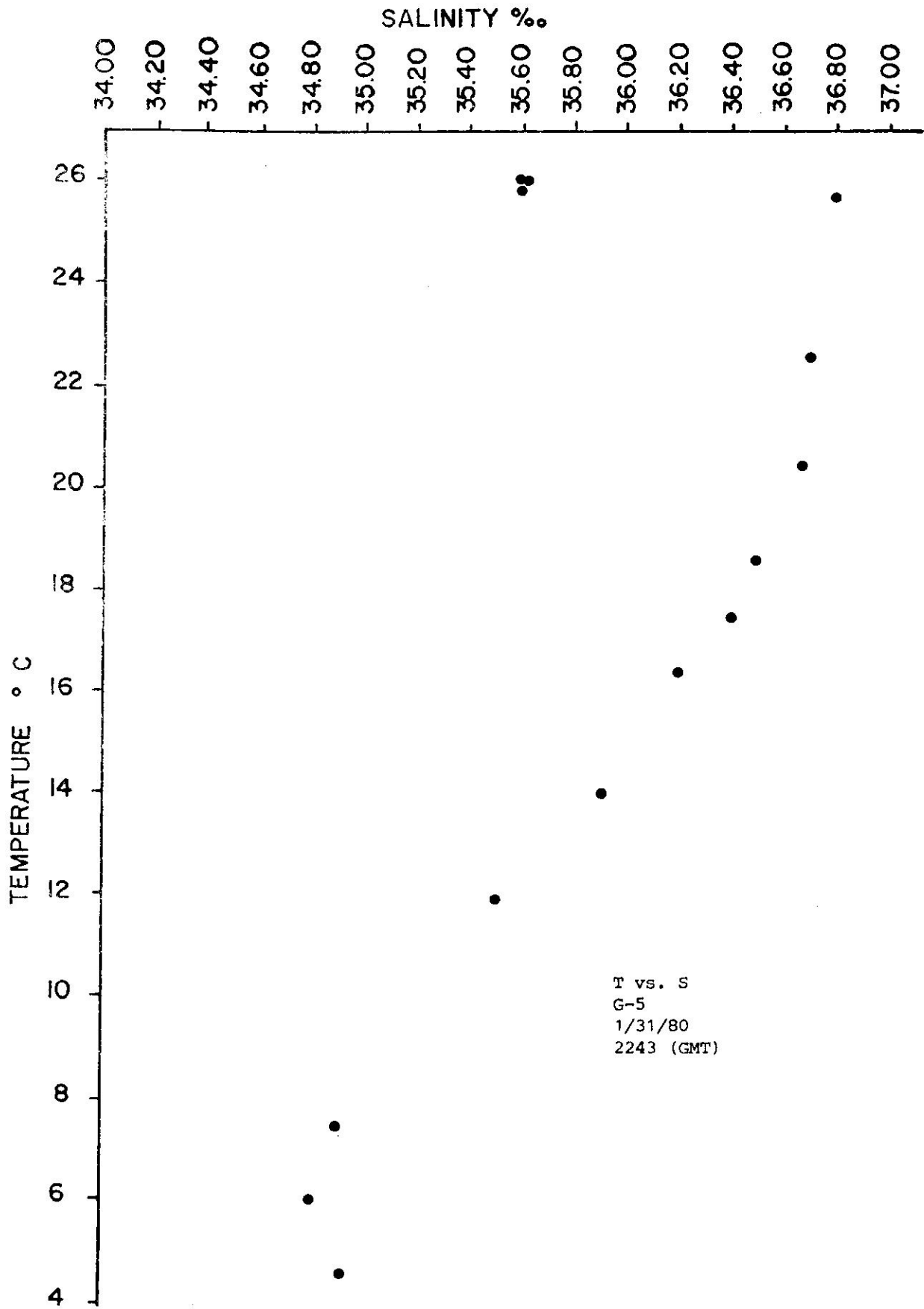
T vs. S
 8-3
 1/31/80
 0714 (GMT)

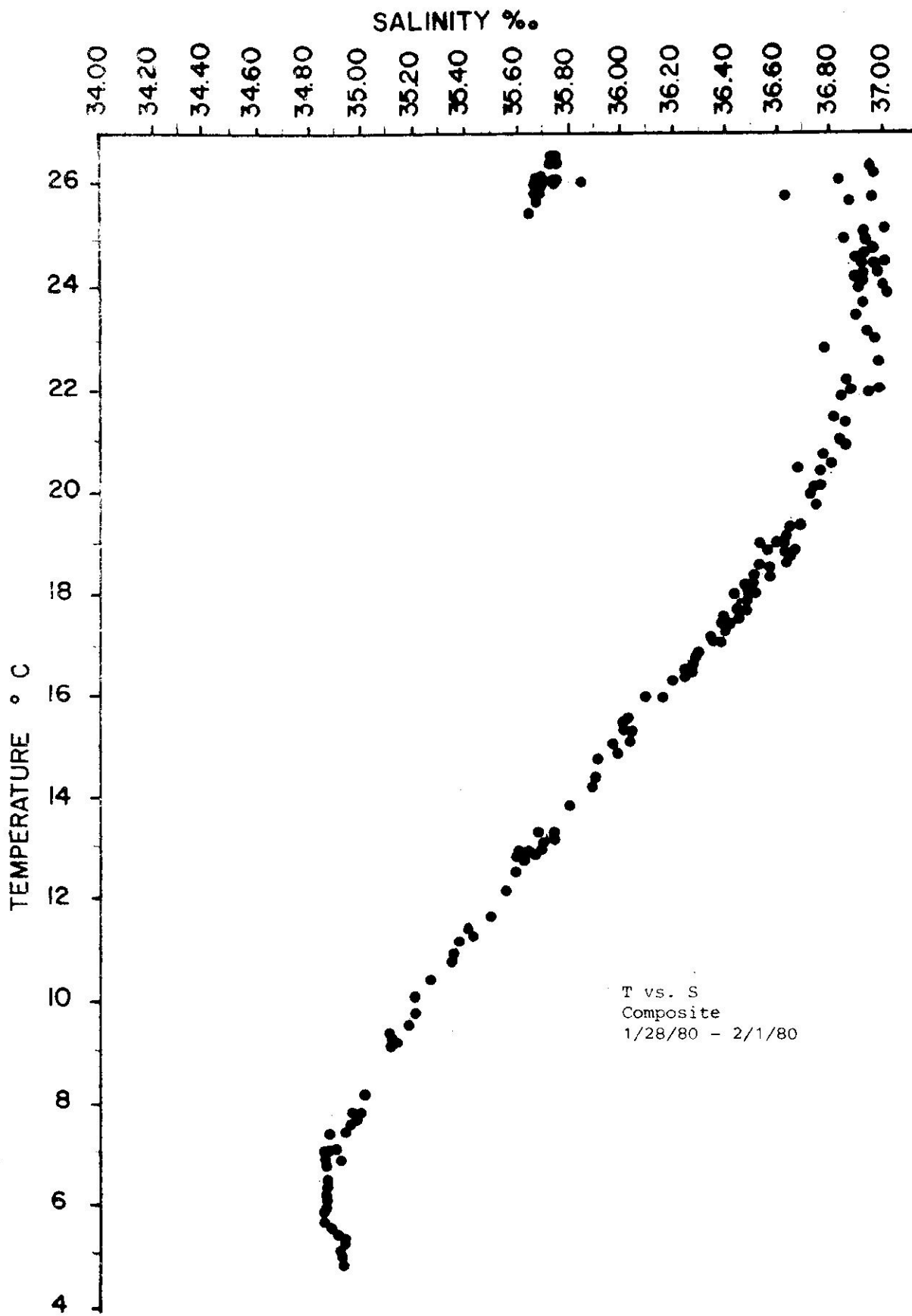


T vs. S
J-5
1/31/80
1125 (GMT)









ZOOPLANKTON DATA

SECOND CRUISE

Station	Date	Local Time	Depth (m)	Latitude	Longitude	Water Filtered (m ³)	Tow Length (m, ft)	Biomass (ml/1000 m ³)	Total Copepods (#/m ³)	Total Larvacean (#/m ³)	Total Chaetognaths (#/m ³)	Total Pteropods (#/m ³)
Benchmark	1/28/80	1115	100-200	17°57.3N	65°51.5	225	13.2	104	219	33	10	1
Benchmark	1/28/80	1115	0-100			157	13.2	---	---	---	---	---
Benchmark	1/28/80	1145	200			251	11.45	140	265	33	25	3
Benchmark	1/28/80	1147	0-100			229	11.35	197	335	66	36	0
Benchmark	1/28/80	1242	0-100			229	19.05	128	267	48	22	0
Benchmark	1/28/80	0157	0-1000			761	60.02	30	10	13	.65	0
Benchmark	1/28/80	0310	0-1000			870	50.0	140	38	4	2.3	0
Benchmark	1/28/80	0430	100-200			428	28.0	140	---	---	---	---
Benchmark	1/28/80	0730	0-1000			831	45.0	60	5	0	.24	0
Benchmark	1/28/80	0845	200-1000			520	45.0	50	9	.23	.69	0
Benchmark	1/28/80	0955	200-1000			735	45.0	50	12	0	0	.27
Benchmark	1/28/80	1055	0-1000			531	15.0	75	18	2	2	0
Benchmark	1/29/80	0115	0-100			220	12.0	80	271	34	9	2
Benchmark	1/29/80	0115	100-200			404	16.0	47	17	2	2	.37
Benchmark	1/29/80	0251	0-100			227	10.0	128	304	30	13	2
Benchmark	1/29/80	0251	100-200			347	10.0	37	25	.43	.86	.86
Benchmark	1/29/80	0325	0-100			207	10.45	50	305	32	12	6
Benchmark	1/29/80	0325	100-200			309	10.45	40	38	0	3	.64
S1	1/29/80	0845	0-100	17°52.7N	65°53.9W	160	30.0	---	---	---	---	---
S2	1/29/80	1120	0-100	17°54.2N	65°50.0W	7	18.05	100	228	9	7	.85
S3	1/29/80	1231	0-100	17°55.9N	65°46.4W	344	13.0	60	247	26	10	1
S4	1/29/80	0205	0-100	17°56.2N	65°55.4W	285	17.0	62	278	41	15	0
Benchmark	1/29/80	0311	0-100	17°57.3N	65°52.0W	250	17.0	62	239	50	12	.6
S6	1/29/80	0422	0-100	17°58.8N	65°48.2W	294	17.5	80	235	44	18	1
S1	1/29/80	0711	0-100	17°52.5N	65°53.6W	336	17.0	100	226	10	11	1
S2	1/29/80	0735	0-100	17°54.0N	65°50.0W	346	18.0	120	298	12	10	2
S3	1/29/80	0900	0-100	17°55.9N	65°46.4W	330	14.46	122	266	15	12	.61
S4	1/29/80	1130	0-100	17°56.1N	65°55.3W	350	18.0	84	441	75	30	.86
Benchmark	1/30/80	0130	0-100	17°57.3N	65°52.0W	336	17.0	80	303	41	18	.60
S6	1/30/80	0200	0-100	17°58.8N	65°48.2W	400	17.0	124	---	---	---	---

SECOND CRUISE

Station	Date	Local Time	Depth (m)	Latitude	Longitude	Water Filtered (m ³)	Tow Length (min)	Biomass (g/L/1000 m ³)	Total Copepods (#/m ³)	Total Larvacean (#/m ³)	Total Chaetognaths (#/m ³)	Total Ichthyoplankton
V-1	1/30/80	0432	0-100	18°04.4N	65°32.6W	96	3.0	19	1,631.0	394	56	13
2	1/30/80	0442	0-100	18°03.6N	65°32.6W	1087	3.0	150	406	35	25	.79
3	1/30/80		0-100	18°01.8N	65°32.7W	3627	----	112	302	28	5	.41
4	1/30/80	1012	0-100	17°57.7N	65°32.6W	689	----	140	---	---	---	---
5	1/30/80	1138	0-100	17°48.5N	65°32.6W	333	16.0	56	710	97	34	5
V-6	1/30/80	0410	0-100	17°32.5N	65°32.8W	328	15.0	110	355	27	30	2
Pt-S	1/31/80	1155	0-100	17°44.2N	65°53.0W	400	19.36	70	303	29	14	2
4	1/31/80	0100	0-100	17°52.0N	65°53.0W	335	16.15	74	312	34	21	2
3	1/31/80	0430	0-100	17°56.0N	65°53.0W	447	20.0	100	412	62	27	4
2	1/31/80	0525	0-100	17°58.1N	65°53.0W	541	35.0	130	332	59	19	1
1	1/31/80	0635	0-100	17°58.2N	65°53.0W	143	----	95	302	36	15	3
J-1	1/31/80	0933	0-10	17°54.8N	66°16.0W	95	5.5	145	856	265	81	9
2	1/31/80	1000	0-100	17°53.7N	66°16.1W	180	9.0	150	411	26	18	2
3	1/31/80	1223	0-100	17°48.7N	66°16.1W	353	18.0	78	371	37	48	.85
4	1/31/80	0104	0-100	17°47.7N	66°16.0W	394	19.0	60	300	82	29	0
5	1/31/80	0225	0-100	17°38.7N	66°16.0W	426	18.0	84	410	59	52	4
6	1/31/80	0700	0-100	17°24.5N	66°16.0W	464	18.0	122	397	8	43	1
G-6	1/31/80	1155	0-100	17°26.5N	66°45.0W	433	16.5	120	503	86	22	3
5	1/31/80	----	0-100	17°41.6N	66°45.0W	409	----	104	403	128	35	8
4	2/1/80	0500	0-100	17°49.3N	66°45.0W	419	5.0	110	377	79	19	0
3	2/1/80	0600	0-100	17°53.4N	66°45.0W	455	17.0	110	331	70	21	1
2	2/1/80	0630	0-100	17°54.9N	66°45.0W	508	----	90	359	52	26	2
1	2/1/80	0727	0-100	17°56.0N	66°45.0W	163	6.	72	1,222.0	456	15	0
0	2/1/80	0753	0-10	17°58.0N	66°45.7W	179	3.	60	550	65	34	10
Pt-6	1/30/80	0705	0-100	17°28.0N	65°53.0W	401	15.0	54	---	---	---	-

APPENDIX

JANUARY 1980 CRUISE PLAN (CRUISE 8001)

DAY 0

1600 Depart Malecon

DAY 1

0600 Arrive Benchmark station
hydrocast (primary productivity), 13 depths
0800 fluorometer profile
1000 oblique net tows (0-100, 100-200m)
1100 vertical net tow (1000-200m)
1200 light profile, secchi
1300 oblique net tows (0-100, 100-200m)
1400 vertical net tow (1000-200m)
1500 oblique net tow (0-100, 100-200m)
1600 vertical net tow (1000-200m)
1700 hydrocast
fluorometer profile
1930 vertical net tow (1000-200m)
2030 oblique net tows (0-100, 100-200m)
2130 vertical net tow (1000-200m)
2230 oblique net tows (0-100, 100-200m)
2330 vertical net tow (1000-200m)

DAY 2

0030 oblique net tows (0-100, 100-200m)
0130 hydrocast
0330 fluorometer profile
0530 Begin small scale pattern study
steam for station S-1
0630 hydrocast at station S-1 (primary productivity)
0830 fluorometer profile, station S-1
0915 oblique net tow (0-100m) station S-1
steam for S-2

DAY 2 (cont)

1000 fluorometer profile, station S-2
1045 oblique net tow (0-100m)
steam for S-3
1130 fluorometer profile, station S-3
1215 oblique net tow (0-100 m)
steam for S-4
1300 fluorometer profile, station S-4
1345 oblique net tow (0-100m)
steam for S-5
1430 fluorometer profile, station S-5 (Benchmark)
1515 oblique net tow
steam for S-6
1600 fluorometer profile, station S-6
1645 oblique net tow
return to benchmark
1730 hydrocast
1930 Begin night series
steam for S-1
2000 oblique net tow (0-100m)
steam for S-2
2100 oblique net tow (0-100m)
steam for S-3
2200 oblique net tow (0-100m)
hydrocast
steam for S-4
2400 oblique net tow (0-100m)
steam for S-5 (benchmark)

DAY 3

0000 oblique net tow (0-100m)
steam for S-6
0100 oblique net tow (0-100m)
0200 steam to Vieques
Begin large scale study

Day 3 (cont.)

0700 arrive station V-1
hydrocast (2 depths)
shallow net tow
fluorometer profile
steam for V-2

0900 shallow net tow
fluorometer profile

steam for V-3

1030 hydrocast (primary productivity), light profile
fluorometer profile
oblique net tow (0-100m)
steam for V-4

1400 oblique net tow (0-100m)
fluorometer profile
steam for V-5

1600 oblique net tow (0-100m)
fluorometer profile
steam for V-6

1930 hydrocast
oblique net tow (0-100m)
fluorometer profile
steam for PT-6

DAY 4

0130 arrive PT-6
hydrocast, net tow
fluorometer profile, oblique net tow (0-100m)
steam for PT-5

0530 oblique net tow (0-100m)
fluorometer profile
steam for PT-4

0800 fluorometer profile
oblique net tow (0-100m)
steam for PT-3 (benchmark)

1000 hydrocast (primary productivity)
oblique net tow (0-100m)
fluorometer profile
light profile

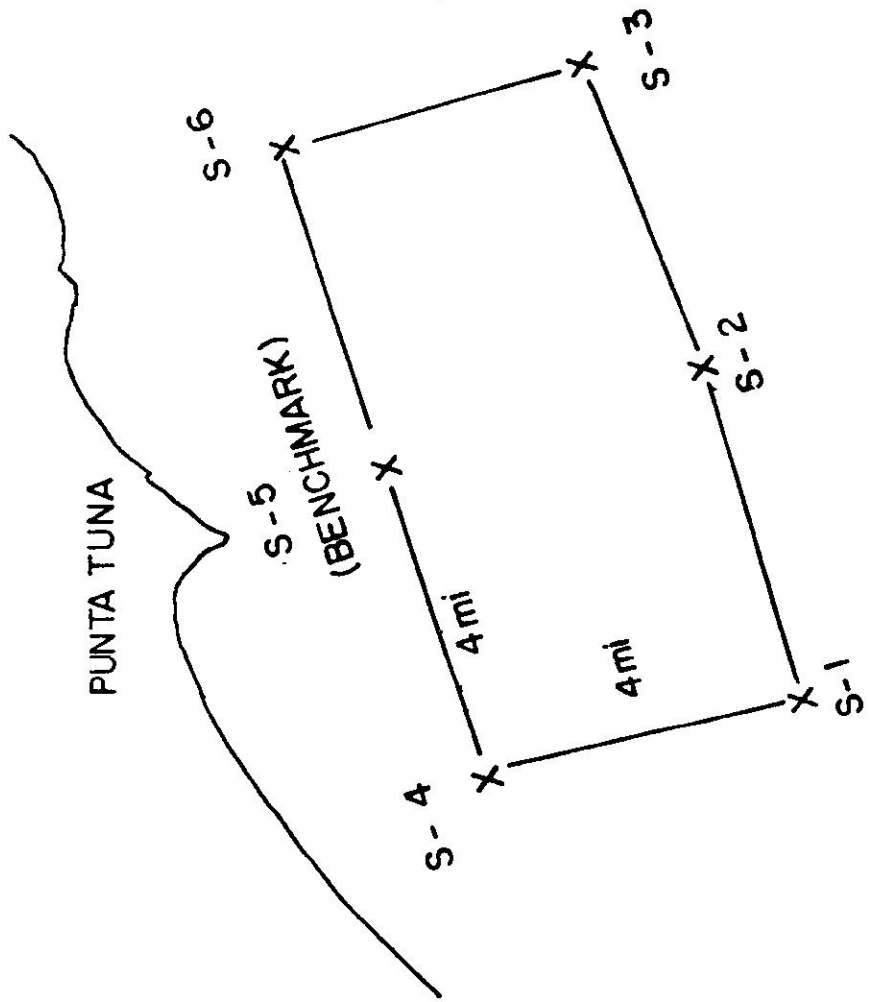
DAY 4 (cont.)

steam for PT-2
1400 fluorometer profile
oblique net tow
steam for PT-1
1600 shallow hydrocast (2 depths)
shallow net tow
fluorometer profile
steam for J-1
2030 shallow hydrocast (2 depths)
shallow net tow
fluorometer profile
steam for J-2
2300 fluorometer profile
oblique net tow
steam for J-3

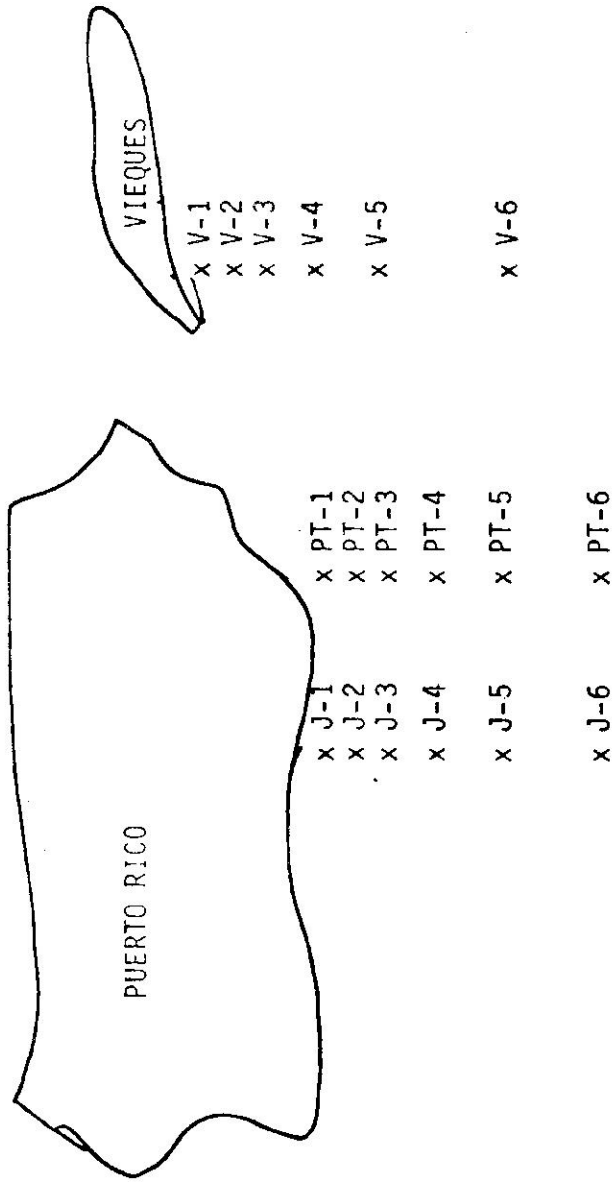
DAY 5

0100 hydrocast
fluorometer profile
oblique net tow (0-100m)
steam for J-4
0430 oblique net tow (0-100m)
fluorometer profile
steam for J-5
0700 fluorometer profile
oblique net tow (0-100m)
steam for J-6
1000 hydrocast (primary productivity), light profile
oblique net tow (0-100m)
fluorometer profile
steam for Malecon
2200 Arrive Malecon

SMALL SCALE STUDY



LARGE SCALE PATTERN STUDY



30 miles

Stations at approx. 1/2, 1 1/2, 3 1/2, 7 1/2, 15 1/2, 32 mi. from shore.

LIST OF SCIENTIFIC PERSONNEL

Paul M. Yoshioka	Scientist II	CEER
Edwin González	Tech.	CEER
José G. Maldonado	Student	UPR High School
Carlos A. Bonafé	Lab. Tech.	CEER
Amaury E. Torres	Student	Univ. of P.R.
Juan G. González	Scientist	CEER
Vance P. Vicente	Senior Associate	CEER
Dennis N. Corales	Lab. Tech.	CEER
Jorge R. García	M.S. Student	UPR & CEER
Jorge Capella	Lab. Tech.	CEER
José A. Ramírez	Lab. Tech.	CEER
Angel Nazario	Tech.	CEER
Daniel Pesante	Senior Associate	CEER
José M. López	Scientist II	CEER
George C. Anderson		Saga Enterprises

WEATHER CODE

- 0 Clear (no cloud at any level)
- 1 Partly cloudy (scattered or broken clouds)
- 2 Continuous layer (s) of cloud (s)
- 3 Sandstorm, duststorm, or blowing snow
- 4 Fog, thick dust, or haze
- 5 Drizzle
- 6 Rain
- 7 Snow, or rain and snow mixed
- 8 Shower (s)
- 9 Thunderstorm (s)