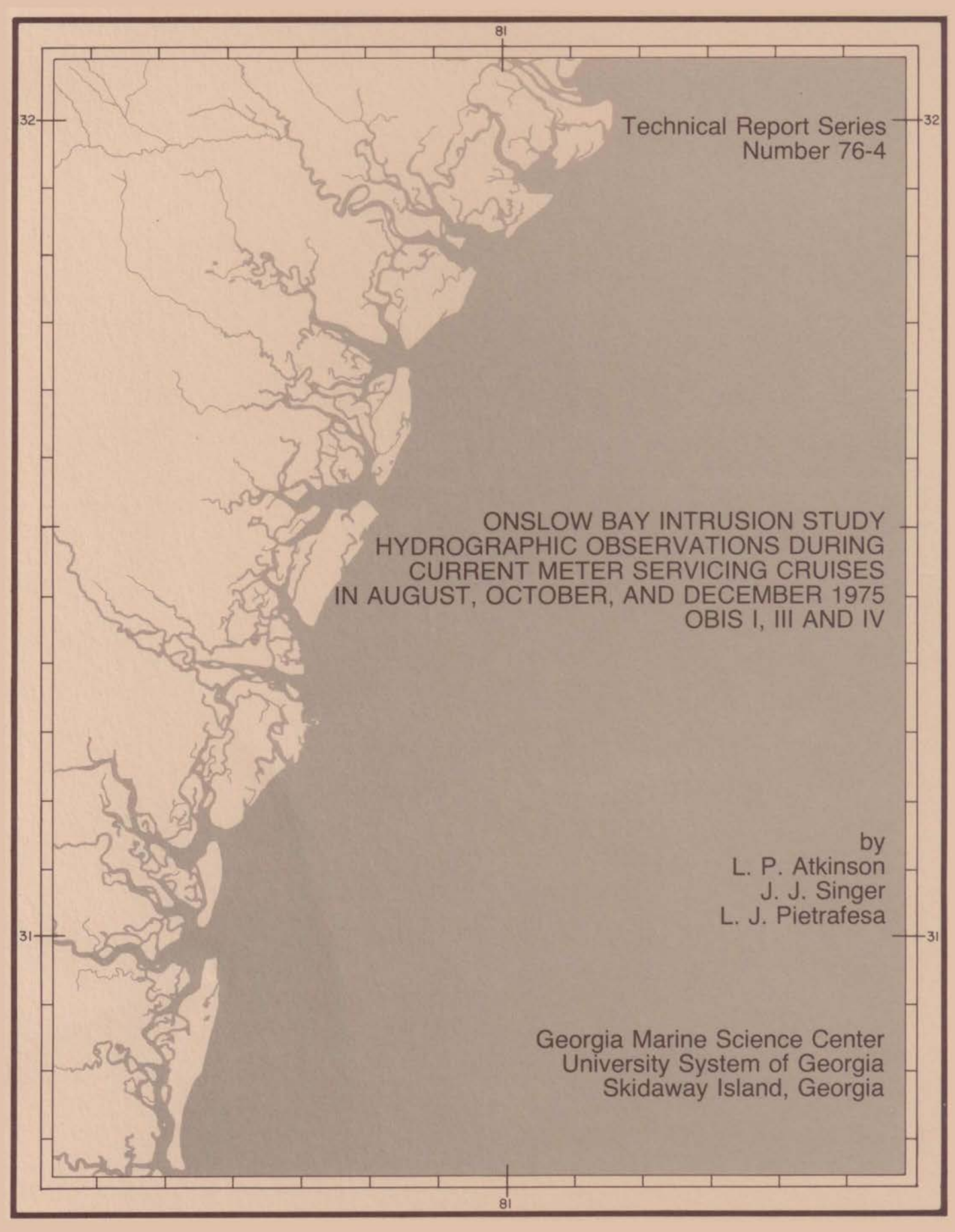

Technical Report Series
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ONSLOW BAY INTRUSION STUDY HYDROGRAPHIC OBSERVATIONS DURING CURRENT METER SERVICING CRUISES IN AUGUST, OCTOBER, AND DECEMBER 1975 OBIS I, III AND IV

by
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Skidaway Island, Georgia

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[1]This study was sponsored by the U. S. Energy Research and Development Administration.

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Carol Porter (OBIS II)
Jim Singer (OBIS II, III, IV)
Dennis Waslenchuk (OBIS III, IV)

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INTRODUCTION

This data report presents a preliminary analysis of chemical/physical data obtained during three current meter servicing cruises in Onslow Bay in August, October and December 1975 (OBIS, I, III, IV) aboard the R/V ADVANCE II. These cruises were made in cooperation with Dr. Len Pietrafesa (N.C. State University) as part of an ERDA sponsored study investigating the shelf processes effecting the distribution of nutrients in the South Atlantic Bight (Figure 1).

The objective of these cruises was to collect temperature and chemical data to correlate with the data recorded by current meters and thermographs which had already been deployed or which were about to be deployed at two locations in the study area (Figure 2). No attempt will be made at this time however to correlate our data to these related records.

An earlier data report, Hydrography of Onslow Bay, North Carolina: September 1975 (OBIS II), discusses chemical/physical observations made over a longer and more intensive sampling period. The related current meter and thermograph data for the present cruise and the one earlier cruise (OBIS II) are presented in: Preliminary Data Report, Physical/Dynamical Observations made in Onslow Bay; Summer, Fall and Winter 1975 by L.J. Pietrafesa et al., N.C.S.U.

The three cruises under consideration include the following:

OBIS I

6-7 August 1975 - This was the first ERDA related cruise into the study area. At this time two moorings were established for current meters and thermographs along the 28 m isobath (Figure 2). ENDECO current meters and General Oceanics thermographs were deployed. Expendable Bathythermograph (XBT) traces and hydro casts were made along two onshore/offshore transects passing near these mooring sites.

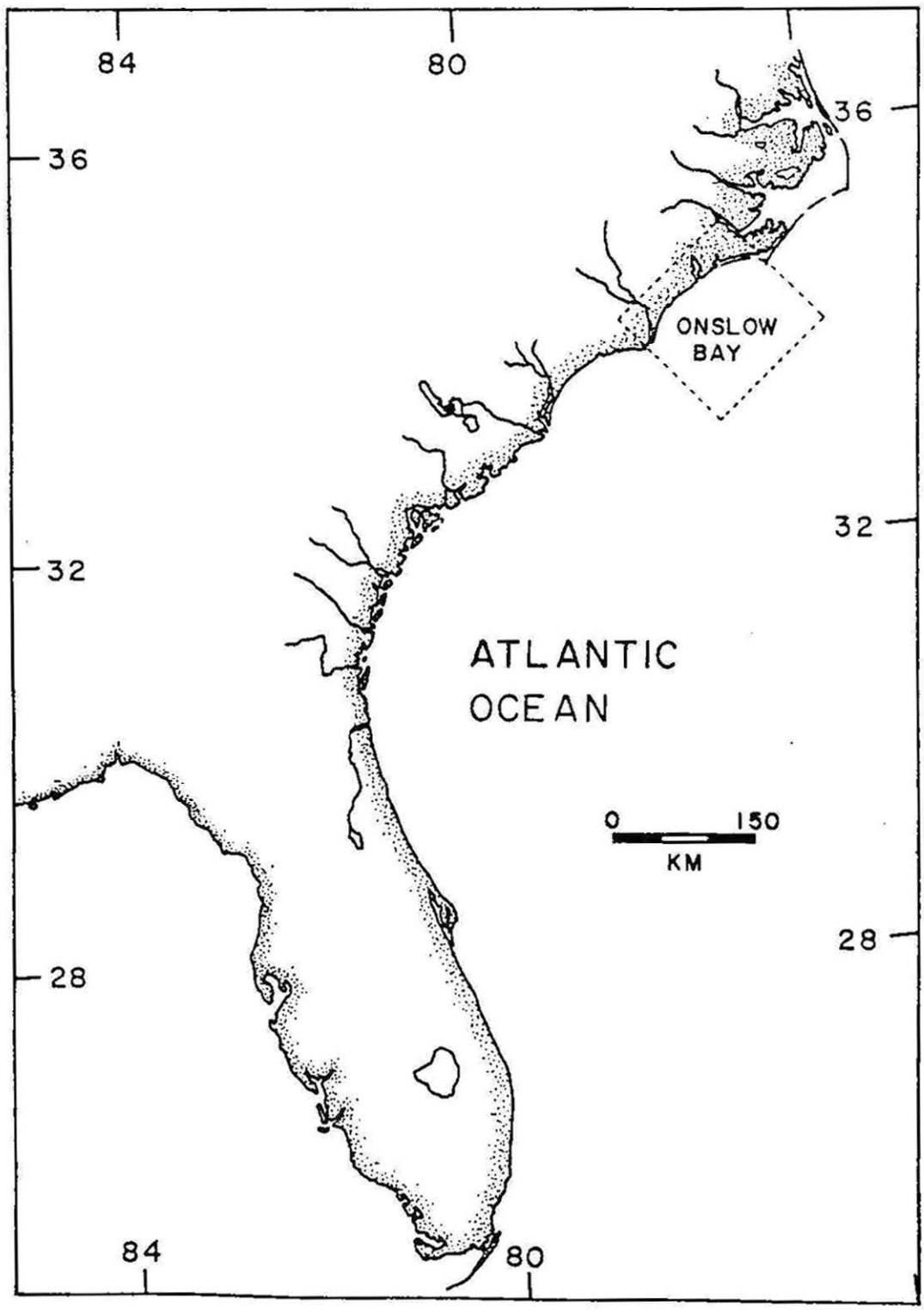

Figure 1. Location of the study area

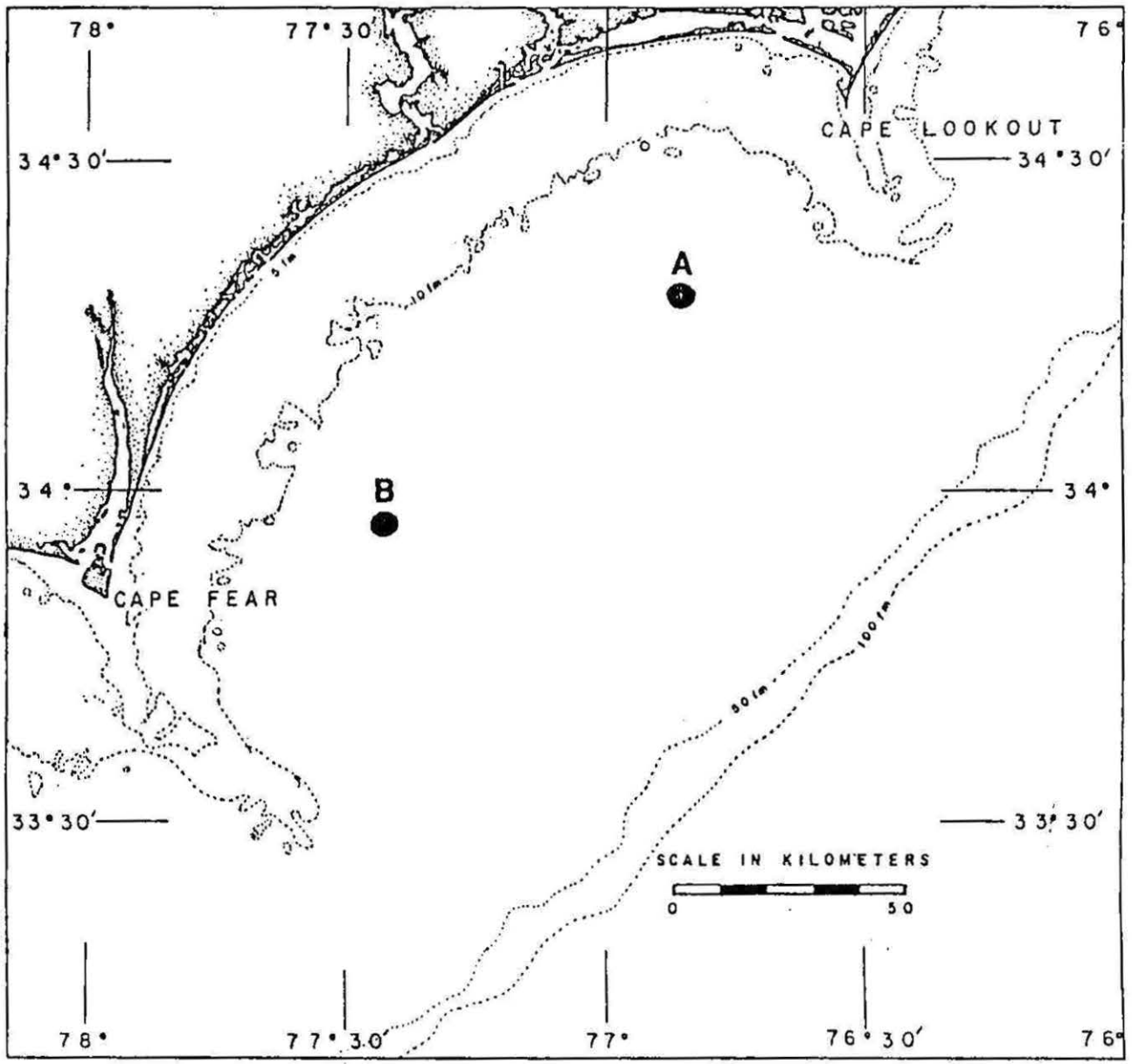

Figure 2. Current meter moorings in Onslow Bay

OBIS III

13-14 October 1975 - ENDECO current meters and General Oceanics thermographs were deployed. XBT traces and surface bucket temperatures were collected along two onshore/offshore transects passing near the mooring sites along a base grid which had been established following OBIS I.

OBIS IV

8-11 December 1975 - Current meters and thermographs from the October cruise (OBIS III) were removed and Geodyne current meters and General Oceanics thermographs were deployed at one of the mooring sites. At this time the temperature structure of the entire Bay was canvassed with XBTs, and hydro casts were made along two onshore/offshore transects.

METHODS

Typically when hydro casts were made they followed XBTs. Niskin sampling depths were determined by analysis of the temperature profile. If a thermocline was present, samples were taken at the surface, just above or below the thermocline and at the bottom. If no thermocline was present just surface and bottom samples were taken. Water samples were taken for the analysis of salinity, temperature, nitrate, phosphate, silicate and oxygen.

Salinity was determined conductometrically, using a Plessey portable laboratory salinometer. Dissolved oxygen was analyzed at sea by the Winkler method. The apparent oxygen utilization (AOU) was computed using the International Oceanographic Tables (1973).

Temperature was determined by deep sea reversing thermometers and expendable bathythermographs (XBTs). The XBT traces are on file at Skidaway and an effort is being made to digitize this information.

After collection, the nutrient samples were immediately frozen in polyethylene bottles and stored in the dark until thawed and analyzed ashore.

Colorimetric determinations of nutrient concentrations were made with a Baush and Lomb Spectronic 88 Spectrophotometer with a sample sipper. Silicate concentration was determined by the method of Mullin and Riley (1955) as modified by Strickland and Parsons (1965), and phosphate concentrations were determined by the method of Murphy and Riley (1962). Nitrate was determined by a modification of the cadmium column reduction technique (Gardner, personal communication).[1]

The hydrographic data (T, S, nutrients, oxygen) are submitted to NODC and are stored there and in our computer system. The data printouts are in the Appendix. The data are available from NODC.

---

[1]Skidaway Institute of Oceanography, Savannah, Georgia 31406.

RESULTS AND CONCLUSIONS

OBIS I

6-7 August 1975

(Julian Date 218-219)

In August 1975 fourteen stations were sampled along the cruise track shown in Figure 3. Of these, nine stations were sampled for salinity, dissolved oxygen, nitrate, phosphate and silicate (see Appendix I). XBT traces were made at all of the indicated stations and the subsequent vertical distribution of temperature (Figure 4) suggests that an intrusion had moved into the area. Particularly note the 23.5°C core defined by the isotherms for stations 10 thru 15. A similar trend is seen in the data for stations 1 thru 6 although the entire core is not observed.

Unfortunately, hydro casts were not made along the entire length of the track encompassing stations 10 thru 15. However, near bottom salinity and sigma-t trends in the vicinity of stations 5 and 6 (Figure 5) also support the conclusion that slope waters had intruded into the area. This is further supported by the higher nutrient concentrations for the same bottom waters shown in Figure 6 and the T-S Plot in Figure 8.

Somewhat contradictory to these trends, however, is the high oxygen concentration near bottom at station 5 (Figure 7). The explanation for this inconsistency is not clear.

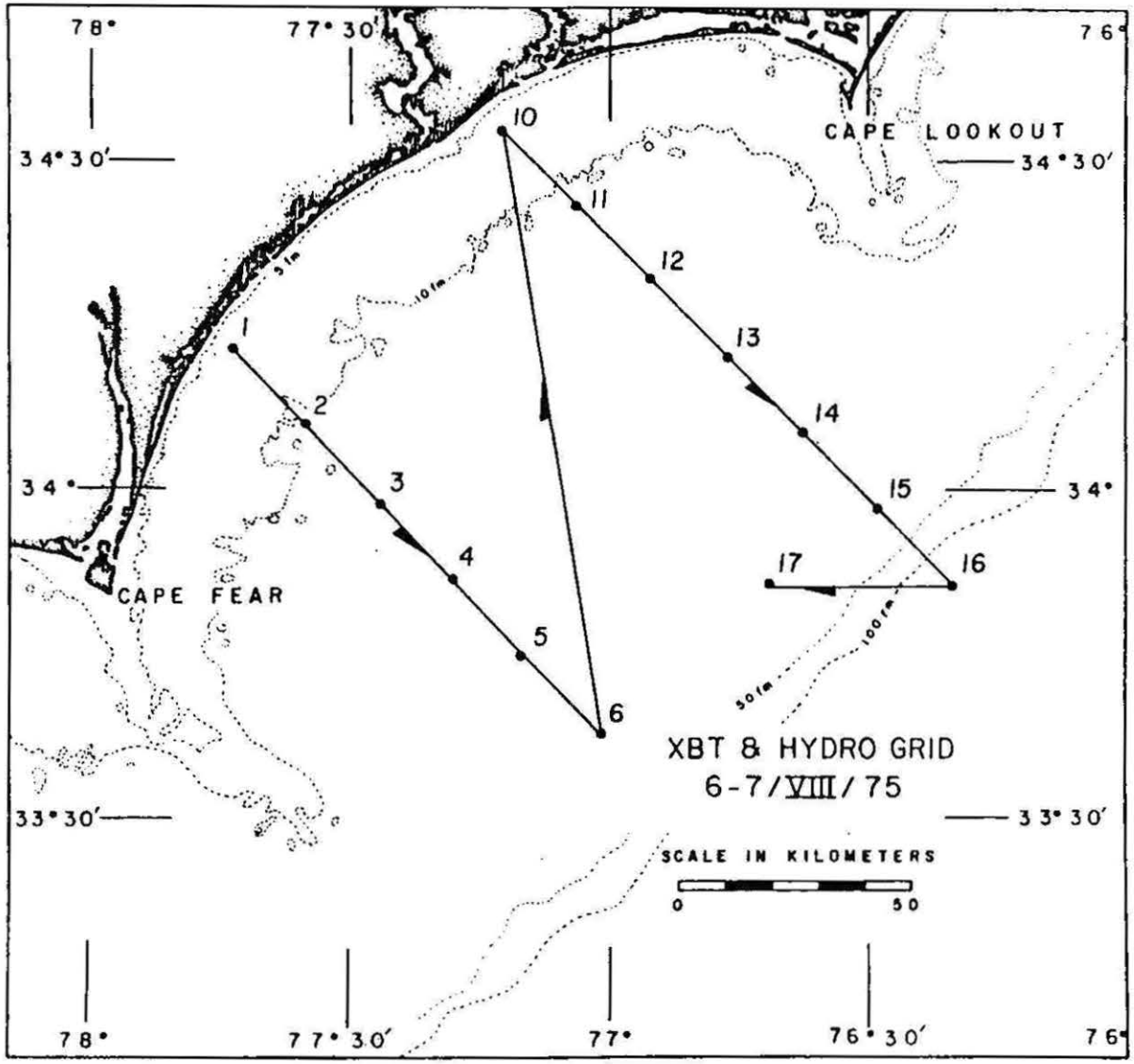

Figure 3. Cruise track (OBIS I: 6-7 August 1975)

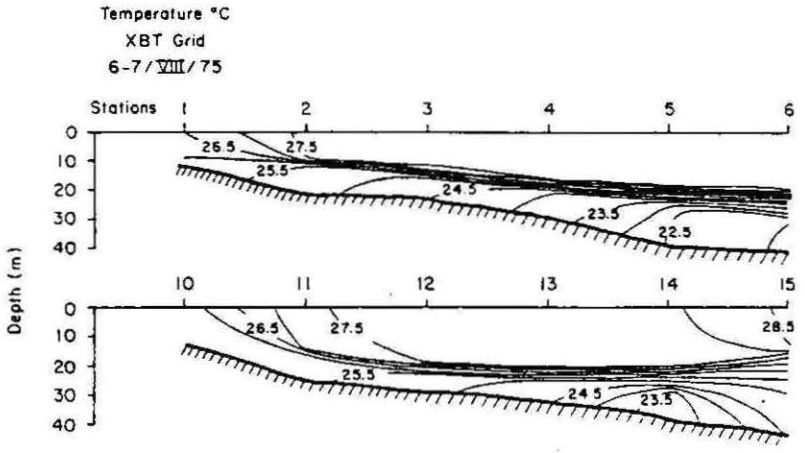

Figure 4. Vertical distribution of temperature (XBT Grid, 6-7 August 1975)

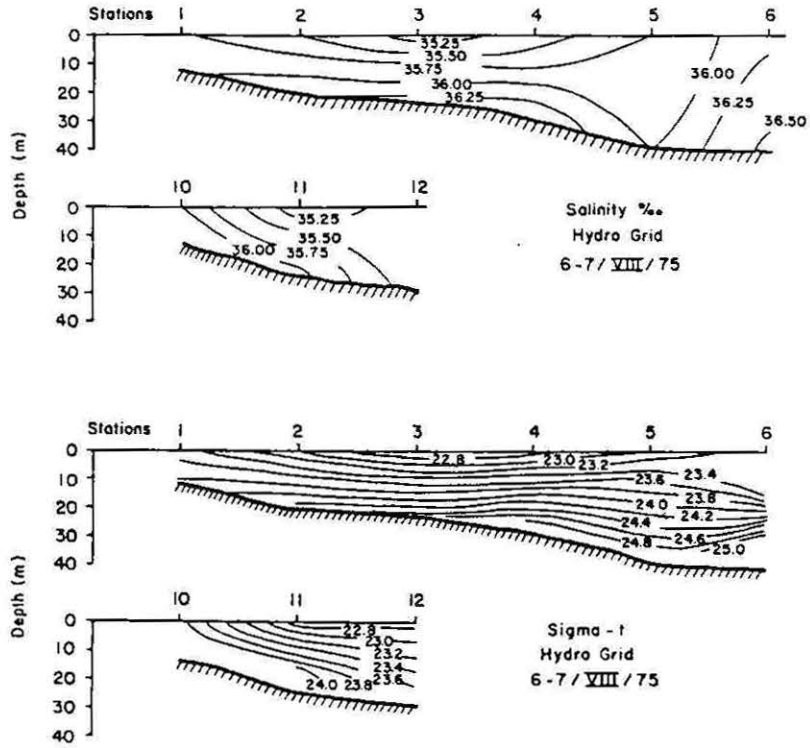

Figure 5. Vertical distribution of salinity and sigma-t (Hydro Grid, 6-7 August 1975)

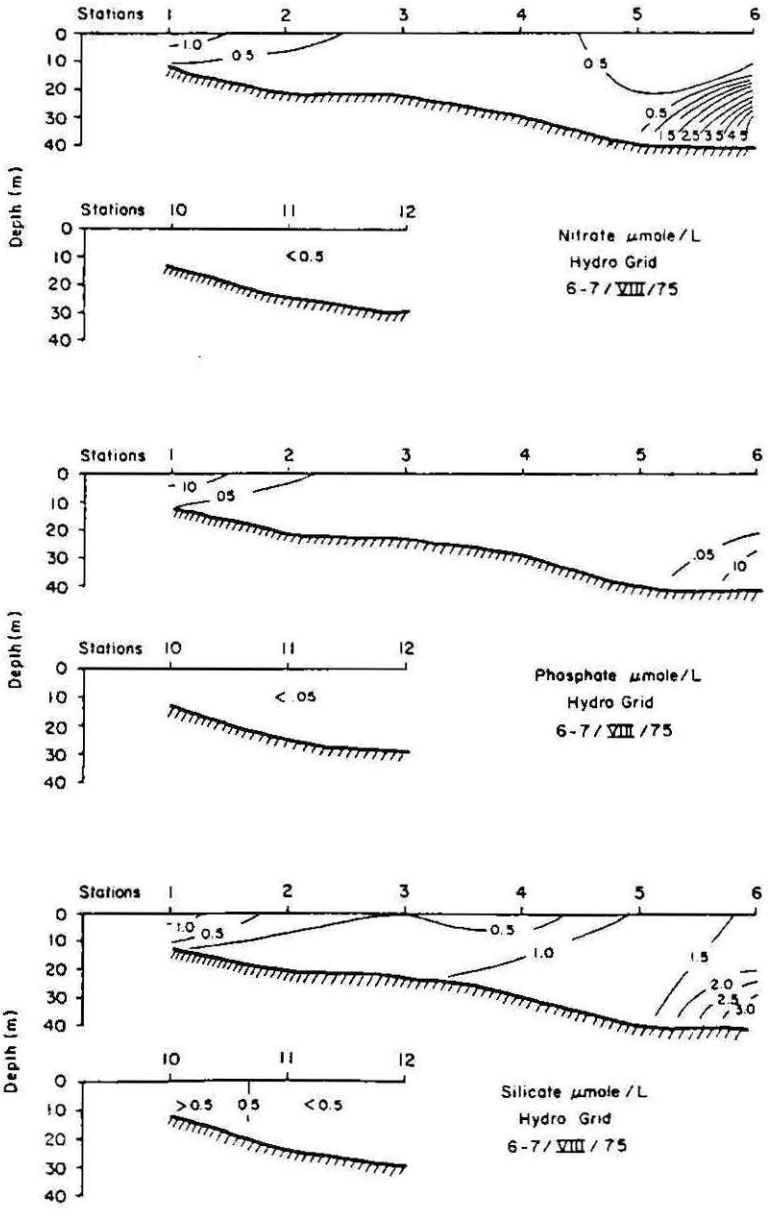

Figure 6. Vertical distribution of nitrate, phosphate and silicate (Hydro Grid, 6-7 August 1975)

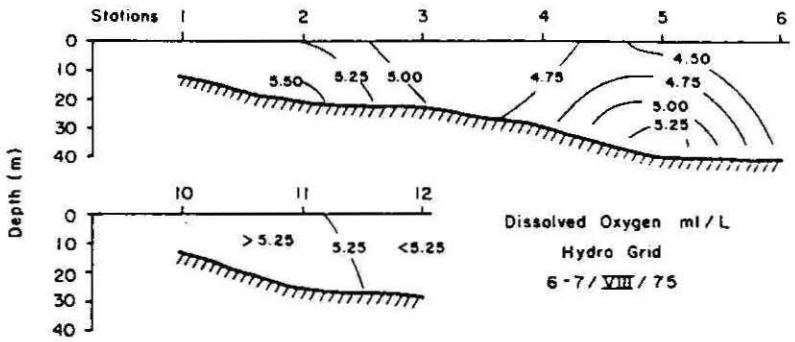

Figure 7. Vertical distribution of dissolved oxygen (Hydro Grid, 6-7 August 1975)

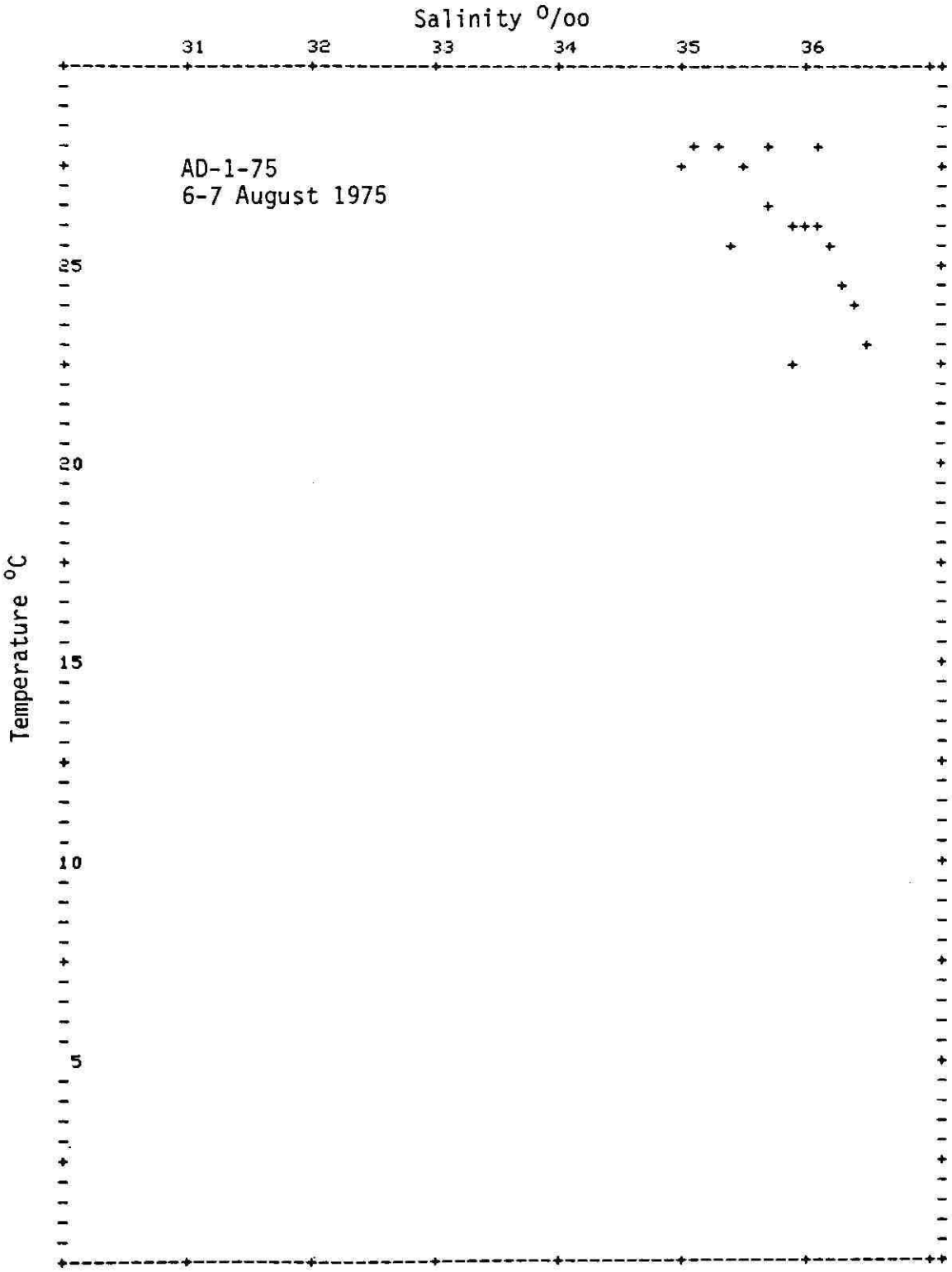

Figure 8. T-S Plot (OBIS I: 6-7 August 1975)

OBIS III

13-14 October 1975

(Julian Date 286-287)

In October 1975, twenty stations were sampled along the track shown in Figure 9. XBT traces were made at fifteen stations and surface bucket temperatures were taken at five others. No hydro casts were made. The vertical temperature structure (Figure 10) reveals generally well mixed waters throughout the inner half of the Bay and the transect for stations 52-57 also suggests cascading or overriding of the denser shelf waters with Gulf Stream water. There is no evidence of an intrusion similar to that observed in August (OBIS I) or September (OBIS II) 1975.

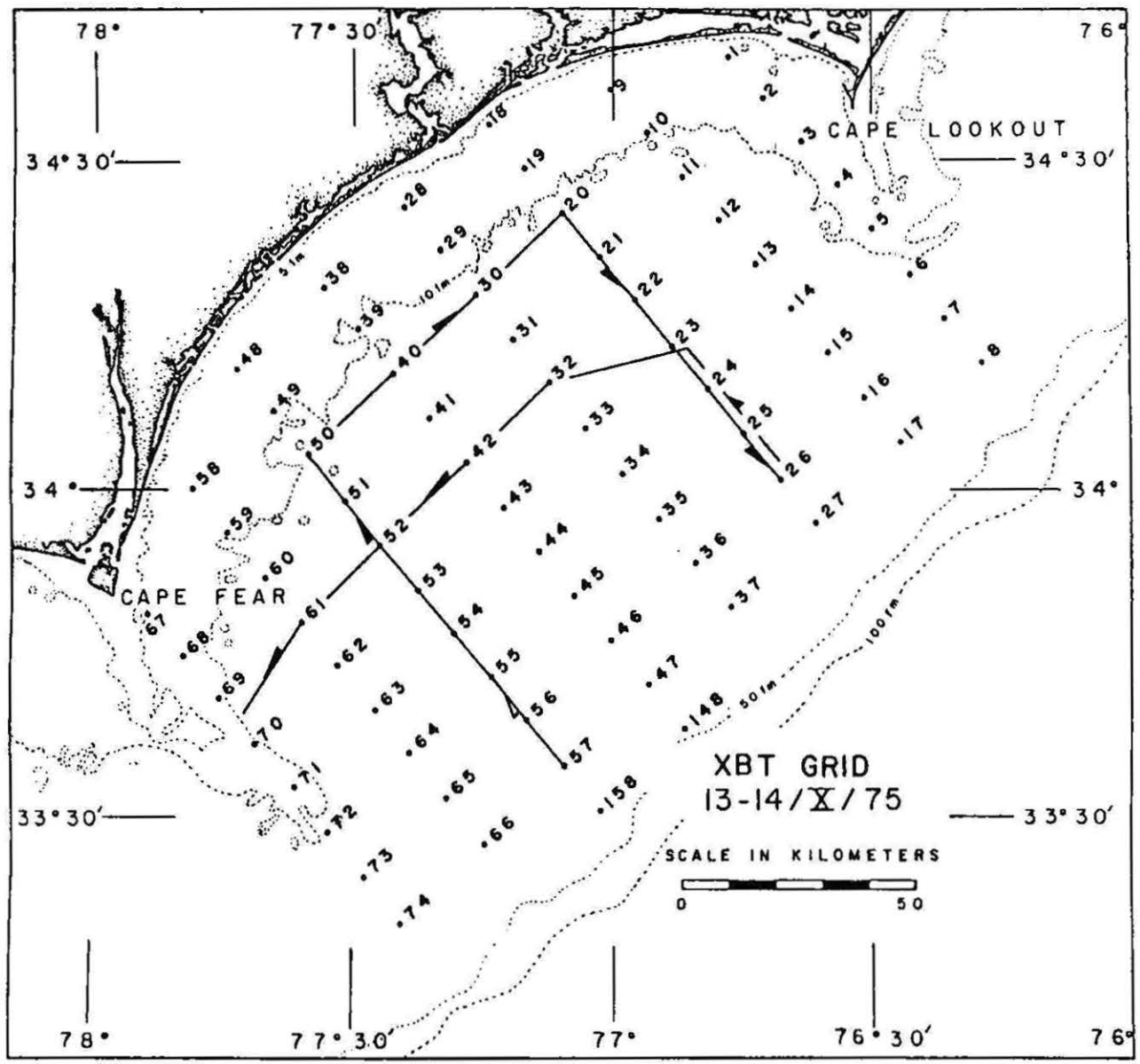

Figure 9. Cruise track (OBIS III: 13-14 October 1975)

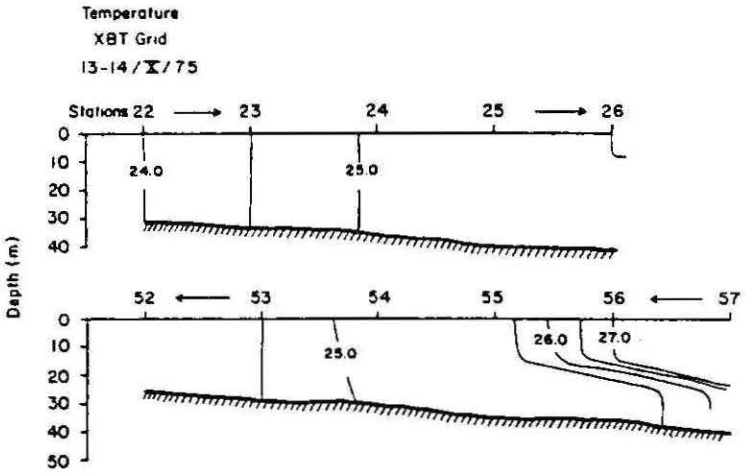

Figure 10. Vertical distribution of temperature (XBT Grid, 13-14 October 1975)

OBIS IV

8-11 December 1975

(Julian Date 342-345)

In December 1975, fifty-nine stations were sampled along the cruise track shown in Figure 11. Of these, twelve stations along two onshore/offshore transects were sampled for salinity, dissolved oxygen, nitrate, phosphate and silicate (see Appendix II). XBT traces were made at all fifty-nine stations, and a rather complete view of both the horizontal and vertical temperature structure throughout the Bay was obtained. One onshore/offshore transect was repeated due to the availability of additional cruise time because of instrument recovery problems at the southwest mooring. This permitted hydro casts along a series of stations (42-47) which earlier had been surveyed by XBTs only.

The horizontal surface and bottom temperature plots of Figures 12 and 13 reveal temperatures ranging from 24°C near the shelf break to 16°C near shore. They reveal strong horizontal temperature gradients to the northeast and in the central offshore portions of the Bay and weaker gradients throughout the remainder of the Bay. It was along this central portion of the Bay that we sampled twice. These repeated samplings came approximately 20 hours apart and they are presented here in Table 1. Note that the greatest temperature changes occurred at those stations in or closest to the region of the strongest horizontal temperature gradient.

Figures 14 and 15 reveal the vertical temperature structure throughout the Bay. At stations 6 thru 8 and 10 thru 17, a mid-depth temperature maximum was observed. Since no hydro casts were made along these tracks, however, it is difficult to ascertain the origin. Throughout the remainder of the Bay the profiles reveal mixed waters nearshore and the apparent movement of a warm front onto the shelf. This can be seen to center around stations 40 thru 47 and gives the appearance of cascading by the mid-shelf waters as the front moves shoreward. Refering back to Figures 12 and 13 one can see the shoreward protrusion in both of the surface and bottom plots of temperature.

The sigma-t Plot (Figure 16) shows some tilting of isopycnals as the

front moves shoreward. The salinity plot reveals that salinities of 36.1 to 36.2 generally dominated along the hydro tracks, and the T-S Plot (Figure 19) is typical of slope waters in this area. These observations all tend to support the view that a Gulf Stream front was moving into the area. The nutrient and dissolved oxygen plots (Figures 17 and 18) are all rather inconclusive though one might expect lower nutrient concentrations to be characteristic of fronts moving into the Bay on the surface as opposed to at depth.

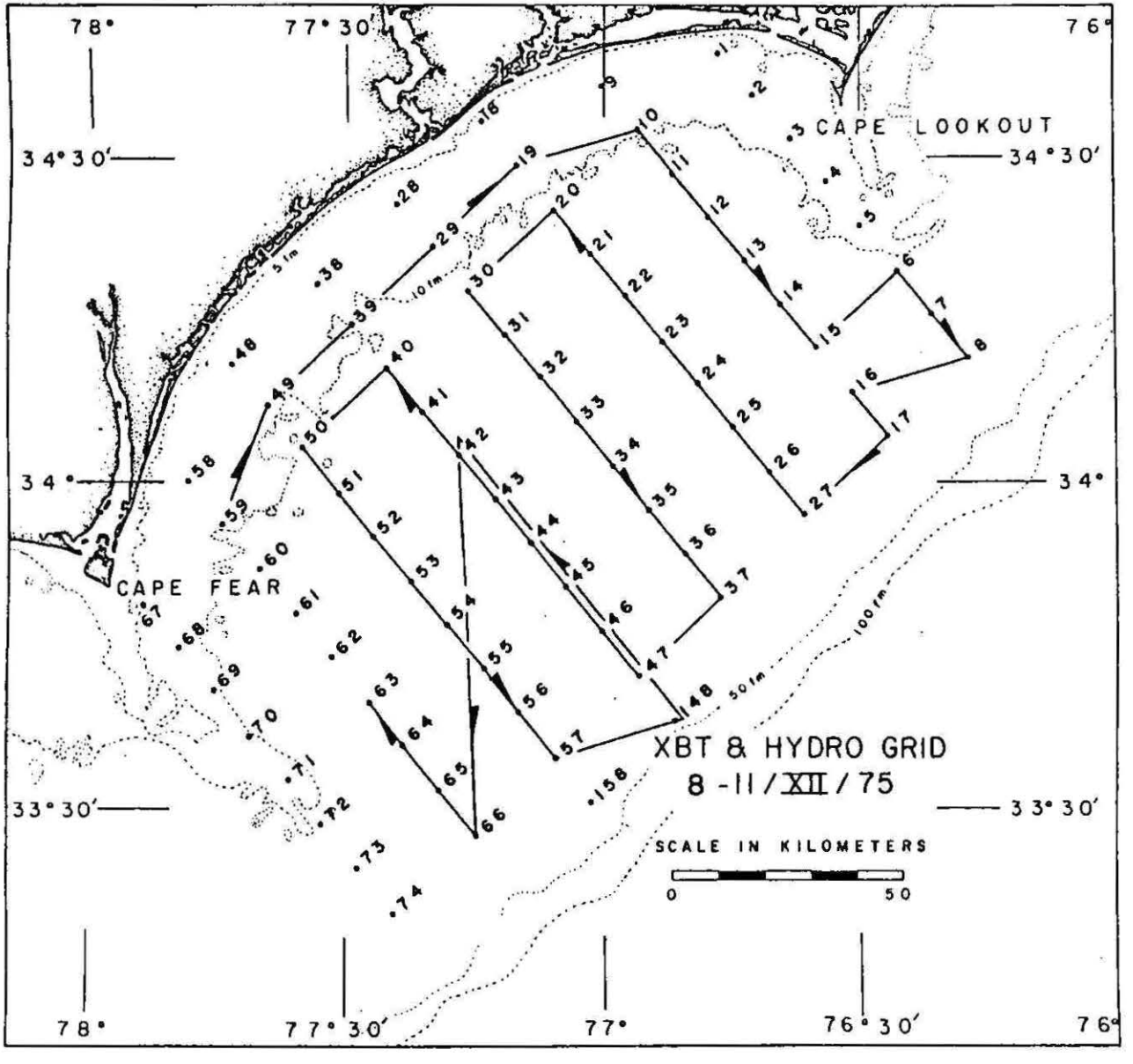

Figure 11. Cruise track (OBIS IV: 8-11 December 1975)

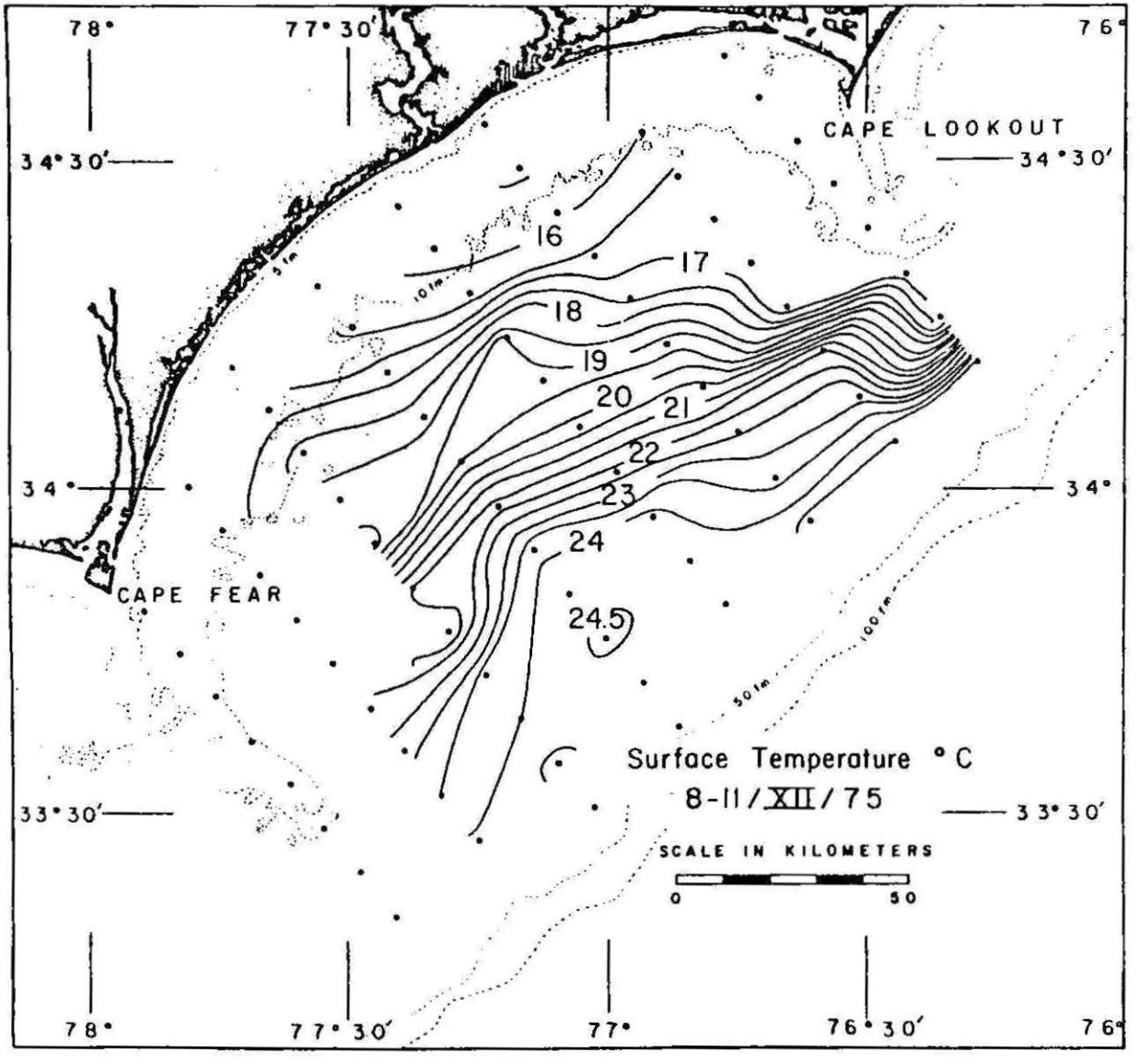

Figure 12. Surface temperature (8-11 December 1975)

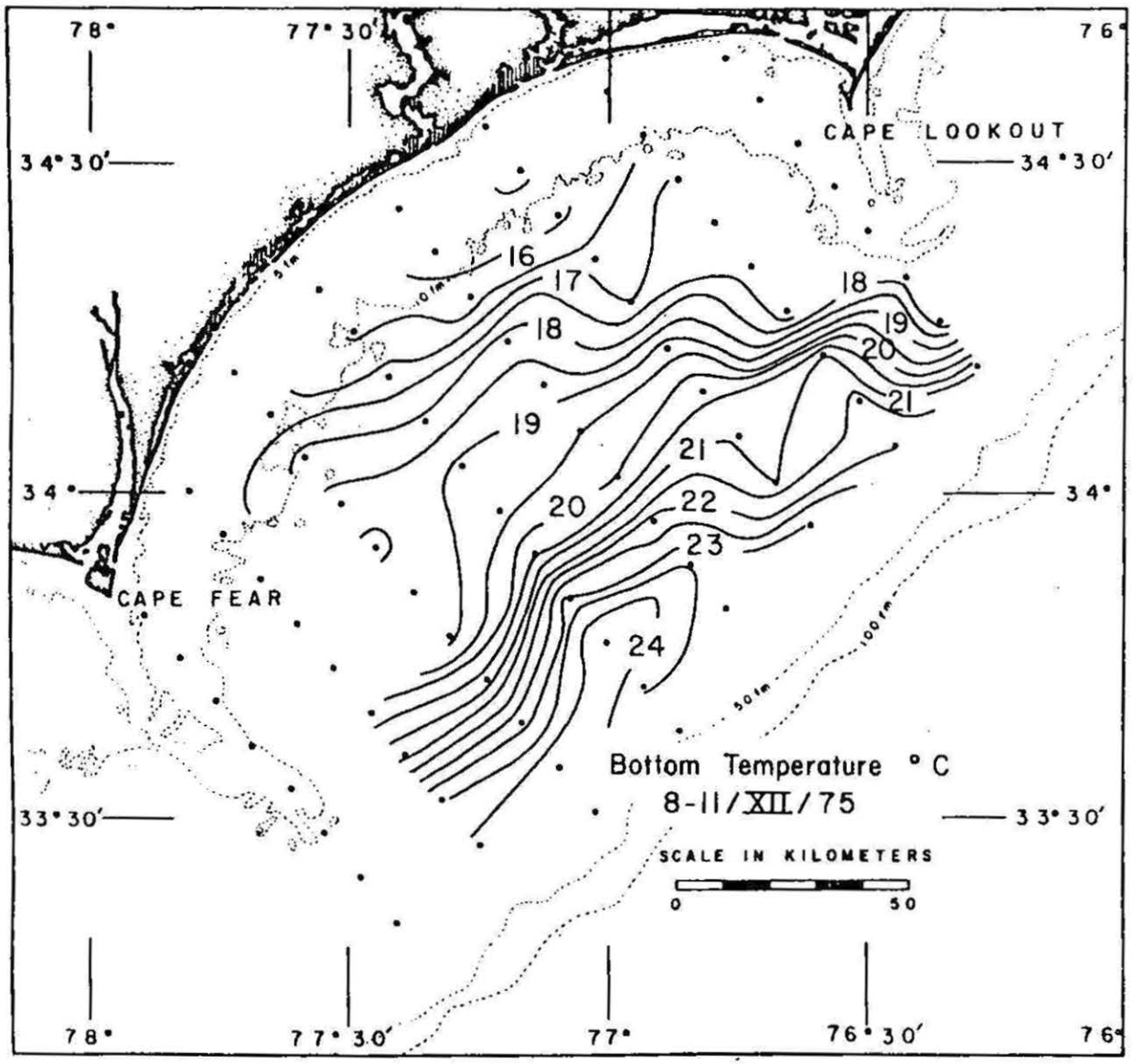

Figure 13. Bottom temperature (8-11 December 1975)

TABLE 1

Changes in bottom temperature at repeated stations.

STATION		TIME (GMT)	TEMP		TIME (GMT)	TEMP	CHANGE
47	Dec.10	0539	23.6	Dec.11	0129	23.4	-0.2
46		0605	24.6		0200	24.0	-0.6
45		0650	23.3		0300	21.8	-1.5
44		0722	20.5		0339	21.1	+0.6
43		0801	19.3		0440	19.6	+0.3
42		0830	19.3		0511	19.2	-0.1

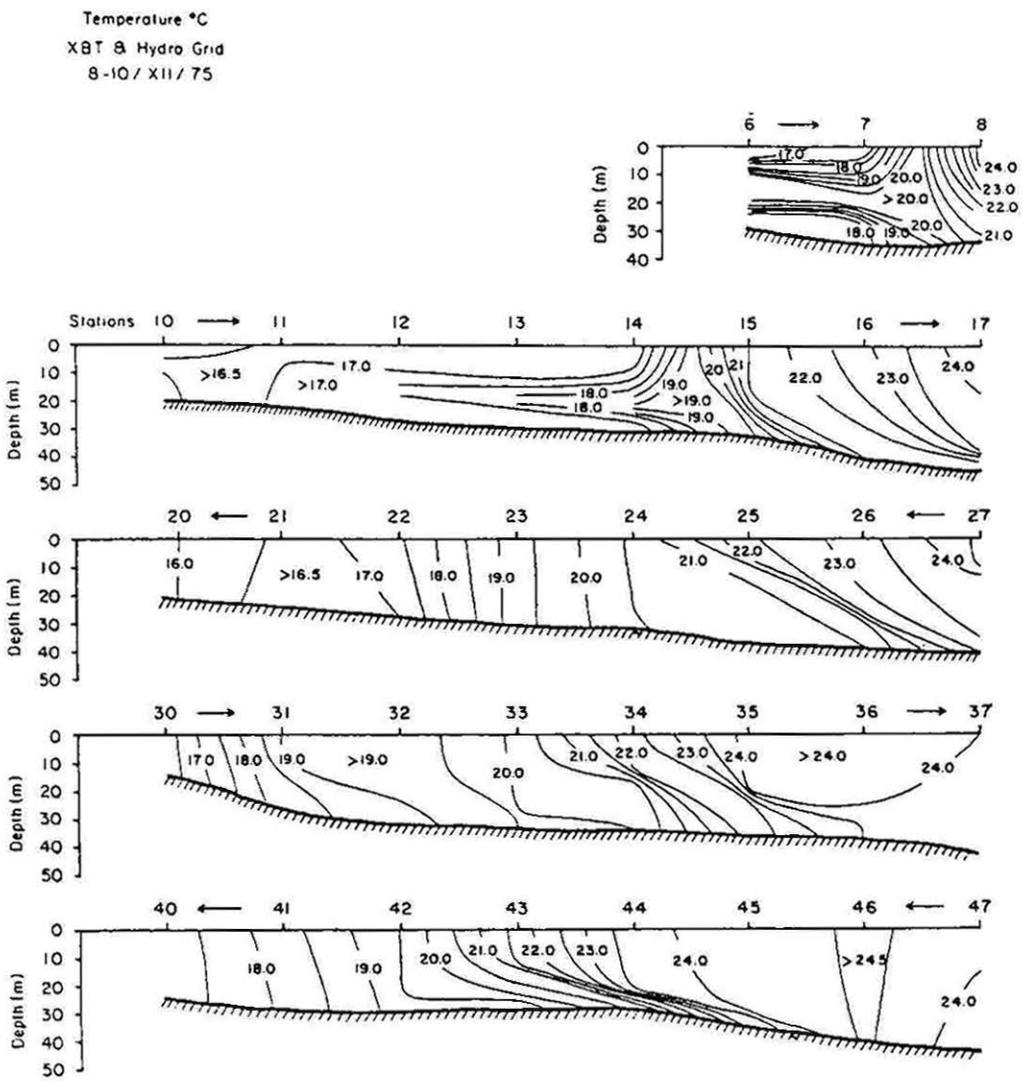

Figure 14. Vertical distribution of temperature (XBT and Hydro Grid, 8-10 December 1975)

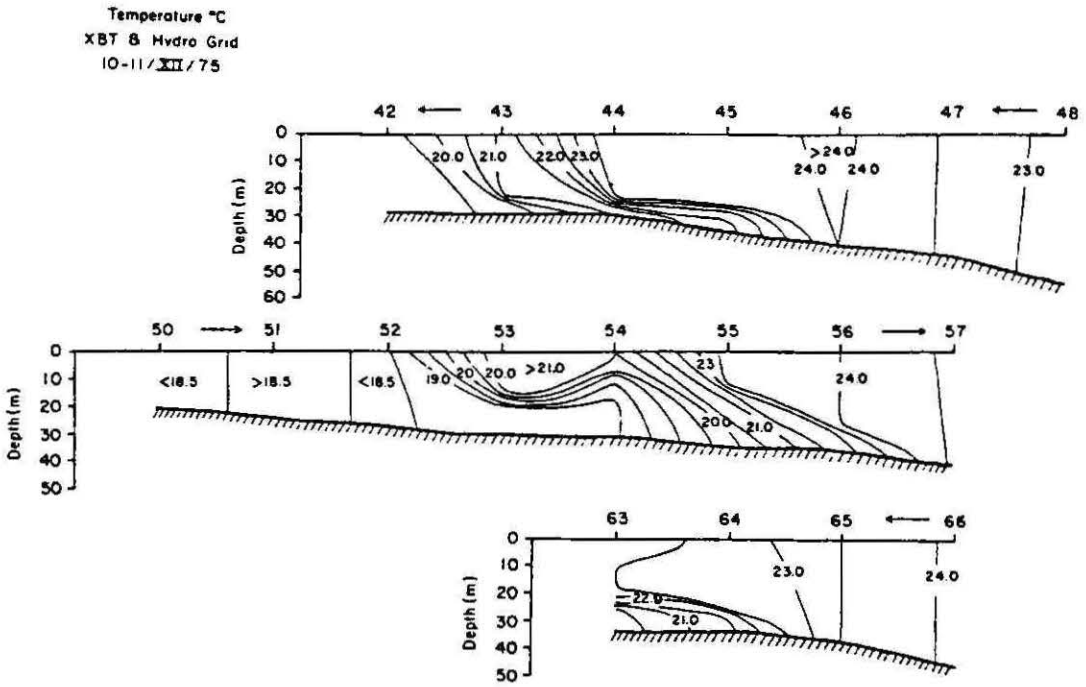

Figure 15. Vertical distribution of temperature (XBT and Hydro Grid, 10-11 December 1975)

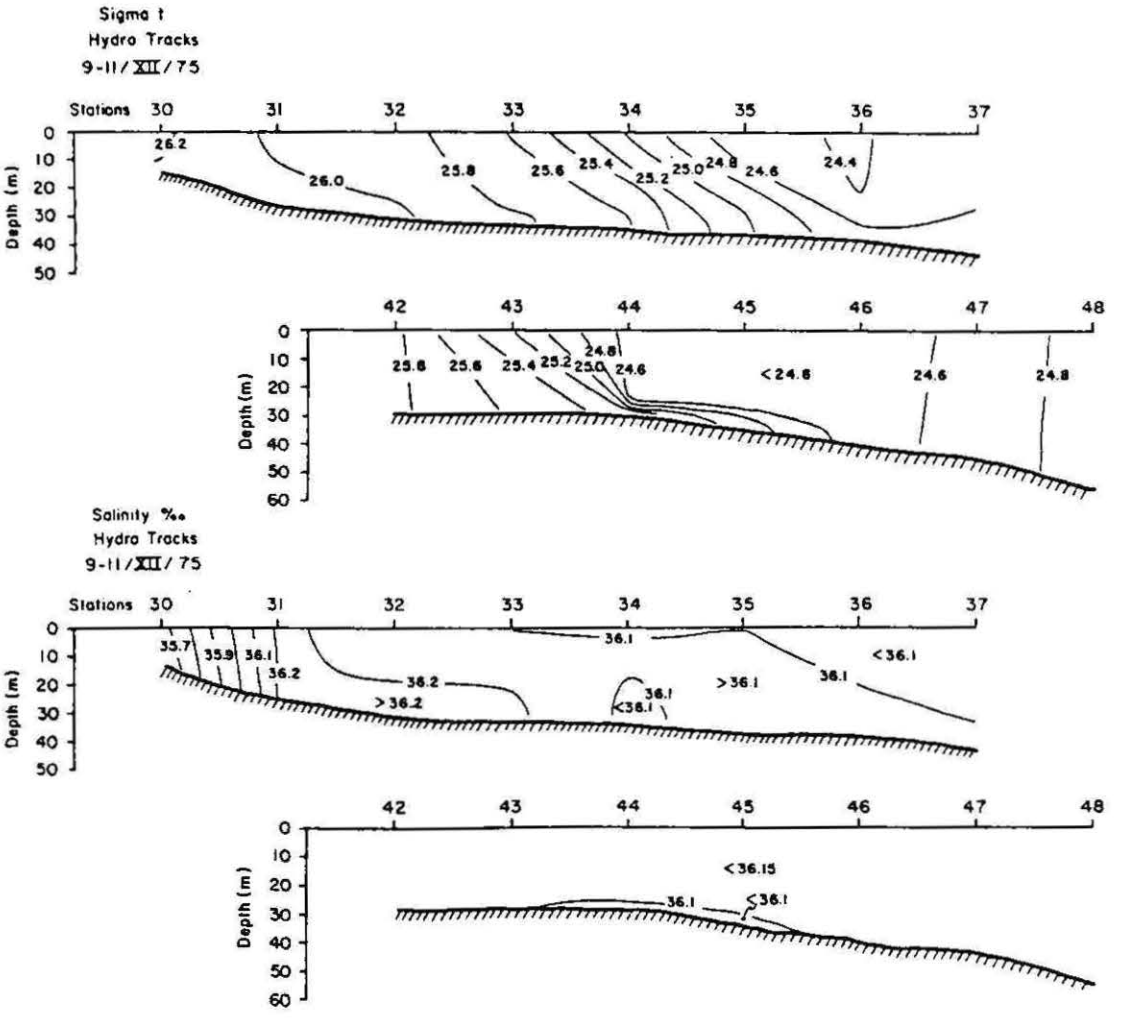

Figure 16. Vertical distribution of sigma-t and salinity (Hydro Tracks, 9-11 December 1975)

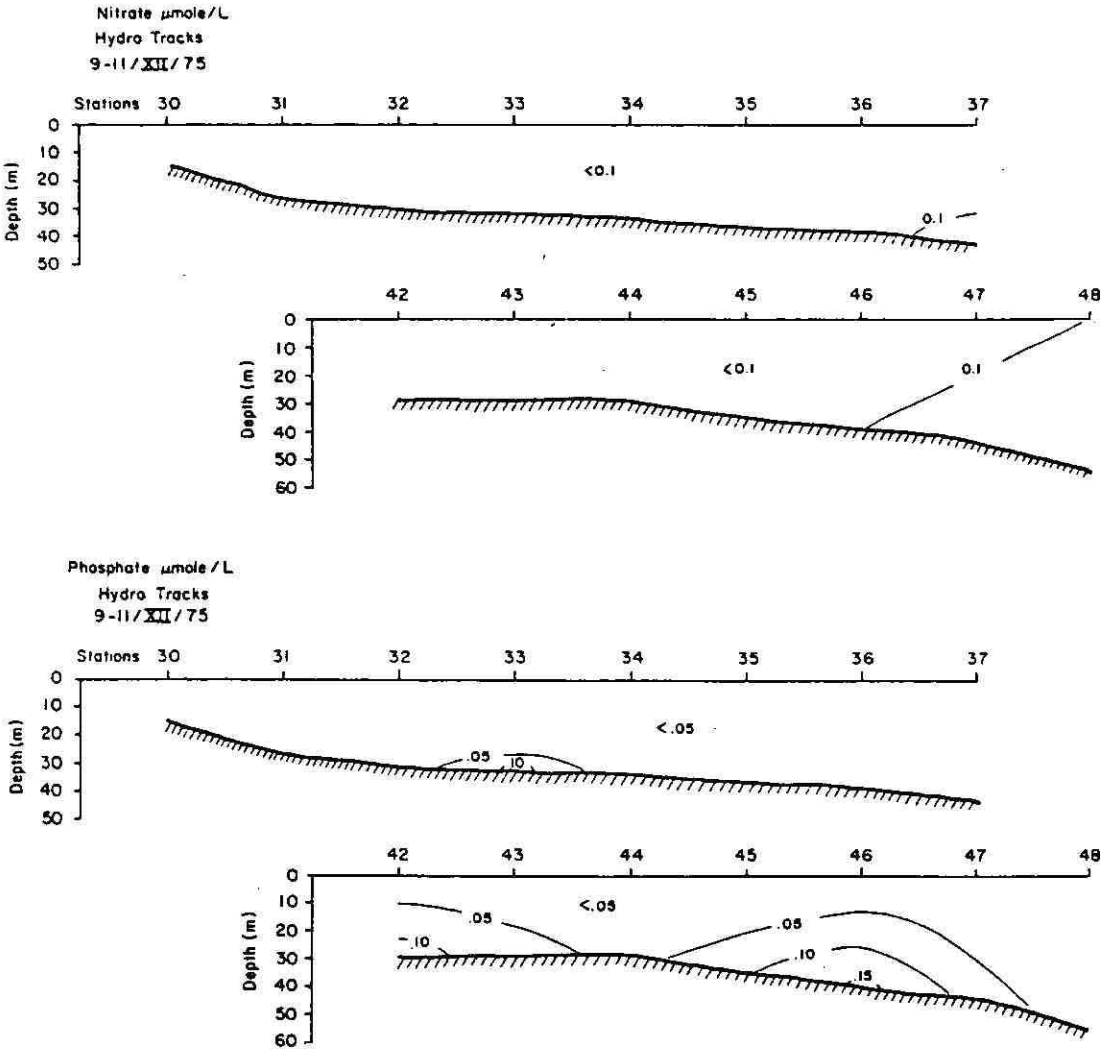

Figure 17. Vertical distribution of nitrate and phosphate (Hydro Tracks, 9-11 December 1975)

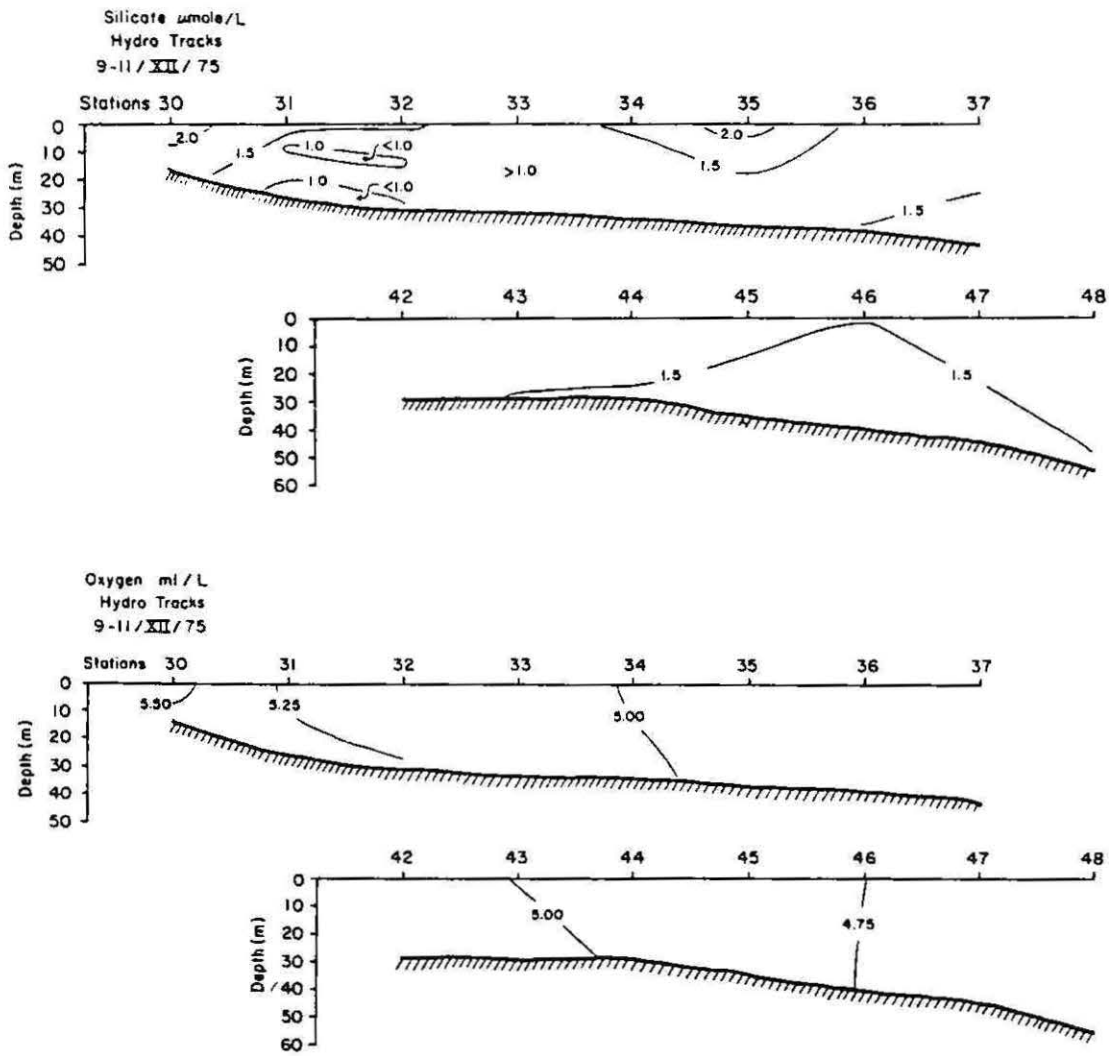

Figure 18. Vertical distribution of silicate and oxygen (Hydro Tracks, 9-11 December 1975)

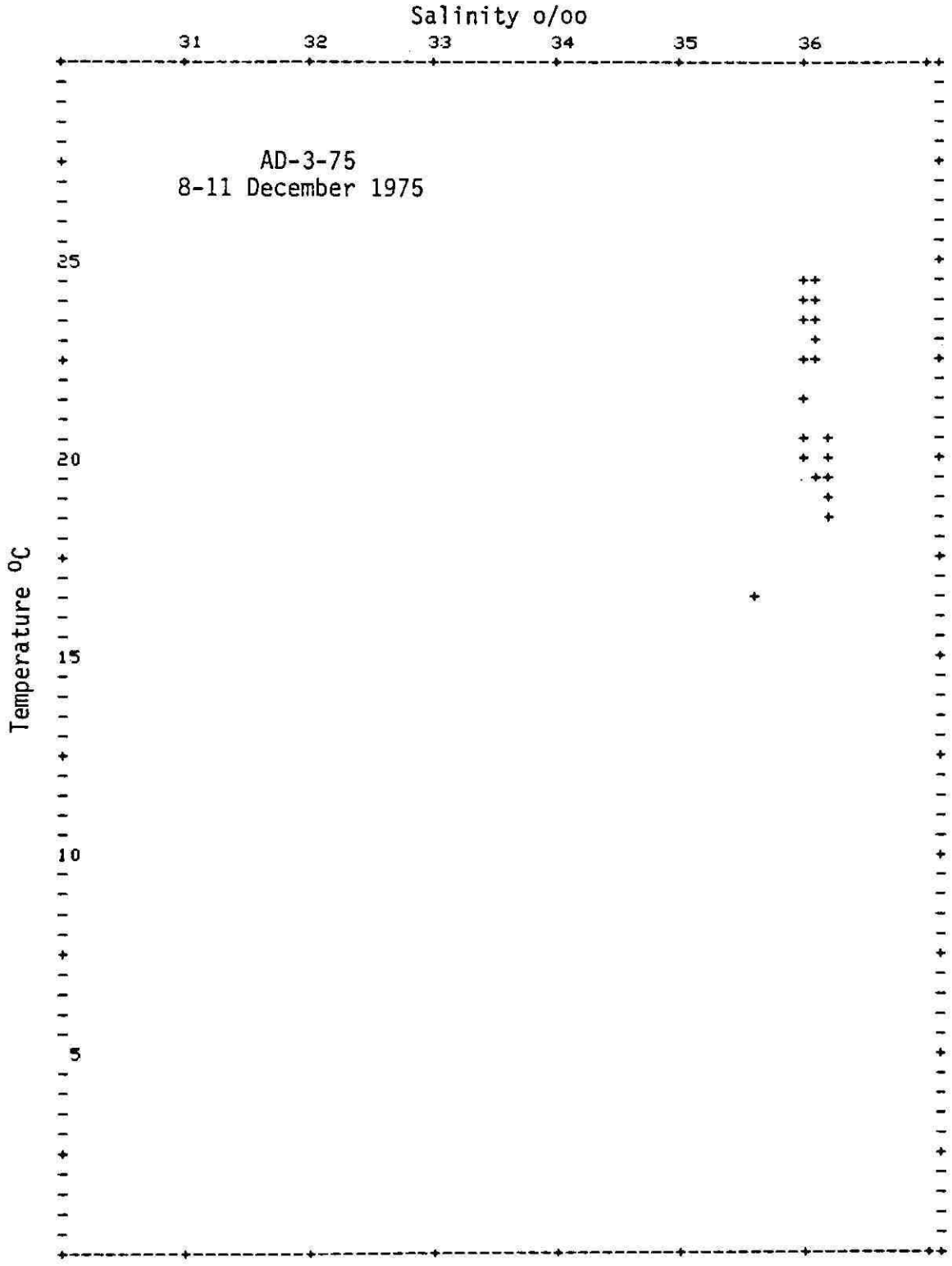

Figure 19. T-S Plot (OBIS IV: 8-11 December 1975)

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APPENDICIES

APPENDIX I

Station Locations and Data

(OBIS I)

STATION SUMMARY FOR ADVANCE II CRUISE AD-1-75

STATION	LATITUDE	LONGITUDE	YR	MN	DY	HOUR GMT	DEPTH M	CONSEC NUMBER
1	34 12.5N	77 44.0W	75	8	6	.3	12	1
2	34 5.5N	77 35.5W	75	8	6	1.8	21	2
3	33 58.5N	77 26.8W	75	8	6	4.2	23	3
4	33 51.5N	77 18.2W	75	8	6	5.3	29	4
5	33 44.6N	77 9.8W	75	8	6	6.5	40	5
6	33 37.7N	77 1.1W	75	8	6	7.7	41	6
10	34 32.8N	77 12.8W	75	8	6	19.3	13	7
11	34 26.0N	77 4.0W	75	8	6	20.5	25	8
12	34 19.1N	76 55.8W	75	8	6	21.8	29	9
13	34 12.0N	76 47.5W	75	8	6	23.1	32	10
14	34 5.0N	76 38.0W	75	8	6	23.9	38	11
15	33 58.5N	76 30.0W	75	8	7	.8	44	12
16	33 51.5N	76 21.0W	75	8	7	1.8	230	13
17	33 51.5N	76 42.0W	75	8	7	5.5	42	14

Data Sheet Symbols

Z = Depth (m)

T = Temperature (C)

S = Salinity (o/oo)

D = Sigma-t (g/cm^3)

SVA = Specific Volume Anomaly

O2 = Dissolved Oxygen (ml/l)

O2' = Oxygen Saturation (International Tables) (ml/l)

AOU = Apparent Oxygen Utilization (O2'-O2) (ml/l)

O2A = Oxygen Anomaly (Richards and Redfield, 1955)

PO4 = Phosphate (μmole)

NO3 = Nitrate (μmole)

SI = Silicate (μmole)

N/P = Nitrate/Phosphate Ratio

ADVANCE II CRUISE 1 STATION 1 6/VIII/75 .3 GMT CONSECUTIVE STATION 1

LAT. = 34 12.5N LONG. = 77 44.0W DEPTH = 12M DIST LAST STA = 0.0KM

WEATHER DATA

WIND FORCE	=	SEA STATE	=
WIND DIRECTION	= - DEGR	WAVE DIRECTION	= - DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	AOU	O2A	PO4	NO3	SI	N/P
0	26.50	35.78	23.49	440					.13	1.4	1.3	10.8
12	25.80	35.96	23.84	407					.05	.4	.4	8.0

ADVANCE II CRUISE 1 STATION 2 6/VIII/75 1.8 GMT CONSECUTIVE STATION 2

LAT. = 34 5.5N LONG. = 77 35.5W DEPTH = 21M DIST LAST STA = 18.4KM

WEATHER DATA

WIND FORCE	=	SEA STATE	=
WIND DIRECTION	= - DEGR	WAVE DIRECTION	= - DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	AOU	O2A	PO4	NO3	SI	N/P
0	27.50	35.52	22.97	490	5.24	5.30	.06	-.87	.06	.6	.2	10.0
19	25.20	36.21	24.21	372	5.59	5.57	-.02	-1.02	.01	.3	1.0	30.0

ADVANCE II CRUISE 1 STATION 3 6/VIII/75 4.2 GMT CONSECUTIVE STATION 3

LAT. = 33 58.5N LONG. = 77 26.8W DEPTH = 23M DIST LAST STA = 18.6KM

WEATHER DATA

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WIND DIRECTION	= - DEGR	WAVE DIRECTION	= - DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	AOU	O2A	PO4	NO3	SI	N/P
0	27.90	35.16	22.57	528	4.80	5.25	.77	-.17	.02	.4	.5	20.0
23	24.50	36.34	24.53	342	4.97	5.65	.68	-.35	.01	.3	.7	30.0

ADVANCE II CRUISE 1 STATION 4 6/VIII/75 5.3 GMT CONSECUTIVE STATION 4

LAT. = 33 51.5N LONG. = 77 18.2W DEPTH = 29M DIST LAST STA = 18.5KM

WEATHER DATA

WIND FORCE	=	SEA STATE	=
WIND DIRECTION	= - DEGR	WAVE DIRECTION	= - DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	AOU	O2A	PO4	NO3	SI	N/P
0	27.90	35.33	22.70	516	4.91	5.25	.34	-.58	0.00	.2	.2	
25	23.80	36.44	24.81	315	4.64	5.74	1.10	.03	.04	.2	1.5	5.0

ADVANCE II CRUISE 1 STATION 5 6/VIII/75 6.5 GMT CONSECUTIVE STATION 5

LAT. = 33 44.6N LONG. = 77 9.8W DEPTH = 40M DIST LAST STA = 18.2KM

WEATHER DATA

WIND FORCE	=	SEA STATE	=
WIND DIRECTION	= - DEGR	WAVE DIRECTION	= - DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	AOU	O2A	PO4	NO3	SI	N/P
0	27.80	35.76	23.05	482	4.35	5.26	.91	.04	0.00	.8	1.1	
35	22.50	35.98	24.84	313	5.47	5.91	.44	-.80	.02	.3	1.1	15.0

ADVANCE II CRUISE 1 STATION 6 6/VIII/75 7.7 GMT CONSECUTIVE STATION 6

LAT. = 33 37.7N LONG. = 77 1.1W DEPTH = 41M DIST LAST STA = 18.5KM

WEATHER DATA

WIND FORCE	=	SEA STATE	=
WIND DIRECTION	= - DEGR	WAVE DIRECTION	= - DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	AOU	O2A	PO4	NO3	SI	N/P
0	27.95	36.19	23.33	455					0.00	1.0	1.6	
15	27.90	36.19	23.34	455	5.13	5.25	.12	-.70	0.00	.3	1.6	
30	23.00	36.56	25.14	284	4.42	5.85	1.43	.30	.13	5.2	3.7	40.0

ADVANCE II CRUISE 1 STATION 10 6/VIII/75 19.3 GMT CONSECUTIVE STATION 7

LAT. = 34 32.8N LONG. = 77 12.8W DEPTH = 13M DIST LAST STA = 103.7KM

WEATHER DATA

WIND FORCE	=	SEA STATE	=
WIND DIRECTION	= - DEGR	WAVE DIRECTION	= - DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	AOU	O2A	PO4	NO3	SI	N/P
0	25.70	36.00	23.90	401	5.52	5.51	-.01	-1.00	.05	.4	.7	8.0

ADVANCE II CRUISE 1 STATION 11 6/VIII/75 20.5 GMT CONSECUTIVE STATION 8

LAT. = 34 26.0N LONG. = 77 4.0W DEPTH = 25M DIST LAST STA = 18.4KM

WEATHER DATA

WIND FORCE	=	SEA STATE	=
WIND DIRECTION	= - DEGR	WAVE DIRECTION	= - DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	AOU	O2A	PO4	NO3	SI	N/P
0	27.40	35.10	22.69	517	5.30	5.31	.01	-.97	0.00	.3	.4	
18	25.60	36.18	24.07	386	5.41	5.52	.11	-.86	0.00	.2	.4	

ADVANCE II CRUISE 1 STATION 12 6/VIII/75 21.8 GMT CONSECUTIVE STATION 9

LAT. = 34 19.1N LONG. = 76 55.8W DEPTH = 29M DIST LAST STA = 17.9KM

WEATHER DATA

WIND FORCE	=	SEA STATE	=
WIND DIRECTION	= - DEGR	WAVE DIRECTION	= - DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	AOU	O2A	PO4	NO3	SI	N/P
0	27.90	35.36	22.72	514					0.00	.3	.1	
25	25.10	35.46	23.68	423					0.00	.3	0.0	

ADVANCE II CRUISE 1 STATION 13 6/VIII/75 23.1 GMT CONSECUTIVE STATION 10

LAT. = 34 12.0N LONG. = 76 47.5W DEPTH = 32M DIST LAST STA = 18.3KM

WEATHER DATA

WIND FORCE	=	SEA STATE	=
WIND DIRECTION	= - DEGR	WAVE DIRECTION	= - DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	AOU	O2A	PO4	NO3	SI	N/P
0	27.80											
20	27.70											
25	25.10											
30	24.60											

ADVANCE II CRUISE 1 STATION 14 6/VIII/75 23.9 GMT CONSECUTIVE STATION 11

LAT. = 34 5.0N LONG. = 76 38.0W DEPTH = 38M DIST LAST STA = 19.5KM

WEATHER DATA

WIND FORCE	=	SEA STATE	=
WIND DIRECTION	= - DEGR	WAVE DIRECTION	= - DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	AOU	O2A	PO4	NO3	SI	N/P
0	27.90											
20	27.80											
25	25.50											
30	24.00											
35	23.10											

ADVANCE II CRUISE 1 STATION 15 7/VIII/75 .8 GMT CONSECUTIVE STATION 12

LAT. = 33 58.5N LONG. = 76 30.0W DEPTH = 44M DIST LAST STA = 17.2KM

WEATHER DATA

WIND FORCE	=	SEA STATE	=
WIND DIRECTION	= - DEGR	WAVE DIRECTION	= - DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	AOU	O2A	PO4	NO3	SI	N/P
0	28.60											
15	28.50											
20	27.00											
25	26.00											
30	25.20											
35	24.90											
40	24.70											

ADVANCE II CRUISE 1 STATION 16 7/VIII/75 1.8 GMT CONSECUTIVE STATION 13

LAT. = 33 51.5N LONG. = 76 21.0W DEPTH = 230M DIST LAST STA = 19.0KM

WEATHER DATA

WIND FORCE	=	SEA STATE	=
WIND DIRECTION	= - DEGR	WAVE DIRECTION	= - DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	AOU	O2A	PO4	NO3	SI	N/P
0	28.10											
20	28.10											
30	26.50											
50	21.50											
75	18.10											
100	16.80											
125	15.90											
150	15.80											
175	15.10											
200	13.80											

ADVANCE II CRUISE 1 STATION 17 7/VIII/75 5.5 GMT CONSECUTIVE STATION 14

LAT. = 33 51.5N LONG. = 76 42.0W DEPTH = 42M DIST LAST STA = 32.3KM

WEATHER DATA

WIND FORCE	=	SEA STATE	=
WIND DIRECTION	= - DEGR	WAVE DIRECTION	= - DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	AOU	O2A	PO4	NO3	SI	N/P
0	27.70											
20	27.70											
30	24.40											
40	23.60											

APPENDIX II

STATION LOCATIONS AND DATA

(OBIS IV)

STATION SUMMARY FOR ADVANCE II AD-3-75

STATION	LATITUDE	LONGITUDE	YR	MN	DY	HOUR GMT	DEPTH M	CONSEC NUMBER
30	34 17.6N	77 16.1W	75	12	9	21.4	15	1
31	34 13.5N	77 11.6W	75	12	9	22.7	26	2
32	34 9.8N	77 7.6W	75	12	9	23.7	31	3
33	34 5.4N	77 3.4W	75	12	10	.8	33	4
34	34 1.2N	76 59.1W	75	12	10	1.5	34	5
35	33 57.3N	76 54.7W	75	12	10	2.7	37	6
36	33 53.2N	76 50.5W	75	12	10	3.6	39	7
37	33 49.1N	76 46.4W	75	12	10	4.6	43	8
148	33 37.8N	76 51.8W	75	12	11	.5	55	9
46	33 45.9N	77 .2W	75	12	11	2.1	42	10
44	33 54.2N	77 8.5W	75	12	11	3.7	31	11
42	34 2.3N	77 16.9W	75	12	11	5.4	30	12

Data Sheet Symbols

Z = Depth (m)

T = Temperature (C)

S = Salinity (o/oo)

D = Sigma-t (g/cm^3)

SVA = Specific Volume Anomaly

O2 = Dissolved Oxygen (ml/l)

O2' = Oxygen Saturation (International Tables) (ml/l)

AOU = Apparent Oxygen Utilization (O2'-O2) (ml/l)

O2A = Oxygen Anomaly (Richards and Redfield, 1955)

PO4 = Phosphate (μmole)

NO3 = Nitrate (μmole)

SI = Silicate (μmole)

N/P = Nitrate/Phosphate Ratio

ADVANCE II CRUISE 3 STATION 30 9/ XII/75 21.4 GMT CONSECUTIVE STATION 1

LAT. = 34 17.6N LONG. = 77 16.1W DEPTH = 15M DIST LAST STA = 0.0KM

WEATHER DATA

WIND FORCE =		SEA STATE =	
WIND DIRECTION =	DEGR	WAVE DIRECTION =	DEGR
AIR TEMP =	C	CLOUD TYPE =	
WEATHER CODE =		CLOUD AMOUNT =	
BAROMETRIC PRESSURE =	MB	VISIBILITY CODE =	

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	AOU	O2A	PO4	NO3	SI	N/P
2	16.19	35.66	26.23	179	5.56	6.87	1.31	-.68	.01	0.0	2.	0.0
13	16.19	35.61	26.19	183	5.45	6.87	1.42	-.43	.03	0.0	2.	0.0

ADVANCE II CRUISE 3 STATION 31 9/ XII/75 22.7 GMT CONSECUTIVE STATION 2

LAT. = 34 13.5N LONG. = 77 11.6W DEPTH = 26M DIST LAST STA = 10.3KM

WEATHER DATA

WIND FORCE =		SEA STATE =	
WIND DIRECTION =	DEGR	WAVE DIRECTION =	DEGR
AIR TEMP =	C	CLOUD TYPE =	
WEATHER CODE =		CLOUD AMOUNT =	
BAROMETRIC PRESSURE =	MB	VISIBILITY CODE =	

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	AOU	O2A	PO4	NO3	SI	N/P
2	19.02	36.21	25.96	205	5.21	6.41	1.20	-.35	.03	0.0	2.	0.0
9	19.02	36.20	25.95	206	5.22	6.41	1.19	-.37	0.00	0.0	1.	I
15	18.32	36.24	26.16	186	5.28	6.52	1.24	-.15	.01	0.0	1.	0.0
24	18.22	36.20	26.15	188	5.29	6.54	1.25	-.12	0.00	0.0	1.	I

ADVANCE II CRUISE 3 STATION 32 9/ XII/75 23.7 GMT CONSECUTIVE STATION 3

LAT. = 34 9.8N LONG. = 77 7.6W DEPTH = 31M DIST LAST STA = 9.2KM

WEATHER DATA

WIND FORCE	=	SEA STATE	=
WIND DIRECTION	= DEGR	WAVE DIRECTION	= DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	AOU	O2A	PO4	NO3	SI	N/P
2	19.17	36.16	25.88	213	5.23	6.39	1.16	-.39	0.00	0.0	2.	I
14	19.17	36.16	25.88	213	5.15	6.39	1.24	-.31	0.00	0.0	1.	I
23	18.97	36.24	25.99	203	5.20	6.42	1.22	-.34	.02	0.0	1.	0.0
27	18.77	36.22	26.03	199	5.25	6.45	1.20	.42	.02	0.0	1.	0.0

ADVANCE II CRUISE 3 STATION 33 10/ XII/75 .8 GMT CONSECUTIVE STATION 4

LAT. = 34 5.4N LONG. = 77 3.4W DEPTH = 33M DIST LAST STA = 10.4KM

WEATHER DATA

WIND FORCE	=	SEA STATE	=
WIND DIRECTION	= DEGR	WAVE DIRECTION	= DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	ADU	O2A	PO4	NO3	SI	N/P
2	20.12	36.10	25.59	240	5.19	6.25	1.06	-.39	0.00	0.0	1.	I
25	20.12	36.22	25.68	232	5.17	6.25	1.08	-.36	.01	0.0	1.	0.0
30	19.52	36.22	25.84	217	5.04	6.34	1.30	-.20	.11	0.0	2.	0.0

ADVANCE II CRUISE 3 STATION 34 10/ XII/75 1.5 GMT CONSECUTIVE STATION 5

LAT. = 34 1.2N LONG. = 76 59.1W DEPTH = 34M DIST LAST STA = 10.2KM

WEATHER DATA

WIND FORCE	=	SEA STATE	=
WIND DIRECTION	= DEGR	WAVE DIRECTION	= DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	AOU	O2A	PO4	NO3	SI	N/P
2	22.29	36.08	24.98	298	4.97	5.94	.97	-.27	0.00	0.0	2.	I
10	22.19	36.14	25.05	292	4.92	5.96	1.04	-.21	0.00	0.0	1.	I
20	20.19	36.09	25.56	244	5.12	6.24	1.12	-.33	0.00	0.0	1.	I
32	19.99	36.08	25.61	239	5.11	6.27	1.16	-.31	.01	0.0/	1.	0.0

ADVANCE II CRUISE 3 STATION 35 10/ XII/75 2.7 GMT CONSECUTIVE STATION 6

LAT. = 33 57.3N LONG. = 76 54.7W DEPTH = 37M DIST LAST STA = 9.9KM

WEATHER DATA

WIND FORCE	=	SEA STATE	=
WIND DIRECTION	= DEGR	WAVE DIRECTION	= DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	AOU	O2A	PO4	NO3	SI	N/P
2	24.24	36.10	24.42	351	4.87	5.69	.82	-.26	0.00	0.0	2.	I
8	24.24	36.14	24.45	349	4.88	5.69	.81	-.27	0.00	0.0	2.	I
24	22.59	36.19	24.97	300	4.95	5.90	.95	-.25	0.00	0.0	1.	I
33	22.24	36.14	25.03	295	4.83	5.95	1.12	-.12	0.00	0.0	1.	I

ADVANCE II CRUISE 3 STATION 36 10/ XII/75 3.6 GMT CONSECUTIVE STATION 7

LAT. = 33 53.2N LONG. = 76 50.5W DEPTH = 39M DIST LAST STA = 10.0KM

WEATHER DATA

WIND FORCE	=	SEA STATE	=
WIND DIRECTION	= DEGR	WAVE DIRECTION	= DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	AOU	O2A	PO4	NO3	SI	N/P
2	24.31	36.08	24.39	354	4.92	5.68	.76	-.32	.03	0.0	1.	0.0
21	24.31	36.10	24.40	354	4.89	5.68	.79	-.29	0.00	0.0	1.	I
36	23.51	36.12	24.65	331	4.88	5.78	.90	-.24	.01	0.0	2.	0.0

ADVANCE II CRUISE 3 STATION 37 10/ XII/75 4.6 GMT CONSECUTIVE STATION 8

LAT. = 33 49.1N LONG. = 76 46.4W DEPTH = 43M DIST LAST STA = 9.9KM

WEATHER DATA

WIND FORCE	=	SEA STATE	=
WIND DIRECTION	= DEGR	WAVE DIRECTION	= DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	AOU	O2A	PO4	NO3	SI	N/P
2	23.96	36.07	24.48	346	4.85	5.72	.87	-.23	0.00	0.0	2.	I
16	23.96	36.08	24.49	345	4.91	5.72	.81	-.29	0.00	0.0	1.	I
33	23.46	36.10	24.65	331	4.86	5.79	.93	-.22	.02	.1	2.	5.0
40	23.36	36.16	24.73	323	4.74	5.80	1.06	-.08	0.00	.2	2.	R

ADVANCE II CRUISE 3 STATION 148 11/ XII/75 .5 GMT CONSECUTIVE STATION 9

LAT. = 33 37.8N LONG. = 76 51.8W DEPTH = 55M DIST LAST STA = 22.5KM

WEATHER DATA

WIND FORCE	=	SEA STATE	=
WIND DIRECTION	= DEGR	WAVE DIRECTION	= DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	AOU	O2A	PO4	NO3	SI	N/P
2	22.72	36.11	24.88	308	4.74	5.88	1.14	-.06	.04	.1	2.	2.5
50	22.72	36.12	24.88	310	4.69	5.88	1.19	-.01	.01	.2	2.	20.0

ADVANCE II CRUISE 3 STATION 46 11/ XII/75 2.1 GMT CONSECUTIVE STATION 10

LAT. = 33 45.9N LONG. = 77 .2W DEPTH = 42M DIST LAST STA = 19.8KM

WEATHER DATA

WIND FORCE	=	SEA STATE	=
WIND DIRECTION	= DEGR	WAVE DIRECTION	= DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	ADU	O2A	PO4	NO3	SI	N/P
2	24.11	36.11	24.47	347	4.75	5.70	.95	-.14	0.00	0.0	2.	I
40	24.01	36.11	24.50	345	4.74	5.72	.98	-.12	.16	.1	2.	.6

ADVANCE II CRUISE 3 STATION 44 11/ XII/75 3.7 GMT CONSECUTIVE STATION 11

LAT. = 33 54.2N LONG. = 77 8.5W DEPTH = 31M DIST LAST STA = 20.0KM

WEATHER DATA

WIND FORCE	=	SEA STATE	=
WIND DIRECTION	= DEGR	WAVE DIRECTION	= DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	ADU	O2A	PO4	NO3	SI	N/P
2	23.94	36.14	24.54	340	4.76	5.72	.96	-.13	0.00	0.0	2.	I
23	24.04	36.14	24.51	344	4.80	5.71	.91	-.18	0.00	0.0	1.	I
29	21.14	36.07	25.29	270	4.97	6.10	1.13	-.22	.03	.1	2.	3.3

ADVANCE II CRUISE 3 STATION 42 11/ XII/75 5.4 GMT CONSECUTIVE STATION 12

LAT. = 34 2.3N LONG. = 77 16.9W DEPTH = 30M DIST LAST STA = 19.8KM

WEATHER DATA

WIND FORCE	=	SEA STATE	=
WIND DIRECTION	= DEGR	WAVE DIRECTION	= DEGR
AIR TEMP	= C	CLOUD TYPE	=
WEATHER CODE	=	CLOUD AMOUNT	=
BAROMETRIC PRESSURE	= MB	VISIBILITY CODE	=

OBSERVATIONS

Z	T	S	D	SVA	O2	O2'	ADU	O2A	PO4	NO3	SI	N/P
2	19.20	36.12	25.84	216	5.21	6.39	1.18	-.37	.01	0.0	1.	0.0
28	19.20	36.14	25.86	215	5.17	6.39	1.22	-.33	.12	0.0	1.	0.0