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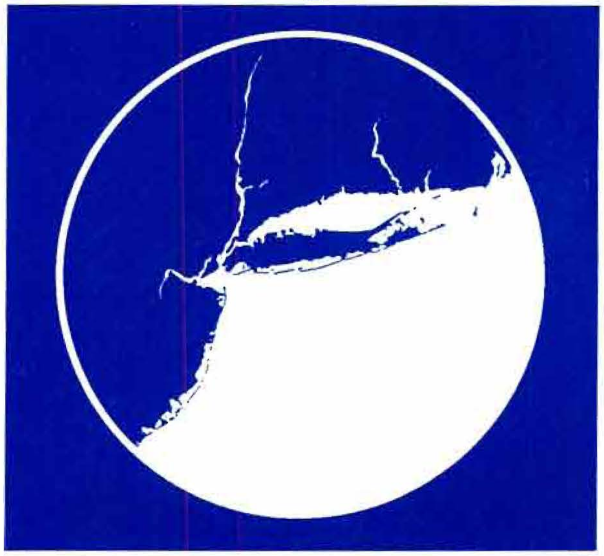

CTD MEASUREMENTS AND SURFACE SALINITY SURVEYS IN THE PECONIC BAYS, 1984. A DATA REPORT.

Marine Sciences Research Center

MARINE SCIENCES RESEARCH CENTER
STATE UNIVERSITY OF NEW YORK
STONY BROOK, NEW YORK 11794-5000

CTD MEASUREMENTS AND SURFACE SALINITY SURVEYS IN THE PECONIC BAYS,1984. A DATA REPORT.

by

Mário E. C. Vieira

June 1990

This work is a result of research sponsored by NOAA Office of Sea Grant, Department of Commerce, under Grant #NA85AADSG021.

Special Data Report #5
Reference #90-10

Approved for Distribution

J. R. Schubel, Director

DEDICATION

This work is dedicated to the Baymen whose livelihood depends on the waters of the Peconics. Their valiant effort to maintain a traditional way of life in the face of many threats is an inspiration to all of us.

Scalloping Northwest

1

Centuries ago
the indians said animals
no longer talked to them
and both entered the fur trade.

Working six weeks into scallop season
I stop speaking and enter that silence.

2

Even the slenderest water
is thicker than air. Erecting itself

on the skittery rasp of the cullboard
a crab holds out a bubble

on the drawtrap of its jaws.

With my next breath
a rock in the fog
lifts its deadrise a boat's length away.

Allen Planz

From "Long Island Poets", 1986

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ABSTRACT

This report contains CTD and surface salinity data collected in the Peconic Bays, Long Island, New York, by researchers from the Marine Sciences Research Center during 1984.

The objective of these observations was to determine the vertical and horizontal structure of the salinity and temperature distribution in the Peconic Bays during the period when their circulation was being studied.

This data report is a companion to MSRC Data Report #4 (Ref. #90-9) and presents 84 individual profiles of temperature, salinity and sigma-t as well as 9 surface salinity survey maps.

1. Introduction

The measurements presented in this data report were made during 1984, the data collection phase of a two year study of the processes of movement, mixing and exchange in the Peconic-Flanders Bay estuarine system in Long Island, New York (Fig.1). The objective of the study was the determination of spatial and temporal scales of the circulation in those waterways and to provide calibration data for numerical models.

The salinity, temperature and density data reported here are intended to document the three-dimensional structure of the Bays as well as its fluctuation with time. These semi-synoptic surveys were conducted at the rate of one per month between March and November 1984.

It must be noted that moored arrays of current meters and a network of tide gauges were also deployed throughout the Peconic Bays during 1984; these related data sets have been documented in a companion data report (Vieira, 1990).

2. Data acquisition and processing

The data presented in this report were taken on board the R/V Siome equipped with a thermosalinograph, a salinometer, a Loran-C receiver and a data logger.

The thermosalinograph was a Martek MK VI S/N 178 salinometer (Martek, no date) adapted to a flow-through cell. Surface water was continually pumped through the instrument's sensors utilizing plastic hose pipe. The instrument was interfaced with an MSRC designed and built programmable data logger PDL-1 which used as controller a Radio Shack TRS-80 Model 100 microcomputer. The data logger was also interfaced with a Loran-C receiver Texas Instruments 9900-II, and was programmed to acquire, store and print readings of conductivity, temperature, salinity and position at short intervals in time. The logger applied calibration coefficients to the conductivity and temperature values and calculated the salinity with the PSS 78 algorithm. A semi-synoptic survey of the Bays would take on the order of 4 hours with the R/V Siome running typically at about 15 knots.

Processing of this information consisted of controlling the quality of the recorded values (checking for errors, confirming positions from the log notes, etc.), manual plotting of the vessel's course and salinity readings, and contouring of isohalines.

The salinometer utilized for the vertical profiles was a direct reading Beckman RS5-3 S/N 705 (Beckman, 1972) equipped with an inductive probe and thermistor. The vessel would stop at each station, the Loran position was taken and the instrument was put over the side and lowered close to the bottom. It was then raised to each discrete depth and the readings of temperature and conductivity recorded on the log. The duration of a vertical

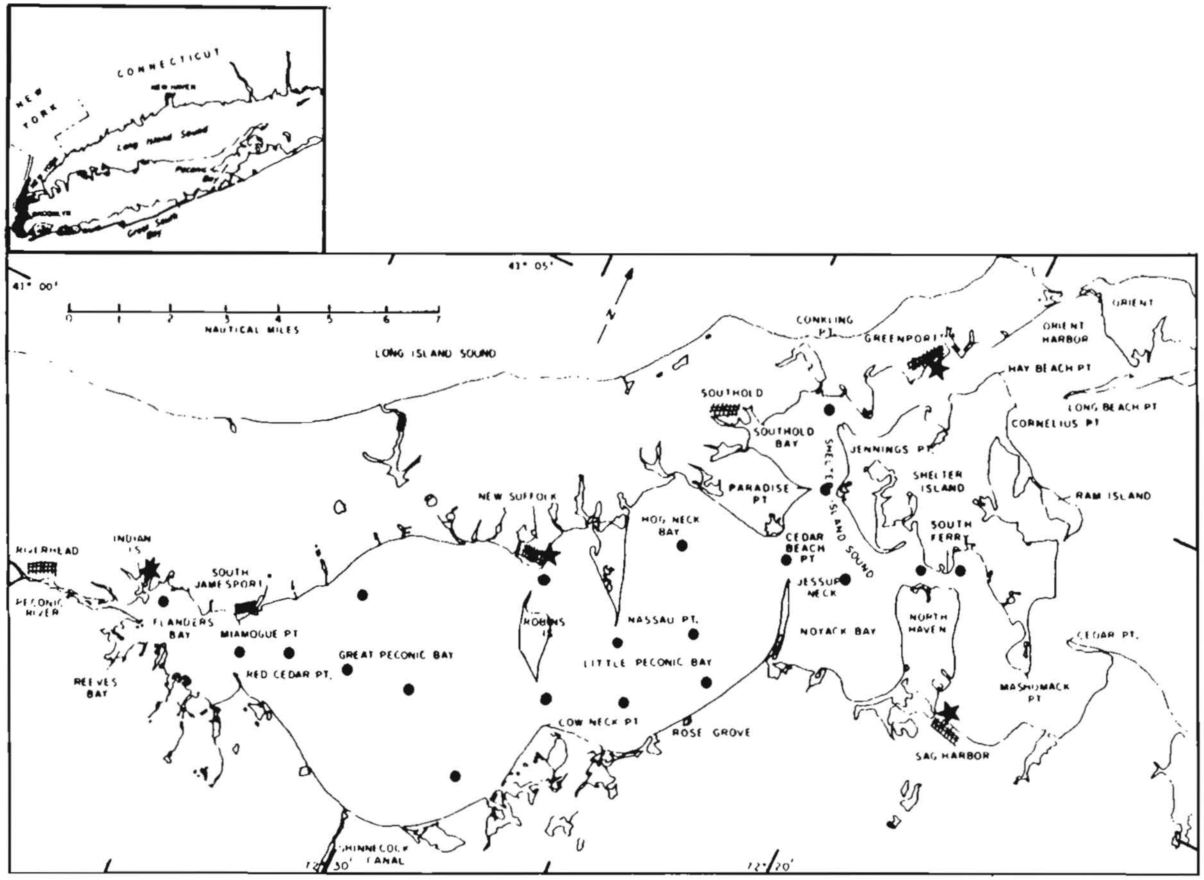


Figure 1. The Peconic Bays system and the locations of the CTD stations ● and tide gauges ★ .

profile was function of the station depth, typically about 1 minute, but could be as long as 6 minutes at the deepest locations.

Processing consisted of checking for errors, applying calibration coefficients, computing salinities (PSS 78 algorithm) and sigma-t (International Equation of State of Sea Water 1980) and plotting the vertical profiles.

Both the Martek MK VI and the Beckman RS5-3 salinometers were calibrated before the experiments began. Calibrations were performed in the MSRC calibration tank whose temperature was allowed to vary over a wide range, while accurately stabilized and measured with a standard bridge at each stop point. The conductivity was made to vary as the tank temperature changed, while tank water samples at each stop point were taken and analyzed in a bench salinometer for reference. Procedures consisted of regression analysis between sensor readings and reference standard; polynomial fit coefficients were then determined for application to the data when running calibration programs. The calibration curves for both instruments had standard errors of 0.02°C for temperature and 0.005 s/m (0.05 mmho/cm) for conductivity.

3. Data presentation

The surface salinity surveys took place on 20 April, 25 May, 20 June, 19 July, 22 August, 30 August, 19 September, 25 October and 16 November 1984.

The maps prepared from these semi-synoptic surveys are presented in chronological order. They show the isohalines (units PSU) and the path of the vessel. Although the areal coverage upon which these contours are based is limited, it does provide useful information on the surface salinity gradients.

Above each survey map are shown the water surface elevations (in meters) for that day at the four tide gauge stations depicted in Figure 1 (for details see Vieira, 1990)

Larry’s Lighthouse Dock (Meetinghouse Creek)	40° 56’.18 N 72° 37’.08 W
Galley-ho Restaurant Dock (New Suffolk)	40° 59’.47 N 72° 28’.22 W
Greenport County Dock (Greenport)	41° 05’.95 N 72° 21’.75 W
Sag Harbor Yacht Dock (Sag Harbor)	41° 00’.17 N 72° 17’.68 W

These tidal elevations are referred to that day’s mean sea level. The vertical arrows refer to the times of start and end of the survey cruise; this will facilitate relating the salinity

distribution to the state of the tide. All times throughout this report are in local time for the meridian 75°W (i.e., Eastern Standard Time).

The CTD data was collected during cruises on 19 March, 20 April, 25 May, 19 June, 17 July, 19 July, 22 August, 30 August, 19 September, 25 October and 19 November. The vertical profiles of temperature, salinity and sigma-t are divided into cruises, presented in chronological order. Station information is listed: latitude, longitude, date, time (Eastern Standard Time) and station depth (in meters). The location of the CTD stations is shown in Figure 1. In some instances the surface or the bottom salinity lead to an apparent instability of the column. This should not correspond to a real situation; it is suspected to be the result of faulty conductivity measurements due to the proximity of the boundary (e.g., disturbing the bottom sediment, possible contact with the vessel's hull). These questionable data points should be ignored; they were presented only to preserve the completeness of the profile.

4. Acknowledgements

The principal investigators in this project were Donald W. Pritchard and Harry H. Carter; Mário E. C. Vieira was associate investigator.

Clifford Jones and Chester Arnold assured the success of the field work. I extend my appreciation to Chester Arnold and Sanjay Gupta for their assistance with the reduction of the salinity survey and CTD data, respectively.

The Peconic-Flanders Bay project was supported by grant # NA85AADSG021 from the New York Sea Grant Institute.

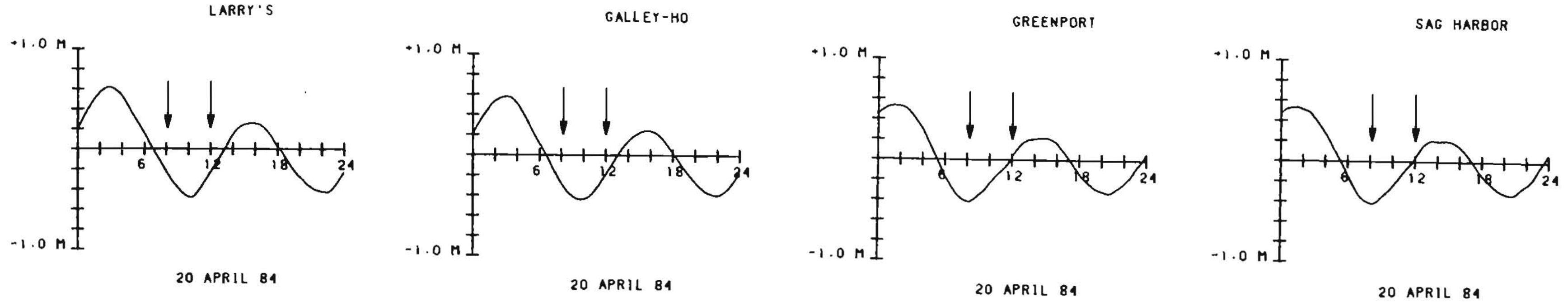
5. References

Beckman Instruments. 1972. Instruction manual for RS5-3 portable salinometer. Beckman Instruments Inc., Cedar Grove, New Jersey.

Martek Instruments. No date. Instruction manual for MK VI water quality analyzer. Martek Instruments, Irvine, California.

Vieira, M.E.C. 1990. Observations of currents, temperature, salinity and sea level in the Peconic Bays, 1984. A data report. Special Data Report #4, Ref. #90-9, Marine Sciences Research Center, State University of New York, Stony Brook, New York.

SURFACE SALINITY SURVEYS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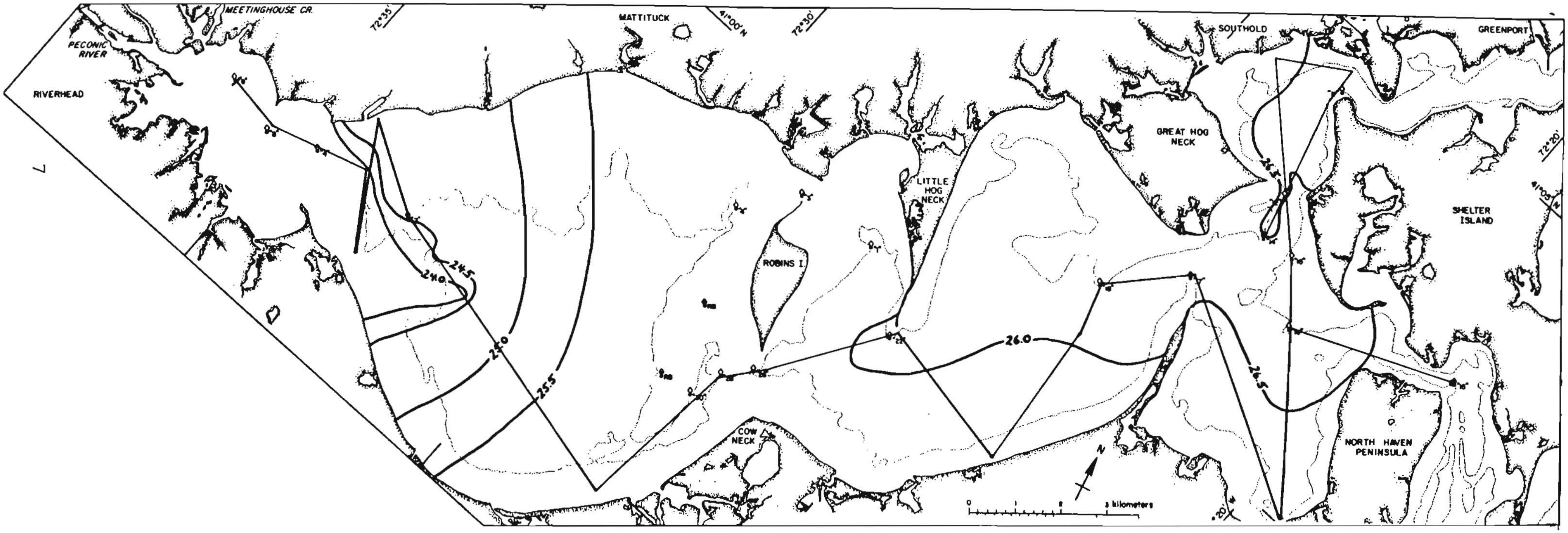
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SOUTHOLD
GREENPORT
72°20'
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LITTLE HOG NECK
SHELTER ISLAND
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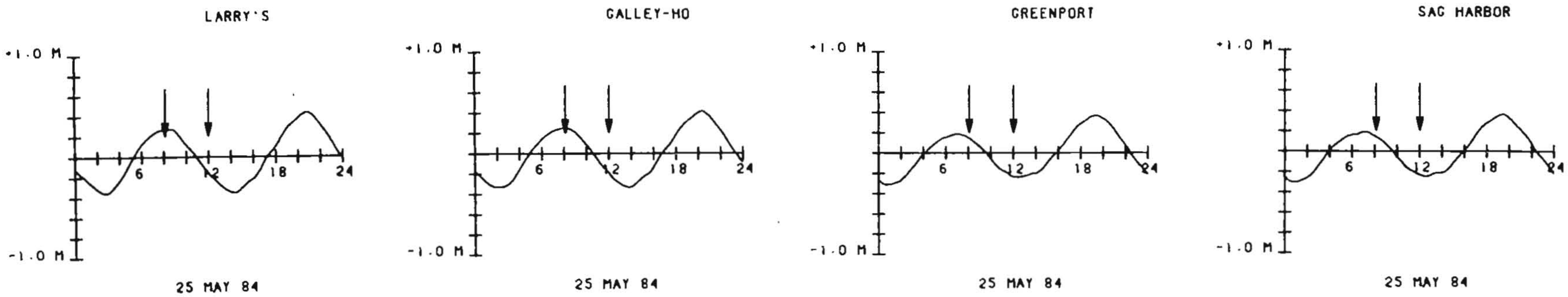
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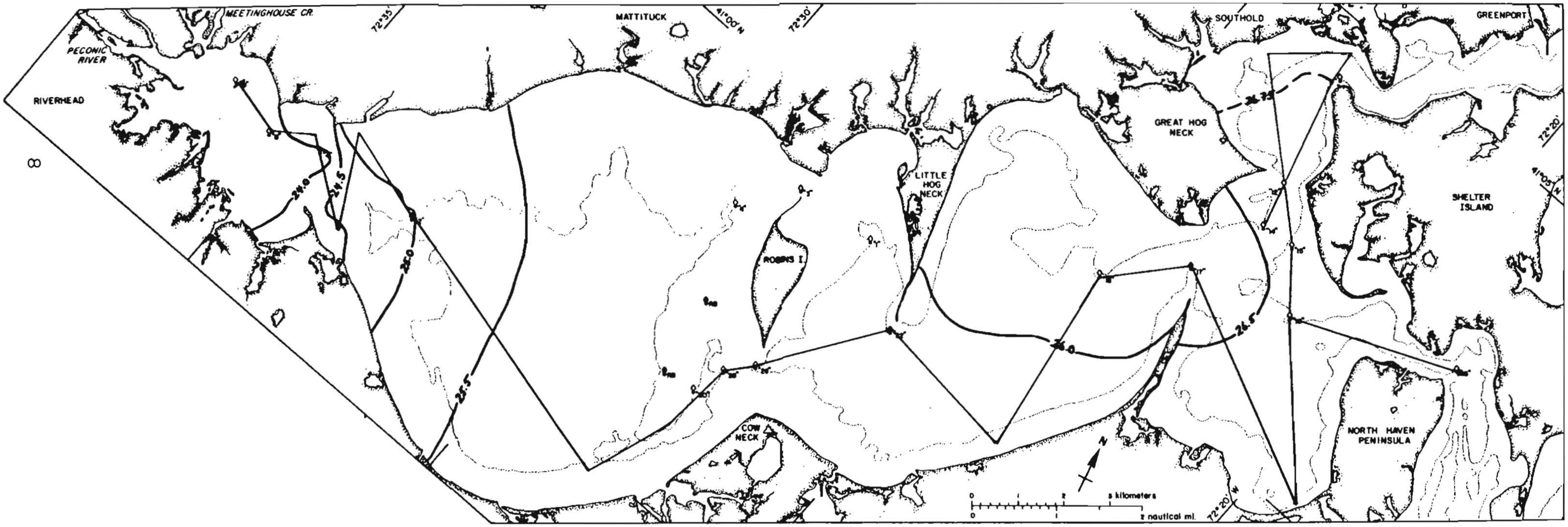
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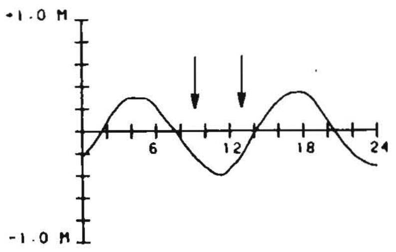

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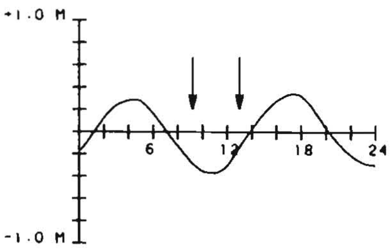

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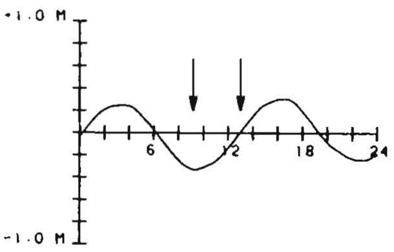

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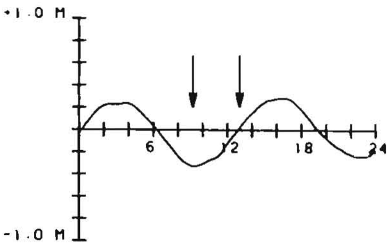

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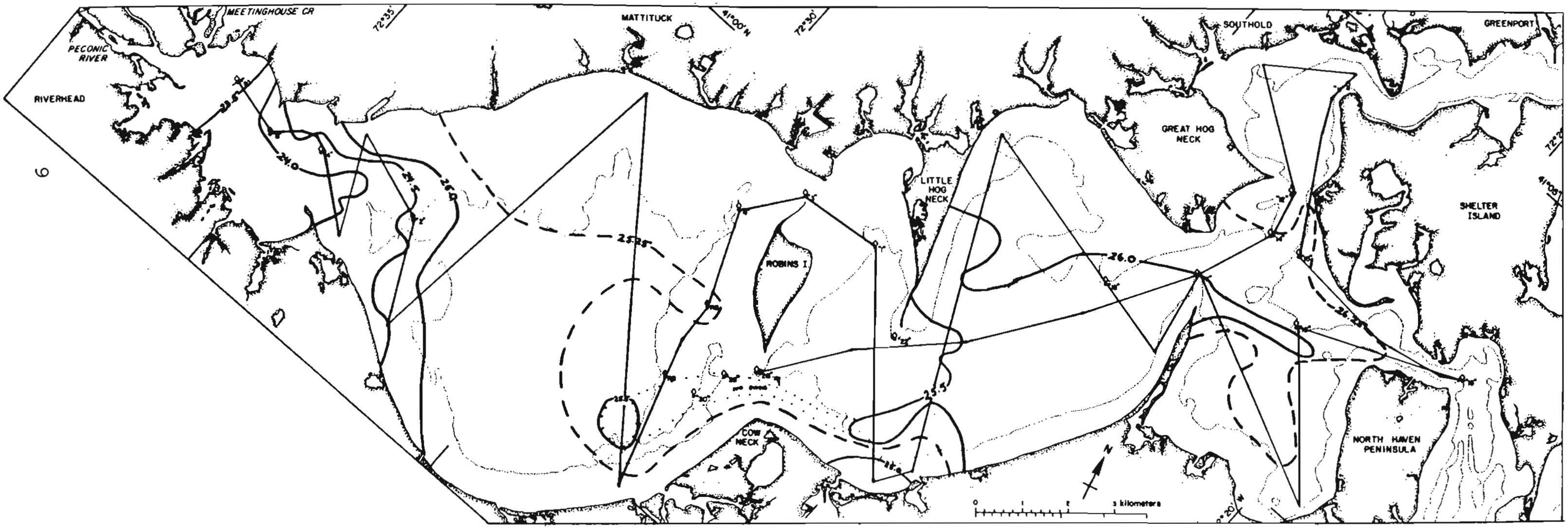

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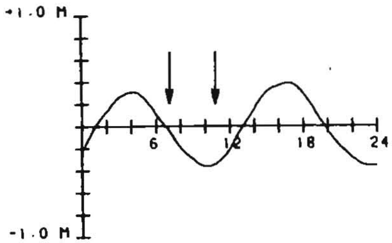

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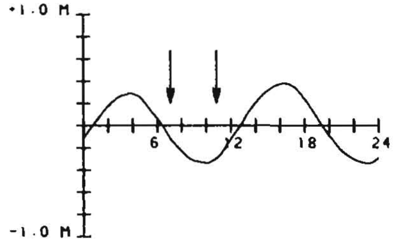

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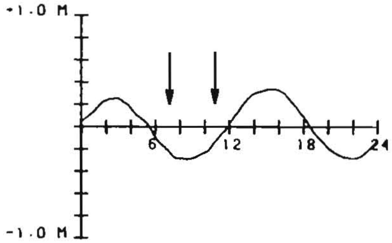

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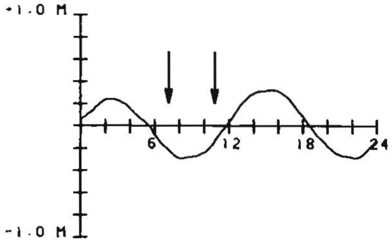

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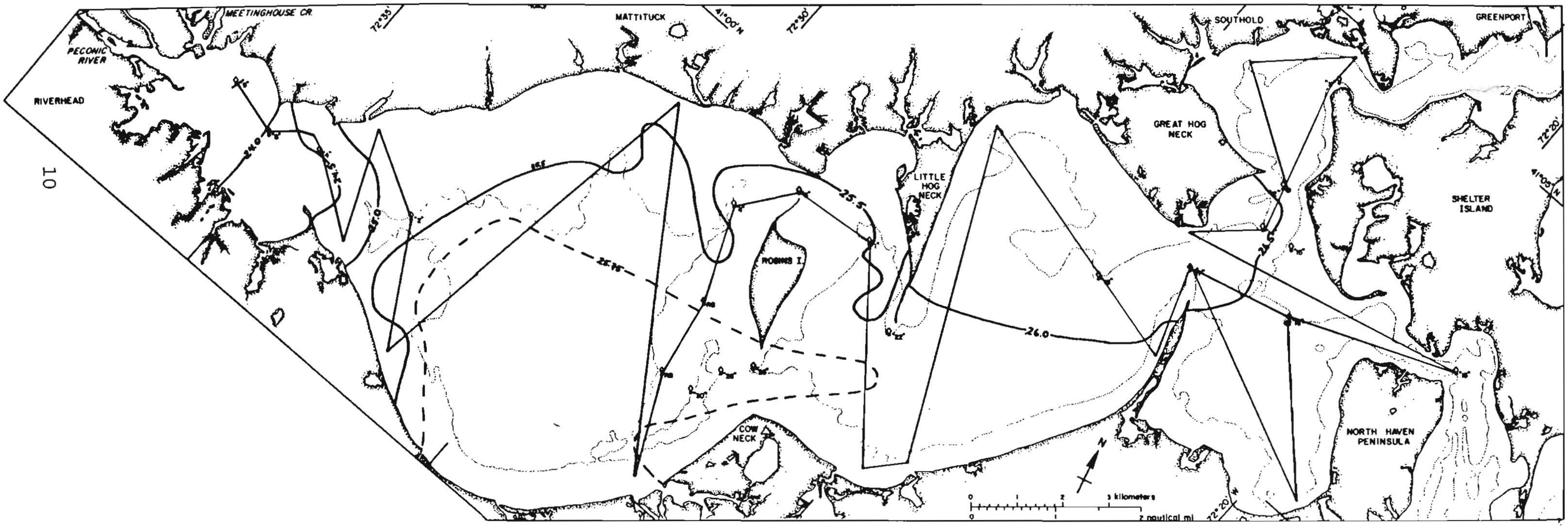

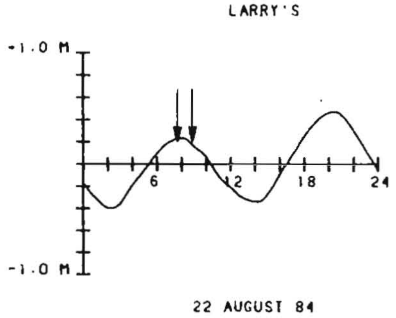

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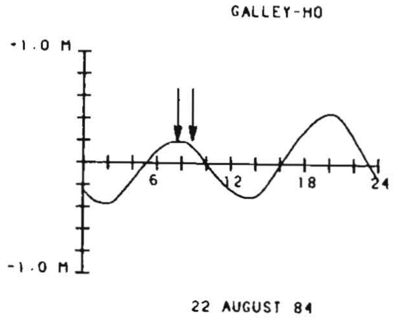

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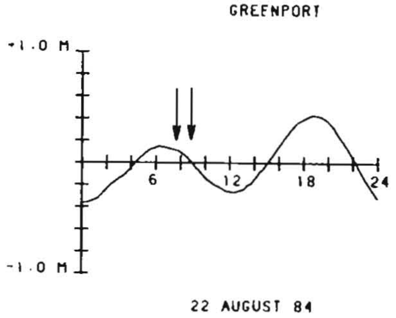

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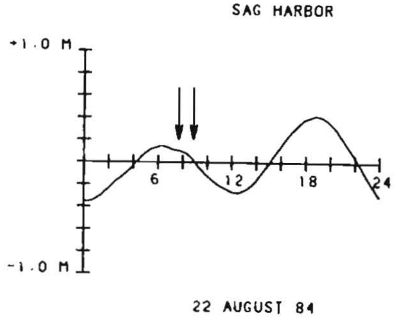

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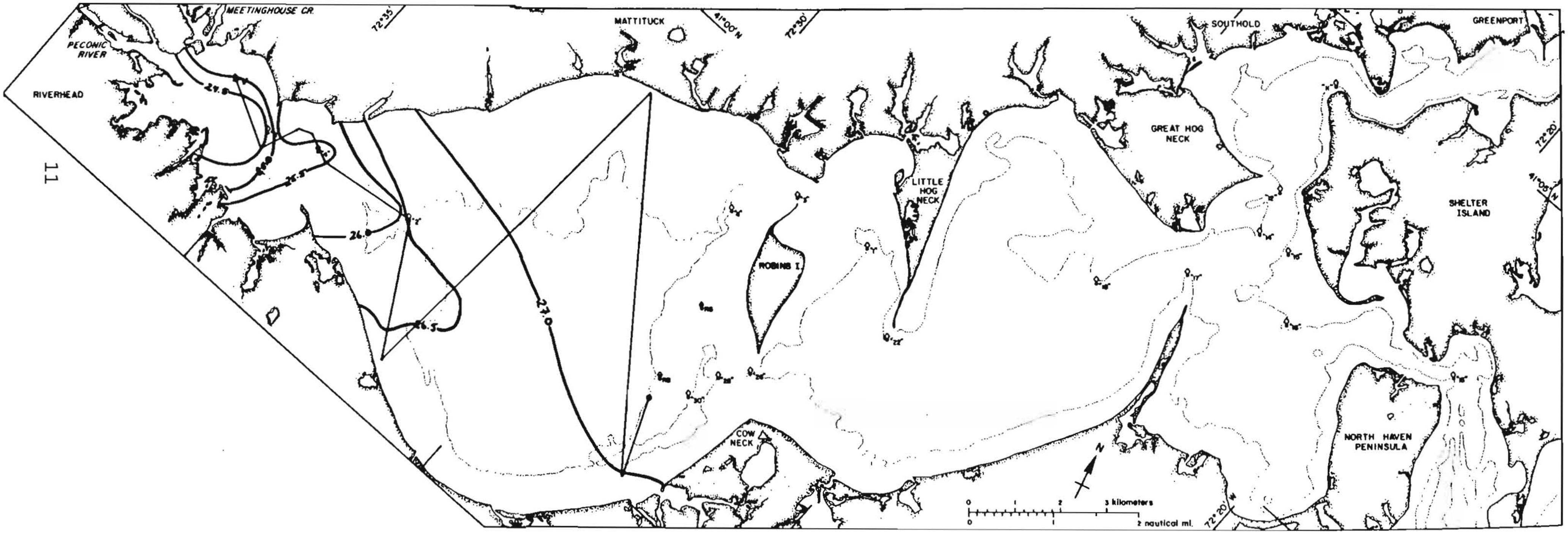

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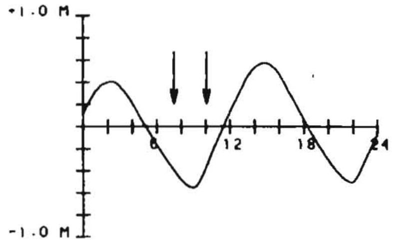

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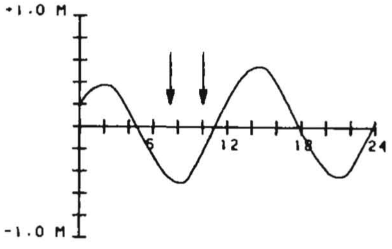

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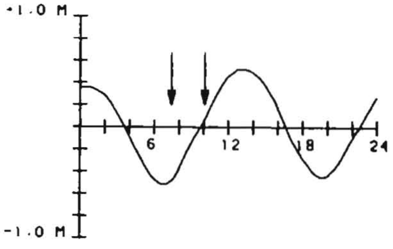

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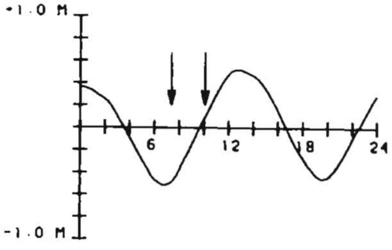

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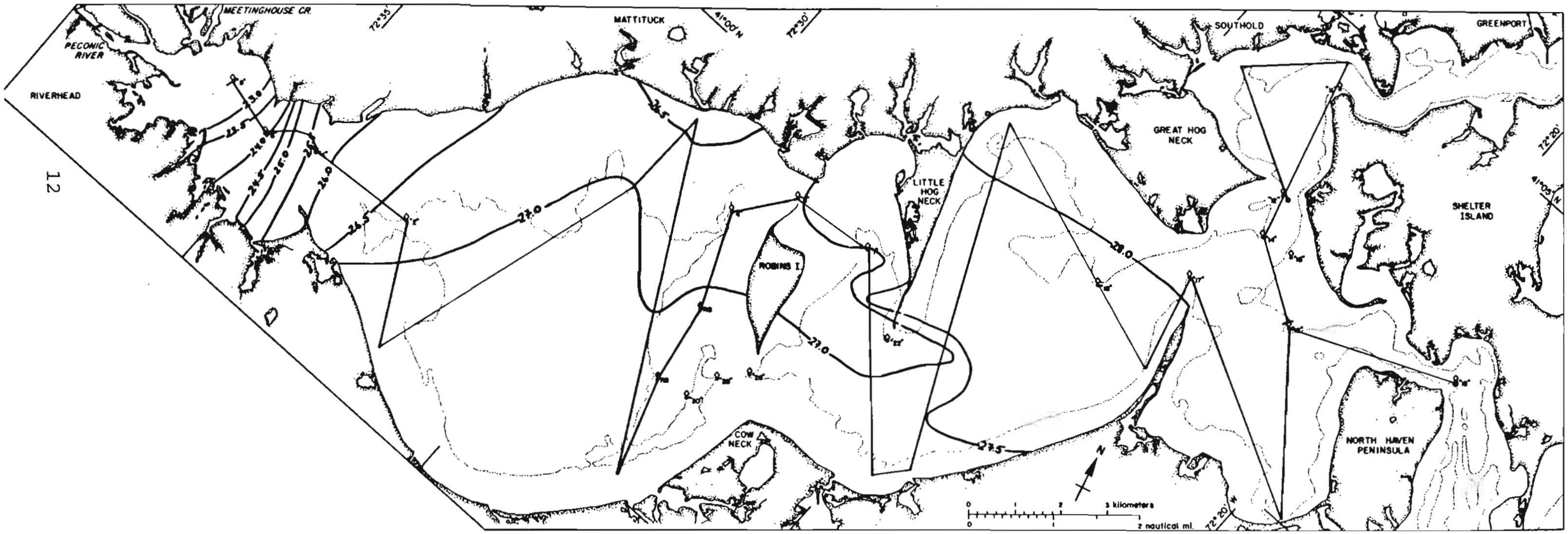

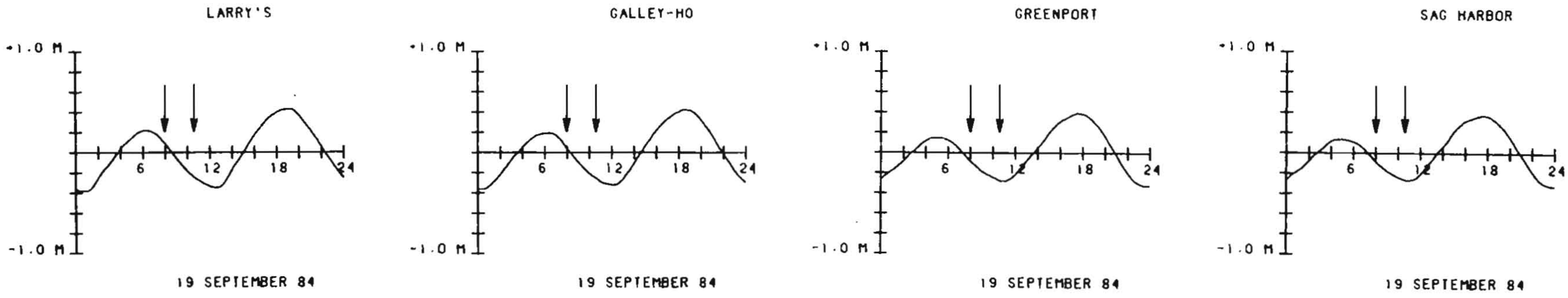
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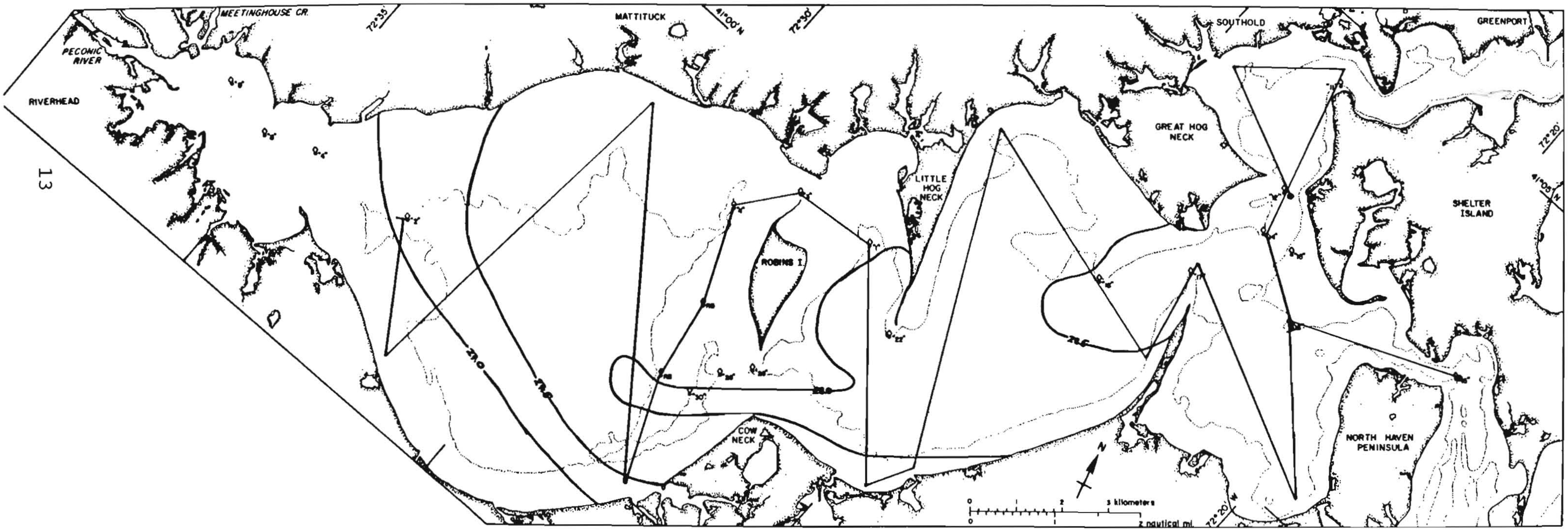
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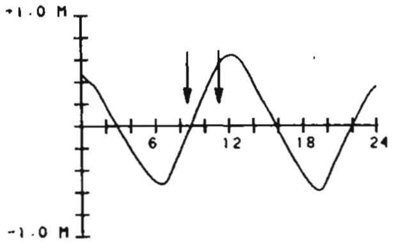

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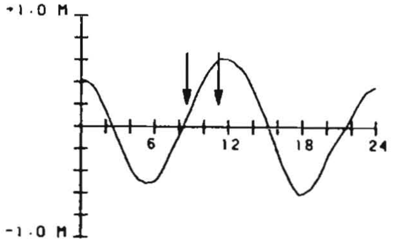

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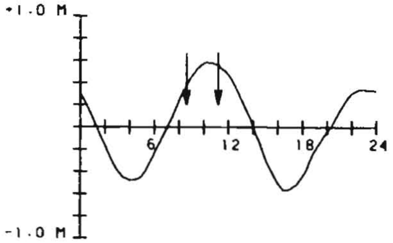

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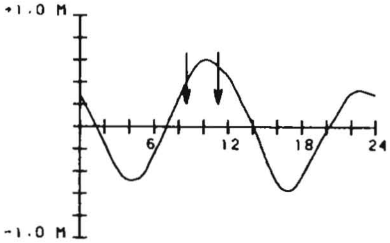

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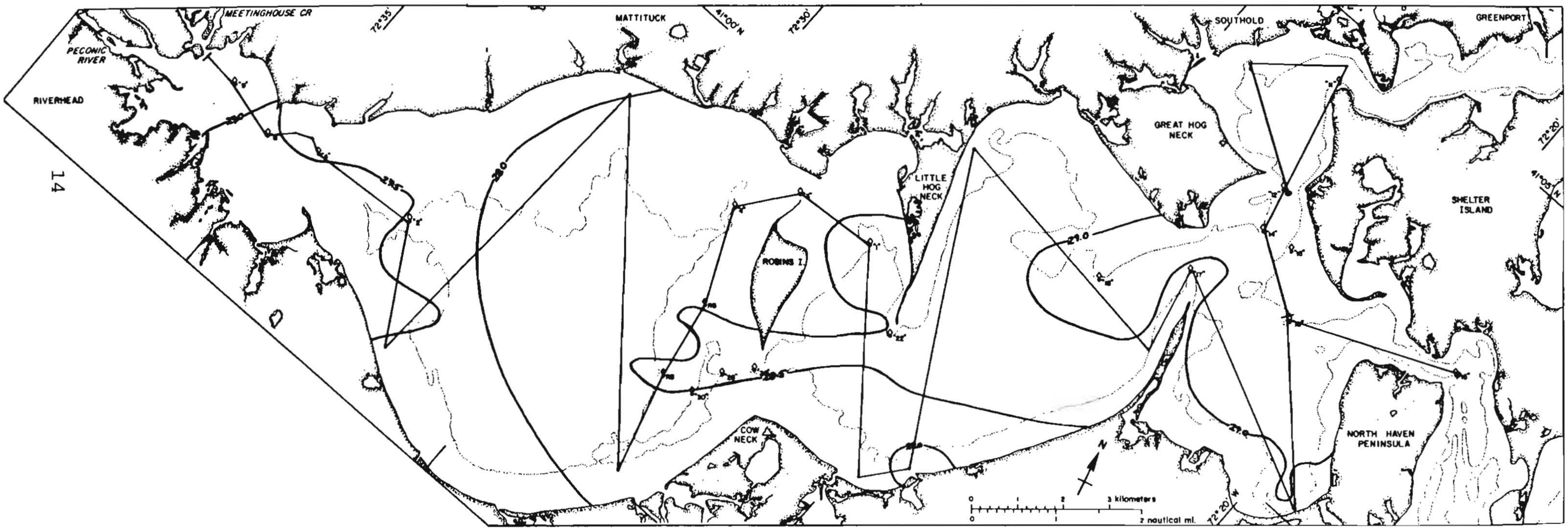

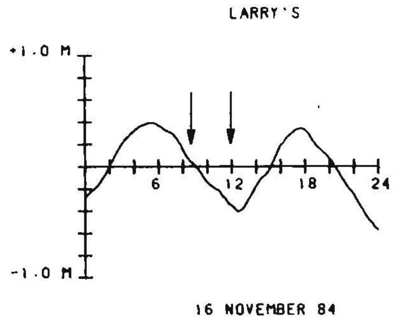
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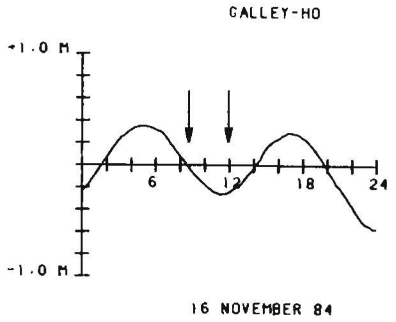
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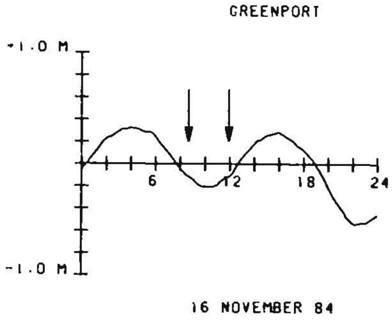
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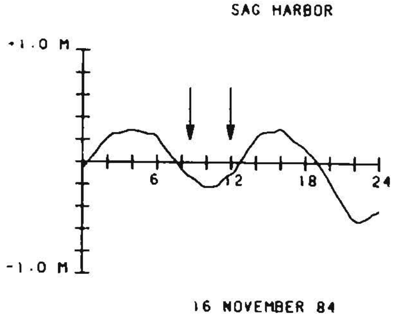
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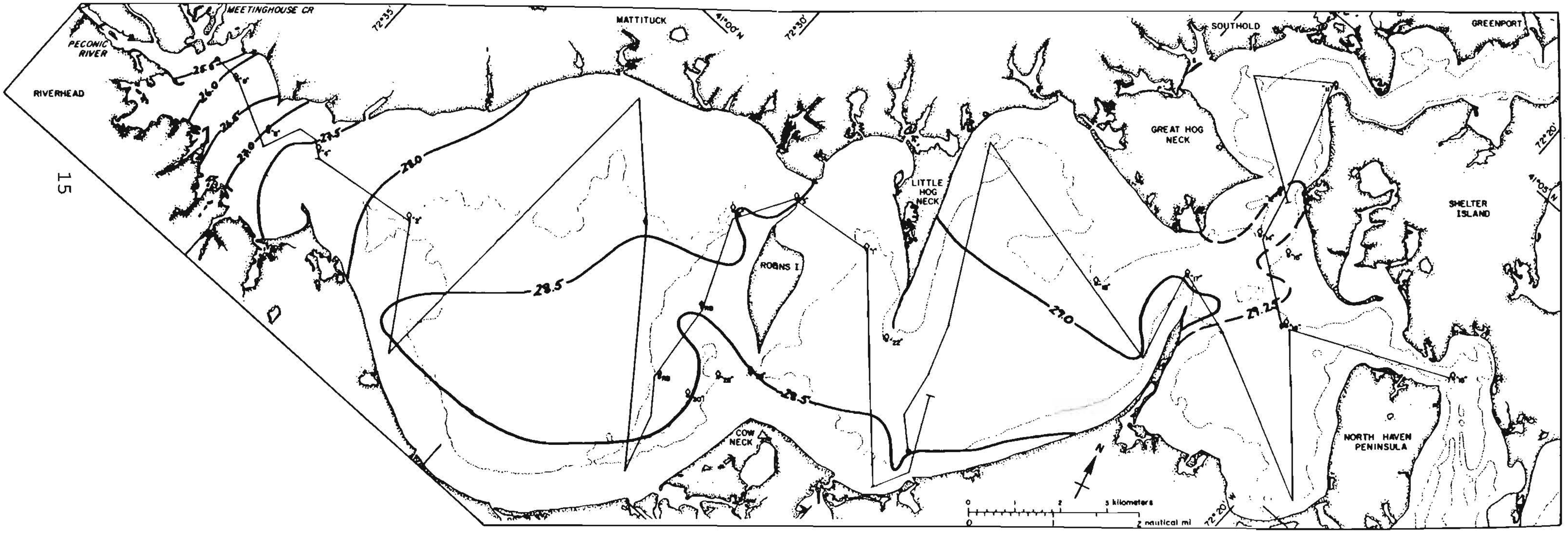
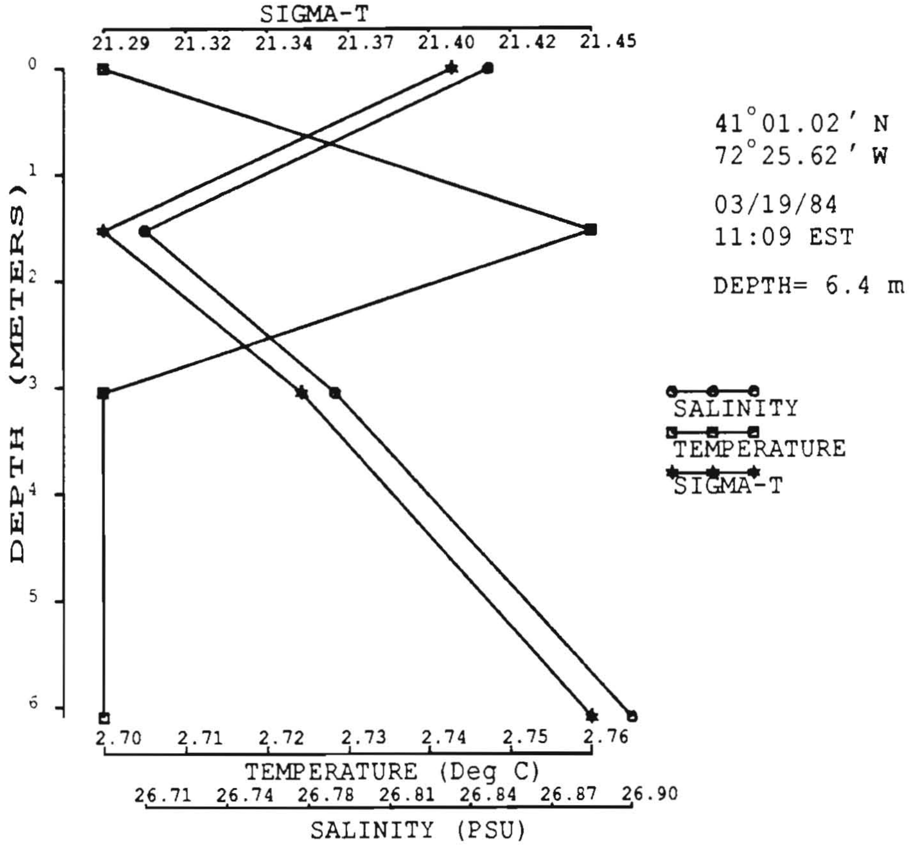


VERTICAL PROFILES OF
TEMPERATURE, SALINITY, SIGMA-T

Cruise of 19 March 1988



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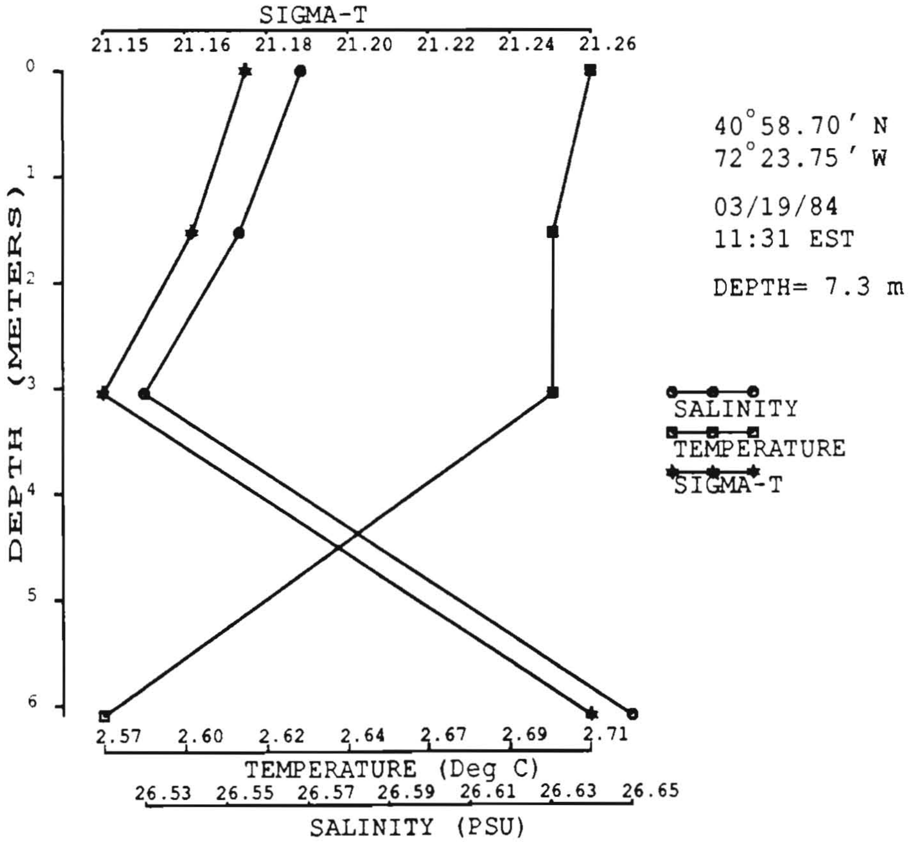

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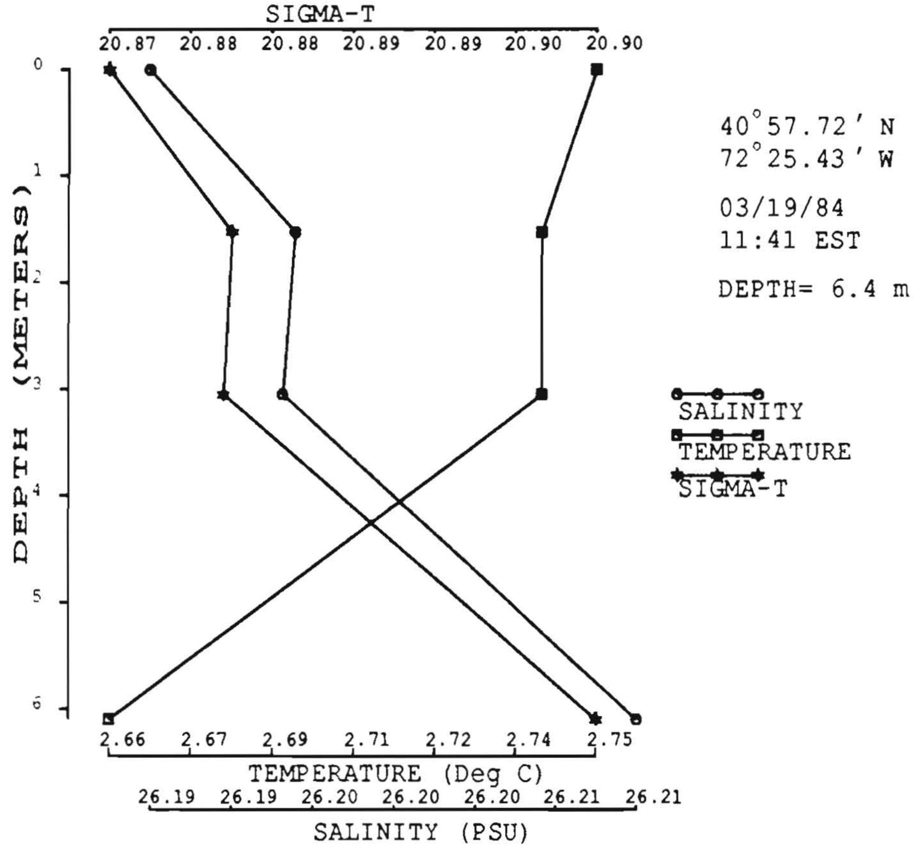

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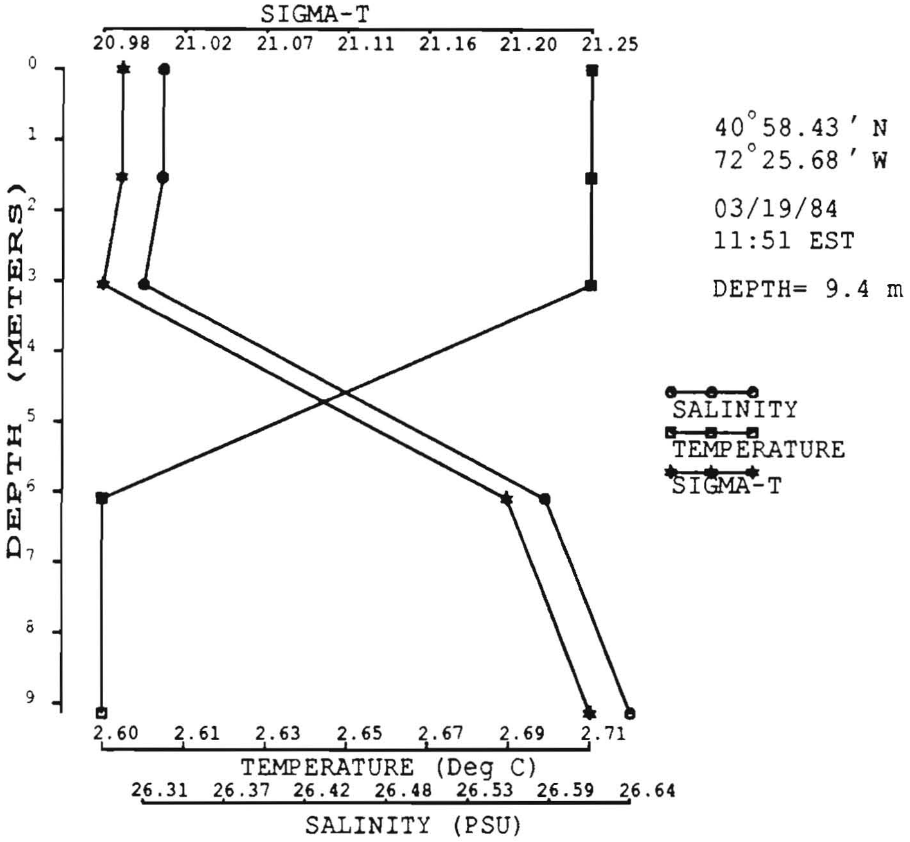

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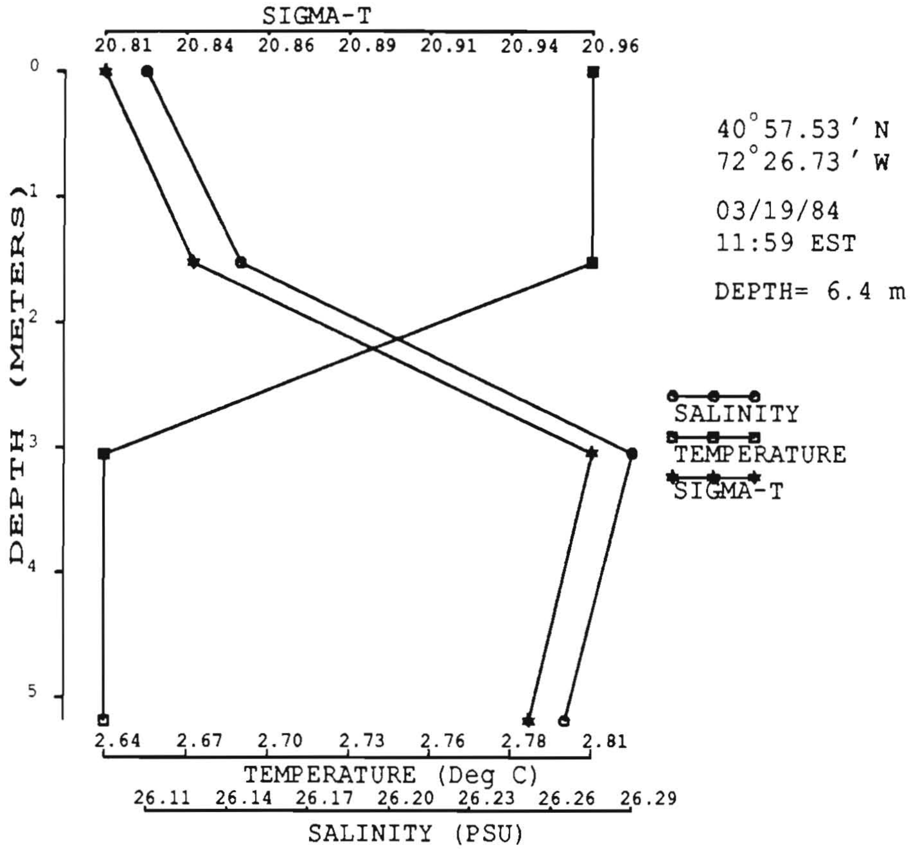
11:51 EST

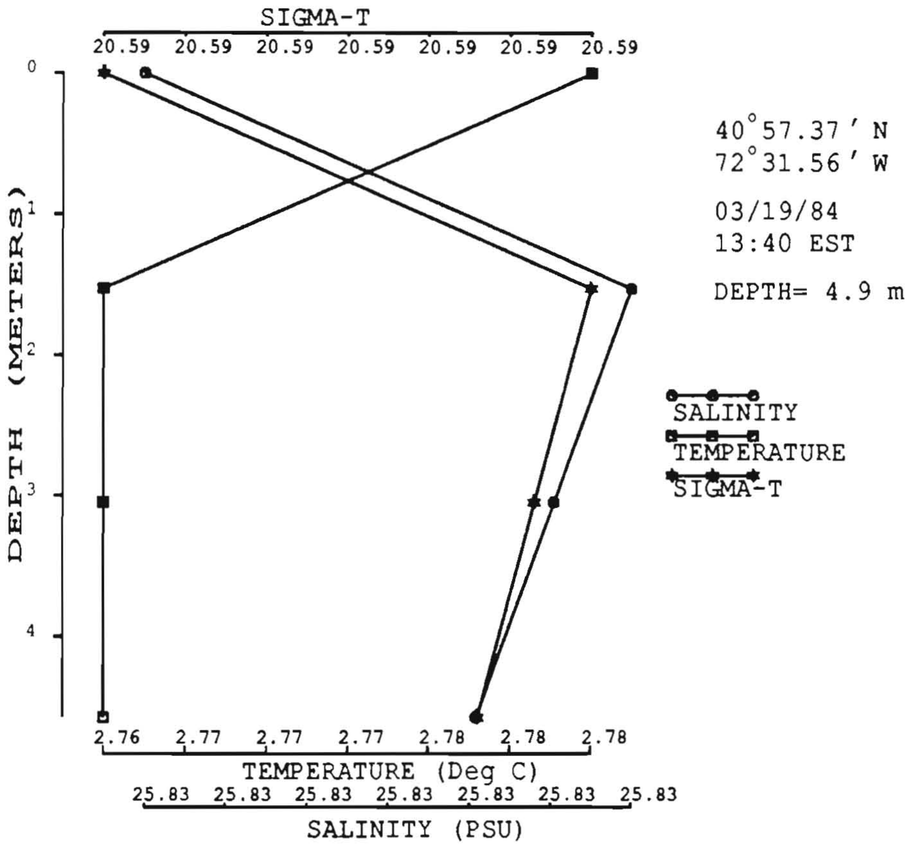
DEPTH= 9.4 m



40°57.53' N
72°26.73' W

03/19/84
11:59 EST

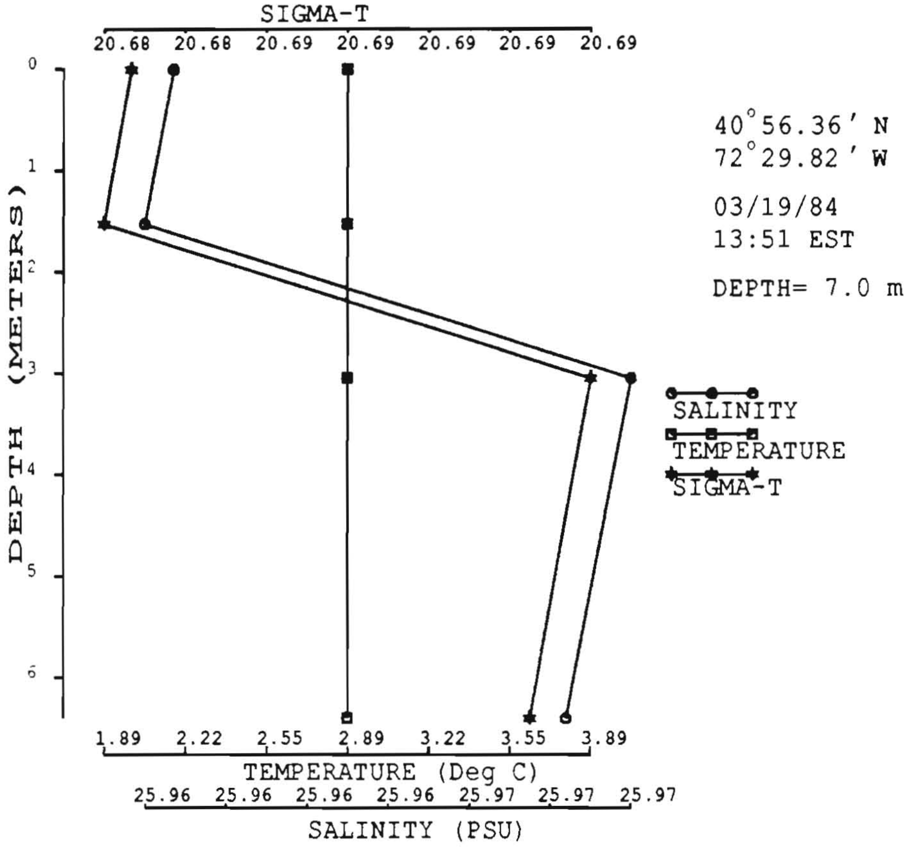
DEPTH= 6.4 m



40°57.37' N
72°31.56' W

03/19/84
13:40 EST

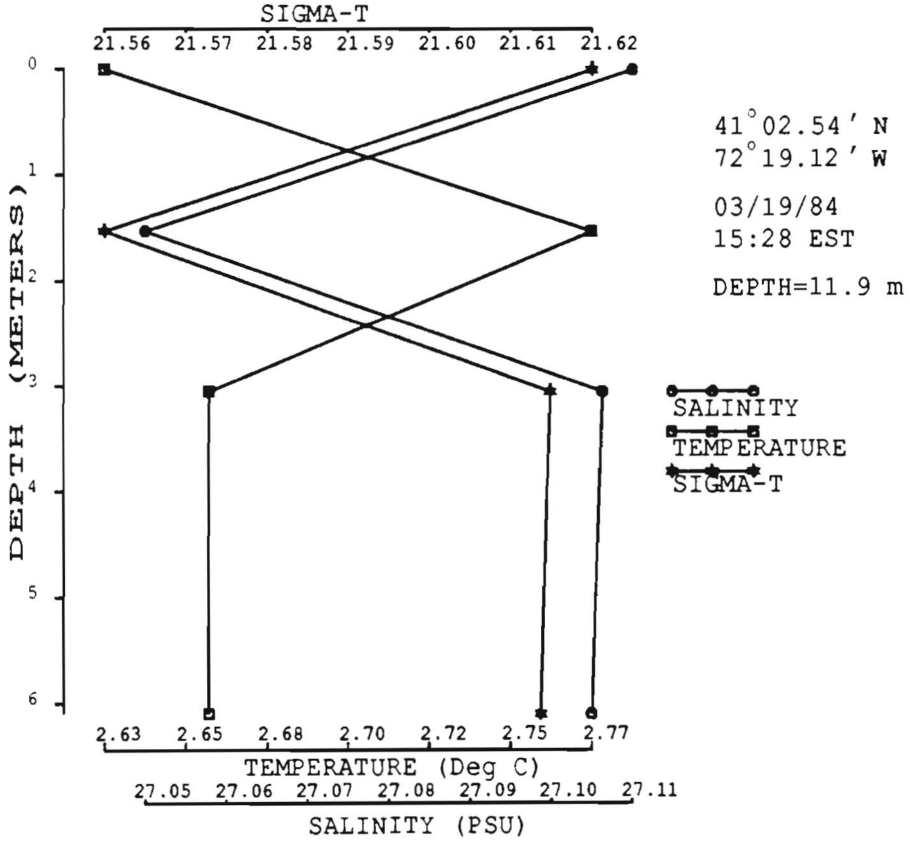
DEPTH= 4.9 m



40°56.36′ N
72°29.82′ W

03/19/84
13:51 EST

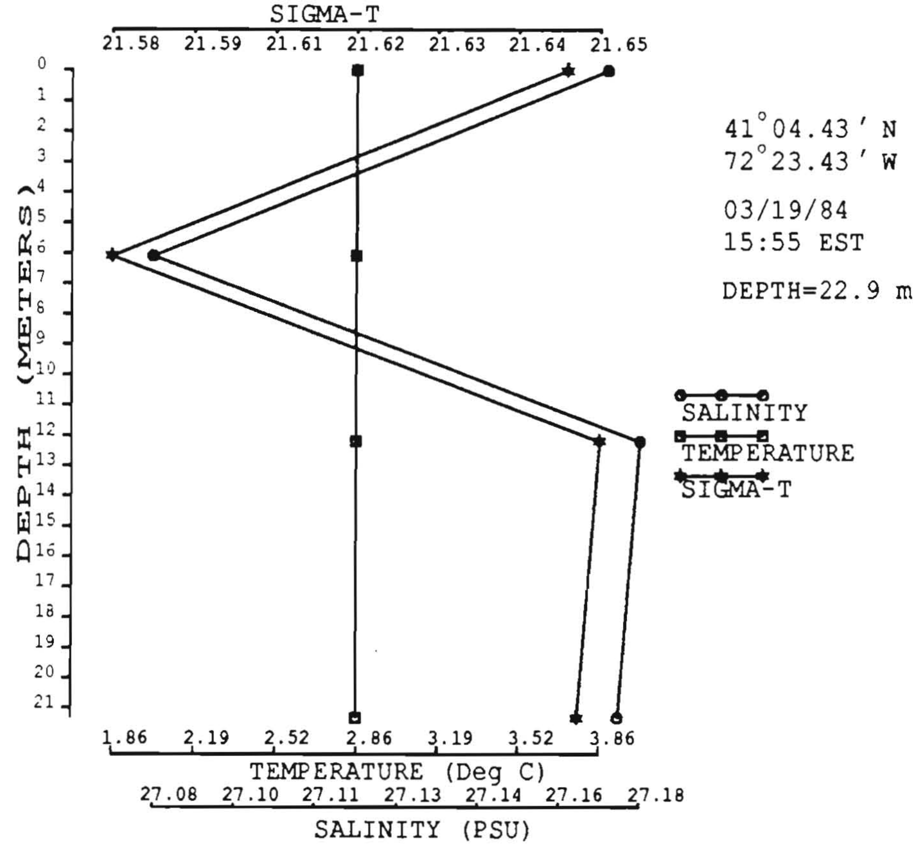
DEPTH= 7.0 m



41°02.54′ N
72°19.12′ W

03/19/84
15:28 EST

DEPTH=11.9 m



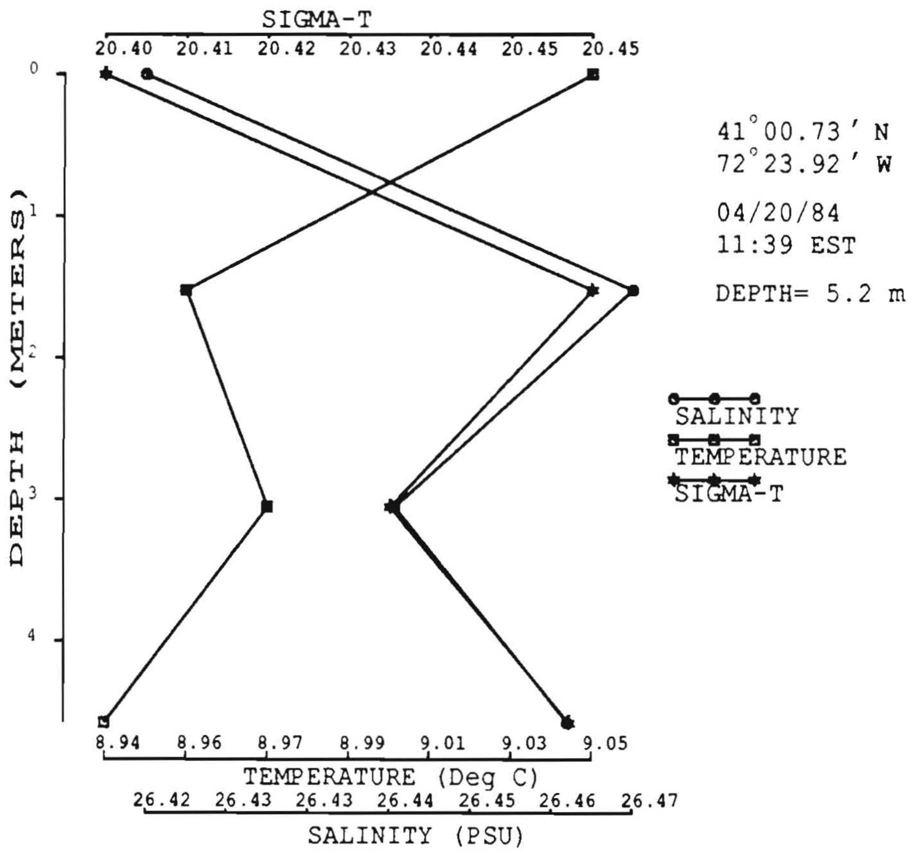
41°04.43′ N
72°23.43′ W

03/19/84
15:55 EST

DEPTH=22.9 m

VERTICAL PROFILES OF TEMPERATURE, SALINITY, SIGMA-T

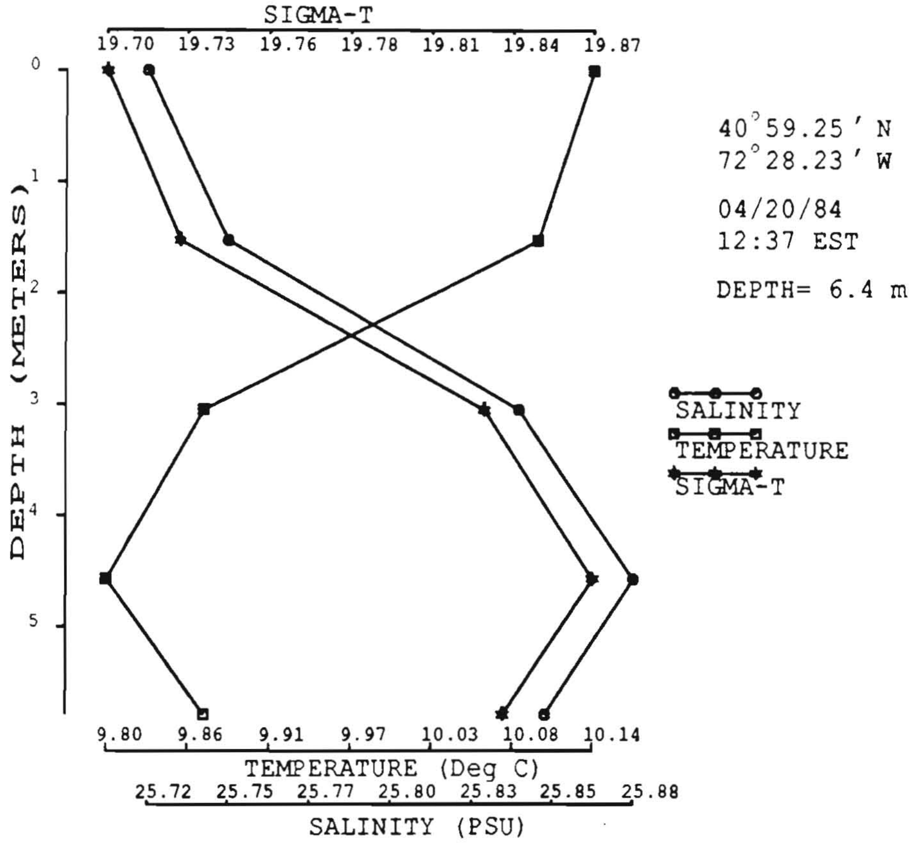
Cruise of 20 April 1988



41°00.73 ′ N
72°23.92 ′ W

04/20/84
11:39 EST

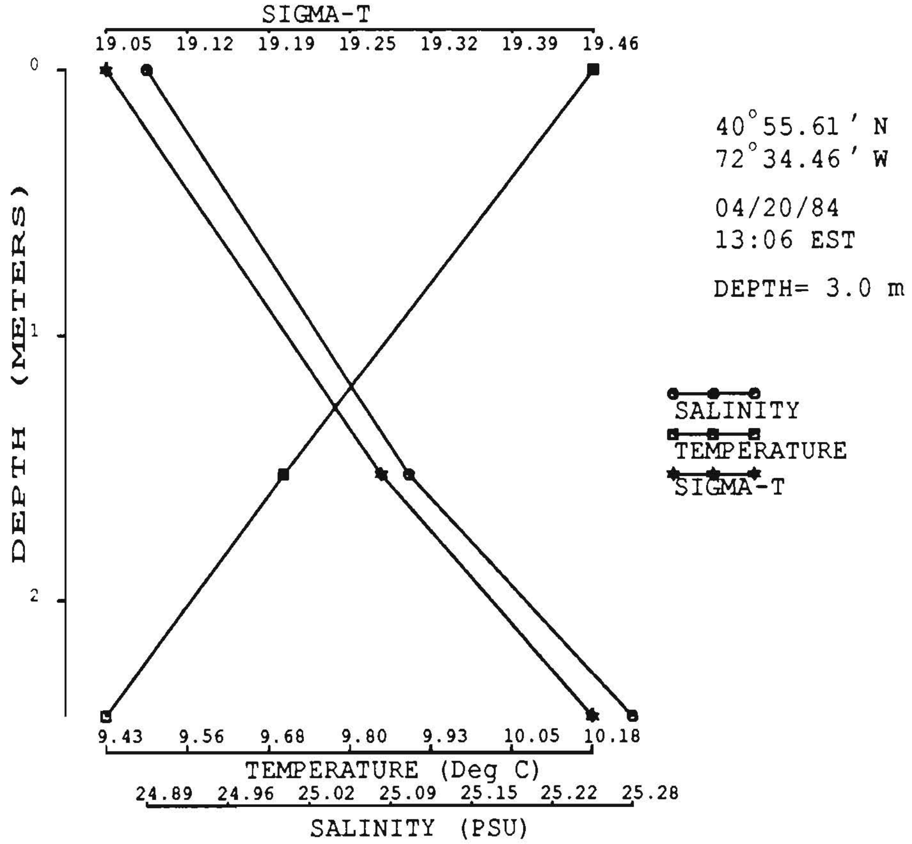
DEPTH= 5.2 m



40°59.25 ′ N
72°28.23 ′ W

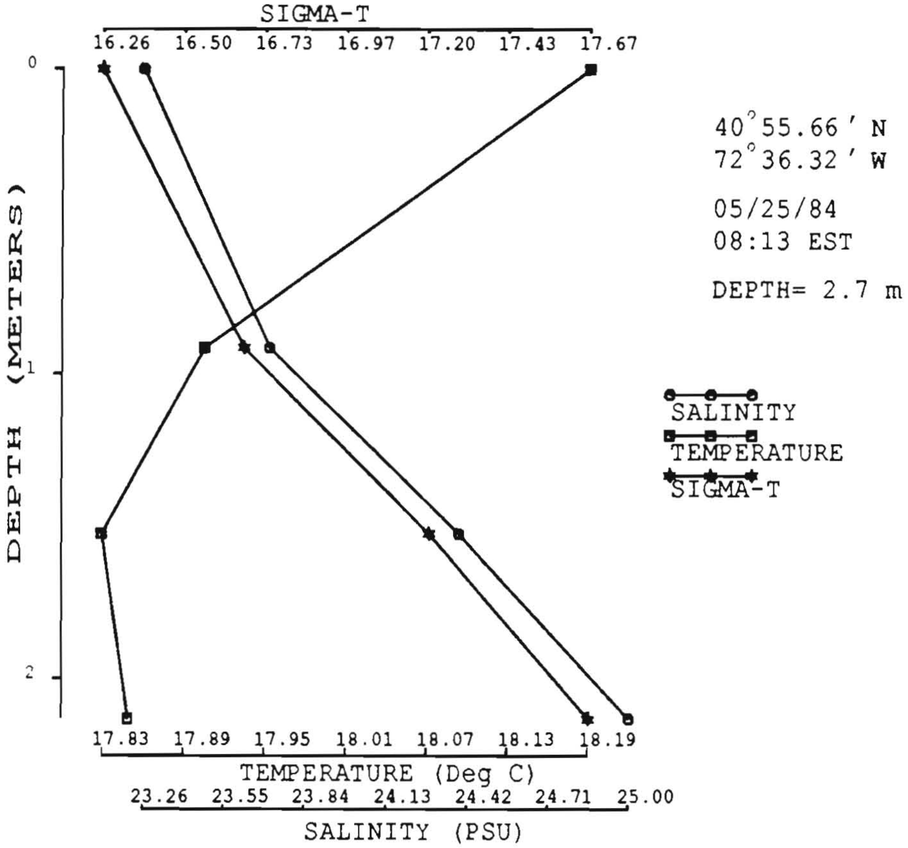
04/20/84
12:37 EST

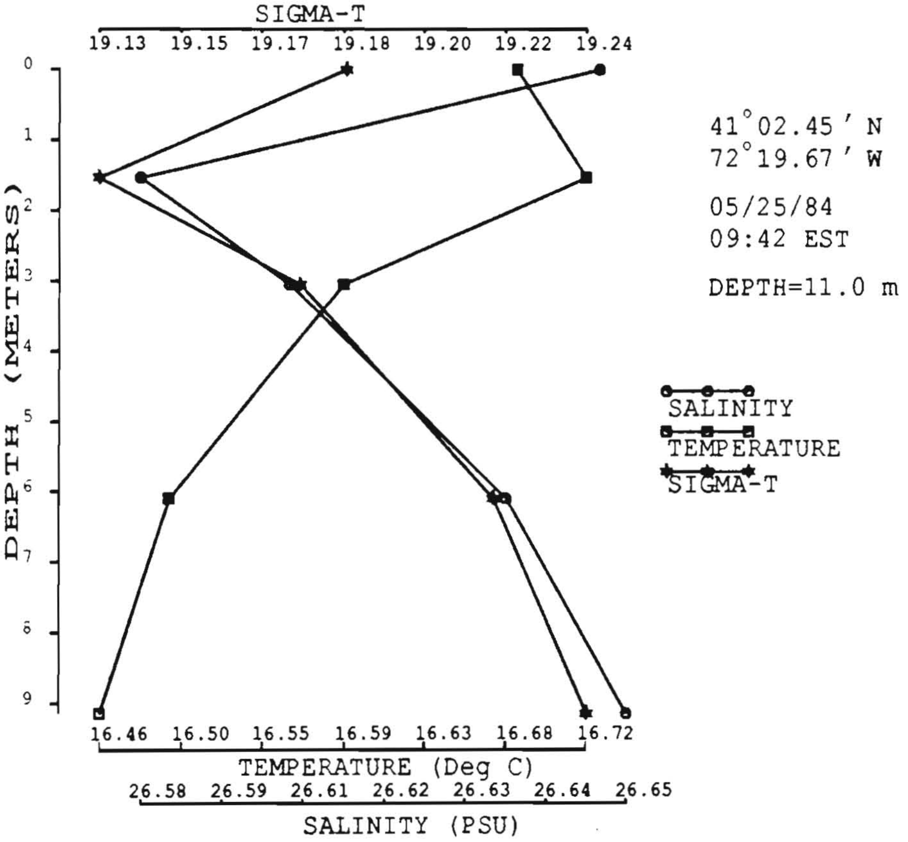
DEPTH= 6.4 m

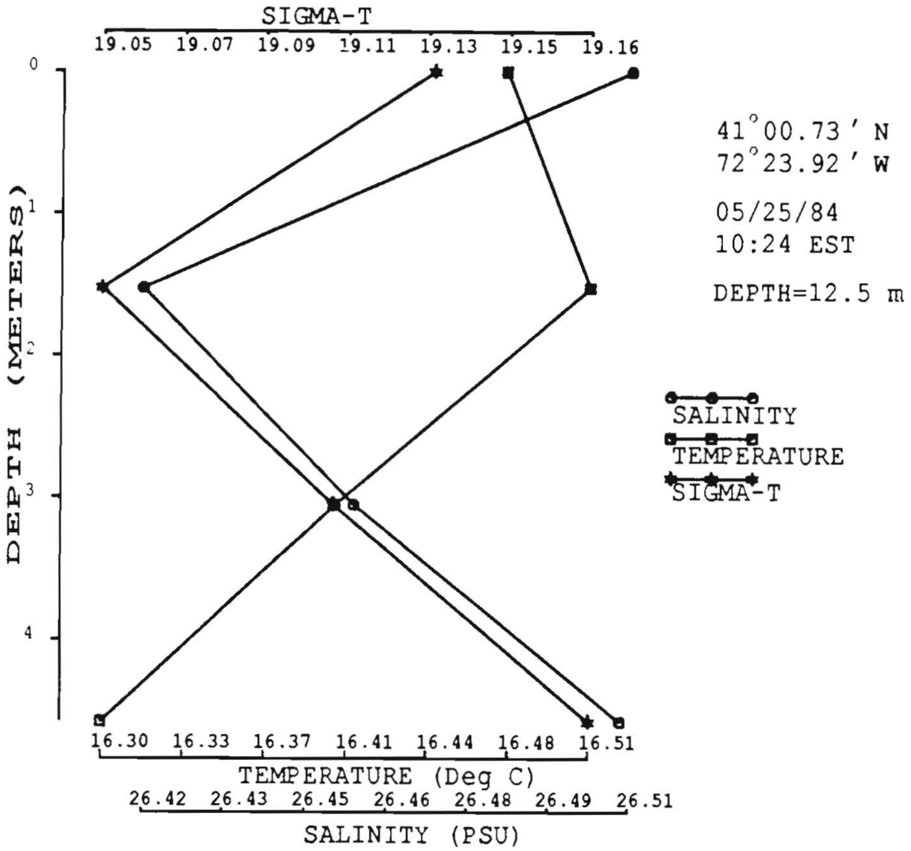

SIGMA-T
19.05
19.12
19.19
19.25
19.32
19.39
19.46
0
1
2
DEPTH (METERS)
40°55.61' N
72°34.46' W
04/20/84
13:06 EST
DEPTH= 3.0 m
SALINITY
TEMPERATURE
SIGMA-T
9.43
9.56
9.68
9.80
9.93
10.05
10.18
TEMPERATURE (Deg C)
24.89
24.96
25.02
25.09
25.15
25.22
25.28
SALINITY (PSU)

VERTICAL PROFILES OF TEMPERATURE, SALINITY, SIGMA-T

Cruise of 25 May 1988


SIGMA-T
16.26 16.50 16.73 16.97 17.20 17.43 17.67
0
1
2
DEPTH (METERS)
40°55.66' N
72°36.32' W
05/25/84
08:13 EST
DEPTH= 2.7 m
SALINITY
TEMPERATURE
SIGMA-T
17.83 17.89 17.95 18.01 18.07 18.13 18.19
TEMPERATURE (Deg C)
23.26 23.55 23.84 24.13 24.42 24.71 25.00
SALINITY (PSU)

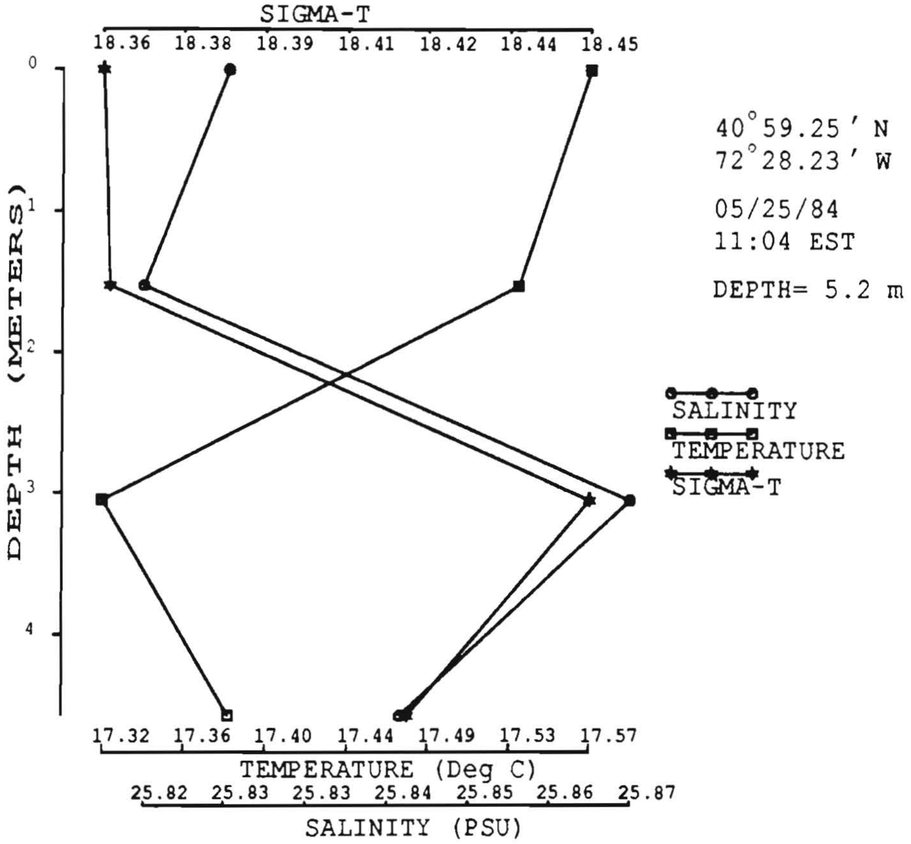

SIGMA-T
19.13 19.15 19.17 19.18 19.20 19.22 19.24
0
1
2
3
4
5
6
7
8
9
DEPTH (METERS)
41°02.45' N
72°19.67' W
05/25/84
09:42 EST
DEPTH=11.0 m
SALINITY
TEMPERATURE
SIGMA-T
16.46 16.50 16.55 16.59 16.63 16.68 16.72
TEMPERATURE (Deg C)
26.58 26.59 26.61 26.62 26.63 26.64 26.65
SALINITY (PSU)



41°00.73′ N
72°23.92′ W

05/25/84
10:24 EST

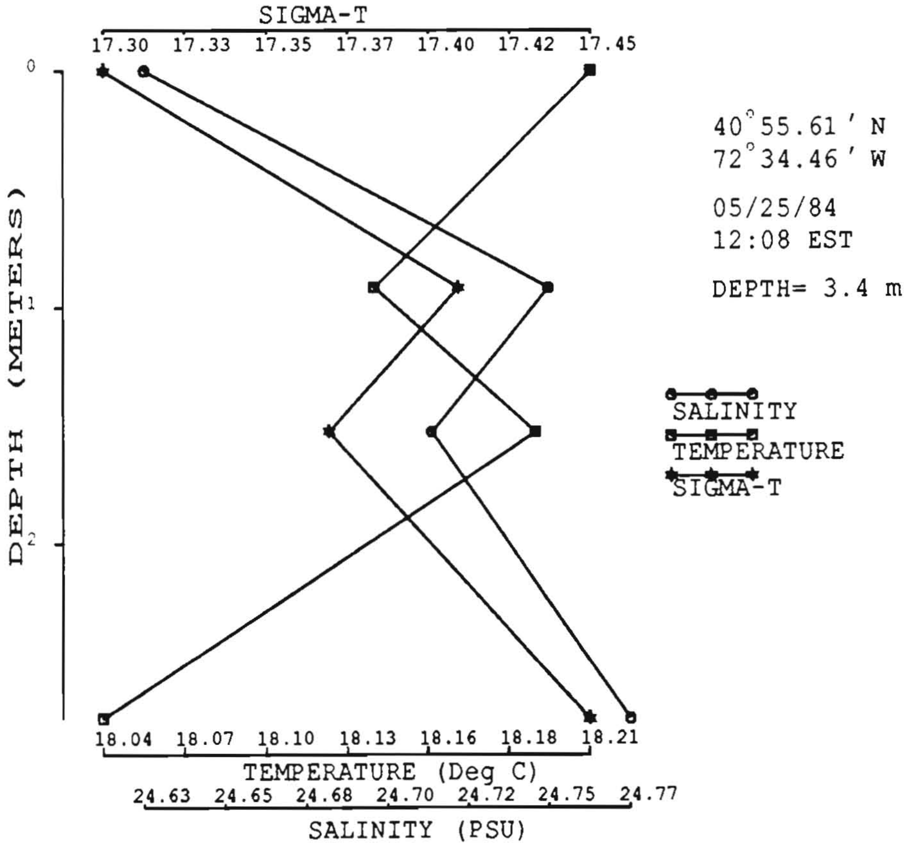
DEPTH=12.5 m



40°59.25′ N
72°28.23′ W

05/25/84
11:04 EST

DEPTH= 5.2 m



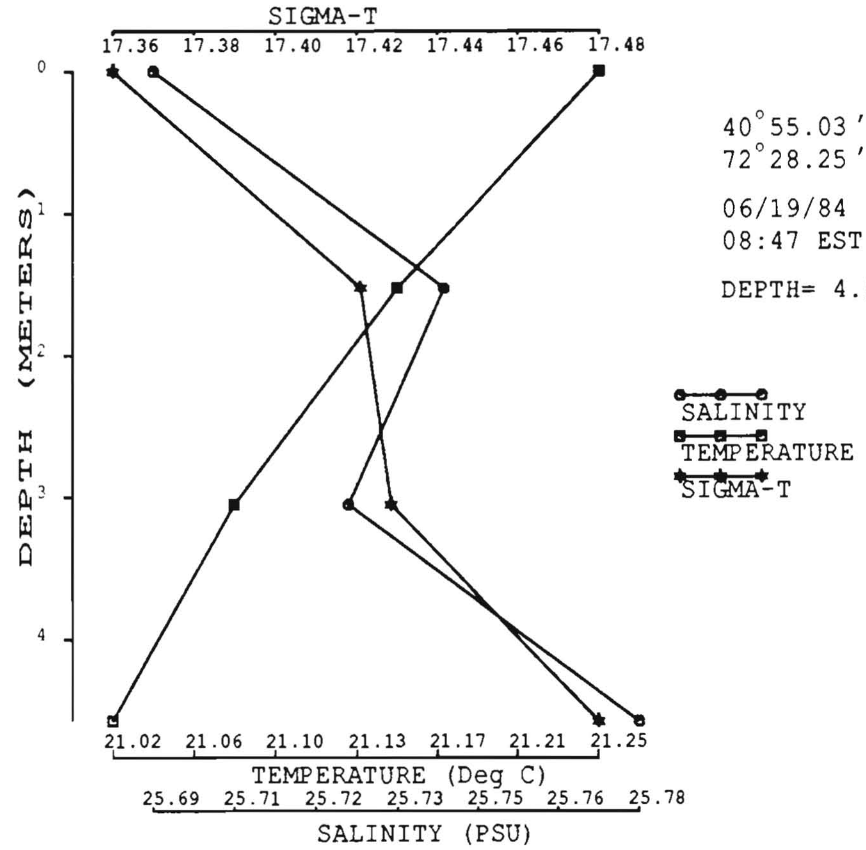
40°55.61 ' N
72°34.46 ' W

05/25/84
12:08 EST

DEPTH= 3.4 m

VERTICAL PROFILES OF
TEMPERATURE, SALINITY, SIGMA-T

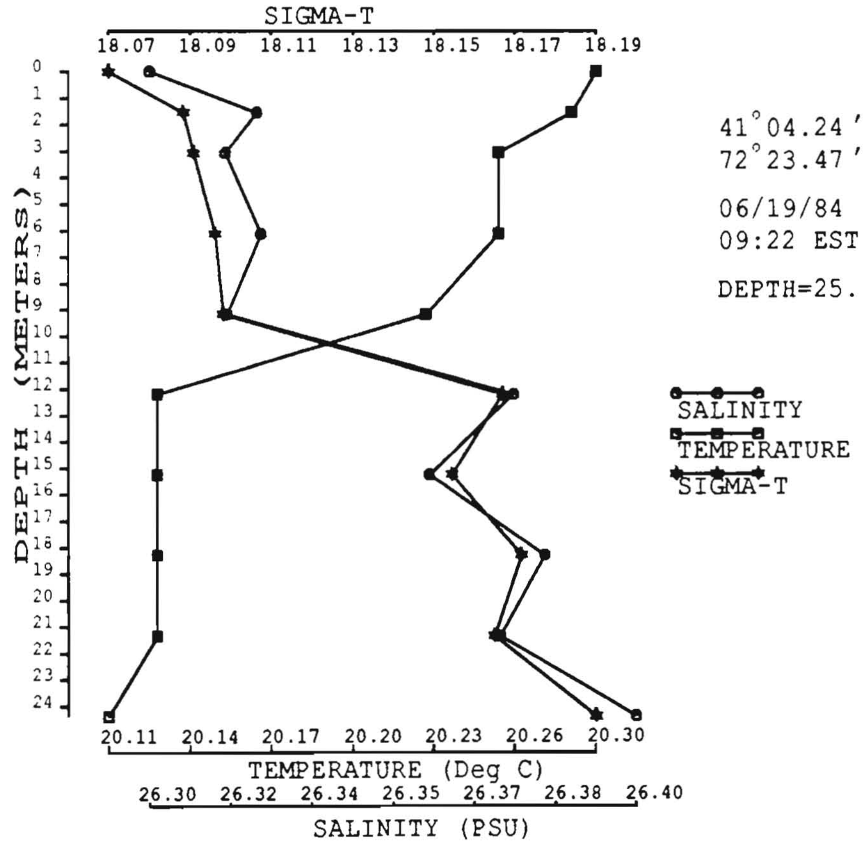
Cruise of 19 June 1988



40°55.03 ′ N
72°28.25 ′ W

06/19/84
08:47 EST

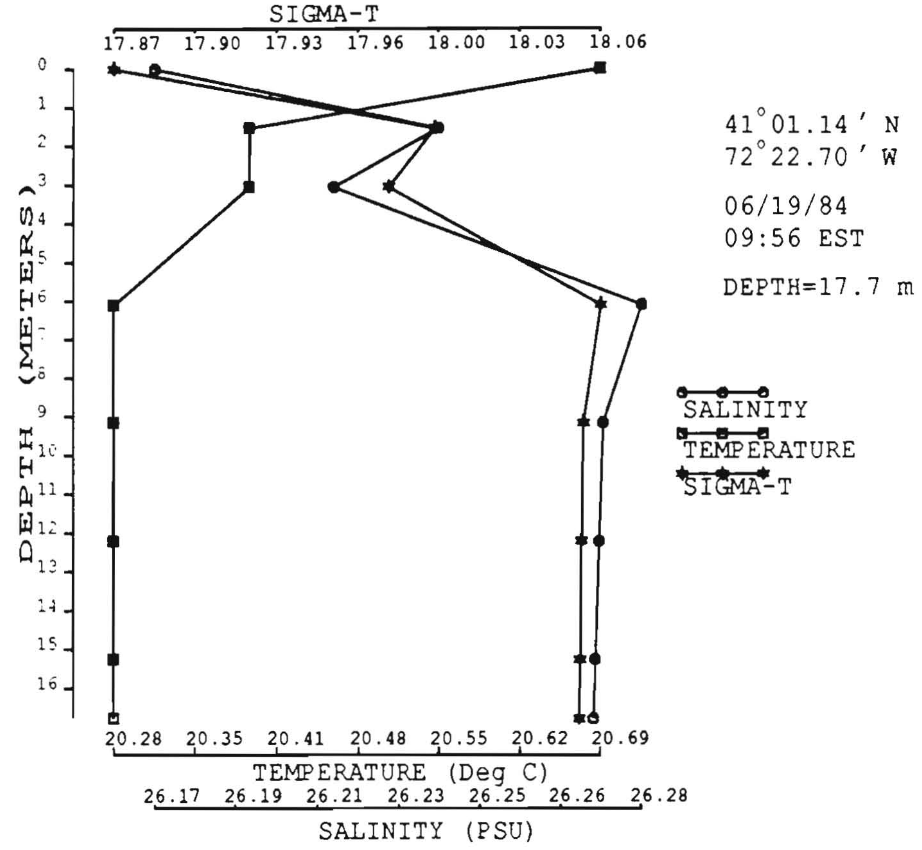
DEPTH= 4.9 m



41°04.24 ′ N
72°23.47 ′ W

06/19/84
09:22 EST

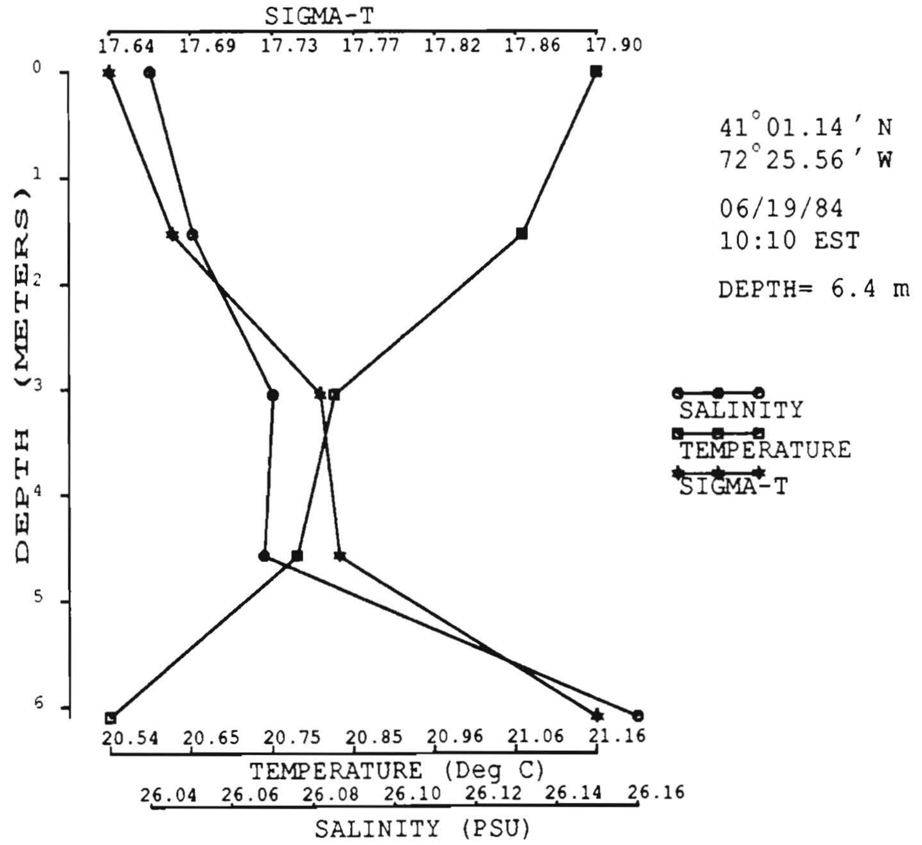
DEPTH=25.9 m



41°01.14 ′ N
72°22.70 ′ W

06/19/84
09:56 EST

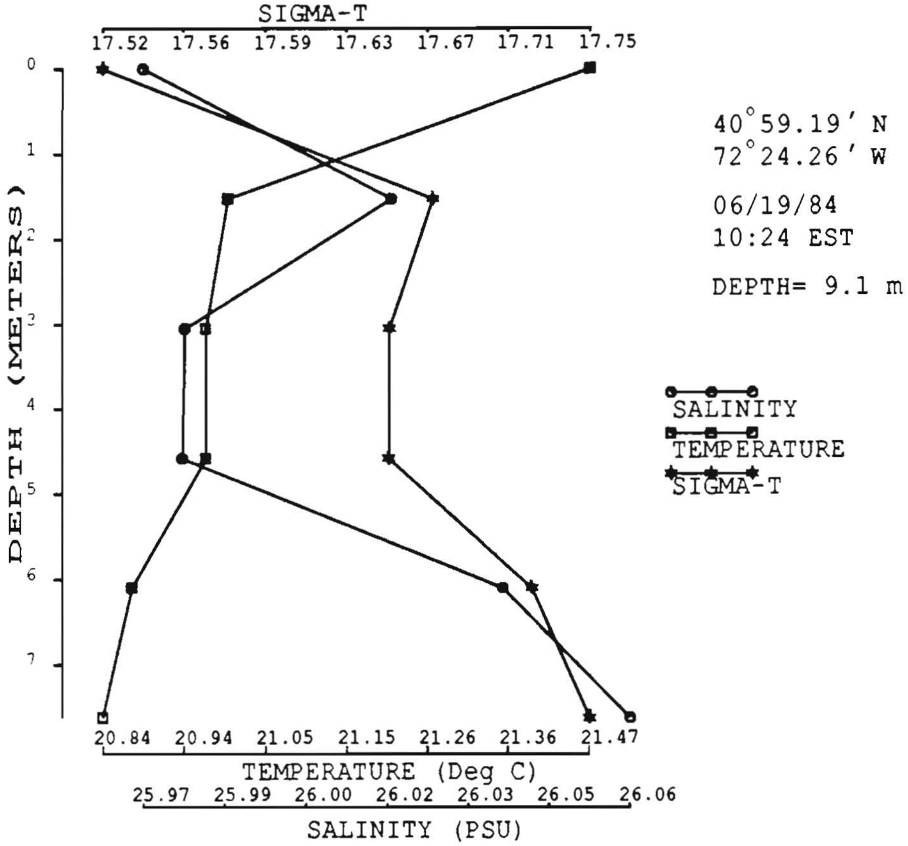
DEPTH=17.7 m



41°01.14 ′ N
72°25.56 ′ W

06/19/84
10:10 EST

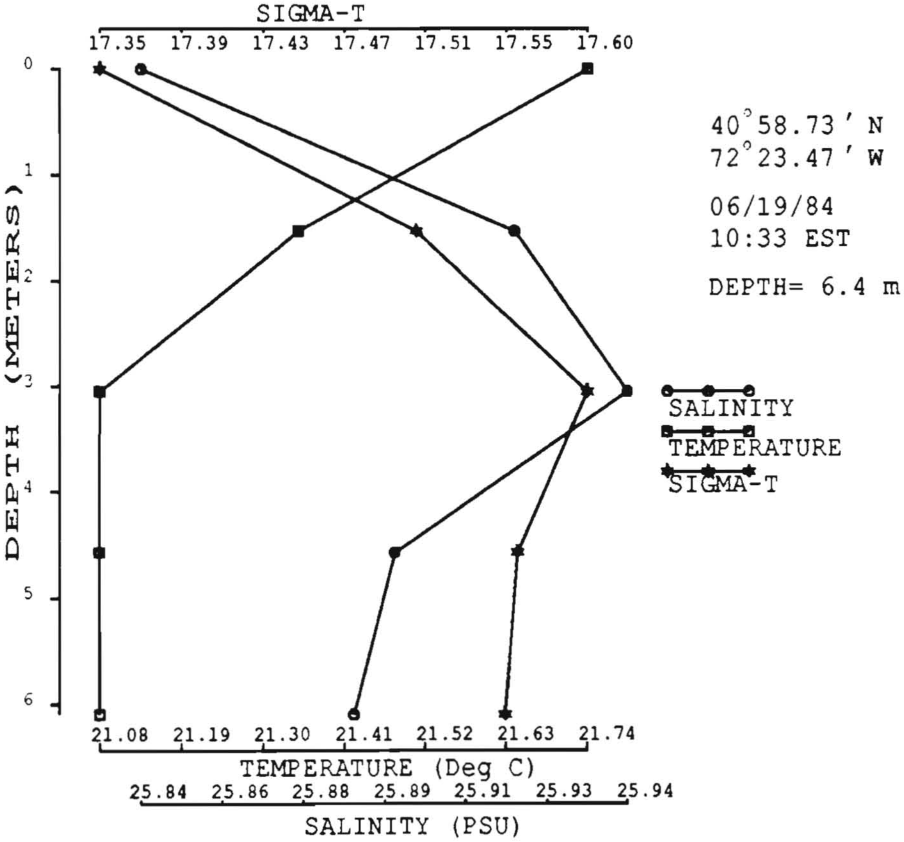
DEPTH= 6.4 m



40°59.19′ N
72°24.26′ W

06/19/84
10:24 EST

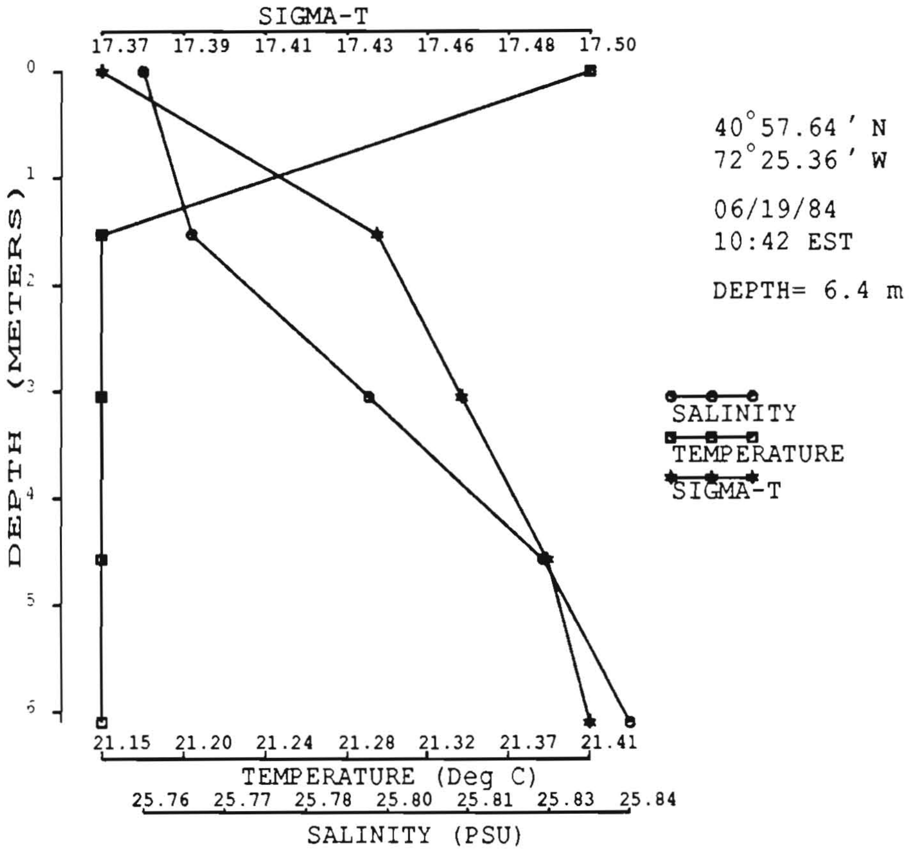
DEPTH= 9.1 m



40°58.73′ N
72°23.47′ W

06/19/84
10:33 EST

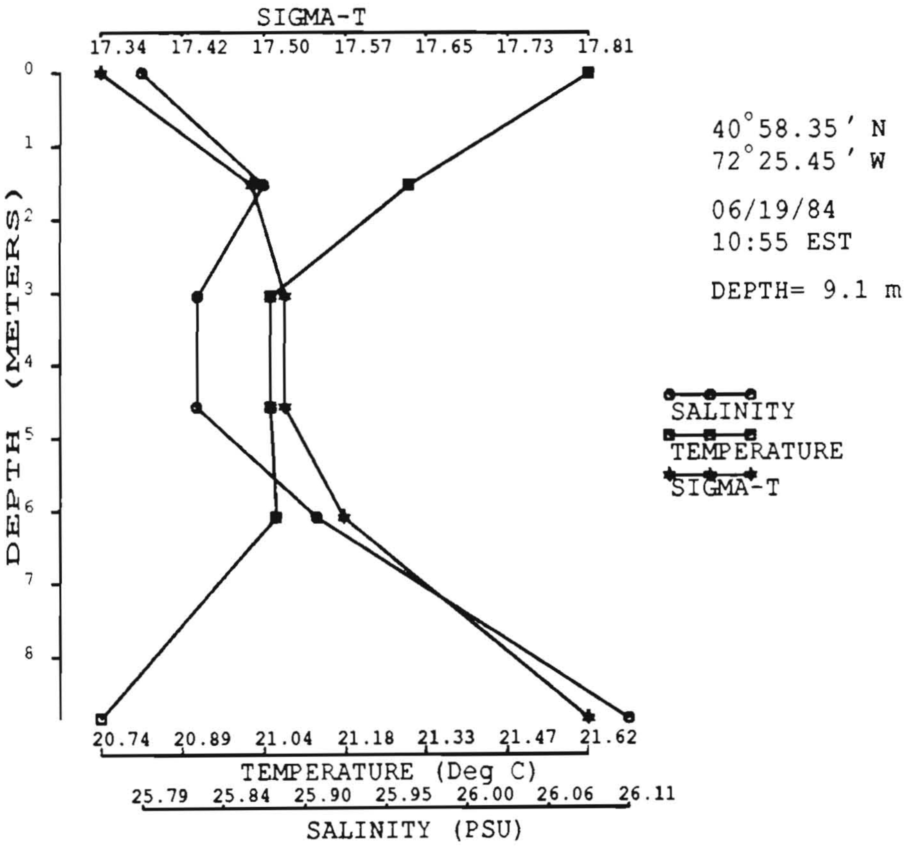
DEPTH= 6.4 m



40°57.64 ′ N
72°25.36 ′ W

06/19/84
10:42 EST

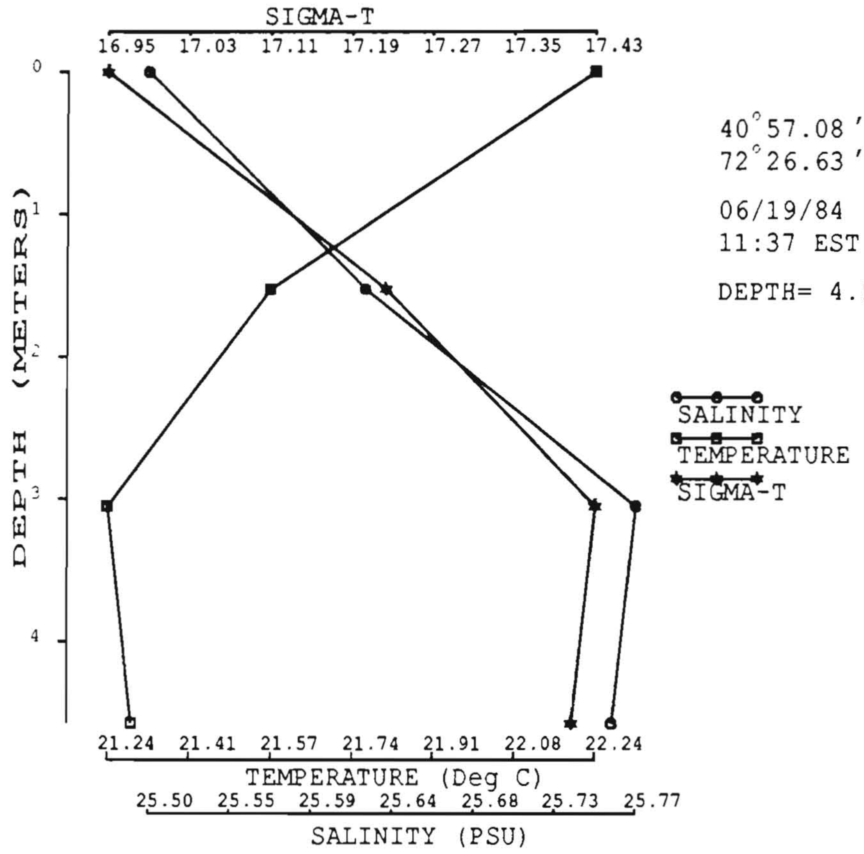
DEPTH= 6.4 m



40°58.35 ′ N
72°25.45 ′ W

06/19/84
10:55 EST

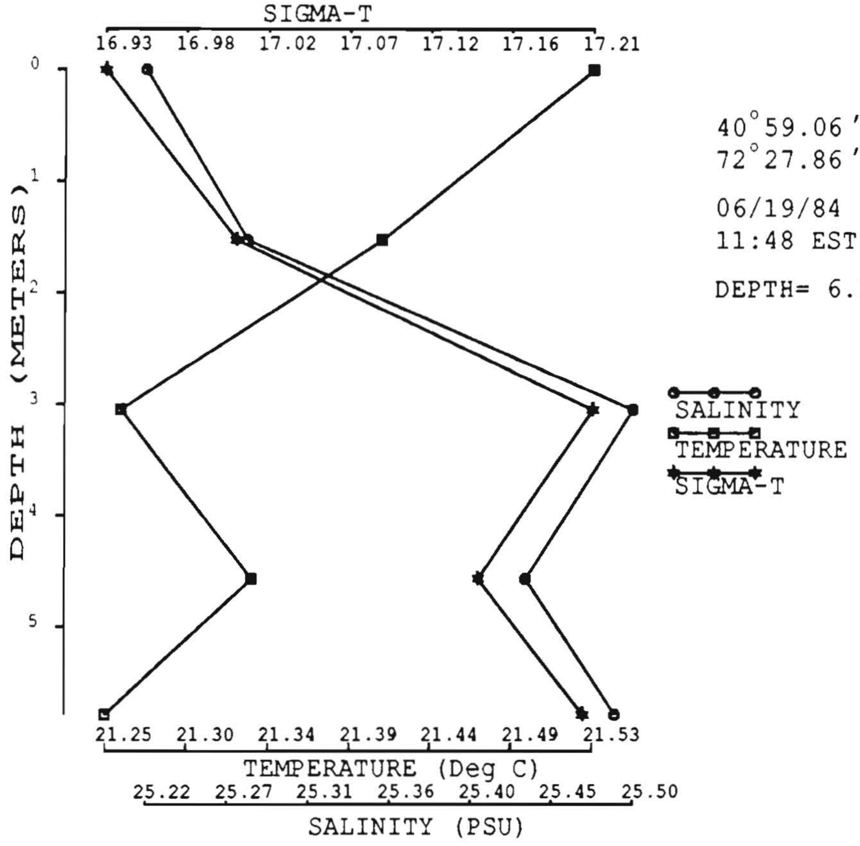
DEPTH= 9.1 m



40°57.08' N
72°26.63' W

06/19/84
11:37 EST

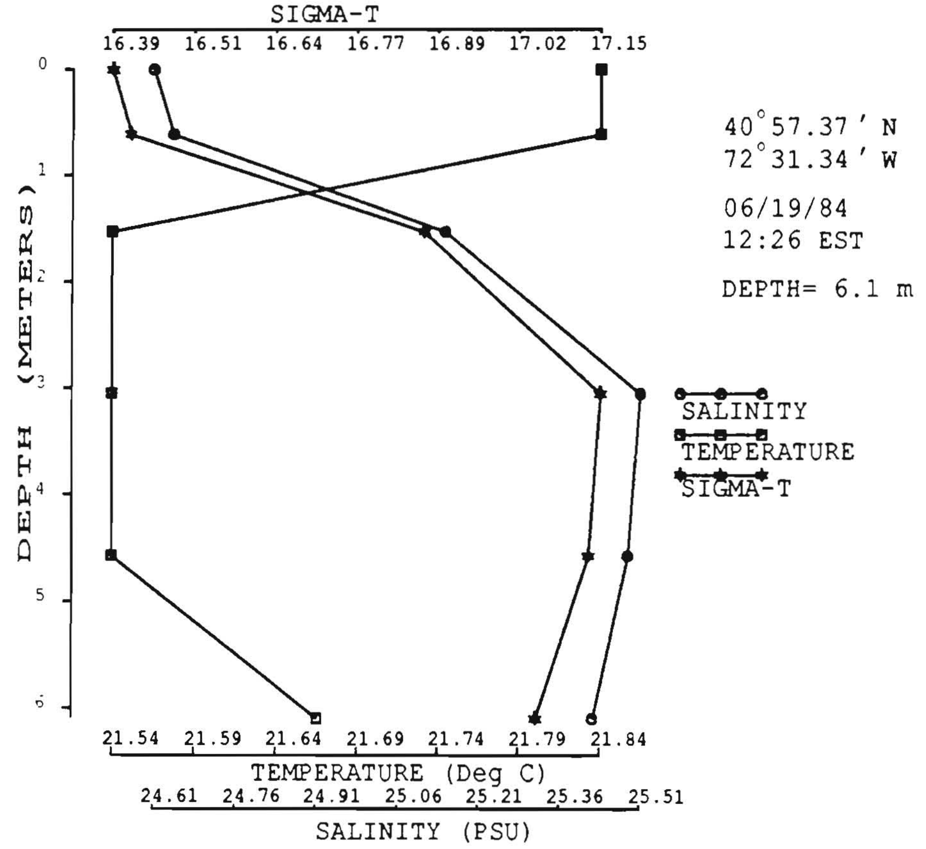
DEPTH= 4.9 m



40°59.06' N
72°27.86' W

06/19/84
11:48 EST

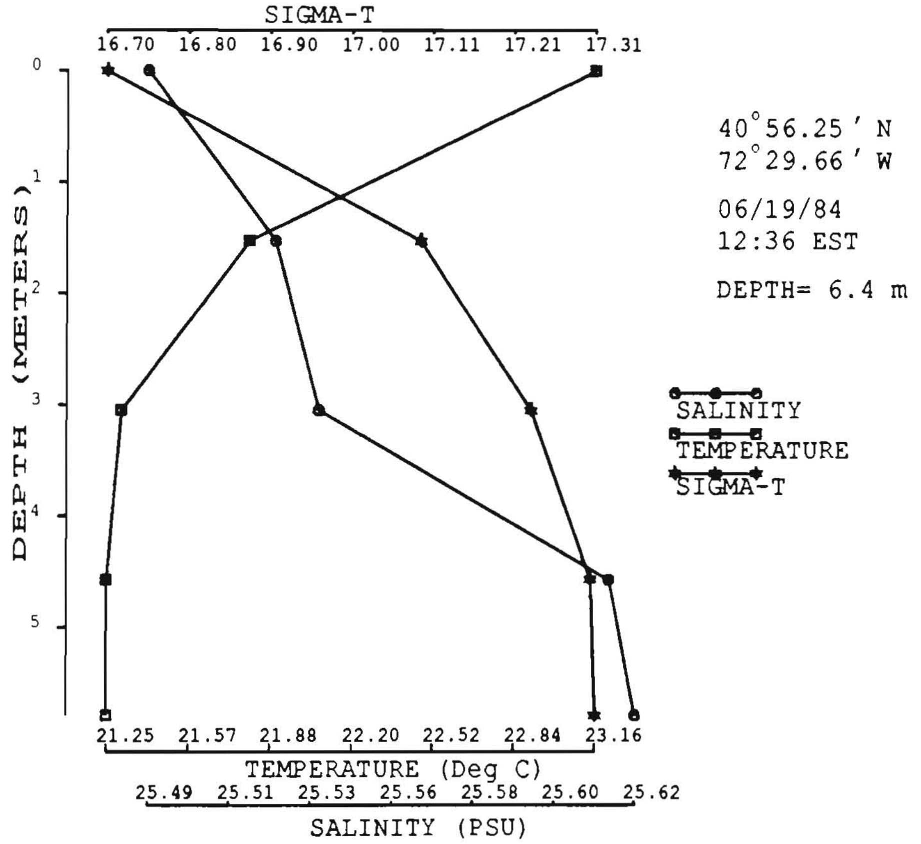
DEPTH= 6.1 m



40°57.37′ N
72°31.34′ W

06/19/84
12:26 EST

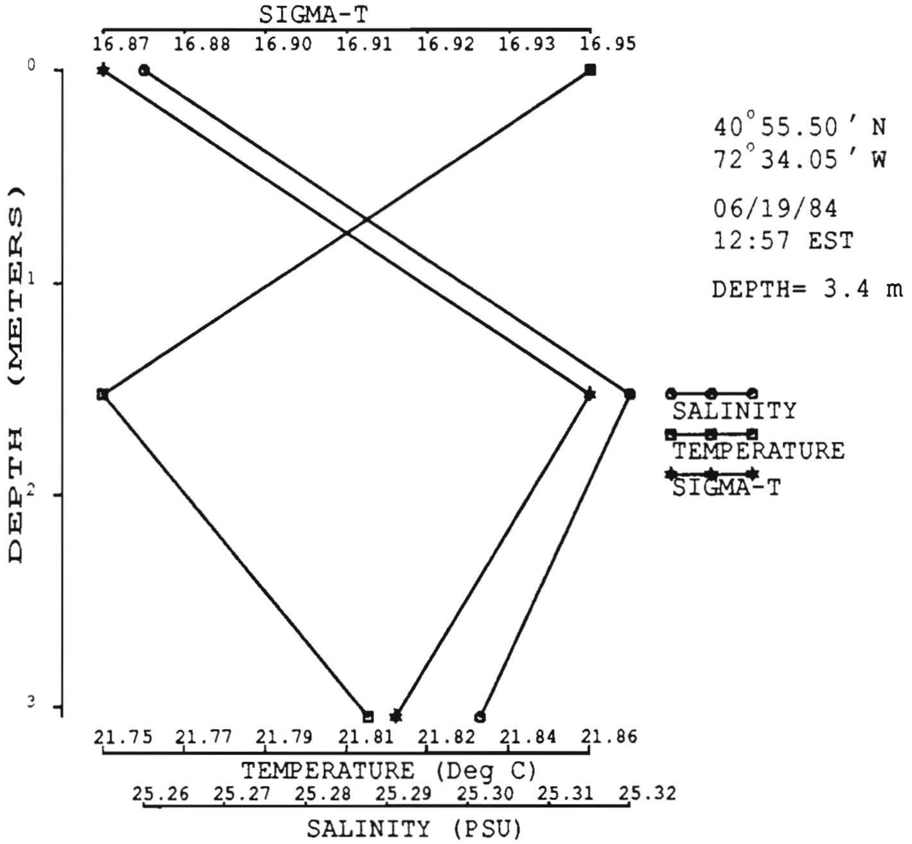
DEPTH= 6.1 m



40°56.25′ N
72°29.66′ W

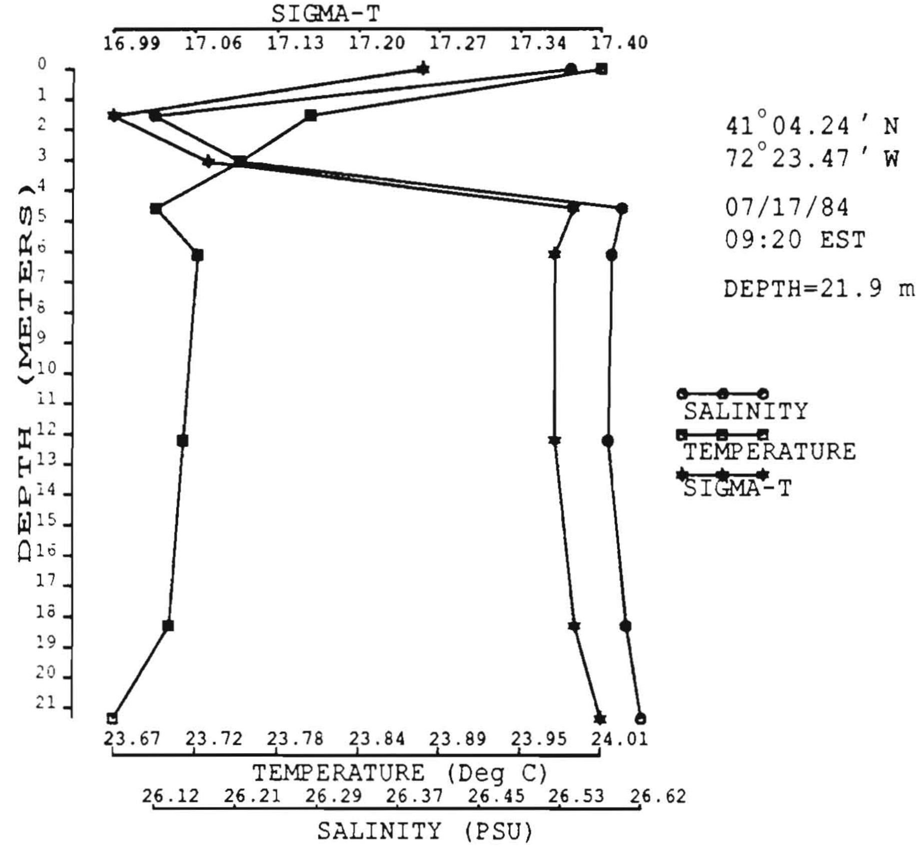
06/19/84
12:36 EST

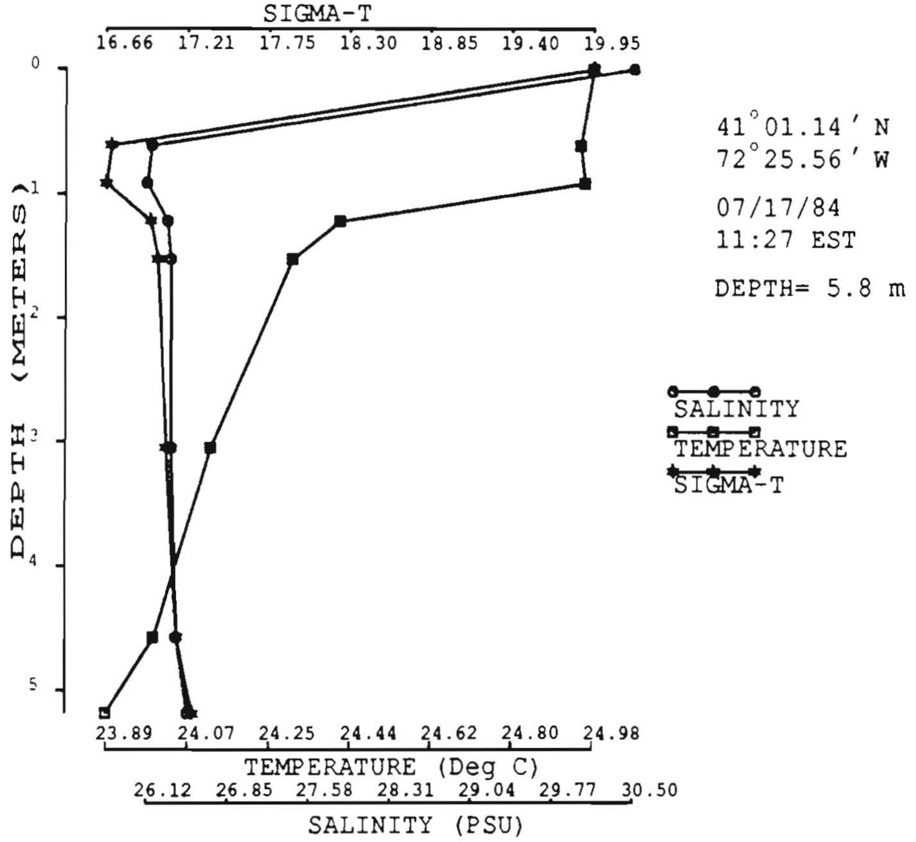
DEPTH= 6.4 m

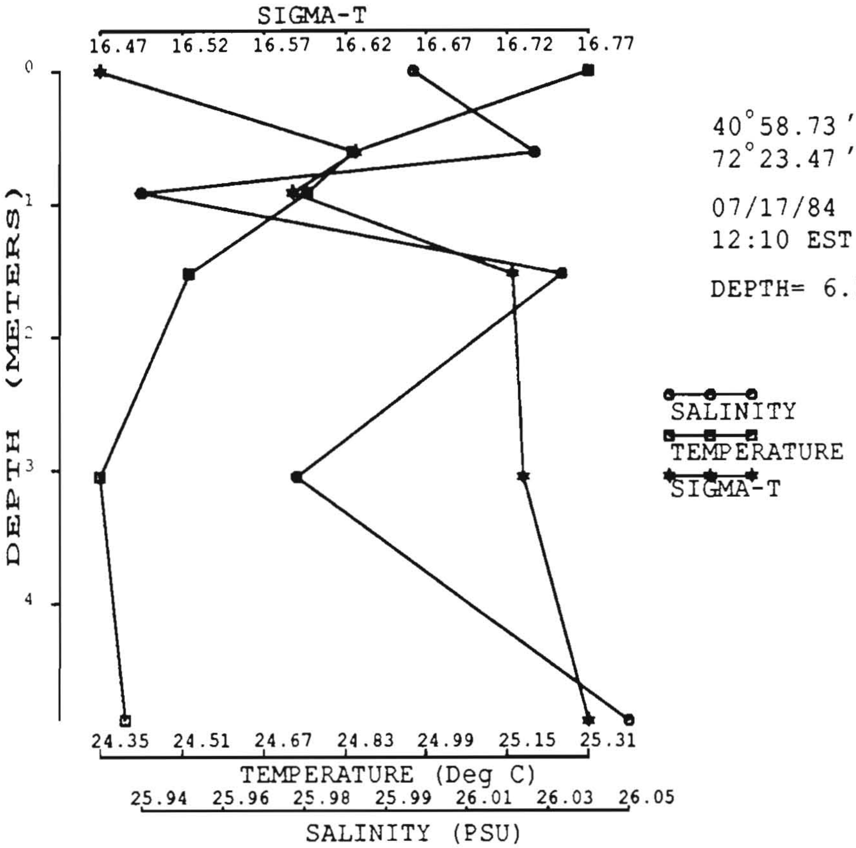

SIGMA-T
16.87 16.88 16.90 16.91 16.92 16.93 16.95
DEPTH (METERS)
0
1
2
3
40°55.50' N
72°34.05' W
06/19/84
12:57 EST
DEPTH= 3.4 m
SALINITY
TEMPERATURE
SIGMA-T
21.75 21.77 21.79 21.81 21.82 21.84 21.86
TEMPERATURE (Deg C)
25.26 25.27 25.28 25.29 25.30 25.31 25.32
SALINITY (PSU)

VERTICAL PROFILES OF TEMPERATURE, SALINITY, SIGMA-T

Cruise of 17 July 1988


SIGMA-T
16.99 17.06 17.13 17.20 17.27 17.34 17.40
DEPTH (METERS)
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
41°04.24' N
72°23.47' W
07/17/84
09:20 EST
DEPTH=21.9 m
SALINITY
TEMPERATURE
SIGMA-T
23.67 23.72 23.78 23.84 23.89 23.95 24.01
TEMPERATURE (Deg C)
26.12 26.21 26.29 26.37 26.45 26.53 26.62
SALINITY (PSU)

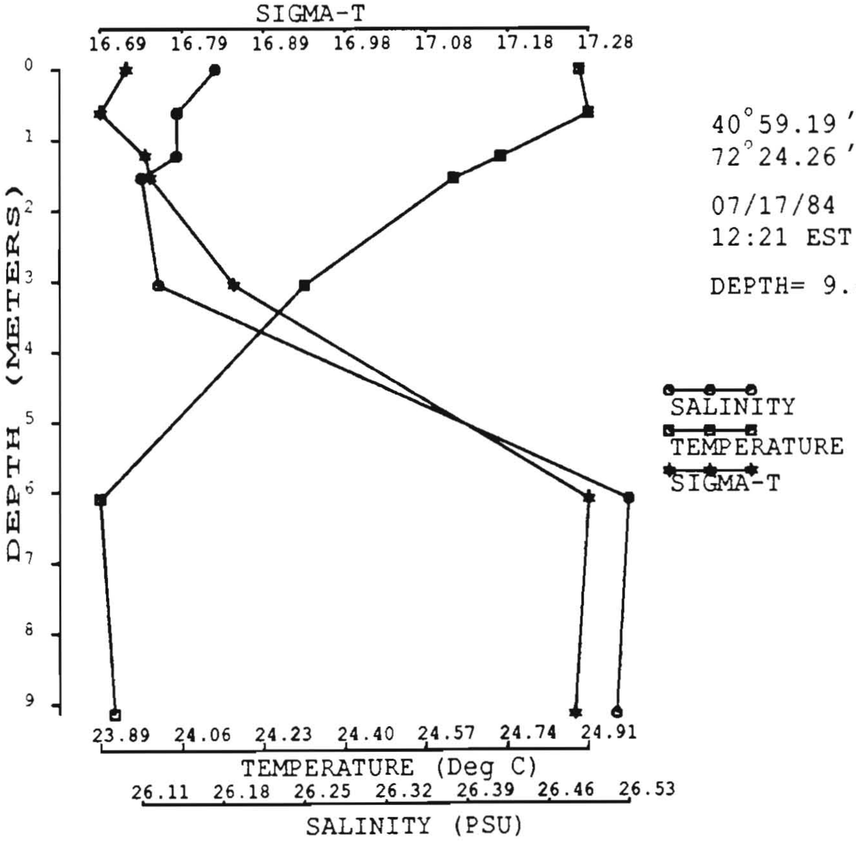

SIGMA-T
16.66 17.21 17.75 18.30 18.85 19.40 19.95
DEPTH (METERS)
0 1 2 3 4 5
41°01.14' N
72°25.56' W
07/17/84
11:27 EST
DEPTH= 5.8 m
SALINITY
TEMPERATURE
SIGMA-T
23.89 24.07 24.25 24.44 24.62 24.80 24.98
TEMPERATURE (Deg C)
26.12 26.85 27.58 28.31 29.04 29.77 30.50
SALINITY (PSU)



40°58.73' N
72°23.47' W

07/17/84
12:10 EST

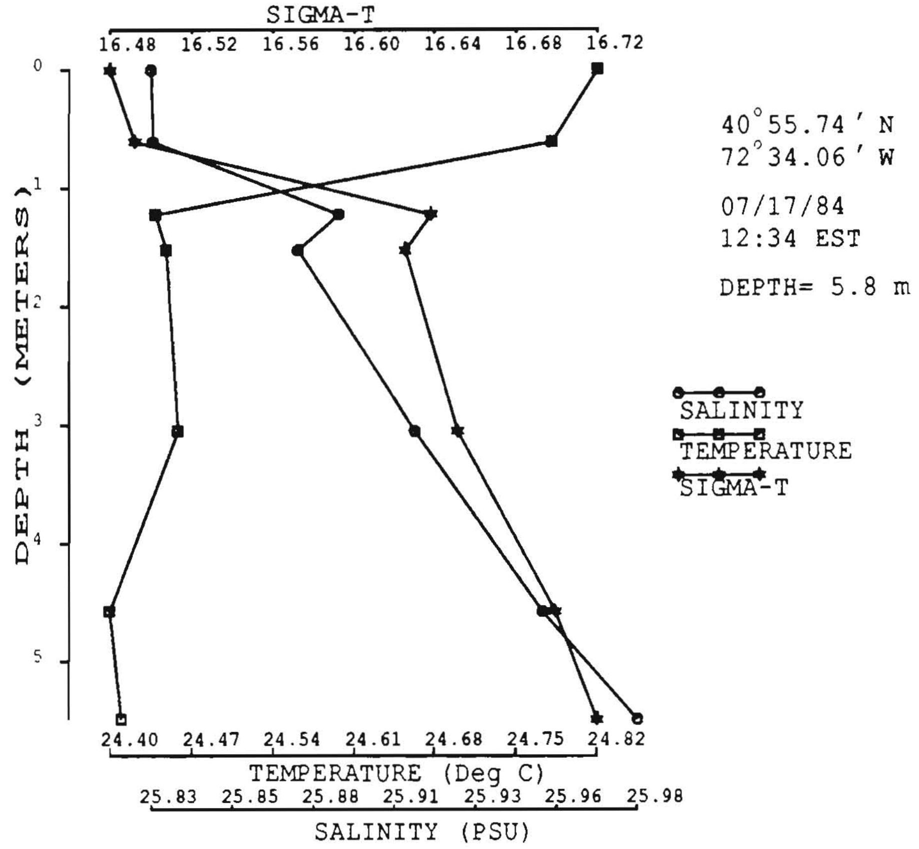
DEPTH= 6.1 m



40°59.19' N
72°24.26' W

07/17/84
12:21 EST

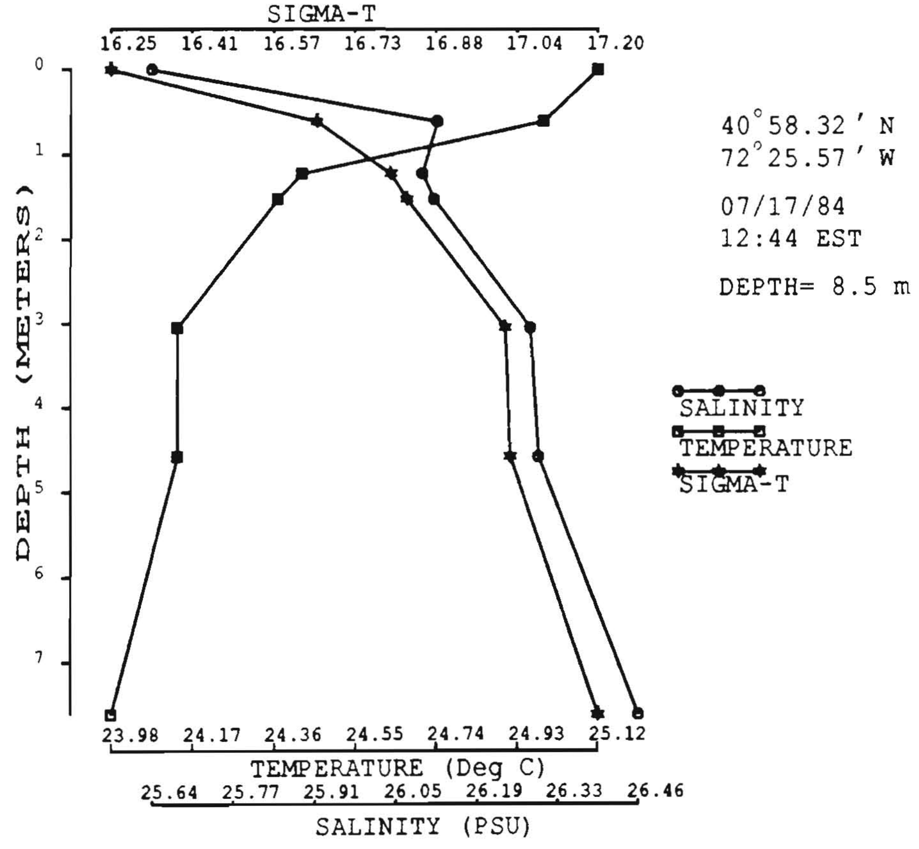
DEPTH= 9.4 m



40°55.74' N
72°34.06' W

07/17/84
12:34 EST

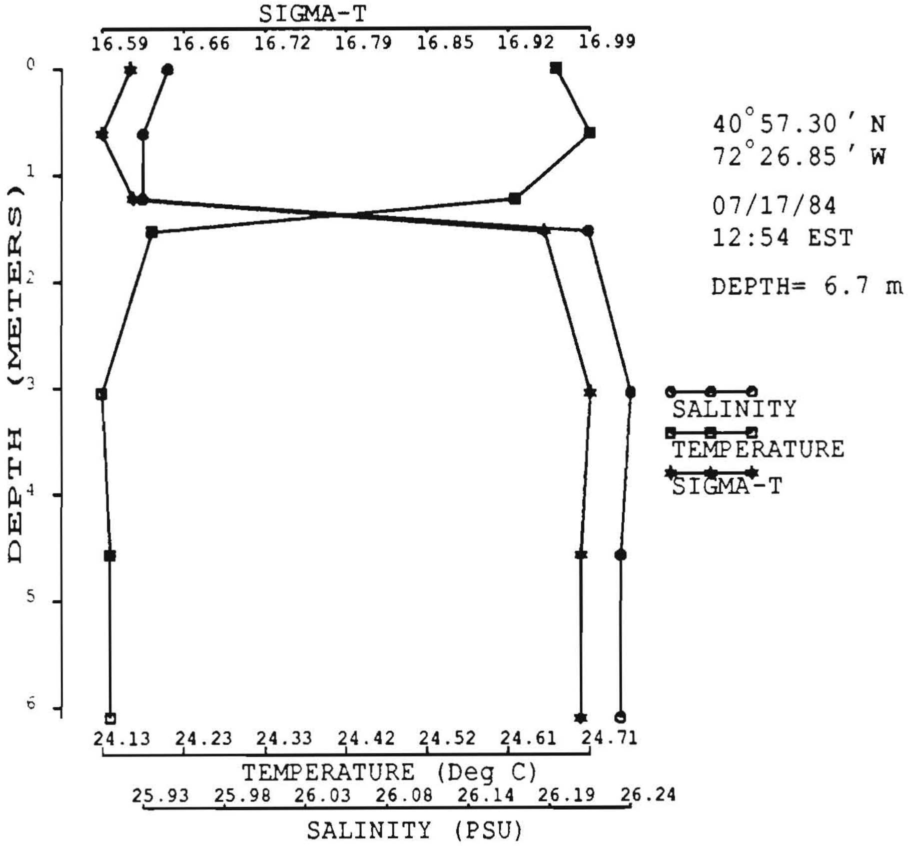
DEPTH= 5.8 m



40°58.32' N
72°25.57' W

07/17/84
12:44 EST

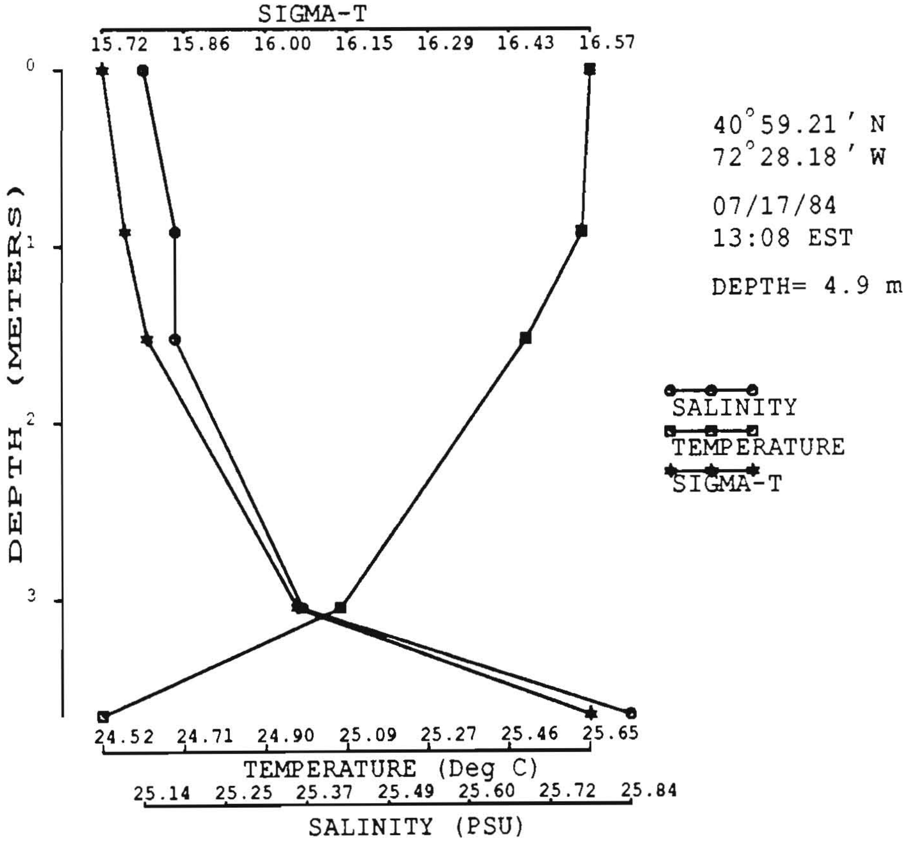
DEPTH= 8.5 m



40°57.30′ N
72°26.85′ W

07/17/84
12:54 EST

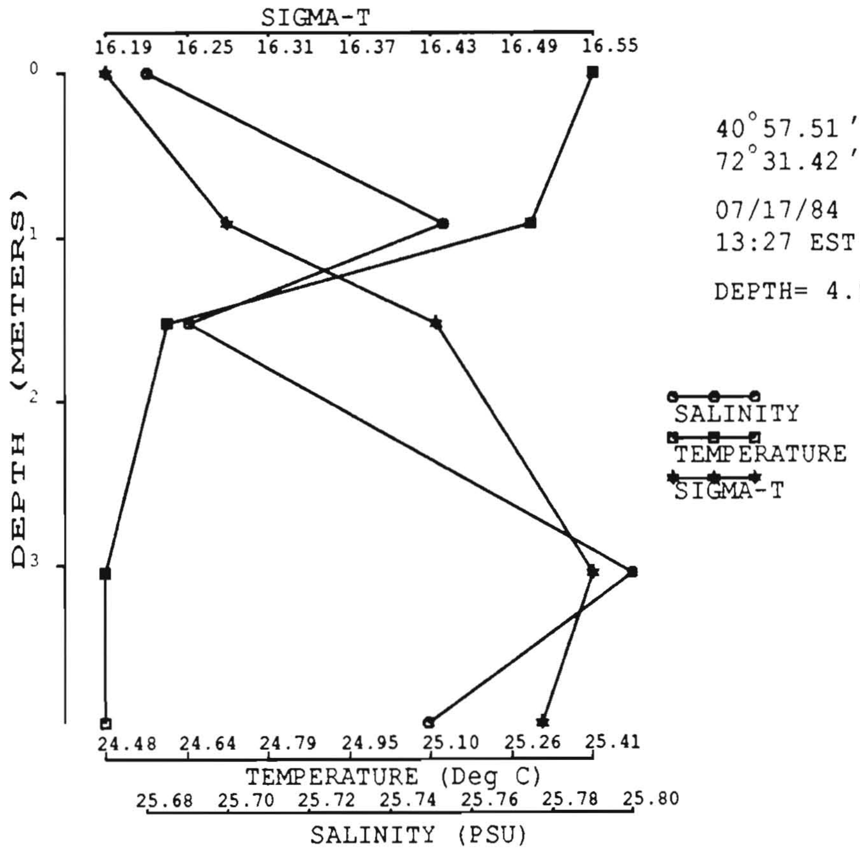
DEPTH= 6.7 m



40°59.21′ N
72°28.18′ W

07/17/84
13:08 EST

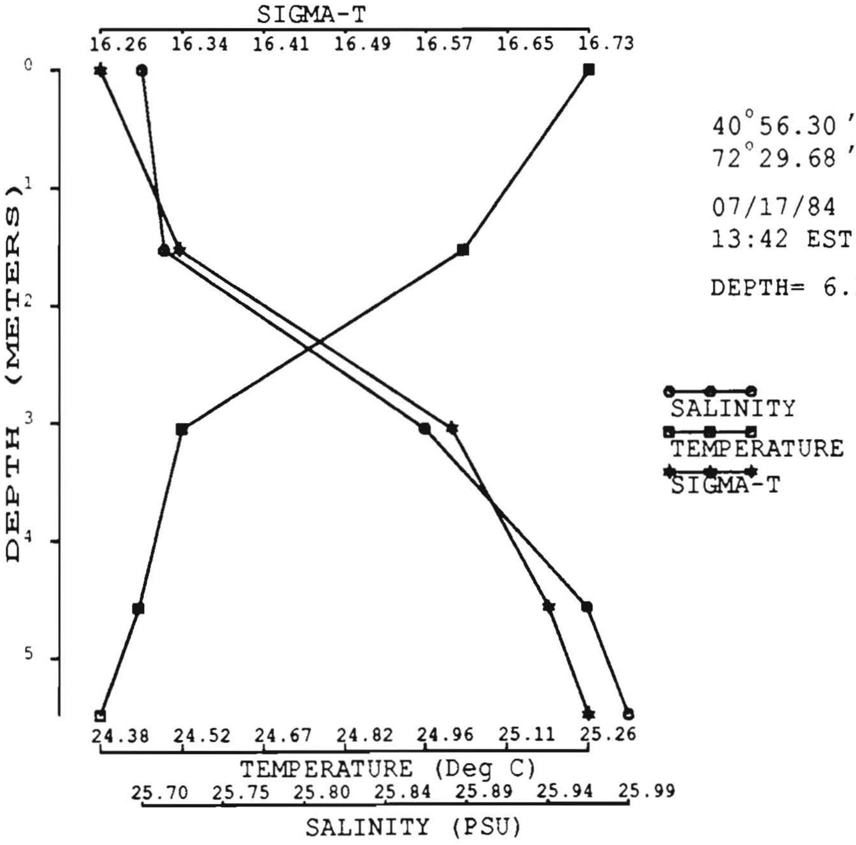
DEPTH= 4.9 m



40°57.51 ' N
72°31.42 ' W

07/17/84
13:27 EST

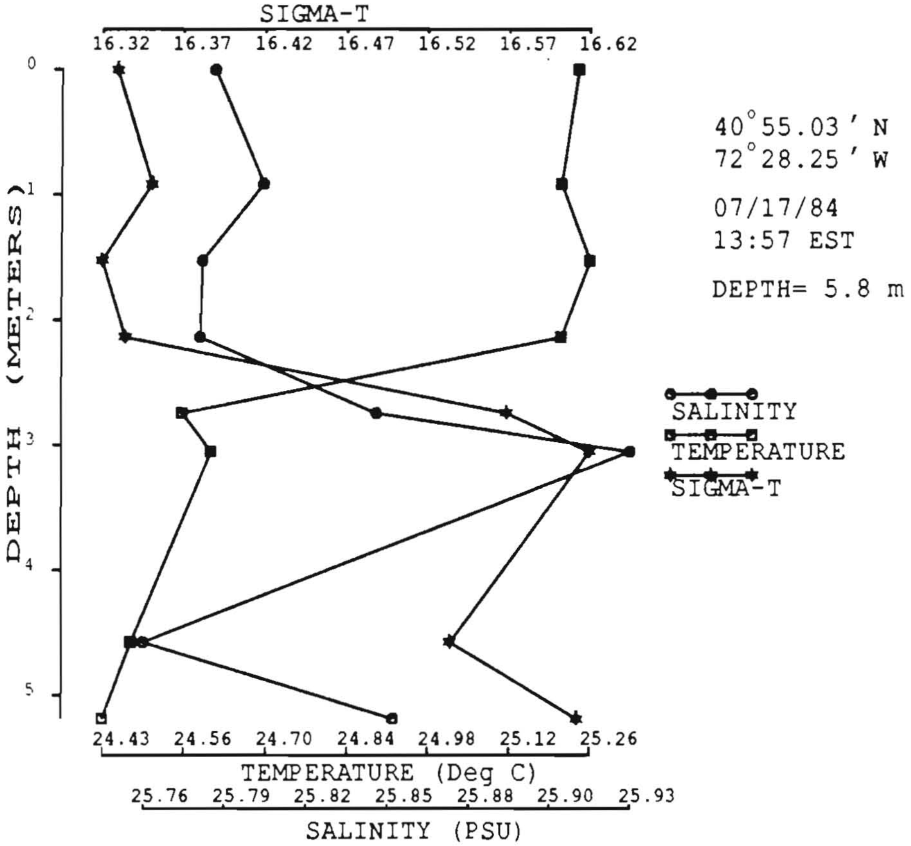
DEPTH= 4.9 m



40°56.30 ' N
72°29.68 ' W

07/17/84
13:42 EST

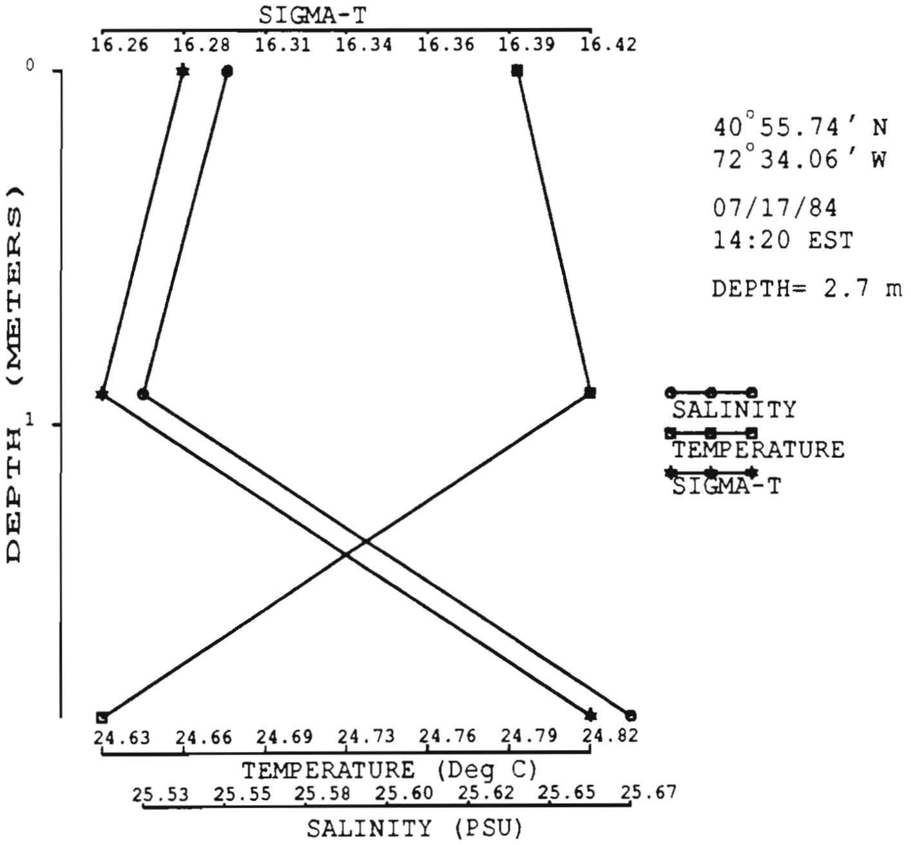
DEPTH= 6.1 m



40°55.03′ N
72°28.25′ W

07/17/84
13:57 EST

DEPTH= 5.8 m



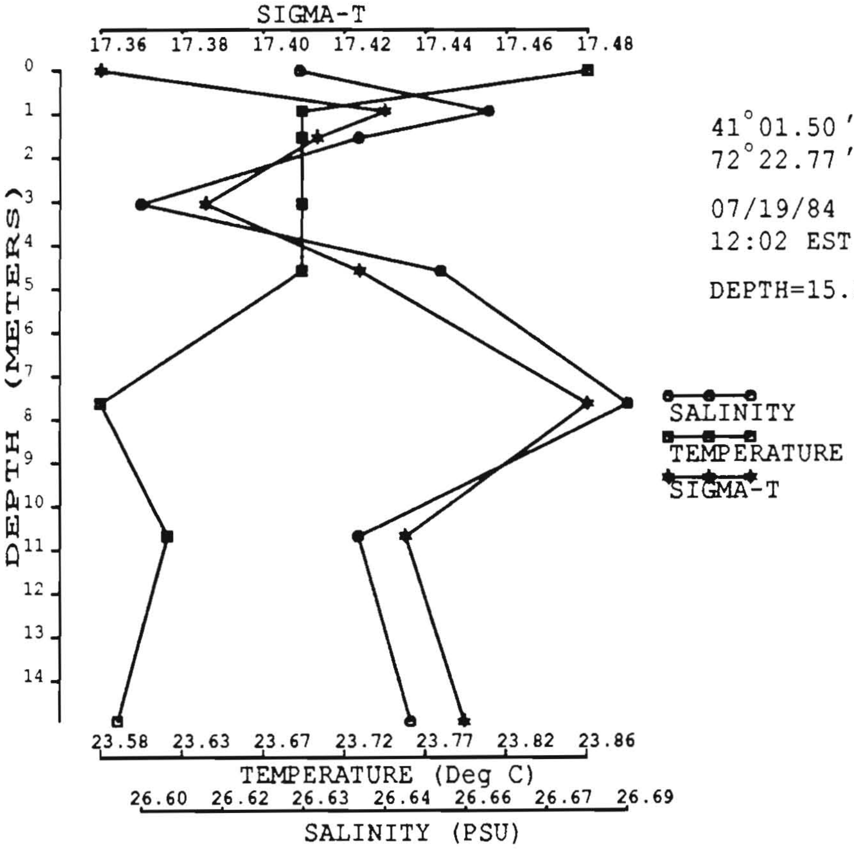
40°55.74′ N
72°34.06′ W

07/17/84
14:20 EST

DEPTH= 2.7 m

VERTICAL PROFILES OF
TEMPERATURE, SALINITY, SIGMA-T

Cruise of 19 July 1988



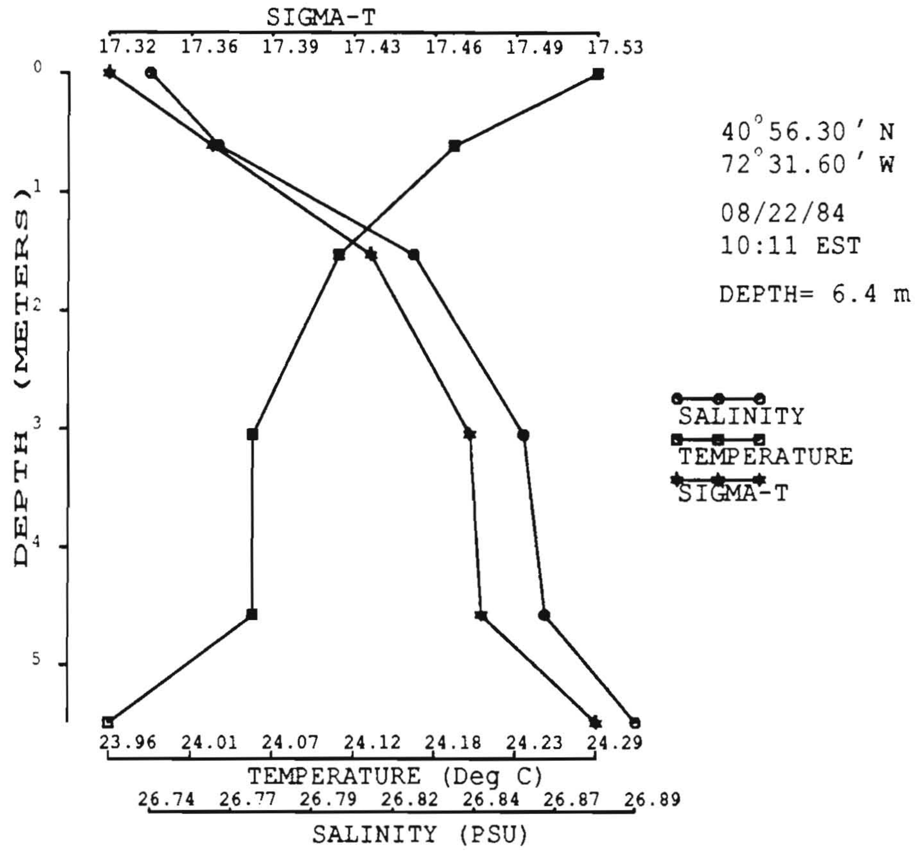
41°01.50' N
72°22.77' W

07/19/84
12:02 EST

DEPTH=15.2 m

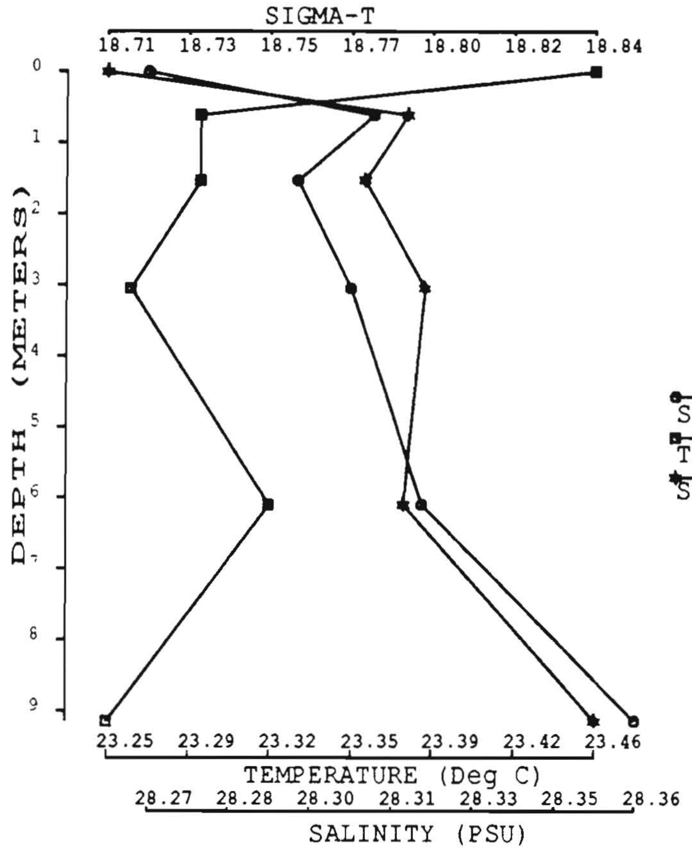
VERTICAL PROFILES OF
TEMPERATURE, SALINITY, SIGMA-T

Cruise of 22 August 1988


SIGMA-T
17.32 17.36 17.39 17.43 17.46 17.49 17.53
DEPTH (METERS)
0
1
2
3
4
5
23.96 24.01 24.07 24.12 24.18 24.23 24.29
TEMPERATURE (Deg C)
26.74 26.77 26.79 26.82 26.84 26.87 26.89
SALINITY (PSU)
40°56.30′ N
72°31.60′ W
08/22/84
10:11 EST
DEPTH= 6.4 m
SALINITY
TEMPERATURE
SIGMA-T

VERTICAL PROFILES OF TEMPERATURE, SALINITY, SIGMA-T

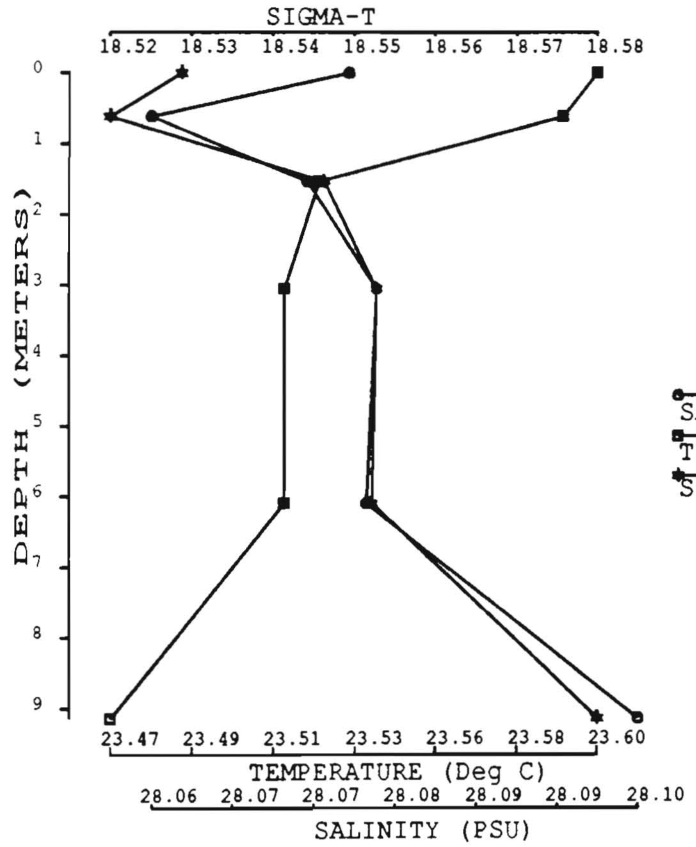
Cruise of 30 August 1988



41°02.59' N
72°18.77' W

08/30/84
09:32 EST

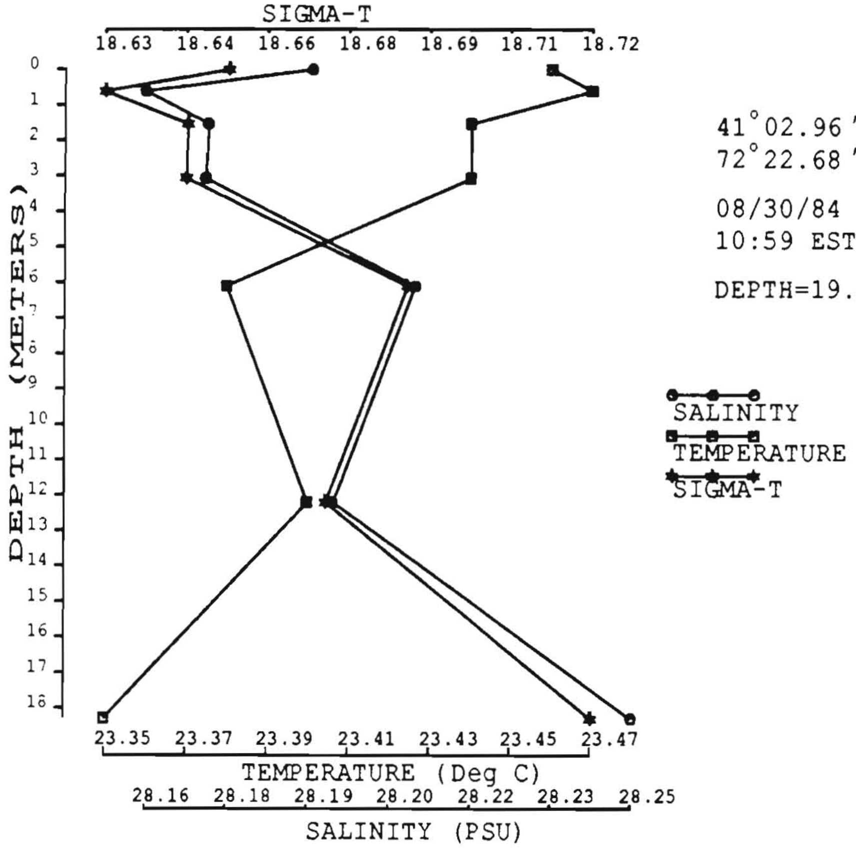
DEPTH=11.0 m



41°01.71' N
72°21.27' W

08/30/84
09:42 EST

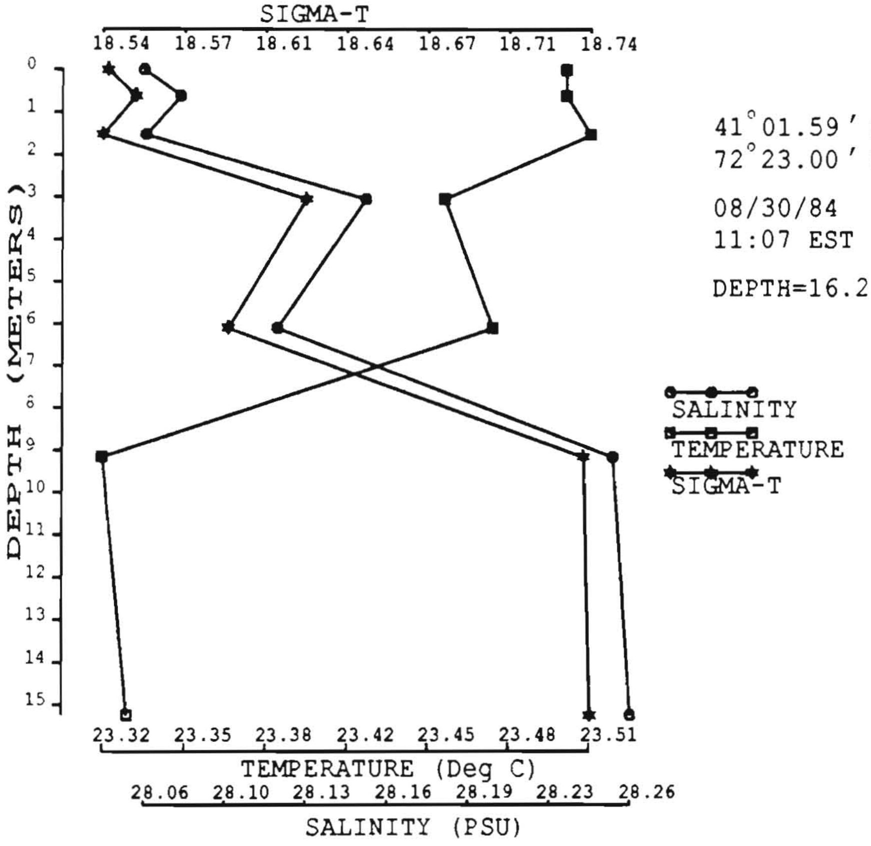
DEPTH=10.1 m



41°02.96′ N
72°22.68′ W

08/30/84
10:59 EST

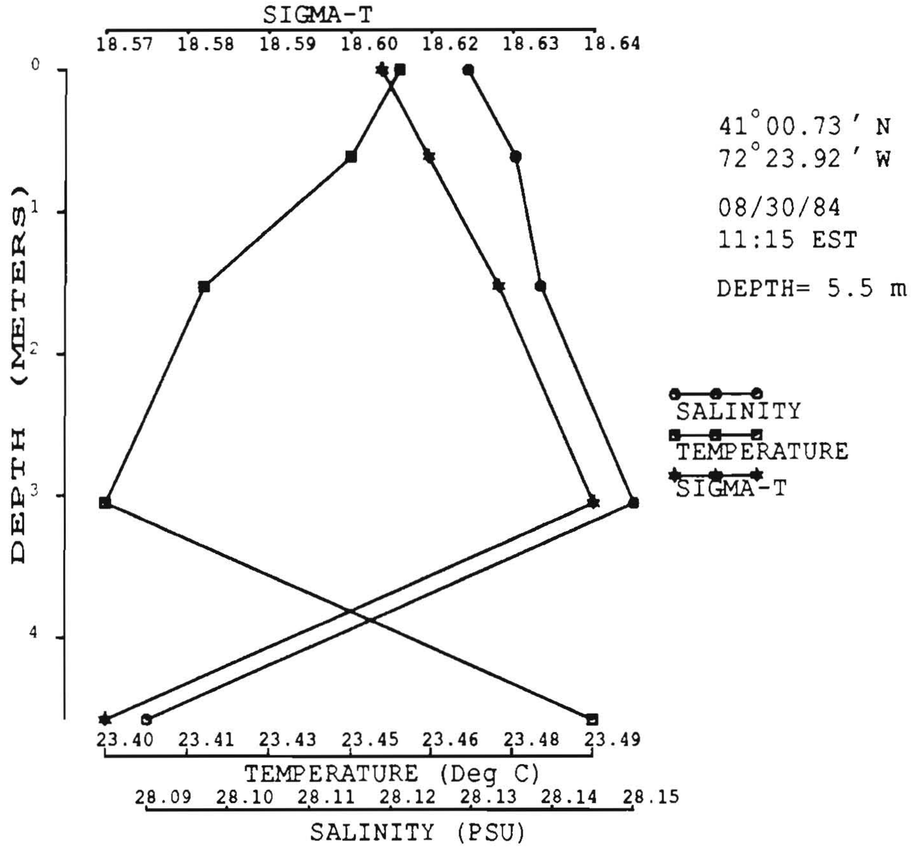
DEPTH=19.2 m



41°01.59′ N
72°23.00′ W

08/30/84
11:07 EST

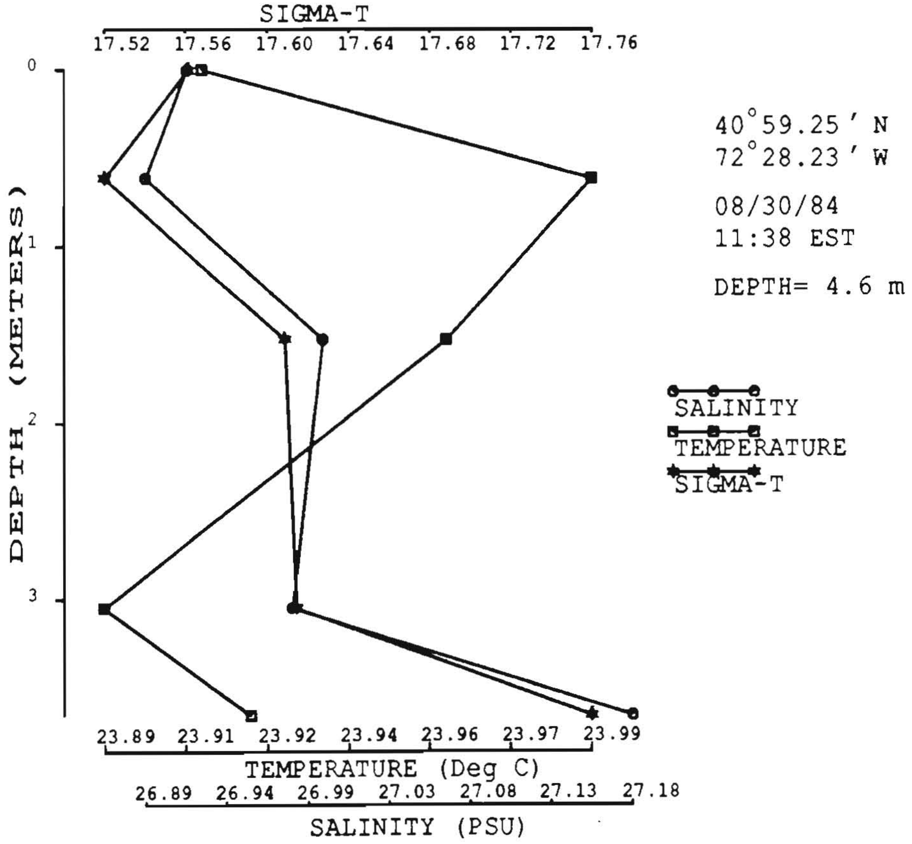
DEPTH=16.2 m



41°00.73 ′ N
72°23.92 ′ W

08/30/84
11:15 EST

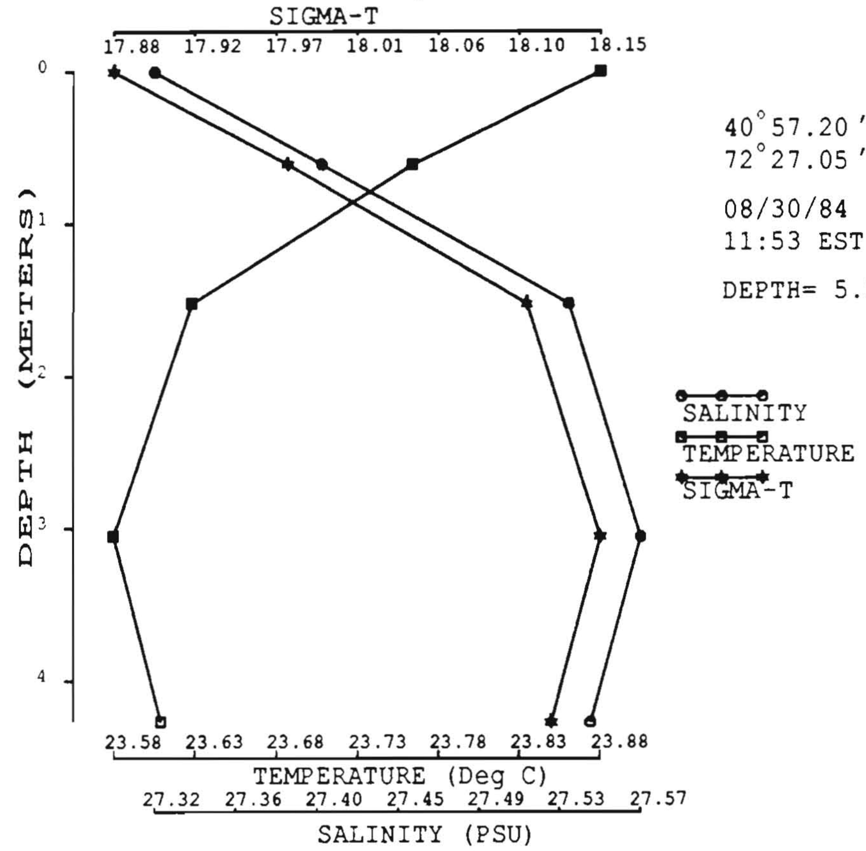
DEPTH= 5.5 m



40°59.25 ′ N
72°28.23 ′ W

08/30/84
11:38 EST

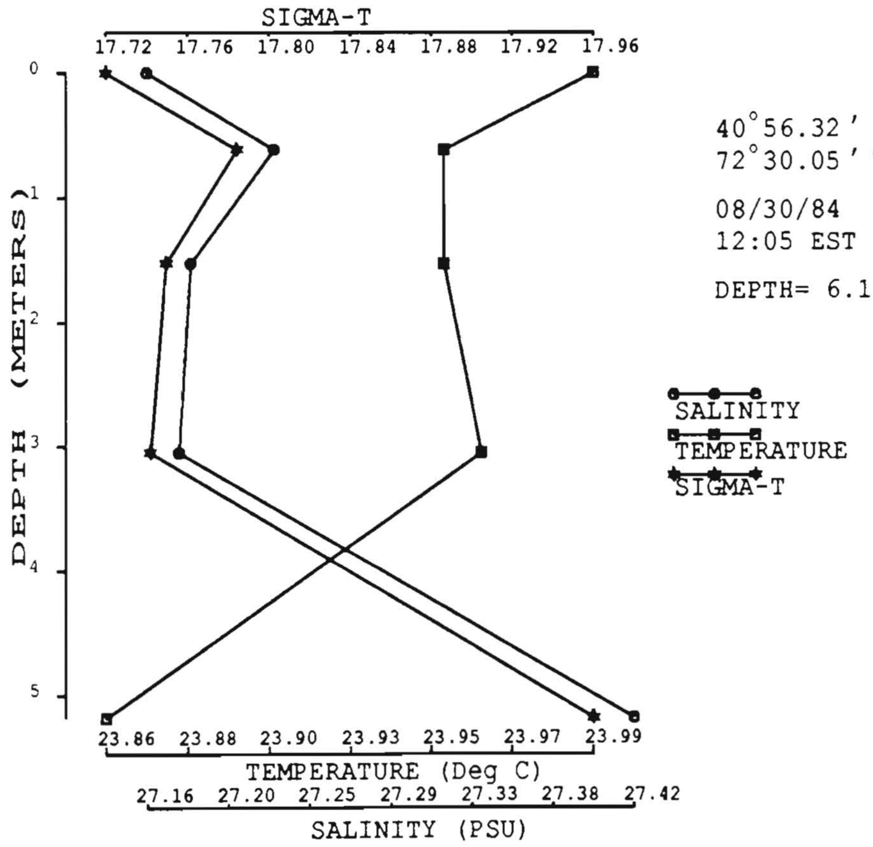
DEPTH= 4.6 m



40°57.20' N
72°27.05' W

08/30/84
11:53 EST

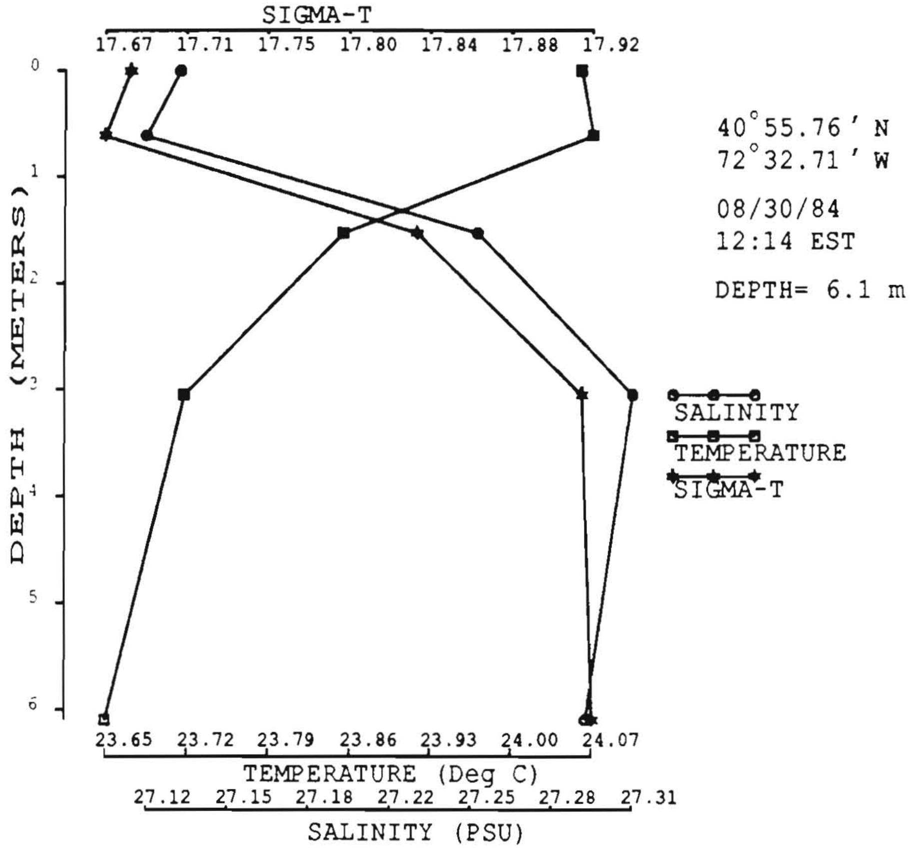
DEPTH= 5.2 m



40°56.32' N
72°30.05' W

08/30/84
12:05 EST

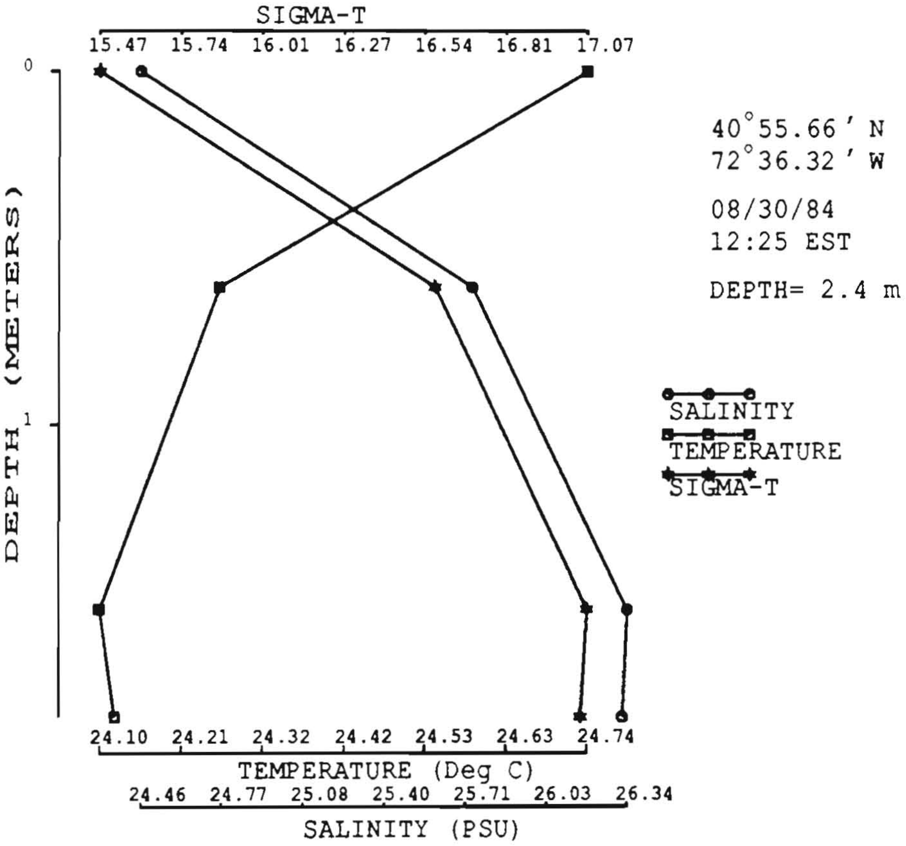
DEPTH= 6.1 m



40°55.76' N
72°32.71' W

08/30/84
12:14 EST

DEPTH= 6.1 m



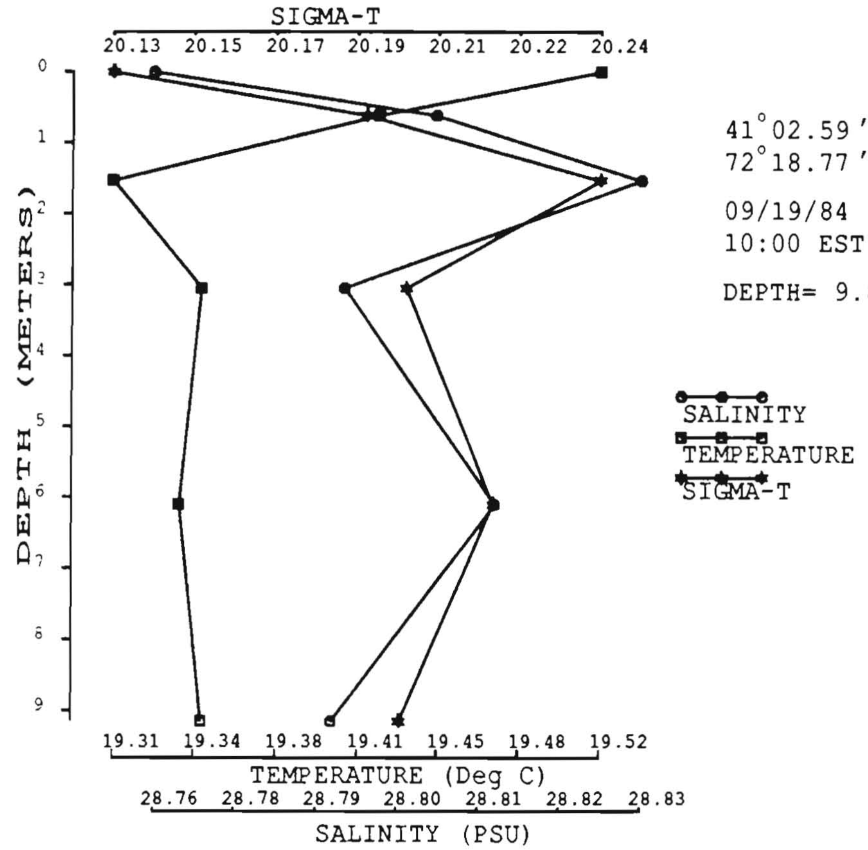
40°55.66' N
72°36.32' W

08/30/84
12:25 EST

DEPTH= 2.4 m

VERTICAL PROFILES OF TEMPERATURE, SALINITY, SIGMA-T

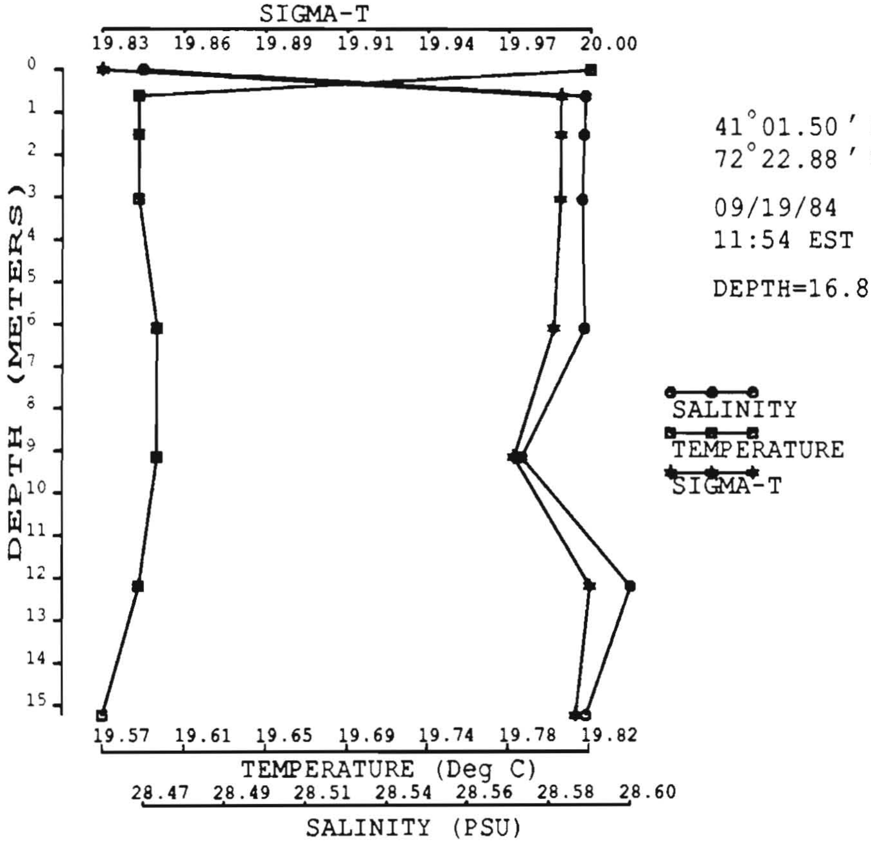
Cruise of 19 September 1988



41°02.59′ N
72°18.77′ W

09/19/84
10:00 EST

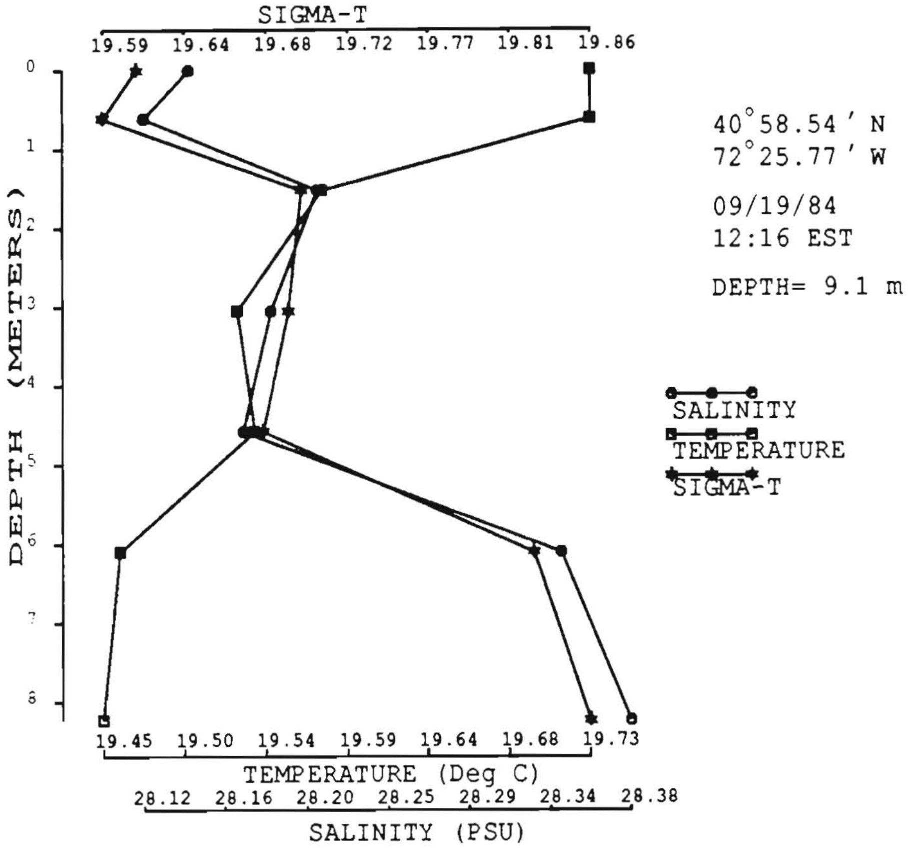
DEPTH= 9.8 m



41°01.50′ N
72°22.88′ W

09/19/84
11:54 EST

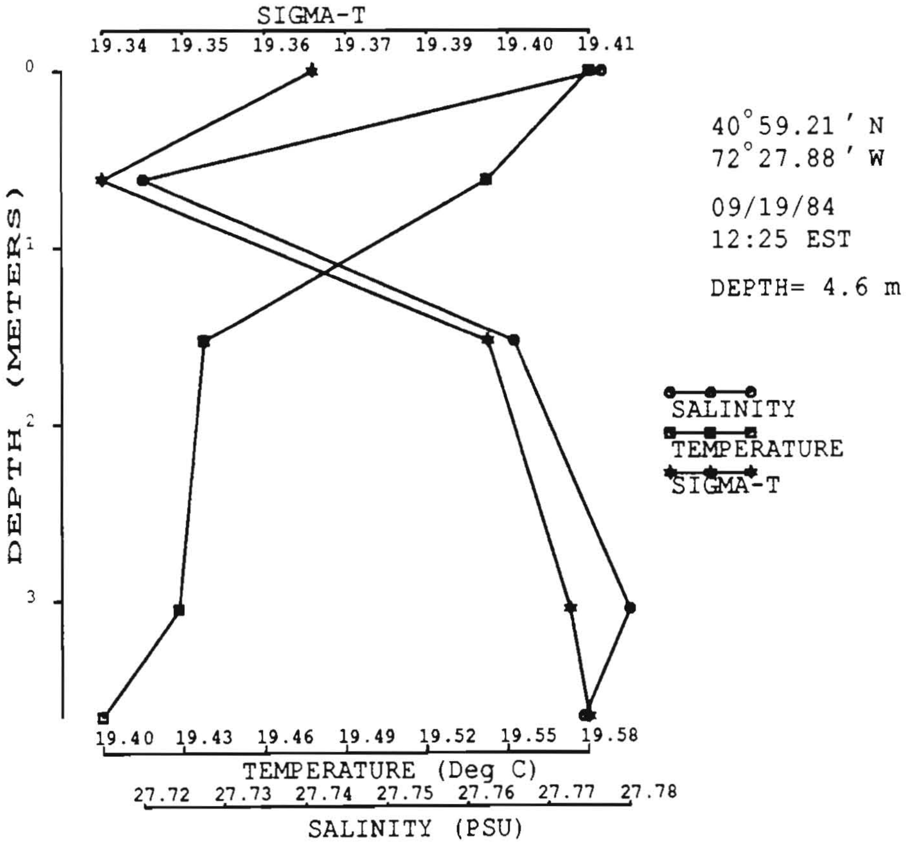
DEPTH=16.8 m



40°58.54' N
72°25.77' W

09/19/84
12:16 EST

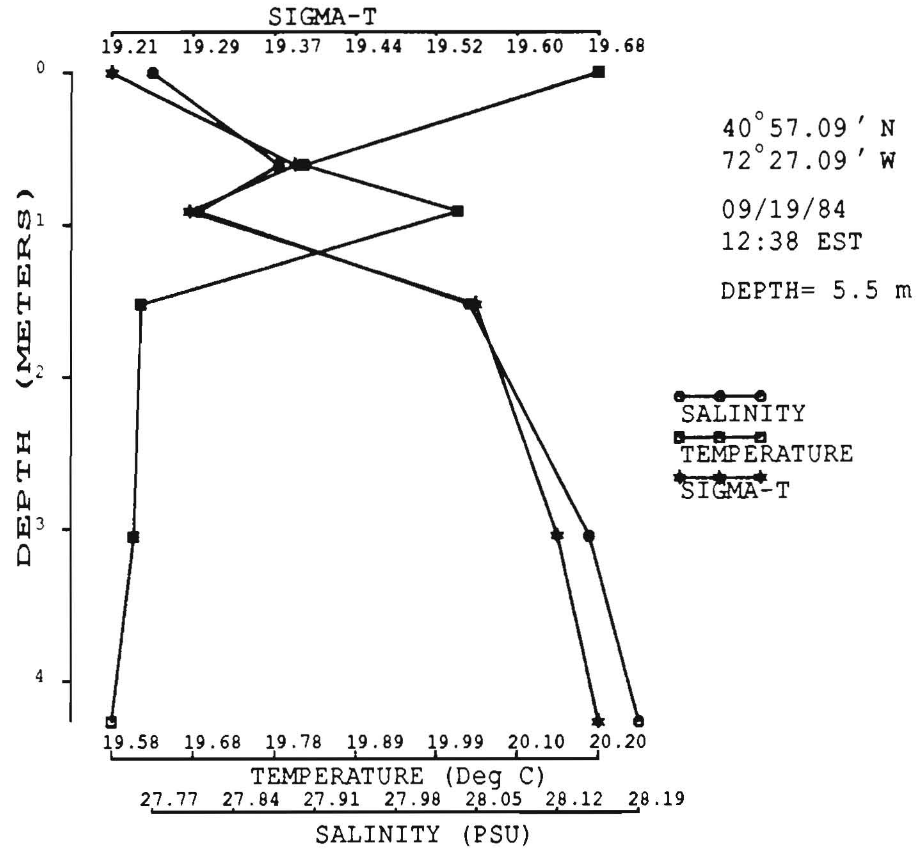
DEPTH= 9.1 m



40°59.21' N
72°27.88' W

09/19/84
12:25 EST

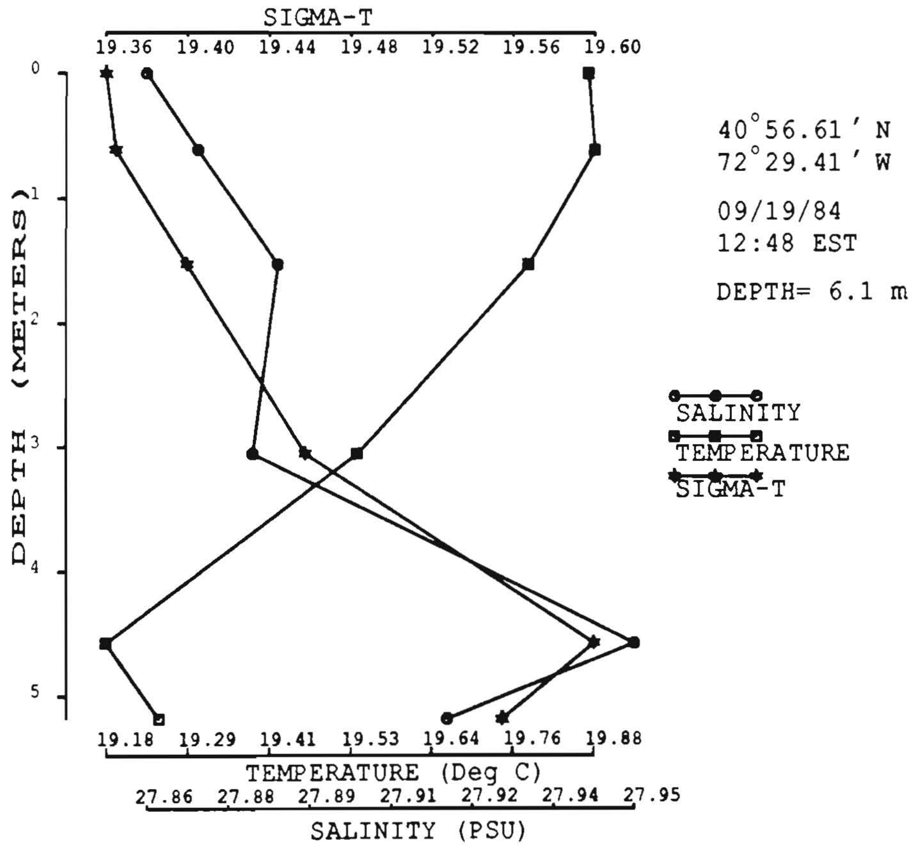
DEPTH= 4.6 m



40°57.09′ N
72°27.09′ W

09/19/84
12:38 EST

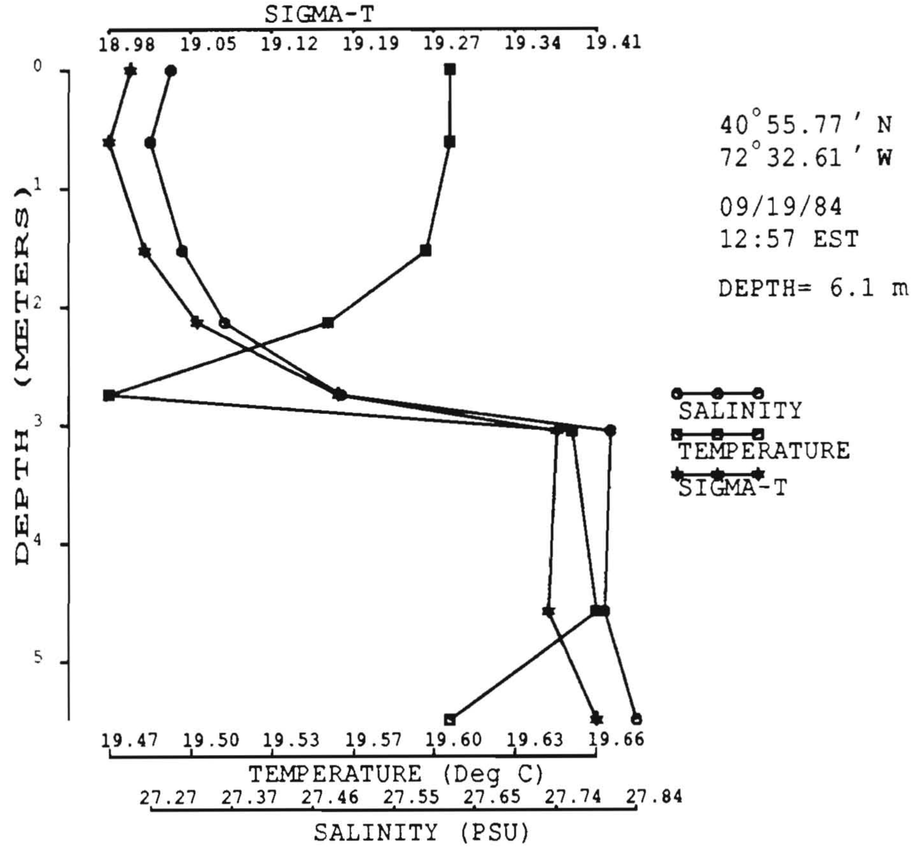
DEPTH= 5.5 m



40°56.61′ N
72°29.41′ W

09/19/84
12:48 EST

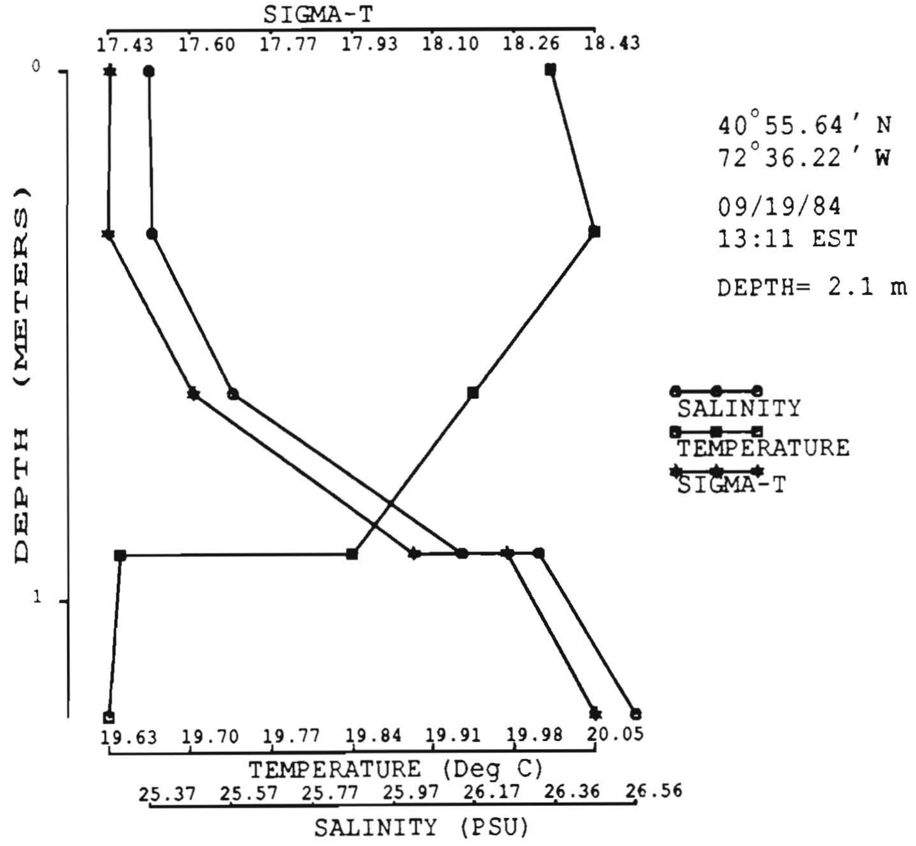
DEPTH= 6.1 m



40°55.77' N
72°32.61' W

09/19/84
12:57 EST

DEPTH= 6.1 m



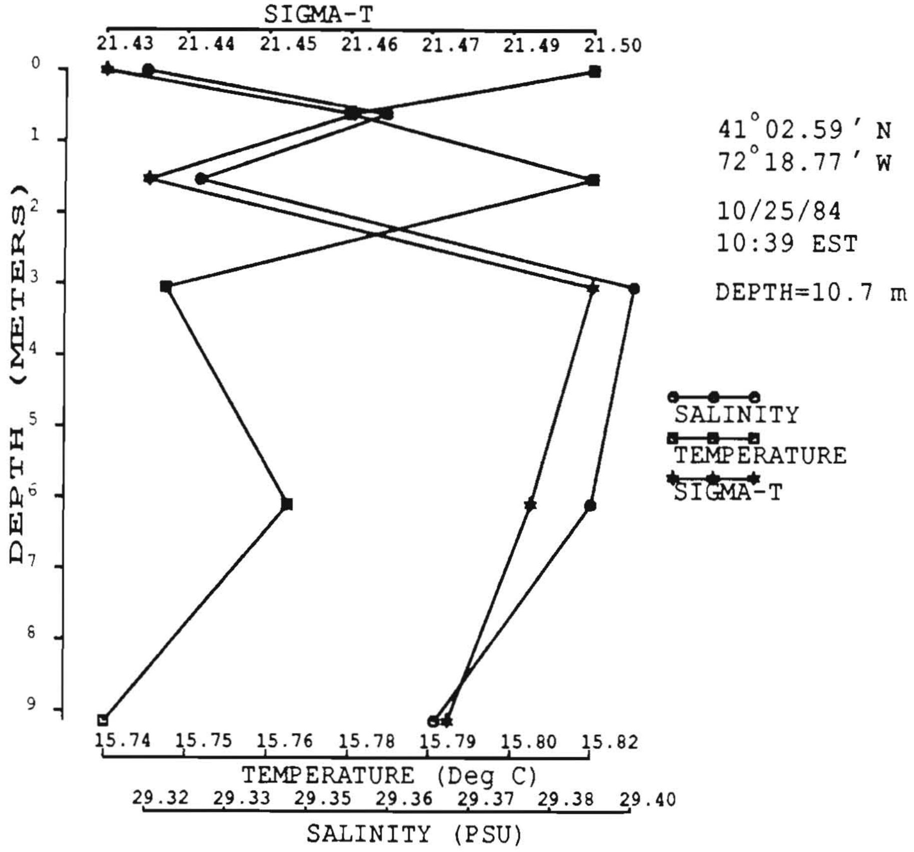
40°55.64' N
72°36.22' W

09/19/84
13:11 EST

DEPTH= 2.1 m

VERTICAL PROFILES OF TEMPERATURE, SALINITY, SIGMA-T

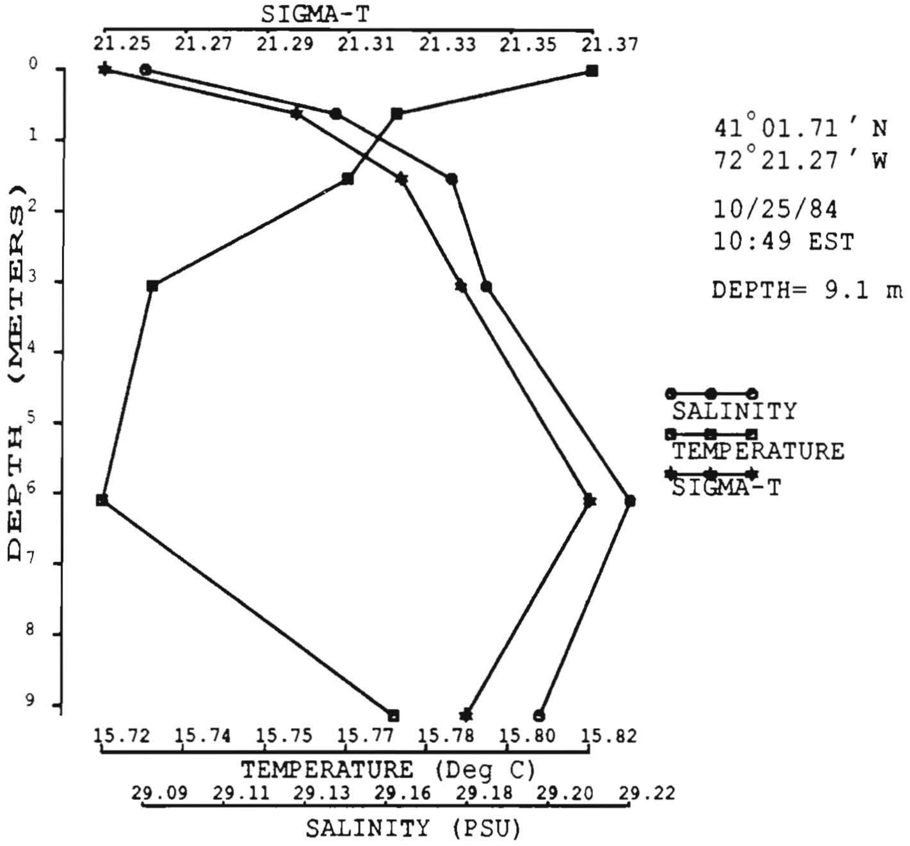
Cruise of 25 October 1988



41°02.59′ N
72°18.77′ W

10/25/84
10:39 EST

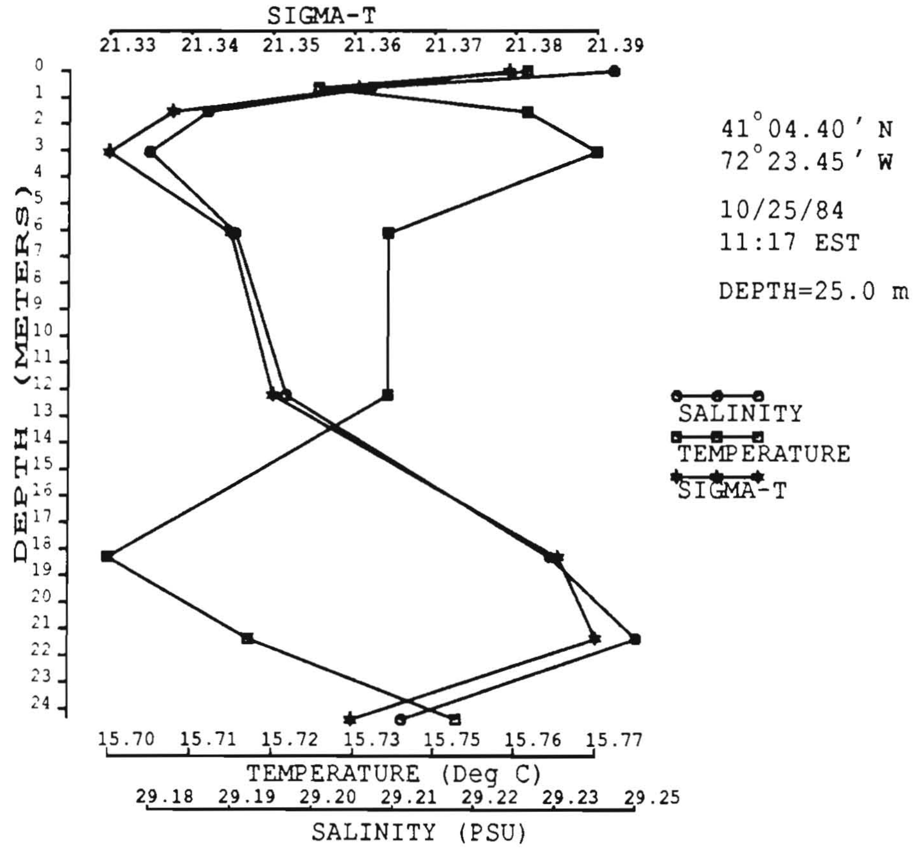
DEPTH=10.7 m



41°01.71′ N
72°21.27′ W

10/25/84
10:49 EST

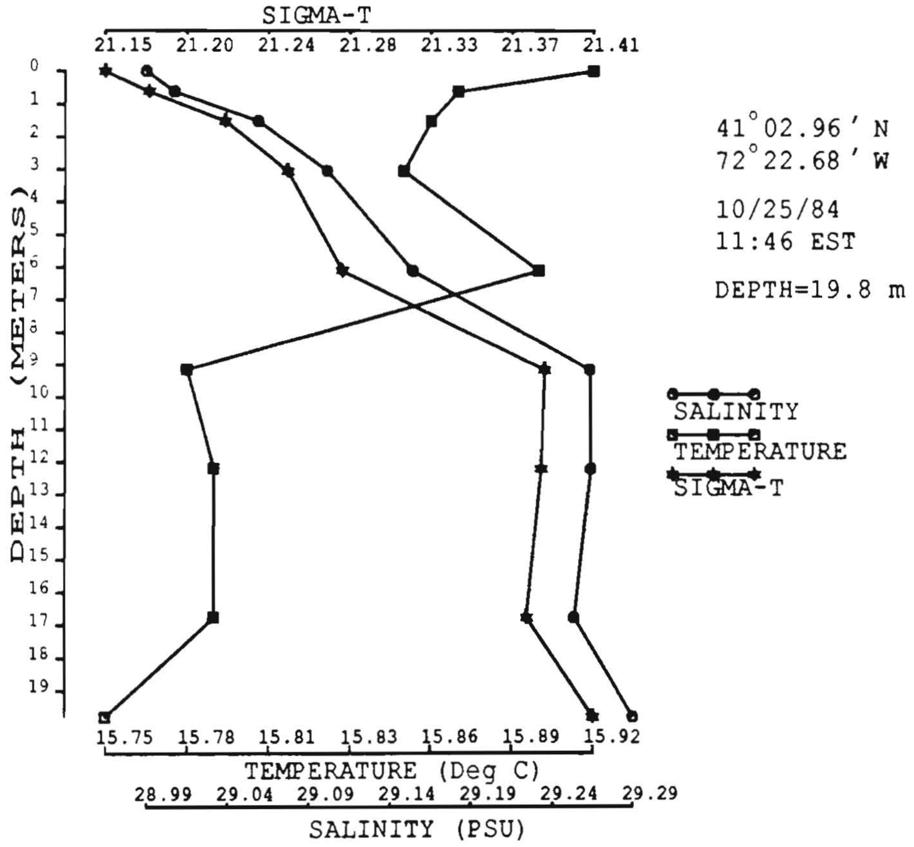
DEPTH= 9.1 m



41°04.40' N
72°23.45' W

10/25/84
11:17 EST

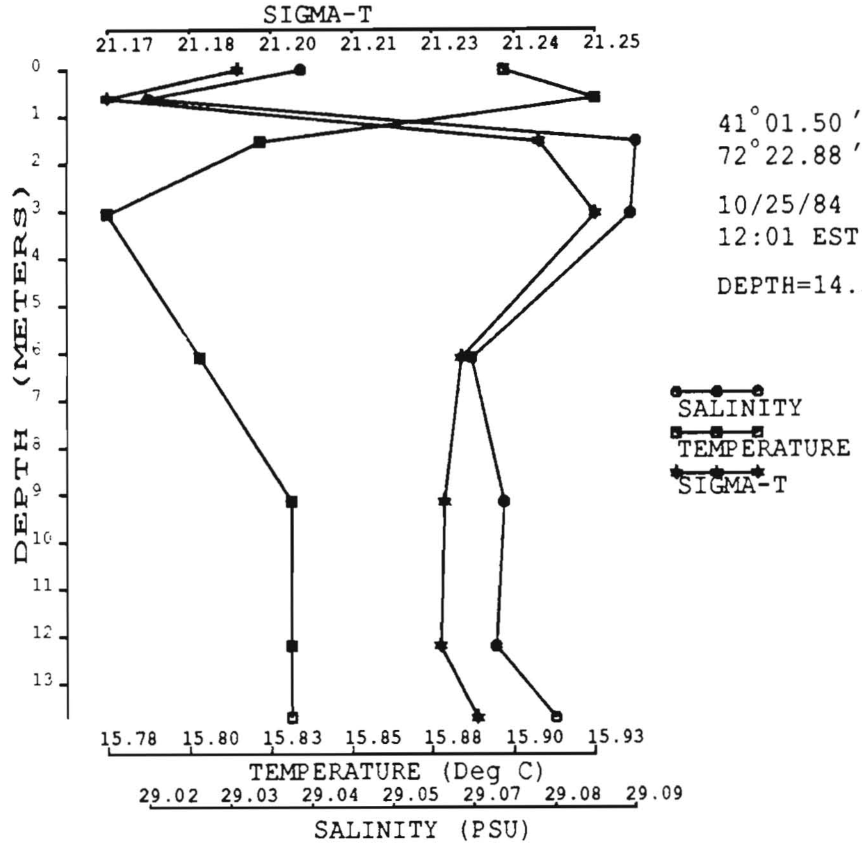
DEPTH=25.0 m



41°02.96' N
72°22.68' W

10/25/84
11:46 EST

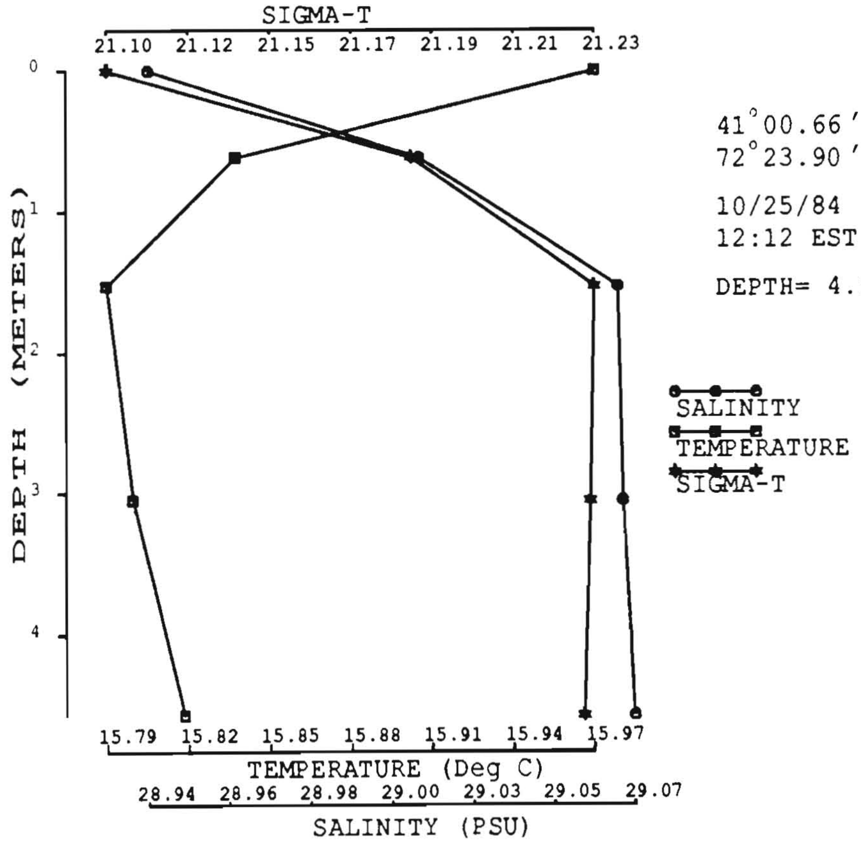
DEPTH=19.8 m



41°01.50′ N
72°22.88′ W

10/25/84
12:01 EST

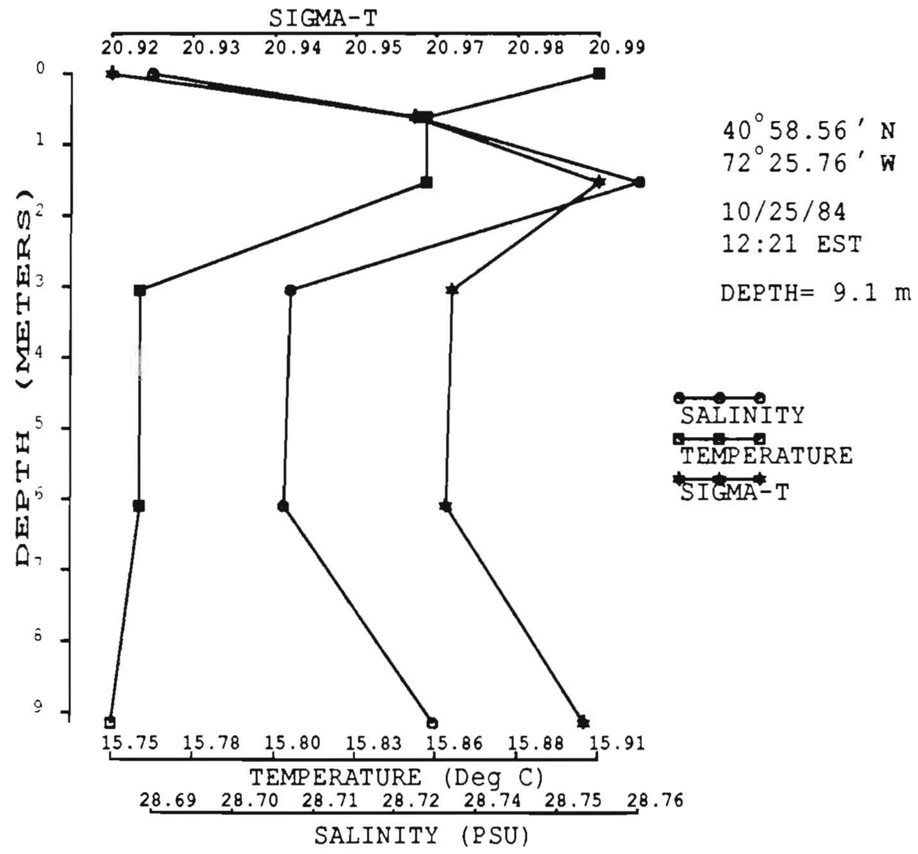
DEPTH=14.3 m



41°00.66′ N
72°23.90′ W

10/25/84
12:12 EST

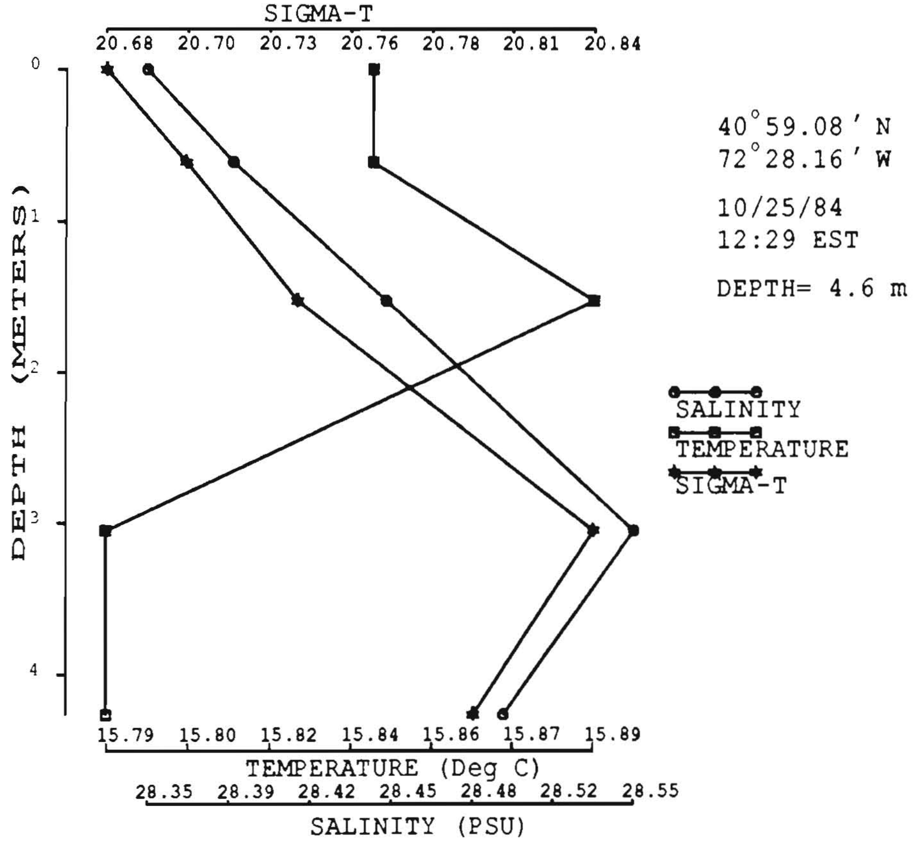
DEPTH= 4.9 m



40°58.56′ N
72°25.76′ W

10/25/84
12:21 EST

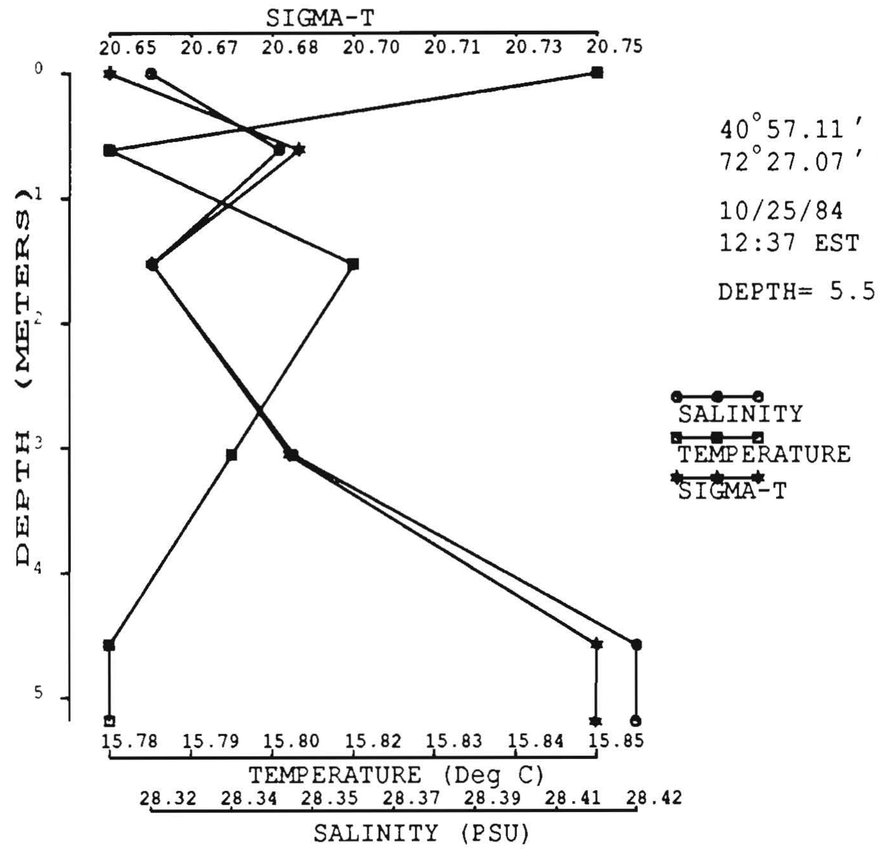
DEPTH= 9.1 m



40°59.08′ N
72°28.16′ W

10/25/84
12:29 EST

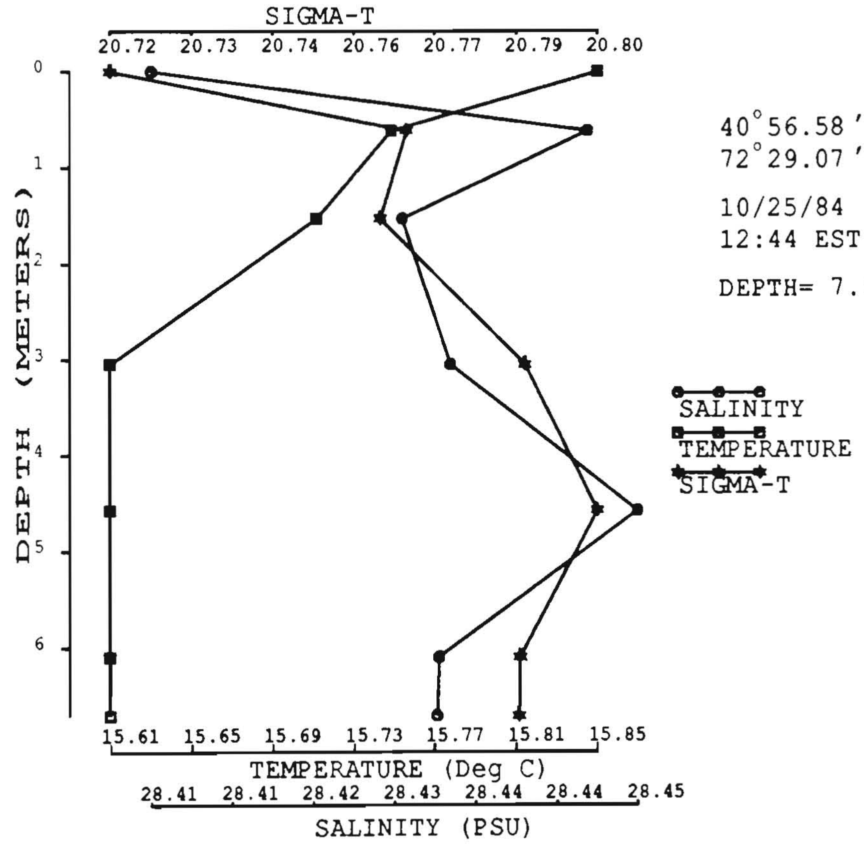
DEPTH= 4.6 m



40°57.11 ′ N
72°27.07 ′ W

10/25/84
12:37 EST

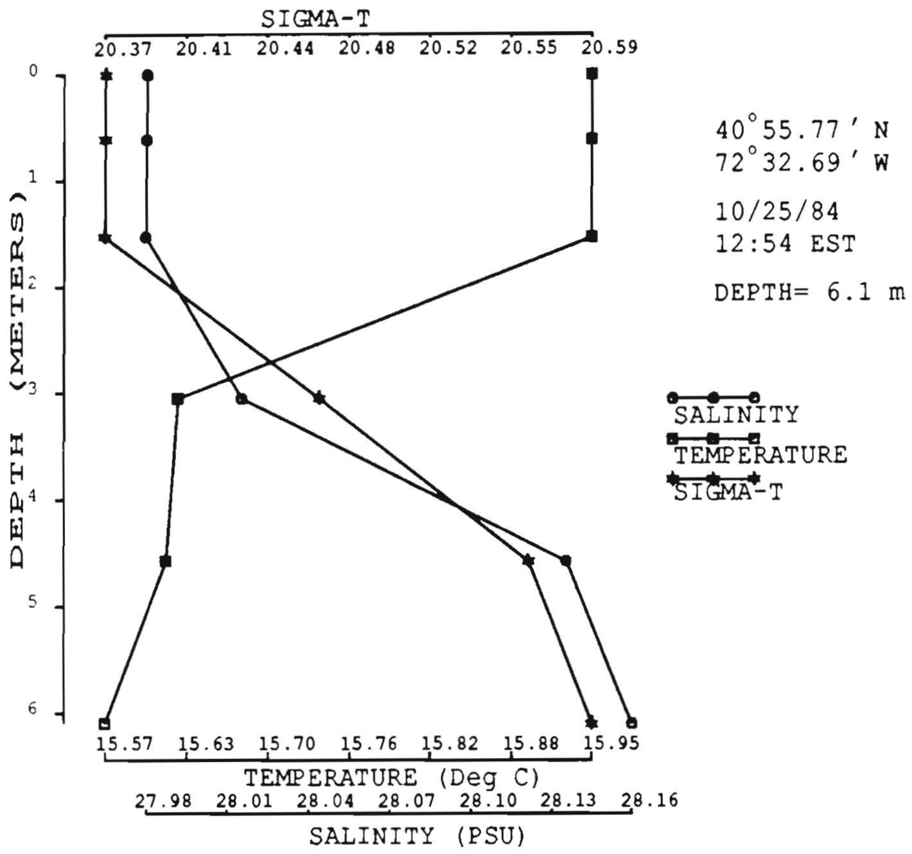
DEPTH= 5.5 m



40°56.58 ′ N
72°29.07 ′ W

10/25/84
12:44 EST

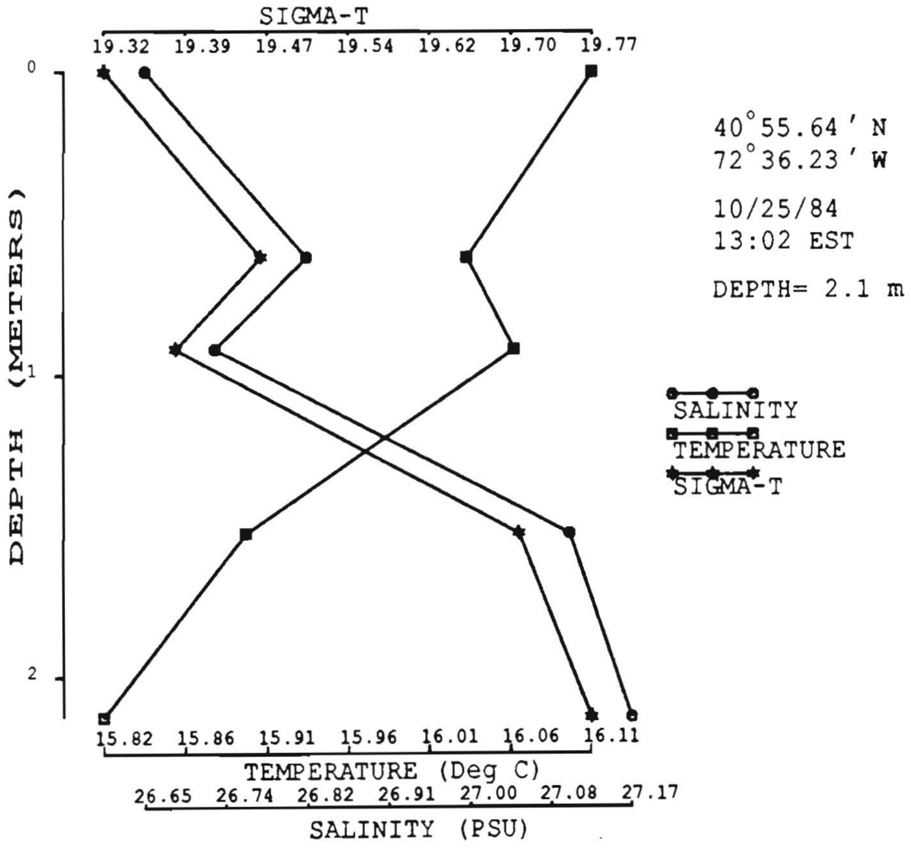
DEPTH= 7.0 m



40°55.77 ′ N
72°32.69 ′ W

10/25/84
12:54 EST

DEPTH= 6.1 m



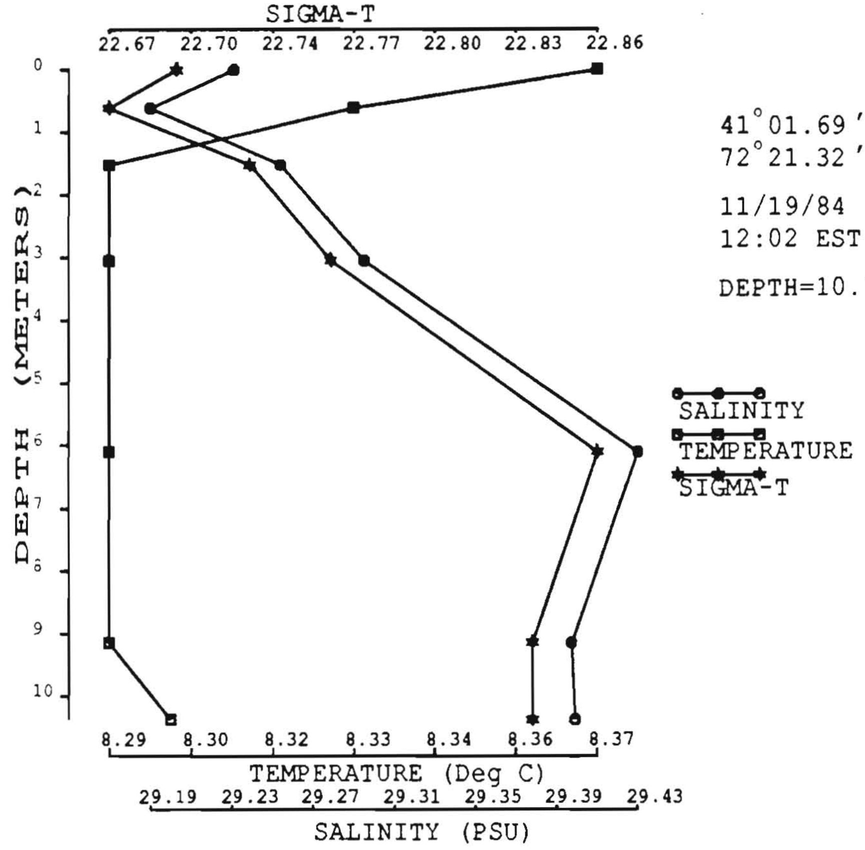
40°55.64 ′ N
72°36.23 ′ W

10/25/84
13:02 EST

DEPTH= 2.1 m

VERTICAL PROFILES OF
TEMPERATURE, SALINITY, SIGMA-T

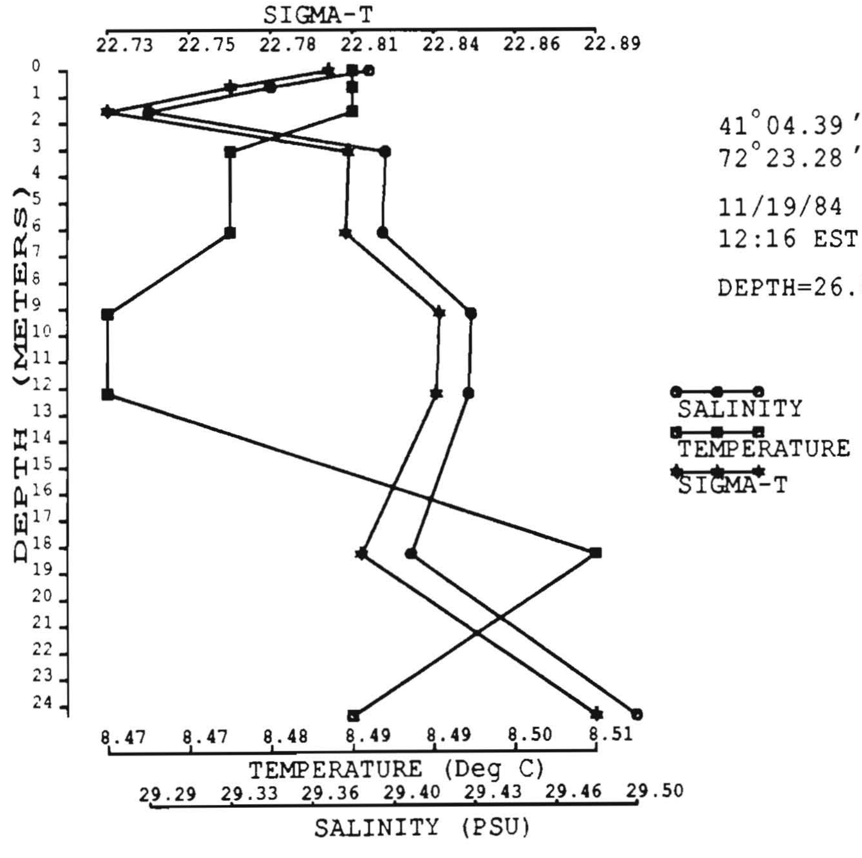
Cruise of 19 November 1988



41°01.69′ N
72°21.32′ W

11/19/84
12:02 EST

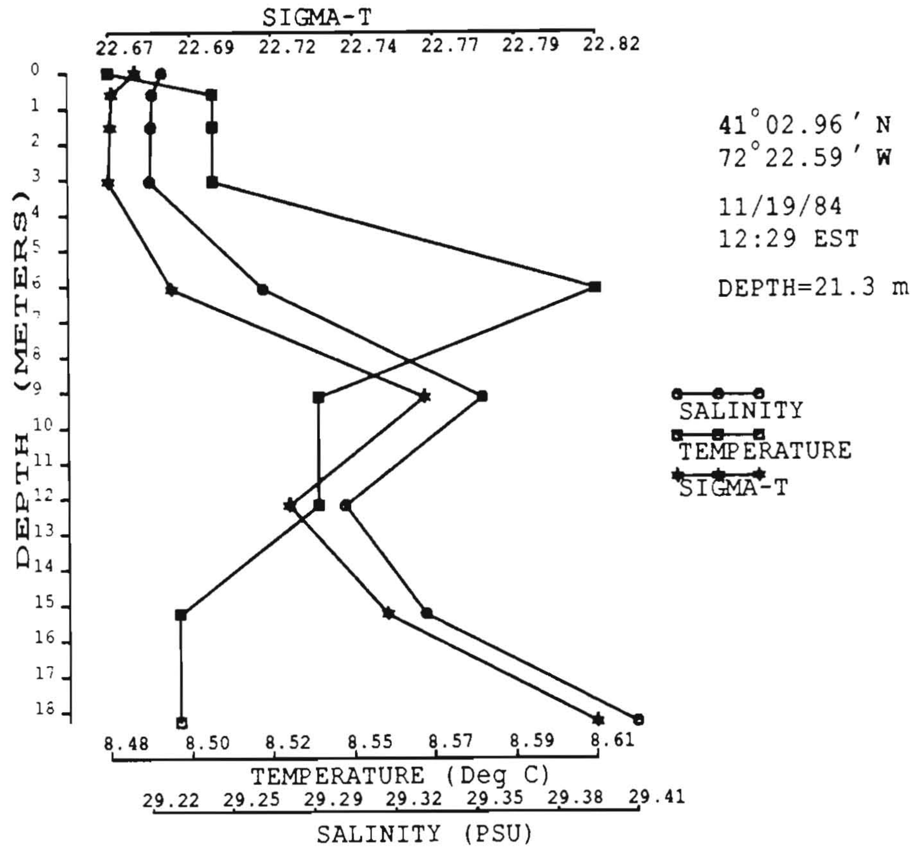
DEPTH=10.7 m



41°04.39′ N
72°23.28′ W

11/19/84
12:16 EST

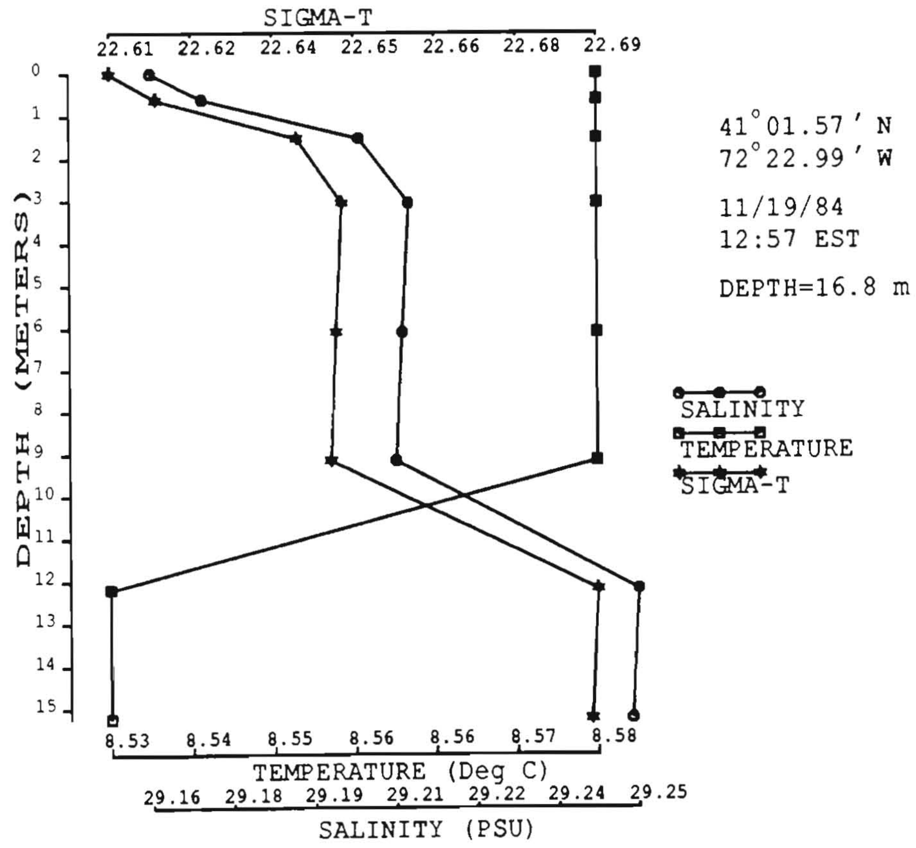
DEPTH=26.8 m



41°02.96′ N
72°22.59′ W

11/19/84
12:29 EST

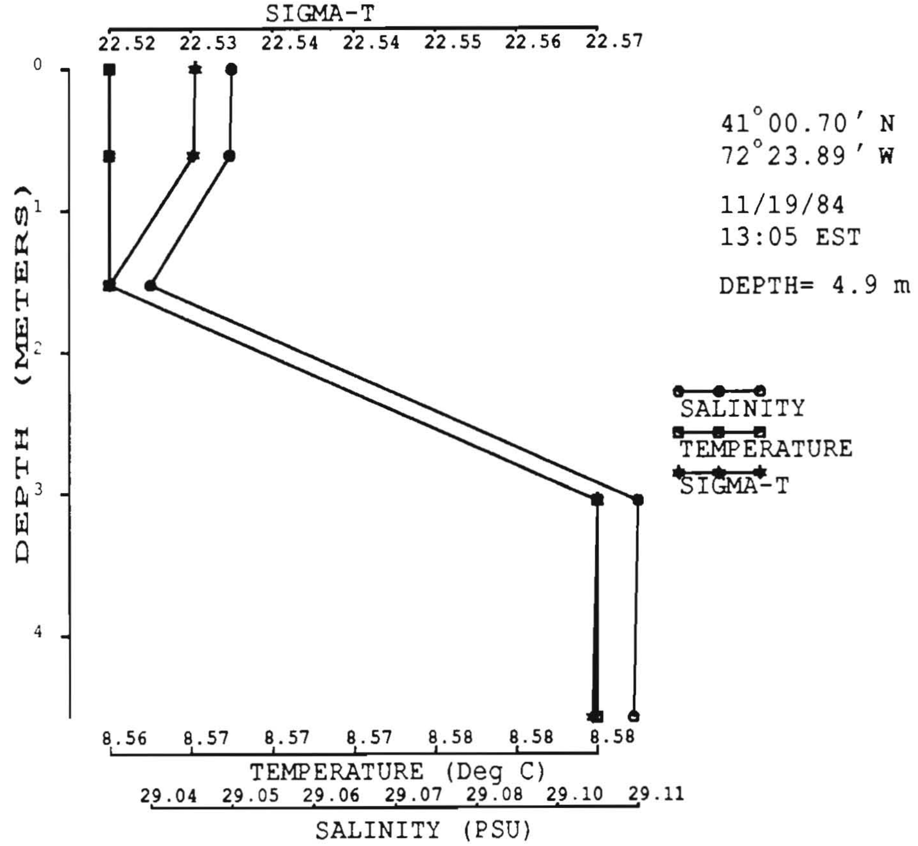
DEPTH=21.3 m



41°01.57′ N
72°22.99′ W

11/19/84
12:57 EST

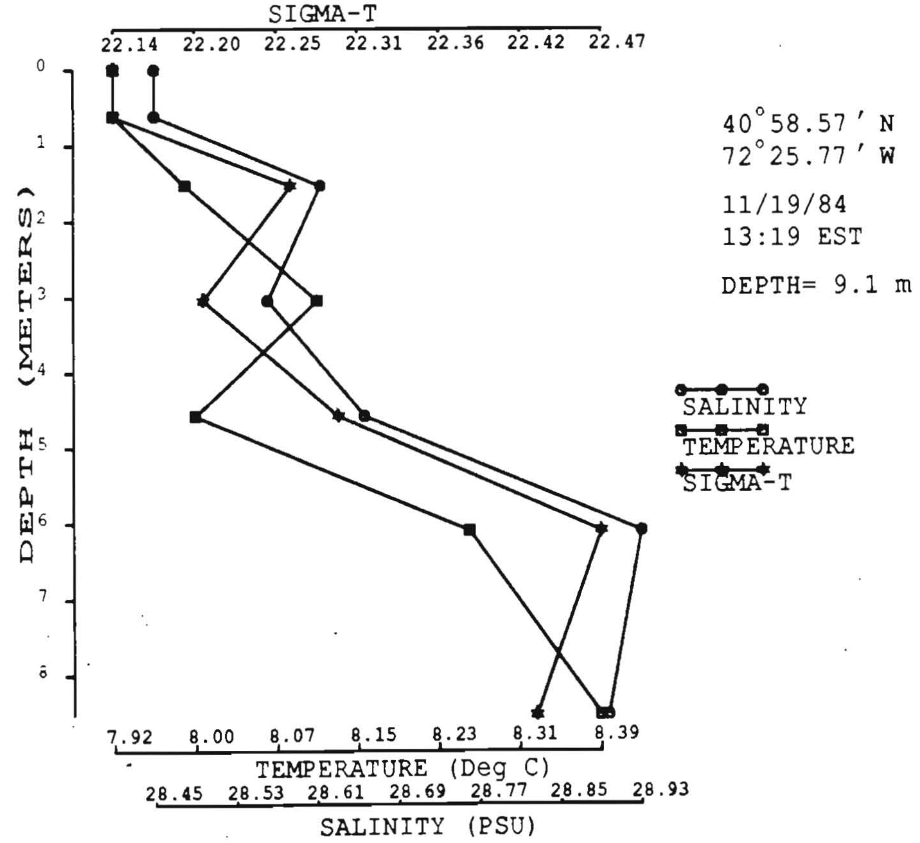
DEPTH=16.8 m



41°00.70′ N
72°23.89′ W

11/19/84
13:05 EST

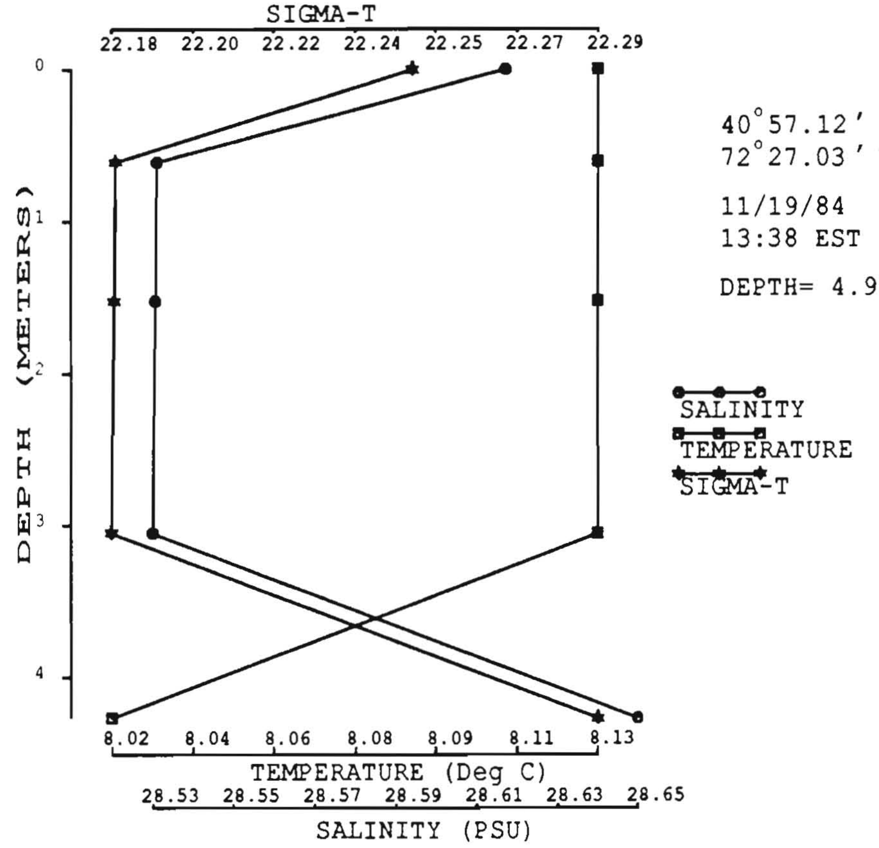
DEPTH= 4.9 m



40°58.57′ N
72°25.77′ W

11/19/84
13:19 EST

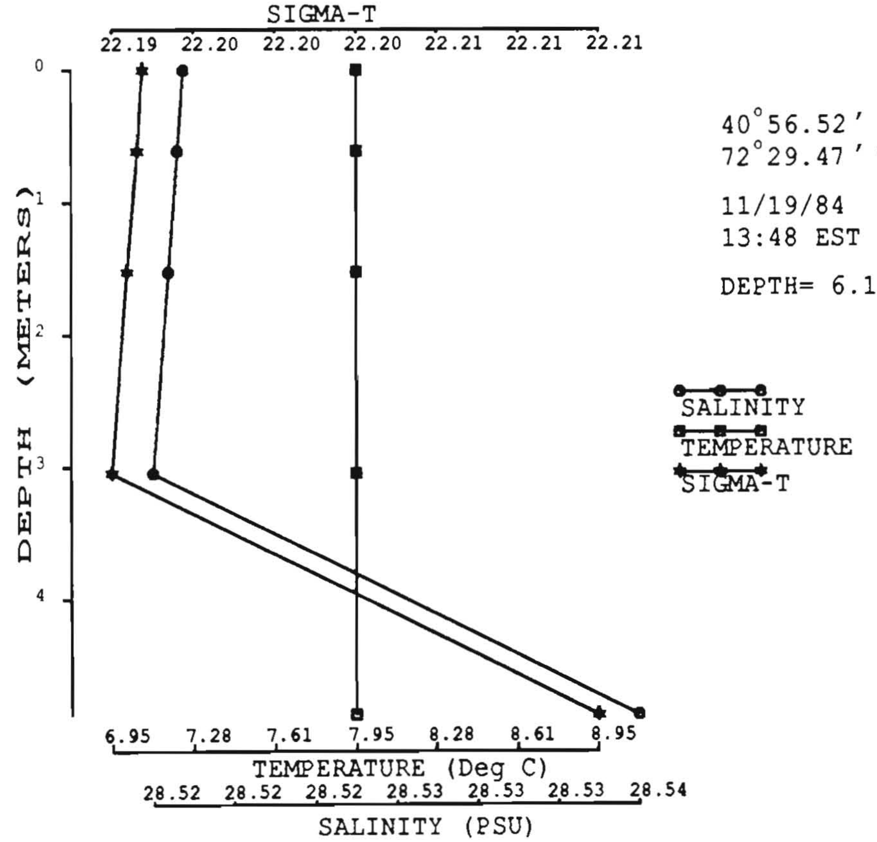
DEPTH= 9.1 m



40°57.12′ N
72°27.03′ W

11/19/84
13:38 EST

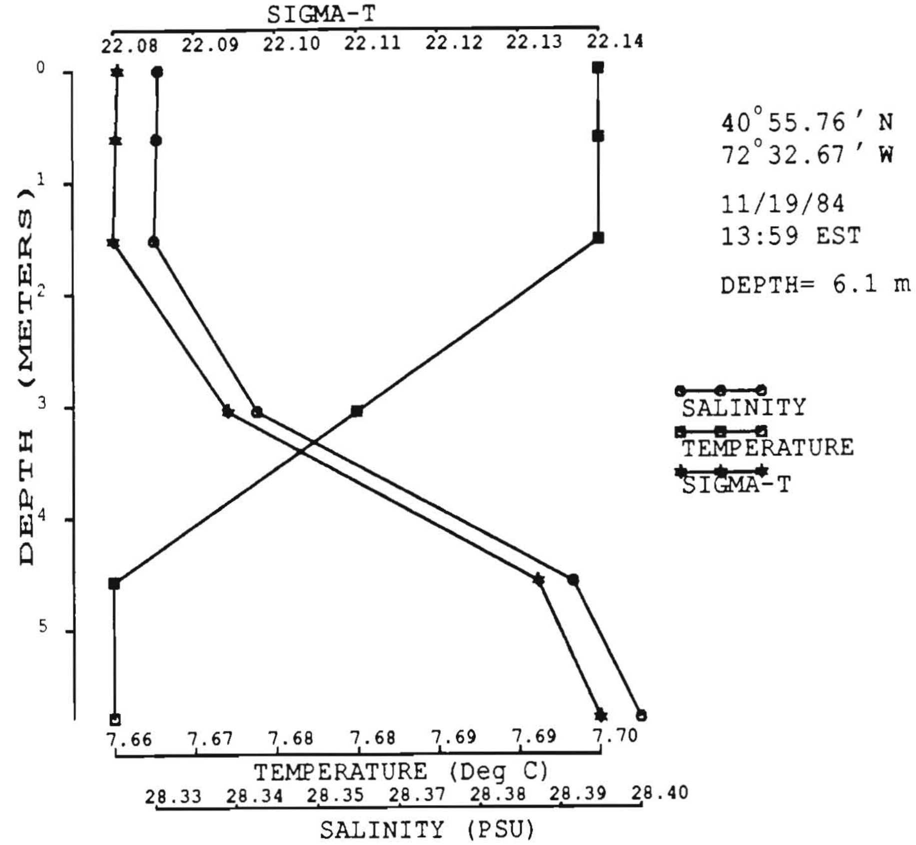
DEPTH= 4.9 m



40°56.52′ N
72°29.47′ W

11/19/84
13:48 EST

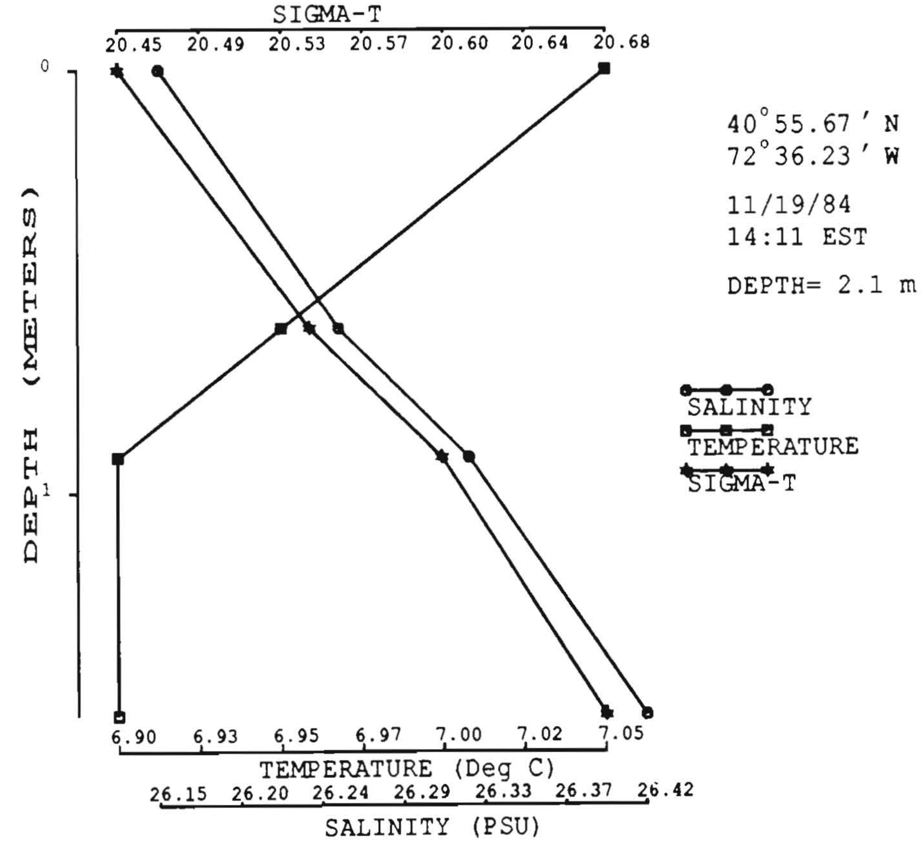
DEPTH= 6.1 m



40°55.76' N
72°32.67' W

11/19/84
13:59 EST

DEPTH= 6.1 m



40°55.67' N
72°36.23' W

11/19/84
14:11 EST

DEPTH= 2.1 m

marine sciences research center
state university of new york

The University at Stony Brook