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SOME RESULTS OF THE FLORIDA CURRENT STUDY
15 May 1953 to 15 November 1953

A Technical Report
February 1954

to

The Office of Naval Research
Contract Nonr0840(01)

CORAL GABLES, FLORIDA

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THE MARINE LABORATORY
University of Miami

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TROPICAL OCEANOGRAPHY

by

Ilmo Hela, Frank Chew, and Lansing P. Wagner

Coral Gables
Florida

F. G. Walton Smith
Director

ML-6787

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SOME RESULTS OF THE FLORIDA CURRENT STUDY
15 May 1954 to 15 November 1953

ABSTRACT

This report consists of observations made in the Florida Current from 15 May to 15 November 1953. Two papers are included, one relating the velocity pattern with increase and decrease of transport with time; the second illustrates the effect the tide seems to have on the velocity pattern and also demonstrates the possible existence of internal waves. Included in this report are comments on the observations made and tables of the observations.

INTRODUCTION

The type of work that has been pursued for the period of 15 May to 15 November 1953 has been practically the same as previously accomplished under this contract. Fourteen cruises in Florida Current were made. Temperature-depth records were made with bathythermographs and in connection with the regular hydrographic stations, with reversing thermometers. Surface currents were measured by means of the Geomagnetic Electrokinetograph. Mean current velocities were determined by the total set of the ship during the transects whenever this was practical. A mean "K" factor for the GEK measurements was determined. More work was devoted to hydrographic stations than had previously been done. Aside from the usual transects of the Florida Current, transects were made between Alligator Reef and Cay Sal Bank, Riding Rock and Miami, and Lake Worth and Settlement Point, Grand Bahama I.

In addition to the transects completed hydrographic observations were made in one position to cover a semidiurnal tidal cycle. Also further observations along the convergence area on the western edge of the Current were made. Work on a buoyed recording current meter was accomplished but only trial records have been made during its calibration due to technical difficulties in the instrument. Permission from the Army Engineers and Coast Guard has been granted for buoying this instrument near the Miami Sea Buoy in an attempt to measure the changing current velocities and directions of the western edge of the Florida Current. The Cat Cay Tide Gage has continued in operation for this project, and records have been forwarded to the U.S. Coast & Geodetic Survey.

The Miami-Cat Cay transects were continued in the manner described in the semiannual report for 15 November 1952 to 15 May 1953 in an attempt to discover the gross seasonal variations in temperature that may or may not be related to transport and velocity variations. Analysis of the observations has helped to clarify the understanding of the relationship of current velocity pattern and mass transport (see Section A) and of the possible effects of the tides on the main current (see Section B). Section C of this report consists of graphic representations of temperatures, salinities and GEK current vectors with some comments. In Section D are tabulated (a) observations of the hydrographic stations and (b) pertinent information for all GEK fixes.

SECTION A

THE VELOCITY STRUCTURE AND THE TRANSPORT OF THE FLORIDA CURRENT: AN APPLICATION OF BJERKNES' EQUATION FOR STABLE INERTIAL OSCILLATIONS ALONG ISENTROPIC SURFACES

by

Frank Chew

The Marine Laboratory, University of Miami

INTRODUCTION

The meandering of the Gulf Stream in the ocean shares many characteristics with the meandering of the jet stream in the atmosphere. Haurwitz and Panofsky (1) on the basis of a simplified model conclude that the meandering of the Gulf Stream may occur when it leaves the "containing wall" of the continental border. A cause of meandering may be inertial oscillation of water particles along isentropic surfaces such that the oscillation may become unstable when the stream leaves its containing wall but must be necessarily stable when within its containing walls. The Florida Current between the Florida Peninsula and the Great Bahama Bank is thought to have stable inertial oscillations. On the basis of certain assumptions, J. Bjerknes (2) derived an expression relating the transverse speed component of the particles in stable inertial oscillation along isentropic surfaces to several measurable variables. For the Florida Current one of these variables was measured by C. K. Wertheim, his results are now in press.

This paper reports on a study of the Florida Current on the basis of Bjerknes' equation, Wertheim's transport values and surface velocity profile across the Florida Current as determined by the Geomagnetic Electrokinetograph (G.E.K.) developed by W. S. von Arx (4) and carried out by this Laboratory.

THEORY

Suppose the water particles in the Florida Current are subject to impulses moving them in the east or west direction along isentropic surface with a speed v_n which is superimposed on the general northward flow. With certain assumptions regarding the kinematic state of the particles and neglecting the frictional force and field acceleration, the magnitude and direction of these particles acted upon by impulsive forces are given approximately by the Bjerknes equation for stable inertial oscillation along isentropic surfaces:

$$v_n = \frac{-\frac{\partial v_g}{\partial t}}{\left(2f + \frac{\partial v_g}{\partial n}\right)} \tag{1}$$

where $\underline{n}$ is the magnitude of the vector pointing east in the direction of steepest downslope along an isentropic surface, $\underline{v_g}$ the geostrophic current and $\underline{2f}$ the Coriolis parameter. For a right-handed coordinate system with the positive $\underline{x}$-axis due eastward and on the assumption that the $\underline{n}$-axis forms a negligible angle with the $\underline{x}$-axis $\frac{\partial v_g}{\partial n}$ will be approximated by $\frac{\partial v_g}{\partial x}$. Integrating equation (1) from the sea bottom to the ocean surface and from one bank to the current axis, equation (1) becomes:

$$\iint v_n \,\delta x \,\delta z = \frac{-\frac{\partial}{\partial t}\iint v_g \,\delta x \,\delta z}{\left(2f + \frac{\partial v_g}{\partial x}\right)} \tag{2}$$

where a mean value of the denominator has been used and taken outside the integral sign. The interchange of the local time change operation and the spatial integration is permissible since it is assumed that the time change of the current axis position is vanishing small.

Equation (2) is directly applicable to the Florida Current west of the current axis when one assumes that the Florida Current is geostrophic. For the portion of the current from Miami to the current axis equation (2) states that when the total transport of the current west of the axis increases with time, the average transverse inertial movement along isentropic surfaces is toward Miami. When the transport decreases with time the direction of the inertial motion is reversed. Assume for the moment that this transverse inertial motion is confined to the west of the current axis, then transverse inertial motion towards the Miami side would decrease the slope of the sea surface and hence the geostrophic current. Similarly, transverse motion toward the current axis would increase the geostrophic current.

In the atmospheric circulation patterns are occasionally found where the magnitude of the anticyclonic shear in an air stream exceeds that of the local turning of the earth. The Florida Current, partly because of its low latitude setting, shares this characteristic and three GEK transects across the current have been found to contain anticyclonic shear of magnitude greater than $6.35 \times 10^{-5}\ sec^{-1}$, the magnitude of the local turning of the earth for latitude 25 50' N. If it is assumed that these surface velocity profiles are also representative of the condition along the isentropic surfaces then equation (2) may take on a specialized form for application to the portion of the current east of the current axis:

$$\iint v_i \,\delta x\,\delta z = \frac{\partial/\partial t \iint v_g \,\delta x\,\delta z}{(\partial v_g/\partial x - 2f)} \qquad (3)$$

Equation (3) states that when the total transport of the current east of the axis increases with time the average transverse inertial movement is toward the east while for a decrease in transport the average transverse motion is toward the current axis.

Suppose the transportseast and west of the current axis increase or decrease simultaneously, then a decrease in transport will effect a transverse convergence at the axis as shown in Figure A-1a, while an increase in transport will effect a transverse divergence at the axis as shown in Figure A-1b. The axis appears as a line of minimum transverse exchange, so that in the case of convergence water is brought from both banks to accumulate near the axis and in the case of divergence water is taken from the axis and piled up at both banks.

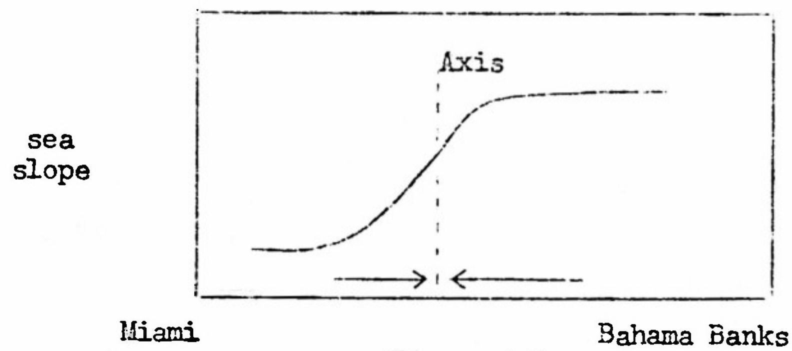

Figure A-1a

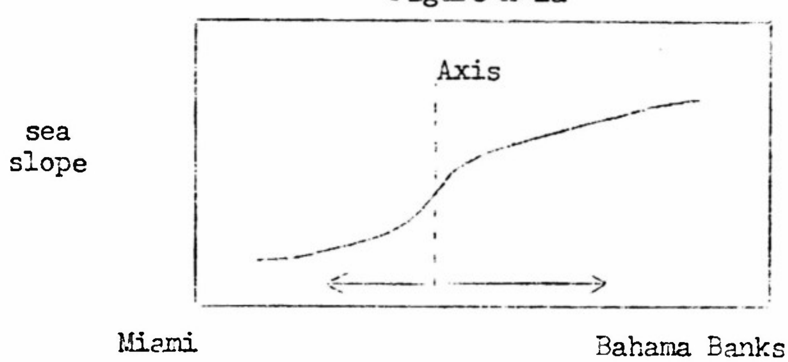

Figure A-1b

From the geostrophic equation and equations (2) and (3) the following conclusions are derived:

a. When the total transport of the Florida Current is increasing with time the speed profile across the entire current should tend to show a higher average current east of the current axis and a lower average current west of the current axis.

b. When the total transport of the current is decreasing with time, the speed profile across the current should tend to show a lower average current east of the axis than west of it.

The conclusions are illustrated in Figure A-2.

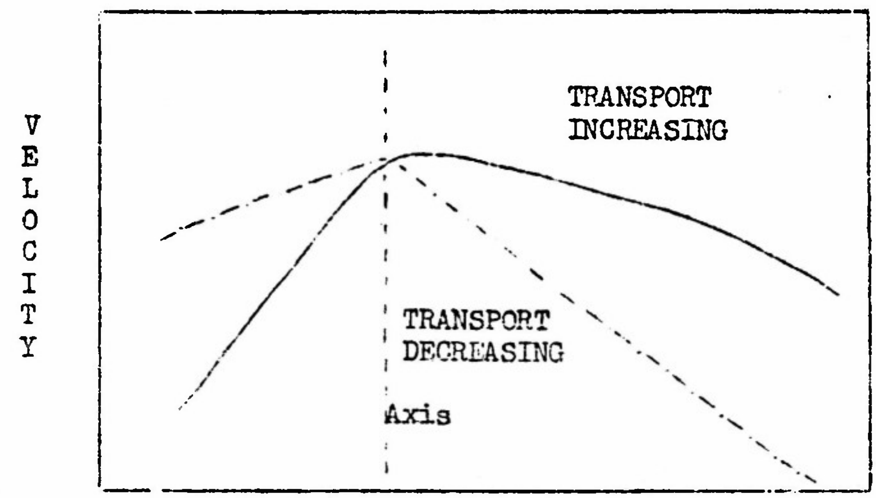

Figure A-2

APPLICATION

During the past year the Marine Laboratory made various GEK transects across the Florida Current. Coinciding with these transects Wertheim measured the time change of total transport of the Florida Current by a study of the electric potential between Key West and Havana. For the present application the sign of the local time change of the total transport of the Florida Current will be read off Figure A-3, which is a reproduction of Wertheim's Figure 2. A total of nine GEK transects are available for this study and they are summarized in Table I. Of the nine transects three have anticyclonic shear of magnitude greater than the local Coriolis paramter; equations (2) and (3) are strictly applicable to these. But the rest are included on the supposition that the anticyclonic shear along the isentropic surfaces is larger than is reflected at the surface.

The magnitudes of the anticyclonic shear were computed by taking the north components of the uncorrected GEK measured current at Long. 79 22' W and subtracting it from that at the current axis and then dividing the remainder by the distance between them. The result is finally multiplied by

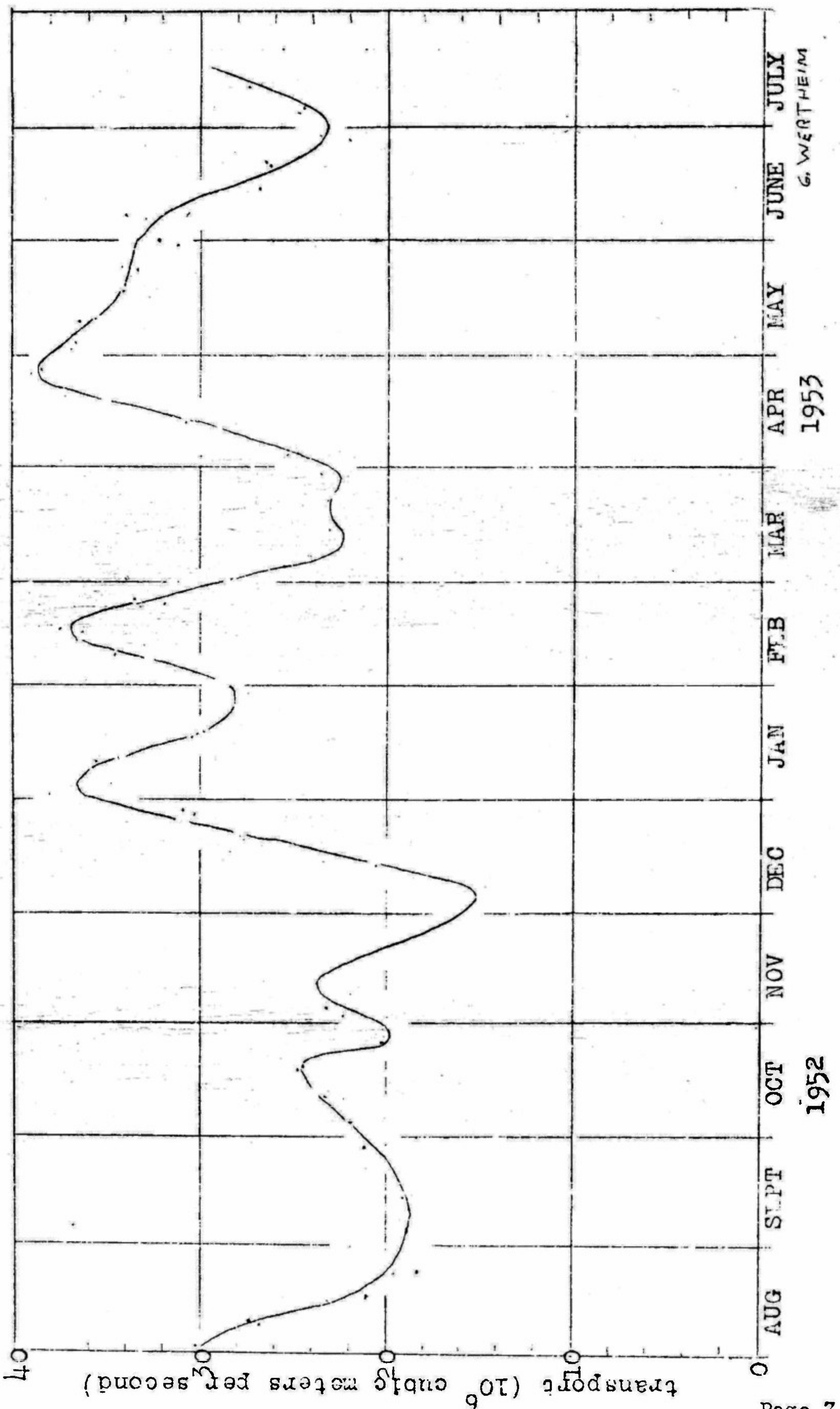

Fig. A-3 MASS TRANSPORT OF THE FLORIDA CURRENT

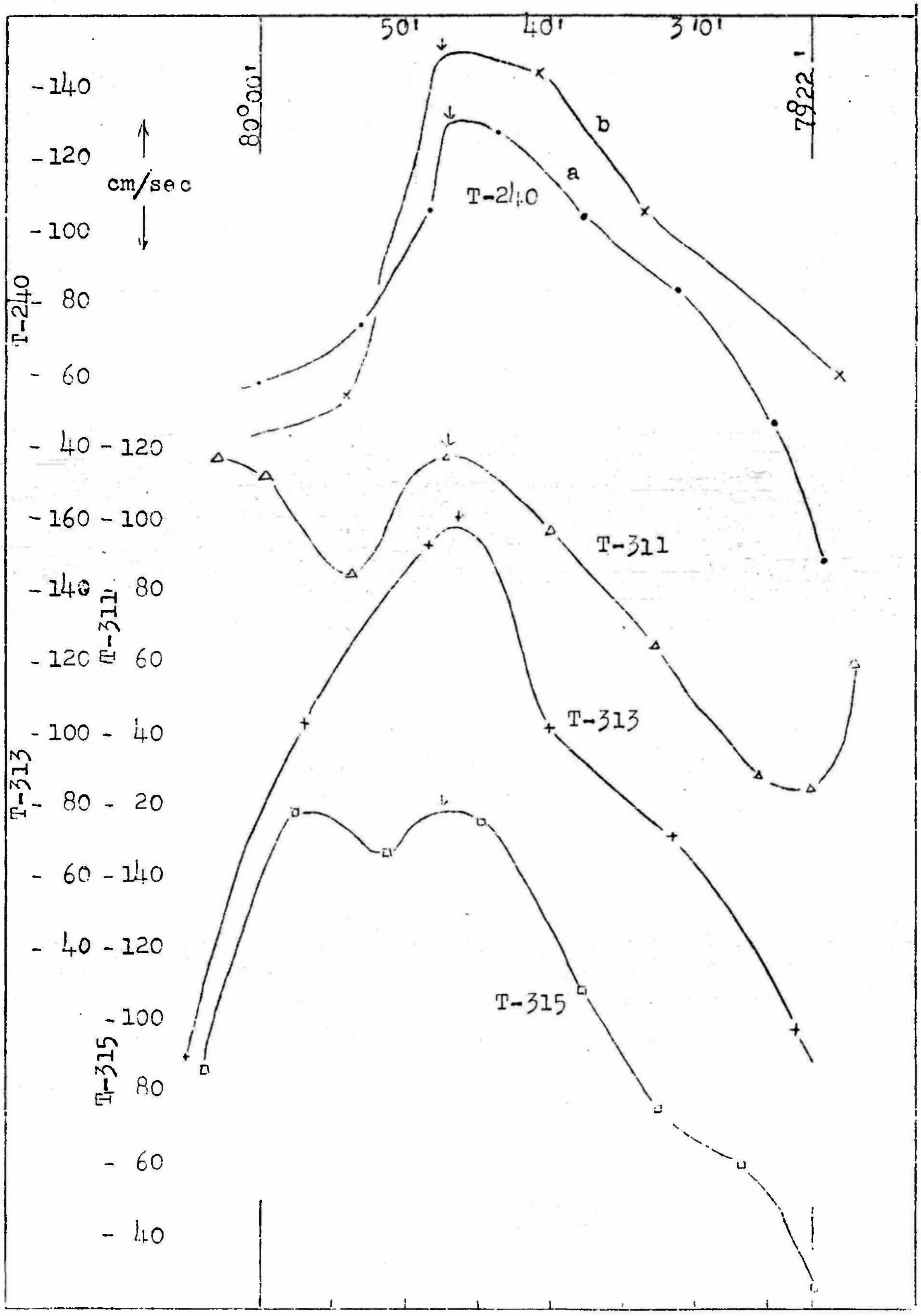

Figure A-4a NORTH COMPONENTS OF CURRENTS
(uncorrected for "K" factor)

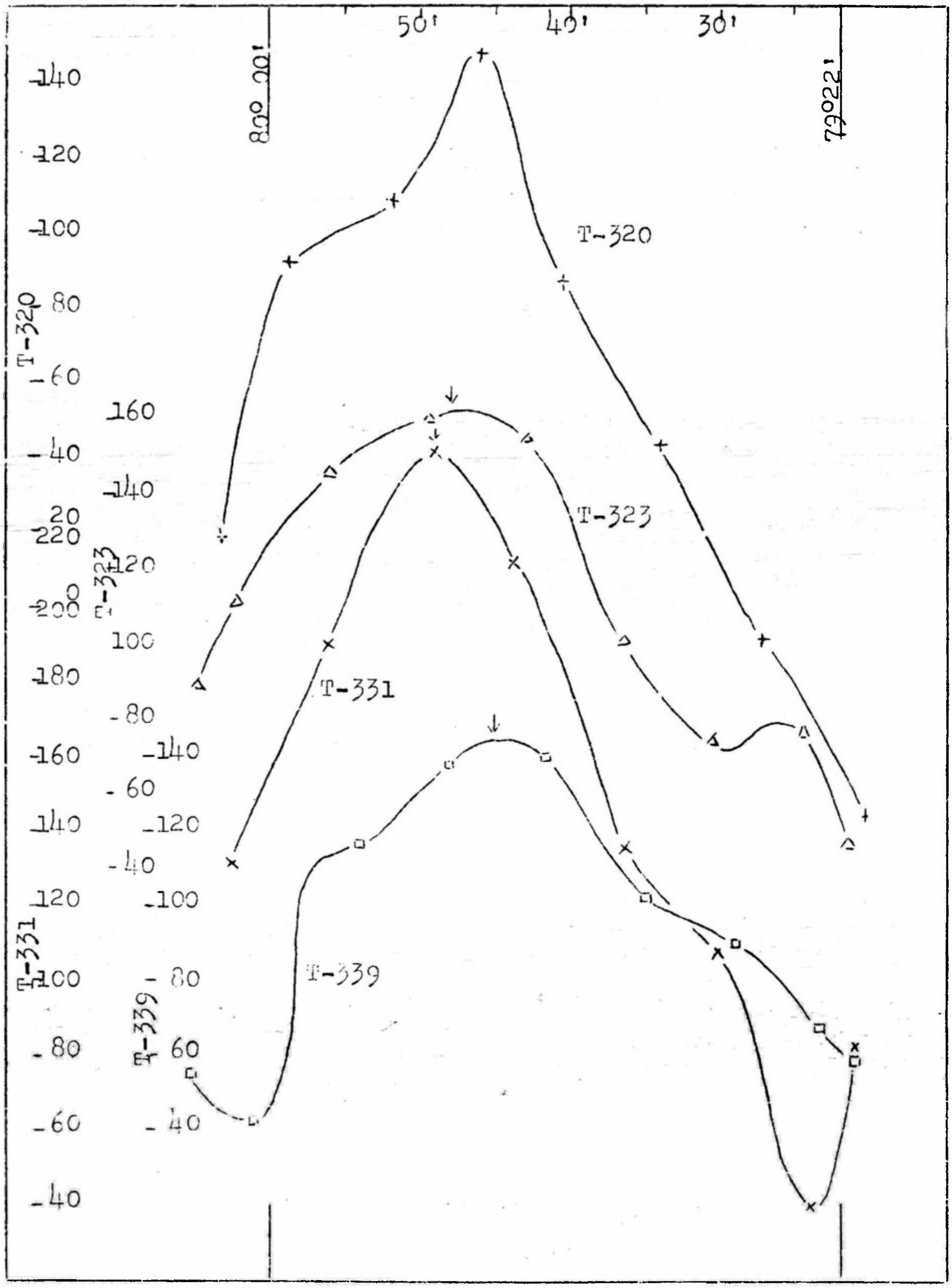

Figure [illegible] NORTH COMPONENTS OF CURRENT
(uncorrected for "K" factor)

TABLE A-1

Summary of GEK Transects

Cruises	Dates	Signs of transport change	Anticyclonic shears	Mean K	Mean[1] K
T-240A	22 XII 52	positive	5.2×10^{-5} sec^{-1}	1.8	2.2
T-240B	23 XII 52	"	3.8	1.8	2.2
T-311B	17 II 53	negative	4.2	1.9	2.2
T-313B	27 II 53	negative	6.4	1.8	1.5
T-315A	12 III 53	negative or zero	5.0	1.5	1.6
T-320B	26 III 53	" " "	8.0	1.7	1.8
T-323A	28 IV 53	negative	4.5	1.7	1.4
T-331A	26 V 53	"	7.2	1.5	1.3
T-339A	25 VI 53	"	2.7	1.5	2.0

[1]K values according to reference (5)

the K factor averaged over the whole current (the K factor is a number which the uncorrected GEK current should be multiplied to get the actual current). The K factors used were those given by Wagner and Chew (5) but adjusted to meet Wertheim's transport values.

The location of each GEK fix and the north component of each uncorrected GEK measured current for each of the above cruises are summarized in GEK Data Tables at end of report.

These data are plotted in Figure A-4, north component of the current against the meridians of the positions across the Florida Current. The circled dots and crosses are current fixes while the small vertical arrows indicate positions of shear in speed or relative maximum as determined from the original GEK records.

For the application of equations (2) and (3) the axis of the Florida Current needs to be defined. Bi-axial current is occasionally found, but for the purpose at hand, the current axis is defined as the absolute maximum in the north component found nearest to Long. 79 degrees and 47 minutes west;

as defined the current axis is seen to be contained within a zone of 10 kilometers. This is consistent with an earlier definition by Wagner and Chew (Op. Cit). To the east of the current axis as defined equation (3) will be applied while to the west of the axis equation (2) will be applied.

In the actual evaluation of V_e and V_w, the average surface speed east and west of the axis respectively, only the velocity curves included between Long. 80.00° and 79° 22' west were used. The choice of these limits was more or less arbitrary but it was guided by the considerations that some GEK observations began or were discontinued at or near these longitudes and that west of Long 80.00° the bottom begins to shoal. The following operations were performed by planimetry:

$$V_e = \frac{1}{L_1} \int_A^C v\,dx \qquad (4)$$

$$V_w = \frac{1}{L_2} \int_M^A v\,dx \qquad (5)$$

Where v is the north component of the current, dx an increment of distance across the Florida Current, C the Long. 79° 22', A the current axis, M the Long. 80° 00'; L_1 the distance C-A and L_2 the distance A-M. These results are tabulated in Table 2. In all these instances V_e and V_w have the correct relative magnitude as illustrated in Figure A-I.

TABLE 2

Values of V_e and V_w

Cruises	V_w (cm/sec)	V_e (cm/sec)
T-240A	82	92
T-240B	74	115
T-311B	102	75
T-313B	124 ?-	85
T-315A	152	97
T-320B	117	52
T-323A	151	106
T-331A	205	140
T-339A	97	87

surfaces also exist. The current velocity profile adjusts itself in the manner that when the transport of the Florida Current is increasing with time the average current speed east of the current axis is higher than that west of the axis, and that when the transport is decreasing the current west of the axis is higher than that east of the axis.

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3. Wertheim, G. K., Studies of the Electric Potential Between Key West, Florida and Havana, Cuba. Trans. A. G. U. in press.

4. Von Arx, W. S., An Electromagnetic Method for measuring the Velocities of Ocean Currents from a Ship Under Way, Woods Hole Ocean. Inst., Vol. XI #3.

5. Marine Laboratory, University of Miami, Tech. Rept. 53-9.

SECTION B

NOTE ON THE TIDAL FLUCTUATIONS IN THE FLORIDA CURRENT

by

Ilmo Hela and Lansing P. Wagner

For a period of twelve months from December 1952 to November 1953 about 280 Geomagnetic Electrokinetograph "fix stations" were occupied between the Miami Sea Buoy and Gun Cay on the western edge of the Great Bahama Banks. The relatively great number of these stations, which gave information on the distribution and fluctuations in the current, allows for a tentative study on the possible tidal fluctuations in the current. To start with, the west-easterly average distribution of the north and of the east component of the current as indicated by the GEK is given in Figure B-1. The same components were used to draw Figure B-2 which shows the east-westerly average distribution of the current vectors. For these representations the area of observation was divided into sections with 15 to 20 current measurements in each. From these figures the mean location of the axis of the Florida Current can be seen to be roughly at 79°47'W IN THIS AREA. In addition to this the diverging character of the mean current profile is recognizable.

An attempt has been made to study the tidal fluctuations in the Florida Current. For this purpose 187 GEK current measurements were plotted against lunar time. The annual fluctuation in the current, the random meteorological changes in the current conditions, the velocity gradient from west to east and the variations in the magnetic field of the earth would make it necessary to have a great number of observations available for a complete study of the tidal fluctuations. Though the number of stations now available is not great enough, the data seem to indicate the existence of a tidal fluctuation. The mean speed of the Florida Current, indicated by the GEK, varies according to the measurements now available in the manner shown in Table B-1 and Figure B-3.

Table B-1 THE MEAN SPEED OF THE FLORIDA CURRENT AS INDICATED BY THE GEK AS A FUNCTION OF THE LUNAR TIME

Time	Northerly component cm/sec	Easterly component cm/sec	Speed cm/sec	Direction
High Tide at Miami Beach	70	7	70	006°
+1 lunar hour	62	6	62	006°
+2	52	7.5	53	008°
+3	67	17	69	015°
+4	105	1	105	000°
+5	101	8	101	005°
+6	79	1.5	79	001°
+7	97	6	97	004°
+8	57	0	57	000°
+9	70	2	70	002°
+10	79	9	80	007°
+11	79	8.5	79	006°

The harmonic analysis for the lunar cycle of the northerly component yields the following sine curve:

$$v_N = 76.5 + 12.5 \sin(x - 89^\circ)$$

Thus it seems probable that there is a maximum in the northerly component of mean speed of the Florida Current simultaneous with the low tide at Miami Beach and a minimum northerly speed simultaneous with the high tide at Miami Beach.

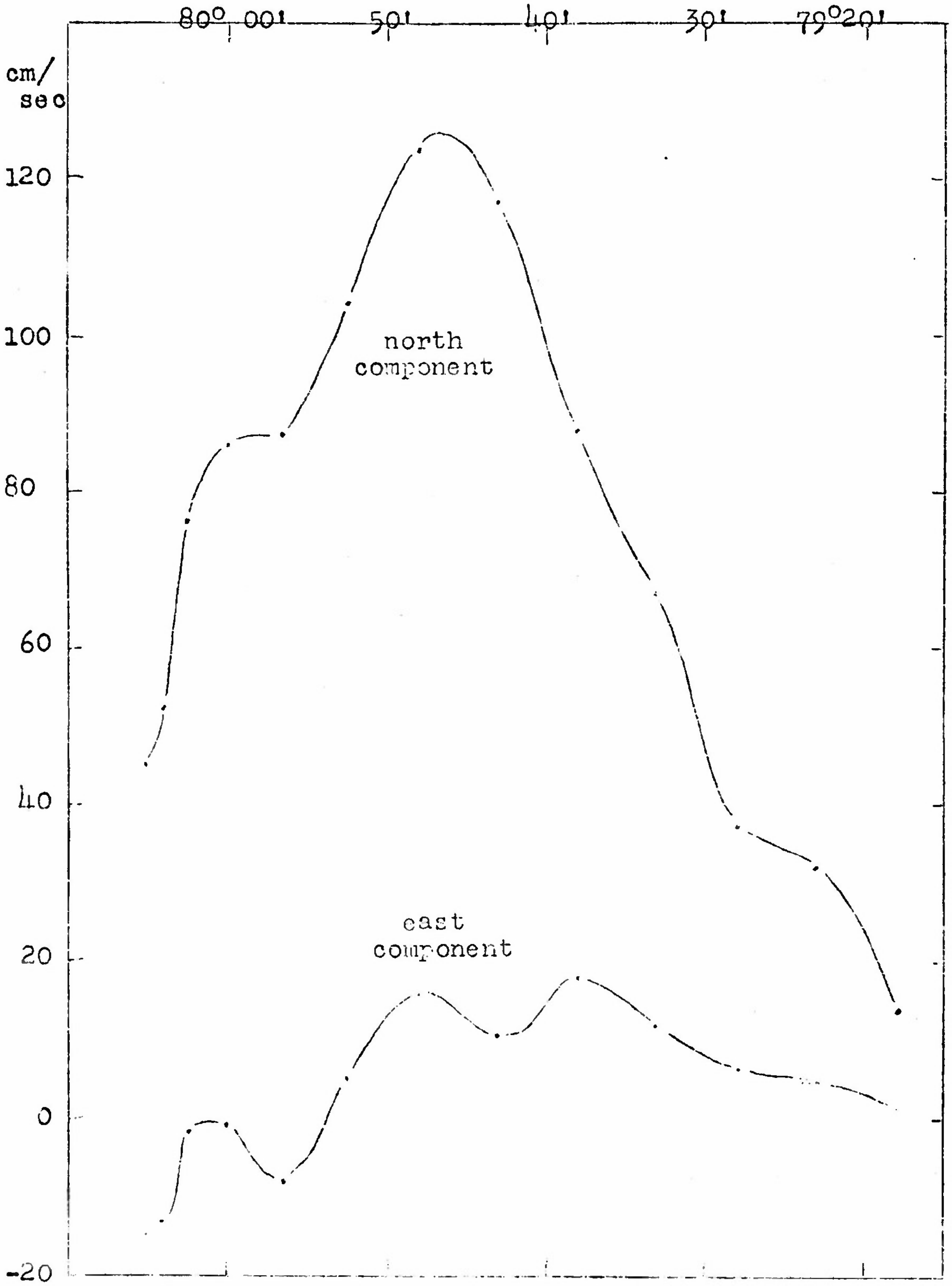


Figure B-1 AVERAGED NORTH AND EAST CURRENT COMPONENTS

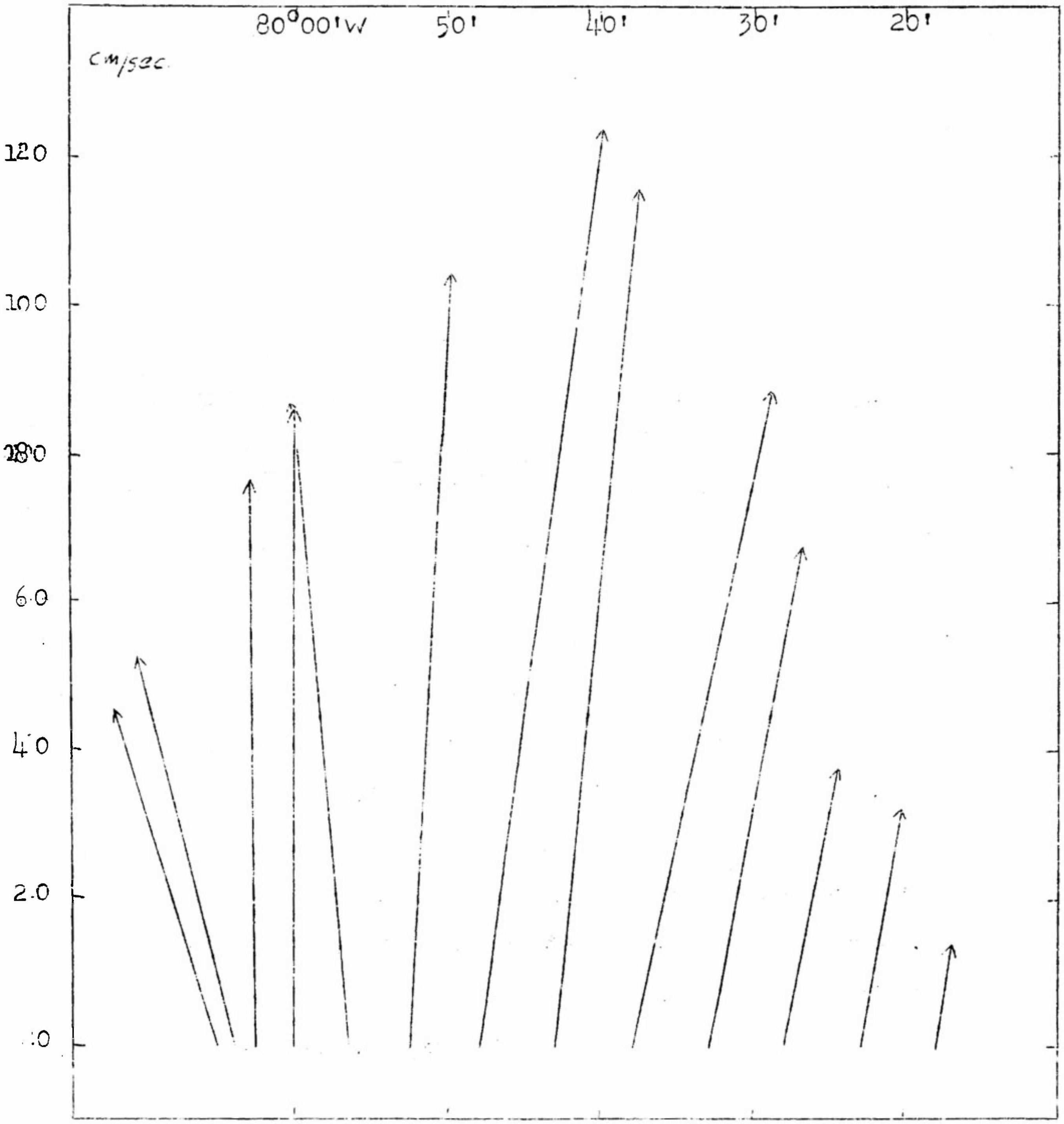


Figure B-2 AVERAGED G.E.K. CURRENT VECTORS

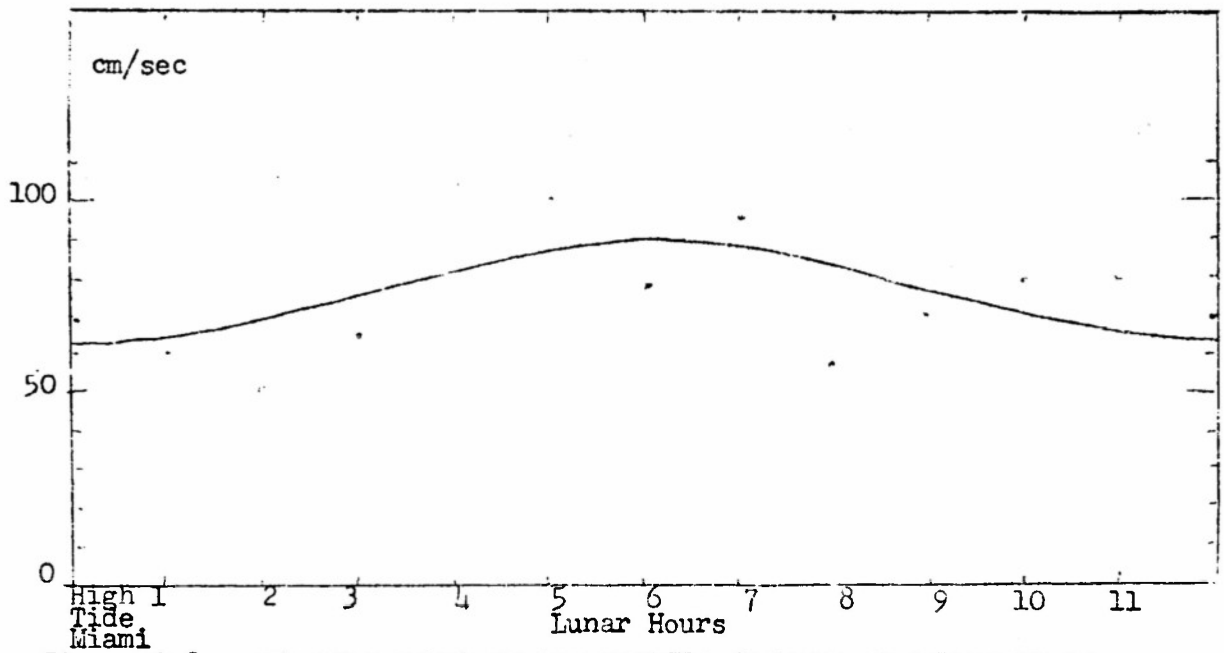


Figure B-3. THE MEAN SPEED OF THE FLORIDA CURRENT AS INDICATED BY THE GEK AS A FUNCTION OF THE LUNAR TIME

In connection with the study of the tidal fluctuations a tentative attempt was made to determine the existence of possible internal waves in the Straits of Florida. For this purpose during Cruise T-362, 10-11 November 1953, six hydrographic stations were occupied in the locality of 25°40'N 79°57'W, where the depth is 180 fathoms. Stations were occupied every two hours. The GEK indicated a surface current of about 30 cm/sec (uncorrected for/"K"). The depths of the different isothermal, isohaline and isopynic surfaces were plotted as a function of time. A distinct up-and-down movement of these surfaces can be seen in the curves given in Figures B-4, 5 and 6. Finally, Figure B-7 shows a combined T-S curve which indicates no changes in the water mass.

Therefore, an hypothesis is needed to explain the observed phenomena. We have to assume that the observations are accurate and that the vertical displacements according to the temperature, salinity and density data are roughly the same. Figure B-8 shows the corresponding "wave heights" as a function of the depth. The maximum of the vertical displacement is encountered at the depth of about 250 meters. At that depth no changes in the hori-

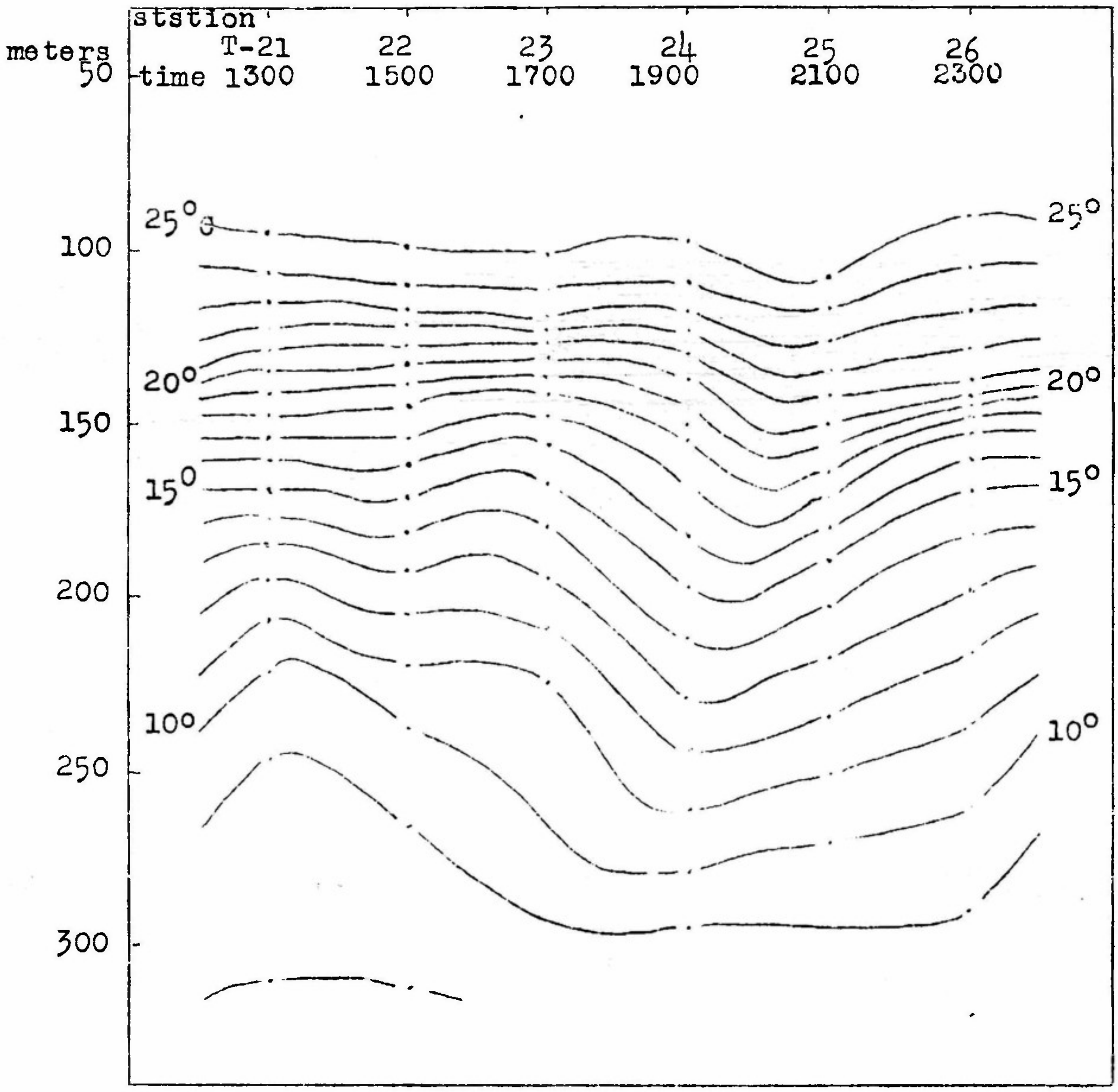


Figure B-4 TEMPERATURES
CRUISE T-362

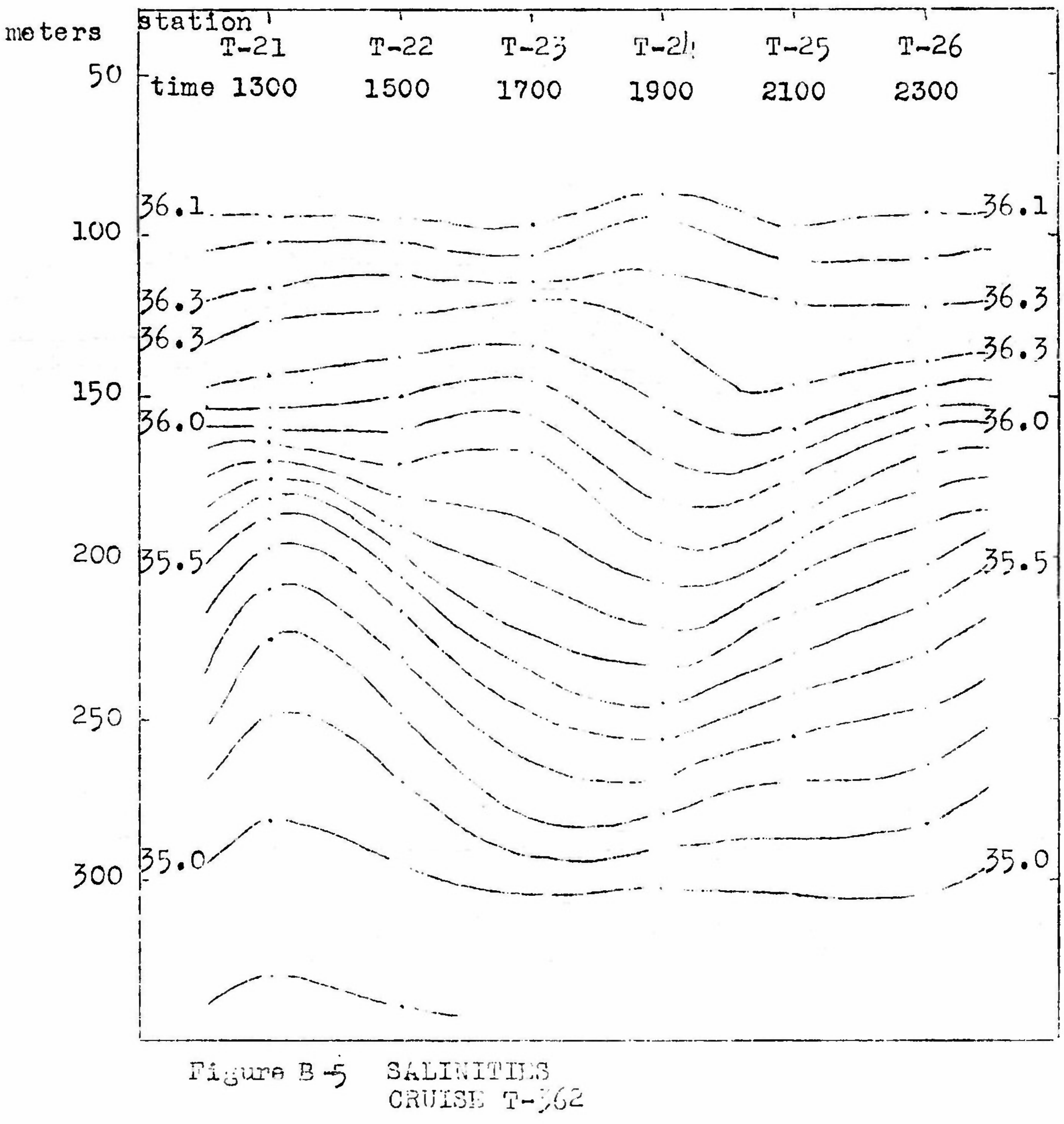


Figure B-5 SALINITIES
CRUISE T-362

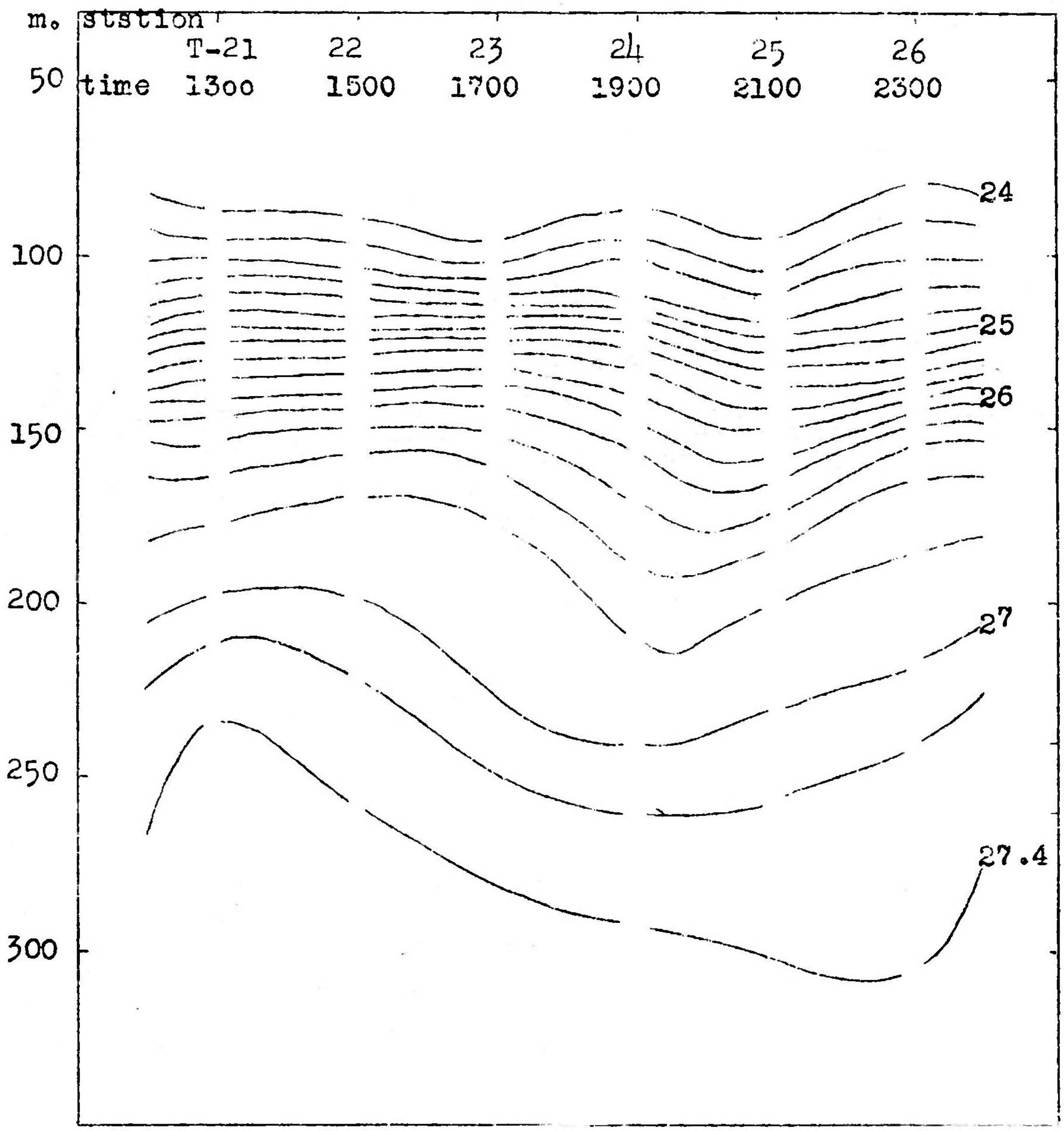


Figure B-6 Sigma T VALUES
CRUISE T-362

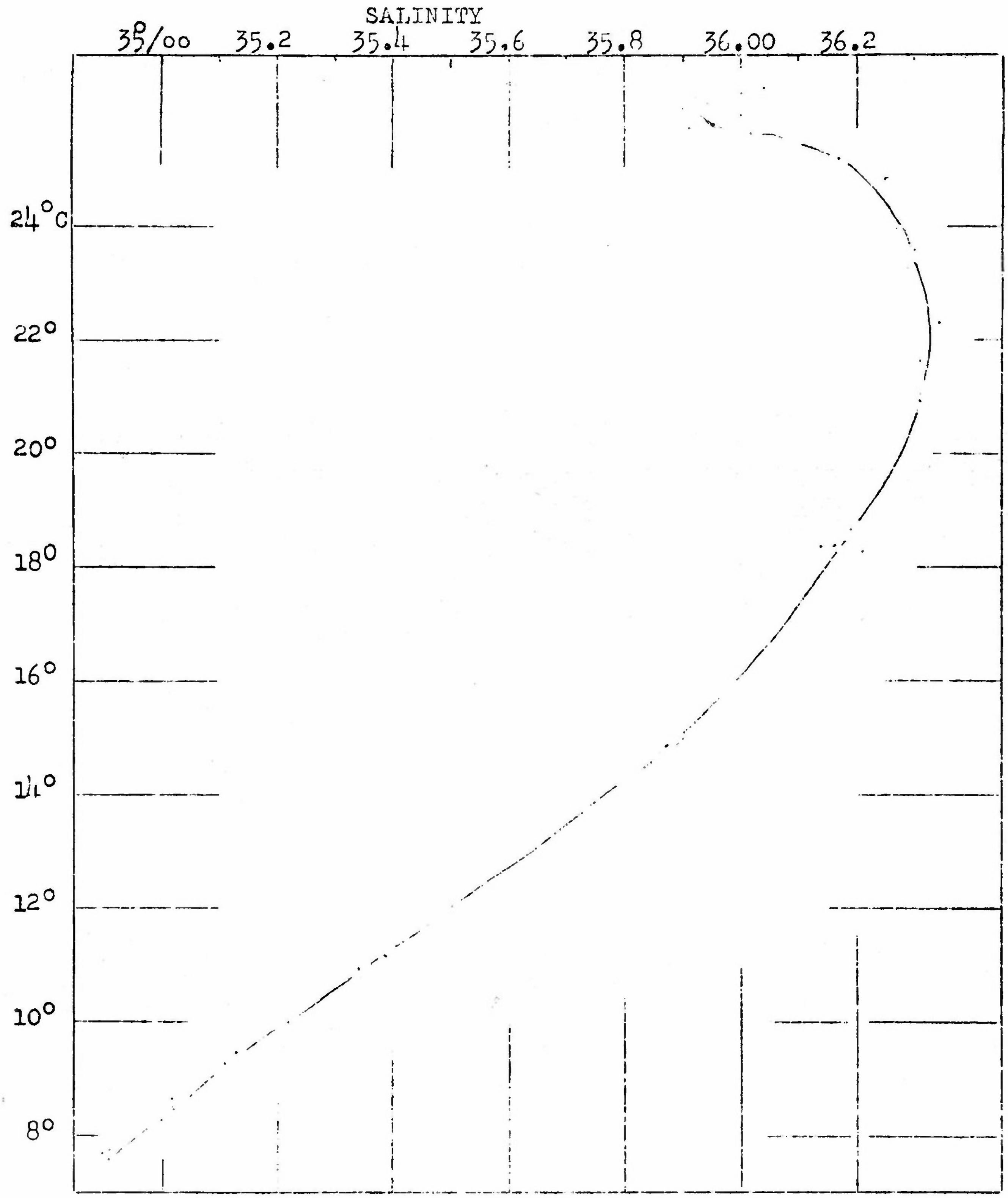


Figure B-7 TEMPERATURE-SALINITY CORRELATION
CRUISE T-362

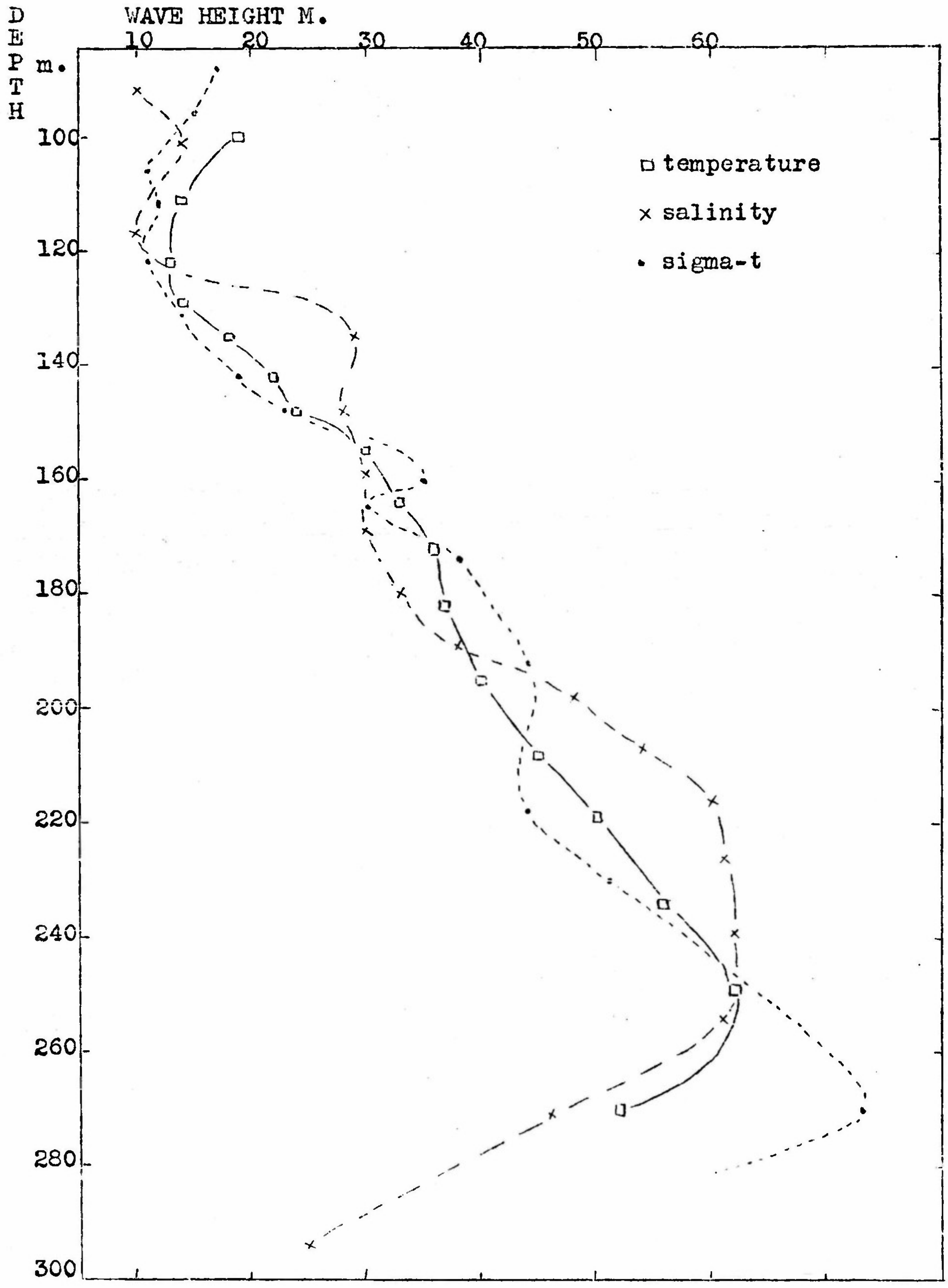


Fig. B-8 WAVE HEIGHTS AS A FUNCTION OF DEPTH zontal velocity can be expected in connection with these displacements. The changes in the horizontal velocities connected with these vertical displacements will have a maximum close to the sea surface. (Below 250m. the horizontal changes in the velocity must be opposite to the ones above the limiting layer.) The most probable cause for this internal fluctuation is that of a wave coming from the south. During this short period of observation the internal wave seems to have its uppermost position at 10:00 hours. Also at 10:00 hours at the surface a maximum southerly component of the current is to be found. In fact, the maximum flood at Miami Beach occurs at about 08:40 hours corresponding to the minimum northerly flow at the surface.

SECTION C

GRAPHIC REPRESENTATIONS OF TRANSECTS OF THE FLORIDA CURRENT AND COMMENTS

ABSTRACT

(1) A temperature-depth profile; (2) a curve showing surface currents across the Florida Current as recorded by the GEK; and (3) curves showing temperatures at 100 meters and 200 meters have been plotted for each transect. In the temperature-depth profiles there is a dotted line to show the depth of the isothermal water. The depth of each reading has been corrected whenever the bathythermogram showed a false surface pressure reading. For those transects made with the GEK bathythermograph traces have been included. All BT slides will be sent to the Woods Hole Oceanographic Institution where they will be photographed. One set will be sent to the Hydrographic Office. Data from several hydrographic stations are included in this section.

The Cay Sal Bank region, in the Straits of Florida immediately north of Cuba, is one of great interest to marine biologists and sports fishermen due to its abundance of fish and plankton. It is also an area of converging currents that may produce hydrographic phenomena seldom encountered in other areas. For these reasons a preliminary cruise was made in that region. "The Atlas of Surface Currents" (H.O. 571) was consulted in an attempt to estimate the current pattern in the channels around the Bank.

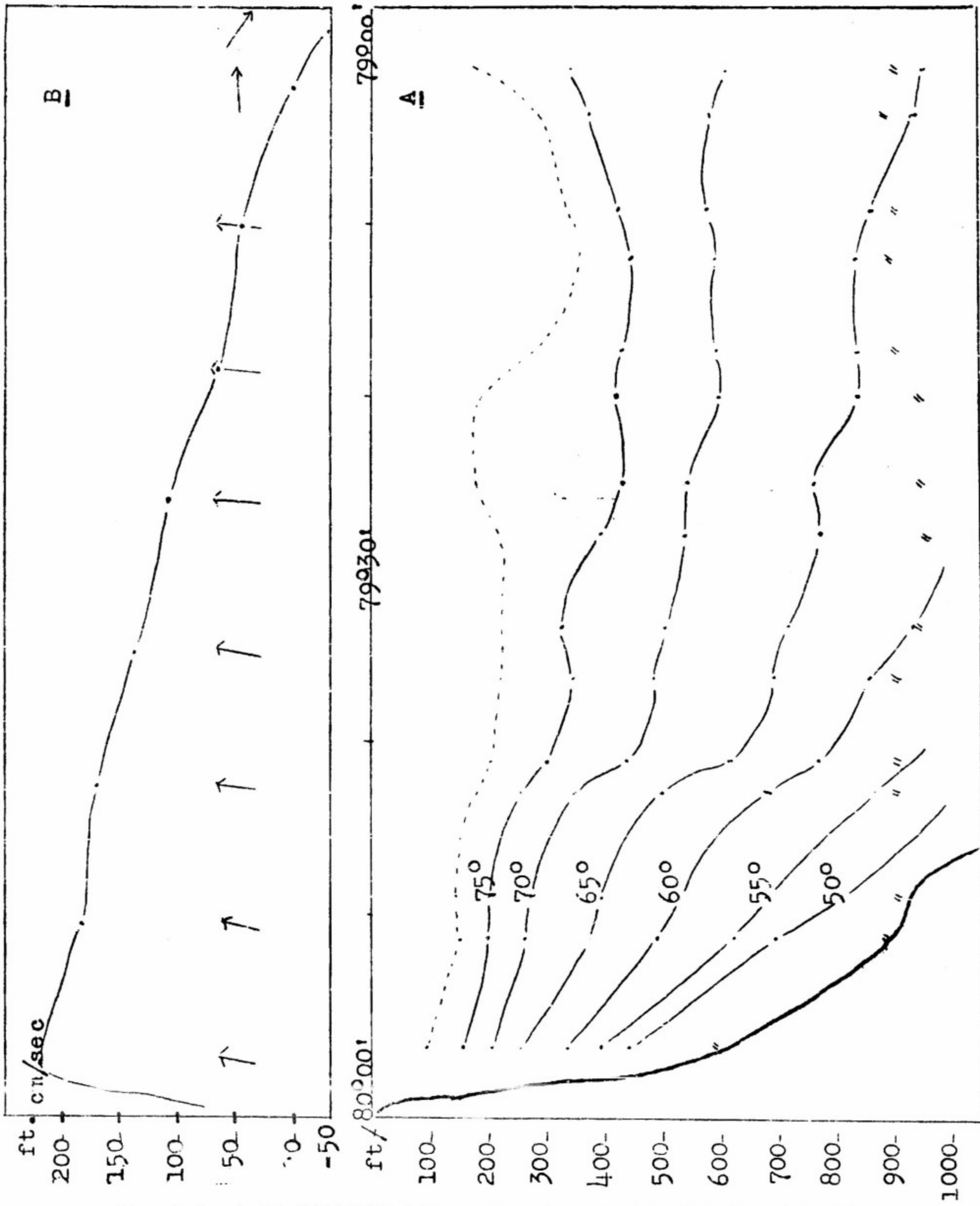


Fig. C-1 A TEMPERATURE-DEPTH PROFILE B GEK CURRENT VECTORS
CRUISE T-324 Lake Worth to Grand Bahama I. May 8, 1953

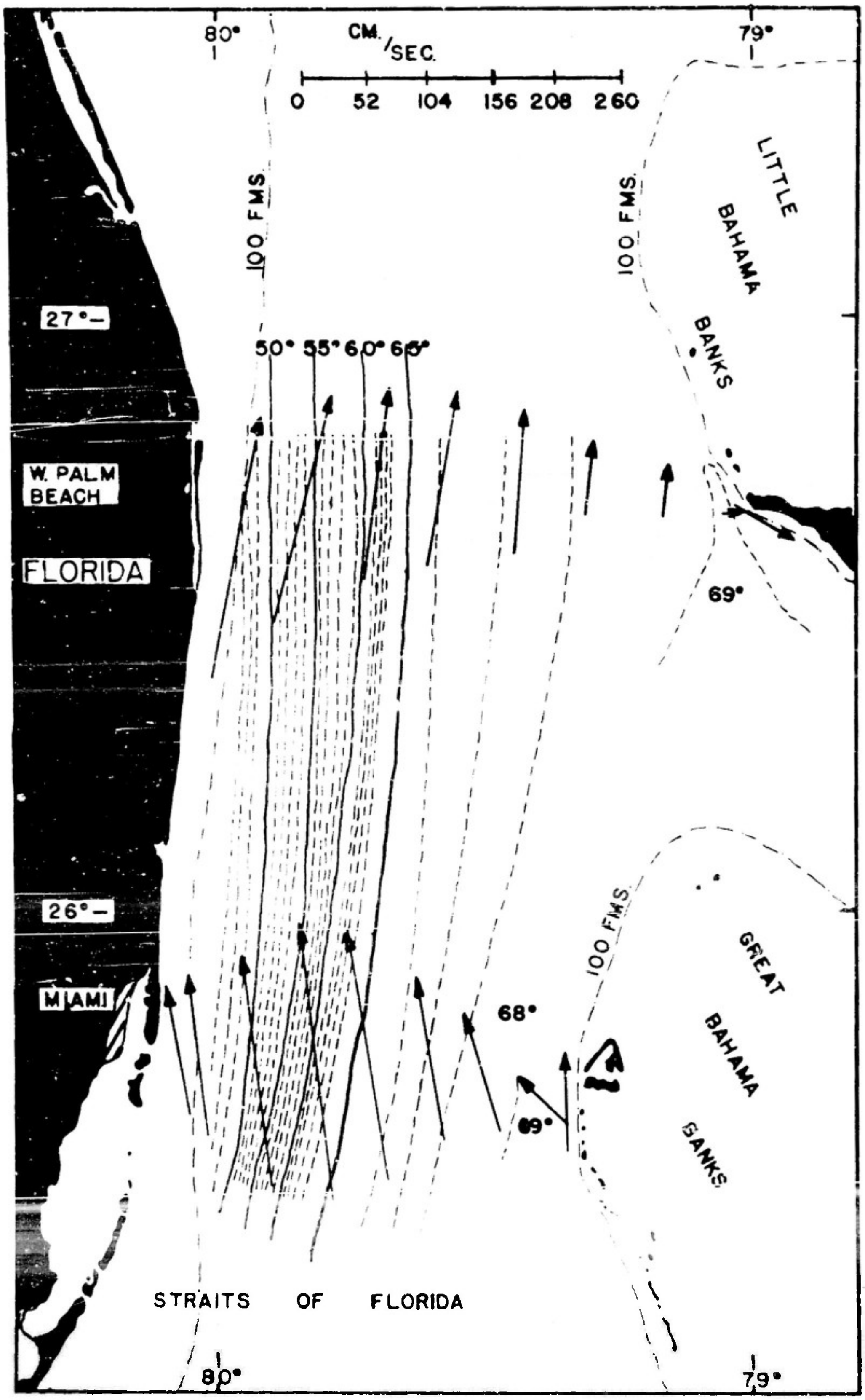


FIGURE C-4

GEK CURRENT VECTORS AND TEMPERATURE AT 200 METERS FOR CRUISES T-324 AND 331.

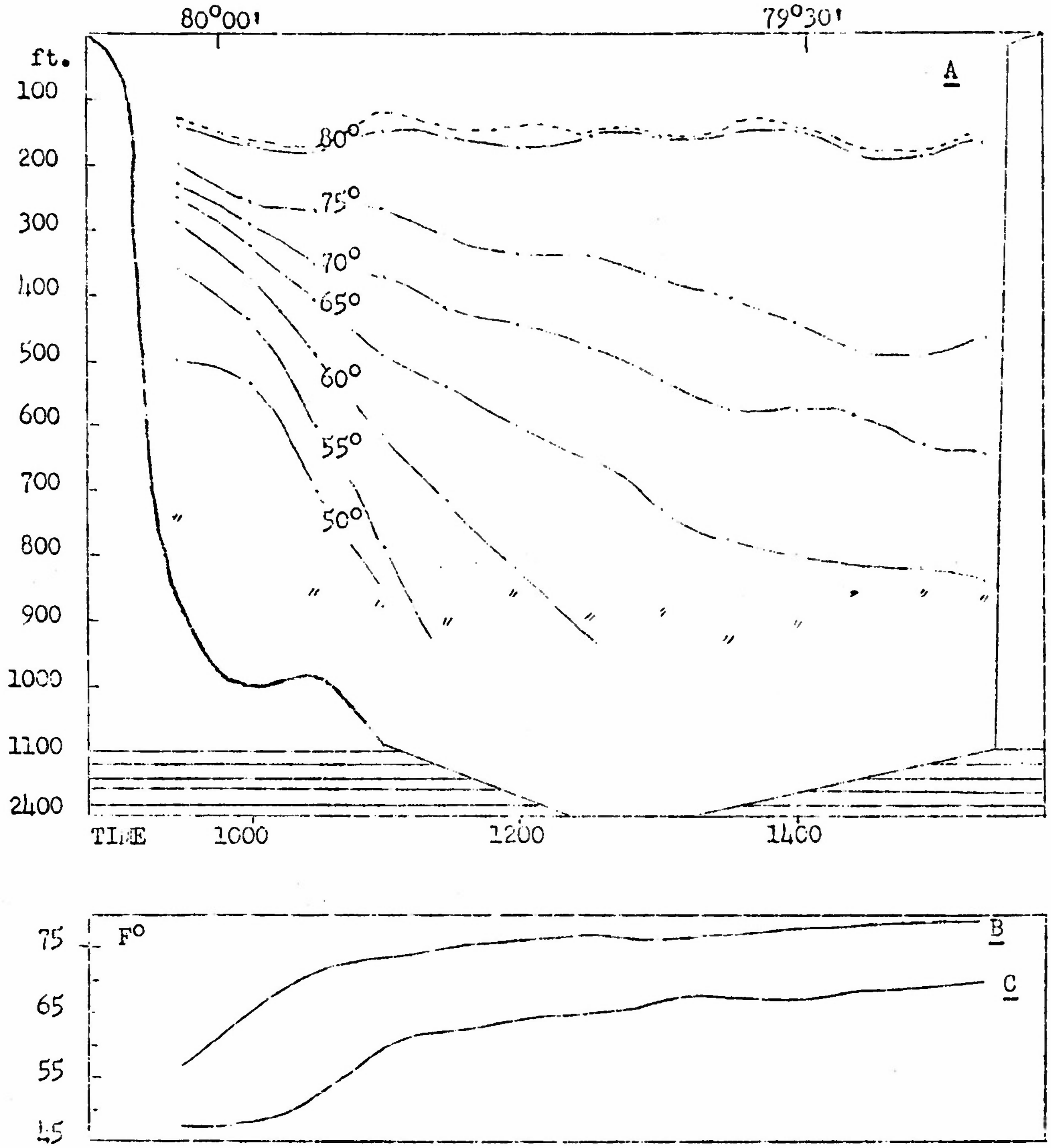


Fig. C-5 A TEMPERATURE-DEPTH PROFILE
B&C TEMPERATURES AT 100 and 200 METERS
CRUISE T-334a Miami -Cat Cay June 9, 1953

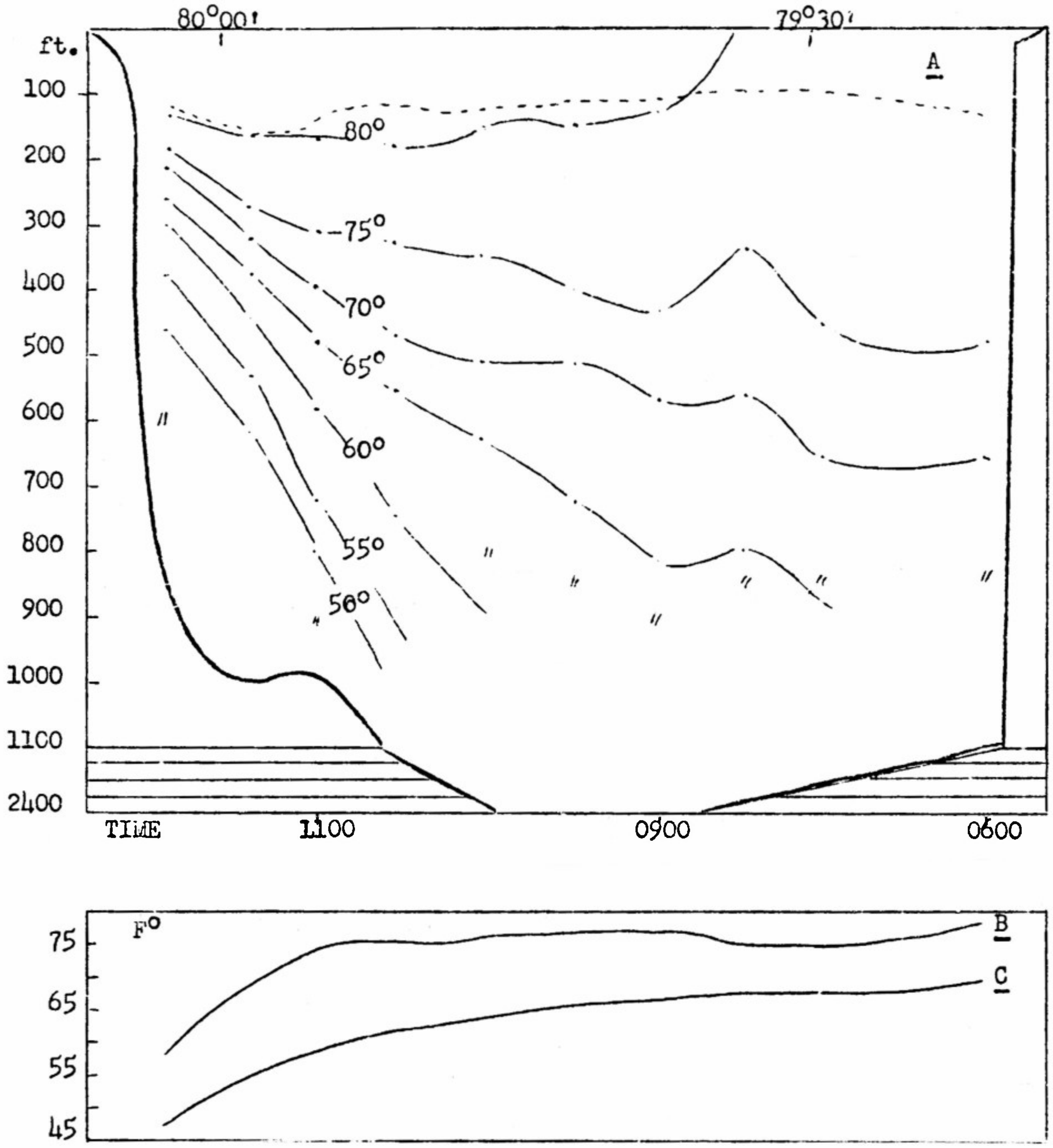


Fig. C-6 A TEMPERATURE-DEPTH PROFILE
B&C TEMPERATURES AT 100 and 200 METERS
CRUISE T-334b Cat Cay-Miami June 10, 1953

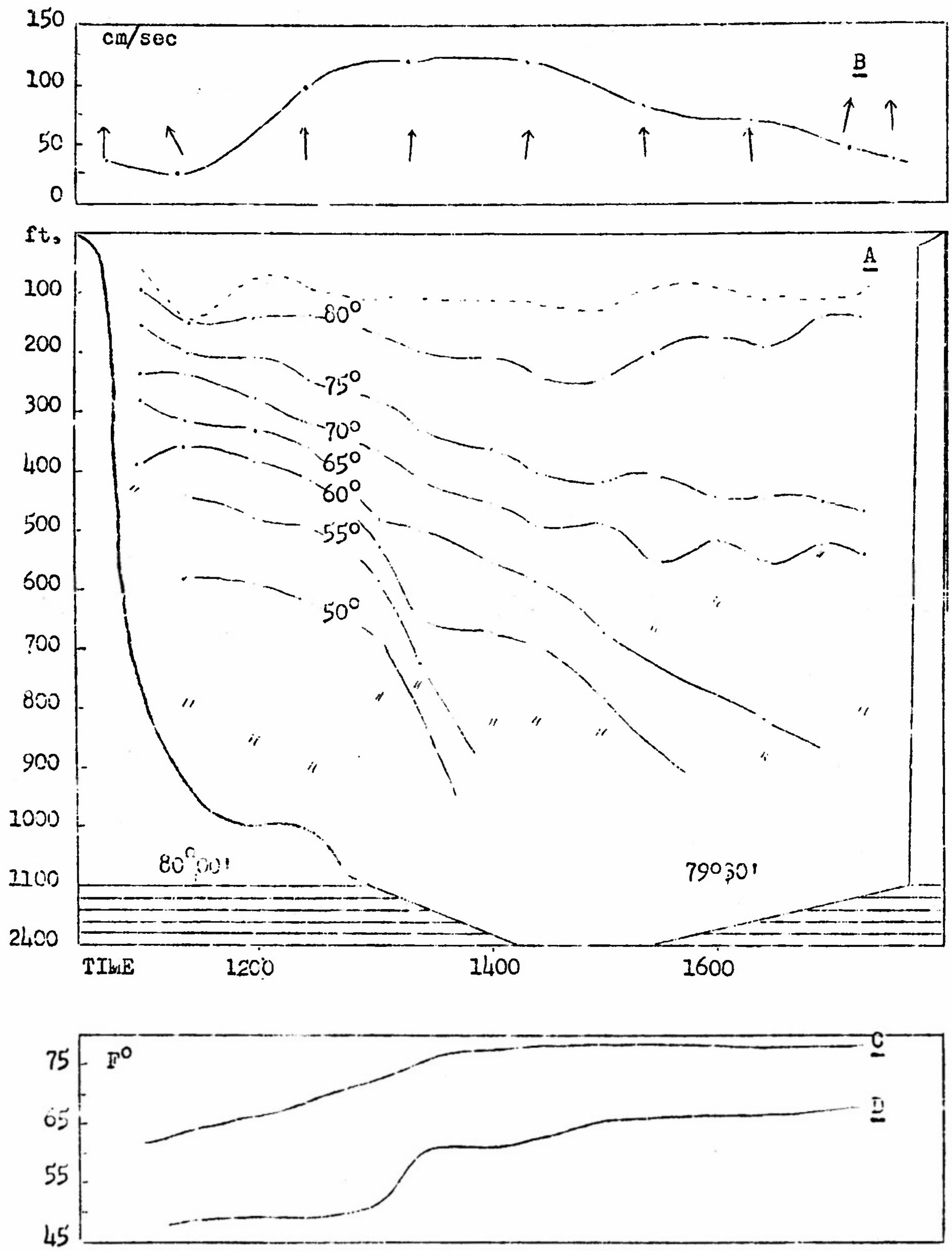


Fig. C-7 A TEMPERATURE-DEPTH PROFILE B GEK CURRENT VECTORS
C&D TEMPERATURES AT 100 and 200 METERS
CRUISE T-339a Miami-Cat Cay June 25, 1953

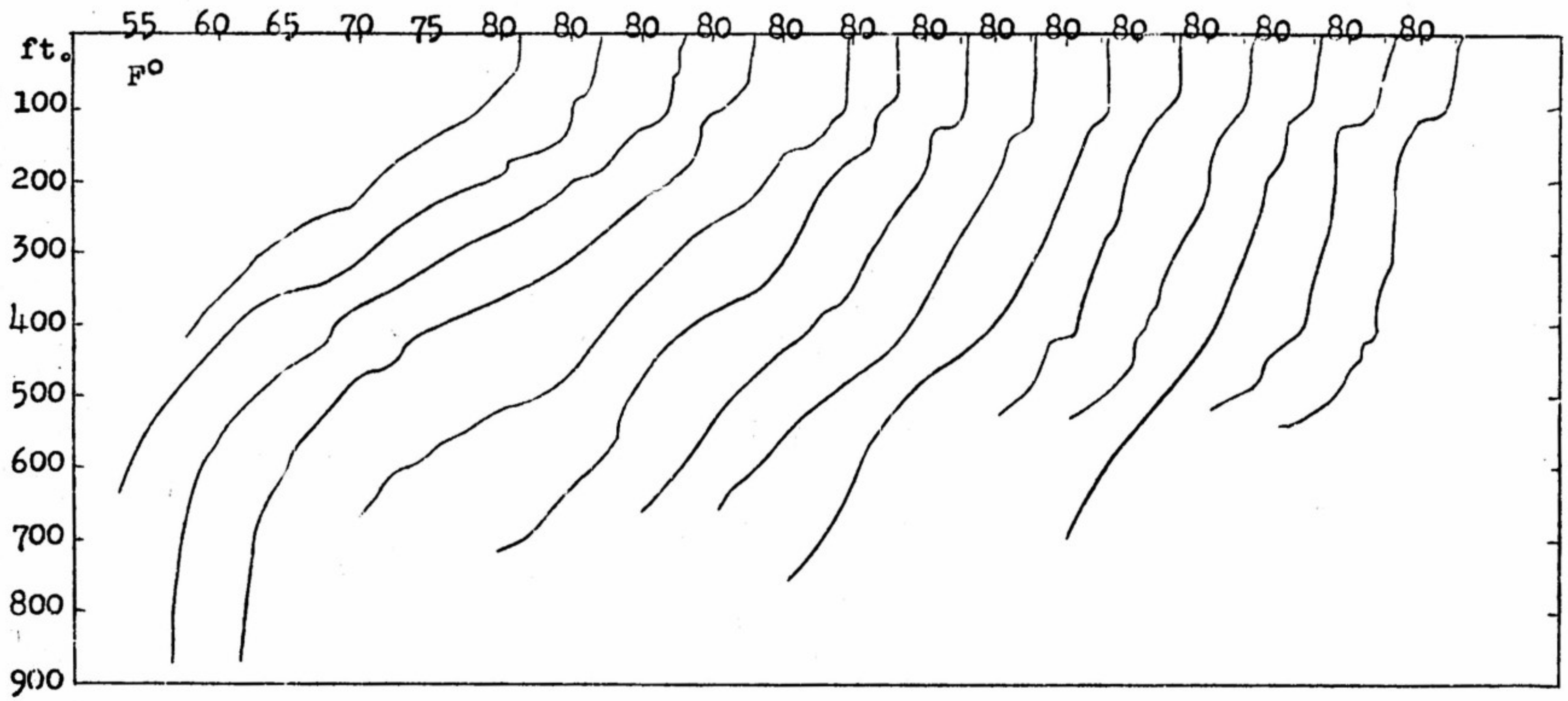


Figure C-8 BATHYTHERMOGRAPH TRACES 1cm = 5°F
CRUISE T-339a

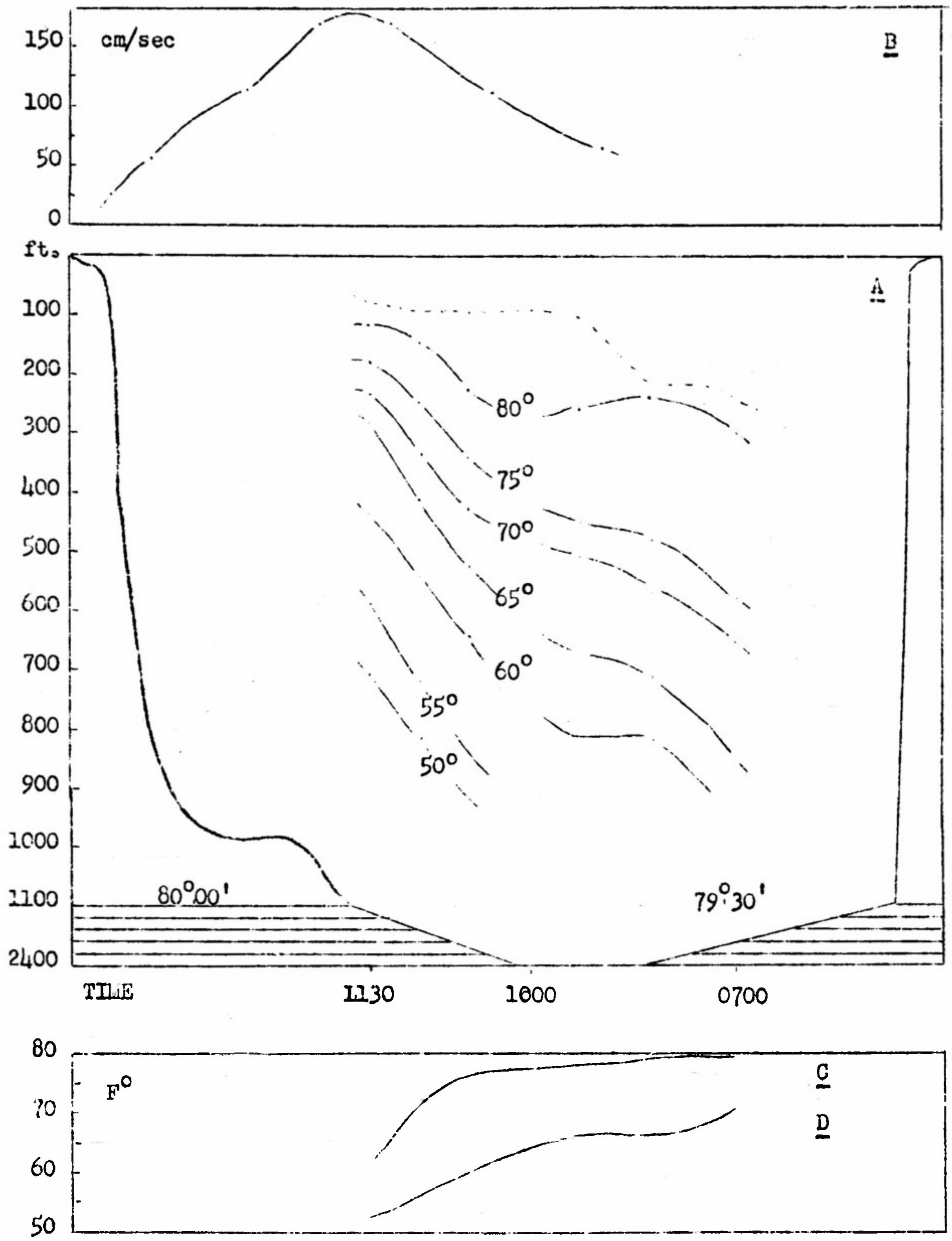


Fig. C-9 A TEMPERATURE-DEPTH PROFILE B GEK CURRENT VECTORS
C&D TEMPERATURES AT 100 and 200 METERS
CRUISE T-339b Cat Cay-Miami June 26, 1953

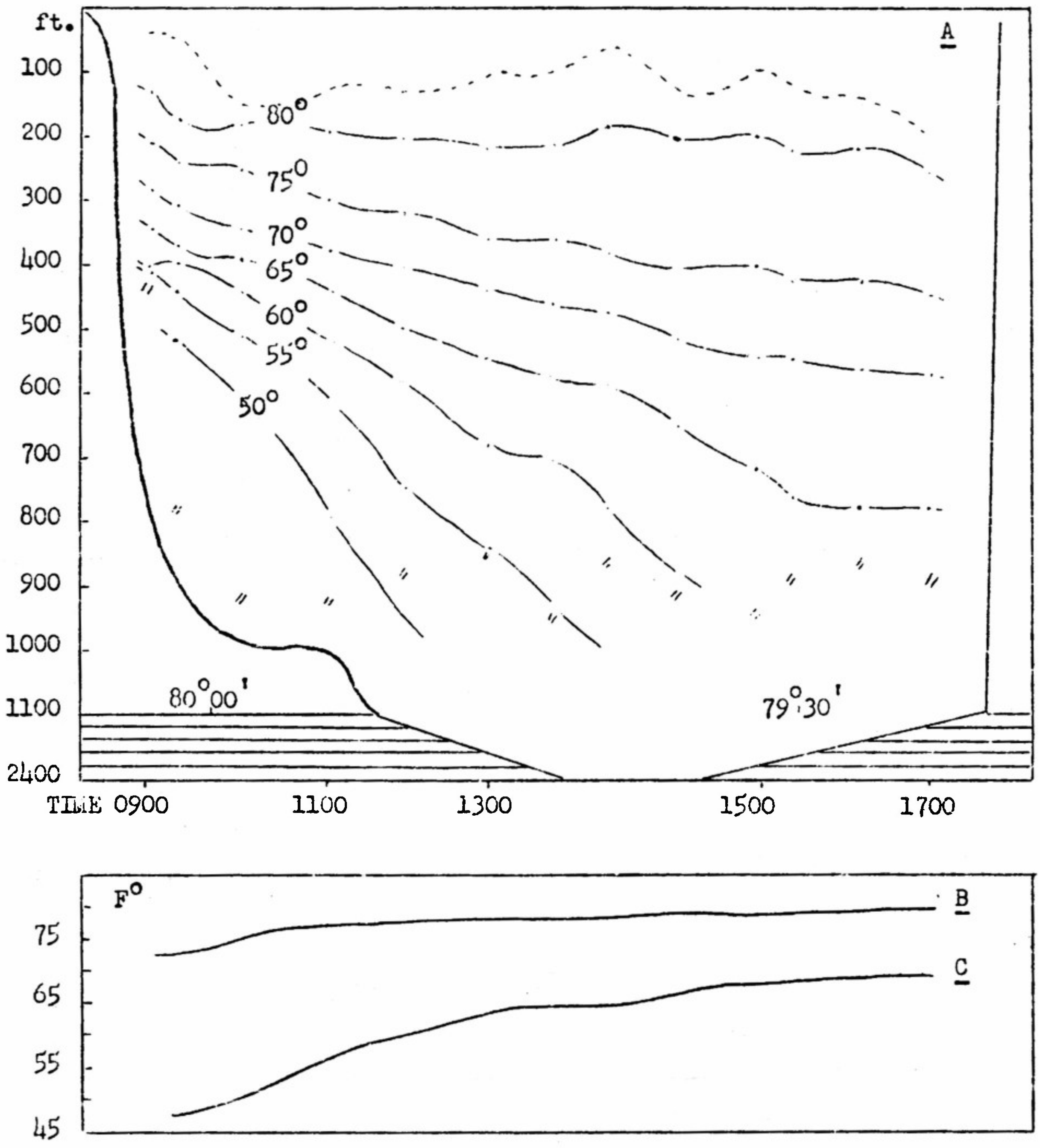


Fig.C-10 A TEMPERATURE-DEPTH PROFILE
B&C TEMPERATURES AT 100 and 200 METERS
CRUISE T-344a Miami-Cat Cay July 7, 1953

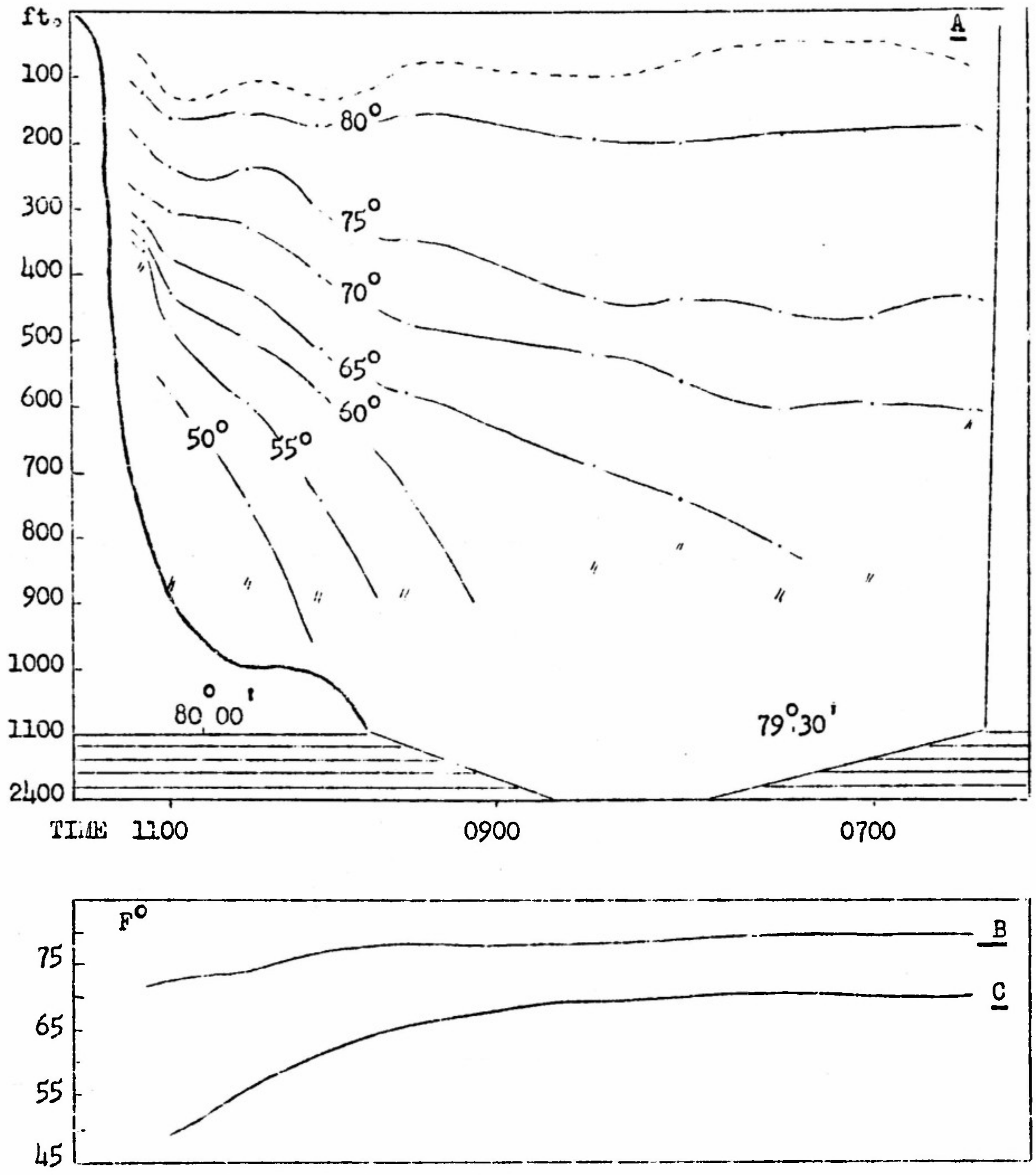


Fig. C-11 A TEMPERATURE-DEPTH PROFILE
B&C TEMPERATURES AT 100 and 200 METERS
CRUISE T-344b Cat Cay-Miami July 8, 1953

Very generally the pattern is this: Northwest of Elbow Cay the current increases during the spring and decreases from July to December. Southwest of the Bank there are indications that as the Florida Current increases in velocity there is an increased easterly component of flow in the Nicholas Channel. As the velocity of the Florida Current drops off in the autumn and early winter, the direction of flow in the Nicholas Channel takes on a westerly component. Off the northeast region of Cay Sal Bank there are higher velocities from January through August, followed by a large decrease in September lasting through December. All of the current directions are generally north of northeast with an increased easterly component in spring and autumn. Southeast of the Anguilla Islands there is a weak, irregular flow to the northwest which increases in April and in August. The flow through the Old Bahama Channel is highest in the autumn and early winter, decreasing through July followed by an increase. In general the highest velocities occur there during the low velocity period of the Florida Current.

The surface current pattern indicated by the GEK during Cruise T-347, July 1953 (see Figure C-15) shows the extreme right edge of the Florida Current entering the western mouth of the Nicholas Channel and possibly meeting with a weak northwesterly current in the channel at about 80°22'W. The resultant direction of flow becomes northerly as the southwestern part of the Bank are approached. In the Santaren Channel a southerly current was indicated by the GEK and by the temperature pattern (See Figure C-13.) Further east toward the Great Bahama Banks the current swung northward cyclonically. At present it is impossible to explain where the southward flowing water came from. It may have come from around the northwest portion of Cay Sal Bank as indicated by the current directions on the previous leg, or it may have been a southern extension of a long countercurrent, which has occasionally been noticed west of Cat Cay.

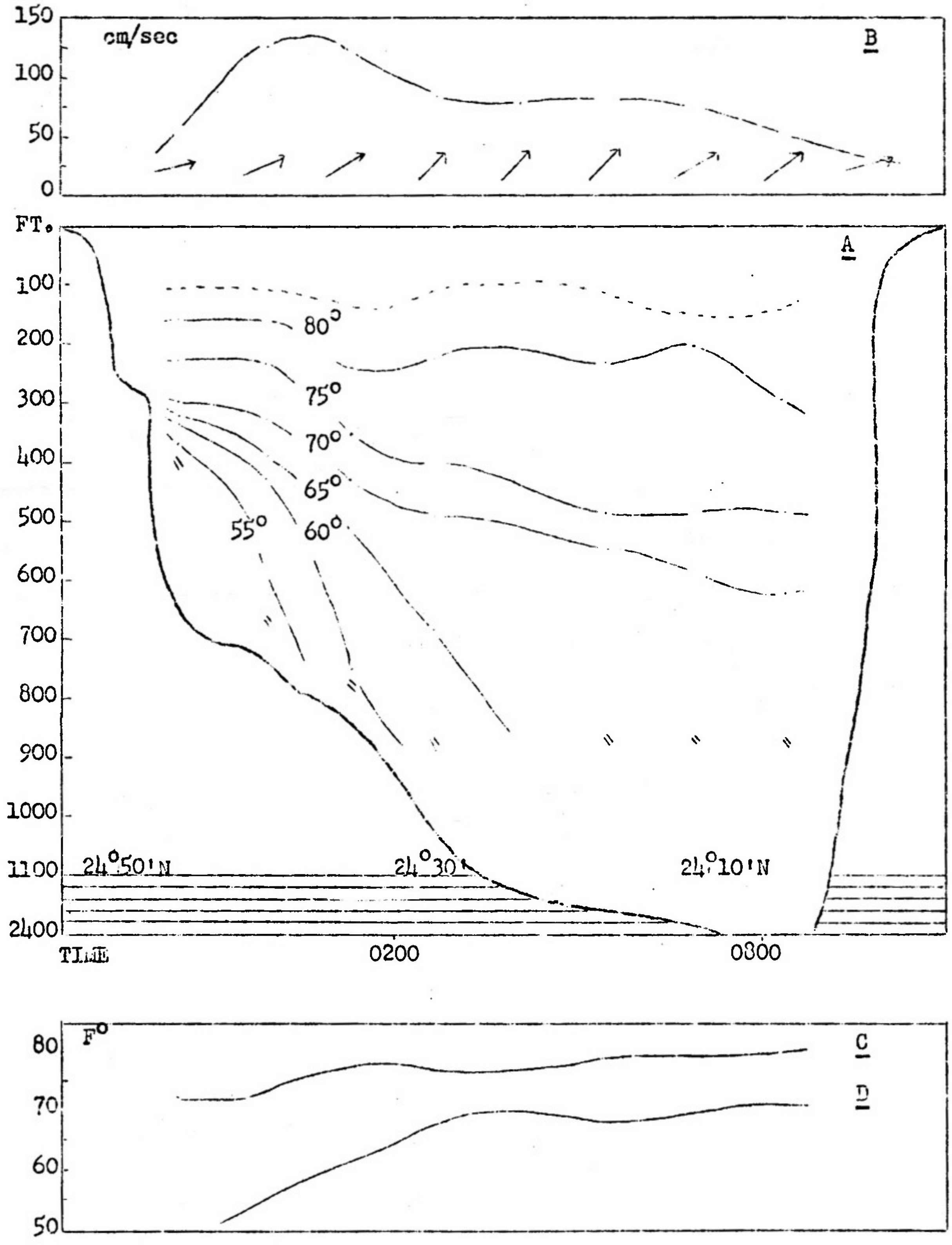


Fig. C-12 A TEMPERATURE-DEPTH PROFILE B GEK CURRENT VECTORS
C&D TEMPERATURES AT 100 and 200 meters
CRUISE T-347 Alligator Reef to Cay Sal Bank July 22, 1953

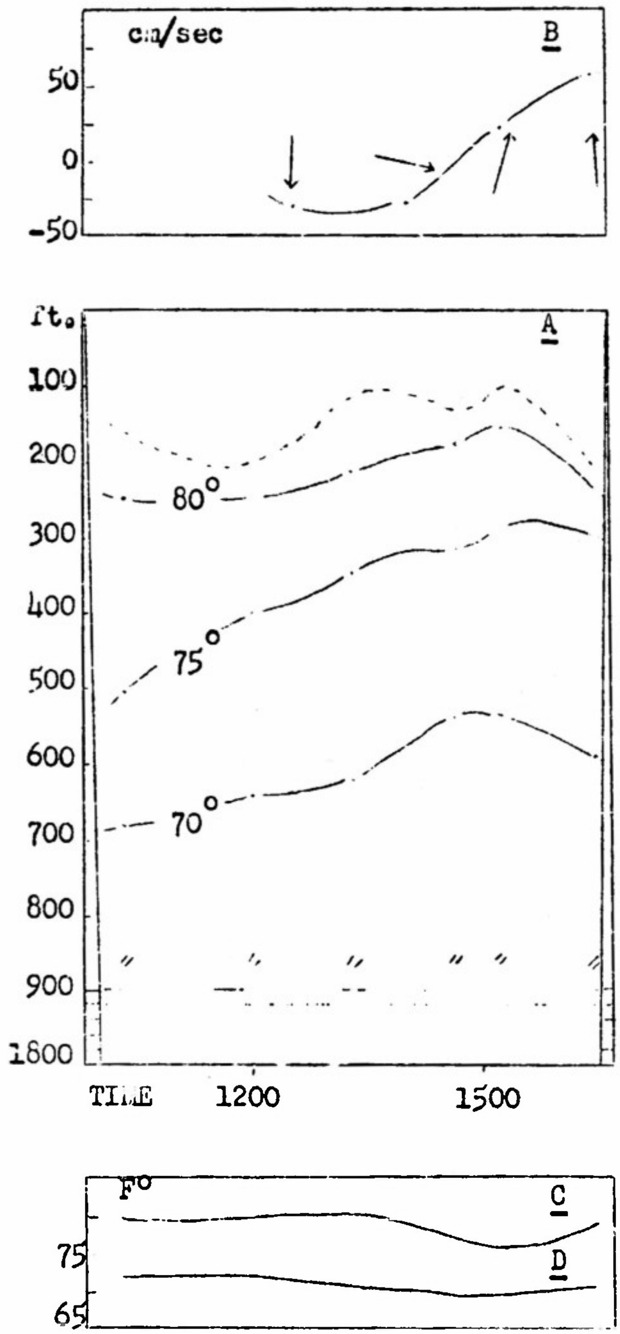


Fig. C-13 A TEMPERATURE-DEPTH PROFILE B GEK CURRENT VECTORS
C&D TEMPERATURES AT 100 and 200 METERS
CRUISE T-347 Anguilla I. to Bahama Banks across
Santaren Channel July 22, 1953

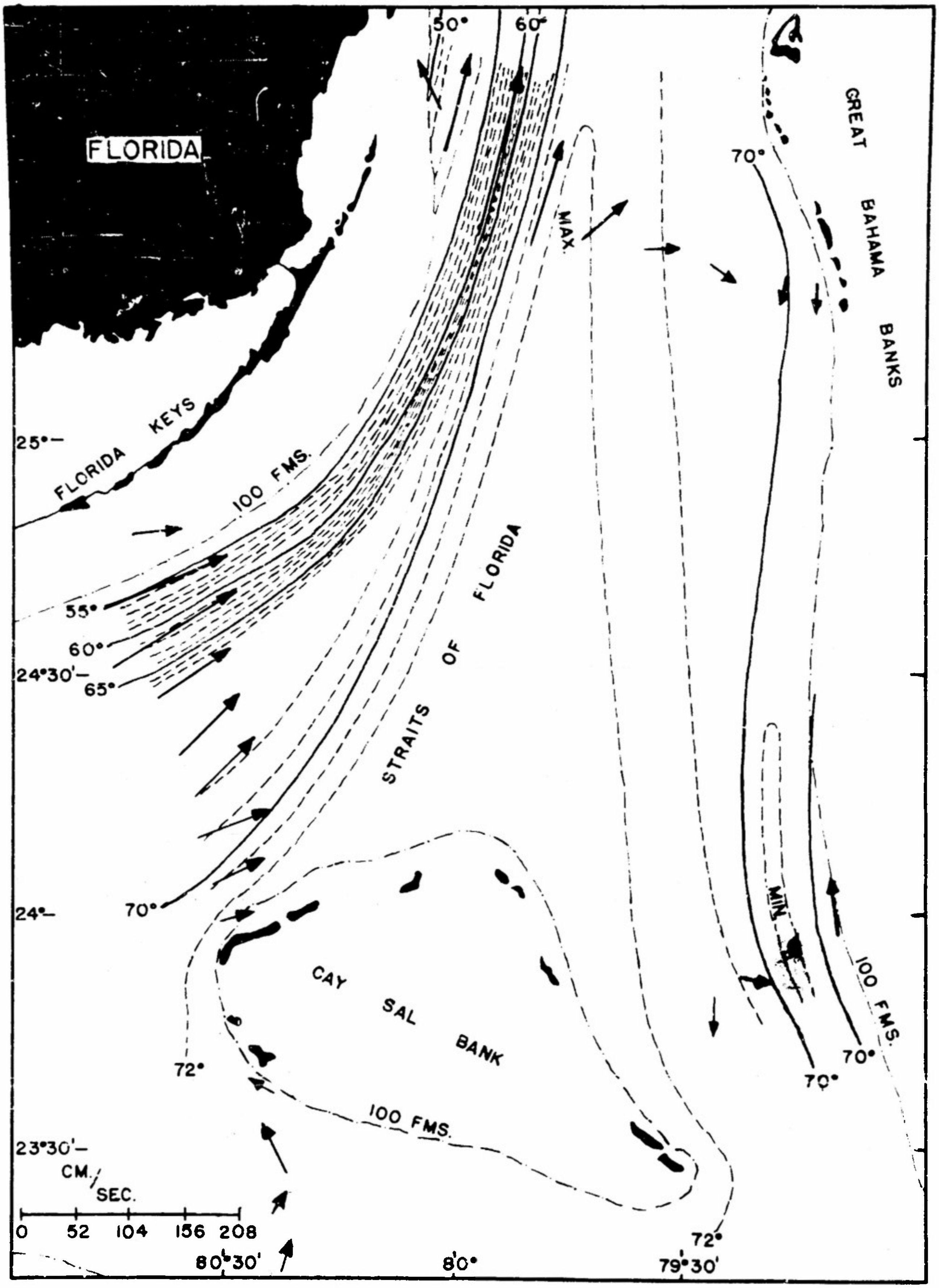


FIGURE C-15

GEK CURRENT VECTORS AND TEMPERATURE AT 200 METERS FOR CRUISE T-347 IN THE CAY SAL BANK REGION.

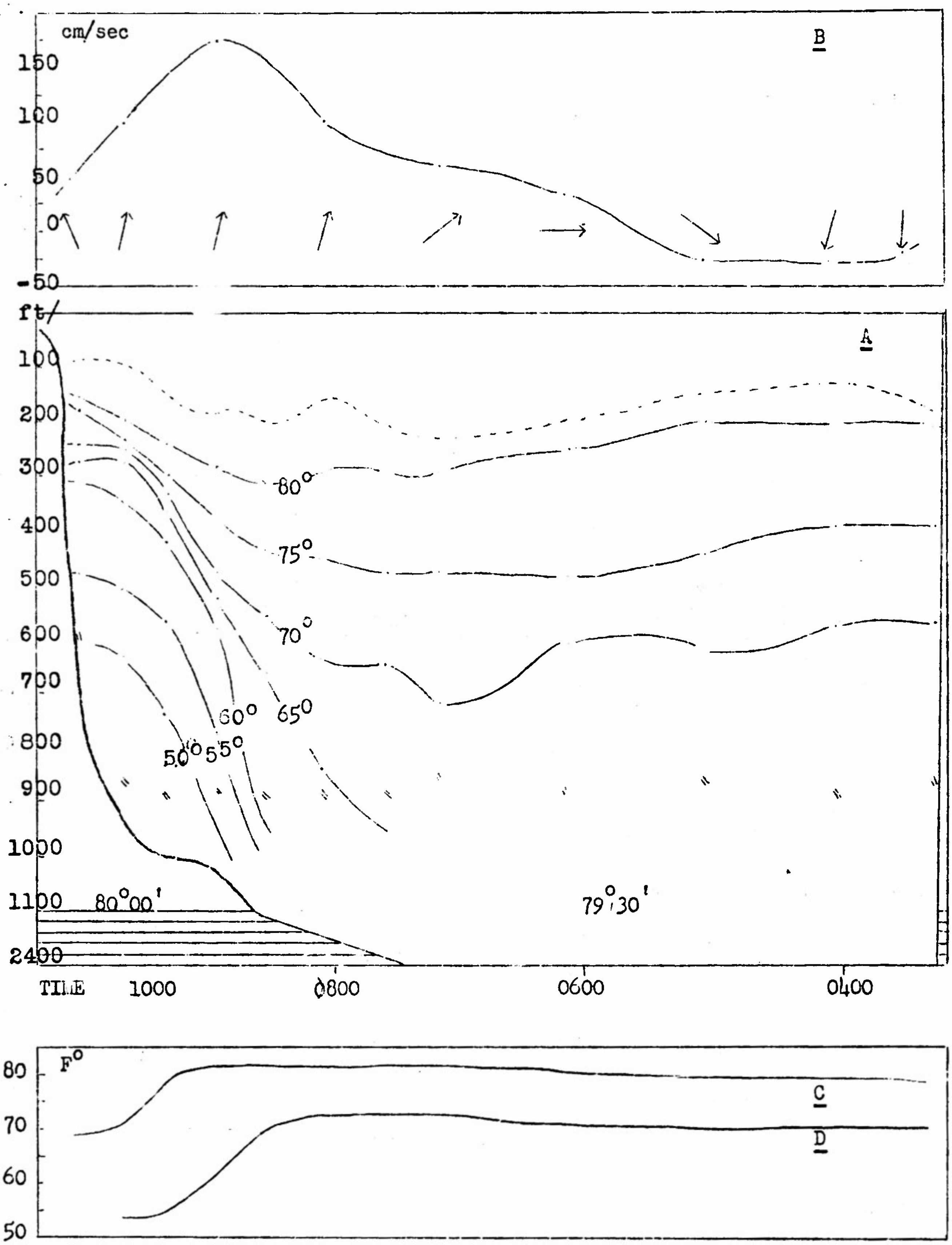


Fig.C-14 A TEMPERATURE-DEPTH PROFILE B GEK CURRENT VECTORS
C&D TEMPERATURES AT 100 and 200 METERS
CRUISE T-347 Riding Rock, Bahamas to Miami July 23, 1953

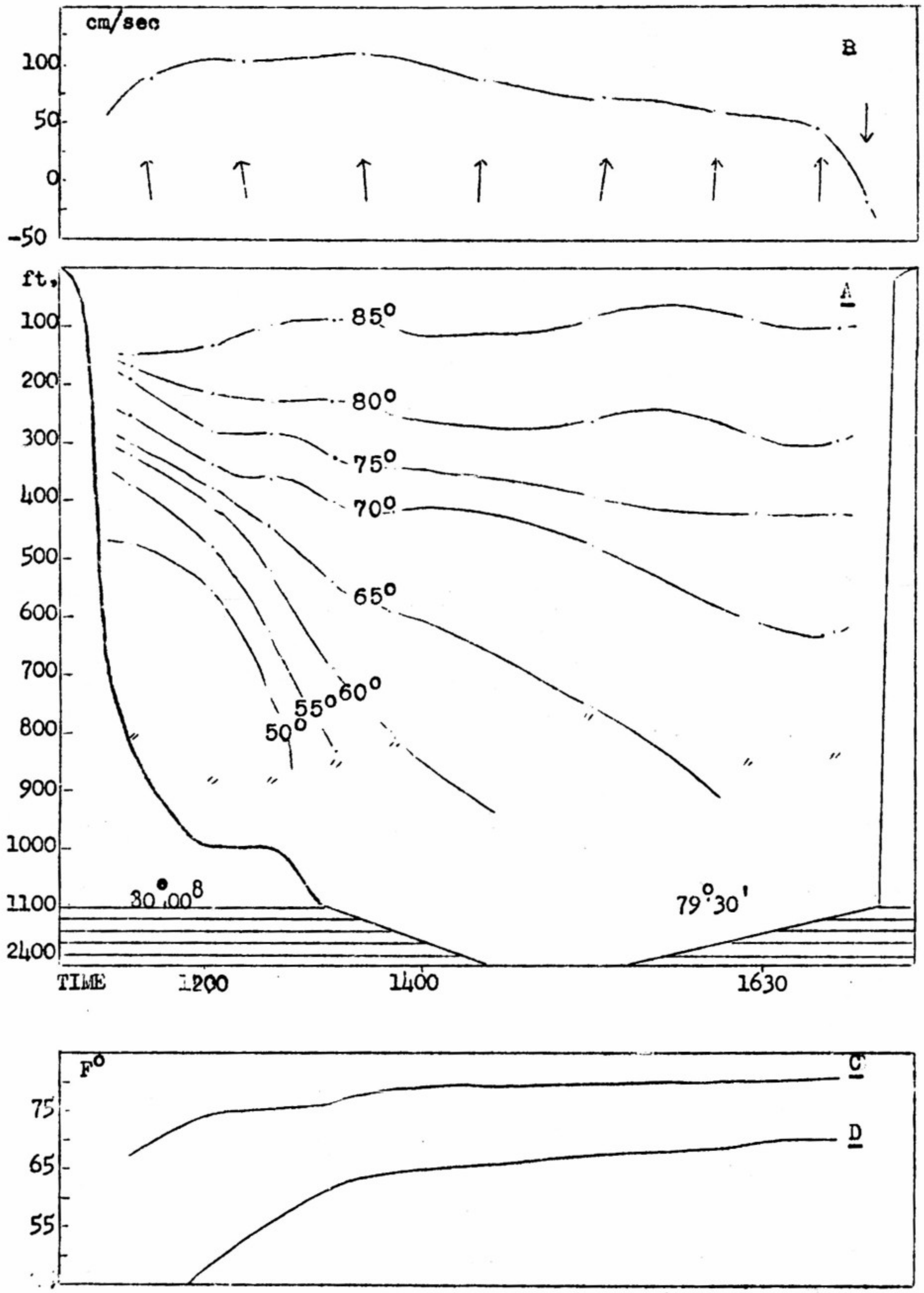


Fig. C-16 A TEMPERATURE-DEPTH PROFILE B GEK CURRENT VECTORS
C&D TEMPERATURES AT 100 and 200 METERS
CRUISE T-349a Miami-Cat Cay August 4, 1953

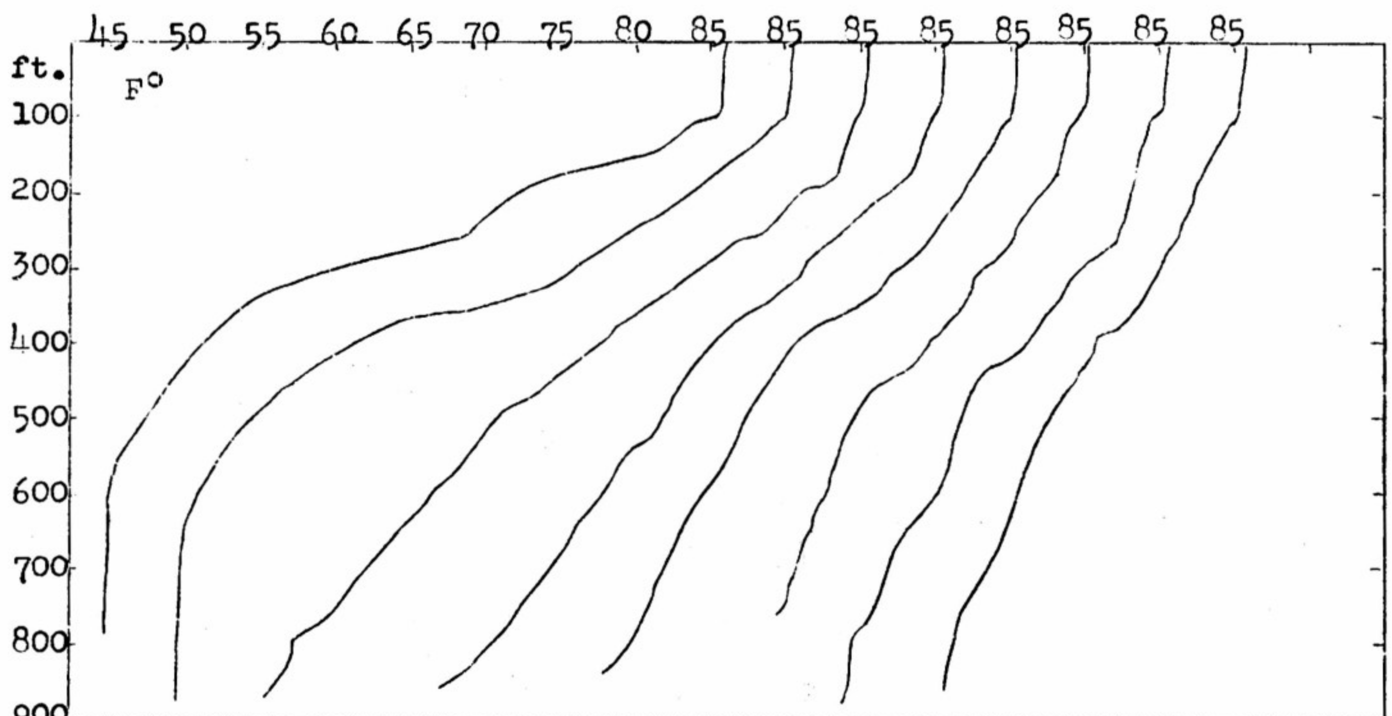


Figure C-17 BATHYTHERMOGRAPH TRACES 1cm = 5°F
CRUISE T-349a

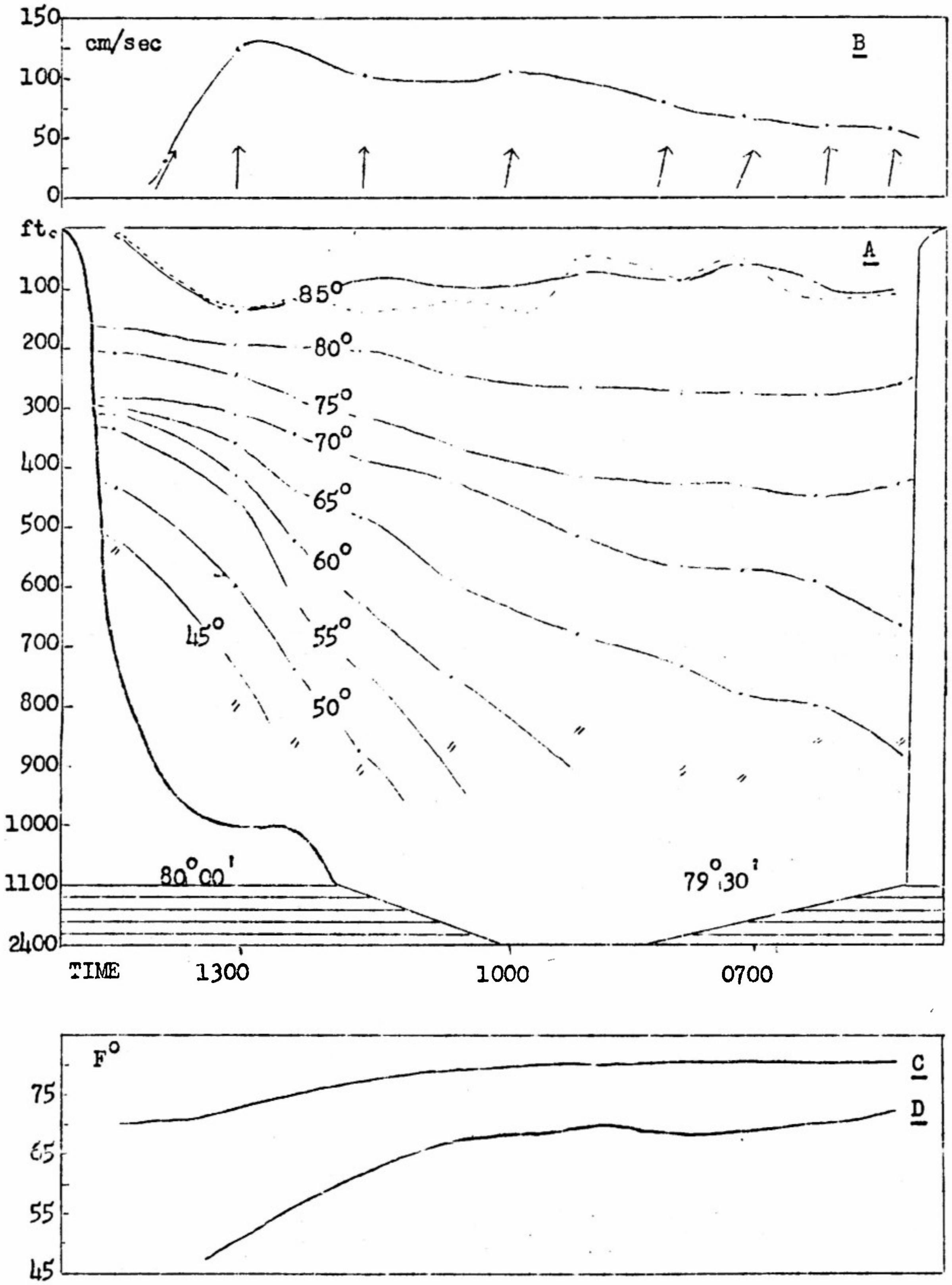


Fig. C-18 A TEMPERATURE-DEPTH PROFILE B GEK CURRENT VECTORS
C&D TEMPERATURES AT 100 ans 200 METERS
CRUISE T-349b Cat Cay-Miami August 5, 1953

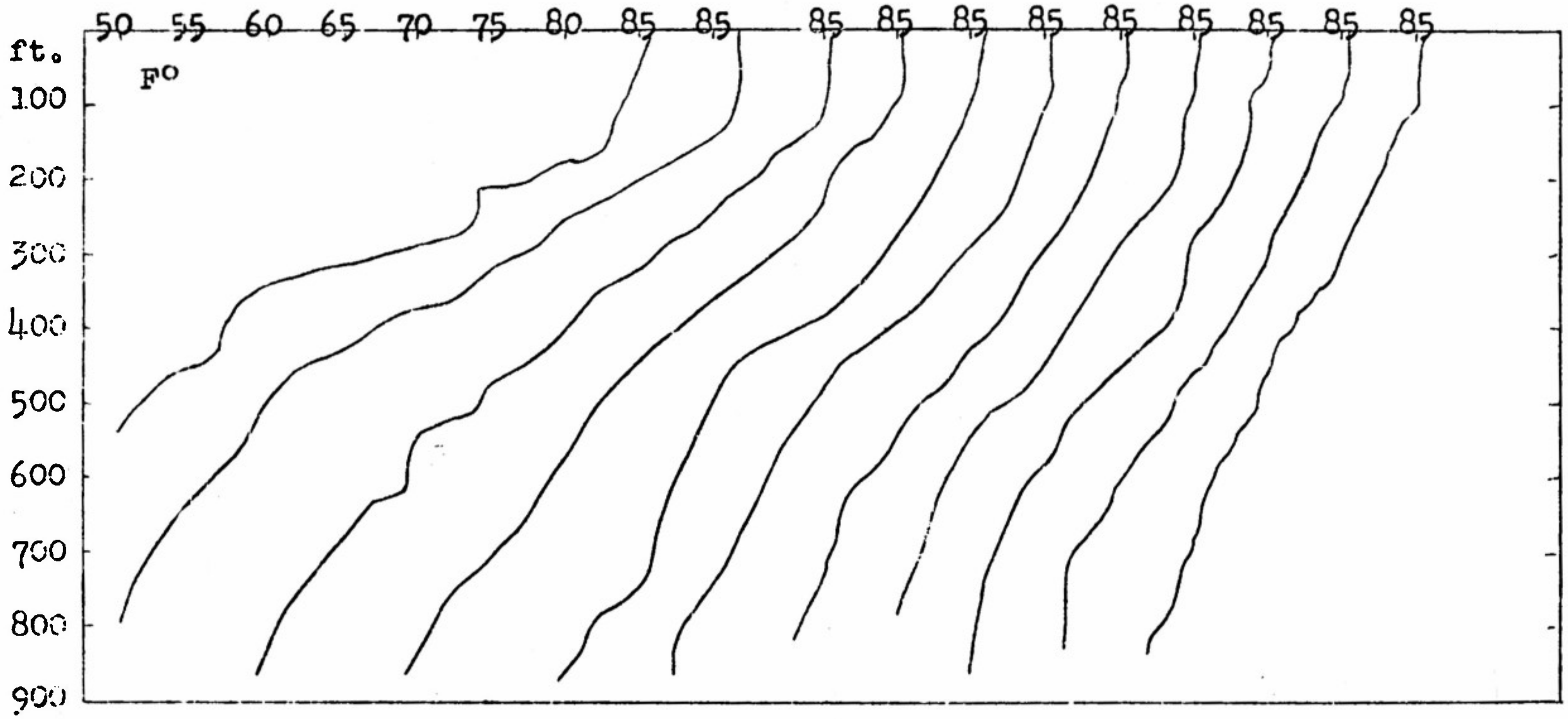


Figure C-19 BATHYTHERMOGRAPH TRACES 1 cm = 5°F
CRUISE T-349b

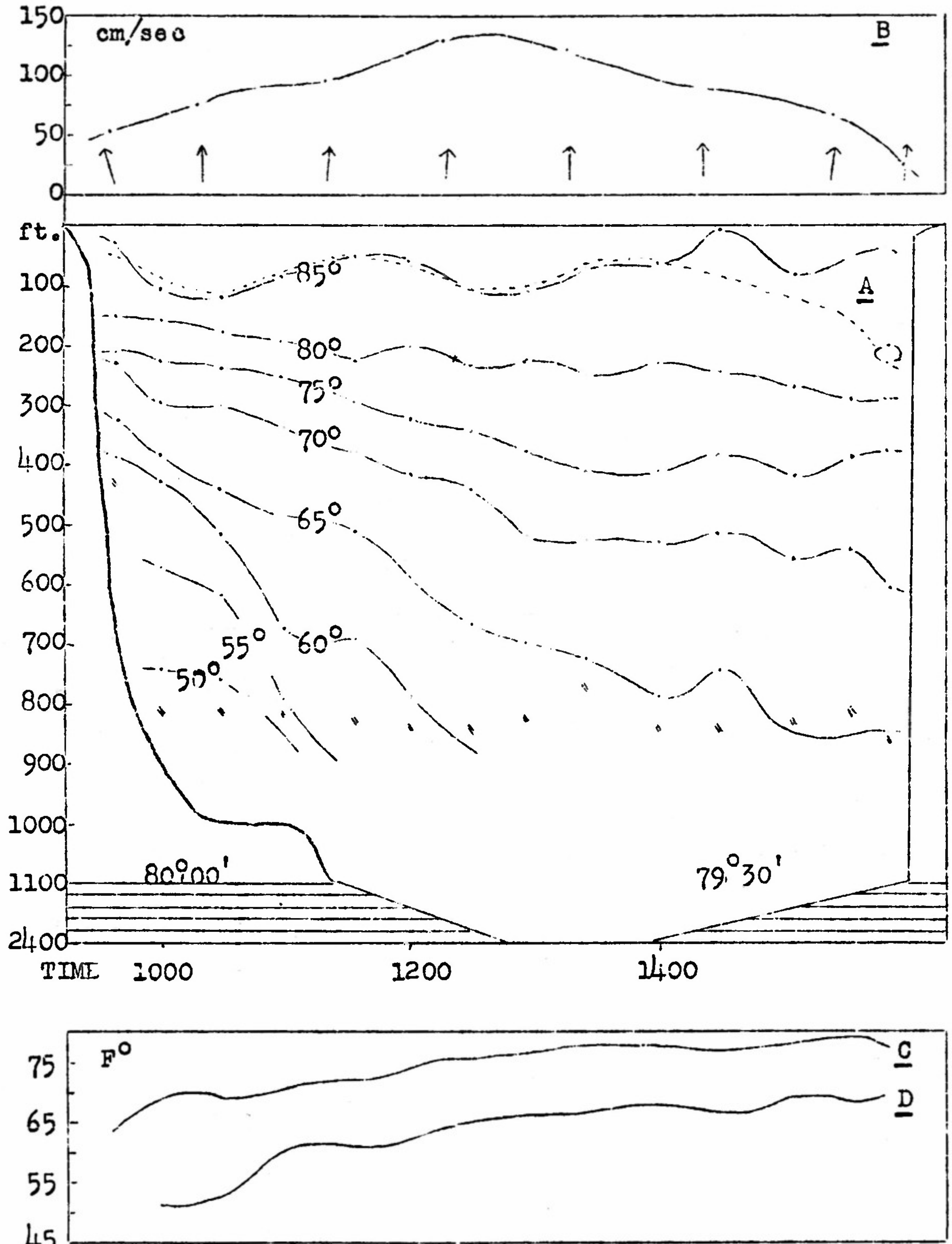


Fig. C-20 A TEMPERATURE-DEPTH PROFILE B GEK CURRENT VECTORS
C&D TEMPERATURES AT 100 and 200 METERS
CRUISE T-352a Miami-Cat Cay August 24, 1953

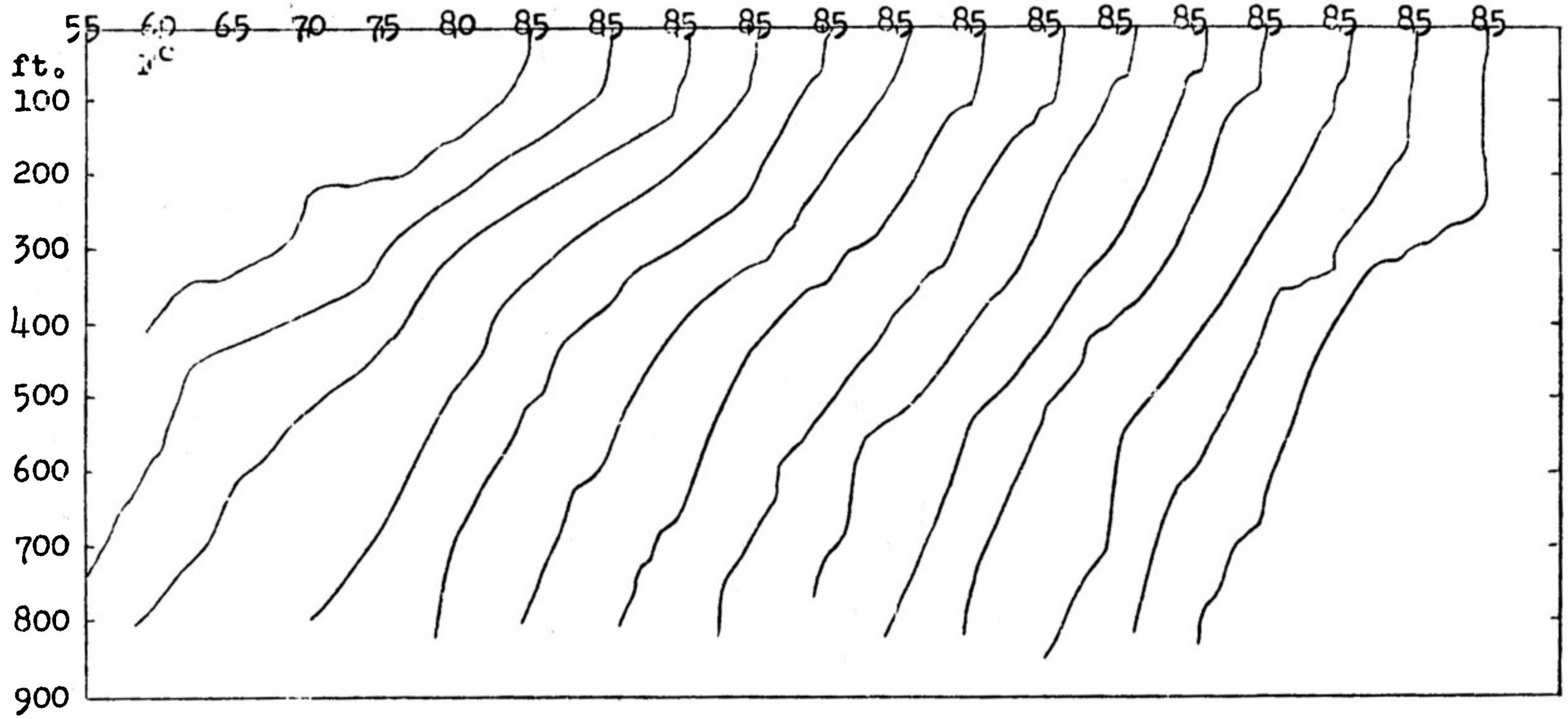


Figure C-21 BATHYTHERMOGRAPH TRACES 1cm = 5°F
CRUISE T-352a

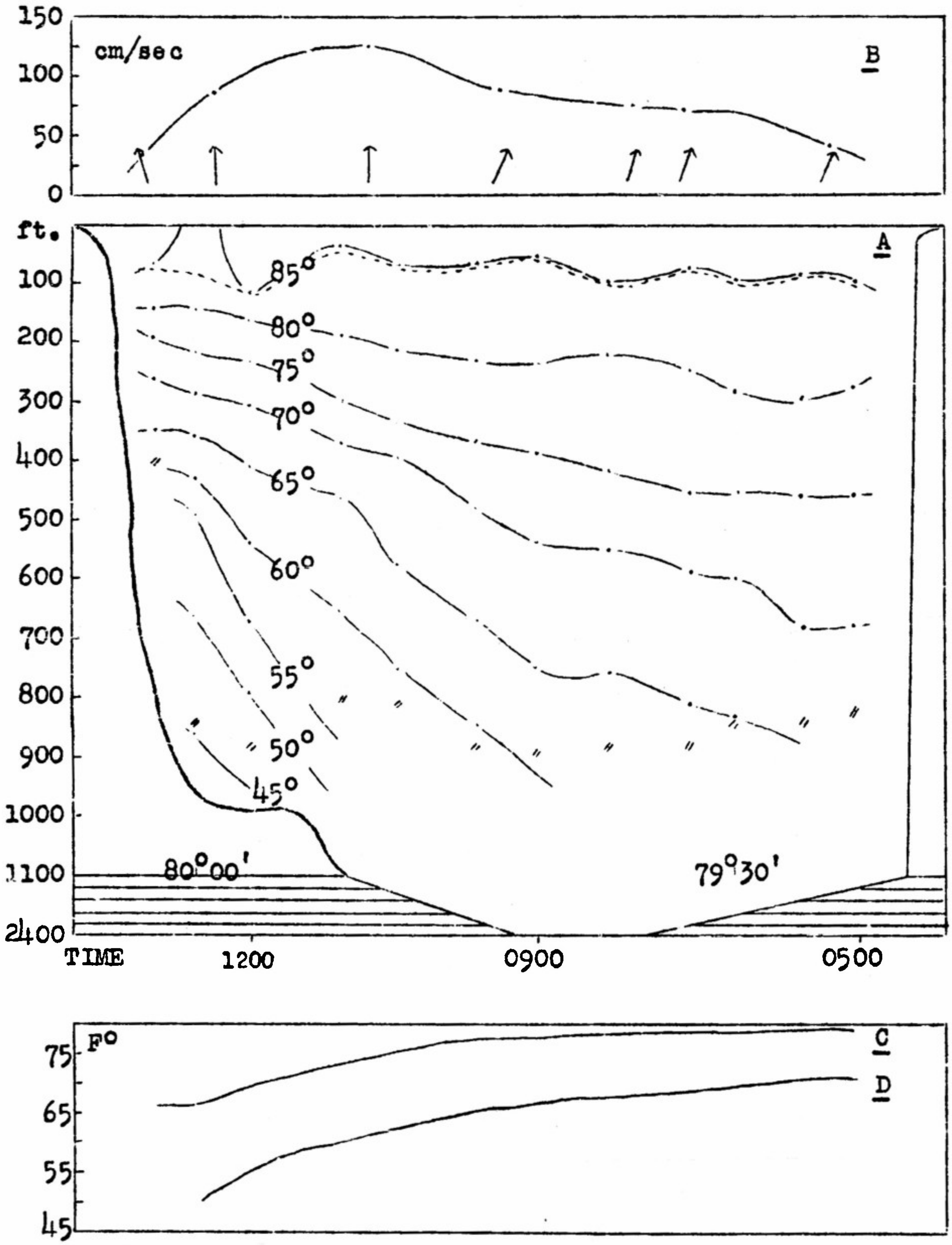


Fig.C-22 A TEMPERATURE-DEPTH PROFILE B GEK CURRENT VECTORS
C&D TEMPERATURES AT 100 and 200 METERS
CRUISE T-352b Cat Cay-Miami August 25, 1953

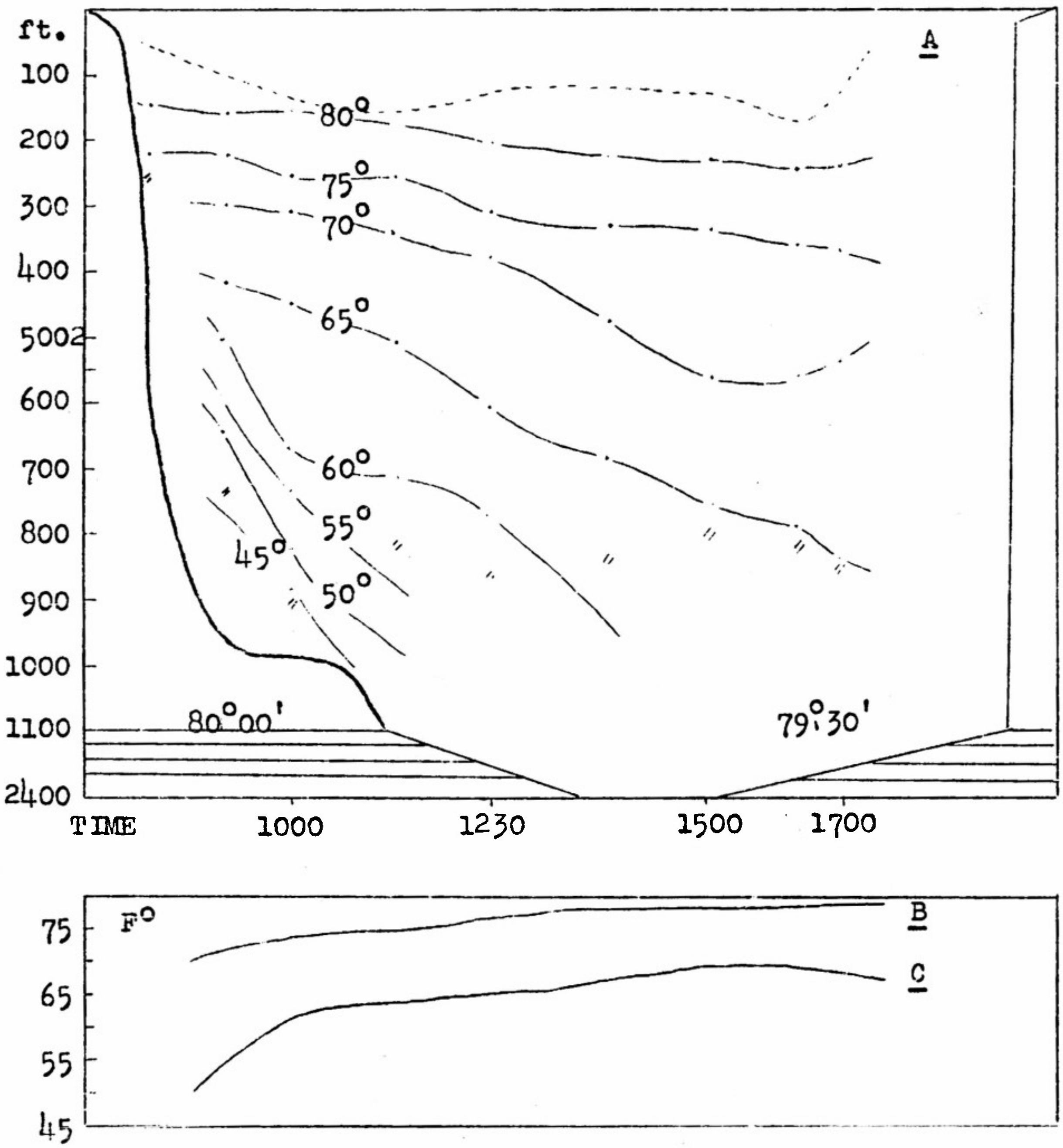


Fig. C-23 A TEMPERATURE-DEPTH PROFILE
B&C TEMPERATURES AT 100 and 200 METERS
CRUISE T-353a Miami-Cat Cay September 21, 1953

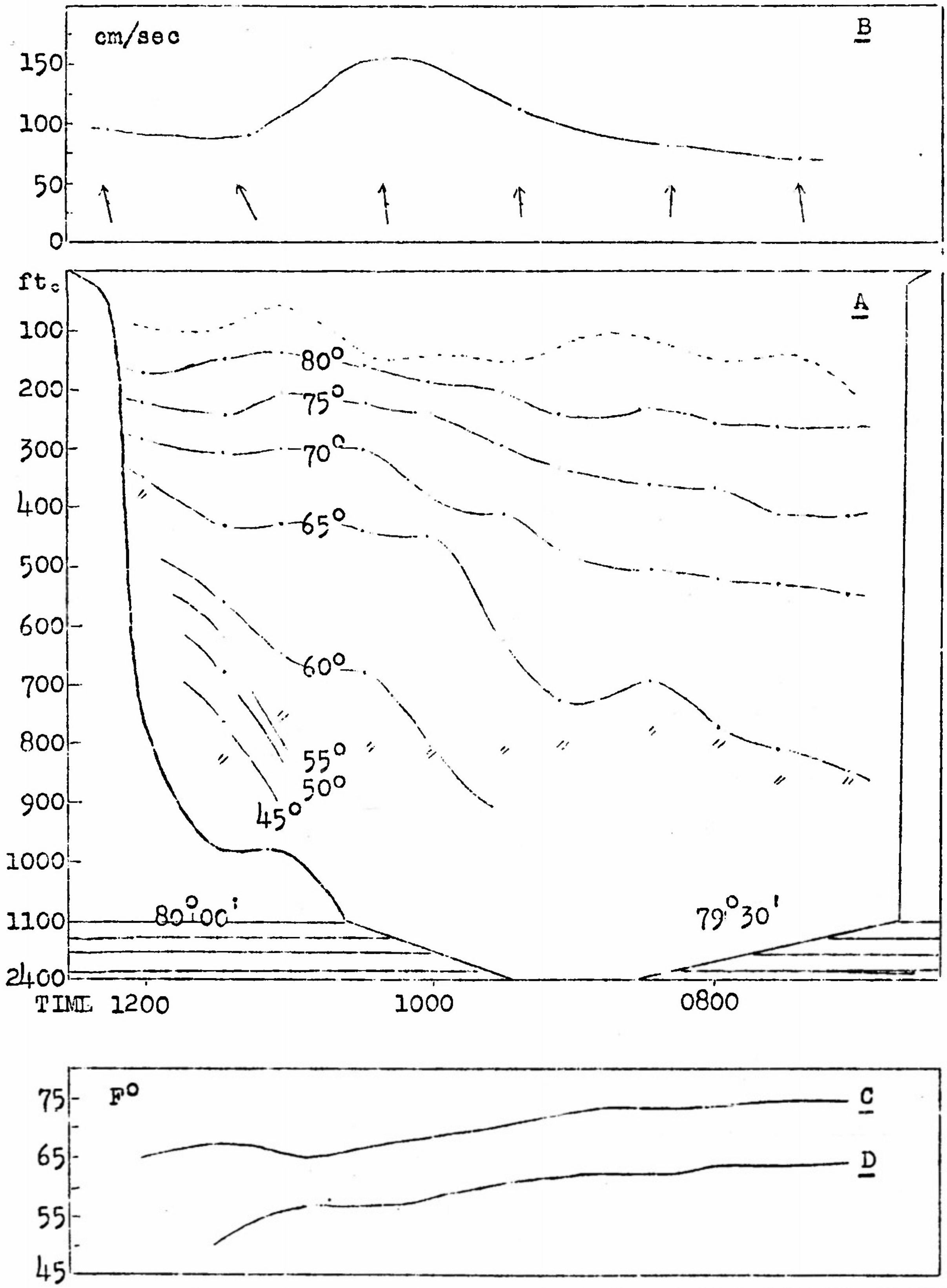


Fig. C-24 A TEMPERATURE-DEPTH PROFILE B GEK CURRENT VECTORS
C&D TEMPERATURES AT 100 and 200 METERS
CRUISE T-353b Cat-Cay-Miami September 22, 1953

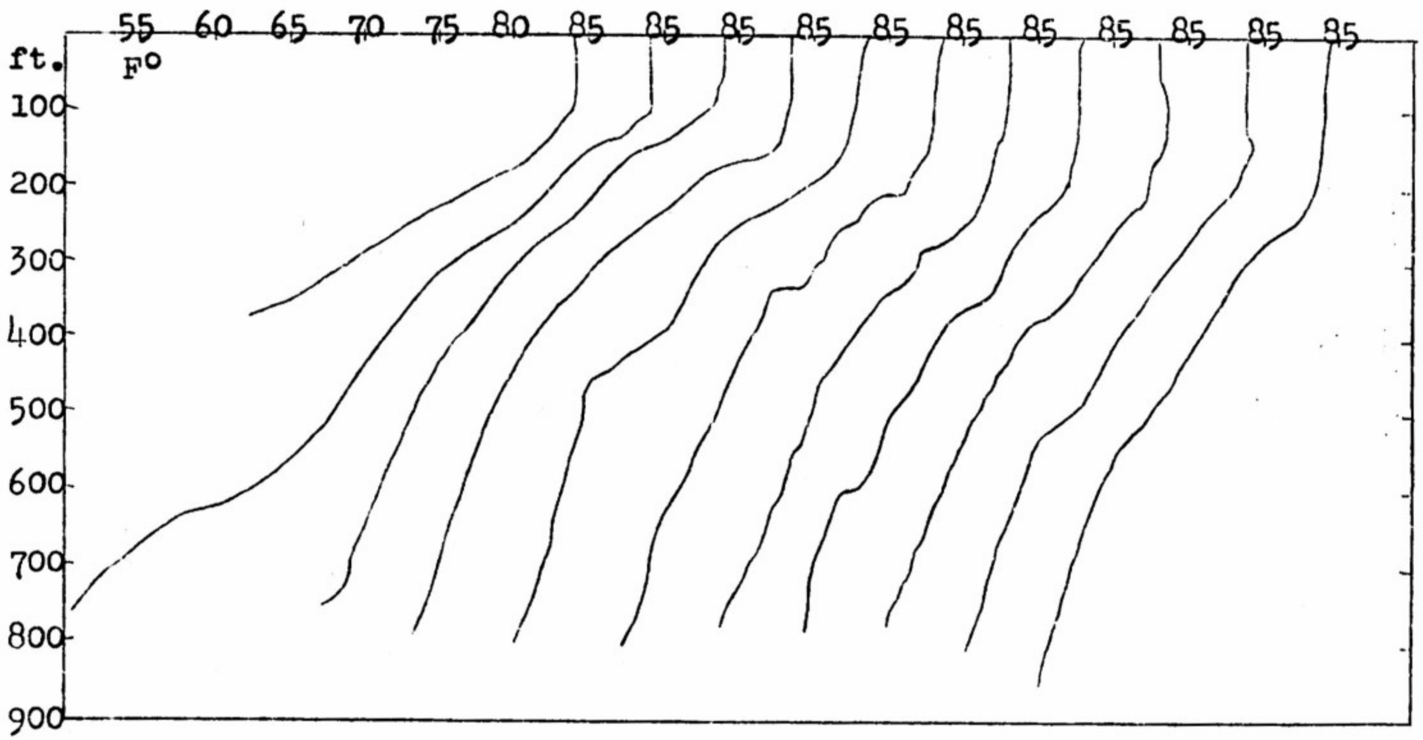


Figure C-25 BATHYTHERMOGRAPH TRACES 1cm = 5°F
CRUISE T-353b

The contouring of the temperatures at 200 meters (Figure C-15) offer little difficulty on the west side of the Current, but on the east side there were several possibilities for different contouring.

The data from the deep hydrographic stations are tabulated in section D of this report. East of 79°55'W. in the Miami - Cat Cay transects there is always water to be found whose temperature-salinity correlation resembles that of Yucatan Channel water. Over the 180-fathom plateau west of 79°55'W. there is water that does not fit this temperature-salinity correlation curve. This water is too fresh to produce the same correlation. (See Figure C-30.) West of 79°55'W. below about 450 ft. the water masses are very much the same as in the Yucatan Channel, as indicated by the close resemblance of the temperature-salinity correlations.

It is not easy to determine, by means of the temperature-salinity correlations, the exact location of the source of this fresher water.

(1) A partial cause might be in a constant mixing of Florida Current water with local inshore run-off water. However, the amount of water brought into the Straits of Florida by local run-off is almost negligible compared with the amounts necessary to change the temperature-salinity correlations in the observed manner. In addition, there are usually two or three sharp lines of strong color change to be noticed from the Florida shore seaward which would indicate non-mixing.

(2) For this reason, the only feasible explanation is in the less saline water derived from the northeast section ("Bank water") of the Gulf of Mexico, as already shown by several authors. A typical temperature-salinity correlation curve for the "Bank water" is, however, not easy to draw. For instance, stations 3-1c 3-25, made by the U.S. Fish and Wildlife Service Vessel ALASKA (Oceanographic Survey of the Gulf of Mexico, Project #24, The

A&M College of Texas, Dept. of Oceanography) were used to plot T-S correlation curves. It was found that the averaged curve more nearly fits that of the Yucatan Channel water than that of the water in question. However, the best evidence for the origin of this less saline water is given by stations in the northern section of the transect between the Key West region and Cuba. DANA Station 1226 (24°16'N 82°47'W) south of the Dry Tortugas at a depth of 575 meters shows very much the same temperature-salinity correlation pattern as found in the western part of the Miami-Cat Cay section. In future, this problem of the effect of the Gulf of Mexico waters on the waters in the Straits of Florida will be given particular attention.

In this connection it is interesting to note that ATLANTIS Stations 1613, 1614 and 1615 of the Cape Canaveral Section, 1621 of the Jacksonville Station and 1637 of the Onslow Bay Section show water with T-S correlations similar to the less saline water off Miami.

In comparing Pillsbury's observed values for temperature and salinity for this transect across the Florida Current with those made recently by this laboratory, it is noted that the patterns are very much the same. The temperature pattern does change slightly with the season, but the salinity pattern remains remarkably the same. The salinity maximum on the east side is at a depth of about 200 meters and on the west side at about 100 meters. The magnitudes of the maxima are also very close.

In comparing these later sections with Wüst's (based on Pillsbury's data), with regard to surface velocities, one seems to find a vast difference. The average surface current for the Florida Current as shown by Wüst is 110 cm/sec, or 2.14 knots. The local seamen, in making their runs across the Current, estimate it at 3 knots, and the average for 23 crossings, made by this Laboratory, is 2.9 knots. (Table C-1). Wüst's diagram indicates no

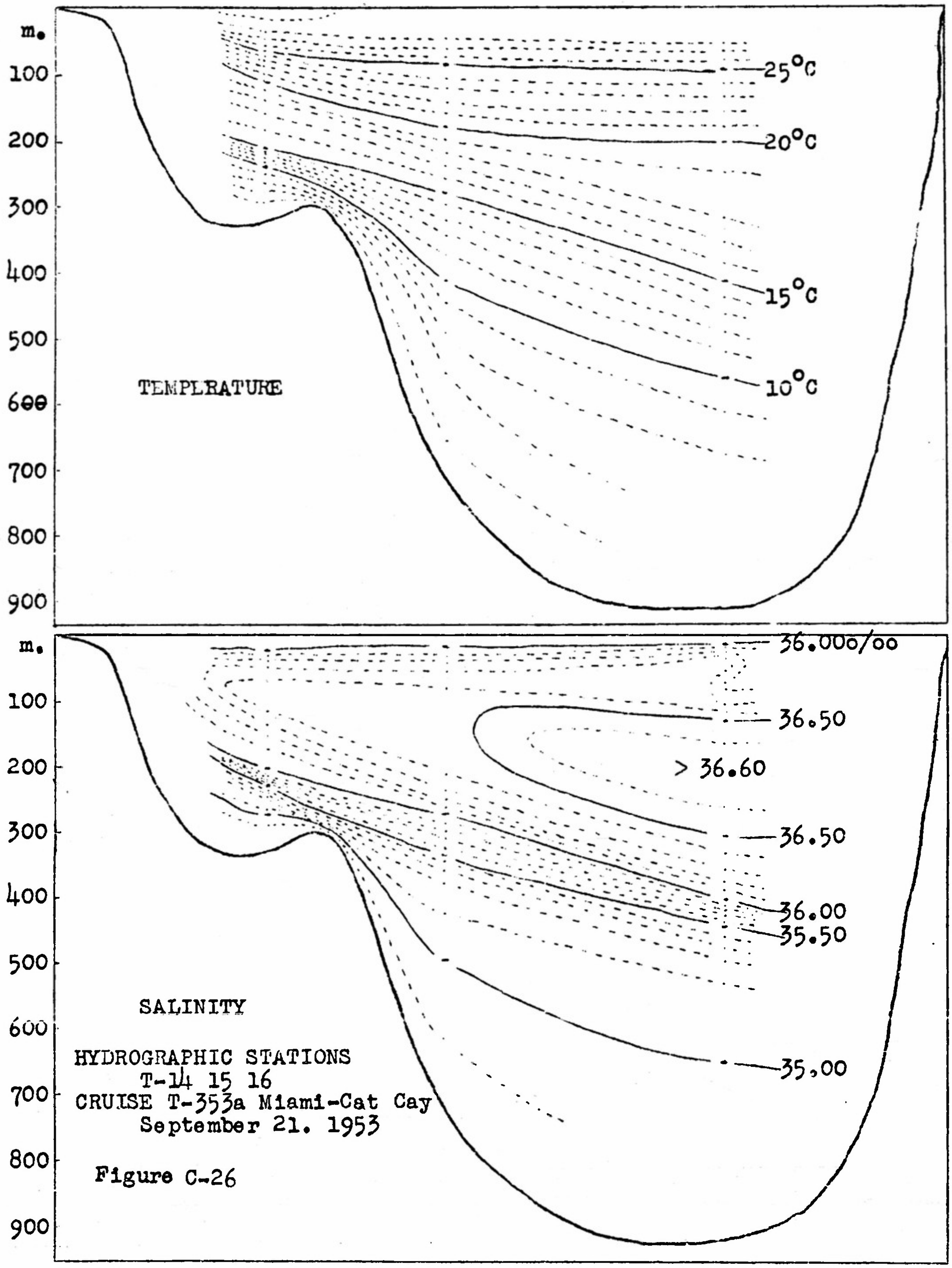
TABLE C-1

SEASONAL CYCLE OF MEAN SURFACE CURRENT VELOCITIES
MASS TRANSPORTS AND GEK "K" FACTORS

CRUISE	DAY	MO.	YEAR	MEAN SURFACE VEL. BY SET cm/sec	MASS TRANSPORT 10^6 cu m/sec	"K" FACTOR
T-240a	21	Dec.	1952	154	40.5	2.16
T-302a	4	Jan.	1953	159		
T-302b	5			190		
T-304a	14			148		
T-304b	15			140		
T-307b	21			171		
T-311b	17	Feb.		183	43.5	2.20
T-313b	27			141	21.0	1.54
T-315a	12	Mar.		175	26.6	1.55
T-320a	26			143		
T-320b	27			125	24.5	1.84
T-323a	28	Apr.		158	23.0	1.39
T-323b	29			153		
T-331a	26	May		193	19.0	1.30
T-334a	9	June		198		
T-330a	25			162	35.0	2.00
T-344b	7	July		71		
T-347	23			116		1.52
T-349a	4	Aug.		154	31.4	1.95
T-352a	24			161	29.6	1.76
T-353b	22	Sept.		131	19.4	1.45
T-358b	24	Oct.		56	4.7	1.23
T-364b	24	Nov.		147	31.4	1.65
Mean + standard deviation				148.5 ± 34.9 cm/sec 2.9 ± 0.7 knots	26.9 ± 9.8	1.68 ± 0.30

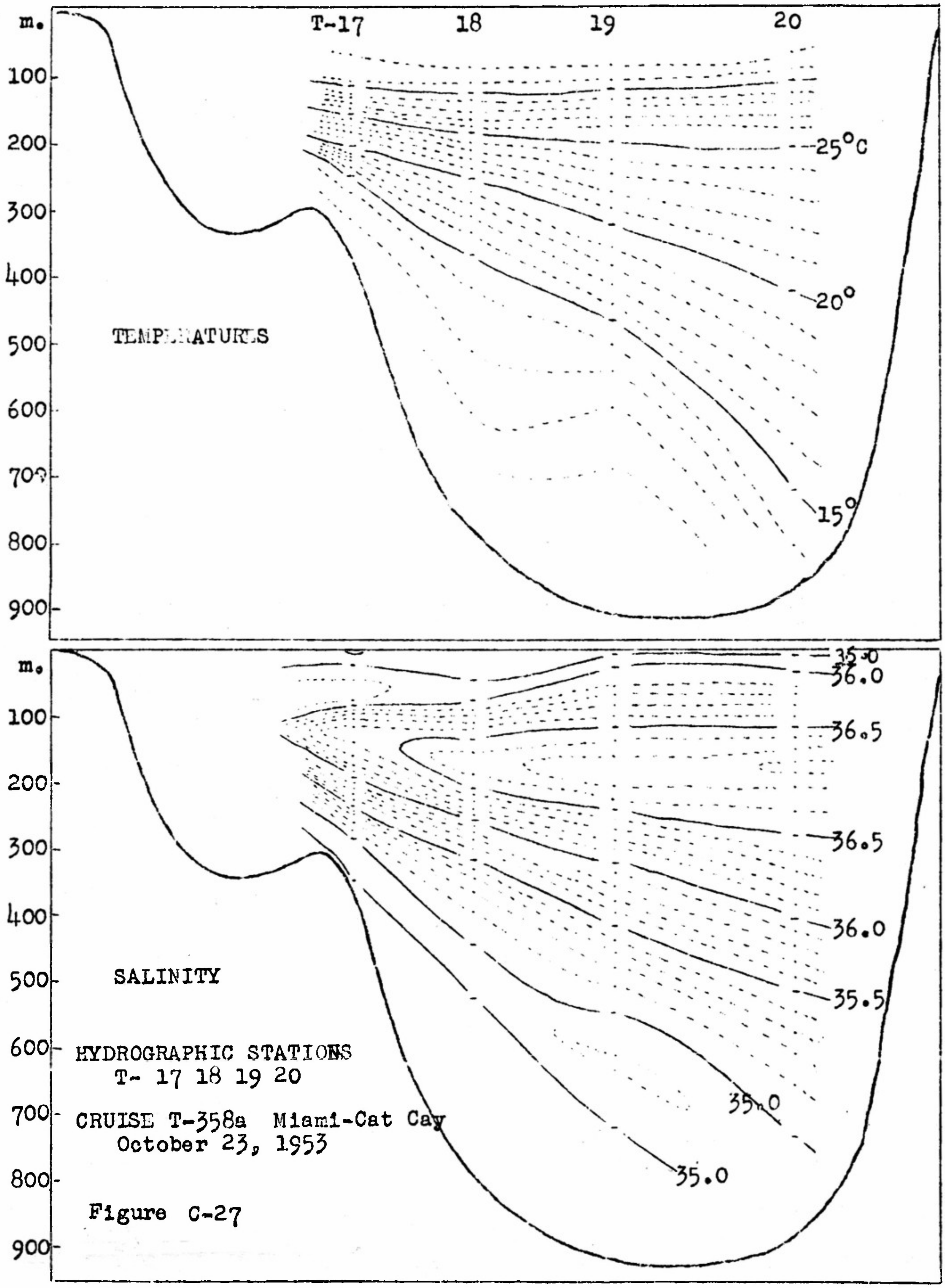
surface velocity higher than between 160 and 179 cm/sec, or 3.4 knots. There must be much higher velocities in order to produce an average of 3 knots for the whole Current. However, very slow currents have been encountered even in the axis of the Current, as shown in Figures C-28 and Table C-1.

During this project crossings of the Florida Current were made every month of the year, and with the exception of January there is a GEK record for every month. In Table C-1 and Figure C-31 are the reductions of the observations made during these crossings showing the mean surface current as



HYDROGRAPHIC STATIONS
T-14 15 16
CRUISE T-353a Miami-Cat Cay
September 21. 1953

Figure C-26



HYDROGRAPHIC STATIONS
T- 17 18 19 20

CRUISE T-358a Miami-Cat Cay
October 23, 1953

Figure C-27

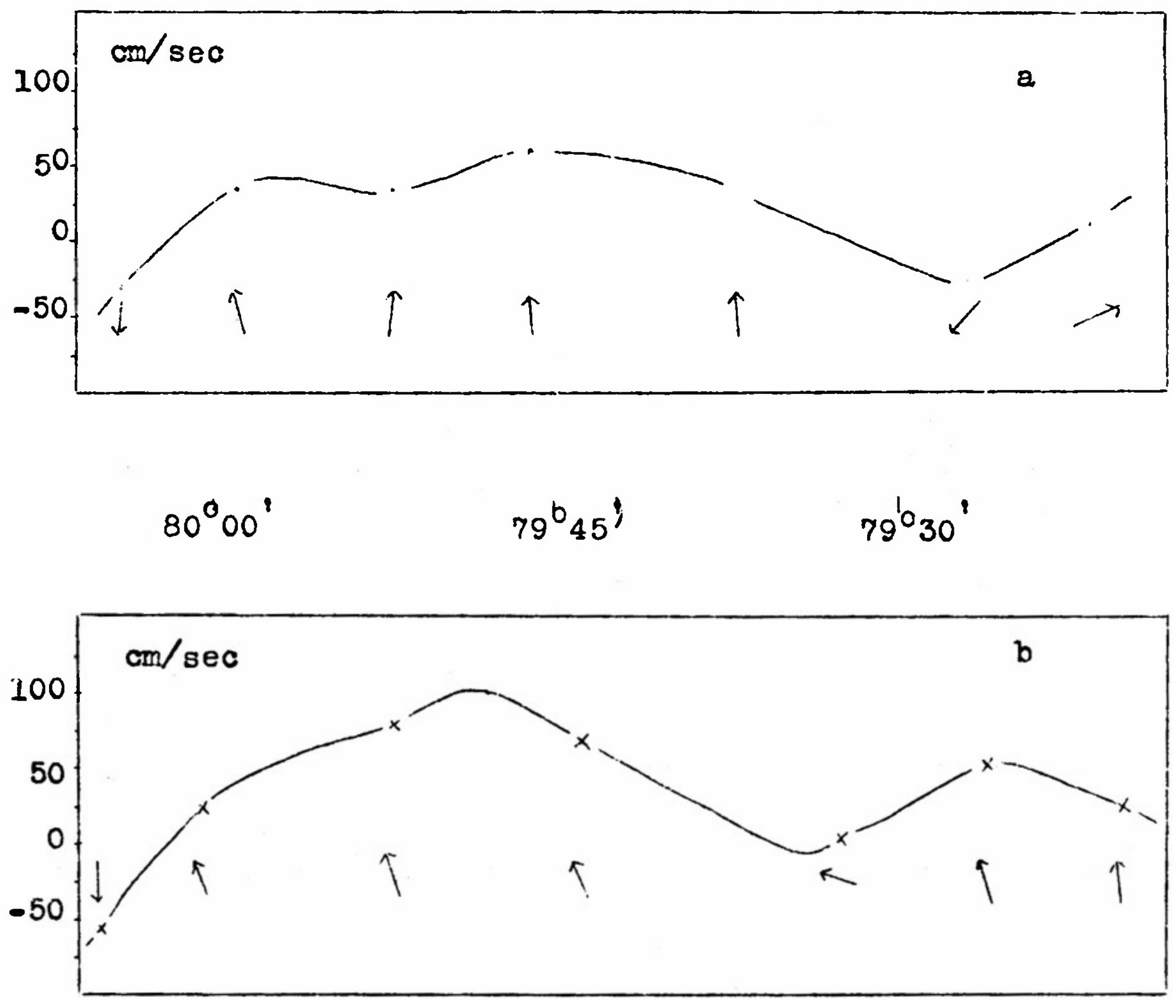


Fig. C-28 GEK CURRENT VECTORS
CRUISE T- 358a & b Miami-Cat Cay-Miami
October 23, 24, 1953

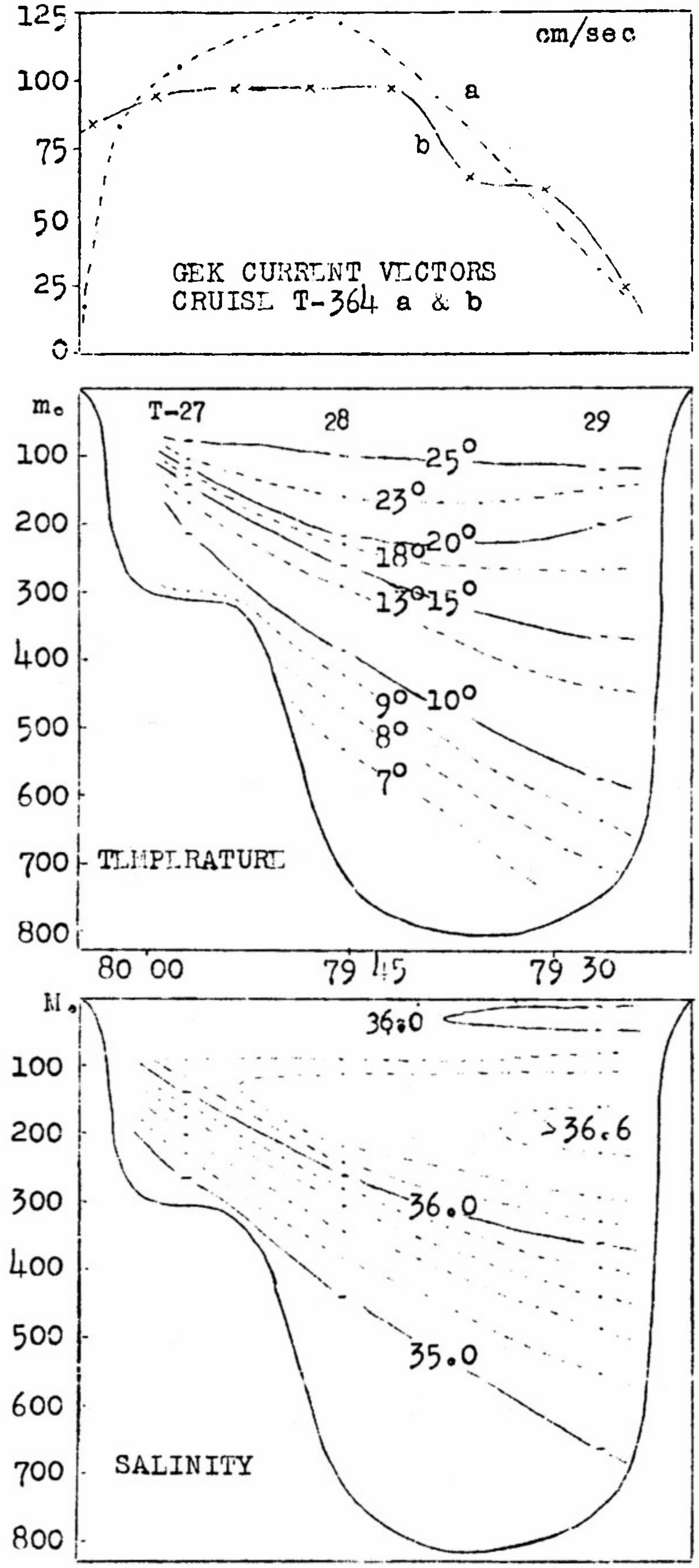


Figure C-29 HYDROGRAPHIC STATIONS T-27 28 29
CRUISE T-364a Miami-Cat Cay Nov. 24, 1953

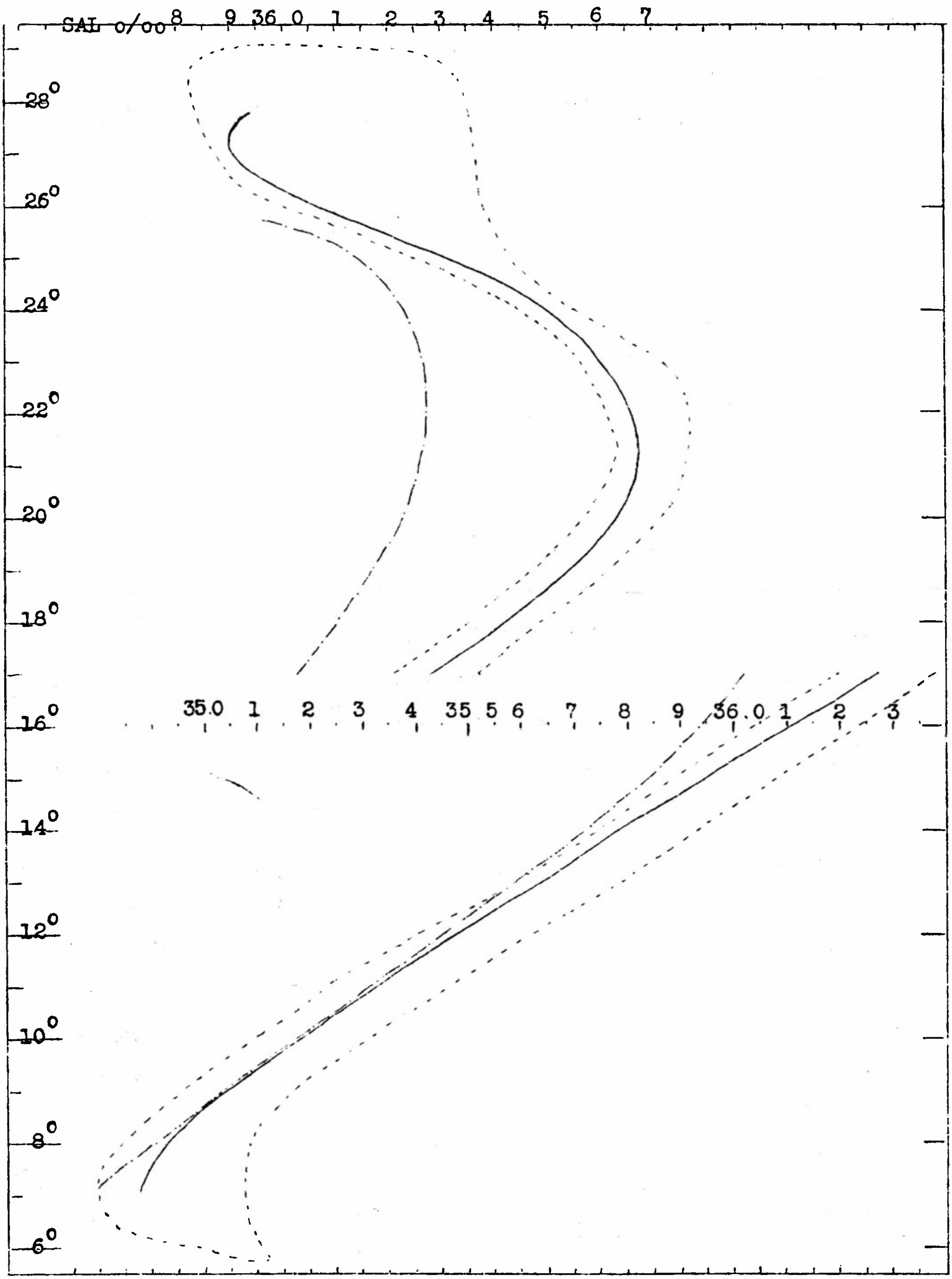


Figure C-30 TEMPERATURE-SALINITY CORRELATION
Solid line--Yucatan Channel Water Dash dot line--western edge of Current Dotted line encloses Florida Current Water

given by the total set of the ship, the computed mass transport (Marine Lab., U. of Miami, Tech. Rep. 53-9) and the "K" factor of the GEK. The range of variation is indicated by the standard deviation.

$$S_x = \frac{(x-\bar{x})^2}{N}$$

There are observations here that are at present impossible to explain. During Cruise T-331 the set of the ship was greater than usual, and the currents measured by the GEK were greater than usual, but the computed mass transport is lower than average. During Cruise T-324 May 8, which was north of the usual transect (Lake Worth to Settlement Point) high velocities were recorded, and in the early part of June the ship was set much more than usual during Cruise T-334.

During Cruise T-344b on July 8th the ship was set only seven miles in 5.08 hours, or a mean surface current of 71 cm/sec. The wind was Beaufort Force 2 from 200 degrees. The GEK was not in operation during this cruise. It was thought that perhaps the depth of the isothermal layer would be much greater than usual indicating a deeper surface current, but this was not found to be the case. Perhaps there were countercurrents on each side of the main current.

Again during Cruise T-358b a very slow current was encountered. The total set of the ship was 5.8 miles in 5.38 hours or a mean velocity of 56 cm/sec. During this transect the GEK was in operation and also recorded low velocities. Its accumulated set shows a total set of 4.7 miles in the same time. There had been a strong wind, Beaufort Force 5, from the north for three days that had helped to knock down the current and also to produce countercurrents on each side (See Figure C-38). No bathythermograph was available, so it was impossible to measure the depth of the isothermal water.

Countercurrents have been recorded by the GEK during five transects.

These are: T-320b (Figure 11 of previous report)
T-324 (Figure C-1)
T-347 (Figure C-14)
T-349a (Figure C-16)
T-358a (Figure C-28)

It is hoped to have a recording current meter buoyed near the western edge of the Current to correlate the existence of countercurrents with meterological phenomena and the tides.

Usually a well defined shear area exists between two and three miles east of the Miami Sea Buoy. On a calm day this area will show north-south slicks and weed lines, and occasionally a rip is noticed. If the water is not too disturbed, there exists a rather sharp color change. There are stronger color changes closer to the Sea Buoy. Figure C-32 is a reproduction of a GEK record made during Cruise T-364a in this area. Notice the change of velocity in the shear area from 21 cm/sec to 83 cm/sec within ten minutes while travelling at a speed of eight knots. This would represent a distance of one and a third nautical miles.

On the eastern side of the current two or three miles from the Bahama Banks the water at times shows a simple current pattern and at other times the GEK records a stringy pattern showing areas of decreasing velocity and increasing velocity very close to each other. These may be noticed from shipboard, and appear as areas of slick, weed line and change in wave or ripple form.

The seasonal cycle of temperatures is graphed in Figure C-33. Three columns of water were chosen; one at the speed axis of the current 79°47'W, one on the western edge of at 80°00'W and a third at the eastern edge at 79°25'W. Depths of 50 ft., 250 ft. and 450 ft. were chosen as representative depths. All of the points in Figure C-33 are from bathythermograms except those with a parenthesis taken in November and December during hydrographic stations. At least down to 250 ft. there is a gradual warming from the middle of February to the end of August followed by more rapid cooling. At 450 ft. this cycle is less pronounced and the warmest period if apparently already between June and July, two months earlier than in the surface layers.

This pattern corresponds closely to the cycle of surface heating and of wind velocity in the Sargasso Sea area. (It is possible that most of the water down to below 200 meters in the Florida Current originally comes from the general area of the Sargasso Sea.) There the surface temperatures reach a maximum near the end of August. By June the strong spring winds have subsided resulting in diminished stirring. For this reason less heat is transferred downward, and the temperature at 450 ft. starts to decrease in the June-July period. This is possibly due to the vertical mixing below the stable surface layer, but more probably due to the upshift of cooler deeper water closer to the surface which might occur in connection with the increased surface current speed. This could be demonstrated in detail, for instance, by a statistical treatment of BT traces chosen from every month at each of the three columns of water. These traces could be compared with bathythermograms from the Sargasso Sea.

It is also noted that the temperatures on the western edge of the Current show a much greater scatter than those at the axis or eastern edge. This phenomenon has been discussed in (53-9 Technical Report 1 June 1953, The Marine Laboratory, The University of Miami)

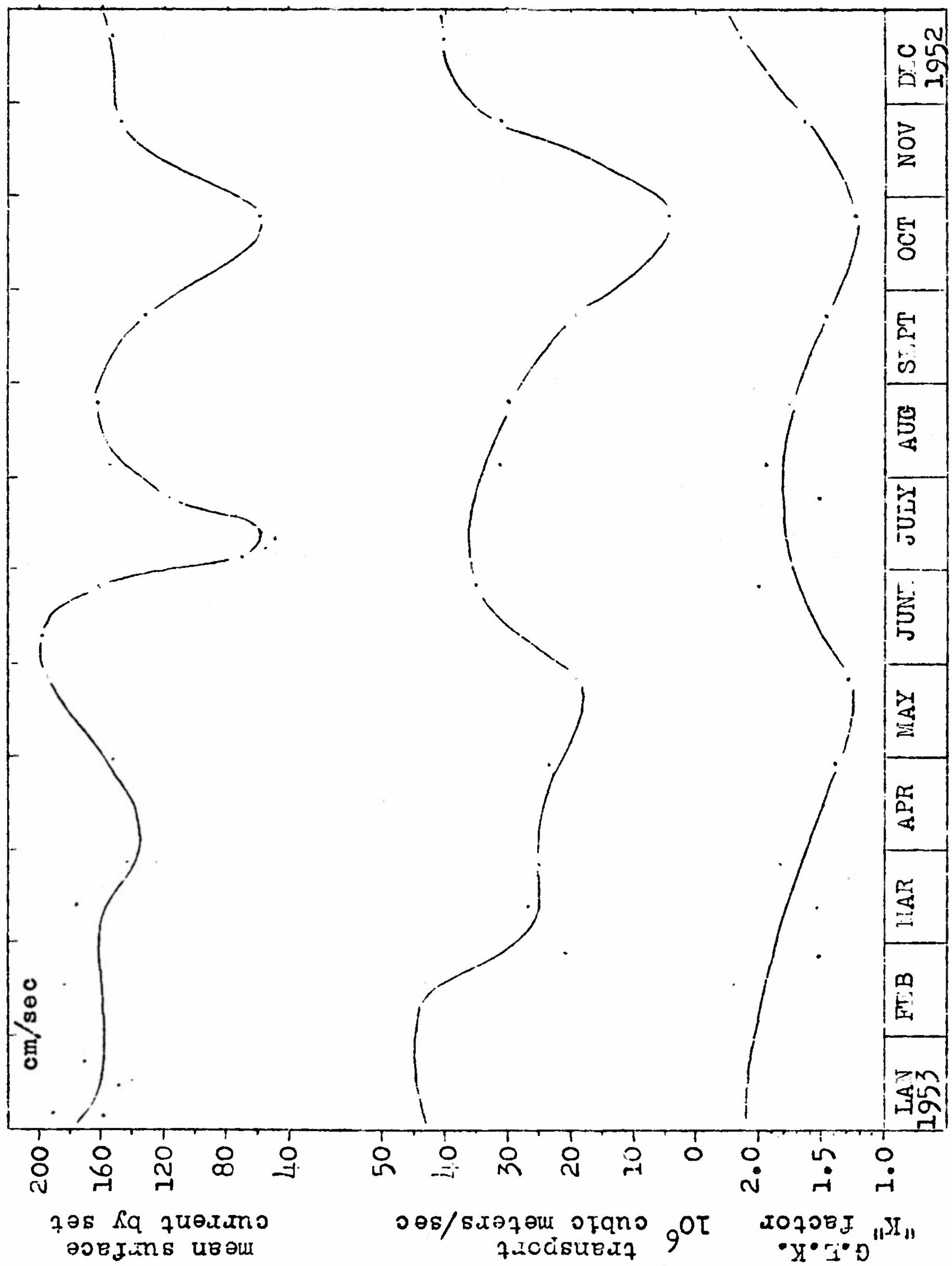


Fig. C-31 SEASONAL CYCLE OF MEAN CURRENT VELOCITIES, MASS TRANSPORT AND G.E.K. "K" FACTORS

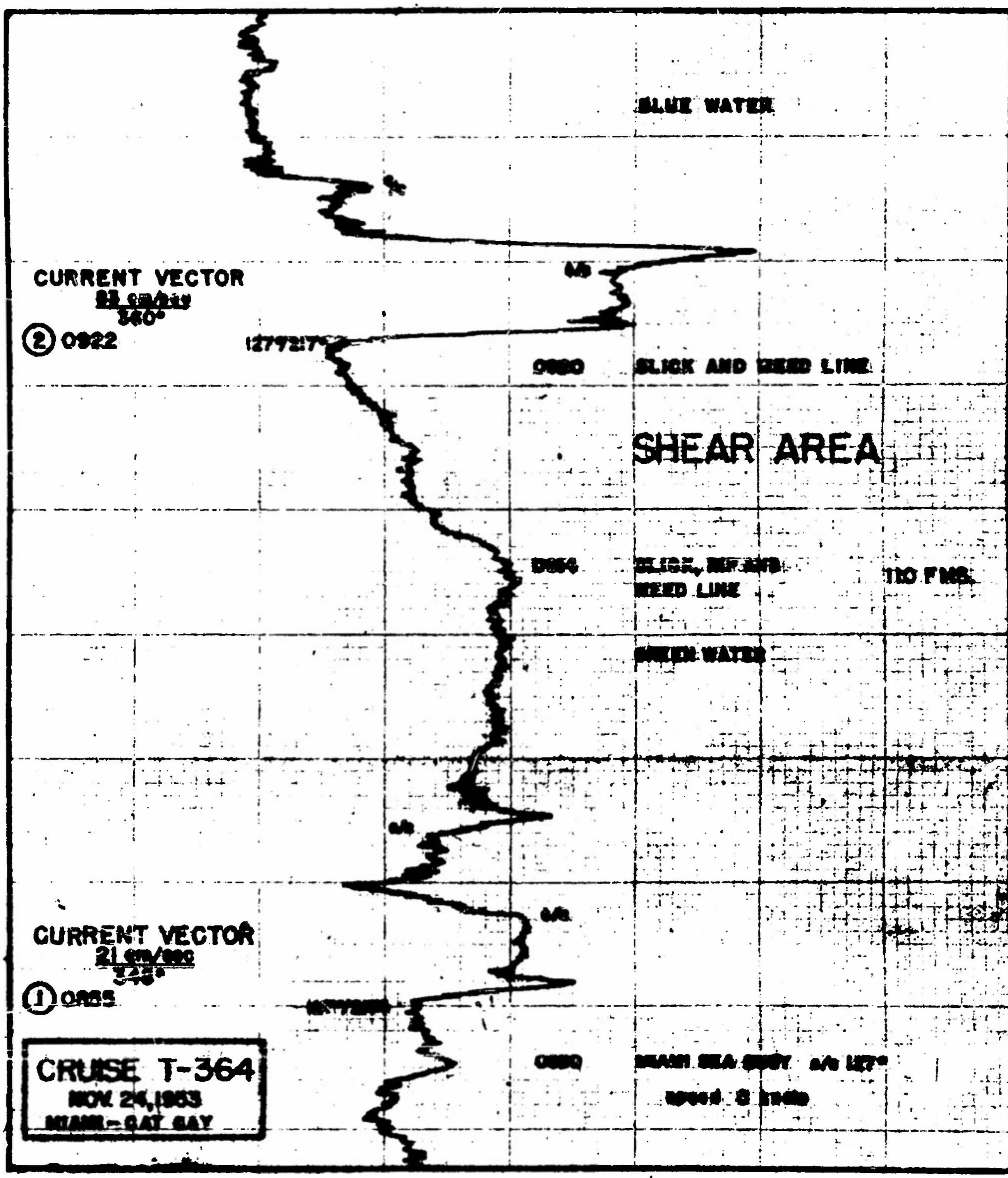


FIGURE D-32
SHEAR AREA AS SHOWN ON A GEK RECORD.

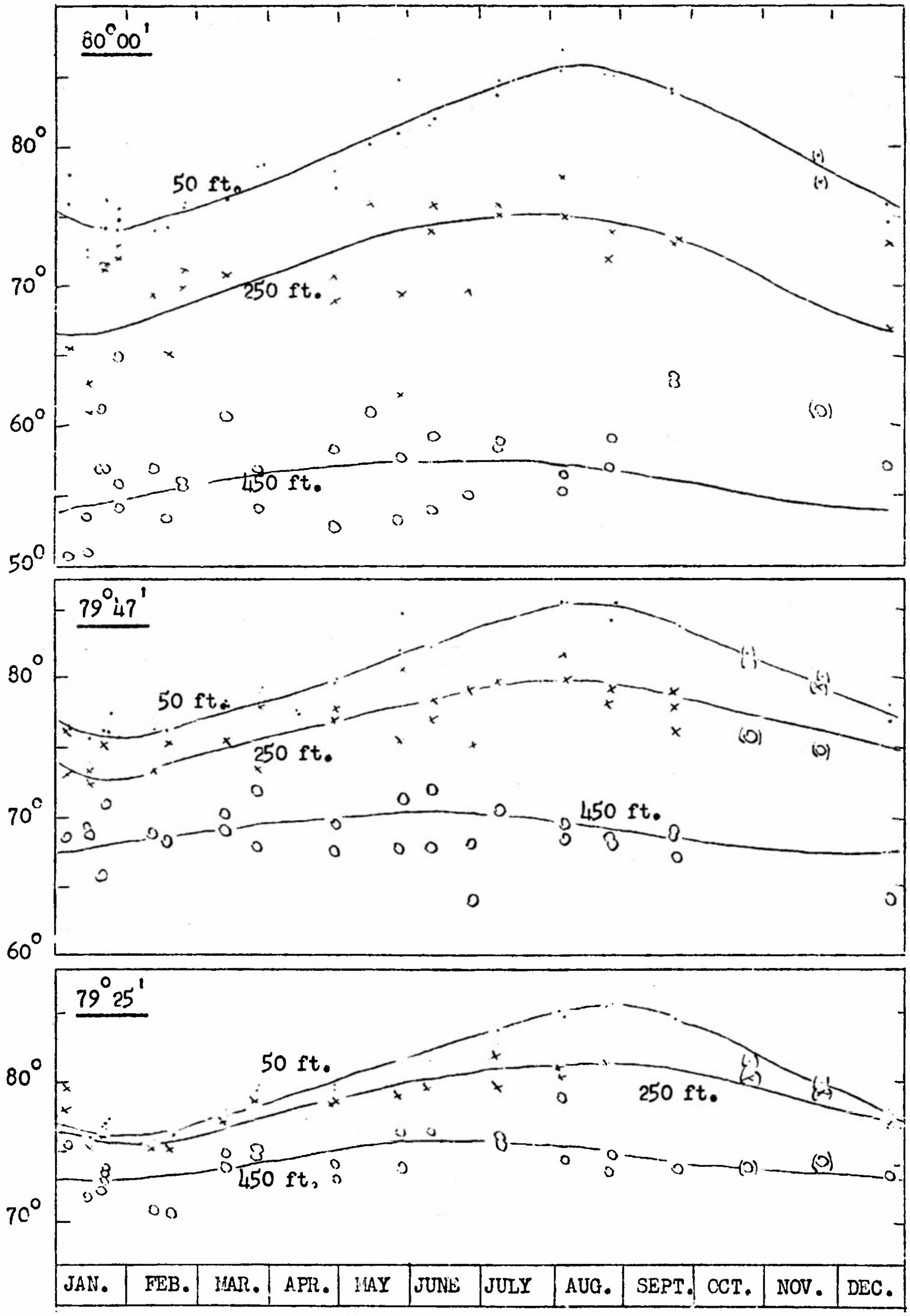


Fig. C-33 SEASONAL CYCLE OF TEMPERATURES

SECTION D

(a) Pertinent information of the GEK fixes.

(b) Data from Hydrographic Stations.

CRUISE	DATE	TIME LST	FIX NO.	LAT. N	LONG. W	SPEED cm/sec	DIRECTION true	N-COMP cm/sec	E-COMP cm/sec
T-240a	XII 22	0815	1	25 45.5	80 00.	63	340	59	-22
		0915	2	25 44	79 33	75	350	74	-13
		1015	3	25 43.5	79 48.5	106	004	106	7
		1115	4	25 42.9	79 43.5	128	007	127	16
		1215	5	25 42	79 37.6	105	008	104	15
		1315	6	25 41.2	79 31.1	84	006	82	9
		1415	7	25 40	79 24.6	51	026	46	22
		1515	8	25 39	79 21.4	30	074	8	29
T-240b	XII 23	0740	9	25 34.3	79 20	60	357	60	-3
		1115	10	25 41.1	79,33.5	107	012	105	22
		1215	11	25 41.4	79 40.7	144	357	144	-8
		1357	12	25 42.5	79 54	54	003	54	3
T-311	II 13	1015	1	25 32	76 31.5	20	101	- 4	20
		1115	2	25 36	76 25	55	007	55	7
		1215	3	25 40	76 18.5	55	064	24	50
		1315	4	25 43	76 12	33	082	5	33
		1415	5	25 47	76 05	64	096	- 7	63
		1515	6	25 50.5	75 59	61	089	1	61
		1615	7	25 54	75 52.5	65	103	-15	63
		1718	8	25 58	75 46	48	068	18	45
		1816	9	26 01.5	75 39	28	064	12	25
		1915	10	26 05	75 32.5	20	037	16	20
		2016	11	26 09	75 26.5	7	039	5	4
		2116	12	26 12.5	75 20	8	352	8	- 1
		2216	13	26 16	75 13	12	051	8	9
		2316	14	26 20	75 07	43	132	-29	32
	II 14	0018	15	26 22	75 03	64	159	-60	23
		0115	16	26 25.5	74 56.5	13	101	- 2	13
		0215	17	26 29	74 51	26	342	25	- 8
		0315	18	26 33	74 44	53	316	38	-37
		0415	19	26 36.5	74 38	30	321	23	-19
		0517	20	26 40	74 31.5	15	002	15	1
		0617	21	26 43.5	74 25	19	036	15	11
		0717	22	26 47	74 18.5	22	038	17	14
		0815	23	26 50.5	74 12.5	27	048	18	20
		1215	24	26 49	74 16	31	038	24	19
		1330	25	26 47	74 21	22	013	21	5
		1630	26	26 38	74 42	35	311	23	-26
		1737	27	26 35	74 49.5	38	290	13	-36
		2230	28	26 30	75 01	40	259	- 8	-39
		2330	29	26 27	75 08	16	257	- 4	-16
	II 15	0030	30	26 24	75 15	11	145	- 9	6
		0130	31	26 21.5	75 21	20	018	19	6
		0230	32	26 18.5	75 27	34	001	34	1
		0330	33	26 16	75 33	51	332	45	-24
		0430	34	26 13.5	75 39	34	349	33	- 6
		0630	35	26 08	75 51	33	045	23	23
		0930	36	26 08	75 51	27	098	- 4	27
		1030	37	26 06	75 57	25	094	- 2	25
	II 17	0408	38	25 49	79 19	64	015	62	17
		0448	39	25 47.8	79,22.1	27	348	26	- 6
		0515	40	25 46.2	79 25.6	31	005	31	3
		0620	41	25 44.9	79 32.8	68	010	67	12
		0715	42	25 45	79 40	102	002	102	4
		0815	43	25 46.7	79 47.1	124	018	118	38

CRUISE	DATE	TIME EST	FIX NO.	LAT. N	LONG W	SPEED cm/sec	DIRECTION true	N-COMP cm/sec	E-COMP cm/sec
		0915	44	25 48.1	79 53.6	90	015	87	23
		1015	45	25 49	79 59.7	119	016	114	43
		1045	46	25 49	80 03	121	012	118	25
		1107	47	25 49.2	80 05	103	312	69	-76
		1118	48	25 49.3	80 05.4	21	345	20	- 5
T-312	II 24	0933	1	25	80 03	162	360	162	0
		0950	2	25	80 01.3	145	356	145	-10
		1015	3	25	79 59	154	360	154	0
		1149	4	25 53	79 59.1	151	007	150	18
		1207	5	25 53.9	79 59.1	151	006	150	16
		1240	6	25 56.8	80 02	160	001	160	3
		1412	7	25 57.9	80 01.5	164	007	163	20
		1515	8	25 54.2	80 06	55	012	54	11
		1645	9	25 46	80 05.1	92	002	92	4
		1654	10	25 46	80 05.1	86	347	84	-19
		1715	11	25 46	80 05.1	82	357	82	- 4
T-313	II 27	1615	1	25 42.5	79 23	24	036	20	14
		1723	2	25 42	79 31.5	82	029	72	40
		1615	3	25 43	79 40	107	018	102	33
		1915	4	25 44.8	79 48.3	162	018	154	50
		2015	5	25 48.8	79 56.8	119	018	113	37
		2115	6	25 49.5	80 05	14	049	9	11
T-315a	III 12	0911	1	25 46.2	80 04	90	346	87	-22
		1015	2	25 45.6	79 57.6	164	346	159	-40
		1108	3	25 46	79 51.2	150	348	147	-31
		1218	4	25 45.8	79 44.8	156	004	156	11
		1315	5	25 44.7	79 37.6	111	008	110	15
		1415	6	25 43	79 32.5	77	007	76	9
		1515	7	25 41.2	79 26.7	61	004	61	4
		1615	8	25 39.5	79 21.8	28	028	25	13
T-315b		1939	9	25 36	79 22.5	8	076	2	8
		2015	10	25 36.7	79 27.7	34	058	18	29
		2115	11	25 38.5	79 35.7	67	024	61	27
		2215	12	25 40.8	79 43.2	108	018	103	33
		2315	13	25 43.3	79 50.4	161	011	158	31
	III 13	0105	14	25 47.8	79 53.2	146	005	145	13
		0215	15	25 48.2	80 00.8	107	345	103	-28
		0240	16	25 48.2	80 04.2	70	339	65	-25
T-316	III 17	0954	1	25 46.2	80 04.6	43	351	42	- 7
		1012	2	25 46.1	80 03.8	39	344	37	-11
		1108	3	25 48.2	80 03.9	68	350	67	-12
		1120	4	25 48.4	80 03.9	59	348	58	-12
		1305	5	25 49.7	80 03.9	76	349	75	-14
		1322	6	25 50.1	80 03.7	106	353	105	-13
		1518	7	25 52.3	80 02.8	137	353	136	-17
T-320a	III 26	1018	1	25 45.8	80 04.5	50	354	50	- 5
		1115	2	25 42.7	79 57.5	62	349	61	-12
		1215	3	25 41.8	79 49.8	105	011	103	20
		1315	4	25 43.4	79 39	146	014	142	35
		1423	5	25 42.7	79 34.5	93	014	90	23
T 320 b		1928	6	25 34.3	79 20.3	57	168	-56	6
		2018	7	25 32.5	79 27.3	9	160	- 8	3
		2115	8	25 32.8	79 34.2	51	031	44	26
		2215	9	25 35.4	79 40.5	100	030	87	50
		2315	10	25 39.2	79 46.2	153	016	147	56

CRUISE	DATE	TIME EST	FIX NO.	LAT N	LONG W	SPEED cm/sec	DIRECTION true	N-COMP cm/sec	E-COMP cm/sec
	III 27	0015	11	25 42.8	79 51.8	125	031	107	64
		0115	12	25 44.3	79 58.8	97	017	93	28
		0150	13	25 43.8	80 03.4	18	008	18	3
T-323a	IV 28	0902	1	25 45.8	80 04.7	91	350	90	-16
		0935	2	25 44.5	80 02	113	349	111	-22
		1014	3	25 43.2	79 56	147	354	146	-15
		1111	4	25 42.4	79 49.5	160	001	160	3
		1215	5	25 42.7	79 43	155	000	155	0
		1315	6	25 42.7	79 36.5	102	356	102	- 7
		1415	7	25 41	79 30.6	77	345	74	-20
		1515	8	25 38.2	79 24.4	83	337	76	-32
		1545	9	25 37	79 21.5	47	351	46	- 7
T-323b	IV 29	1120	10	25 36	79 27.5	48	021	45	17
		1215	11	25 37	79 35.6	104	350	102	-18
		1315	12	25 39.4	79 43.6	132	001	132	2
		1413	13	25 42.6	79 51.2	152	000	152	0
*** T-324		1515	14	25 45.3	79 59	126	346	122	-30
(below)		1545	15	25 46.4	80 04	113	359	113	- 2
T-325	V 12	1100	1	25 44.7	80 02	86	037	69	52
		1145	2	25 44.2	79 58.7	137	359	137	- 2
		1215	3	25 44.5	79 56	142	360	142	0
		1245	4	25 44.5	79 53	133	005	132	12
T-331	V 26	0900	1	25 46.5	80 04.7	116	350	114	-20
		0917	2	25 45.5	79 02.6	133	354	132	-13
		1016	3	25 44.3	79 56	192	353	191	-23
		1115	4	25 44.5	79 49	243	353	241	-30
		1218	5	25 45.5	79 43.7	214	351	212	-34
		1317	6	25 45.6	79 36.5	138	214	-114	-77
		1416	7	25 44	79 30.2	113	343	108	-33
		1516	8	25 41.9	79 24	58	313	40	-42
		1559	9	25 41.4	79 21	83	359	83	- 1
T-339a	VI 25	1052	1	25 45.9	80 05.4	35	001	35	1
		1115	2	25 43.5	80 01	25	334	22	-11
		1215	3	25 42.5	79 54	98	355	98	- 9
		1315	4	25 42.6	79 48.1	119	004	119	8
		1415	5	25 43.4	79 41.6	121	007	120	15
		1515	6	25 43.4	79 35	82	359	82	- 1
		1615	7	25 40.8	79 29	70	358	70	- 2
		1715	8	25 38.0	79 23.5	49	014	48	12
		1735	9	25 36.7	79 21.1	39	358	39	- 1
T-339 b	VI 26	0703	10	25 32.5	79 29.6	43	027	38	20
		0915	11	25 35.8	79 37.2	88	030	76	44
		1015	12	25 38.8	79 43.4	146	021	136	52
		1115	13	25 43	79 49.2	146	012	143	30
		1150	14	25 44.7	79 53.2	88	349	86	-17
		1350	15	25 51.5	79 57.2	31	344	30	- 9
		1427	16	25 52	80 02.7	7	219	- 5	- 4
T-347	VII 21	0100	1	24 46	80 38	54	075	14	52
		0200	2	24 40	80 37	127	066	52	116
		0300	3	24 34.5	80 35.7	123	058	65	104
		0400	4	24 28.8	80 34	85	056	48	71
		0500	5	24 22 8	80 31.5	78	045	55	55
		0600	6	24 17	80 29.7	82	044	59	57
		0700	7	24 11	80 29	75	059	39	64

CRUISE	DATE	TIME EST	FIX NO.	LAT N	LONG W	SPEED cm/sec	DIRECTION true	N-COMP cm/sec	E-COMP cm/sec
		0800	8	24 05	80 28	51	052	31	40
		0900	9	23 59.3	80 27.5	32	073	9	31
		2030	10	23 38.5	80 24.5	33	301	17	-28
		2130	11	23 32	80 23.5	57	336	52	-27
		2230	12	23 25	80 22.5	26	028	23	12
		2330	13	23 18.5	80 21.5	35	015	34	9
T-347	VII 22	1235	15	23 47	79 26	30	182	-30	- 1
		1406	16	23 51.7	79 20.5	29	099	- 5	29
		1500	17	23 56	79 15.5	21	016	20	6
		1600	18	24 01	79 10.2	56	354	56	- 6
	VII 23	0323	19	25 14.5	79 12.5	21	182	-21	- 1
		0400	20	25 15	79 16.8	29	195	-28	- 8
		0500	21	25 17	79 24.5	27	127	-16	22
		0600	22	25 19.5	79 32.8	33	089	0	33
		0700	23	25 22.5	79 40.3	59	051	37	46
		0800	24	25 26	79 47.6	100	017	96	29
		0900	25	25 30.8	79 54	175	014	170	42
		1000	26	25 36	79 59.7	100	012	98	21
		1045	27	25 39.5	80 03	47	336	43	-19
T-349a	VIII 4	1125	1	25 44.8	80 01.7	88	354	88	- 9
		1215	2	25 44.8	79 56.2	102	351	101	-16
		1315	3	25 46.7	79 49.5	109	356	109	- 8
		1415	4	25 46.6	79 42.6	87	002	87	3
		1515	5	25 44.8	79 35.8	73	009	72	12
		1615	6	25 41.5	79 29.5	62	005	62	5
		1713	7	25 38.5	79 23.6	45	002	45	2
		1748	8	25 36.7	79 21	19	282	4	-19
T-349b	VIII 5	0605	9	25 34.5	79 20.5	56	007	56	7
		0700	10	25 33	79 24.5	60	004	60	4
		0737	11	25 32.5	79 29	67	020	63	23
		0930	12	25 34	79 33.6	80	009	79	13
		1030	13	25 38.8	79 42	106	010	104	18
		1130	14	25 38.2	79 50	102	004	102	7
		1300	15	25 45	79 57	124	002	124	5
		1338	16	25 46.2	80 01	30	025	27	13
T-352a	VIII 24	0927	1	25 45.5	80 04.6	54	344	52	-15
		1015	2	25 43.3	79 59.4	76	359	76	- 1
		1110	3	25 42.2	79 52.4	87	005	97	8
	VIII 24	1215	4	25 42.6	79 45.9	130	004	130	9
		1315	5	25 42.3	79 39.1	121	000	121	0
		1415	6	25 40.3	79 31.8	88	001	88	1
		1515	7	25 37.1	79 24.6	66	009	65	11
		1558	8	25 35.6	79 20.6	24	006	24	3
T-352b	VIII 25	0515	9	25 32	79 24.8	41	025	37	17
		0615	10	25 30	79 32.6	72	021	67	26
		0815	11	25 32.5	79 35.7	76	017	73	22
		0915	12	25 33.5	79 43	91	024	83	37
		1015	13	25 36	79 50.5	126	002	126	5
		1215	14	25 42	79 59	87	358	87	- 3
		1257	15	25 42	80 03	34	346	33	- 8
T-353b	IX 22	0715	1	25 34	79 25.6	70	356	70	- 5
		0815	2	25 34.4	79 33	82	002	82	3
		0915	3	25 36.5	79 41.2	112	356	112	- 8

CRUISE	DATE	TIME EST	FIX NO.	LAT N	LONG W	SPEED cm/sec	DIRECTION true	N-COMP cm/sec	E-COMP cm/sec
		1015	4	25 39.7	79 48.8	154	352	153	-21
		1115	5	25 41.8	79 56.6	91	338	84	-34
		1212	6	25 42.6	80 04.7	96	350	95	-16
T-355	X 2	0853	1	25 46.2	80 04.9	34	302	18	-29
		0916	2	25 46.3	80 03.8	17	328	14	- 9
		0940	3	25 46.3	80 01.8	31	331	27	-15
		1024	4	25 46.4	80 03.8	24	308	15	-19
		1036	5	25 46.7	80 05	45	313	31	-33
		1203	6	25 46.5	80 04.9	32	322	25	-20
		1216	7	25 46.5	80 04.3	32	322	25	-20
		1240	8	25 46.6	80 02.2	20	325	16	-11
		1301	9	25 47	80 00.6	69	341	65	-22
		1329	10	25 47.2	80 02.3	31	337	29	-12
		1352	11	25 47.4	80 05	37	310	24	-28
T-358a	X 23	0835	1	25 45	80 04.2	30	186	-30	- 3
		0915	2	25 42.5	79 58.8	36	346	35	- 9
		1010	3	25 39	79 52.1	34	006	34	4
		1200	4	25 37	79 46.1	60	355	60	- 5
		1415	5	25 35	79 37.2	33	354	33	- 3
		1643	6	25 31.4	79 27.2	35	224	-25	-24
		1834	7	25 31.4	79 27.5	33	066	13	30
T-358b	X 24	0630	8	25 34.4	79 20.2	26	355	26	- 2
		0715	9	25 35	79 26.5	54	344	52	-15
		0755	10	25 35.3	79 32.6	15	290	5	-14
		0915	11	25 36.8	79 43.7	75	338	70	-28
		1015	12	25 39	79 52	85	345	82	-22
		1115	13	25 40	80 00.4	30	341	28	-10
		1150	14	25 40	80 05	55	179	-55	1
T-362	XI 10	1257	1	25 40	79 58	20	008	20	3
		1555	2	25 40	79 58	32	001	32	1
		1612	3	25 40	79 58	30	354	30	- 3
		1948	4	25 40	79 56	67	028	59	31
	XI 11	0012	5	25 41	79 59	25	180	-25	0
		0112	6	25 44	80 03	34	108	-11	32
T-364a	XI 24	0855	1	25 45.5	80 04.5	21	348	21	- 4
		0922	2	25 44.3	80 02.3	83	000	83	0
		1000	3	25 43	79 57.2	110	018	104	34
		1221	4	25 40.6	79 45.7	126	016	121	35
		1437	5	25 43	79 38.5	103	024	94	42
		1628	6	25 40.2	79 26.6	39	037	31	23
T-364b		1945	8	25 34.5	79 24.7	26	356	26	- 2
		2030	9	25 34.5	79 30.6	60	000	60	0
		2115	10	25 35	79 36.5	67	007	66	6
		2200	11	25 36.6	79 42.2	99	005	98	9
		2245	12	25 39.8	79 48	110	011	108	21
		2330	13	25 42.7	79 53.6	99	009	98	15
	XI 25	0015	14	25 44.2	79 59.2	95	006	94	10
		0100	15	25 45	80 05	85	005	84	5
**									
T-324	V 7	2315	1	26 36.7	79 58.5	222	011	218	43
	8	0020	2	22 40.5	79 50.5	187	015	182	48
		0115	3	26 42.3	79 42.5	171	008	169	24
		0215	4	26 43.4	79 34.7	140	011	137	27

CRUISE	DATE	TIME EST	FIX NO.	LAT. N	LONG. W	SPEED cm/sec	direction true	N-COMP cm/sec	E-COMP cm/sec
T-324	V 8	0315	5	26 43.4	79 26	108	005	107	9
		0415	6	26 43	79 18.3	66	008	65	10
		0515	7	26 41.9	79 10	44	007	43	4
		0615	8	26 39.6	79 02	20	084	22	20
		0645	9	26 38.5	78 58.8	48	123	-27	41

Cruise T-240 Station T 1 Lat. 25° 39.5' N. Long. 79° 26.5' W.

Date 23 XII 52 Local time 0950 Time Zone +5

Depth 768 m. Max. sample depth 746 m. Wire angle 15°

Weather 01 Clouds AC 3/8 Wind 300° 3 Sea 2 Swell 0

OBSERVED VALUES

Depth m	Temp. °C	Sal. °/oo	σ_t
1	25.52	36.14	24.06
9	25.52	36.13	24.05
47	25.29	36.17	24.17
93	25.13	36.18	24.23
184	20.27	36.55	25.90
364	14.80	35.86	26.71
546	10.61	35.23	27.04
746	6.36	34.83	27.41

VALUES AT STANDARD DEPTHS

Depth m	Temp °C	Sal. °/oo	σ_t	$10^5\delta$	ΔD dyn.m.	$\Sigma\Delta D$ dyn.m.
0	25.52	36.14	24.06	387.5		.0000
					.0388	
10	25.52	36.13	24.05	387.8		.0388
					.0387	
20	25.46	36.13	24.08	385.4		.0775
					.0384	
30	25.34	36.13	24.12	382.0		.1159
					.0759	
50	25.23	36.13	24.18	377.2		.1918
					.0942	
75	25.21	36.15	24.20	376.2		.2860
					.0932	
100	25.00	36.21	24.28	369.6		.3792
					.1566	
150	21.75	36.56	25.48	257.1		.5358
					.1163	
200	19.68	36.51	26.01	208.3		.6521
					.0973	
250	18.00	36.33	26.31	181.1		.7494
					.0834	
300	16.46	36.13	26.62	152.8		.8328
					.1476	
400	13.98	35.70	26.75	142.4		.9804
					.1352	
500	11.70	35.31	26.91	128.0		1.156
					.1165	
600	9.37	35.08	27.15	105.1		1.2321
					.0965	
700	7.22	34.89	27.32	87.9		1.3286
					.0736	
800	(5.50)	(34.80)	27.61	59.3		1.4022

Cruise T-240 Station T 2 Lat. 25° 42.5' N. Long. 79° 55.2' W.

Date 23 XII 52 Local time 1420 Time Zone +5

Depth 355 m. Max. sample depth 350 m. Wire angle 10°

Weather 02 Clouds Ci 4/8 Ac 4 Wind 300° 1 Sea 2 Swell 0

OBSERVED VALUES				VALUES AT STANDARD DEPTHS						
Depth m	Temp. °C	Sal. °/oo	σ_t	Depth m	Temp. °C	Sal. °/oo	σ_t	$10^5\delta$	ΔD dyn.m.	$\Sigma \Delta D$ dyn.m.
1	23.88	36.21	24.60	0	23.88	36.21	24.60	335.1		.0000
									.0334	
10	23.78	36.19	24.62	10	23.78	36.19	24.62	333.6		.0334
									.0335	
50	23.20	36.09	24.72	20	23.75	36.14	24.60	335.8		.0669
									.0669	
100	18.50	35.94	25.89	30	23.50	36.09	24.63	333.3		.1338
									.0659	
150	11.64	35.48	27.05	50	23.20	36.09	24.72	325.6		.1997
									.0801	
200	10.50	35.26	27.08	75	22.85	36.12	24.84	315.1		.2798
									.0663	
250	9.59	35.11	27.12	100	18.50	35.94	25.89	215.7		.3461
									.0804	
350	8.29	34.97	27.23	150	11.64	35.48	27.05	106.0		.4265
									.0524	
				200	10.50	35.26	27.08	103.9		.4789
									.0511	
				250	9.59	35.11	27.12	100.8		.5300
									.0498	
				300	8.90	35.00	27.15	98.7		.5798

Cruise T 315 Station T 3 Lat. 25° 33.5' N. Long. 79° 22.5' W.

Date 12 III 53 Local time 1745 Time Zone +5

Depth 713 m. Max. sample depth 576 m. Wire angle 5°

Weather 02 Clouds Ci 6/8 Wind 180° 2 Sea 2 Swell 7sec. S.

OBSERVED VALUES

Depth m	Temp °C	Sal. °/oo	σ_t
1	27.20	36.04	23.46
38	27.10	36.05	23.49
75	25.70	36.12	23.99
145	24.73	36.40	24.50
282	18.00	36.49	26.44
422	12.96	35.78	27.03
576	7.95	34.97	27.28

VALUES AT STANDARD DEPTHS

Depth m	Temp °C	Sal °/oo	σ_t	$10^5 \delta$	ΔD dyn.m.	$\Sigma \Delta D$ dyn.m.
0	27.20	36.04	23.46	443.6		.0000
					.0443	
10	27.16	36.04	23.48	442.3		.0443
					.0442	
20	27.15	36.04	23.49	441.8		.0885
					.0438	
30	27.05	36.05	23.53	434.2		.1323
					.0864	
50	26.76	36.07	23.63	429.7		.2187
					.1032	
75	25.70	36.12	23.99	396.3		.3219
					.0976	
100	25.45	36.19	24.12	384.9		.4195
					.1822	
150	24.44	36.37	24.57	344.1		.6017
					.1479	
200	21.63	36.65	25.60	247.7		.7496
					.1099	
250	19.26	36.61	26.20	192.0		.8595
					.0886	
300	17.34	36.40	26.52	162.7		.9481
					.1424	
400	13.68	35.89	26.95	122.1		1.0905
					.1149	
500	10.32	35.37	27.12	107.7		1.2054
					.0976	
600	(7.31)	(34.89)	27.31	87.5		1.3030

Cruise T 315 Station T 4 Lat. 25° 43' N. Long. 79° 50.2' W.

Date 12 III 53 Local time 2345 Time Zone +5

Depth 549 m. Max. sample depth 353 m. Wire angle 40°

Weather 01 Clouds Cu 3/8 Wind 150 4 Sea 2 Swell 0

OBSERVED VALUES

Depth m	Temp °C	Sal. ‰	σ_t
1	25.79	36.05	23.92
19	25.93	36.17?	23.97?
32	25.78	36.03	23.90
133	21.34	36.38	25.47
220	15.72?	36.10	26.67?
284		35.72	
353	9.66	35.39	27.33

VALUES AT STANDARD DEPTHS

Depth m	Temp °C	Sal ‰	σ_t	$10^5 \delta$	ΔD dyn.m.	ΣΔD dyn.m.
0	25.79	36.05	23.92	399.9		.0000
					.0400	
10	25.79	36.04	23.91	401.2		.0400
					.0404	
20	25.93	36.03	23.85	407.4		.0804
					.0405	
30	25.79	36.03	23.90	403.0		.1209
					.0805	
50	25.78	36.04	23.92	402.0		.2014
					.0945	
75	24.68	36.29	24.43	354.3		.2959
					.0800	
100	22.51	36.40	25.16	285.6		.3759
					.1325	
150	20.67	36.33	25.61	244.5		.5084
					.0951	
200	15.61	36.18	26.76	136.0		.6035
					.0618	
250	13.52	35.94	27.03	111.3		.6653
					.1058	
300	11.59	35.62	27.15	100.3		.7711
					.0930	
400	(7.98)	(35.00)	27.30	85.7		.8641

Cruise T 334 Station T 5 Lat. 25° 32.2' N. Long. 79° 33.5' W.

Date 10 VI 53 Local time 0730 Time Zone +5

Depth 805 m. Max. sample depth 200 m. Wire angle 0°

Weather 01 Clouds Ac 2/8 Wind 090 1 Sea 1 Swell 0

OBSERVED VALUES

Depth m	Temp °C	Sal. °/oo	σ_t
1	27.25	35.85	23.30
20	27.25	35.87	23.31
30	27.12	35.98	23.44
40	26.49	36.02	23.68
50	26.22	36.10	23.82
60	26.17	36.08	23.82
100	24.94	36.24	24.31
200	20.44	36.67	25.94

VALUES AT STANDARD DEPTHS

Depth m	Temp °C	Sal °/oo	σ_t	$10^5\delta$	ΔD dyn.m.	$\Sigma\Delta D$ dyn.m.
0	27.25	35.85	23.30	458.9		.0000
					.0459	
10	27.25	35.86	23.31	458.6		.0459
					.0459	
20	27.25	35.87	23.31	458.5		.0918
					.0453	
30	27.12	35.98	23.44	446.7		.1371
					.0858	
50	26.22	36.10	23.82	411.7		.2229
					.1019	
75	26.03	36.15	23.91	403.4		.3248
					.0962	
100	24.94	36.14	24.31	365.9		.4210
					.1598	
150	22.55	36.62	25.31	273.1		.5808
					.1221	
200	20.44	36.67	25.93	215.4		.7029
					.0982	
250	(18.44)	(36.53)	26.35	177.2		.8011

Cruise T 334 Station T 6 Lat. 25° 36' N. Long. 79° 55' W.

Date 10 VI 53 Local time 1100 Time Zone +5

Depth 439 m. Max. sample depth 230 Wire angle 35°

Weather 02 Clouds Cu 6/8 Wind 130° 1 Sea 1 Swell 0

OBSERVED VALUES				VALUES AT STANDARD DEPTHS						
Depth m	Temp. °C	Sal. °/oo	σ_t	Depth m	Temp. °C	Sal °/oo	σ_t	$10^5\delta$	△ D dyn.m.	Σ△ D dyn.m.
1	28.05	36.12	23.24	0	28.05	36.12	23.25	463.9		.0000
									.0465	
20	27.67	36.09	23.35	10	28.05	36.10	23.23	466.2		.0465
									.0461	
26	27.57	36.09	23.38	20	27.67	36.09	23.35	455.1		.0926
									.0449	
33	26.85	36.17	23.67	30	27.24	36.11	23.49	422.2		.1375
									.0826	
39	25.76	36.21	24.04	50	25.75	36.27	24.09	385.7		.2201
									.0897	
52	25.72	36.27	24.10	75	24.00	36.32	24.66	336.3		.3098
									.0719	
64	25.18	36.23	24.25	100	20.58	36.30	25.61	242.7		.3817
									.1012	
123	18.28	36.24	26.18	150	16.65	36.11	26.47	162.2		.4829
									.0722	
230	12.30	35.55	26.99	200	13.80	35.78	26.85	126.8		.5551
									.0589	
				250	(11.28)	(35.39)	27.05	108.5		.6140

Cruise T 339 Station T 7 Lat. 25° 32.2' N. Long. 79° 29.5' W.

Date 26 VI 53 Local time 0725 Time Zone +5

Depth 823 m. Max. sample depth 364 m. Wire angle 5°

Weather 03 Clouds Cu 8/8 Wind 170° 2 Sea 2 Swell 0

OBSERVED VALUES				VALUE AT STANDARD DEPTHS						
Depth m	Temp. °C	Sal. ‰	σ_t	Depth m	Temp. °C	Sal ‰	σ_t	$10^5\delta$	ΔD dyn.m.	$\Sigma\Delta D$ dyn.m.
1	28.6^{8}	35.91	22.90	0	28.60	35.91	22.90	497.0		.0000
									.0494	
30	28.29	36.00	23.07	10	28.50	35.95	22.96	491.4		.0494
									.0488	
40	28.18	36.00	23.11	20	28.36	35.98	23.03	485.7		.0982
									.0484	
49	27.85	36.00	23.22	30	28.29	36.00	23.07	482.3		.1466
									.0951	
59	27.38	36.00	23.37	50	27.85	36.00	23.22	469.0		.2417
									.1135	
78	26.84	36.06	23.59	75	27.00	36.05	23.54	439.3		.3552
									.1001	
97		36.36		100	25.20	36.41	24.36	362.0		.4553
									.1617	
191	20.82?	36.65	25.82?	150	23.00	36.63	25.19	284.8		.6170
									.1378	
364	14.05	35.78	26.80	200	22.25	36.63	25.40	266.7		.2548
									.1103	
				250	18.04	36.43	26.38	174.6		.8651
									.0828	
				300	16.31	36.16	26.58	156.6		.9479
									.1429	
				400	(13.00)	(35.60)	26.88	129.2		1.0908

Cruise T 344 Station T 8 Lat. 25° 43.8' N. Long 79° 59.8' W.

Date 7 VII . 53 Local time 1030 Time Zone +5

Depth 292 m. Max. sample depth 290 m. Wire angle 30°

Weather 01 Clouds Cu 2/8 Wind 120° 1 Sea 1 Swell 0

OBSERVED VALUES				VALUE AT STANDARD DEPTHS						
Depth m	Temp. °C	Sal °/oo	σ_t	Depth m	Temp. °C	Sal °/oo	σ_t	$10^5\delta$	ΔD dyn.m.	$\Sigma\Delta D$ dyn.m.
1	28.61	36.09	23.03	0	28.61	36.09	23.03	484.9		.0000
									.0484	
17	28.41	36.06	23.08	10	28.51	36.07	23.05	483.4		.0484
24	28.31	36.07	23.11							
									.0481	
33	28.08	36.07	23.19	20	28.36	36.07	23.10	479.0		.0965
									.0476	
51	27.32	36.10	23.47	30	28.17	36.07	23.16	473.7		.1441
									.0921	
114	21.14	36.60	25.69	50	27.36	36.10	23.45	446.9		.2362
									.1034	
290	7.11	35.06	27.47	75	25.52	36.27	24.16	380.1		.3396
									.0830	
				100	22.90	36.58	25.18	283.7		.4226
									.1055	
				150	16.33	36.34	26.72	138.4		.5281
									.0633	
				200	12.78	35.67	26.97	115.1		.5914
									.0528	
				250	9.64	35.31	27.17	96.3		.6442

Cruise T 344 Station T 9 Lat. 25° 48.3' N. Long. 79° 43.1' W.

Date 7 VII 53 Local time 1300 Time Zone

Depth 786 m. Max. sample depth 362 m. Wire angle 20°

Weather 01 Clouds Ci Cu 3/8 Wind 120° 2 Sea 2 Swell 0

OBSERVED VALUES

Depth m	Temp. °C	Sal °/oo	σ_t
1	28.9^{5}	36.08	22.93
21	28.54		
30	28.10	36.05	23.17
38	27.51	36.00	23.33
47	27.21	36.18	23.56
55	27.13	36.05?	23.49?
63	26.57	36.26	23.82
125	22.43	36.79	25.47
362	9.61	35.23	27.22

VALUE AT STANDARD DEPTHS

Depth m	Temp. °C	Sal. °/oo	σ_t	$10^5\delta$	ΔD dyn.m.	$\Sigma\Delta D$ dyn. m.
0	28.95	36.08	22.91	496.0		.0000
					.0496	
10	28.95	36.08	22.91	496.4		.0496
					.0491	
20	28.60	36.07	23.02	486.7		.0987
					.0480	
30	28.10	36.05	23.17	472.8		.1467
					.0918	
50	27.20	36.01	23.47	445.0		.2385
					.1042	
75	26.19	36.43	24.07	388.8		.3427
					.0891	
100	24.50	36.64	24.76	323.8		.4318
					.1333	
150	20.48	36.75	25.98	209.5		.5651
					.0890	
200	16.39	36.28	26.65	146.8		.6541
					.0690	
250	14.34	35.92	26.84	129.5		.7231
					.0593	
300	12.04	35.61	27.07	108.0		.7824
					.0964	
400	(8.00)	(35.02)	27.31	84.8		.8788

Cruise T 344	Station T 10	Lat. 25° 48.3' N.	Long. 79° 31.8' W.
Date 7 VII 53	Local time 1500	Time Zone + 5	
Depth 823 m.	Max. sample depth 393 m.	Wire angle 5°	
Weather 01	Clouds Ci Cu 2/8	Wind 090° 1	Sea 1 Swell 0

OBSERVED VALUES

Depth m	Temp. °C	Sal. °/oo	σ_t
1	29.50[B]	36.22	22.82
25	28.42	36.05	23.07
34	28.17	36.03	23.13
44	27.50	36.06	23.38
54	27.36	36.08	23.45
63	26.96	36.08	23.57
73	26.64	36.08	23.67
143	22.76	36.74	25.34
393	13.15	35.76	36.93

VALUE AT STANDARD DEPTHS

Depth m	Temp. °C	Sal. °/oo	σ_t	$10^5\delta$	ΔD dyn.m.	ΣΔD dyn.m.
0	29.50	36.22	22.82	504.0		.0000
					.0498	
10	28.96	36.13	22.95	492.4		.0498
					.0489	
20	28.54	36.07	23.04	484.8		.0987
					.0481	
30	28.22	36.03	23.12	477.4		.1468
					.0926	
50	27.39	36.07	23.42	449.0		.2394
					.1089	
75	26.50	36.03	23.71	422.0		.3483
					.0982	
100	25.22	36.58	24.33	364.0		.3965
					.0779	
150	22.33	36.74	25.46	259.1		.4744
					.1147	
200	19.86	36.69	26.10	199.9		.5891
					.0914	
250	17.87	36.51	26.47	166.0		.6805
					.0782	
300	16.13	36.24	26.68	146.8		.7587
					.1333	
400	(12.91)	(35.72)	26.98	119.8		.8920

Cruise T 349 Station T 11 Lat. 25° 32.5' N. Long. 79° 29' W.

Date 5 VIII 53 Local time 0800 Time Zone +5

Depth 730 m. Max. sample depth 400 m. Wire angle 0°

Weather 03 Clouds Cu Ci 7/8 Wind 230 1 Sea 1 Swell 0

OBSERVED VALUES

Depth m	Temp. °C	Sal. °/oo	σ_t
1	29.1? B	35.99	22.79?
30	28.45	35.90	22.95
40	28.40	35.91	22.96
50	28.24	35.99	23.08
60	27.81	36.02	23.25
100	25.87	36.19	24.00
200	19.72	36.62	26.10
300	18.15	35.56	26.46
400	16.96	36.16	26.44

VALUE AT STANDARD DEPTHS

Depth m	Temp. °C	Sal. °/oo	σ_t	$10^5\delta$	ΔD dyn. m.	ΣΔD dyn. m.
0	28.75	35.99	22.91	496.0		.0000
					.0496	
10	28.65	35.96	22.92	495.4		.0496
					.0496	
20	28.60	35.92	22.91	496.8		.0992
					.0495	
30	28.45	35.90	22.95	493.2		.1487
					.0975	
50	28.24	35.99	23.08	482.3		.2462
					.1155	
75	27.14	36.08	23.51	442.1		.3617
					.1048	
100	25.87	36.19	24.00	396.4		.4665
					.1674	
150	22.25	46.51	25.31	273.2		.6339
					.1182	
200	19.72	36.63	26.10	199.8		.7521
					.0951	
250	18.90	36.64	26.32	180.6		.8472
					.0873	
300	18.15	36.56	26.46	168.7		.9345
					.1711	
400	16.96	36.16	26.44	173.5		1.1056

Cruise T 349 Station T 12 Lat. 28° 38.2' N. Long. 79° 50.2' W.

Date 5 VIII 53 Local time 1130 Time Zone +5

Depth 550 m. Max. sample depth 342 m. Wire angle 25°

Weather 02 Clouds Cs 7/8 Wind 0 Sea 0 Swell 0

OBSERVED VALUES

Depth m	Temp. °C	Sal ‰	σ_t
1	29.80[B]	36.04	22.59
36	28.93	36.05	22.89
45		36.13	
54	27.91		
72	26.08	36.21	23.95
134	19.67	36.52	26.02
252	12.42	35.55	26.96
342	6.65	34.99	27.50

VALUE AT STANDARD DEPTHS

Depth m	Temp. °C	Sal ‰	σ_t	$10^5 \delta$	ΔD dyn.m.	$\Sigma \Delta D$ dyn.m.
0	29.80	36.04	22.59	526.0		.0000
					.0526	
10	29.73	36.01	22.60	525.4		.0526
					.0527	
20	29.60	36.01	22.63	528.8		.1053
					.0519	
30	29.20	36.03	22.79	509.2		.1572
					.0982	
50	28.14	36.09	23.18	472.8		.2554
					.1079	
75	25.80	36.23	24.05	390.6		.3633
					.0890	
100	23.80	36.41	24.78	321.9		.4523
					.1261	
150	18.61	36.47	26.26	182.5		.5784
					.0808	
200	15.44	36.06	26.71	140.7		.6592
					.0657	
250	12.70	35.56	26.91	122.1		.7249
					.0556	
300	9.95	35.21	27.14	100.3		.7805
					.0782	
400	(5.28)	(34.91)	27.59	56.1		.8587

Cruise T 352 Station T 13 Lat. 25° 36.5' N. Long. 79° 54' W.

Date 25 VIII 53 Local time 1130 Time Zone +5

Depth 430 m. Max. sample depth 303 m. Wire angle 35°

Weather 01 Clouds Ci Cu 2/10 Wind 170 3 Sea 2 Swell 0

OBSERVED VALUES

Depth m	Temp. °C	Sal. °/oo	σ_t
1	29.70?	35.99	22.72?
33	28.28	36.00	23.04
50	27.24?	36.08	23.48?
67	26.09	36.22	23.95
83	24.14	36.26	24.58
160	16.69	36.18	26.52
234	13.72	35.78	26.87
303	8.97	35.04	27.17

VALUE AT STANDARD DEPTHS

Depth m	Temp. °C	Sal. °/oo	σ_t	$10^5\delta$	ΔD dyn.m.	$\Sigma\Delta D$ dyn. m.
0	29.50	35.99	22.64	522.0		.0000
					.0522	
10	29.50	35.99	22.64	522.4		.0522
					.0520	
20	29.40	35.99	22.63	518.8		.1042
					.0511	
30	29.00	36.00	22.83	504.3		.1553
					.0956	
50	27.50	36.08	23.40	451.7		.2509
					.1060	
75	26.00	36.25	23.99	396.3		.3569
					.0925	
100	23.62	36.27	24.74	325.7		.4494
					.1284	
150	18.09	36.21	26.20	188.1		.5778
					.0814	
200	15.10	36.01	26.74	137.7		.6592
					.0642	
250	12.71	35.61	26.94	119.4		.7234
					.0545	
300	9.27	35.08	27.15	98.8		.7779

Cruise T 353 Station T 14 Lat. 25° 43.6' N. Long. 79° 56.6' W.

Date 21 IX 53 Local time 1000 Time Zone +5

Depth 320 m. Max. sample depth 269 Wire angle 30°

Weather 50 Clouds Lt 8/10 Wind 170 2 Sea 2 Swell

OBSERVED VALUES

Depth m	Temp. °C	Sal. °/oo	σt
1	29.05	35.17	22.19
42	27.27	36.25	23.59
84	22.39	26.44	25.22
132	19.41	36.34	25.96
180	16.20	36.08	26.55
205	15.38	36.00	26.67
230		35.49	
269	7.55	35.05	27.40

VALUE AT STANDARD DEPTHS

Depth m	Temp. °C	Sal. °/oo	σt	$10^5\delta$	ΔD dyn. m.	ΣΔD dyn. m.
0	29.05	35.17	22.19	564.3		.0000
					.0545	
10	29.05	35.69	22.57	527.4		.0545
					.0516	
20	28.95	35.95	22.81	505.9		.1061
					.0492	
30	28.45	36.12	23.11	478.2		.1553
					.0879	
50	26.34	36.30	23.97	400.9		.2432
					.0884	
75	23.33	36.42	24.93	306.1		.3316
					.0682	
100	20.88	36.44	25.64	239.6		.3998
					.1027	
150	17.42	36.23	26.37	171.3		.5025
					.0793	
200	15.56	36.02	26.65	146.2		.5818
					.0573	
250	9.10	35.23	27.30	83.3		.6391
					.0367	
300	(5.65)	(34.82)	27.50	63.6		.6758

Cruise T 353 Station T 15 Lat. 25° 44.3' N. Long. 79° 46.5' W

Date 21 IX 53 Local time 1230 Time Zone +5

Depth 768 m. Max. sample depth 596 m. Wire angle 40+°

Weather 03 Clouds Ns 8/10 Wind 200° 2 Sea 2 Swell 0

OBSERVED VALUES

Depth m	Temp. °C	Sal. °/oo	σ_t
1	28.38	35.82	22.90
37	28.43	36.16	23.14
88	24.83	36.42	24.49
175		36.49	
305	13.78	35.75	26.83
374	10.99	35.22	26.96
596	6.48	34.88	27.43

VALUE AT STANDARD DEPTHS

Depth m	Temp. °C	Sal. °/oo	σ_t	$10^5\delta$	ΔD dyn. m.	$\Sigma\Delta D$ dyn. m.
0	28.38	35.82	22.90	496.3		.0000
					.0494	
10	28.42	35.91	22.96	491.4		.0494
					.0489	
20	28.50	36.02	23.01	486.6		.0983
					.0483	
30	28.50	36.11	23.09	480.5		.1466
					.0928	
50	27.75	36.26	23.45	447.2		.2394
					.1030	
75	25.70	36.38	24.19	377.1		.3424
					.0882	
100	24.18	36.45	24.70	328.7		.4306
					.1458	
150	21.54	36.50	25.50	254.5		.5764
					.1124	
200	18.98	36.44	26.14	195.1		.6888
					.0874	
250	16.50	36.21	26.57	154.8		.7762
					.0721	
300	14.00	35.78	26.81	133.8		.8483
					.1230	
400	10.32	35.15	27.03	112.3		.9713
					.1059	
500	8.70	34.99	27.18	99.5		1.0772
					.0877	
600	6.47	34.88	27.42	76.0		1.1649

Cruise T353 Station T 16 Lat. 25° 43.6' N. Long. 79° 31' W.

Date 21 IX 53 Local time 1600 Time Zone +5

Depth 750 m. Max. sample depth 532 m. Wire angle 40+°

Weather 50 Clouds St 4/10 Wind 170 4 Sea 4 Swell 0

OBSERVED VALUES

Depth m	Temp. °C	Sal. °/oo	σ_t
1	28.7	35.82	22.79
38	28.68	36.32	23.18
76	26.33	36.19	23.85
142		36.56	
228	19.43	36.63	26.17
304	18.31	36.50	26.36
380	16.33	36.17	26.58
542	10.78	35.10	26.91

VALUE AT STANDARD DEPTHS

Depth m	Temp. °C	Sal. °/oo	σ_t	$10^5\delta$	ΔD dyn. m.	$\Sigma \Delta D$ dyn. m.
0	28.70	35.82	22.79	506.4		.0000
					.0502	
10	28.73	35.97	22.90	497.0		.0502
					.0491	
20	28.74	36.14	23.02	485.5		.0993
					.0481	
30	28.74	36.26	23.11	477.5		.1494
					.0937	
50	28.25	36.30	23.31	459.9		.2411
					.1092	
75	26.47	36.19	23.80	413.8		.3503
					.0964	
100	24.77	36.29	24.40	357.3		.4467
					.1563	
150	22.26	36.58	25.36	267.9		.6030
					.1202	
200	20.21	36.62	25.96	213.0		.7232
					.0991	
250	19.00	36.63	26.28	183.7		.8223
					.0906	
300	18.37	36.51	26.36	178.1		.9129
					.1649	
400	15.60	36.02	26.66	151.2		1.0778
					.1399	
500	11.80	35.18	26.90	128.6		1.2177
600	(7.60)	(34.99)	27.33	85.9	.1072	1.3249

Cruise T 358 Station T 17 Lat. 25° 38.7' N. Long. 79° 51.7' W.

Date 23 X 53 Local time 1100 Time Zone +5

Depth 348 m. Max. sample depth 330 m. Wire angle 10°

Weather 00 Clouds 0/10 Wind 010 5 Sea 5 Swell North

OBSERVED VALUES

Depth m	Temp. °C	Sal. °/oo	σ_t
1	27.59	36.00	23.30
24	27.59	36.00	23.30
56	27.56?	35.86	23.20?
107	25.88	36.36	24.12
138		36.41	
220	13.11	35.67?	26.91?
288	8.43	34.99	27.22
330	7.85	34.98	27.30

VALUES AT STANDARD DEPTHS

Depth m	Temp. °C	Sal. °/oo	σ_t	$10^5\delta$	ΔD dyn. m.	$\Sigma\Delta D$ dyn. m.
0	27.59	36.00	23.30	459.1		.0000
					.0459	
10	27.59	36.00	23.30	459.5		.0459
					.0460	
20	27.59	36.00	23.30	459.9		.0919
					.0460	
30	27.59	36.00	23.30	460.3		.1379
					.0926	
50	27.57?	35.91	23.25	466.1		.2305
					.1157	
75	27.24	35.88	23.33	459.4		.3462
					.1085	
100	26.42	36.26	23.87	408.9		.4547
					.1390	
150	17.10	36.47	26.63	147.1		.5937
					.0654	
200	14.40	36.00	26.98	114.8		.6591
					.0557	
250	10.78	35.28	27.05	108.0		.7148
					.0494	
300	8.20	34.97	27.24	89.8		.7642
					.0804	
400	(7.40)	(35.10)	27.45	71.1		.8446

Cruise T-358   Station T 18   Lat. 25° 36.6' N.   Long. 79° 44.6' W.

Date 23 X 53   Local time 1215   Time Zone +5

Depth 786 m.   Max. sample depth 444 m.   Wire angle 10°

Weather 00   Clouds 0/10   Wind 010 5   Sea 5   Swell North

OBSERVED VALUES

Depth m	Temp. °C	Sal. °/oo	σ_t
1		36.00	
25	27.52	36.03	23.35
63	27.47	35.95	23.30
122	25.26	36.41	24.35
169	21.76	36.63	25.54
221	17.52	36.39	26.47
332		35.39	
444	8.65	35.00	27.19

VALUES AT STANDARD DEPTHS

Depth m	Temp. °C	Sal. °/oo	σ_t	$10^5 \delta$	ΔD dyn.m.	$\Sigma \Delta D$ dyn.m.
0	27.52	36.00	23.33	456.3		.0000
					.0456	
10	27.52	36.02	23.34	455.7		.0456
					.0455	
20	27.52	36.03	23.35	455.1		.0911
					.0455	
30	27.52	36.03	23.35	455.5		.1366
					.0914	
50	27.51	36.00	23.33	458.5		.2280
					.1141	
75	27.20	35.93	23.38	454.6		.3421
					.1091	
100	26.45	36.13	23.77	418.4		.4512
					.1800	
150	23.50	36.59	25.01	301.9		.6312
					.1211	
200	18.92	36.59	26.28	182.5		.7523
					.0852	
250	15.62	35.90	26.54	158.5		.8375
					.0704	
300	12.68	35.56	26.91	123.3		.9079
					.1098	
400	9.40	35.17	27.20	96.4		1.0177
					.0957	
500	(8.00)	(34.91)	27.22	95.0		1.1134

Cruise T-358 Station T 19 Lat. 25° 35.6' N. Long. 79° 37.2' W.

Date 23 X 53 Local time 1420 Time Zone +5

Depth 823 m Max. sample depth 774 m. Wire angle 15°

Weather 01 Clouds cu 2 Wind 000° 5 Sea 5 Swell North

OBSERVED VALUES

Depth m	Temp. °C	Sal °/oo	σ_t
1		36.01	23.35
15	27.47	36.01	23.35
48	27.47	35.99	23.34
120	25.11	36.44	24.42
191	20.45	36.75	25.99
260	17.60	36.37	26.44
439	11.16	35.39	27.08
611	6.89	34.90	27.39
774	5.64	35.11	27.11

VALUES AT STANDARD DEPTHS

Depth m	Temp. °C	Sal. °/oo	σ_t	$10^5\delta$	ΔD dyn.m.	$\Sigma\Delta D$ dyn.m.
0	(27.47)	36.01	23.35	454.2		.0000
					.0454	
10	27.47	36.01	23.35	454.6		.0454
					.0455	
20	27.47	36.01	23.55	455.0		.0909
					.0455	
30	27.47	36.01	23.35	455.4		.1364
					.0913	
50	27.47	35.99	23.33	457.7		.2277
					.1135	
75	27.20	35.99	23.42	450.4		.3412
					.1080	
100	26.42	36.19	23.82	413.3		.4492
					.1753	
150	23.22	36.67	25.15	288.0		.6245
					.1203	
200	19.75	36.73	26.17	193.3		.7448
					.0908	
250	17.86	36.44	26.43	169.8		.8356
					.0830	
300	16.35	36.08	26.51	162.4		.9186
					.1428	
400	12.50	35.55	26.94	123.2		1.0614
					.1102	
500	9.42	35.18	27.21	97.2		1.1716
					.0890	
600	7.02	34.92	27.37	80.9		1.2606
					.0738	
700	6.02	34.94	27.52	66.7		1.3344
					.0558	
800	(5.49)	(35.16)	27.76	44.8		1.3902

Cruise T-358 Station T-20 Lat. 25° 31.6' N. Long. 79° 27.1' W.

Date 23 X 53 Local time 1700 Time Zone +5

Depth 823 m Max. sample depth 790 m. Wire angle 35°

Weather 01 Clouds cu 2 Wind 010° 5 Sea 5 Swell North

OBSERVED VALUES

Depth m	Temp. °C	Sal. °/oo	σ_t
1		36.04	23.37
12	27.47	35.98	23.33
40	27.45	36.02	23.36
101	25.54	36.40	24.26
164	21.90	36.74	25.58
224	19.50	36.64	26.16
405	15.47	36.01	26.66
592	11.95	35.23	26.81
790	9.19	34.97	27.08

VALUES AT STANDARD DEPTHS

Depth m	Temp. °C	Sal. °/oo	σ_t	$10^5\delta$	ΔD dyn.m.	$\Sigma\Delta D$ dyn.m.
0	27.47	36.04	23.37	452.0		.0000
					.0454	
10	27.47	35.99	23.33	456.0		.0454
					.0457	
20	27.46	35.97	23.32	457.6		.0911
					.0457	
30	27.45	35.99	23.34	456.2		.1368
					.0904	
50	27.28	36.04	23.43	448.3		.2272
					.1104	
75	26.88	36.07	23.58	434.9		.3376
					.1012	
100	25.54	36.36	24.22	374.9		.4388
					.1601	
150	22.46	36.69	25.39	265.5		.5989
					.1196	
200	20.62	36.77	25.96	212.8		.7185
					.1020	
250	19.20	36.54	26.16	195.3		.8205
					.0932	
300	17.88	36.37	26.37	177.0		.9137
					.1644	
400	15.56	36.03	26.66	151.8		1.0781
					.1500	
500	13.58	35.54	26.71	148.2		1.2281
					.1440	
600	11.80	35.21	26.81	139.8		1.3721
					.1333	
700	10.34	35.05	26.95	126.8		1.5054
					.1198	
800	(9.08)	(34.97)	27.10	112.8		1.6252

Cruise T-362 Station T 21 Lat. 25° 40' N. Long. 79° 57' W.

Date 10 XI 53 Local Time 1300 Time Zone +5

Depth 348 m Max. sample depth 330 Wire angle 5°

Weather 03 Clouds St 8 Wind 000° 2 Sea 1 Swell 0

OBSERVED VALUES				VALUES AT STANDARD DEPTHS						
Depth m	Temp. °C	Sal. ‰	σt	Depth m	Temp. °C	Sal. ‰	σt	$10^5 \delta$	Δ D dyn.m.	Σ Δ D dyn.m.
1	26.03	35.90	23.72	0	26.03	35.90	23.72	418.3		.0000
									.0418	
83	25.62	36.02	23.96	10	26.03	35.90	23.72	418.7		.0418
									.0419	
112	23.29	36.29	24.84	20	26.02	35.90	23.73	418.8		.0837
									.0419	
140	19.07	36.22	25.96	30	26.01	25.90	23.73	418.9		.1256
									.0837	
169	14.90	35.89	26.70	50	26.00	35.92	23.75	418.1		.2093
									.1034	
220	9.97	35.22	27.15	75	25.81	35.93	23.85	409.1		.3127
									.0961	
280	8.23	35.00	27.26	100	24.58	36.18	24.38	359.7		.4088
									.1356	
330	7.67	34.90	27.28	150	17.58	36.12	26.25	182.8		.5444
									.0736	
				200	11.45	35.37	27.00	114.6		.6180
									.0504	
				250	8.89	35.09	27.23	90.2		.6684
									.0445	
				300	8.00	34.95	27.26	87.9		.7129

Cruise T-362 Station T 22 Lat. 25° 40' N. Long. 79° 57' W.

Date 10 XI 53 Local Time 1500 Time Zone +5

Depth 348 m. Max. sample depth 336 m. Wire angle 5°

Weather 03 Clouds St 8 Wind 000 2 Sea 1 Swell 0

OBSERVED VALUES

Depth m	Temp. °C	Sal. °/oo	σ_t
1	25.73	35.91	23.82
59	26.08	35.92	23.73
83	25.70	35.99	23.90
113	23.59	36.30	24.76
142	18.36	36.16	26.10
171	14.97	35.90	26.70
223	10.70	35.34	27.11
289	8.47	35.02	27.24
336	7.59	34.91	27.30

VALUES AT STANDARD DEPTHS

Depth m	Temp. °C	Sal. °/oo	σ_t	$10^5\delta$	△ D dyn.m.	Σ △D dyn.m.
0	25.73	35.91	23.82	408.7		.0000
					.0411	
10	25.84	35.91	23.79	412.4		.0411
					.0414	
20	25.92	35.91	23.77	415.1		.0825
					.0416	
30	26.00	35.91	23.74	417.9		.1241
					.0839	
50	26.09	35.91	23.71	421.5		.2080
					.1044	
75	25.88	35.95	23.81	413.3		.3124
					.0978	
100	24.82	36.15	24.28	368.9		.4102
					.1376	
150	17.42	36.09	26.26	181.4		.5478
					.0738	
200	12.38	35.57	26.98	114.0		.6216
					.0518	
250	9.50	35.18	27.20	93.4		.6734
					.0463	
300	8.45	34.99	27.22	91.8		.7197

Cruise T-362 Station T 23 Lat. 25° 40' N. Long. 79° 57' W.

Date 10 XI 53 Local time 1700 Time Zone +5

Depth 330 Max. sample depth 225 m Wire angle 5°

Weather 03 Clouds St 8 Wind 000 3 Sea 2 Swell 0

OBSERVED VALUES

Depth m	Temp. °C	Sal. °/oo	σ_t
1	25.95	35.89	23.74
83	25.95	36.00	23.83
112	23.94	36.27	24.63
140	18.29	36.14	26.10
170	14.72	35.86	26.71
225	10.91	35.24	27.00

VALUES AT STANDARD DEPTHS

Depth m	Temp. °C	Sal. °/oo	σ_t	$10^5\delta$	ΔD dyn.m.	$\Sigma\Delta D$ dyn.m.
0	25.95	35.89	23.74	416.6		.0000
					.0419	
10	26.08	35.89	23.70	420.9		.0419
					.0423	
20	26.18	35.89	23.67	424.3		.0842
					.0425	
30	26.22	35.89	23.66	425.9		.1267
					.0854	
50	26.29	35.90	23.64	428.2		.2121
					.1059	
75	26.10	35.96	23.75	419.2		.3180
					.0994	
100	25.04	36.14	24.21	376.0		.4174
					.1359	
150	16.69	36.05	26.41	167.5		.5533
					.0724	
200	12.56	35.51	26.89	121.9		.6257
					.0556	
250	(9.55)	(35.09)	27.12	100.7		.6813

Cruise T-362 Station T 24 Lat. 25° 40' N. Long. 79° 57' W.

Date 10 XI 53 Local time 1900 Time Zone +5

Depth 348 m. Max. sample depth 300 m. Wire angle 20°

Weather 03 Clouds St 8 Wind 000° 4 Sea 3 Swell 0

OBSERVED VALUES				VALUES AT STANDARD DEPTHS						
Depth m	Temp. °C	Sal. °/oo	σ_t	Depth m	Temp. °C	Sal. °/oo	σ_t	$10^5\delta$	ΔD dyn.m.	ΣΔD dyn.m.
1	26.74	35.97	23.55	0	26.74	35.97	23.55	434.7		.0000
									.0434	
52	26.14	35.94	23.73	10	26.63	35.96	23.58	432.5		.0434
									.0430	
74	25.91	35.95	23.80	20	26.48	35.96	23.63	428.3		.0864
									.0427	
100	24.82	36.25	24.36	30	26.34	35.95	23.66	425.2		.1291
									.0846	
126	21.65	36.31	25.34	50	26.15	35.94	23.72	421.1		.2137
									.1043	
152	18.26	36.21	26.16	75	25.88	35.95	23.81	413.3		.3180
									.0969	
199	14.81	35.87	26.71	100	24.83	36.25	24.36	362.0		.4149
									.1396	
258	11.12	35.39	27.09	150	18.45	36.22	26.11	196.4		.5545
									.0841	
300	8.61	35.02	27.22	200	14.77	35.87	26.71	140.0		.6386
									.0625	
				250	11.65	35.46	27.03	110.1		.7011
									.0505	
				300	8.61	35.02	27.22	92.0		.7516

Cruise T-362 Station T 25 Lat. 25° 40' N. Long. 79° 57' W.

Date 10 XI 53 Local time 2100 Time Zone

Depth 348 m. Max. sample depth 280 m Wire angle 15°

Weather 03 Clouds St 8 Wind 000 4 Sea 4 Swell 0

OBSERVED VALUES				VALUES AT STANDARD DEPTHS						
Depth m	Temp. °C	Sal. °/oo	σ_t	Depth m	Temp. °C	Sal. °/oo	σ_t	$10^5\delta$	ΔD dyn.m.	$\Sigma \Delta D$ dyn.m.
				0	26.49	(36.05)	23.70	421.4		.0000
55	26.41	36.04	23.72	10	26.49	-	-	-		-
									.2106	
78	26.30	36.00	23.72	20	26.45	-	-	-		-
105	25.18	36.17	24.20	30	26.43	-	-	-	-	-
132	22.28	36.34	25.18	50	26.41	36.05	23.72	421.0	-	.2106
									.1055	
159	18.68	36.19	26.04	75	26.33	36.00	23.70	423.2		.3161
									.1018	
195	14.41	35.81	26.75	100	25.52	36.12	24.05	391.5		.4179
									.0908	
280	9.42	35.13	27.17	200	14.12	35.77	26.77	133.8		.6639
									.0601	
				250	11.03	35.35	27.06	106.6		.7240
									.0500	
				300	(8.60)	(35.00)	27.20	93.3		.7740

Cruise T-362 Station T 26 Lat. 25° 40' N. Long. 79° 57' W.

Date 10 XI 53 Local time 2300 Time Zone +5

Depth 348 m Max. sample depth 327 m. Wire angle 5°

Weather 03 Clouds St 8 Wind 000 5 Sea 4+ Swell 0

OBSERVED VALUES				VALUES AT STANDARD DEPTHS						
Depth m	Temp. °C	Sal. ‰	σ_t	Depth m	Temp. °C	Sal. ‰	σ_t	$10^5 \delta$	ΔD dyn.m.	ΣΔD dyn.m.
				0	26.50	(36.00)	23.65	425.3		.0000
									.0426	
57	26.14	35.97	23.75	10	26.50	(35.99)	23.64	426.8		.0426
									.0427	
81	25.49	36.09	24.04	20	26.50	(35.98)	23.64	427.5		.0853
									.0428	
137	21.03	36.31	25.50	30	26.48	(35.97)	23.64	428.0		.1281
									.0852	
161	15.82	35.97	26.55	50	26.29	35.96	23.69	423.9		.2133
									.1034	
217	11.97	35.48	27.00	75	25.69	36.00	23.91	403.4		.3167
									.0948	
282	9.26	35.11	27.18	100	24.35	36.15	24.43	355.2		.4115
									.1343	
327	7.73	34.91	27.28	150	17.61	36.14	26.26	182.1		.5458
									.0756	
				200	12.85	35.61	26.91	120.3		.6214
									.0558	
				250	10.46	35.27	27.10	102.8		.6772
									.0486	
				300	8.63	35.03	27.22	91.6		.7258

Cruise T-364 Station T 27 Lat. 25° 43' N. Long. 79° 57' W.

Date 24 XI 53 Local time 1015 Time Zone +5

Depth 310 m Max. sample depth 270 m Wire angle 40°

Weather 02 Clouds cu 02 Wind 165 2 Sea 2 Swell 0

OBSERVED VALUES

Depth m	Temp. °C	Sal. °/oo	σ_t
0	26.40	36.15	23.80
23	26.40	36.17	23.81
64	25.53	36.34	24.22
85	24.72	36.18	24.35
105	23.49	36.21	24.72
124	18.26	36.17	26.13
150	14.28	35.85	26.80
220	9.82	35.29	27.23
270	8.54	34.97	27.19

VALUES AT STANDARD DEPTHS

Depth m	Temp. °C	Sal. °/oo	σ_t	$10^5\delta$	ΔD dyn.m.	$\Sigma\Delta D$ dyn.m.
0	26.40	36.15	23.80	411.4		.0000
					.0411	
10	26.40	36.17	23.81	410.4		.0411
					.0411	
20	26.40	36.17	23.81	410.8		.0822
					.0411	
30	26.35	36.16	23.82	410.5		.1233
					.0822	
50	26.20	36.10	23.82	411.1		.2055
					.0982	
75	25.15	36.19	24.22	374.4		.3037
					.0888	
100	23.81	36.21	24.64	335.6		.3925
					.1164	
150	14.28	35.85	26.80	130.0		.5089
					.0562	
200	10.63	35.40	27.17	95.0		.5651
					.0468	
250	8.92	35.07	27.21	92.2		.6119
					.0458	
300	(7.90)	34.89	27.22	90.9		.6577

Cruise T-364 Station T 28 Lat. 25° 40.6' N. Long. 79° 45.7' W.

Date 24 XI 53 Local time 1235 Time Zone +5

Depth 786 m. Max. sample depth 555 m. Wire angle 45°

Weather 01 Clouds Cu 3 Wind 170 3 Sea 2 Swell 0

OBSERVED VALUES

Depth m	Temp. °C	Sal. °/oo	σ_t
.1	26.65	36.08	23.66
36	26.65	36.11	23.69
70	26.59	36.07	23.68
103	24.85	36.33	24.42
136	23.90	36.25	24.64
232	17.66	36.29	26.37
323	11.76	35.49	27.04
438	8.68	35.00	27.20
555	6.60	34.84	27.39

VALUES AT STANDARD DEPTHS

Depth m	Temp. °C	Sal. °/oo	σ_t	$10^5\delta$	ΔD dyn.m.	$\Sigma\Delta D$ dyn.m.
0	26.65	36.08	23.66	424.0		.0000
					.0423	
10	26.65	36.10	23.68	423.0		.0423
					.0423	
20	26.65	36.12	23.69	422.0		.0846
					.0422	
30	26.65	36.12	23.69	422.4		.1268
					.0848	
50	26.65	36.08	23.66	426.1		.2116
					.1056	
75	26.38	36.08	23.75	418.9		.3172
					.0976	
100	24.97	36.31	24.36	361.7		.4148
					.1664	
150	23.40	36.52	24.99	303.7		.5812
					.1343	
200	20.61	36.48	25.74	233.4		.7155
					.0961	
250	15.94	36.09	26.62	151.0		.8116
					.0675	
300	12.71	35.63	26.96	118.9		.8791
					.1110	
400	9.64	35.12	27.13	103.2		.9901
					.0962	
500	7.50	34.88	27.27	89.1		1.0863
					.0818	
600	(6.20)	(34.85)	27.43	74.6		1.1681

Cruise T-364 Station T 29 Lat. 25° 40.2' N. Long. 79° 26.6' W.

Date 24 XI 53 Local time 1630 Time Zone +5

Depth 695 m Max. Sample depth 684 m Wire angle 10°

Weather 02 Clouds Cu 7 Wind 180 3 Sea 2 Swell 0

OBSERVED VALUES

Depth m	Temp. °C	Sal. °/oo	σ_t
1	26.70	36.09	23.66
9	26.70	36.00	23.59
58	26.[illegible]6	36.07	23.76
105	26.05	36.39	24.09
197	20.14	36.63	25.98
287	17.34	36.41	26.53
469	12.34	35.46	26.91
684	8.28	34.97	27.23

VALUES AT STANDARD DEPTHS

Depth m	Temp. °C	Sal. °/oo	σ_t	$10^5\delta$	ΔD dyn.m.	$\Sigma\Delta D$ dyn.m.
0	26.70	36.09	23.66	424.8		.0000
					.0428	
10	26.70	36.00	23.59	431.7		.0428
					.0433	
20	26.70	35.96	23.56	435.0		.0861
					.0435	
30	26.70	35.96	23.56	435.4		.1296
					.0861	
50	26.50	36.02	23.66	426.0		.2157
					.1044	
75	26.31	36.18	23.85	409.6		.3201
					.1003	
100	26.15	36.36	24.03	393.0		.4204
					.1678	
150	22.66	36.59	25.26	270.2		.5882
					.1214	
200	20.02	36.63	26.02	207.5		.7096
					.0957	
250	18.42	36.55	26.37	175.3		.8053
					.0829	
300	16.94	36.35	26.58	156.4		.8882
					.1464	
400	14.00	35.78	26.81	136.4		1.0346
					.1294	
500	11.55	35.35	26.96	122.4		1.1640
					.1151	
600	9.54	35.09	27.12	107.8		1.2791
					.0934	
700	(7.04)	(34.97)	27.41	79.0		1.3725

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