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Observations of Currents and Water Properties in Puget Sound, 1973

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OBSERVATIONS OF CURRENTS AND WATER PROPERTIES IN PUGET SOUND, 1973

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Description is given of current meter measurements and STD observations made in Puget Sound in January and February 1973. A level of no net motion at about 50 m was consistent with data collected in a previous experiment. Near surface currents, temperatures, and salinities were observed to be modified by a change in wind direction.

1. INTRODUCTION

During January and February 1973 PMEL continued its investigation of the dynamics of the Puget Sound system. Experiments conducted were based on results of a similar study in 1972 (Cannon and Laird, 1972). Measurements of currents throughout the water column were made from two current meter moorings, and the distributions of temperature and salinity were determined by STD measurements. In addition, time histories of temperature and salinity were obtained at seven depths on the moorings. Auxiliary wind data were obtained simultaneously by personnel of University of Washington, and tides were monitored at Seattle by National Ocean Survey. This report provides a summary of the experiment and data.

2. CURRENT METER MEASUREMENTS

Current meter measurements were made at depths between 2 and 193 meters from two moorings deployed midway between West Point and Point Jefferson in approximately 197 m of water (Fig. 1). Two moorings, separated by 750 m, were used so we could sample near surface currents, yet provide security for the majority of the instruments by attaching them to a subsurface buoy. The moorings were operational from January 8 to February 14, 1973. Their configurations are shown on Figure 2.

Three kinds of current meters were used, all of which are self-contained and record on magnetic tape. Aanderaa meters (RCM-4) record averages of speed and instantaneous readings of direction, temperature, conductivity, and on one meter, pressure every 10 min. Geodyne meters (850-2) record 30 samples of speed and direction in a 169 sec period every 15 min. The AMF vector averaging current meter recorded averaged east and north components of velocity and averaged temperature every 15 min. Additional descriptions of the Geodyne and AMF current meters can be found in Halpern, et al., 1973.

Distribution of instruments on the subsurface buoy, mean depths, and the parameters sampled are summarized in Table 1. Buoyancy (about 300 kg) for the subsurface float was provided by a 0.95 m diameter steel sphere (ORE-SS37). Current meters were connected by 12.7 mm (½") shackles to varying lengths of 9.5 mm (3/8") torque balanced 3 x 19 cable. Swivels were used on at least one end of each length of cable, except between 40 and 60 m where two Aanderaa meters were coupled together, since they are free to swivel about the mooring.

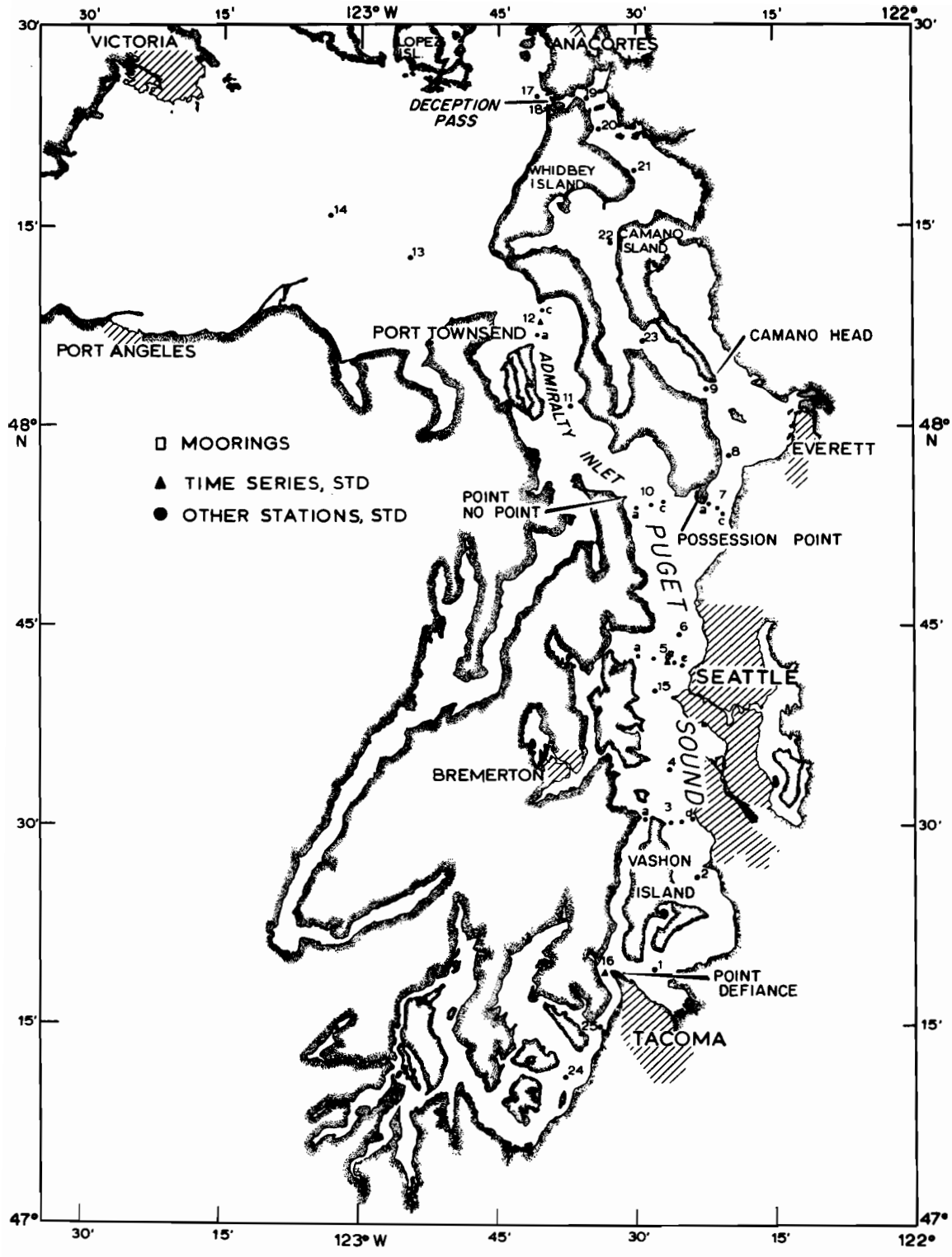

Figure 1. Puget Sound region showing stations locations.

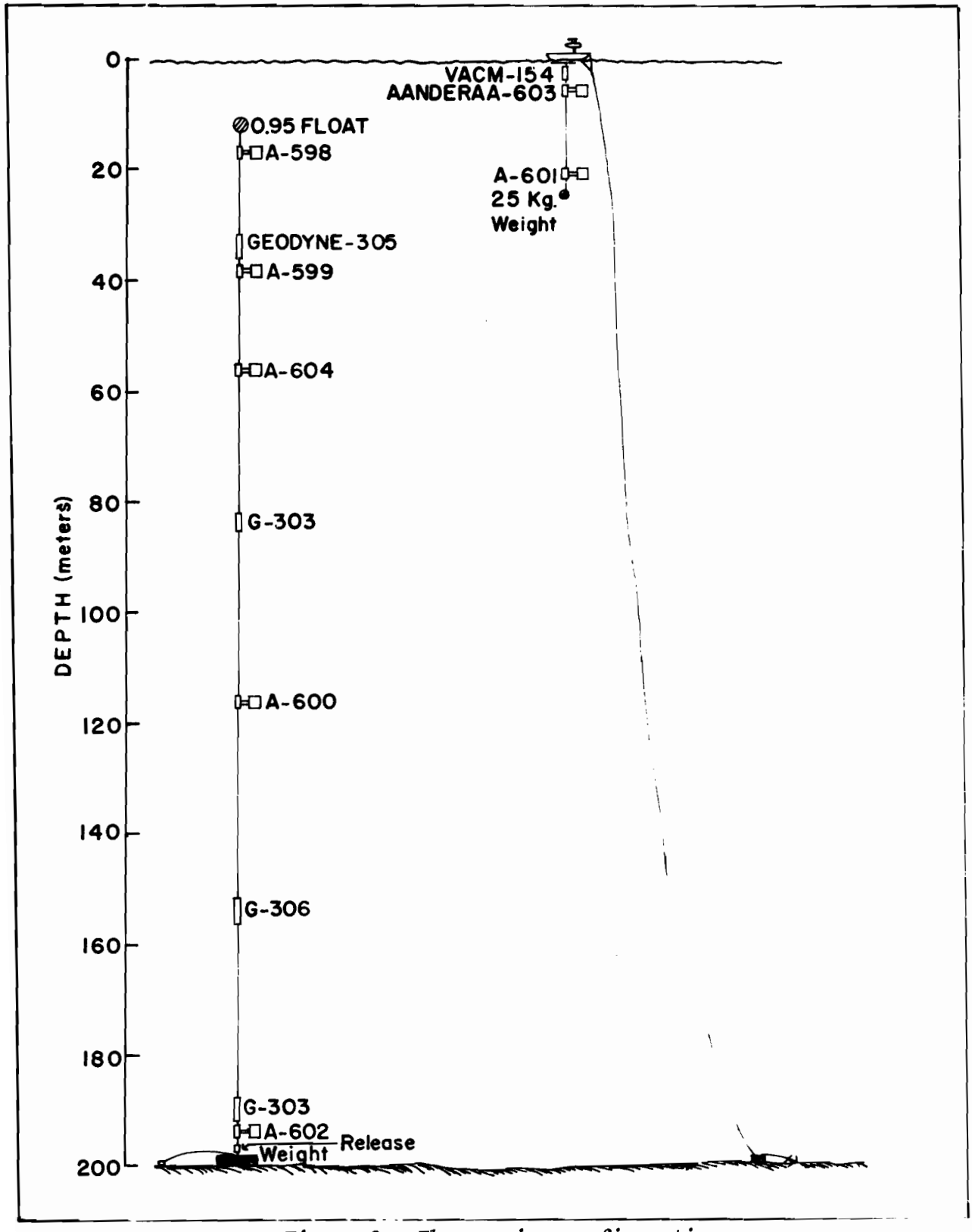

Figure 2. The mooring configurations.

Table 1. Summary of Subsurface Mooring Instrumentation, $47^{o}42.3'N$ $122^{o}26.9'W$

Meter Number	Depth (m)	Variables	Start Times (PST)	(Date)	Length of Records (Days)	Remarks
A598	17	S,T,C	2242	8 Jan 73	34.7	Bad records at beginning
G305	36	S	1535	8 Jan 73	30.2	Weak battery after 30
A599	36.5	S,T,C	1542	8 Jan 73	34.7	
A604	56	S,T,P,C	1542	8 Jan 73	15.3	Failed after 15 days
G303	85	S	1535	8 Jan 73	30.2	Weak battery after 30 days
A600	115.5	S,T,C	1542	8 Jan 73	34.7	
G306	155	-	-	No record		
G304	192	S	1535	8 Jan 73	18.7	Failed after 18.7 days
A602	192.5	S,T,C	1532	8 Jan 73	34.7	

Note: A or G with meter numbers signifies Aanderaa or Geodyne. Variables S, T, P, C signify currents, temperature, pressure and conductivity, respectively. Sampling interval was 10 min for A meters and 15 min for G meters.

The mooring was deployed buoy first. After the addition of current meters, hardware, and an acoustic release, the anchor (two railroad wheels, 680 kg) was lowered to the bottom on 450 m of 6.35 mm (¼") wire. When the anchor was on bottom, excess lowering wire was streamed out and a small weight was attached to the free end and dropped overboard. The primary reason for lowering the anchor was that in earlier experiments it was found that considerable damage occurred to deep current meters when the anchor was simply dropped. It is possible the momentum of the free falling mooring caused the meters to collide, as well as allowing slack wire to develop which fouled some meters. There were no damaged meters on this experiment. The excess wire streamed out in an expected direction and could be grappled should the acoustic release fail to fire.

The surface moored current meters are summarized in Table 2. Buoyancy of about 1200 kg was provided by a 3 m (120") steel Roberts buoy (Roberts, 1950). Current meters and anchor line were attached to the buoy and the system set in the water. An anchor line, 400 m of 9.5 mm (3/8") torque balanced 3 x 19 wire, was attached to one railroad wheel (340 kg) and a Danforth anchor (14 kg) which were dropped when the correct position was reached. This gave a mooring scope of 2 to 1. Movement of the buoy around the anchor was observed for 20 hrs before retrieval on February 14. It was found the buoy moved about 150 m north and south on the ebb and floor currents, respectively. If motion of the buoy were rotary at the semidiurnal period, then current speeds of about 2.6 cm/sec could be generated by buoy movement; however, east-west components of velocity are comparatively small in Puget Sound, which tends

Table 2. Summary of Surface Mooring Instrumentation, $47^{o}42.4'N$, $122^{o}26.7'W$

Meter Number	Depth (m)	Variables	Start Times (PST) (Date)	Length of Records (Days	Remarks
V154	2	S,T	1144 8 Jan 73	37.1	
A603	2,5	S,T,C	0422 15 Jan 73	30.6	Bad records at beginning
A601	20	S,T,C	1405 7 Feb 73	6.9	

Note: A or V with meter numbers signifies Aanderaa or AMF. Variables are the same as for Table 1. Sampling interval was 10 min for A meters and 15 min for V meter.

to make currents a reversing type, as was observed. Resulting currents generated from this type of buoy movement would be about 1.5 cm/sec. The third current meter (A-601) was added on February 7 for comparison with meter (A-598) on the subsurface mooring.

3. STD MEASUREMENTS

Temperature and salinity measurements were made during three periods while the current meter arrays were operational (January 8-11, January 16-18, February 12-13). Station locations are shown on Figure 1, the chronology of events in Table 3, and positions listed in Table 4. Stations were occupied to within a few meters of the bottom by using a pinger attached to the Plessey 9006 STD. Data were recorded both on a digital data logger (Plessey 8114A) and on an analog recorder (Esterline Angus, x^1, x^2, y). Data were recorded digitally once per second while the sensors were lowered at a rate of 30m/min. Samples from Nansen bottles placed above the STD were obtained while raising. Analyses of these samples resulted in correction factors of $-.01^{o}C$ and +.03% which were added to the data.

4. DATA REDUCTION AND PRESENTATION

The Aanderaa current meter data were translated and processed to an edited data tape by University of Washington facilities and programs. The edited tapes contain speed, direction, temperature, salinity, and pressure (if available) for each of the current meters at 10 min intervals. The magnetic tape cassettes from the AMF vector averaging meter

Table 3. Chronology of STD Operations

	Date	Time	
*	January 8	2208	START STD stations at number 24; proceed north to station 14. Omit stations between Elliot Point and Deception Pass. END 1722, January 9.
	January 10	0011	Time series at location 5C. END 0000, January 11.
	January 11	0230	Time series at location 12C. END 0300, January 12.
	January 16	1205	Time series at location 16. END 1200, January 17.
*	January 17	1236	STD Station 1 through 17, center of basin stations only. END 2312, January 17.
	January 18	0505	Stations 7B through 17, END 1009, January 18.
*	January 18	1153	Stations 14 south to Station 1. END 2116, January 18.
	January 18	2335	3 STD casts at mooring 5C for conductivity check. END 2352, January 18.
*	February 12	1543	STD Stations 14 to 10, 7 through 22, 6 through 24. END 1342, February 13.
	February 13	1635	4 station grid for time series. END 1908, 14 February.

* Denotes longitudinal section through main basin

Note: The longitudinal section through the main basin (Gordon Point 24 to New Dungeness 14) was repeated four times during this experiment because previous work (Cannon and Laird, 1972) showed considerable change in water properties in a month interval.

Table 4. Location of STD Stations - Puget Sound - January, February 1973

Number	Approx. Location	Position		Sounding	Chart
1	Browns Point	47°19.2'	122°28.0'	174 m	6460
2	Point Pulley	47°26.5'	122°23.5'	238	
3 a	Point Vashon	47°19.2'	122°28.0'	174 m	6460
b	Dolphin Point	47°30.2'	122°26.3'		
c	Dolphin Point	47°30.3'	122°25.1'	194	
d	Dolphin Point	47°30.6'	122°23.9'		
4	Alki Point	47°34.2'	122°26.5'	245	
5	Point Monroe - Meadow Point	47°42.5'	122°29.8'	62 m	6445
b	Meadow Point	47°42.3'	122°28.4'	175	
c	Meadow Point	47°42.0'	122°26.6'	198	
d	Meadow Point	47°42.0'	122°25.8'	175	
e	Meadow Point	47°41.8'	122°24.8'	62	
6	Point Jefferson	47°44.4'	122°25.4'	284	
7 a	Possession Point	47°54.1'	122°22.2'	146 m	6450
b	Possession Point	47°53.7'	122°21.2'	225	
c	Possession Point	47°53.4'	122°20.5'	110	
8	Columbia Beach	47°57.8'	122°19.8'	201	
9	Camano Head	48°02.9'	122°22.5'	170	
10 a	Point-No-Point	47°53.8'	122°30.0'	91	
b	Point-No-Point	47°54.0'	122°28.6'	201	
c	Point-No-Point	47°54.3'	122°27.1'	91	
11	Bush Point	48°01.7'	122°37.5'	110	
12 a	Port Townsend	48°07.3'	122°41.5'	55	
b	Port Townsend	48° 41.2'	122°41.2'	117	
c	Port Townsend	48°09.1'	122°40.9'	57	
13	Protection Island	48°12.8'	122°55.0'	102 m	6382
14	New Dungeness	48°15.6'	123°03.8'	170	
15	West Point	47°28	122°28.0'	227 m	6445
16	Point Defiance	47°19.0'	122°33.6'	73 m	6460
17	Deception Island	48°25.0'	122°41.1'	91 m	6376
18	Strawberry Island	48°24.4'	122°38.1'	46	
19	Dewey	48°24.9'	122°35.9'	37	
20	Hope Island	48°22.9'	122°34.4'	38	

Table 4. Location of STD Stations -
Puget Sound - January, February 1973

Number	Approx. Location	Position		Sounding	Chart
21	Buoy #106	48°19.3'	122°30.5'	29 m	6450
22	Rocky Point	48°06.5'	122°29.5'	73	
23	East Point	48°06.5'	122°29.5'	143	
24	Gordon Point	47°11.0'	122°38.0'	166 m	6460
25	Days Island	47°14.9'	122°34.4'	59	

were translated and edited on equipment and programs at PMEL. The edited tape contains average north and east components of velocity and average water temperatures at 15 min intervals. The Geodyne data were first translated by the manufacturer and then edited by PMEL programs. The edited tapes contain speed and directions for each meter at 15 min intervals.

The STD data were translated, edited, corrected, and interpolated to provide values of temperature salinity and sigma-t (σ_T) at 5 m intervals by PMEL programs at UW facilities. Linear interpolations for temperature and salinity were made at the first intersection of a depth. Sigma-t was computed from the interpolated temperature and salinity. These data were used for all subsequent work.

The following presentations of data have been selected as being the most descriptive for a wide variety of users. For each current meter there are five pages of data presentation in Appendix A, which include standard statistics, speed and direction histograms, time series components of velocity, progressive vector diagrams and spectra of the velocity. In Appendix B temperature, salinity, and pressure are presented as standard statistics, spectra, and time series for those meters having additional parameters.

4.1 Histogram

Speeds and directions were grouped into 1.5 cm/sec and 6^{o} intervals, respectively. In Appendix B, temperatures and salinities were sorted into $.1^{o}C$ and .1% intervals, while pressure from the instrument at 56 m was sorted by .5 PSI. These data are presented as the actual number of observations in each interval.

4.2 Time Series

Time series plots are the hourly averages of the u and v components of velocity (east and north respectively).

4.3 Progressive Vector Diagrams

Progressive vector diagrams were constructed by vector addition of the hourly averaged east and north components of velocity. The plots begin with a circle and are marked every 24 hrs by an asterisk. The diagrams do not represent real water particle trajectories since the observations were taken at single point, but they do give an indication of the longer period fluctuations at that point. The scales of the diagrams are adjusted so all plots are the same size.

4.4 Spectra

The velocity, temperature, salinity, and pressure time histories were transformed to the frequency (spectral) representation by a fast Fourier transform algorithm (FFT) (Halpern, et al., 1973) and plotted on a log-log grid. The left plot in Appendix A is the the spectral estimates of the north and east components, and the spectra of the sums of the two components are shown in the right hand plot.

4.5 Physical Property Sections

STD data are presented in Appendix B as vertical sections of temperature, salinity, and sigma-t (σ_T). Contour intervals are 0.2^{o}C, 0.2%, and 0.2 g/l, respectively, for the above three variables. The first and deepest values are also given. The data are arranged so temporal variations for similar sections can be assessed. Figures 3a, b, c, d show the meridional sections through the main basin of Puget Sound. Figures

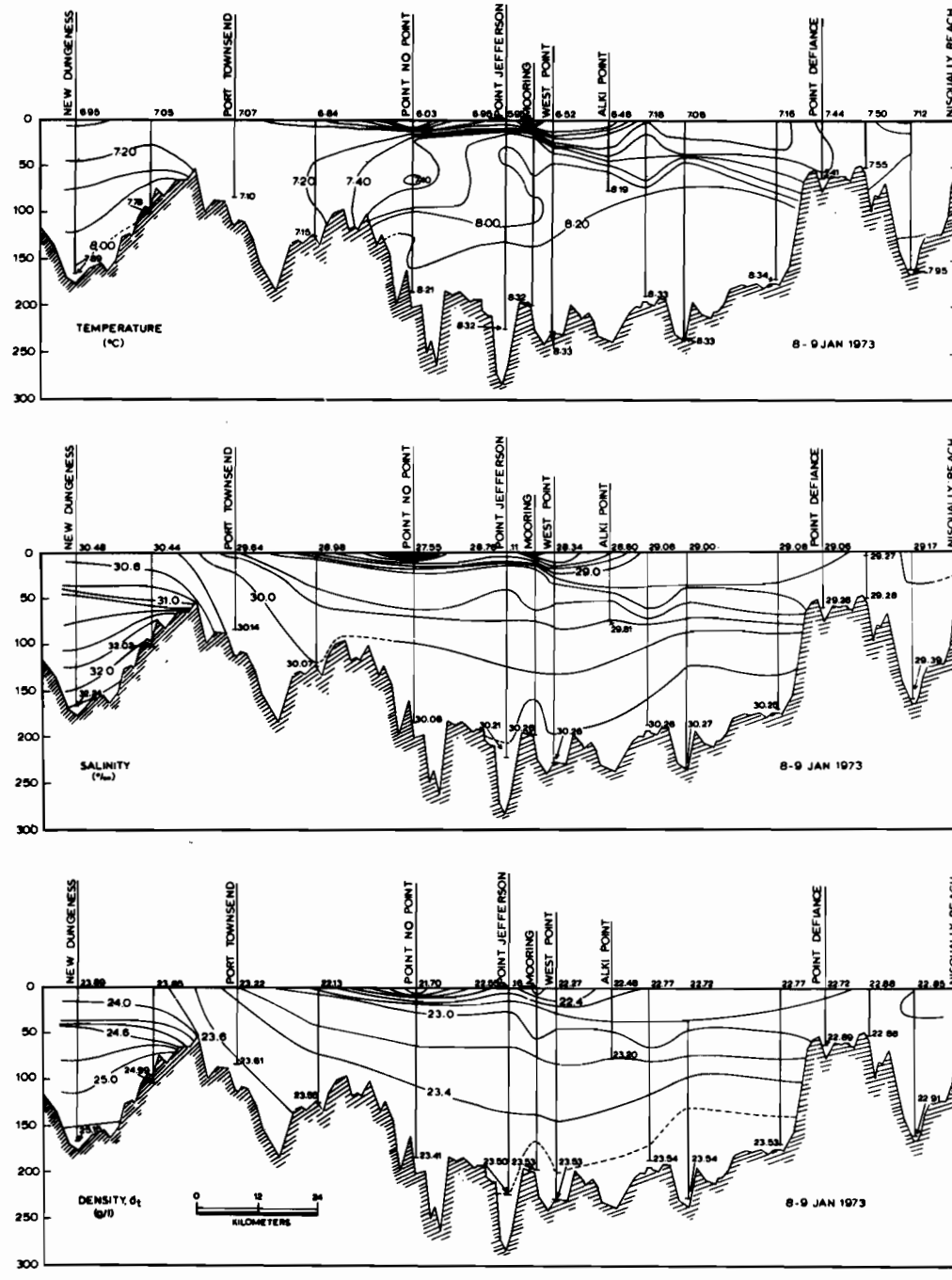

Figure 3a. Physical properties of the main basin: vertical sections of temperature, salinity, and sigma-t, January 8-9, 1973.

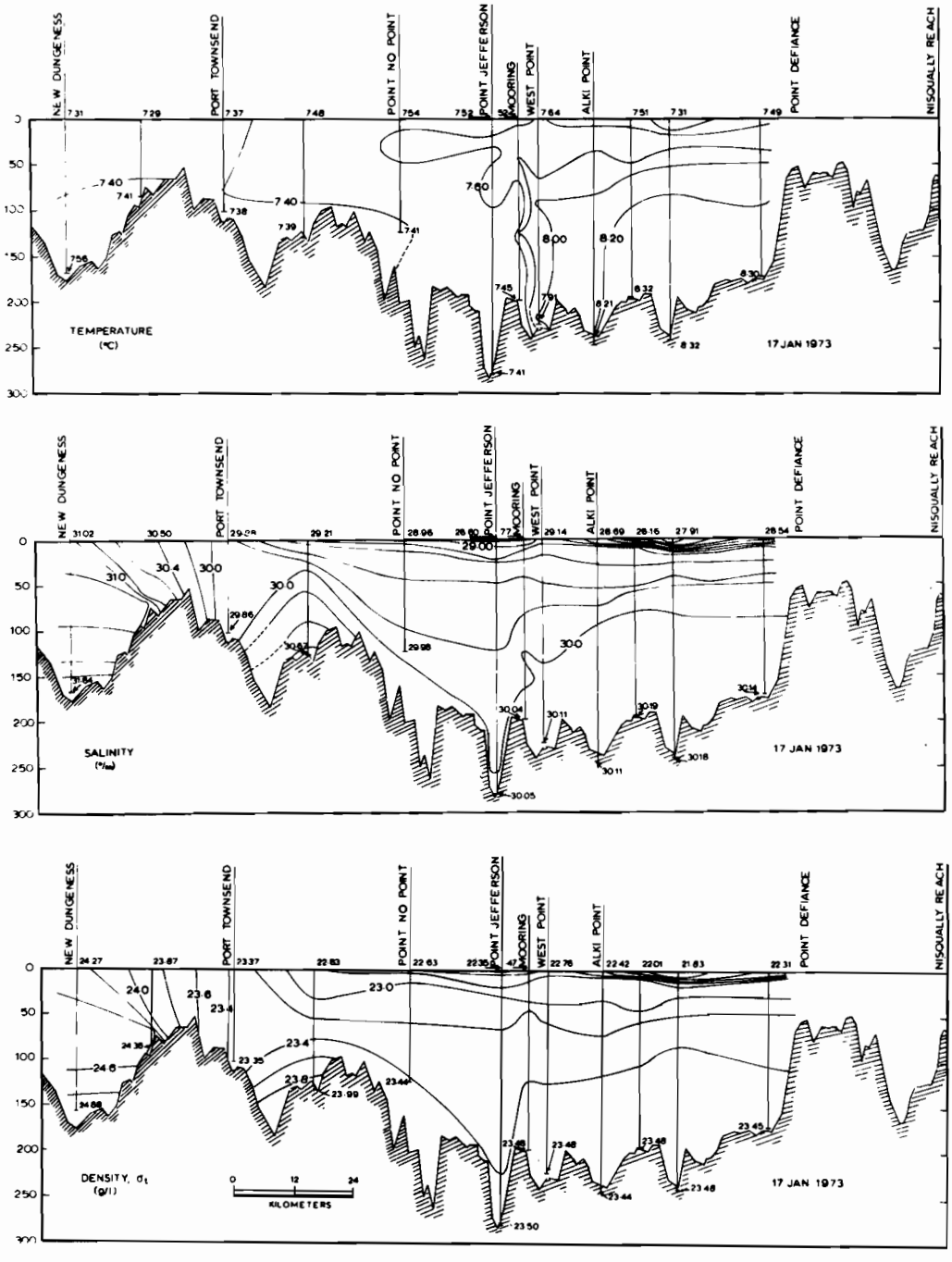

Figure 3b. Physical properties of the main basin: vertical sections of temperature, salinity, and sigma-t, January 17, 1973.

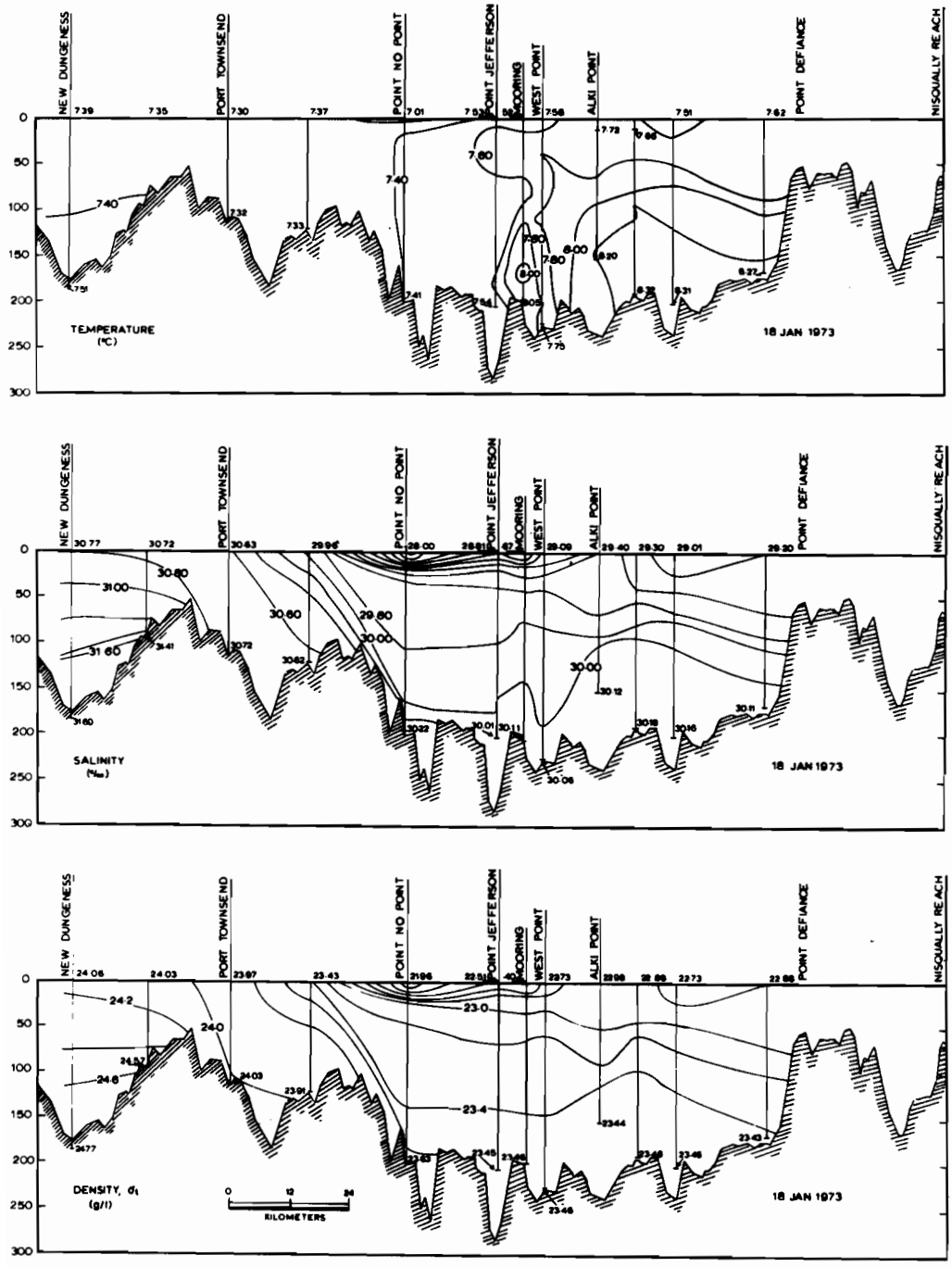

Figure 3c. Physical properties of the main basin: vertical sections of temperature, salinity, and sigma-t, January 18, 1973.

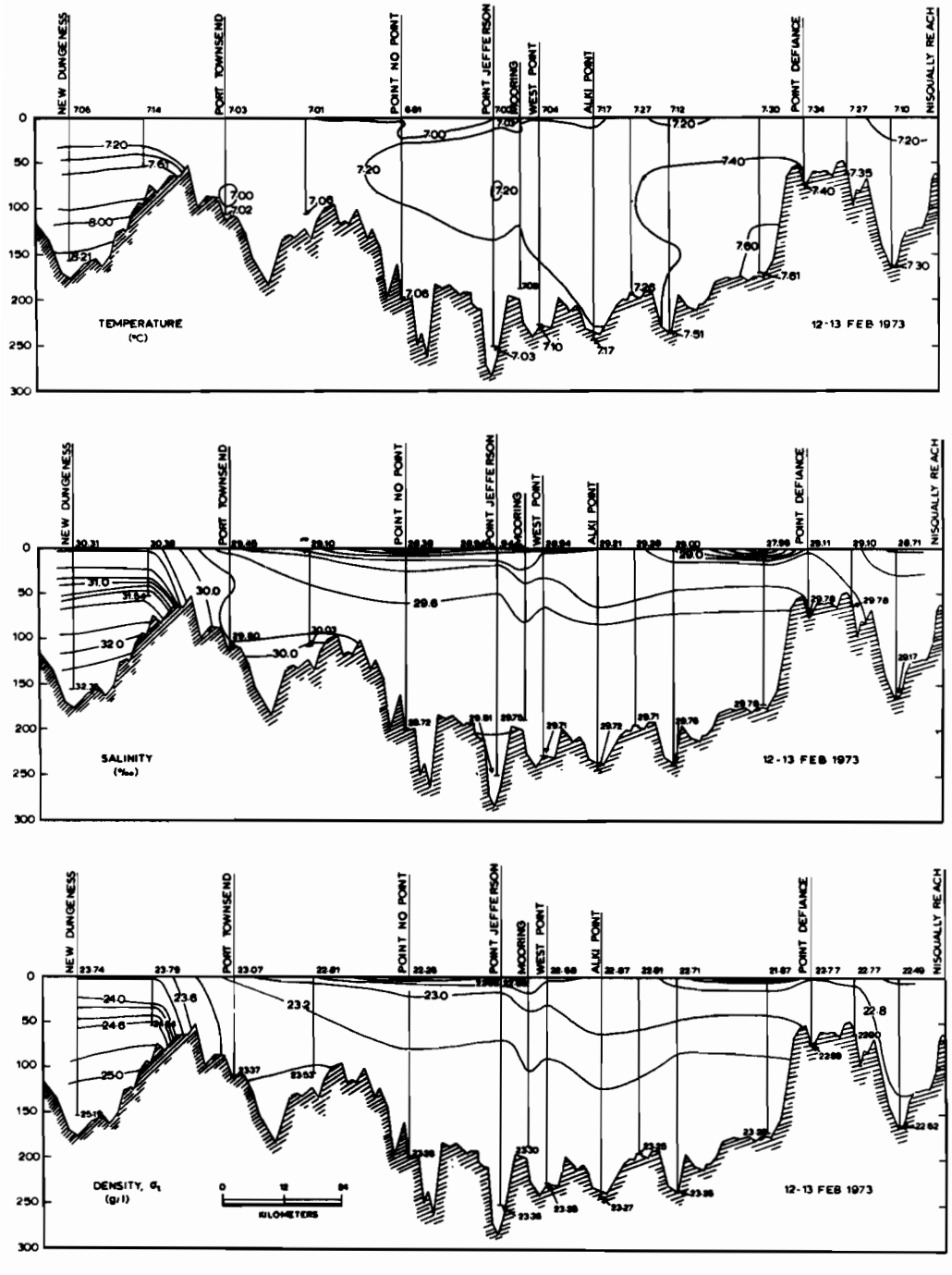

Figure 3d. Physical properties of the main basin: vertical sections of temperature, salinity, and sigma-t, February 12-13, 1973.

4a, b, show sections through Saratoga passage from the mooring site to Deception Pass, and Figures 5a, b, show cross sections of Puget Sound at various locations which can be located from Figure 1.

4.6 Auxiliary Data

Wind observations collected at West Point are shown in Figure 6 as a progressive vector diagram. The diagram indicates the direction the air is flowing which is opposite to conventional weather direction. Tides are routinely collected at Seattle and are available from the National Ocean Survey.

4.7 Physical Properties of Time Series Stations

Figures 7a, b, c and 8a, b, c show compositie plots of temperature, salinity and sigma-t versus depth for two of the time series stations. the first, 5c, was at the mooring site and the second was located in Admiralty Inlet. Each station was sampled hourly for 25 hrs.

5. DISCUSSION

Mean flow at the moorings was northerly from 2 m down to at least 36 m and southerly from 56 m to the bottom. This is consistent with the previous experiment (Cannon and Laird, 1972) in that the level of no net motion is approximately 50 m, and corresponds to the bottom of the halocline (Fig. 3a, b, c, d, progressive vector diagrams). The directions of currents below the level of no net motion are roughly parallel to the bathymetry.

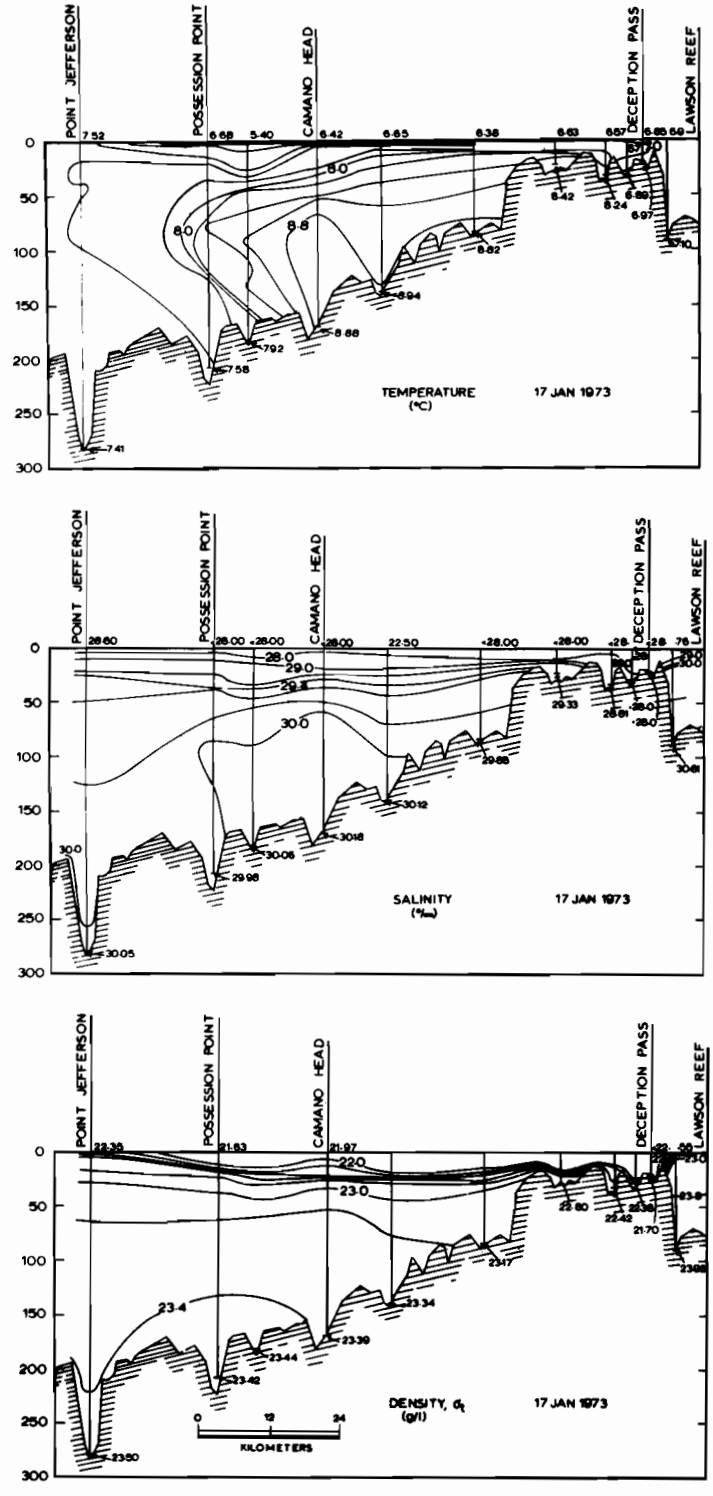

Figure 4a. Physical properties of Saratoga Passage: vertical sections of temperature, salinity, and sigma-t, January 17, 1973.

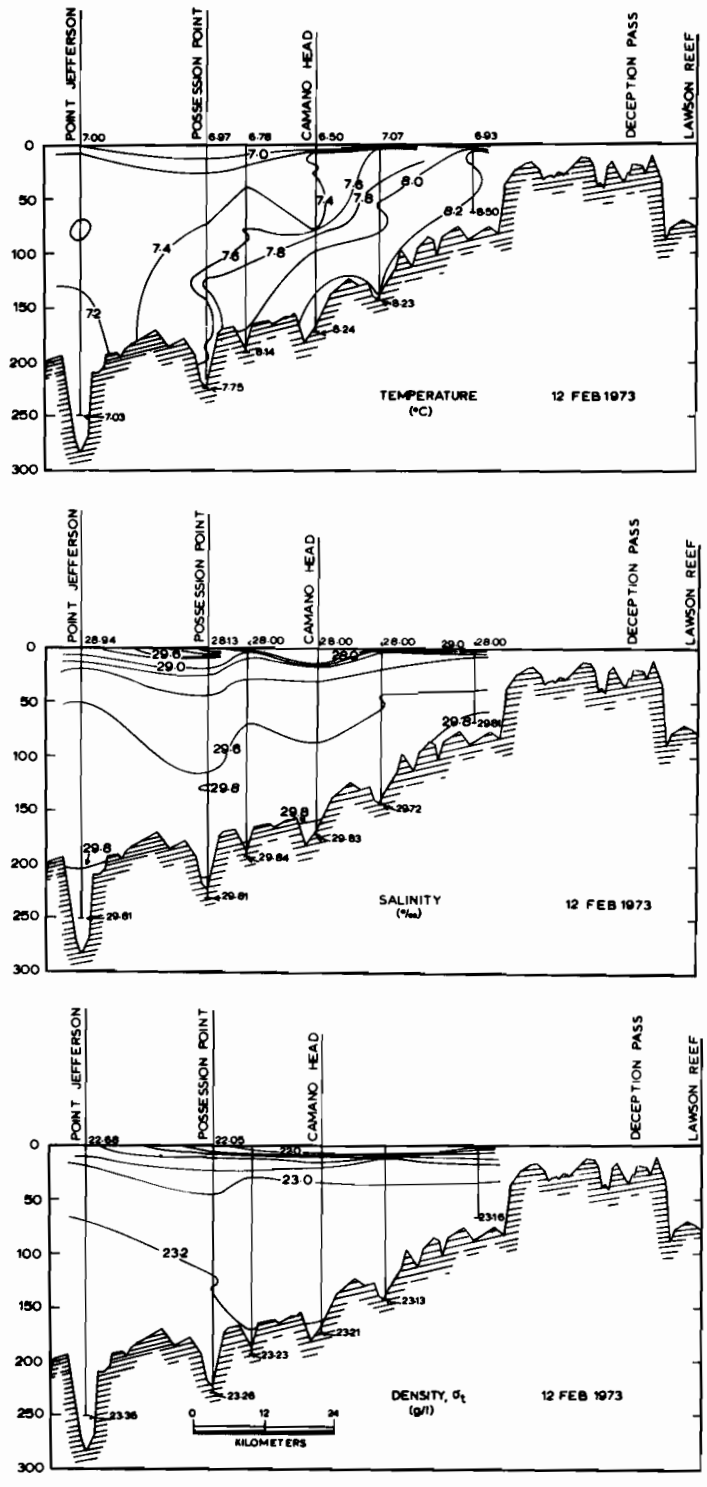

Figure 4b. Physical properties of Saratoga Passage: vertical sections of temperature, salinity, and sigma-t, February 12, 1973.

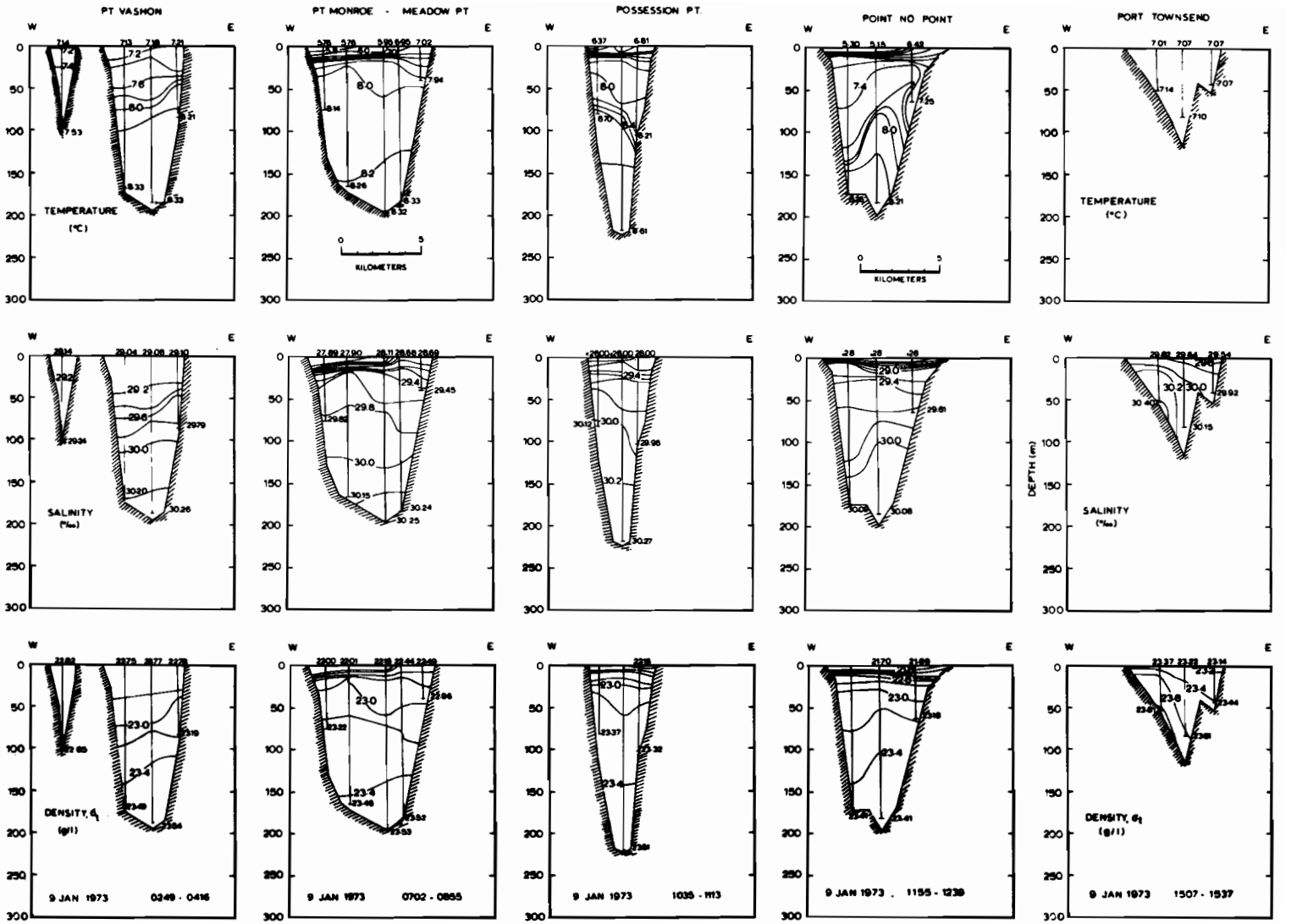

Figure 5a. Physical properties of cross sections of Puget Sound: vertical sections of temperature, salinity, and sigma-t, January 9, 1973.

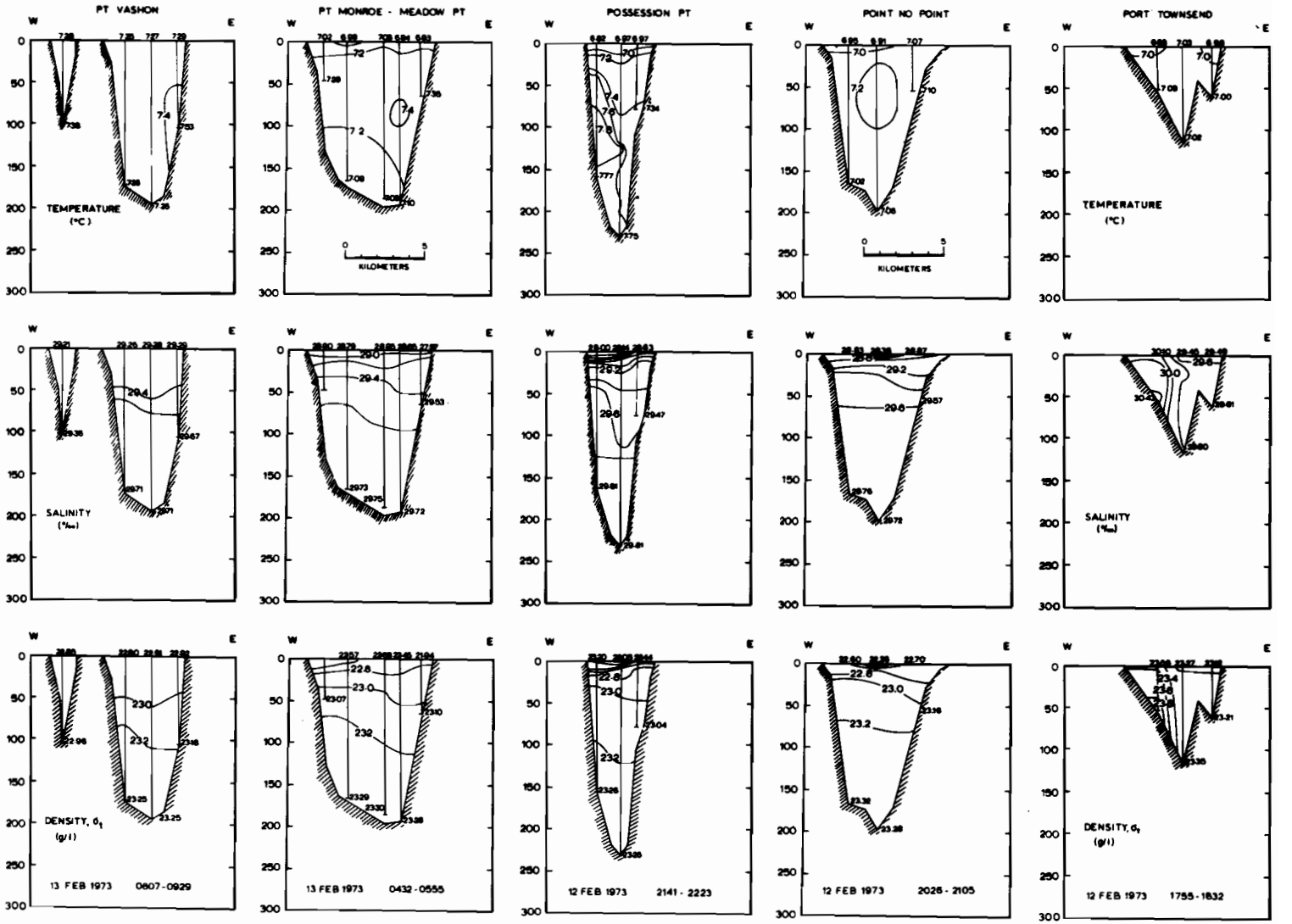

Figure 5b. Physical properties of cross sections of Puget Sound: vertical sections of temperature, salinity, and sigma-t, February 12-13, 1973.

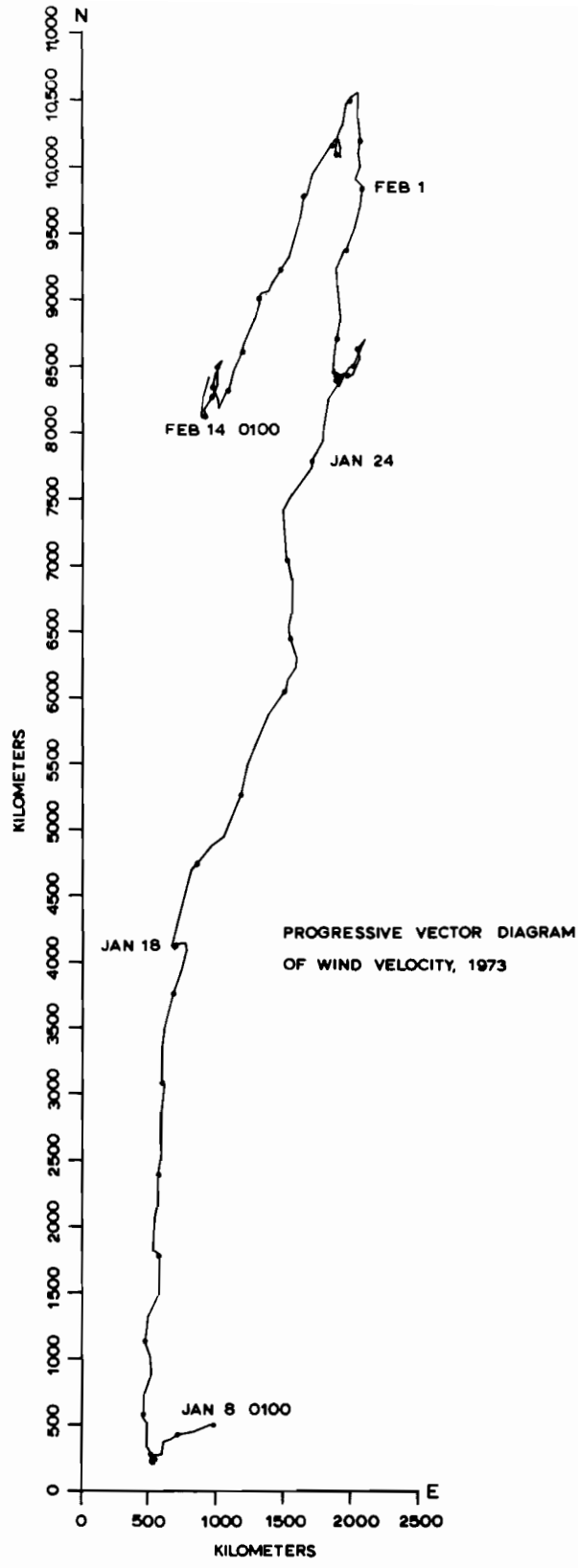

Figure 6. Progressive vector diagrams of winds.

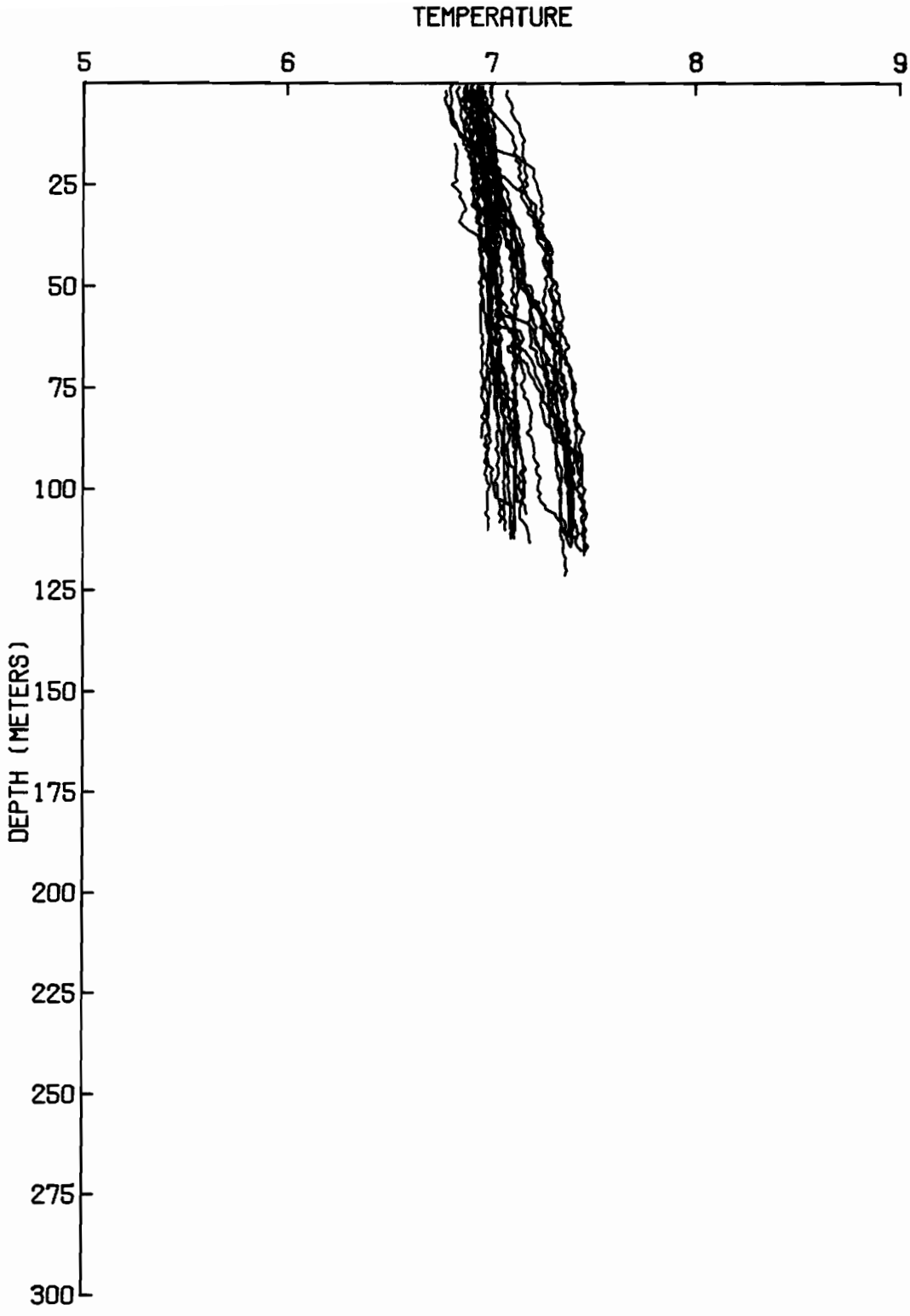

Figure 7a. Composite plot of temperature vs depth at Time Series Station 5c. 0230 11 Jan 73 to 0300 12 Jan 73 Station 12B.

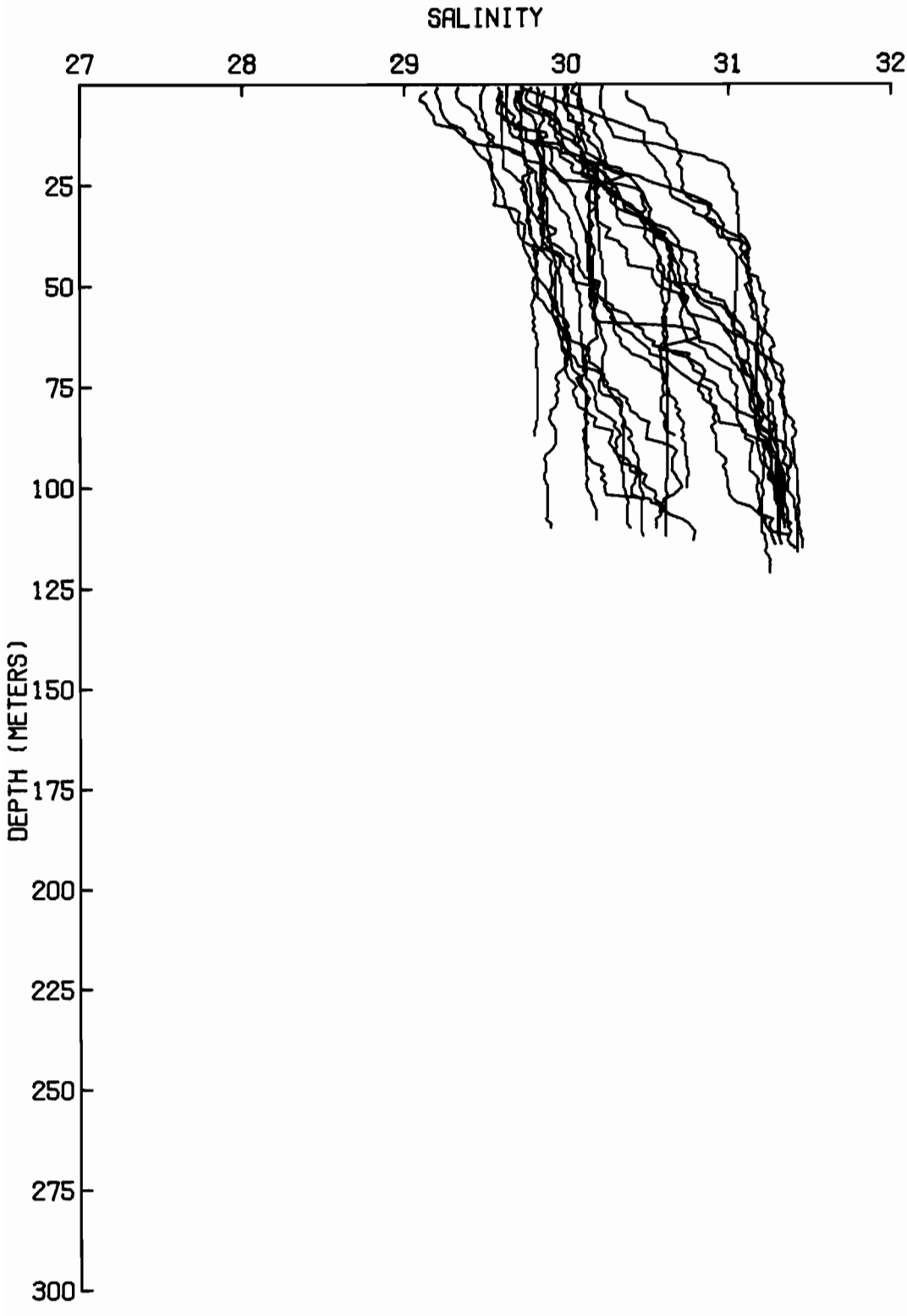

Figure 7b. Composite plot of salinity vs depth at Time Series Station 5c. 0230 11 Jan 73 to 0300 12 Jan 73 Station 12B.

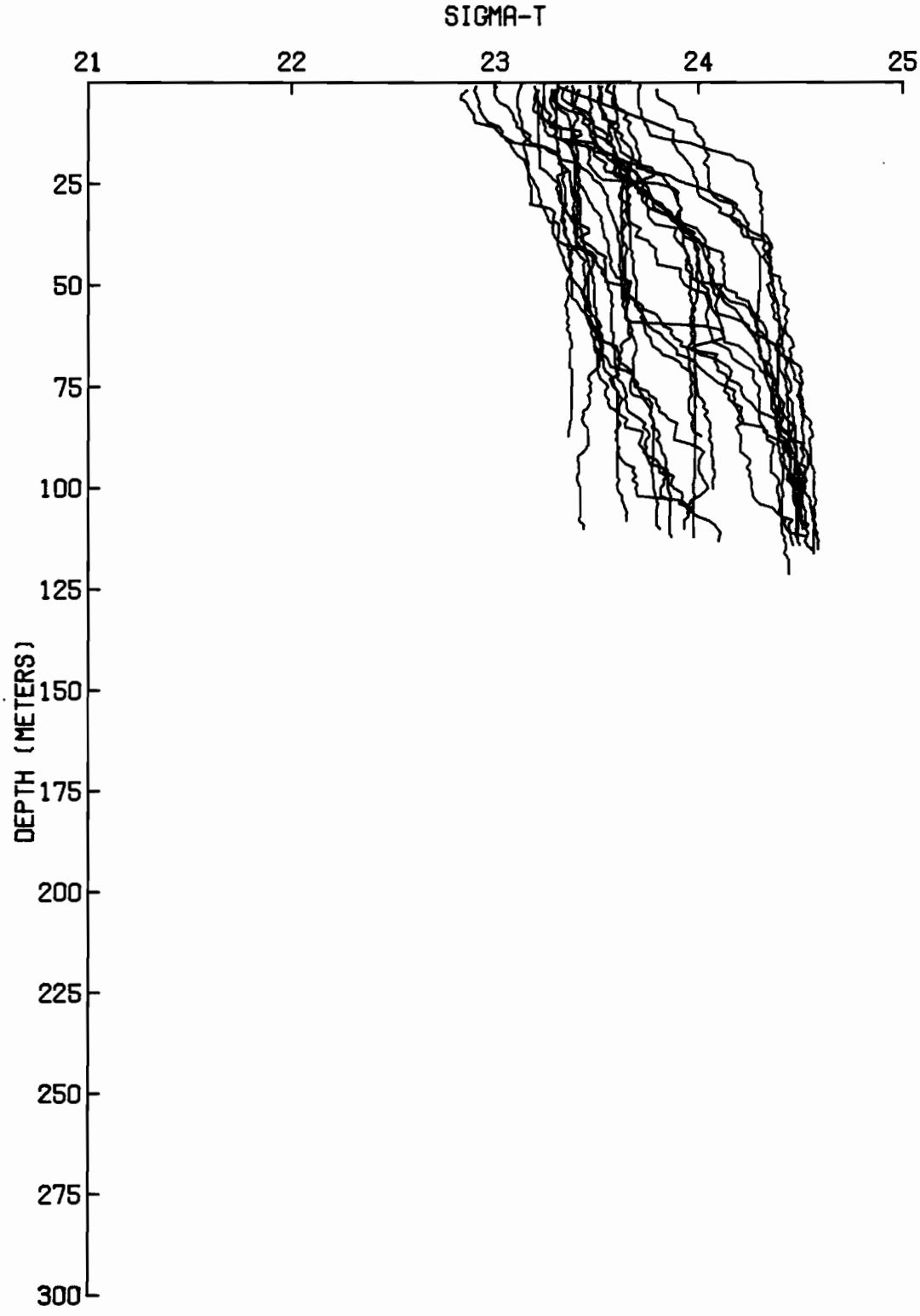

Figure 7c. Composite plot of sigma-t vs depth at Time Series Station 5c. 0230 11 Jan 73 to 0300 12 Jan 73 Station 12B.

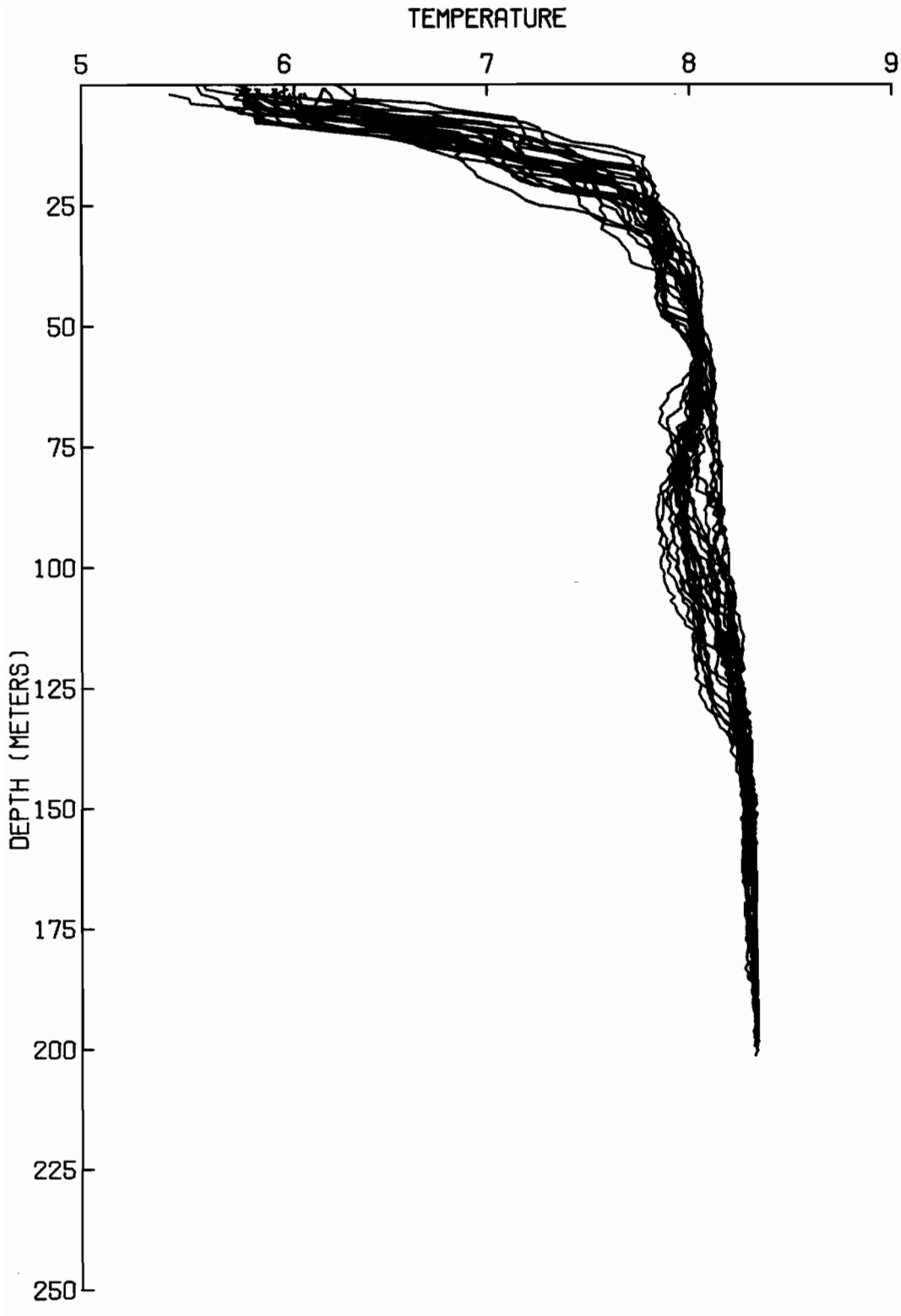

Figure 8a. Composite plot of temperature vs depth at Time Series Station 12B. 0011 10 Jan 73 to 0000 11 Jan 73 Station 5c.

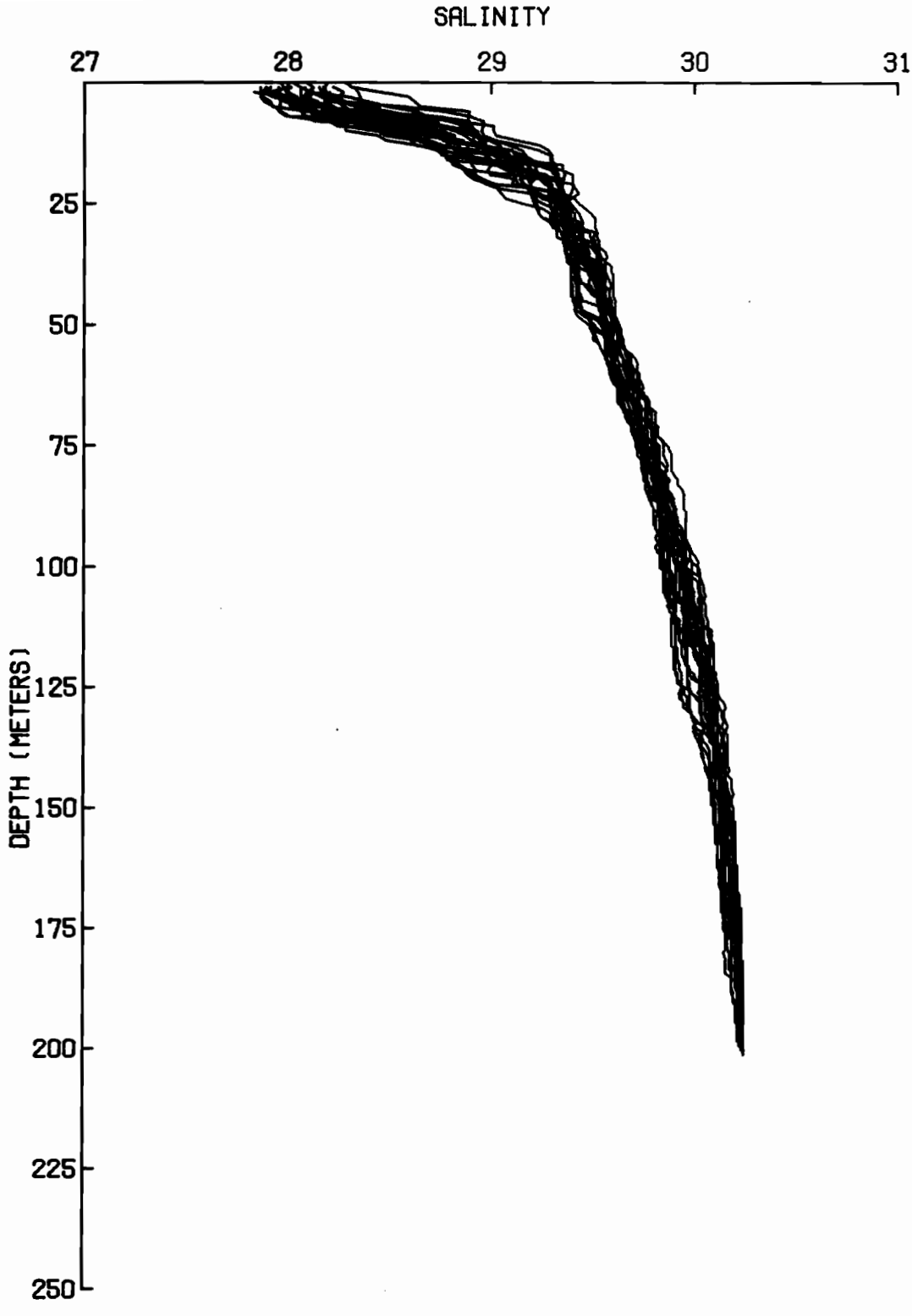

Figure 8b. Composite plot of salinity vs depth at Time Series Station 12B. 0011 10 Jan 73 to 0000 11 Jan 73 Station 5c.

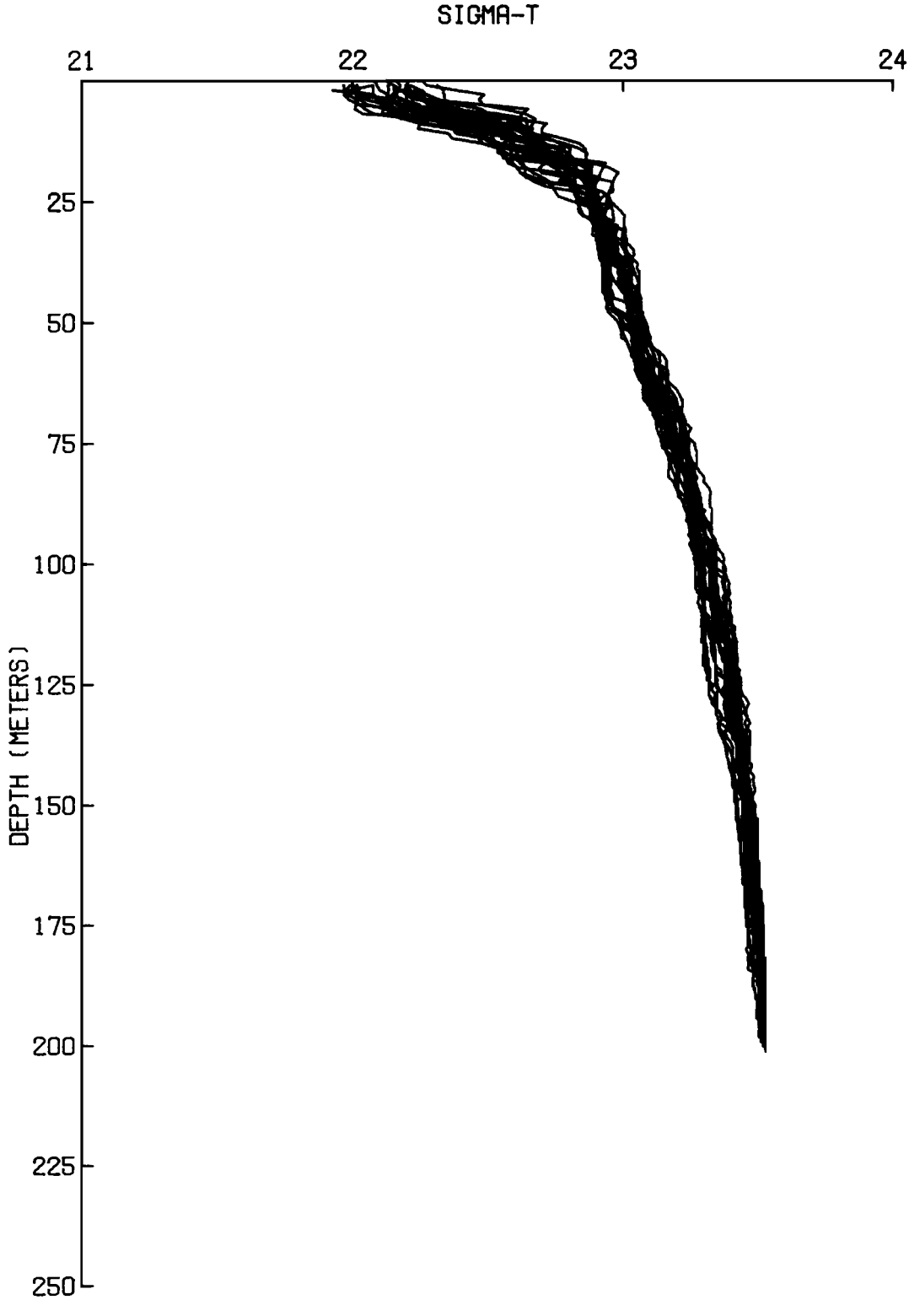

Figure 8c. Composite plot of sigma-t vs depth at Time Series Station 12B. 0011 10 Jan 73 to 0000 11 Jan 73 Station 5c.

During the period 10 to 25 January moderate south (north flowing) winds averaging 7 m/s (Fig. 6) imposed an Ekman drift on the surface layers of about 15 cm/sec. The drift when added to the net northward estuarine flow resulted in periods when the tidal currents did not reverse. This can be seen in the time plots of north-south components of velocity for the current meters at 2 and 2.5 m. The progressive vector diagrams for the same two current meters also show this effect and indicate a high correlation to the wind PVD. North winds (south flowing) during 5 to 9 February retarded the estuarine flow and produced a net southerly flow in the surface layer.

Temperatures recorded by the current meters at 2 and 2.5 m increased during the periods of south winds (10 to 25 January and 30 January to 3 February). Salinity at 2.5 m also shows an increase, during the same periods. There is no apparent change in temperature and salinity at 17 m or below. The increase in both temperature and salinity is probably the result of wind mixing with warmer, more saline water below the surface layer. During periods when the wind slackens (25 to 30 January) or reverses, the surface layer again becomes cooler and fresher.

From the vertical sections (Figs. 5-7) it is apparent that during the sampling period Puget Sound and Saratoga passage became cooler, less saline, and less dense at depth, while the surface layer became warmer, saltier and slightly more dense. Again, this was consistent with the data collected in 1972. Source water from the Strait of Juan de Fuca did not change much from January to February; therefore,

to reduce the density in the basin and to establish the sampled values of temperature and salinity, it appears some refluxing of the estuarine flow is required at Admiralty Inlet. The refluxed water is mixed with source water at the sill to form an intermediate density water, that is mixed with the deeper Sound waters by tidal action.

Analysis and further discussion of the data will be presented in a later paper.

6. ACKNOWLEDGEMENTS

We thank the officers and crew of the NOAA ship McARTHUR for their support and cooperation in carrying out the experiment. Considerable assistance by Mr. James L. Stephens (PMEL) in carrying out the field work is gratefully acknowledged. We are indebted to Dr. David Halpern and Mr. James R. Holbrook (PMEL) for computer software for current meter analysis and formatting ideas. We thank Mr. Eugene Collias (UW) for providing wind data. In particular, we thank Dr. Glenn Cannon (NSF) for initiating, designing, and participating in the experiment and for his continued interest and suggestions.

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8. APPENDIX A: CURRENT METER DATA PRESENTATIONS

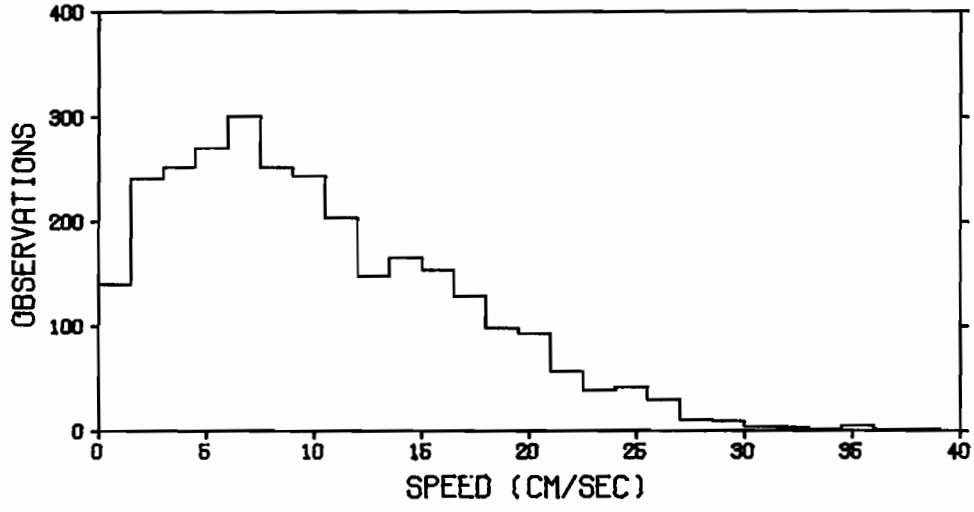
Current Meter G305

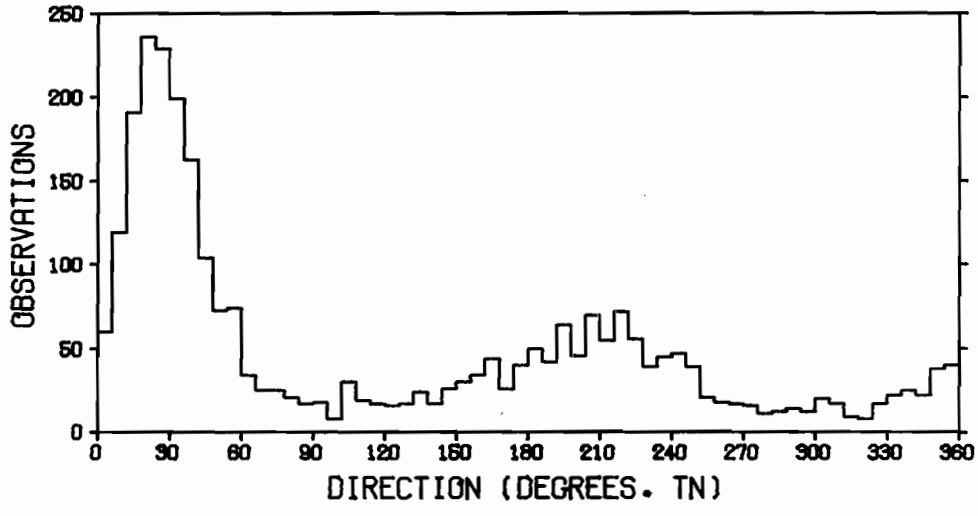
Depth 36.0 m

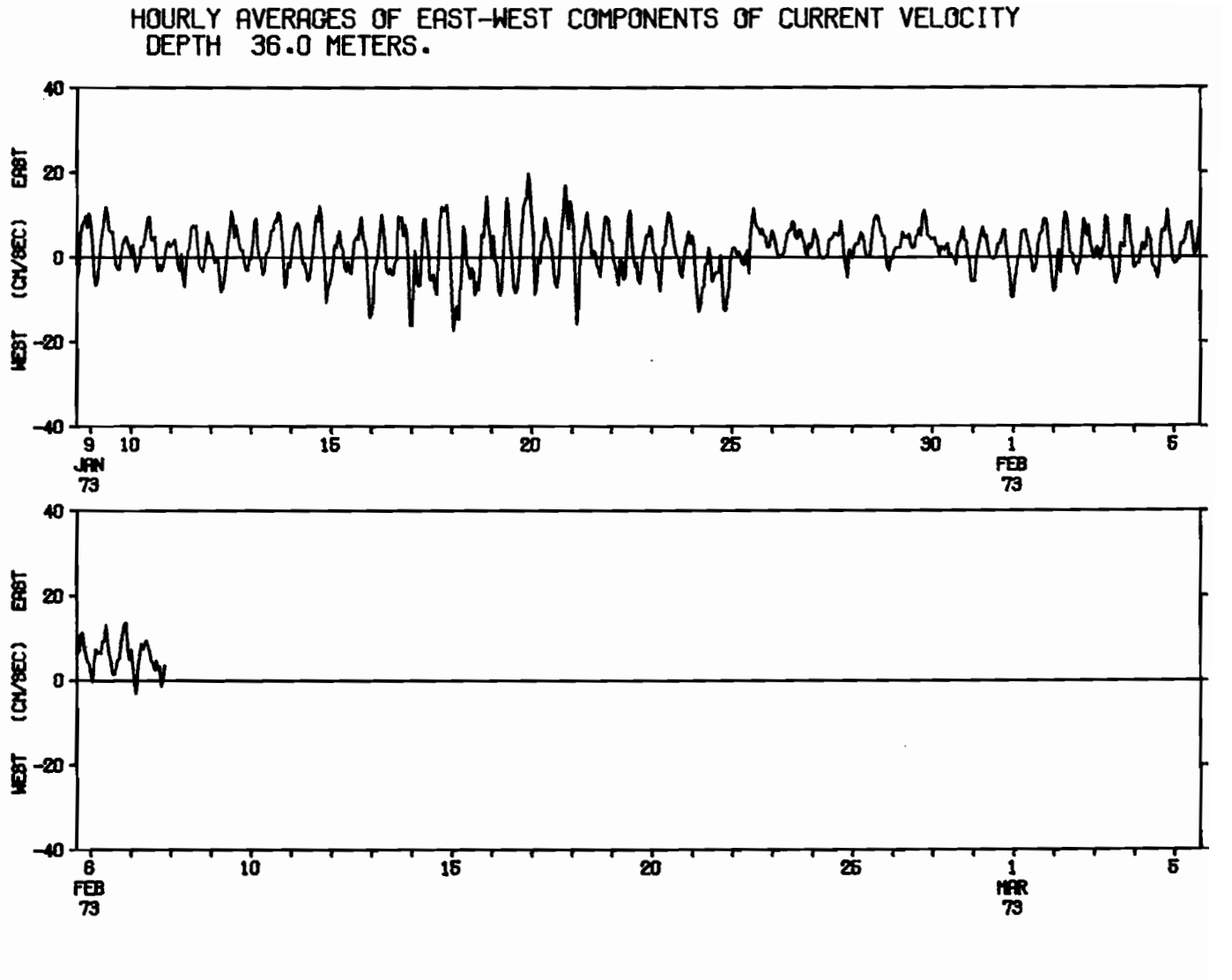
STATISTICS OF G305 *47 42.3N* LAT *122 26.9W* LONG
DEPTH 36.0 METERS NUMBER OF OBSERVATIONS = 2900
OBSERVATION PERIOD 30.2 DAYS FROM 1535 PST 8 JAN 73

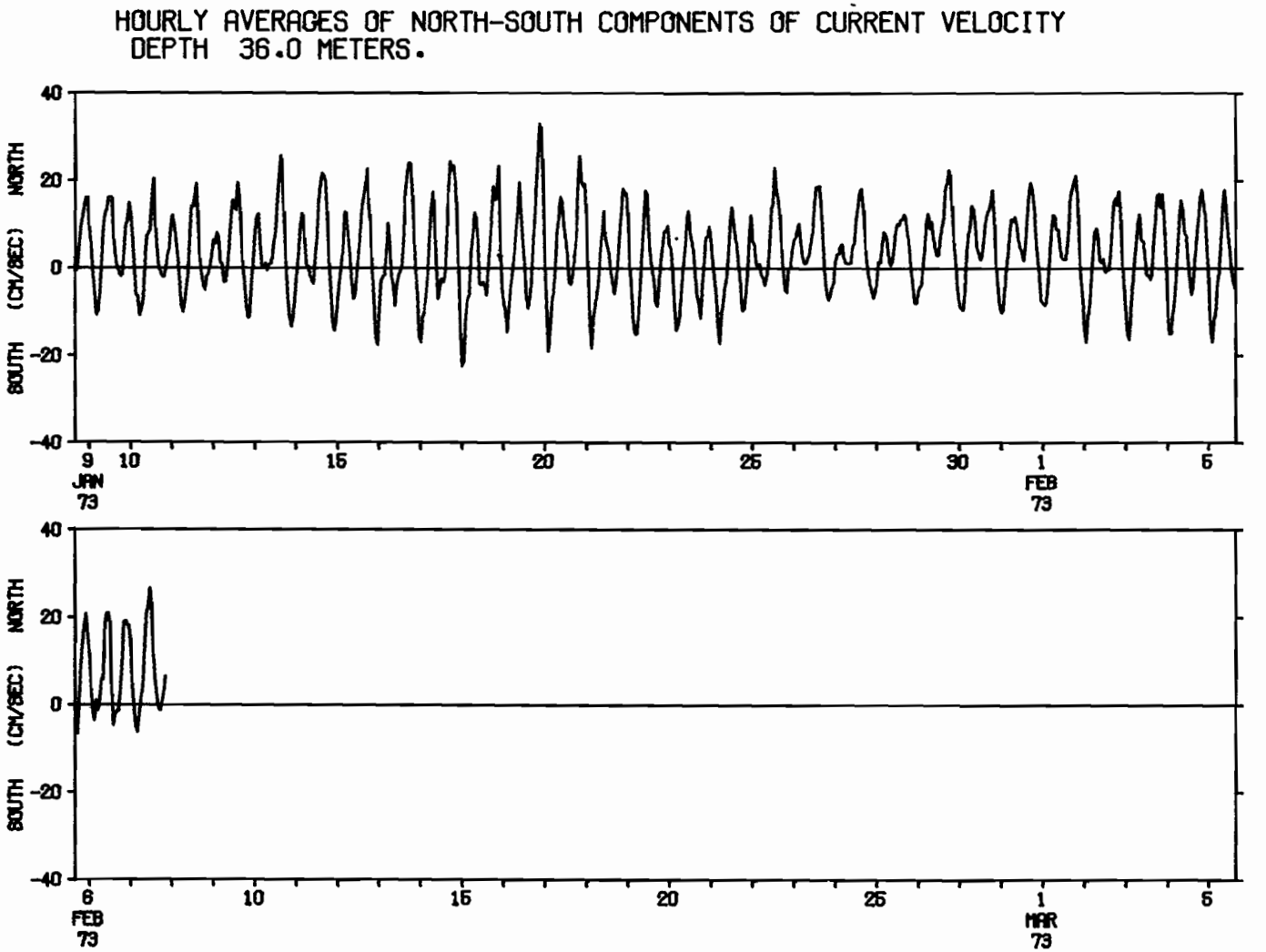
	MEAN (CM/SEC)	VARIANCE (CM/SEC)2	ST-DEV (CM/SEC)	SKEW	KURT	MAX (CM/SEC)	MIN (CM/SEC)
S	10.21	44.33	6.66	.816	3.36	37.85	.16
U	2.07	33.09	5.75	-.366	3.50	20.68	-20.06
V	3.92	95.83	9.79	.071	2.66	34.69	-30.95

S = SPEED
U = EAST-WEST COMPONENT OF VELOCITY, EAST = POSITIVE U
V = NORTH-SOUTH COMPONENT OF VELOCITY, NORTH = POSITIVE V

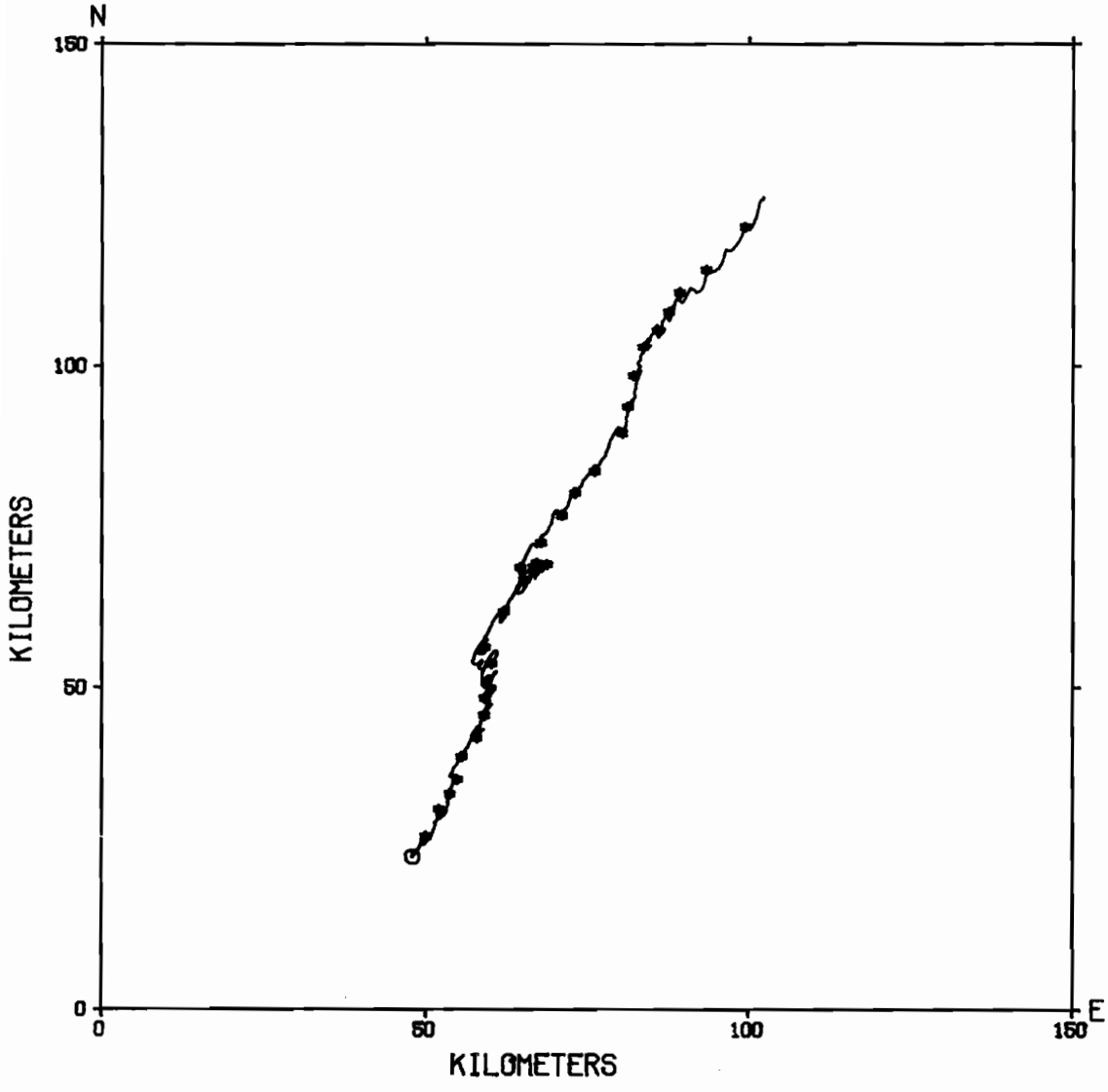


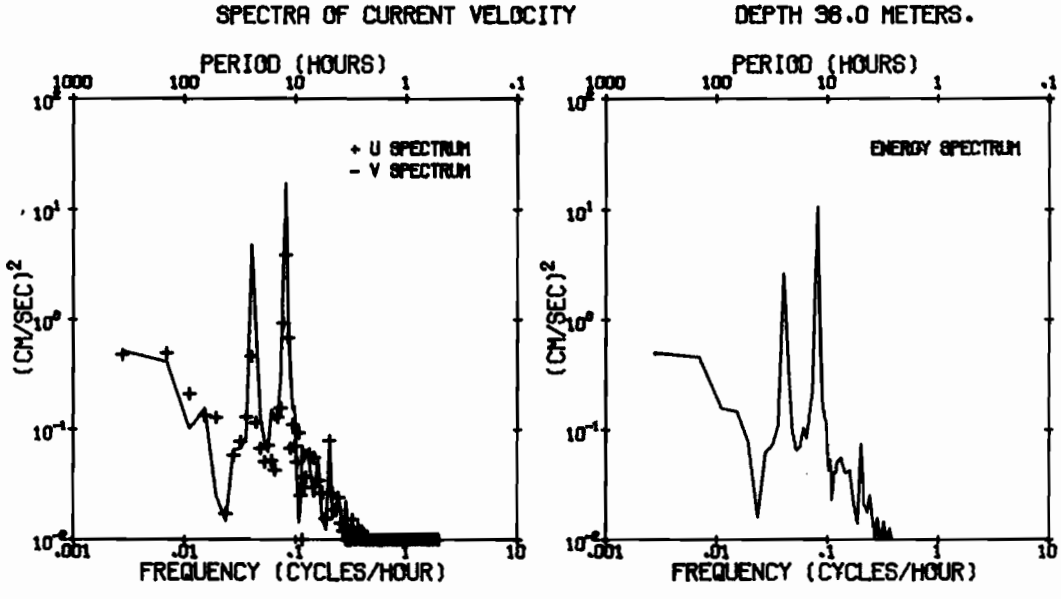



HOURLY AVERAGES OF EAST-WEST COMPONENTS OF CURRENT VELOCITY
DEPTH 36.0 METERS.
EAST
(CM/SEC)
WEST
40
20
0
-20
-40
9
10
15
20
25
30
1
5
JAN
73
FEB
73
6
10
15
20
25
1
5
FEB
73
MAR
73


HOURLY AVERAGES OF NORTH-SOUTH COMPONENTS OF CURRENT VELOCITY
DEPTH 36.0 METERS.
SOUTH (CM/SEC) NORTH
40
20
0
-20
-40
9
10
15
20
25
30
1
5
JAN
73
FEB
73
SOUTH (CM/SEC) NORTH
40
20
0
-20
-40
6
10
15
20
25
1
5
FEB
73
MAR
73

PROGRESSIVE VECTOR DIAGRAM OF HOURLY AVERAGES OF G305
OBSERVATION PERIOD 30.2 DAYS FROM 1535 PST 8 JAN 73.
DEPTH 36.0 METERS.




SPECTRA OF CURRENT VELOCITY
DEPTH 36.0 METERS.
PERIOD (HOURS)
1000
100
10
1
.1
+ U SPECTRUM
- V SPECTRUM
(CM/SEC)2
FREQUENCY (CYCLES/HOUR)
.001
.01
.1
1
10
PERIOD (HOURS)
ENERGY SPECTRUM
(CM/SEC)2
FREQUENCY (CYCLES/HOUR)

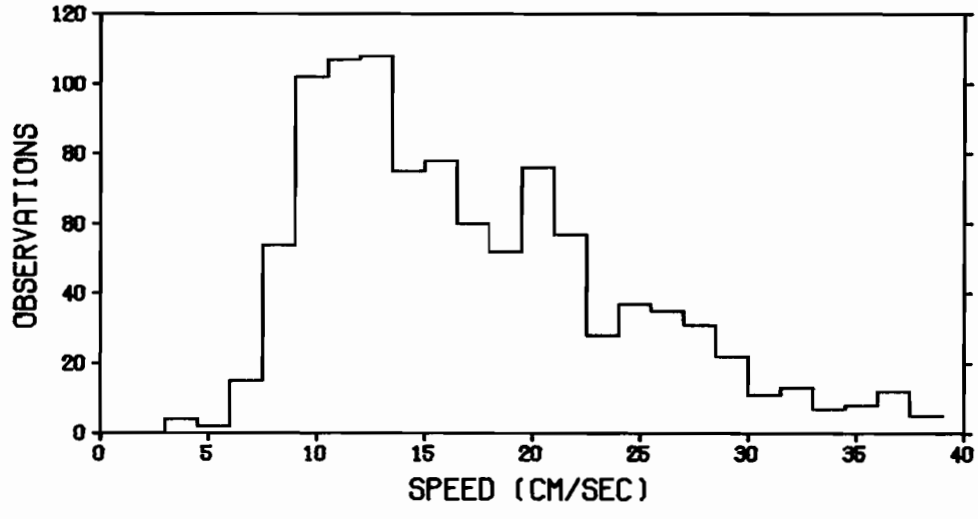
Current Meter A601

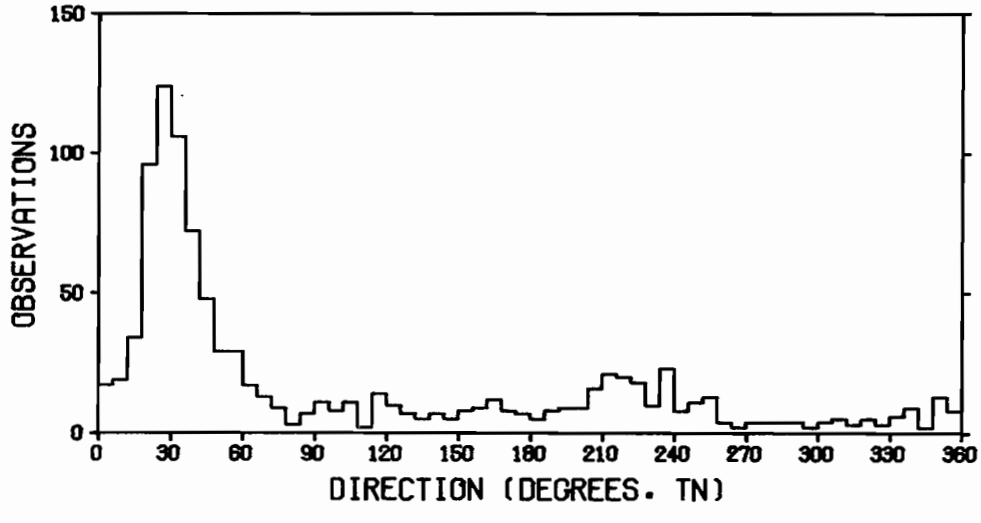
Depth 20.0 m

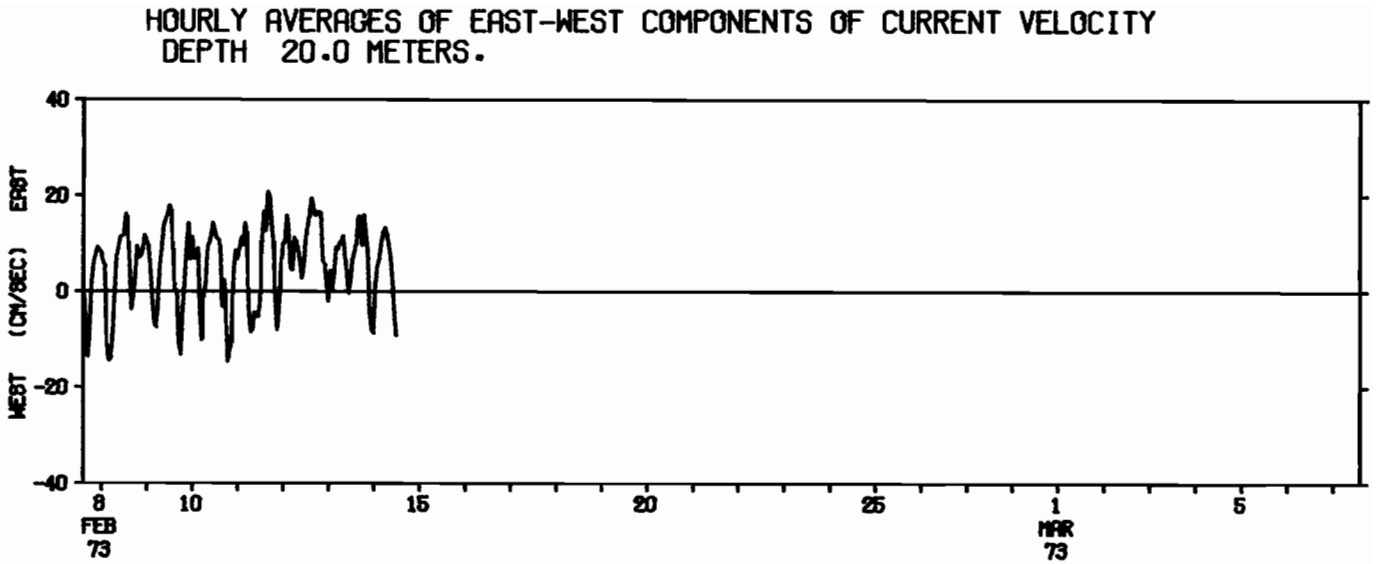
STATISTICS OF A601 *47 42.4N* LAT *122 26.7W* LONG
DEPTH 20.0 METERS NUMBER OF OBSERVATIONS = 1000
OBSERVATION PERIOD 6.9 DAYS FROM 1405 PST 7 FEB 73

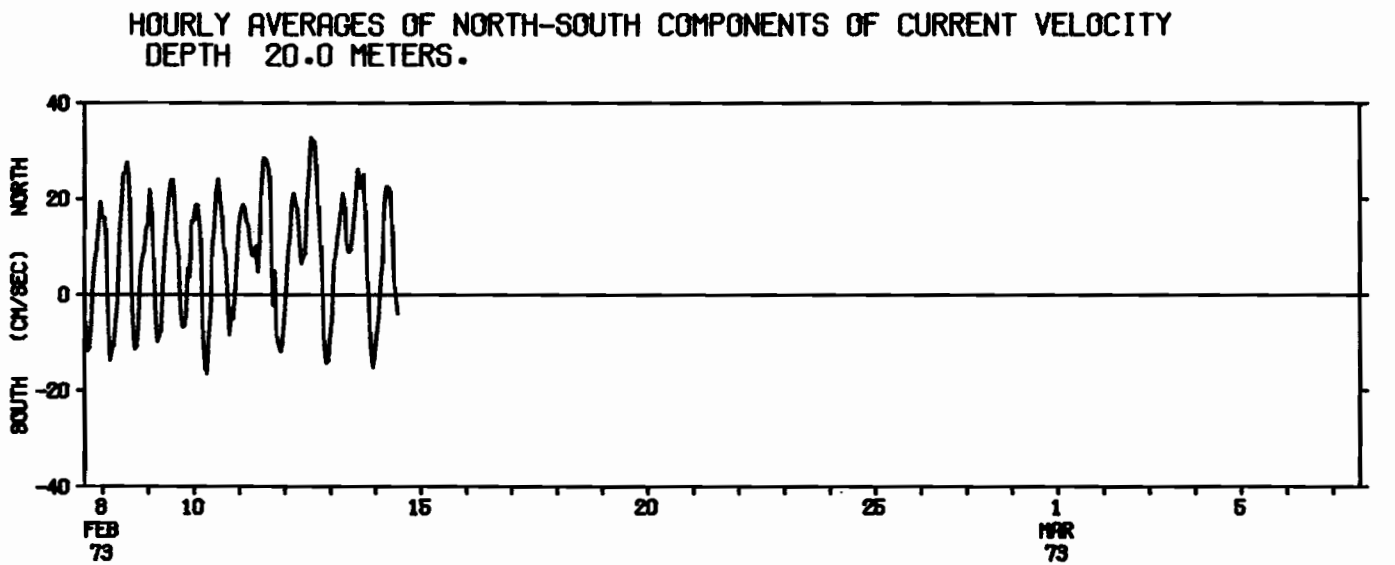
	MEAN (CM/SEC)	VARIANCE (CM/SEC)2	ST-DEV (CM/SEC)	SKEW	KURT	MAX (CM/SEC)	MIN (CM/SEC)
S	17.18	50.17	7.08	.805	3.08	39.47	3.86
U	5.40	82.52	9.08	-.650	2.50	24.20	-18.40
V	8.22	166.00	12.88	-.251	2.03	35.90	-19.80

S = SPEED
U = EAST-WEST COMPONENT OF VELOCITY, EAST = POSITIVE U
V = NORTH-SOUTH COMPONENT OF VELOCITY, NORTH = POSITIVE V

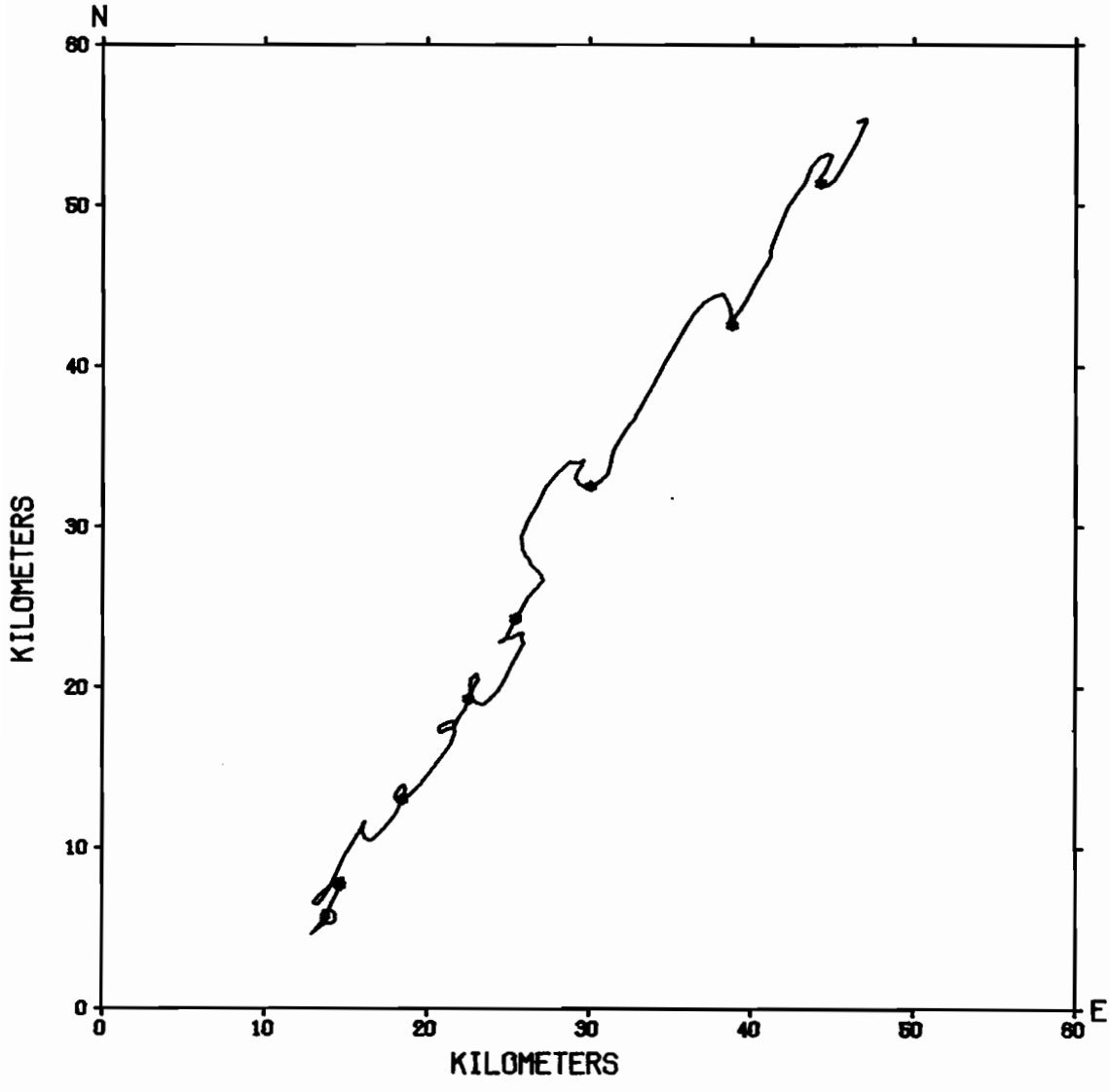


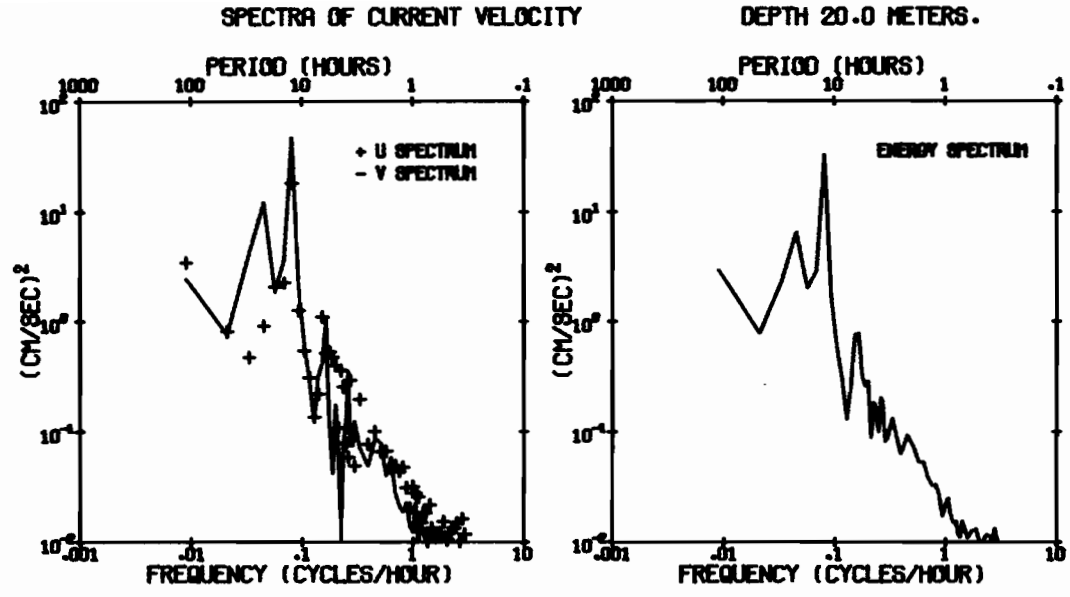



HOURLY AVERAGES OF EAST-WEST COMPONENTS OF CURRENT VELOCITY
DEPTH 20.0 METERS.
WEST (CM/SEC) EAST
40
20
0
-20
-40
8
FEB
73
10
15
20
25
1
MAR
73
5


HOURLY AVERAGES OF NORTH-SOUTH COMPONENTS OF CURRENT VELOCITY
DEPTH 20.0 METERS.
SOUTH (CM/SEC) NORTH
40
20
0
-20
-40
8
FEB
73
10
15
20
25
1
MAR
73
5

PROGRESSIVE VECTOR DIAGRAM OF HOURLY AVERAGES OF A601
OBSERVATION PERIOD 6.9 DAYS FROM 1405 PST 7 FEB 73.
DEPTH 20.0 METERS.




SPECTRA OF CURRENT VELOCITY
DEPTH 20.0 METERS.
PERIOD (HOURS)
1000
100
10
1
.1
+ U SPECTRUM
- V SPECTRUM
(CM/SEC)²
FREQUENCY (CYCLES/HOUR)
.001
.01
.1
1
10
PERIOD (HOURS)
ENERGY SPECTRUM
(CM/SEC)²
FREQUENCY (CYCLES/HOUR)

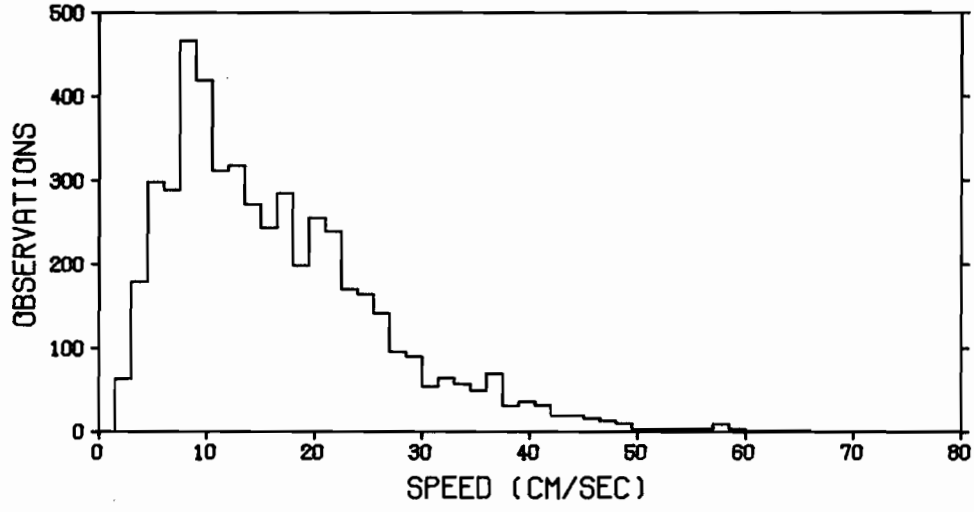
Current Meter A598

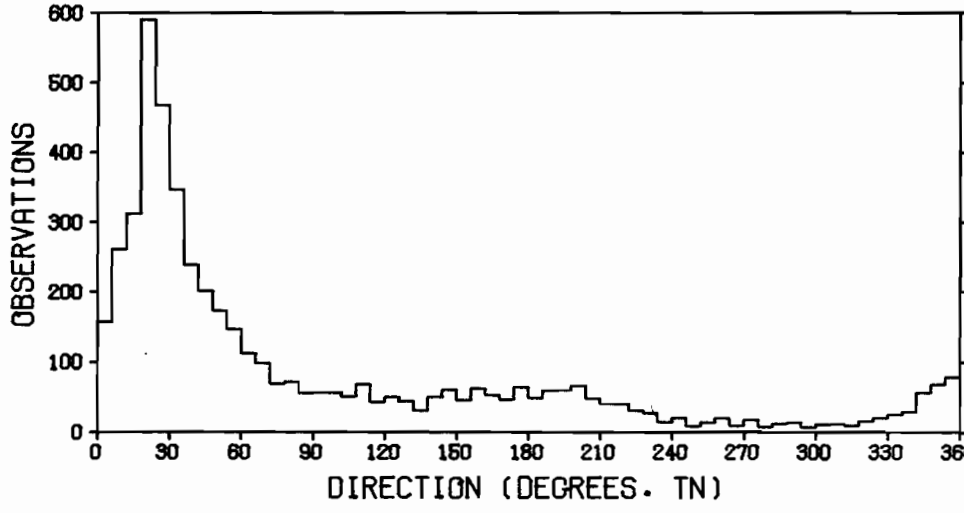
Depth 17.0 m

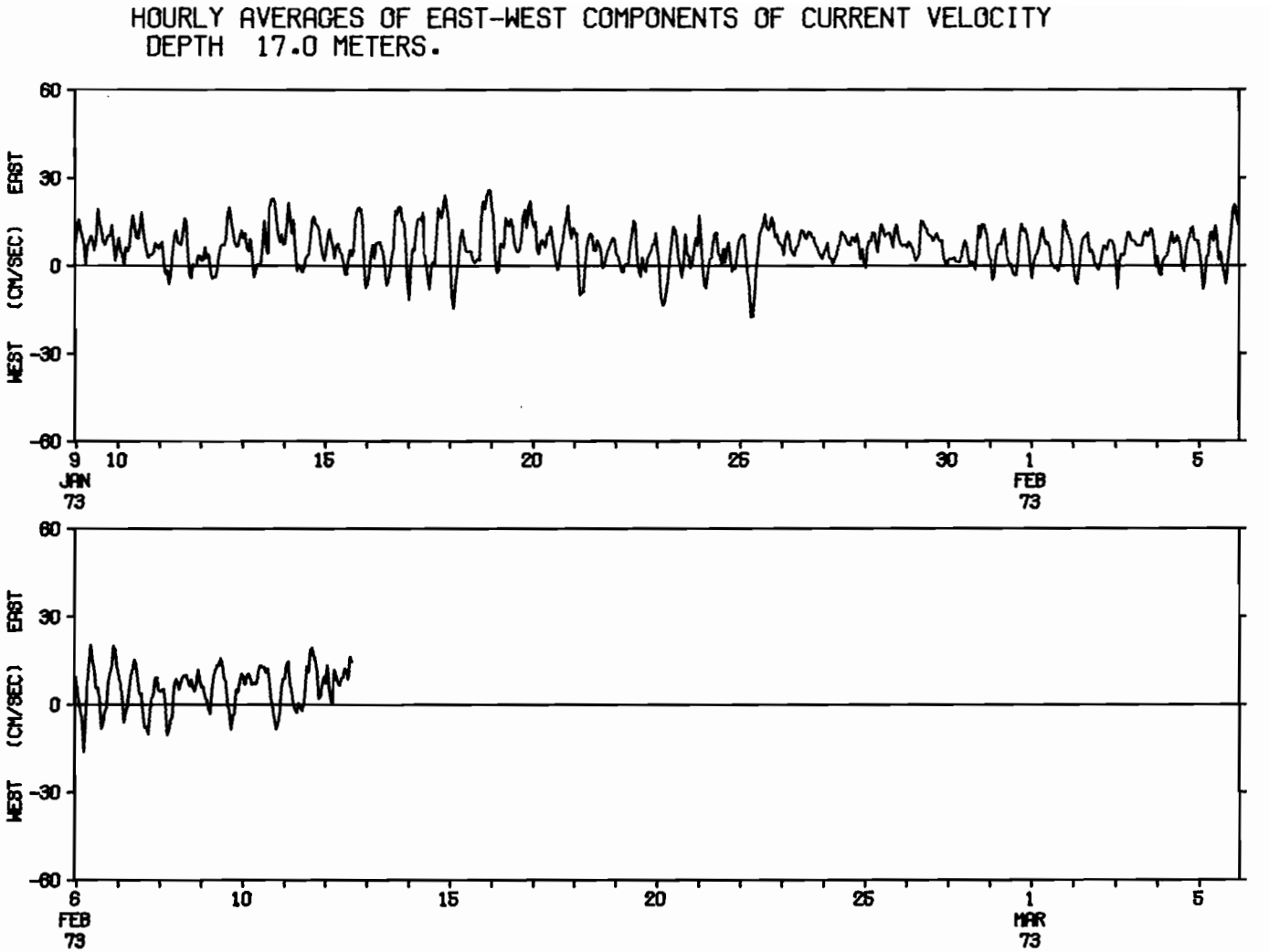
STATISTICS OF A598 LAT LONG
DEPTH 17.0 METERS NUMBER OF OBSERVATIONS = 5000
OBSERVATION PERIOD 34.7 DAYS FROM 2242 PST 8 JAN 73

	MEAN (CM/SEC)	VARIANCE (CM/SEC)2	ST-DEV (CM/SEC)	SKEW	KURT	MAX (CM/SEC)	MIN (CM/SEC)
S	16.54	100.44	10.02	1.139	4.45	65.51	1.72
U	6.27	51.03	7.14	-.214	3.35	32.30	-19.90
V	9.53	192.79	13.88	.179	2.98	60.40	-36.60

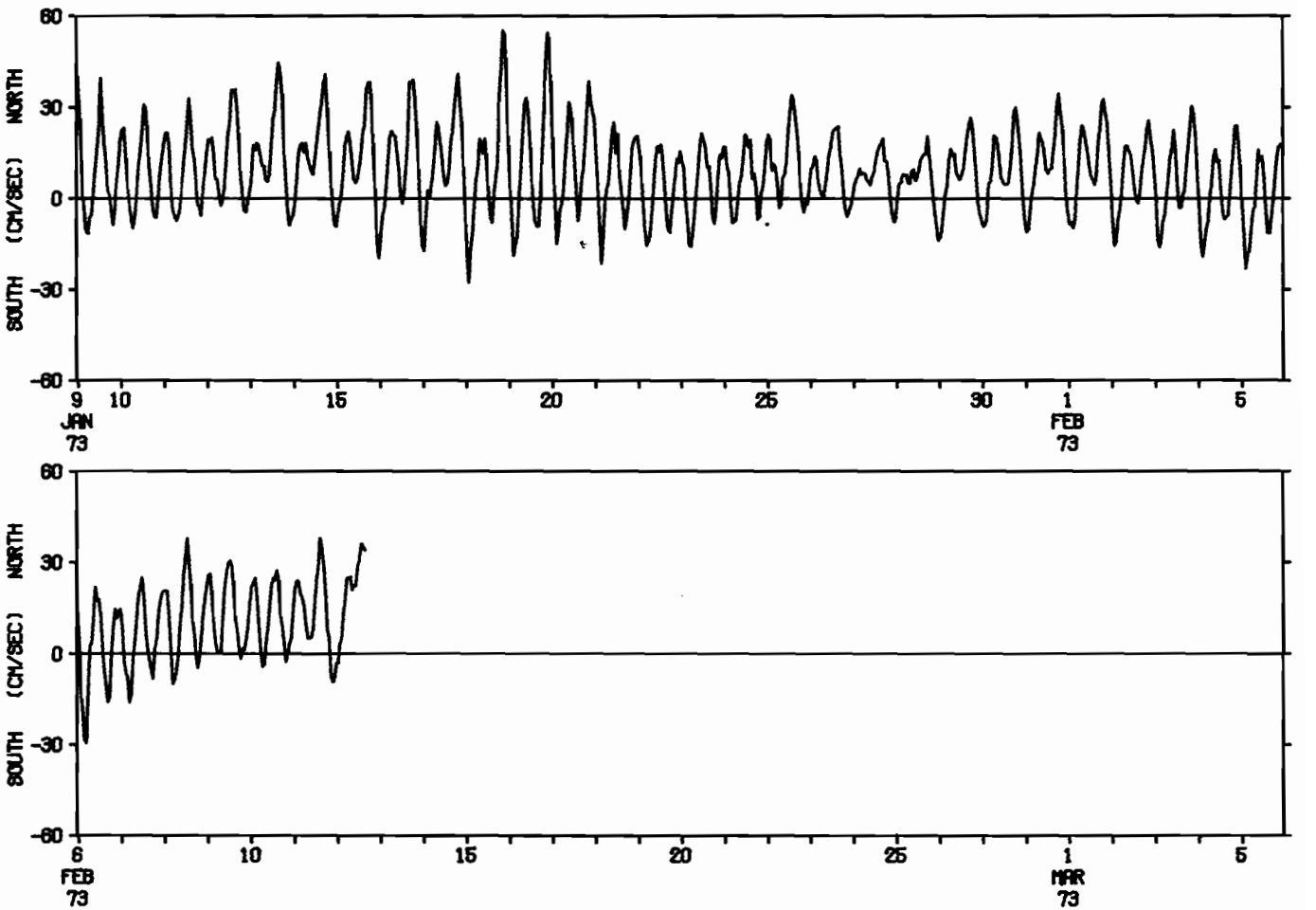
S = SPEED
U = EAST-WEST COMPONENT OF VELOCITY, EAST = POSITIVE U
V = NORTH-SOUTH COMPONENT OF VELOCITY, NORTH = POSITIVE V

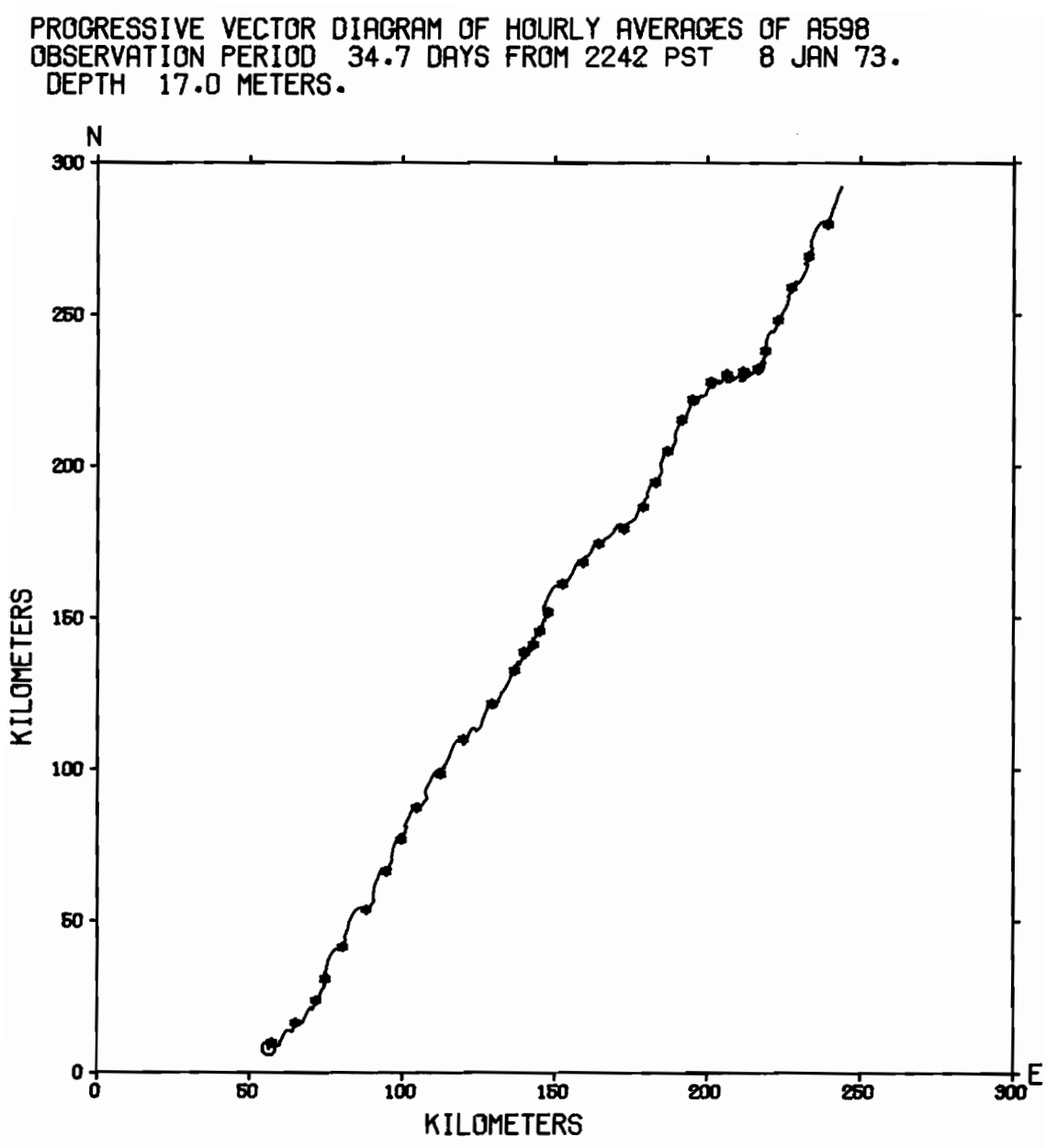


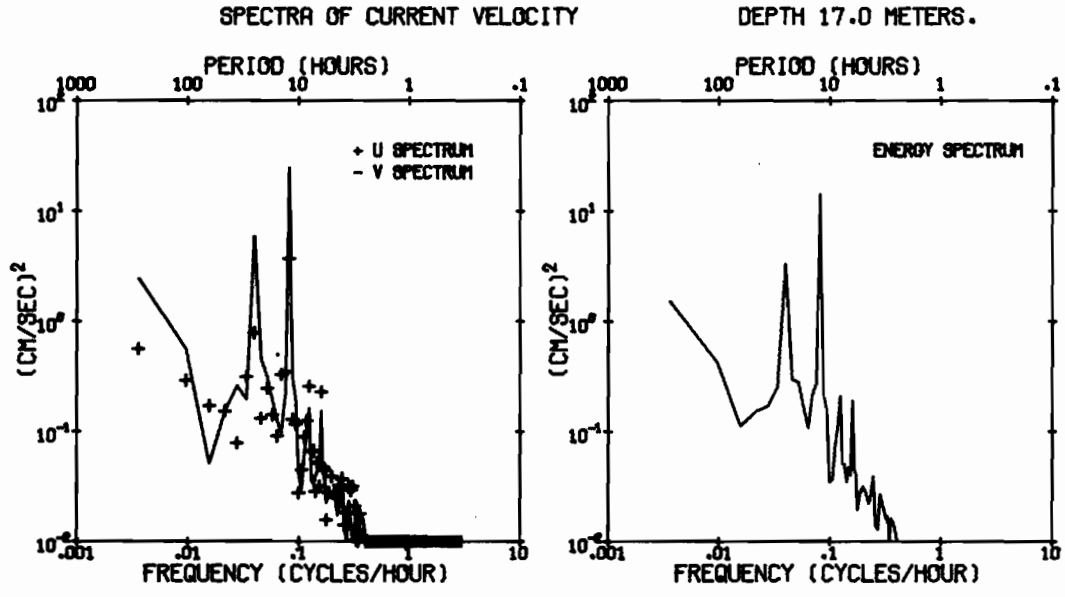



HOURLY AVERAGES OF EAST-WEST COMPONENTS OF CURRENT VELOCITY
DEPTH 17.0 METERS.
60
30
0
-30
-60
EAST
(CM/SEC)
WEST
9
10
15
20
25
30
1
5
JAN
73
FEB
73
6
10
15
20
25
1
5
FEB
73
MAR
73

HOURLY AVERAGES OF NORTH-SOUTH COMPONENTS OF CURRENT VELOCITY
DEPTH 17.0 METERS.




PROGRESSIVE VECTOR DIAGRAM OF HOURLY AVERAGES OF A598
OBSERVATION PERIOD 34.7 DAYS FROM 2242 PST 8 JAN 73.
DEPTH 17.0 METERS.
N
E
KILOMETERS
KILOMETERS
0
50
100
150
200
250
300


SPECTRA OF CURRENT VELOCITY
DEPTH 17.0 METERS.
PERIOD (HOURS)
1000
100
10
1
.1
+ U SPECTRUM
- V SPECTRUM
(CM/SEC)²
FREQUENCY (CYCLES/HOUR)
.001
.01
.1
1
10
PERIOD (HOURS)
ENERGY SPECTRUM
(CM/SEC)²
FREQUENCY (CYCLES/HOUR)

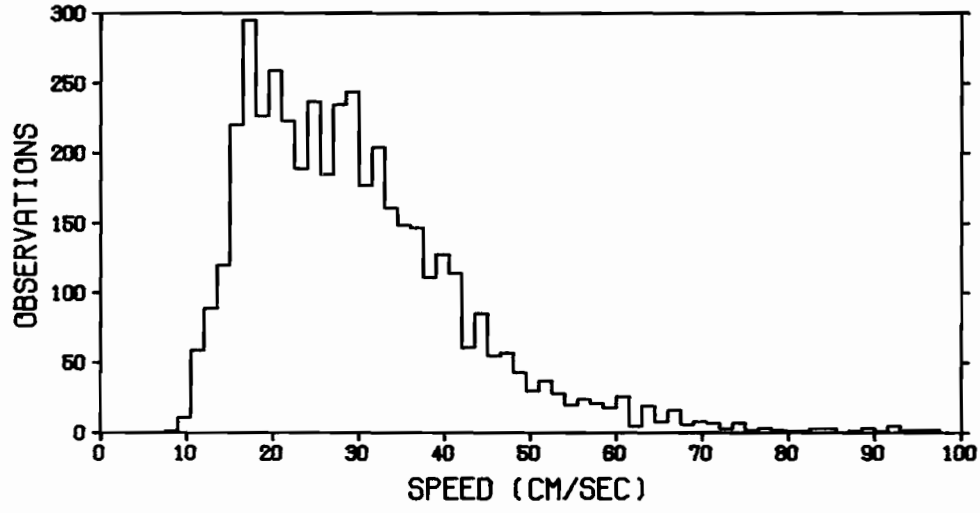
Current Meter A603

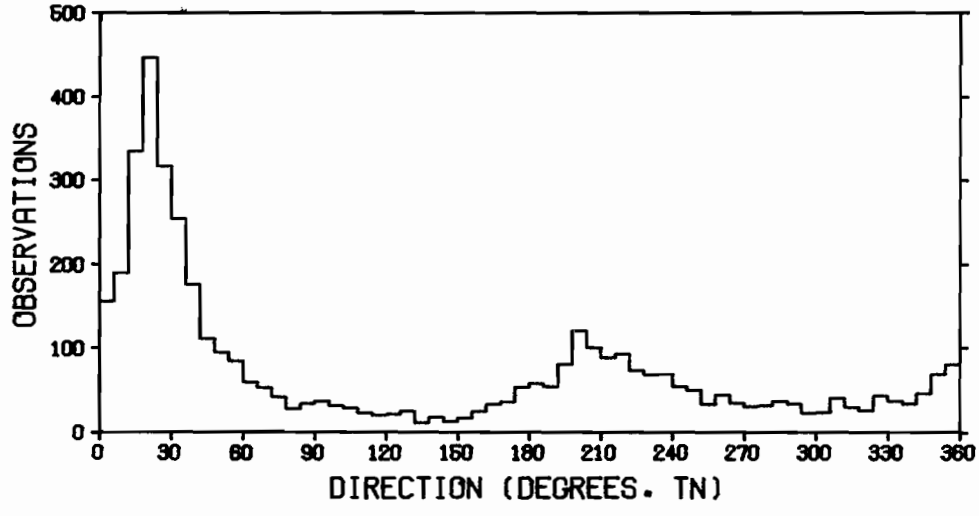
Depth 2.5 m

STATISTICS OF A603 *47 42.4N* LAT *122 26.7W* LONG
DEPTH 2.5 METERS NUMBER OF OBSERVATIONS = 4400
OBSERVATION PERIOD 30.6 DAYS FROM 0422 PST 15 JAN 73

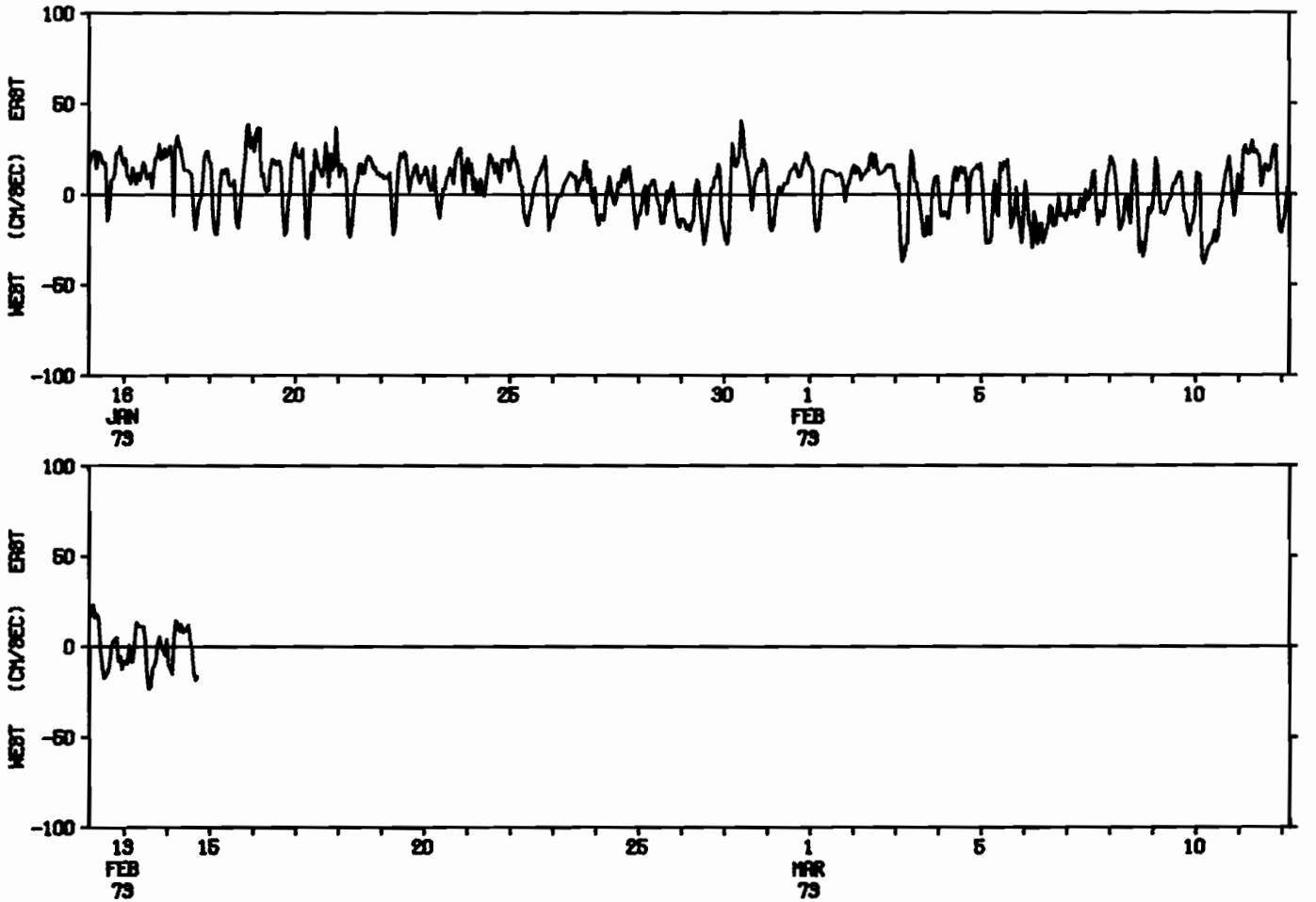
	MEAN (CM/SEC)	VARIANCE (CM/SEC)2	ST-DEV (CM/SEC)	SKEW	KURT	MAX (CM/SEC)	MIN (CM/SEC)
S	29.62	164.64	12.83	1.343	5.81	99.47	8.78
U	3.75	266.91	16.34	-.318	2.67	85.30	-55.30
V	11.58	627.08	25.04	-.223	2.70	91.30	-70.80

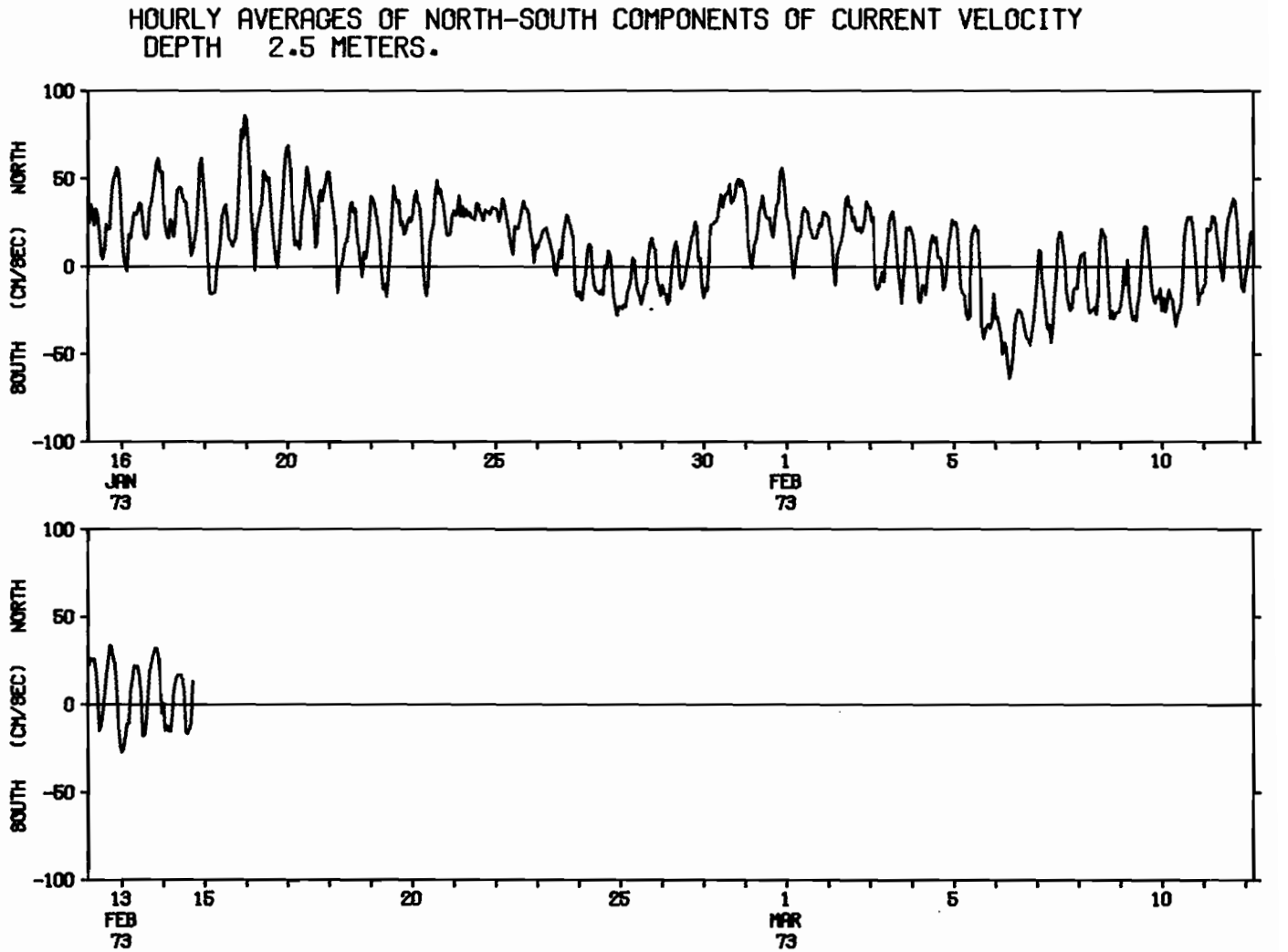
S = SPEED
U = EAST-WEST COMPONENT OF VELOCITY, EAST = POSITIVE U
V = NORTH-SOUTH COMPONENT OF VELOCITY, NORTH = POSITIVE V



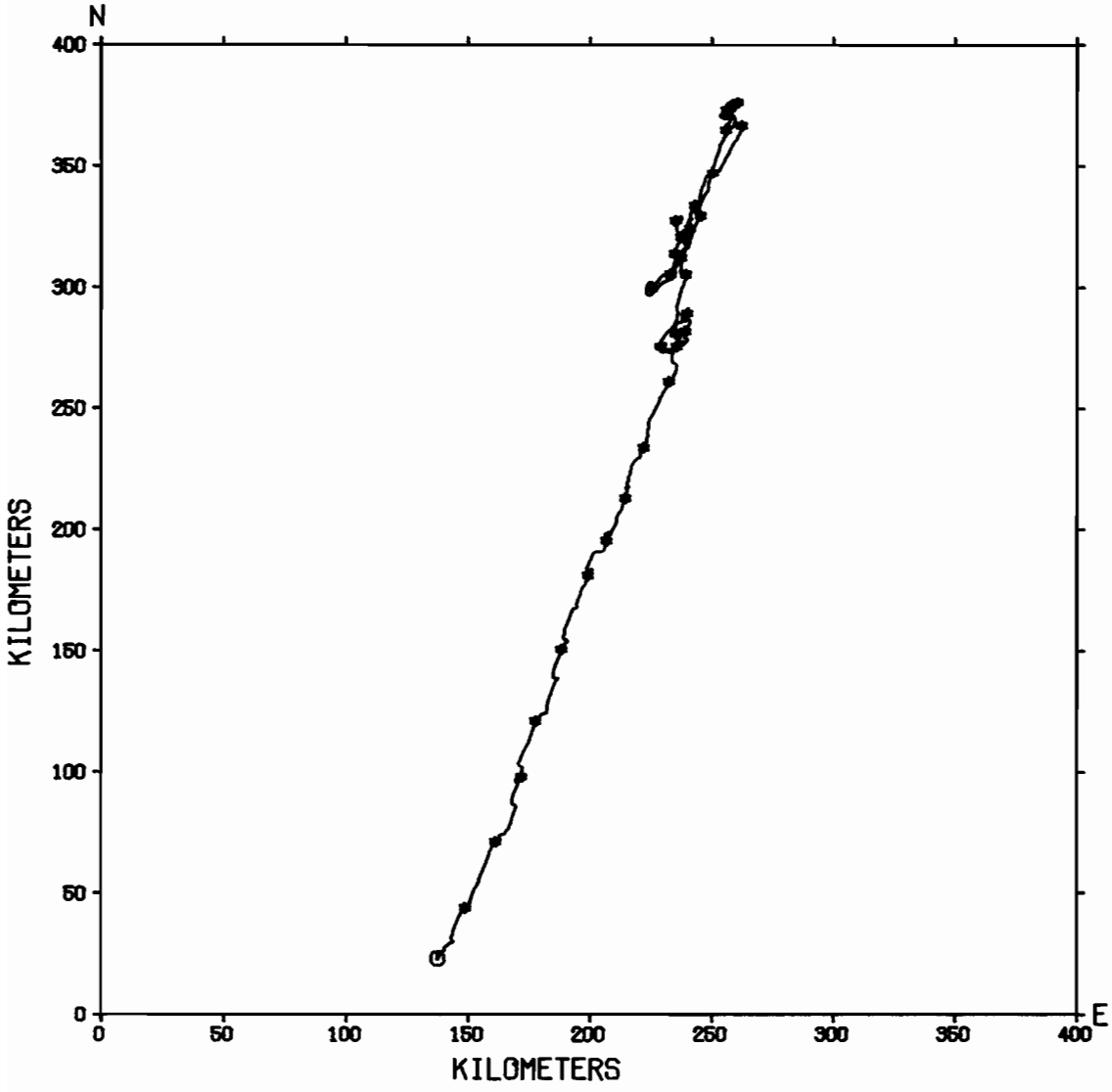


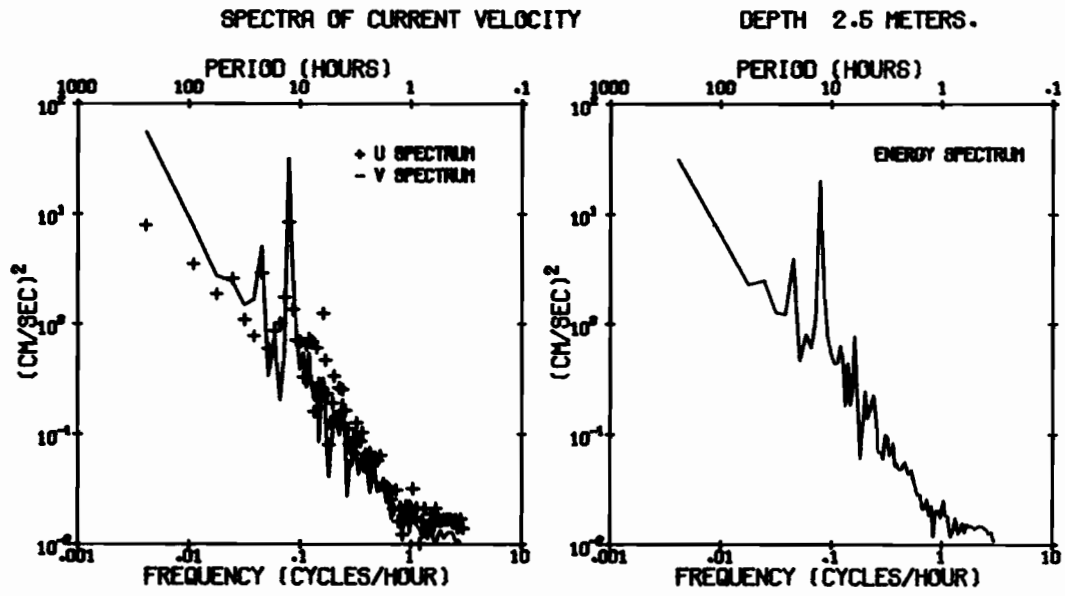
HOURLY AVERAGES OF EAST-WEST COMPONENTS OF CURRENT VELOCITY
DEPTH 2.5 METERS.




HOURLY AVERAGES OF NORTH-SOUTH COMPONENTS OF CURRENT VELOCITY
DEPTH 2.5 METERS.
SOUTH (CM/SEC) NORTH
100
50
0
-50
-100
16
JAN
73
20
25
30
1
FEB
73
5
10
13
FEB
73
15
20
25
1
MAR
73
5
10

PROGRESSIVE VECTOR DIAGRAM OF HOURLY AVERAGES OF A603
OBSERVATION PERIOD 30.6 DAYS FROM 0422 PST 15 JAN 73.
DEPTH 2.5 METERS.




SPECTRA OF CURRENT VELOCITY
DEPTH 2.5 METERS.
PERIOD (HOURS)
1000
100
10
1
.1
+ U SPECTRUM
- V SPECTRUM
(CM/SEC)²
FREQUENCY (CYCLES/HOUR)
.001
.01
.1
1
10
PERIOD (HOURS)
ENERGY SPECTRUM
(CM/SEC)²
FREQUENCY (CYCLES/HOUR)

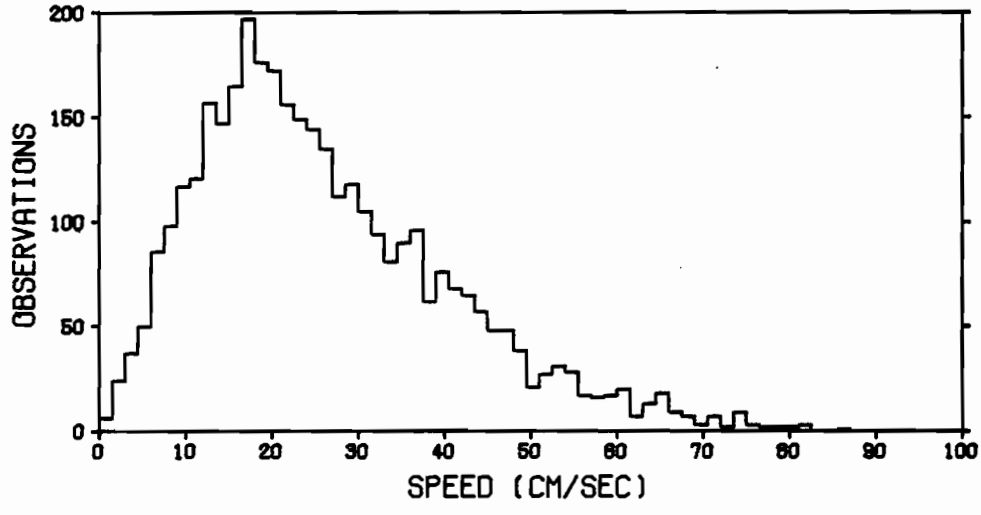
Current Meter V154

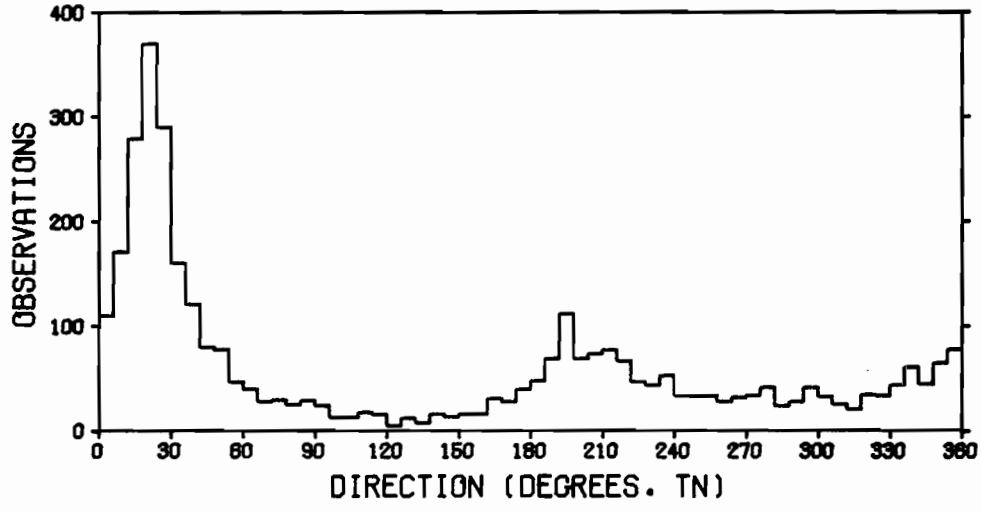
Depth 2.0 m

STATISTICS OF V154 *47 42.4 N* LAT *122 26.7 W* LONG
DEPTH 2.0 METERS NUMBER OF OBSERVATIONS = 3560
OBSERVATION PERIOD 37.1 DAYS FROM 1144 PST 8 JAN 73

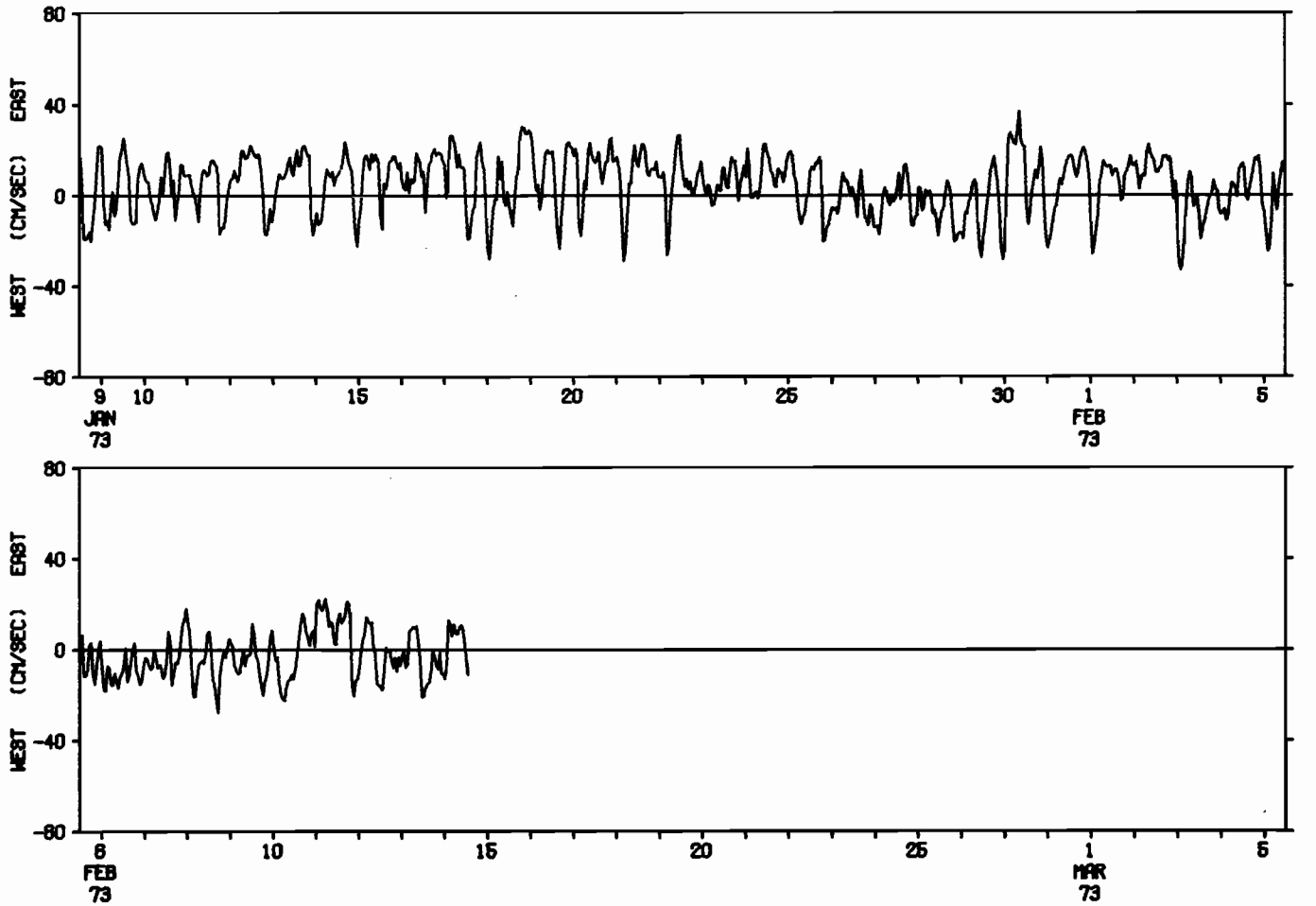
	MEAN (CM/SEC)	VARIANCE (CM/SEC)2	ST-DEV (CM/SEC)	SKEW	KURT	MAX (CM/SEC)	MIN (CM/SEC)
S	26.13	213.57	14.61	.893	3.62	86.61	.60
U	2.81	169.55	13.02	-.271	2.34	39.78	-36.99
V	11.75	580.90	24.10	-.177	2.91	81.15	-75.42

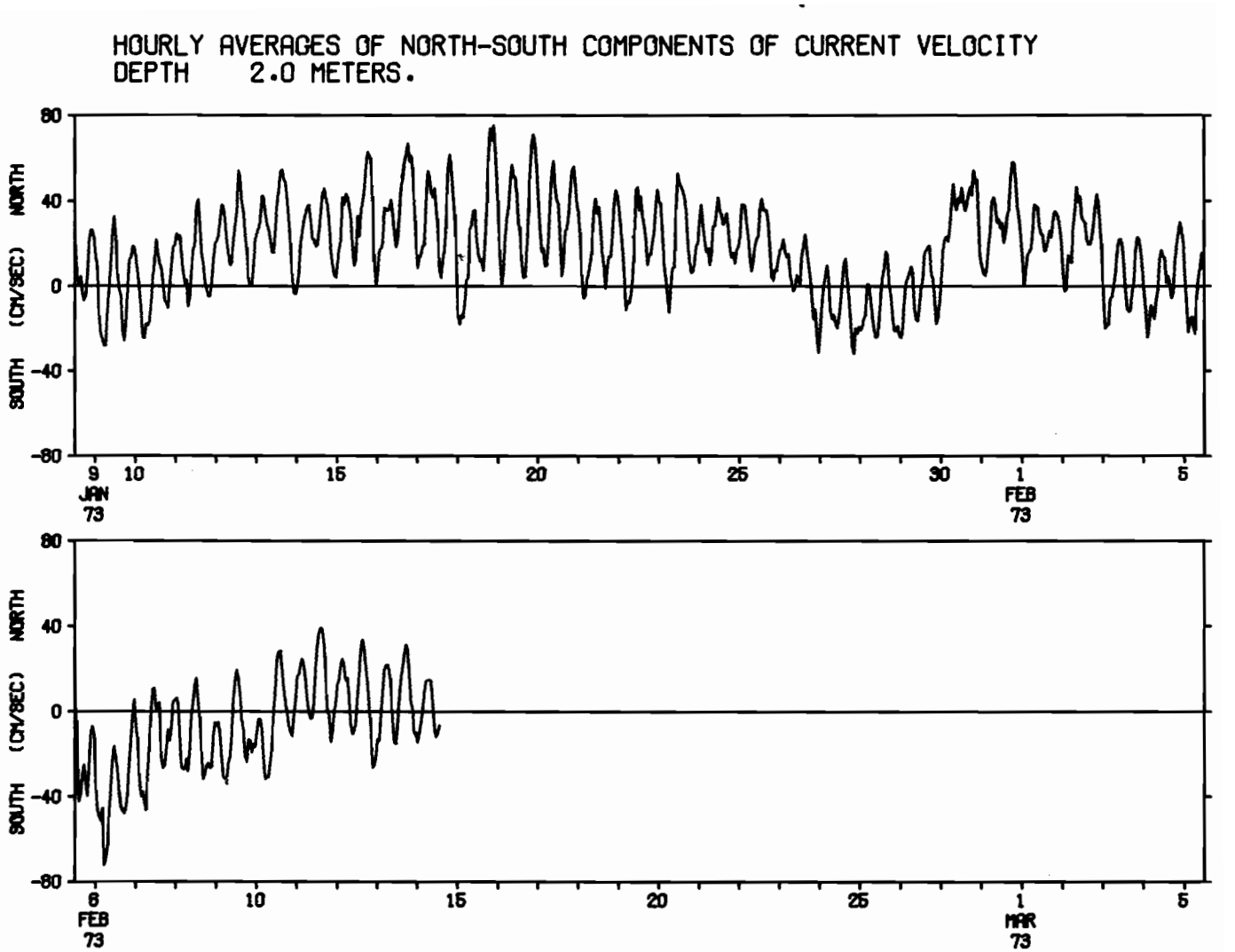
S = SPEED
U = EAST-WEST COMPONENT OF VELOCITY, EAST = POSITIVE U
V = NORTH-SOUTH COMPONENT OF VELOCITY, NORTH = POSITIVE V



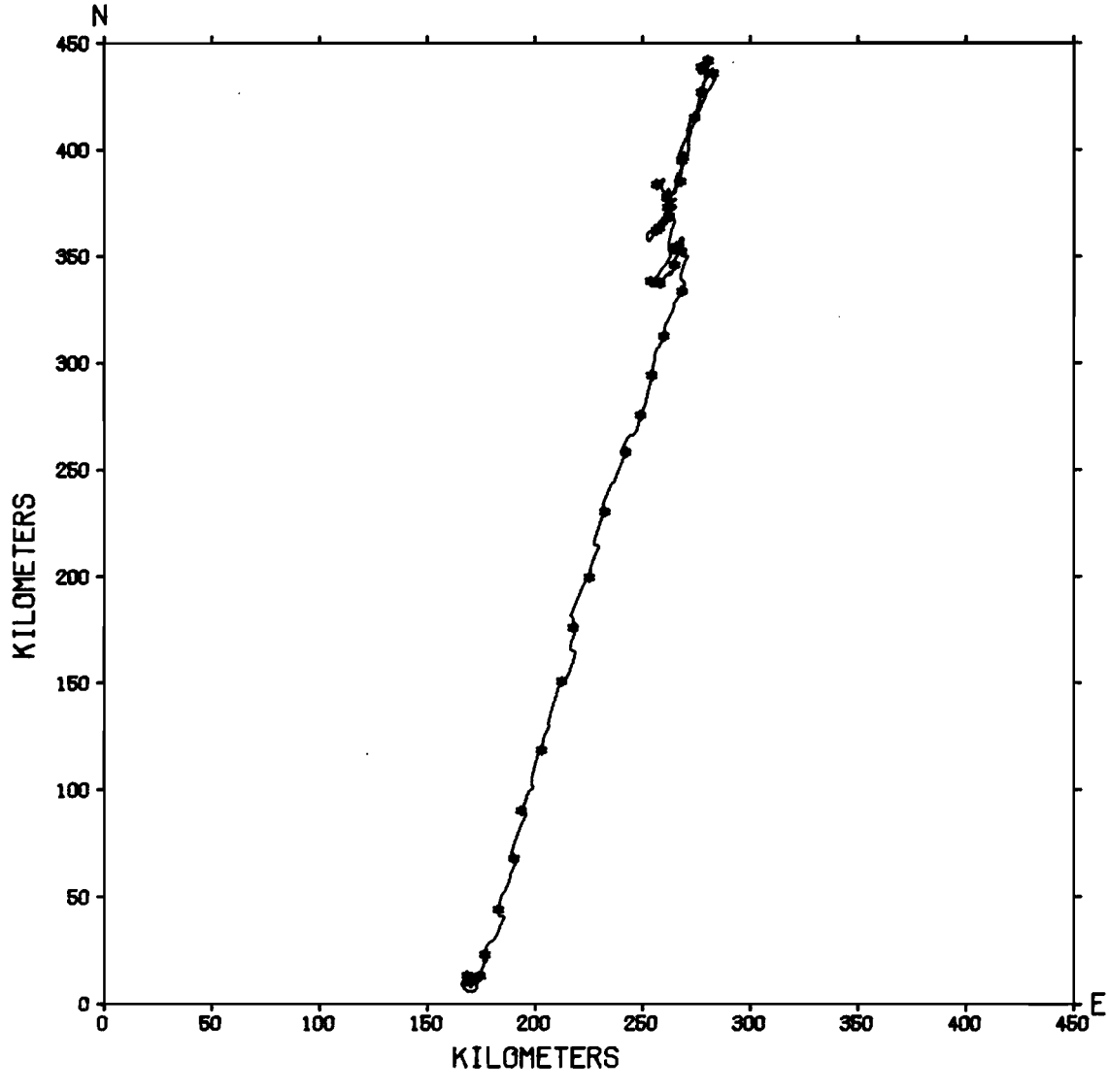


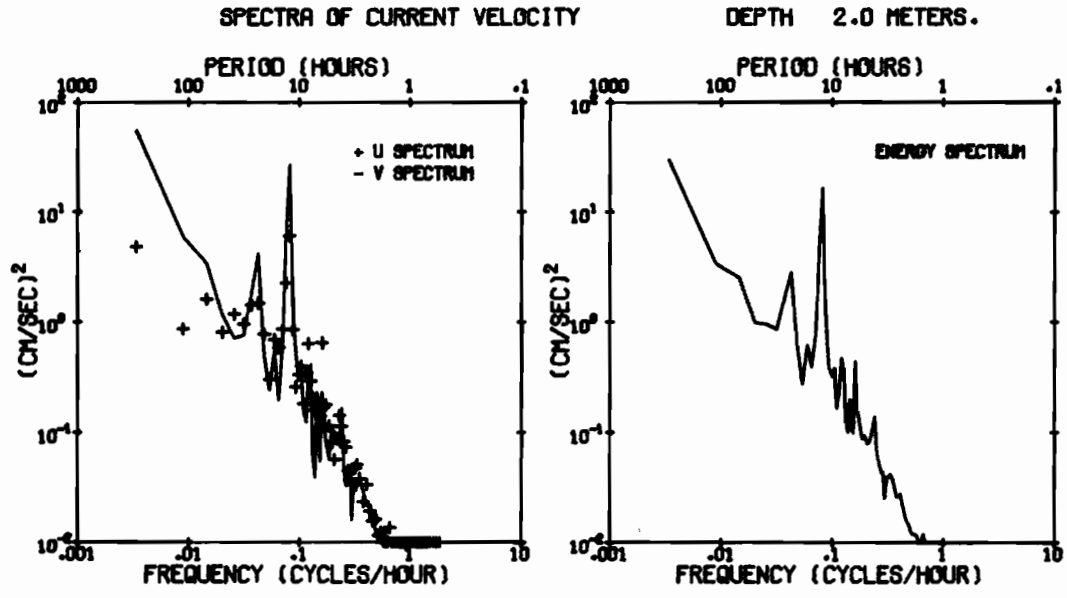
HOURLY AVERAGES OF EAST-WEST COMPONENTS OF CURRENT VELOCITY
DEPTH 2.0 METERS.




HOURLY AVERAGES OF NORTH-SOUTH COMPONENTS OF CURRENT VELOCITY
DEPTH 2.0 METERS.
80
40
0
-40
-80
SOUTH (CM/SEC) NORTH
9
JAN
73
10
15
20
25
30
1
FEB
73
5
6
FEB
73
10
15
20
25
1
MAR
73
5

PROGRESSIVE VECTOR DIAGRAM OF HOURLY AVERAGES OF V154
OBSERVATION PERIOD 37.1 DAYS FROM 1144 PST 8 JAN 73.
DEPTH 2.0 METERS.




SPECTRA OF CURRENT VELOCITY
DEPTH 2.0 METERS.
PERIOD (HOURS)
1000
100
10
1
.1
+ U SPECTRUM
- V SPECTRUM
ENERGY SPECTRUM
(CM/SEC)2
FREQUENCY (CYCLES/HOUR)
.001
.01
.1
1
10

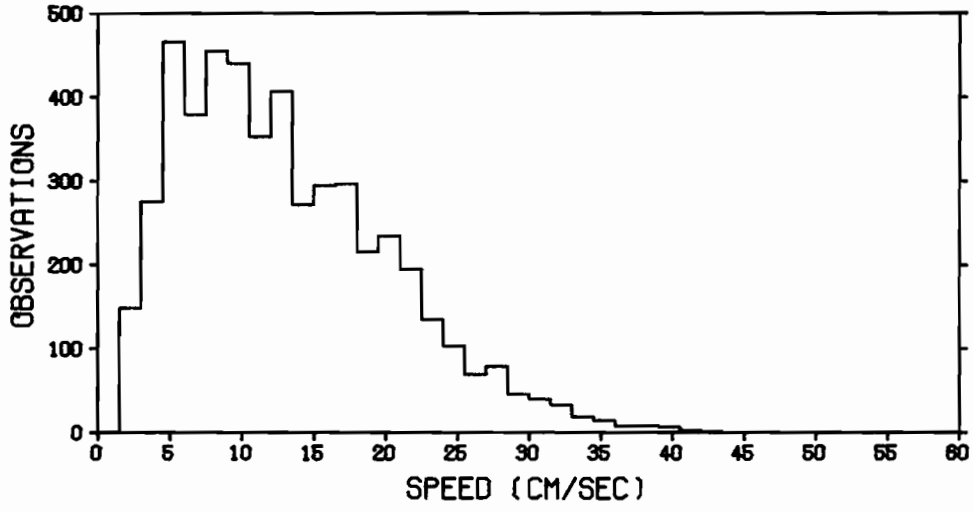
Current Meter A599

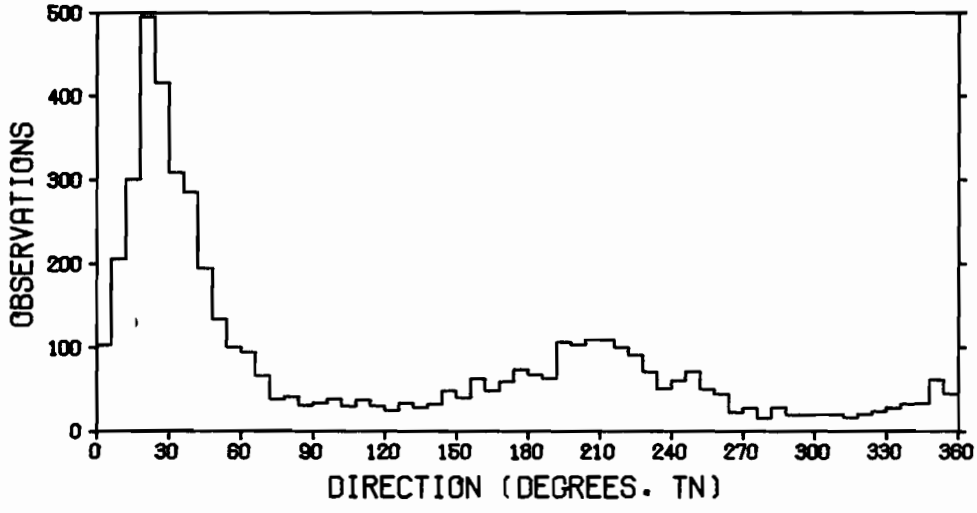
Depth 36.5 m

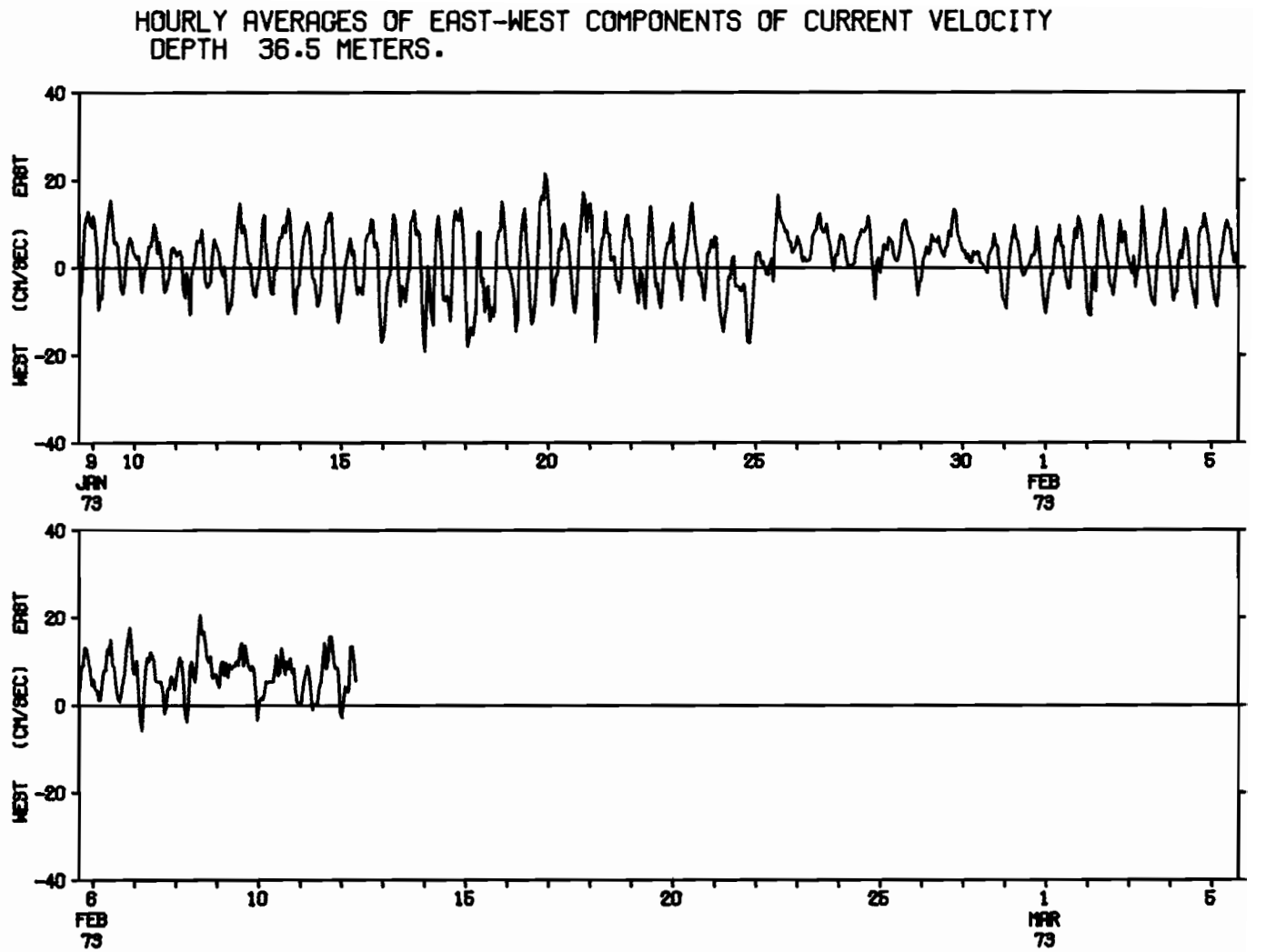
STATISTICS OF A599 *47 42.3N* LAT *122 26.9W* LONG
DEPTH 36.5 METERS NUMBER OF OBSERVATIONS = 5000
OBSERVATION PERIOD 34.7 DAYS FROM 1542 PST 8 JAN 73

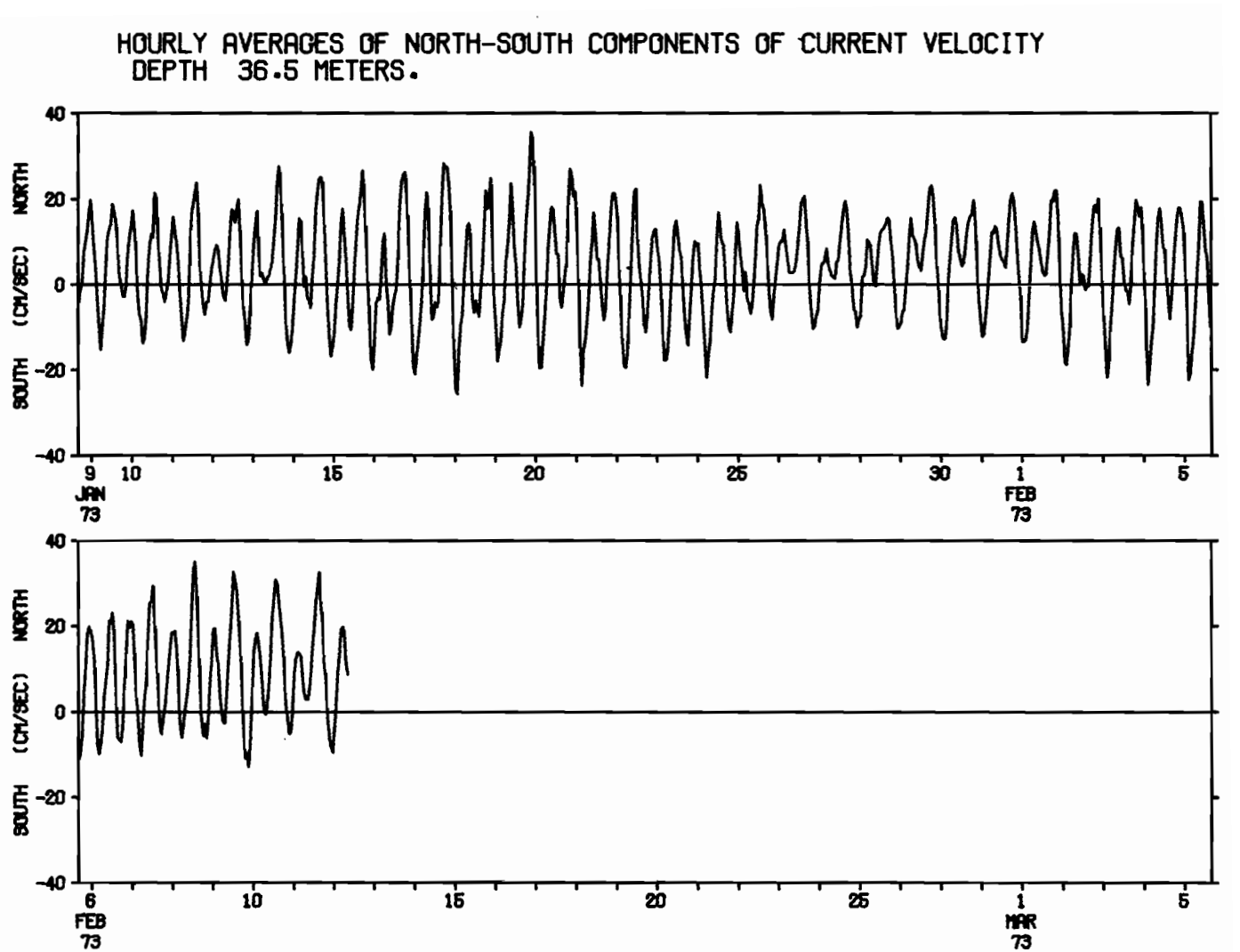
	MEAN (CM/SEC)	VARIANCE (CM/SEC)2	ST-DEV (CM/SEC)	SKEW	KURT	MAX (CM/SEC)	MIN (CM/SEC)
S	13.15	53.89	7.34	.781	3.27	42.00	1.72
U	2.88	52.48	7.24	-.438	2.97	24.10	-22.90
V	4.97	141.29	11.89	-.053	2.48	38.10	-34.60

S = SPEED
U = EAST-WEST COMPONENT OF VELOCITY, EAST = POSITIVE U
V = NORTH-SOUTH COMPONENT OF VELOCITY, NORTH = POSITIVE V

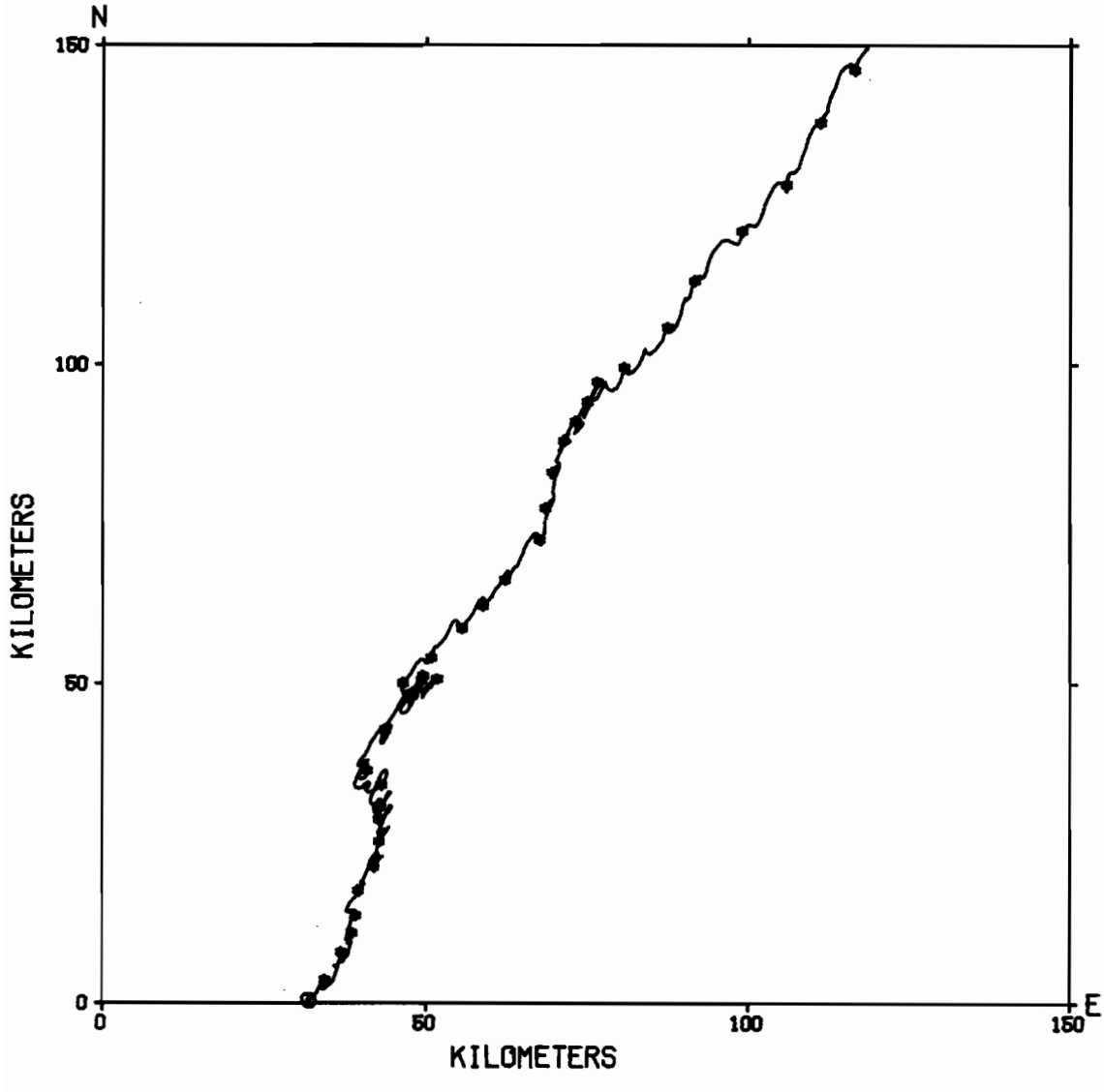


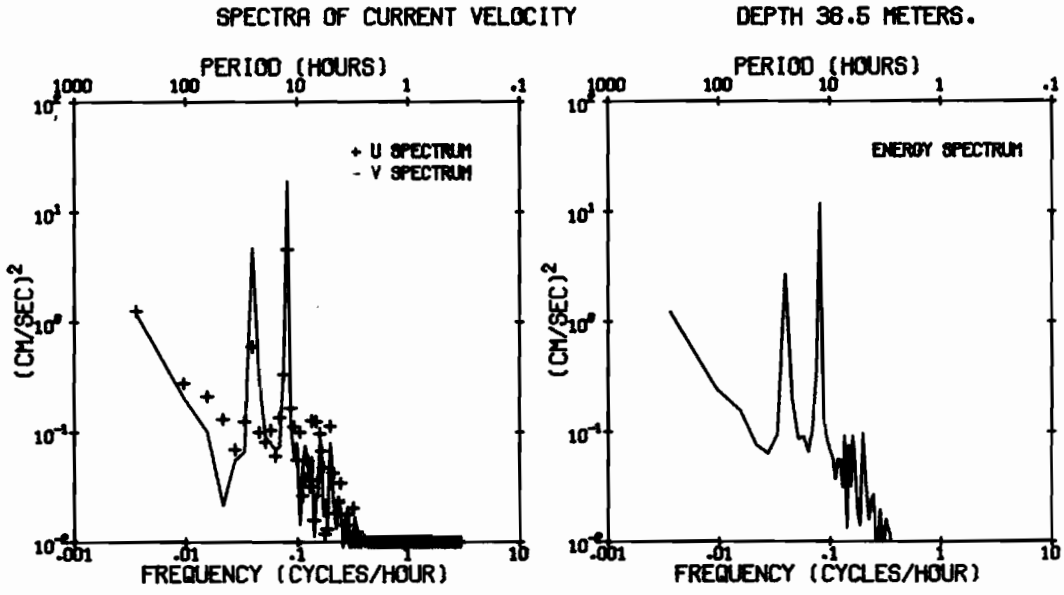



HOURLY AVERAGES OF EAST-WEST COMPONENTS OF CURRENT VELOCITY
DEPTH 36.5 METERS.
EAST (CM/SEC) WEST
40
20
0
-20
-40
9
JAN
79
10
15
20
25
30
1
FEB
79
5
6
FEB
79
10
15
20
25
1
MAR
79
5


HOURLY AVERAGES OF NORTH-SOUTH COMPONENTS OF CURRENT VELOCITY
DEPTH 36.5 METERS.
SOUTH (CM/SEC) NORTH
40
20
0
-20
-40
9
10
15
20
25
30
1
5
JAN
73
FEB
73
SOUTH (CM/SEC) NORTH
40
20
0
-20
-40
6
10
15
20
25
1
5
FEB
73
MAR
73

PROGRESSIVE VECTOR DIAGRAM OF HOURLY AVERAGES OF A599
OBSERVATION PERIOD 34.7 DAYS FROM 1542 PST 8 JAN 73.
DEPTH 36.5 METERS.




SPECTRA OF CURRENT VELOCITY
DEPTH 36.5 METERS.
PERIOD (HOURS)
1000
100
10
1
.1
+ U SPECTRUM
- V SPECTRUM
(CM/SEC)²
FREQUENCY (CYCLES/HOUR)
.001
.01
.1
1
10
PERIOD (HOURS)
ENERGY SPECTRUM
(CM/SEC)²
FREQUENCY (CYCLES/HOUR)

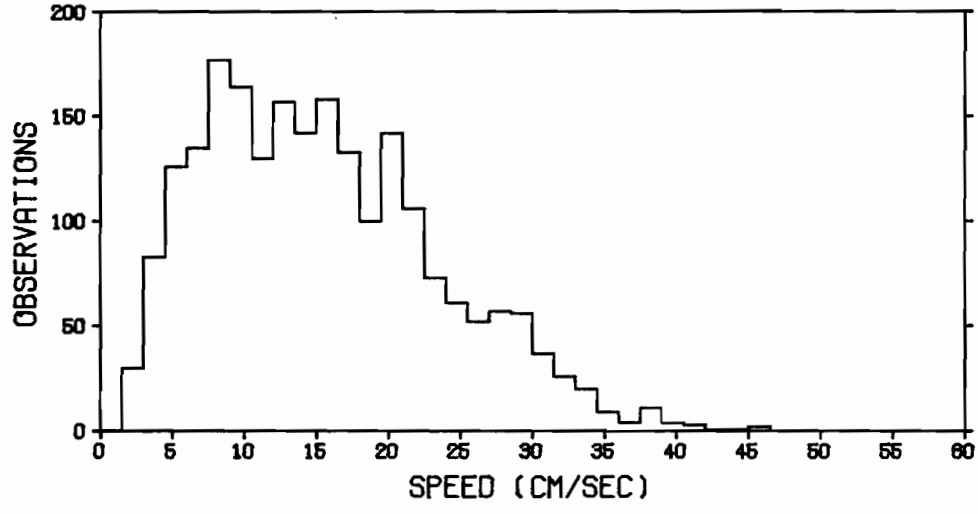
Current Meter A604

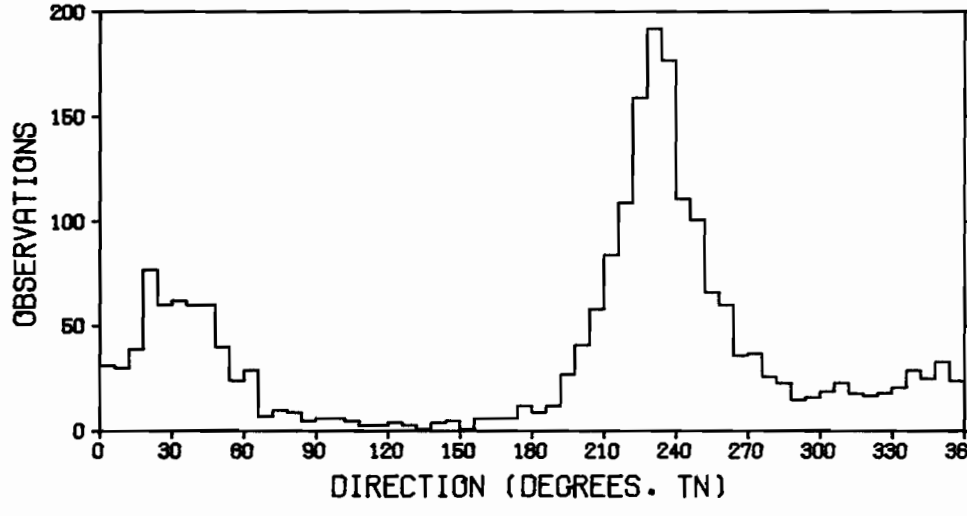
Depth 56.0 m

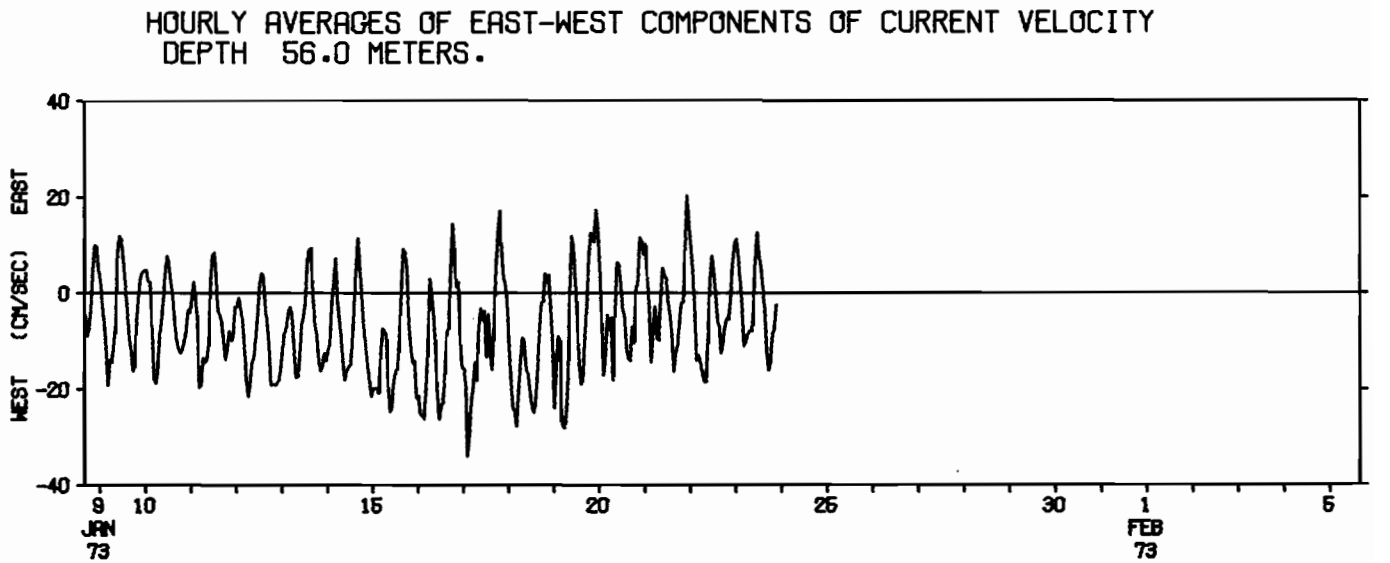
STATISTICS OF A604 *47 42.3N* LAT *122 26.9W* LONG
DEPTH 56.0 METERS NUMBER OF OBSERVATIONS = 2200
OBSERVATION PERIOD 15.3 DAYS FROM 1542 PST 8 JAN 73

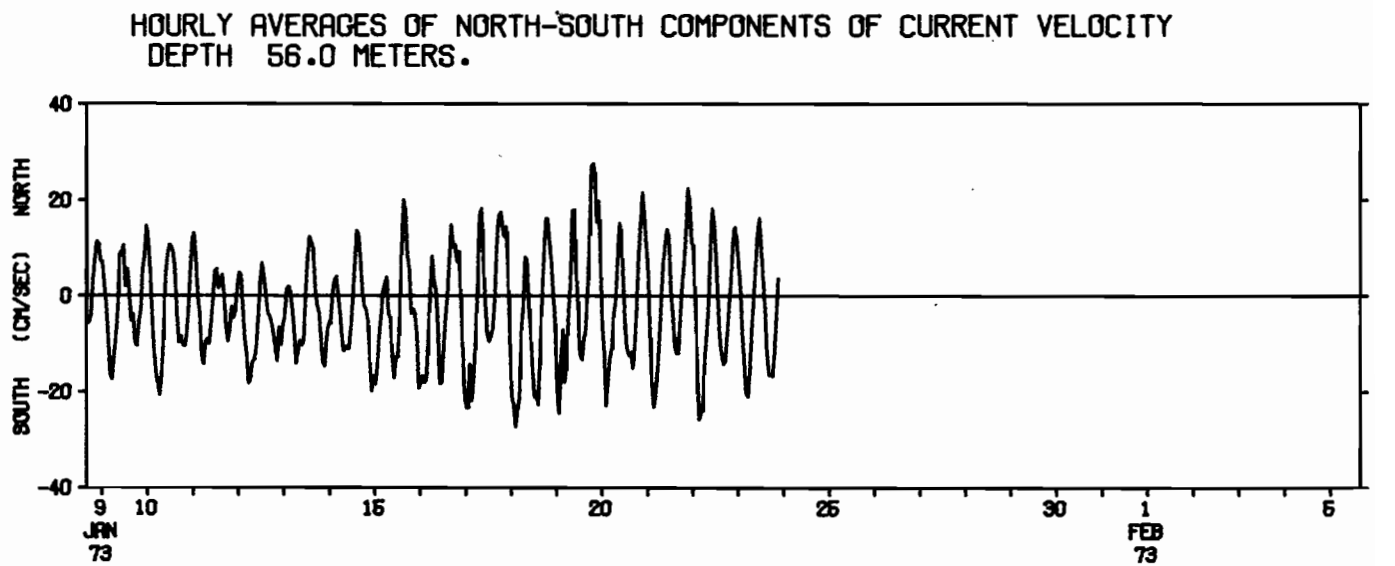
	MEAN (CM/SEC)	VARIANCE (CM/SEC)2	ST-DEV (CM/SEC)	SKEW	KURT	MAX (CM/SEC)	MIN (CM/SEC)
S	15.50	65.11	8.07	.612	2.90	46.04	1.75
U	-6.79	114.23	10.69	.110	2.48	22.60	-38.80
V	-2.68	137.85	11.74	.185	2.42	33.90	-31.30

S = SPEED
U = EAST-WEST COMPONENT OF VELOCITY, EAST = POSITIVE U
V = NORTH-SOUTH COMPONENT OF VELOCITY, NORTH = POSITIVE V

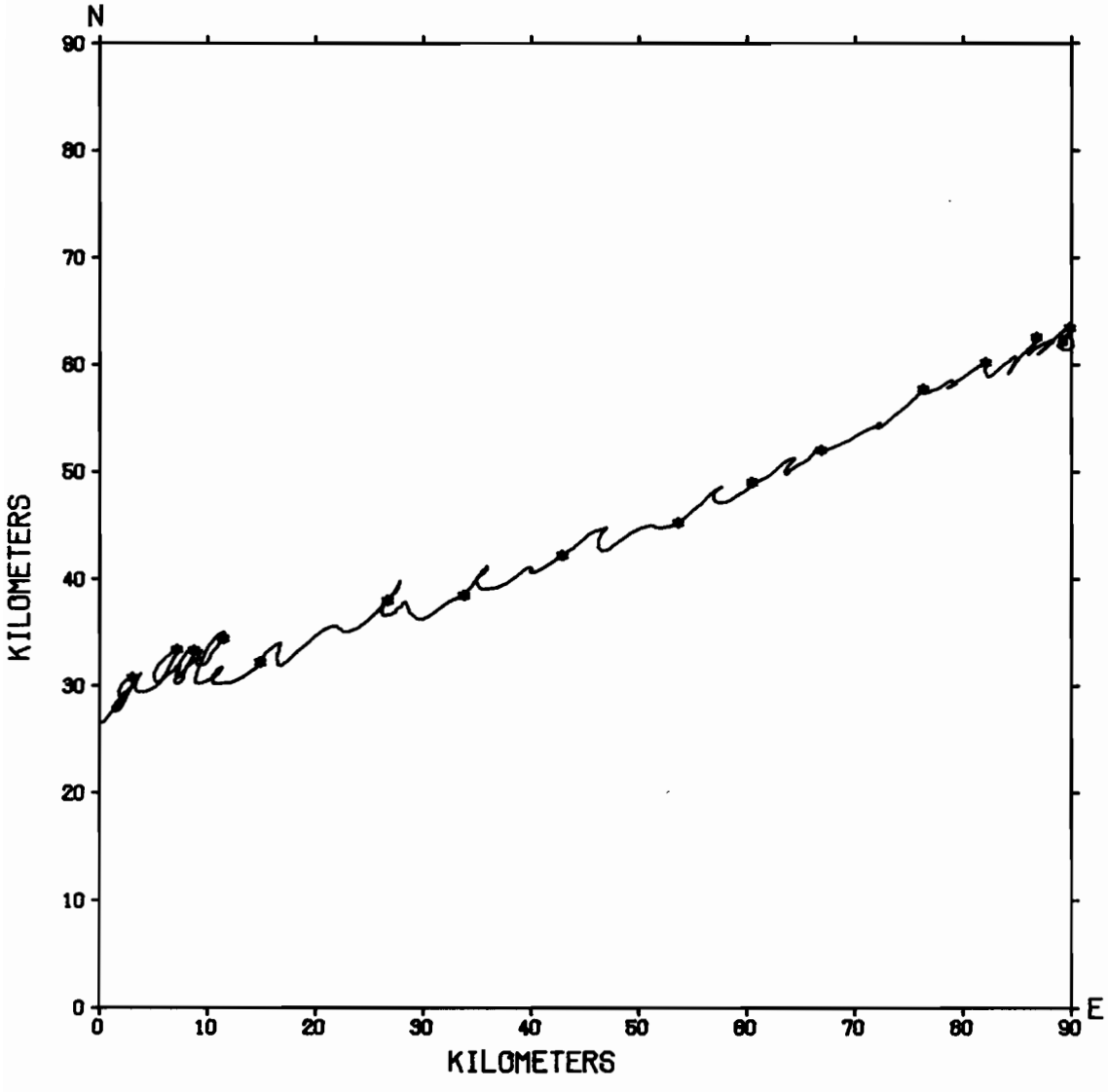


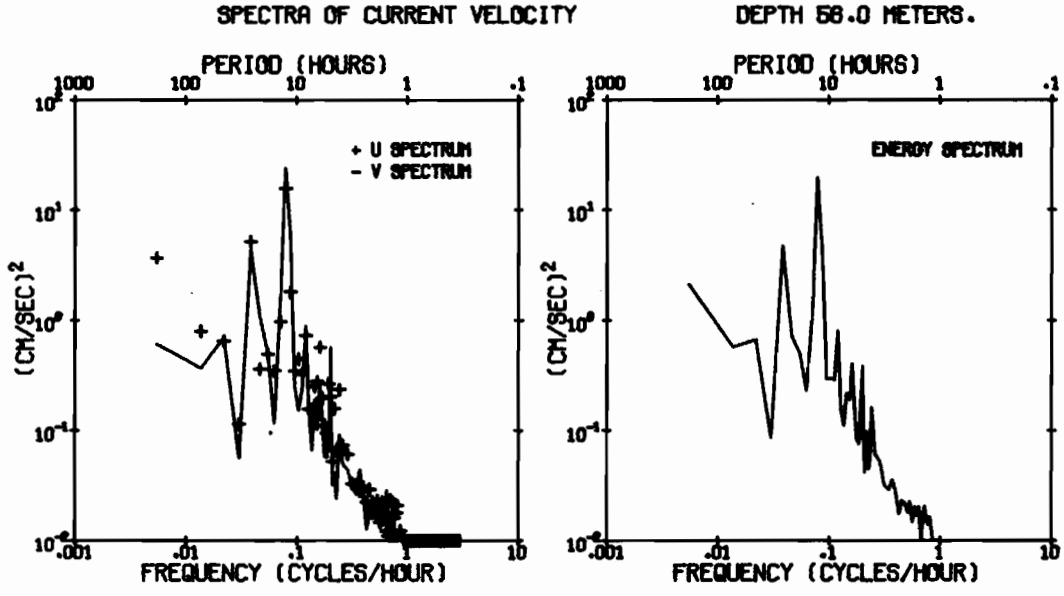



HOURLY AVERAGES OF EAST-WEST COMPONENTS OF CURRENT VELOCITY
DEPTH 56.0 METERS.
WEST (CM/SEC) EAST
40
20
0
-20
-40
9
JAN
73
10
15
20
25
30
1
FEB
73
5


HOURLY AVERAGES OF NORTH-SOUTH COMPONENTS OF CURRENT VELOCITY
DEPTH 56.0 METERS.
SOUTH (CM/SEC) NORTH
40
20
0
-20
-40
9
JAN
73
10
15
20
25
30
1
FEB
73
5

PROGRESSIVE VECTOR DIAGRAM OF HOURLY AVERAGES OF A604
OBSERVATION PERIOD 15.3 DAYS FROM 1542 PST 8 JAN 73.
DEPTH 56.0 METERS.




SPECTRA OF CURRENT VELOCITY
DEPTH 58.0 METERS.
PERIOD (HOURS)
1000
100
10
1
.1
+ U SPECTRUM
- V SPECTRUM
ENERGY SPECTRUM
(CM/SEC)²
FREQUENCY (CYCLES/HOUR)
.001
.01
.1
1
10

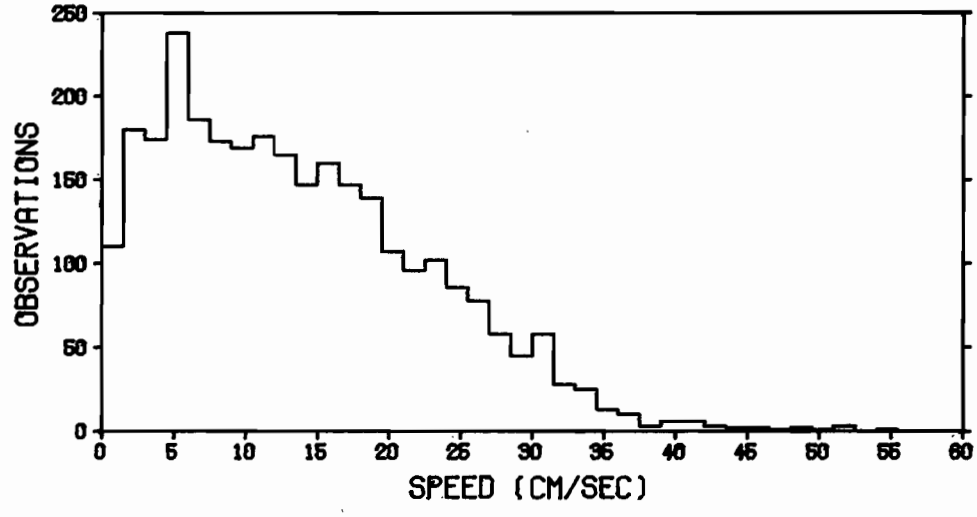
Current Meter G303

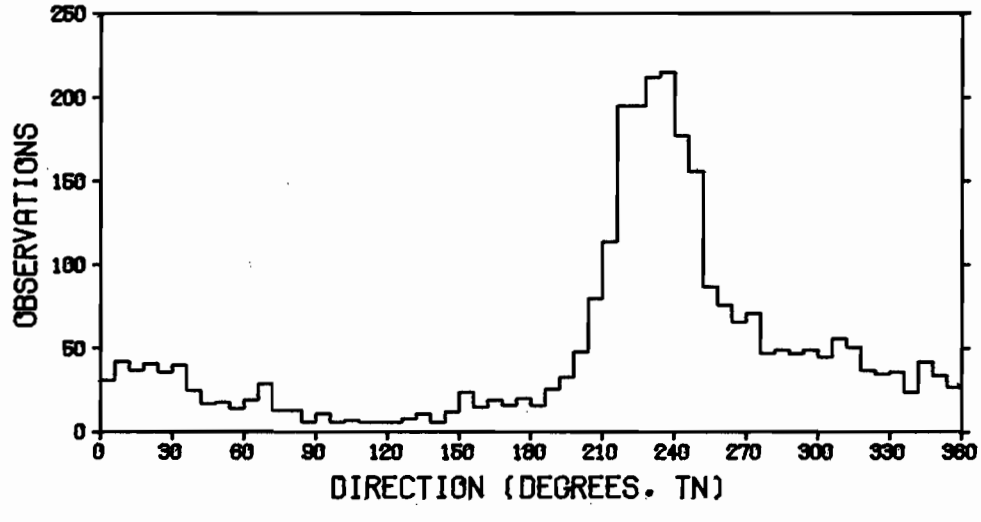
Depth 85.5 m

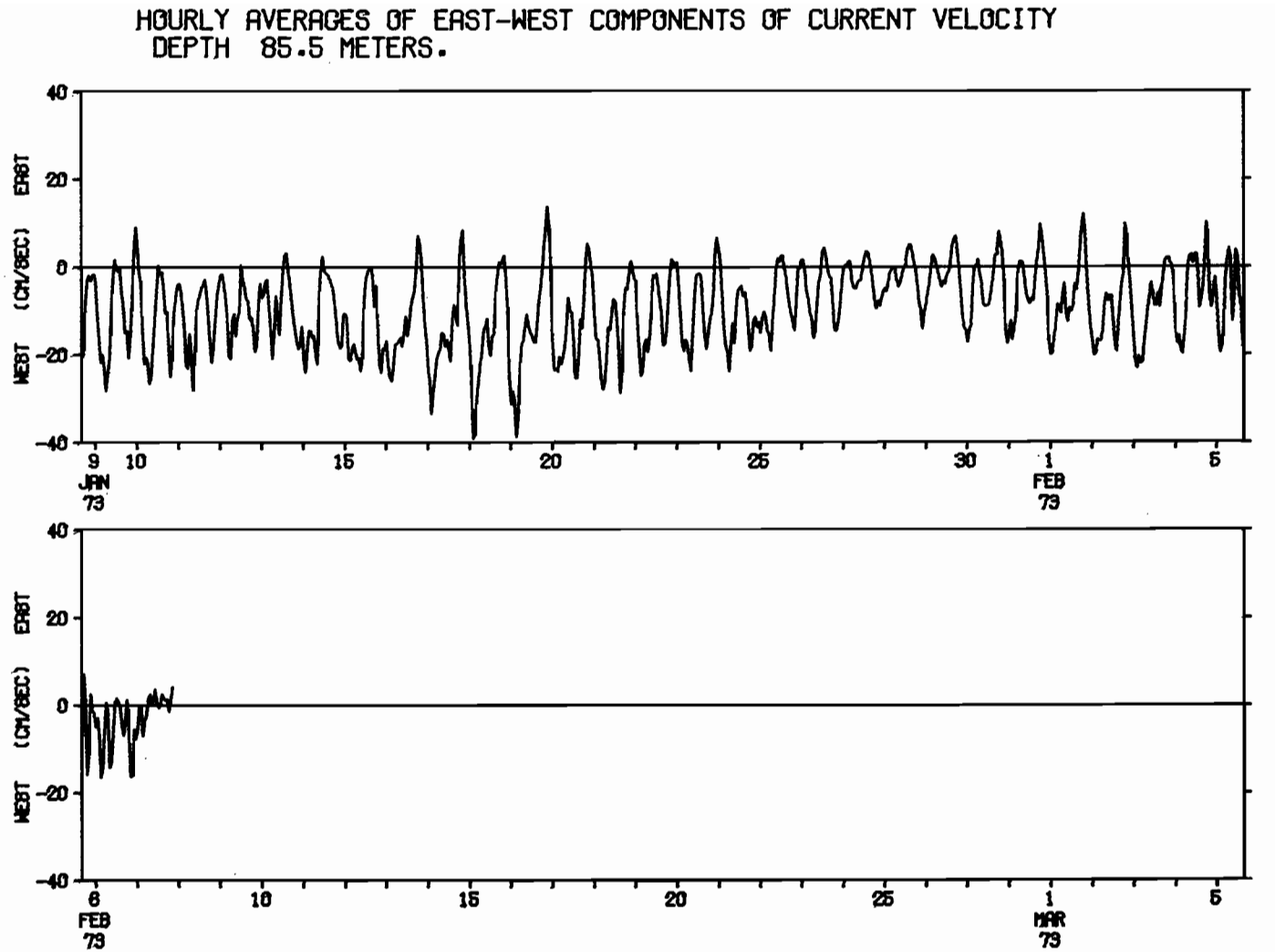
STATISTICS OF G303 *47 42.3N* LAT *122 26.9W* LONG
DEPTH 85.5 METERS NUMBER OF OBSERVATIONS = 2900
OBSERVATION PERIOD 30.2 DAYS FROM 1535 PST 8 JAN 73

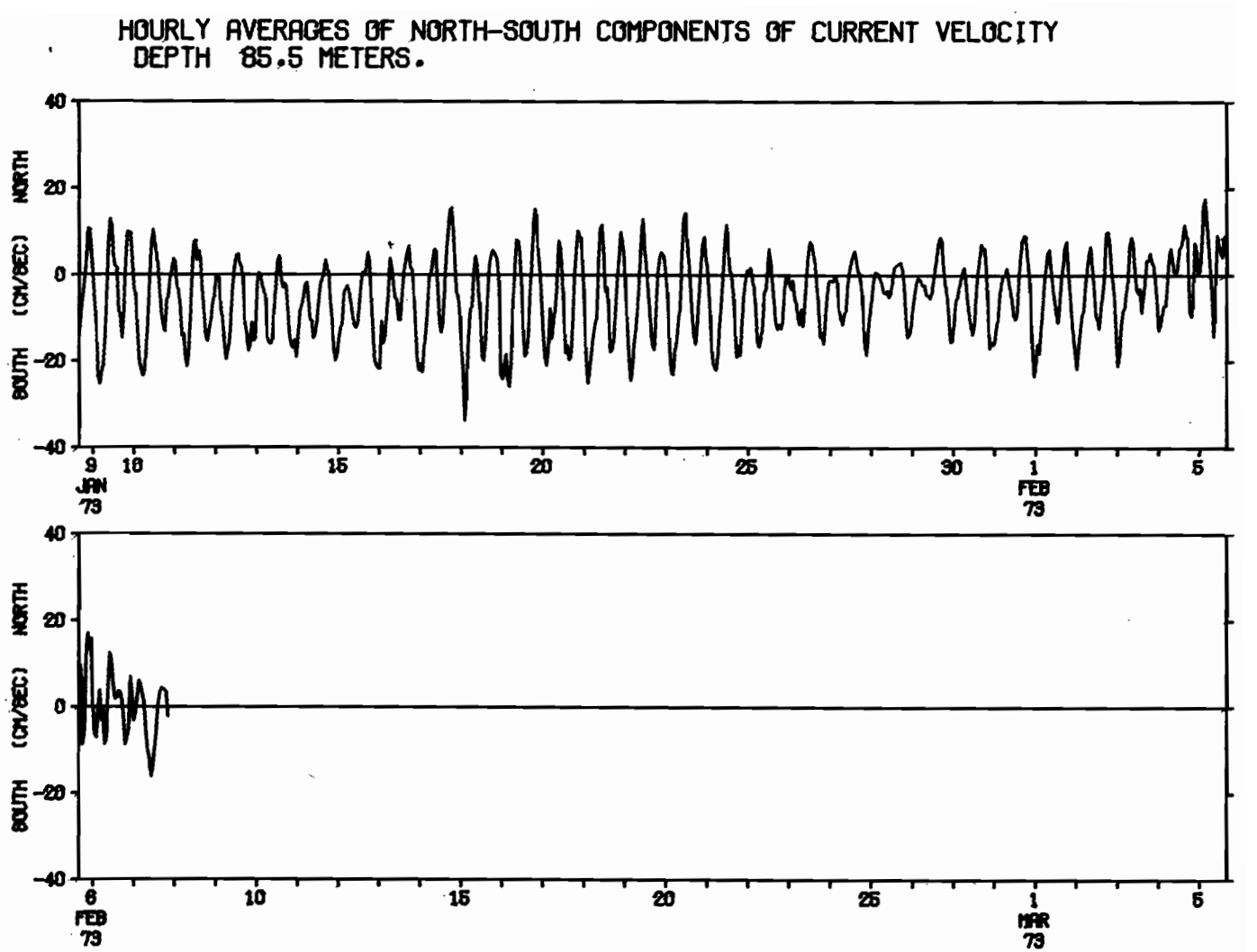
	MEAN (CM/SEC)	VARIANCE (CM/SEC)2	ST-DEV (CM/SEC)	SKEW	KURT	MAX (CM/SEC)	MIN (CM/SEC)
S	13.78	82.97	9.11	.741	3.26	55.30	.14
U	-8.83	86.17	9.28	-.315	2.65	14.92	-42.58
V	-4.49	88.68	9.42	-.196	2.52	19.83	-36.64

S = SPEED
U = EAST-WEST COMPONENT OF VELOCITY, EAST = POSITIVE U
V = NORTH-SOUTH COMPONENT OF VELOCITY, NORTH = POSITIVE V

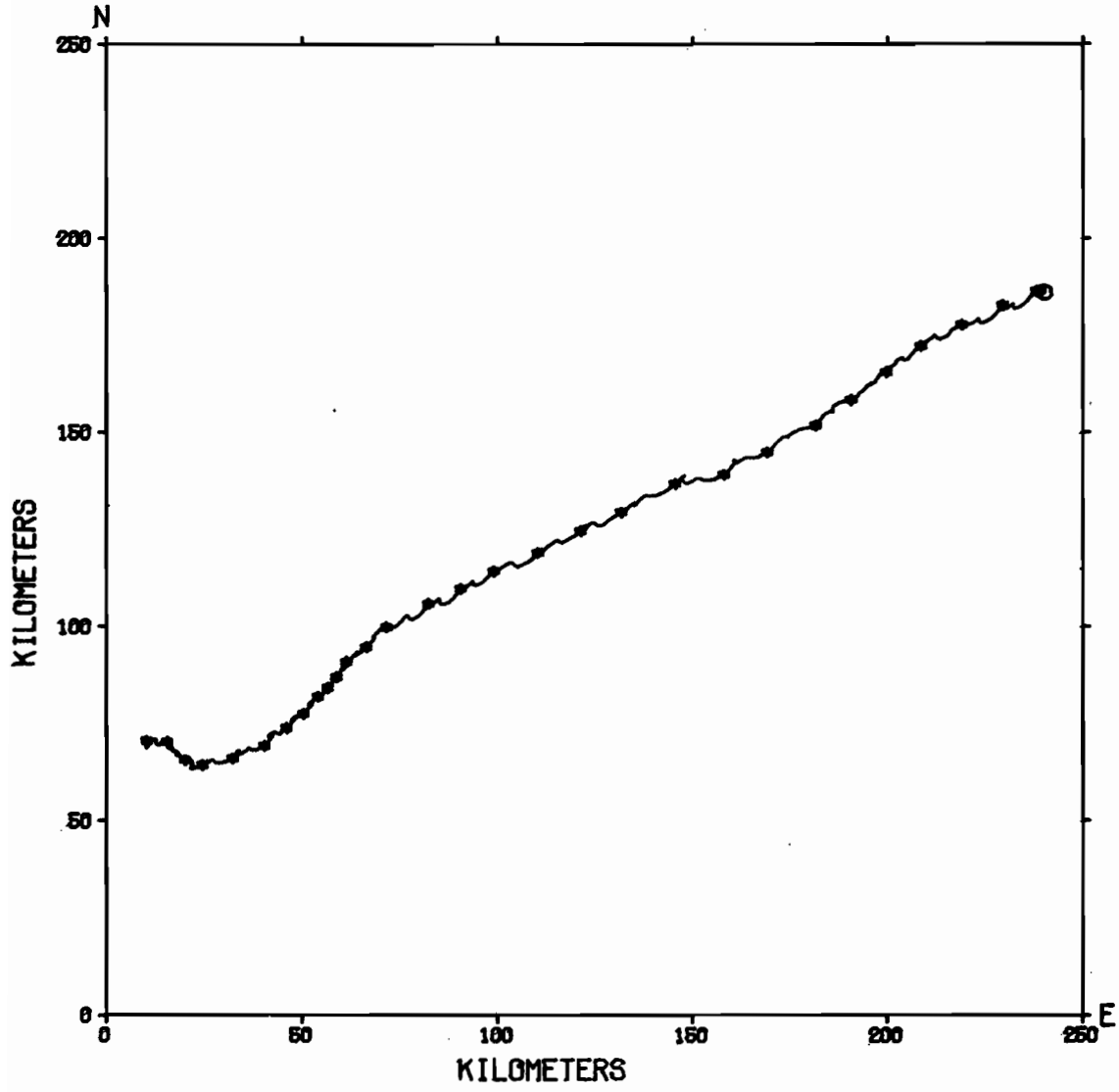


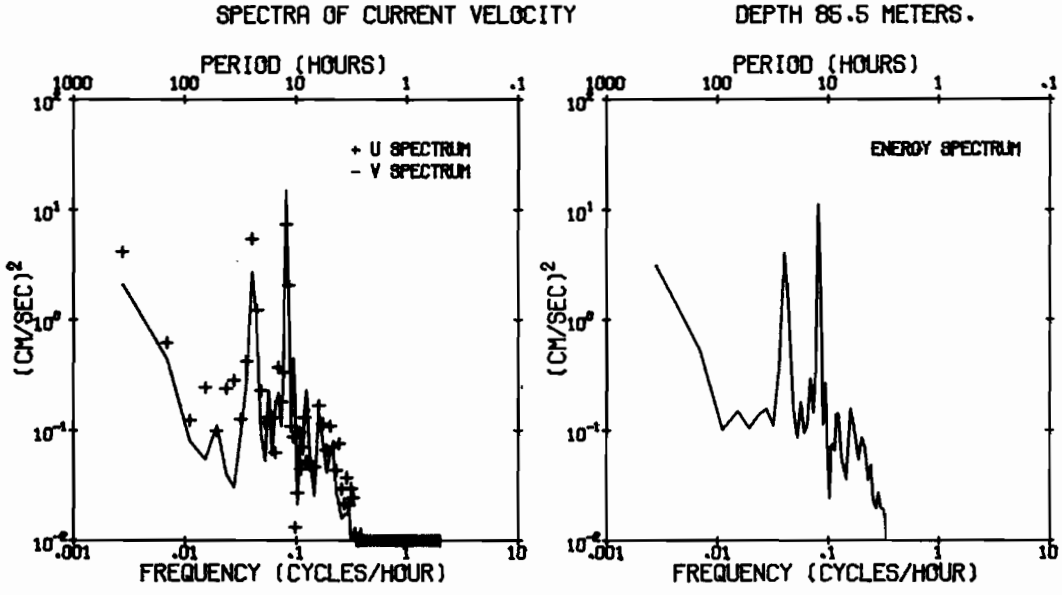



HOURLY AVERAGES OF EAST-WEST COMPONENTS OF CURRENT VELOCITY
DEPTH 85.5 METERS.
WEST (CM/SEC) EAST
40
20
0
-20
-40
9
10
15
20
25
30
1
5
JAN
73
FEB
73
WEST (CM/SEC) EAST
40
20
0
-20
-40
6
10
15
20
25
1
5
FEB
73
MAR
73


HOURLY AVERAGES OF NORTH-SOUTH COMPONENTS OF CURRENT VELOCITY
DEPTH 85.5 METERS.
NORTH
(CM/SEC)
SOUTH
40
20
0
-20
-40
9
10
15
20
25
30
1
5
JAN
73
FEB
73
6
10
15
20
25
1
5
FEB
73
MAR
73

PROGRESSIVE VECTOR DIAGRAM OF HOURLY AVERAGES OF G303
OBSERVATION PERIOD 30.2 DAYS FROM 1535 PST 8 JAN 73.
DEPTH 85.5 METERS.




SPECTRA OF CURRENT VELOCITY
DEPTH 85.5 METERS.
PERIOD (HOURS)
1000
100
10
1
.1
+ U SPECTRUM
- V SPECTRUM
ENERGY SPECTRUM
(CM/SEC)²
FREQUENCY (CYCLES/HOUR)
.001
.01
.1
1
10

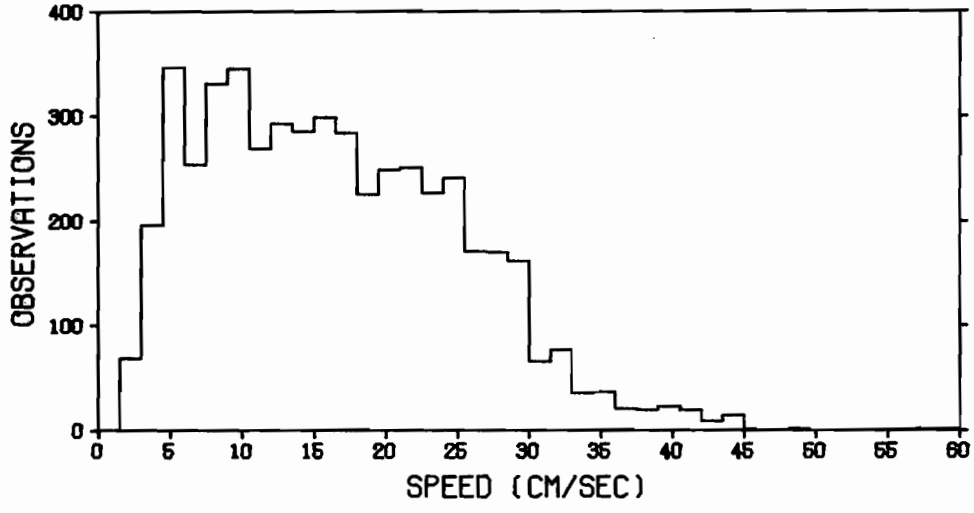
Current Meter A600

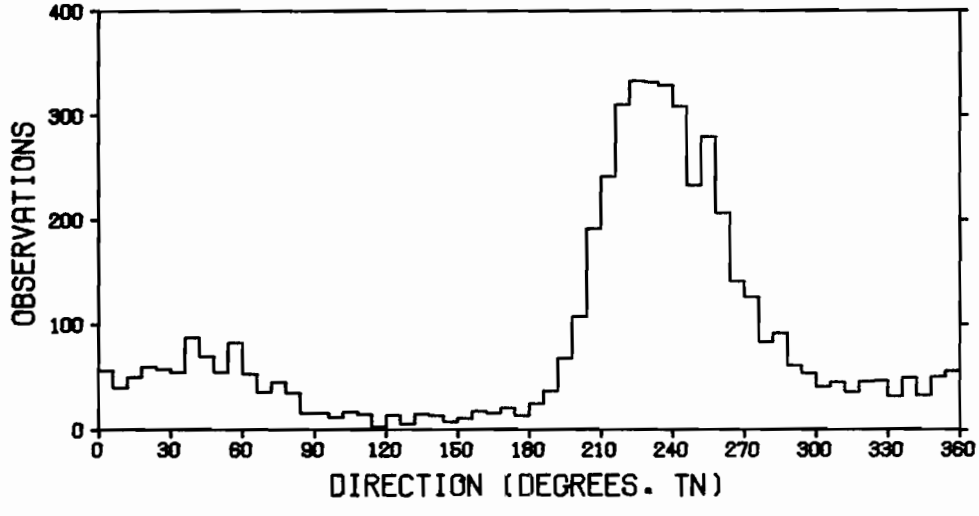
Depth 115.5 m

STATISTICS OF A600 *47 42.3 N* LAT *122 26.9 W* LONG
DEPTH 115.5 METERS NUMBER OF OBSERVATIONS = 5000
OBSERVATION PERIOD 34.7 DAYS FROM 1542 PST 8 JAN 73

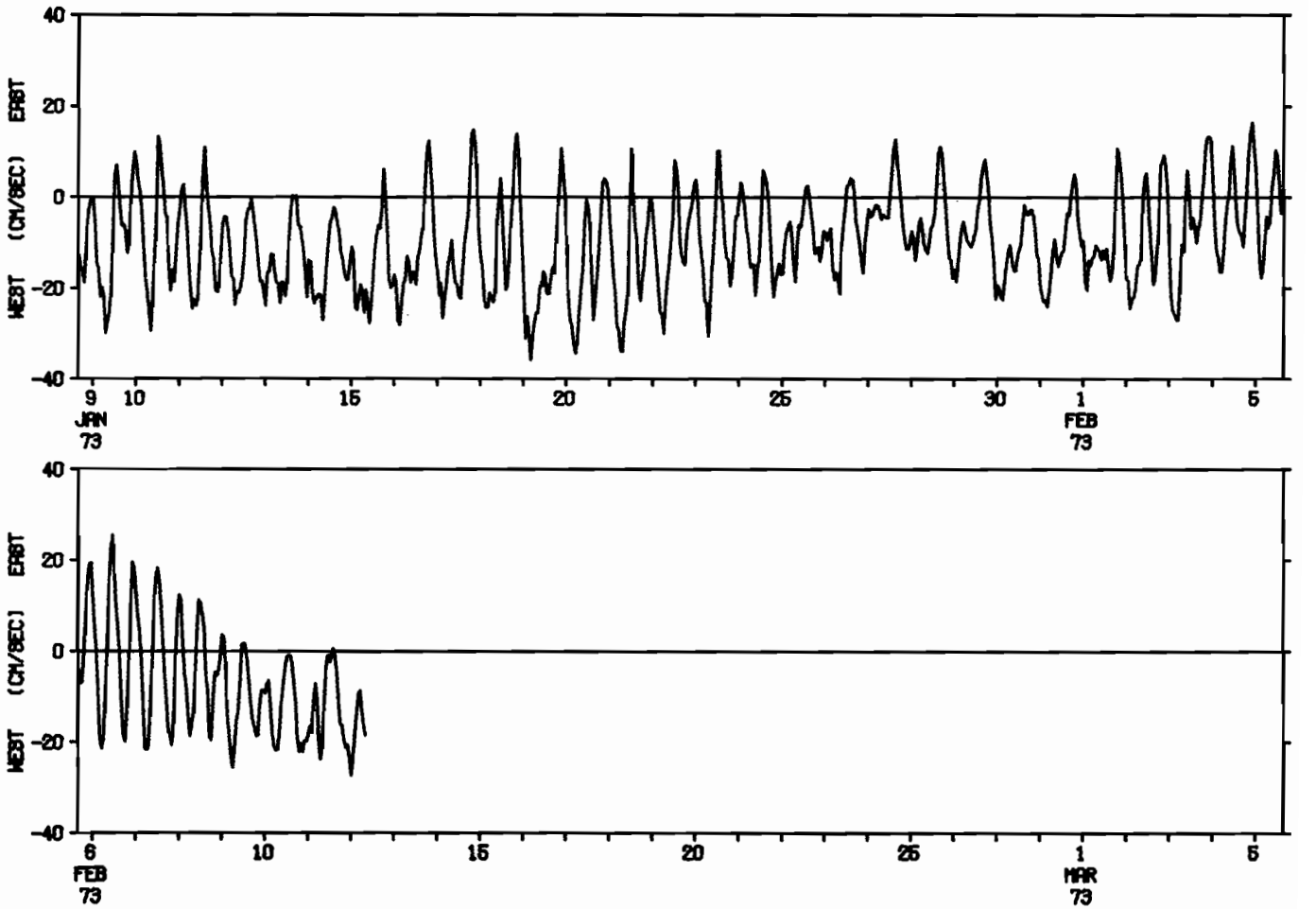
	MEAN (CM/SEC)	VARIANCE (CM/SEC)2	ST-DEV (CM/SEC)	SKEW	KURT	MAX (CM/SEC)	MIN (CM/SEC)
S	16.51	78.33	8.85	.567	2.96	59.77	1.72
U	-9.33	120.93	11.00	.303	2.78	28.50	-50.60
V	-5.03	117.73	10.85	.054	2.68	29.00	-43.80

S = SPEED
U = EAST-WEST COMPONENT OF VELOCITY, EAST = POSITIVE U
V = NORTH-SOUTH COMPONENT OF VELOCITY, NORTH = POSITIVE V

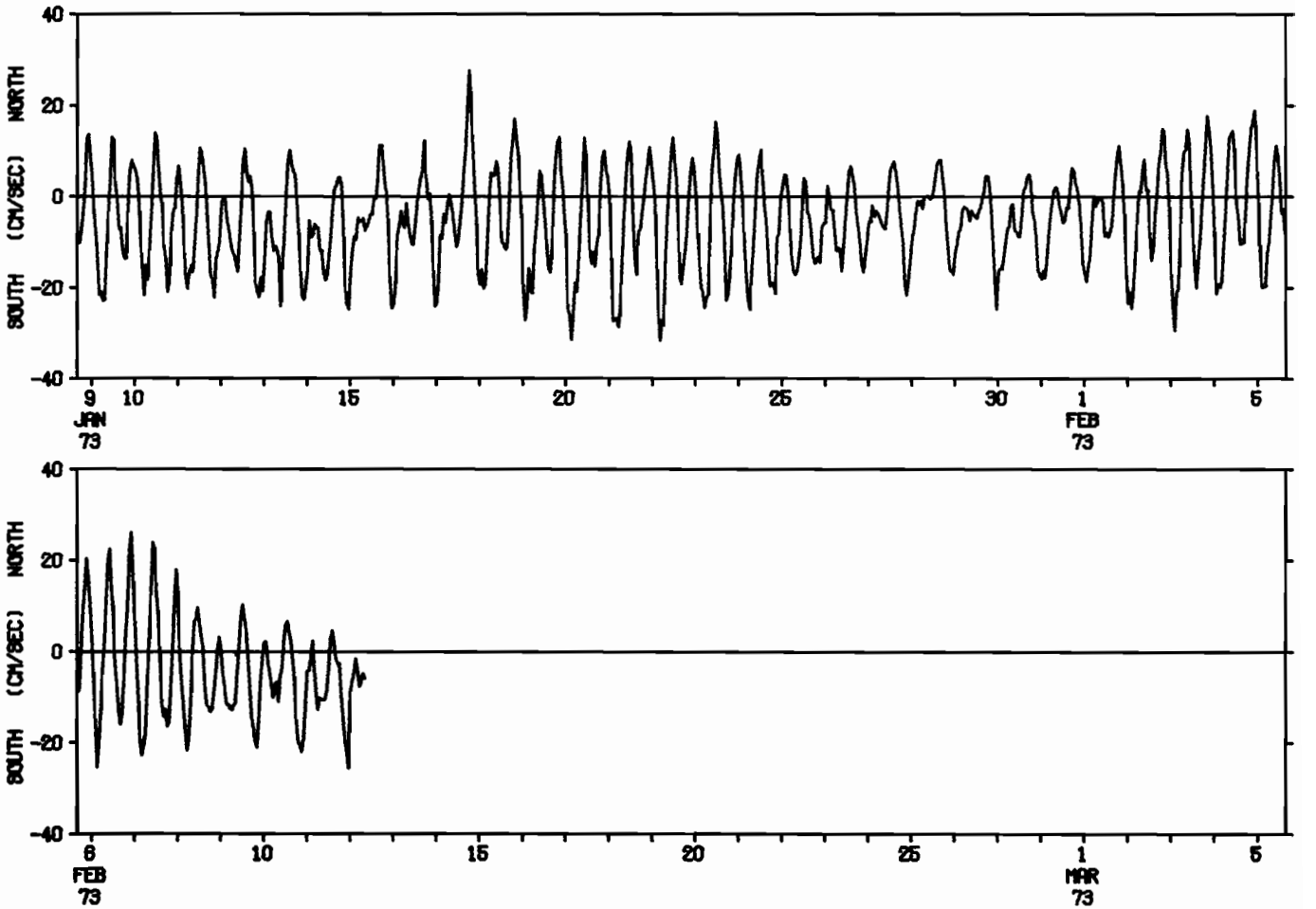




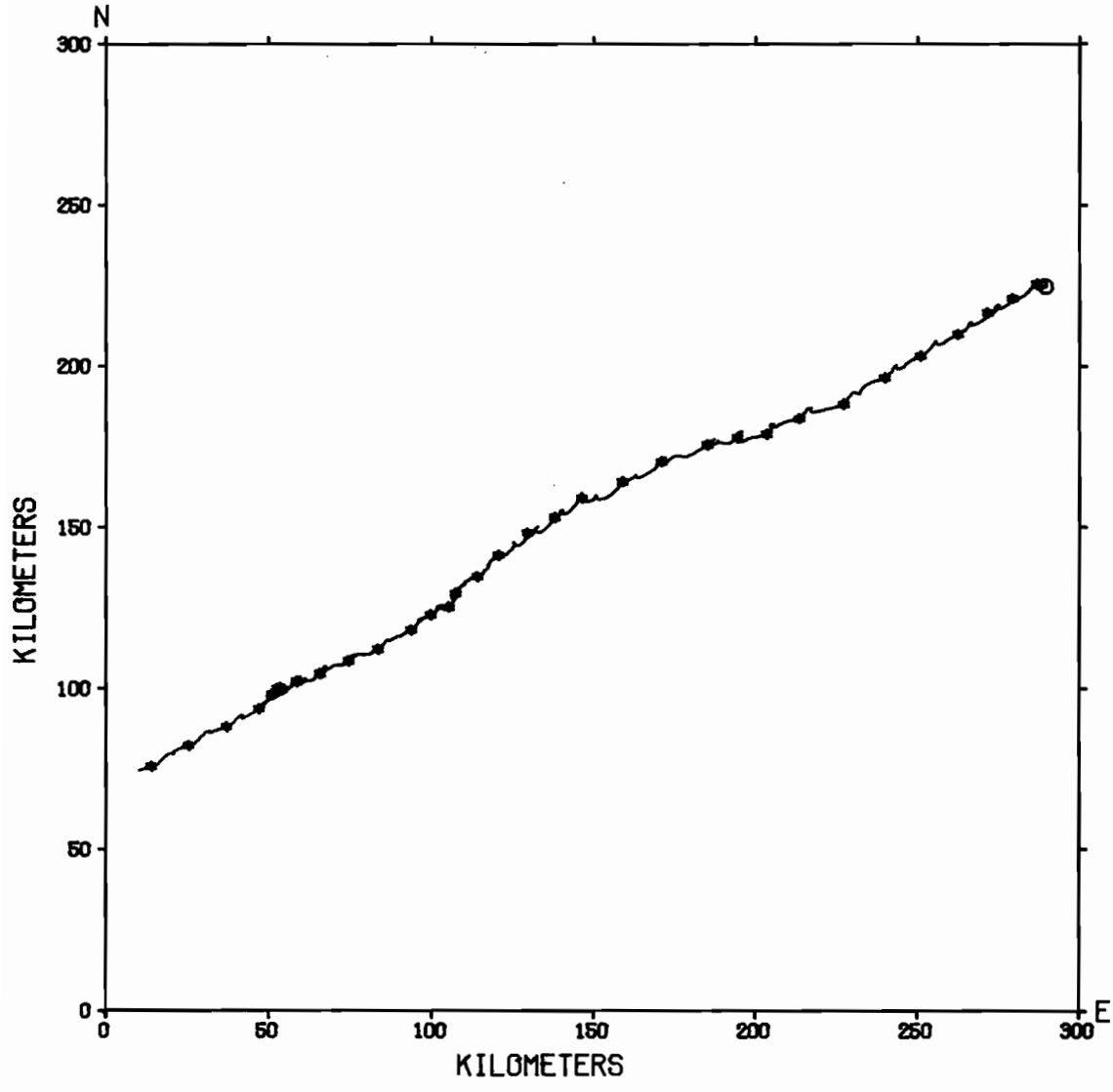
HOURLY AVERAGES OF EAST-WEST COMPONENTS OF CURRENT VELOCITY
DEPTH 115.5 METERS.

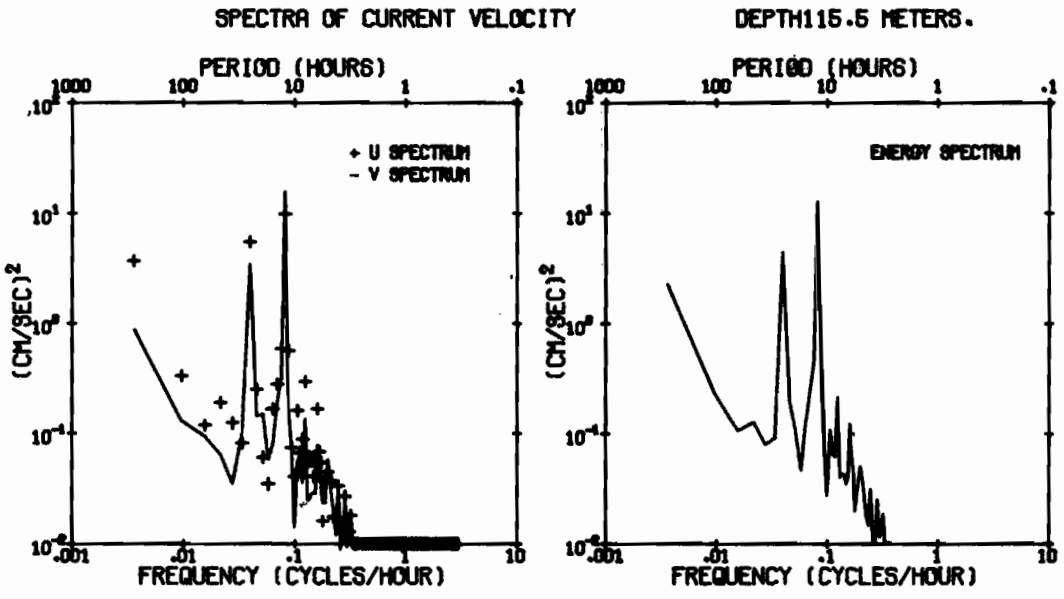


HOURLY AVERAGES OF NORTH-SOUTH COMPONENTS OF CURRENT VELOCITY
DEPTH 115.5 METERS.



PROGRESSIVE VECTOR DIAGRAM OF HOURLY AVERAGES OF A600
OBSERVATION PERIOD 34.7 DAYS FROM 1542 PST 8 JAN 73.
DEPTH 115.5 METERS.




SPECTRA OF CURRENT VELOCITY
DEPTH115.5 METERS.
PERIOD (HOURS)
1000
100
10
1
.1
+ U SPECTRUM
- V SPECTRUM
(CM/SEC)²
FREQUENCY (CYCLES/HOUR)
.001
.01
.1
1
10
PERIOD (HOURS)
ENERGY SPECTRUM
(CM/SEC)²
FREQUENCY (CYCLES/HOUR)

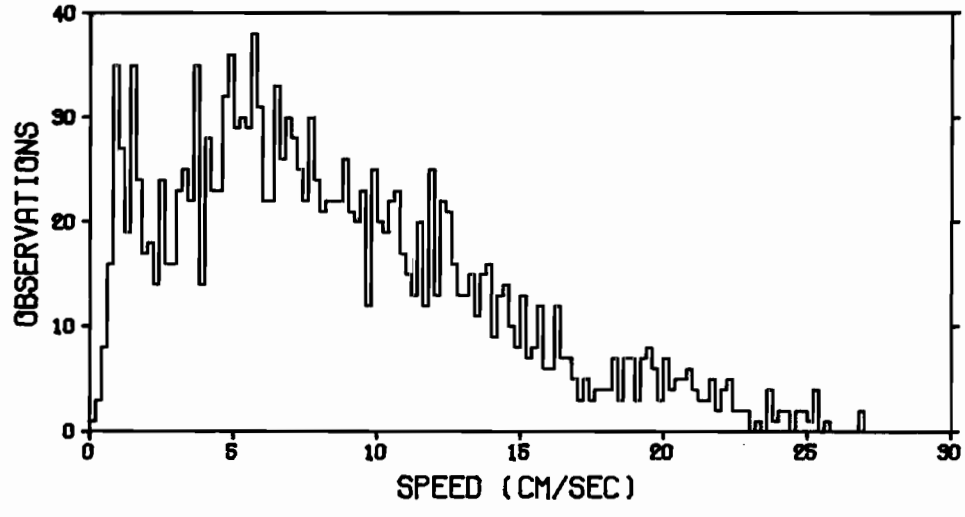
Current Meter G304

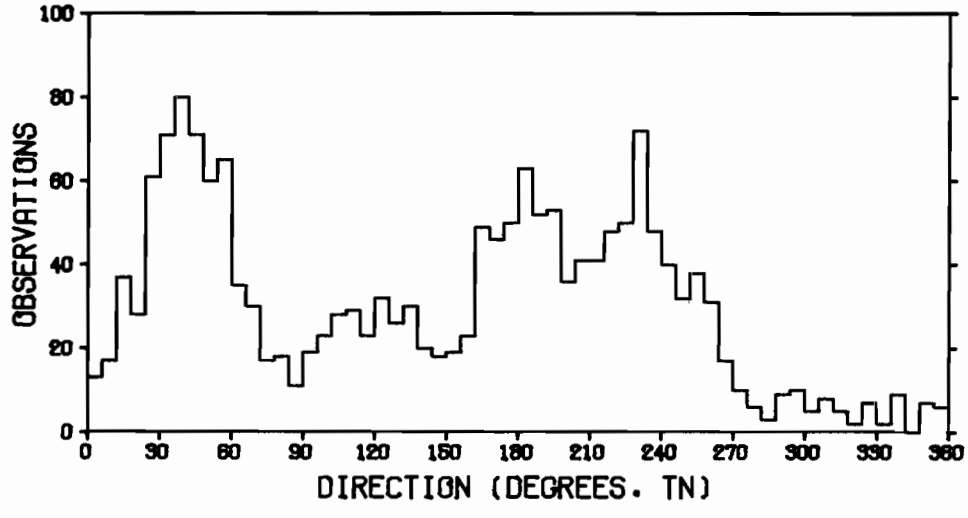
Depth 192.0 m

STATISTICS OF G304 *47 42.3N* LAT *122 26.9W* LONG
DEPTH 192.0 METERS NUMBER OF OBSERVATIONS = 1800
OBSERVATION PERIOD 18.7 DAYS FROM 1535 PST 8 JAN 73

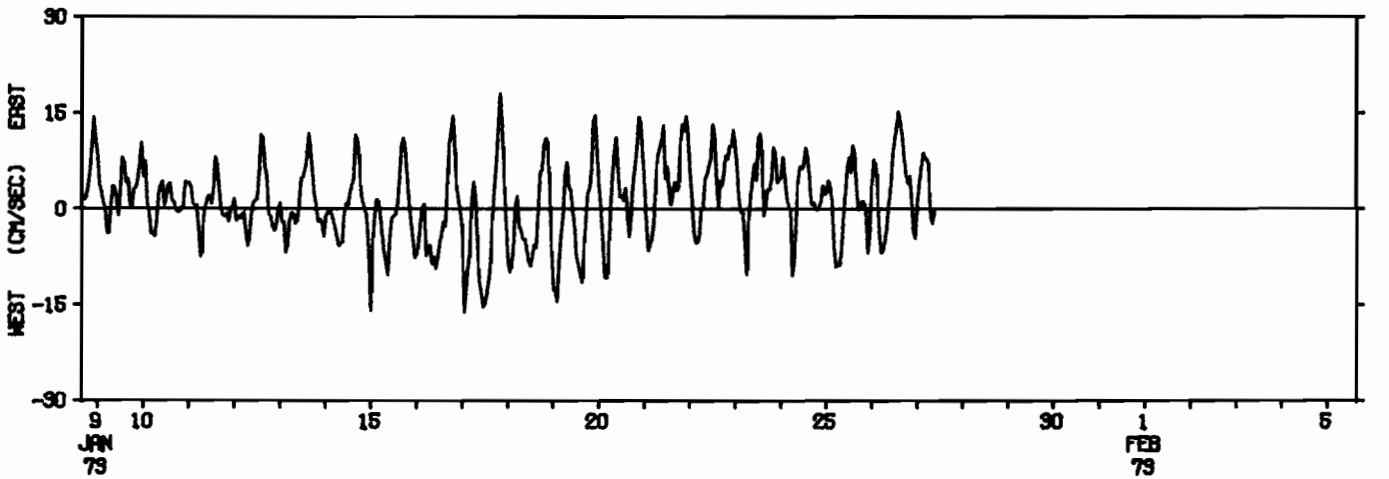
	MEAN (CM/SEC)	VARIANCE (CM/SEC)2	ST-DEV (CM/SEC)	SKEW	KURT	MAX (CM/SEC)	MIN (CM/SEC)
S	8.59	30.18	5.49	.758	3.08	26.84	.06
U	1.19	41.70	6.46	-.137	2.96	19.56	-21.94
V	-.52	60.49	7.78	.538	2.99	22.49	-18.90

S = SPEED
U = EAST-WEST COMPONENT OF VELOCITY, EAST = POSITIVE U
V = NORTH-SOUTH COMPONENT OF VELOCITY, NORTH = POSITIVE V

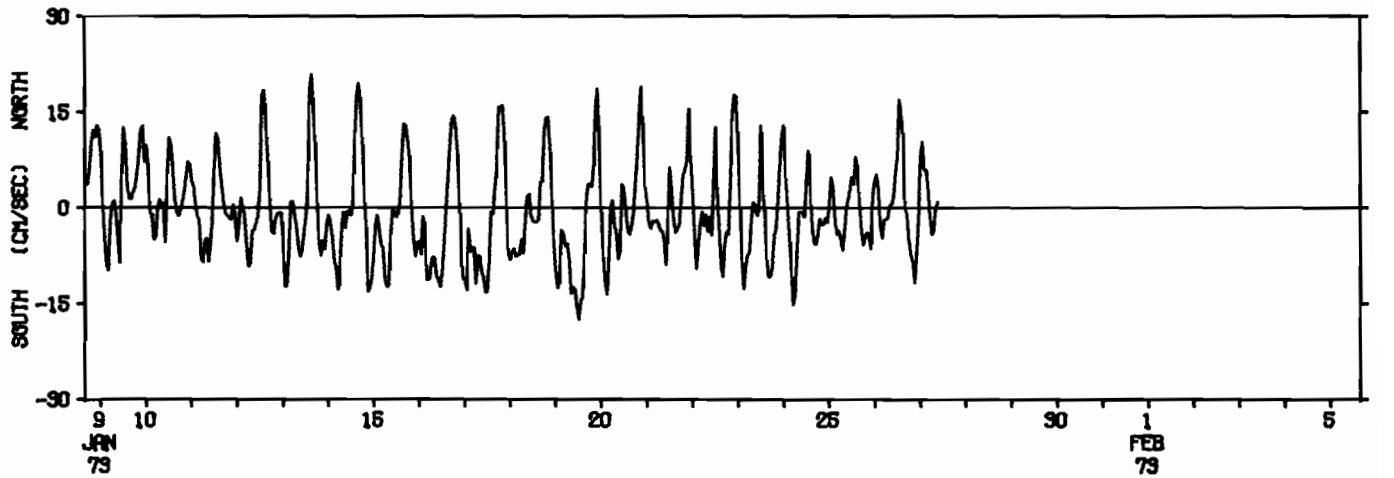




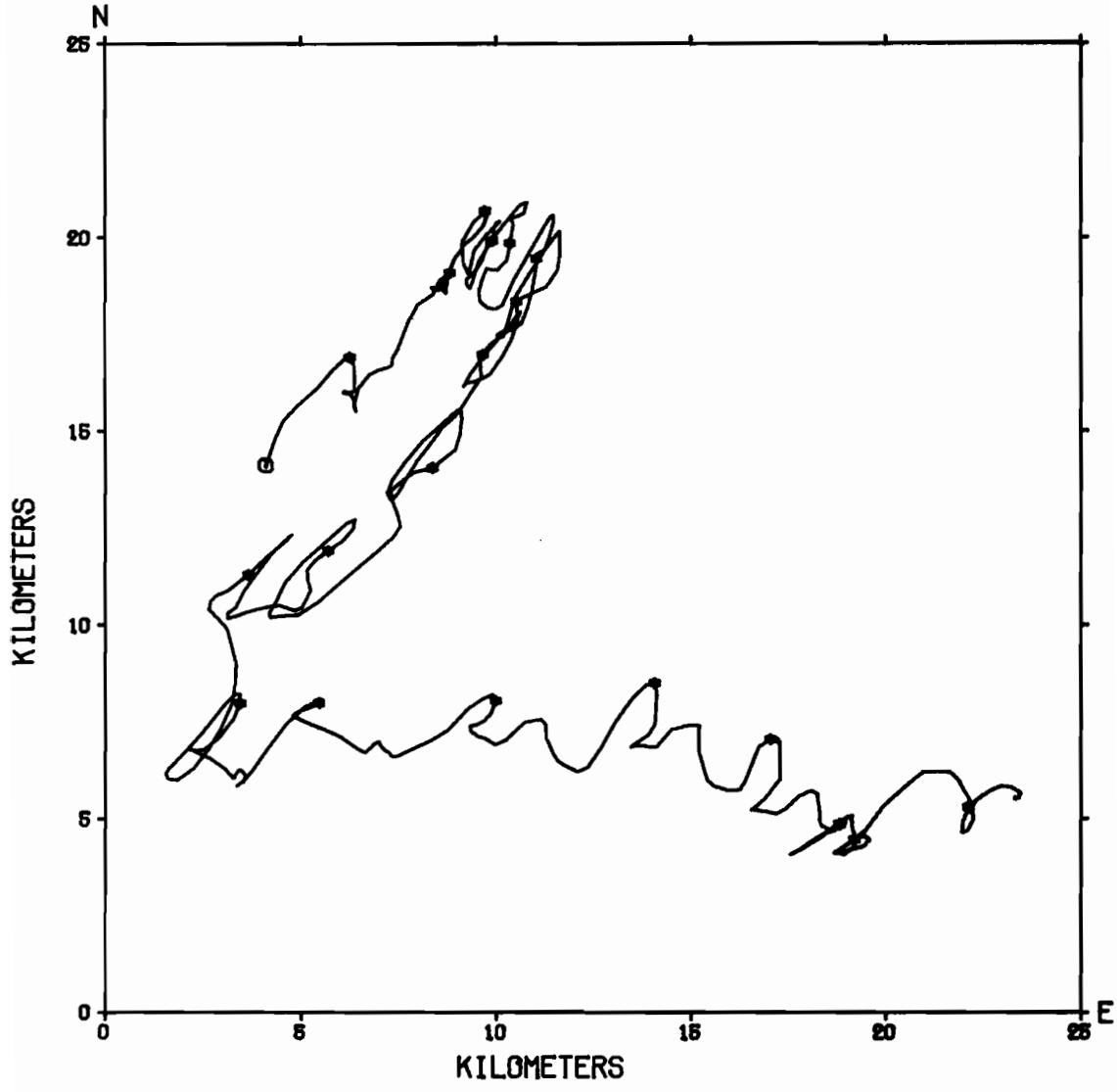
HOURLY AVERAGES OF EAST-WEST COMPONENTS OF CURRENT VELOCITY
DEPTH 192.0 METERS.

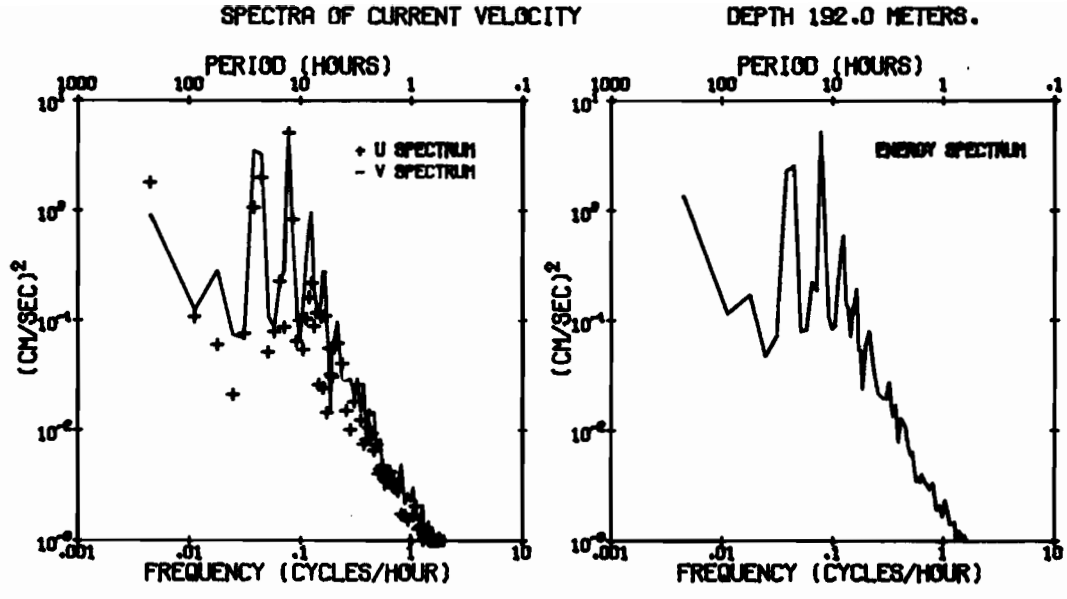


HOURLY AVERAGES OF NORTH-SOUTH COMPONENTS OF CURRENT VELOCITY
DEPTH 192.0 METERS.



PROGRESSIVE VECTOR DIAGRAM OF HOURLY AVERAGES OF G304
OBSERVATION PERIOD 18.7 DAYS FROM 1535 PST 8 JAN 73.
DEPTH 192.0 METERS.




SPECTRA OF CURRENT VELOCITY
DEPTH 192.0 METERS.
PERIOD (HOURS)
1000
100
10
1
.1
+ U SPECTRUM
- V SPECTRUM
(CM/SEC)²
FREQUENCY (CYCLES/HOUR)
.001
.01
.1
1
10
PERIOD (HOURS)
ENERGY SPECTRUM
(CM/SEC)²
FREQUENCY (CYCLES/HOUR)

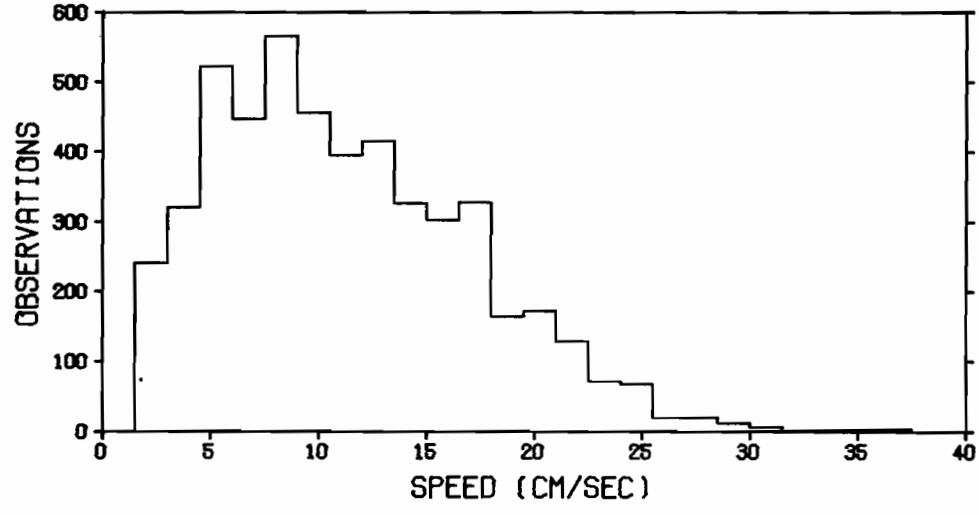
Current Meter A602

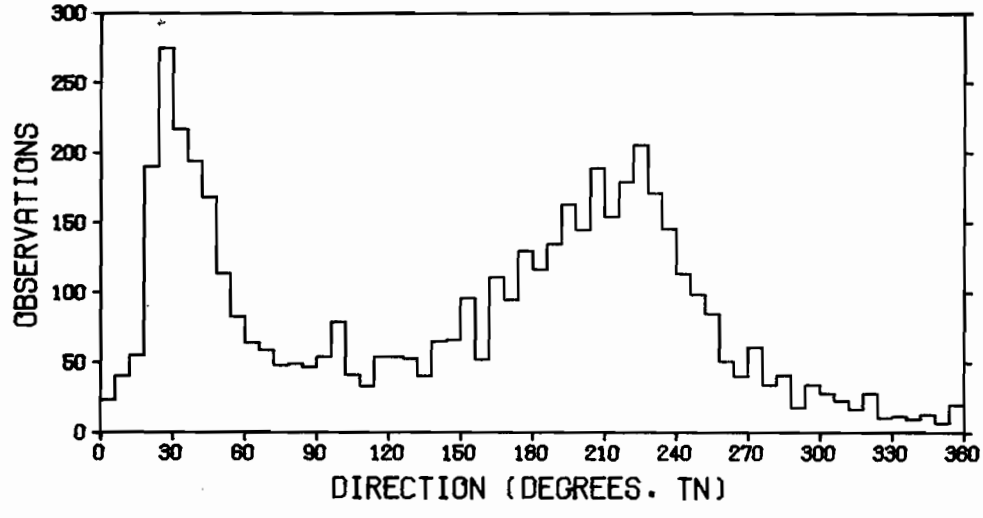
Depth 192.5 m

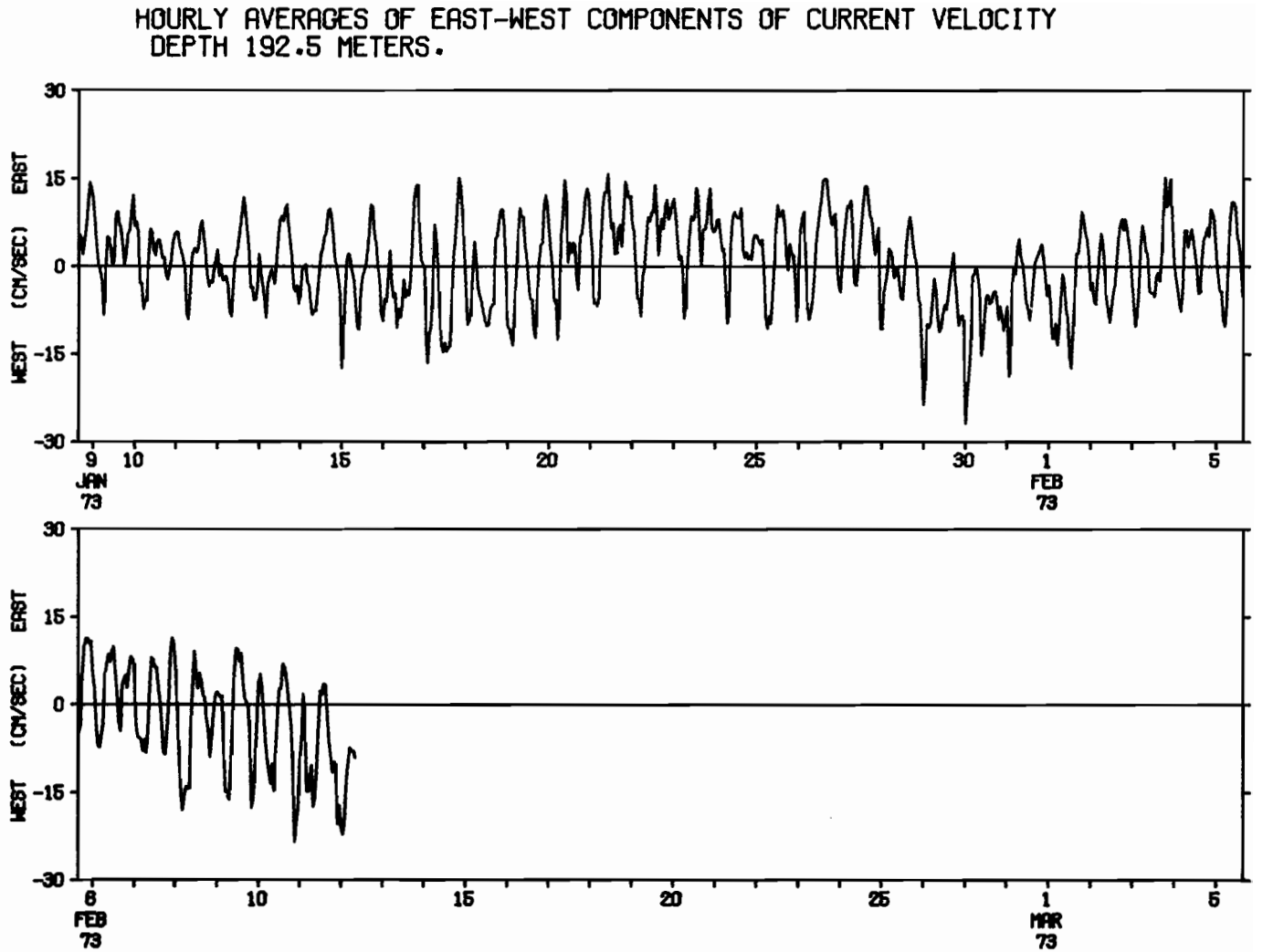
STATISTICS OF A602 *47 42.3N* LAT *122 26.9W* LONG
DEPTH 192.5 METERS NUMBER OF OBSERVATIONS = 5000
OBSERVATION PERIOD 34.7 DAYS FROM 1532 PST 8 JAN 73

	MEAN (CM/SEC)	VARIANCE (CM/SEC)2	ST-DEV (CM/SEC)	SKEW	KURT	MAX (CM/SEC)	MIN (CM/SEC)
S	11.24	35.66	5.97	.670	3.18	37.00	1.73
U	-.14	62.35	7.90	-.404	2.85	18.60	-29.10
V	-1.83	96.35	9.82	.335	2.51	25.30	-27.00

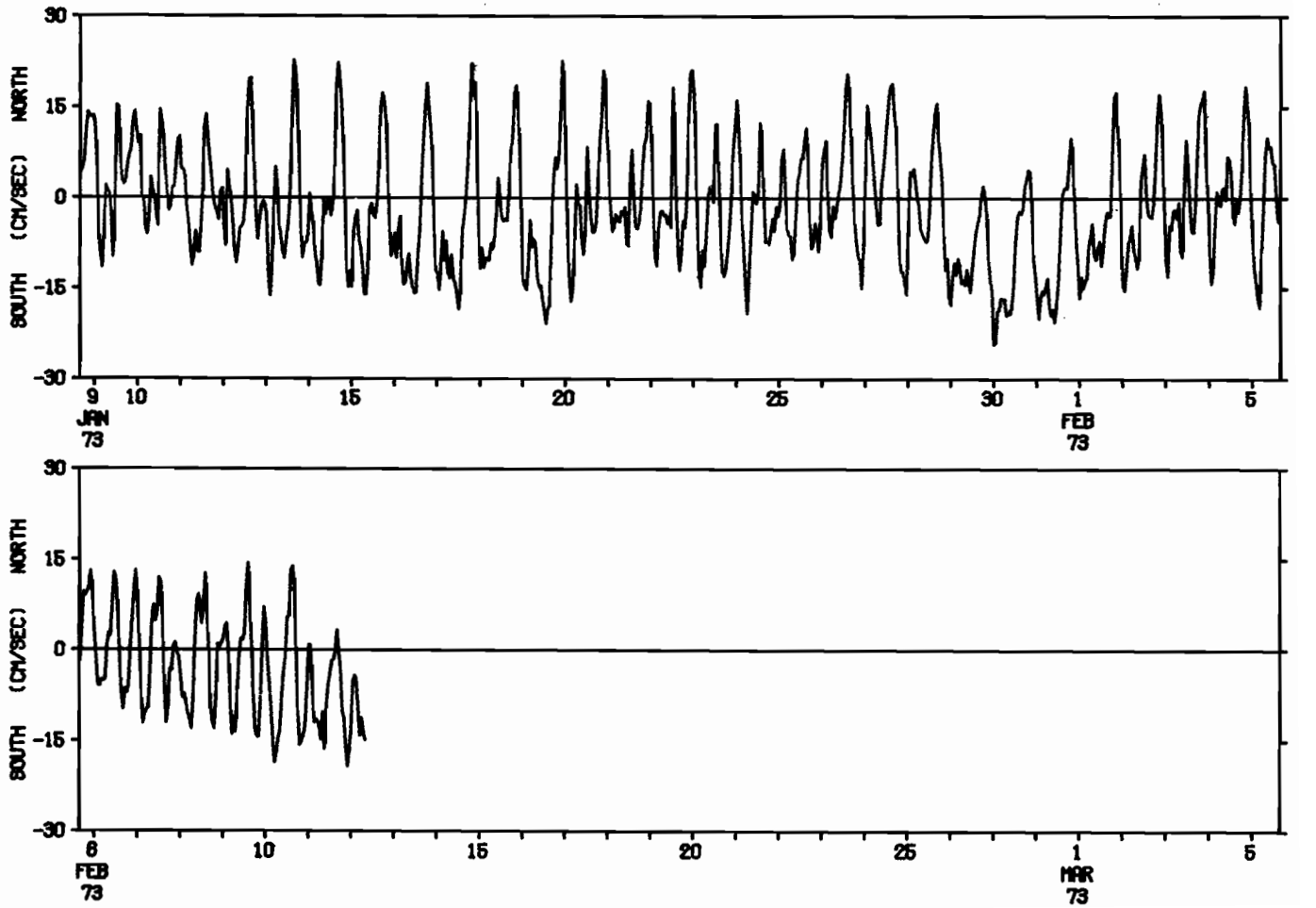
S = SPEED
U = EAST-WEST COMPONENT OF VELOCITY, EAST = POSITIVE U
V = NORTH-SOUTH COMPONENT OF VELOCITY, NORTH = POSITIVE V



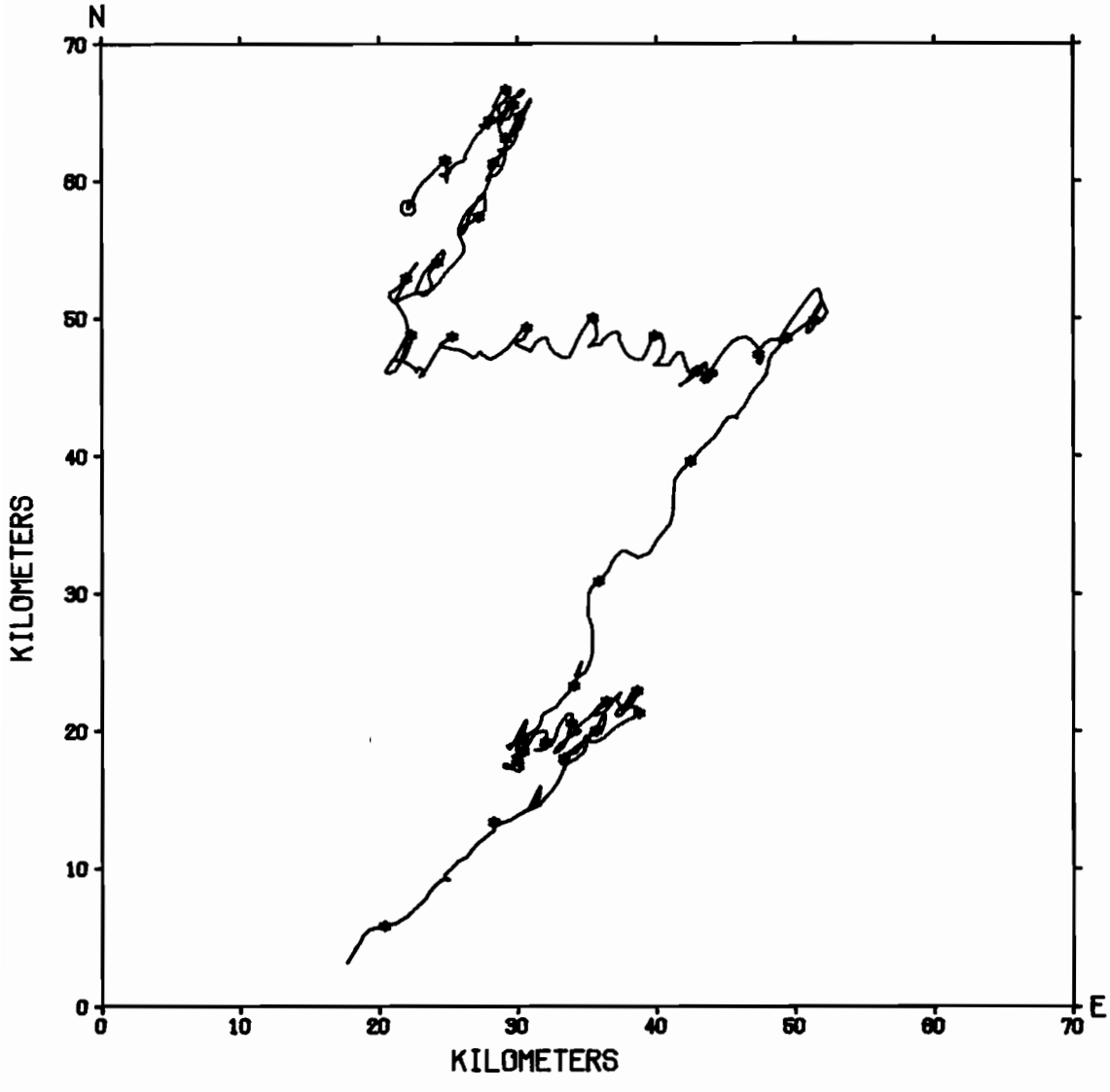


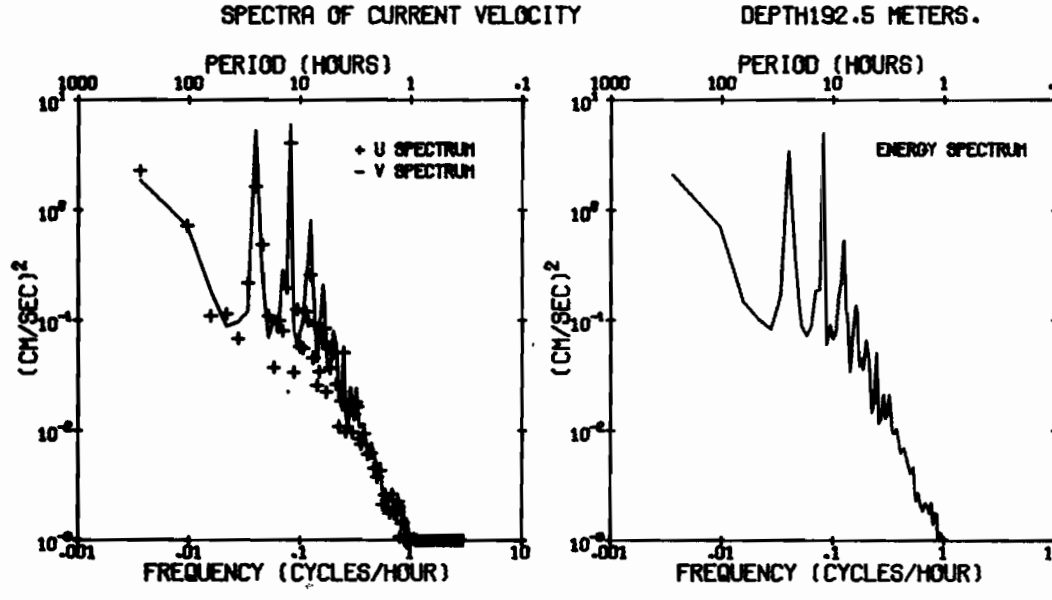

HOURLY AVERAGES OF EAST-WEST COMPONENTS OF CURRENT VELOCITY
DEPTH 192.5 METERS.
WEST (CM/SEC) EAST
30
15
0
-15
-30
9
10
15
20
25
30
1
5
JAN
73
FEB
73
WEST (CM/SEC) EAST
30
15
0
-15
-30
8
10
15
20
25
1
5
FEB
73
MAR
73

HOURLY AVERAGES OF NORTH-SOUTH COMPONENTS OF CURRENT VELOCITY
DEPTH 192.5 METERS.



PROGRESSIVE VECTOR DIAGRAM OF HOURLY AVERAGES OF A602
OBSERVATION PERIOD 34.7 DAYS FROM 1532 PST 8 JAN 73.
DEPTH 192.5 METERS.




SPECTRA OF CURRENT VELOCITY
DEPTH192.5 METERS.
PERIOD (HOURS)
1000
100
10
1
.1
+ U SPECTRUM
- V SPECTRUM
(CM/SEC)²
FREQUENCY (CYCLES/HOUR)
.001
.01
.1
1
10
PERIOD (HOURS)
ENERGY SPECTRUM
(CM/SEC)²
FREQUENCY (CYCLES/HOUR)

9. APPENDIX B: TEMPERATURE, SALINITY AND PRESSURE FROM CURRENT METERS

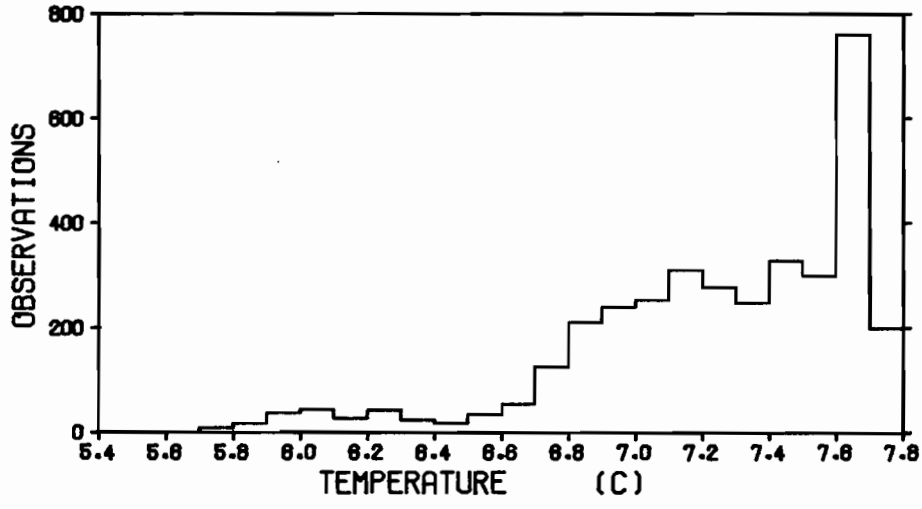
Meter V154

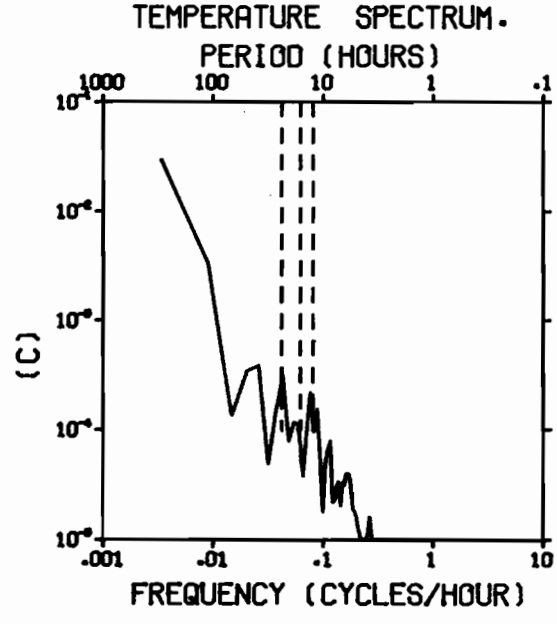
Depth 2.0 m

Temperature

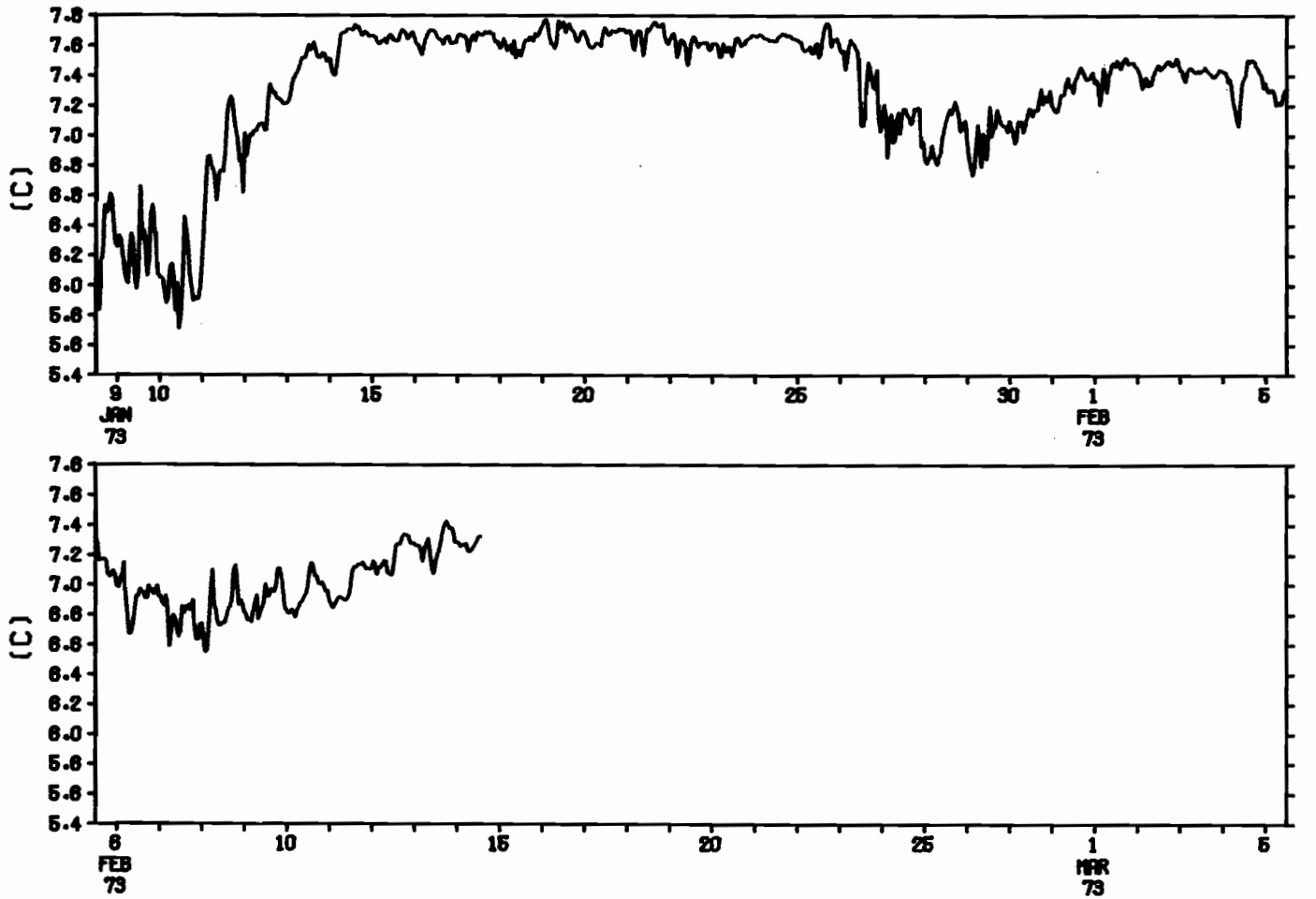
TEMPERATURE STATISTICS LAT. 47 42.4N LONG. 122 26.7W
DEPTH 2.0 METERS NUMBER OF OBSERVATIONS = 3560
OBSERVATION PERIOD 37.1 DAYS FROM 1144 PST 8 JAN 73

MEAN (C)	VARIANCE (C)	ST-DEV (C)	SKEW	KURT	MAX (C)	MIN (C)
7.24	.18	.43	-1.16	4.23	7.80	5.40





HOURLY AVERAGES OF TEMPERATURE DEPTH 2.0 METERS.



Meter A603

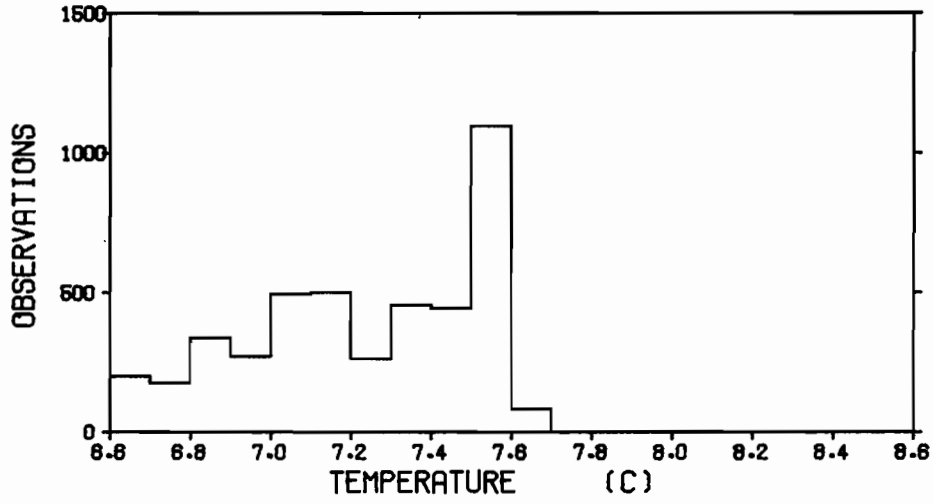
Depth 2.5 m

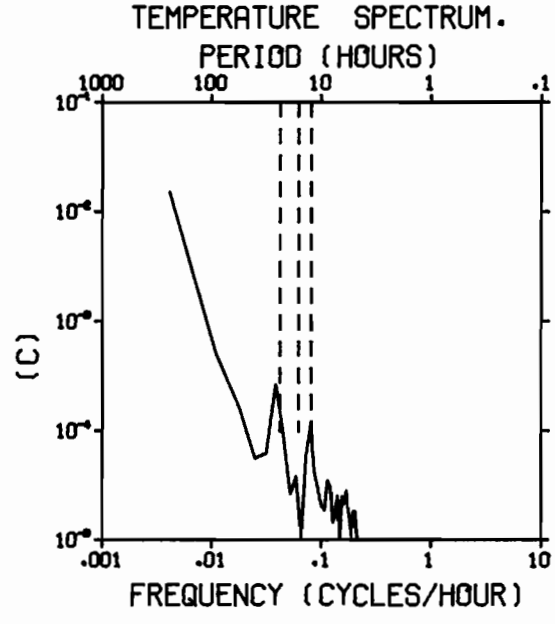
Temperature

Salinity

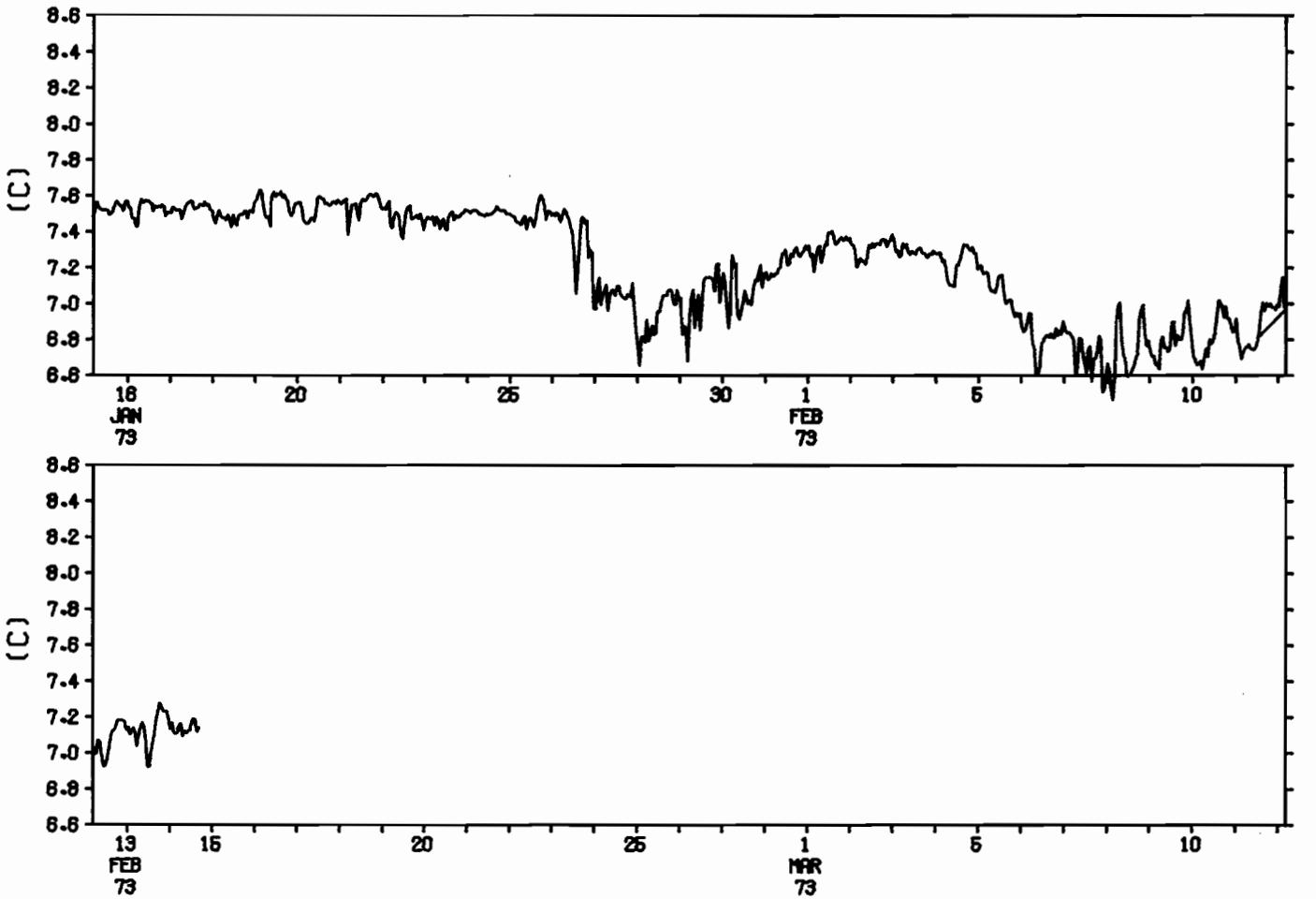
TEMPERATURE STATISTICS LAT. 47 42.4N LONG. 122 26.7W
DEPTH 2.5 METERS NUMBER OF OBSERVATIONS = 4400
OBSERVATION PERIOD 30.5 DAYS FROM 0422 PST 15 JAN 73

MEAN (C)	VARIANCE (C)	ST-DEV (C)	SKEW	KURT	MAX (C)	MIN (C)
7.21	.09	.29	-.46	2.11	7.66	6.27



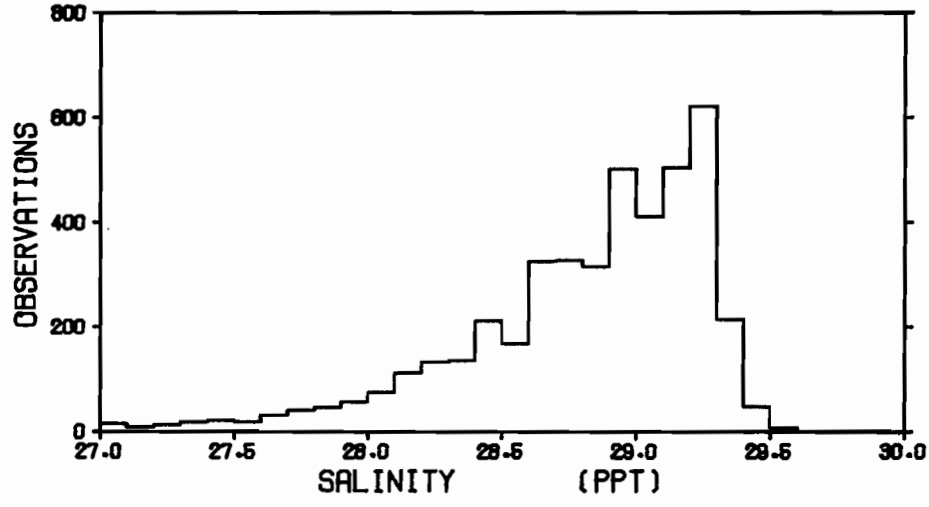


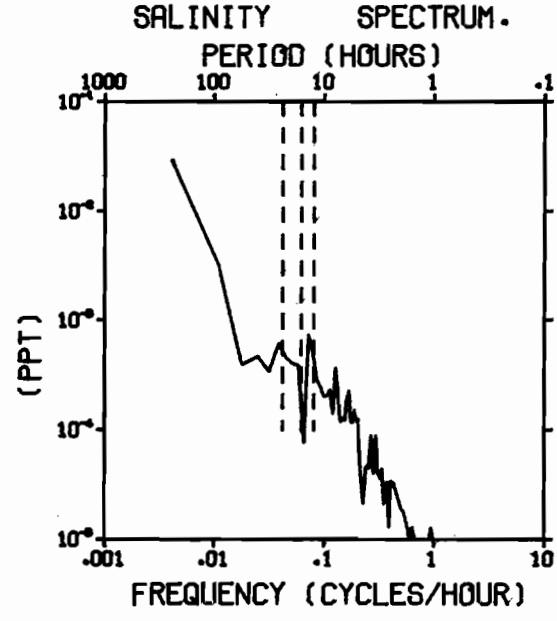
HOURLY AVERAGES OF TEMPERATURE DEPTH 2.5 METERS.



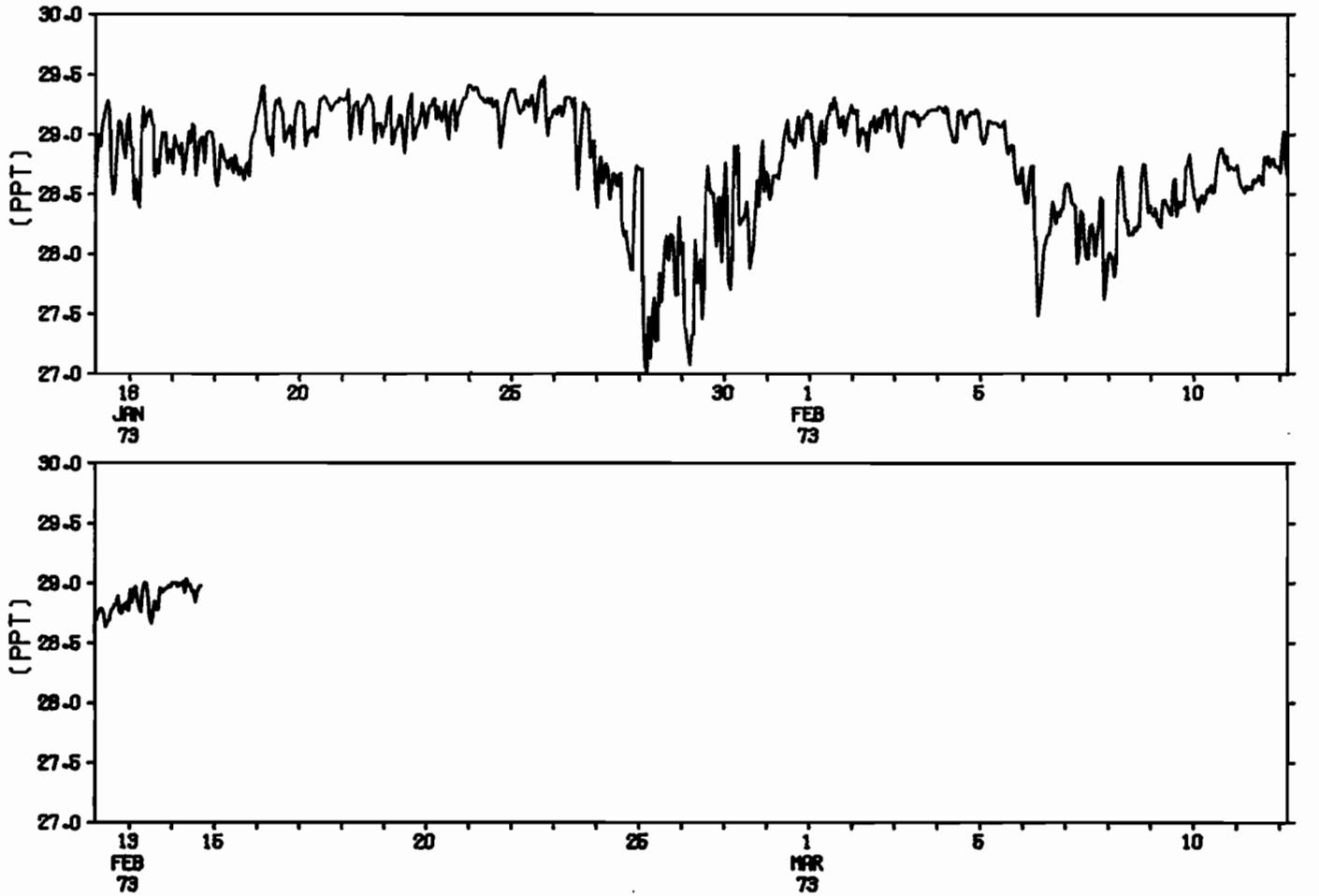
SALINITY STATISTICS LAT. 47 42.4N LONG. 122 26.7W
DEPTH 2.5 METERS NUMBER OF OBSERVATIONS = 4400
OBSERVATION PERIOD 30.5 DAYS FROM 0422 PST 15 JAN 73

MEAN (PPT)	VARIANCE (PPT)	ST-DEV (PPT)	SKEW	KURT	MAX (PPT)	MIN (PPT)
28.80	.22	.47	-1.29	4.79	29.59	26.88





HOURLY AVERAGES OF SALINITY DEPTH 2.5 METERS.



Meter A598

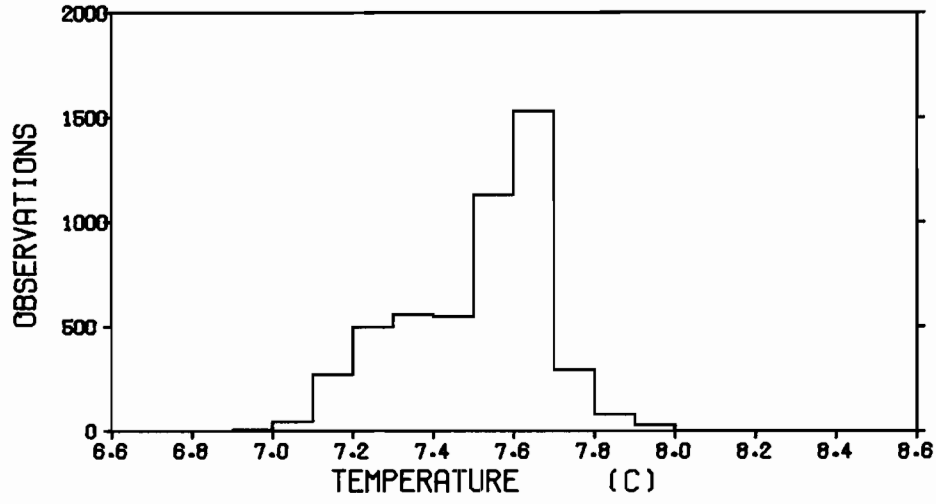
Depth 17.0 m

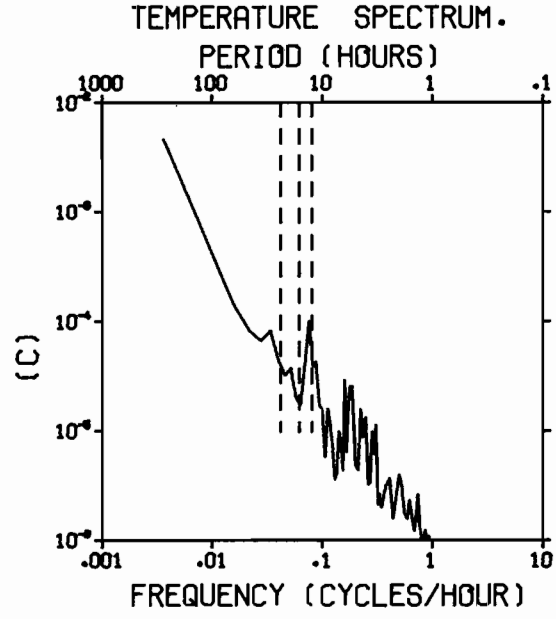
Temperature

Salinity

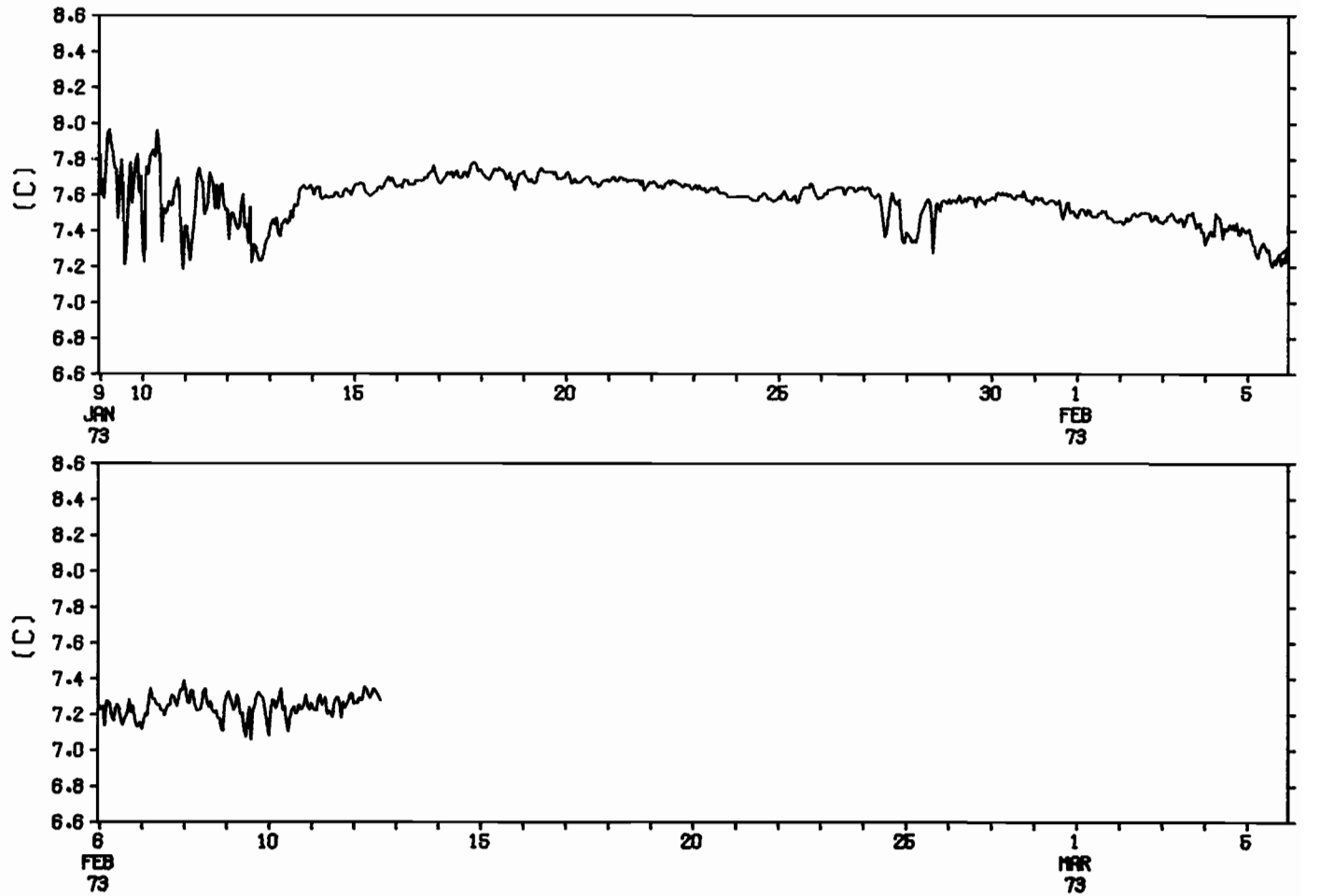
TEMPERATURE STATISTICS LAT. 47 42.3N LONG. 122 26.9W
DEPTH 17.0 METERS NUMBER OF OBSERVATIONS = 5000
OBSERVATION PERIOD 34.7 DAYS FROM 2242 PST 8 JAN 73

MEAN (C)	VARIANCE (C)	ST-DEV (C)	SKEW	KURT	MAX (C)	MIN (C)
7.51	.03	.18	-.44	2.67	8.52	6.91



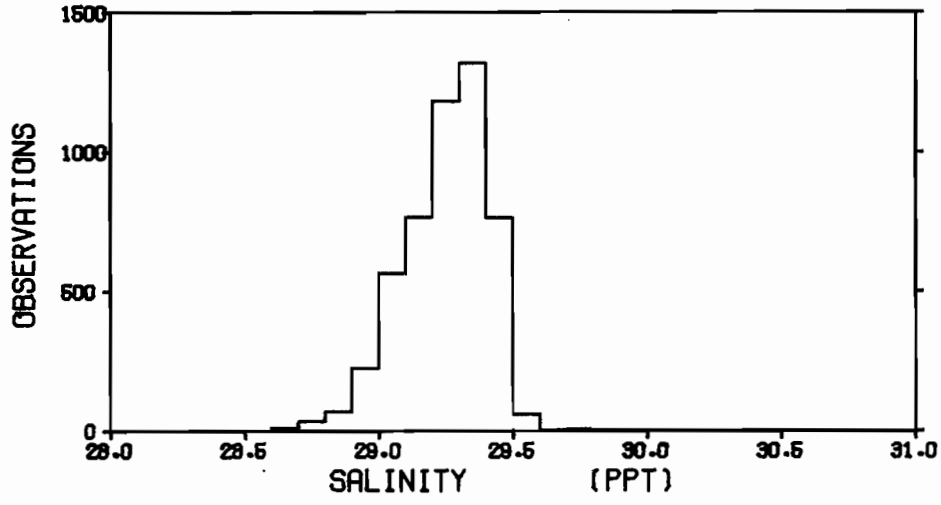


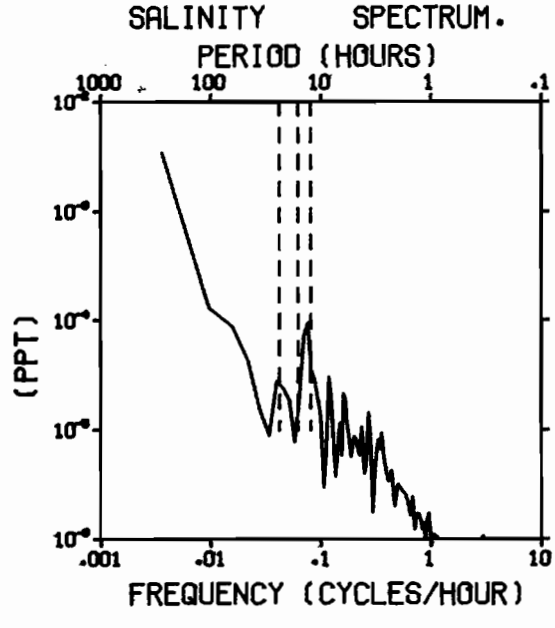
HOURLY AVERAGES OF TEMPERATURE DEPTH 17.0 METERS.



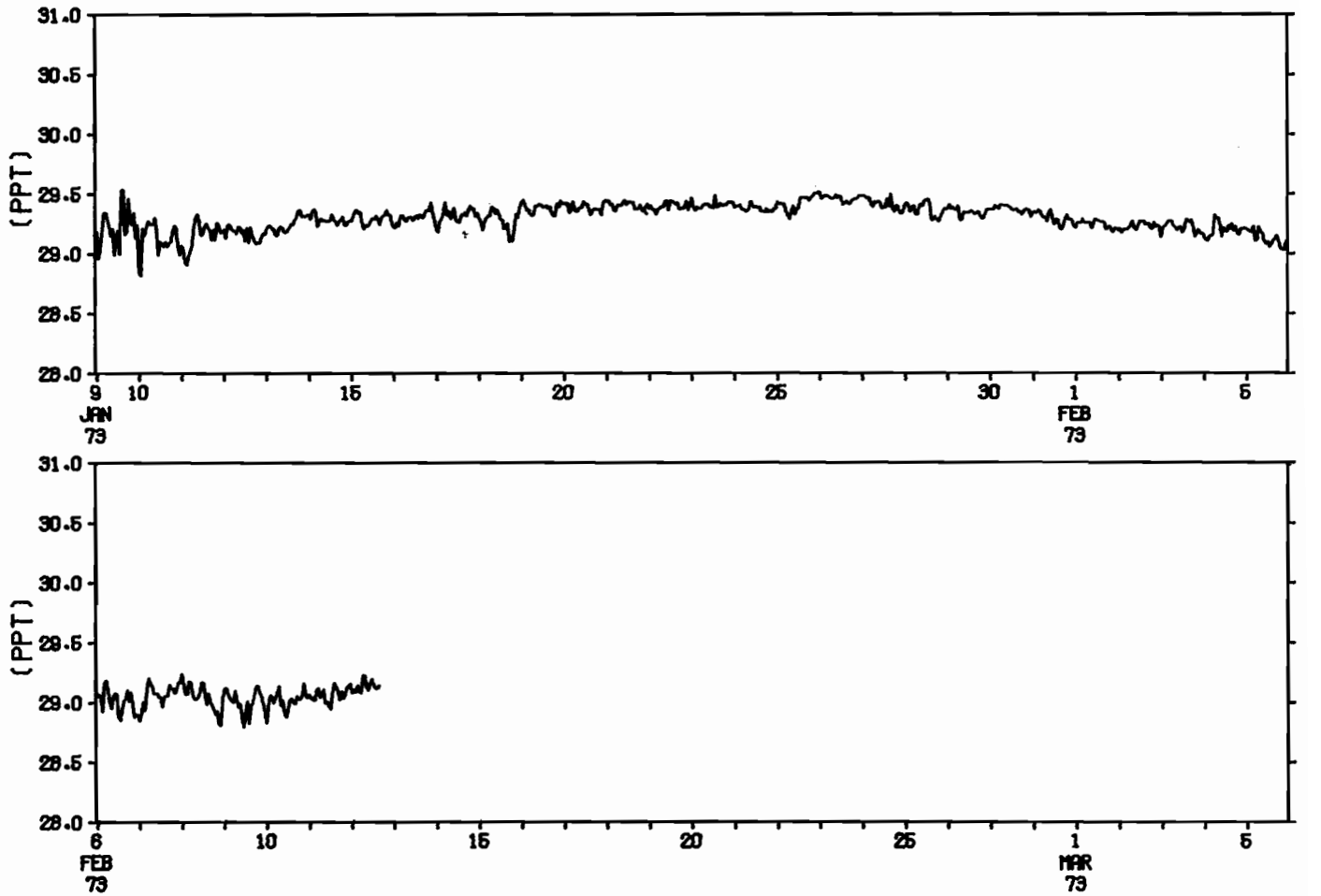
SALINITY STATISTICS LAT. 47 42.3N LONG. 122 26.9W
DEPTH 17.0 METERS NUMBER OF OBSERVATIONS = 5000
OBSERVATION PERIOD 34.7 DAYS FROM 2242 PST 8 JAN 73

MEAN (PPT)	VARIANCE (PPT)	ST-DEV (PPT)	SKEW	KURT	MAX (PPT)	MIN (PPT)
29.25	.02	.16	-.66	3.38	29.89	28.54





HOURLY AVERAGES OF SALINITY DEPTH 17.0 METERS.



Meter A601

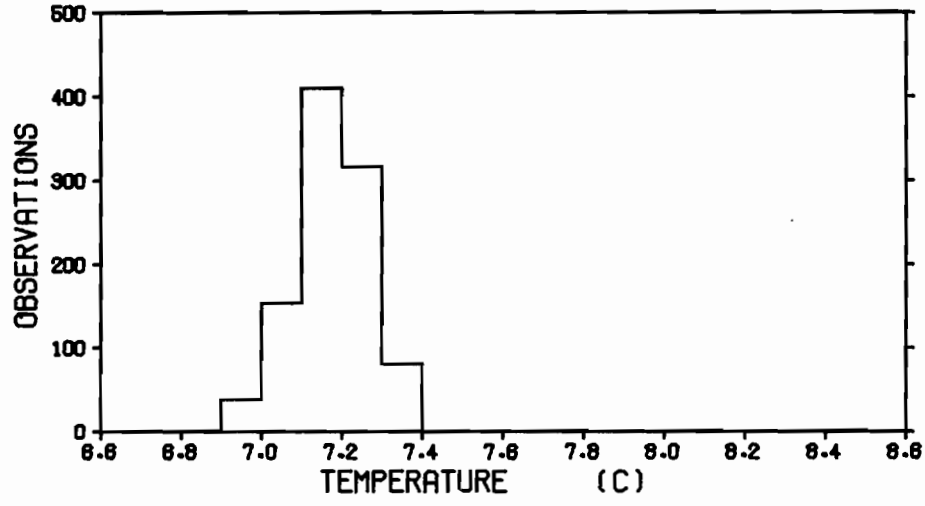
Depth 20.0 m

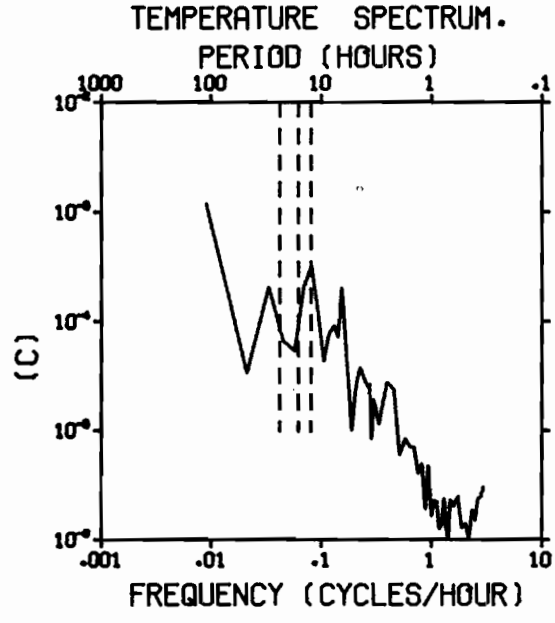
Temperature

Salinity

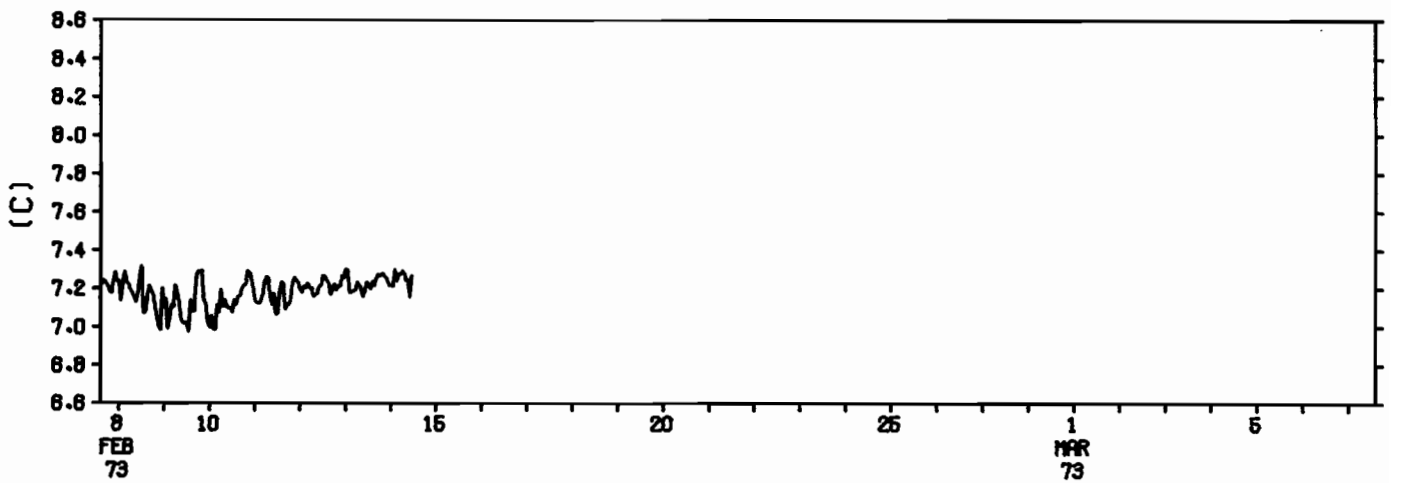
TEMPERATURE STATISTICS LAT. 47 42.4N LONG. 122 26.7W
DEPTH 20.0 METERS NUMBER OF OBSERVATIONS = 1000
OBSERVATION PERIOD 6.9 DAYS FROM 1405 PST 7 FEB 73

MEAN (C)	VARIANCE (C)	ST-DEV (C)	SKEW	KURT	MAX (C)	MIN (C)
7.18	.01	.09	-.71	2.97	7.34	6.91



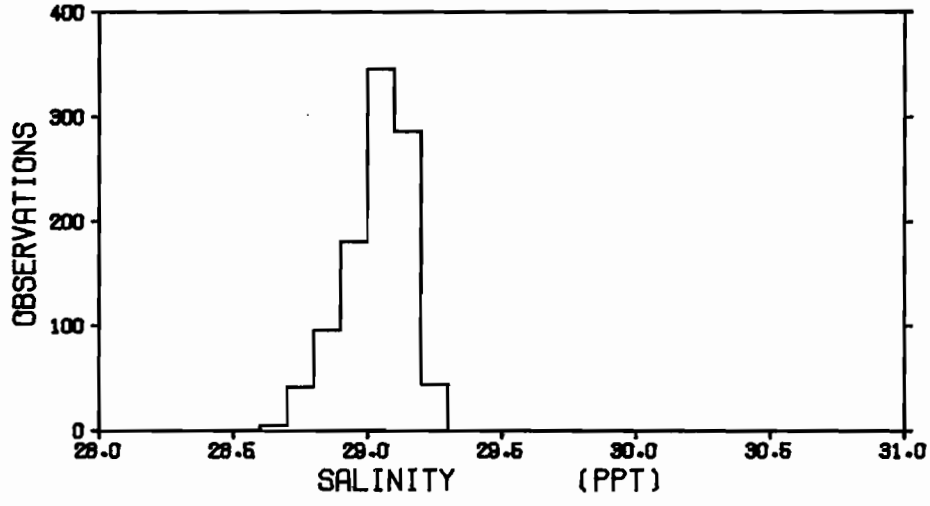


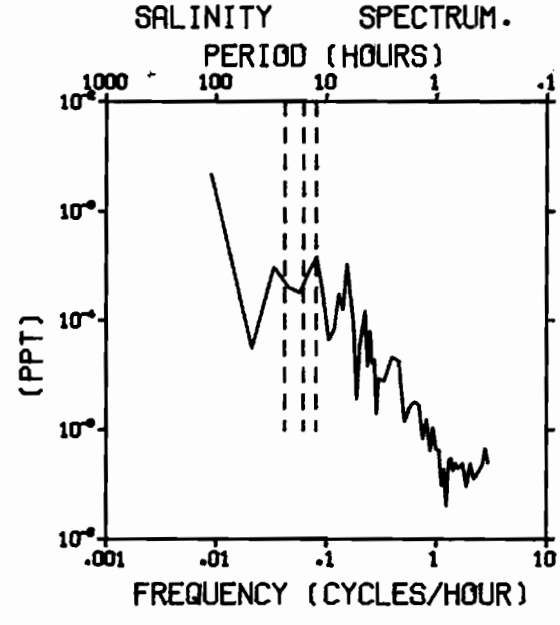
HOURLY AVERAGES OF TEMPERATURE DEPTH 20.0 METERS.

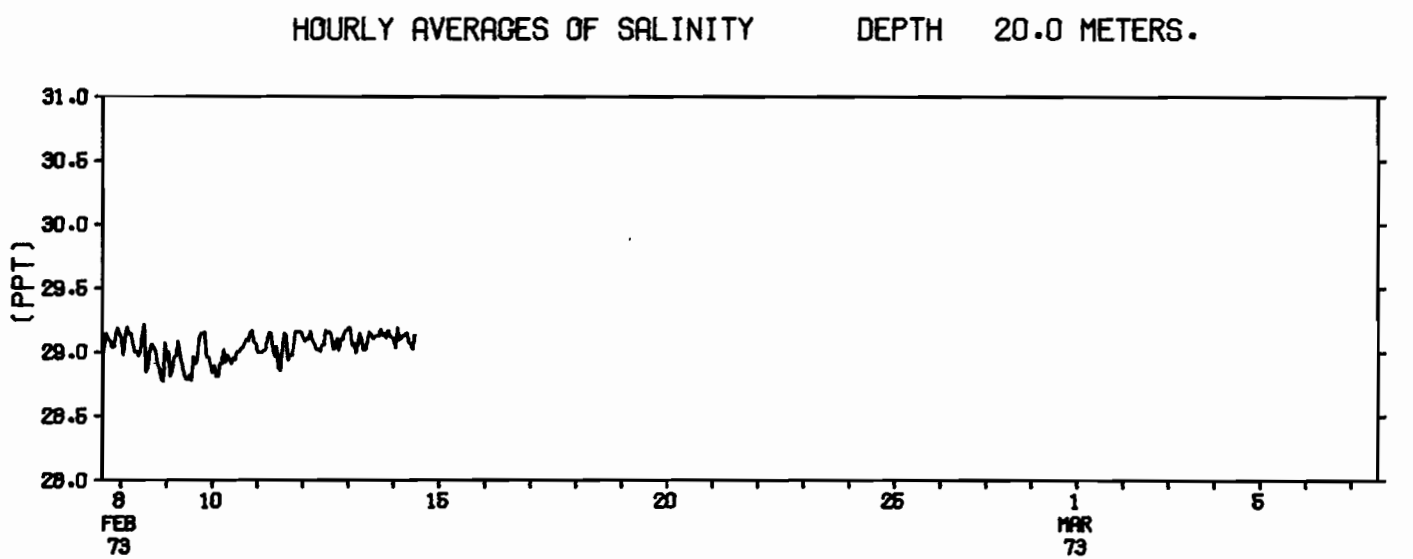


SALINITY STATISTICS LAT. 47 42.4N LONG. 122 26.7W
DEPTH 20.0 METERS NUMBER OF OBSERVATIONS = 1000
OBSERVATION PERIOD 6.9 DAYS FROM 1405 PST 7 FEB 73

MEAN (PPT)	VARIANCE (PPT)	ST-DEV (PPT)	SKEW	KURT	MAX (PPT)	MIN (PPT)
29.04	.01	.12	-.70	2.97	29.29	28.66






HOURLY AVERAGES OF SALINITY DEPTH 20.0 METERS.
(PPT)
31.0
30.5
30.0
29.5
29.0
28.5
28.0
8
FEB
73
10
15
20
25
1
MAR
73
5

Meter A599

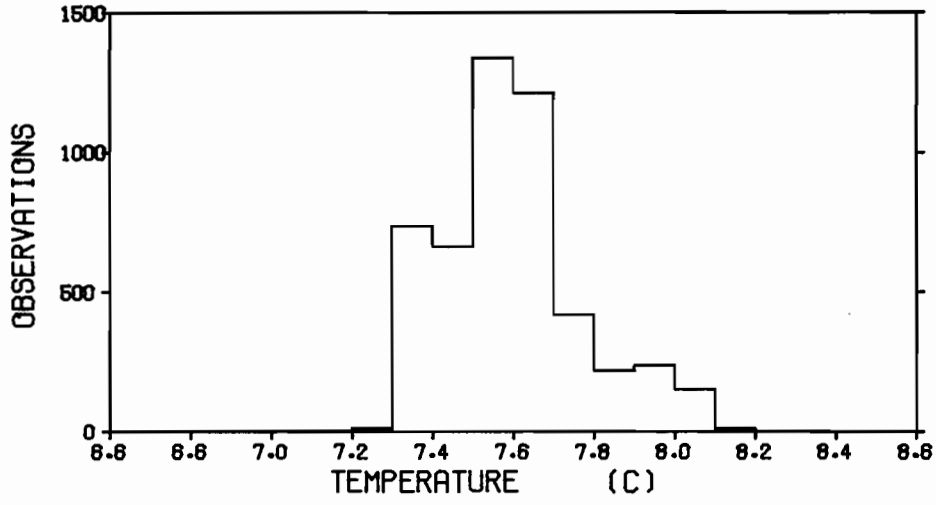
Depth 36.5 m

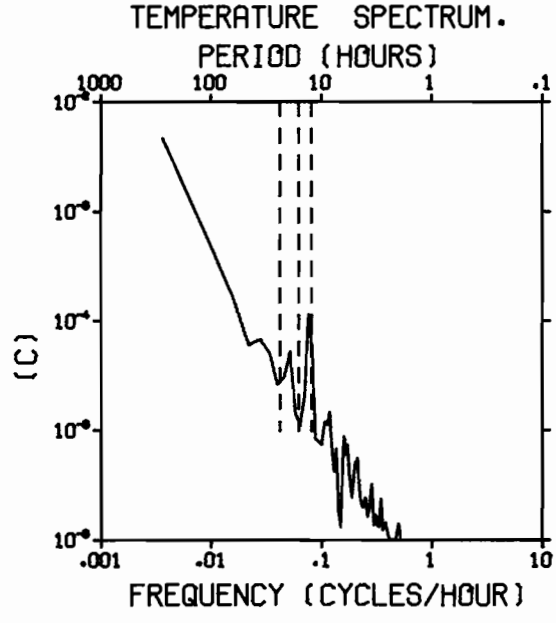
Temperature

Salinity

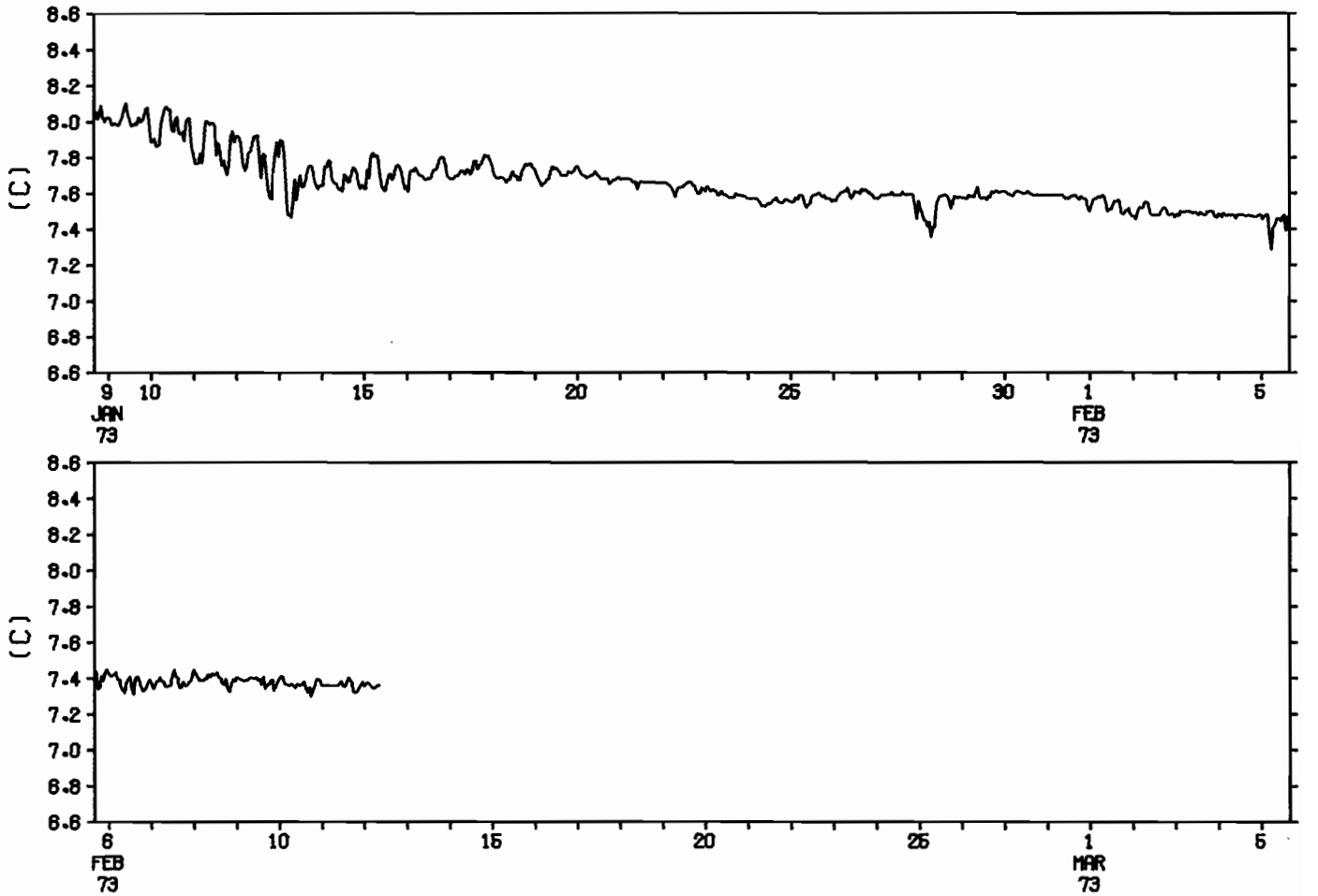
TEMPERATURE STATISTICS LAT. 47 42.3N LONG. 122 26.9W
DEPTH 36.5 METERS NUMBER OF OBSERVATIONS = 5000
OBSERVATION PERIOD 34.7 DAYS FROM 1542 PST 8 JAN 73

MEAN (C)	VARIANCE (C)	ST-DEV (C)	SKEW	KURT	MAX (C)	MIN (C)
7.60	.03	.17	.64	3.24	8.11	7.20



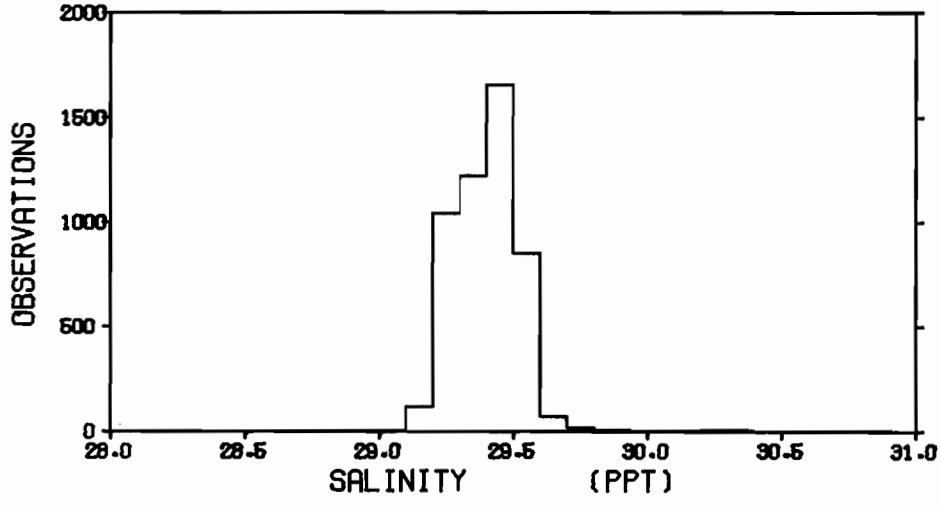


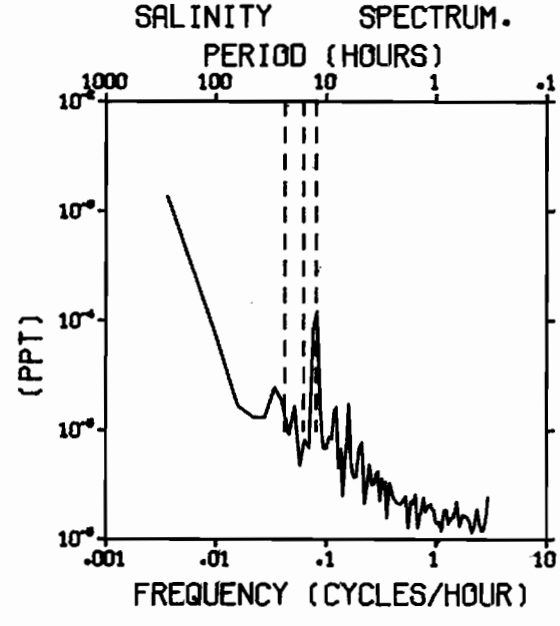
HOURLY AVERAGES OF TEMPERATURE DEPTH 36.5 METERS.

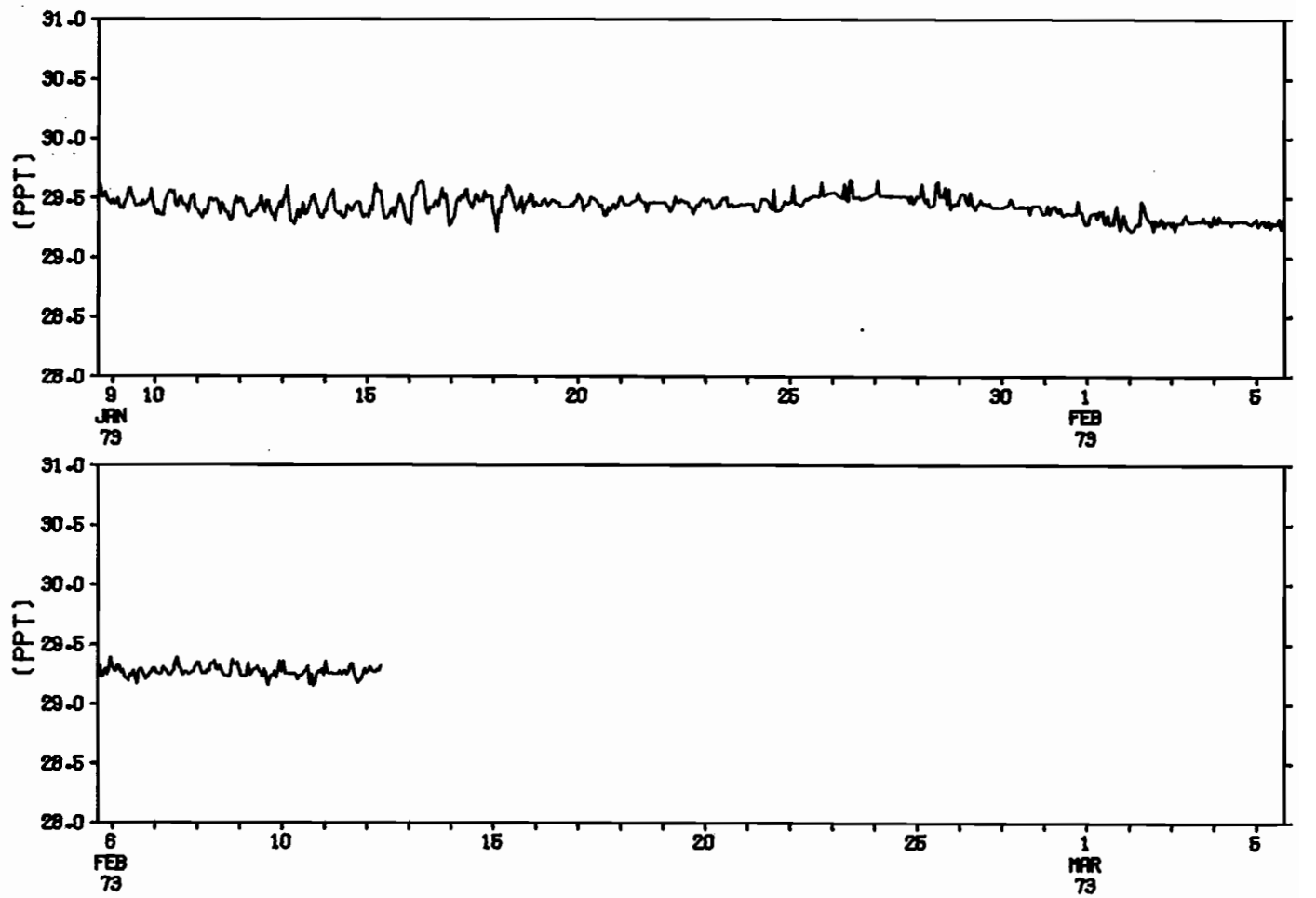


SALINITY STATISTICS LAT. 47 42.3N LONG. 122 26.9W
DEPTH 36.5 METERS NUMBER OF OBSERVATIONS = 5000
OBSERVATION PERIOD 34.7 DAYS FROM 1542 PST 8 JAN 73

MEAN (PPT)	VARIANCE (PPT)	ST-DEV (PPT)	SKEW	KURT	MAX (PPT)	MIN (PPT)
29.40	.01	.12	1.06	10.50	30.37	29.02






HOURLY AVERAGES OF SALINITY DEPTH 36.5 METERS.
(PPT)
31.0
30.5
30.0
29.5
29.0
28.5
28.0
9
10
15
20
25
30
1
5
JAN
79
FEB
79
(PPT)
31.0
30.5
30.0
29.5
29.0
28.5
28.0
6
10
15
20
25
1
5
FEB
79
MAR
79

Meter A604

Depth 56 m

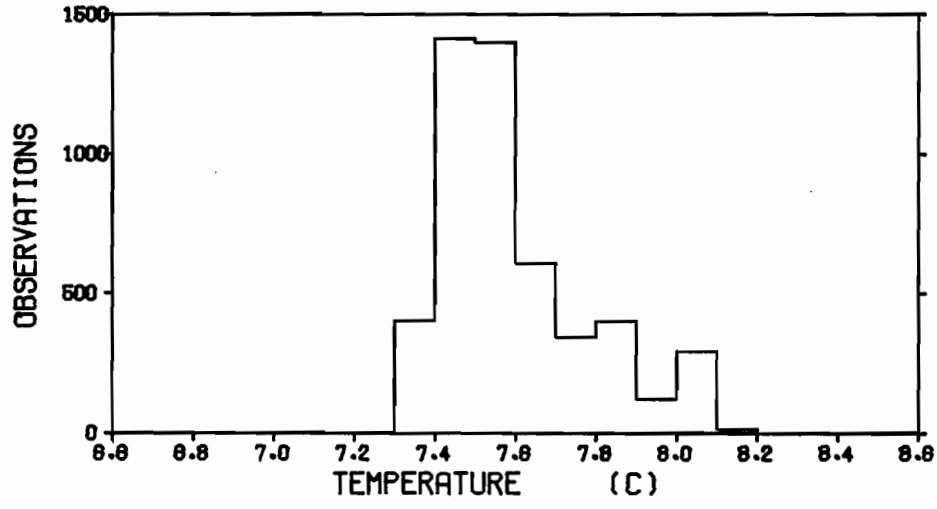
Temperature

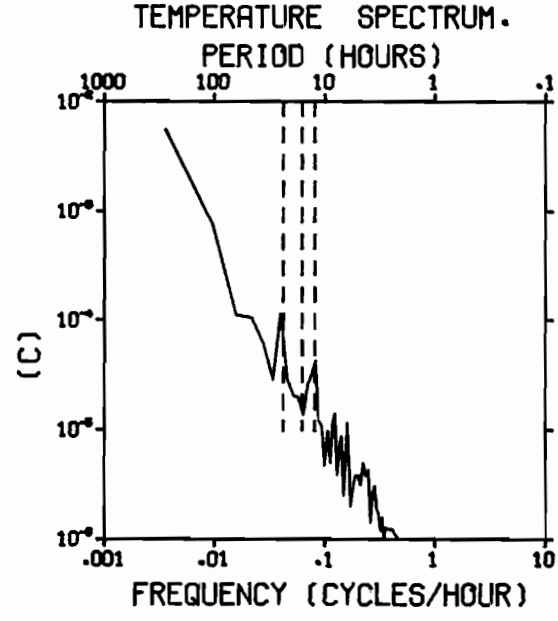
Salinity

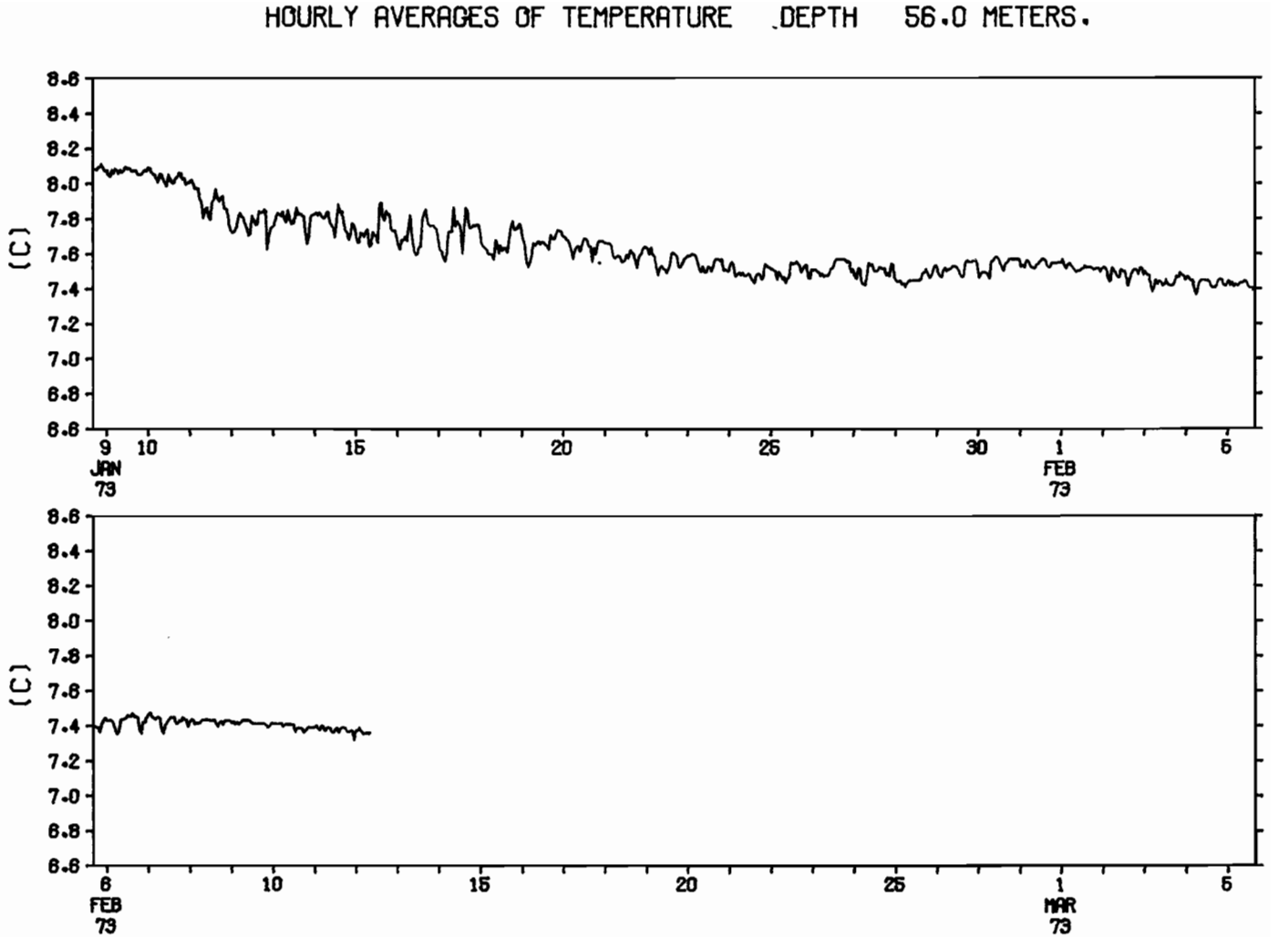
Pressure

TEMPERATURE STATISTICS LAT. 47 42.3N LONG. 122 26.9W
DEPTH 56.0 METERS NUMBER OF OBSERVATIONS = 5000
OBSERVATION PERIOD 34.7 DAYS FROM 1542 PST 8 JAN 73

MEAN (C)	VARIANCE (C)	ST-DEV (C)	SKEW	KURT	MAX (C)	MIN (C)
7.59	.04	.19	1.07	3.36	8.11	7.30

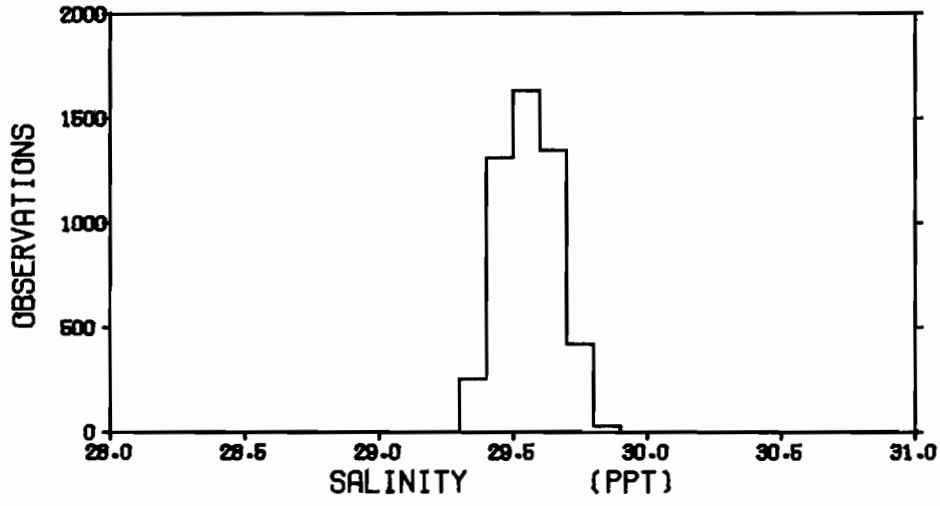


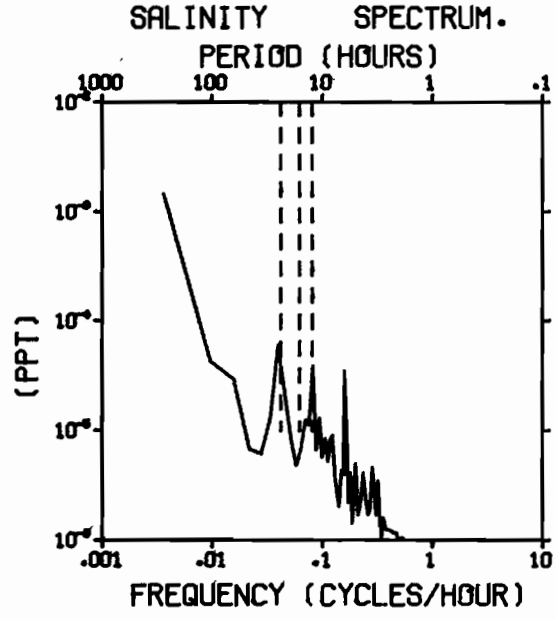



HOURLY AVERAGES OF TEMPERATURE DEPTH 56.0 METERS.
8.6
8.4
8.2
8.0
7.8
7.6
7.4
7.2
7.0
6.8
6.6
(C)
9
JAN
73
10
15
20
25
30
1
FEB
73
5
6
FEB
73
10
15
20
25
1
MAR
73
5

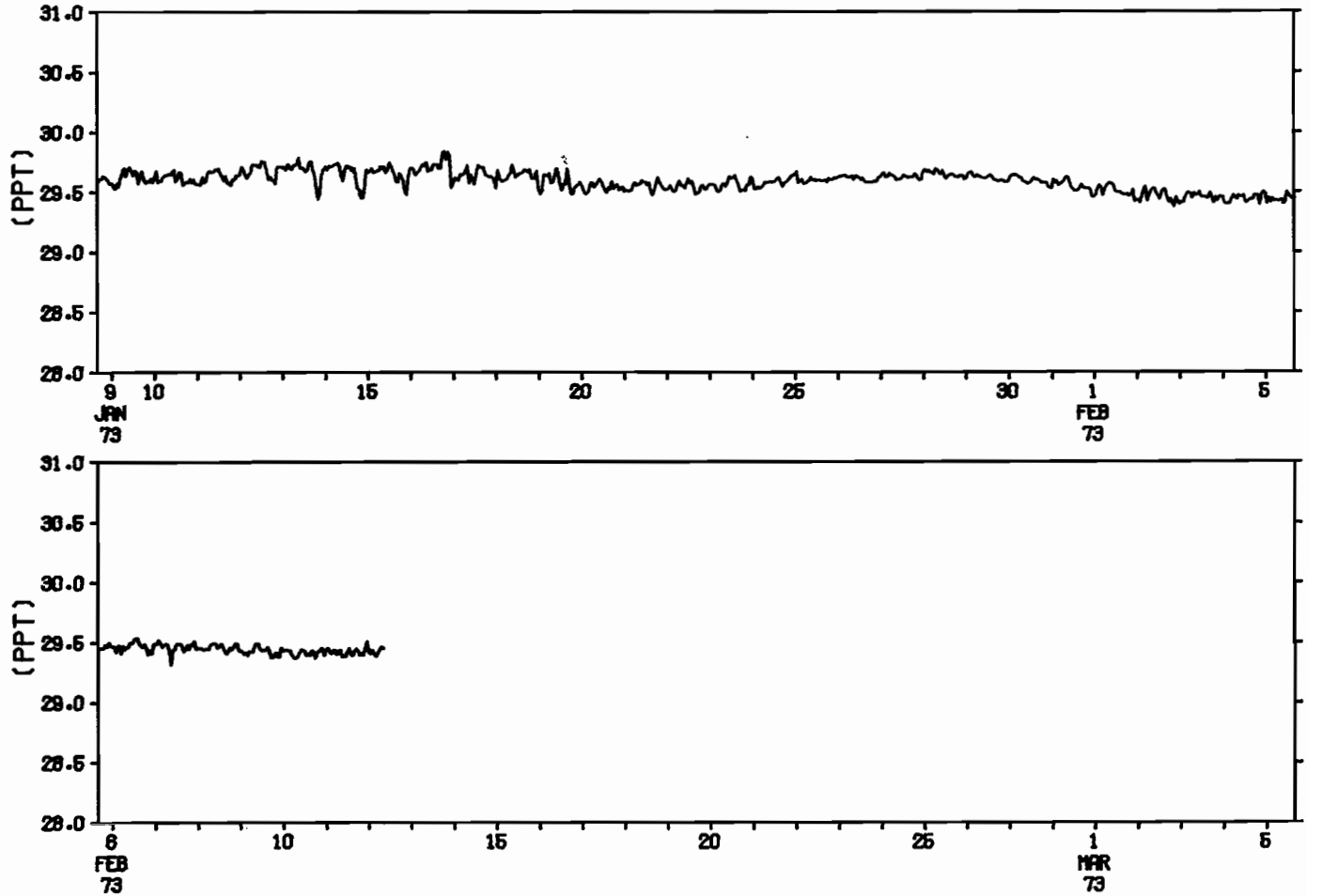
SALINITY STATISTICS LAT. 47 42.3N LONG. 122 26.9W
DEPTH 56.0 METERS NUMBER OF OBSERVATIONS = 5000
OBSERVATION PERIOD 34.7 DAYS FROM 1542 PST 8 JAN 73

MEAN (PPT)	VARIANCE (PPT)	ST-DEV (PPT)	SKEW	KURT	MAX (PPT)	MIN (PPT)
29.56	.01	.10	-.02	2.76	30.01	28.90



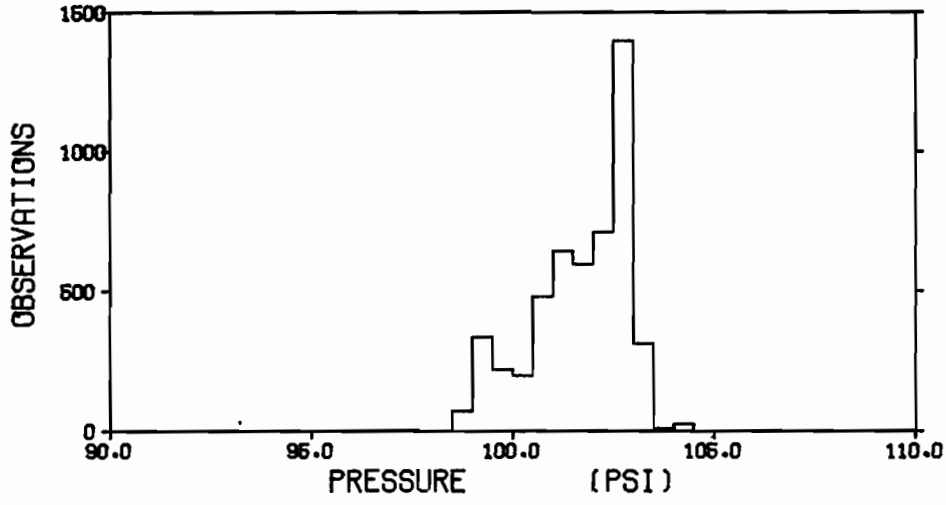


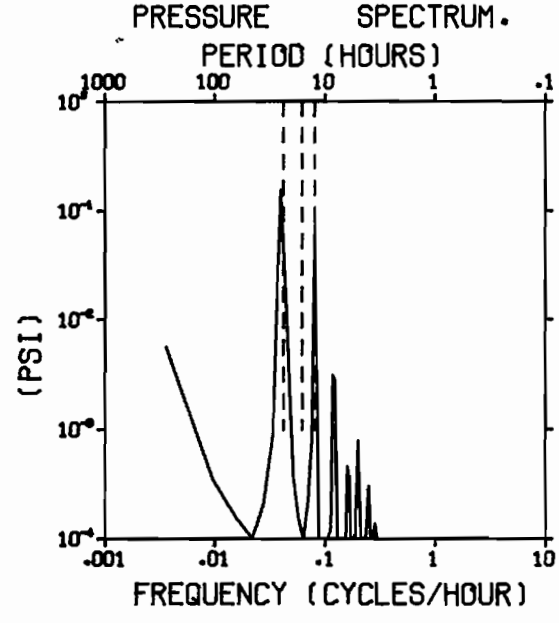
HOURLY AVERAGES OF SALINITY DEPTH 56.0 METERS.

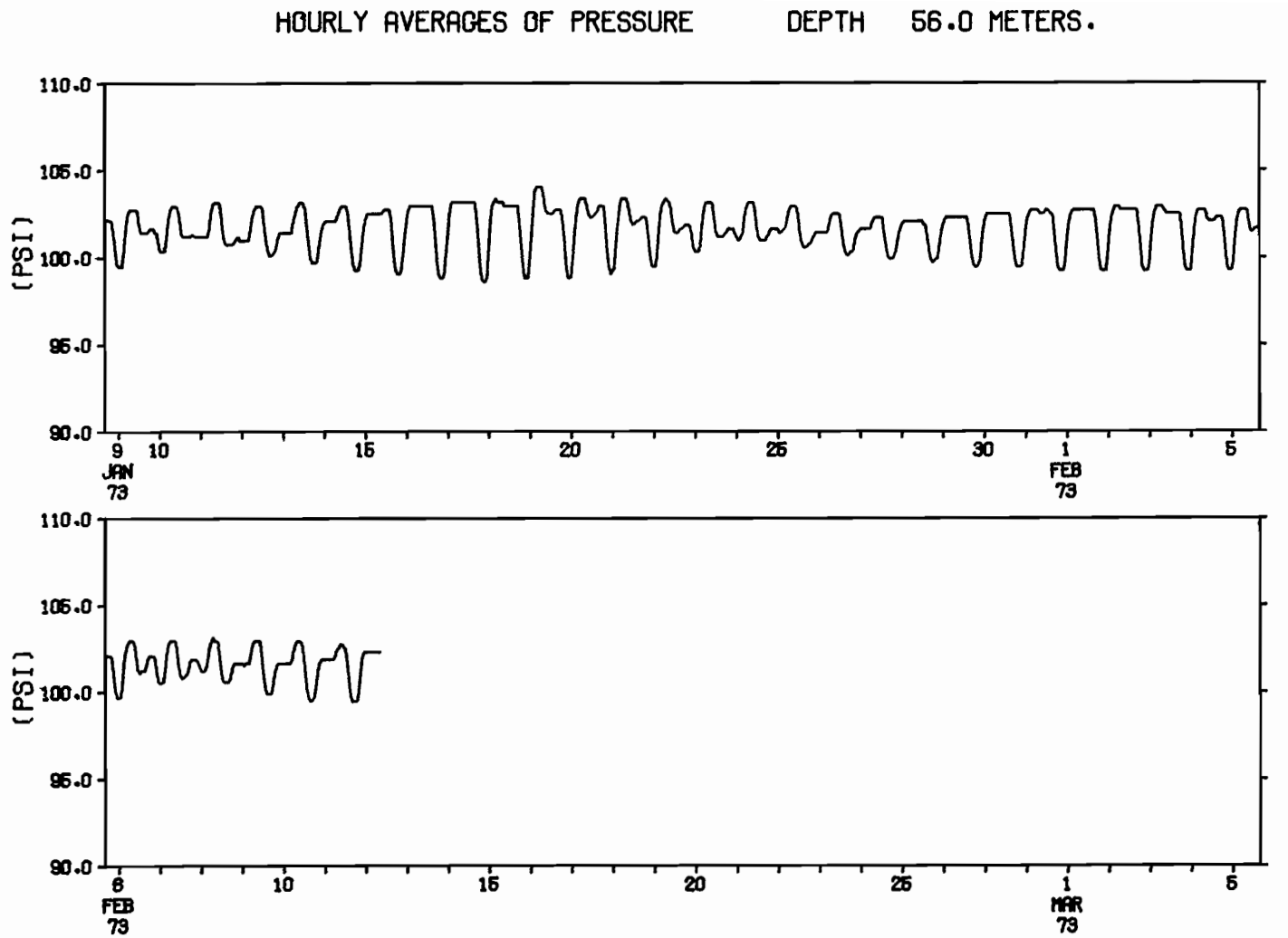


PRESSURE STATISTICS LAT. 47 42.3N LONG. 122 26.9W
DEPTH 56.0 METERS NUMBER OF OBSERVATIONS = 5000
OBSERVATION PERIOD 34.7 DAYS FROM 1542 PST 8 JAN 73

MEAN (PSI)	VARIANCE (PSI)	ST-DEV (PSI)	SKEW	KURT	MAX (PSI)	MIN (PSI)
101.69	1.38	1.17	-.69	2.65	104.04	98.59






HOURLY AVERAGES OF PRESSURE DEPTH 56.0 METERS.
110.0
105.0
100.0
95.0
90.0
(PSI)
9
JAN
73
10
15
20
25
30
1
FEB
73
5
110.0
105.0
100.0
95.0
90.0
(PSI)
8
FEB
73
10
15
20
25
1
MAR
73
5

Meter A600

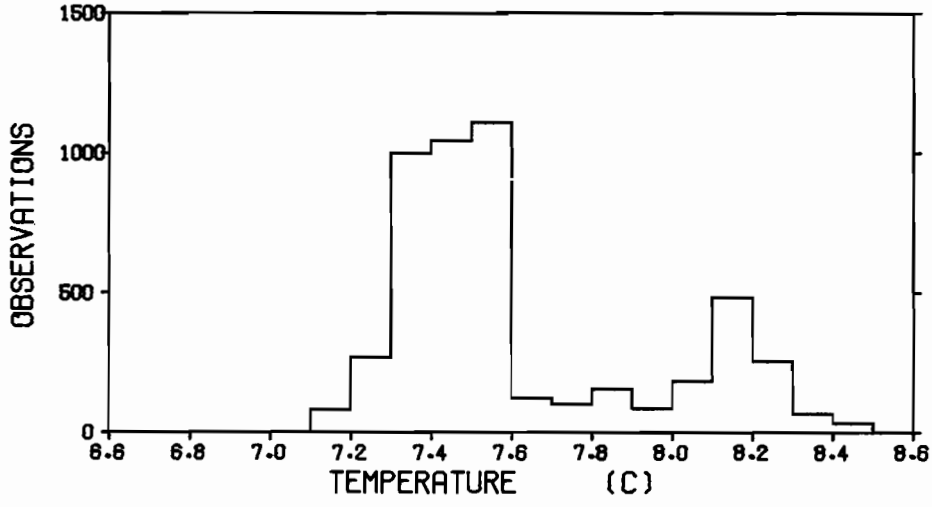
Depth 115.5 m

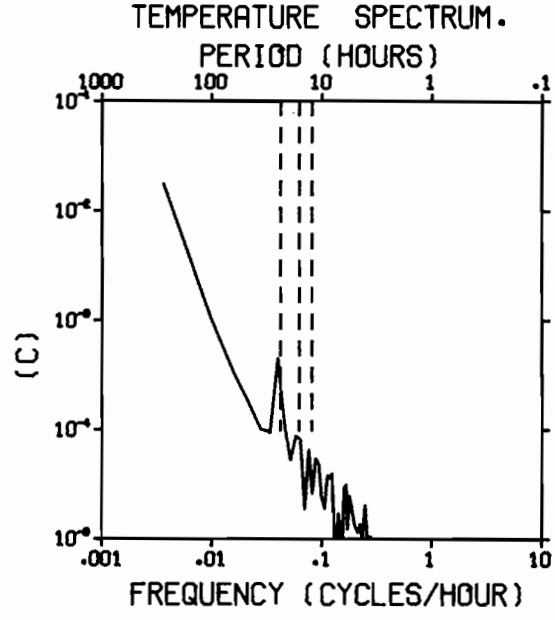
Temperature

Salinity

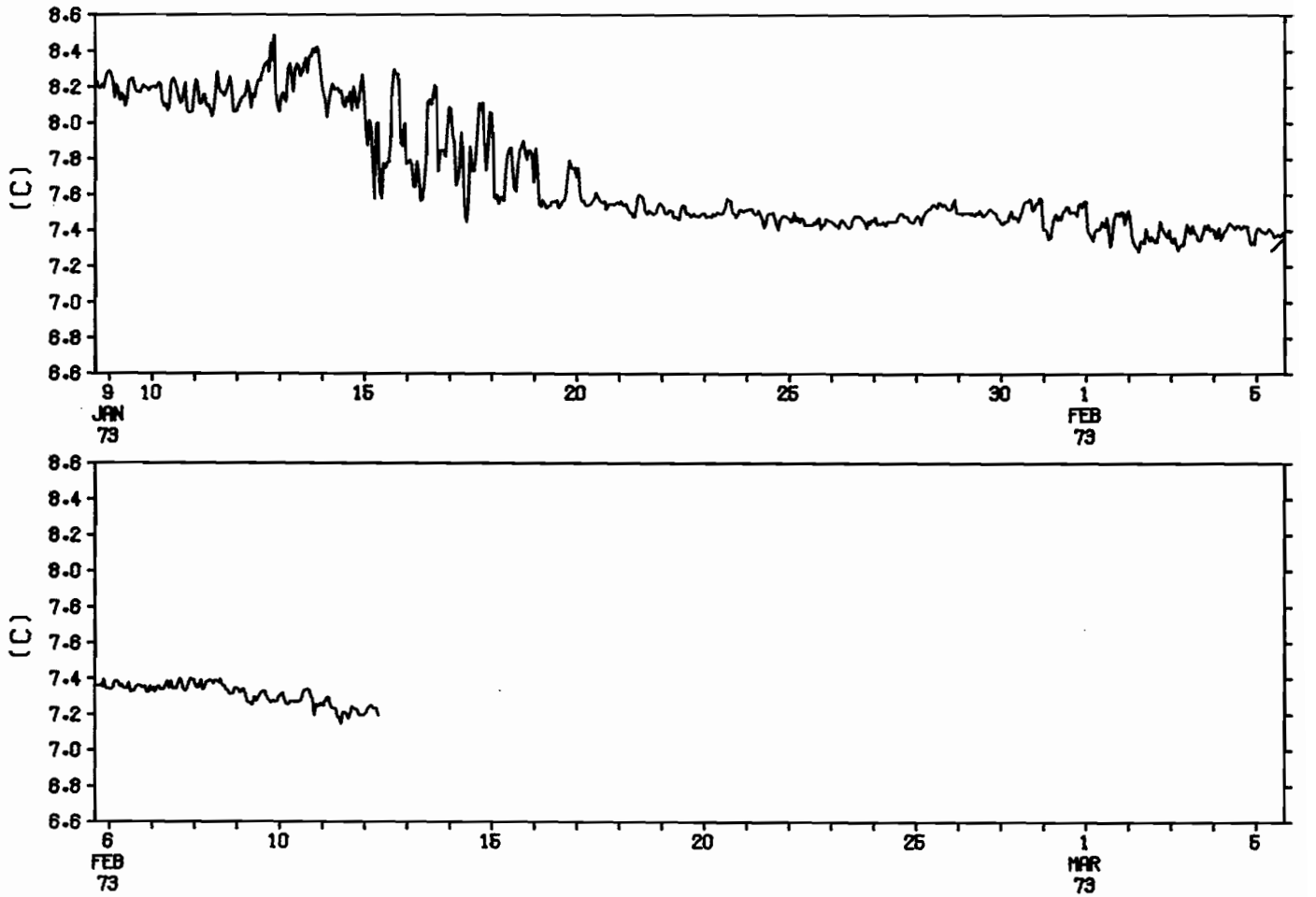
TEMPERATURE STATISTICS LAT. 47 42.3N LONG. 122 26.9W
DEPTH 115.5 METERS NUMBER OF OBSERVATIONS = 5000
OBSERVATION PERIOD 34.7 DAYS FROM 1542 PST 8 JAN 73

MEAN (C)	VARIANCE (C)	ST-DEV (C)	SKEW	KURT	MAX (C)	MIN (C)
7.62	.11	.33	.99	2.61	8.59	7.09



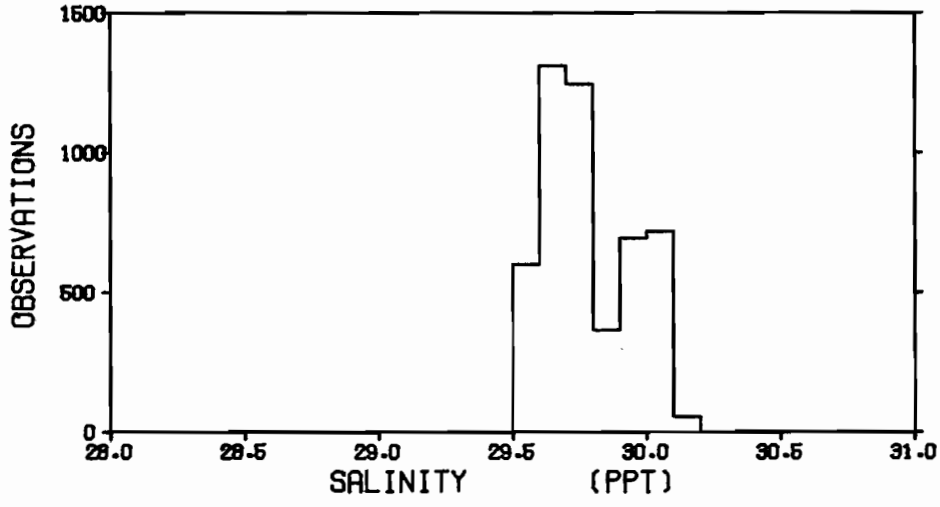


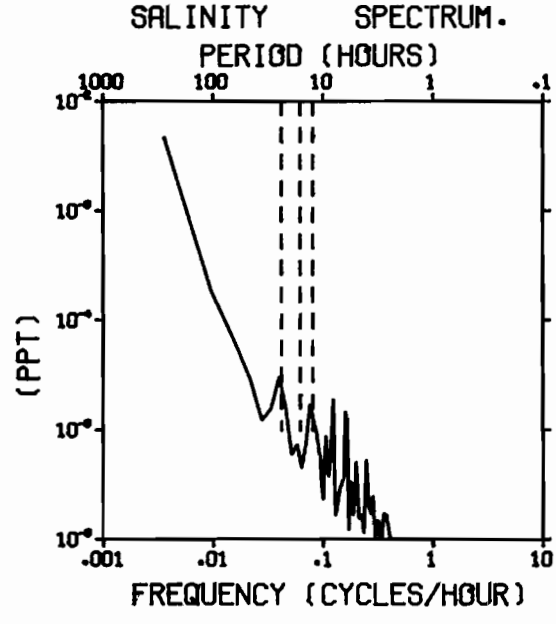
HOURLY AVERAGES OF TEMPERATURE . DEPTH 115.5 METERS.



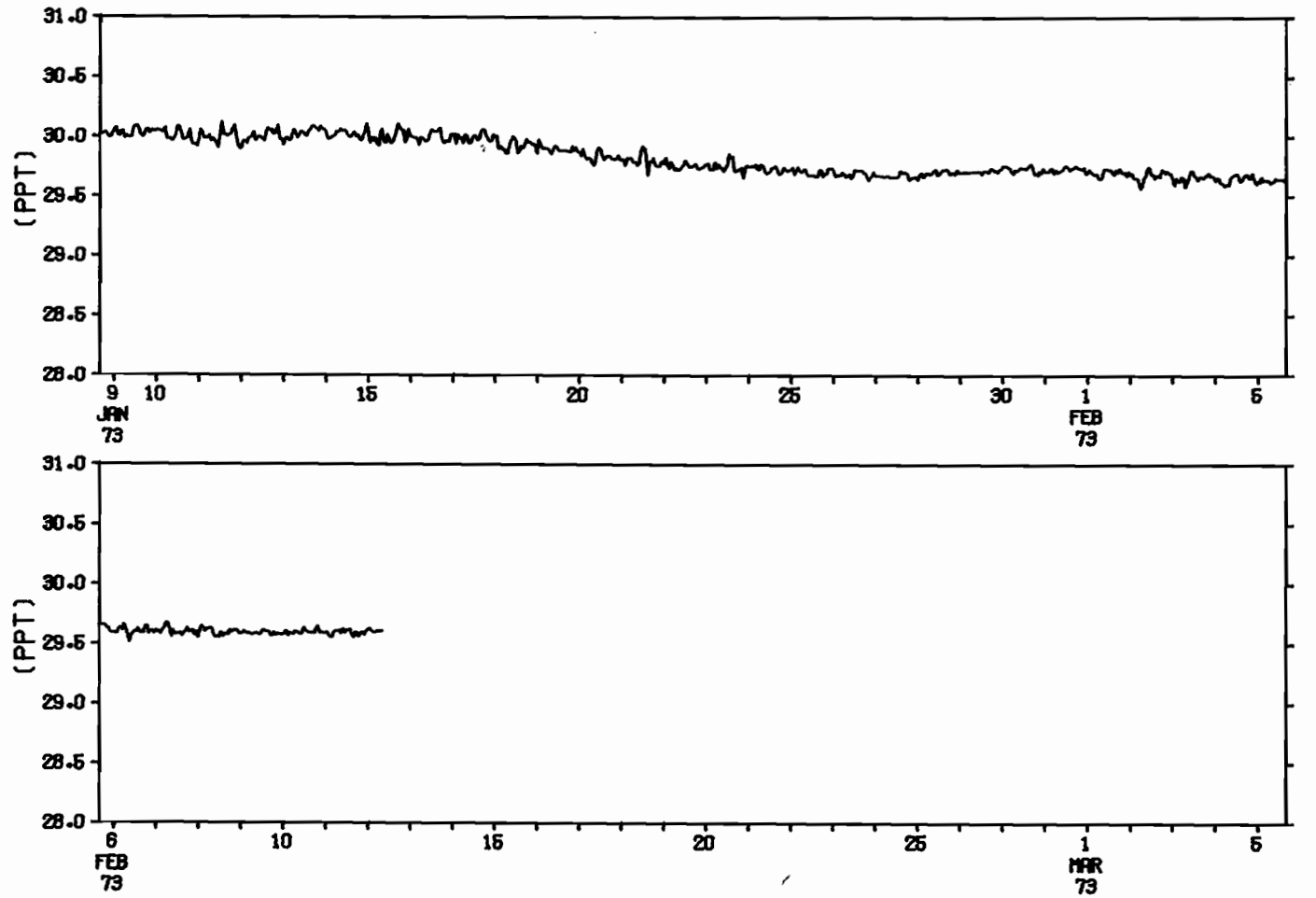
SALINITY STATISTICS LAT. 47 42.3N LONG. 122 26.9W
DEPTH 115.5 METERS NUMBER OF OBSERVATIONS = 5000
OBSERVATION PERIOD 34.7 DAYS FROM 1542 PST 8 JAN 73

MEAN (PPT)	VARIANCE (PPT)	ST-DEV (PPT)	SKEW	KURT	MAX (PPT)	MIN (PPT)
29.78	.03	.16	.41	2.17	30.19	28.98





HOURLY AVERAGES OF SALINITY DEPTH 115.5 METERS.



Meter A602

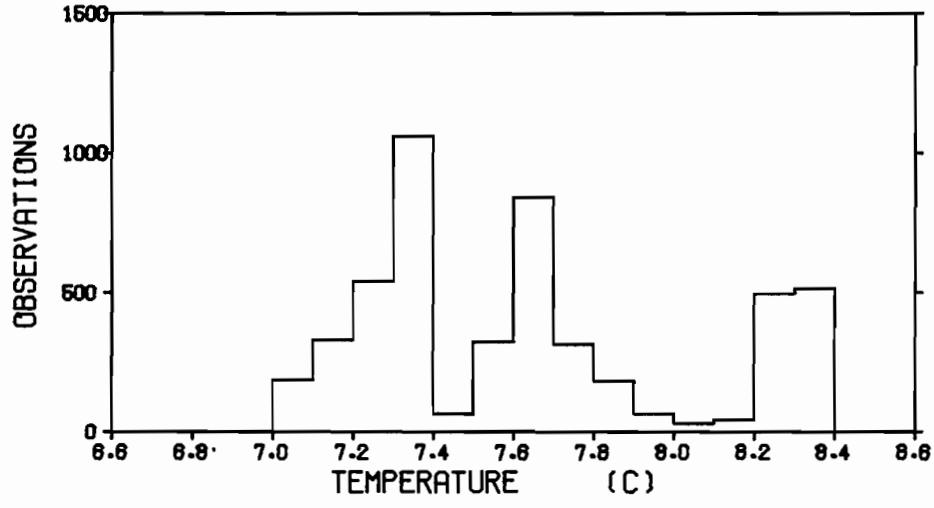
Depth 192.5 m

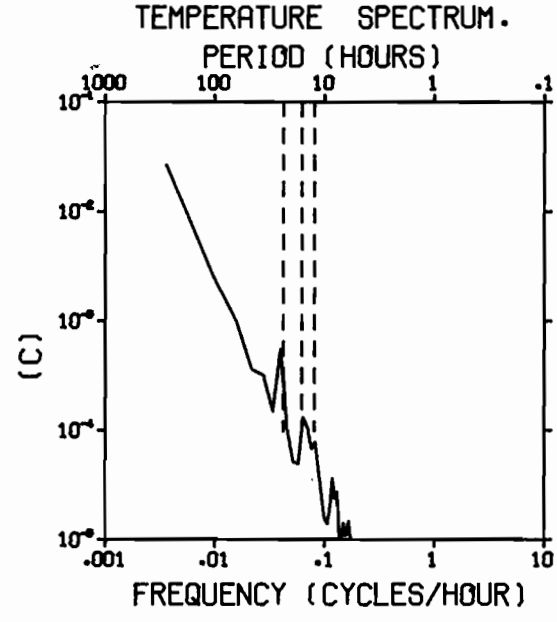
Temperature

Salinity

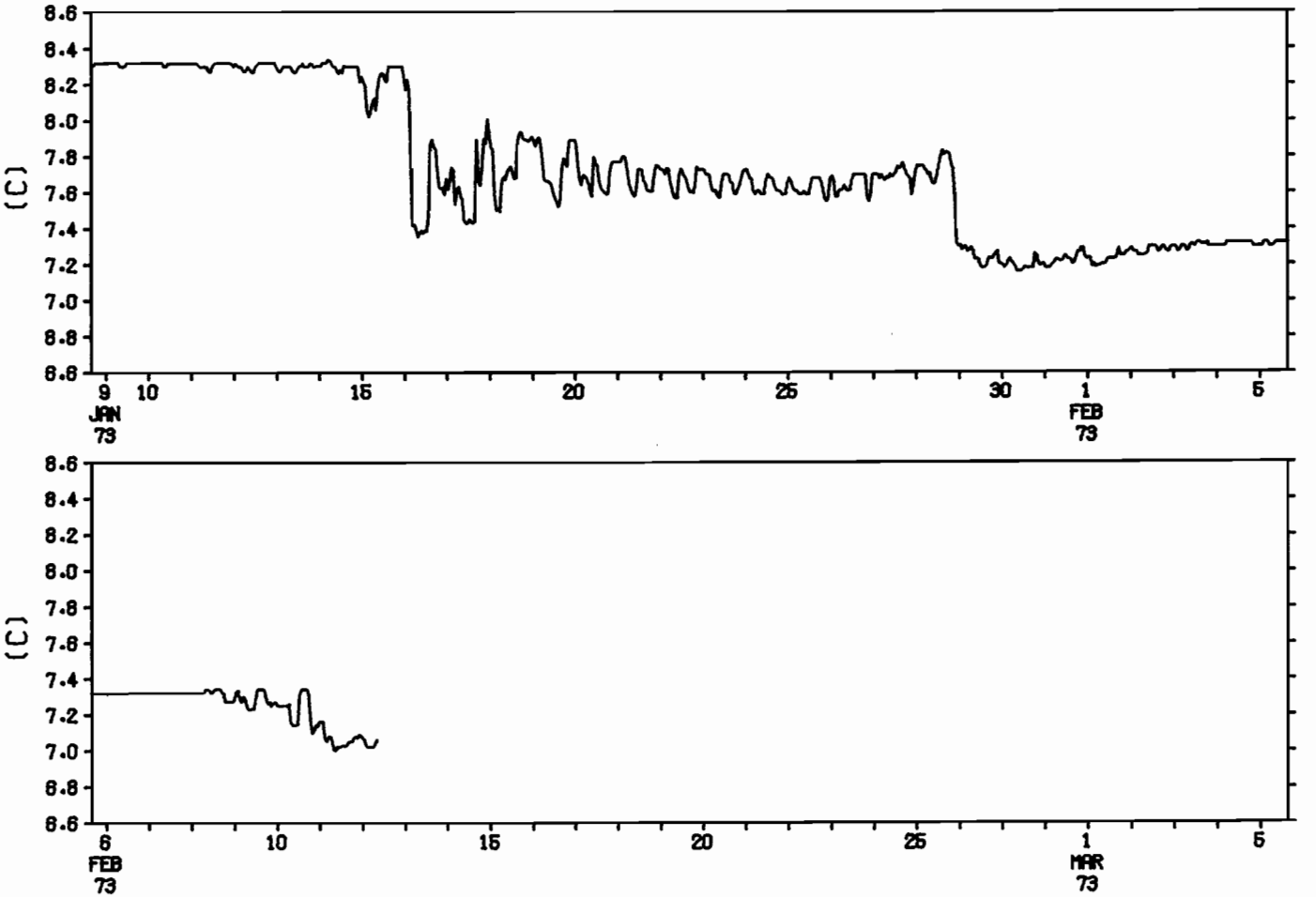
TEMPERATURE STATISTICS LAT. 47 42.3N LONG. 122 26.9W
DEPTH 192.5 METERS NUMBER OF OBSERVATIONS = 5000
OBSERVATION PERIOD 34.7 DAYS FROM 1532 PST 8 JAN 73

MEAN (C)	VARIANCE (C)	ST-DEV (C)	SKEW	KURT	MAX (C)	MIN (C)
7.63	.16	.40	.57	2.04	8.34	7.00



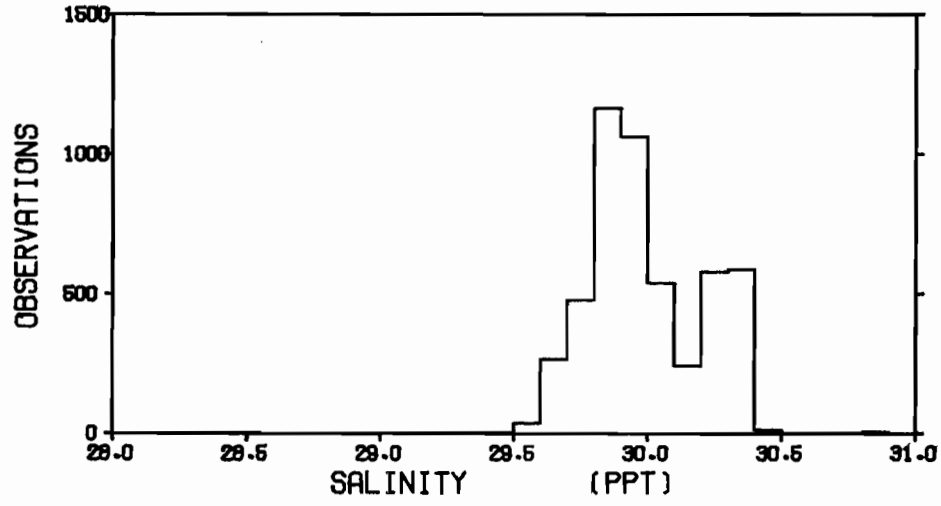


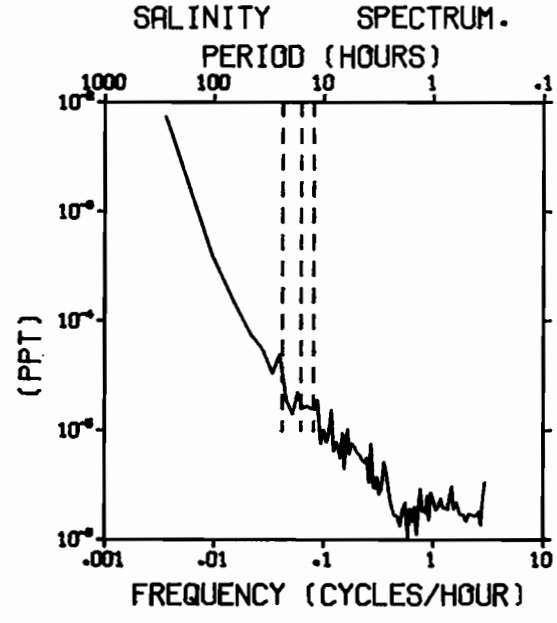
HOURLY AVERAGES OF TEMPERATURE DEPTH 192.5 METERS.

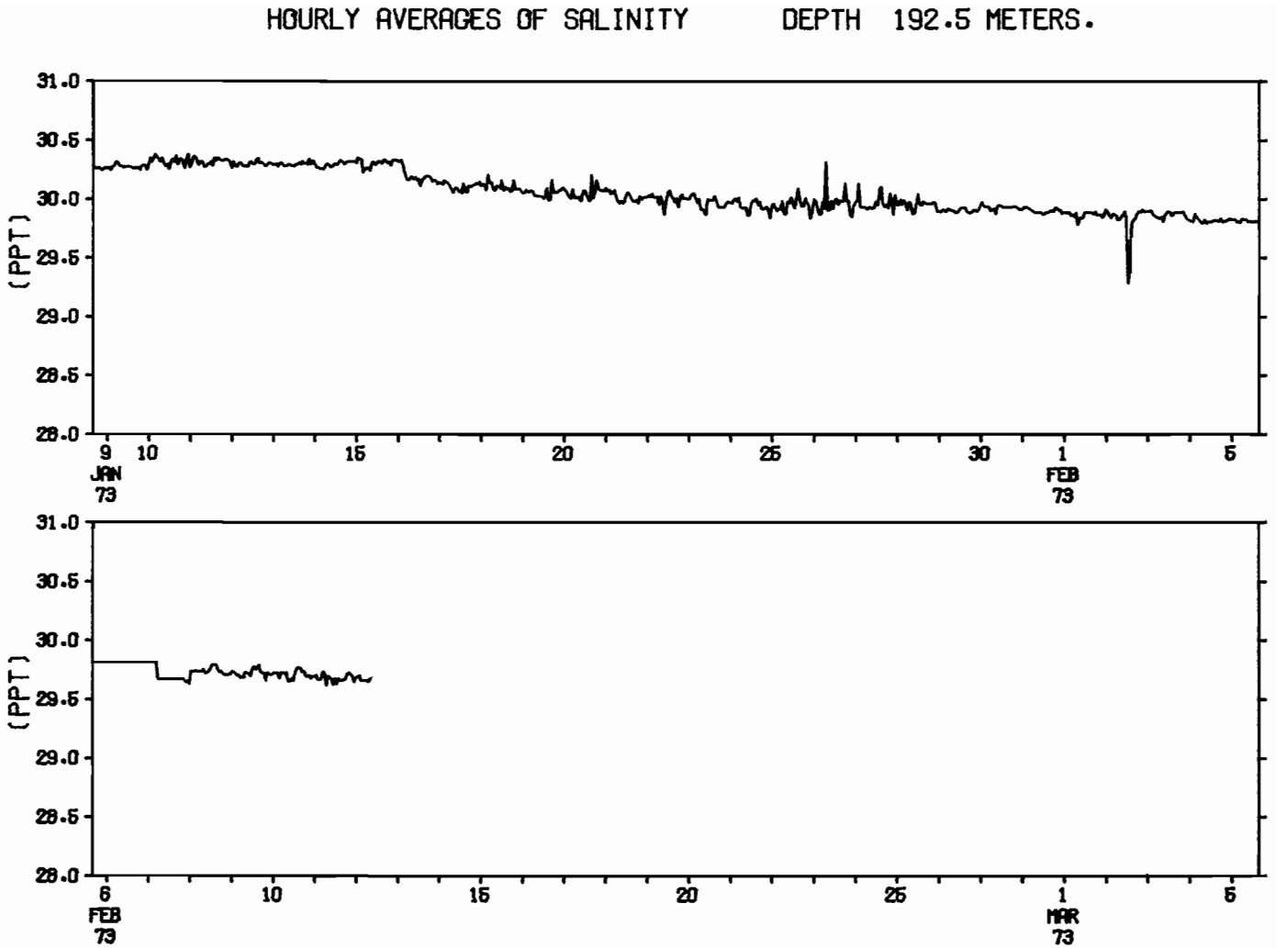


SALINITY STATISTICS LAT. 47 42.3N LONG. 122 26.9W
DEPTH 192.5 METERS NUMBER OF OBSERVATIONS = 5000
OBSERVATION PERIOD 34.7 DAYS FROM 1532 PST 8 JAN 73

MEAN (PPT)	VARIANCE (PPT)	ST-DEV (PPT)	SKEW	KURT	MAX (PPT)	MIN (PPT)
29.99	.05	.22	.29	3.14	30.93	28.74







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