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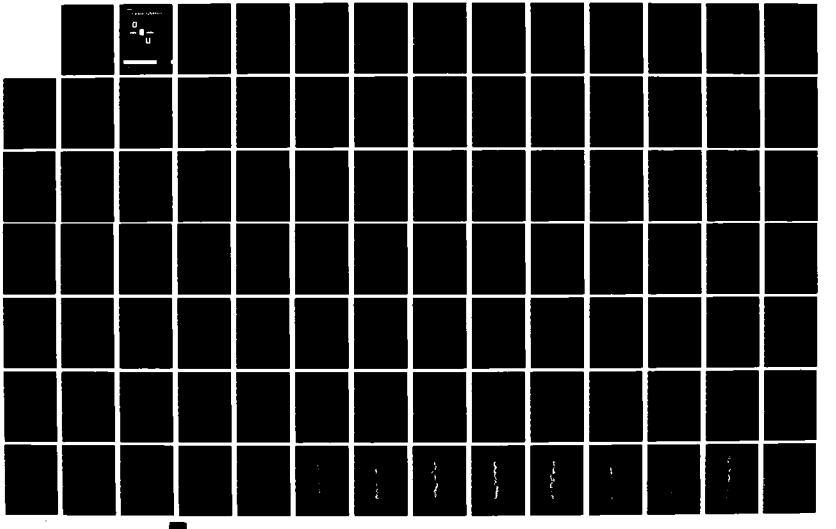

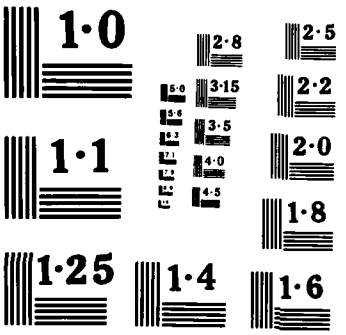

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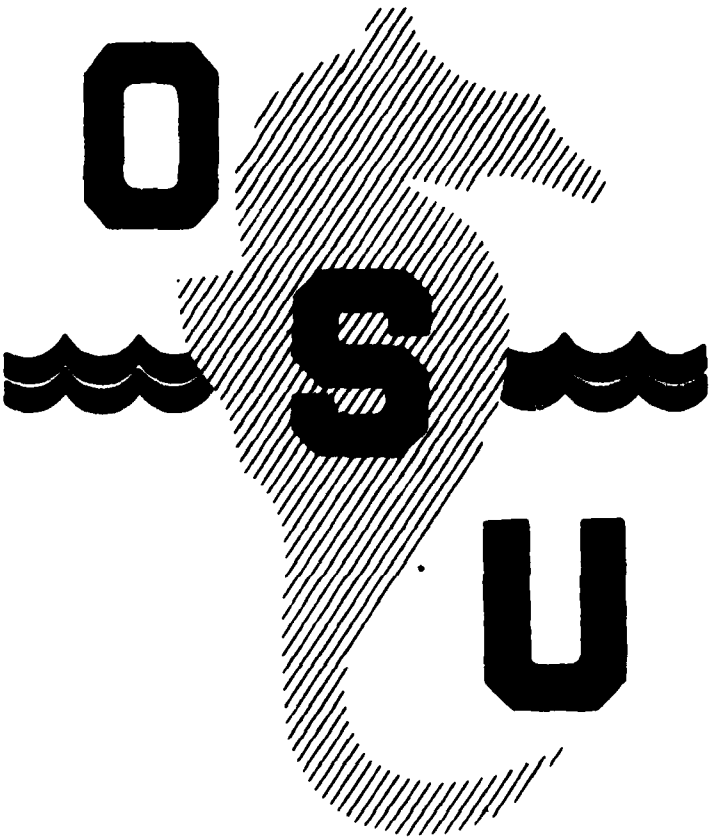

TOWED THERMISTOR CHAIN OBSERVATIONS DURING MILDEX

by

R.J. Baumann
L.M. deWitt
C.A. Paulson
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Office of Naval Research
N00014-79-C-0004
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Observations of temperature and pressure in the upper 115 m of the Pacific Ocean were taken with a towed thermistor chain during October and November, 1983, as a part of the Mixed Layer Dynamics Experiment (MILDEX). The MILDEX area was approximately 400 nautical miles west of Santa Barbara. The chain was towed on four occasions for a total distance of approximately 2500 km. The observations were averaged over sequential 30-second intervals and isotherms depths were interpolated from the averaged observations. Cross-sections of temperature and isotherm depth are presented.

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REPORT

Office of Naval Research
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Douglas R. Caldwell
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TABLE OF CONTENTS

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INTRODUCTION

This report presents observations of temperature in the upper ocean obtained by use of a towed thermistor chain. The observations were taken as part of a cooperative investigation of the upper ocean entitled Mixed Layer Dynamics Experiment (MILDEX). Measurements were made in October and November, 1983 in a region approximately 400 nautical miles west of Santa Barbara, California. The objectives of our participation were:

- To describe the horizontal variation of temperature in the upper layers.
- To describe the wavenumber properties of the internal wave field.
- To cooperate in a combined analysis of measurements with the towed chain, an acoustic doppler log and an underway profiler of conductivity and temperature.

The towed chain measurements were made aboard the R/V WECOMA. The R/V ACANIA from the Naval Postgraduate School and the R/P FLIP from Scripps Institution of Oceanography (SIO) also participated in the experiment. In addition to the towed chain measurements aboard the WECOMA, Lloyd Regier (SIO) made underway measurements of vertical profiles of horizontal velocity with an acoustic doppler log, John Marra (Lamont-Doherty Geological Observatory) made underway measurements of chlorophyll-alpha, Russ Davis (SIO) deployed expendable current-following drifters, Roland de Szoeke and Jim

Richman (OSU) deployed a drifting current meter array which also measured surface atmospheric variables, and Doug Caldwell and Thomas Dillon (OSU) made measurements with microstructure profiling systems. Meteorological and surface temperature and salinity measurements made aboard the WECOMA are described in a separate report (Baumann et al. 1985).

INSTRUMENTATION

The towed chain system and its use in other experiments have been previously described by Spoering (1979), Baumann et al. (1980), Paulson et al. (1980), Baumann et al. (1982), and Baumann et al. (1983). For the MILDEX cruise the spacing of the sensors was modified from previous cruises. Table 1 shows the location of the sensors relative to the depressor and their operating status for each of the four times the chain was deployed during MILDEX. The three conductivity sensors were improperly grounded and did not yield reliable data. Navigational data from the ship's satellite and LORAN C instruments were recorded once every two minutes on a data logger system.

Table 1. Location and operation of sensors on the towed chain. The stations have either a temperature, conductivity or a pressure sensor installed denoted by a T, C, or P. The distance along the chain from the depressor to the sensor is denoted by S which has units of "chain-meters." One chain-meter equals 40 in. or 1.02 m.

Channel No.	Station	S (Chain-Meters)	Operation Sensors (Y = yes) Run 1	Run 2	Run 3	Run 4
0	P0	2/6[1]		Y	Y	Y
1	T0	4/102[2]	Y		Y	Y
2	T1	8	Y	Y		
3	P1	10	Y			
4	T2	12	Y	Y	Y	
5	C0	16				
6	T3	16	Y	Y	Y	Y
7	T4	20	Y	Y	Y	Y
8	T5	24	Y	Y		
9	T6	28	Y	Y	Y	Y
10	T7	32	Y	Y	Y	Y
11	T8	36	Y	Y	Y	Y
12	T9	40	Y			
13	T10	44	Y		Y	Y
14	T11	48	Y	Y		Y
15	T12	52	Y	Y	Y	Y
16	T13	56	Y	Y	Y	Y
17	P2	58	Y	Y	Y	Y
18	C1	60				
19	T14	60	Y	Y	Y	Y
20	T15	61	Y		Y	Y
21	T16	62	Y	Y	Y	Y
22	T17	63	Y	Y		
23	T18	64			Y	Y
24	T19	65	Y			
25	T20	66	Y		Y	Y
26	T21	67		Y		Y
27	T22	68	Y	Y		
28	T23	69				Y
29	C2	70				
30	T24	70	Y		Y	Y
31	P3	72	Y			
32	T25	74	Y			Y
33	T26	78		Y		Y
34	T27	86				
35	T28	94	Y	Y	Y	Y

[1] Moved to chain-meter 6 between Runs 1 and 2
[2] Moved to chain-meter 102 between Runs 2 and 3

OBSERVATIONS

The thermistor chain was towed on four occasions during the cruise. The tow tracks are shown in Figures 1-5. The locations of FLIP and the Richman/de Szeoke drifting current meter string are also shown in Figures 1-3. The fourth tow began with a survey of a front encountered while returning to San Diego (Figure 4) and continued across the California Current (Figure 5). The times and positions of the corners of the tows are tabulated in Table 2. Table 3 gives additonal navigational information about the tow segments as well as the isotherms calculated for each segment. During Run 3 the chain was raised approximately 10 meters for 25 hours to repair damage to the fairing that occured near the surface.

The depths of sensors were determined from a combination of the pressure measurements and a model of the configuration of the chain under tow. The model is described by Baumann et al. (1982) and Baumann et al. (1980). The description is also supplemented by material in Appendix A of this report. The average depth of the sensors for each tow segment is also complied in this appendix.

The temperature, conductivity and pressure observations were recorded at 4 Hz and subsequently low-pass filtered by computing sequential 30-s averages. Filtering removes fluctuations caused by variations in sensor depths associated with surface gravity waves and the pitch, roll and heave of the ship. The filtered temperature and

pressure observations are presented in Appendix B. The isotherm depths that were calcutated from the observed temperature values are presented in Appendix C.

Table 2. Positions and navigational notes for the tow segments. Positions are from LORAN-C data recorded every two minutes by the SAIL system.

Date (1983)	Time (GMT)	N. Latitude (deg)	(min)	W. Longitude (deg)	(min)	Comments
27-Oct	1800	33	49.45	127	02.37	Start Run 1
	1823	---		---		Speed increae
	2230	33	50.01	126	33.52	
28-Oct	0359	33	50.09	125	56.51	Turn to 000°
	0935	34	20.00	125	57.21	Turn to 270°
	1450	34	20.14	126	32.83	Turn to 180°
	2100	33	50.10	126	32.95	
29-Oct	0256	33	20.03	126	32.78	Turn to 270°
	0734	33	20.17	126	58.68	Turn to 037°
	1356	33	49.53	126	33.49	End Run 1
31-Oct	1905	34	01.33	126	11.48	Start Run 2
1-Nov	0000	34	04.25	125	37.62	
	0430	34	03.95	125	07.08	Turn to 180°
	1038	33	34.25	125	05.69	Turn to 270°
	1240	---		---		Increase in speed
	1602	33	34.16	125	41.91	Turn to 000°
	1602	---		---		Decrease in speed
	2200	34	04.48	125	37.16	
2-Nov	0340	34	34.51	125	37.48	Turn to 270°
	0830	34	34.59	126	12.38	Turn to 180°
	1449	34	02.20	126	10.10	
	1530	33	58.33	126	11.74	
	2107	33	27.96	126	09.65	Turn to 270°
3-Nov	0309	33	28.05	126	46.29	Turn to 000°
	0845	33	58.53	126	45.99	Turn to 090°
	1541	33	58.10	126	03.03	End Run 2
6-Nov	2103	33	52.97	125	50.05	Start Run 3
7-Nov	0219	34	21.07	125	49.88	Turn to 270°
	0741	34	20.95	126	25.87	Turn to 180°
	1241	33	50.82	126	26.08	Turn to 090°
	1743	33	51.77	125	50.14	Turn to 000°
	2215	---		---		Chain raised 10 m
	2305	34	20.97	125	50.02	Turn to 090°
8-Nov	0503	34	21.26	125	13.83	Turn to 180°
	1101	33	51.16	125	13.65	Turn to 270°
	1702	33	50.88	125	49.88	Turn to 000°
	2218	34	20.96	125	50.06	Turn to 270°
	2200	---		---		Chain lowered 10 m
9-Nov	0334	34	21.07	126	25.99	Turn to 180°
	0942	33	51.05	126	25.18	Turn to 090°
	1432	33	50.96	125	48.18	Turn to 000°
	1953	34	20.97	125	48.46	Turn to 090°
10-Nov	0129	34	21.01	125	13.68	Turn to 180°
	0243	34	15.33	125	13.63	End Run 3

Mildex Run 2
Average sensor depth for each tow segment.

Box side: Channel	0-9	9-6	6-7	7-8	8-9
1	113.30	112.98	112.15	112.96	113.57
0	111.24	110.94	110.11	110.92	111.53
2	109.18	108.90	108.07	108.88	109.49
3	107.12	106.86	106.03	106.84	107.45
4	105.06	104.83	104.00	104.80	105.41
5	100.95	100.76	99.93	100.73	101.35
6	100.95	100.76	99.93	100.73	101.35
7	96.85	96.70	95.87	96.67	97.28
8	92.76	92.64	91.83	92.62	93.23
9	88.68	88.60	87.79	88.58	89.18
10	84.61	84.57	83.77	84.54	85.14
11	80.56	80.55	79.76	80.52	81.11
12	76.52	76.54	75.76	76.51	77.10
13	72.50	72.54	71.78	72.52	73.09
14	68.49	68.56	67.81	68.54	69.10
15	64.50	64.59	63.87	64.57	65.12
16	60.53	60.64	59.94	60.63	61.16
17	58.55	58.68	57.93	58.66	59.18
18	56.58	56.71	56.03	56.69	57.21
19	56.58	56.71	56.03	56.69	57.21
20	55.59	55.73	55.05	55.71	56.22
21	54.61	54.75	54.08	54.73	55.24
22	53.63	53.77	53.10	53.75	54.26
23	52.64	52.79	52.13	52.78	53.27
24	51.66	51.82	51.16	51.80	52.29
25	50.69	50.84	50.19	50.82	51.31
26	49.71	49.87	49.23	49.85	50.33
27	48.73	48.89	48.26	48.88	49.36
28	47.76	47.92	47.30	47.90	48.38
29	46.78	46.95	46.33	46.93	47.40
30	46.78	46.95	46.33	46.93	47.40
31	44.84	45.01	44.41	44.99	45.45
32	42.90	43.07	42.49	43.06	43.51
33	39.04	39.22	38.67	39.20	39.63
34	31.38	31.56	31.08	31.55	31.92
35	23.81	23.98	23.58	23.97	24.28

Mildex Run 2
Average sensor depth for each tow segment.

Box side: Channel	0-0'	0'-1	1-2	2-3	3-0'	0'-4	4-5	5-0
1	111.22	112.38	114.19	110.67	114.15	113.47	113.56	113.46
0	109.19	110.34	112.15	108.63	112.1'	111.43	111.51	111.41
2	107.15	108.30	110.11	106.59	110.07	109.39	109.47	109.38
3	105.12	106.26	108.07	104.55	108.03	107.35	107.43	107.34
4	103.09	104.23	106.03	102.52	105.99	105.31	105.40	105.30
5	99.03	100.16	101.96	98.46	101.92	101.24	101.32	101.23
6	99.03	100.16	101.96	98.46	101.92	101.24	101.32	101.23
7	94.98	96.10	97.89	94.41	97.85	97.17	97.26	97.17
8	90.94	92.05	93.83	90.37	93.79	93.12	93.20	93.11
9	86.92	88.01	89.78	86.34	89.74	89.07	89.15	89.06
10	82.91	83.98	85.74	82.33	85.70	85.03	85.11	85.03
11	78.91	79.96	81.70	78.34	81.66	81.01	81.08	81.00
12	74.93	75.96	77.68	74.37	77.64	76.99	77.07	76.99
13	70.97	71.98	73.66	70.41	73.63	72.99	73.06	72.98
14	67.03	68.01	69.66	66.48	69.62	69.00	69.07	68.99
15	63.10	64.05	65.67	62.57	65.63	65.02	65.09	65.02
16	59.20	60.12	61.69	58.67	61.65	61.06	61.13	61.06
17	57.25	58.16	59.70	56.74	59.67	59.09	59.15	59.08
18	55.31	56.20	57.72	54.80	57.69	57.11	57.18	57.11
19	55.31	56.20	57.72	54.80	57.69	57.11	57.18	57.11
20	54.34	55.22	56.73	53.84	56.70	56.13	56.19	56.13
21	53.38	54.25	55.74	52.88	55.71	55.15	55.21	55.14
22	52.41	53.27	54.76	51.92	54.72	54.16	54.23	54.16
23	51.45	52.30	53.77	50.96	53.74	53.18	53.24	53.18
24	50.49	51.33	52.78	50.00	52.75	52.20	52.26	52.20
25	49.52	50.36	51.80	49.04	51.77	51.22	51.28	51.22
26	48.57	49.39	50.81	48.09	50.78	50.24	50.30	50.24
27	47.61	48.42	49.83	47.13	49.80	49.27	49.32	49.26
28	46.65	47.45	48.85	46.18	48.82	48.29	48.35	48.29
29	45.69	46.48	47.87	45.23	47.83	47.31	47.37	47.31
30	45.69	46.48	47.87	45.23	47.83	47.31	47.37	47.31
31	43.79	44.56	45.90	43.34	45.87	45.37	45.42	45.36
32	41.88	42.63	43.95	41.45	43.92	43.42	43.47	43.42
33	38.10	38.80	40.04	37.68	40.02	39.55	39.60	39.54
34	30.59	31.20	32.28	30.23	32.26	31.85	31.89	31.85
35	23.18	23.68	24.58	22.88	24.56	24.22	24.25	24.22

Mildex Run 1
Average sensor depth for each tow segment.

Box side: Channel	0-6	6-1	1-2	2-3	3-6	6-4	4-5	5-6
0	107.55	107.24	108.15	108.13	108.38	108.00	108.25	107.00
1	103.47	103.15	104.06	104.05	104.30	103.92	104.16	102.91
2	99.40	99.07	99.98	99.97	100.22	99.84	100.08	98.83
3	97.36	97.03	97.94	97.93	98.18	97.80	98.04	96.80
4	95.33	95.00	95.90	95.89	96.14	95.76	96.00	94.76
5	91.26	90.93	91.83	91.82	92.07	91.69	91.93	90.69
6	91.26	90.93	91.83	91.82	92.07	91.69	91.93	90.69
7	87.20	86.86	87.76	87.75	88.00	87.62	87.86	86.63
8	83.15	82.81	83.70	83.69	83.93	83.56	83.79	82.58
9	79.11	78.76	79.65	79.63	79.88	79.51	79.74	78.54
10	75.07	74.73	75.60	75.59	75.83	75.47	75.69	74.51
11	71.05	70.71	71.57	71.55	71.79	71.43	71.65	70.49
12	67.04	66.70	67.54	67.53	67.76	67.41	67.62	66.48
13	63.04	62.70	63.52	63.51	63.74	63.40	63.61	62.49
14	59.05	58.72	59.52	59.51	59.73	59.39	59.60	58.51
15	55.07	54.75	55.53	55.51	55.73	55.40	55.60	54.55
16	51.11	50.79	51.55	51.53	51.75	51.43	51.62	50.60
17	49.14	48.82	49.56	49.55	49.76	49.44	49.63	48.64
18	47.16	46.85	47.58	47.56	47.77	47.46	47.65	46.67
19	47.16	46.85	47.58	47.56	47.77	47.46	47.65	46.67
20	46.18	45.87	46.59	46.57	46.78	46.48	46.65	45.69
21	45.20	44.89	45.60	45.58	45.79	45.49	45.66	44.72
22	44.21	43.91	44.61	44.60	44.70	44.50	44.67	43.74
23	43.23	42.93	43.62	43.61	43.81	43.51	43.69	42.76
24	42.25	41.95	42.63	42.62	42.82	42.53	42.70	41.79
25	41.27	40.98	41.65	41.64	41.83	41.54	41.71	40.81
26	40.29	40.00	40.66	40.65	40.84	40.56	40.73	39.84
27	39.31	39.03	39.68	39.67	39.85	39.58	39.74	38.87
28	38.34	38.05	38.70	38.68	38.87	38.60	38.76	37.89
29	37.36	37.08	37.71	37.70	37.88	37.62	37.77	36.92
30	37.36	37.08	37.71	37.70	37.88	37.62	37.77	36.92
31	35.41	35.14	35.75	35.74	35.92	35.66	35.81	34.99
32	33.46	33.20	33.79	33.78	33.95	33.70	33.85	33.06
33	29.59	29.34	29.88	29.88	30.03	29.80	29.94	29.21
34	21.88	21.67	22.12	22.11	22.24	22.05	22.16	21.56
35	14.23	14.07	14.41	14.40	14.50	14.36	14.44	13.99

was corrected by subtracting 0.5 m. Channel 17 was corrected by first multiplying the measured pressure by 0.9954 and then adding 0.4 m.

The following pages list sensor depths for each tow segment.

APPENDIX A

Sensor Depths

The sequential 30-s averages of pressure measurements and a model of the thermistor chain under tow were used to calculate the depth of the temperature sensors. The model specifies the shape of the chain as a function of tow speed. Tow speed was not known with sufficient accuracy, however, so numerical techniques were used to compute a time series of fictitious speed based on the lowest pressure measurement. The fictitious speed is then used in the model to calculate sensor depth as a function of time. Isotherms were calculated by linear interpolation between adjacent temperature sensors.

The chain model used was derived by Baumann et al. (1980). The drag coefficient of the chain was adjusted in the model to fit the depths measured by the pressure sensors. The drag force on the chain ($CA\rho U^2$) was calculated by use of $CA\rho = 2.4$ N/m^3s^2 (compared to 2.6 N/m^3s^2 used for JASIN and 1.7 N/m^3s^2 used for FRONTS 80). In addition, the length of a chain-meter was 1.02 m instead of 1.016 m used in previous experiments.

The pressure measurements used were those from the deepest operating pressure sensor for each run. Channel 17 was used for Run 1 and channel 0 was used for Runs 2 through 4. The laboratory pressure calibrations were adjusted by examining the pressure measured as the chain was raised at the end of each run. The pressure from channel 0

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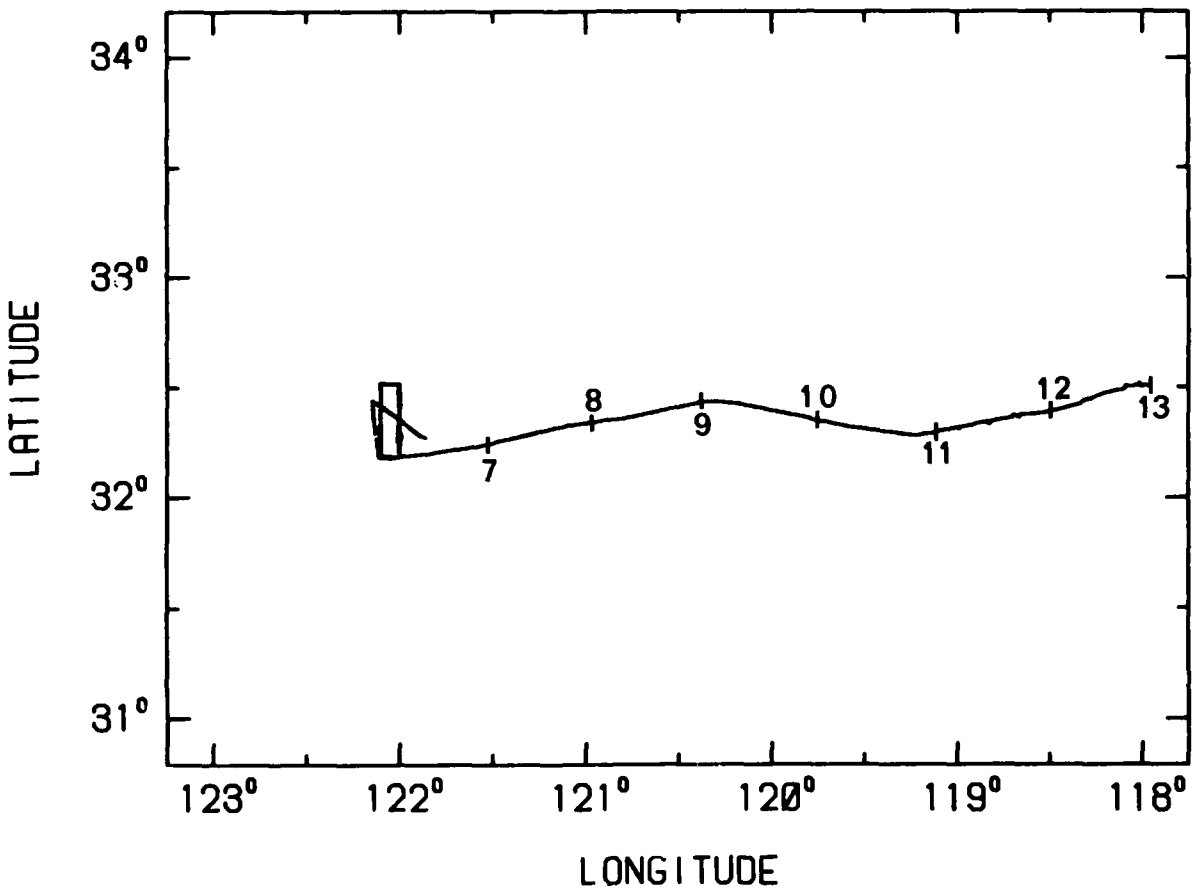


Figure 5. Tow track for Run 4. Figure 4 shows the detail of the beginning of the tow. The tow began at 2036 on 13-Nov-1983 and finished at 1737 on 16-Nov-1983 (GMT) at location 13. Positions numbered 7 through 13 are at six hour intervals. Additional navigational information is given in Tables 2 and 3.

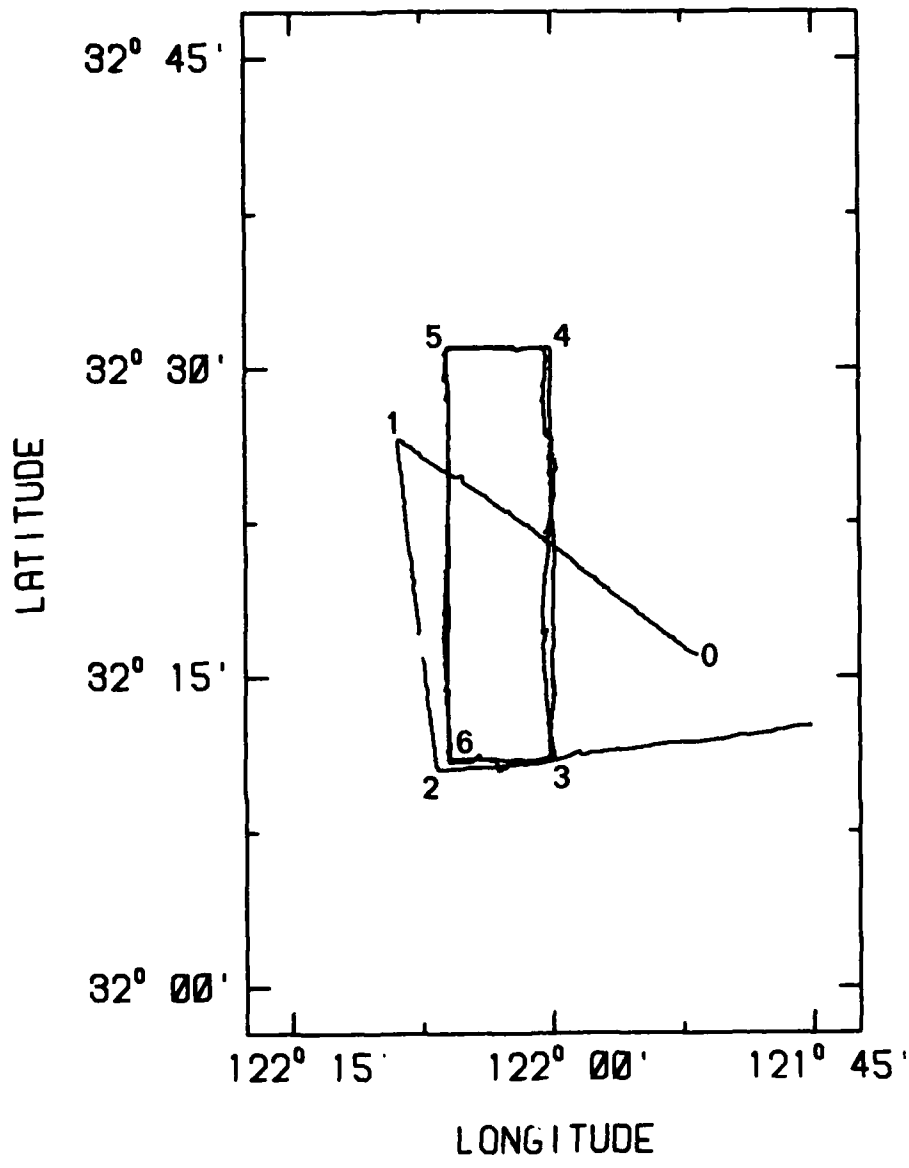


Figure 4. Beginning of the tow track for Run 4. The tow began at 2036 on 13-Nov-1983 (GMT) at point 0. Additional navigational information is given in Tables 2 and 3.

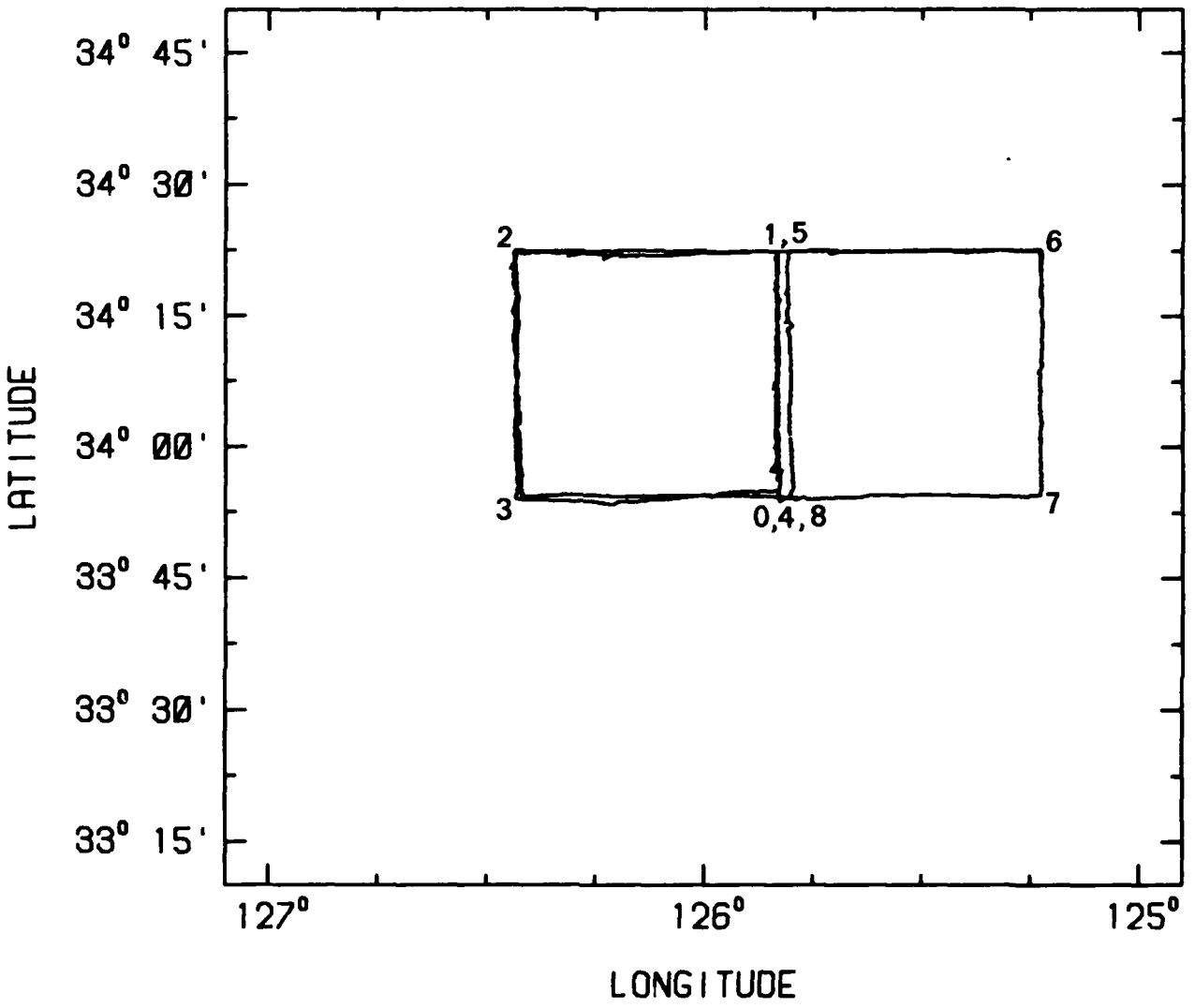


Figure 3. Tow track for Run 3. R/P FLIP was near the center of the eastern box and the Richman/de Szoeke drifter was near the center of the western box. The tow began at 2103 on 6-Nov-1983 and ended at 0243 on 10-Nov-1983 (GMT). Tables 2 and 3 give additional navigational information.

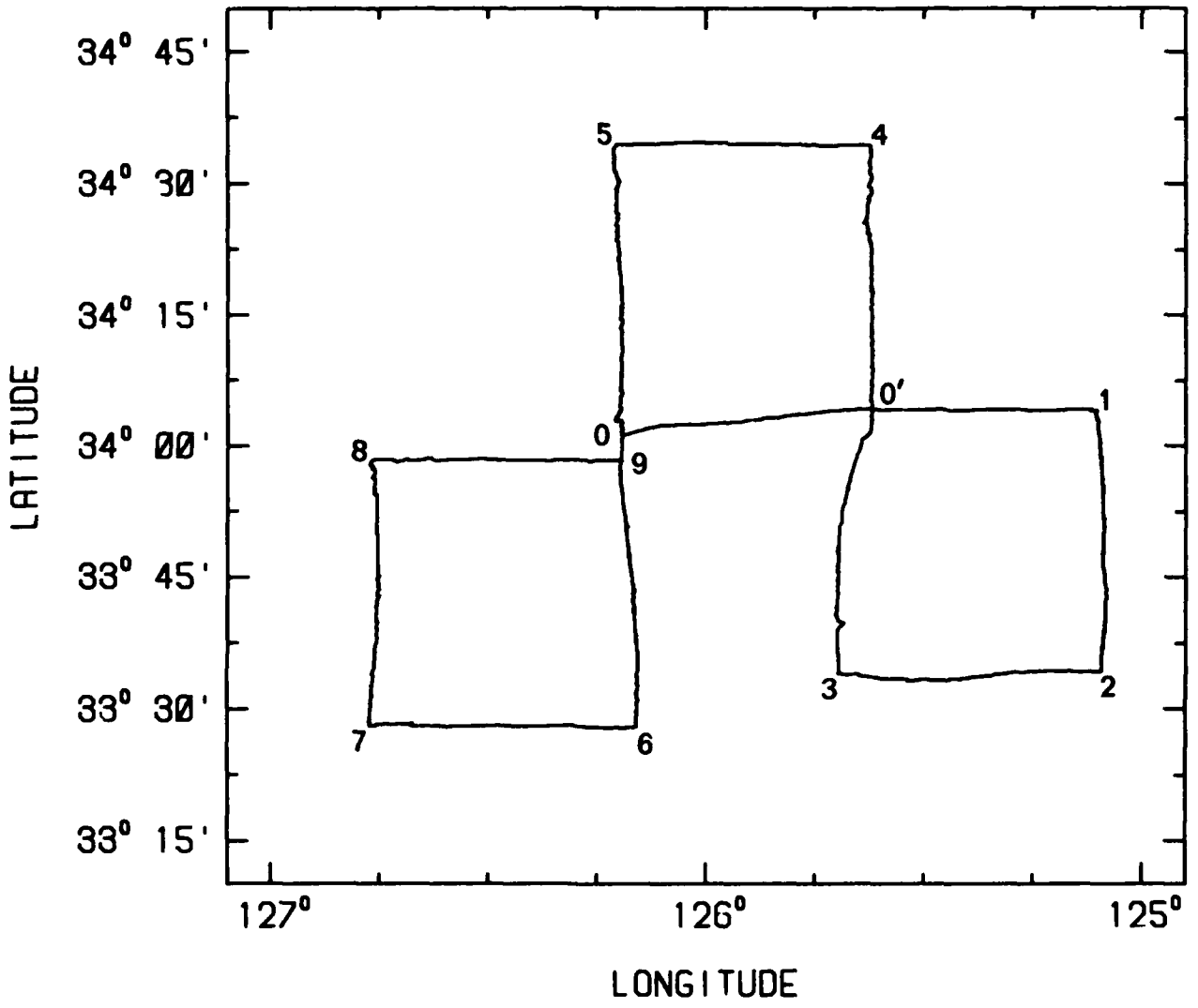


Figure 2. Tow track for Run 2. The survey began at 0 at 1905 on 31-Oct-1983 and ended at 1541 on 3-Nov-1983 (GMT) at 9. The Richman/de Szoeke drifting current meter array was near corner 9 while R/P FLIP was near corner 0'. Tables 2 and 3 give additional navigational information.

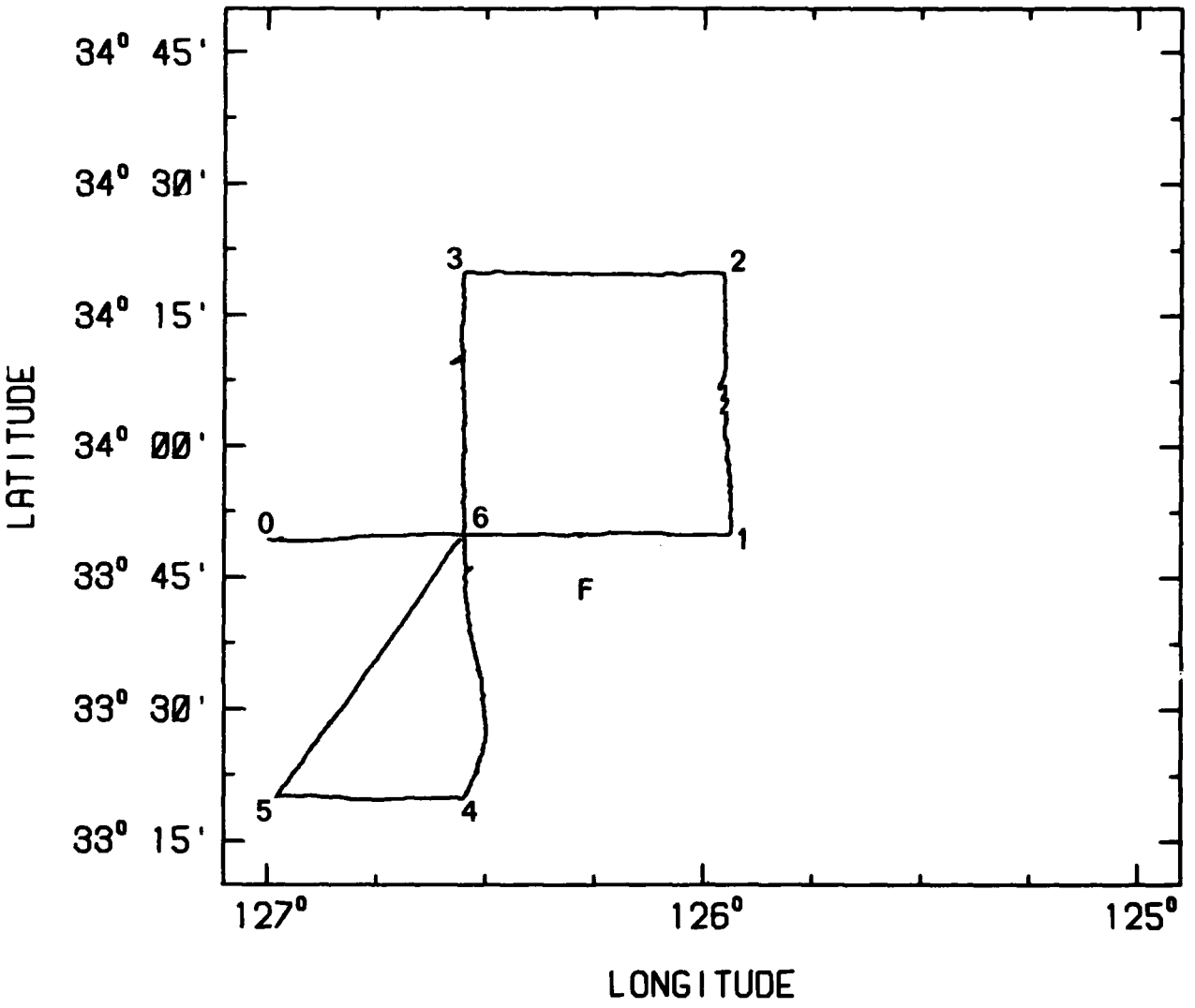


Figure 1. Tow track for Run 1. The Richman/de Szoeke drifting current meter array was near corner 6. The F marks FLIP's location at the beginnng of the tow. The tow began at 1800 on 27-Oct-1983 and ended at 1356 on 29-Oct-1983. The positions plotted are 2 minute LORAN-C positions. Tables 2 and 3 give additional navigational information.

Table 3. (continued)

Date (1983)	Times (GMT) from	to	Length (hrs)	Tow Speed (m/s)	Length (km)	Isotherms (deg C) No.	High	Low	Run No.	Side
13-Nov	2036	0020	3.68	2.46	32.62	9	17.0	13.0	4	0-1
14-Nov	0020	0320	3.02	2.74	29.74	10	17.0	12.5	4	1-2
	0320	0432	1.22	2.30	10.07	11	17.5	12.5	4	2-3
	0432	0856	4.40	2.33	36.85	10	17.0	12.5	4	3-4
	0856	0954	0.97	2.70	9.41	10	17.0	12.5	4	4-5
	0954	1344	3.83	2.67	36.88	10	17.0	12.5	4	5-6
	1344	1448	1.07	2.42	9.29	10	17.0	12.5	4	6-3
	1448	1908	4.33	2.35	36.64	9	17.0	13.0	4	3-4
	1908	2002	0.92	2.68	8.84	9	17.0	13.0	4	4-5
	2002	2348	3.75	2.71	36.57	9	17.0	13.0	4	5-6
	2348	0600	6.20	2.47	55.12	10	17.0	12.5	4	6-7
15-Nov	0600	1200	6.00	2.43	52.53	12	17.5	12.0	4	7-8
	1200	1800	6.00	2.63	56.85	14	18.0	11.5	4	8-9
	1800	0000	6.00	2.80	60.57	15	18.5	11.5	4	9-10
16-Nov	0000	0600	6.00	2.84	61.32	14	18.5	12.0	4	10-11
	0600	1200	6.00	2.73	59.01	15	19.0	[illegible]0	4	11-12
	1200	1737	5.38	2.73	52.80	12	18.5	13.0	4	12-13

Table 3. Parameters for segments of tows that correspond in most instances to the sides of boxes (Figures 1-5).

Date (1983)	Times (GMT) from	to	Length (hrs)	Tow Speed (m/s)	Length (km)	Isotherms (deg C) No.	High	Low	Run No.	Side
27-Oct	1800	2230	4.50	2.82	45.66	15	18.0	11.0	1	0-6
	2230	0359	5.47	2.84	55.96	16	18.5	11.0	1	6-1
28-Oct	0359	0935	5.60	2.74	55.30	15	18.0	11.0	1	1-2
	0935	1450	5.25	2.89	54.63	14	18.0	11.5	1	2-3
	1450	2100	6.18	2.50	55.63	14	18.0	11.5	1	3-6
	2100	0256	5.92	2.63	55.94	10	18.0	13.5	1	6-4
29-Oct	0256	0734	4.63	2.41	40.24	10	18.0	13.5	1	4-5
	0734	1356	6.40	2.91	66.82	10	18.0	13.5	1	5-6
31-Oct	1905	0000	4.92	2.95	55.28	16	18.5	11.0	2	0-0'
1-Nov	0000	0430	4.48	2.89	46.70	15	18.5	11.5	2	0'-1
	0430	1038	6.13	2.50	55.12	10	18.5	14.0	2	1-2
	1038	1602	5.40	2.89	56.14	9	18.0	14.0	2	2-3
	1602	2200	5.98	2.67	57.51	12	18.0	12.5	2	3-0'
	2200	0340	5.65	2.68	54.46	14	18.0	11.5	2	0'-4
2-Nov	0340	0830	4.83	3.07	54.41	14	18.0	11.5	2	4-5
	0830	1449	6.33	2.64	60.14	14	18.0	11.5	2	5-0
	1449	1530	0.68	2.76	6.79	17	18.5	10.5	2	0-9
	1530	2107	5.60	2.80	56.37	11	18.0	13.0	2	9-6
	2107	0309	6.03	2.62	56.90	10	18.0	13.5	2	6-7
3-Nov	0309	0845	5.60	2.80	56.43	11	18.0	13.0	2	7-8
	0845	1541	6.97	2.66	66.62	15	18.0	11.0	2	8-9
6-Nov	2103	0219	5.25	2.74	51.83	15	18.5	11.5	3	0-1
7-Nov	0219	0741	5.37	2.85	55.15	14	18.0	11.5	3	1-2
	0741	1241	5.00	3.10	55.74	14	18.0	11.5	3	2-3
	1241	1742	5.02	3.06	55.35	14	18.0	11.5	3	3-4
	1742	2305	5.37	2.79	53.97	13	18.0	12.0	3	4-5
	2305	0503	5.97	2.58	55.50	11	18.0	13.0	3	5-6
8-Nov	0503	1101	5.97	2.59	55.71	9	18.0	14.0	3	6-7
	1101	1702	6.02	2.58	55.89	9	18.0	14.0	3	7-8
	1702	2218	5.27	2.93	55.64	11	18.0	13.0	3	0-1
	2218	0334	5.27	2.91	55.09	14	18.0	11.5	3	1-2
9-Nov	0334	0942	6.13	2.51	55.53	13	18.0	12.0	3	2-3
	0942	1432	4.83	3.28	57.10	13	18.0	12.0	3	3-4
	1432	1952	5.35	2.88	55.45	13	18.0	12.0	3	4-5
	1952	0129	5.60	2.64	53.29	13	18.0	12.0	3	5-6
10-Nov	0129	0243	1.27	2.36	10.76	13	18.0	12.0	3	6-7

Table 2. (continued)

Date (1983)	Time (GMT)	N. Latitude (deg) (min)	W. Longitude (deg) (min)	Comments
13-Nov	2036	32 16.01	121 51.67	Start Run 4
14-Nov	0020	32 26.55	122 08.75	Turn to 172°
	0320	32 10.64	122 06.66	Turn to 083°
	0432	32 10.93	122 00.34	Turn to 000°
	0856	32 30.90	122 00.04	Turn to 270°
	0954	32 30.93	122 06.06	Turn to 180°
	1344	32 11.00	122 05.90	Turn to 090°
	1448	32 11.03	121 59.99	Turn to 000°
	1908	32 30.85	122 00.40	Turn to 270°
	2002	32 30.89	122 05.93	Turn to 180°
	2348	32 10.99	122 05.96	Turn to 080°
15-Nov	0600	32 14.56	121 31.18	
	1200	32 20.42	120 58.45	
	1800	32 25.80	120 22.78	
	1813	---	---	Turn to 100°
16-Nov	0000	32 20.65	119 44.77	
	0445	---	---	Turn to 070°
	0600	32 17.81	119 06.19	
	1200	32 24.71	118 29.48	
	1637	---	---	Turn to 120°
	1705	---	---	Turn to 080°
	1737	32 30.32	117 56.80	End Run 4

Mildex Run 3
Average sensor depth for each tow segment.

Box side: Channel	0-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8
0	111.65	110.49	108.69	110.10	106.56	97.67	96.83	97.13
2	109.60	108.45	106.65	108.07	104.52	95.63	94.79	95.09
3	107.56	106.42	104.62	106.03	102.49	93.59	92.75	93.05
4	105.53	104.38	102.58	103.99	100.46	91.55	90.72	91.01
5	101.46	100.31	98.52	99.92	96.41	87.48	86.65	86.94
6	101.46	100.31	98.52	99.92	96.41	87.48	86.65	86.94
7	97.40	96.25	94.47	95.87	92.37	83.42	82.59	82.88
8	93.35	92.20	90.43	91.82	88.35	79.36	78.54	78.83
9	89.31	88.16	86.40	87.78	84.35	75.31	74.40	74.79
10	85.27	84.13	82.39	83.76	80.37	71.27	70.47	70.75
11	81.25	80.12	78.40	79.74	76.42	67.24	66.45	66.73
12	77.23	76.12	74.42	75.75	72.49	63.22	62.45	62.73
13	73.23	72.13	70.47	71.77	68.58	59.22	58.46	58.73
14	69.24	68.16	66.53	67.80	64.70	55.22	54.49	54.75
15	65.26	64.20	62.62	63.85	60.84	51.24	50.53	50.78
16	61.29	60.26	58.72	59.93	57.01	47.27	46.59	46.83
17	59.32	58.30	56.78	57.97	55.11	45.30	44.63	44.87
18	57.34	56.34	54.85	56.01	53.21	43.32	42.67	42.90
19	57.34	56.34	54.85	56.01	53.21	43.32	42.67	42.90
20	56.36	55.36	53.88	55.04	52.27	42.33	41.69	41.92
21	55.37	54.39	52.92	54.07	51.32	41.35	40.71	40.94
22	54.39	53.41	51.96	53.09	50.38	40.37	39.74	39.96
23	53.41	52.44	51.00	52.12	49.44	39.38	38.76	38.98
24	52.42	51.46	50.04	51.15	48.50	38.40	37.79	38.01
25	51.44	50.49	49.08	50.18	47.57	37.42	36.82	37.03
26	50.46	49.52	48.13	49.22	46.63	36.44	35.85	36.06
27	49.48	48.55	47.17	48.25	45.70	35.46	34.88	35.08
28	48.50	47.58	46.22	47.28	44.77	34.48	33.91	34.11
29	47.53	46.62	45.27	46.32	43.84	33.50	32.94	33.14
30	47.53	46.62	45.27	46.32	43.84	33.50	32.94	33.14
31	45.58	44.68	43.37	44.40	41.98	31.55	31.01	31.20
32	43.63	42.76	41.48	42.48	40.13	29.60	29.08	29.26
33	39.74	38.92	37.71	38.66	36.46	25.72	25.24	25.41
34	32.02	31.30	30.26	31.07	29.20	18.00	17.62	17.75
35	24.37	23.77	22.90	23.58	22.05	10.35	10.08	10.17
1	16.78	16.31	15.65	16.17	15.01	2.77	2.62	2.67

Mildex Run 3
Average sensor depth for each tow segment.

Box side: Channel	0-1[1]	1-2[1]	2-3[1]	3-4[1]	4-5[1]	5-6[1]	6-7[1]
0	96.73	110.54	111.89	109.77	110.50	110.90	113.35
2	94.69	108.50	109.85	107.73	108.47	108.86	111.30
3	92.65	106.46	107.81	105.69	106.43	106.82	109.25
4	90.61	104.43	105.77	103.66	104.39	104.78	107.20
5	86.54	100.37	101.70	99.59	100.32	100.71	103.11
6	86.54	100.37	101.70	99.59	100.32	100.71	103.11
7	82.48	96.31	97.63	95.53	96.26	96.65	99.02
8	78.43	92.27	93.58	91.49	92.21	92.60	94.93
9	74.39	88.23	89.53	87.45	88.17	88.52	90.85
10	70.37	84.21	85.48	83.43	84.14	84.52	86.78
11	66.35	80.20	81.45	79.42	80.13	80.50	82.72
12	62.35	76.20	77.43	75.43	76.12	76.49	78.66
13	58.37	72.21	73.42	71.45	72.14	72.50	74.62
14	54.40	68.24	69.42	67.50	68.16	68.52	70.58
15	50.44	64.29	65.44	63.55	64.21	64.55	66.56
16	46.50	60.35	61.46	59.63	60.27	60.60	62.54
17	44.55	58.39	59.48	57.68	58.30	58.64	60.54
18	42.58	56.43	57.50	55.73	56.34	56.67	58.54
19	42.58	56.43	57.50	55.73	56.34	56.67	58.54
20	41.61	55.45	56.52	54.76	55.37	55.69	57.54
21	40.63	54.48	55.53	53.79	54.39	54.71	56.54
22	39.66	53.50	54.54	52.82	53.41	53.73	55.55
23	38.68	52.53	53.56	51.85	52.44	52.75	54.55
24	37.71	51.55	52.57	50.88	51.47	51.78	53.55
25	36.74	50.58	51.59	49.92	50.49	50.80	52.56
26	35.77	49.61	50.61	48.95	49.52	49.83	51.56
27	34.80	48.64	49.63	47.99	48.54	48.86	50.57
28	33.83	47.67	48.65	47.02	47.57	47.88	49.58
29	32.87	46.70	47.67	46.06	46.62	46.91	48.58
30	32.87	46.70	47.67	46.06	46.62	46.91	48.58
31	30.94	44.77	45.71	44.15	44.69	44.97	46.60
32	29.01	42.84	43.76	42.23	42.76	43.04	44.62
33	25.18	39.00	39.87	38.42	38.92	39.19	40.67
34	17.57	31.38	32.13	30.87	31.30	31.53	32.82
35	10.04	23.83	24.45	23.41	23.77	23.96	25.01
1	2.60	16.37	16.84	16.04	16.31	16.46	17.26

[1]The second traverse of this tow segment.

Mildex Run 4
Averge sensor depth for each tow segment.

Box side: Channel	0-1	1-2	2-3	3-4	4-5	5-6	6-3	3-4[1]
0	105.17	104.08	106.23	105.14	105.51	104.90	105.67	105.35
2	103.13	102.04	104.18	103.10	103.45	102.86	103.61	103.31
3	101.10	100.00	102.12	101.06	101.40	100.82	101.56	101.27
4	99.06	97.96	100.07	99.02	99.34	98.78	99.51	99.22
5	94.99	93.88	95.97	94.94	95.23	94.70	95.41	95.15
6	94.99	93.88	95.97	94.94	95.23	94.70	95.41	95.15
7	90.92	89.81	91.88	90.87	91.13	90.63	91.31	91.07
8	86.86	85.75	87.79	86.80	87.03	86.56	87.22	87.01
9	82.81	81.70	83.70	82.74	82.95	82.50	83.14	82.94
10	78.76	77.65	79.63	78.69	78.87	78.45	79.07	78.89
11	74.72	73.62	75.55	74.64	74.79	74.41	75.00	74.84
12	70.69	69.60	71.49	70.61	70.73	70.38	70.94	70.80
13	66.67	65.59	67.43	66.58	66.68	66.35	66.89	66.77
14	62.65	61.59	63.38	62.56	62.64	62.34	62.85	62.75
15	58.64	57.61	59.34	58.55	58.61	58.34	58.82	58.73
16	54.65	53.64	55.30	54.56	54.60	54.34	54.80	54.73
17	52.65	51.66	53.29	52.56	52.59	52.35	52.80	52.73
18	50.66	49.69	51.28	50.57	50.59	50.36	50.79	50.74
19	50.66	49.69	51.28	50.57	50.59	50.36	50.79	50.74
20	49.67	48.70	50.28	49.58	49.59	49.37	49.79	49.74
21	48.67	47.72	49.27	48.58	48.59	48.38	48.79	48.75
22	47.68	46.73	48.27	47.59	47.60	47.39	47.80	47.75
23	46.69	45.75	47.27	46.59	46.60	46.40	46.80	46.76
24	45.69	44.77	46.26	45.60	45.61	45.41	45.80	45.76
25	44.70	43.78	45.26	44.61	44.61	44.42	44.80	44.77
26	43.71	42.80	44.26	43.62	43.62	43.43	43.81	43.78
27	42.72	41.82	43.26	42.63	42.62	42.44	42.81	42.78
28	41.73	40.85	42.26	41.64	41.63	41.46	41.82	41.79
29	40.74	39.87	41.26	40.65	40.64	40.47	40.83	40.80
30	40.74	39.87	41.26	40.65	40.64	40.47	40.83	40.80
31	38.77	37.92	39.27	38.68	38.66	38.50	38.84	38.82
32	36.79	35.97	37.27	36.71	36.68	36.53	36.86	36.85
33	32.86	32.08	33.30	32.78	32.74	32.61	32.91	32.90
34	25.02	24.37	25.37	24.95	24.90	24.81	25.04	25.06
35	17.23	16.72	17.49	17.17	17.12	17.07	17.23	17.26
1	9.50	9.14	9.66	9.45	9.40	9.38	9.48	9.51

[1]The second traverse of this tow segment.

Mildex Run 4
Averge sensor depth for each tow segment.

Box side: Channel	4-5[1]	5-6[1]	6-7	7-8	8-9	9-10	10-11	11-12
0	105.70	104.74	105.06	105.08	104.64	103.74	104.10	103.99
2	103.64	102.70	103.02	103.04	102.60	101.70	102.06	101.95
3	101.58	100.66	100.98	101.00	100.56	99.66	100.03	99.91
4	99.53	98.62	98.94	98.96	98.52	97.62	97.99	97.87
5	95.42	94.54	94.87	94.88	94.45	93.55	93.92	93.80
6	95.42	94.54	94.87	94.88	94.45	93.55	93.92	93.80
7	91.31	90.47	90.80	90.81	90.38	89.49	89.85	89.74
8	87.21	86.40	86.74	86.75	86.32	85.43	85.79	85.68
9	83.12	82.35	82.68	82.69	82.26	81.38	81.74	81.63
10	79.03	78.30	78.63	78.64	78.22	77.35	77.70	77.60
11	74.96	74.26	74.59	74.60	74.18	73.33	73.68	73.57
12	70.89	70.23	70.55	70.56	70.15	69.31	69.66	69.55
13	66.84	66.20	66.53	66.54	66.14	65.31	65.64	65.55
14	62.79	62.19	62.51	62.52	62.13	61.33	61.65	61.55
15	58.76	58.20	58.51	58.52	58.13	57.35	57.67	57.57
16	54.73	54.21	54.51	54.52	54.15	53.40	53.70	53.61
17	52.73	52.22	52.52	52.53	52.16	51.42	51.73	51.63
18	50.72	50.23	50.53	50.54	50.18	49.45	49.75	49.66
19	50.72	50.23	50.53	50.54	50.18	49.45	49.75	49.66
20	49.72	49.24	49.53	49.54	49.19	48.47	48.76	48.67
21	48.72	48.25	48.54	48.55	48.20	47.49	47.78	47.69
22	47.72	47.26	47.55	47.56	47.21	46.51	46.79	46.71
23	46.73	46.27	46.55	46.56	46.22	45.53	45.81	45.72
24	45.73	45.28	45.56	45.57	45.23	44.55	44.83	44.74
25	44.73	44.30	44.57	44.58	44.25	43.57	43.85	43.76
26	43.74	43.31	43.58	43.59	43.26	42.59	42.87	42.78
27	42.74	42.32	42.59	42.60	42.28	41.62	41.89	41.80
28	41.75	41.34	41.61	41.61	41.29	40.64	40.91	40.83
29	40.75	40.35	40.62	40.63	40.31	39.67	39.93	39.85
30	40.75	40.35	40.62	40.63	40.31	39.67	39.93	39.85
31	38.77	38.39	38.64	38.65	38.35	37.72	37.98	37.90
32	36.79	36.43	36.67	36.68	36.39	35.78	36.03	35.95
33	32.84	32.51	32.74	32.75	32.48	31.91	32.14	32.07
34	24.98	24.73	24.92	24.93	24.70	24.23	24.42	24.36
35	17.18	17.00	17.15	17.16	16.98	16.62	16.76	16.72
1	9.43	9.33	9.44	9.44	9.32	9.08	9.17	9.14

[1]The second traverse of this tow segment.

Mildex Run 4
Averge sensor depth for each tow segment.

Box side:12-13

Channel	
0	104.66
2	102.62
3	100.58
4	98.54
5	94.47
6	94.47
7	90.40
8	86.34
9	82.28
10	78.23
11	74.20
12	70.17
13	66.15
14	62.14
15	58.15
16	54.16
17	52.18
18	50.19
19	50.19
20	49.20
21	48.21
22	47.22
23	46.23
24	45.25
25	44.26
26	43.27
27	42.29
28	41.30
29	40.32
30	40.32
31	38.36
32	36.40
33	32.48
34	24.70
35	16.98
1	9.32

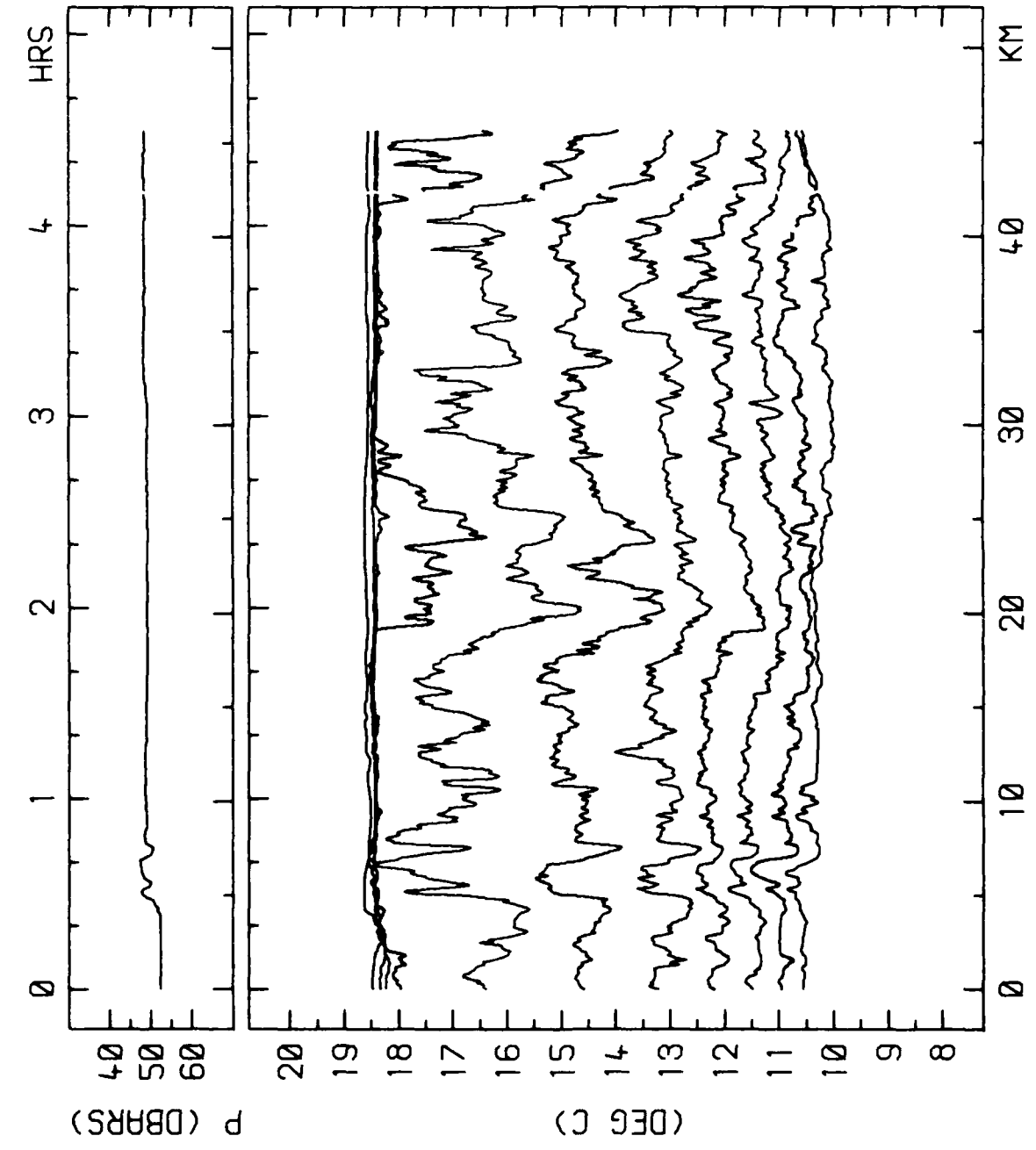
APPENDIX B

Temperature Cross-Sections

On the following pages are plots of temperature measurements as a function of distance and time along each tow segment. Dates and times are GMT. Also plotted is the depth record from the bottommost pressure sensor on the chain. The operating temperature sensors are shown in Table 1. For the plots to be easily legible, not all the operating sensors are plotted. Table B-1 gives the sensors whose data is plotted. Average sensor depths for each tow segment are given in Appendix A. The tow speeds and navigational information are found in Tables 2 and 3. The temperature and pressure measurements are low-pass filtered, computed by averaging over sequential 30-s intervals.

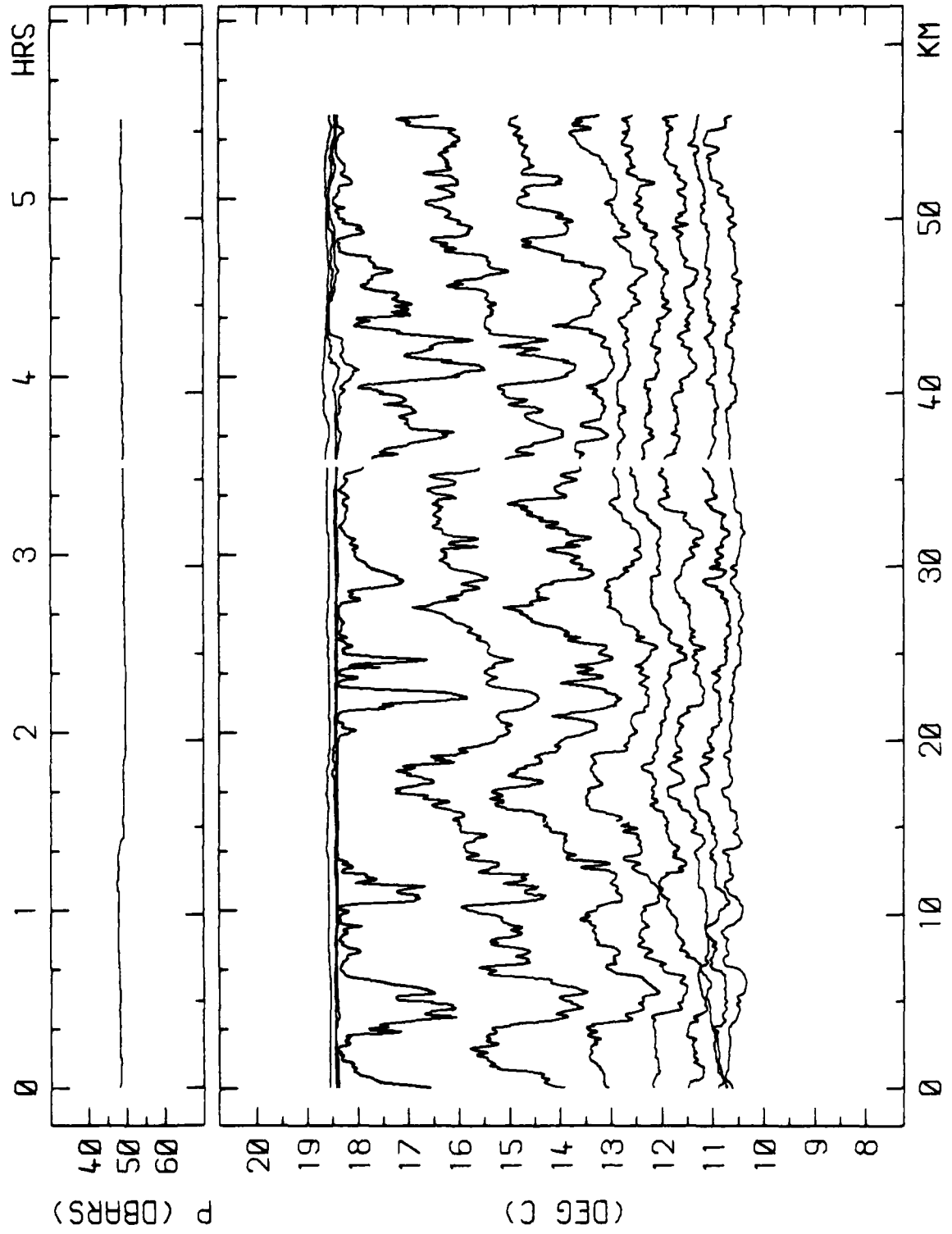
Table B-1. Selection of temperatures plotted on the subsequent plots. Table 1 gives a complete list of all functioning sensors. Appendix A contains a compilation of sensor depths for each tow segment.

Run 1		Run 2		Run 3		Run 4	
Chan No.	Location (chain m)	Chan No.	Location (chain m)	Chan No.	Location (chain m)	Chan No.	Location (chain m)
1	4	2	8	4	12	6	16
4	12	6	16	7	20	7	20
7	20	9	28	9	28	9	28
9	28	11	36	11	36	11	36
11	36	14	48	13	44	13	44
13	44	16	56	15	52	15	52
15	52	21	62	19	60	19	60
19	60	27	68	25	66	26	67
27	68	33	78	30	70	33	78
32	74	35	94	35	94	35	94
35	94			1	102	1	102

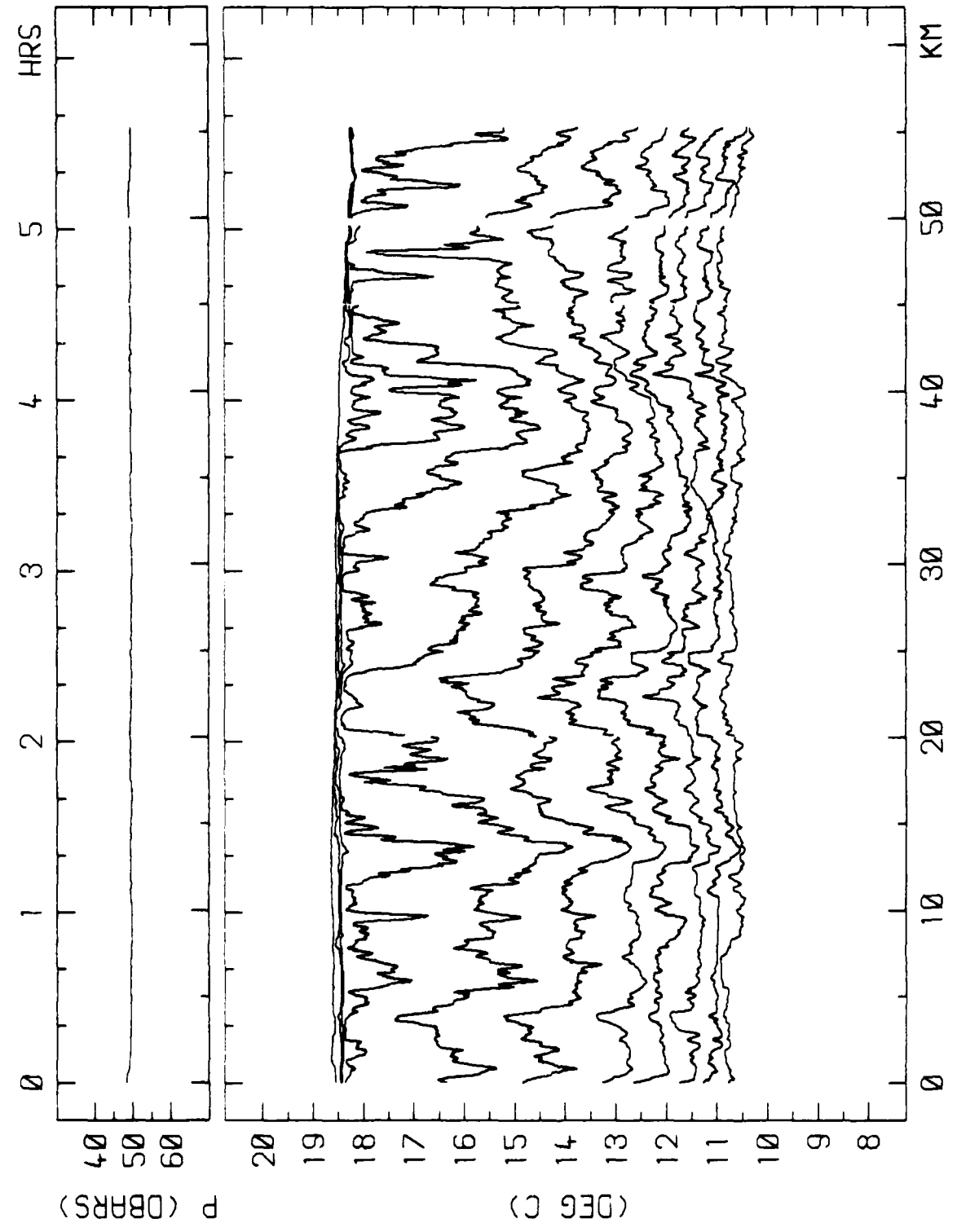


TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.82 M/S
1800 27-OCT-83 TO 2230 27-OCT-83

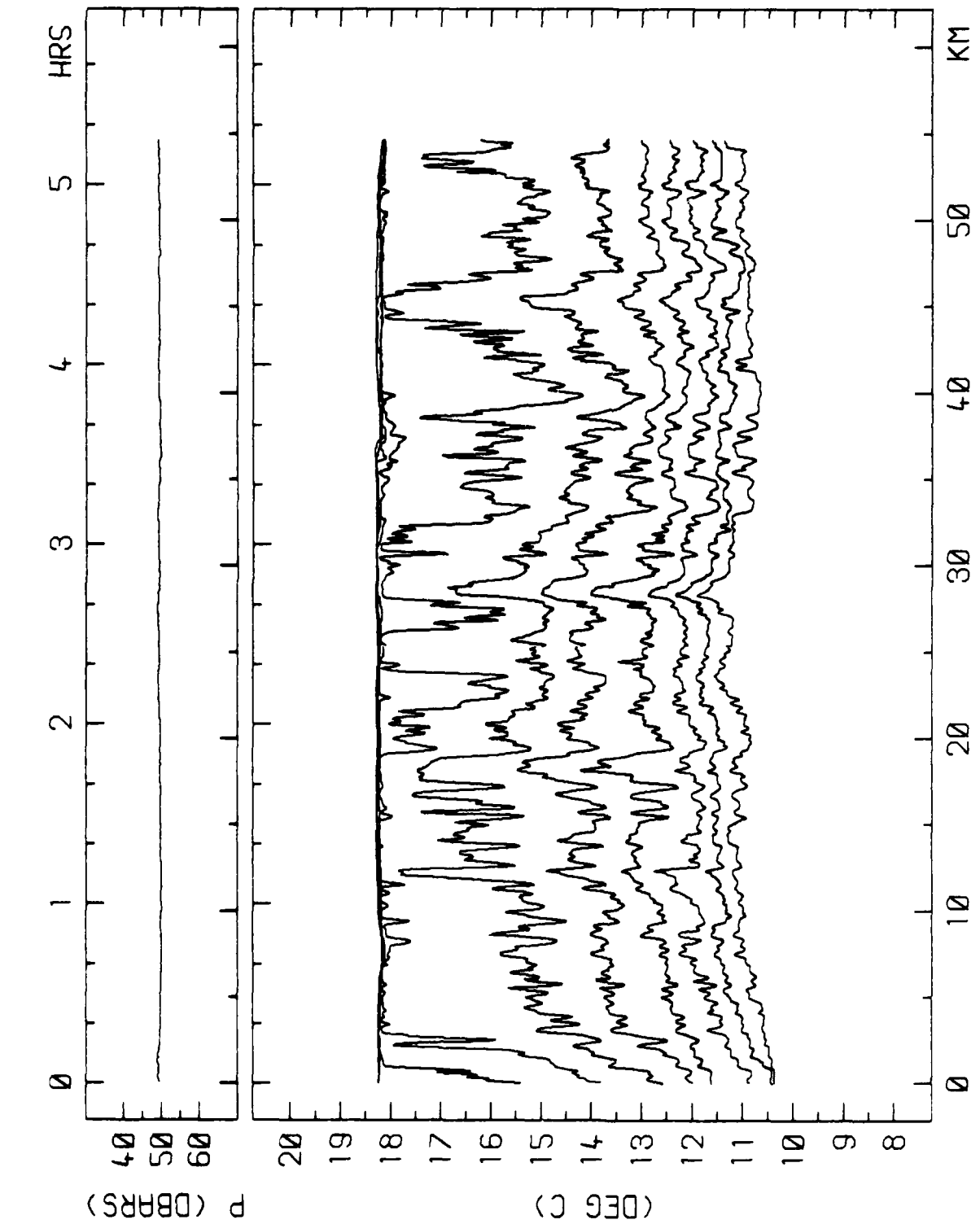
31



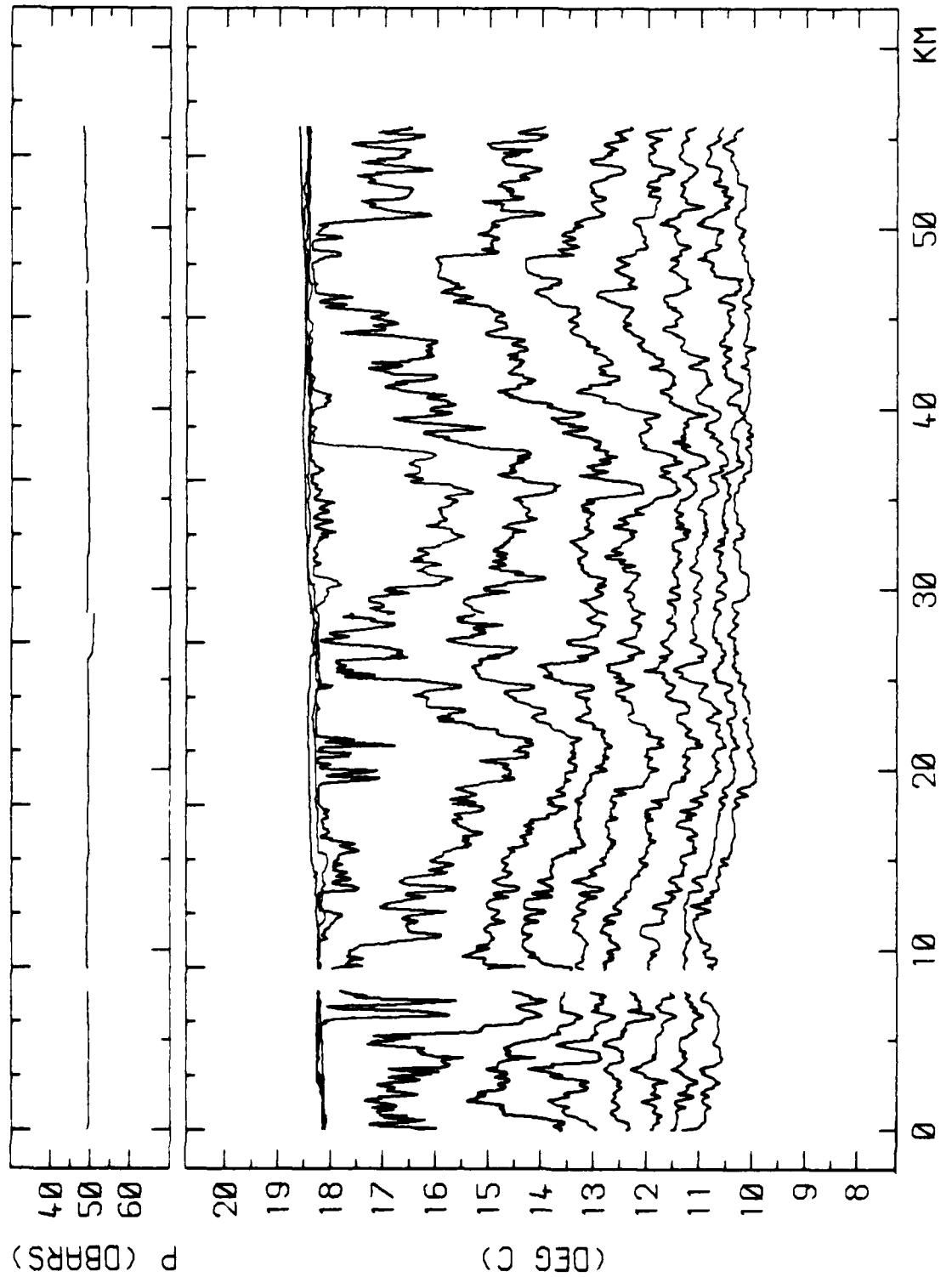
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.84 M/S
2231 27-OCT-83 TO 0358 28-OCT-83

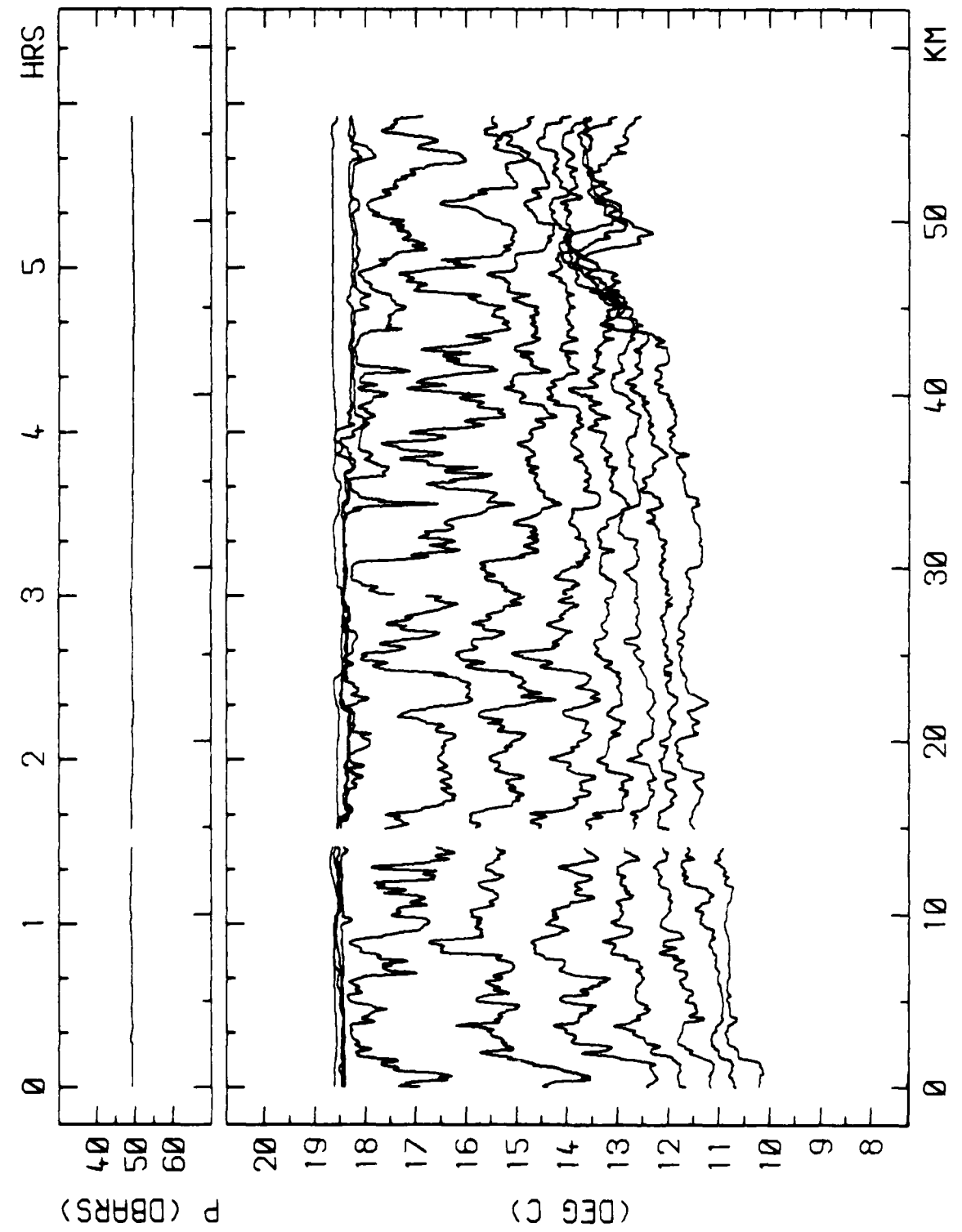


TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.74 M/S
0359 28-OCT-83 TO 0934 28-OCT-83

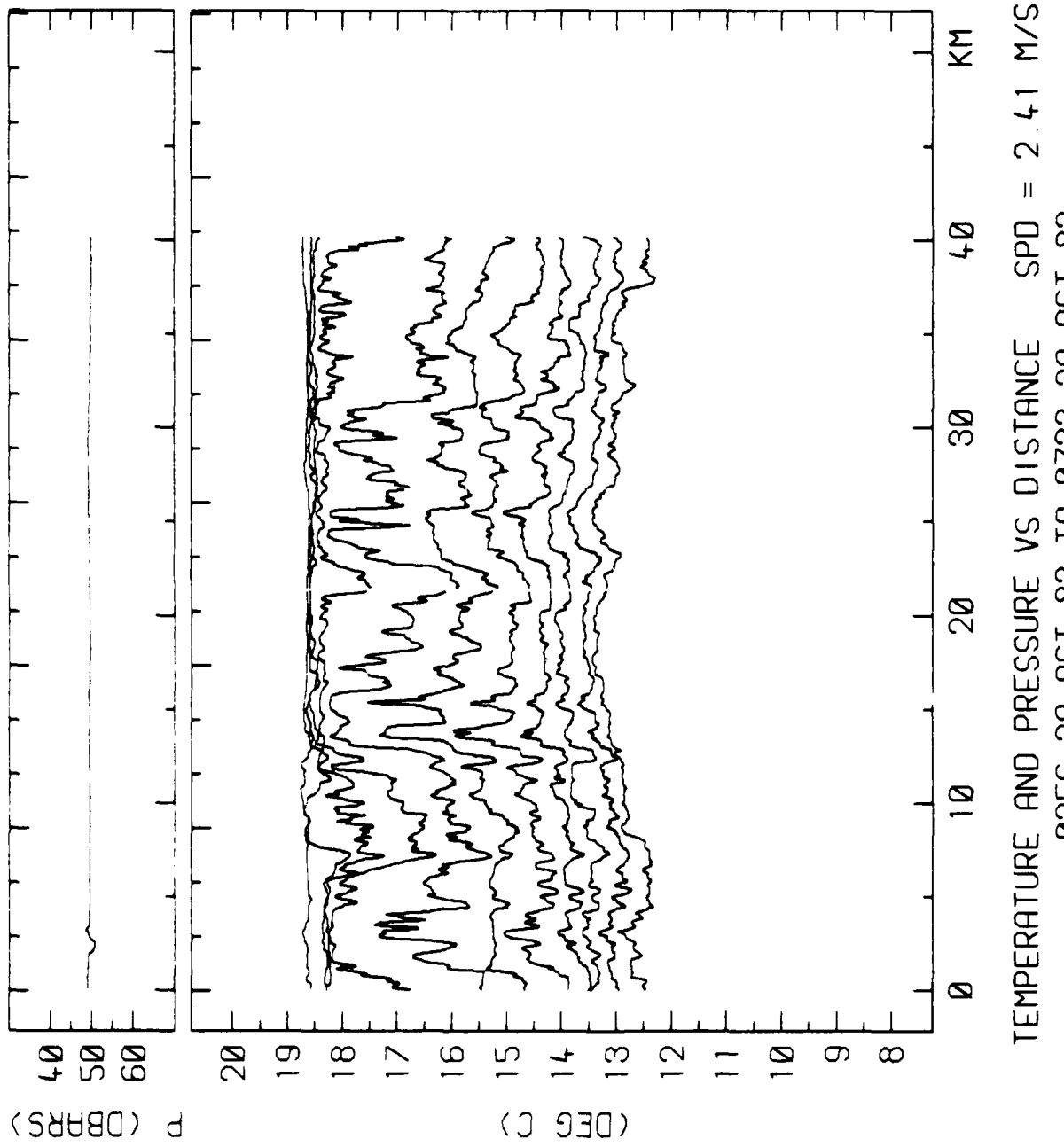


TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.89 M/S
0935 28-OCT-83 TO 1449 28-OCT-83

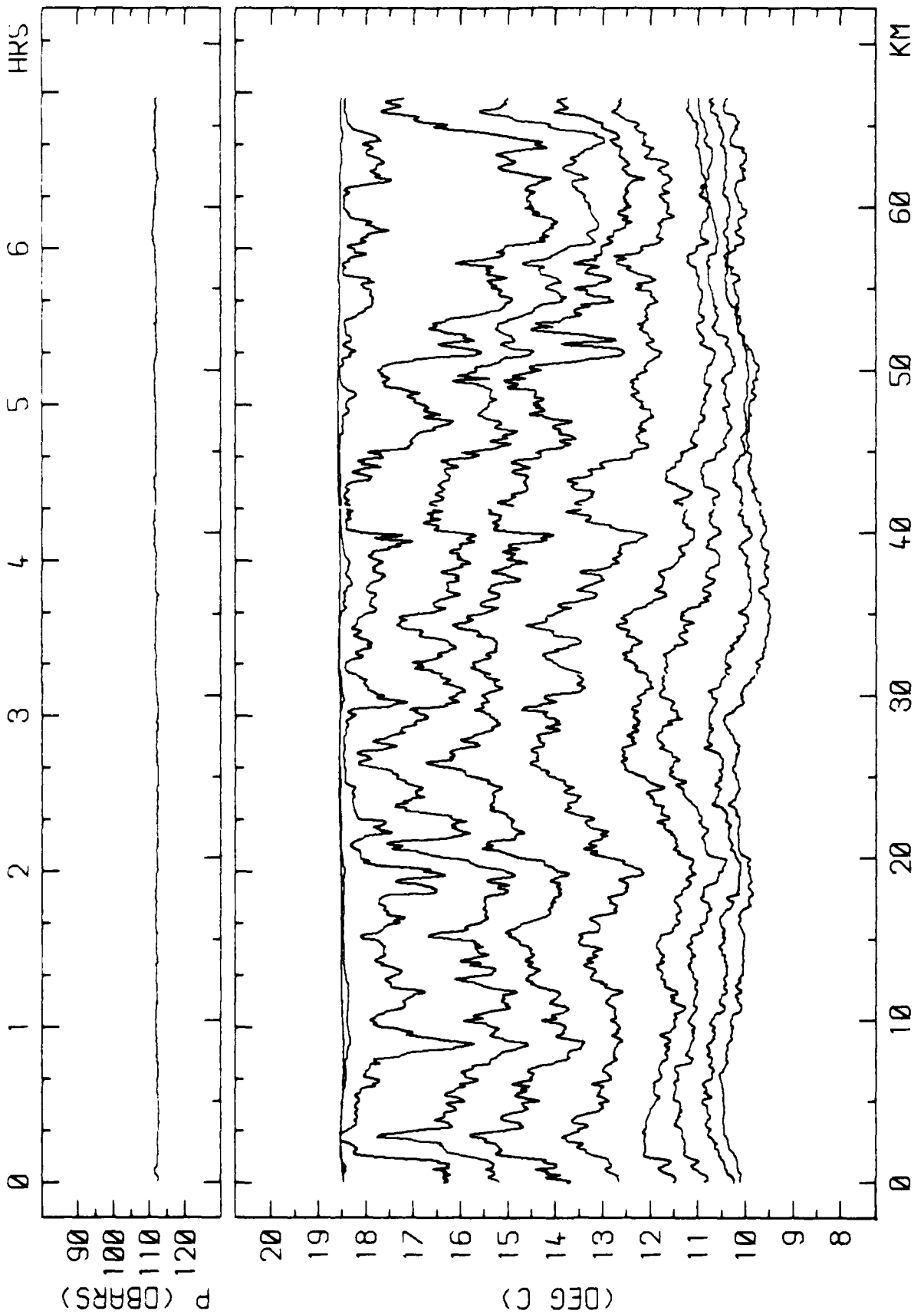

HRS
KM
P (DBARS)
(DEG C)
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.50 M/S
1450 28-OCT-83 TO 2100 28-OCT-83

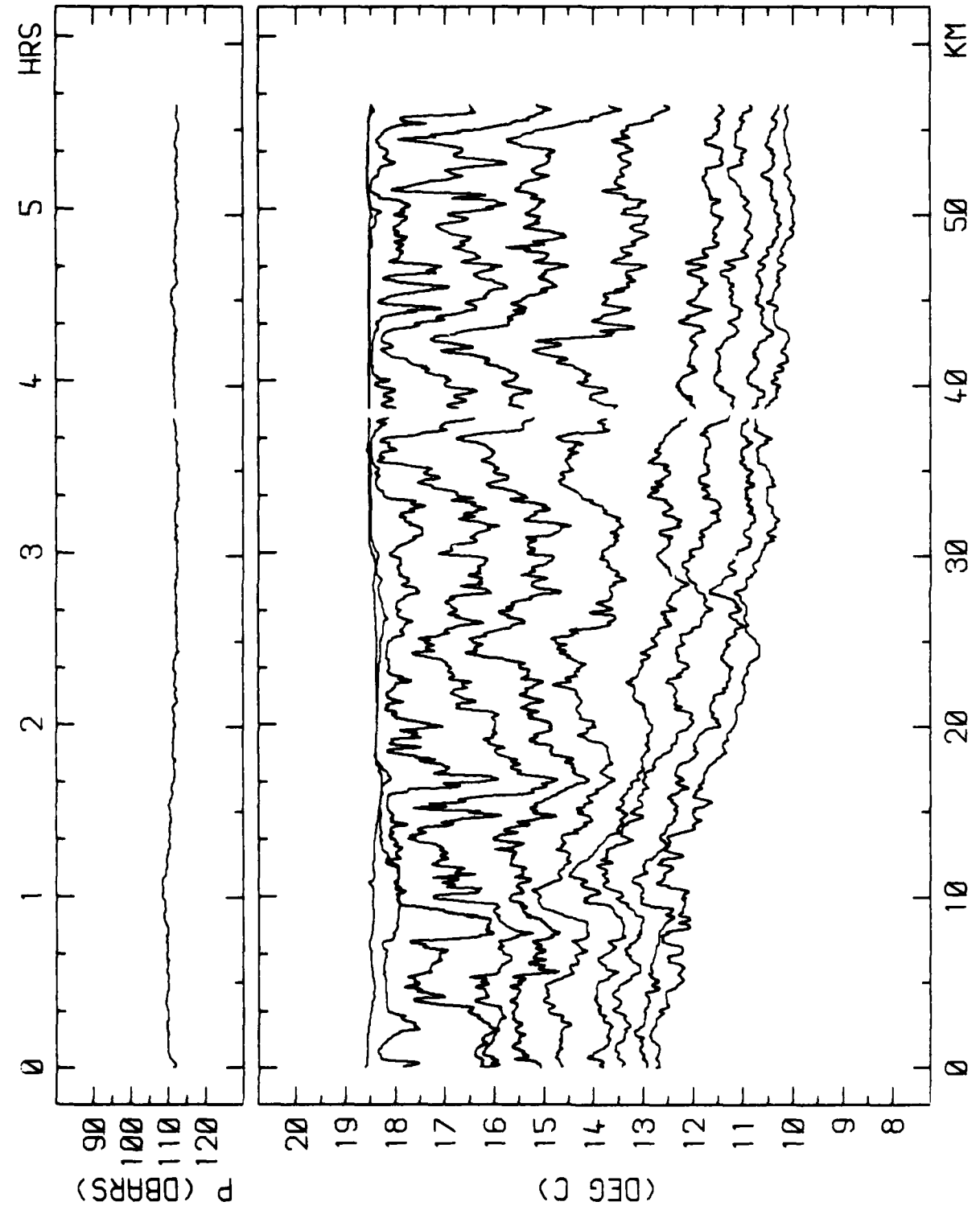


TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.63 M/S
2101 28-OCT-83 TO 0255 29-OCT-83

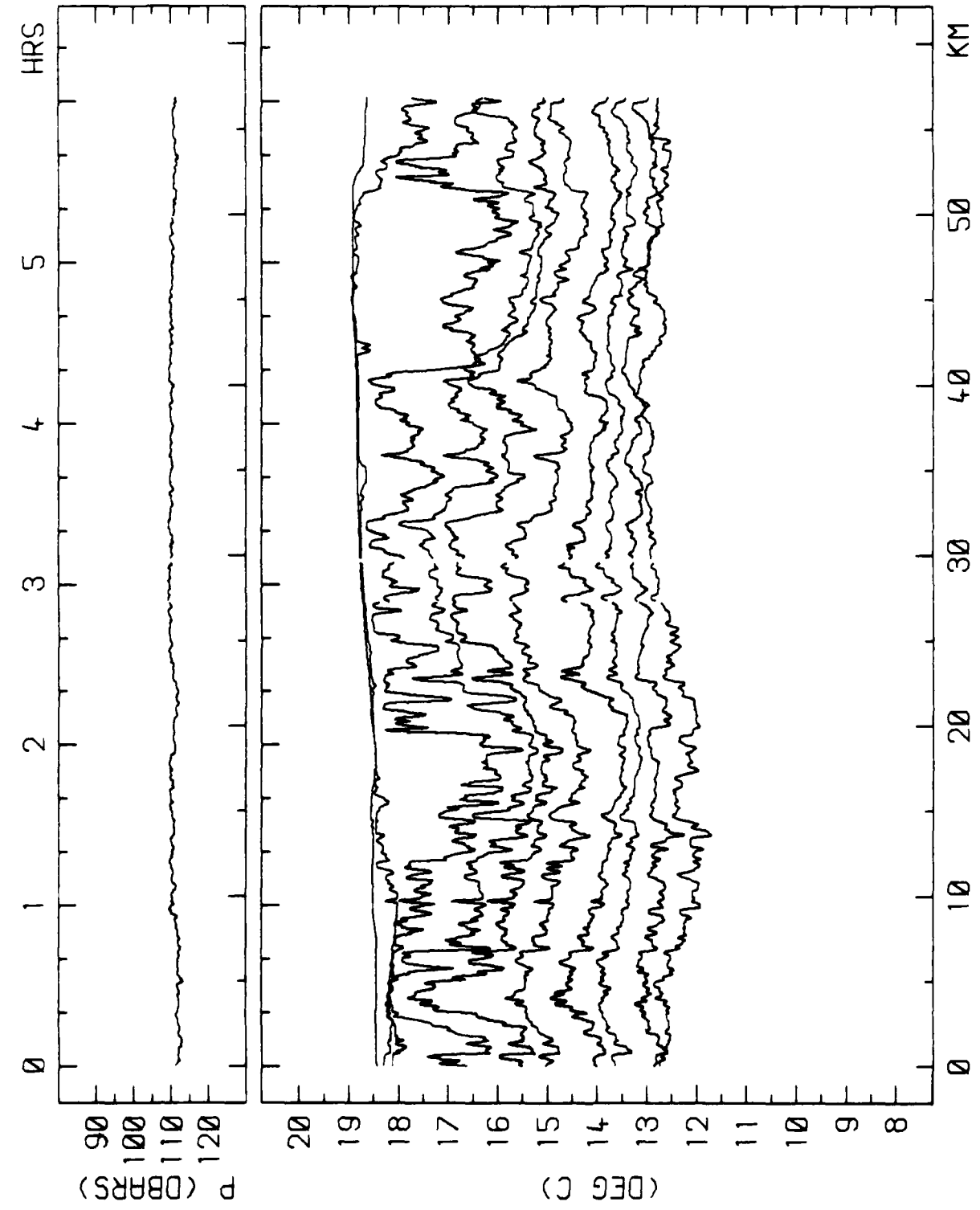


TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.41 M/S
0256 29-OCT-83 TO 0733 29-OCT-83

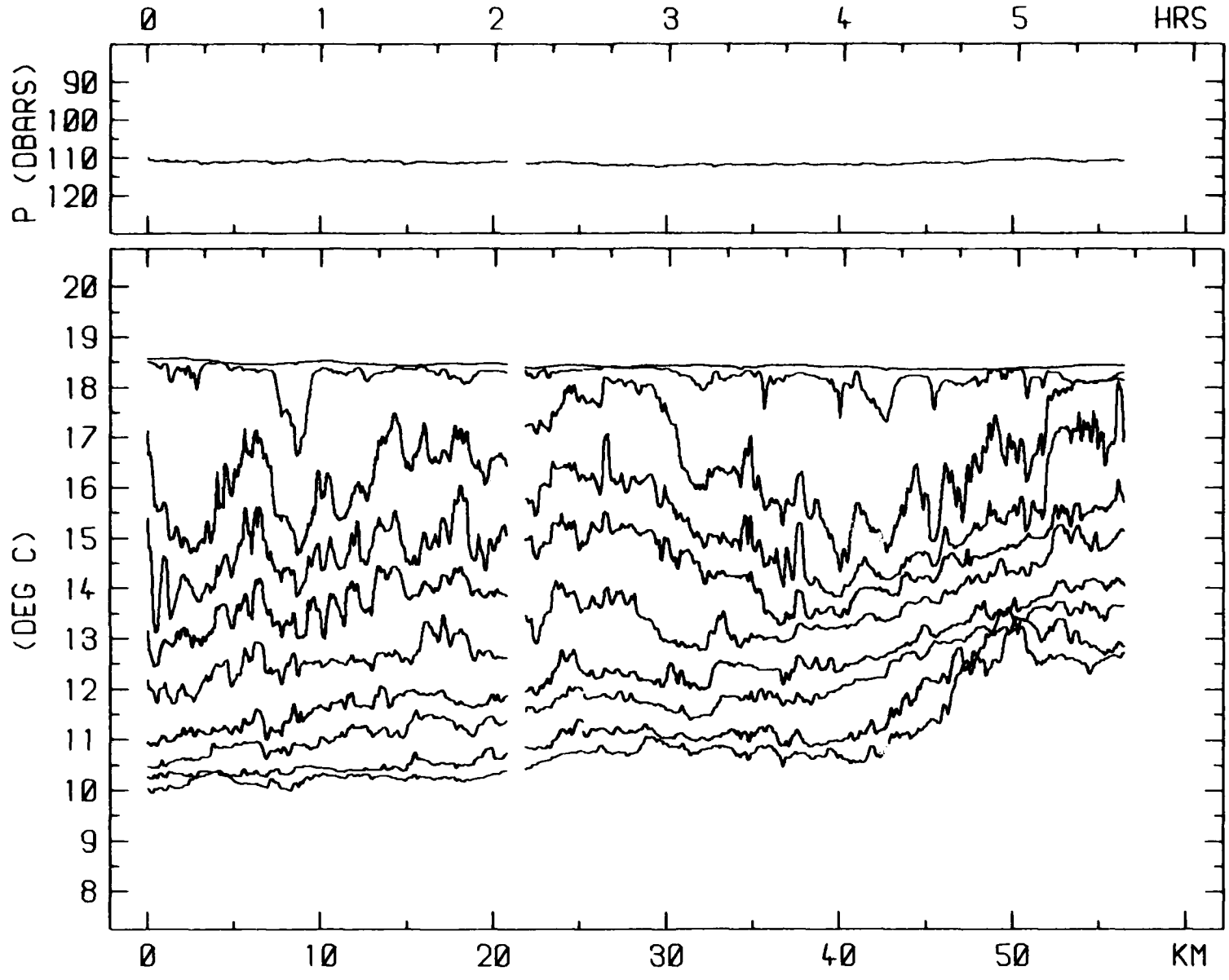

HRS
P (DBARS)
(DEG C)
KM
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.66 M/S
0845 3-NOV-83 TO 1541 3-NOV-83



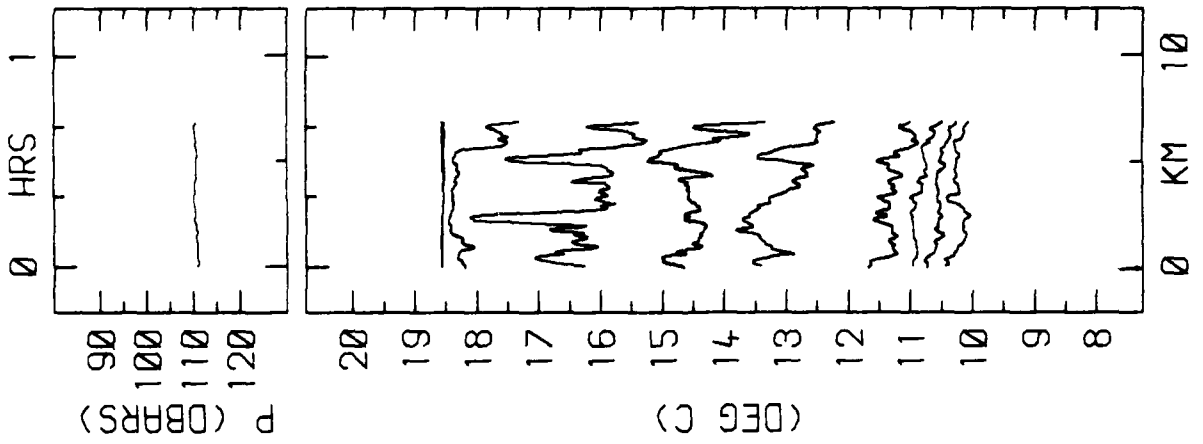
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.80 M/S
0309 3-NOV-83 TO 0844 3-NOV-83



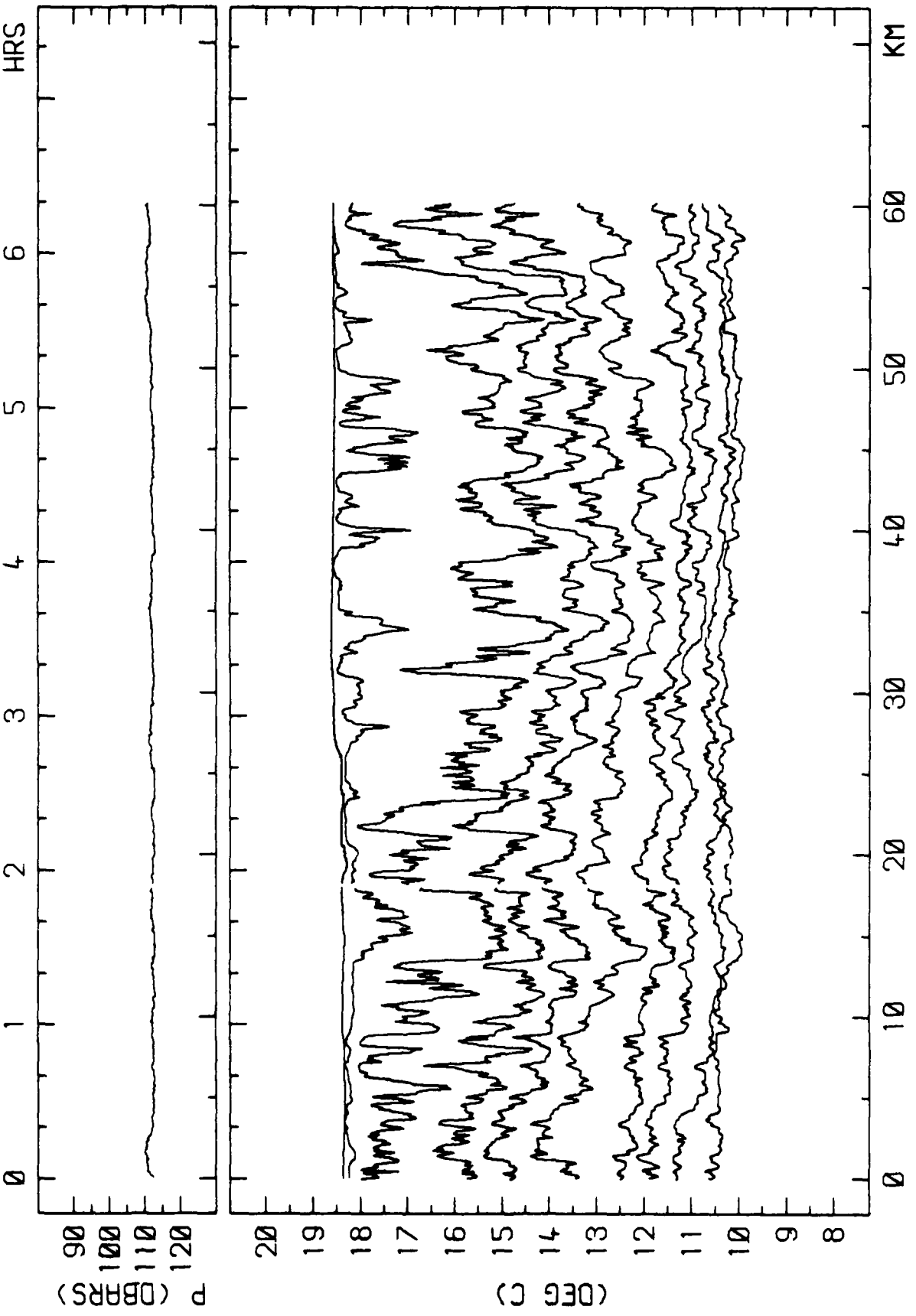
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.62 M/S
2107 2-NOV-83 TO 0308 3-NOV-83



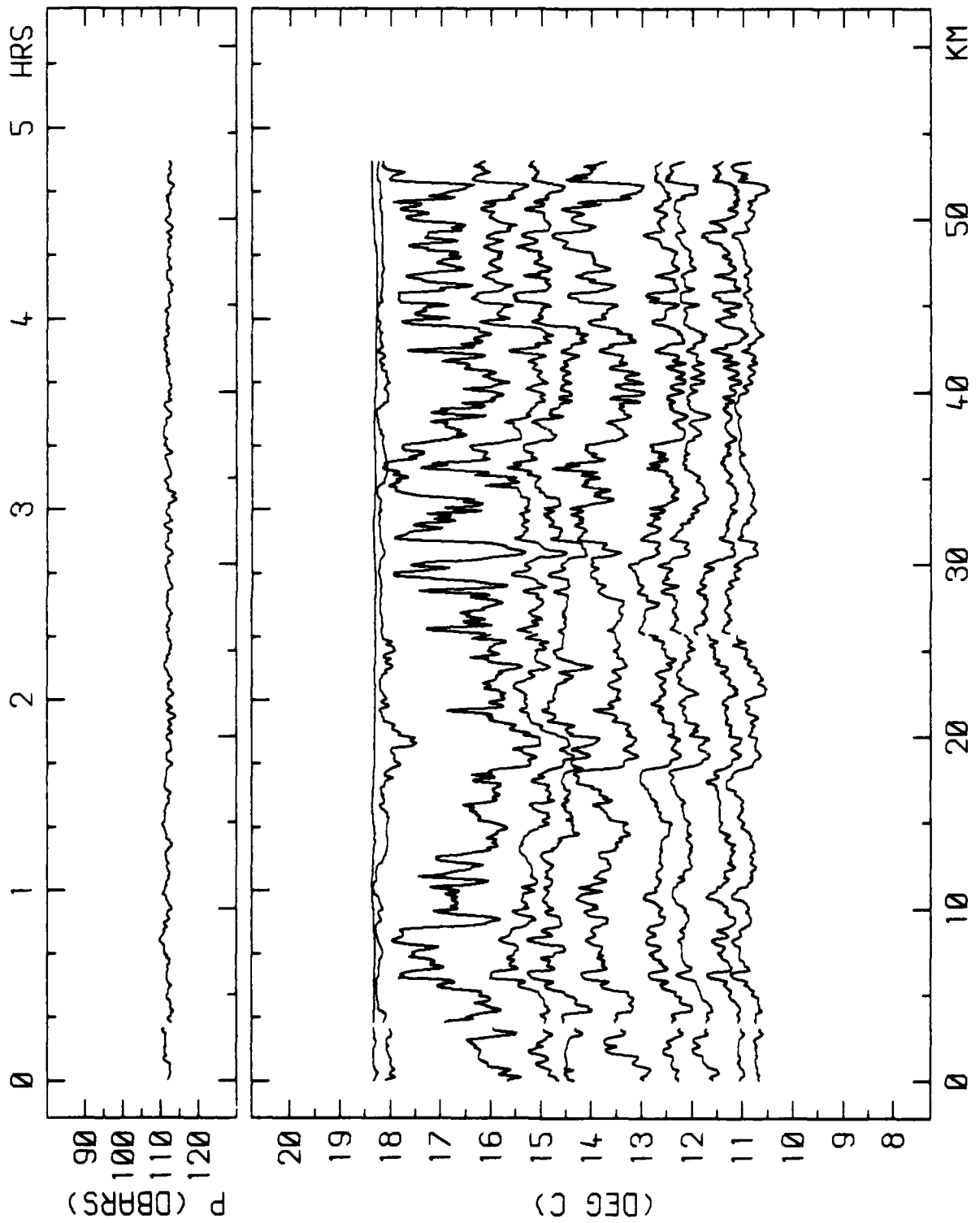
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.80 M/S
1531 2-NOV-83 TO 2106 2-NOV-83



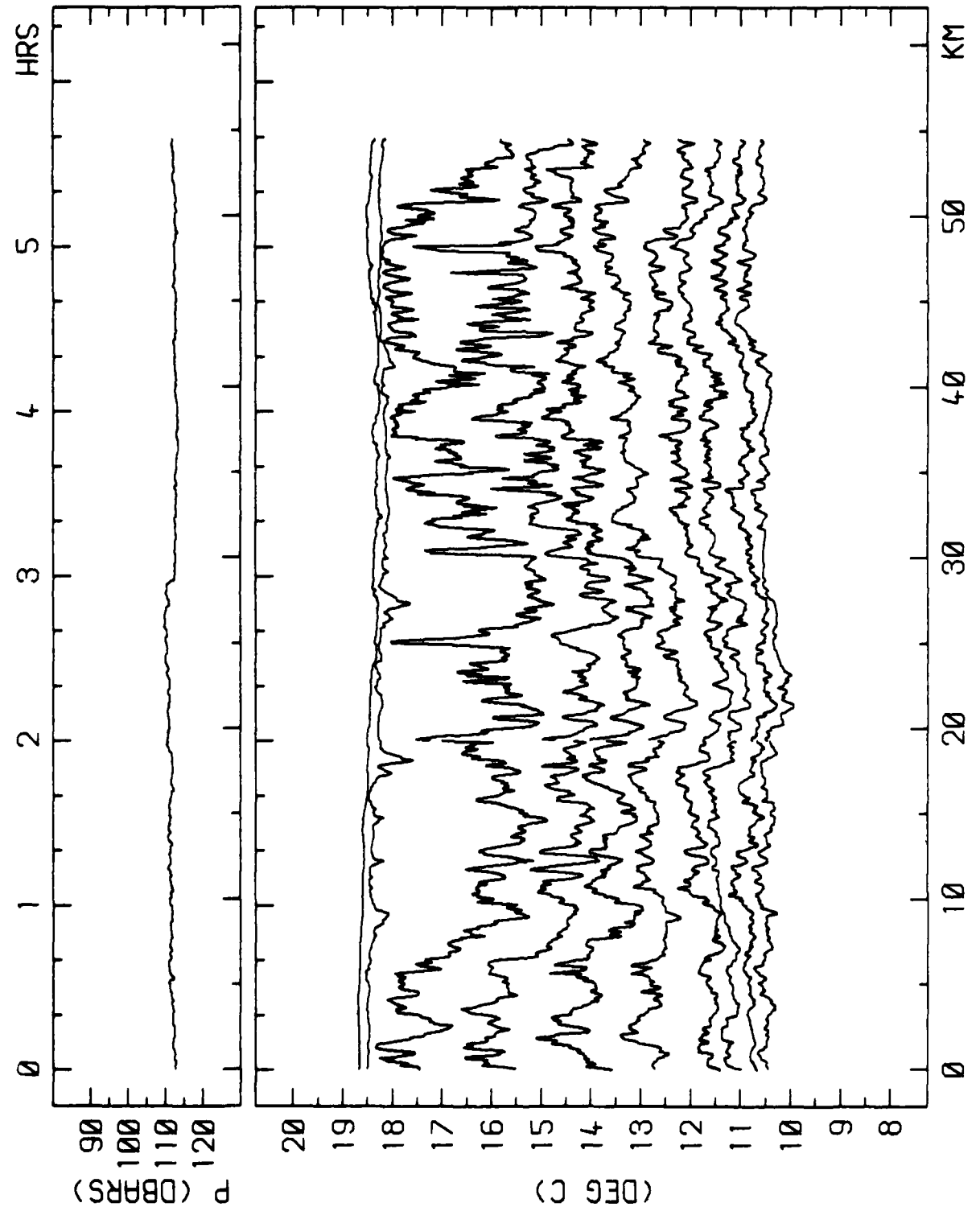
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.76 M/S
1450 2-NOV-83 TO 1530 2-NOV-83



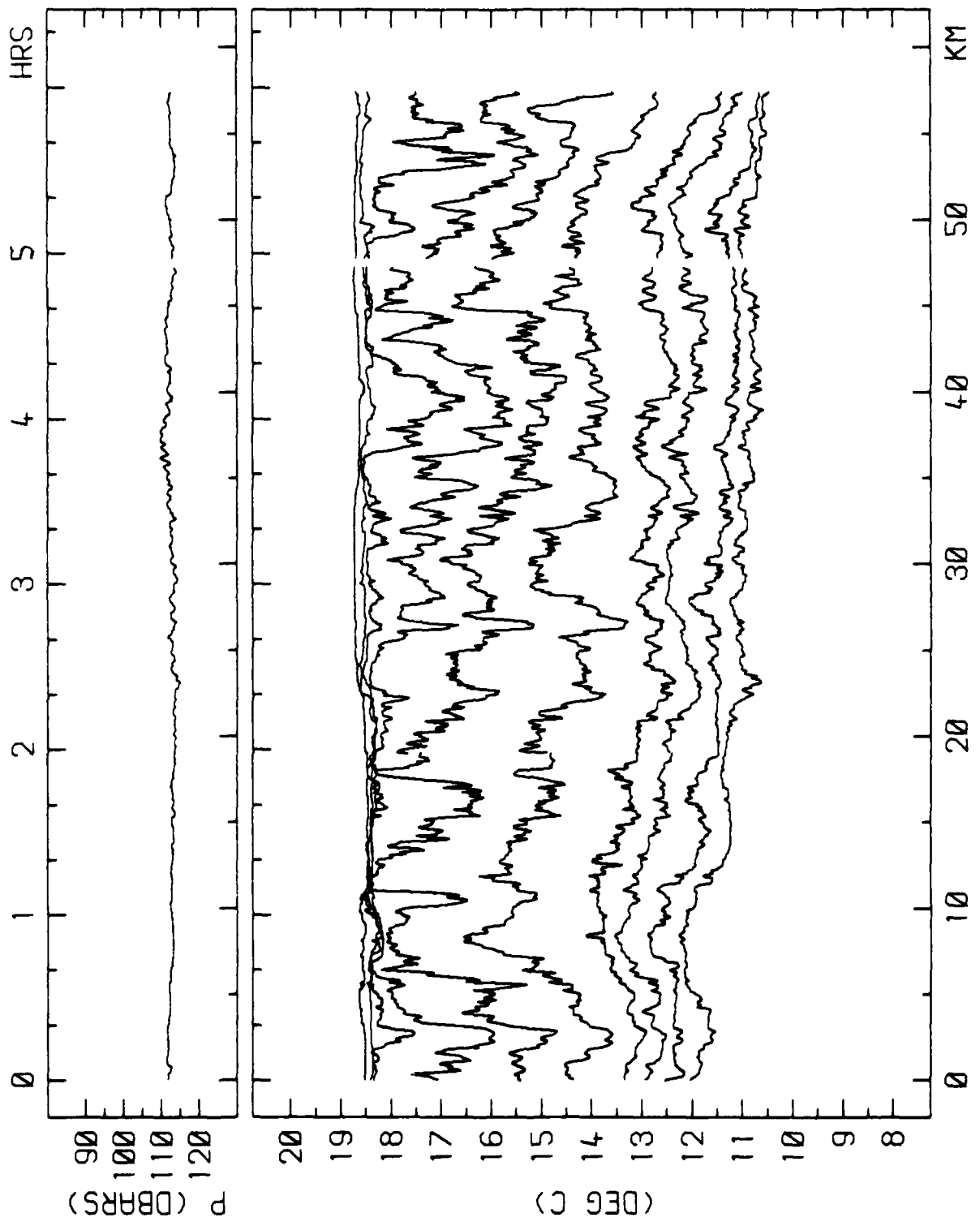
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.64 M/S
0830 2-NOV-83 TO 1449 2-NOV-83



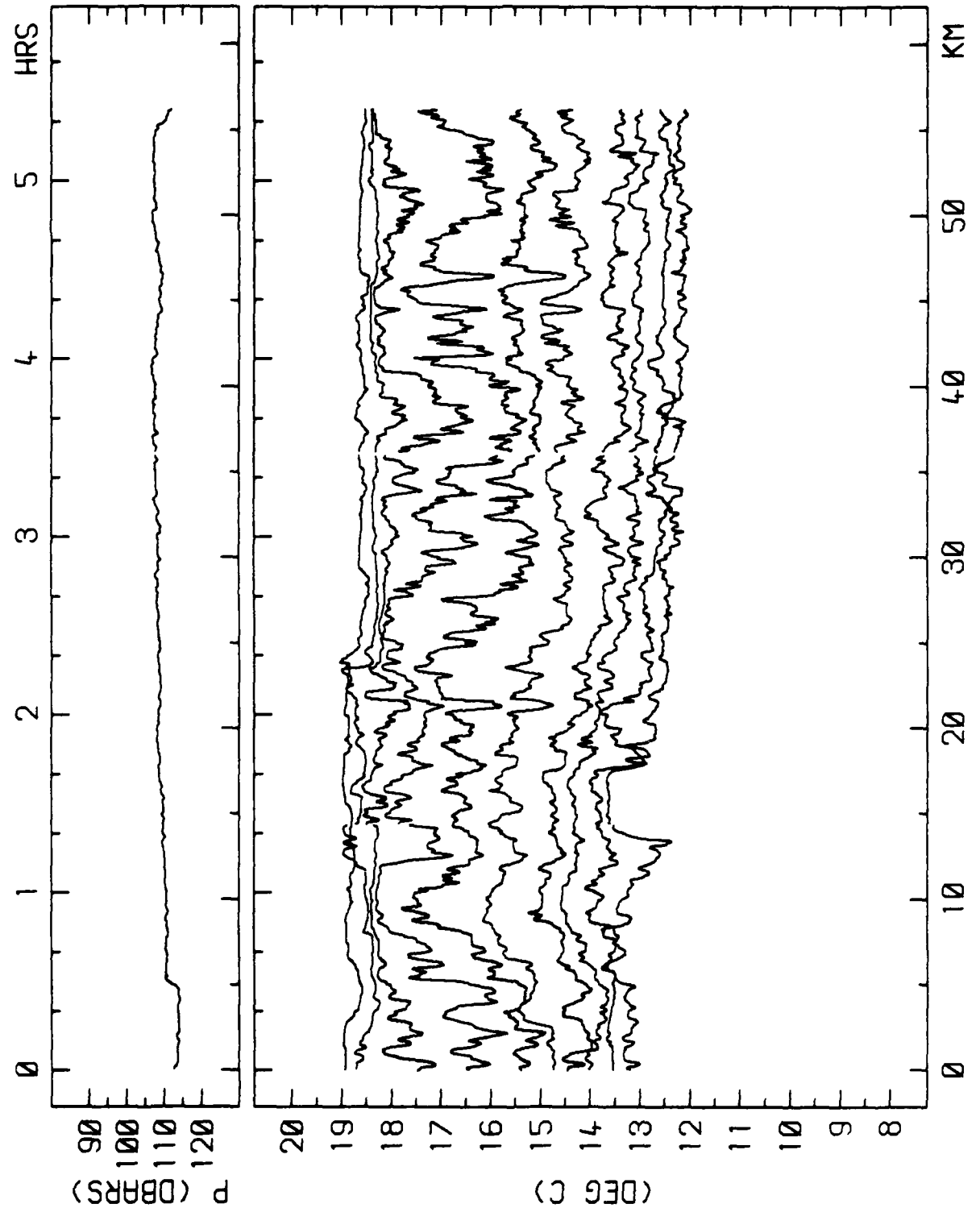
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 3.07 M/S
0340 2-NOV-83 TO 0829 2-NOV-83



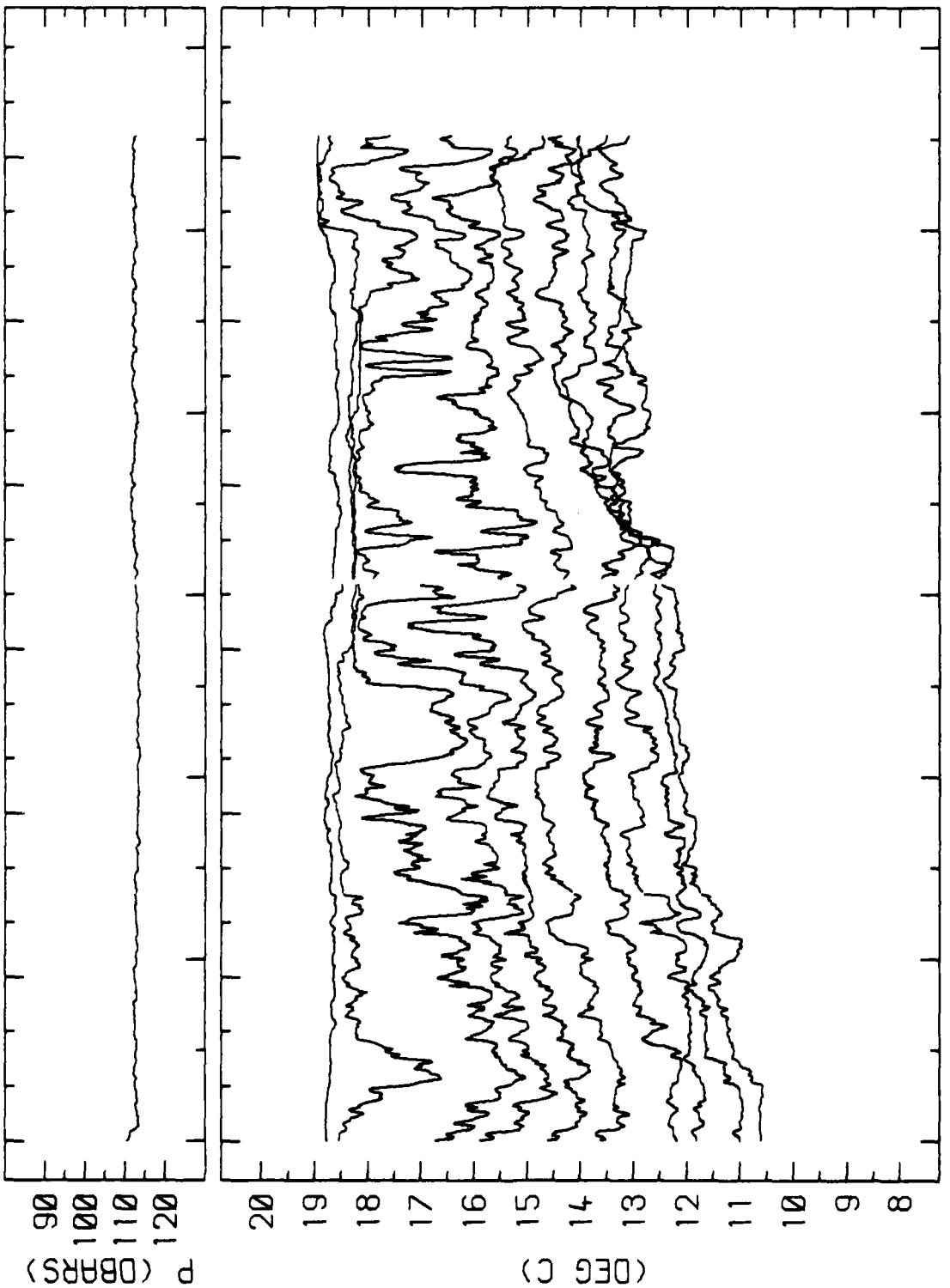
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.68 M/S
2201 1-NOV-83 TO 0339 2-NOV-83



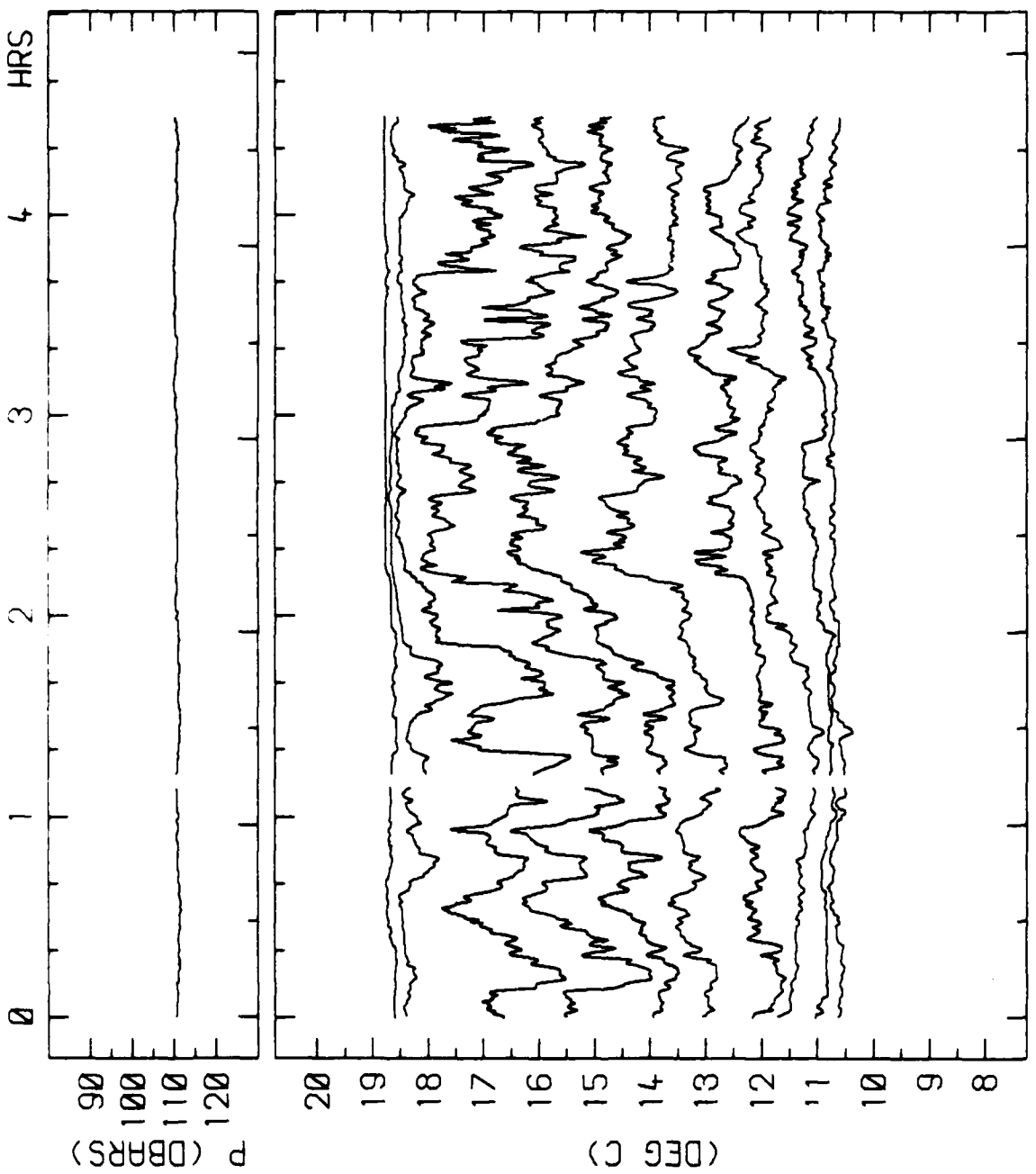
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.67 M/S
1602 1-NOV-83 TO 2200 1-NOV-83

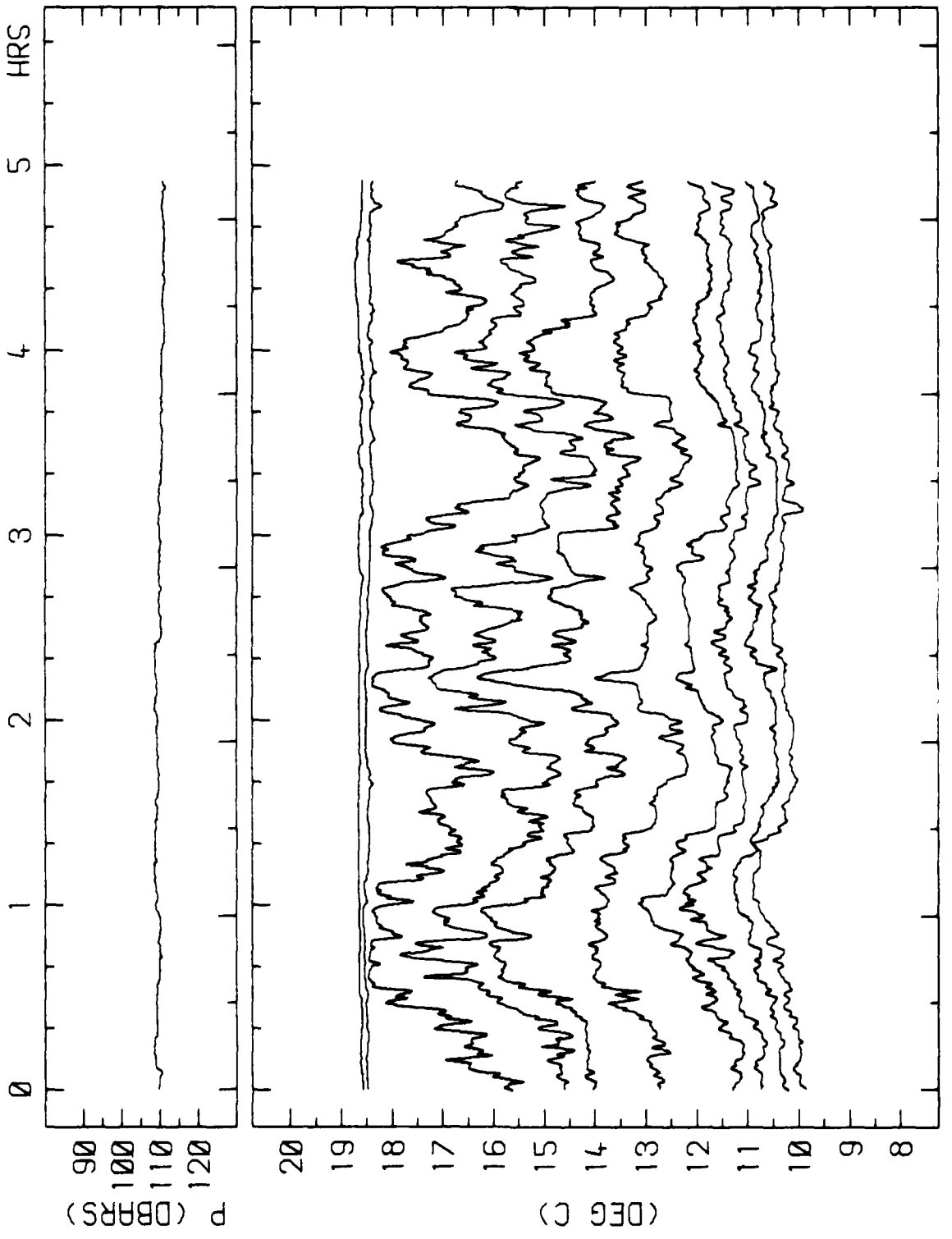


TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.89 M/S
1038 1-NOV-83 TO 1601 1-NOV-83

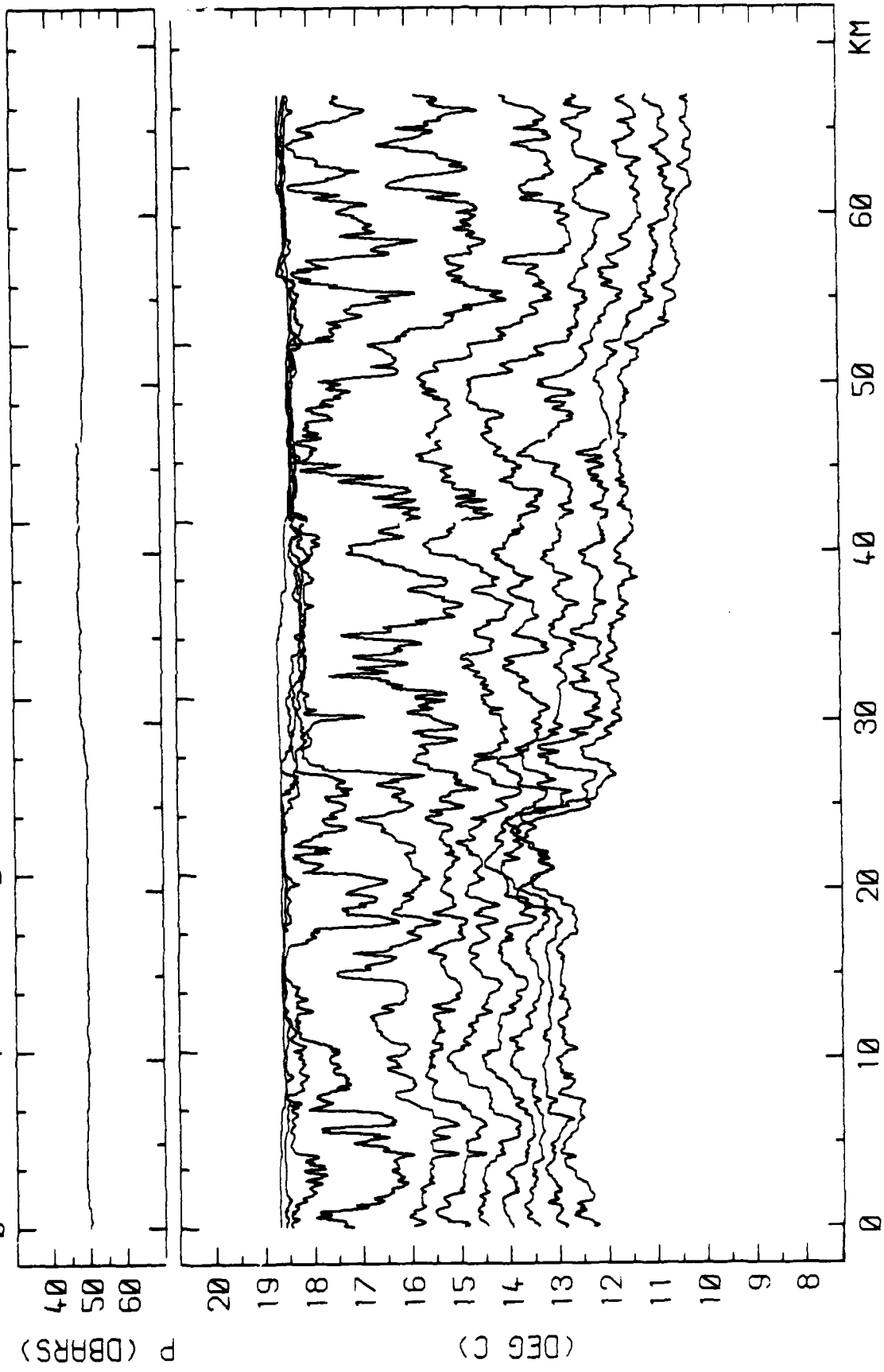


TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.50 M/S
0430 1-NOV-83 TO 1037 1-NOV-83

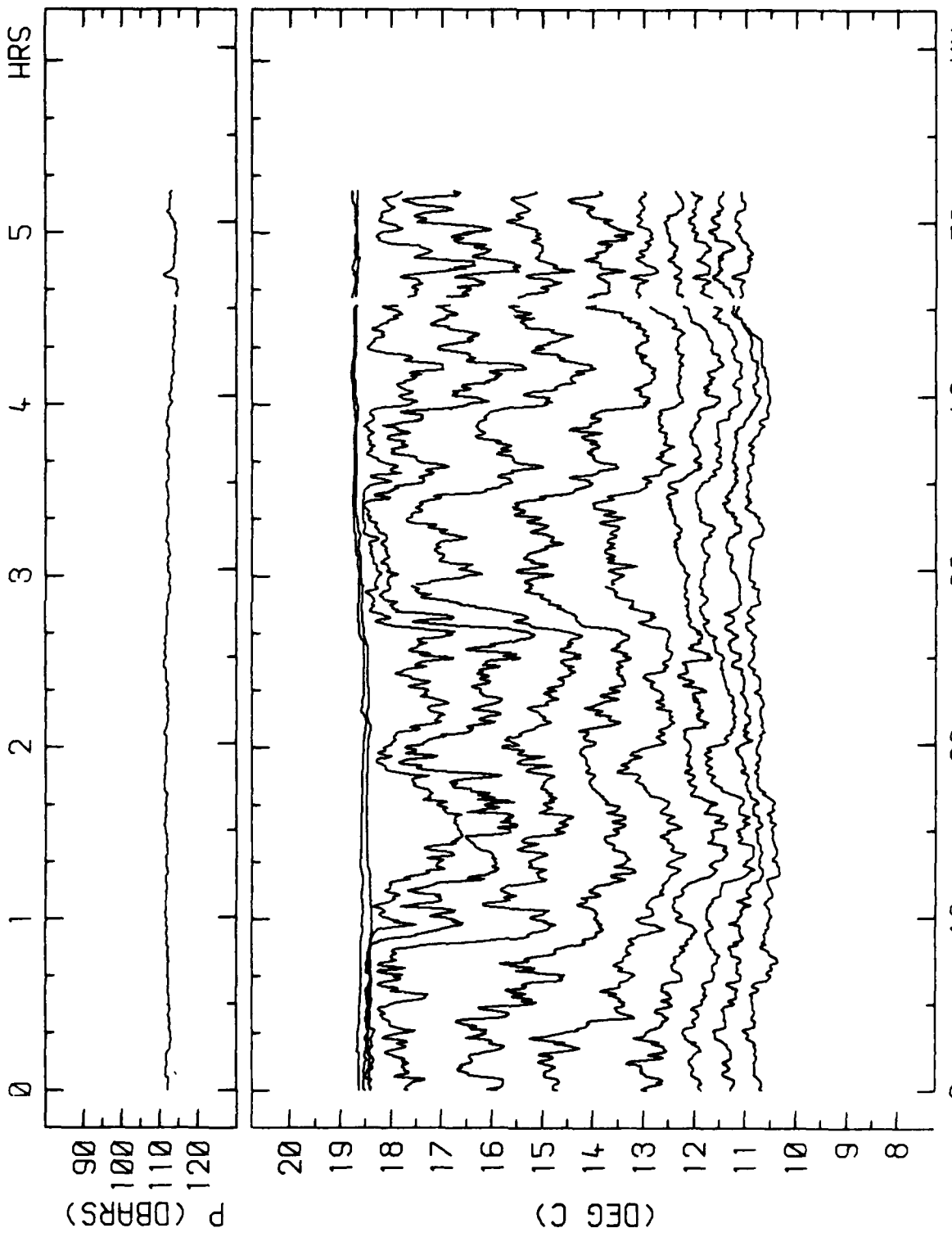

HRS
P (DBARS)
(DEG C)
KM
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.89 M/S
0000 1-NOV-83 TO 0429 1-NOV-83



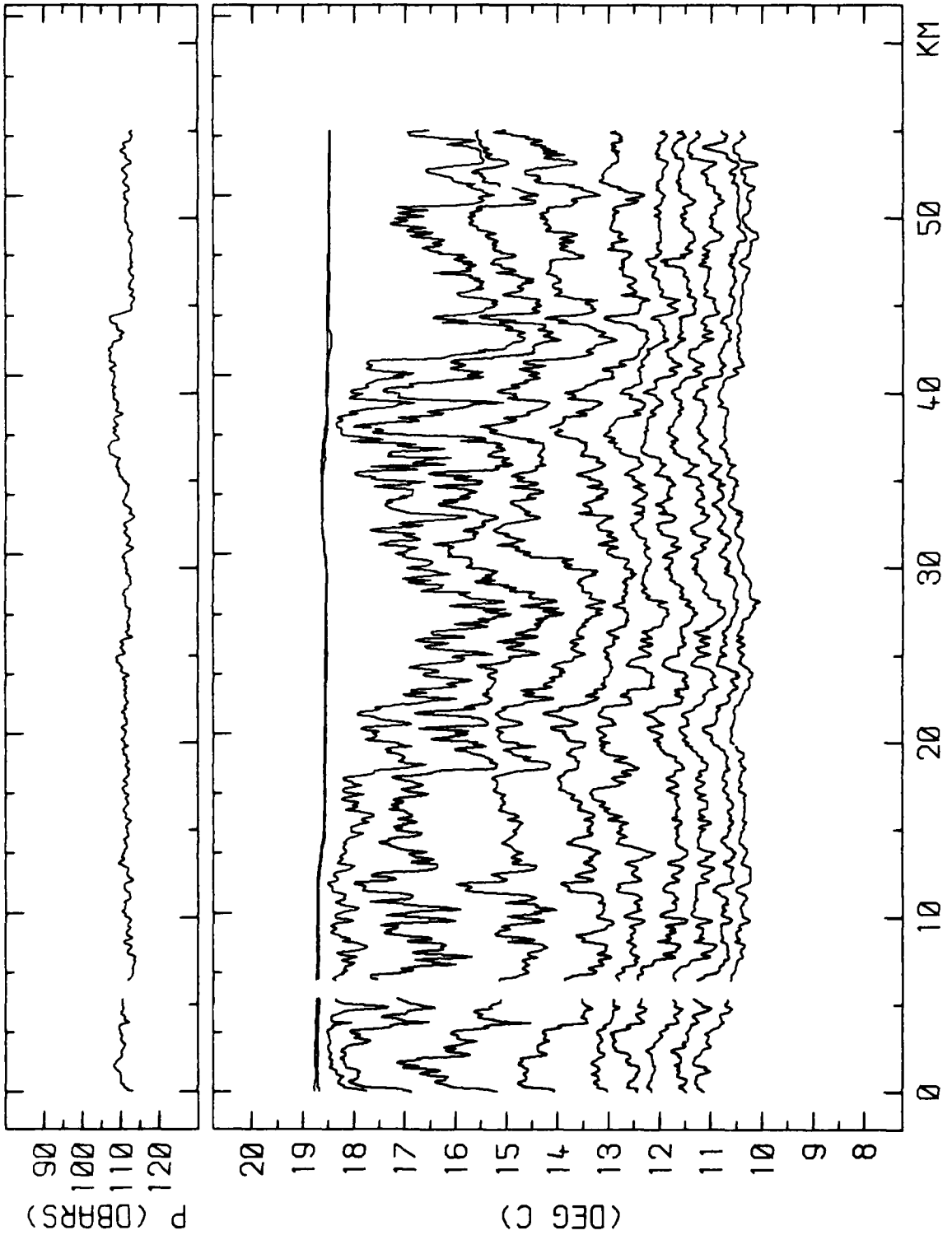
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.95 M/S
1905 31 OCT 83 TO 2400 31 OCT-83



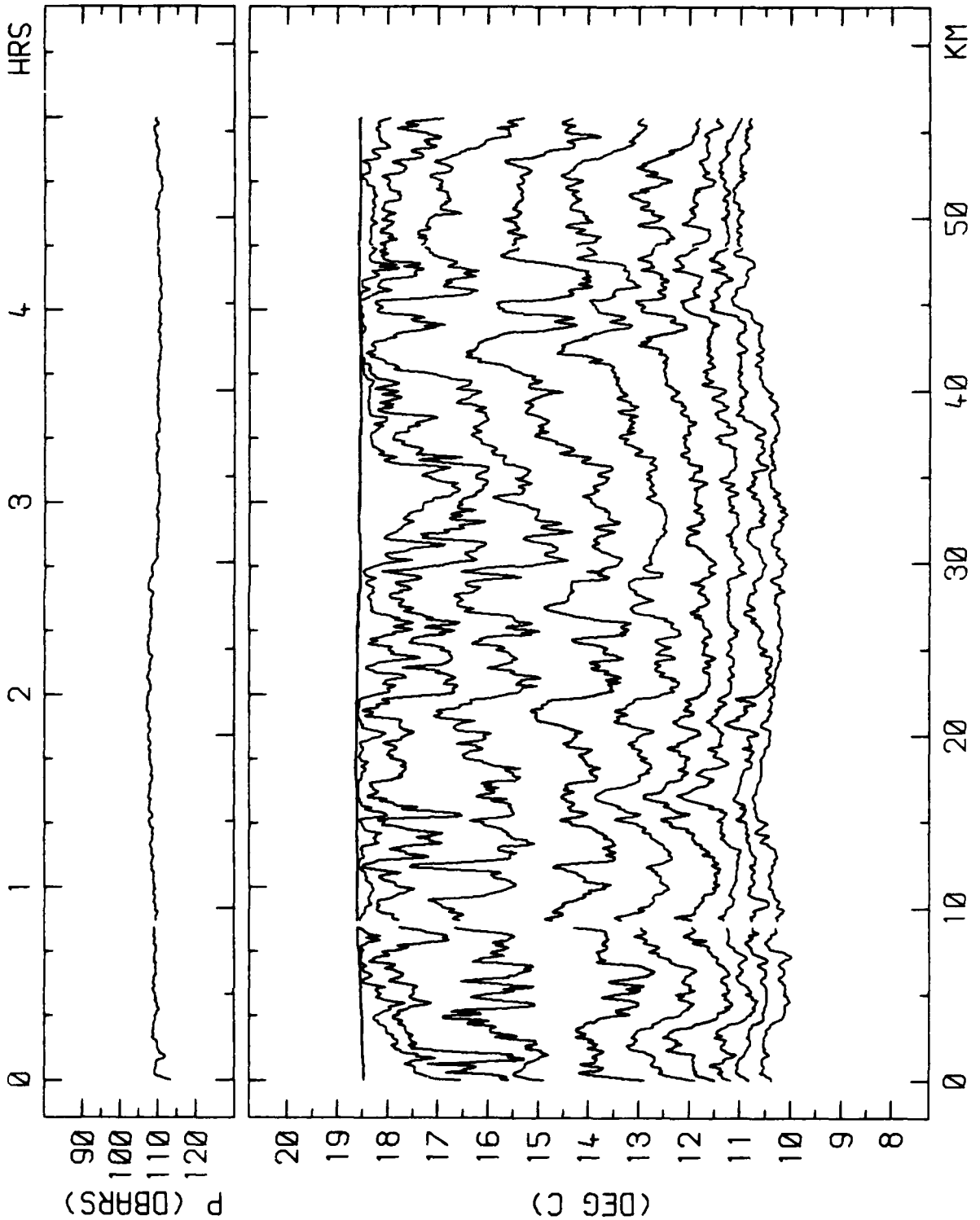
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.91 M/S
0734 29-OCT-83 TO 1356 29-OCT-83



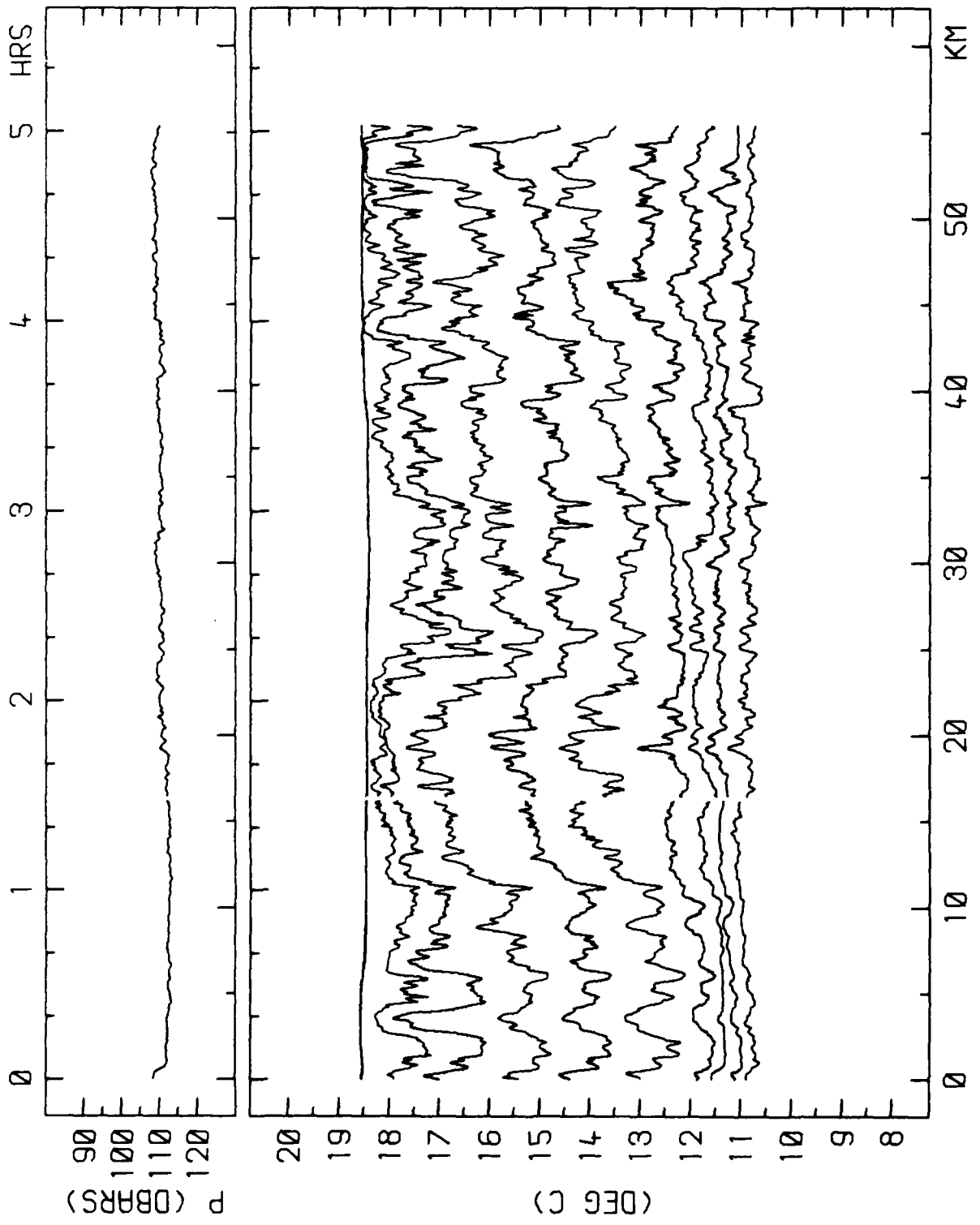
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.74 M/S
2103 6-NOV-83 TO 0218 7-NOV-83



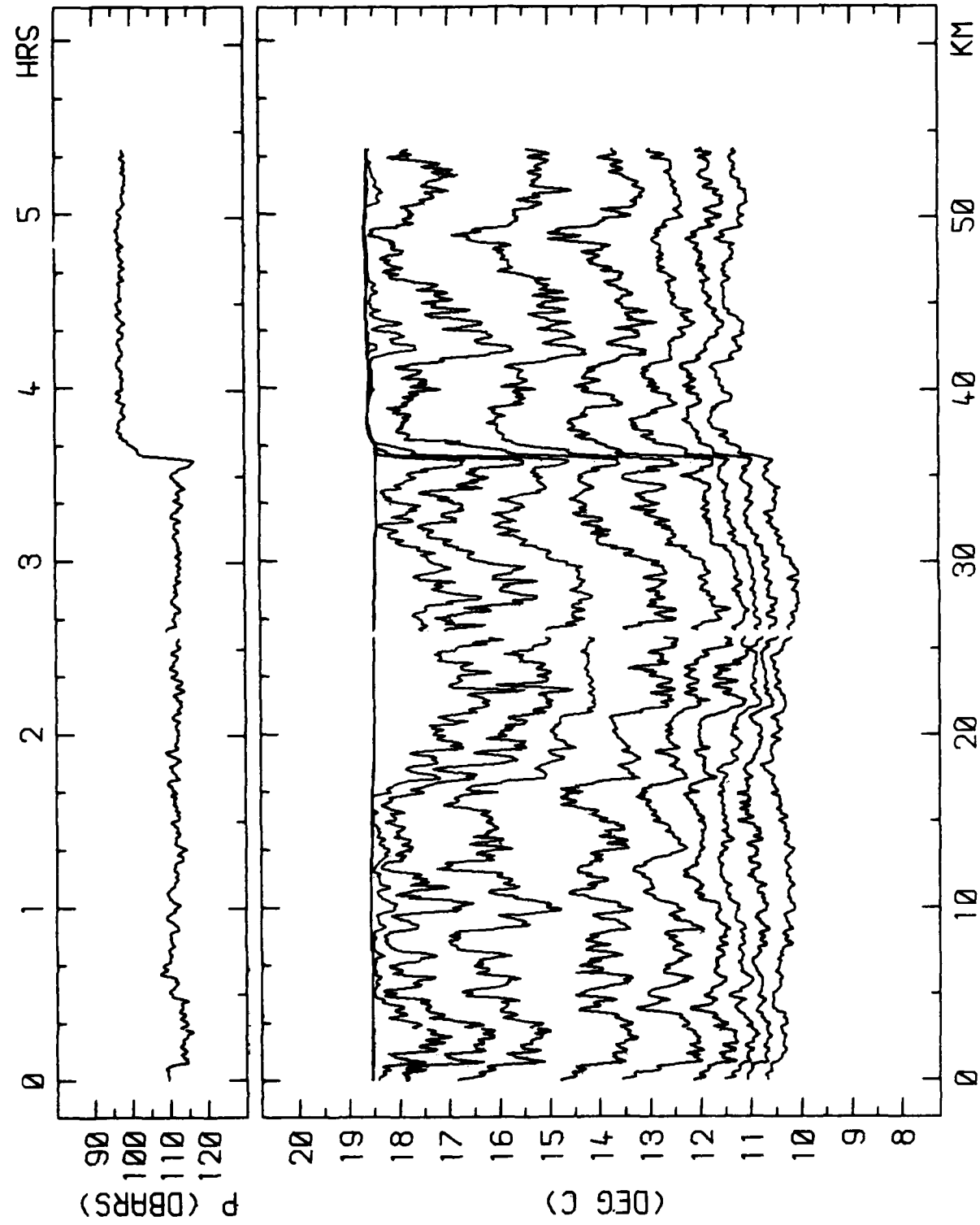
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.85 M/S
0219 7-NOV-83 TO 0740 7-NOV-83



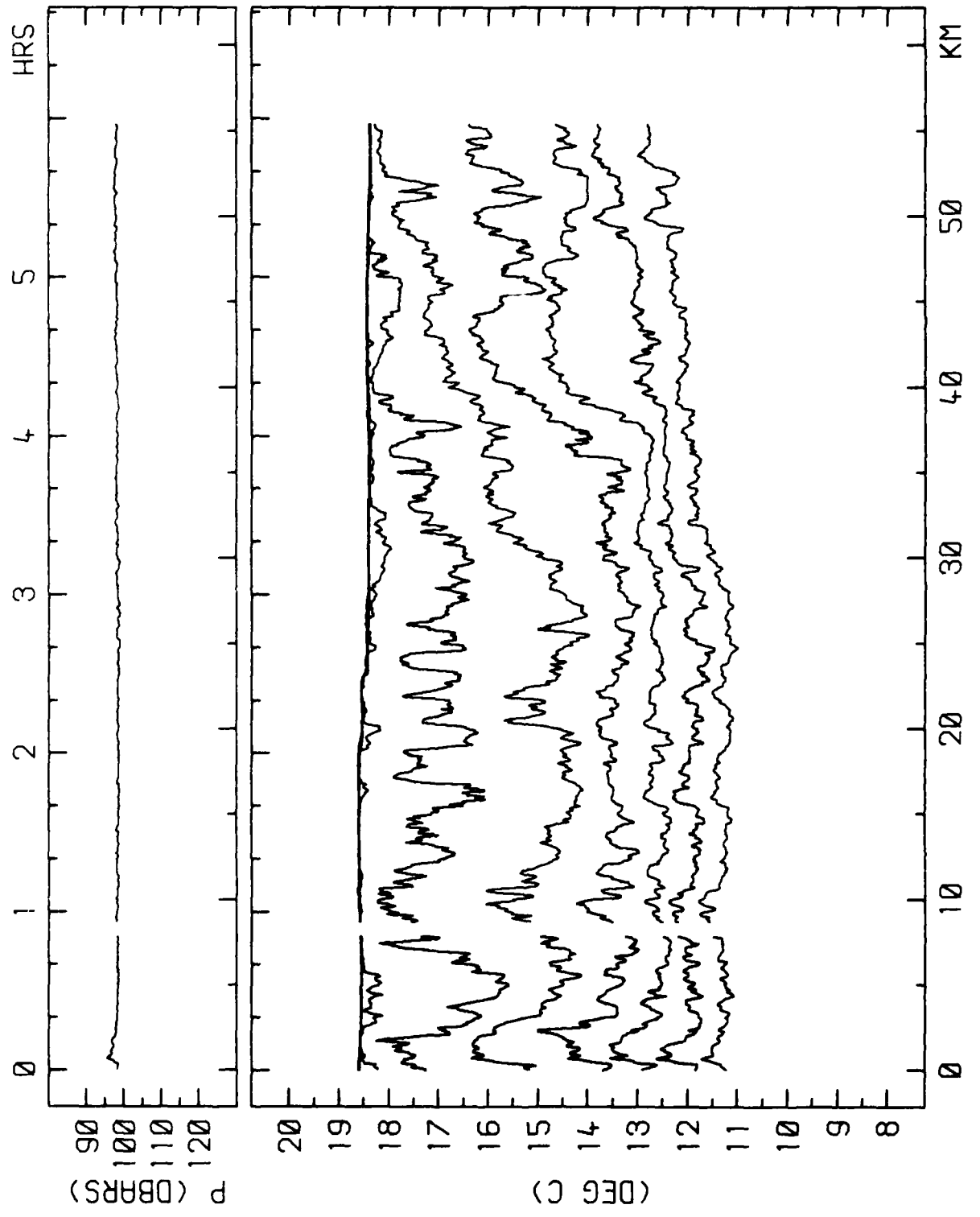
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 3.10 M/S
0741 7-NOV-83 TO 1240 7-NOV-83



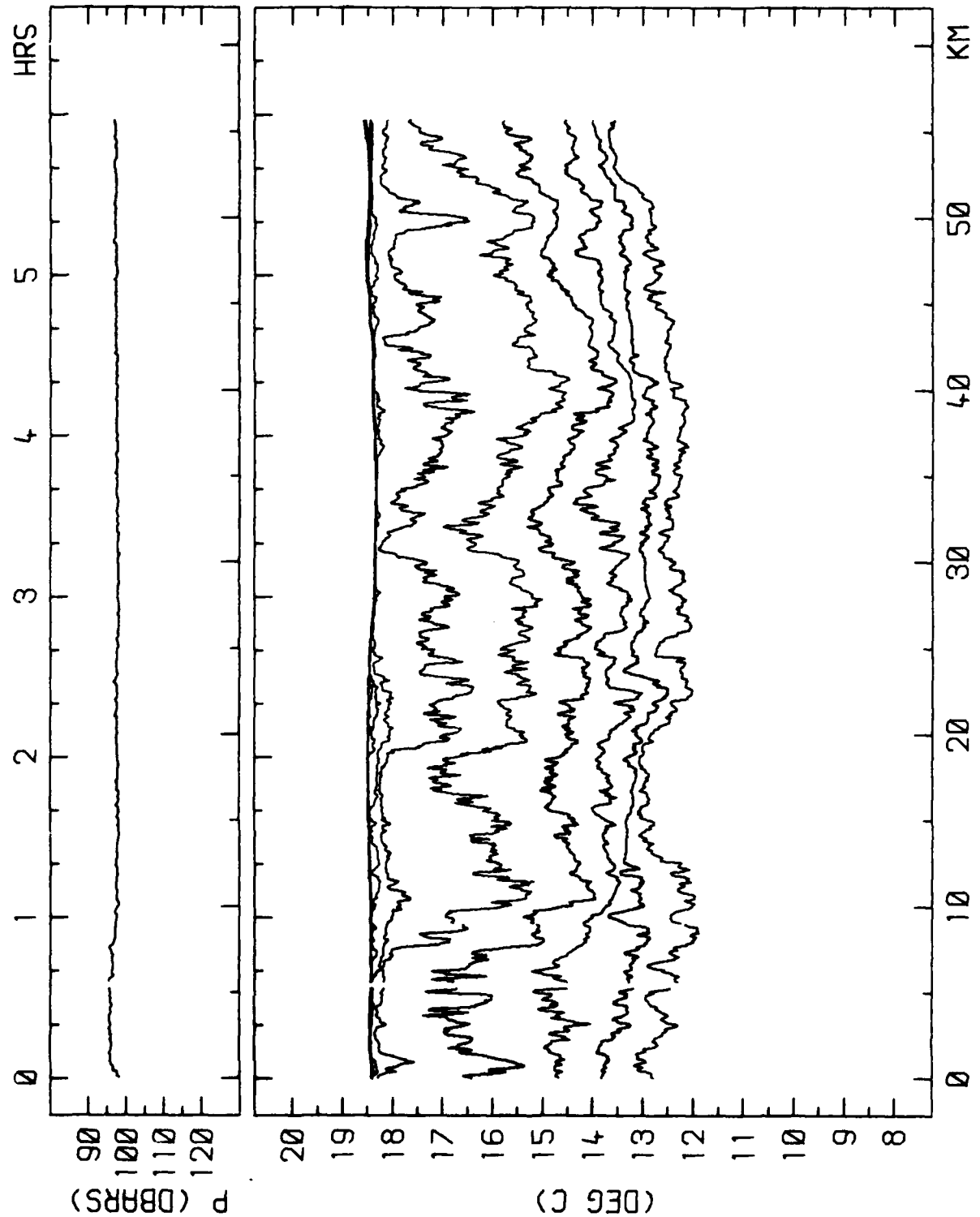
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 3.06 M/S
1241 7-NOV-83 TO 1742 7-NOV-83



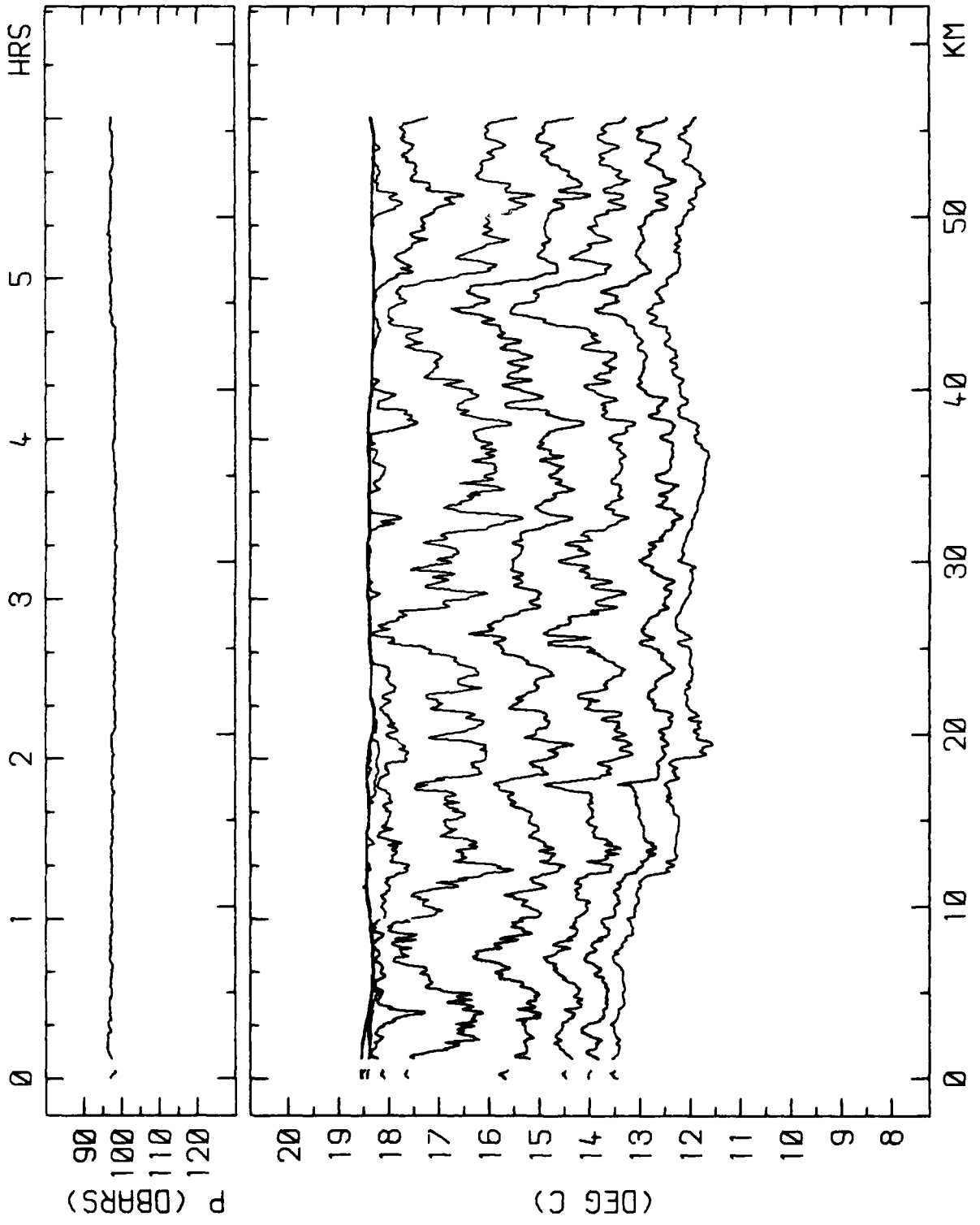
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.79 M/S
1743 7-NOV-83 TO 2304 7-NOV-83



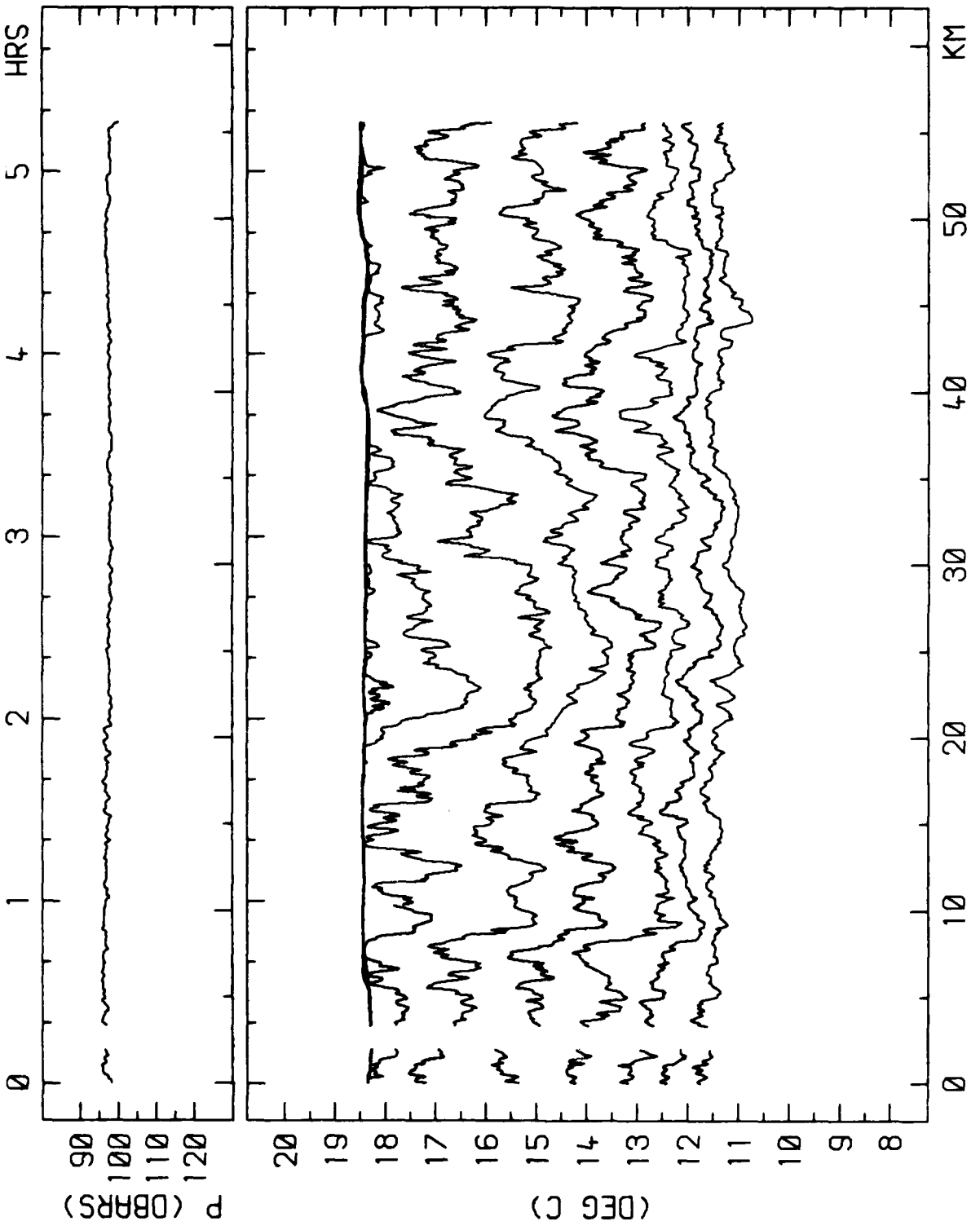
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.58 M/S
2305 7-NOV-83 TO 0502 8-NOV-83



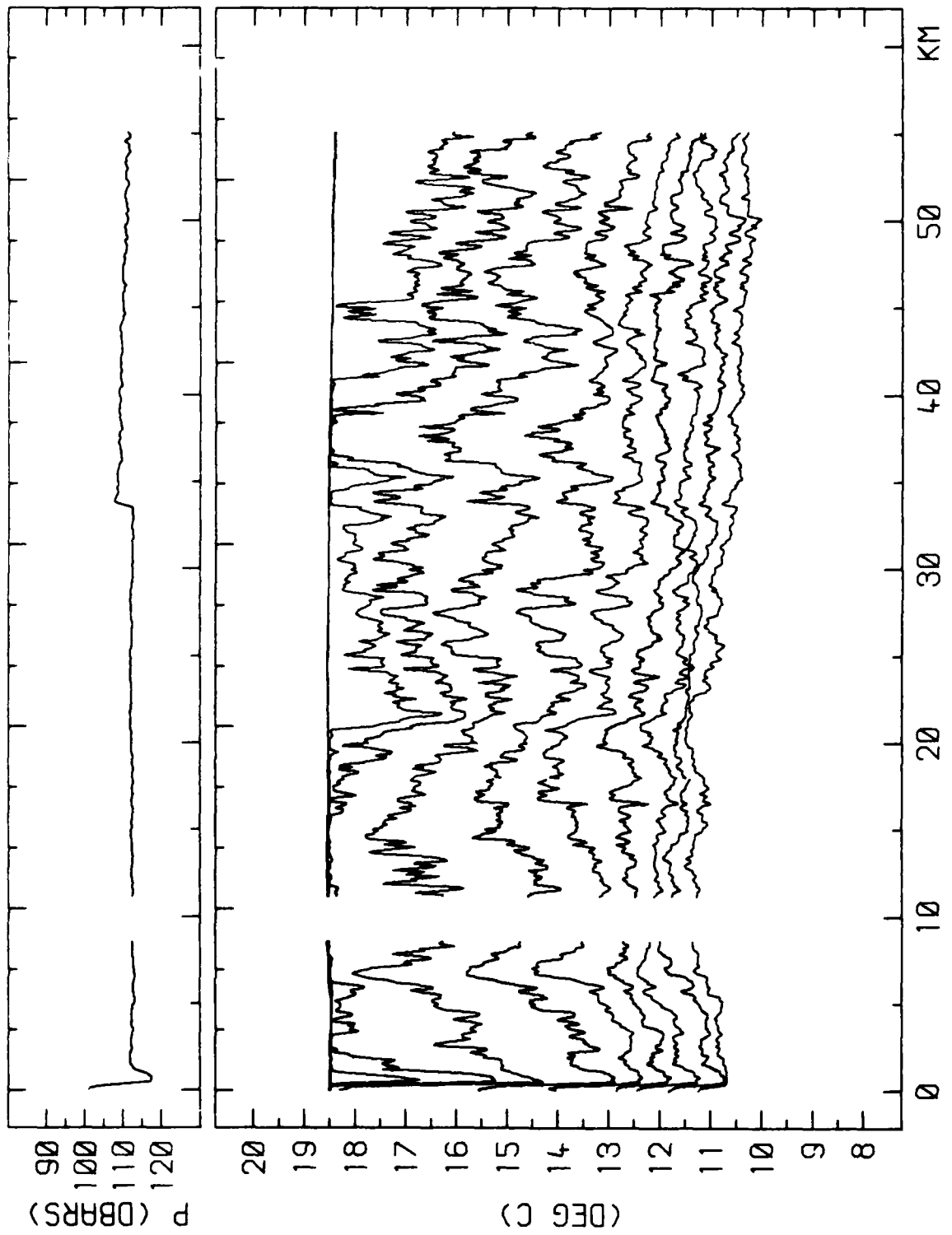
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.59 M/S
0503 8-NOV-83 TO 1100 8-NOV-83



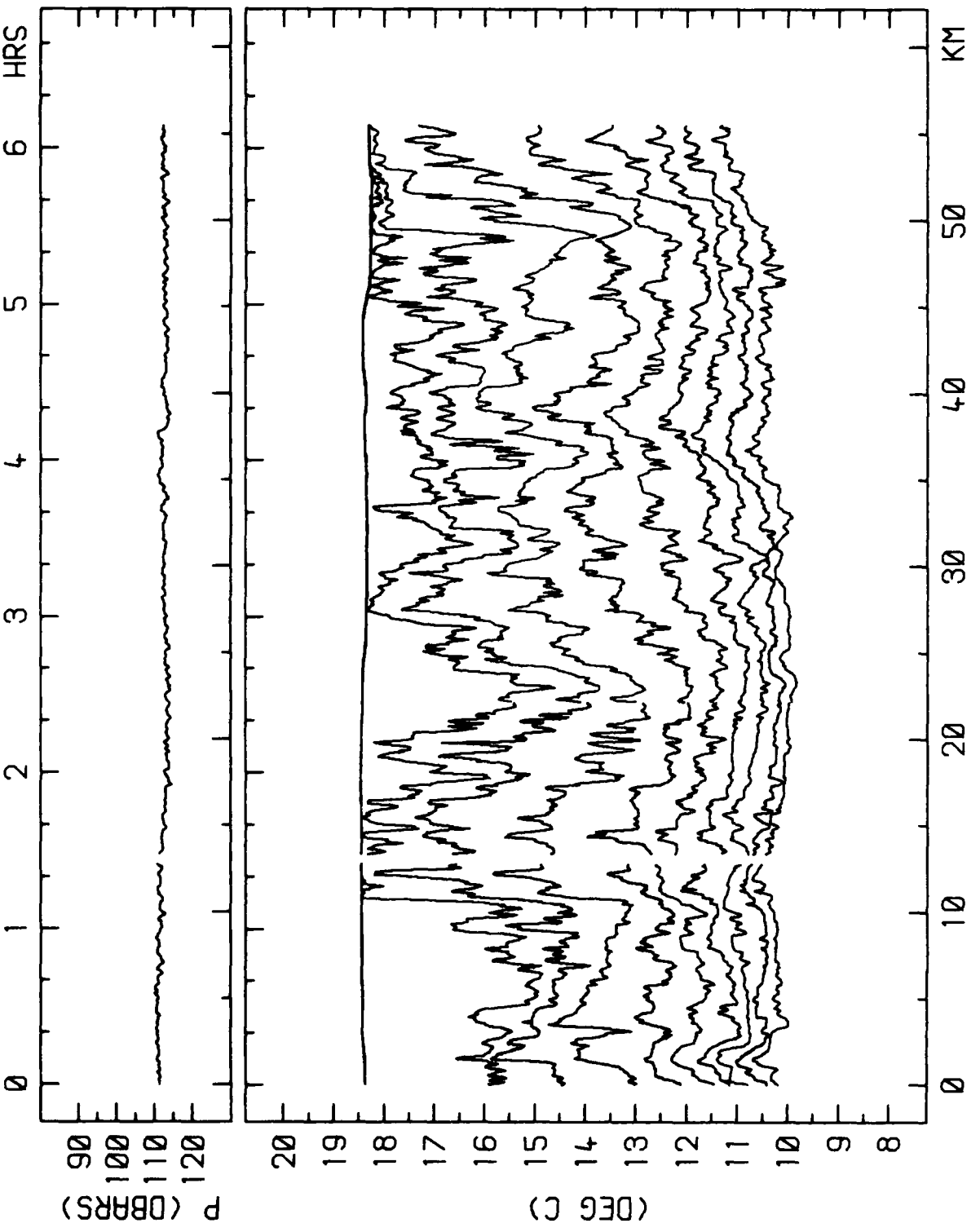
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.58 M/S
1101 8-NOV-83 TO 1701 8-NOV-83



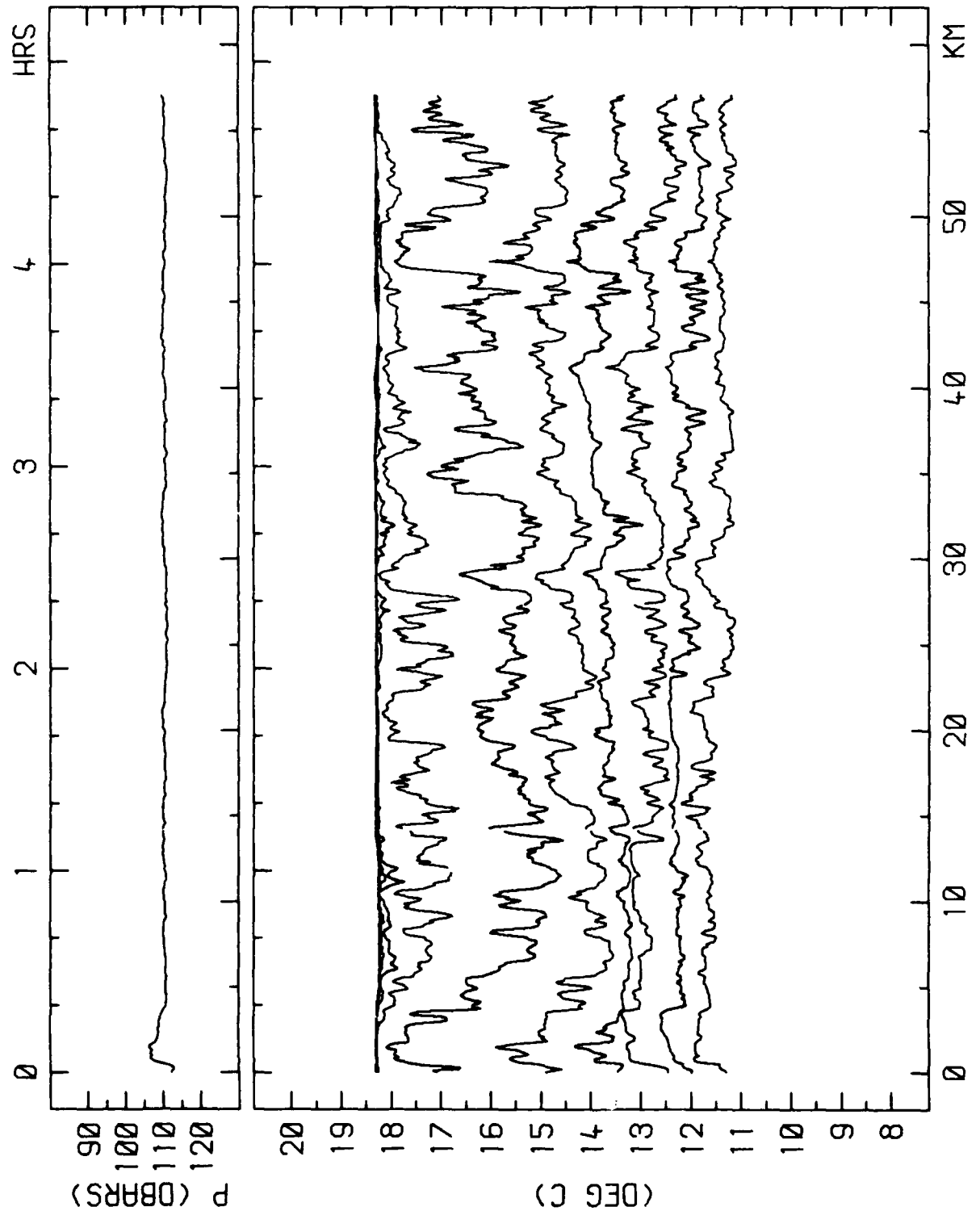
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.93 M/S
1702 8-NOV-83 TO 2217 8-NOV-83



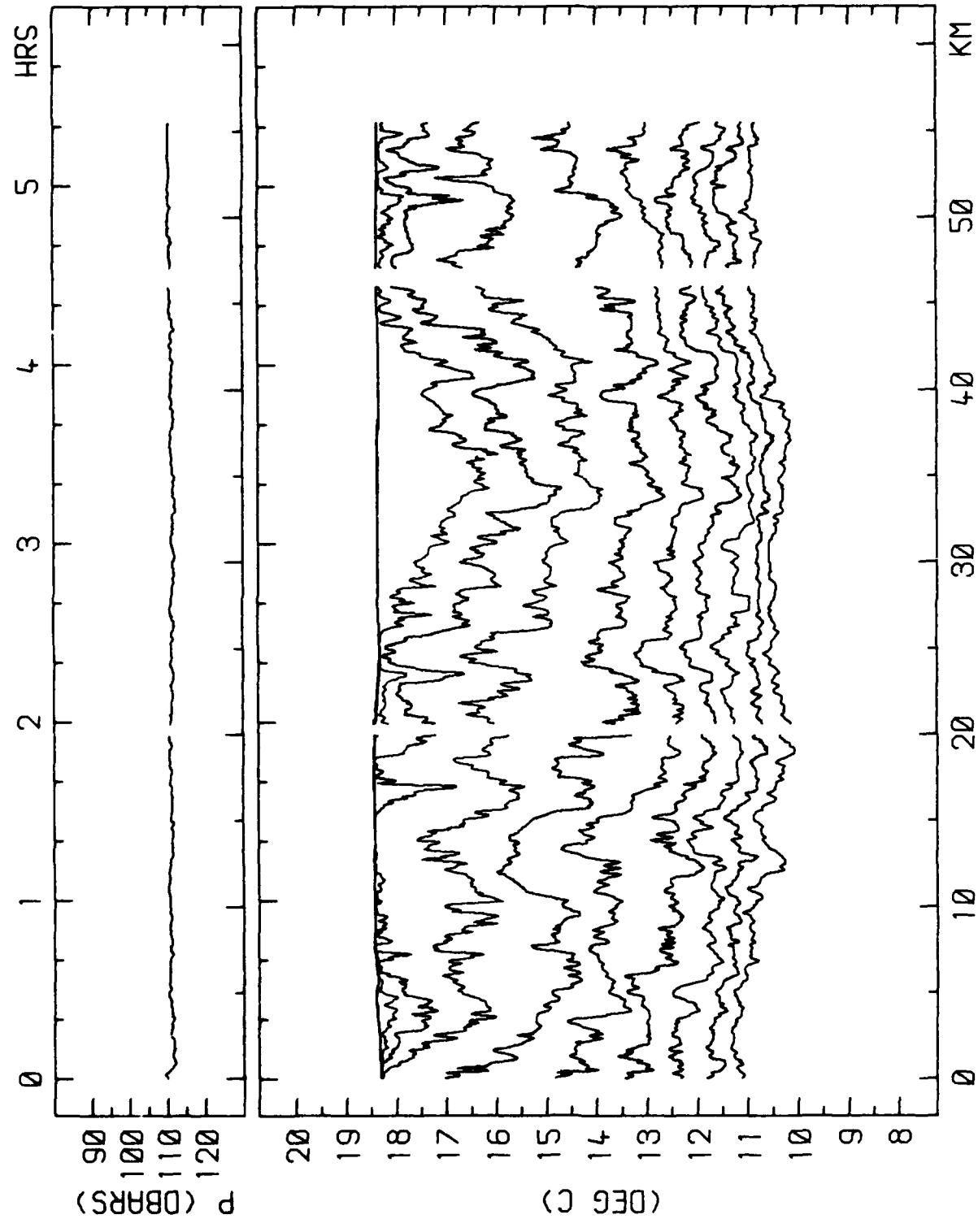
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.91 M/S
2218 8-NOV-83 TO 0333 9-NOV-83



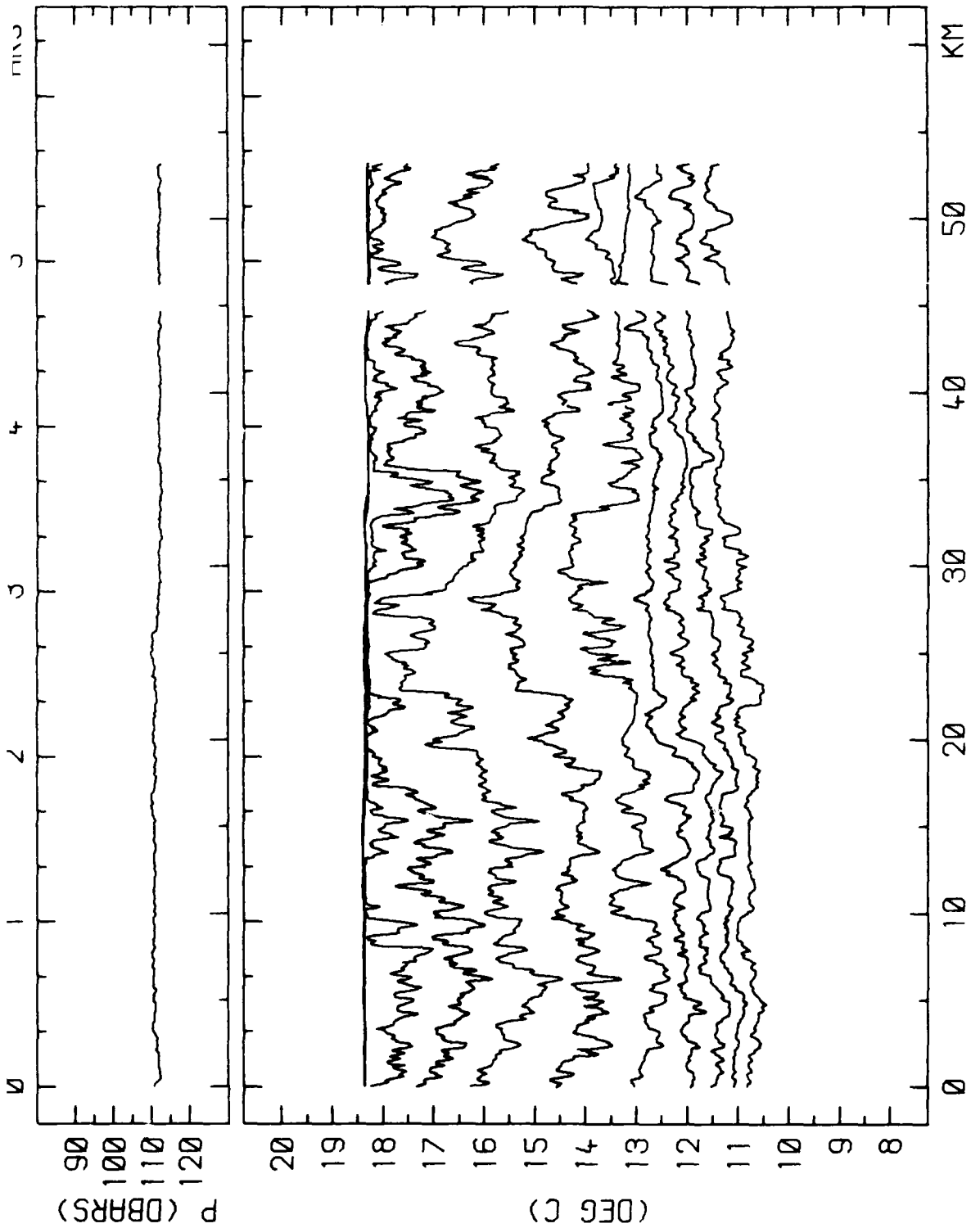
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.51 M/S
0334 9-NOV-83 TO 0941 9-NOV-83



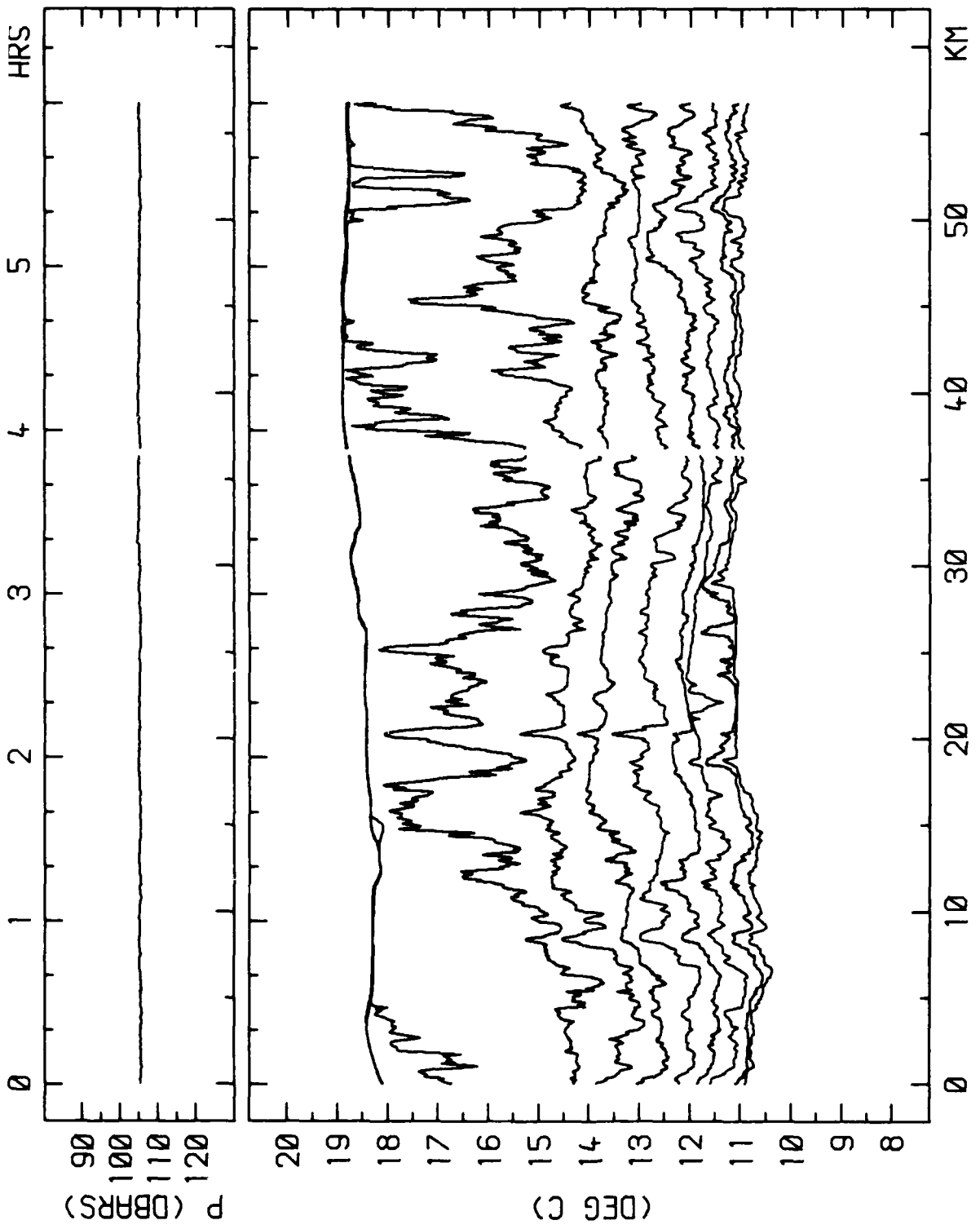
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 3.28 M/S
0942 9-NOV-83 TO 1431 9-NOV-83



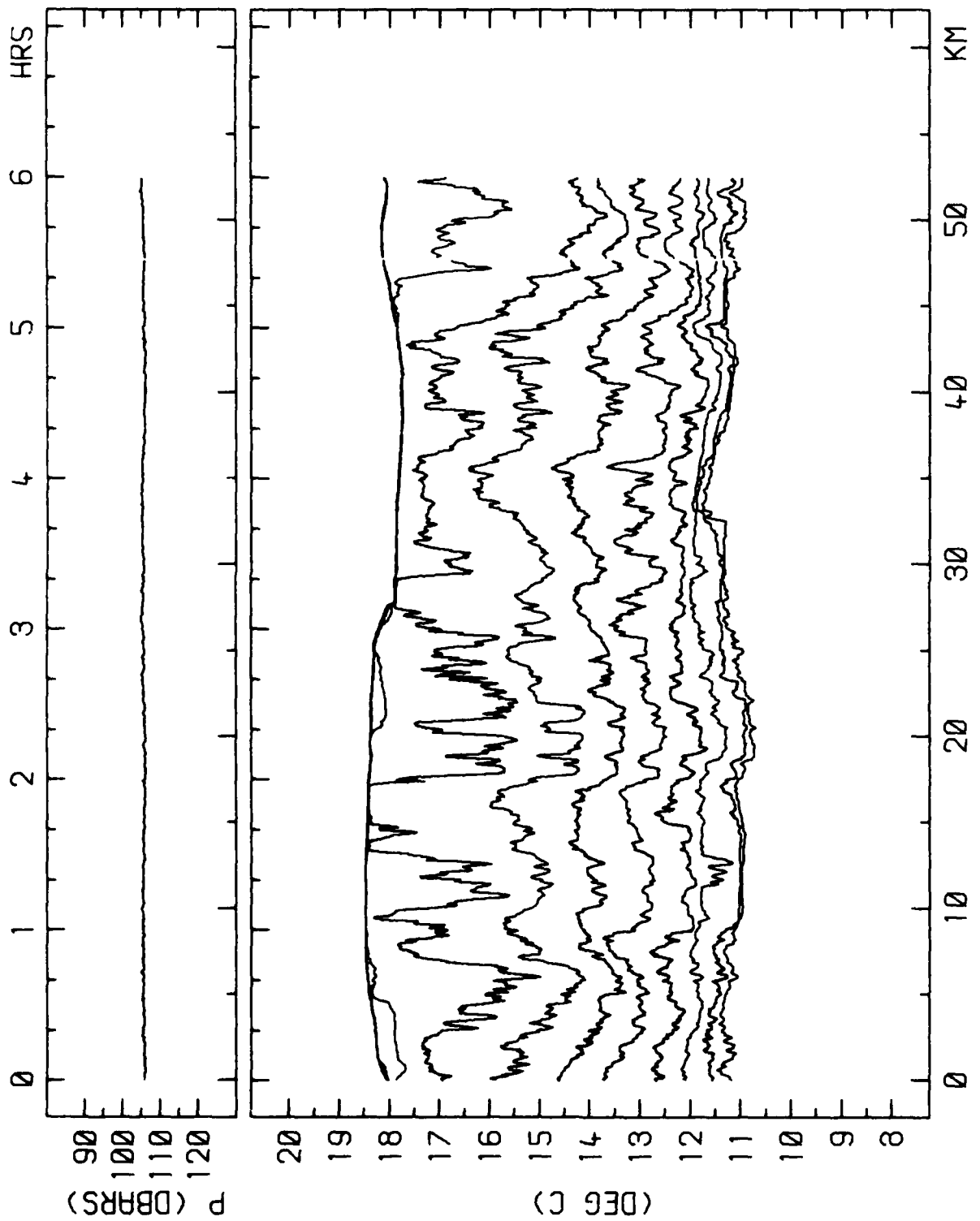
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.88 M/S
1432 9-NOV-83 TO 1952 9-NOV-83



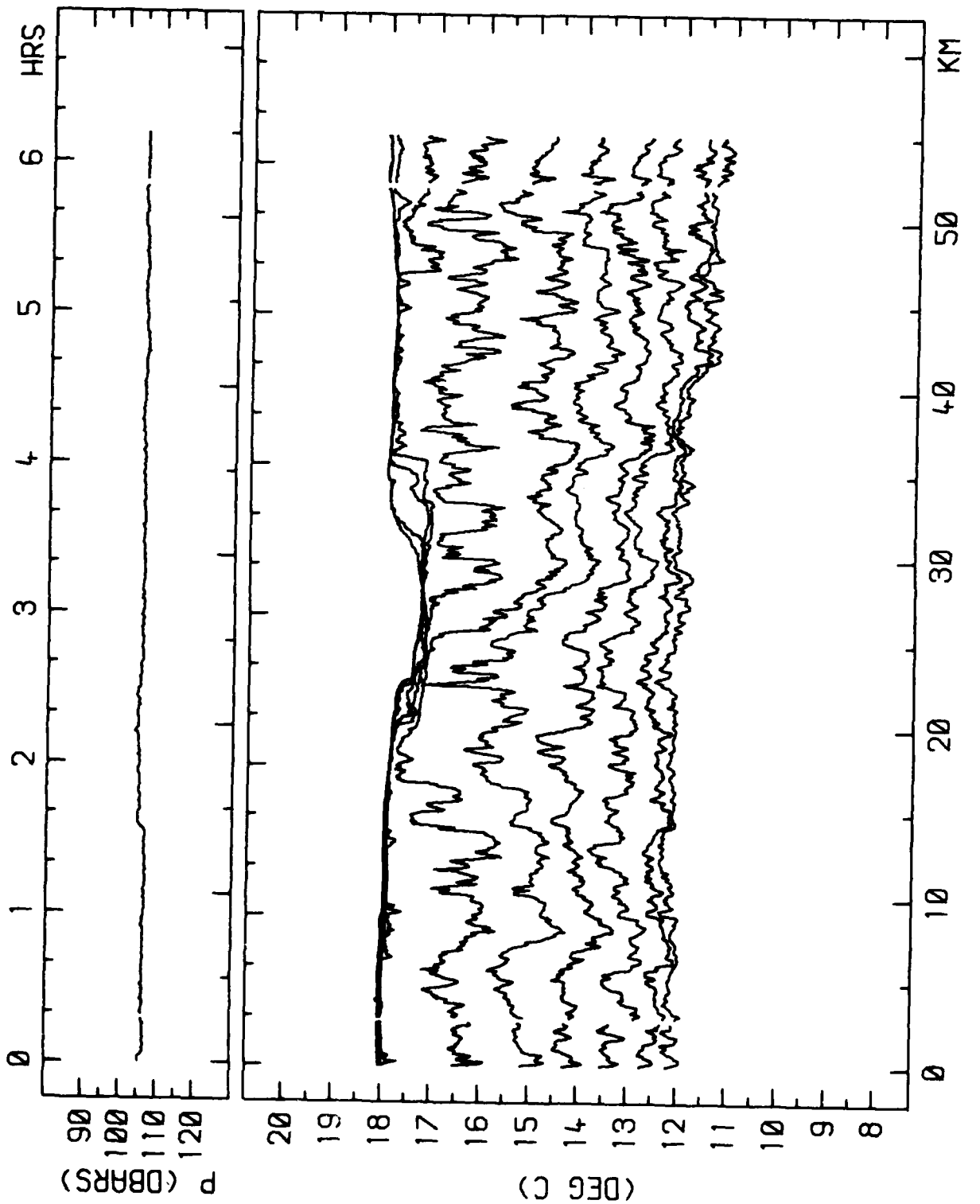
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.64 M/S
1953 9-NOV-83 TO 0128 10-NOV-83



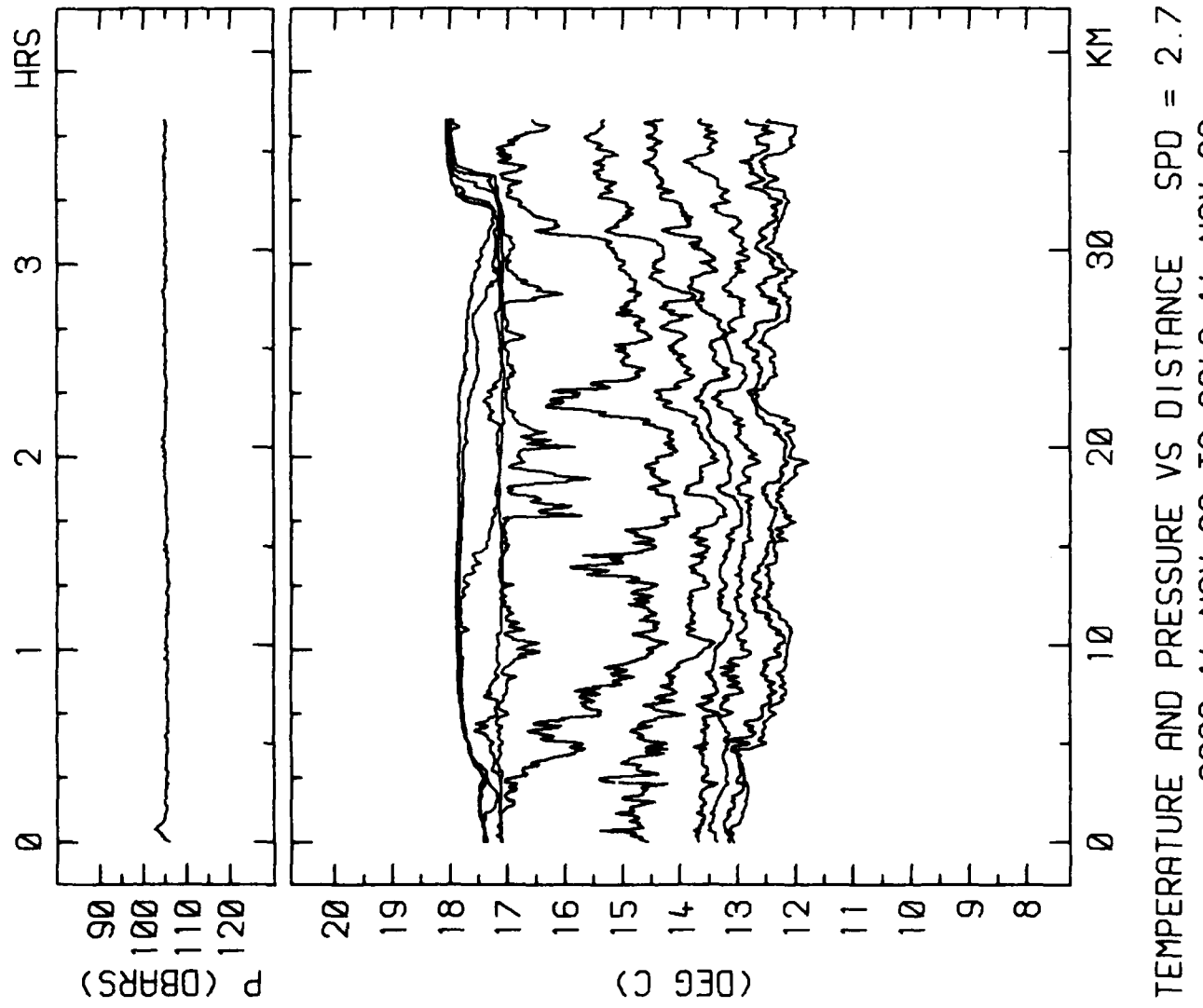
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.63 M/S
1200 15-NOV-83 TO 1800 15-NOV-83



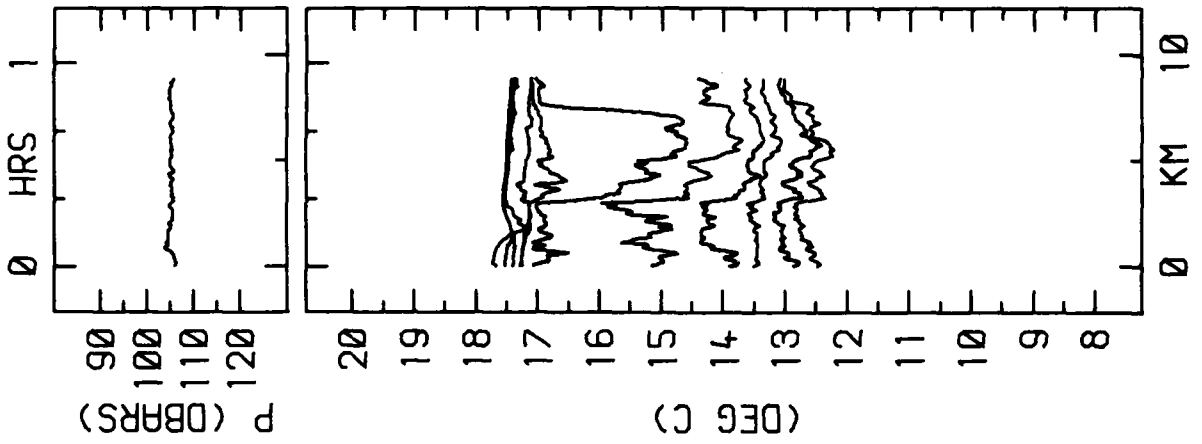
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.43 M/S
0600 15-NOV-83 TO 1200 15-NOV-83



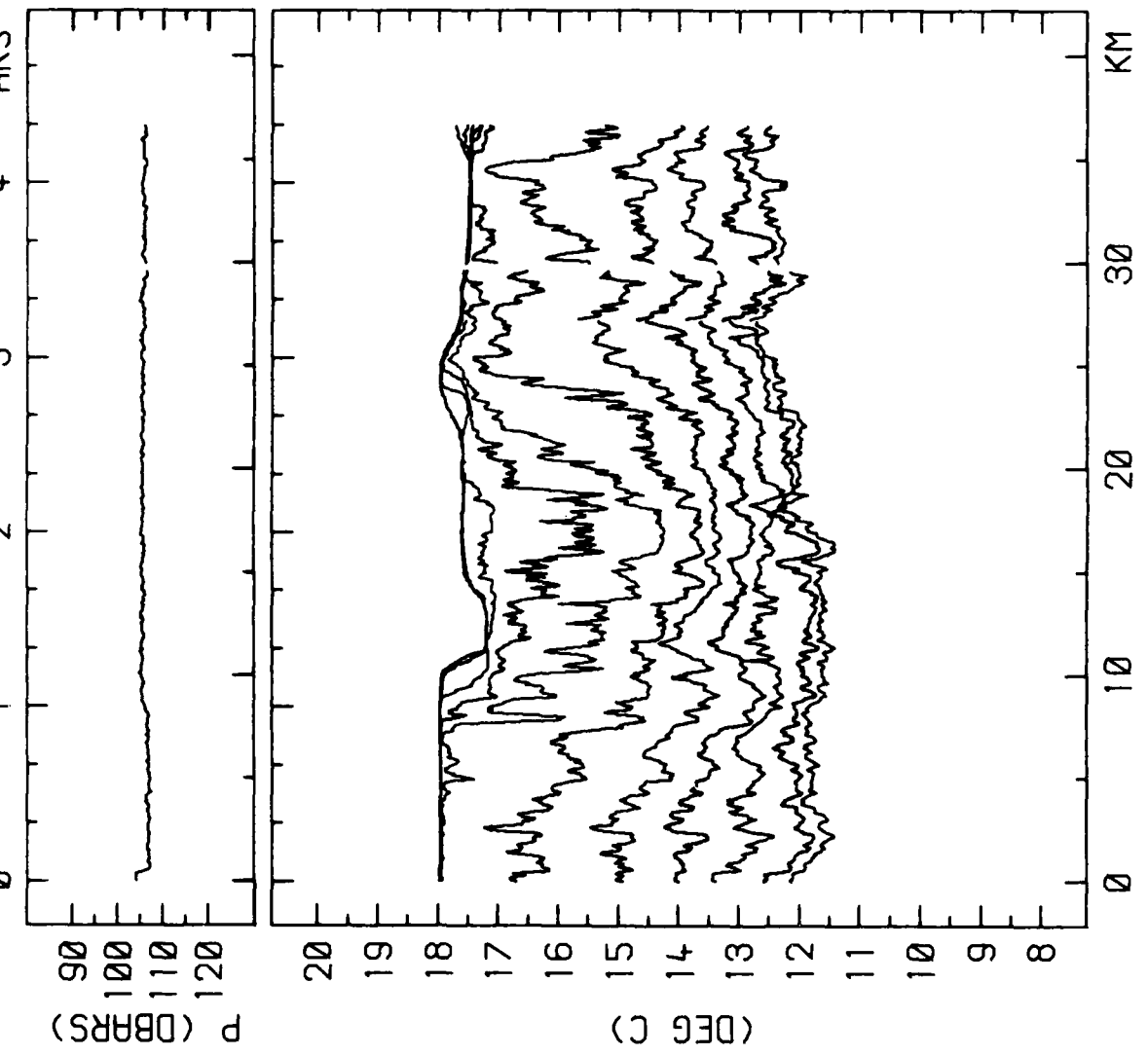
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.47 M/S
2348 14-NOV-83 TO 0600 15-NOV-83



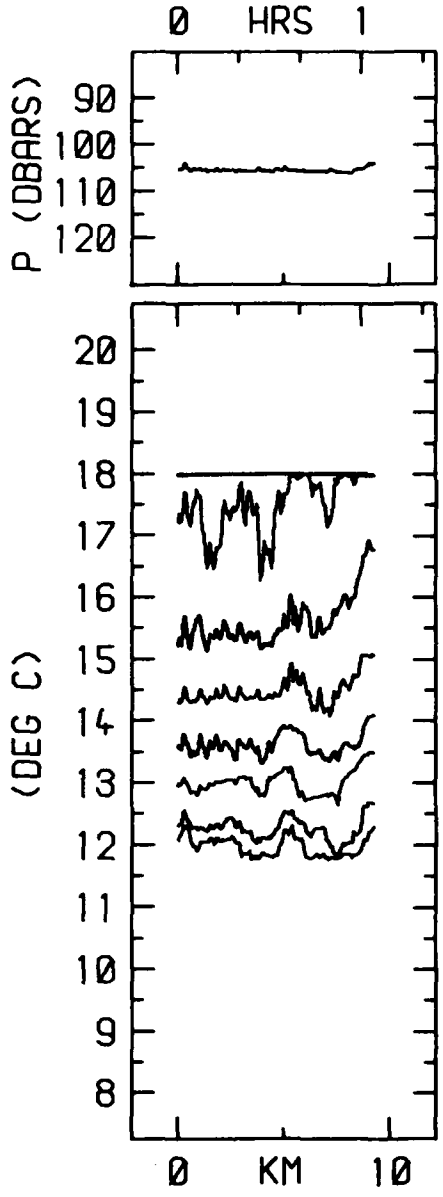
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.71 M/S
2003 14-NOV-83 TO 2348 14-NOV-83



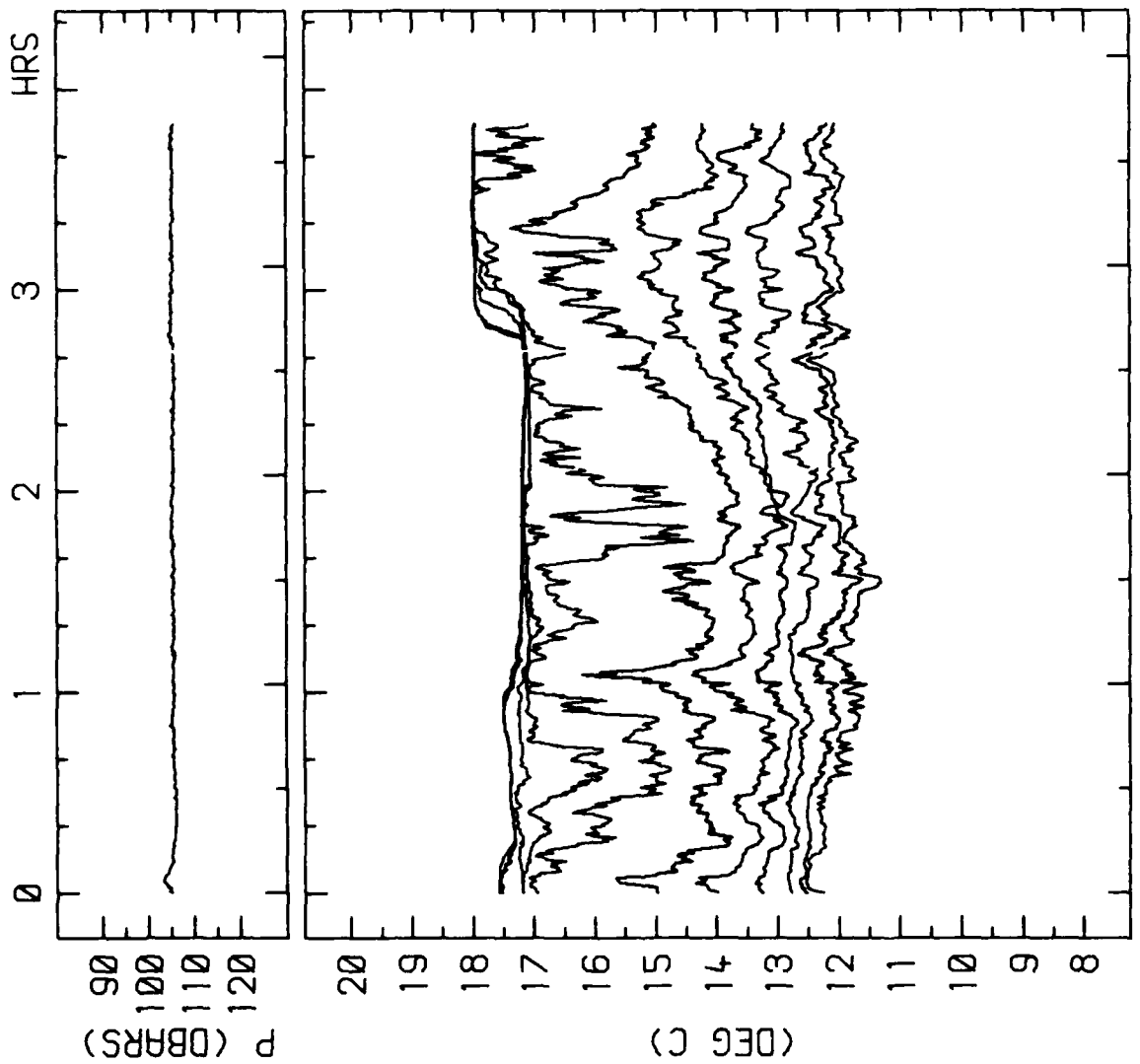
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.68 M/S
1908 14-NOV-83 TO 2002 14-NOV-83



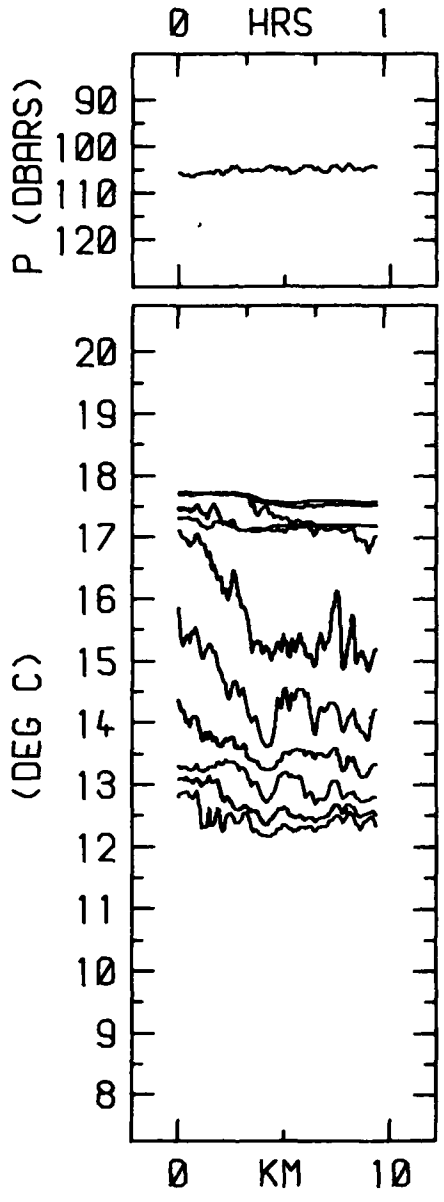
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.35 M/S
1448 14-NOV-83 TO 1907 14-NOV-83



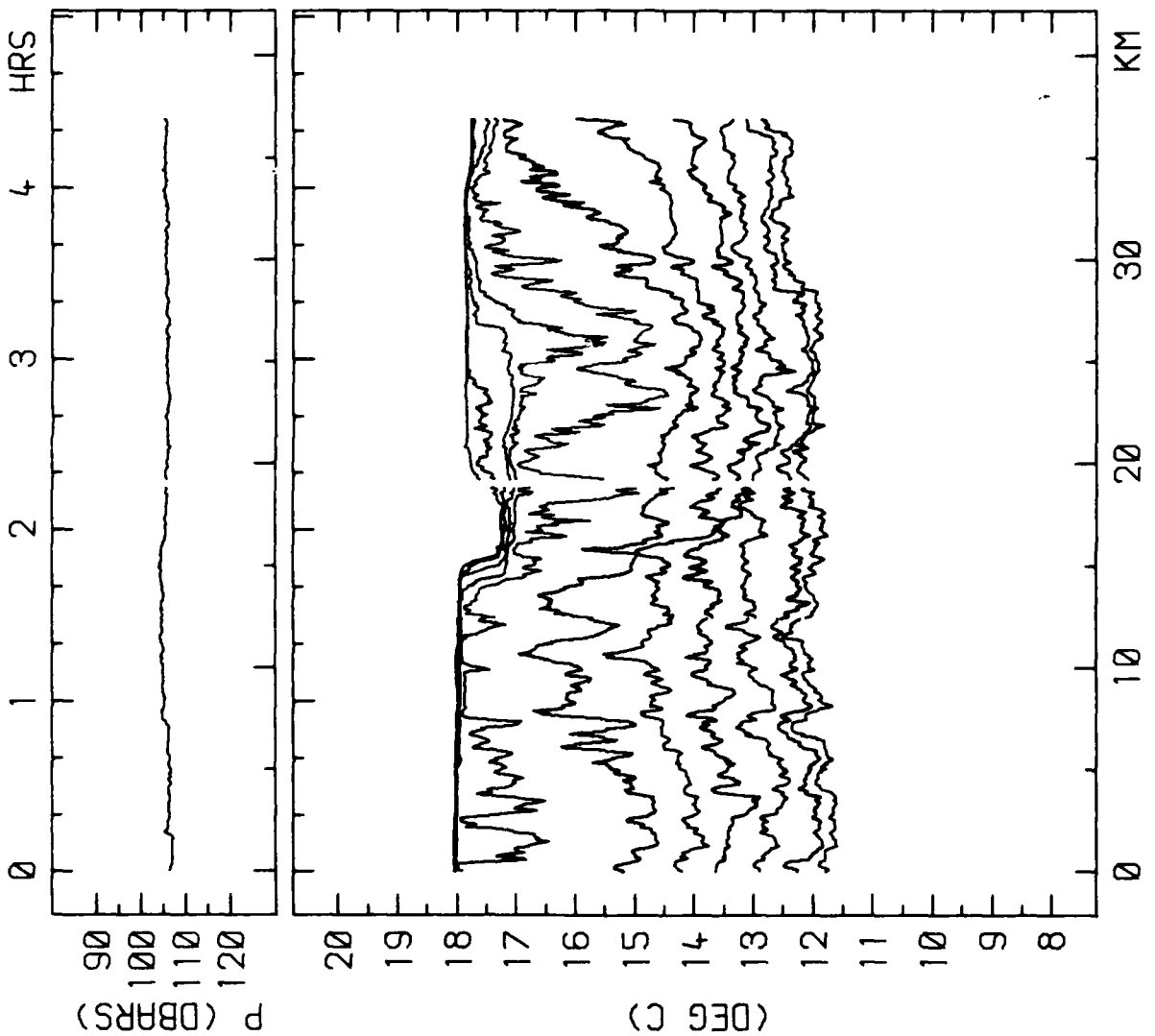
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.42 M/S
1344 14-NOV-83 TO 1447 14-NOV-83



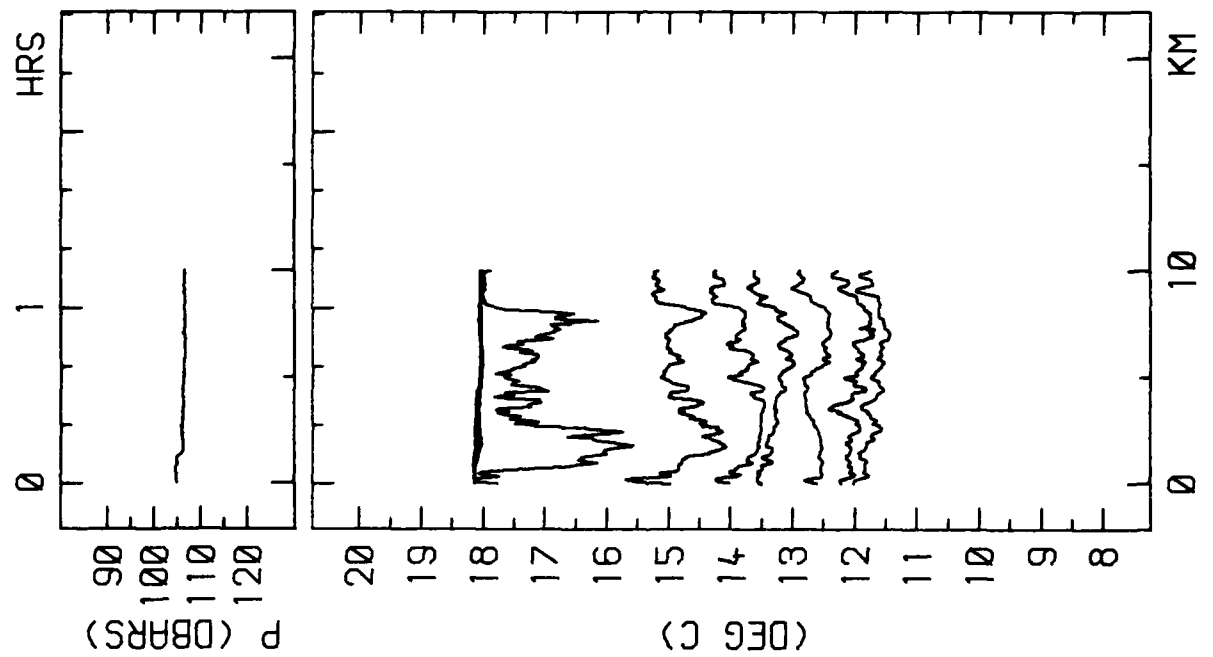
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.67 M/S
0954 14-NOV-83 TO 1343 14-NOV-83



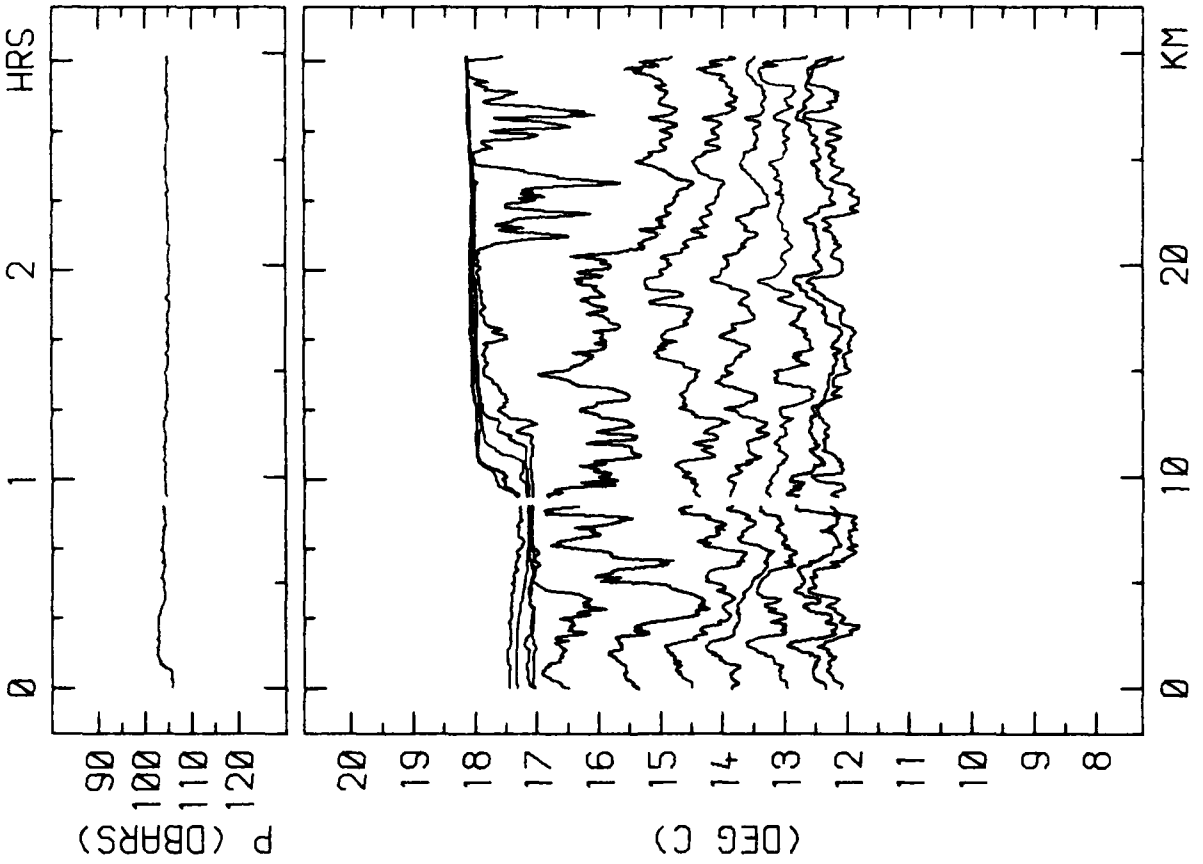
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.70 M/S
0856 14-NOV-83 TO 0953 14-NOV-83



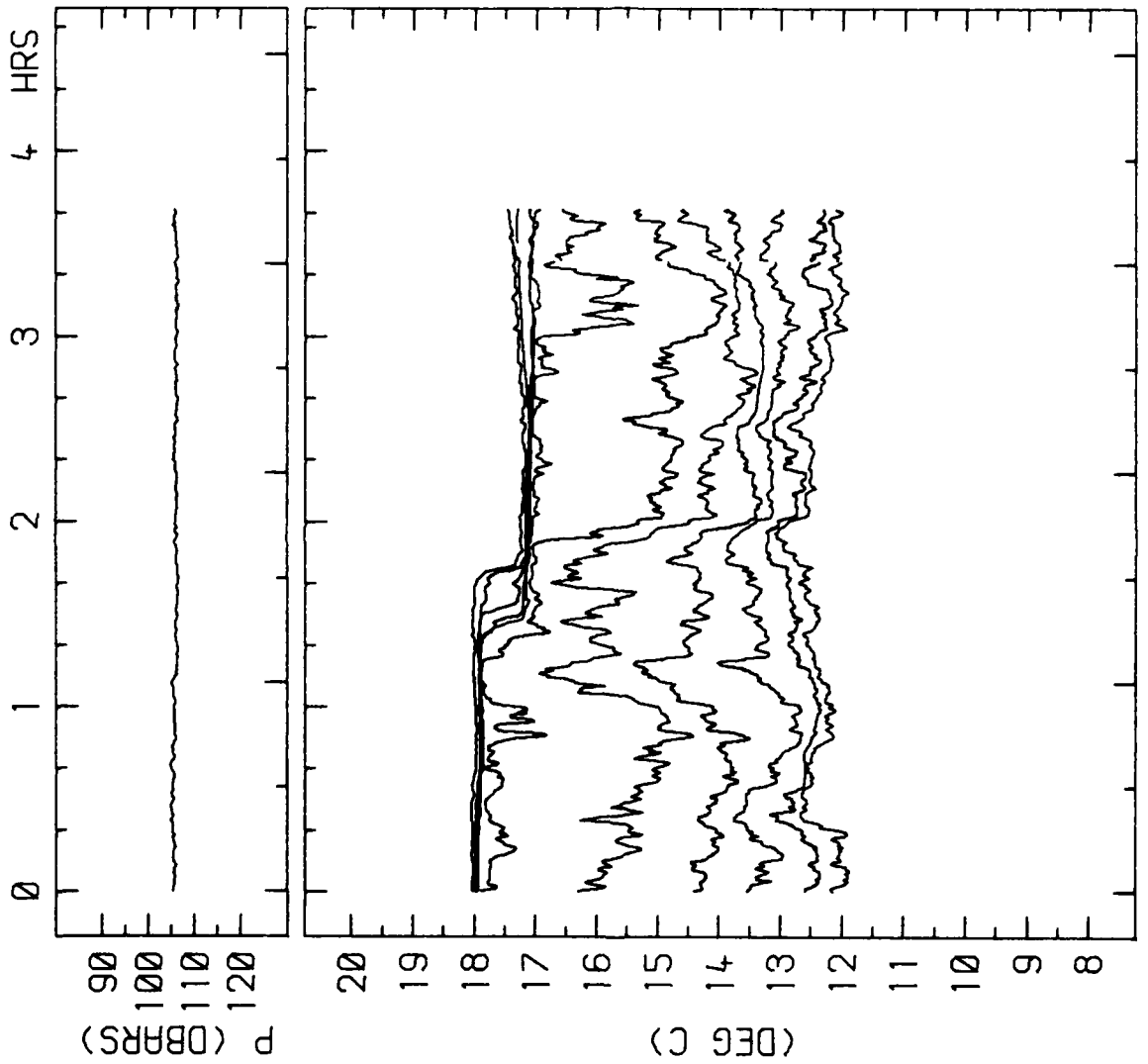
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.33 M/S
0432 14-NOV-83 TO 0855 14-NOV-83



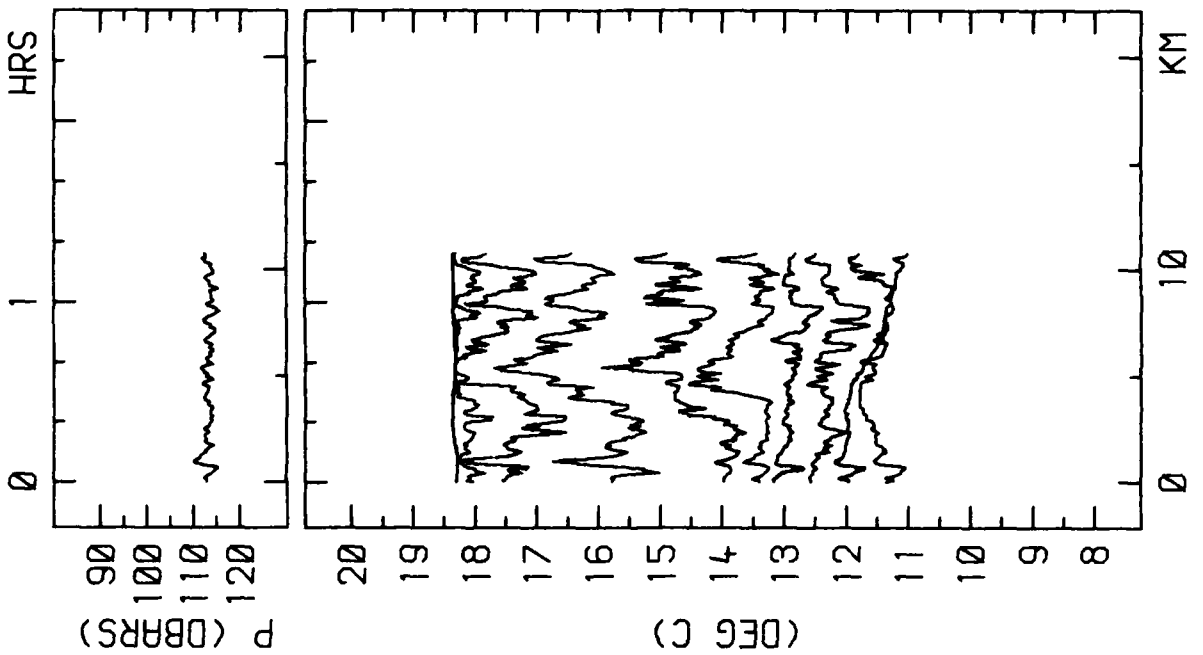
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.30 M/S
0320 14-NOV-83 TO 0431 14-NOV-83



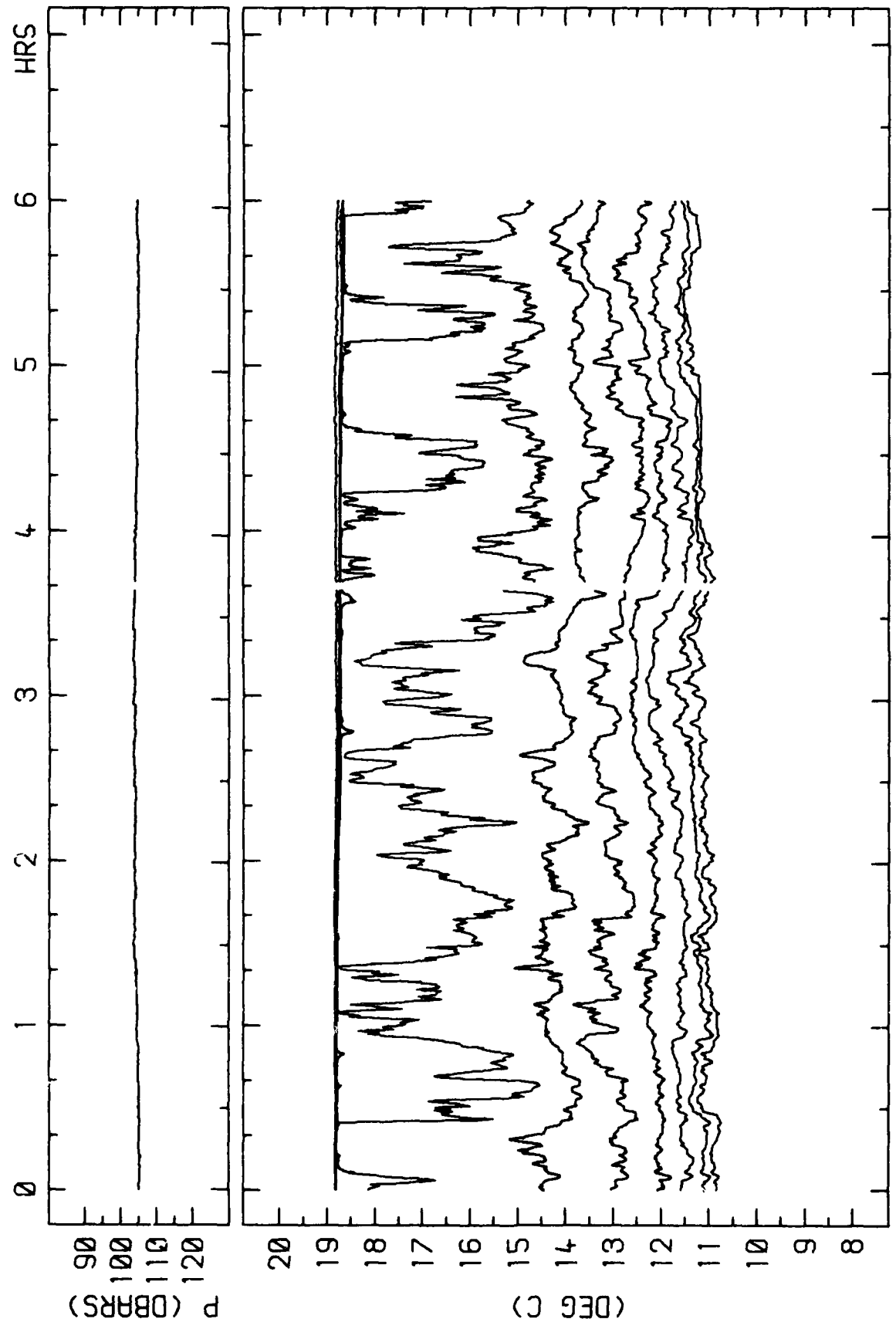
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.74 M/S
0020 14-NOV-83 TO 0319 14-NOV-83



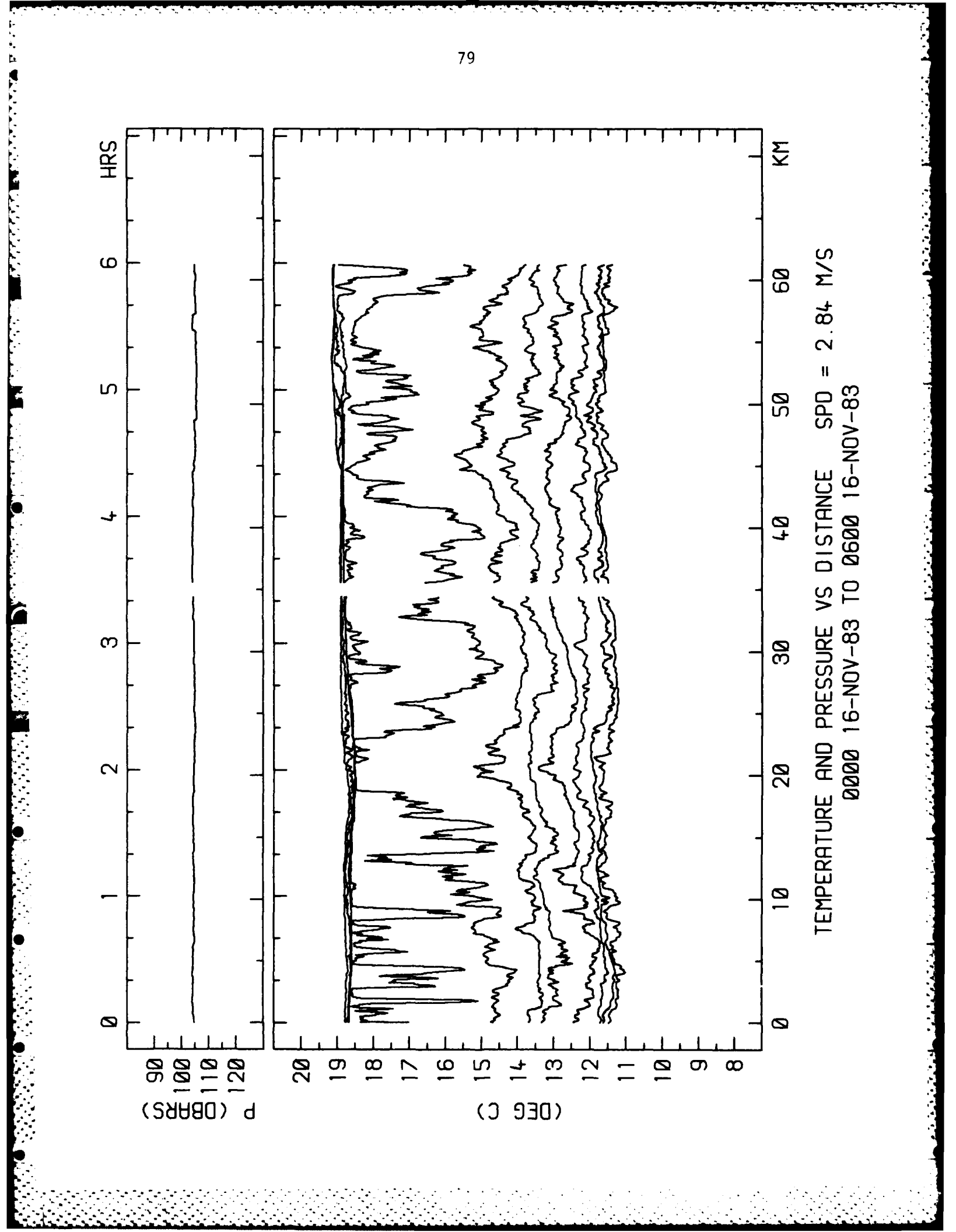
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.46 M/S
2036 13-NOV-83 TO 0019 14-NOV-83

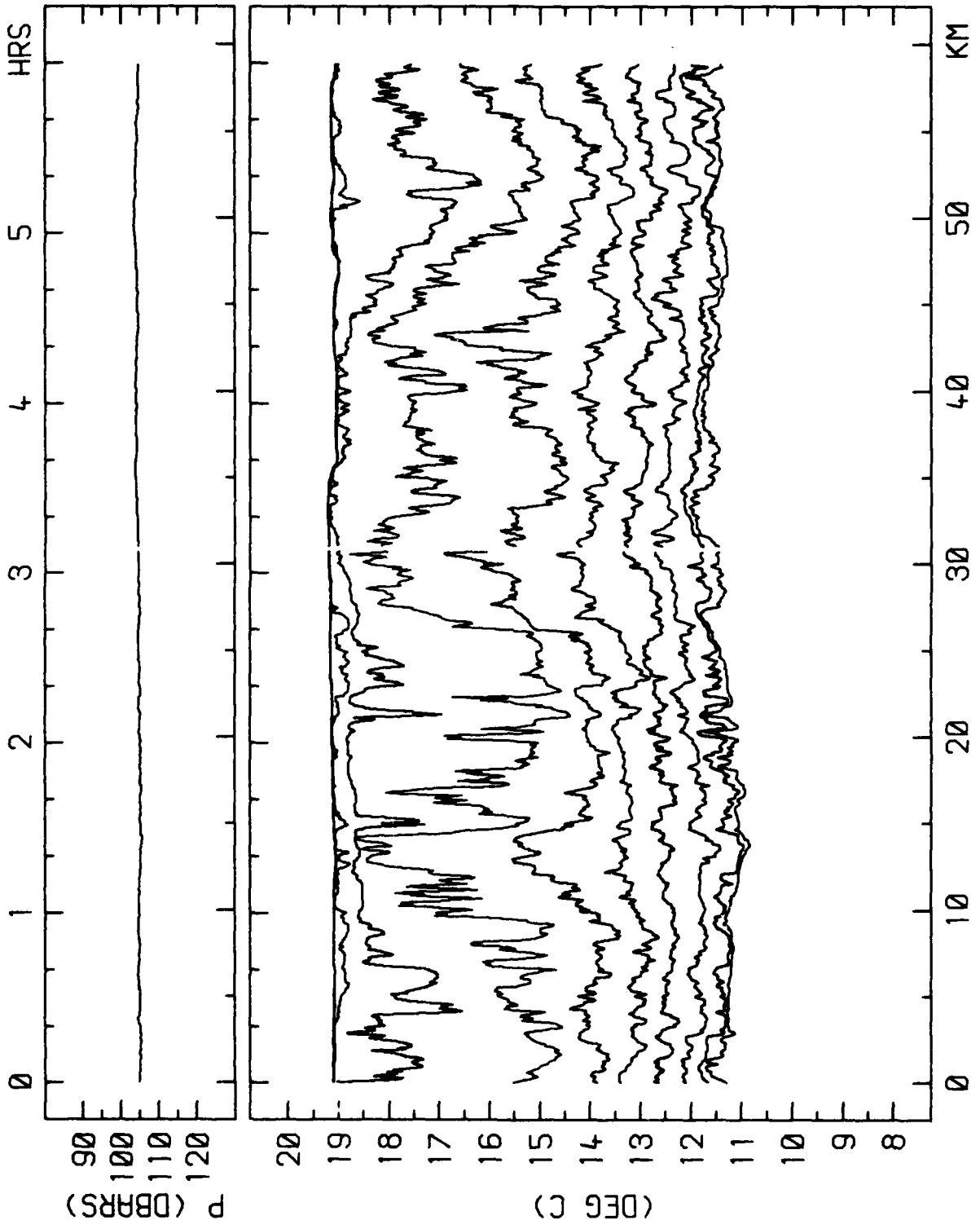


TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.36 M/S
0129 10-NOV-83 TO 0243 10-NOV-83

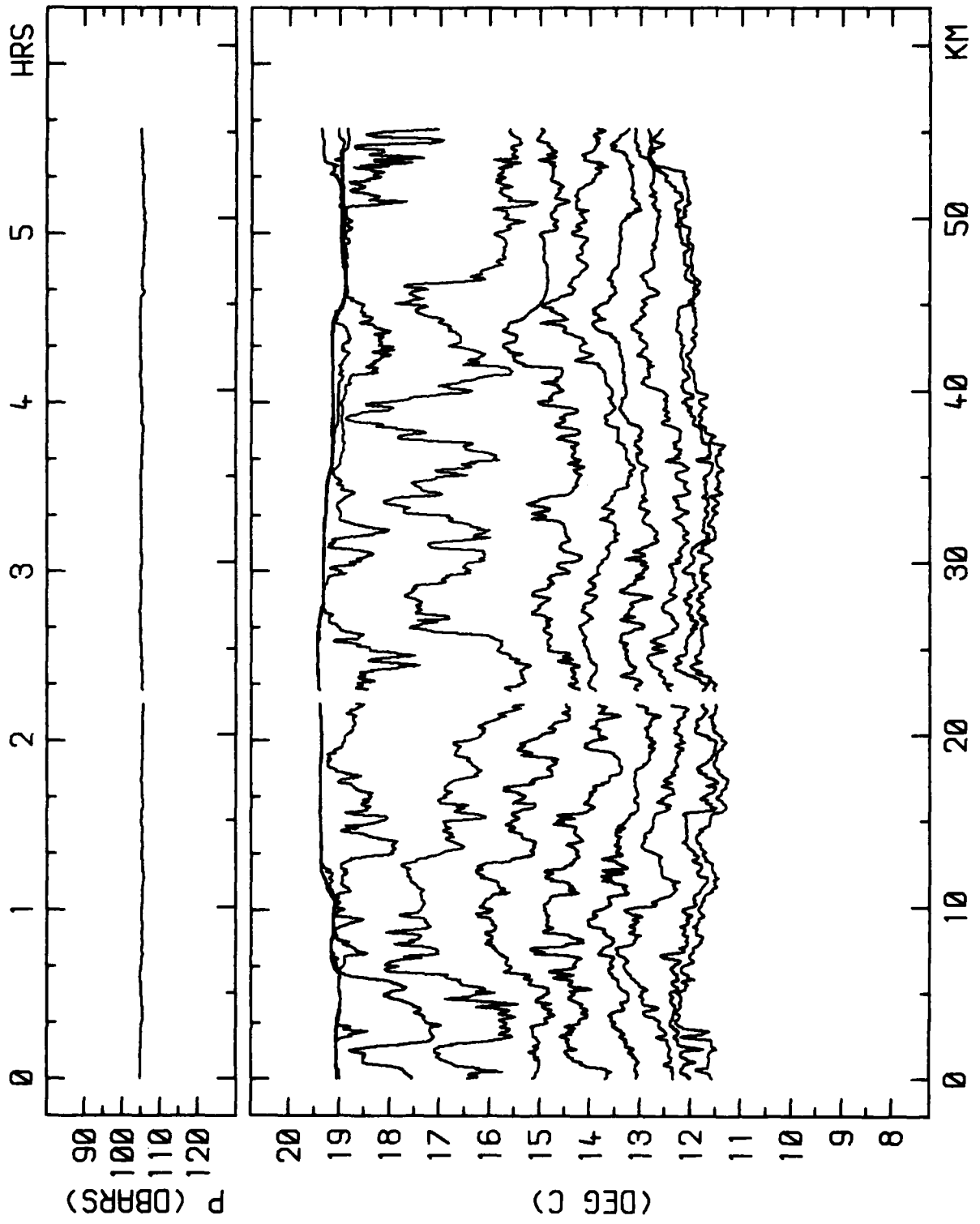


TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.80 M/S
1800 15-NOV-83 TO 2400 15-NOV-83


HRS
KM
P (DBARS)
(DEG C)
TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.84 M/S
0000 16-NOV-83 TO 0600 16-NOV-83



TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.73 M/S
0600 16-NOV-83 TO 1200 16-NOV-83

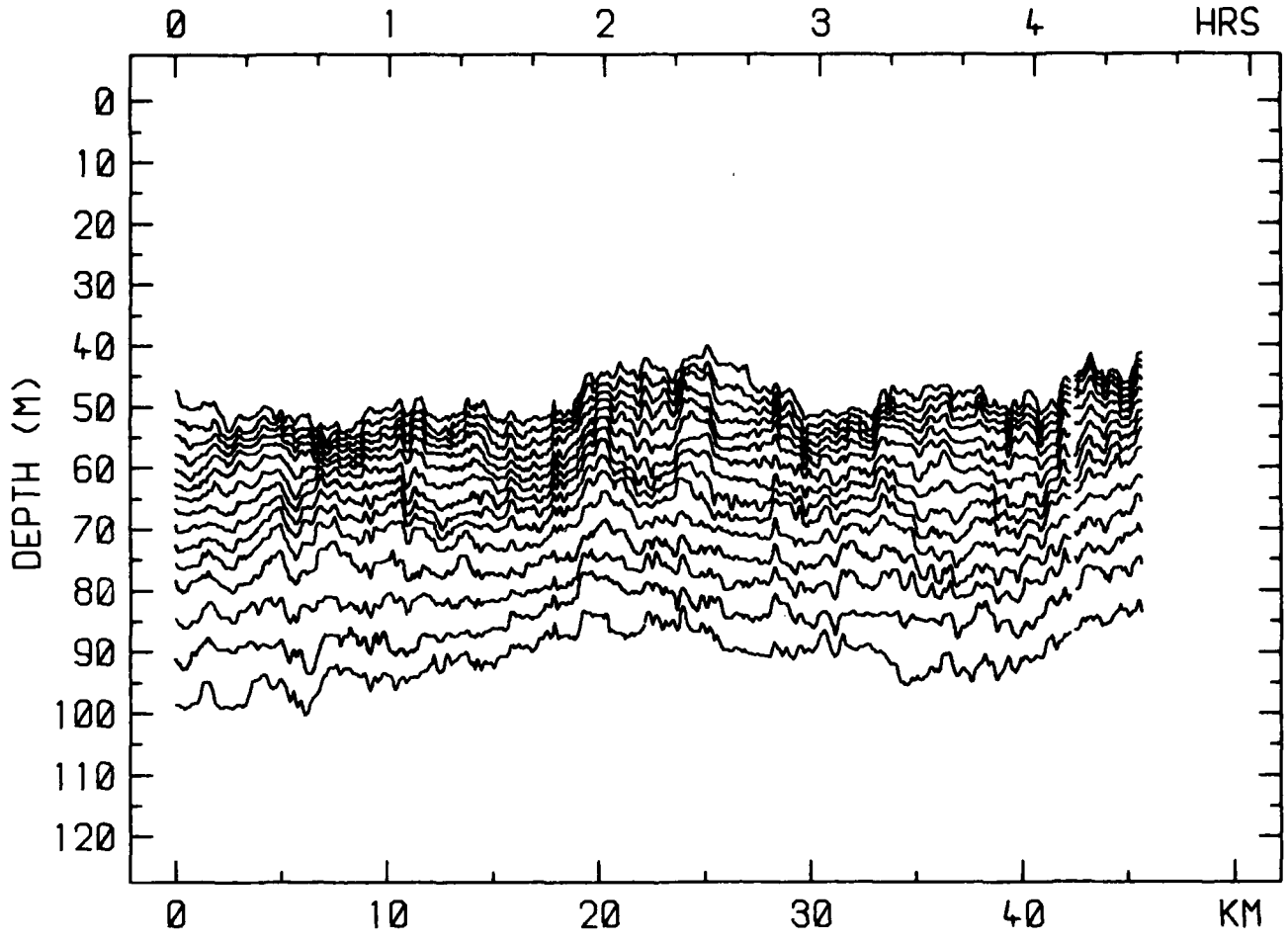


TEMPERATURE AND PRESSURE VS DISTANCE SPD = 2.73 M/S
1200 16-NOV-83 TO 1737 16-NOV-83

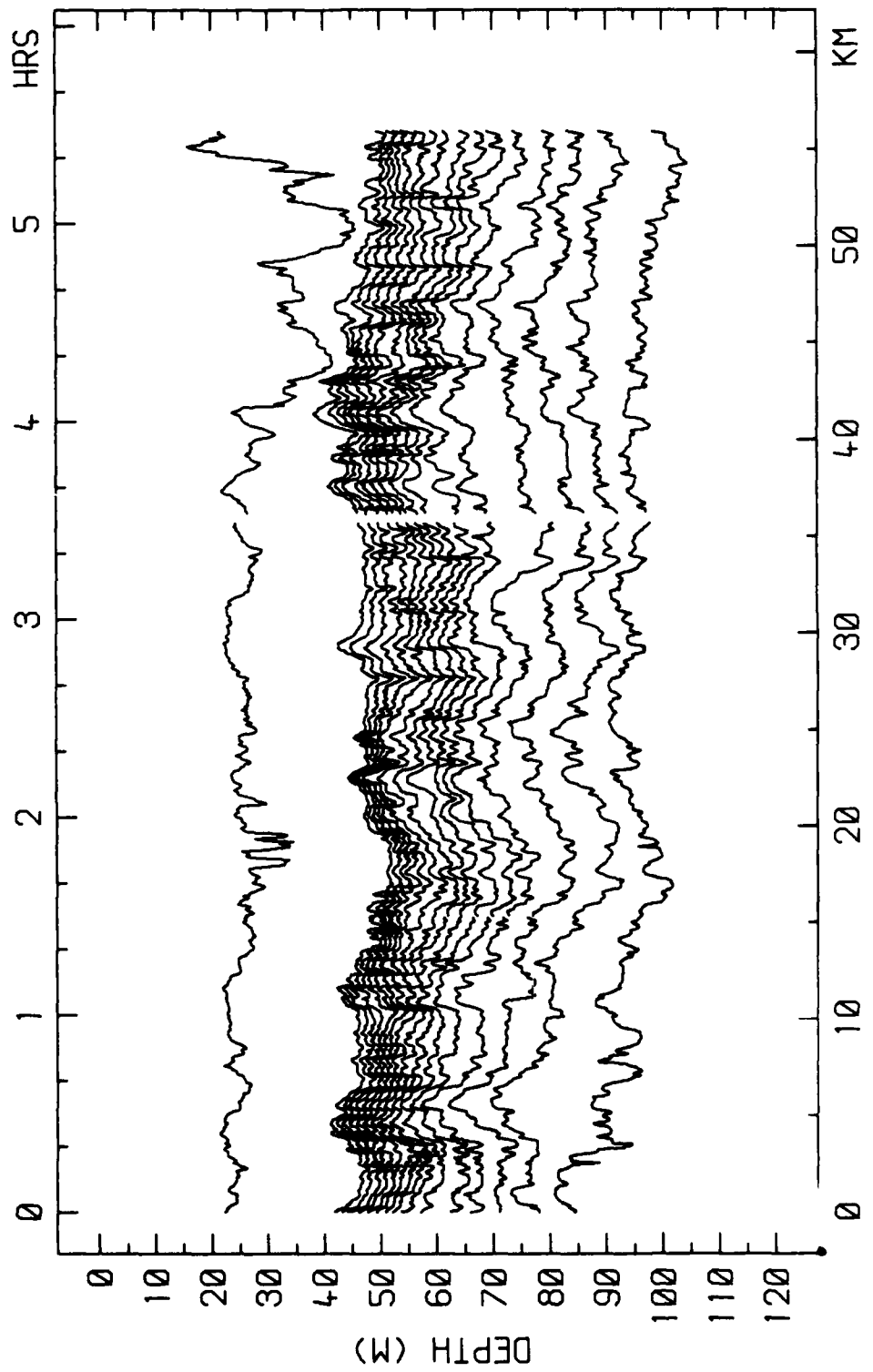
APPENDIX C

Isotherm Cross-Sections

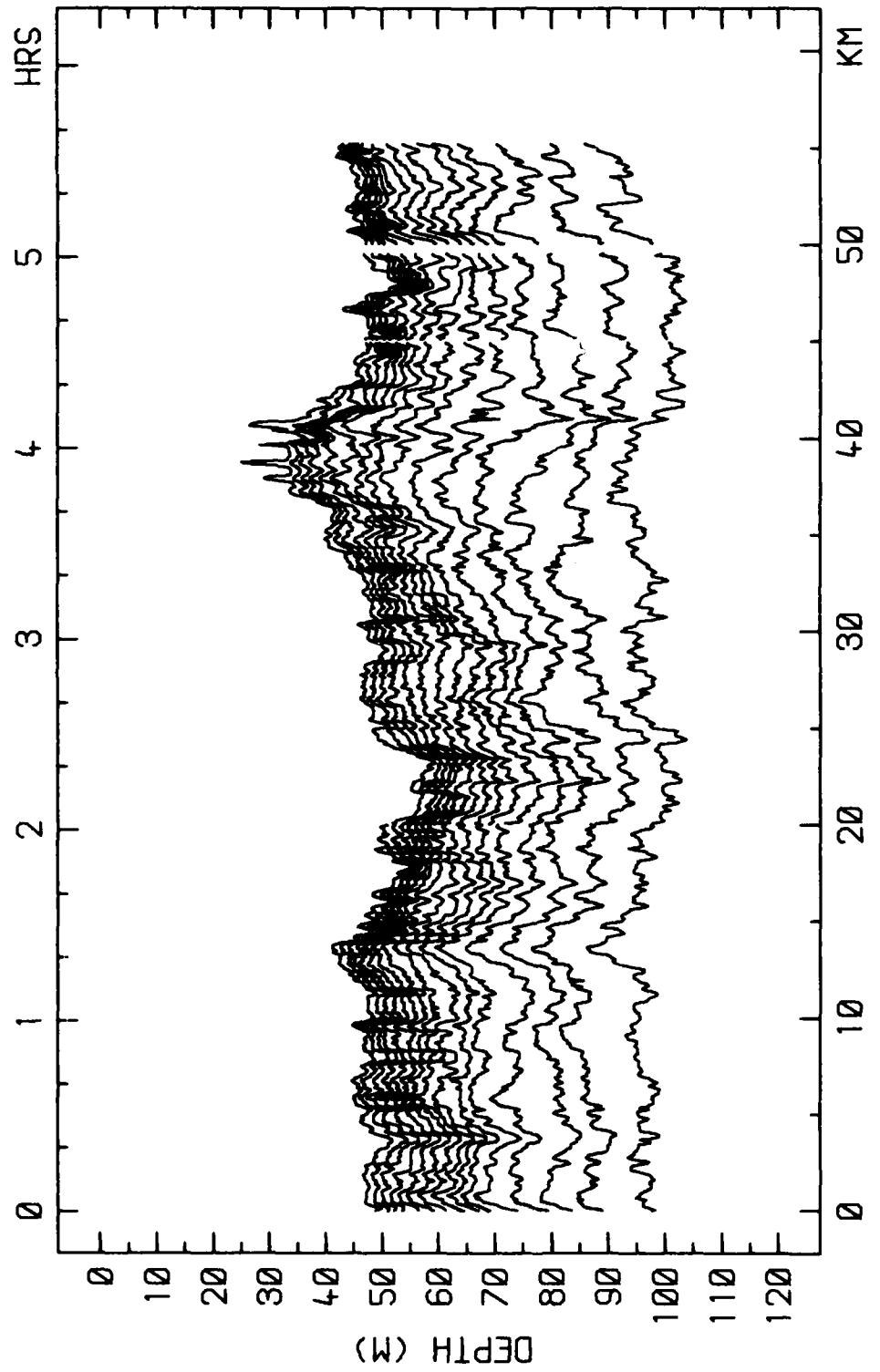
On the following pages are plots of the depths of isotherms at 0.5° C intervals for the tow segments given in Tables 2 and 3. The depths of isotherms were obtained by linear interpolation between the low-pass filtered temperature observations plotted in Appendix B. Isotherms which were not at least 80% complete were not plotted. Isotherms which were incomplete, but had no more than 20% of the record missing, were completed by linear extrapolation from adjacent isotherms.



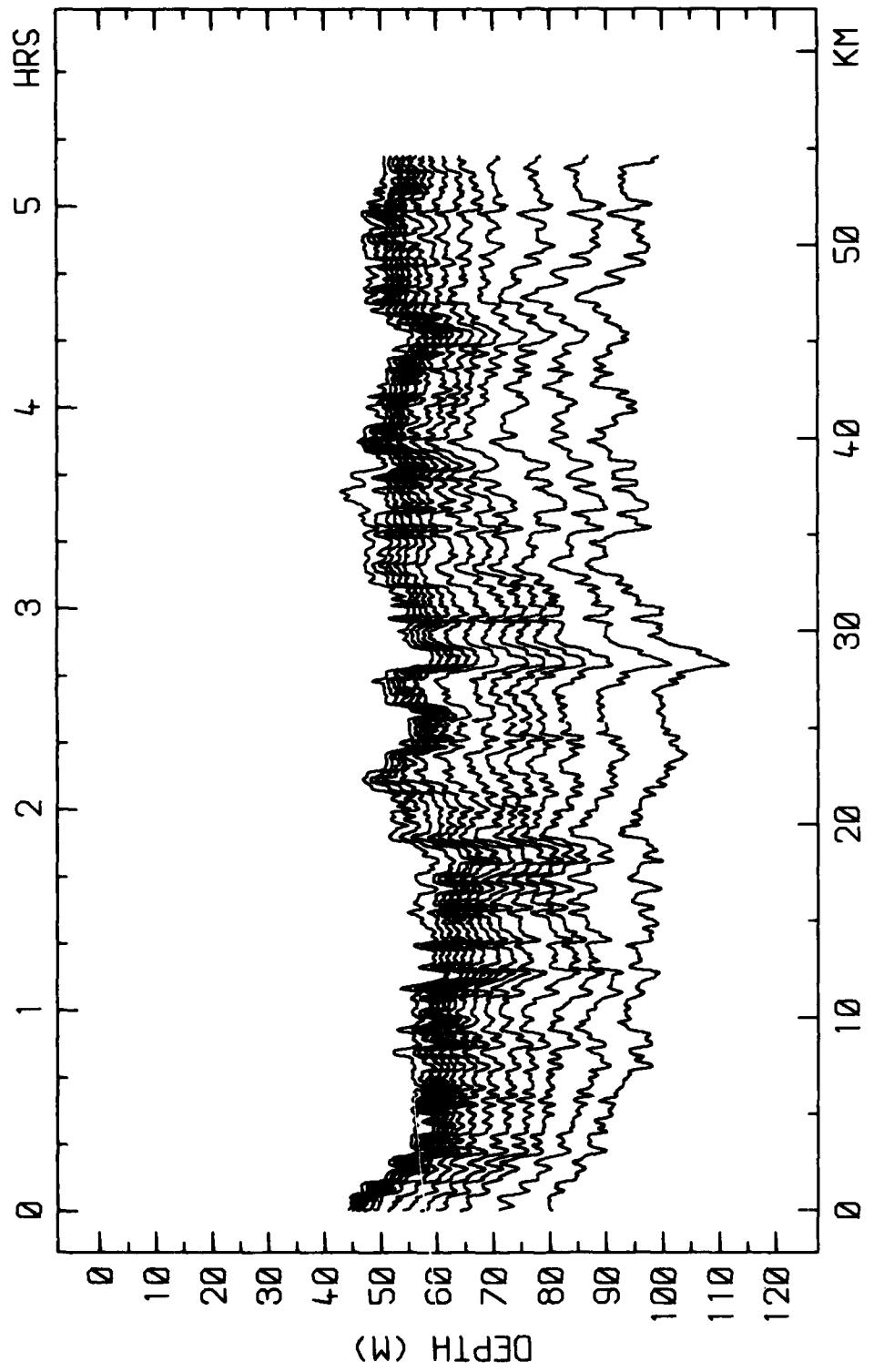
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.82 M/S
18.0 - 11.0 DEG C, 1800 27-OCT-83 TO 2230 27-OCT-83



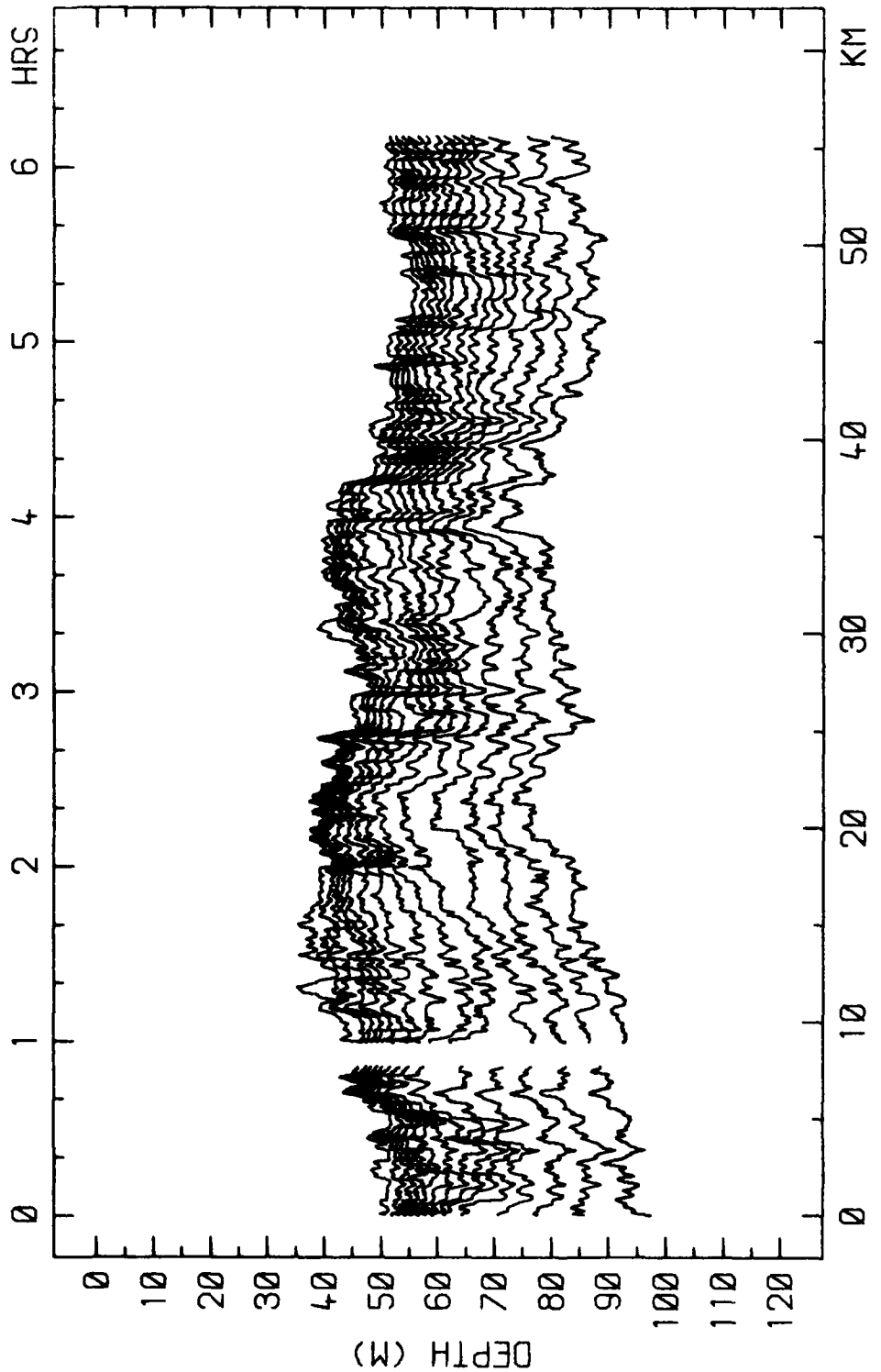
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.84 M/S
18.5 - 11.0 DEG C, 2231 27-OCT-83 TO 0358 28-OCT-83



EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.74 M/S
18.0 - 11.0 DEG C, 0359 28-OCT-83 TO 0934 28-OCT-83



EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.89 M/S
18.0 - 11.5 DEG C, 0935 28-OCT-83 TO 1449 28-OCT-83



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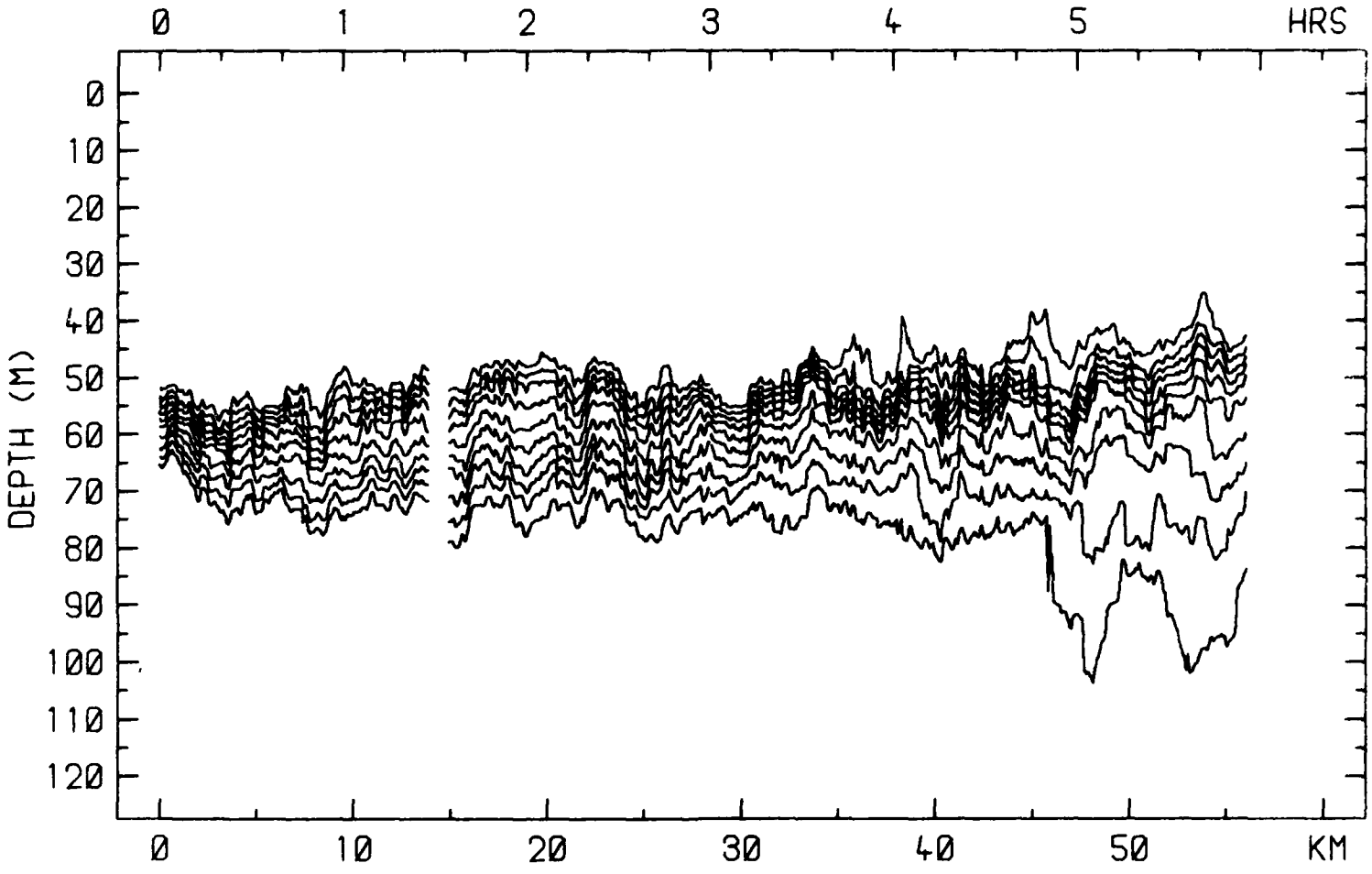
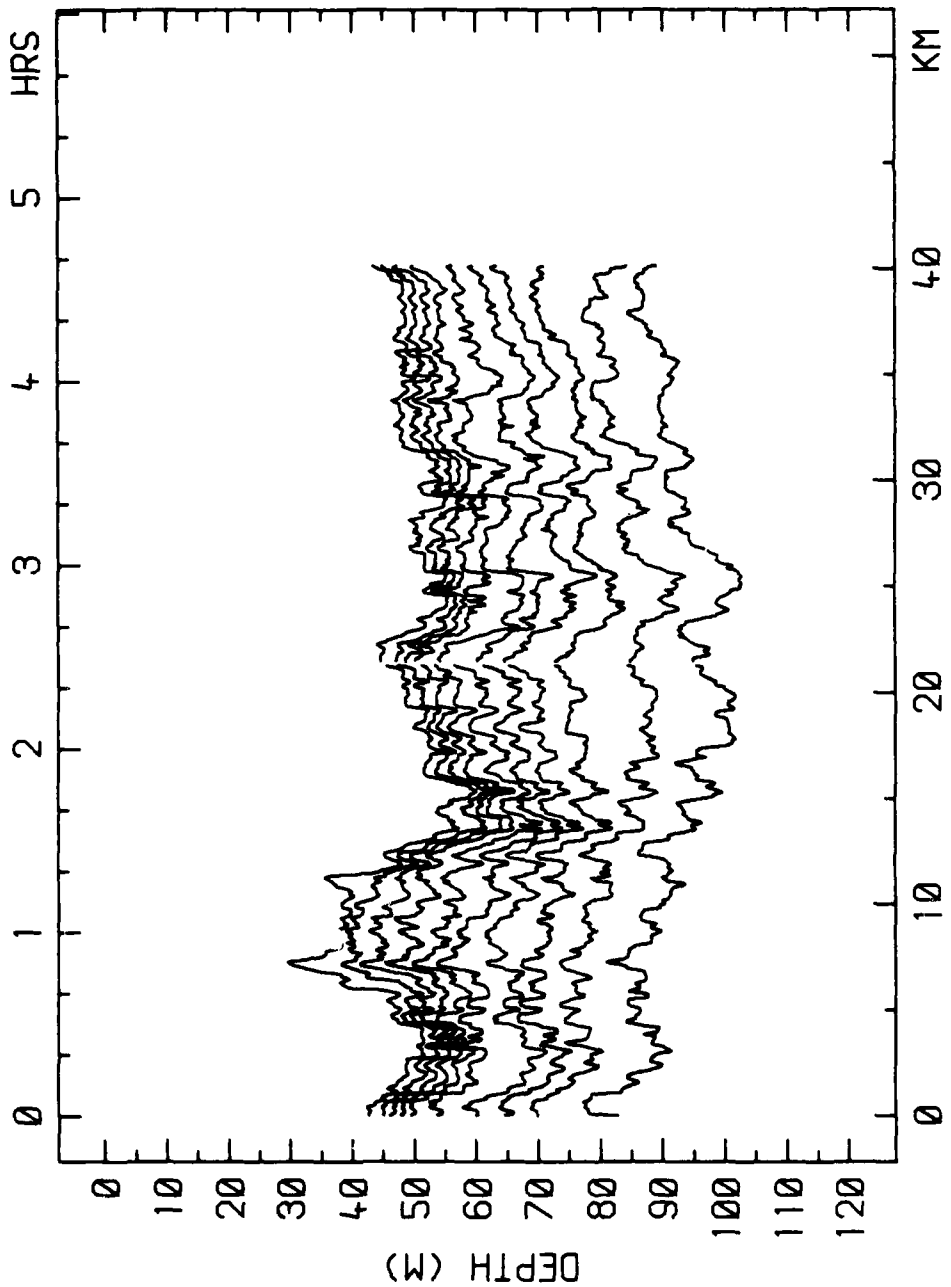
18.0 - 11.5 DEG C, 1450 28-OCT-83 TO 2100 28-OCT-83



EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.63 M/S
18.0 - 13.5 DEG C, 2101 28-OCT-83 TO 0255 29-OCT-83



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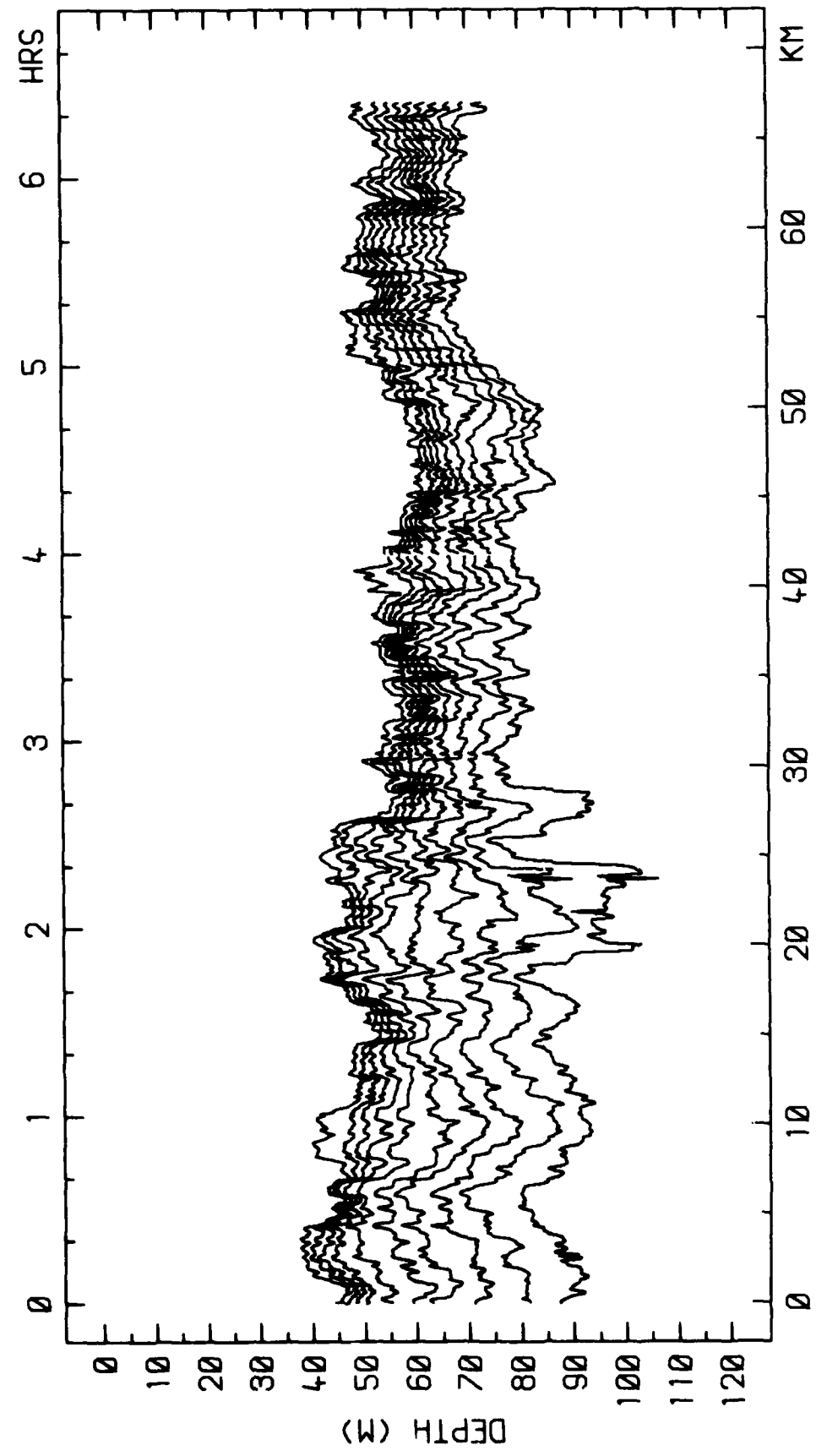
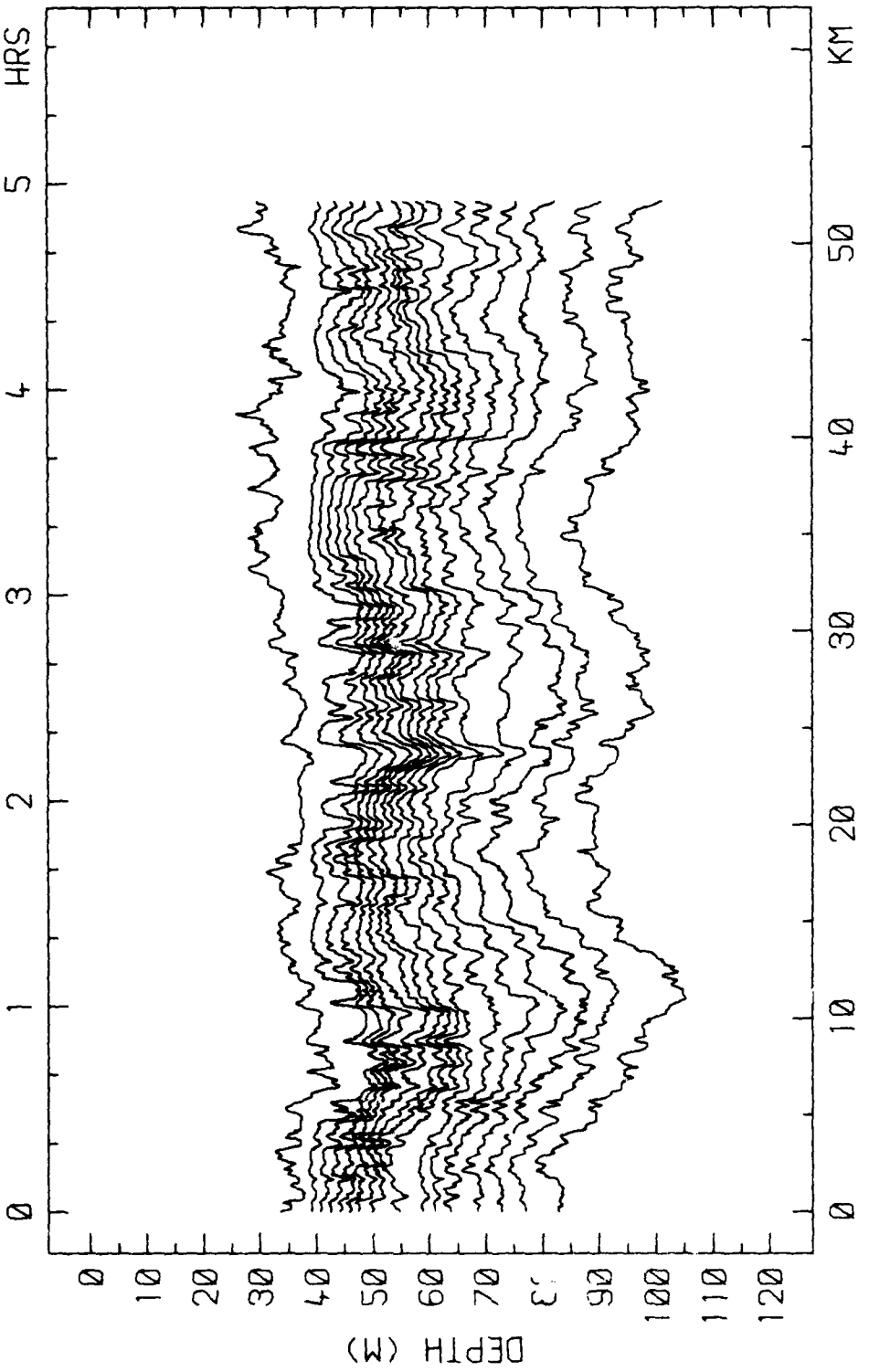
18.0 - 13.5 DEG C, 0256 29-OCT-83 TO 0733 29-OCT-83



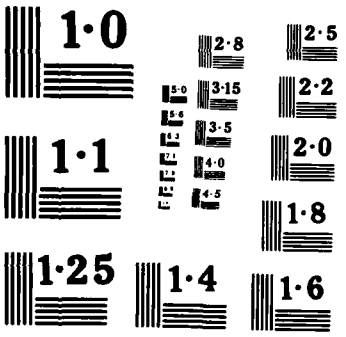
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.91 M/S
18.0 - 13.5 DEG C, 0734 29-OCT-83 TO 1356 29-OCT-83



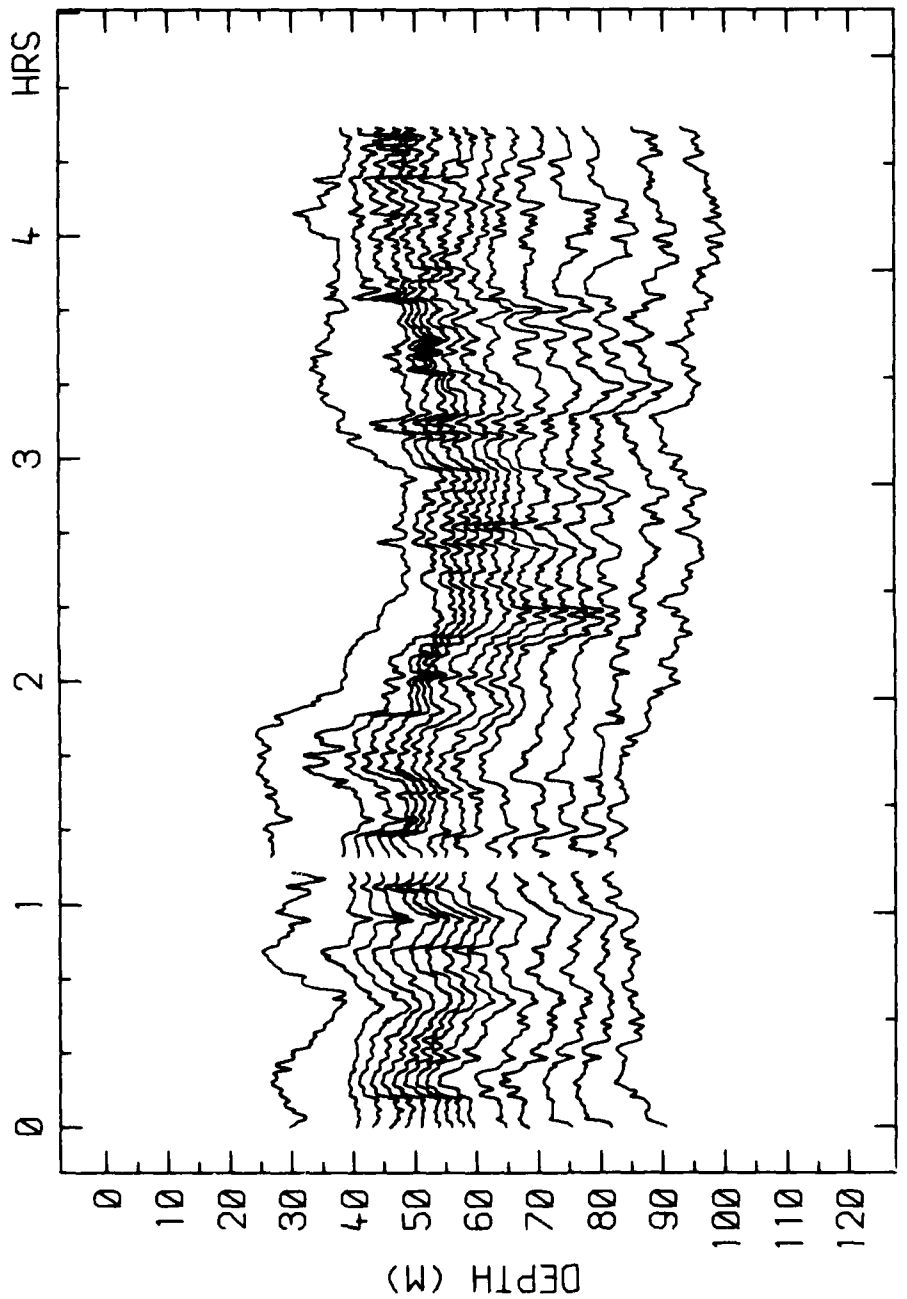
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.95 M/S
18.5 - 11.0 DEG C, 1905 31-OCT-83 TO 2400 31-OCT-83

AD-A158 304 TOWED THERMISTOR CHAIN OBSERVATIONS DURING MILDEX (MIXED LAYER DYNAMICS E..(U) OREGON STATE UNIV CORVALLIS COLL OF OCEANOGRAPHY R J BAUMANN ET AL. 2/2

UNCLASSIFIED JUN 85 REF-85-12 N00014-79-C-0004 F/G 8/10 NL



NATIONAL BUREAU OF STANDARDS
MICROCOPY RESOLUTION TEST CHART



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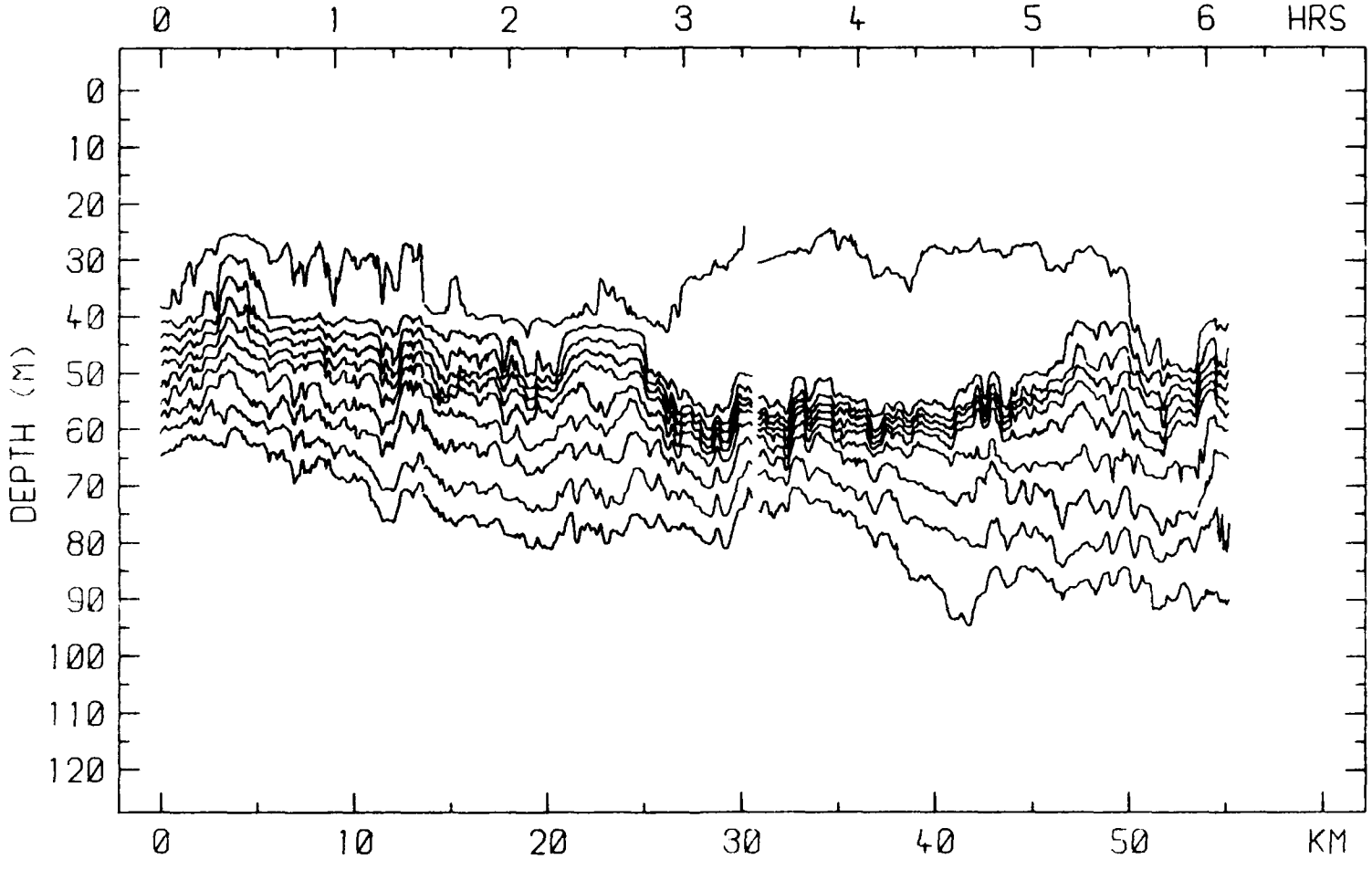
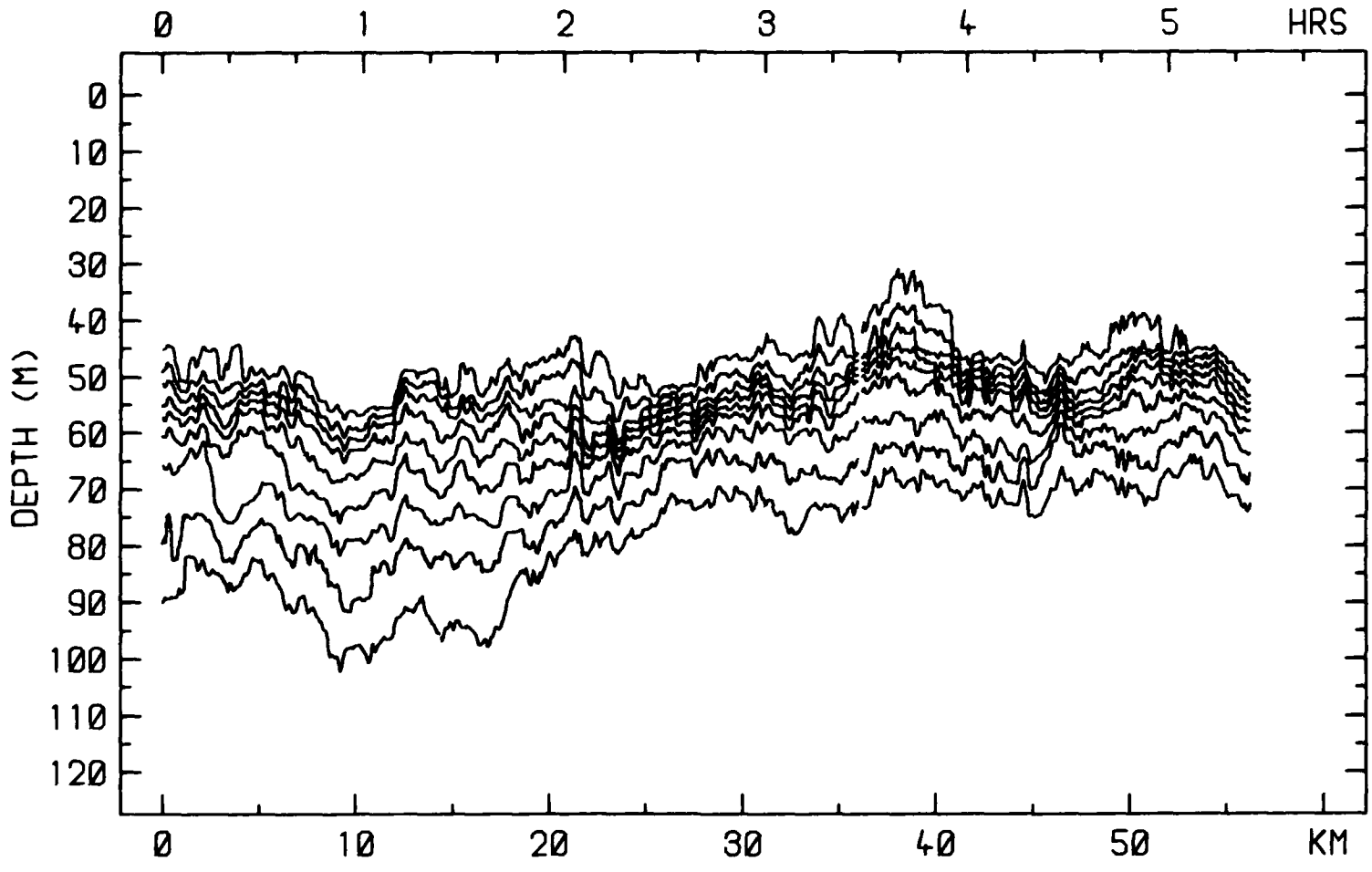
18.5 - 11.5 DEG C, 0000 1-NOV-83 TO 0429 1-NOV-83



EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.50 M/S
18.5 - 14.0 DEG C, 0430 1-NOV-83 TO 1037 1-NOV-83



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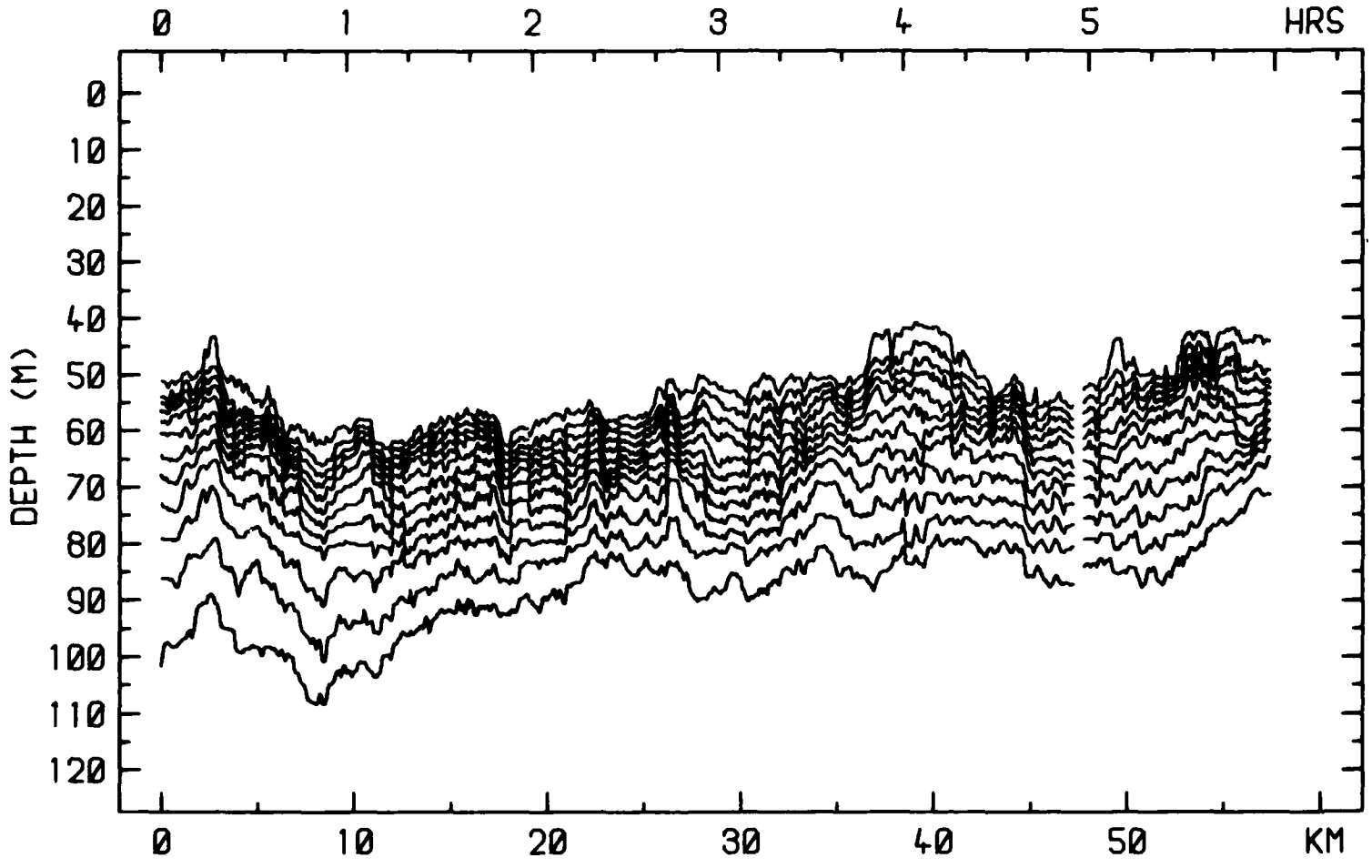
18.0 - 14.0 DEG C, 1038 1-NOV-83 TO 1601 1-NOV-83



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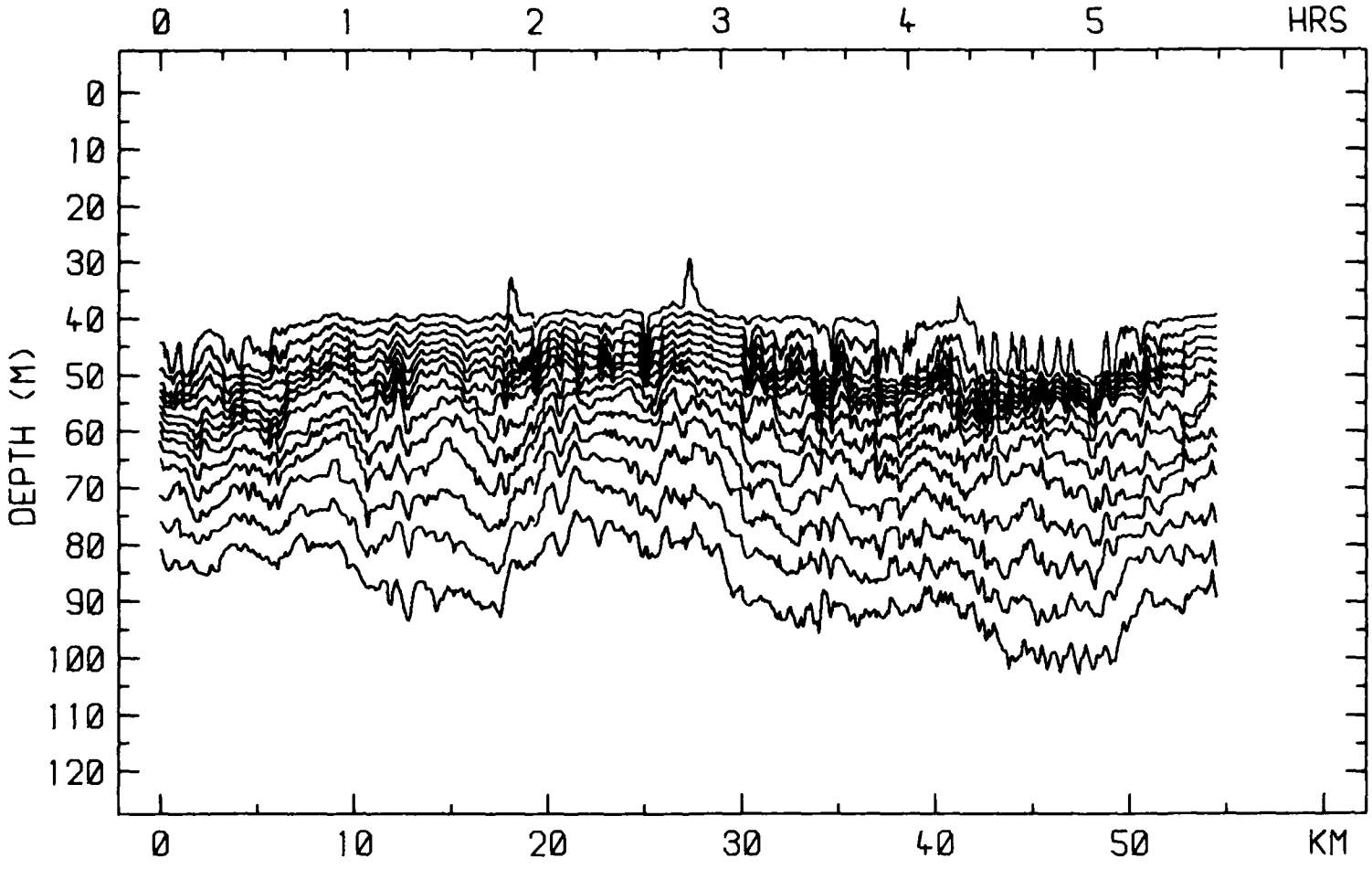
18.0 - 12.5 DEG C, 1602 1-NOV-83 TO 2200 1-NOV-83



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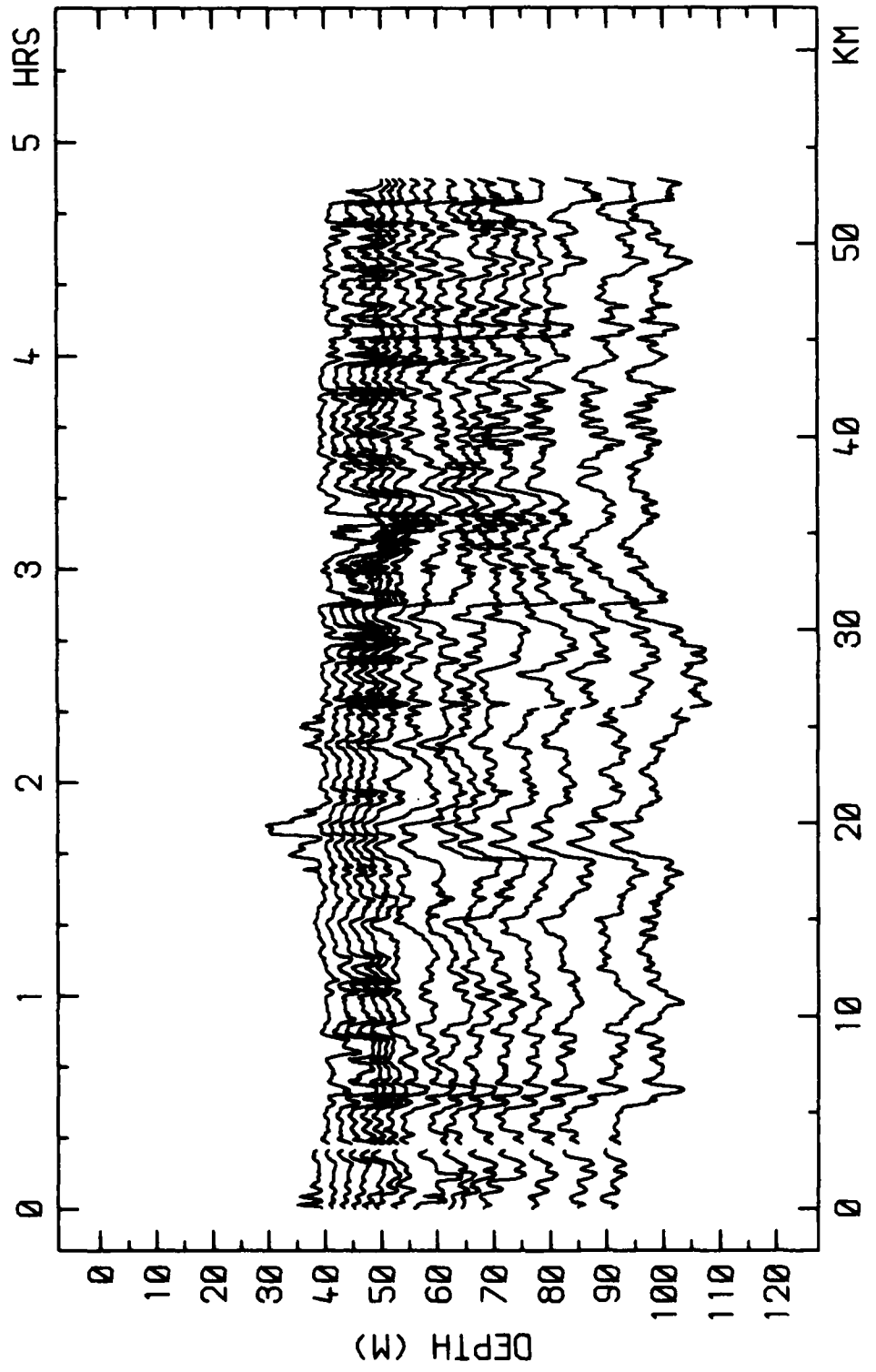
18.0 - 11.5 DEG C, 2201 1-NOV-83 TO 0339 2-NOV-83



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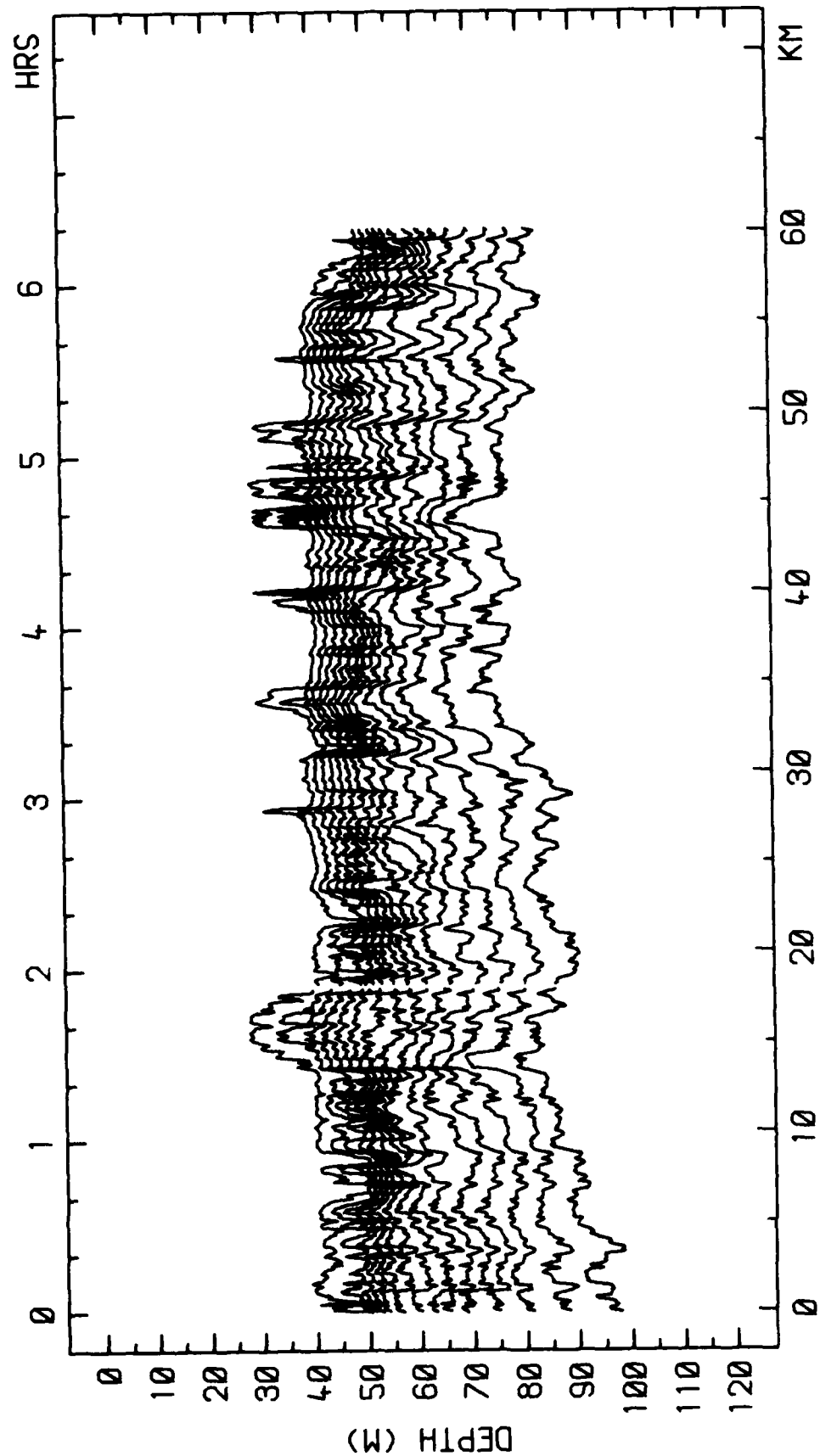
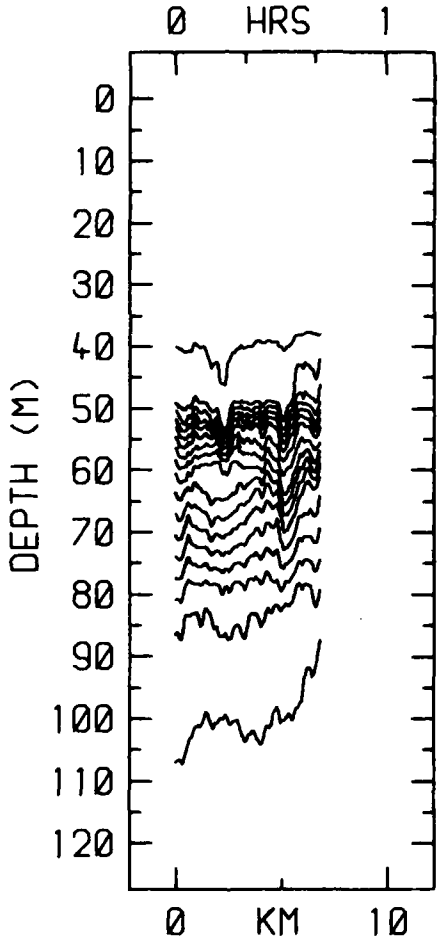
18.0 - 11.5 DEG C, 0340 2-NOV-83 TO 0829 2-NOV-83


HRS
0
1
2
3
4
5
6
KM
0
10
20
30
40
50
60
DEPTH (M)
0
10
20
30
40
50
60
70
80
90
100
110
120
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.64 M/S
18.0 - 11.5 DEG C, 0830 2-NOV-83 TO 1449 2-NOV-83



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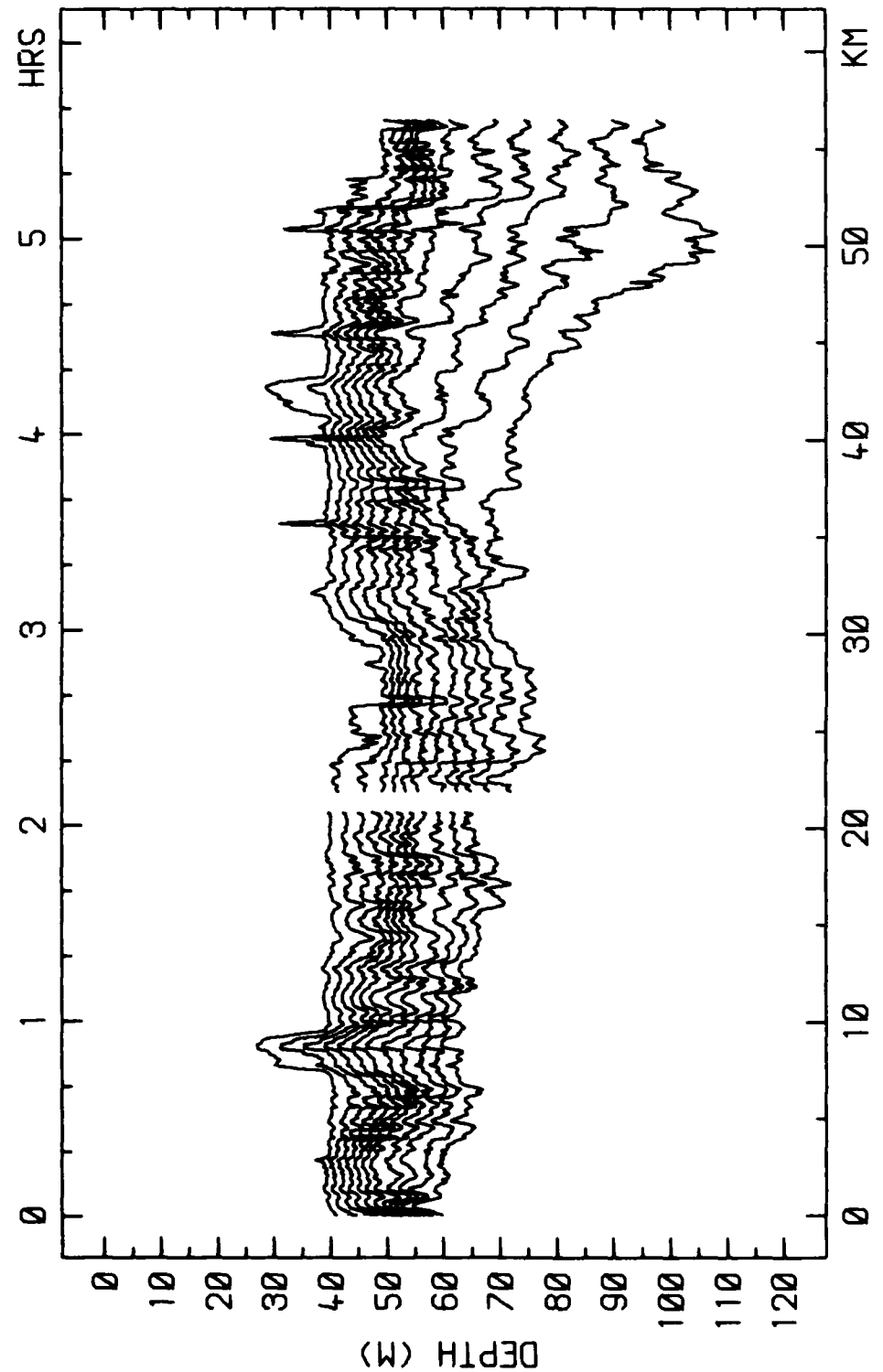
18.5 - 10.5 DEG C, 1450 2-NOV-83 TO 1530 2-NOV-83



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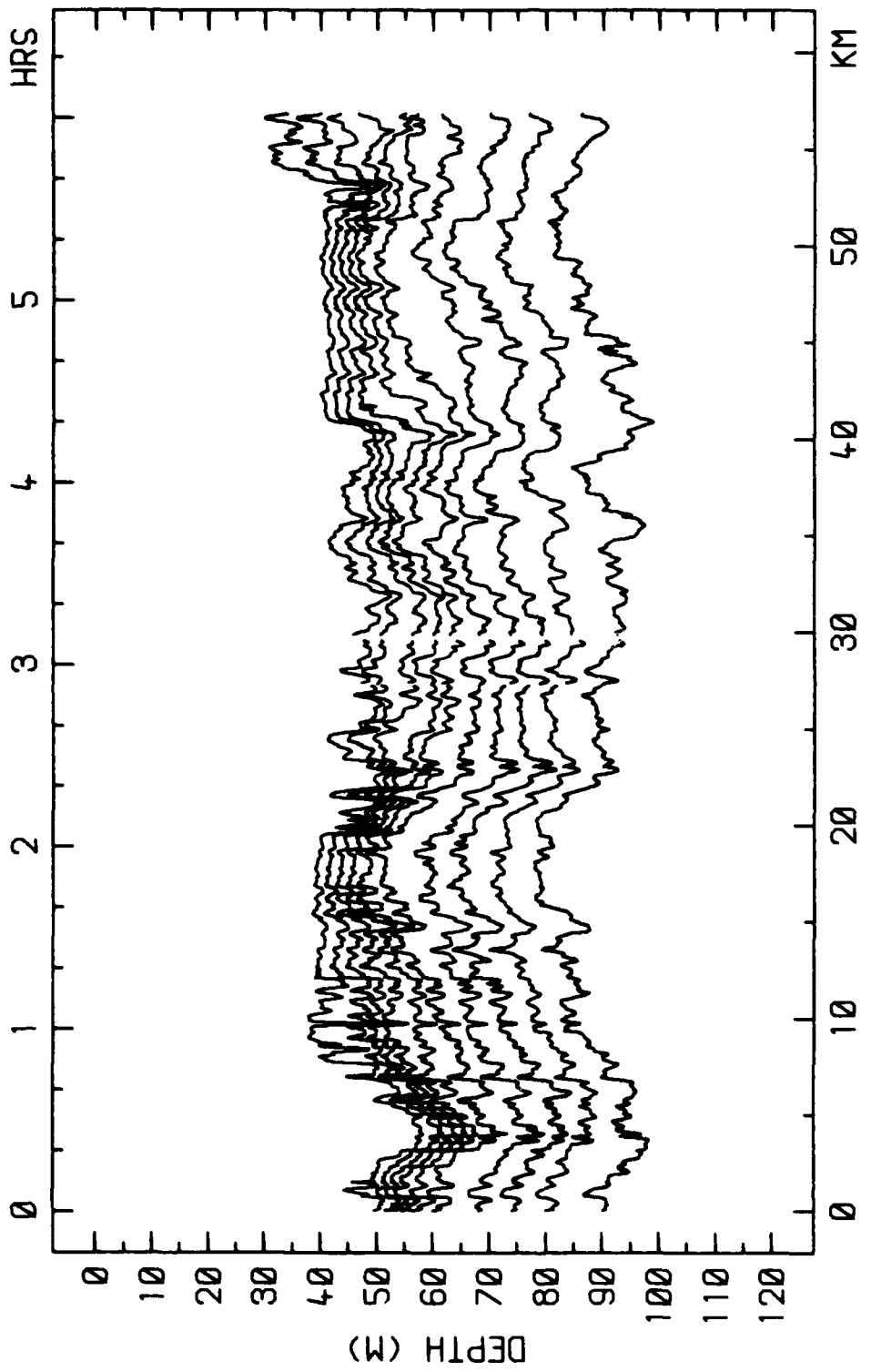
18.0 - 13.0 DEG C, 1531 2-NOV-83 TO 2106 2-NOV-83



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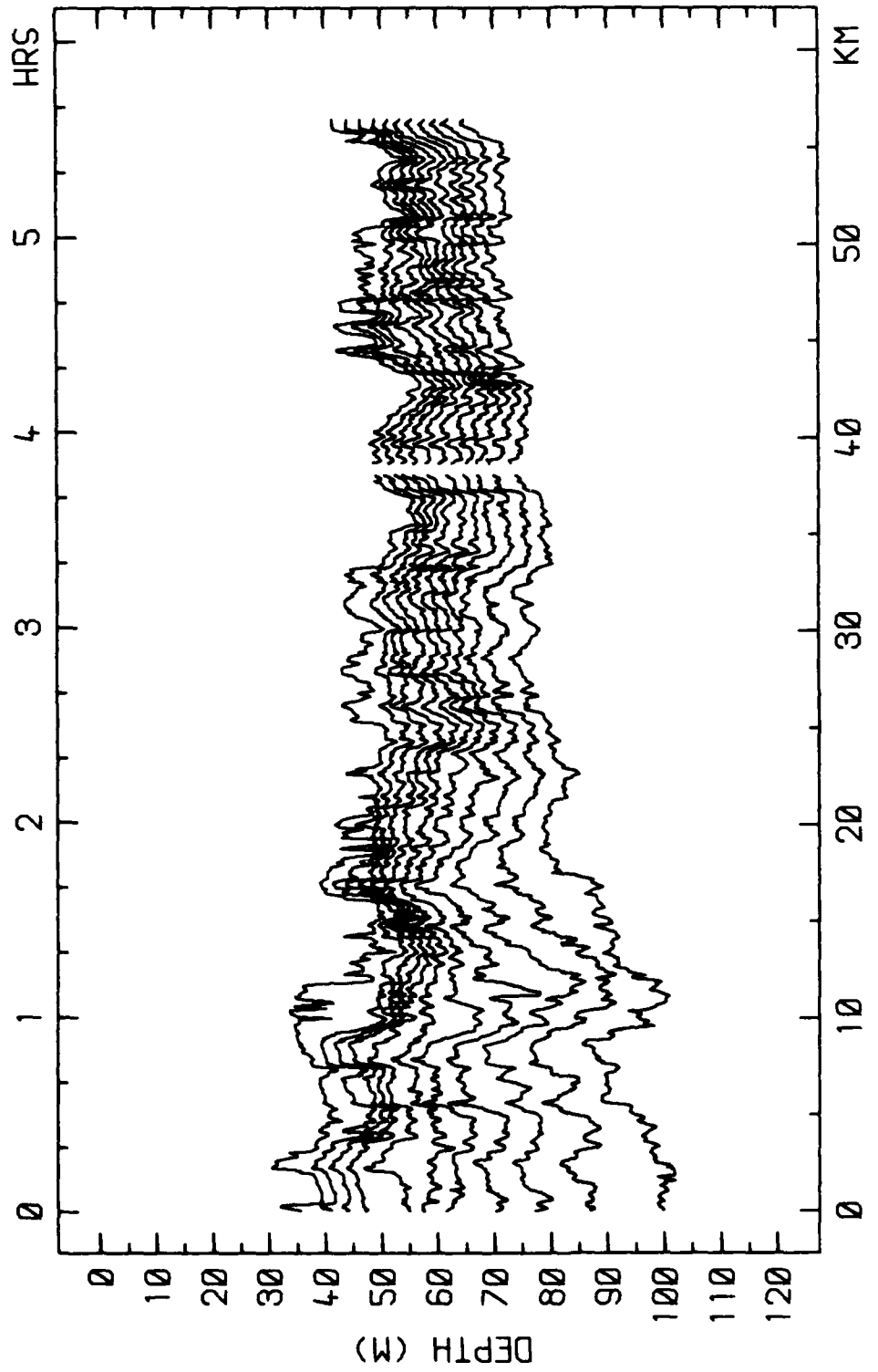
18.0 - 13.5 DEG C, 2107 2-NOV-83 TO 0308 3-NOV-83



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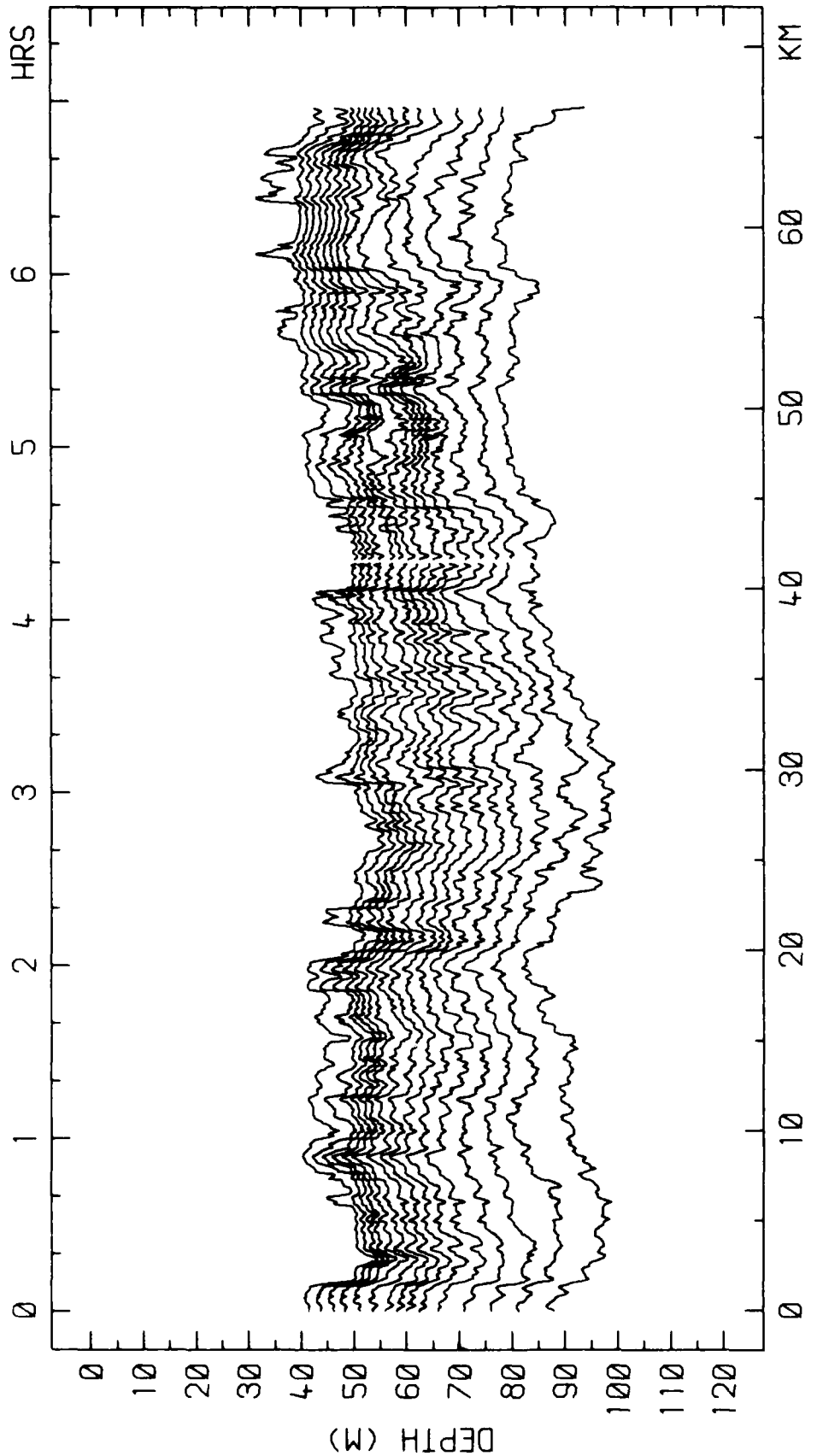
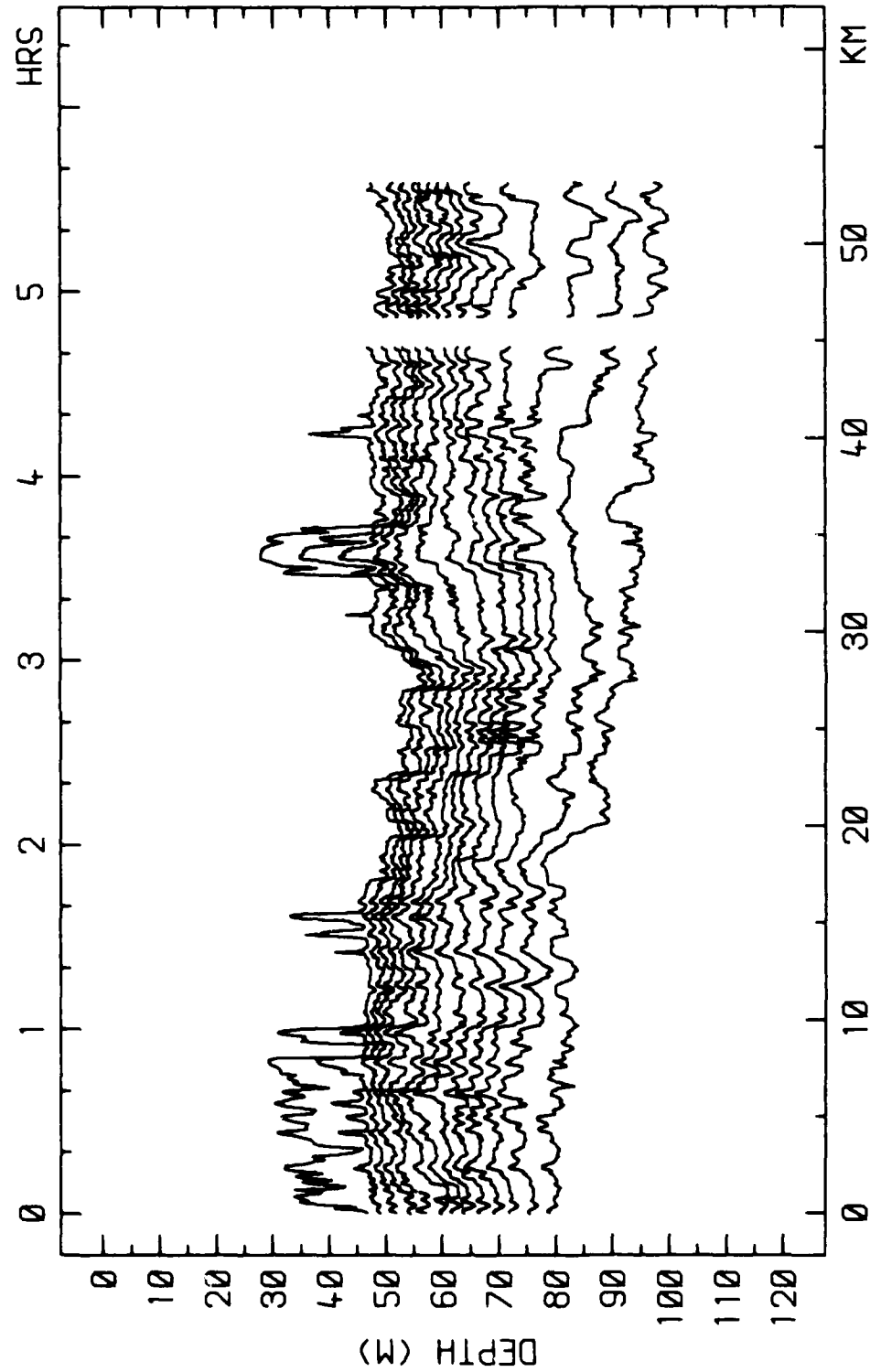
18.0 - 13.0 DEG C, 0309 3-NOV-83 TO 0844 3-NOV-83



EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.66 M/S
18.0 - 11.0 DEG C, 0845 3-NOV-83 TO 1541 3-NOV-83



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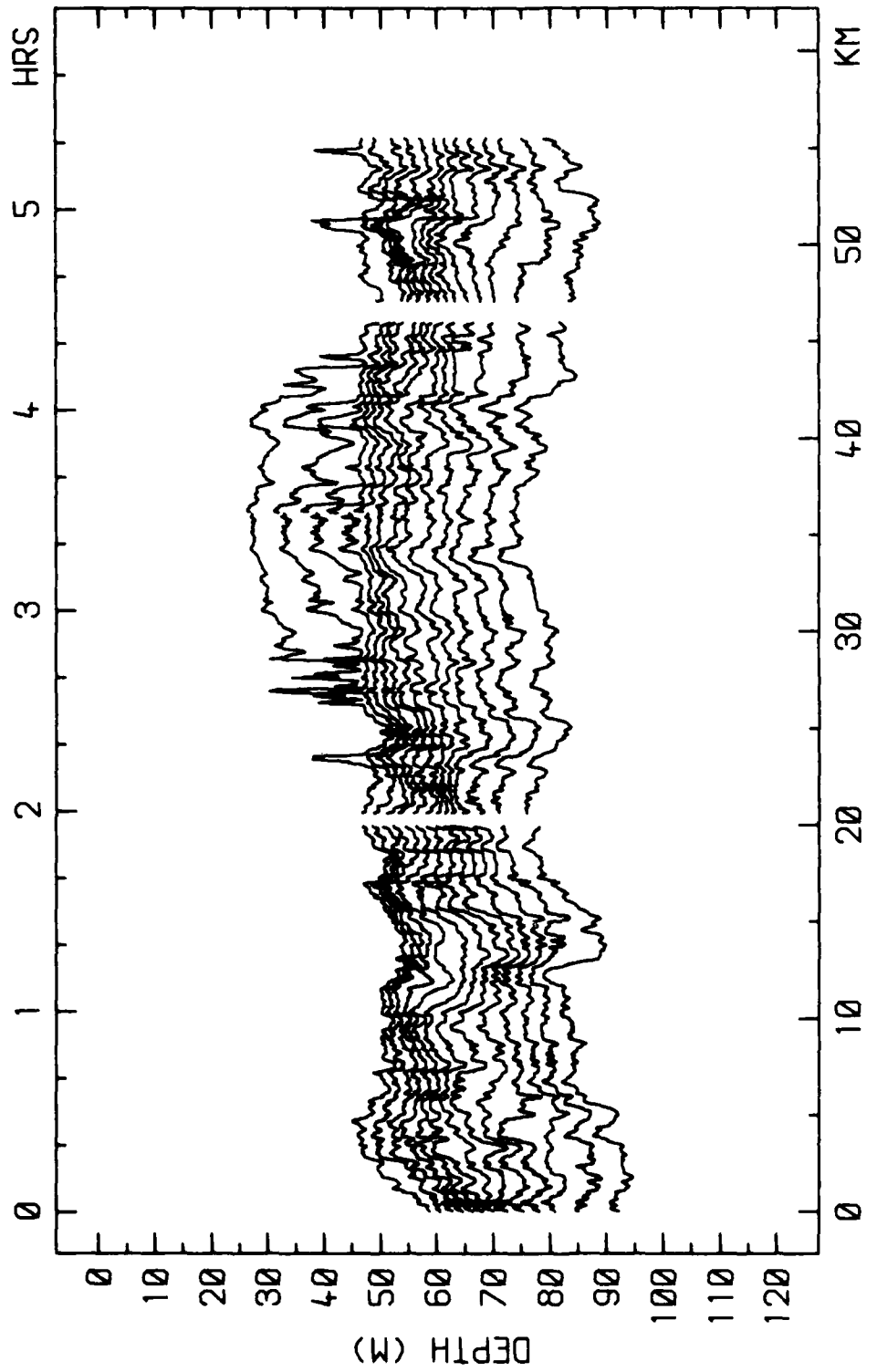
18.0 - 12.0 DEG C, 1953 9-NOV-83 TO 0128 10-NOV-83



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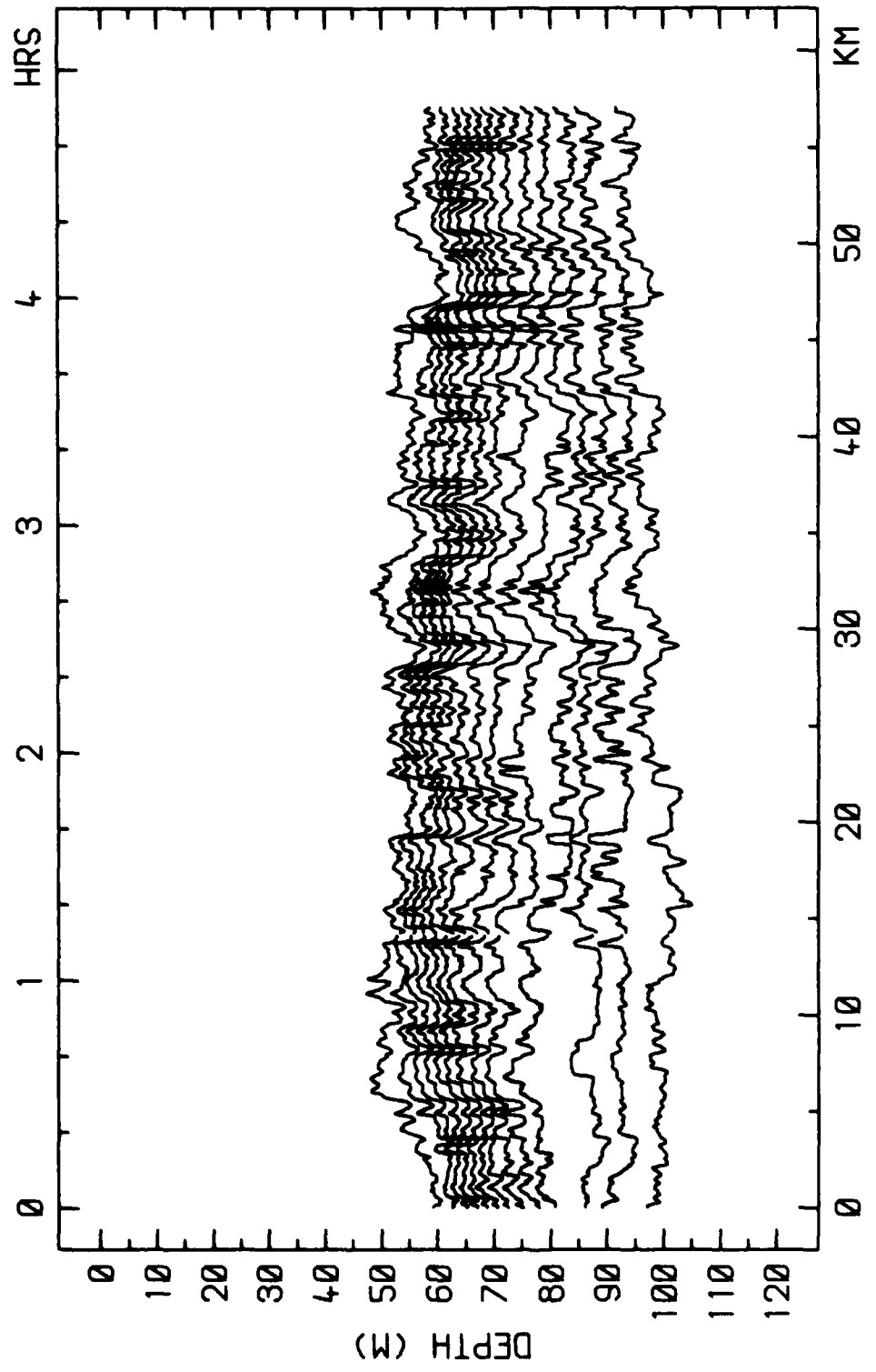
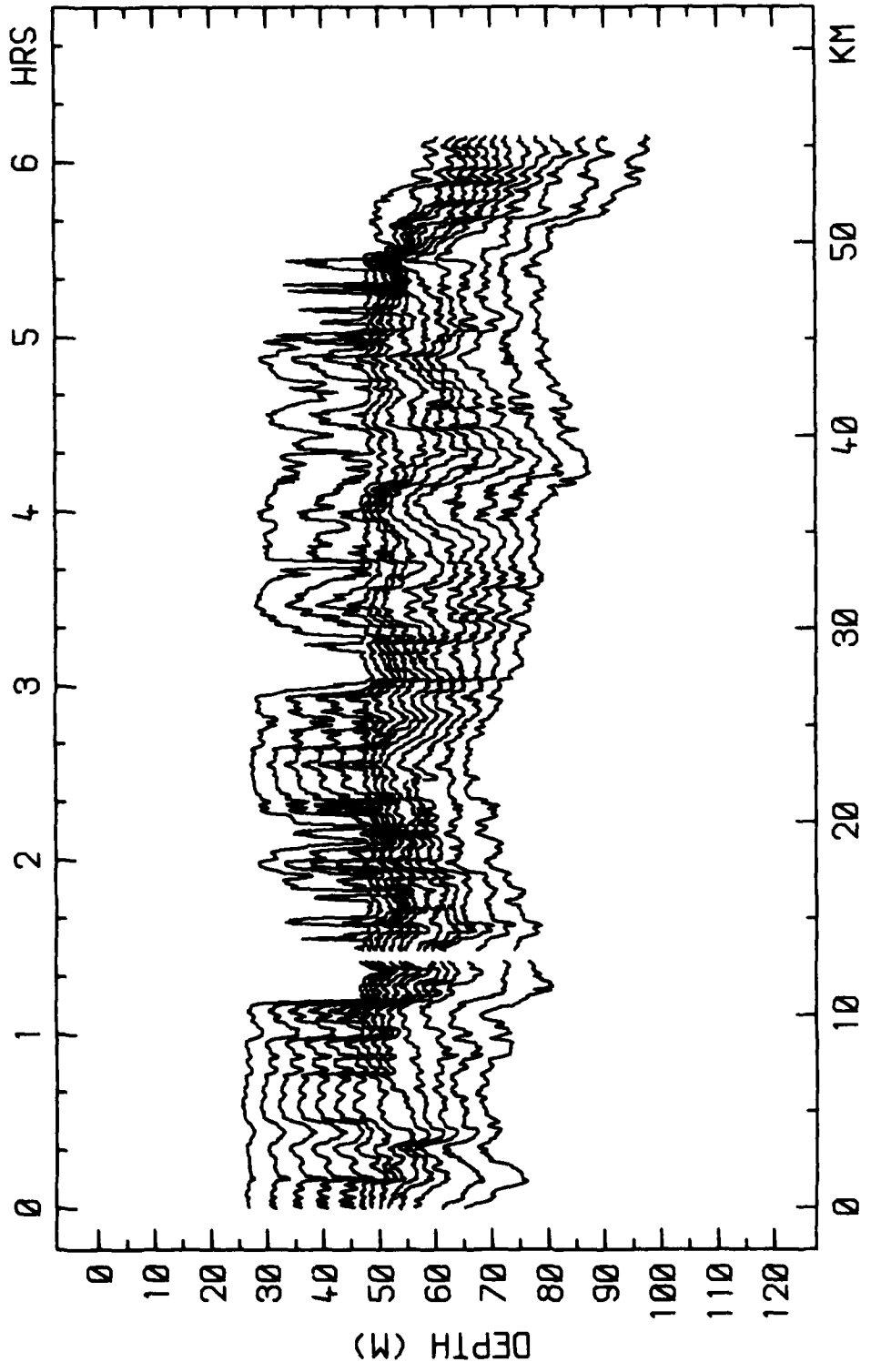
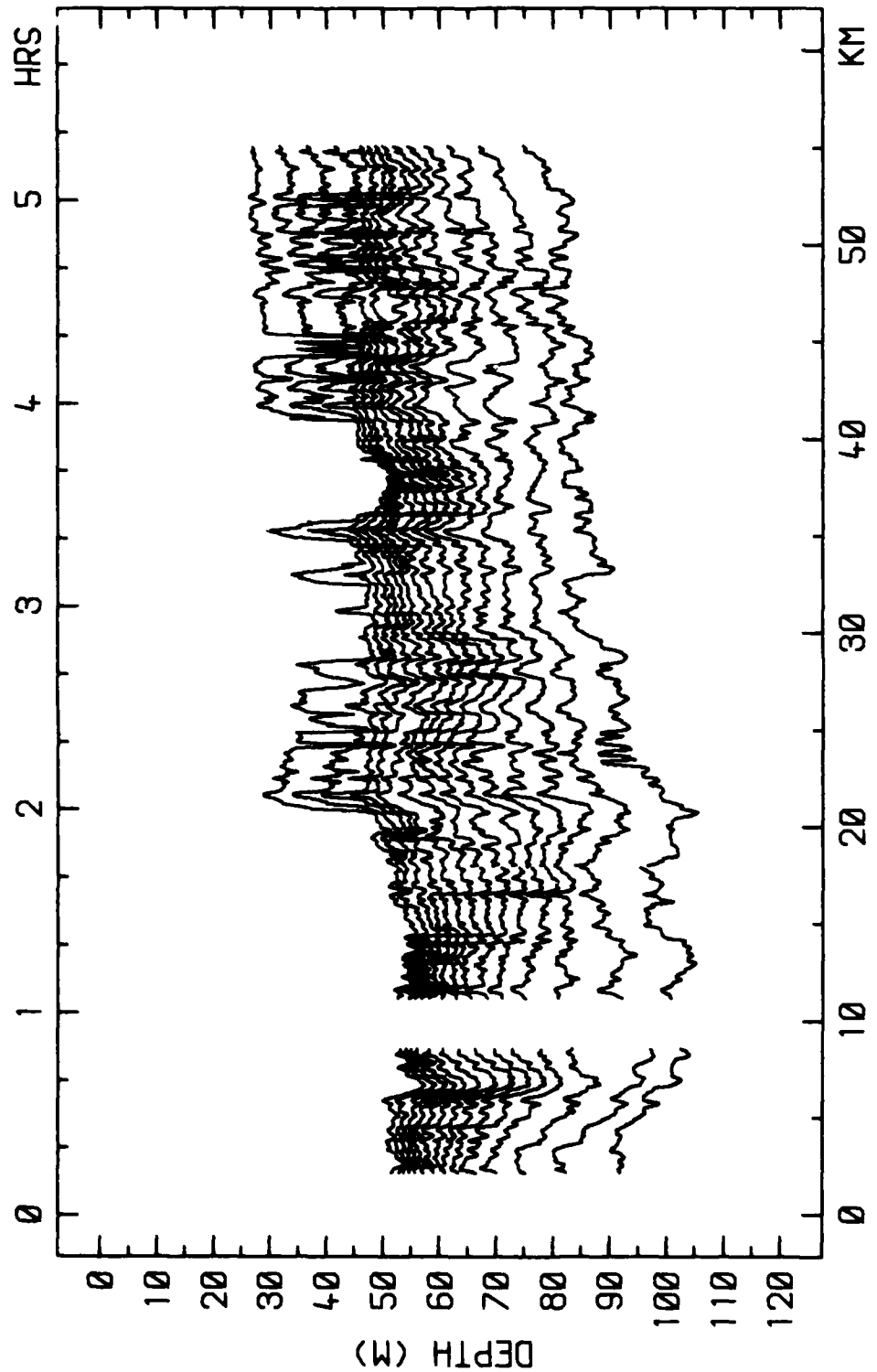
18.0 - 12.0 DEG C, 1432 9-NOV-83 TO 1952 9-NOV-83



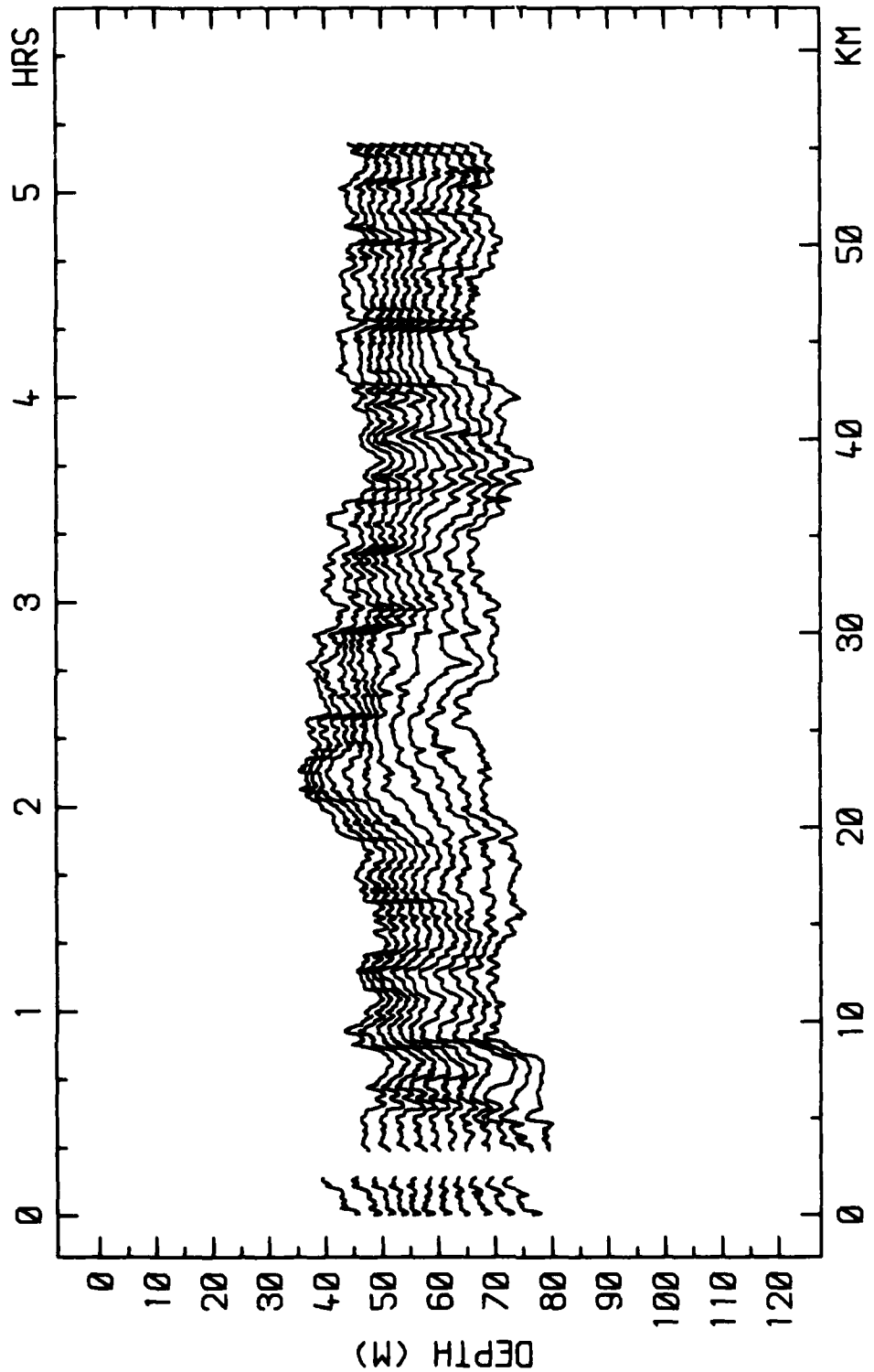
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 3.28 M/S
18.0 - 12.0 DEG C, 0942 9-NOV-83 TO 1431 9-NOV-83



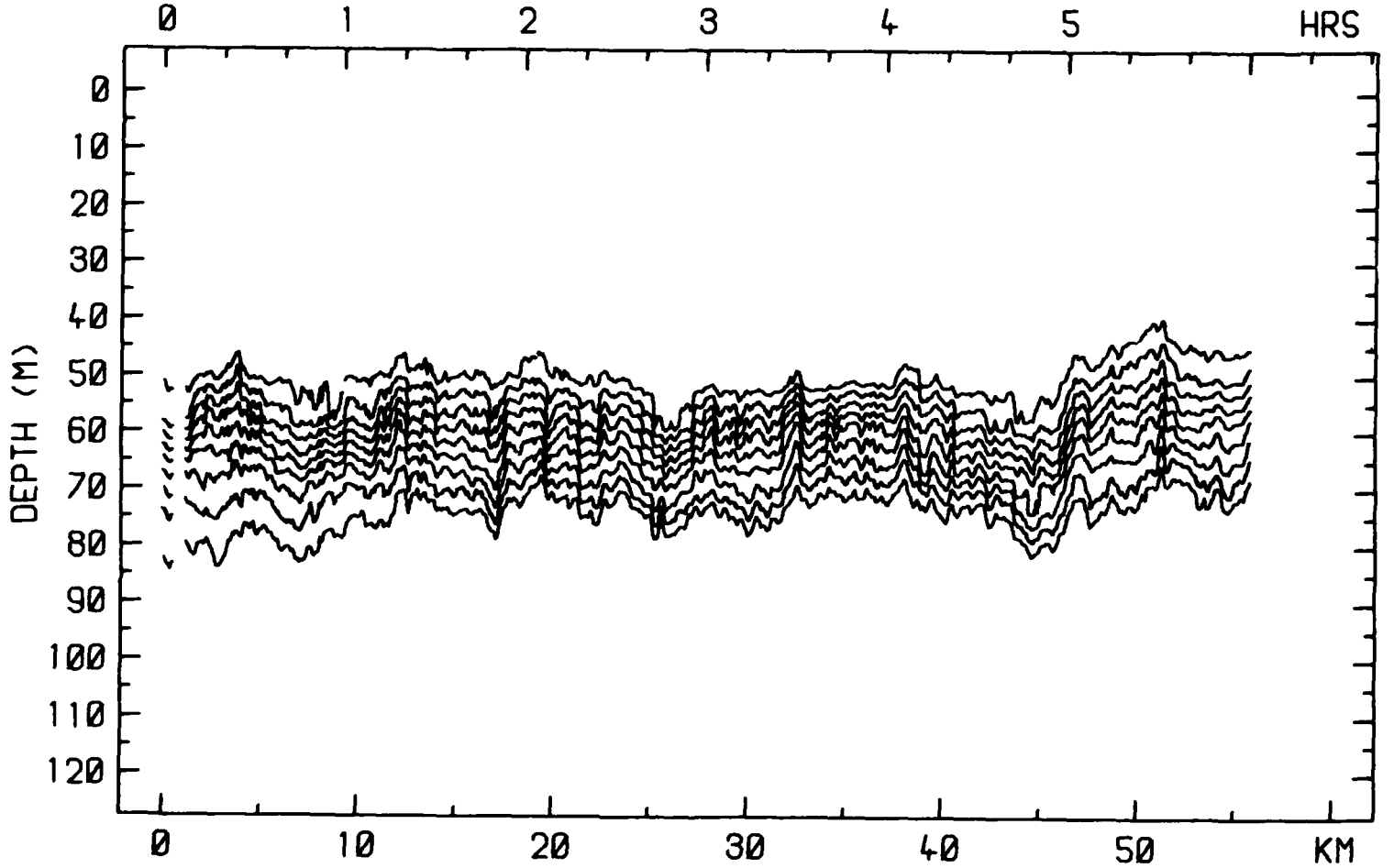
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.51 M/S
18.0 - 12.0 DEG C, 0334 9-NOV-83 TO 0941 9-NOV-83



EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.91 M/S
18.0 - 11.5 DEG C, 2218 8-NOV-83 TO 0333 9-NOV-83



EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.93 M/S
18.0 - 13.0 DEG C, 1702 8-NOV-83 TO 2217 8-NOV-83



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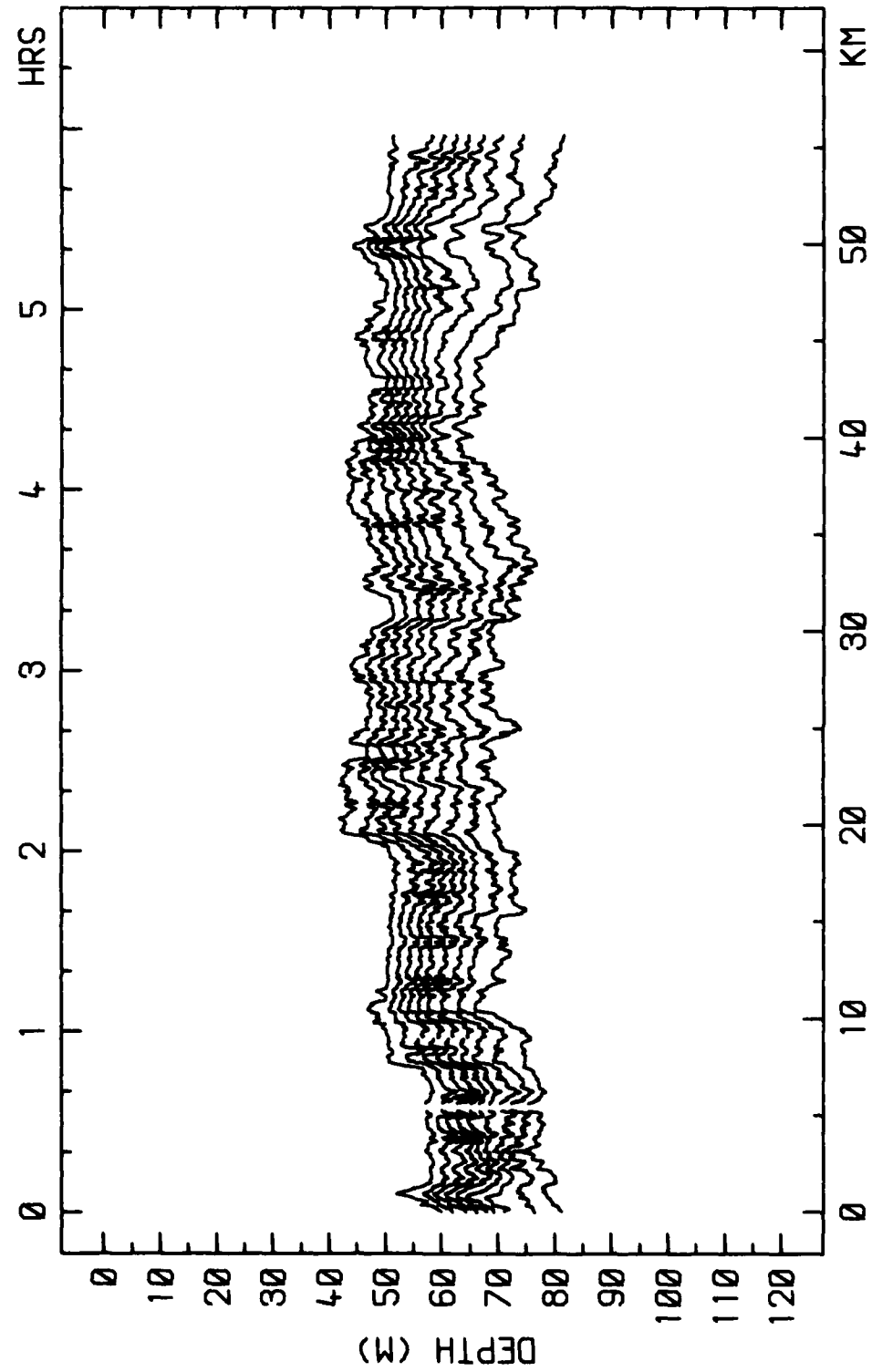
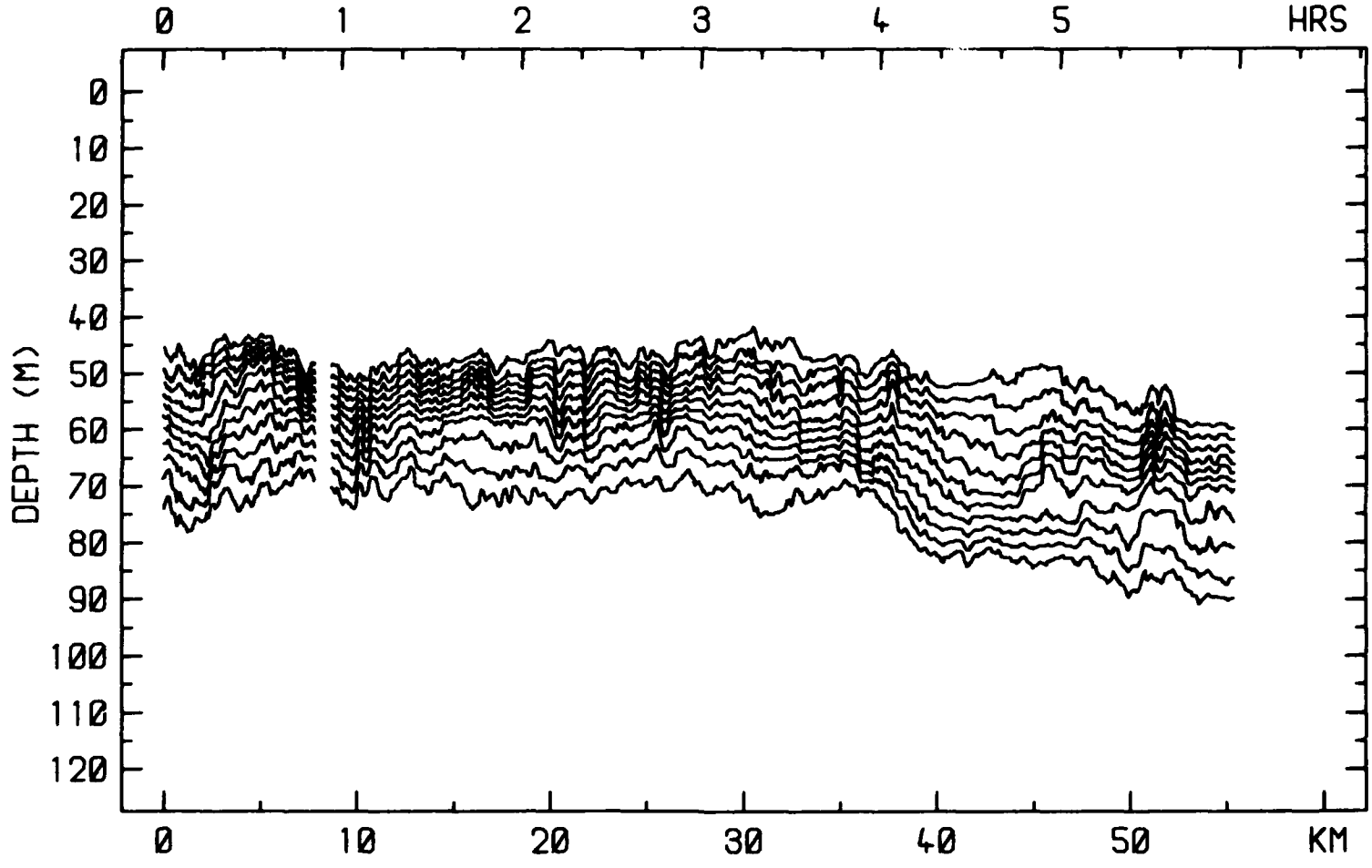
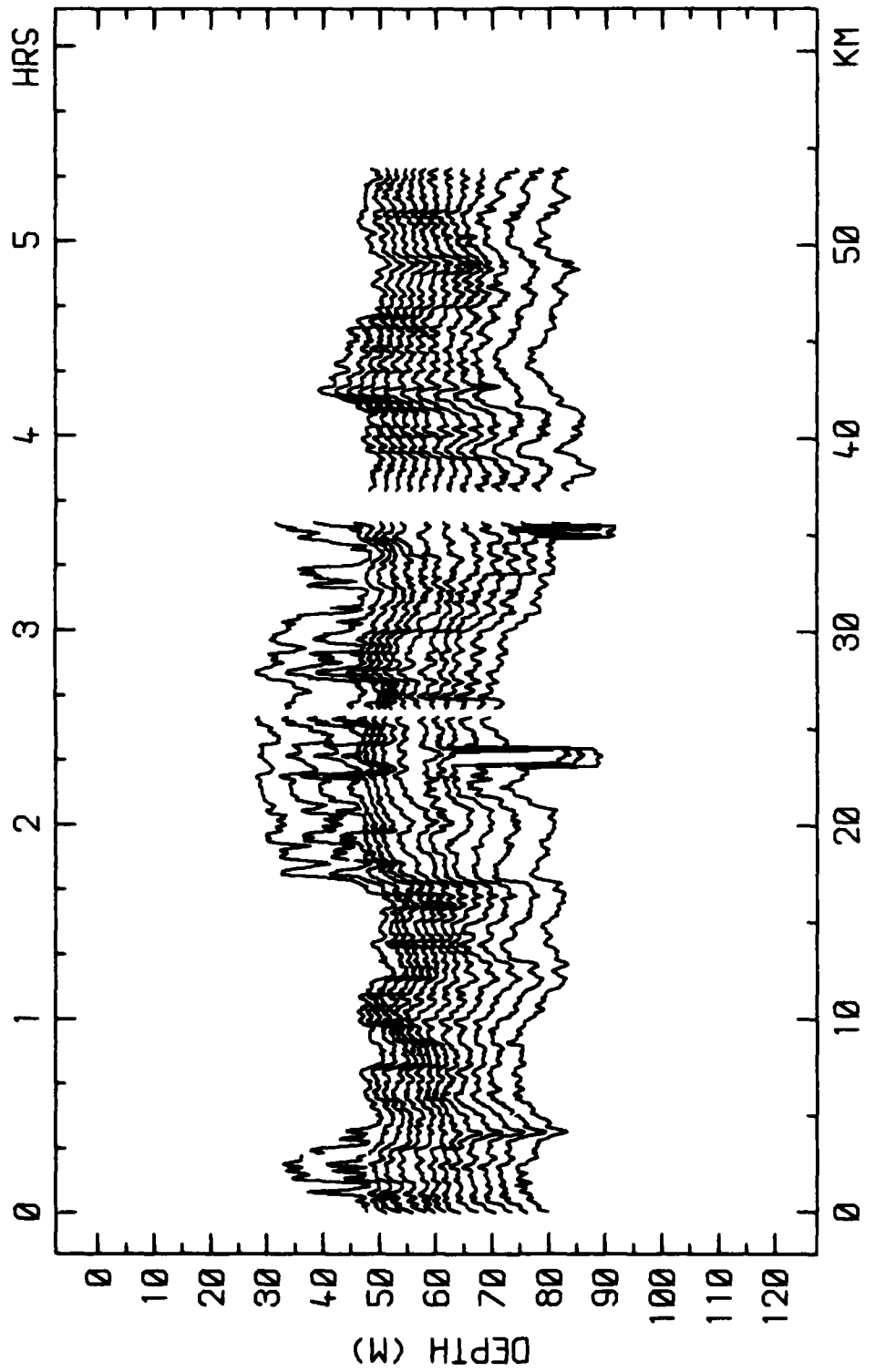
18.0 - 14.0 DEG C, 1101 8-NOV-83 TO 1701 8-NOV-83



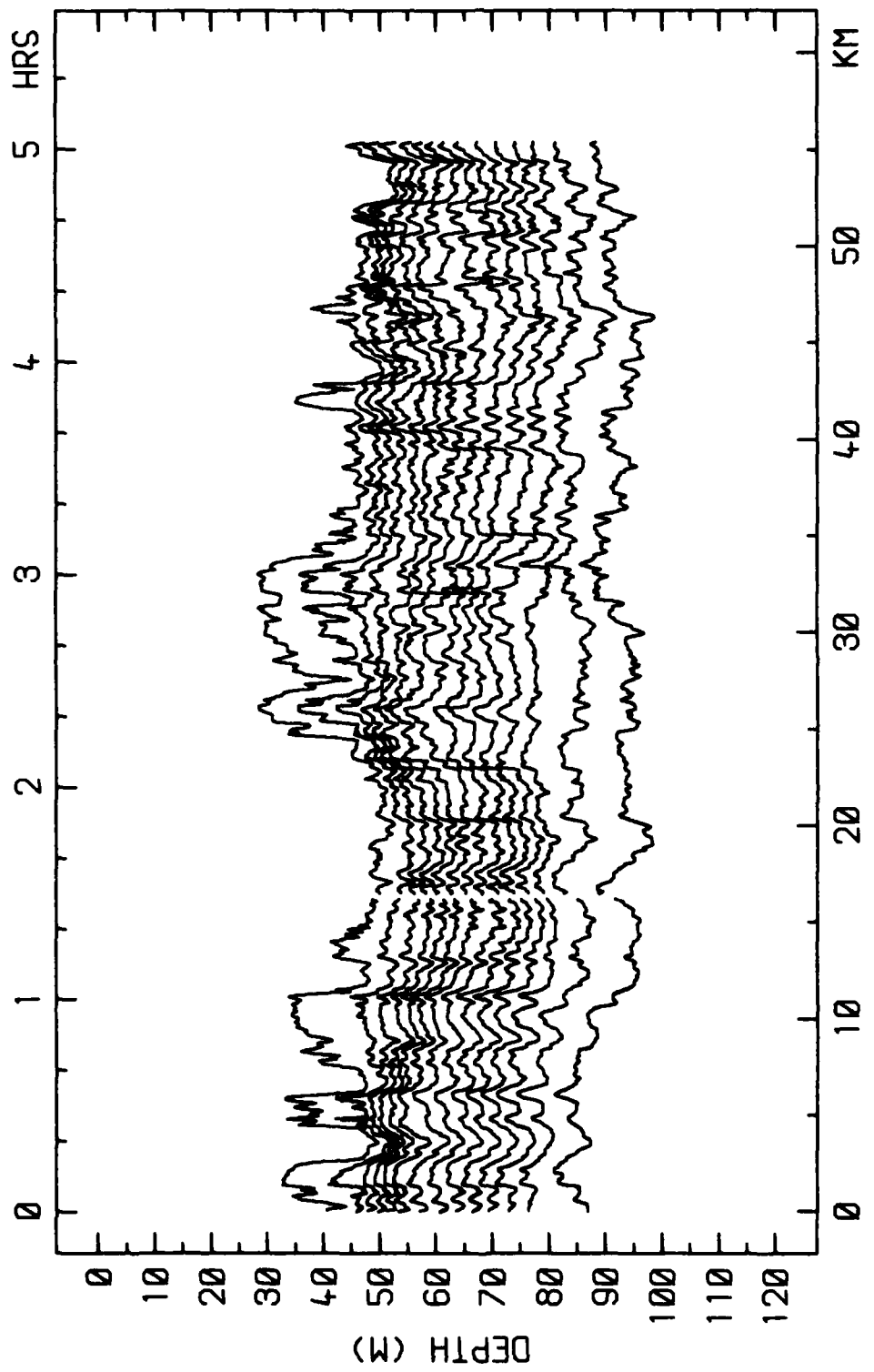
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.59 M/S
18.0 - 14.0 DEG C, 0503 8-NOV-83 TO 1100 8-NOV-83



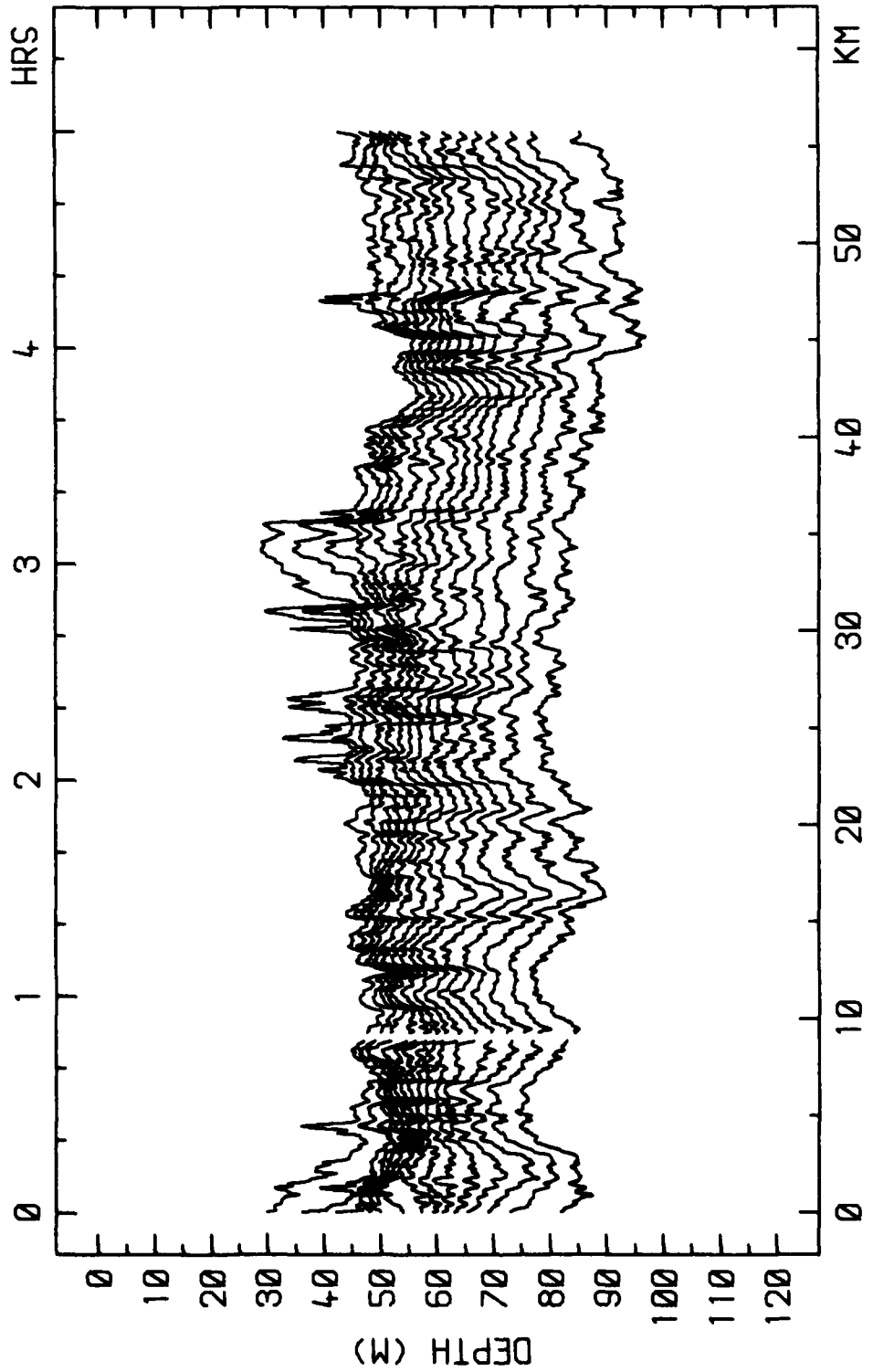
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.58 M/S
18.0 - 13.0 DEG C, 2305 7-NOV-83 TO 0502 8-NOV-83



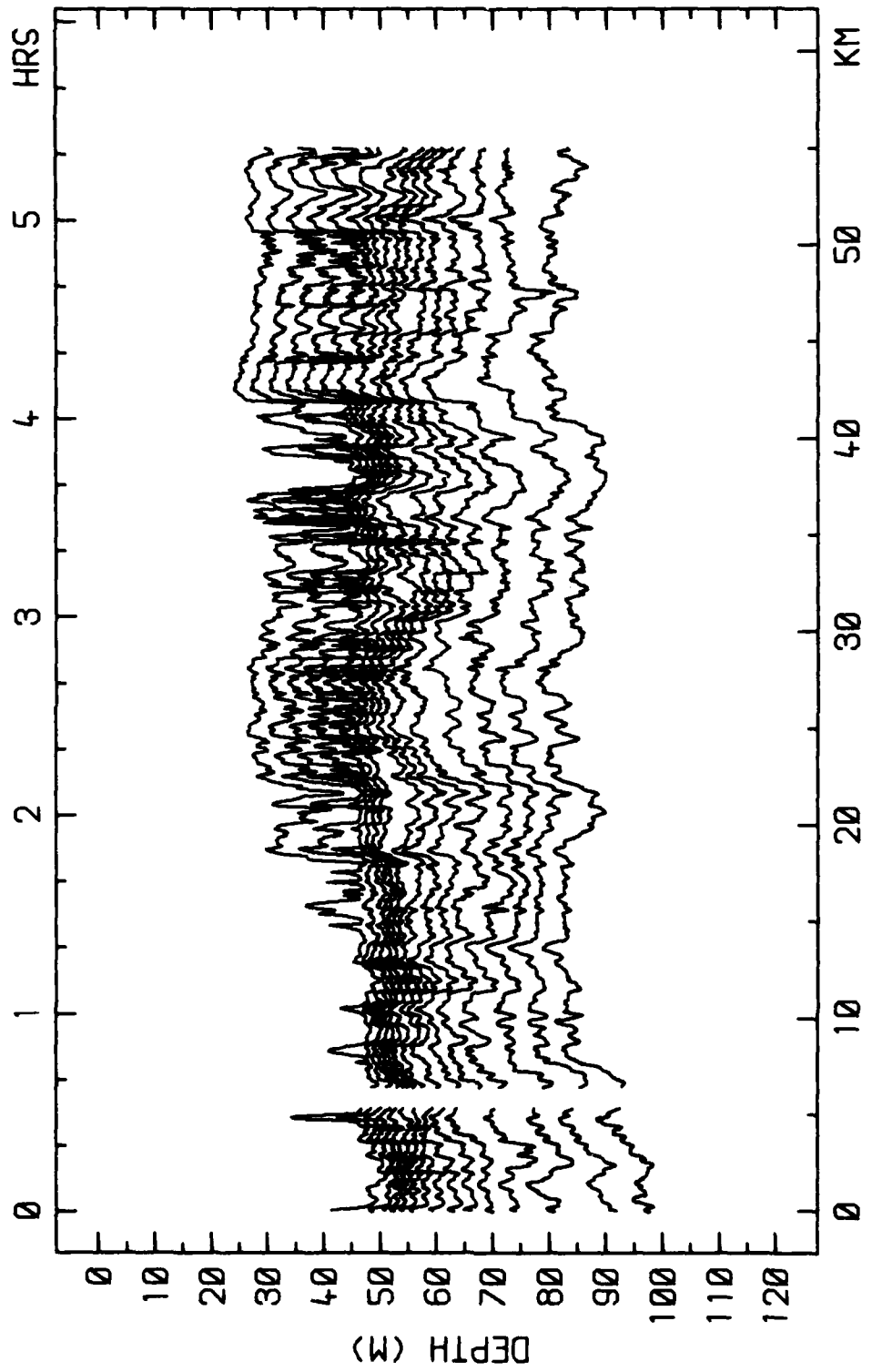
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.79 M/S
18.0 - 12.0 DEG C, 1743 7-NOV-83 TO 2304 7-NOV-83



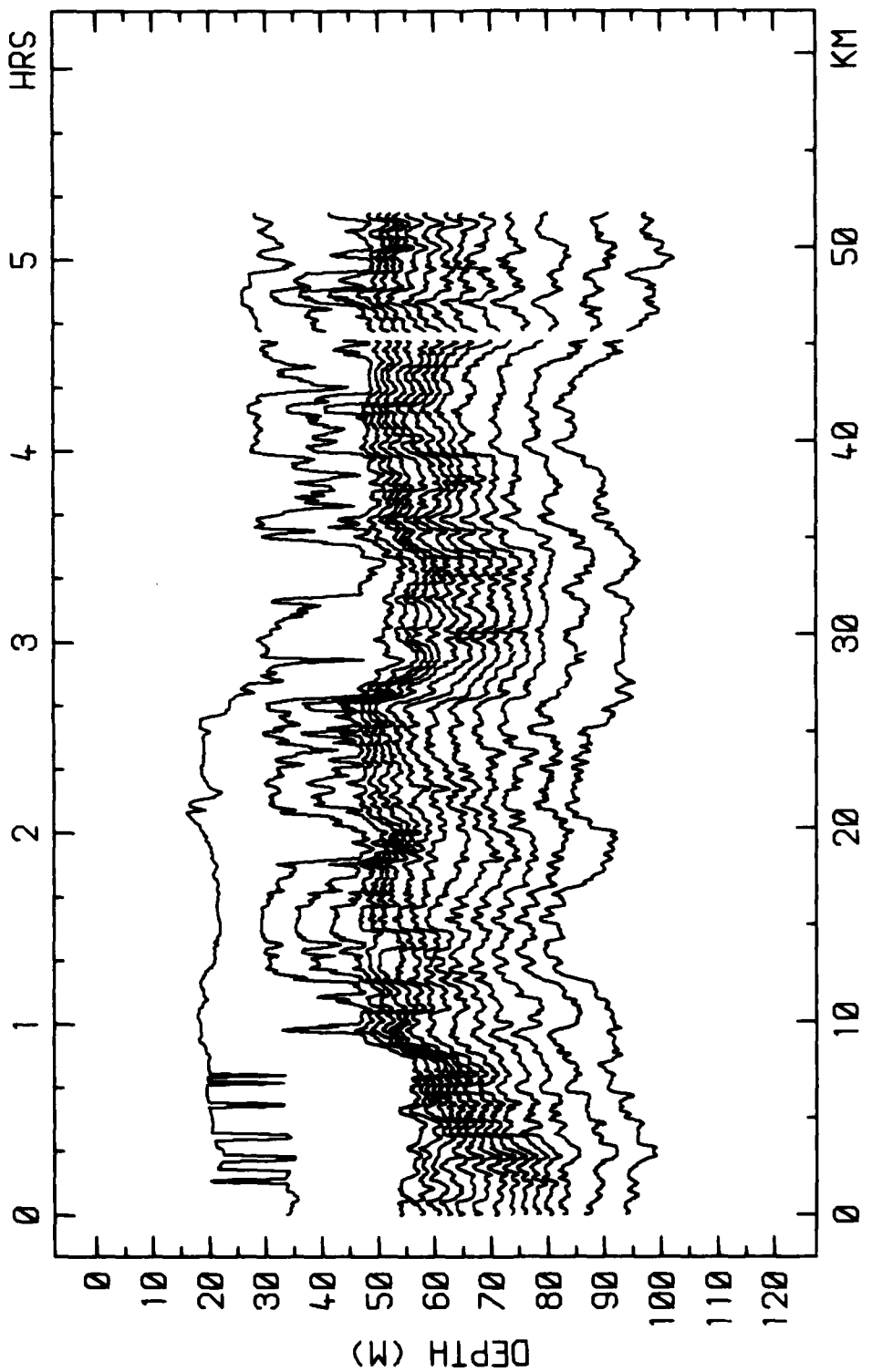
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 3.06 M/S
18.0 - 11.5 DEG C, 1241 7-NOV-83 TO 1742 7-NOV-83



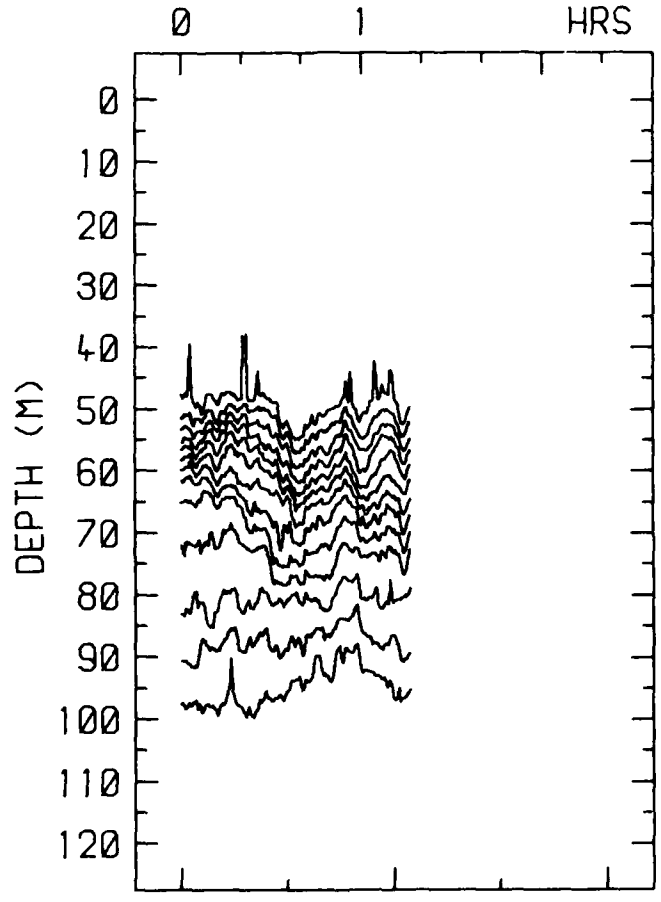
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 3.10 M/S
18.0 - 11.5 DEG C, 0741 7-NOV-83 TO 1240 7-NOV-83



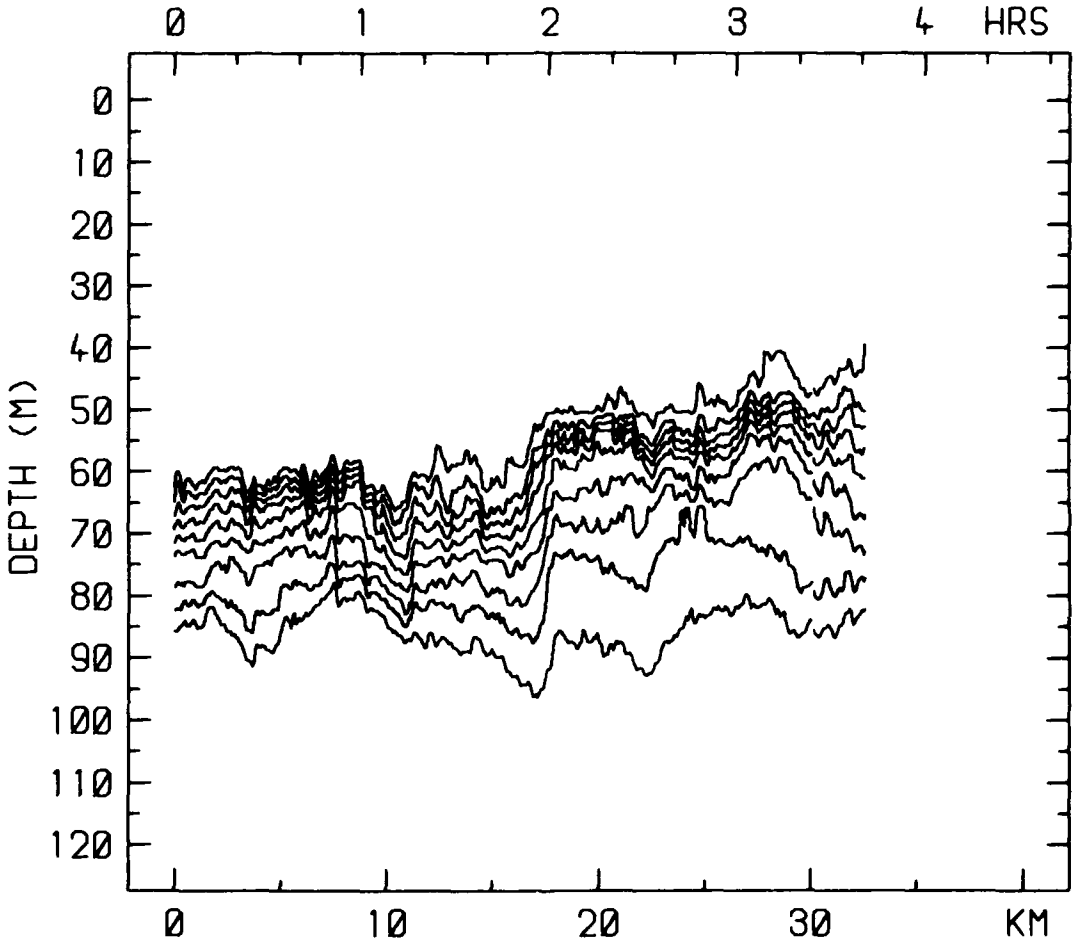
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.85 M/S
18.0 - 11.5 DEG C, 0219 7-NOV-83 TO 0740 7-NOV-83



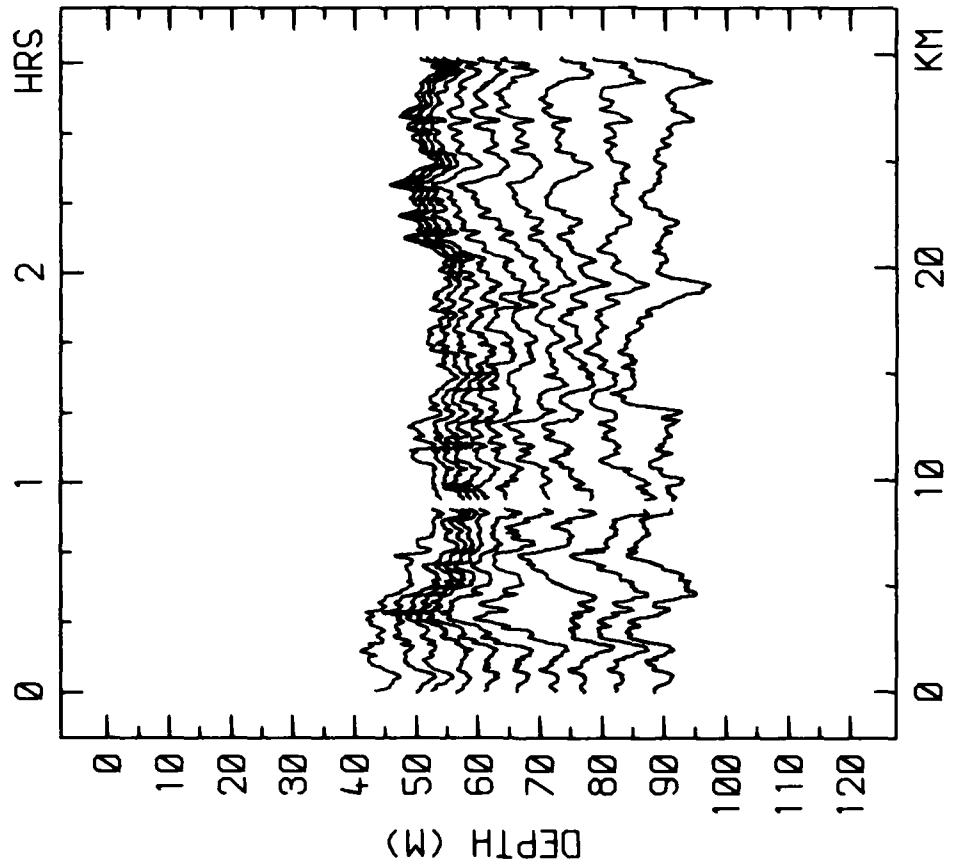
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.74 M/S
18.5 - 11.5 DEG C, 2103 6-NOV-83 TO 0218 7-NOV-83



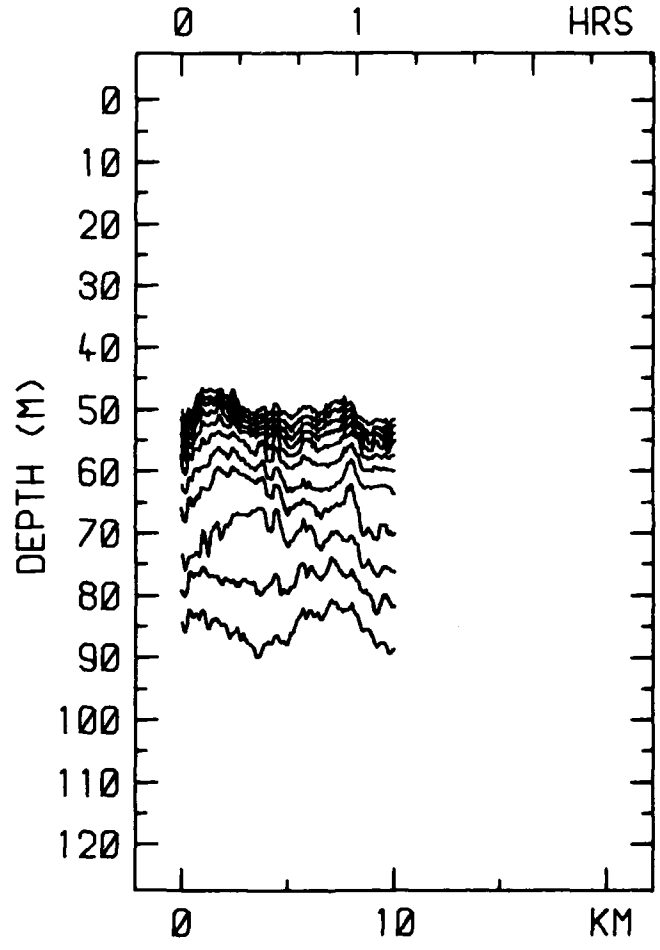
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.36 M/S
18.0 - 12.0 DEG C, 0129 10-NOV-83 TO 0243 10-NOV-83



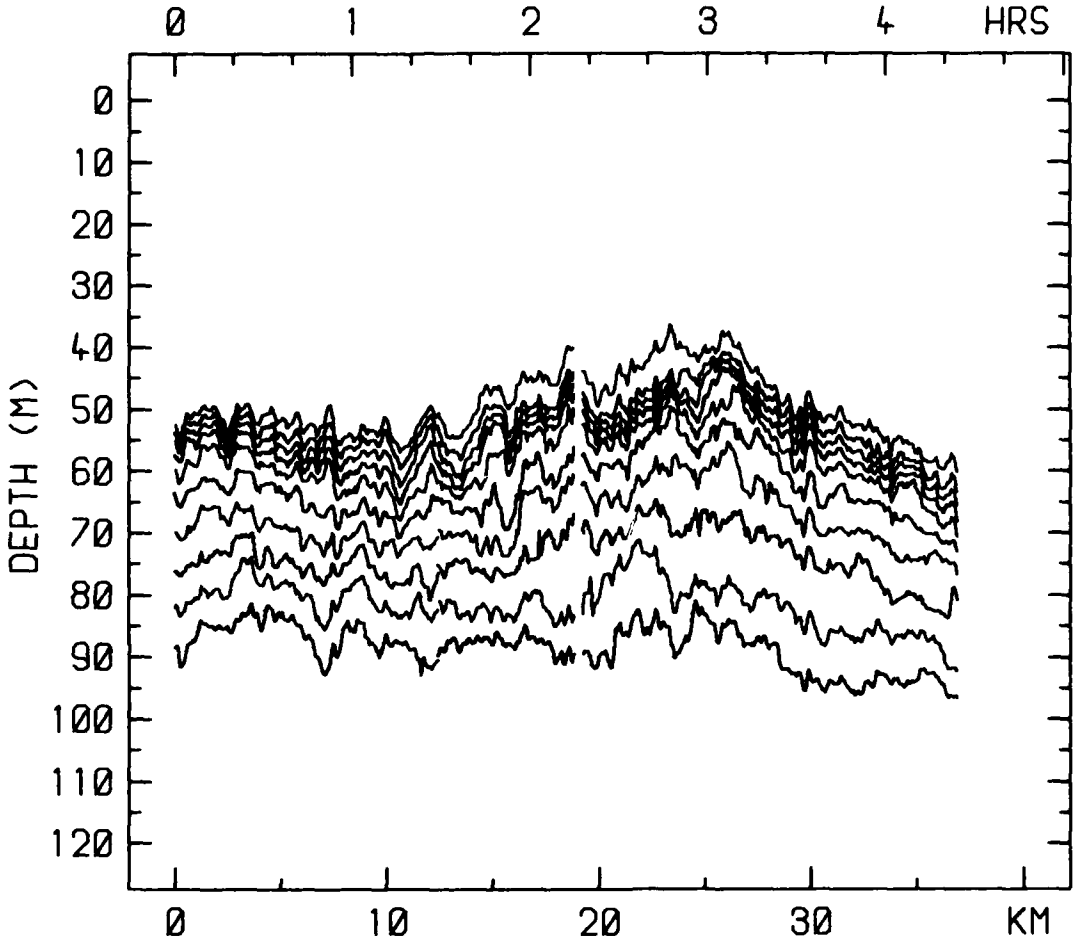
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.46 M/S
17.0 - 13.0 DEG C, 2036 13-NOV-83 TO 0019 14-NOV-83



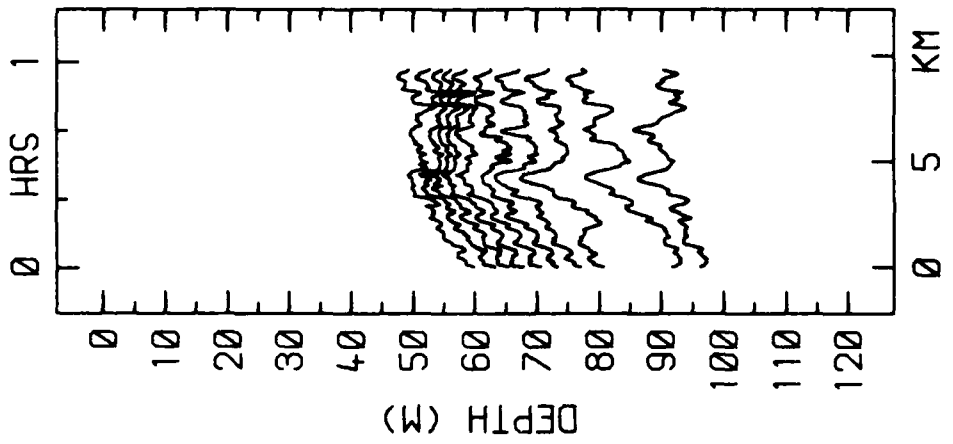
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.74 M/S
17.0 - 12.5 DEG C, 0020 14-NOV-83 TO 0319 14-NOV-83



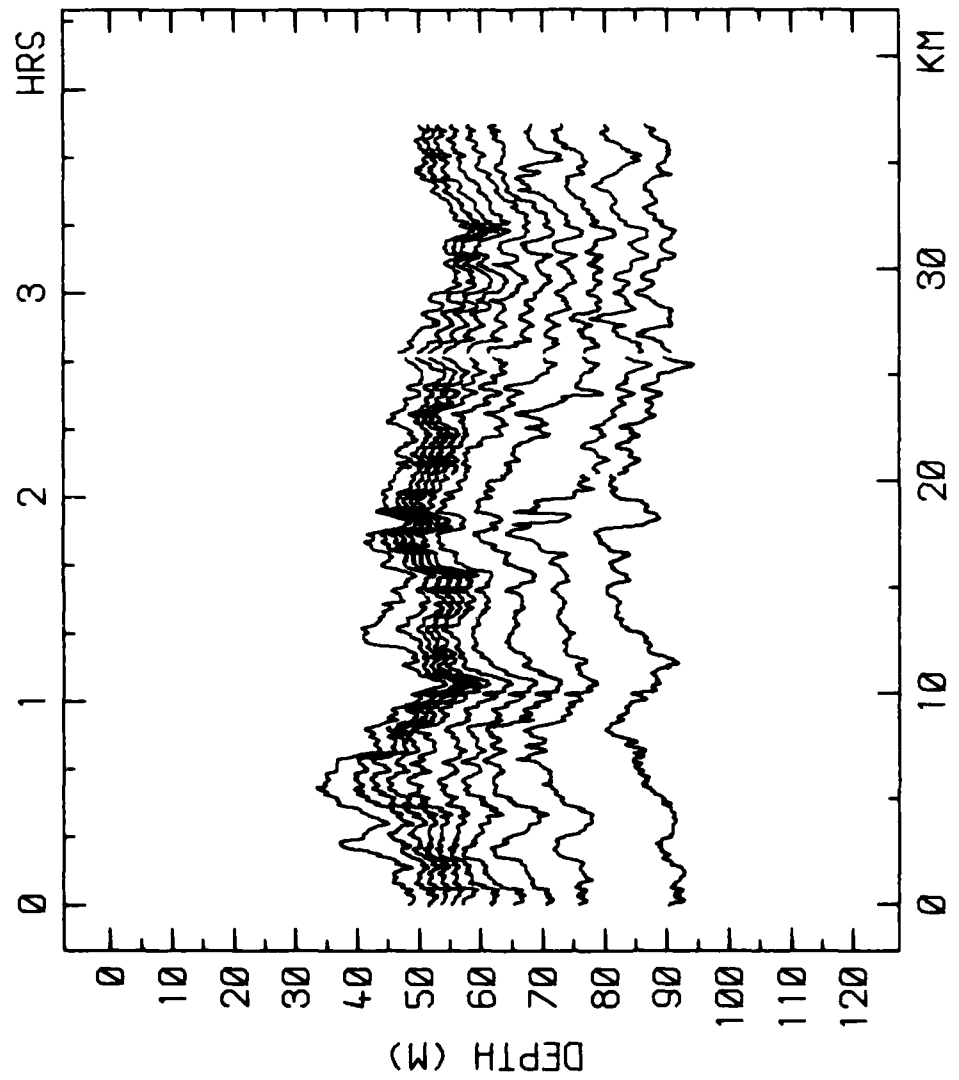
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.30 M/S
17.5 - 12.5 DEG C, 0320 14-NOV-83 TO 0431 14-NOV-83



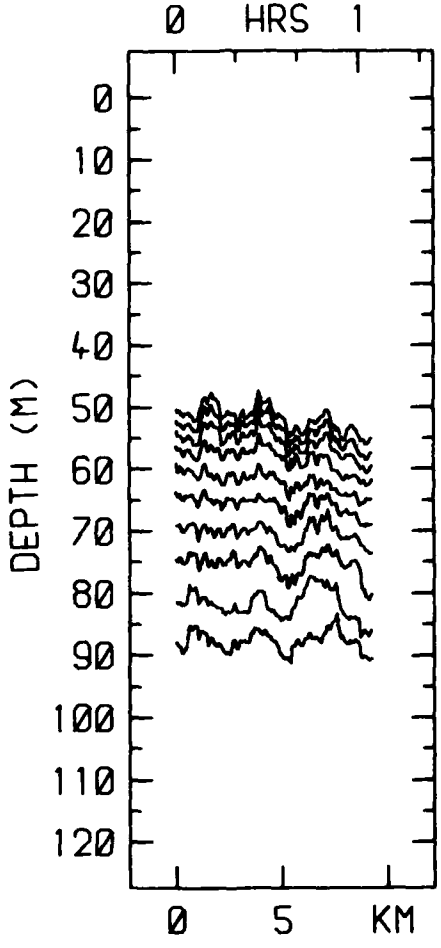
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.33 M/S
17.0 - 12.5 DEG C, 0432 14-NOV-83 TO 0855 14-NOV-83



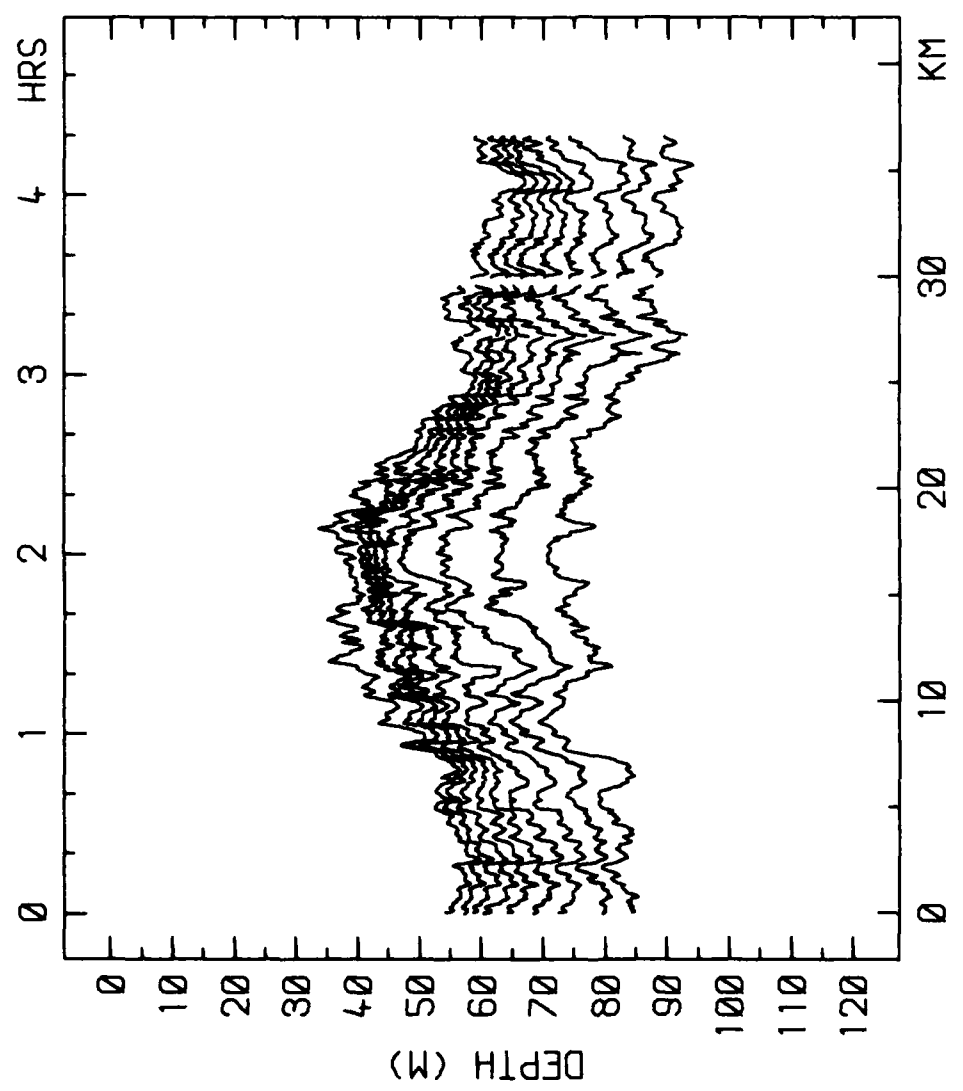
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.70 M/S
17.0 - 12.5 DEG C, 0856 14-NOV-83 TO 0953 14-NOV-83



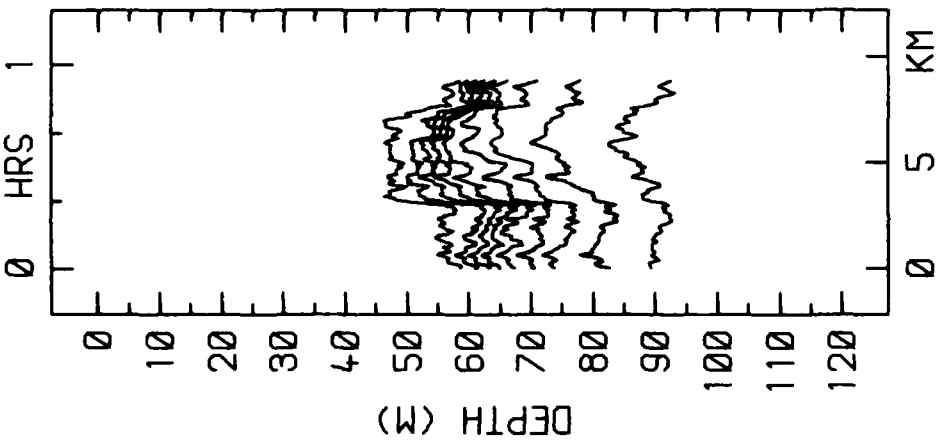
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.67 M/S
17.0 - 12.5 DEG C, 0954 14-NOV-83 TO 1343 14-NOV-83



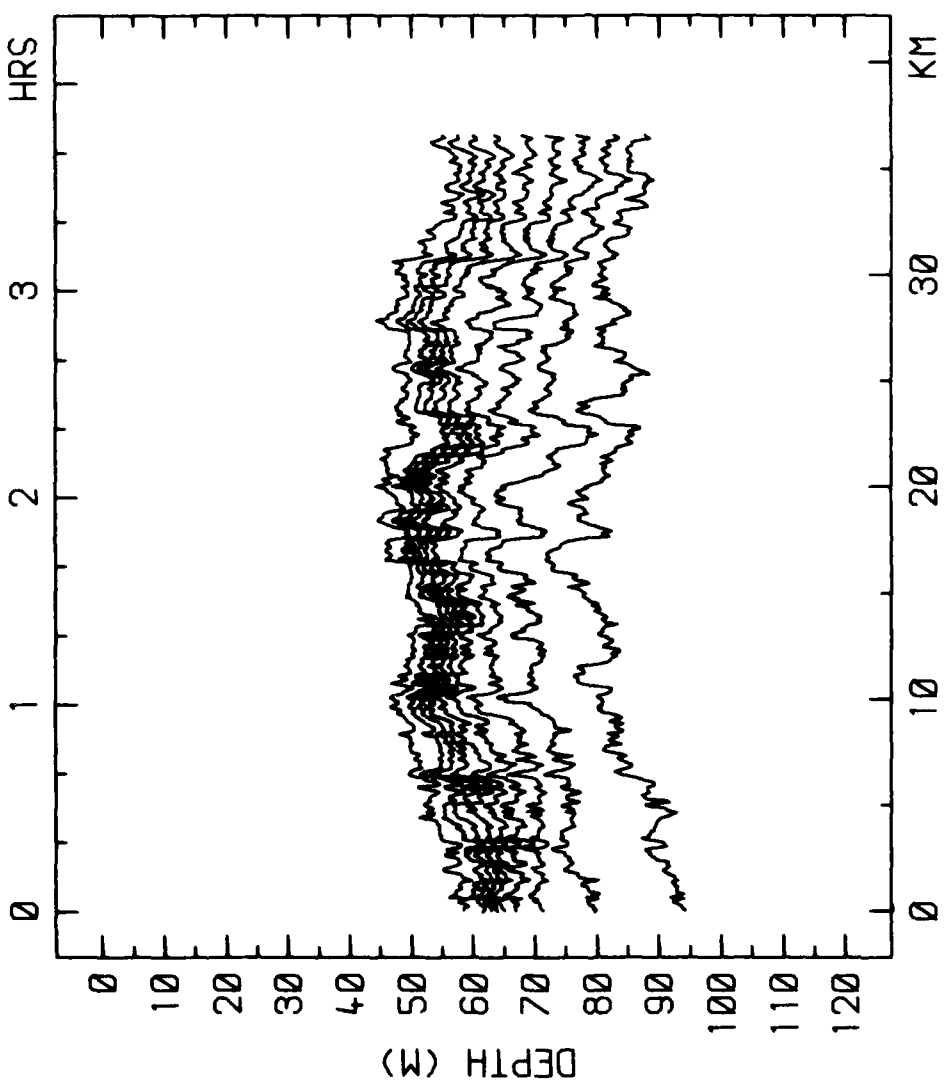
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.42 M/S
17.0 - 12.5 DEG C, 1344 14-NOV-83 TO 1447 14-NOV-83



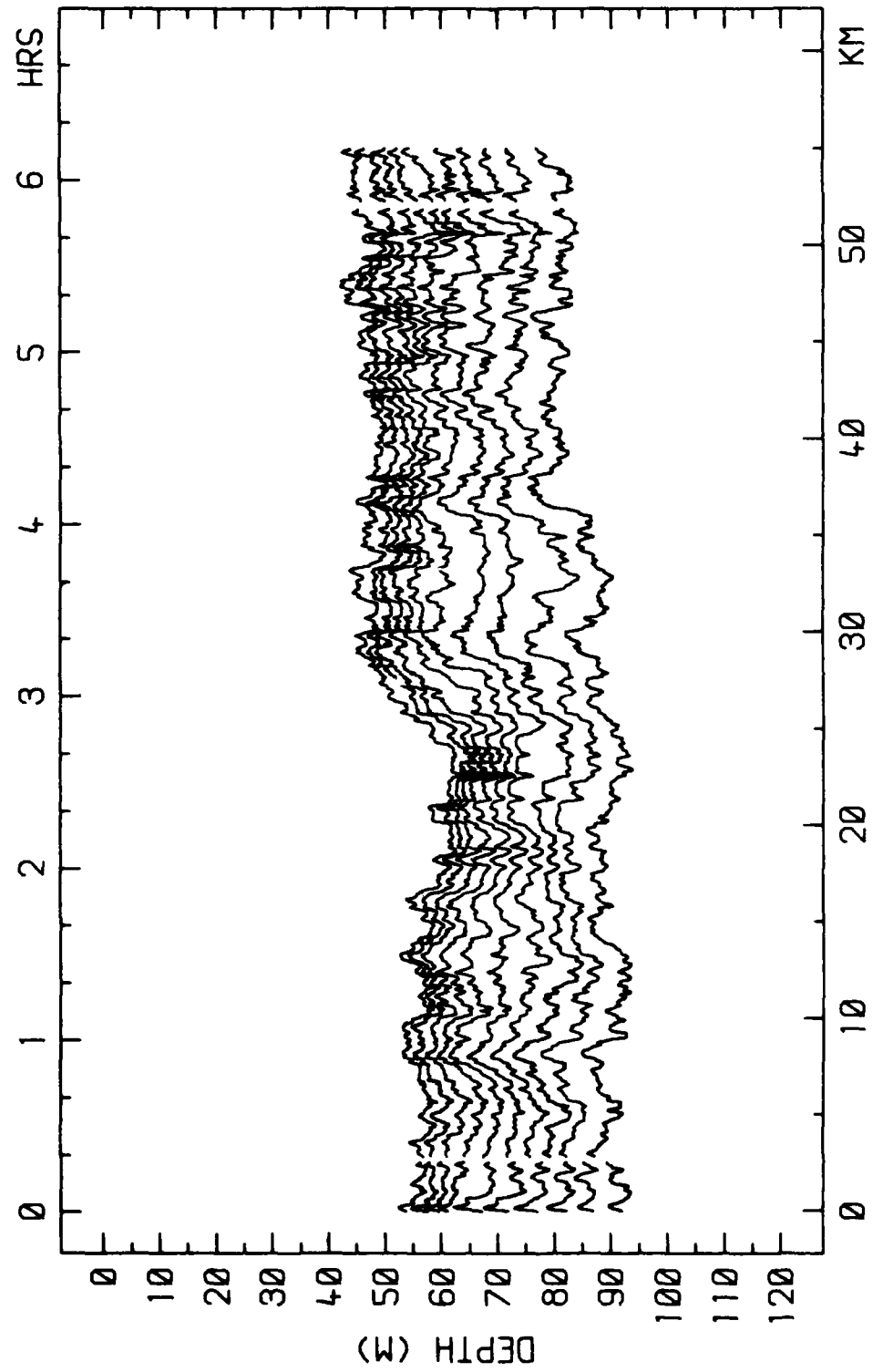
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.35 M/S
17.0 - 13.0 DEG C, 1448 14-NOV-83 TO 1907 14-NOV-83



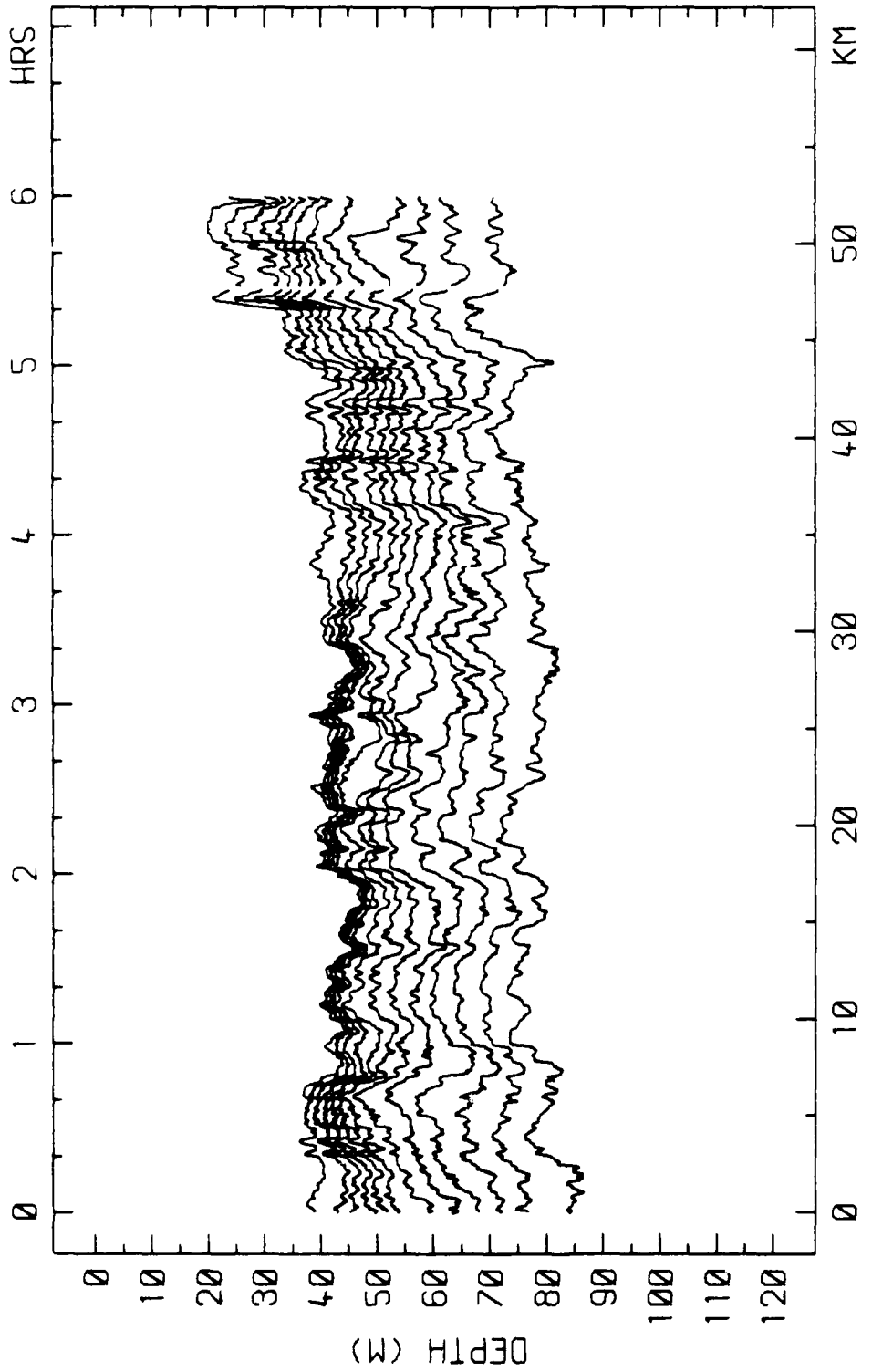
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.68 M/S
17.0 - 13.0 DEG C, 1908 14-NOV-83 TO 2002 14-NOV-83



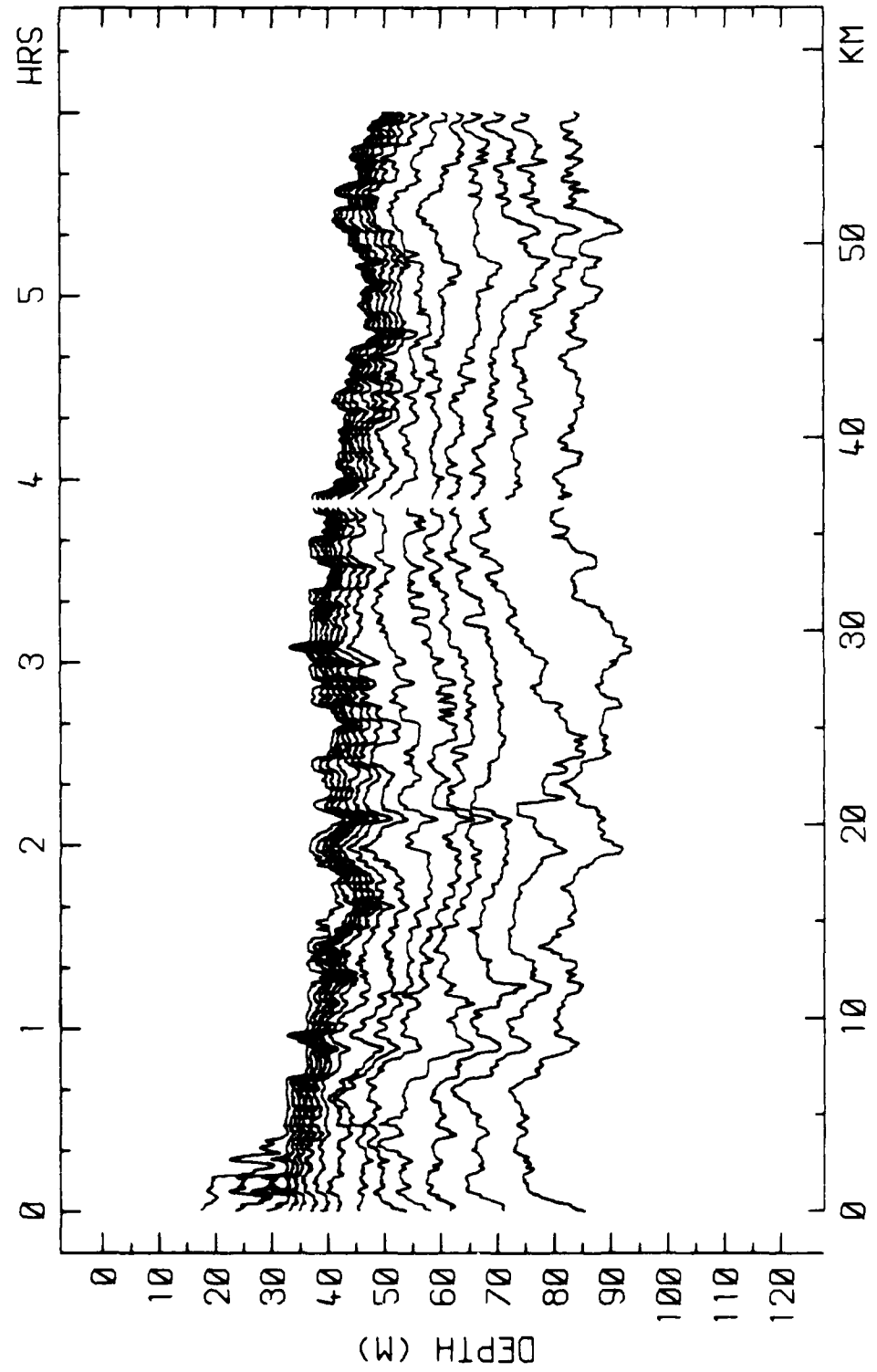
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.71 M/S
17.0 - 13.0 DEG C, 2003 14-NOV-83 TO 2348 14-NOV-83



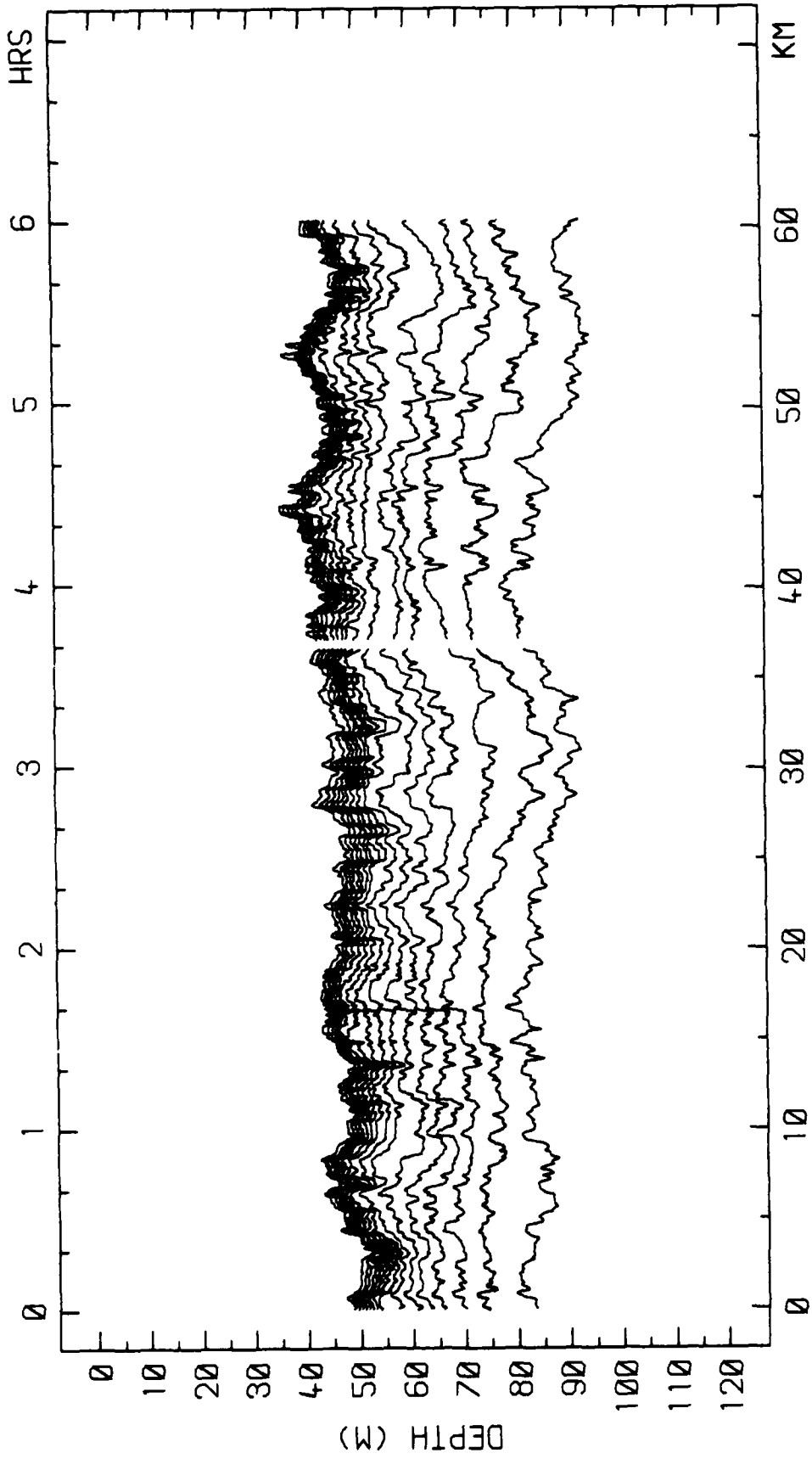
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.47 M/S
17.0 - 12.5 DEG C, 2348 14-NOV-83 TO 0600 15-NOV-83



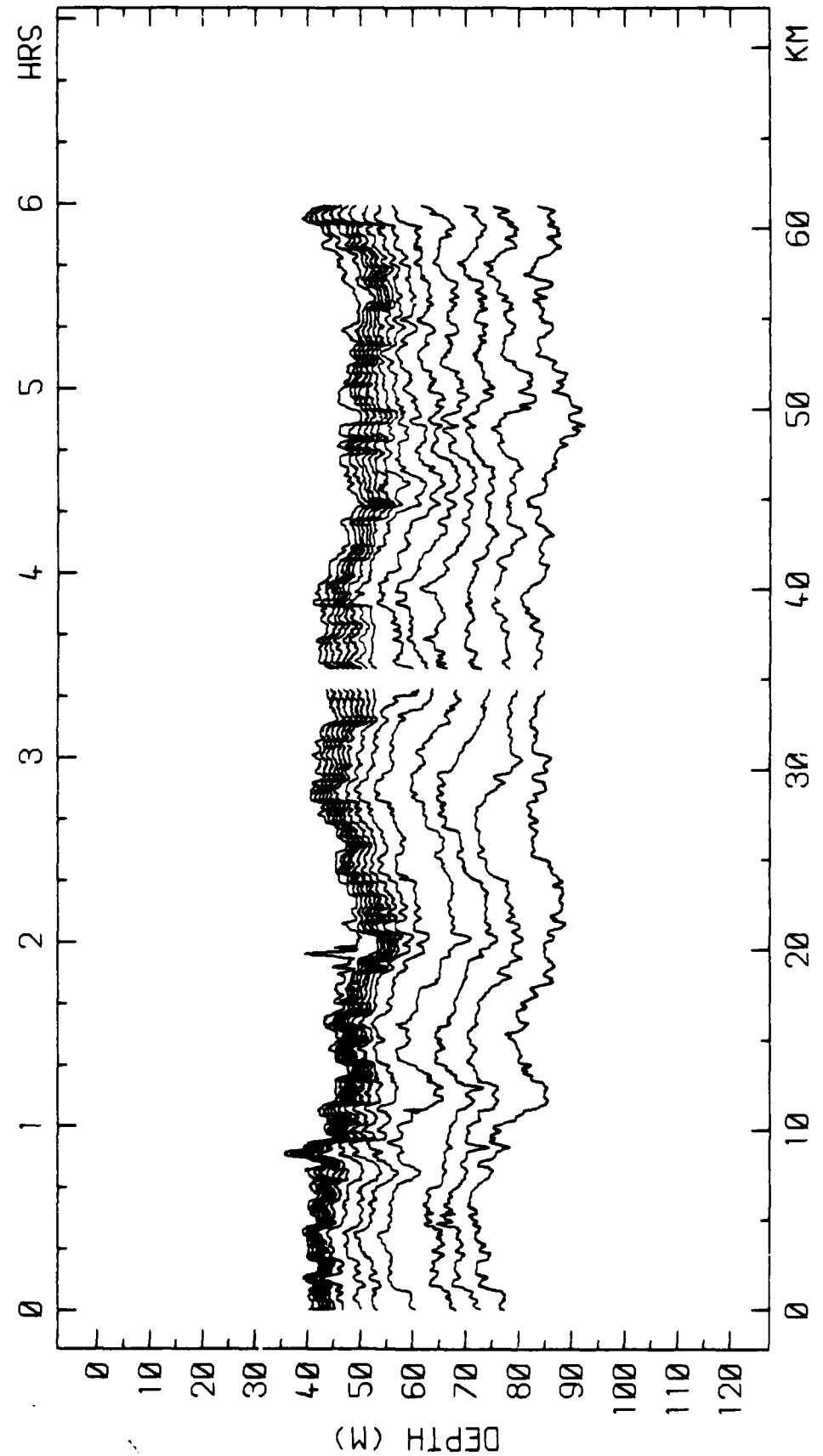
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.43 M/S
17.5 - 12.0 DEG C, 0600 15-NOV-83 TO 1200 15-NOV-83



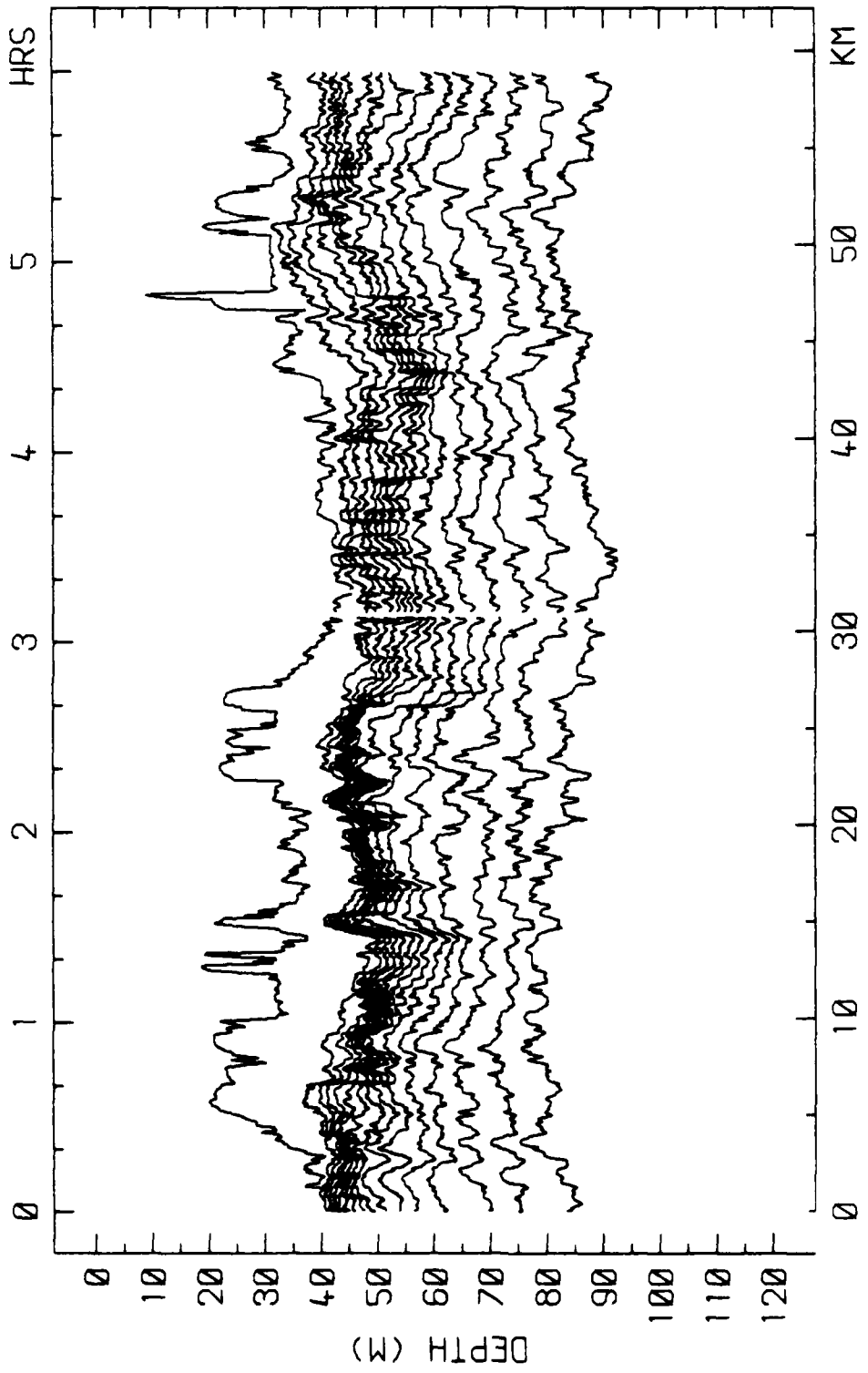
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.63 M/S
18.0 - 11.5 DEG C, 1200 15-NOV-83 TO 1800 15-NOV-83



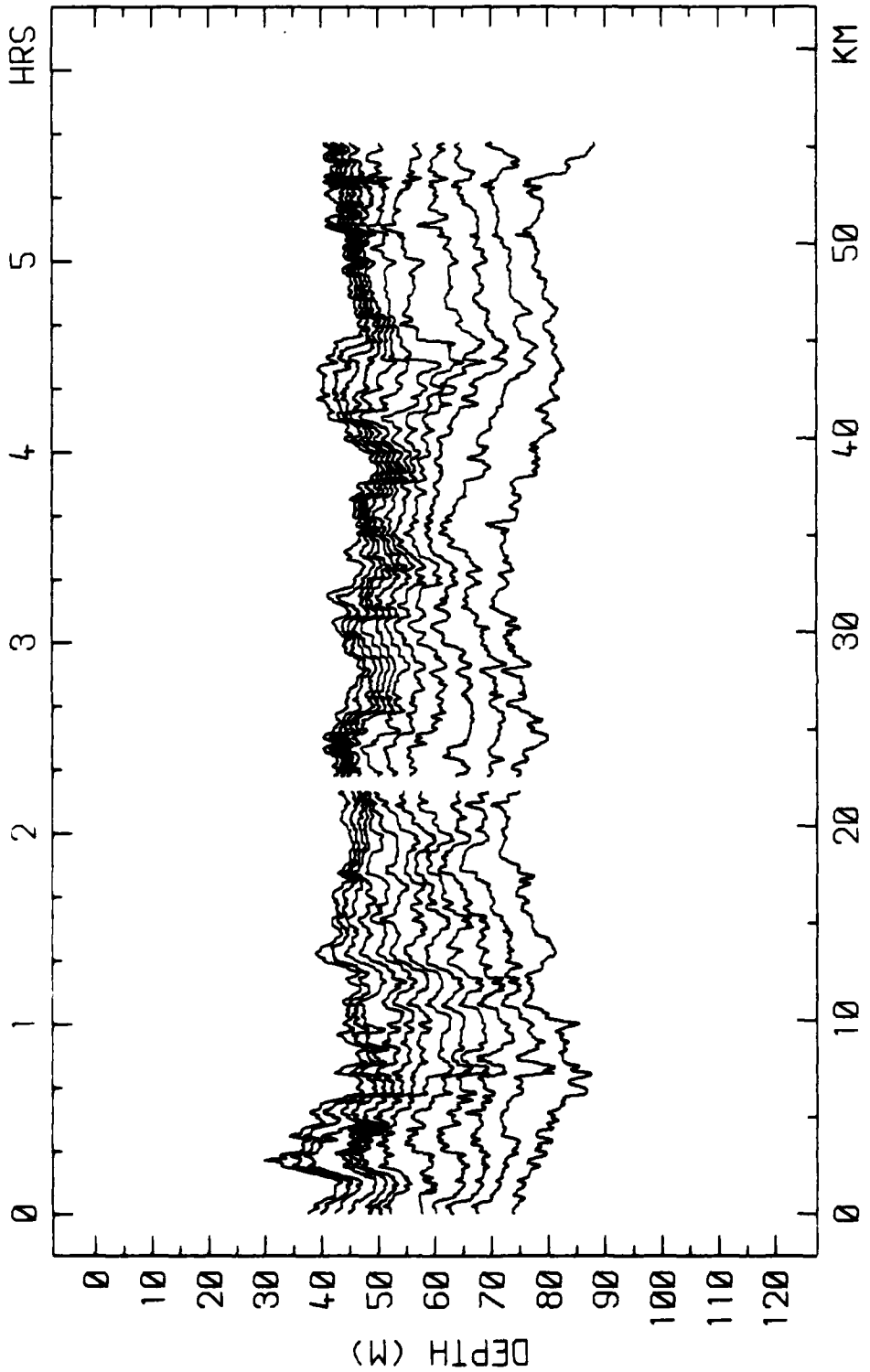
EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.80 M/S
18.5 - 11.5 DEG C, 1800 15-NOV-83 TO 2400 15-NOV-83



EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.84 M/S
18.5 - 12.0 DEG C, 0000 16-NOV-83 TO 0600 16-NOV-83



EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.73 M/S
19.0 - 12.0 DEG C, 0600 16-NOV-83 TO 1200 16-NOV-83



EDITED ISOTHERM DEPTH VS DISTANCE SPD = 2.73 M/S
18.5 - 13.0 DEG C, 1200 16-NOV-83 TO 1737 16-NOV-83

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