50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. WHOI-93-32	2.	3. Recipient's Accession No.

4. Title and Subtitle

Fluid Mechanical Measurements within the Bottom Boundary Layer Over the Northern California Continental Shelf During STRESS

5. Report Date
September, 1993

6.

7. Author(s) J.J. Fredericks, John H. Trowbridge, A.J. Williams III, Steven J. Lentz, Bradford Butman and Thomas F. Gross.

8. Performing Organization Rept. No.
WHOI 93-32

9. Performing Organization Name and Address

The Woods Hole Oceanographic Institution
Woods Hole, Massachusetts 02543

10. Project/Task/Work Unit No.

11. Contract(C) or Grant(G) No.
(C) N00014-89-J-1067
(G) N00014-89-J-1058
N00014-89-J-1074

12. Sponsoring Organization Name and Address

Funding was provided by the Office of Naval Research through contracts to the Woods Hole Oceanographic Institution, The U.S. Geological Survey and Skidaway Institute of Oceanography

13. Type of Report & Period Covered
Technical Report

14.

15. Supplementary Notes

This report should be cited as: Woods Hole Oceanog. Inst. Tech. Rept., WHOI-93-32.

16. Abstract (Limit: 200 words)

In studying the processes controlling particle distribution of fine sediments over the continental shelf, the height, structure and dynamics of the bottom boundary layer must be better understood. The Sediment Transport Events on Shelves and Slopes (STRESS) program provides a comprehensive set of data over the bottom half of the water column at the 90m and the 130m isobaths along the northern California continental shelf during the winters of 1988-89 and 1990-91.

This report presents the STRESS salinity, temperature, velocity, wave characteristics and attenuation data. The report describes the processing, provides plots and tables of the data and corresponding statistics for evaluation of the data, and documents the data files. The combined set of moored and tripod mounted instrument measurements provides integrated, hourly-averaged profiles of the lower half of the water column at the four sites which can be used for analysis and modeling purposes.

17. Document Analysis a. Descriptors

1. bottom boundary layer
2. sediment transport
3. continental shelf
4. integrated profiles

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report)	21. No. of Pages
Approved for publication; distribution unlimited.	UNCLASSIFIED	128
	20. Security Class (This Page)	22. Price

(See ANSI-Z39.18) *See Instructions on Reverse*

OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

WHOI-93-32

Woods Hole Oceanographic Institution

Fluid Mechanical Measurements within the Bottom Boundary Layer Over the Northern California Continental Shelf during STRESS

by

J. J. Fredericks et al
John H. Trowbridge
A.J. Williams III
Steven J. Lentz
Bradford Butman
Thomas F. Gross

September 1993

Technical Report

Funding was provided by the Office of Naval Research under contracts N0014-89-J-1067, N00014-89-J-1058 and N00014-89-J-1074.

WHOI-93-32

Fluid Mechanical Measurements within the Bottom Boundary Layer Over the Northern California Continental Shelf During STRESS

by

J. J. Fredericks †
John H. Trowbridge †
A.J. Williams III †
Steven J. Lentz †
Bradford Butman ††
Thomas F. Gross †††

†Woods Hole Oceanographic Institution, Woods Hole, Massachusetts 02543
††Atlantic Marine Branch, U.S. Geological Survey, Woods Hole, Massachusetts 02543
†††Skidaway Institute of Oceanography, Savannah, Georgia 31416

September 1993

Technical Report

Funding provided by the Office of Naval Research under contracts N00014-89-J-1067, N00014-89-J-1058 and N00014-89-J-1074.

Approved for Distribution:

George V. Frisk

George V. Frisk, Chair
Department of Applied Ocean Physics & Engineering

Table of Contents

List of Tables

List of Figures

(continued next page ...)

List of Figures (continued)

1. INTRODUCTION

STRESS (Sediment TRansport Events on Shelves and Slopes), funded by the U. S. Office of Naval Research and the U. S. Geological Survey, was a program aimed at understanding the water-column processes controlling the amount, distribution and flux of fine sediments in suspension over continental shelves, and at characterizing the response of the shelf floor to physical and biological processes [1]. As part of STRESS, two field experiments were conducted over the continental shelf off northern California (Figure 1) during the winters of 1988-89 (STRESS 1) and 1990-91 (STRESS 2). During these experiments, time-series measurements of velocity, temperature and salinity were obtained for the bottom half of the water column at three isobaths (C2, C3 (and C3') and C4) over the central and outer shelf. These measurements provide an unprecedented opportunity to examine the height, structure and dynamics of the continental shelf bottom boundary layer.

This report summarizes the STRESS measurements at C2 (STRESS 2 only), C3 (STRESS 1 and 2), C3' (STRESS 1 only) and C4 (STRESS 2 only) that specifically address the fluid mechanics of the bottom boundary layer. Included are measurements of horizontal current velocity, temperature, salinity, surface wave characteristics, and, for the sake of completeness, optical attenuation, which is a crude measure of sediment concentration. Other acoustical and optical measurements obtained during STRESS are not presented here, as they were aimed exclusively at determining characteristics of the sediment concentration field.

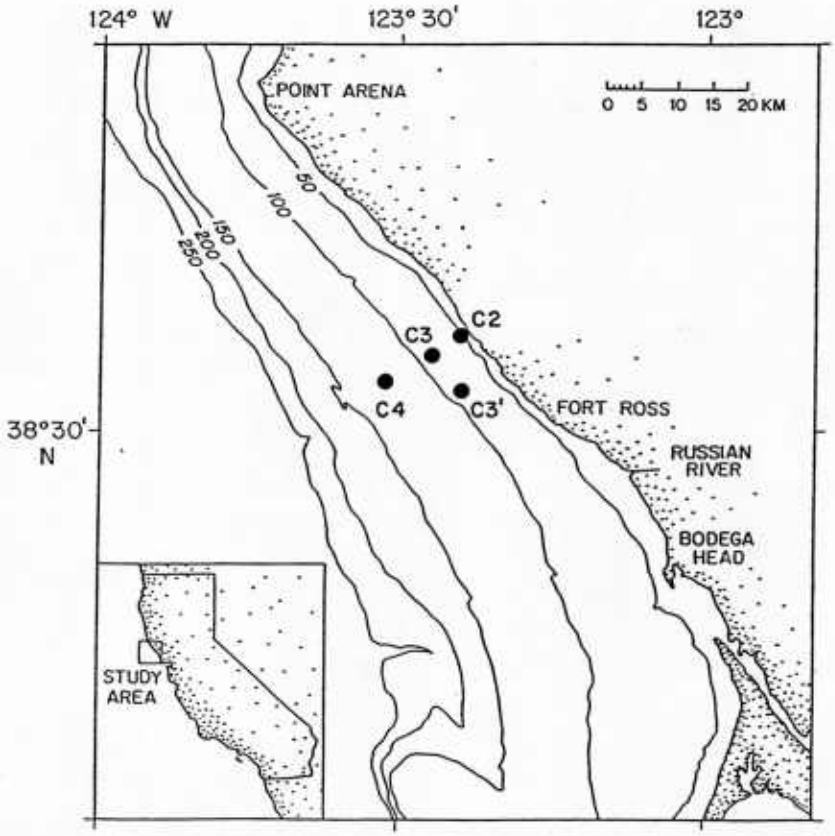


Figure 1. Geographic Locations of STRESS Moorings and Tripods

STRESS 1				
	C3			C3-Prime
water depth	97 meters	90 meters		92 meters
	mooring	tra*	trb*	mooring
coverage	12/6/88 - 2/27/89	12/6/88- 1/24/89	1/26/89-3/15/89	12/6/88-2/26/89
latitude	38 38.44 N	38 38.48 N	38 36.89 N	38 38.48 N
longitude	123 29.64 W	123 29.47 W	123 27.18 W	123 29.67 W

STRESS 2					
water depth	C2 49 meters	C3 90 meters		C4 130 meters	
	mooring	mooring	tripod	mooring	tripod
coverage	11/21/90-3/9/91	11/20/90-3/9/91	1/12/91-3/8/91	11/20/90-3/9/91	1/9/91-3/13/91
latitude	38 39.50 N	38 38.14 N	38 37.88 N	38 35.64 N	38 35.55 N
longitude	123 25.64 W	123 28.31 W	123 28.16 W	123 32.52 W	123 32.23 W

Table 1. Geographic Locations of STRESS Moorings and Tripods

*tra & trb represent tripod deployment 1 and tripod deployment 2, respectively.

2. STRESS INSTRUMENTATION

The STRESS program consisted of two experiments: STRESS 1 was conducted over the 1988-89 winter season; and, STRESS 2 was conducted over the 1990-1991 winter season. The data were collected using instrumentation mounted on a bottom-landing tripod for the bottom 6 meters and moored instrumentation for the remainder of the bottom half of the water column. For the sites included in this report, the instrumentation is shown in Figure 2, summarized in Table 2 (below), and described, in greater detail in Tables 3 through 12 of Section 4.

TRIPOD MOUNTED				MOORED					
HAB	STRESS 1	STRESS 2		HAB	STRESS 1		STRESS 2		
(m)	C3	C3	C4	(m)	C3	C3'	C2	C3	C4
.2	..v.	...t	...t	6	cavt	.avt	....	....	....
.4	.a.t	..v.	..v.	7	....	....	....	cavt	c..t
.5	..v.	....	....	10	....	....	..vt	cavt	..vt
.6	...t	....	....	12	..vt	....	....	....	....
.7	....	..v.	..v.	13	....	....	....	cavt	...t
1.0	....	....	...t	16	....	....	....	c..t	....
1.1	..vt	...t	....	18	cavt	.avt	....	....	....
1.3	....	..v.	..v.	19	....	....	....	cavt	cavt
1.4	.a..	.a..	.a..	22	....	....	....	c..t	....
1.7	....	...t	....	23	....	....	....	....	...t
1.7	....	...t	....	24	..vt	....	....	....	....
2.0	..vt	..v.	..vt	25	....	....	....	c..t	....
2.5	..vt	...t	..v.	27	....	....	....	....	...t
2.6	....	..v.	....	28	....	....	....	c..t	....
2.9	....	....	...t	30	cavt	....	....	....	....
3.4	....	.a..	.a..	31	....	....	....	cavt	....
3.6	...t	....	....	41	....	....	....	....	...t
3.7	....	...t	...t	56	....	....	....	....	...t
4.0	p...	p...	p...	71	....	....	....	....	cavt
4.5	....	...t	...t						
5.0	..vt	..vt	..vt						
5.8	...t	...t	....						
6.0	....	....	...t						

Table 2. Table of Sensor Height Above Bottom with Properties Measured. The symbols represent: c (conductivity), a (attenuation), v (velocity), t (temperature), and p (pressure).

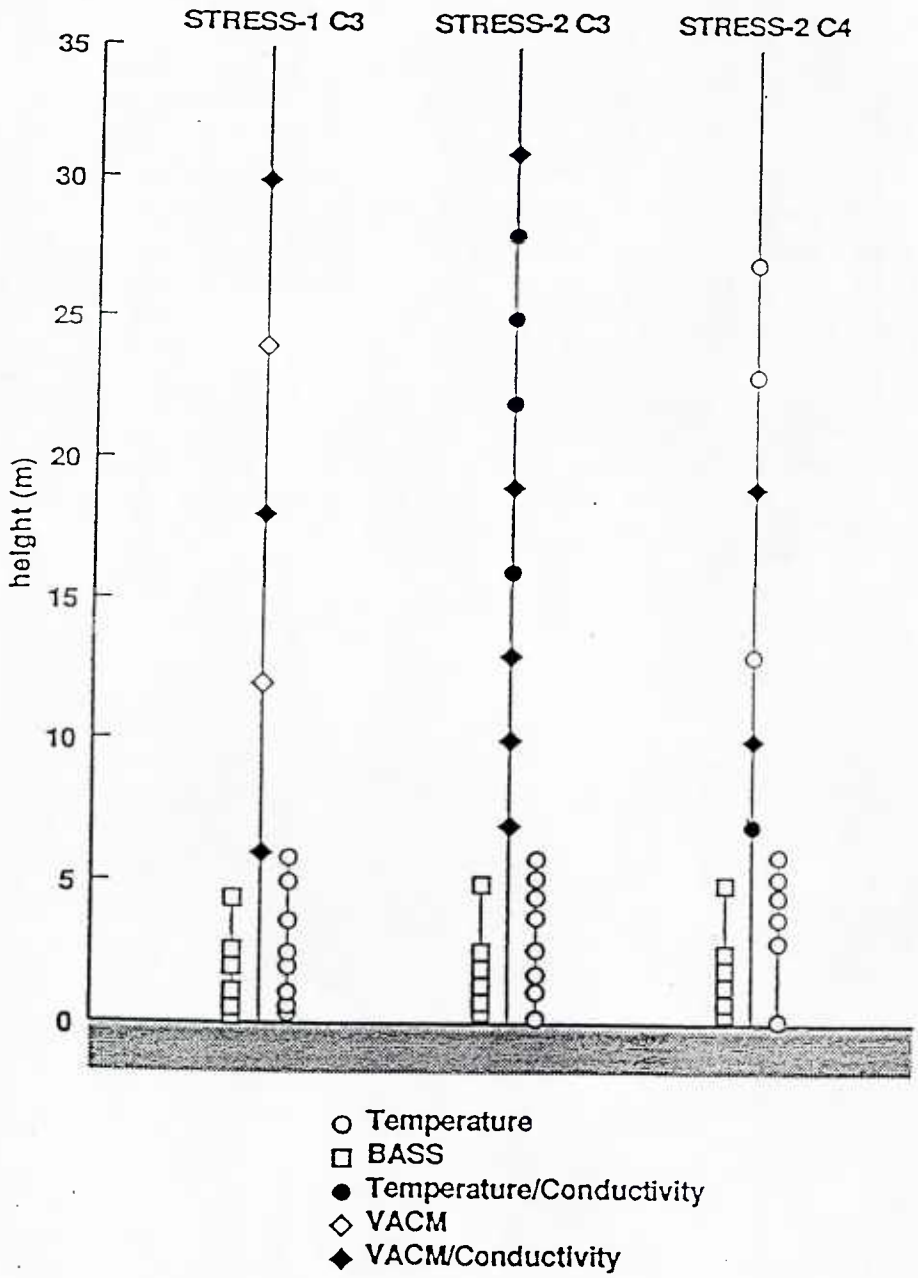


Figure 2.
The schematic shows the sensor vertical locations on the STRESS 1 and STRESS 2 moorings and adjacent BASS bottom tripods. The heights are heights above bottom. The C3 mooring sites were in 90 meters of water and the C4 site was in 130 meters of water. Measurements taken above 35 meters above bottom and those at Site C3-Prime (during STRESS 1) and C2 (during STRESS 2) are not shown in the above figure for the sake of clarity.

2.1 Moored Instrumentation

The moorings were equipped with Vector Averaging Current Meters (VACMs) to measure horizontal velocity at 3.75 minute intervals at each site. Each of the VACMs was equipped with a Yellow Spring Instrument (YSI) thermistor. Some of the VACMs were also fitted with Sea-Bird temperature/conductivity sensors which provided salinity data and SeaTech transmissometers which provided attenuation data. (Strahle et al. [2]). When both thermistors were present, the YSI thermistor of the VACM was used.

To provide better resolution in the vertical profile, more temperature and conductivity measurements were provided during the STRESS 2 experiment. Supplemental moored instrumentation included Sea-Bird thermistors (some with conductivity sensors) recorded by the SeaCAT/CT recorder; and, YSI thermistors recorded by the NOAA/PMEL Minature Temperature Recorder (MTR).

2.2 Tripod Mounted Instrumentation

A field report on the STRESS 1 BASS component is contained in Montgomery et al. [3]. Tripod instrumentation are also described for STRESS 1 in Gross et al [4] and for STRESS 2 in Gross et al [5].

Each tripod was equipped with 6 Benthic Acoustic Stress Sensor (BASS) cages to measure velocity components in the bottom 6 meters at 2Hz. The velocity data were stored as half-hourly averages. The Tattletale data logger also stored 10-minute averages of temperature data at 8 levels and light transmission at 2 levels. Each half-hour, the data were logged with the tilt and roll. The transmissometers were fitted with Plexiglass to reduce the pathlength of the measured light transmission.

There were discrepancies in the recorded elevations of the BASS sensor heights above bottom for STRESS 1 and STRESS 2. The heights used in this report were reconstructed as shown in Figure 3 for STRESS 1. The reconstruction assumes cage heights of 25 or 35 cm, spacer heights of 25cm, and a mounting platform thickness of 5.1cm.

ParoScientific pressure sensors provided pressure signals which, in conjunction with the 2 Hz velocity measurements, were used to compute wave statistics (frequency at the peak of the energy spectrum and root-mean-square near-bottom wave orbital velocity) in a frequency-domain analysis based on linear wave theory (see Gross et al. [4]).

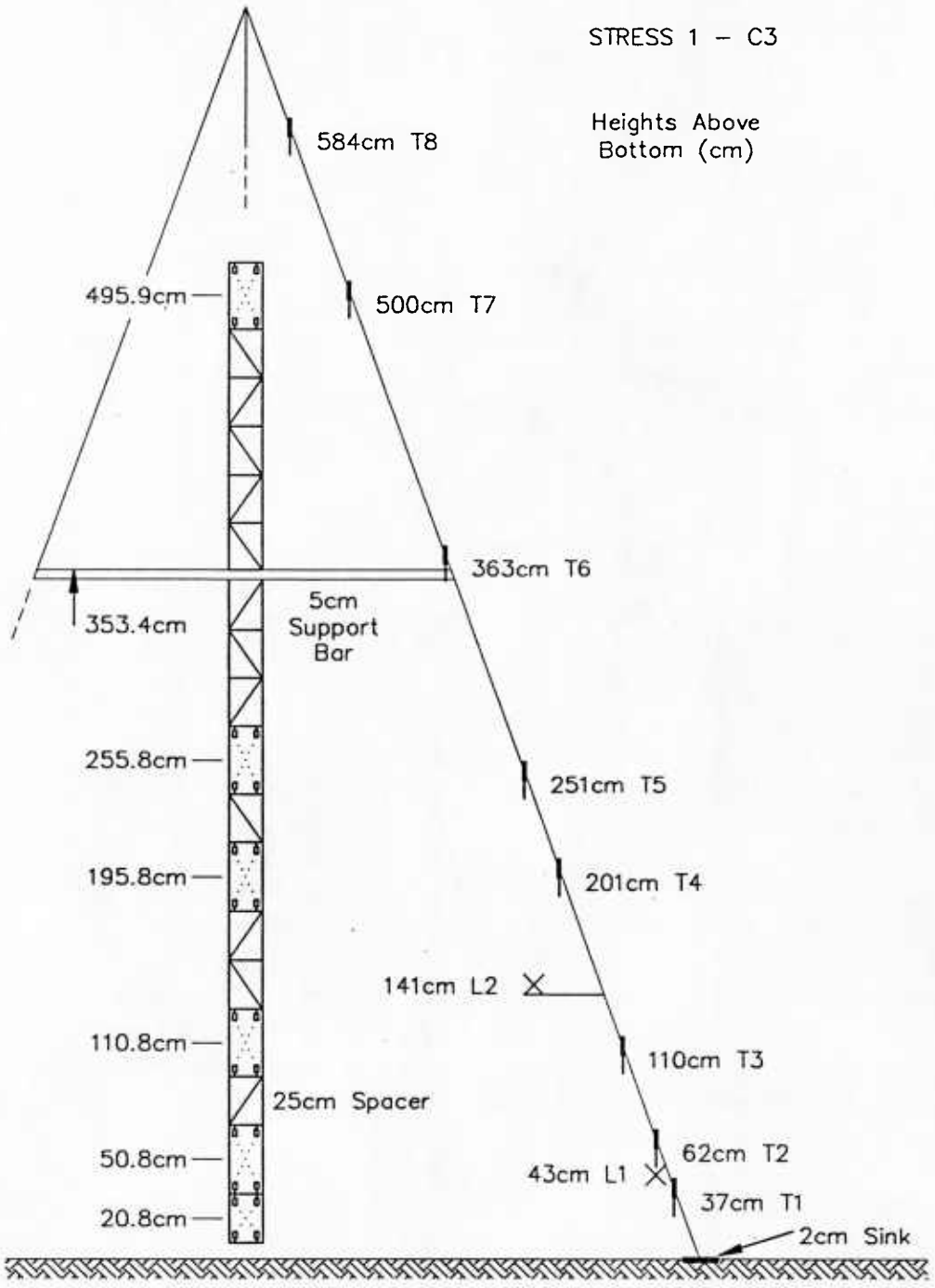


Figure 3.
Schematic showing the sensor heights above bottom at Site C3 during STRESS 1. The central structure represents the BASS cages with the respective heights. The heights label Tn represent the heights of the tripod mounted thermistors. The L1 and L2 heights show the location of the transmissometers.

3. DATA PROCESSING

All of the data were converted to hourly averages in a common reference time with 0.5 representing noon (GMT) of January 1. The hourly averages were centered on the hour. The velocity components were rotated into along-shore (v) and across-shelf components (u), using an isobath orientation of 317° True North.

3.1 Moored Instrumentation Data

VACM data were processed using the Woods Hole Oceanographic Institution Buoy Group Data Processing System (Tarbell et al. [6]). Further processing converted the velocity components from N-E to cross-shelf and along-shore by rotating the components to the 317° isobath. When necessary, the data were adjusted to GMT time and to a 17°E magnetic variation. The VACM mooring temperatures were calibrated using a platinum standard in a constant temperature bath (WHOI Batch #270 and #297 for the STRESS 1 and STRESS 2 data, respectively).

Conductivity measured on the VACM equipped moorings were converted to salinity using the Buoy Group Data Processing System (Tarbell et al. [6]). Other conductivity measurements were converted to salinity using the SEASOFT CTD package (Sea-Bird Electronics, Inc.), which uses the 1978 Practical Salinity Scale.

Beam attenuation (1/meters) is computed from the light transmission as -4*ln(V/Vmax), where V is the voltage output of the transmissometer and Vmax is either 95% of the clear air voltage output (measured before deployment) or the maximum voltage output during the deployment, whichever is greater.

Temperatures from the SeaCAT thermistors were computed using the manufacturers' calibration coefficients (4 June 91). The YSI thermistors recorded by the MTRs were calibrated in a constant temperature bath, using a SeaCAT as a standard.

A bug in the collection software caused the loss of all MTR-logged temperature data beyond the end of the year (12/31 midnight).

3.2 Tripod Mounted Instrumentation Data

Processing steps are described in Gross et al. [4 and 5]. Only excursions from the stated steps are described in this section.

The STRESS 1 C3a (first deployment) contained no compass. Orientation of the velocities was determined by alignment with the processed, concurrent lower-most VACM velocities.

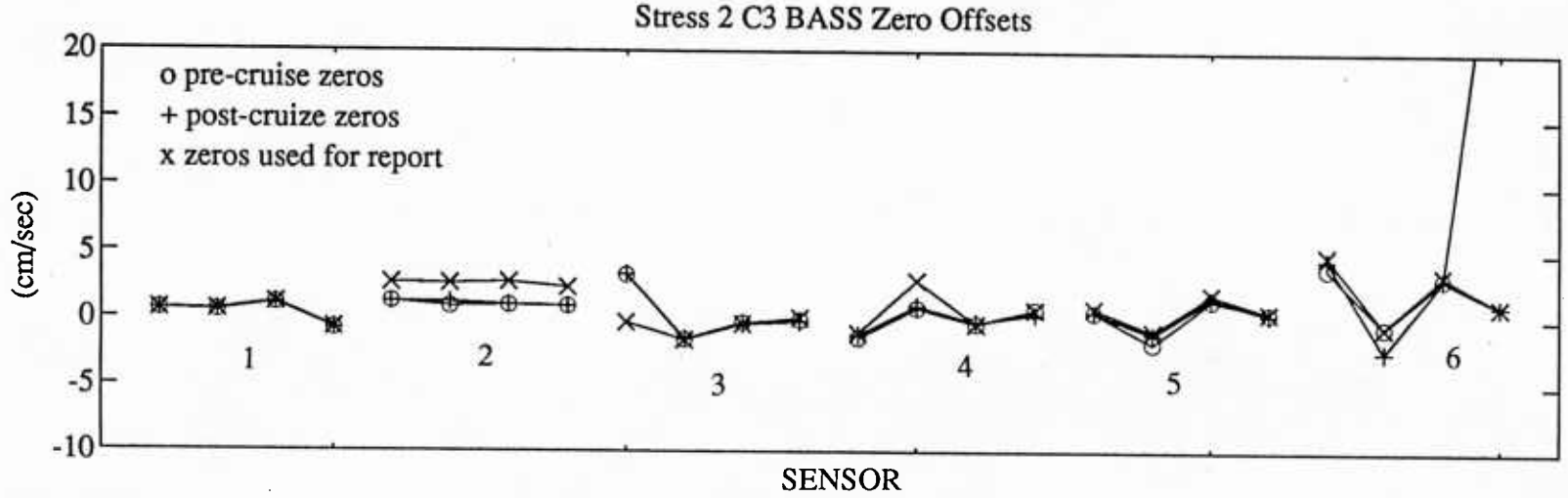
As described in Gross et al. [5], BASS zeros were subtracted from the measured velocities. STRESS 2 velocities were recomputed after initial analyses presented a problem with the highest sensor at C3 and the lowest sensor at C4. The B axis at the Site C3 top elevation had to be dropped (as it failed) and the other components rotated to compensate for upside-down mounting. The B component was reconstructed by assuming a net vertical velocity of zero (A+C=B+D): therefore, B = A + C - D. The sensor signal of the top-most BASS at Site C3 (STRESS 2) drifted for the first 240 hours of observation. (See Figures 29-31,33.) The bottom-most sensor at site C4 (STRESS 2) had a similar signal drifting problem which did not stabilize until about 750 hours into the experiment. (See Figures 40-42,44.) The magnetic variation for velocity alignment was 17.0°E. The BASS zero offsets used for STRESS 2 are shown in Figure 4. The BASS zero offsets used in STRESS 1 are given by Gross et al. [4].

During STRESS 2 at site C4, upon occasion there were velocity measurement "dropouts" in the 2 HZ data used in the computation of the wave statistics. Although these "dropouts" did not affect the half-hourly velocities, the effect on the in situ IFFT used to compute the wave statistics was a several order of magnitude jump in the spectral level which was identified and eliminated from the processed data.

For STRESS 1, the thermistor calibrations were made using a constant temperature bath, with a platinum standard. For STRESS 2, the thermistors were calibrated in a nearly-constant temperature bath using a Sea-Bird thermistor as a standard.

During STRESS 2, the thermistors at 1 and 2 meters failed at site C4.

The attenuation was determined by assuming that the maximum observed counts reflect the transmission through clear water.



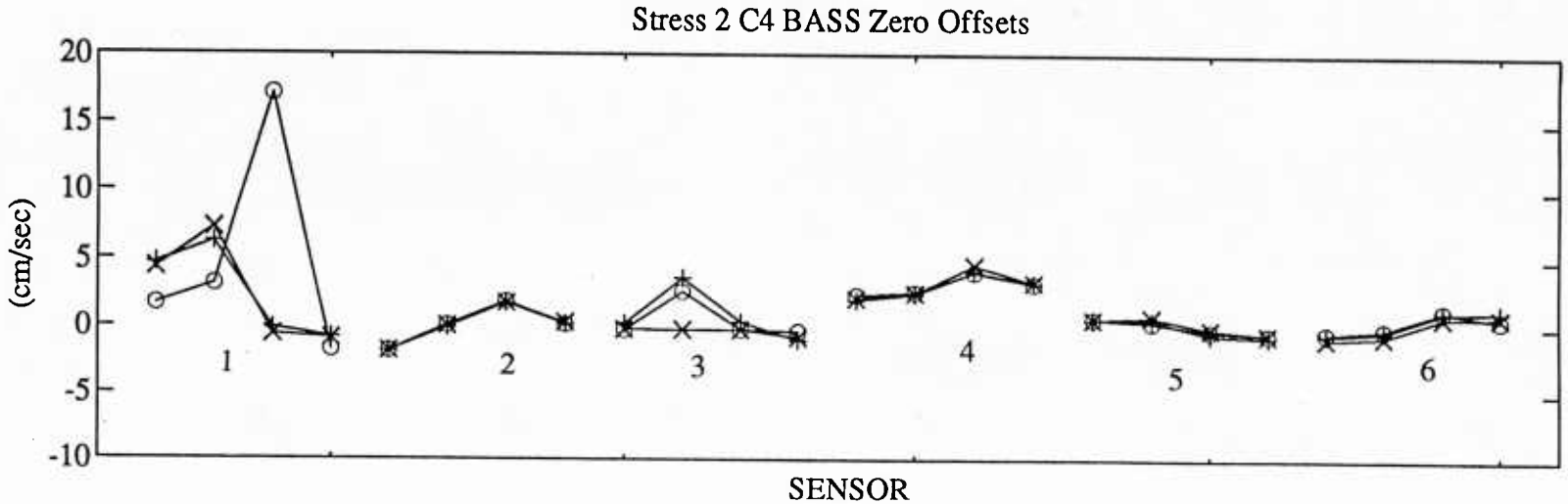


Figure 4.
Plot of BASS zero offsets for the four axes of each of the six BASS sensors during STRESS 2 (the left-most series represents the lowest sensor; the right-most represents the top-most sensor).

4. SUMMARY OF STRESS MEASUREMENTS

This section contains tables and plots of each measurement collected during the STRESS 1 and STRESS 2. At each height where an observation occurred, the tables include the mooring or tripod identification, instrument and/or sensor(s) used, the property measured, the observation period and the duration of observance. The heights are estimated heights above bottom in meters.

The resultant pathlengths of the fitted SeaTech25 transmissometers are noted as the model for the tripod attenuation instrumentation.

The velocity stick plots were generated from the cross-shelf and along-shore velocity components. These data were passed through a digital filter with a triangular impulse response function (32 hours width) to remove tidal fluctuations; and, then, subsampled every 6 hours for clarity in presentation. A vector is straight up when flow is poleward along the 317° isobath. With onshore current, the vector is rotated to the right; with offshore current, the vector is rotated to the left.

4.1 Plot Units

The units of velocity are cm/seconds; temperatures are degrees Centigrade; salinity are practical salinity units; wave orbital velocity are cm/seconds; and, wave period are seconds.

The plot of the lowest profile is placed on the actual axis of the data. Subsequent profiles are offset for clarity. The scales between sites and experiments for each property measured remain consistent to allow comparison amongst the data sets.

4.2 Abbreviations

Instrumentation:

BASS	.....	Benthic Acoustic STRESS Sensor
BS	.....	BayShore
PS	.....	ParoScientific
VACM	.....	Vector Averaging Current Meters
YSI	.....	Yellow Spring Instruments

STRESS 1 - SITE C3 (moored instruments)					
height (m)	mooring ID	instrument/ model	variable	start/stop times 1/1/89(noon) as 0.5	hours days
6	3275	Sea-Bird SBE-04	conductivity	12/06/88(4:00) - 2/27/89(22:00) -25.8333 - 57.9167	2011 83.7917
	3275	YSI 44032	temperature	12/06/88(3:00) - 2/27/89(22:00) -25.8750 - 57.9167	2012 83.8333
	3275	VACM 610	velocity	12/06/88(3:00) - 2/27/89(22:00) -25.8750 - 57.9167	2012 83.8333
	3275	SeaTech TR-2025	attenuation	12/06/88(3:00) - 2/27/89(22:00) -25.8750 - 57.9167	2012 83.8333
12	3274	YSI 44032	temperature	12/06/88(3:00) - 2/27/89(22:00) -25.8750 - 57.9167	2012 83.8333
	3274	VACM 610	velocity	12/06/88(3:00) - 2/27/89(22:00) -25.8750 - 57.9167	2012 83.8333
18	3273	Sea-Bird SBE-04	conductivity	12/06/88(4:00) - 2/27/89(22:00) -25.8333 - 57.9167	2011 83.7917
	3273	YSI 44032	temperature	12/06/88(3:00) - 2/27/89(22:00) -25.8750 - 57.9167	2012 83.8333
	3273	VACM 610	velocity	12/06/88(3:00) - 2/27/89(22:00) -25.8750 - 57.9167	2012 83.8333
	3273	SeaTech TR-2025	attenuation	12/06/88(3:00) - 2/27/89(22:00) -25.8750 - 57.9167	2012 83.8333
24	3272	YSI 44032	temperature	12/06/88(3:00) - 2/27/89(22:00) -25.8750 - 57.9167	2012 83.8333
	3272	VACM 610	velocity	12/06/88(3:00) - 2/27/89(22:00) -25.8750 - 57.9167	2012 83.8333
30	3271	Sea-Bird SBE-04	conductivity	12/06/88(4:00) - 2/27/89(22:00) -25.8333 - 57.9167	2011 83.7917
	3271	YSI 44032	temperature	12/06/88(3:00) - 2/27/89(22:00) -25.8750 - 57.9167	2012 83.8333
	3271	VACM 610	velocity	12/06/88(3:00) - 2/27/89(22:00) -25.8750 - 57.9167	2012 83.8333
	3271	SeaTech TR-2025	attenuation	12/08/88(14:00) - 2/27/89(12:00) -23.5833 - 57.5000	1947 81.1250

Table 3. STRESS 1: Instrumentation on C3 mooring (7 to 30 meters above bottom).

STRESS 1 - SITE C3 (tripod instruments)					
height (m)	tripod ID	instrument/ model	variable	start/stop times 1/1/89(noon) as 0.5	hours days
0.21	BS-IV	BASS BS-IV	velocity	12/06/88(3:00) - 1/24/89(9:00) -25.8750 - 23.3750 1/26/89(22:00) - 3/15/89(18:00) 25.9167 - 73.7500	1183 49.2917 1149 47.8750
0.37	BS-IV	YSI 44105	temperature	12/06/88(3:00) - 1/24/89(9:00) -25.8750 - 23.3750 1/26/89(22:00) - 3/15/89(19:00) 25.9167 - 73.7917	1183 49.2917 1150 47.9167
0.44	BS-IV	SeaTech-25 (5 cm pathlength)	attenuation	12/06/88(3:00) - 1/24/89(9:00) -25.8750 - 23.3750 1/26/89(22:00) - 3/19/89(20:00) 25.9167 - 77.8333	0* 1247 51.9583
0.51	BS-IV	BASS BS-IV	velocity	12/06/88(3:00) - 1/24/89(9:00) -25.8750 - 23.3750 1/26/89(22:00) - 3/15/89(18:00) 25.9167 - 73.7500	1183 49.2917 1149 47.8750
0.62	BS-IV	YSI 44105	temperature	12/06/88(3:00) - 1/24/89(9:00) -25.8750 - 23.3750 1/26/89(22:00) - 3/15/89(19:00) 25.9167 - 73.7917	1183 49.2917 1150 47.9167
1.10	BS-IV	YSI 44105	temperature	12/06/88(3:00) - 1/24/89(9:00) -25.8750 - 23.3750 1/26/89(22:00) - 3/15/89(19:00) 25.9167 - 73.7917	1183 49.2917 1150 47.9167
1.11	BS-IV	BASS BS-IV	velocity	12/06/88(3:00) - 1/24/89(9:00) -25.8750 - 23.3750 1/26/89(22:00) - 3/15/89(18:00) 25.9167 - 73.7500	1183 49.2917 1149 47.8750
1.42	BS-IV	SeaTech-25 (5 cm pathlength)	attenuation	1/26/89(22:00) - 3/19/89(20:00) 25.9167 - 77.8333	1247* 51.9583
1.96	BS-IV	BASS BS-IV	velocity	12/06/88(3:00) - 1/24/89(9:00) -25.8750 - 23.3750 1/26/89(22:00) - 3/15/89(18:00) 25.9167 - 73.7500	1183 49.2917 1149 47.8750
2.01	BS-IV	YSI 44105	temperature	12/06/88(3:00) - 1/24/89(9:00) -25.8750 - 23.3750 1/26/89(22:00) - 3/15/89(19:00) 25.9167 - 73.7917	1183 49.2917 1150 47.9167

Table 4. STRESS 1: Instrumentation on C3 BASS tripod (bottom to 2 m).

*The attenuation data for first deployment have not been received.

STRESS 1 - SITE C3 (tripod instruments - continued)					
height (m)	tripod ID	instrument/ model	variable	start/stop times 1/1/89(noon) as 0.5	hours days
2.51	BS-IV	YSI 44105	temperature	12/06/88(3:00) - 1/24/89(9:00) -25.8750 - 23.3750 1/26/89(22:00) - 3/15/89(19:00) 25.9167 - 73.7917	1183 49.2917 1150 47.9167
2.56	BS-IV	BASS BS-IV	velocity	12/06/88(3:00) - 1/24/89(9:00) -25.8750 - 23.3750 1/26/89(22:00) - 3/15/89(18:00) 25.9167 - 73.7500	1183 49.2917 1149 47.8750
3.63	BS-IV	YSI 44105	temperature	12/06/88(3:00) - 1/24/89(9:00) -25.8750 - 23.3750 1/26/89(22:00) - 3/15/89(19:00) 25.9167 - 73.7917	1183 49.2917 1150 47.9167
4.00	BS-IV	PS-8200 #13032	pressure	11/28/88(22:00) - 1/13/89(19:00) -33.0834 - 12.7916	1102* 45.9167
4.96	BS-IV	BASS BS-IV	velocity	12/06/88(3:00) - 1/24/89(9:00) -25.8750 - 23.3750 1/26/89(22:00) - 3/15/89(18:00) 25.9167 - 73.7500	1183 49.2917 1149 47.8750
5.00	BS-IV	YSI 44105	temperature	12/06/88(3:00) - 1/24/89(9:00) -25.8750 - 23.3750 1/26/89(22:00) - 3/15/89(19:00) 25.9167 - 73.7917	1183 49.2917 1150 47.9167
5.84	BS-IV	YSI 44105	temperature	12/06/88(3:00) - 1/24/89(9:00) -25.8750 - 23.3750 1/26/89(22:00) - 3/15/89(19:00) 25.9167 - 73.7917	1183 49.2917 1150 47.9167

Table 5. STRESS 1: Instrumentation on C3 BASS tripod (2.5 to 5.84 meters above bottom).

* wave statistics have not been received for second deployment.

Figure 5. Stress 1 C3 Salinity Profile (offset = 0.5 practical salinity units)

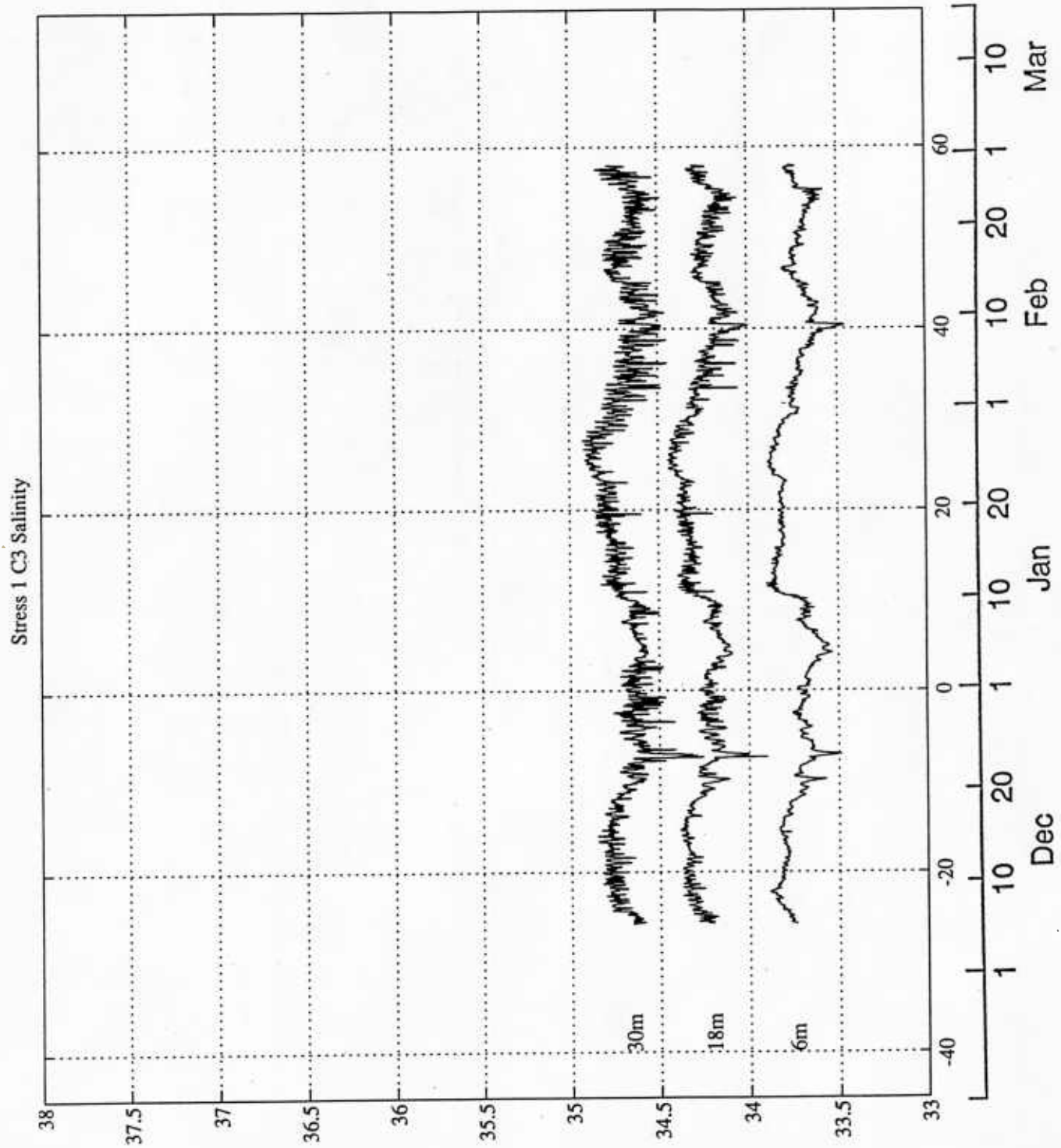


Figure 6. Stress 1 C3 Temperature Profile (offset = 1.0 degrees Centigrade)

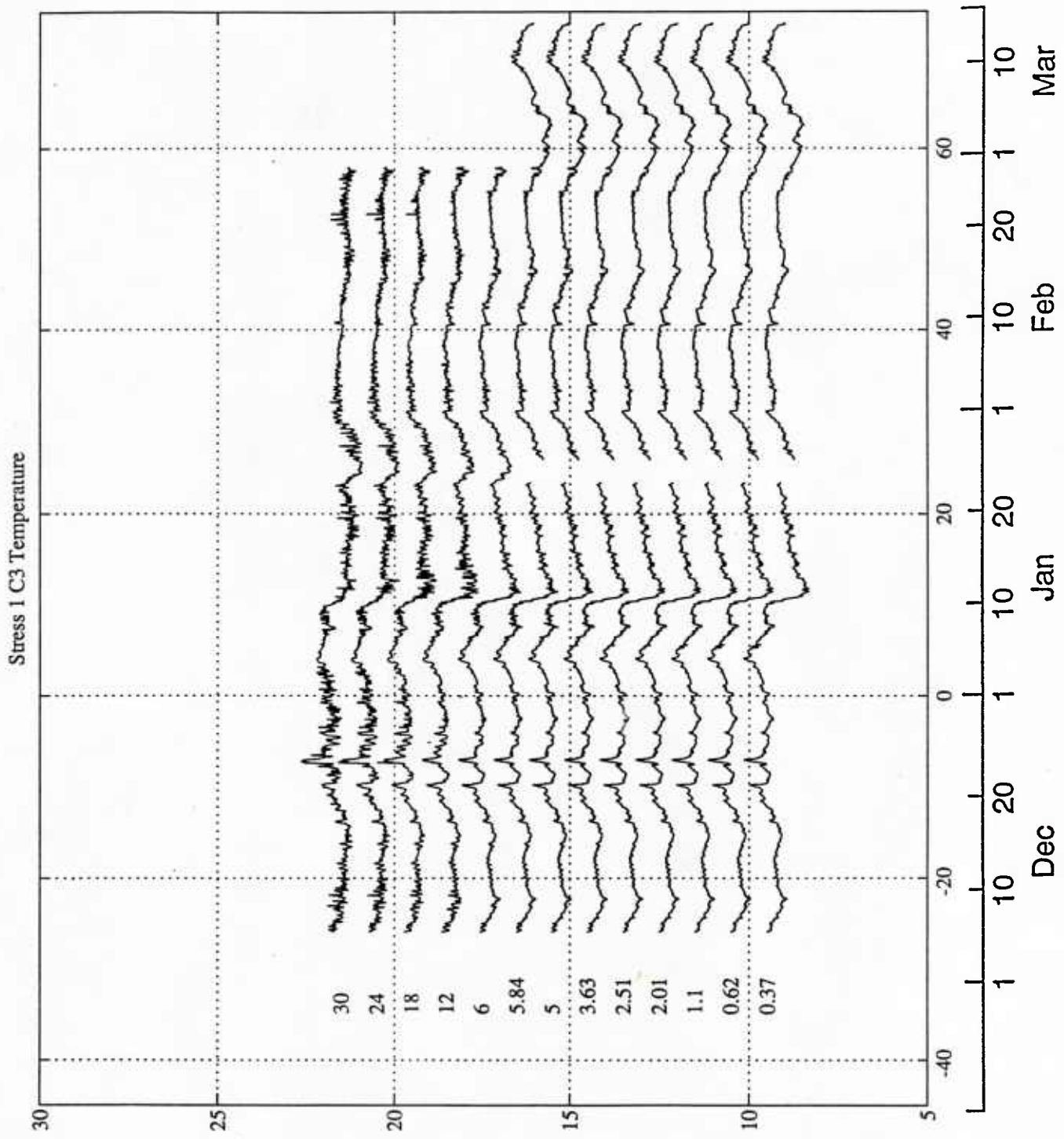


Figure 7. Stress 1 C3 Across-Shelf Velocity Profile (offset = 25 cm/s)

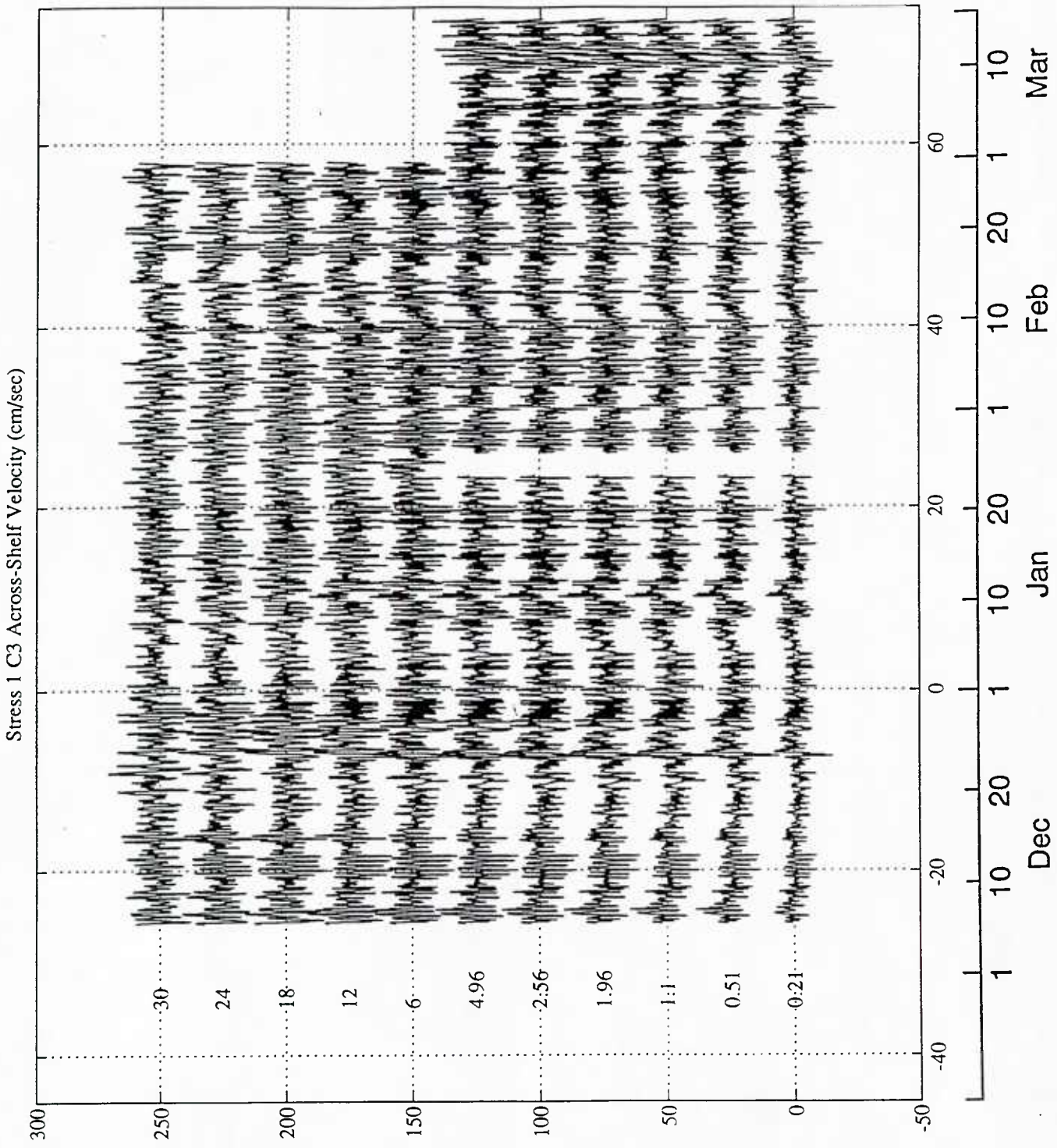


Figure 8. Stress 1 C3 Along-Shore Velocity Profile (offset = 25 cm/s)

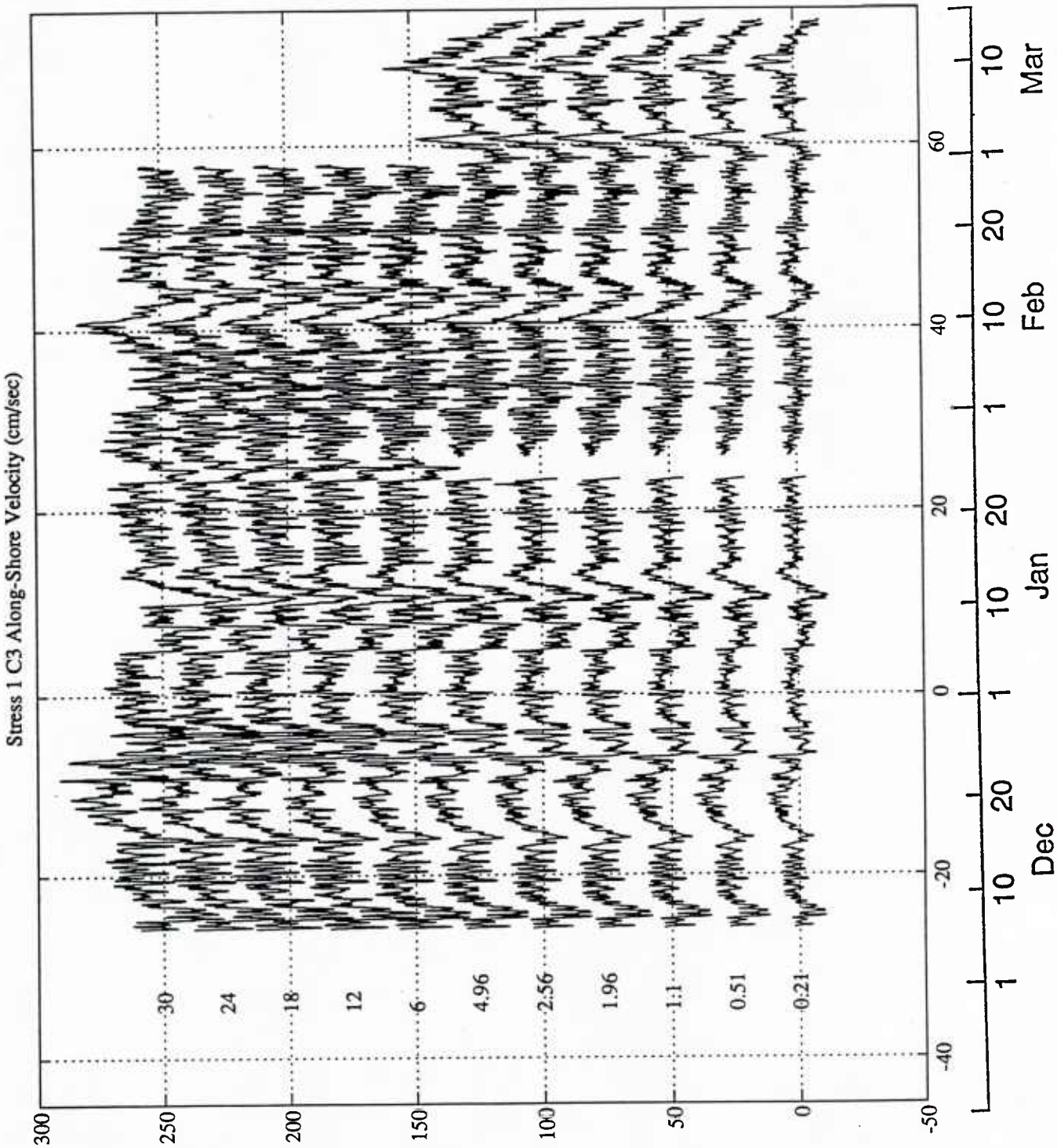


Figure 9. Stress 1 C3 Current Speed Profile (offset = 25 cm/s)

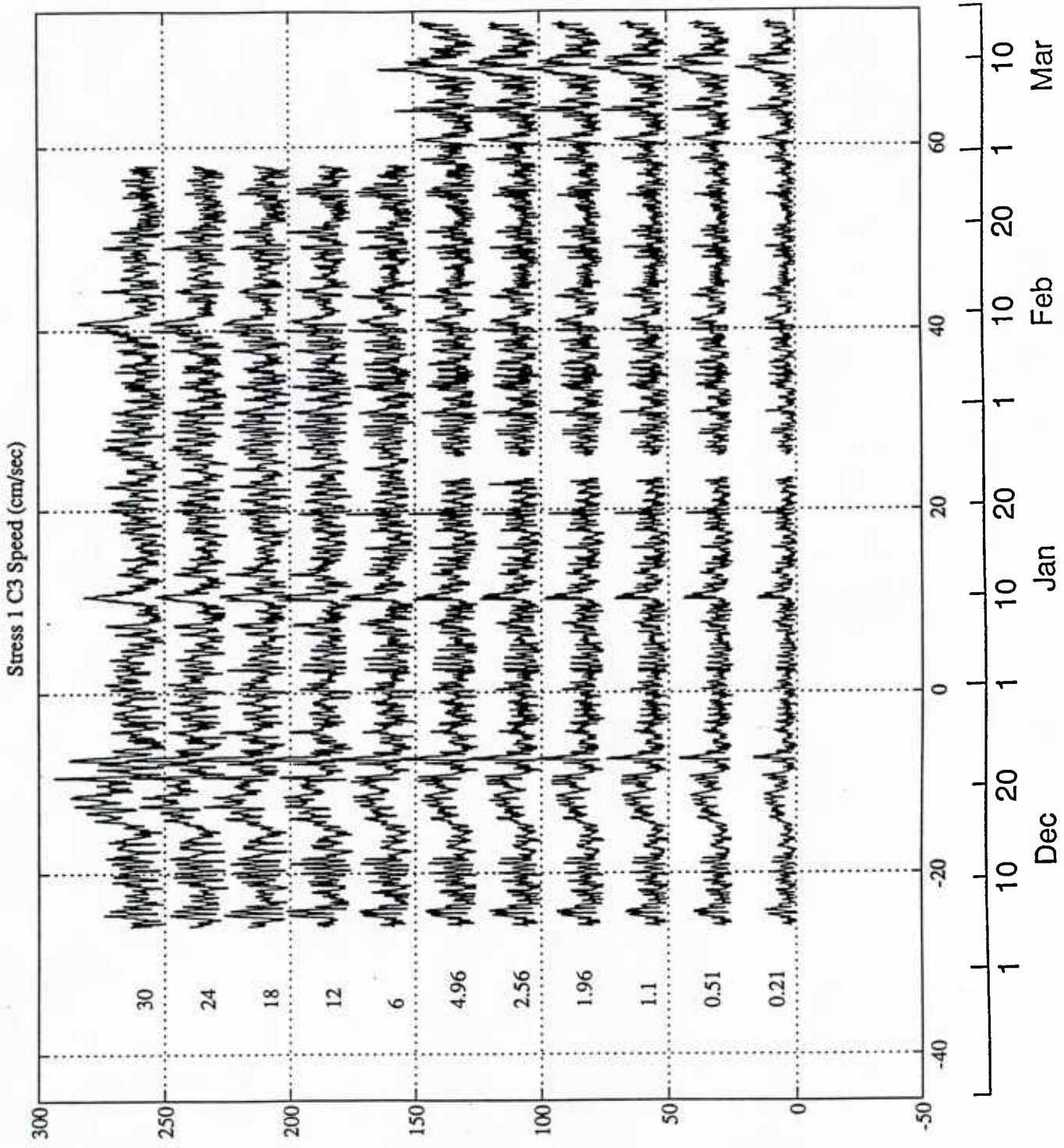


Figure 10. Stress 1 C3 VACM Velocity

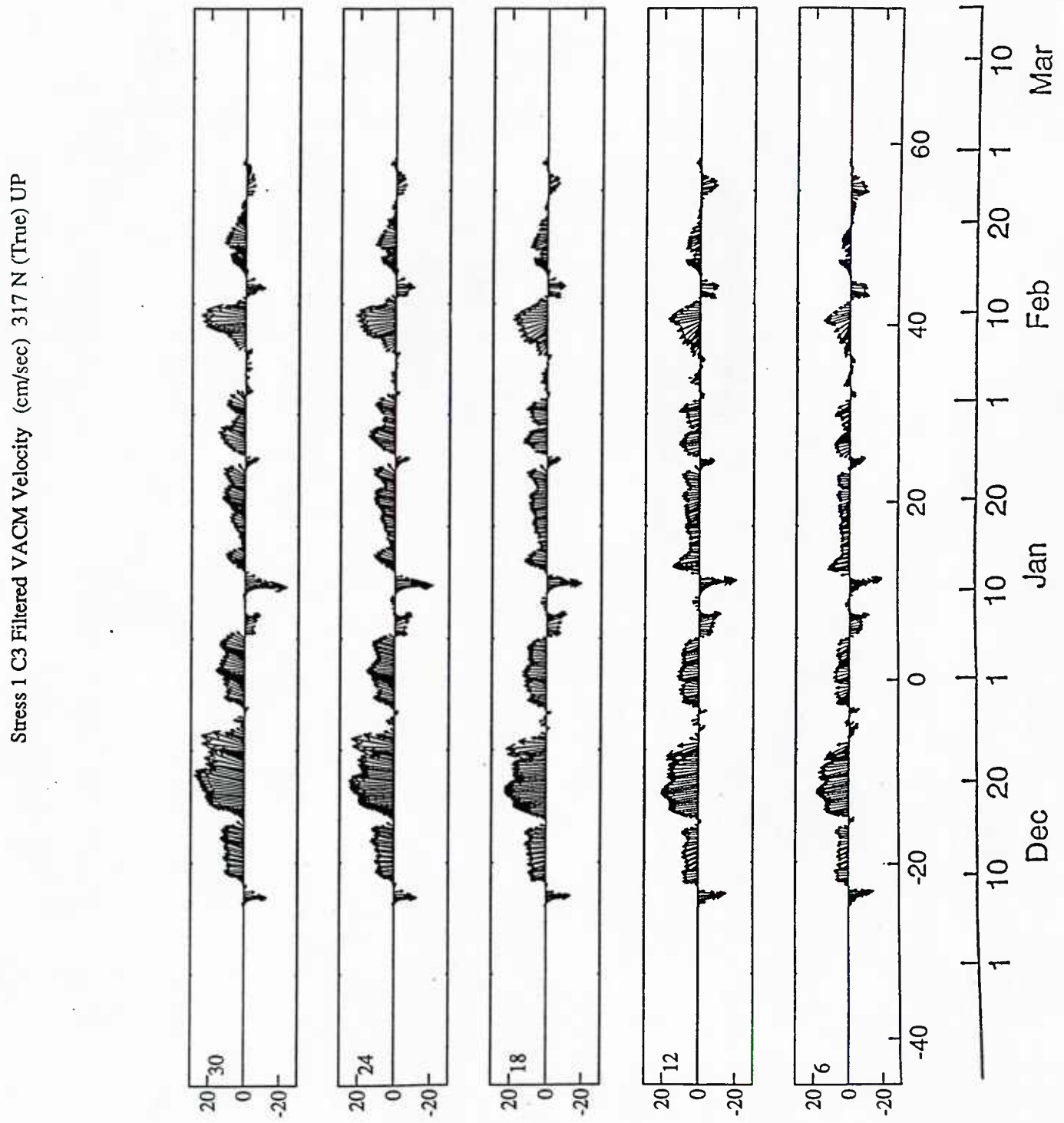


Figure 11. Stress 1 C3 BASS Velocity

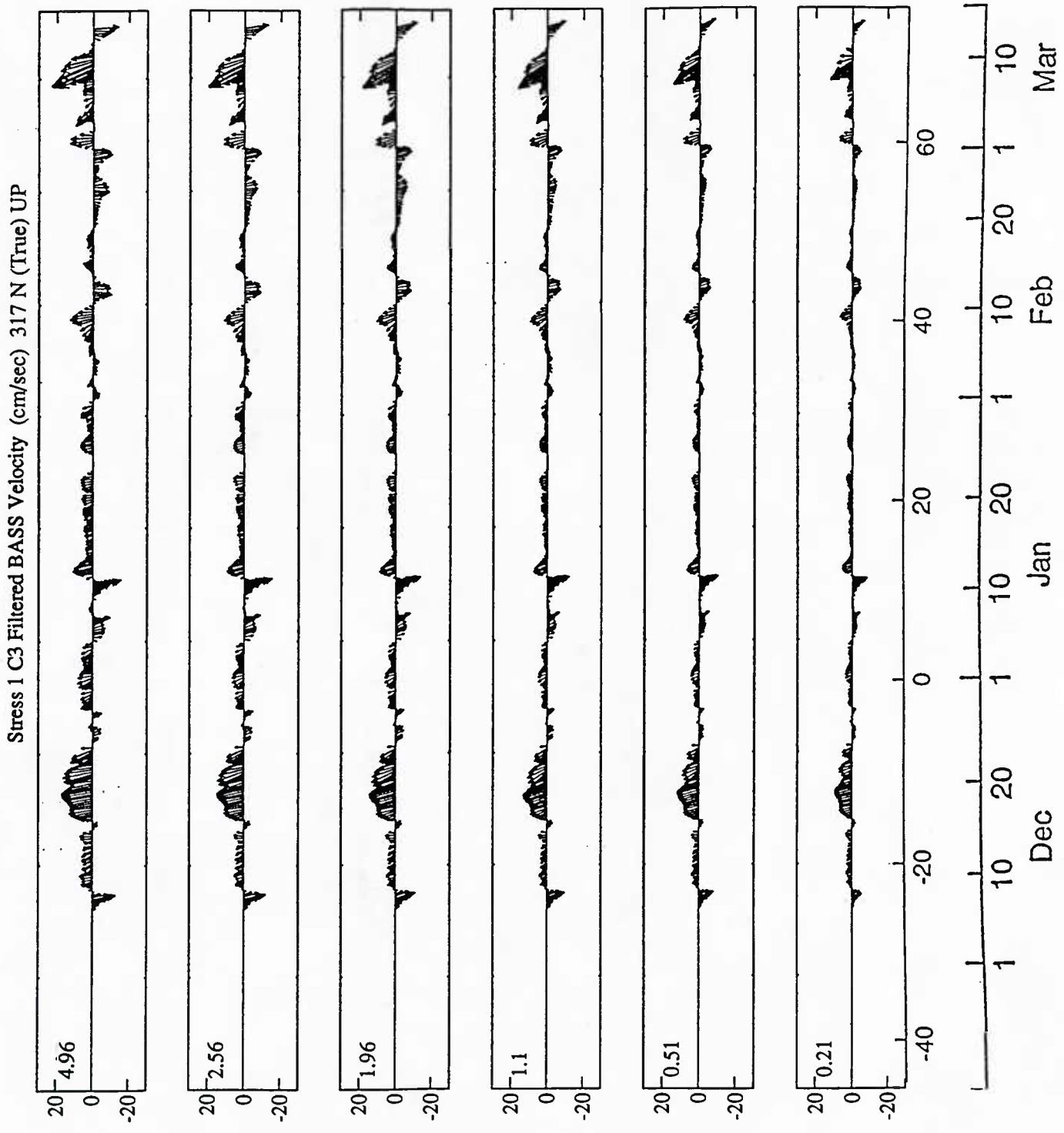


Figure 12. Stress 1 C3 Moored Attenuation Profile (offset = 5.0 l/m)

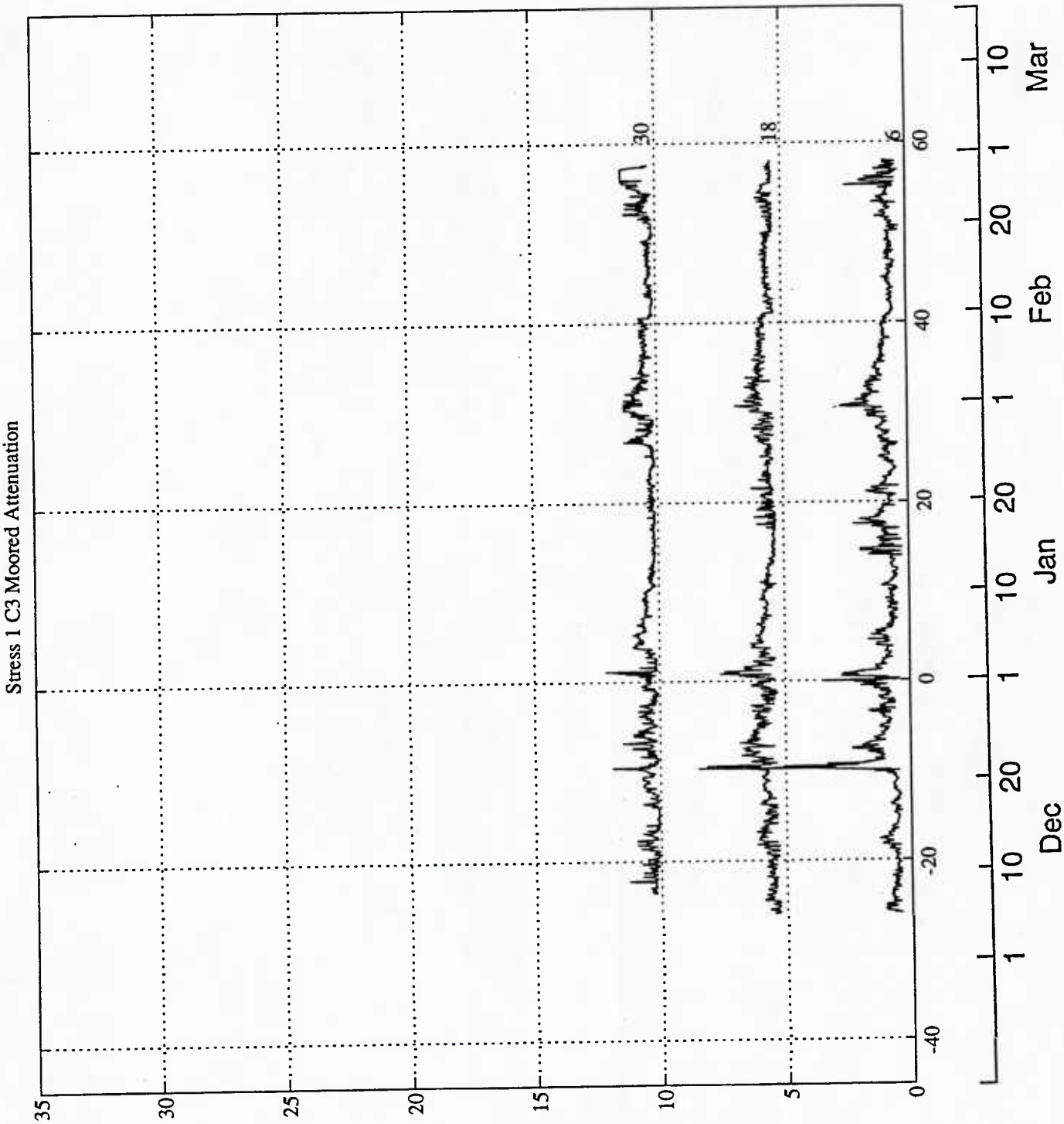


Figure 13. Stress 1 C3 Tripod Attenuation Profile (offset = 15.0 l/m)

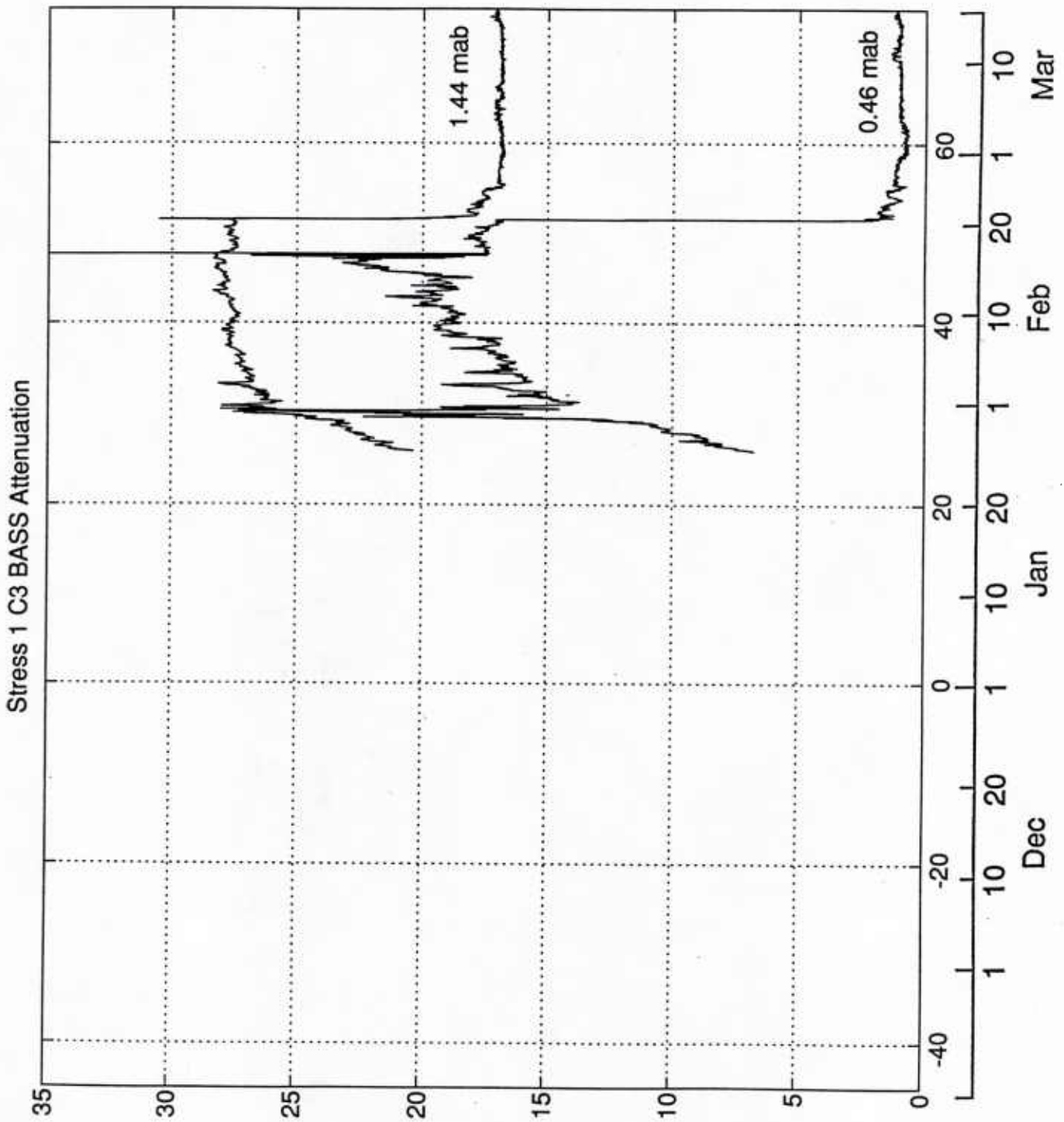


Figure 14. Stress 1 C3 Wave Mean Period Profile (seconds)

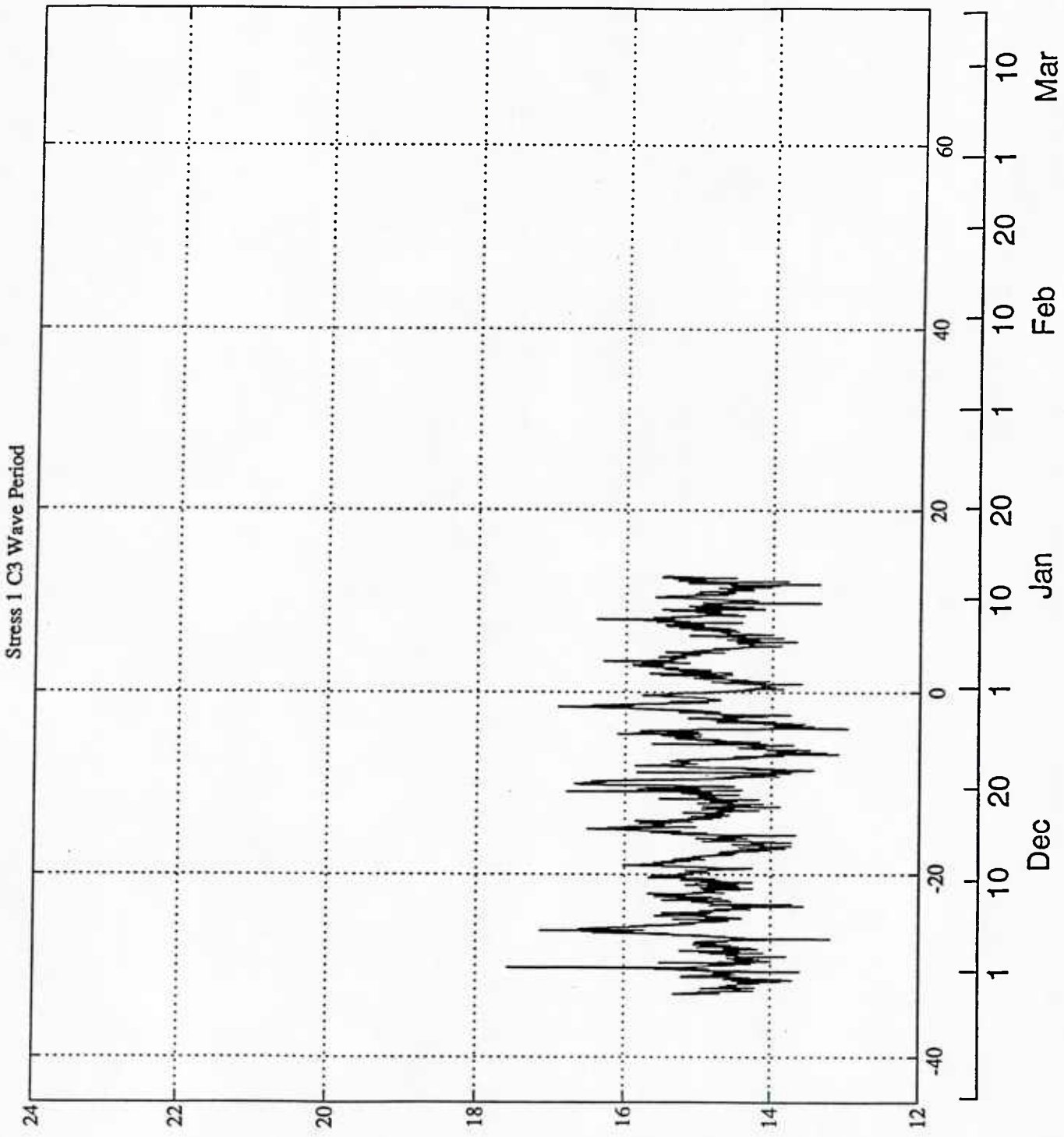
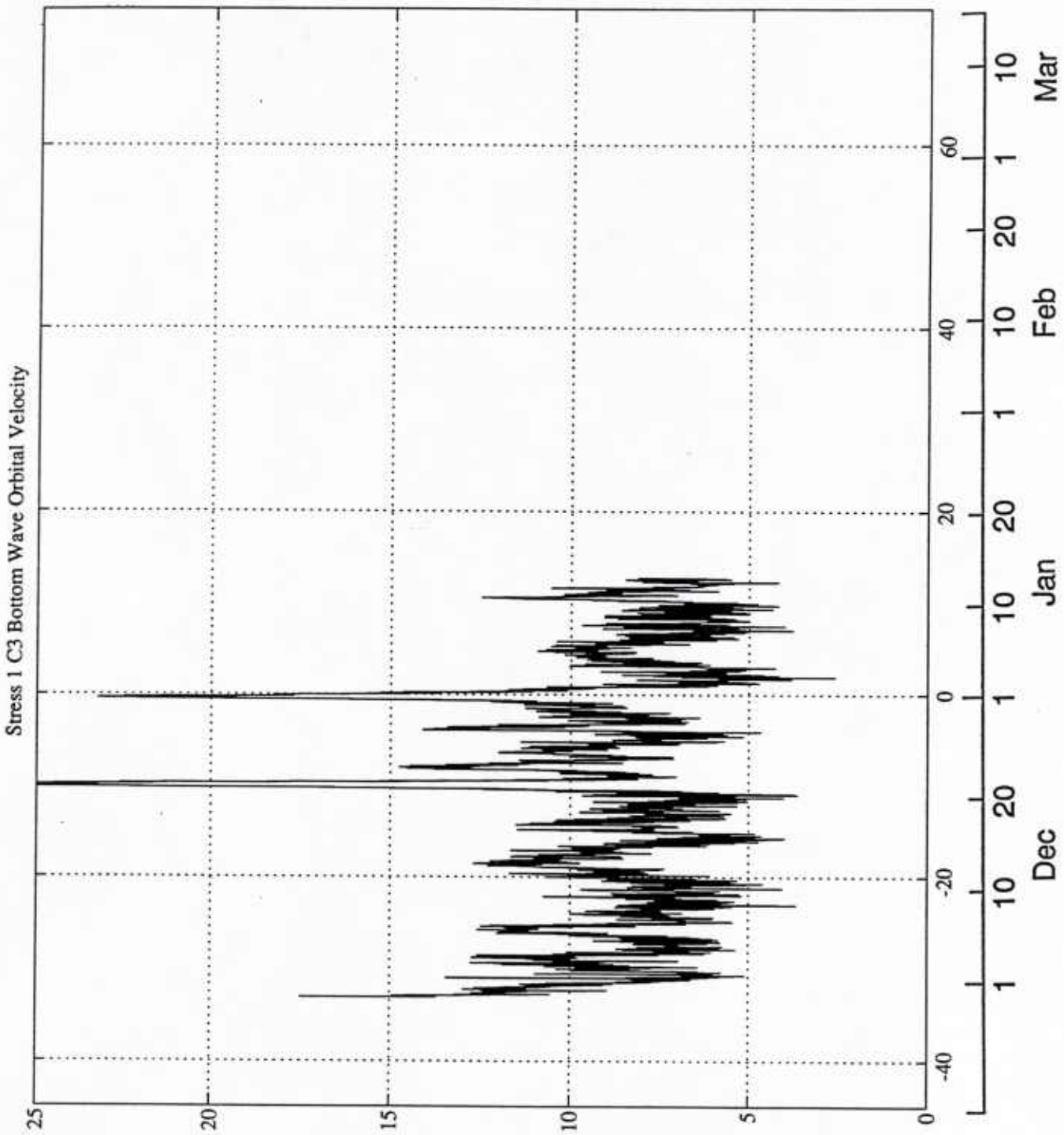


Figure 15. Stress 1 C3 Wave Orbital Velocity Profile (cm/s)



STRESS 1 - SITE C3-Prime (moored instruments)					
height (m)	mooring ID	instrument/ model	variable	start/stop times 1/1/89(noon) as 0.5	hours days
6	3282	Sea-Bird SBE-04	conductivity	12/06/88(19:00) - 2/26/89(18:00) -25.2083 - 56.7500	1968 82.0000
	3282	YSI 44032	temperature	12/06/88(19:00) - 2/26/89(18:00) -25.2083 - 56.7500	1968 82.0000
	3282	VACM 610	velocity	12/06/88(19:00) - 2/26/89(18:00) -25.2083 - 56.7500	1968 82.0000
	3282	SeaTech TR-2025	attenuation	12/06/88(19:00) - 2/26/89(18:00) -25.2083 - 56.7500	1968 82.0000
18	3281	Sea-Bird SBE-04	conductivity	12/06/88(19:00) - 2/26/89(18:00) -25.2083 - 56.7500	1968 82.0000
	3281	YSI 44032	temperature	12/06/88(19:00) - 2/26/89(18:00) -25.2083 - 56.7500	1968 82.0000
	3281	VACM 610	velocity	12/06/88(19:00) - 2/26/89(18:00) -25.2083 - 56.7500	1968 82.0000
	3281	SeaTech TR-2025	attenuation	12/06/88(19:00) - 2/26/89(18:00) -25.2083 - 56.7500	1968 82.0000

Table 6. STRESS 1: Instrumentation on C3-Prime mooring.

Figure 16. Stress 1 C3-Prime Temperature Profile (offset = 1.0 degrees Centigrade)

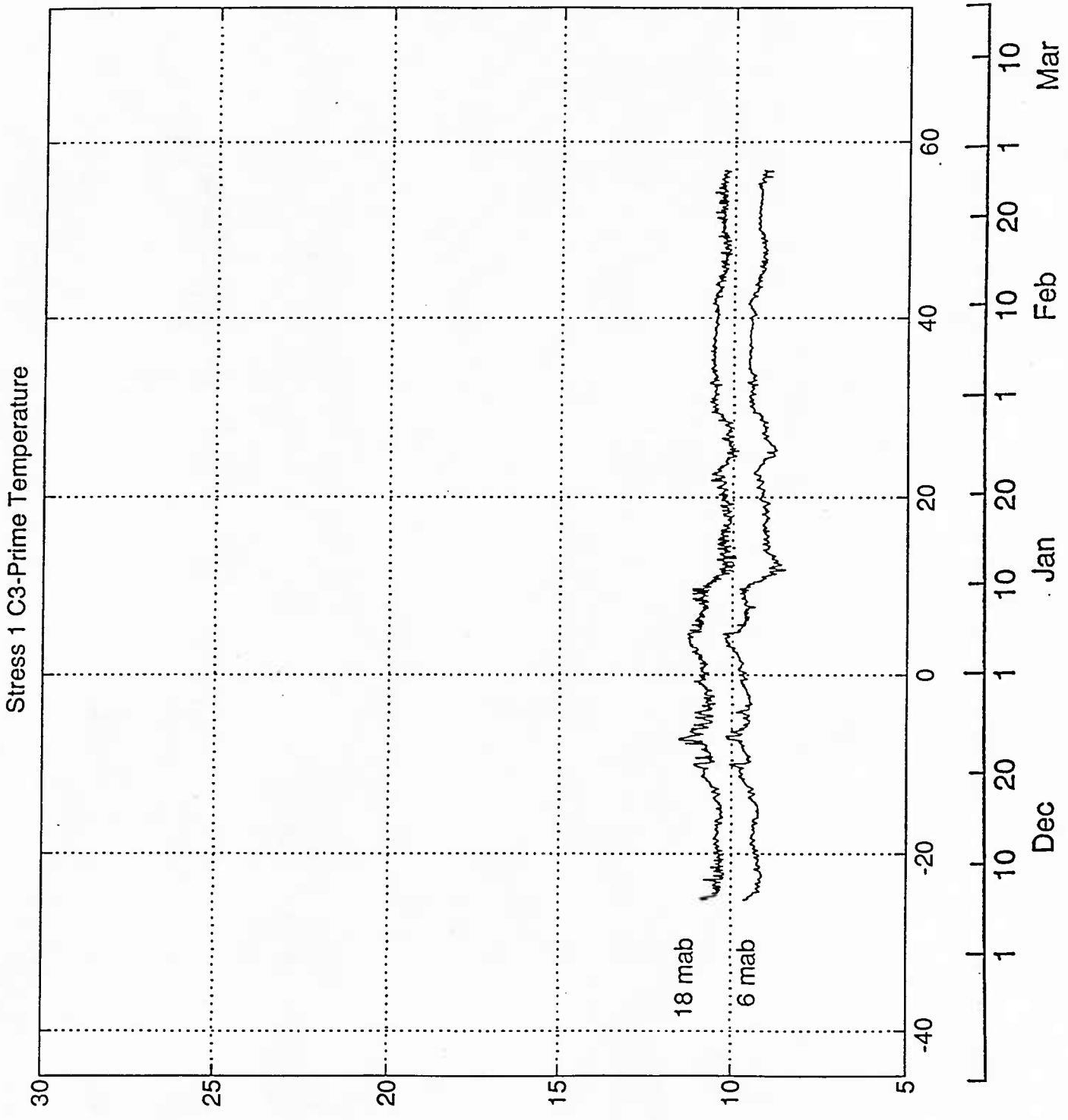


Figure 17. Stress 1 C3-Prime Across-Shelf Velocity Profile (offset = 25 cm/s)

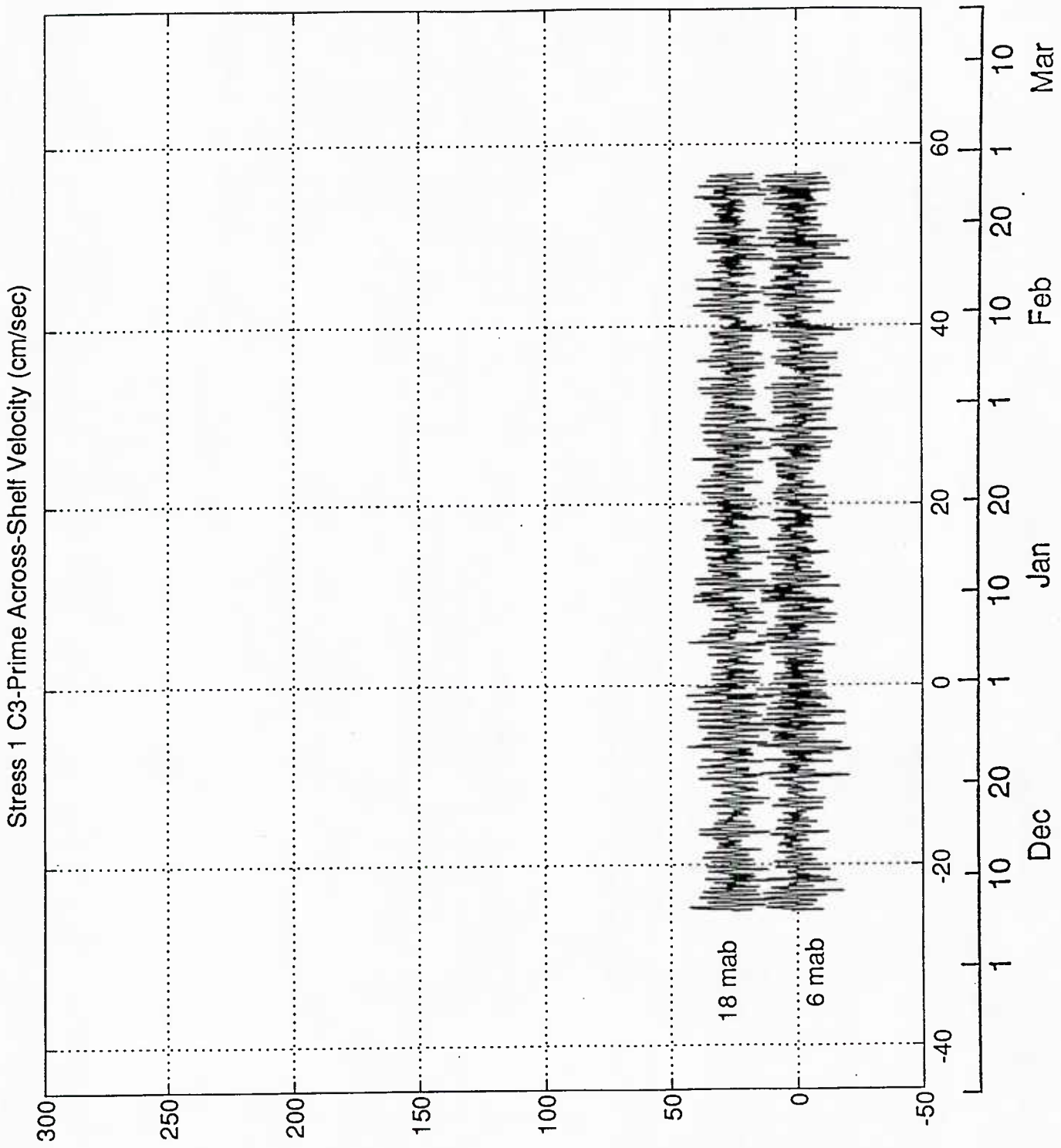


Figure 18. Stress 1 C3-Prime Along-Shore Velocity Profile (offset = 25 cm/s)

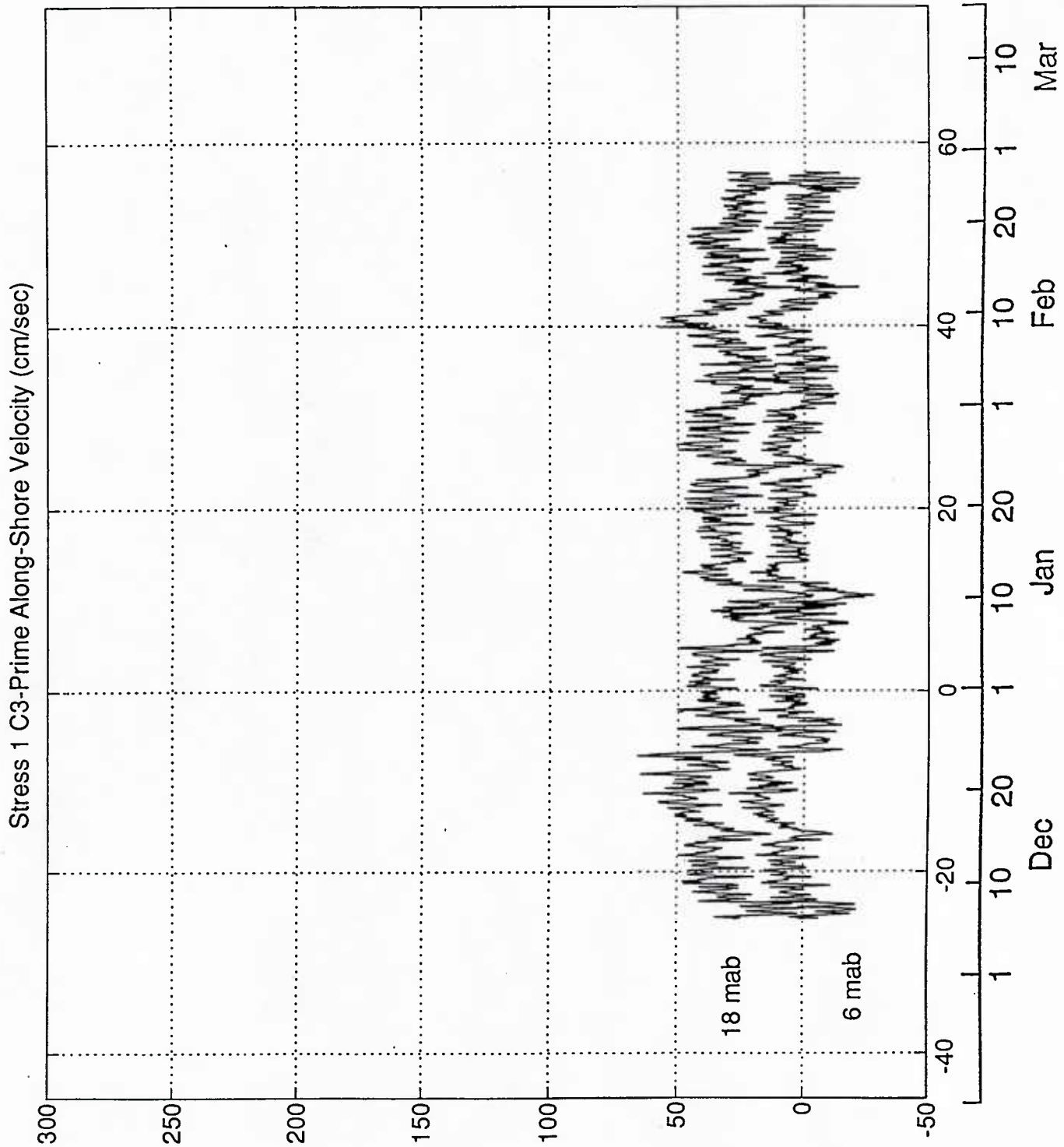


Figure 19. Stress 1 C3-Prime Current Speed Profile (offset = 25 cm/s)

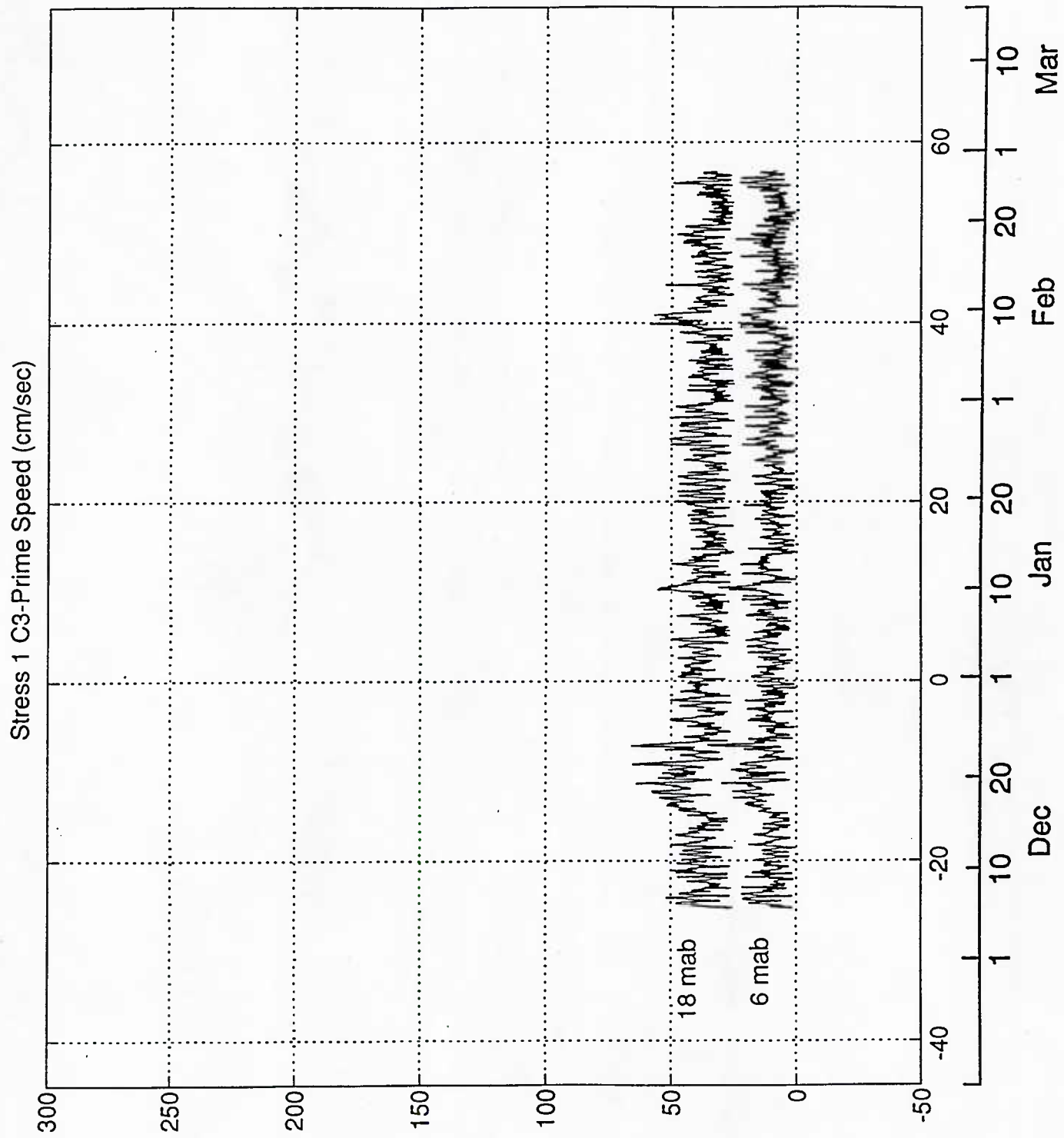


Figure 20. Stress 1 C3-Prime VACM Velocity Stickplots

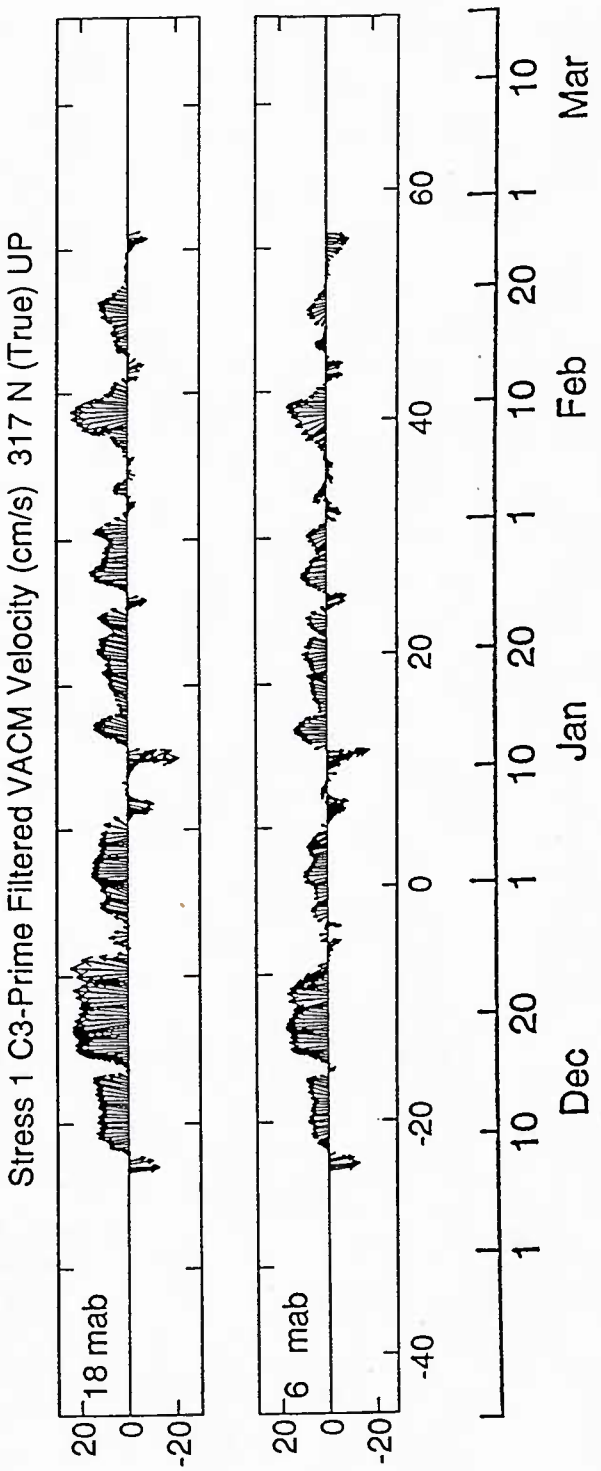
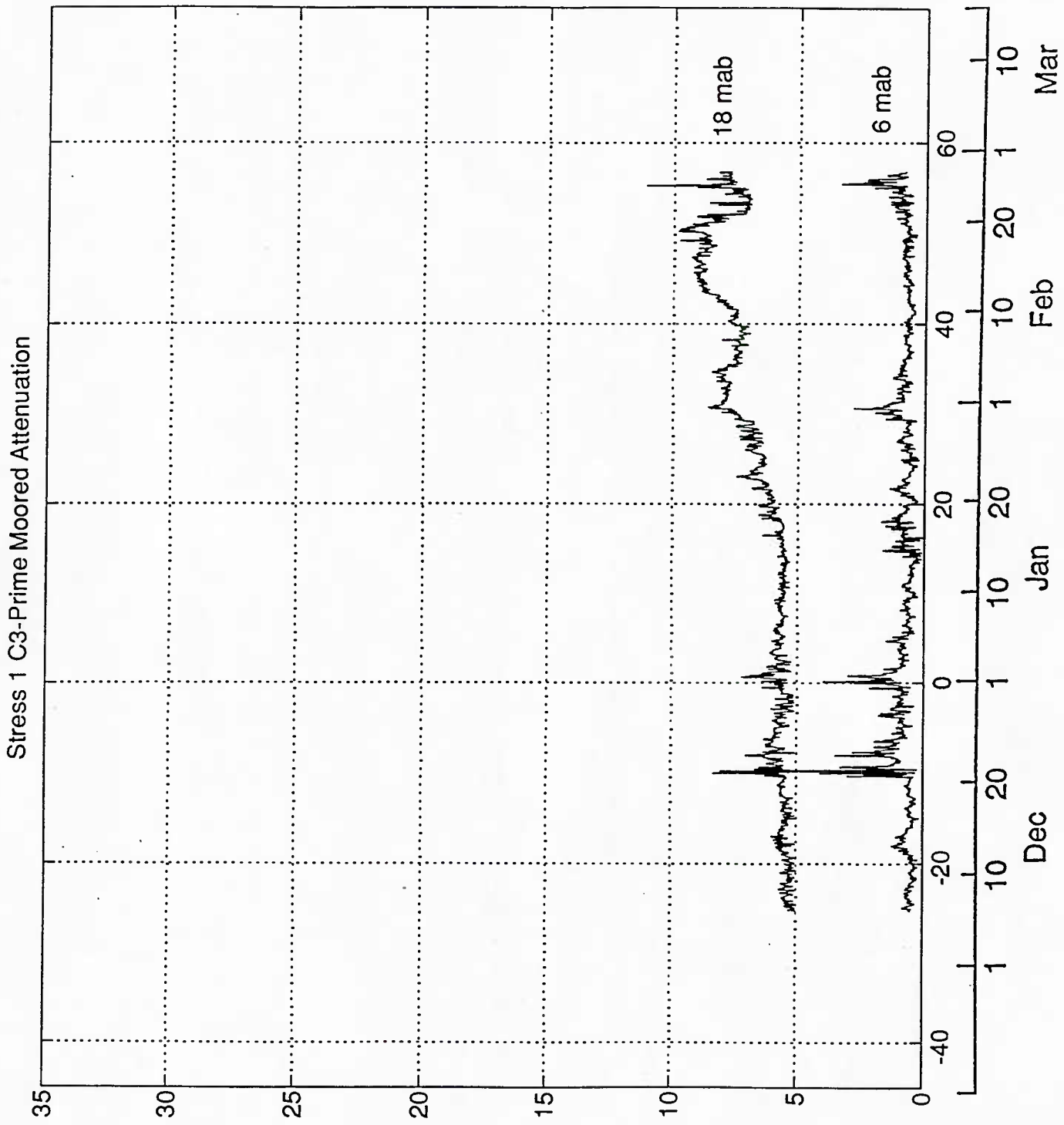


Figure 21. Stress 1 C3-Prime Moored Attenuation Profile (offset = 5.0 l/m)



STRESS 2 - SITE C2 (moored instruments)					
height (m)	mooring ID	instrument/ model	variable	start/stop times 1/1/91(noon) as 0.5	hours days
10	3621	VACM 610	velocity	11/21/90(4:00) - 3/ 9/91(21:00) -40.8333 - 67.8750	2610 108.7500
	3621	YSI 44032	temperature	11/21/90(4:00) - 3/ 9/91(21:00) -40.8333 - 67.8750	2610 108.7500

Table 7. STRESS 2: Instrumentation on C2 Mooring.

Figure 22. Stress 2 C2 Temperature Profile (offset = 1.0 degrees Centigrade)

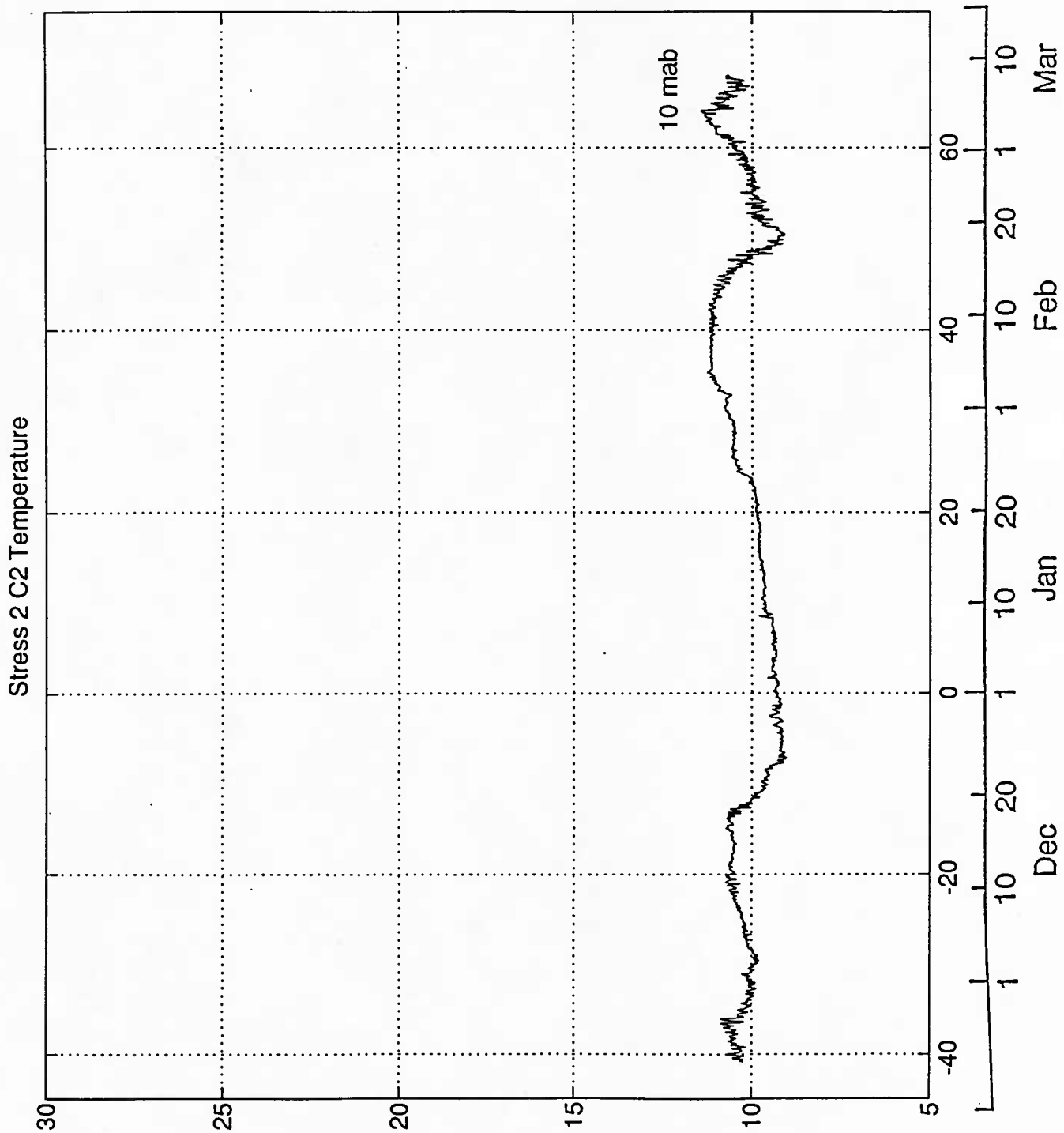


Figure 23. Stress 2 C2 Across-Shelf Velocity Profile (offset = 25 cm/s)

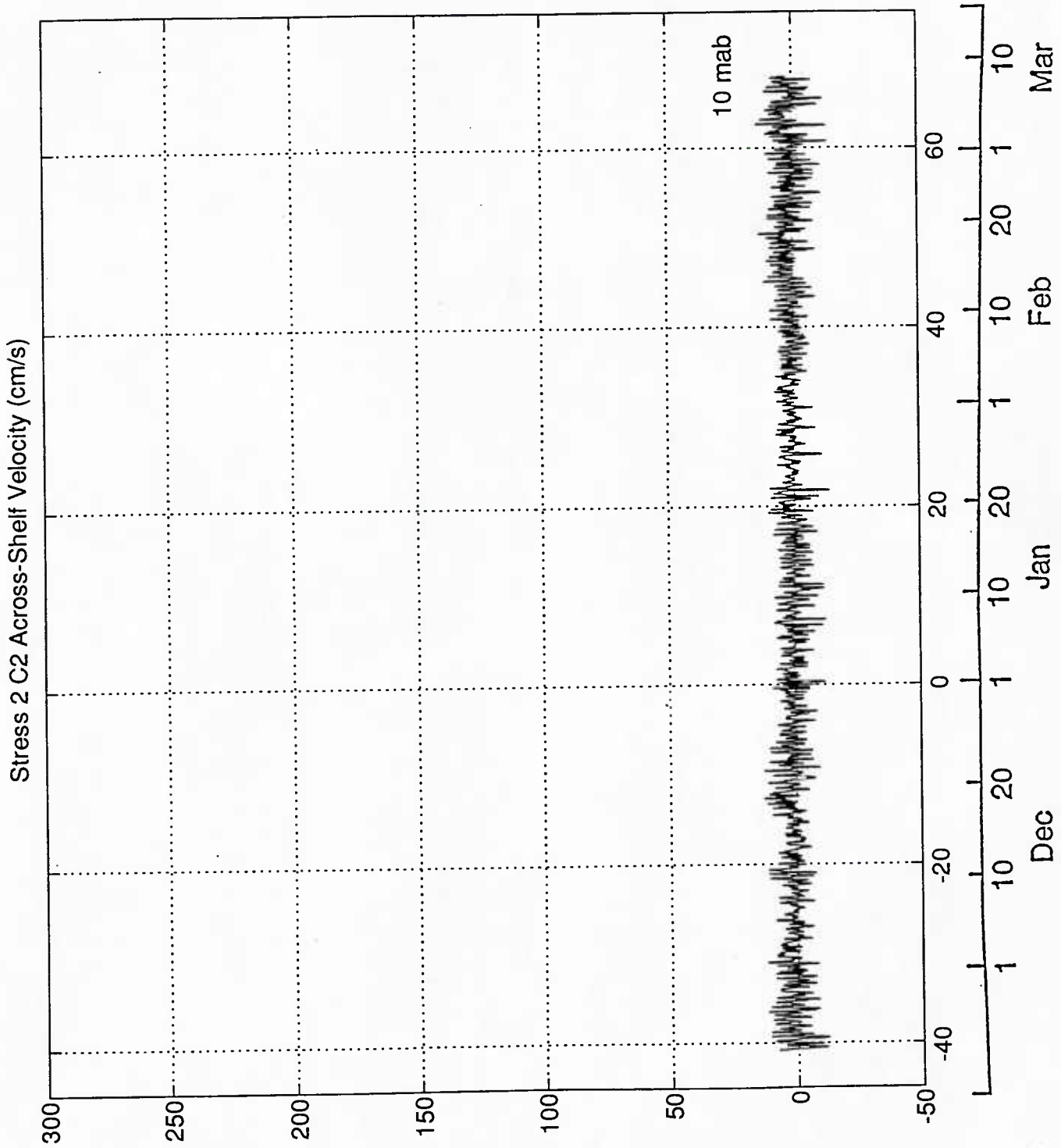


Figure 24. Stress 2 C2 Along-Shore Velocity Profile (offset = 25 cm/s)

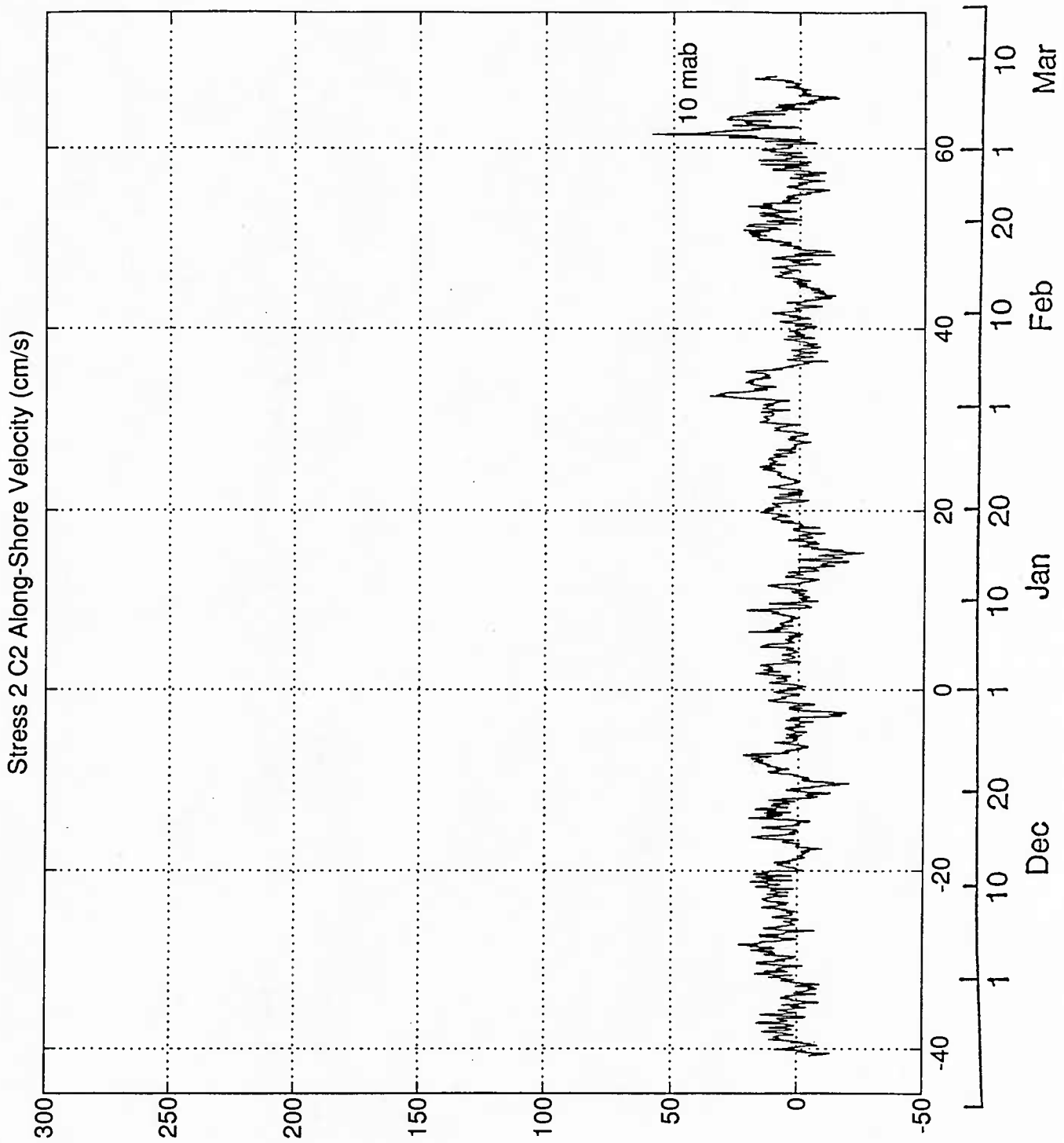


Figure 25. Stress 2 C2 Current Speed Profile (offset = 25 cm/s)

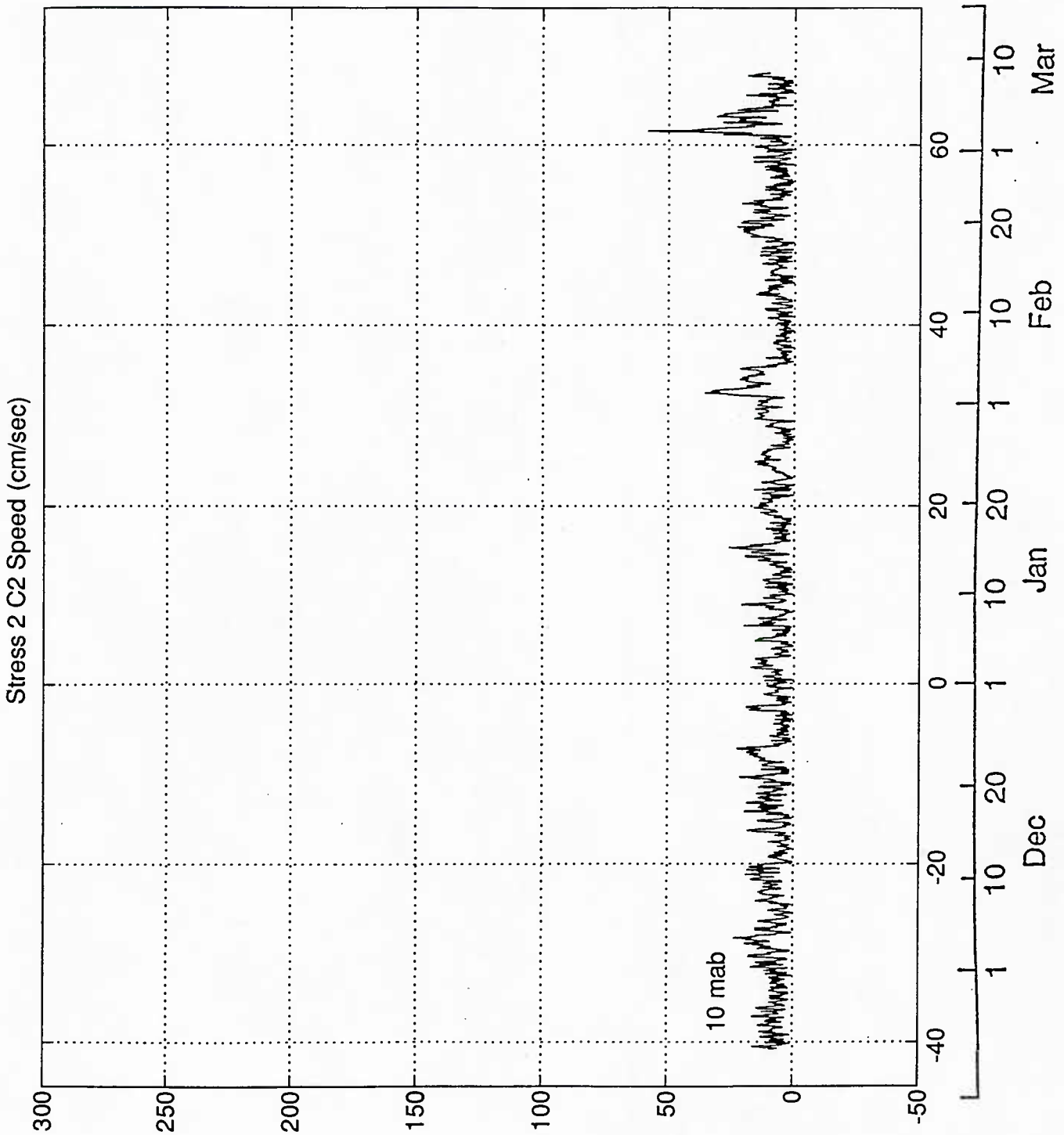
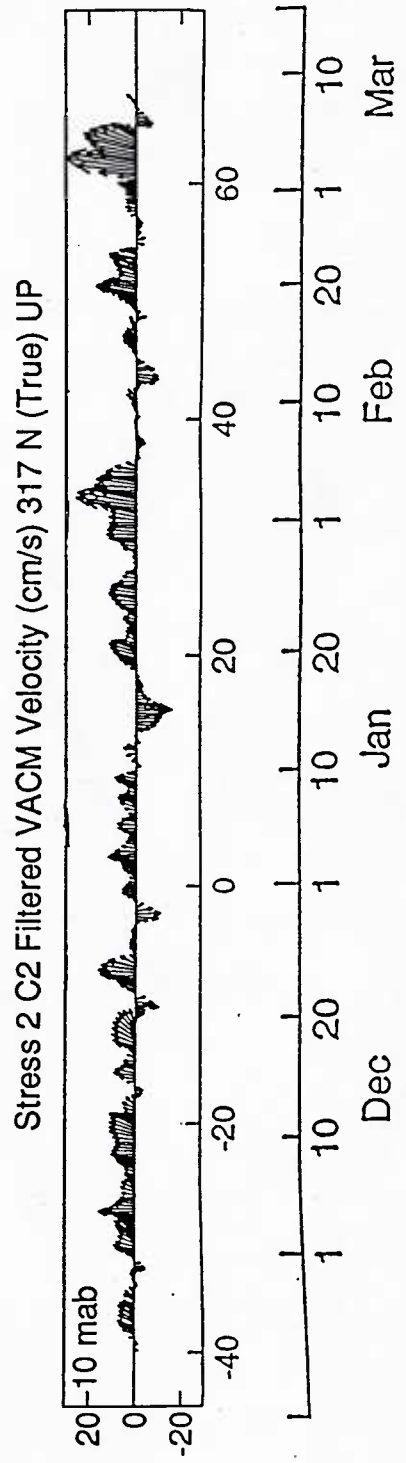


Figure 26. Stress 2 C2 VACM Velocity



STRESS 2 - SITE C3 (moored instruments)					
height (m)	mooring ID	instrument/ model	variable	start/stop times 1/1/91(noon) as 0.5	hours days
7	3639	Sea-Bird SBE-04	conductivity	11/20/90(21:00) - 1/14/91(19:00) -41.1250 - 13.7917	1319 54.9583
	3639	YSI 44032	temperature	11/20/90(21:00) - 3/09/91(22:00) -41.1250 - 67.9167	2618 109.0833
	3639	VACM 610	velocity	11/20/90(21:00) - 3/09/91(22:00) -41.1250 - 67.9167	2618 109.0833
	3639	SeaTech TR-2025	attenuation	11/20/90(21:00) - 1/14/91(19:00) -41.1250 - 13.7917	1319 54.9583
10	3638	Sea-Bird SBE-04	conductivity	11/20/90(23:00) - 3/09/91(22:00) -41.0417 - 67.9167	2616 109.0000
	3638	YSI 44032	temperature	11/20/90(23:00) - 3/09/91(22:00) -41.0417 - 67.9167	2616 109.0000
	3638	VACM 610	velocity	11/20/90(23:00) - 3/09/91(22:00) -41.0417 - 67.9167	2616 109.0000
	3638	SeaTech TR-2025	attenuation	11/21/90(0:00) - 3/09/91(22:00) -41.0000 - 67.9167	2615 108.9583
13	3637	Sea-Bird SBE-04	conductivity	11/20/90(21:00) - 3/09/91(22:00) -41.1250 - 67.9167	2618 109.0833
	3637	YSI 44032	temperature	11/20/90(21:00) - 3/09/91(22:00) -41.1250 - 67.9167	2618 109.0833
	3637	VACM 610	velocity	11/20/90(21:00) - 3/09/91(22:00) -41.1250 - 67.9167	2618 109.0833
	3637	SeaTech TR-2025	attenuation	11/20/90(21:00) - 3/09/91(22:00) -41.1250 - 67.9167	2618 109.0833
16	3636	SEACAT SBE-16/144	conductivity	11/20/90(21:00) - 3/09/91(22:00) -41.1250 - 67.9167	2618 109.0833
	3636	SEACAT SBE-16/144	temperature	11/20/90(21:00) - 3/09/91(22:00) -41.1250 - 67.9167	2618 109.0833
19	3635	Sea-Bird SBE-04	conductivity	11/20/90(21:00) - 3/09/91(22:00) -41.1250 - 67.9167	2618 109.0833
	3635	YSI 44032	temperature	11/20/90(21:00) - 3/09/91(22:00) -41.1250 - 67.9167	2618 109.0833
	3635	VACM 610	velocity	11/20/90(21:00) - 3/09/91(22:00) -41.1250 - 67.9167	2618 109.0833
	3635	SeaTech TR-2025	attenuation	11/20/90(21:00) - 3/09/91(22:00) -41.1250 - 67.9167	2618 109.0833

Table 8. STRESS 2: Instrumentation on C3 mooring (7 - 19m from bottom).

STRESS 2 - SITE C3 (moored instruments - continued)					
height (m)	mooring ID	instrument/ model	variable	start/stop times . 1/1/91(noon) as 0.5	hours days
22	3634	SEACAT SBE-16/143	conductivity	11/20/90(21:00) - 3/09/91(22:00) -41.1250 - 67.9167	2618 109.0833
	3634	SEACAT SBE-16/143	temperature	11/20/90(21:00) - 3/09/91(22:00) -41.1250 - 67.9167	2618 109.0833
25	3633	SEACAT SBE-16/142	conductivity	11/20/90(21:00) - 3/09/91(22:00) -41.1250 - 67.9167	2618 109.0833
	3633	SEACAT SBE-16/142	temperature	11/20/90(21:00) - 3/09/91(22:00) -41.1250 - 67.9167	2618 109.0833
28	3632	SEACAT SBE-16/141	conductivity	11/20/90(21:00) - 3/09/91(22:00) -41.1250 - 67.9167	2618 109.0833
	3632	SEACAT SBE-16/141	temperature	11/20/90(21:00) - 3/09/91(22:00) -41.1250 - 67.9167	2618 109.0833
31	3631	Sea-Bird SBE-04	conductivity	11/20/90(21:00) - 3/09/91(22:00) -41.1250 - 67.9167	2618 109.0833
	3631	YSI 44032	temperature	11/20/90(21:00) - 3/09/91(22:00) -41.1250 - 67.9167	2618 109.0833
	3631	VACM 610	velocity	11/20/90(21:00) - 3/09/91(22:00) -41.1250 - 67.9167	2618 109.0833
	3631	SeaTech25	attenuation	11/20/90(21:00) - 2/16/91(20:00) -41.1250 - 46.8333	2112 88.0000

Table 9. STRESS 2: Instrumentation on C3 mooring (from 22 to 31 m above bottom).

STRESS 2 - SITE C3 (tripod instruments)					
height (m)	tripod ID	instrument/ model	variable	start/stop times 1/1/91(noon) as 0.5	hours days
0.19	BS-III	YSI 44105	temperature	1/12/91(4:00) - 3/08/91(18:00) 11.1667 - 66.7500	1335 55.6250
0.39	BS-III	BASS	velocity	1/12/91(4:00) - 3/08/91(18:00) 11.1667 - 66.7500	1335 55.6250
0.74	BS-III	BASS	velocity	1/12/91(4:00) - 3/08/91(18:00) 11.1667 - 66.7500	1335 55.6250
1.08	BS-III	YSI 44105	temperature	1/12/91(4:00) - 3/08/91(18:00) 11.1667 - 66.7500	1335 55.6250
1.34	BS-III	BASS	velocity	1/12/91(4:00) - 3/08/91(18:00) 11.1667 - 66.7500	1335 55.6250
1.38	BS-III	SeaTech25 (10 cm pathlength)	attenuation	1/13/91(2:00) - 3/10/91(0:00) 12.0833 - 68.0000	1343 55.9583
1.73	MTR	YSI 2008/44105	temperature	11/20/90(21:00) - 12/31/90(23:00) -41.1250 - -0.0417	987 41.1250
1.75	BS-III	YSI 44105	temperature	1/12/91(4:00) - 3/08/91(18:00) 11.1667 - 66.7500	1335 55.6250
1.94	BS-III	BASS	velocity	1/12/91(4:00) - 3/08/91(18:00) 11.1667 - 66.7500	1335 55.6250
2.54	BS-III	BASS	velocity	1/12/91(4:00) - 3/08/91(18:00) 11.1667 - 66.7500	1335 55.6250
2.62	BS-III	YSI 44105	temperature	1/12/91(4:00) - 3/08/91(18:00) 11.1667 - 66.7500	1335 55.6250
3.42	BS-III	SeaTech25 (15 cm pathlength)	attenuation	1/13/91(2:00) - 3/10/91(0:00) 12.0833 - 68.0000	1343 55.9583
3.76	BS-III	YSI 44105	temperature	1/12/91(4:00) - 3/08/91(18:00) 11.1667 - 66.7500	1335 55.6250
4.00	BS-III	PS-8200 #9129	pressure	1/12/91(4:00) - 3/08/91(18:00) 11.1667 - 66.7500	1365 56.8750
4.48	BS-III	YSI 44105	temperature	1/12/91(4:00) - 3/08/91(18:00) 11.1667 - 66.7500	1335 55.6250
4.94	BS-III	BASS	velocity	1/12/91(4:00) - 3/08/91(18:00) 11.1667 - 66.7500	1335 55.6250
5.14	BS-III	YSI 44105	temperature	1/12/91(4:00) - 3/08/91(18:00) 11.1667 - 66.7500	1335 55.6250
5.83	BS-III	YSI 44105	temperature	1/12/91(4:00) - 3/08/91(18:00) 11.1667 - 66.7500	1335 55.6250

Table 10. STRESS 2: Instruemntation on C3 BASS tripod.

Figure 27. Stress 2 C3 Salinity Profile (offset = 0.5 practical salinity units)

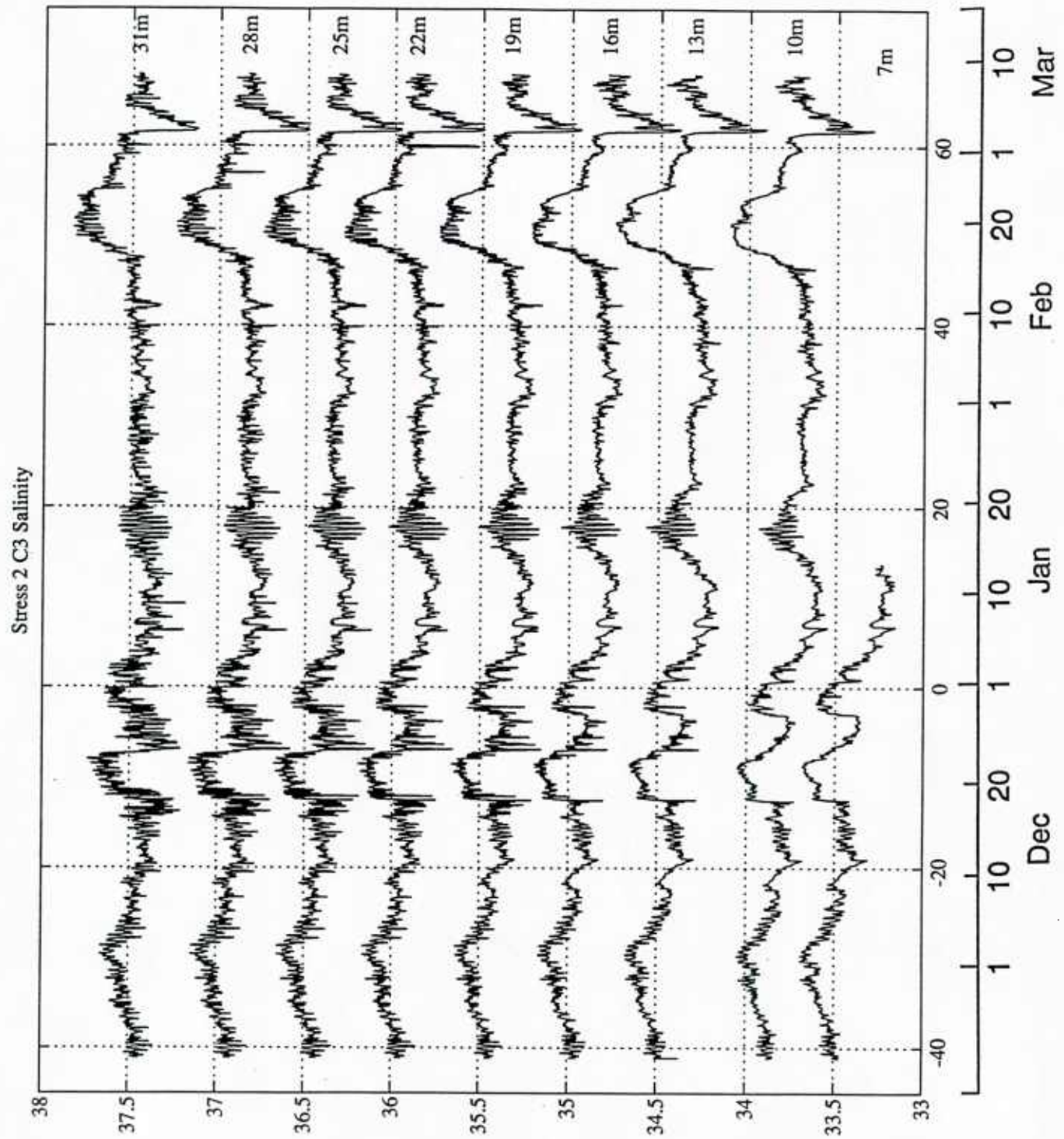


Figure 28. Stress 2 C3 Temperature Profile (offset = 1.0 degrees Centigrade)

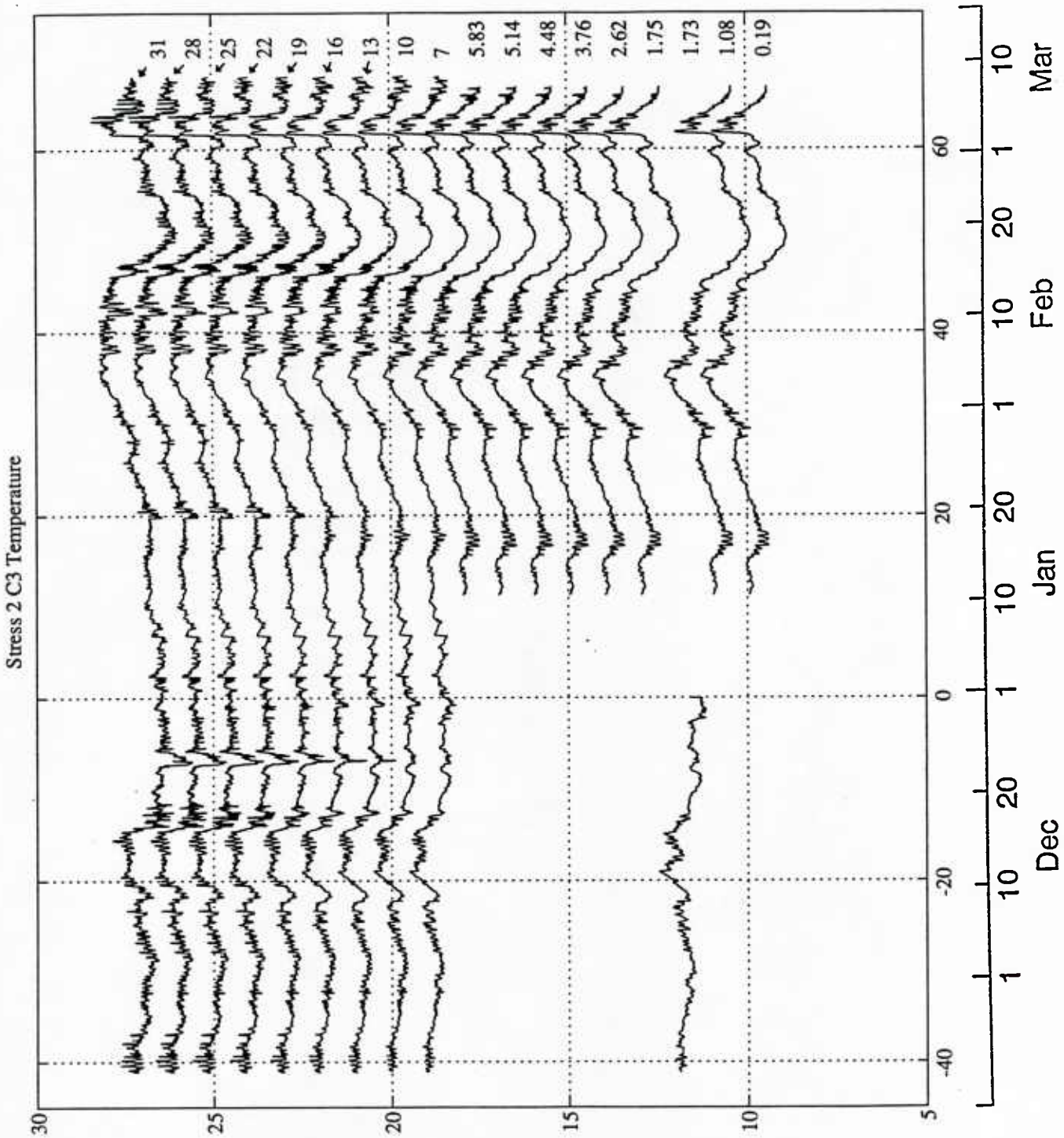


Figure 29. Stress 2 C3 Across-Shelf Velocity Profile (offset = 25 cm/s)

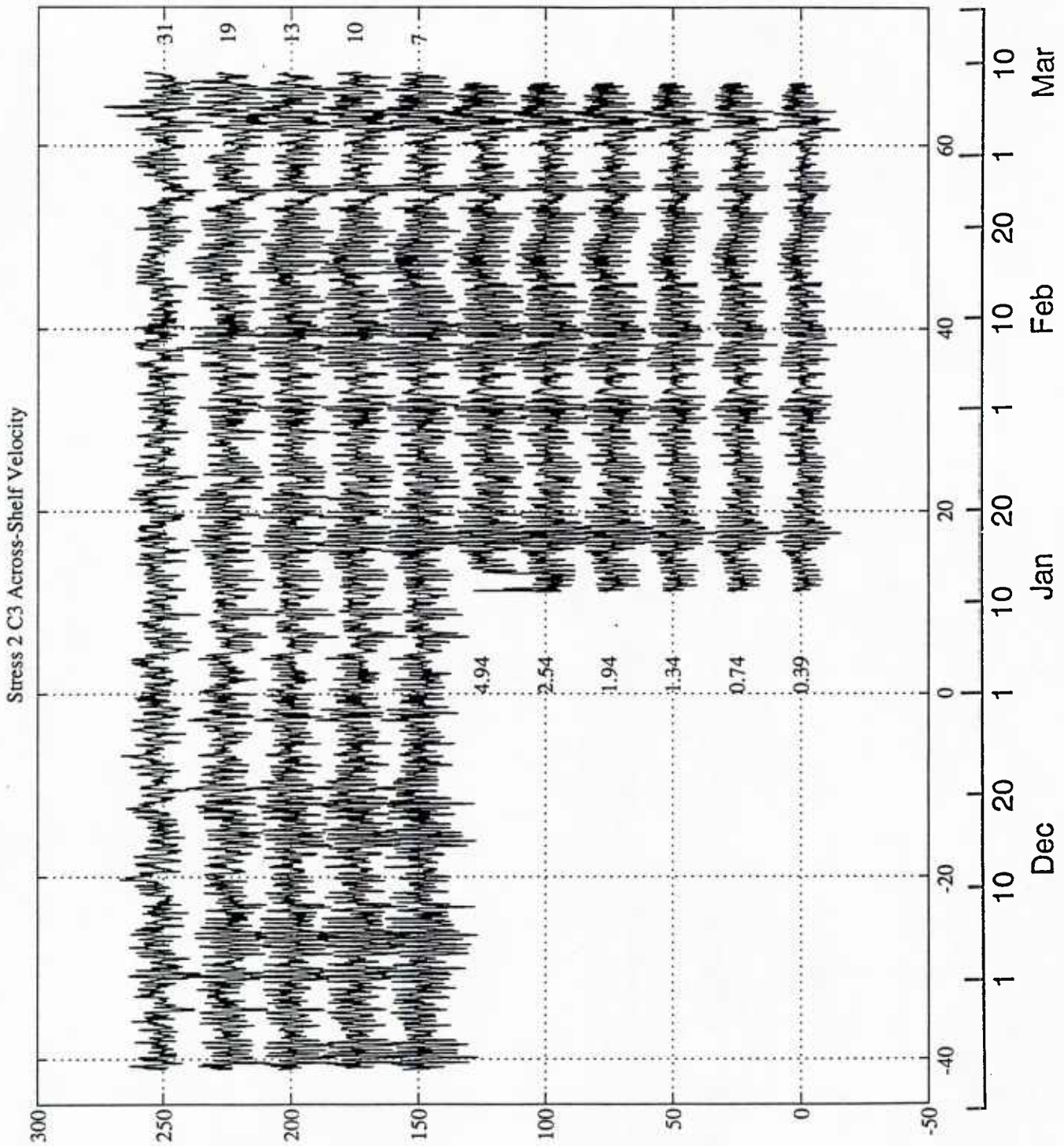


Figure 30. Stress 2 C3 Along-Shore Velocity Profile (offset = 25 cm/s)

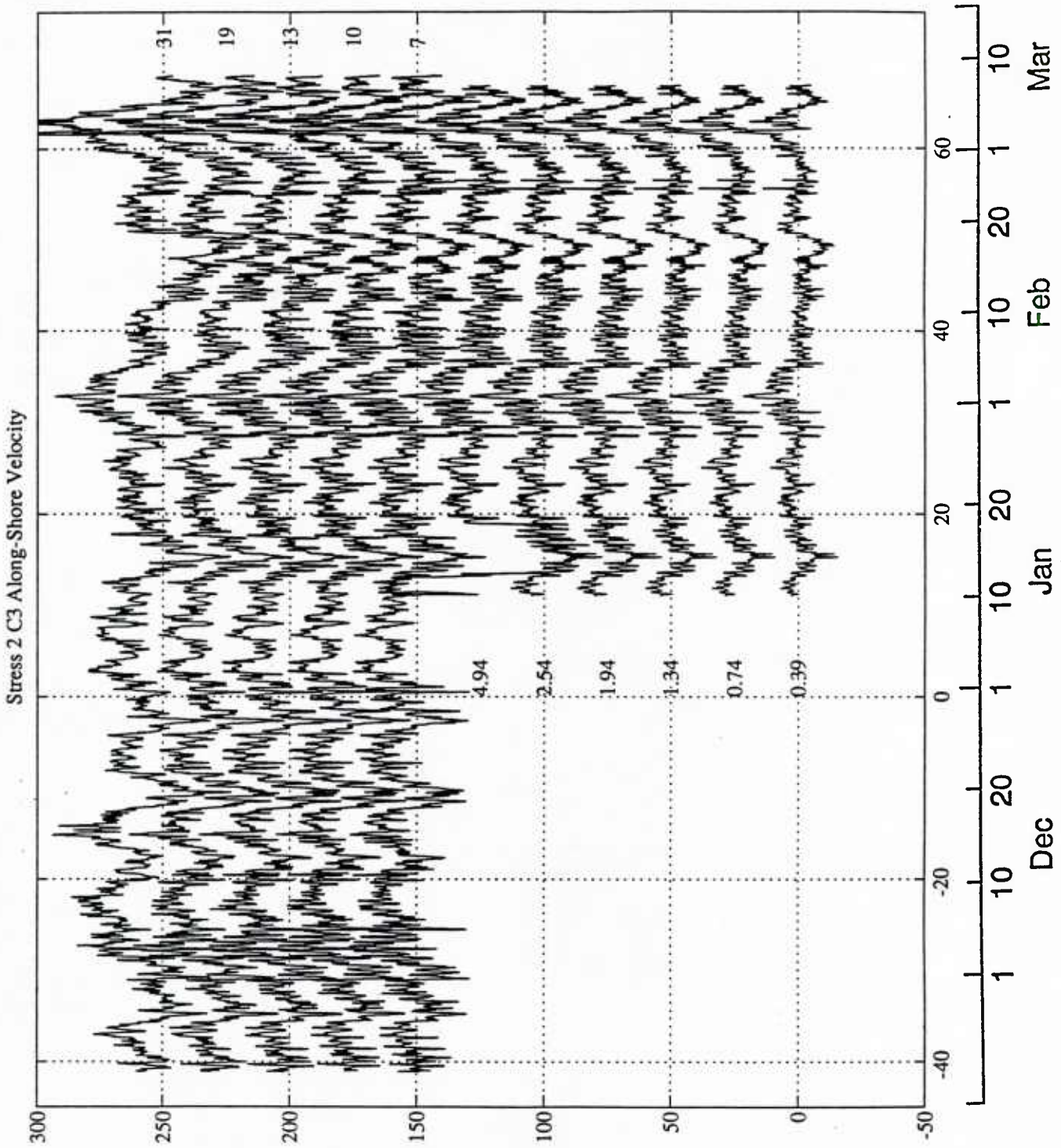


Figure 31. Stress 2 C3 Current Speed Profile (offset = 25 cm/s)

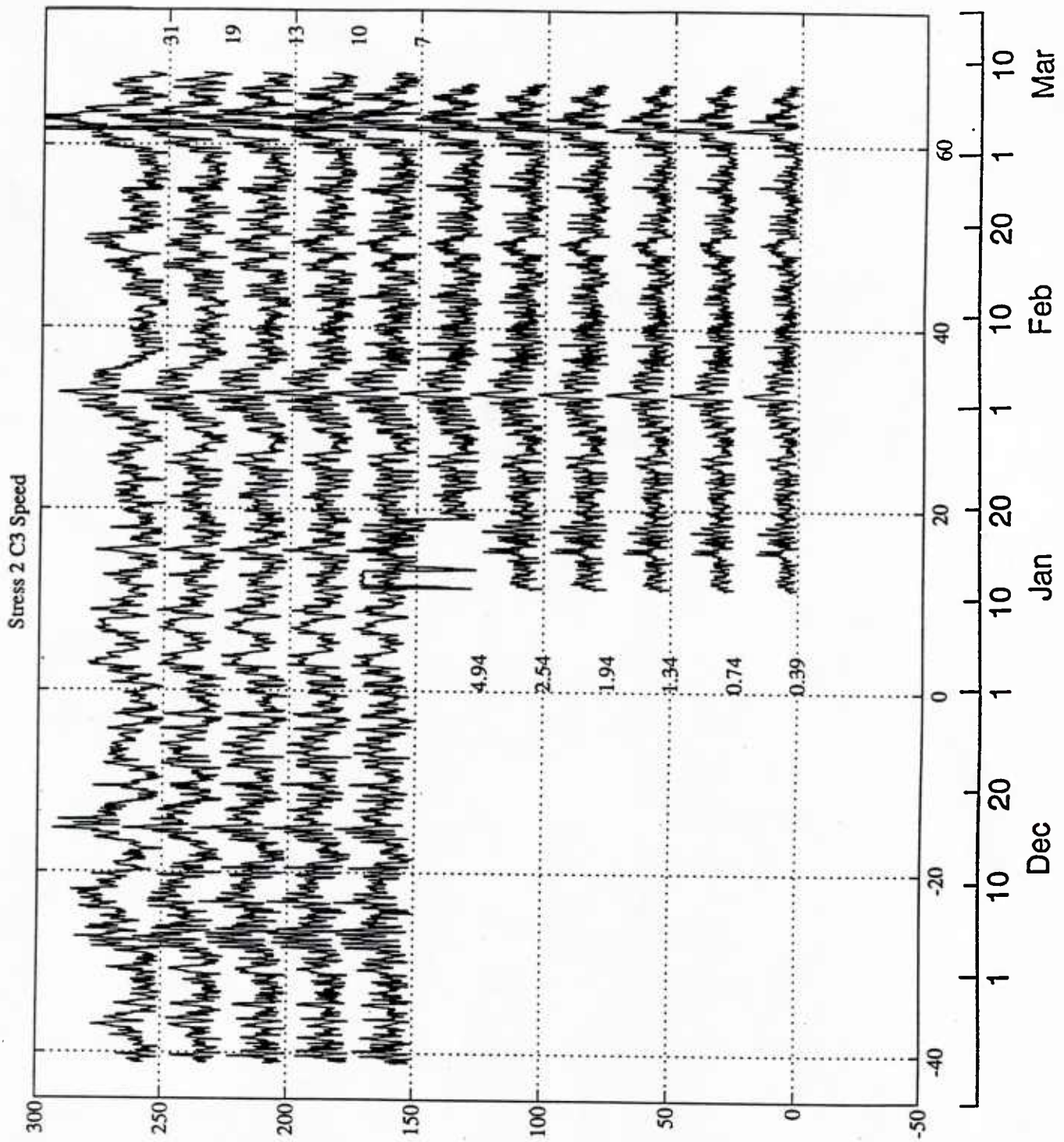


Figure 32. Stress 2 C3 VACM Velocity

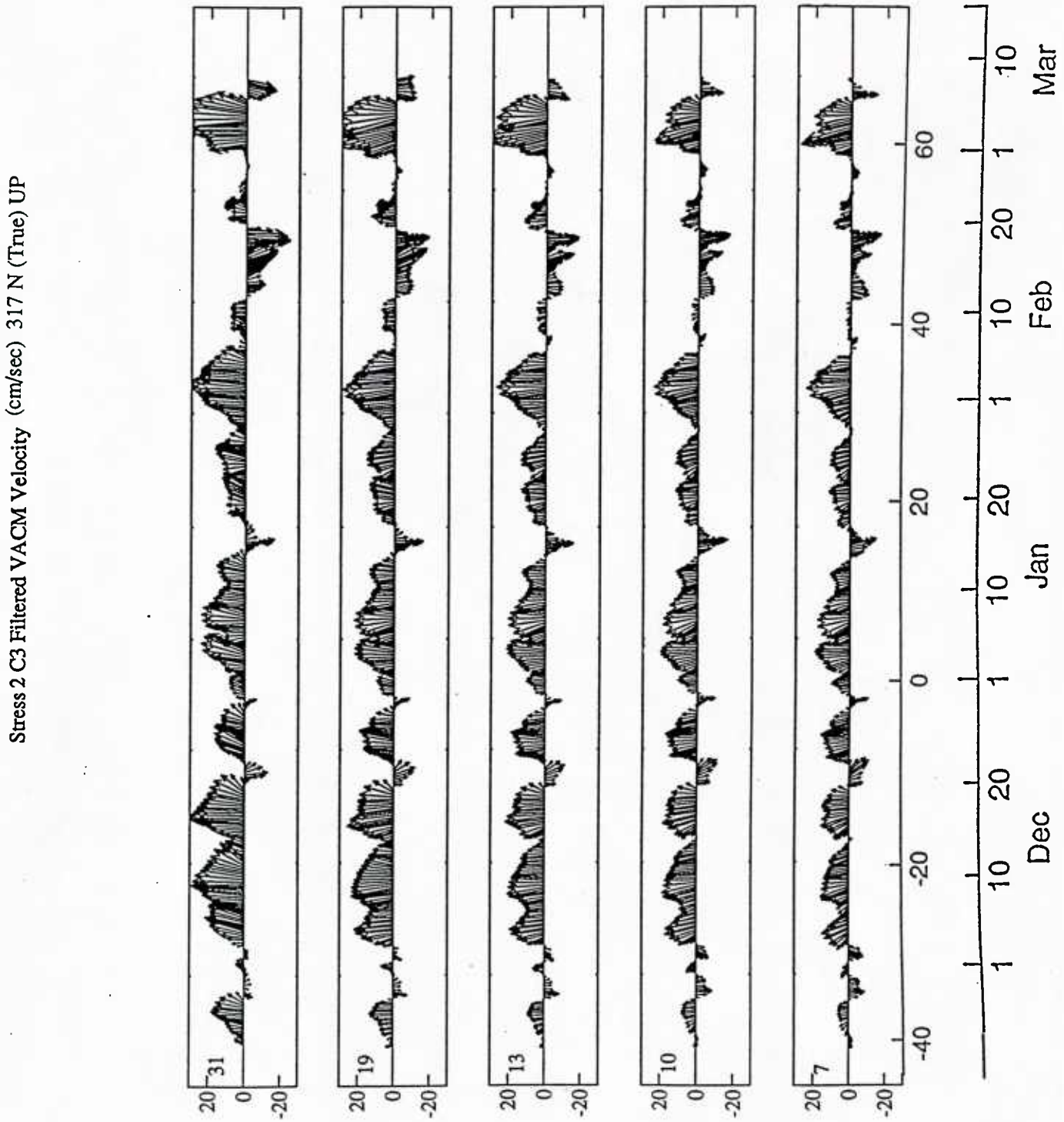


Figure 33. Stress 2 C3 BASS Velocity

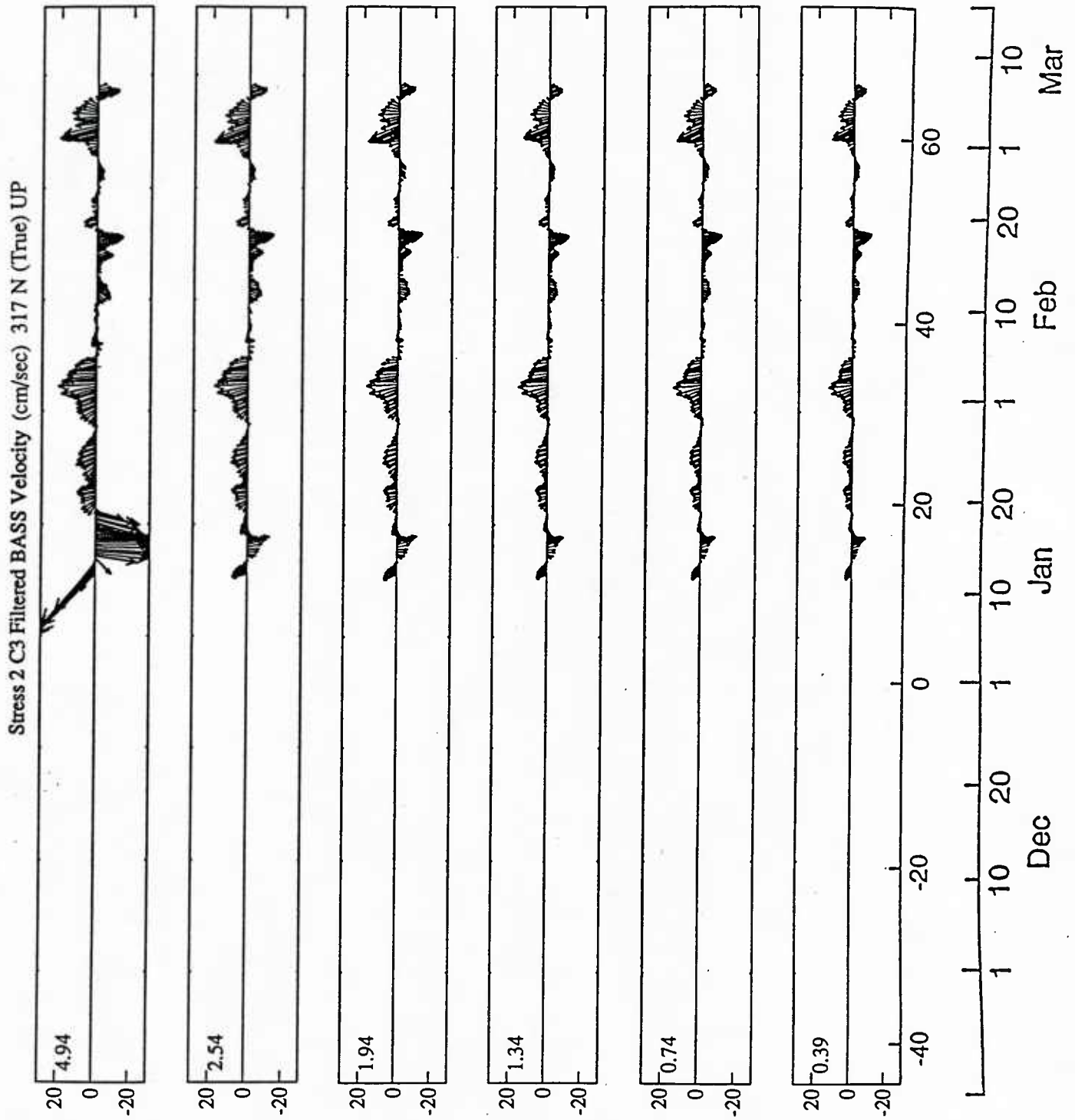


Figure 34. Stress 2 C3 Moored Attenuation Profile (offset = 5.0 l/m)

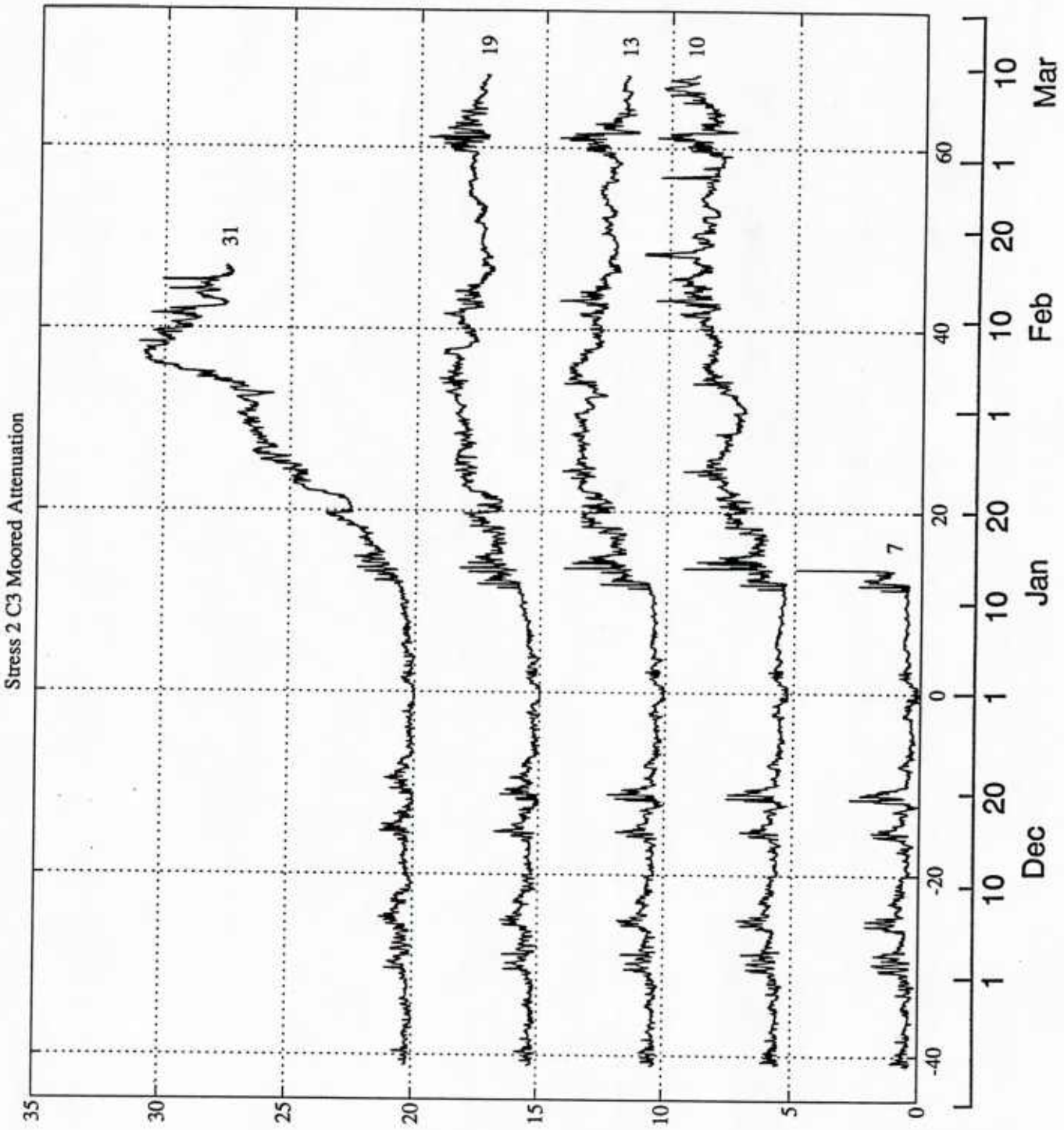


Figure 35. Stress 2 C3 Tripod Attenuation Profile (offset = 5.0 l/m)

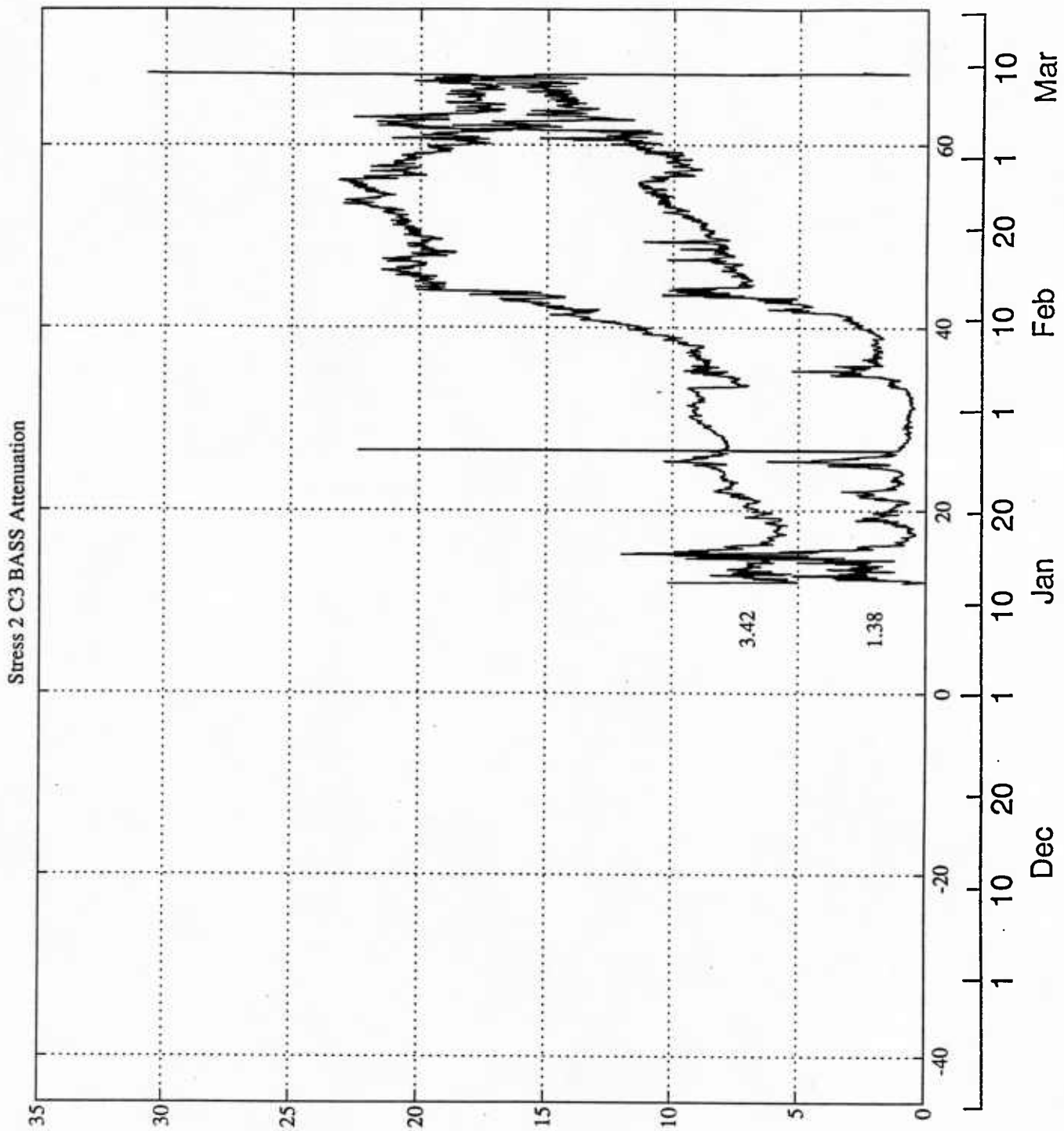


Figure 36. Stress 2 C3 Wave Mean Period Profile (seconds)

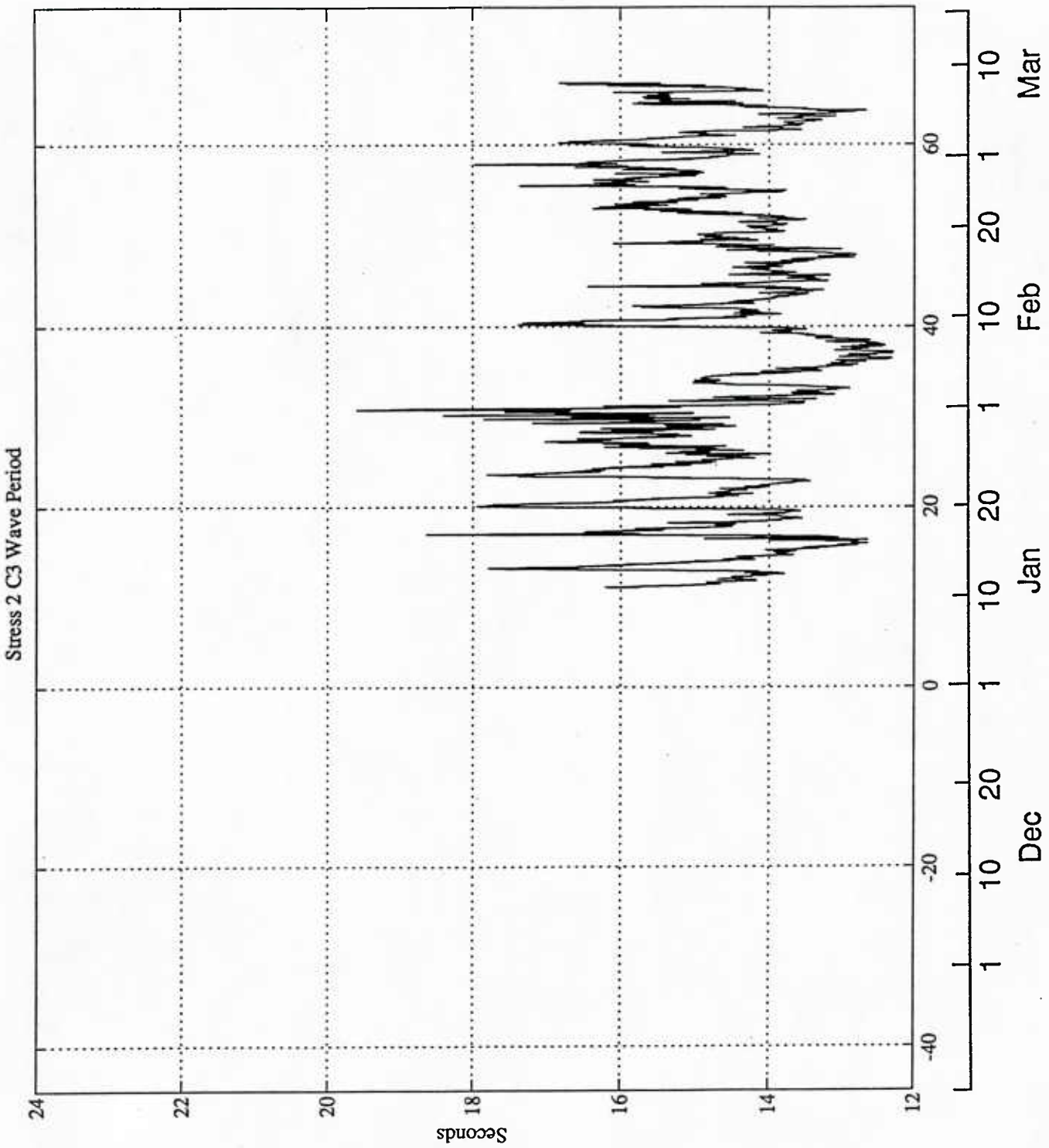
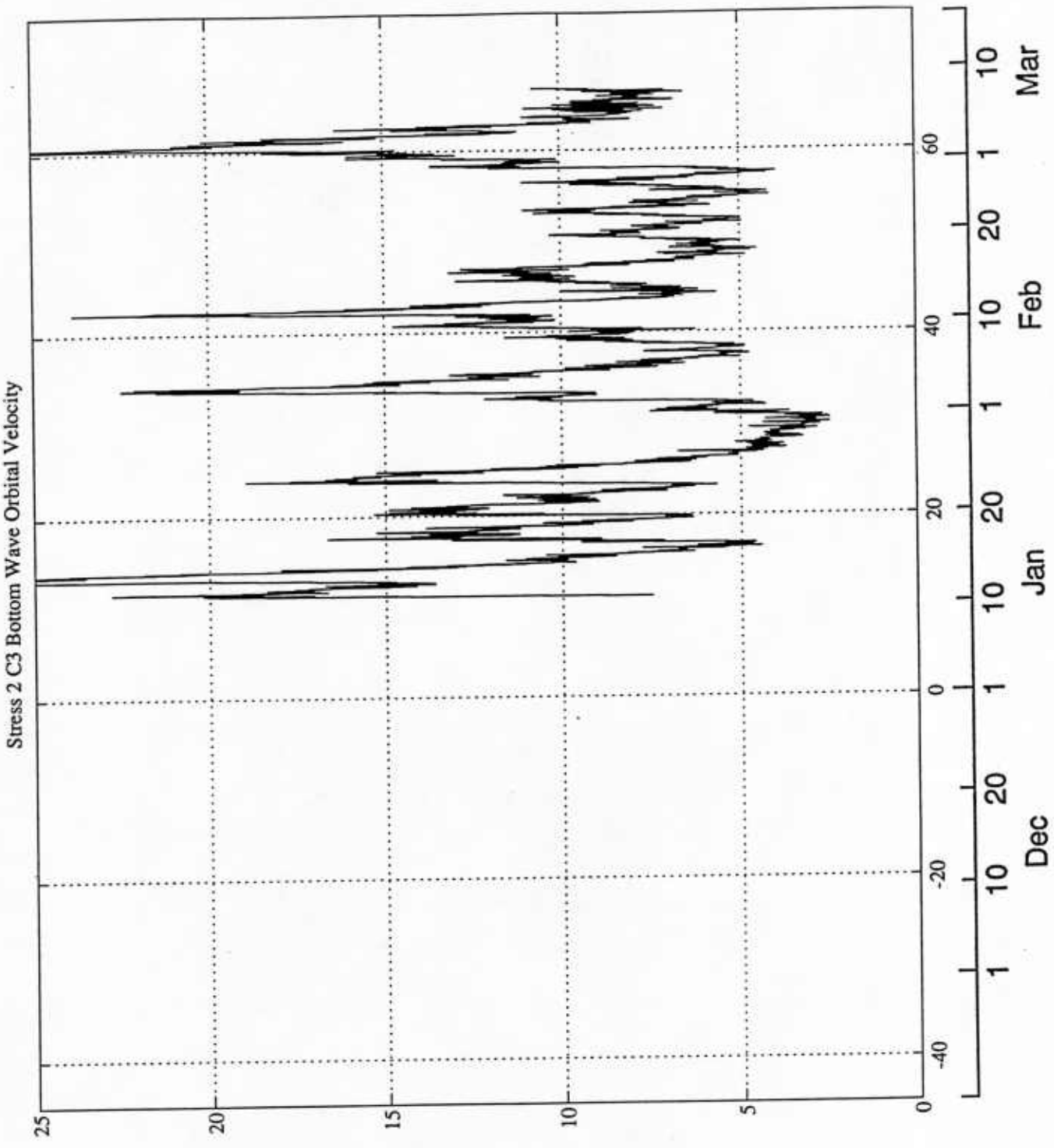


Figure 37. Stress 2 C3 Wave Orbital Velocity Profile (cm/s)



STRESS 2 - SITE C4 (moored instruments)					
height (m)	mooring id 1D	instrument/ model	variable	start/stop times 1/1/91(noon) as 0.5	hours days
7	36410	SEACAT SBE-16/146	conductivity	11/20/90(21:00) - 3/08/91(22:00) -41.1250 - 66.9167	2594 108.0833
	36410	SEACAT SBE-16/146	temperature	11/21/90(1:00) - 3/08/91(20:00) -40.9583 - 66.8333	2588 107.8333
10	3649	YSI 44032	temperature	11/21/90(0:00) - 3/09/91(23:00) -41.0000 - 67.9583	2616 109.0000
	3649	VACM 610	velocity	11/21/90(0:00) - 3/09/91(23:00) -41.0000 - 67.9583	2616 109.0000
13	3648	MTR/YSI 2021/46006	temperature	11/21/90(2:00) - 1/01/91(0:00) -40.9167 - 0.0000	983 40.9583
19	3646	Sea-Bird SBE-04	conductivity	11/21/90(1:00) - 3/09/91(23:00) -40.9583 - 67.9583	2615 108.9583
	3646	YSI 44032	temperature	11/21/90(1:00) - 3/09/91(23:00) -40.9583 - 67.9583	2615 108.9583
	3646	VACM 610	velocity	11/21/90(1:00) - 3/09/91(23:00) -40.9583 - 67.9583	2615 108.9583
	3646	SeaTech TR-2025	attenuation	11/21/90(1:00) - 3/09/91(23:00) -40.9583 - 67.9583	2615 108.9583
23	3645	MTR/YSI 2017/46006	temperature	11/21/90(2:00) - 1/01/91(0:00) -40.9167 - 0.0000	983 40.9583
27	3644	MTR/YSI 2007/46006	temperature	11/21/90(2:00) - 1/01/91(0:00) -40.9167 - 0.0000	983 40.9583
41	3643	MTR/YSI 2023/46006	temperature	11/21/90(2:00) - 1/01/91(0:00) -40.9167 - 0.0000	983 40.9583
56	3642	MTR/YSI 2022/46006	temperature	11/21/90(2:00) - 1/01/91(0:00) -40.9167 - 0.0000	983 40.9583
71	3641	Sea-Bird SBE-04	conductivity	11/21/90(2:00) - 3/09/91(23:00) -40.9167 - 67.9583	2614 108.9167
	3641	YSI 44032	temperature	11/21/90(2:00) - 3/09/91(23:00) -40.9167 - 67.9583	2614 108.9167
	3641	VACM 610	velocity	11/21/90(2:00) - 3/09/91(23:00) -40.9167 - 67.9583	2614 108.9167
	3641	SeaTech TR-2025	attenuation	11/21/90(2:00) - 3/09/91(23:00) -40.9167 - 67.9583	2614 108.9167

Table 11. STRESS 2: Instrumentation on C4 mooring.

STRESS 2 - SITE C4 (tripod instruments)					
height (m)	tripod id ID	instrument/ model	variable	start/stop times 1/1/91(noon) as 0.5	hours days
0.15	BS-IV	YSI 44105	temperature	1/09/91(20:00) - 3/11/91(23:00) 8.8333 - 69.9583	1468 61.1667
0.38	BS-IV	BASS 44105	velocity	1/09/91(3:00) - 3/12/91(6:00) 8.1250 - 70.2500	1492 62.1667
0.73	BS-IV	BASS	velocity	1/09/91(3:00) - 3/12/91(6:00) 8.1250 - 70.2500	1492 62.1667
1.01	BS-IV	YSI	temperature	bad	0
1.33	BS-IV	BASS	velocity	1/09/91(3:00) - 3/12/91(6:00) 8.1250 - 70.2500	1492 62.1667
1.37	BS-IV	SeaTech25 (5cm pathlength)	attenuation	1/09/91(20:00) - 3/12/91(6:00) 8.8333 - 70.2500	1475 61.4583
1.93	BS-IV	BASS	velocity	1/09/91(3:00) - 3/12/91(6:00) 8.1250 - 70.2500	1492 62.1667
	BS-IV	YSI	temperature	bad	0
2.53	BS-IV	BASS	velocity	1/09/91(3:00) - 3/12/91(6:00) 8.1250 - 70.2500	1492 62.1667
2.93	BS-IV	YSI 44105	temperature	1/09/91(20:00) - 3/11/91(23:00) 8.8333 - 69.9583	1468 61.1667
3.38	BS-IV	SeaTech25 (5cm pathlength)	attenuation	1/09/91(20:00) - 3/12/91(6:00) 8.8333 - 70.2500	1475 61.4583
3.77	BS-IV	YSI 44105	temperature	1/09/91(20:00) - 3/11/91(23:00) 8.8333 - 69.9583	1468 61.1667
4.00	BS-IV	PS-8200 #13032	pressure	1/09/91(4:00) - 3/13/91(17:00) 8.1667 - 71.7083	1526 63.5833
4.53	BS-IV	YSI 44105	temperature	1/09/91(20:00) - 3/11/91(23:00) 8.8333 - 69.9583	1468 61.1667
4.93	BS-IV	BASS	velocity	1/09/91(3:00) - 3/12/91(6:00) 8.1250 - 70.2500	1492 62.1667
5.18	BS-IV	YSI 44105	temperature	1/09/91(20:00) - 3/11/91(23:00) 8.8333 - 69.9583	1468 61.1667
5.96	BS-IV	YSI 44105	temperature	1/09/91(20:00) - 3/11/91(23:00) 8.8333 - 69.9583	1468 61.1667

Table 12. STRESS 2: Instrumentation on C4 BASS tripod.

Figure 38. Stress 2 C4 Salinity Profile (offset = 0.5 practical salinity units)

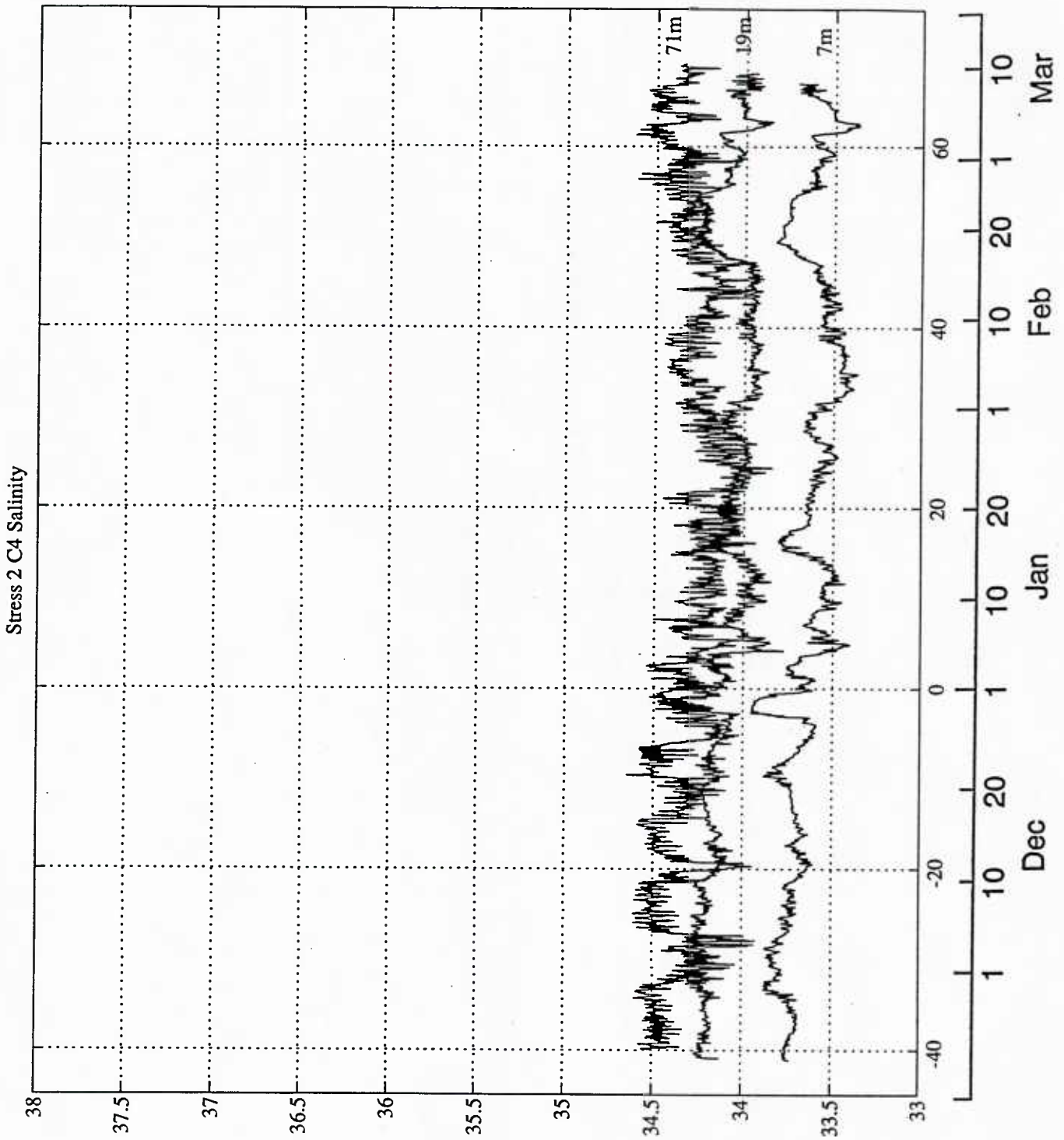


Figure 39. Stress 2 C4 Temperature Profile (offset = 1.0 degrees Centigrade)

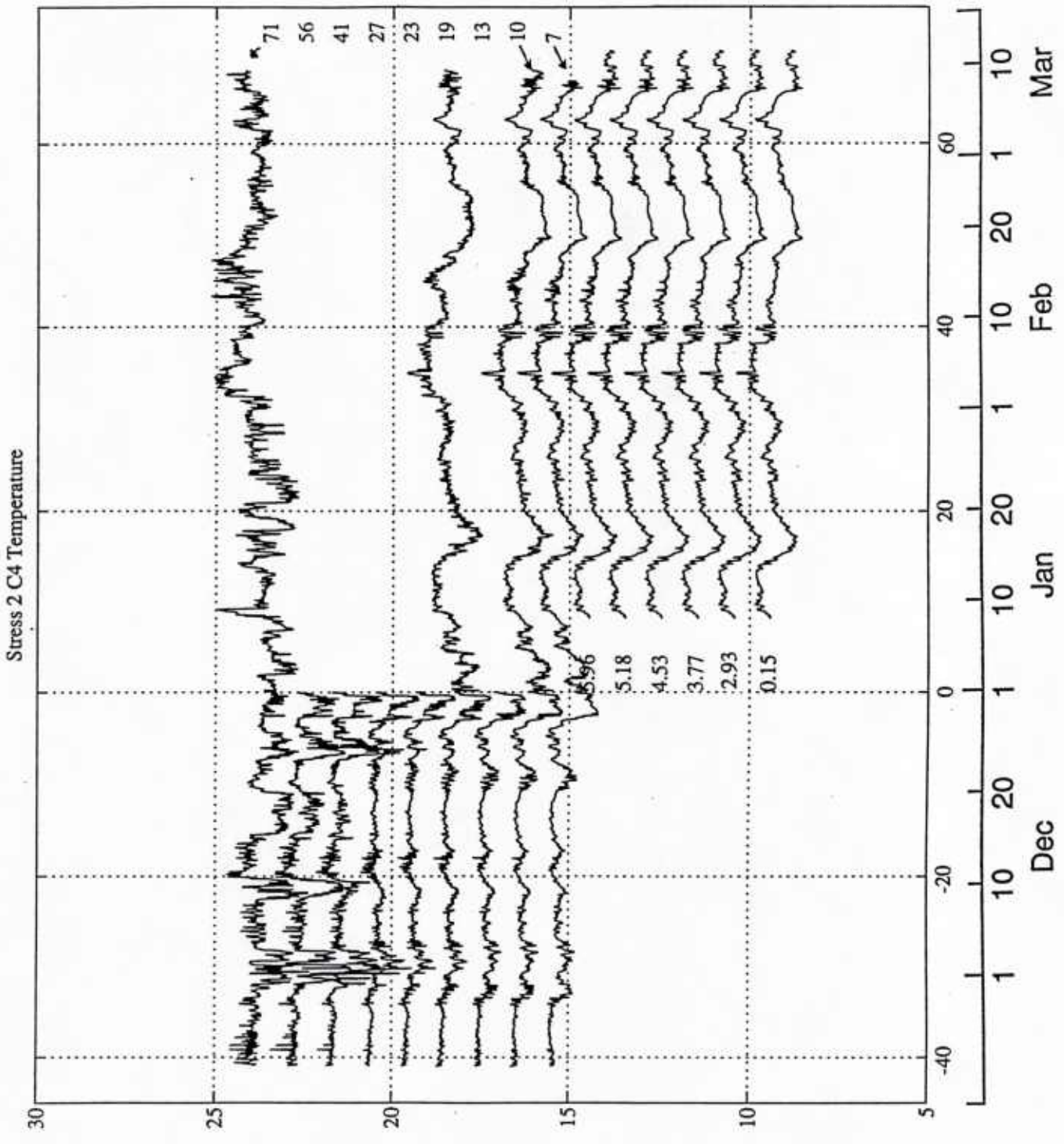


Figure 40. Stress 2 C4 Across-Shelf Velocity Profile (offset = 25 cm/s)

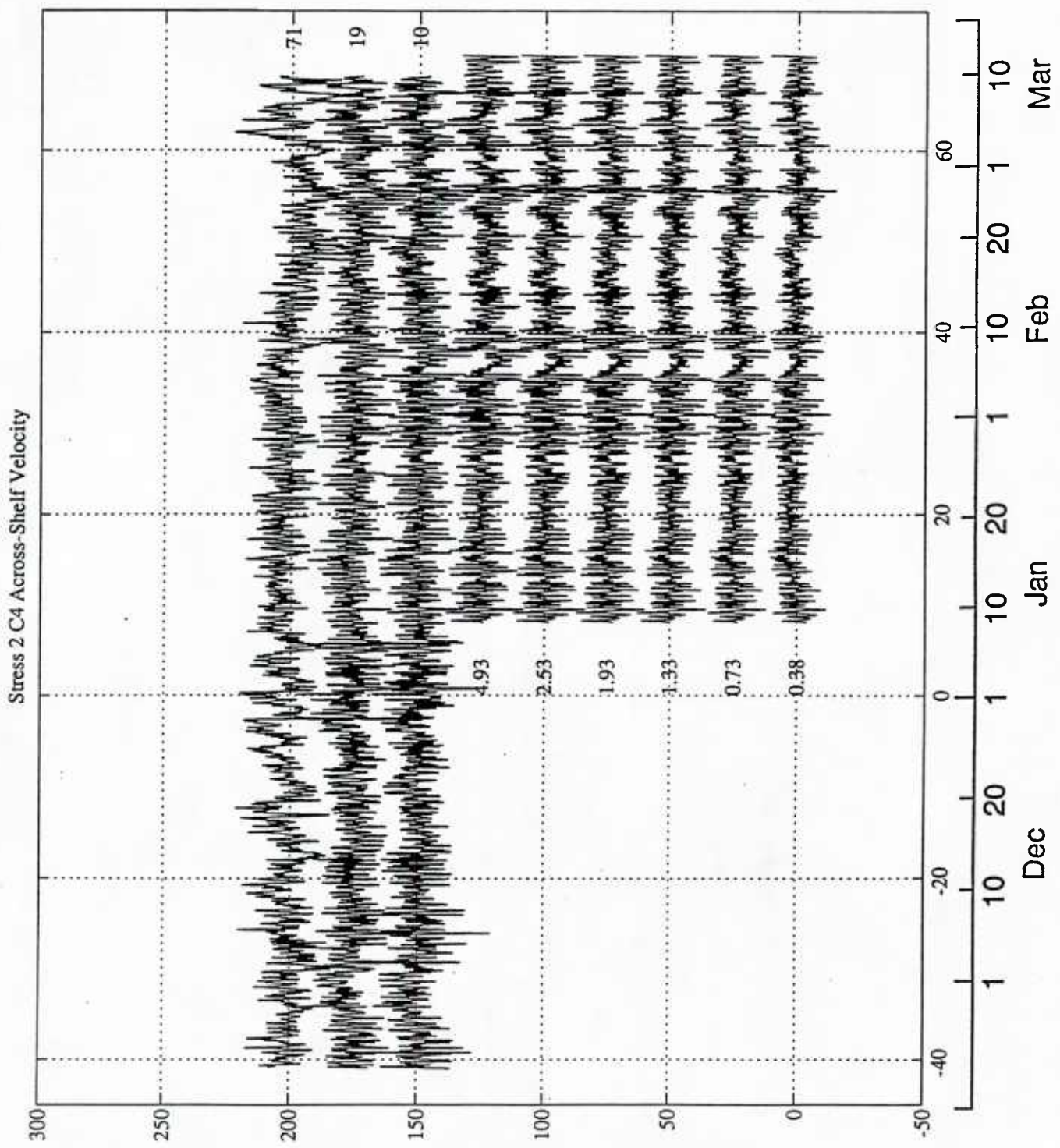


Figure 41. Stress 2 C4 Along-Shore Velocity Profile (offset = 25 cm/s)

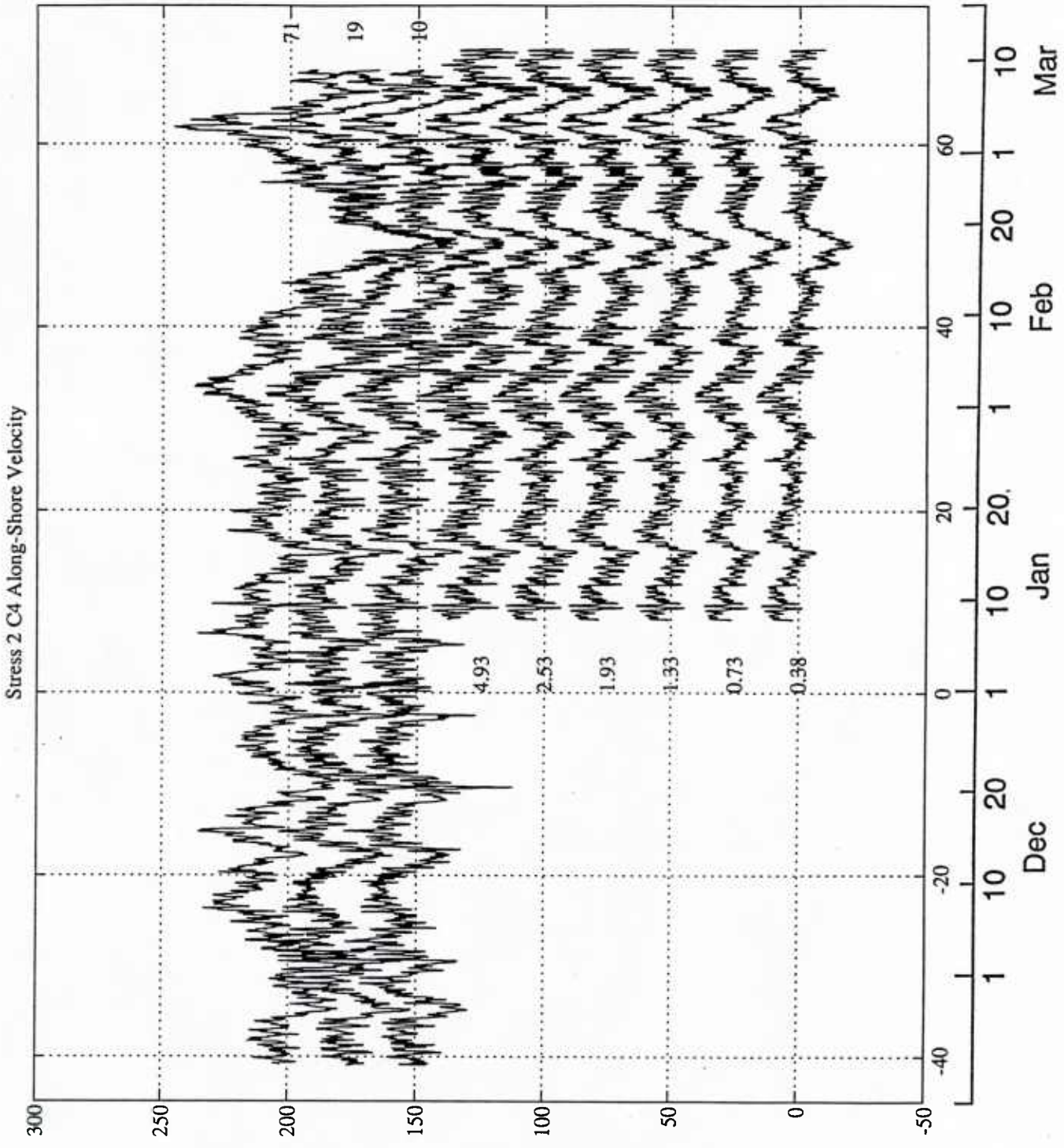


Figure 42. Stress 2 C4 Current Speed Profile (offset = 25 cm/s)

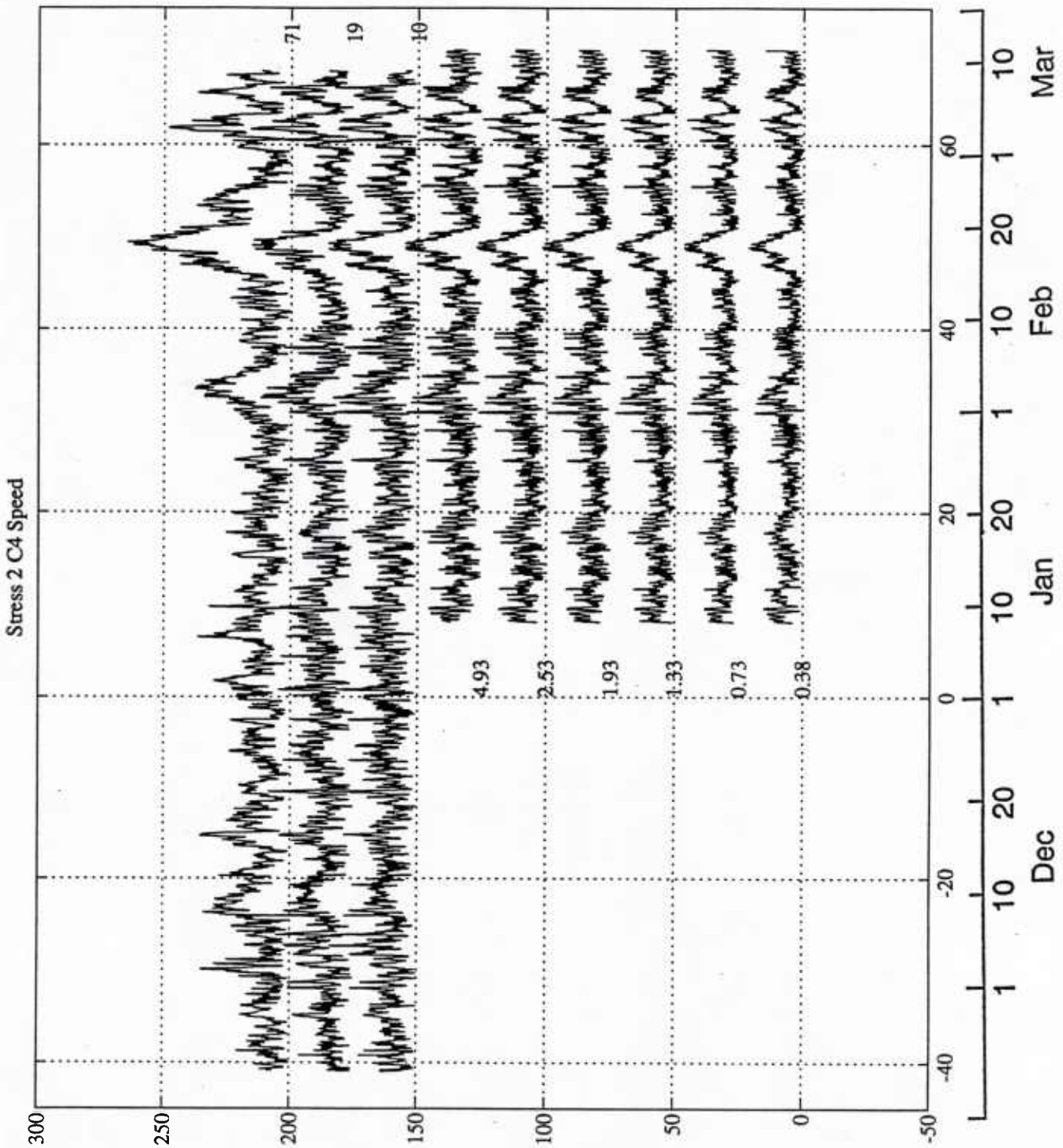


Figure 43. Stress 2 C4 VACM Velocity

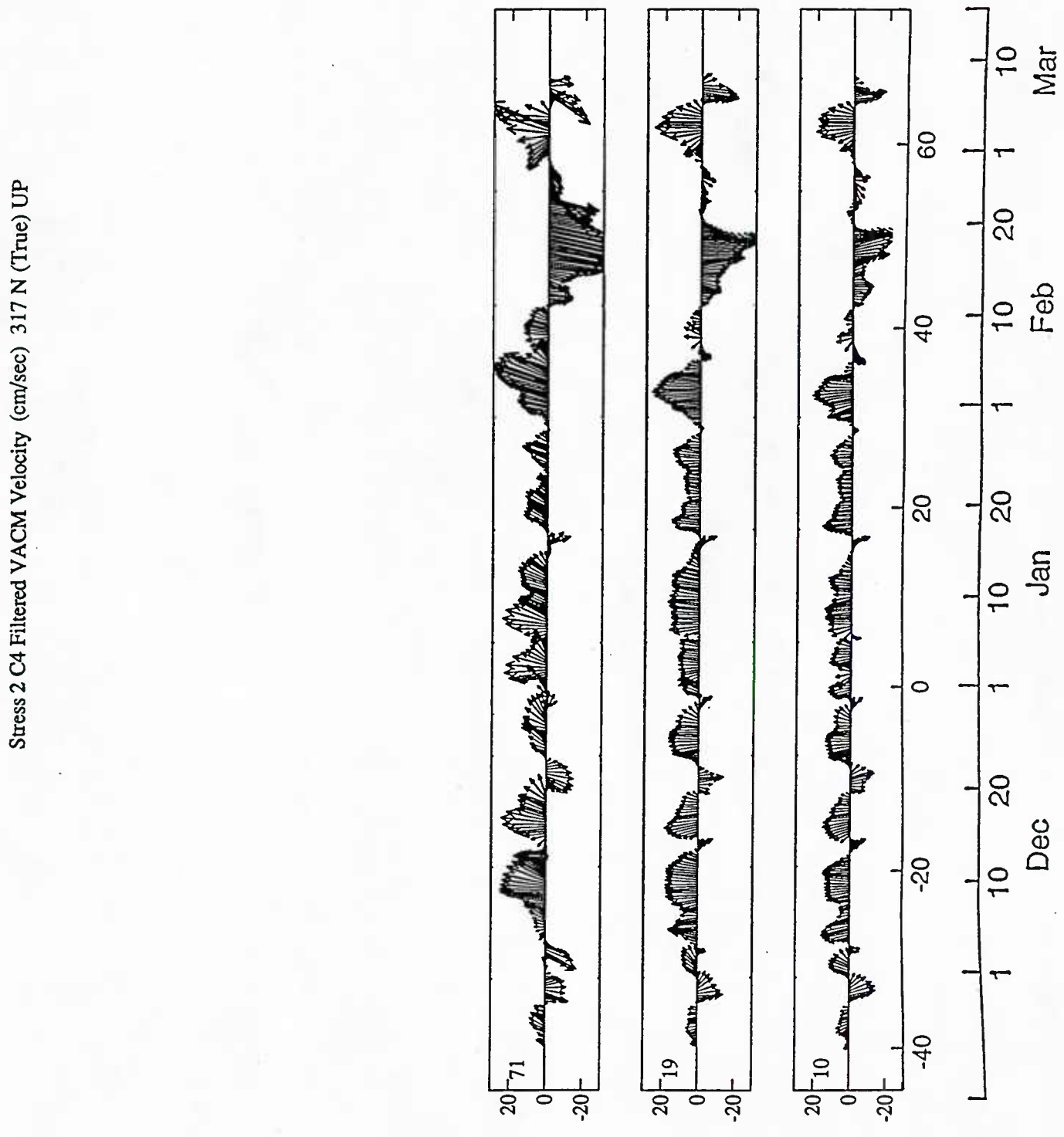


Figure 44. Stress 2 C4 BASS Velocity

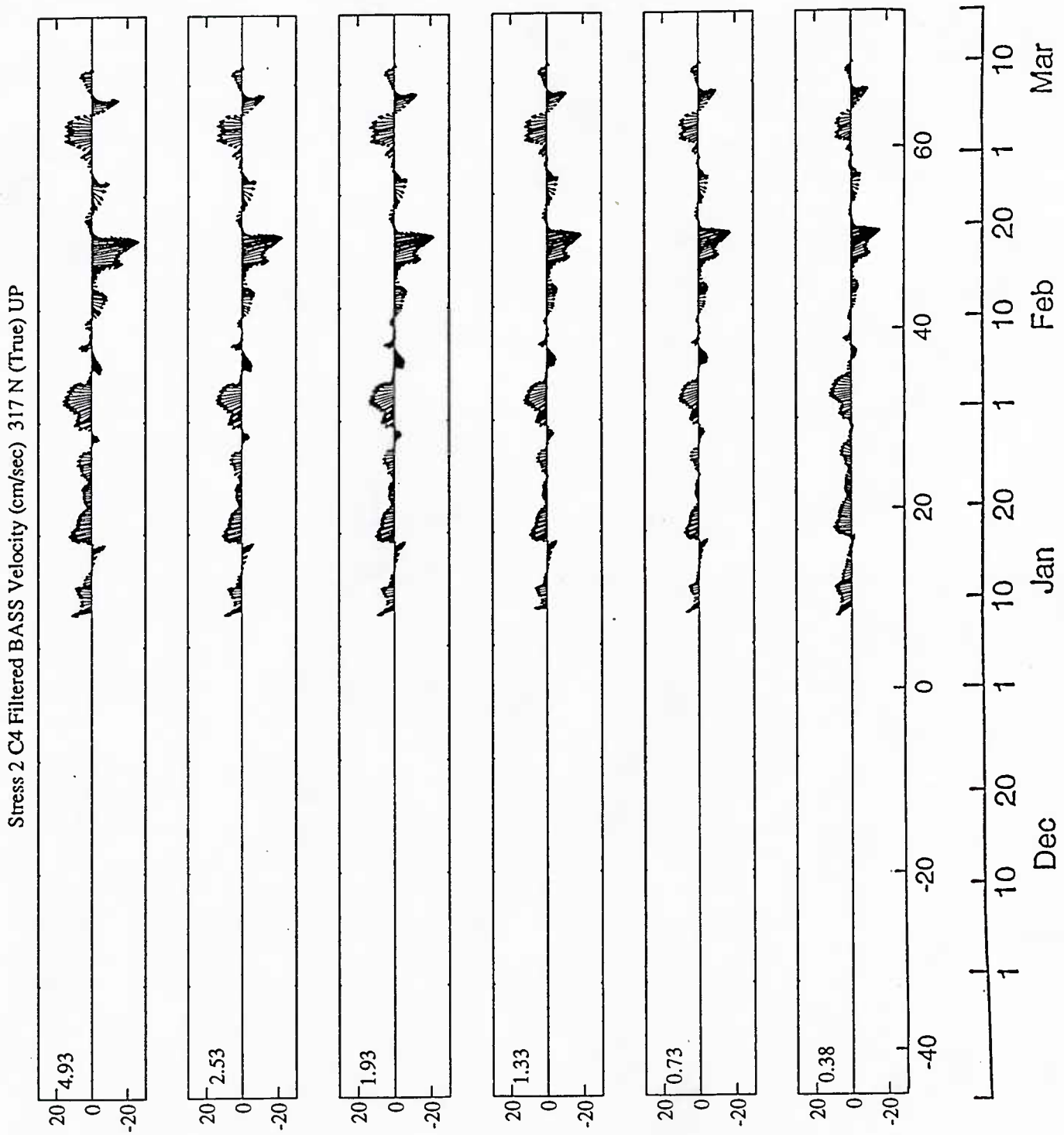


Figure 45. Stress 2 C4 Moored Attenuation Profile (offset = 15.0 l/m)

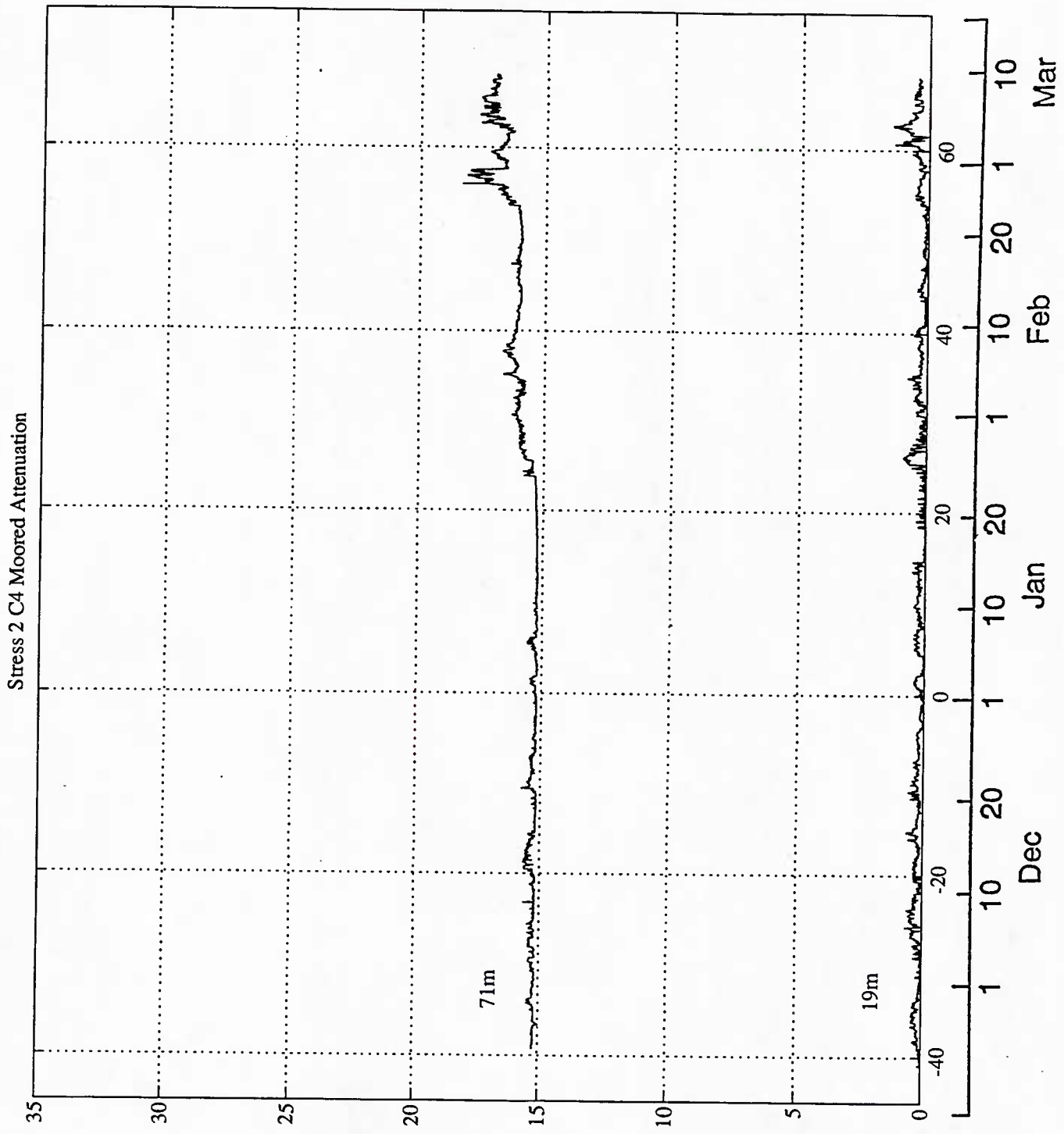


Figure 46. Stress 2 C4 Tripod Attenuation Profile (offset = 5.0 l/m)

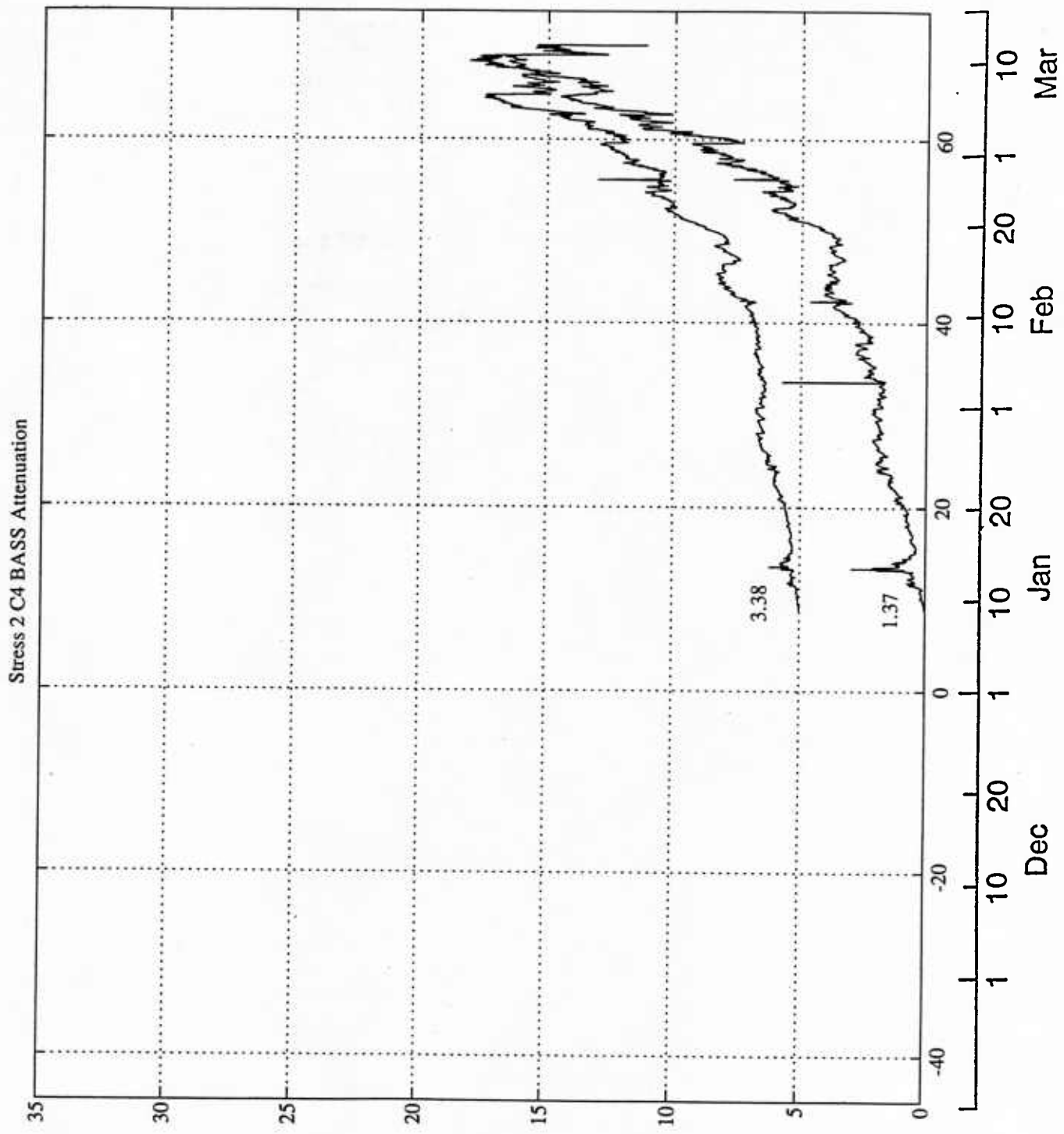


Figure 47. Stress 2 C4 Wave Mean Period Profile (seconds)

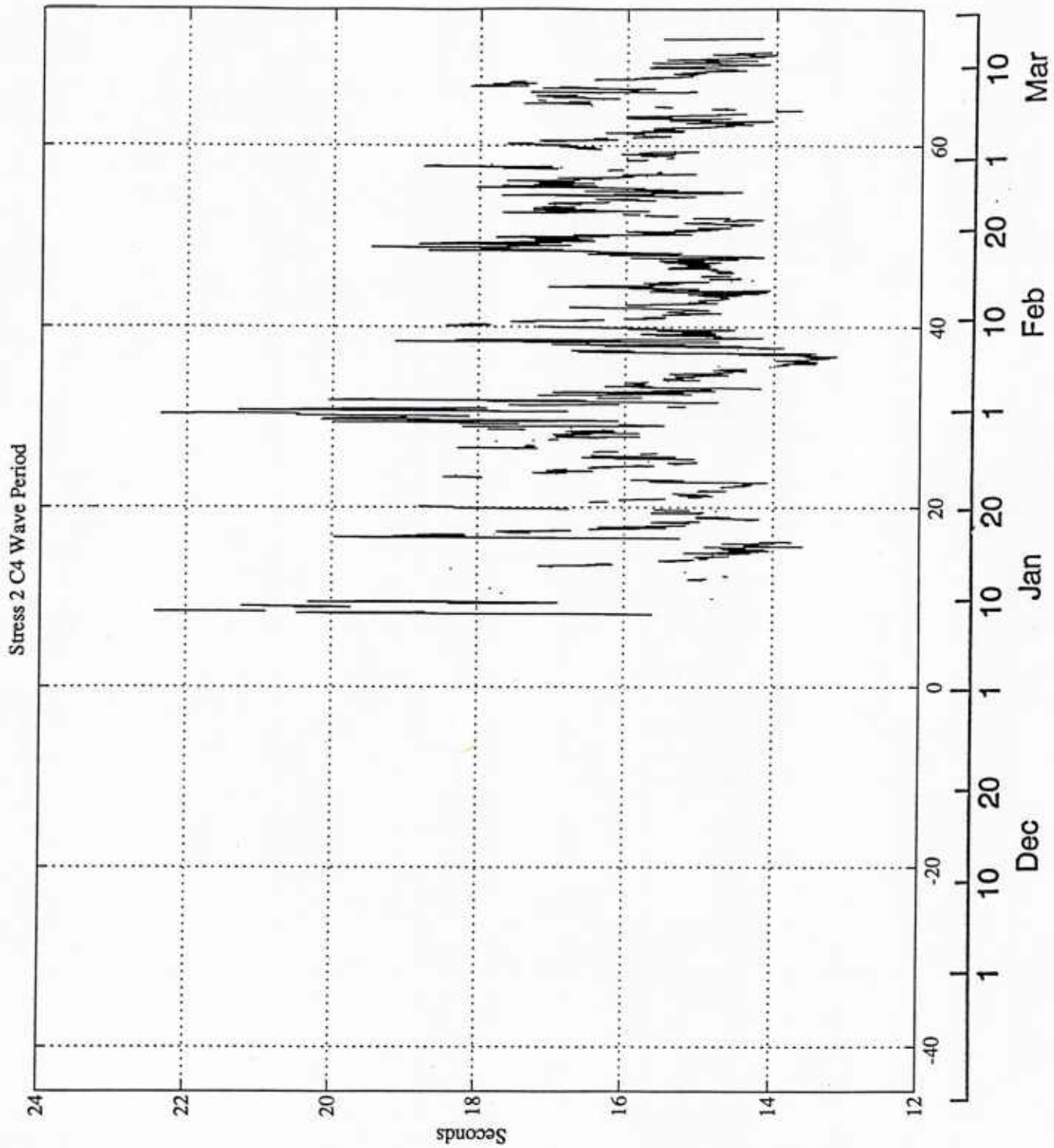
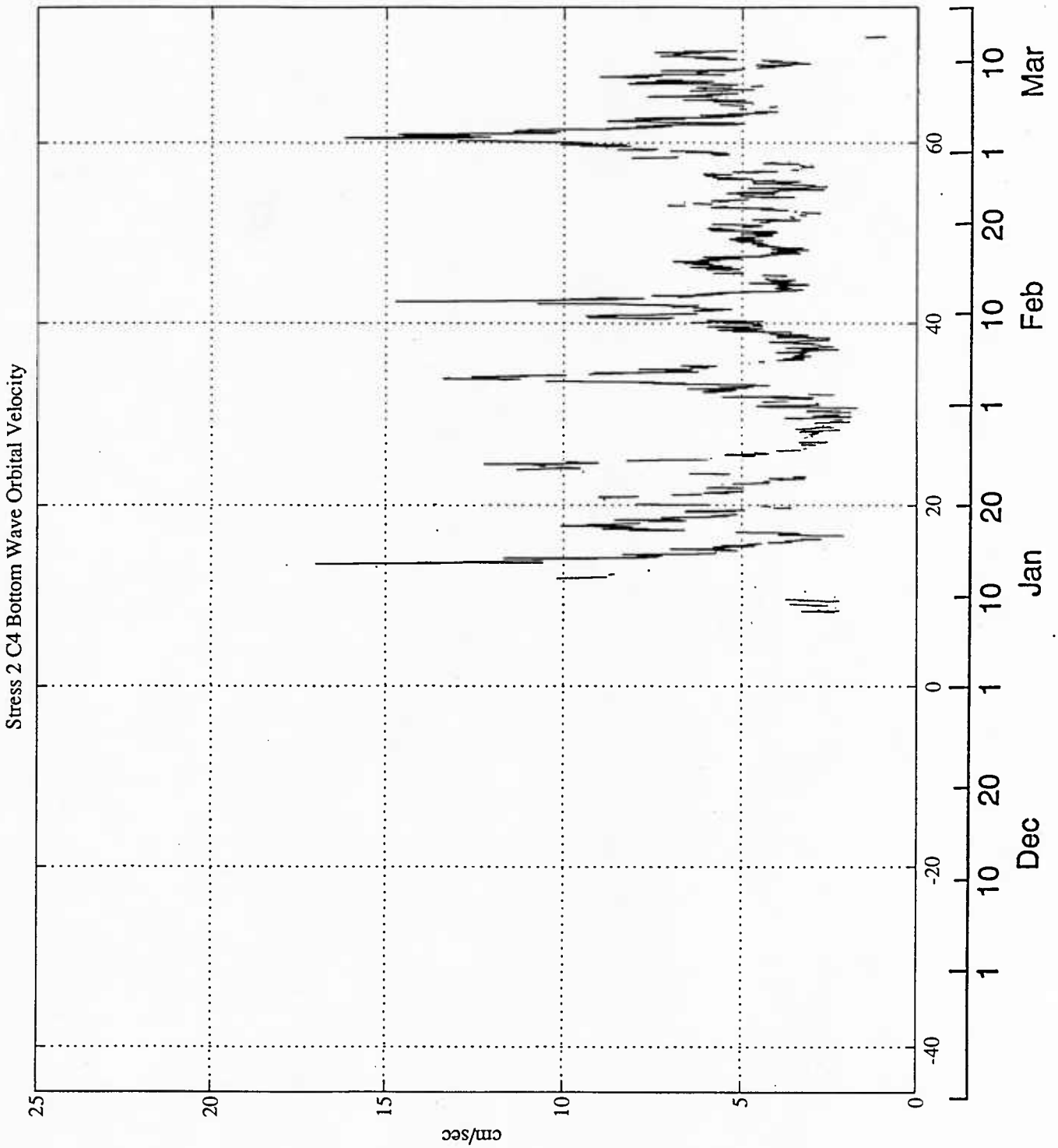


Figure 48. Stress 2 C4 Wave Orbital Velocity Profile (cm/s)



5. SUMMARY OF STRESS STATISTICAL ANALYSES

This section includes tables and graphs of statistical analyses conducted for evaluation of the collected measurements. The windows on which these were computed were chosen to maximize the timespan for each vertical profile and are shown in Figures 49 and 58 for STRESS 1 and STRESS 2, respectively.

(NOTE: During Stress 2, the windows of statistical analyses of the velocity data from C3 and C4 were reduced to eliminate the apparent trouble with the BASS top-most sensor during the first 10 days of observation. The same statistical windows were used for the velocity analyses of both sites, even though there appeared to be signal drifting of the bottom-most BASS sensor at Site C4 for the first half of the experiment.)

The Empirical Orthogonal Functions (EOFs) provide a qualitative indicator of the vertical structure (e.g., Davis, [8]) and are used in this report simply as an indicator of data consistency. The relative directions between different sensors associated with the EOF modes are meaningful, but the absolute directions are arbitrary. The profiles marked by 'x' indicate the first mode; and, the profiles marked by 'o' are the second mode. The percent of the variance fit contributed by each mode is indicated on the plots.

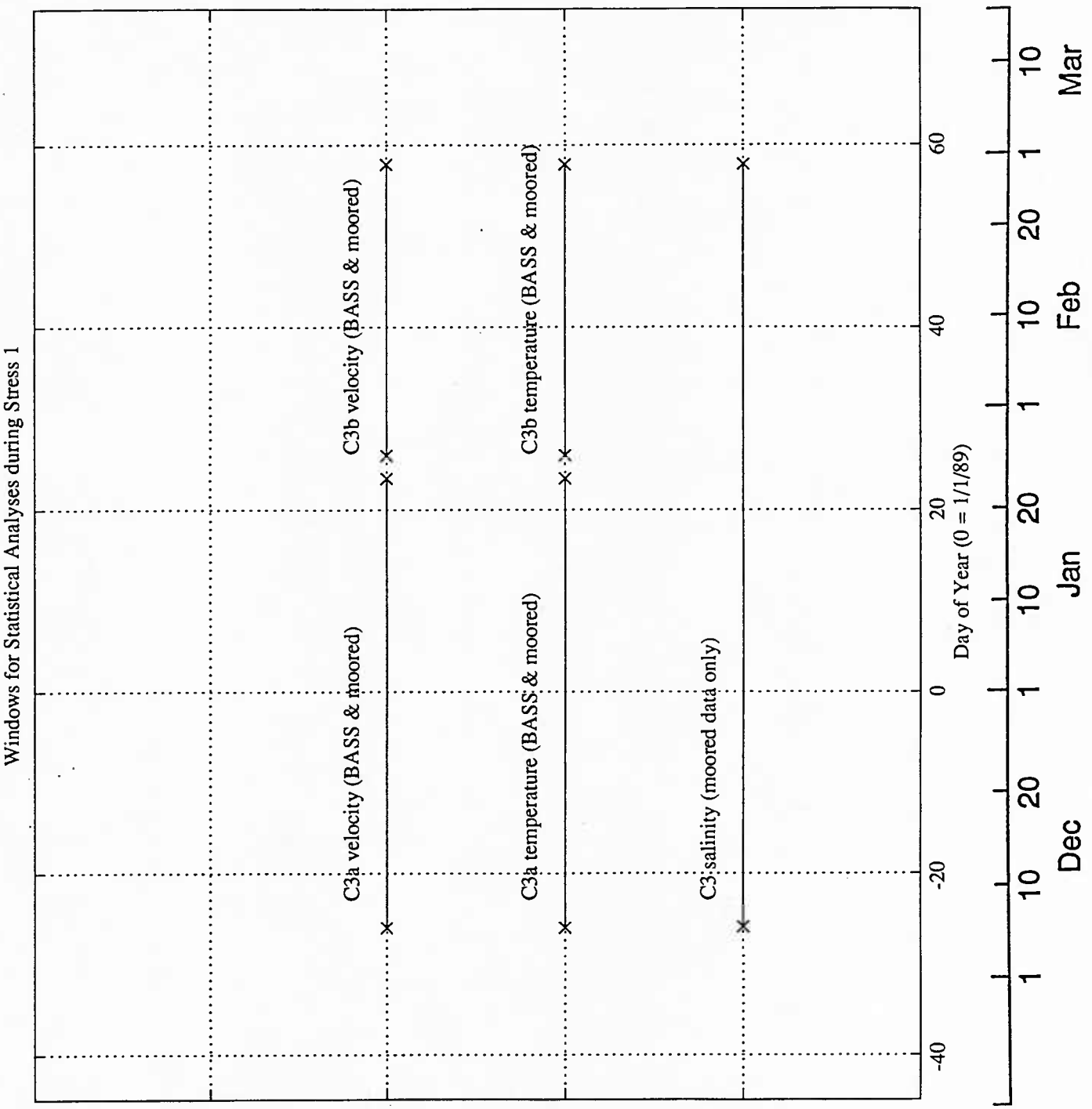
No statistical evaluation was completed on the attenuation data. It can only provide a qualitative estimate of sediment concentration and was only included in this report for the sake of completeness.

Statistical plots were not included for sites C2 and C3-Prime, where coverage was minimal within the bottom boundary layer.

5.1 Plot Units

The units of velocity are cm/seconds; temperatures are degrees Centigrade; salinity are practical salinity units; directions are in degrees.

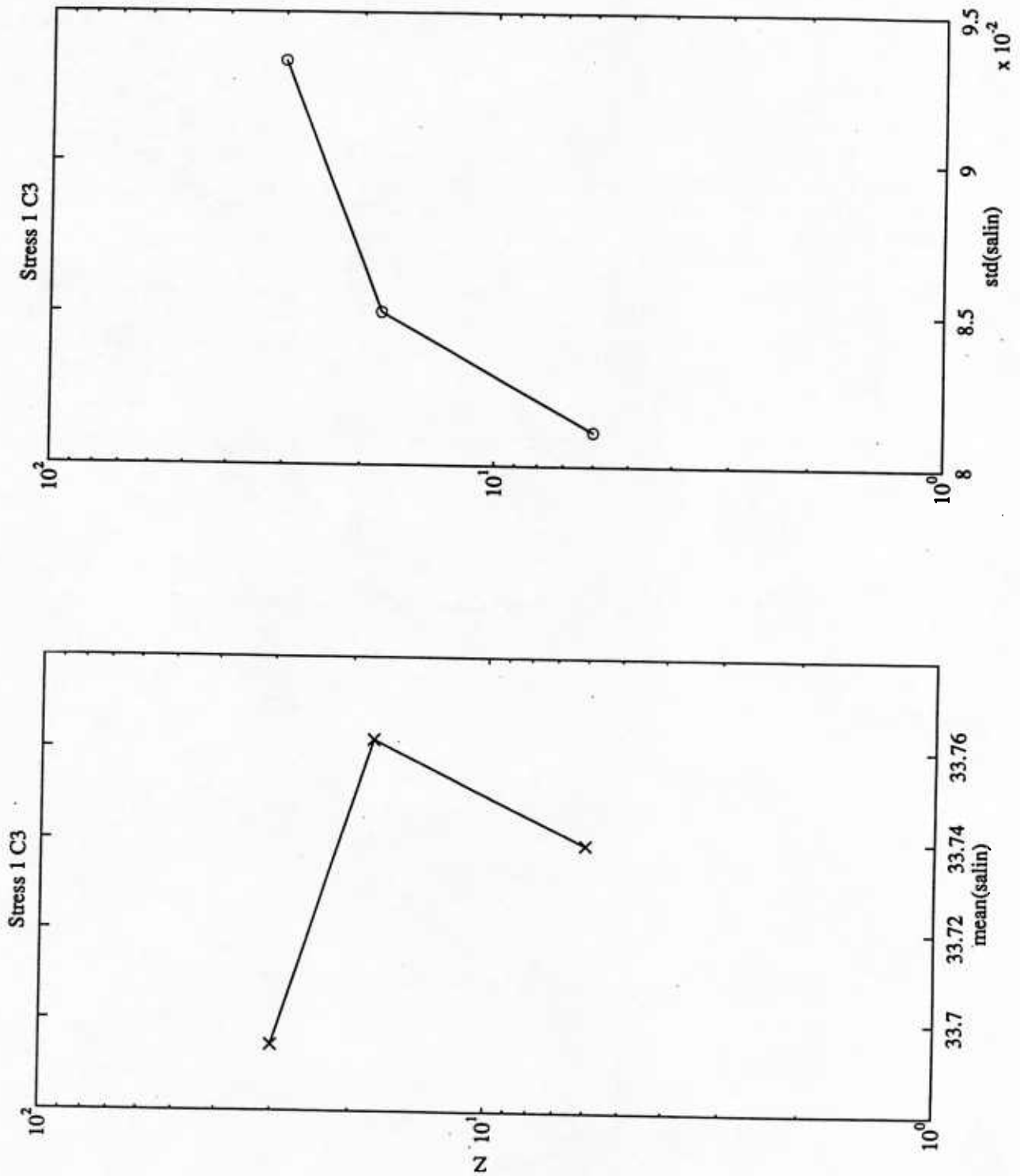
Figure 49. Windows for Statistical Analyses of STRESS 1 Data



STRESS 1 Salinity				
Height	C3			
(m)	Mean	Stdev	Min	Max
6.00	33.74	0.08	33.46	33.90
18.00	33.76	0.09	33.40	33.94
30.00	33.69	0.09	33.26	33.92

Table 13. Statistics on STRESS 1 Salinity

Figure 50. Stress 1 C3 Salinity: Mean and Standard Deviation (practical salinity units)



STRESS 1 Temperature (degrees C)								
Height	C3a				C3b			
(m)	Mean	Stdev	Min	Max	Mean	Stdev	Min	Max
0.37	9.307	0.361	8.364	10.147	9.224	0.191	8.758	9.560
0.62	9.306	0.361	8.362	10.144	9.222	0.191	8.758	9.558
1.10	9.309	0.362	8.362	10.147	9.225	0.191	8.760	9.560
2.01	9.309	0.363	8.360	10.145	9.224	0.191	8.757	9.558
2.51	9.315	0.363	8.364	10.153	9.233	0.191	8.763	9.565
3.63	9.318	0.363	8.369	10.153	9.260	0.190	8.780	9.586
5.00	9.328	0.363	8.373	10.161	9.247	0.189	8.766	9.567
5.84	9.328	0.362	8.365	10.156	9.244	0.188	8.761	9.560
6.00	9.348	0.359	8.410	10.160	9.261	0.186	8.770	9.570
12.00	9.408	0.335	8.610	10.180	9.300	0.176	8.790	9.620
18.00	9.487	0.307	8.800	10.470	9.351	0.169	8.860	9.660
24.00	9.550	0.294	8.870	10.570	9.390	0.165	8.900	9.780
30.00	9.614	0.293	9.010	10.640	9.419	0.160	8.940	9.810

STRESS 1 Temperature (degrees C)				
Height	C3-PRIME			
(m)	Mean	Stdev	Min	Max
6	9.374	0.285	8.500	10.240
18	9.490	0.279	8.870	10.490

Table 14. STRESS 1: Temperature at Sites C3 and C3-Prime.

Figure 51. Stress 1 C3 Temperature: Mean and Standard Deviation (degrees Centigrade)

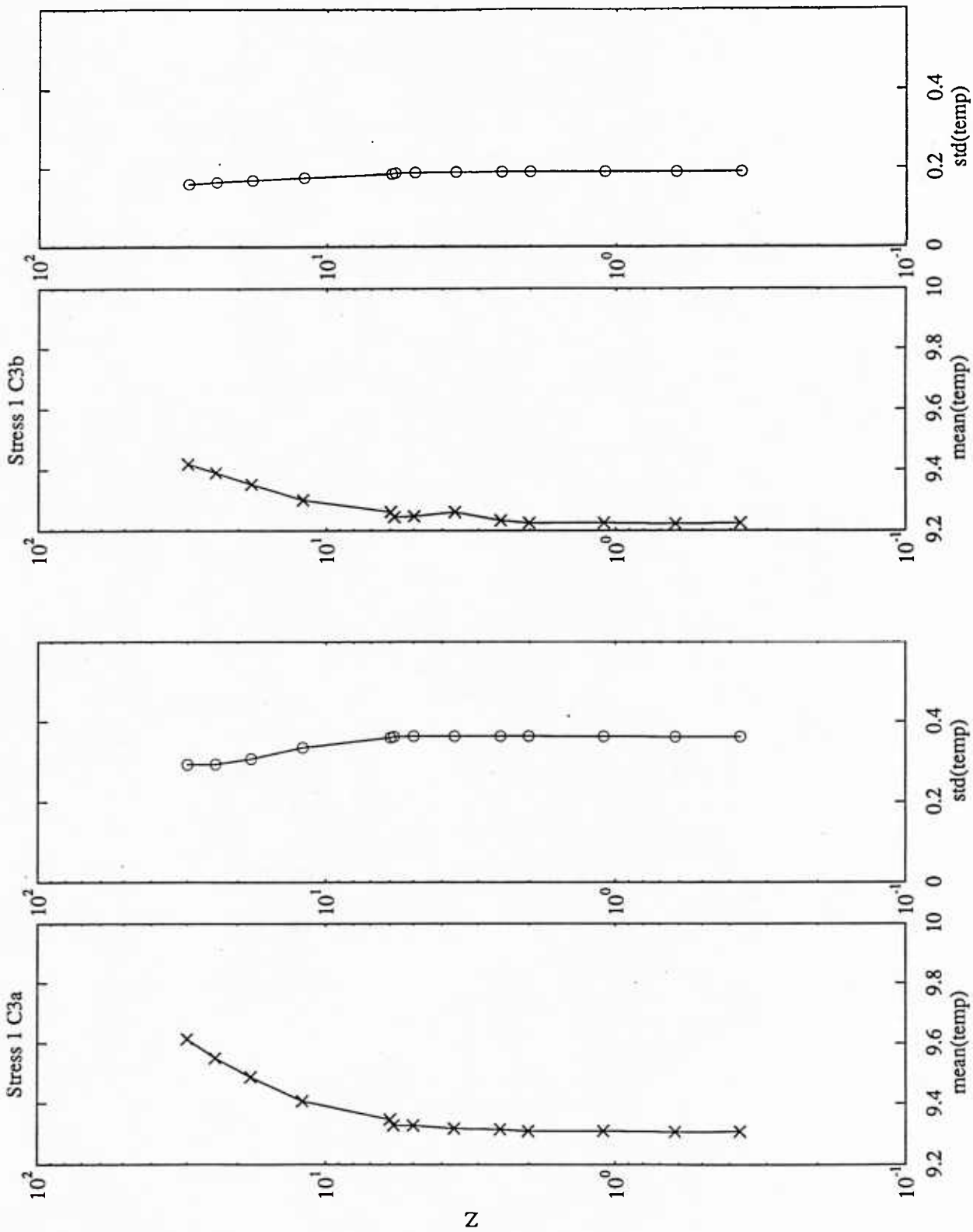
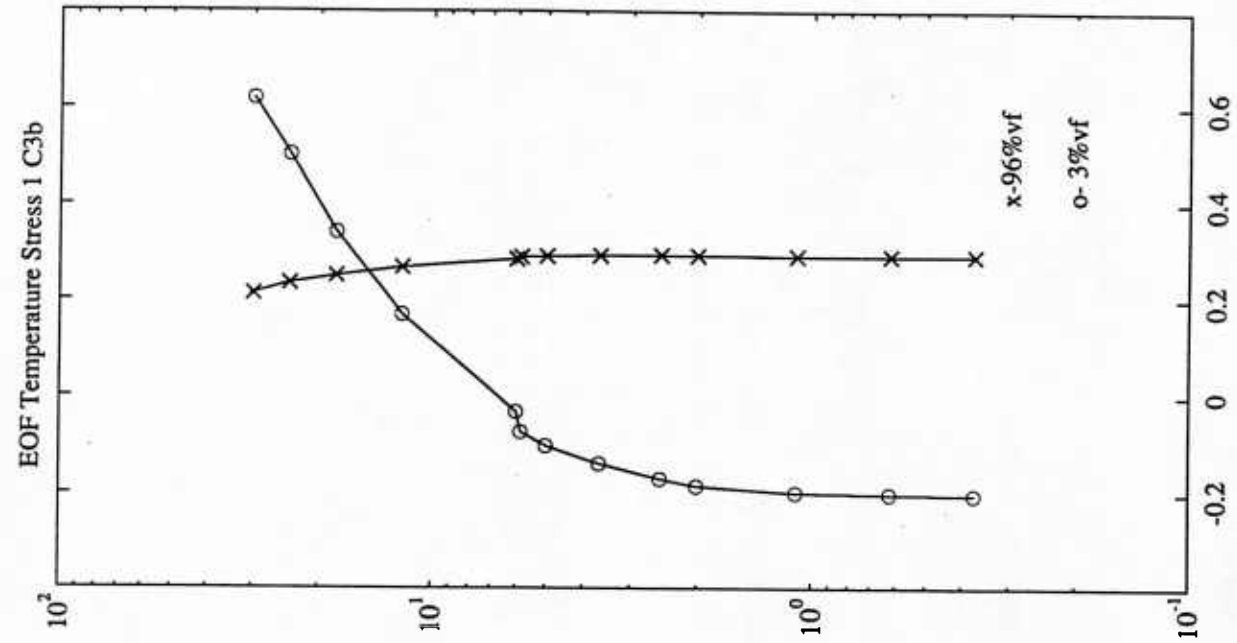
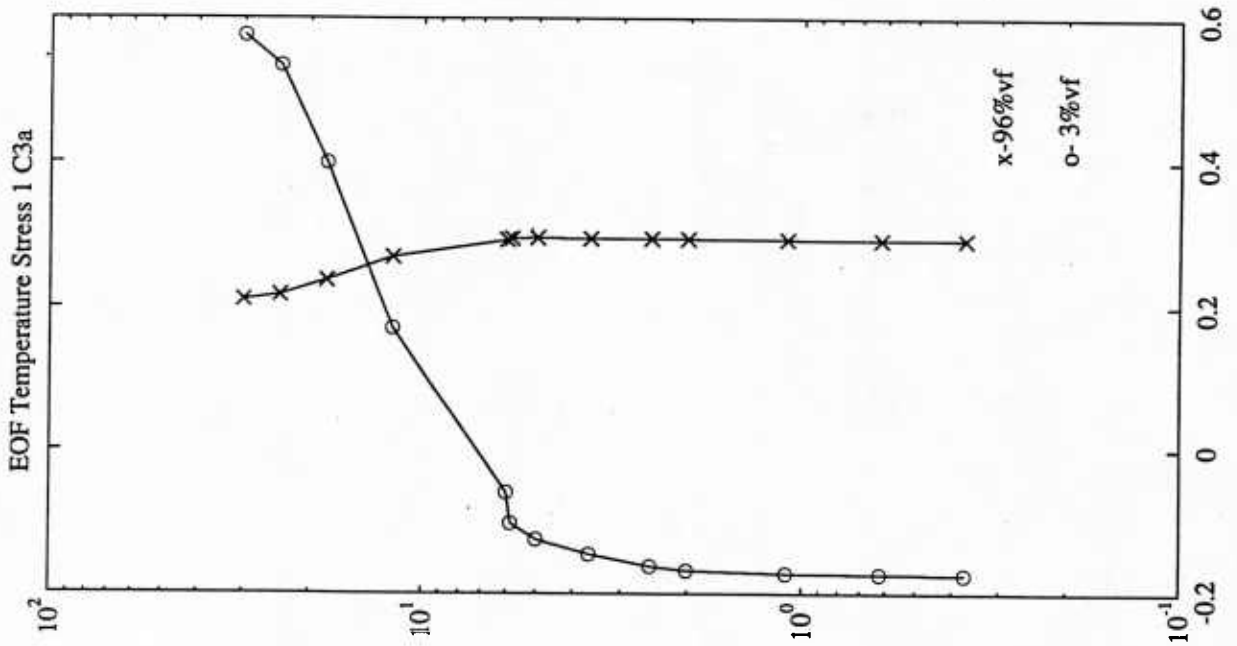


Figure 52. Stress 1 C3 EOF Analysis of Temperature Measurements





STRESS 1 C3a Velocity (cm/sec)								
Height	Across-shelf Current				Along-shore Current			
(m)	Mean	Stdev	Min	Max	Mean	Stdev	Min	Max
0.21	-0.42	3.11	-15.07	11.07	1.48	3.93	-11.77	12.45
0.51	-0.61	4.13	-18.95	14.24	1.77	4.94	-14.35	16.17
1.10	-0.92	4.80	-22.30	15.95	1.67	5.77	-16.78	18.13
1.96	-0.93	5.27	-24.20	17.32	2.13	6.71	-18.77	20.91
2.56	-0.83	5.34	-25.12	17.49	2.40	7.27	-21.49	21.25
4.96	-0.99	5.52	-27.51	18.23	3.48	8.10	-21.91	23.50
6.00	-0.82	6.08	-28.08	16.66	4.22	9.12	-27.29	26.76
12.00	-0.55	6.08	-23.14	16.43	5.48	10.10	-31.05	34.09
18.00	0.11	6.23	-21.12	16.37	6.35	10.74	-27.69	39.97
24.00	1.50	5.88	-18.68	17.93	6.86	10.88	-28.17	39.90
30.00	2.22	5.63	-18.96	20.98	7.22	11.34	-31.33	41.12

STRESS 1 C3b Velocity (cm/sec)								
Height	Across-shelf Current				Along-shore Current			
(m)	Mean	Stdev	Min	Max	Mean	Stdev	Min	Max
0.21	-0.50	3.28	-11.55	7.90	0.19	3.17	-9.51	11.05
0.51	-0.75	4.41	-15.12	10.66	0.22	4.10	-12.02	14.33
1.10	-1.18	5.02	-17.30	10.97	0.06	4.80	-13.65	16.18
1.96	-1.32	5.55	-18.40	12.34	0.22	5.65	-15.57	17.22
2.56	-1.37	5.72	-20.06	12.44	0.32	6.19	-17.00	18.10
4.96	-1.11	5.88	-19.07	14.08	0.54	7.00	-19.52	19.59
6.00	-1.73	6.77	-22.98	14.48	1.71	7.78	-21.59	21.43
12.00	-1.07	6.83	-21.36	17.15	3.19	8.56	-21.31	24.89
18.00	-0.21	6.55	-20.02	15.57	3.97	8.65	-19.88	26.15
24.00	0.98	5.93	-17.02	15.30	4.42	8.83	-19.47	29.52
30.00	1.69	5.64	-13.82	16.92	4.27	9.06	-23.14	33.27

STRESS 1 SPEED (cm/sec)								
Height	C3a				C3b			
(m)	Mean	Stdev	Min	Max	Mean	Stdev	Min	Max
0.21	4.51	2.67	0.11	16.65	3.97	2.31	0.09	12.34
0.51	5.81	3.34	0.16	20.44	5.31	2.94	0.10	15.36
1.10	6.78	3.75	0.10	23.83	6.21	3.31	0.25	17.89
1.96	7.81	4.14	0.21	26.81	7.12	3.70	0.42	21.00
2.56	8.28	4.39	0.20	28.75	7.56	3.97	0.46	22.15
4.96	9.25	4.86	0.40	33.89	8.12	4.37	0.20	22.56
6.00	10.61	5.09	0.37	37.22	9.45	4.78	0.06	24.46
12.00	11.69	5.71	0.38	39.32	10.26	5.09	0.25	25.55
18.00	12.54	6.09	0.14	41.01	10.28	5.25	0.43	27.61
24.00	12.70	6.39	0.31	40.15	10.22	5.40	0.25	29.91
30.00	12.92	7.09	0.05	43.67	10.11	5.71	0.22	33.74

Table 15. STRESS 1: Velocity Statistics at Site C3

STRESS 1 C3-Prime Velocity (cm/sec)								
Height	Across-shelf Current				Along-shore Current			
(m)	Mean	Stdev	Min	Max	Mean	Stdev	Min	Max
6	-0.54	6.67	-22.51	15.92	3.50	9.04	-27.64	29.51
18	0.80	6.42	-23.12	18.41	6.58	10.81	-28.42	40.58

STRESS 1 SPEED (cm/sec)								
Height	C3-Prime							
(m)	Mean	Stdev	Min	Max				
6	10.63	5.04	0.07	35.13				
18	12.50	6.77	0.22	40.62				

Table 16. STRESS 1: Velocity Statistics at Site C3 Prime

Figure 53. Stress 1 C3a Velocity Components: Mean and Standard Deviation (cm/s)

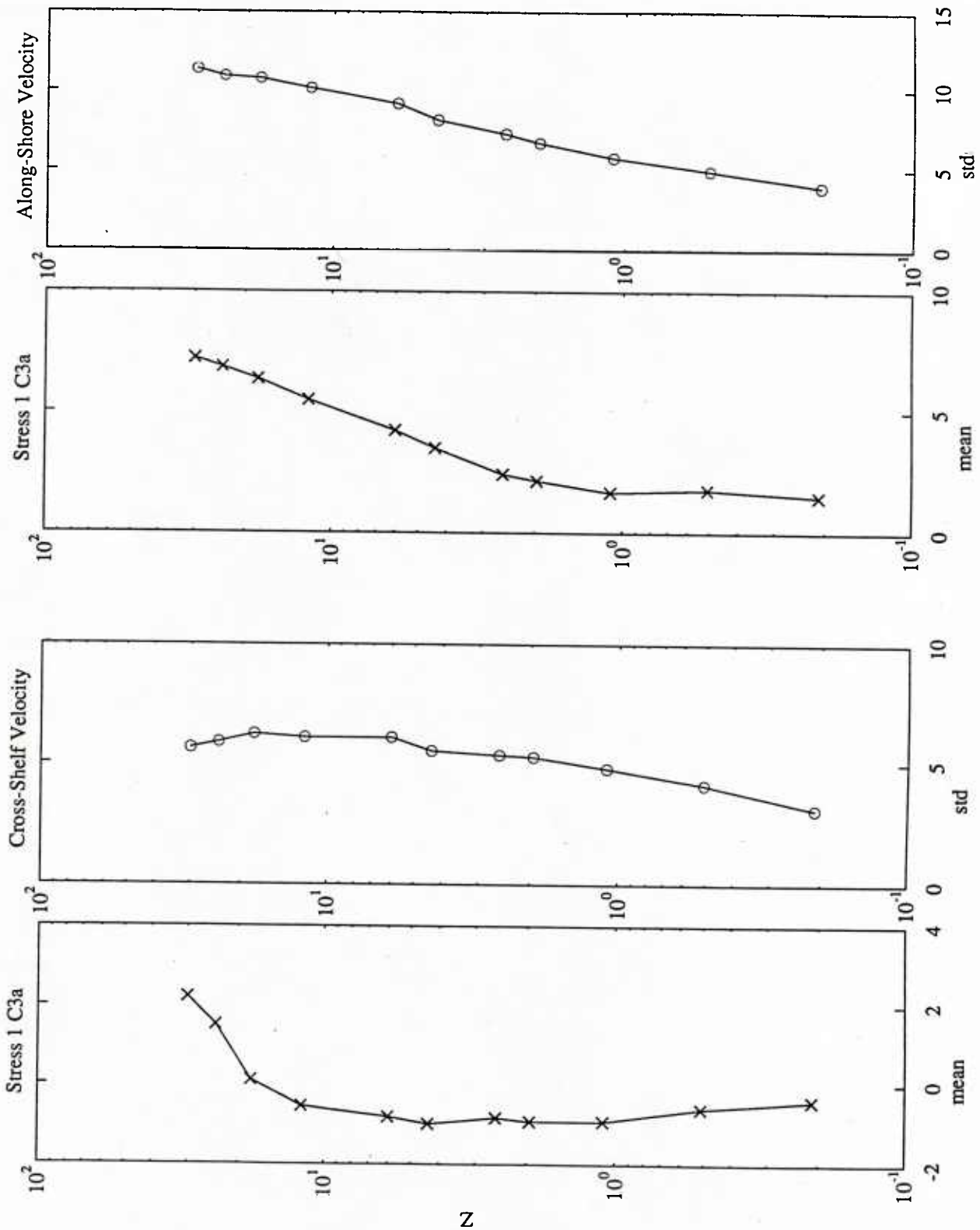


Figure 54. Stress 1 C3b Velocity Components: Mean and Standard Deviation (cm/s)

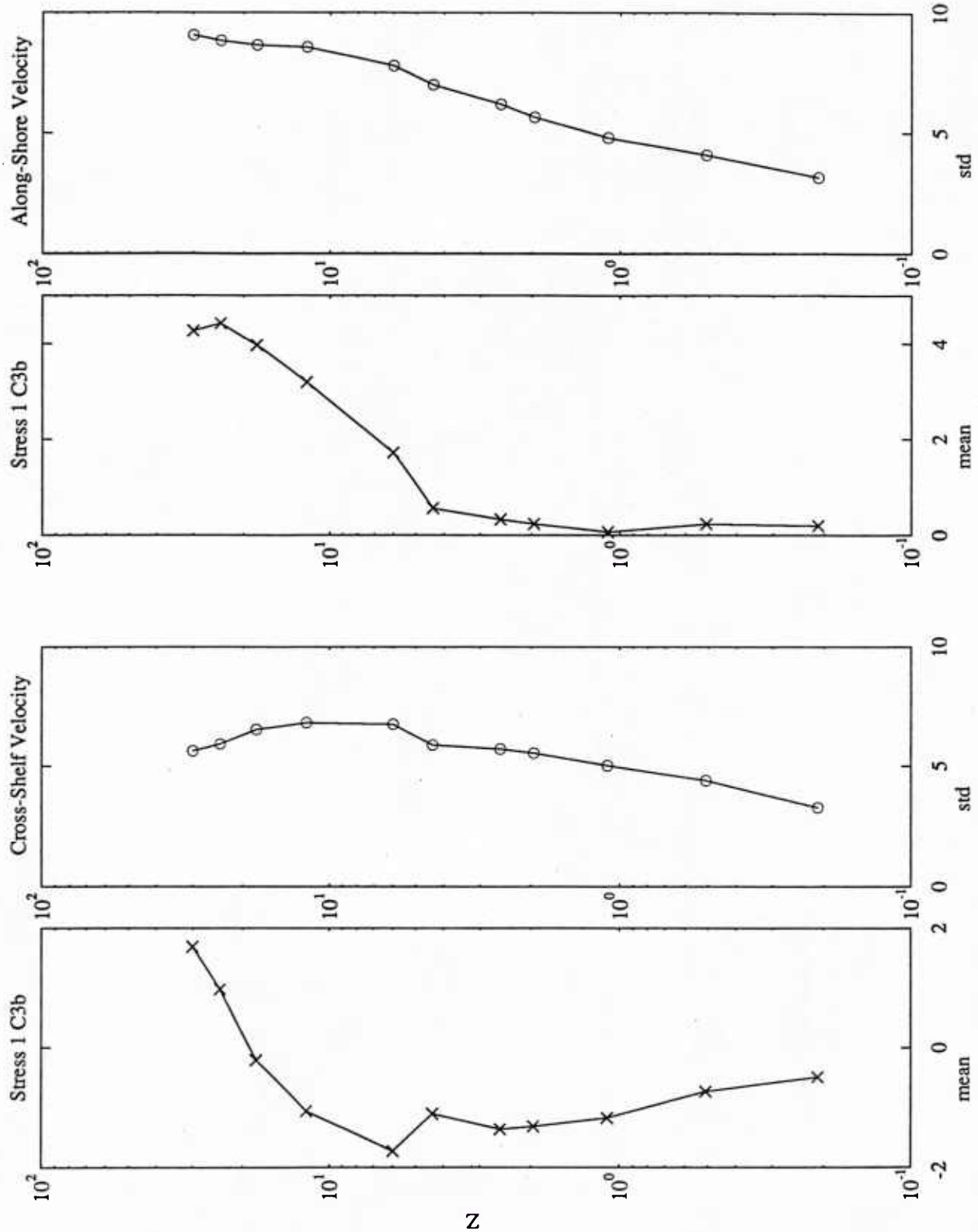


Figure 55. Stress 1 C3 Current Speed: Mean and Standard Deviation (cm/s)

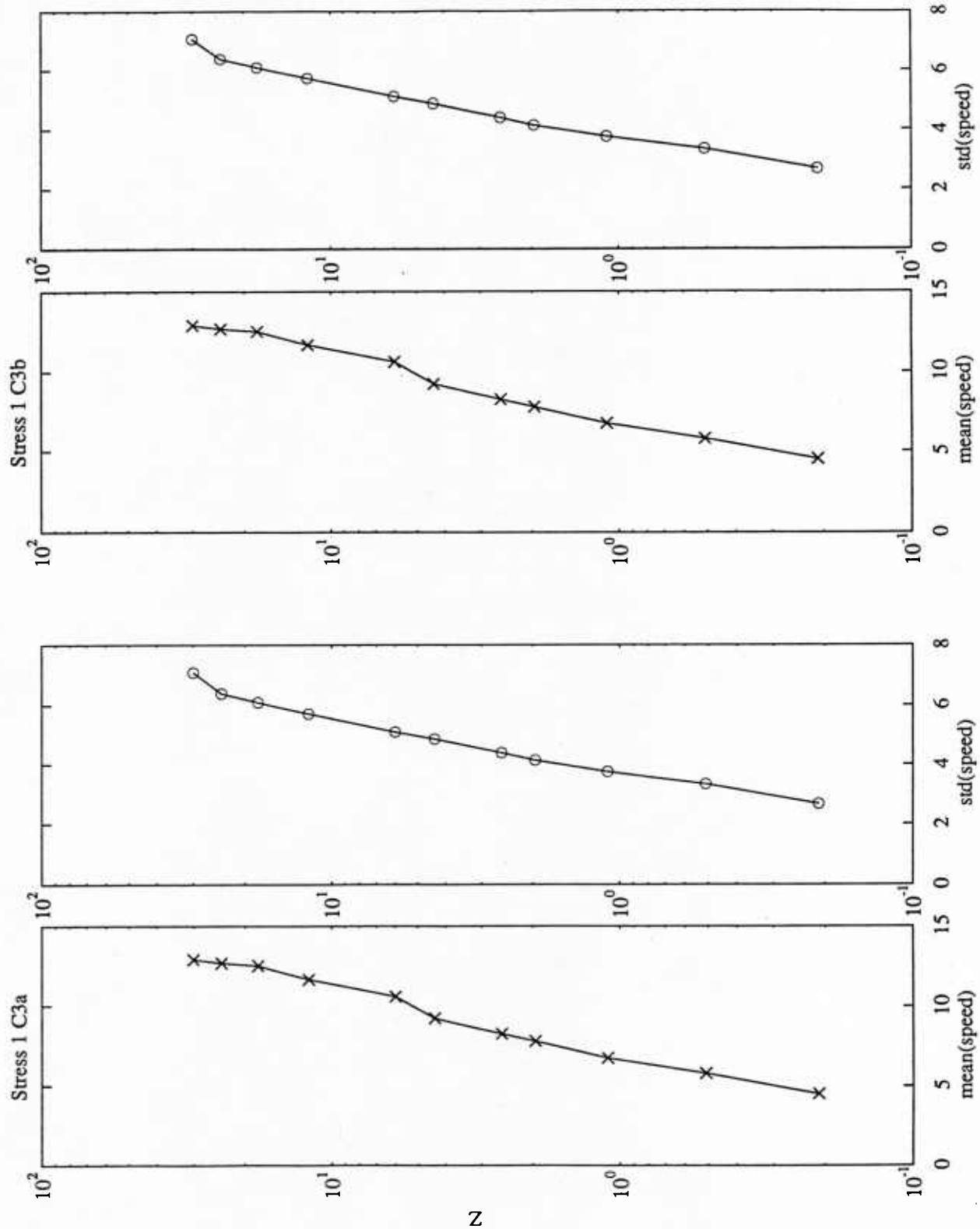


Figure 56. Stress 1 C3a EOF Analysis of Velocity Measurements

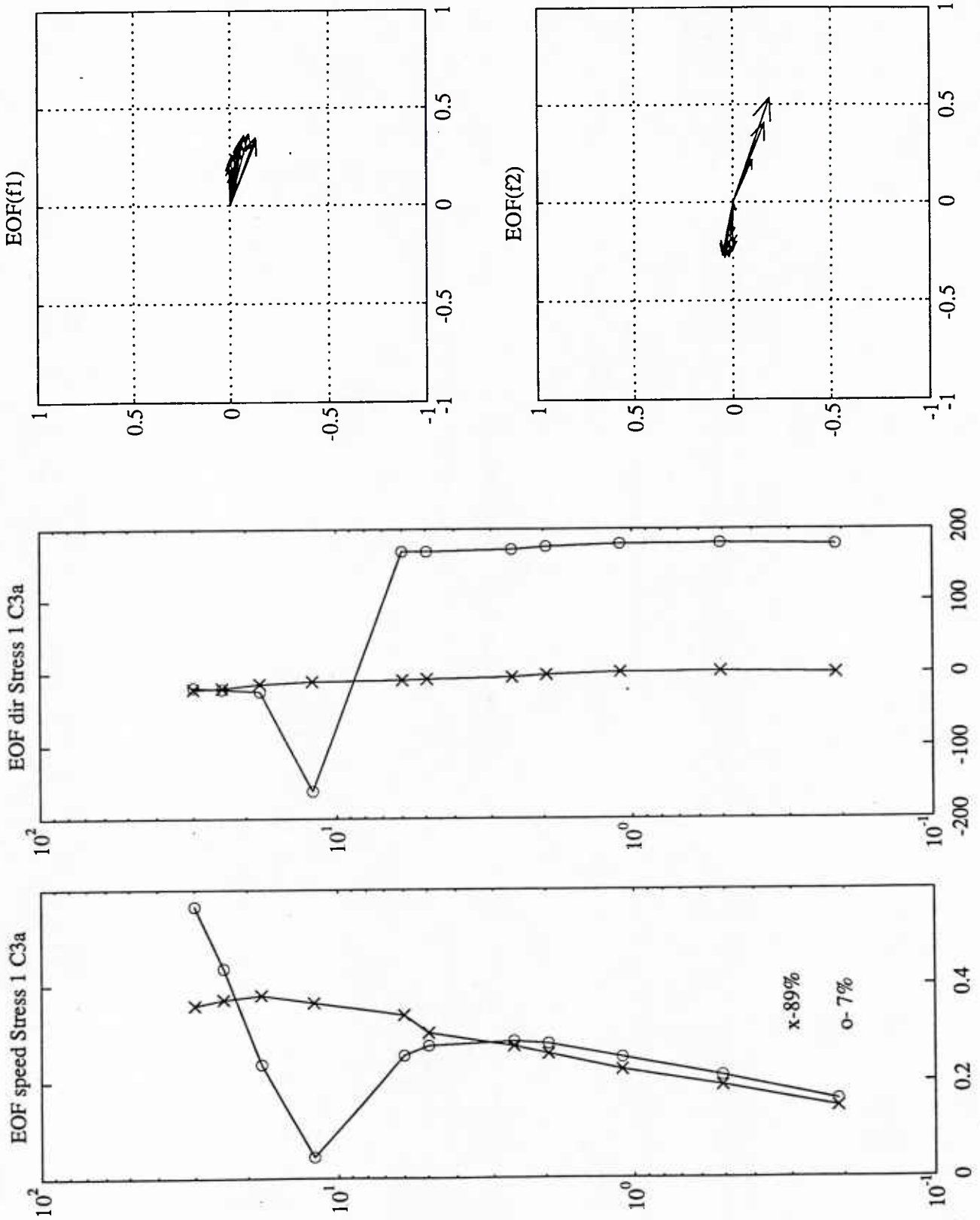


Figure 57. Stress 1 C3b EOF Analysis of Velocity Measurements

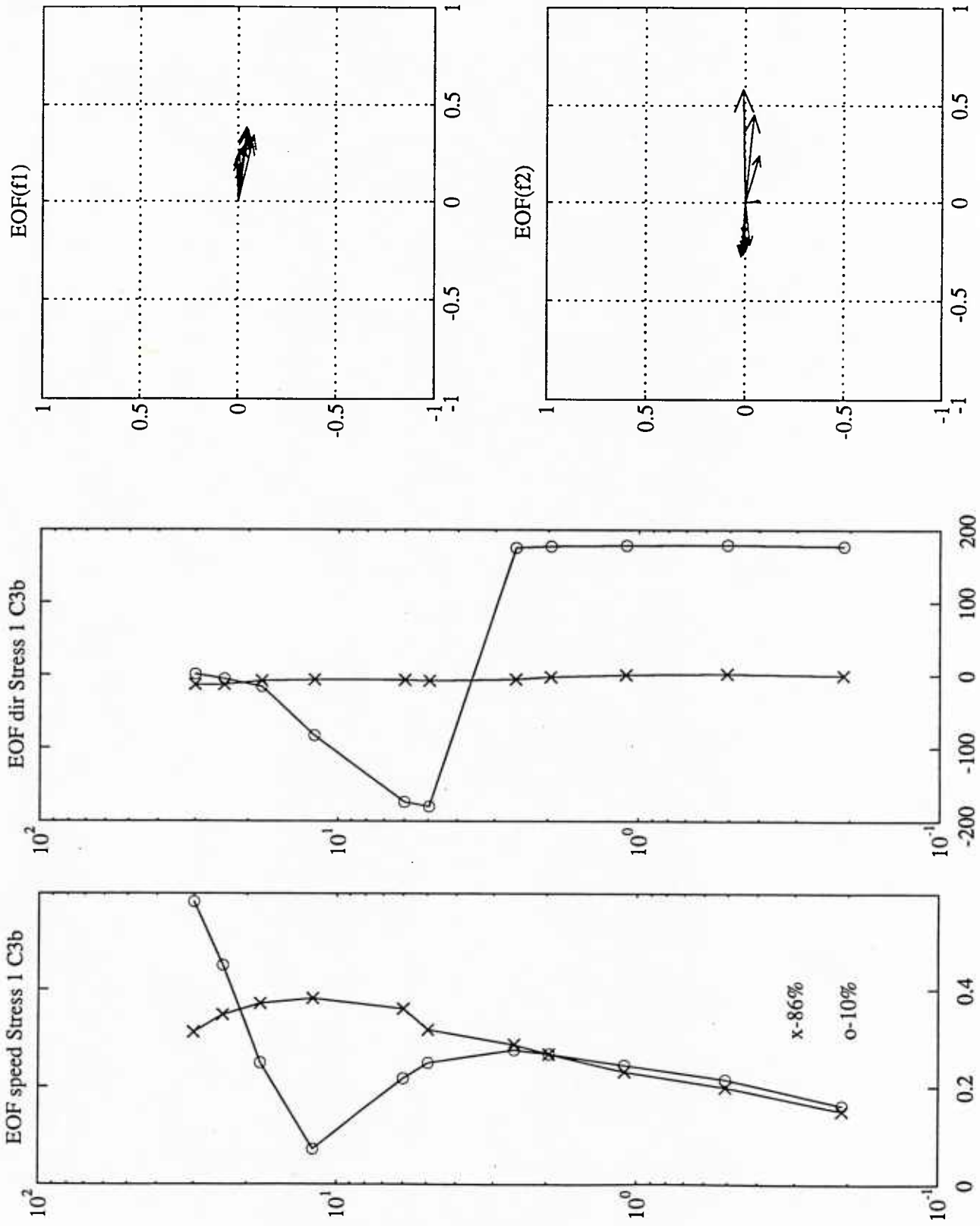
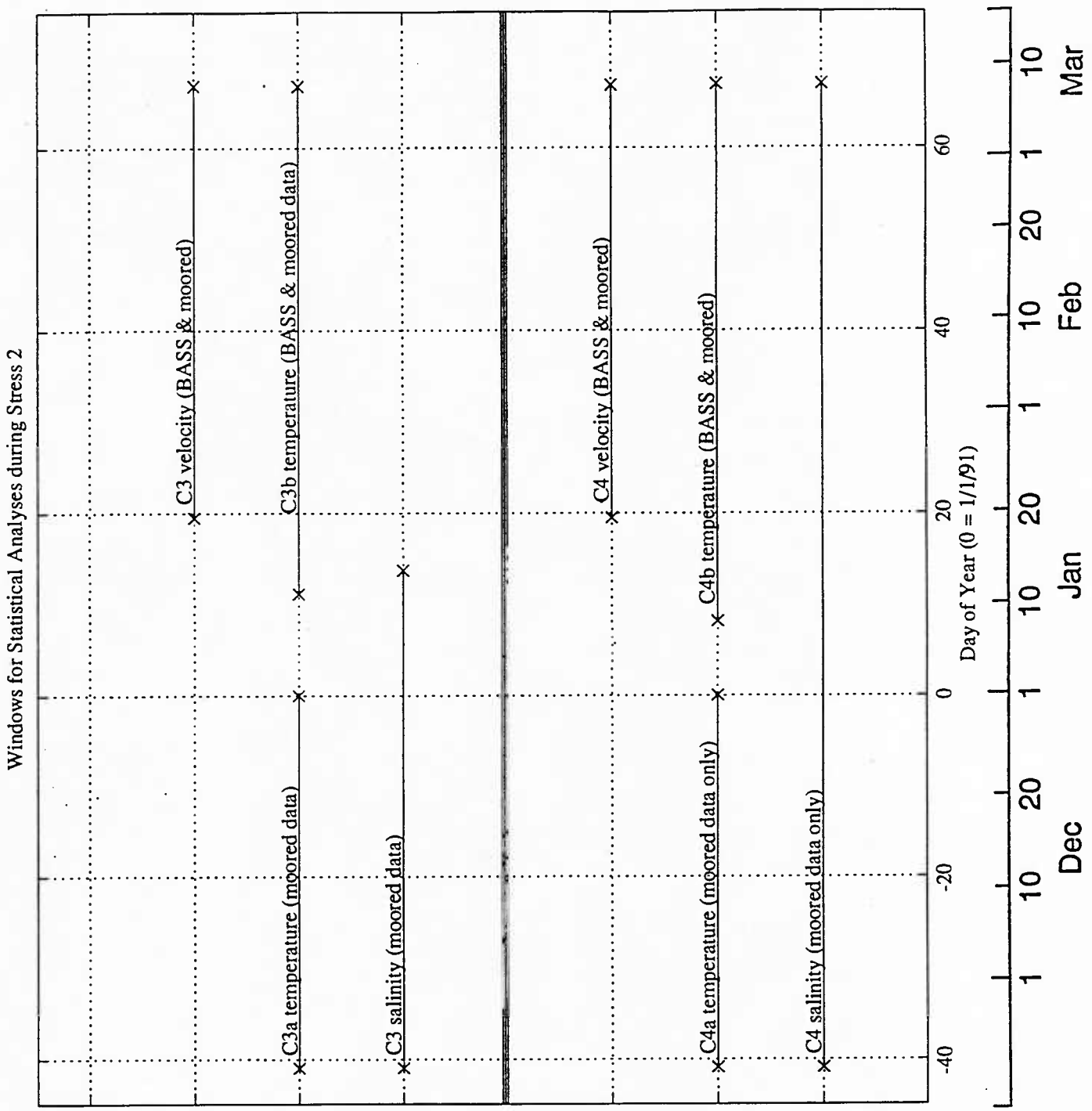


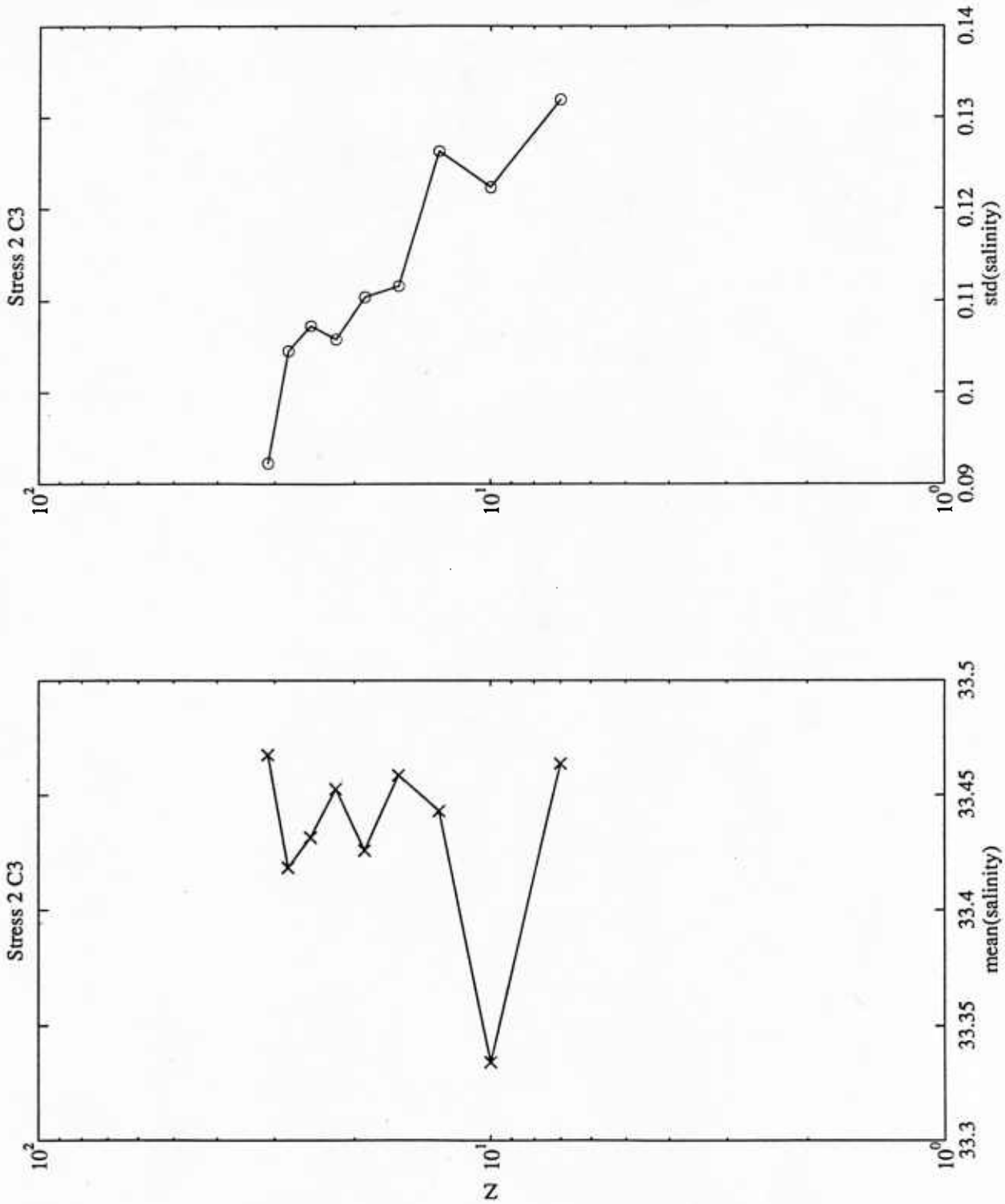
Figure 58. Windows for Statistical Analyses of STRESS 2 Data



STRESS 2 C3 Salinity				
height(m)	Mean	Stdev	Min	Max
7.00	33.46	0.13	33.16	33.69
10.00	33.33	0.12	33.05	33.55
13.00	33.44	0.13	33.16	33.67
16.00	33.46	0.11	33.20	33.69
19.00	33.43	0.11	33.16	33.66
22.00	33.45	0.11	33.16	33.69
25.00	33.43	0.11	33.10	33.67
28.00	33.42	0.10	33.08	33.66
31.00	33.47	0.09	33.19	33.74

Table 17. STRESS 2: Salinity Statistics at Sites C3

Figure 59. Stress 2 C3 Salinity: Mean and Standard Deviation (practical salinity units)



STRESS 2 C2 Temperature (degrees C)				
Height	C2 (Day -41 - 68)			
(m)	Mean	Stdev	Min	Max
10	10.165	0.580	9.060	11.410

STRESS 2 C3 Temperature (degrees C)								
Height	C3a (Day -41 - 0)				C3b (Day 11 - 67)			
(m)	Mean	Stdev	Min	Max	Mean	Stdev	Min	Max
0.1900					9.985	0.546	8.873	11.261
1.0800					9.995	0.547	8.878	11.270
1.7300	9.726	0.245	9.171	10.456				
1.7500					9.989	0.548	8.869	11.261
2.6200					10.000	0.549	8.873	11.265
3.7600					10.024	0.554	8.883	11.277
4.4800					10.033	0.556	8.885	11.279
5.1400					10.038	0.558	8.882	11.273
5.8300					10.050	0.561	8.881	11.277
7.0000	9.785	0.270	9.180	10.490	9.994	0.564	8.800	11.180
10.0000	9.804	0.277	9.190	10.490	10.025	0.572	8.790	11.170
13.0000	9.814	0.287	8.890	10.490	10.051	0.577	8.790	11.170
16.0000	9.841	0.299	8.706	10.554	10.088	0.580	8.806	11.185
19.0000	9.841	0.316	8.620	10.590	10.106	0.579	8.800	11.170
22.0000	9.863	0.335	8.632	10.681	10.142	0.576	8.810	11.203
25.0000	9.875	0.354	8.615	10.681	10.169	0.573	8.834	11.216
28.0000	9.886	0.372	8.637	10.760	10.196	0.570	8.927	11.328
31.0000	9.866	0.392	8.600	10.840	10.196	0.566	8.980	11.400

Table 18. STRESS 2: Temperature Statistics at Sites C2 and C3

Figure 60. Stress 2 C3 Temperature: Mean and Standard Deviation (degrees Centigrade)

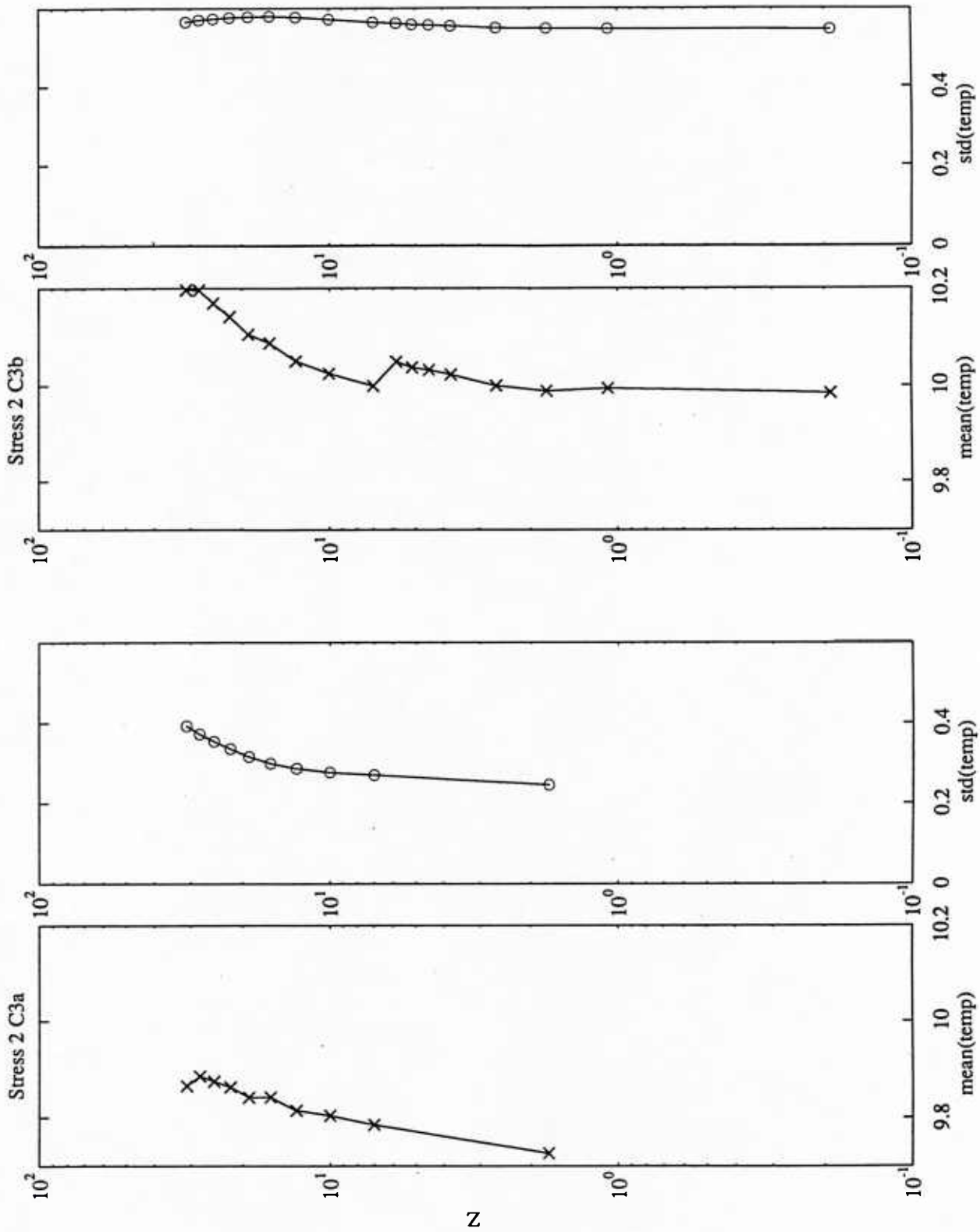
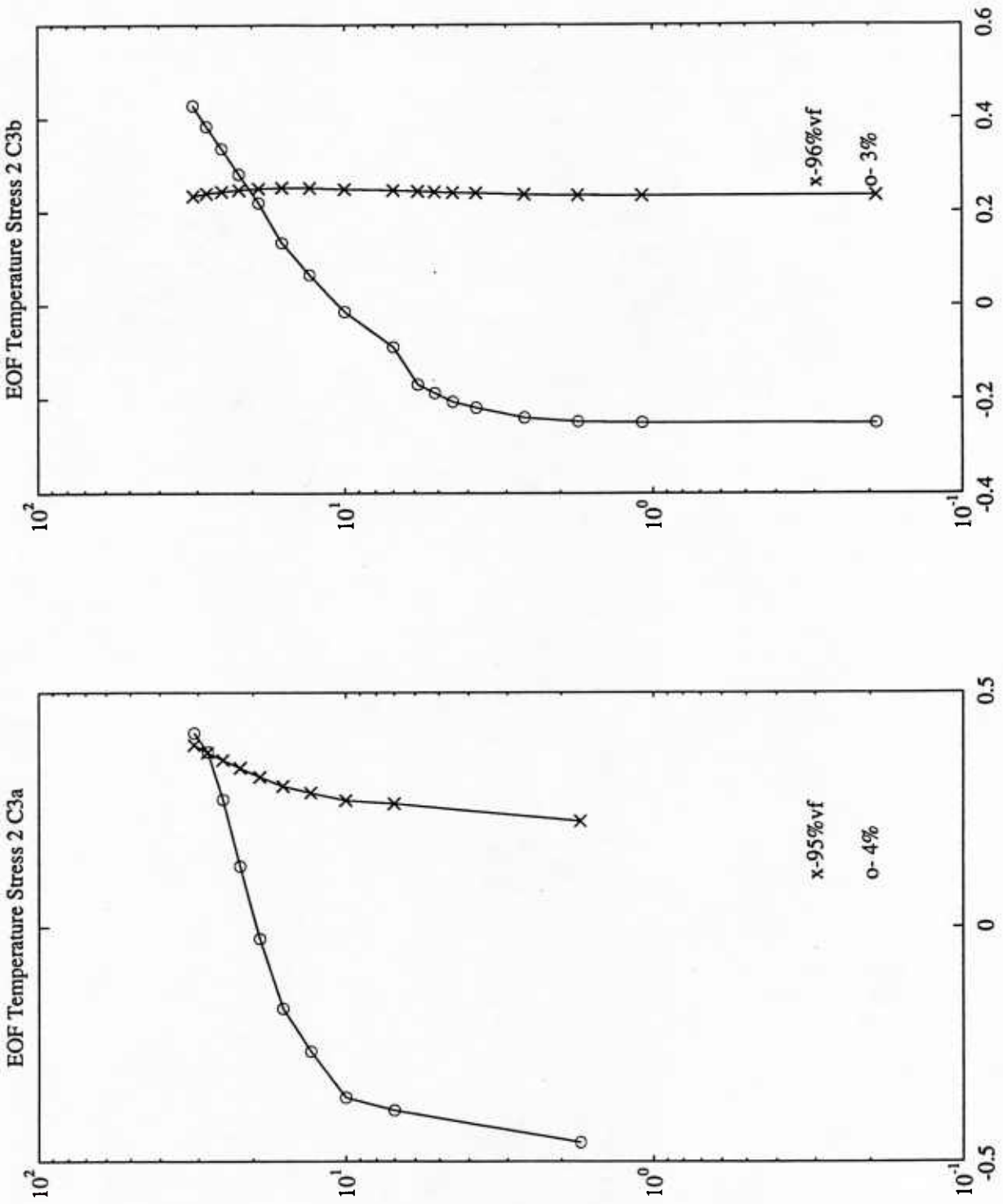


Figure 61. Stress 2 C3 EOF Analysis of Temperature Measurements



STRESS 2 C2 Velocity (cm/sec) - Day 19.5 -> 66.75								
Height	Across-shelf Current				Along-shore Current			
(m)	Mean	Stdev	Min	Max	Mean	Stdev	Min	Max
10	1.46	3.99	-13.67	14.13	5.90	9.02	-15.06	58.13

STRESS 2 C2 SPEED (cm/sec)				
Height	C2 (Day 19 - 67)			
(m)	Mean	Stdev	Min	Max
10	9.35	6.84	0.28	58.17

STRESS 2 C3 Velocity (cm/sec) - Day 19.5 -> 66.75								
Height	Across-shelf Current				Along-shore Current			
(m)	Mean	Stdev	Min	Max	Mean	Stdev	Min	Max
0.39	-0.97	4.22	-16.47	10.35	1.13	5.37	-13.58	23.93
0.74	-1.06	4.71	-16.90	11.02	1.43	6.15	-13.35	26.41
1.34	-1.18	4.67	-16.39	11.81	1.58	6.41	-14.52	26.18
1.94	-1.24	5.81	-20.58	13.65	1.82	7.54	-17.58	31.65
2.54	-1.54	5.92	-20.77	13.79	2.21	8.10	-18.48	32.93
4.94	-2.08	6.50	-23.38	13.61	2.82	8.94	-19.71	36.93
7.00	-1.22	6.75	-22.54	18.12	4.11	11.09	-24.78	48.58
10.00	-0.90	6.33	-20.11	16.94	4.28	10.73	-24.75	48.19
13.00	-0.68	6.40	-21.77	19.72	5.88	12.42	-25.86	59.71
19.00	-0.43	6.22	-21.82	20.09	7.19	13.49	-26.56	61.11
31.00	1.310	5.12	-18.44	23.61	8.13	15.20	-32.66	59.37

STRESS 2 SPEED (cm/sec)				
Height	C3 (Day 19 - 67)			
(m)	Mean	Stdev	Min	Max
0.4	5.86	3.81	0.15	28.55
0.7	6.72	4.24	0.12	31.14
1.3	6.99	4.23	0.19	26.84
1.9	8.40	4.98	0.21	36.70
2.5	8.92	5.31	0.12	37.51
4.9	10.03	5.82	0.43	40.08
7.0	11.77	6.97	0.32	51.23
10.0	11.42	6.62	0.21	49.29
13.0	12.93	7.95	0.24	60.82
19.0	14.10	8.59	0.50	61.97
31.0	15.32	9.50	0.15	60.58

Table 19. STRESS 2: Velocity Statistics at Site C2 and C3

Figure 62. Stress 2 C3 Velocity Components: Mean and Standard Deviation (cm/s)

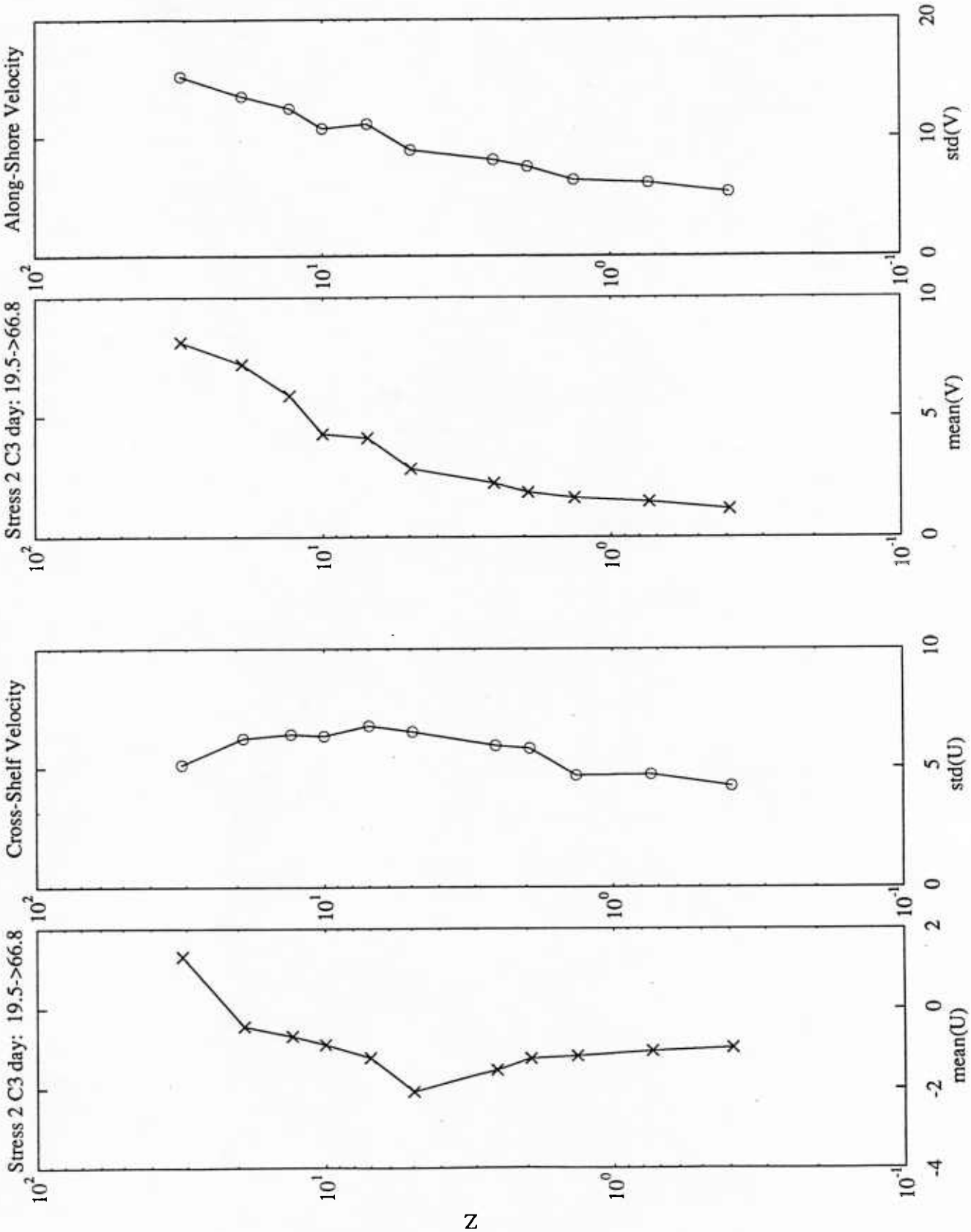


Figure 63. Stress 2 C3 Current Speed: Mean and Standard Deviation (cm/s)

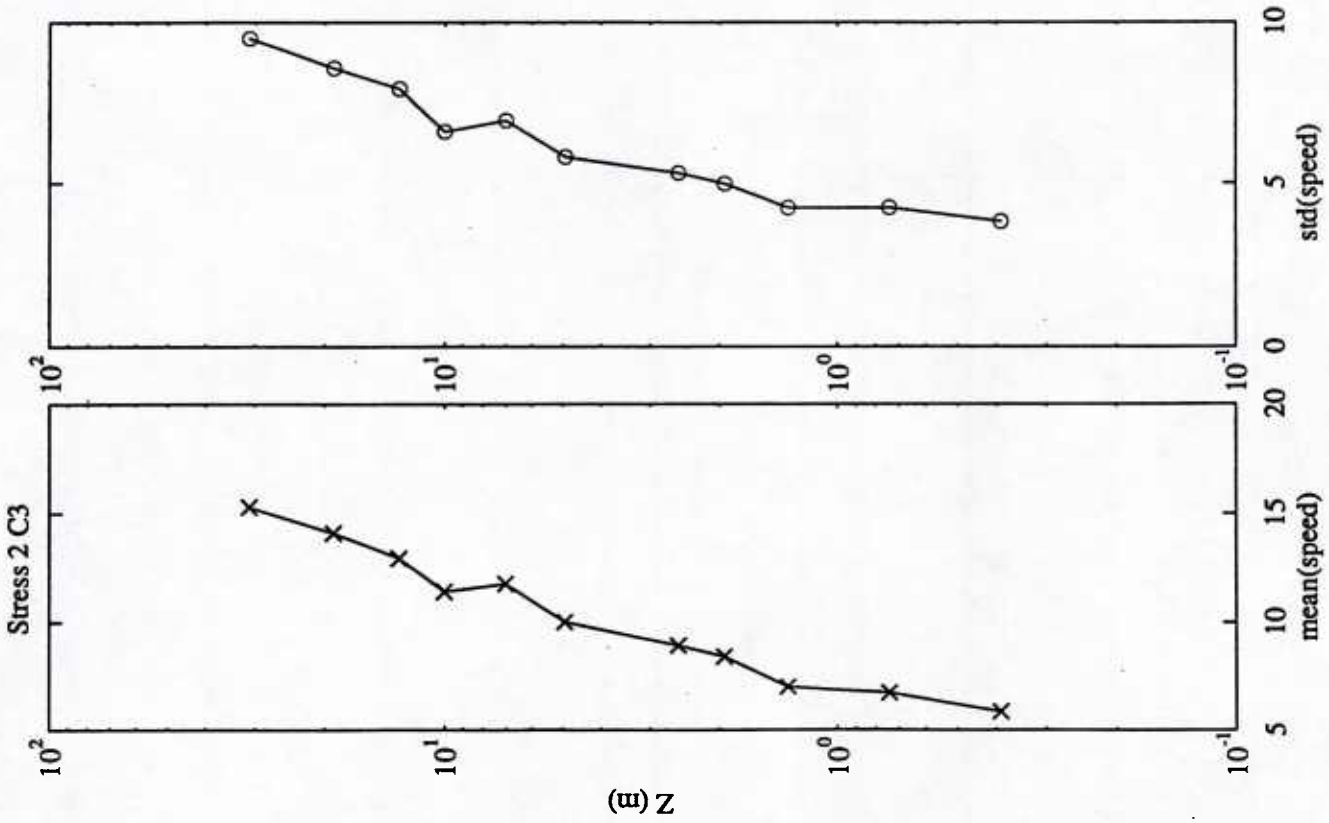
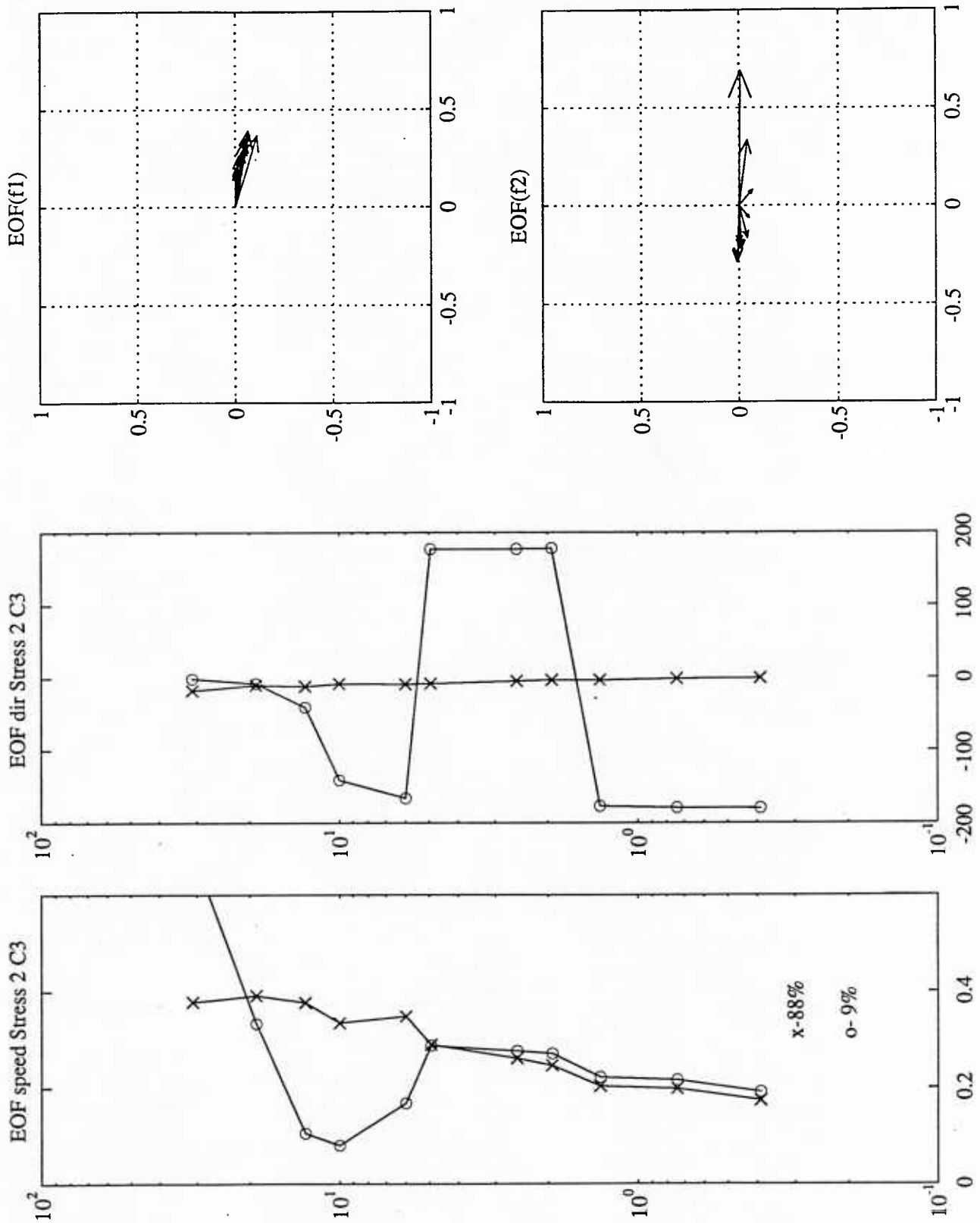


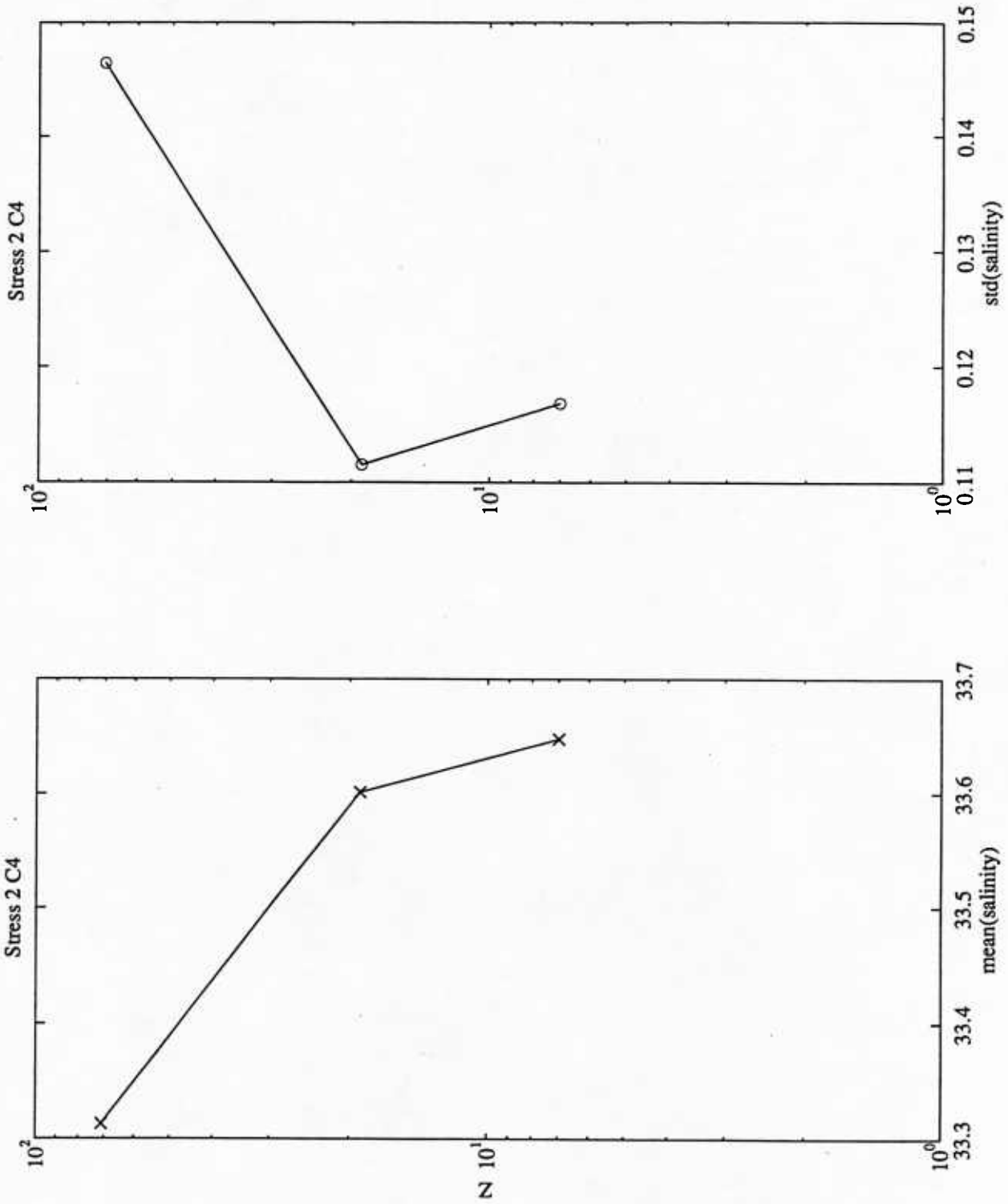
Figure 64. Stress 2 C3 EOF Analysis of Velocity Measurements



STRESS 2 C4 Salinity				
height(m)	Mean	Stdev	Min	Max
7.00	33.65	0.12	33.37	33.95
19.00	33.60	0.11	33.28	33.92
71.00	33.31	0.15	32.85	33.65

Table 20. STRESS 2: Salinity Statistics at Sites C4

Figure 65. Stress 2 C4 Salinity: Mean and Standard Deviation (practical salinity units)



STRESS 2 C4 Temperature (degrees C)								
Height	C4a (Day -41 - 0)				C4b (Day 8 - 67)			
(m)	Mean	Stdev	Min	Max	Mean	Stdev	Min	Max
0.15					9.340	0.340	8.569	10.367
2.93					9.342	0.340	8.564	10.395
3.77					9.352	0.345	8.563	10.439
4.53					9.364	0.347	8.569	10.452
5.18					9.370	0.348	8.570	10.464
5.96					9.379	0.350	8.571	10.501
7.00	9.238	0.289	8.186	9.638	9.344	0.350	8.531	10.454
10.00	9.264	0.276	8.210	9.640	9.375	0.355	8.490	10.480
13.00	9.301	0.269	8.231	9.690				
19.00	9.353	0.242	8.230	9.770	9.465	0.375	8.480	10.580
23.00	9.384	0.240	8.228	9.797				
27.00	9.411	0.247	8.257	9.863				
41.00	9.428	0.352	8.177	10.136				
56.00	9.470	0.444	8.140	10.404				
71.00	9.642	0.404	8.350	10.650	9.938	0.444	8.710	11.130

Table 21. STRESS 2: Temperature Statistics at Site C4

Figure 66. Stress 2 C4 Temperature: Mean and Standard Deviation (degrees Centigrade)

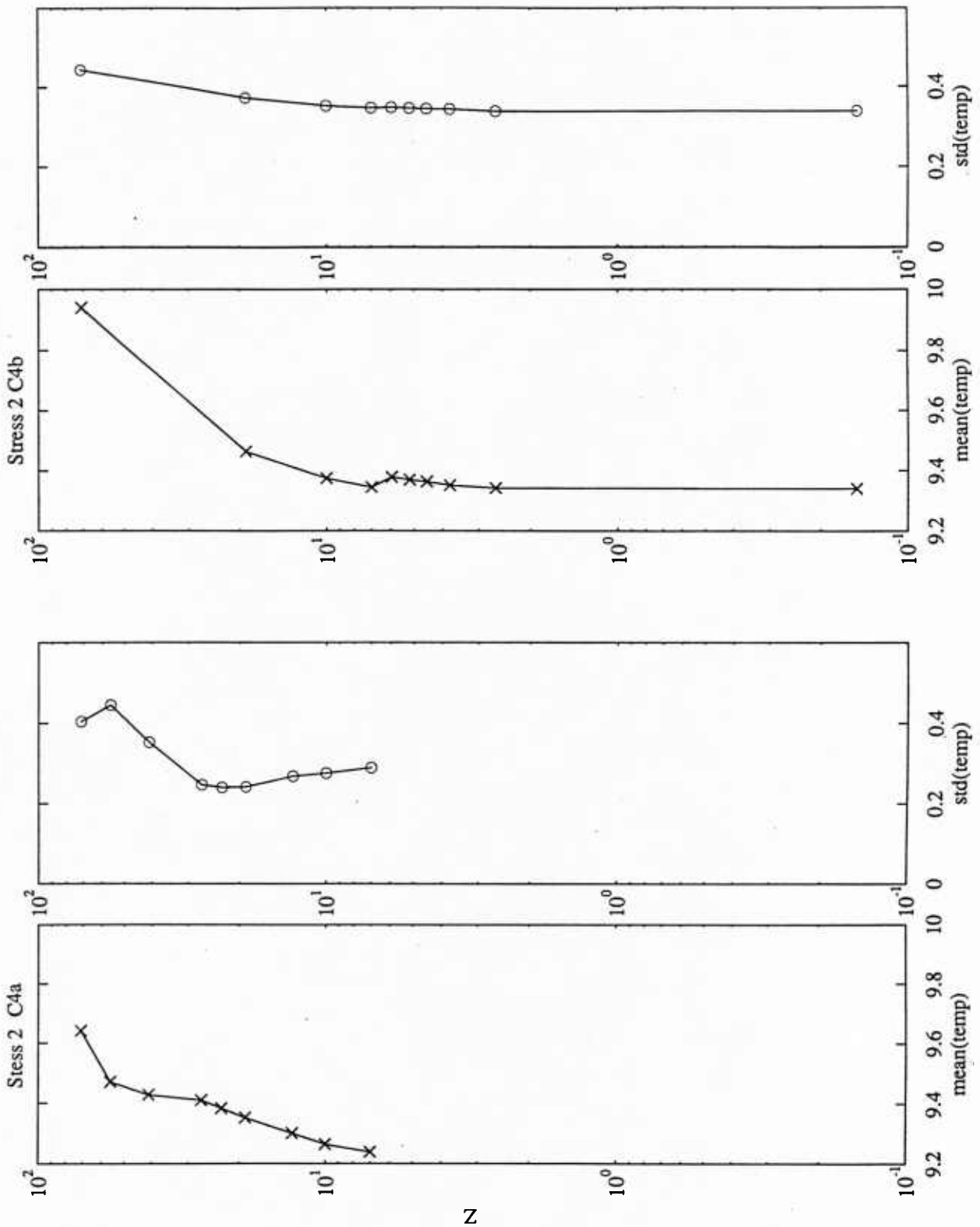
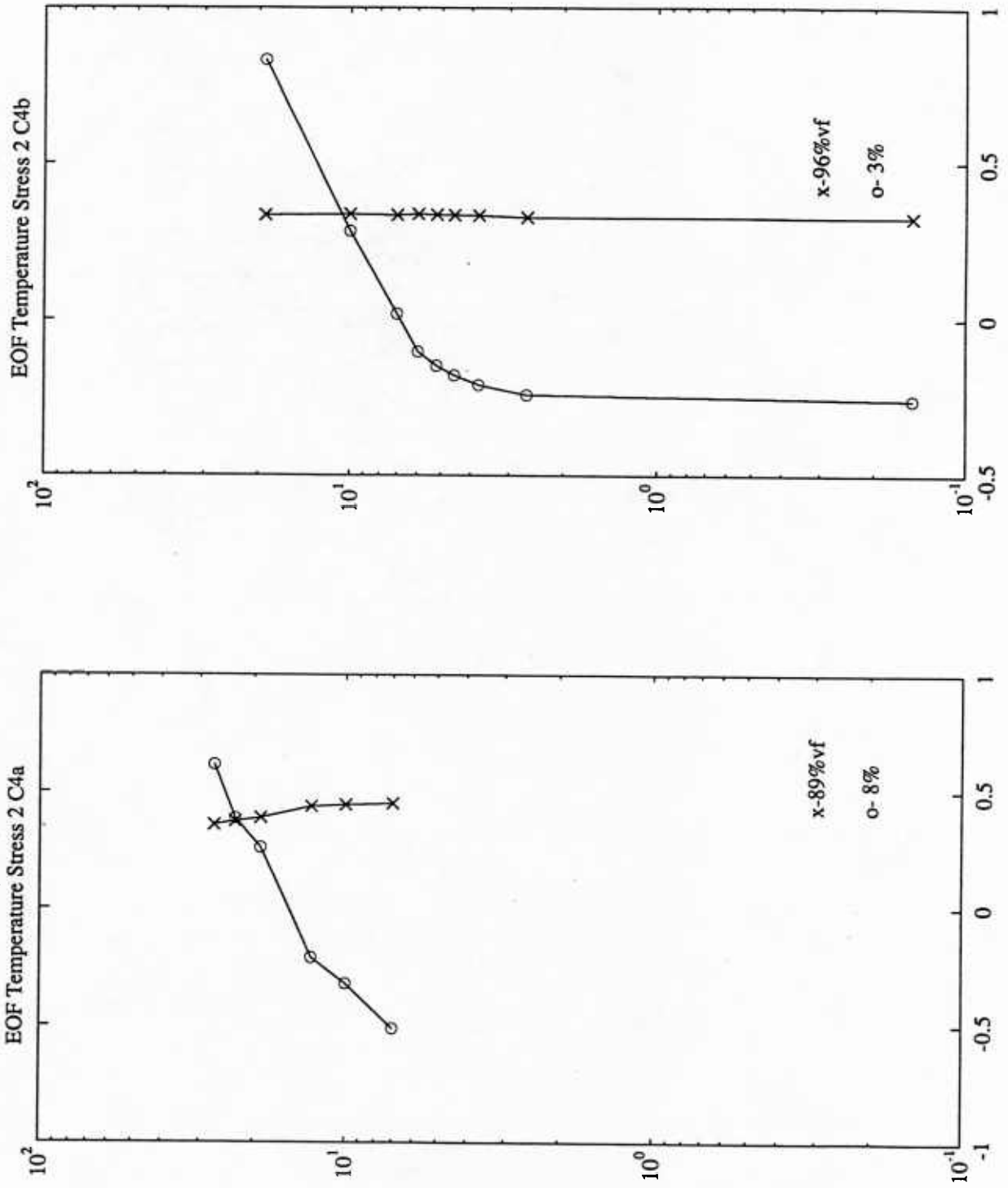


Figure 67. Stress 2 C4 EOF Analysis of Temperature Measurements



STRESS 2 C4 Velocity (cm/sec) - Day 19.5 -> 66.75								
Height	Across-shelf Current				Along-shore Current			
(m)	Mean	Stdev	Min	Max	Mean	Stdev	Min	Max
0.38	0.32	4.20	-15.62	11.93	0.08	6.10	-19.69	16.07
0.73	-0.56	4.58	-18.65	12.79	-0.77	6.29	-20.63	18.78
1.33	-0.81	4.83	-20.16	12.35	-0.66	6.99	-22.25	19.85
1.93	-0.96	5.44	-22.49	13.37	-0.59	8.03	-25.77	20.52
2.53	-1.10	5.73	-24.18	14.21	-0.49	8.41	-26.26	22.91
4.93	-1.32	6.03	-23.70	14.48	-0.19	9.94	-29.50	23.90
10.00	-0.62	6.59	-27.06	15.19	0.66	12.14	-33.44	30.74
19.00	-0.49	6.25	-26.89	19.96	1.23	14.26	-39.95	40.87
71.00	-0.25	7.83	-25.06	23.15	-1.78	20.00	-63.96	45.31

STRESS 2 SPEED (cm/sec)				
Height	C4 (Day 19 - 67)			
(m)	Mean	Stdev	Min	Max
0.4	6.32	3.88	0.26	20.65
0.7	6.66	4.14	0.17	21.49
1.3	7.29	4.49	0.07	23.05
1.9	8.36	5.04	0.10	26.30
2.5	8.83	5.20	0.20	26.85
4.9	10.05	5.99	0.38	29.87
10.0	11.87	7.12	0.55	35.07
19.0	13.45	7.95	0.51	40.90
71.	17.82	12.11	0.40	64.45

Table 22. STRESS 2: Velocity Statistics at Site C4.

Figure 68. Stress 2 C4 Velocity Components: Mean and Standard Deviation (cm/s)

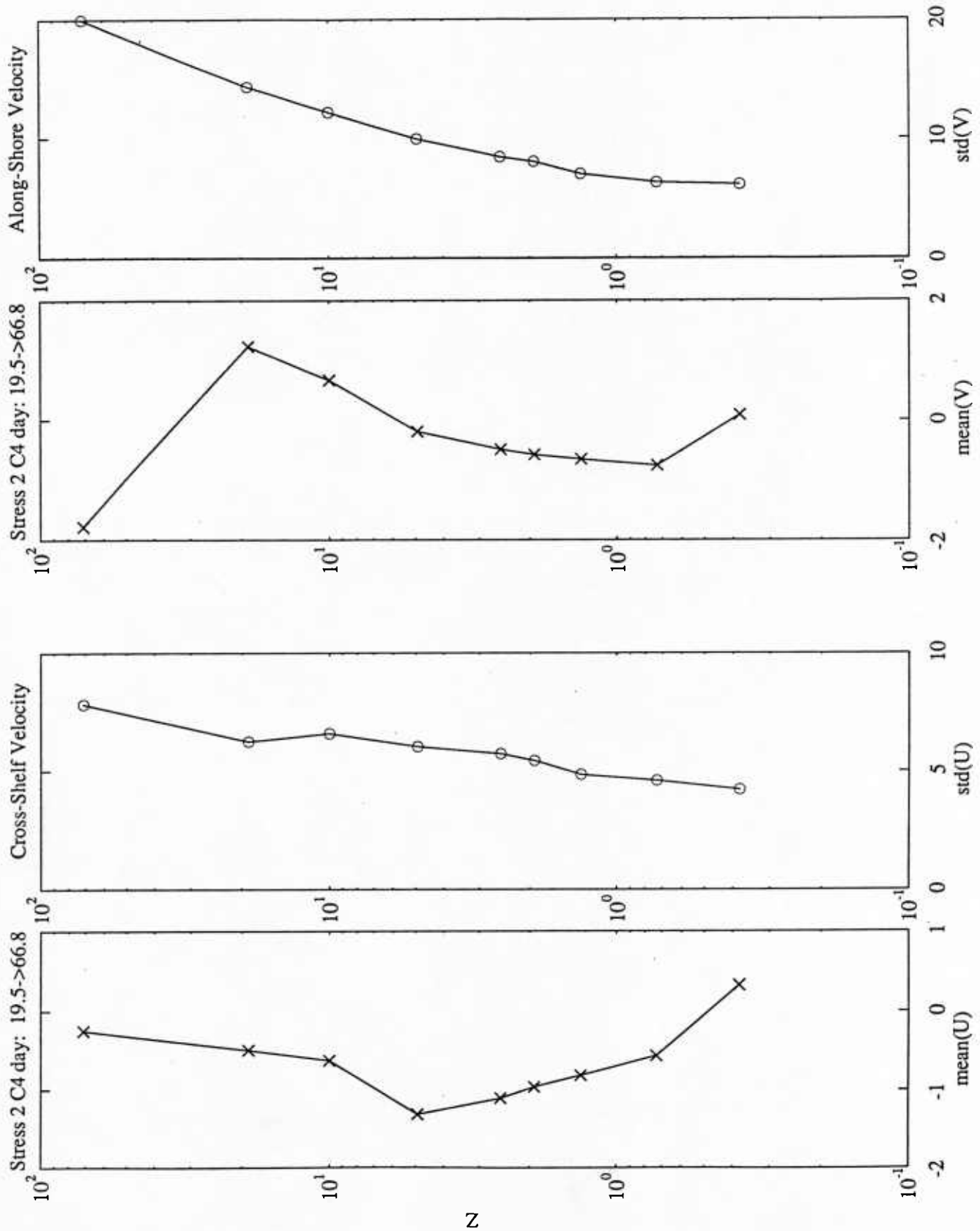


Figure 69. Stress 2 C4 Current Speed: Mean and Standard Deviation (cm/s)

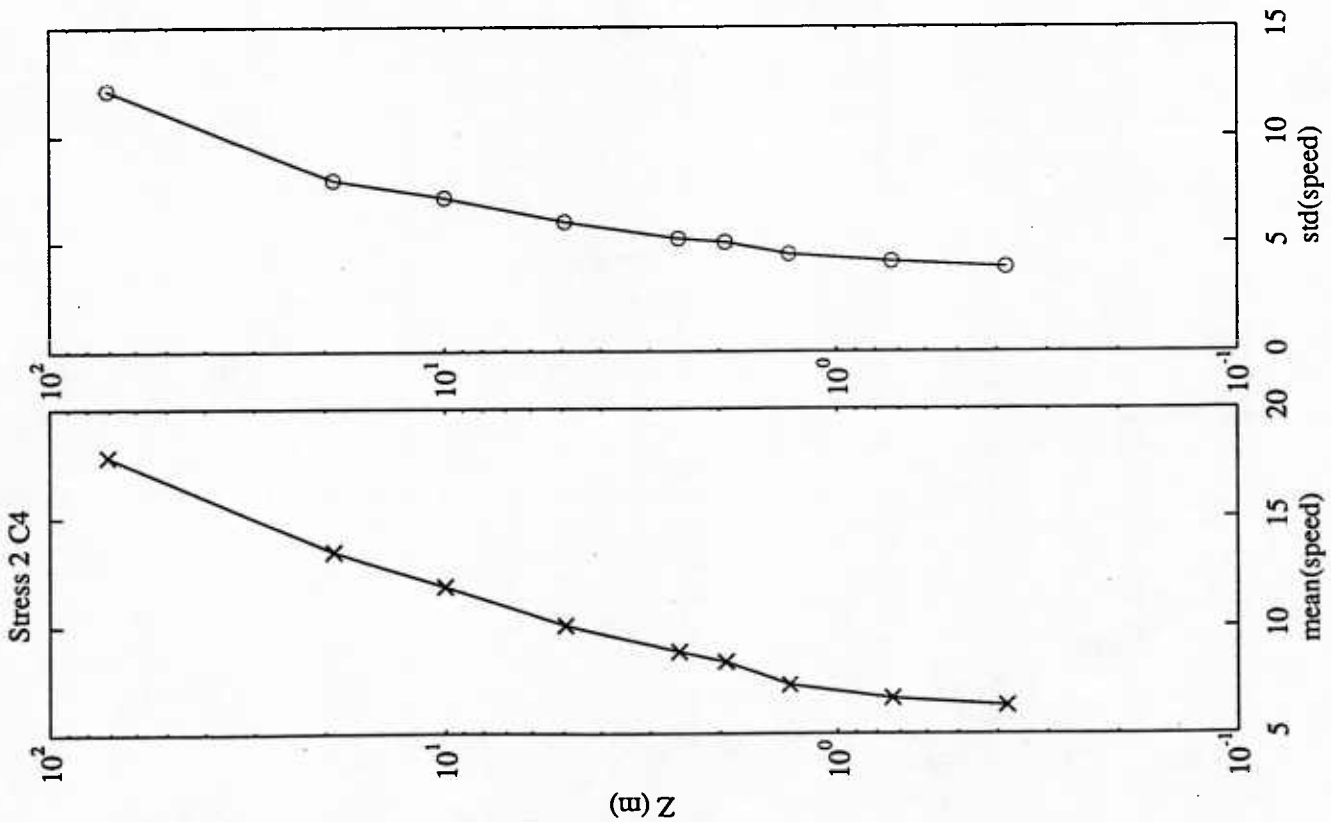
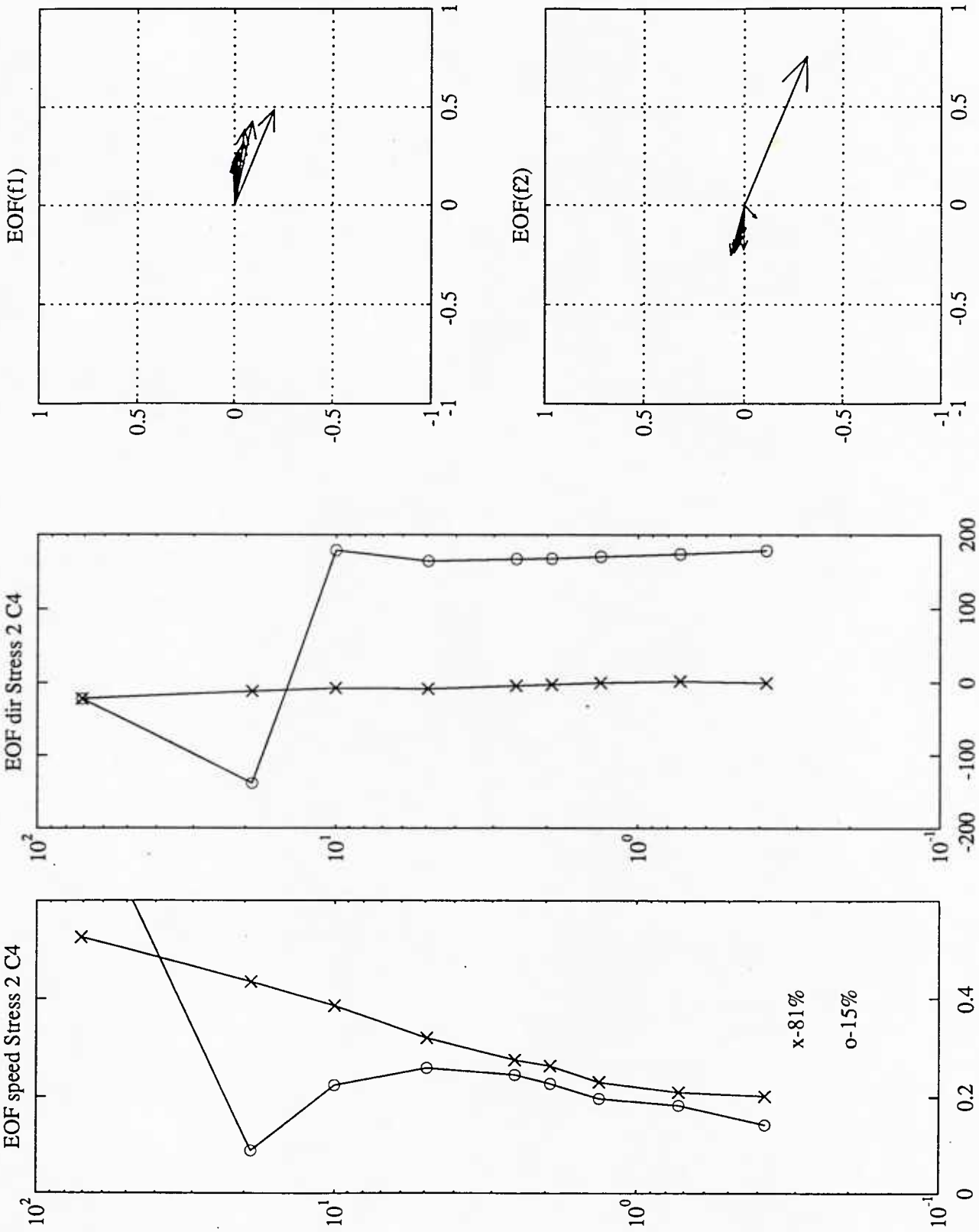


Figure 70. Stress 2 C4 EOF Analysis of Velocity Measurements



6. DATA FILE DOCUMENTATION

The data, as described, were saved as MATLAB® (mat) files. The following data sets were created:

STRESS 1:

salc3
tempc3,tempc3a,tempc3b,tempc3p
wc3,wc3a,wc3b,wc3p
atc3,wc3p
wvc3

STRESS 2:

salc3,salc4
tempc2,tempc3,tempc4
wc2,wc3,wc4
atc3,atc4
wvc3,wvc4

where:

cN: represents the site N (c2,c3,c3p[rime] or c4)
sal: contains salinity data
temp: contains temperature data
w: contains velocity components (w=u+iv)
at: contains light attenuation data
wv: contains wave statistics

Each file contains the property measurement, the time of observation reflected by each data element, and the height above bottom for each time-series. The start time in each file varies according to the earliest observation of the given property. The end time in each file is the lastest time of observation of the given property. Since all instrumentation did not commence and terminate at the same times, the value 'NaN' is filled in at times when no observation occurs. Included in each file is a 'mn' and 'mx' matrix which describes where the actual data begins and ends in each time series. The filenames with 'a' or 'b' after the site (eg, tempc3a) contain data subsets where times were selected so as not to include any gaps in the profile (i.e., there are no 'NaN' data values).

MATLAB is a trademark of The MathWorks Inc., Natick, MA 01760

7. ACKNOWLEDGMENTS

We thank Carol Alessi, Woods Hole Oceanographic Institution, for her cooperation in processing and discussing the data which was used in the SMILE and STRESS projects [7]; and, Marinna Martini, Fran Hotchkiss and William Strahle, Atlantic Marine Branch, U.S. Geological Survey, for their cooperation in processing, discussing and deployment of the VACM mooring measurements. We also thank the illustrator, Betsey Doherty, Woods Hole Oceanographic Institution.

The Sediment TRansport Events on Shelves and Slopes was funded by the Geology and Geophysics Program and the Coastal Sciences Program of the Office of Naval Research under ONR Grants: N00014-89-J-1058, N00014-89-J-1067, N00014-89-J-1074 to the Woods Hole Oceanographic Institution; and, N00014-90-J-1046 to the Skidaway Institute of Oceanography. The U.S.Geological Survey contribution was funded by the U.S.G.S. and under ONR Contract N00014-89-J-1058. This support is gratefully acknowledged.

8. REFERENCES

[1] Nowell,A.R.M., P.A. Jumars and J.H.Kravitz, 1987: "Sediment Transport Events on Shelves and Slopes (STRESS) and Biological Effects of Coastal Sediment Transport (BECOST)", *EOS,* **68:** 722-724.

[2] Strahle, William, and Bradford Butman,1985: "Modification of EG&G Vector Averaging Current Meter to Record Light Transmission and Water Conductivity", *U.S.Geological Survey Open File Report,* 85-106.

[3] Montgomery, Ellyn T., C.V.R. Dunn, A.J. Williams 3rd,1989: "Report on Sediment TRansport Events on Shelf and Slope (STRESS) Field Season 1: Winter 1988 - 1989 Benthic Acoustic STRESS Sensor (BASS) Component", *Woods Hole Oceanographic Institution Technical Report* , WHOI-89-56.

[4] Gross, Thomas F., A.J.Williams 3rd, (in progress): "Bottom Boundary Layer STRESS Measurements with BASS Tripods Data Report STRESS 1988 - 1989", *Woods Hole Oceanographic Institution Memorandum* , WHOI-93-NN.

[5] Gross, Thomas F., J. Amft, A.J.Williams 3rd, (in progress): "Data Report: STRESS Meeasurements in the Bottom Boundary Layer with BASS Tripods STRESS II 1990-1991", *Woods Hole Oceanographic Institution Memorandum* , WHOI-93-NN.

[6] Tarbell, Susan, A.Spencer, E.T.Montgomery, 1988: "The Buoy Group Data Processing System", *Woods Hole Oceanographic Institution Technical Report* , WHOI-88-3.

[7] Alessi, Carol A., Steven J. Lentz and Robert C. Beardsley, 1991: "Shelf MIxed Layer Experiment (SMILE) PRogram Description and Coastal and Moored Array Data Report", *Woods Hole Oceanographic Institution Technical Report* , WHOI-91-39.

[8] Davis, R.E., 1976: "Predictability of Sea Surface Temperature and Sea Level Pressure Anomalies over the North Pacific Ocean", *Journal of Physical Oceanography* , JPO **6** :249-266.

APPENDIX A. MTR Thermistor Calibration Coefficients.

STRESS 2 (C3) MTR Thermistor Calibration Constants			
Thermistor	a0	a1	a2
2007	-22.5743	15.6421	-1.3330
2008	-22.4719	15.1189	-1.2349
2017	-22.2048	14.7763	-1.1889
2021	-22.5307	15.6785	-1.3410
2022	-22.6014	14.8399	-1.1973
2023	-22.5427	14.6984	-1.1757

APPENDIX B. BASS Tripod Mounted Thermistor Calibration Coefficients

STRESS 1 (C3) BASS Tripod Mounted Thermistor Calibration Constants				
Thermistor	a0	a1	a2	a3
4	0.25978	5.69180	-0.29519	0.02702
2	0.13756	5.71025	-0.30366	0.02876
3	0.11909	5.71763	-0.30799	0.02958
4	0.11870	5.71956	-0.30505	0.02892
6	0.26392	5.70124	-0.30520	0.02899
6	0.20447	5.70589	-0.29862	0.02764
7	0.24592	5.69860	-0.30187	0.02849
8	0.17706	5.71554	-0.31204	0.03043

Stress 2 C3 BASS Thermistor Calibration Constants		
Thermistor	a0	a1
1	0.7431	4.9963
2	0.7482	4.9993
3	0.7473	4.9942
4	0.7523	5.0033
5	0.7648	4.9975
6	0.7581	4.9992
7	0.7621	4.9969
8	0.7620	4.9972

Stress 2 C4 BASS Thermistor Calibration Constants		
Thermistor	a0	a1
1	0.8677	4.9182
2		
3	0.3397	5.3722
4	0.8467	4.9190
5	0.8338	4.9204
6	0.8812	4.9191
7	0.8605	4.9164
8	0.8417	4.9227

DOCUMENT LIBRARY

Distribution List for Technical Report Exchange – July 1, 1993

University of California, San Diego
SIO Library 0175C (TRC)
9500 Gilman Drive
La Jolla, CA 92093-0175

Hancock Library of Biology & Oceanography
Alan Hancock Laboratory
University of Southern California
University Park
Los Angeles, CA 90089-0371

Gifts & Exchanges
Library
Bedford Institute of Oceanography
P.O. Box 1006
Dartmouth, NS, B2Y 4A2, CANADA

Office of the International Ice Patrol
c/o Coast Guard R & D Center
Avery Point
Groton, CT 06340

NOAA/EDIS Miami Library Center
4301 Rickenbacker Causeway
Miami, FL 33149

Library
Skidaway Institute of Oceanography
P.O. Box 13687
Savannah, GA 31416

Institute of Geophysics
University of Hawaii
Library Room 252
2525 Correa Road
Honolulu, HI 96822

Marine Resources Information Center
Building E38-320
MIT
Cambridge, MA 02139

Library
Lamont-Doherty Geological Observatory
Columbia University
Palisades, NY 10964

Library
Serials Department
Oregon State University
Corvallis, OR 97331

Pell Marine Science Library
University of Rhode Island
Narragansett Bay Campus
Narragansett, RI 02882

Working Collection
Texas A&M University
Dept. of Oceanography
College Station, TX 77843

Fisheries-Oceanography Library
151 Oceanography Teaching Bldg.
University of Washington
Seattle, WA 98195

Library
R.S.M.A.S.
University of Miami
4600 Rickenbacker Causeway
Miami, FL 33149

Maury Oceanographic Library
Naval Oceanographic Office
Stennis Space Center
NSTL, MS 39522-5001

Library
Institute of Ocean Sciences
P.O. Box 6000
Sidney, B.C. V8L 4B2
CANADA

Library
Institute of Oceanographic Sciences
Deacon Laboratory
Wormley, Godalming
Surrey GU8 5UB
UNITED KINGDOM

The Librarian
CSIRO Marine Laboratories
G.P.O. Box 1538
Hobart, Tasmania
AUSTRALIA 7001

Library
Proudman Oceanographic Laboratory
Bidston Observatory
Birkenhead
Merseyside L43 7 RA
UNITED KINGDOM

IFREMER
Centre de Brest
Service Documentation - Publications
BP 70 29280 PLOUZANE
FRANCE