MARINE SCIENCES RESEARCH CENTER
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Calibration and CTD intercomparison for the Long Island Sound Study 1989

H. Bokuniewicz, R. Muller and J. Salerno
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This work was supported by the U.S. EPA and conducted in cooperation with the Marine Science Institute of the University of Connecticut. We were fortunate to have been able to collaborate with Dr. W. Frank Bohlen and Mr. David Cohen.

Approved for Distribution

J. R. Schubel, Director
August 1989

Working Paper #34
Reference #89-6

INTRODUCTION

Beginning in April 1988, CTD cruises were conducted in western Long Island Sound under the EPA National Estuary Program's Long Island Sound Study. An Applied Microsystem (AMS) CTD Model STD 12 was used. At the same time, cruises were also conducted in the eastern Sound by the Marine Sciences Institute of the University of Connecticut using a Seabird Seacat Model SBE 19 CTD. After June, 1989 some supplemental cruises were also run in the western Sound by the Marine Sciences Research Center using a Seabird Seacat Model SBE 19 CTD. The results of an intercomparison done among these three instruments are presented in this report.

METHOD

In the western Sound the instrument routinely would be lowered to the sea floor together with a water-bottle rosette. The package would then be brought to the surface stopping to record CTD data and to take water samples every 2 meters. The entire cast typically takes 20 to 30 minutes. The Seacat was lowered to the bottom at a speed of about one meter per second and recorded twice every second. The calibration data for both of these instruments is included in the appendices (I and II). Between August 1986 and April 1987, data was taken with a Martek Model Mark VI. This instrument was not included in the intercomparison but its calibration data is appended to an MSRC Special Report by Zimmerman and Bokuniewicz (1989, in preparation).

The intercalibration was done off the R/V UCONN in the eastern Sound at approximately 41^{o} 17' 30" N; 72^{o} 01' 50" W on 8 June, 1989. The water depth was about 26 m. All instruments were lowered 1 meter below the surface and allowed to equilibrate for two minutes. The continuous casts were done at speeds of one meter per second. After the first cast all instruments were lowered on the same wire. Five comparable casts were done as follows:

TIME CAST BEGAN (EDT)	MSRC SEACAT	MSRC AMS	UCONN SEACAT	COMMENTS
1030	SU00	CAST 1	FIS1A	SUNY's SEACAT and AMS was lowered with the rosette at about 1m/s and came up slow stopping every 2m. UCONN's SEACAT went down on a separate line at 1m/s and came up 1m/s.

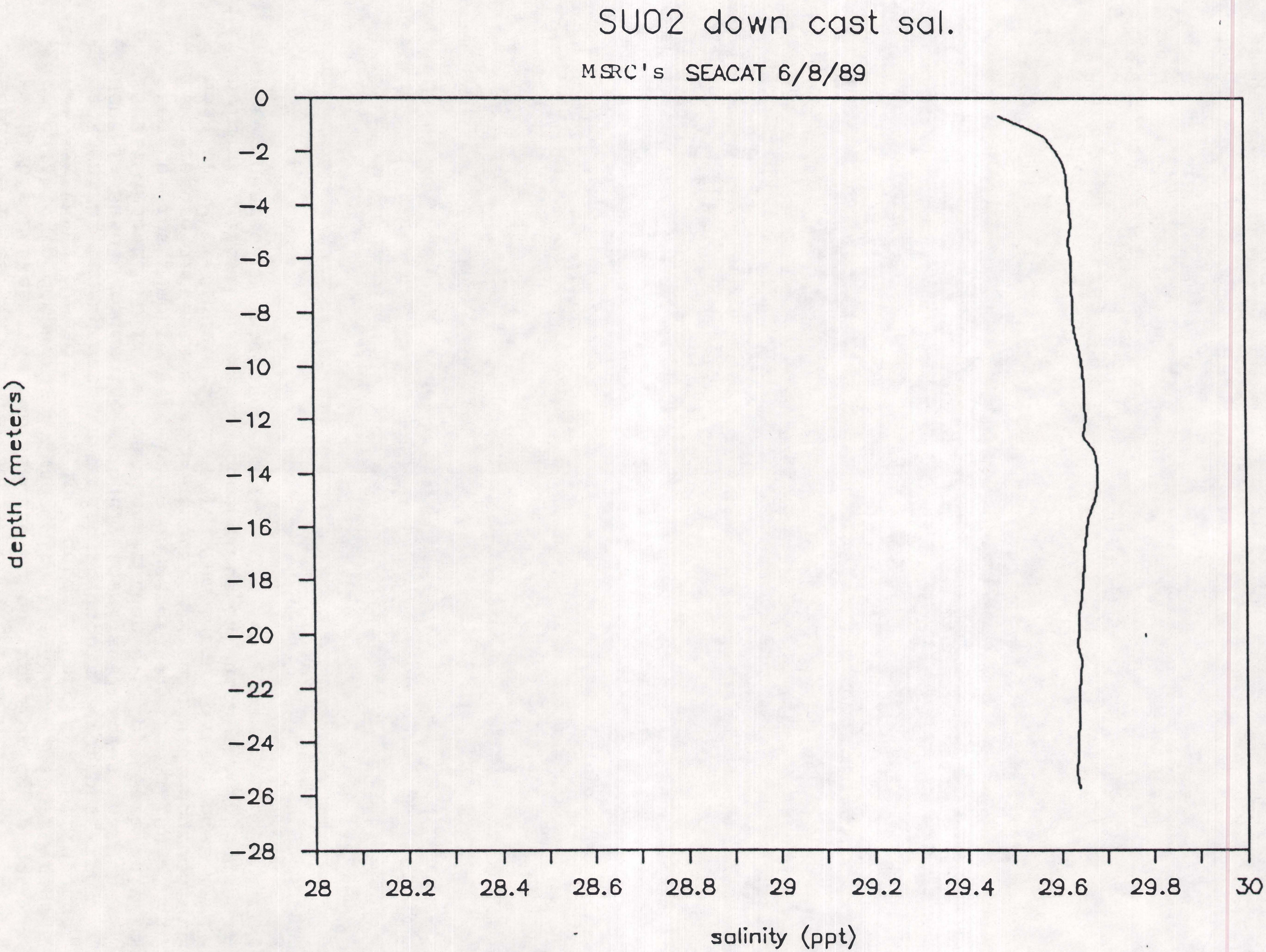
	SU02		FIS2A	Both SEACATS together on rosette, down at 1m/s and up at 1m/s.
1118	SU04	CAST 2	FIS2B	All instruments together on one line, down at 1m/s, up slowly stopping every 2m.
1200	SU05	CAST 3	FIS3A	All together on one line, down and up at 1m/s, 5 times.
1235	SU06	CAST 4	FIS4A	All together, down and up at 1m/s.

RESULTS

Individual salinity profiles recorded by all instruments are shown in Figures 1 through 18 and the temperature profiles in Figures 19 through 36. (The set of Figures 1 through 48 are reproduced as Appendix III to this report and, for economy, only representative examples will be inserted in the main text as needed.) The water column was well mixed (e.g., Figure 3A) with salinities of about 29.6 parts per thousand (ppt) and a temperature of about 13^{O}C (e.g., Figure 21A)

During the simultaneous tests the pressure recorded by the AMS at the bottom averaged 11% higher than that recorded by SUNY's Seacat and 9% higher than that recorded by UCONN's Seacat. For these comparisons, therefore, a correction of 10% was applied to the AMS's pressure data.

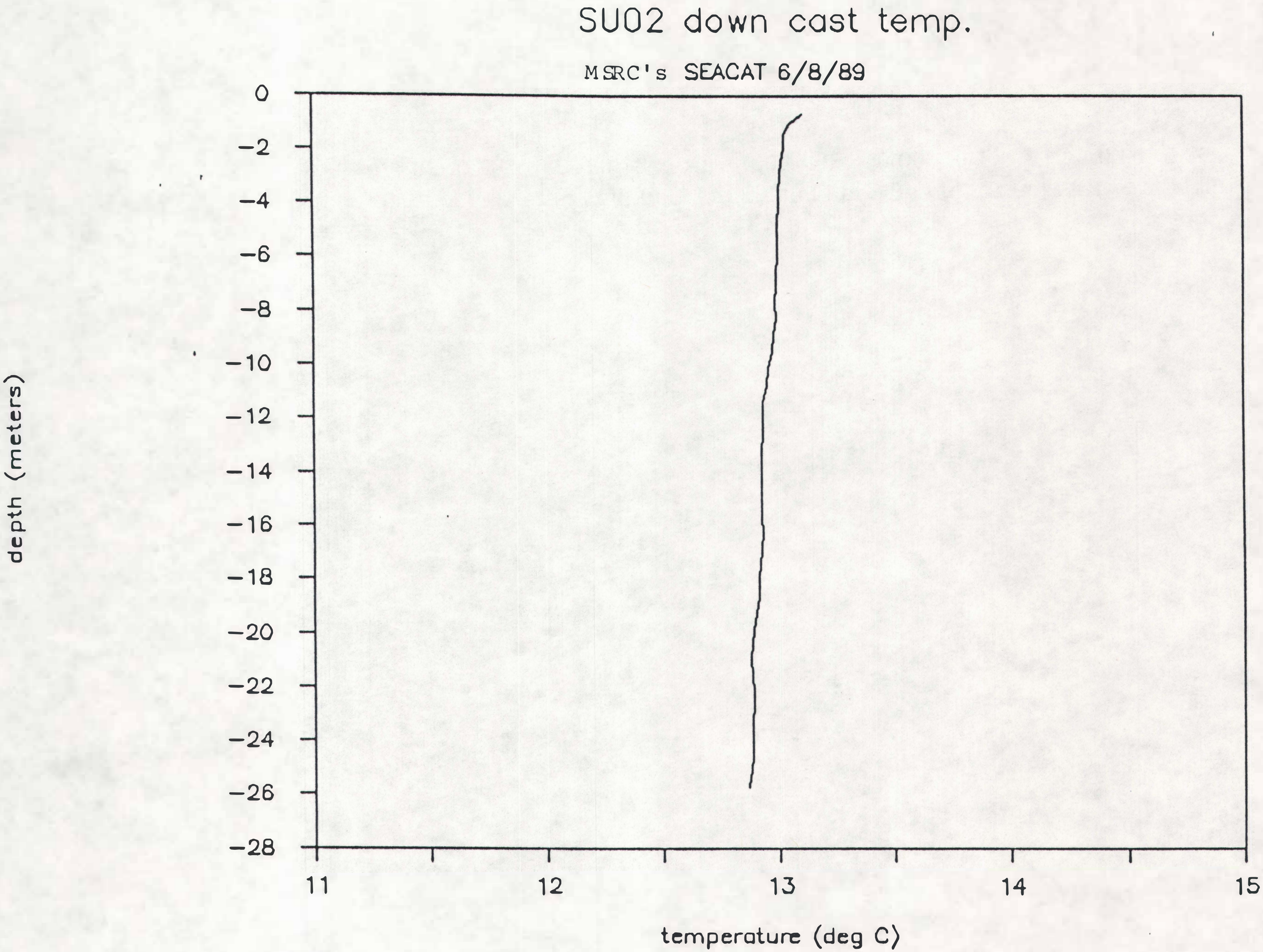
Whenever two measurements were made on separate instruments simultaneously and within 0.1 m of each other, the differences in the measurements were plotted. Salinity differences are shown in Figures 37 to 42 and temperature differences in Figures 43 through 48 (Appendix IV). Both temperature and salinity diferences are also presented as histograms in Figures 49 to 60. There was no substantial difference between upcast and downcast comparisons. The salinity differences were generally within 0.05 ppt. Between the AMS and UCONN's Seacat, a salinity difference was 0.01 ppt on the downcast (Figure 49) and 0.02 ppt on the upcast (Figure 50) were observed most frequently with the Seacat recording higher salinities. Larger differences (0.05 to 0.10 ppt) with the AMS recording higher salinities were found on the cast in which the instruments were lowered on different wires. The salinity comparison between the AMS and SUNY's Seacat showed a difference of 0.02 ppt (Figures 51 and 52) most frequently with measurements from the AMS always being lower than that of the Seacat when the two instruments were downcast on separate lines. These measurements appear as a cluster between + 0.03 and + 0.06 ppt in Figure 51. On the upcasts, the AMS consistently recorded lower salinities than SUNY's Seacat and differences larger than 0.04 ppt were only recorded when the instruments were operated on separate lines. A greater number of intercomparisons were available between the two Seacats so the resolution is not comparable to compariusons made with the AMS. The differences between the two Seacata are in Figures 53 and 54. Differences between the two Seacats were most frequenlty 0.02 ppt with UCONN's Seacat recording slightly lower salinities than the SUNY's Seacat. Differences greater than 0.05 ppt were only found when the instruments were lowed on separate wires. The temperature differences were generally within 0.03 degrees with a mode of zero (Figures 55 to 60). The larger differences were primarily attributable to those casts on which the instruments were lowered on separate wires.



SU02 down cast sal.
MSRC's SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

4

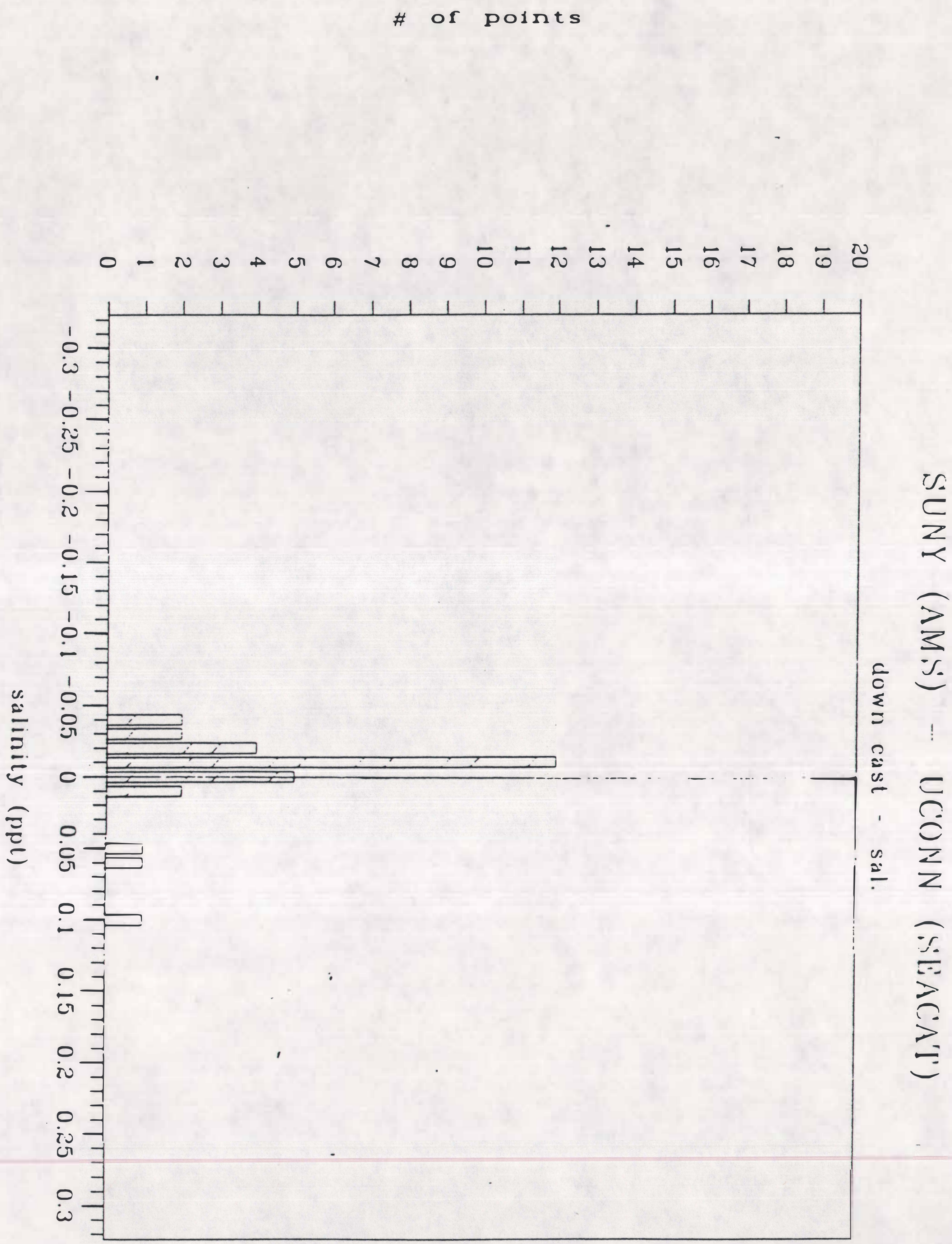
Figure 3A



SU02 down cast temp.
MSRC's SEACAT 6/8/89
depth (meters)
0
−2
−4
−6
−8
−10
−12
−14
−16
−18
−20
−22
−24
−26
−28
11
12
13
14
15
temperature (deg C)

Figure 21A

Figure 49 Histogram of the salinity differences between the AMS and UCONN's Seacat on the downcasts.



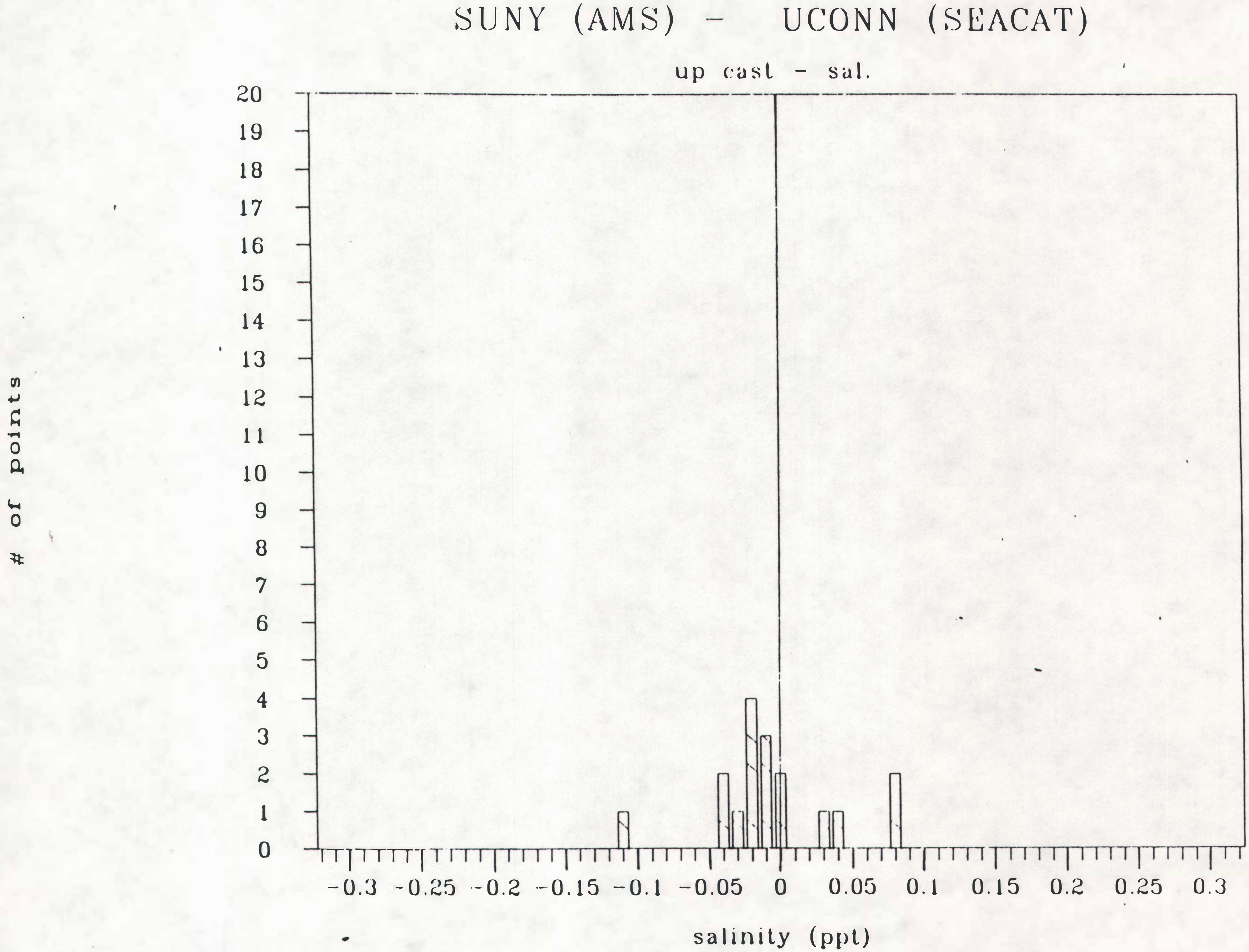


Figure 50 Histogram of the salinity differences between the AMS and UCONN's Seacat on the upcasts.

Figure 51 Histogram of the salinity differences between the AMS and SUNY's Seacat on the downcasts.

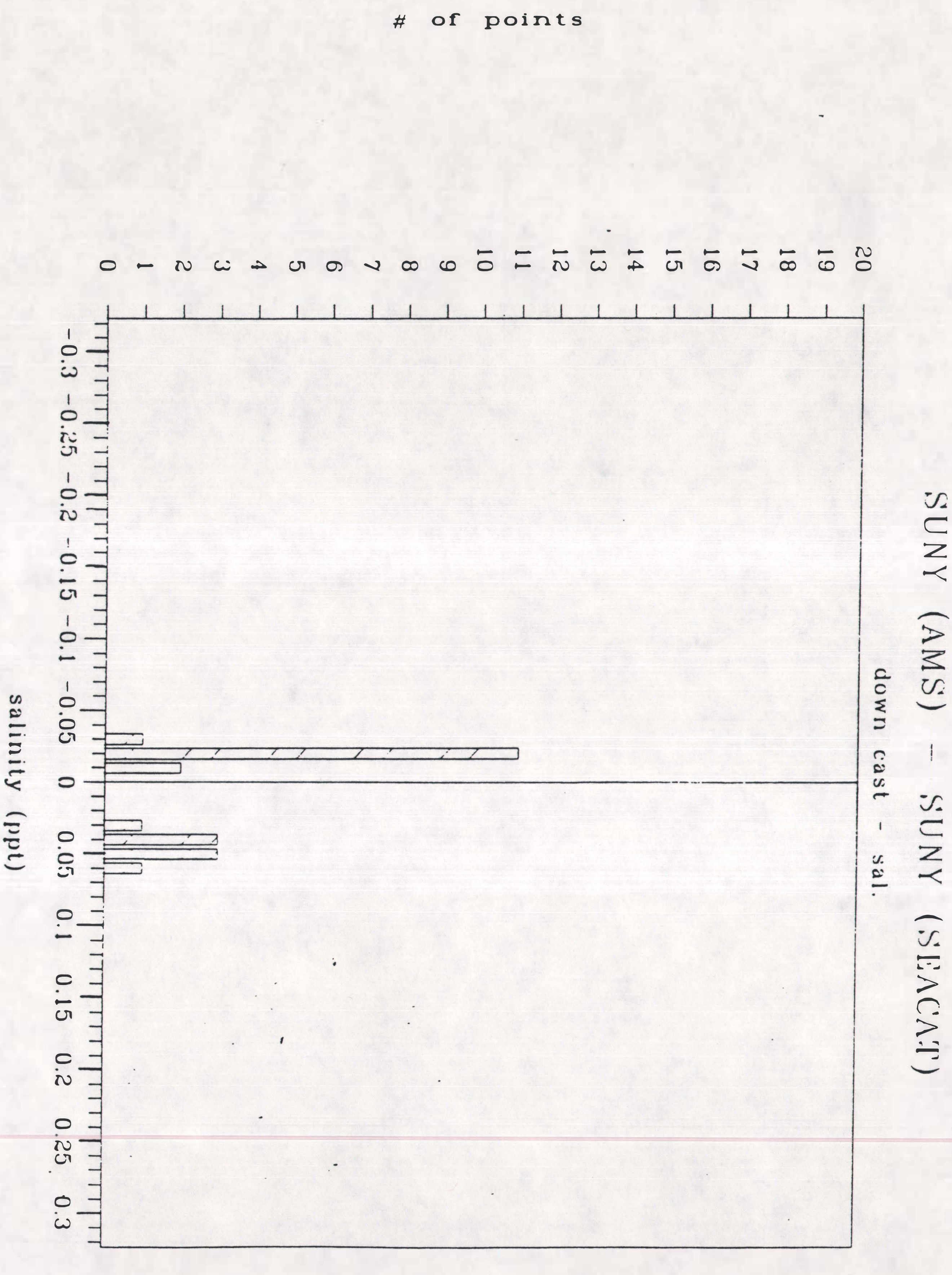


Figure 52 Histogram of the salinity differences between the AMS and SUNY's Seacat on the upcasts.

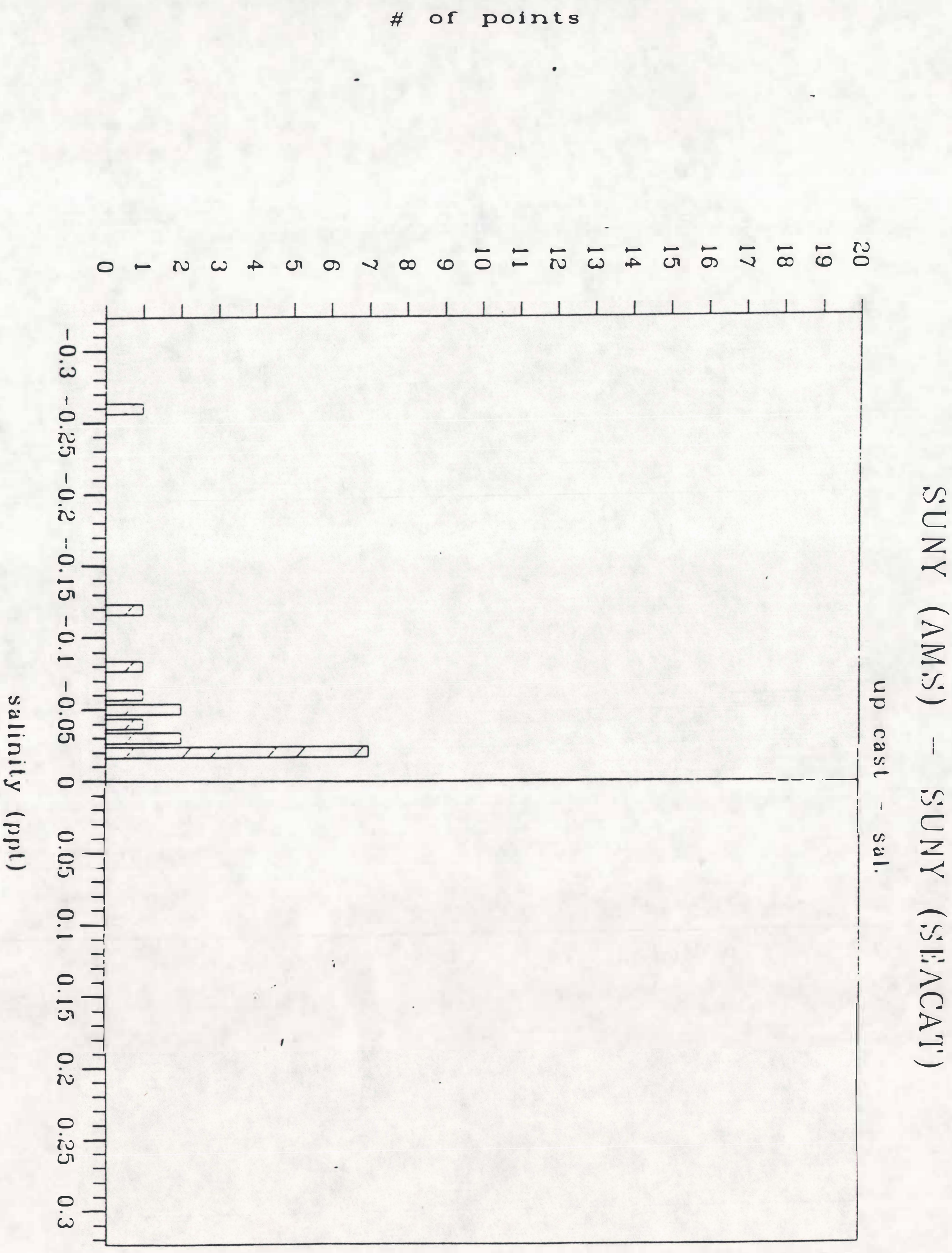


Figure 53 Histogram of the salinity differences between UCONN's Seacat and SUNY's Seacat on the downcasts.

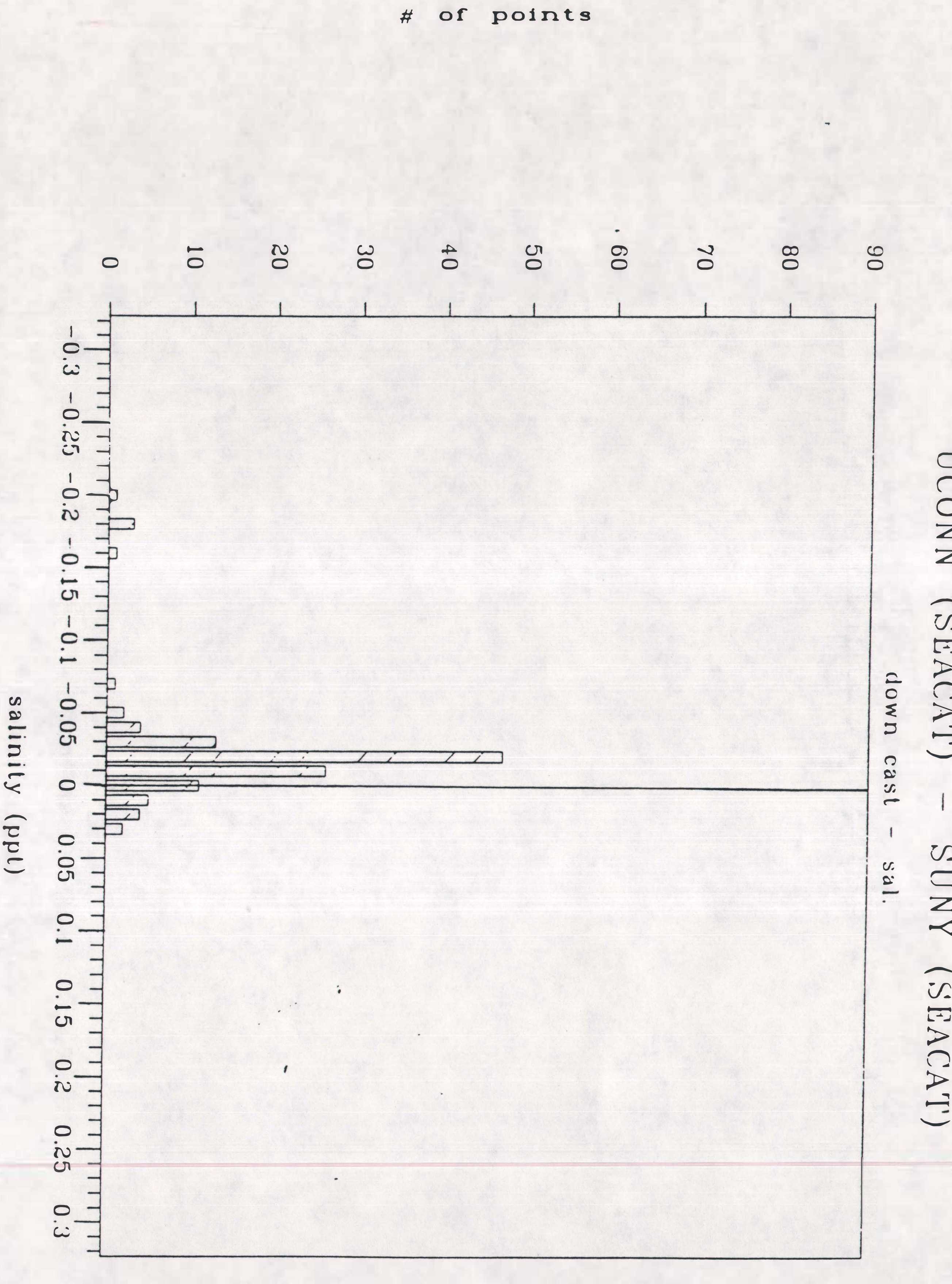


Figure 54 Histogram of the salinity differences between UCONN's Seacat and SUNY's Seacat on the upcasts.

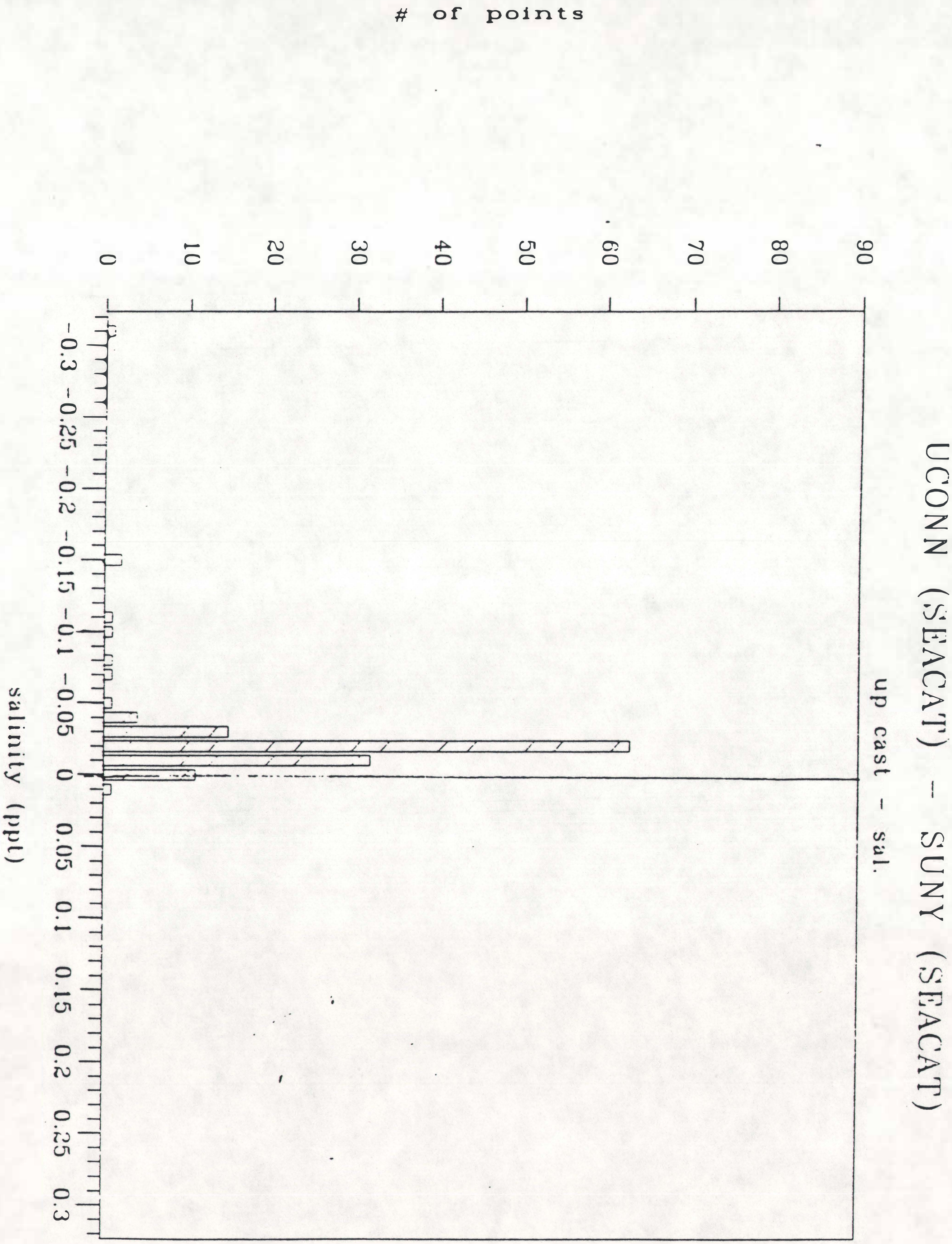


Figure 55 Histogram of the temperature differences between the AMS and UCONN's Seacat on the downcasts.

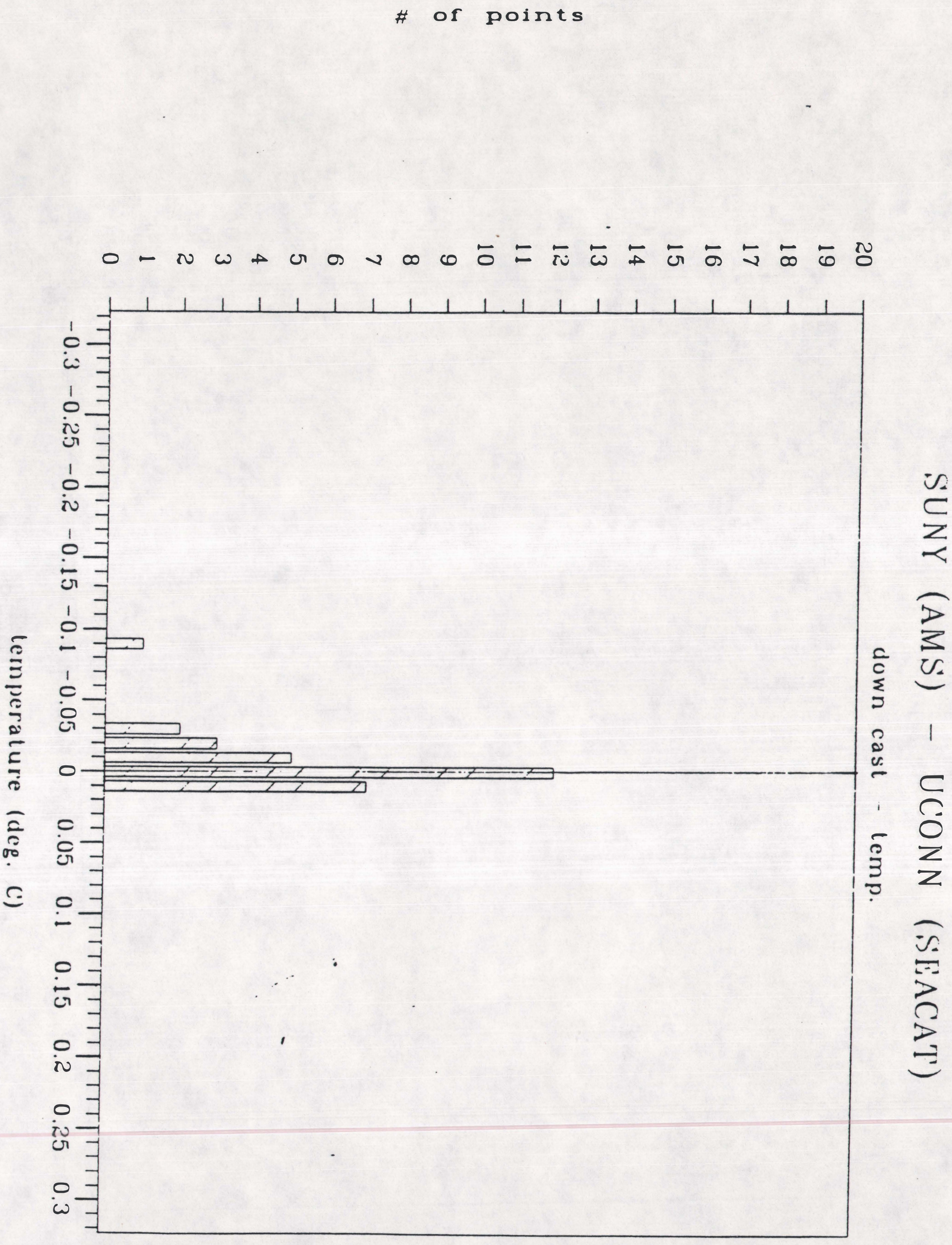


Figure 56 Histogram of the temperature differences between the AMs and UCONN's Seacat on the upcasts.

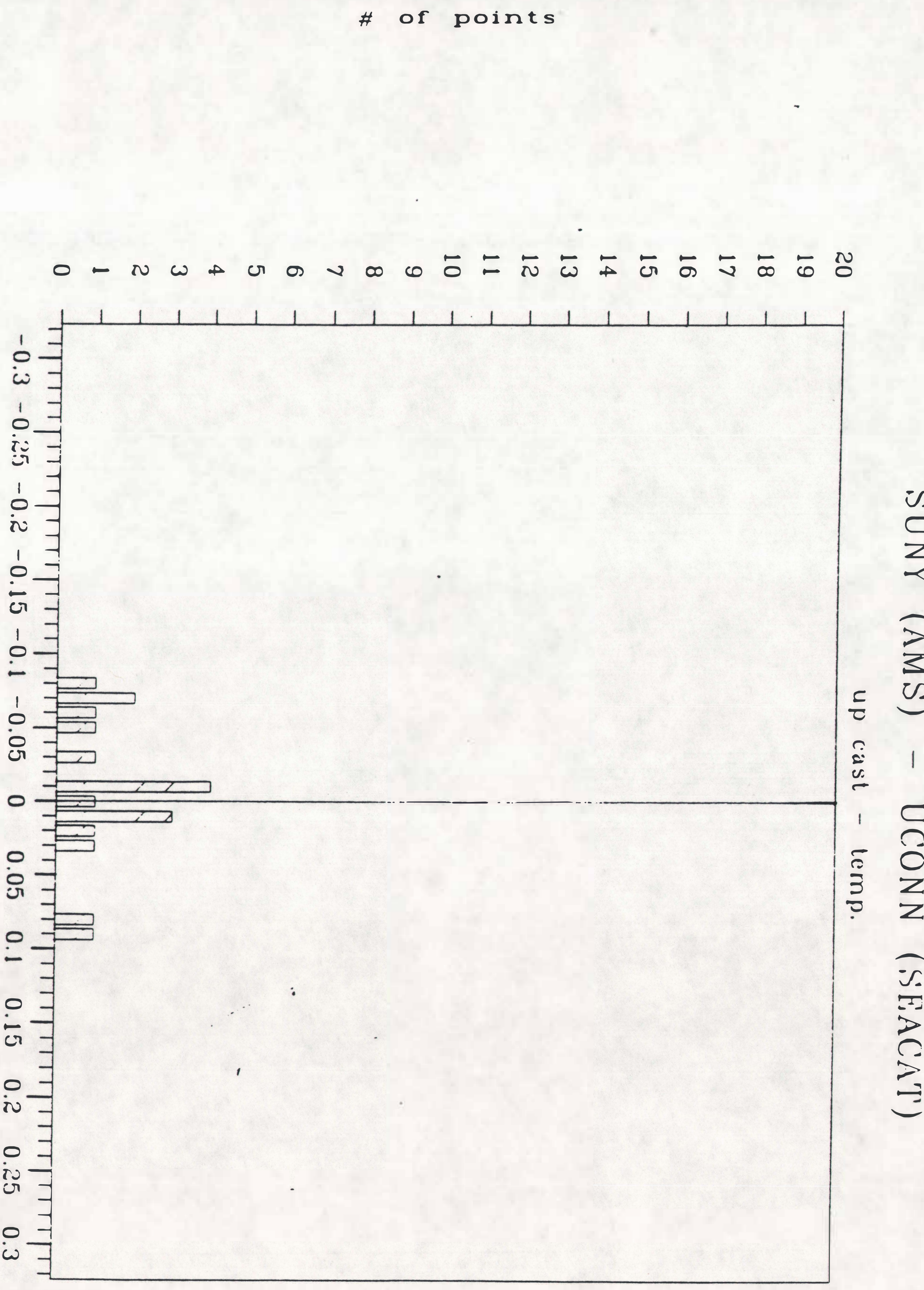


Figure 57 Histogram of the temperature differences between the AMS and SUNY's Seacat on the downcasts.

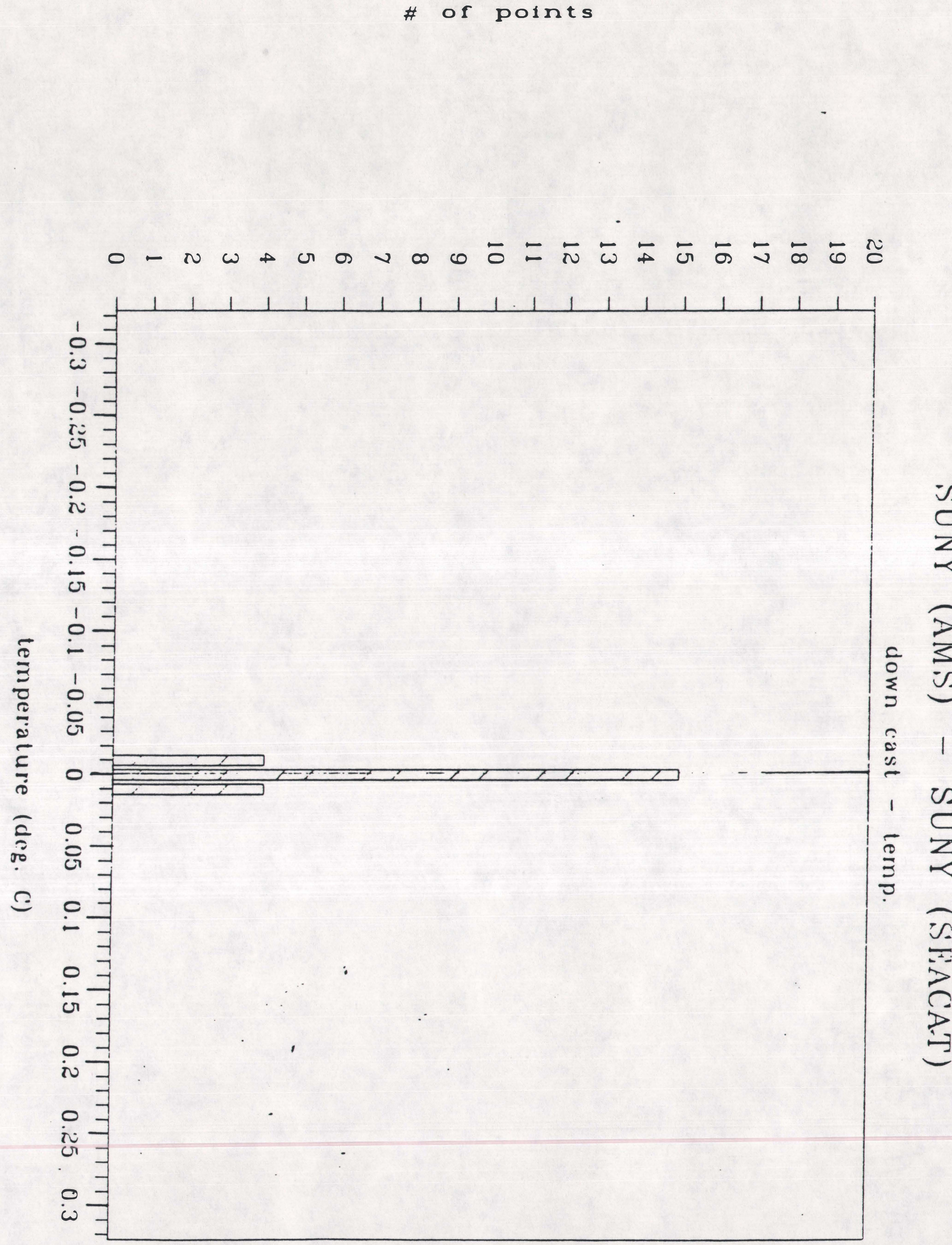


Figure 58 Histogram of the temperature differences between the AMS and SUNY's Seacat on the upcasts.

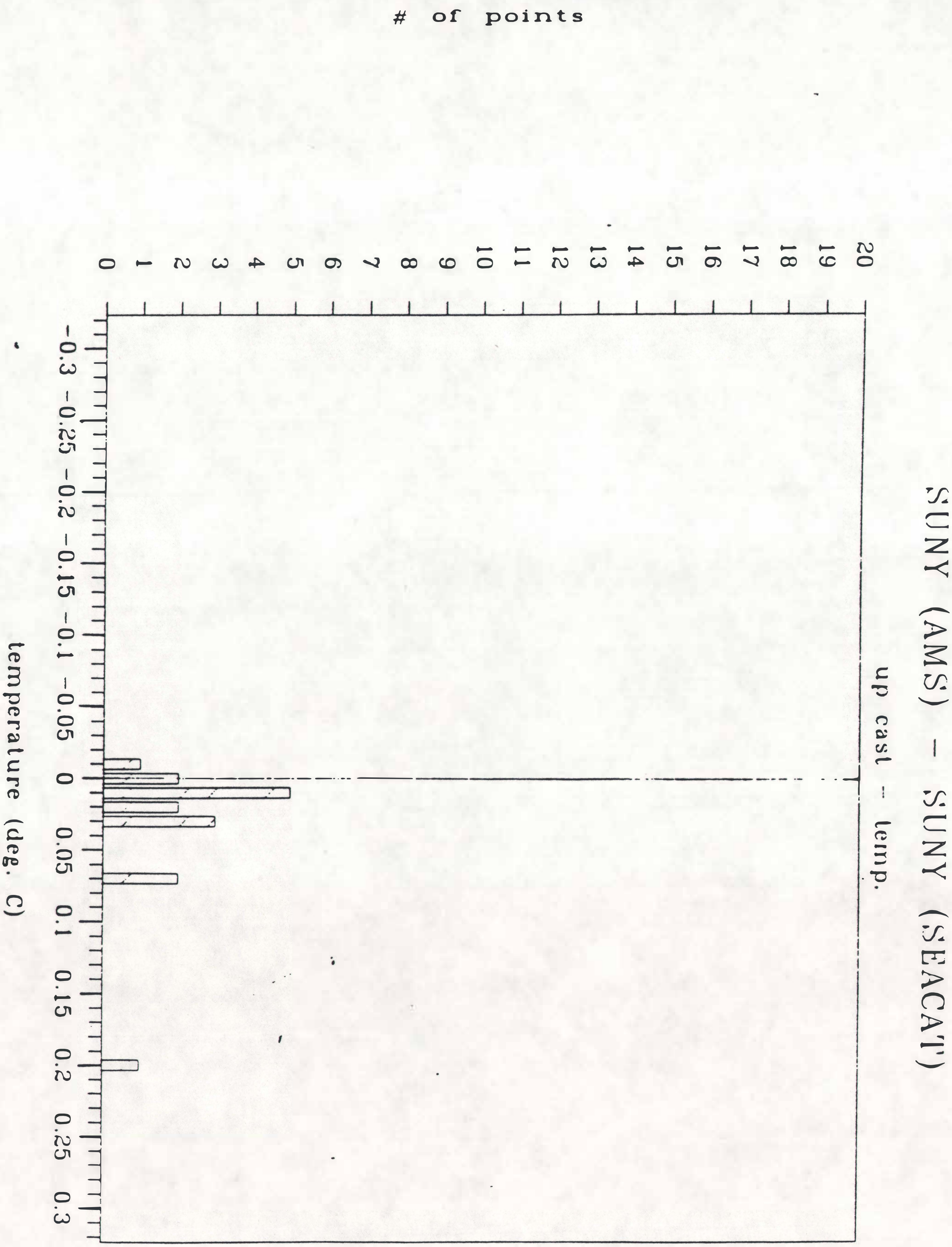


Figure 59 Histogram of the temperature differences between UCONN's Seacat and SUNY's Seacat on the downcasts.

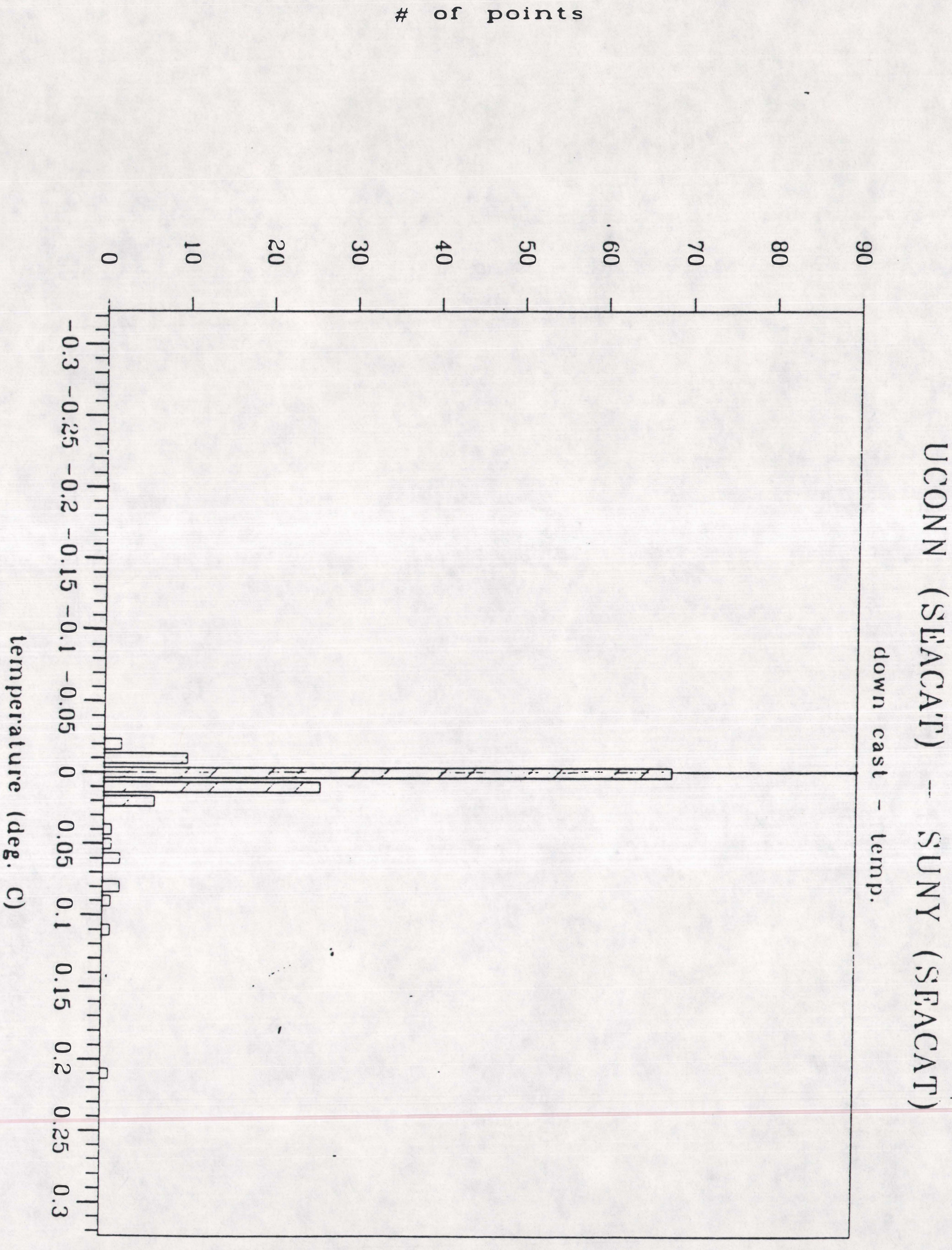
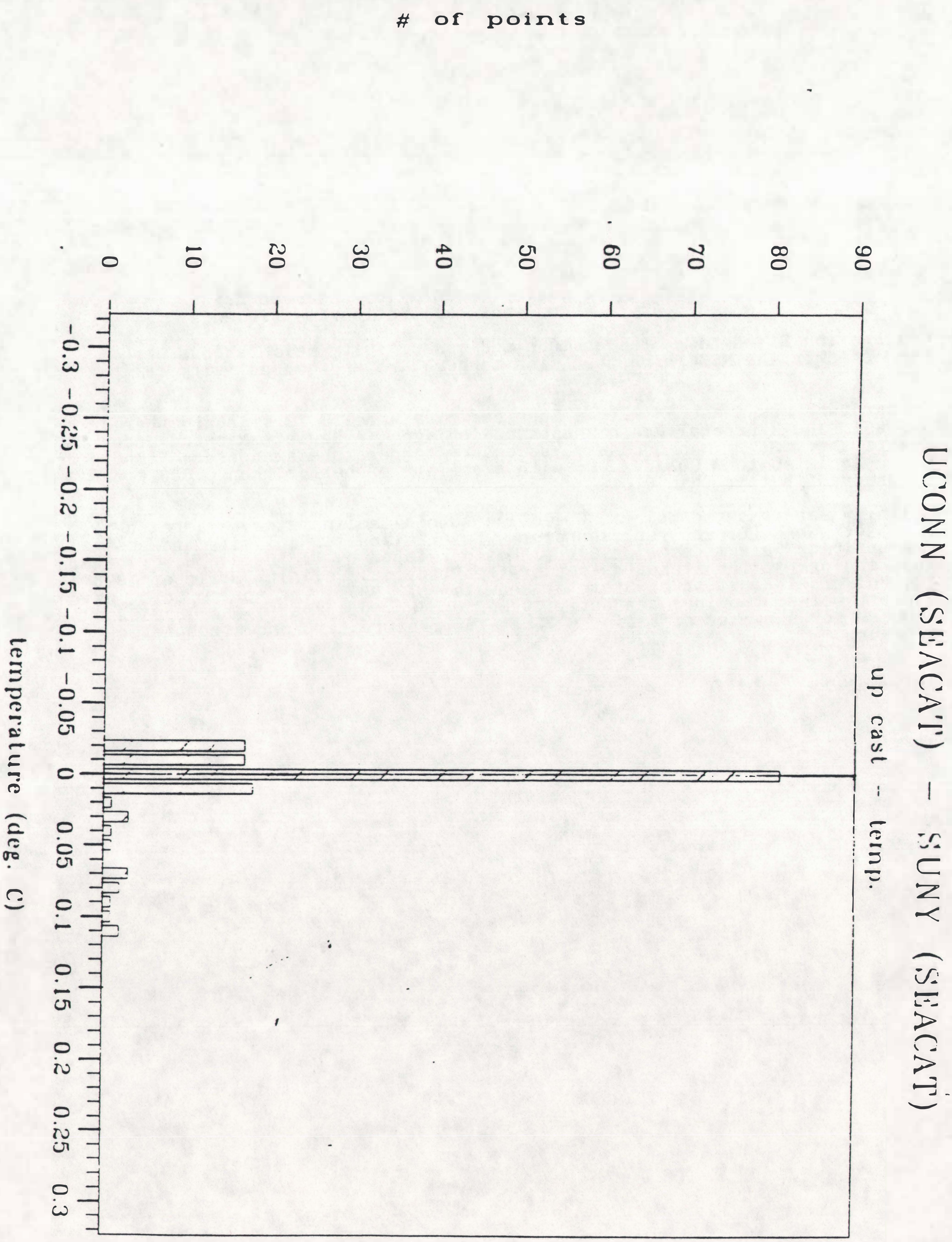


Figure 60 Histogram of the temperature differences between UCONN's Seacat and SUNY's Seacat on the upcasts.



APPENDIX I

ELECTRONICS AND OCEAN INSTRUMENT FACILITY
MARINE SCIENCES RESEARCH CENTER
STATE UNIVERSITY OF NEW YORK, STONY BROOK, NY 11794-5000

CALIBRATION REPORT

INSTRUMENT: Applied Microsystems STD-12.
SERIAL NUMBER: 487.
USED FOR FIELD DATES BETWEEN: 4/4/88 until 3/21/89.
REPORT DATE: 14 April 1989.

GENERAL INFORMATION

Generalized Polynomial Translation Equation:

$$P_c=A_0+A_1*P_r+A_2*(P_r)^2+A_3*(P_r)^3$$

Where: P_c= Translated parameter (corrected data).
P_r= Observed parameter (reading or observed data).
A_0, A_1, A_2, A_3= constant calibration coefficients.

Calibration Standards: Temperature and conductivity calibrations were conducted in the MSRC high precision temperature and conductivity calibration facility.

Temperature was measured with a Thermometrics Model S-10 standard thermistor, S/N 554, and a General Radio Wheatstone bridge. A Hewlett Packard Model 2801A Quartz thermometer was used as a secondary temperature standard. Temperature was calculated to 0.001 deg. C, with stability of better than 0.003 C and accuracy of better than 0.01 C.

Salinity was measured using a Guildline AutoSal salinometer calibrated with IAPSO standard "Copenhagen" seawater. Calculations of salinity and nominal conductivity were made using algorithms developed by Dr. Donald W. Pritchard that conform to the standards set by the Practical Salinity Scale of 1978 and the Universal Equation of State of Seawater of 1980. The scale factor used to convert between nominal conductivity and conductivity ratio was 42.9192 mmho/cm for seawater of salinity 35 at temperature 15 C and atmospheric pressure.

PARAMETER: Temperature, degrees centigrade.
CALIBRATION DATE: 4/1/88.

CALIBRATION DATA AND ANALYSIS

STD-12 Reading	Bath Temperature	Calculated Temperature	Error
14007.5	30.011	30.012	0.001
17407	25.032	25.032	0.000
20923	20.007	19.995	-0.012
24358	15.013	15.026	0.013
27698.5	9.988	9.996	0.008
30809	5.027	5.009	-0.018
33689	0.020	0.027	0.007

Regression coefficients:
A_0= 5.49774E+01 A_1= -2.19560E-03
A_2= 3.85850E-08 A_3= -6.47950E-13
The standard error of the regression fit is 0.0121 degrees C.

PARAMETER: Conductivity, millimho/centimeter.
CALIBRATION DATE: 4/1/88.

CALIBRATION DATA AND ANALYSIS

STD-12 Reading	Bath Conductivity	Calculated Conductivity	Error
33422	46.784	46.784	-0.000
31005	38.466	38.477	0.011
29871	34.444	34.408	-0.036
28806	30.531	30.580	0.049
27736	26.822	26.792	-0.030
26706	23.253	23.260	0.007

Regression coefficients:
A_0= 1.55408E+02 A_1= -1.94204E-02
A_2= 7.72878E-07 A_3= -8.64866E-12
The standard error of the regression fit is 0.0344 mmho/cm.

PARAMETER: Pressure, decibars.
CALIBRATION DATE: Spring 1986.
NOTE: To minimize thermal offset effects inherent in strain-gauge pressure transducers such as used in the STD-12, readings are forced to zero at the surface before each STD cast by recalculating the A_0 regression parameter. The data below reflect such recalculation.

CALIBRATION DATA AND ANALYSIS

STD-12 Rdg	Test Pressure	Calculated Pressure	Error
20242	0	0.004	0.004
20951	36.3115	36.638	0.327
21702	74.7446	75.442	0.698
23057	144.1196	145.455	1.336
24395	212.7476	214.590	1.842
25774	283.5406	285.843	2.302
28662	432.6566	435.066	2.409
30325	518.8356	520.993	2.157
32507	632.2336	633.737	1.503
34328	727.3026	727.828	0.525

Regression coefficients:
A0= -1.04590E+03 A1= 5.16700E-02
A2= 0.00000E+00 A3= 0.00000E+00
The standard error of the regression fit is 0.753 decibar.

Approved for use: 4/14/89.

Thomas C. Wilson, Jr.
MSRC Ocean Instrument Engineer

ELECTRONICS AND OCEAN INSTRUMENT FACILITY
MARINE SCIENCES RESEARCH CENTER
STATE UNIVERSITY OF NEW YORK, STONY BROOK, NY 11794-5000

CALIBRATION REPORT

INSTRUMENT: Applied Microsystems STD-12.
SERIAL NUMBER: 487.
USED FOR FIELD DATES BETWEEN: 3/21/89 until superceded.
REPORT DATE: 14 April 1989.

GENERAL INFORMATION

Generalized Polynomial Translation Equation:

$$P_c=A_o+A_1*P_r+A_2*(P_r)^2+A_3*(P_r)^3$$

Where: P_c= Translated parameter (corrected data).
P_r= Observed parameter (reading or observed data).
A_o. A_1, A_2, A_3= constant calibration coefficients.

Calibration Standards: Temperature and conductivity calibrations were conducted in the MSRC high precision temperature and conductivity calibration facility.

Temperature was measured with a Thermometrics Model S-10 standard thermistor. S/N 554, and a General Radio Wheatstone bridge. A Hewlett Packard Model 2801A Quartz thermometer was used as a secondary temperature standard. Temperature was calculated to 0.001 deg. C, with stability of better than 0.003 C and accuracy of better than 0.01 C.

Salinity was measured using a Guildline AutoSal salinometer calibrated with IAPSO standard "Copenhagen" seawater. Calculations of salinity and nominal conductivity were made using algorithms developed by Dr. Donald W. Pritchard that conform to the standards set by the Practical Salinity Scale of 1978 and the Universal Equation of State of Seawater of 1980. The scale factor used to convert between nominal conductivity and conductivity ratio was 42.9192 mmho/cm for seawater of salinity 35 at temperature 15 C and atmospheric pressure.

PARAMETER: Temperature, degrees centigrade.
CALIBRATION DATE: 3/21-22/89.

CALIBRATION DATA AND ANALYSIS

STD-12 Reading	Bath Temperature	Calculated Temperature	Error
10778	34.925	34.941	0.016
14041	29.995	29.957	-0.038
17426	24.993	25.013	0.020
24390	14.956	14.971	0.015
27725	9.941	9.938	-0.003
30826	4.988	4.965	-0.023
33698	-0.002	0.011	0.013

Regression coefficients:
A_0= 5.45206E+01 A_1= -2.13066E-03
A_2= 3.56722E-08 A_3= -6.06760E-13
The standard error of the regression fit is 0.0246 degrees C.

PARAMETER: Conductivity, millimho/centimeter.
CALIBRATION DATE: 3/21-22/89

CALIBRATION DATA AND ANALYSIS

STD-12 Reading	Bath Conductivity	Calculated Conductivity	Error
34245	51.092	51.103	0.011
33037	46.805	46.780	-0.025
31860	42.551	42.557	0.006
30705	38.393	38.409	0.016
29580	34.363	34.367	0.004
28489	30.461	30.451	-0.010
27458	26.764	26.756	-0.008
26469	23.214	23.221	0.007

Regression coefficients:
A_0= -5.81994E+01 A_1= 2.24487E-03
A_2= 4.41740E-08 A_3= -4.82502E-13
The standard error of the regression fit is 0.0146 mmho/cm.

PARAMETER: Pressure, decibars.
CALIBRATION DATE: Spring 1986.
NOTE: To minimize thermal offset effects inherent in strain-gauge pressure transducers such as used in the STD-12, readings are forced to zero at the surface before each STD cast by recalculating the A_0 regression parameter. The data below reflect such recalculation.

CALIBRATION DATA AND ANALYSIS

STD-12 Rdg	Test Pressure	Calculated Pressure	Error
20242	0	0.004	0.004
20951	36.3115	36.638	0.327
21702	74.7446	75.442	0.698
23057	144.1196	145.455	1.336
24395	212.7476	214.590	1.842
25774	283.5406	285.843	2.302
28662	432.6566	435.066	2.409
30325	518.8356	520.993	2.157
32507	632.2336	633.737	1.503
34328	727.3026	727.828	0.525

Regression coefficients:
A0= -1.04590E+03 A1= 5.16700E-02
A2= 0.00000E+00 A3= 0.00000E+00
The standard error of the regression fit is 0.753 decibar.

Approved for use: 4/14/89.

Thomas C. Wilson, Jr.
MSRC Ocean Instrument Engineer

SEA-BIRD ELECTRONICS, INC.
1808 136th Place N.E., Bellevue, Washington 98005
Telephone: (206) 643-9866 Telex: 292915 SBEI UR

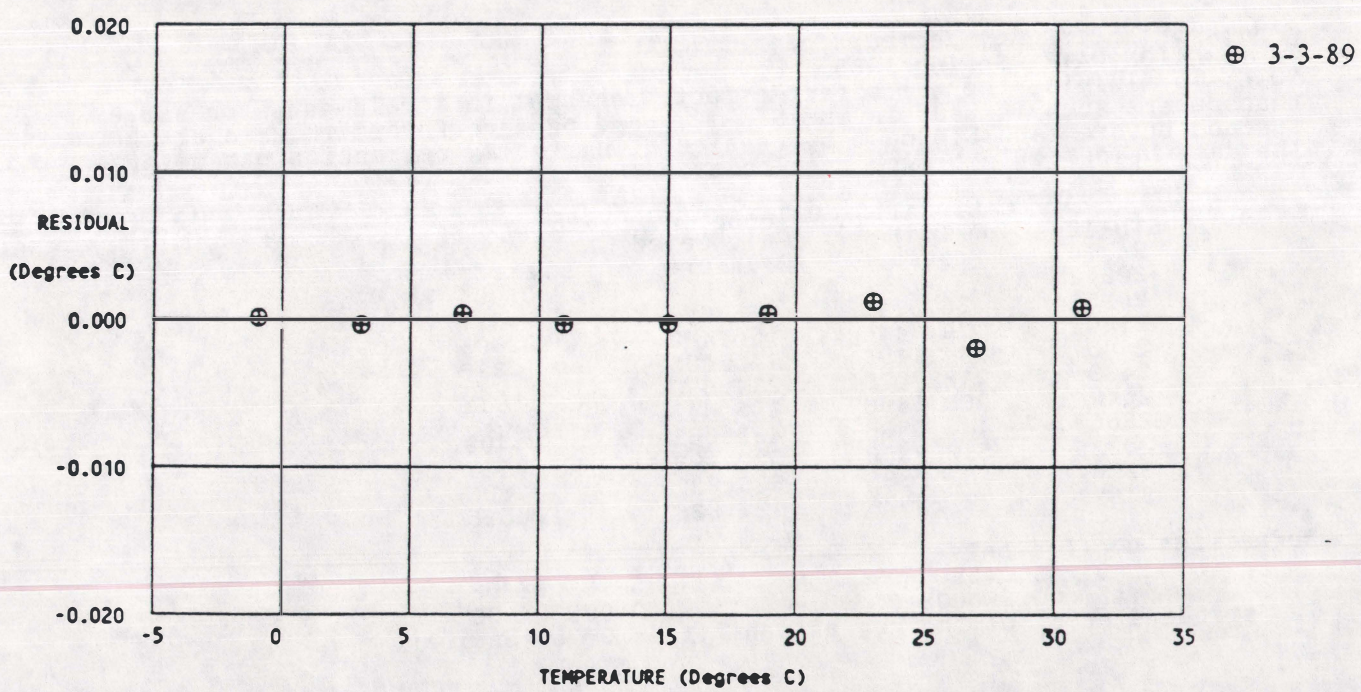
TEMPERATURE CALIBRATION DATA
CALIBRATION DATE: 3-3-89

SENSOR SERIAL NUMBER = 226

BATH TEMP (°C)	INSTRUMENT FREQ (Hz)	INST TEMP (°C)	RESIDUAL (°C)
26.9783	4637.29	26.9764	-0.00194
18.8629	3942.24	18.8633	0.00040
10.9458	3337.77	10.9455	-0.00031
3.0755	2804.46	3.0751	-0.00037
31.0134	5013.37	31.0142	0.00075
23.0148	4288.11	23.0160	0.00118
15.0137	3639.52	15.0134	-0.00027
7.0061	3062.73	7.0065	0.00040
-0.9489	2556.32	-0.9488	0.00014

Temperature = $1/\{a + b[\ln(f_0/f)] + c[\ln^2(f_0/f)] + d[\ln^3(f_0/f)]\} - 273.15$ (°C)

Residual = instrument temperature - bath temperature



S E A - B I R D   E L E C T R O N I C S ,   I N C .
1808 136th Place N.E., Bellevue, Washington 98005
Telephone: (206) 643-9866   Telex: 292915 SBEI UR

CONDUCTIVITY CALIBRATION DATA
CALIBRATION DATE: 3-3-89

PSS 1978: C(35,15,0) = 4.2914 Siemens/meter

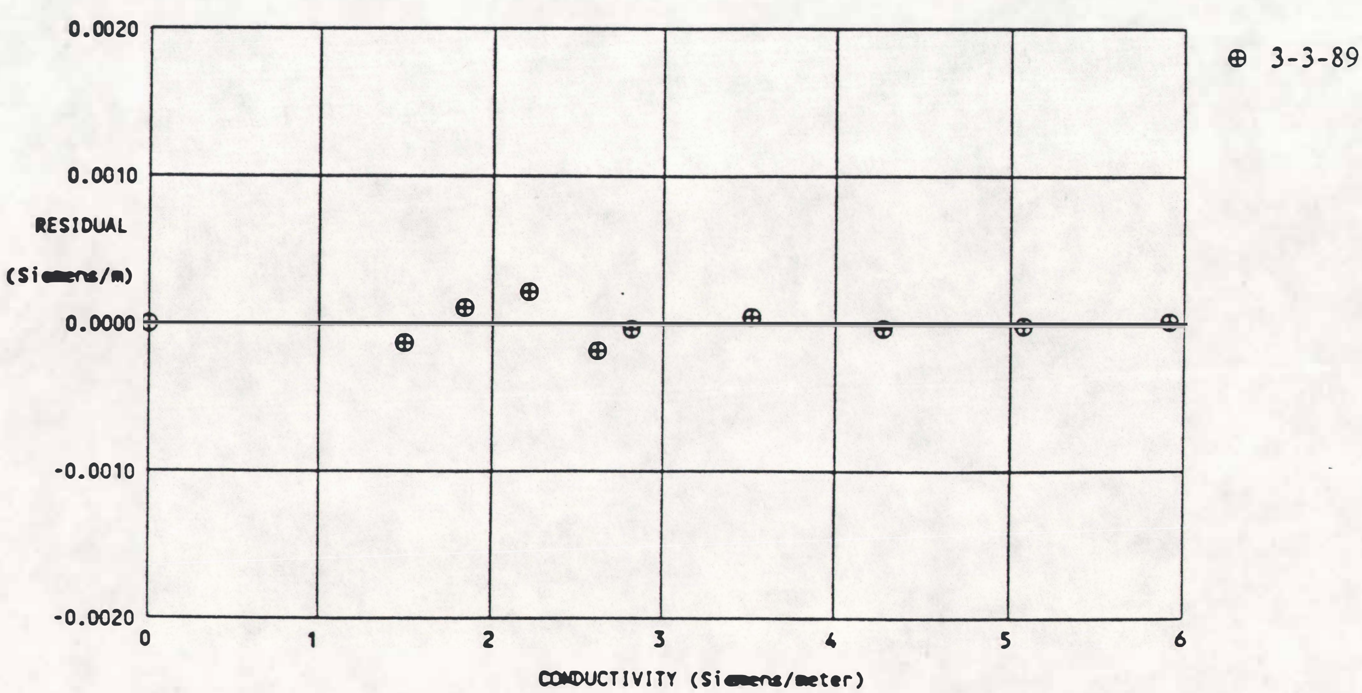
SENSOR SERIAL NUMBER = 226

BATH TEMP (°C)	BATH SAL (°/oo)	BATH COND (Siemens/m)	INST FREQ (kHz)	INST COND (Siemens/m)	RESIDUAL (Siemens/m)
26.9783	15.1540	2.59136	7.70591	2.59117	-0.00019
18.8629	15.1534	2.19189	7.17990	2.19210	0.00021
10.9458	15.1532	1.82153	6.65398	1.82164	0.00011
3.0755	15.1532	1.47613	6.12217	1.47600	-0.00013
31.0134	34.8019	5.91365	11.15378	5.91367	0.00002
23.0148	34.8025	5.07463	10.39323	5.07462	-0.00001
15.0137	34.8025	4.27109	9.60775	4.27106	-0.00003
7.0061	34.8021	3.51091	8.79952	3.51096	0.00005
-0.9489	34.8015	2.80785	7.97825	2.80782	-0.00003
0.0000	0.0000	0.00000	2.88591	0.00000	0.00000

Conductivity = $(af^m + bf^2 + c + dt) / [10(1 - 9.57(10^{-8})p)]$ Siemens/meter, where p = pressure in dbars

Residual = instrument conductivity - bath conductivity

NOTE: Multiply Siemens/meter by 10 to obtain mmho/cm



SBE SEA-BIRD ELECTRONICS, INC.
1808 - 136th Place Northeast, Bellevue, Washington 98005
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SBE 192297-226

Pressure calibration: Senso-Metrics SP91FFS-200A S/N 8A609 9 March 1989

Pressure(psia) = M(Binary) + B where **M = -0.06009** and **B = 239.27**

Input pressure (psi)	Output (binary)	error, psi	error, % FS
14.44	3741.58	-0.004	-0.00
40.02	3315.79	0.002	0.00
80.04	2648.69	0.069	0.03
120.07	1982.90	0.047	0.02
160.09	1317.00	0.041	0.02
200.11	653.59	-0.114	-0.06
160.09	1316.04	0.099	0.05
120.07	1982.20	0.089	0.04
80.04	2648.95	0.053	0.03
40.02	3316.26	-0.026	-0.01
14.44	3743.87	-0.142	-0.07

Output binary values are averages of 101 samples taken at 2 Hz.

APPENDIX III

FIGURE CAPTIONS

Figure 1 Salinity measurements on the first downcast. UCONN's Seacat went down on a separate wire.
1a. SU00 MSRC Seacat
1b. CAST 1 AMS
1c. FIS1A UCONN Seacat

Figure 2 Salinity measurements on the first upcast. UCONN's Seacat went down on a separate wire.
2a. SU00 MSRC Seacat
2b. CAST 1 AMS
2c. FIS1A UCONN Seacat

Figure 3 Salinity measurements on the second downcast. AMS not used.
3a. SU02 MSRC's Seacat
3b. FIS2A UCONN's Seacat

Figure 4 Salinity measurements on the second upcast. AMS not used.
4a. SU02 MSRC's Seacat
4b. FIS2A UCONN's Seacat

Figure 5 Salinity measurements on the third downcast.
5a. SU04 MSRC's Seacat
5b. CAST 2 AMS
5c. FIS2B UCONN's Seacat

Figure 6 Salinity measurements on the third upcast.
6a. SU04 MSRC's Seacat
6b. CAST 2 AMS
6c. FIS2B UCONN's Seacat

Figure 7 Salinity measurements on the fourth downcast.
7a. SU05 MSRC's Seacat
7b. CAST 3 AMS
7c. FIS3A UCONN's Seacat

Figure 8 Salinity measurements on the fourth upcast. AMS not recording.
8a. SU05 MSRC's Seacat
8b. FIS3A UCONN's Seacat

Figure 9 Salinity measurements on the fifth downcast. AMS not recording.
9a. SU05 MSRC's Seacat
9b. FIS3A UCONN's Seacat

Figure 30 Temperature measurements on the sixth upcast. AMS not recording.
30a. SU05 MSRC's Seacat
30b. FIS3A UCONN's Seacat

Figure 31 Temperature measurements on the seventh downcast. AMS not recording.
31a. SU05 MSRC's Seacat
31b. FIS3A UCONN's Seacat

Figure 32 Temperature measurements on the seventh upcast. AMS not recording.
32a. SU05 MSRC's Seacat
32b. FIS3A UCONN's Seacat

Figure 33 Temperature measurements on the eighth downcast. AMS not recording.
33a. SU05 MSRC's Seacat
33b. FIS3A UCONN's Seacat

Figure 34 Temperature measurements on the eighth upcast. AMS not recording.
34a. SU05 MSRC's Seacat
34b. FIS3A UCONN's Seacat

Figure 35 Temperature measurements on the ninth downcast.
35a. SU06 MSRC's Seacat
35b. CAST 4 AMS
35c. FIS4A UCONN's Seacat

Figure 36 Temperature measurements on the ninth upcast. AMS not recording.
36a. SU06 MSRC's Seacat
36b. FIS4A UCONN's Seacat

Figure 37 Salinity comparisons between the AMS and UCONN's Seacat on the downcasts.
37a. CAST 1 - FIS1A (different wires)
37b. CAST 2 - FIS2B
37c. CAST 3 - FIS3A
37d. CAST 4 - FIS4A

Figure 38 Salinity comparisons between the AMS and UCONN's Seacat on the upcasts.
38a. CAST 1 - FIS1A (different wires)
38b. CAST 2 - FIS2B

Figure 39 Salinity comparisons between the AMS and SUNY's Seacat on the downcasts.
39a. CAST 1 - SU00
39b. CAST 2 - SU04
39c. CAST 3 - SU05
39d. CAST 4 - SU06

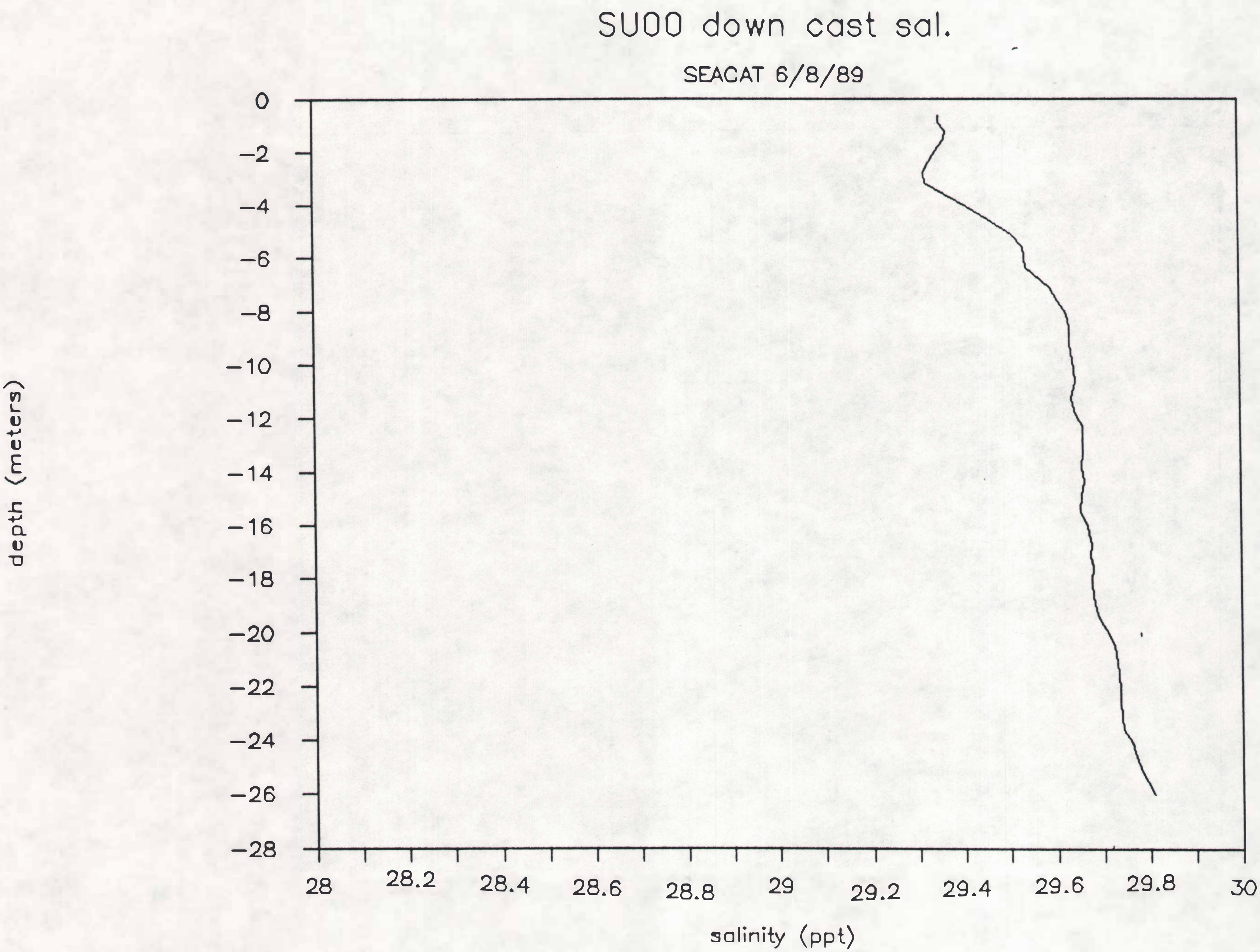

SU00 down cast sal.
SEACAT 6/8/89
0
−2
−4
−6
−8
−10
−12
−14
−16
−18
−20
−22
−24
−26
−28
depth (meters)
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 1A

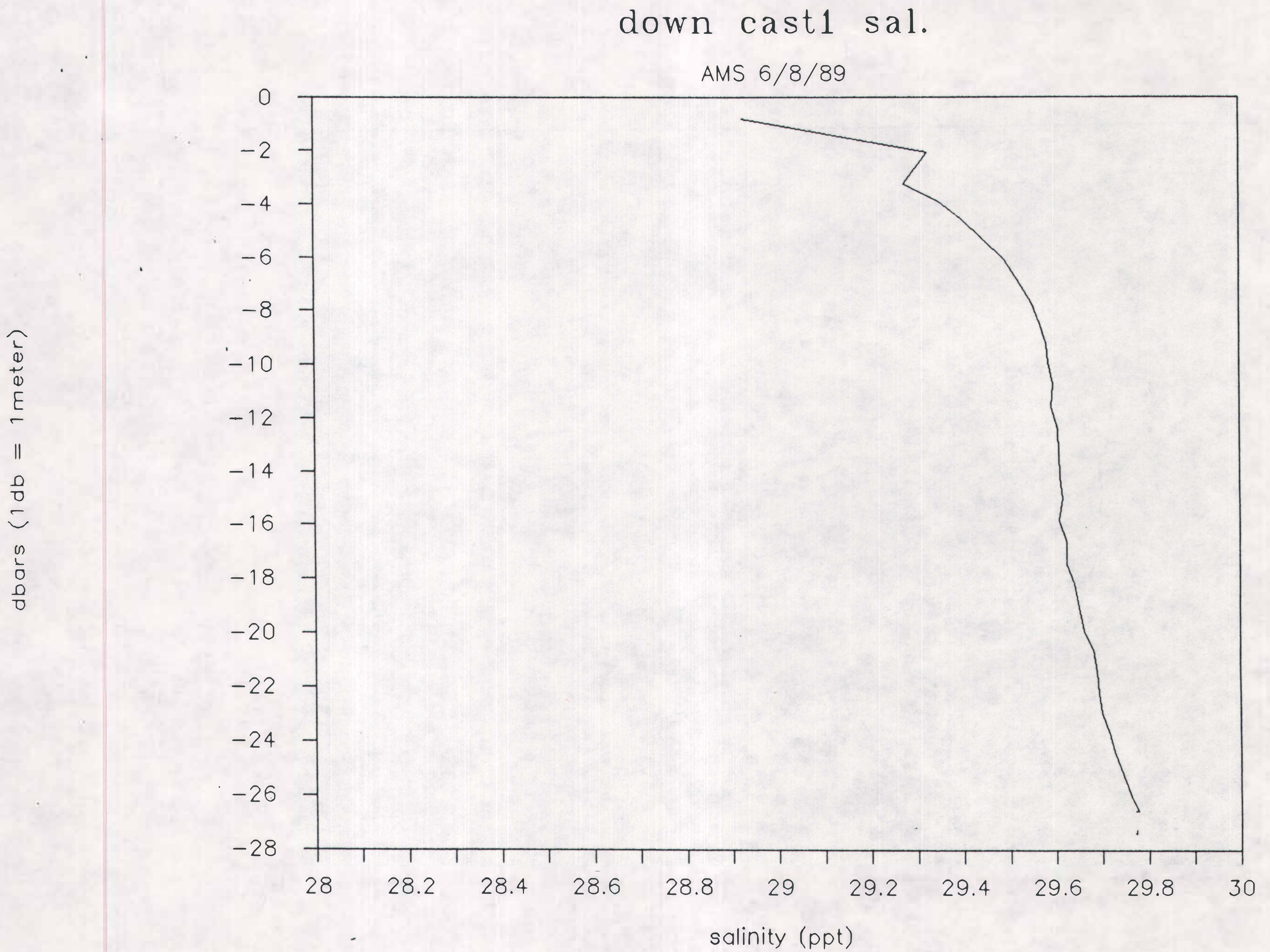

down cast1 sal.
AMS 6/8/89
dbars (1db = 1meter)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 1B

FIS1A down cast sal.

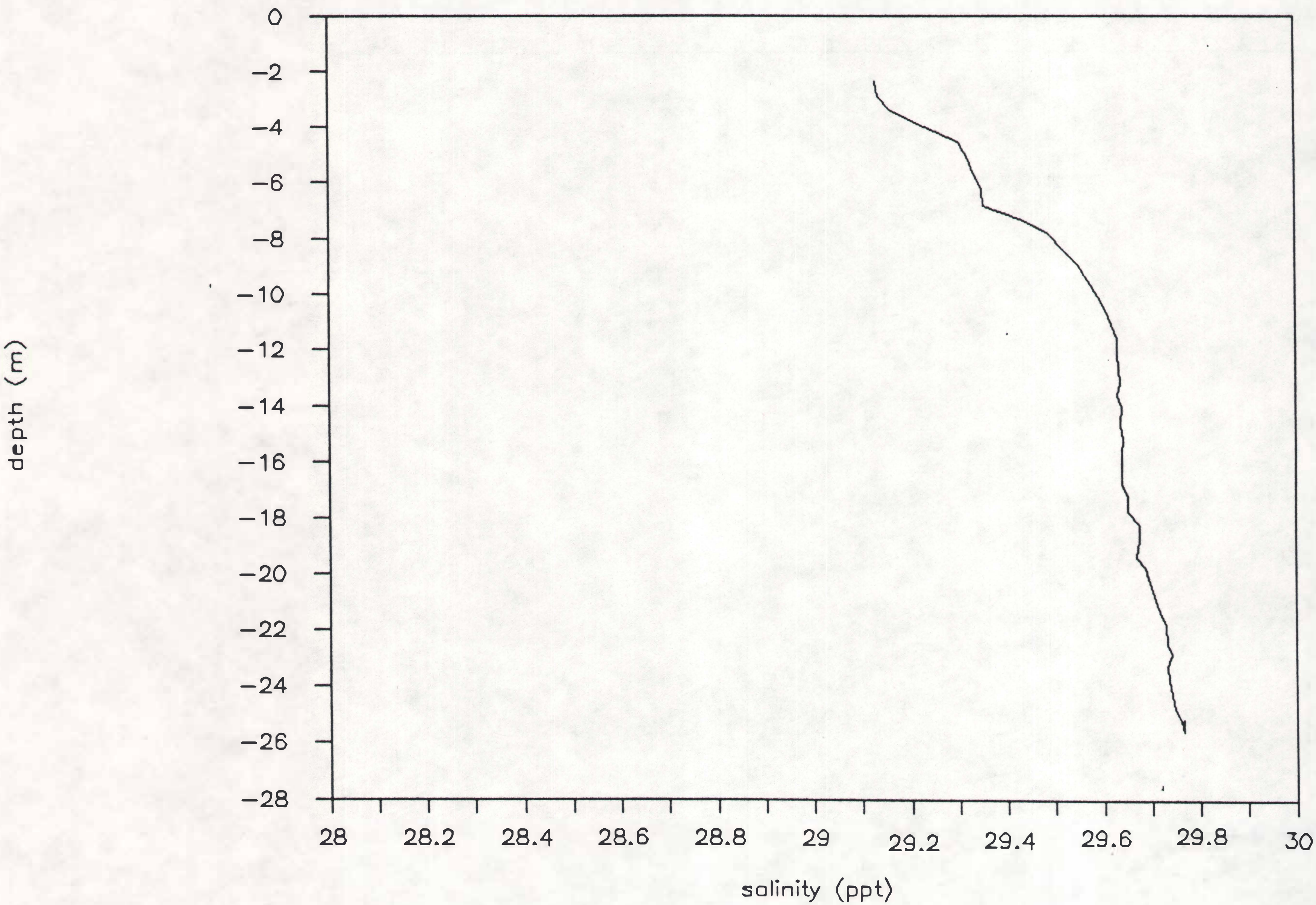


Figure 1c

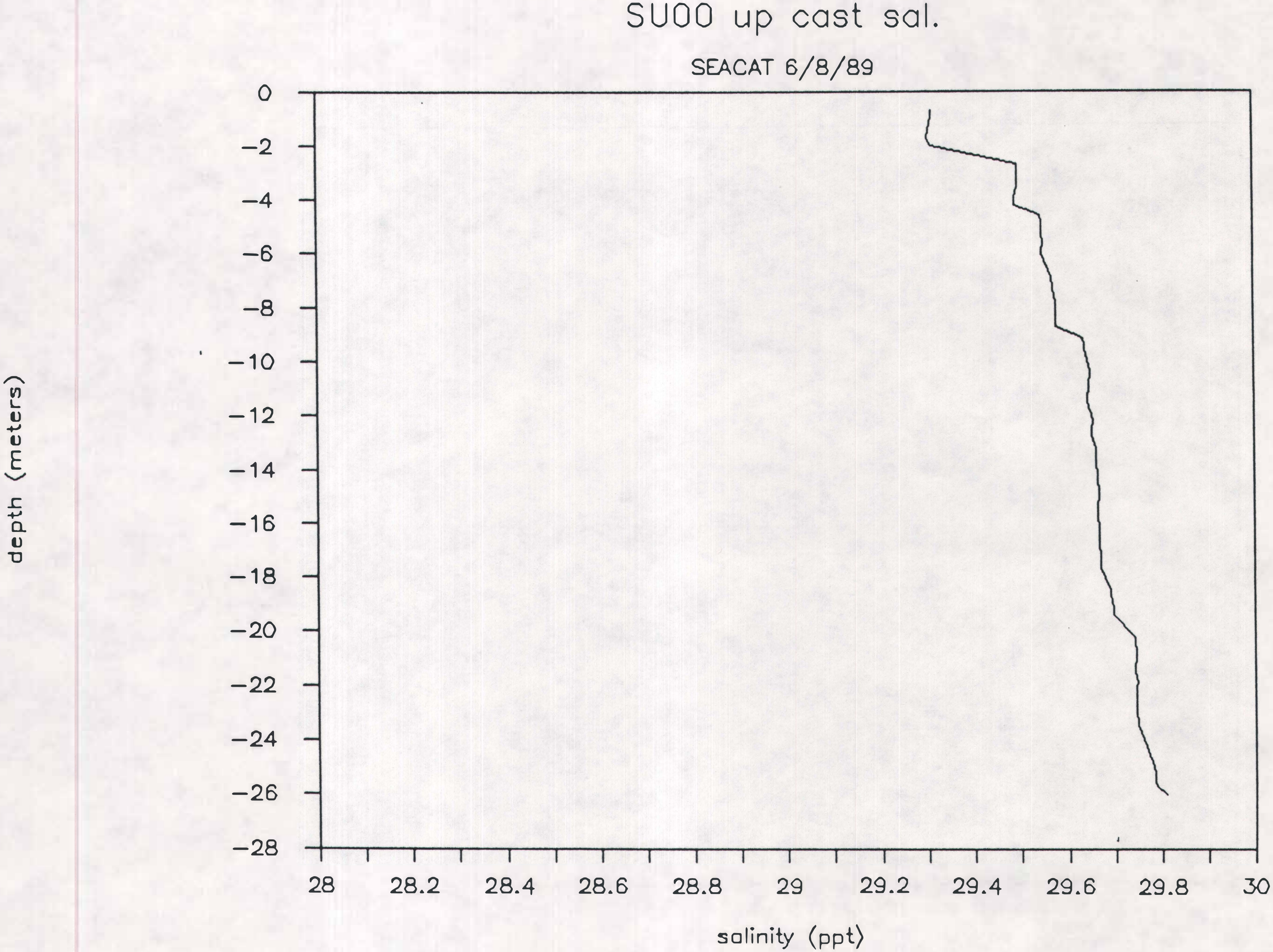
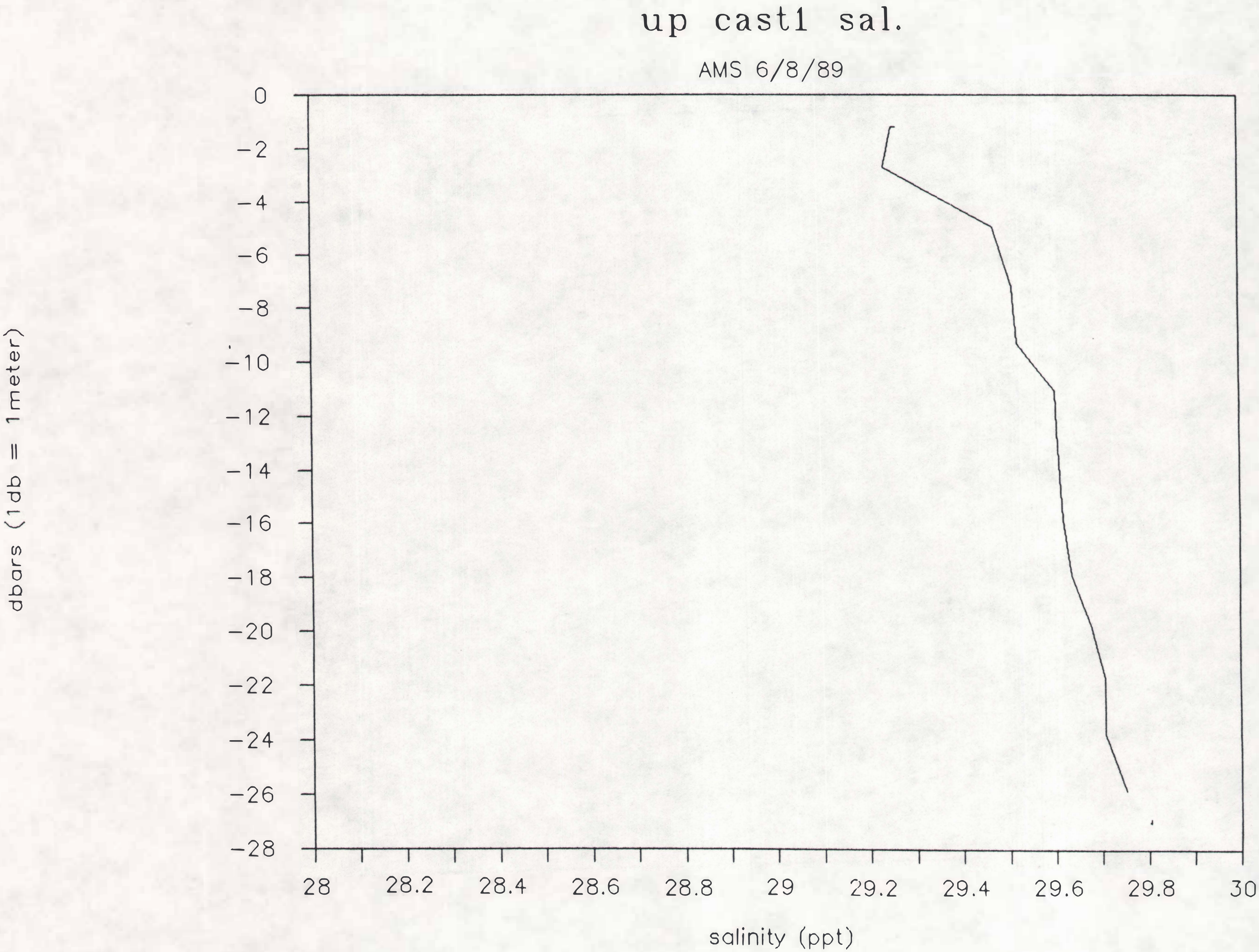

SU00 up cast sal.
SEACAT 6/8/89
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 2A

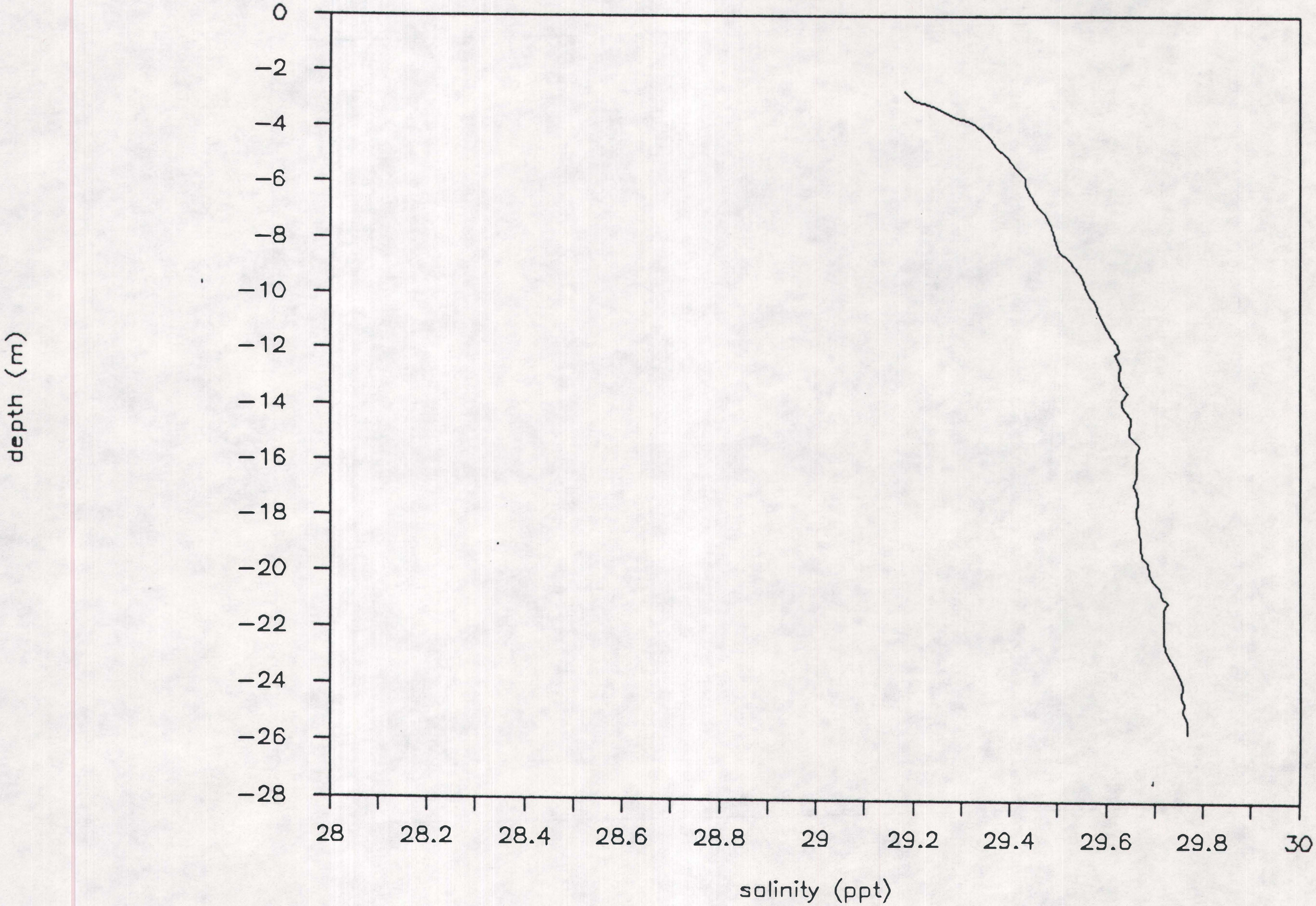


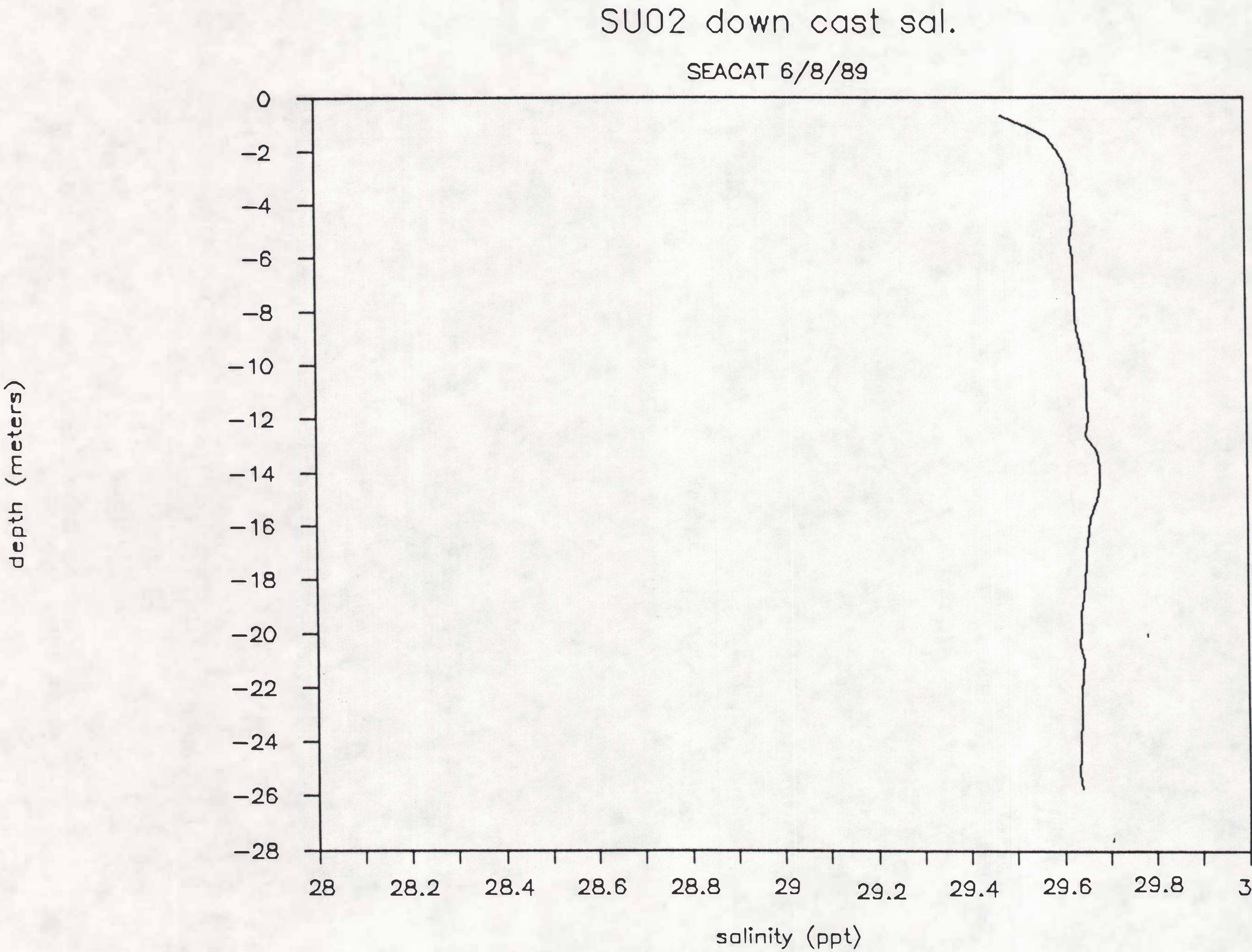
up cast1 sal.
AMS 6/8/89
dbars (1db = 1meter)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 2B

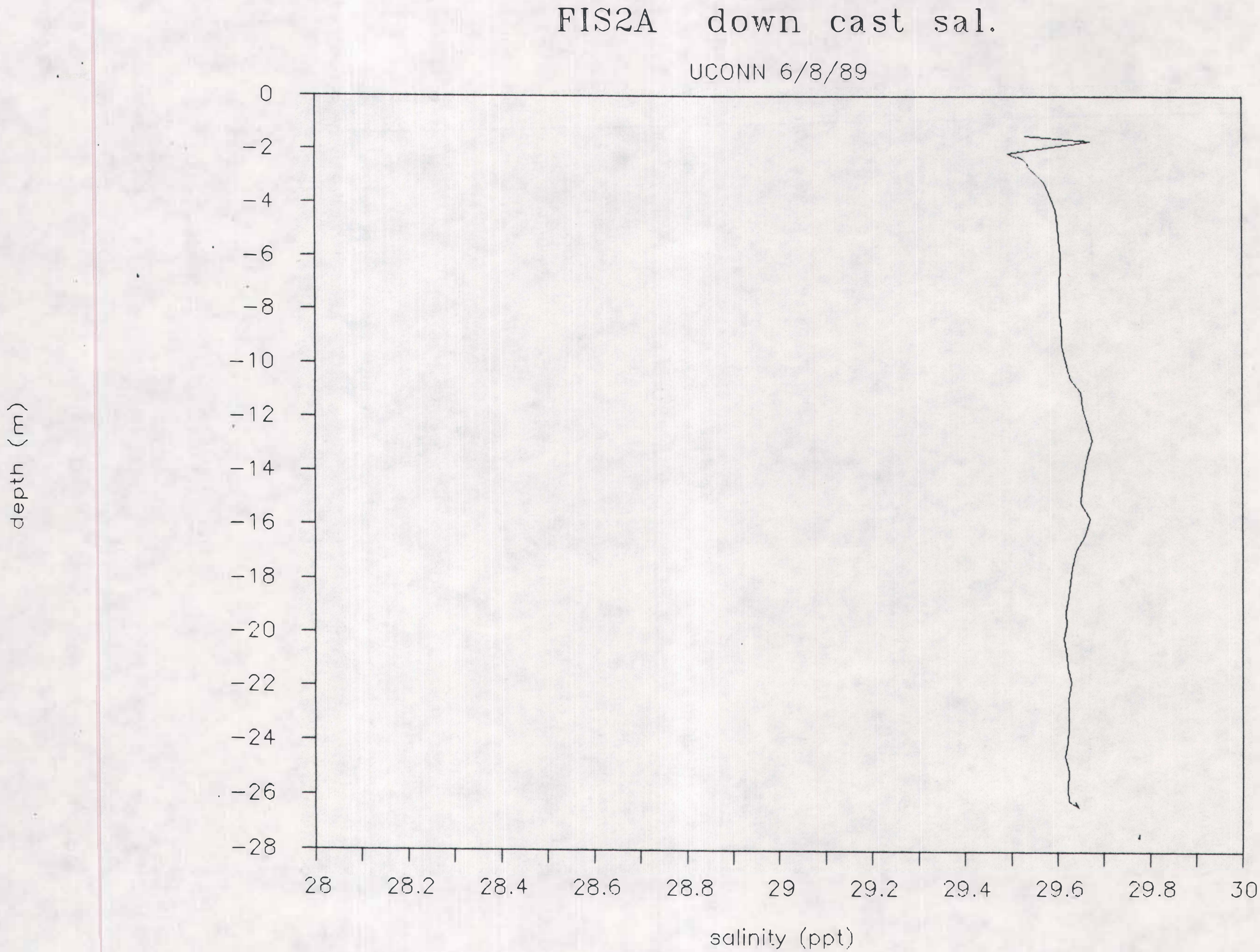
FIS1A up cast sal.

UCONN



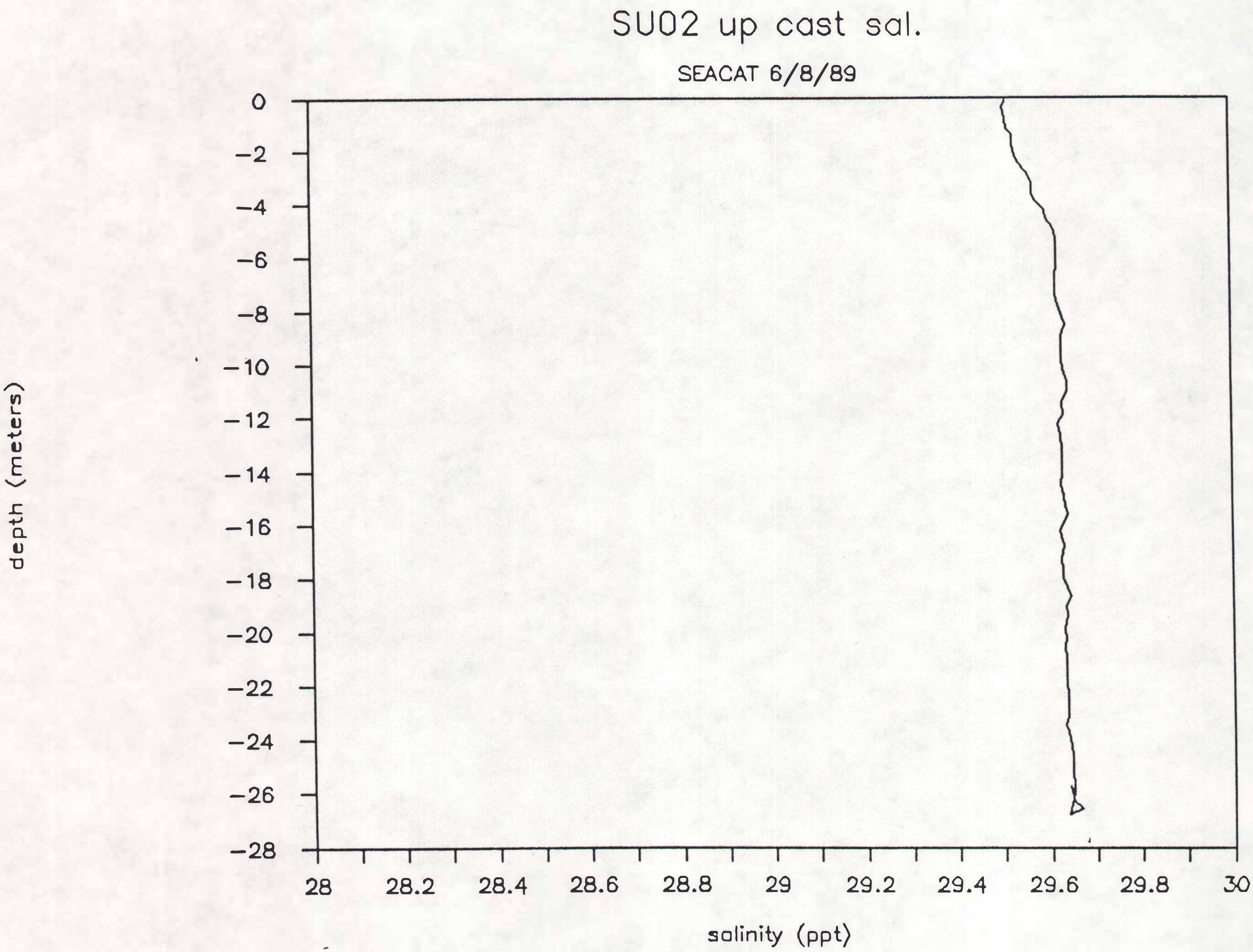


SU02 down cast sal.
SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)



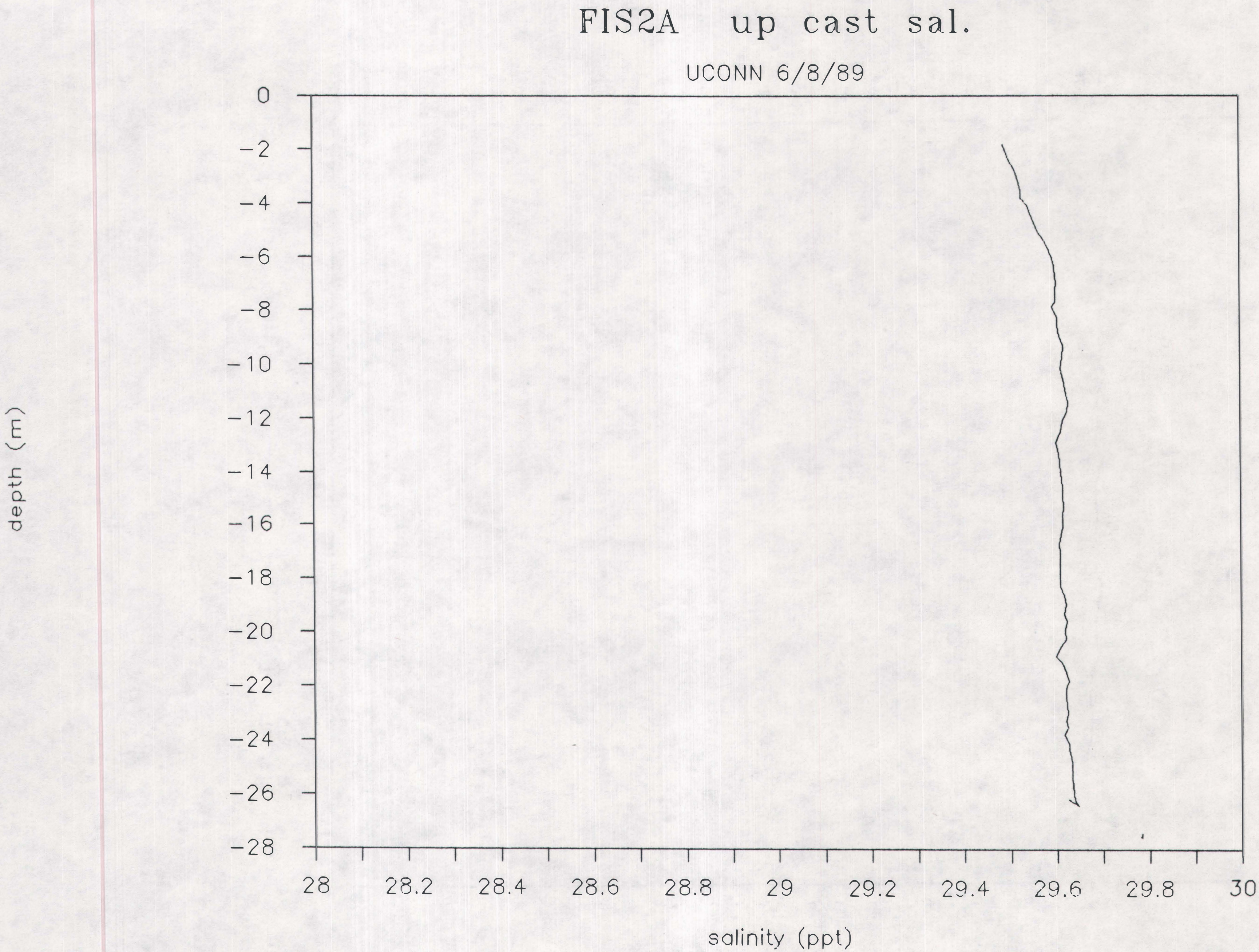
FIS2A down cast sal.
UCONN 6/8/89
depth (m)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 3B



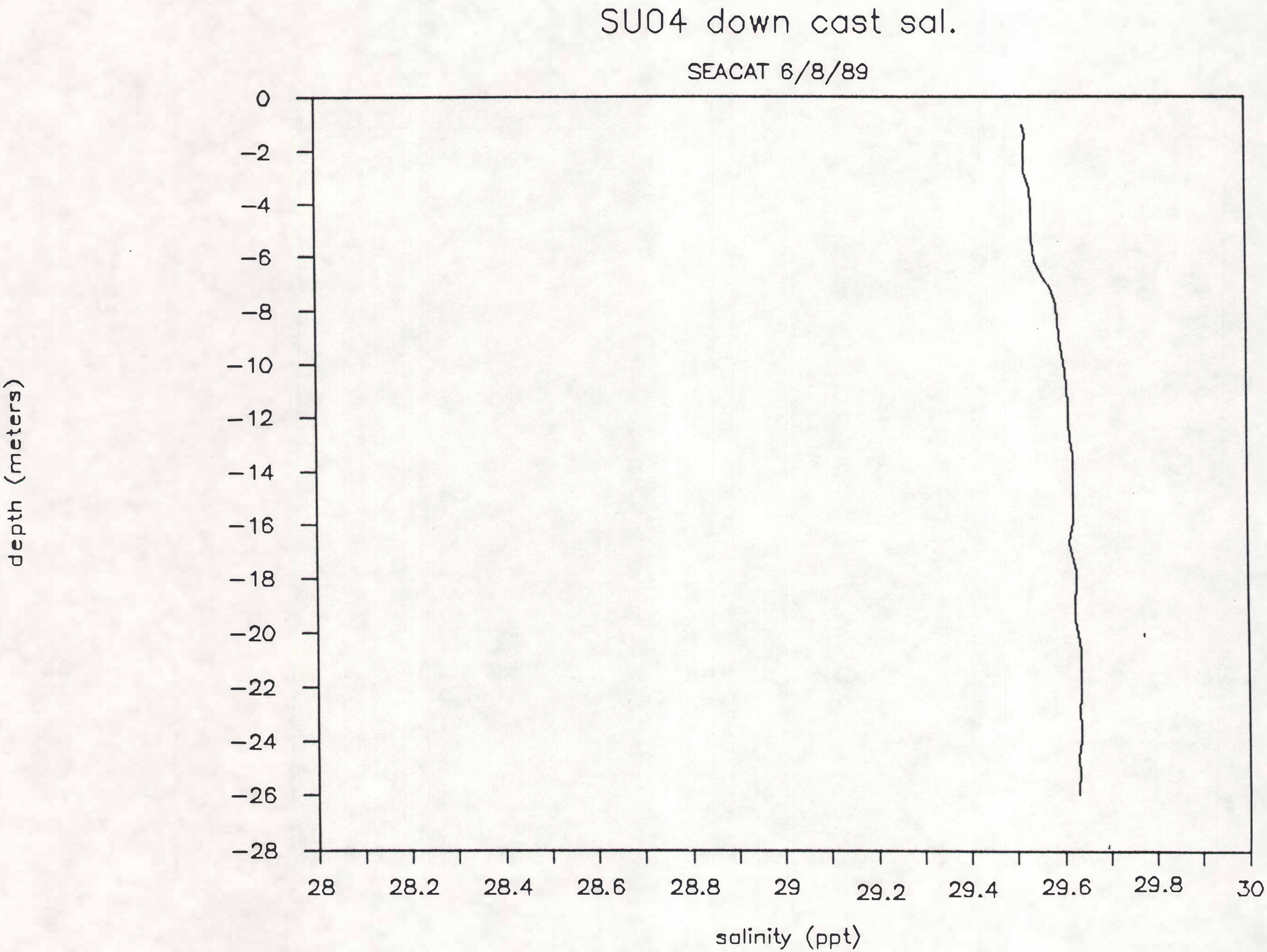
SU02 up cast sal.
SEACAT 6/8/89
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 4A



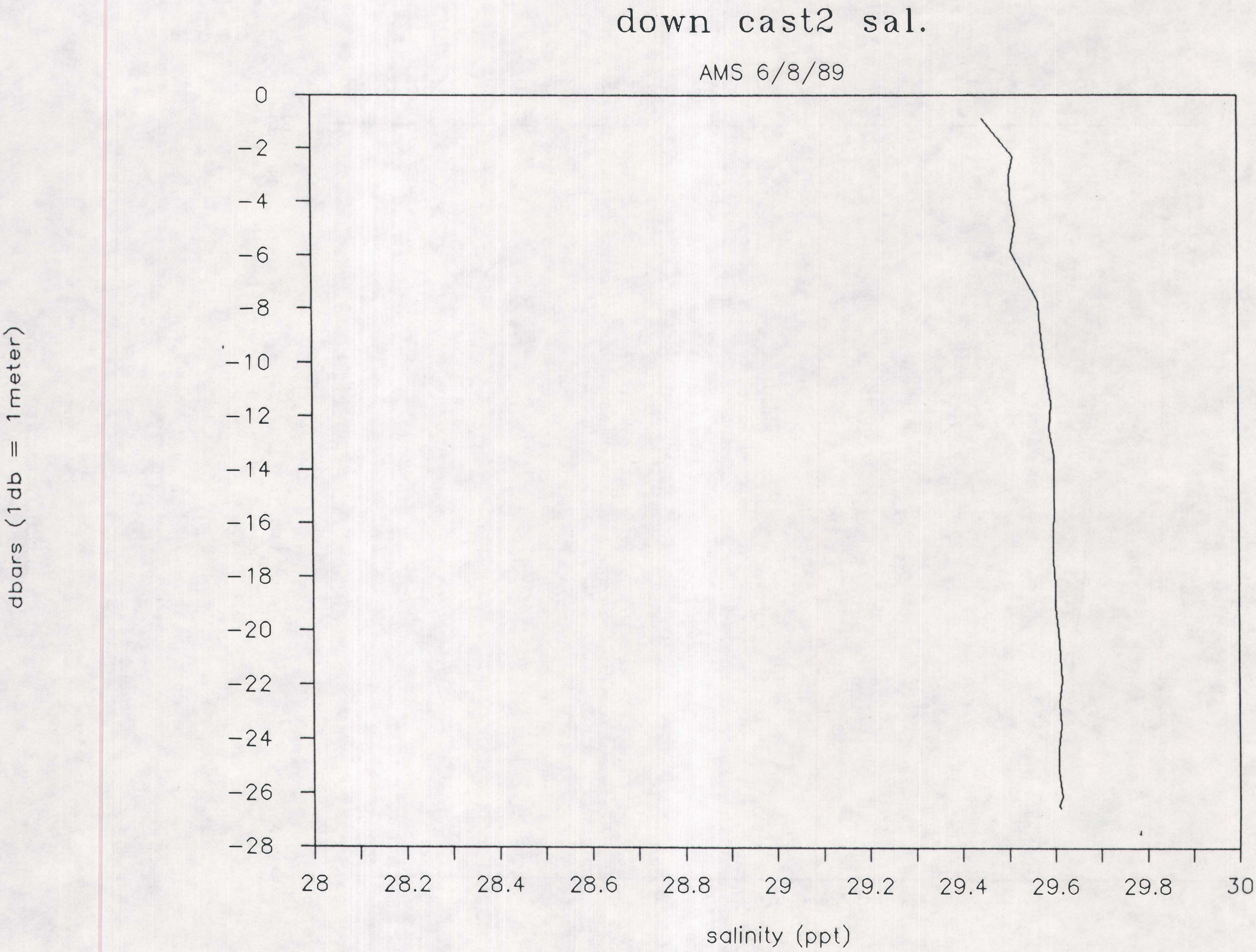
FIS2A up cast sal.
UCONN 6/8/89
depth (m)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 4B



SU04 down cast sal.
SEACAT 6/8/89
0
−2
−4
−6
−8
−10
−12
−14
−16
−18
−20
−22
−24
−26
−28
depth (meters)
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
solinity (ppt)

Figure 5A



down cast2 sal.
AMS 6/8/89
dbars (1db = 1meter)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 5B

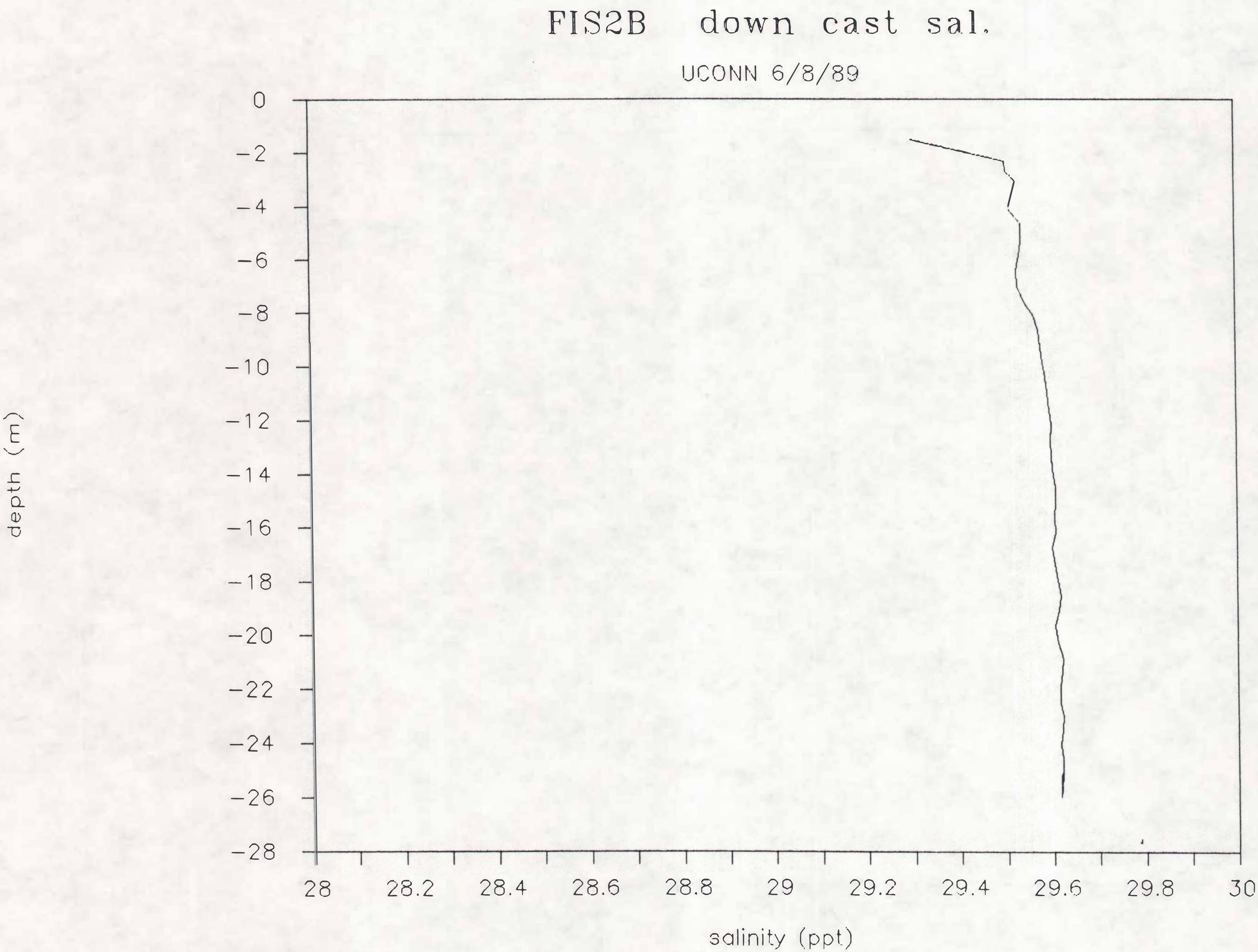

FIS2B down cast sal.
UCONN 6/8/89
depth (m)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 5C

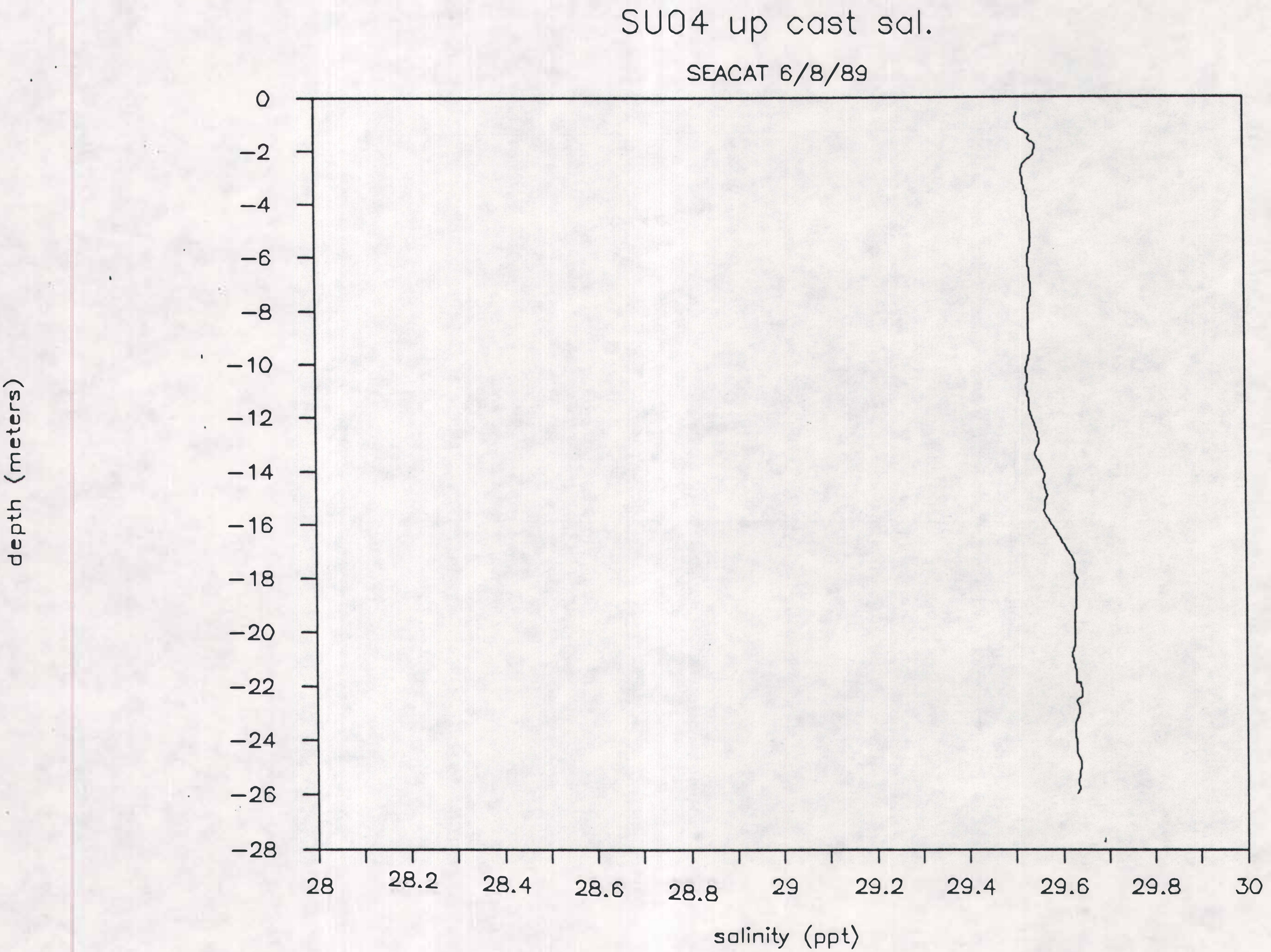
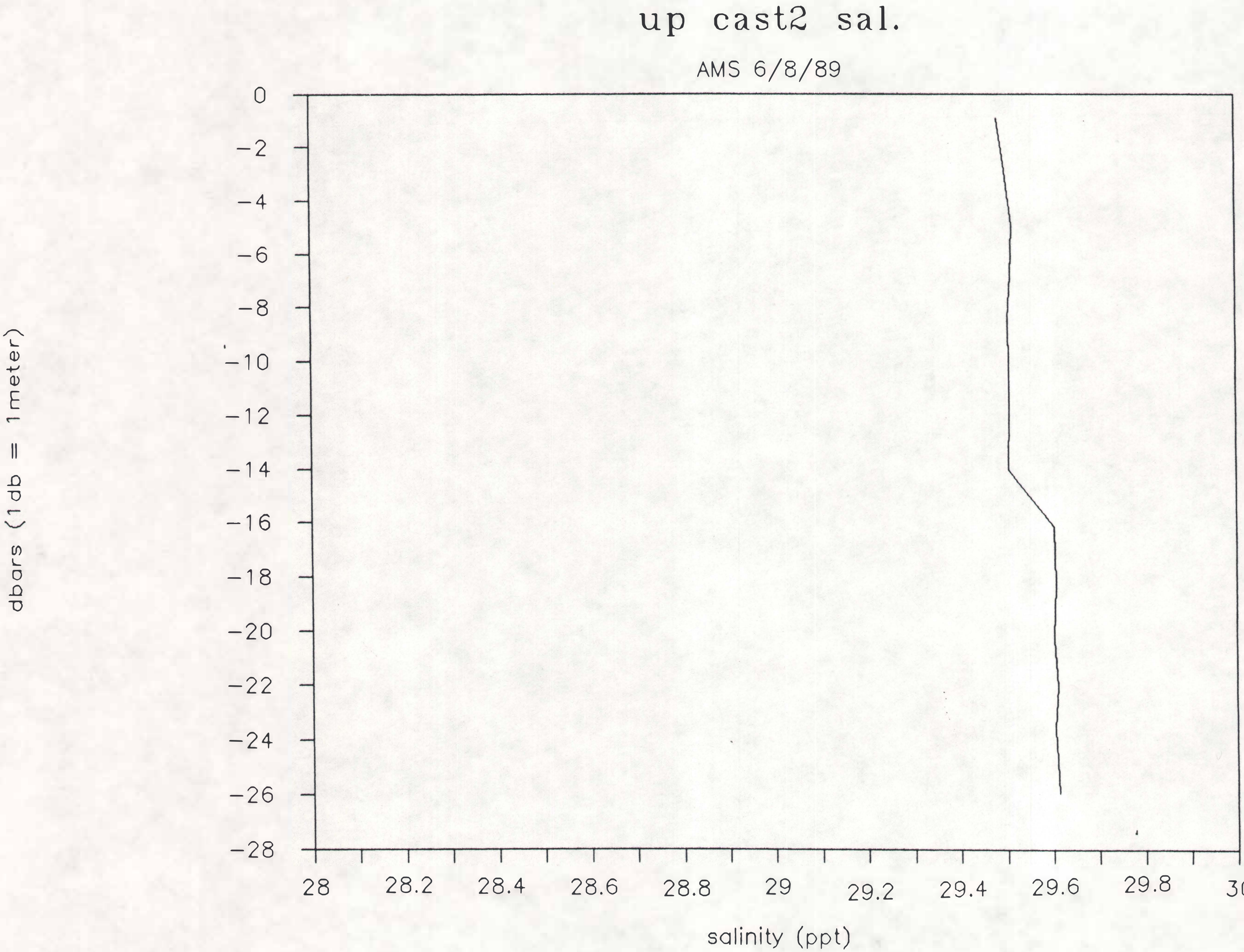
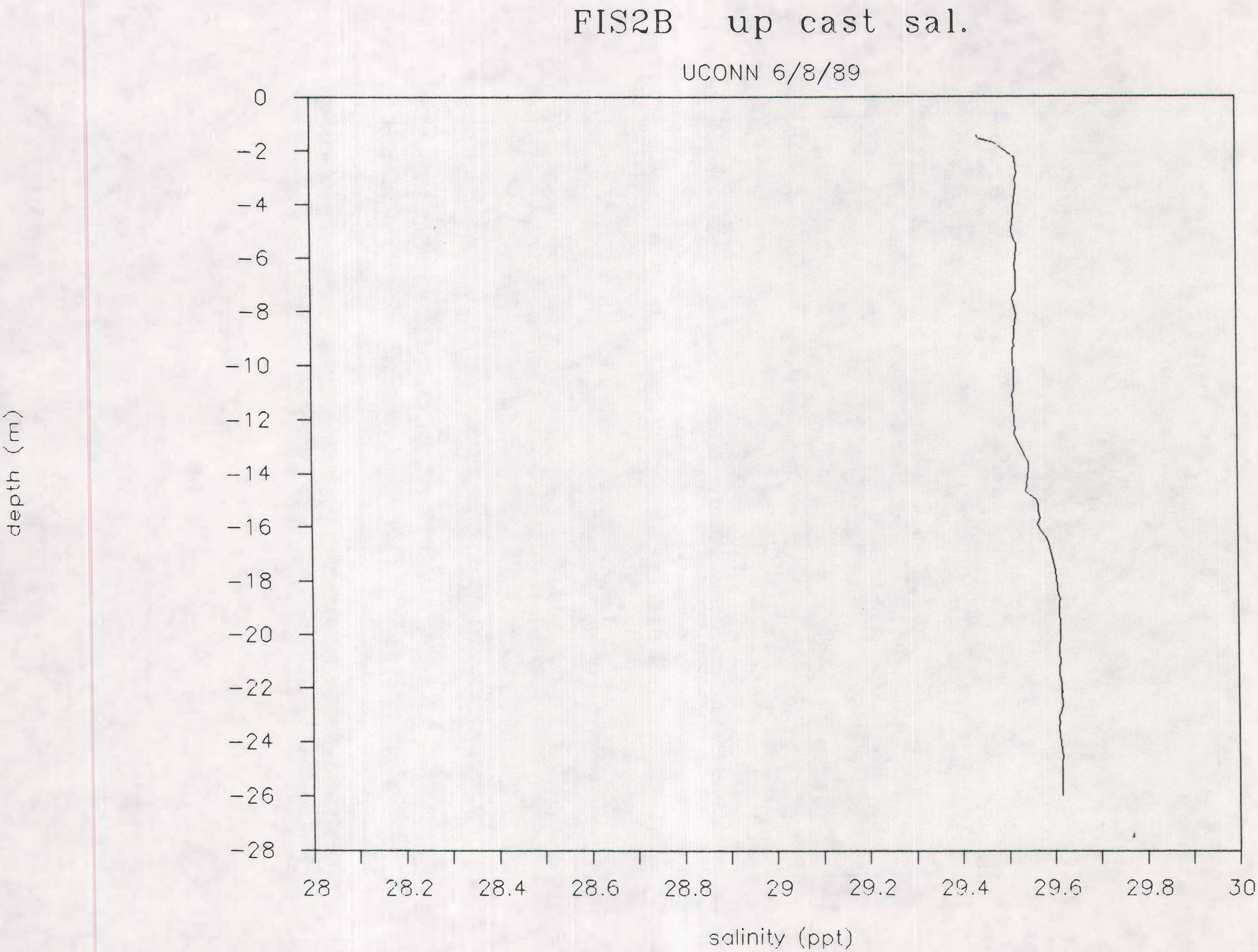

SU04 up cast sal.
SEACAT 6/8/89
0
−2
−4
−6
−8
−10
−12
−14
−16
−18
−20
−22
−24
−26
−28
depth (meters)
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 6A



up cast2 sal.
AMS 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
dbars (1db = 1meter)
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 6B



FIS2B up cast sal.
UCONN 6/8/89
depth (m)
0
−2
−4
−6
−8
−10
−12
−14
−16
−18
−20
−22
−24
−26
−28
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 6C

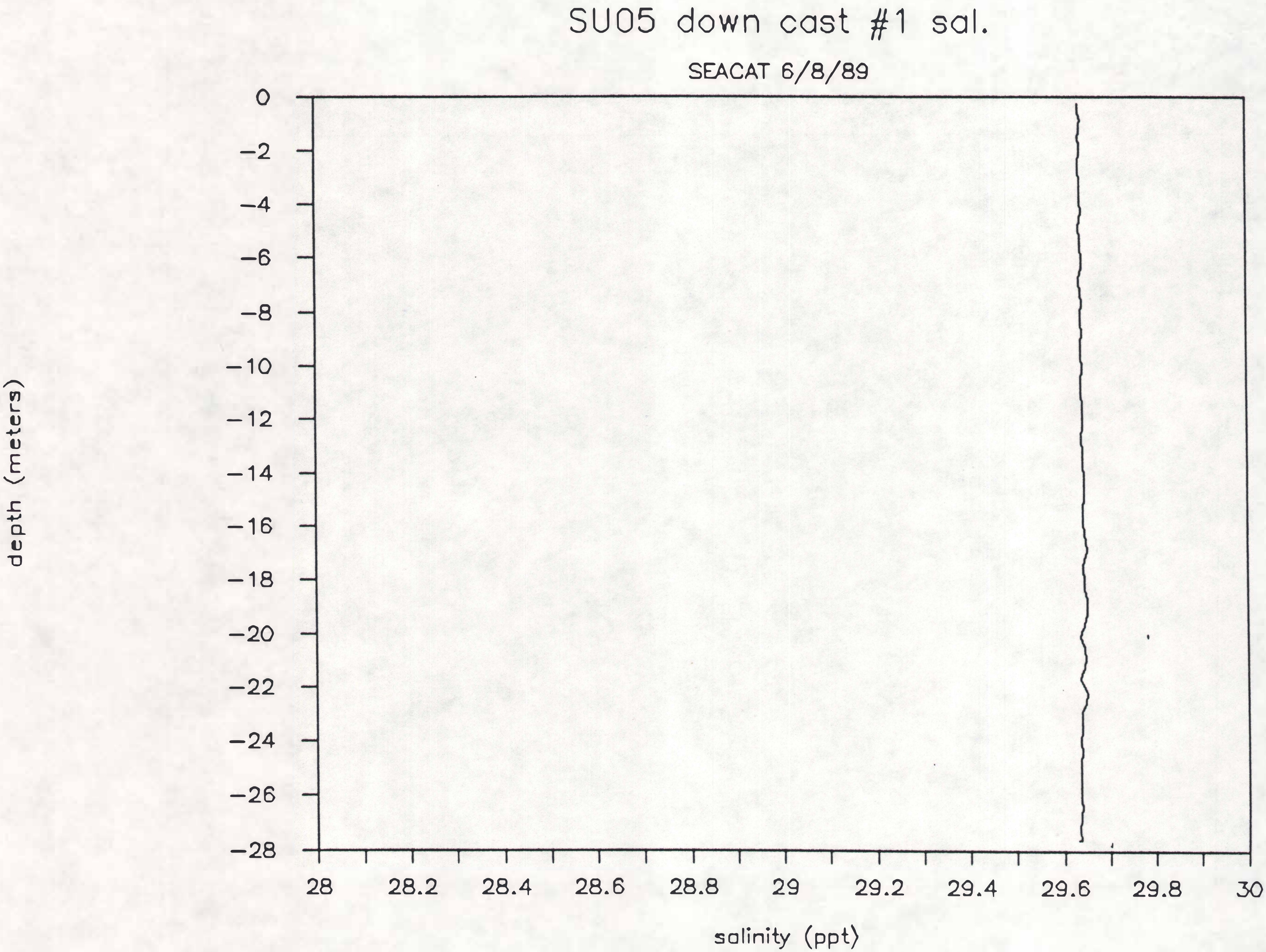

SU05 down cast #1 sal.
SEACAT 6/8/89
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 7A

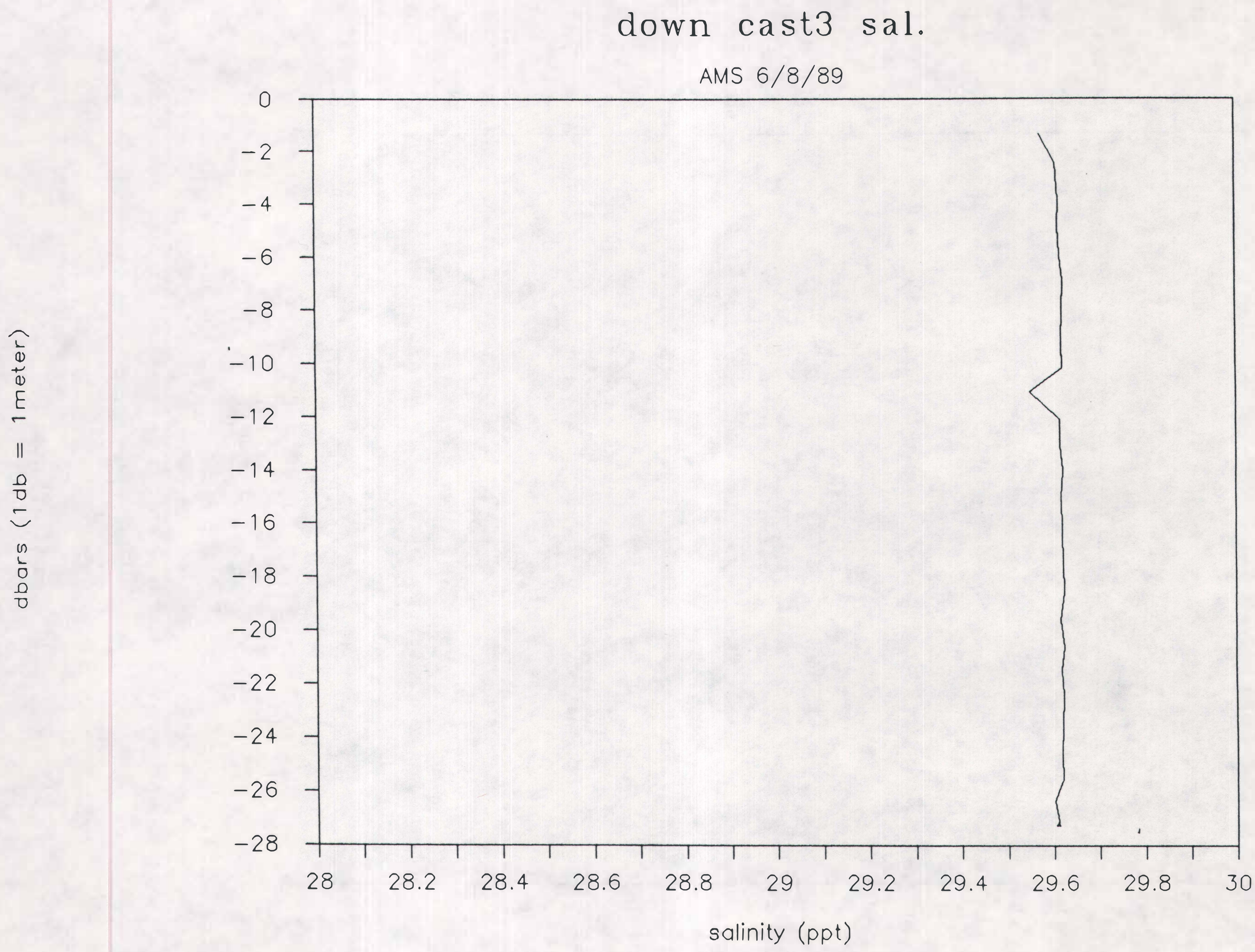

down cast3 sal.
AMS 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
dbars (1db = 1meter)
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 7B

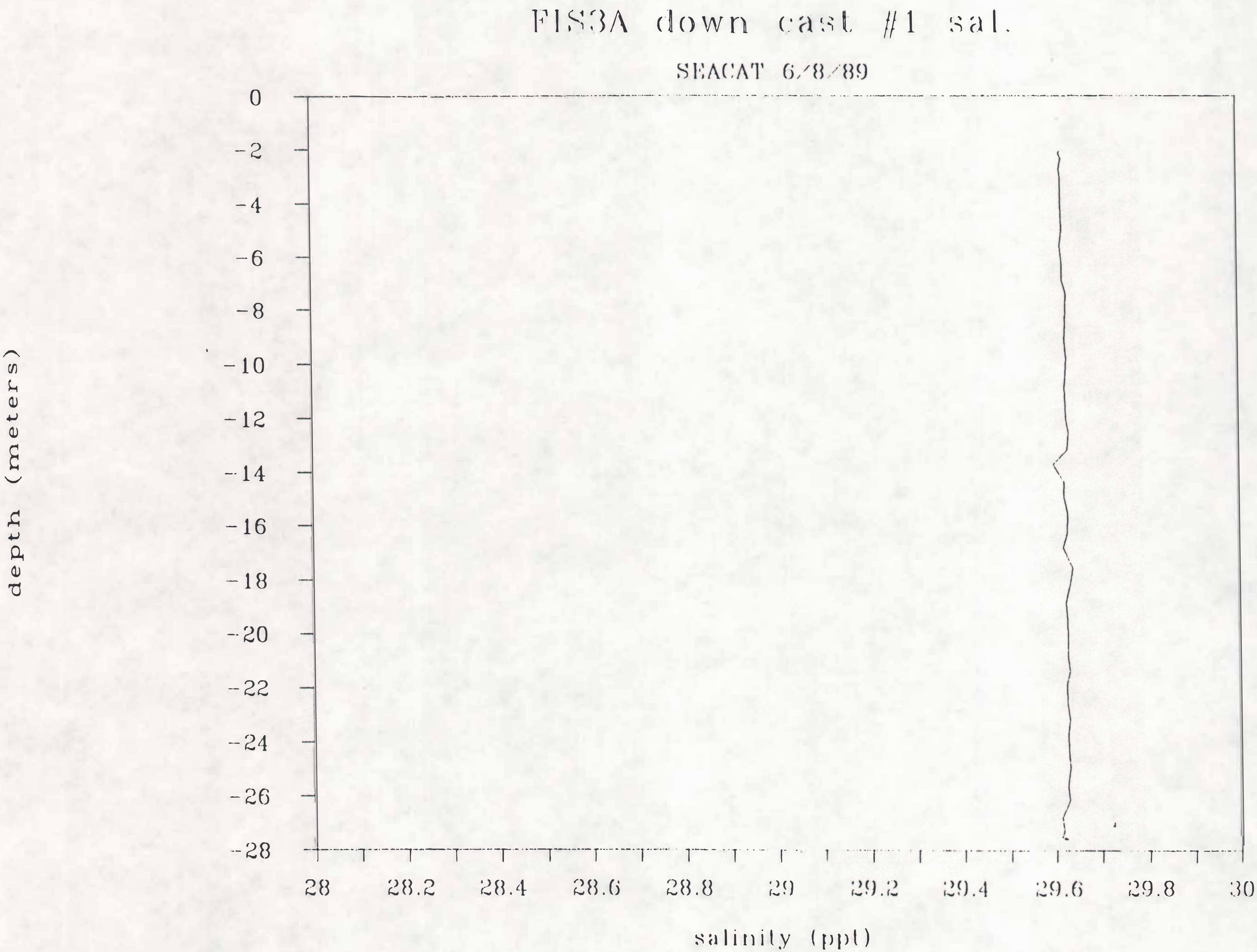

FIS3A down cast #1 sal.
SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 7C

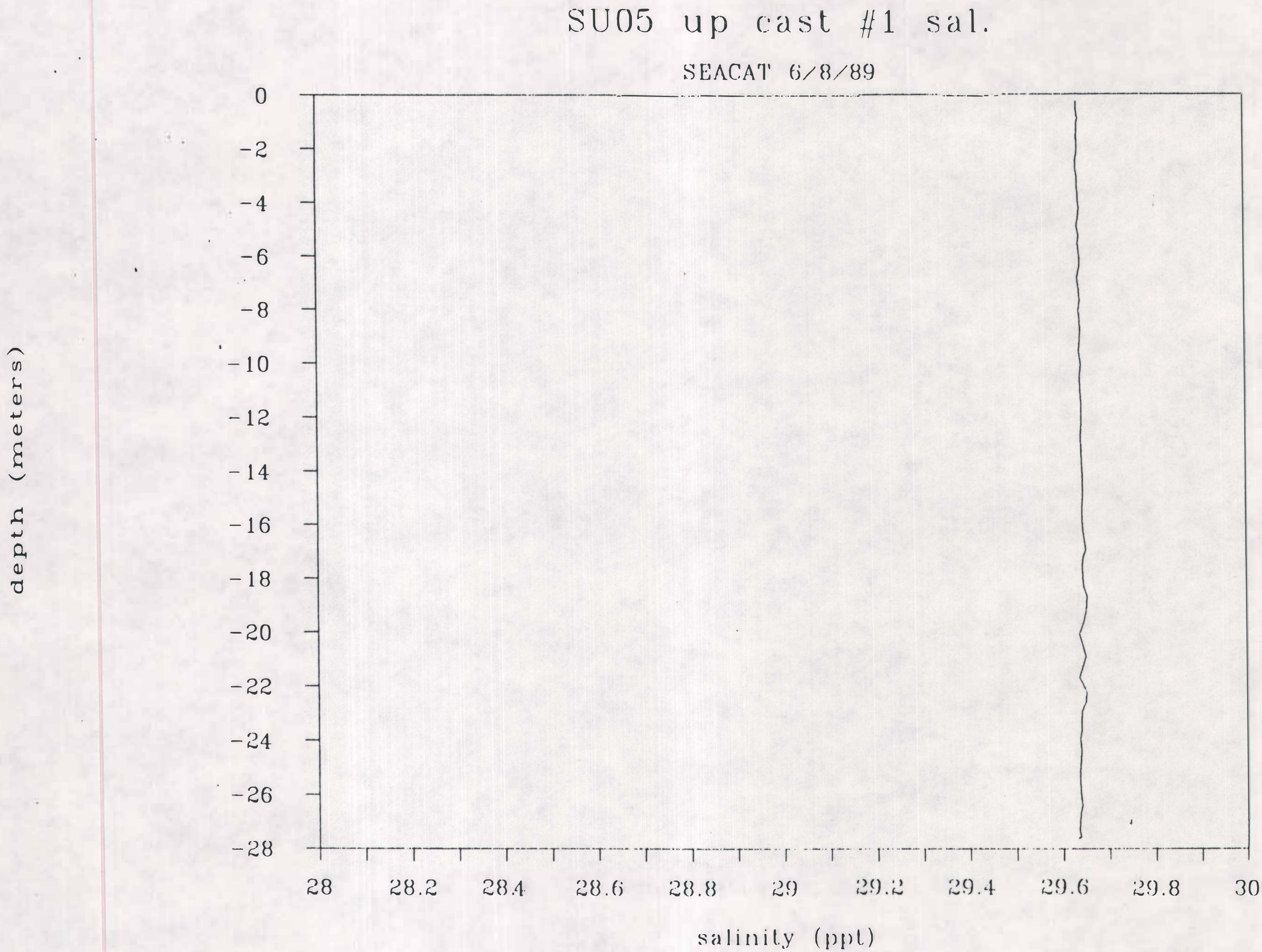

SU05 up cast #1 sal.
SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 8A

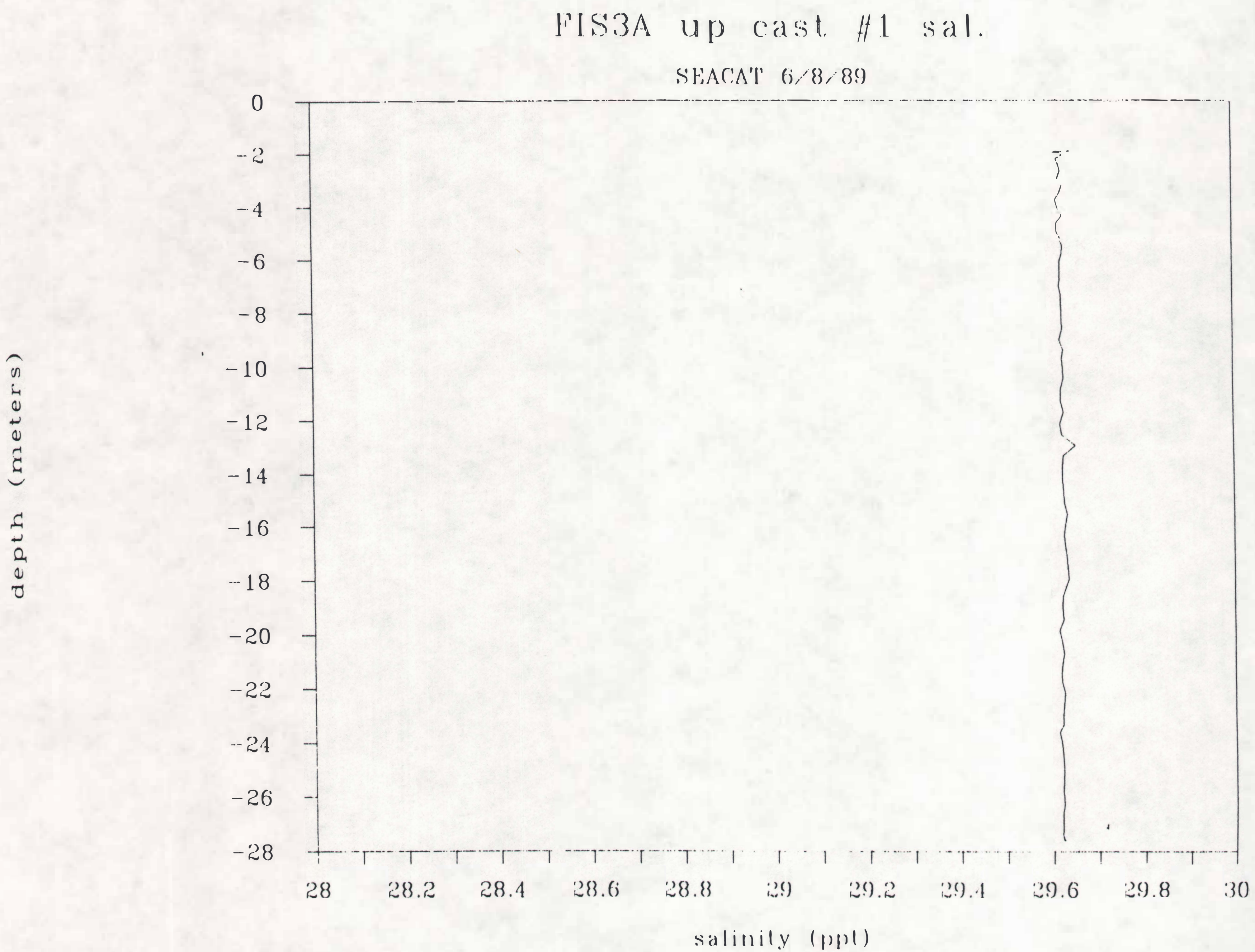

FIS3A up cast #1 sal.
SEACAT 6/8/89
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 8B

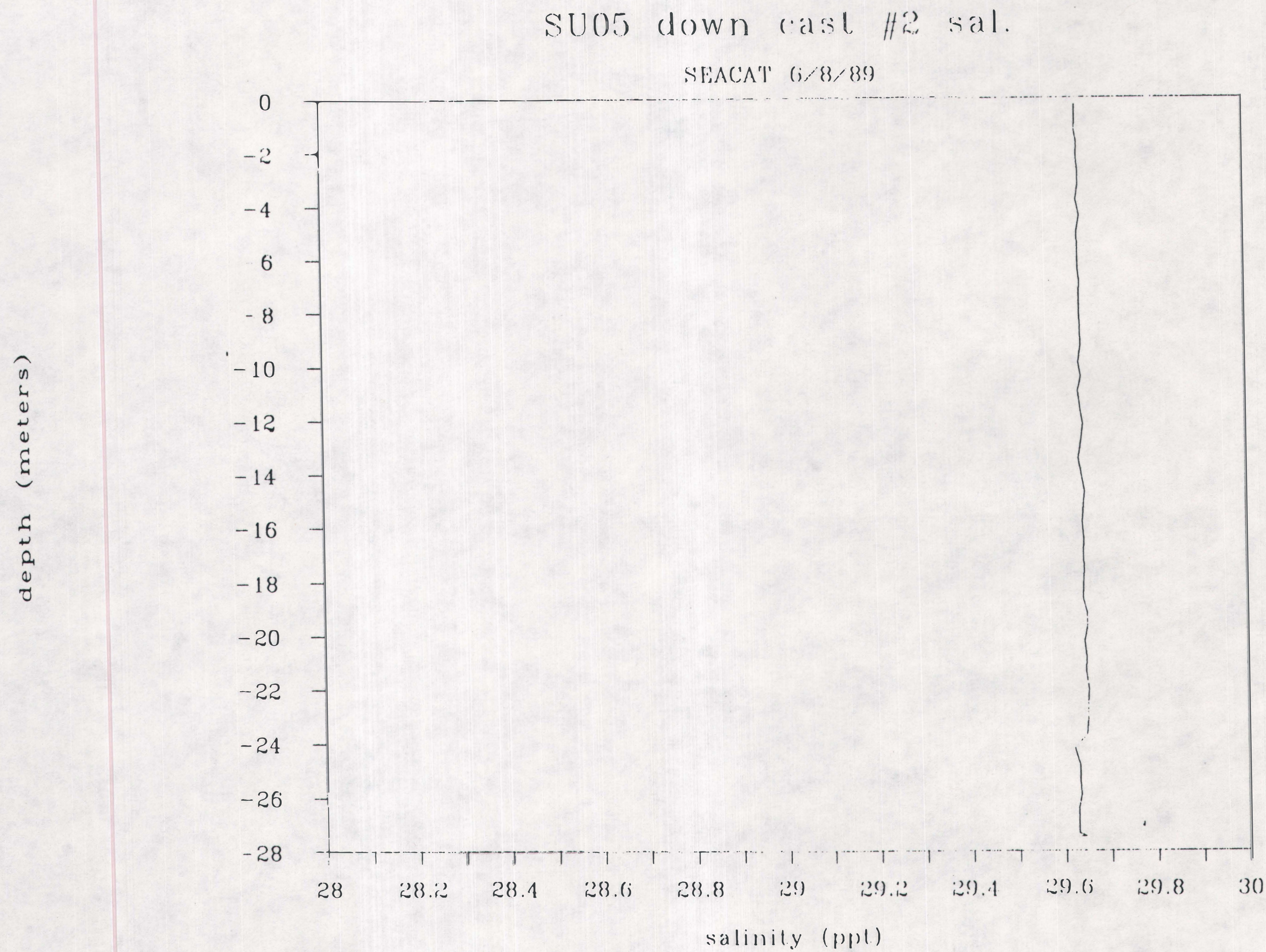

SU05 down cast #2 sal.
SEACAT 6/8/89
depth (meters)
0
-2
-4
6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 9A

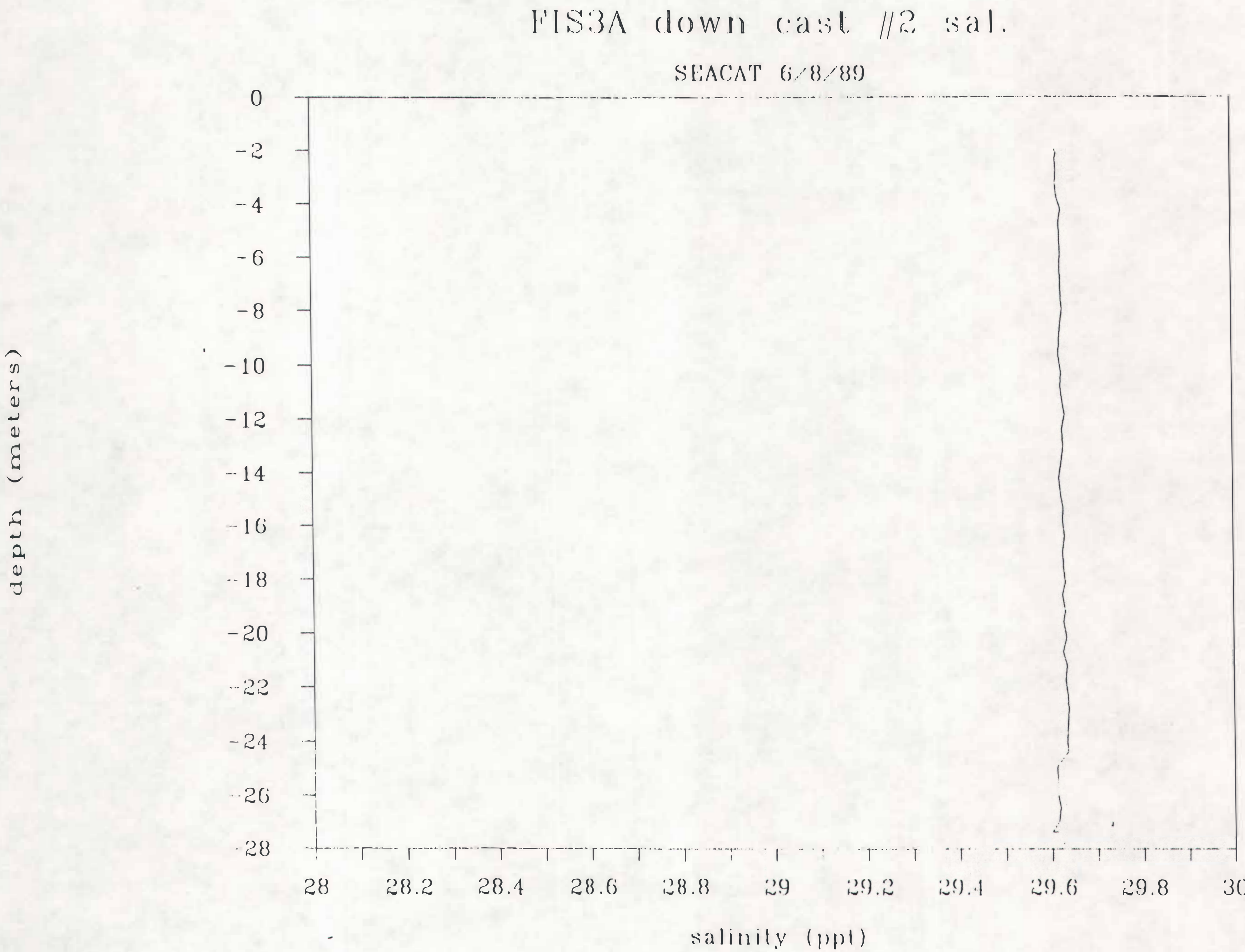

FIS3A down cast //2 sal.
SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 9B

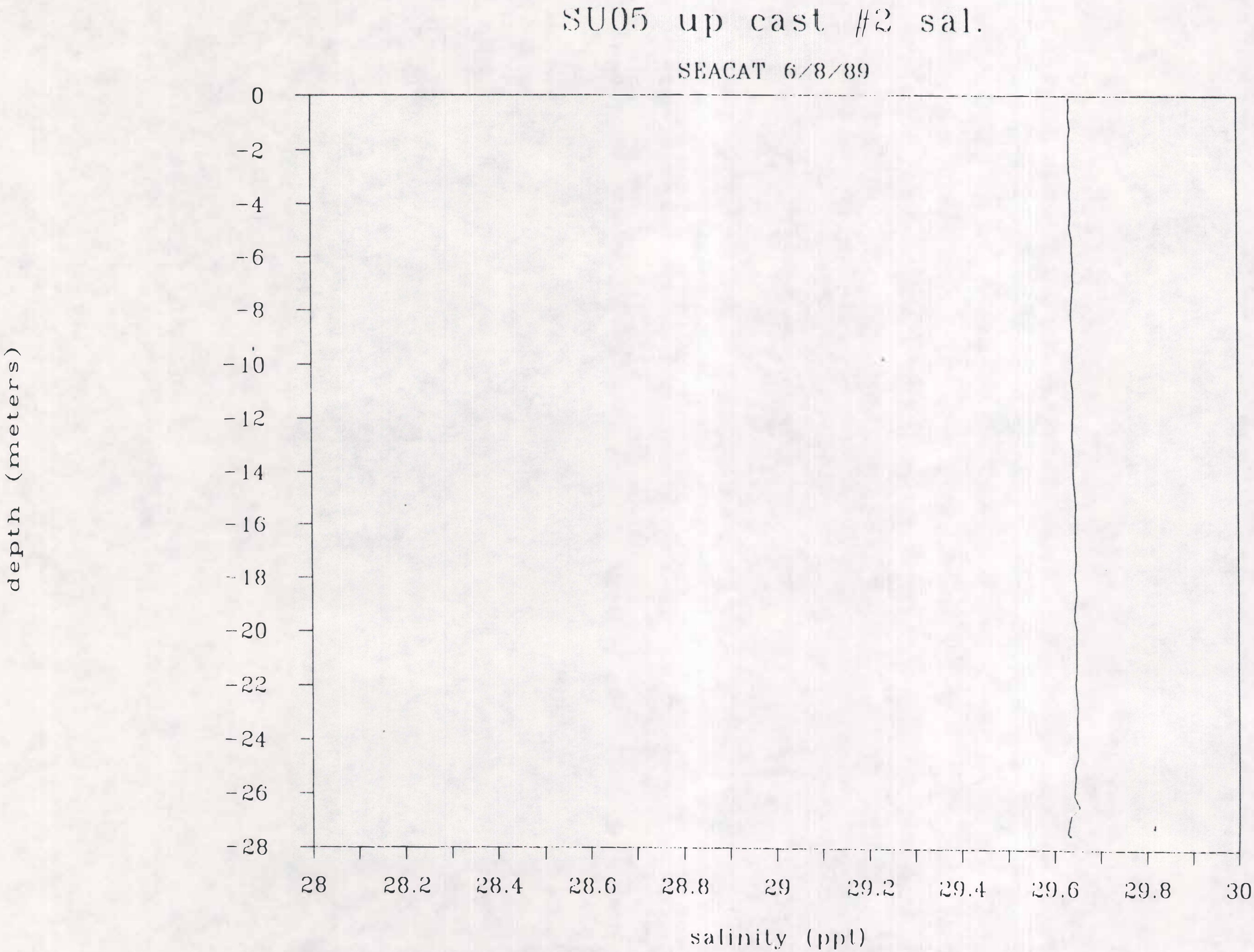

SU05 up cast #2 sal.
SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 10A

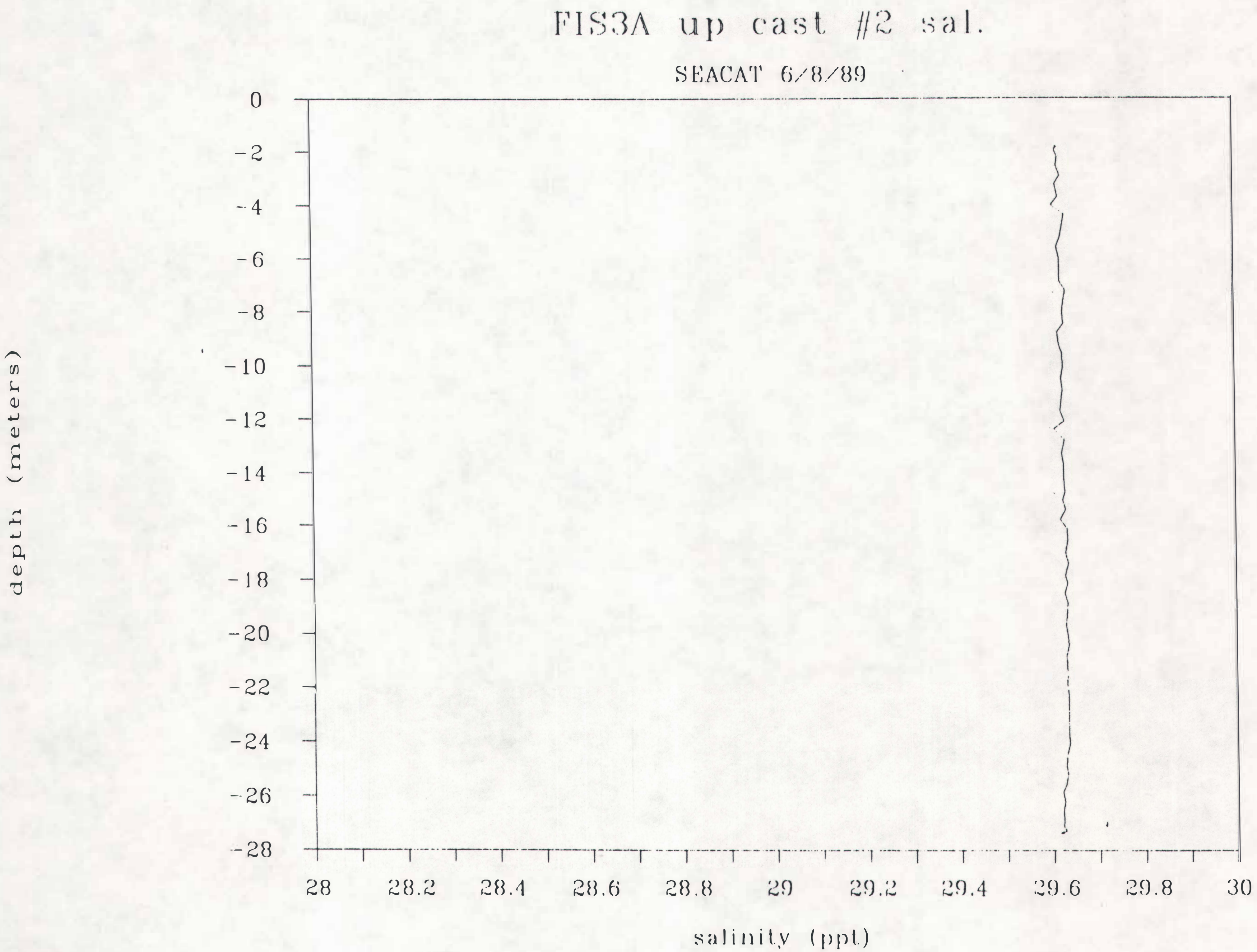

FIS3A up cast #2 sal.
SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 10B

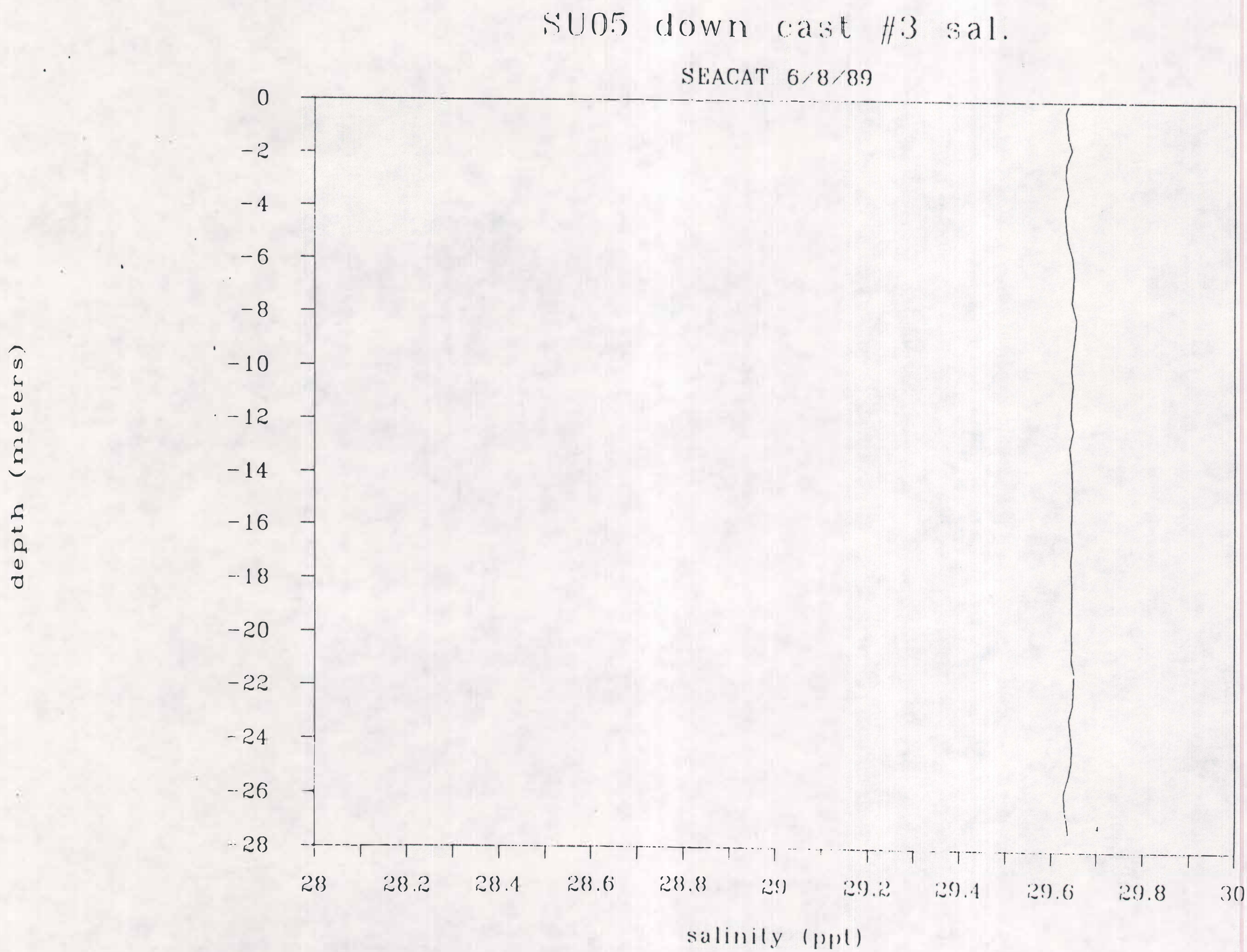

SU05 down cast #3 sal.
SEACAT 6/8/89
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 11A

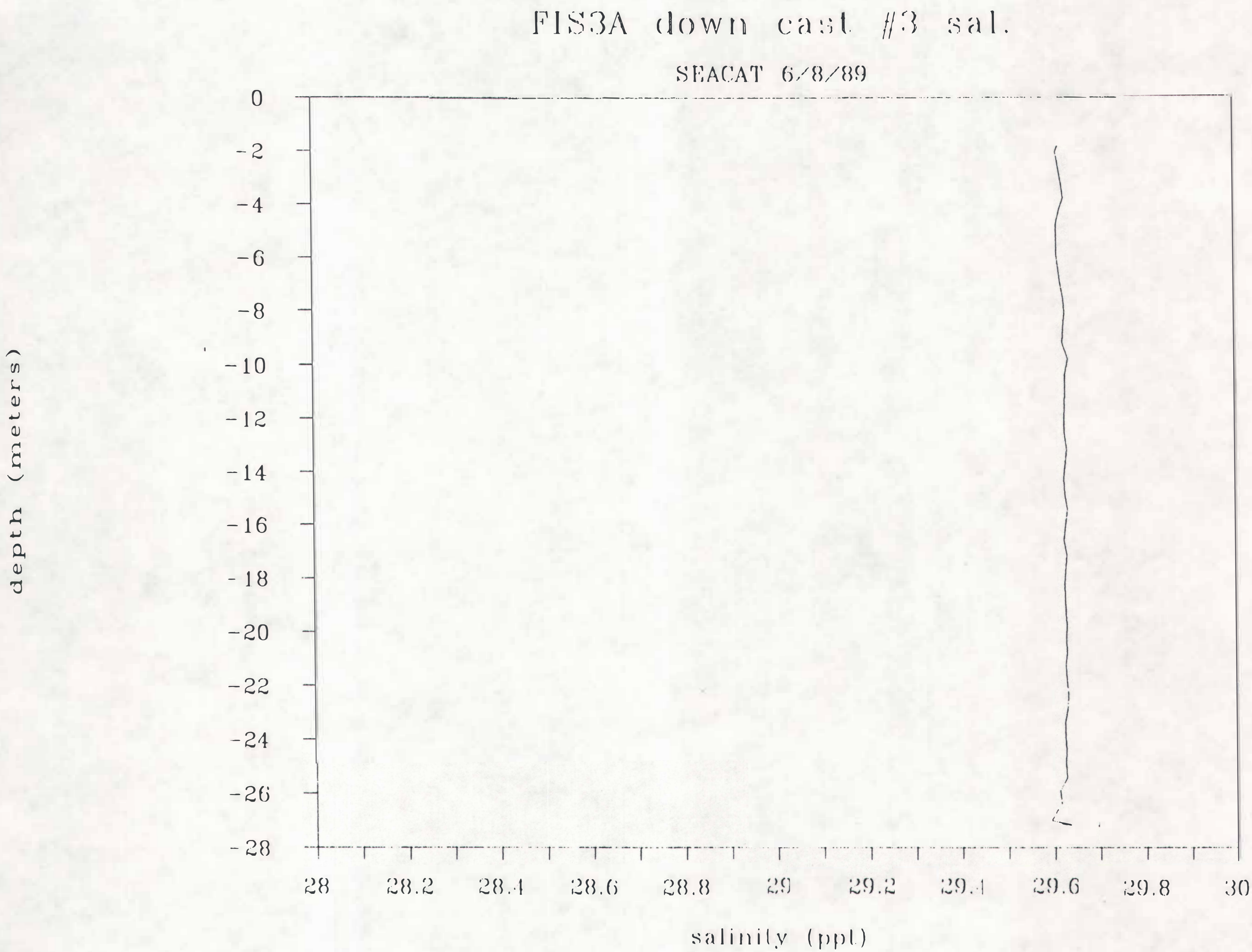
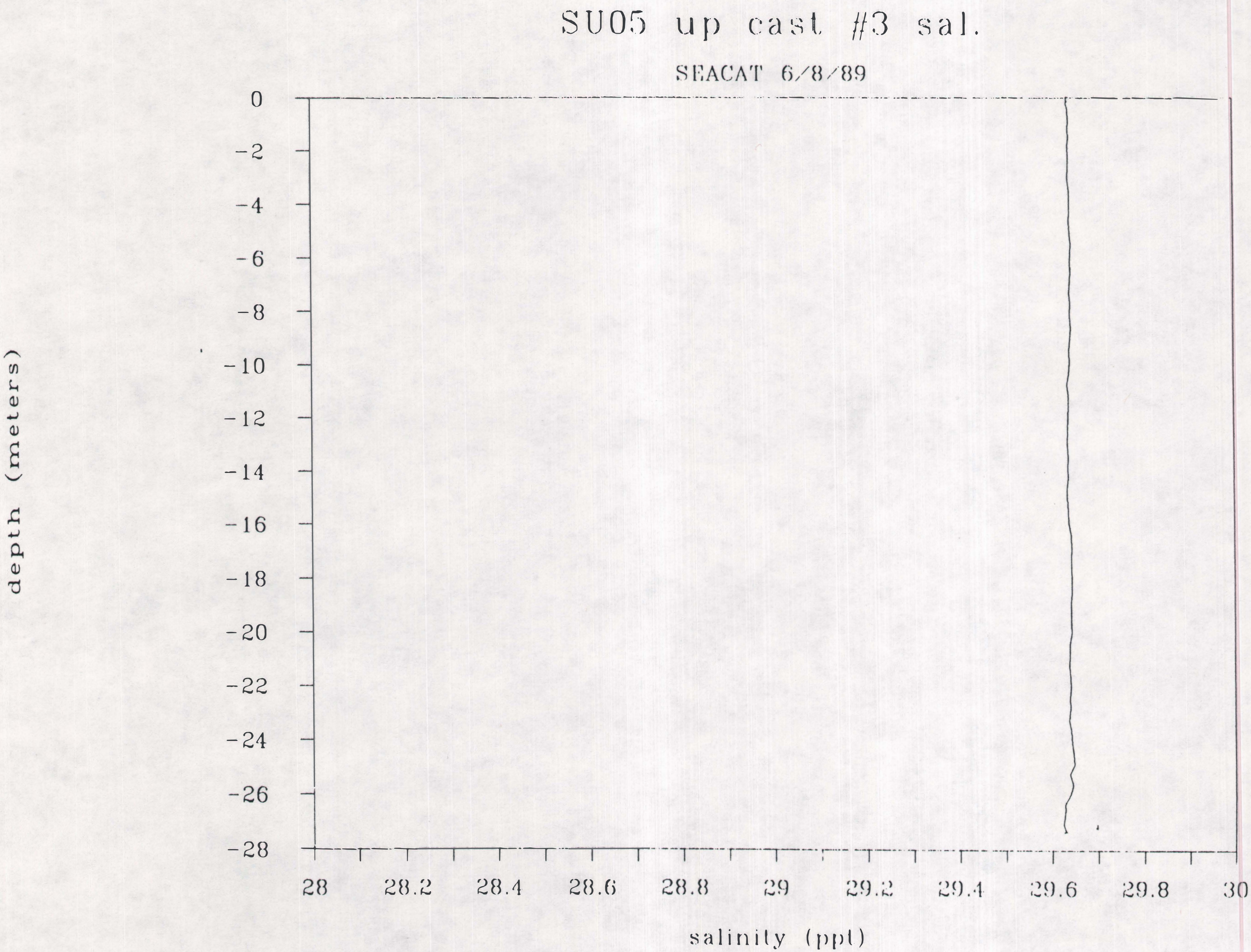

FIS3A down cast #3 sal.
SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 11B



SU05 up cast #3 sal.
SEACAT 6/8/89
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 12A

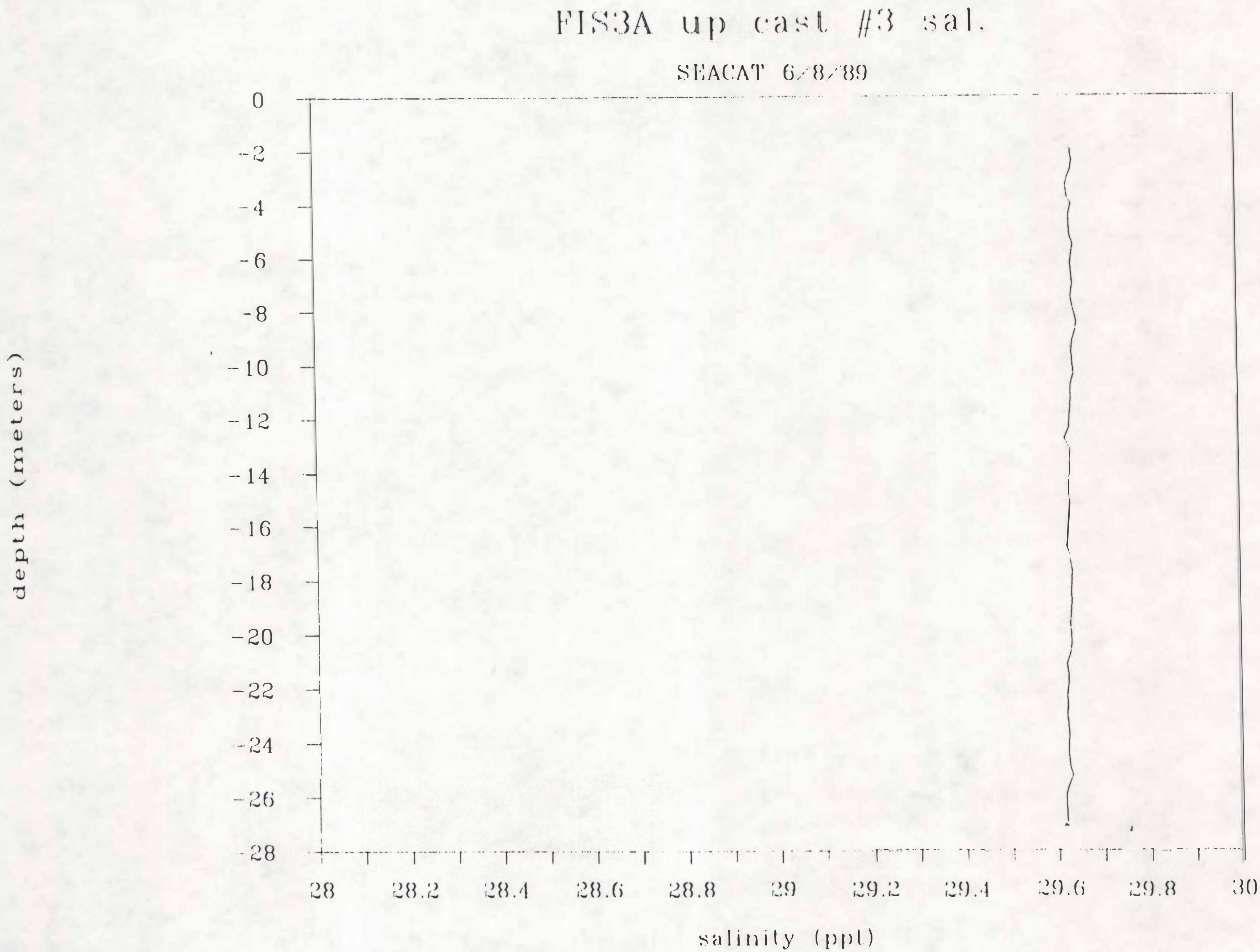
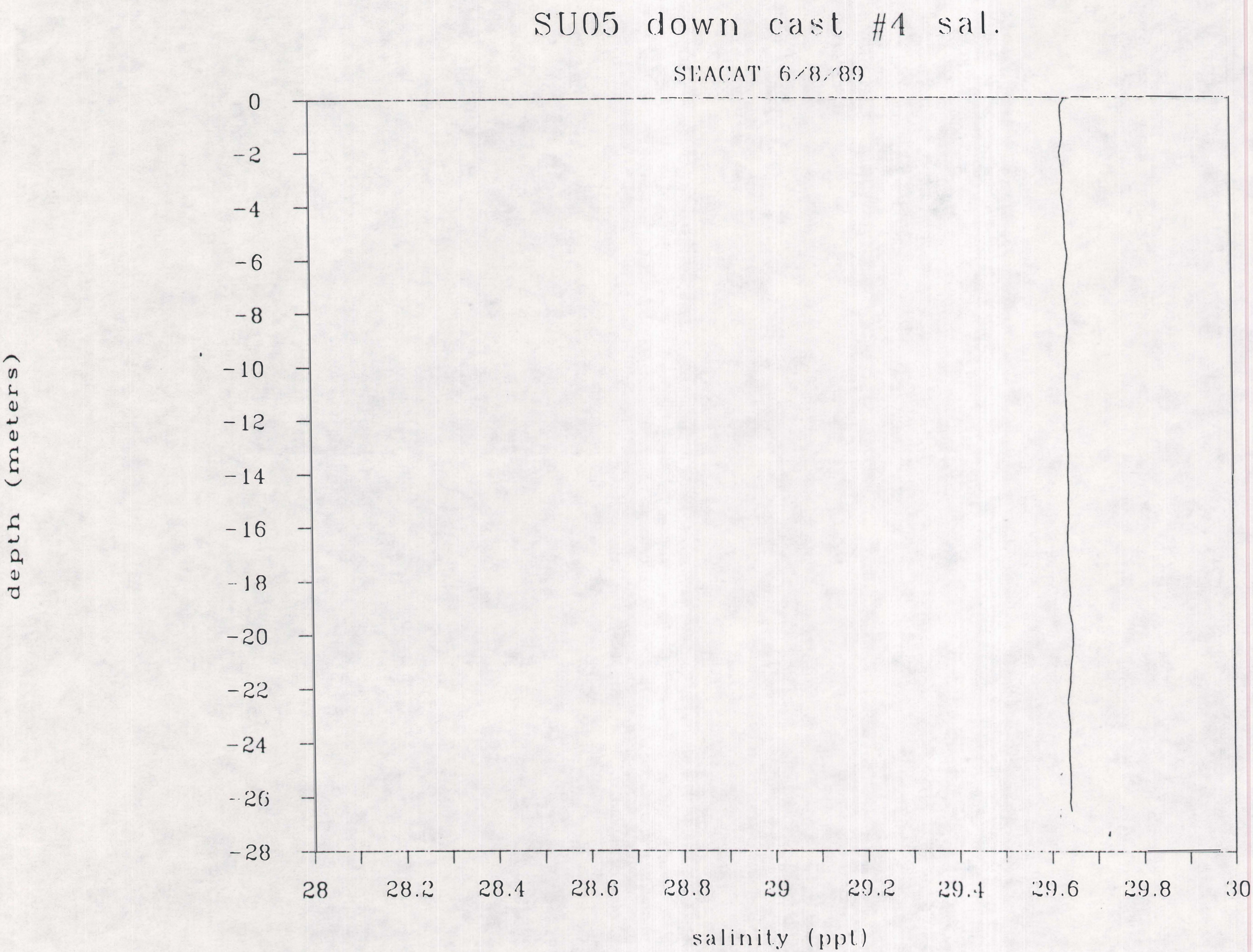

FIS3A up cast #3 sal.
SEACAT 6/8/89
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 12B



SU05 down cast #4 sal.
SEACAT 6/8/89
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 13A

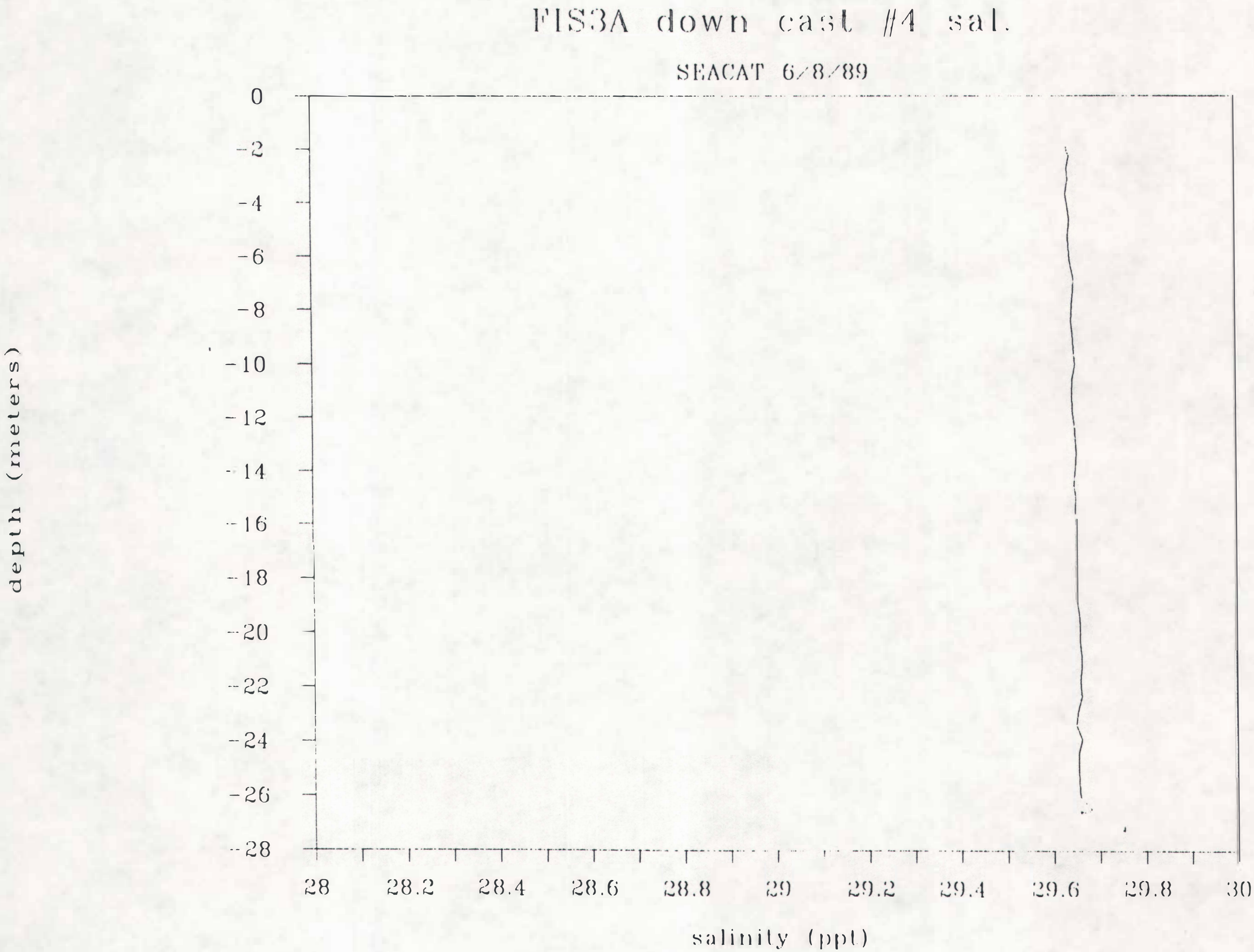
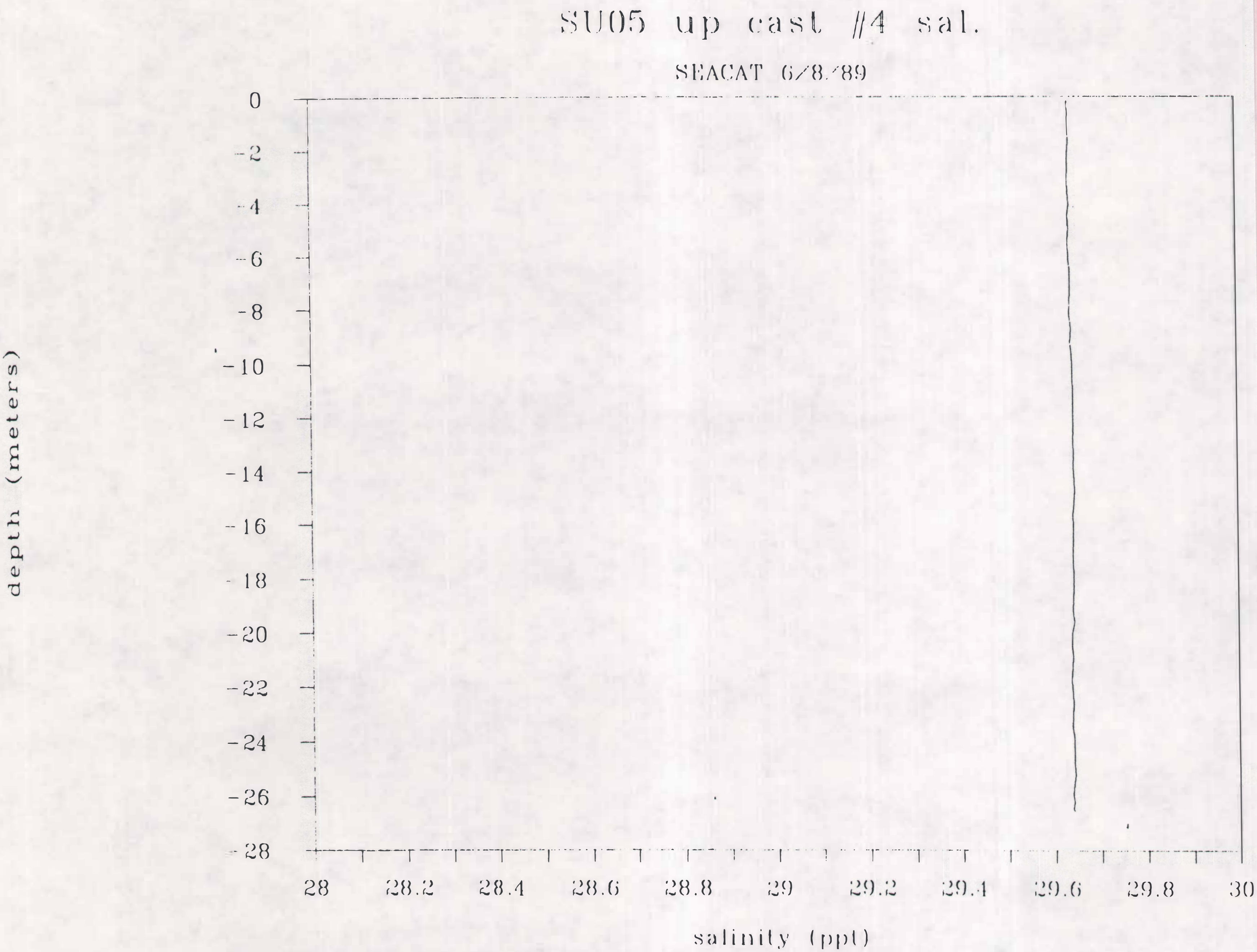
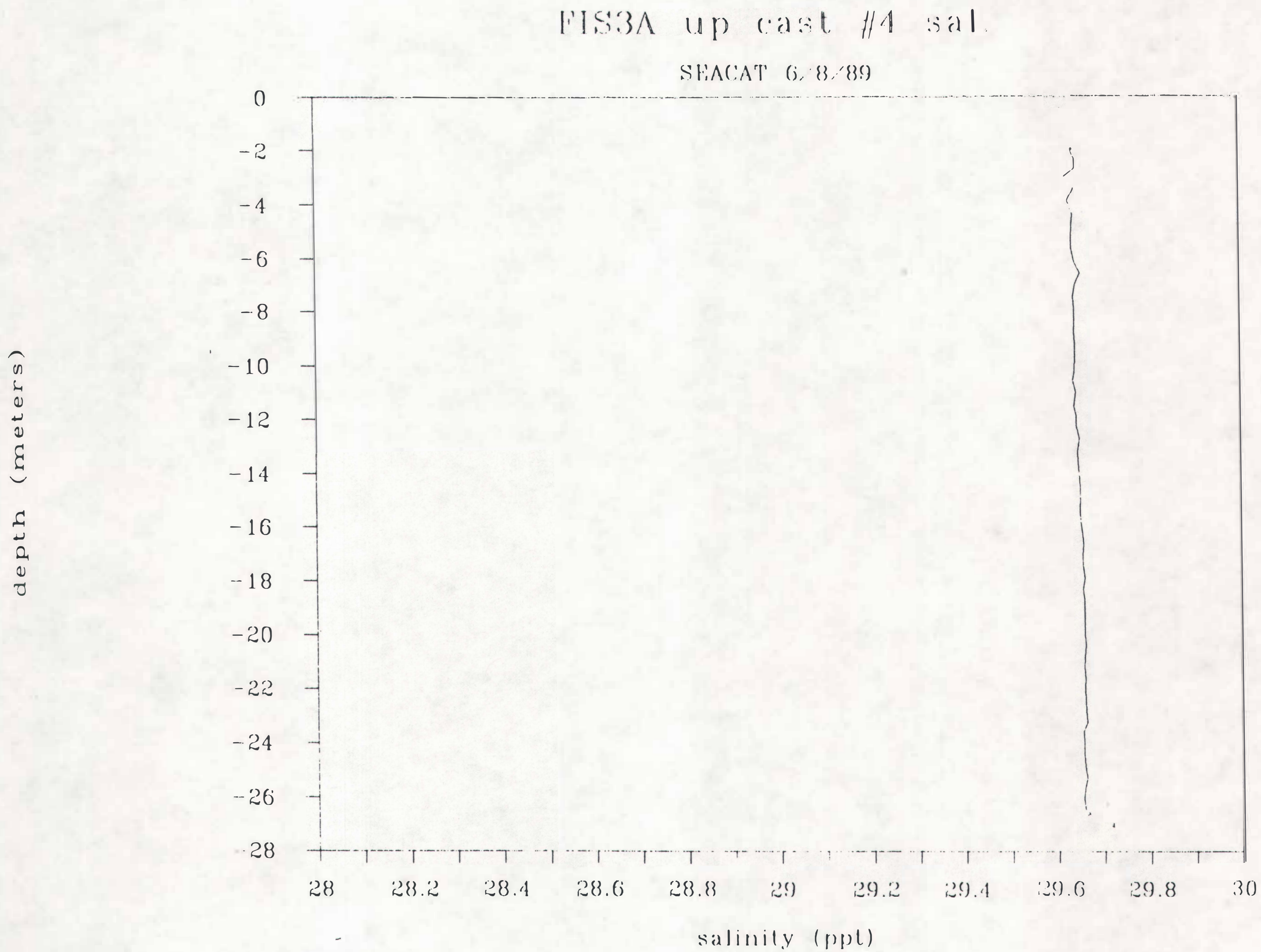

FIS3A down cast #4 sal.
SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 13B



SU05 up cast #4 sal.
SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 14A



FIS3A up cast #4 sal.
SEACAT 6/8/89
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 14B

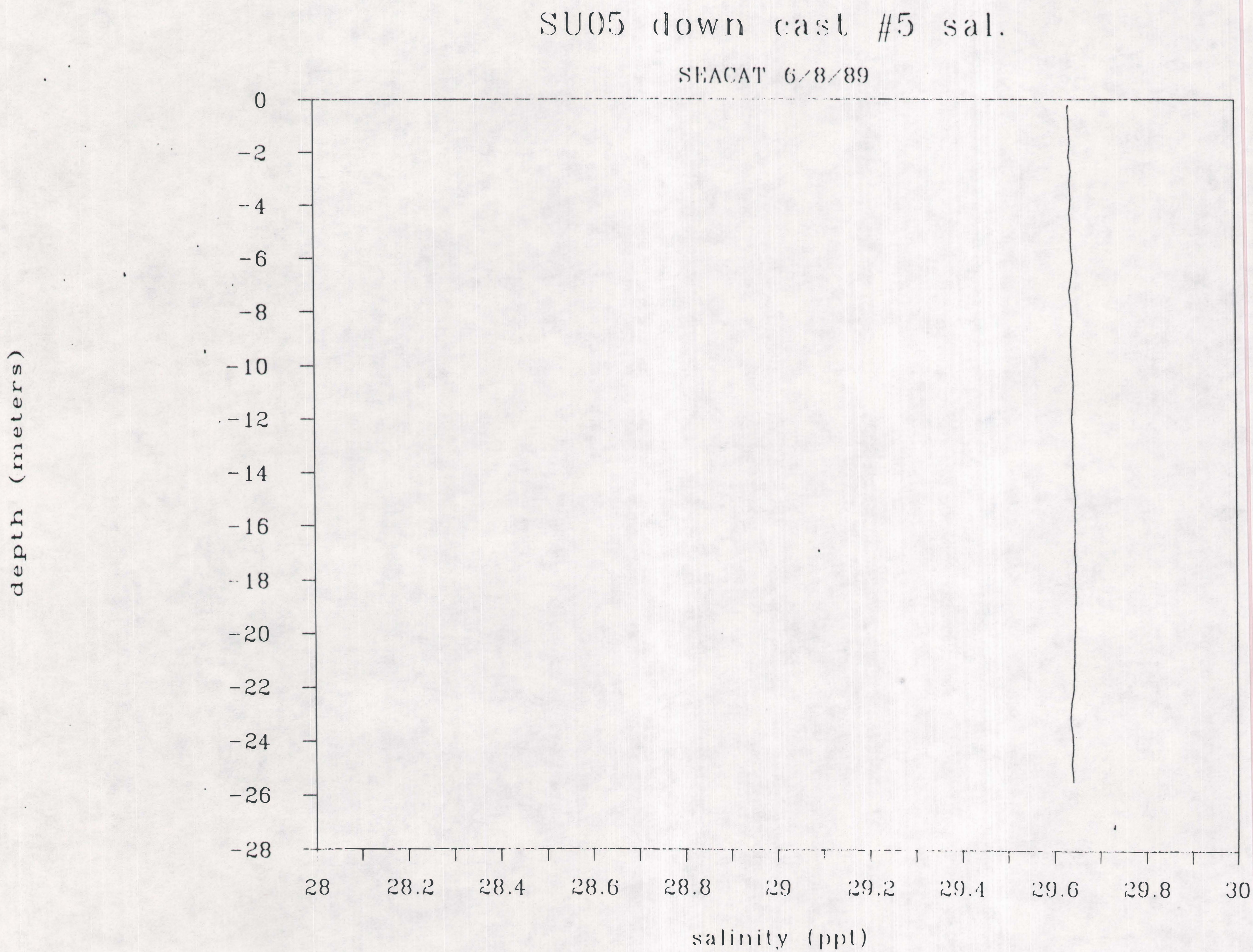

SU05 down cast #5 sal.
SEACAT 6/8/89
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 15A

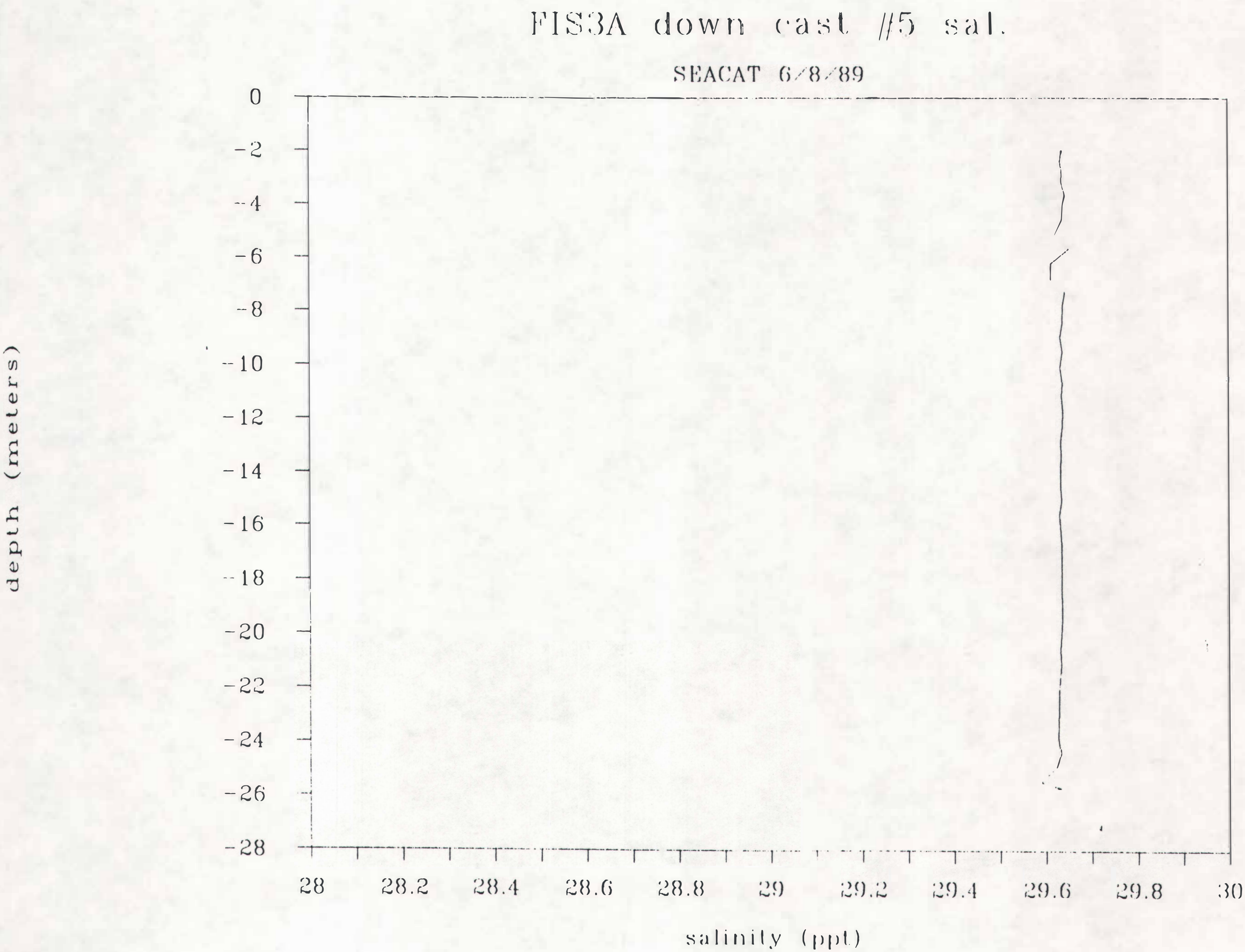
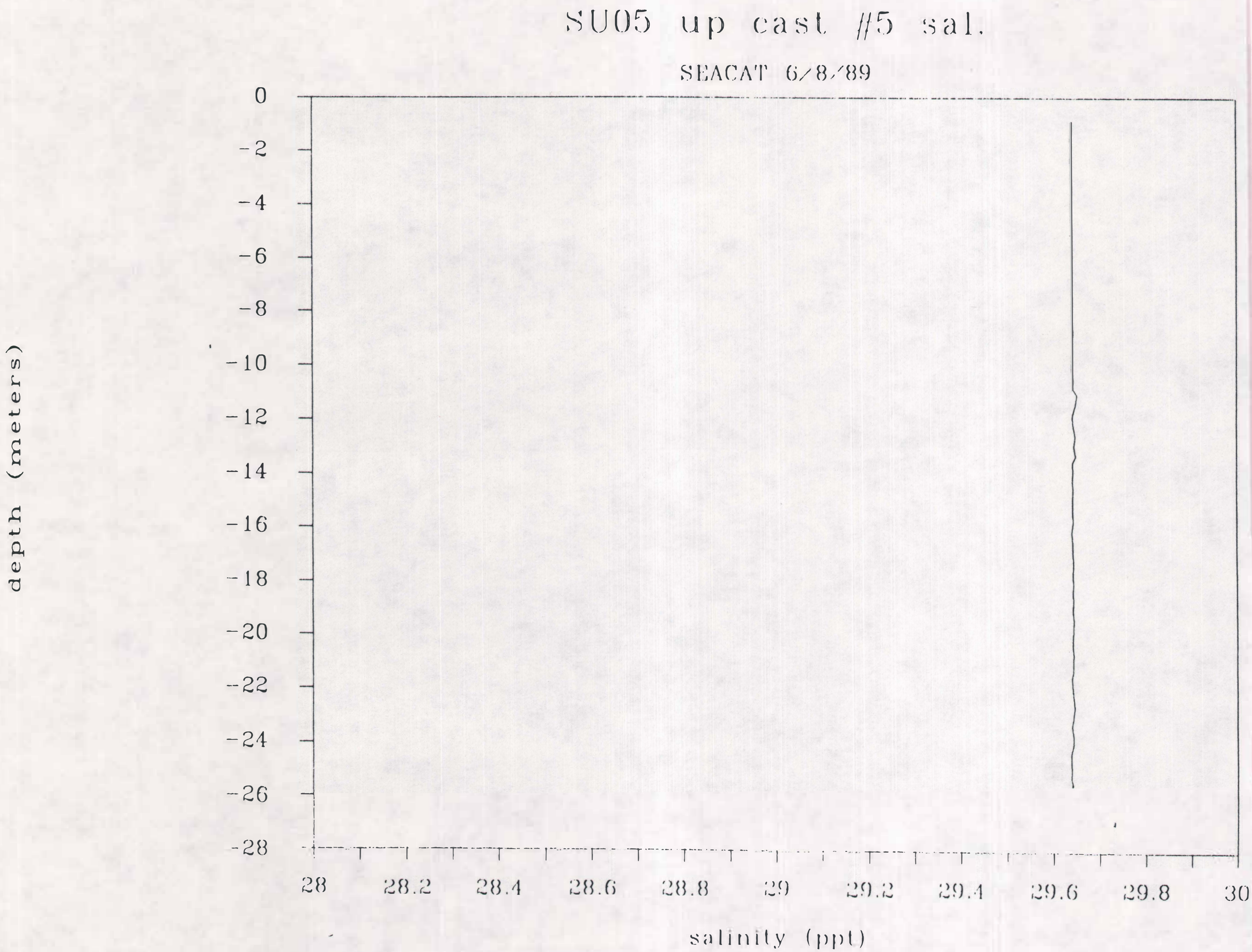

FIS3A down cast #5 sal.
SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 15B



SU05 up cast #5 sal.
SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 16A

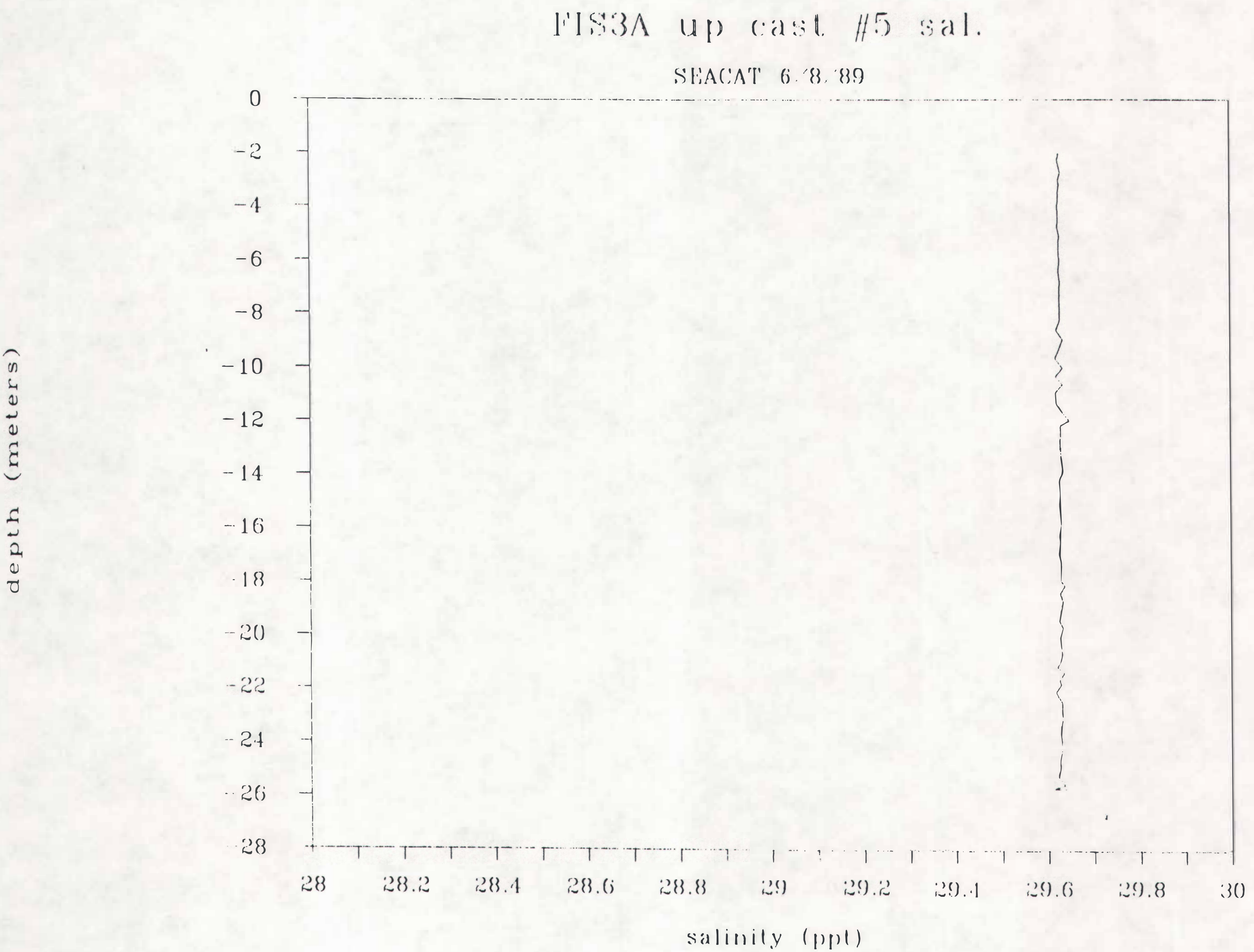

FIS3A up cast #5 sal.
SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 16B

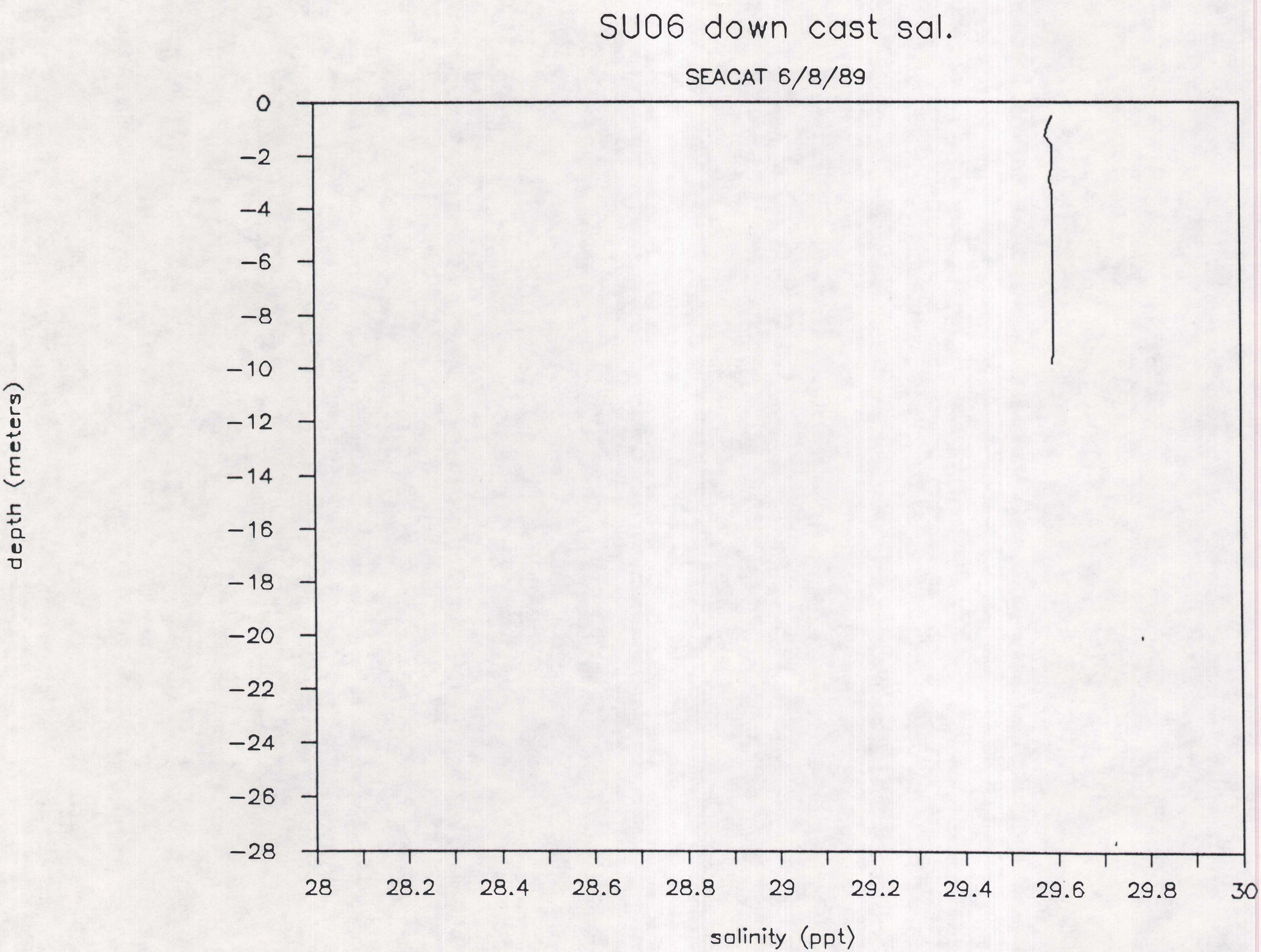

SU06 down cast sal.
SEACAT 6/8/89
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
solinity (ppt)

Figure 17A

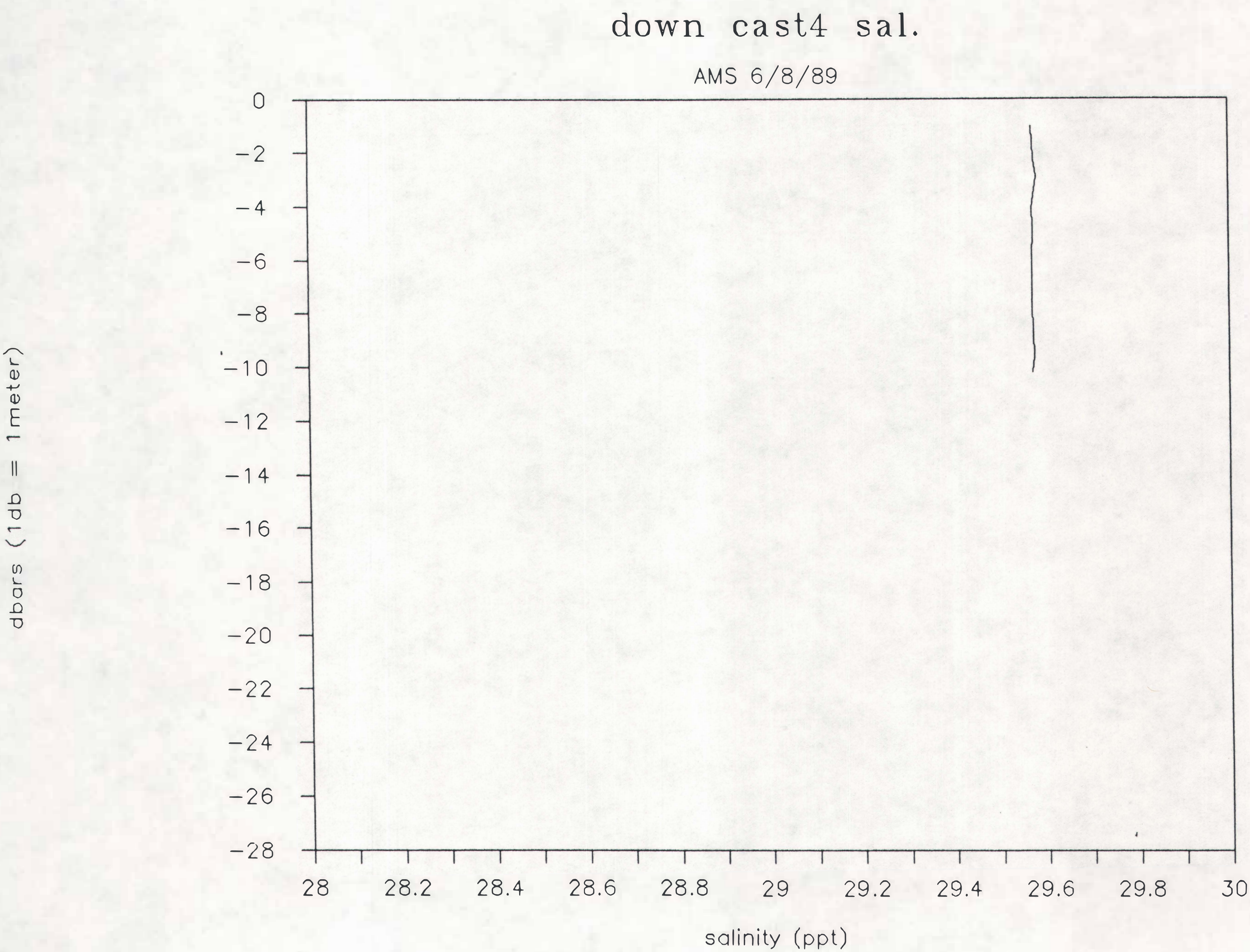
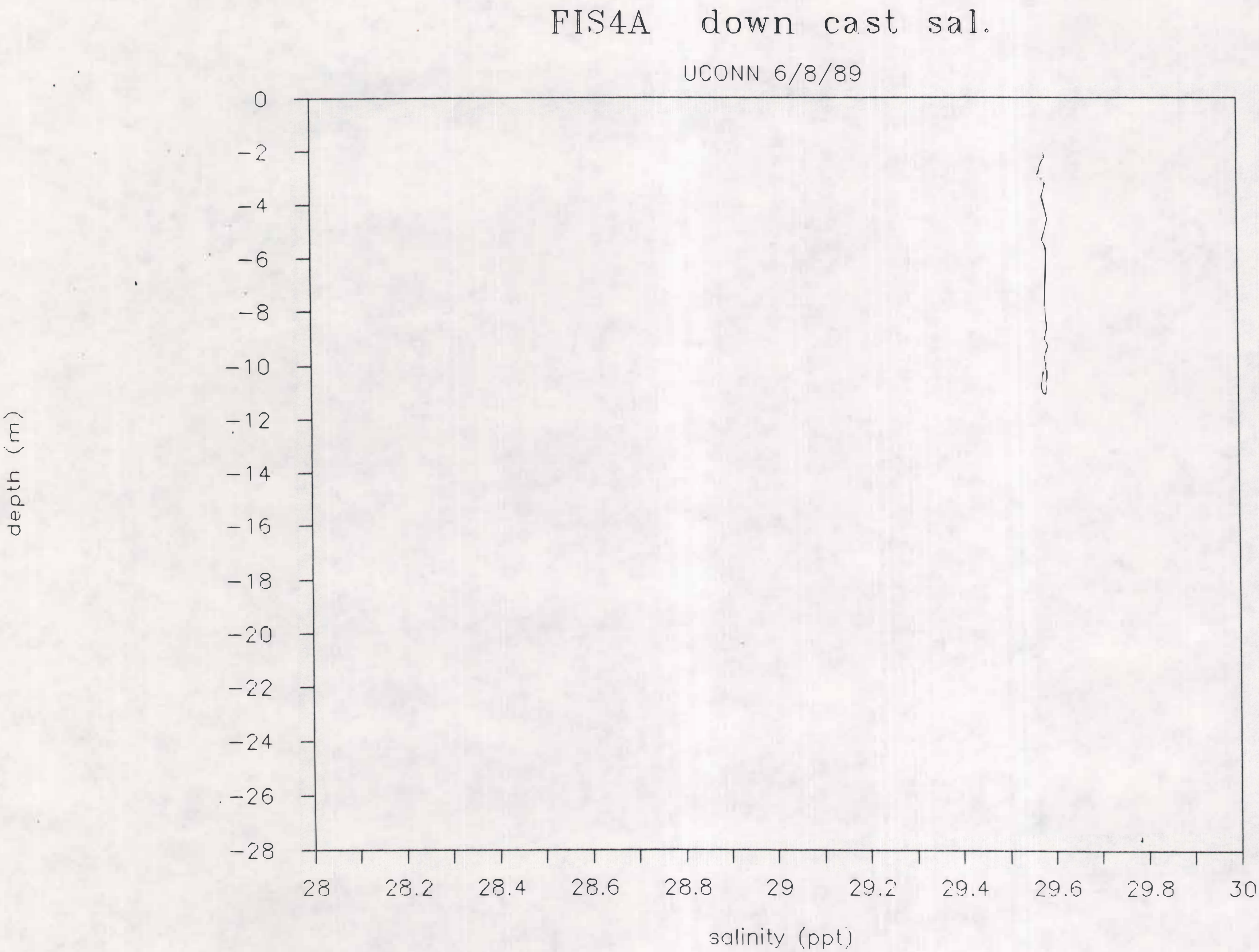
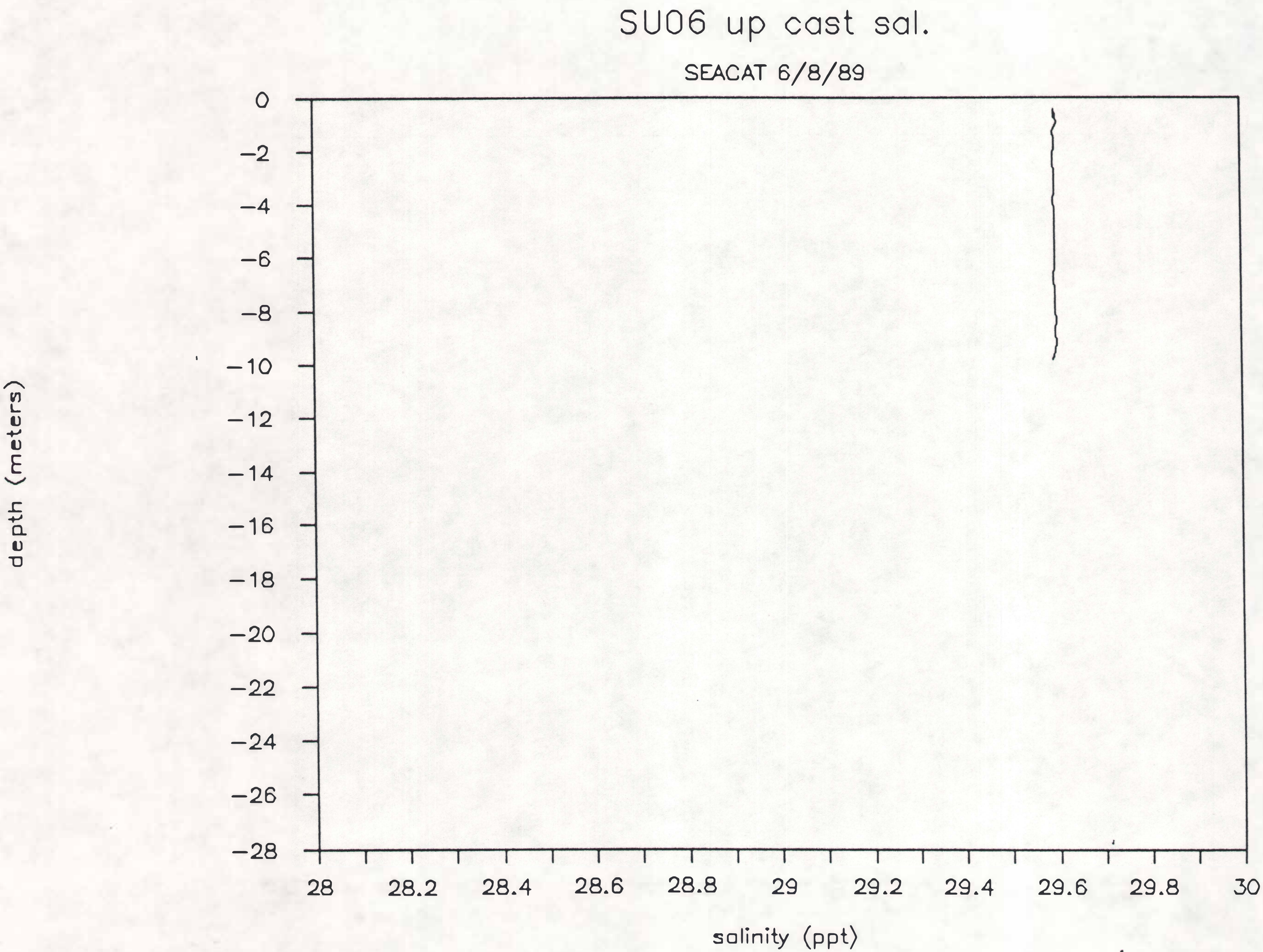

down cast4 sal.
AMS 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
dbars (1db = 1meter)
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 17B



FIS4A down cast sal.
UCONN 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (m)
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 17C



SU06 up cast sal.
SEACAT 6/8/89
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 18A

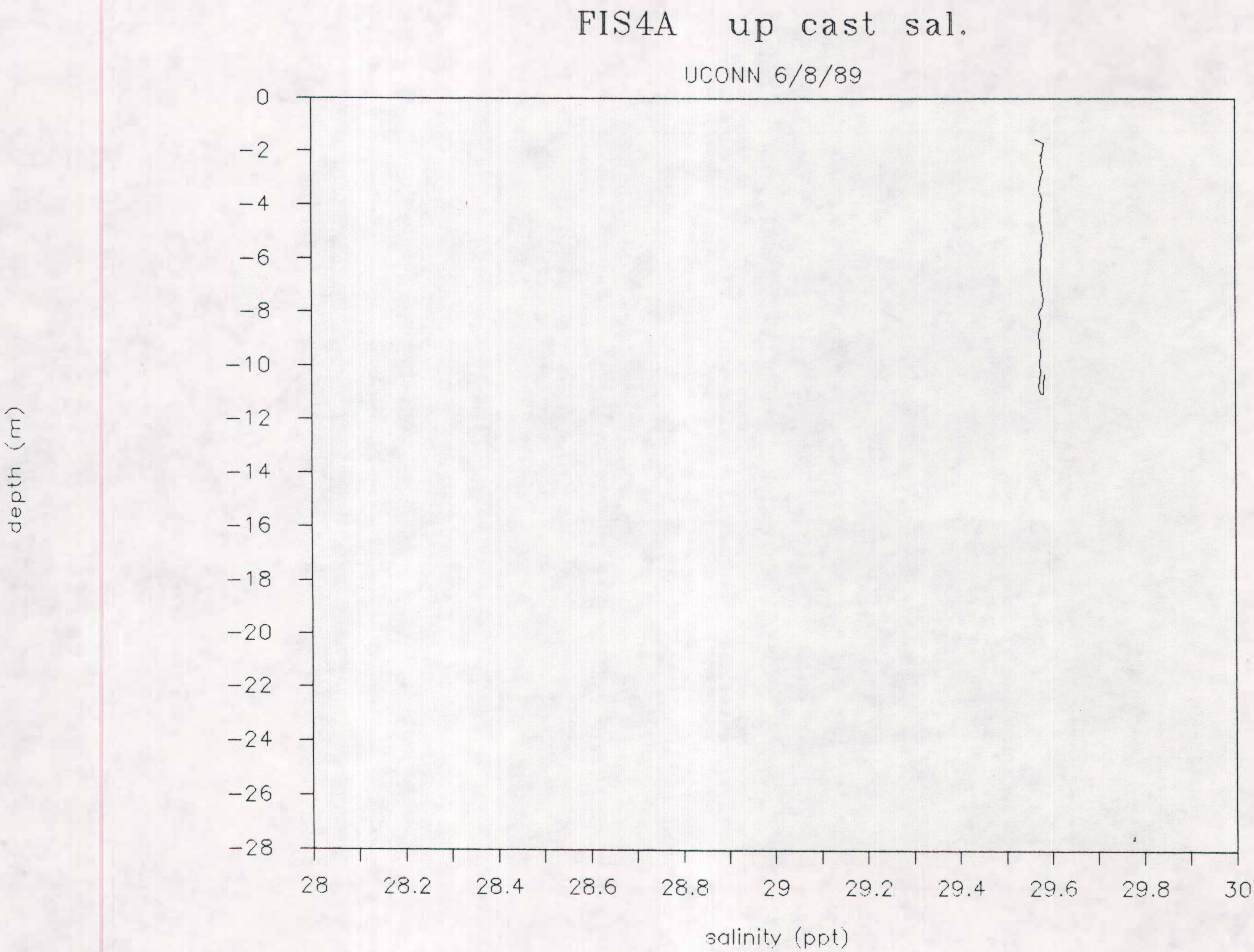

FIS4A up cast sal.
UCONN 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (m)
28
28.2
28.4
28.6
28.8
29
29.2
29.4
29.6
29.8
30
salinity (ppt)

Figure 18B

SU00 down cast temp.

SEACAT 6/8/89

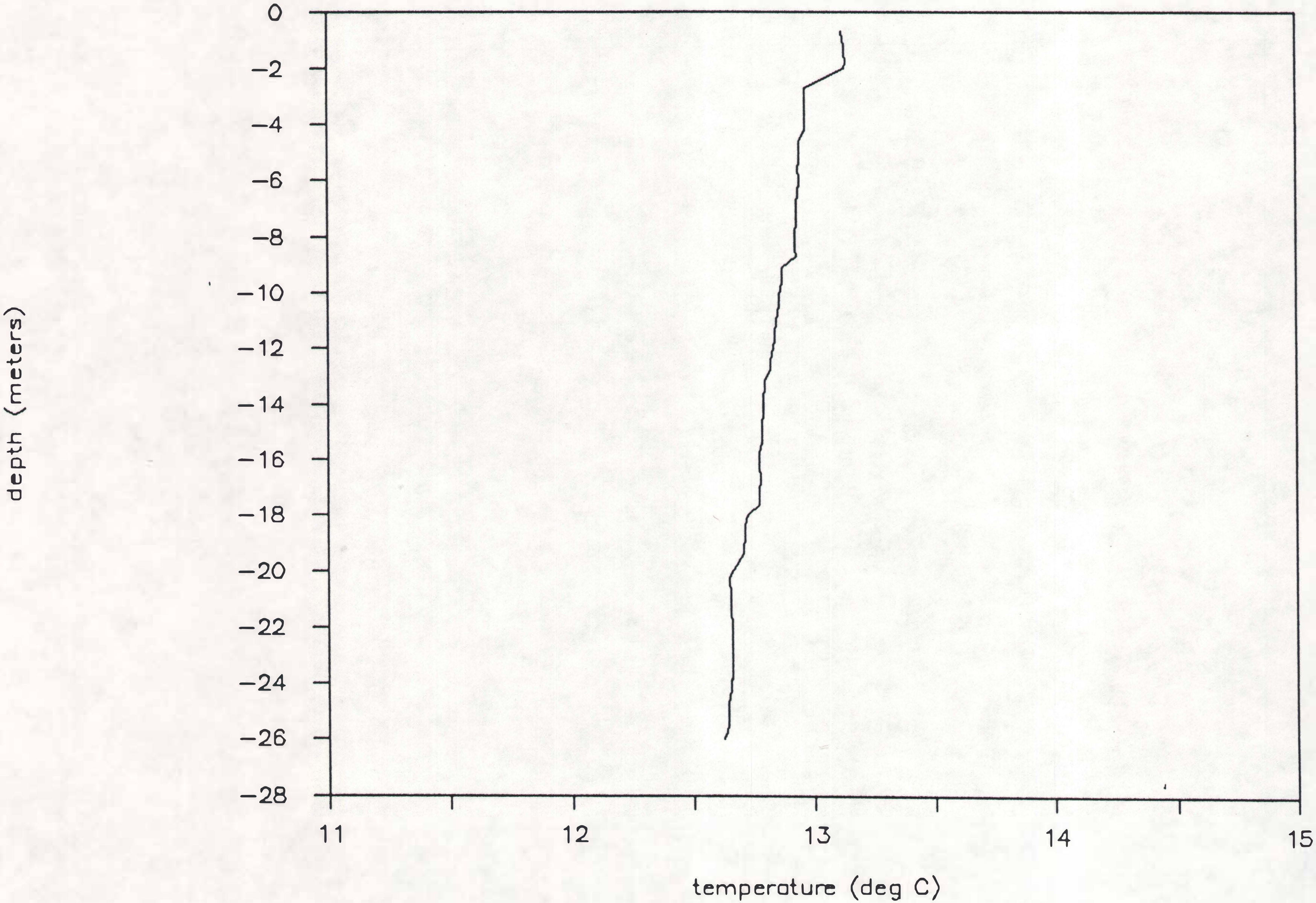


Figure 18b

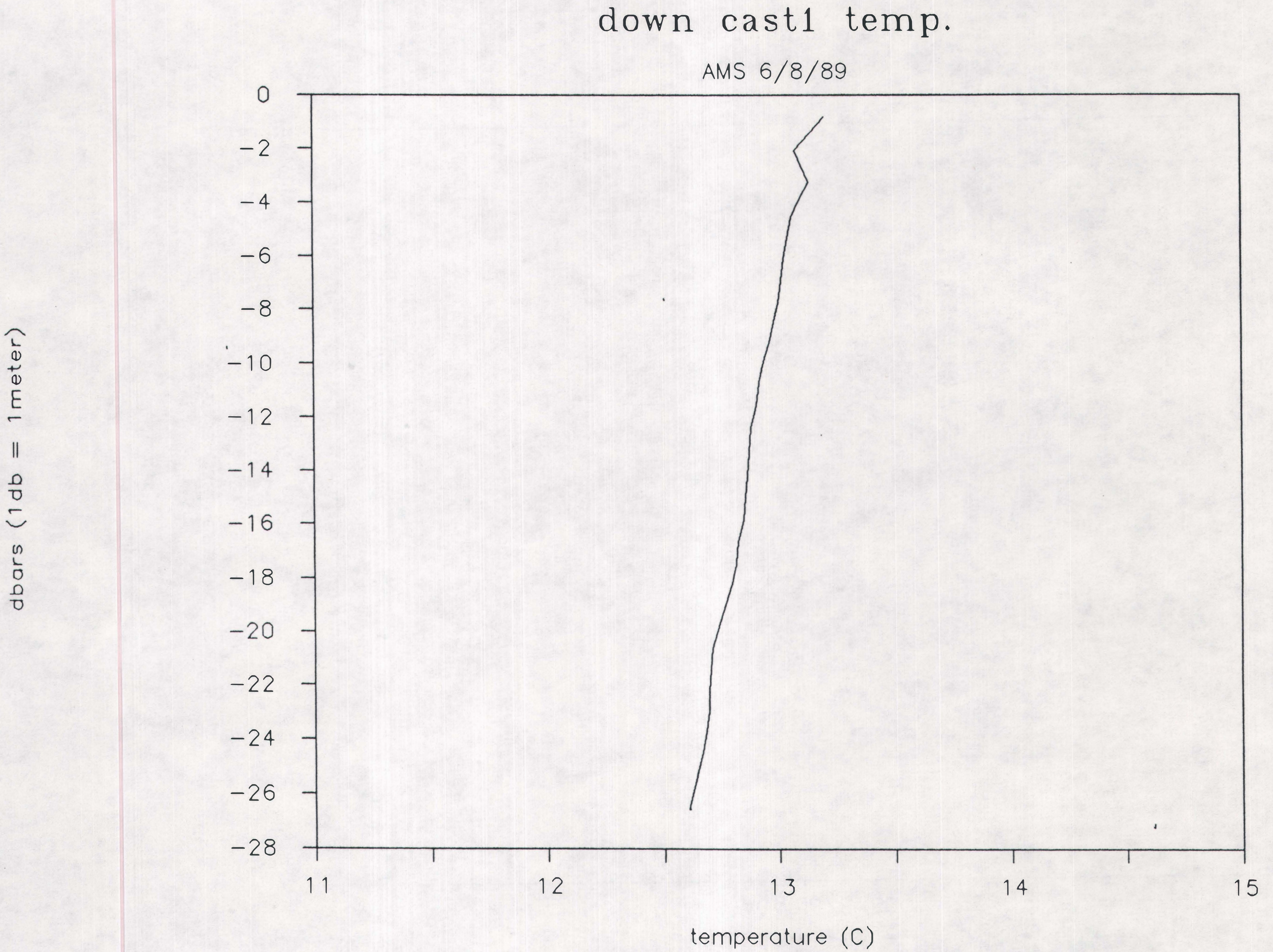
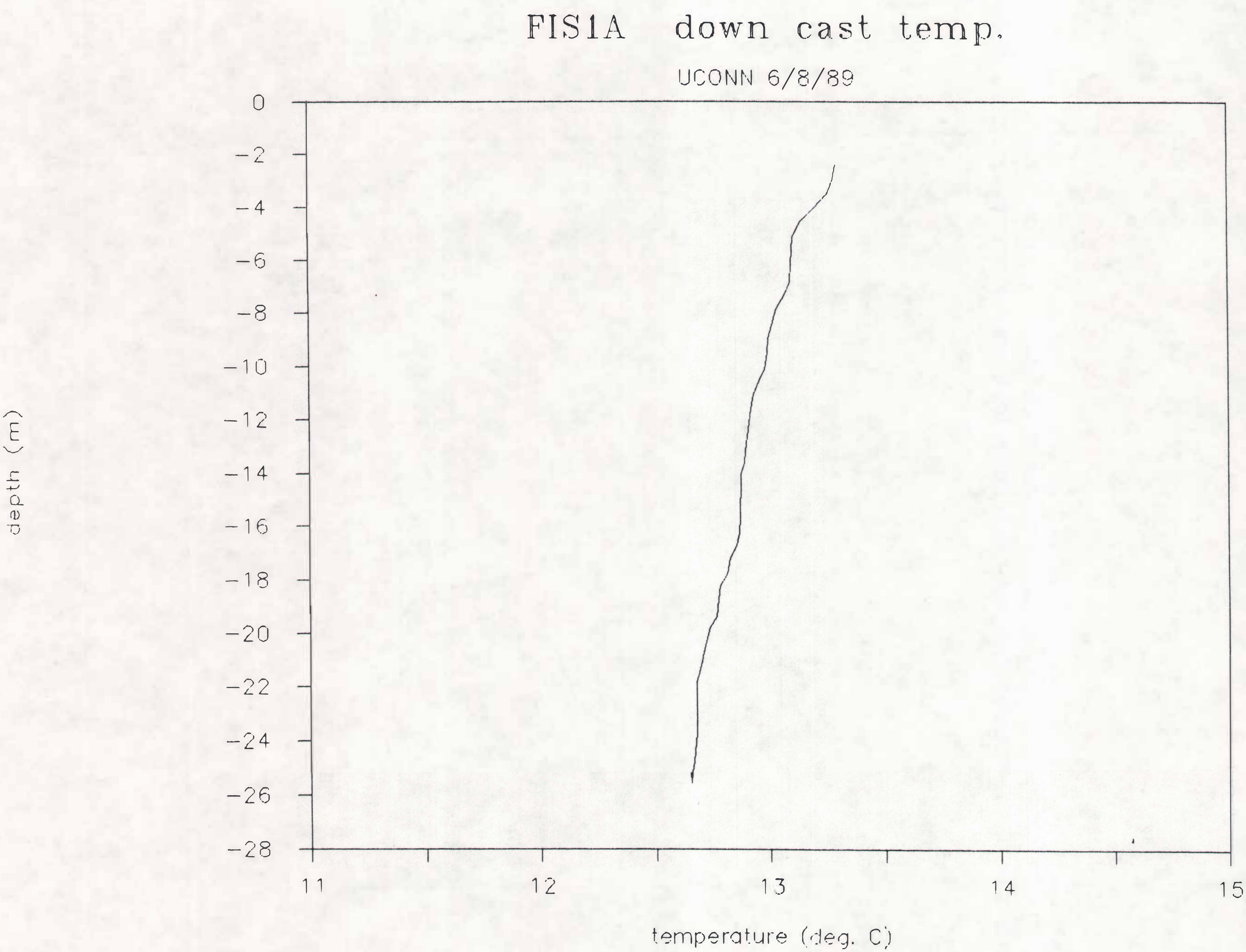
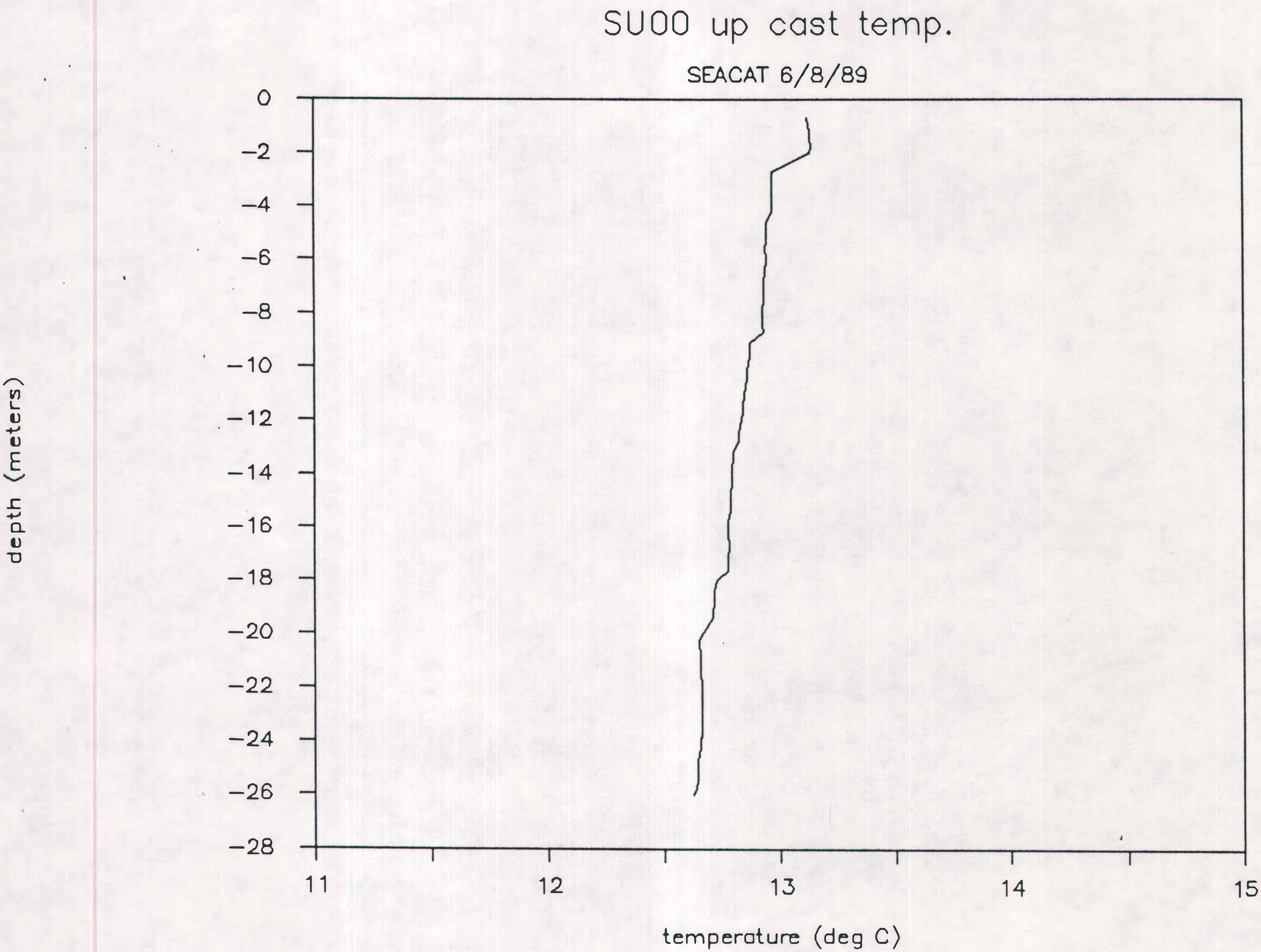

down cast1 temp.
AMS 6/8/89
dbars (1db = 1meter)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
11
12
13
14
15
temperature (C)

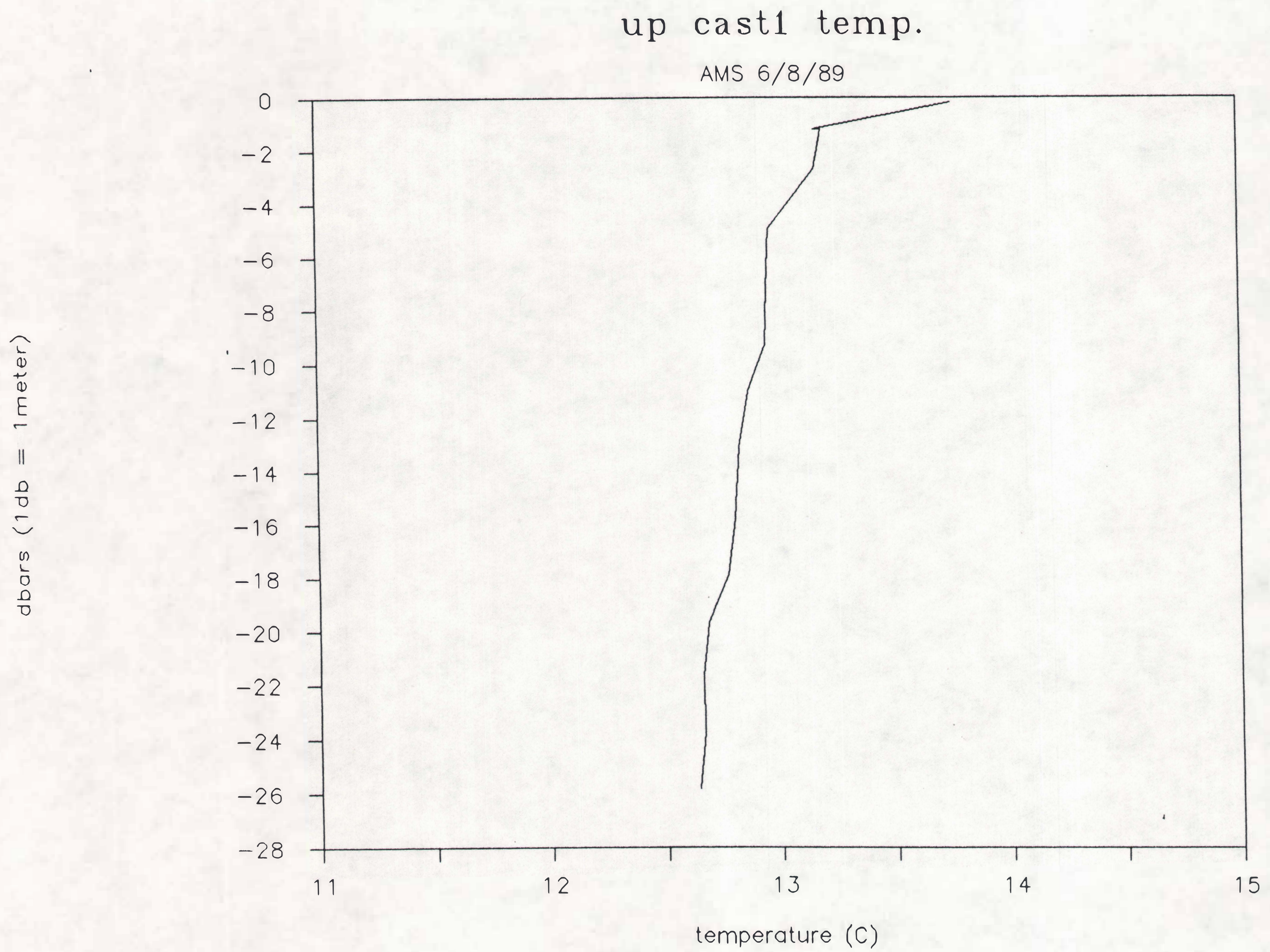
Figure 19B



FIS1A down cast temp.
UCONN 6/8/89
depth (m)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
11
12
13
14
15
temperature (deg. C)

Figure 19C


SU00 up cast temp.
SEACAT 6/8/89
depth (meters)
0
−2
−4
−6
−8
−10
−12
−14
−16
−18
−20
−22
−24
−26
−28
11
12
13
14
15
temperature (deg C)



up cast1 temp.
AMS 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
dbars (1db = 1meter)
11
12
13
14
15
temperature (C)

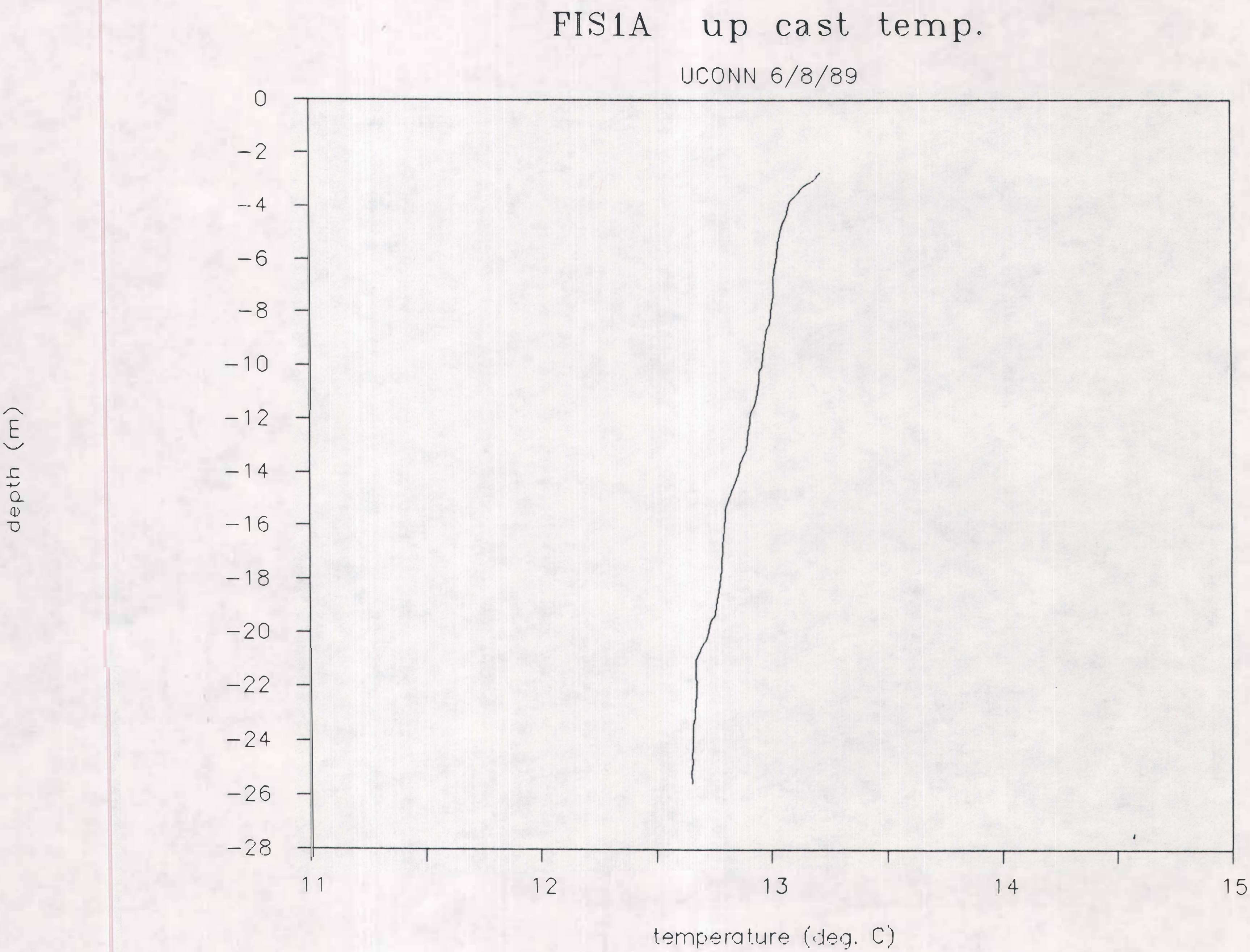
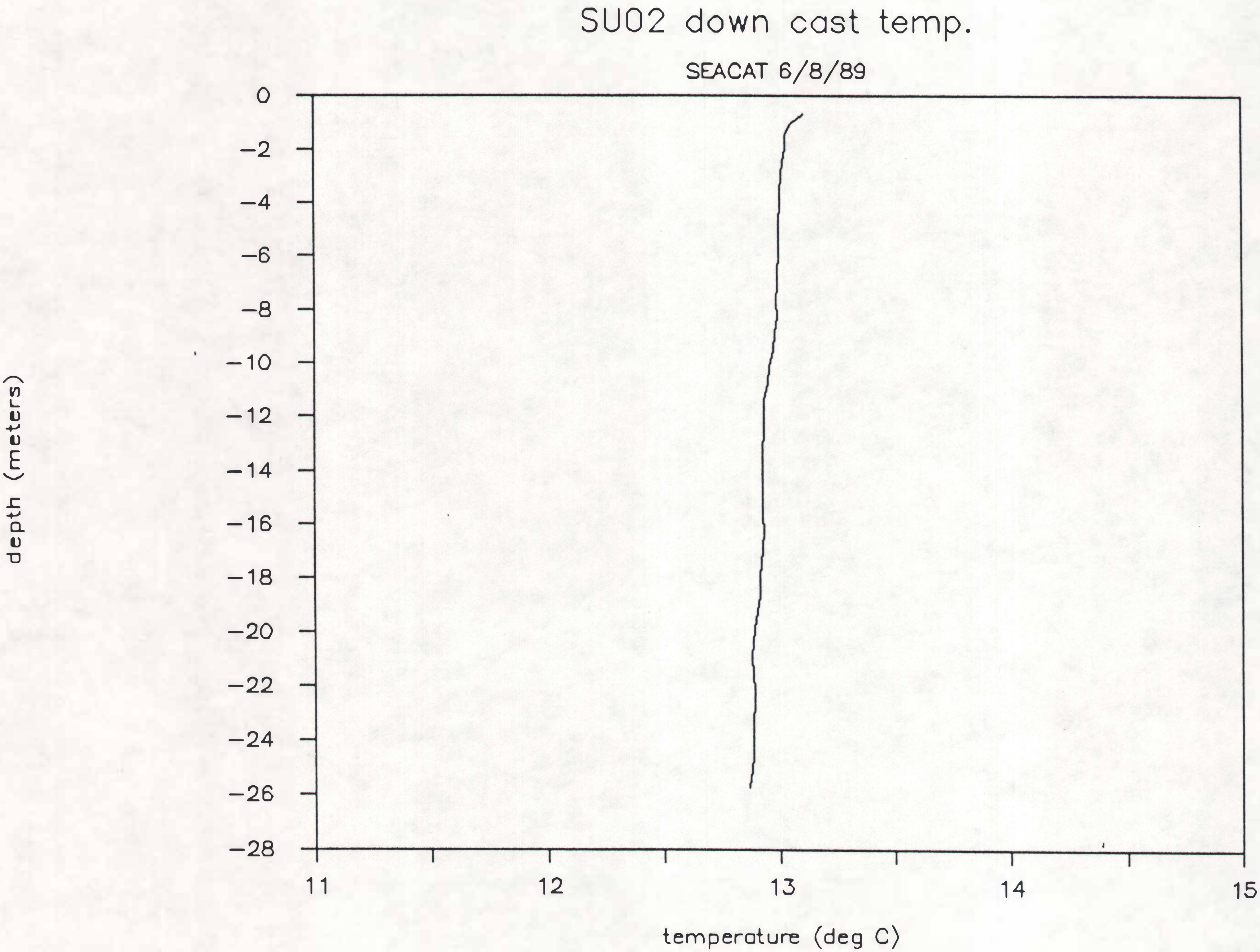
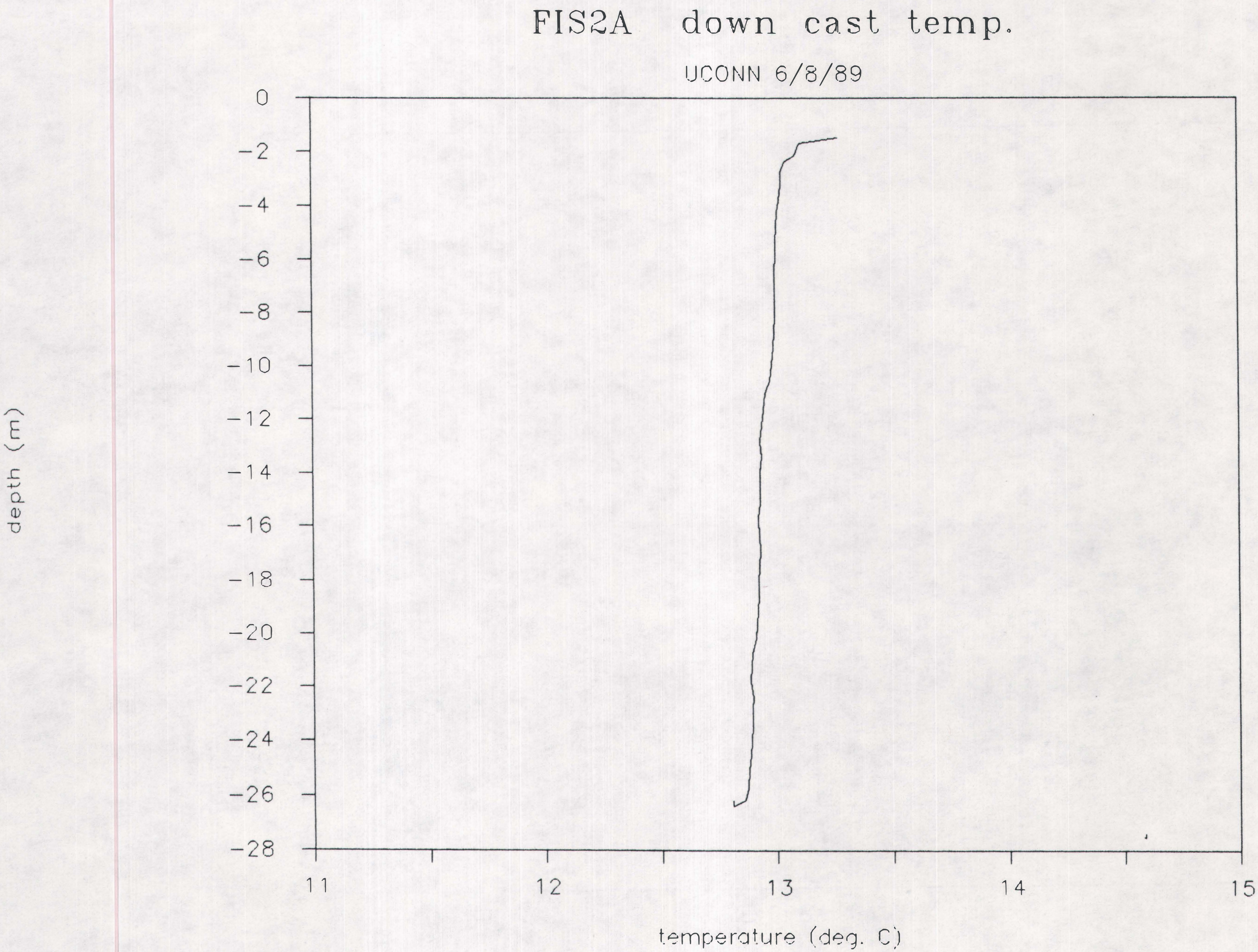

FIS1A up cast temp.
UCONN 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (m)
11
12
13
14
15
temperature (deg. C)

Figure 20C



SU02 down cast temp.
SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
11
12
13
14
15
temperature (deg C)

Figure 21A


FIS2A down cast temp.
UCONN 6/8/89
depth (m)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
11
12
13
14
15
temperature (deg. C)

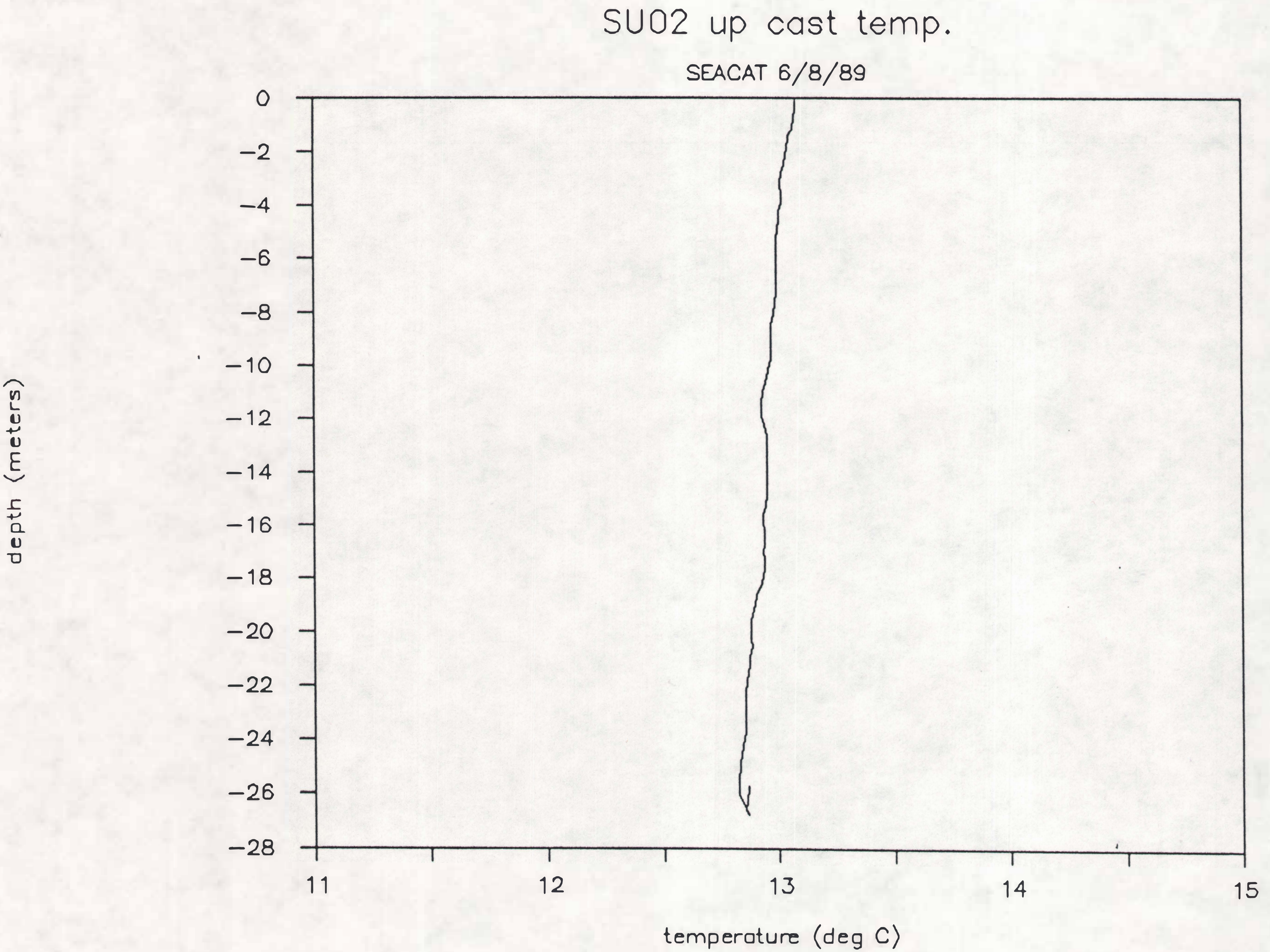
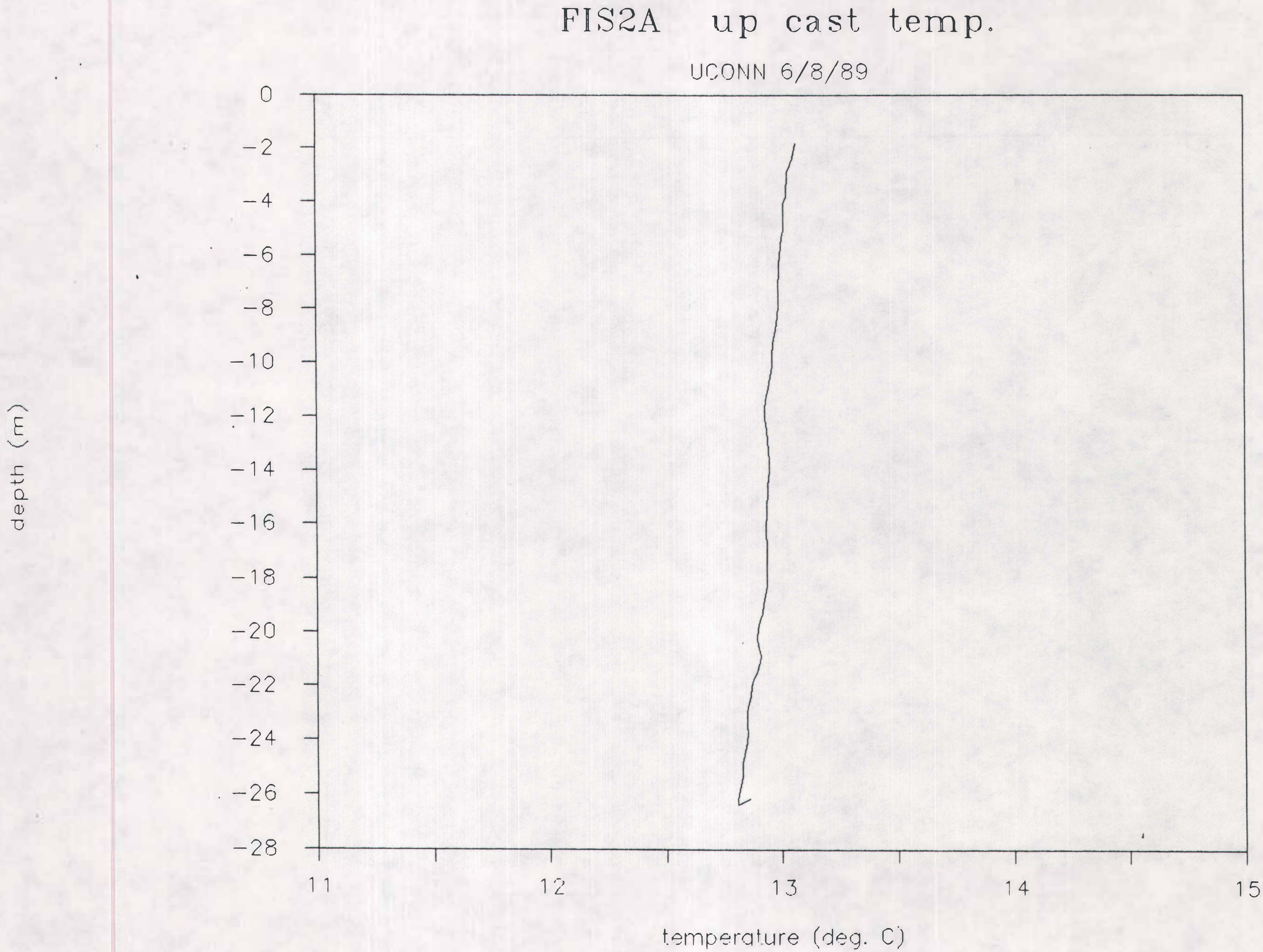

SU02 up cast temp.
SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
11
12
13
14
15
temperature (deg C)

Figure 22A



FIS2A up cast temp.
UCONN 6/8/89
depth (m)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
11
12
13
14
15
temperature (deg. C)

Figure 22B

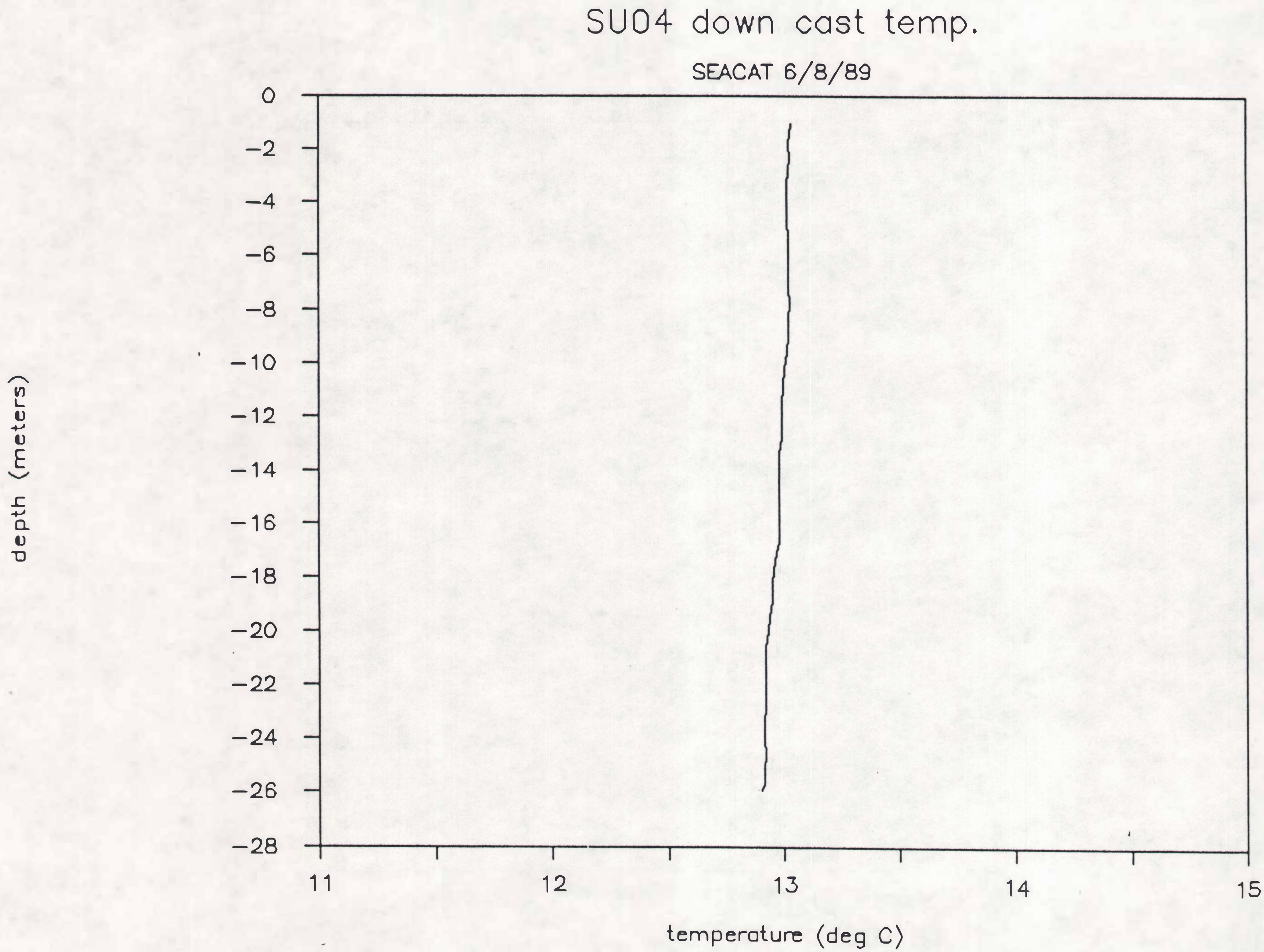

SU04 down cast temp.
SEACAT 6/8/89
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
11
12
13
14
15
temperature (deg C)

Figure 23A

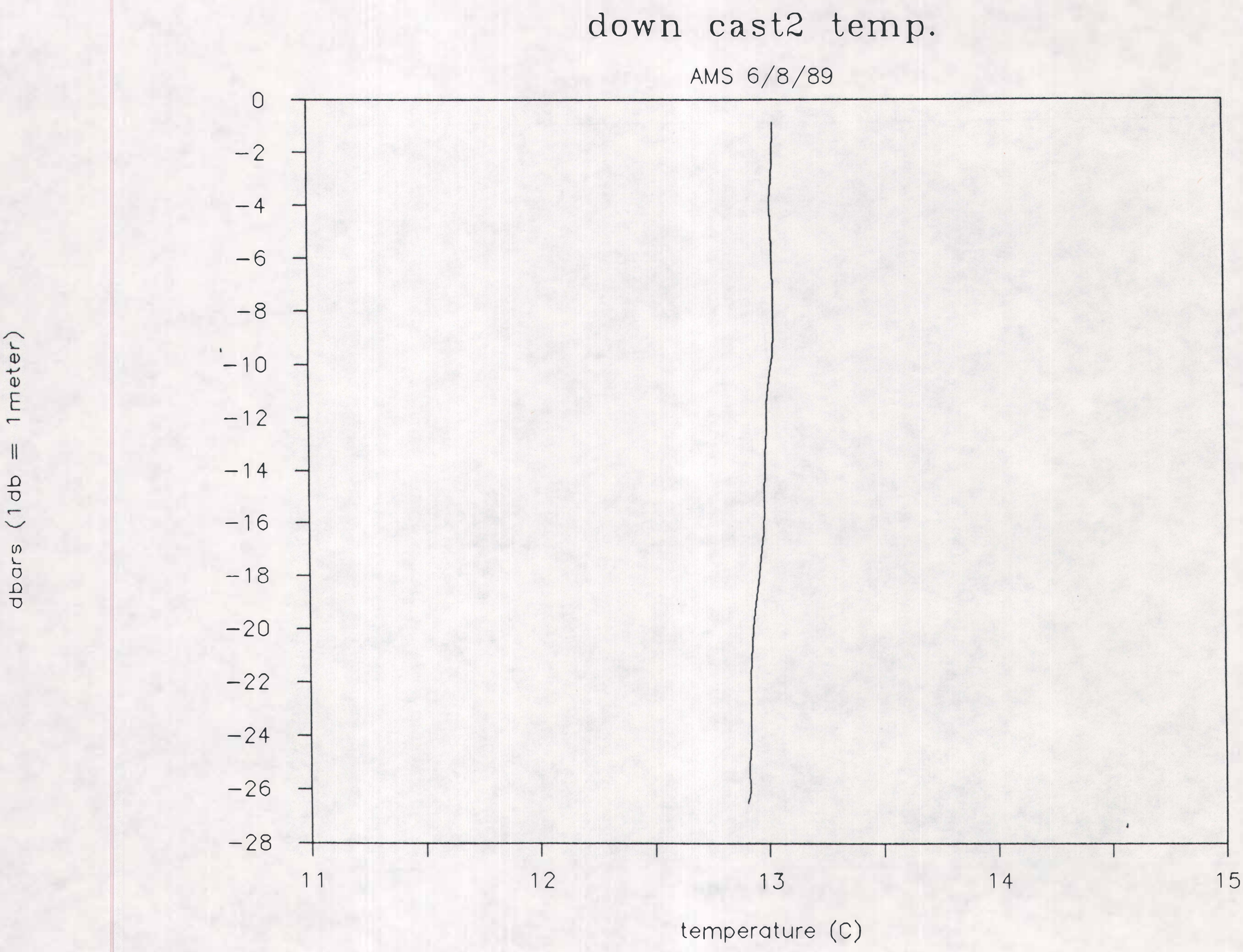
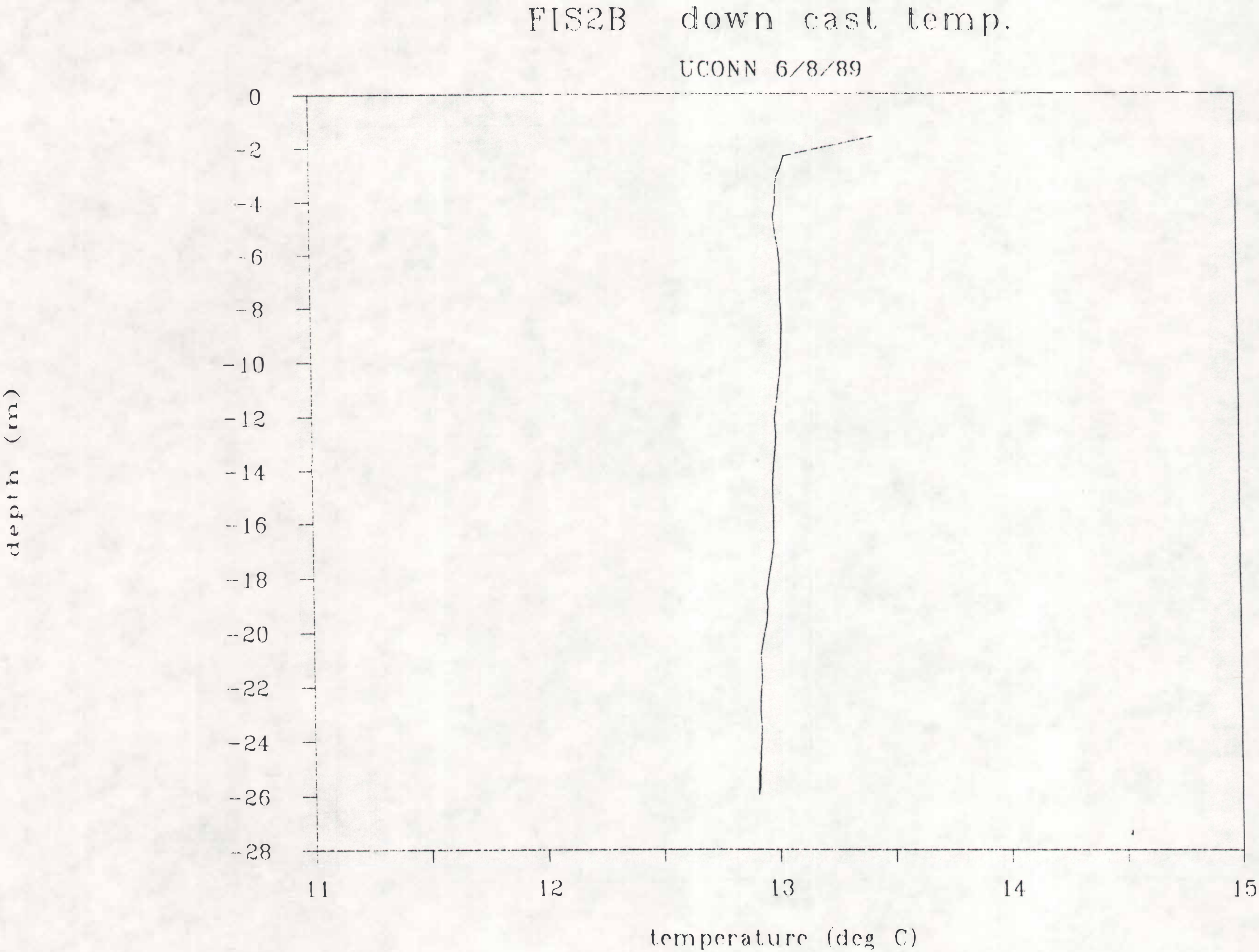

down cast2 temp.
AMS 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
dbars (1db = 1meter)
11
12
13
14
15
temperature (C)

Figure 23B



FIS2B down cast temp.
UCONN 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (m)
11
12
13
14
15
temperature (deg C)

Figure 23C

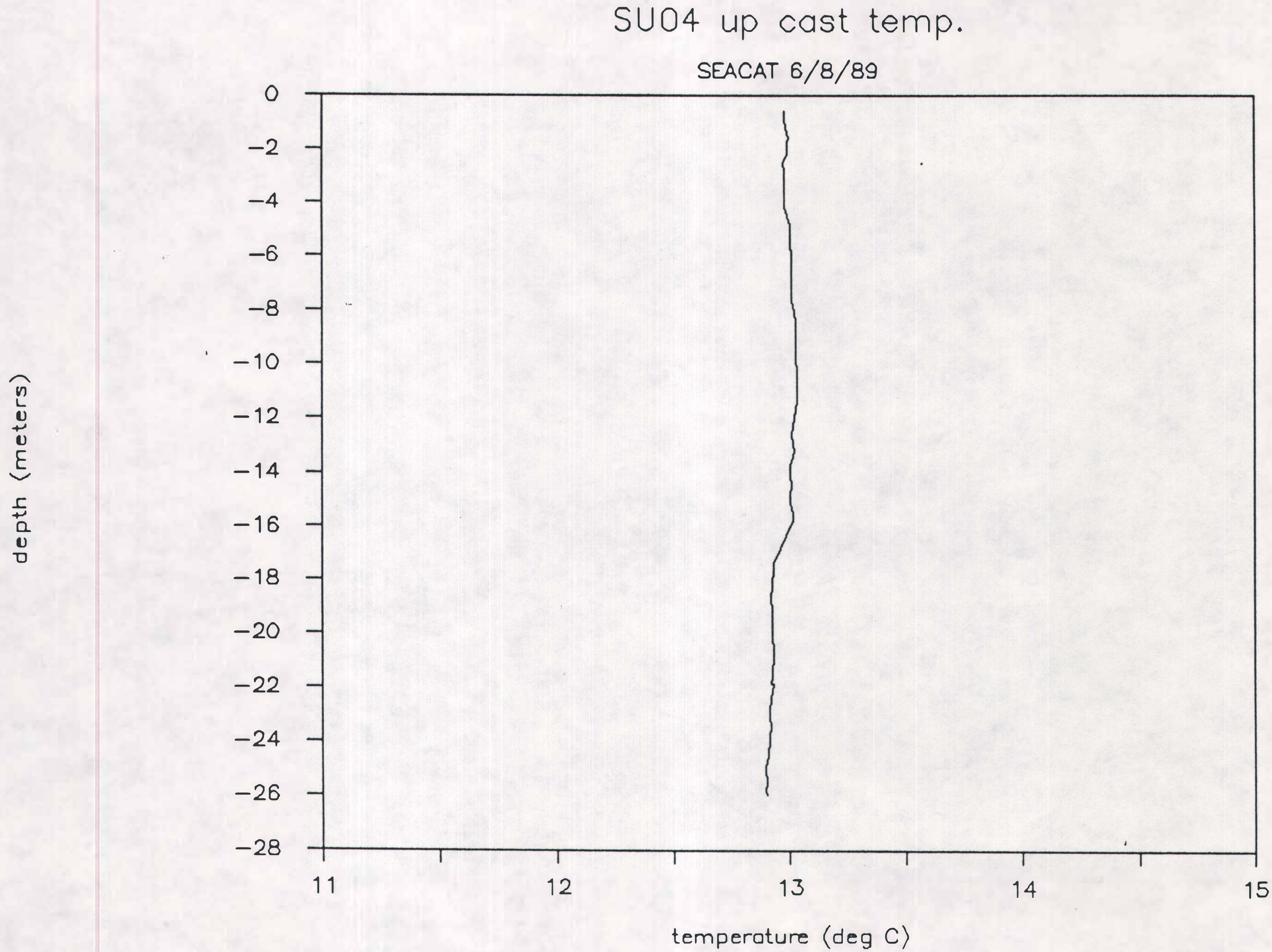

SU04 up cast temp.
SEACAT 6/8/89
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
11
12
13
14
15
temperature (deg C)

Figure 24A

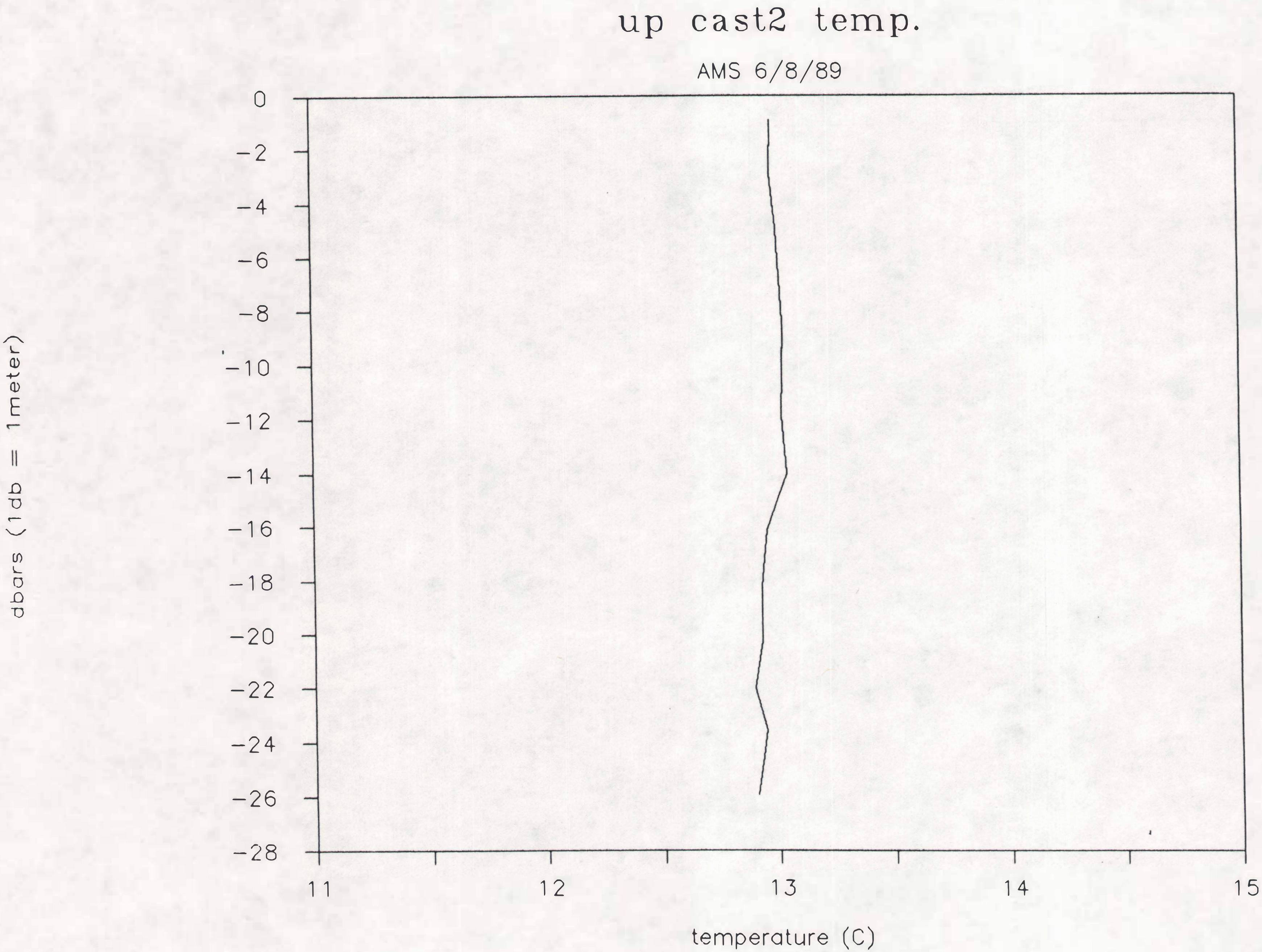

up cast2 temp.
AMS 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
dbars (1db = 1meter)
11
12
13
14
15
temperature (C)

Figure 24B

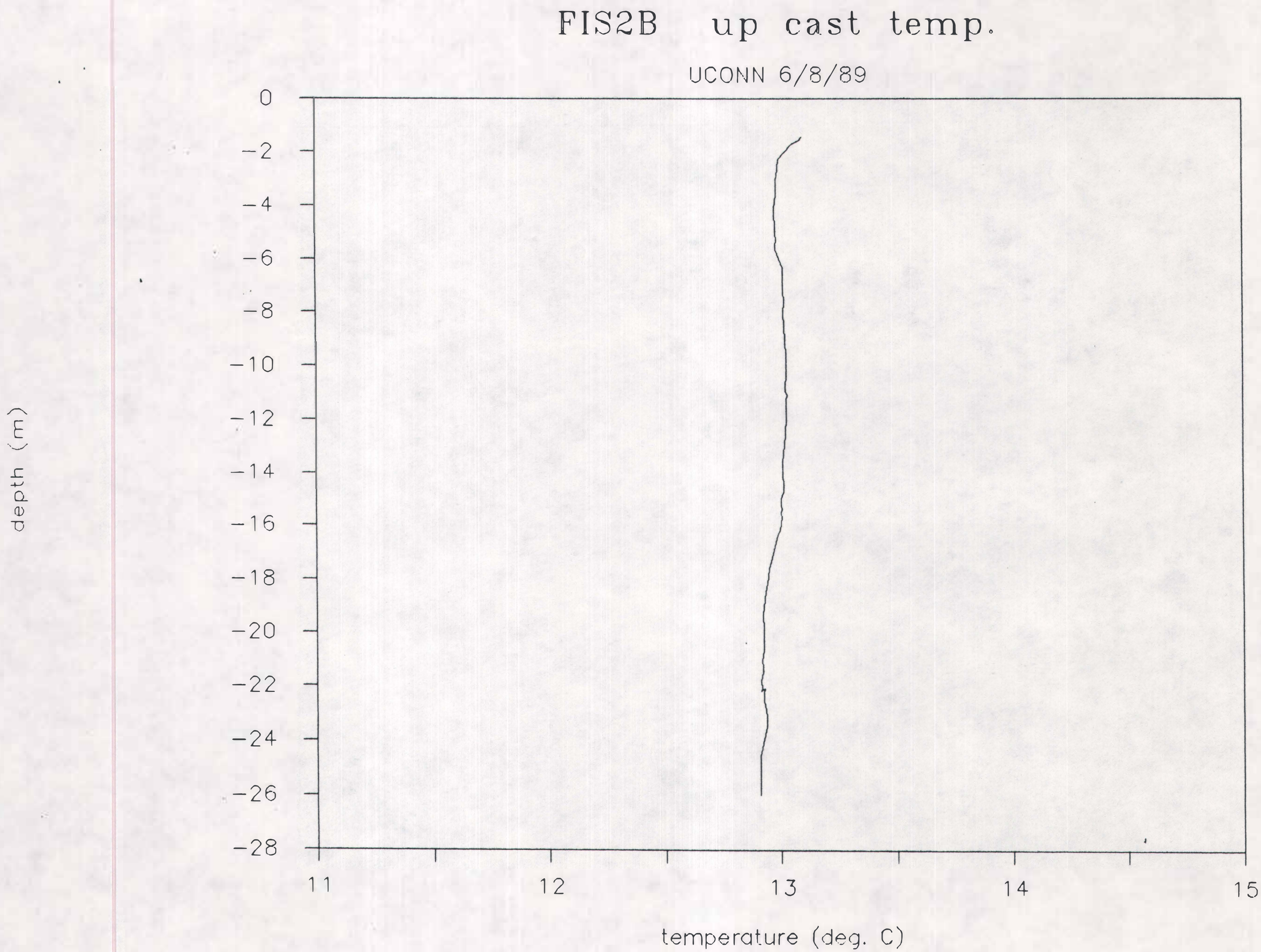
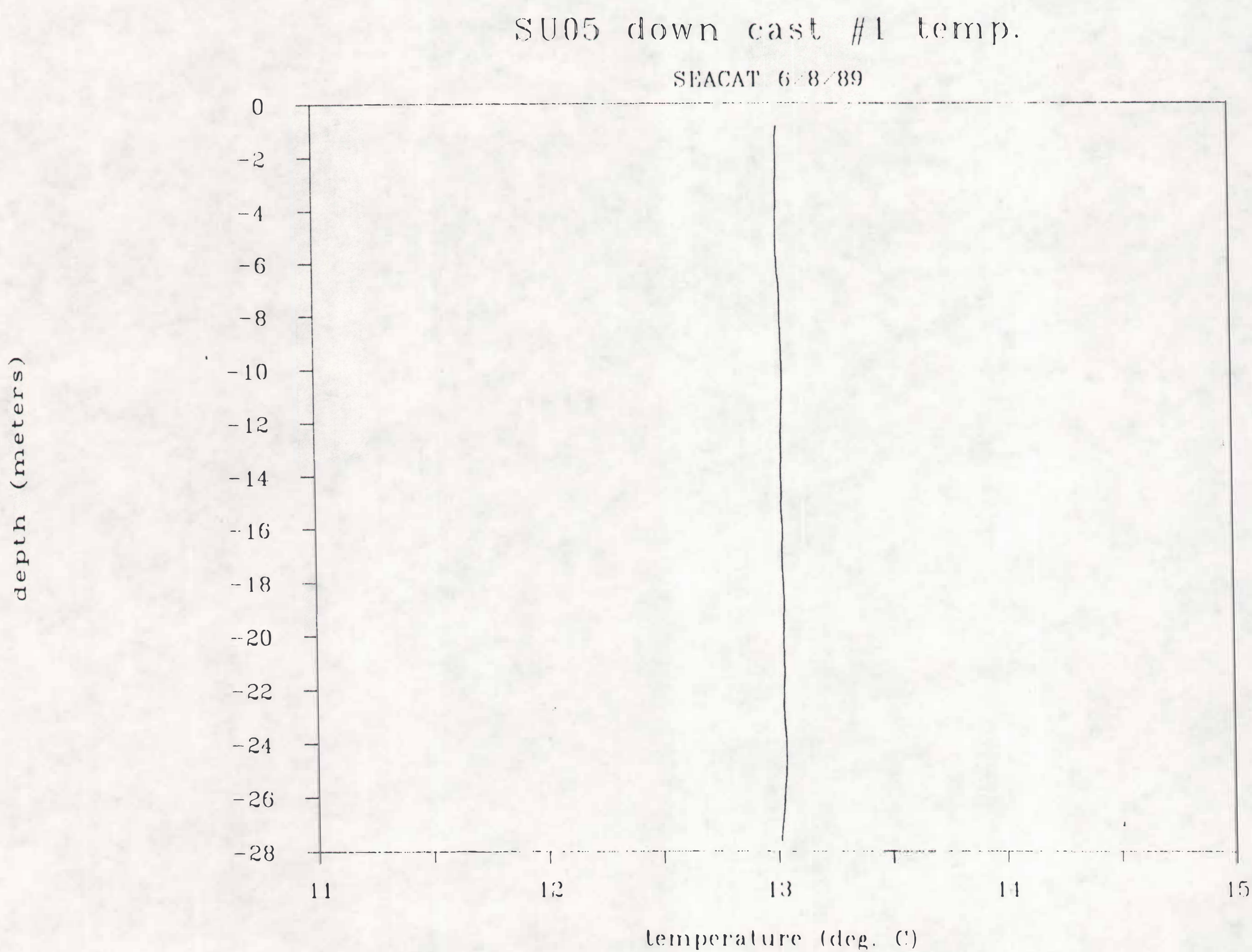

FIS2B up cast temp.
UCONN 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (m)
11
12
13
14
15
temperature (deg. C)

Figure 24C



SU05 down cast #1 temp.
SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
11
12
13
14
15
temperature (deg. C)

Figure 25A

down cast3 temp.

AMS 6/8/89

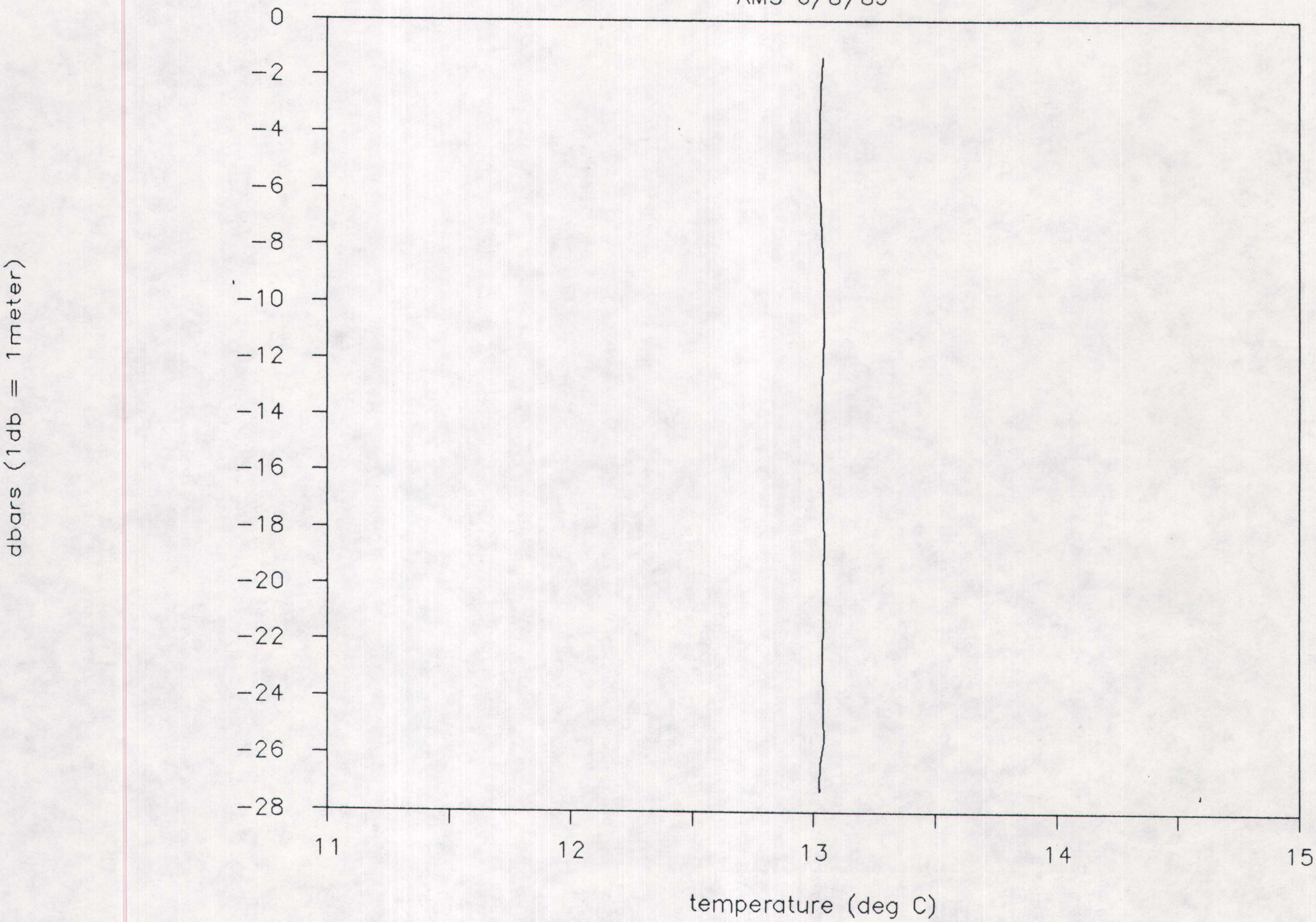


Figure 25B

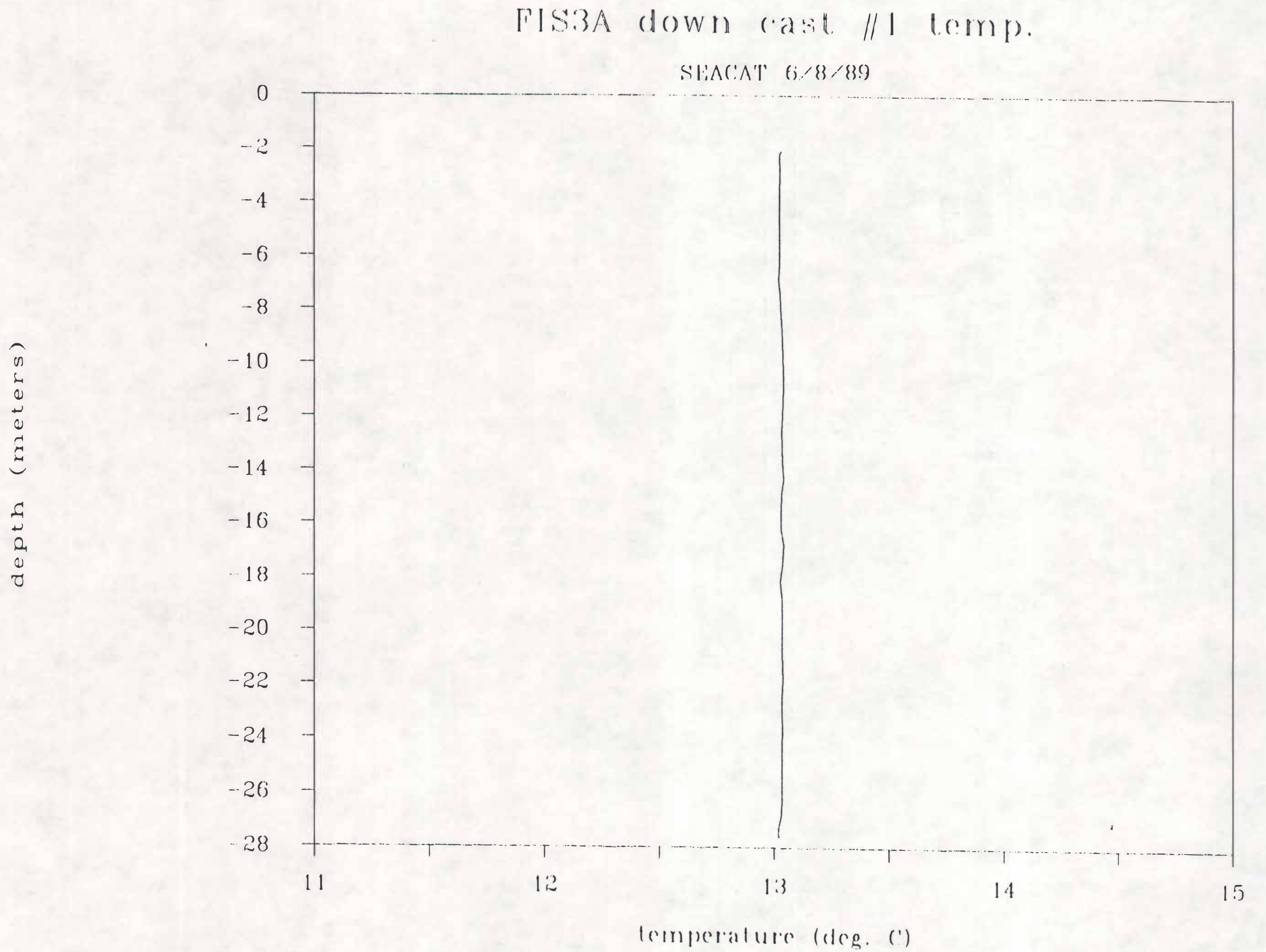

FIS3A down cast #1 temp.
SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
11
12
13
14
15
temperature (deg. C)
depth (meters)

Figure 25C

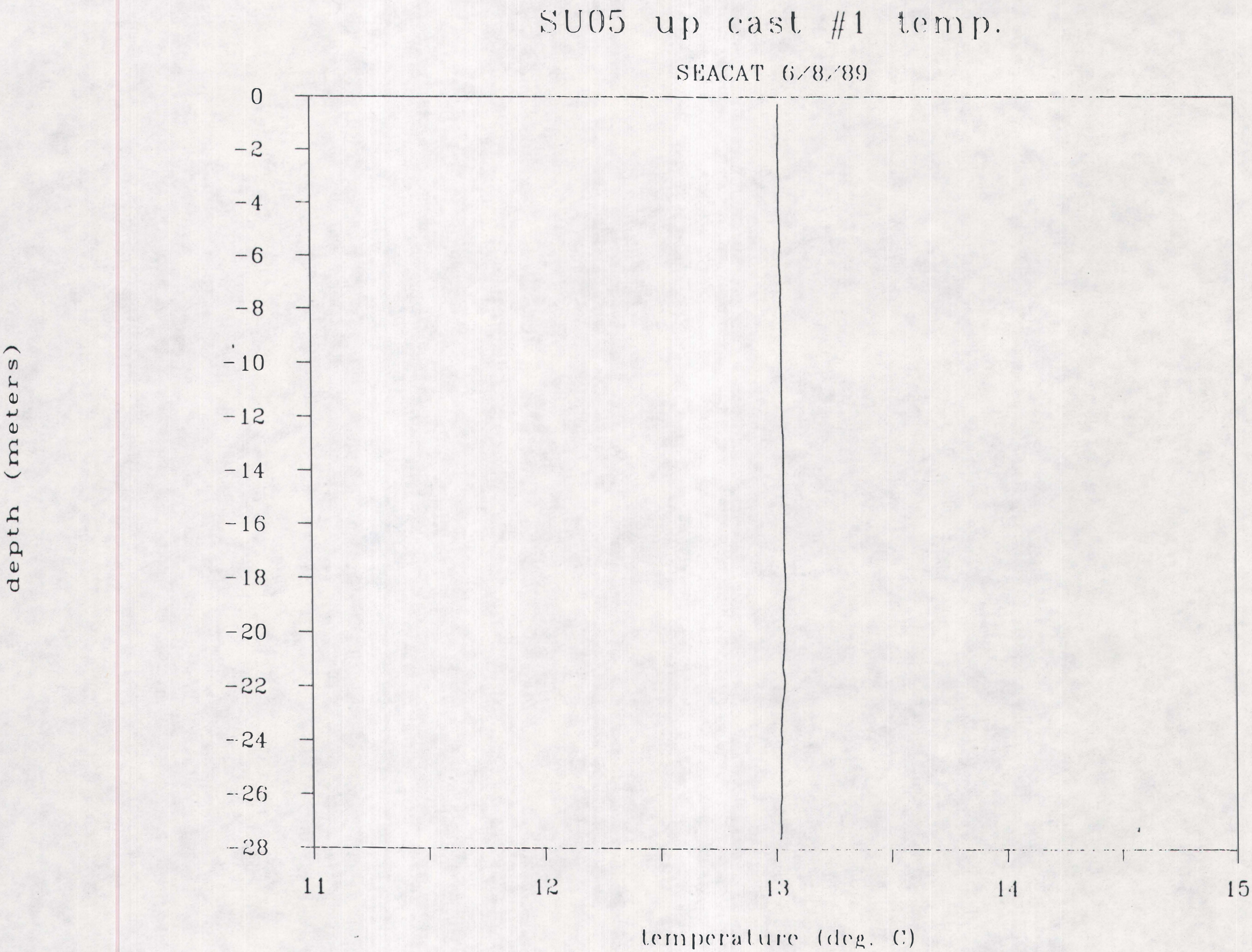
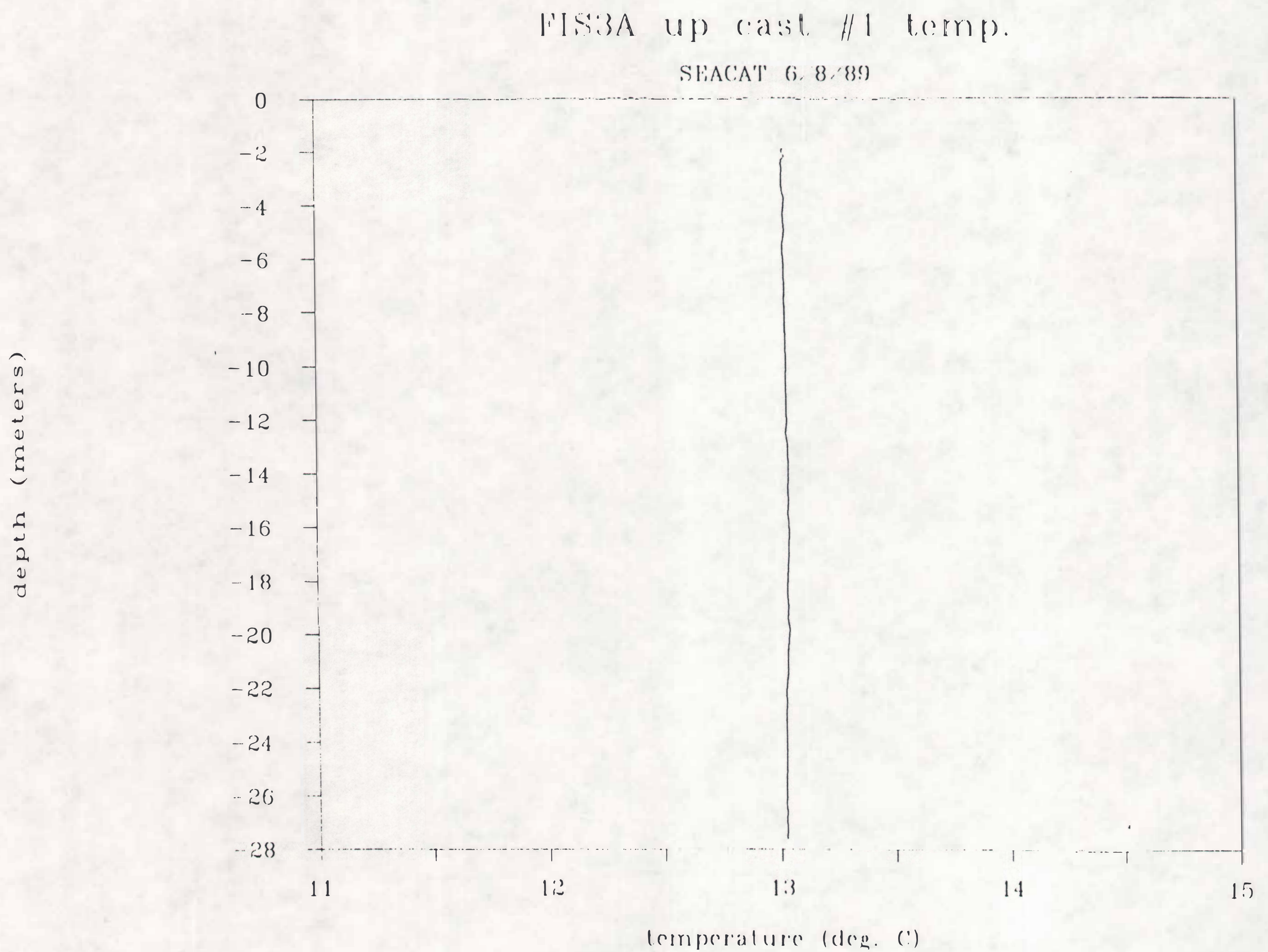
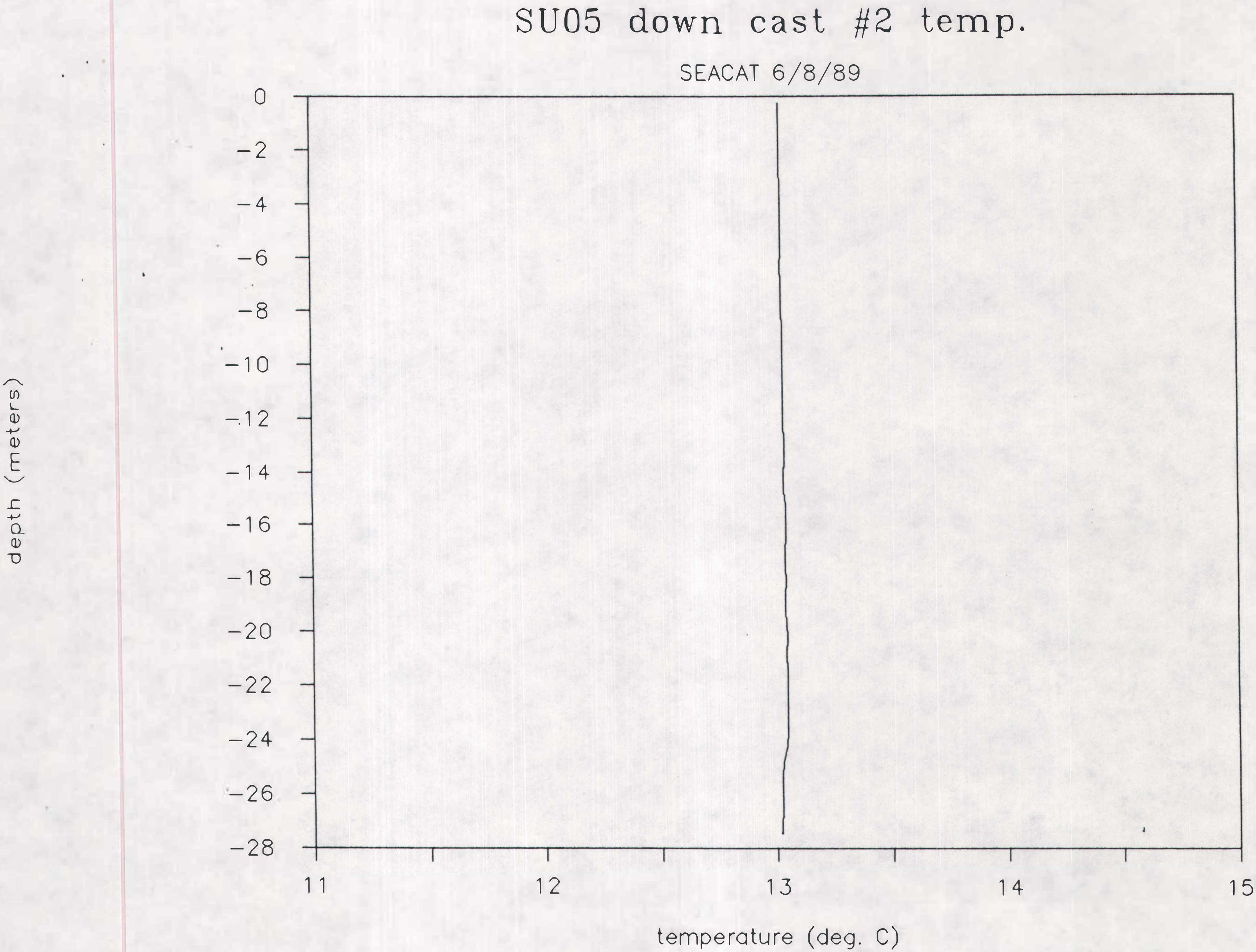

SU05 up cast #1 temp.
SEACAT 6/8/89
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
11
12
13
14
15
temperature (deg. C)

Figure 26A



FIS3A up cast #1 temp.
SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
11
12
13
14
15
temperature (deg. C)

Figure 26B



SU05 down cast #2 temp.
SEACAT 6/8/89
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
11
12
13
14
15
temperature (deg. C)

Figure 27A

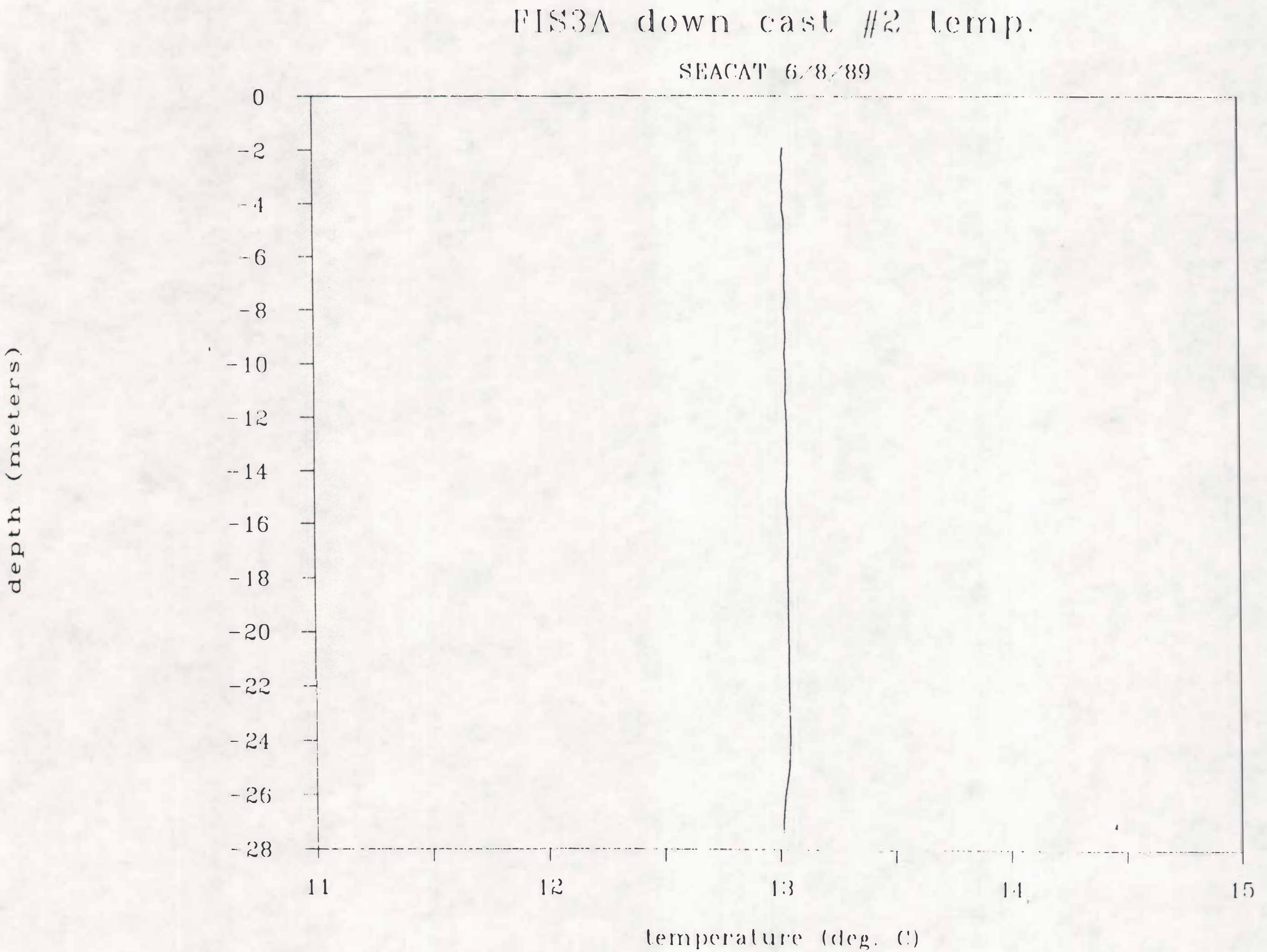

FIS3A down cast #2 temp.
SEACAT 6/8/89
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
11
12
13
14
15
temperature (deg. C)

Figure 27B

SU05 up cast #2 temp.

SEACAT 6/8/89

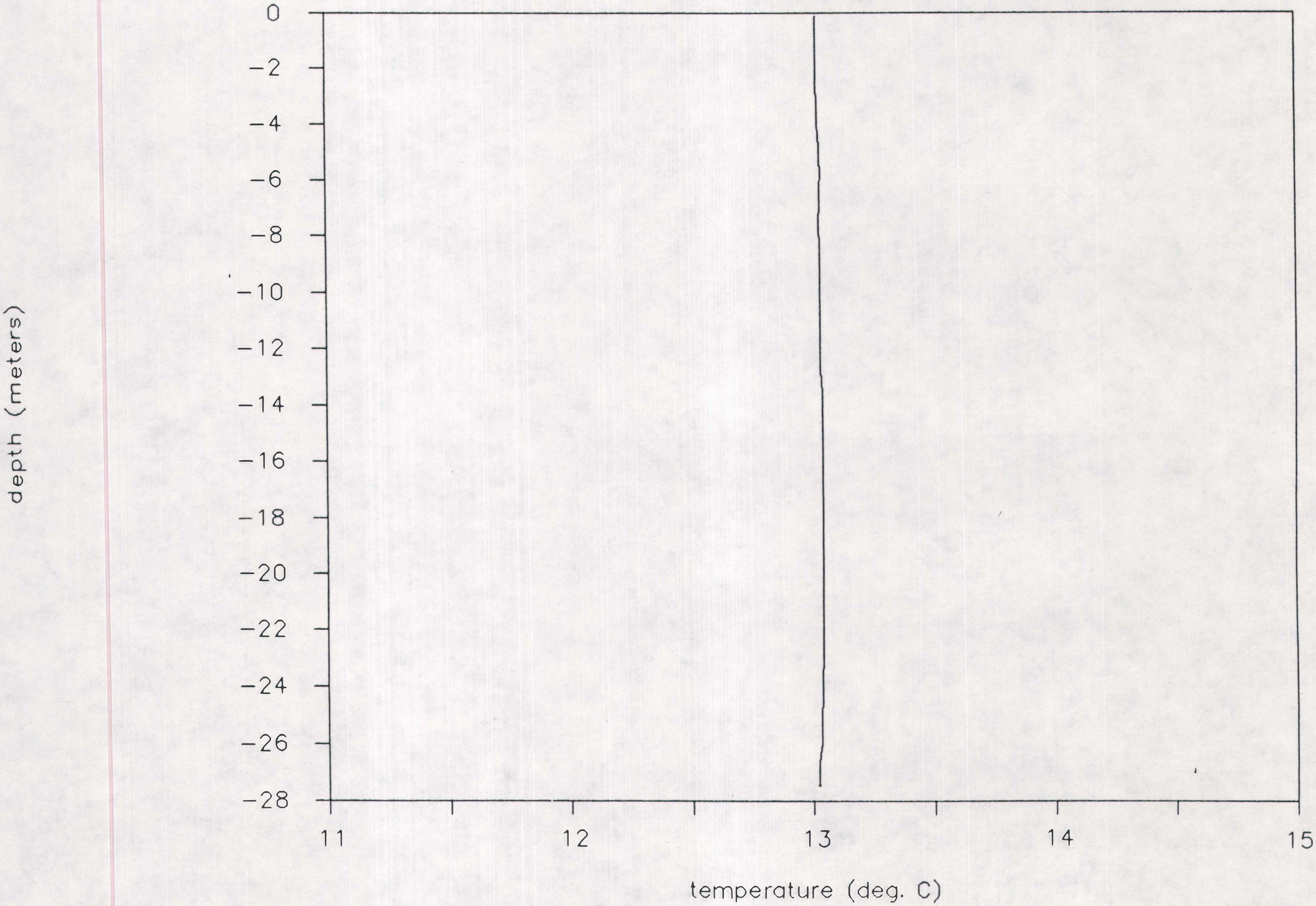


Figure 28A

FIS3A up cast #2 temp.

SEACAT 6/8/89

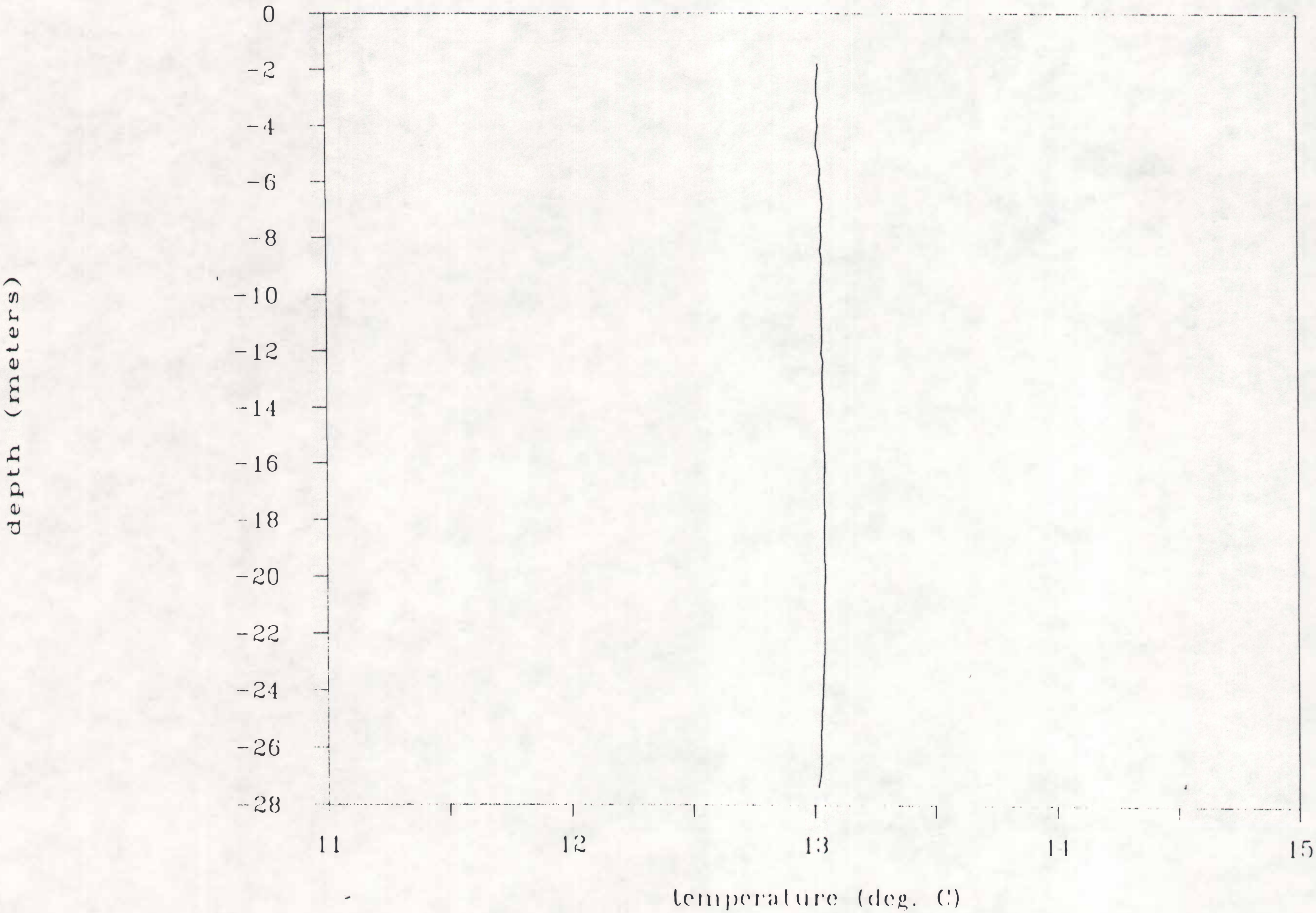


Figure 28B

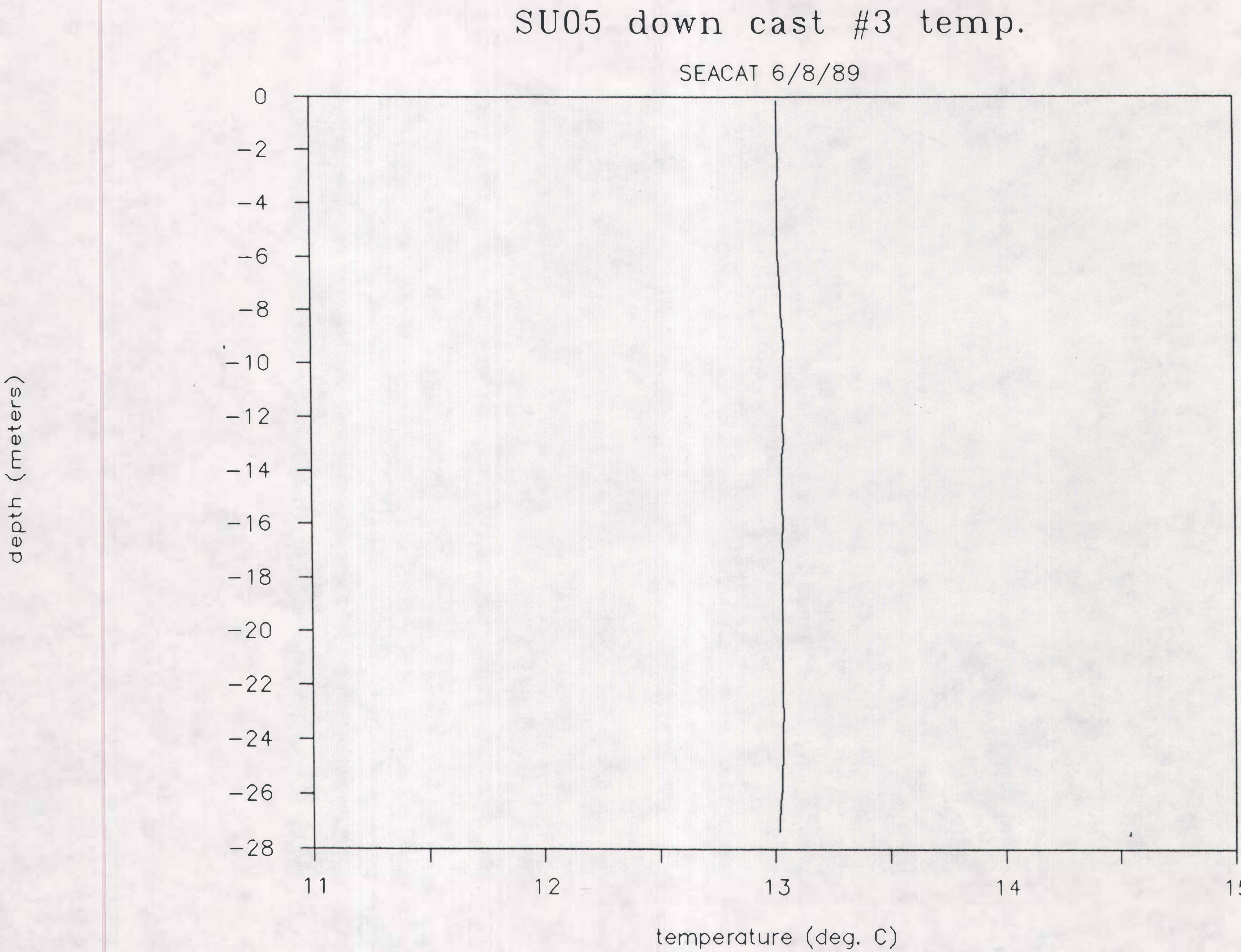

SU05 down cast #3 temp.
SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
11
12
13
14
15
temperature (deg. C)

Figure 29A

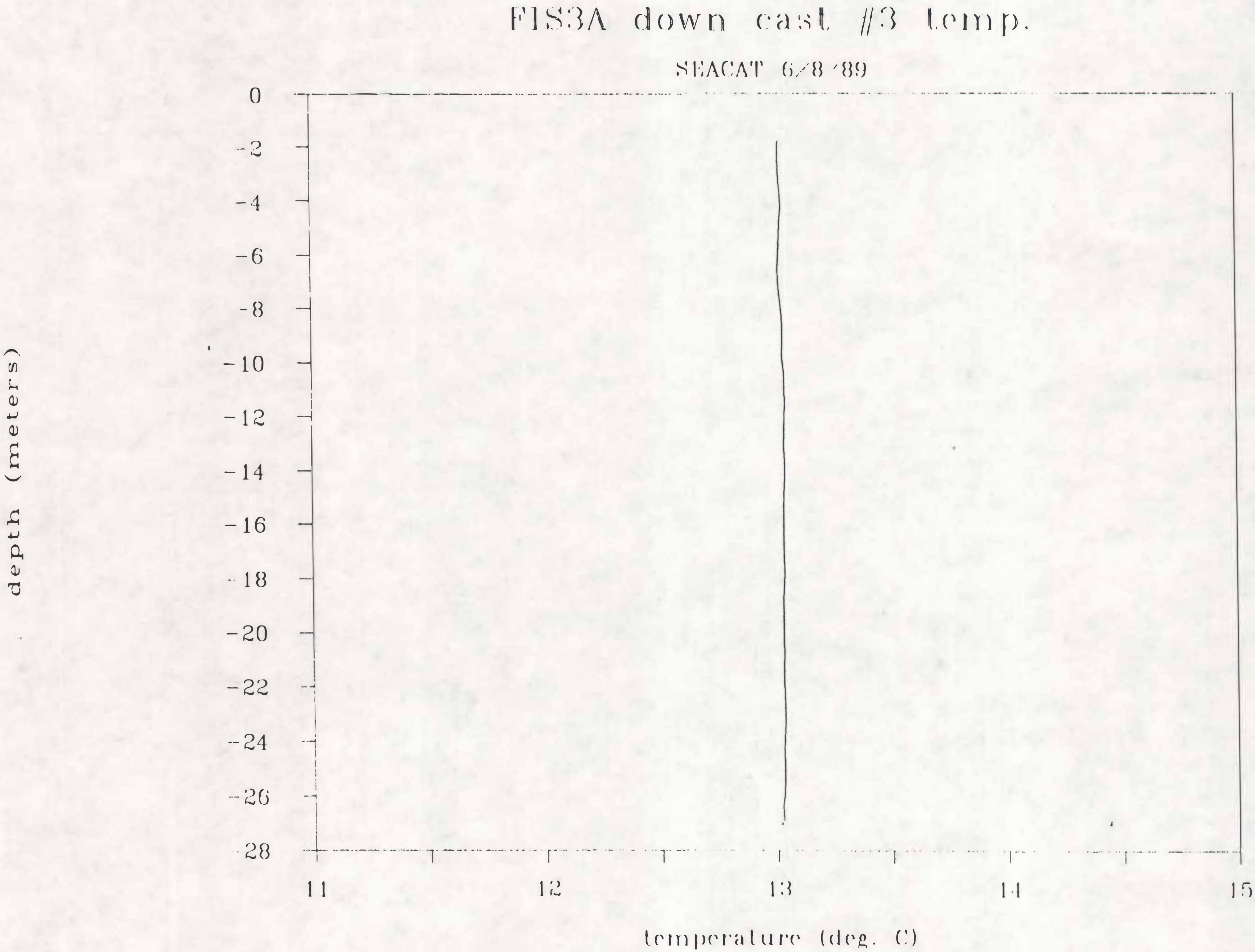

FIS3A down cast #3 temp.
SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
11
12
13
14
15
temperature (deg. C)

Figure 29B

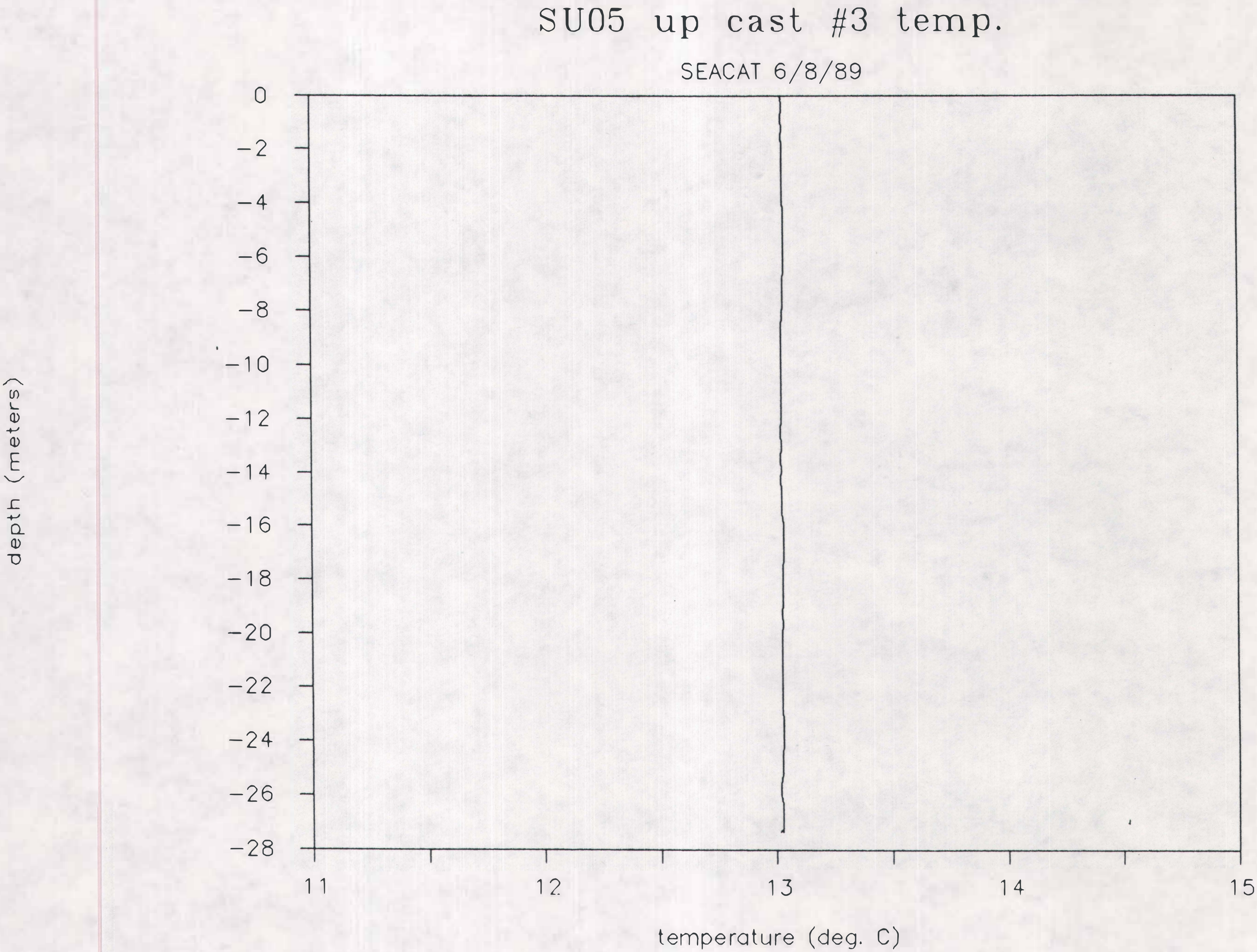
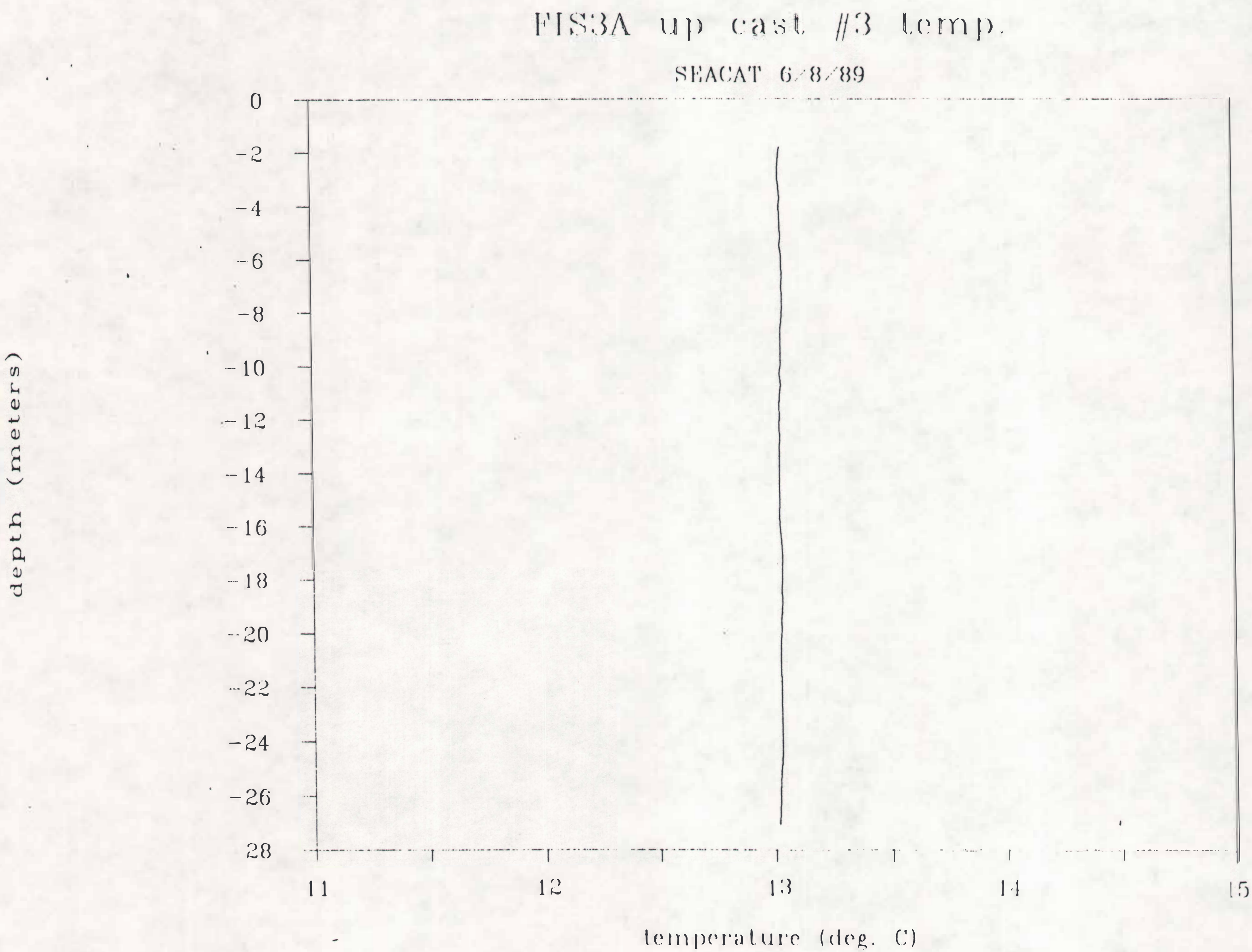

SU05 up cast #3 temp.
SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
11
12
13
14
15
temperature (deg. C)

Figure 30A



FIS3A up cast #3 temp.
SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
28
depth (meters)
11
12
13
14
15
temperature (deg. C)

Figure 30B

SU05 down cast #4 temp.

SEACAT 6/8/89

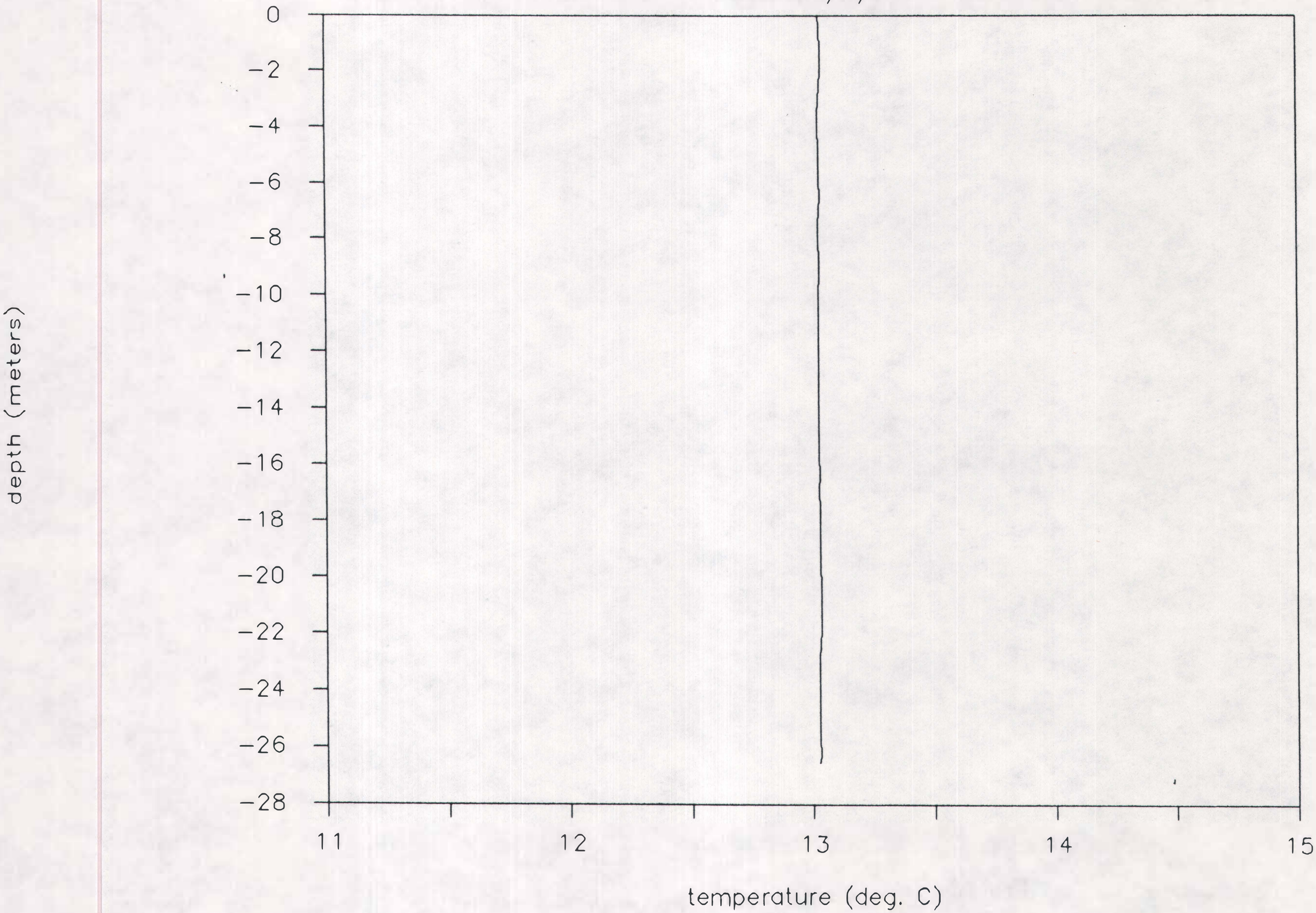


Figure 31A

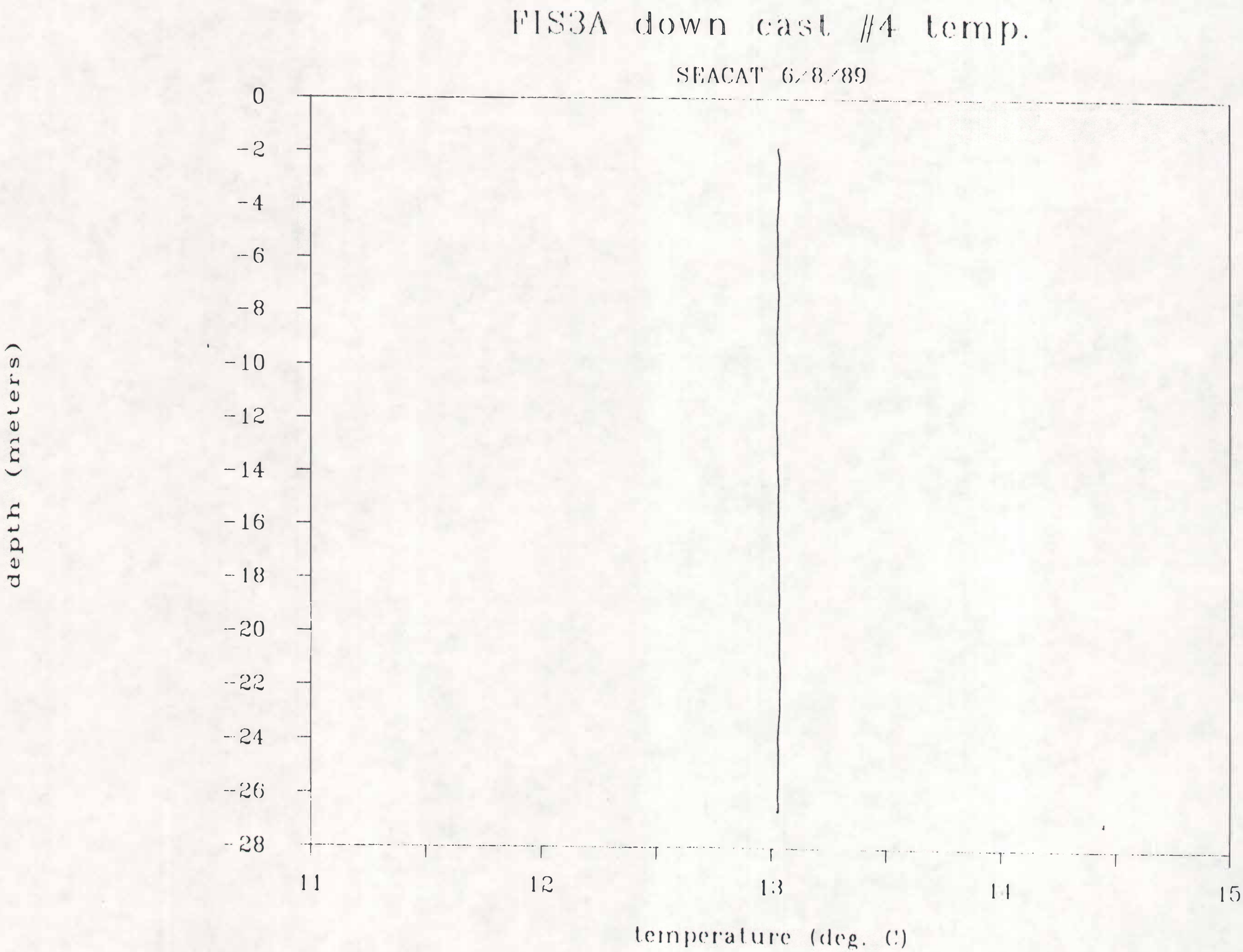

FIS3A down cast #4 temp.
SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
11
12
13
14
15
temperature (deg. C)

Figure 31B

SU05 up cast #4 temp.

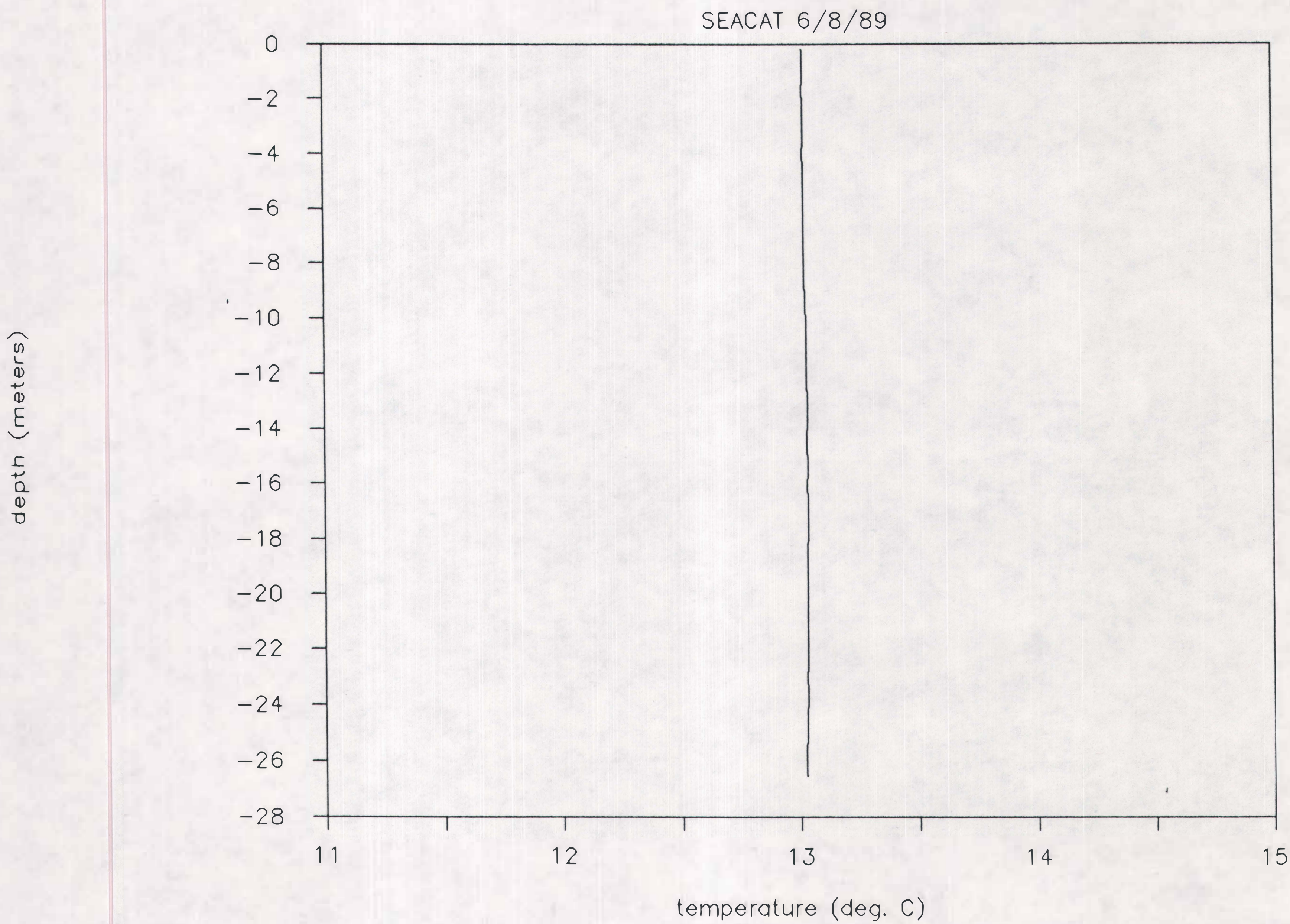


Figure 32A

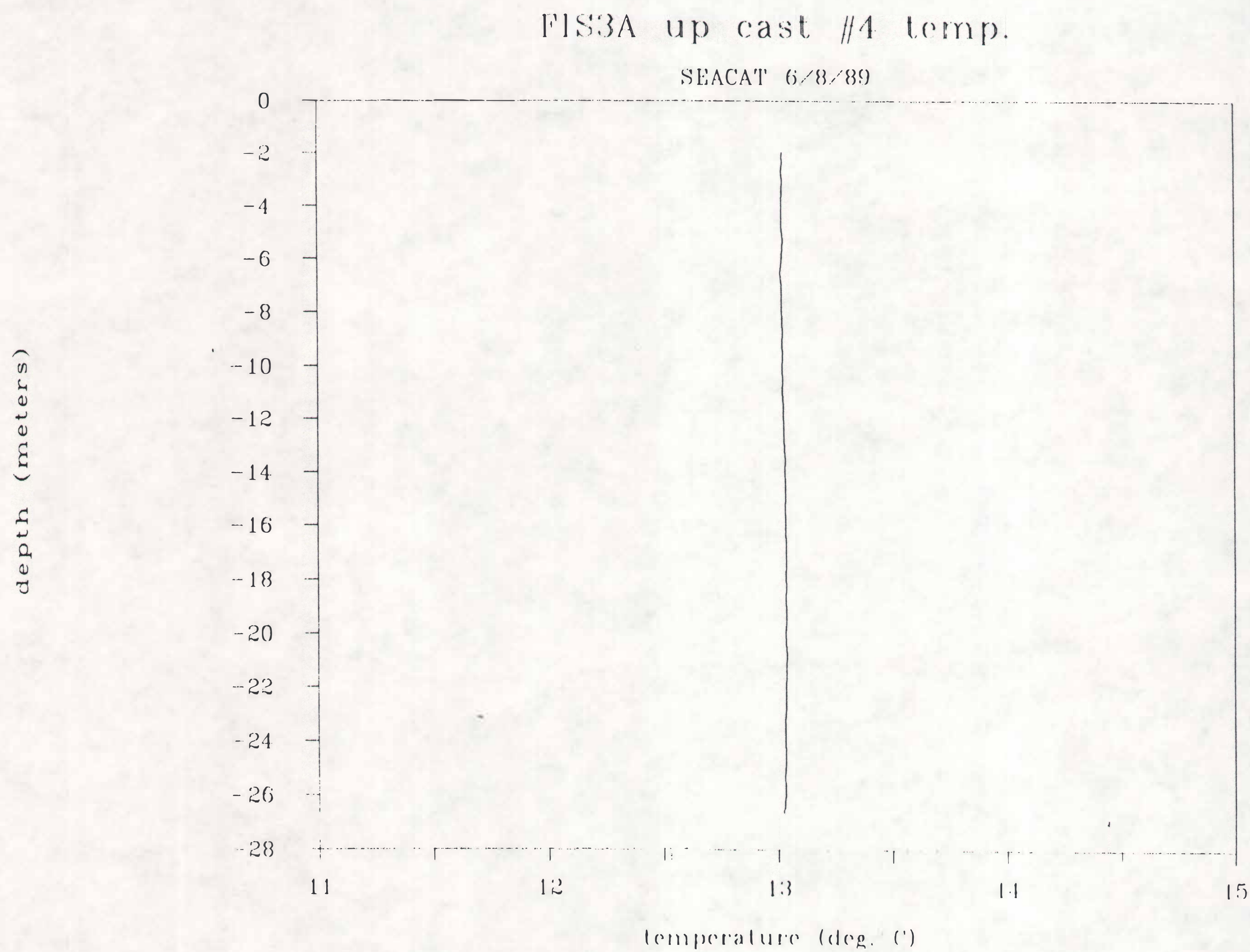

FIS3A up cast #4 temp.
SEACAT 6/8/89
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
11
12
13
14
15
temperature (deg. C)

Figure 32B

SU05 down cast #5 temp.

SEACAT 6/8/89

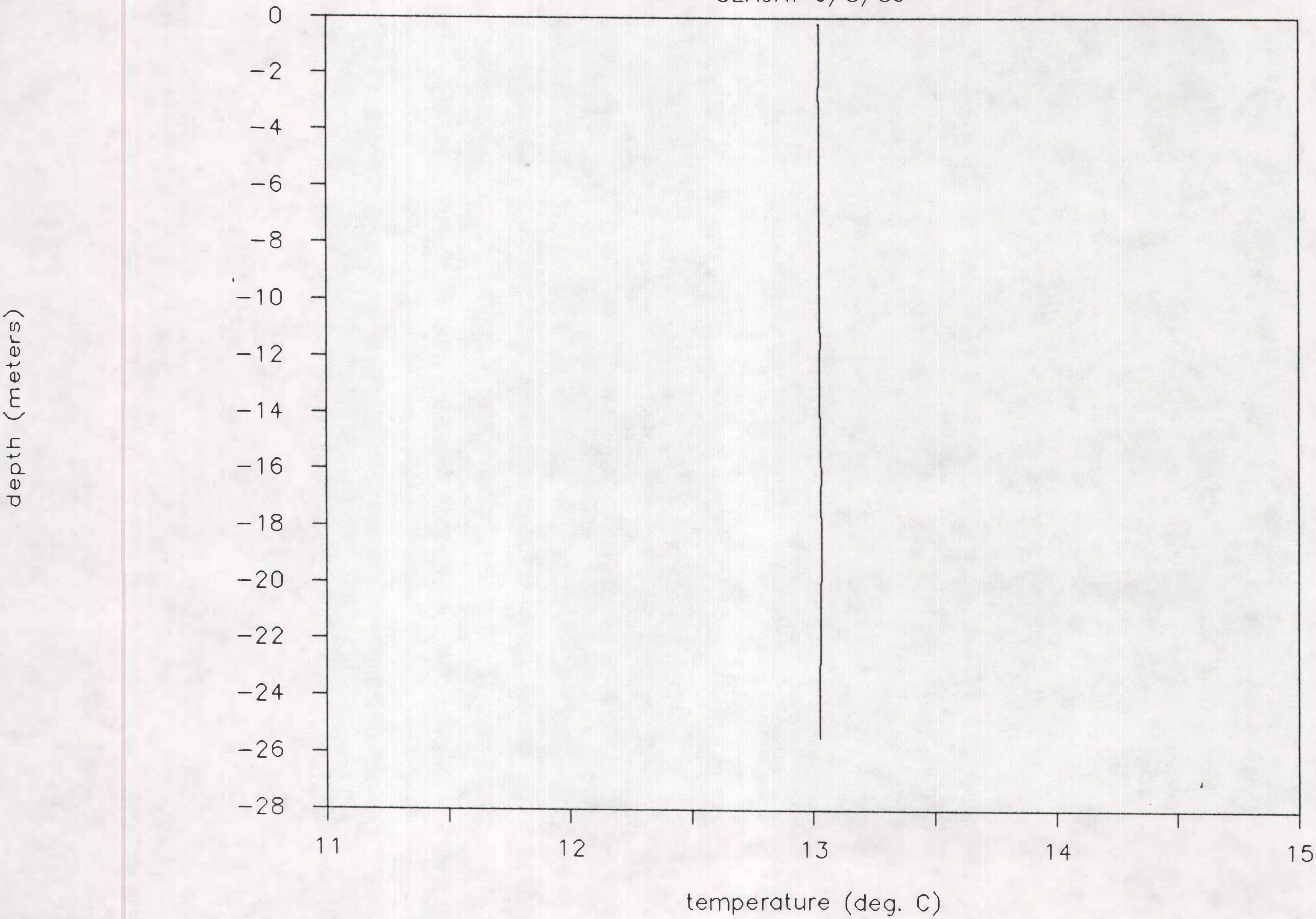


Figure 33A

FIS3A down cast #5 temp.

SEACAT 6/8/89

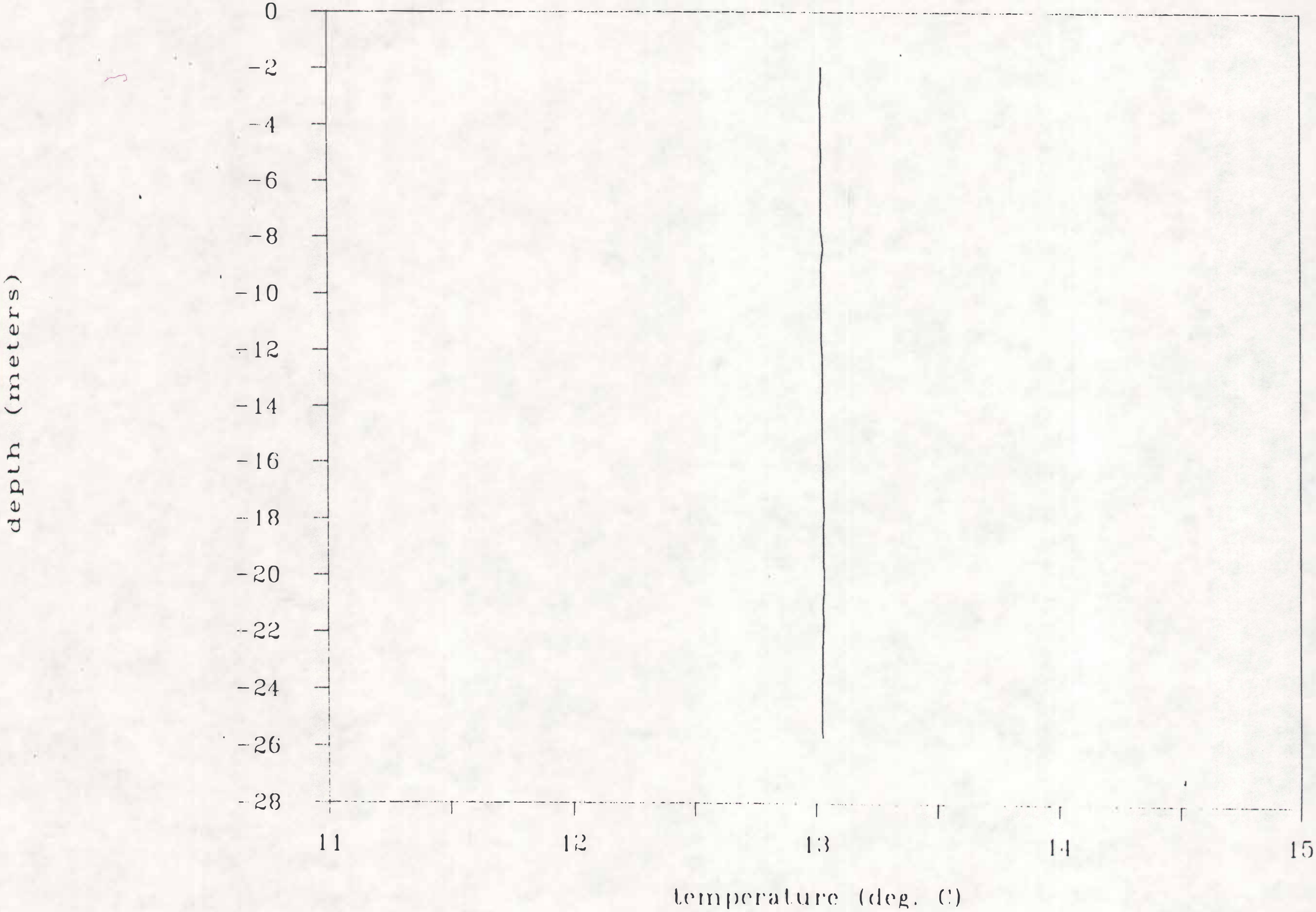


Figure 33B

SU05 up cast #5 temp.

SEACAT 6/8/89

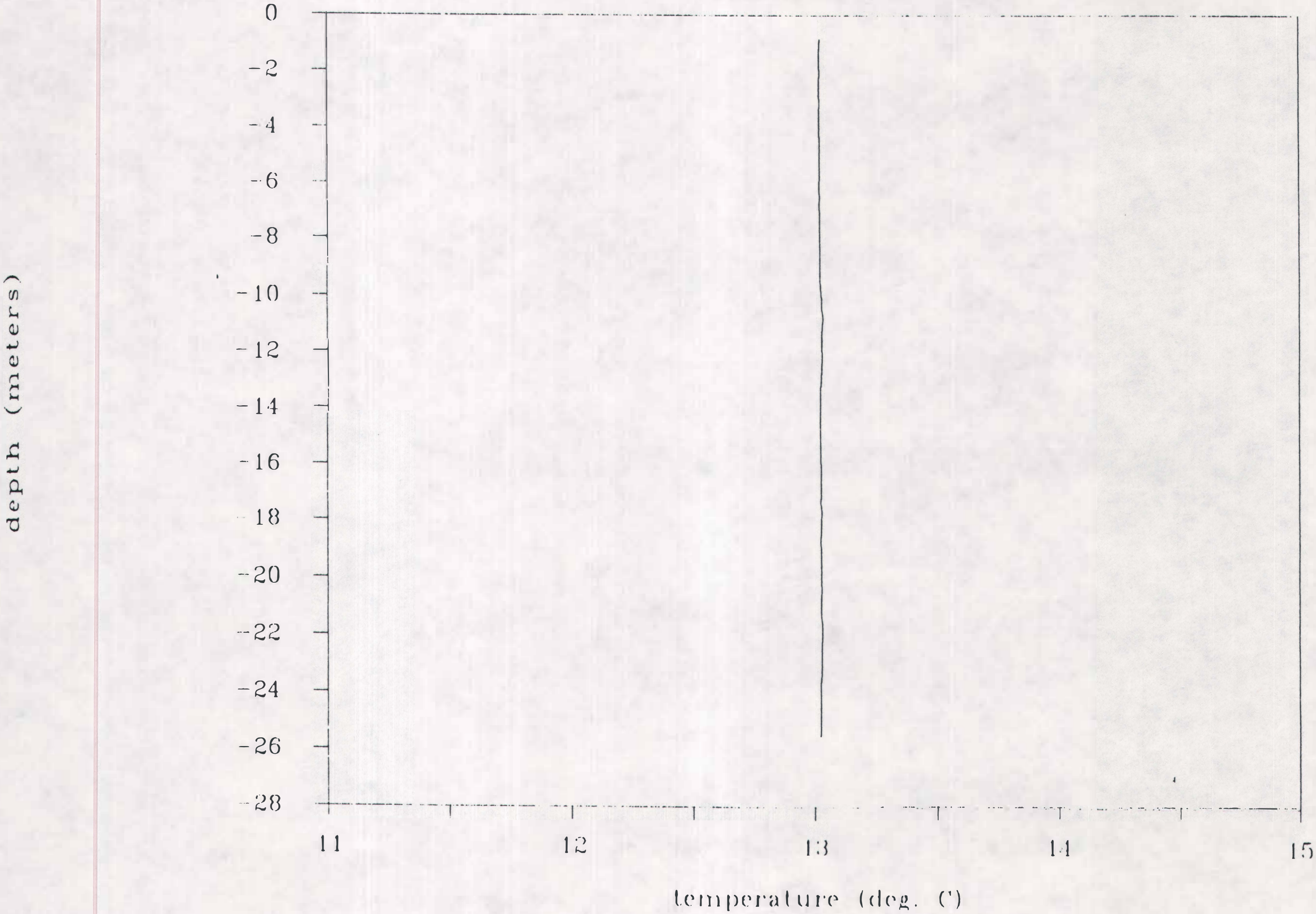
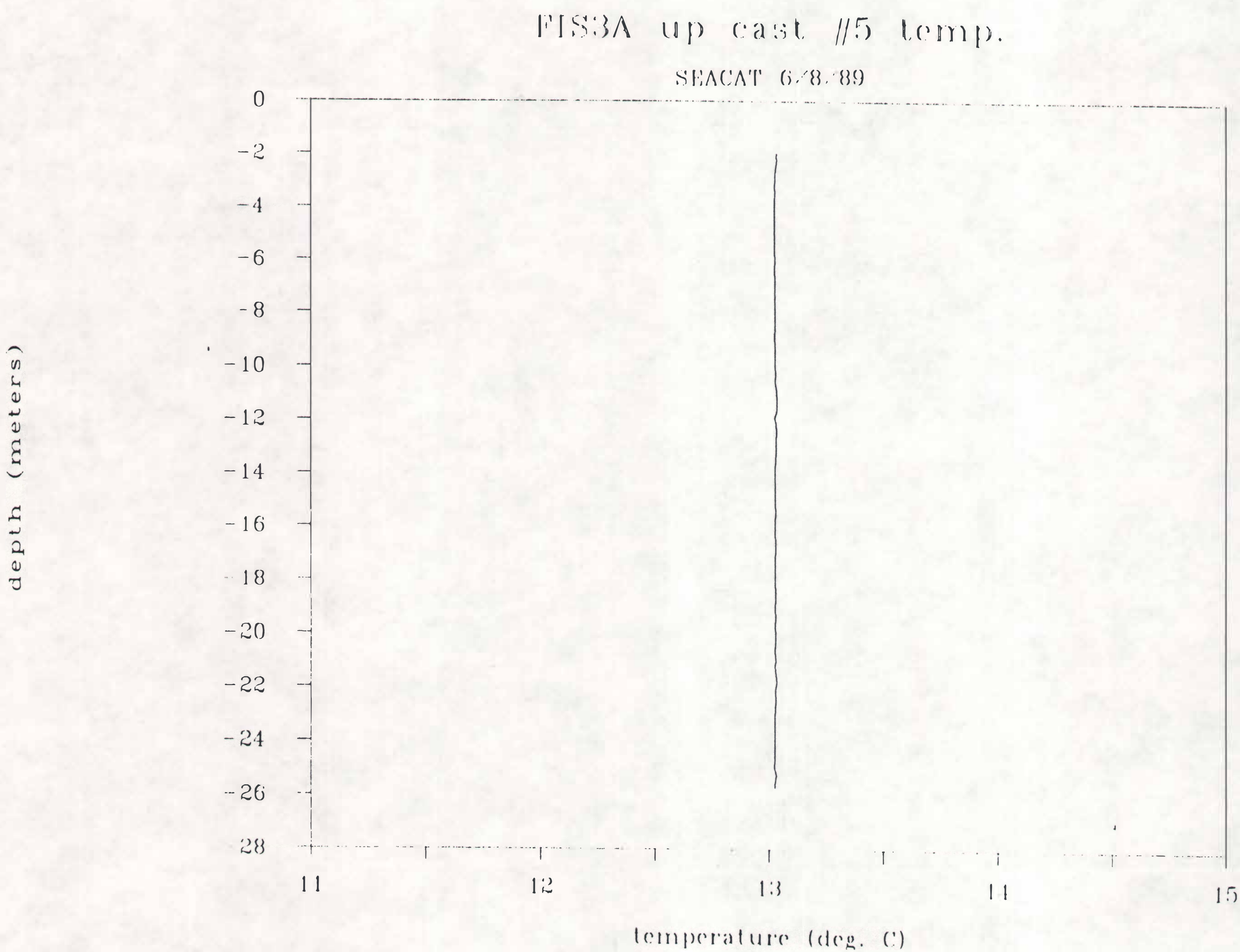


Figure 34A


FIS3A up cast #5 temp.
SEACAT 6/8/89
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
11
12
13
14
15
temperature (deg. C)

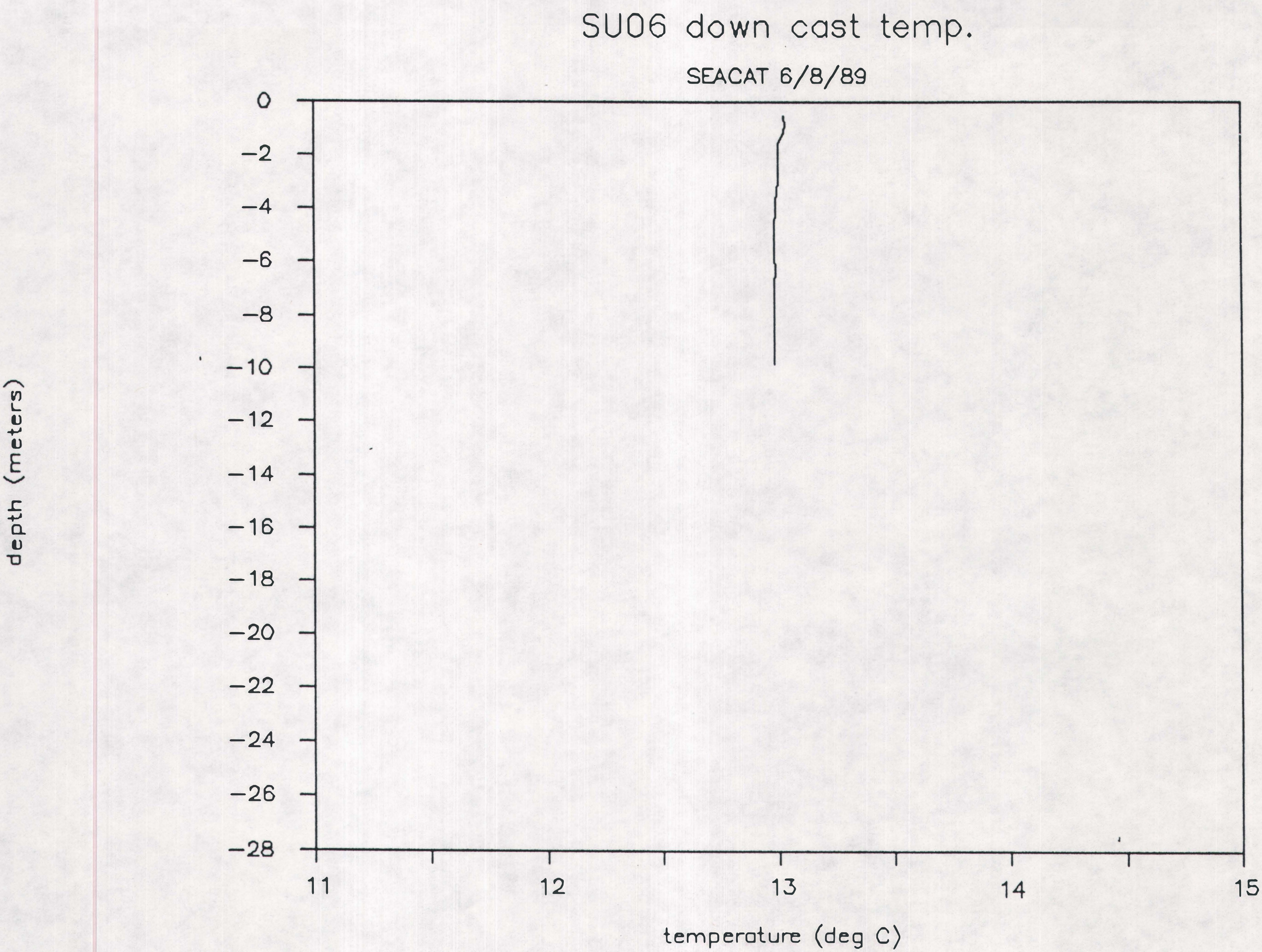

SU06 down cast temp.
SEACAT 6/8/89
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
11
12
13
14
15
temperature (deg C)

Figure 35A

down cast4 temp.

AMS 6/8/89

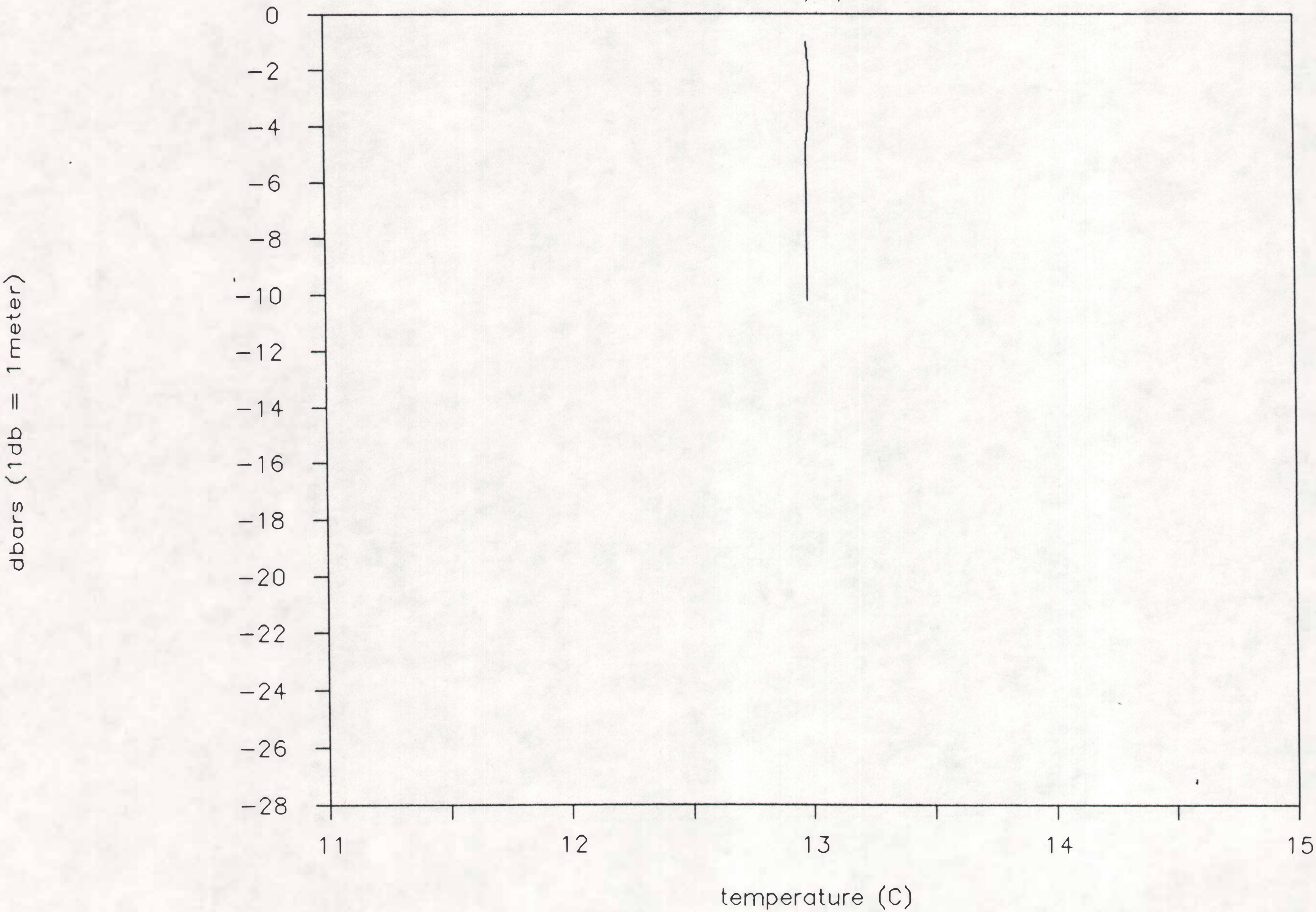


Figure 35B

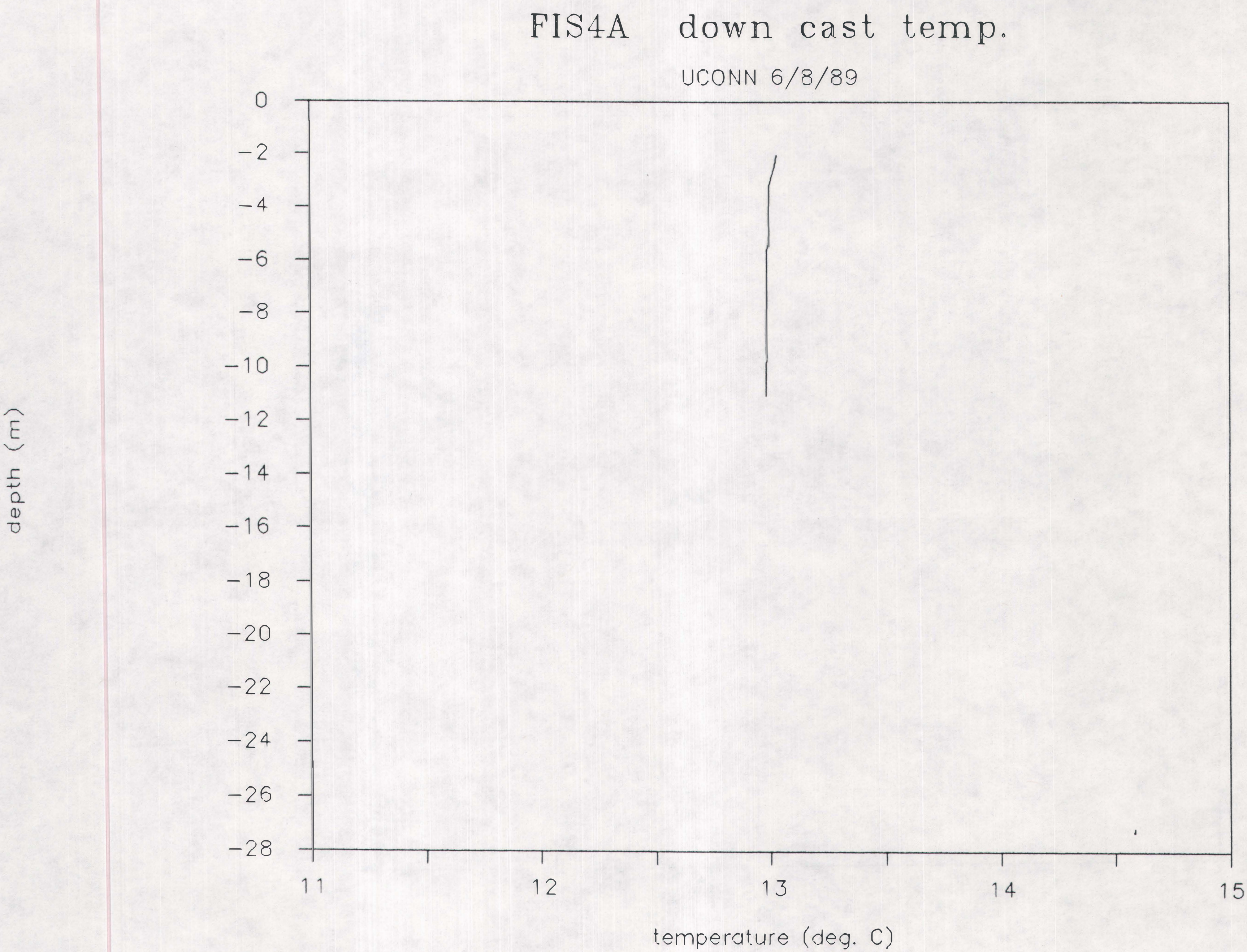
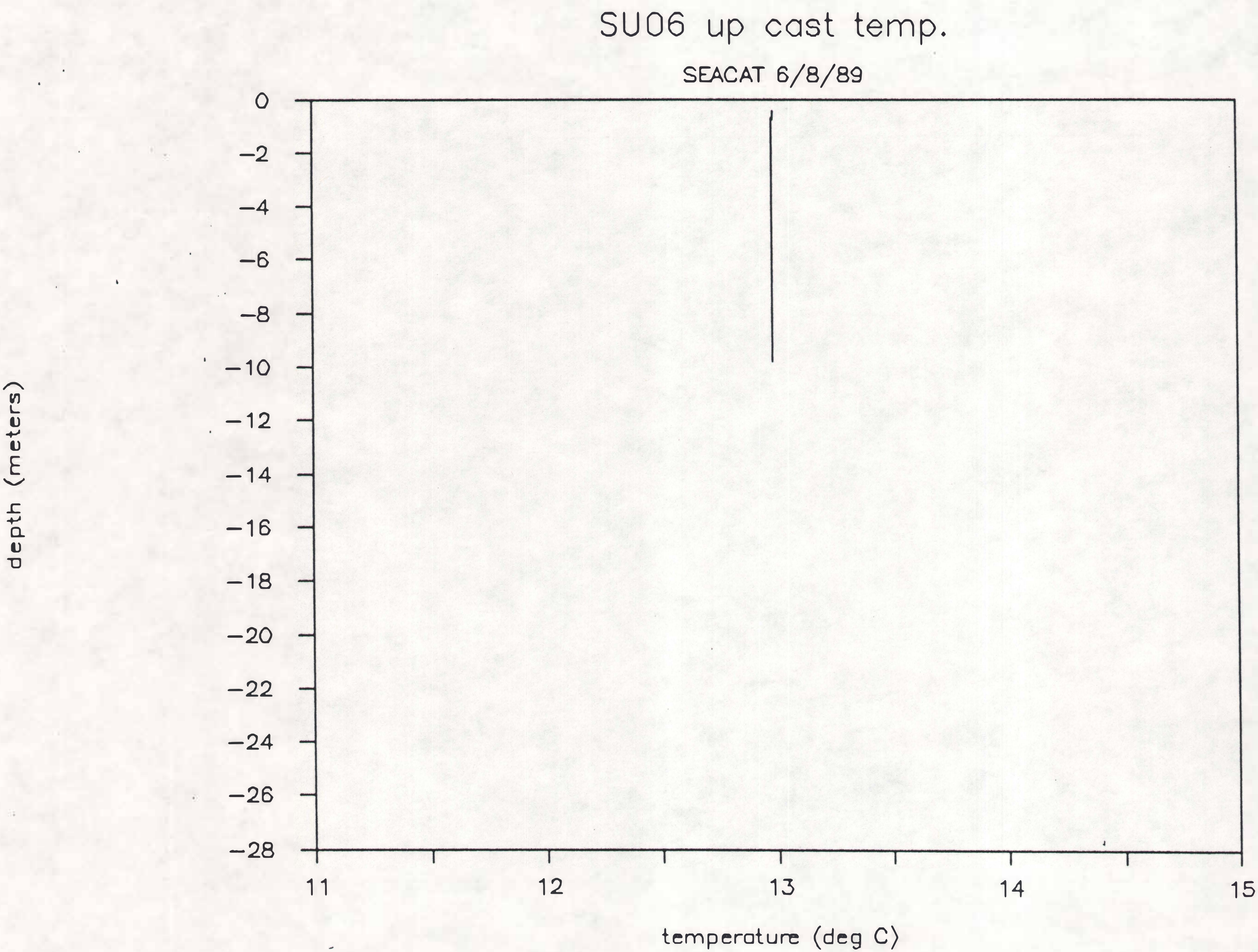

FIS4A down cast temp.
UCONN 6/8/89
depth (m)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
11
12
13
14
15
temperature (deg. C)

Figure 35C



SU06 up cast temp.
SEACAT 6/8/89
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
11
12
13
14
15
temperature (deg C)

Figure 36A

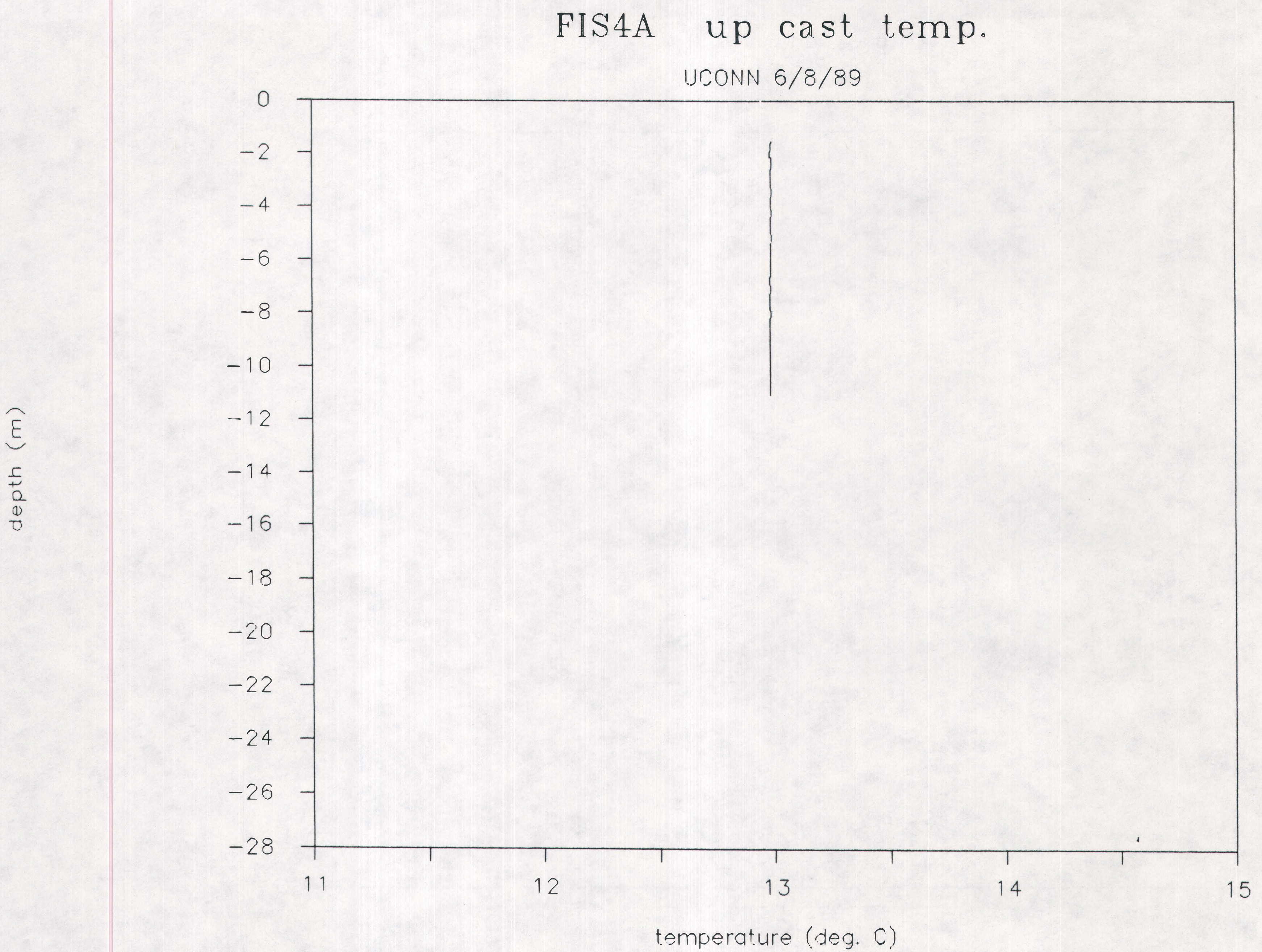
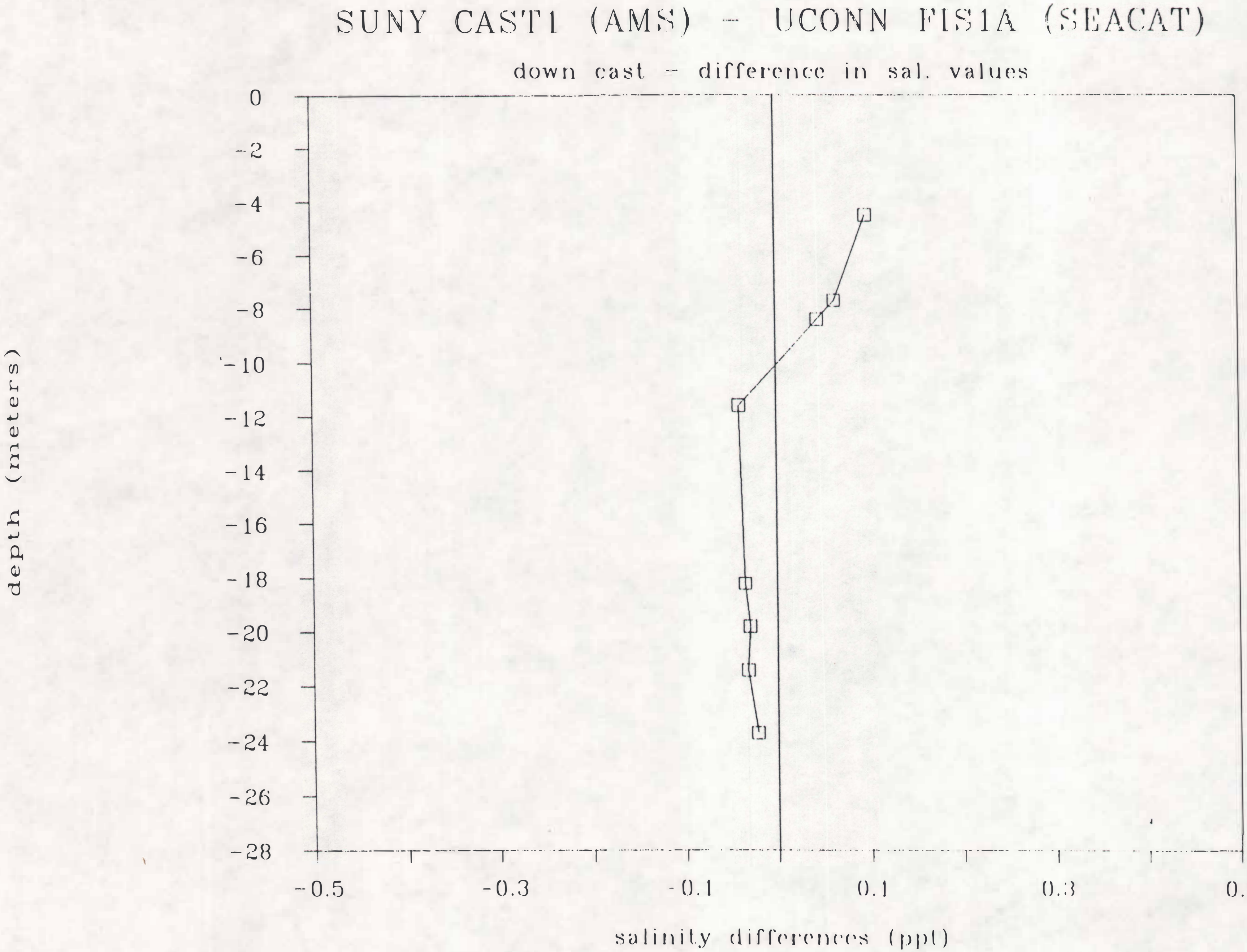
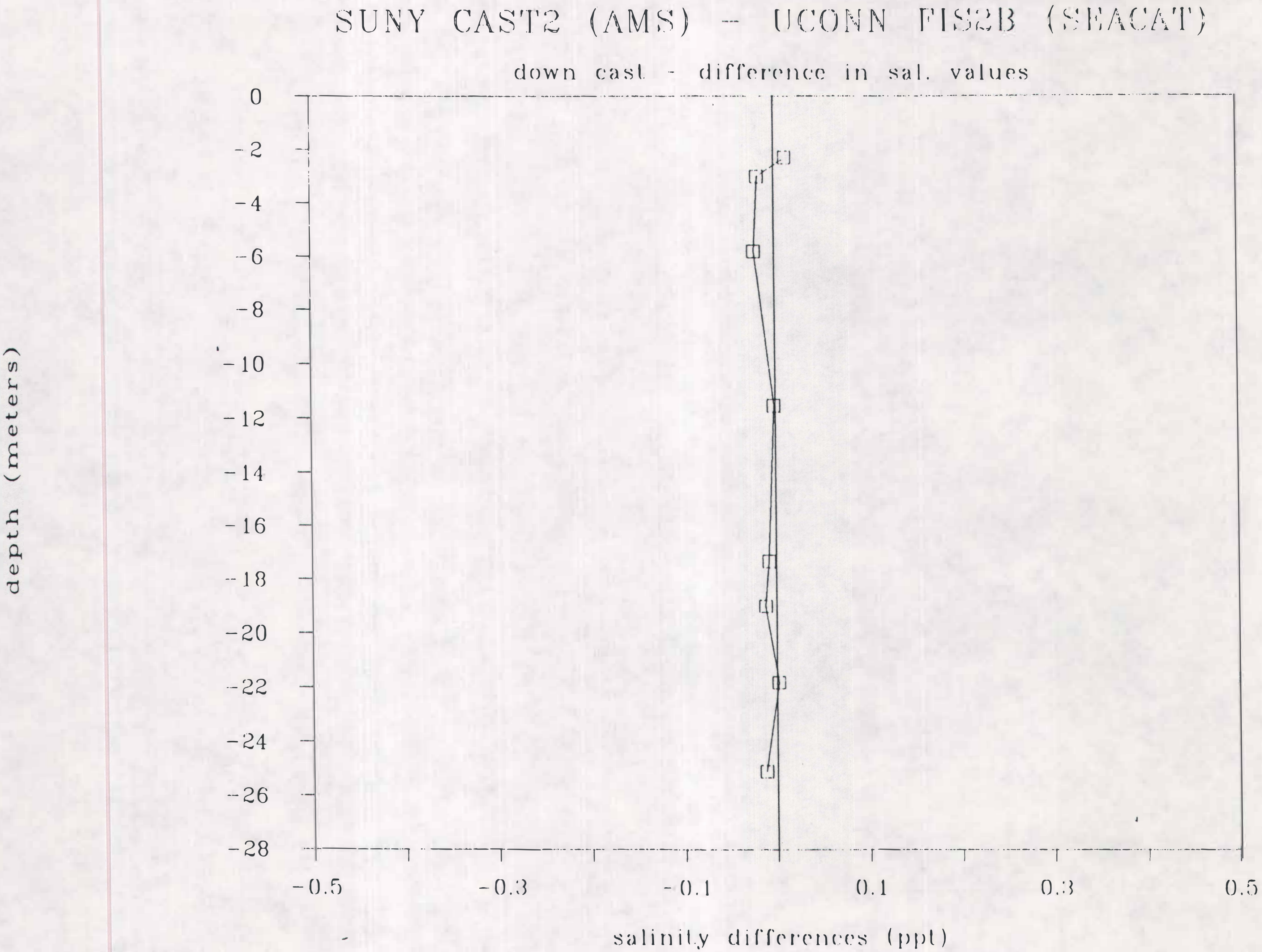

FIS4A up cast temp.
UCONN 6/8/89
depth (m)
temperature (deg. C)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
11
12
13
14
15

Figure 36B



SUNY CAST1 (AMS) - UCONN FIS1A (SEACAT)
down cast - difference in sal. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
salinity differences (ppt)

Figure 37A


SUNY CAST2 (AMS) – UCONN FIS2B (SEACAT)
down cast - difference in sal. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
salinity differences (ppt)

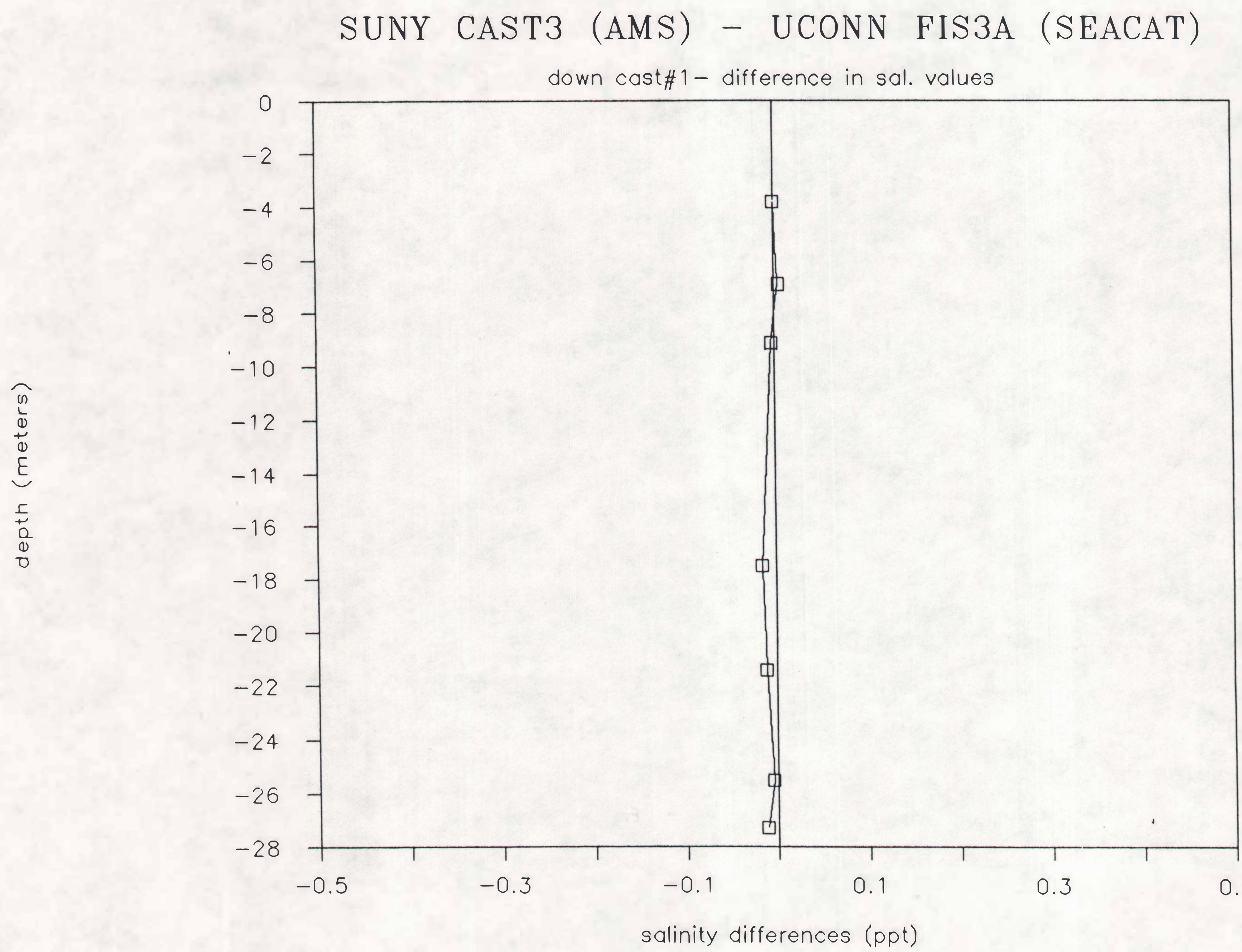
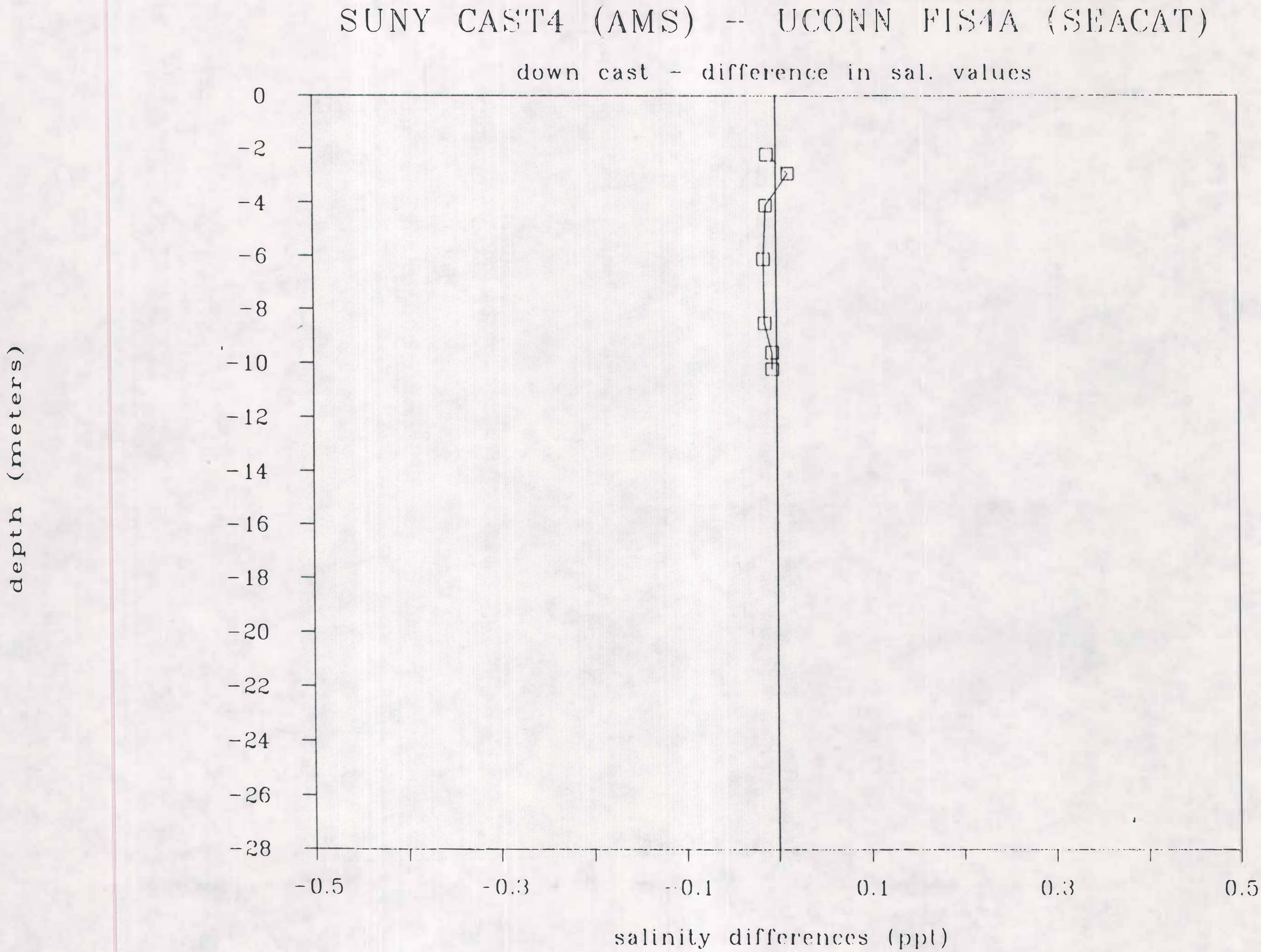
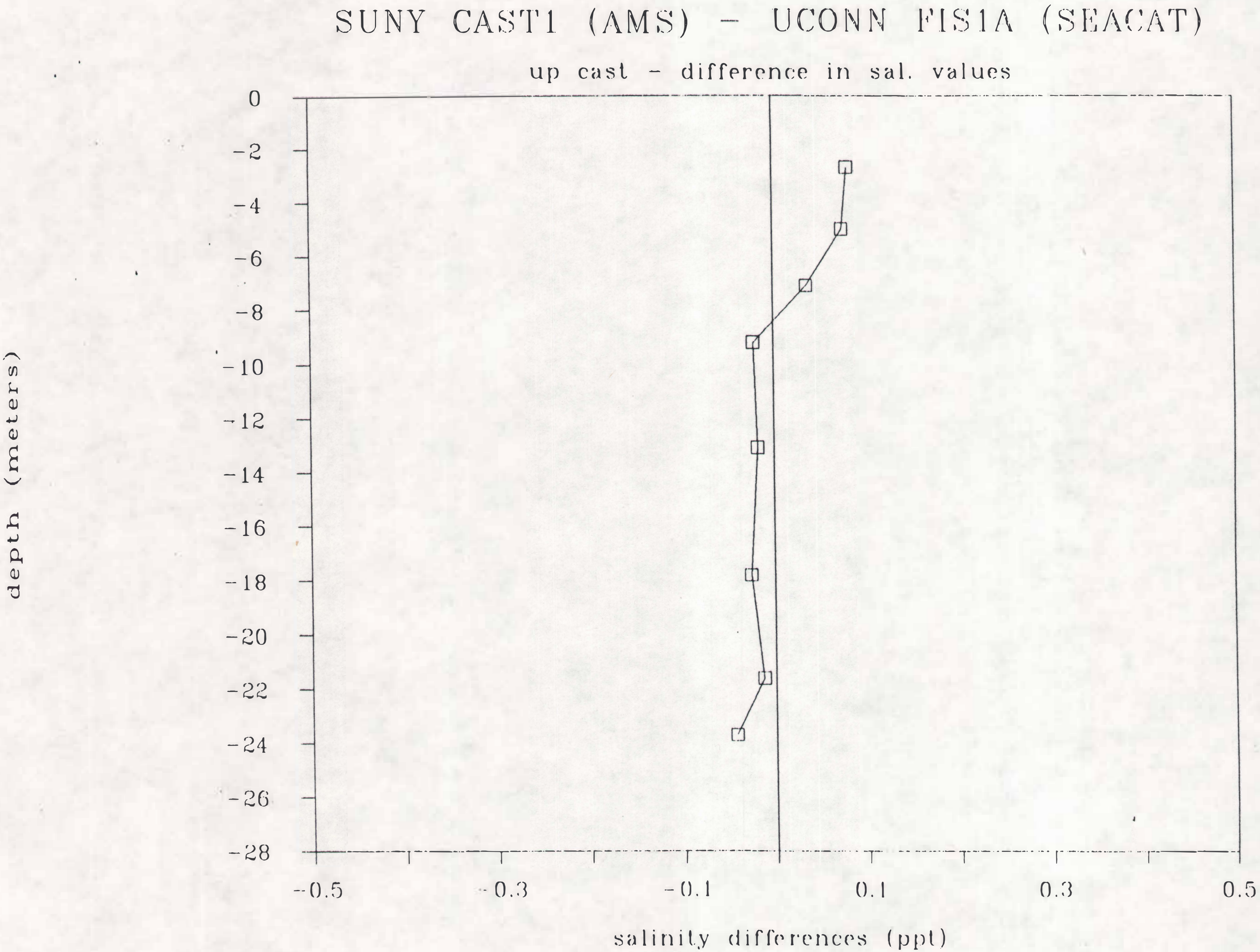

SUNY CAST3 (AMS) - UCONN FIS3A (SEACAT)
down cast#1- difference in sal. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
salinity differences (ppt)

Figure 37C



SUNY CAST4 (AMS) -- UCONN FIS4A (SEACAT)
down cast - difference in sal. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
salinity differences (ppt)

Figure 37D



SUNY CAST1 (AMS) - UCONN FIS1A (SEACAT)
up cast - difference in sal. values
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
-0.5
-0.3
-0.1
0.1
0.3
0.5
salinity differences (ppt)

Figure 38A

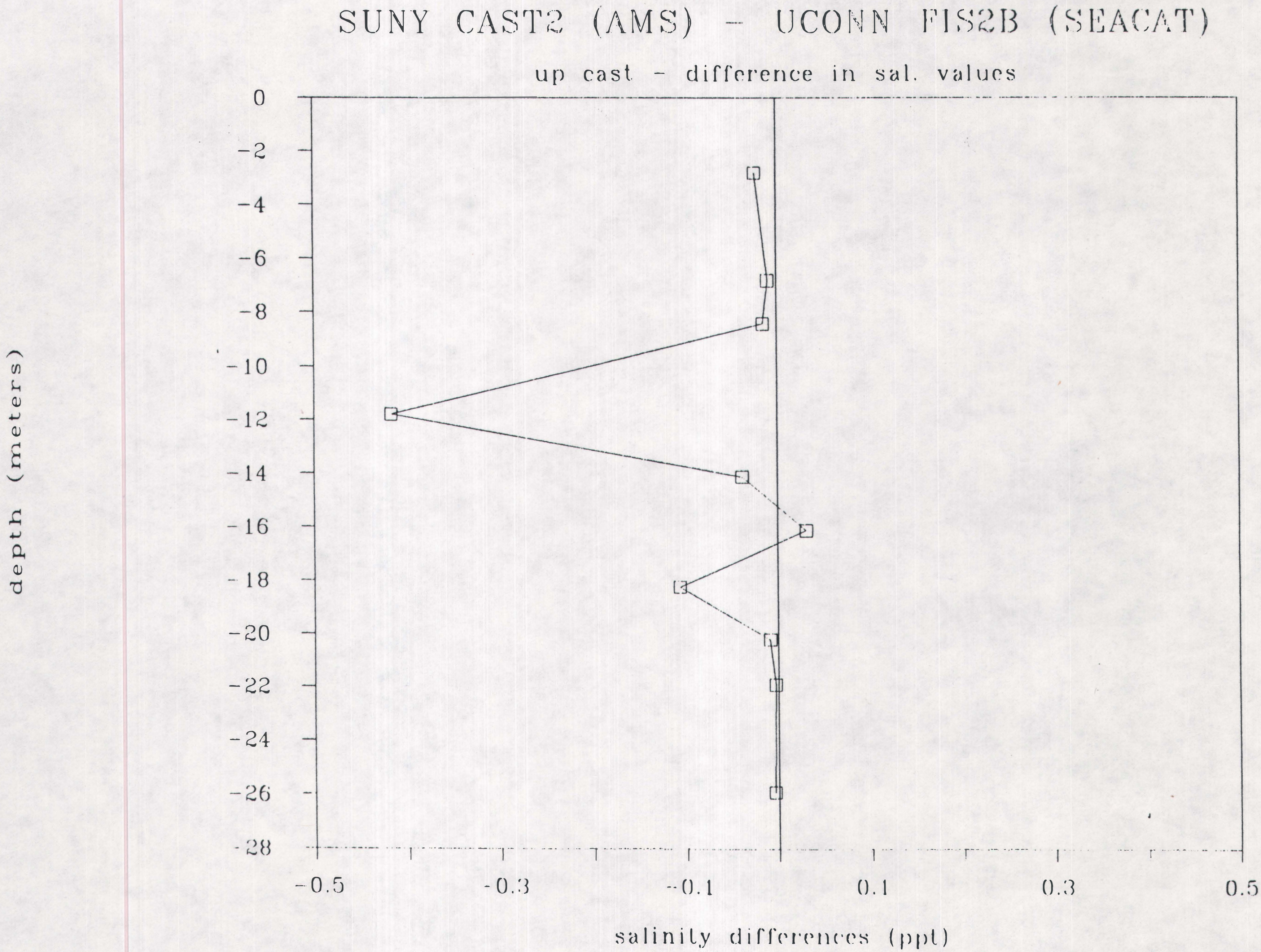
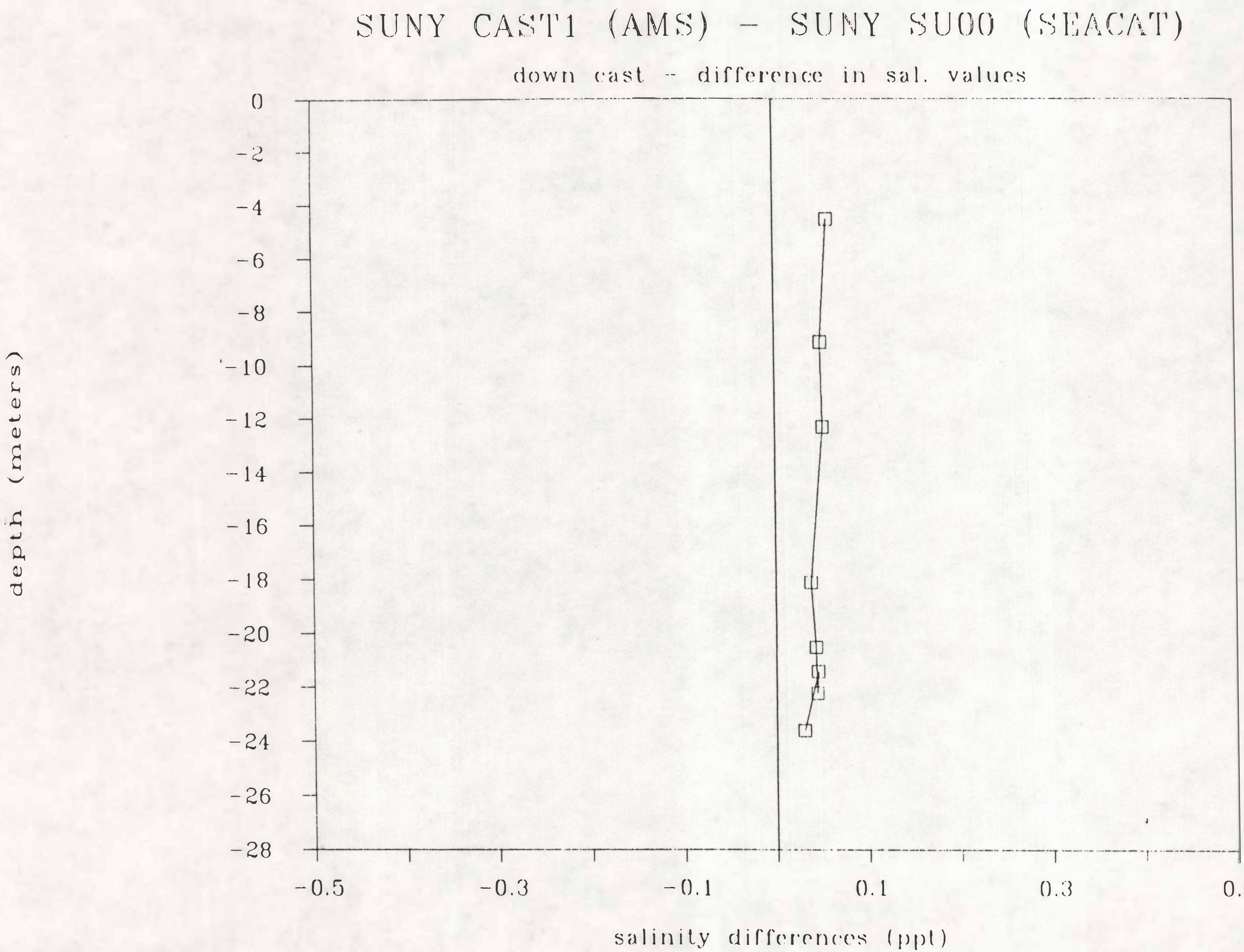

SUNY CAST2 (AMS) - UCONN FIS2B (SEACAT)
up cast - difference in sal. values
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
-0.5
-0.3
-0.1
0.1
0.3
0.5
salinity differences (ppt)

Figure 38B



SUNY CAST1 (AMS) - SUNY SU00 (SEACAT)
down cast - difference in sal. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
salinity differences (ppt)

Figure 39A

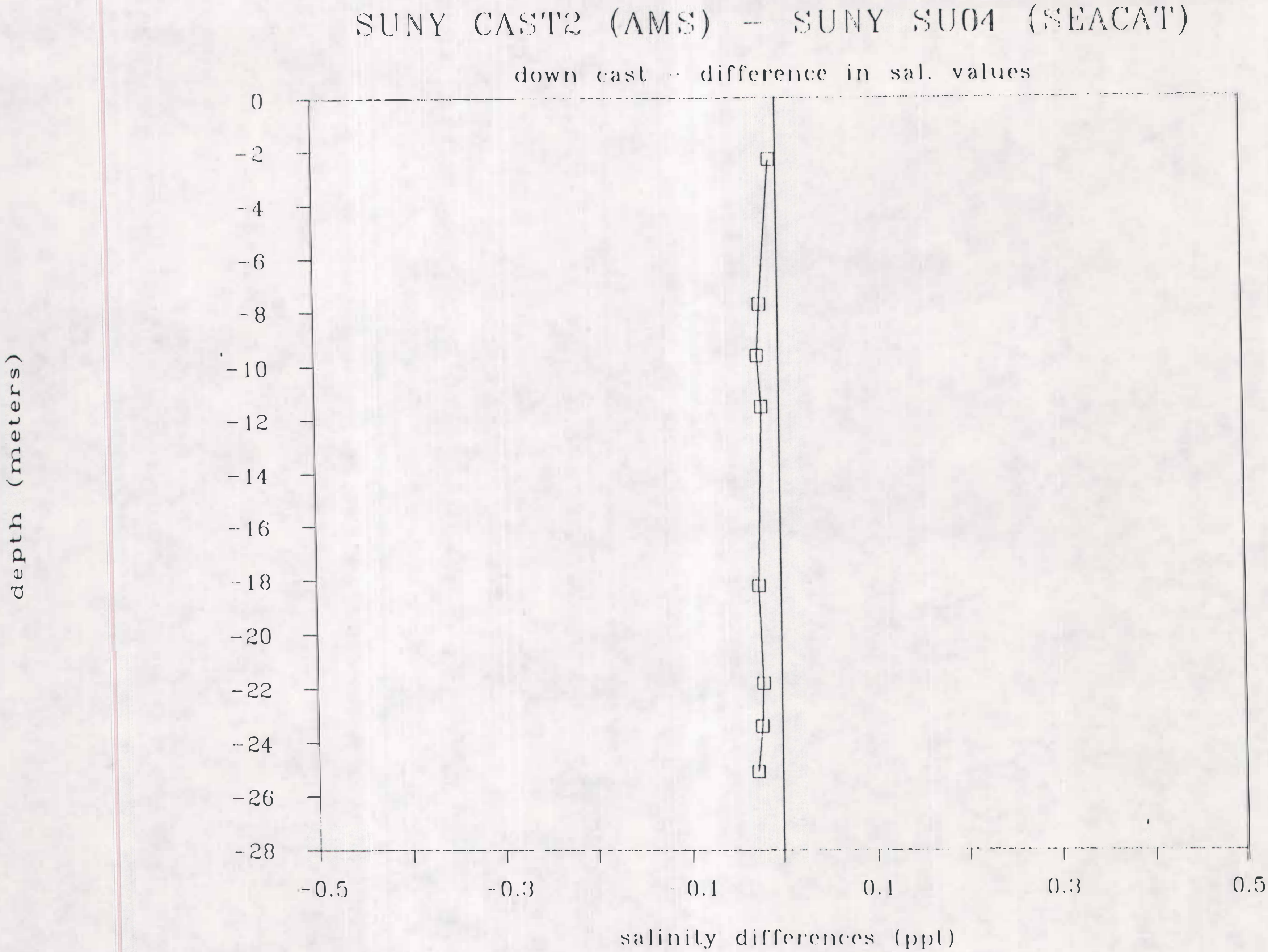

SUNY CAST2 (AMS) - SUNY SU04 (SEACAT)
down cast - difference in sal. values
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
-0.5
-0.3
0.1
0.1
0.3
0.5
salinity differences (ppt)

Figure 39B

SUNY CAST3 (AMS) - SUNY SU05 (SEACAT)

down cast#1- difference in sal. values

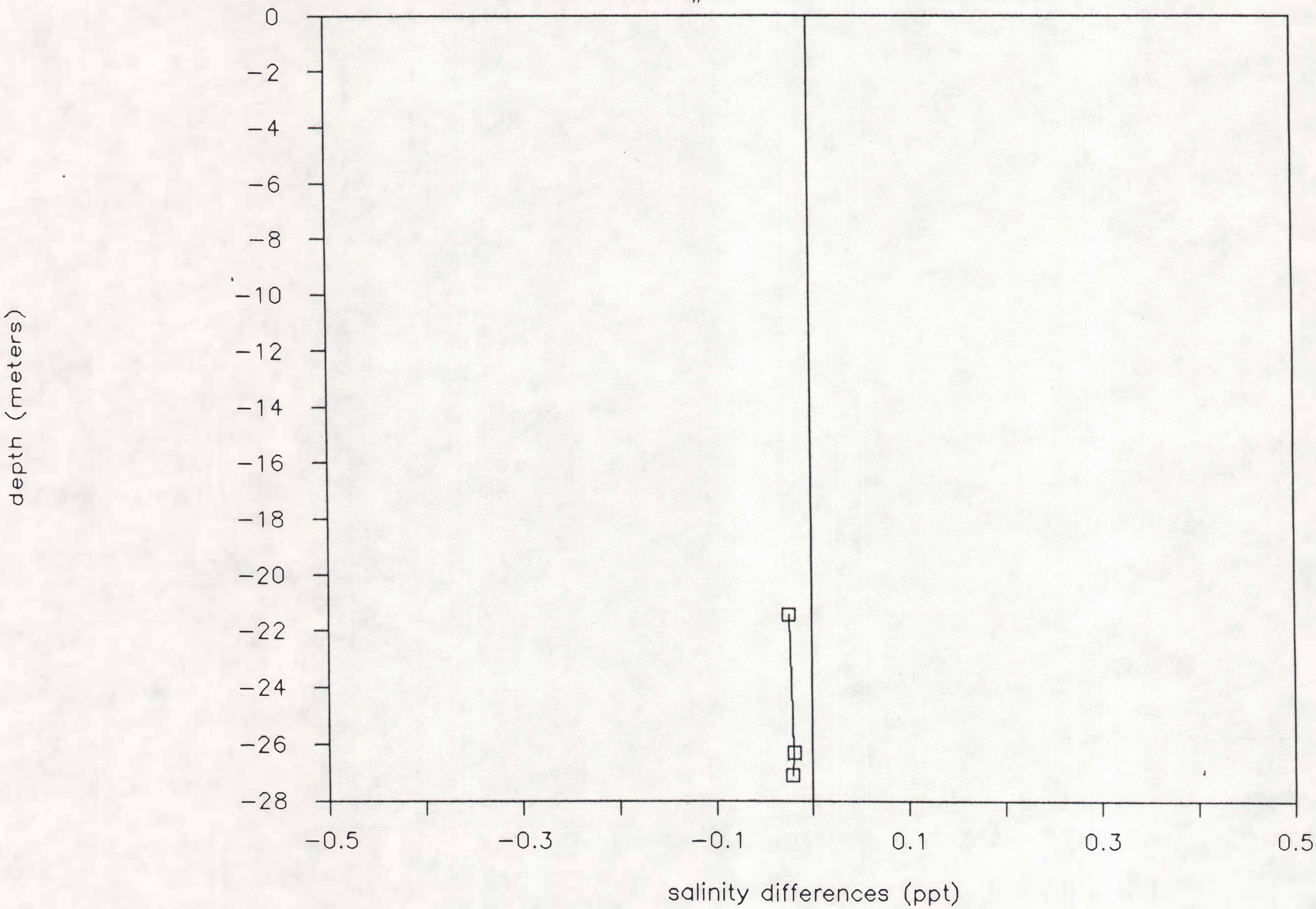


Figure 39C

SUNY CAST4 (AMS) - SUNY SU06 (SEACAT)

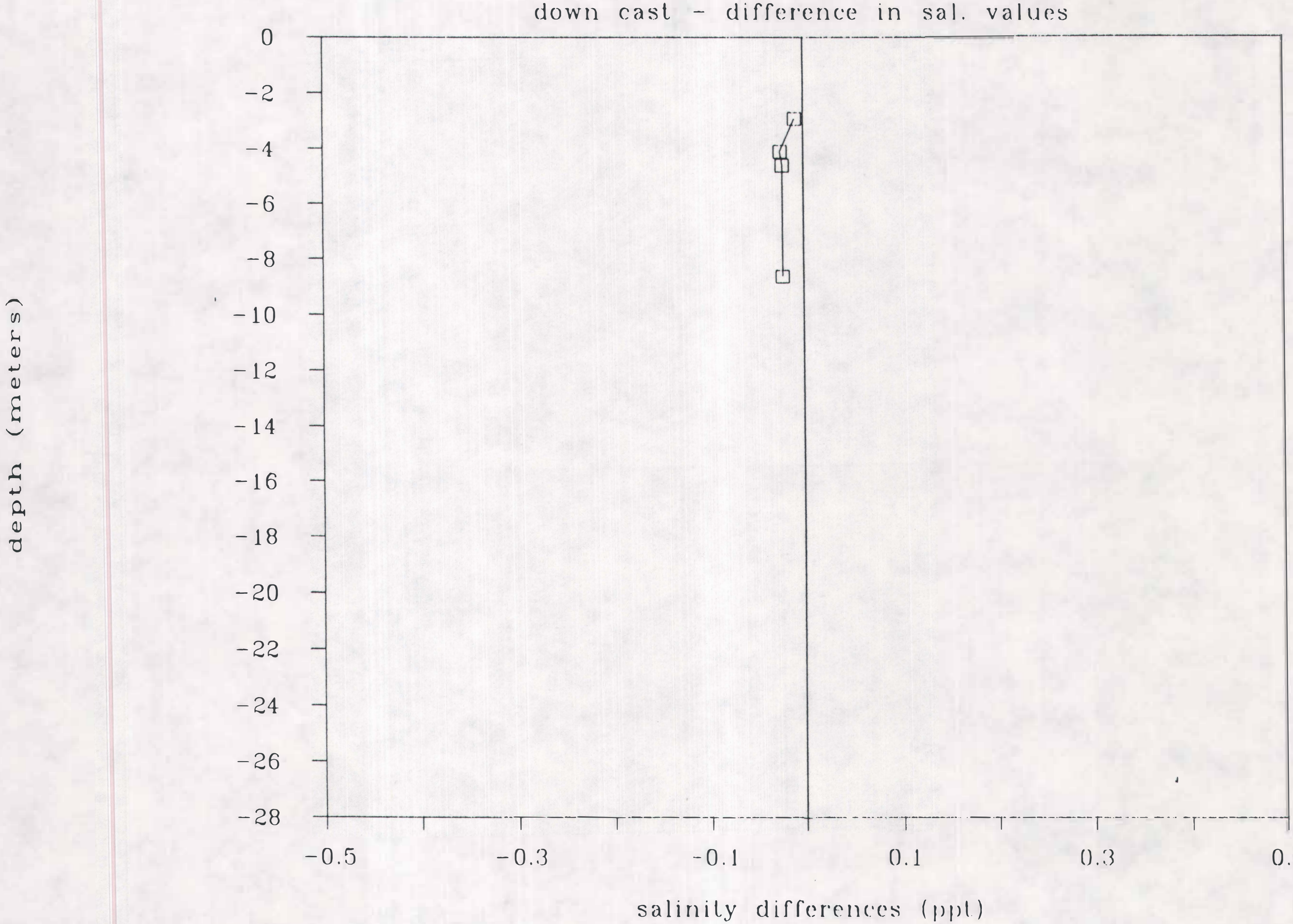


Figure 39D

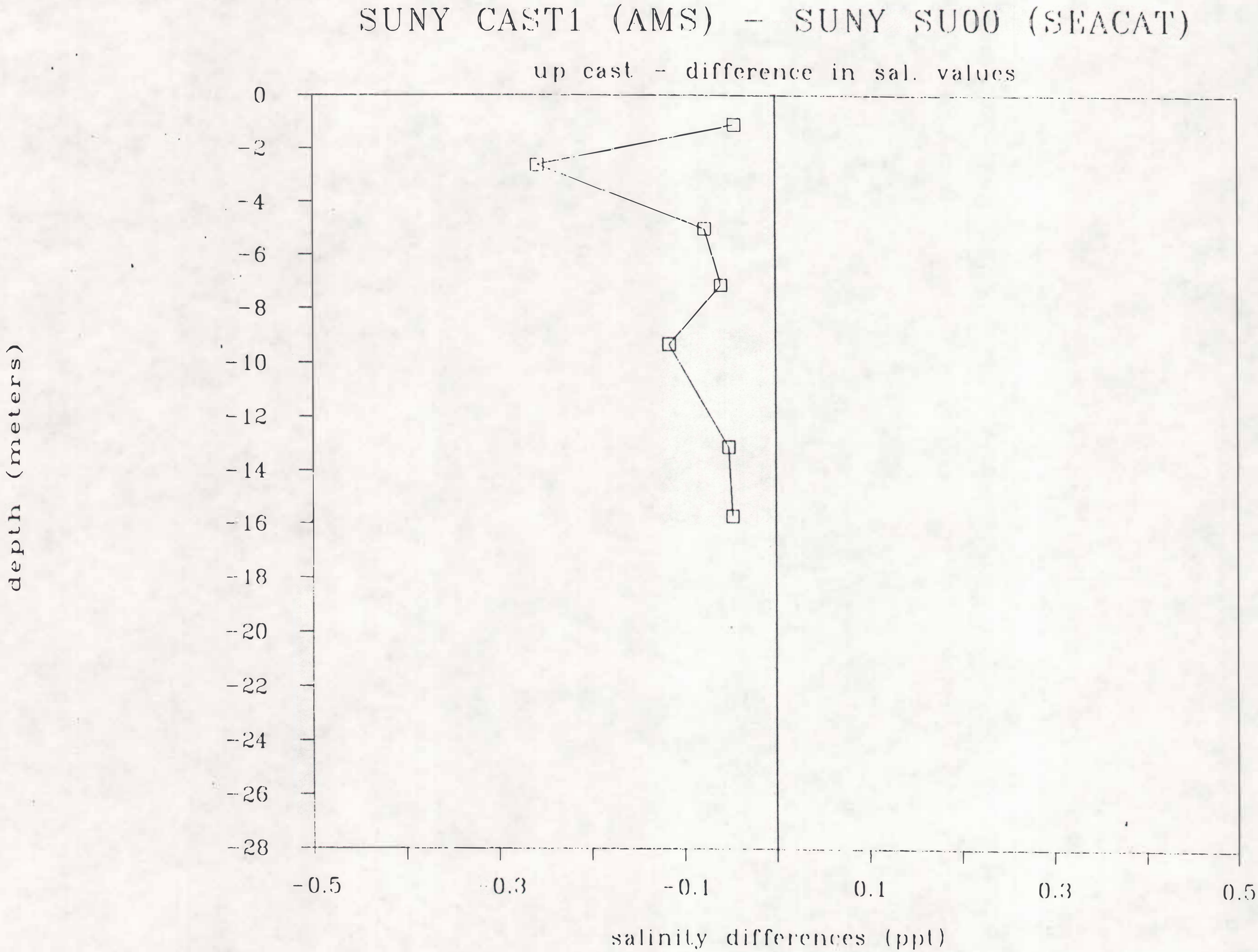

SUNY CAST1 (AMS) - SUNY SU00 (SEACAT)
up cast - difference in sal. values
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
-0.5
-0.3
-0.1
0.1
0.3
0.5
salinity differences (ppt)

Figure 40A

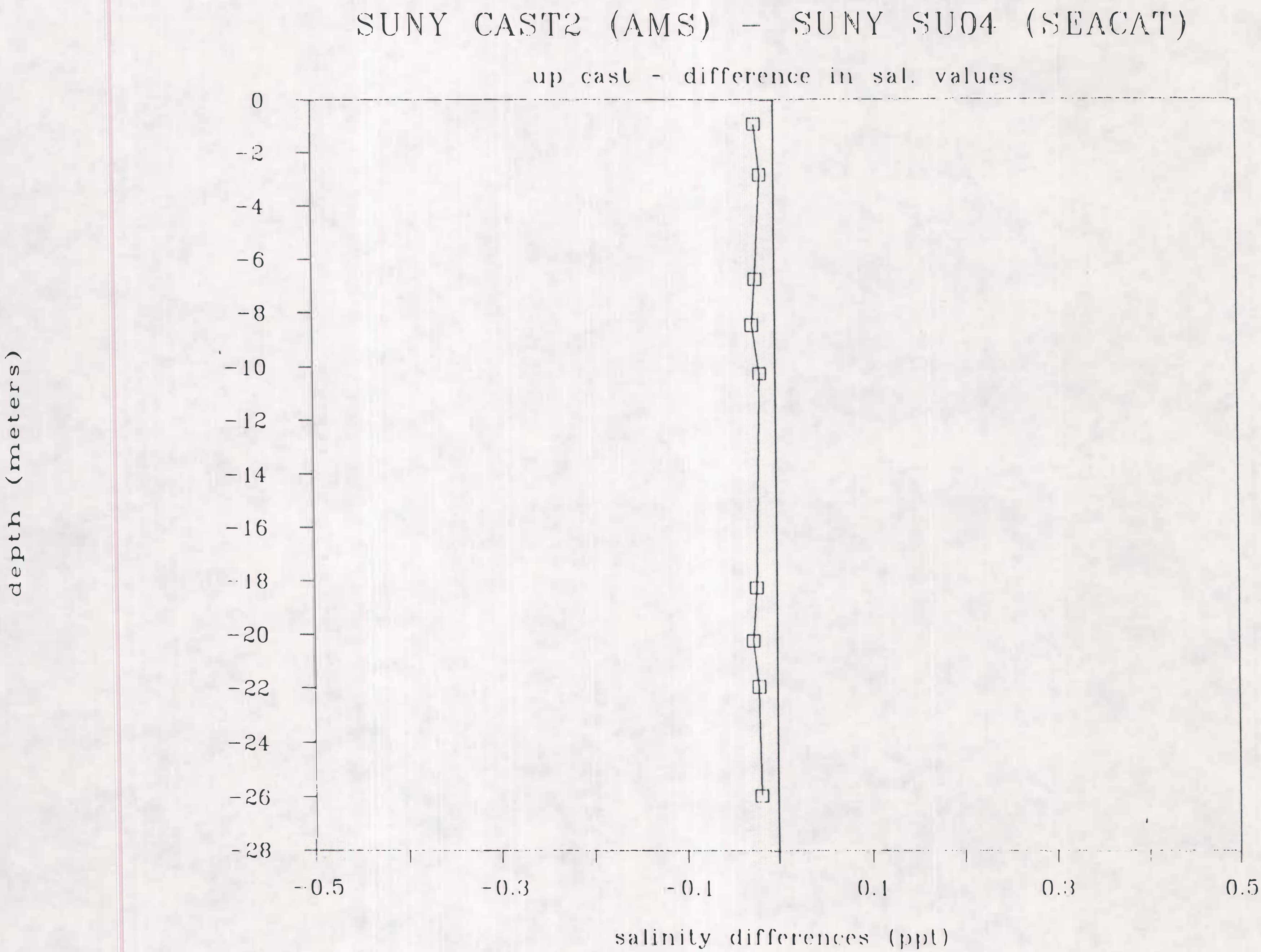
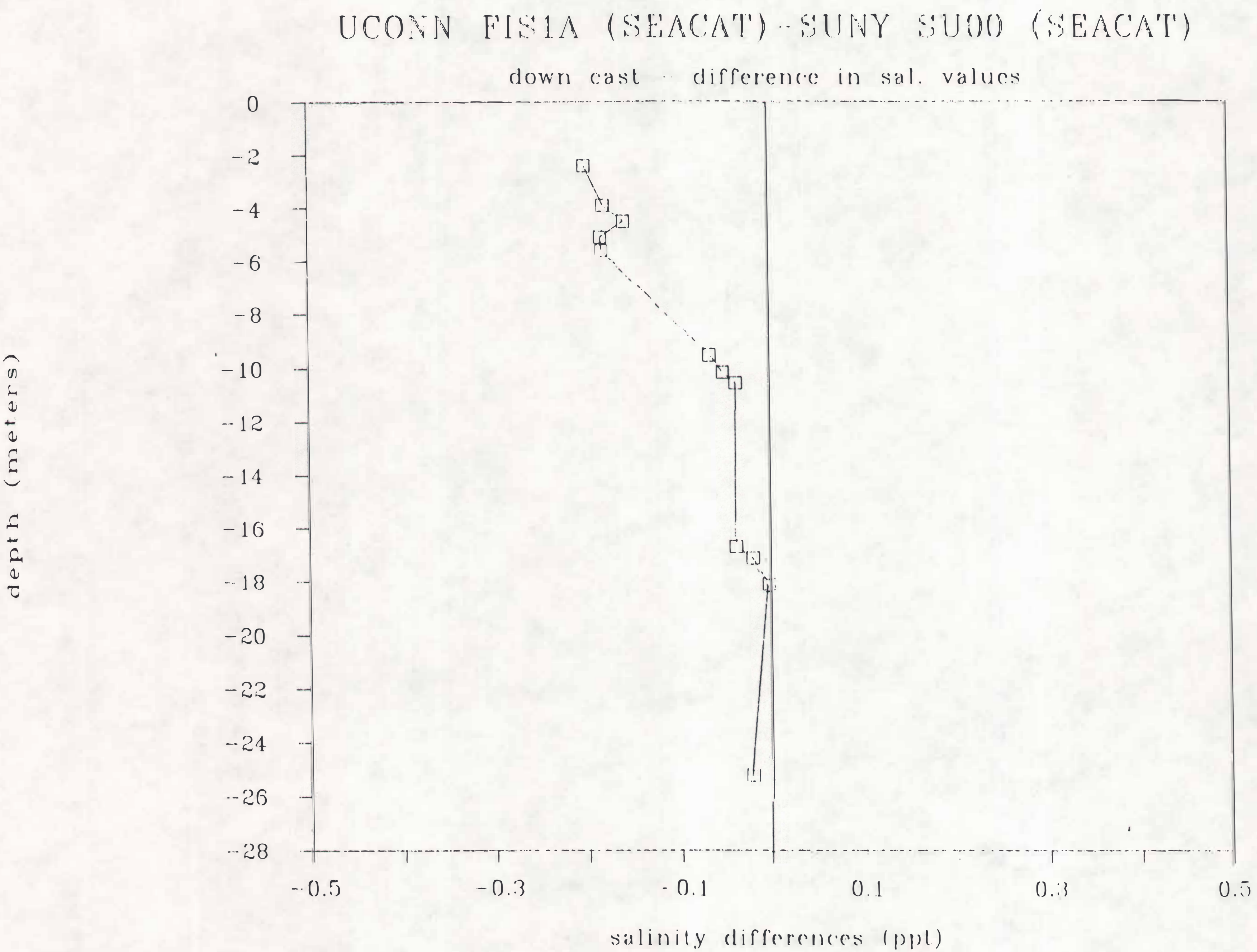
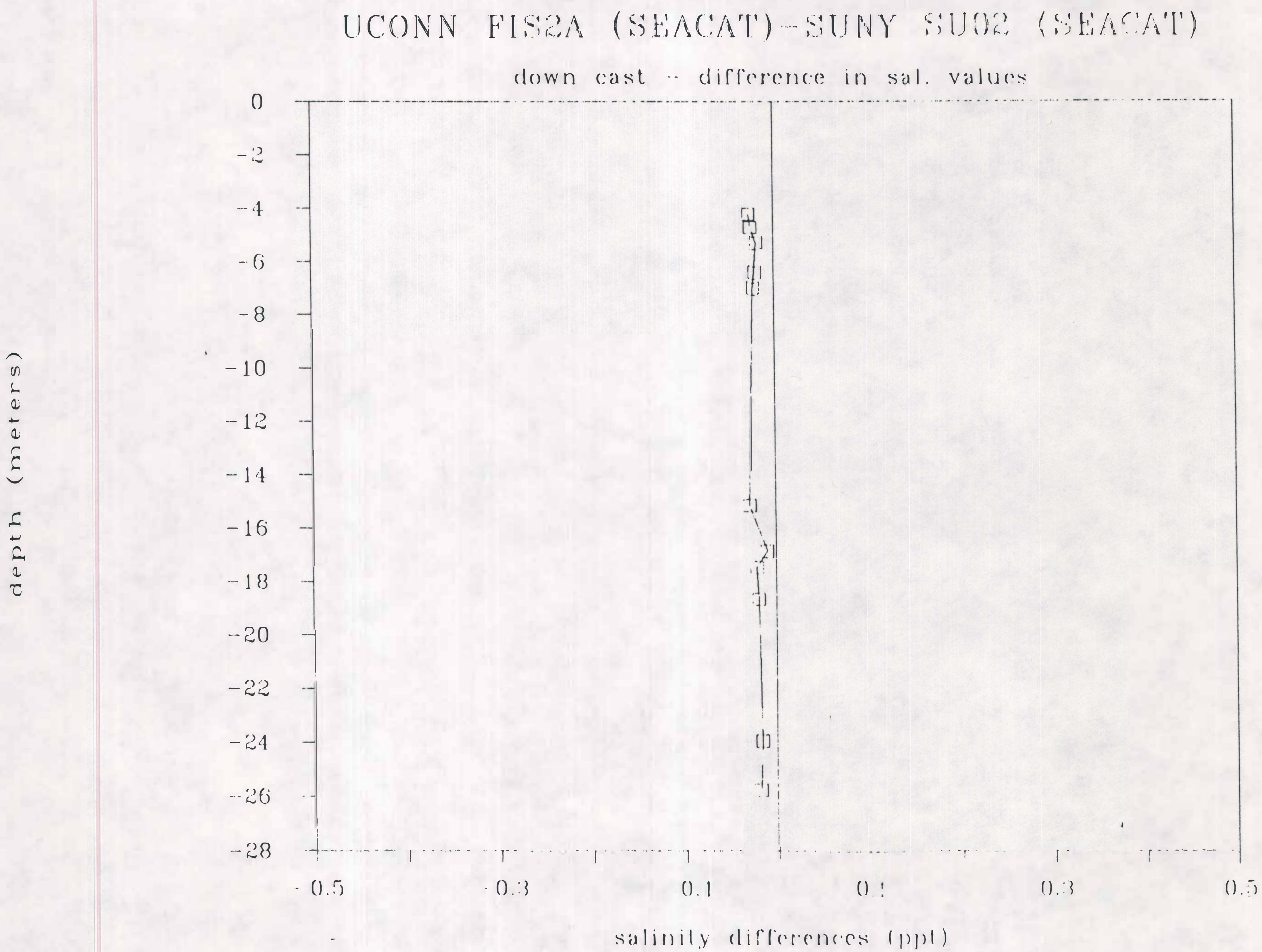

SUNY CAST2 (AMS) – SUNY SU04 (SEACAT)
up cast - difference in sal. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
salinity differences (ppt)

Figure 40B



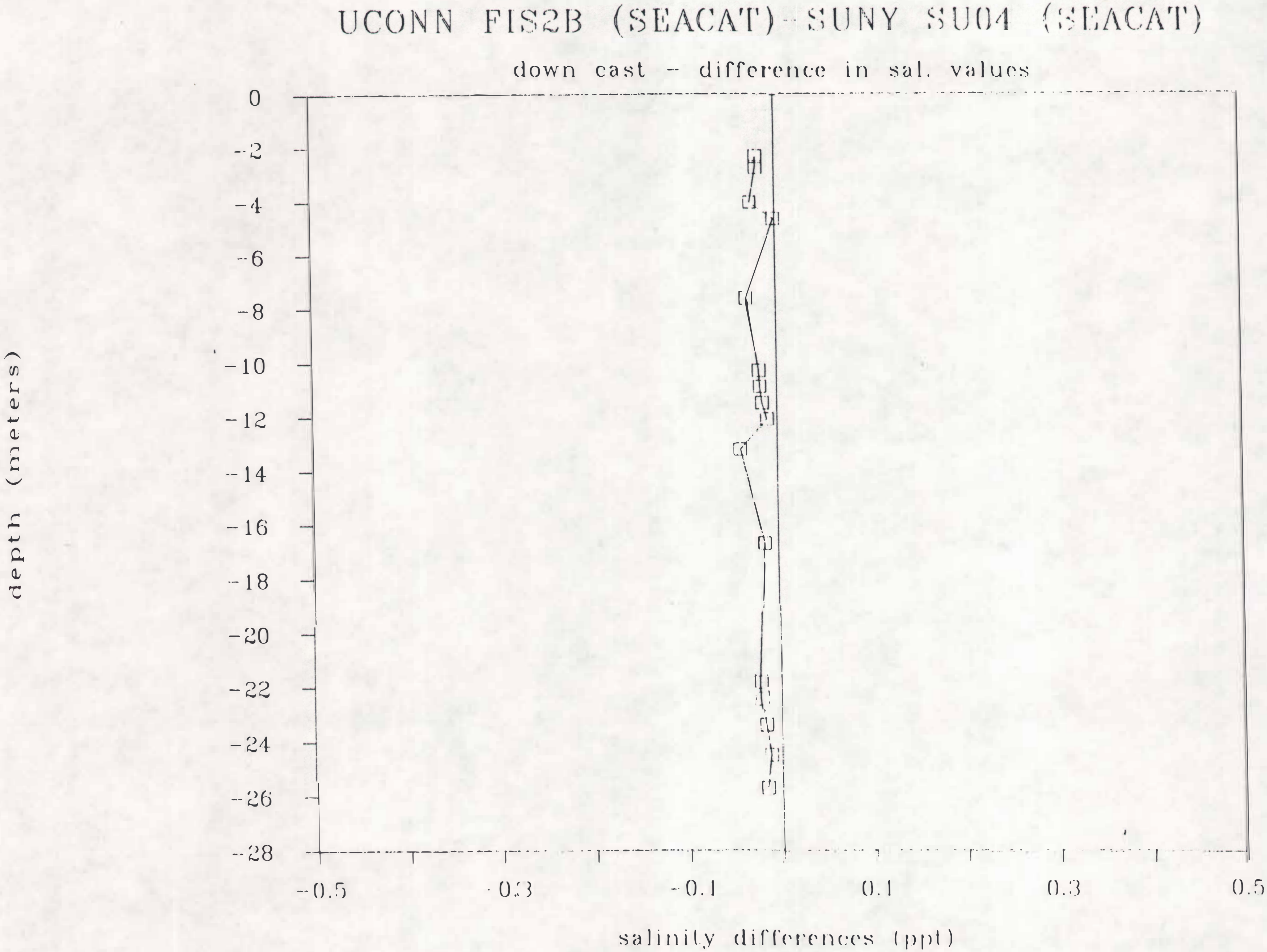
UCONN FIS1A (SEACAT)-SUNY SU00 (SEACAT)
down cast -- difference in sal. values
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
-0.5
-0.3
-0.1
0.1
0.3
0.5
salinity differences (ppt)

Figure 41A



UCONN FIS2A (SEACAT)-SUNY SU02 (SEACAT)
down cast - difference in sal. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
salinity differences (ppt)

Figure 41B



UCONN FIS2B (SEACAT)-SUNY SU04 (SEACAT)
down cast - difference in sal. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
salinity differences (ppt)

Figure 41C

UCONN FIS3A (SEACAT)–SUNY SU05 (SEACAT)

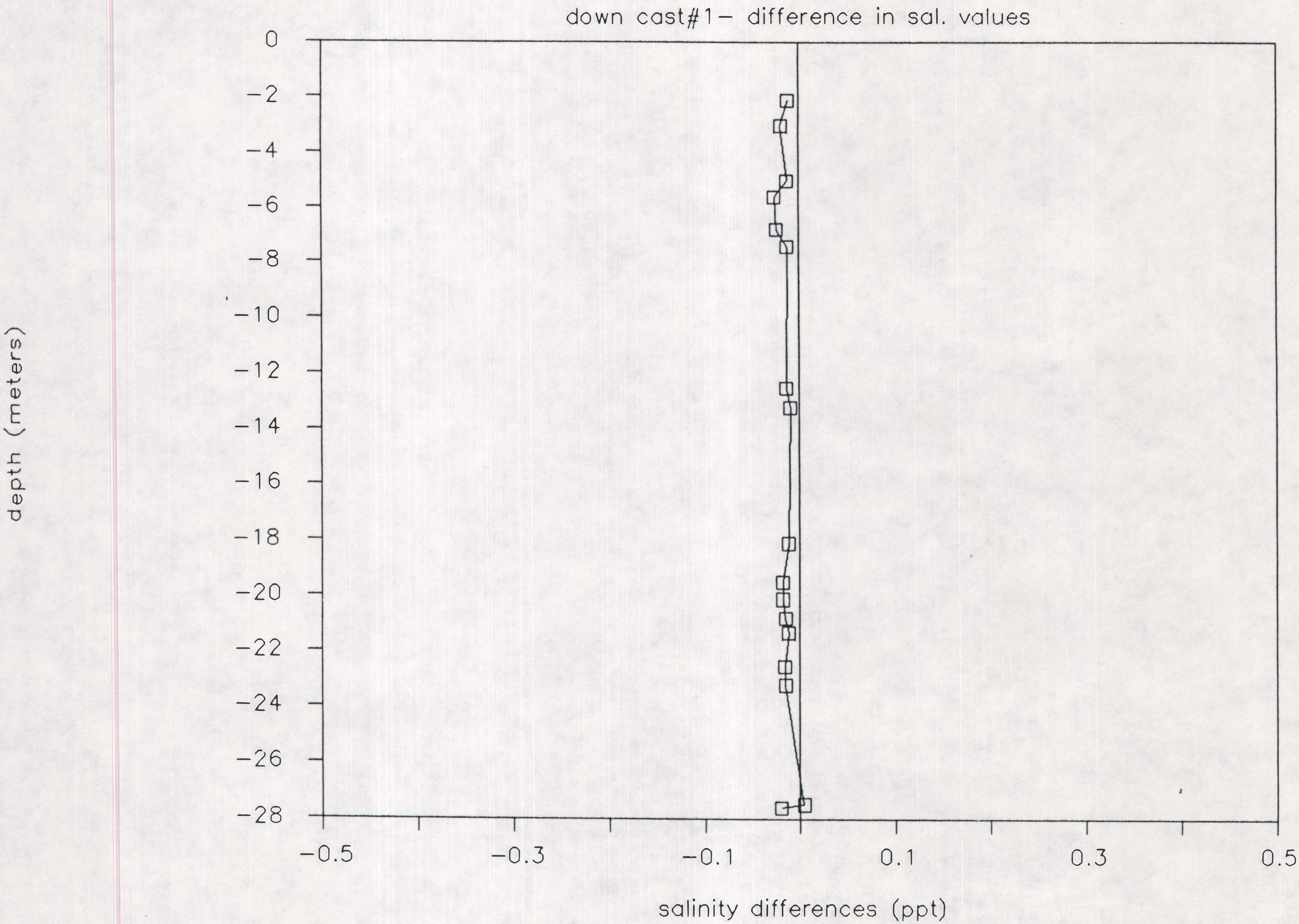


Figure 41B

UCONN FIS3A (SEACAT)-SUNY SU05 (SEACAT)

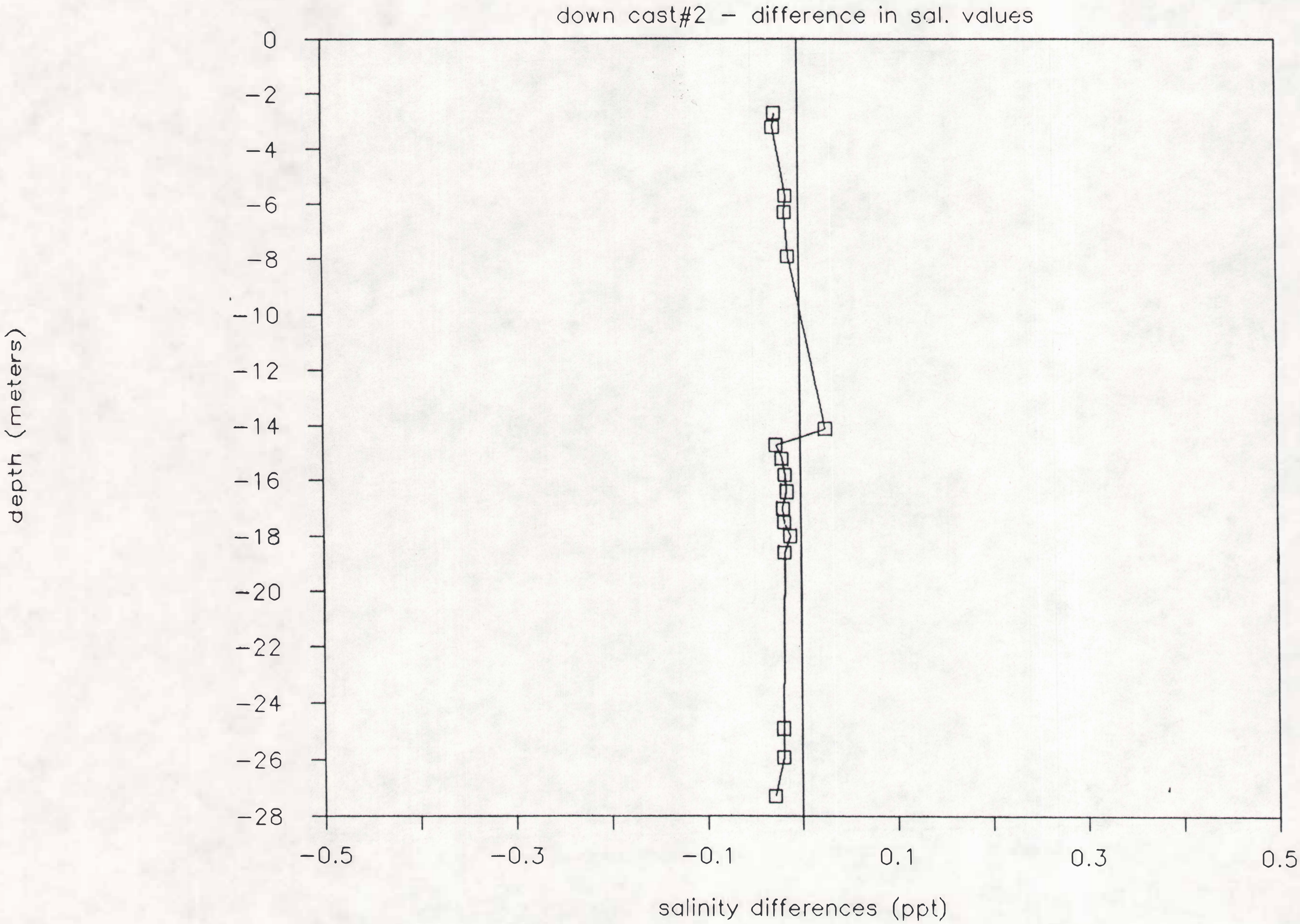


Figure 41F

UCONN FIS3A (SEACAT)-SUNY SU05 (SEACAT)

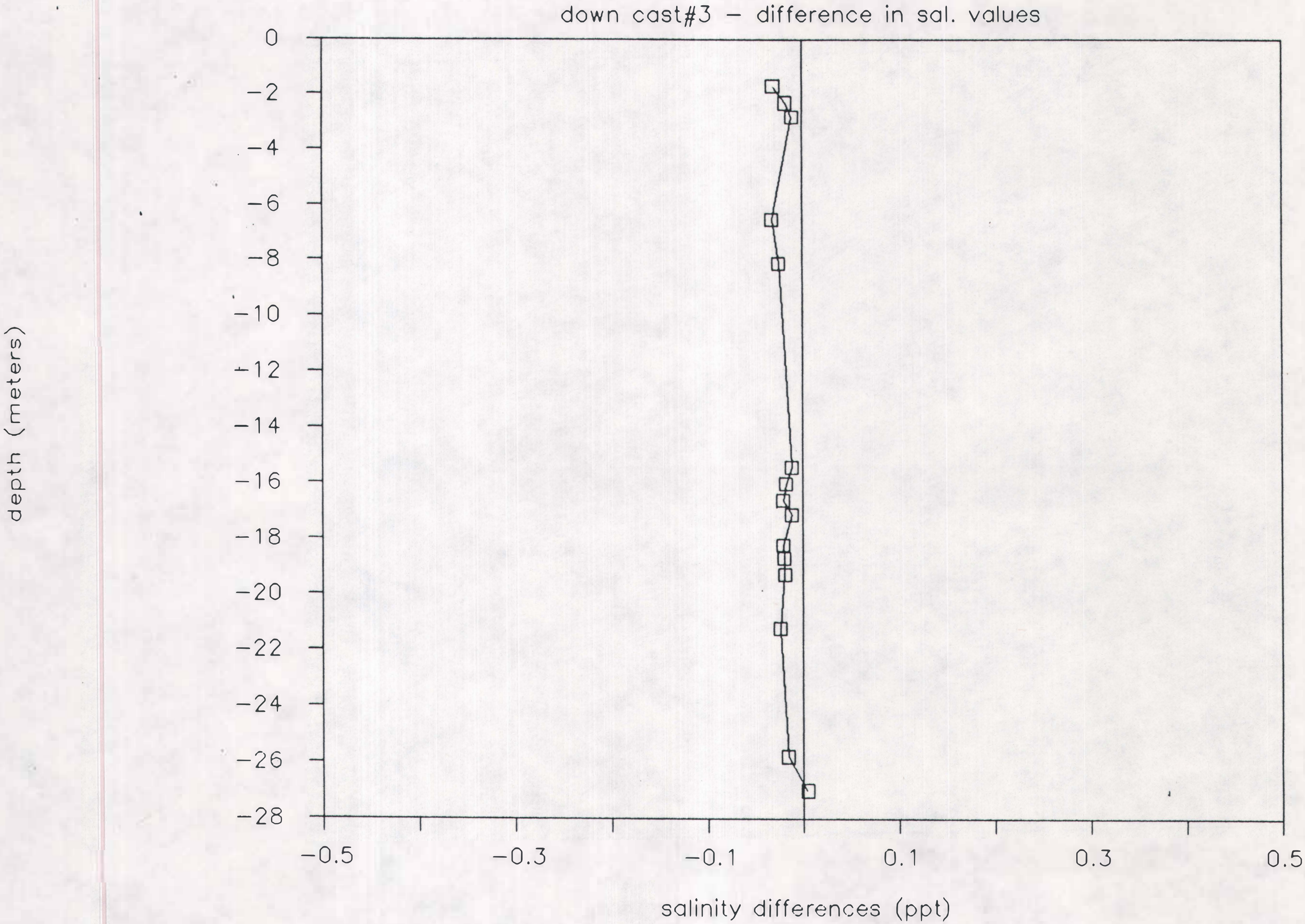


Figure 41F

UCONN FIS3A (SEACAT)-SUNY SU05 (SEACAT)

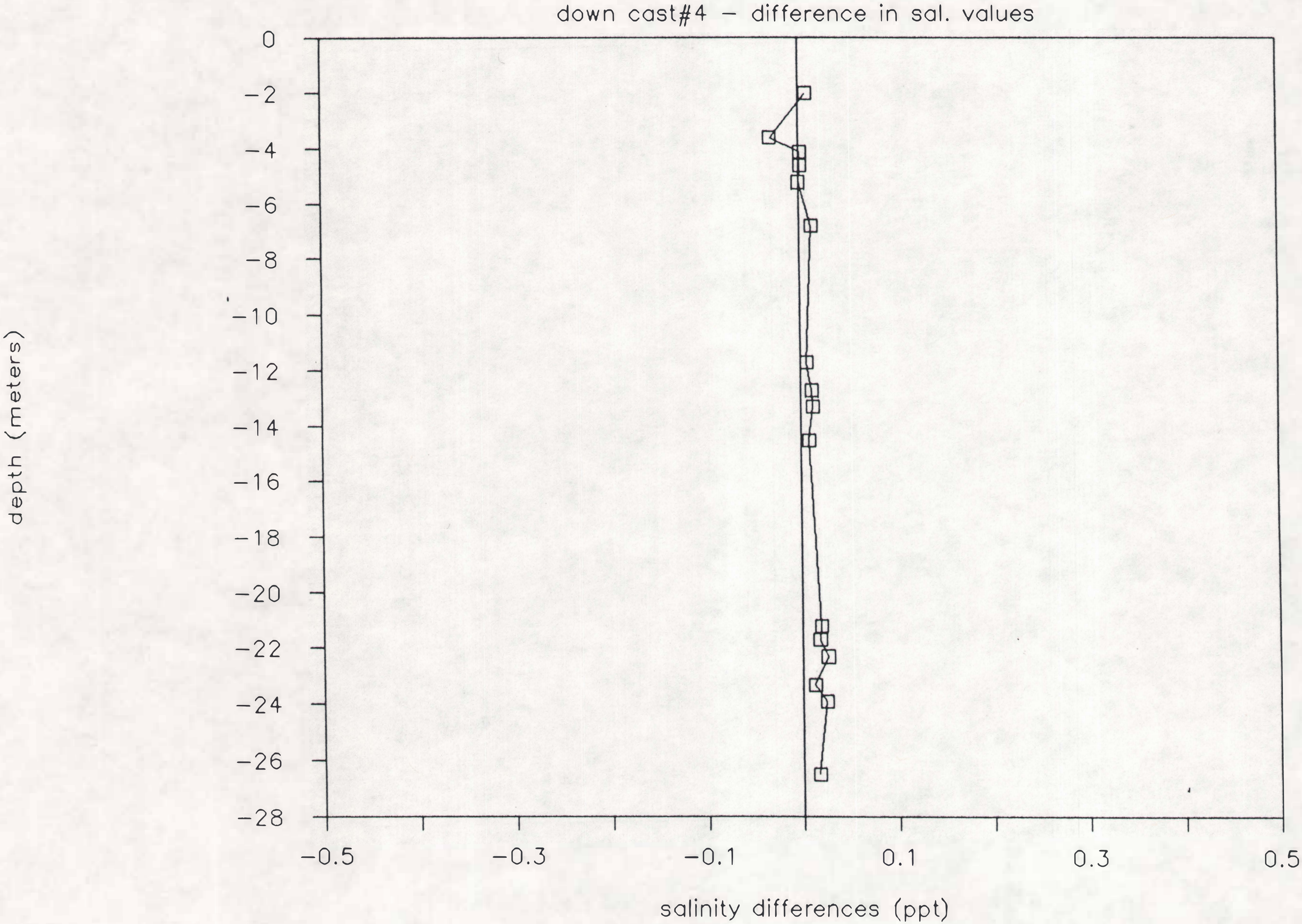


Figure 41C

UCONN FIS3A (SEACAT)-SUNY SU05 (SEACAT)

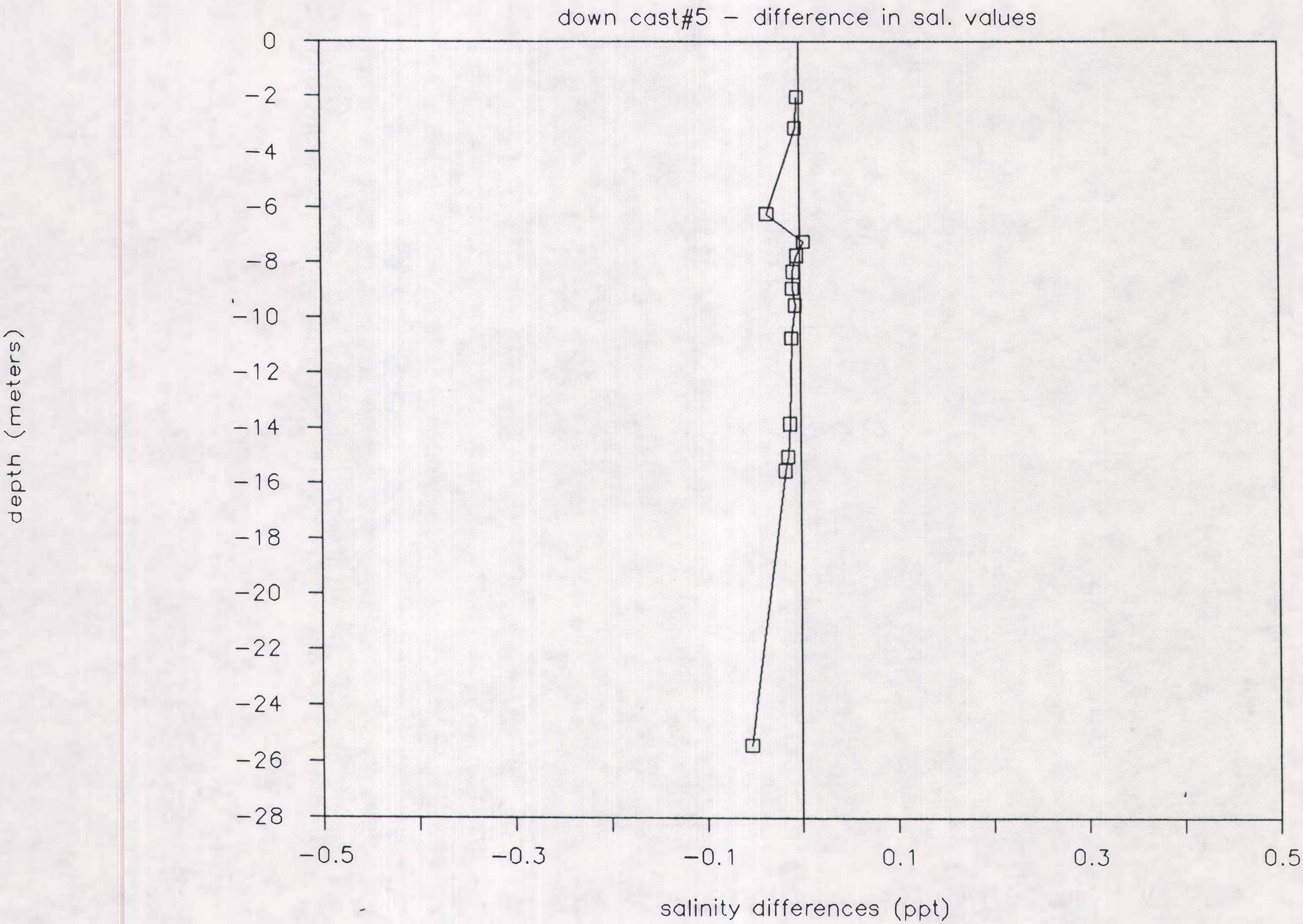


Figure 41H

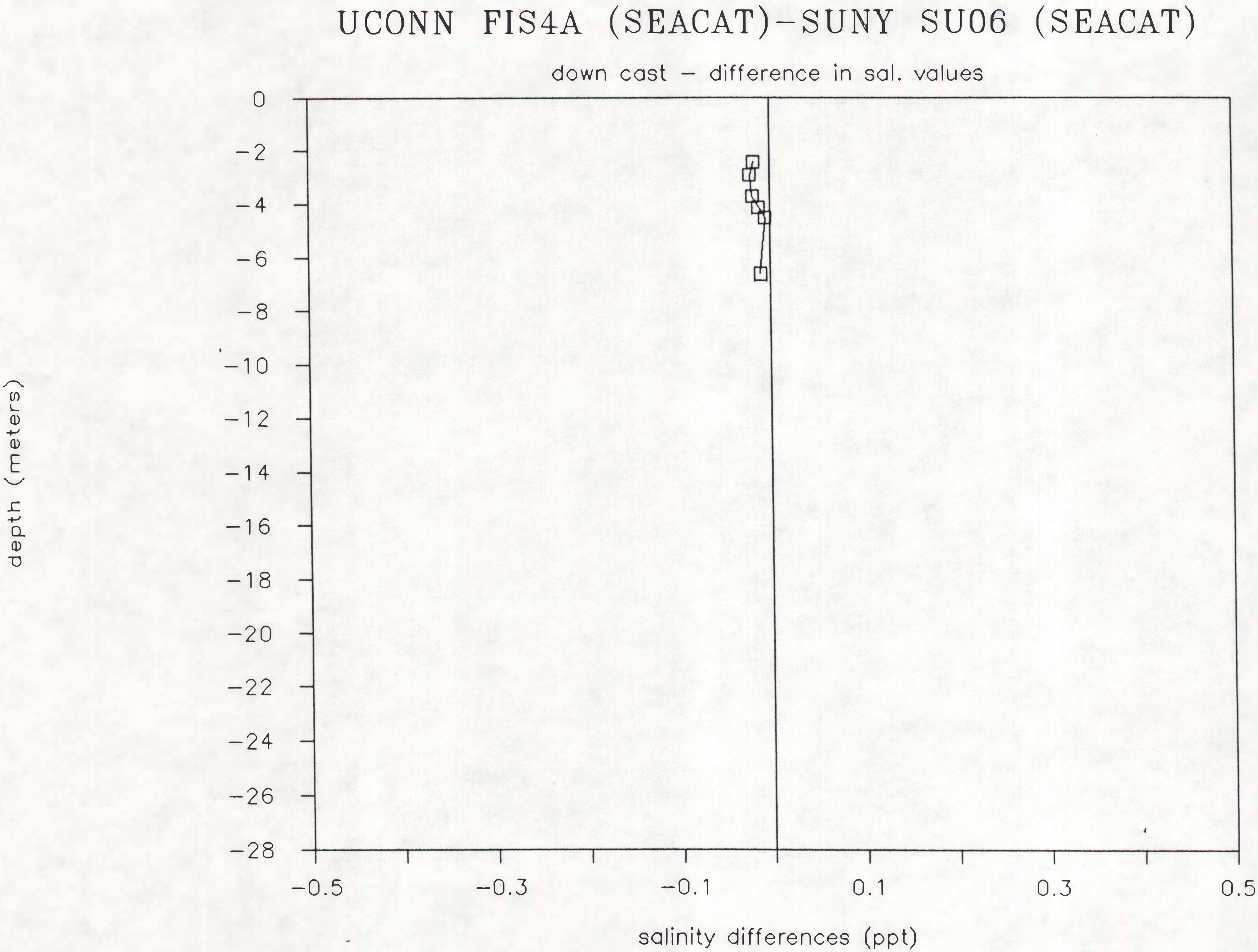
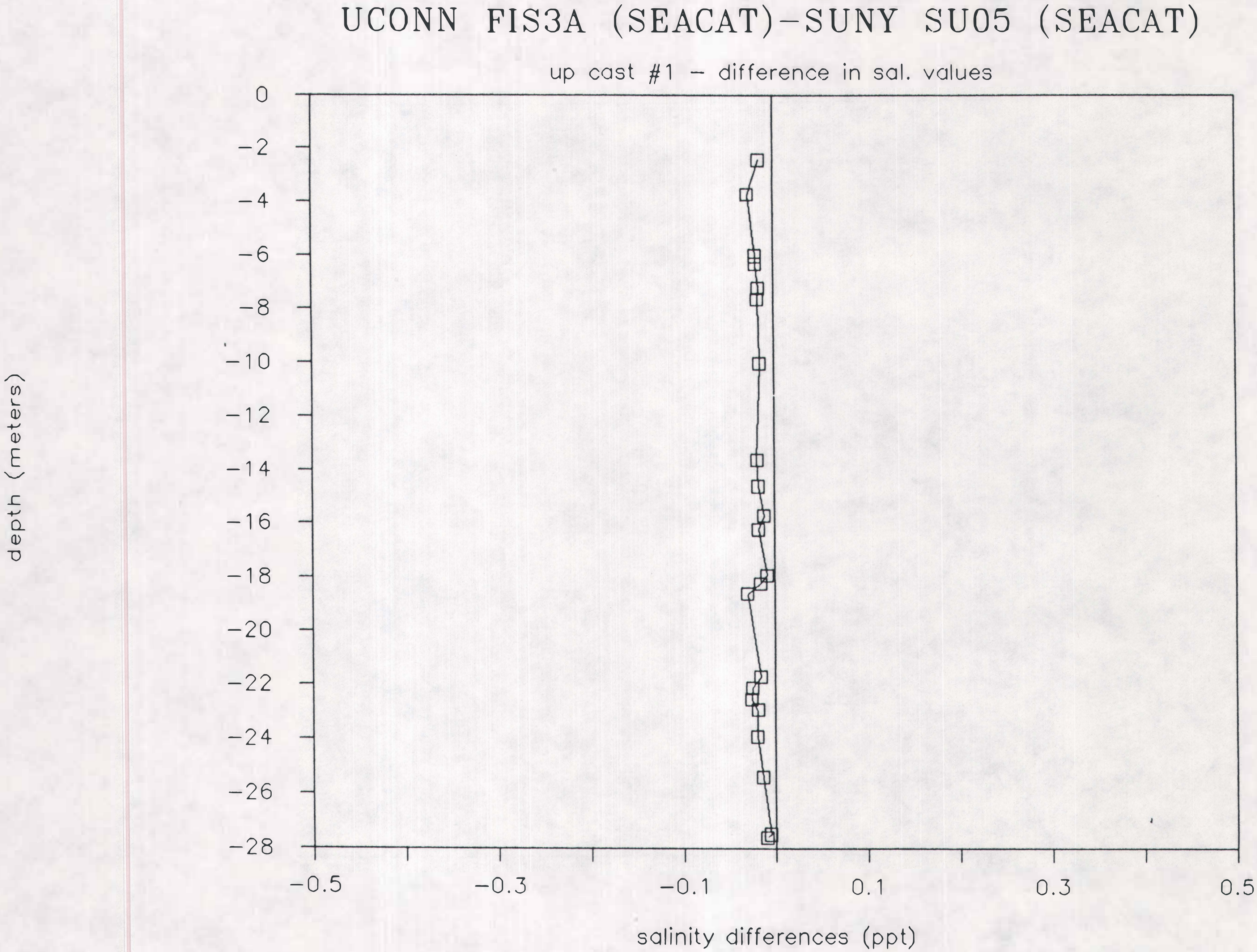

UCONN FIS4A (SEACAT)-SUNY SU06 (SEACAT)
down cast - difference in sal. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
salinity differences (ppt)

Figure 41I



UCONN FIS3A (SEACAT)-SUNY SU05 (SEACAT)
up cast #1 - difference in sal. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
salinity differences (ppt)

Figure 42A

UCONN FIS3A (SEACAT)-SUNY SU05 (SEACAT)

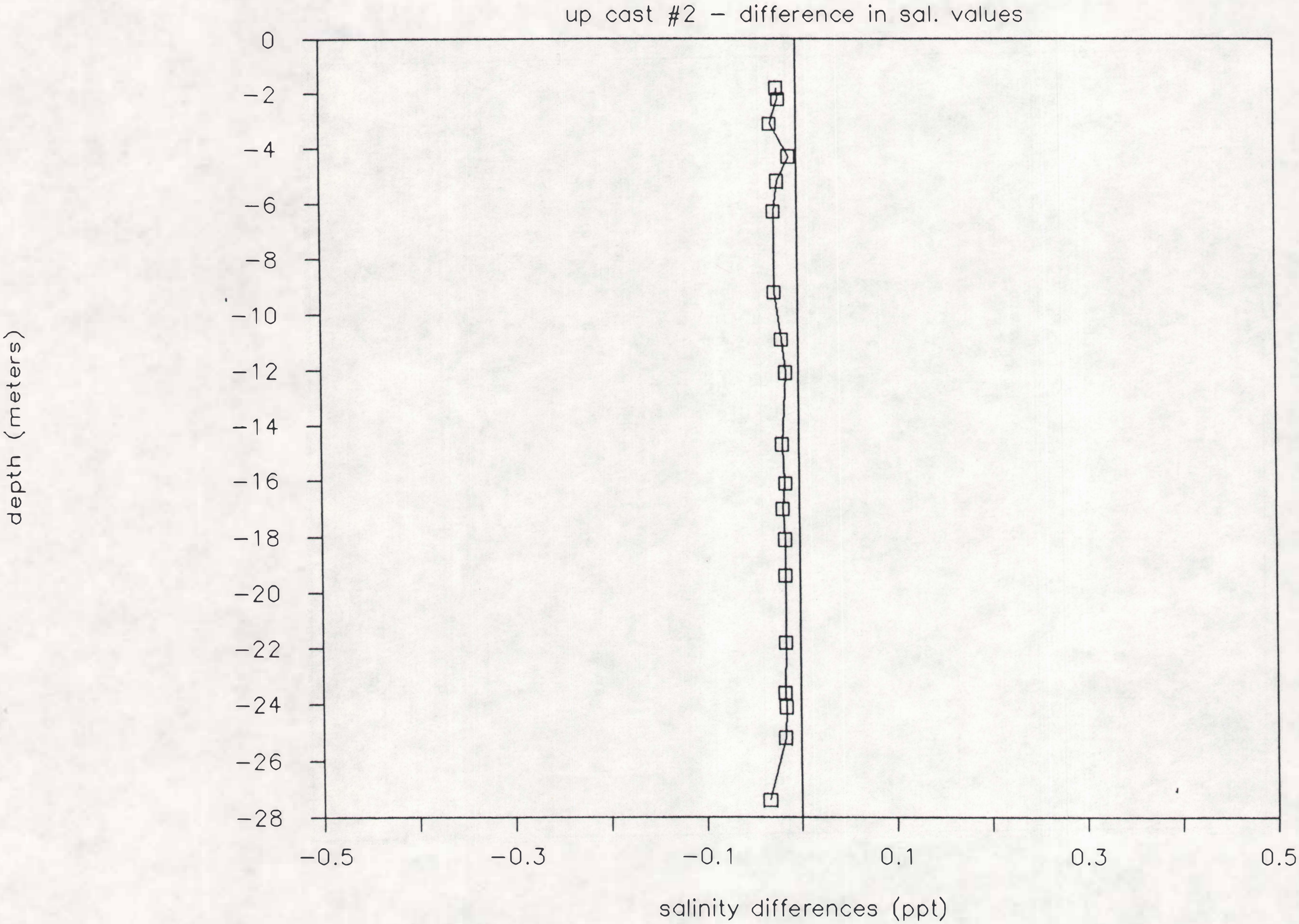


Figure 42B

UCONN FIS3A (SEACAT)–SUNY SU05 (SEACAT)

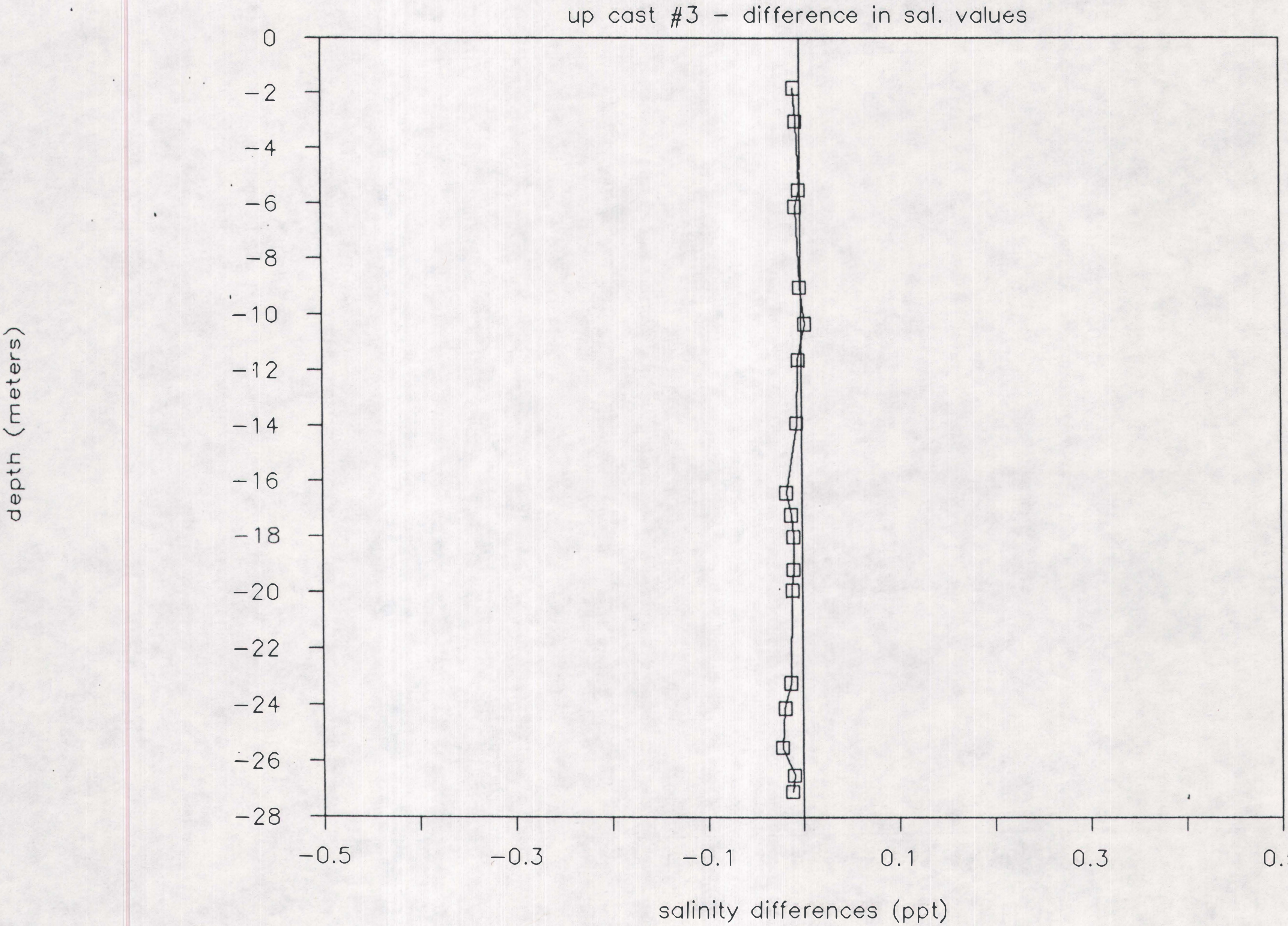


Figure 42C

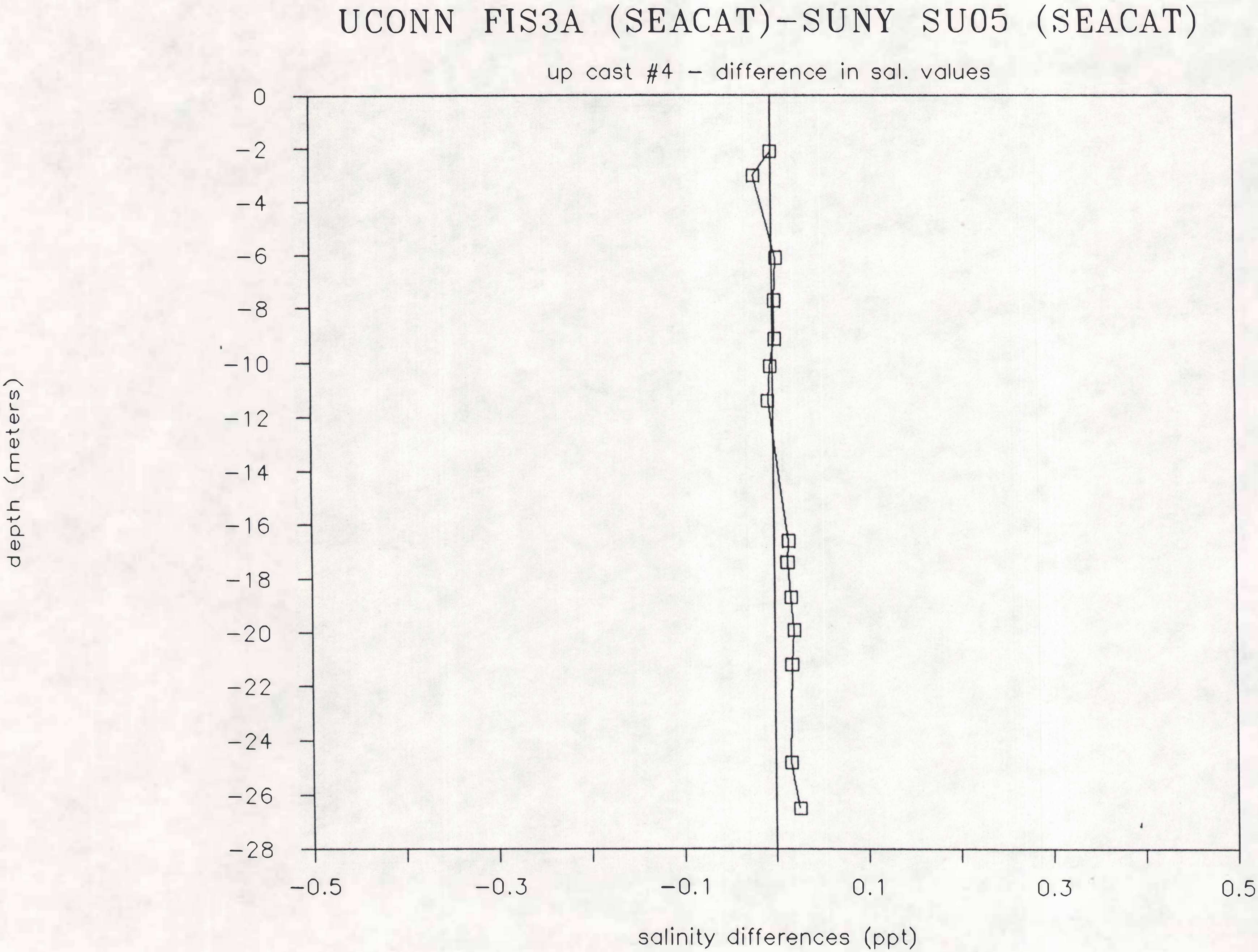

UCONN FIS3A (SEACAT)-SUNY SU05 (SEACAT)
up cast #4 - difference in sal. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
salinity differences (ppt)

Figure 42D

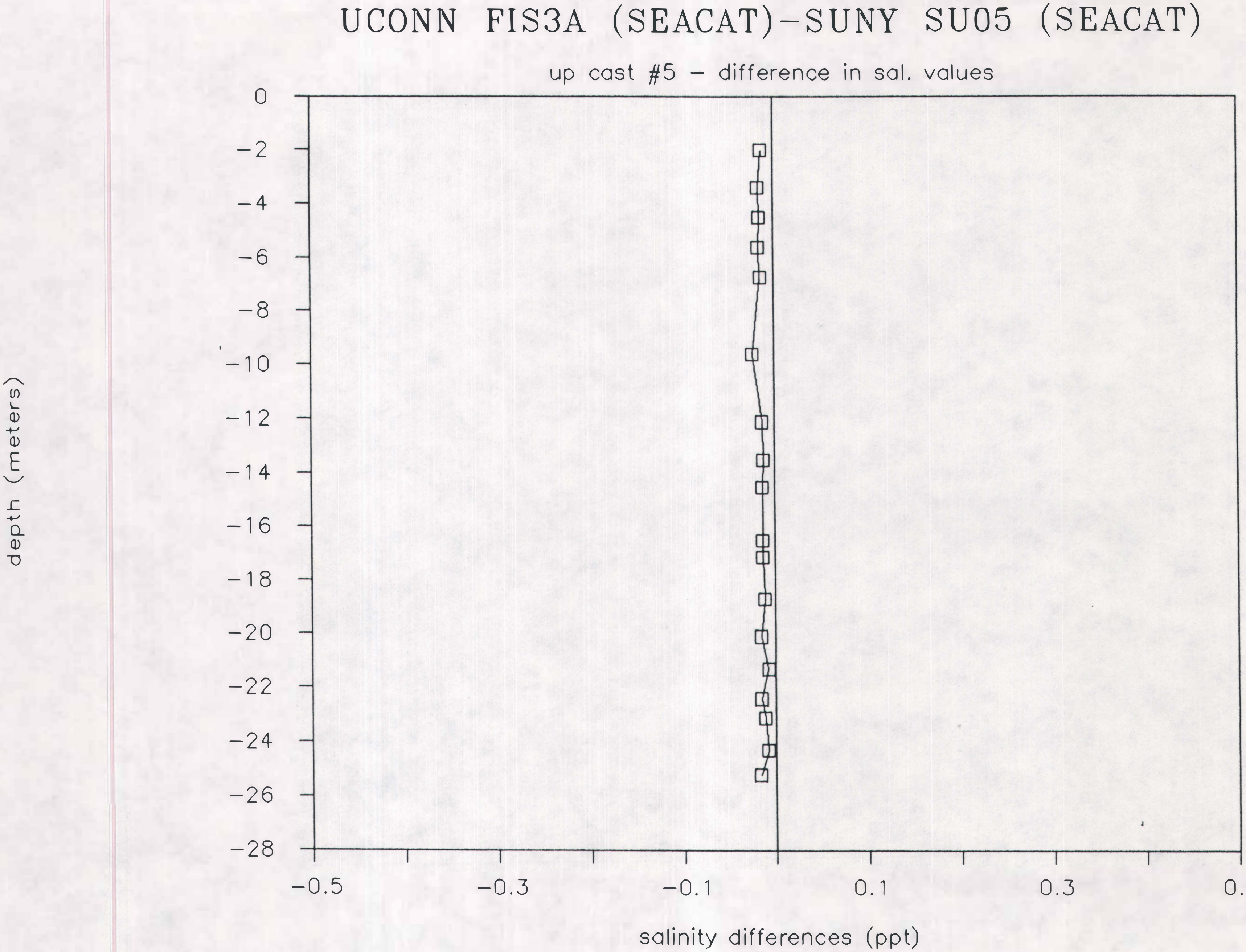

UCONN FIS3A (SEACAT)-SUNY SU05 (SEACAT)
up cast #5 - difference in sal. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
salinity differences (ppt)

Figure 42E

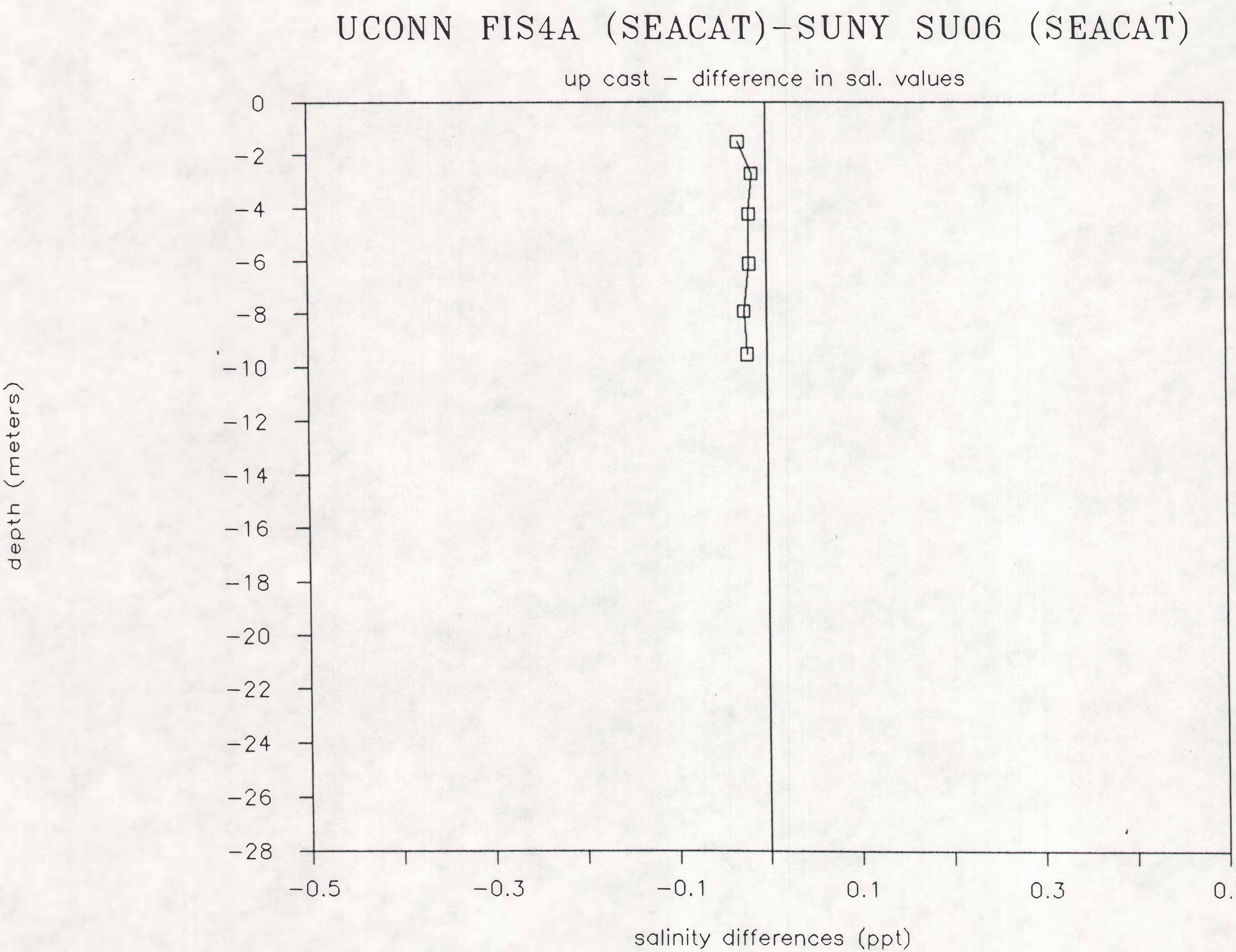
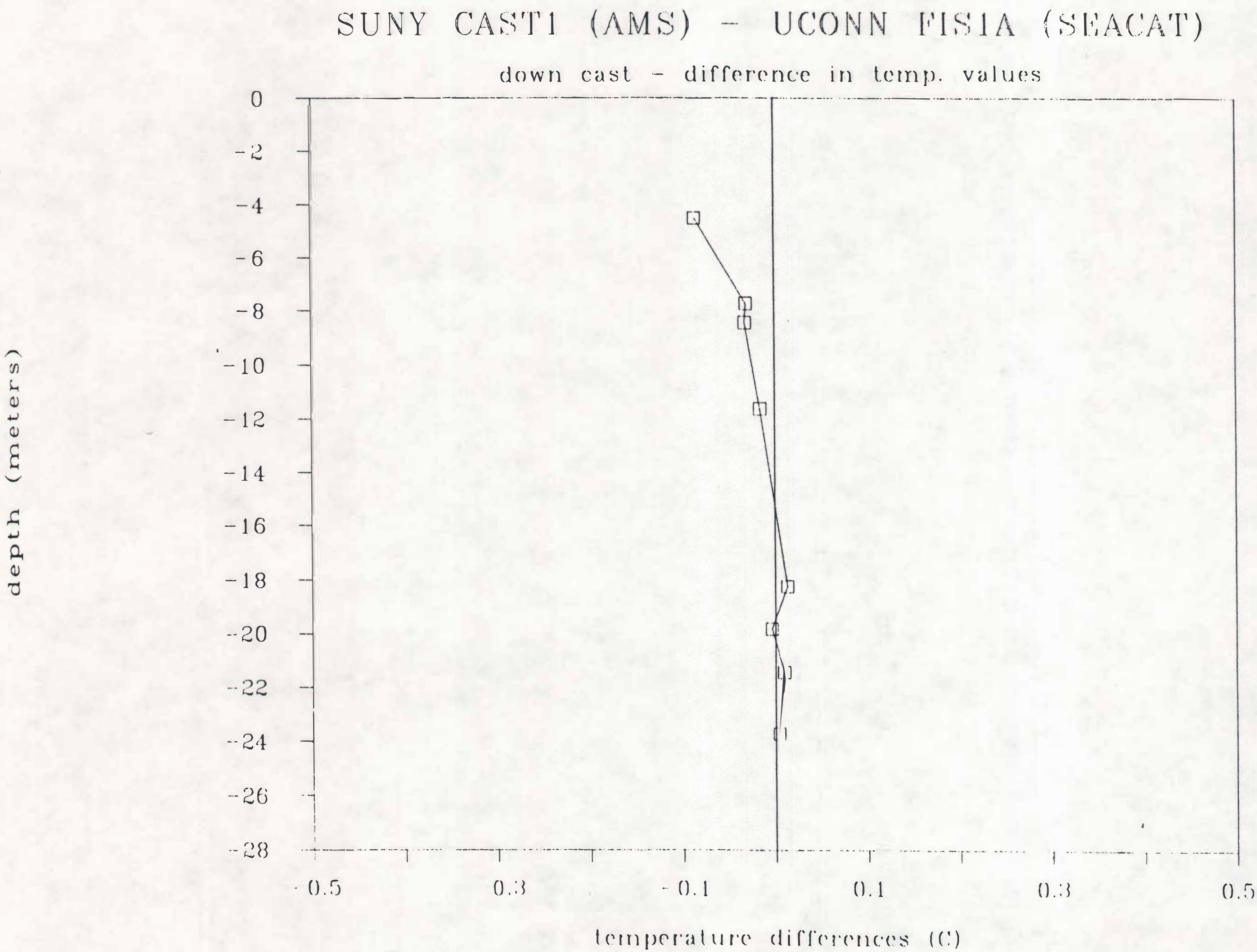

UCONN FIS4A (SEACAT)-SUNY SU06 (SEACAT)
up cast - difference in sal. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
salinity differences (ppt)

Figure 42F



SUNY CAST1 (AMS) - UCONN FIS1A (SEACAT)
down cast - difference in temp. values
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
-0.5
-0.3
-0.1
0.1
0.3
0.5
temperature differences (C)

Figure 43A

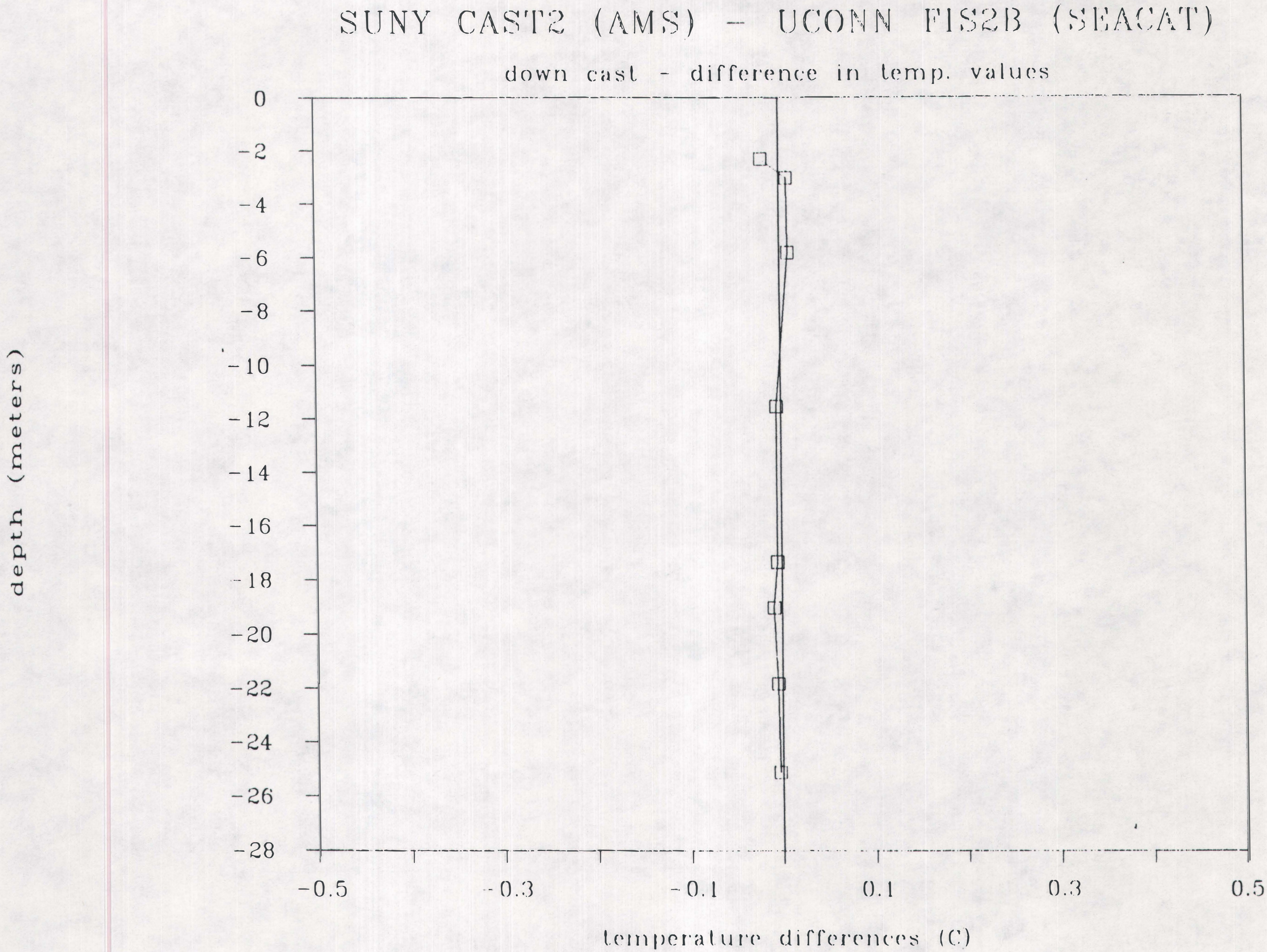

SUNY CAST2 (AMS) - UCONN FIS2B (SEACAT)
down cast - difference in temp. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
temperature differences (C)

Figure 43B

SUNY CAST3 (AMS) – UCONN FIS3A (SEACAT)

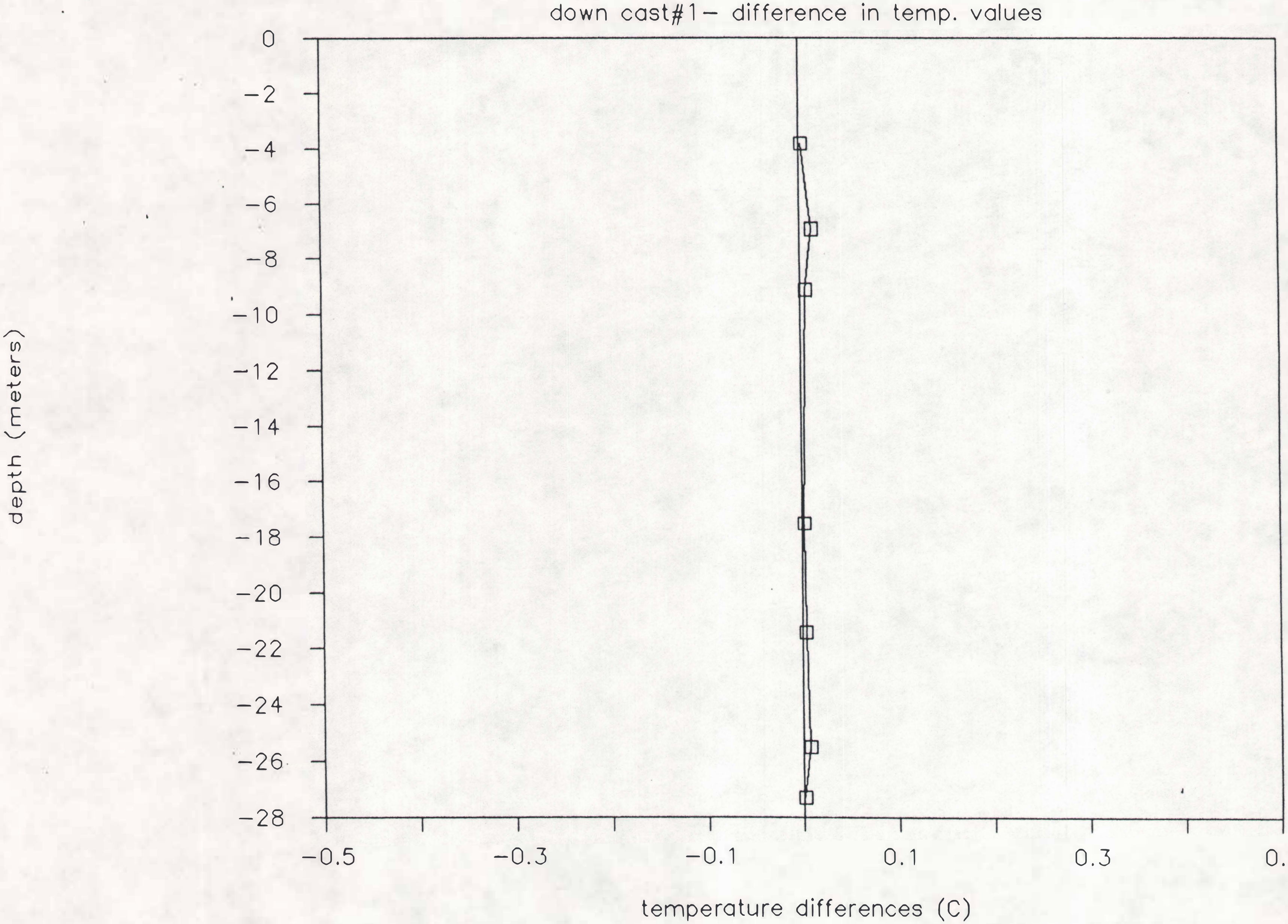


Figure 43C

SUNY CAST4 (AMS) - UCONN FIS4A (SEACAT)

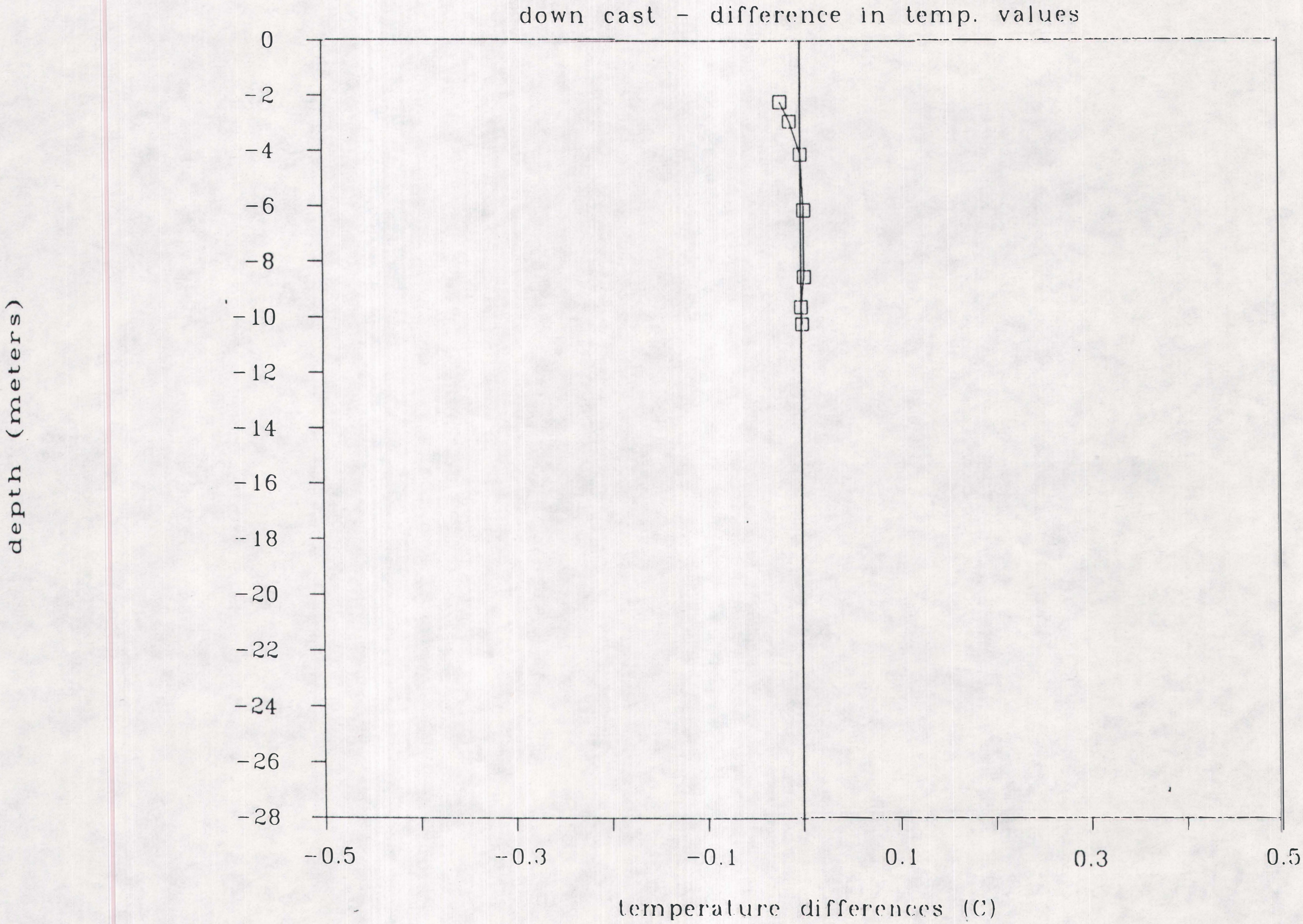
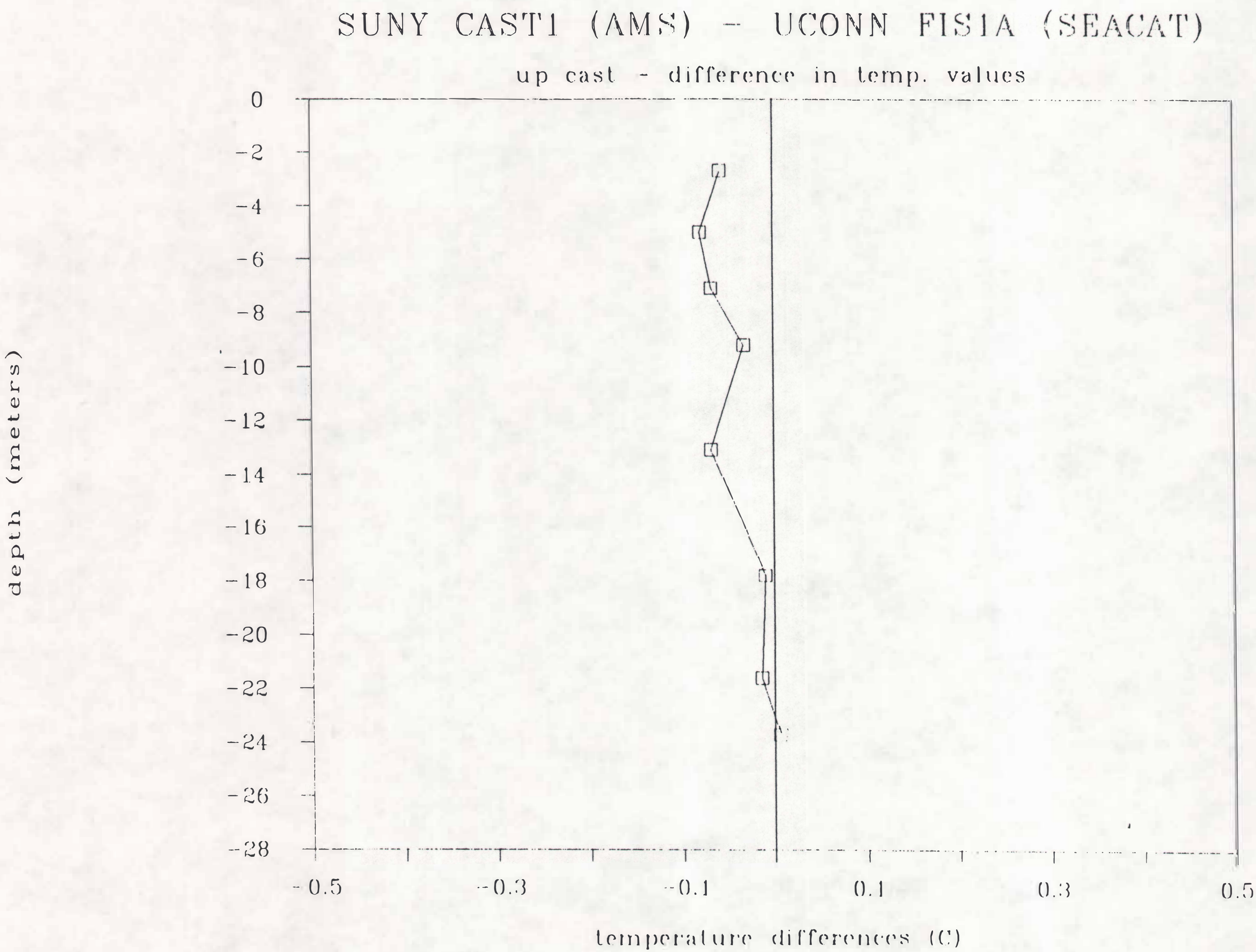


Figure 43D



SUNY CAST1 (AMS) - UCONN FIS1A (SEACAT)
up cast - difference in temp. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
temperature differences (C)

Figure 44A

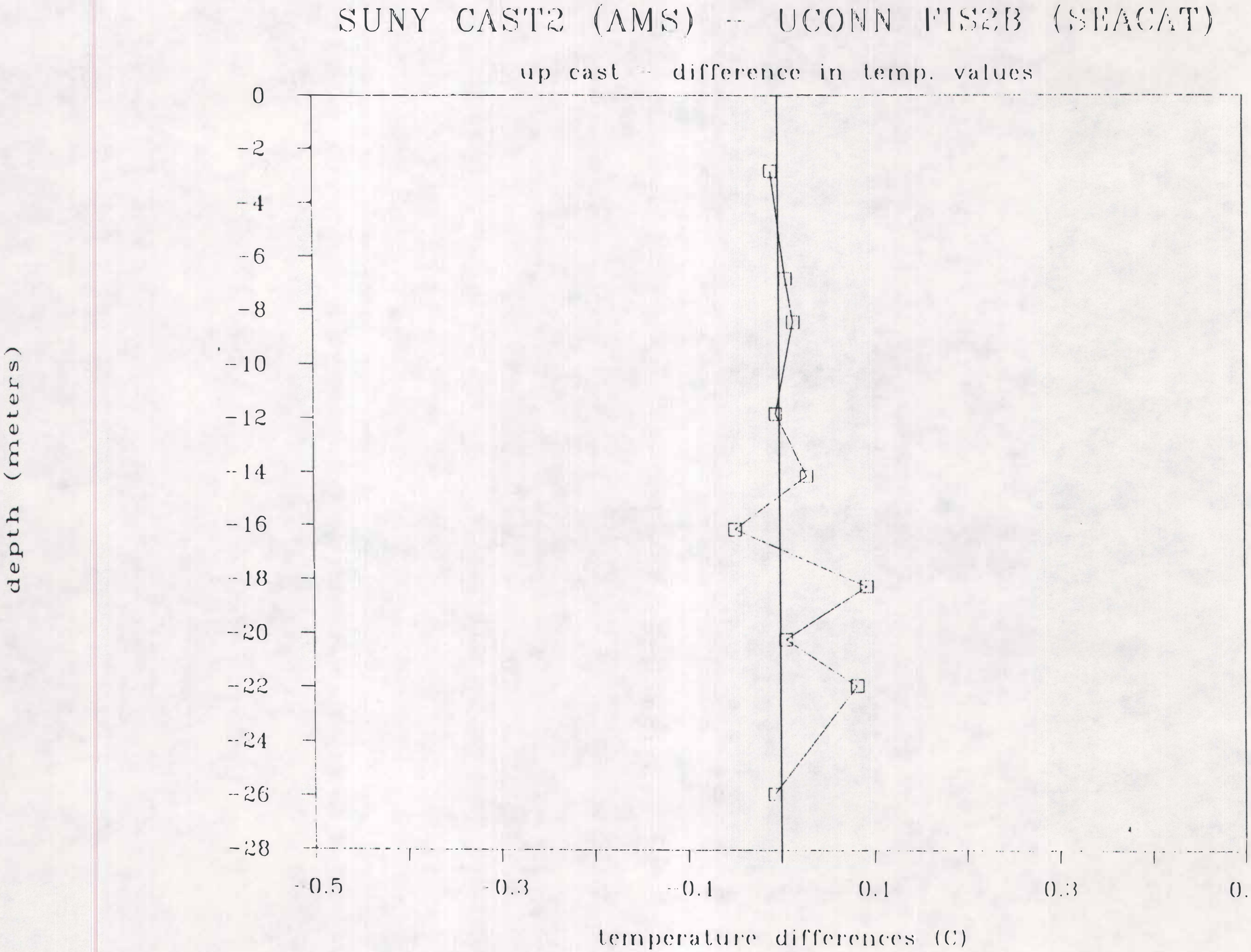

SUNY CAST2 (AMS) - UCONN FIS2B (SEACAT)
up cast - difference in temp. values
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
-0.5
-0.3
-0.1
0.1
0.3
0.5
temperature differences (C)

Figure 44B

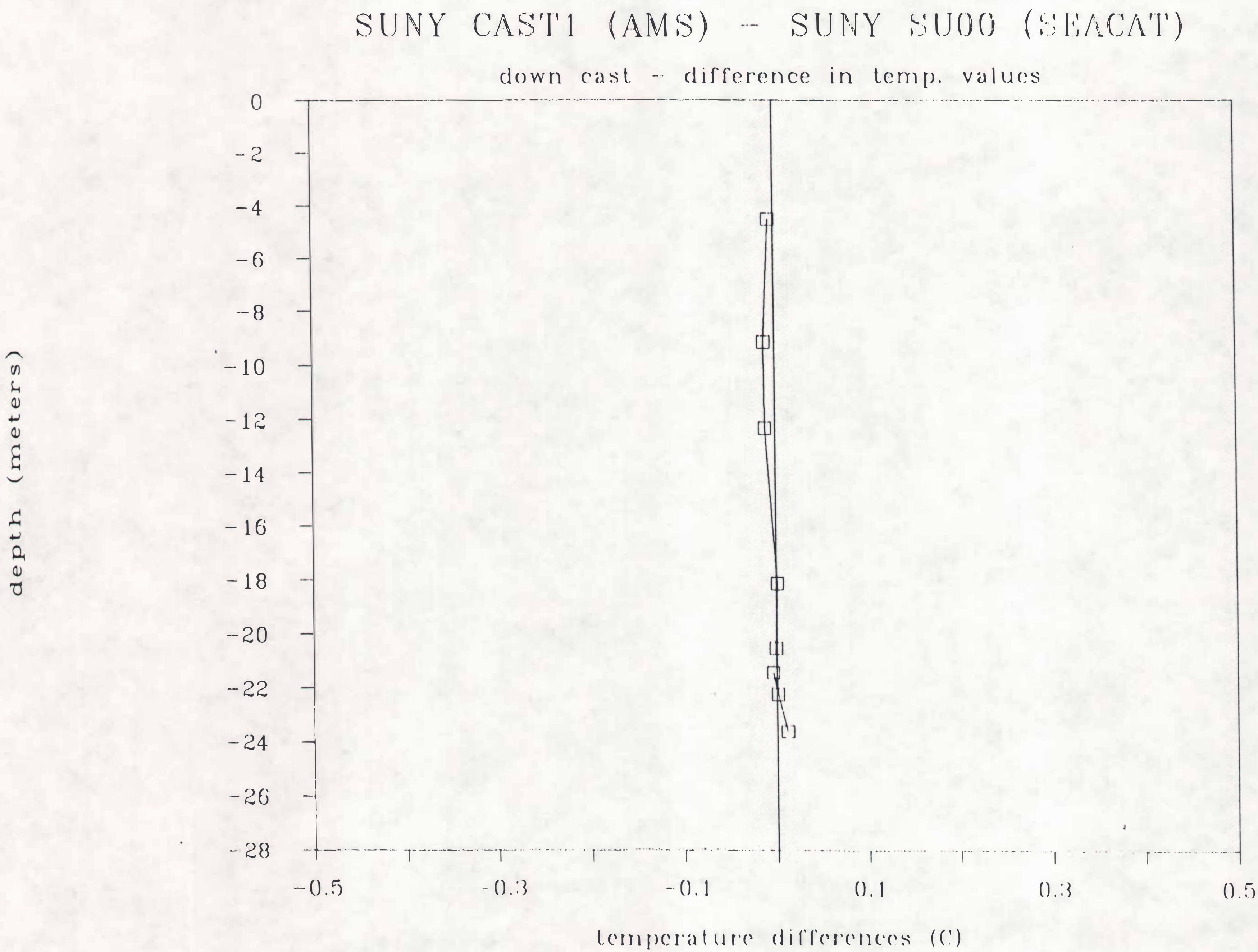

SUNY CAST1 (AMS) - SUNY SU00 (SEACAT)
down cast - difference in temp. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
temperature differences (C)

Figure 45A

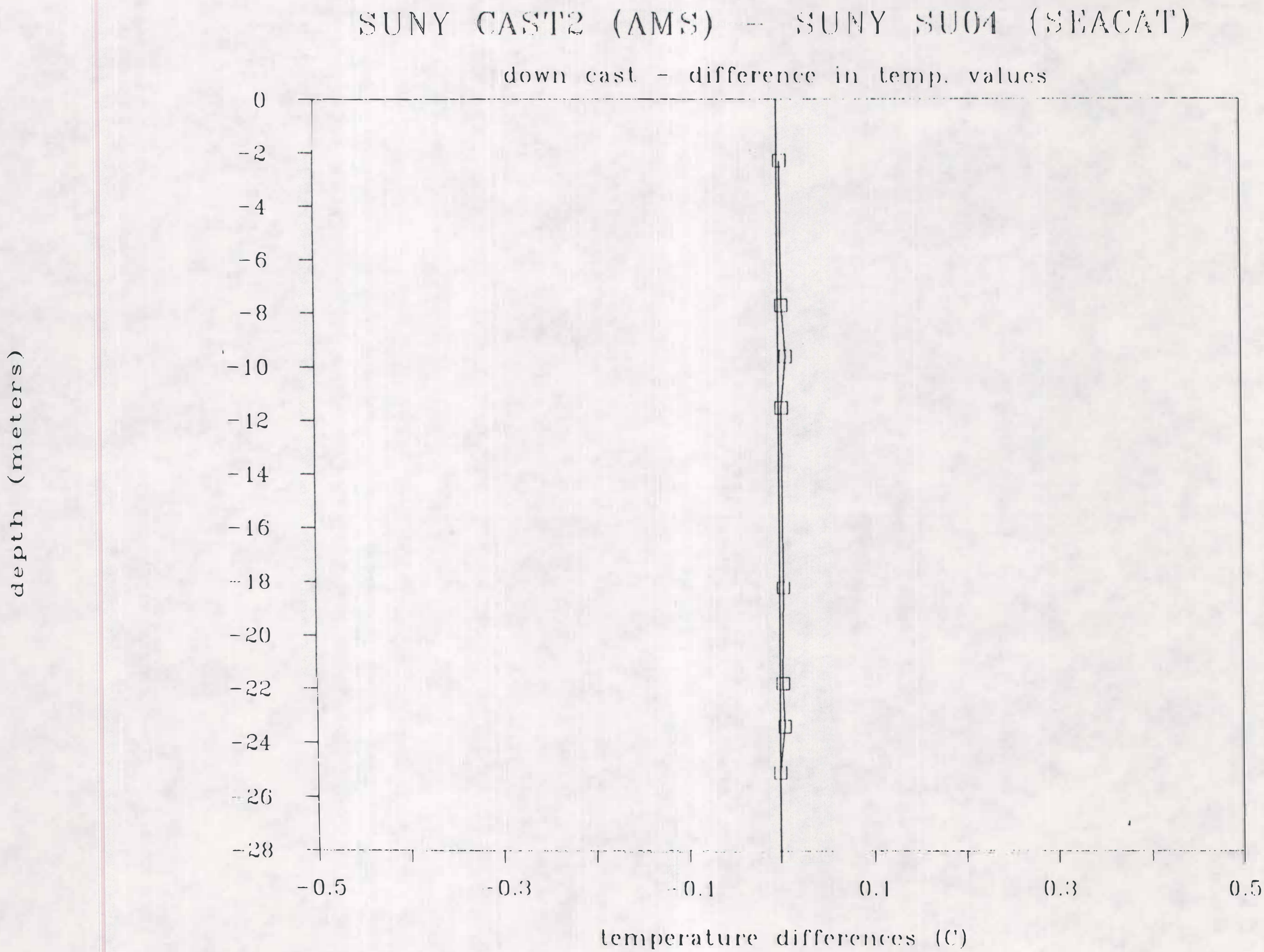

SUNY CAST2 (AMS) - SUNY SU04 (SEACAT)
down cast - difference in temp. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
temperature differences (C)

Figure 45B

SUNY CAST3 (AMS) - SUNY SU05 (SEACAT)

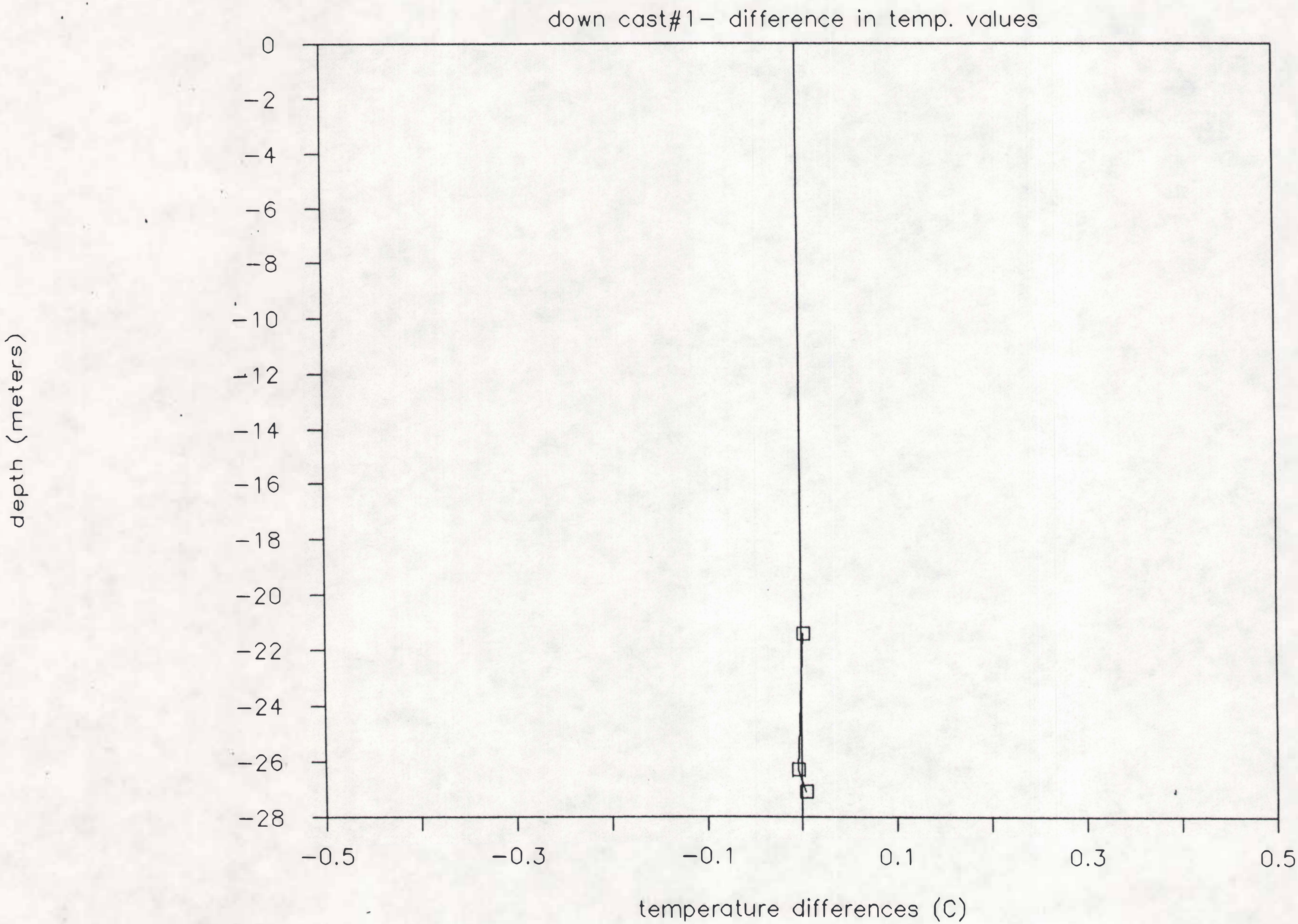


Figure 45C

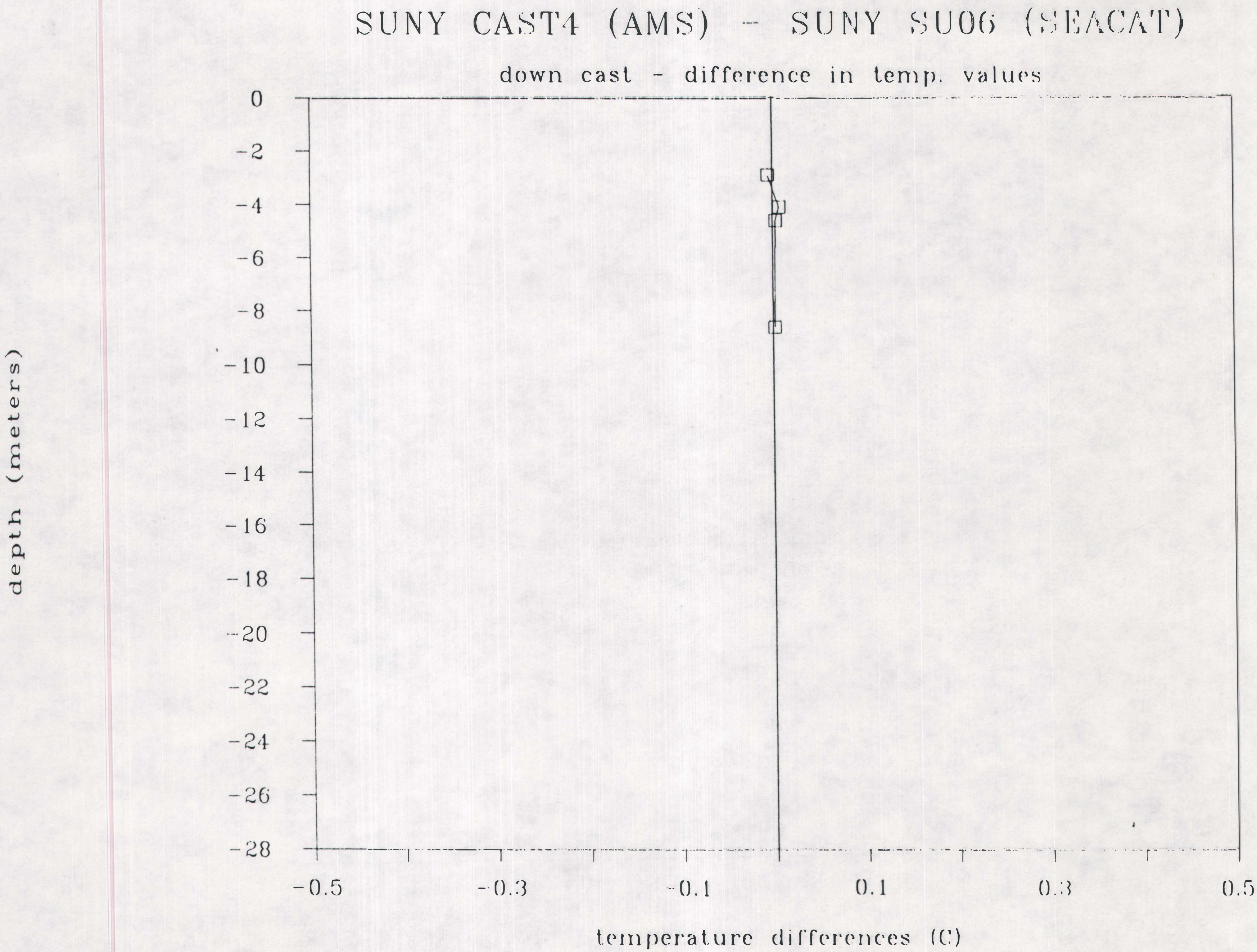

SUNY CAST4 (AMS) - SUNY SU06 (SEACAT)
down cast - difference in temp. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
temperature differences (C)

Figure 45D

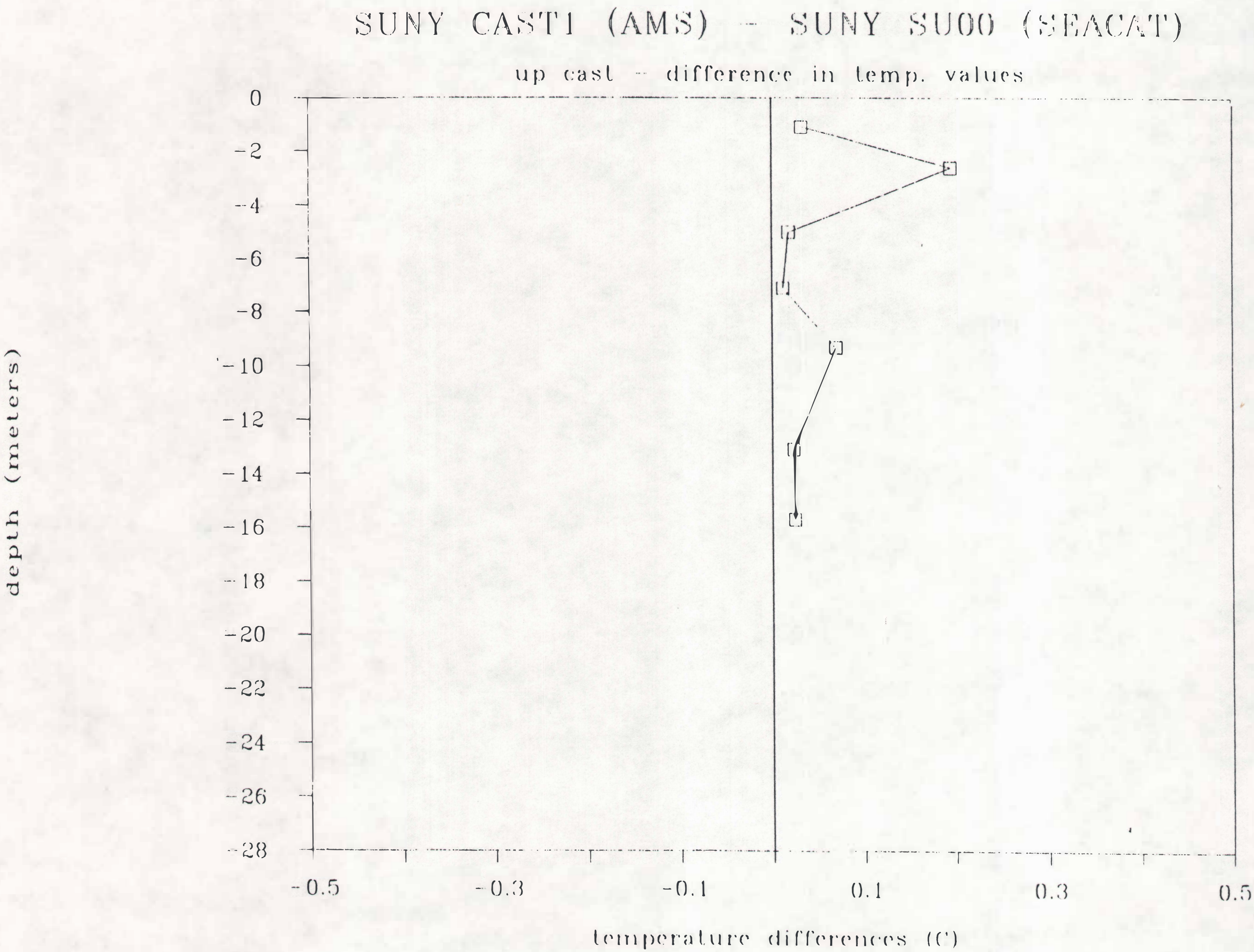

SUNY CAST1 (AMS) - SUNY SU00 (SEACAT)
up cast - difference in temp. values
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
-0.5
-0.3
-0.1
0.1
0.3
0.5
temperature differences (C)

Figure 46A

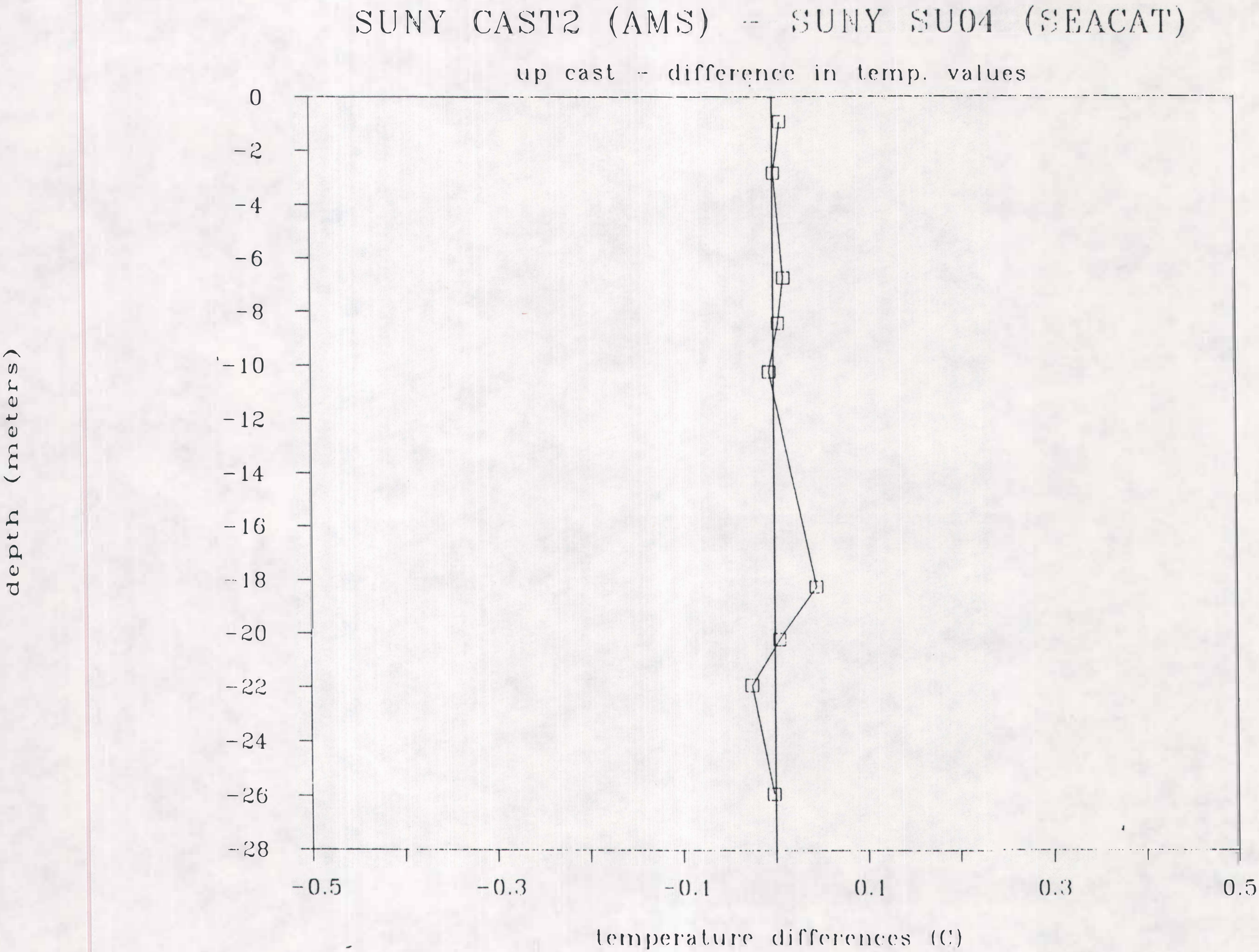
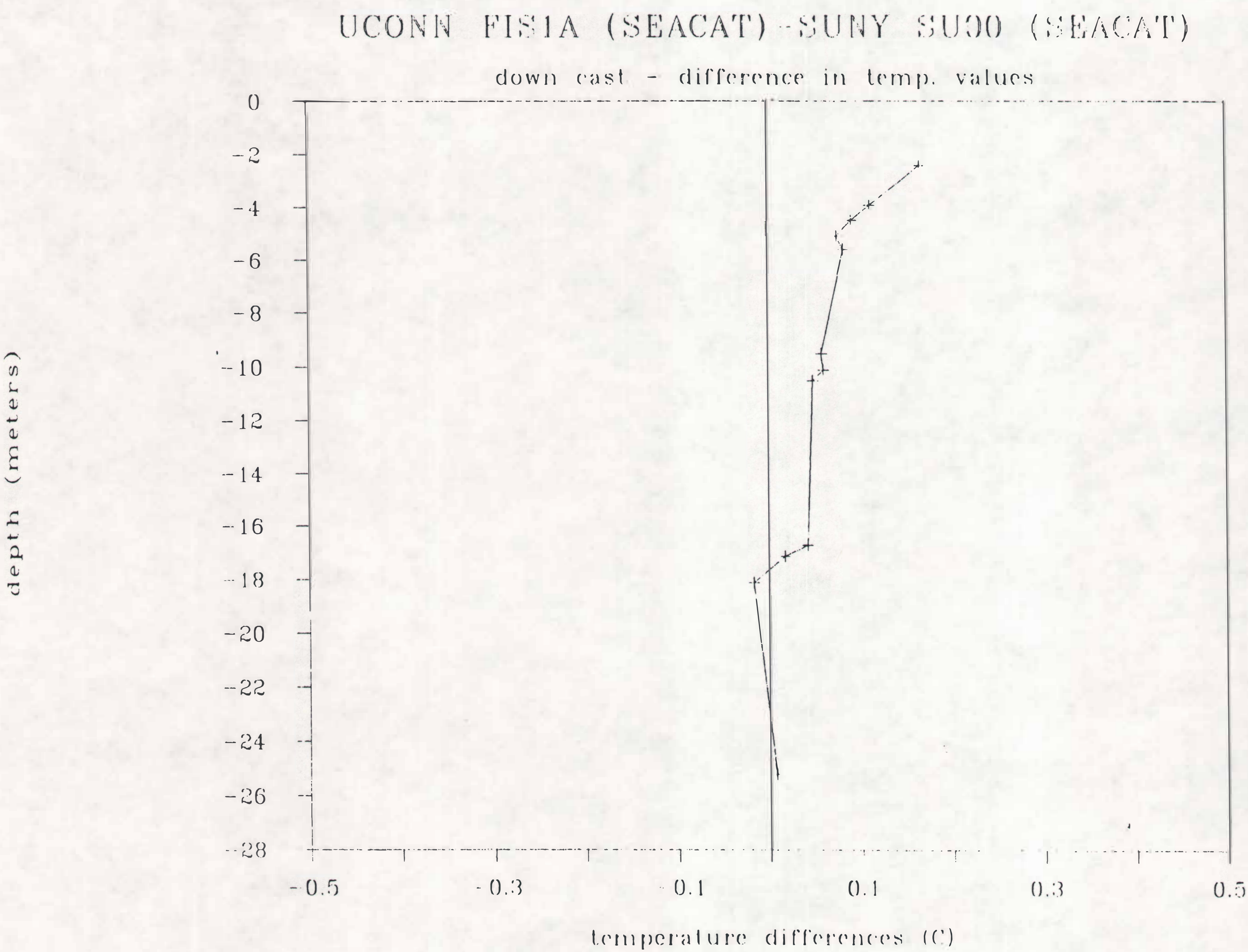

SUNY CAST2 (AMS) - SUNY SU04 (SEACAT)
up cast - difference in temp. values
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
-0.5
-0.3
-0.1
0.1
0.3
0.5
temperature differences (C)

Figure 46B



UCONN FIS1A (SEACAT)-SUNY SU00 (SEACAT)
down cast - difference in temp. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
temperature differences (C)

Figure 47A

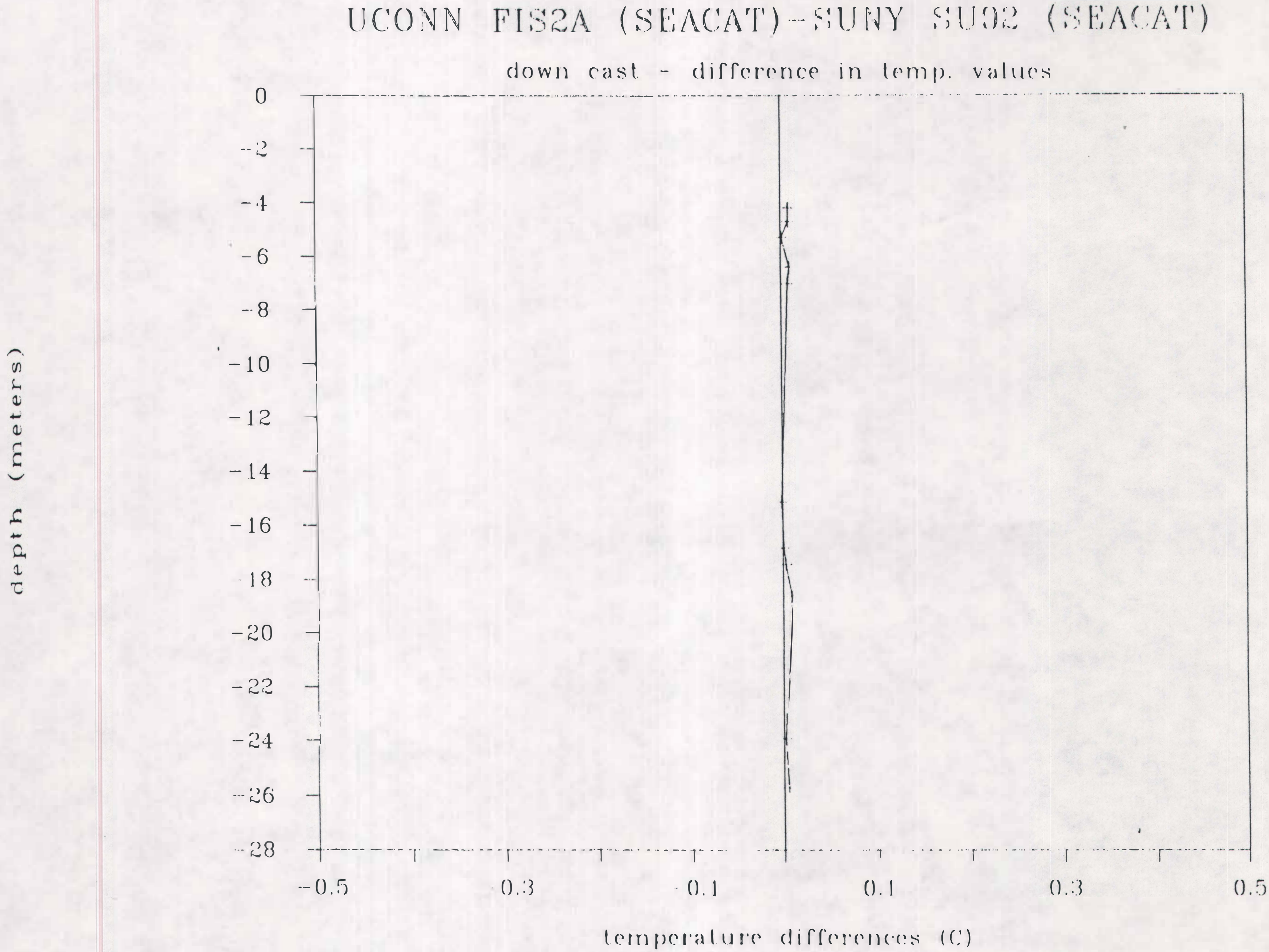
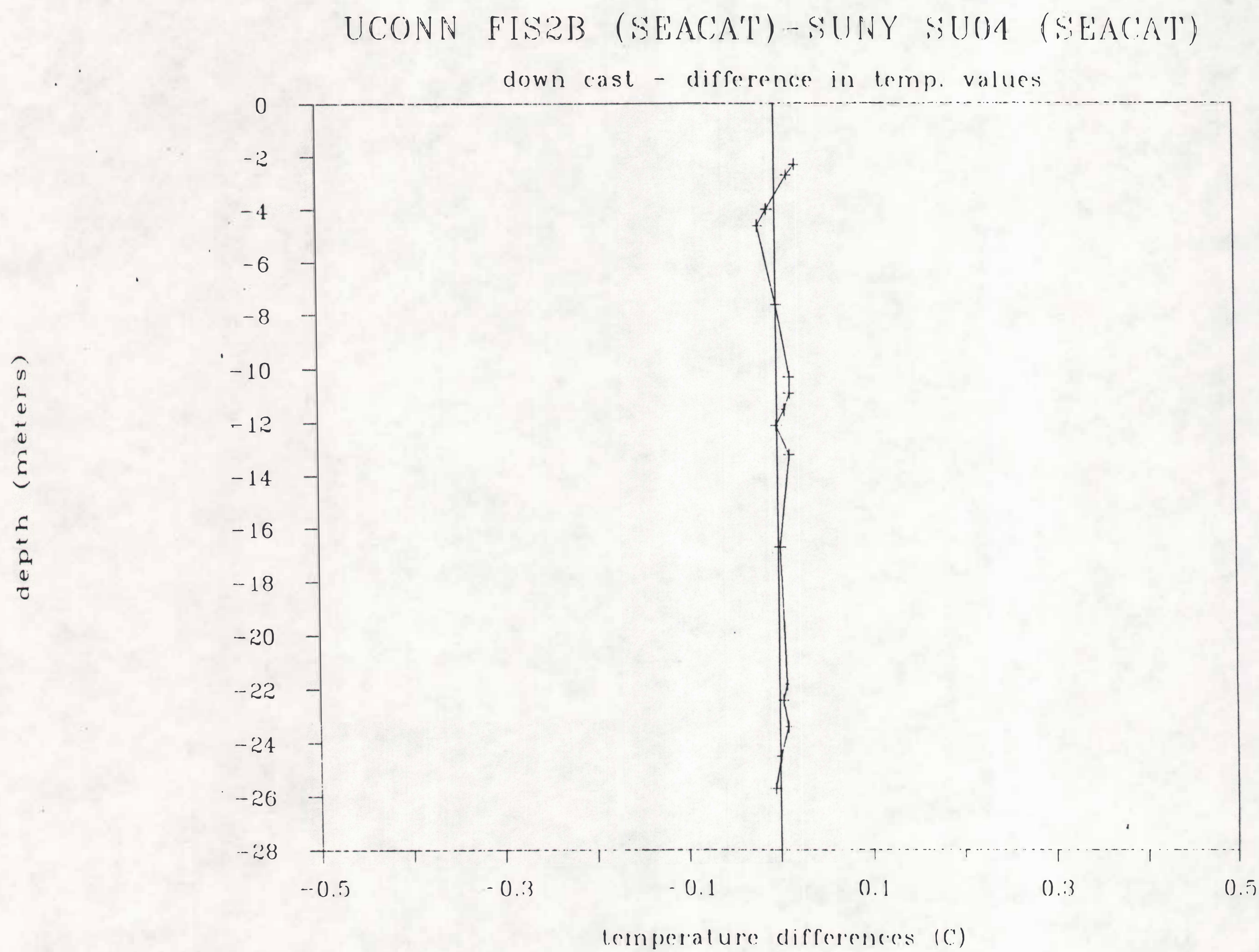

UCONN FIS2A (SEACAT)-SUNY SU02 (SEACAT)
down cast - difference in temp. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
temperature differences (C)

Figure 47B



UCONN FIS2B (SEACAT)-SUNY SU04 (SEACAT)
down cast - difference in temp. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
temperature differences (C)

Figure 47C

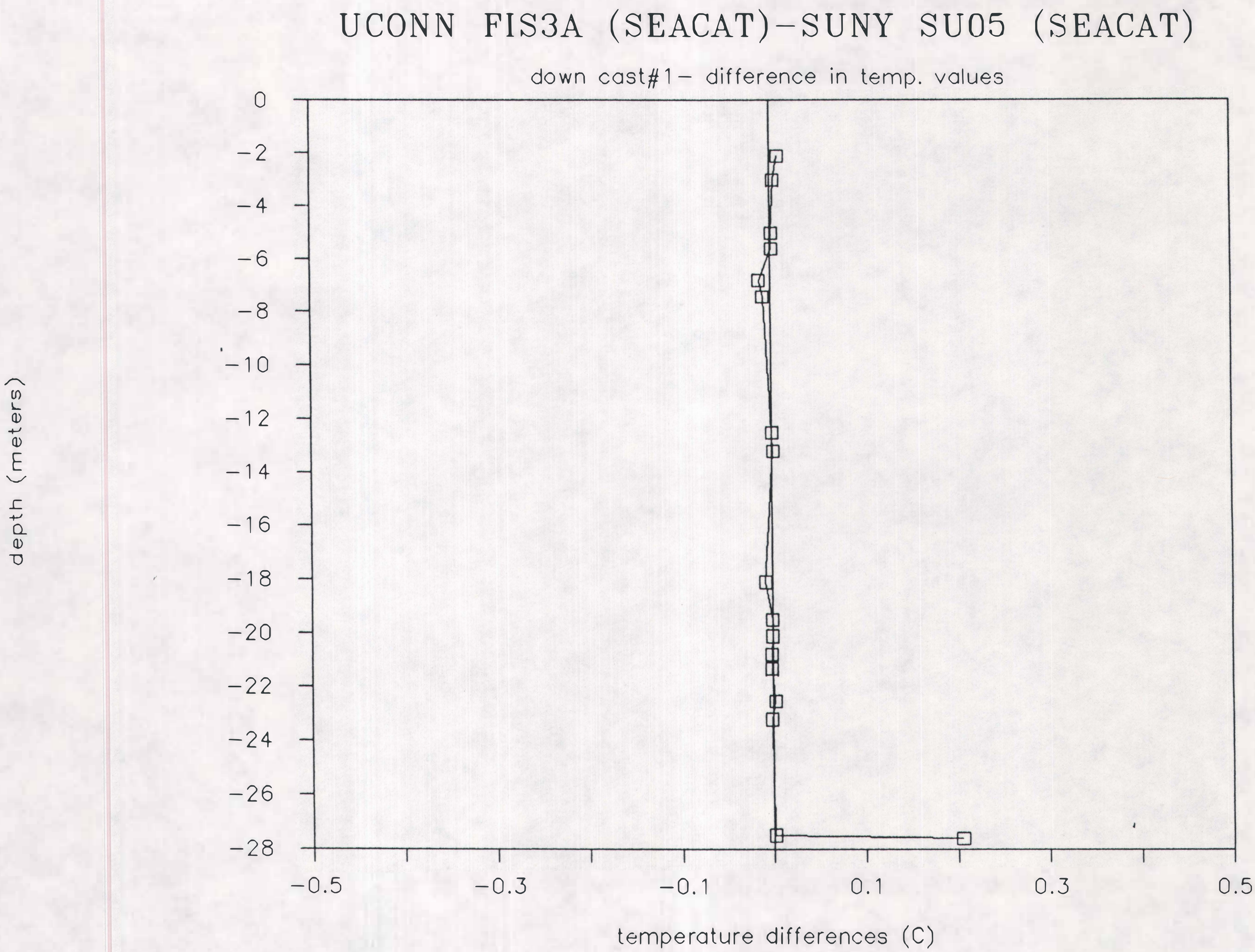
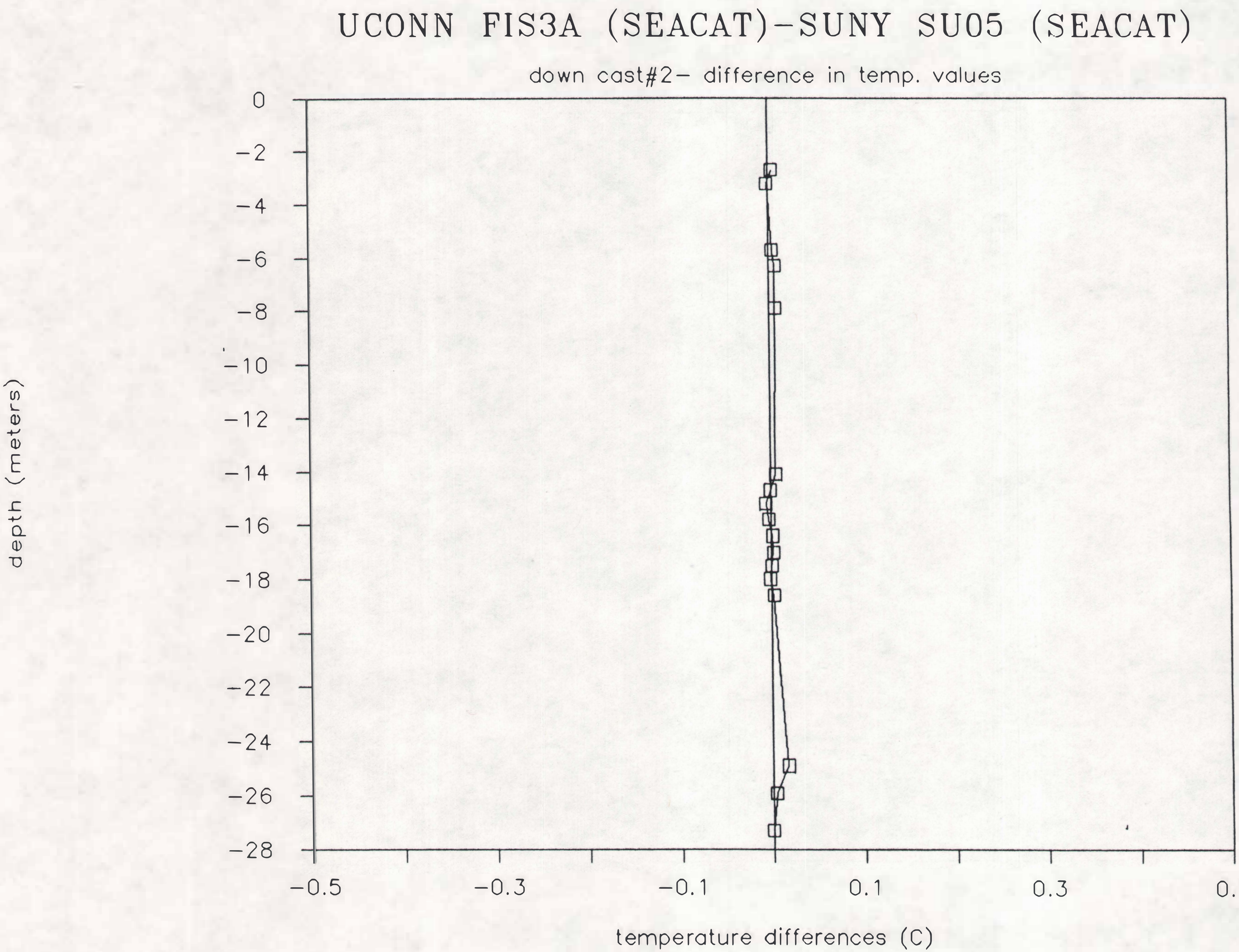

UCONN FIS3A (SEACAT)-SUNY SU05 (SEACAT)
down cast#1- difference in temp. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
temperature differences (C)

Figure 47D



UCONN FIS3A (SEACAT)-SUNY SU05 (SEACAT)
down cast#2- difference in temp. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
temperature differences (C)

Figure 47E

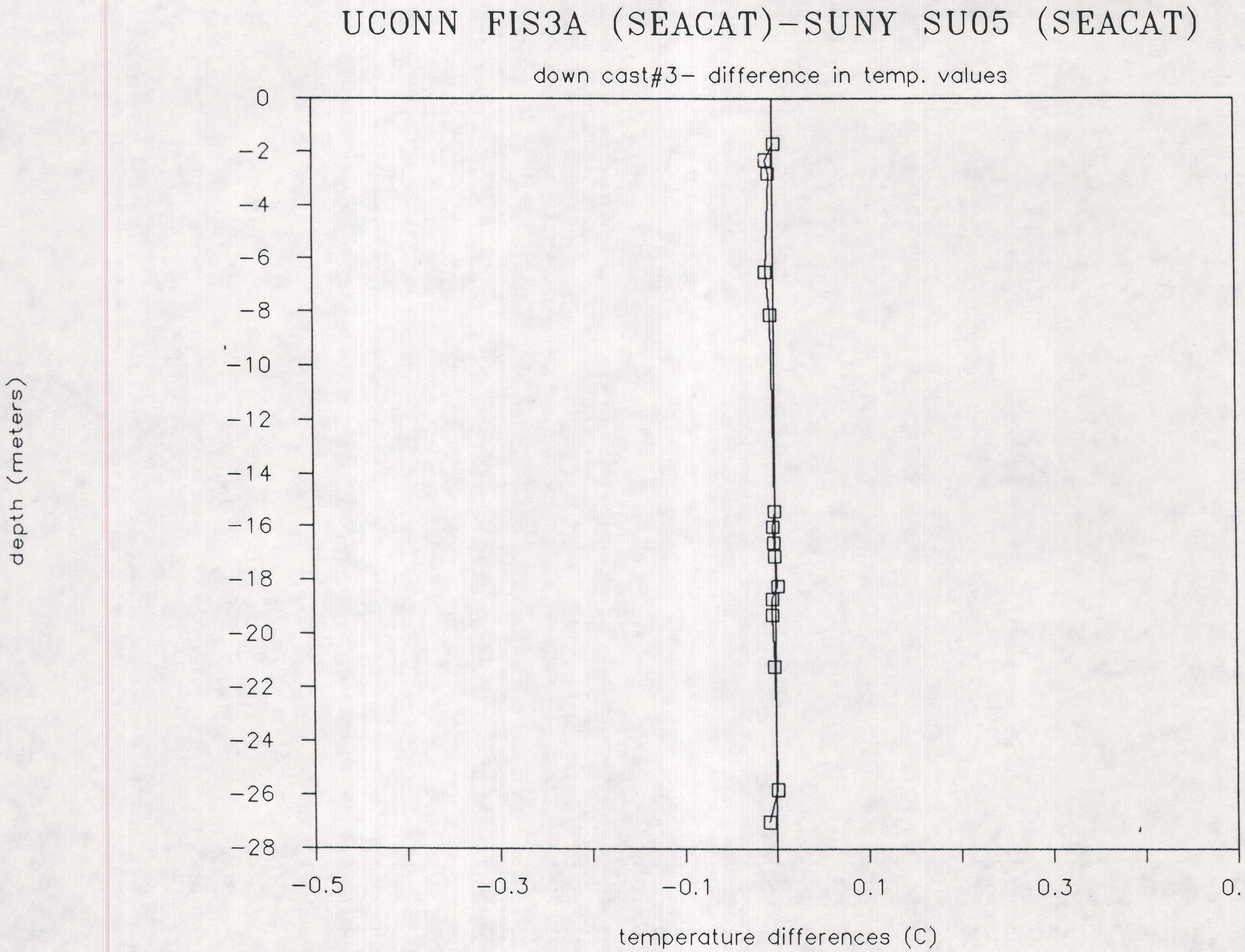

UCONN FIS3A (SEACAT)-SUNY SU05 (SEACAT)
down cast#3- difference in temp. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
temperature differences (C)

Figure 47F

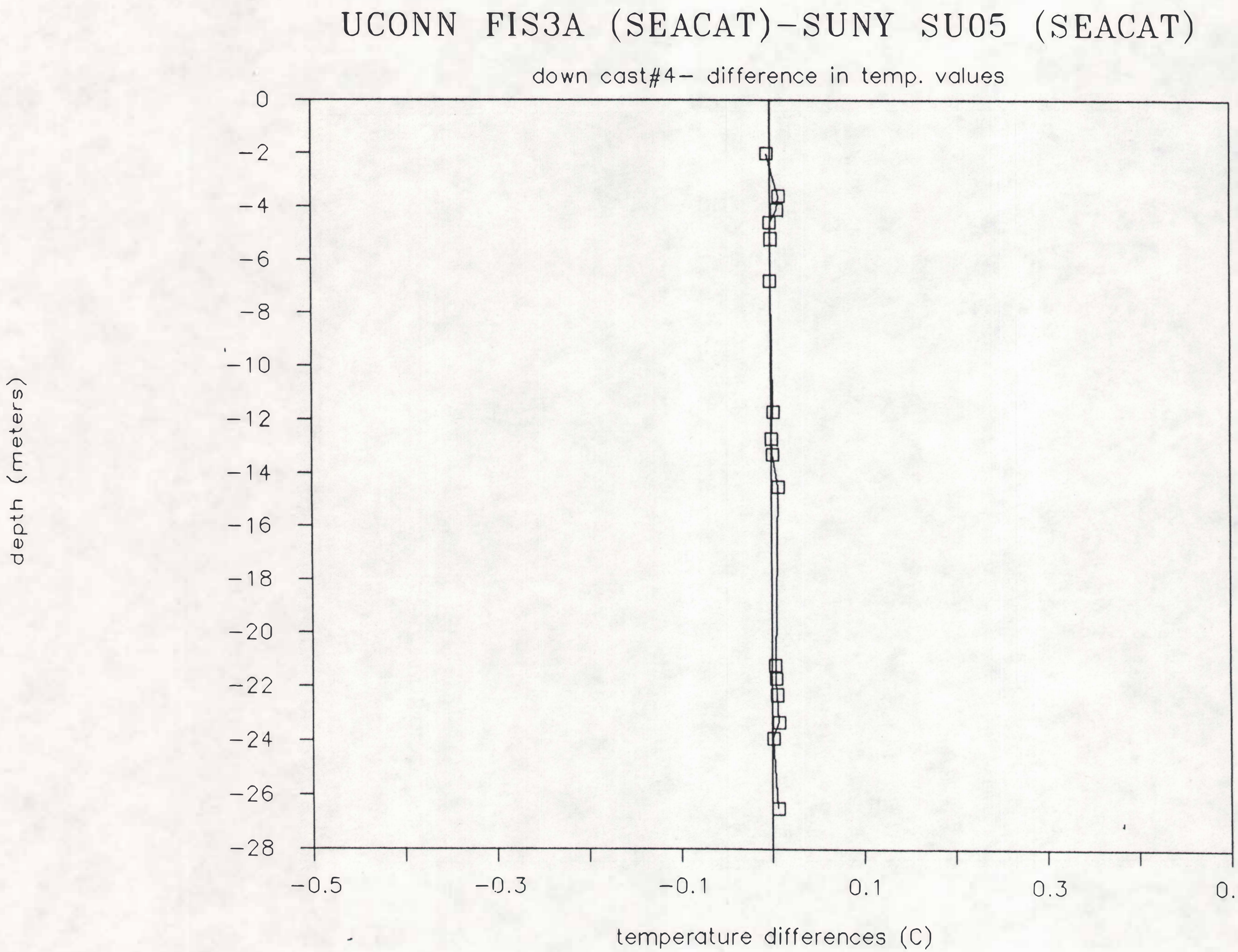
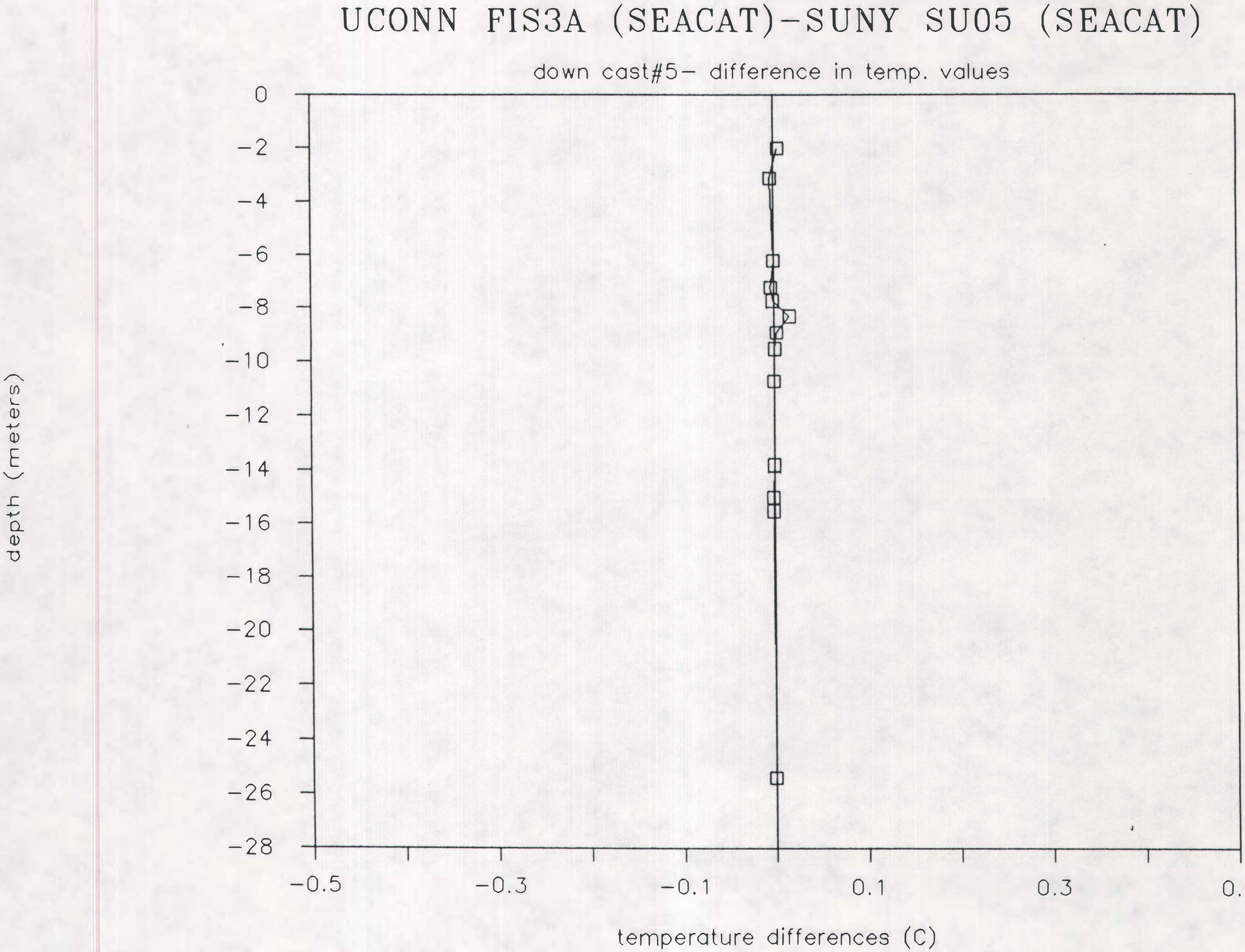

UCONN FIS3A (SEACAT)-SUNY SU05 (SEACAT)
down cast#4- difference in temp. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
temperature differences (C)

Figure 47C



UCONN FIS3A (SEACAT)-SUNY SU05 (SEACAT)
down cast#5- difference in temp. values
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
-0.5
-0.3
-0.1
0.1
0.3
0.5
temperature differences (C)

Figure 47H

UCONN FIS4A (SEACAT)-SUNY SU06 (SEACAT)

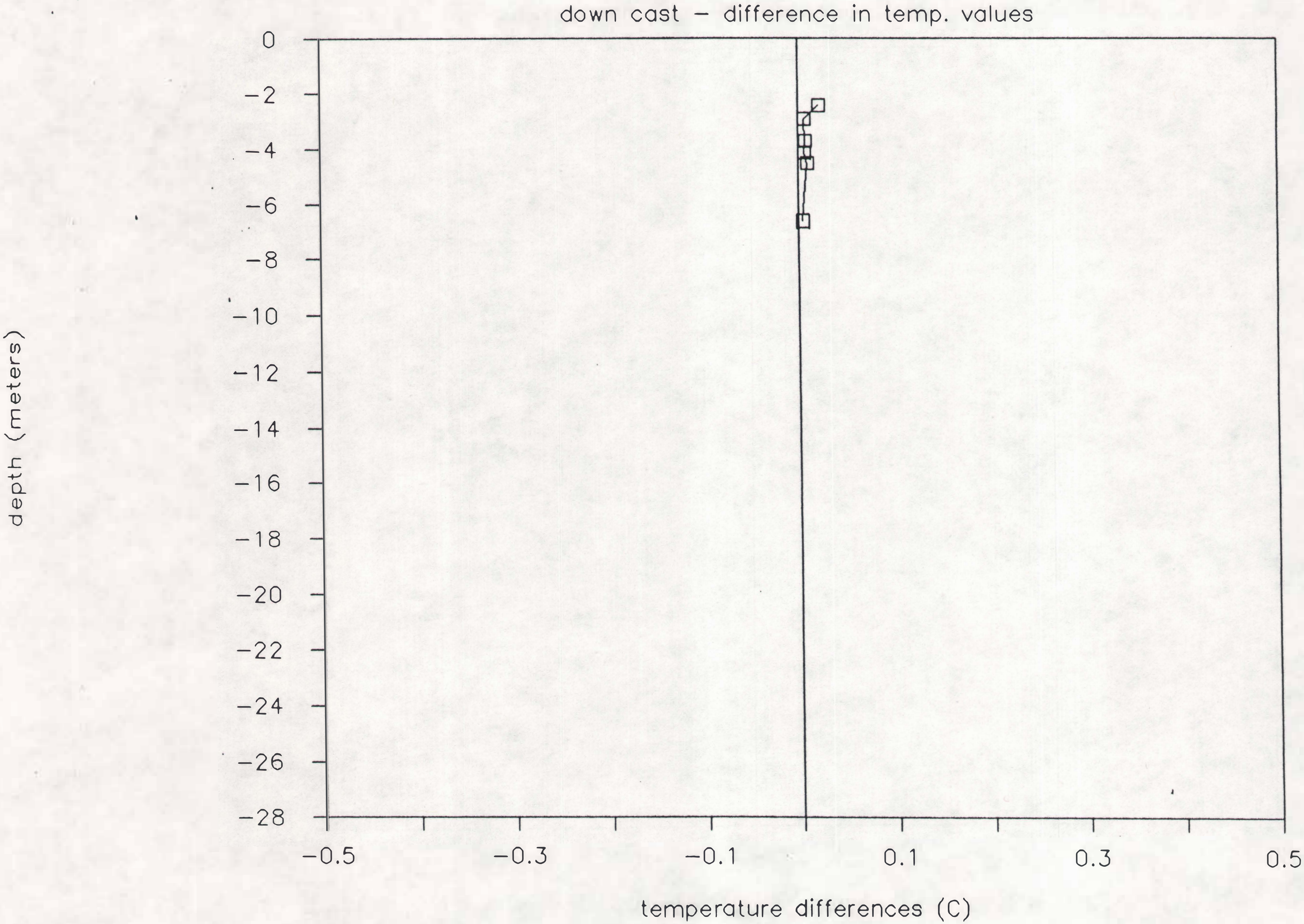


Figure 47I

UCONN FIS3A (SEACAT)-SUNY SU05 (SEACAT)

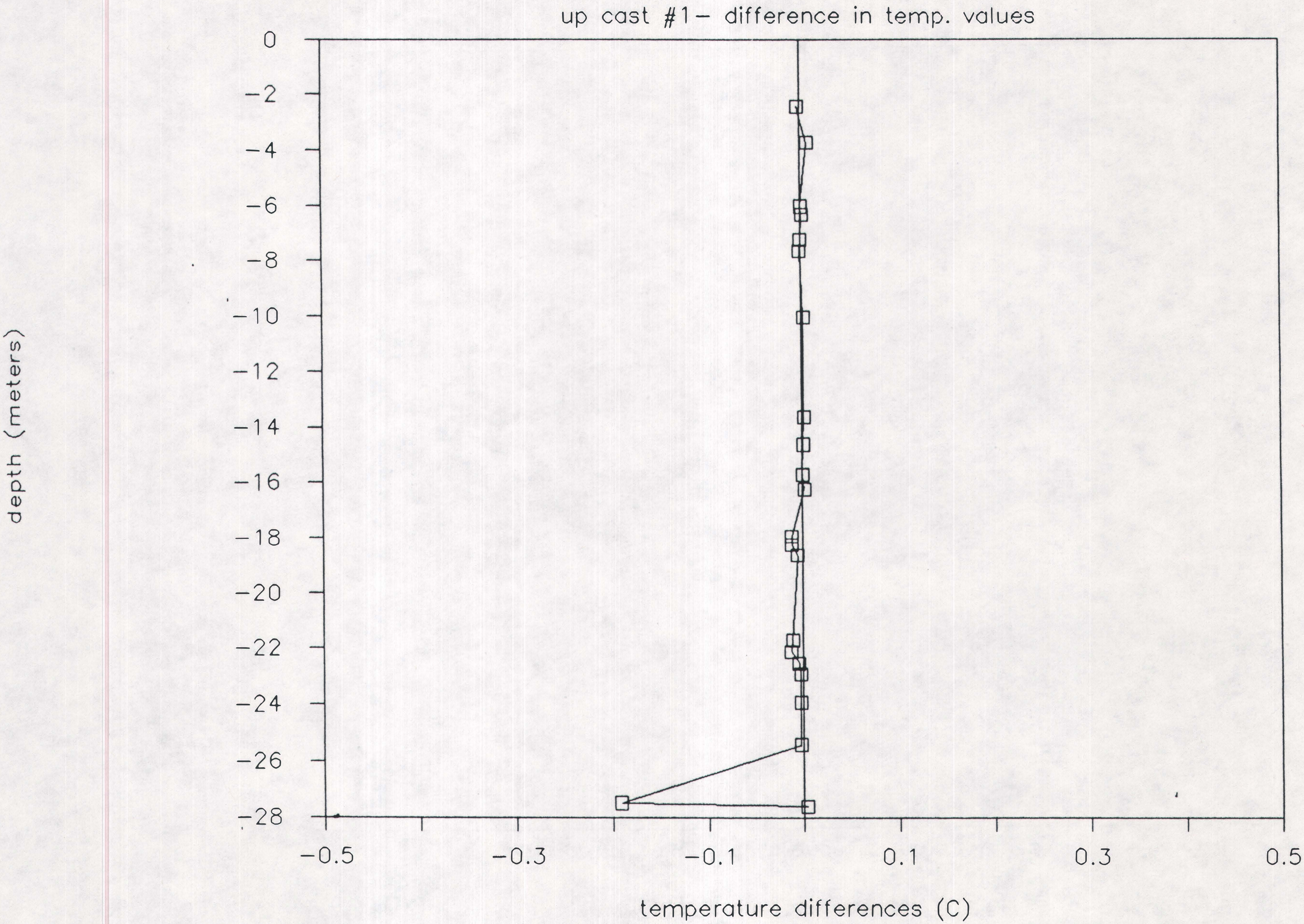


Figure 48A

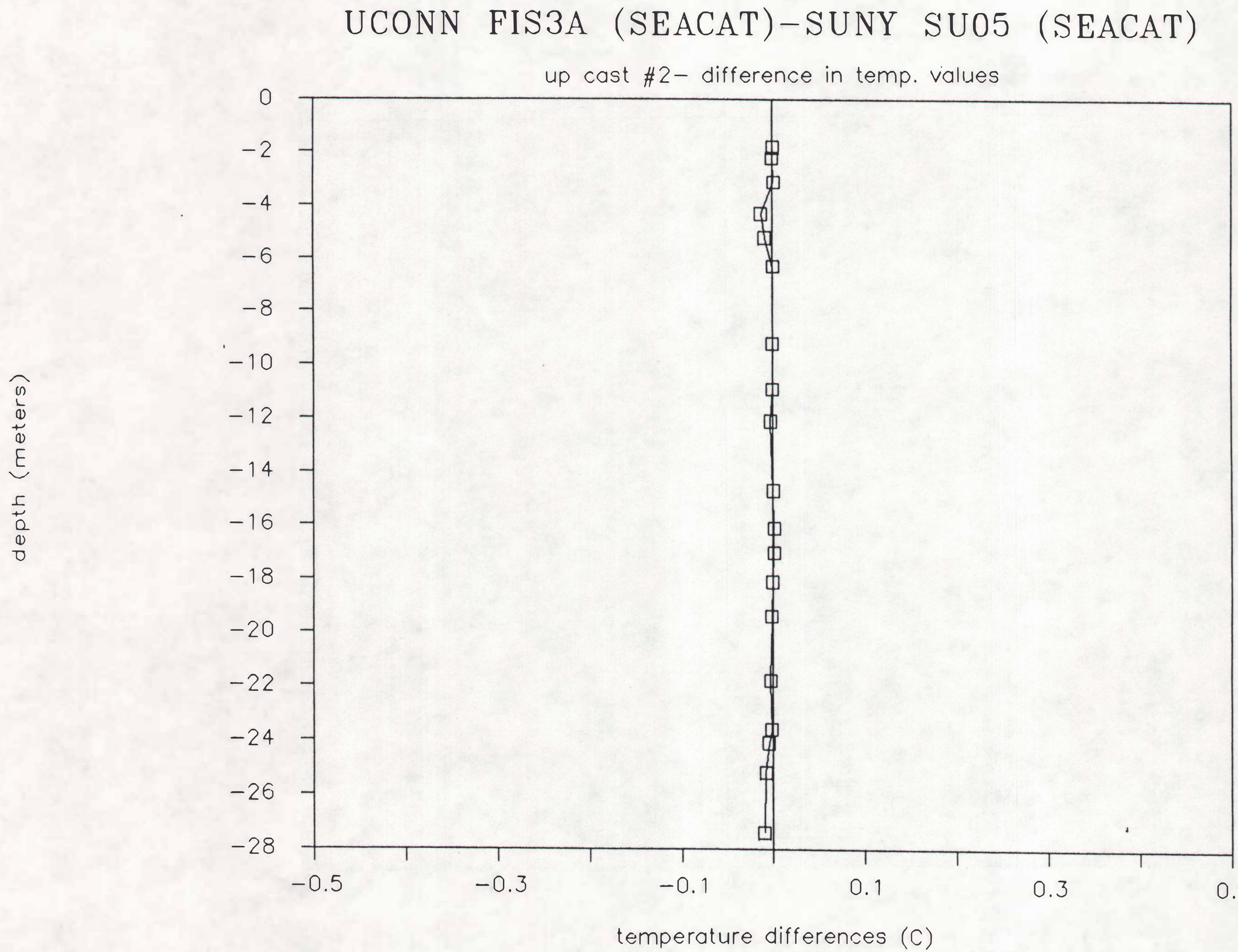

UCONN FIS3A (SEACAT)-SUNY SU05 (SEACAT)
up cast #2- difference in temp. values
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
depth (meters)
-0.5
-0.3
-0.1
0.1
0.3
0.5
temperature differences (C)

Figure 48B

UCONN FIS3A (SEACAT)-SUNY SU05 (SEACAT)

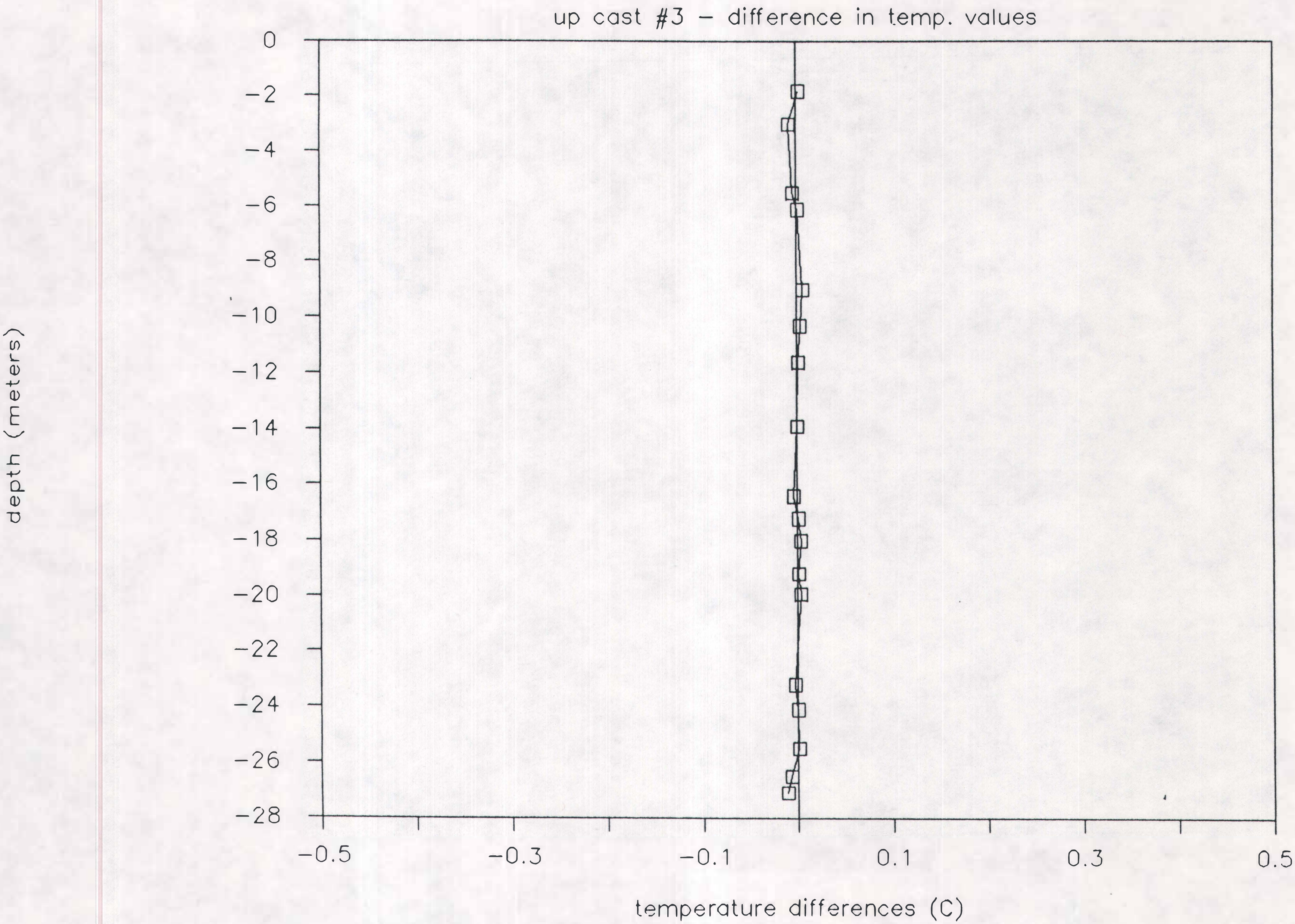
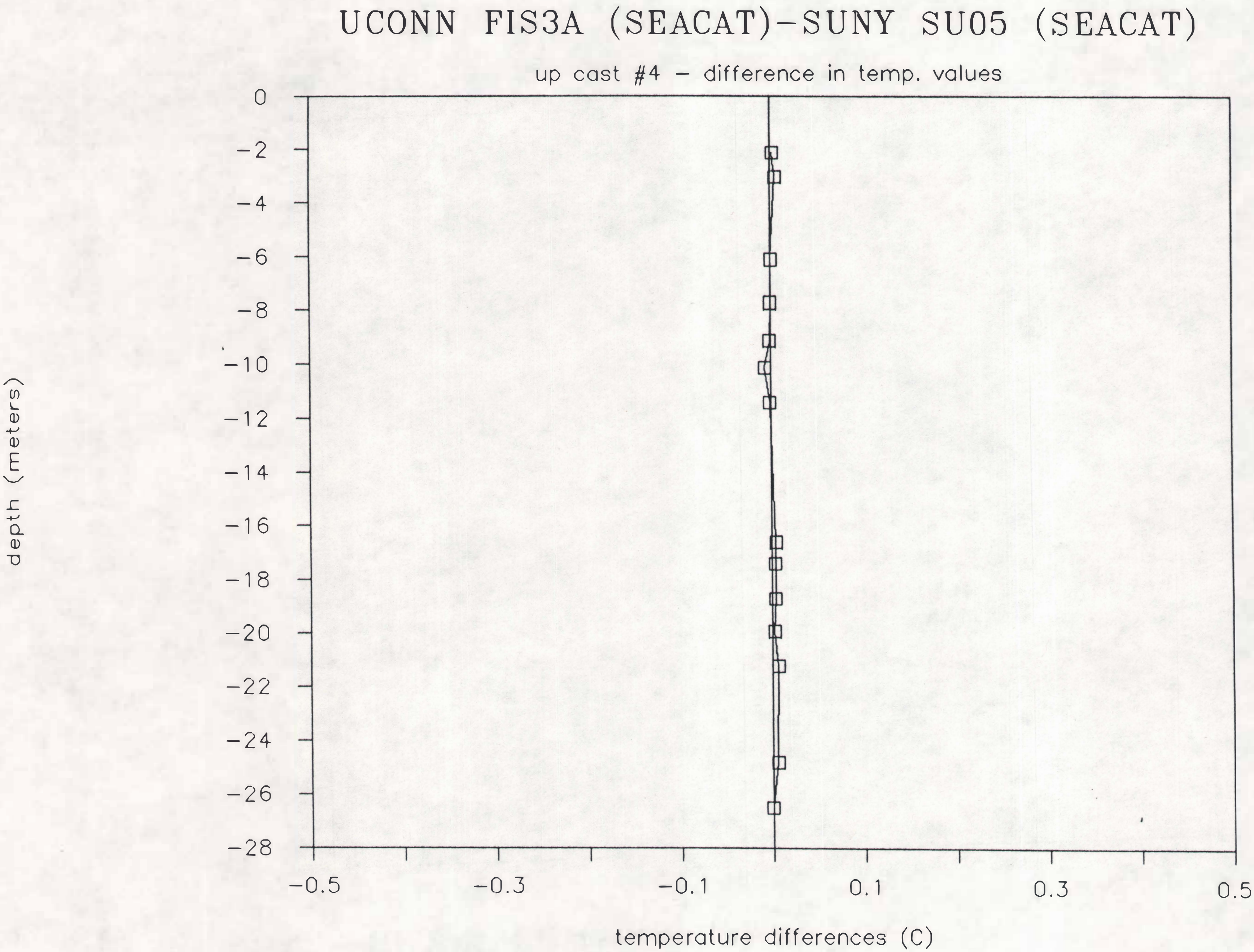


Figure 48C


UCONN FIS3A (SEACAT)-SUNY SU05 (SEACAT)
up cast #4 - difference in temp. values
depth (meters)
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-0.5
-0.3
-0.1
0.1
0.3
0.5
temperature differences (C)

UCONN FIS3A (SEACAT)–SUNY SU05 (SEACAT)

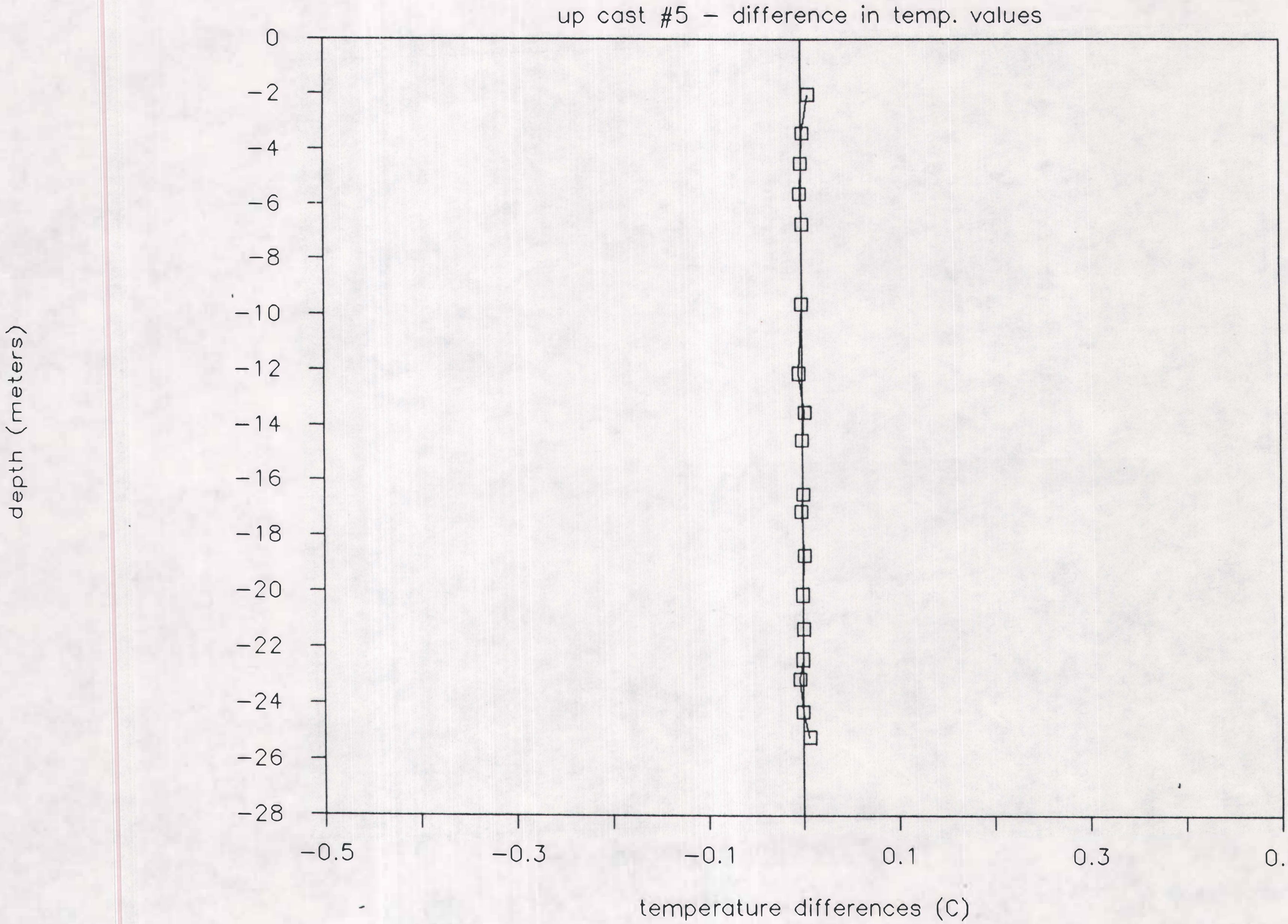


Figure 48E

UCONN FIS4A (SEACAT)-SUNY SU06 (SEACAT)

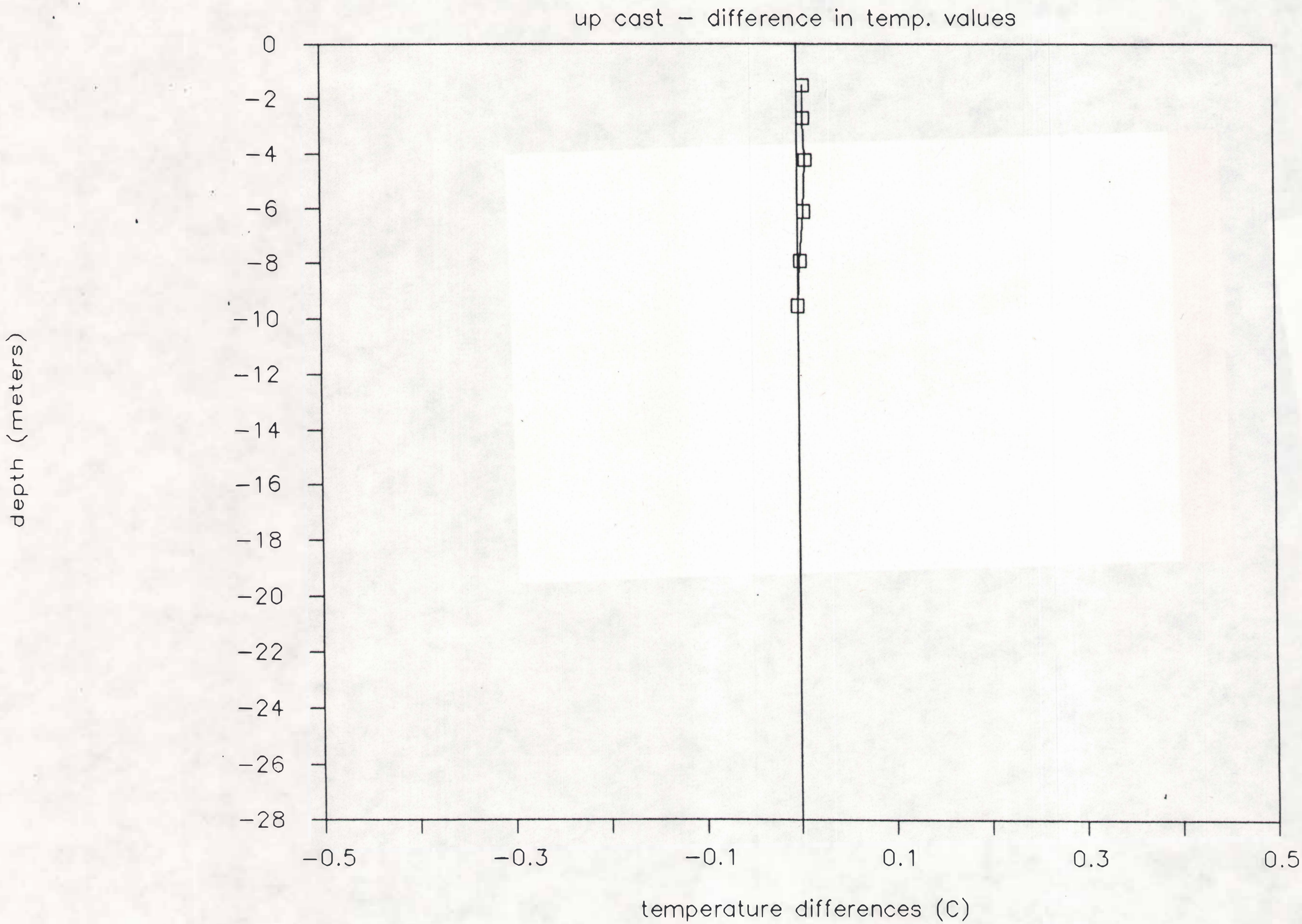


Figure 48F