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**Turbulence and Water Property  
Observations During the Ocean Storms  
Program in the Northeast Pacific,  
October 22 to November 10, 1987**

by

W.R. Crawford and A.E. Gargett  
Institute of Ocean Sciences

Institute of Ocean Sciences  
Department of Fisheries and Oceans  
Sidney, B.C. V8L 4B2

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Canadian Data Report of Hydrography and Ocean Sciences No. 68

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**TURBULENCE AND WATER PROPERTY OBSERVATIONS  
DURING THE OCEAN STORMS PROGRAM IN THE NORTHEAST PACIFIC,  
OCTOBER 22 TO NOVEMBER 10, 1987**

INSTITUTE OF OCEAN SCIENCES  
BOX 6000  
SIDNEY, B.C. CANADA V8L 4B2

W.R. Crawford

A.E. Gargett

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**ABSTRACT**

Crawford, W.R. and A.E. Gargett. 1988. Turbulence and water property observations during the OCEAN STORMS program in the Northeast Pacific, October 22 to November 10, 1987. Can. Data Rep. Hydrogr. Ocean Sci. 68:140 pp.

This report presents the following water properties measured with the FLY turbulence profilers: turbulent dissipation rate, Brunt-Vaisala frequency, temperature and salinity. These are displayed in graphical form. The second part of this report presents the following water properties measured by a Guildline CTD: temperature, salinity, sigma-t, specific volume anomaly, delta-d, potential energy and sound velocity. All are listed at standard pressures. Temperature and salinity profiles are plotted.

**Key words:** OCEAN STORMS, turbulence, Northeast Pacific.

**RESUME**

Crawford, W.R. and A.E. Gargett. 1988. Turbulence and water property observations during the OCEAN STORMS program in the Northeast Pacific, October 22 to November 10, 1987. Can. Data Rep. Hydrogr. Ocean Sci. 68:140 pp.

Ce rapport presente les proprietes de l'eau suivantes, mesurees par les sondes de profil de turbulence "FLY": la dissipation turbulente, la frequence Brunt-Vaisala, la temperature et la salinite. Ces proprietes sont montrees graphiquement.

La partie seconde du rapport presente les proprietes de l'eau suivantes, mesurees par un Guildline CTD: la temperature, la salinite, le sigma-t, l'anomalie de volume specifique, le delta-d, l'energie potentielle et la vitesse du son. Toutes les proprietes sont listees sur pression normale. Des profils de la temperature et de la salinite sont traces.

**Mot-cle:** OCEAN STORMS, turbulence, Pacifique du Nord-Est,

#### ACKNOWLEDGEMENTS

We thank Captain Frost and officers and crew of the CSS PARIZEAU for their cooperation during the field portion of this project. They maintained good cheer despite the foreboding name of this program. The unexpected calm weather may have cheered them as well.

We also acknowledge the scientific and technical staff who participated in this portion of the cruise: Stan Huggett (Chief Scientist), Rolf Lueck, Chris MacKay and Ron Woolley.

Lizette Beauchemin undertook all the analysis and computer graphics of the turbulence data. Joe Linguanti processed the CTD data. George Chase prepared FLY I and provided valuable advice and assistance in preparation for the cruise. Chris MacKay of SyTech Res. Ltd. built FLY II and the special winch and line puller for operating the FLY turbulence profilers in heavy seas.

Funding for this program was provided by the Department of Fisheries and Oceans of the Government of Canada, and by the Office of Naval Research, Department of the Navy of the United States of America (ONR #N0014-87-J-1140).

## 1. INTRODUCTION

These measurements were undertaken from the Canadian Survey Ship *PARIZEAU* during a cruise out of Patricia Bay, B.C., from October 22, 1987 to November 10, 1987, as part of the OCEAN STORMS program. (D'Asaro, 1985). This report presents the water property data from the Guildline CTD profiler, and water property and turbulence data from the Fast Light Yo-yo (FLY) profilers.

The first useable FLY measurements began at  $47^{\circ} 53.52'N$ ,  $139^{\circ} 00'W$  on 1 November 1987 near the center of the array of moored current meters. Subsequent measurements were generally near a drifting, instrumented buoy which moved slowly to the east during the cruise. More precise positions together with weather data are listed in Table 1.

The turbulence measurements provide information on the rate of mixing of heat and salt vertically through the water column. The conductivity and temperature sensors on the FLY profilers provide temperature, salinity and Brunt-Vaisala frequency profiles simultaneously with the rate of dissipation of turbulent energy, which is determined from shear sensors on the instrument.

The CTD also provides temperature, salinity and Brunt-Vaisala frequency profiles and descends deeper than FLY I or II. CTD profiles were taken at the start or end of each series of FLY profiles, and near the drifting buoys and a few current meter moorings for calibrations.

## 2. TURBULENCE MEASUREMENTS

Part A of this report displays data in graphical form from the turbulence profilers FLY I and II. Four water properties are plotted on each pair of pages: turbulent dissipation rate  $\epsilon$ , Brunt-Vaisala frequency  $N$ , temperature and salinity. They are presented as profiles of each property, with data from ten profiles on each page. The series number is listed at the page top, and the profile number at the bottom of each profile. The nature of data processing and analysis for each property are described later in this section.

Two profilers denoted FLY I and FLY II were used on this cruise. FLY II completed most of the observations, with FLY I used for series 14 and 17 only. These profilers carry identical sensors, and differ mainly in their power packs and ballasting. A detailed description of FLY II as used in coastal waters is presented by Dewey et al. (1987). To modify it for the type of weather expected in this program, the probe guard was shortened at the bottom, and extended upward to protect the conductivity sensor. The slow temperature probe was removed, and the fast temperature probe was used in its place.

A new hydraulic winch and line puller were built for this project by SyTech Ltd. of Sidney, B.C. These eliminated the need for a person to manually pull the line off the winch and throw it into the water, and simplified the normal operation of the instrument. Observations with FLY I and FLY II continued throughout many series of profiles, with each series extending over periods of one half-hour to six hours. A series begins with the deployment of FLY and ends when FLY is recovered from the water, after a number of profiles. Multiple profiles are necessary to examine the changes over time and space of the turbulence properties and to compute stable averages of the turbulent dissipation rate, a quantity which is highly intermittent in time and space.

For all turbulence profiles, FLY I and FLY II free-fell through the water, dragging behind a slack line containing electrical conductors to transmit signals to the surface. Once they reached the desired depth they were winched to the surface, to within 50 m of the ship and released again to free-fall. Nominal descent rate was  $80 \text{ cm s}^{-1}$ , and this rate slowed by 15% from top to bottom for FLY II and by 25% for FLY I. Profiles were terminated at 100, 150 or 200 m, depending upon the magnitude of the dissipation rate in these ranges.

## 2.1 Data Processing

The signals are transmitted to the ship as 12-bit numbers, in groups of three, consisting of two shears and one of the slow channels. Successive groups of three select another slow channel until all eight are sampled, and the sequence is repeated. Shears are sampled at  $274 \text{ s}^{-1}$ , each slow channel at  $274/8 = 34.3 \text{ s}^{-1}$ .

### (a) shear

The dissipation rate ( $\epsilon$ ) in  $\text{cm}^2 \text{sec}^{-3}$  is computed from the formula

$$\epsilon = 3.75 \nu [(\partial u / \partial z)^2 + (\partial v / \partial z)^2]$$

where

$$\partial u / \partial z = SE / \rho G W^2$$

and E denotes the output voltage of the electronics, S the sensitivity of the shear probe in  $\text{cm}^2 \text{s}^{-2} \text{volt}^{-1}$ ,  $\rho$  and  $\nu$  the density and kinematic viscosity of seawater respectively, G the gain of the electronics, and W the fall speed in  $\text{cm s}^{-1}$ . The formula of Miyake and Koizumi (1948) is used to compute the viscosity. A standard value of  $1.025 \text{ gm cm}^{-3}$  is used for density.

Only four airfoil shear probes were used on this cruise. All were

manufactured by Undersea Marketing in 1983. Serial numbers are 140 and 141 (FLY I) and 138, 142 (FLY II). They were calibrated in the IOS water tunnel several times in the period 1983 to 1987, and in the rotating calibrator in Baltimore in February 1988. Probe 140 was calibrated in Monterey by R. Lueck in 1984. The calibrations are uniform to within 8% when compared with each other and previous calibrations, except for the absolute value of the 1988 calibrations, where it was found that although the ratios of sensitivities of the four probes were the same as found previously, the absolute values of the averages of all probes had changed by 60%. We suspect a change in calibration procedure may have caused this shift.

The spatial response function determined by Ninnis (1984) is used to compensate for lack of small scale resolution of this probe. These corrections are applied to the power spectrum of the signal, for the first 300 coefficients. At a sampling rate of 274 per second, a fall rate of  $80 \text{ cm s}^{-1}$ , and a spectral window of 1024 points, the 300th coefficient has a wavelength of 1 cm.

The gain G of the electronics falls off at high frequency, being a single pole filter with half-power point near 70 Hz. This attenuation is also compensated for in the power spectrum.

Normally the first 4, 5, or 6 coefficients in the power spectrum are removed, depending on the fall speed. We found that much of the energy at these wavelengths was not turbulence, but was dominated by non-turbulent shears at density interfaces. Although these shears do contribute to the dissipation, it is not isotropic turbulence and the multiplier of 7.5 which we apply to these individual  $\partial u / \partial z$  and  $\partial v / \partial z$  signals (or 3.75 to their sum) is too big for this type of shear, as noted by Denman and Gargett (1988). A multiplier of 2 is more appropriate. We observed these signals to influence the spectra at a dissipation rate of  $10^{-4} \text{ cm}^2 \text{ sec}^{-3}$  or less, and they were removed because this type of shear does not contribute to the mixing and because we suspect that a thermal response of the probe may have caused a small portion of this signal. These signals were not accompanied by two-sided temperature gradients, which normally indicate the presence of turbulence.

The peak of the power spectra of turbulent shears moves to shorter wavelengths as the dissipation increases. A region of the spectrum which is dominated by vibrational noise at low dissipations will have a real shear signal at high dissipations. Therefore, the range over which the power-spectrum coefficients are summed varies with the variance of the spectrum. Four transition wavelengths of the summations were determined from a comparison of arbitrary and individually chosen cutoff wavenumbers of at least one profile from each series of profiles from this cruise. In no case did the high-wavenumber limit of this summation cut off more than 15% of the energy in a universal

spectrum of the same variance, and for dissipations above  $10^{-4}$   $\text{cm}^2\text{sec}^{-3}$ , the cut-off was less than 10%.

We applied the universal curve presented by Dewey (1987) to determine these cutoff values, and also the cutoff values for the low-wavenumber limit, noted previously. This low-wavenumber limit was fixed for each series of profiles, and the cutoff is 15% at a dissipation less than  $10^{-4}$   $\text{cm}^2\text{sec}^{-1}$  only. As the dissipation increases and the peak of the dissipation spectrum moves to higher wavenumbers, the percentage of lost variance drops rapidly.

Noise levels were not constant throughout the cruise. A 3 hz oscillation in the data, likely due to vibrations in FLY, overpowered the signal at low dissipations. A general level of  $5 \times 10^{-5}$   $\text{cm}^2\text{sec}^{-3}$  is typical of the cruise, but some series may have variations about this value. In the profiles of dissipations presented, all values are plotted. Because dissipations and mixing are dominated by signals much above the noise level, the interpretation of these plots is not difficult, and a noise level can be determined by eye in many cases. The level of  $5 \times 10^{-5}$   $\text{cm}^2\text{s}^{-3}$  was selected by examining many spectra and time series of data from regions of dissipation near this level.

#### (b) Depth and fall speed.

Pressure is recorded on a slow channel at the rate of  $274/8 = 32.3$  data points per second. The pressure transducer, a strain gauge, increments about every half meter, giving a staircase appearance to the output record. To smooth this record for fall speed calculations, a running average of 512 points was passed twice over the data, from beginning to end. For fall rates of 60 and  $90 \text{ m s}^{-1}$ , 500 points enclose 9 and 14 meters respectively. The width of this running mean was selected as a compromise; shorter windows produced oscillations in fall speed due to irregular steps in the output of the pressure sensor, while longer ones failed to reproduce actual changes in fall speed.

The calculation of dissipation commences at the point in the record where the total tilt is less than  $8^\circ$ , or at 8 m depth, whichever is deepest. The fall speed computed by the running mean at 15 m is assigned to all depths between 8 and 15 m. The fall speed at the bottom of the profile is treated in a similar manner; the last averaged fall speed is assigned to the last few records. These speeds at the bottom should be accurate, because the winch was stopped after the data recording had terminated.

In most cases fall speed decreases with depth because FLY pulls more of the nearly neutrally buoyant line behind as it reaches the bottom of the profile. In some cases there are unusual changes of fall speed with depth, likely because the tension in

the line at surface was adjusted, either to increase the slackness of the line at surface or to reduce the buildup of cable behind the ship. Small changes in speed of the ship, due to changes in wind, may also have produced fall speed changes.

#### (c) Temperature

A Thermometrics P20 thermistor senses temperature. It is mounted at the nose of FLY, beside the two shear probes. Signals are amplified and recorded on a slow channel at 34.3 samples s<sup>-1</sup> and passed through a differentiating amplifier and recorded on two slow channels for a sampling rate of 68.6 samples s<sup>-1</sup>. This doubling of the sampling rate is possible because one slow channel is sampled after every sample of each of the two shear (fast) channels; the eight slow channels are sampled in sequence, not simultaneously. By placing the temperature gradient on slow channels 1 and 5 the rate is doubled.

A block average of temperature is computed from  $1024/8 = 128$  points and these block averages form the temperature profiles in the following figures. The temperature circuit in FLY II was calibrated before and after the cruise, with a shift of 0.01 degrees in average calibration. There is also a deviation of about 0.01 degrees over the range of 6°C to 12°C due to the non-linearity of the output of the thermistor.

The differentiated signal was displayed on a Brush recorder during the cruise, and the mean square temperature gradient was computed over each block during post-cruise analysis. However, the probe does not resolve the entire temperature gradient spectrum, and Cox numbers cannot be computed. We found this signal to be useful in diagnosing the nature of the shear signals, but have not included temperature gradient in the data displayed in this report.

#### (d) Salinity

We compute salinity from conductivity and temperature. Conductivity is measured with a Sea-Bird SBE-4-04/A cell, mounted beside the pressure case near the nose, and with the SBE-4-03 electronics inside the FLY pressure case beside the cell. Although the nominal response is 170 ms when towed at 4 knots, we operate at a slower speed without a pump to push water through the cell, and the response is much slower. To eliminate resulting spikes in salinity due to the different response times of the thermistor and conductivity cell we first offset the signals to account for their different positions along the profiler, and compute the salinity from the average conductivity and temperature over a block. To eliminate some false inversions remaining in salinity we run a three-point average over the

salinity, with the two outside values weighted to one-half the centre one. These are plotted below temperature in Part A.

The conductivity cell and electronics in FLY II were calibrated before and after the cruise, with an observed shift of 0.0015 to 0.0025 in conductivity ratio. Most of this offset is due to a difference in the method of pumping water through the cell, with the post-cruise calibrations being the more accurate. These shifts give rise to a change in salinity of 0.07 to 0.1. A cubic polynomial is used to compute conductivity from the output of a frequency to voltage converter attached to the electronics. It fits the actual values to within a conductivity ratio of 0.0015, and a corresponding salinity change of 0.07.

#### (e) Brunt-Vaisala frequency

From calculated values of temperature and salinity we compute Brunt-Vaisala frequency and plot it below the dissipations. Each value is computed from a centered difference of density over  $\pm 1$  block from the centre block. Therefore the vertical resolution is nominally 9 m, given the standard block length of 3 m. The data are passed through a 3-point running median filter (3RSSH, Kleiner and Graedel, 1980) which eliminates outliers. Therefore, the profiles plotted in Part A represent bulk values in the Brunt-Vaisala frequency.

### 3. WATER PROPERTY MEASUREMENTS

A Guildline CTD (or STD) returned 42 profiles of temperature, salinity and sigma-t from this cruise. Most CTD profiles are to 300 m, with a few deeper casts. Some profiles were taken near the moored profiling CTD and a few were near a drifting buoy with acoustic sensors to determine the density structure for interpretation of the data. These data are presented in Part B in the standard Institute of Ocean Sciences format, with both graphical and tabular format.

Calibrations during the previous OCEAN STORMS cruise, during this cruise and following this cruise showed the temperature output to be stable to within 0.01 degree Celcius, and the salinity to be stable to within 0.1. Normally the salinity signal is more stable, but sudden shifts appeared in the calibrations during these cruises, degrading the conductivity signal, and therefore the salinity signal too.

The latitude and longitude of these profiles are the positions given by Loran-C at the beginning of each profile.

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TABLE 1

Each line in this table presents environmental and navigation information recorded at the beginning of each FLY profile. The following data were recorded by SAIL (Serial ASCII Interface Loop) on the CSS *PARIZEAU*, and are described below:

LORAN LAT/LONG	denotes position as determined by the ship Loran-C receiver.
DATE:	is listed as ddmmmyy.
TIME:	in 24 hour clock, in GMT.
SHIP S/H:	the ship speed and heading as determined by the navigation doppler system. Speed is in knots, direction in degrees true.
SFC P	is the sea-surface air pressure, in millibars.
TWIND S/D	denotes the true wind speed, after the ship speed has been subtracted. Speed in $\text{m s}^{-1}$ , direction in degrees true.
SAT LAT/LONG	denotes position as determined by the Transit satellite navigation system, and updated with the ship speed between fixes.

## SAIL LIST

FLY: 2 SERIES: 6 PROFILES: 1 TO 23

	LORAN LAT/LONG.	DATE	TIME	SHIP	S/H	SFC P	TWIND	S/D	SAT LAT/LONG
1	4753.52	13900.00	011187	2358	.93	266.3	1021.2	6.69	261.0 4752.20 13901.06
2	4753.38	13900.76	021187	0006	.93	269.2	1020.9	4.68	252.0 4752.20 13901.44
3	4753.62	13900.56	021187	0014	.93	265.2	1021.0	5.14	257.0 4752.19 13901.82
4	4753.38	13901.42	021187	0023	.93	268.7	1020.7	5.14	246.0 4752.19 13902.19
5	4753.18	13902.27	021187	0031	.93	271.0	1020.8	5.14	248.0 4752.18 13902.54
6	4753.19	13902.69	021187	0039	1.08	269.0	1021.0	6.17	250.0 4752.18 13902.92
7	4753.38	13903.00	021187	0054	.77	271.2	1021.3	7.72	258.4 4752.17 13903.53
8	4753.74	13902.38	021187	0100	.93	267.0	1021.3	5.66	250.0 4752.16 13903.77
9	4753.51	13903.15	021187	0108	.93	265.8	1021.4	8.74	262.0 4752.16 13904.11
10	4753.75	13903.21	021187	0121	.93	268.7	1021.3	5.66	252.0 4752.14 13904.62
11	4753.55	13904.06	021187	0129	.77	267.8	1021.5	8.23	262.0 4752.14 13904.95
12	4753.82	13903.95	021187	0139	.93	266.8	1021.4	6.17	255.0 4752.13 13905.36
13	4753.71	13904.55	021187	0147	.77	269.5	1021.5	6.17	244.0 4752.13 13905.69
14	4753.64	13905.14	021187	0156	.77	268.7	1021.5	8.23	258.0 4752.12 13905.99
15	4753.70	13905.30	021187	0204	.77	268.5	1021.8	8.23	263.0 4752.12 13906.30
16	4753.71	13905.47	021187	0214	.77	271.2	1021.8	6.17	257.0 4753.50 13905.06
17	4753.64	13906.06	021187	0222	.77	265.2	1021.7	5.14	258.0 4753.50 13905.37
18	4753.69	13906.22	021187	0233	.77	266.8	1021.7	5.14	253.0 4753.49 13905.75
19	4753.91	13906.20	021187	0241	.77	268.2	1021.6	6.69	244.0 4753.59 13905.86
20	4753.81	13906.96	021187	0251	.77	268.0	1021.9	7.72	246.0 4753.59 13906.21
21	4753.89	13907.20	021187	0300	.77	270.0	1022.1	7.20	247.0 4753.60 13906.50
22	4753.75	13907.72	021187	0310	.77	273.2	1021.9	7.72	254.0 4753.60 13906.86
23	4754.45	13906.38	021187	0318	.77	269.3	1022.0	8.74	255.0 4753.60 13907.14

FLY: 2 SERIES: 7 PROFILES: 1 TO 21

	LORAN LAT/LONG.	DATE	TIME	SHIP	S/H	SFC P	TWIND	S/D	SAT LAT/LONG
1	4752.54	13859.28	021187	0644	.77	228.8	1022.1	10.80	222.0 4752.34 13858.60
2	4752.45	13859.53	021187	0701	.77	234.7	1022.4	11.16	238.1 4752.17 13859.20
3	4752.33	13859.72	021187	0711	.62	229.2	1022.4	10.24	242.0 4752.03 13859.46
4	4752.11	13900.24	021187	0718	.62	225.7	1022.6	11.83	239.0 4752.02 13859.69
5	4752.40	13859.38	021187	0726	.62	230.8	1022.6	9.16	236.4 4751.92 13859.88
6	4751.49	13901.38	021187	0736	1.08	229.2	1022.6	13.12	250.0 4751.76 13900.17
7	4751.91	13900.43	021187	0747	1.08	226.8	1022.5	9.83	252.0 4751.52 13900.62
8	4751.33	13901.82	021187	0757	.62	235.2	1022.6	11.78	243.7 4751.24 13901.18
9	4750.99	13902.53	021187	0806	.62	234.5	1022.5	9.31	246.0 4751.14 13901.36
10	4751.23	13901.92	021187	0812	.62	223.3	1022.6	10.91	244.0 4751.07 13901.50
11	4751.23	13901.92	021187	0820	.46	231.2	1022.6	11.21	244.0 4750.99 13901.66
12	4751.0	13902.1	021187	0827	.77	233.2	1022.8	11.42	248.0 4750.8 13901.8
13	4750.86	13902.79	021187	0837	.77	234.7	1022.3	10.49	246.0 4750.72 13902.24
14	4750.8	13902.9	021187	0846	.77	237.2	1022.1	11.83	232.0 4750.6 13902.4
15	4750.78	13903.22	021187	0852	.77	240.2	1022.1	11.32	231.0 4750.54 13902.67
16	4750.94	13902.78	021187	0900	.77	240.8	1022.2	10.80	238.0 4750.42 13902.95
17	4750.51	13904.00	021187	0909	.77	231.5	1022.5	11.21	244.0 4750.31 13903.21
18	4750.48	13903.92	021187	0921	.62	234.0	1022.5	11.21	251.0 4750.14 13903.56
19	4750.61	13903.90	021187	0928	.62	236.0	1022.7	12.04	257.0 4750.06 13903.73

## SAIL LIST

FLY: 2 SERIES: 7 PROFILES: 1 TO 21

	LORAN LAT/LONG.	DATE	TIME	SHIP	S/H	SFC	P	TWIND	S/D	SAT LAT/LONG
20	4750.51	13904.00	021187	0938	.77	229.5	1022.6	9.67	252.0	4749.90 13904.01
21	4750.25	13904.70	021187	0950	.46	246.3	1022.5	11.27	262.0	4750.00 13904.02

FLY: 2 SERIES: 8 PROFILES: 1 TO 21

	LORAN LAT/LONG.	DATE	TIME	SHIP	S/H	SFC	P	TWIND	S/D	SAT LAT/LONG
1	4752.84	13905.24	021187	1244	.62	267.3	1022.9	10.80	255.0	4752.26 13906.13
2	4752.44	13906.29	021187	1252	.46	248.0	1023.1	12.40	270.0	4752.24 13906.35
3	4752.39	13906.80	021187	1300	.62	261.7	1023.1	10.75	268.0	4752.22 13906.64
4	4752.69	13906.26	021187	1308	.62	258.8	1023.1	13.32	267.5	4752.20 13906.91
5	4753.00	13905.97	021187	1319	.46	277.0	1023.3	11.32	263.0	4752.20 13907.27
6	4752.79	13906.41	021187	1329	.62	245.5	1023.2	10.55	270.0	4752.15 13907.56
7	4752.62	13907.11	021187	1337	1.08	260.3	1023.5	13.32	270.8	4752.12 13907.85
8	4752.74	13906.67	021187	1348	.77	256.0	1023.6	11.47	268.0	4752.08 13908.23
9	4752.53	13907.62	021187	1356	.93	259.5	1023.5	12.14	268.5	4752.04 13908.56
10	4752.39	13908.14	021187	1408	.93	260.2	1023.7	9.21	270.9	4751.97 13909.07
11	4752.52	13907.88	021187	1417	.46	260.7	1023.7	11.27	262.5	4751.92 13909.41
12	4752.64	13907.69	021187	1425	.93	259.8	1023.6	12.35	252.0	4751.89 13909.74
13	4752.50	13908.21	021187	1435	.93	262.3	1023.5	8.23	247.0	4752.24 13908.28
14	4752.36	13908.74	021187	1444	.77	260.8	1023.8	10.29	267.0	4752.21 13908.60
15	4752.37	13908.90	021187	1454	.93	262.5	1023.7	9.77	256.0	4752.17 13909.00
16	4752.31	13909.25	021187	1500	.77	260.0	1023.7	13.63	263.6	4752.15 13909.26
17	4751.92	13910.22	021187	1510	.77	263.3	1023.7	11.83	257.3	4752.11 13909.62
18	4752.18	13909.94	021187	1521	.62	259.3	1023.6	13.37	254.0	4752.06 13910.06
19	4752.61	13909.21	021187	1529	.93	262.0	1023.5	7.72	251.0	4752.17 13909.98
20	4752.40	13910.08	021187	1539	.77	262.5	1023.5	9.77	253.0	4752.13 13910.36
21	4752.00	13911.14	021187	1546	.62	258.8	1023.7	13.37	258.0	4752.11 13910.58

FLY: 2 SERIES: 9 PROFILES: 1 TO 8

	LORAN LAT/LONG.	DATE	TIME	SHIP	S/H	SFC	P	TWIND	S/D	SAT LAT/LONG
1	4755.73	13851.04	021187	1929	1.23	316.5	1024.4	6.17	214.0	4755.88 13849.59
2	4756.22	13850.33	021187	1940	.77	316.2	1024.5	3.96	207.0	4756.07 13849.89
3	4756.20	13851.15	021187	1948	.77	313.3	1024.6	8.23	223.0	4756.21 13850.11
4	4756.63	13850.53	021187	1956	.77	313.3	1024.5	15.43	231.0	4756.33 13850.32
5	4756.81	13850.91	021187	2008	.77	311.8	1024.6	7.20	241.0	4756.53 13850.61
6	4756.80	13851.40	021187	2017	.46	289.0	1024.6	9.77	247.0	4756.62 13850.81
7	4757.21	13851.19	021187	2031	.62	285.2	1024.4	11.32	241.6	4756.71 13851.24
8	4757.28	13851.67	021187	2043	.46	280.5	1024.2	11.32	245.0	4756.76 13851.59

## SAIL LIST

FLY: 2 SERIES: 10 PROFILES: 3 TO 15

	LORAN LAT/LONG.	DATE	TIME	SHIP	S/H	SFC	P	TWIND	S/D	SAT	LAT/LONG
3	4754.00	13858.95	031187	0206	1.08	251.7	1024.6	10.39	270.0	4753.99	13858.46
4	4753.98	13859.03	031187	0214	.93	264.7	1024.5	9.77	263.0	4753.96	13858.78
5	4754.10	13858.85	031187	0222	.77	252.7	1024.5	8.44	254.6	4753.90	13859.13
6	4753.95	13859.45	031187	0233	.62	263.2	1024.6	10.80	252.0	4753.88	13859.52
7	4753.83	13859.88	031187	0241	.77	263.3	1024.7	10.85	273.4	4753.83	13859.80
8	4753.91	13859.87	031187	0249	.77	271.8	1024.8	12.35	265.0	4753.80	13900.11
9	4753.80	13900.04	031187	0300	.46	235.0	1024.8	11.63	269.0	4753.75	13900.35
10	4754.09	13859.35	031187	0308	.62	245.0	1024.9	9.72	265.0	4753.72	13900.56
11	4753.85	13859.96	031187	0316	.46	249.0	1025.0	11.27	268.0	4753.76	13859.56
12	4753.67	13900.72	031187	0325	.93	273.0	1024.8	13.89	262.0	4753.74	13859.87
13	4753.39	13901.33	031187	0331	1.08	265.5	1025.0	10.80	261.0	4753.71	13900.09
14	4753.72	13900.88	031187	0341	.93	259.8	1025.1	10.60	269.6	4753.64	13900.50
15	4753.58	13901.23	031187	0351	.77	260.3	1025.1	10.80	265.0	4753.58	13900.90

FLY: 2 SERIES: 11 PROFILES: 1 TO 33

	LORAN LAT/LONG.	DATE	TIME	SHIP	S/H	SFC	P	TWIND	S/D	SAT	LAT/LONG
1	4755.01	13844.49	031187	0732	.62	249.2	1025.2	12.19	257.7	4754.78	13844.05
2	4755.25	13843.82	031187	0741	.62	251.8	1025.2	9.00	264.0	4754.73	13844.27
3	4754.17	13846.43	031187	0755	.62	256.7	1025.1	10.44	260.4	4754.62	13844.81
4	4754.35	13846.09	031187	0801	.31	264.7	1025.1	10.29	256.0	4754.60	13844.94
5	4754.59	13845.42	031187	0814	.77	244.3	1025.2	9.21	249.6	4754.49	13845.42
6	4754.26	13846.34	031187	0828	.62	244.0	1025.3	13.37	242.5	4754.35	13845.94
7	4754.04	13846.68	031187	0837	.62	241.8	1025.4	11.99	251.0	4754.25	13846.23
8	4753.71	13847.37	031187	0847	.77	242.3	1025.3	13.01	257.0	4754.13	13846.62
9	4753.24	13848.39	031187	0855	.62	249.2	1025.2	10.80	236.0	4754.05	13846.87
10	4753.15	13848.39	031187	0905	.77	254.0	1025.3	11.83	245.0	4753.95	13847.21
11	4753.27	13847.98	031187	0916	.62	239.3	1025.3	10.60	252.0	4753.86	13847.54
12	4752.93	13848.74	031187	0924	.62	265.7	1025.2	8.23	250.0	4753.07	13847.71
13	4753.07	13848.65	031187	0939	.62	250.2	1025.2	9.77	240.0	4753.07	13848.15
14	4753.21	13848.55	031187	0949	.77	255.3	1025.2	10.29	246.0	4753.02	13848.43
15	4752.93	13849.15	031187	0955	.62	260.2	1025.2	8.74	248.0	4753.00	13848.58
16	4752.96	13849.23	031187	0959	.46	254.8	1025.2	13.37	249.7	4752.98	13848.69
17	4752.90	13849.56	031187	1005	.62	259.8	1025.2	7.72	246.0	4752.95	13848.88
18	4753.02	13849.55	031187	1012	.46	260.2	1025.3	10.29	246.0	4752.93	13849.04
19	4752.98	13849.55	031187	1016	.62	252.5	1025.4	8.85	252.9	4752.91	13849.14
20	4752.99	13849.71	031187	1024	.77	254.7	1025.3	11.32	252.0	4752.86	13849.39
21	4752.84	13850.30	031187	1030	.62	252.7	1025.3	11.32	247.0	4752.83	13849.58
22	4752.92	13850.13	031187	1032	.62	250.0	1025.4	7.72	240.0	4752.81	13849.64
23	4752.81	13850.71	031187	1040	.77	255.0	1025.5	10.96	258.4	4752.76	13849.90
24	N475.29	W1385.04	031187	1045	.62	255.2	1025.5	9.26	246.0	N475.27	W1385.00
25	4753.06	13850.44	031187	1049	.46	248.0	1025.6	8.74	65.0	4752.73	13850.10
26	4752.56	13851.38	031187	1053	.62	246.0	1025.6	8.54	260.0	4752.69	13850.20
27	4752.80	13851.20	031187	1059	.62	249.7	1025.6	9.36	254.6	4752.64	13850.38
28	4752.44	13852.05	031187	1107	.77	252.8	1025.6	9.77	245.0	4752.57	13850.64
29	4752.59	13851.87	031187	1120	.77	247.5	1025.6	10.85	266.0	4752.42	13851.07

## SAIL LIST

FLY: 2 SERIES: 11 PROFILES: 1 TO 33

LORAN LAT/LONG. DATE TIME SHIP S/H SFC P TWIND S/D SAT LAT/LONG

30	4752.94	13851.10	031187	1126	.77	255.2	1025.7	9.77	250.0	4752.42	13851.21
31	4752.68	13851.86	031187	1130	.77	241.7	1025.7	7.10	257.0	4752.38	13851.33
32	4752.74	13851.94	031187	1141	.62	249.7	1025.6	10.70	254.8	4752.30	13851.64
33	4752.19	13852.98	031187	1147	.62	244.7	1025.6	10.34	262.0	4752.25	13851.80

FLY: 2 SERIES: 12 PROFILES: 1 TO 40

LORAN LAT/LONG. DATE TIME SHIP S/H SFC P TWIND S/D SAT LAT/LONG

1	N475.59	W1383.93	031187	1410	.93	247.7	1025.0	7.10	253.2	N475.57	W1383.91
2	4756.04	13839.50	031187	1420	.77	252.5	1025.0	8.23	251.7	4755.67	13839.55
3	4755.88	13840.15	031187	1430	.93	257.3	1024.8	8.23	247.0	4755.61	13839.95
4	4755.80	13840.56	031187	1436	.77	255.0	1024.8	7.20	240.0	4755.58	13840.15
5	4755.71	13840.65	031187	1443	.77	249.5	1025.0	7.56	253.7	4755.53	13840.36
6	4756.17	13839.88	031187	1449	.93	254.0	1024.8	8.33	257.5	4755.48	13840.58
7	4755.87	13840.39	031187	1457	.77	251.3	1024.9	8.08	251.3	4755.43	13840.84
8	4755.89	13840.55	031187	1505	.93	253.3	1024.8	7.72	237.5	4755.37	13841.16
9	4755.75	13841.28	031187	1512	.62	252.7	1024.8	7.20	237.0	4755.47	13841.09
10	4755.26	13842.45	031187	1518	.77	253.3	1024.7	10.80	252.0	4755.43	13841.28
11	4755.51	13842.19	031187	1528	.77	258.2	1024.8	7.72	249.0	4755.37	13841.64
12	4755.44	13842.35	031187	1534	.77	250.3	1024.7	8.74	246.0	4755.30	13841.82
13	4755.21	13842.70	031187	1545	.77	241.0	1024.7	8.54	256.0	4755.21	13842.12
14	4755.42	13842.67	031187	1551	.77	252.0	1024.6	9.26	247.0	4755.26	13842.15
15	4755.26	13843.10	031187	1557	.77	246.8	1024.6	8.74	235.7	4755.22	13842.33
16	4755.15	13843.51	031187	1605	.62	257.0	1024.6	8.08	262.2	4755.16	13842.59
17	4755.61	13842.74	031187	1611	.77	256.3	1024.7	7.72	238.0	4755.13	13842.78
18	4755.24	13843.66	031187	1620	.62	254.5	1024.7	8.74	231.0	4755.32	13843.29
19	4755.66	13843.13	031187	1626	.77	257.3	1024.6	10.80	234.4	4755.28	13843.52
20	4755.54	13843.79	031187	1634	.62	260.0	1024.5	11.32	240.0	4755.25	13843.79
21	4755.51	13843.71	031187	1640	.62	257.7	1024.6	8.74	245.0	4755.22	13843.99
22	4755.30	13844.46	031187	1645	.77	259.8	1024.7	7.72	253.2	4755.19	13844.13
23	4755.17	13844.95	031187	1651	.62	256.0	1024.8	9.77	243.0	4755.16	13844.36
24	4755.22	13845.11	031187	1659	.77	257.0	1024.6	6.69	241.0	4755.18	13844.15
25	4755.40	13844.77	031187	1705	.62	252.5	1024.7	8.23	240.0	4755.14	13844.36
26	4755.34	13845.09	031187	1712	.77	246.2	1024.6	8.23	229.0	4755.08	13844.57
27	4755.23	13845.27	031187	1718	.77	245.8	1024.5	7.72	227.0	4755.02	13844.79
28	4755.21	13845.59	031187	1724	.93	247.7	1024.5	6.69	222.0	4754.95	13845.03
29	4755.11	13845.92	031187	1732	.77	245.5	1024.4	7.72	217.0	4754.86	13845.33
30	4754.86	13846.44	031187	1738	.77	237.2	1024.5	5.66	223.0	4754.81	13845.52
31	N475.47	W1384.66	031187	1747	.62	244.7	1024.4	9.77	214.0	N475.47	W1384.58
32	4755.13	13845.84	031187	1753	.93	247.2	1024.5	7.20	229.0	4754.63	13846.07
33	4754.92	13846.51	031187	1759	.77	250.2	1024.6	9.26	236.0	4754.57	13846.30
34	4754.75	13847.01	031187	1805	.93	243.8	1024.6	8.23	220.0	4754.63	13846.22
35	4754.91	13846.59	031187	1813	.77	246.3	1024.8	7.20	237.0	4754.52	13846.56
36	4754.14	13848.37	031187	1819	1.08	246.0	1024.7	8.74	222.0	4754.45	13846.81
37	4754.36	13848.02	031187	1828	.77	240.5	1024.8	8.74	229.0	4754.35	13847.14
38	4754.68	13847.18	031187	1834	.93	241.0	1024.8	8.64	243.7	4754.28	13847.36

## SAIL LIST

FLY: 2 SERIES: 12 PROFILES: 1 TO 40

	LORAN LAT/LONG.	DATE	TIME	SHIP	S/H	SFC	P	TWIND	S/D	SAT LAT/LONG
39	4754.35	13848.11	031187	1842	.93	242.8	1024.7	8.23	231.0	4754.17 13847.69
40	4754.01	13848.63	031187	1901	.93	237.0	1024.8	8.90	249.0	4753.89 13847.99

FLY: 2 SERIES: 13 PROFILES: 1 TO 38

	LORAN LAT/LONG.	DATE	TIME	SHIP	S/H	SFC	P	TWIND	S/D	SAT LAT/LONG
1	4757.05	13835.28	041187	0223	1.08	254.7	1021.8	7.72	220.0	4756.93 13834.77
2	4757.25	13835.26	041187	0233	.93	256.5	1021.8	6.17	218.0	4756.86 13835.20
3	4757.08	13836.23	041187	0242	.77	258.0	1021.8	8.23	216.0	4756.82 13835.53
4	4757.21	13836.37	041187	0250	.77	257.5	1021.7	6.17	210.0	4756.78 13835.85
5	4757.15	13836.93	041187	0256	.93	259.0	1021.8	8.74	211.0	4756.74 13836.09
6	4757.05	13837.26	041187	0300	.77	262.0	1021.8	6.69	214.0	4756.72 13836.25
7	4757.30	13837.23	041187	0309	.77	256.7	1021.8	8.23	226.0	4757.03 13837.31
8	4757.21	13837.72	041187	0315	.93	257.3	1021.8	7.20	218.0	4756.99 13837.57
9	4757.14	13838.36	041187	0323	.62	262.3	1021.8	8.23	221.0	4756.95 13837.87
10	4756.99	13838.93	041187	0329	.77	256.8	1021.9	7.72	224.0	4756.92 13838.11
11	4757.0	13839.3	041187	0338	.93	254.8	1021.8	8.74	223.0	4756.8 13838.4
12	4757.22	13839.46	041187	0346	.93	258.5	1021.6	8.23	220.0	4756.80 13838.93
13	4757.19	13839.87	041187	0352	.93	259.3	1021.6	7.20	215.0	4756.77 13839.20
14	4757.31	13840.09	041187	0400	1.08	257.3	1021.6	6.17	221.0	4756.70 13839.61
15	4757.29	13840.41	041187	0406	.93	254.5	1021.5	8.74	216.0	4756.65 13839.92
16	4757.29	13840.89	041187	0415	1.39	254.3	1021.5	9.26	222.0	4756.57 13840.43
17	4757.49	13840.87	041187	0423	1.23	253.0	1021.5	8.74	222.0	4756.48 13840.85
18	4757.33	13841.52	041187	0429	1.08	251.3	1021.4	6.17	238.5	4756.42 13841.15
19	4757.33	13842.00	041187	0439	1.39	251.3	1021.3	7.72	237.0	4756.31 13841.67
20	4757.35	13842.32	041187	0448	1.23	253.5	1021.2	10.80	232.0	4756.22 13842.08
21	4757.12	13843.39	041187	0458	1.23	253.3	1021.2	10.80	246.0	4756.12 13842.56
22	4757.40	13842.96	041187	0506	1.23	246.8	1021.3	9.26	243.0	4756.04 13842.95
23	4757.36	13843.60	041187	0517	1.08	247.2	1021.0	8.23	241.0	4757.22 13842.89
24	4757.30	13843.93	041187	0525	.93	253.0	1020.9	7.20	232.0	4757.13 13843.29
25	4757.27	13844.33	041187	0533	1.23	252.2	1020.9	9.26	232.0	4757.05 13843.68
26	4757.11	13844.99	041187	0539	1.08	247.8	1020.8	7.20	233.0	4757.24 13844.50
27	4757.28	13844.73	041187	0546	1.23	253.5	1020.9	8.23	235.0	4757.17 13844.83
28	4757.09	13845.32	041187	0552	1.39	249.7	1020.9	7.72	232.0	4757.09 13845.17
29	4757.33	13845.13	041187	0600	1.23	251.3	1020.8	8.23	229.5	4756.97 13845.66
30	4756.89	13846.47	041187	0608	1.23	255.8	1020.7	8.23	229.5	4756.86 13846.14
31	4757.34	13845.77	041187	0615	1.23	250.5	1020.8	8.74	228.0	4756.78 13846.47
32	4756.95	13846.78	041187	0621	1.23	250.0	1021.0	7.72	228.0	4756.70 13846.82
33	4756.90	13847.27	041187	0629	1.39	246.2	1021.1	7.20	232.0	4756.58 13847.32
34	4757.06	13847.10	041187	0635	1.39	249.3	1021.0	7.72	233.0	4756.48 13847.70
35	4756.78	13848.18	041187	0643	1.23	245.7	1021.3	7.20	238.0	4756.36 13848.16
36	4756.55	13848.77	041187	0650	1.08	251.5	1021.1	6.69	235.6	4756.27 13848.52
37	4756.80	13848.50	041187	0656	1.39	248.8	1021.0	6.17	230.0	4756.18 13848.90
38	4756.86	13848.41	041187	0702	1.39	250.8	1021.0	8.23	215.0	4756.74 13848.76

## SAIL LIST

FLY: 1 SERIES: 14 PROFILES: 1 TO 26

	LORAN LAT/LONG.	DATE	TIME	SHIP	S/H	SFC	P	TWIND	S/D	SAT LAT/LONG
1	4757.52	13838.48	041187	1300	1.23	265.0	1019.9	7.72	210.0	4757.32 13838.33
2	4757.68	13838.70	041187	1310	1.08	263.7	1020.1	8.74	198.0	4757.29 13838.95
3	4757.52	13839.83	041187	1321	1.39	262.7	1020.0	7.72	205.0	4757.25 13839.58
4	4757.63	13839.90	041187	1327	1.23	262.3	1020.1	7.72	216.0	4757.23 13839.96
5	4757.66	13840.37	041187	1333	1.08	263.8	1020.0	7.20	211.0	4757.54 13840.64
6	4757.74	13840.60	041187	1341	.93	261.5	1019.8	6.17	222.0	4757.51 13841.09
7	4757.48	13841.59	041187	1348	1.08	258.2	1019.8	9.26	205.0	4757.47 13841.40
8	4757.73	13841.32	041187	1352	1.08	256.5	1019.7	8.74	208.0	4757.45 13841.62
9	4757.41	13842.24	041187	1358	1.23	259.7	1019.7	7.72	200.0	4757.40 13841.95
10	4757.60	13842.05	041187	1402	1.08	258.0	1019.4	6.69	230.0	4757.37 13842.18
11	4757.43	13842.55	041187	1408	1.23	259.2	1019.3	7.72	163.0	4757.38 13842.45
12	4757.41	13843.11	041187	1414	1.08	258.2	1019.4	8.23	200.0	4757.34 13842.80
13	4757.7	13842.6	041187	1420	1.39	258.5	1019.4	8.23	196.0	4757.3 13843.1
14	4757.53	13843.34	041187	1427	1.08	261.3	1019.3	7.72	205.0	4757.42 13844.09
15	4757.48	13844.07	041187	1435	1.23	259.7	1019.3	9.26	202.0	4757.36 13844.55
16	4757.66	13844.21	041187	1441	1.23	261.0	1019.2	9.26	203.0	4757.31 13844.92
17	4757.50	13844.87	041187	1447	1.23	255.5	1019.0	7.72	207.0	4757.27 13845.26
18	4757.61	13844.94	041187	1452	1.39	258.0	1019.1	7.72	208.0	4757.23 13845.50
19	4757.66	13845.33	041187	1458	1.08	257.0	1019.1	9.26	212.0	4757.19 13845.85
20	4757.41	13846.25	041187	1502	1.08	257.7	1019.1	9.26	210.0	4757.16 13846.06
21	4757.57	13846.07	041187	1508	1.23	260.0	1019.1	12.35	203.0	4757.11 13846.39
22	4757.43	13846.81	041187	1514	1.23	259.5	1018.9	8.23	223.0	4757.06 13846.75
23	4757.45	13846.97	041187	1516	1.23	257.7	1018.9	8.74	201.0	4757.05 13846.87
24	4757.61	13846.95	041187	1522	.93	256.5	1018.9	9.77	217.0	4757.62 13846.34
25	4757.83	13846.84	041187	1527	.93	254.3	1018.9	10.29	214.0	4757.59 13846.55
26	4757.94	13846.91	041187	1533	1.23	256.0	1018.9	9.26	208.0	4757.54 13846.89

FLY: 2 SERIES: 15 PROFILES: 1 TO 3

	LORAN LAT/LONG.	DATE	TIME	SHIP	S/H	SFC	P	TWIND	S/D	SAT LAT/LONG
1	4755.70	13839.86	051187	0348	1.08	184.7	1011.3	10.80	176.0	4755.23 13839.43
2	4755.44	13839.49	051187	0356	1.39	182.8	1011.0	10.80	177.0	4754.86 13839.44
3	4755.16	13839.68	051187	0401	1.39	183.7	1011.0	9.26	170.0	4754.67 13839.44

FLY: 2 SERIES: 16 PROFILES: 1 TO 28

	LORAN LAT/LONG.	DATE	TIME	SHIP	S/H	SFC	P	TWIND	S/D	SAT LAT/LONG
1	4753.69	13836.49	051187	1831	.93	260.0	1007.9	18.98	274.0	4754.04 13835.96
2	4753.5	13837.0	051187	1843	.77	256.7	1008.1	16.46	71.7	4753.9 13836.4
3	4753.43	13837.46	051187	1850	.62	245.2	1008.0	18.00	71.7	4753.97 13836.65
4	4753.02	13838.62	051187	1858	1.08	263.2	1008.1	15.38	266.1	4753.93 13837.02
5	4753.67	13837.28	051187	1906	.62	250.0	1008.2	14.35	266.0	4753.91 13837.35
6	4753.04	13838.93	051187	1915	.93	269.7	1008.3	16.72	274.5	4753.88 13837.66
7	4753.59	13837.69	051187	1917	.93	254.0	1008.4	16.56	284.0	4753.87 13837.74
8	4753.46	13837.94	051187	1923	.62	258.7	1008.4	14.97	284.0	4753.85 13837.95

## SAIL LIST

FLY: 2 SERIES: 16 PROFILES: 1 TO 28

	LORAN LAT/LONG.	DATE	TIME	SHIP	S/H	SFC	P	TWIND	S/D	SAT	LAT/LONG
9	4753.48	13837.86	051187	1929	.93	260.3	1008.6	14.76	277.0	4753.82	13838.15
10	4752.89	13839.51	051187	1937	.31	261.7	1008.7	13.79	277.0	4753.79	13838.48
11	4752.88	13839.59	051187	1943	.77	267.5	1008.9	11.93	277.6	4753.78	13838.69
12	4752.64	13840.25	051187	1950	.46	268.0	1008.9	12.29	282.0	4753.76	13838.91
13	4752.65	13840.41	051187	1954	.62	270.8	1009.0	14.20	282.0	4753.76	13839.05
14	4752.77	13840.16	051187	2000	.77	268.0	1009.0	14.51	283.0	4753.76	13839.22
15	4752.86	13840.15	051187	2004	.46	261.7	1009.1	12.86	87.1	4753.75	13839.33
16	4752.47	13841.15	051187	2010	.62	265.7	1009.2	13.99	281.0	4753.73	13839.50
17	4752.44	13841.31	051187	2015	.46	266.0	1009.2	13.89	80.5	4753.74	13839.63
18	4752.58	13840.98	051187	2019	.93	270.3	1009.2	13.73	277.7	4753.73	13839.79
19	4752.57	13841.06	051187	2025	.46	271.2	1009.2	14.40	258.0	4753.72	13839.97
20	4752.23	13842.21	051187	2033	.62	266.2	1009.2	16.46	262.0	4753.72	13840.23
21	4752.37	13842.12	051187	2041	.62	269.8	1009.2	14.92	253.0	4753.72	13840.46
22	4752.64	13841.77	051187	2046	.62	275.3	1009.4	13.89	264.6	4753.72	13840.58
23	4752.08	13843.27	051187	2052	.62	270.7	1009.4	13.01	277.7	4753.72	13840.78
24	4751.94	13843.77	051187	2056	.46	274.2	1009.4	12.35	255.0	4753.73	13840.89
25	4752.27	13843.33	051187	2102	.62	266.2	1009.2	14.92	259.0	4753.73	13841.08
26	4752.10	13843.99	051187	2108	.62	263.0	1009.4	14.40	262.0	4753.72	13841.25
27	4752.23	13843.74	051187	2114	.77	267.5	1009.4	11.37	283.0	4753.71	13841.43
28	4752.66	13842.97	051187	2119	.62	262.0	1009.4	11.21	276.0	4753.71	13841.56

FLY: 1 SERIES: 17 PROFILES: 1 TO 35

	LORAN LAT/LONG.	DATE	TIME	SHIP	S/H	SFC	P	TWIND	S/D	SAT	LAT/LONG
1	4752.21	13836.46	061187	0010	.46	274.3	1009.2	11.83	262.2	4752.68	13834.46
2	4752.76	13835.62	061187	0016	.62	272.0	1009.3	12.86	266.0	4752.69	13834.60
3	4752.43	13836.37	061187	0018	.46	279.7	1009.4	10.29	266.0	4752.70	13834.65
4	4752.57	13836.43	061187	0026	.62	264.2	1009.5	12.14	273.0	4752.71	13834.87
5	4752.55	13836.59	061187	0031	.62	268.3	1009.5	11.11	277.5	4752.56	13836.06
6	4752.75	13836.34	061187	0035	.46	274.7	1009.5	8.23	274.0	4752.56	13836.18
7	4752.81	13836.49	061187	0039	.62	274.8	1009.5	10.29	263.2	4752.58	13836.31
8	4752.65	13837.14	061187	0045	.77	272.5	1009.7	12.35	270.0	4752.59	13836.46
9	4752.77	13837.53	061187	0053	.62	270.7	1009.7	8.74	270.0	4752.60	13836.71
10	4752.83	13837.68	061187	0059	.77	268.2	1009.7	12.86	251.4	4752.62	13836.90
11	4753.13	13837.33	061187	0104	.93	264.7	1009.7	12.86	260.0	4752.61	13837.08
12	4753.04	13838.06	061187	0110	1.08	265.8	1009.7	11.78	267.0	4752.60	13837.37
13	4753.05	13838.46	061187	0116	.62	265.3	1009.7	14.92	246.9	4752.59	13837.64
14	4753.01	13838.86	061187	0120	.93	267.2	1009.8	11.37	271.4	4752.58	13837.82
15	4753.15	13838.76	061187	0126	.46	276.7	1009.9	9.26	264.0	4752.58	13838.02
16	4753.0	13839.3	061187	0130	.93	254.7	1009.9	12.40	272.0	4752.5	13838.1
17	4753.02	13840.13	061187	0139	1.08	266.8	1010.0	7.92	276.3	4752.57	13838.48
18	4753.02	13840.77	061187	0147	.93	261.8	1010.1	10.60	276.0	4752.59	13838.81
19	4753.05	13840.85	061187	0151	.93	261.0	1010.2	10.39	265.2	4752.58	13838.96
20	4753.37	13840.66	061187	0157	1.23	277.0	1010.2	9.93	279.3	4752.59	13839.26
21	4753.50	13841.05	061187	0206	.77	270.0	1010.3	9.77	263.0	4752.62	13839.60
22	4753.87	13840.77	061187	0212	1.08	276.3	1010.5	9.77	273.5	4752.65	13839.91

## SAIL LIST

FLY: 1 SERIES: 17 PROFILES: 1 TO 35

	LORAN LAT/LONG.	DATE	TIME	SHIP	S/H	SFC P	TWIND	S/D	SAT LAT/LONG
23	4753.96	13841.40	061187	0220	1.08	279.0	1010.3	10.29	253.0 4753.55 13842.10
24	4753.79	13842.54	061187	0226	1.08	277.7	1010.5	8.23	259.0 4753.57 13842.42
25	4753.84	13842.94	061187	0233	.77	261.2	1010.6	8.28	273.0 4753.58 13842.74
26	4754.16	13842.50	061187	0237	.77	274.5	1010.5	9.26	253.9 4753.58 13842.88
27	4754.38	13842.64	061187	0243	.77	294.0	1010.7	7.72	252.0 4753.62 13843.09
28	4754.41	13843.12	061187	0249	.93	275.2	1010.7	7.72	233.0 4753.64 13843.36
29	4754.08	13844.28	061187	0253	.93	272.8	1010.8	9.26	233.2 4753.65 13843.53
30	4754.35	13844.33	061187	0300	.62	269.3	1010.8	6.17	247.6 4753.66 13843.75
31	4754.53	13844.23	061187	0306	.93	273.8	1010.8	10.29	256.0 4753.67 13843.98
32	4754.59	13844.79	061187	0312	1.23	276.3	1011.0	8.74	260.0 4753.68 13844.28
33	4754.60	13845.19	061187	0318	.62	277.8	1010.9	8.74	253.0 4753.70 13844.51
34	4754.84	13845.00	061187	0322	.77	285.2	1011.0	10.80	256.0 4754.71 13844.58
35	4754.73	13845.82	061187	0328	.93	284.3	1011.0	8.74	253.0 4754.73 13844.87

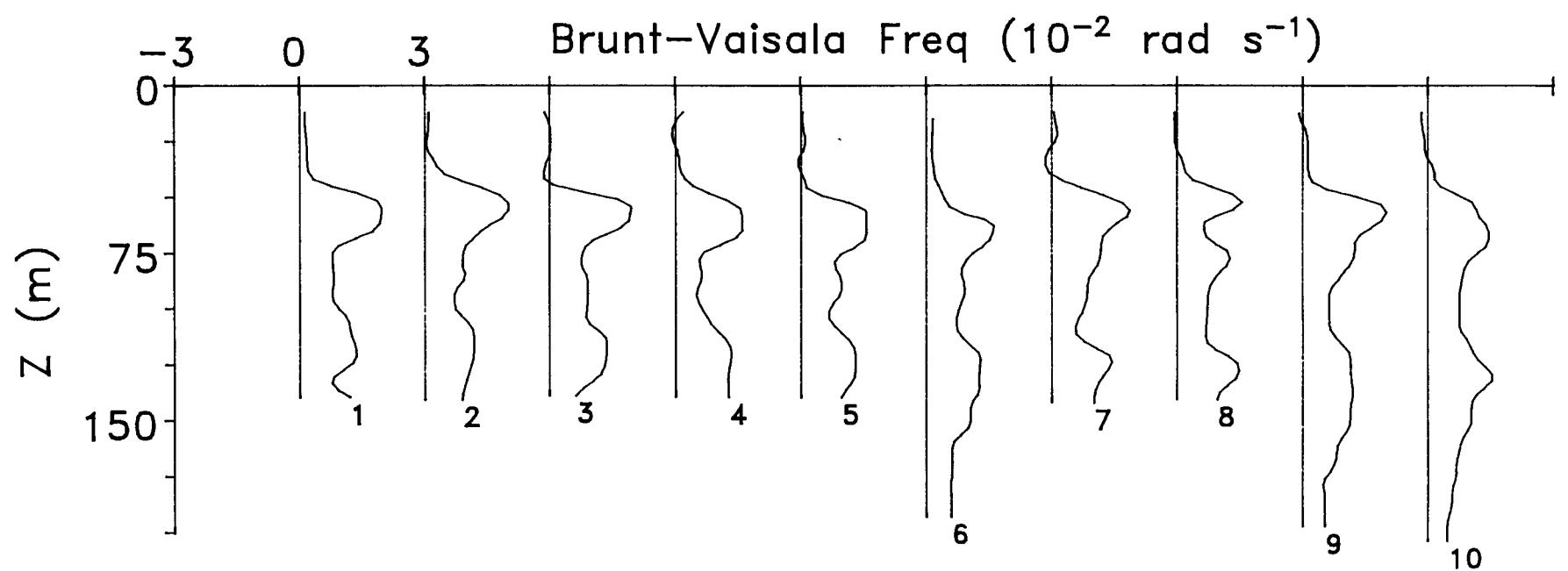
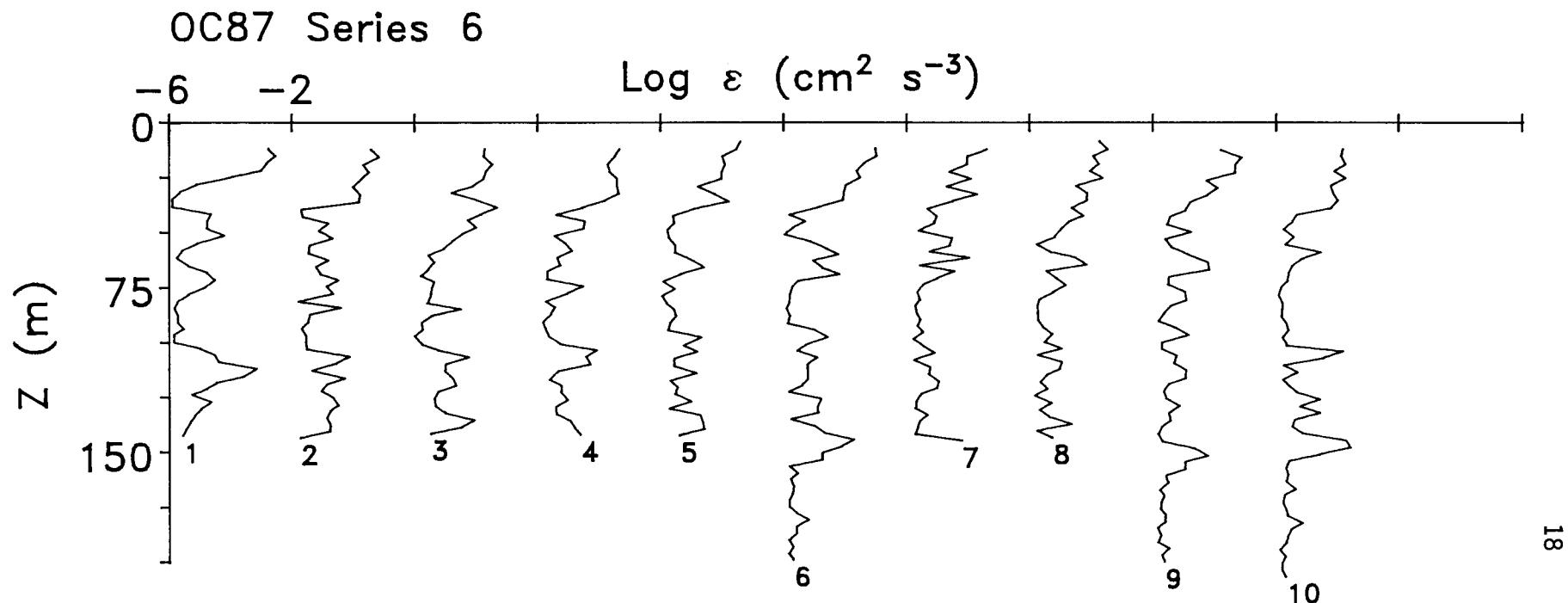
FLY: 2 SERIES: 18 PROFILES: 1 TO 55

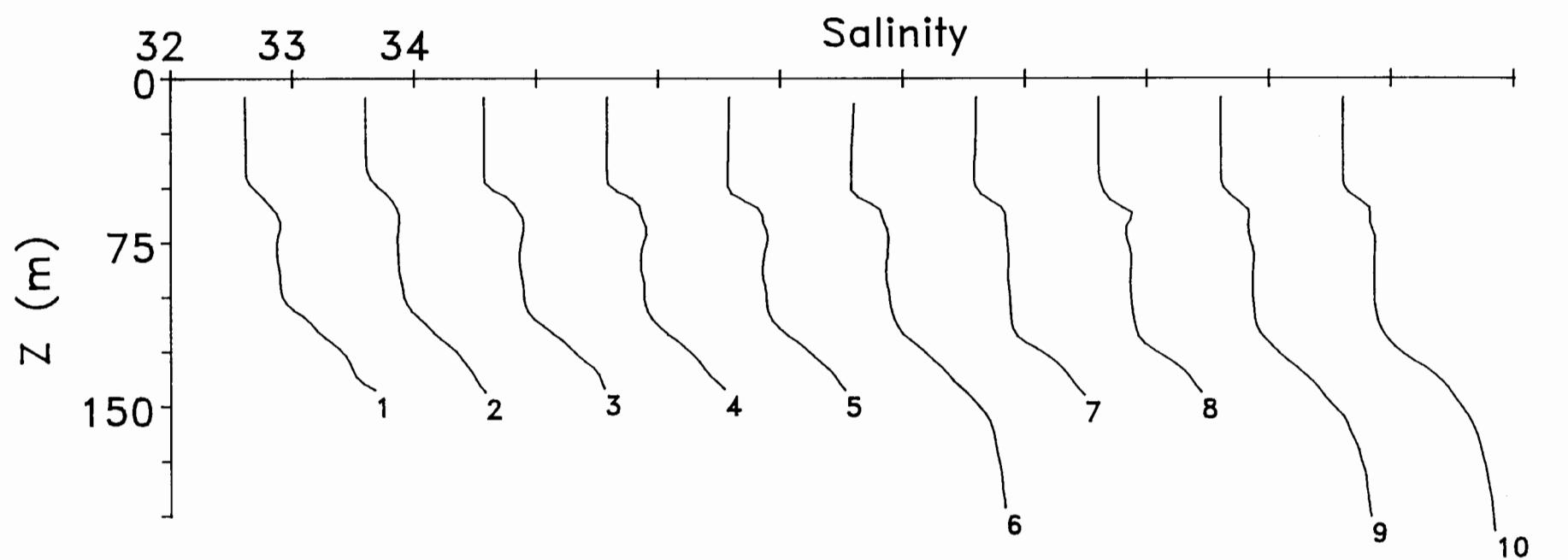
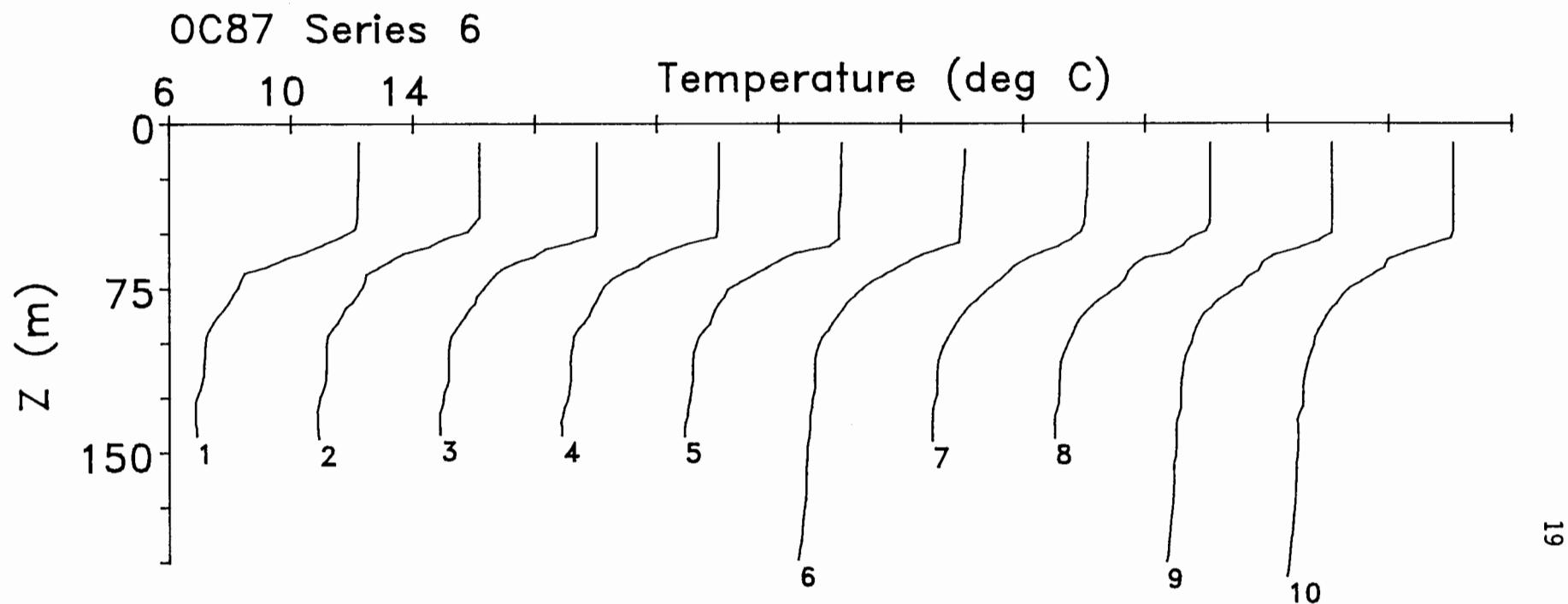
	LORAN LAT/LONG.	DATE	TIME	SHIP	S/H	SFC P	TWIND	S/D	SAT LAT/LONG
1	4750.72	13847.28	071187	0919	.62	097.5	1001.3	14.45	98.9 4750.63 13847.13
2	4750.86	13846.78	071187	0927	.77	108.3	1001.1	13.37	97.0 4750.58 13846.85
3	4750.70	13846.96	071187	0933	.62	094.5	1001.1	14.04	107.0 4750.56 13846.67
4	4750.62	13846.72	071187	0939	.77	100.5	1000.9	13.89	97.0 4750.53 13846.45
5	4750.37	13847.23	071187	0944	.77	095.7	1000.8	14.87	105.6 4750.74 13845.96
6	4750.66	13846.31	071187	0950	.46	098.7	1000.6	10.80	93.0 4750.71 13845.78
7	4750.86	13845.65	071187	0956	.93	093.8	1000.5	14.15	103.1 4750.72 13845.51
8	4751.02	13845.23	071187	1002	.62	085.3	1000.5	13.94	105.0 4750.73 13845.29
9	4751.3	13844.5	071187	1006	.62	084.0	1000.4	13.32	104.0 4750.7 13845.1
10	4751.21	13844.64	071187	1015	.62	082.7	1000.3	13.79	97.4 4750.74 13844.83
11	4750.95	13845.15	071187	1021	.46	080.5	1000.4	14.92	3.2 4750.75 13844.61
12	4751.61	13843.16	071187	1108	.62	087.7	999.7	15.02	100.0 4751.40 13842.79
13	4751.54	13843.32	071187	1113	.93	086.7	999.6	16.77	104.0 4751.40 13842.63
14	4751.70	13842.91	071187	1121	.46	097.2	999.5	13.79	99.7 4751.41 13842.38
15	4751.67	13842.83	071187	1127	.77	087.7	999.3	12.91	94.7 4751.40 13842.17
16	4751.79	13842.41	071187	1131	.62	090.2	999.2	14.87	96.0 4751.40 13842.04
17	4751.98	13841.83	071187	1137	.62	091.2	999.1	15.48	97.7 4751.38 13841.84
18	4752.08	13841.50	071187	1142	.46	096.7	998.9	13.89	102.0 4751.38 13841.73
19	4752.00	13841.51	071187	1146	.46	089.3	998.8	12.65	104.0 4751.37 13841.61
20	4752.04	13841.27	071187	1154	.77	099.2	998.5	12.45	103.3 4751.35 13841.31
21	4752.08	13840.86	071187	1200	.62	103.3	998.4	14.92	96.0 4751.34 13841.08
22	4751.88	13841.04	071187	1206	.93	093.5	998.4	14.87	102.1 4751.76 13840.66
23	4751.84	13841.05	071187	1211	1.08	091.3	998.3	13.99	91.7 4751.75 13840.48
24	4751.77	13840.97	071187	1217	.77	096.5	998.4	11.83	94.0 4751.74 13840.25
25	4752.32	13839.32	071187	1225	.62	102.7	998.3	12.35	97.0 4751.93 13840.10
26	4752.22	13839.41	071187	1231	.93	107.7	998.1	12.35	96.0 4751.89 13839.94
27	4751.99	13839.59	071187	1240	.62	093.2	998.0	13.89	99.0 4751.88 13839.69
28	4751.95	13839.60	071187	1244	.31	098.0	998.0	14.40	92.5 4751.88 13839.57
29	4751.90	13839.44	071187	1254	.77	092.2	998.0	12.86	98.0 4751.88 13839.30

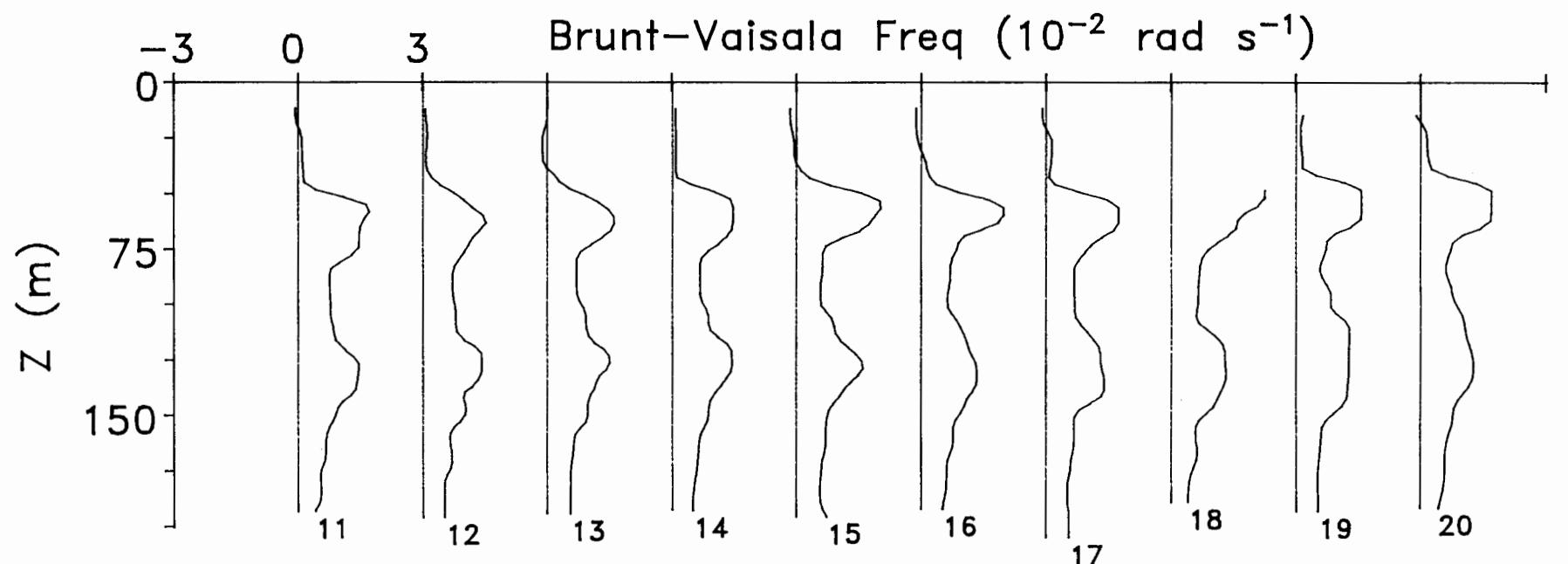
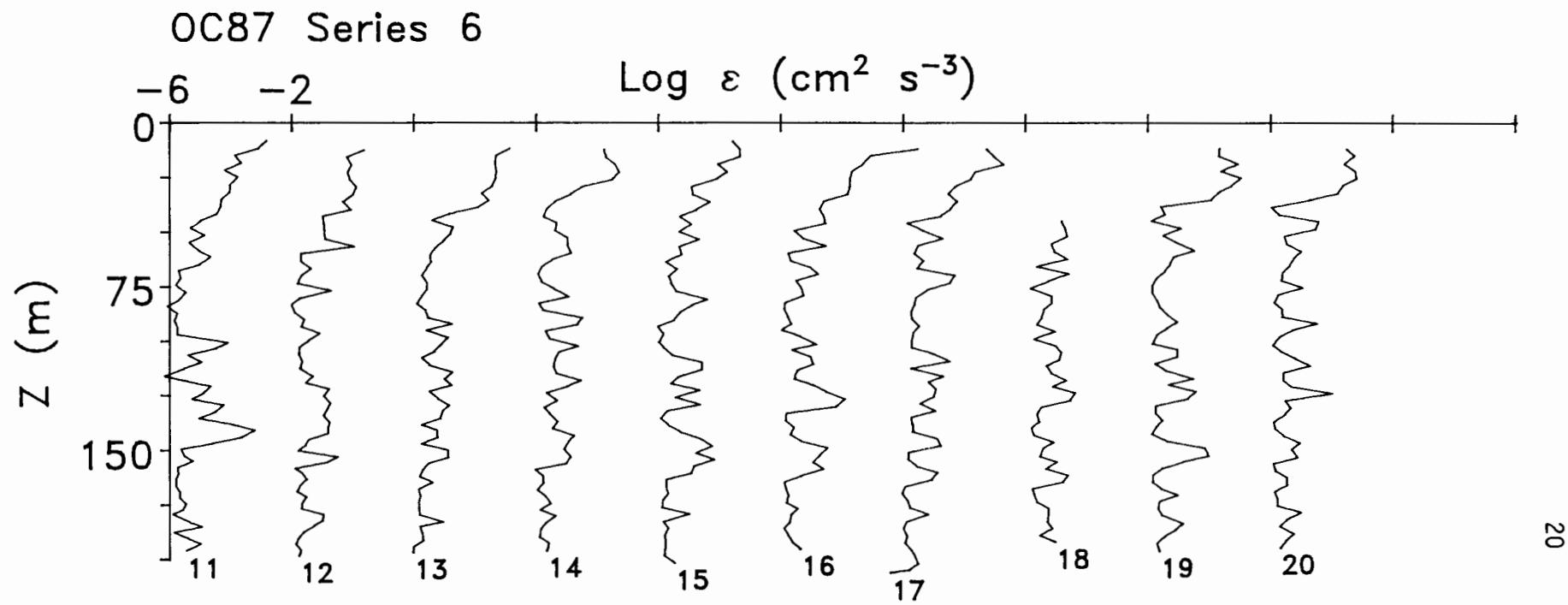
## SAIL LIST

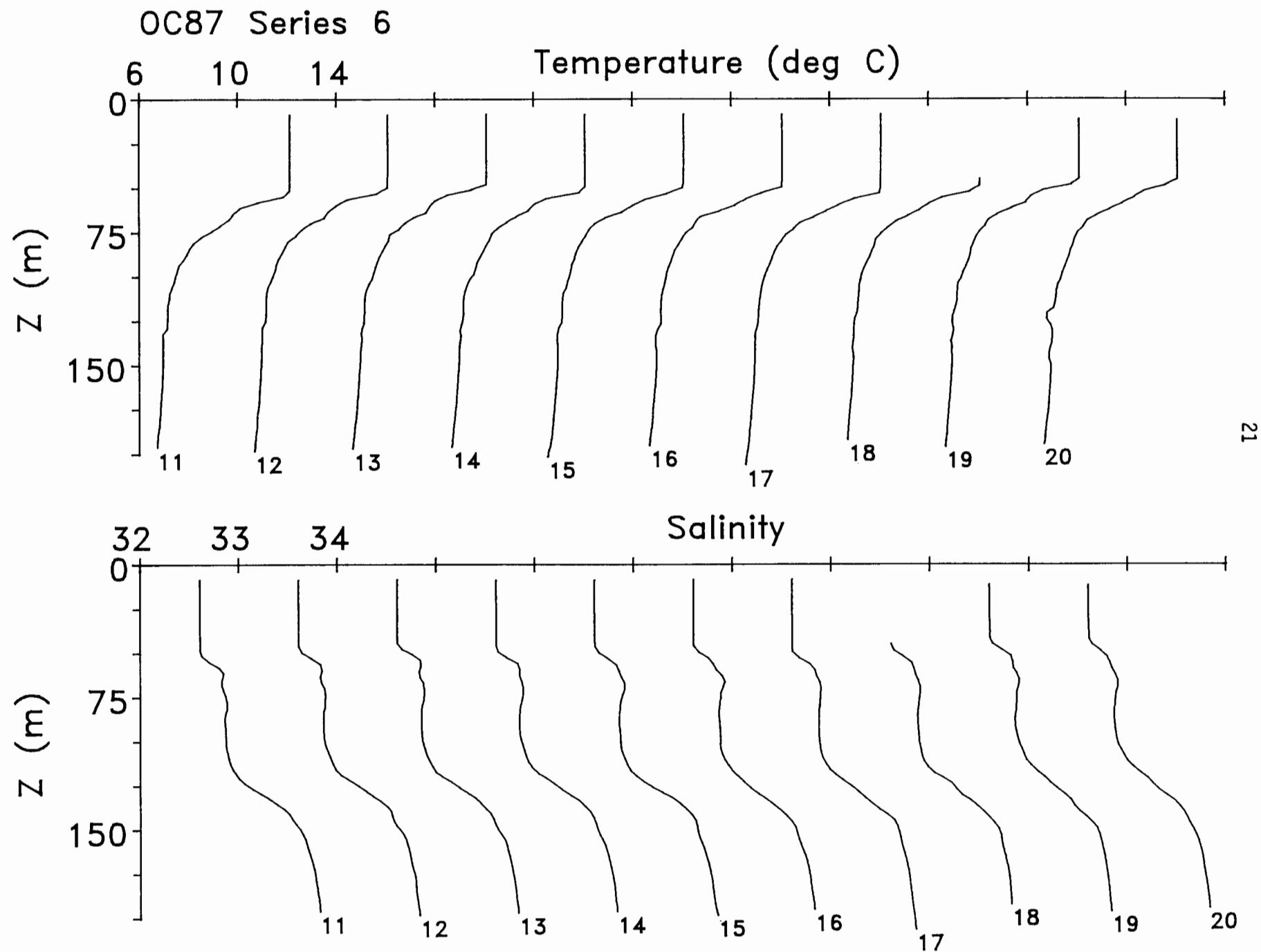
FLY: 2 SERIES: 18 PROFILES: 1 TO 55

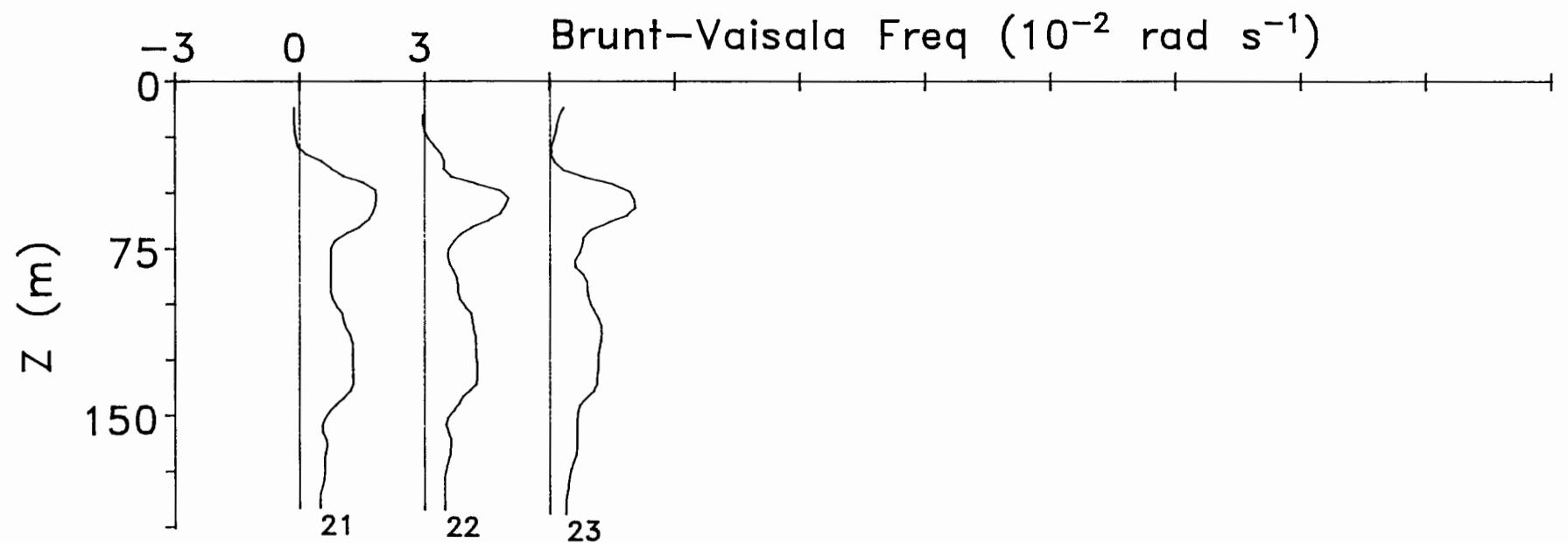
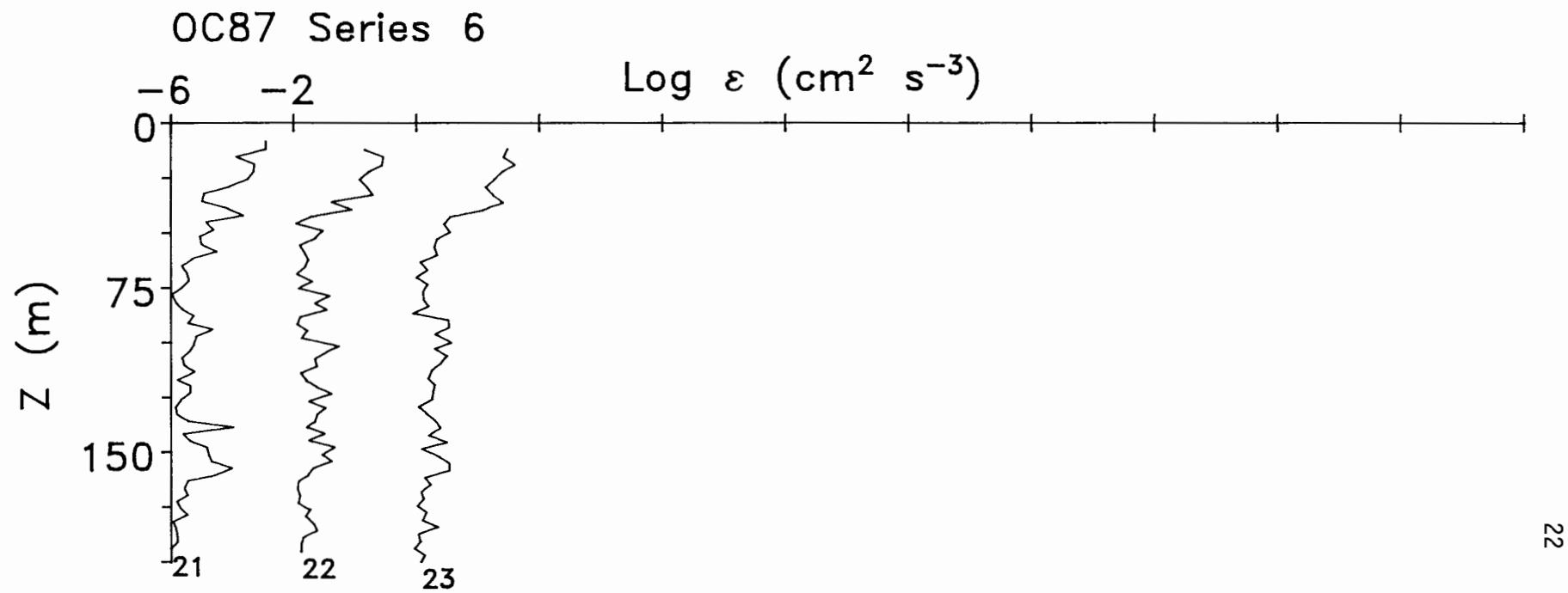
	LORAN LAT/LONG.	DATE	TIME	SHIP	S/H	SFC P	TWIND	S/D	SAT LAT/LONG
30	4752.04	13838.87	071187	1300	.77	089.7 997.9	12.96	98.5	4751.87 13839.09
31	4752.37	13837.96	071187	1309	.62	046.5 997.8	13.53	87.8	4751.89 13838.79
32	4752.69	13837.77	071187	1319	.93	054.5 997.6	12.14	93.6	4752.08 13838.41
33	4752.82	13837.92	071187	1329	.93	054.0 997.4	12.35	3.1	4752.27 13838.04
34	4753.23	13837.24	071187	1340	.93	053.2 997.2	11.88	98.3	4752.45 13837.67
35	4753.54	13836.90	071187	1346	.77	049.8 997.2	13.68	92.2	4753.33 13837.22
36	4753.77	13836.48	071187	1352	.77	049.8 997.2	11.83	3.0	4753.44 13837.00
37	4753.90	13836.47	071187	1358	1.08	054.3 997.2	11.83	1.7	4753.56 13836.77
38	4754.10	13836.45	071187	1406	.77	052.8 997.1	13.22	90.6	4753.91 13836.44
39	4754.27	13836.19	071187	1411	.93	048.2 997.1	16.36	87.7	4753.98 13836.30
40	4754.45	13836.10	071187	1417	.77	050.5 997.0	13.53	91.5	4754.30 13835.63
41	4754.67	13835.76	071187	1423	.93	051.5 997.0	14.20	92.1	4754.41 13835.44
42	4754.92	13835.50	071187	1429	.77	050.0 996.9	14.20	91.3	4754.52 13835.24
43	4755.2	13834.8	071187	1433	1.08	052.7 996.8	14.04	91.9	4754.6 13835.0
44	4755.38	13834.74	071187	1444	.93	093.3 996.7	15.17	98.1	4754.75 13834.71
45	4755.26	13834.75	071187	1450	.77	084.3 996.6	13.32	96.5	4755.16 13835.13
46	4755.22	13834.76	071187	1454	.77	089.8 996.5	13.89	82.0	4755.16 13834.94
47	4755.29	13834.12	071187	1502	.77	090.8 996.3	13.12	96.4	4755.16 13834.59
48	4755.24	13833.73	071187	1508	.77	080.8 996.2	12.14	96.5	4755.17 13834.34
49	4755.09	13833.66	071187	1515	.93	077.3 996.2	12.76	97.6	4755.18 13834.07
50	4754.99	13833.59	071187	1521	1.08	084.8 996.1	13.68	90.8	4755.18 13833.83
51	4755.30	13832.78	071187	1525	.93	091.5 995.9	14.92	90.0	4755.19 13833.67
52	4755.30	13832.54	071187	1531	.77	092.7 995.7	11.83	83.0	4755.22 13833.42
53	4755.46	13832.29	071187	1533	.62	088.2 995.7	12.60	92.2	4755.15 13832.31
54	4755.53	13831.73	071187	1542	.93	094.0 995.6	12.35	71.0	4755.16 13831.99
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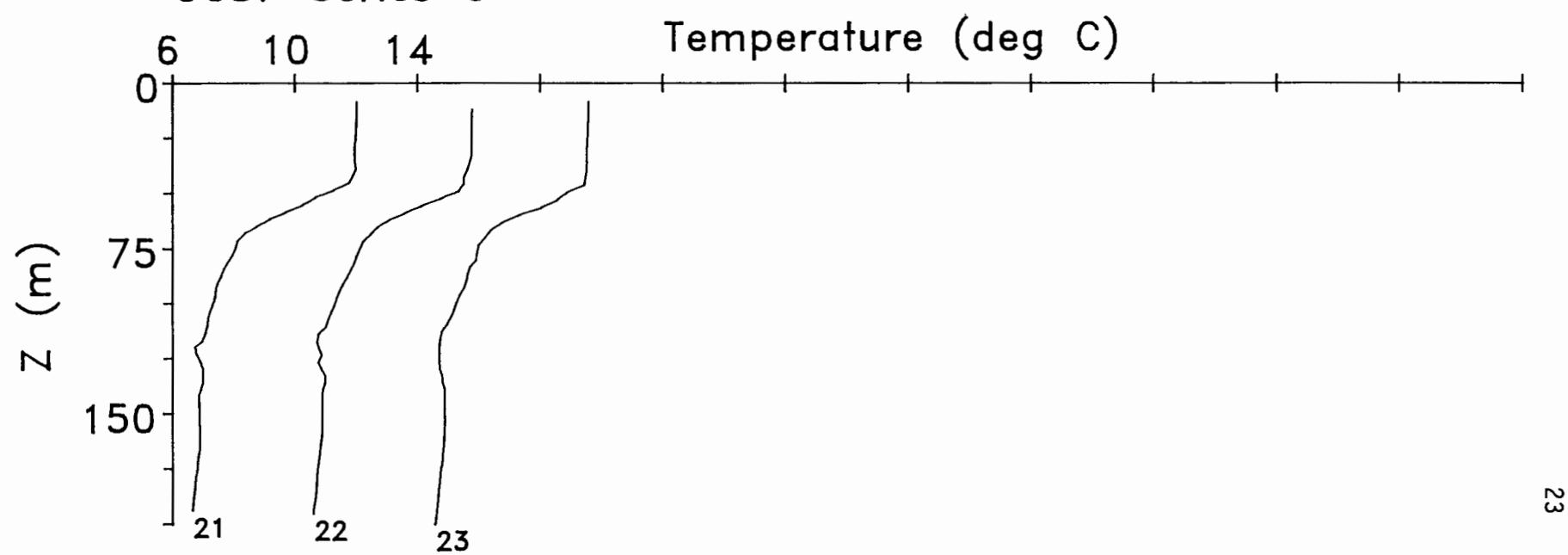




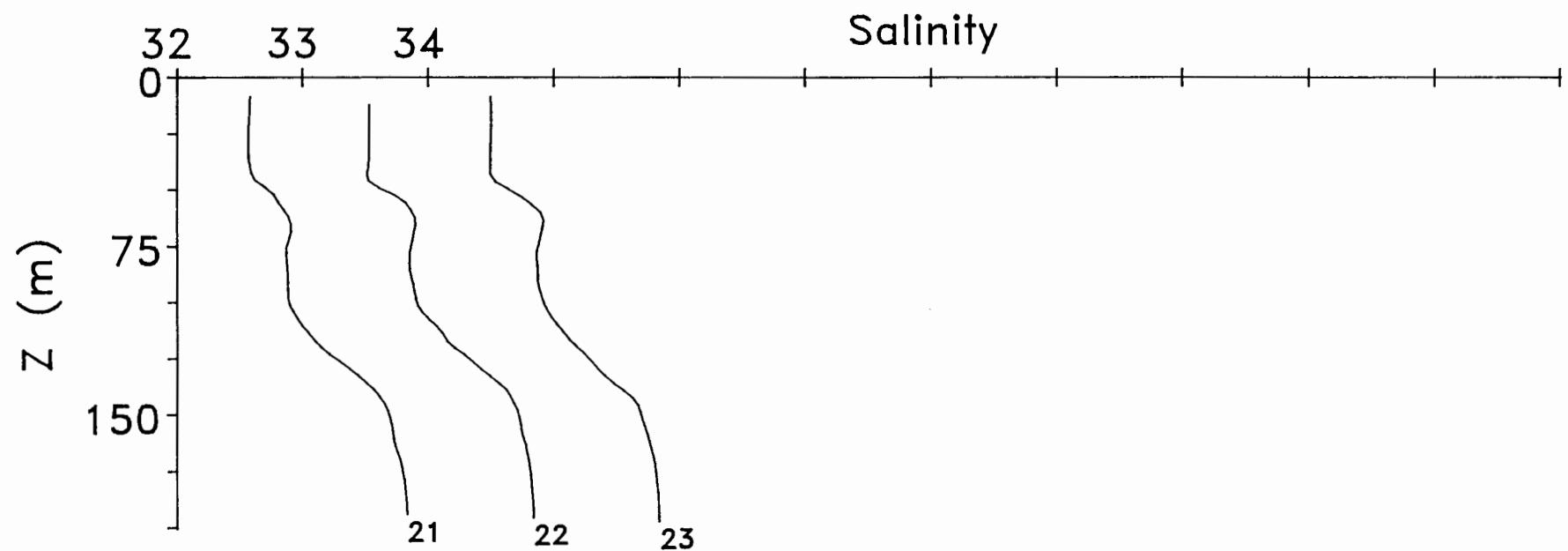


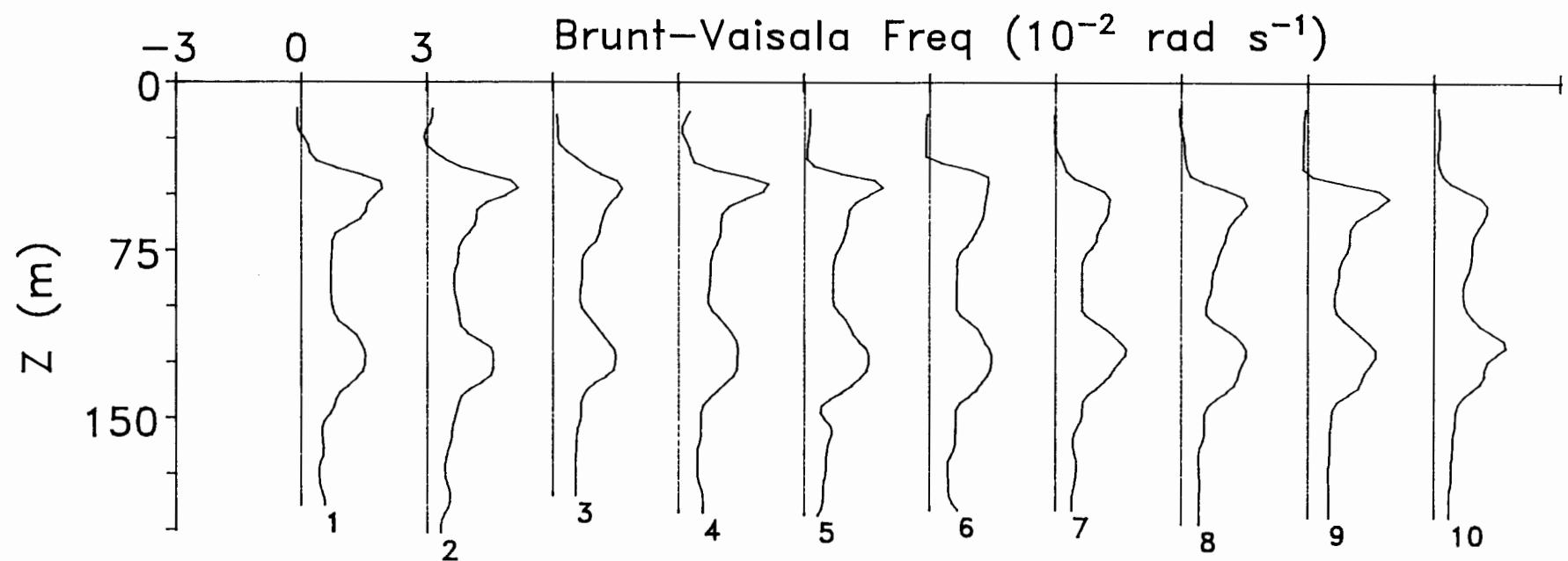
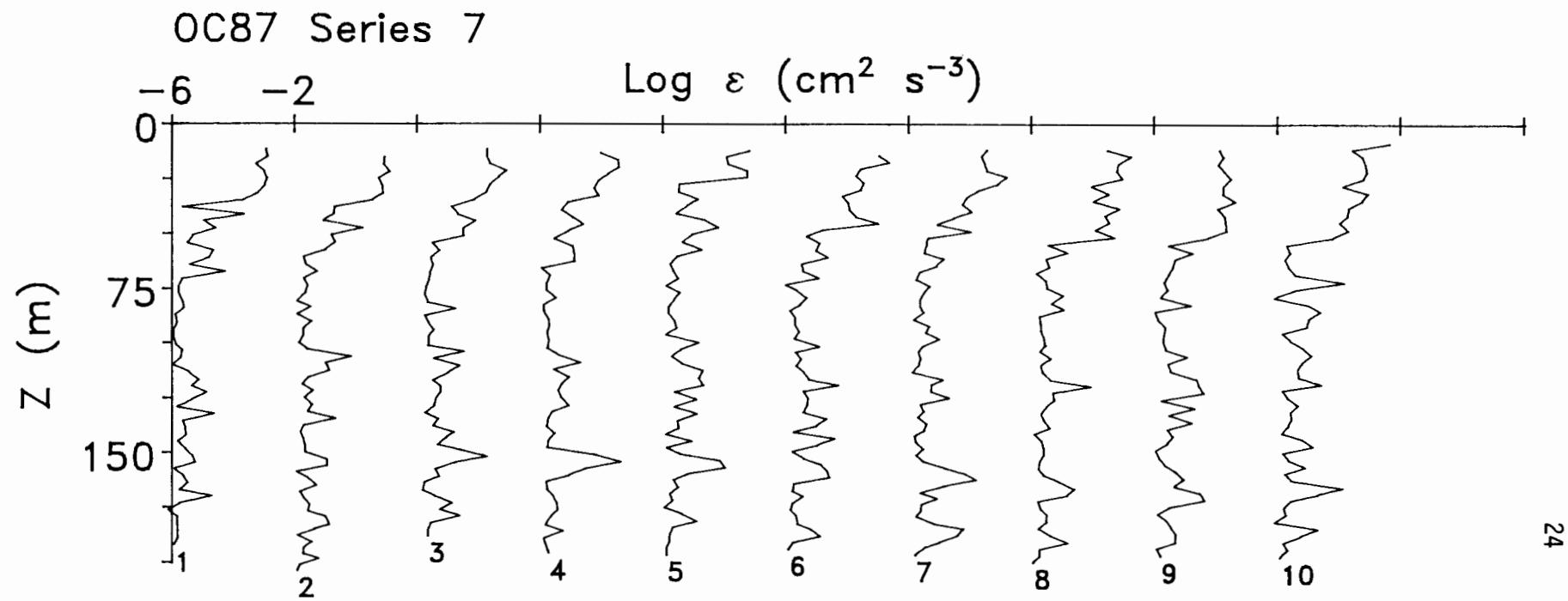


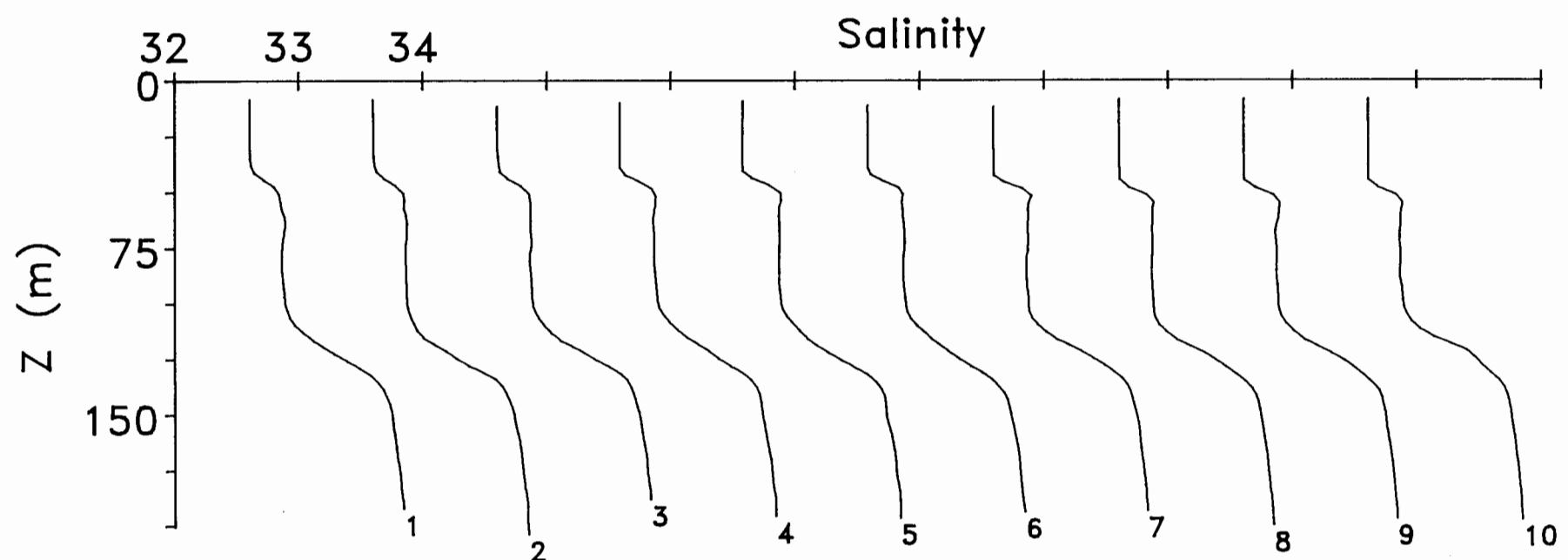
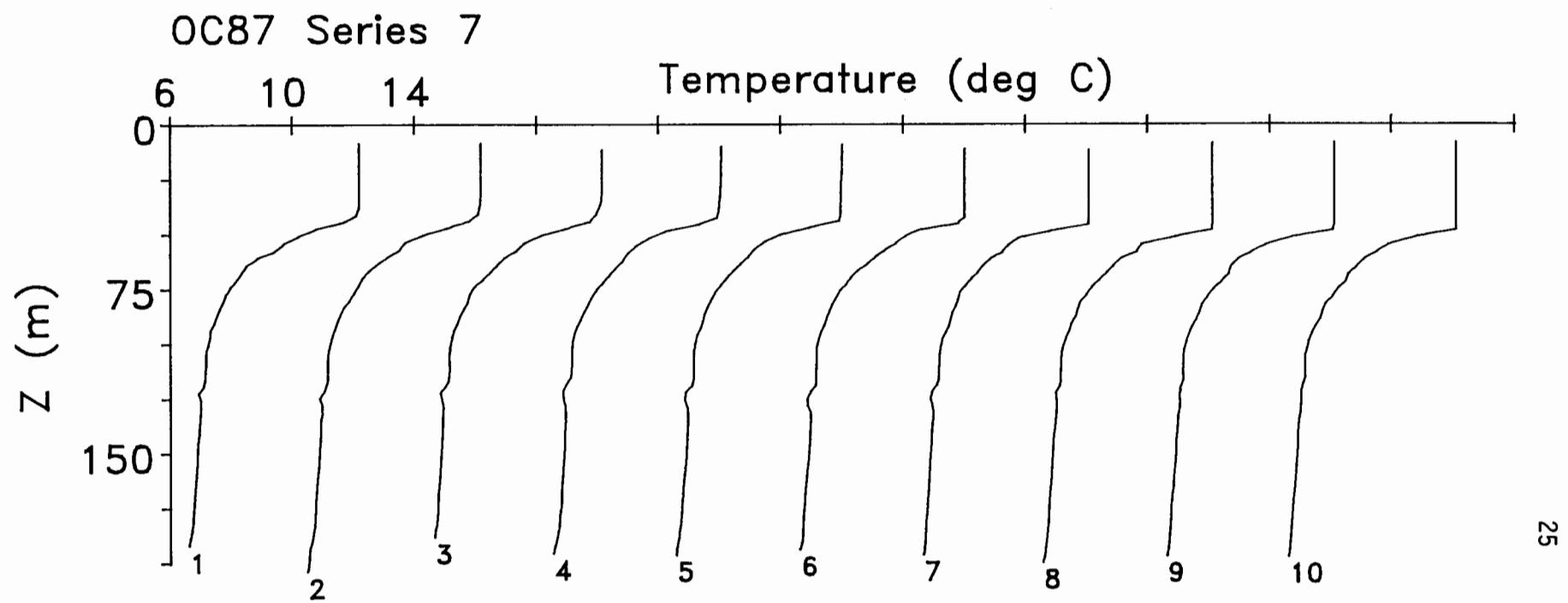
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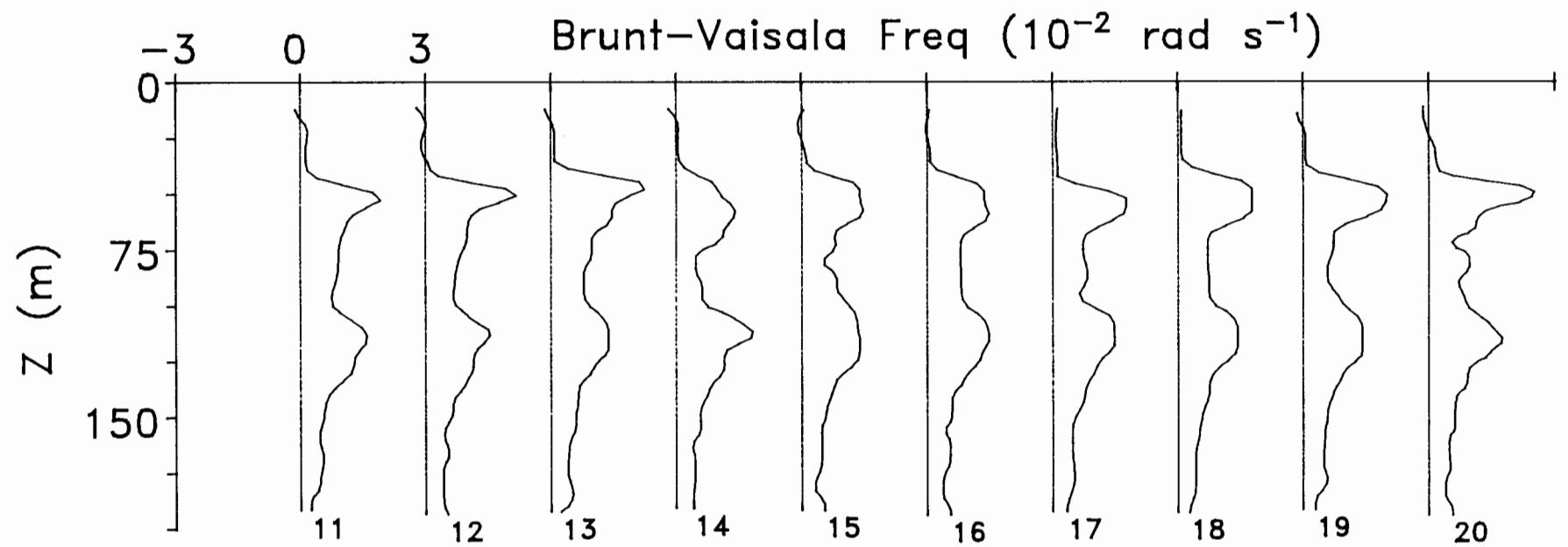
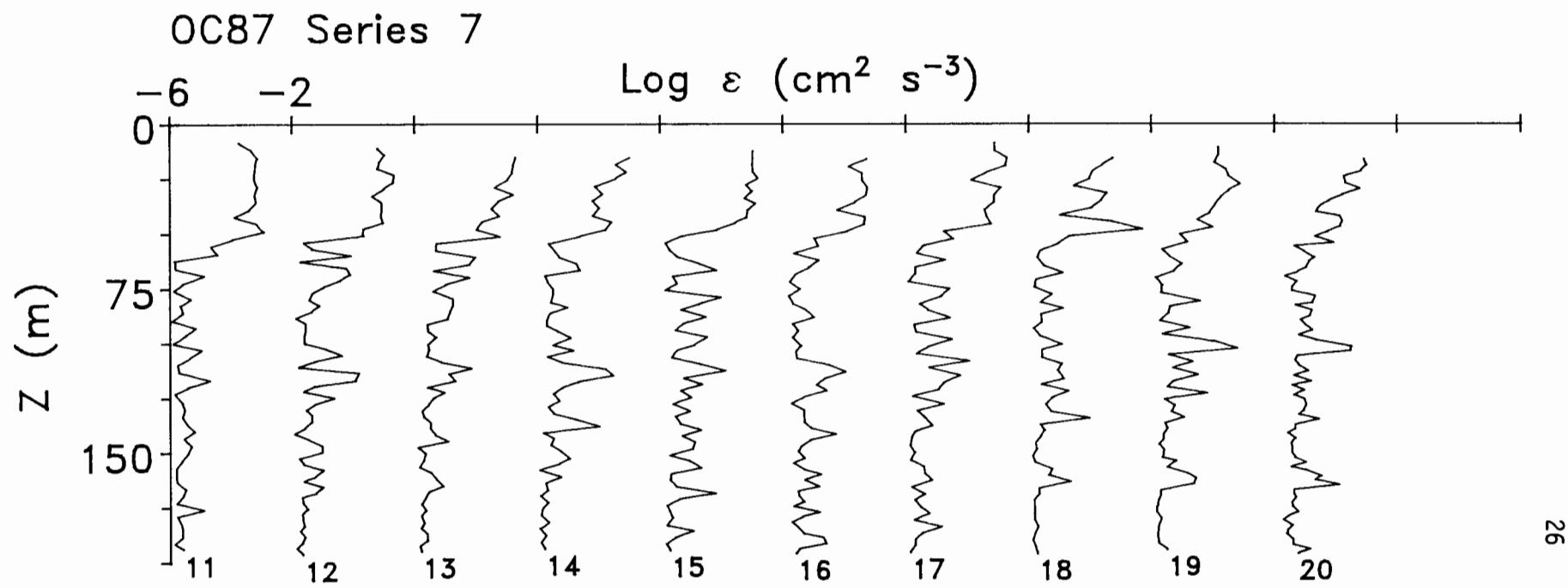


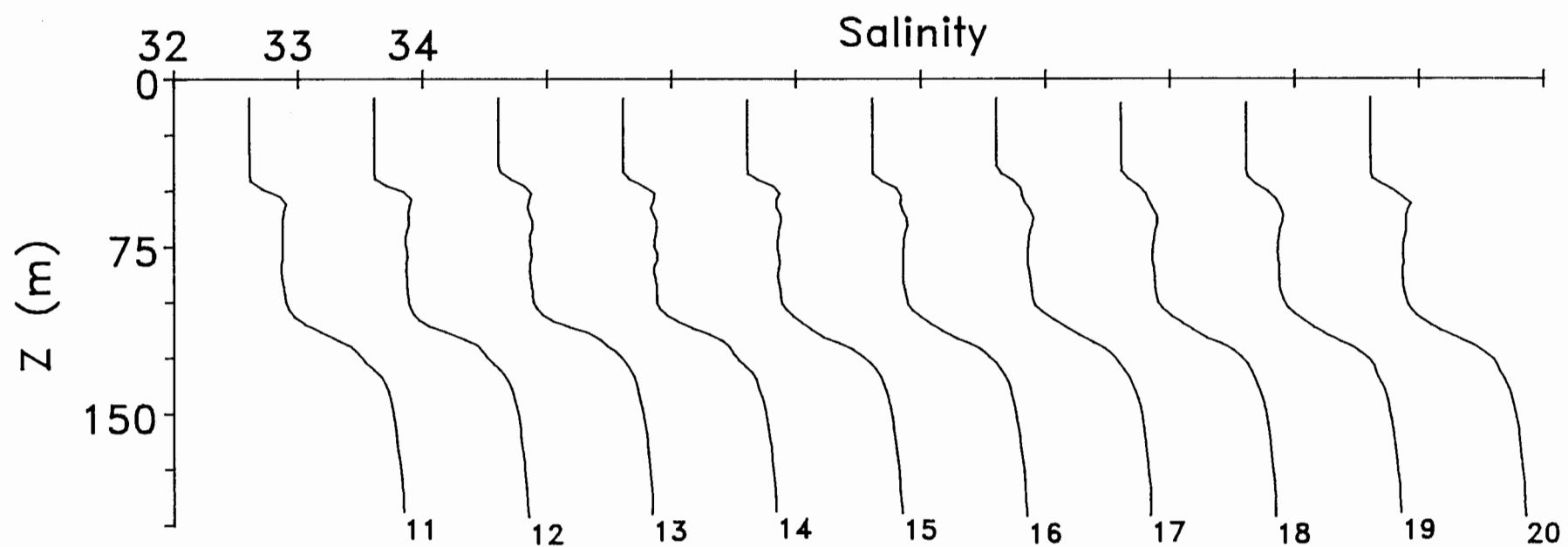
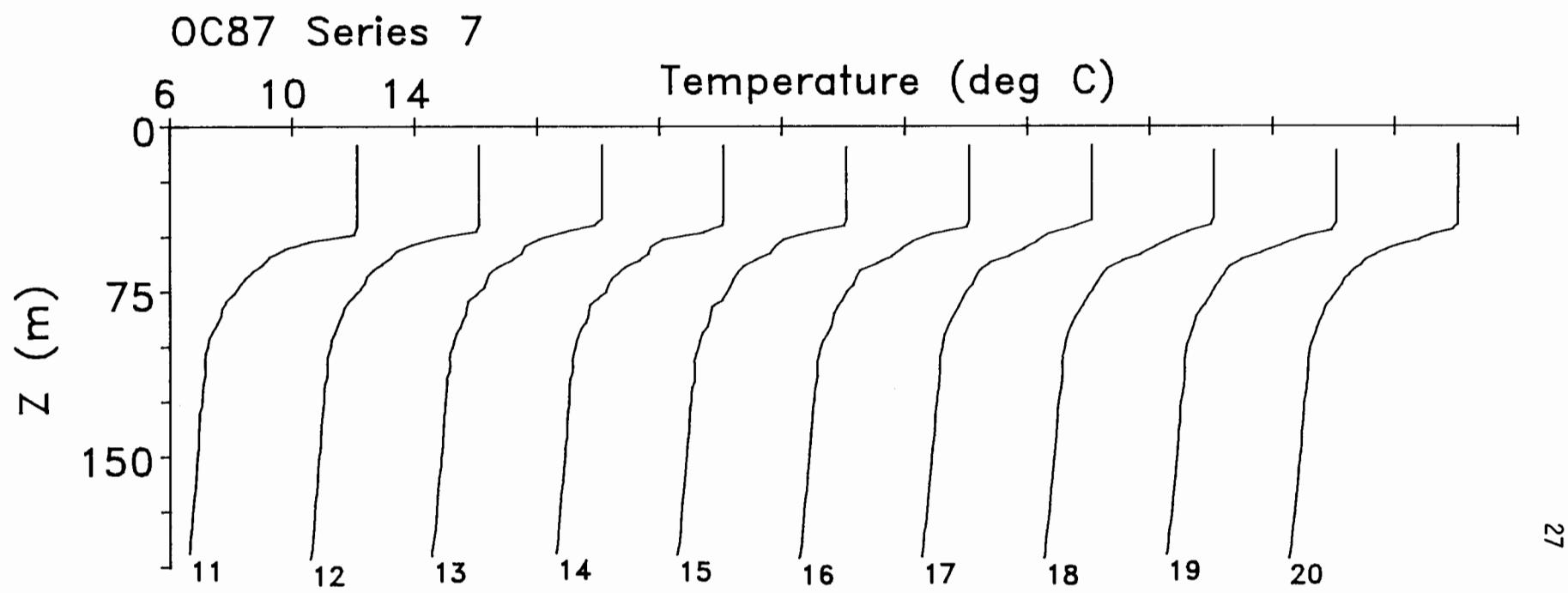
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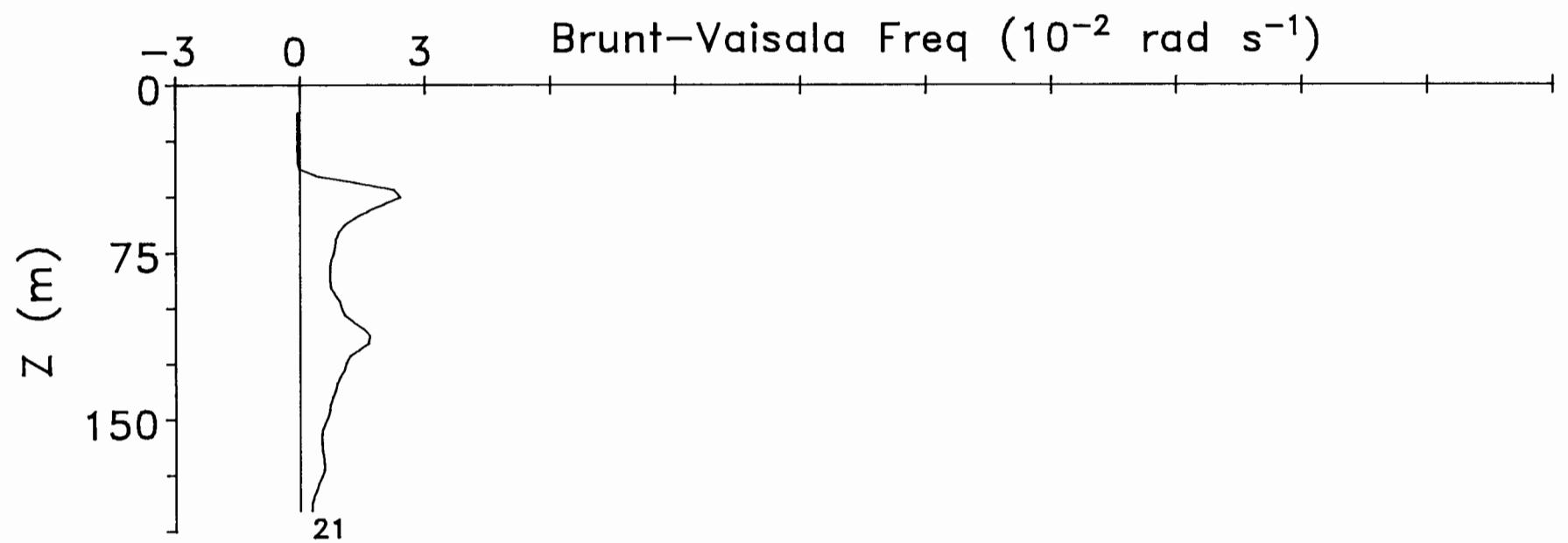
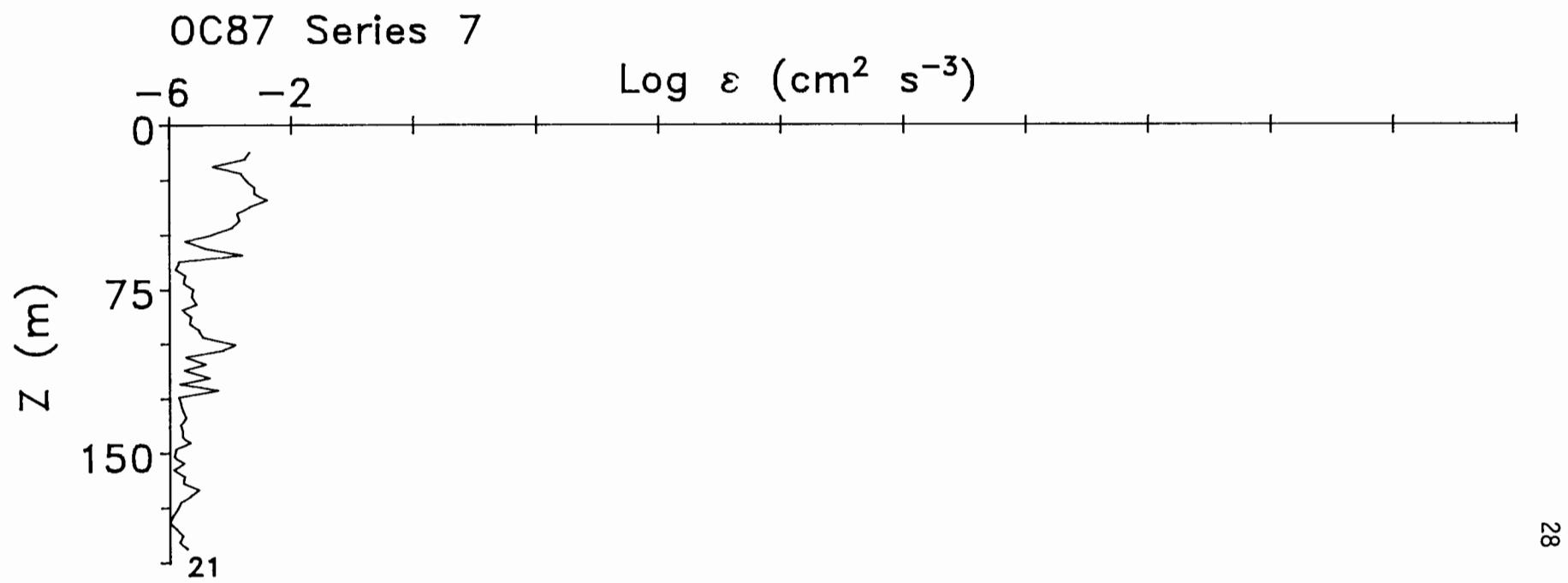


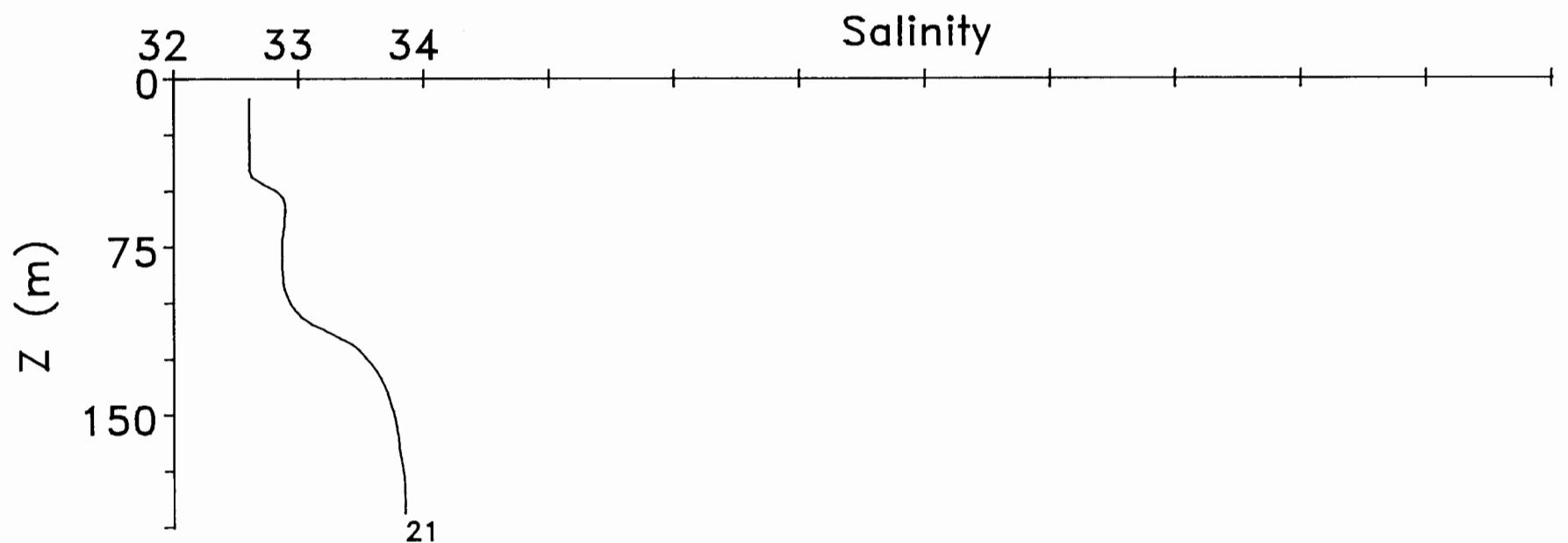
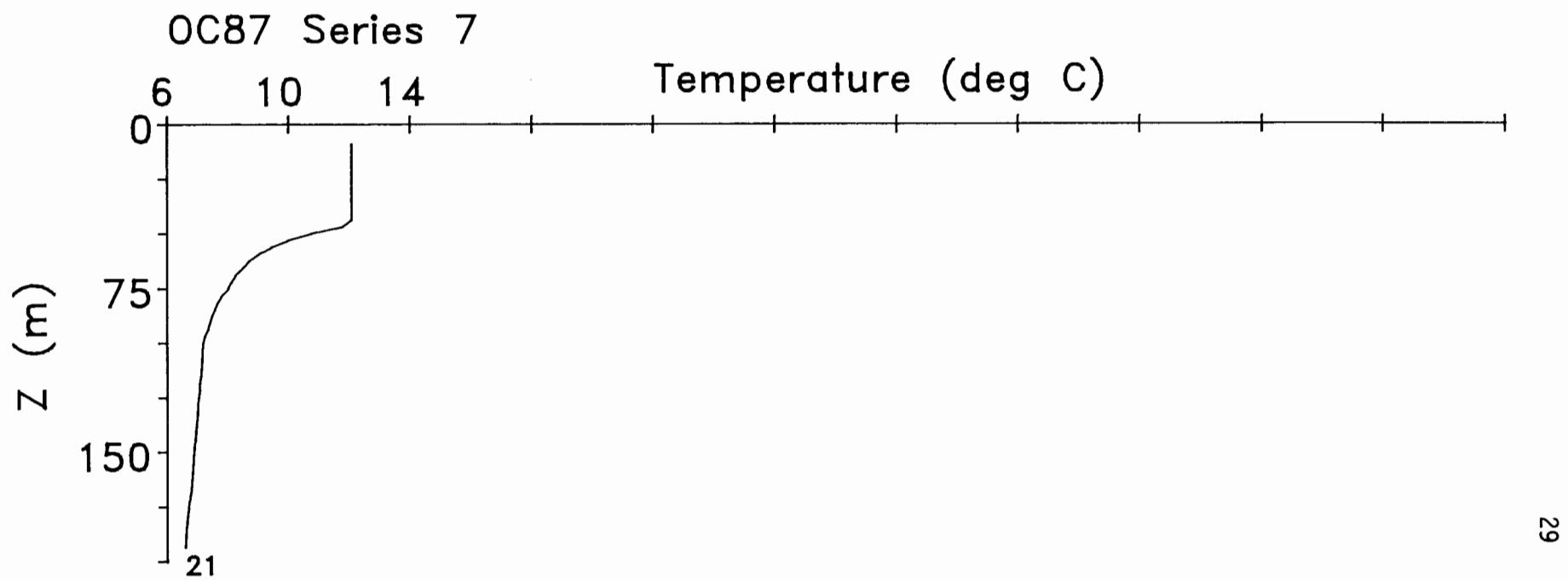


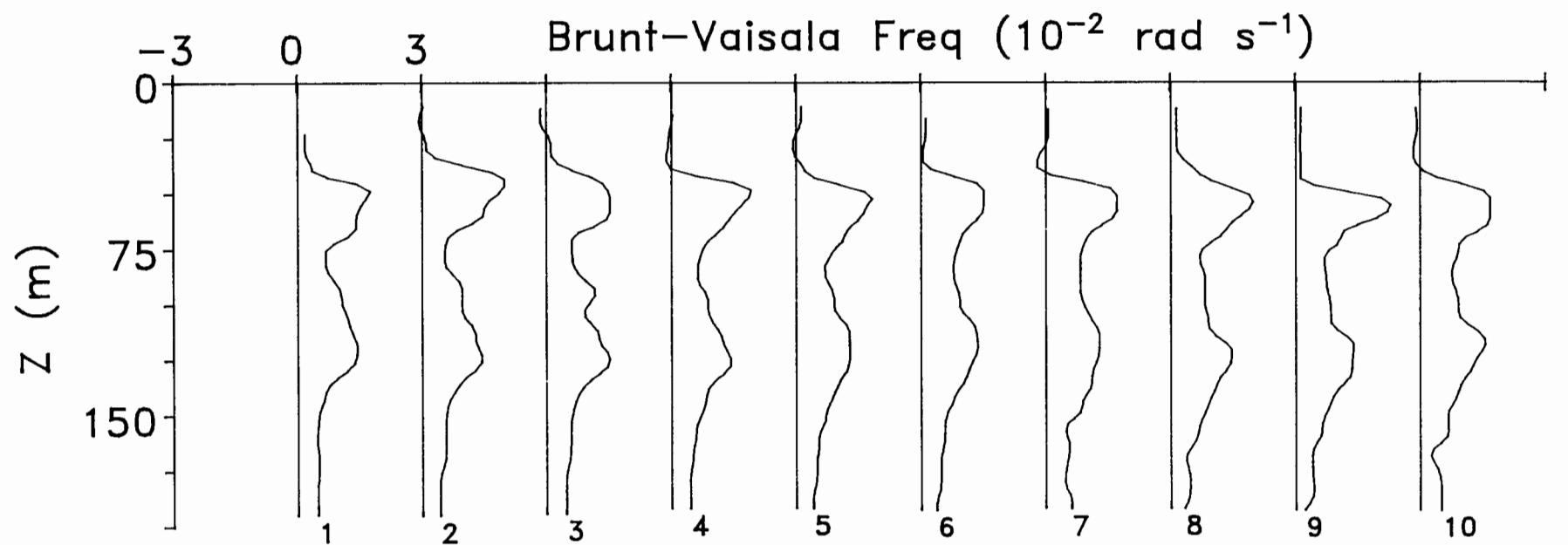
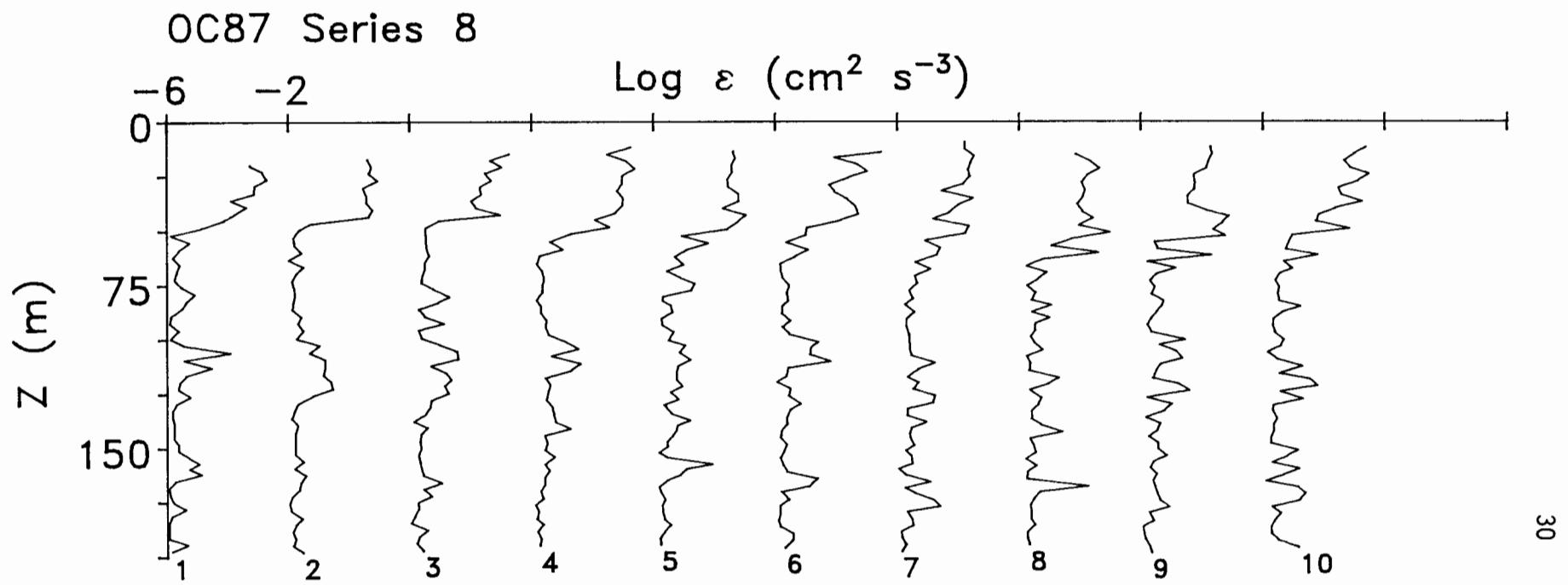


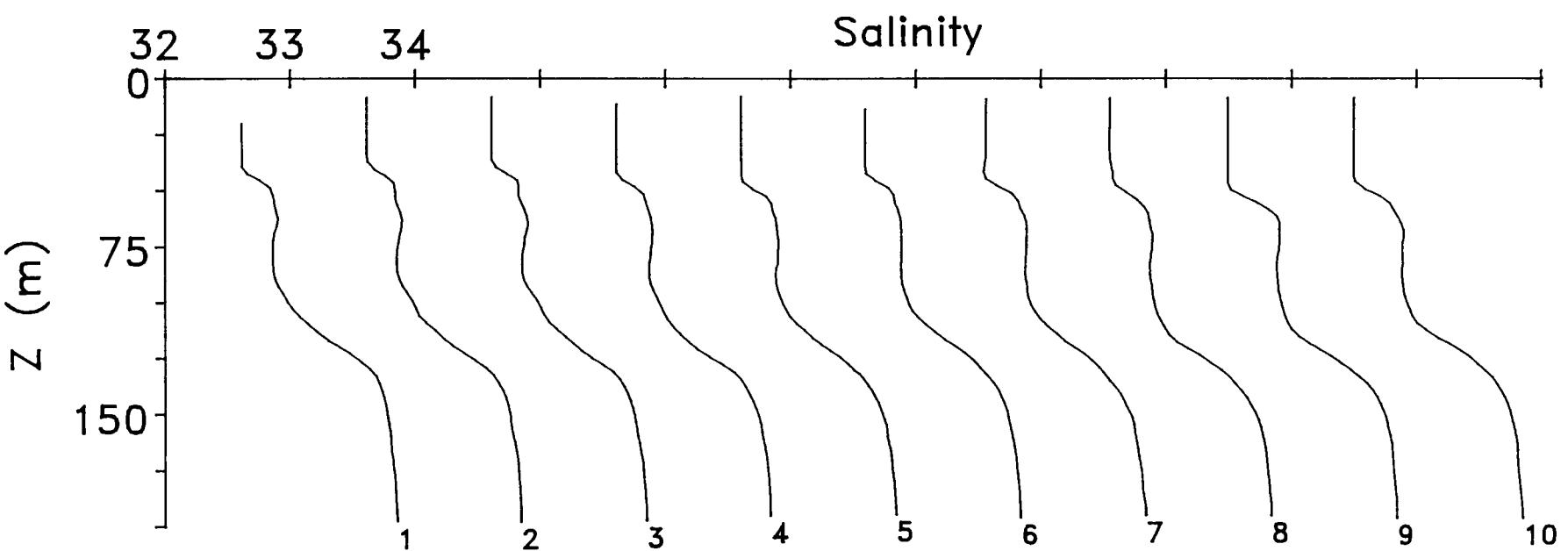
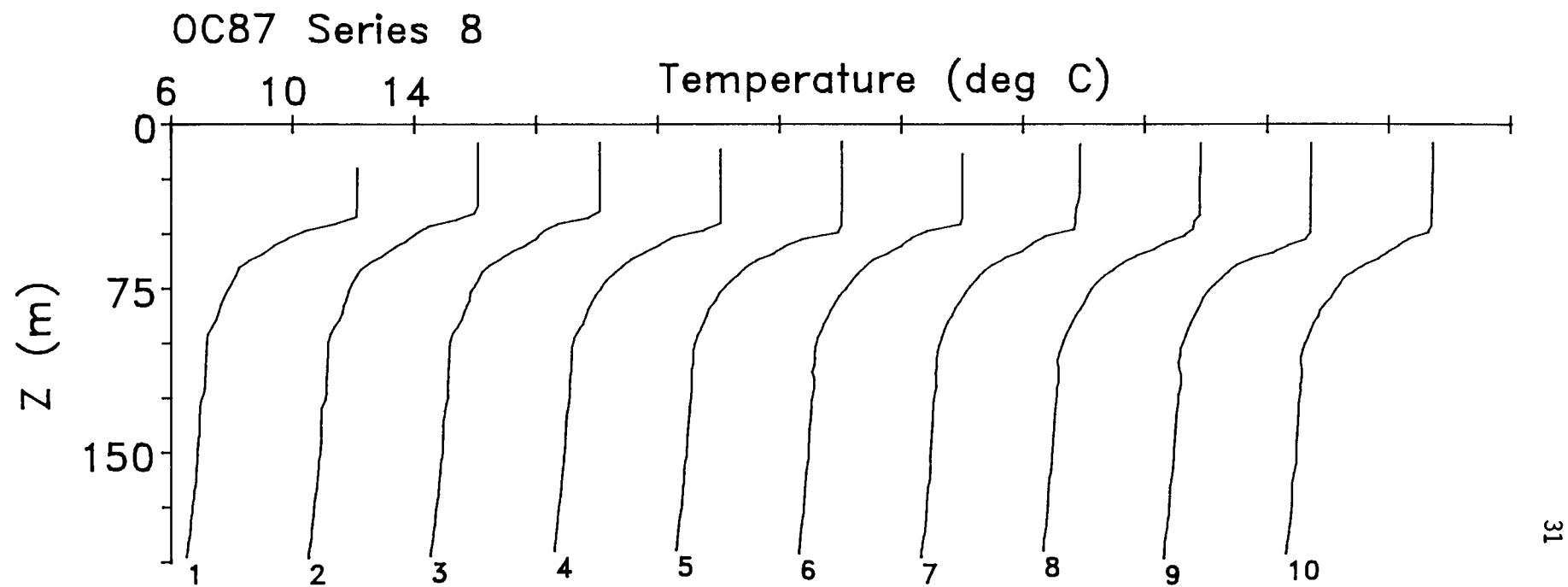


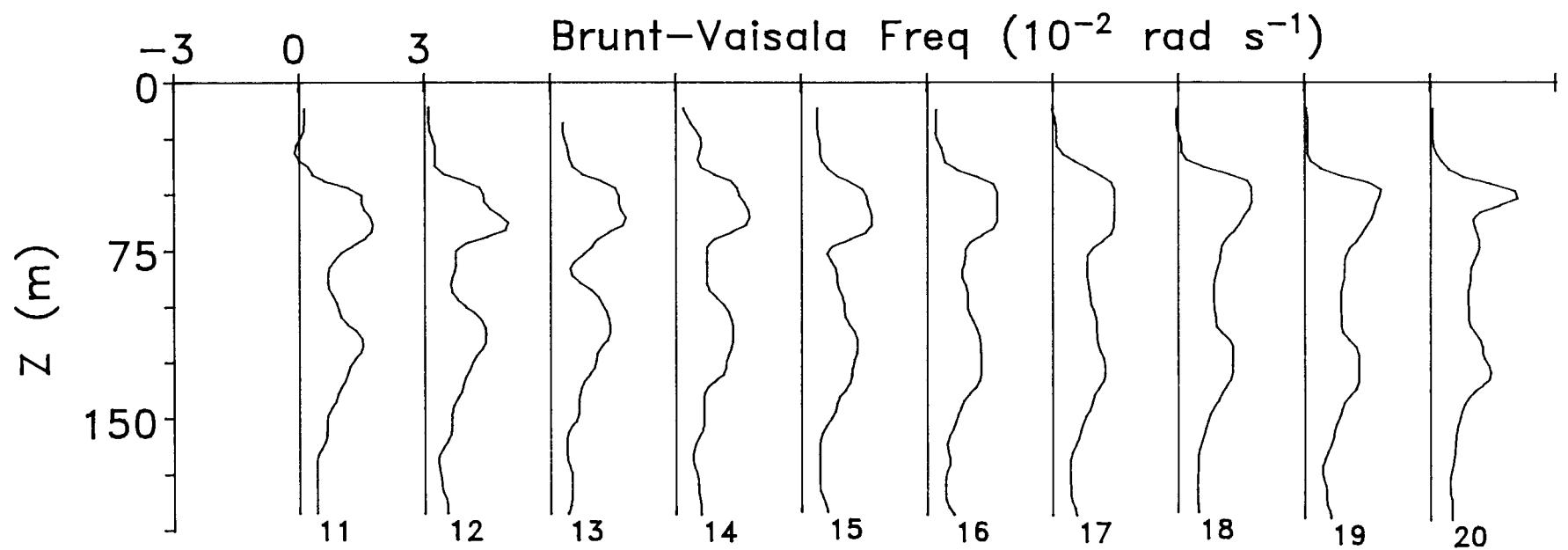
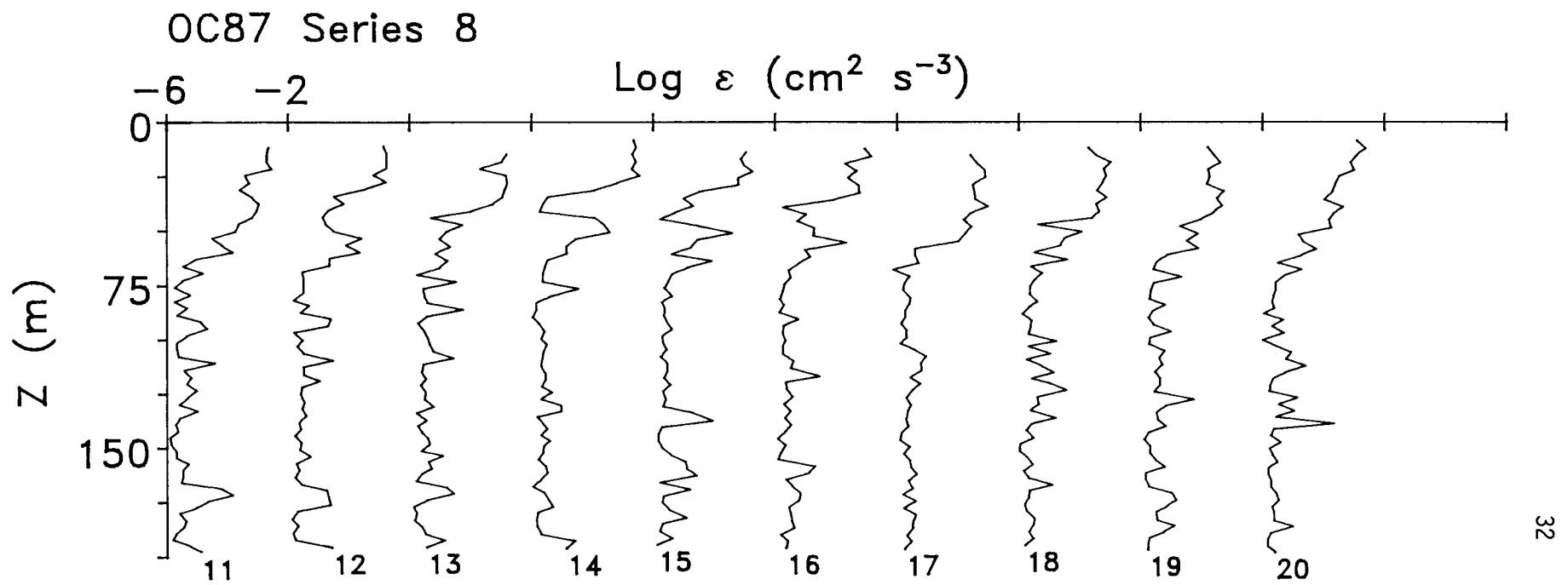


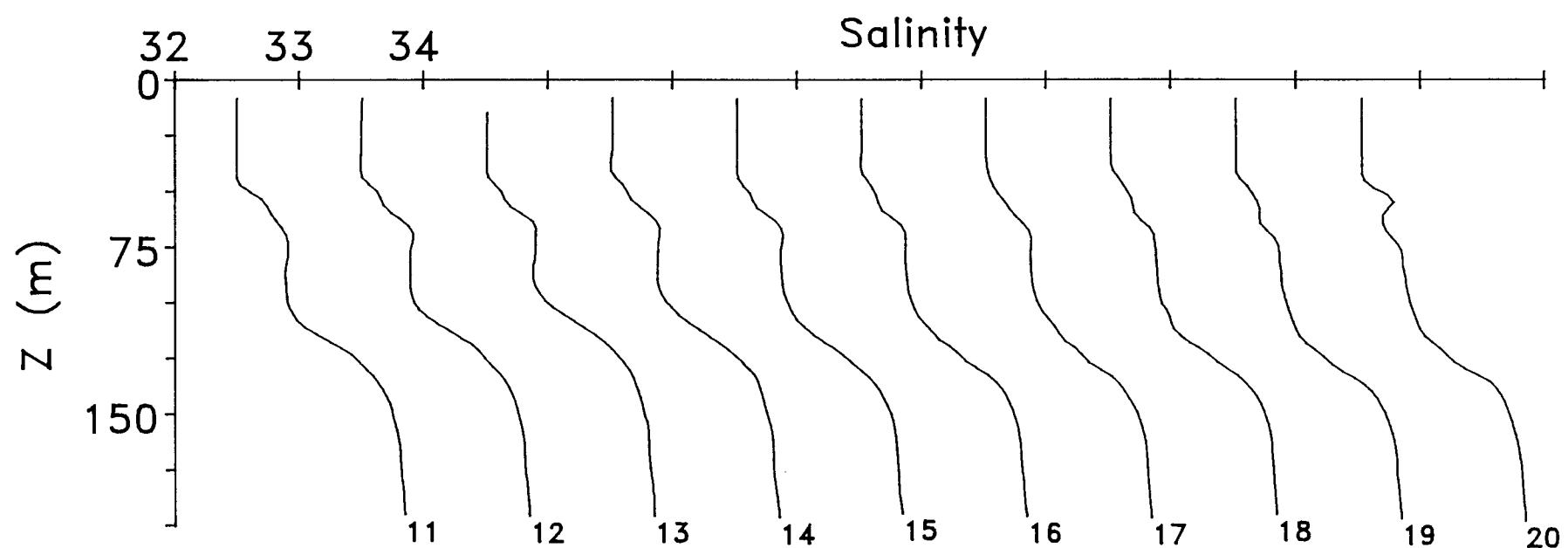
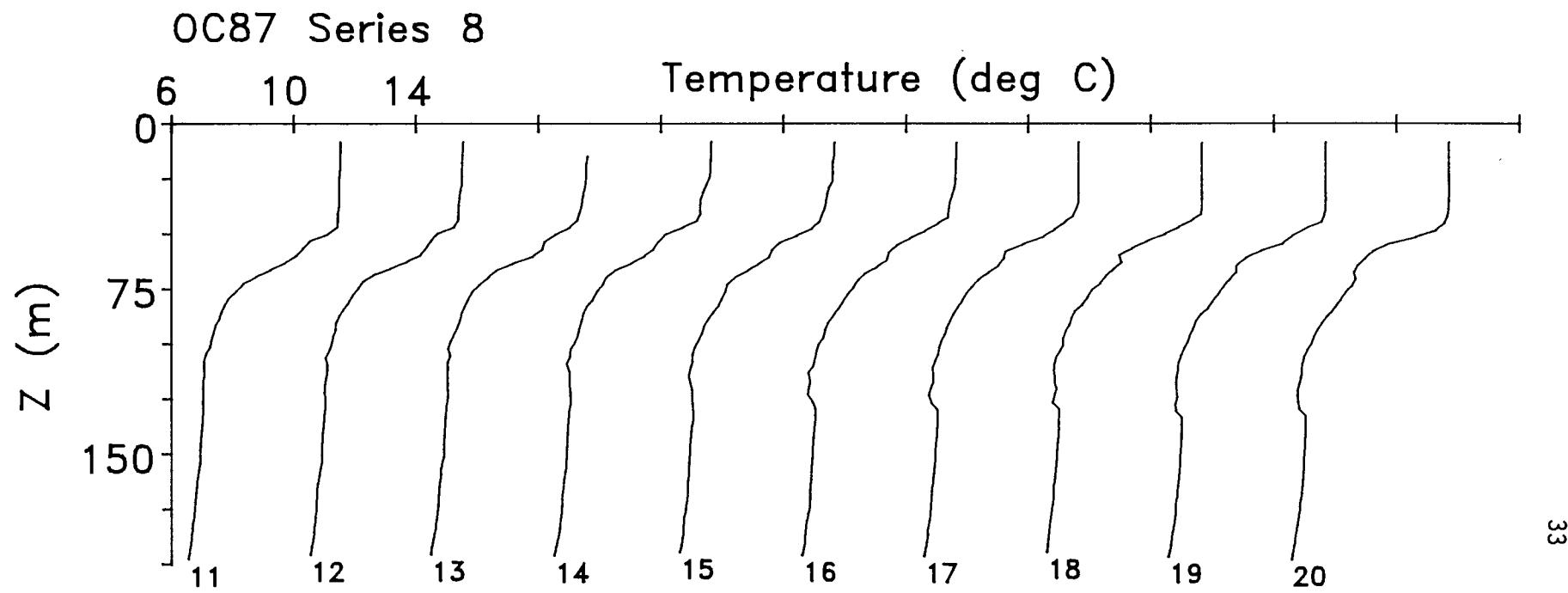


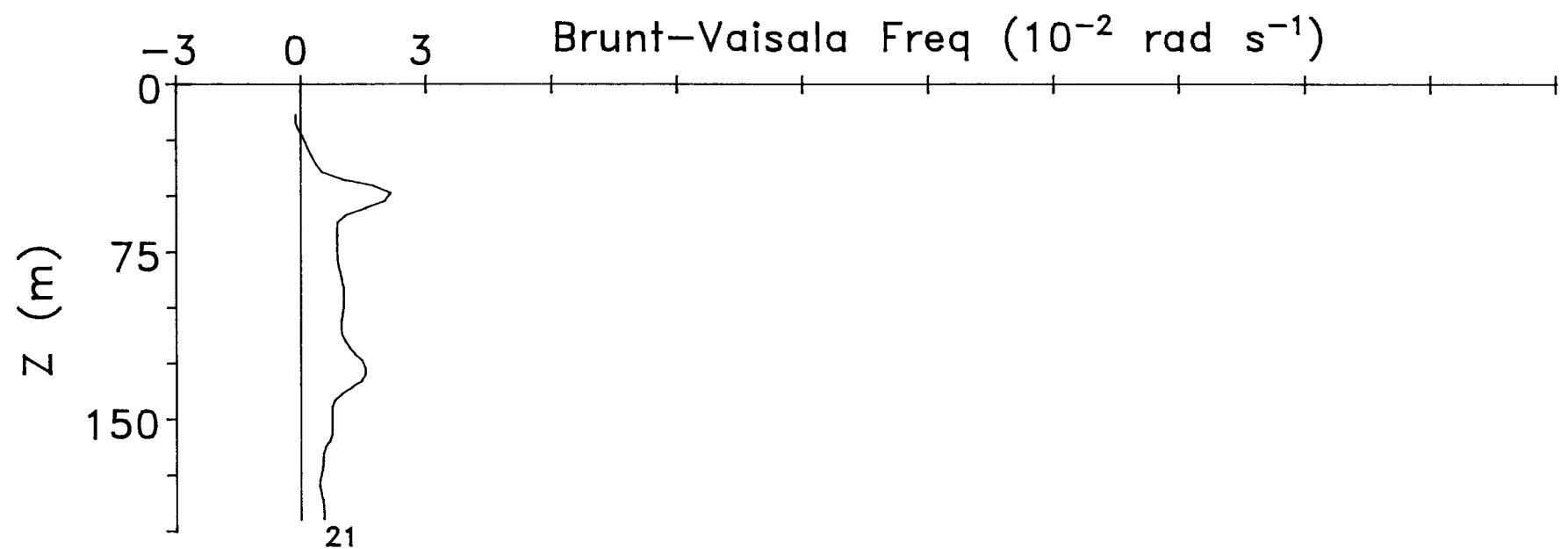
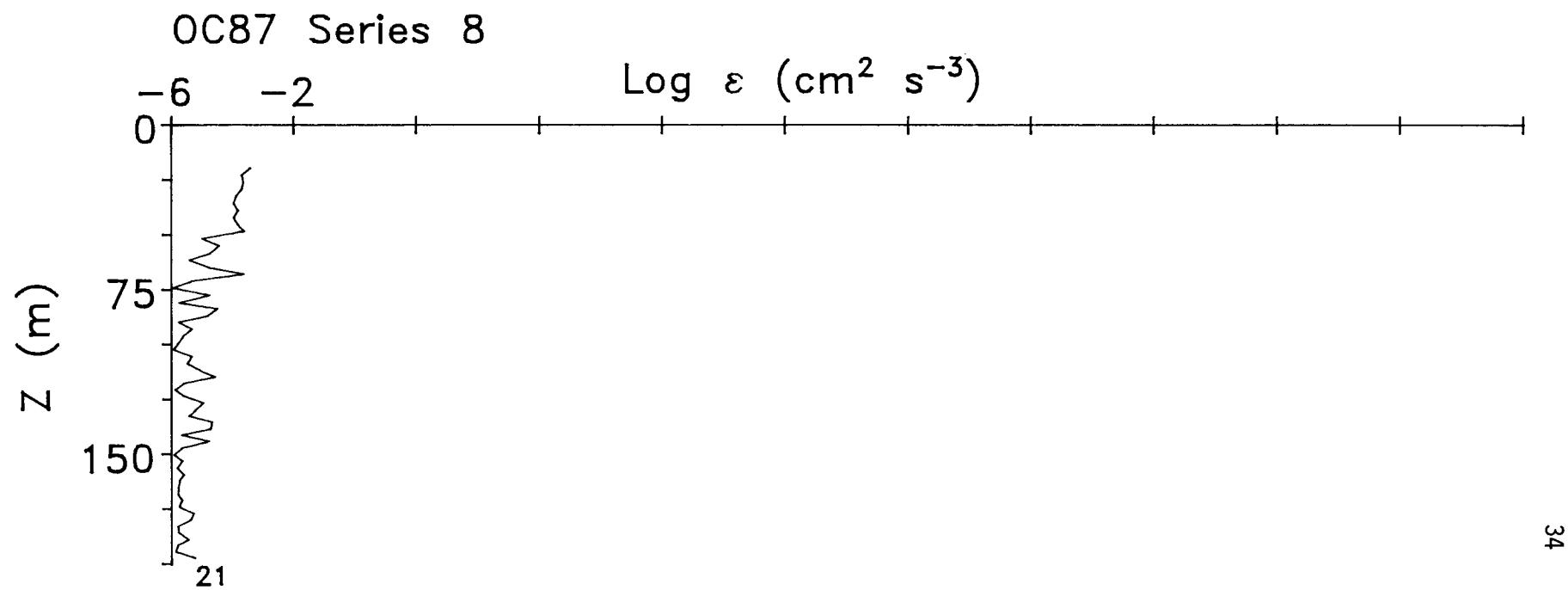


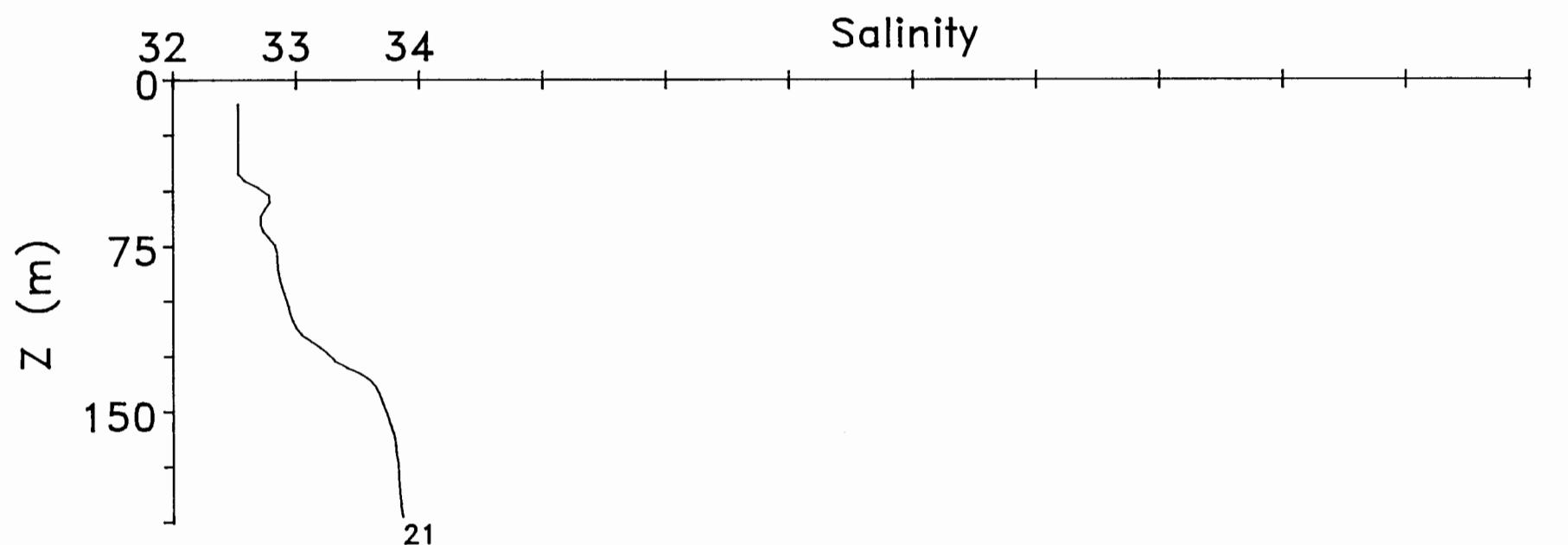
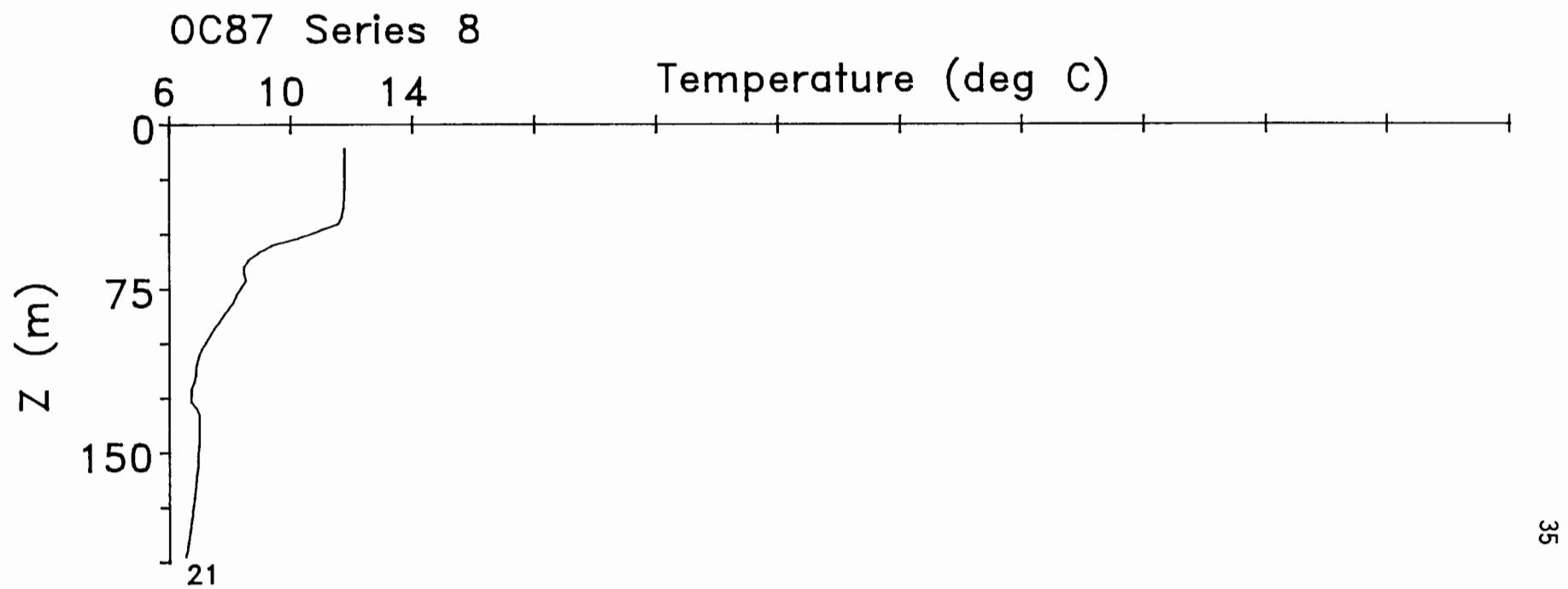


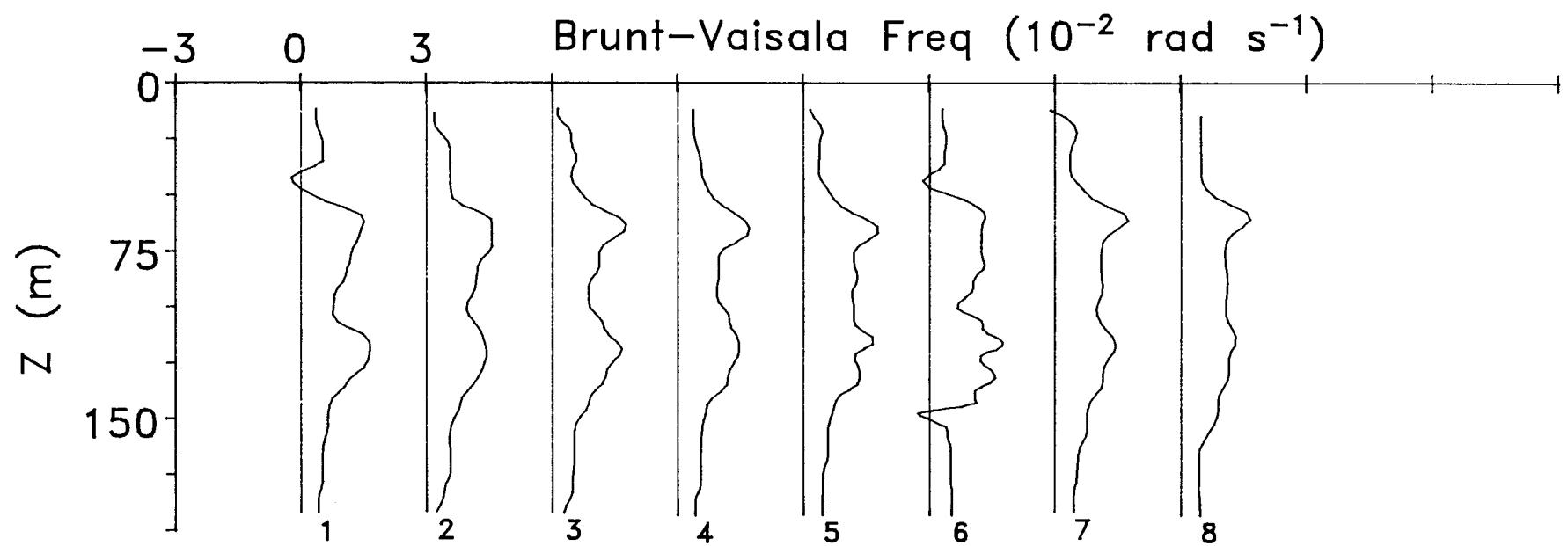
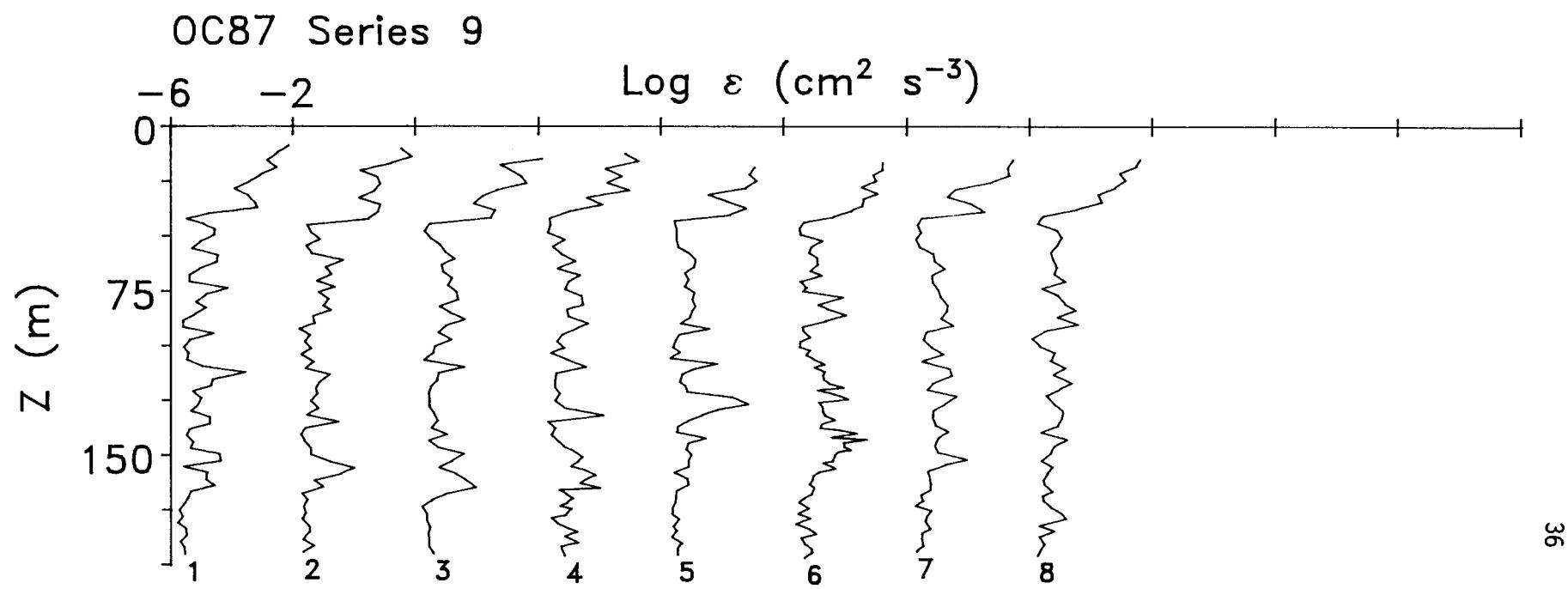


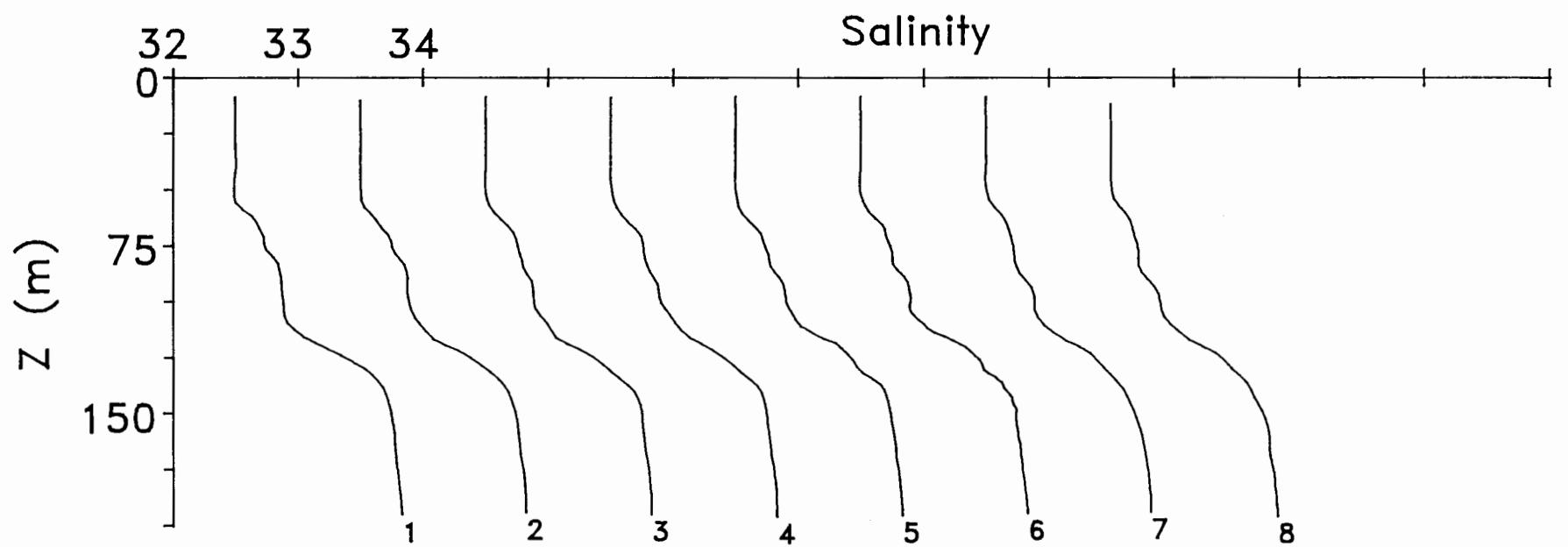
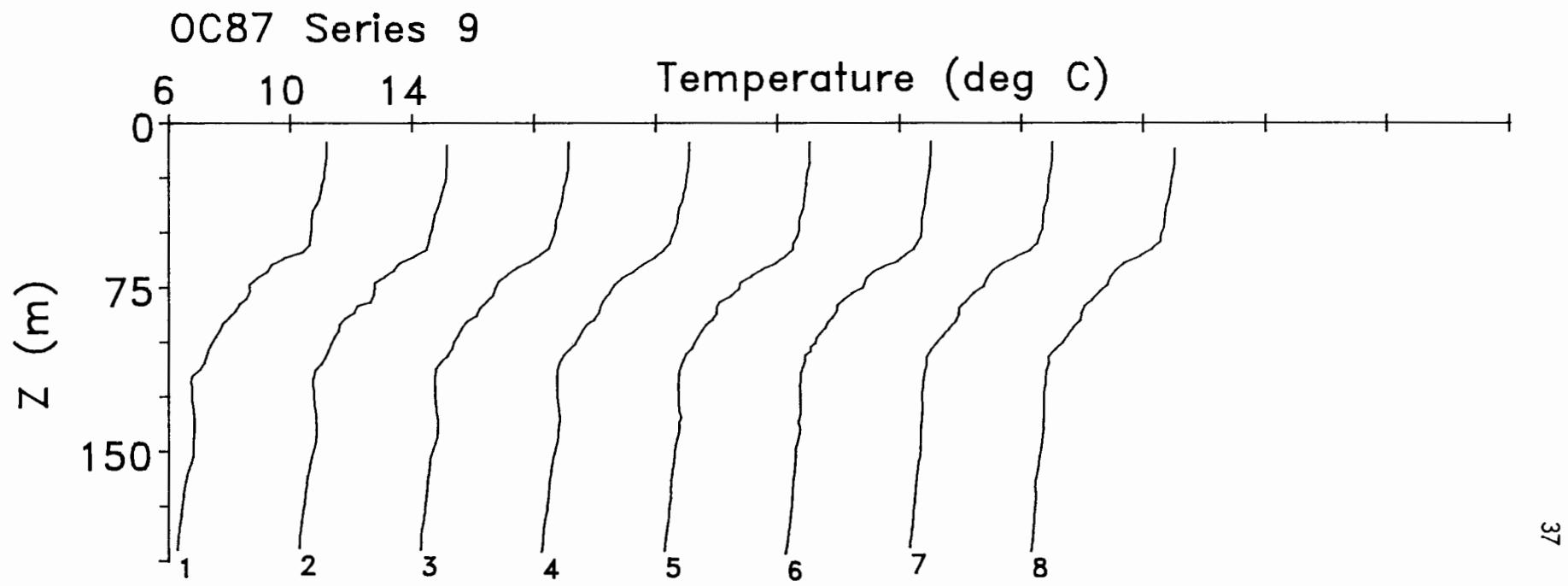


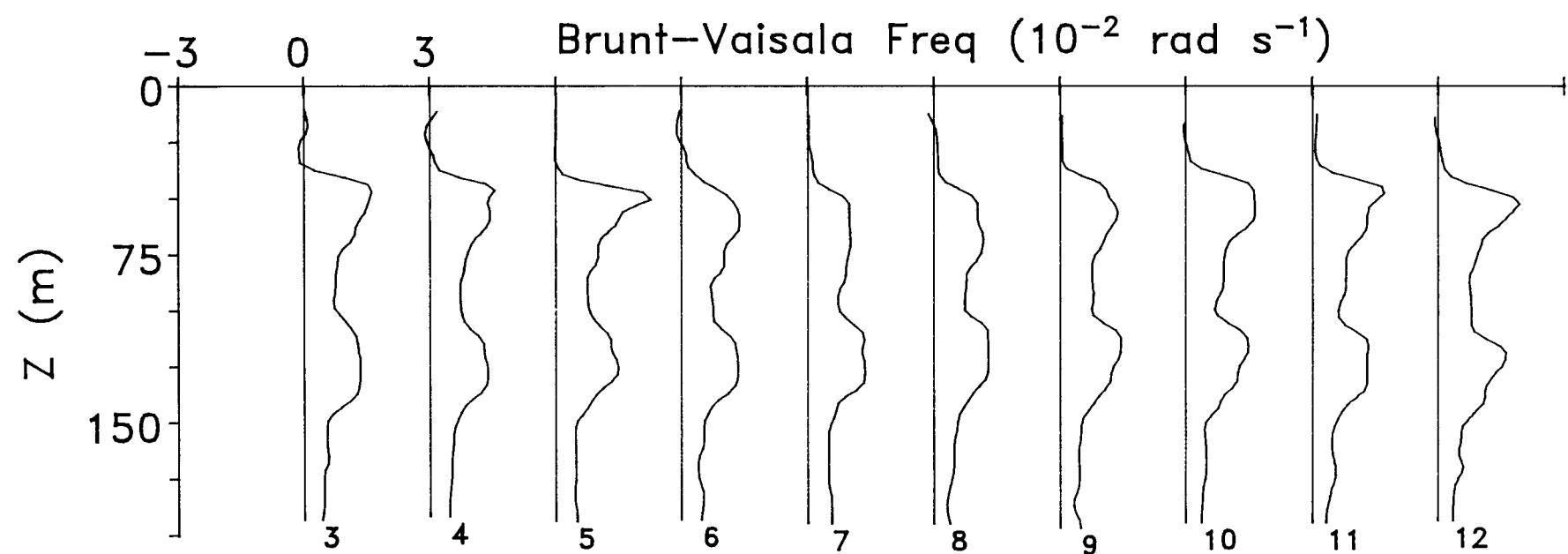
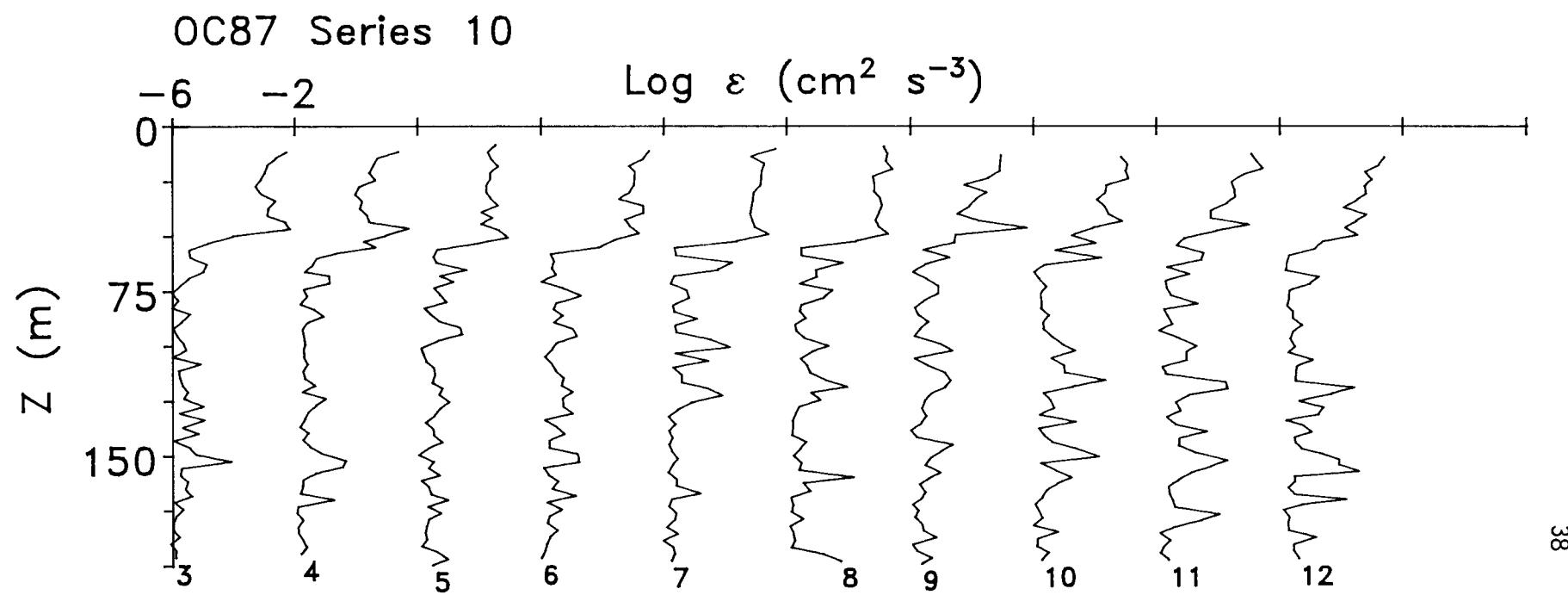


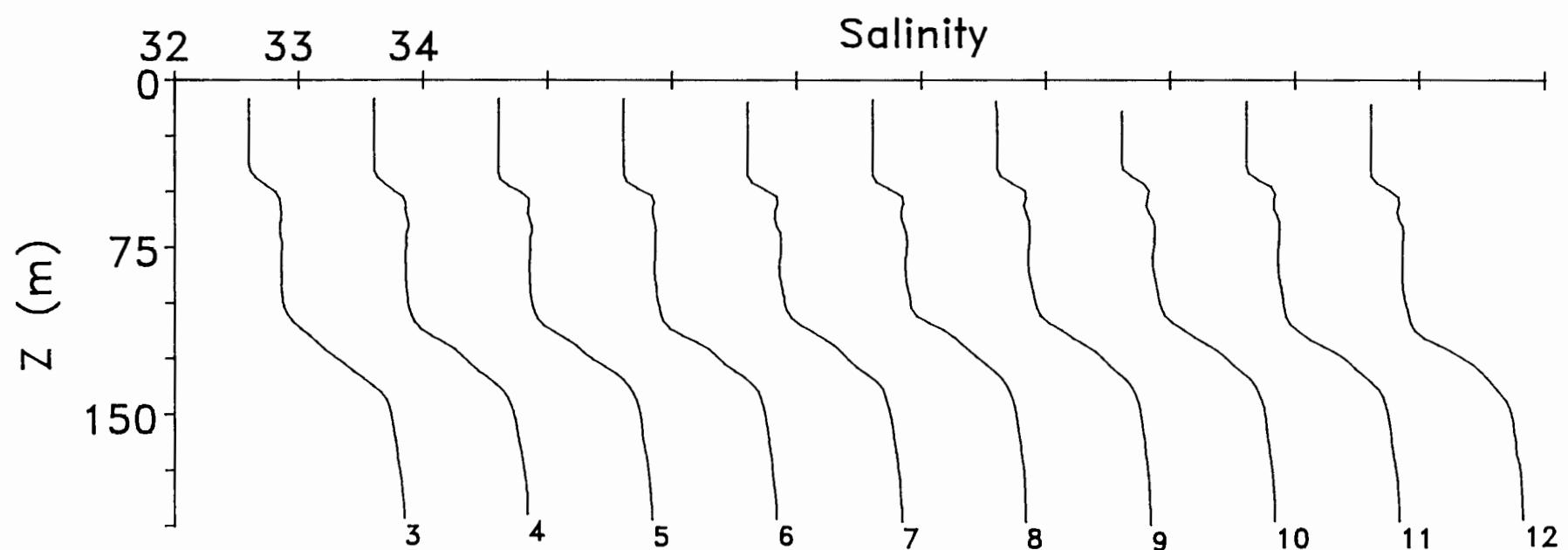
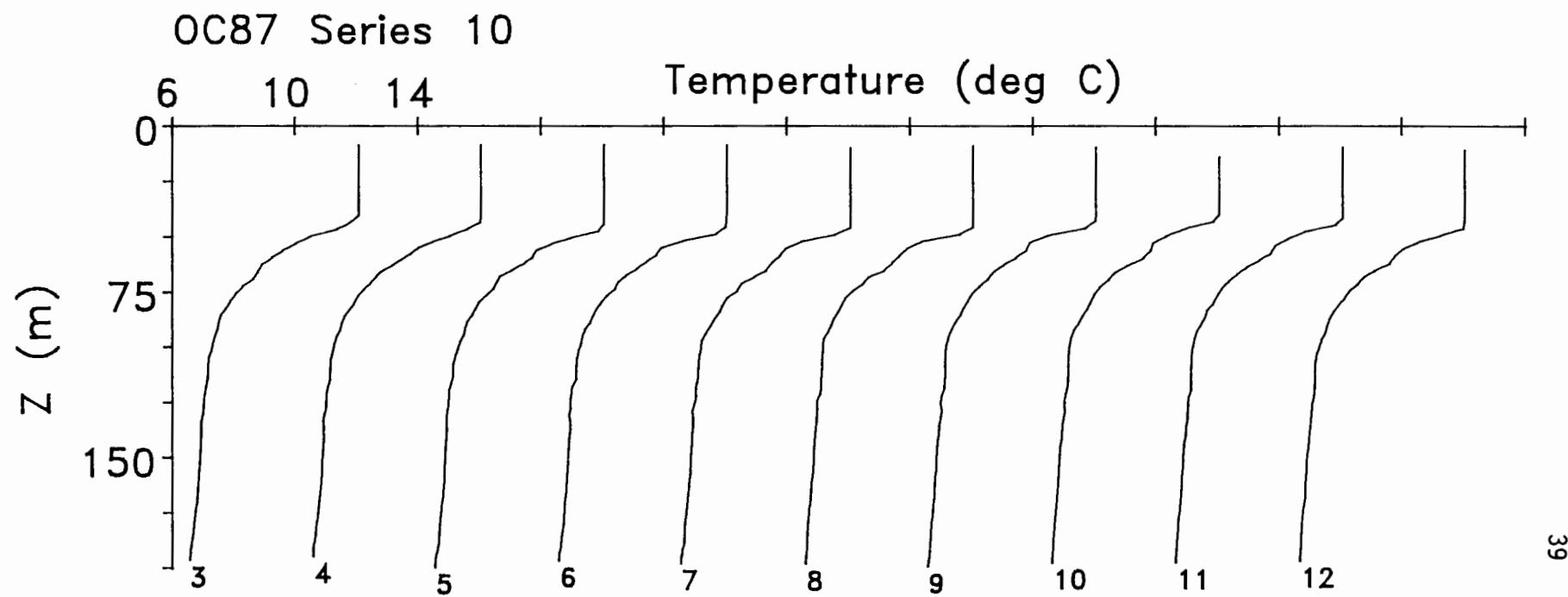


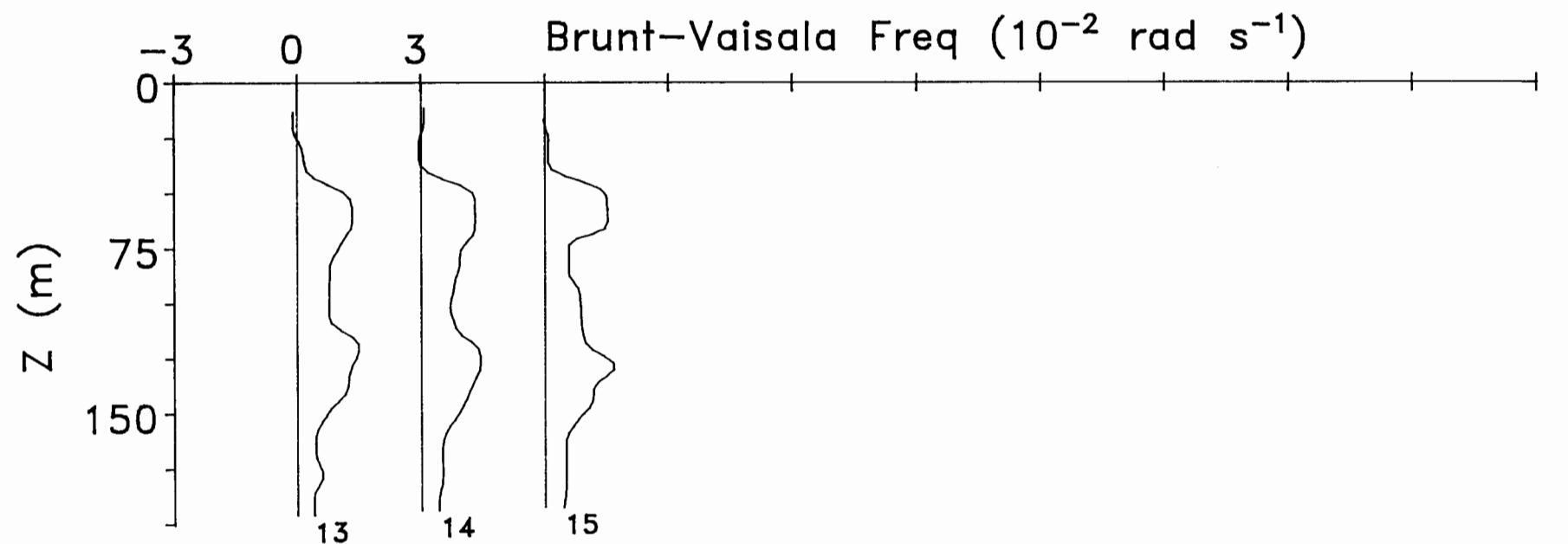
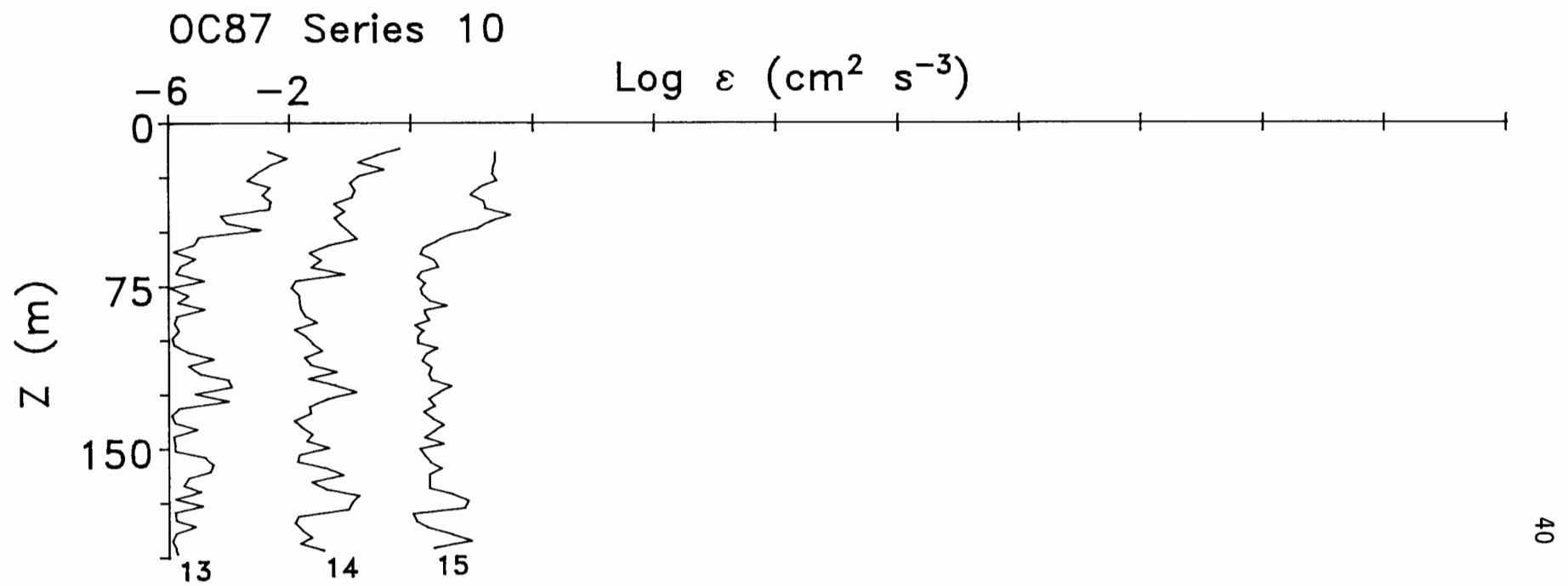


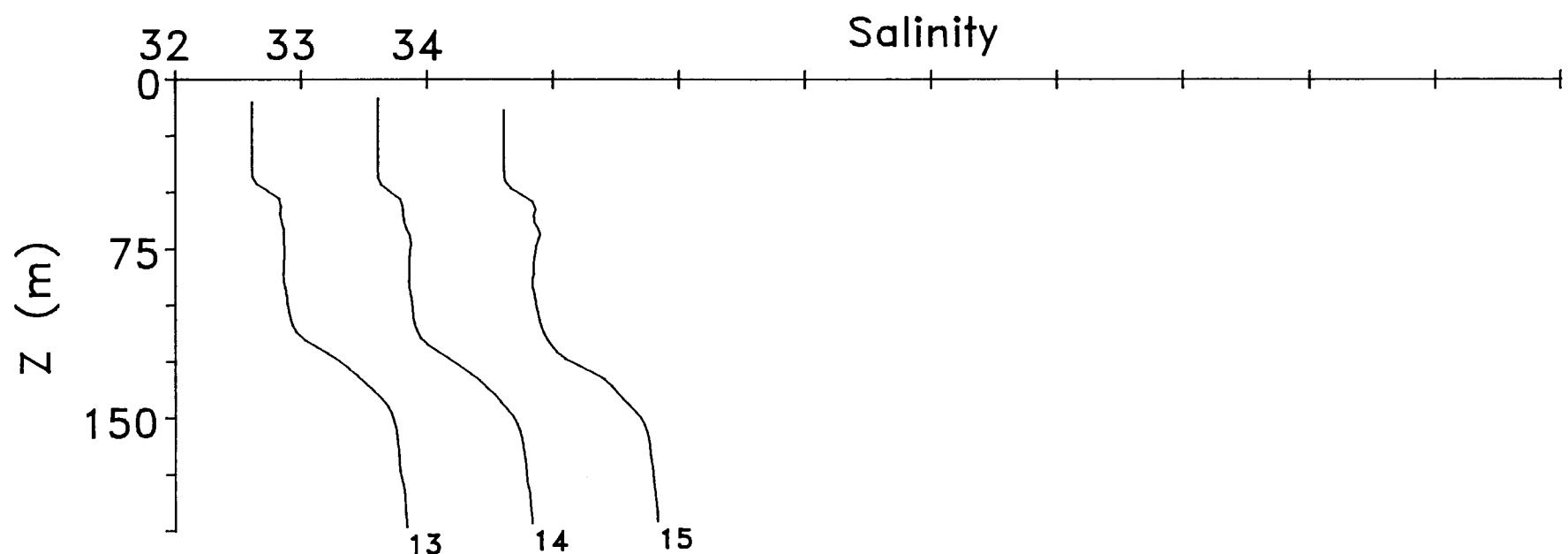
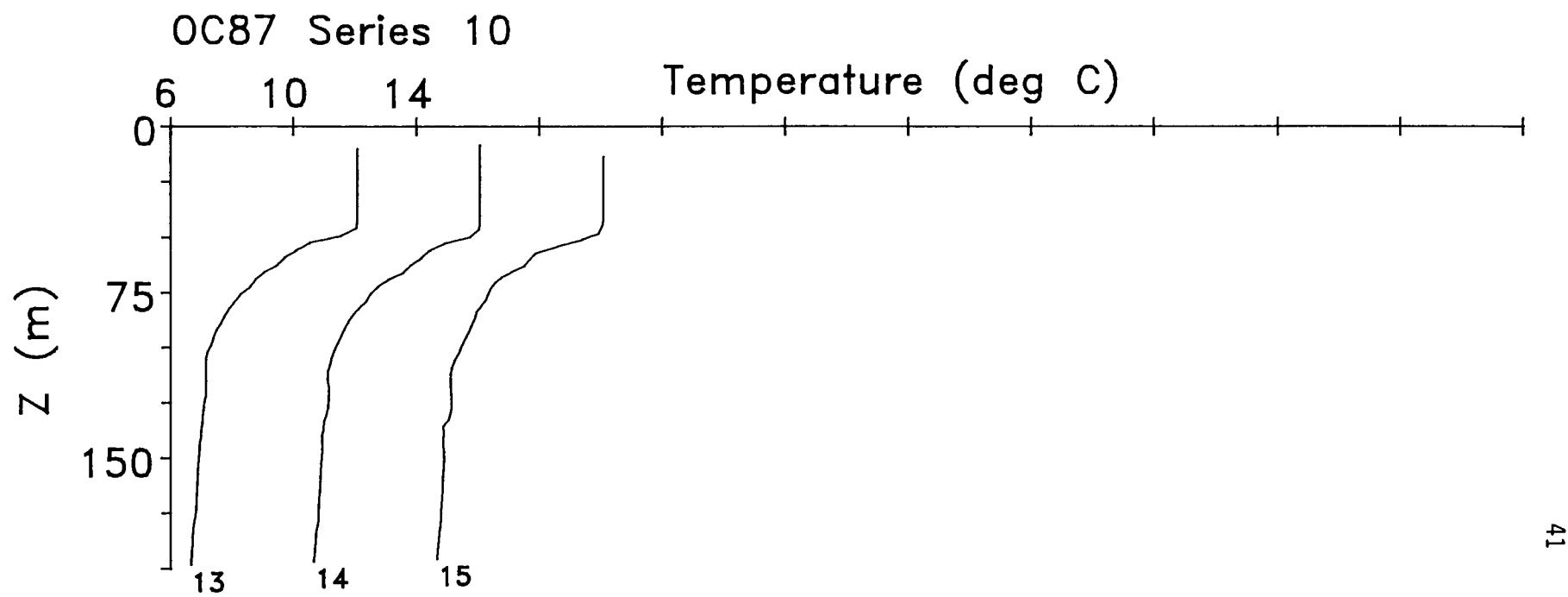


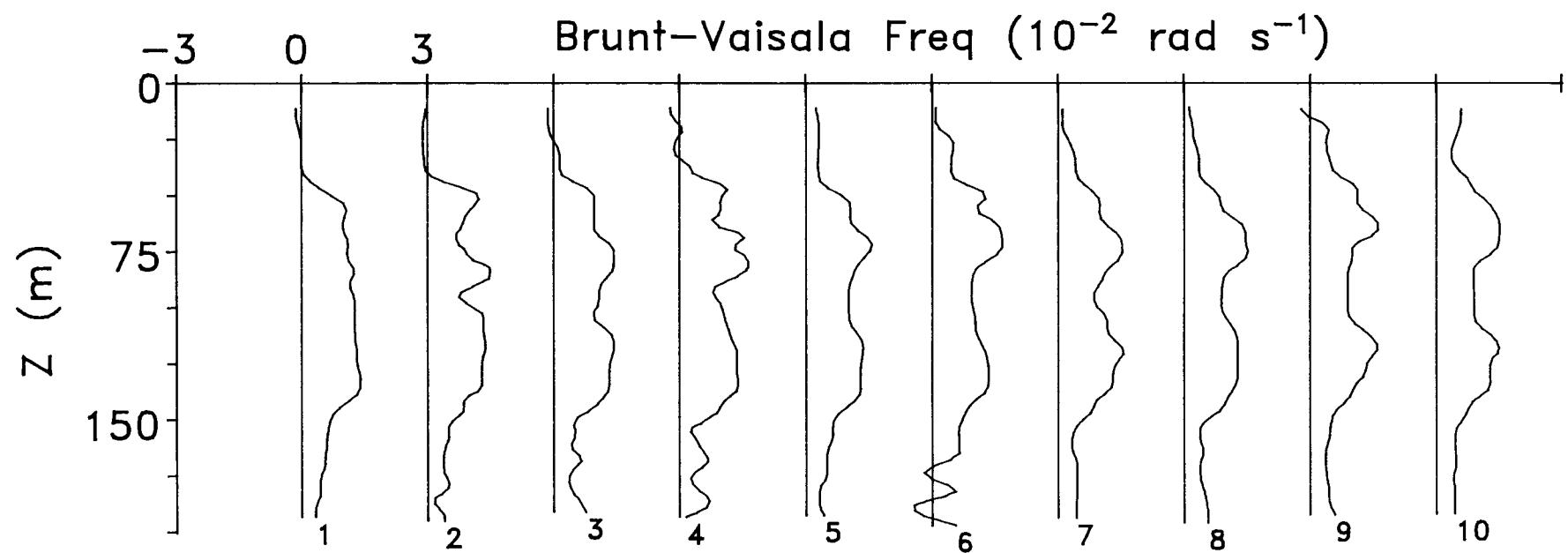
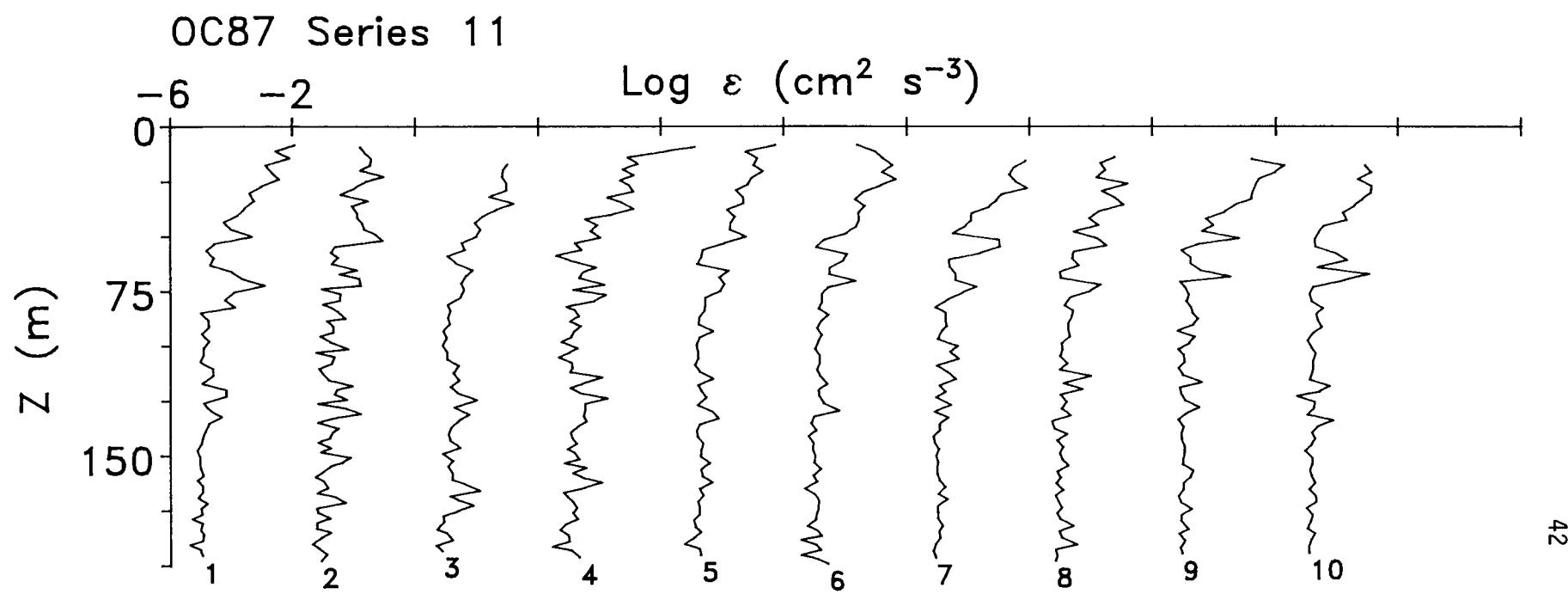






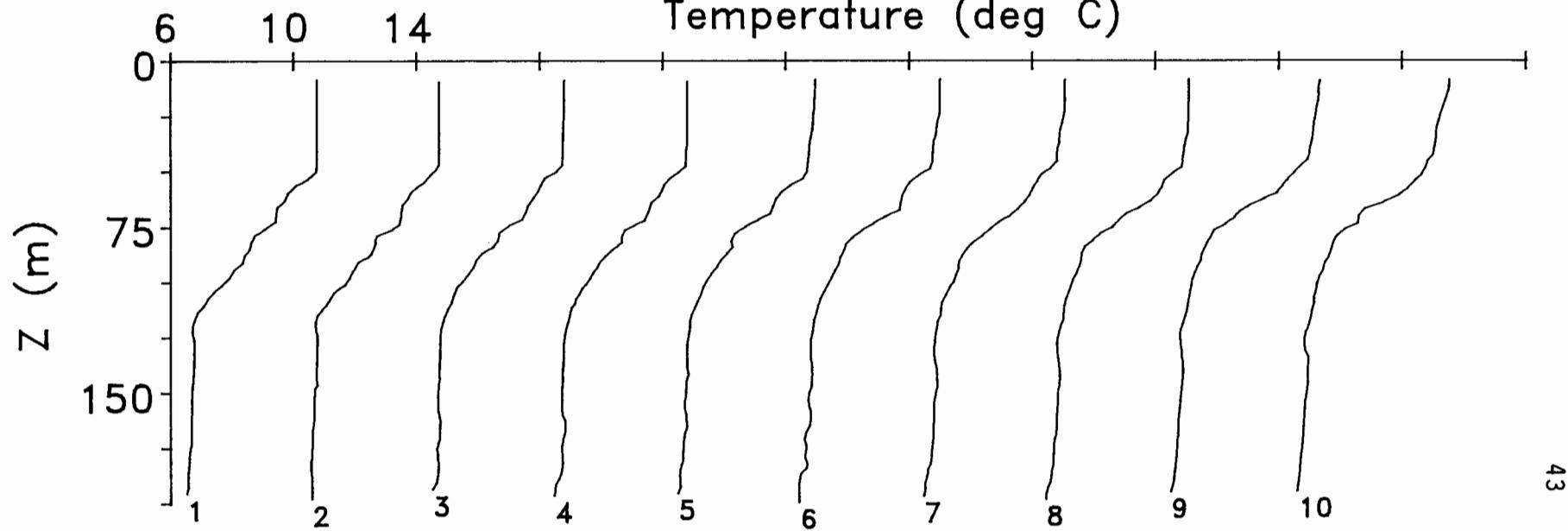




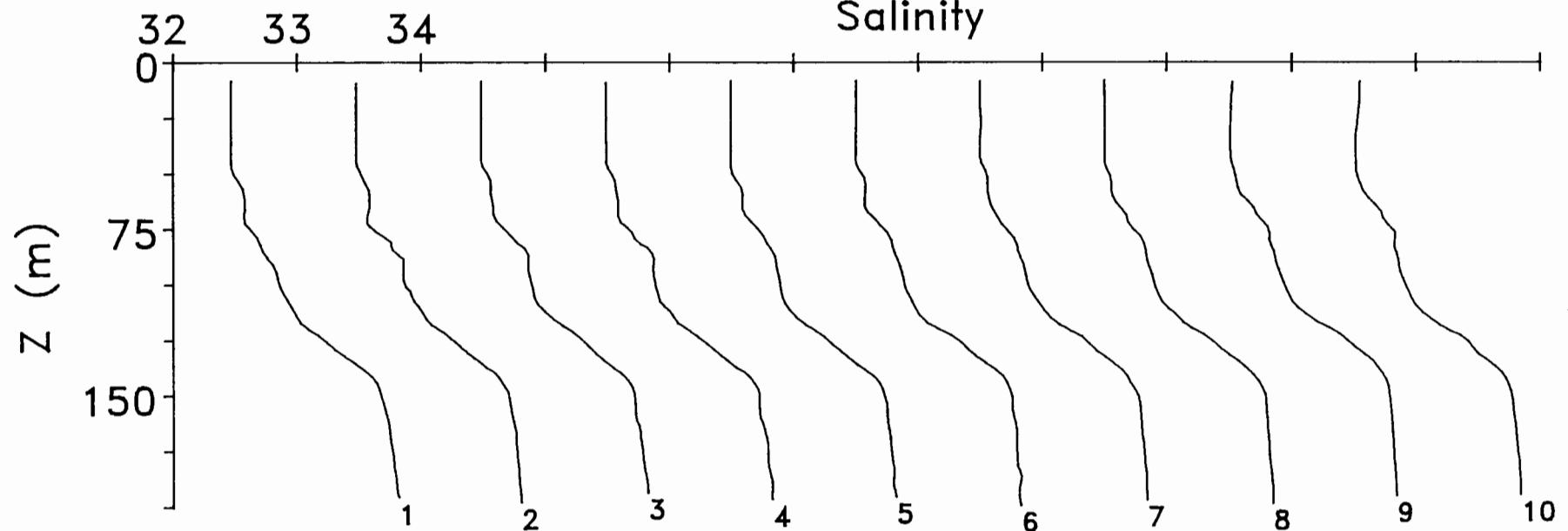


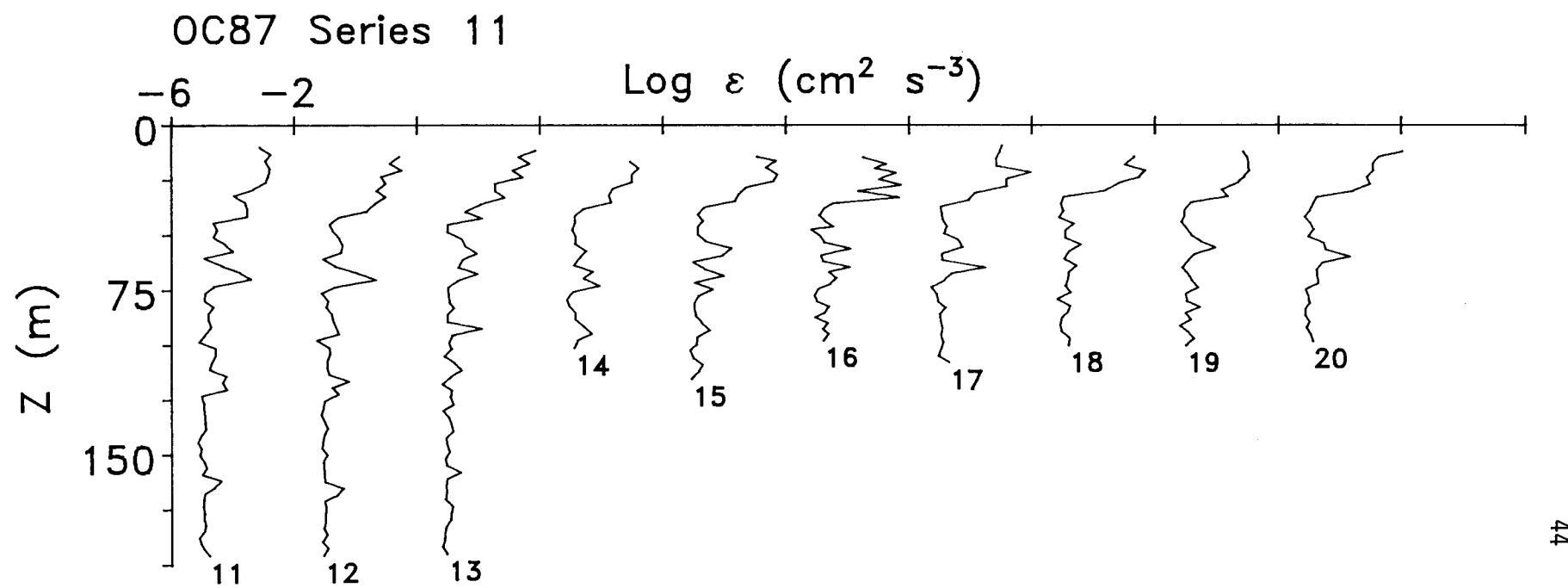
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Temperature (deg C)

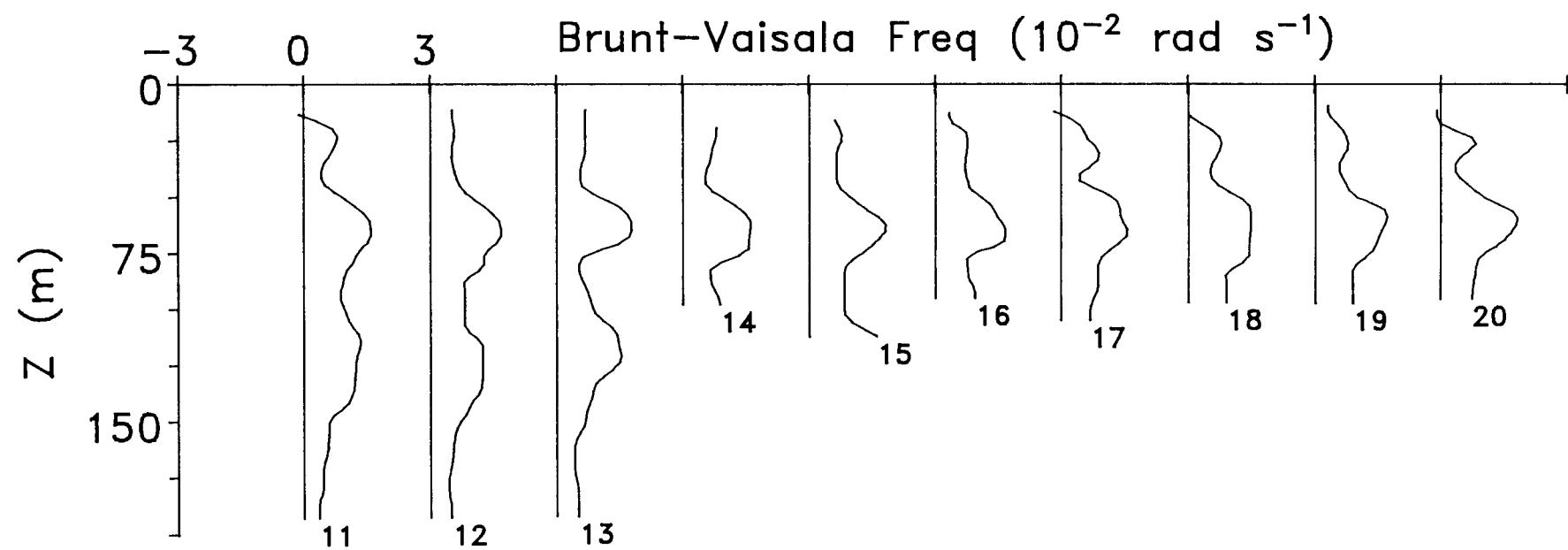


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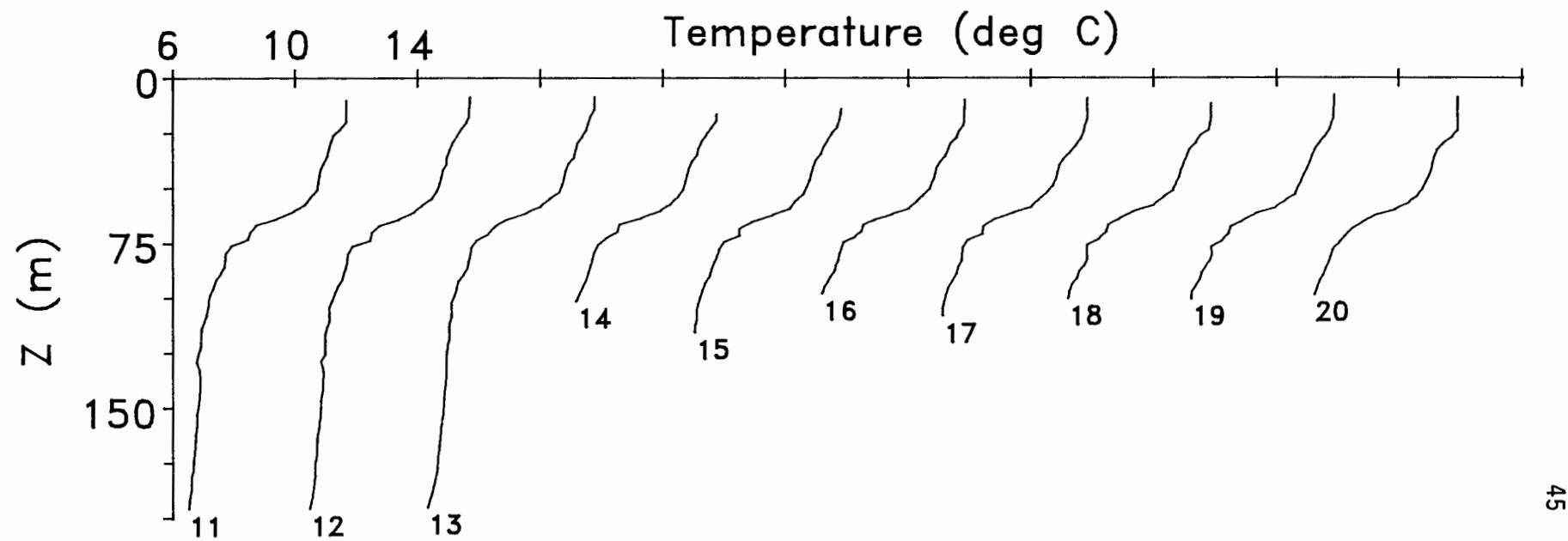




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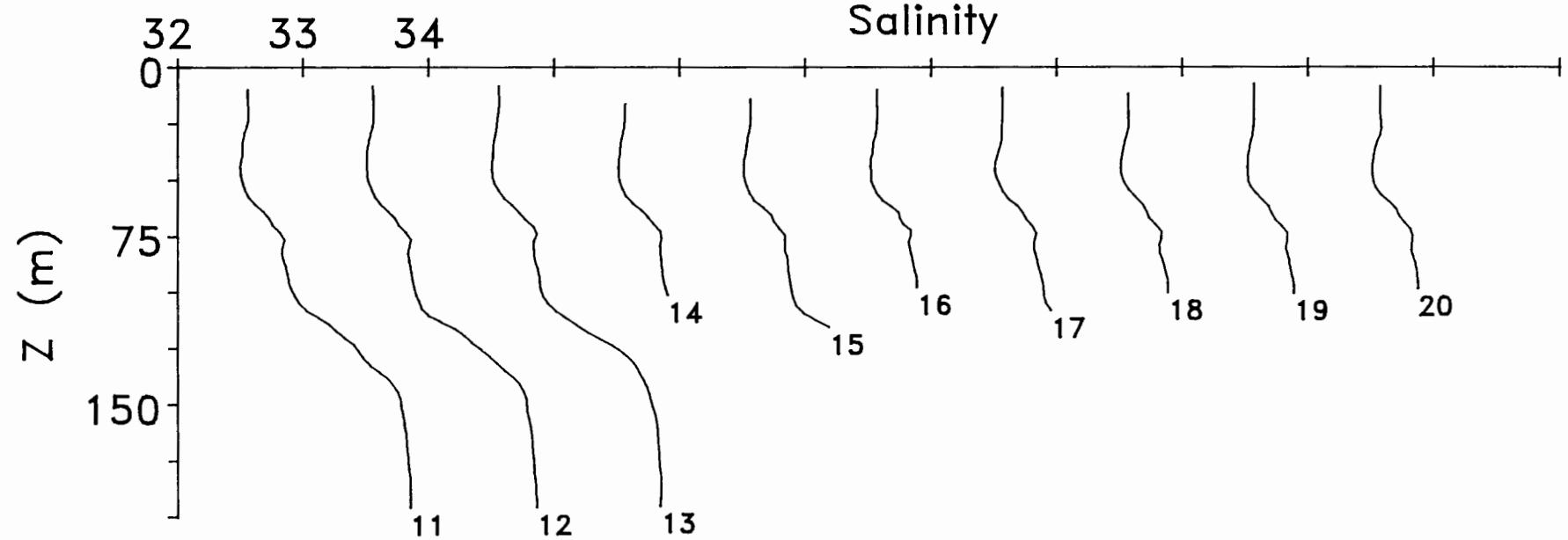


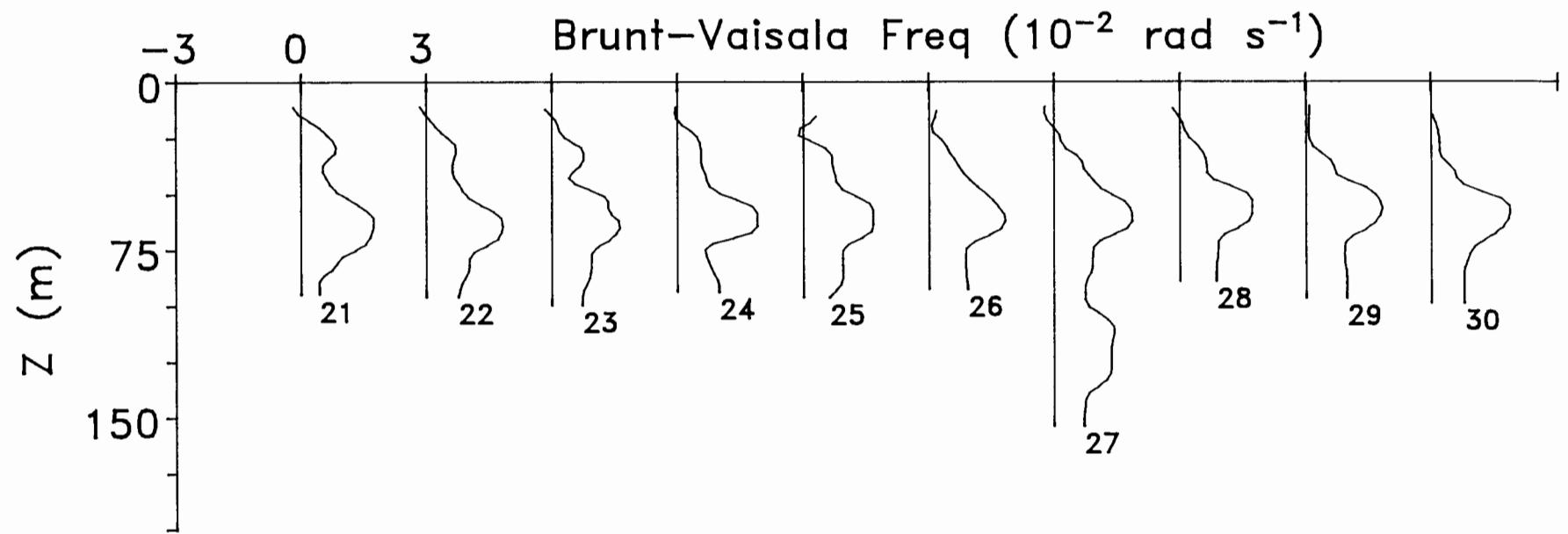
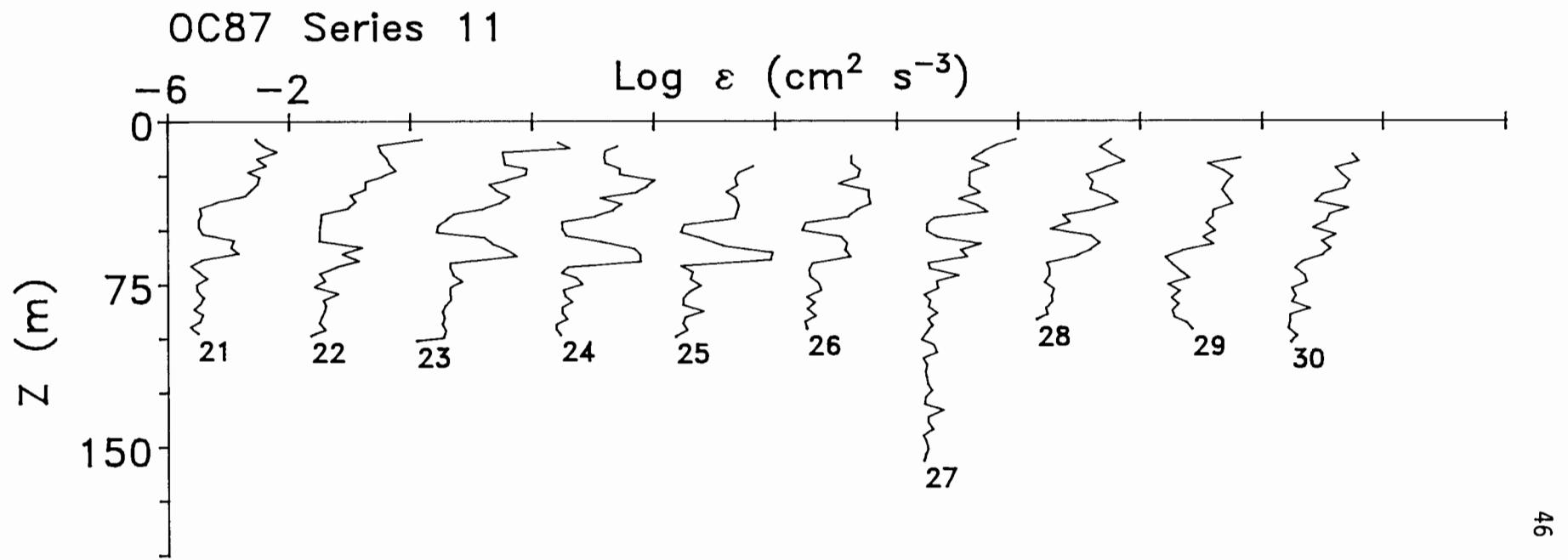
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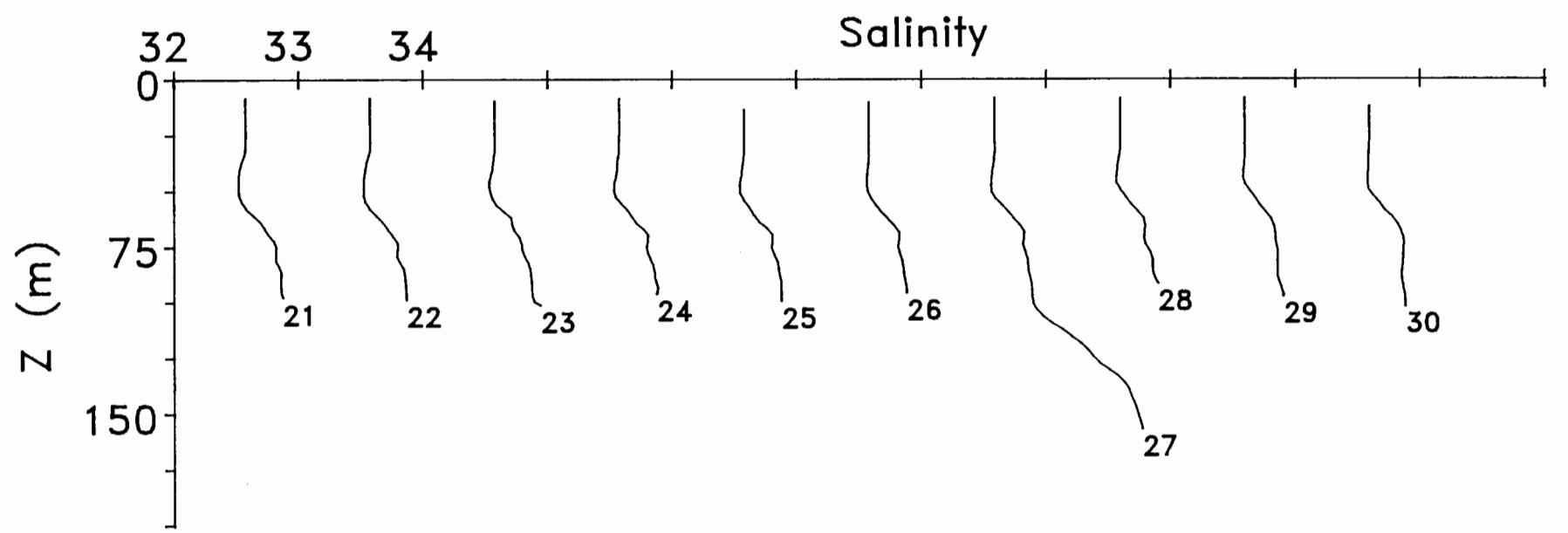
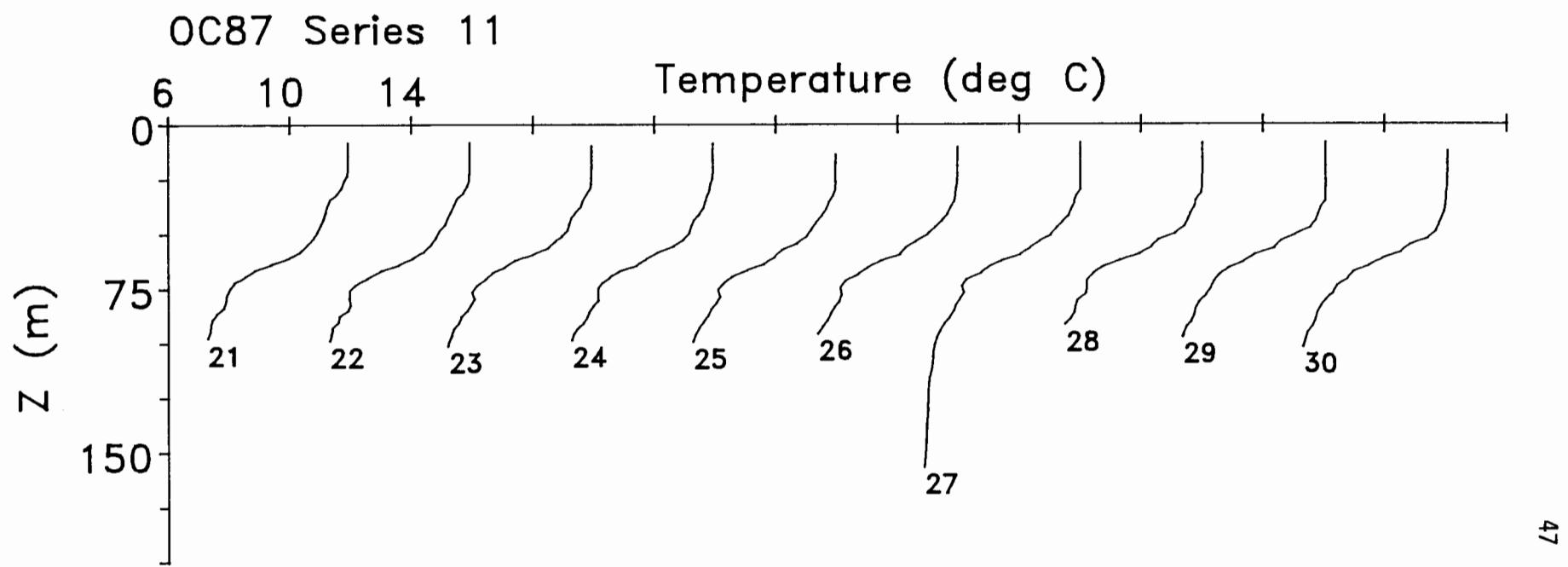


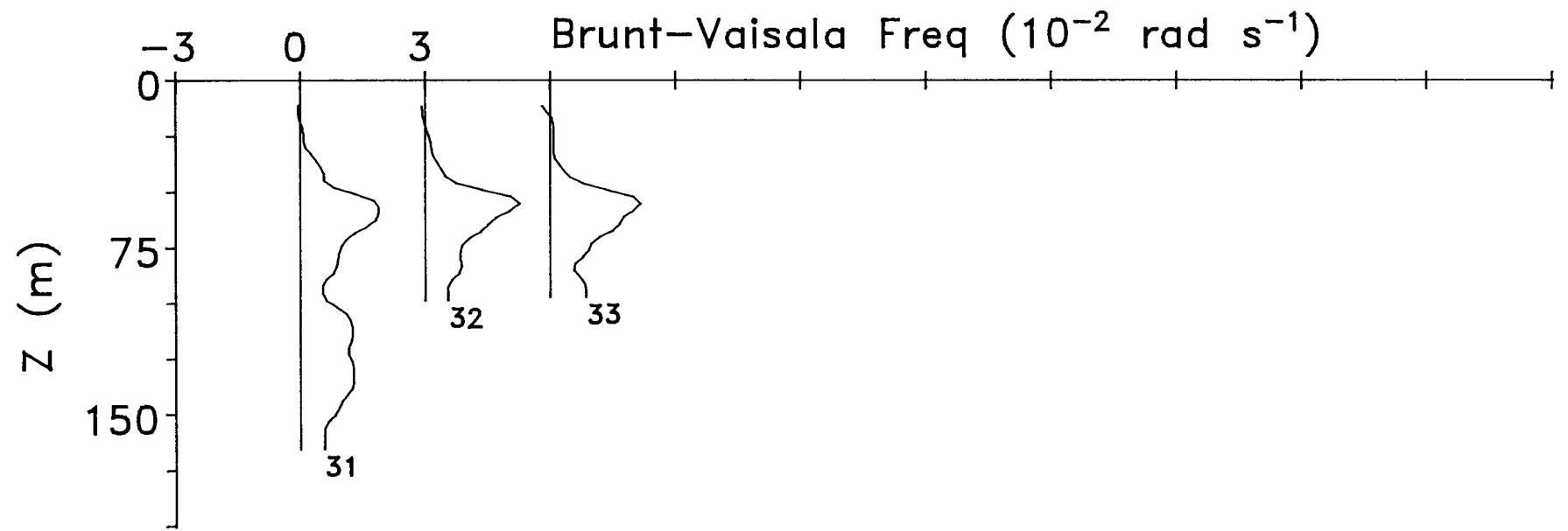
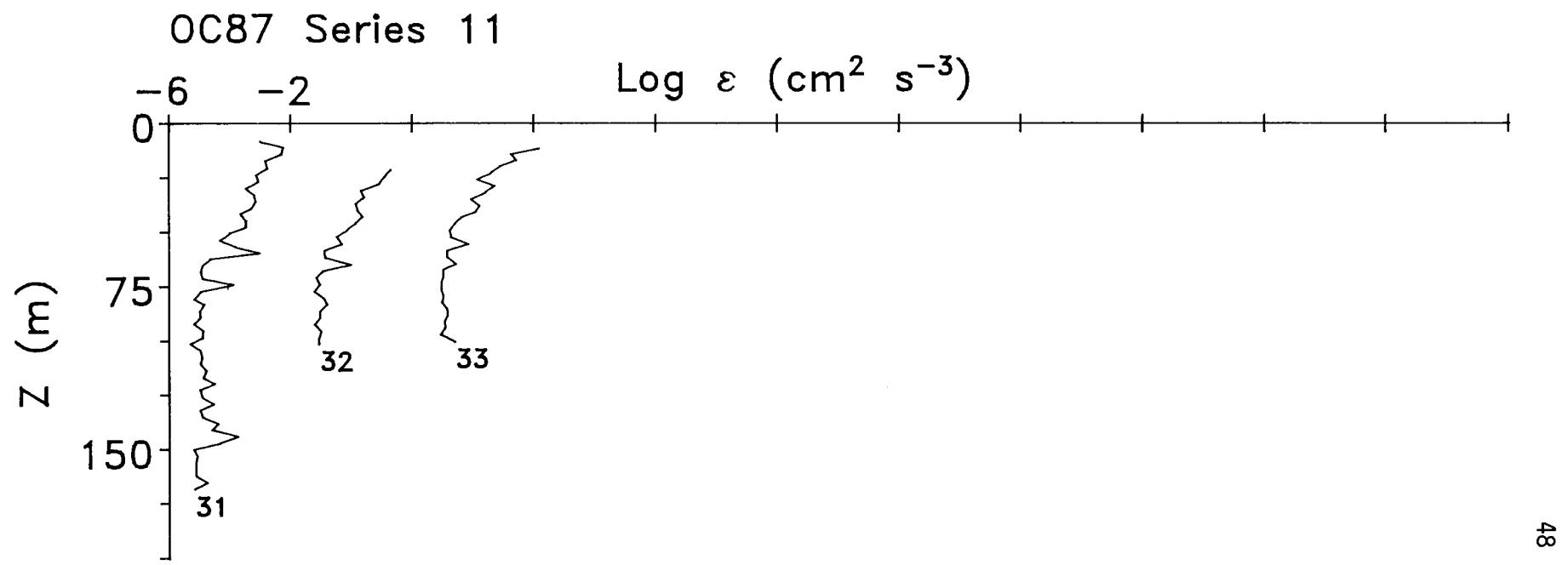
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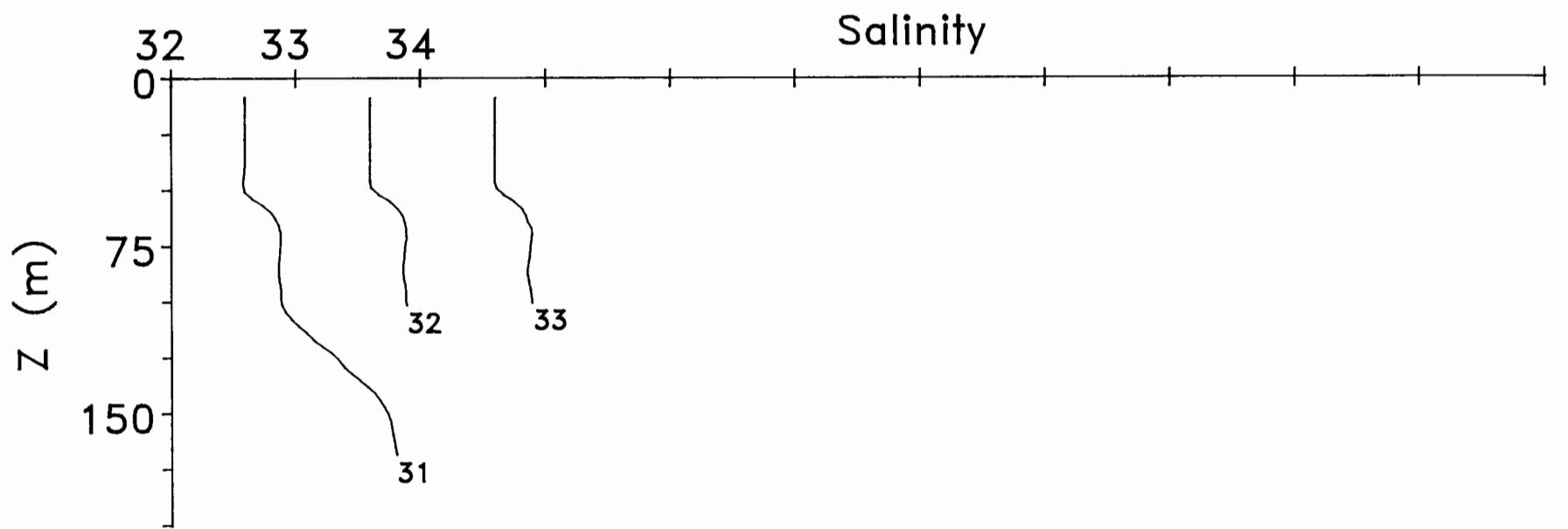
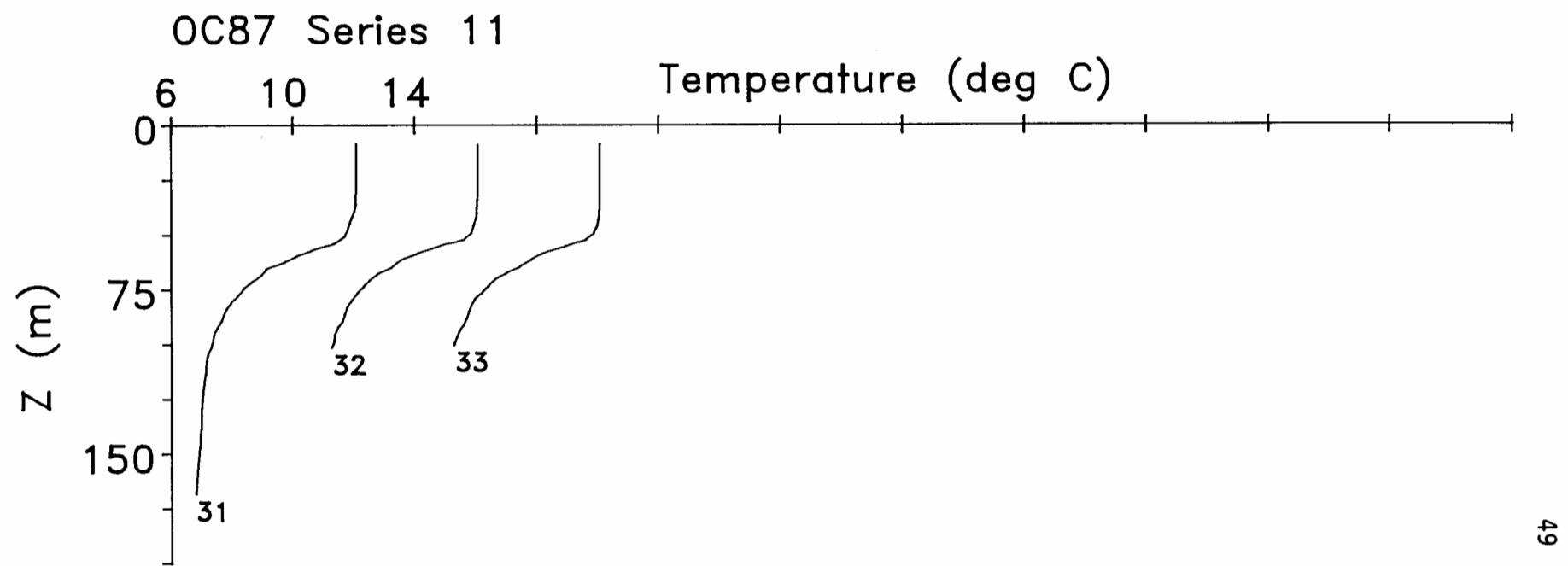
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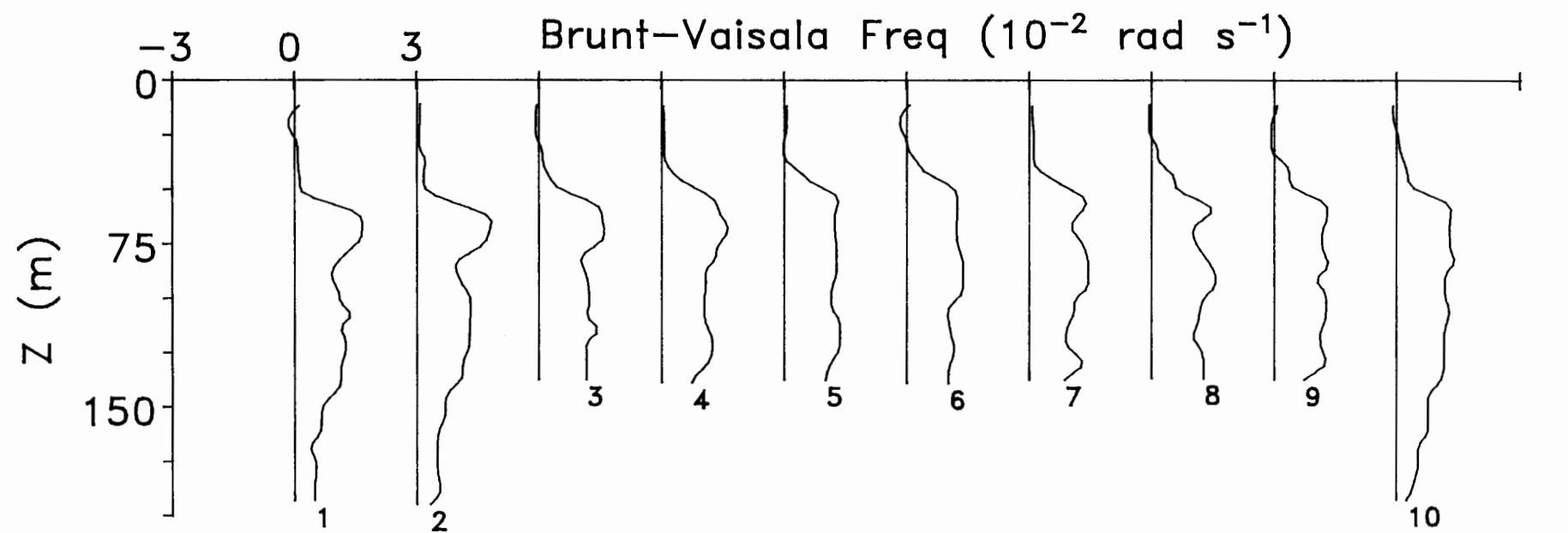
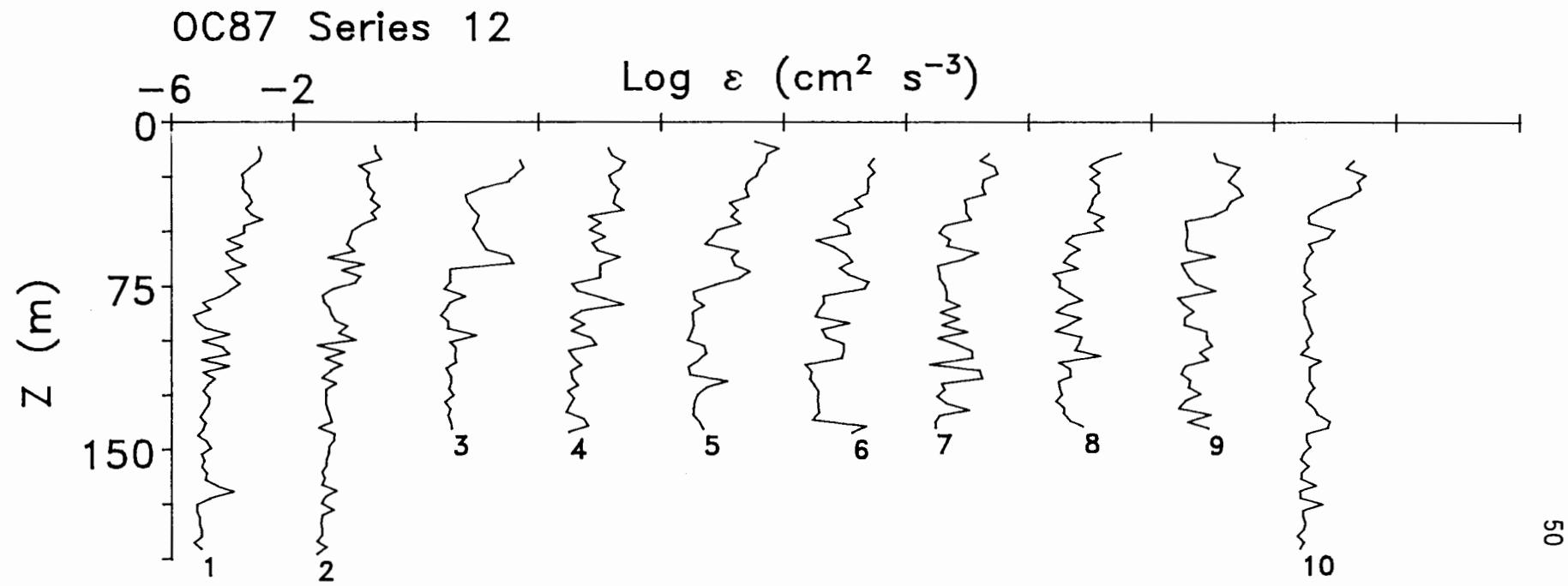


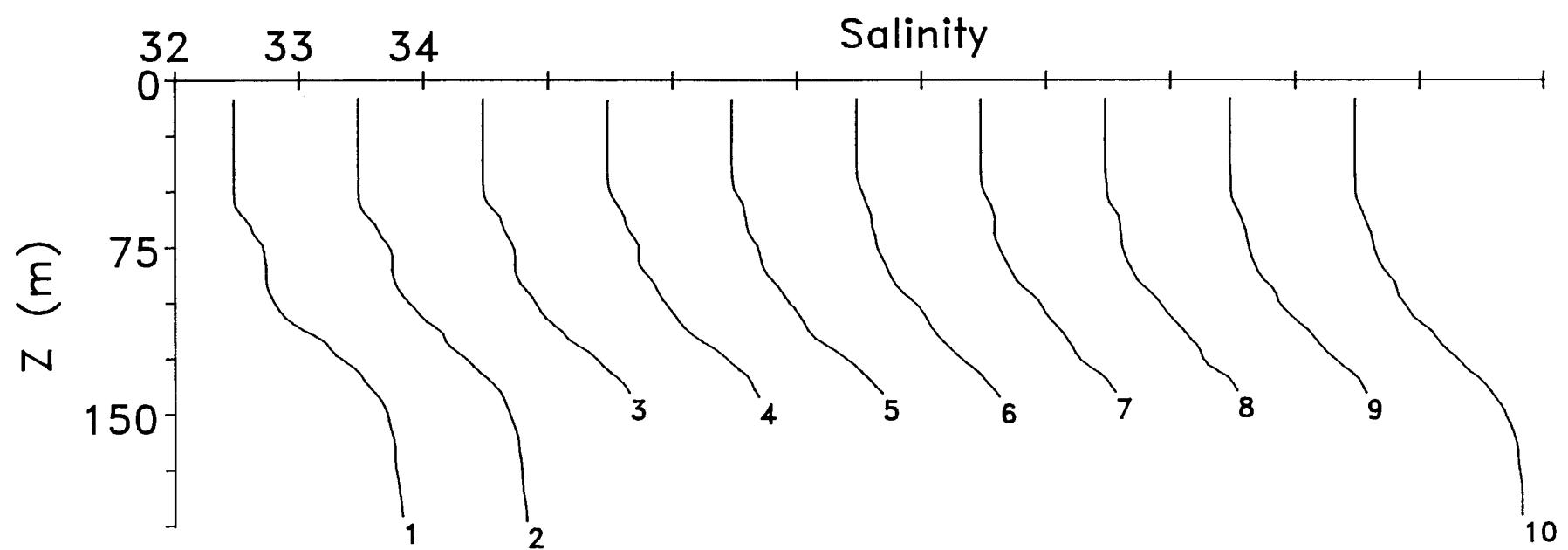
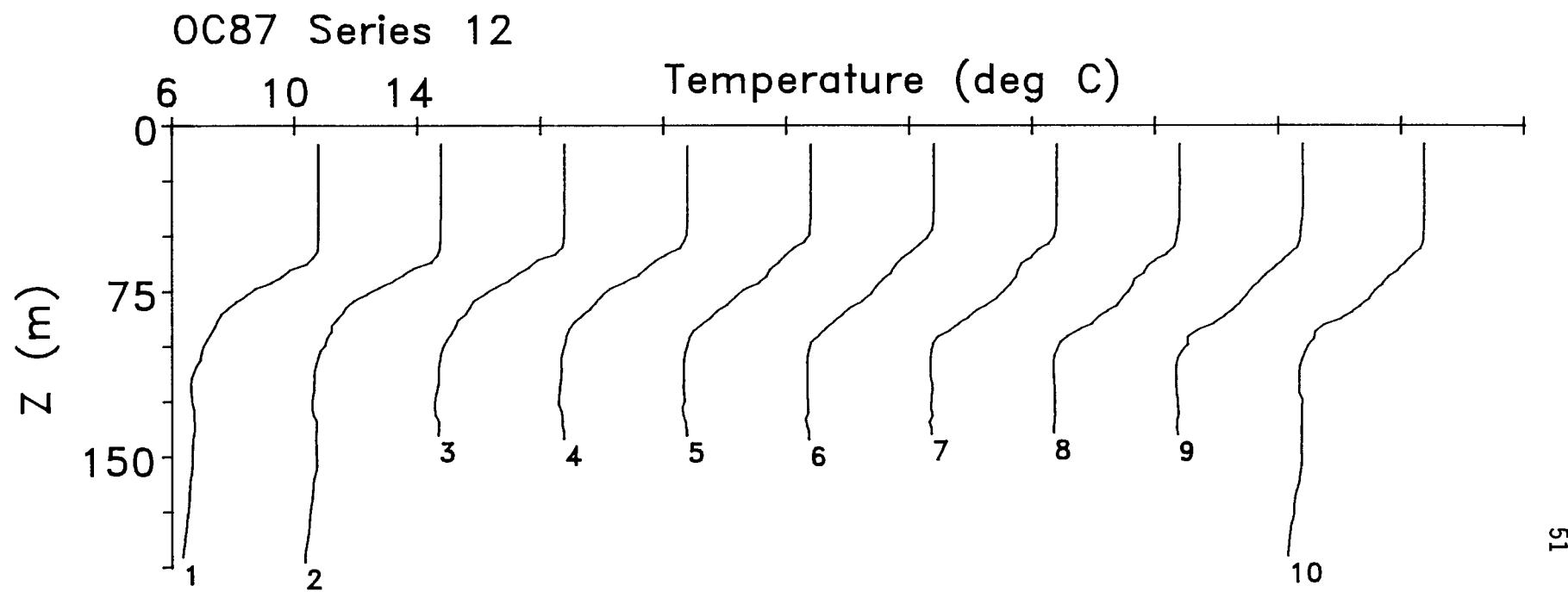


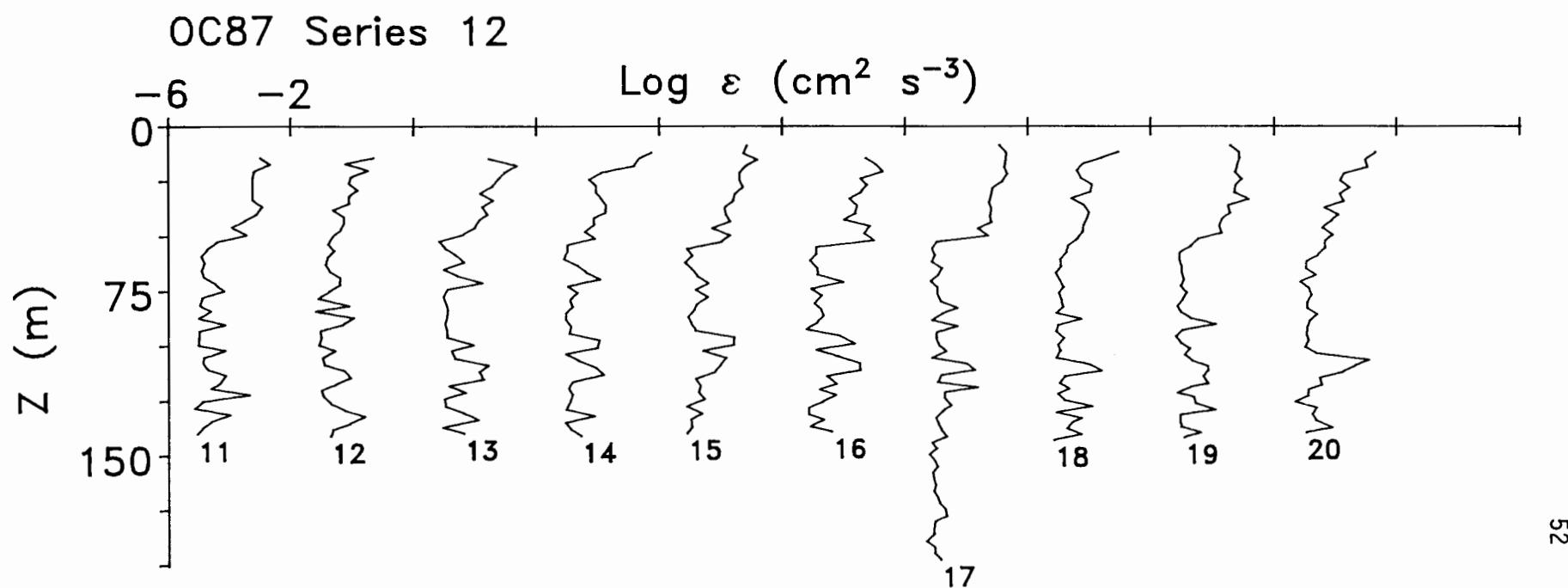




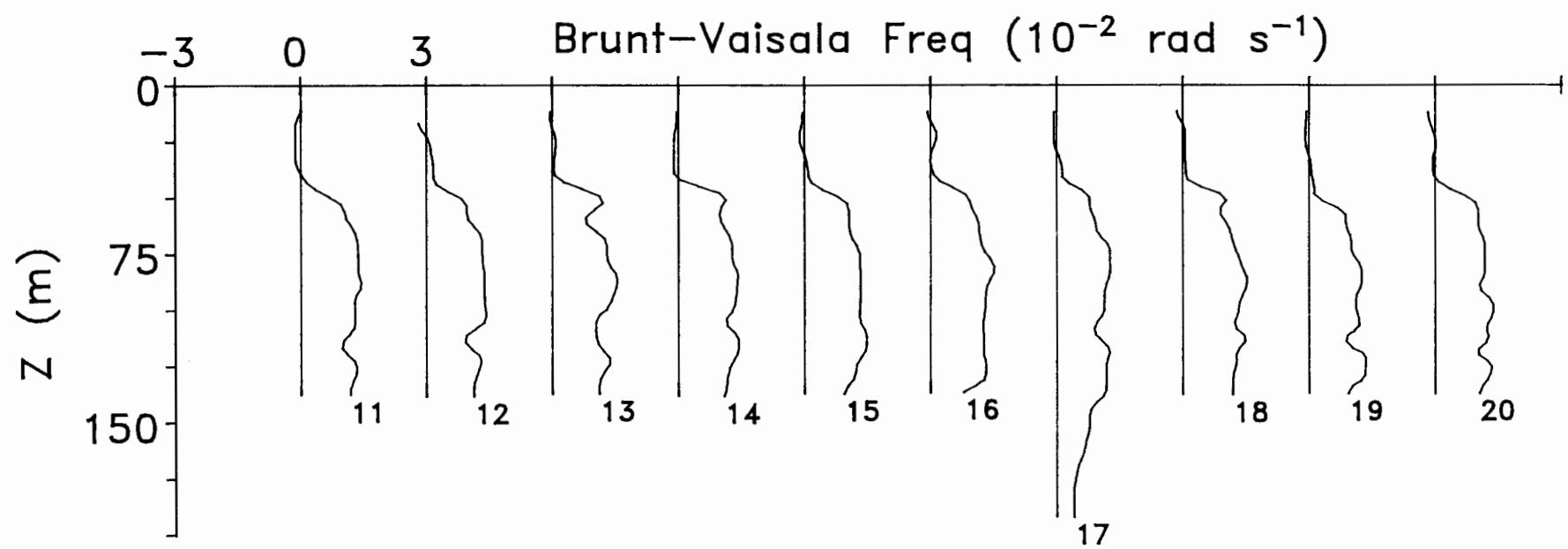


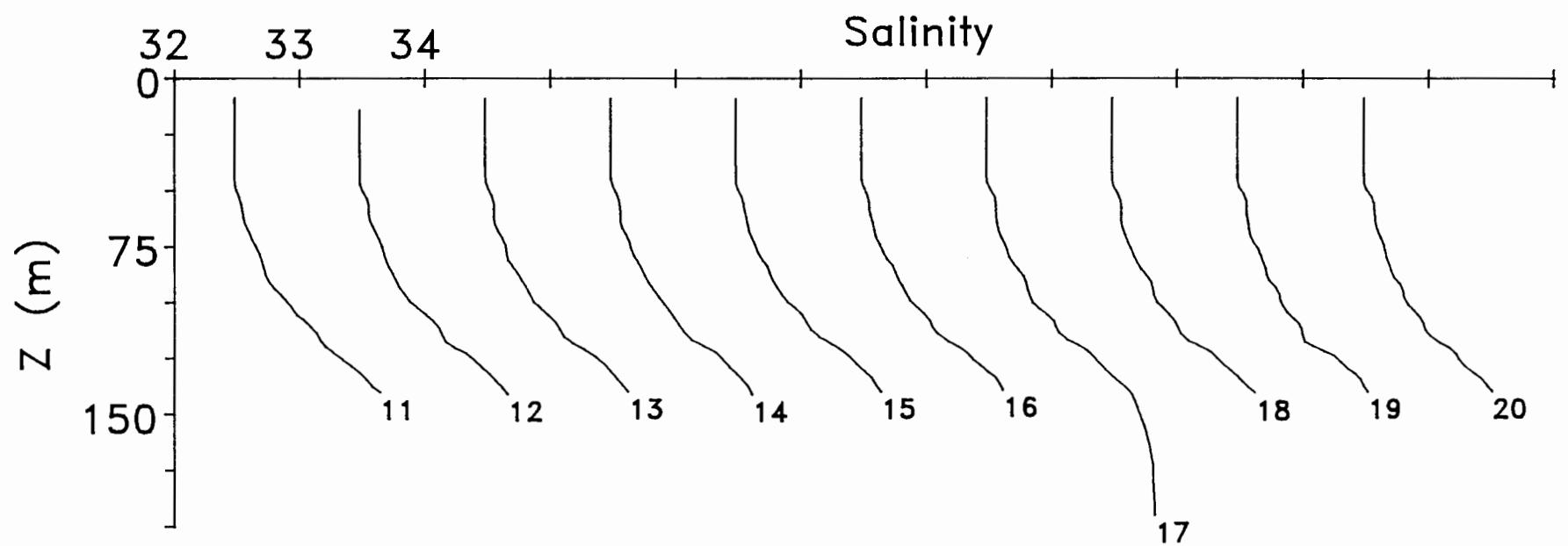
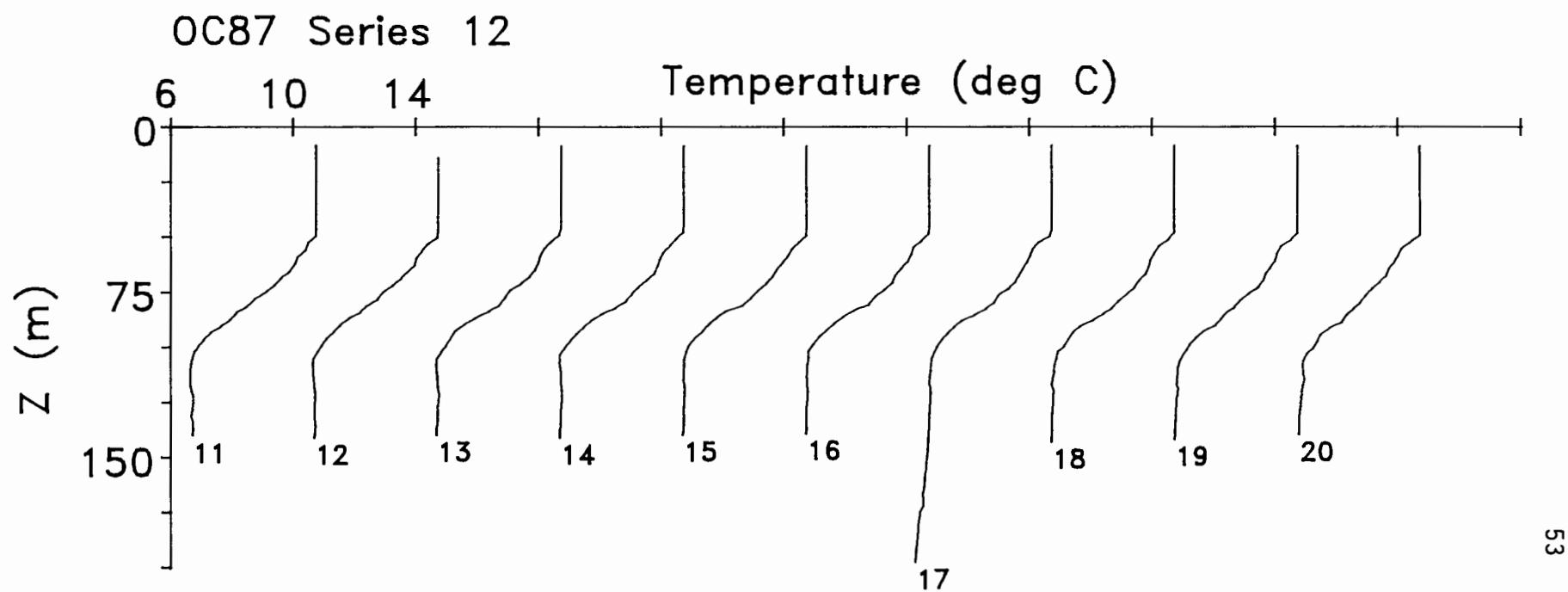


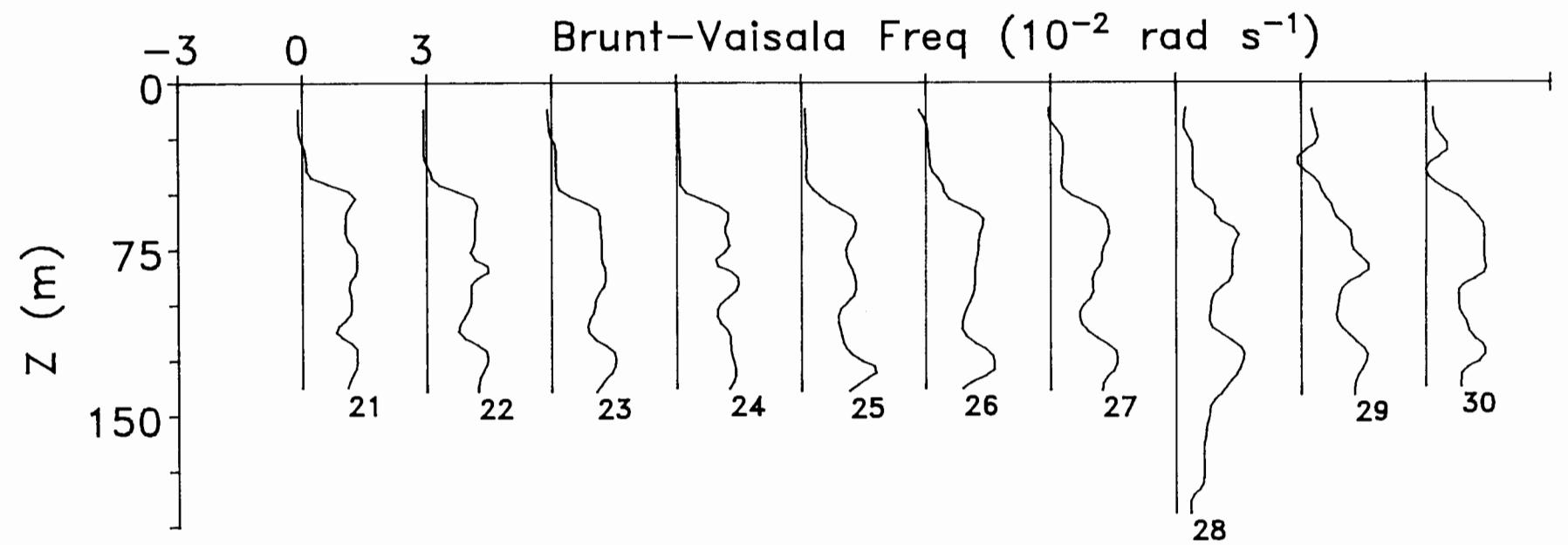
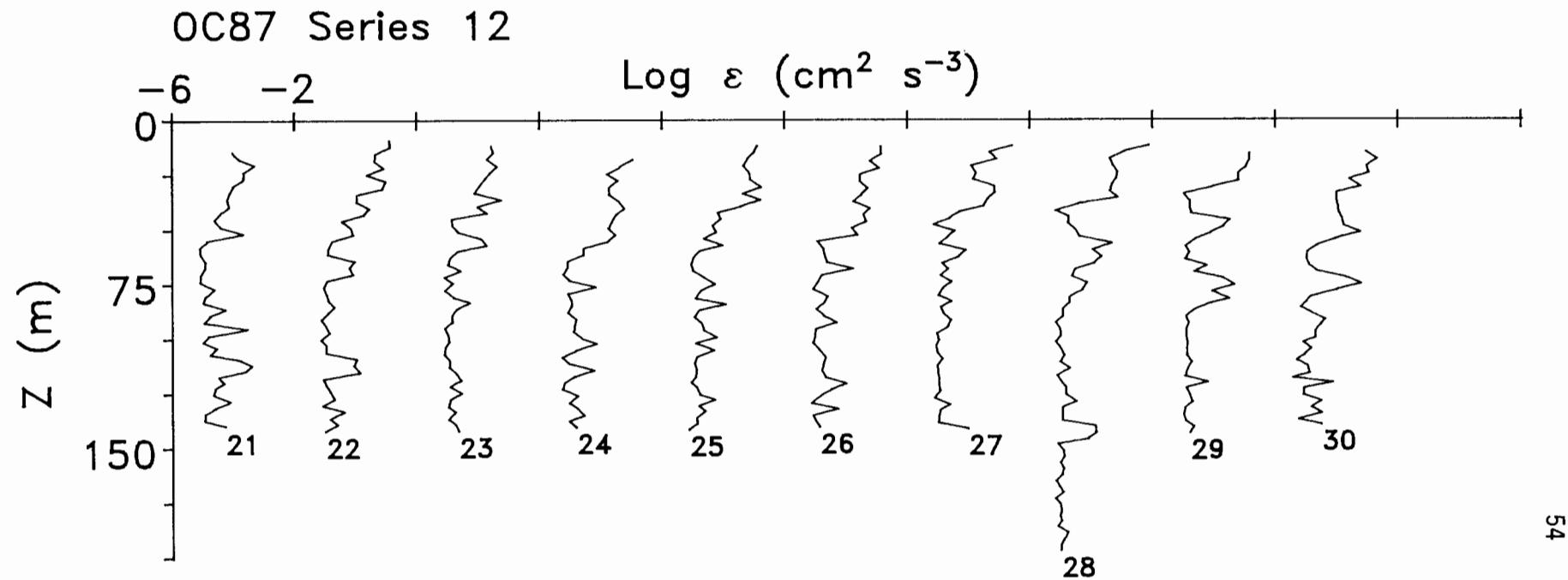


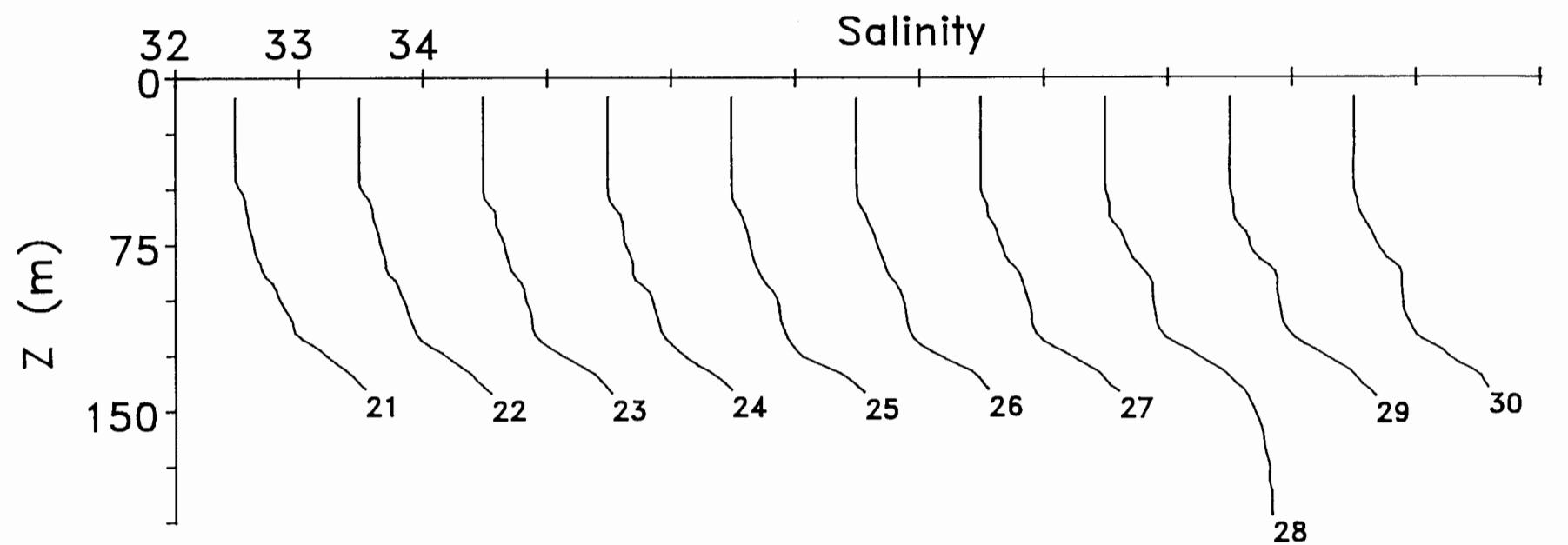
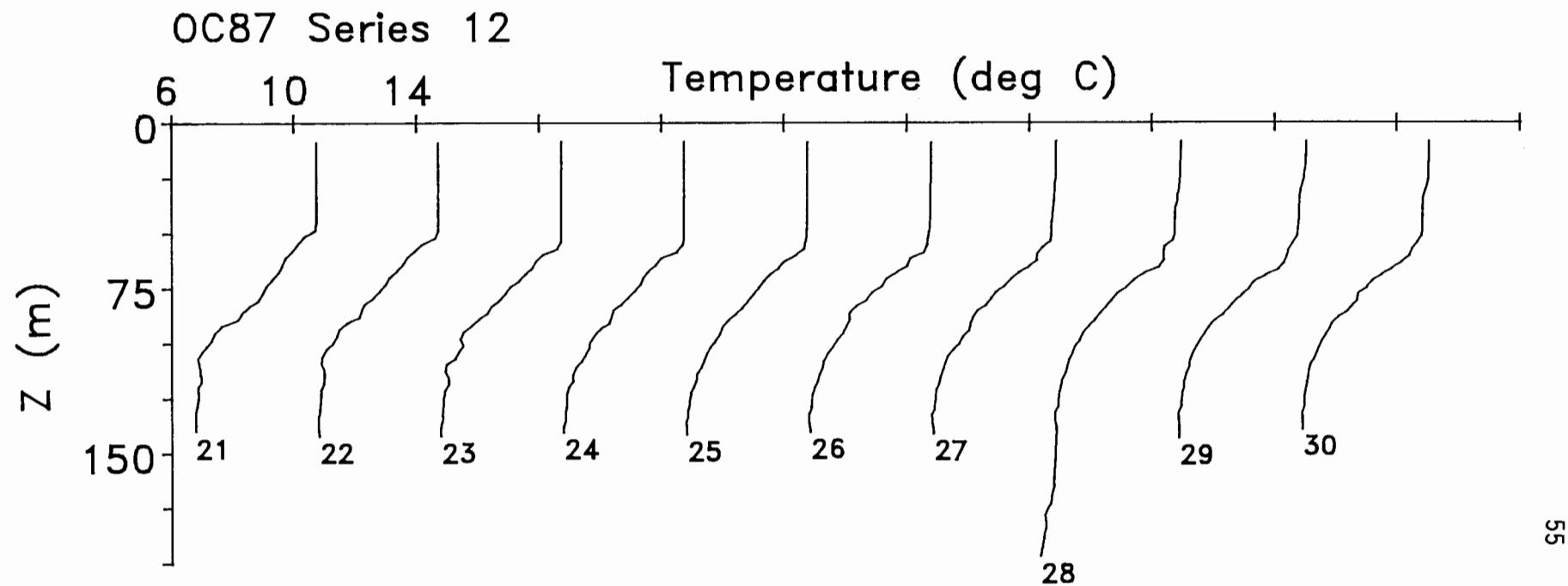


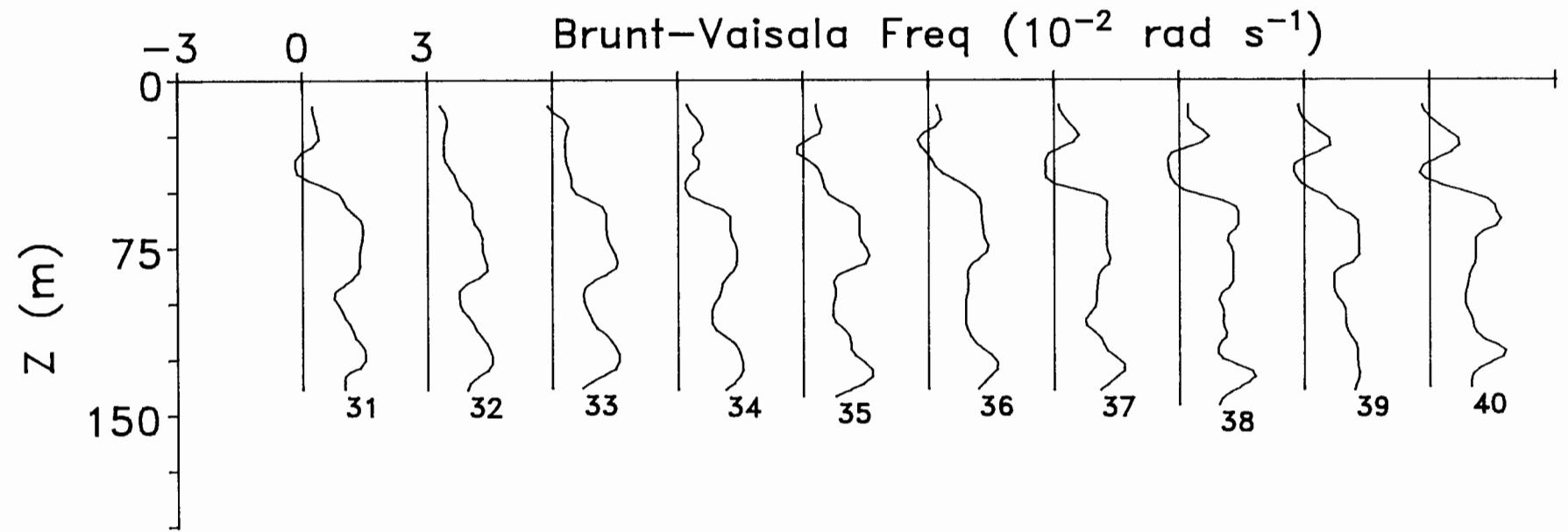
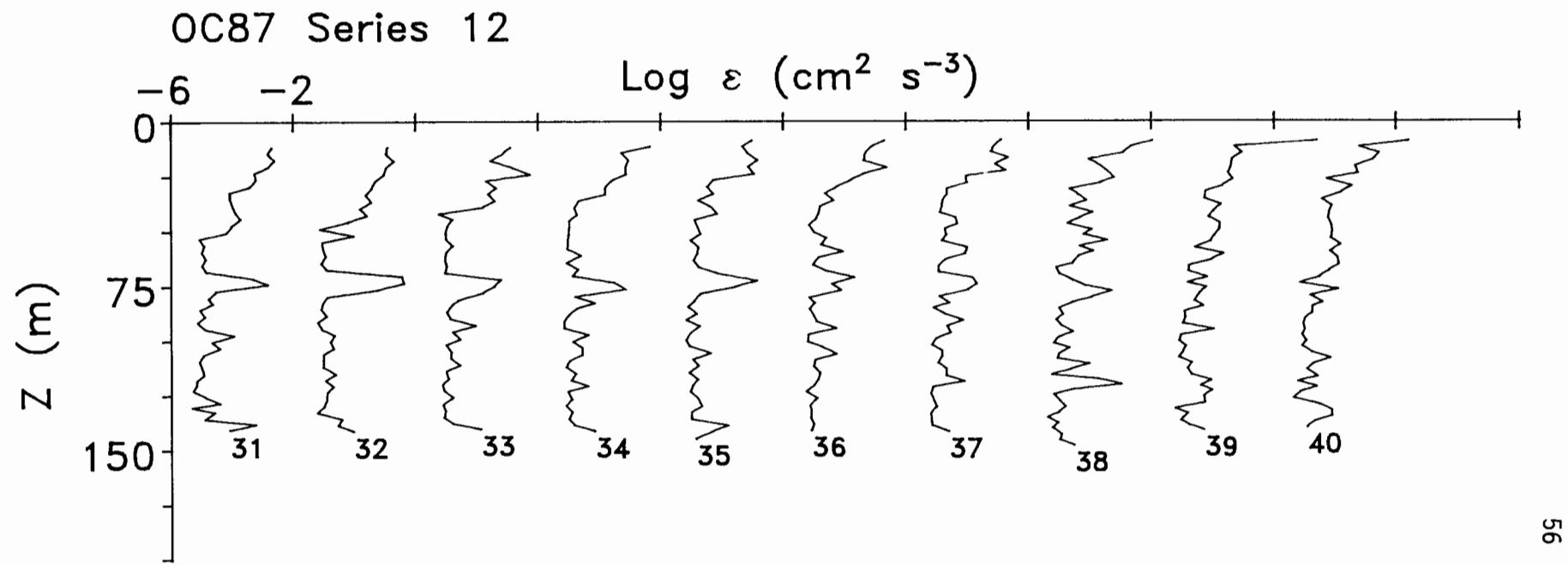
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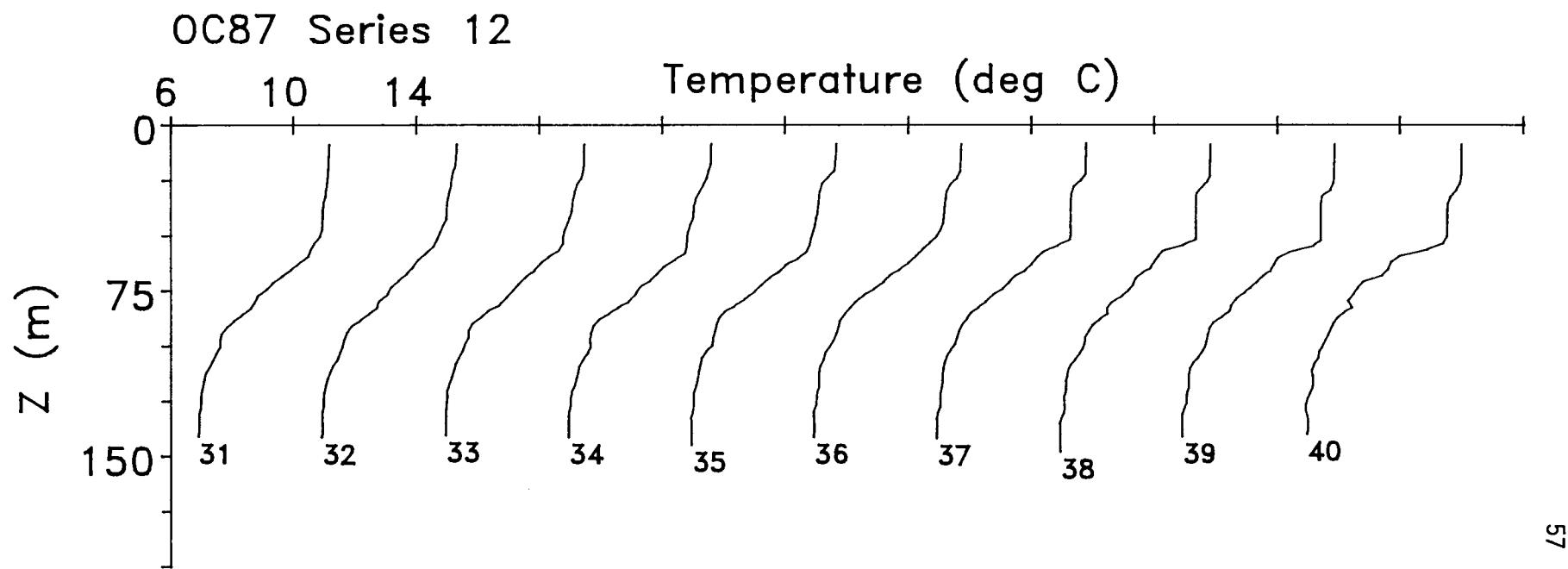




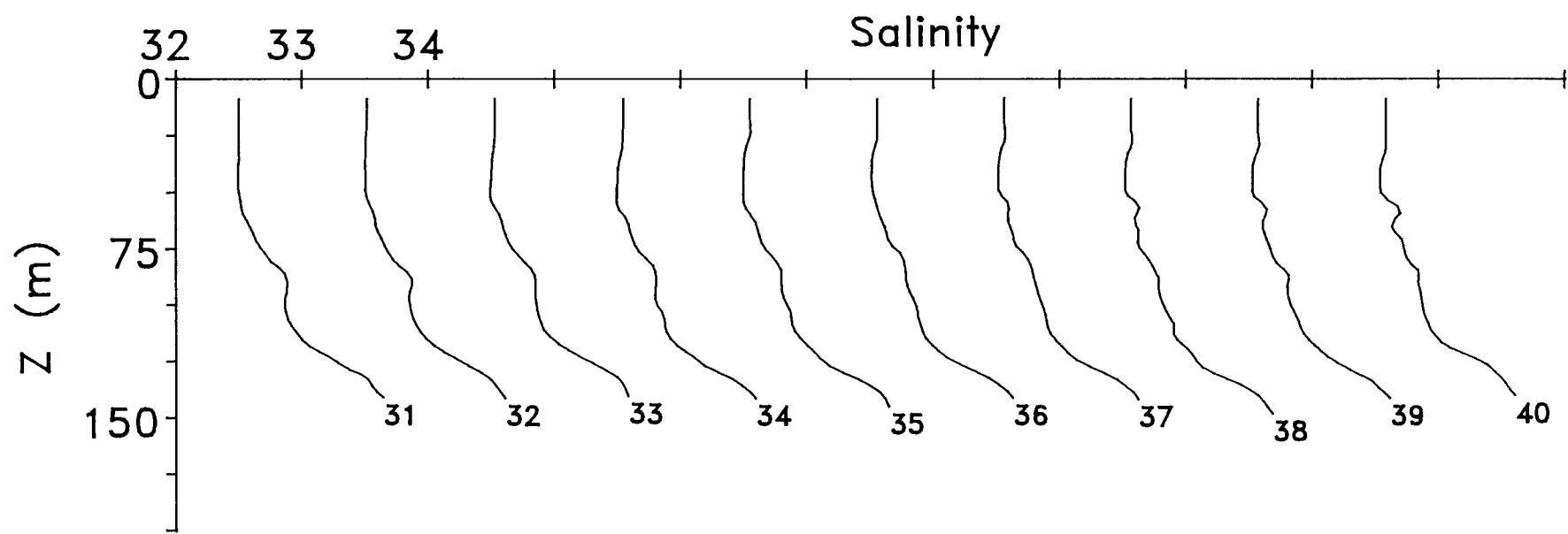


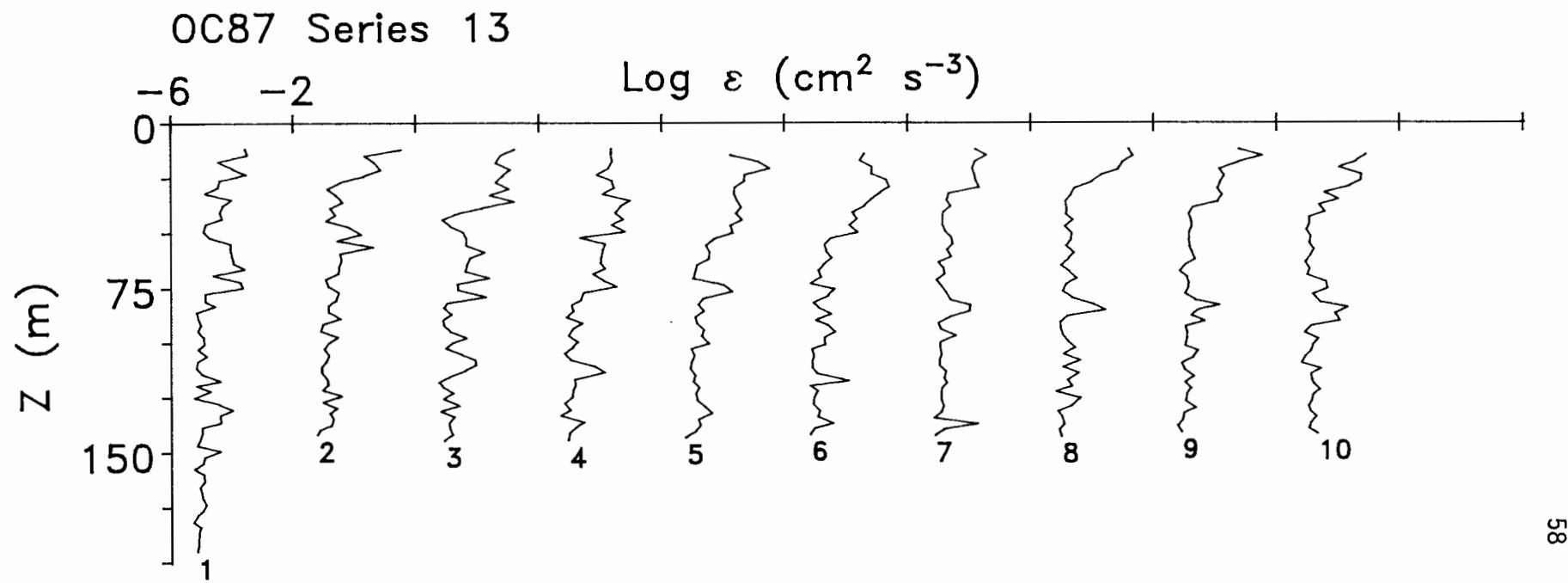




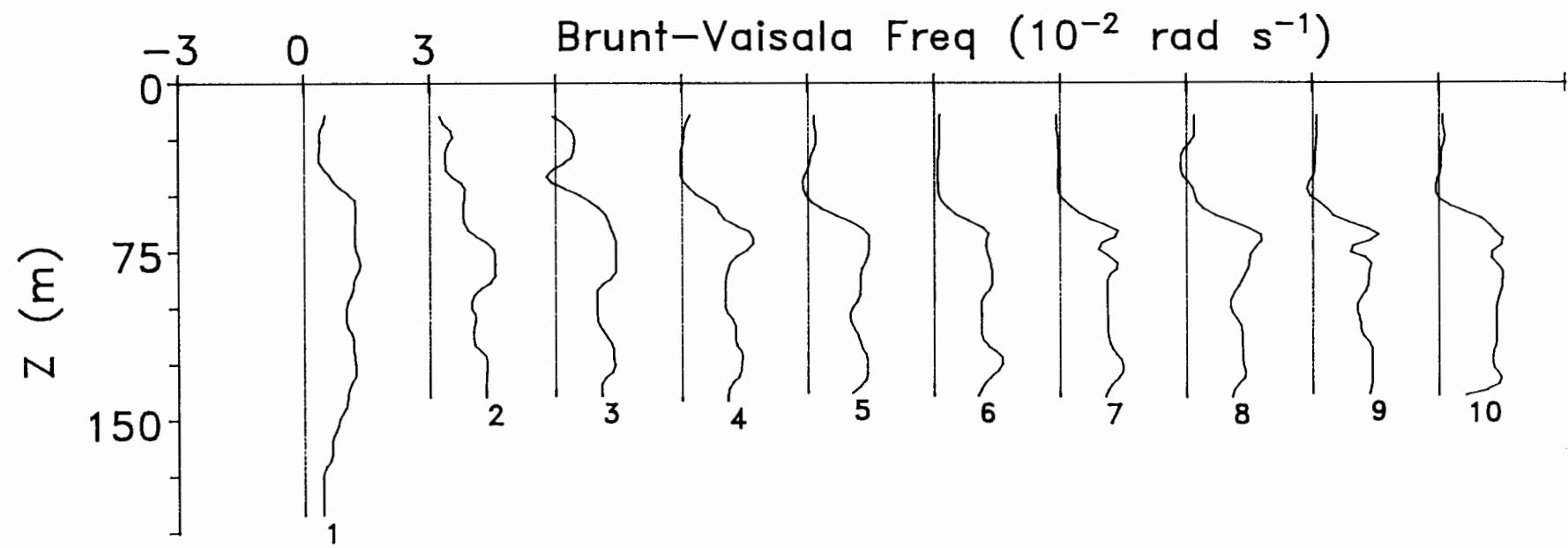


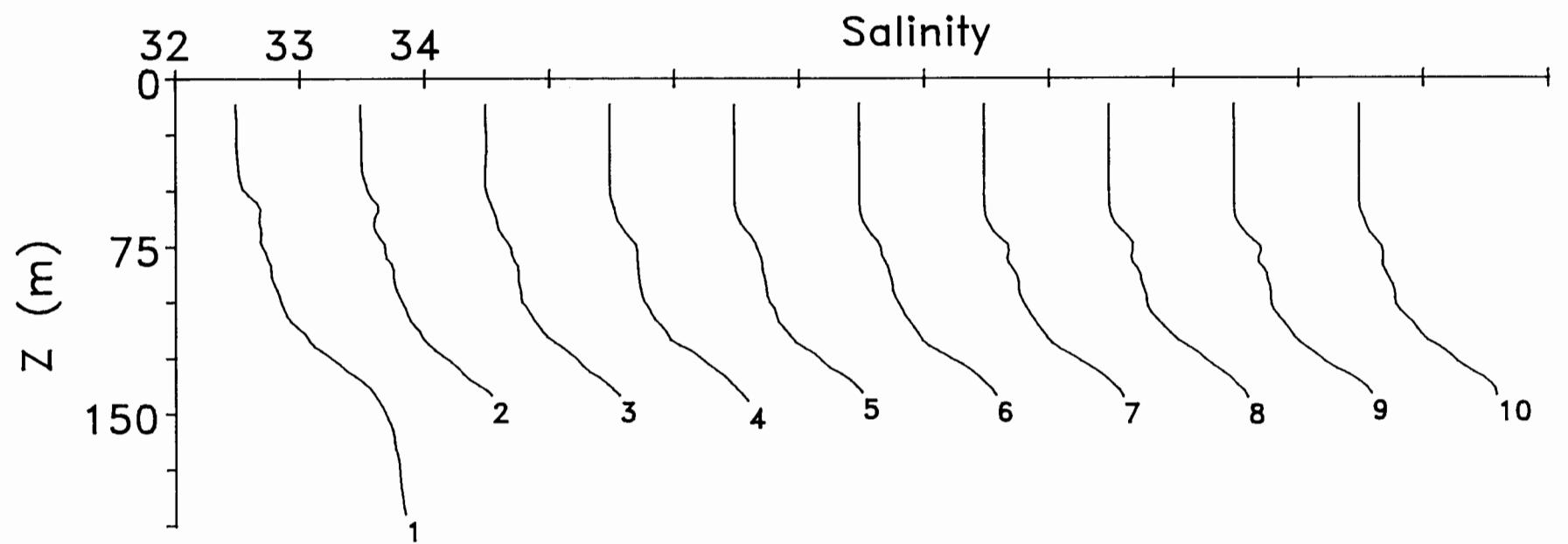
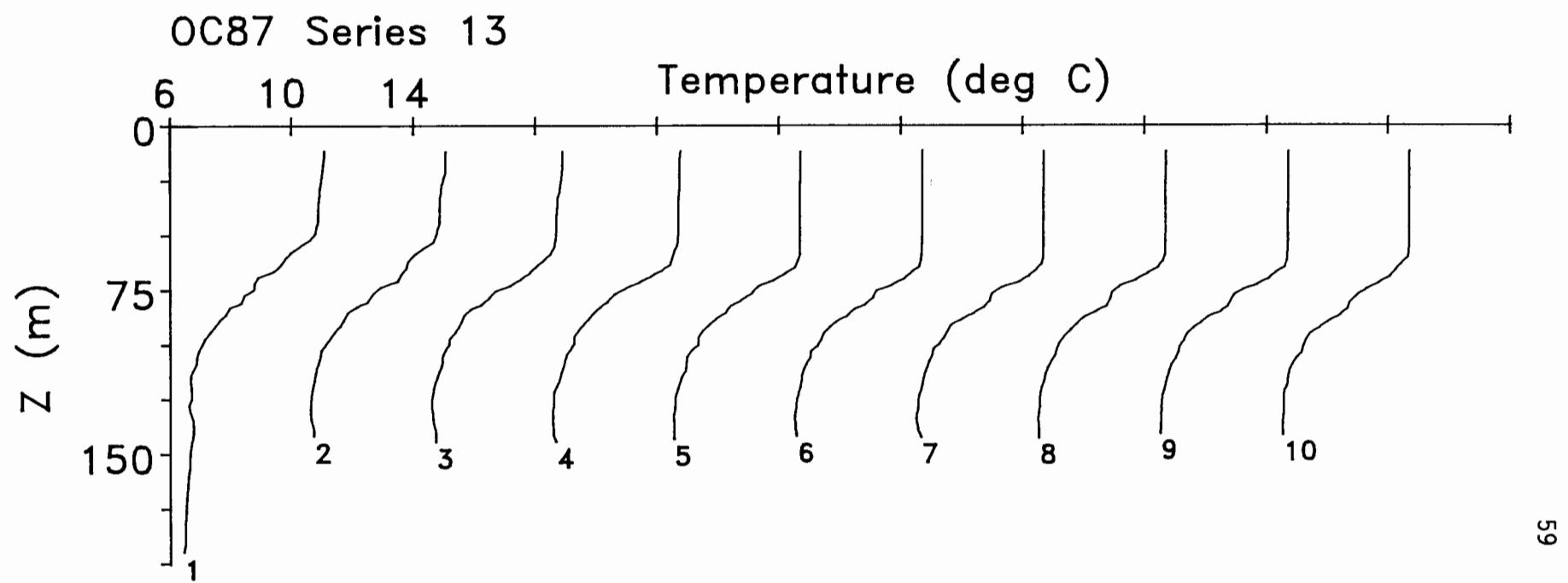
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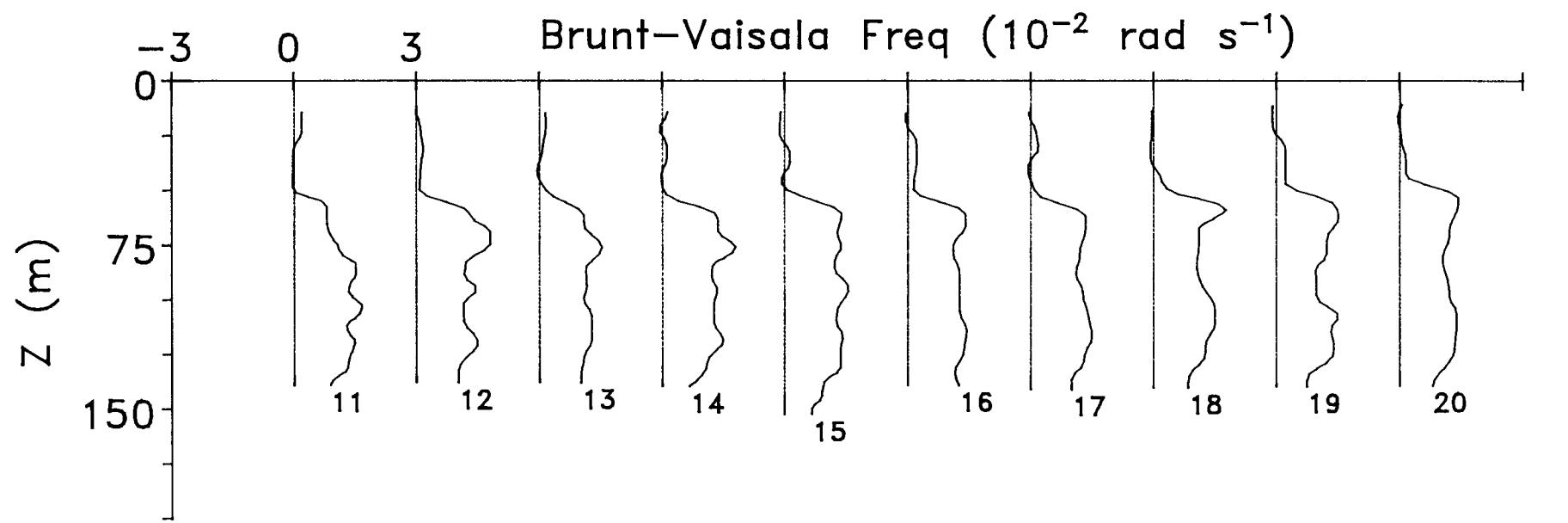
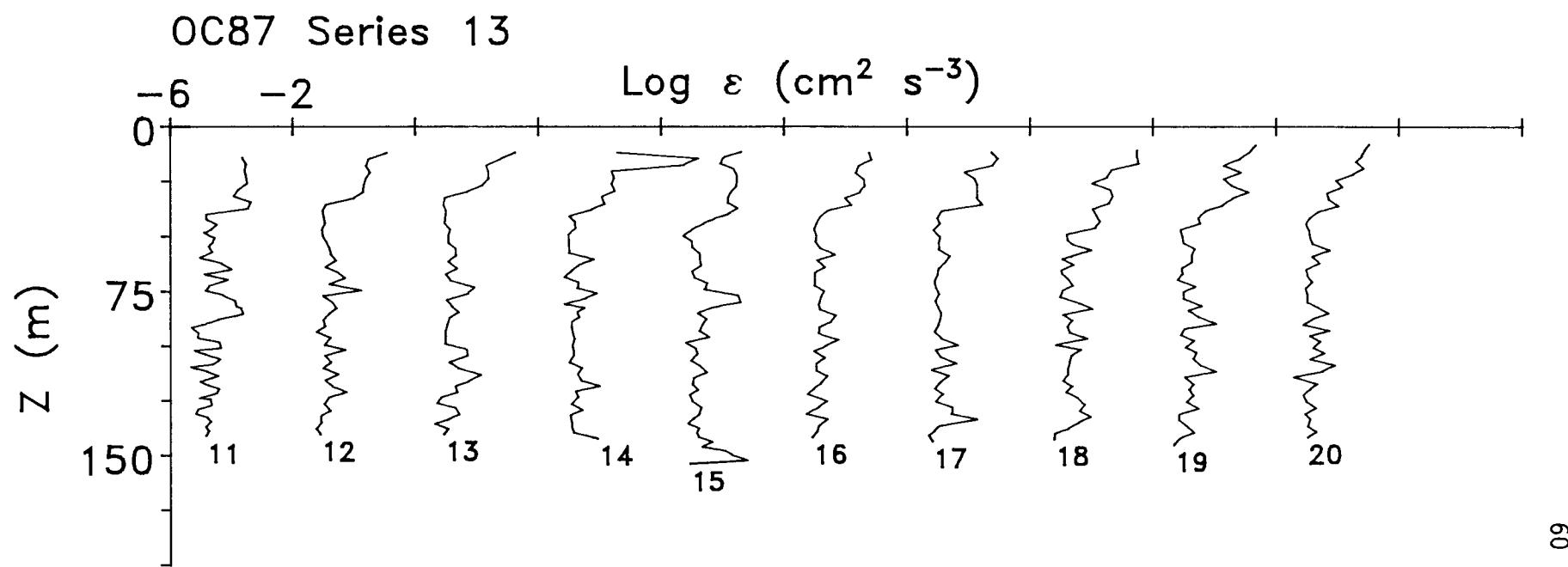


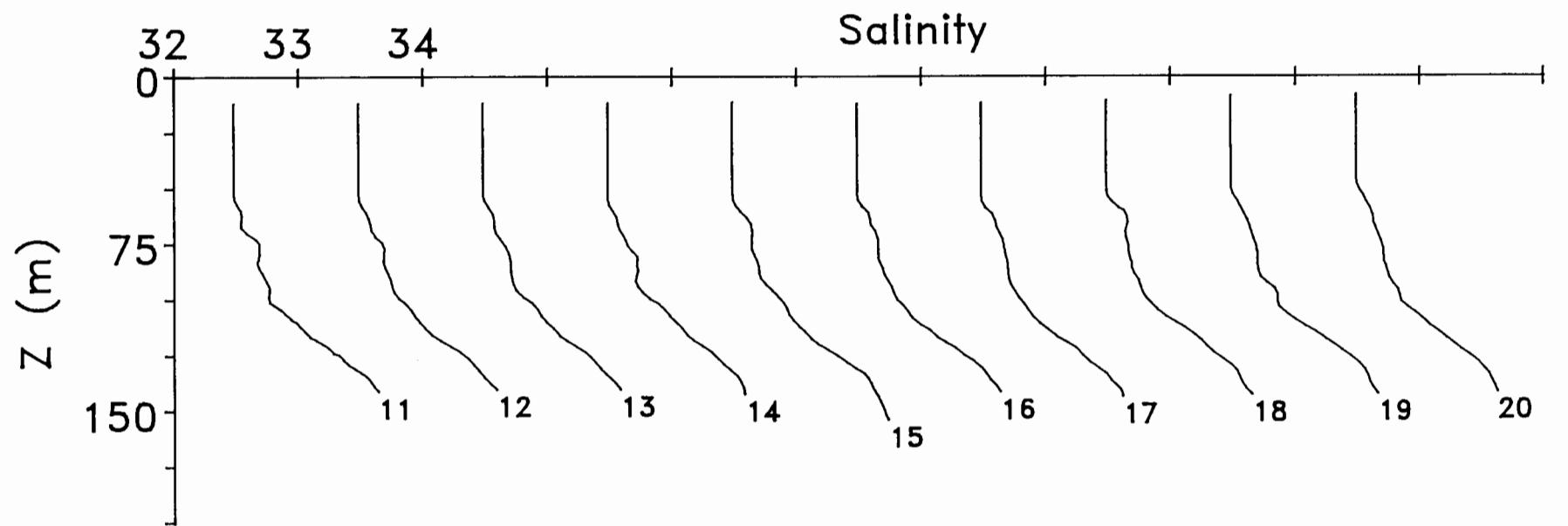
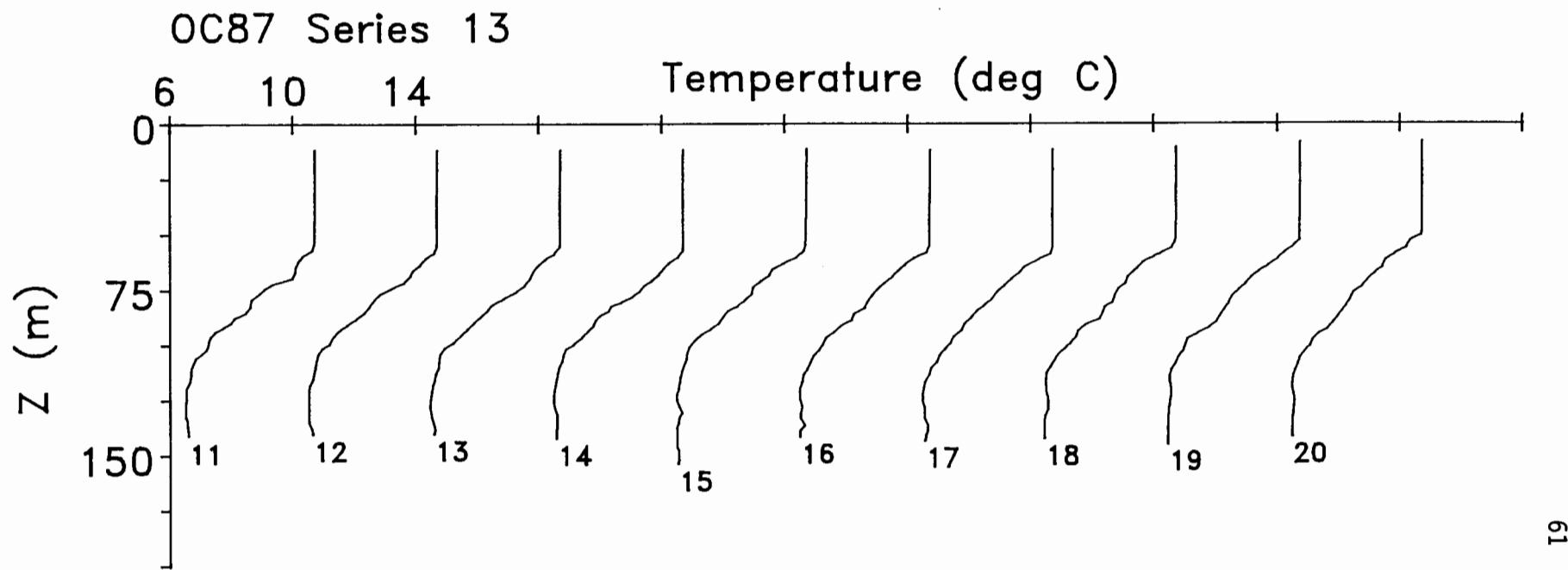


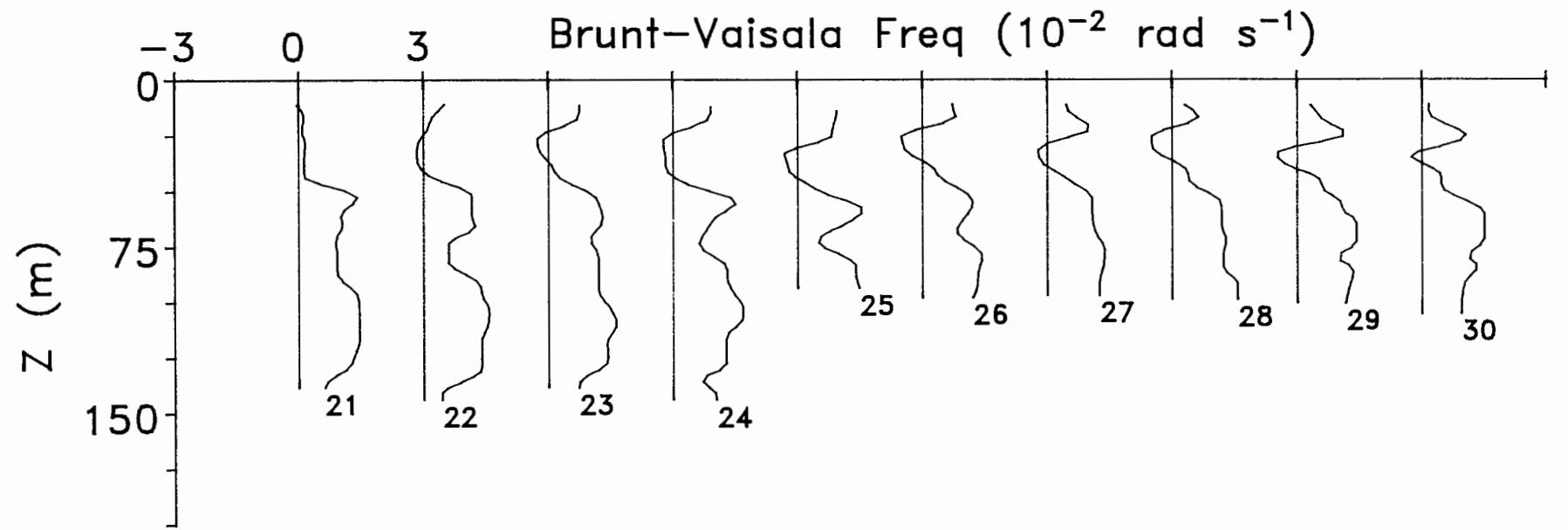
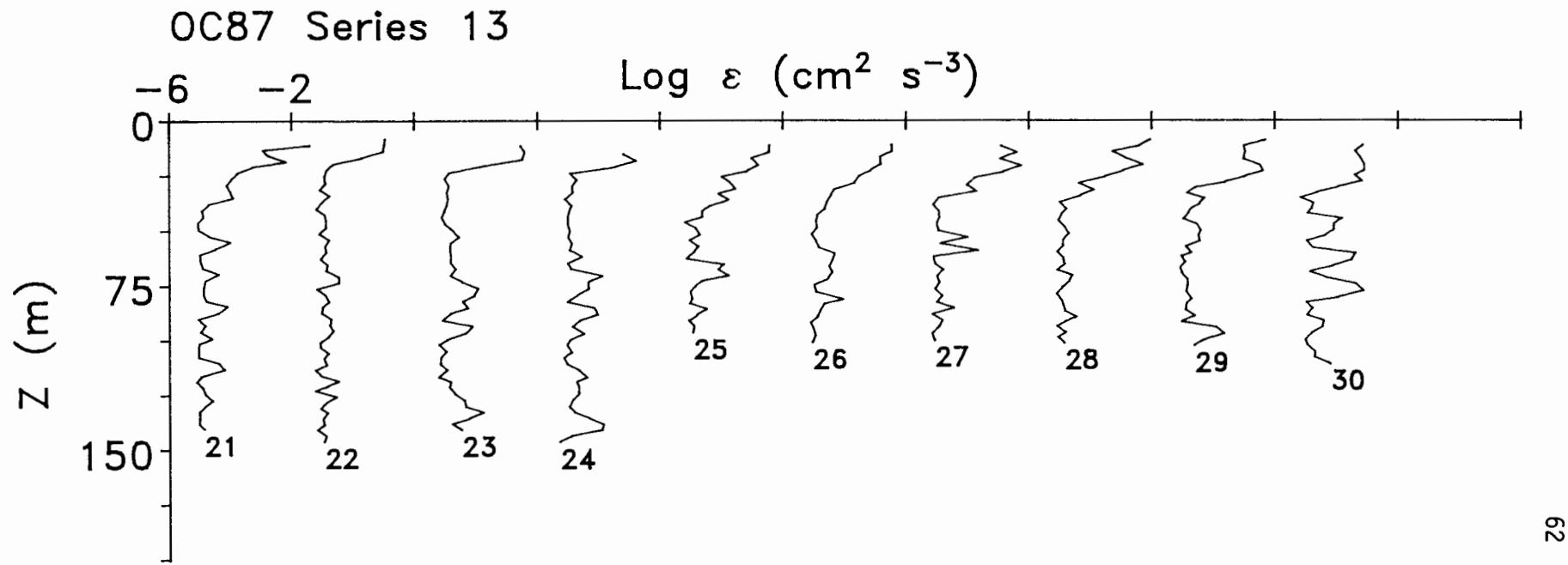
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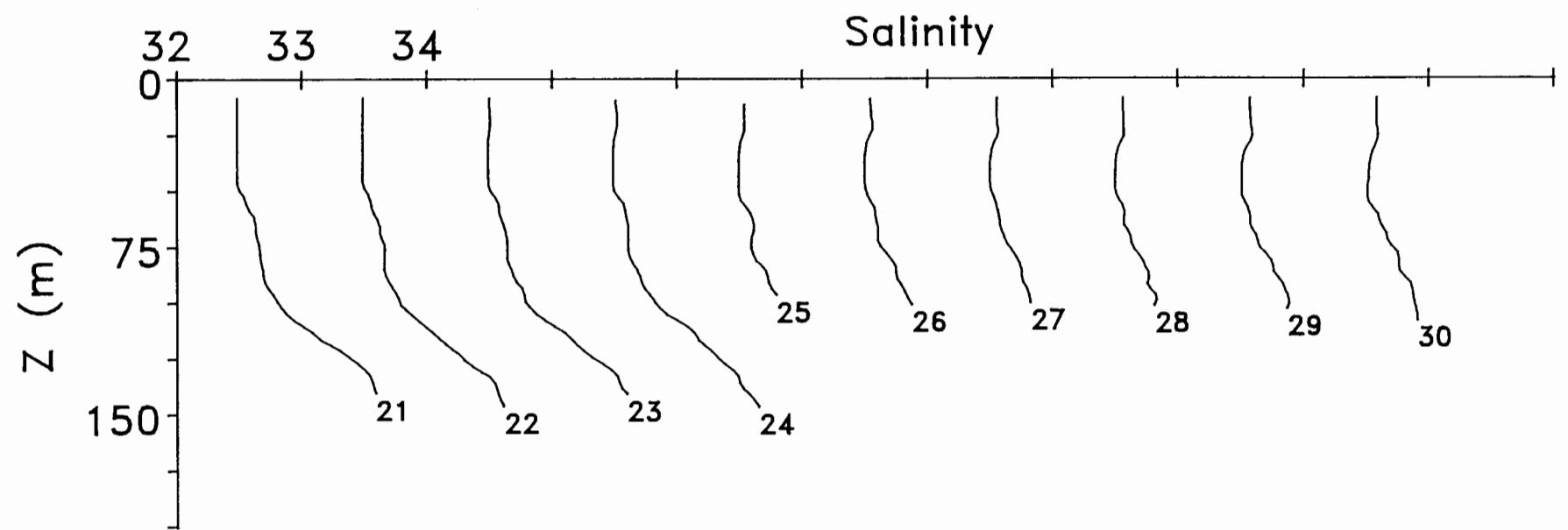
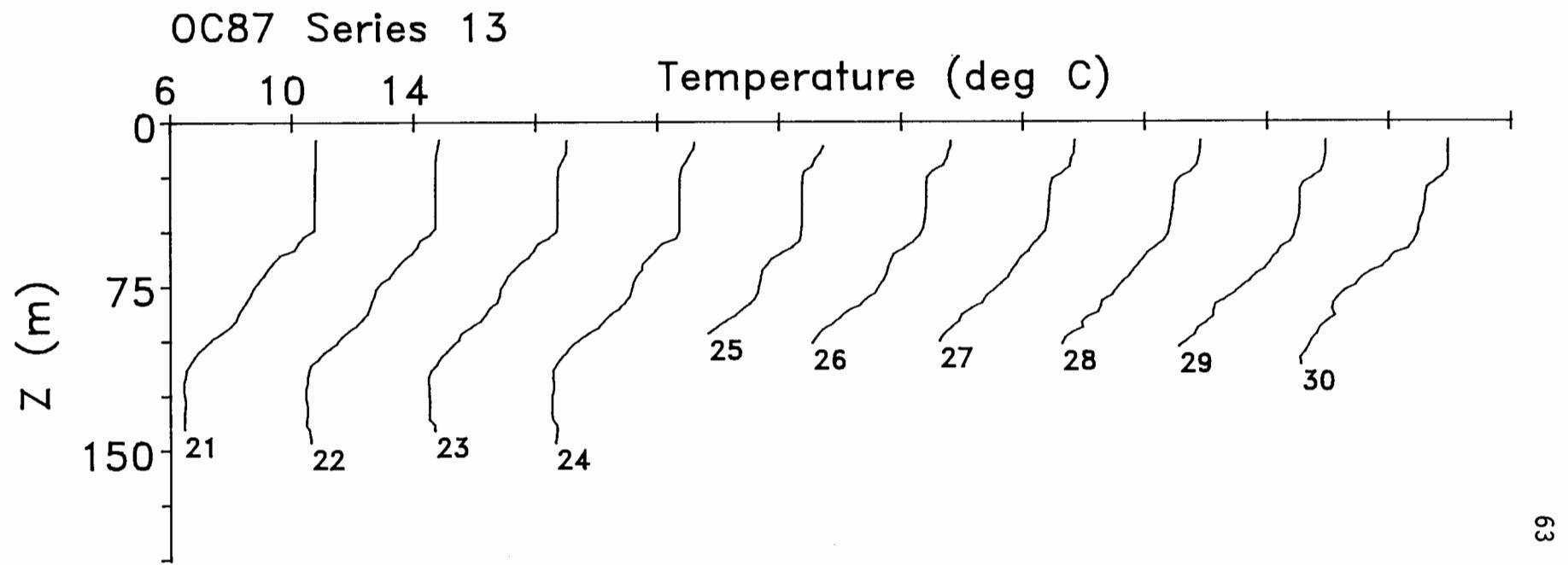


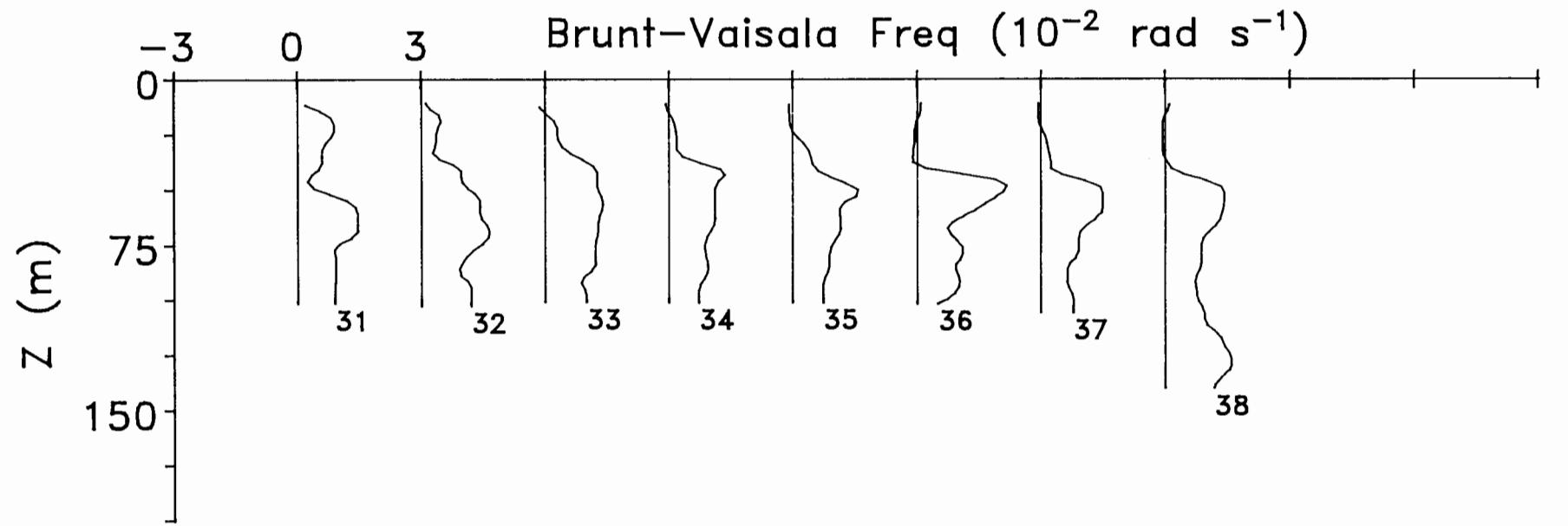
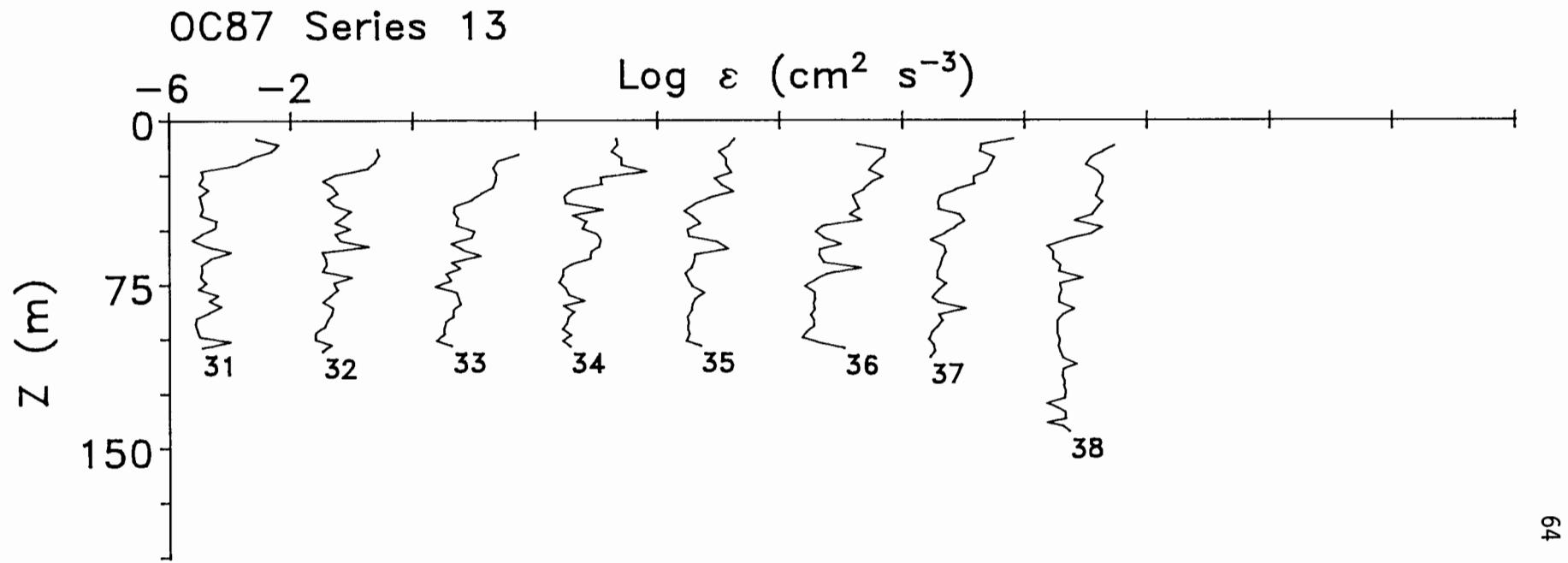


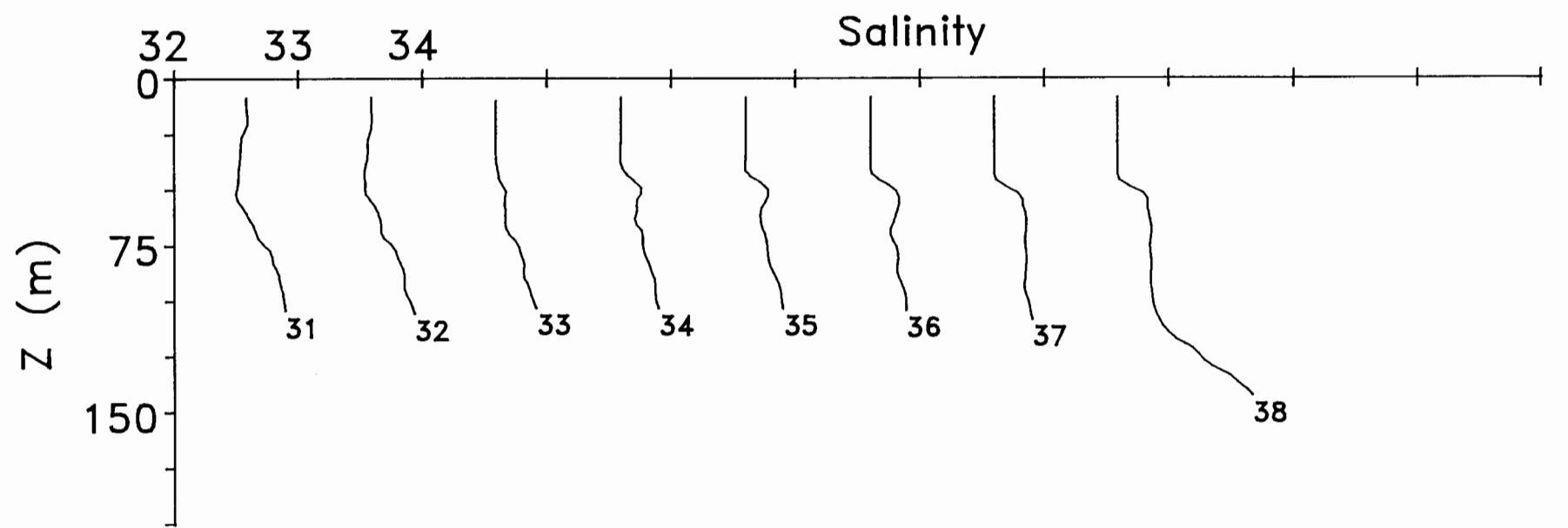
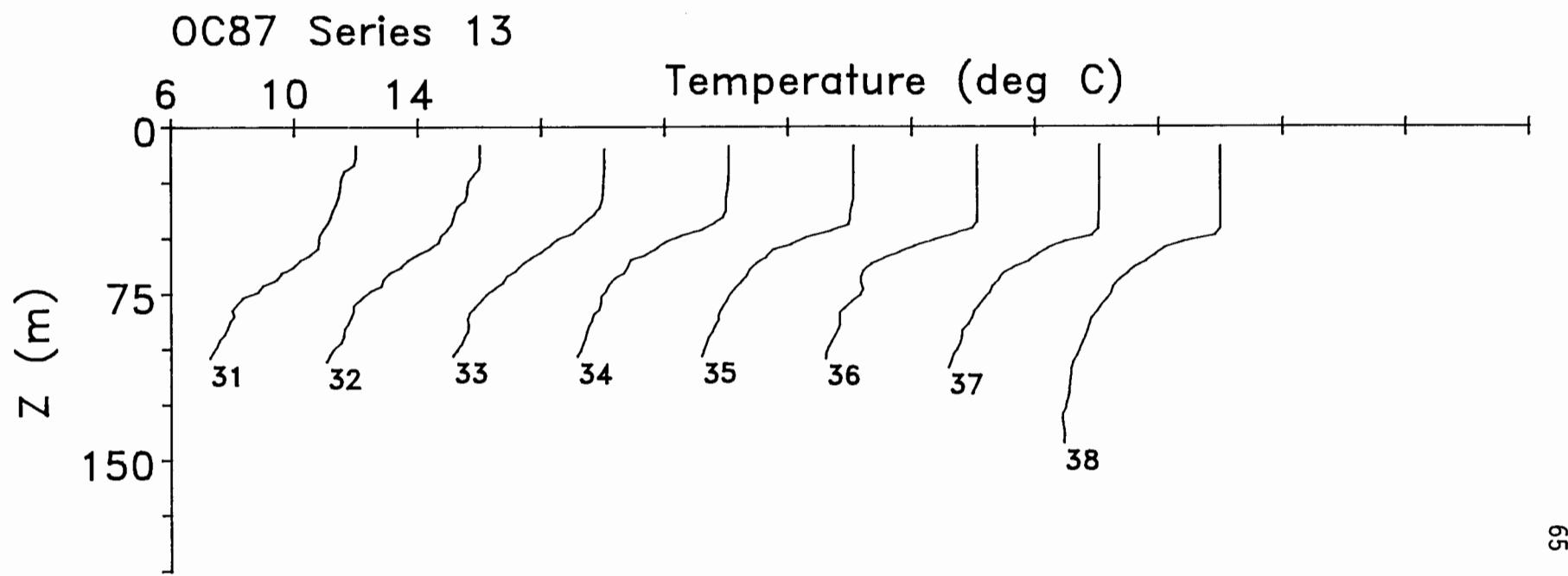


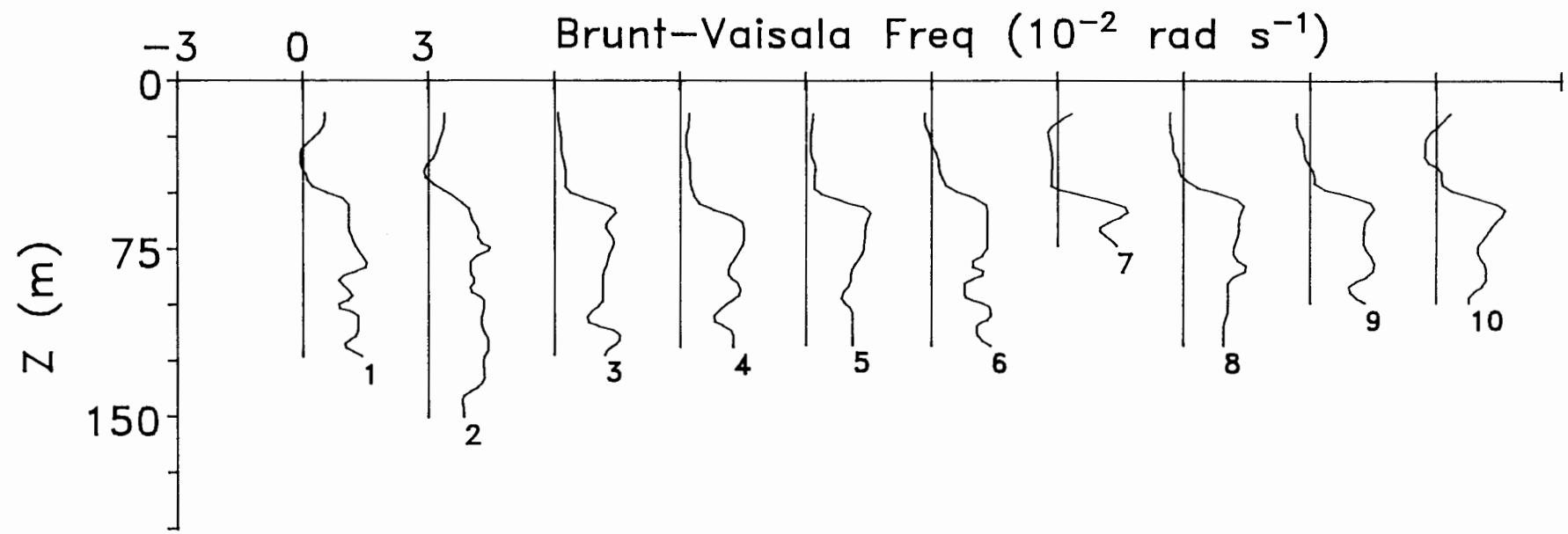
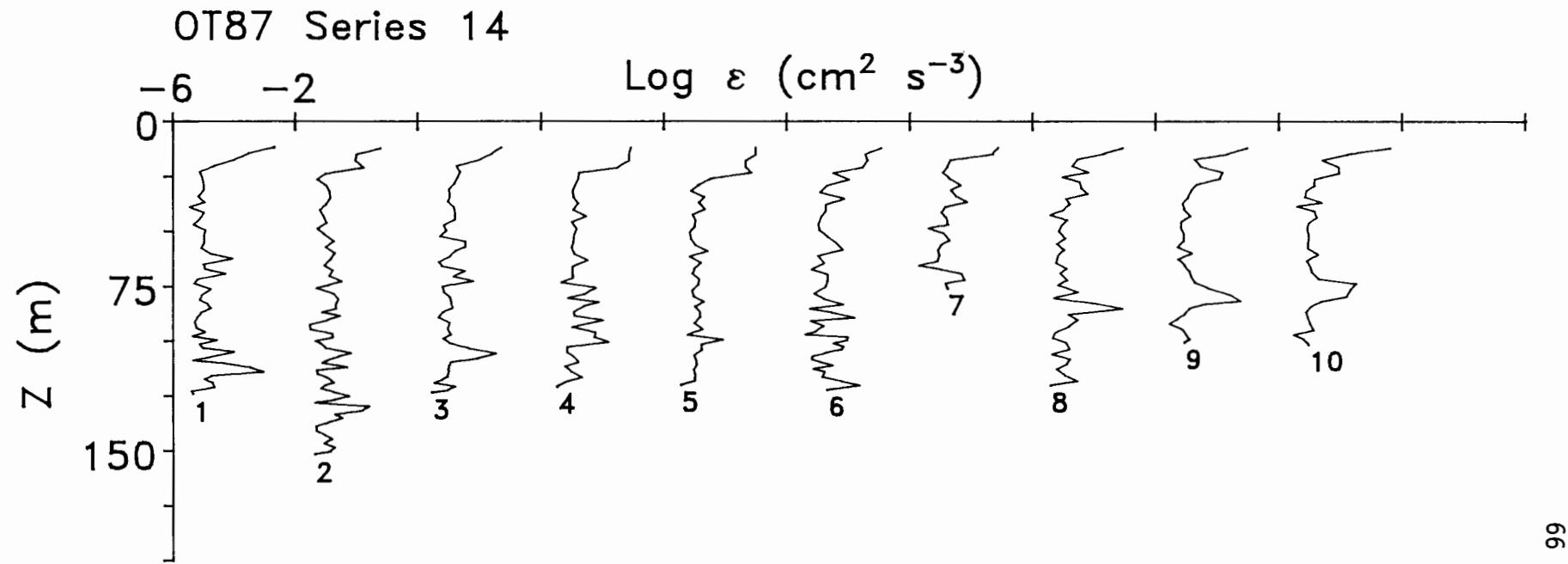


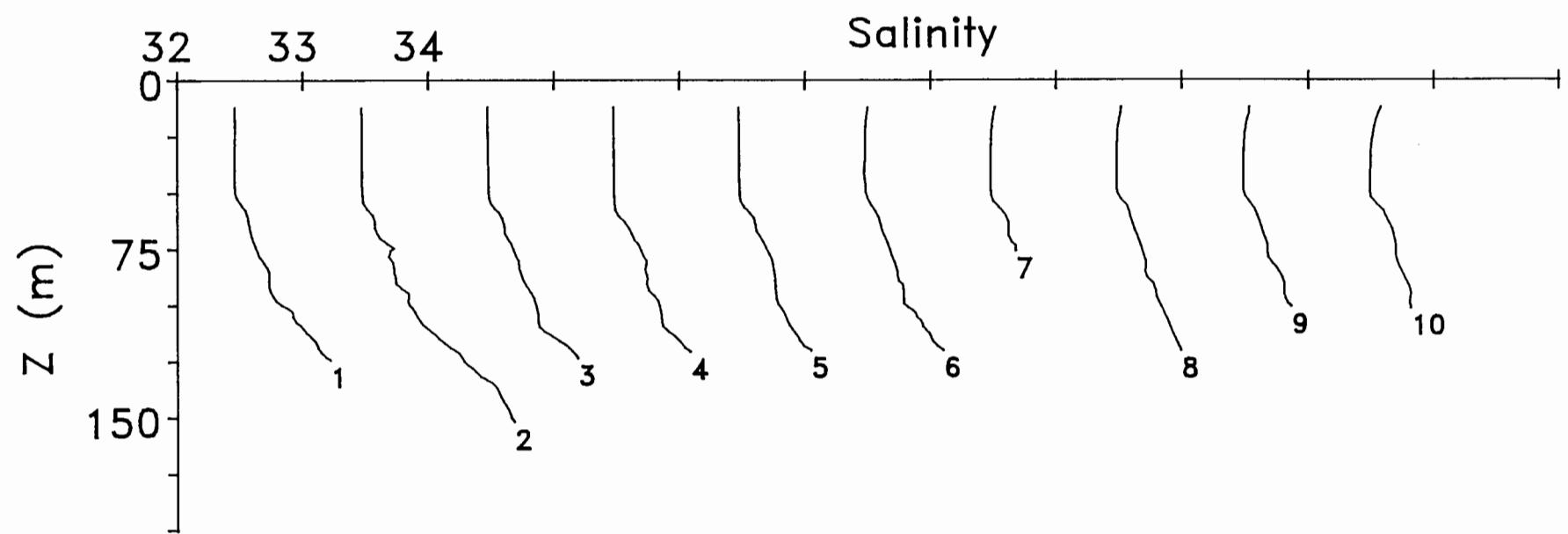
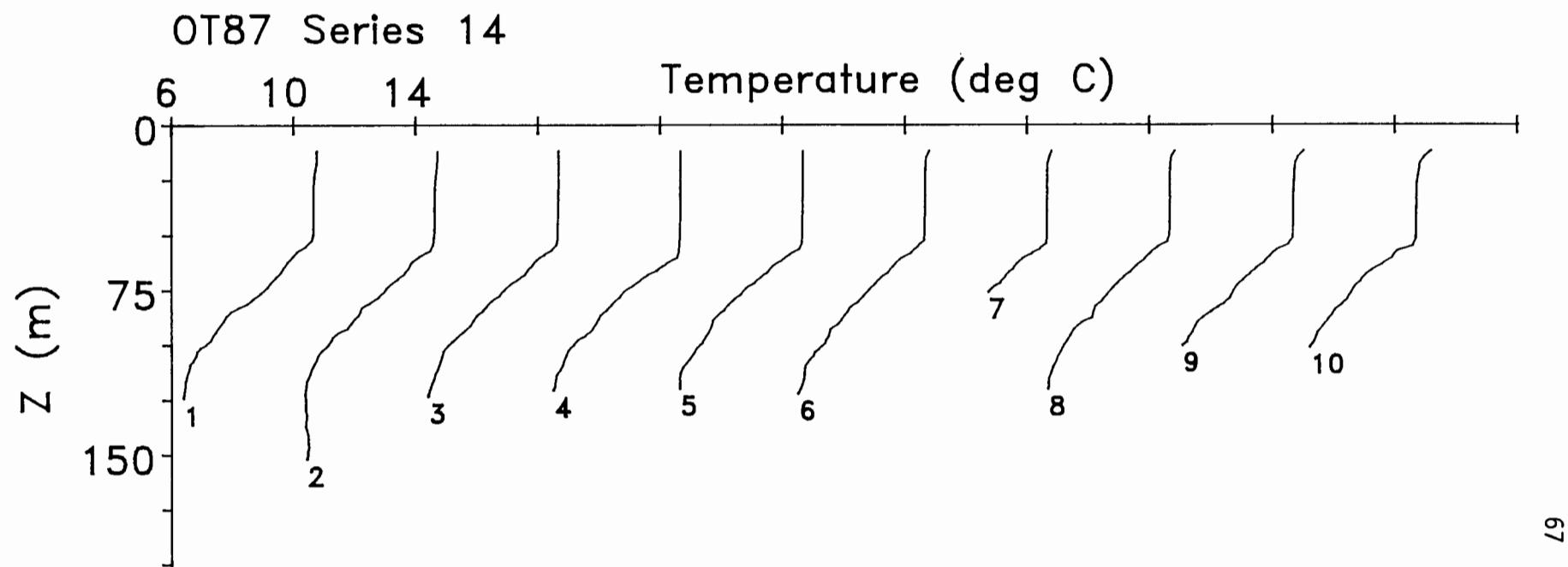


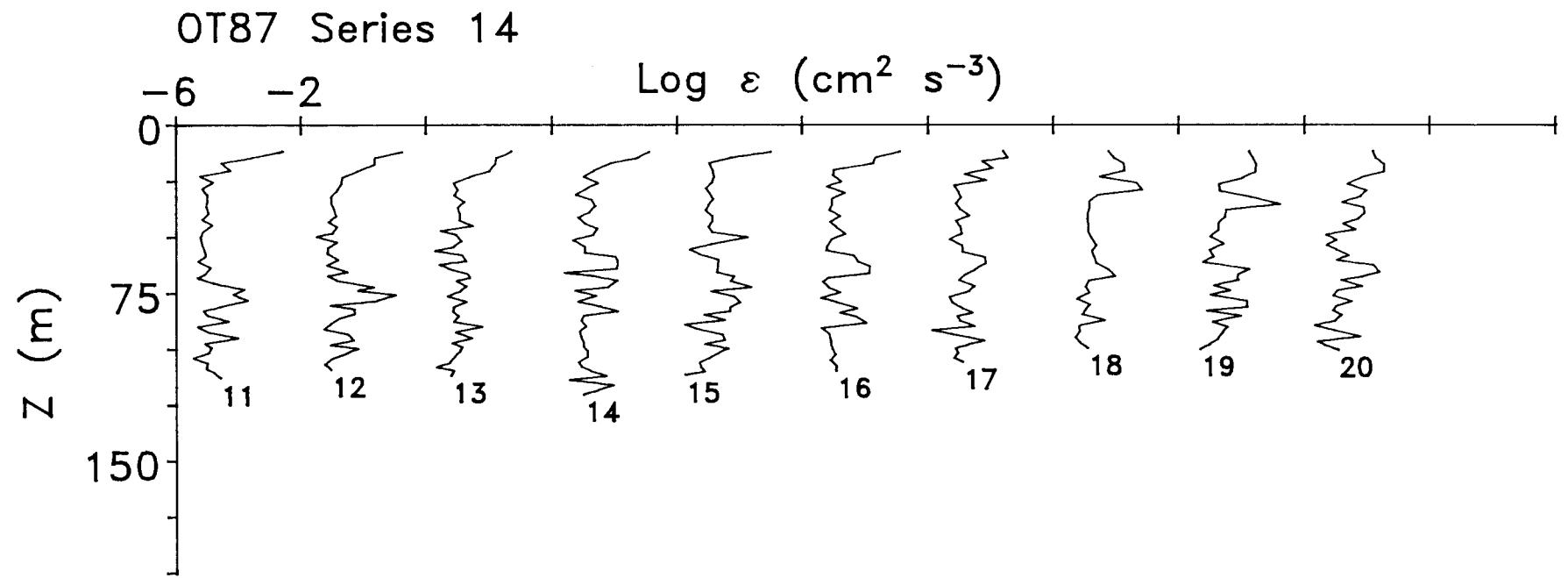




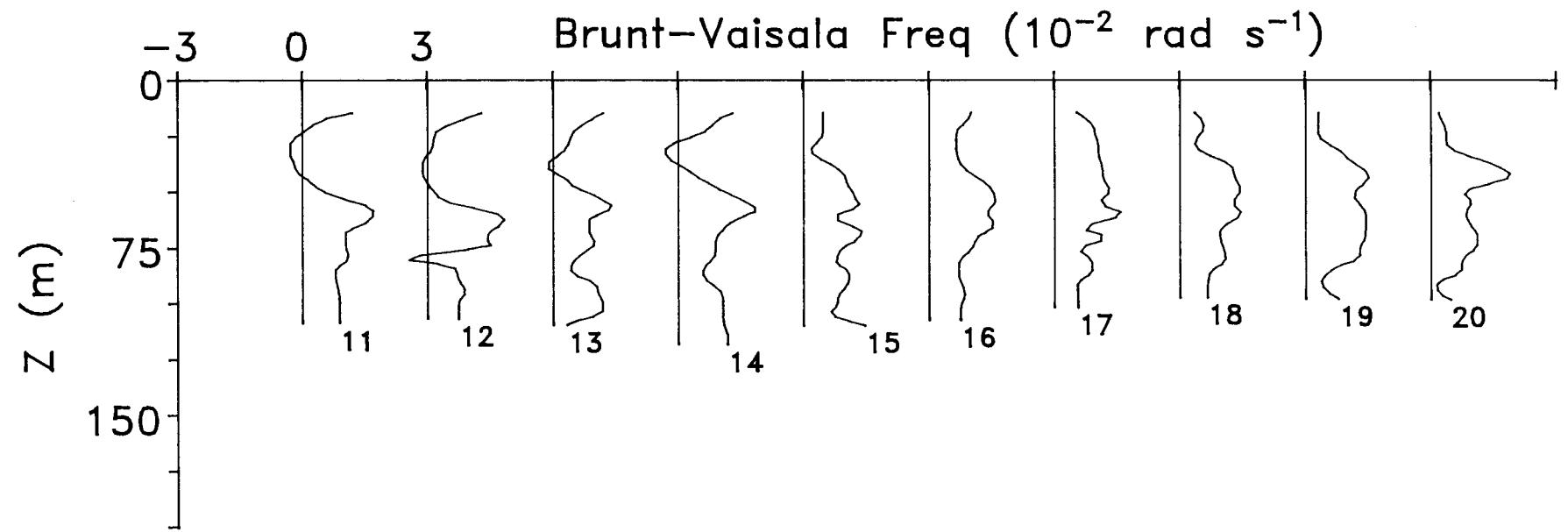


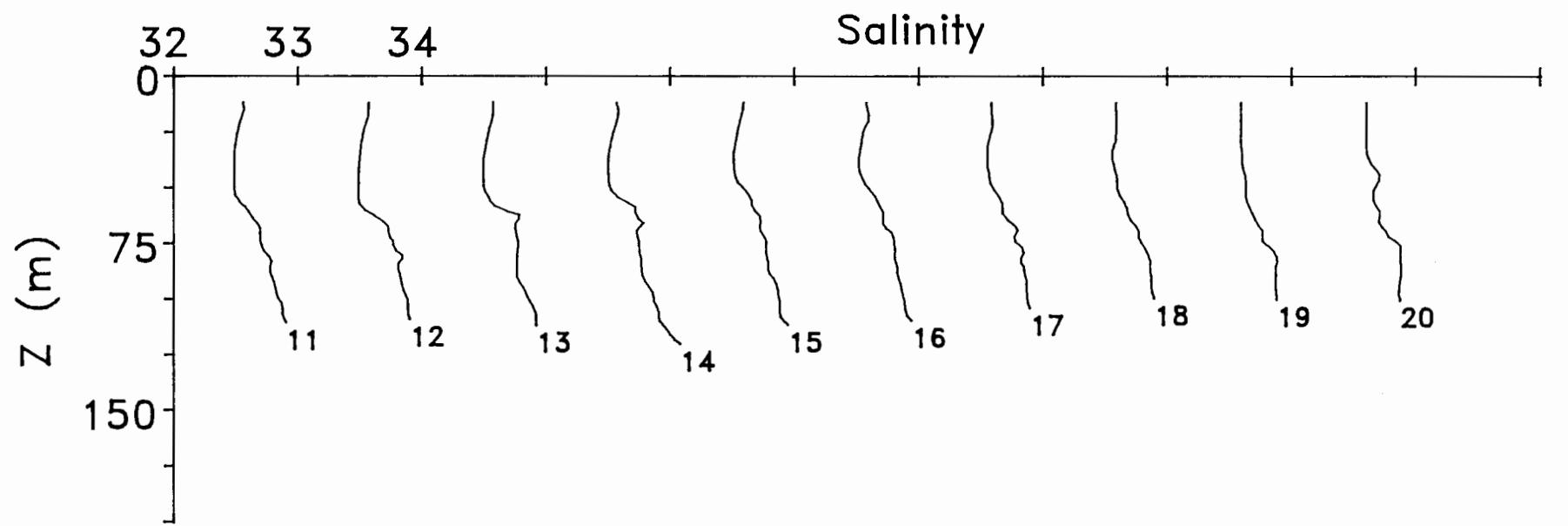
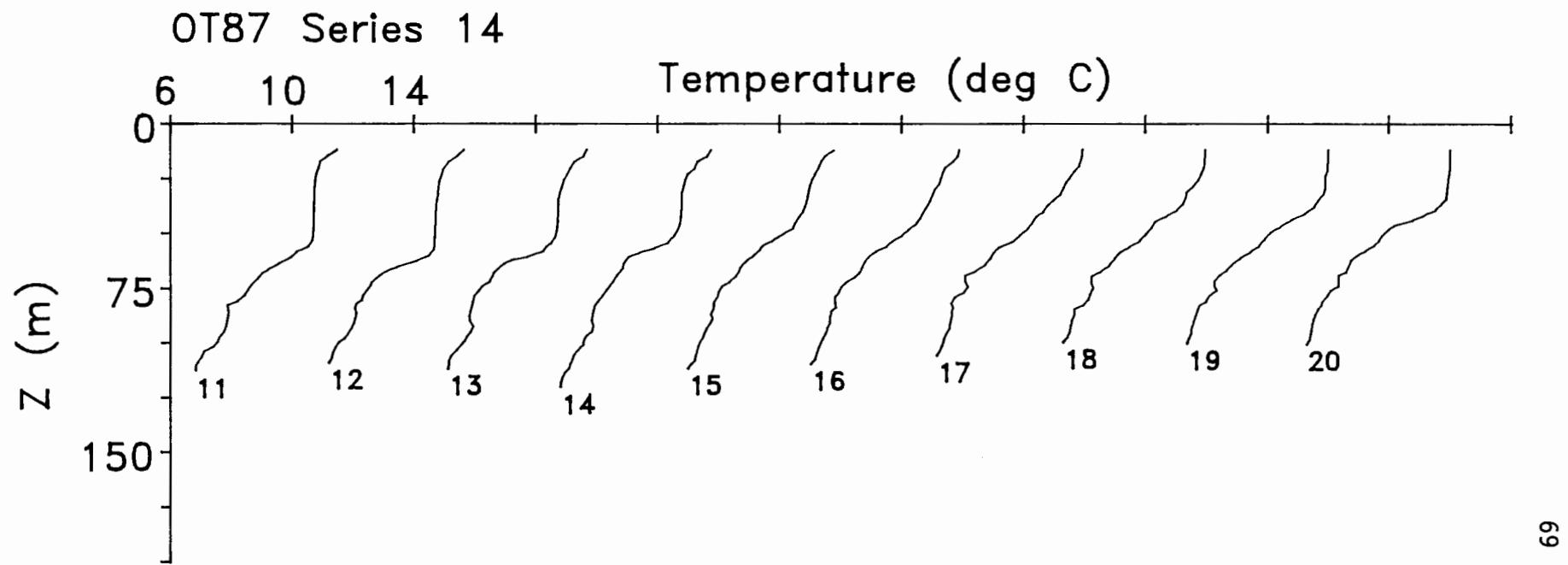


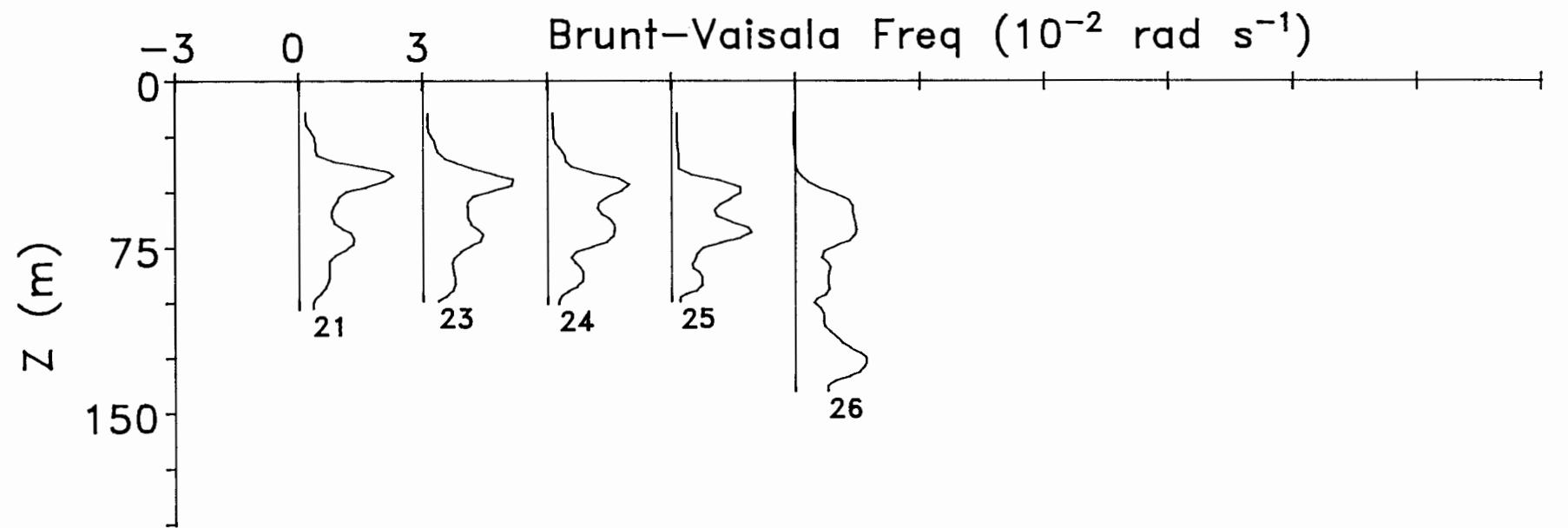
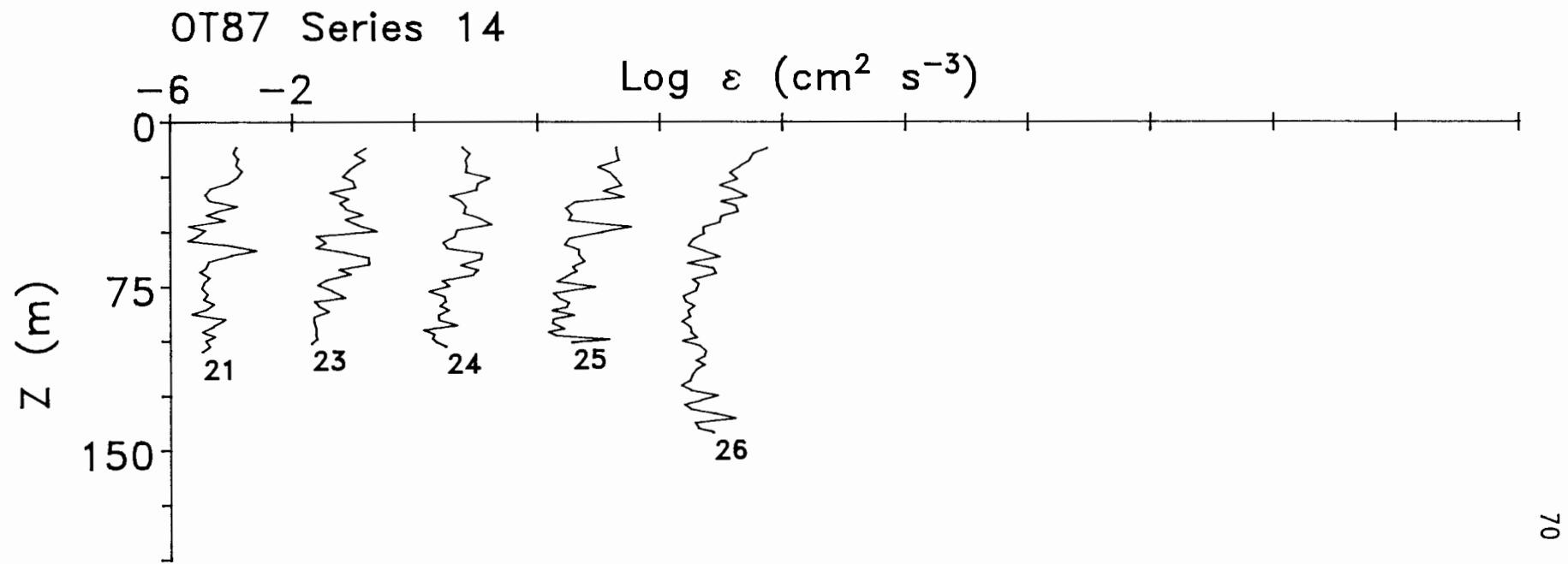


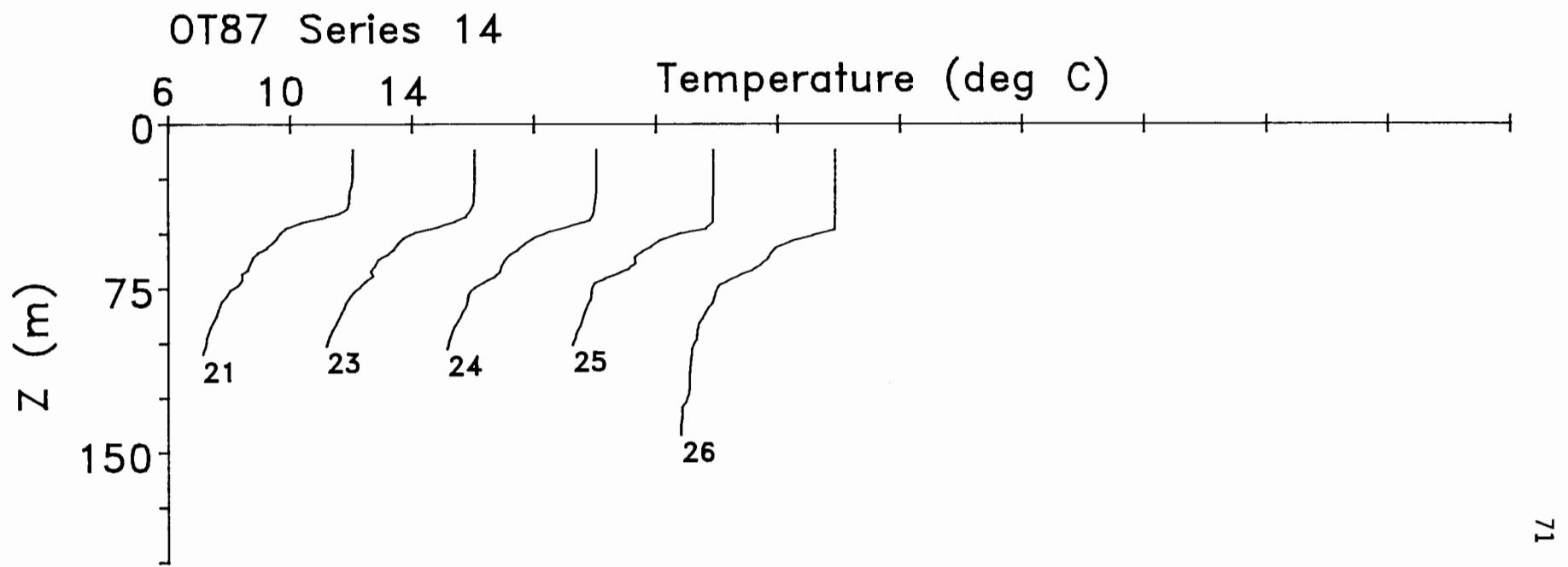


89

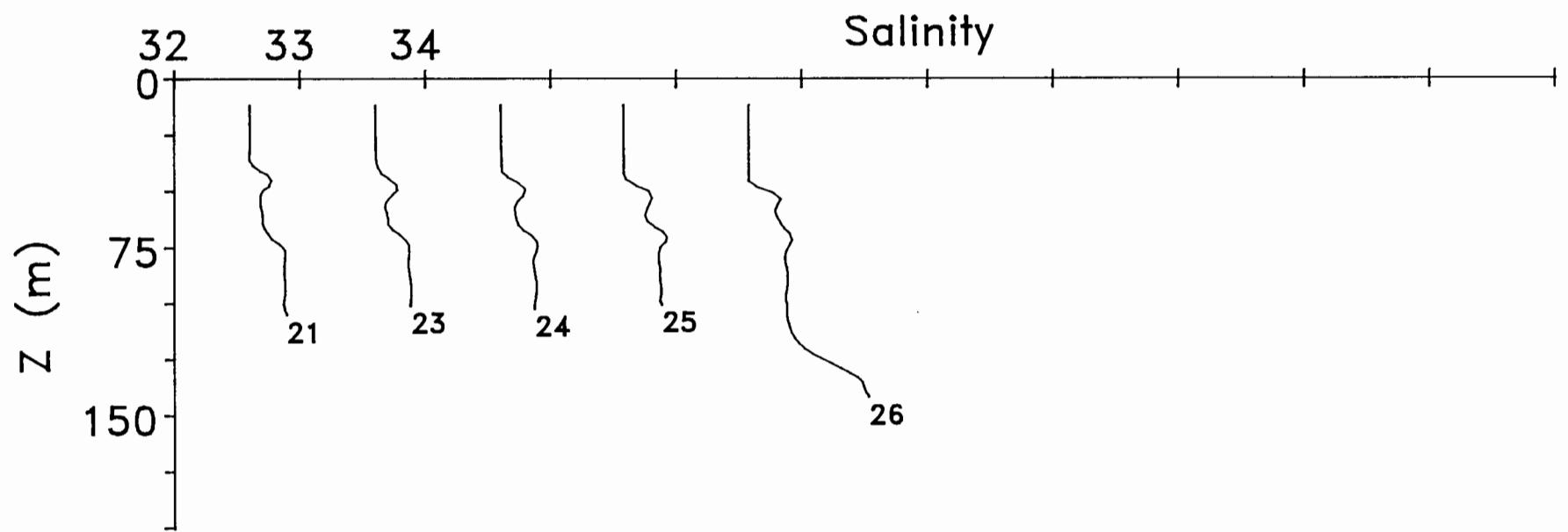


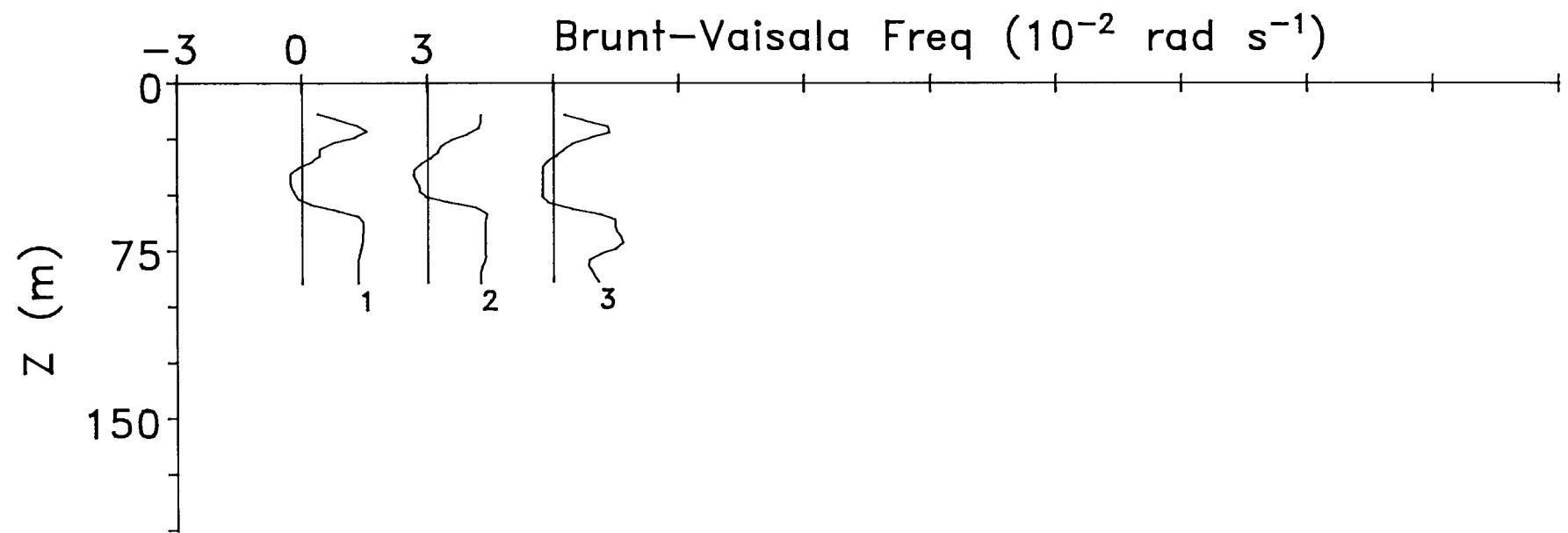
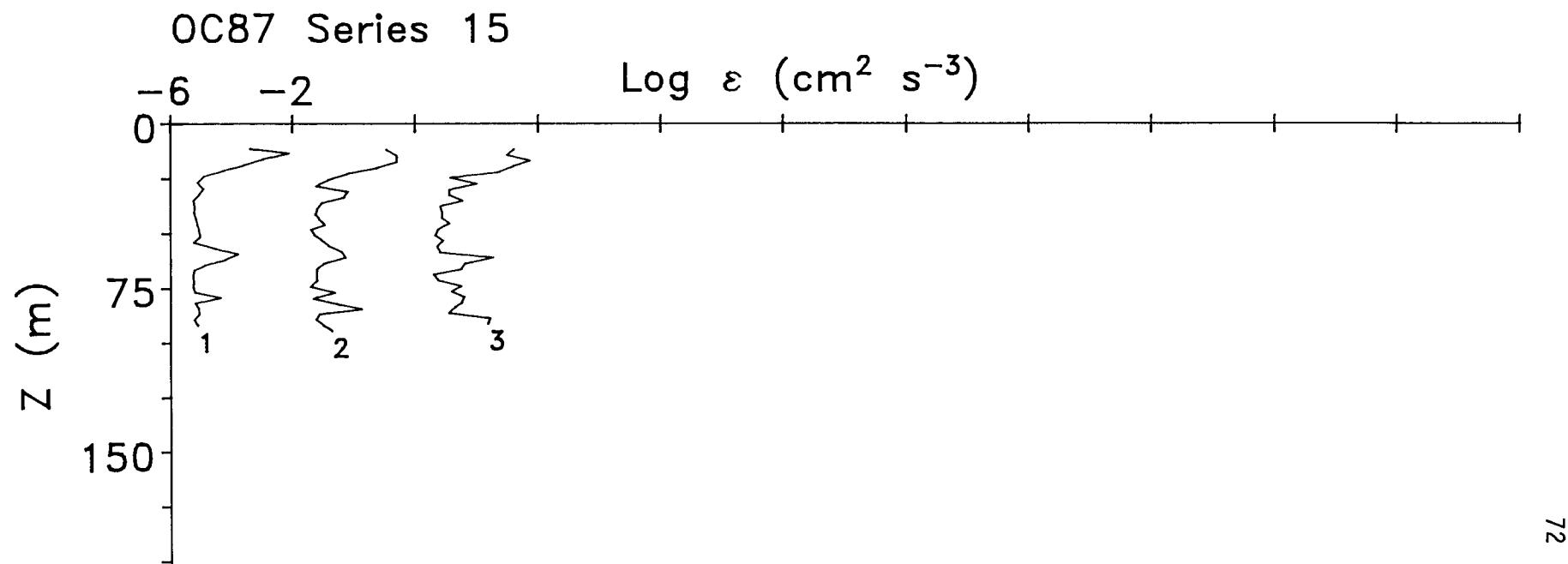




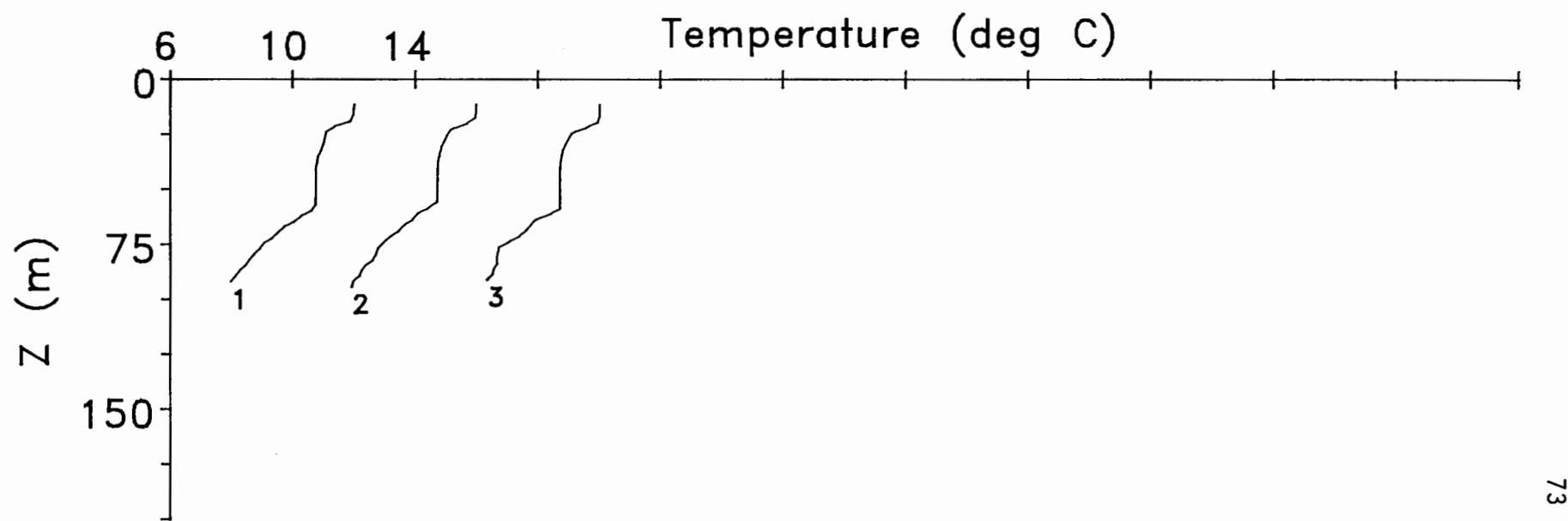


71



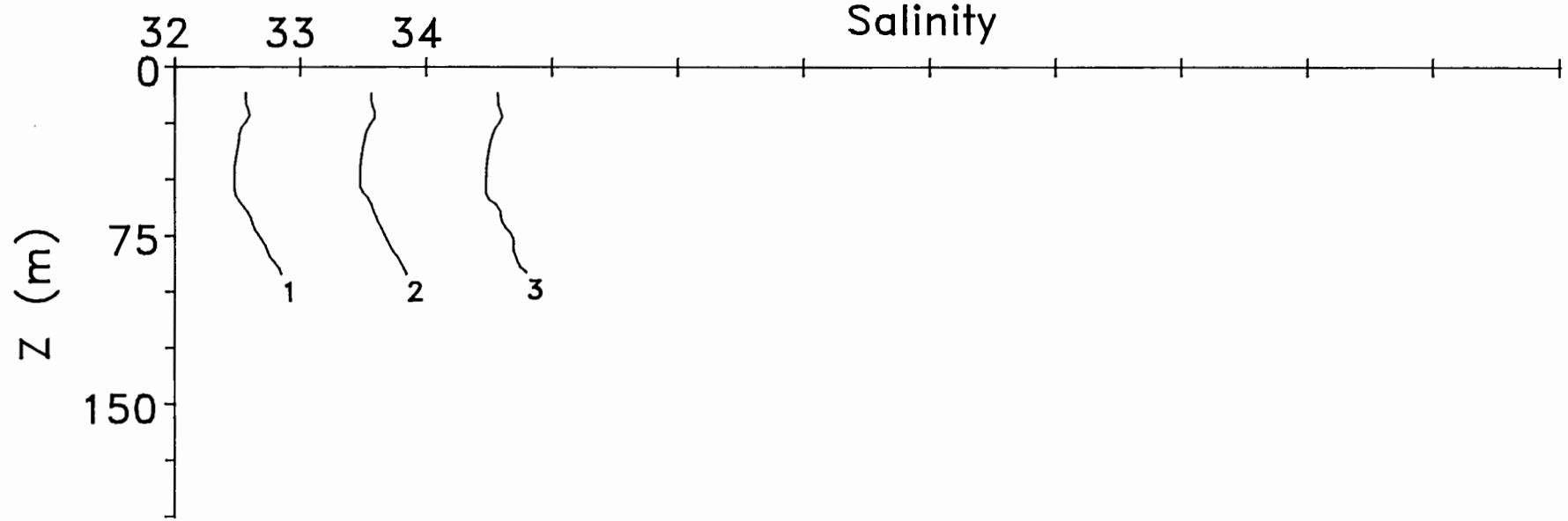


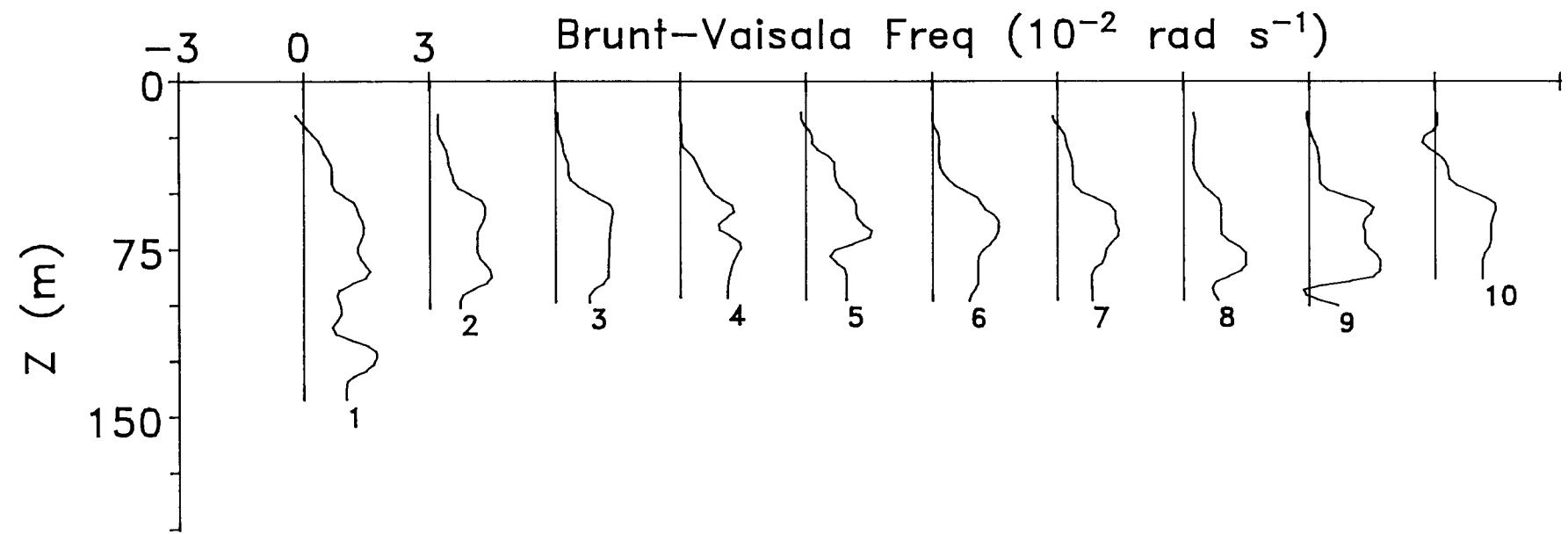
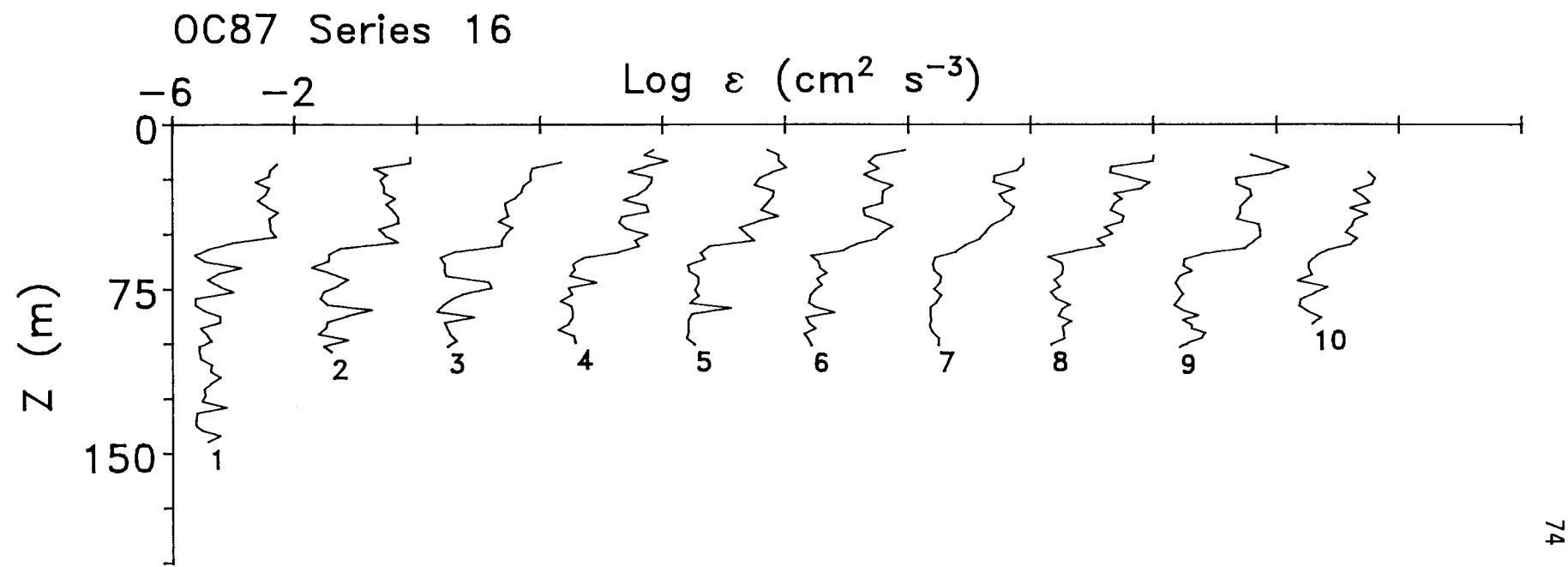
OC87 Series 15



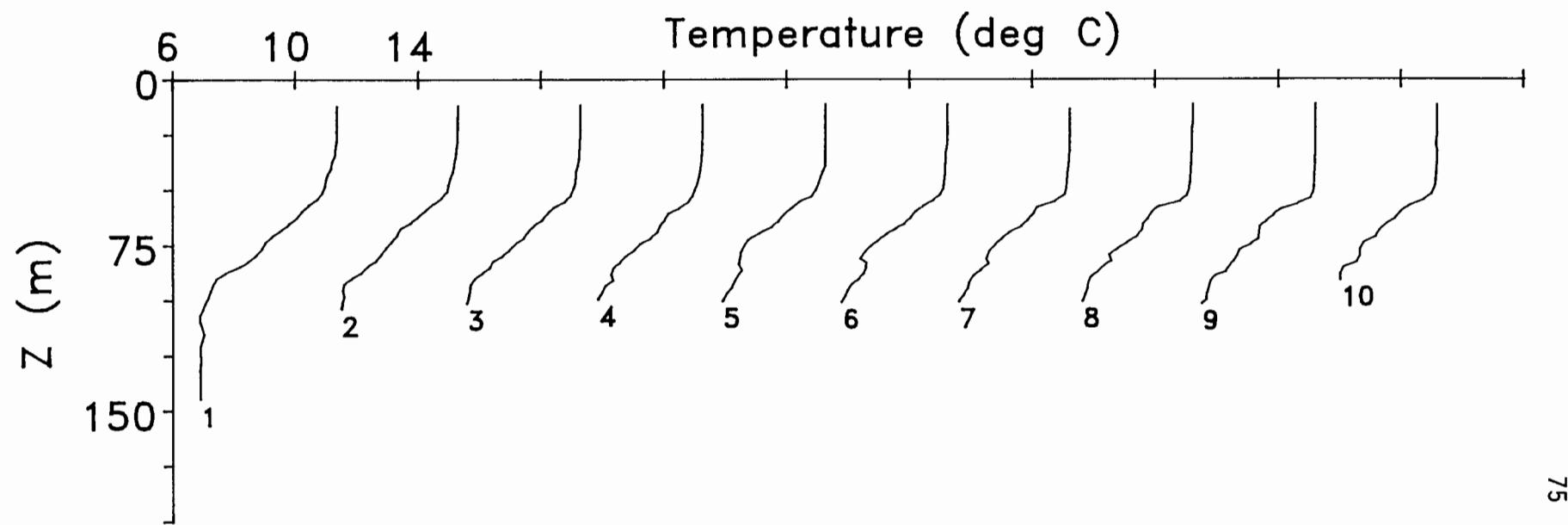
73

Salinity

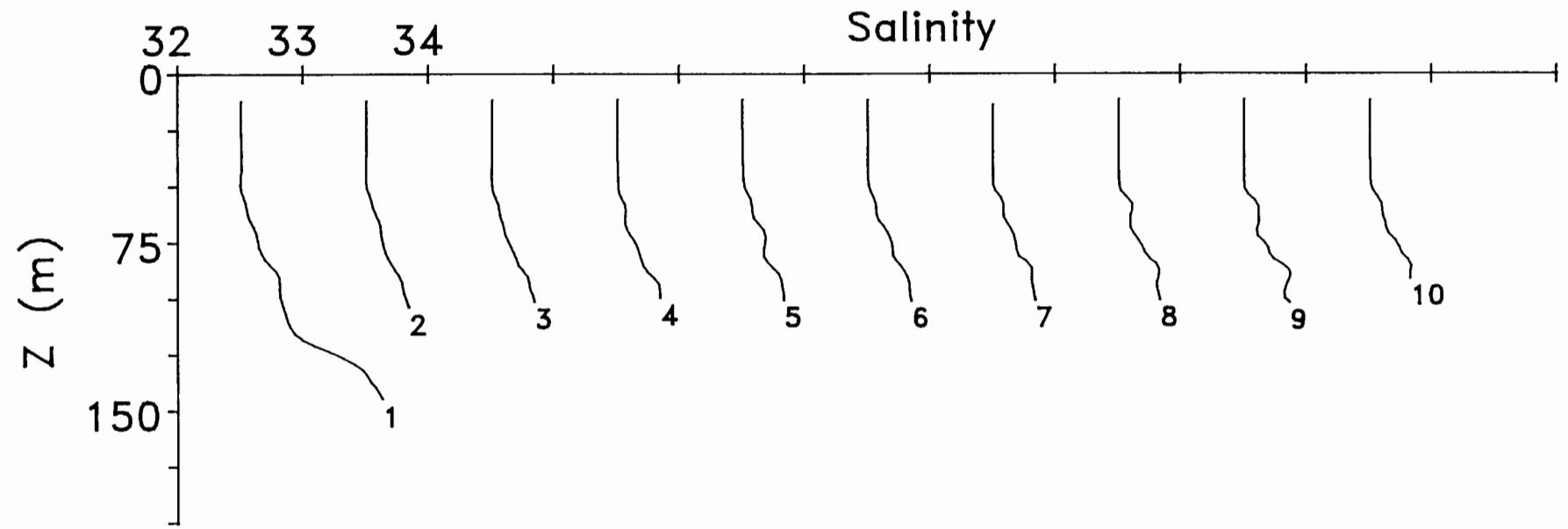


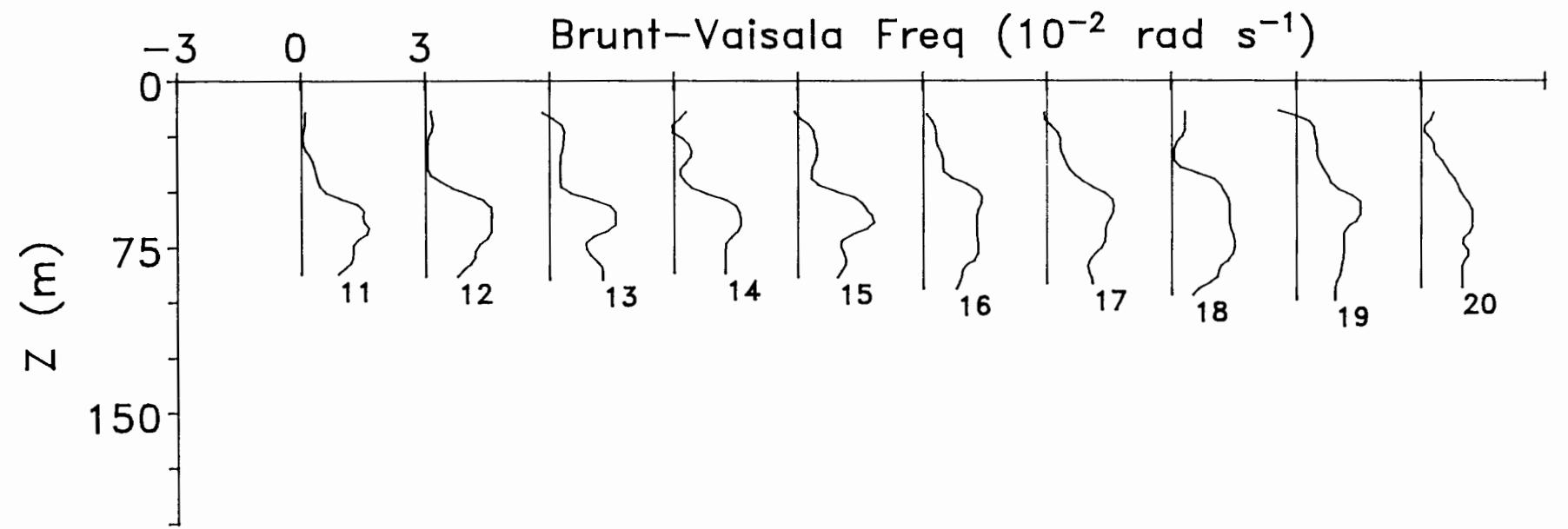
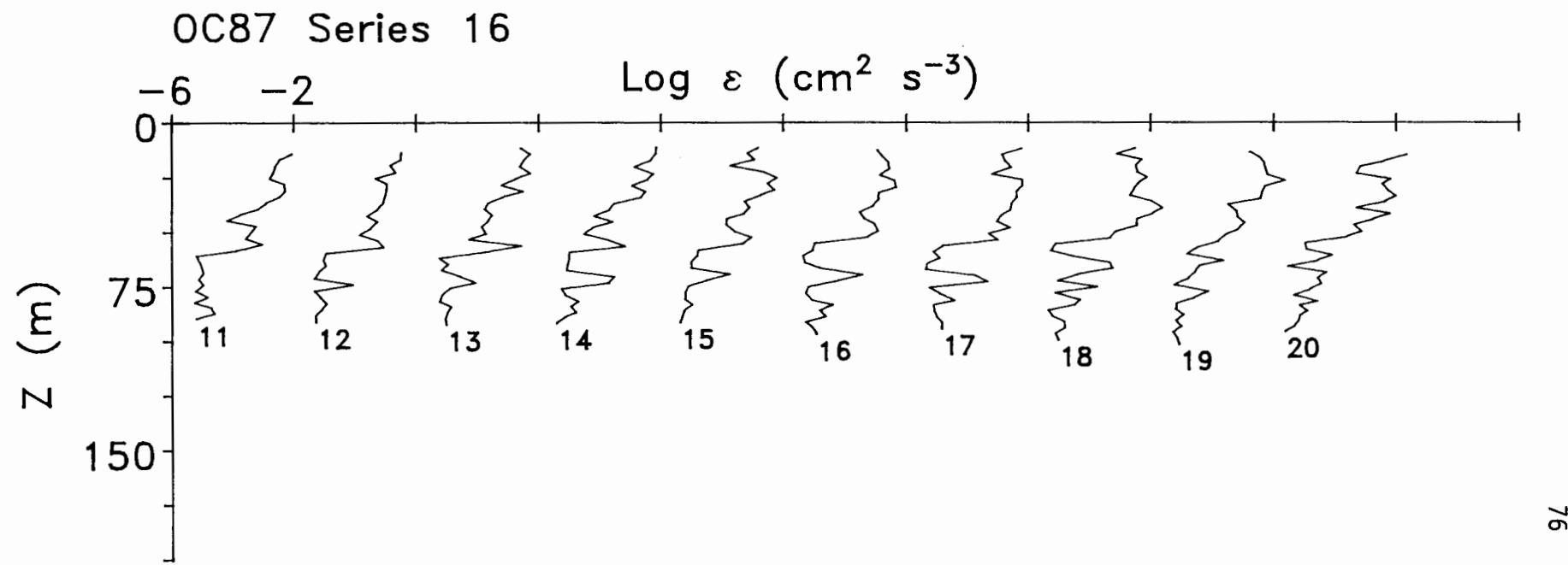


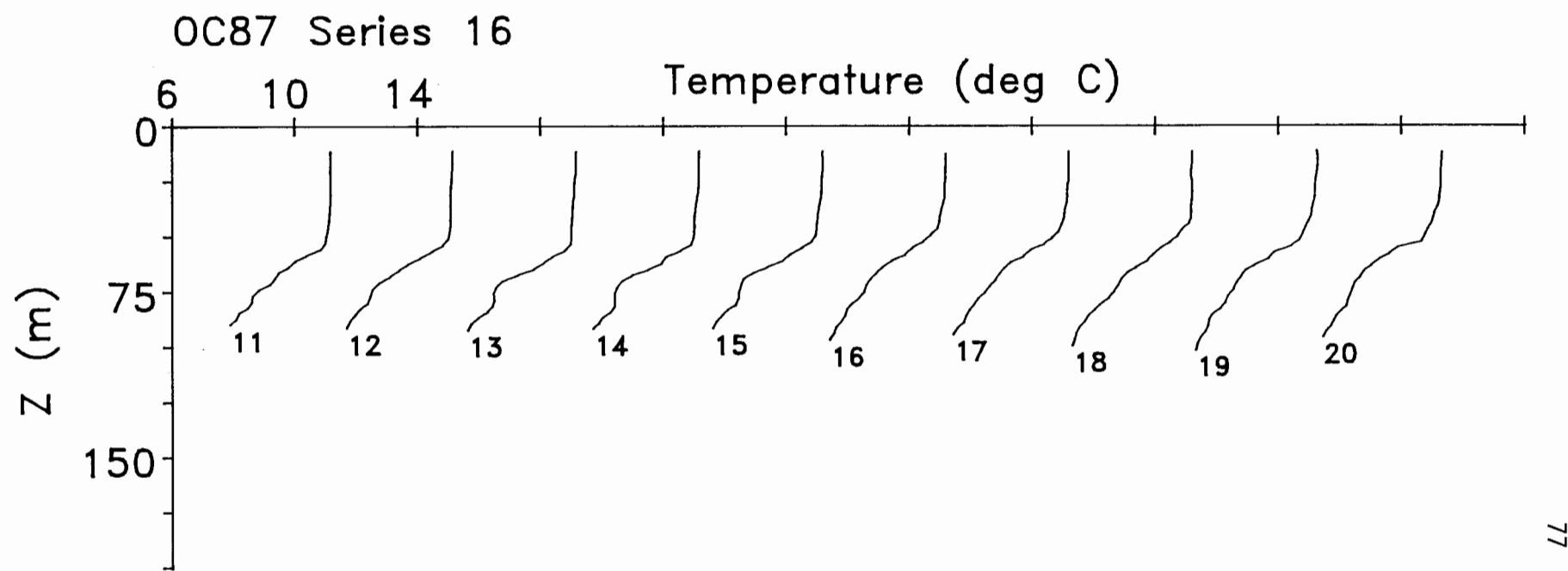
OC87 Series 16



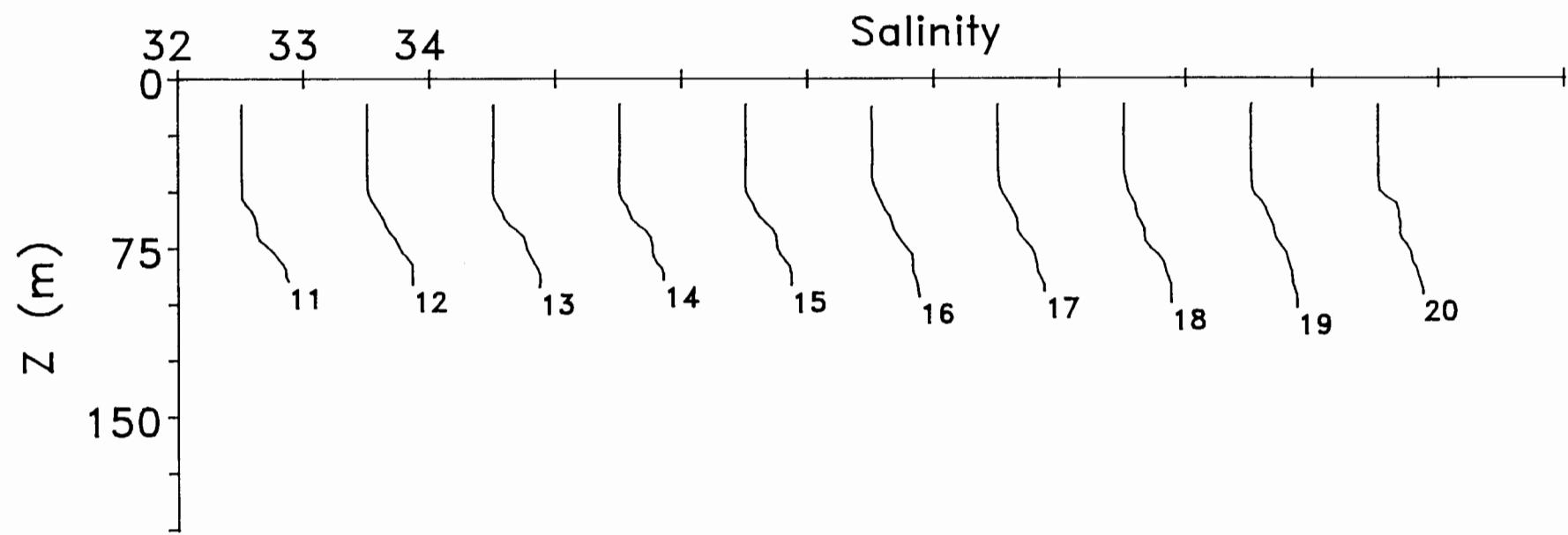
Salinity

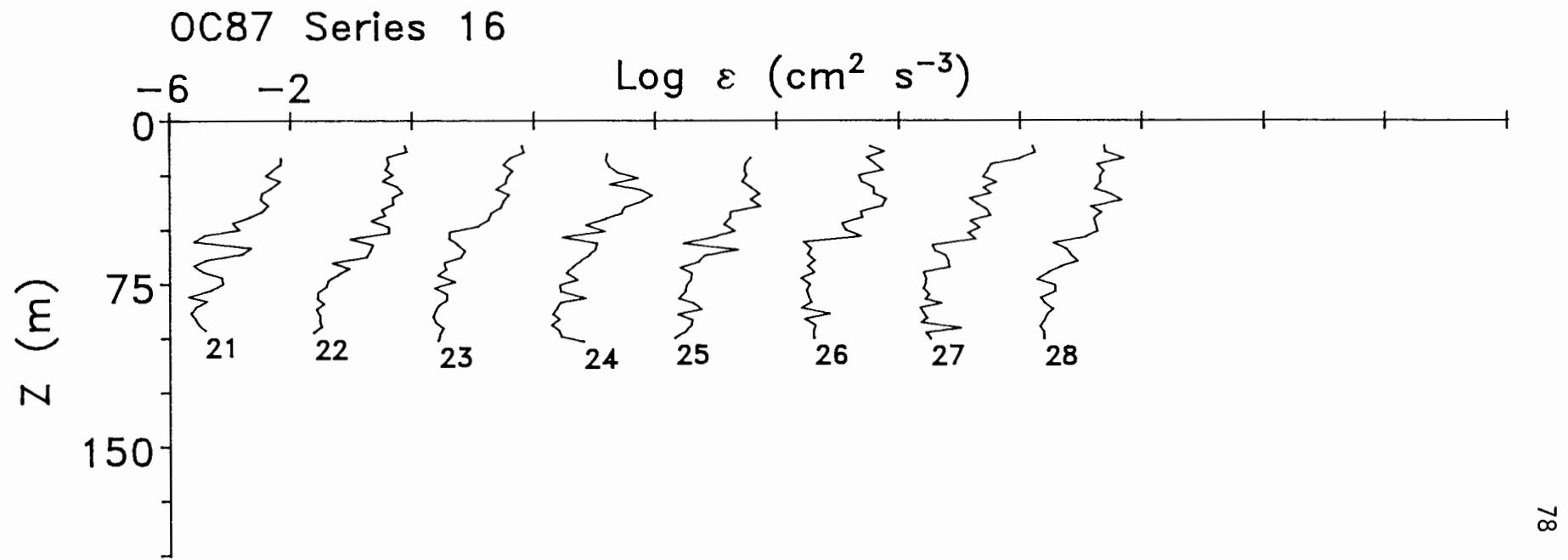




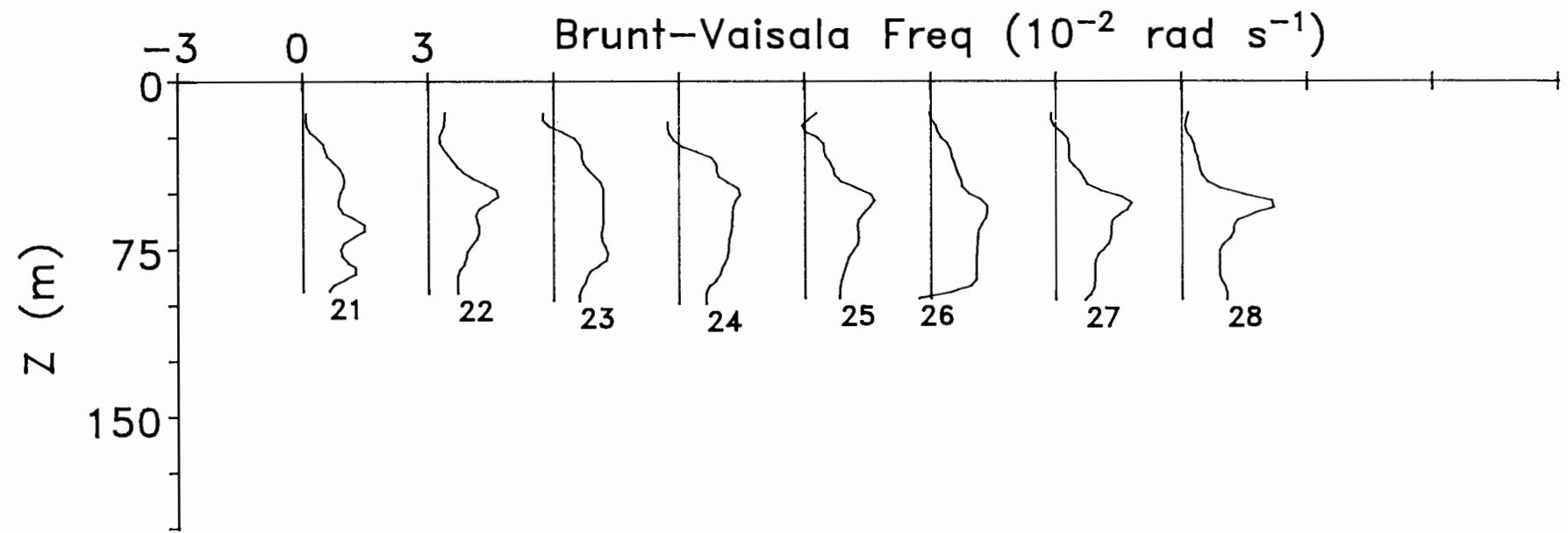


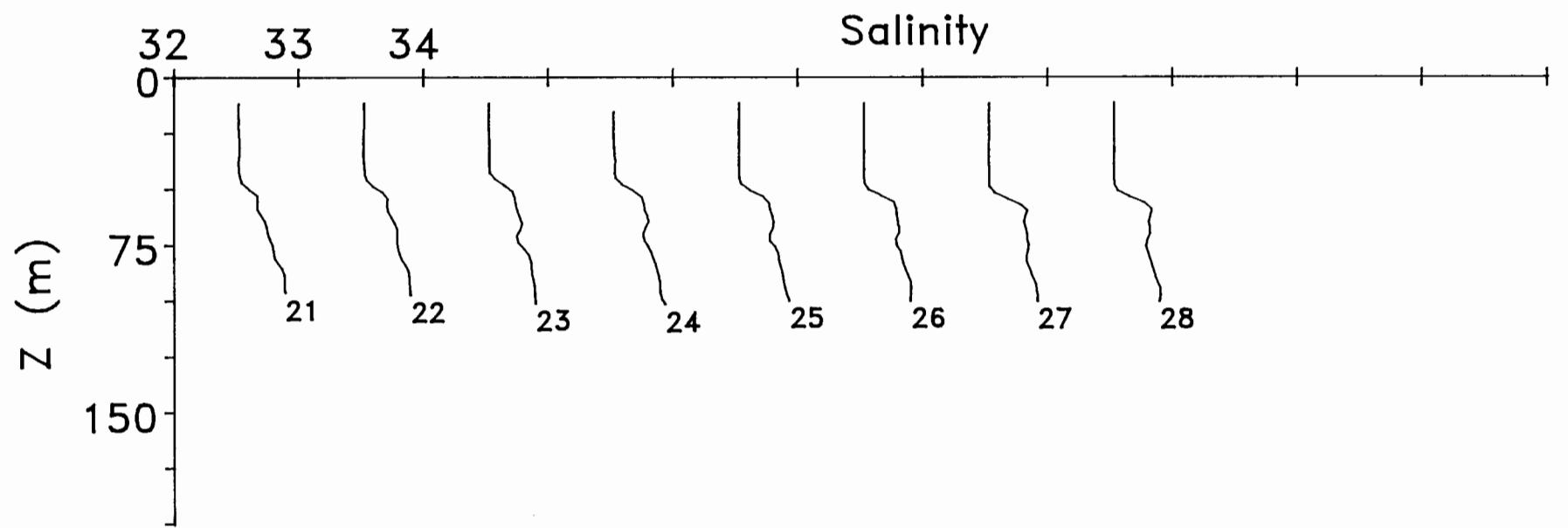
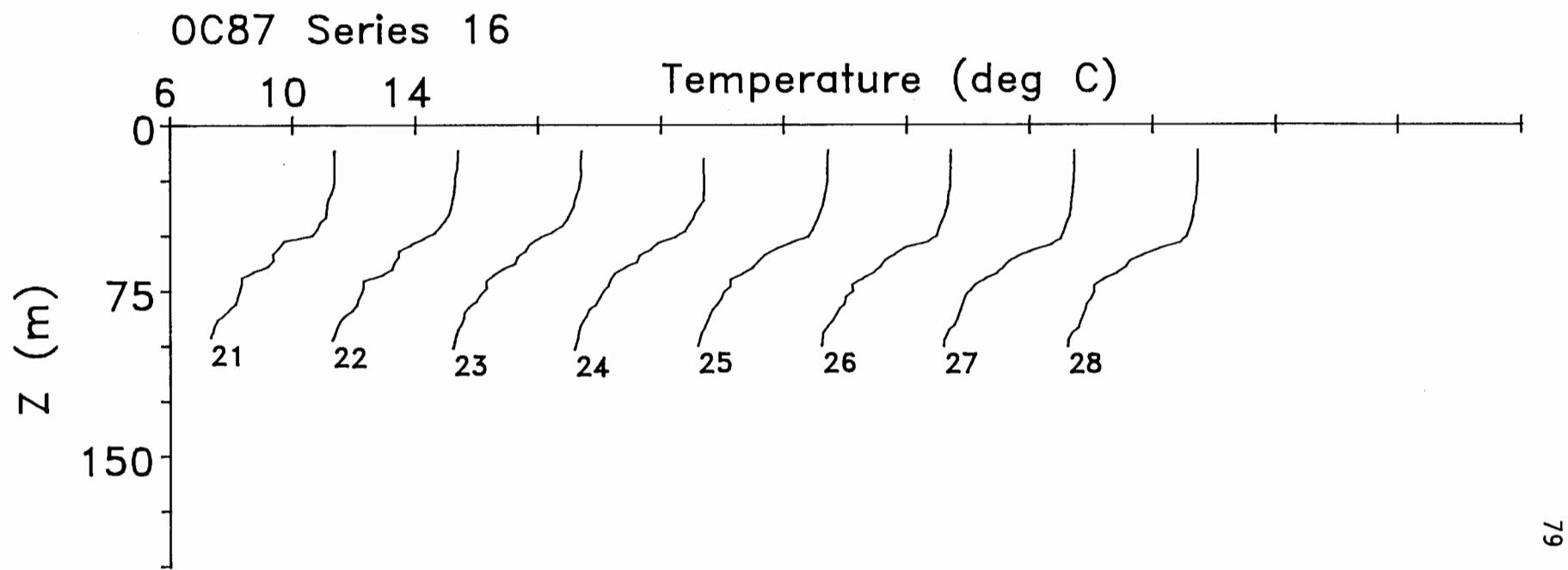
L7

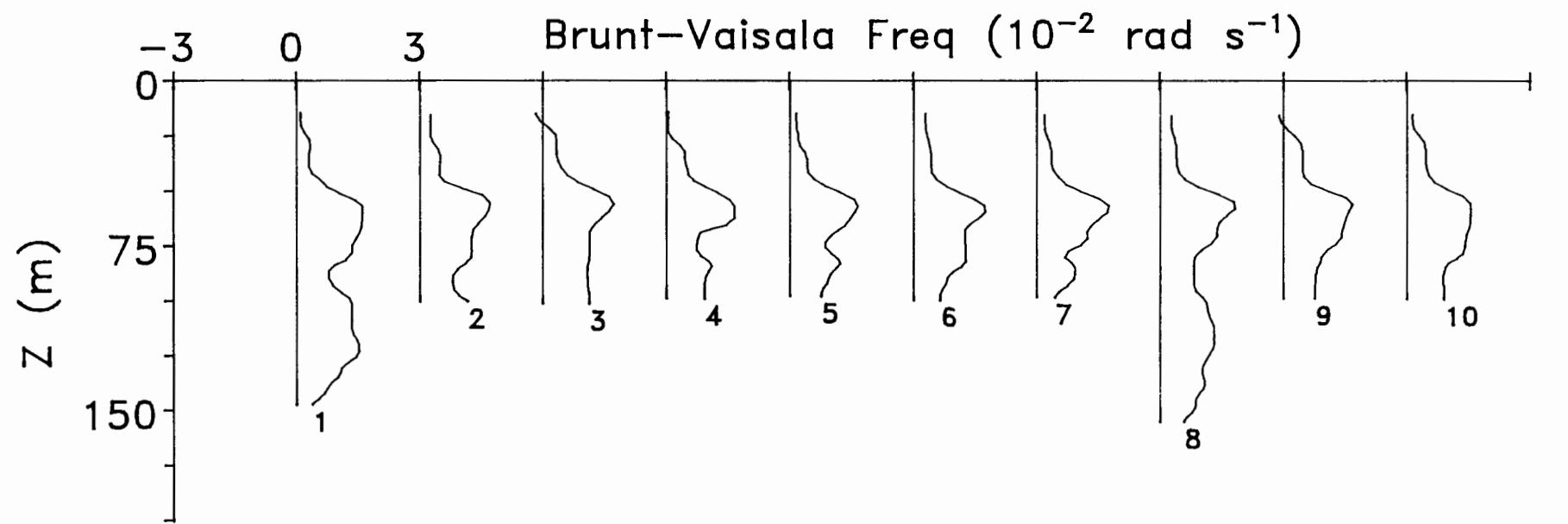
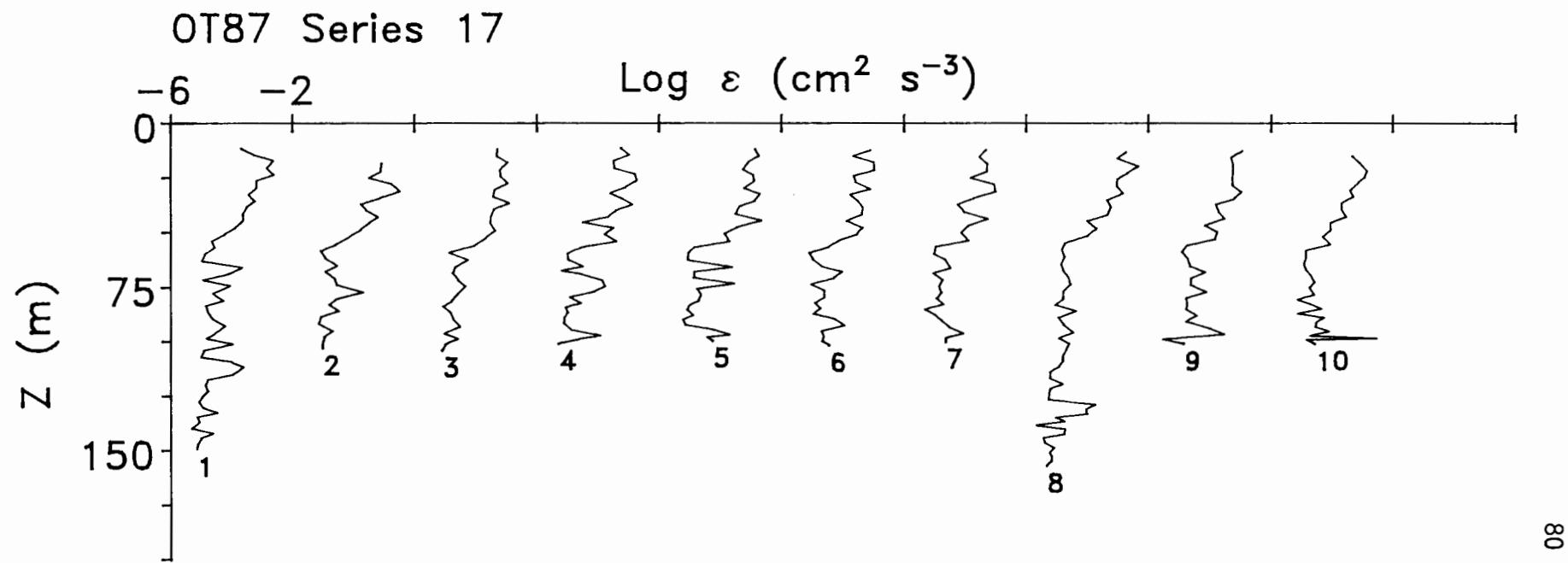


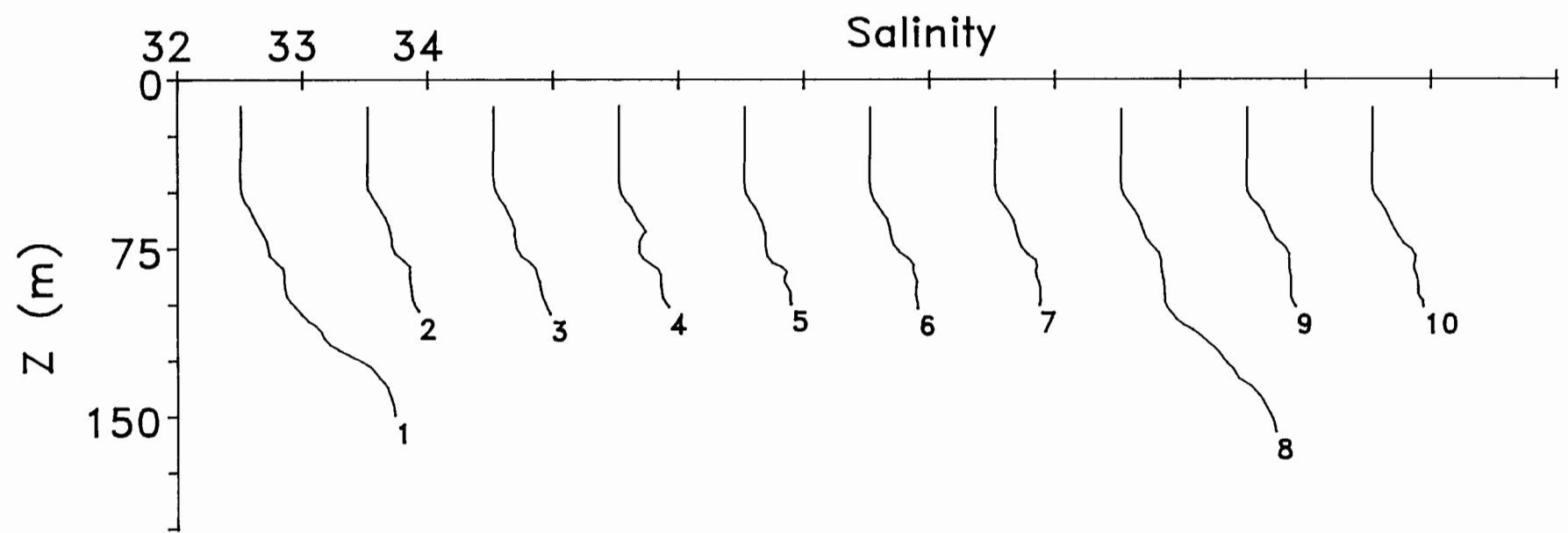
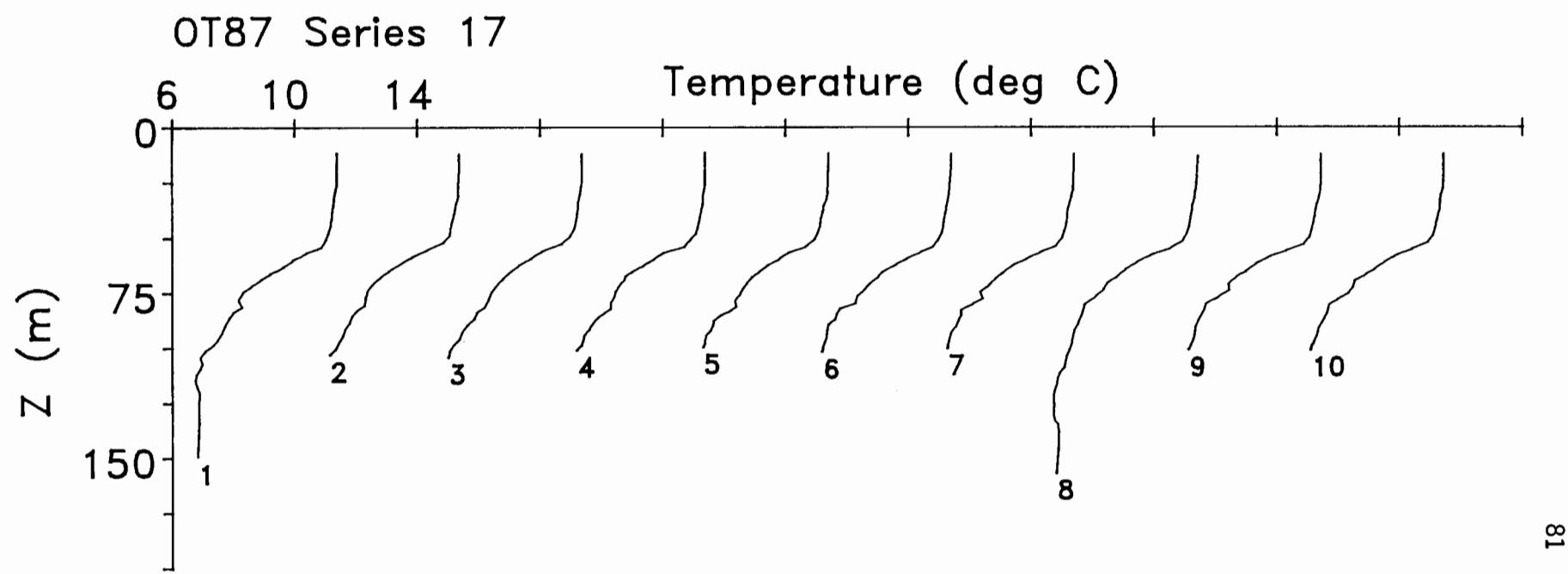


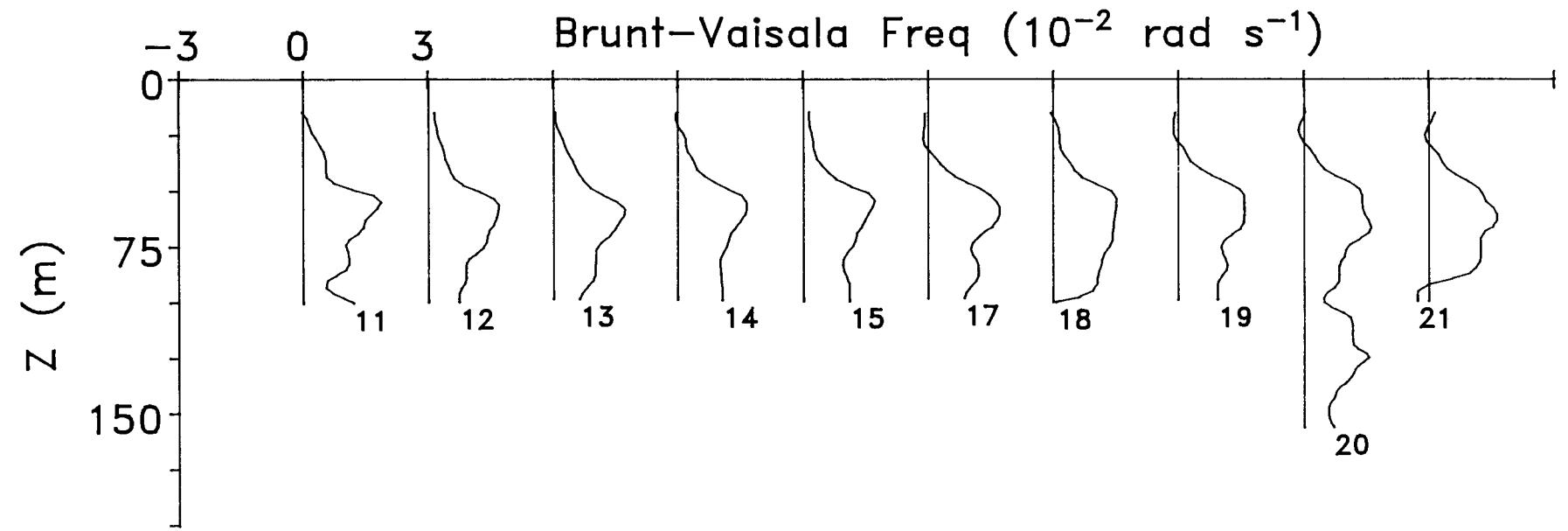
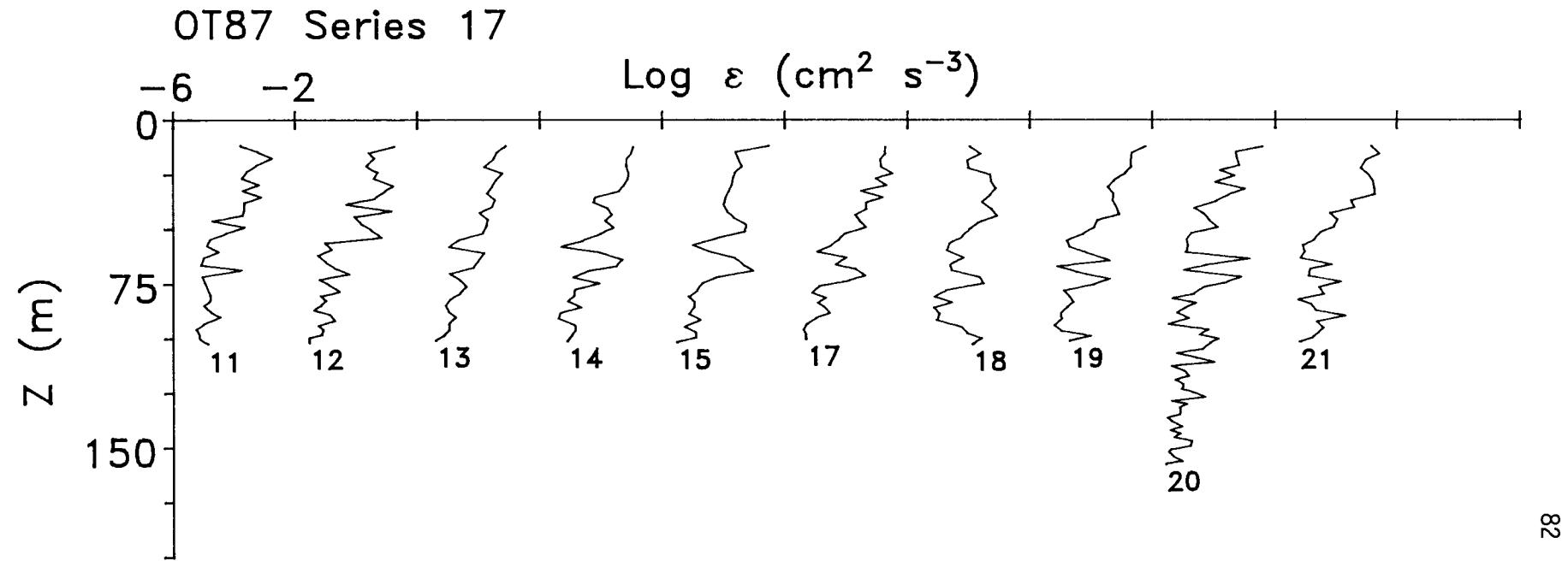
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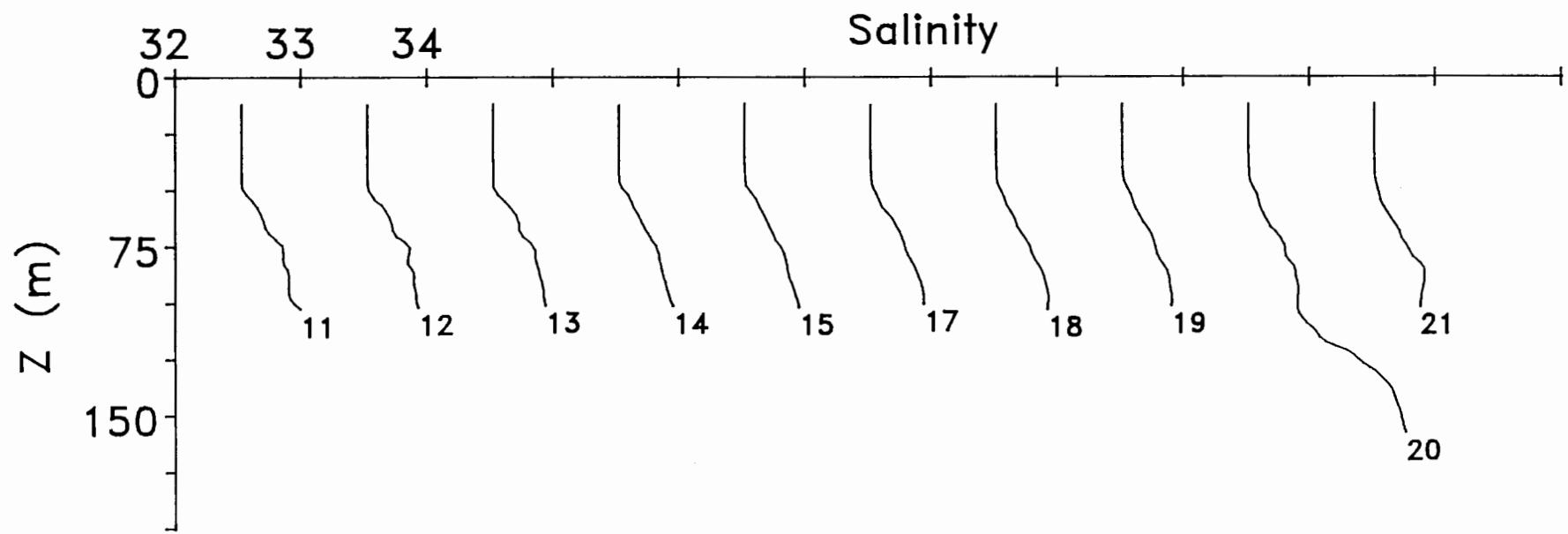
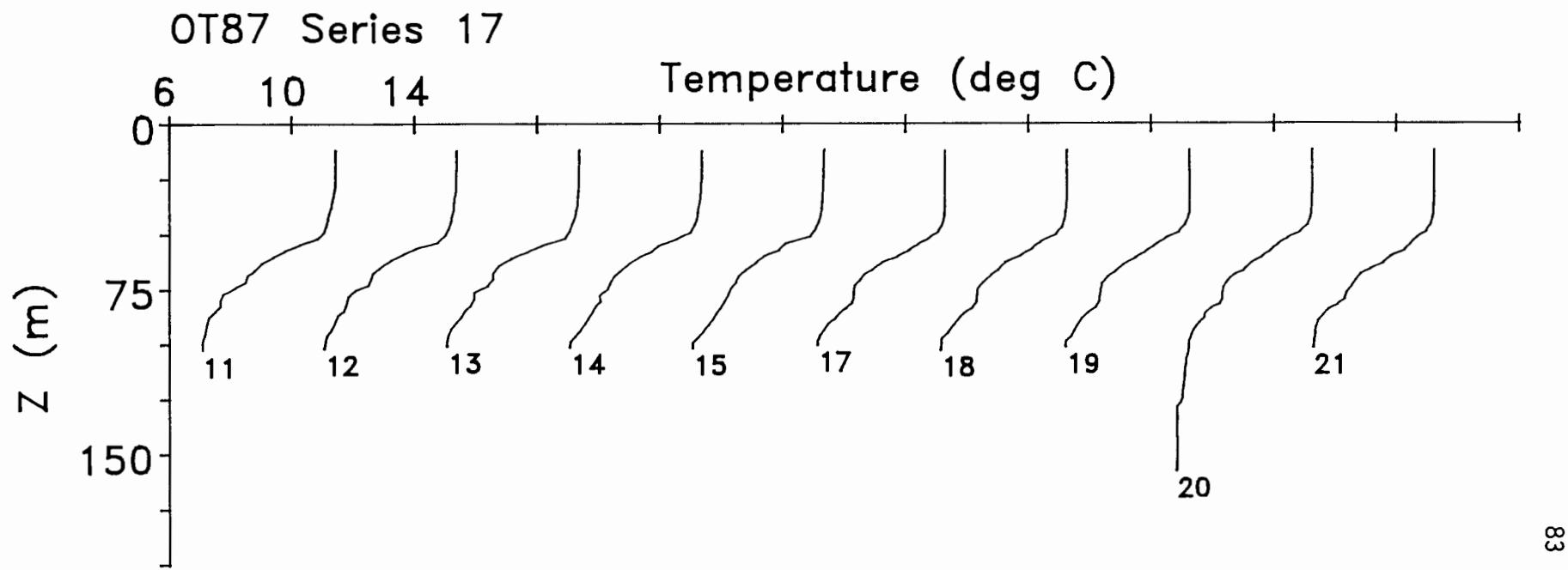


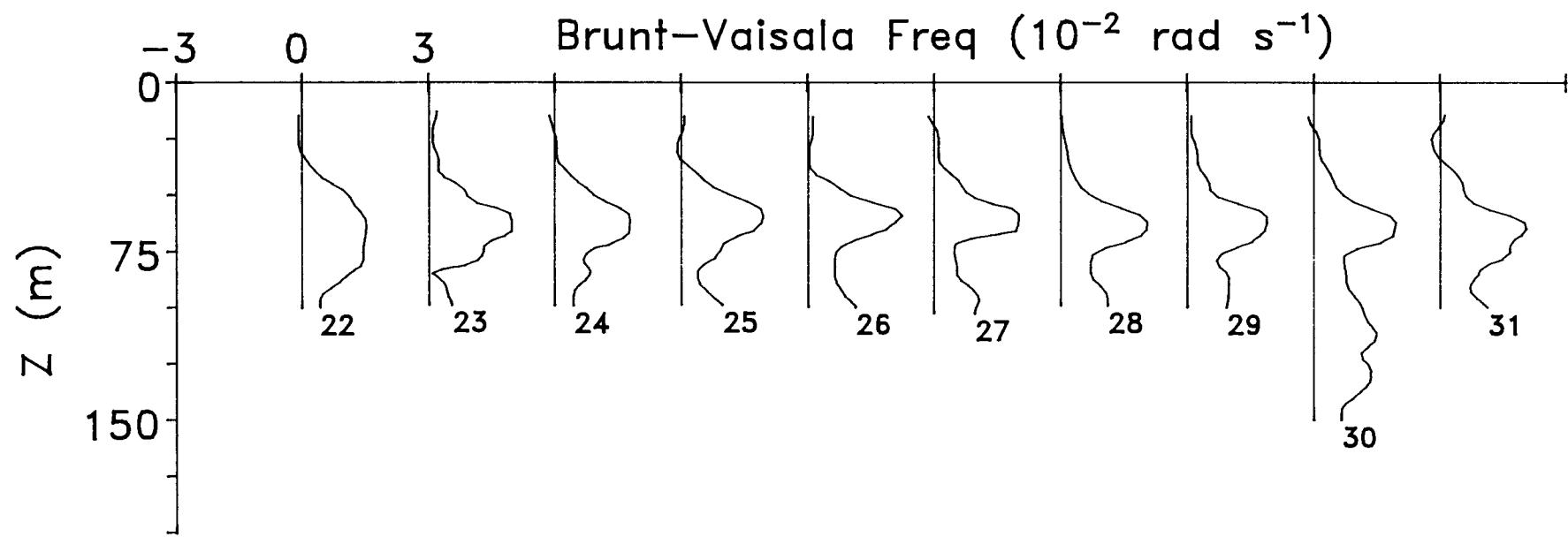
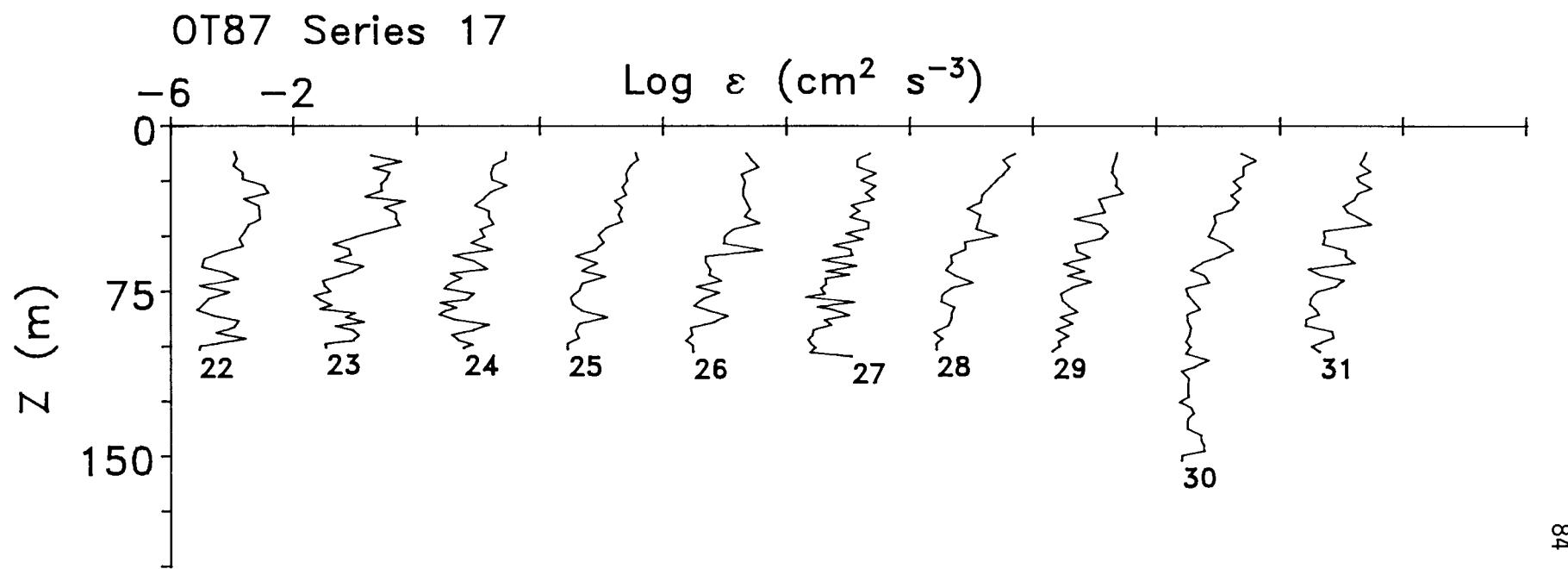


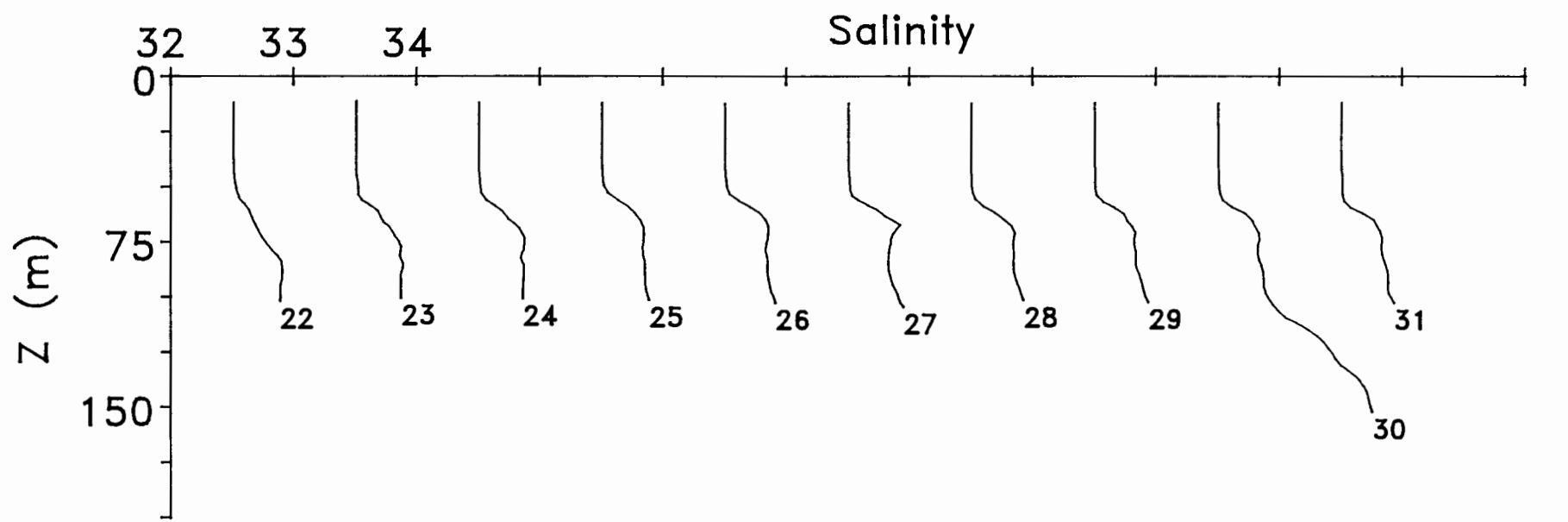
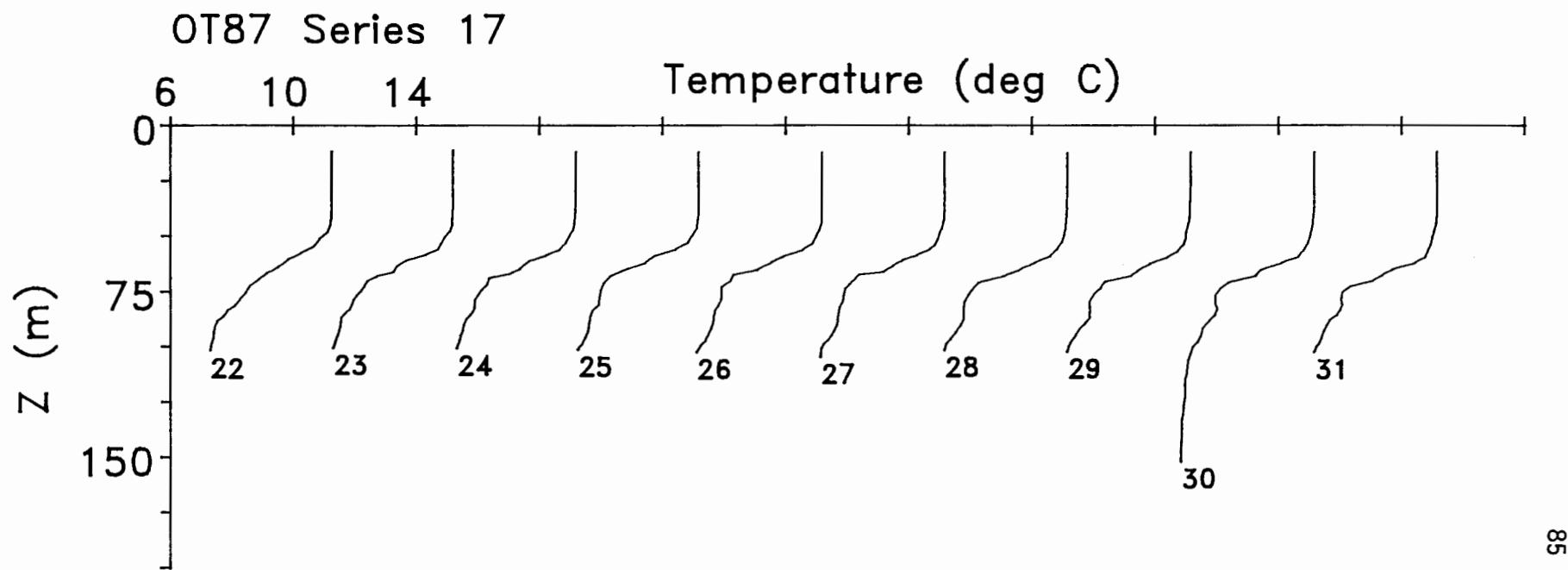


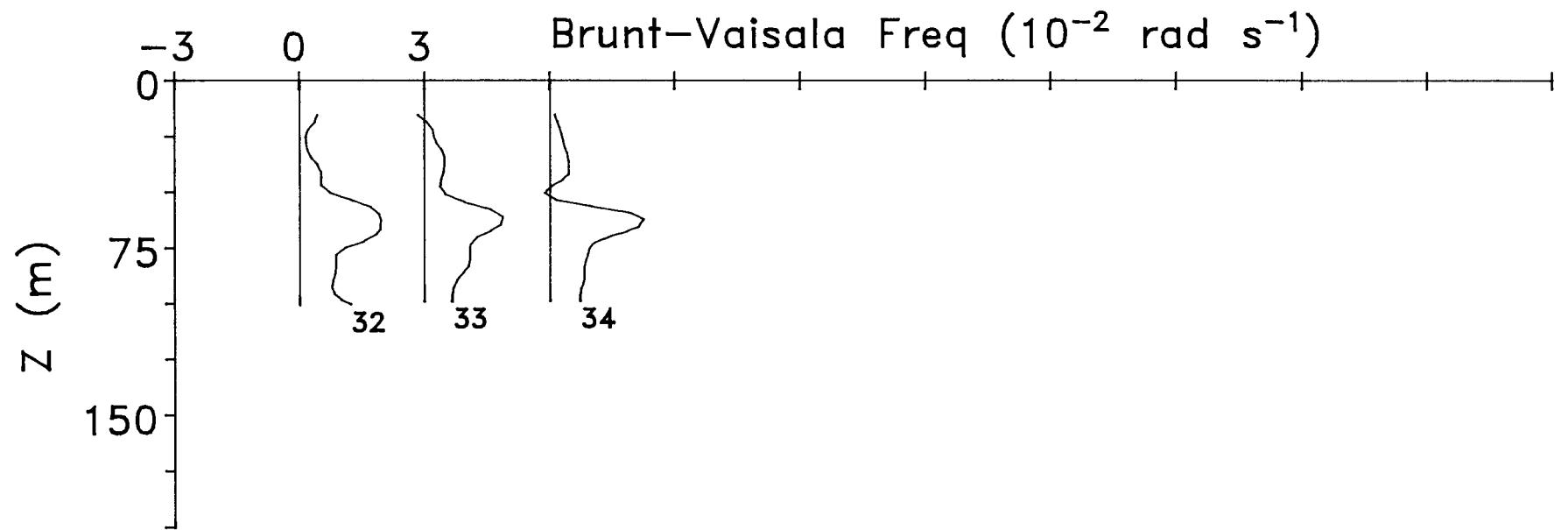
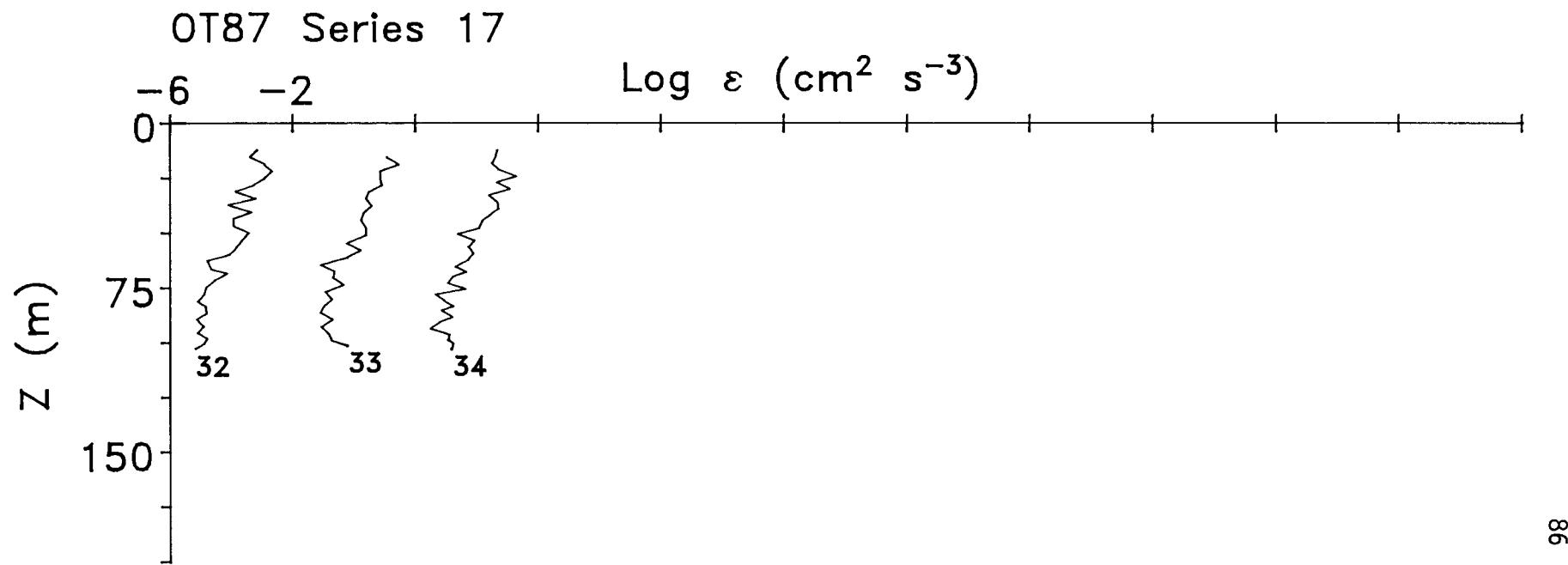




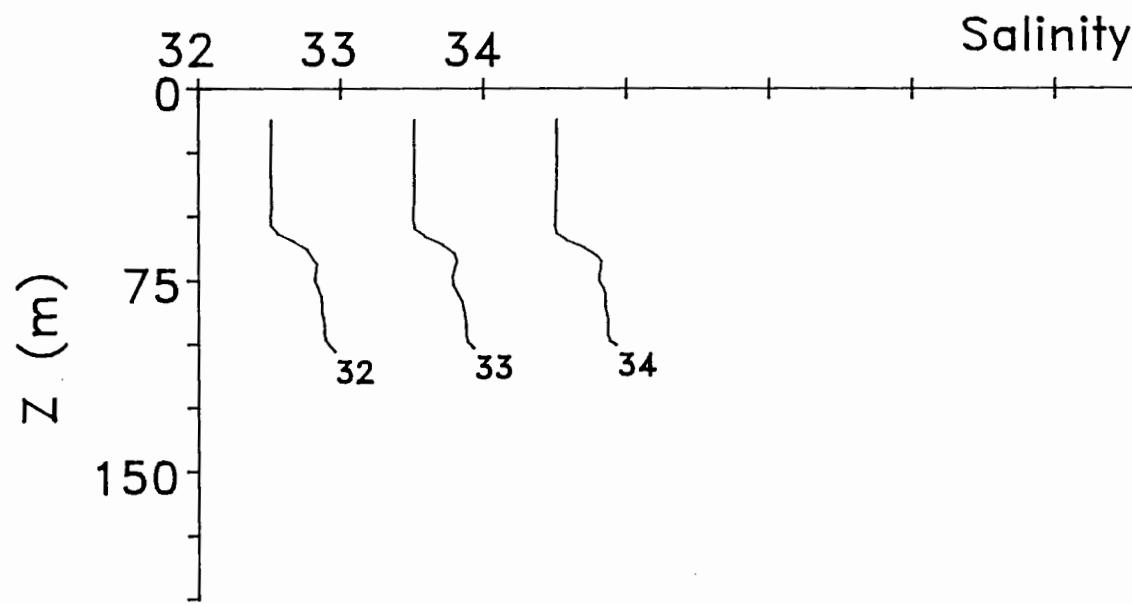
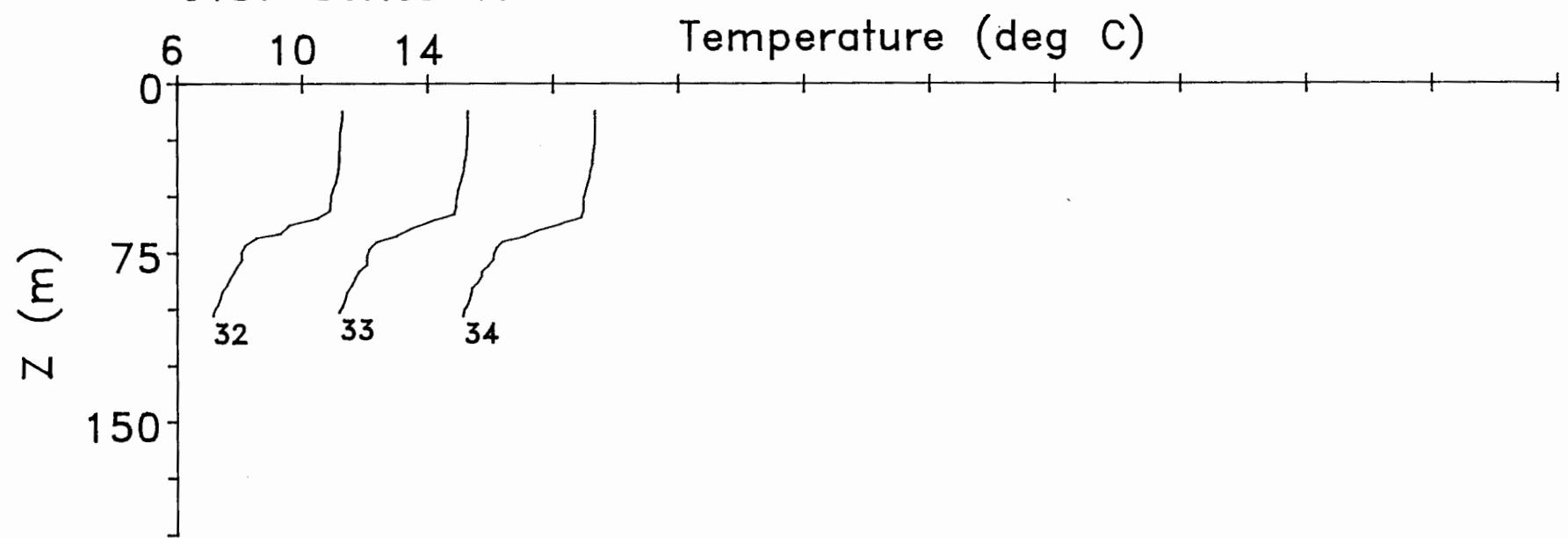


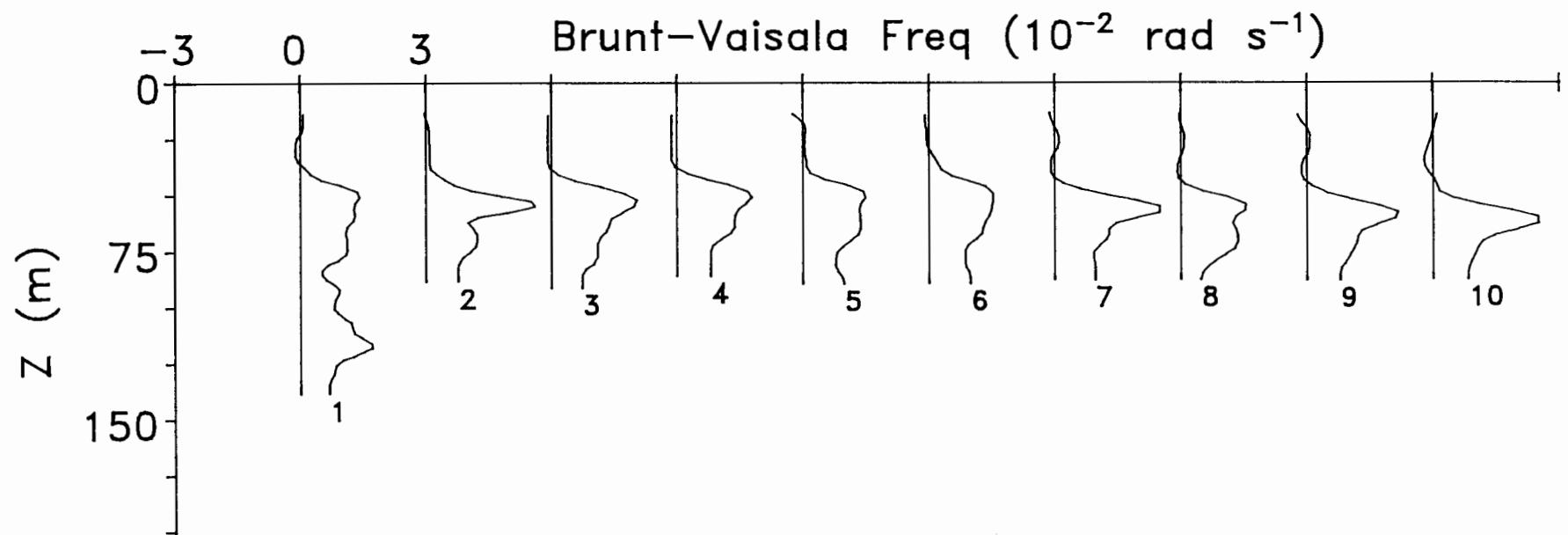
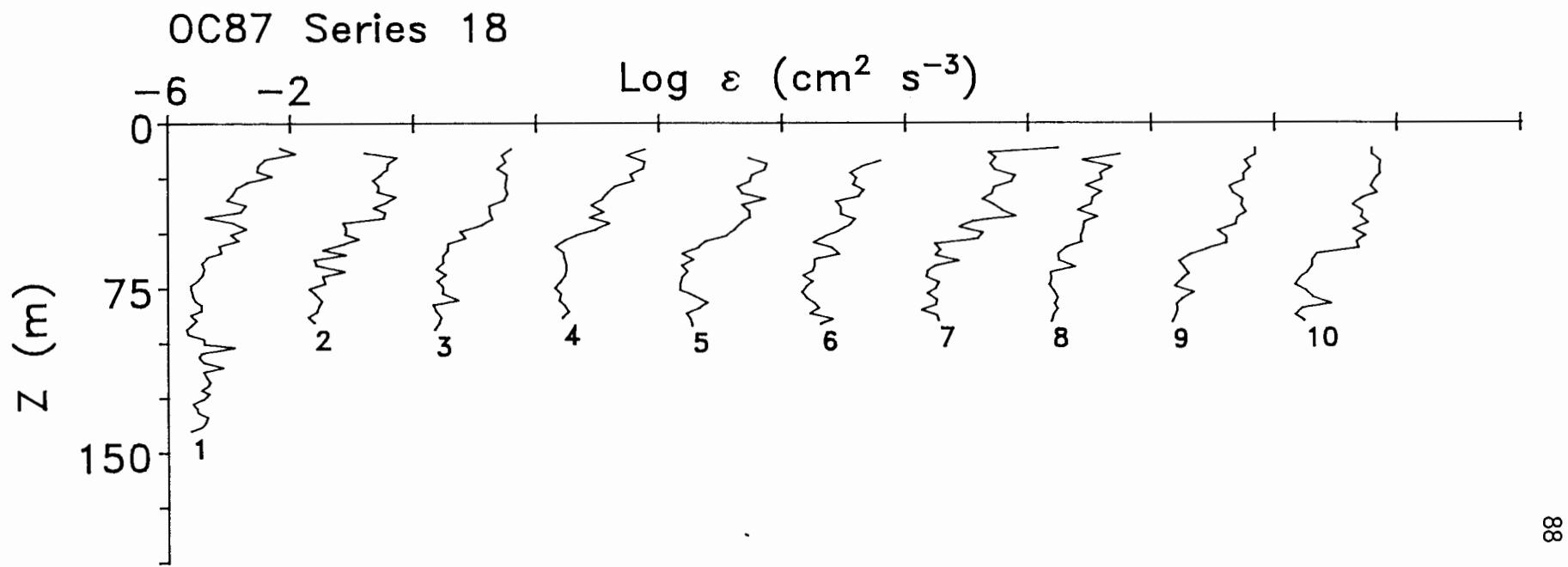


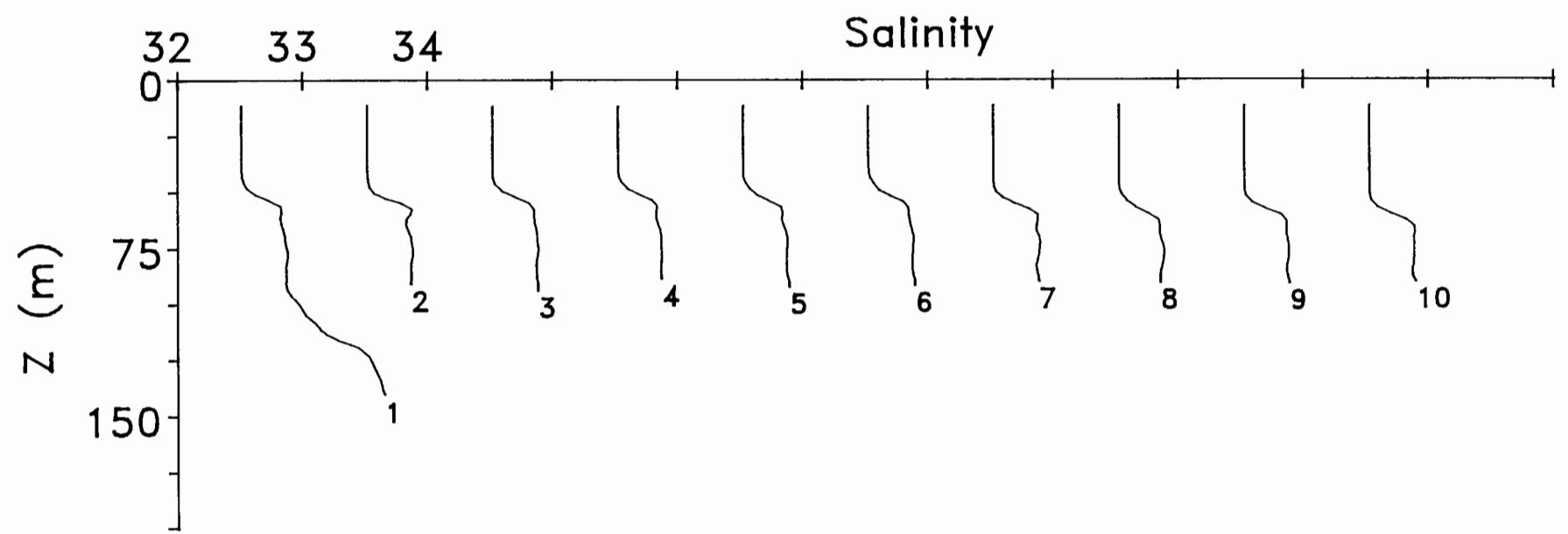
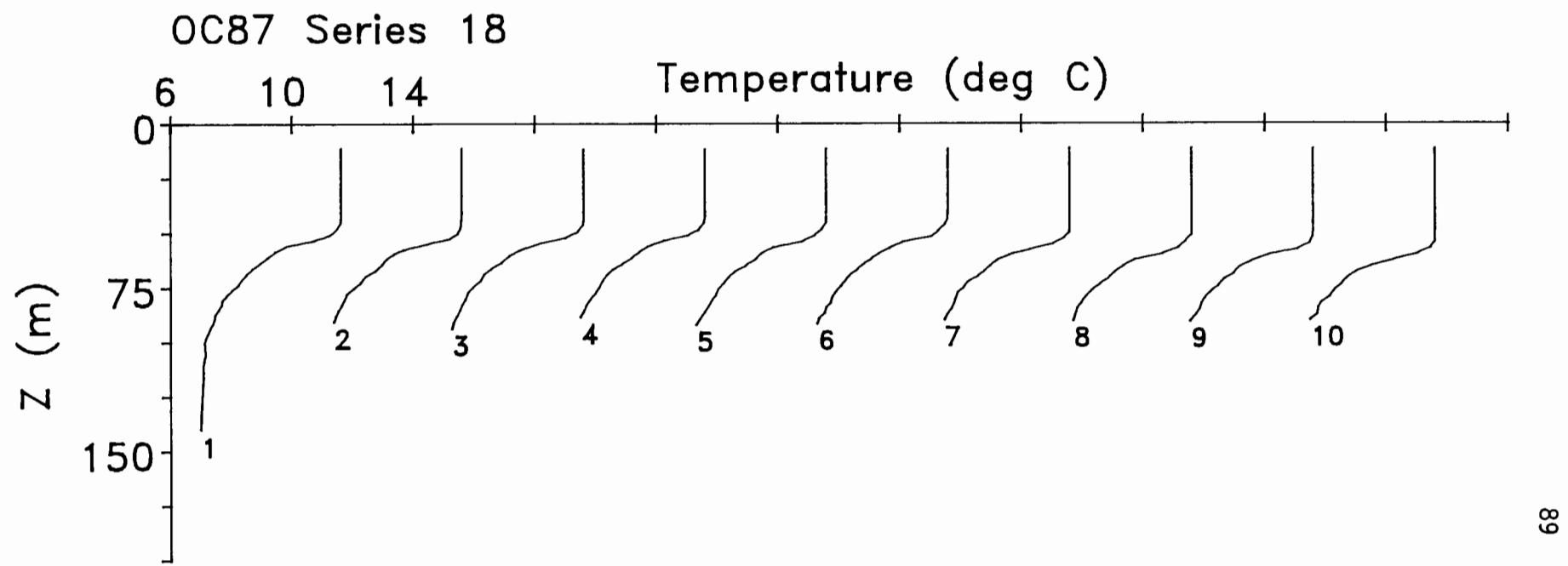


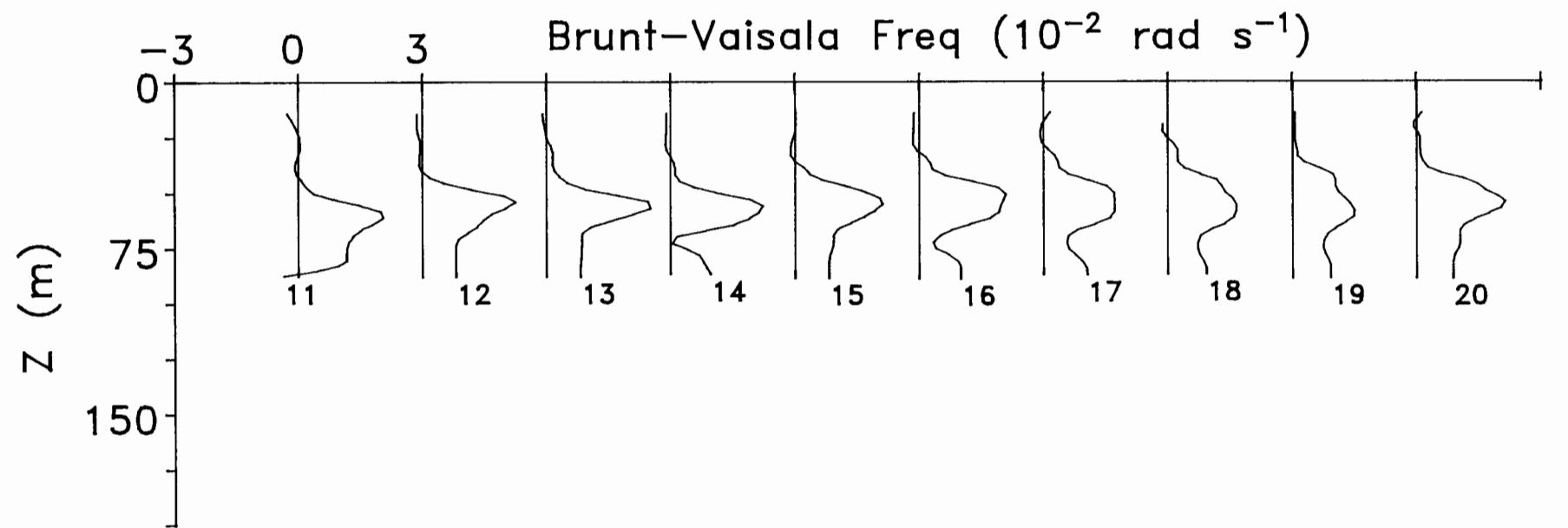
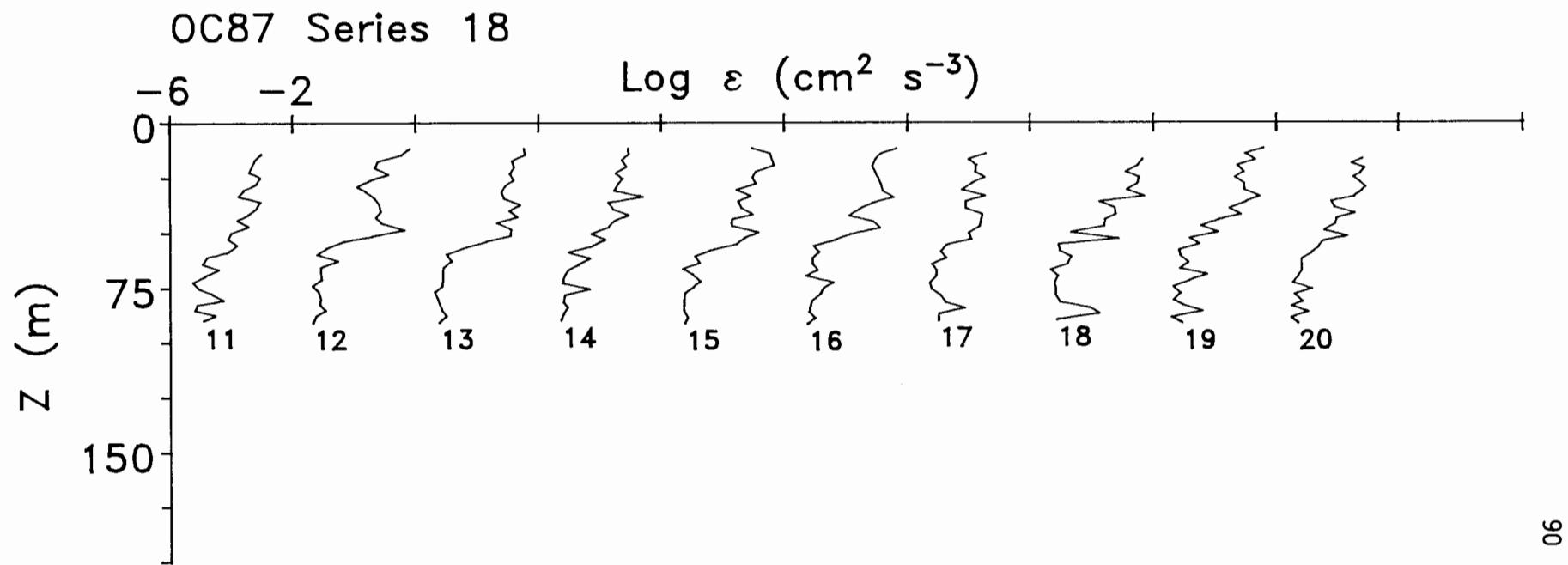


OT87 Series 17

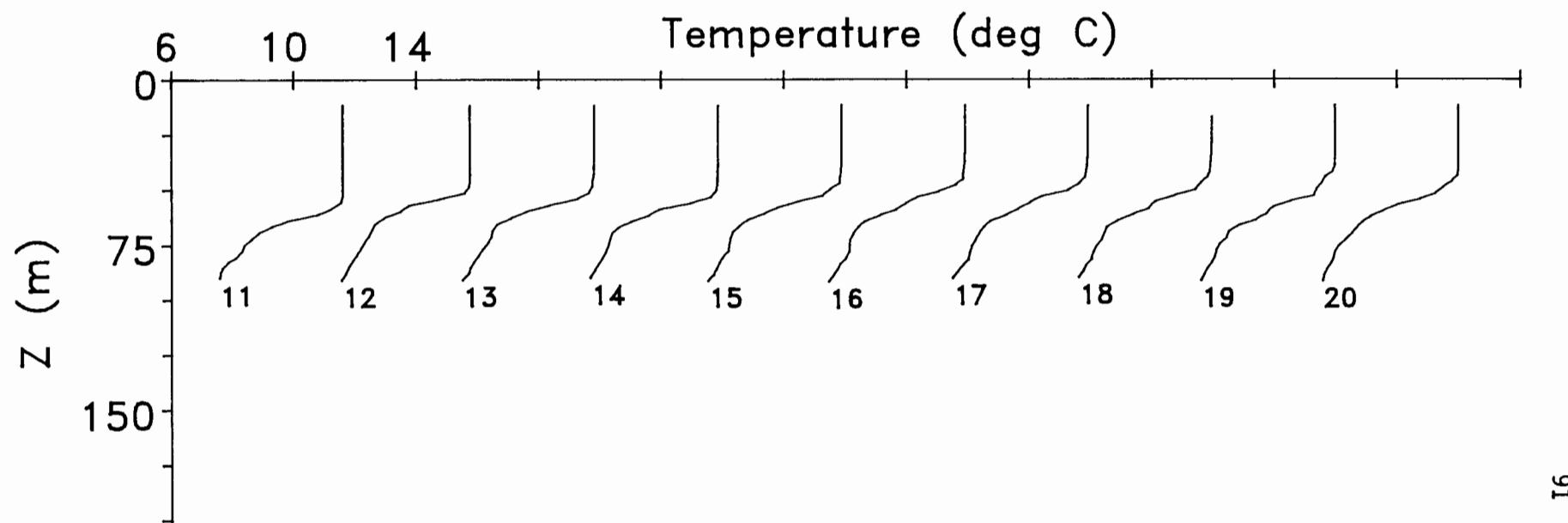






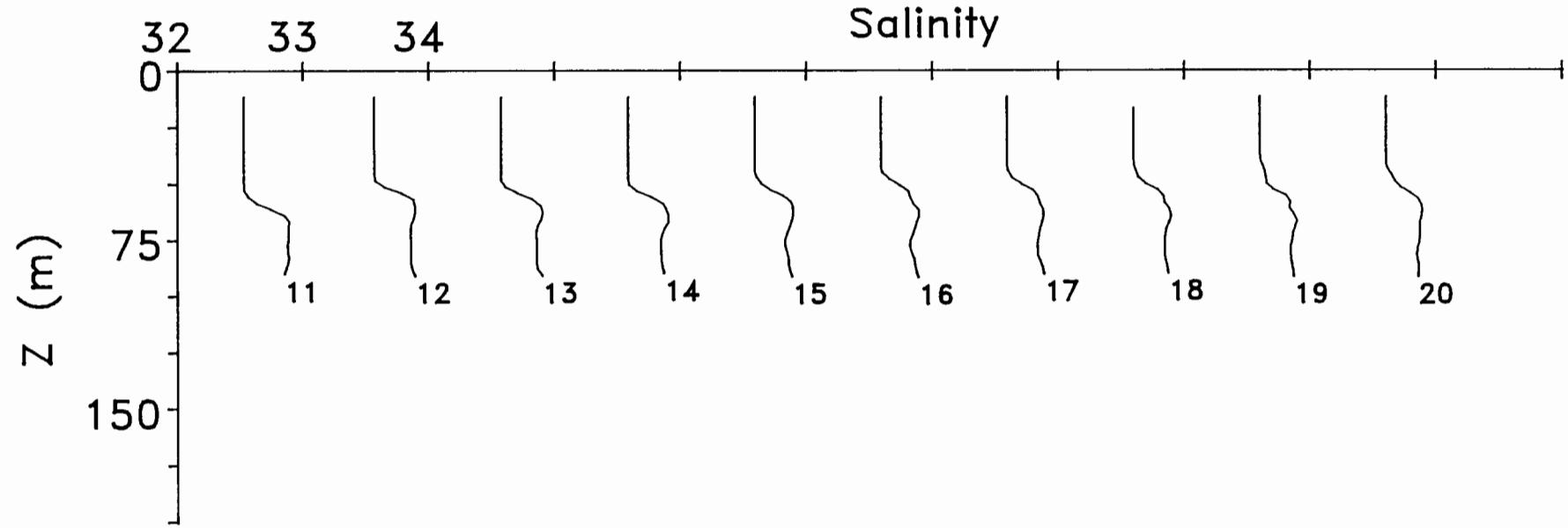


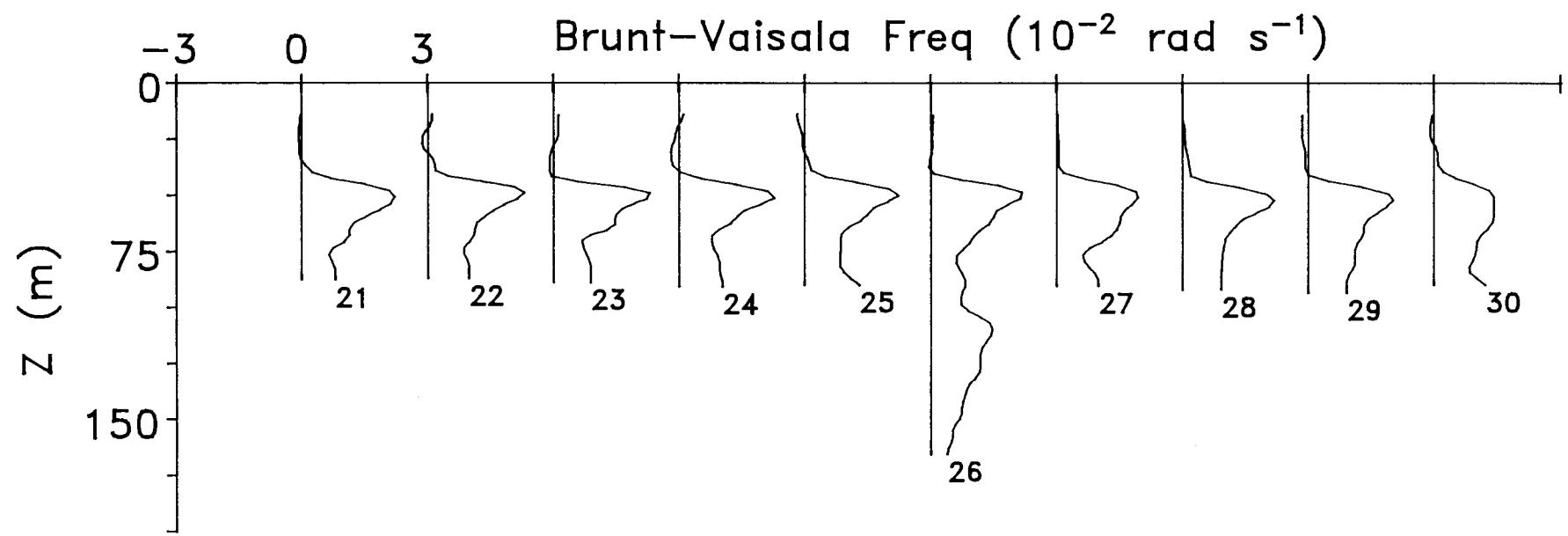
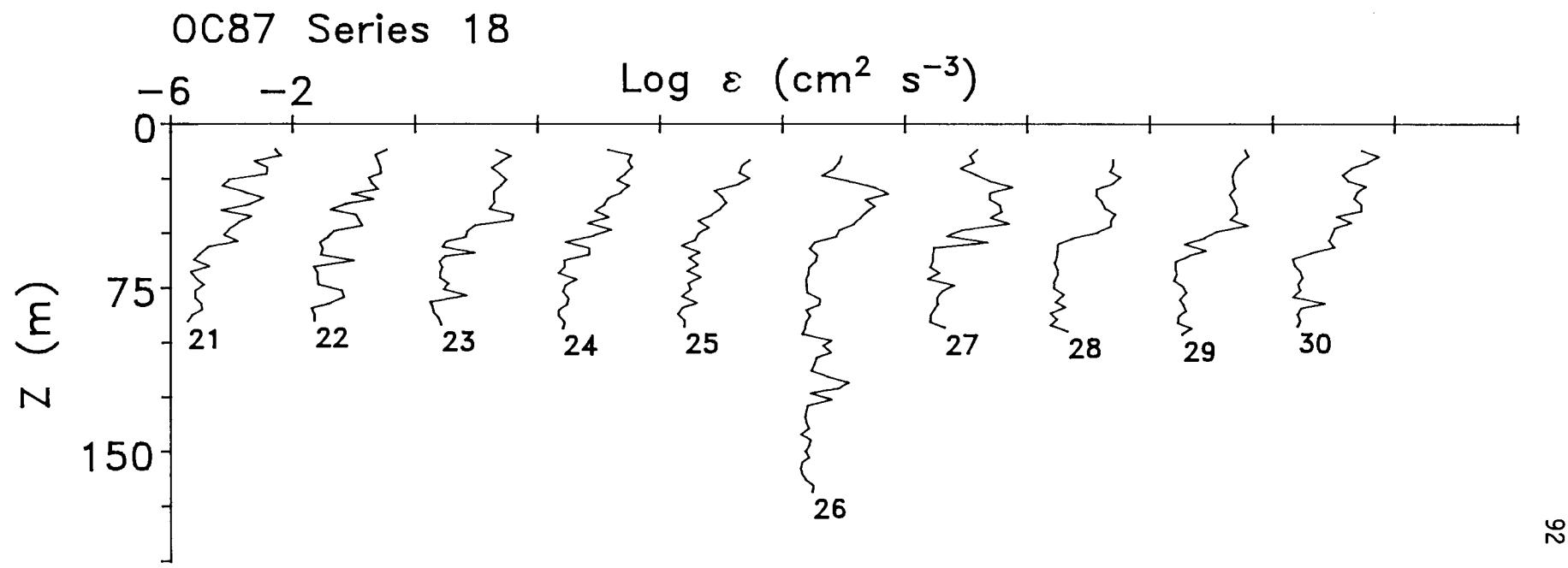
OC87 Series 18



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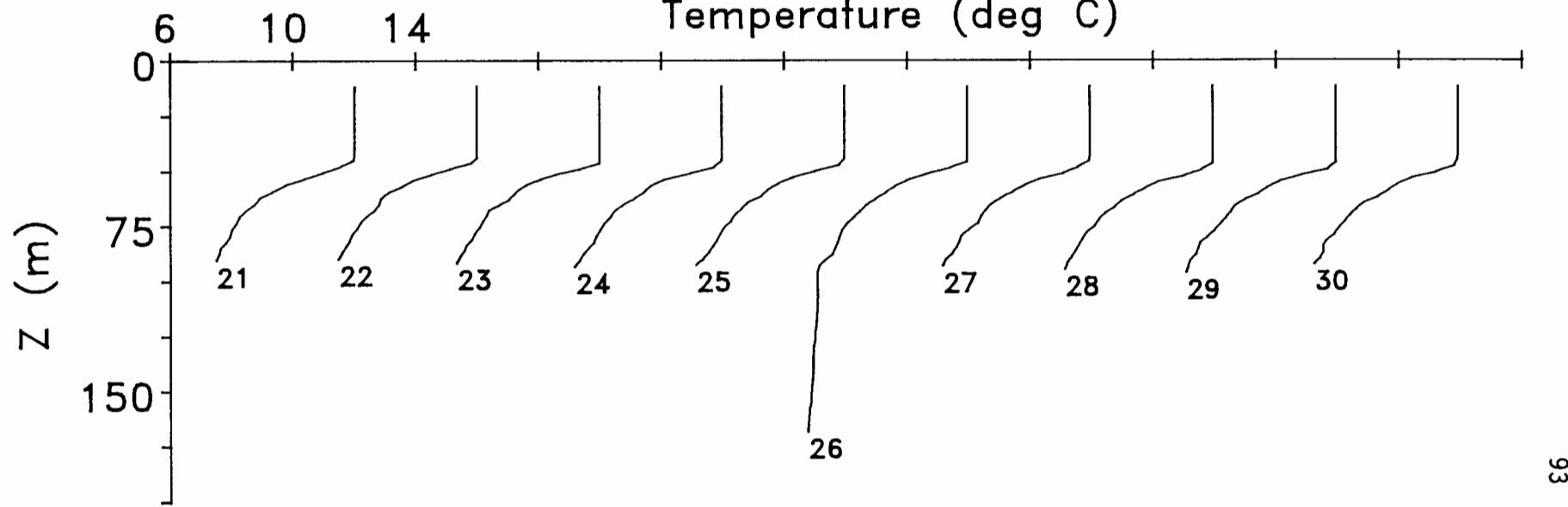
Salinity



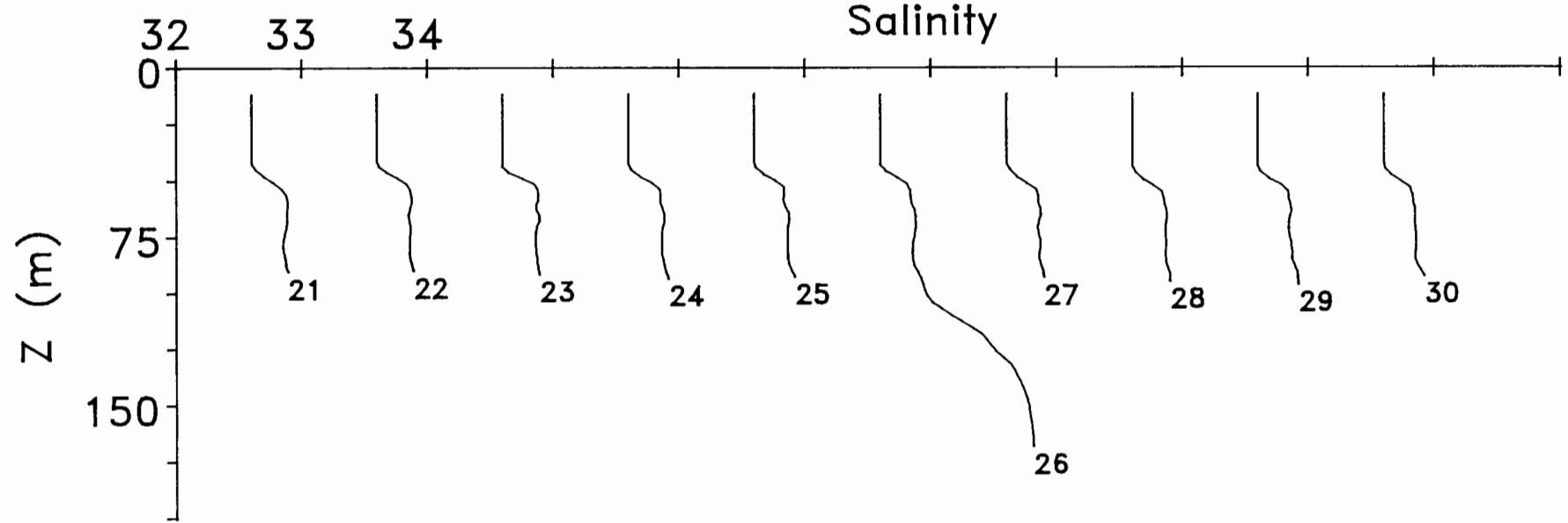


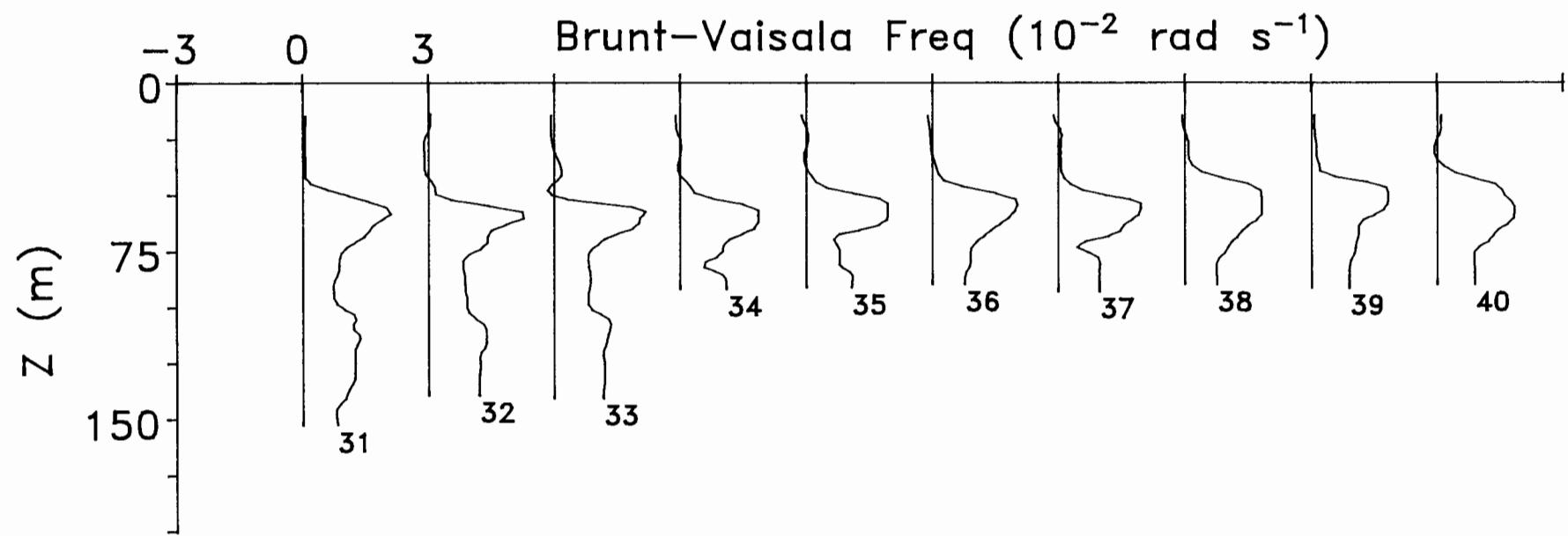
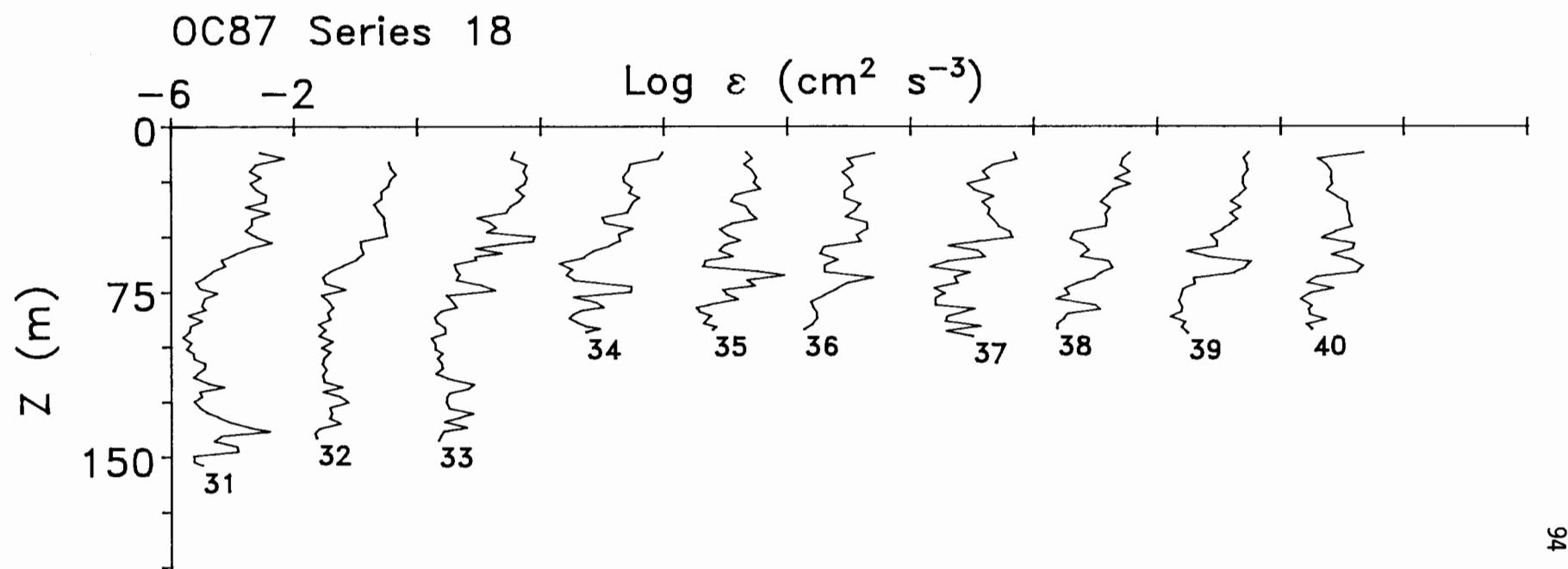
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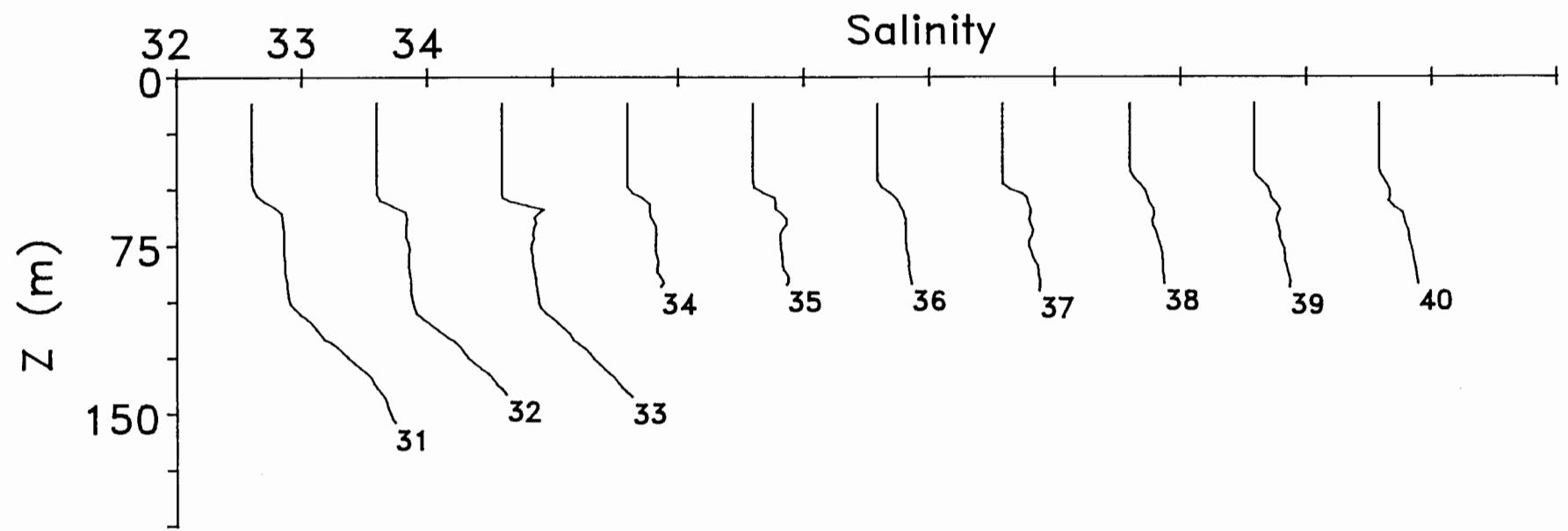
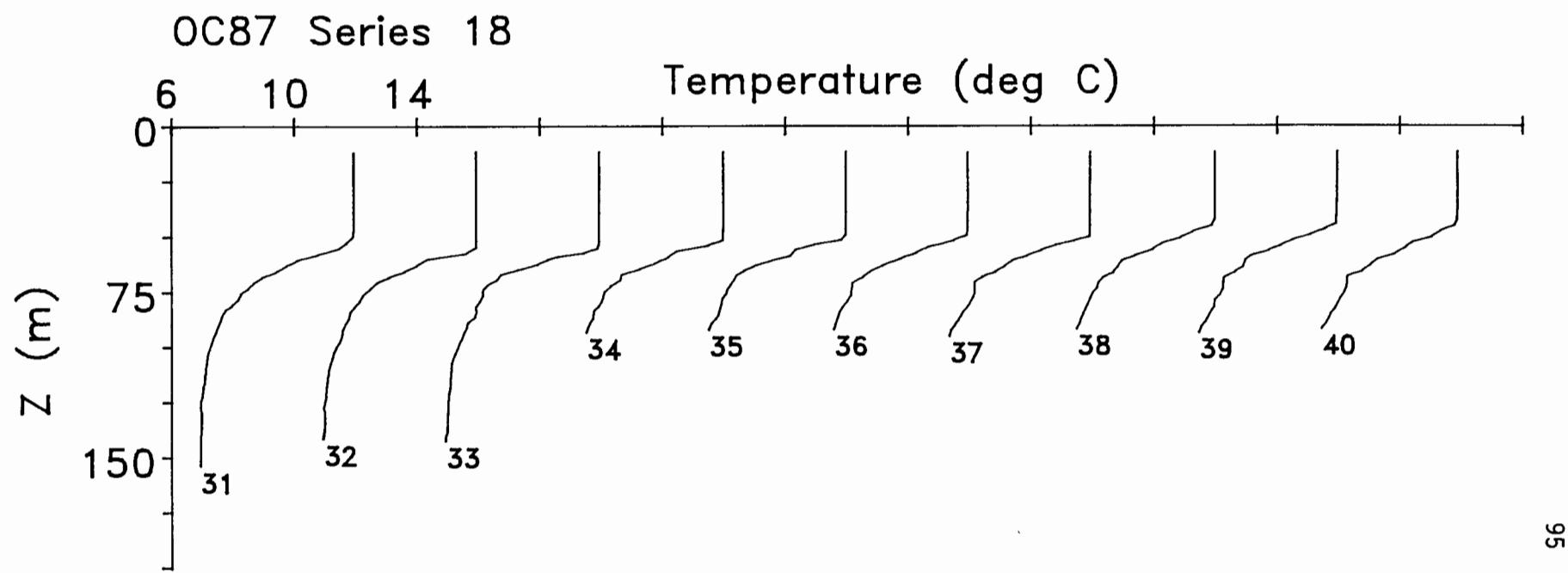
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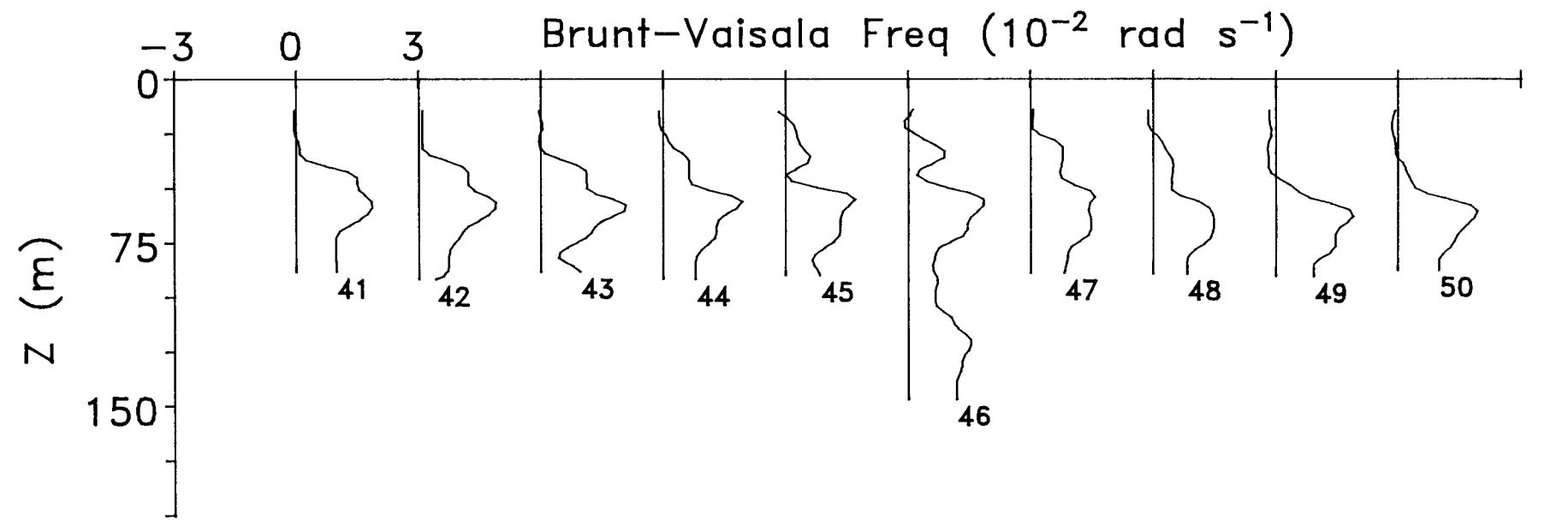
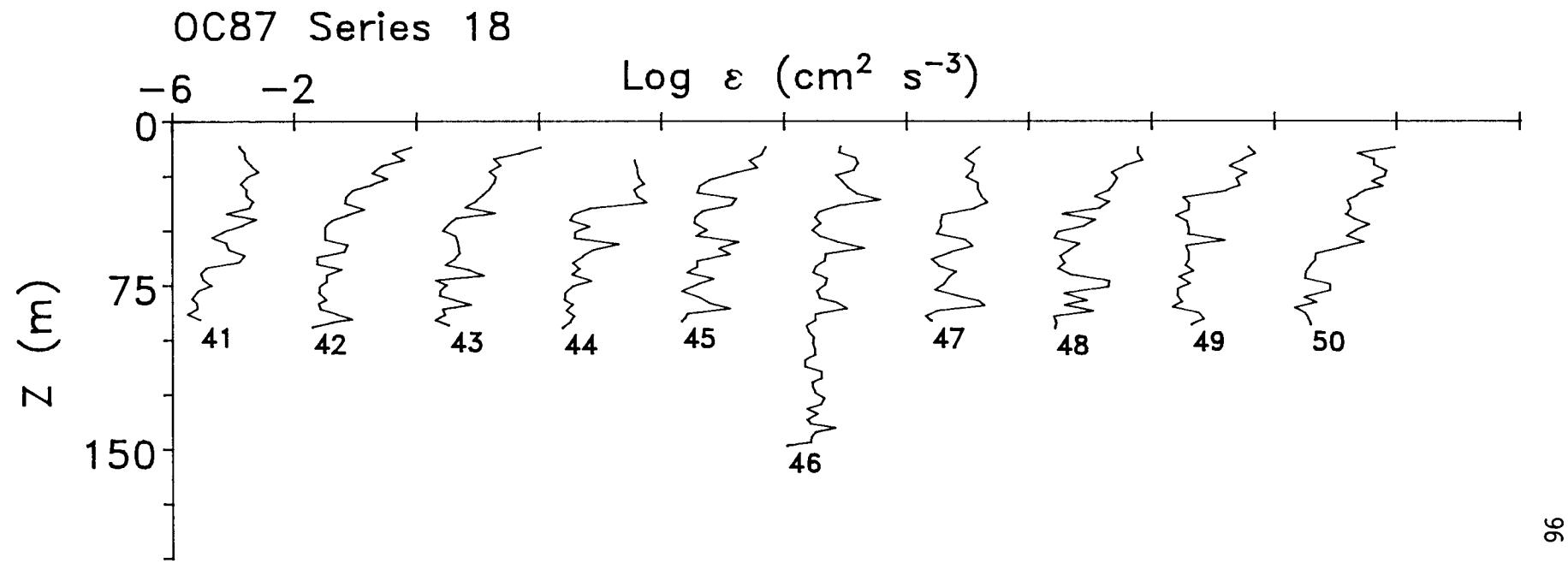


Salinity

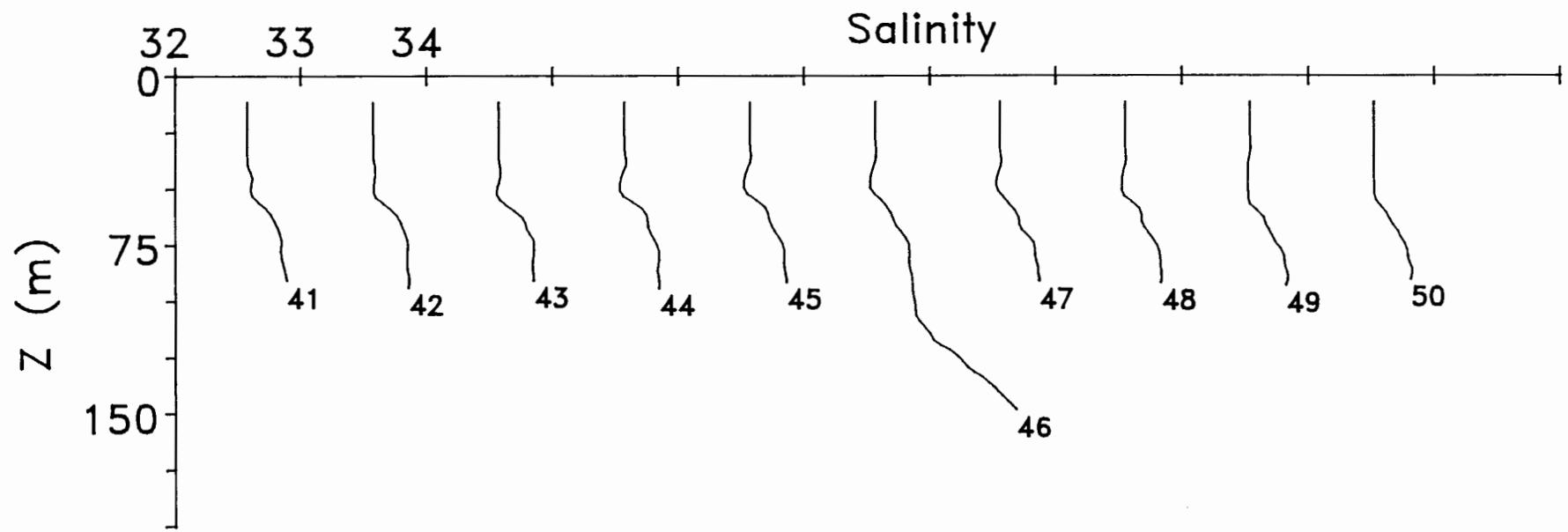
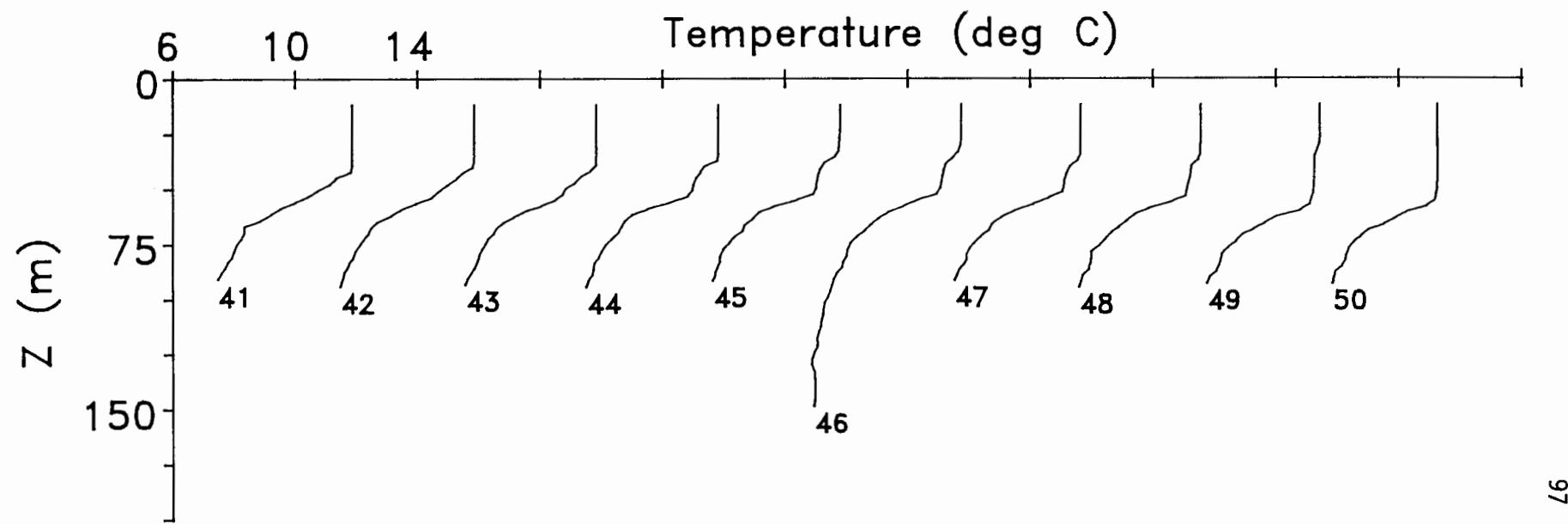


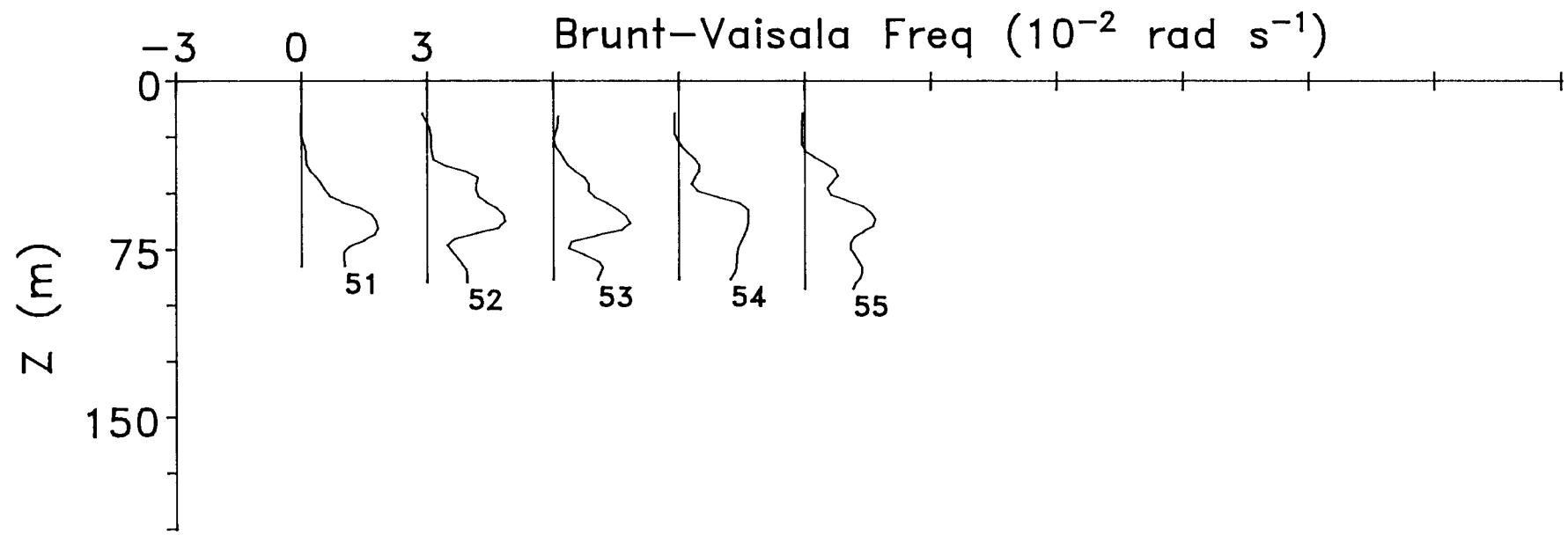
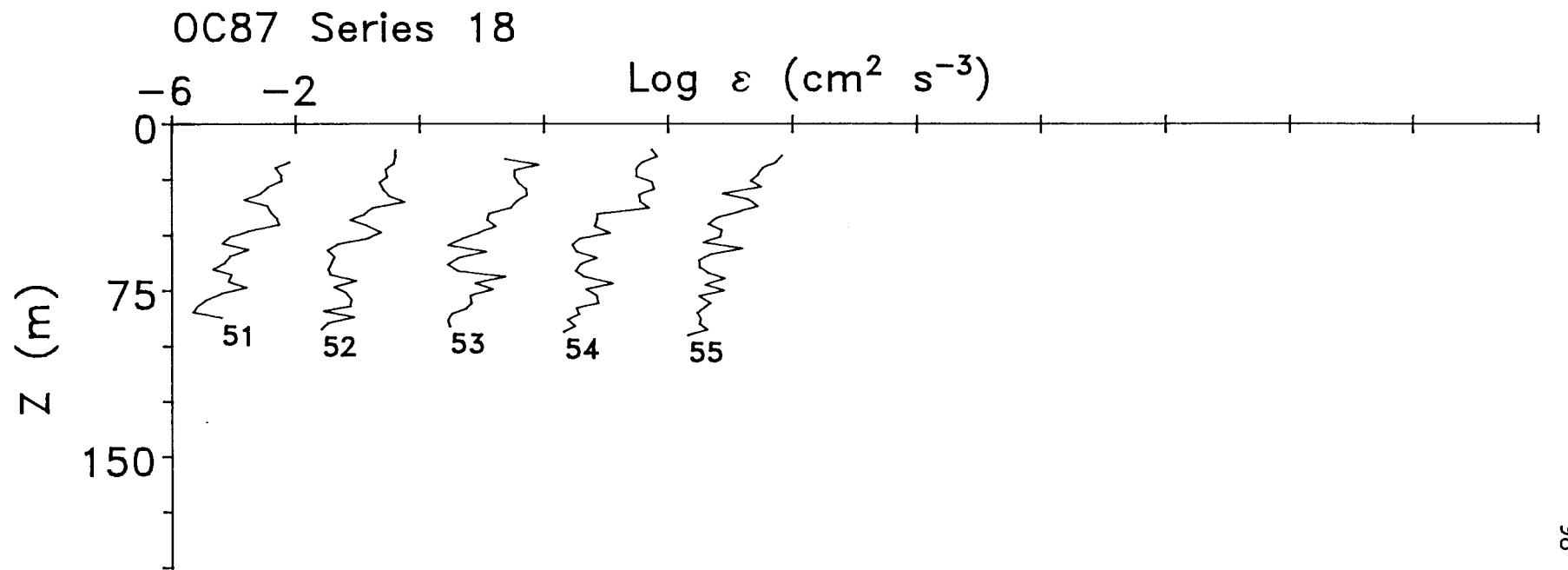




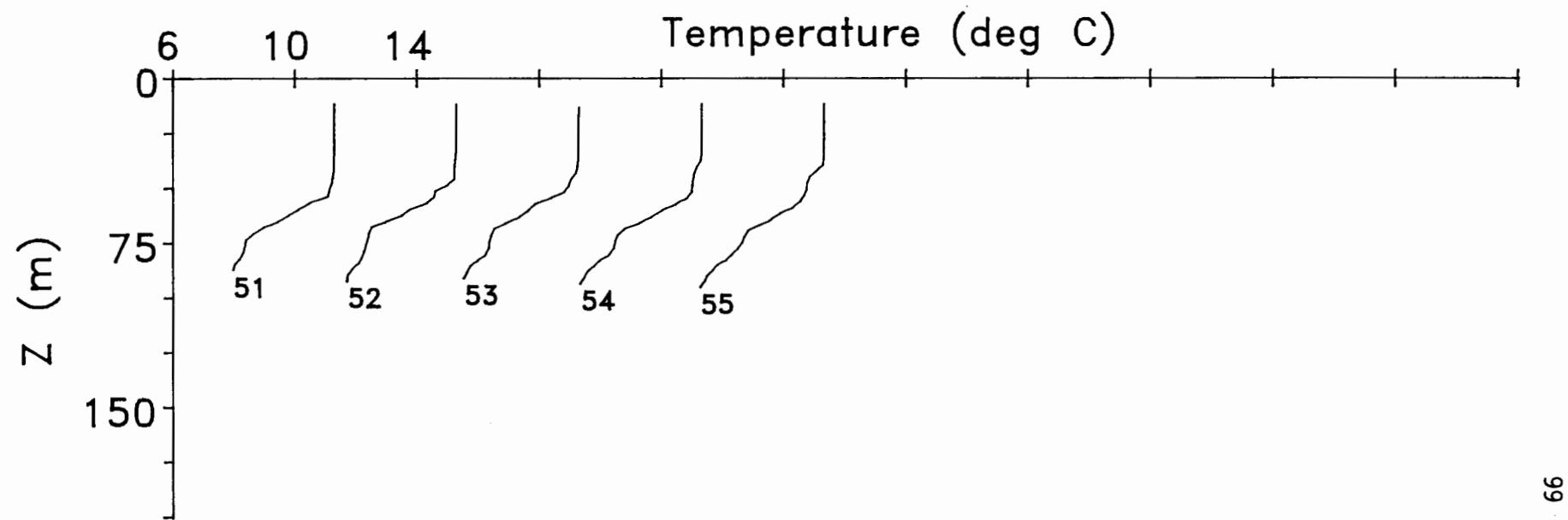


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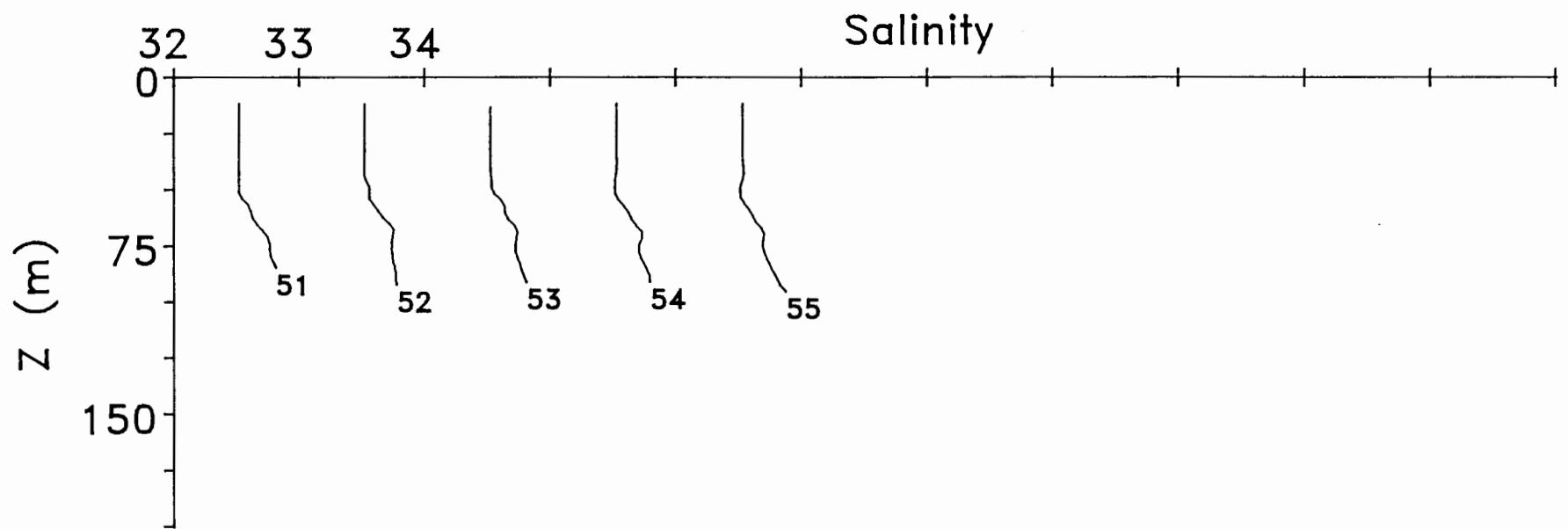




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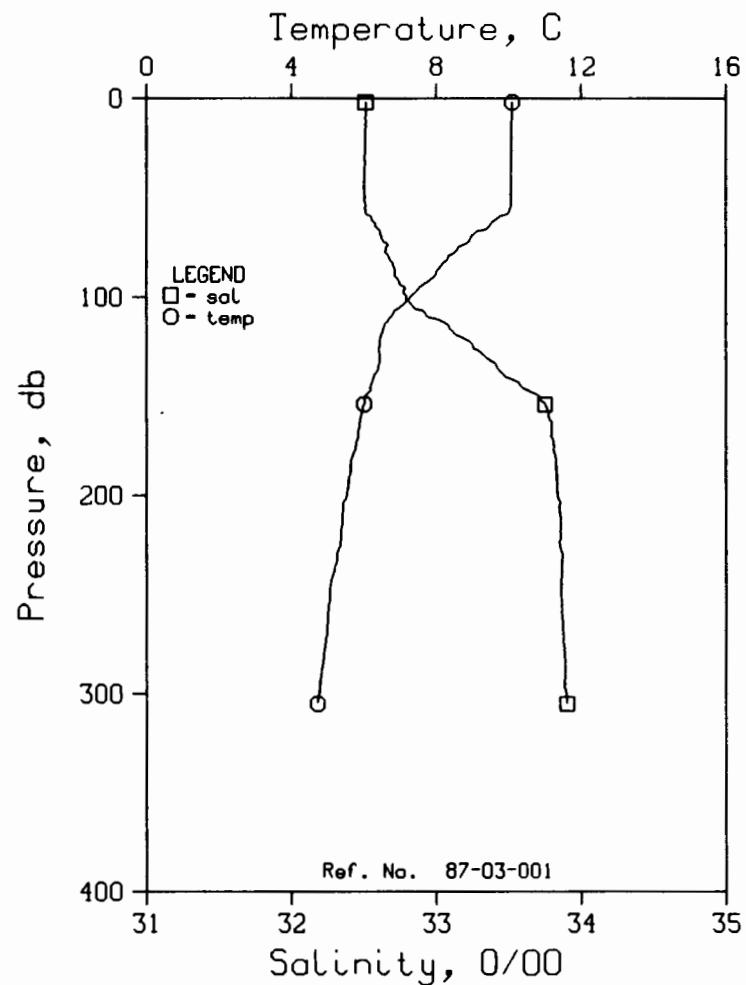


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## SCHEDULE OF HYDROGRAPHIC AND STD OBSERVATIONS (87-03)

CONSEC #	STATION ID	DATE (UTC)	TIME (UTC)	STD DEPTH(M)	HYDRO DEPTH(M)
001	ST01	10/25/87	2032	305	
002	ST02	10/26/87	0152	298	
003	ST03	10/26/87	0613	301	
004	ST04	10/27/87	0138	82	
005	ST05	10/27/87	0146	307	
006	ST06	10/27/87	0342	303	
007	ST07	10/27/87	0433	305	
008	ST08	10/27/87	0553	308	
009	ST09	10/27/87	1509	306	
010	ST10	10/28/87	0336	505	
011	ST11	10/30/87	1118	506	
012	ST12	10/31/87	0851	303	
013	ST13	10/31/87	1456	306	
014	ST14	11/02/87	0339	305	
015	ST15	11/02/87	0612	306	
016	ST16	11/02/87	1006	301	
017	ST17	11/02/87	1217	308	
018	ST18	11/02/87	1837	91	
019	ST19	11/02/87	1846	301	
020	ST20	11/03/87	0410	304	
021	ST21	11/03/87	0614	302	
022	ST22	11/03/87	1201	304	
023	ST23	11/03/87	1343	312	
024	ST24	11/03/87	1922	306	
025	ST25	11/04/87	0202	304	
026	ST26	11/04/87	0722	306	
027	ST27	11/04/87	1230	302	
028	ST28	11/04/87	2233	306	
029	ST29	11/05/87	1749	303	
030	ST30	11/05/87	2132	304	
031	ST31	11/05/87	2339	315	
033	ST33	11/06/87	2025	1207	
034	ST34	11/06/87	2118	302	
035	ST35	11/06/87	2146	304	
037	ST37	11/06/87	2219	304	
038	ST38	11/06/87	2249	304	
039	ST39	11/06/87	2312	304	
040	ST40	11/06/87	2332	306	
041	ST41	11/06/87	2355	304	
042	ST42	11/07/87	0814	304	

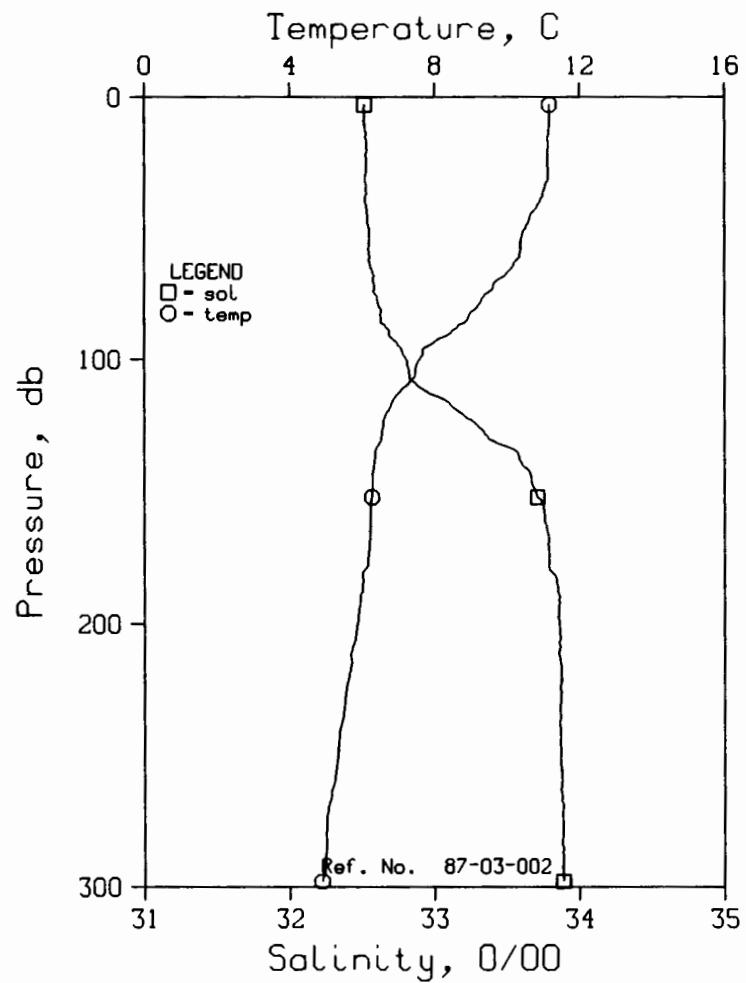


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03- 1 DATE 25/10/87  
 POSITION 48-35.8N, 140- 0.0W GMT 20:32 STATION ST01  
 RESULTS OF STP CAST  
 GUILDLINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>0</sub>	POT. EN	SOUND
0	10.10	32.51	0	25.02	294.8	0.00	0.00	1488.
10	10.09	32.51	10	25.02	295.0	0.29	0.02	1488.
20	10.07	32.51	20	25.02	295.0	0.59	0.06	1488.
30	10.07	32.51	30	25.02	295.4	0.88	0.14	1488.
50	10.06	32.51	50	25.02	295.8	1.48	0.38	1488.
75	8.60	32.65	75	25.37	263.1	2.18	0.82	1483.
100	7.28	32.79	99	25.67	234.7	2.81	1.38	1479.
125	6.43	33.26	124	26.14	189.4	3.33	1.98	1477.
150	6.04	33.71	149	26.55	151.2	3.76	2.58	1476.
175	5.78	33.81	174	26.66	140.6	4.12	3.18	1475.
200	5.53	33.84	199	26.72	136.0	4.47	3.84	1475.
225	5.35	33.85	223	26.75	132.9	4.80	4.56	1475.
250	5.07	33.86	248	26.79	129.7	5.13	5.35	1474.
300	4.76	33.90	298	26.85	123.8	5.76	7.13	1473.

DEEPEST MEASUREMENT:

305	4.72	33.90	303	26.86	122.9	5.83	7.32	1473.
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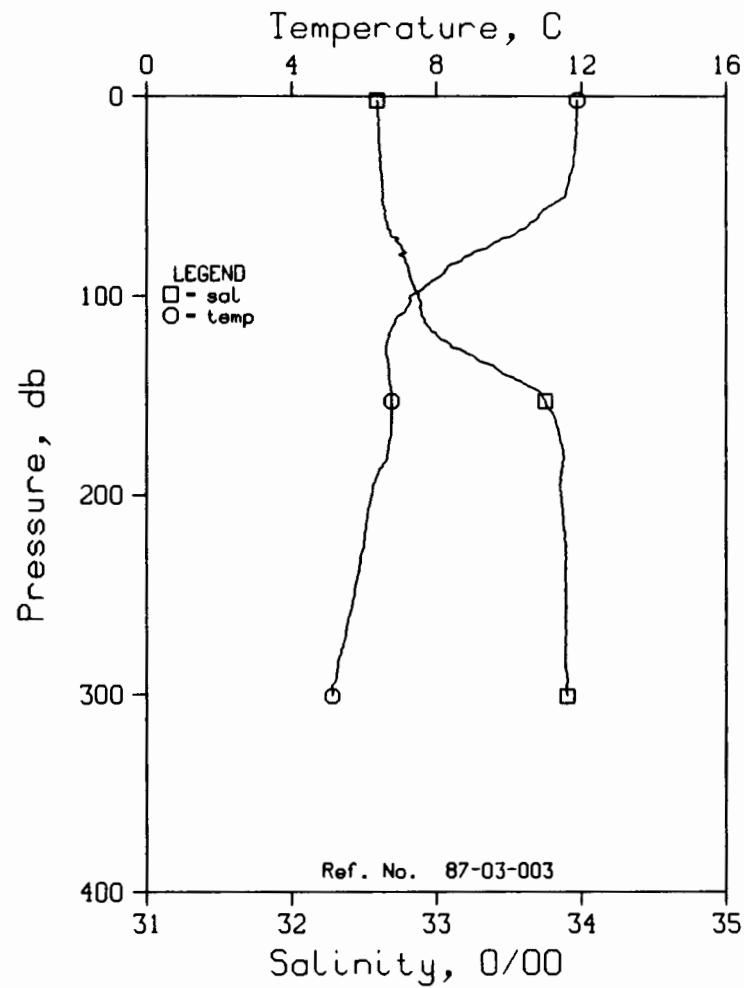


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03- 2 DATE 26/10/87  
 POSITION 48- 3.6N 140- 0.0W GMT 1:52 STATION ST02  
 RESULTS OF STP CAST  
 GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. EN	SOUND
0	11.17	32.51	0	24.84	312.3	0.00	0.00	1491.
10	11.17	32.51	10	24.83	312.6	0.31	0.02	1492.
20	11.12	32.53	20	24.86	310.6	0.62	0.06	1492.
30	11.13	32.52	30	24.85	311.9	0.94	0.14	1492.
50	10.52	32.55	50	24.98	300.0	1.55	0.39	1490.
75	9.40	32.59	75	25.19	279.6	2.28	0.86	1486.
100	7.60	32.81	99	25.64	237.7	2.93	1.44	1480.
125	6.59	33.30	124	26.16	188.4	3.47	2.06	1477.
150	6.28	33.70	149	26.51	154.9	3.89	2.64	1477.
175	6.18	33.79	174	26.60	147.2	4.27	3.26	1477.
200	5.87	33.86	199	26.69	138.5	4.62	3.93	1476.
225	5.57	33.87	223	26.74	134.4	4.96	4.67	1475.
250	5.33	33.87	248	26.77	131.7	5.29	5.48	1475.
300	4.86	33.89	298	26.83	125.5	5.94	7.28	1474.

DEEPEST MEASUREMENT:

298	4.89	33.89	296	26.83	126.0	5.91	7.20	1474.
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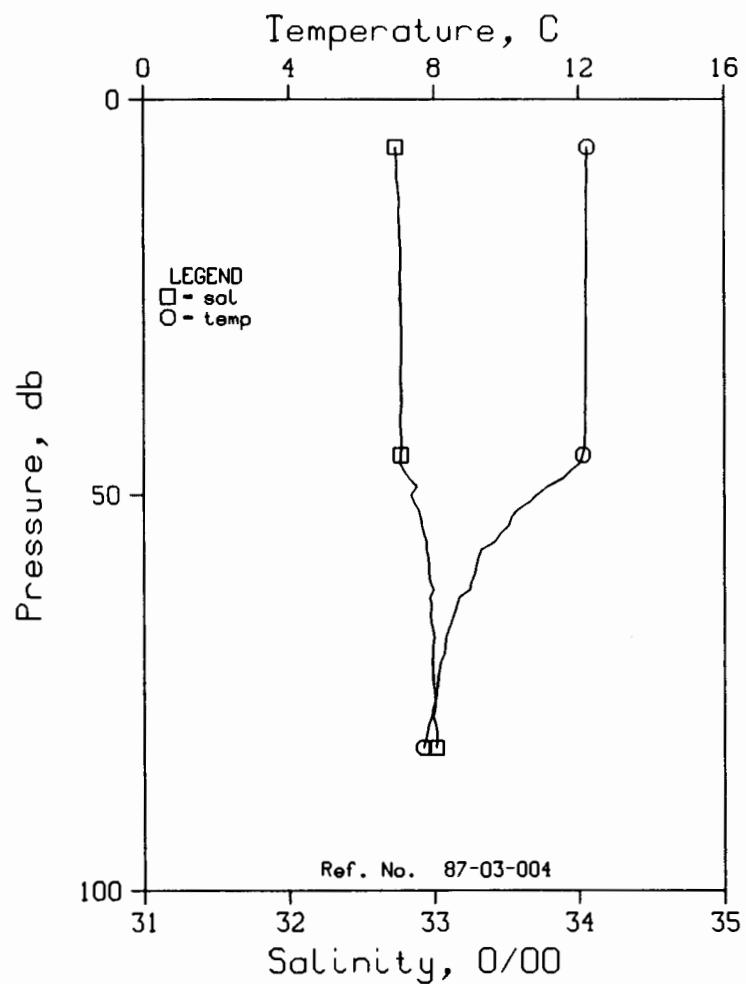


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03- 3      DATE 26/10/87  
 POSITION 47-32.3N, 139-59.1W    GMT 6:13    STATION ST03  
 RESULTS OF STP CAST  
 GUILDLINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. EN	SOUND
0	11.88	32.59	0	24.77	319.0	0.00	0.00	1494.
10	11.88	32.60	10	24.77	318.9	0.32	0.02	1494.
20	11.86	32.60	20	24.78	318.2	0.64	0.06	1494.
30	11.80	32.61	30	24.80	316.7	0.95	0.15	1494.
50	11.55	32.63	50	24.86	311.4	1.58	0.40	1494.
75	9.44	32.76	75	25.32	267.9	2.31	0.87	1487.
100	7.28	32.88	99	25.73	228.4	2.93	1.41	1479.
125	6.62	33.10	124	26.00	203.5	3.48	2.04	1477.
150	6.77	33.72	149	26.47	159.2	3.93	2.67	1479.
175	6.68	33.87	174	26.59	148.0	4.31	3.30	1479.
200	6.22	33.86	199	26.65	142.9	4.67	4.00	1478.
225	6.01	33.90	224	26.70	137.8	5.02	4.75	1477.
250	5.74	33.90	248	26.74	134.8	5.37	5.58	1477.
300	5.13	33.90	298	26.81	127.7	6.02	7.42	1475.

DEEPEST MEASUREMENT:

301	5.13	33.90	299	26.81	127.5	6.04	7.46	1475.
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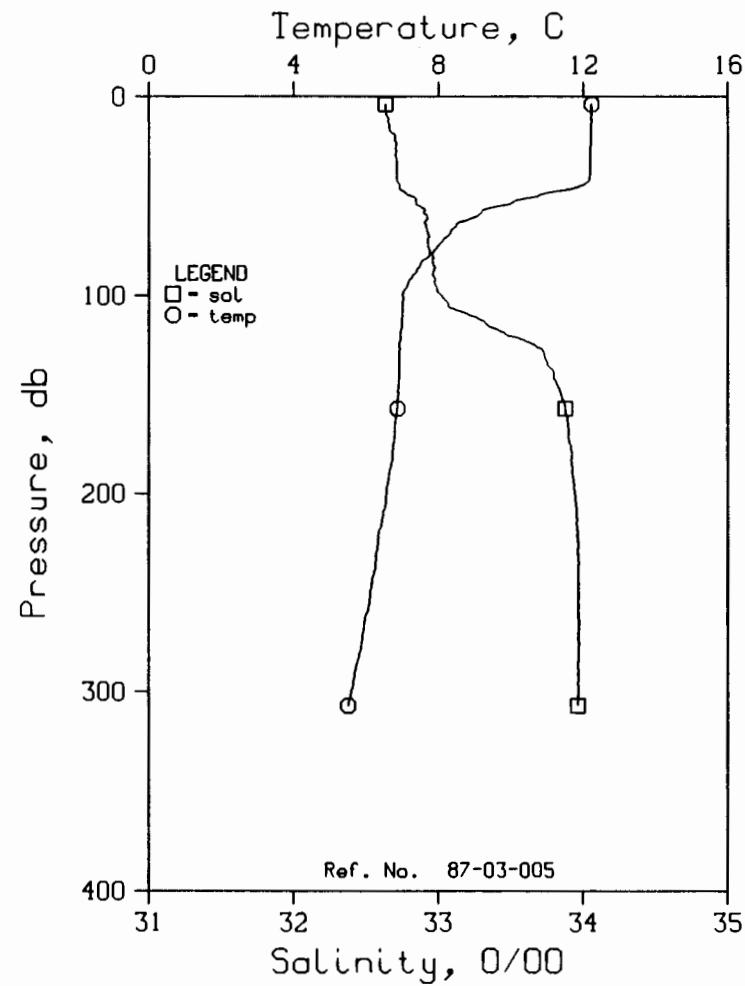


OCEAN PHYSICS DIVISION  
REFERENCE NO. 87-03- 4 DATE 27/10/87  
POSITION 47-35.2N 139-26.3W GMT 1:38 STATION ST04  
RESULTS OF STP CAST  
GUIDELINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. EN	SOUND
0	12.23	32.74	0	24.81	314.6	0.00	0.00	1495.
10	12.22	32.74	10	24.82	314.0	0.31	0.02	1496.
20	12.21	32.77	20	24.84	312.0	0.63	0.06	1496.
30	12.19	32.77	30	24.85	311.8	0.94	0.14	1496.
50	10.85	32.84	50	25.14	283.9	1.56	0.39	1492.
75	8.06	33.00	75	25.72	229.3	2.17	0.78	1482.

DEEPEST MEASUREMENT:

82	7.71	33.01	82	25.78	223.5	2.33	0.91	1481.
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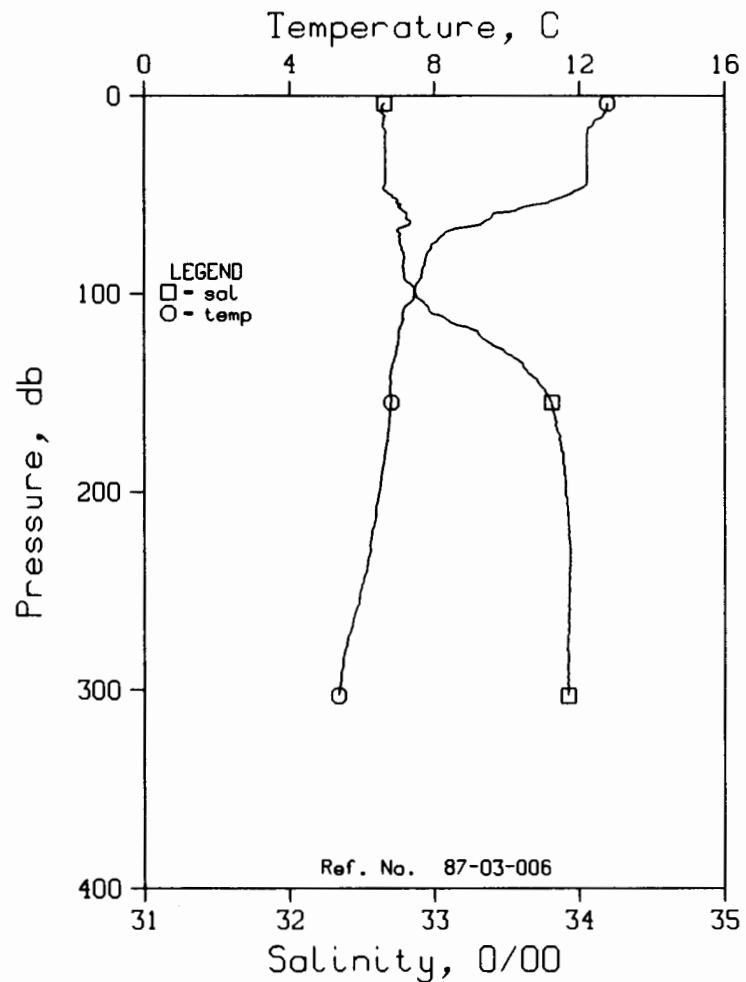


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03- 5 DATE 27/10/87  
 POSITION 47-35.2N, 139-27.0W GMT 1:46 STATION ST05  
 RESULTS OF STP CAST  
 GUIDELINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. EN	SOUND
0	12.23	32.64	0	24.73	321.9	0.00	0.00	1495.
10	12.23	32.65	10	24.74	321.2	0.32	0.02	1495.
20	12.21	32.70	20	24.79	317.4	0.64	0.07	1496.
30	12.19	32.71	30	24.80	316.8	0.96	0.15	1496.
50	10.71	32.83	50	25.16	282.5	1.58	0.40	1491.
75	7.99	32.92	75	25.67	234.2	2.20	0.79	1481.
100	7.01	33.02	99	25.88	214.2	2.76	1.29	1478.
125	6.93	33.67	124	26.40	165.4	3.25	1.84	1479.
150	6.89	33.85	149	26.55	151.8	3.64	2.39	1480.
175	6.76	33.91	174	26.62	145.4	4.01	3.01	1480.
200	6.57	33.94	199	26.67	141.1	4.37	3.69	1479.
225	6.34	33.97	223	26.72	136.7	4.72	4.45	1479.
250	6.14	33.97	248	26.74	134.4	5.05	5.27	1478.
300	5.61	33.97	298	26.81	128.3	5.71	7.11	1477.

DEEPEST MEASUREMENT:

307	5.51	33.96	305	26.82	127.8	5.80	7.38	1477.
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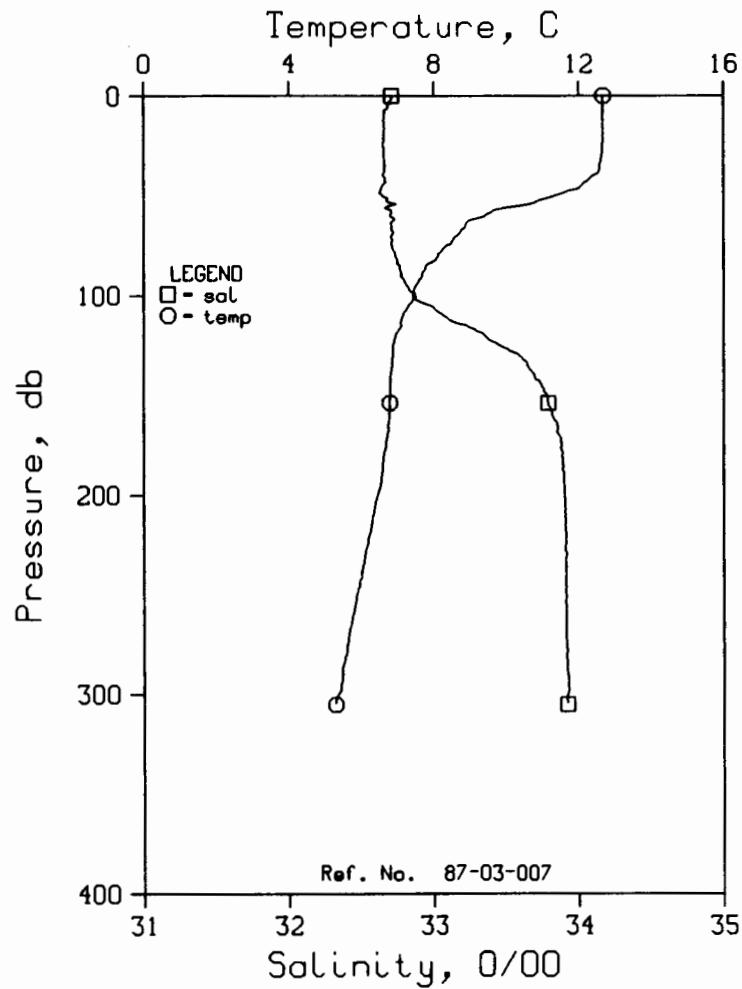


OCEAN PHYSICS DIVISION  
REFERENCE NO. 87-03- 6 DATE 27/10/87  
POSITION 47-24.4N, 139-21.6W GMT 3:42 STATION ST06  
RESULTS OF STP CAST  
GUIDELINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>0</sub>	POT. EN	SOUND
0	12.77	32.66	0	24.65	330.2	0.00	0.00	1497.
10	12.65	32.66	10	24.67	328.0	0.33	0.02	1497.
20	12.22	32.66	20	24.75	320.5	0.65	0.07	1496.
30	12.21	32.66	30	24.76	320.4	0.97	0.15	1496.
50	11.66	32.71	50	24.90	307.5	1.61	0.41	1494.
75	7.93	32.76	75	25.55	245.4	2.28	0.83	1481.
100	7.45	32.87	99	25.71	230.8	2.88	1.36	1480.
125	7.00	33.39	124	26.17	186.8	3.41	1.96	1479.
150	6.79	33.77	149	26.50	156.3	3.83	2.55	1479.
175	6.69	33.87	174	26.59	147.7	4.21	3.18	1479.
200	6.49	33.91	199	26.65	142.7	4.57	3.87	1479.
225	6.25	33.93	224	26.70	138.0	4.92	4.63	1478.
250	5.96	33.93	248	26.74	134.8	5.26	5.46	1478.
300	5.38	33.92	298	26.80	129.0	5.92	7.31	1476.

DEEPEST MEASUREMENT:

303	5.35	33.92	301	26.80	128.7	5.96	7.43	1476.
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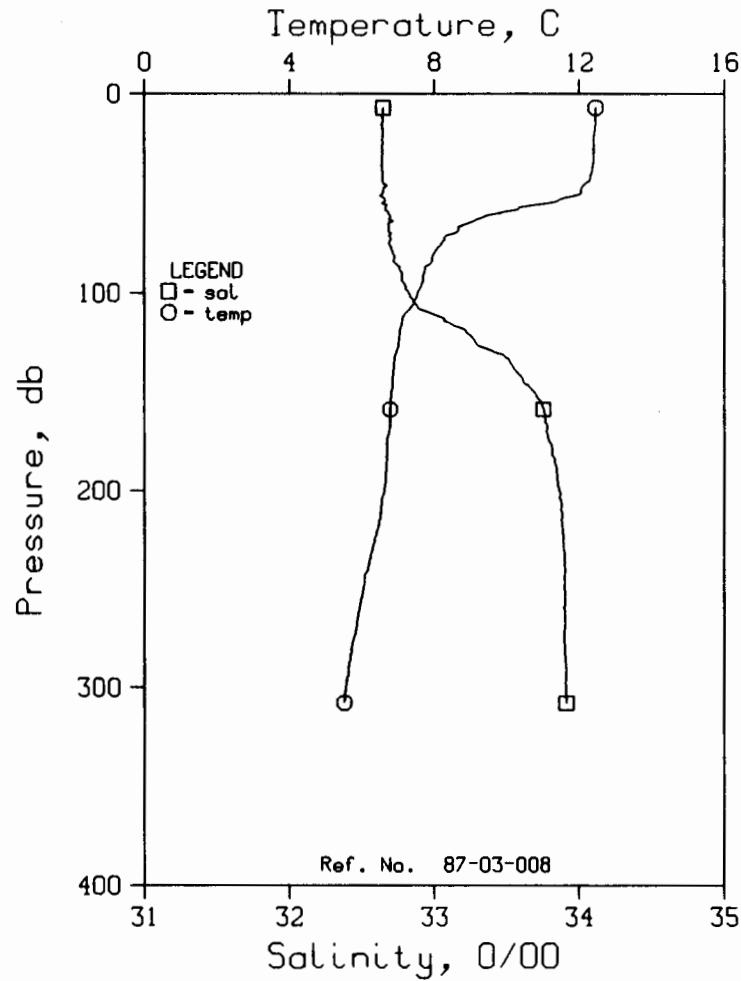


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03- 7 DATE 27/10/87  
 POSITION 47-19.5N, 139-20.6W GMT 4:33 STATION ST07  
 RESULTS OF STP CAST  
 GUILDLINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. EN	SOUND
0	12.68	32.71	0	24.71	324.6	0.00	0.00	1497.
10	12.67	32.65	10	24.67	328.7	0.33	0.02	1497.
20	12.66	32.65	20	24.67	328.9	0.66	0.07	1497.
30	12.63	32.65	30	24.67	328.6	0.98	0.15	1497.
50	11.28	32.64	50	24.92	305.8	1.63	0.41	1493.
75	8.34	32.71	75	25.45	254.7	2.31	0.84	1482.
100	7.43	32.87	99	25.71	230.9	2.91	1.38	1480.
125	6.88	33.45	124	26.24	180.6	3.43	1.97	1479.
150	6.79	33.78	149	26.51	155.4	3.84	2.55	1479.
175	6.68	33.88	174	26.60	146.7	4.22	3.17	1479.
200	6.45	33.90	199	26.65	142.6	4.58	3.87	1479.
225	6.17	33.91	224	26.69	139.0	4.93	4.63	1478.
250	5.87	33.91	248	26.73	135.3	5.28	5.46	1477.
300	5.36	33.92	298	26.80	129.1	5.94	7.31	1476.

DEEPEST MEASUREMENT:

305	5.29	33.92	303	26.81	128.3	6.00	7.51	1476.
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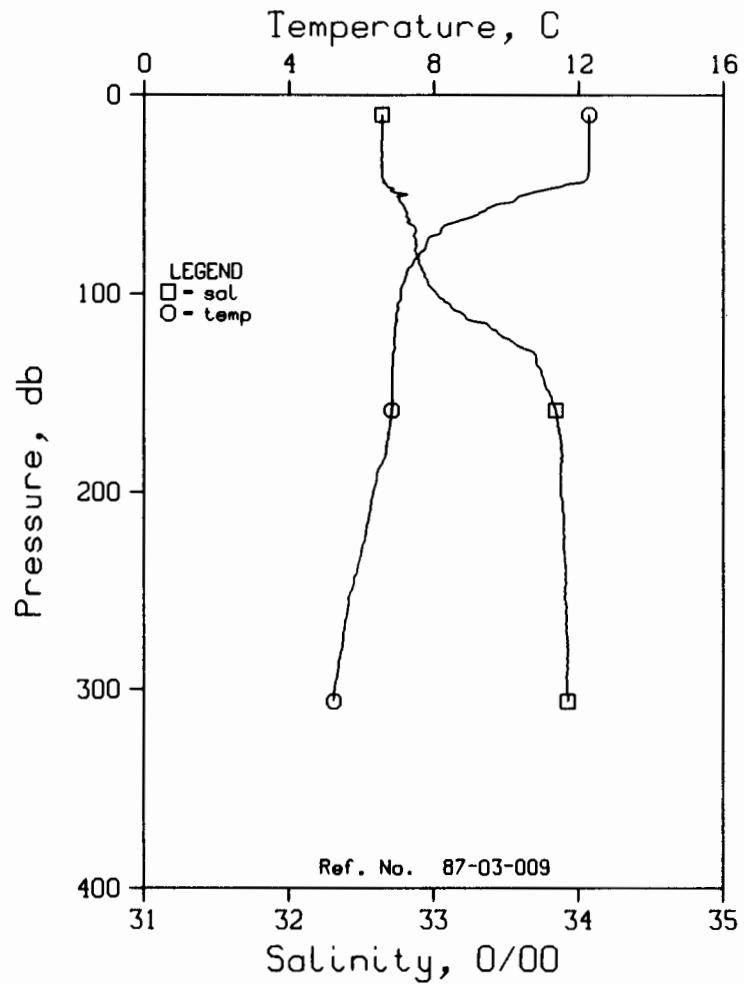


OCEAN PHYSICS DIVISION  
REFERENCE NO. 87-03- 8 DATE 27/10/87  
POSITION 47-26.4N, 139- 7.3W GMT 5:53 STATION ST08  
RESULTS OF STP CAST  
GUIDELINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. <sub>EN</sub>	SOUND
0	12.45	32.65	0	24.70	325.0	0.00	0.00	1496.
10	12.46	32.65	10	24.70	325.6	0.33	0.02	1496.
20	12.42	32.64	20	24.70	325.2	0.65	0.07	1496.
30	12.40	32.64	30	24.71	325.2	0.98	0.15	1496.
50	12.05	32.65	50	24.78	319.1	1.62	0.41	1495.
75	8.20	32.69	75	25.46	254.2	2.32	0.85	1482.
100	7.54	32.83	99	25.66	235.7	2.93	1.40	1480.
125	7.03	33.28	124	26.09	194.9	3.47	2.01	1479.
150	6.83	33.69	149	26.43	162.9	3.91	2.62	1479.
175	6.69	33.79	174	26.53	153.5	4.30	3.27	1479.
200	6.62	33.87	199	26.60	147.5	4.67	3.99	1479.
225	6.36	33.89	224	26.65	142.6	5.04	4.78	1479.
250	6.05	33.90	248	26.70	138.3	5.39	5.62	1478.
300	5.57	33.91	298	26.77	132.1	6.06	7.52	1477.

DEEPEST MEASUREMENT:

308	5.52	33.91	306	26.78	131.5	6.17	7.84	1477.
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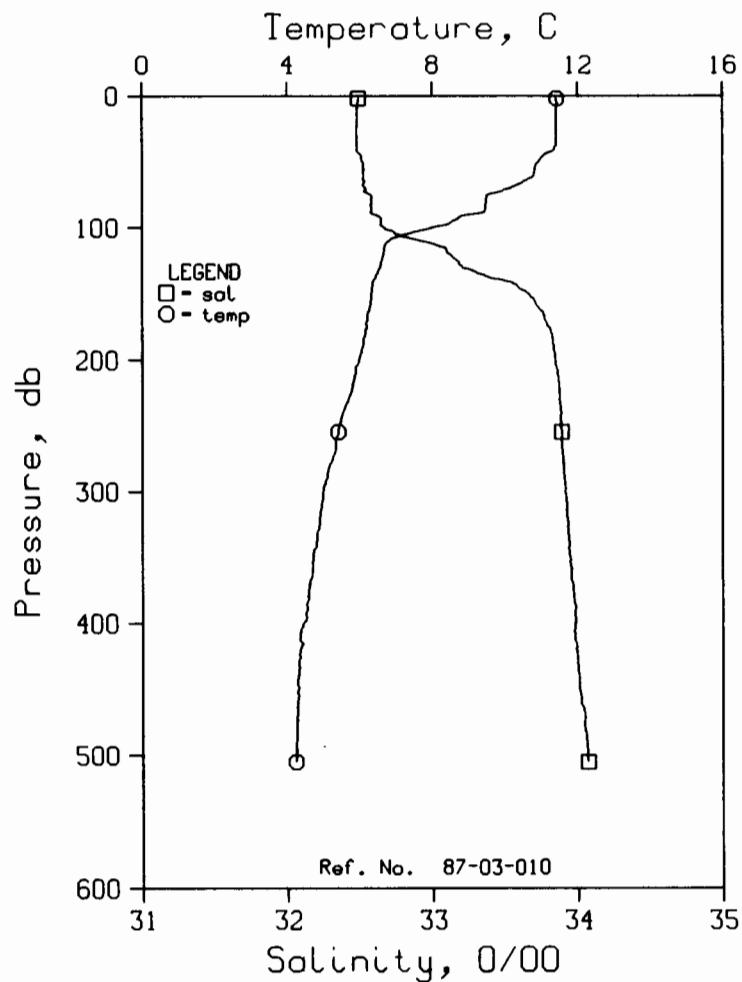


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03- 9 DATE 27/10/87  
 POSITION 47-45.5N, 139-19.3W GMT 15: 9 STATION ST09  
 RESULTS OF SIP CAST  
 GUIDELINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>0</sub>	POT. EN	SOUND
0	12.29	32.64	0	24.73	322.6	0.00	0.00	1495.
10	12.28	32.64	10	24.73	322.6	0.32	0.02	1496.
20	12.29	32.64	20	24.73	322.9	0.65	0.07	1496.
30	12.28	32.64	30	24.73	323.1	0.97	0.15	1496.
50	10.54	32.82	50	25.18	280.2	1.60	0.40	1490.
75	7.78	32.88	75	25.66	234.8	2.24	0.81	1481.
100	7.08	33.02	99	25.87	215.2	2.80	1.31	1478.
125	6.91	33.56	124	26.32	173.2	3.29	1.87	1479.
150	6.85	33.80	149	26.51	154.9	3.69	2.43	1479.
175	6.70	33.88	174	26.60	147.2	4.07	3.06	1479.
200	6.33	33.88	199	26.64	143.0	4.43	3.75	1478.
225	6.08	33.90	223	26.69	138.6	4.79	4.51	1478.
250	5.72	33.90	248	26.75	133.9	5.13	5.33	1477.
300	5.27	33.92	298	26.81	128.0	5.78	7.16	1476.

DEEPEST MEASUREMENT:

306	5.24	33.93	304	26.82	127.3	5.85	7.40	1476.
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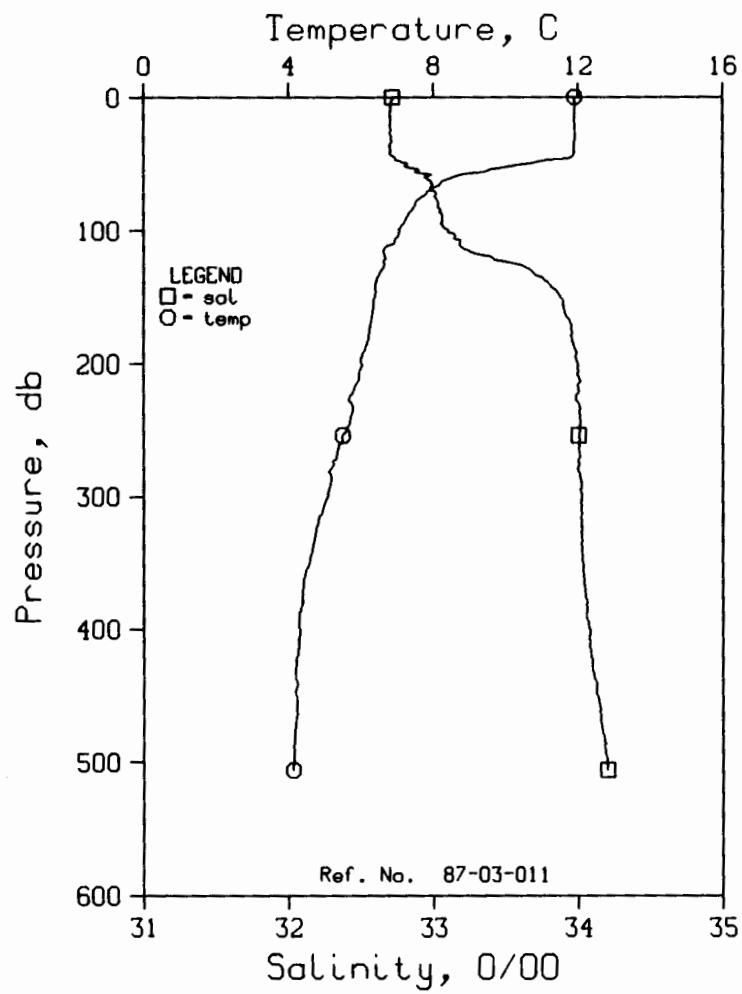


OCEAN PHYSICS DIVISION  
REFERENCE NO. 87-03-10 DATE 28/10/87  
POSITION 47-52.0N, 140-13.2W GMT 3:36 STATION ST10  
RESULTS OF STP CAST  
GUIDELINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. EN	SOUND
0	11.43	32.49	0	24.77	318.2	0.00	0.00	1492.
10	11.43	32.49	10	24.77	319.1	0.32	0.02	1492.
20	11.42	32.48	20	24.76	319.5	0.64	0.07	1493.
30	11.43	32.48	30	24.76	319.9	0.96	0.15	1493.
50	10.94	32.52	50	24.88	309.1	1.59	0.40	1491.
75	9.50	32.58	75	25.17	281.7	2.34	0.88	1487.
100	8.00	32.67	99	25.47	253.6	3.03	1.49	1482.
125	6.61	33.18	124	26.06	197.5	3.57	2.11	1477.
150	6.34	33.66	149	26.48	158.2	4.01	2.73	1477.
175	6.21	33.80	174	26.60	146.7	4.39	3.36	1477.
200	5.99	33.85	199	26.66	141.0	4.75	4.04	1477.
225	5.76	33.87	224	26.71	136.5	5.10	4.79	1476.
250	5.44	33.89	248	26.77	131.8	5.43	5.60	1475.
300	4.99	33.91	298	26.84	125.4	6.08	7.41	1474.
400	4.44	33.98	397	26.95	115.0	7.28	11.68	1474.
500	4.24	34.07	496	27.04	107.2	8.39	16.77	1475.

DEEPEST MEASUREMENT:

505	4.24	34.07	501	27.05	106.9	8.44	17.05	1475.
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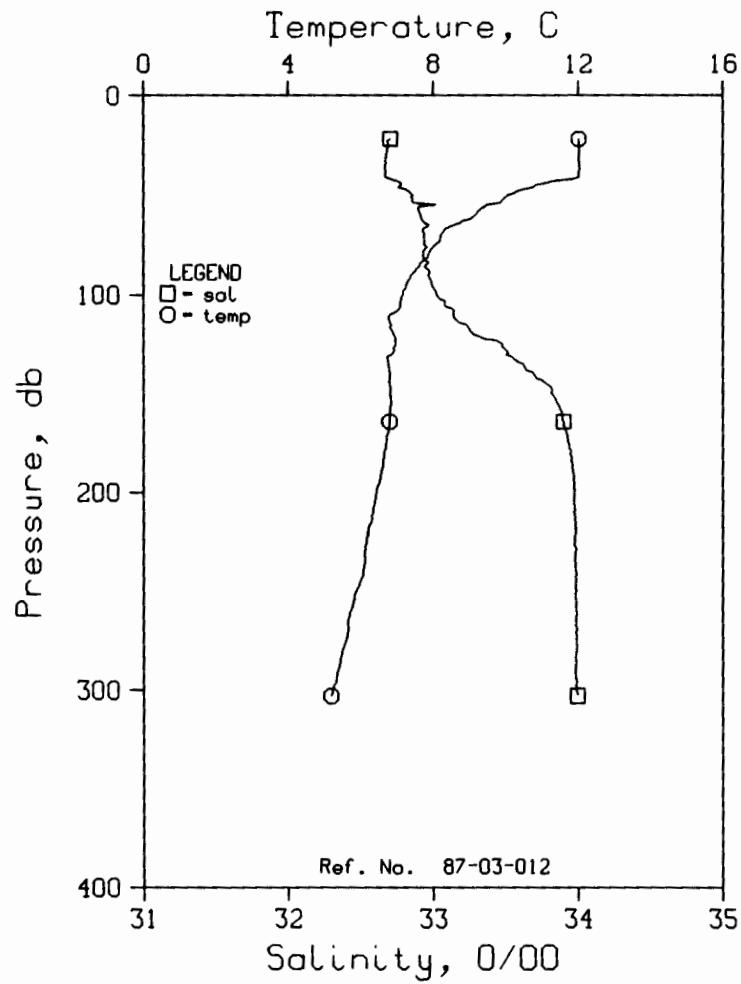


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03- 11 DATE 30/10/87  
 POSITION 47-57.5N, 139-23.1W GMT 11:18 STATION ST11  
 RESULTS OF STP CAST  
 GUIDELINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. EN	SOUND
0	11.90	32.72	0	24.86	310.0	0.00	0.00	1494.
10	11.90	32.71	10	24.85	311.2	0.31	0.02	1494.
20	11.90	32.70	20	24.85	311.6	0.62	0.06	1495.
30	11.91	32.71	30	24.85	311.4	0.93	0.14	1495.
50	10.64	32.83	50	25.17	281.4	1.55	0.39	1491.
75	7.67	33.01	75	25.78	223.3	2.15	0.77	1480.
100	7.07	33.10	99	25.94	208.6	2.69	1.26	1478.
125	6.66	33.58	124	26.37	168.4	3.18	1.81	1478.
150	6.38	33.88	149	26.64	142.8	3.56	2.34	1478.
175	6.24	33.95	174	26.72	135.8	3.91	2.92	1478.
200	6.02	34.00	199	26.78	130.2	4.24	3.55	1477.
225	5.68	33.99	223	26.81	127.2	4.56	4.25	1476.
250	5.60	34.01	248	26.84	124.5	4.87	5.01	1476.
300	5.08	34.03	298	26.92	117.9	5.48	6.71	1475.
400	4.31	34.08	397	27.04	106.3	6.60	10.70	1473.
500	4.15	34.20	496	27.16	96.4	7.62	15.35	1475.

DEEPEST MEASUREMENT:

506	4.14	34.20	502	27.16	96.1	7.67	15.65	1475.
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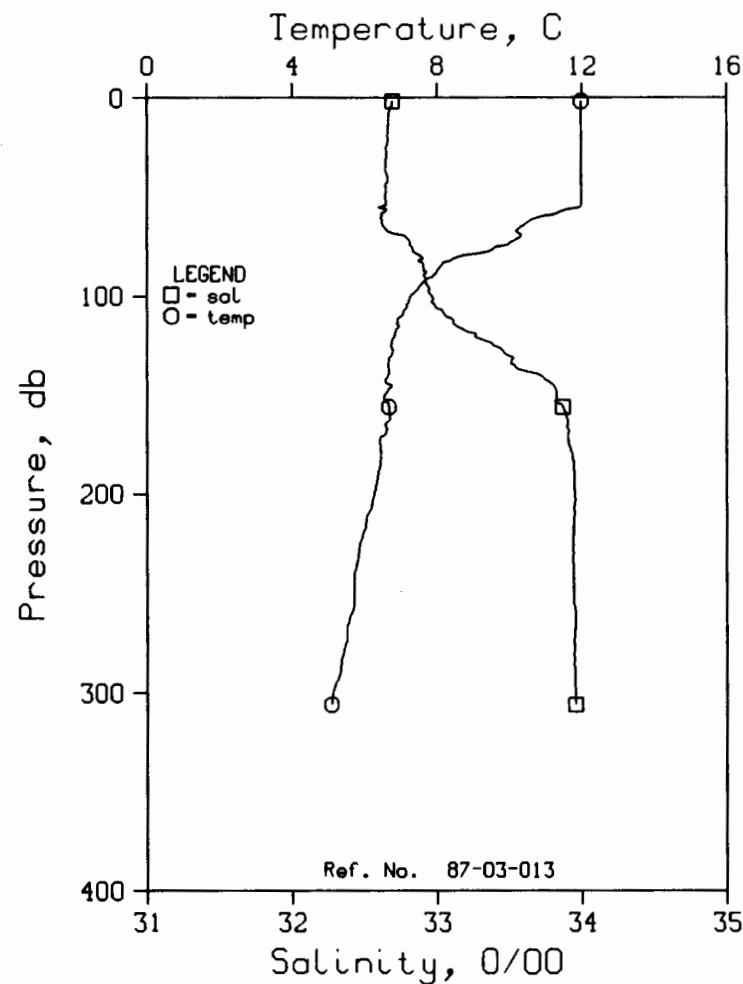


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03-12 DATE 31/10/87  
 POSITION 47-52.0N, 139-15.5W GMT 08:51 STATION ST12  
 RESULTS OF STP CAST  
 GUILDLINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. EN	SOUND
0	12.01	32.71	0	24.83	312.9	0.00	0.00	1495.
10	12.01	32.69	10	24.82	313.9	0.31	0.02	1495.
20	12.02	32.69	20	24.81	314.9	0.63	0.06	1495.
30	12.02	32.68	30	24.81	315.6	0.94	0.14	1495.
50	10.05	32.86	50	25.30	269.5	1.55	0.39	1489.
75	8.05	32.94	75	25.67	233.9	2.17	0.78	1482.
100	7.15	33.02	99	25.87	215.7	2.73	1.28	1479.
125	6.97	33.48	124	26.25	179.9	3.23	1.86	1479.
150	6.82	33.82	149	26.53	153.1	3.65	2.43	1479.
175	6.70	33.94	174	26.64	143.0	4.02	3.04	1479.
200	6.44	33.97	199	26.71	137.4	4.37	3.71	1479.
225	6.17	33.98	223	26.75	133.7	4.70	4.45	1478.
250	5.89	33.99	248	26.79	129.7	5.03	5.25	1477.
300	5.23	33.99	298	26.87	122.5	5.67	7.02	1476.

DEEPEST MEASUREMENT:

303	5.19	33.99	301	26.88	121.5	5.70	7.13	1475.
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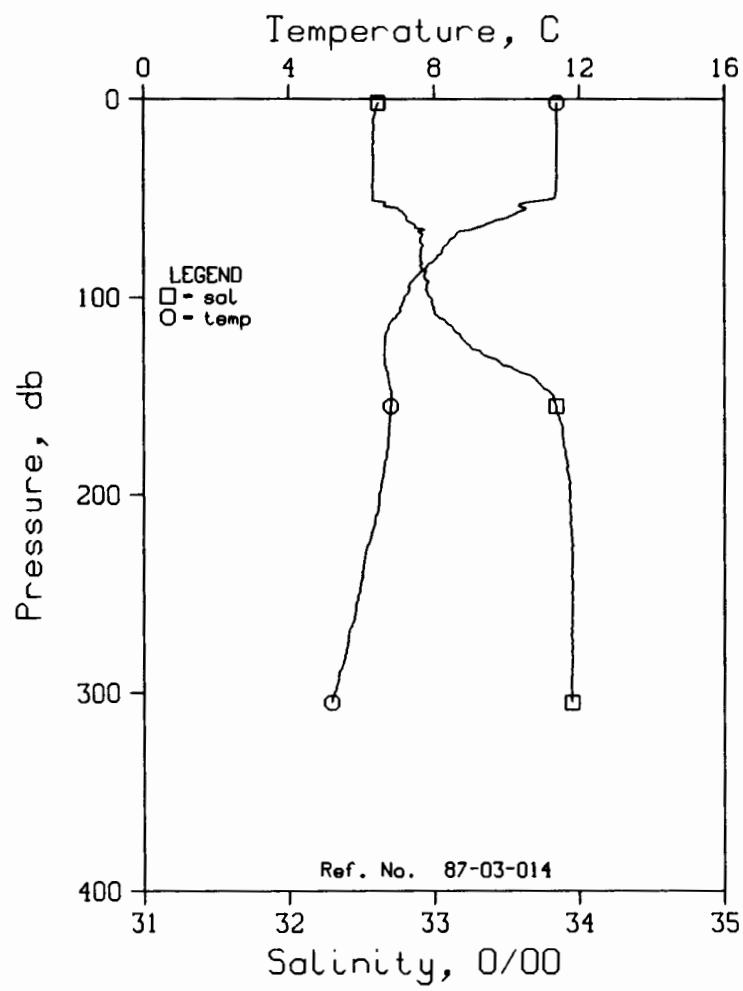


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03-13 DATE 31/10/87  
 POSITION 47-54.9N, 139-16.6W GMT 14:56 STATION ST13  
 RESULTS OF STP CAST  
 GUIDELINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. EN	SOUND
0	11.98	32.69	0	24.83	313.1	0.00	0.00	1494.
10	11.98	32.67	10	24.81	315.4	0.31	0.02	1495.
20	11.98	32.66	20	24.80	316.0	0.63	0.06	1495.
30	11.98	32.65	30	24.79	317.0	0.95	0.15	1495.
50	11.98	32.64	50	24.79	318.2	1.58	0.40	1495.
75	9.60	32.83	75	25.35	264.9	2.32	0.87	1487.
100	7.26	32.96	99	25.80	221.6	2.91	1.40	1479.
125	6.74	33.39	124	26.21	183.4	3.43	1.99	1478.
150	6.55	33.82	149	26.57	149.2	3.84	2.56	1478.
175	6.44	33.91	174	26.66	141.6	4.20	3.17	1478.
200	6.27	33.95	199	26.71	136.8	4.55	3.83	1478.
225	5.87	33.94	223	26.75	132.9	4.89	4.56	1477.
250	5.71	33.94	248	26.78	130.9	5.22	5.36	1477.
300	5.13	33.95	298	26.85	123.9	5.86	7.15	1475.

DEEPEST MEASUREMENT:

306	5.09	33.95	304	26.86	123.3	5.93	7.37	1475.
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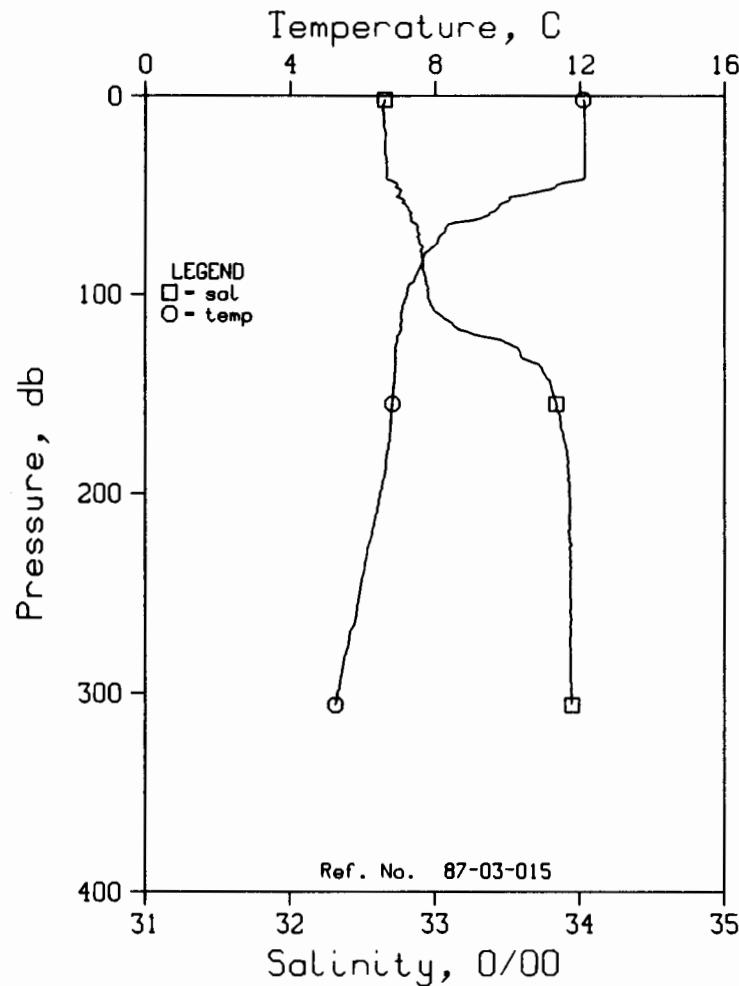


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03-14 DATE 2/11/87  
 POSITION 47-54.2N, 139- 7.8W GMT 3:39 STATION ST14  
 RESULTS OF STD CAST  
 GUILDLINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. EN	SOUND
0	11.38	32.62	0	24.88	308.4	0.00	0.00	1492.
10	11.38	32.58	10	24.85	311.0	0.31	0.02	1492.
20	11.38	32.58	20	24.85	311.2	0.62	0.06	1493.
30	11.38	32.58	30	24.85	311.6	0.93	0.14	1493.
50	11.31	32.58	50	24.86	311.1	1.56	0.40	1493.
75	8.24	32.91	75	25.62	238.7	2.22	0.81	1482.
100	7.17	32.98	99	25.83	219.3	2.79	1.33	1479.
125	6.64	33.25	124	26.11	192.6	3.31	1.92	1477.
150	6.82	33.82	149	26.54	152.7	3.73	2.51	1479.
175	6.73	33.89	174	26.61	146.6	4.11	3.13	1479.
200	6.49	33.94	199	26.67	140.5	4.46	3.81	1479.
225	6.20	33.95	223	26.72	136.0	4.81	4.57	1478.
250	5.94	33.95	248	26.75	133.4	5.15	5.38	1478.
300	5.26	33.95	298	26.84	125.4	5.80	7.19	1476.

DEEPEST MEASUREMENT:

305	5.19	33.95	303	26.84	124.8	5.86	7.39	1475.
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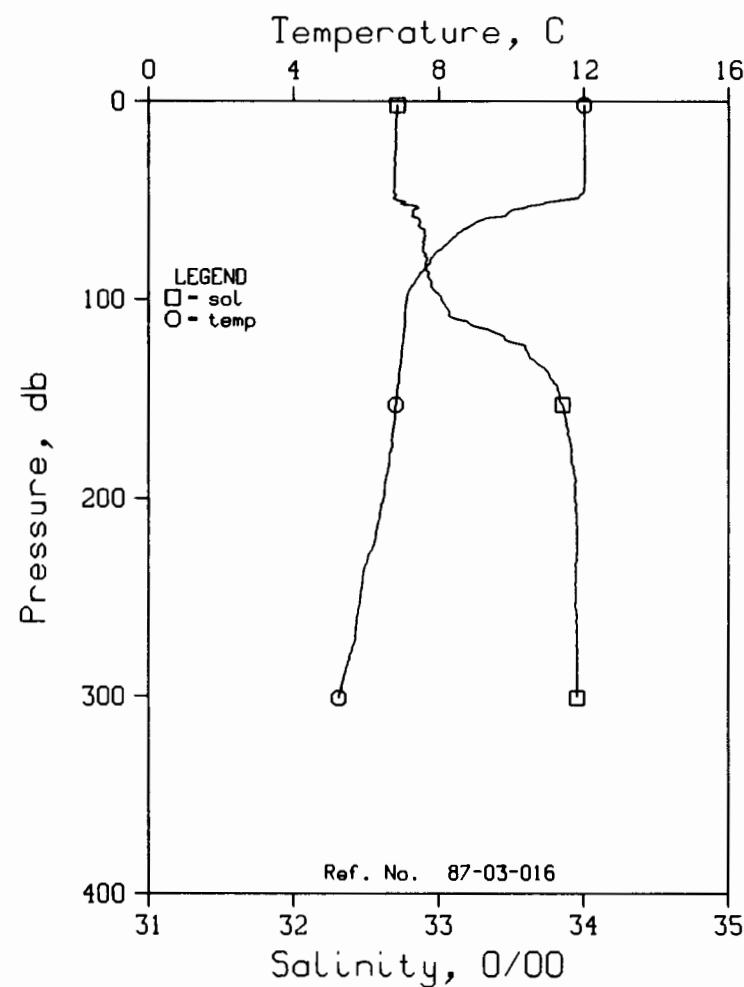


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03-15 DATE 2/11/87  
 POSITION 47-53.0N, 138-57.7W GMT 6:12 STATION ST15  
 RESULTS OF STP CAST  
 GUIDELINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>0</sub>	POT. EN	SOUND
0	12.08	32.65	0	24.77	318.2	0.00	0.00	1495.
10	12.12	32.64	10	24.76	319.6	0.32	0.02	1495.
20	12.12	32.66	20	24.77	318.9	0.64	0.07	1495.
30	12.13	32.66	30	24.77	319.0	0.96	0.15	1495.
50	10.45	32.75	50	25.15	283.7	1.58	0.40	1490.
75	8.03	32.90	75	25.64	236.9	2.22	0.80	1482.
100	7.22	32.95	99	25.80	222.0	2.79	1.31	1479.
125	6.93	33.52	124	26.28	176.4	3.31	1.90	1479.
150	6.84	33.81	149	26.53	153.5	3.71	2.47	1479.
175	6.72	33.90	174	26.61	146.2	4.09	3.09	1479.
200	6.50	33.92	199	26.66	141.5	4.44	3.78	1479.
225	6.18	33.93	223	26.71	137.2	4.79	4.53	1478.
250	5.92	33.94	248	26.74	134.1	5.13	5.35	1477.
300	5.31	33.94	298	26.82	126.7	5.79	7.18	1476.

DEEPEST MEASUREMENT:

306	5.26	33.94	304	26.83	126.0	5.86	7.42	1476.
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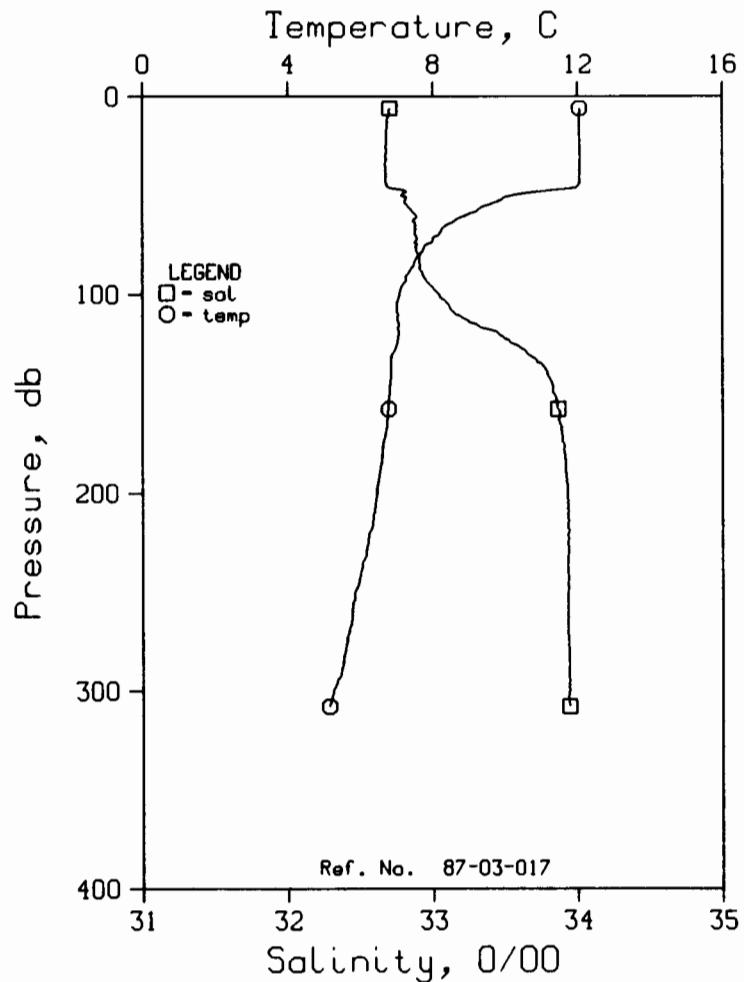


OCEAN PHYSICS DIVISION  
REFERENCE NO. 87-03-16 DATE 2/11/87  
POSITION 47-50.2N, 139- 4.9W GMT 10: 6 STATION ST16  
RESULTS OF STP CAST  
GUIDELINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. EN	SOUND
0	12.01	32.72	0	24.84	312.1	0.00	0.00	1495.
10	12.01	32.70	10	24.83	313.2	0.31	0.02	1495.
20	12.01	32.70	20	24.83	313.5	0.63	0.06	1495.
30	12.01	32.70	30	24.82	314.2	0.94	0.14	1495.
50	11.40	32.71	50	24.95	302.7	1.57	0.40	1493.
75	8.05	32.89	75	25.64	237.3	2.21	0.81	1482.
100	7.12	33.02	99	25.87	215.6	2.78	1.31	1479.
125	6.99	33.60	124	26.34	171.1	3.27	1.87	1479.
150	6.84	33.83	149	26.55	152.0	3.67	2.43	1479.
175	6.70	33.92	174	26.63	144.4	4.04	3.04	1479.
200	6.49	33.94	199	26.67	140.4	4.39	3.72	1479.
225	6.18	33.95	223	26.73	135.6	4.74	4.47	1478.
250	5.84	33.95	248	26.76	132.4	5.07	5.28	1477.
300	5.27	33.96	298	26.84	125.4	5.72	7.08	1476.

DEEPEST MEASUREMENT:

301	5.25	33.96	299	26.84	125.1	5.73	7.12	1476.
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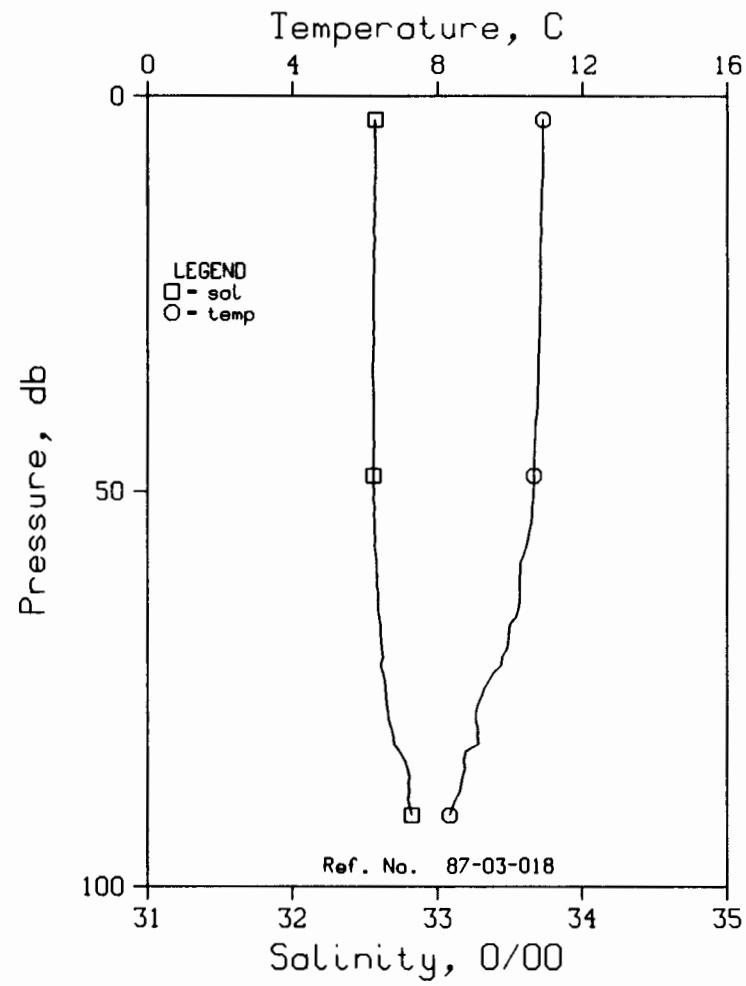


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03-17 DATE 2/11/87  
 POSITION 47-52.6N, 139- 5.3W GMT 12:17 STATION ST17  
 RESULTS OF STP CAST  
 GUILDLINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. EN	SOUND
0	12.06	32.71	0	24.82	313.7	0.00	0.00	1495.
10	12.06	32.69	10	24.81	314.8	0.31	0.02	1495.
20	12.06	32.68	20	24.80	315.9	0.63	0.06	1495.
30	12.06	32.67	30	24.79	317.0	0.95	0.14	1495.
50	10.18	32.78	50	25.21	277.2	1.57	0.40	1489.
75	7.81	32.89	75	25.67	233.8	2.19	0.79	1481.
100	7.08	33.04	99	25.89	213.2	2.76	1.30	1478.
125	7.01	33.56	124	26.30	174.5	3.25	1.86	1479.
150	6.82	33.83	149	26.54	152.1	3.65	2.41	1479.
175	6.64	33.90	174	26.63	144.7	4.02	3.03	1479.
200	6.46	33.93	199	26.67	140.6	4.37	3.71	1479.
225	6.22	33.93	223	26.71	137.5	4.72	4.46	1478.
250	5.86	33.93	248	26.75	133.5	5.06	5.28	1477.
300	5.26	33.94	298	26.83	126.3	5.71	7.11	1476.

DEEPEST MEASUREMENT:

308	5.14	33.94	306	26.84	124.8	5.81	7.42	1475.
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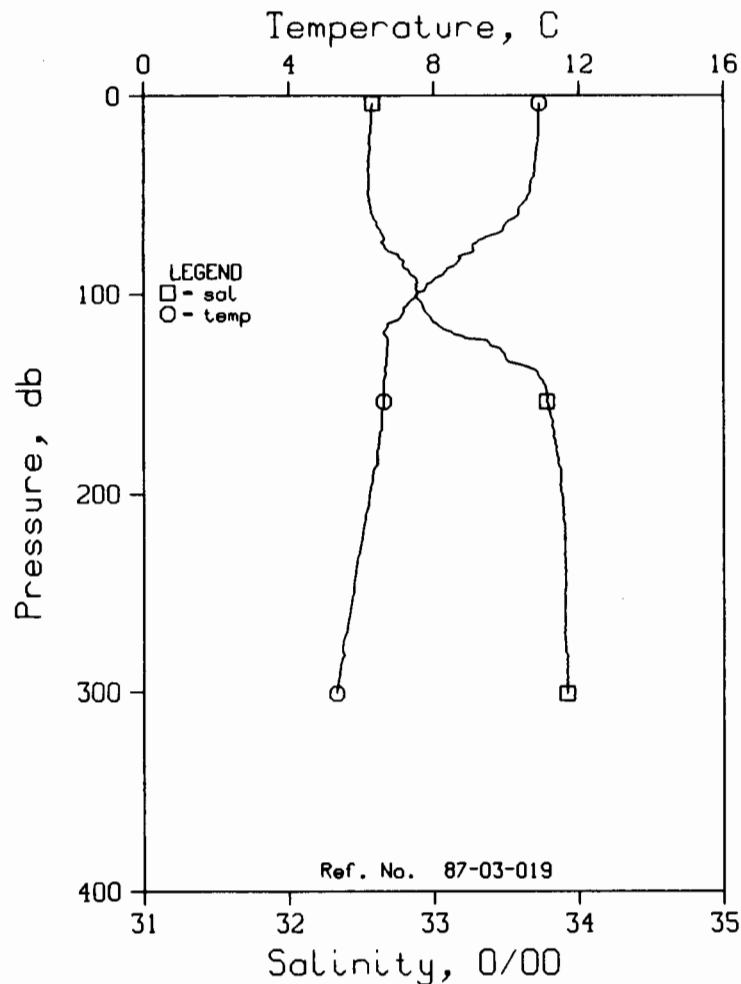


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03-18 DATE 2/11/87  
 POSITION 47-55.7N, 138-48.6W GMT 18:37 STATION ST18  
 RESULTS OF STP CAST  
 GUIDELINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. EN	SOUND
0	10.91	32.57	0	24.92	303.9	0.00	0.00	1491.
10	10.91	32.57	10	24.93	303.8	0.30	0.02	1491.
20	10.84	32.56	20	24.93	303.7	0.61	0.06	1491.
30	10.81	32.56	30	24.93	303.6	0.91	0.14	1491.
50	10.65	32.57	50	24.97	300.8	1.52	0.39	1490.
75	9.28	32.64	75	25.25	273.9	2.25	0.85	1486.

DEEPEST MEASUREMENT:

91	8.34	32.83	90	25.54	246.6	2.66	1.20	1483.
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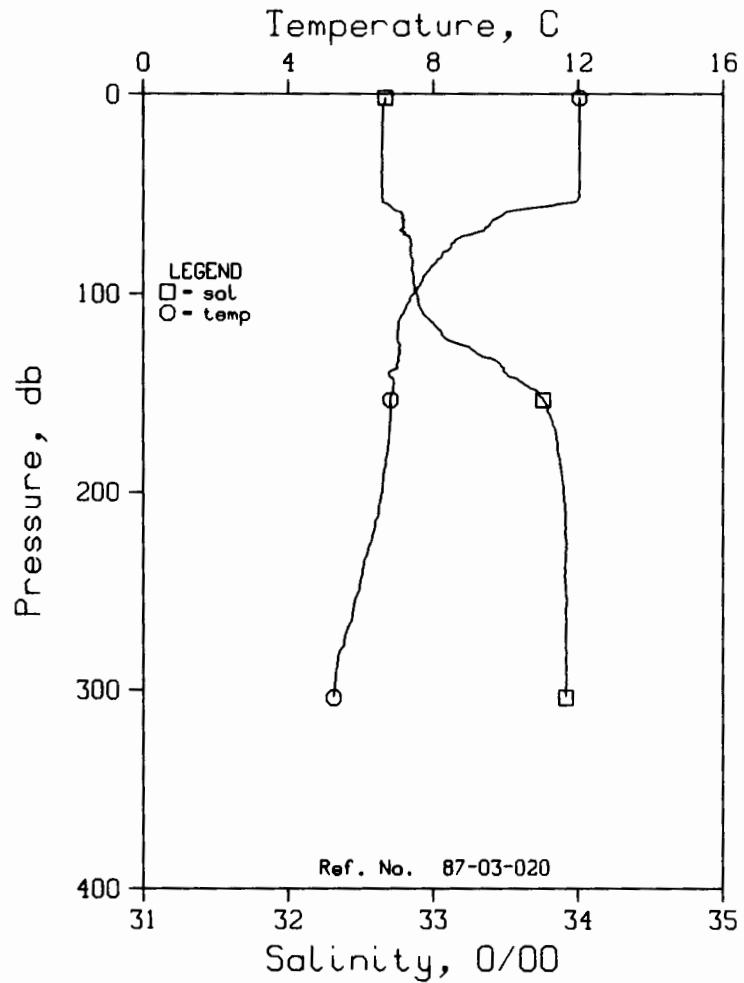


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03- 19 DATE 2/11/87  
 POSITION 47-55.7N, 138-48.6W GMT 18:46 STATION ST19  
 RESULTS OF STP CAST  
 GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>0</sub>	POT. EN	SOUND
0	10.90	32.58	0	24.93	303.2	0.00	0.00	1491.
10	10.89	32.57	10	24.93	303.9	0.30	0.02	1491.
20	10.89	32.56	20	24.92	304.7	0.61	0.06	1491.
30	10.81	32.55	30	24.93	304.3	0.91	0.14	1491.
50	10.61	32.55	50	24.96	301.7	1.52	0.39	1490.
75	9.07	32.66	75	25.30	269.7	2.24	0.85	1485.
100	7.55	32.88	99	25.70	231.7	2.86	1.40	1480.
125	6.72	33.39	124	26.21	183.5	3.40	2.01	1478.
150	6.63	33.78	149	26.53	153.7	3.81	2.58	1478.
175	6.49	33.84	174	26.59	147.6	4.18	3.21	1478.
200	6.23	33.88	199	26.66	141.2	4.55	3.90	1478.
225	6.00	33.90	223	26.71	137.1	4.89	4.65	1477.
250	5.79	33.90	248	26.74	134.8	5.23	5.47	1477.
300	5.33	33.92	298	26.80	128.7	5.89	7.31	1476.

DEEPEST MEASUREMENT:

301	5.32	33.92	299	26.80	128.7	5.90	7.35	1476.
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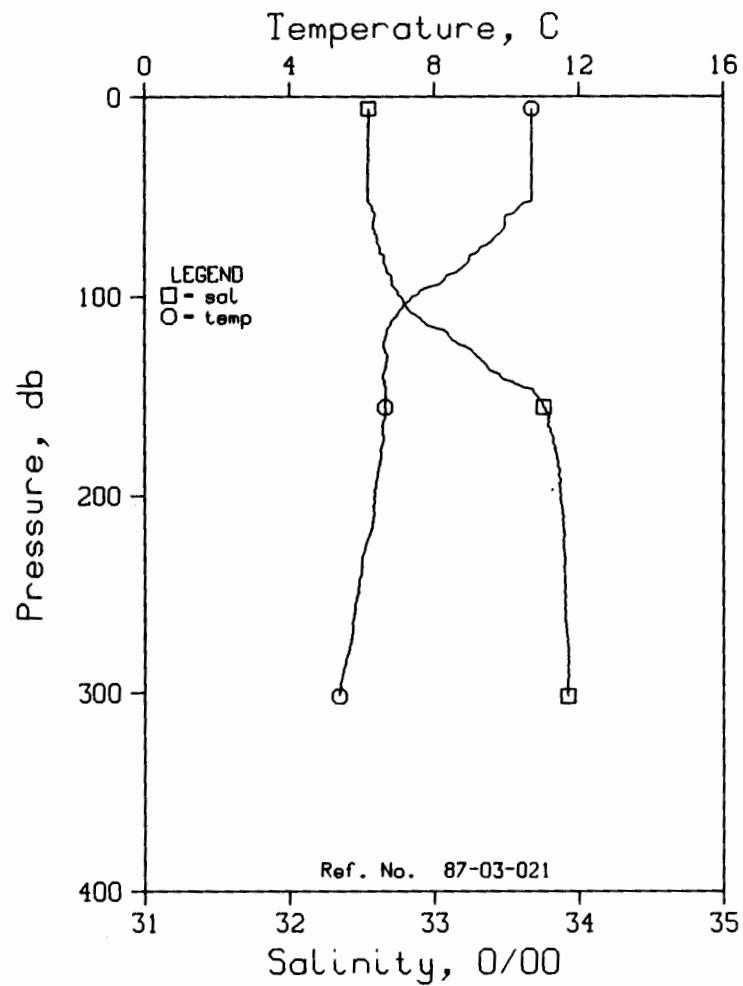


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03-20 DATE 3/11/87  
 POSITION 47-53.5N, 139- 1.5W GMT 4:10 STATION ST20  
 RESULTS OF STP CAST  
 GUIDELINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVR	DELTA <sub>D</sub>	POT.	SOUND
0	12.04	32.67	0	24.80	316.1	0.00	0.00	1495.
10	12.04	32.65	10	24.78	317.5	0.32	0.02	1495.
20	12.04	32.65	20	24.78	317.9	0.63	0.06	1495.
30	12.04	32.64	30	24.78	318.6	0.95	0.15	1495.
50	12.03	32.65	50	24.78	318.7	1.59	0.41	1495.
75	8.49	32.85	75	25.54	246.7	2.28	0.84	1483.
100	7.46	32.88	99	25.71	230.2	2.88	1.38	1480.
125	7.04	33.15	124	25.98	204.9	3.43	2.00	1479.
150	6.89	33.72	149	26.45	161.0	3.88	2.64	1479.
175	6.76	33.86	174	26.58	149.5	4.27	3.27	1479.
200	6.59	33.90	199	26.63	144.8	4.64	3.98	1479.
225	6.30	33.92	224	26.68	139.8	4.99	4.75	1478.
250	5.97	33.92	248	26.72	136.1	5.34	5.58	1478.
300	5.28	33.92	298	26.81	128.2	5.99	7.42	1476.

DEEPEST MEASUREMENT:

304	5.25	33.92	302	26.81	128.2	6.04	7.58	1476.
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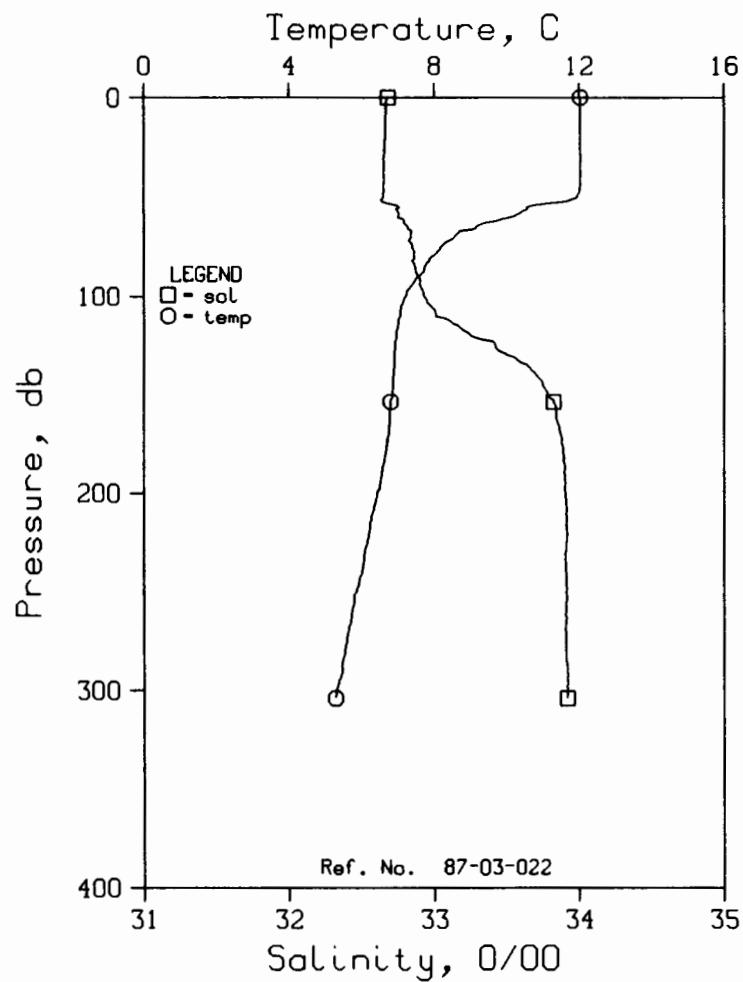


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03- 21 DATE 3/11/87  
 POSITION 47-54.9N, 139-43.1W GMT 6:14 STATION ST21  
 RESULTS OF STP CAST  
 GUIDELINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. EN	SOUND
0	10.69	32.55	0	24.95	301.9	0.00	0.00	1490.
10	10.69	32.55	10	24.94	302.1	0.30	0.02	1490.
20	10.69	32.54	20	24.94	302.5	0.60	0.06	1490.
30	10.69	32.54	30	24.94	302.8	0.91	0.14	1490.
50	10.70	32.54	50	24.94	303.1	1.51	0.39	1491.
75	9.28	32.62	75	25.24	275.5	2.24	0.85	1486.
100	7.39	32.77	99	25.64	237.6	2.89	1.42	1479.
125	6.60	33.21	124	26.09	195.1	3.43	2.05	1477.
150	6.66	33.70	149	26.47	159.5	3.88	2.67	1478.
175	6.56	33.83	174	26.58	148.9	4.26	3.30	1479.
200	6.36	33.88	199	26.65	142.9	4.63	4.00	1478.
225	6.11	33.89	224	26.69	139.2	4.98	4.77	1478.
250	5.90	33.90	248	26.72	136.3	5.32	5.60	1477.
300	5.40	33.92	298	26.80	129.3	5.99	7.45	1476.

DEEPEST MEASUREMENT:

302	5.38	33.92	300	26.80	128.9	6.01	7.53	1476.
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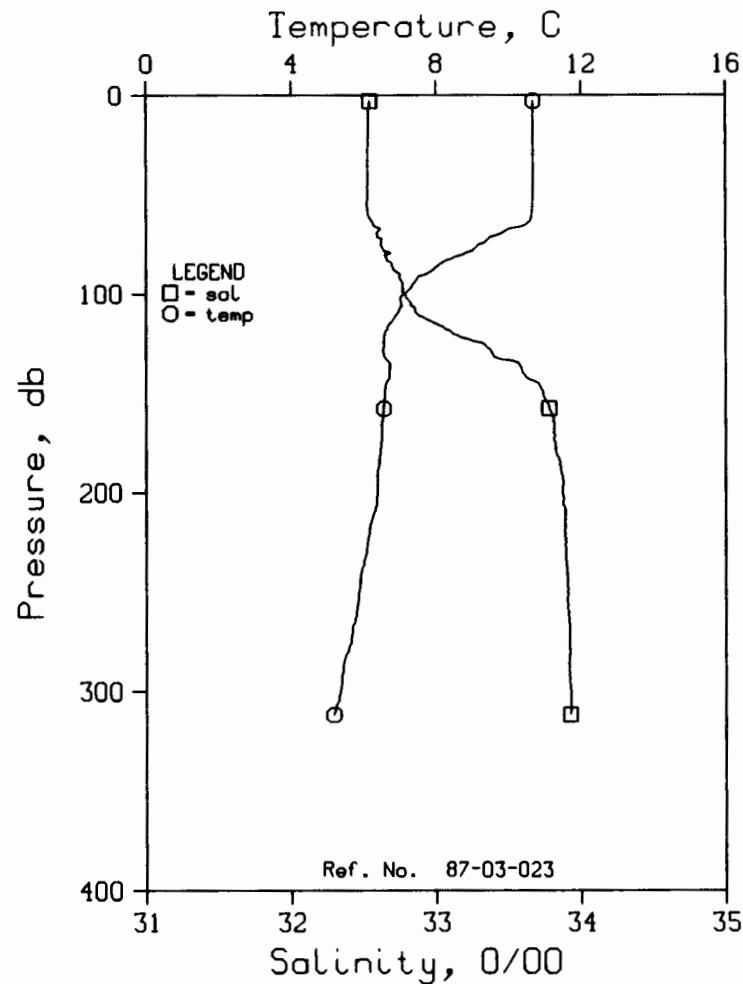


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03-22 DATE 3/11/87  
 POSITION 47-52.4N 138-52.7W GMT 12: 1 STATION ST22  
 RESULTS OF STP CAST  
 GUIDELINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. EN	SOUND
0	12.04	32.68	0	24.81	315.1	0.00	0.00	1495.
10	12.04	32.67	10	24.79	316.5	0.32	0.02	1495.
20	12.04	32.66	20	24.79	316.9	0.63	0.06	1495.
30	12.05	32.65	30	24.78	318.0	0.95	0.15	1495.
50	11.94	32.65	50	24.80	316.8	1.59	0.40	1495.
75	8.17	32.85	75	25.58	242.6	2.26	0.83	1482.
100	7.21	32.93	99	25.79	223.2	2.84	1.35	1479.
125	6.93	33.42	124	26.21	183.6	3.36	1.94	1479.
150	6.85	33.78	149	26.50	156.2	3.78	2.53	1479.
175	6.70	33.88	174	26.60	147.1	4.15	3.15	1479.
200	6.43	33.91	199	26.66	142.1	4.52	3.84	1479.
225	6.17	33.91	223	26.69	138.6	4.87	4.60	1478.
250	5.86	33.91	248	26.73	135.2	5.21	5.43	1477.
300	5.32	33.92	298	26.80	128.9	5.87	7.28	1476.

DEEPEST MEASUREMENT:

304	5.29	33.92	302	26.81	128.3	5.92	7.43	1476.
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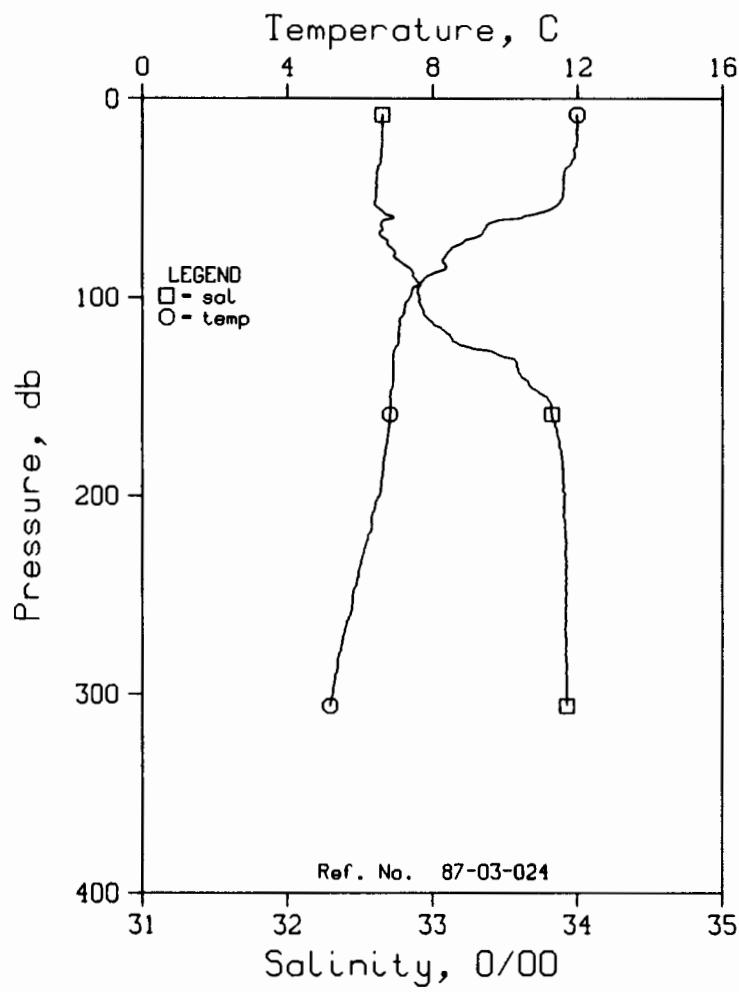


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03-23 DATE 3/11/87  
 POSITION 47-56.2N 138-38.2W GMT 13:43 STATION ST23  
 RESULTS OF STP CAST  
 GUILDLINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. EN	SOUND
0	10.68	32.54	0	24.94	302.1	0.00	0.00	1490.
10	10.68	32.53	10	24.94	303.0	0.30	0.02	1490.
20	10.68	32.53	20	24.93	303.3	0.61	0.06	1490.
30	10.68	32.53	30	24.93	303.5	0.91	0.14	1490.
50	10.67	32.53	50	24.93	304.0	1.52	0.39	1490.
75	9.18	32.62	75	25.25	274.3	2.25	0.86	1486.
100	7.12	32.78	99	25.68	233.4	2.88	1.41	1478.
125	6.56	33.32	124	26.18	186.4	3.42	2.03	1477.
150	6.59	33.74	149	26.50	155.7	3.85	2.62	1478.
175	6.49	33.82	174	26.58	148.6	4.22	3.25	1478.
200	6.37	33.87	199	26.64	144.0	4.59	3.95	1478.
225	6.10	33.89	224	26.69	139.2	4.94	4.71	1478.
250	5.87	33.90	248	26.73	135.8	5.29	5.54	1477.
300	5.35	33.93	298	26.81	128.2	5.95	7.39	1476.

DEEPEST MEASUREMENT:

312	5.17	33.92	310	26.83	126.6	6.10	7.87	1475.
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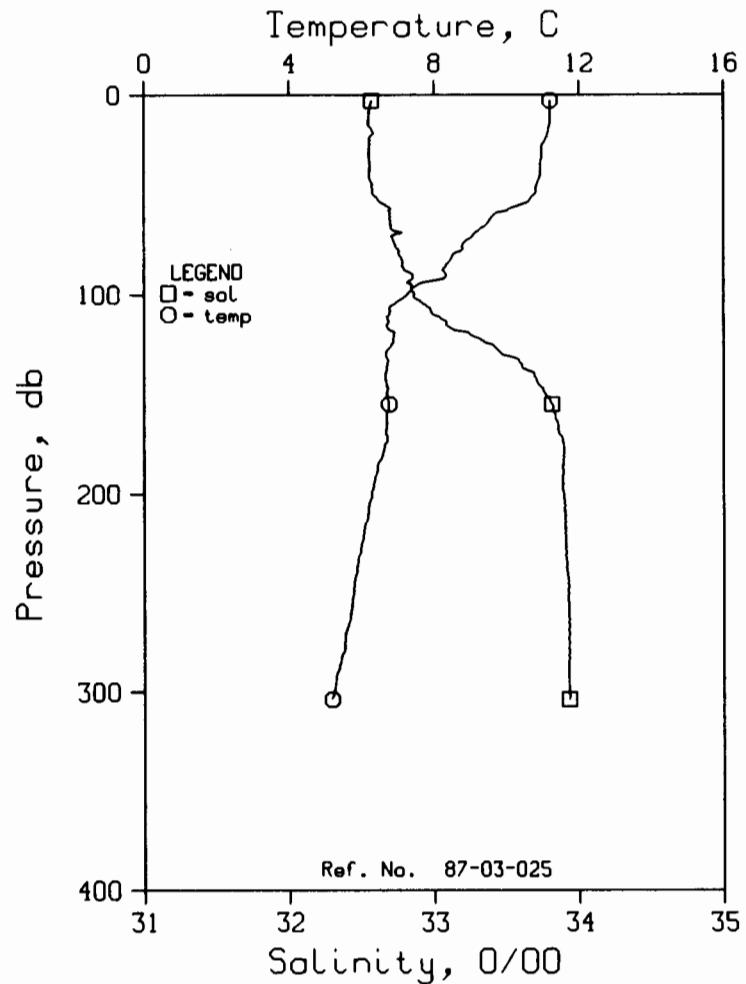
OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03-24 DATE 3/11/87  
 POSITION 47-53.8N, 138-49.0W GMT 19:22 STATION ST24  
 RESULTS OF STP CAST  
 GUIDELINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>0</sub>	POT. EN	SOUND
0	11.99	32.65	0	24.79	316.5	0.00	0.00	1494.
10	11.99	32.65	10	24.79	316.7	0.32	0.02	1495.
20	11.99	32.65	20	24.79	316.9	0.63	0.06	1495.
30	11.91	32.64	30	24.80	316.6	0.95	0.15	1495.
50	11.58	32.61	50	24.83	313.5	1.58	0.40	1494.
75	8.52	32.72	75	25.43	257.1	2.29	0.85	1483.
100	7.37	32.91	99	25.75	227.1	2.89	1.39	1479.
125	6.99	33.24	124	26.06	197.5	3.43	2.01	1479.
150	6.82	33.78	149	26.51	155.8	3.86	2.60	1479.
175	6.72	33.88	174	26.60	147.5	4.24	3.23	1479.
200	6.54	33.91	199	26.65	142.9	4.60	3.92	1479.
225	6.16	33.92	224	26.70	137.8	4.95	4.68	1478.
250	5.81	33.92	248	26.75	133.6	5.29	5.51	1477.
300	5.25	33.92	298	26.82	127.3	5.94	7.33	1475.

DEEPEST MEASUREMENT:

306	5.19	33.93	304	26.83	126.4	6.02	7.57	1475.
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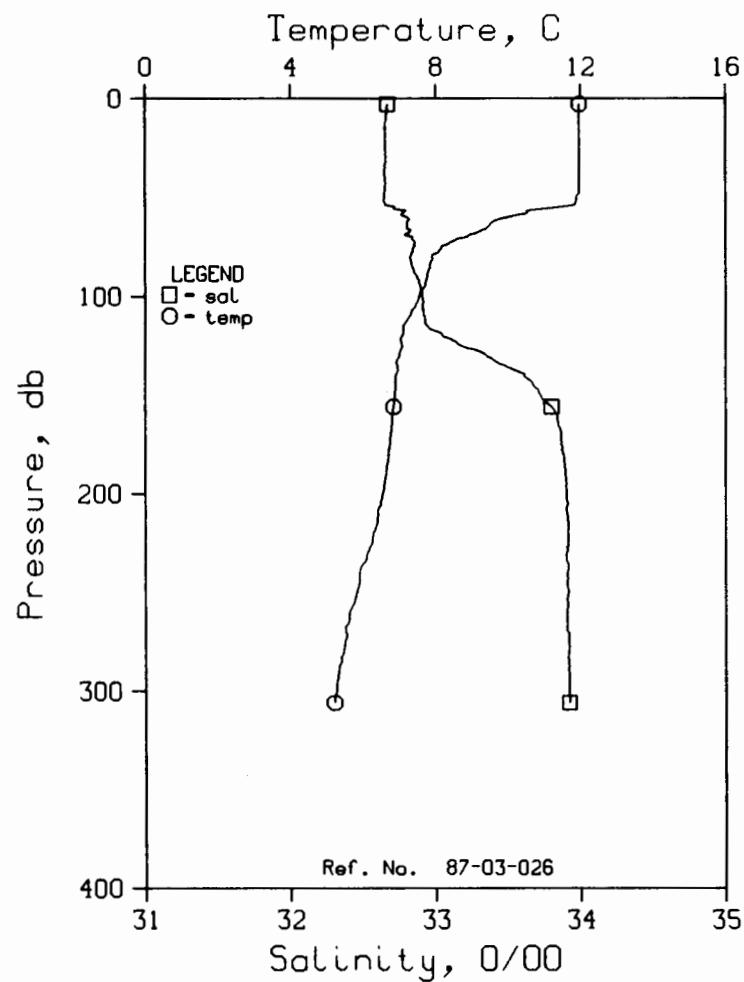


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03- 25      DATE 4/11/87  
 POSITION 47-57.3N, 138-33.3W    GMT 2: 2    STATION ST25  
 RESULTS OF STP CAST  
 GUIDELINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>0</sub>	POT. EN	SOUND
0	11.20	32.57	0	24.87	308.9	0.00	0.00	1492.
10	11.20	32.55	10	24.86	310.4	0.31	0.02	1492.
20	11.12	32.57	20	24.89	307.7	0.62	0.06	1492.
30	10.98	32.55	30	24.90	307.2	0.93	0.14	1491.
50	10.76	32.58	50	24.96	301.7	1.54	0.39	1491.
75	8.79	32.73	75	25.40	260.0	2.23	0.83	1484.
100	7.26	32.86	99	25.73	229.1	2.84	1.38	1479.
125	6.83	33.40	124	26.21	183.7	3.36	1.97	1478.
150	6.69	33.77	149	26.52	154.6	3.78	2.55	1479.
175	6.65	33.90	174	26.62	145.4	4.15	3.17	1479.
200	6.28	33.90	199	26.67	140.9	4.51	3.86	1478.
225	5.99	33.91	223	26.72	136.4	4.86	4.61	1477.
250	5.77	33.93	248	26.76	132.9	5.20	5.42	1477.
300	5.24	33.93	298	26.82	126.7	5.85	7.24	1475.

DEEPEST MEASUREMENT:

304	5.18	33.93	302	26.83	126.1	5.90	7.40	1475.
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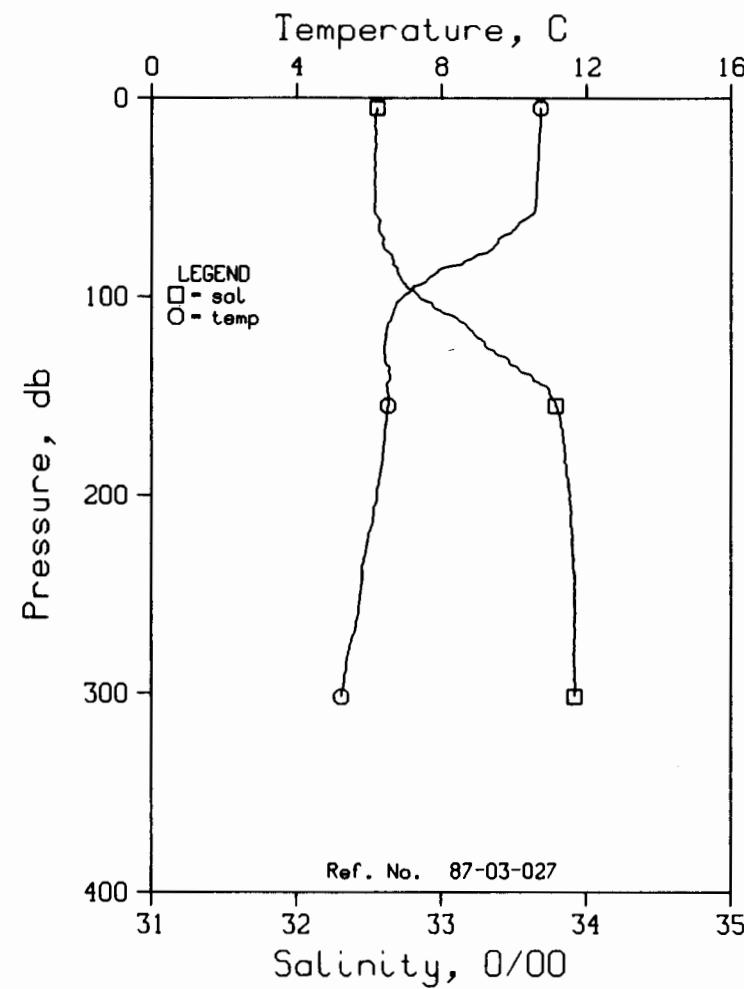


OCEAN PHYSICS DIVISION  
REFERENCE NO. 87-03- 26 DATE 4/11/87  
POSITION 47-56.6N, 138-49.3W GMT 7:22 STATION ST26  
RESULTS OF STP CAST  
GUIDELINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>0</sub>	POT. EN	SOUND
0	11.97	32.67	0	24.81	314.8	0.00	0.00	1494.
10	11.97	32.66	10	24.80	315.7	0.32	0.02	1495.
20	11.96	32.65	20	24.80	316.4	0.63	0.06	1495.
30	11.96	32.65	30	24.80	316.4	0.95	0.15	1495.
50	11.88	32.65	50	24.81	315.9	1.58	0.40	1495.
75	8.16	32.86	75	25.59	241.5	2.27	0.84	1482.
100	7.55	32.91	99	25.72	229.5	2.86	1.36	1480.
125	7.07	33.18	124	26.00	203.2	3.41	1.99	1479.
150	6.87	33.72	149	26.45	160.7	3.85	2.61	1479.
175	6.74	33.86	174	26.58	148.9	4.23	3.24	1479.
200	6.54	33.90	199	26.64	143.8	4.60	3.94	1479.
225	6.23	33.91	224	26.69	139.3	4.95	4.70	1478.
250	5.83	33.92	248	26.74	134.4	5.29	5.53	1477.
300	5.26	33.92	298	26.81	127.8	5.95	7.37	1476.

DEEPEST MEASUREMENT:

306	5.21	33.92	304	26.82	127.3	6.02	7.60	1475.
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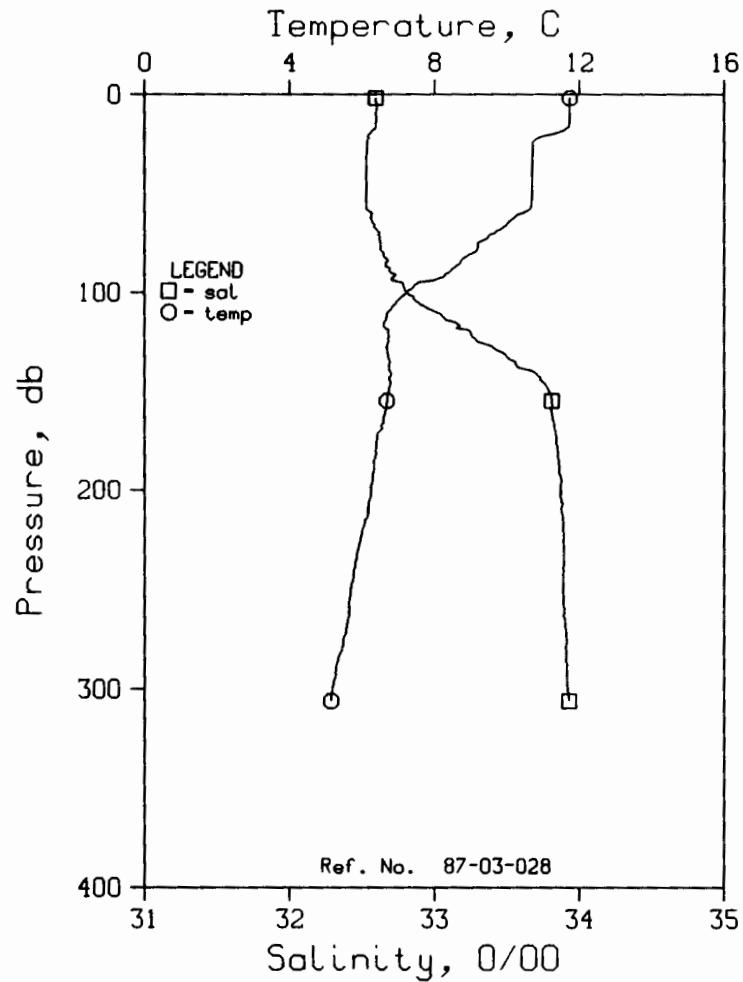


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03- 27 DATE 4/11/87  
 POSITION 47-57.2N, 138-37.4W GMT 12:30 STATION ST27  
 RESULTS OF STP CAST  
 GUILDLINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. EN	SOUND
0	10.73	32.56	0	24.94	302.0	0.00	0.00	1490.
10	10.74	32.54	10	24.93	303.2	0.30	0.02	1490.
20	10.69	32.54	20	24.94	302.8	0.61	0.06	1490.
30	10.68	32.54	30	24.94	303.1	0.91	0.14	1490.
50	10.62	32.54	50	24.95	302.3	1.51	0.39	1490.
75	9.45	32.60	75	25.19	279.7	2.25	0.85	1487.
100	6.93	32.85	99	25.76	225.9	2.88	1.41	1478.
125	6.42	33.30	124	26.18	185.9	3.38	1.99	1477.
150	6.53	33.75	149	26.52	154.1	3.80	2.58	1478.
175	6.41	33.85	174	26.61	145.6	4.17	3.19	1478.
200	6.22	33.89	199	26.67	140.6	4.53	3.88	1478.
225	5.95	33.90	223	26.71	136.6	4.88	4.63	1477.
250	5.77	33.91	248	26.75	133.8	5.22	5.44	1477.
300	5.26	33.92	298	26.81	128.1	5.87	7.27	1476.

DEEPEST MEASUREMENT:

302	5.24	33.92	300	26.82	127.6	5.90	7.35	1475.
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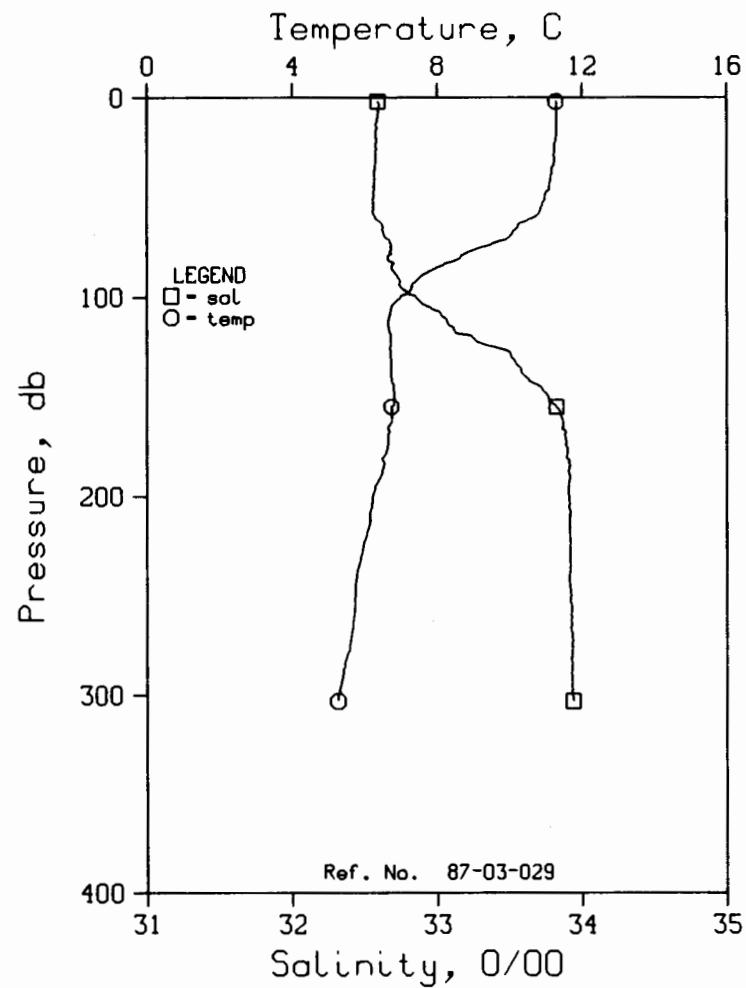


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03- 28 DATE 4/11/87  
 POSITION 47-55.5N, 138-39.6W GMT 22:33 STATION ST28  
 RESULTS OF STP CAST  
 GUIDELINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. EN	SOUND
0	11.74	32.60	0	24.79	316.2	0.00	0.00	1494.
10	11.73	32.59	10	24.79	316.6	0.32	0.02	1494.
20	11.30	32.55	20	24.84	312.2	0.63	0.06	1492.
30	10.70	32.53	30	24.93	303.7	0.94	0.14	1490.
50	10.69	32.53	50	24.93	304.3	1.55	0.39	1491.
75	9.20	32.63	75	25.25	273.9	2.28	0.86	1486.
100	7.23	32.81	99	25.68	233.0	2.92	1.43	1479.
125	6.72	33.31	124	26.15	189.0	3.44	2.02	1478.
150	6.74	33.79	149	26.52	154.2	3.86	2.61	1479.
175	6.40	33.84	174	26.61	146.1	4.24	3.23	1478.
200	6.24	33.87	199	26.65	142.3	4.60	3.92	1478.
225	5.95	33.89	224	26.71	137.4	4.95	4.68	1477.
250	5.69	33.89	248	26.74	134.5	5.29	5.50	1476.
300	5.18	33.92	298	26.82	126.8	5.94	7.34	1475.

DEEPEST MEASUREMENT:

306	5.14	33.93	304	26.83	125.9	6.02	7.57	1475.
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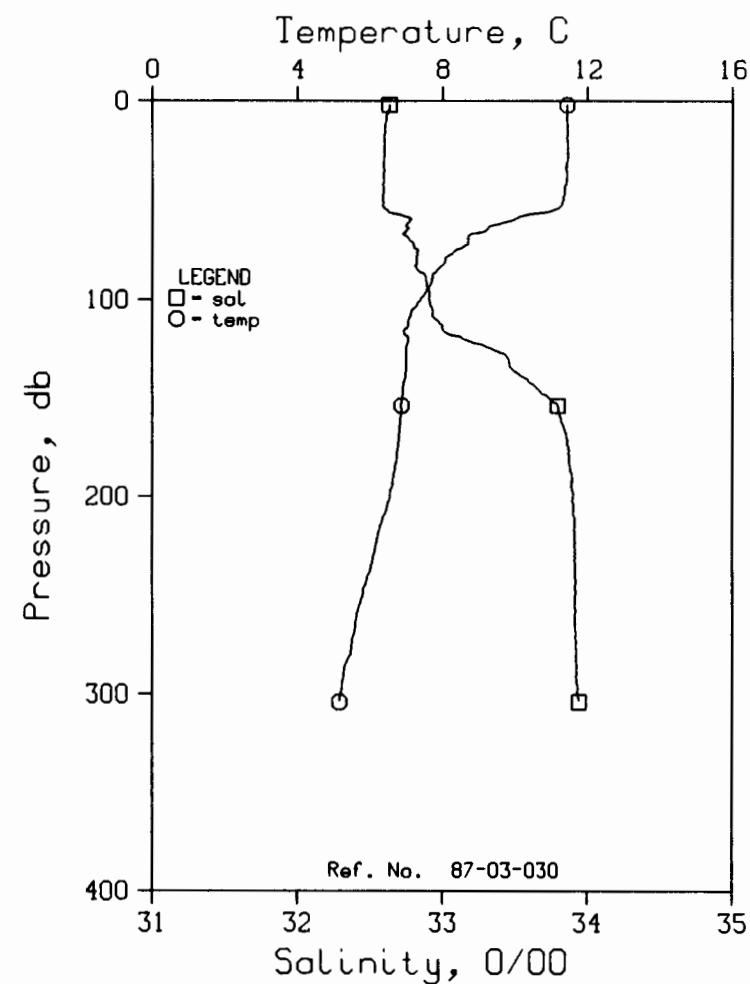


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03- 29      DATE 5/11/87  
 POSITION 47-54.6N, 138-35.1W    GMT 17:49    STATION ST29  
 RESULTS OF STP CAST  
 GUILDLINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>0</sub>	POT. EN	SOUND
0	11.28	32.59	0	24.87	308.7	0.00	0.00	1492.
10	11.29	32.59	10	24.87	308.9	0.31	0.02	1492.
20	11.28	32.58	20	24.86	310.0	0.62	0.06	1492.
30	11.23	32.57	30	24.87	309.7	0.93	0.14	1492.
50	10.98	32.56	50	24.91	306.7	1.54	0.39	1492.
75	9.22	32.68	75	25.29	270.4	2.28	0.86	1486.
100	6.99	32.85	99	25.76	226.1	2.90	1.41	1478.
125	6.70	33.40	124	26.23	181.7	3.41	2.00	1478.
150	6.82	33.77	149	26.50	156.5	3.83	2.59	1479.
175	6.63	33.90	174	26.62	145.1	4.21	3.20	1479.
200	6.23	33.91	199	26.69	139.0	4.56	3.88	1478.
225	5.96	33.92	223	26.73	135.6	4.91	4.63	1477.
250	5.74	33.92	248	26.76	132.7	5.24	5.44	1477.
300	5.28	33.93	298	26.82	127.2	5.89	7.27	1476.

DEEPEST MEASUREMENT:

303	5.26	33.94	301	26.83	126.4	5.93	7.38	1476.
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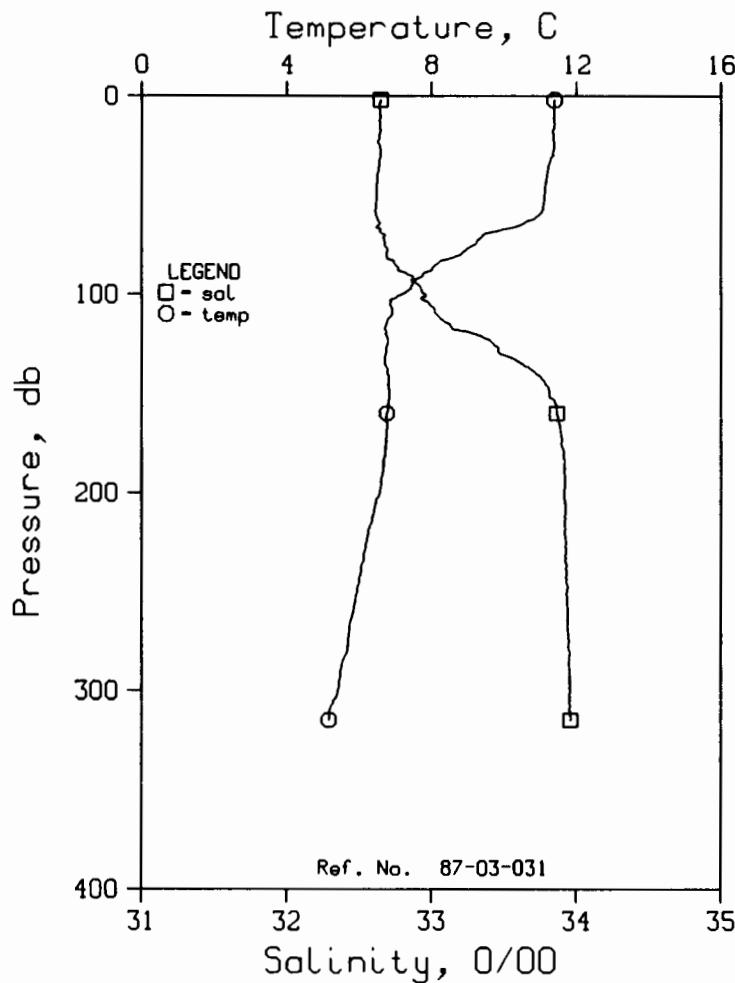


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03- 30 DATE 5/11/87  
 POSITION 47-52.4N, 138-43.6W GMT 21:32 STATION ST30  
 RESULTS OF STP CAST  
 GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>0</sub>	POT. EN	SOUND
0	11.44	32.63	0	24.88	308.2	0.00	0.00	1493.
10	11.44	32.61	10	24.86	310.4	0.31	0.02	1493.
20	11.44	32.60	20	24.85	311.1	0.62	0.06	1493.
30	11.45	32.60	30	24.85	311.7	0.93	0.14	1493.
50	11.33	32.59	50	24.86	310.7	1.55	0.40	1493.
75	8.35	32.83	75	25.54	246.2	2.24	0.83	1483.
100	7.38	32.91	99	25.74	227.4	2.83	1.36	1479.
125	6.99	33.33	124	26.13	190.8	3.37	1.97	1479.
150	6.89	33.73	149	26.46	160.4	3.81	2.59	1479.
175	6.76	33.87	174	26.58	148.7	4.19	3.22	1479.
200	6.55	33.90	199	26.64	144.0	4.56	3.92	1479.
225	6.15	33.91	223	26.70	138.5	4.91	4.68	1478.
250	5.80	33.92	248	26.74	134.0	5.25	5.51	1477.
300	5.20	33.93	298	26.83	126.3	5.90	7.33	1475.

DEEPEST MEASUREMENT:

304	5.16	33.94	302	26.84	125.1	5.95	7.48	1475.
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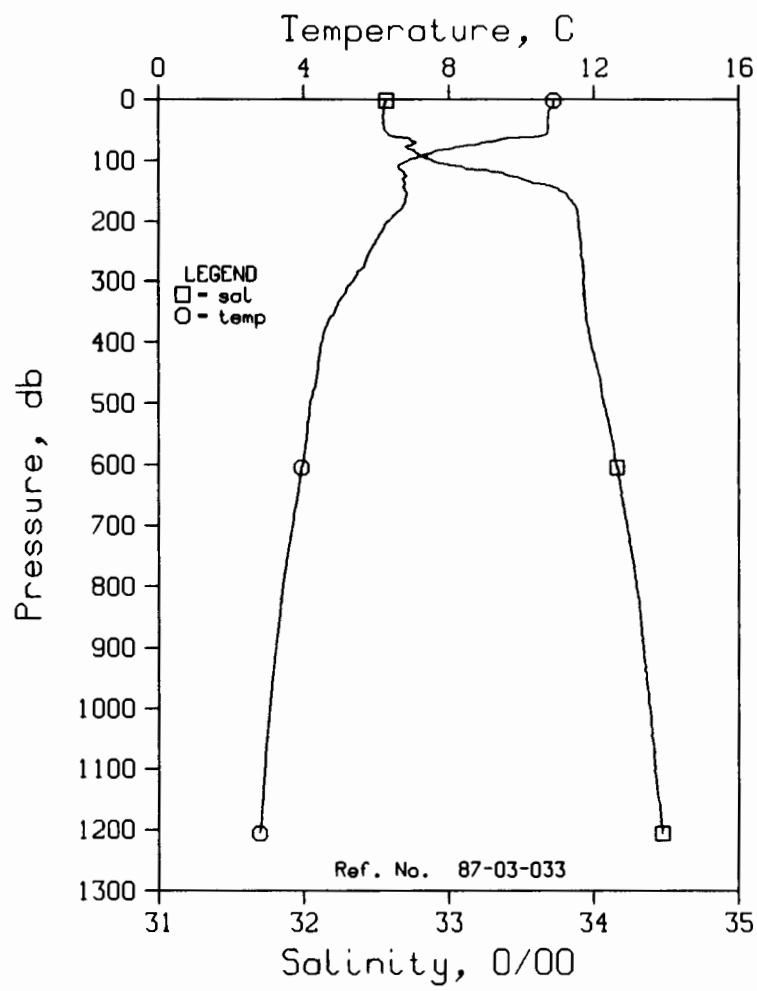


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03- 31 DATE 5/11/87  
 POSITION 47-52.9N, 138-33.7W GMT 23:39 STATION ST31  
 RESULTS OF STP CAST  
 GUILDLINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. EN	SOUND
0	11.39	32.65	0	24.90	306.3	0.00	0.00	1492.
10	11.37	32.65	10	24.90	306.3	0.31	0.02	1492.
20	11.37	32.64	20	24.90	307.0	0.61	0.06	1493.
30	11.37	32.65	30	24.91	306.1	0.92	0.14	1493.
50	11.13	32.62	50	24.93	304.8	1.53	0.39	1492.
75	9.18	32.68	75	25.30	269.5	2.26	0.85	1486.
100	7.19	32.95	99	25.80	221.6	2.87	1.40	1479.
125	6.79	33.42	124	26.23	181.6	3.39	1.98	1478.
150	6.84	33.81	149	26.53	153.4	3.80	2.56	1479.
175	6.74	33.90	174	26.61	146.5	4.17	3.17	1479.
200	6.57	33.92	199	26.65	143.0	4.53	3.86	1479.
225	6.20	33.93	223	26.70	137.7	4.88	4.62	1478.
250	5.95	33.94	248	26.74	134.3	5.22	5.45	1478.
300	5.42	33.96	298	26.82	127.1	5.87	7.27	1476.

DEEPEST MEASUREMENT:

315	5.17	33.96	313	26.85	123.9	6.06	7.86	1475.
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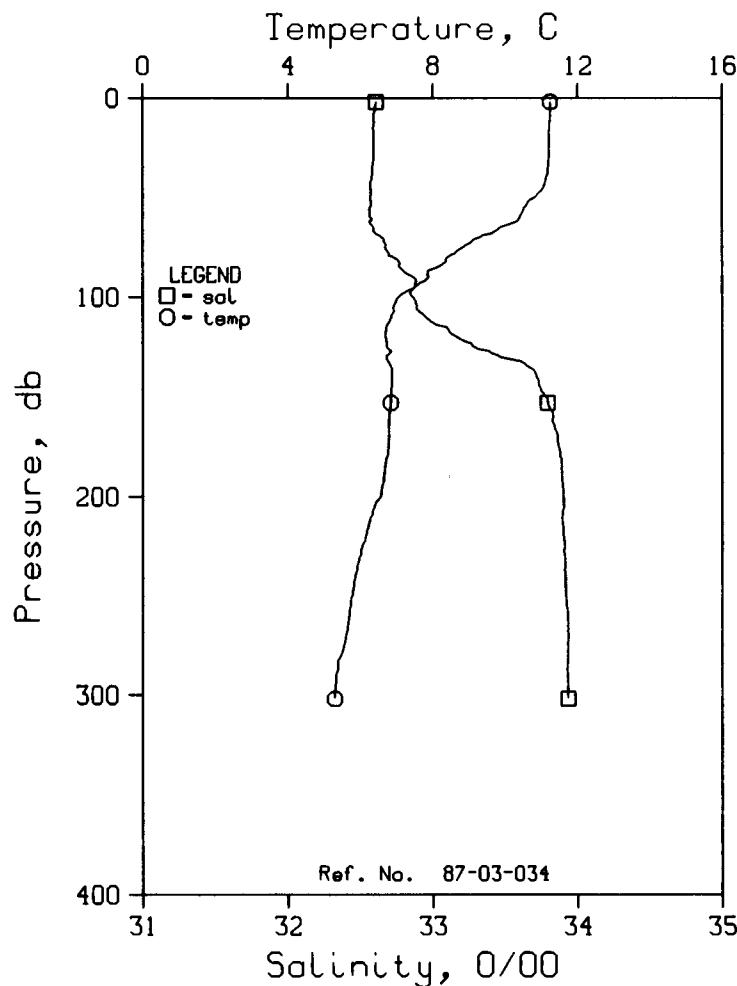


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03-33 DATE 6/11/87  
 POSITION 47-53.0N, 138-32.3W GMT 20:25 STATION ST33  
 RESULTS OF STP CAST  
 GUILOLINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA 0	POT. EN	SOUND
0	10.89	32.57	0	24.93	303.5	0.00	0.00	1490.
10	10.88	32.56	10	24.92	304.7	0.30	0.02	1491.
20	10.75	32.55	20	24.94	303.2	0.61	0.06	1490.
30	10.74	32.55	30	24.94	303.4	0.91	0.14	1490.
50	10.74	32.55	50	24.94	303.2	1.52	0.39	1491.
75	8.59	32.75	75	25.44	255.7	2.22	0.83	1483.
100	6.88	32.89	99	25.80	222.3	2.82	1.36	1477.
125	6.83	33.41	124	26.21	183.0	3.32	1.94	1478.
150	6.79	33.77	149	26.50	156.3	3.74	2.52	1479.
175	6.72	33.88	174	26.59	147.7	4.12	3.15	1479.
200	6.33	33.89	199	26.66	141.9	4.48	3.84	1478.
225	6.07	33.91	223	26.70	137.8	4.83	4.60	1478.
250	5.84	33.91	248	26.74	134.6	5.17	5.42	1477.
300	5.37	33.93	298	26.81	128.5	5.83	7.27	1476.
400	4.51	33.98	397	26.94	116.0	7.05	11.60	1474.
500	4.19	34.06	496	27.05	106.8	8.16	16.69	1475.
600	3.99	34.15	595	27.14	98.7	9.18	22.42	1475.
800	3.44	34.29	793	27.30	83.9	11.00	35.34	1477.
1000	3.07	34.39	991	27.41	74.4	12.58	49.80	1478.
1200	2.81	34.47	1188	27.51	66.2	13.99	65.60	1481.

DEEPEST MEASUREMENT:

1207	2.79	34.47	1195	27.51	66.0	14.04	66.16	1481.
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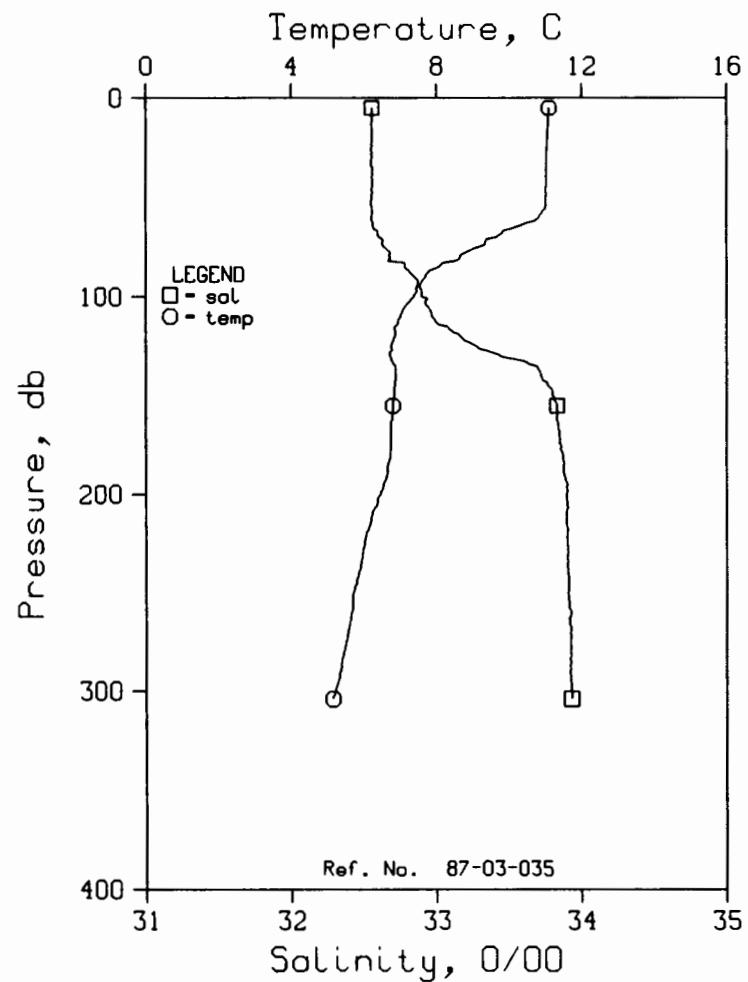


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03- 34      DATE 6/11/87  
 POSITION 47-53.0N, 138-33.5W    GMT 21:18    STATION ST34  
 RESULTS OF STP CAST  
 GUILDLINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. EN	SOUND
0	11.24	32.61	0	24.89	306.7	0.00	0.00	1492.
10	11.23	32.59	10	24.88	307.9	0.31	0.02	1492.
20	11.21	32.59	20	24.89	307.8	0.62	0.06	1492.
30	11.21	32.59	30	24.89	308.1	0.92	0.14	1492.
50	10.80	32.57	50	24.94	303.2	1.54	0.39	1491.
75	8.85	32.67	75	25.34	265.5	2.26	0.85	1484.
100	7.04	32.86	99	25.75	226.4	2.87	1.39	1478.
125	6.73	33.29	124	26.13	190.7	3.39	1.99	1478.
150	6.84	33.78	149	26.50	156.0	3.81	2.57	1479.
175	6.77	33.87	174	26.58	149.0	4.19	3.20	1479.
200	6.56	33.90	199	26.63	144.1	4.56	3.90	1479.
225	6.04	33.91	223	26.71	137.0	4.91	4.66	1477.
250	5.78	33.92	248	26.75	133.6	5.25	5.48	1477.
300	5.30	33.94	298	26.82	127.1	5.90	7.30	1476.

DEEPEST MEASUREMENT:

302	5.29	33.94	300	26.82	127.1	5.92	7.38	1476.
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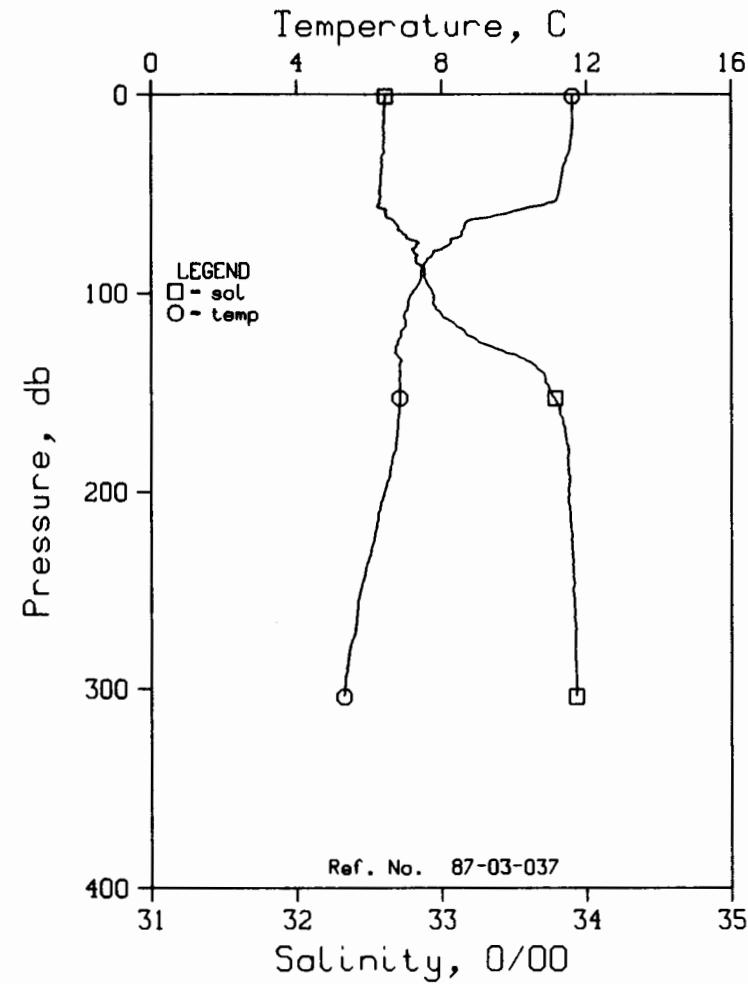


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03- 35 DATE 6/11/87  
 POSITION 47-53.1N, 138-34.9W GMT 21:46 STATION ST35  
 RESULTS OF STP CAST  
 GUIDELINE WAS USED,PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVR	DELTA <sub>0</sub>	POT. EN	SOUND
0	11.10	32.56	0	24.88	308.1	0.00	0.00	1491.
10	11.08	32.56	10	24.88	308.0	0.31	0.02	1491.
20	11.06	32.56	20	24.89	307.9	0.62	0.06	1491.
30	11.04	32.55	30	24.89	307.9	0.92	0.14	1491.
50	11.01	32.56	50	24.90	307.7	1.54	0.39	1492.
75	9.17	32.64	75	25.27	272.5	2.28	0.86	1485.
100	7.38	32.90	99	25.74	227.9	2.89	1.40	1479.
125	6.77	33.28	124	26.12	192.2	3.42	2.01	1478.
150	6.83	33.80	149	26.52	154.2	3.83	2.59	1479.
175	6.75	33.86	174	26.57	149.5	4.21	3.22	1479.
200	6.47	33.90	199	26.65	143.1	4.58	3.92	1479.
225	6.02	33.90	223	26.71	137.4	4.93	4.67	1477.
250	5.72	33.91	248	26.75	133.7	5.27	5.49	1477.
300	5.20	33.93	298	26.83	126.5	5.92	7.32	1475.

DEEPEST MEASUREMENT:

304	5.14	33.93	302	26.83	125.7	5.97	7.47	1475.
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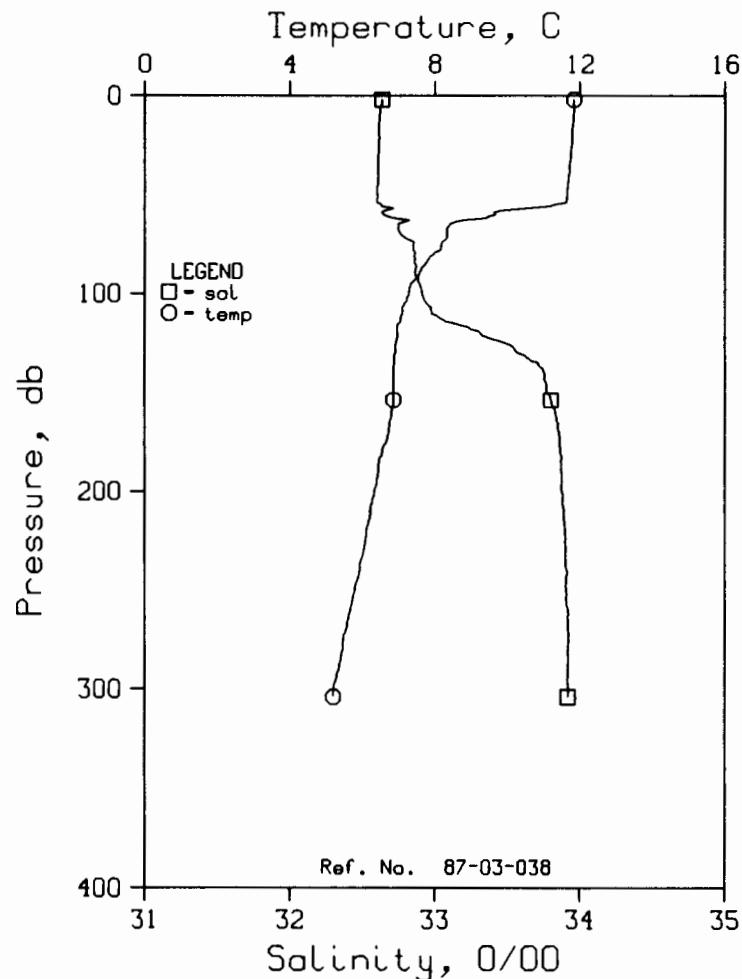


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03- 37 DATE 6/11/87  
 POSITION 47-52.1N, 138-35.0W GMT 22:19 STATION ST37  
 RESULTS OF STP CAST  
 GUIDELINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>0</sub>	POT. EN	SOUND
0	11.61	32.61	0	24.83	312.7	0.00	0.00	1493.
10	11.61	32.60	10	24.82	313.6	0.31	0.02	1493.
20	11.59	32.60	20	24.83	313.6	0.63	0.06	1493.
30	11.48	32.59	30	24.84	312.7	0.94	0.14	1493.
50	11.22	32.57	50	24.87	310.0	1.56	0.40	1493.
75	8.25	32.85	75	25.57	243.6	2.25	0.83	1482.
100	7.19	32.94	99	25.79	222.5	2.84	1.35	1479.
125	6.79	33.26	124	26.10	193.5	3.36	1.96	1478.
150	6.86	33.76	149	26.48	158.1	3.79	2.55	1479.
175	6.76	33.86	174	26.58	149.3	4.17	3.18	1479.
200	6.43	33.88	199	26.63	144.1	4.53	3.88	1479.
225	6.13	33.90	223	26.69	139.1	4.89	4.65	1478.
250	5.76	33.90	248	26.74	134.4	5.23	5.47	1477.
300	5.33	33.93	298	26.81	127.8	5.88	7.30	1476.

DEEPEST MEASUREMENT:

304	5.31	33.93	302	26.81	127.8	5.93	7.46	1476.
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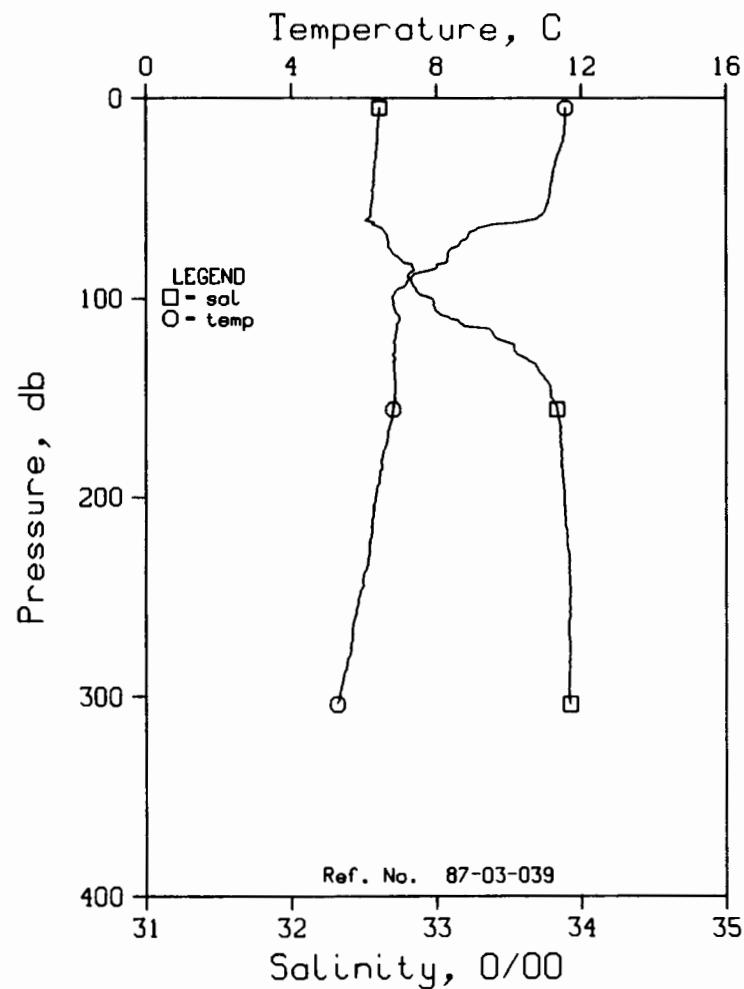


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03-38 DATE 6/11/87  
 POSITION 47-51.1N, 138-35.0W GMT 22:49 STATION ST38  
 RESULTS OF STP CAST  
 GUILDLINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. EN	SOUND
0	11.83	32.63	0	24.81	314.9	0.00	0.00	1494.
10	11.83	32.62	10	24.80	316.4	0.32	0.02	1494.
20	11.79	32.61	20	24.80	316.3	0.63	0.06	1494.
30	11.75	32.61	30	24.80	316.0	0.95	0.15	1494.
50	11.64	32.60	50	24.82	315.1	1.58	0.40	1494.
75	8.19	32.85	75	25.58	242.2	2.26	0.83	1482.
100	7.28	32.91	99	25.76	225.7	2.85	1.35	1479.
125	6.92	33.49	124	26.26	178.6	3.37	1.95	1479.
150	6.86	33.77	149	26.49	157.0	3.77	2.52	1479.
175	6.66	33.86	174	26.59	147.7	4.15	3.15	1479.
200	6.33	33.88	199	26.65	142.9	4.52	3.84	1478.
225	6.08	33.90	223	26.69	138.6	4.87	4.60	1478.
250	5.79	33.91	248	26.74	134.5	5.21	5.42	1477.
300	5.20	33.92	298	26.82	127.1	5.86	7.25	1475.

DEEPEST MEASUREMENT:

304	5.20	33.92	302	26.82	127.3	5.91	7.41	1475.
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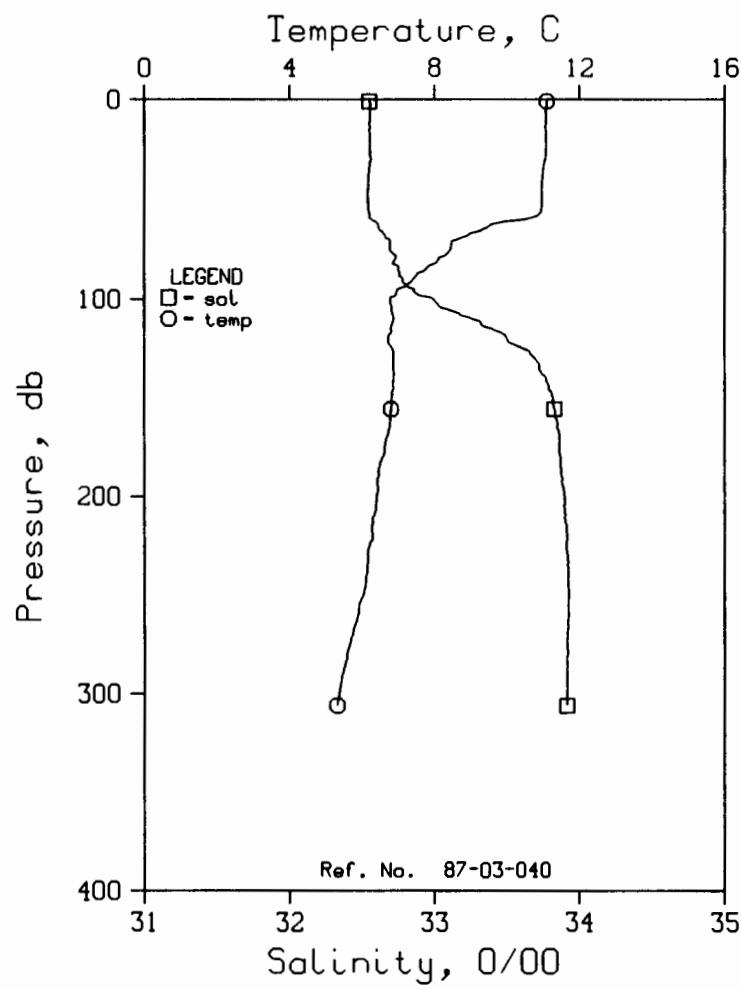


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03- 39 DATE 6/11/87  
 POSITION 47-51.1N 138-33.5W GMT 23:12 STATION ST39  
 RESULTS OF STP CAST  
 GUILDLINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>0</sub>	POT. EN	SOUND
0	11.56	32.61	0	24.84	312.1	0.00	0.00	1493.
10	11.56	32.60	10	24.83	312.7	0.31	0.02	1493.
20	11.51	32.59	20	24.84	312.7	0.63	0.06	1493.
30	11.32	32.58	30	24.86	310.8	0.94	0.14	1493.
50	11.11	32.56	50	24.88	308.9	1.56	0.40	1492.
75	8.43	32.68	75	25.41	258.7	2.27	0.85	1483.
100	6.79	32.97	99	25.88	214.8	2.87	1.38	1477.
125	6.86	33.54	124	26.31	174.1	3.36	1.94	1479.
150	6.86	33.79	149	26.51	155.3	3.77	2.51	1479.
175	6.59	33.85	174	26.59	147.6	4.14	3.13	1479.
200	6.33	33.88	199	26.65	142.4	4.51	3.82	1478.
225	6.16	33.91	223	26.69	138.8	4.86	4.58	1478.
250	5.87	33.92	248	26.74	134.3	5.20	5.41	1477.
300	5.33	33.92	298	26.80	128.8	5.86	7.26	1476.

DEEPEST MEASUREMENT:

304	5.27	33.92	302	26.81	127.7	5.91	7.42	1476.
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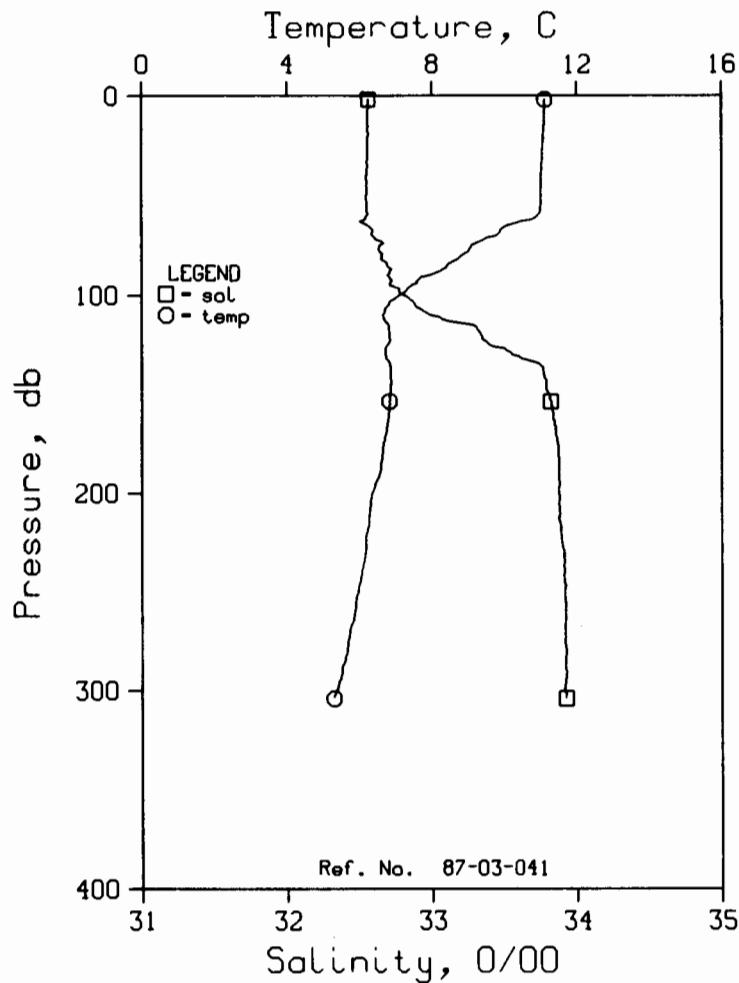


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03-40 DATE 6/11/87  
 POSITION 47-51.1N 138-32.0W GMT 23:32 STATION ST40  
 RESULTS OF STP CAST  
 GUIDELINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. EN	SOUND
0	11.10	32.55	0	24.88	308.3	0.00	0.00	1491.
10	11.07	32.55	10	24.88	308.1	0.31	0.02	1491.
20	11.07	32.56	20	24.89	308.0	0.62	0.06	1491.
30	11.06	32.56	30	24.89	307.6	0.92	0.14	1492.
50	10.96	32.54	50	24.89	307.8	1.54	0.39	1492.
75	8.43	32.69	75	25.42	257.6	2.25	0.84	1483.
100	6.78	32.99	99	25.89	213.0	2.85	1.37	1477.
125	6.84	33.61	124	26.37	168.5	3.33	1.92	1479.
150	6.83	33.82	149	26.53	153.0	3.72	2.47	1479.
175	6.62	33.86	174	26.60	147.3	4.10	3.10	1479.
200	6.40	33.90	199	26.65	142.3	4.46	3.79	1478.
225	6.21	33.91	223	26.69	139.1	4.81	4.55	1478.
250	6.03	33.93	248	26.72	136.0	5.16	5.38	1478.
300	5.37	33.92	298	26.80	129.4	5.82	7.24	1476.

DEEPEST MEASUREMENT:

306	5.32	33.92	304	26.80	128.9	5.90	7.48	1476.
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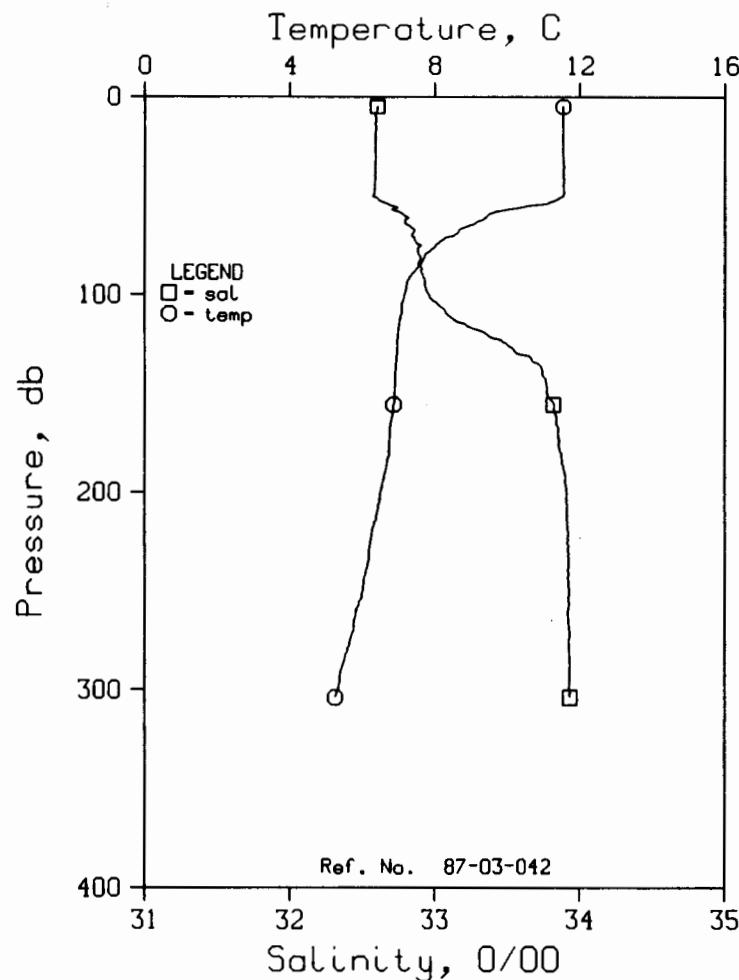


OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03- 41 DATE 6/11/87  
 POSITION 47-52.1N, 138-32.0W GMT 23:55 STATION ST41  
 RESULTS OF STP CAST  
 GUIDELINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA <sub>T</sub>	SVA	DELTA <sub>D</sub>	POT. EN	SOUND
0	11.12	32.56	0	24.88	308.0	0.00	0.00	1491.
10	11.10	32.55	10	24.88	308.5	0.31	0.02	1491.
20	11.07	32.56	20	24.89	307.7	0.62	0.06	1491.
30	11.05	32.55	30	24.89	308.0	0.92	0.14	1492.
50	11.00	32.55	50	24.89	308.1	1.54	0.39	1492.
75	9.09	32.64	75	25.28	271.2	2.28	0.86	1485.
100	7.10	32.81	99	25.71	230.8	2.92	1.43	1478.
125	6.79	33.39	124	26.21	183.7	3.43	2.01	1478.
150	6.85	33.81	149	26.52	154.3	3.83	2.58	1479.
175	6.67	33.87	174	26.59	147.6	4.21	3.20	1479.
200	6.34	33.88	199	26.64	143.1	4.57	3.90	1478.
225	6.16	33.89	224	26.68	139.9	4.93	4.66	1478.
250	5.96	33.91	248	26.72	136.2	5.27	5.50	1478.
300	5.36	33.92	298	26.80	129.2	5.94	7.36	1476.

DEEPEST MEASUREMENT:

304	5.29	33.92	302	26.81	128.0	5.99	7.52	1476.
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OCEAN PHYSICS DIVISION  
 REFERENCE NO. 87-03-42 DATE 7/11/87  
 POSITION 47-50.8N, 138-48.8W GMT 8:14 STATION ST42  
 RESULTS OF STP CAST  
 GUILDLINE WAS USED, PRESSURES ARE INPUT

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	11.54	32.60	0	24.84	312.1	0.00	0.00	1493.
10	11.54	32.59	10	24.83	313.4	0.31	0.02	1493.
20	11.54	32.59	20	24.83	313.5	0.63	0.06	1493.
30	11.55	32.59	30	24.83	313.9	0.94	0.14	1493.
50	11.54	32.57	50	24.81	315.7	1.57	0.40	1494.
75	8.02	32.91	75	25.65	235.7	2.24	0.82	1481.
100	7.16	32.96	99	25.81	220.6	2.81	1.33	1479.
125	6.97	33.50	124	26.26	178.4	3.31	1.91	1479.
150	6.90	33.78	149	26.49	157.2	3.72	2.48	1479.
175	6.75	33.86	174	26.57	149.5	4.10	3.11	1479.
200	6.51	33.91	199	26.65	142.7	4.47	3.81	1479.
225	6.22	33.92	223	26.69	138.9	4.82	4.57	1478.
250	6.02	33.93	248	26.73	135.7	5.17	5.41	1478.
300	5.33	33.93	298	26.81	127.7	5.82	7.25	1476.

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DEEPEST MEASUREMENT:

304	5.25	33.93	302	26.82	126.7	5.87	7.41	1476.
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