

**CSIRO**  
**Marine Laboratories**

**REPORT 188**

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from the Australian Coastal Experiment**

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1987

**National Library of Australia Cataloguing-in-Publication Entry**

White, N. (Neil).

Salinity, temperature and pressure data from  
the Australian coastal experiment.

ISBN 0 643 04292 X.

1. Salinity - Tasman Sea - Measurement. 2.  
Ocean temperature - Tasman Sea - measurement.
3. Sea-water - Density. I. Church, J.A.,  
1951- . II. Commonwealth Scientific and  
Industrial Research Organisation (Australia).  
Marine Laboratories. III. Title. (Series:  
Report (Commonwealth Scientific and Industrial  
Research Organisation (Australia). Marine laboratories; no. 188).

551.46'578

# **SALINITY, TEMPERATURE AND PRESSURE DATA FROM THE AUSTRALIAN COASTAL EXPERIMENT**

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**CSIRO Marine Laboratories Report No. 188**

## **Abstract**

This report presents salinity, temperature and pressure data collected during the Australian Coastal Experiment, which was conducted off the coast of New South Wales in the western Tasman Sea from September 1983 to March 1984. The data were collected with a Neil Brown Mark III-B conductivity-temperature-depth profiler. Contoured sections of potential temperature, salinity and sigma-theta are presented and the methods used in processing the data are described. In all, data for 602 stations off the coast of New South Wales in the western Tasman Sea are available from the CSIRO Division of Oceanography.

## INTRODUCTION

The Australian Coastal Experiment (ACE) was conducted off the coasts of New South Wales and Tasmania from September 1983 to March 1984. The purpose of this experiment was to test the dynamics of coastal-trapped waves (Clarke and Thompson, 1984). Data gathered during ACE include salinity, temperature, pressure profiles (this report), current meter data (Freeland *et al.*, 1985), meteorological data (Forbes, 1985a), sea-level data (Forbes, 1985b), satellite-tracked buoy data (Metso *et al.*, 1986), infrared satellite photographs and expendable bathythermograph (from ship and airplane) data.

RV *Sprightly* made seven cruises during ACE; the first was primarily to deploy instruments, and the last was solely to recover the instruments deployed on the first cruise. Salinity, temperature and pressure data were collected with a Neil Brown Mark III-B conductivity-temperature-depth (CTD) profiler. A 12-bottle rosette was fitted about one metre above the sensor head of the CTD. Reversing thermometers were fitted to some of the Niskin bottles (1.8 l capacity).

CTD sections were completed at the locations of the moored current-meters (offshore from Newcastle, Stanwell Park and Cape Howe) as well as offshore from Cronulla and Jervis Bay (Beecroft Head). The location of the main sections are shown in Fig. 1. A section at Brush Island near Jervis Bay was also completed once. In addition, sections were made through offshore eddies.

The Stanwell Park section was occupied most often: 14 times. The station depths, the depths at which water samples were taken and the quantities for which they were analysed (salinity, dissolved oxygen and nutrients [nitrate plus nitrite, silicate and phosphate]) are indicated in Table 1. The Stanwell Park section differed from the other cross-shelf sections in that the Cronulla section only went to the second 1500 m station, the Cape Howe section did not have a 30 m or an 800 m station, and the Jervis Bay (Beecroft Head) section did not have a 20 m station.

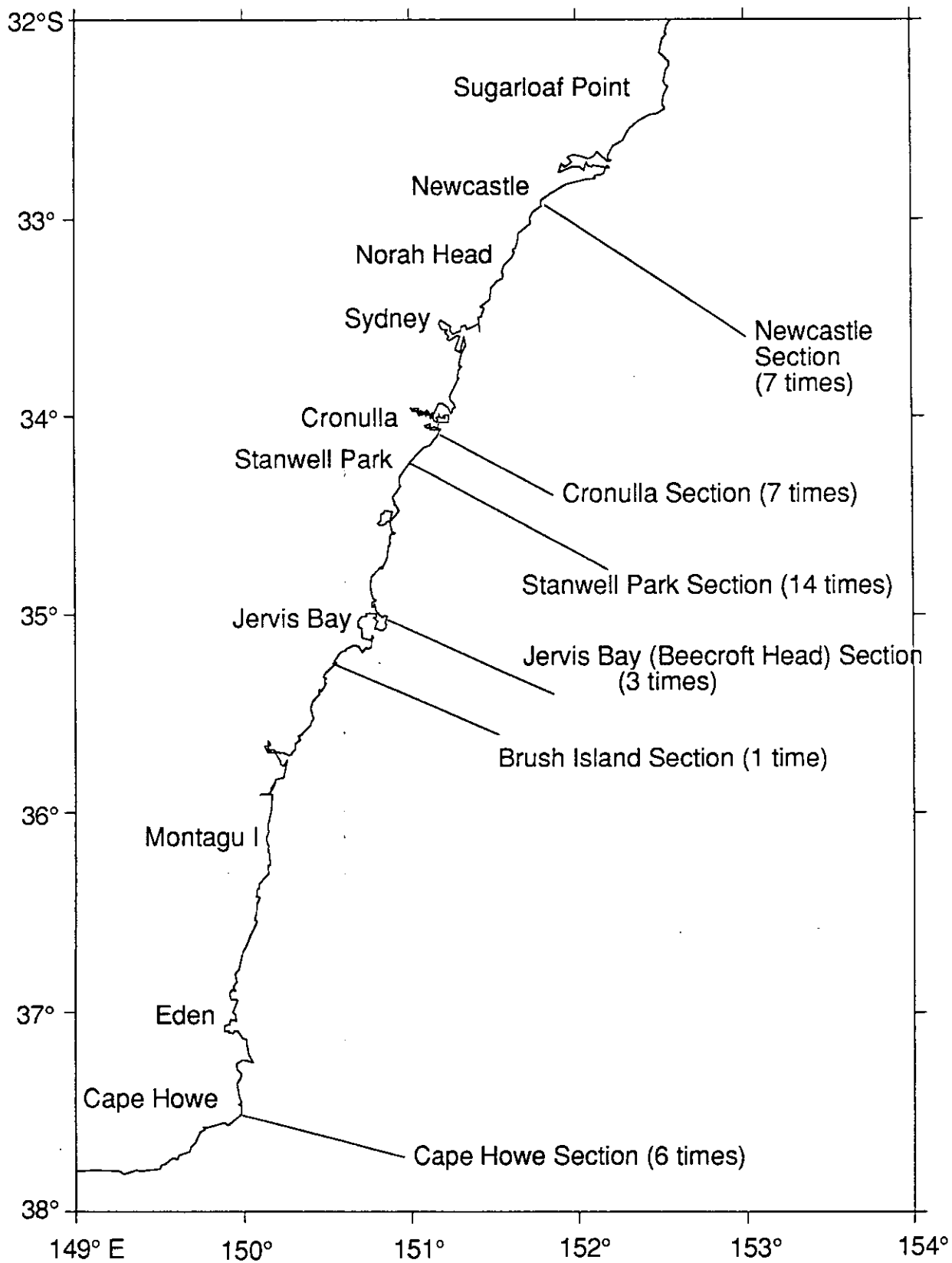


Fig. 1 Locations of the ACE CTD sections

Table 1 The water depths and sample depths for the Stanwell Park CTD section. S denotes salinity, T temperature (deep sea reversing thermometers) O<sub>2</sub> dissolved oxygen, and N nutrients

Water Depth	STANWELL PARK SECTION		Bottle Spacing								Depth (m) properties	
	1	2	3	4	5	6	7	8	9	10	11	
20	Surface S,T,O <sub>2</sub> ,N	15 S,O <sub>2</sub> ,N										
30	"	30 S,O <sub>2</sub> ,N										
50	"	10 S,O <sub>2</sub> ,N	20 S,O <sub>2</sub> ,N	30 S,O <sub>2</sub> ,N	40 S,O <sub>2</sub> ,N	50 S,O <sub>2</sub> ,N						
70	"	30 S,O <sub>2</sub> ,N	50 S,T,O <sub>2</sub> ,N	70 S,O <sub>2</sub> ,N								
100	"	10 S,O <sub>2</sub> ,N	20 S,O <sub>2</sub> ,N	30 S,O <sub>2</sub> ,N	40 S,O <sub>2</sub> ,N	50 S,O <sub>2</sub> ,N	60 S,O <sub>2</sub> ,N	70 S,O <sub>2</sub> ,N	80 S,O <sub>2</sub> ,N	90 T,S,O <sub>2</sub> ,N	100 S,O <sub>2</sub> ,N	
125	"	50 S,O <sub>2</sub> ,N	80 S,O <sub>2</sub> ,N	100 T,S,O <sub>2</sub> ,N	125 S,O <sub>2</sub> ,N							
150	"	50 S,O <sub>2</sub> ,N	80 S,O <sub>2</sub> ,N	100 T,S,O <sub>2</sub> ,N	140 S,O <sub>2</sub> ,N							
200	"	50 S,O <sub>2</sub> ,N	80 S,O <sub>2</sub> ,N	100 S,O <sub>2</sub> ,N	125 S,O <sub>2</sub> ,N	150 T,S,O <sub>2</sub> ,N	190 S,O <sub>2</sub> ,N					
300	"	"	"	"	150 S,O <sub>2</sub> ,N	200 S,O <sub>2</sub> ,N	250 T,S,O <sub>2</sub> ,N	300 S,O <sub>2</sub> ,N				
500	"	"	"	"	"	"	350 S,O <sub>2</sub> ,N	400 T,S,O <sub>2</sub> ,N	450 S,O <sub>2</sub> ,N			
800	"	"	"	"	200 S,O <sub>2</sub> ,N	350 S,O <sub>2</sub> ,N	400 S,O <sub>2</sub> ,N	450 S,O <sub>2</sub> ,N	sal. mln. T,S,O <sub>2</sub> ,N			
1200	"	"	"	"	"	"	"	"	"	1150 S,O <sub>2</sub> ,N		
2000	"	"	"	"	"	"	"	"	"	1500 S,O <sub>2</sub> ,N		
>2000	"	"	"	"	"	"	"	"	"	"		
>2000	"	"	"	"	"	"	"	"	"	"		
>2000	"	"	"	"	"	"	"	"	"	"		

As the Cronulla section included the Port Hacking 50 m station (occupied about once a week since 1945), the Port Hacking 100 m station (occupied about once a week since 1954) and the Port Hacking 300 m station (occupied intermittently from 1976 to 1979), the ACE study can be related to a large body of historical data (Hahn *et al.*, 1977).

## **METHODS**

### **Data collection**

The Neil Brown Mark III-B conductivity-temperature-depth profiler (CTD) was fitted with the standard sensors. Both the platinum resistance thermometer and the thermistor were connected in the standard Neil Brown manner. The 3 cm conductivity cell was used.

The CTD data was logged on the ship, using a PDP 11/23 computer. The full downcast was recorded as well as bursts of approximately 20 s of data immediately before each bottle sample was taken. The signal from the CTD was recorded on audio tape and the PDP 11/23 recorded the data in digital form on 9-track magnetic tape as well as producing (uncalibrated) 1 m averages and plots for each station. As the shipboard computer system was in its final stages of development during the ACE experiment, some stations had to be replayed from the audio tapes and the sample bursts were lost for these stations. Problems with the salinity board (constructed by the CSIRO Division of Oceanography) in the CTD deck unit caused gaps in some of the downcasts.

### **Data analysis**

After each cruise the tapes from the shipboard system were processed on the Division's VAX 11/750 computer in Hobart.

Uncalibrated, despiked files were produced for each downcast and for the sample bursts. Spurious values were rejected on the grounds of implausible gradients. A simple recursive filter was used to compensate for the different time constants of the sensors. Both the pressure and the conductivity were lagged to get coincident values for pressure, temperature and conductivity. The recursive filter is of the form (Millard, 1982):

$$y(t) = y(t-dt) \cdot w\phi + x(t) \cdot w1 ,$$

where:  $y(t)$  is the current filtered output conductivity or pressure  
 $y(t-dt)$  is the previous filtered value  
 $x(t)$  is the current unfiltered input conductivity or pressure  
 $w\phi = \exp(-dt/T_{lag})$   
 $w1 = 1 - w\phi$   
 $dt$  = the sample period of the CTD system (= .032 s)

$T_{lag}$  ( 0.1 s (the "temperature time constant") when the  
 ( quantity being filtered is the pressure,  
 ( 0.07 s (the difference between the temperature and  
 ( conductivity time constants) when the quantity being  
 ( filtered is conductivity.

That is, the signals from the sensors with the faster response times (pressure and conductivity) were lagged to get values coincident with the signal from the slowest sensor (temperature).

In determining  $T_{lag}$ , we used a time constant of 0.03 s for the conductivity sensor and then adjusted the time constant of the temperature sensor until the salinity spiking problem was minimised. This occurred for a time constant of 0.1 s. We assumed an instantaneous response from the pressure sensor. (The time constant for the conductivity cell (0.03 s) is the flushing time of the cell). Any spurious values were replaced by the previous value before filtering; if there were more than five spurious values in succession the filter was re-started. Whenever the filter was started the first 30 values were ignored.

For the downcasts, traces monotonic in pressure were produced by discarding any data points whose pressure was less than the maximum pressure for all previous data points in that downcast. For the sample bursts, the ranges, means and standard deviations of pressure, temperature, conductivity and salinity were calculated and each sample was assigned a quality code. This quality code was set to 1 if all the ranges and standard deviations were small and to 0 or -1 if the standard deviations or ranges were beyond certain limits or if the ranges of temperature and conductivity were disproportionate. The samples with quality codes of -1 were ignored in the calibration calculations. The 1978 equation of state was used at all times. That is, the formulae in Lewis (1980) were used.

### Sample analyses

The salinity samples from the Niskin bottles were analysed on the ship, using a Yeokal inductive salinometer.



The oxygen samples were analysed on the ship, using a Winkler titration.

For the first three cruises, (inorganic) phosphates, silicates and nitrate plus nitrite were analysed on board, using a Technicon autoanalyser (Airey and Sandars, 1984). For the last three cruises phosphates were analysed on board, using the single-solution method (Major *et al.*, 1972). Samples for nitrate plus nitrite and for silicate were preserved on board with mercuric chloride and analysed on shore, using a Technicon autoanalyser.

### Salinity calibration

The results of the salinity analyses were combined with the calibration data from the CTD. The following steps were followed:

1. Any obviously wrong values (due to leaking bottles etc.) were rejected.
2. A plot of salinity offset versus station number was produced. (For all plots the rejected samples were plotted. These samples were ignored in the calculation of means, standard deviations and lines of best fit.)
3. An "in situ" conductivity for each bottle sample was calculated from the sample salinity and the CTD pressure and temperature.
4. A plot of cell factor ( $C_{\text{sample}}/C_{\text{CTD}}$ ) versus station number was produced.
5. Because the cell factor appeared to drift more or less uniformly throughout each CTD section, we decided to fit straight lines to the cell factor on a section-by-section basis. That is, for each CTD section a line of best fit was found by linear regression and the cell factor for each station picked off this line. In only two places throughout ACE, two lines were used instead of one because of an obvious change of gradient at some point.
6. Points more than 2.8 standard deviations from those straight lines were rejected.
7. Steps 5 and 6 were repeated once.
8. A final plot of cell factor versus station number was produced. Straight lines were fitted to this plot on a section-by-section basis and a cell factor calculated for each station.
9. The salinities of the CTD samples were re-calculated using this cell factor and a final verification plot of salinity offset was produced.

The sequence of plots for cruise SP2/84 (February 1984) is shown in Fig. 2). This calibration procedure is based on that described in Fofonoff *et al.*, 1974 and Millard, 1982.

Because of problems with the shipboard computer, some of the sample bursts were lost. When this occurred for a series of stations, the values from the display of the CTD deck unit (recorded manually on CTD logs) were used. The values from the CTD deck unit were consistent with the values from the computer for stations where both sets were available.

The mean salinity offsets and standard deviations for the initial and final plots of salinity offset are listed in Table 2.

Note: a. the varying offset from cruise to cruise  
b. the zero mean offset for the final plots  
c. the very large standard deviations for some of the initial plots, caused partly by the drift of the CTD conductivity during the cruise.

The offset between the CTD and the bottle-sample salinities varied between about .04 psu and about .13 psu. (The CTD consistently read low.) The largest variation occurred during the October cruise (SP14/83), when the offset rose from about .04 psu to about .09 psu. The CTD hit bottom during this cruise.

### Temperature calibration

The CTD temperature could only be checked by comparing the CTD and the reversing thermometers. For 689 such samples, the mean offset was .006°C, with a standard deviation of .016°C. As the reversing thermometers are only accurate to about .02°C, this comparison is as good as can be expected.

### Production of averaged data

Once the cell factors were decided for each station, averaged data could be produced. Averages were produced for every two decibar interval throughout a cast, these intervals being centred on even integral values.

Averages were calculated only for intervals with 18 or more valid data points. The mean temperature and (calibrated) conductivity were calculated for the interval; salinity was calculated for the mid-point of the pressure interval from the means of temperature and conductivity. Sigma-t, anomaly of specific volume and geopotential anomaly in J/kg were also calculated and listed.

**Table 2 Comparison of mean salinity offsets between the CTD and bottle data before and after calibration**

Cruise	initial mean salinity offset (psu)	initial salinity standard deviation (psu)	final mean salinity offset (psu)	final salinity standard deviation (psu)
SP13/83	.042	.00850	0.000	.00519
SP14/83	.061	.01127	0.000	.00486
SP15/83	.100	.01159	0.000	.00515
SP16/83	.104	.01685	0.000	.00452
SP1/84	.116	.01268	0.000	.00556
SP2/84	.085	.00776	0.000	.00431

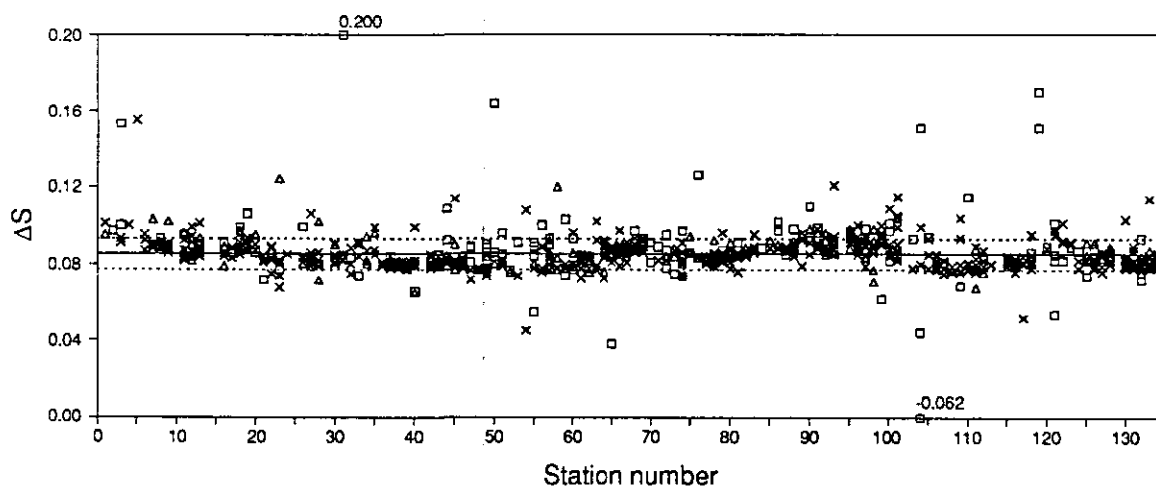


Fig. 2.1 Initial plot of salinity offset (sample salinity - CTD salinity) versus station number for cruise Sp 2/84. Good samples are plotted as crosses, dubious samples as triangles and bad samples as squares. Points outside the range of the plot are plotted on the axis, and the value written next to it. The mean offset is indicated by the solid line. The dashed lines are one standard deviation away from it.

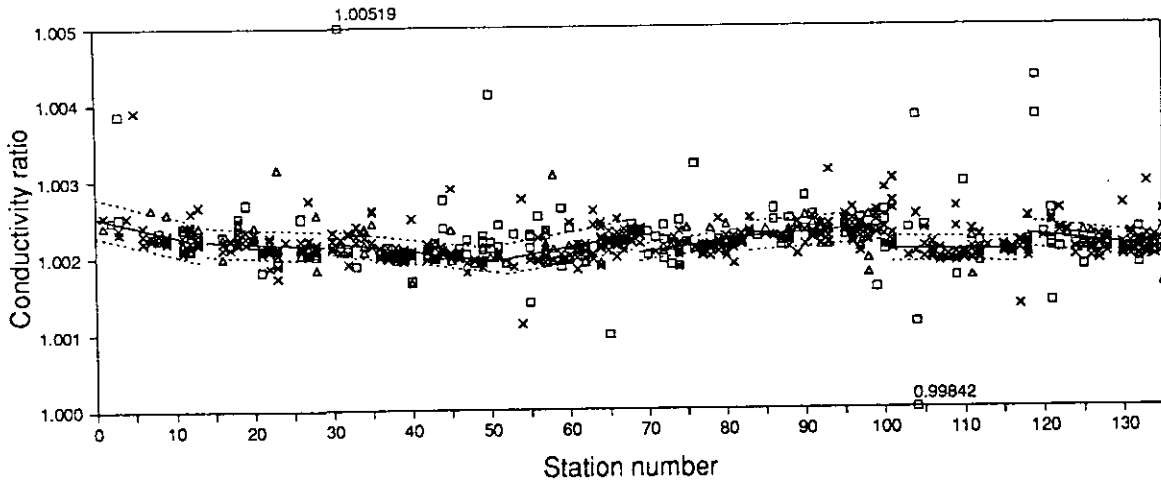


Fig. 2.2 First plot of conductivity ratio (sample conductivity / CTD conductivity) versus station number for cruise Sp 2/84. Symbols are as for figure 2.1. For each group of stations the line of best fit (the solid line) is shown. The dashed lines are one standard deviation away from it.

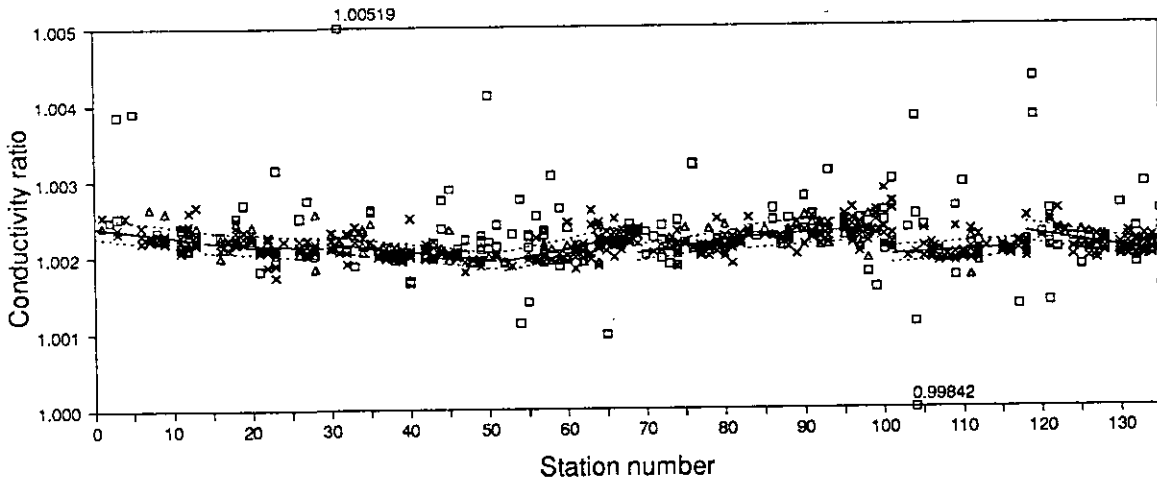


Fig. 2.3 Second plot of conductivity ratio versus station number for cruise Sp 2/84. Symbols are as for figure 2.1. For each group of stations the line of best fit (the solid line) is shown. The dashed lines are one standard deviation away from it.

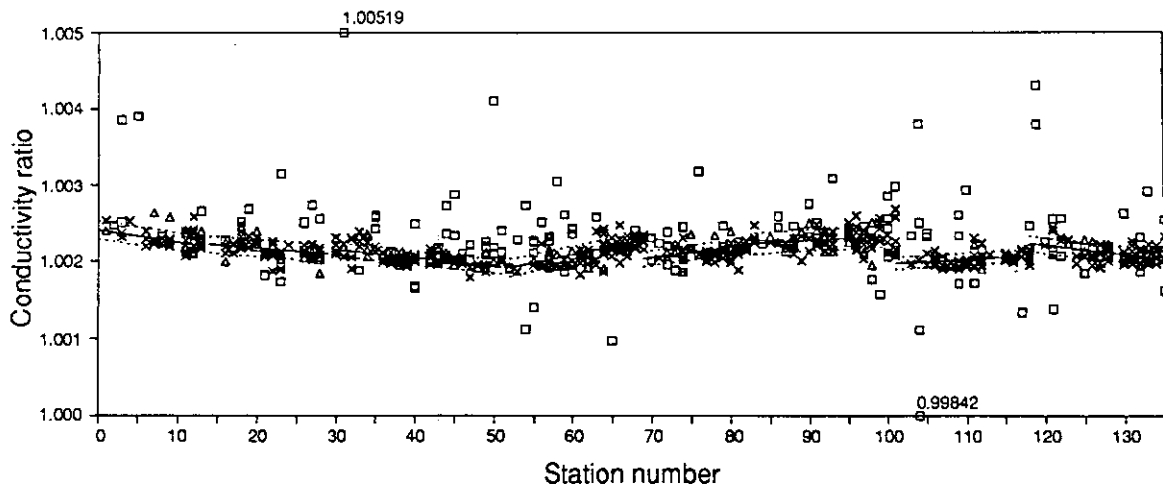


Fig. 2.4 Third plot of conductivity ratio versus station number for cruise Sp 2/84. Symbols are as for figure 2.1. For each group of stations the line of best fit (the solid line) is shown. The dashed lines are one standard deviation away from it.

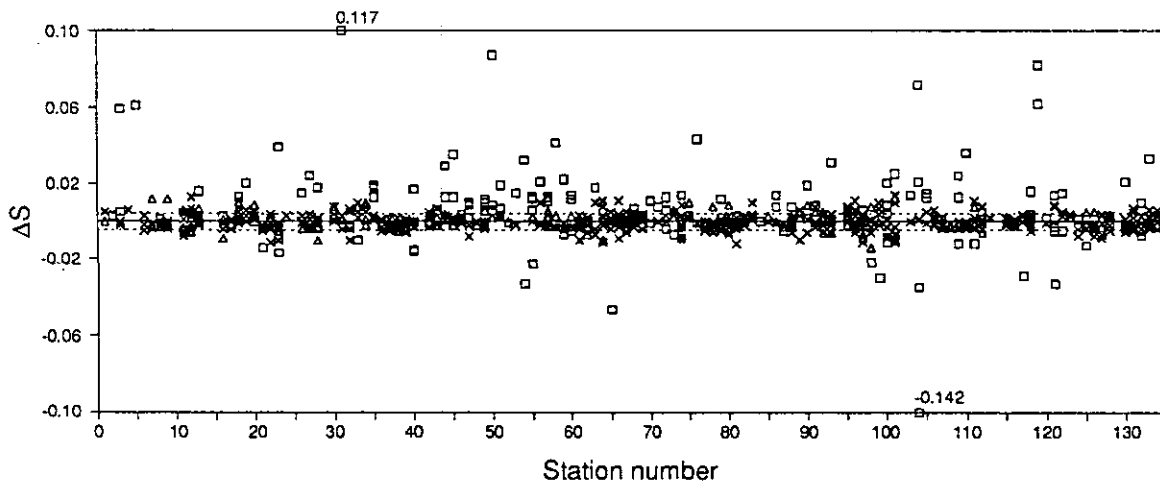


Fig. 2.5 Final plot of salinity offset versus station number for cruise Sp 2/84. Symbols are as for figure 2.1. The mean offset is indicated by the solid line. The dashed lines are one standard deviation away from it.

The positions, times and bottom depths were then checked against the *Sprightly* bridge logs, CTD logs, GEBCO charts and bathymetric maps, and corrected where appropriate.

### **Production of vertical sections**

Vertical sections of potential temperature, salinity and sigma-theta versus pressure were produced for all of the CTD sections throughout the ACE experiment.

Our two decibar averages were used to produce 10 m averages in the following way:

1. linearly interpolating over any gaps  $\leq 10$  decibars;
2. averaging five consecutive 2 decibar values to get a 10 decibar value.

These 10 decibar bins were centred on integral multiples of 10 decibars and any values for the 2 or 4 decibar intervals were used to calculate a surface value.

The NCAR package provided by the National Centre for Atmospheric Research, Boulder, Colorado, USA was then used to contour the 10 decibar values.

### **THE DATA**

During the first six cruises of ACE, 602 CTD stations were completed. For each cruise, the completed sections and other stations are shown in Figure 3. The stations are listed in Table 3,\* together with station number through the cruise, station number through the year, nominal water depth for those in the ACE sections, dates of the sections and some other relevant information.

Vertical sections of potential temperature, salinity and sigma-theta for 43 of the 44 sections are included in Fig. 4.\* (One section was abandoned after 4 stations and is not included.) A reference level of 0 decibars is used for all calculations. Where a standard section was extended two sets of sections are included: the first is of the standard ACE section and the

\* see appendix

second of the whole section. The standard ACE sections are all at the same horizontal scale; the sections are all at the same vertical scale.

Listings of the two decibar values for all of the stations are available on magnetic tape on request.

### Acknowledgements

NCAR, Boulder, Colorado for the use of their plotting software; Dave Crooks, Frank Davies and all computing and OMS personnel at Cronulla; the scientific, technical and ship's crew who assisted in the collection of the data; George Cavill and Ralph Masterson, the Master and Mate of *RV Sprightly*; Bernadette Baker for her patience in typing this manuscript.

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## Appendix

- Tables 3.1-3.6:** Station lists (by section) for the first six ACE cruises. On the standard ACE sections, the last four stations are in water deeper than 2000 m, and, respectively, 15, 30, 45 and 60 km beyond the 2000 m station. Station numbers through the cruise (upper) and through the year (lower) are given.
- Figure 3.1-3.6:** Standard sections and other stations for the first six ACE cruises.
- Tables 4.1-4.6:** Station lists giving dates, times, positions etc. for the first six ACE cruises.
- Figure 4.1-4.43:** Vertical sections of sigma-theta (top), salinity (middle) and potential temperature (bottom) for 43 of the 44 CTD sections collected during ACE. The Cape Howe section from cruise SP15/83 is not included as only four stations were completed. Maximum cast pressures are shown by symbols. Station positions are shown by tick marks along the top of each section. Where practicable, station numbers are shown at the very top. Full station lists are in Table 3.

**Table 3.1** Station lists (by section) for Cruise: Sp 13/83. On the standard ACE sections, the last four stations are in water deeper than 2000 m, and, respectively, 15, 30, 45 and 60 km beyond the 2000 m station. Station numbers through the cruise (upper) and through the year (lower) are given.

Section	Nominal Water Depth																	Extra Stations and other sections	
	20	30	50	70	100	125	150	200	300	500	800	1200	2000	+15 km	+30 km	+45 km	+60 km		
Stanwell Park 7-8/9/83	1 332	2 333	3 334	4 335	5 336	6 337	7 338	8 339	9 340										
Cape Howe 10/9/83	10 341	11 342	12 343	13 344	14 345														
Newcastle 13-14/9/83 17-19/9/83*	15 346	16 347	17 348	18 349	19 350	20 351	21 352	22 353											24-26 355-357
Cronulla 21-23/9/83	27 358	28 359	29 360	30 361	31 362	32 363	33 364	34 365	35 366	36 367	37 368	38 369	39 370						

\* outside Ace region

**Table 3.2** Station lists (by section) for Cruise: Sp 14/83. On the standard ACE sections, the last four stations are in water deeper than 2000 m, and, respectively, 15, 30, 45 and 60 km beyond the 2000 m station. Station numbers through the cruise (upper) and through the year (lower) are given.

Nominal Water Section	Depth															+60 km Extra Stations and other sections	
	20	30	50	70	100	125	150	200	300	500	800	1200	2000	+15 km	+30 km		+45 km
Stanwell Park 13-14/10/83	1 371	2 372	3 373	4 374	5 375	6 376	7 377	8 378	9 379	10 380	11 381	12 382	13 383	14 384	15 385		
Cape Howe 16-18/10/83	16 386	17 387	18 388	19 389	20 390	21 391	22 392	23 393	24 394	25 395	26 396	27 397	28 398	29 399	30 400		
Newcastle 20-21/10/83	31 401	32 402	33 403	34 404	35 405	36 406	37 407	38 408	39 409	40 410	41 411	42 412	43 413	44 414	45 415	46 416	
Cronulla 22-23/10/83	47 417	48 418	49 419	50 420	51 421	52 422	53 423	54 424	55 425	56 426	57 427	58 428	59 429	60 430			
Stanwell Park 23-24/10/83	61 431	62 432	63 433	64 434	65 435	66 436	67 437	68 438	69 439	70 440	71 441	72 442	73 443	74 444	75 445	76 446	77 447

**Table 3.3** Station lists (by section) for Cruise: Sp 15/83. On the standard ACE sections, the last four stations are in water deeper than 2000 m, and, respectively, 15, 30, 45 and 60 km beyond the 2000 m station. Station numbers through the cruise (upper) and through the year (lower) are given.

Section	Nominal Water Depth																	+60km Stations and other sections
	20	30	50	70	100	125	150	200	300	500	800	1200	2000	+15km	+30km	+45km	+60km	
Stanwell Park 8-10/11/83	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	464
	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	
Newcastle 11-12/11/83	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	481
	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	
Cronulla 12-13/11/83†	35	36	37	38	39	40	41	42	43	44	45	46	48	49				
	482	483	484	485	486	487	488	489	490	491	492	493	494	495				
Stanwell Park 13-15/11/83	58	59	60	61	62	63	64	65	66	57/67	56	55	54	53	52	51	50	496
	504	505	506	507	508	509	510	511	512	503/513	502	501	500	499	498	497	496	
15-16/11/83*																		514-524*
Cape Howe 18/11/83 #	80	81	82	83														
	526	527	528	529														
Brush Is 18-20/11/83 ++	102	101	100	99	98	97	96	95	94	93	92	91	90	89	88	87	86	530
	548	547	546	545	544	543	542	541	540	539	538	537	536	535	534	533	532	
Stanwell Park 20-21/11/83	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	565
	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	

† there was no station 47

\* section south through the eddy from 34°44.5'S 152°00.1'E to 37°15.5'S 152°00.1'E abandoned due to bad weather

++ section through the eddy. Brush Island is near Jervis Bay.

# abandoned due to bad weather

**Table 3.4** Station lists (by section) for Cruise: Sp 16/83. On the standard ACE sections, the last four stations are in water deeper than 2000 m, and, respectively, 15, 30, 45 and 60 km beyond the 2000 m station. Station numbers through the cruise (upper) and through the year (lower) are given.

Section	Nominal Water Depth																	Extra Stations and other sections
	20	30	50	70	100	125	150	200	300	500	800	1200	2000	+15 km	+30 km	+45 km	+60 km	
Newcastle 8-9/12/83	1 566	2 567	3 568	4 569	5 570	6 571	7 572	8 573	9 574	10 575	11 576	12 577	13 578	14 579	15 580	16 581	17 582	
Cronulla 11-12/12/83	29 594	28 593	27 592	26 591	25 590	24 589	23 588	22 587	21 586	20 585	19 584	18 583						
Stanwell Park 13-13/12/83	30 595	31 596	32 597	33 598	34 599	35 600	36 601	37 602	38 603	39 604	40 605	41 606	42 607	43 608	44 609	45 610		
Cape Howe 15-16/12/83*	46 611	47 612	48 613	49 614	50 615	51 616	52 617	53 618	54 619	55 620	56 621	57 622	58 623	59 624	60 625	61, 62 626, 627		
Jervis Bay 18-19/12/83	63 628	64 629	65 630	66 631	67 632	68 633	69 634	70 635	71 636	72 637	73 638	74 639	75 640	76 641				
Stanwell Park 19-20/12/83	77 642	78 643	79 644	80 645	81 646	82 647	83 648	84 649	85 650	86 651	87 652	88 653	89 654	90 655	91 656	92 657	93 658	
Cronulla 21/12/83†	109 672	108 671	106 670	105 669	104 668	103 667	102 666	101 665	100 664	99 663	98 662	97 661	96 660	95 659				

\* two extra stations at end of section because of possible Antarctic middle water

† no station 94 or 107; both aborted



**Table 3.6** Station lists (by section) for Cruise: Sp 2/84. On the standard ACE sections, the last four stations are in water deeper than 2000 m, and, respectively, 15, 30, 45 and 60 km beyond the 2000 m station. Station numbers through the cruise (upper) and through the year (lower) are given.

Section	Nominal Water Depth																+60 km	Extra Stations and other sections
	20	30	50	70	100	125	150	200	300	500	800	1200	2000	+15 km	+30 km	+45 km		
Stanwell Park	1	2	3	4	5	6	7	8	9	10	11	12	13					
9-11/12/83*	132	133	134	135	136	137	138	139	140	141	142	143	144					
Cape Howe	15	16	17	18	19	20	21	22	23	24	26	27	28	30				
11-12/2/84**	145	146	147	148	149	150	151	152	153	154	155	156	157	158				
Jervis Bay	52	51	50	49	48	47	46	45	44	43	42	40	38	37	36	35-31		
13-14/2/84†	179	178	177	176	175	174	173	172	171	170	169	168	166	165	164	163-159		
Stanwell Pk	53	54	55	56	57	58	59	60	61	62	63	64	65	67	68	69		
15-16/2/84	180	181	182	183	184	185	186	187	188	189	190	191	192	194	195	196		
Cronulla	70	71	72	73	74	75	76	77	78	79	80	81	82	83				
16-17/2/84	197	198	199	200	201	202	203	204	205	206	207	208	209	210				
Newcastle	84	85	86	87	88	89	90	91	92	94	95	96	97	99	100	101	93	
17-18/2/84++	211	212	213	214	215	216	217	218	219	221	222	223	225	226	227	220		
Stanwell Park	102	103	104	105	106	107	108	109	110	111	112	113	114	116	117	118		
19-21/2/84	228	229	230	231	232	233	234	235	236	237	238	239	240	242	243	244		
Stanwell Park	119	120	121	122	123	124	125	126	127	128	129	130	131	133	134	135		
21-22/2/84	245	246	247	248	249	250	251	252	253	254	255	256	257	259	260	261		

\* abandoned due to rough weather; there is no station 14

\*\* stations 25 and 29 abandoned

† extended section across the meander; station 41 abandoned

++ 94 repeat of 93

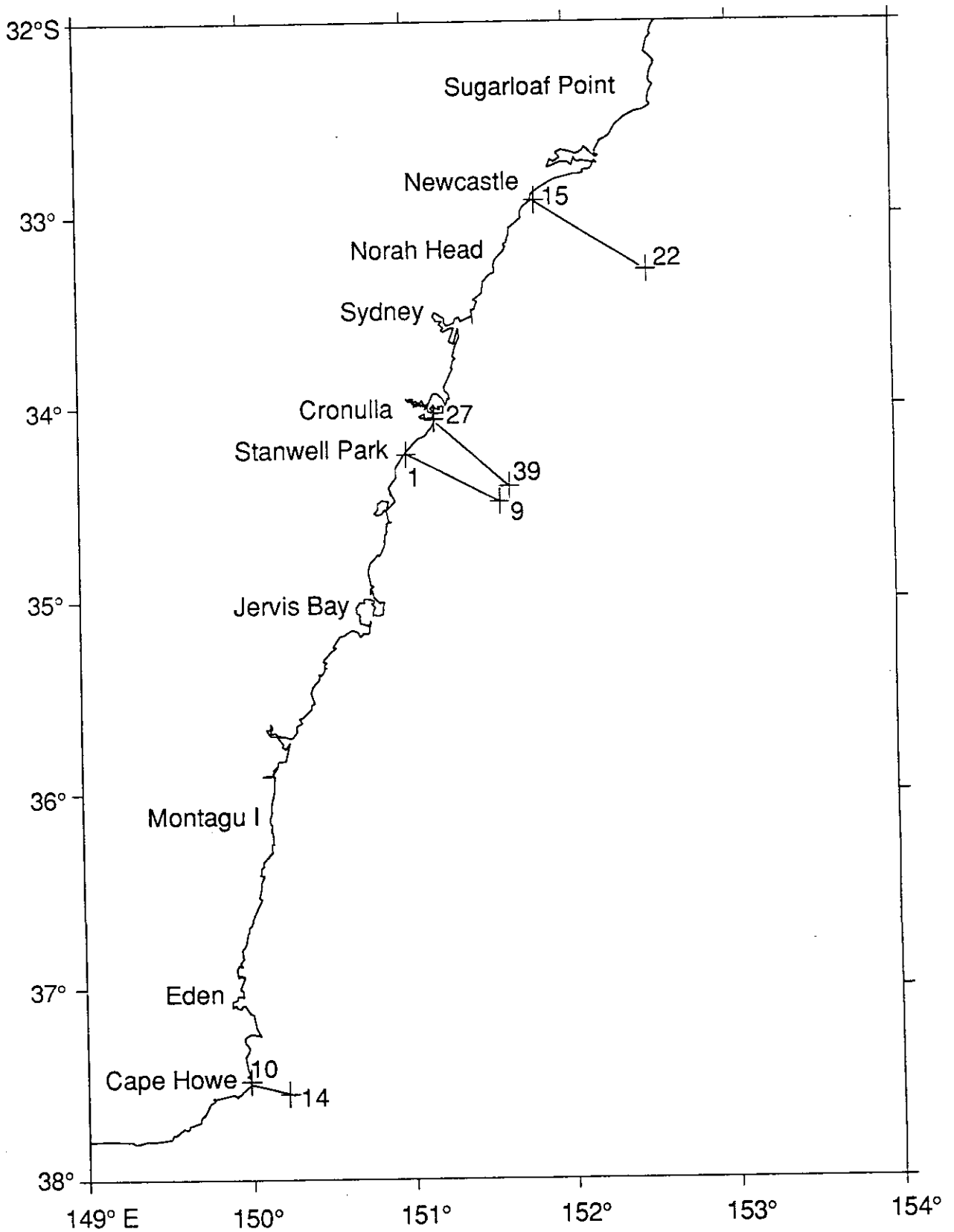


Fig. 3.1 CTD sections for cruise Sp 13/83. The numbers of the stations at each end are shown. Full station lists are in table 3.1.



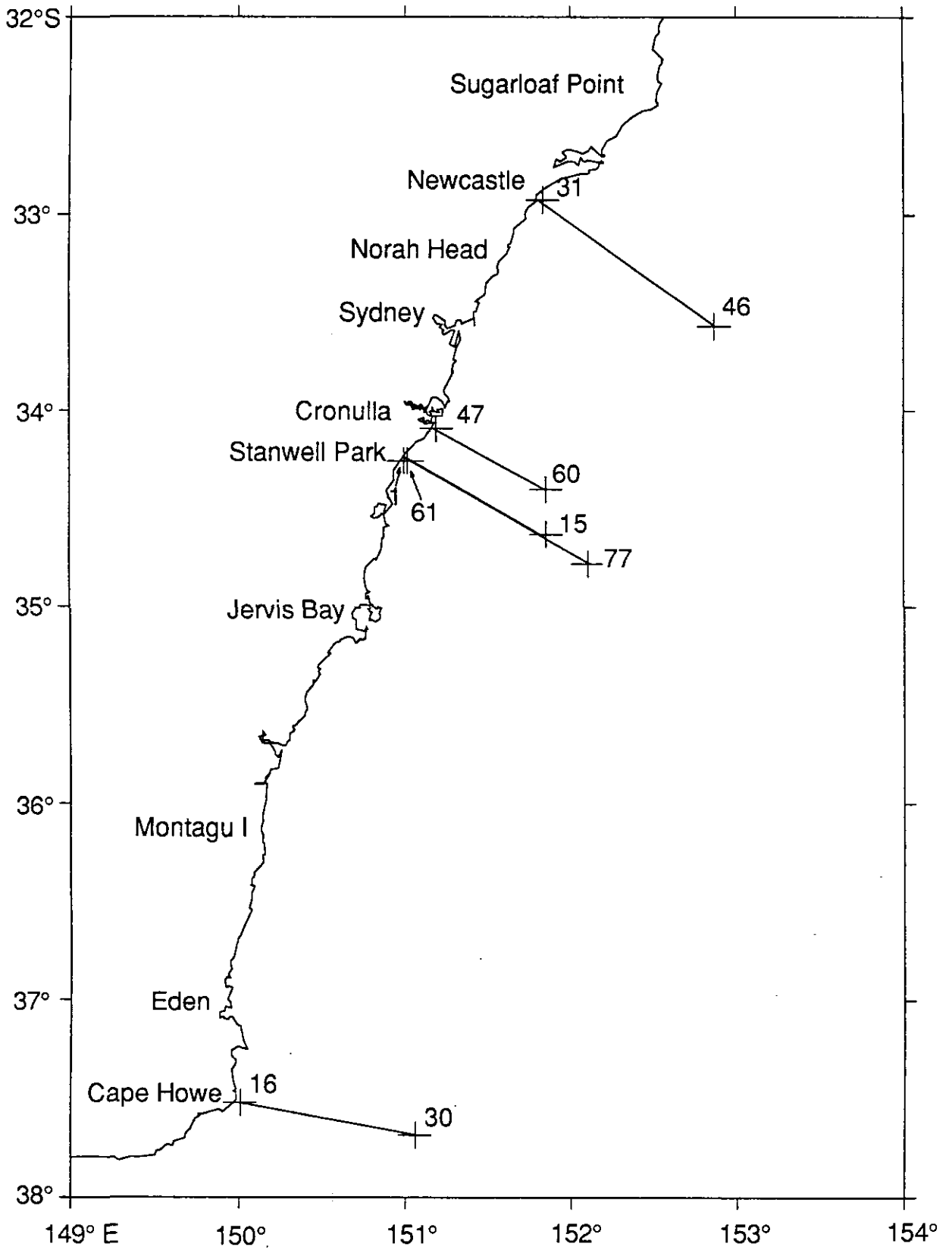


Fig. 3.2 CTD sections for cruise Sp 14/83. The numbers of the stations at each end are shown. Full station lists are in table 3.2.

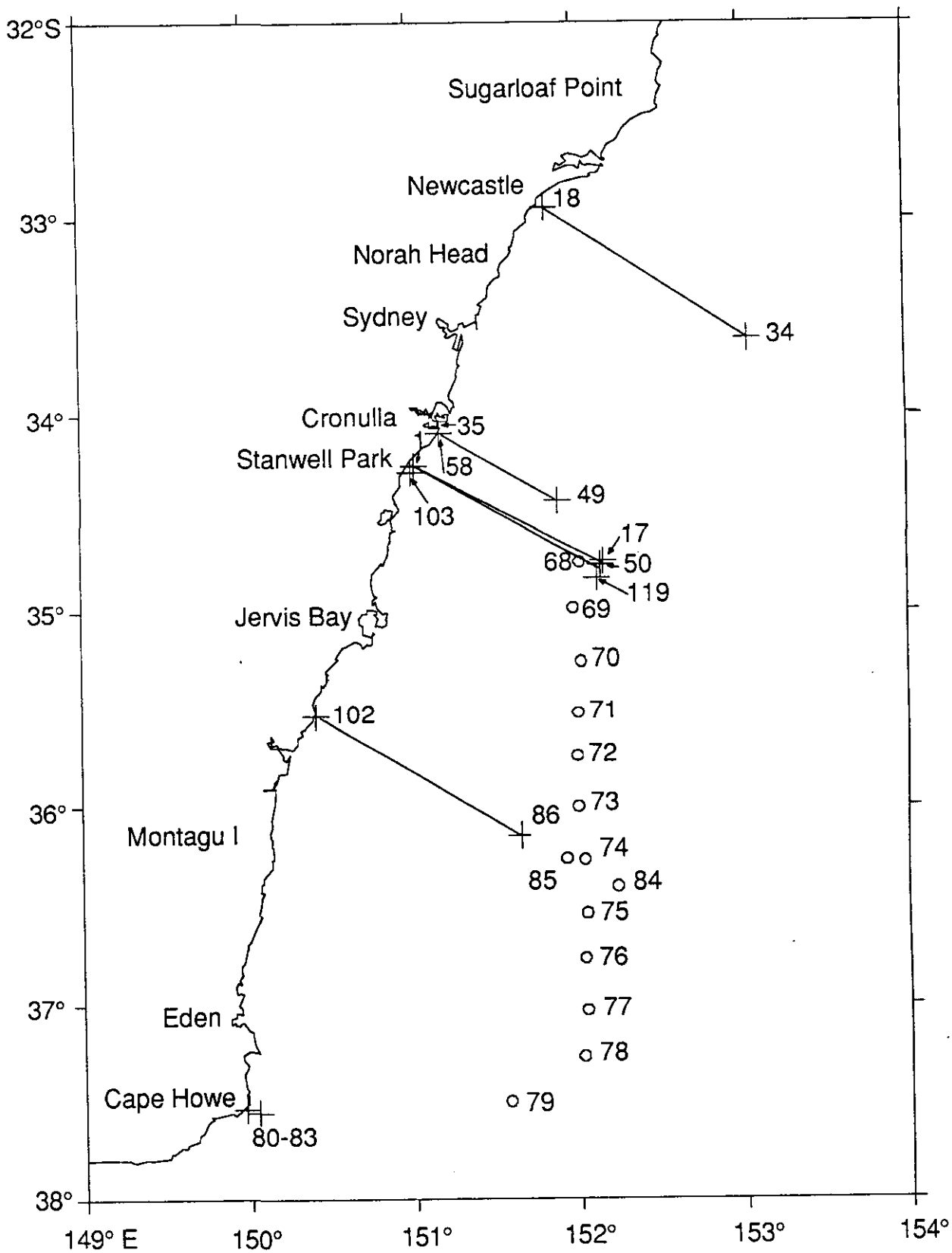


Fig. 3.3 CTD sections for cruise Sp 15/83. The numbers of the stations at each end are shown. Additional stations are shown as circles. Full station lists are in table 3.3.

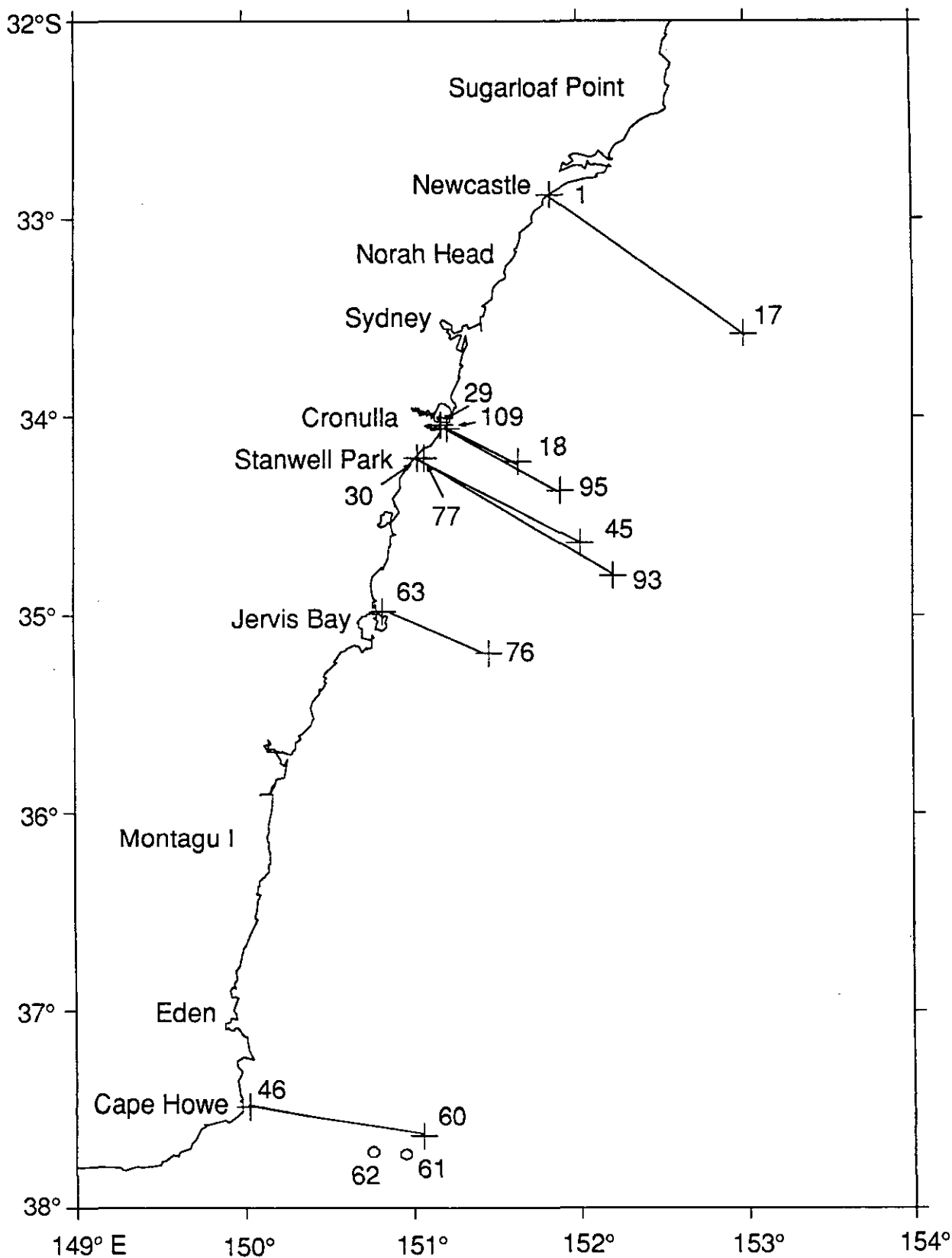


Fig. 3.4 CTD sections for cruise Sp 16/83. The numbers of the stations at each end are shown. Additional stations are shown as circles. Full station lists are in table 3.4.

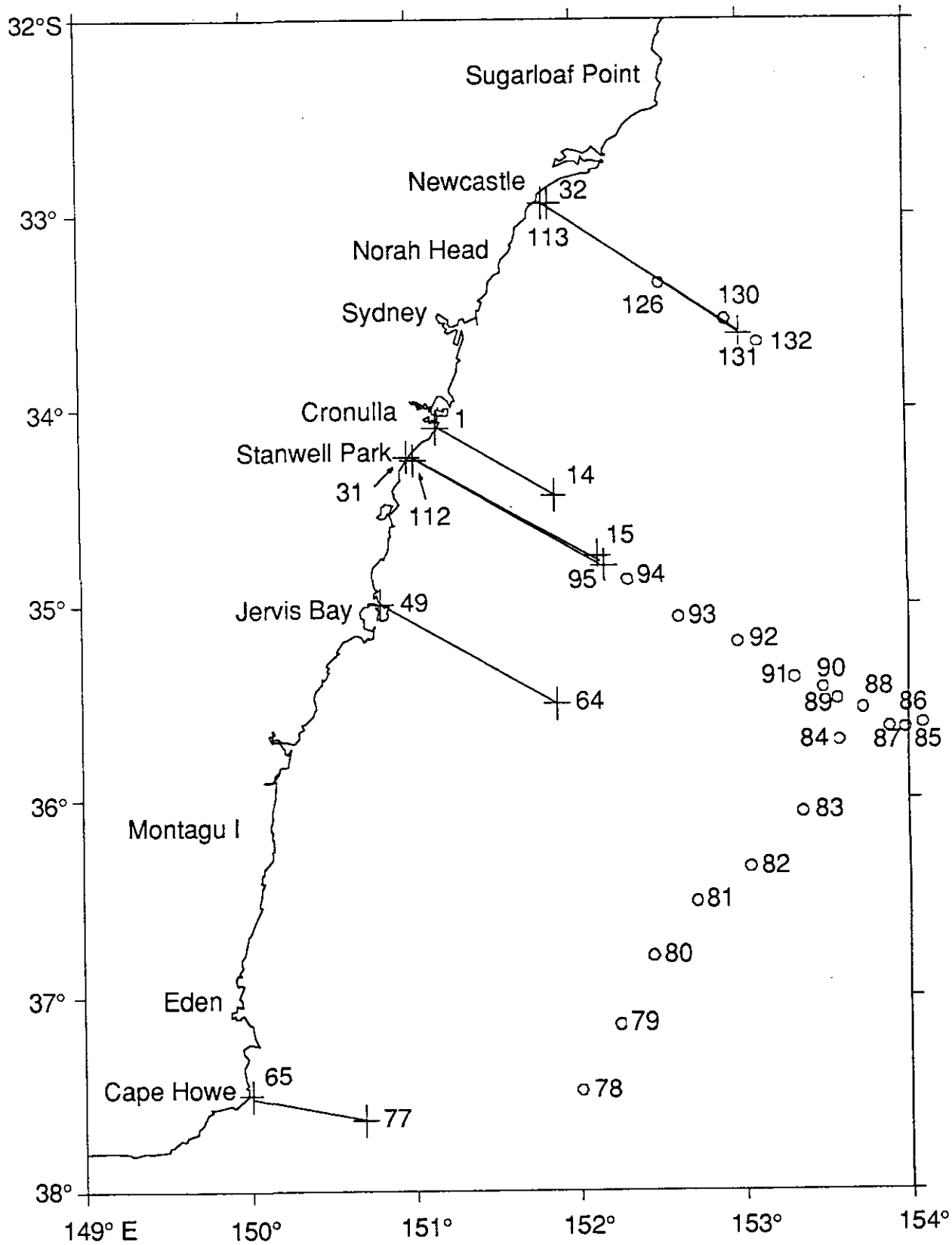


Fig. 3.5 CTD sections for cruise Sp 1/84. The numbers of the stations at each end are shown. Additional stations are shown as circles. Full station lists are in table 3.5.

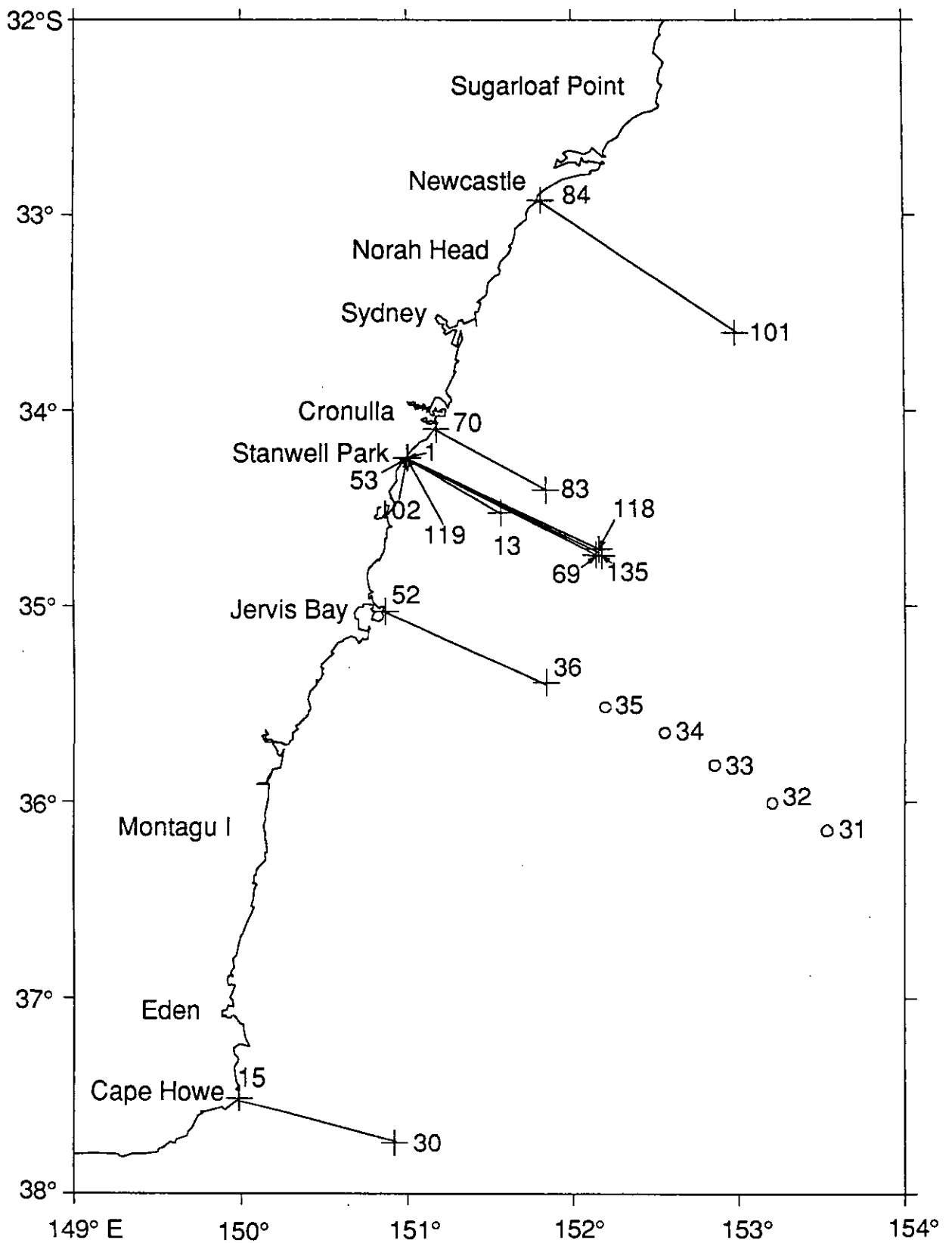


Fig. 3.6 CTD sections for cruise Sp 2/84. The numbers of the stations at each end are shown. Additional stations are shown as circles. Full station lists are in table 3.6.

**Table 4.1** Station list for cruise Sp13/83

(Times in zone 'K' = UTC + 10 hours)

Station	Time	Date	Position	Cast Depth	Bottom Depth
1	2041K	07-SEP-1983	34°14.3'S 151°00.3'E	16	21
2	2134K	07-SEP-1983	34°15.9'S 151°05.3'E	50	55
3	2231K	07-SEP-1983	34°16.9'S 151°08.0'E	104	105
4	2347K	07-SEP-1983	34°18.3'S 151°11.1'E	126	135
5	1449K	08-SEP-1983	34°24.3'S 151°14.4'E	142	152
6	1552K	08-SEP-1983	34°24.0'S 151°16.0'E	192	205
7	1719K	08-SEP-1983	34°27.0'S 151°20.5'E	452	503
8	1924K	08-SEP-1983	34°26.4'S 151°28.8'E	1154	1240
9	2131K	08-SEP-1983	34°28.7'S 151°34.5'E	1502	2030
10	1911K	10-SEP-1983	37°29.9'S 149°59.3'E	22	25
11	1950K	10-SEP-1983	37°30.4'S 150°01.1'E	50	55
12	2102K	10-SEP-1983	37°31.5'S 150°05.4'E	100	105
13	2219K	10-SEP-1983	37°32.1'S 150°08.9'E	128	135
14	2333K	10-SEP-1983	37°33.0'S 150°15.0'E	192	209
15	2033K	13-SEP-1983	32°55.9'S 151°49.0'E	16	20
16	2123K	13-SEP-1983	32°57.5'S 151°52.7'E	50	56
17	2223K	13-SEP-1983	32°59.4'S 151°56.3'E	102	105
18	1715K	14-SEP-1983	33°07.0'S 152°09.0'E	126	135
19	1908K	14-SEP-1983	33°11.6'S 152°17.7'E	192	205
20	2011K	14-SEP-1983	33°13.5'S 152°19.0'E	454	528
21	2139K	14-SEP-1983	33°15.2'S 152°24.6'E	1154	1316
22	2316K	14-SEP-1983	33°16.4'S 152°27.3'E	1500	2030
24	2052K	17-SEP-1983	30°01.8'S 154°32.8'E	1508	4580
25	0808K	18-SEP-1983	31°48.4'S 154°03.4'E	1504	4664
26	1035K	18-SEP-1983	32°00.0'S 153°59.0'E	1504	4697
27	1721K	21-SEP-1983	34°04.6'S 151°11.2'E	20	26
28	1749K	21-SEP-1983	34°05.0'S 151°12.1'E	32	40
29	1823K	21-SEP-1983	34°05.8'S 151°12.6'E	54	60
30	1909K	21-SEP-1983	34°05.7'S 151°12.8'E	72	84
31	1955K	21-SEP-1983	34°06.1'S 151°14.2'E	100	107
32	2120K	21-SEP-1983	34°09.6'S 151°19.5'E	126	135
33	2232K	21-SEP-1983	34°11.9'S 151°23.8'E	140	150
34	2122K	22-SEP-1983	34°11.6'S 151°25.5'E	190	204
35	2215K	22-SEP-1983	34°12.8'S 151°27.5'E	142	313
36	2314K	22-SEP-1983	34°14.0'S 151°29.0'E	450	500
37	0045K	23-SEP-1983	34°18.0'S 151°34.0'E	804	850
38	0202K	23-SEP-1983	34°20.0'S 151°34.6'E	1150	1198
39	0402K	23-SEP-1983	34°24.0'S 151°38.0'E	28	2040

**Table 4.2** Station list for cruise Sp14/83

(Times in zone 'K' = UTC + 10 hours)

Station	Time	Date	Position	Cast Depth	Bottom Depth
1	1035K	13-OCT-1983	34°13.9'S 151°00.1'E	16	20
2	1115K	13-OCT-1983	34°14.8'S 151°00.9'E	24	35
3	1237K	13-OCT-1983	34°15.2'S 151°03.1'E	48	60
4	1352K	13-OCT-1983	34°18.0'S 151°05.5'E	72	80
5	1448K	13-OCT-1983	34°19.3'S 151°06.2'E	100	105
6	1603K	13-OCT-1983	34°19.3'S 151°09.1'E	130	135
7	1715K	13-OCT-1983	34°20.0'S 151°13.3'E	144	153
8	1855K	13-OCT-1983	34°22.4'S 151°18.6'E	194	210
9	2010K	13-OCT-1983	34°23.7'S 151°19.6'E	296	324
10	2144K	13-OCT-1983	34°25.6'S 151°21.6'E	500	550
11	2347K	13-OCT-1983	34°25.9'S 151°23.8'E	754	830
12	0204K	14-OCT-1983	34°28.9'S 151°26.3'E	1018	1150
13	0510K	14-OCT-1983	34°29.9'S 151°32.8'E	1498	2000
14	0855K	14-OCT-1983	34°32.9'S 151°42.1'E	1508	2960
15	1145K	14-OCT-1983	34°38.2'S 151°50.3'E	1508	4881
16	2035K	16-OCT-1983	37°30.7'S 149°59.5'E	18	30
17	2110K	16-OCT-1983	37°30.2'S 150°00.5'E	40	48
18	2215K	16-OCT-1983	37°30.6'S 150°01.1'E	74	76
19	2324K	16-OCT-1983	37°31.3'S 150°04.6'E	92	105
20	0110K	17-OCT-1983	37°31.8'S 150°09.5'E	120	125
21	0212K	17-OCT-1983	37°32.2'S 150°11.9'E	144	150
22	0430K	17-OCT-1983	37°31.9'S 150°14.2'E	172	200
23	1808K	17-OCT-1983	37°33.0'S 150°16.0'E	302	325
24	1919K	17-OCT-1983	37°33.2'S 150°18.2'E	460	520
25	2050K	17-OCT-1983	37°34.2'S 150°21.6'E	1152	1500
26	2322K	17-OCT-1983	37°34.4'S 150°26.0'E	1510	2000
27	0207K	18-OCT-1983	37°35.6'S 150°35.3'E	1502	3021
28	1333K	18-OCT-1983	37°36.4'S 150°42.7'E	1502	4638
29	1602K	18-OCT-1983	37°36.9'S 150°52.9'E	1504	4670
30	1830K	18-OCT-1983	37°40.5'S 151°03.9'E	1504	4600
31	1537K	20-OCT-1983	32°55.8'S 151°48.6'E	16	20
32	1630K	20-OCT-1983	32°57.5'S 151°50.8'E	36	40
33	1715K	20-OCT-1983	32°58.2'S 151°51.8'E	58	60
34	1804K	20-OCT-1983	32°59.1'S 151°53.2'E	76	80
35	1848K	20-OCT-1983	32°59.7'S 151°56.9'E	100	105
36	2029K	20-OCT-1983	33°06.5'S 152°06.5'E	132	135
37	2144K	20-OCT-1983	33°09.5'S 152°14.4'E	140	150
38	2253K	20-OCT-1983	33°11.6'S 152°17.4'E	192	204
39	0718K	21-OCT-1983	33°11.8'S 152°19.9'E	294	320
40	0910K	21-OCT-1983	33°11.4'S 152°22.0'E	450	500

Table 4.2 (continued)

(Times in zone 'K' = UTC + 10 hours)

Station	Time	Date	Position	Cast Depth	Bottom Depth
41	1100K	21-OCT-1983	33°11.0'S 152°27.5'E	804	900
42	1254K	21-OCT-1983	33°13.8'S 152°27.9'E	1148	1250
43	1520K	21-OCT-1983	33°16.6'S 152°30.4'E	1504	2000
44	1821K	21-OCT-1983	33°22.3'S 152°36.2'E	1478	3500
45	2052K	21-OCT-1983	33°28.6'S 152°44.4'E	1520	4800
46	2258K	21-OCT-1983	33°33.5'S 152°51.5'E	1506	4850
47	1630K	22-OCT-1983	34°05.5'S 151°10.7'E	16	30
48	1720K	22-OCT-1983	34°06.0'S 151°11.2'E	32	35
49	1746K	22-OCT-1983	34°06.0'S 151°11.7'E	50	55
50	1827K	22-OCT-1983	34°06.3'S 151°12.2'E	72	80
51	1911K	22-OCT-1983	34°07.1'S 151°13.8'E	102	125
52	2033K	22-OCT-1983	34°09.8'S 151°20.0'E	126	150
53	2134K	22-OCT-1983	34°11.5'S 151°23.1'E	142	165
54	2232K	22-OCT-1983	34°12.5'S 151°25.0'E	192	200
55	2357K	22-OCT-1983	34°14.0'S 151°26.9'E	292	300
56	0124K	23-OCT-1983	34°14.1'S 151°29.1'E	454	500
57	0301K	23-OCT-1983	34°15.8'S 151°34.0'E	832	900
58	0455K	23-OCT-1983	34°17.3'S 151°36.1'E	1150	1247
59	0705K	23-OCT-1983	34°20.1'S 151°41.5'E	1502	2000
60	0930K	23-OCT-1983	34°24.4'S 151°50.9'E	1502	3015
61	1518K	23-OCT-1983	34°14.3'S 150°59.8'E	16	20
62	1548K	23-OCT-1983	34°14.7'S 151°00.3'E	30	35
63	1711K	23-OCT-1983	34°17.3'S 151°04.1'E	50	55
64	1802K	23-OCT-1983	34°17.5'S 151°06.4'E	70	80
65	1850K	23-OCT-1983	34°17.9'S 151°08.2'E	102	110
66	2015K	23-OCT-1983	34°19.5'S 151°12.8'E	126	135
67	2134K	23-OCT-1983	34°21.2'S 151°16.2'E	140	150
68	2225K	23-OCT-1983	34°22.5'S 151°18.1'E	202	224
69	2348K	23-OCT-1983	34°23.9'S 151°20.6'E	290	349
70	0119K	24-OCT-1983	34°24.5'S 151°21.7'E	454	498
71	0254K	24-OCT-1983	34°26.0'S 151°24.4'E	852	900
72	0500K	24-OCT-1983	34°27.1'S 151°27.5'E	1152	1261
73	0703K	24-OCT-1983	34°30.1'S 151°33.4'E	1500	2600
74	0959K	24-OCT-1983	34°32.6'S 151°43.7'E	1498	3500
75	1208K	24-OCT-1983	34°37.6'S 151°50.9'E	1502	4550
76	1426K	24-OCT-1983	34°41.7'S 151°58.3'E	1500	4876
77	1637K	24-OCT-1983	34°46.9'S 152°06.9'E	1500	4870



**Table 4.3** Station list for cruise Sp15/83

(Times in zone 'L' = UTC + 11 hours)

Station	Time	Date	Position	Cast Depth	Bottom Depth
1	1720L	08-NOV-1983	34°14.2'S 150°59.6'E	20	26
2	1820L	08-NOV-1983	34°15.0'S 151°01.8'E	34	40
3	1925L	08-NOV-1983	34°16.3'S 151°04.8'E	50	65
4	2045L	08-NOV-1983	34°17.9'S 151°06.4'E	72	95
5	0915L	09-NOV-1983	34°18.4'S 151°08.1'E	100	125
6	1053L	09-NOV-1983	34°19.6'S 151°11.6'E	128	139
7	1217L	09-NOV-1983	34°21.3'S 151°14.7'E	142	155
8	1350L	09-NOV-1983	34°23.4'S 151°17.2'E	190	200
9	1525L	09-NOV-1983	34°24.6'S 151°18.8'E	278	300
10	1705L	09-NOV-1983	34°25.1'S 151°21.4'E	496	550
11	1908L	09-NOV-1983	34°26.2'S 151°25.1'E	816	960
12	2124L	09-NOV-1983	34°27.0'S 151°27.9'E	1162	1234
13	2355L	09-NOV-1983	34°30.2'S 151°34.1'E	1502	2012
14	0230L	10-NOV-1983	34°32.4'S 151°43.5'E	1506	3050
15	0545L	10-NOV-1983	34°35.7'S 151°52.6'E	1550	4523
16	0910L	10-NOV-1983	34°41.8'S 152°00.6'E	1498	4866
17	1237L	10-NOV-1983	34°46.4'S 152°06.5'E	1506	4854
18	0130L	11-NOV-1983	32°56.0'S 151°48.7'E	16	20
19	0225L	11-NOV-1983	32°56.8'S 151°51.0'E	34	35
20	0315L	11-NOV-1983	32°57.3'S 151°52.9'E	52	60
21	0420L	11-NOV-1983	32°58.1'S 151°54.5'E	72	80
22	0525L	11-NOV-1983	32°59.3'S 151°56.1'E	102	105
23	0810L	11-NOV-1983	33°05.6'S 152°06.6'E	126	134
24	1031L	11-NOV-1983	33°09.8'S 152°14.6'E	142	150
25	1225L	11-NOV-1983	33°12.0'S 152°17.2'E	192	205
26	1335L	11-NOV-1983	33°12.8'S 152°18.0'E	284	306
27	1455L	11-NOV-1983	33°13.2'S 152°19.6'E	452	529
28	1705L	11-NOV-1983	33°15.5'S 152°21.3'E	852	935
29	1911L	11-NOV-1983	33°15.2'S 152°24.3'E	1154	1235
30	2133L	11-NOV-1983	33°18.9'S 152°29.0'E	1506	2500
31	0015L	12-NOV-1983	33°26.3'S 152°37.7'E	922	4080
32	0325L	12-NOV-1983	33°27.5'S 152°43.0'E	1302	4800
33	0640L	12-NOV-1983	33°29.6'S 152°52.2'E	1502	4830
34	0900L	12-NOV-1983	33°36.5'S 153°01.2'E	1502	4865
35	2230L	12-NOV-1983	34°05.2'S 151°10.5'E	20	32
36	2309L	12-NOV-1983	34°05.6'S 151°11.2'E	34	50
37	2340L	12-NOV-1983	34°05.6'S 151°12.3'E	52	73
38	0025L	13-NOV-1983	34°05.9'S 151°12.4'E	72	85
39	0125L	13-NOV-1983	34°06.7'S 151°13.5'E	104	113
40	0245L	13-NOV-1983	34°08.5'S 151°16.7'E	126	136

Table 4.3 (continued)

(Times in zone 'L' = UTC + 11 hours)

Station	Time	Date	Position		Cast Depth	Bottom Depth
41	0400L	13-NOV-1983	34°11.1'S	151°23.0'E	144	154
42	0455L	13-NOV-1983	34°12.7'S	151°24.6'E	196	210
43	0555L	13-NOV-1983	34°13.4'S	151°26.7'E	282	308
44	0700L	13-NOV-1983	34°14.0'S	151°29.1'E	452	515
45	0850L	13-NOV-1983	34°15.8'S	151°33.7'E	806	872
46	1040L	13-NOV-1983	34°16.6'S	151°37.1'E	1154	1258
48	1400L	13-NOV-1983	34°20.9'S	151°44.2'E	1502	2100
49	1605L	13-NOV-1983	34°25.1'S	151°51.3'E	1504	3800
50	1955L	13-NOV-1983	34°45.1'S	152°09.0'E	1504	4874
51	2215L	13-NOV-1983	34°41.0'S	151°59.8'E	1504	4870
52	0032L	14-NOV-1983	34°38.6'S	151°51.2'E	1266	4880
53	0235L	14-NOV-1983	34°35.8'S	151°41.6'E	1502	2960
54	0445L	14-NOV-1983	34°30.5'S	151°31.9'E	1502	1620
55	0707L	14-NOV-1983	34°27.3'S	151°26.6'E	1152	1212
56	0847L	14-NOV-1983	34°26.0'S	151°24.4'E	804	976
57	1022L	14-NOV-1983	34°24.3'S	151°22.0'E	454	500
58	1922L	14-NOV-1983	34°14.2'S	150°59.8'E	16	20
59	2006L	14-NOV-1983	34°14.3'S	151°01.4'E	30	46
60	2105L	14-NOV-1983	34°16.6'S	151°04.8'E	52	62
61	2212L	14-NOV-1983	34°17.8'S	151°06.5'E	72	89
62	2310L	14-NOV-1983	34°18.2'S	151°08.5'E	102	125
63	0020L	15-NOV-1983	34°19.6'S	151°11.4'E	126	135
64	0145L	15-NOV-1983	34°22.1'S	151°14.2'E	140	150
65	0250L	15-NOV-1983	34°24.5'S	151°17.3'E	192	218
66	0355L	15-NOV-1983	34°24.8'S	151°19.7'E	278	320
67	0510L	15-NOV-1983	34°25.2'S	151°21.8'E	448	548
68	0958L	15-NOV-1983	34°44.5'S	152°00.1'E	1288	4861
69	1253L	15-NOV-1983	34°58.2'S	151°57.8'E	1476	4874
70	1535L	15-NOV-1983	35°14.7'S	152°00.4'E	1506	4874
71	1825L	15-NOV-1983	35°30.6'S	151°59.4'E	1476	4903
72	2110L	15-NOV-1983	35°43.8'S	151°58.7'E	1500	4892
73	0022L	16-NOV-1983	35°59.2'S	151°58.9'E	1430	4709
74	0425L	16-NOV-1983	36°15.2'S	152°01.0'E	1356	4773
75	0824L	16-NOV-1983	36°31.5'S	152°01.9'E	1512	4810
76	1127L	16-NOV-1983	36°45.3'S	152°00.9'E	1504	4810
77	1420L	16-NOV-1983	37°01.2'S	152°01.6'E	1502	4820
78	1715L	16-NOV-1983	37°15.5'S	152°00.1'E	1504	4800
79	2122L	16-NOV-1983	37°29.3'S	151°33.3'E	1500	4903
80	0802L	18-NOV-1983	37°30.6'S	149°59.4'E	22	40
81	0905L	18-NOV-1983	37°30.5'S	150°00.6'E	22	63

Table 4.3 (continued)

(Times in zone 'L' = UTC + 11 hours)

Station	Time	Date	Position		Cast Depth	Bottom Depth
82	0947L	18-NOV-1983	37°30.8'S	150°01.8'E	72	92
83	1048L	18-NOV-1983	37°31.1'S	150°03.5'E	98	106
84	0000L	19-NOV-1983	36°23.2'S	152°12.8'E	1492	4832
85	0300L	19-NOV-1983	36°14.8'S	151°54.8'E	1502	4832
86	0540L	19-NOV-1983	36°08.2'S	151°38.2'E	1542	4825
87	0915L	19-NOV-1983	36°00.6'S	151°23.5'E	1506	4833
88	1155L	19-NOV-1983	35°52.9'S	151°08.4'E	1504	4849
89	1430L	19-NOV-1983	35°47.5'S	150°52.2'E	1502	3248
90	1715L	19-NOV-1983	35°43.5'S	150°47.4'E	1504	2375
91	1900L	19-NOV-1983	35°41.1'S	150°44.3'E	1058	1166
92	2041L	19-NOV-1983	35°40.2'S	150°43.2'E	834	1000
93	2218L	19-NOV-1983	35°39.3'S	150°41.7'E	452	580
94	2340L	19-NOV-1983	35°38.6'S	150°40.9'E	282	450
95	0040L	20-NOV-1983	35°38.0'S	150°39.7'E	190	251
96	0145L	20-NOV-1983	35°38.2'S	150°38.4'E	140	161
97	0235L	20-NOV-1983	35°38.1'S	150°38.0'E	128	155
98	0420L	20-NOV-1983	35°33.2'S	150°29.1'E	102	119
99	0530L	20-NOV-1983	35°32.4'S	150°27.8'E	70	91
100	0605L	20-NOV-1983	35°32.3'S	150°26.5'E	52	76
101	0645L	20-NOV-1983	35°32.4'S	150°26.2'E	30	55
102	0725L	20-NOV-1983	35°32.0'S	150°25.4'E	20	38
103	1845L	20-NOV-1983	34°14.4'S	150°59.8'E	16	27
104	1912L	20-NOV-1983	34°14.4'S	151°01.3'E	32	48
105	2012L	20-NOV-1983	34°16.3'S	151°04.3'E	52	66
106	2102L	20-NOV-1983	34°17.3'S	151°06.3'E	66	70
107	2155L	20-NOV-1983	34°17.7'S	151°08.5'E	102	127
108	2308L	20-NOV-1983	34°19.5'S	151°11.5'E	126	138
109	0012L	21-NOV-1983	34°20.6'S	151°13.3'E	140	148
110	0130L	21-NOV-1983	34°22.8'S	151°17.8'E	190	201
111	0230L	21-NOV-1983	34°23.0'S	151°20.3'E	280	300
112	0330L	21-NOV-1983	34°24.2'S	151°22.2'E	454	509
113	0505L	21-NOV-1983	34°25.4'S	151°24.4'E	822	873
114	0645L	21-NOV-1983	34°27.4'S	151°27.6'E	1200	1289
115	0906L	21-NOV-1983	34°30.1'S	151°35.0'E	1504	2416
116	1128L	21-NOV-1983	34°33.6'S	151°43.0'E	1508	3192
117	1400L	21-NOV-1983	34°37.9'S	151°52.2'E	1500	4348
118	1620L	21-NOV-1983	34°42.4'S	151°59.6'E	1504	4866
119	1905L	21-NOV-1983	34°46.7'S	152°07.7'E	1502	4855

**Table 4.4** Station list for cruise Sp16/83

(Times in zone 'L' = UTC + 11 hours)

Station	Time	Date	Position		Cast Depth	Bottom Depth
1	0534L	08-DEC-1983	32°55.3'S	151°49.0'E	20	29
2	0614L	08-DEC-1983	32°56.1'S	151°51.3'E	30	38
3	0700L	08-DEC-1983	32°57.6'S	151°53.2'E	52	63
4	0809L	08-DEC-1983	32°58.8'S	151°53.5'E	70	85
5	0916L	08-DEC-1983	33°00.0'S	151°57.2'E	102	116
6	1125L	08-DEC-1983	33°04.6'S	152°07.0'E	128	135
7	1325L	08-DEC-1983	33°09.0'S	152°14.3'E	142	150
8	1452L	08-DEC-1983	33°11.3'S	152°17.4'E	194	209
9	1626L	08-DEC-1983	33°12.8'S	152°17.8'E	292	302
10	1748L	08-DEC-1983	33°13.3'S	152°18.7'E	456	477
11	1910L	08-DEC-1983	33°14.5'S	152°22.2'E	840	883
12	2130L	08-DEC-1983	33°16.5'S	152°24.1'E	1184	1508
13	2344L	08-DEC-1983	33°17.6'S	152°27.3'E	1316	1900
14	0301L	09-DEC-1983	33°24.2'S	152°34.0'E	1502	3229
15	0553L	09-DEC-1983	33°28.9'S	152°41.0'E	1512	4294
16	0910L	09-DEC-1983	33°33.1'S	152°49.8'E	1454	4841
17	1200L	09-DEC-1983	33°37.1'S	152°58.3'E	1502	4834
18	1912L	11-DEC-1983	34°16.1'S	151°37.3'E	1102	1211
19	2102L	11-DEC-1983	34°16.5'S	151°34.0'E	842	867
20	2240L	11-DEC-1983	34°14.6'S	151°29.9'E	486	556
21	0000L	12-DEC-1983	34°13.6'S	151°27.1'E	294	331
22	0119L	12-DEC-1983	34°13.6'S	151°24.5'E	200	210
23	0236L	12-DEC-1983	34°11.7'S	151°23.6'E	146	155
24	0348L	12-DEC-1983	34°09.3'S	151°19.8'E	128	135
25	0512L	12-DEC-1983	34°06.5'S	151°13.2'E	98	103
26	0615L	12-DEC-1983	34°06.0'S	151°12.4'E	70	77
27	0656L	12-DEC-1983	34°05.0'S	151°11.6'E	40	42
28	0758L	12-DEC-1983	34°04.8'S	151°11.2'E	34	38
29	0820L	12-DEC-1983	34°05.0'S	151°10.8'E	18	22
30	1608L	12-DEC-1983	34°14.2'S	150°59.8'E	20	31
31	1707L	12-DEC-1983	34°14.8'S	151°01.9'E	32	47
32	1800L	12-DEC-1983	34°16.0'S	151°04.0'E	54	61
33	1904L	12-DEC-1983	34°17.5'S	151°06.5'E	70	89
34	2003L	12-DEC-1983	34°18.0'S	151°08.0'E	106	120
35	2122L	12-DEC-1983	34°19.6'S	151°11.0'E	122	136
36	2230L	12-DEC-1983	34°21.5'S	151°14.6'E	142	152
37	2347L	12-DEC-1983	34°23.8'S	151°18.0'E	192	204
38	0049L	13-DEC-1983	34°24.5'S	151°19.4'E	288	301
39	0202L	13-DEC-1983	34°25.4'S	151°21.5'E	454	524
40	0859L	13-DEC-1983	34°26.4'S	151°24.0'E	820	850

Table 4.4 (continued)

(Times in zone 'L' = UTC + 11 hours)

Station	Time	Date	Position		Cast Depth	Bottom Depth
41	1022L	13-DEC-1983	34°27.5'S	151°26.0'E	1112	1200
42	1258L	13-DEC-1983	34°29.3'S	151°34.9'E	1502	2066
43	1538L	13-DEC-1983	34°33.6'S	151°42.1'E	1506	3107
44	1805L	13-DEC-1983	34°37.7'S	151°50.7'E	1500	4500
45	2021L	13-DEC-1983	34°39.8'S	151°59.6'E	1504	4870
46	1418L	15-DEC-1983	37°30.3'S	149°59.5'E	20	31
47	1455L	15-DEC-1983	37°30.7'S	150°00.2'E	50	65
48	1549L	15-DEC-1983	37°30.8'S	150°01.8'E	74	91
49	1720L	15-DEC-1983	37°32.5'S	150°04.9'E	96	106
50	1842L	15-DEC-1983	37°33.4'S	150°08.5'E	132	135
51	1940L	15-DEC-1983	37°32.8'S	150°11.5'E	142	158
52	2106L	15-DEC-1983	37°32.9'S	150°14.3'E	194	207
53	2158L	15-DEC-1983	37°33.4'S	150°15.4'E	294	310
54	2327L	15-DEC-1983	37°33.3'S	150°18.3'E	452	510
55	0048L	16-DEC-1983	37°34.1'S	150°22.3'E	1156	1600
56	0230L	16-DEC-1983	37°34.5'S	150°25.2'E	1502	2700
57	0430L	16-DEC-1983	37°35.8'S	150°33.1'E	1506	3559
58	0639L	16-DEC-1983	37°38.5'S	150°42.2'E	1526	4633
59	0851L	16-DEC-1983	37°38.4'S	150°51.9'E	1522	4651
60	1105L	16-DEC-1983	37°39.1'S	151°01.7'E	1518	4650
61	1400L	16-DEC-1983	37°45.2'S	150°56.0'E	1500	4630
62	1715L	16-DEC-1983	37°44.7'S	150°44.0'E	1504	4600
63	1153L	18-DEC-1983	35°00.7'S	150°51.0'E	16	35
64	1219L	18-DEC-1983	35°00.5'S	150°51.5'E	26	47
65	1310L	18-DEC-1983	35°00.5'S	150°52.4'E	52	62
66	1405L	18-DEC-1983	35°00.2'S	150°53.5'E	72	84
67	1512L	18-DEC-1983	35°02.0'S	150°55.0'E	106	112
68	1720L	18-DEC-1983	35°04.8'S	151°00.3'E	124	140
69	1815L	18-DEC-1983	35°05.2'S	151°00.5'E	138	148
70	1915L	18-DEC-1983	35°05.6'S	151°01.6'E	192	208
71	2021L	18-DEC-1983	35°05.6'S	151°03.3'E	282	309
72	2135L	18-DEC-1983	35°05.8'S	151°04.0'E	458	524
73	2303L	18-DEC-1983	35°06.7'S	151°07.2'E	278	890
74	0048L	19-DEC-1983	35°08.0'S	151°10.1'E	1214	1290
75	0248L	19-DEC-1983	35°09.5'S	151°15.7'E	1522	2000
76	0515L	19-DEC-1983	35°12.9'S	151°24.5'E	1516	3329
77	1601L	19-DEC-1983	34°14.2'S	151°00.1'E	16	21
78	1638L	19-DEC-1983	34°14.8'S	151°01.6'E	32	42
79	1732L	19-DEC-1983	34°16.6'S	151°04.3'E	50	56
80	1838L	19-DEC-1983	34°16.9'S	151°06.4'E	70	82

Table 4.4 (continued)

(Times in zone 'L' = UTC + 11 hours)

Station	Time	Date	Position		Cast Depth	Bottom Depth
81	1935L	19-DEC-1983	34°18.2'S	151°08.3'E	102	120
82	2057L	19-DEC-1983	34°19.3'S	151°11.5'E	128	134
83	2216L	19-DEC-1983	34°21.4'S	151°14.2'E	140	150
84	2319L	19-DEC-1983	34°22.0'S	151°19.2'E	198	217
85	0020L	20-DEC-1983	34°23.0'S	151°20.7'E	300	308
86	0130L	20-DEC-1983	34°24.5'S	151°22.3'E	500	600
87	0243L	20-DEC-1983	34°25.4'S	151°24.7'E	802	890
88	0415L	20-DEC-1983	34°26.4'S	151°29.2'E	1004	1290
89	0558L	20-DEC-1983	34°29.7'S	151°34.1'E	1478	2032
90	0830L	20-DEC-1983	34°33.9'S	151°42.5'E	1520	3355
91	1058L	20-DEC-1983	34°38.6'S	151°52.0'E	1504	4880
92	1327L	20-DEC-1983	34°43.9'S	152°01.5'E	1546	4852
93	1553L	20-DEC-1983	34°49.3'S	152°10.8'E	1492	4844
95	0258L	21-DEC-1983	34°24.2'S	151°51.7'E	1506	3100
96	0536L	21-DEC-1983	34°19.2'S	151°42.8'E	1526	2034
97	0732L	21-DEC-1983	34°16.4'S	151°37.0'E	1176	1270
98	0858L	21-DEC-1983	34°16.1'S	151°34.0'E	808	831
99	1020L	21-DEC-1983	34°14.5'S	151°29.2'E	458	560
100	1132L	21-DEC-1983	34°13.4'S	151°27.4'E	298	330
101	1250L	21-DEC-1983	34°12.9'S	151°24.9'E	188	202
102	1345L	21-DEC-1983	34°13.1'S	151°22.9'E	142	156
103	1457L	21-DEC-1983	34°10.6'S	151°18.5'E	124	136
104	1724L	21-DEC-1983	34°07.3'S	151°13.3'E	100	107
105	1822L	21-DEC-1983	34°06.1'S	151°12.2'E	72	87
106	1910L	21-DEC-1983	34°05.2'S	151°12.1'E	54	66
108	1958L	21-DEC-1983	34°05.6'S	151°11.7'E	30	39
109	2035L	21-DEC-1983	34°05.2'S	151°10.8'E	16	26

**Table 4.5** Station list for cruise Sp01/84

(Times in zone 'L' = UTC + 11 hours)

Station	Time	Date	Position		Cast Depth	Bottom Depth
1	1025L	10-JAN-1984	34°05.5'S	151°11.0'E	16	25
2	1110L	10-JAN-1984	34°05.6'S	151°11.6'E	36	50
3	1210L	10-JAN-1984	34°05.7'S	151°12.1'E	54	74
4	1325L	10-JAN-1984	34°06.2'S	151°12.2'E	72	85
5	1440L	10-JAN-1984	34°06.3'S	151°13.9'E	100	105
6	1615L	10-JAN-1984	34°09.6'S	151°19.2'E	126	135
7	1725L	10-JAN-1984	34°11.5'S	151°22.7'E	142	150
8	1825L	10-JAN-1984	34°11.9'S	151°25.2'E	190	200
9	1940L	10-JAN-1984	34°12.8'S	151°27.7'E	298	340
10	2101L	10-JAN-1984	34°13.9'S	151°29.2'E	452	512
11	2309L	10-JAN-1984	34°15.8'S	151°33.4'E	812	828
12	0125L	11-JAN-1984	34°17.2'S	151°37.4'E	1304	1430
13	0315L	11-JAN-1984	34°20.6'S	151°41.5'E	1090	2070
14	0540L	11-JAN-1984	34°25.6'S	151°51.8'E	1272	3200
15	0910L	11-JAN-1984	34°47.2'S	152°08.0'E	1508	4874
16	1205L	11-JAN-1984	34°43.5'S	151°59.0'E	1486	4850
17	1435L	11-JAN-1984	34°41.5'S	151°48.9'E	1356	4300
18	1705L	11-JAN-1984	34°36.2'S	151°40.4'E	1304	3100
19	1916L	11-JAN-1984	34°30.7'S	151°34.1'E	1498	1860
20	2132L	11-JAN-1984	34°27.5'S	151°27.8'E	1144	1477
21	2339L	11-JAN-1984	34°23.8'S	151°28.8'E	852	880
22	0125L	12-JAN-1984	34°24.3'S	151°22.2'E	452	500
23	0240L	12-JAN-1984	34°23.3'S	151°19.8'E	290	300
24	0400L	12-JAN-1984	34°22.0'S	151°18.7'E	188	200
25	0500L	12-JAN-1984	34°20.7'S	151°15.8'E	142	150
26	0605L	12-JAN-1984	34°19.1'S	151°11.6'E	126	135
27	0700L	12-JAN-1984	34°17.4'S	151°09.1'E	100	110
28	0849L	12-JAN-1984	34°16.9'S	151°06.5'E	72	79
29	1000L	12-JAN-1984	34°16.2'S	151°04.6'E	50	54
30	1105L	12-JAN-1984	34°14.9'S	151°01.5'E	38	44
31	1130L	12-JAN-1984	34°14.2'S	151°00.3'E	24	25
32	2252L	12-JAN-1984	32°56.2'S	151°48.6'E	22	26
33	2340L	12-JAN-1984	32°56.8'S	151°51.0'E	34	38
34	0032L	13-JAN-1984	32°57.5'S	151°53.4'E	54	59
35	0125L	13-JAN-1984	32°58.5'S	151°55.0'E	72	80
36	0210L	13-JAN-1984	32°59.2'S	151°57.3'E	102	105
37	0340L	13-JAN-1984	33°04.4'S	152°08.1'E	126	135
38	0505L	13-JAN-1984	33°08.5'S	152°14.5'E	140	145
39	0610L	13-JAN-1984	33°12.6'S	152°18.3'E	230	270
40	0722L	13-JAN-1984	33°13.5'S	152°18.3'E	296	308

Table 4.5 (continued)

(Times in zone 'L' = UTC + 11 hours)

Station	Time	Date	Position	Cast Depth	Bottom Depth
41	0900L	13-JAN-1984	33°14.0'S 152°20.0'E	450	557
42	1040L	13-JAN-1984	33°15.7'S 152°20.4'E	854	876
43	1244L	13-JAN-1984	33°16.3'S 152°23.2'E	1052	1215
44	1445L	13-JAN-1984	33°17.5'S 152°26.5'E	1212	2100
45	1710L	13-JAN-1984	33°20.7'S 152°35.6'E	1502	3000
46	1915L	13-JAN-1984	33°26.4'S 152°43.9'E	1492	4308
47	2148L	13-JAN-1984	33°31.4'S 152°51.8'E	1502	4830
48	2357L	13-JAN-1984	33°36.3'S 152°59.4'E	1500	4823
49	1700L	14-JAN-1984	35°00.8'S 150°51.2'E	32	35
50	1735L	14-JAN-1984	35°01.2'S 150°51.8'E	50	55
51	1820L	14-JAN-1984	35°01.2'S 150°52.5'E	70	80
52	1925L	14-JAN-1984	35°01.9'S 150°55.8'E	100	108
53	2048L	14-JAN-1984	35°03.4'S 150°58.9'E	130	134
54	2215L	14-JAN-1984	35°05.0'S 151°01.3'E	140	149
55	2310L	14-JAN-1984	35°04.5'S 151°02.1'E	192	210
56	0002L	15-JAN-1984	35°05.6'S 151°02.9'E	290	302
57	0110L	15-JAN-1984	35°06.4'S 151°03.9'E	448	530
58	0230L	15-JAN-1984	35°07.0'S 151°06.7'E	802	900
59	0405L	15-JAN-1984	35°07.4'S 151°09.7'E	1148	1200
60	0605L	15-JAN-1984	35°09.5'S 151°15.8'E	1514	2000
61	0820L	15-JAN-1984	35°13.9'S 151°24.0'E	1502	2900
62	1100L	15-JAN-1984	35°18.6'S 151°34.4'E	1510	4880
63	1330L	15-JAN-1984	35°23.1'S 151°40.9'E	1498	4870
64	1610L	15-JAN-1984	35°29.6'S 151°51.5'E	1150	4851
65	0802L	16-JAN-1984	37°30.9'S 150°00.0'E	22	32
66	0900L	16-JAN-1984	37°30.9'S 150°01.0'E	56	60
67	1012L	16-JAN-1984	37°31.2'S 150°03.0'E	72	88
68	1110L	16-JAN-1984	37°30.7'S 150°04.8'E	94	102
69	1320L	16-JAN-1984	37°31.6'S 150°09.2'E	122	132
70	1435L	16-JAN-1984	37°32.8'S 150°12.0'E	142	150
71	1625L	16-JAN-1984	37°32.8'S 150°14.8'E	204	220
72	1735L	16-JAN-1984	37°32.4'S 150°15.9'E	286	295
73	1840L	16-JAN-1984	37°33.2'S 150°18.7'E	450	500
74	2011L	16-JAN-1984	37°33.5'S 150°22.0'E	1154	1275
75	2157L	16-JAN-1984	37°33.0'S 150°23.7'E	1500	2418
76	0015L	17-JAN-1984	37°34.4'S 150°33.3'E	1506	3000
77	0235L	17-JAN-1984	37°37.6'S 150°42.0'E	1502	4600
78	1112L	17-JAN-1984	37°28.6'S 152°00.0'E	1012	4756
79	1400L	17-JAN-1984	37°08.1'S 152°14.0'E	1004	4700
80	1700L	17-JAN-1984	36°47.4'S 152°26.3'E	1012	4830



Table 4.5 (continued)

(Times in zone 'L' = UTC + 11 hours)

Station	Time	Date	Position	Cast Depth	Bottom Depth
81	1958L	17-JAN-1984	36°30.9'S 152°42.2'E	994	4818
82	2303L	17-JAN-1984	36°20.5'S 153°01.8'E	1010	4812
83	0230L	18-JAN-1984	36°03.7'S 153°21.2'E	998	4750
84	0520L	18-JAN-1984	35°41.6'S 153°34.2'E	986	4840
85	0906L	18-JAN-1984	35°36.2'S 154°04.5'E	1476	4805
86	1115L	18-JAN-1984	35°37.7'S 153°58.4'E	1516	4503
87	1325L	18-JAN-1984	35°37.4'S 153°52.5'E	1360	4812
88	1520L	18-JAN-1984	35°31.6'S 153°42.9'E	1466	4840
89	1750L	18-JAN-1984	35°28.8'S 153°33.7'E	1504	4833
90	2007L	18-JAN-1984	35°25.3'S 153°28.6'E	1488	4818
91	2220L	18-JAN-1984	35°22.2'S 153°18.4'E	1516	4828
92	0120L	19-JAN-1984	35°11.2'S 152°57.8'E	1506	4832
93	0425L	19-JAN-1984	35°03.6'S 152°36.1'E	1526	4837
94	0724L	19-JAN-1984	34°52.0'S 152°18.2'E	1490	4839
95	0953L	19-JAN-1984	34°46.3'S 152°08.4'E	1496	4840
96	1203L	19-JAN-1984	34°43.7'S 152°01.8'E	1500	4844
97	1435L	19-JAN-1984	34°39.6'S 151°51.0'E	1494	4764
98	1710L	19-JAN-1984	34°35.1'S 151°41.2'E	1344	3020
100	2158L	19-JAN-1984	34°32.6'S 151°33.4'E	1228	2025
101	0102L	20-JAN-1984	34°28.3'S 151°28.5'E	1152	1352
102	0315L	20-JAN-1984	34°25.0'S 151°25.3'E	808	860
103	0440L	20-JAN-1984	34°24.5'S 151°21.9'E	474	520
104	0550L	20-JAN-1984	34°21.9'S 151°21.3'E	296	308
105	0650L	20-JAN-1984	34°22.0'S 151°19.0'E	198	214
106	0745L	20-JAN-1984	34°20.5'S 151°15.1'E	142	149
107	0829L	20-JAN-1984	34°19.3'S 151°11.6'E	126	134
108	0925L	20-JAN-1984	34°18.0'S 151°08.3'E	102	110
109	1012L	20-JAN-1984	34°17.5'S 151°06.2'E	72	79
110	1051L	20-JAN-1984	34°16.5'S 151°05.0'E	52	62
111	1126L	20-JAN-1984	34°15.0'S 151°02.2'E	30	48
112	1156L	20-JAN-1984	34°14.0'S 151°00.0'E	26	30
113	1455L	22-JAN-1984	32°56.0'S 151°48.1'E	16	24
114	1540L	22-JAN-1984	32°55.8'S 151°50.9'E	30	35
115	1610L	22-JAN-1984	32°57.8'S 151°52.8'E	52	56
116	1705L	22-JAN-1984	32°59.1'S 151°53.5'E	70	85
117	1755L	22-JAN-1984	33°00.1'S 151°55.7'E	102	110
118	1925L	22-JAN-1984	33°04.7'S 152°07.8'E	126	136
119	2100L	22-JAN-1984	33°09.8'S 152°17.2'E	130	155
120	2205L	22-JAN-1984	33°11.0'S 152°18.0'E	192	206
121	2255L	22-JAN-1984	33°12.6'S 152°19.0'E	290	314

Table 4.5 (continued)

(Times in zone 'L' = UTC + 11 hours)

Station	Time	Date	Position	Cast Depth	Bottom Depth
122	0005L	23-JAN-1984	33°12.9'S 152°19.7'E	470	549
123	0135L	23-JAN-1984	33°14.7'S 152°21.9'E	728	880
124	0315L	23-JAN-1984	33°15.4'S 152°23.8'E	1054	1200
125	0505L	23-JAN-1984	33°17.1'S 152°28.0'E	1480	2000
126	0655L	23-JAN-1984	33°21.2'S 152°30.9'E	1488	2760
127	0858L	23-JAN-1984	33°24.3'S 152°33.8'E	1476	3144
128	1125L	23-JAN-1984	33°23.5'S 152°46.4'E	1466	4436
129	1400L	23-JAN-1984	33°31.4'S 152°54.8'E	1508	4831
130	1540L	23-JAN-1984	33°32.4'S 152°54.5'E	1180	4830
131	1710L	23-JAN-1984	33°36.0'S 152°59.8'E	1510	4825
132	1900L	23-JAN-1984	33°39.5'S 153°06.3'E	1508	4805

**Table 4.6** Station list for cruise Sp02/84

(Times in zone 'L' = UTC + 11 hours)

Station	Time	Date	Position	Cast Depth	Bottom Depth
1	1420L	09-FEB-1984	34°14.0'S 150°59.8'E	0	20
2	1500L	09-FEB-1984	34°14.3'S 151°01.5'E	30	35
3	1550L	09-FEB-1984	34°15.2'S 151°04.3'E	52	55
4	1700L	09-FEB-1984	34°17.6'S 151°06.6'E	72	80
5	1745L	09-FEB-1984	34°18.4'S 151°07.6'E	100	110
6	1903L	09-FEB-1984	34°19.2'S 151°11.9'E	126	134
7	2007L	09-FEB-1984	34°21.3'S 151°14.6'E	142	150
8	2107L	09-FEB-1984	34°21.7'S 151°18.8'E	190	208
9	2211L	09-FEB-1984	34°23.7'S 151°19.9'E	292	320
10	2320L	09-FEB-1984	34°24.0'S 151°21.8'E	450	524
11	0040L	10-FEB-1984	34°26.0'S 151°24.4'E	800	860
12	0205L	10-FEB-1984	34°28.1'S 151°25.9'E	1180	1240
13	0405L	10-FEB-1984	34°31.1'S 151°34.8'E	1496	2100
15	1510L	11-FEB-1984	37°30.5'S 149°59.4'E	16	20
16	1545L	11-FEB-1984	37°30.6'S 150°00.2'E	50	55
17	1625L	11-FEB-1984	37°30.8'S 150°01.8'E	72	80
18	1725L	11-FEB-1984	37°31.1'S 150°05.1'E	98	105
19	1829L	11-FEB-1984	37°32.4'S 150°08.7'E	124	136
20	1930L	11-FEB-1984	37°32.3'S 150°12.2'E	140	153
21	2033L	11-FEB-1984	37°33.0'S 150°15.0'E	186	203
22	2126L	11-FEB-1984	37°32.9'S 150°16.4'E	298	337
23	2241L	11-FEB-1984	37°33.2'S 150°18.1'E	454	511
24	0000L	12-FEB-1984	37°34.2'S 150°22.4'E	1070	1240
26	0250L	12-FEB-1984	37°36.0'S 150°26.7'E	1504	2000
27	0505L	12-FEB-1984	37°35.4'S 150°34.0'E	1502	3501
28	0715L	12-FEB-1984	37°36.8'S 150°43.9'E	1482	3500
30	1245L	12-FEB-1984	37°43.3'S 150°56.9'E	1512	4503
31	0711L	13-FEB-1984	36°08.6'S 153°32.6'E	1508	4794
32	1000L	13-FEB-1984	35°59.9'S 153°12.7'E	1494	4824
33	1315L	13-FEB-1984	35°48.4'S 152°52.0'E	1424	4834
34	1600L	13-FEB-1984	35°38.5'S 152°33.8'E	1504	4834
35	1844L	13-FEB-1984	35°30.3'S 152°12.3'E	1506	4837
36	2123L	13-FEB-1984	35°23.7'S 151°51.0'E	1502	4837
37	2314L	13-FEB-1984	35°20.6'S 151°41.7'E	1504	4835
38	0105L	14-FEB-1984	35°18.0'S 151°33.7'E	1502	4790
39	0315L	14-FEB-1984	35°13.1'S 151°24.8'E	1500	3063
40	0515L	14-FEB-1984	35°09.7'S 151°13.8'E	1502	2106
42	0815L	14-FEB-1984	35°08.4'S 151°09.2'E	1158	1217
43	1000L	14-FEB-1984	35°08.1'S 151°05.8'E	806	830
44	1130L	14-FEB-1984	35°05.8'S 151°03.1'E	450	501

Table 4.6 (continued)

(Times in zone 'L' = UTC + 11 hours)

Station	Time	Date	Position		Cast Depth	Bottom Depth
45	1240L	14-FEB-1984	35°05.6'S	151°03.2'E	338	345
46	1345L	14-FEB-1984	35°05.5'S	151°01.8'E	192	200
47	1440L	14-FEB-1984	35°04.4'S	151°01.8'E	140	150
48	1530L	14-FEB-1984	35°04.8'S	150°59.4'E	126	135
49	1720L	14-FEB-1984	35°02.8'S	150°54.0'E	100	110
50	1815L	14-FEB-1984	35°00.1'S	150°53.3'E	76	85
51	1900L	14-FEB-1984	35°01.0'S	150°52.0'E	58	70
52	1935L	14-FEB-1984	35°01.0'S	150°51.5'E	38	46
53	1707L	15-FEB-1984	34°14.0'S	151°00.1'E	14	22
54	1735L	15-FEB-1984	34°14.4'S	151°00.9'E	30	35
55	1816L	15-FEB-1984	34°16.0'S	151°03.8'E	46	55
56	1905L	15-FEB-1984	34°17.0'S	151°06.8'E	72	82
57	1952L	15-FEB-1984	34°18.0'S	151°09.0'E	106	120
58	2100L	15-FEB-1984	34°19.5'S	151°11.2'E	124	136
59	2150L	15-FEB-1984	34°21.8'S	151°14.5'E	138	150
60	2258L	15-FEB-1984	34°19.3'S	151°19.6'E	190	204
61	0000L	16-FEB-1984	34°23.9'S	151°19.8'E	292	300
62	0110L	16-FEB-1984	34°23.9'S	151°22.0'E	450	500
63	0250L	16-FEB-1984	34°24.9'S	151°27.4'E	798	850
64	0420L	16-FEB-1984	34°26.9'S	151°27.9'E	1138	1213
65	0603L	16-FEB-1984	34°27.9'S	151°34.3'E	1498	2049
66	0827L	16-FEB-1984	34°33.6'S	151°42.7'E	1504	3006
67	1039L	16-FEB-1984	34°38.1'S	151°50.9'E	1506	4395
68	1305L	16-FEB-1984	34°42.3'S	152°01.5'E	1506	4950
69	1500L	16-FEB-1984	34°45.5'S	152°08.7'E	1506	4862
70	2202L	16-FEB-1984	34°05.2'S	151°11.0'E	22	27
71	2240L	16-FEB-1984	34°05.3'S	151°11.2'E	26	32
72	2308L	16-FEB-1984	34°05.4'S	151°12.0'E	54	59
73	2353L	16-FEB-1984	34°06.2'S	151°13.0'E	72	80
74	0045L	17-FEB-1984	34°06.3'S	151°14.0'E	102	108
75	0145L	17-FEB-1984	34°07.1'S	151°18.7'E	126	135
76	0245L	17-FEB-1984	34°08.6'S	151°23.8'E	140	150
77	0340L	17-FEB-1984	34°11.0'S	151°26.1'E	188	200
78	0430L	17-FEB-1984	34°11.7'S	151°28.1'E	290	303
79	0525L	17-FEB-1984	34°12.7'S	151°29.9'E	452	500
80	0652L	17-FEB-1984	34°15.8'S	151°34.4'E	806	845
81	0825L	17-FEB-1984	34°18.4'S	151°37.1'E	1204	1290
82	1010L	17-FEB-1984	34°19.7'S	151°42.3'E	1508	2022
83	1220L	17-FEB-1984	34°23.6'S	151°51.1'E	1508	2870
84	2205L	17-FEB-1984	32°55.6'S	151°49.0'E	16	22

Table 4.6 (continued)

(Times in zone 'L' = UTC + 11 hours)

Station	Time	Date	Position		Cast Depth	Bottom Depth
85	2238L	17-FEB-1984	32°56.1'S	151°51.7'E	32	37
86	2310L	17-FEB-1984	32°57.5'S	151°53.5'E	52	61
87	2346L	17-FEB-1984	32°58.3'S	151°54.2'E	72	82
88	0030L	18-FEB-1984	32°59.7'S	151°56.8'E	102	105
89	0200L	18-FEB-1984	33°05.4'S	152°07.2'E	126	135
90	0310L	18-FEB-1984	33°09.8'S	152°14.9'E	136	145
91	0400L	18-FEB-1984	33°11.2'S	152°18.0'E	192	200
92	0450L	18-FEB-1984	33°12.0'S	152°19.1'E	292	305
94	0630L	18-FEB-1984	33°13.3'S	152°19.4'E	444	455
95	0727L	18-FEB-1984	33°13.2'S	152°23.3'E	806	881
96	0856L	18-FEB-1984	33°16.0'S	152°25.6'E	1202	1910
97	1230L	18-FEB-1984	33°19.8'S	152°27.5'E	1506	2600
98	1445L	18-FEB-1984	33°23.3'S	152°35.8'E	1502	3400
99	1705L	18-FEB-1984	33°27.0'S	152°43.2'E	1160	4800
100	1912L	18-FEB-1984	33°31.3'S	152°51.9'E	1502	4800
101	2120L	18-FEB-1984	33°35.7'S	152°59.9'E	1504	4800
102	2109L	19-FEB-1984	34°14.0'S	151°00.4'E	18	19
103	2143L	19-FEB-1984	34°14.8'S	151°01.5'E	38	41
104	2223L	19-FEB-1984	34°15.7'S	151°04.0'E	50	57
105	2310L	19-FEB-1984	34°16.8'S	151°07.1'E	74	85
106	2353L	19-FEB-1984	34°18.4'S	151°07.7'E	102	108
107	0105L	20-FEB-1984	34°18.4'S	151°11.5'E	124	135
108	0210L	20-FEB-1984	34°19.3'S	151°15.1'E	140	150
109	0310L	20-FEB-1984	34°21.1'S	151°19.1'E	192	200
110	0400L	20-FEB-1984	34°22.6'S	151°20.7'E	286	300
111	0500L	20-FEB-1984	34°24.2'S	151°22.4'E	470	500
112	0615L	20-FEB-1984	34°25.3'S	151°27.0'E	770	868
113	0754L	20-FEB-1984	34°26.6'S	151°28.3'E	1152	1278
114	2222L	20-FEB-1984	34°30.3'S	151°33.7'E	1502	1984
115	0045L	21-FEB-1984	34°33.9'S	151°43.4'E	1504	3000
116	0310L	21-FEB-1984	34°35.9'S	151°53.2'E	1520	4586
117	0515L	21-FEB-1984	34°39.8'S	152°01.6'E	1514	4855
118	0726L	21-FEB-1984	34°42.5'S	152°09.8'E	1504	4842
119	1730L	21-FEB-1984	34°14.0'S	151°00.0'E	16	20
120	1755L	21-FEB-1984	34°14.6'S	151°01.1'E	32	38
121	1837L	21-FEB-1984	34°16.0'S	151°04.0'E	50	57
122	1930L	21-FEB-1984	34°17.1'S	151°05.8'E	72	80
123	2009L	21-FEB-1984	34°18.2'S	151°08.3'E	102	109
124	2129L	21-FEB-1984	34°19.7'S	151°13.0'E	126	137
125	2225L	21-FEB-1984	34°20.6'S	151°16.5'E	140	152

Table 4.6 (continued)

(Times in zone 'L' = UTC + 11 hours)

Station	Time	Date	Position		Cast Depth	Bottom Depth
126	2323L	21-FEB-1984	34°22.5'S	151°18.8'E	194	217
127	0015L	22-FEB-1984	34°24.0'S	151°19.3'E	292	300
128	0125L	22-FEB-1984	34°24.5'S	151°21.5'E	452	483
129	0240L	22-FEB-1984	34°26.0'S	151°24.6'E	850	890
130	0405L	22-FEB-1984	34°27.5'S	151°28.4'E	1200	1250
131	0600L	22-FEB-1984	34°30.5'S	151°35.4'E	1504	2314
132	0834L	22-FEB-1984	34°34.2'S	151°43.1'E	1504	3002
133	1126L	22-FEB-1984	34°38.3'S	151°50.7'E	1504	4410
134	1400L	22-FEB-1984	34°42.6'S	152°00.7'E	1502	4851
135	1610L	22-FEB-1984	34°45.8'S	152°10.6'E	1506	4850

Figure 4.1 - 4.43

Vertical sections of sigma-theta (top), salinity (middle) and potential temperature (bottom) for 43 of the 44 CTD sections collected during ACE. The Cape Howe section from cruise SP15/83 is not included as only four stations were completed. Maximum cast pressures are shown by symbols. Station positions are shown by tick marks along the top of each section. Where practicable, station numbers are shown at the very top. Full station lists are in Table 3.

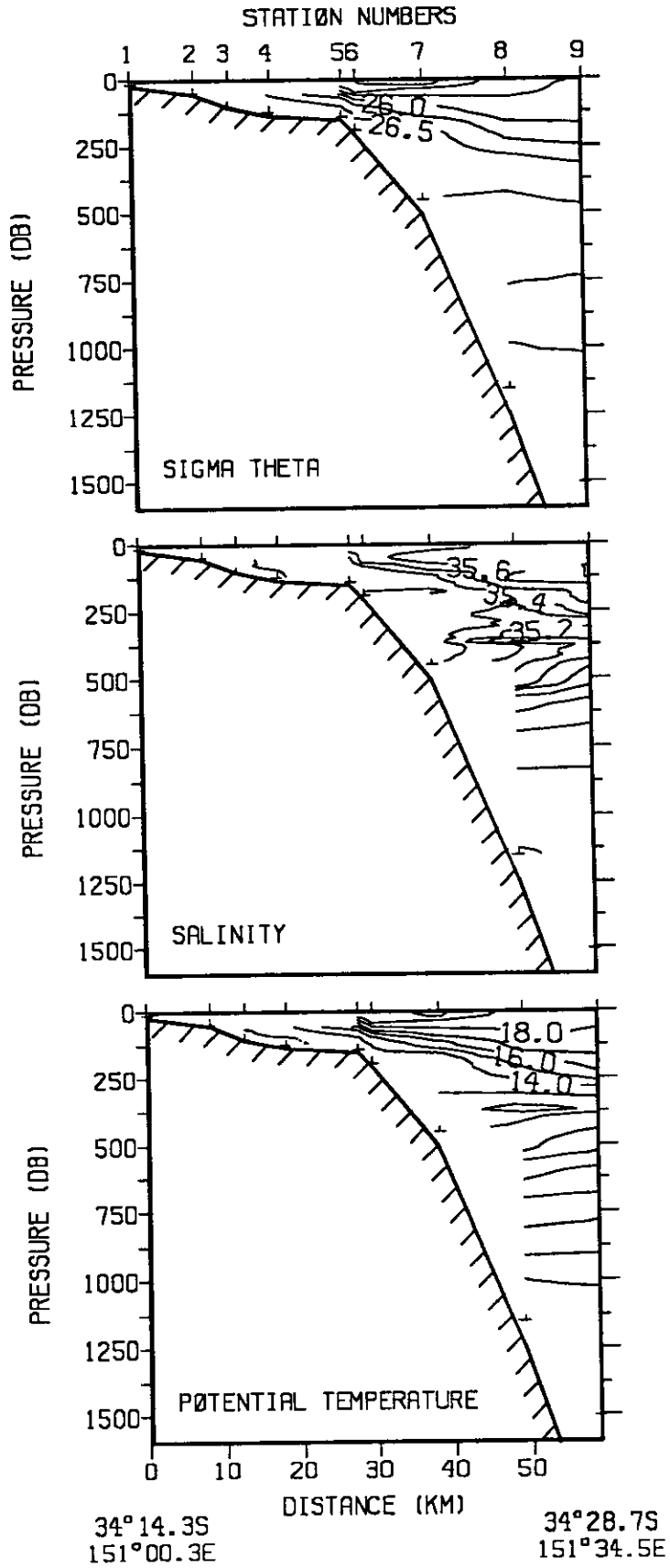


Fig 4.1 Cruise Sp13/83 Stanwell Park  
Section 7-8 September 1983



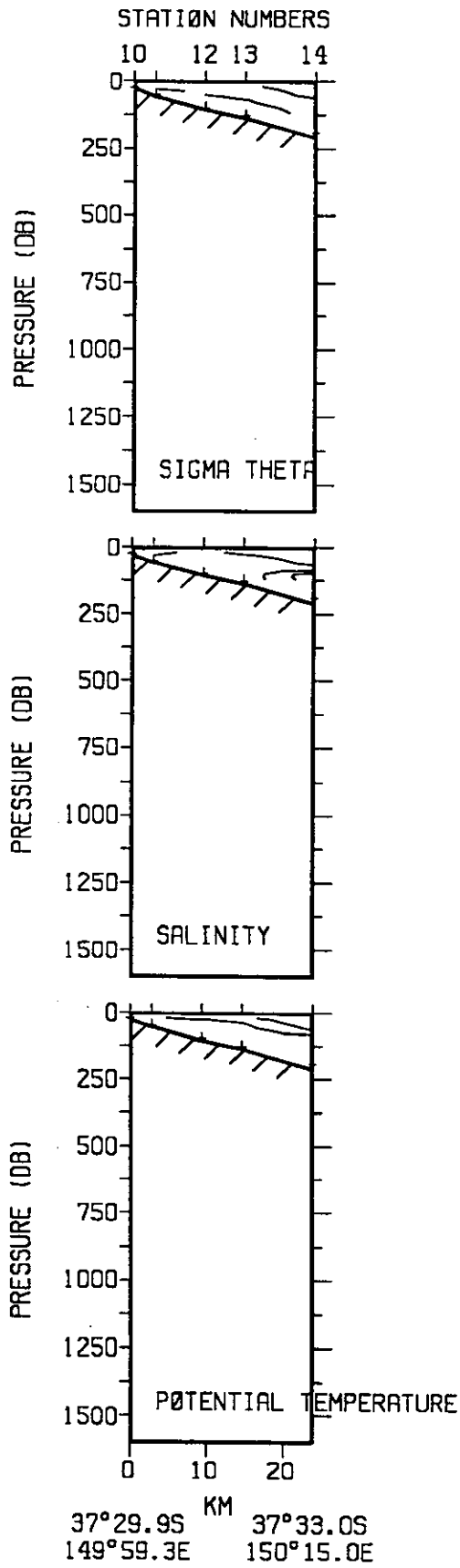


Fig 4.2 Cruise Sp13/83 Cape Howe Section 10 September 1983

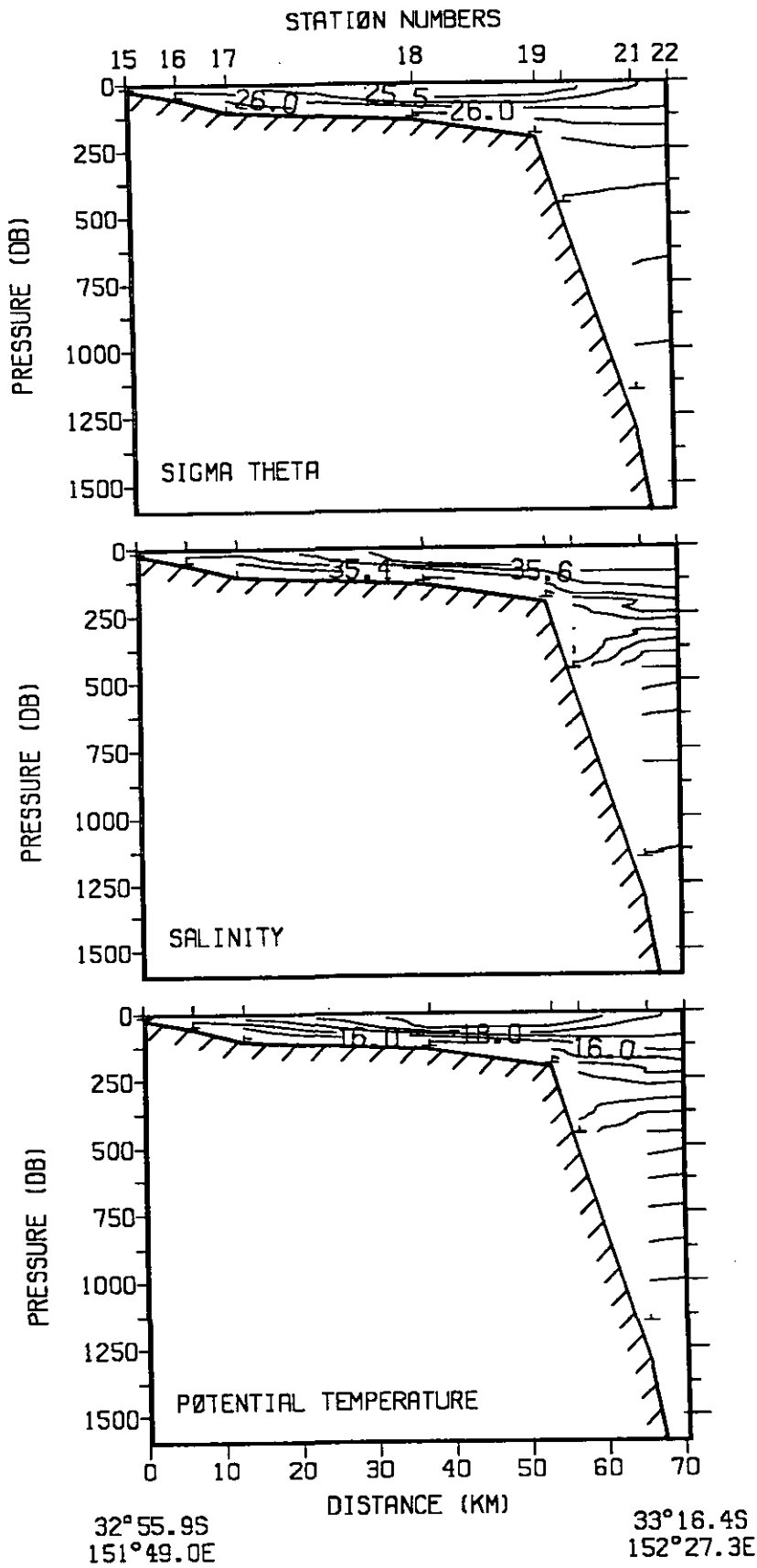


Fig 4.3 Cruise Sp13/83 Newcastle Section 13-14 September 1983

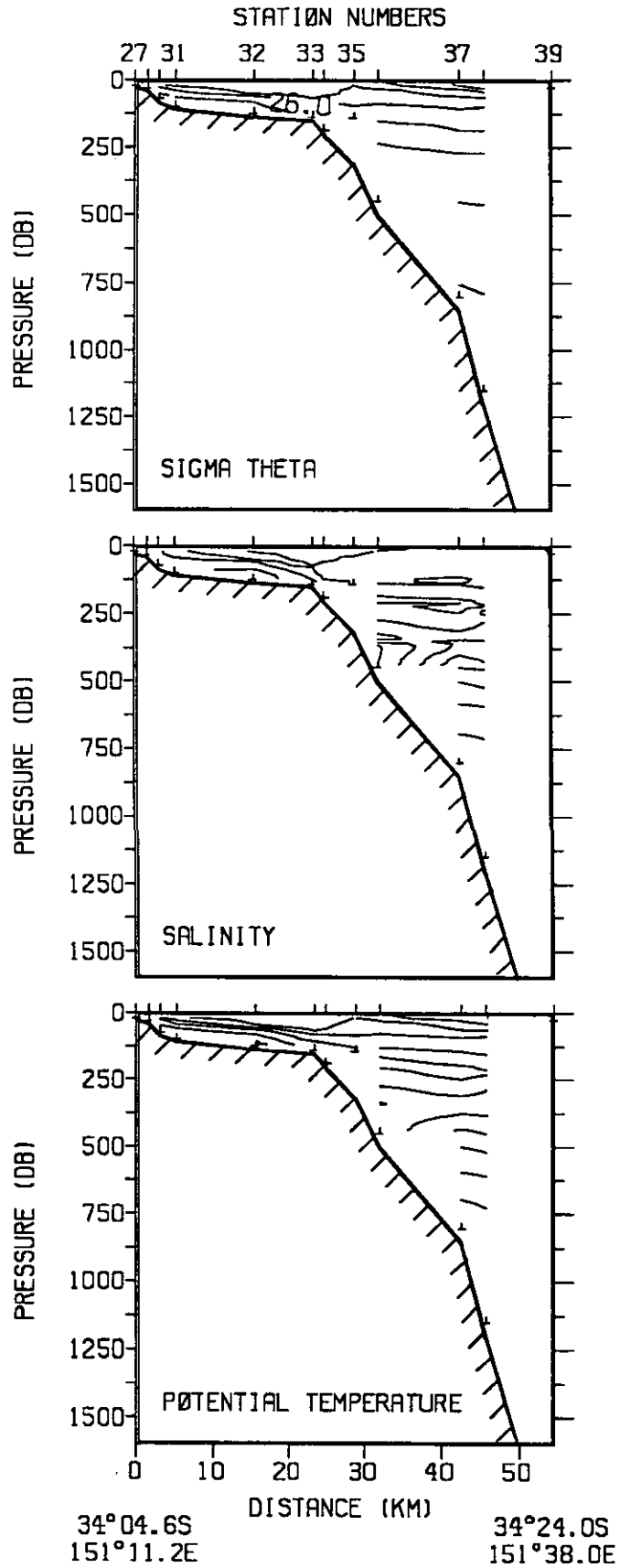


Fig 4.4 Cruise Sp13/83 Cronulla Section 21-23 September 1983

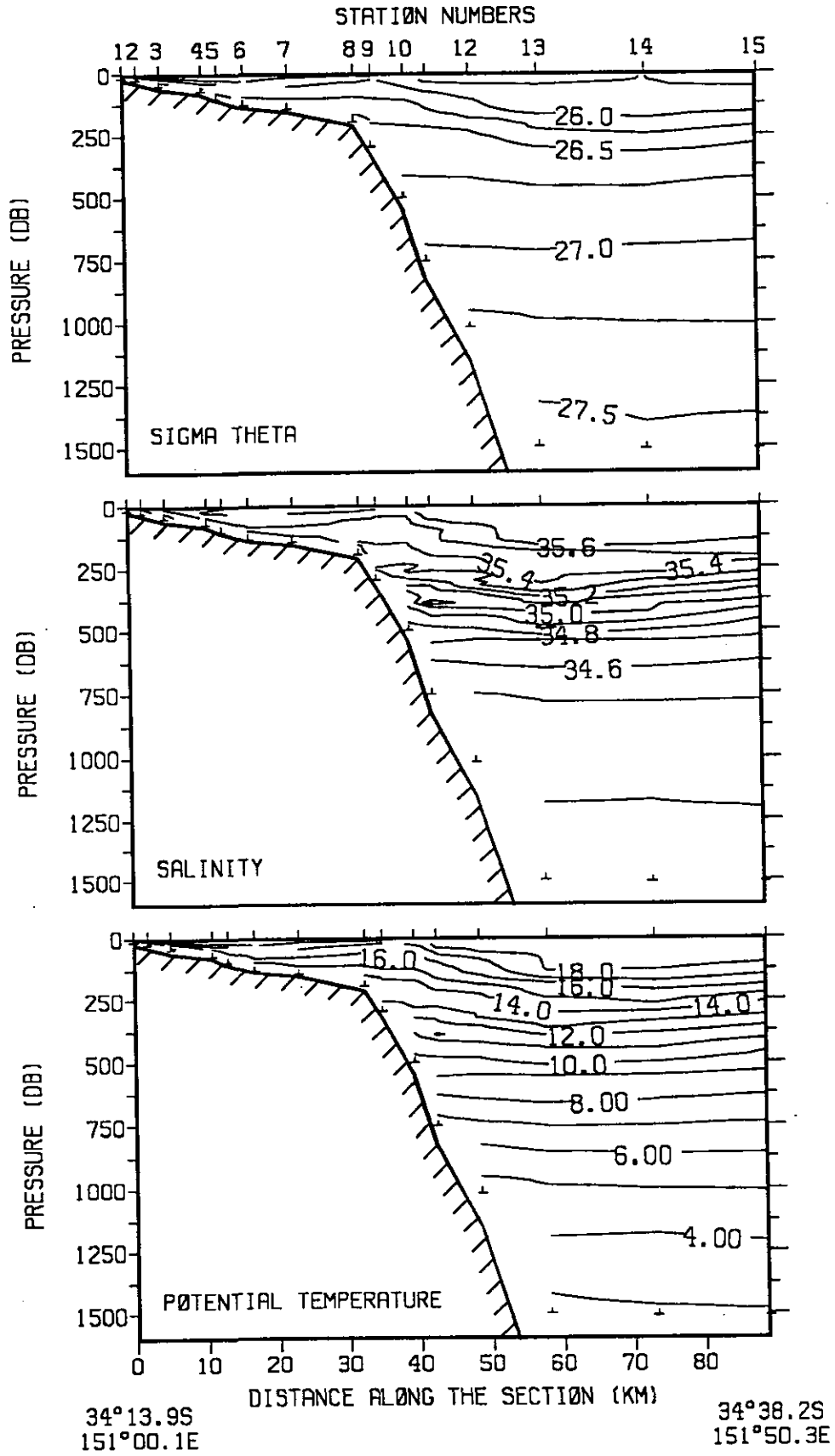


Fig 4.5 Cruise Sp14/83 Stanwell Park Section 13-14 October 1983

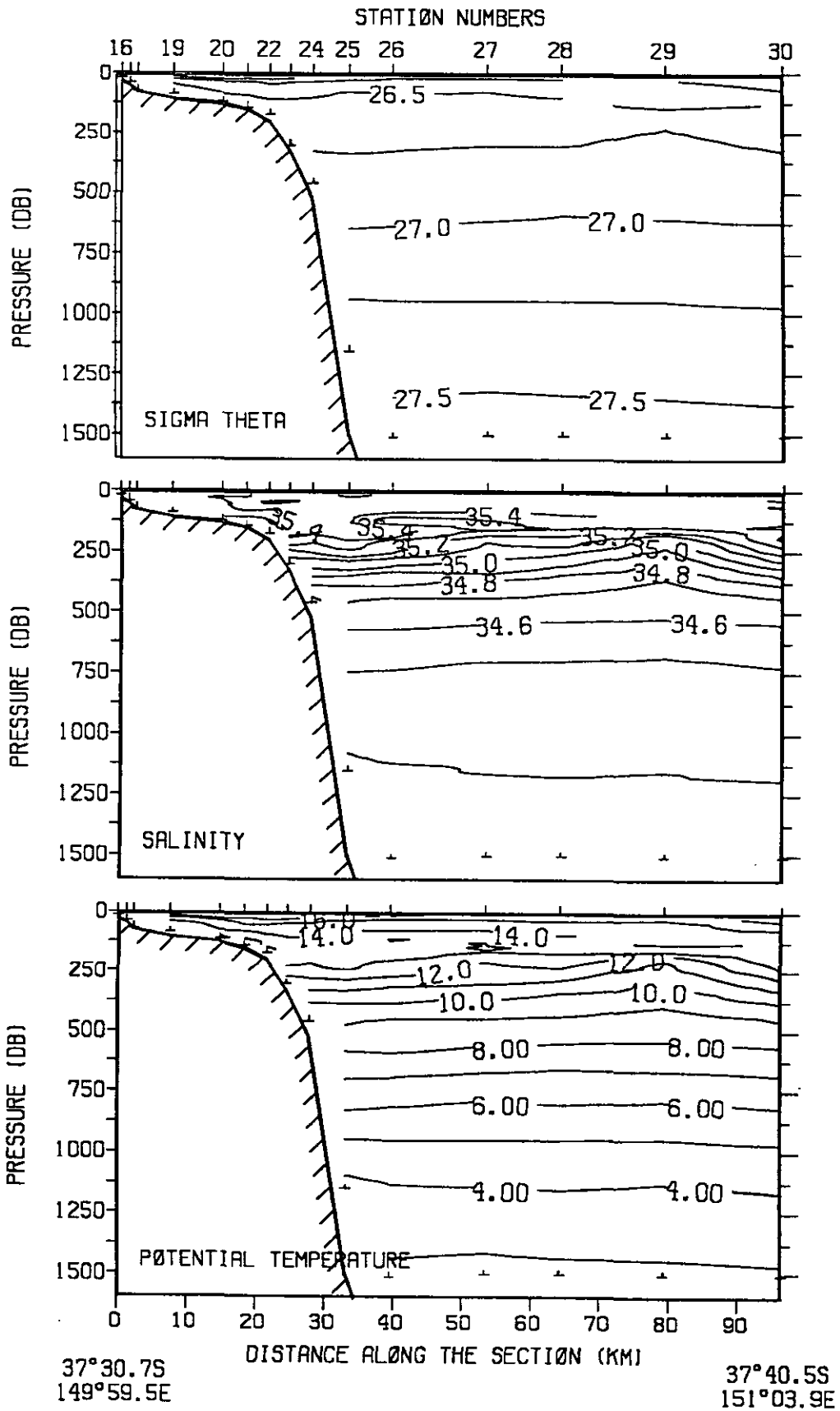


Fig 4.6 Sp14/83 Cape Howe Section 16-18 October 1983

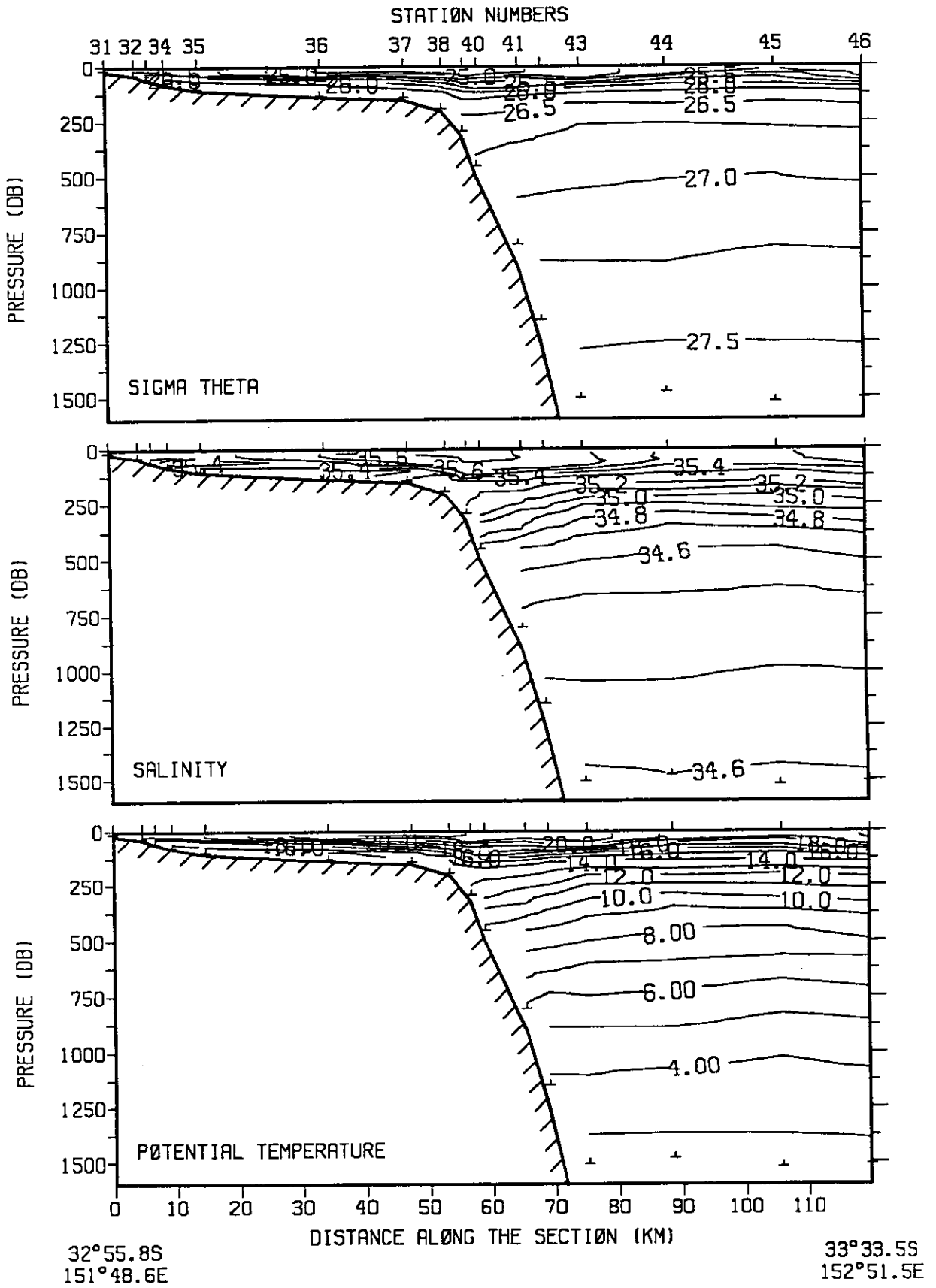


Fig. 4.7 Cruise Sp14/83 Newcastle Section 20-21 October 1983

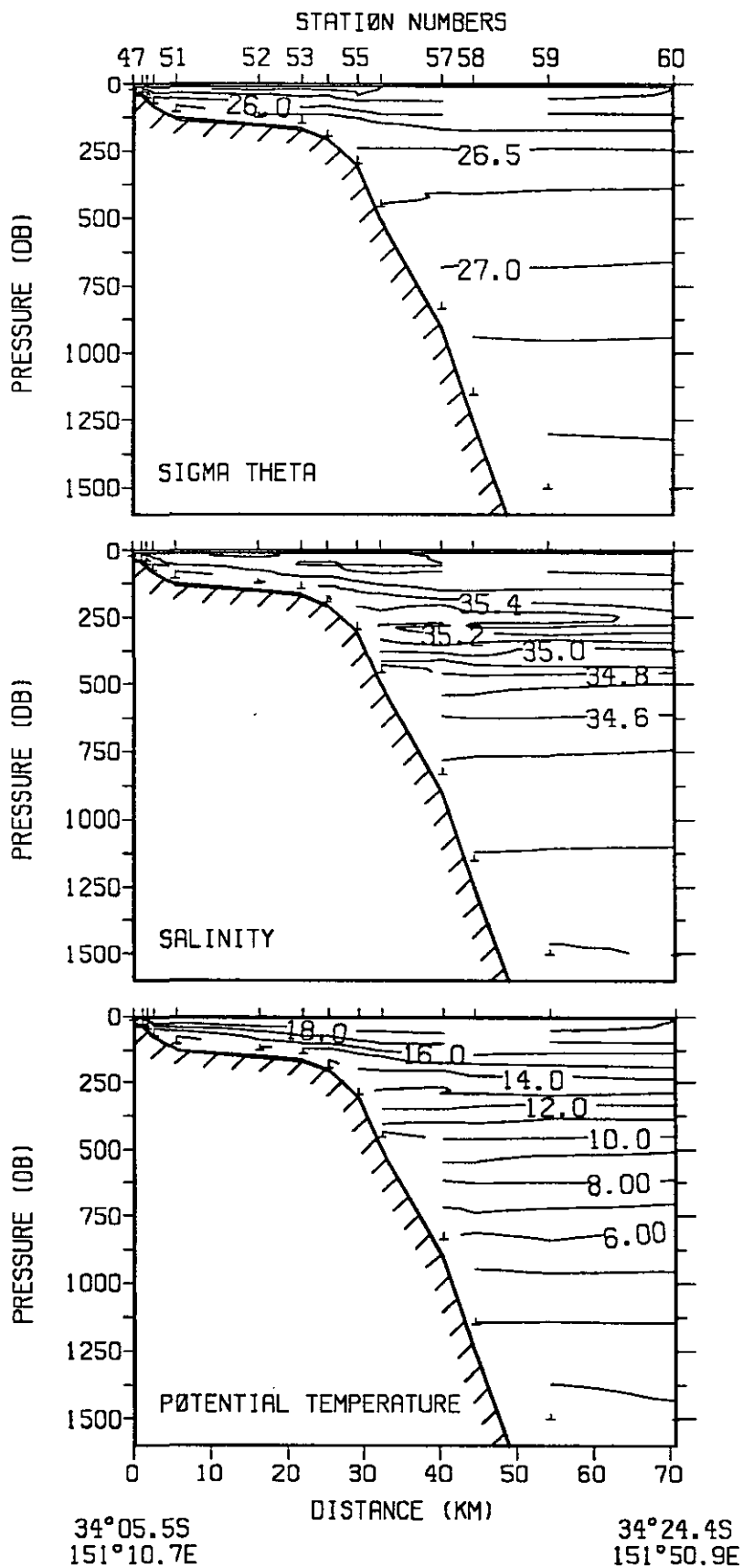


Fig 4.8 Cruise Sp14/83 Cronulla Section 22-23 October 1983

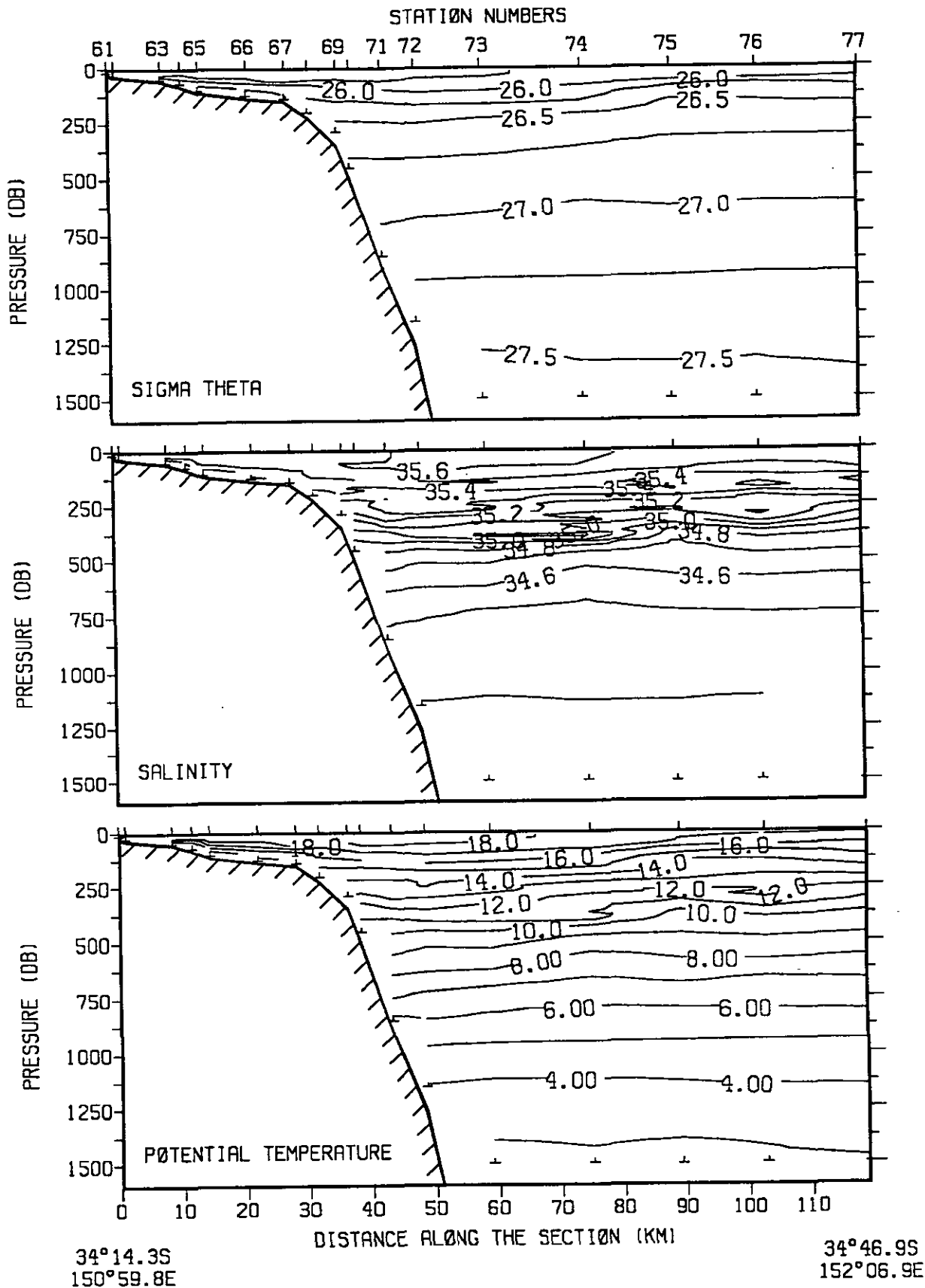


Fig 4.9 Cruise Sp14/83 Stanwell Park Section 23-24 October 1983



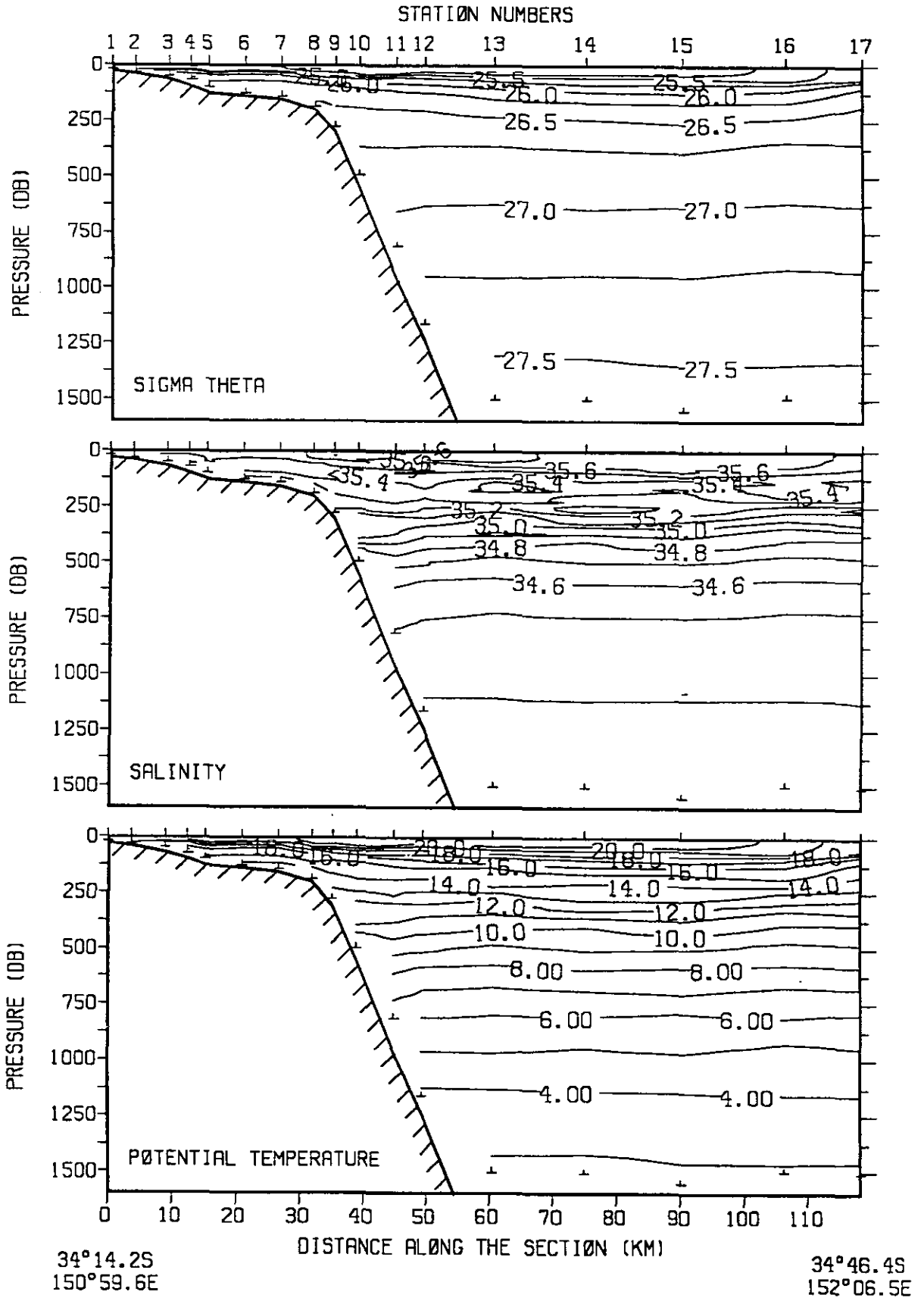


Fig 4.10 Cruise Sp15/83 Stanwell Park Section  
8-10 November 1983

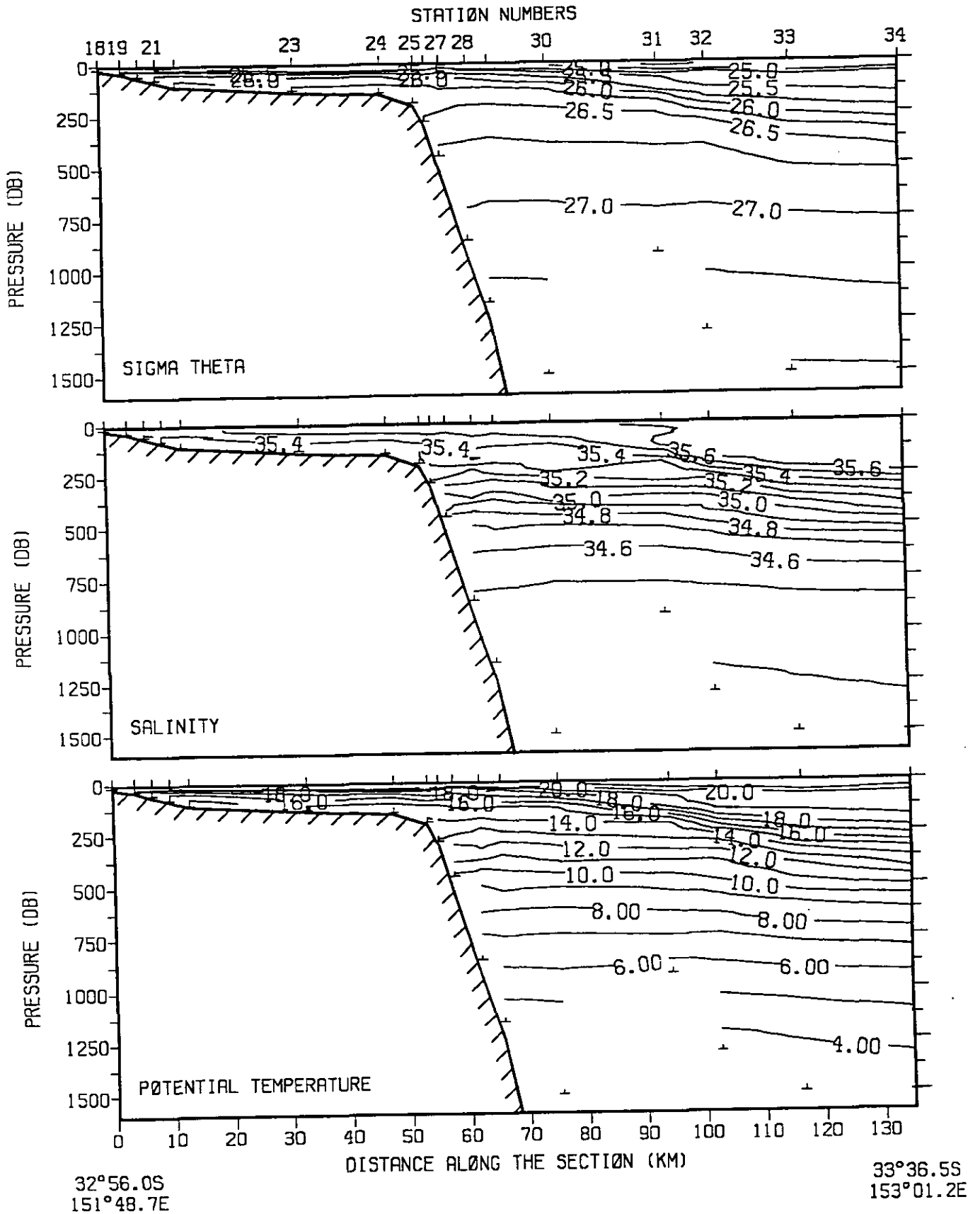


Fig 4.11 Cruise Sp15/83 Newcastle Section 11-12 November 1983

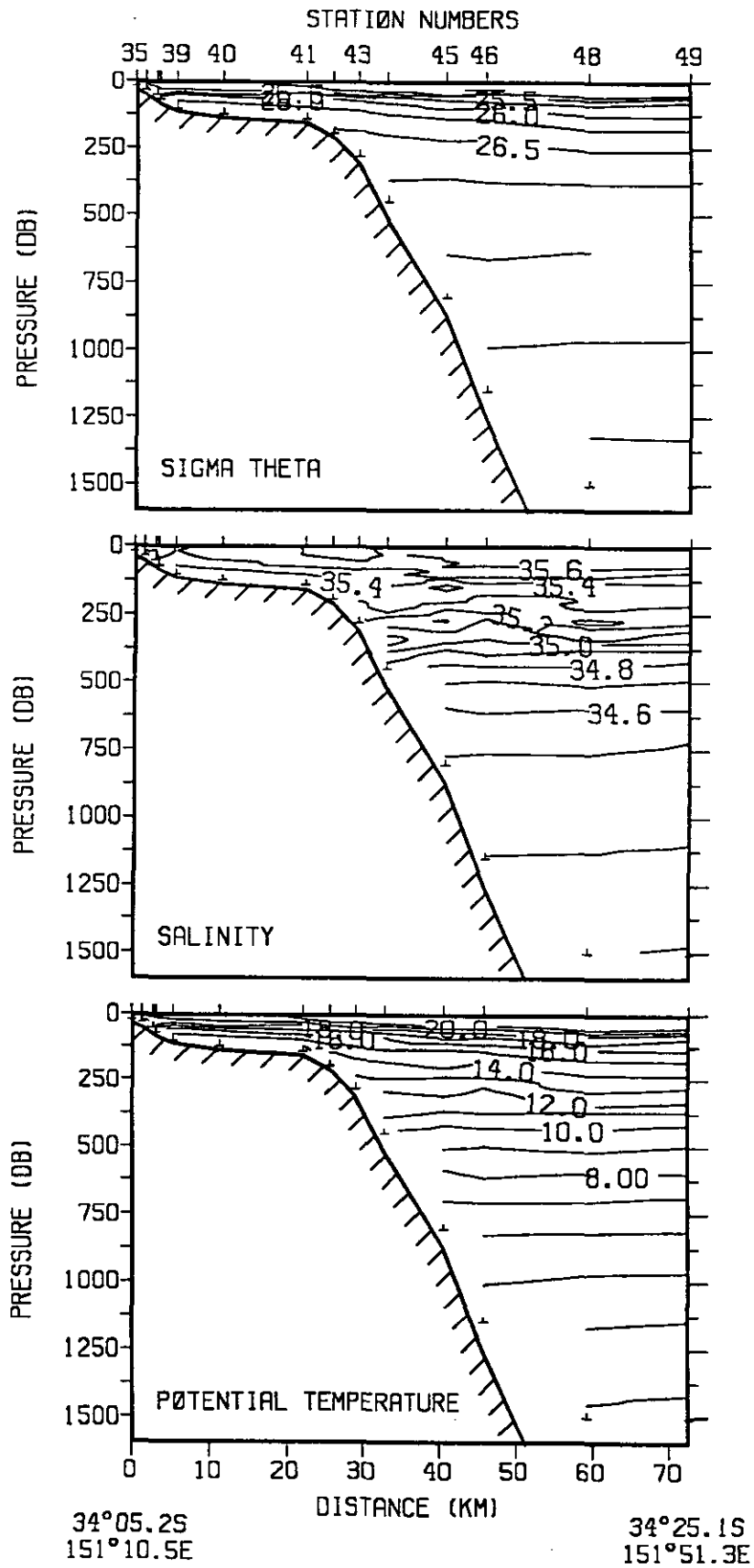


Fig 4.12 Sp15/83 Cronulla Section  
 12-13 November 1983

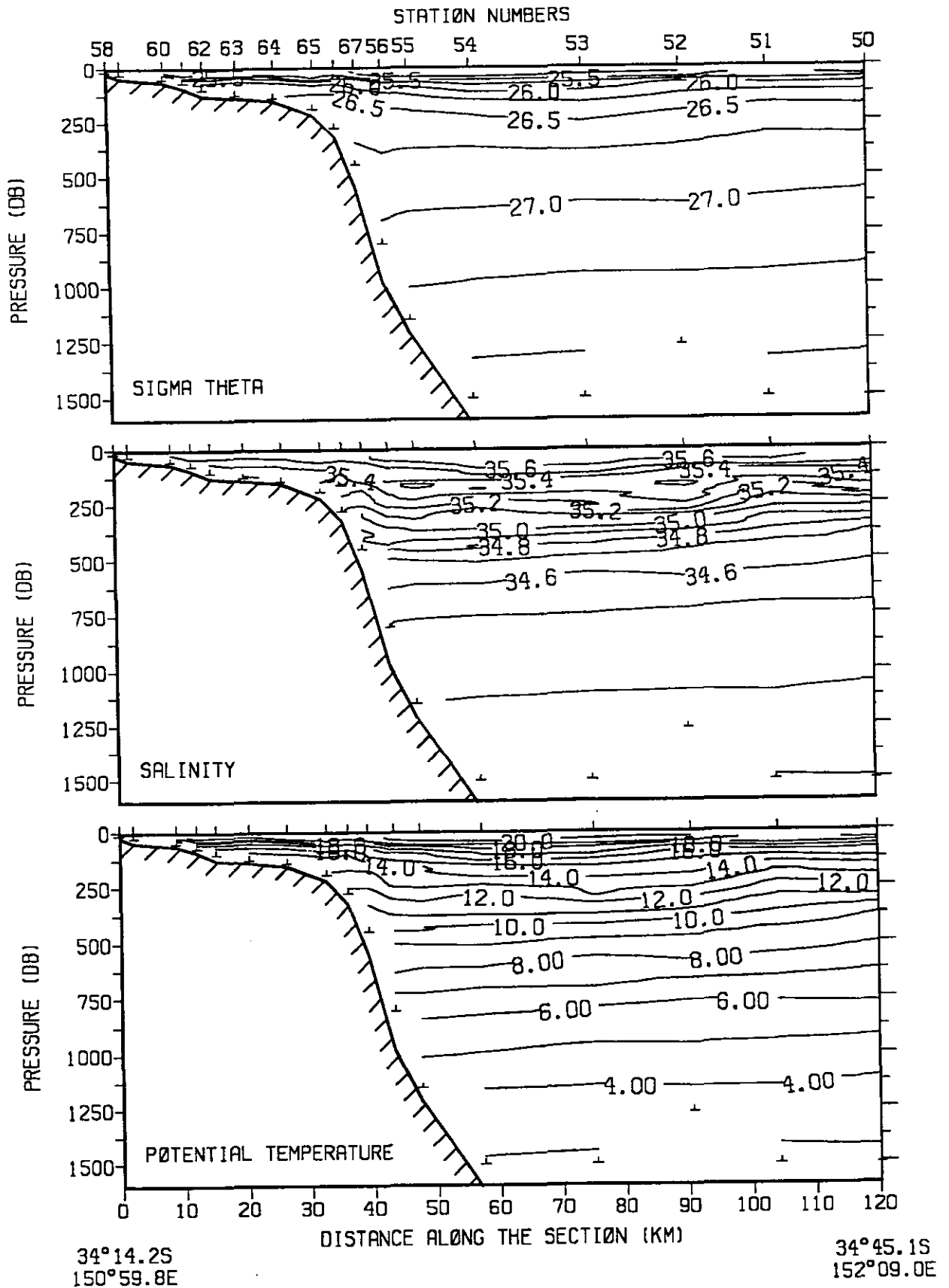


Fig 4.13 Cruise Sp15/83 Stanwell Park Section 13-15 November 1983

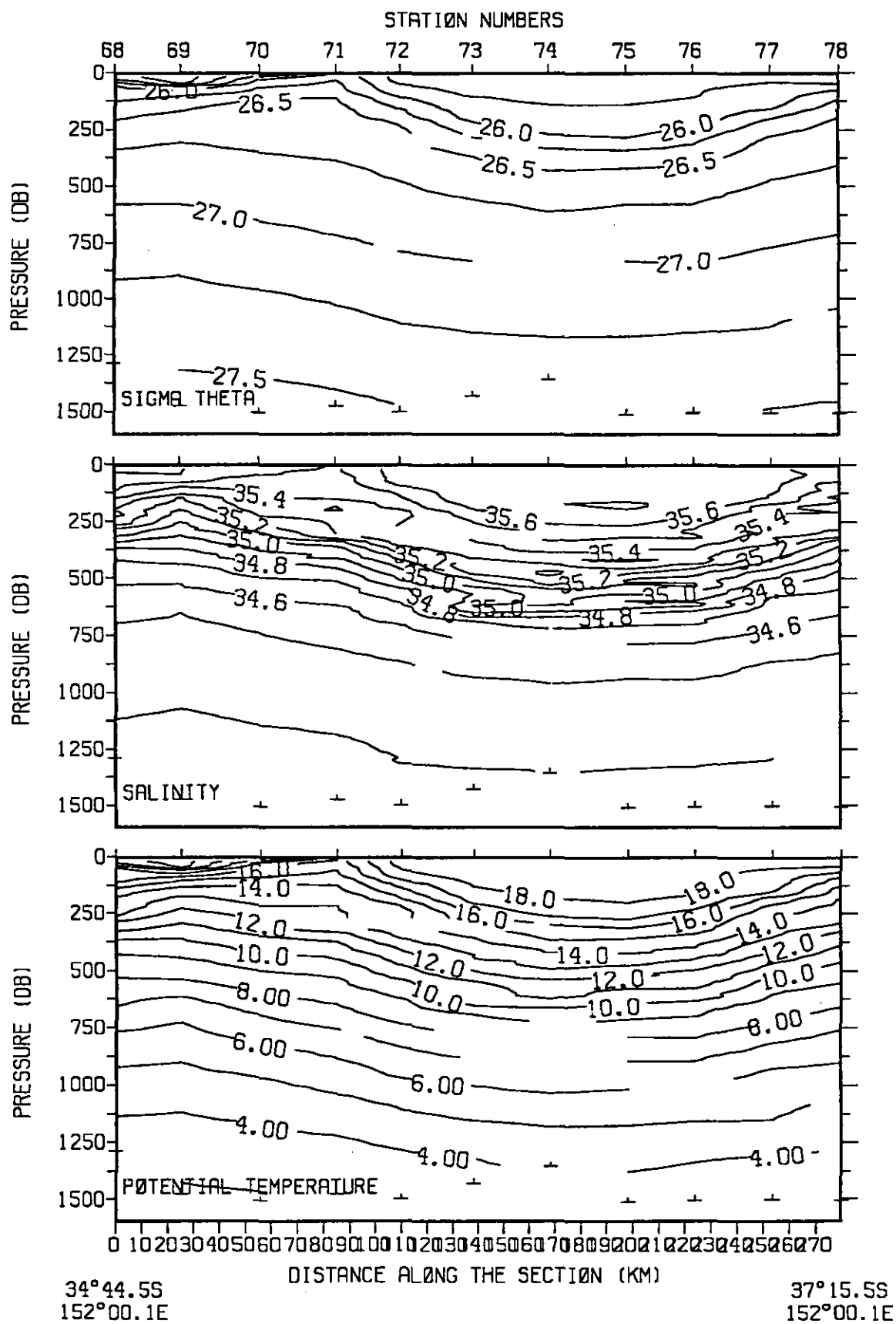


Fig 4.14 Cruise Sp15/83 Section south through eddy 15-16 November 1983

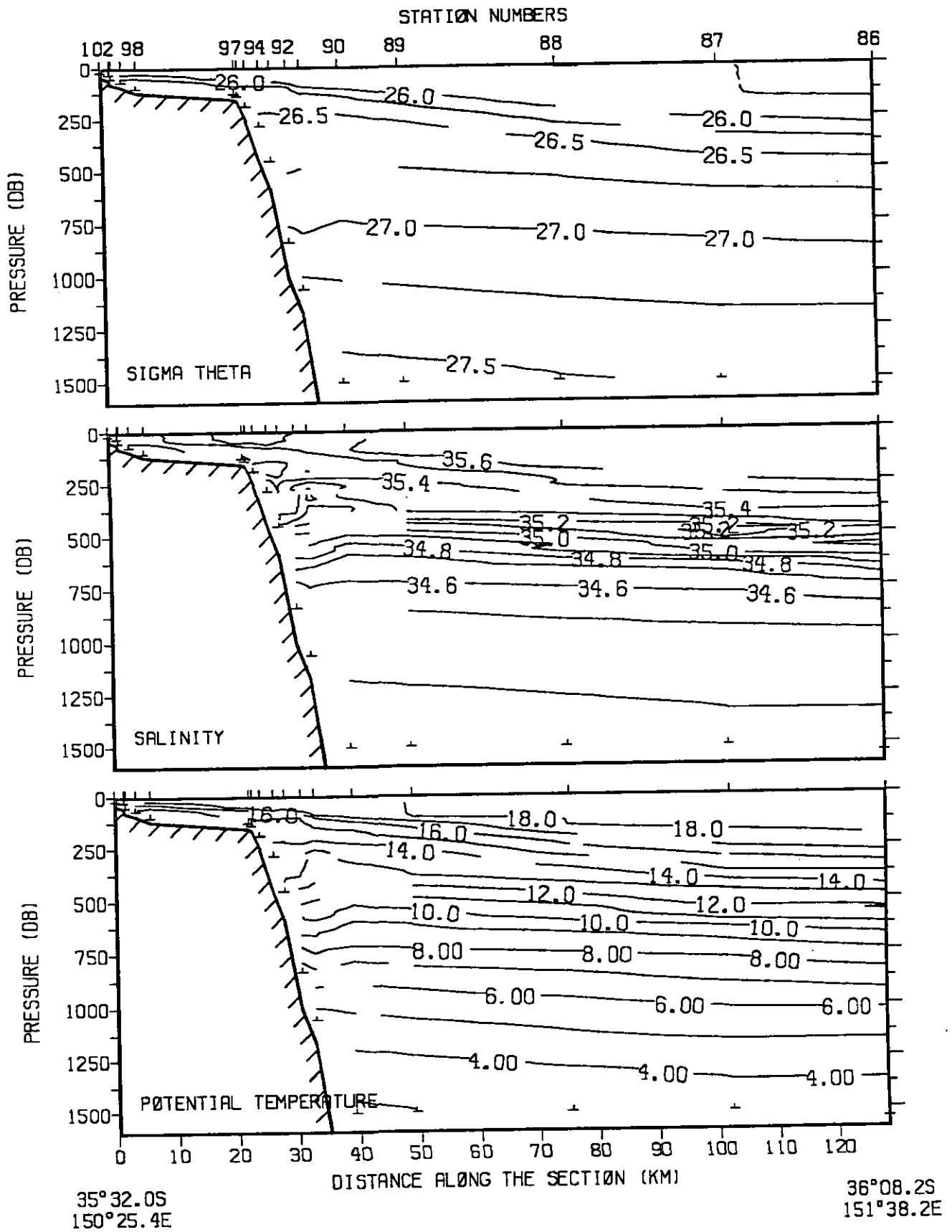


Fig 4.15 Cruise Sp15/83 Brush Island Section 18-20 November 1983

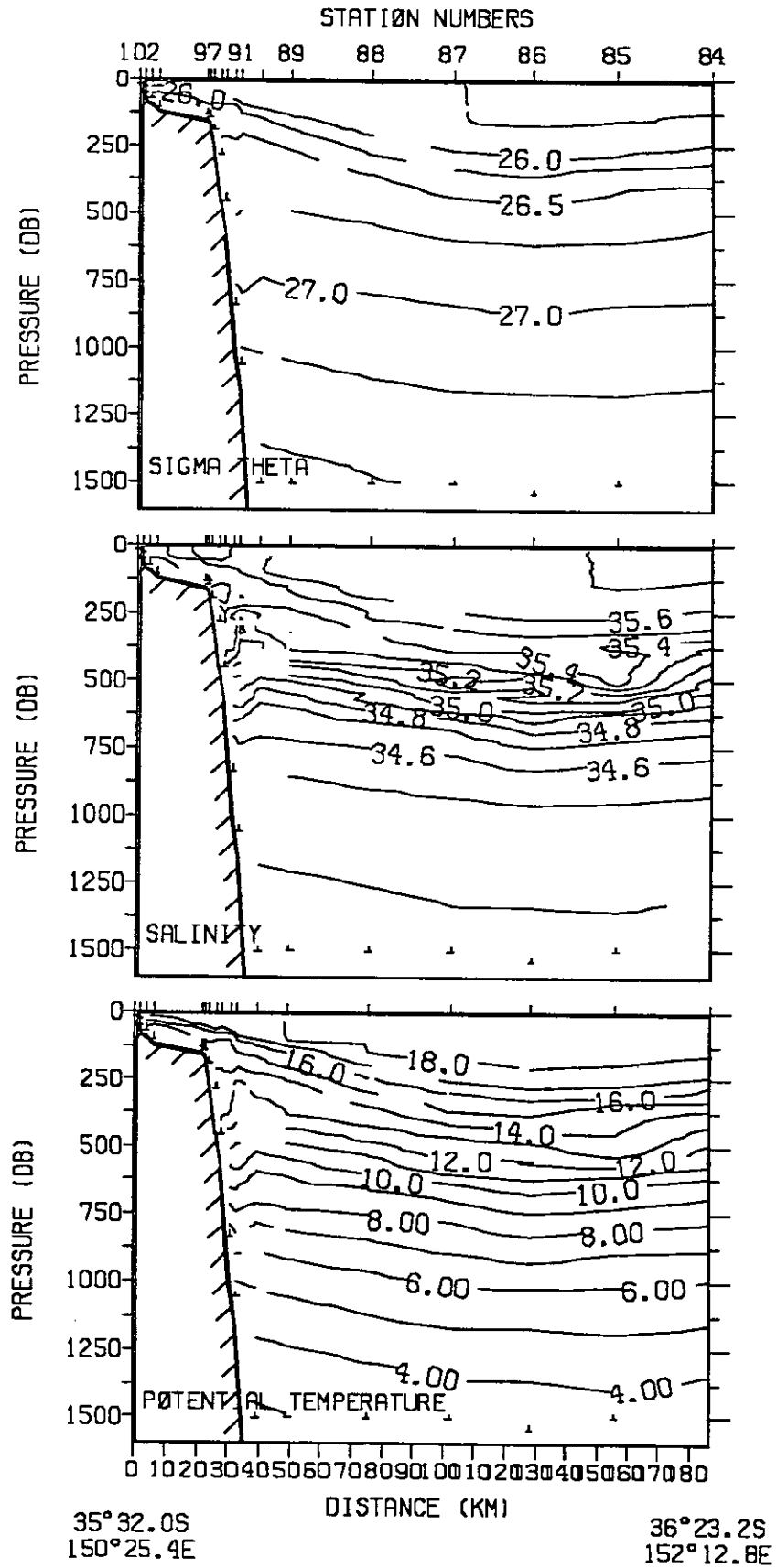
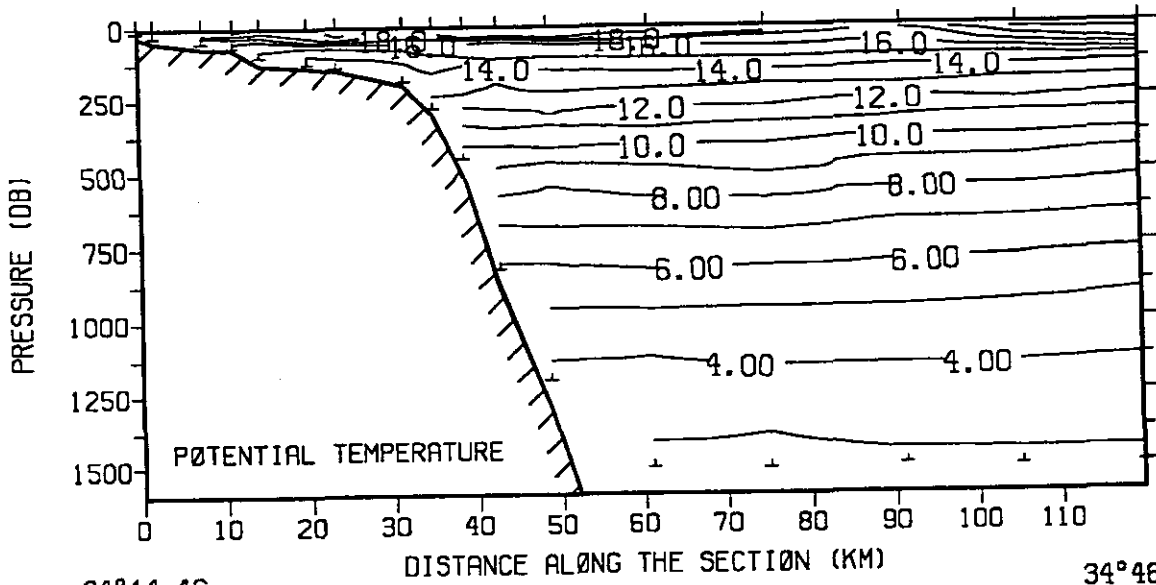
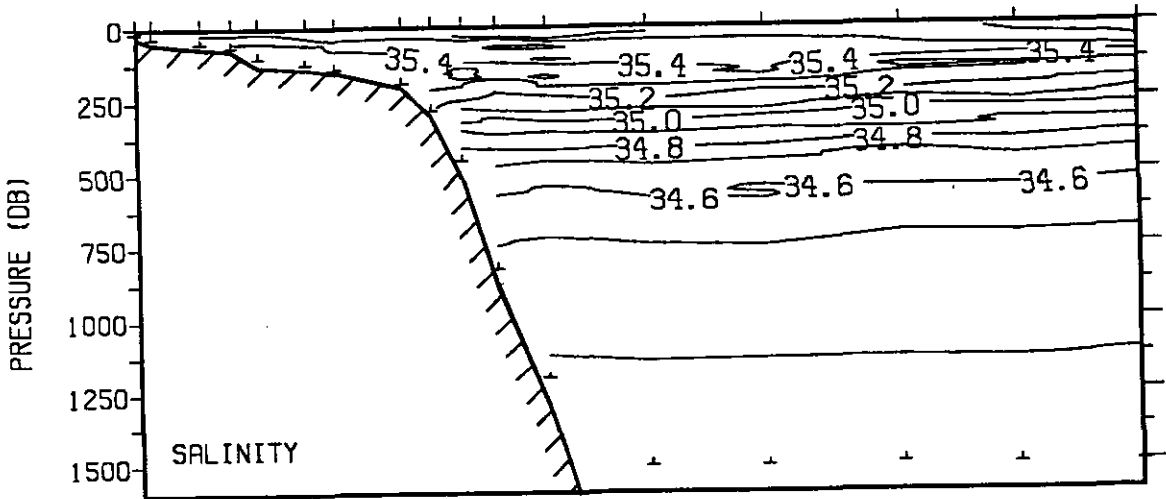
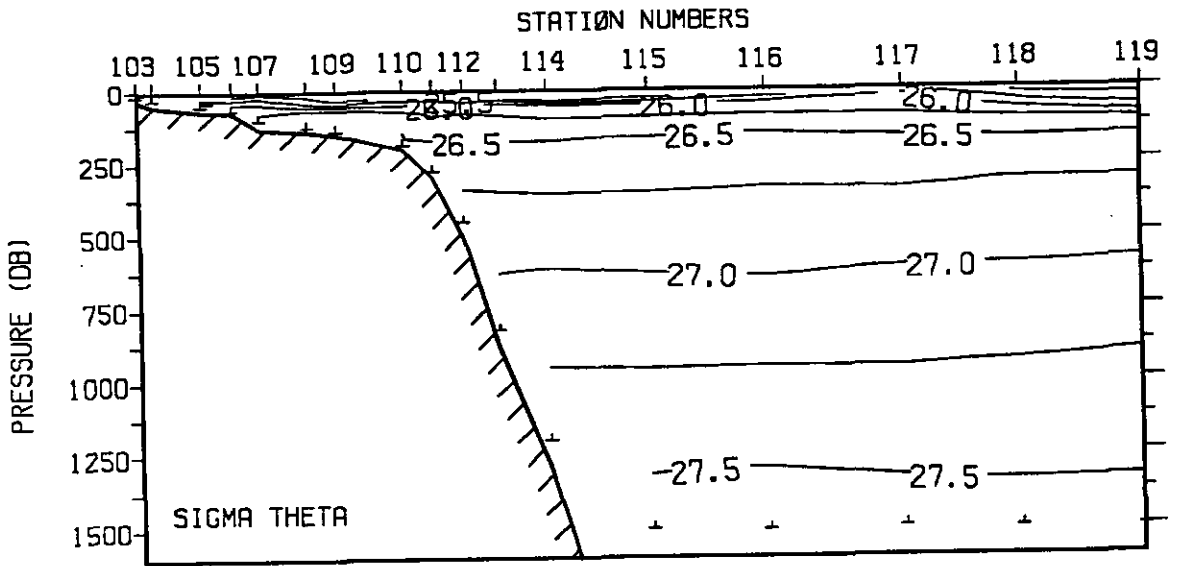


Fig 4.16 Cruise Sp15/83 Brush Island Section  
18-20 November 1983



34°14.4S  
150°59.8E

34°46.7S  
152°07.7E

Fig 4.17 Cruise Sp15/83 Stanwell Park Section 20-21 November 1983



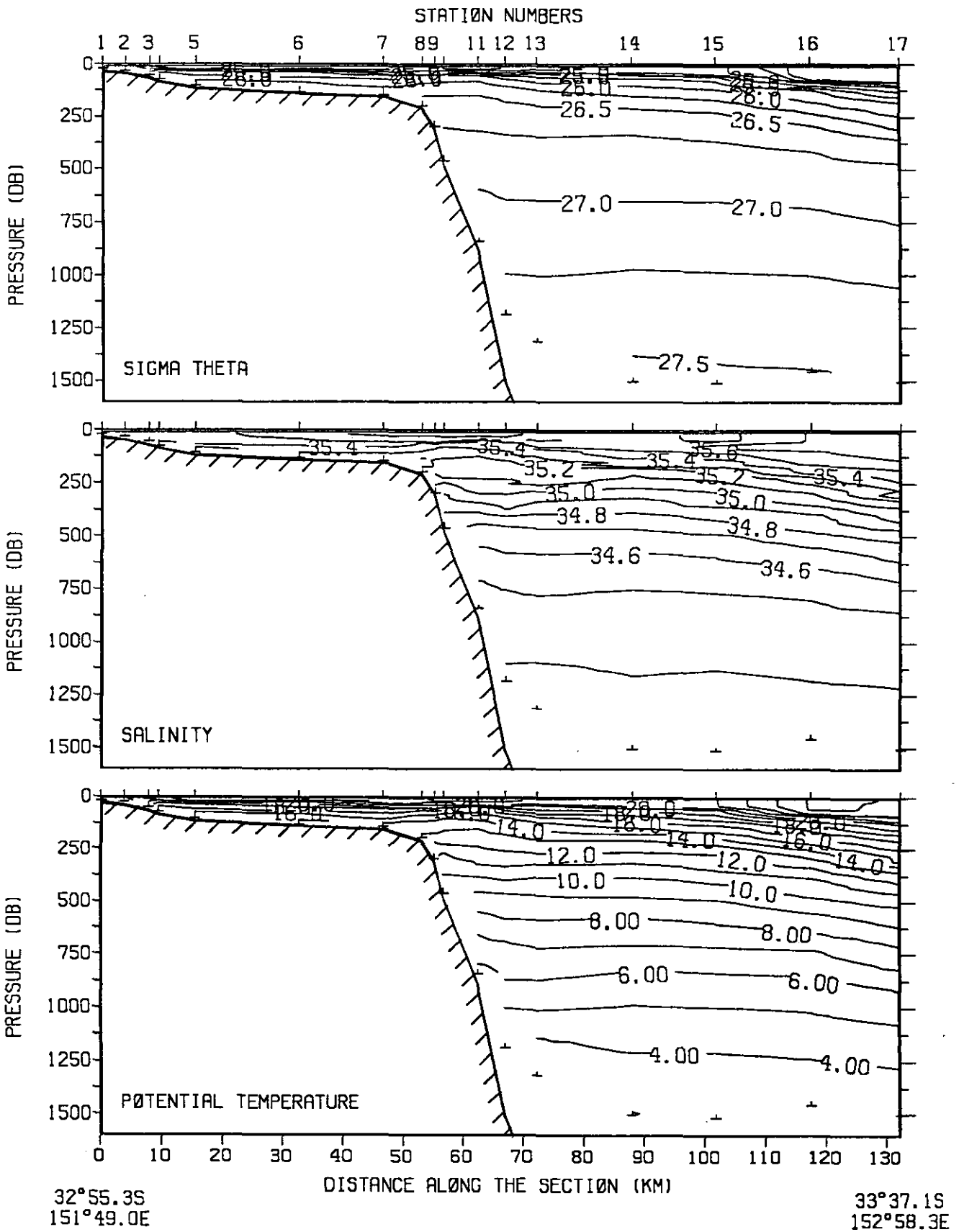


Fig 4.18 Cruise Sp16/83 Newcastle Section 8-9 December 1983

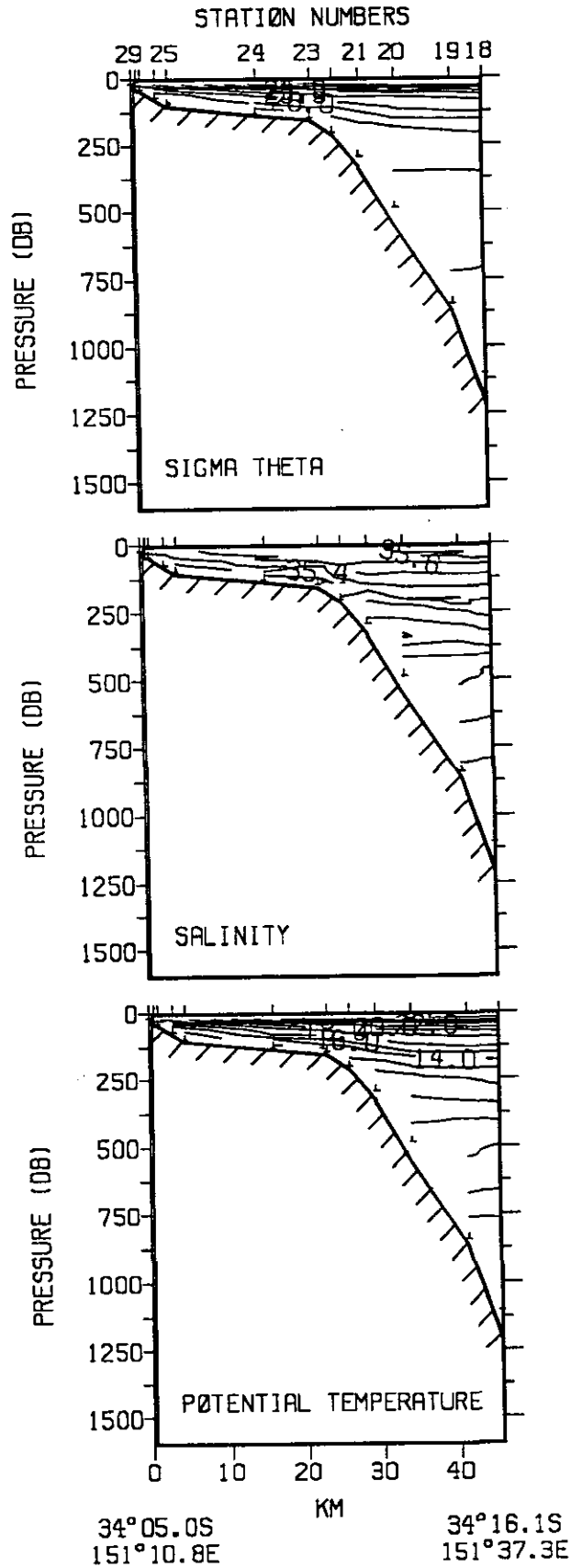


Fig 4.19 Cruise Sp16/83 Cronulla Section 11-12 December 1983

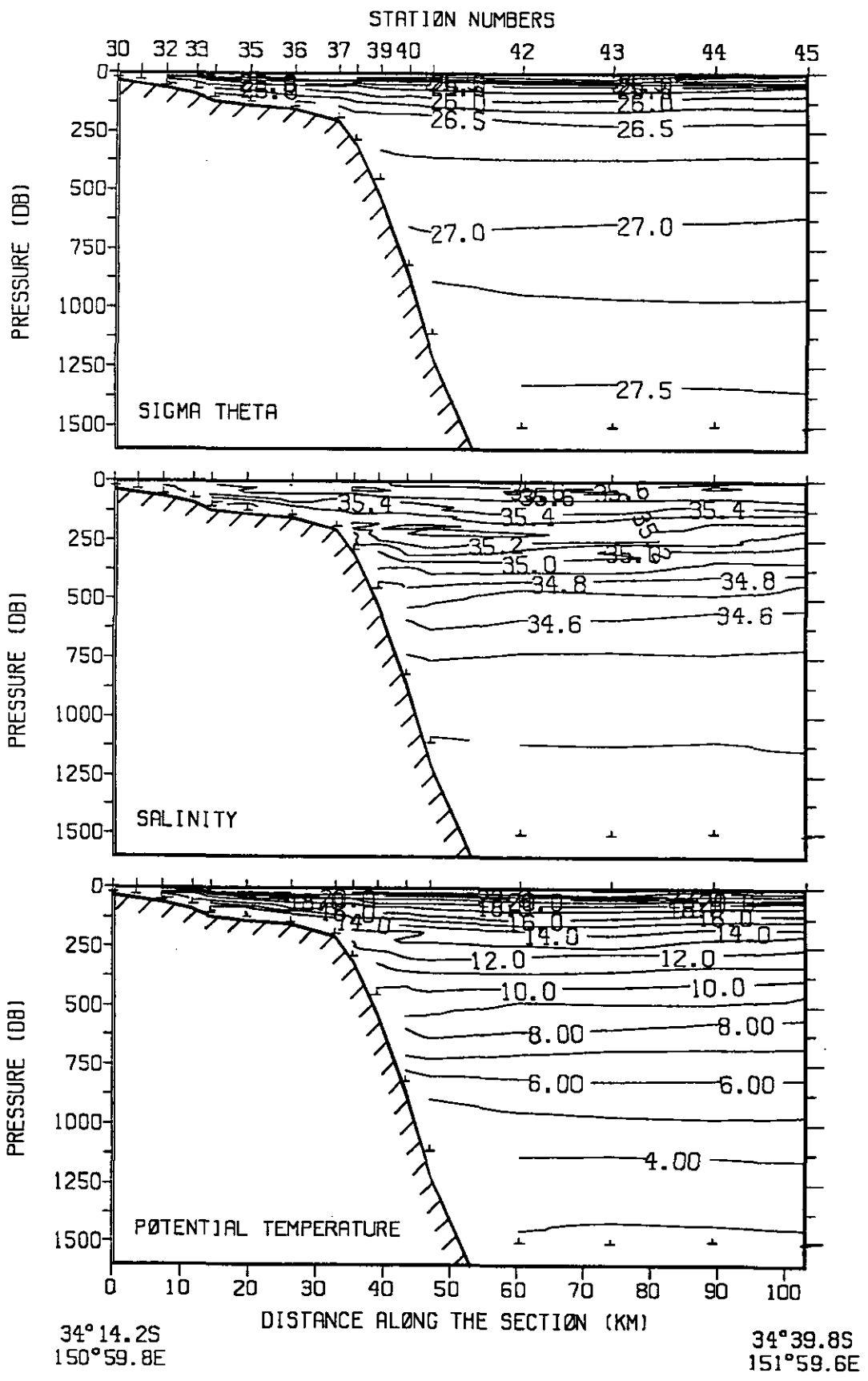


Fig 4.20 Cruise Sp16/83 Stanwell Park Section 12-13 December 1983

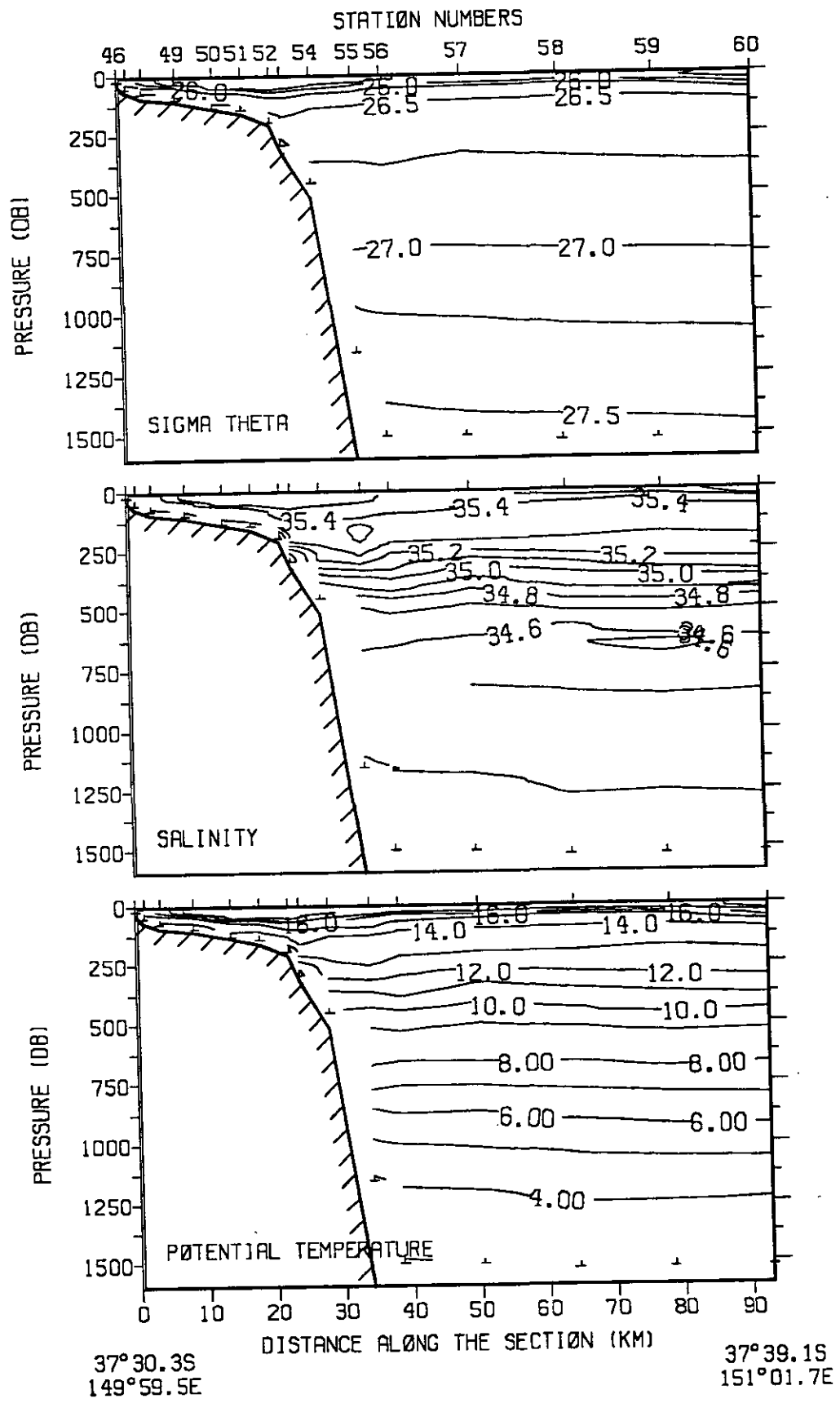


Fig 4.21 Cruise Sp16/83 Cape Howe Section 15-16 December 1983

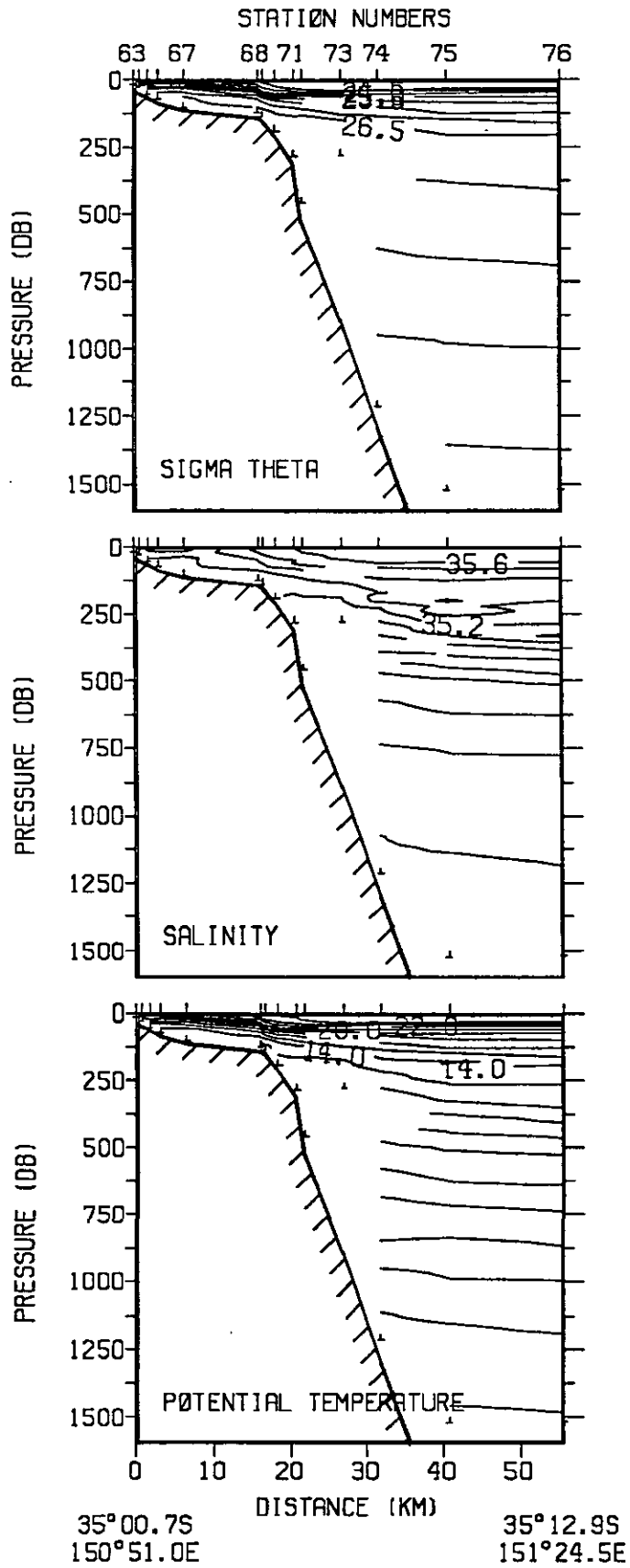


Fig 4.22 Cruise Sp16/83 Beecroft Head Section  
 18-19 December 1983

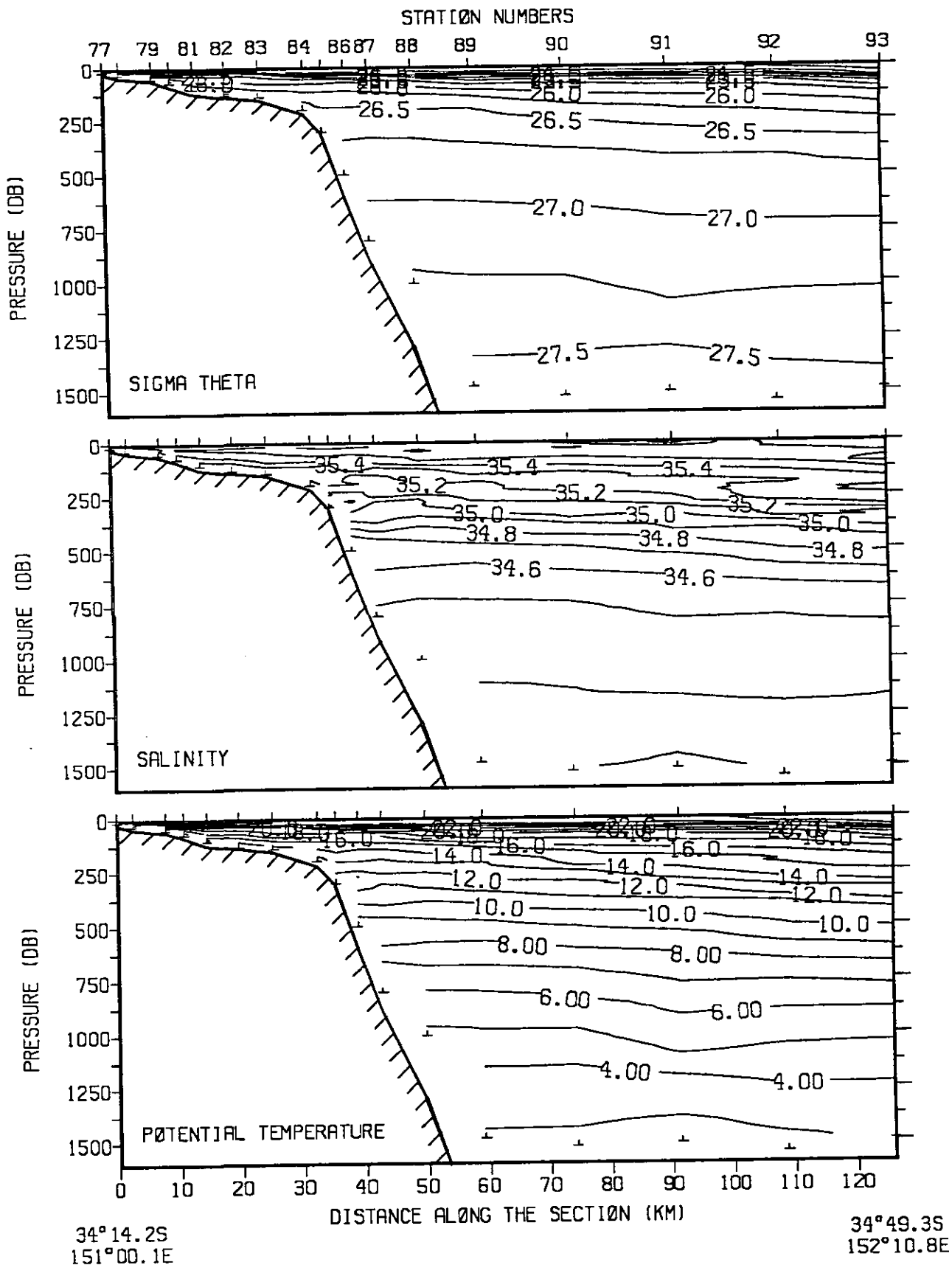


Fig 4.23 Cruise Sp16/83 Stanwell Park Section 19-20 December 1983

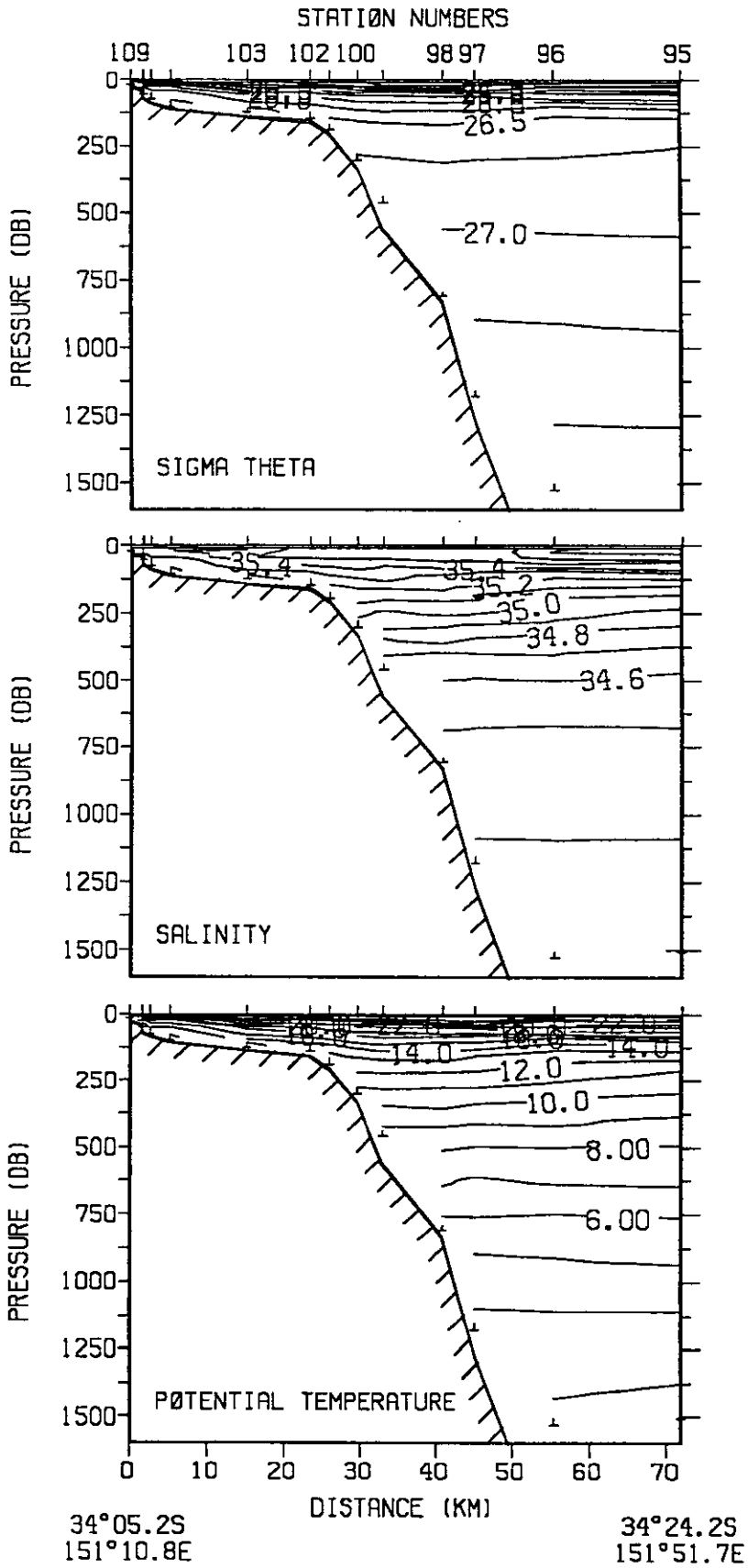


Fig 4.24 Cruise Sp16/83 Cronulla Section 21 December 1983

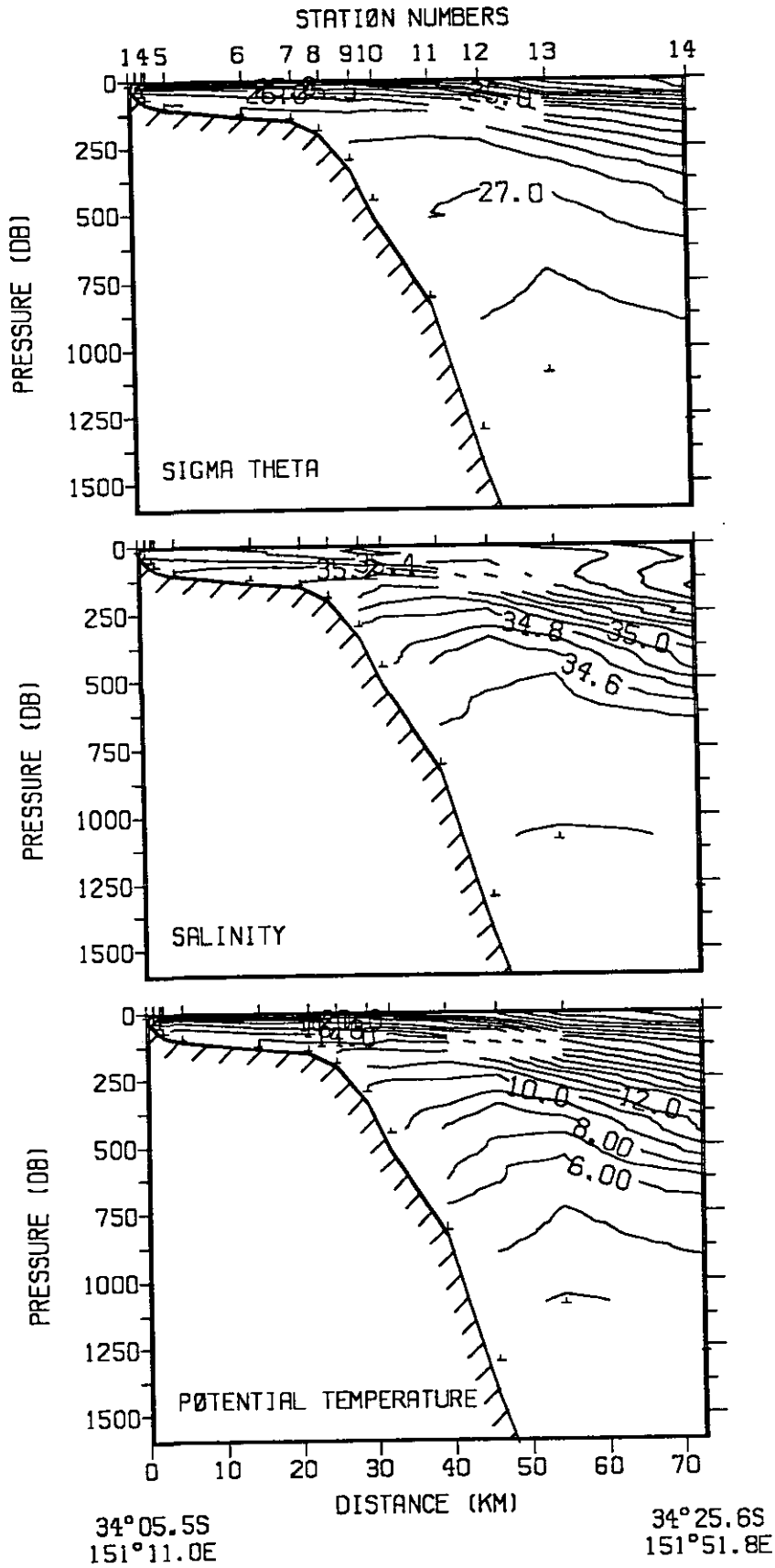


Fig 4.25 Cruise Sp01/84 Cronulla Section 10-11 January 1984



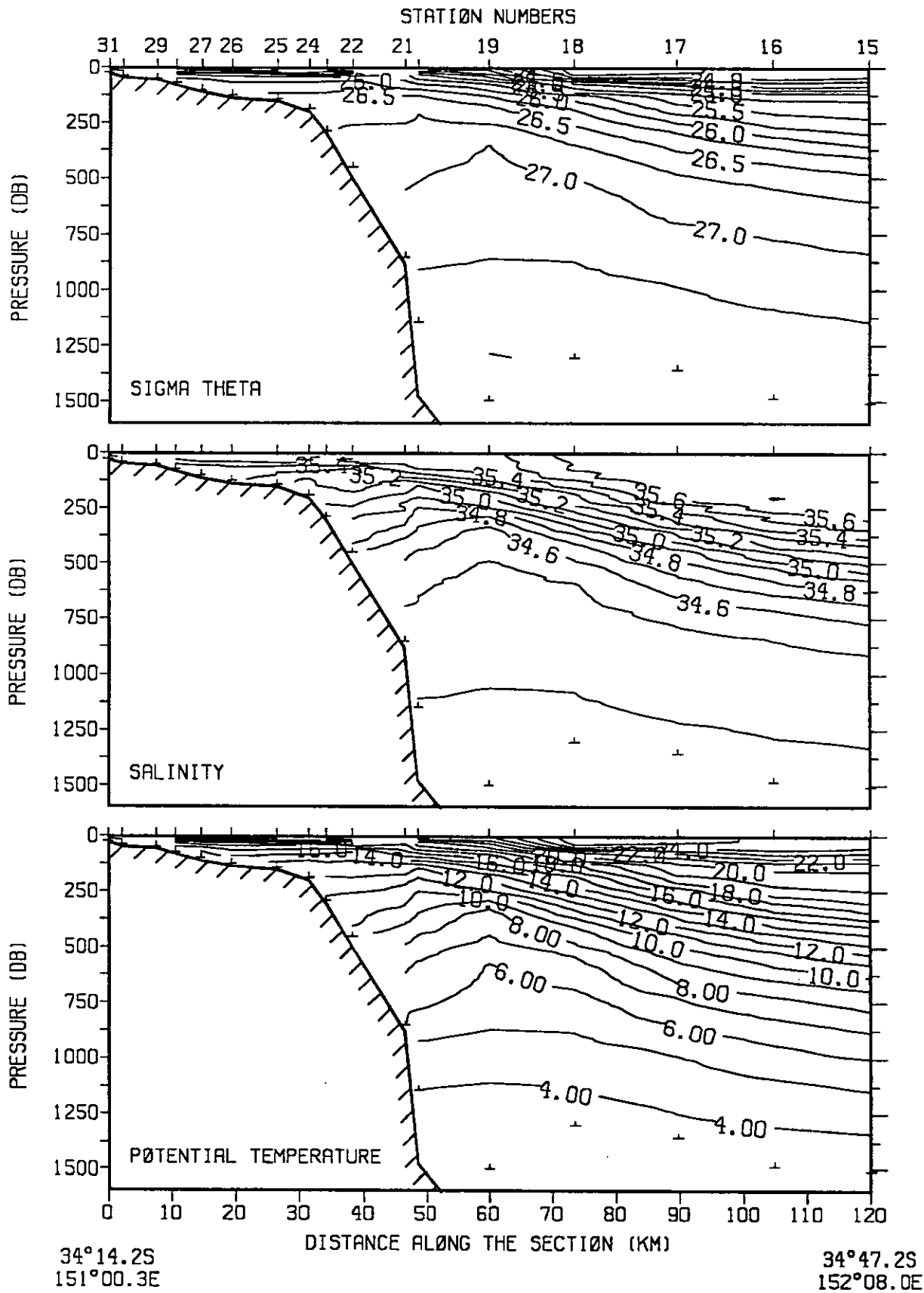


Fig 4.26 Cruise Sp01/84 Stanwell Park Section 11-12 January 1984

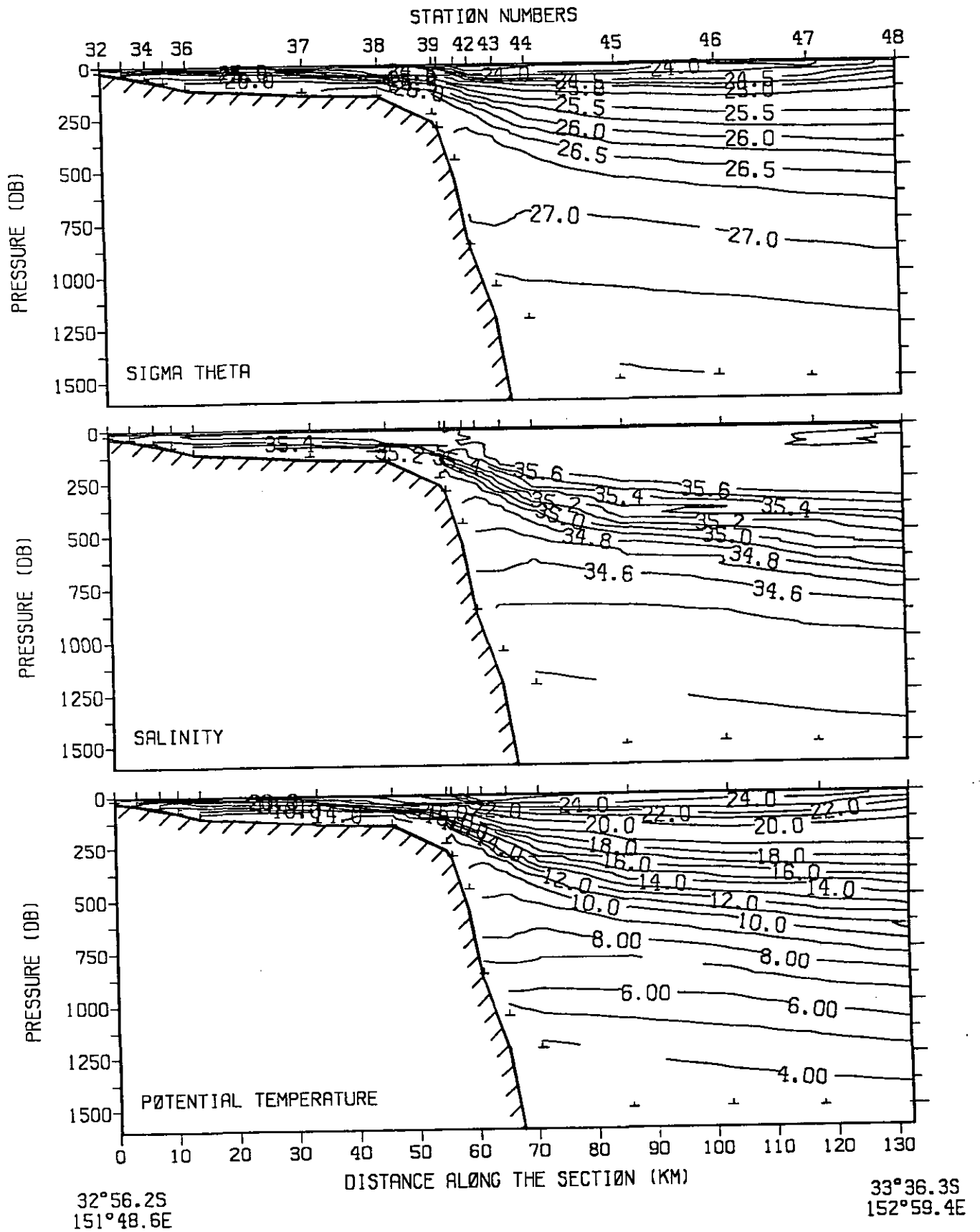


Fig 4.27 Cruise Sp01/84 Newcastle Section 12-14 January 1984

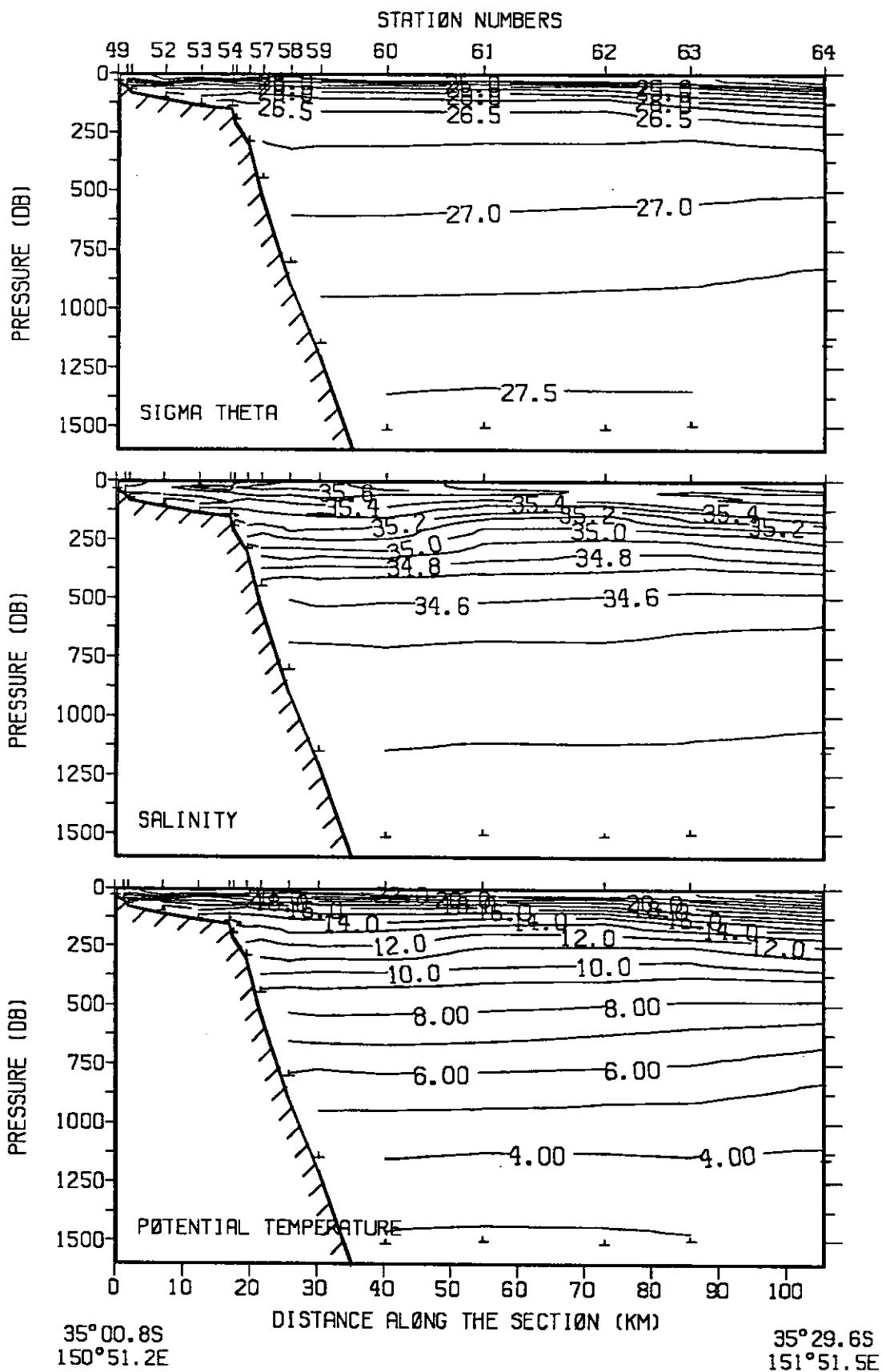


Fig 4.28 Cruise Sp01/84 Becroft Head Section 14-15 January 1984

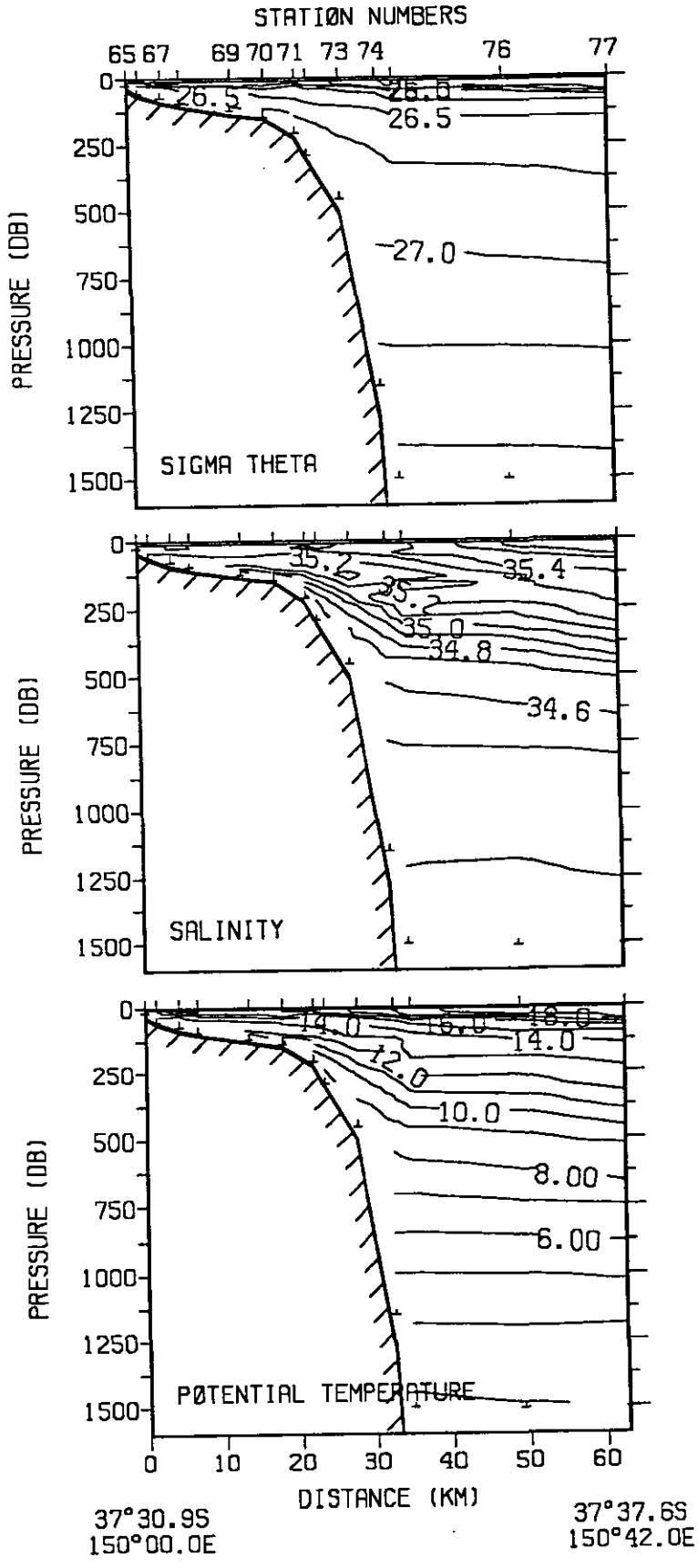


Fig 4.29 Cruise Sp01/84 Cape Howe Section 16-17 January 1984

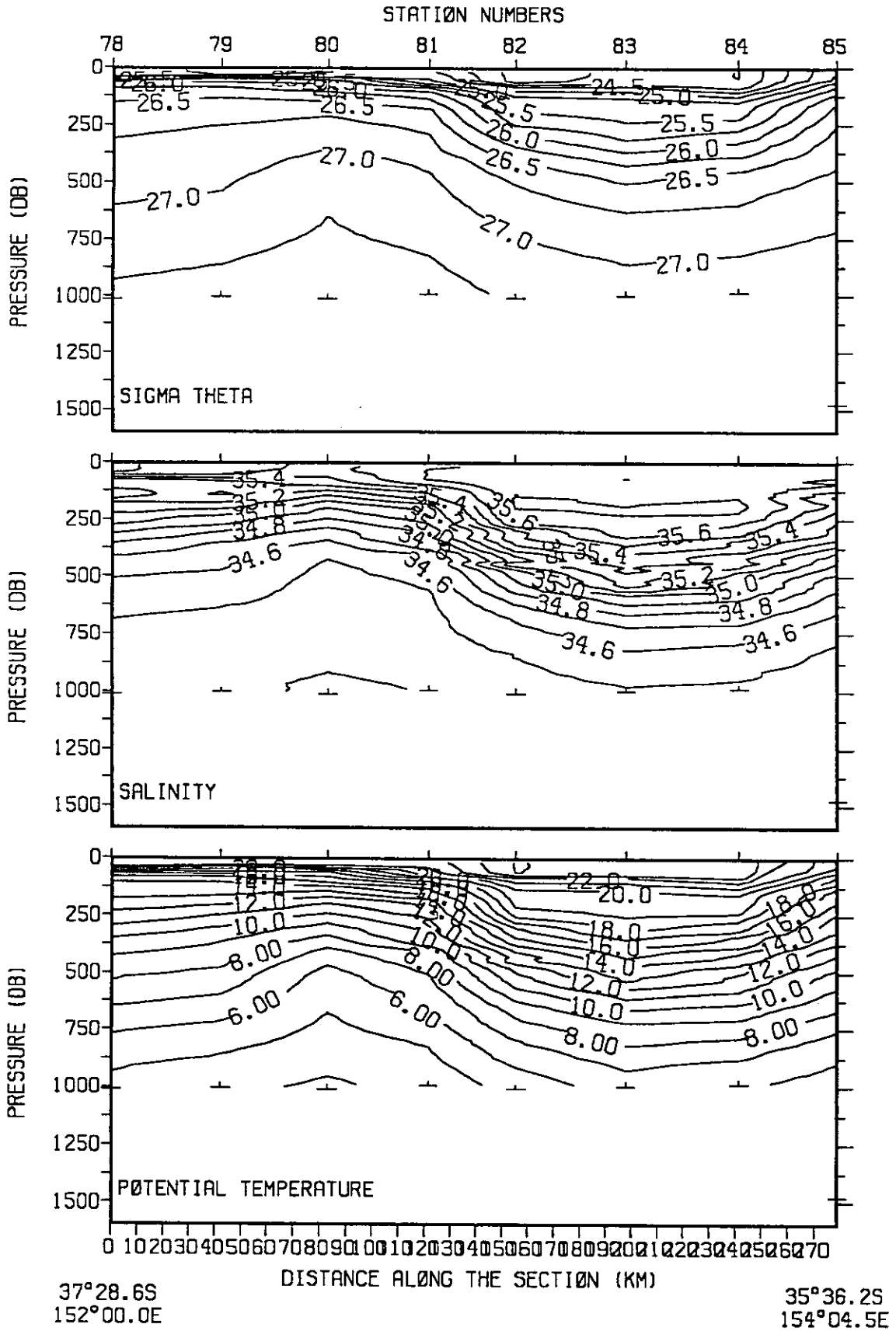


Fig 4.30 Cruise Sp01/84 Section N.E. across Meander 17-18 January 1984

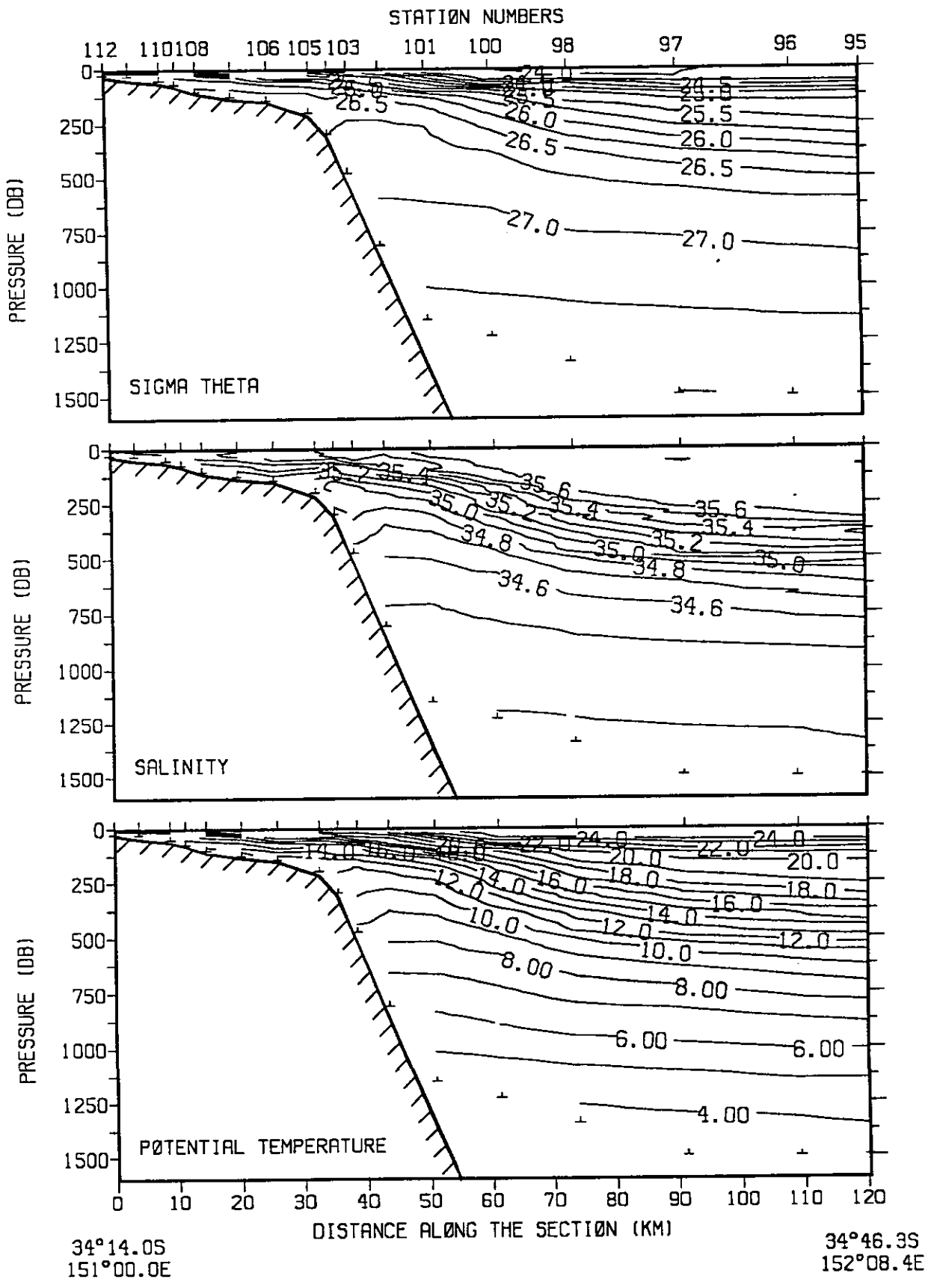


Fig 4.31 Cruise Sp01/84 Stanwell Park Section 18-20 January 1984

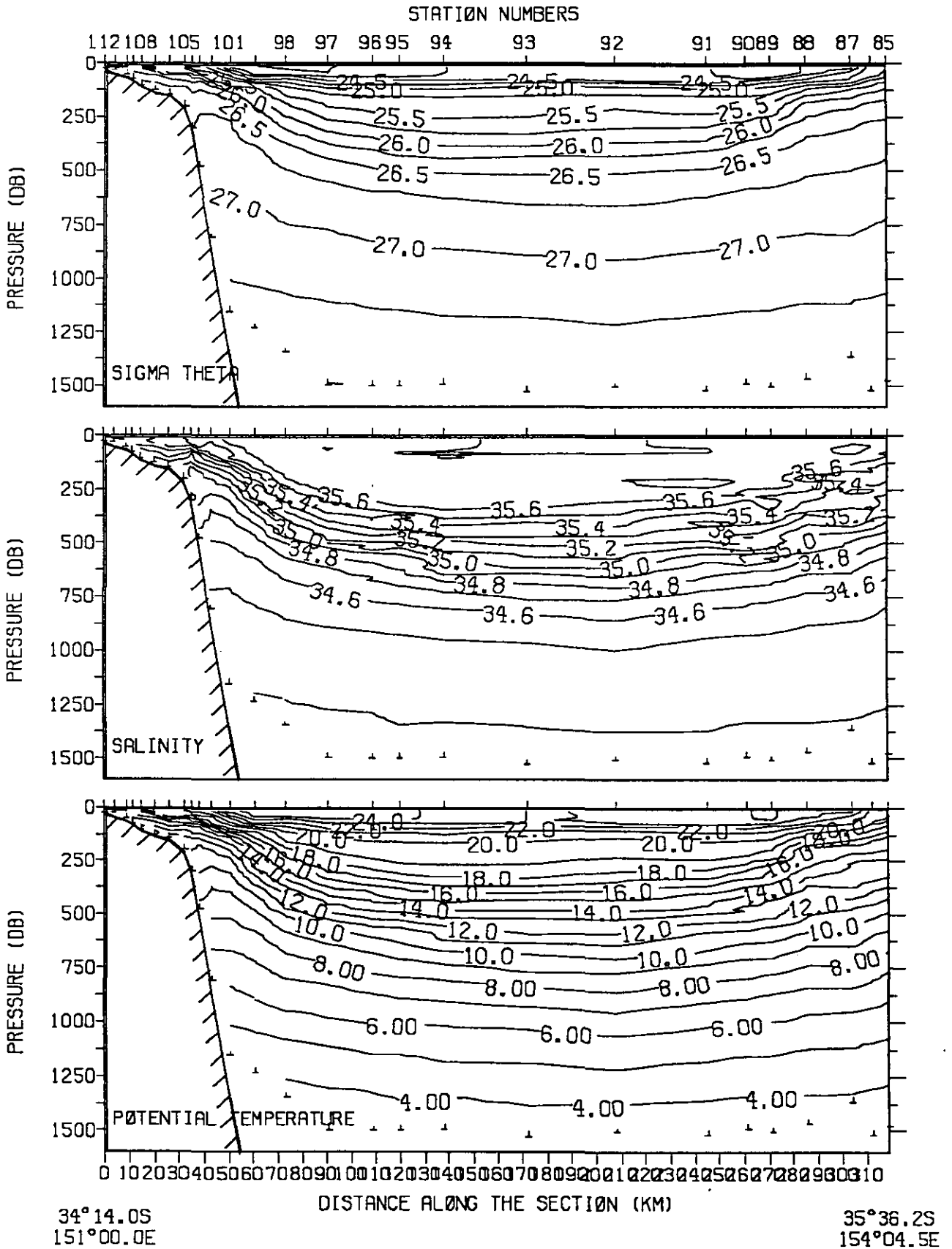


Fig 4.32 Cruise Sp01/84 Stanwell Park Section 18-20 January 1984

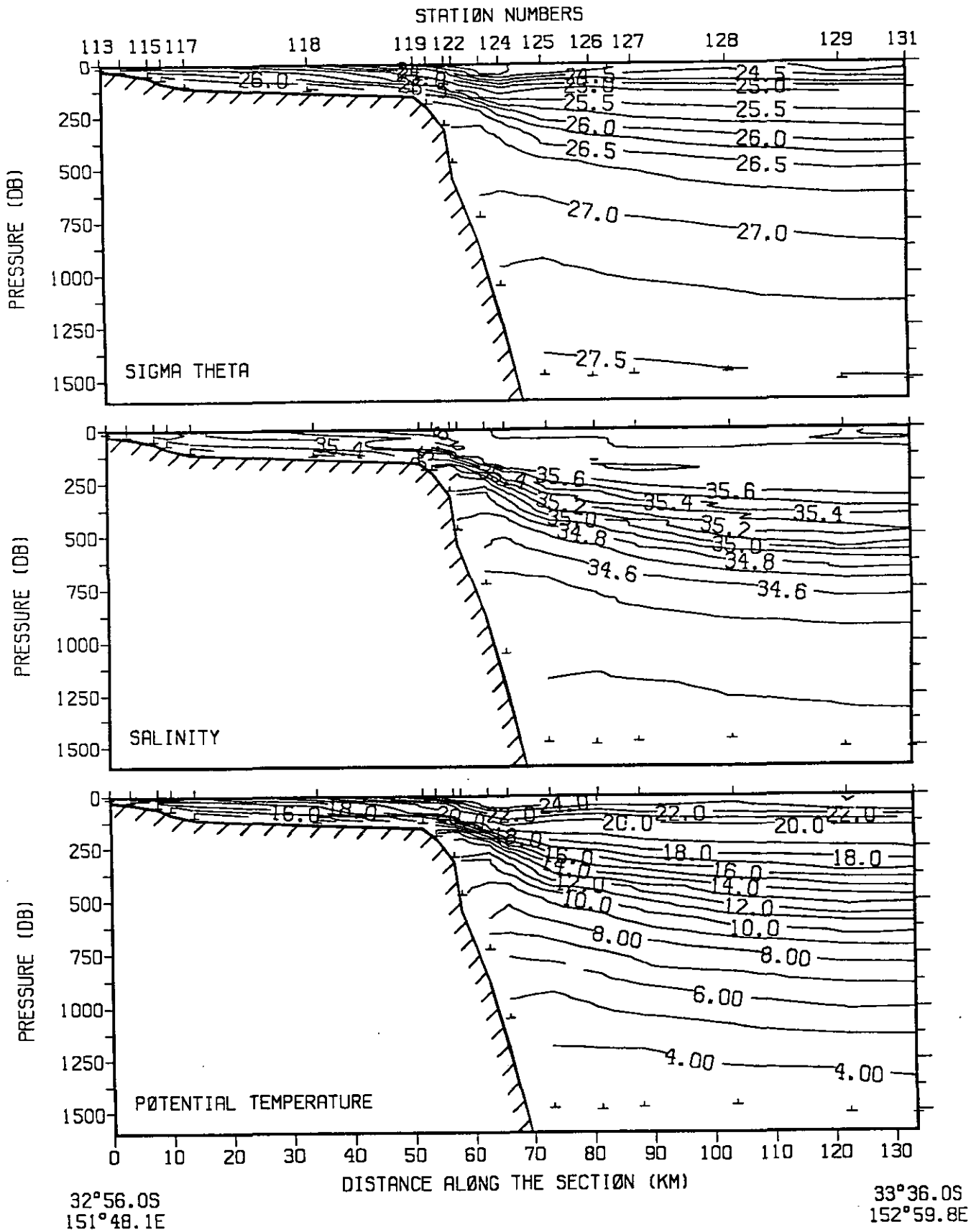


Fig 4.33 Cruise Sp01/84 Newcastle Section 22-23 January 1984



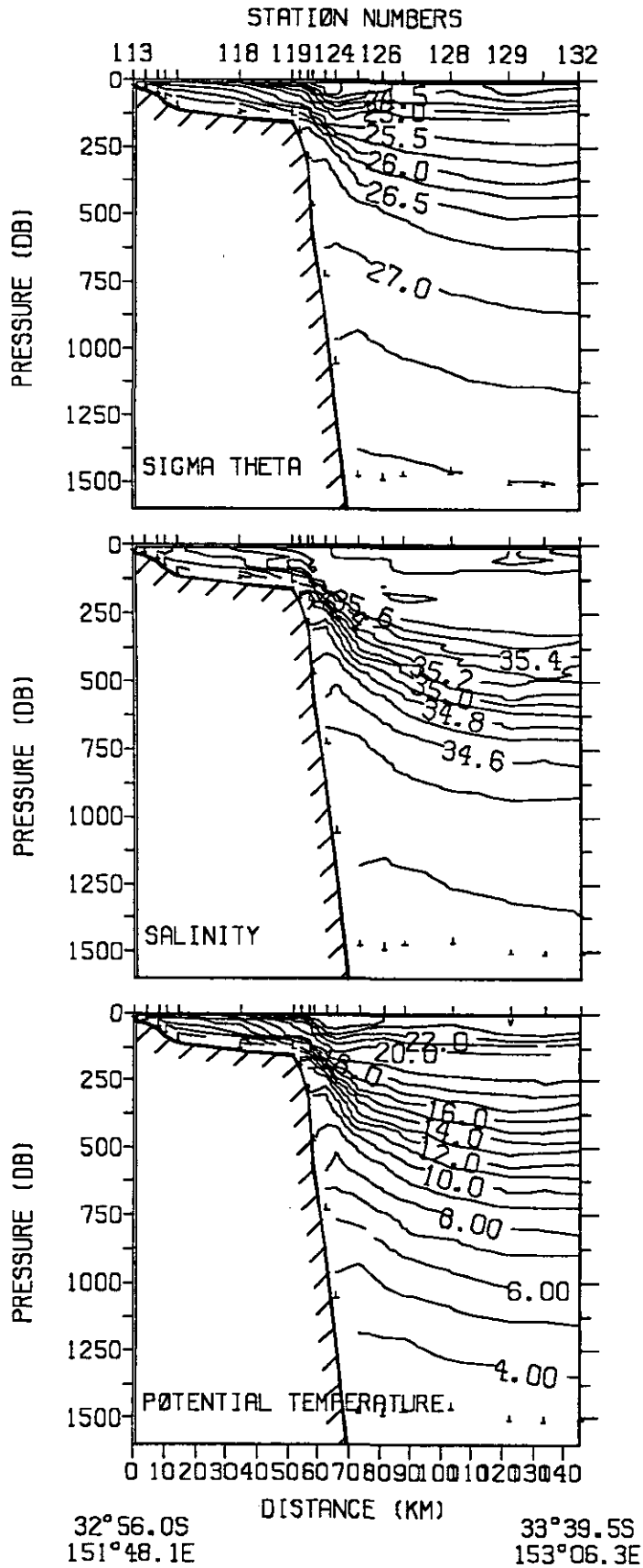


Fig 4.34 Cruise Sp01/84 Newcastle Section 22-23 January 1984

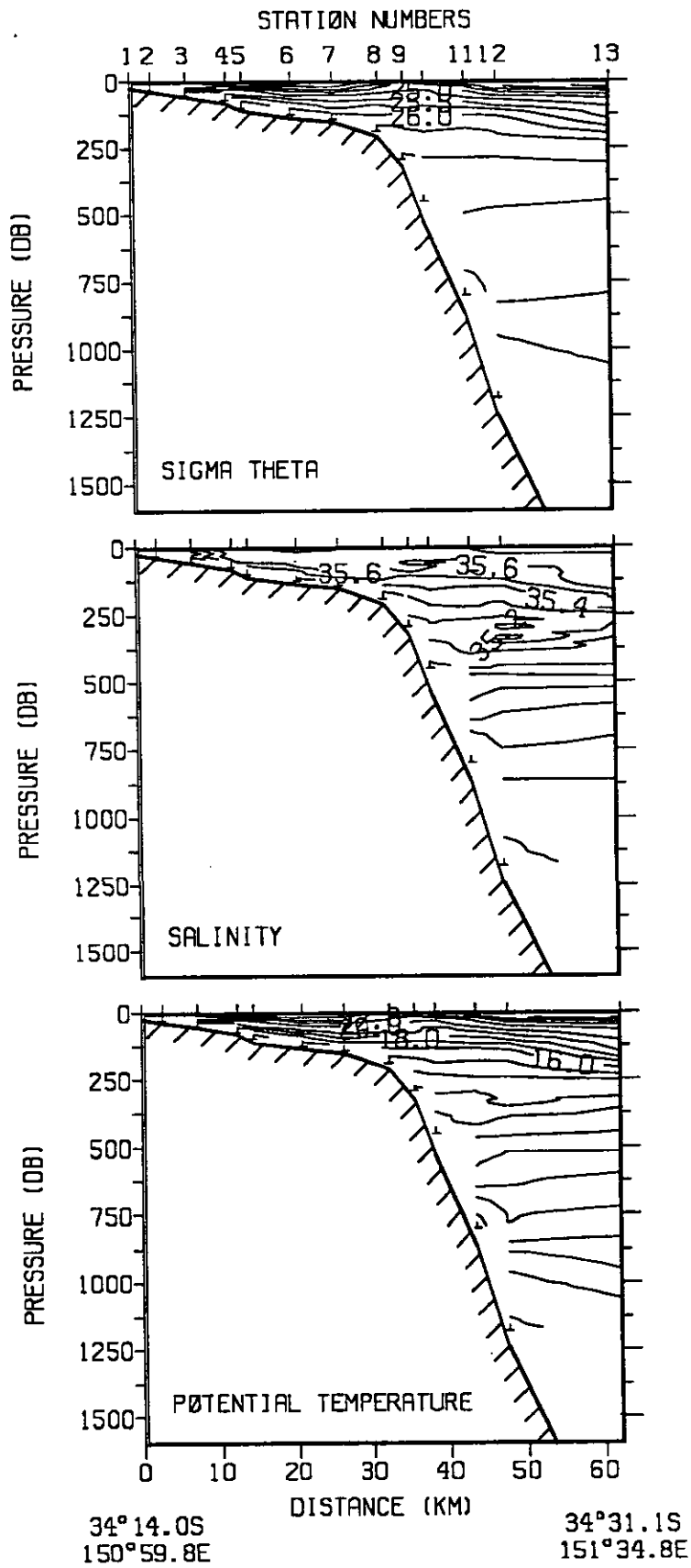


Fig 4.35 Cruise Sp02/84 Stanwell Park Section 9-11 February 1984

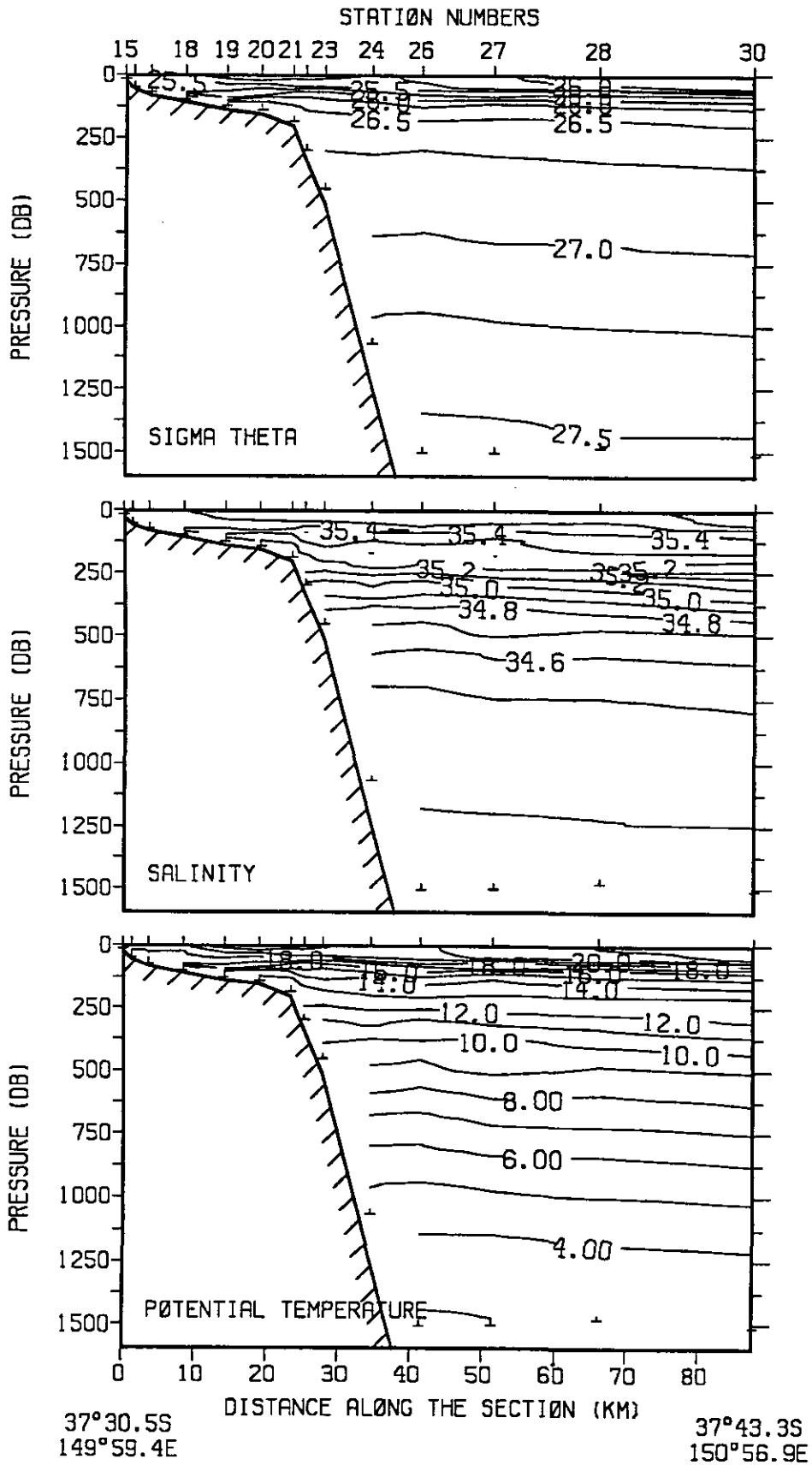


Fig 4.36 Cruise Sp02/84 Cape Howe Section 11-12 February 1984

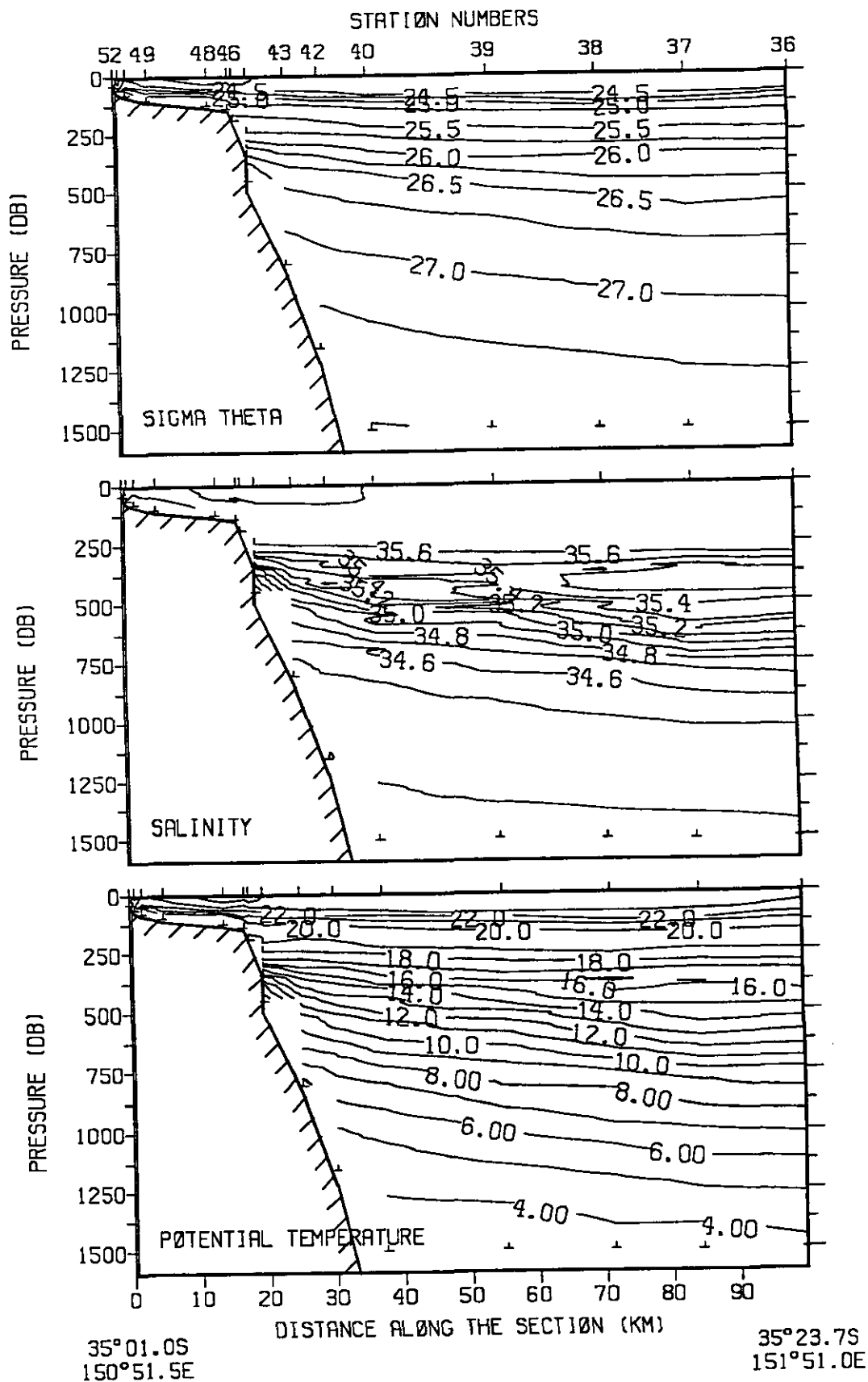


Fig 4.37 Cruise Sp02/84 Beecroft Head Section 13-14 February 1984

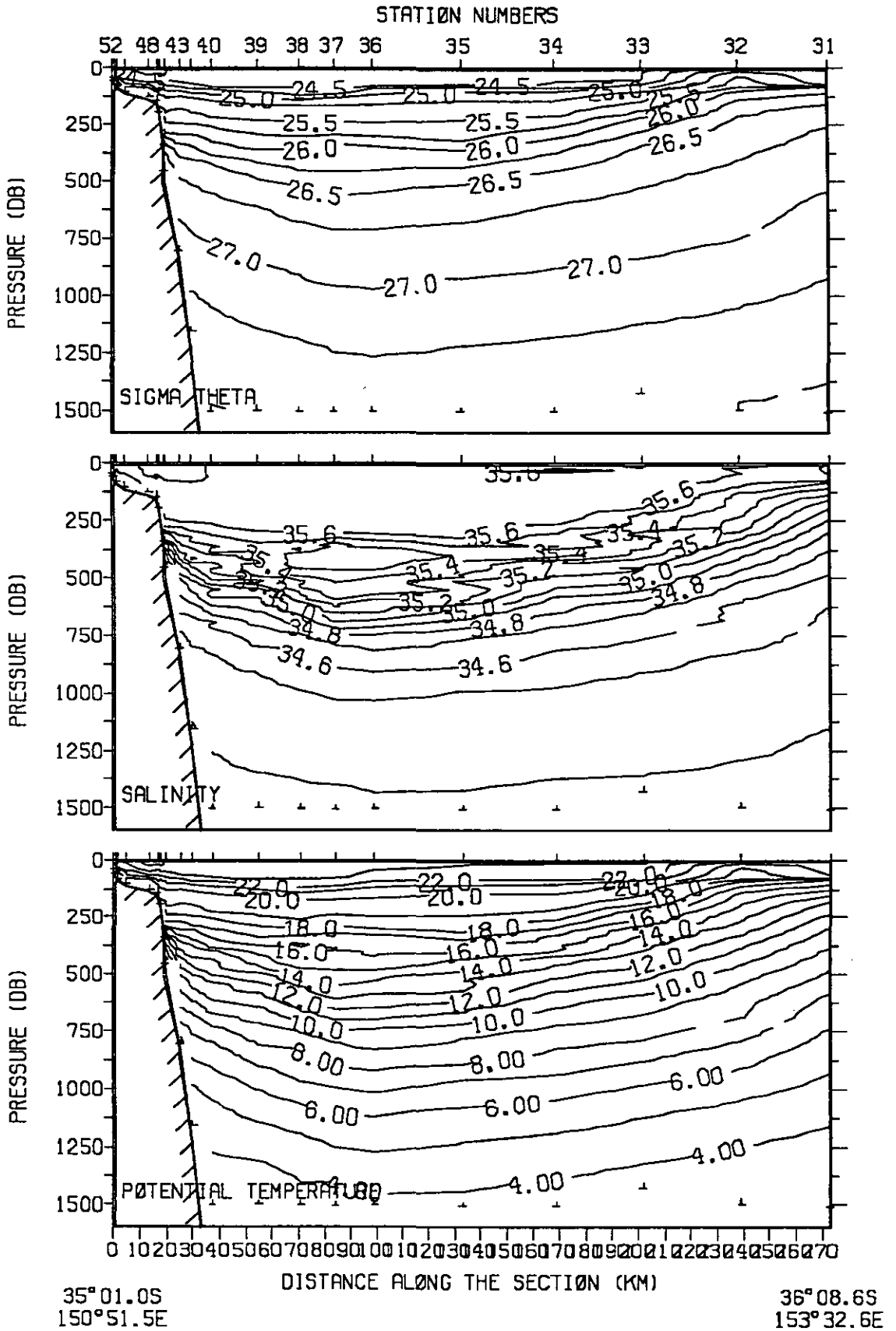


Fig 4.38 Cruise Sp02/84 Becroft Head Section 13-14 February 1984

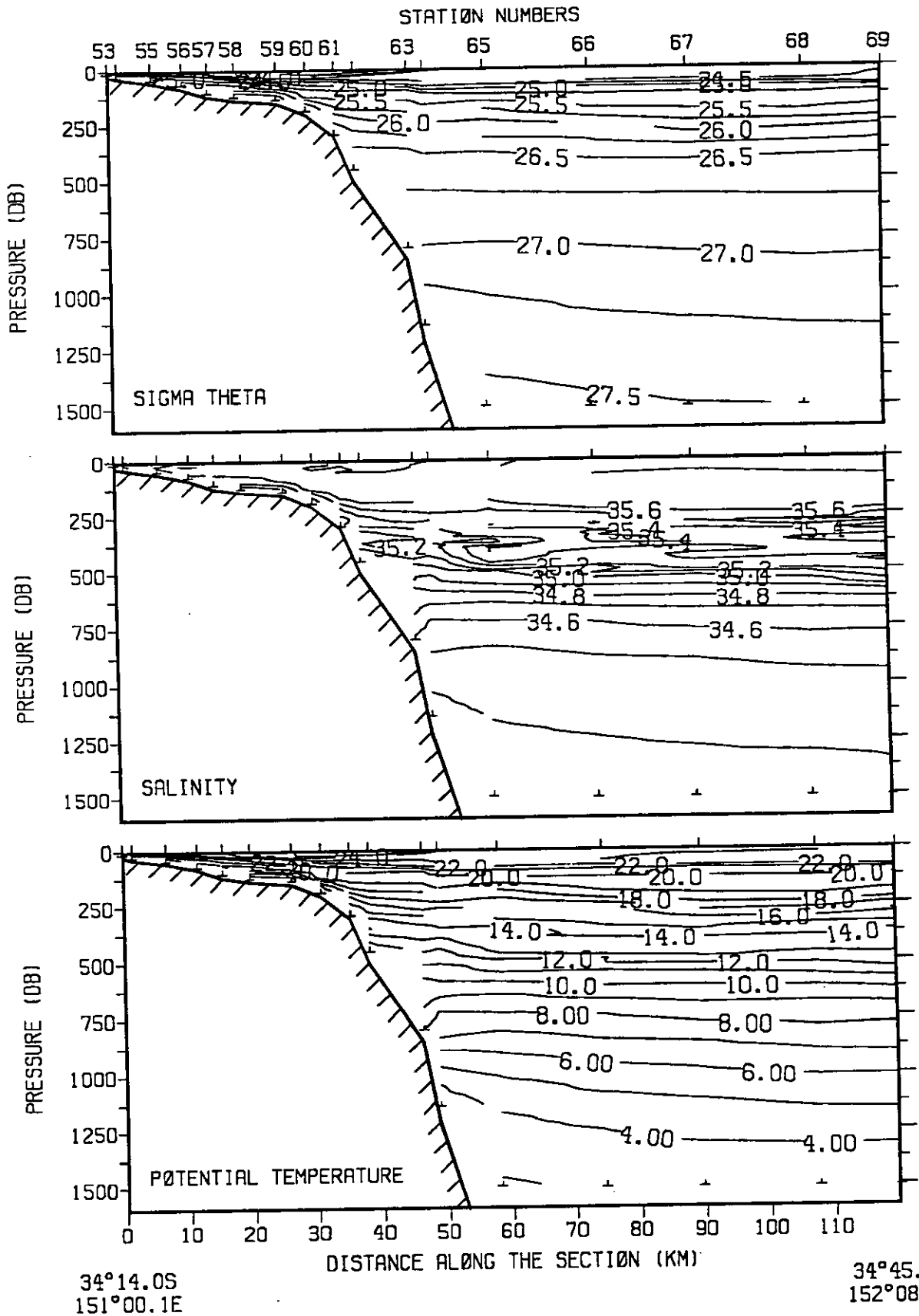


Fig 4.39 Cruise /Sp02/84 Stanwell Park Section 15-16 February 1984

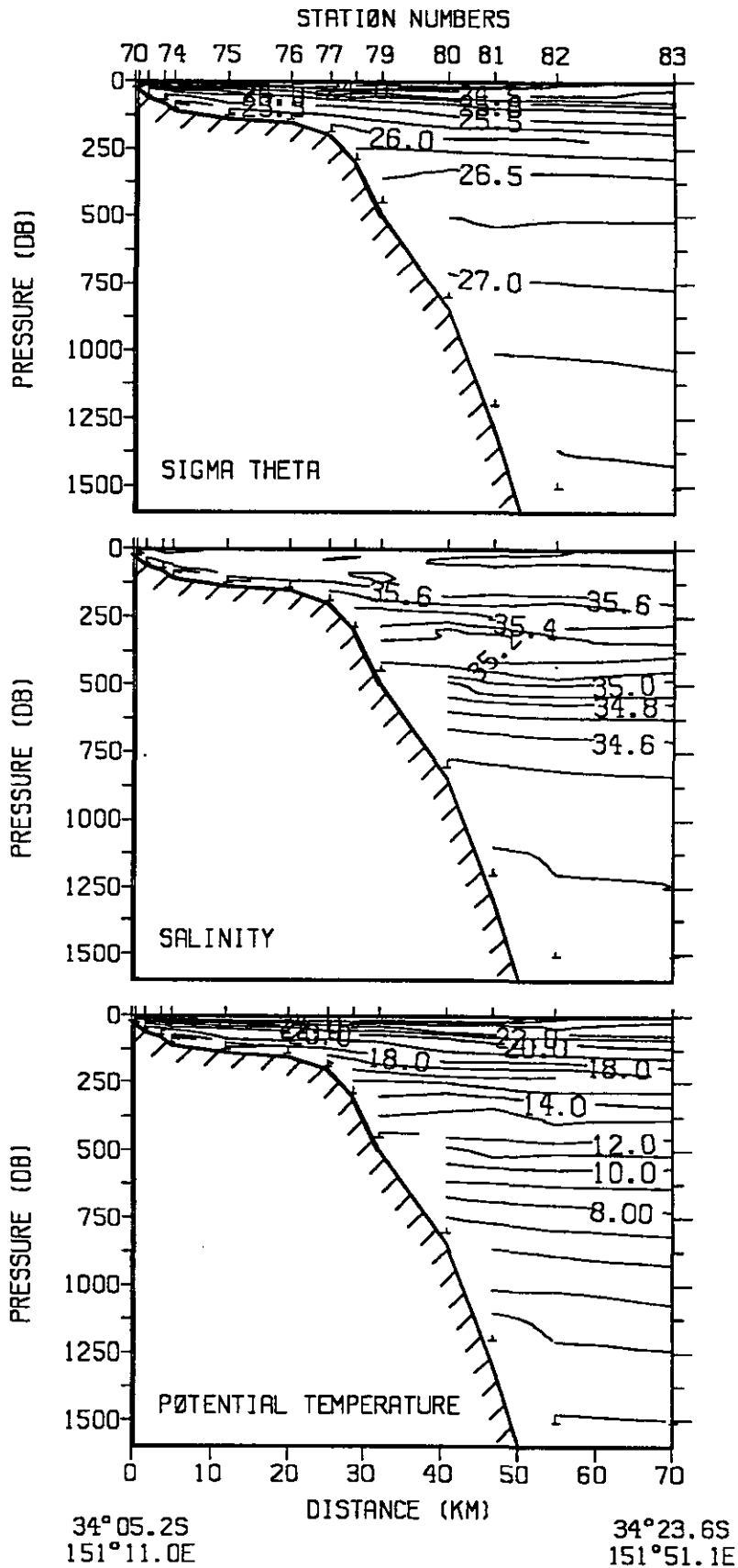


Fig 4.40 Cruise Sp02/84 Cronulla Section 16-17 February 1984

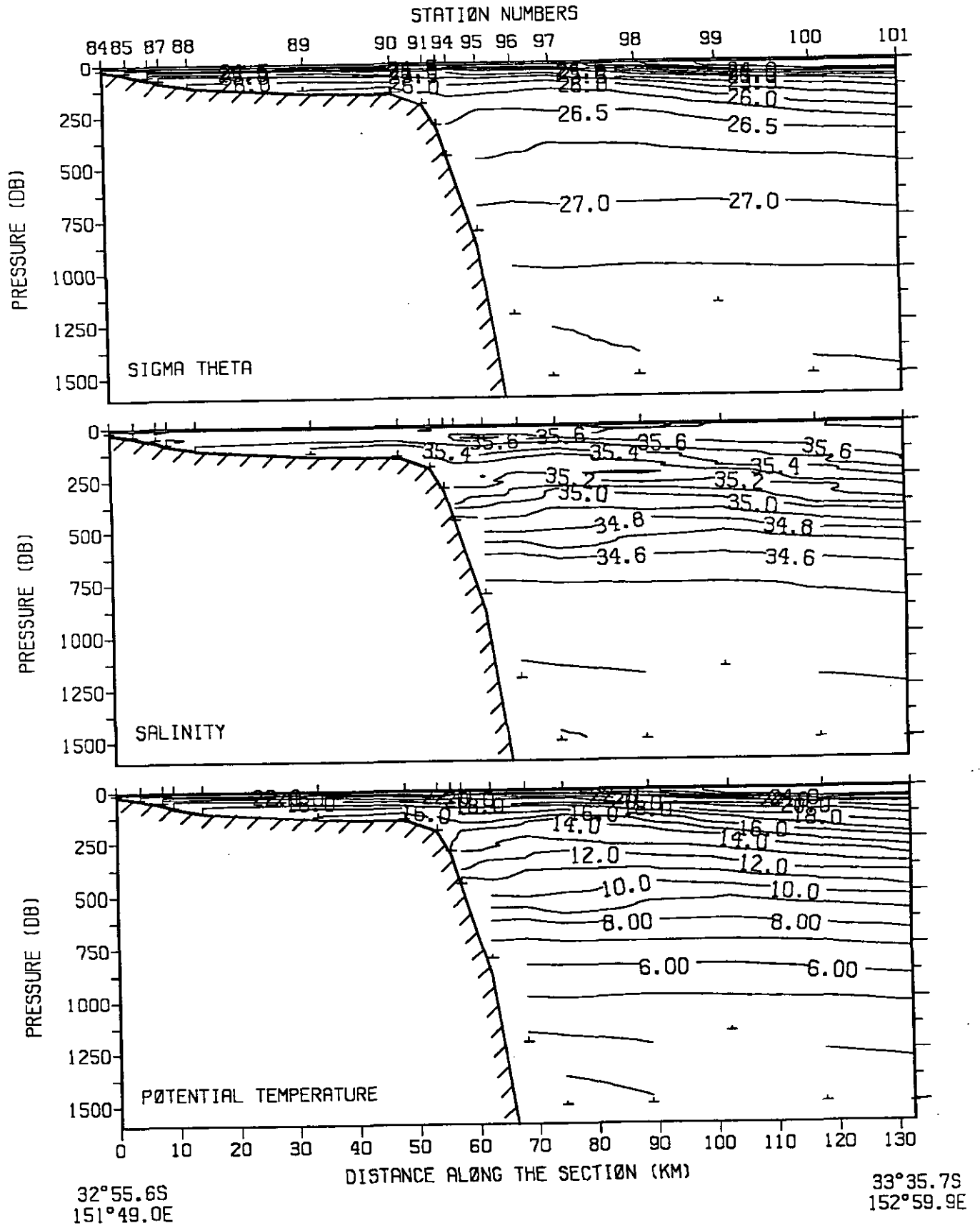


Fig 4.41 Cruise Sp02/84 Newcastle Section 17-18 February 1984



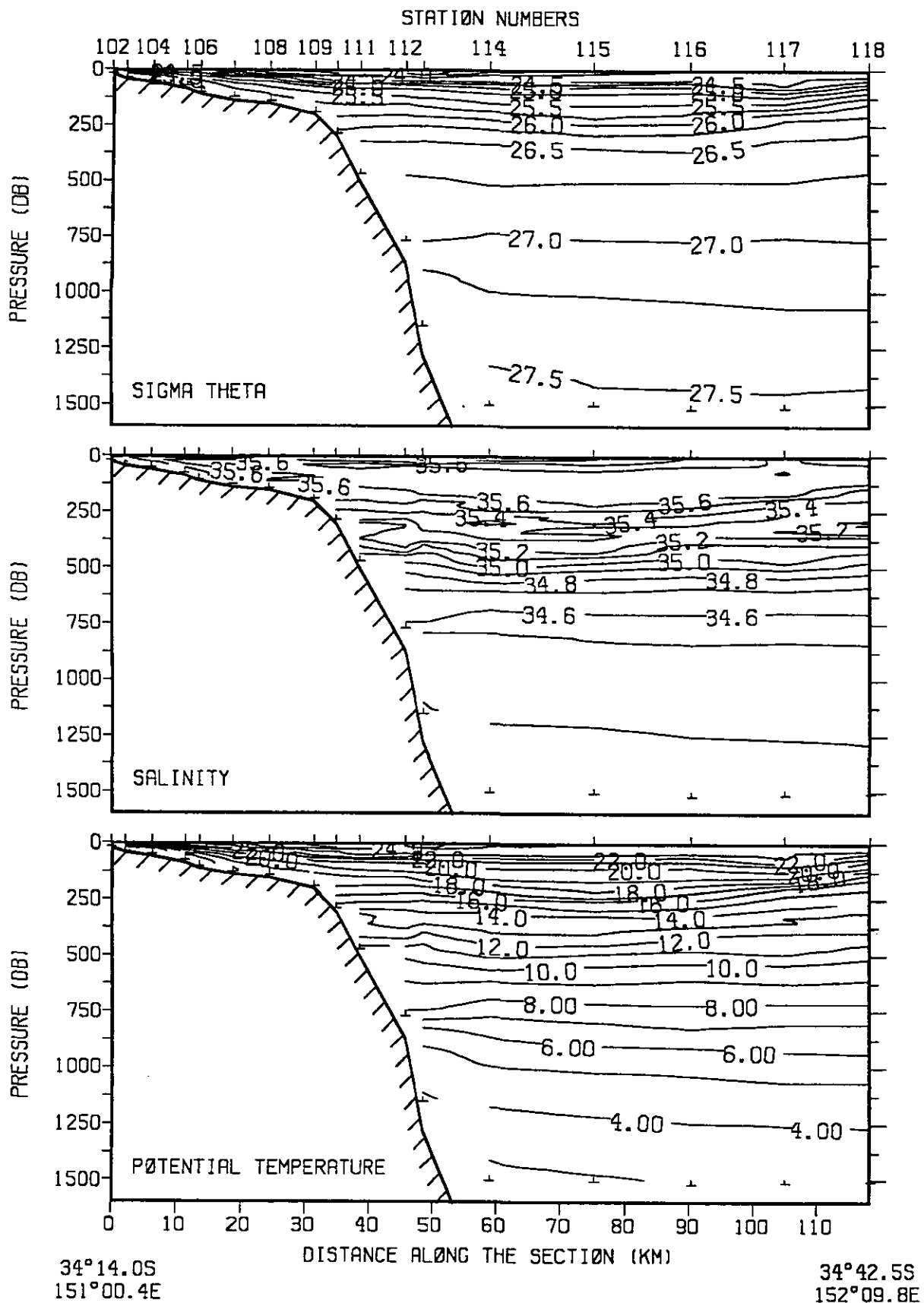


Fig 4.42 Cruise Sp02/84 Stanwell Park Section 19-21 February 1984

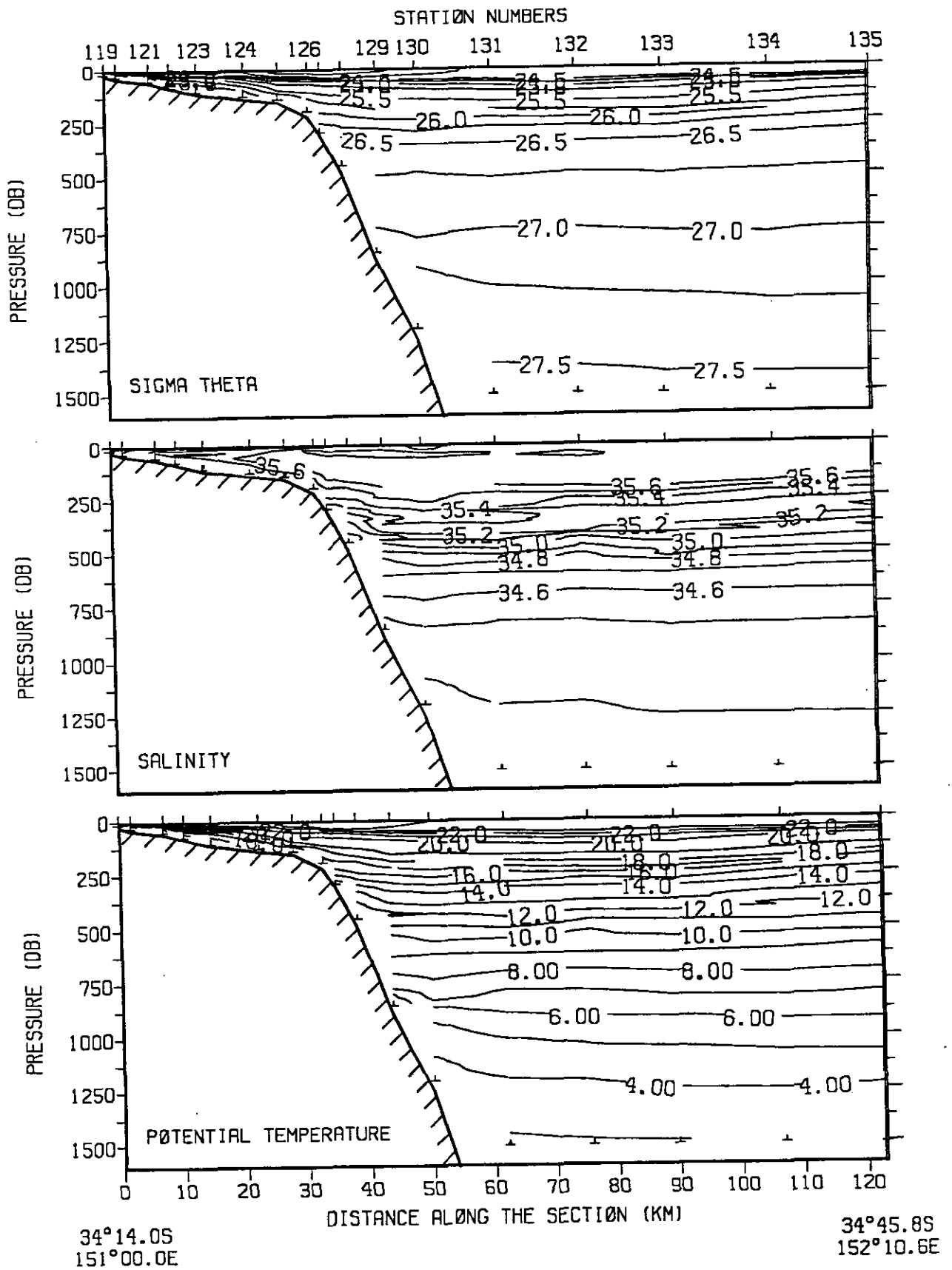


Fig 4.43 Cruise Sp02/84 Stanwell Park Section 21-22 February 1984

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