Cruise Report

C.S.S. PARIZEAU Cruise 95-010
to Scotian Shelf and Georges Bank

June 6-13, 1995

REPORT ON *C.S.S. Parizeau* CRUISE 95-010
6-13 June 1995

by

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BEDFORD INSTITUTE OF OCEANOGRAPHY CRUISE REPORT *Parizeau* 95-010

Local Cruise Designation:	95-010
Vessel:	*C.S.S. Parizeau*
Dates:	6-13 June 1995
Area:	Southwest Nova Scotia/Georges Bank
Responsible Agency:	Ocean Sciences Division Scotia-Fundy Region, DFO
Ship's Master:	Capt. C.R. Lockyer

Scientific Personnel:

P.C.Smith	Ocean Sciences
G. Bugden	Ocean Sciences
P. d'Entremont	Ocean Sciences
R. Boyce	Ocean Sciences
M. Stepanczak	Ocean Sciences
B. Nickerson	Ocean Sciences
M.J. Graca	Harding Scientific
J. Bobanovic	Dalhousie U.
J. Bartlett	Dalhousie U.
K. Bryan	Dalhousie U.
F. McArthur	Dalhousie U.

1. PURPOSE

The scientific objectives of this cruise were:

1) long term monitoring of the major inflows to the Gulf of Maine, namely the surface inflow from the Scotian Shelf off Cape Sable and the deep inflow of slope water through Northeast Channel,
2) determining the seasonal hydrographic properties along the eastern boundary of the Gulf of Maine, and
3) measuring the hydrographic structure over Truxton Swell and in Jordan Basin (if possible) in order to determine the extent of slope water penetration into Jordan Basin.

The activities planned for the cruise period include:

1) replacement of moorings off Cape Sable (C2) and in Northeast Channel (NECE), placement of a single mooring in Northeast Channel (NECW), and recovery of a single mooring (NEP) on the Northeast Peak of Georges Bank,
2) conduct of a CTD survey along the eastern boundary of the Gulf of Maine, including Browns Bank, Northeast Channel, Georges Basin and Truxton Swell, and
3) conduct of repeated ADCP transects across Northeast Channel over at least one tidal cycle.

2. NATURE OF DATA GATHERED

During this cruise, a total of six current meter moorings and seven guard buoys were recovered at three sites in the Gulf of Maine (C2, NEP, NECE; see Figure 1a and Table 1a). Biological fouling was evident on several of the near-surface instruments on recovery. Specifically, the rotors on two instruments were stiff and the conductivity cells on seven instruments were clogged to varying degrees (4 heavy, 3 light). Furthermore, batteries in two of the bottom pressure gauges died prior to recovery, reducing the data return.

In addition, a total of 48 CTD stations (Fig.1b, Table 2) were occupied along:

1) a section from the 50 m isobath off Cape Sable, across Browns Bank and Northeast Channel to Georges Bank (Figs.2,3),
2) three shorter sections across the mouth of Northeast Channel, in Georges Basin and on Truxton Swell (Figs.4,5,6),
3) a section following the 200 m isobath on the eastern side of the Channel and extended out into the slope water (Fig.7),
4) a section across the inner Scotian Shelf off Shelburne (Fig.8), and
5) at each mooring site.

The quality of the CTD temperature and salinity measurements is quite acceptable (Table 2a), although there were some problems in resetting the electronic thermometers for the temperature calibration. Oxygen samples were drawn from up to 9 depths at each station, providing a reasonable distribution of the dissolved oxygen field. However, Beckman and YSI dissolved oxygen sensors both showed a large offsets with respect to the titrated values (Table 2b; Fig.9a,b). After calibration by linear regression, values from the faster YSI sensor were much less scattered. In addition, 291 oxygen isotope samples were collected throughout the water column for Dr. Robert Houghton of Lamont-Doherty Earth Observatory. Also, nutrient samples were collected throughout the water column at all stations.

Seventeen repeated ADCP transects (Table 3) were run over the duration of the cruise along the mooring/CTD line in Northeast Channel (Fig.1b) in order to monitor the inflow/outflow over an M2 tidal cycle. A total of ~50 hrs was devoted to straight transects, with an additional 20 hrs spent on the CTD and mooring lines. Only processed (averaged) data were collected over the entire cruise and stored as 5-min averaged data files. Shortly after departing BIO, a test of the ADCP transducer alignment error and amplification factor showed that these values were acceptably small(Table 3a.)

3. PROGRAM SUMMARY

Date	From(UTC)	To(UTC)	Operation
6 June	1400	0500 (7)	Depart BIO for C2 site; CTD0
7 June	0500	0900	CTD 1-3 on Sect.Ia
	0900	1500	Mooring operations at C2
	1500	0030 (8)	CTD4-11 on Sect.Ia
8 June	0200	2330	Repeated ADCP transects
	2330	0730 (9)	CTD12-18 on Sect.Ib
9 June	0900	1200	Mooring operations at NECW
	1300	1900	Mooring operations at NECE
	1900	1400 (10)	CTD19-32 on Sects.IV, V
10 June	1400	1700	Mooring operations at NEP
	1900	2000(11)	Repeated ADCP transects across NEC
11 June	2100	1610 (12)	CTD33-44 on Sects.II,III,V
12 June	2150	0019 (13)	CTD45-48 on Sect. VI
13 June	0830		Arrive BIO

4. MOORING OPERATIONS

The recovery of six instrument moorings at three sites (C2,NECE, and NEP; Table 1a) was completed without incident. Using differential GPS positioning and transponding with the release, it was possible to locate and retrieve all of the moorings quickly. One of the NECE moorings (1171; Table 1a) was found roughly 0.6 nm out of position (i.e. outside the guard buoy array) and the jacket on its mooring line appears to have been chafed. However, there was no apparent damage to the instruments. Several of the returning instruments from NECE and NEP (see Table 1a) had stiff rotors and clogged conductivity cells due to severe fouling. Furthermore, the Eveready batteries in two of the three bottom pressure gauges died, yielding only 63% and

23% of the potential record lengths at C2 and NECE, respectively.

Two of the original nine guard buoys were missing, both from the NECE site. The bottom chain from the remaining buoy at NECE showed signs of severe pitting and corrosion, especially at the welds of the individual links. In fact, the anchor from that buoy was lost when the anchor chain parted at the weakest link. Fortunately, the broken link was recovered to show that all but a 1/8" spot of the weld had been eaten away. This clear danger prevented the recovery of one anchor at the NEP site because the bottom chain appeared to be in the same condition, so the chain was cut and the anchor released for safety's sake. Other present dangers with the guard buoys include the sharp edges of the radar reflectors which injure the seamen as they attempt recovery along the rail of the ship. A new design is required. Finally on a positive note, the bushings installed on the shackles under the buoys in November appear to have done their job, namely to prevent serious wear between the shackle pin and the ring under the buoy. Though each was worn through, there was minimum wear on the metal over 6 mos.

The placement of the new moorings (see Table 1) was relatively straightforward. Using the DGPS positions from previous deployments, it was possible to relocate the moorings in those precise locations with the help of AGCNAV. One confusion was the difference between the present and previous ship sounders. The new instrument gives higher values than before (set to higher sound speed?) but offers a "correction sheet" which reduces the soundings by roughly 5m (2m) in 200m (100m) of water. Furthermore, there was some difficulty with the deployment of mooring 1191 due to the strong tidal currents present at the time. As a result, the mooring lies somewhat outside of the guard buoy array, but still appears to be protected by it.

Problems:

(1) *The cause of excessive corrosion in the guard buoy anchor chain must be investigated, and the problem eliminated. The present system is dangerous.*

(2) *A new design for the radar reflectors on the guard buoys that does not have sharp edges must be implemented.*

(3) *The bottom pressure gauges should be equipped with lithium batteries in future to insure that the sampling will continue for the entire deployment.*

(4) *The deployment of the chain tackle for the guard buoys from a barrel is an efficient innovation, but presently the lead from the barrel to the anchor is too short. In future, the chain should be packed with a longer lead.*

5. HYDROGRAPHIC MEASUREMENTS

Hydrographic and chemical measurements were made at a total of 48 stations (Table 2) using a Seabird 9/11 Plus system, equipped with a Beckman dissolved oxygen sensor (CTD0-32). In addition, a SBE 23Y dissolved oxygen sensor, manufactured by Yellow Springs Instruments (YSI), was installed for stations CTD33-48. The YSI instrument is limited to depths less than 2000 m, but has a faster response time than the Beckman, making it more suitable for use in shelf waters where gradients are steep. The data were logged on a 33 Mhz 486 PC and post-processed between stations using SEABIRD's software. Once processed, the data were transferred to the VAX over the network for final tape backup to EXABYTE.

5a. Processing

The processing and data transfer to the VAX was initiated by a single command at the end of the station. This command, called PROCESS, starts a batch job that sequentially passes the data through a number of programs. Most were from SEABIRD's SEASOFT package. A few were custom written at BIO. The following is a summary of the processing procedure:

(1) Convert raw frequency data to binary pressure, temperature and conductivity using SEABIRD's DATCNV program.
(2) Split the file into the up and down traces using SEABIRD's SPLIT program.
(3) Check downcast for and mark any 'wild' data points with SEABIRD's WILDEDIT program.
(4) Filter downcast conductivity and temperature using SEABIRD's FILTER program. This is a low pass filter and we used a time constant of 0.045 seconds for conductivity and 0.15 seconds for temperature.
(5) Mark downcast scans where the CTD is moving less than the minimum velocity of 0.10 m/s using SEABIRD's LOOPEDIT program.
(6) Align downcast pressure, temperature and conductivity using SEABIRD's ALIGNCTD program by advancing the conductivity signal by 0.01 sec.
(7) Apply the thermal mass correction for the conductivity cell using SEABIRD's CELLTM program.
(8) Bin average downcast data to 1.0 m intervals using SEABIRD's BINAVG program.
(9) Compute downcast salinity, potential density (Sigma-θ), potential temperature, dissolved oxygen, and depth using SEABIRD's DERIVE program.
(10) Convert the down cast from binary to ASCII using SEABIRD's TRANS program.
(11) Convert downcast to ODF format using PCS program SEAODF.
(12) Create IGOSS message using PCS program ODF_IGOS.
(13) Prepare batch and command files to transfer the data to the VAX and create the input for SEABIRD's ROSSUM program using our customized MAKEFILE program.
(14) Check for bottles, then use ROSSUM to create the rosette summary file.
(15) Convert the resulting .BTL file to a format suitable for ingestion into Quattro PRO using our customized QPROBTL program.
(16) Use the command file from step (12) to perform the FTP transfer of the raw binary and processed data to the VAX.
(17) Copy Quattro, downcast, and ODF files to appropriate directories and clean up.

Plots and status info displayed by the SEASAVE program during the acquisition are discarded when the program terminates. The post-processing plotting was not included in the batch job because SEABIRD's SEAPLOT program requires interactive operator attention.

5b. Calibration

At the base of each CTD cast two rosette bottles were tripped, one of which carried a pair of digital thermometers. One salinity sample was drawn from each of the two bottles. The sample from the first rosette bottle was analyzed onboard with an Guildline AutoSal salinometer; the other sample will be analyzed at BIO. The comparison of these standards against the SeaBird CTD (Table 2a below) shows that, after the removal of several obvious outliers, the offset in temperature is negligible, but that for salinity is significantly different from zero. However, the standard deviations about the offsets are small, so the calibrations for both T and S are acceptable.

In addition, dissolved oxygen samples were collected from rosette bottles tripped over the entire water column and analyzed on board with the automated titration unit borrowed from Marine Chemistry. Comparisons between the both Beckman and YSI measurements and bottle samples revealed that both sensors have significant offsets with respect to the titrated values (Fig.2a,b). Linear regressions give the effective calibrations for the two sensors (Table 2b) and indicate that the corrected YSI sensor (std.err. ±0.27 ml/l) is much more accurate than the Beckman (std.err. ±0.75 ml/l).

Problems:

(1) The YSI oxygen sensor clearly outperformed the Beckman sensor, after correction for a small offset, and also showed a significantly higher sensitivity. Therefore, it is recommended that the YSI sensor, with its faster response, be used on all future cruises.

5c. Sections

CTD sections I-VI (Figs. 3-10) depict hydrographic conditions, 1) along the eastern boundary of the Gulf of Maine, 2) across the sill in Northeast Channel, 3) down the western flank of Browns Bank, 4) along Truxton Swell, 5) across the mouth of Northeast Channel, 6) along the 200 m isobath on the eastern side of the Channel, and 7) across the inner Scotian Shelf off Shelburne, respectively. Section Ia (Fig.3) shows the transition from the cold well-mixed waters off Cape Sable to the stratified water on the outer half of Browns Bank. A sharp demarcation between water masses appears at Station 8 (Fig.3a) and the salinity section and T,S plot (Figs.3b,d) indicate a zone of stratified water over the outer part of the Bank with warm fresh surface water and a distinct cold intermediate layer. High salinity deep water on the Bank appears to be "spilling over" the shelf break from Northeast Channel at Stations 11 and 12. Comparison with earlier observations (Smith, 1994; Fig.2d) reveals that 1995 conditions are significantly colder and fresher at the core of the intermediate layer (Station 12) than in June 1994, when minimum temperatures exceeded 5°C.

Section Ib, across Northeast Channel (Fig.4), shows evidence for inflowing deep water below 75 m (Stations 13,14) with temperatures in excess of 12°C and salinities approaching 35.5. Above the slope water on the eastern side of the Channel is a frontal structure separating fresh Scotian Shelf water (S<32) from Georges Bank surface waters. Both of these features are more pronounced than in 1994, when, for example, the maximum temperature and salinity in the Channel did not exceed 11°C and 35.0.

Section II (Fig.5), on the western flank of Browns Bank, also reveals the frontal structure between the Scotian Shelf and central Gulf of Maine water. A sharp distinction may be seen in the T,S properties of the surface waters between Stations 36 and 37, whereas a transition between incoming slope and central Gulf waters occurs between Stations 37 and 38. Again the maximum and minimum T and S are more pronounced that in 1994.

Section III along Truxton Swell (Fig.6) shows the transition from stratified central Gulf of Maine water, with a distinct cold intermediate layer (Stns. 39-41) to well-mixed shallow water off Yarmouth (Stn.44). A tongue of slope water (S>34.5) is centred at Station 41, near the inferred inflow axis from earlier observations (October,1993; June 1994).

Section IV at the mouth of Northeast Channel (Fig.7) clearly depicts the surface front between Browns Bank and offshore waters and shows evidence of strong interleaving between Stations 22 and 26. The slope water mass is pressed against the eastern side of the Channel with T,S maxima between 70-160 m. This gives way to outflowing water on the western side with generally lower T and S. Conditions on Georges Bank are reasonably well-mixed.

Section V (Figs.8,9) roughly follows the slope water inflow axis along Northeast Channel to Truxton Swell. Off the mouth of the Channel, the slope water source is evident, with T,S in excess of 13°C and 35.5 at depths of 50-150 m (Fig.8a,b). Along the Channel, pockets of slope-derived (Stns 19,37) and cold, intermediate (Stns 33,34) waters are found (Fig.9a,b). If the slope water boundary value is taken as $S=34.5$, then slope water is also present on Truxton Swell (Stn. 41), but clearly the volume is small and the properties diluted. The T,S plots (Figs.8d,9d) indicate the wide range of properties found along this section.

Finally, Section VI (Fig.10) reveals the source water properties on the Scotian Shelf off Shelburne. Minimum temperatures and salinities (T,S < 2°C,31.0) are the lowest observed in the region, with core waters trapped to the coast. A sharp contrast in properties occurs at Station 47 (Fig.10d), beyond which the characteristics seem to be similar to those found on the northern flank of Browns Bank on the Cape Sable section (Fig.3d). Inshore properties on the Cape Sable line appear to represent a mixture of the two water masses found off Shelburne, while conditions on the outer edge of Browns (Stns 11,12; Fig.3) are similar to those found inshore off Shelburne. This suggests that there are two primary routes for Scotian Shelf water to reach the Gulf of Maine, inshore off Shelburne and offshore around Browns Bank.

References:

Smith, P.C. 1994. Report on *C.S.S. PARIZEAU* Cruise 94-018, 24-30 June 1994. Bedford Institute Cruise Report, 34 pp.

6. ADCP TRANSECTS

The RDI ADCP was run continuously over the cruise in the bottom track mode. Short breaks in the acquisition resulted in a total of 3 transect files collected over the duration of the cruise. The velocity measurements were made in 100 4-m bins below the transducer depth (4.9 m). In the standard acquisition mode, 4-ping ensembles were averaged over 5 minutes to create processed profiles of velocity, beam intensity, etc. The RDI system appeared to work well over the cruise, although some difficulty was encountered in downloading the processed files for calibration purposes. A bad diskette is suspected.

Seventeen primary transects (Table 3) formed the repeated ADCP section across the Channel, including CTD Section Ib and the transits during mooring operations. On these transects, only the averaged processed data were collected. A total of 49.6 hrs was devoted to straight transects, with an additional 20 hrs spent on the CTD and mooring lines (transects 7 and 8). The transects in Table 3 show indications of strong vertical shear in the water column and will form the basis for the removal of the semidiurnal tidal signal from the records. With more than twice the amount of transect data than was obtained on either of the previous cruises, it is hoped that the confidence intervals on the mean currents will be greatly reduced.

A calibration of the transducer alignment and amplification factor was conducted shortly after leaving BIO, on the straight run down to SW Nova Scotia. The results (Table 3a) show that both these quantities are negligibly different from their design values of 0 deg. and 1.00, respectively.

TABLE 1. Moorings Deployed During *Parizeau* Cruise 95010
6-13 June 1995

Mooring No.	Site (Depth,m)	N. Lat. W. Long.	Deployment Time(Z),Date	Instrument (Depth,m)	
1192	C2A (114)	43°02.58' 65°46.76'	1426,June 7	RCM7650(26)	
1193	C2 (109)	43°02.73' 65°47.04'	1502,June 7	RCM7134(49) RCM2663(99) TG109(109)	
1188	NECWA (214)	42°07.60' 66°00.73'	1121,June 9	RCM4600(26)	
1189	NECW (216)	42°07.72' 66°00.69'	1203,June 9	RCM9355(53) RCM4998(104) RCM5358(154) RCM6404(196) TG336(216)	rotors free
1190	NECEA (211)	42°17.75' 65°50.39'	1806,June 9	RCM7138(23)	
1191	NECE (214)	42°17.92' 65°50.94'	1900,June 9	RCM7592(51) RCM7122(102) RCM3300(152) RCM4406(194) TG343(214)	rotors free

TABLE 1a. Moorings Recovered During *Parizeau* Cruise 95010
6-13 June 1995

Mooring No.	Site (Depth,m)	N. Lat. W. Long.	Recovery Time(Z),Date	Instrument (Depth,m)	Comments
1173	C2A (116)	43°02.58' 65°46.82'	0934,June 7	RCM3569(28)	rotor free light growth
1174	C2 (107)	43°02.74' 65°47.00'	0949,June 7	RCM4208(47)	rotors free
				RCM6400(97)	
				TG109A(107)	63% recovered, battery died
1169	NEPA (74)	41°44.01' 66°32.30'	1412,June 10	RCM7127(23)	rotor free heavy growth
1170	NEP (73)	41°44.01' 66°32.08'	1426,June 10	RCM8697(37)	rotor free, large growth on vane
				RCM7651(59)	light growth, rotor free, vane + case encrusted
				TG821(73)	case encrusted
1171	NECEA (211)	42°17.95' 65°50.86'	1322,June 9	RCM7131(23)	heavy growth, rotor stiff, cond.cell clogged out of position by >0.6 nm, wire chafed
1172	NECE (211)	42°17.89' 65°50.31'	1355,June 9	RCM7137(48)	heavy growth, rotor stiff, cond.cell clogged
				RCM7525(99)	some growth, rotor free
				RCM6401(149)	rotor free
				RCM7124(191)	" "
				TG1271(211)	some growth, 23% recovered, battery died

TABLE 2. CTD Stations During Parizeau 95010, 6-13 June 1995

Stn. No.	N.LAT.	W.LONG.	Sound. (m)	Date	Year Day	Time [UTC]
0	44.693	63.639	74	Jun 06 1995	157	15:52:13
1	43.249	65.745	40	Jun 07 1995	158	05:57:18
2	43.165	65.744	47	Jun 07 1995		07:34:58
3	43.085	65.744	91	Jun 07 1995		08:40:38
4	43.033	65.779	109	Jun 07 1995		16:05:18
5	42.999	65.749	127	Jun 07 1995		17:11:22
6	42.918	65.753	145	Jun 07 1995		18:27:51
7	42.835	65.756	96	Jun 07 1995		19:33:49
8	42.752	65.756	99	Jun 07 1995		20:32:52
9	42.672	65.747	84	Jun 07 1995		21:43:00
10	42.585	65.747	86	Jun 07 1995		23:07:39
11	42.500	65.750	80	Jun 08 1995	159	00:21:00
12	42.426	65.750	95	Jun 09 1995	160	00:15:11
13	42.335	65.798	194	Jun 09 1995		01:22:08
14	42.266	65.865	215	Jun 09 1995		02:28:31
15	42.199	65.930	213	Jun 09 1995		03:39:35
16	42.132	65.994	203	Jun 09 1995		04:48:29
17	42.063	66.079	88	Jun 09 1995		06:28:20
18	42.001	66.139	86	Jun 09 1995		07:21:39
19	42.307	65.871	212	Jun 09 1995		19:41:29
20	42.192	65.702	217	Jun 09 1995		21:30:10
21	42.177	65.499	110	Jun 09 1995		22:51:45
22	42.090	65.510	555	Jun 09 1995		23:56:44
23	42.042	65.416	504	Jun 10 1995	161	01:12:36
24	41.983	65.317	496	Jun 10 1995		02:34:15
25	41.920	65.219	507	Jun 10 1995		03:58:05
26	42.010	65.557	504	Jun 10 1995		06:22:42
27	41.942	65.607	498	Jun 10 1995		07:34:50
28	41.856	65.686	509	Jun 10 1995		08:52:11
29	41.828	65.913	102	Jun 10 1995		10:17:30
30	41.807	66.128	81	Jun 10 1995		11:27:46
31	41.780	66.341	71	Jun 10 1995		12:40:48
32	41.738	66.518	69	Jun 10 1995		13:54:25
33	42.426	65.980	203	Jun 11 1995	162	21:14:23
34	42.510	66.180	206	Jun 11 1995		22:28:56
35	42.802	66.434	96	Jun 12 1995	163	00:24:03
36	42.708	66.612	161	Jun 12 1995		01:47:23
37	42.591	66.777	215	Jun 12 1995		03:21:32
38	42.507	66.961	322	Jun 12 1995		04:50:14

39	43.121	67.553	175	Jun 12 1995		09:34:01
40	43.168	67.315	191	Jun 12 1995		10:57:57
41	43.135	67.101	175	Jun 12 1995		12:14:45
42	43.170	66.865	149	Jun 12 1995		13:36:25
43	43.217	66.648	105	Jun 12 1995		14:53:39
44	43.280	66.438	58	Jun 12 1995		16:07:17
45	43.533	65.138	58	Jun 12 1995		21:59:29
46	43.466	65.074	93	Jun 12 1995		22:44:31
47	43.398	65.006	141	Jun 12 1995		23:28:23
48	43.330	64.941	144	Jun 13 1995	164	00:15:56

TABLE 2a. Temperature and Salinity Calibration Results for *Parizeau* 95010

QUANTITY	NO. SAMPLES	MEAN DIFF.	STD. DEV.
Salinity: CTD-AutoSal.	37	-0.018	0.005
Temperature: CTD-Thermometers	35	-0.001	0.006
Dissolved Oxygen: Beckman-Titration	92	-1.288	0.260

TABLE 2b. Dissolved Oxygen Regression Results for *Parizeau* 95010
$Y = aX+b$ (Y=titration, X=sensor)

SENSOR	NO. SAMPLES	$a\pm\delta a$	b(ml/l)	$\pm\delta Y$(ml/l)	r^2
Beckman	235	0.8664±0.0414	1.812	±0.75	0.653
YSI	90	0.9615±0.0252	-0.828	±0.27	0.943

TABLE 3 Primary ADCP Transects During *Parizeau* 95-010

NO.	DATE (m-d)	STRT (UTC)	END (UTC)	FROM (Lat./Long.)	TO (Lat./Long.)	COMMENTS
1	06-08	02:13	06:48	42°25'/65°46'	42°00'/66°08'	
2	06-	06:48	10:51	42°00'/66°07'	42°25'/65°45'	
3	06-	10:51	15:00	42°25'/65°46'	42°00'/66°08'	
4	06-	15:00	18:00	42°00'/66°08'	42°25'/65°45'	
5	06-	18:00	20:56	42°25'/65°45'	42°00'/66°08'	
6	06-	20:56	23:59	42°00'/66°08'	42°25'/65°45'	
7	06-	23:59	07:30	42°25'/65°45'	42°00'/66°08'	CTD Line; Sect. Ib
8	06-09	07:30	19:57	42°00'/66°08'	42°19'/65°52'	Mooring Line (incomplete)
9	06-10	16:20	22:14	42°00'/66°08'	42°25'/65°45'	
10	06-	22:14	00:51	42°25'/65°45'	42°00'/66°08'	
11	06-11	00:51	03:30	42°00'/66°08'	42°25'/65°45'	
12	06-	03:30	06:05	42°25'/65°46'	42°00'/66°08'	
13	06-	06:05	09:03	42°00'/66°07'	42°25'/65°45'	
14	06-	09:03	11:47	42°25'/65°46'	42°00'/66°08'	
15	06-	11:47	14:25	42°00'/66°08'	42°25'/65°45'	
16	06-	14:25	17:12	42°25'/65°45'	42°00'/66°08'	
17	06-	17:12	20:08	42°00'/66°08'	42°25'/65°45'	

TABLE 3a. Straight Run RDI Calibrations for *Parizeau 95-010*

DATE: 6 June, 1995

TIME	MISALIGNMENT ANGLE	AMPLIFICATION FACTOR
19:05:22	-0.027	1.005
19:10:13	4.580	0.995
19:15:18	-0.762	0.990
19:20:22	-2.082	0.996
19:25:13	-1.242	1.001
19:30:18	-2.793	1.004
19:35:22	0.802	0.999
AVERAGE	-0.204	0.998

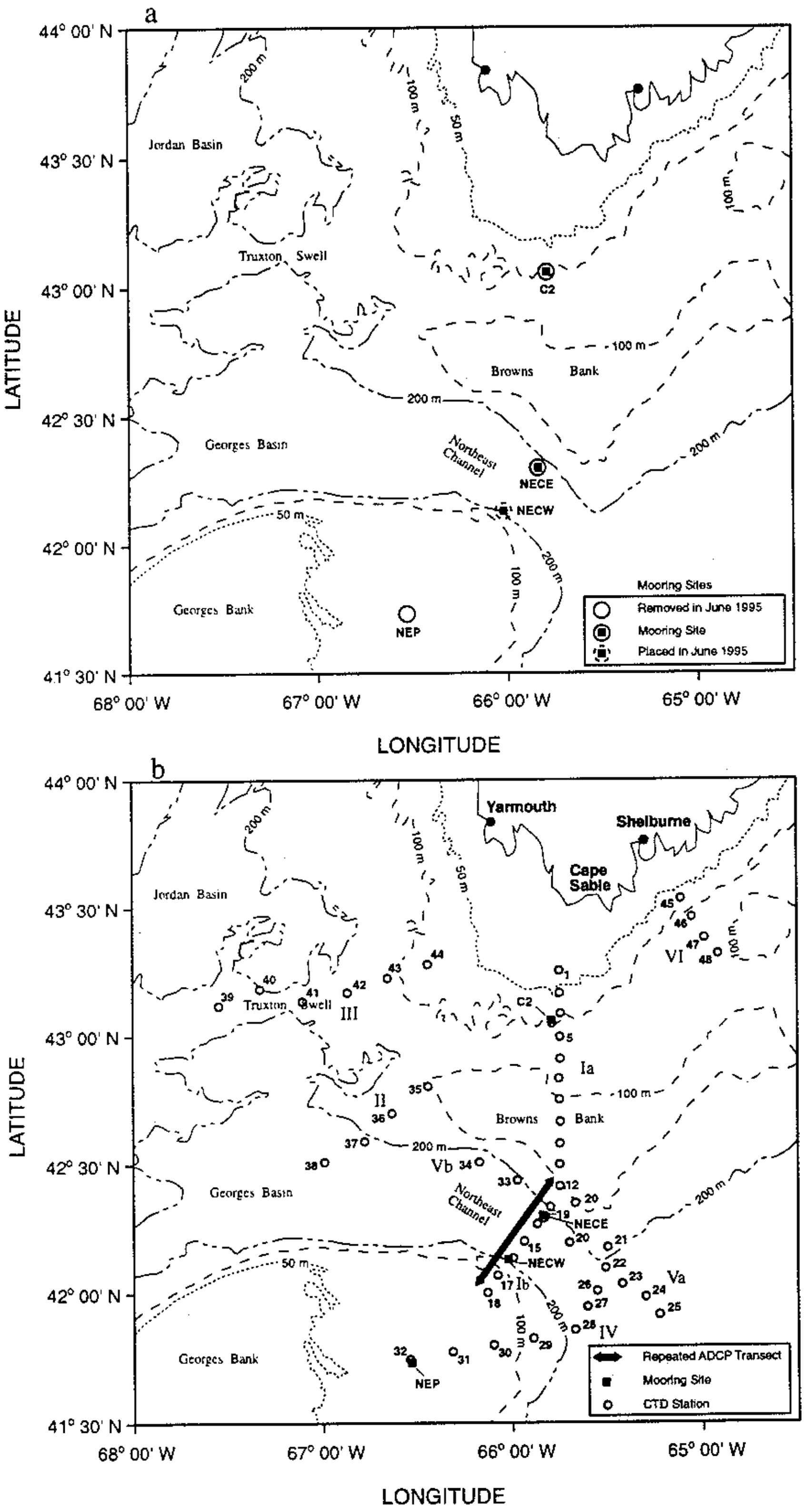


Fig. 1. a) Mooring sites, and b) CTD positions and ADCP transects for *C.S.S. Parizeau* Cruise 95-010, 6-13 June 1995.

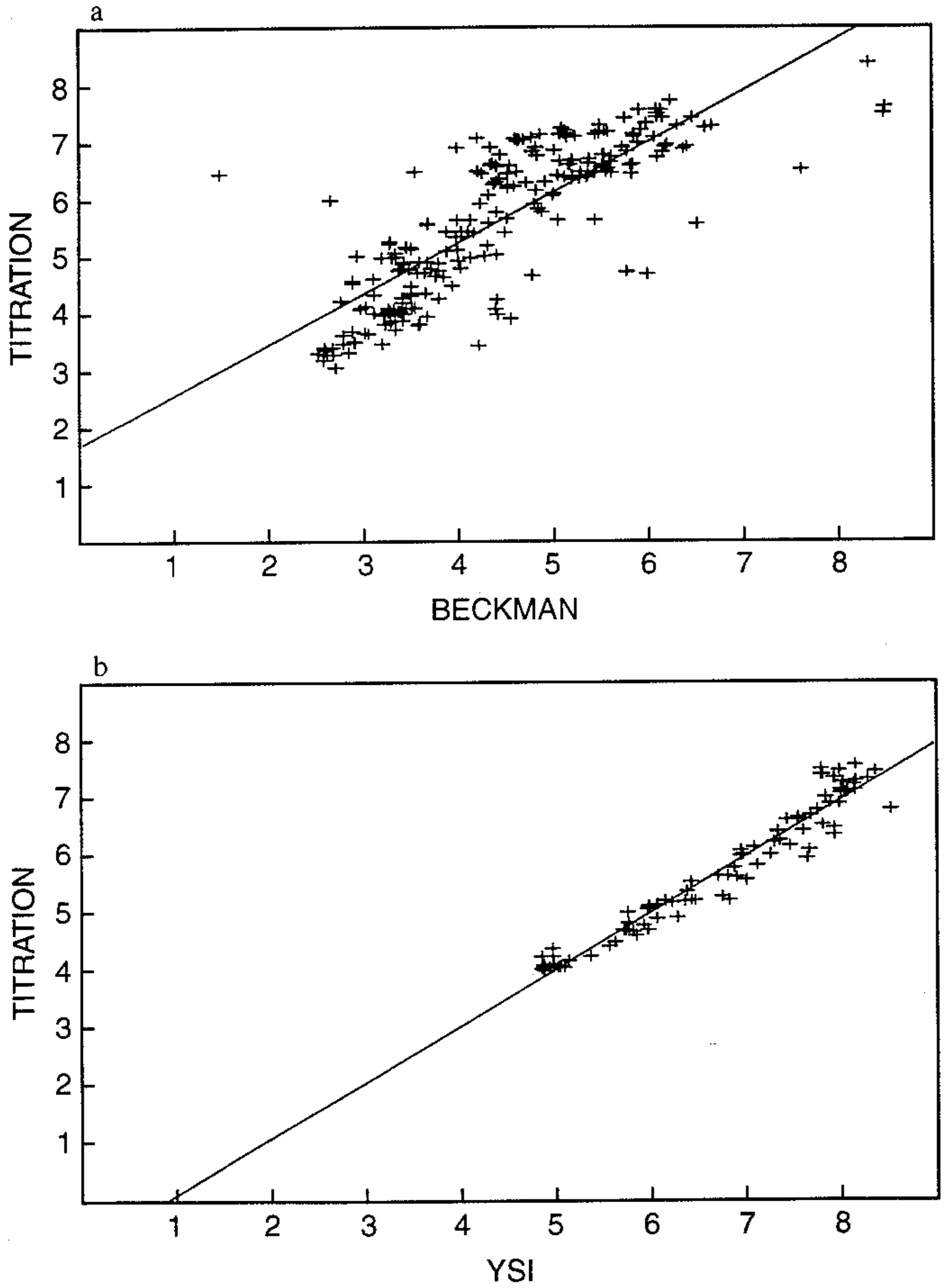
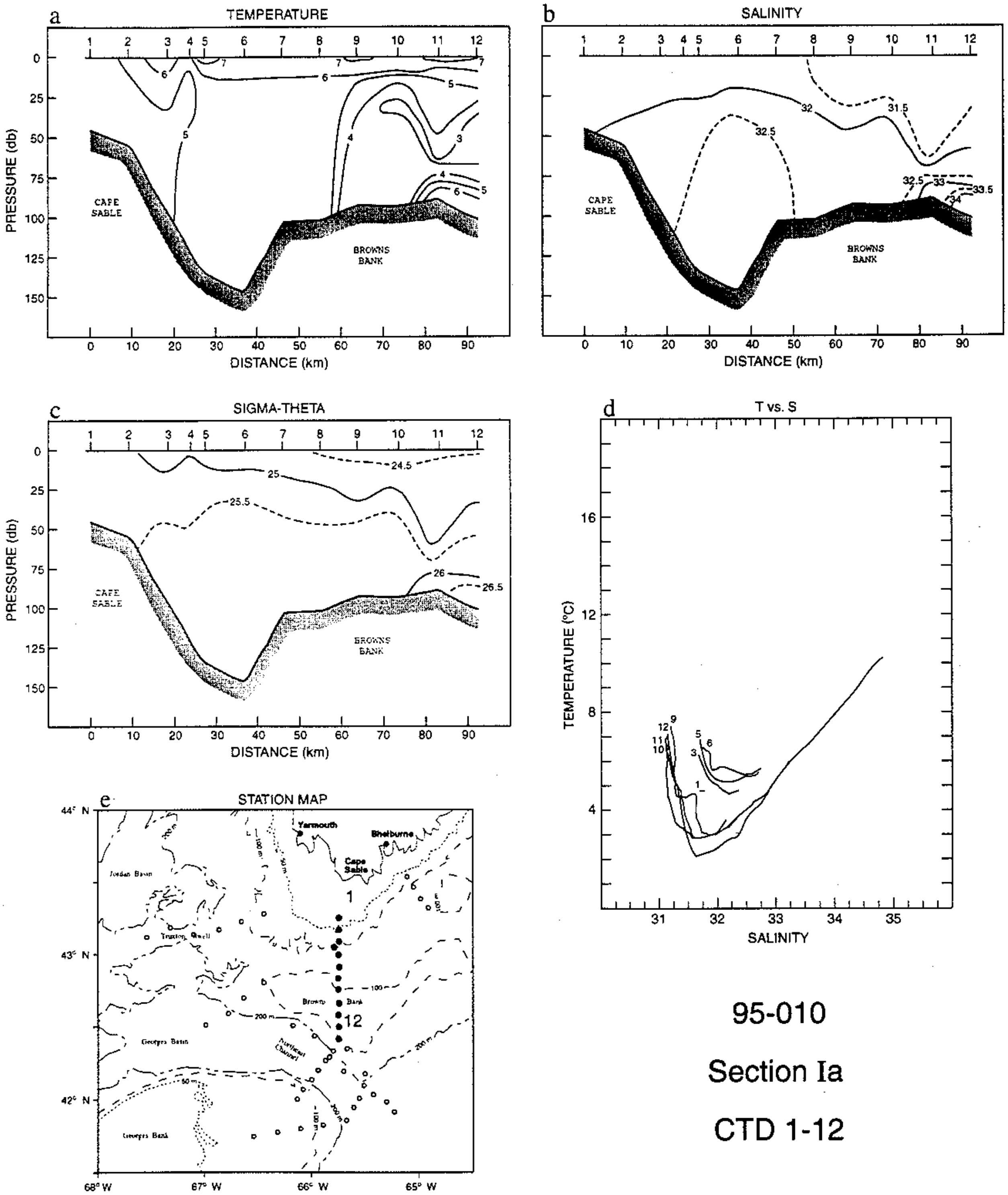


Fig. 2. Calibration data for the (a) Beckman and (b) YSI dissolved oxygen sensors. Titrated values from rosette bottle samples are plotted against downtrace values from the sensors at the same depth. Straight lines through the points are linear regressions of titrated on sensor values (Table 2b).

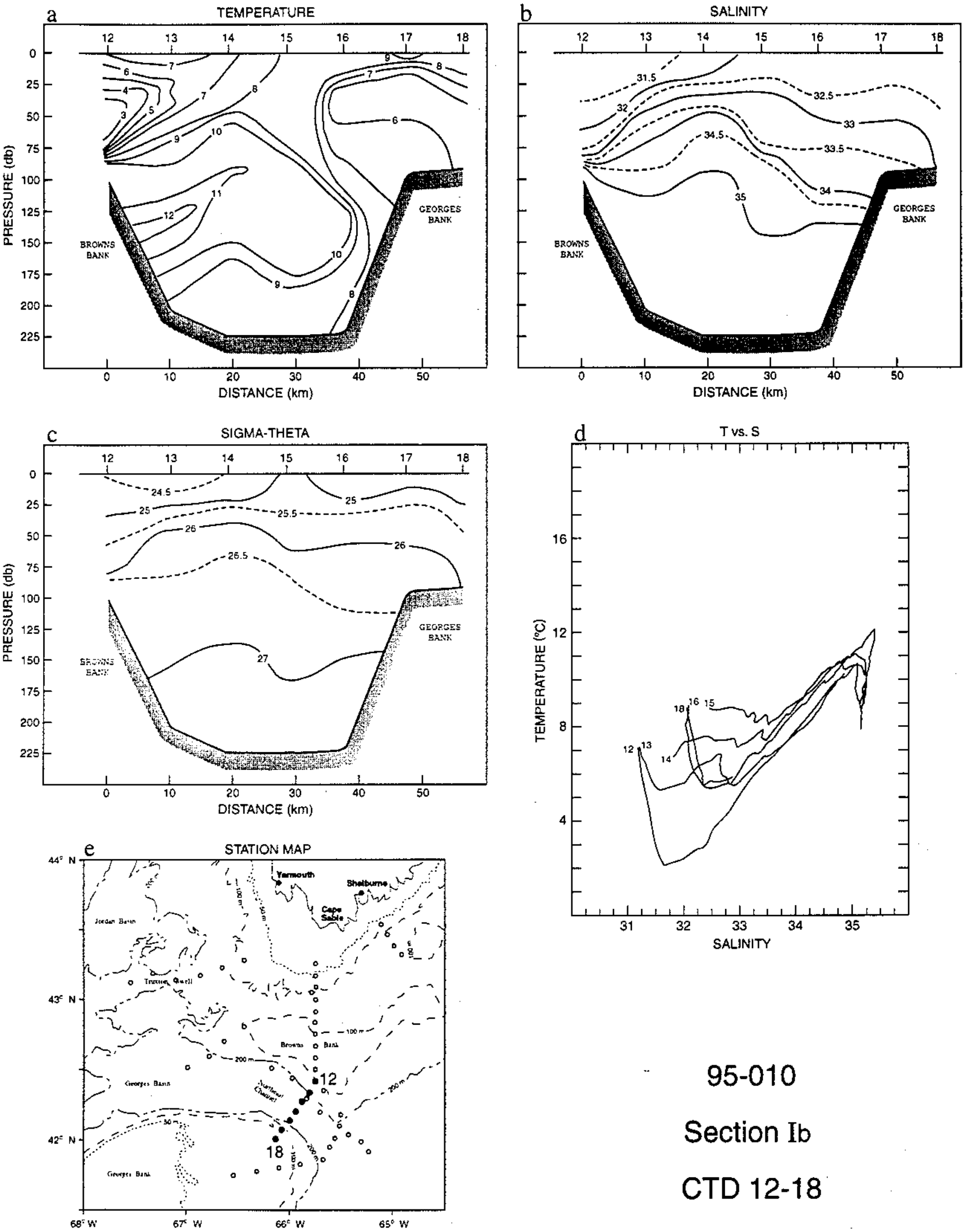


95-010

Section Ia

CTD 1-12

Fig. 3. Hydrographic section Ia (CTD 1-12) from Cape Sable to the offshore edge of Browns Bank.



95-010

Section Ib

CTD 12-18

Fig. 4. Hydrographic section Ib (CTD 12-18) across Northeast Channel at the mooring line.

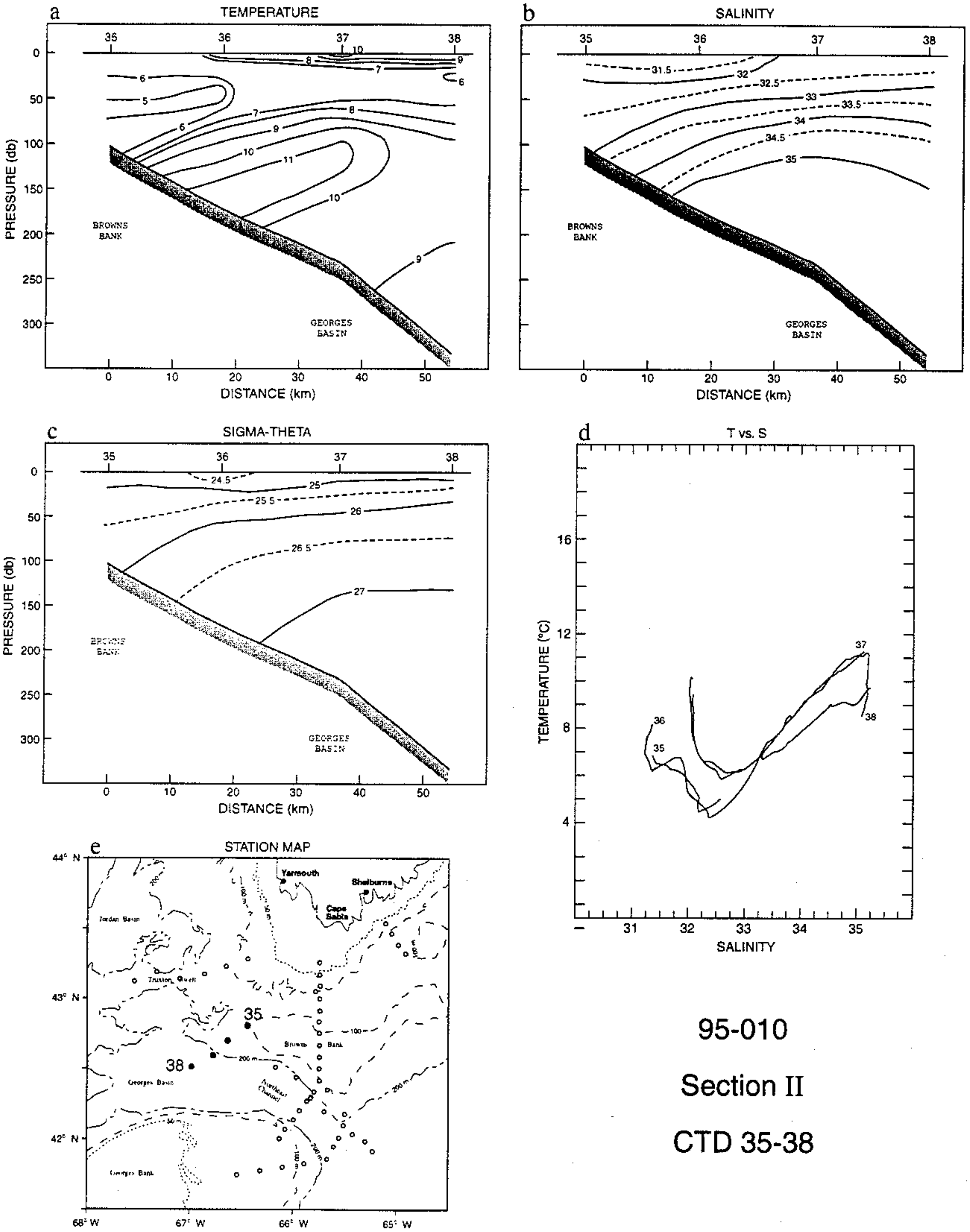
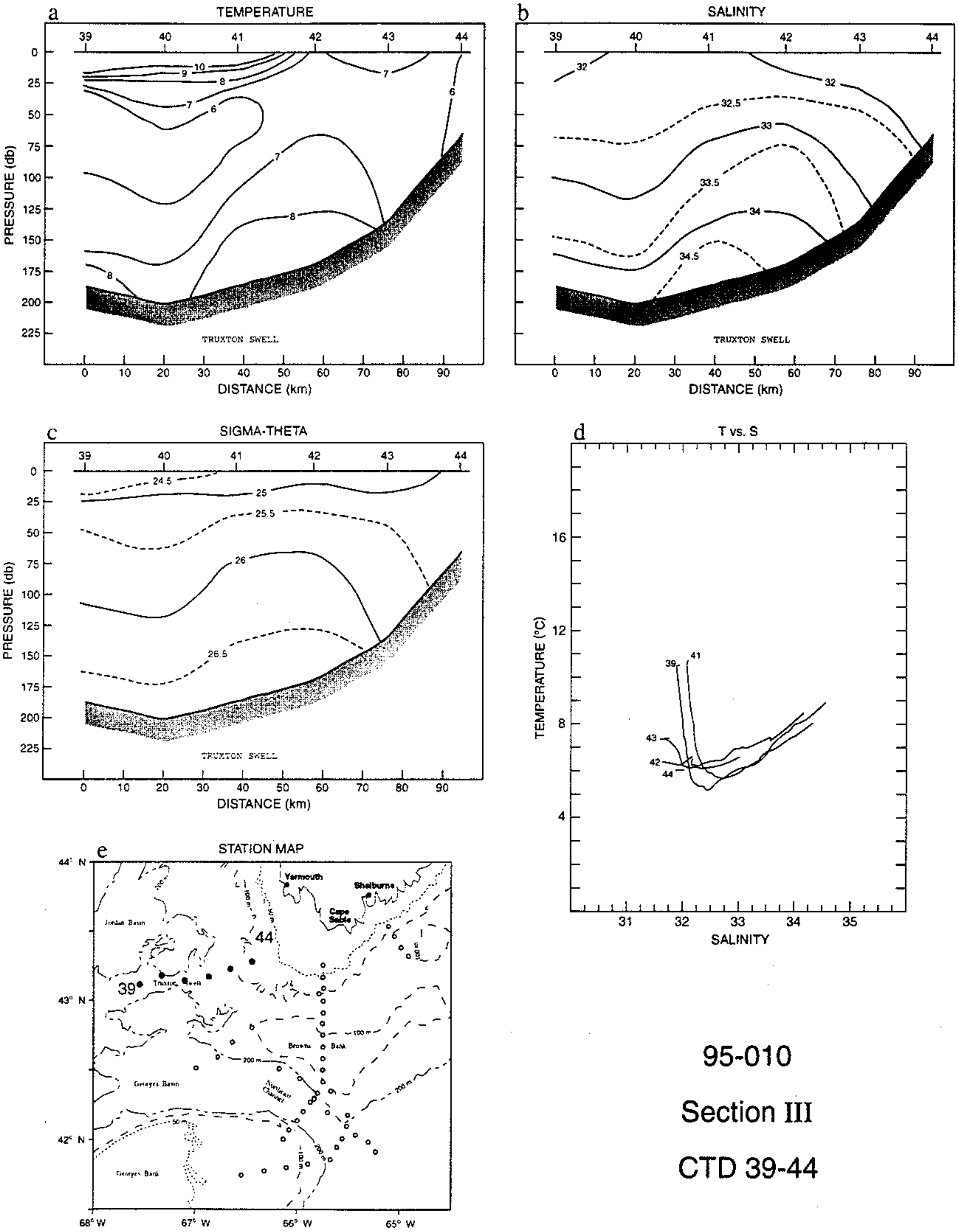


Fig. 5. Hydrographic section II (CTD 35-38) on the western flank of Browns Bank.

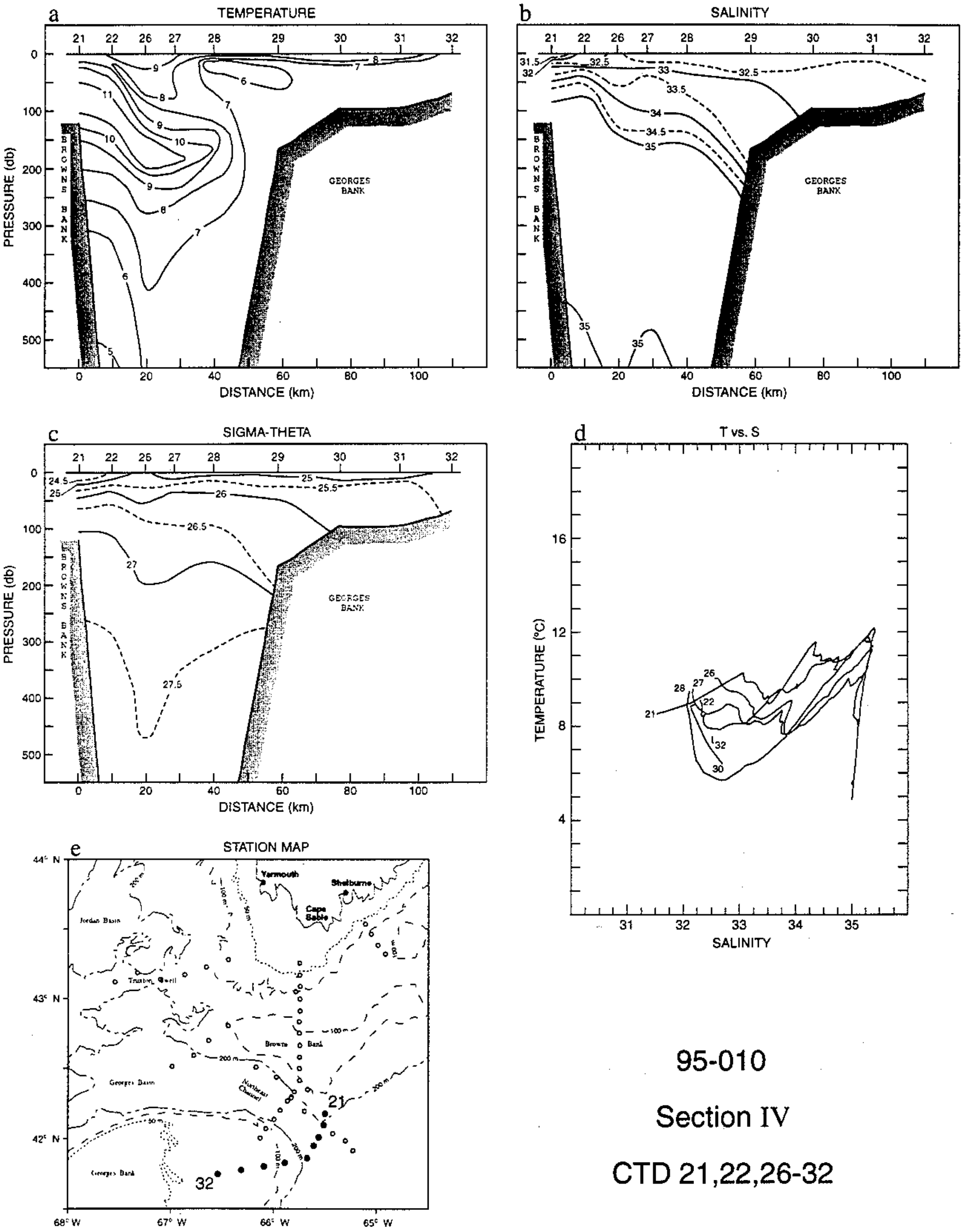


95-010

Section III

CTD 39-44

Fig. 6. Hydrographic section III (CTD 39-44) along Truxton Swell.



95-010

Section IV

CTD 21,22,26-32

Fig. 7. Hydrographic section IV (CTD 21, 22, 26-32) across the mouth of Northeast Channel and Northeast Peak.

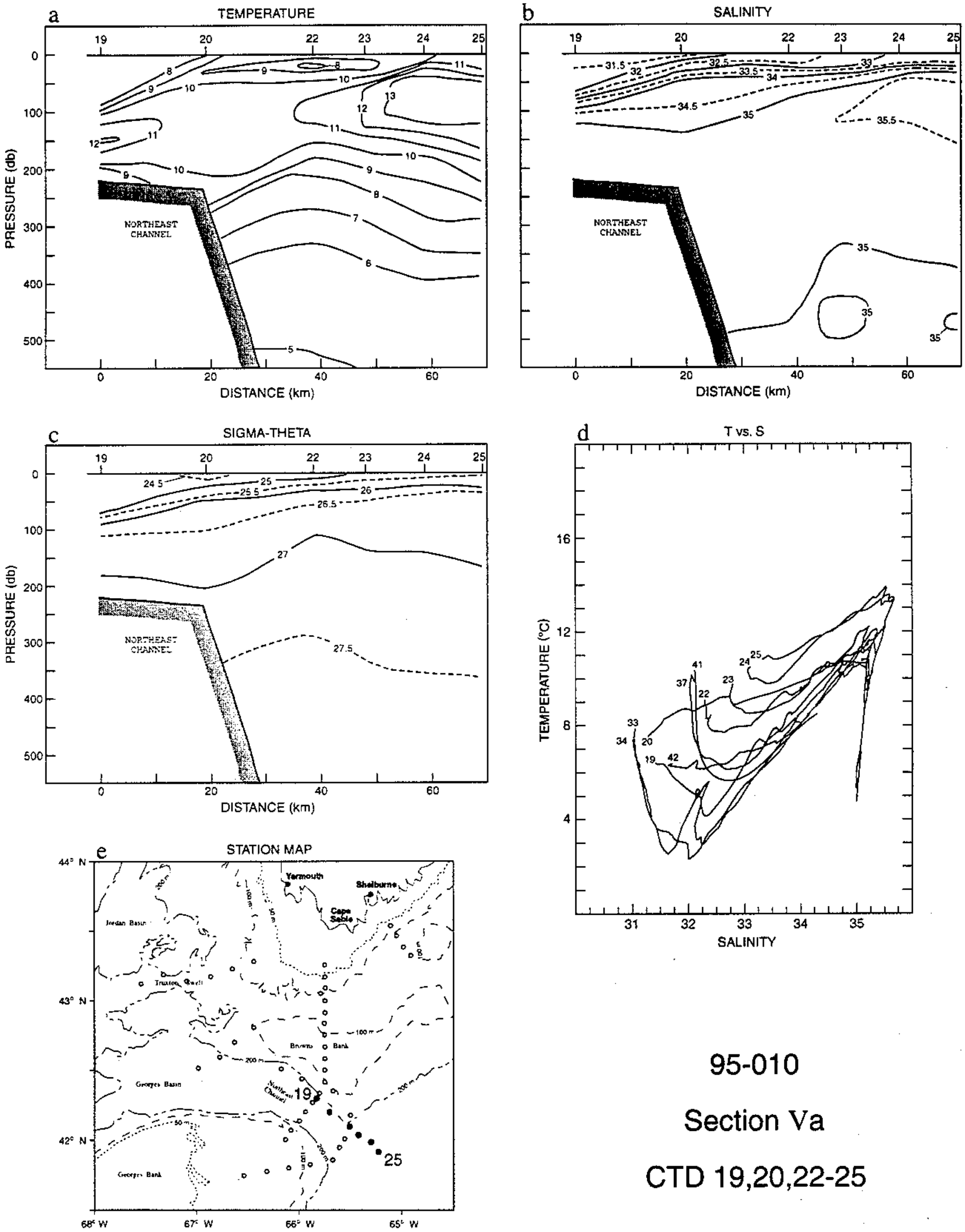
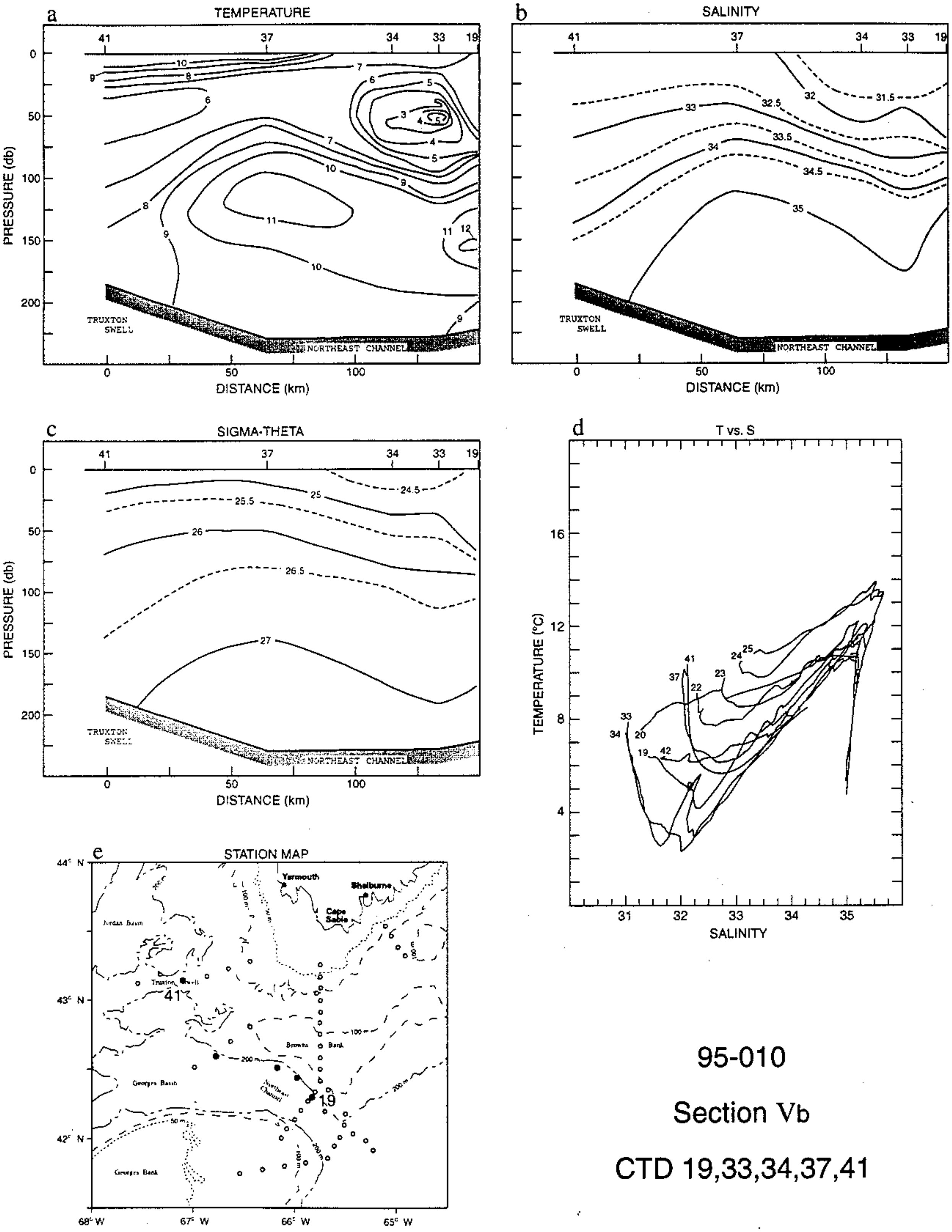


Fig. 8. Hydrographic section Va (CTD 19, 20, 22-25) along the slope water inflow axis through Northeast Channel to the slope water.

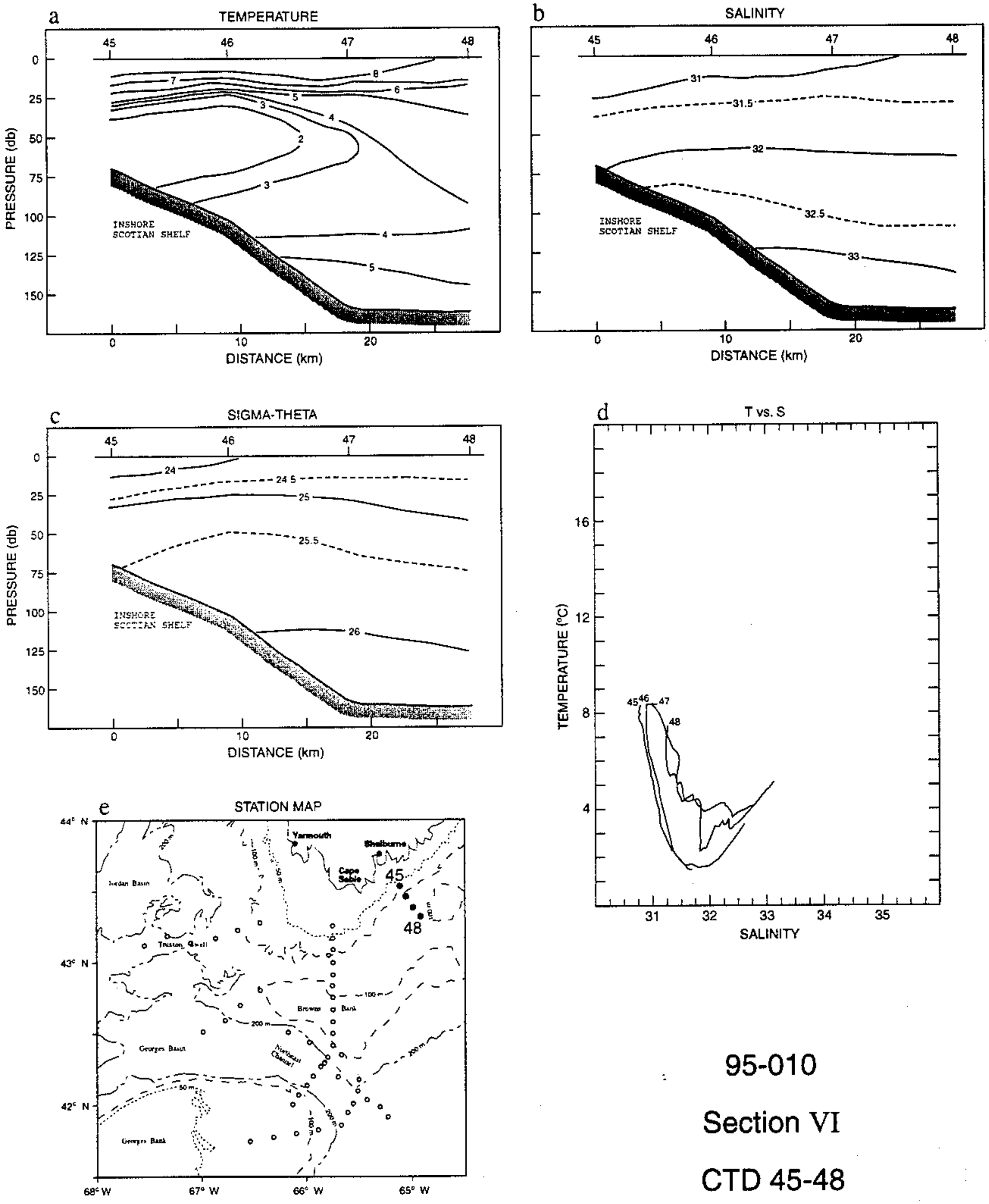


95-010

Section Vb

CTD 19,33,34,37,41

Fig. 9. Hydrographic section Vb (CTD 19, 33, 34, 37, 41) along the slope water inflow axis from Truxton Swell to Northeast Channel.



95-010

Section VI

CTD 45-48

Fig. 10. Hydrographic section VI (CTD 45-48) across the inshore Scotian Shelf off Shelburne.