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Avalon Channel – Newfoundland Temperature, Salinity and Sigma-t Sections

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June 1983

Canadian Technical Report of
Hydrography and Ocean Sciences
No. 24



Fisheries
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Canadian Technical Report of Hydrography and Ocean Sciences

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AVALON CHANNEL - NEWFOUNDLAND
TEMPERATURE, SALINITY AND SIGMA-T SECTIONS

by
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Cat. No. Fs 97-18/24E ISSN 0711-6764

Correct citation for this publication:

Lively, R.R. 1983. AVALON CHANNEL - Newfoundland temperature, salinity
and Sigma-t sections. Can. Tech. Rep. Hydrogr. Ocean. Sci. 24:
v + 65p.

Abstract

Lively, R.R. 1983 Avalon Channel - Temperature Salinity and Sigma-t sections. Can. Tech. Rep. Hydrogr. Ocean Sci. 24: v + 65p.

The temperature, salinity and density data that were collected off the coast of Newfoundland in the Avalon Channel area by the CSS Dawson during the cruises 80-019 (June 18 to July 3, 1980) and 80-034 (October 22 to October 29, 1980) are presented in this report as oceanographic sections.

Resume

Lively, R.R. 1983 Avalon Channel - Temperature Salinity and Sigma-t sections. Can. Tech. Rep. Hydrogr. Ocean Sci. 24: v + 65p.

Dans le présent rapport, on présente, sous forme de sections relatives à l'océanographie, les données sur la température, la salinité et la densité que le Dawson a recueillies au large de Terre-Neuve, dans la région du chenal Avalon, au cours des expéditions 80-019 (du 18 juin au 3 juillet 1980) et 80-034 (du 22 au 29 octobre 1980).

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OCEANOGRAPHIC SECTIONS

STATIONS	P A G E S		
	TEMPERATURE	SALINITY	SIGMA-T
1-9 (8-019)	11	12	13
10-19 (8-019)	15	16	17
44-49 (80-019)	19	20	21
50-60 (80-019)	23	24	25
60-66 (80-019)	27	28	29
66-75 (80-019)	31	32	33
75-84 (80-019)	35	36	37
1-7 (80-034)	39	40	41
7-13 (80-034)	43	44	45
13-19 (80-034)	47	48	49
13-24 (80-034)	51	52	53
25-30 (80-034)	55	56	57
31-36 (80-034)	59	60	61
37-47 (80-034)	63	64	65

INTRODUCTION

Dawson cruises 80-019 and 80-034 were undertaken to study the effects of the fresh water runoff from the Labrador and Arctic regions on the physical oceanography of the Newfoundland Shelf. Coastal sea level and hydrological properties respond annually to the arrival of the fresher water pulse in Avalon Channel during late summer (Petrie and Anderson, 1983). Operations during cruise 80-019 (June 18 to July 3, 1980) consisted of the deployment of a mooring array and hydrographic sections to determine property distributions before the arrival of the fresher water pulse. Marked changes of temperature, salinity and velocity structure occur with the arrival of the leading edge of the fresher water pulse and a more gradual modification of water properties, such as decreasing salinity takes place over the following months. Cruise 80-034 (October 22 to October 29, 1980) surveyed the region for changes in hydrographic properties after the arrival of the fresher water pulse.

This report presents the oceanographic sections (temperature, salinity, sigma-t) from cruises 80-019 and 80-034. The other data collected by the Dawson on these two cruises is being analysed by Anderson (1983, in prep.). Cruise 80-019 was the combination of two studies, the Avalon Channel and the Flemish Cap. The CTD stations (numbers 20-43) will be published in another report being prepared by C.K. Ross (1983).

DATA REDUCTION

The CTD casts were made using the Guideline Mark II analog CTD mounted on a rosette with two bottles. A pinger was also mounted on the rosette cage which allowed the water column to be sampled to within a few meters of the bottom. The CTD was lowered and raised at a speed of 1 m/s. The data from the CTD were logged on a Hewlett Packard 21MX computer, using Coastal Oceanography's version of the Metrology RTE4 system software. The two bottles were tripped mostly near the bottom of the profile for calibration purposes. At times, when the gradients were too large near the bottom, one bottle would be tripped in the upper layer where the water properties were more uniform. Temperature calibrations were made using the Richter and Wiese, Yashino or Kurt Gohla reversing thermometers attached to one of the bottles.

The raw data consisted of pressure, temperature and conductivity measurements and were stored on nine track magnetic tape. These data were later run on the Cyber 171 at Bedford Institute using the CMSYST CTD software package. This software package uses the UNESCO formula (Perkin and Lewis, 1980) to calculate the salinity from conductivity, temperature and pressure.

The values of temperature and salinity obtained from the rosette samples were used for the in situ calibration. The salinity determinations were made with an "Auto-Lab" inductive salinometer (Guildline Instruments, 1974) which is considered accurate to $\pm 0.004^{\circ}/\text{‰}$. The reversing thermometers are considered accurate to $\pm 0.02^{\circ}\text{C}$. A mean difference was

calculated from the in situ calibrations and used in the data processing. The values used as the calibrations for the processed data are +0.025°C for temperature +0.009‰ for salinity and 3 decibars for pressure.

No correction was made for the difference in time between the temperature and conductivity sensors. This difference does not show up unless there are large thermal gradients which produce spikes in the salinity. These spikes were manually edited out of the data.

GRAPHICAL PRESENTATIONS

This report contains section plots of temperature, salinity and sigma-t from cruises 80-019 and 80-034. The sections for cruise 80-019 are presented first followed by the sections for cruise 80-034. Within each cruise, the sections are ordered by increasing station numbers. The geographical location for stations from each cruise is shown in figures 1, 2 and figures 3 to 16 (one figure for each section). Table 1 shows a comparison of the positions of the stations for each cruise.

The horizontal spacing between stations in each section is found by performing a least squares straight line fit to all the station positions and then projecting each station onto this line. The vertical scale for all sections is 200 m depth. The bottom profiles for each section are generated from the soundings taken at each station. The horizontal scale is adjusted for each section to maintain a constant vertical scale.

ACKNOWLEDGEMENTS

I would like to thank the many people who assisted in the collection and processing of the data. Special thanks to Mr. John Pritchard who did some of the drafting and for his advice with the layout of the diagrams. I would also like to thank Dr. Brian Petrie for his advice and for reading the manuscript.

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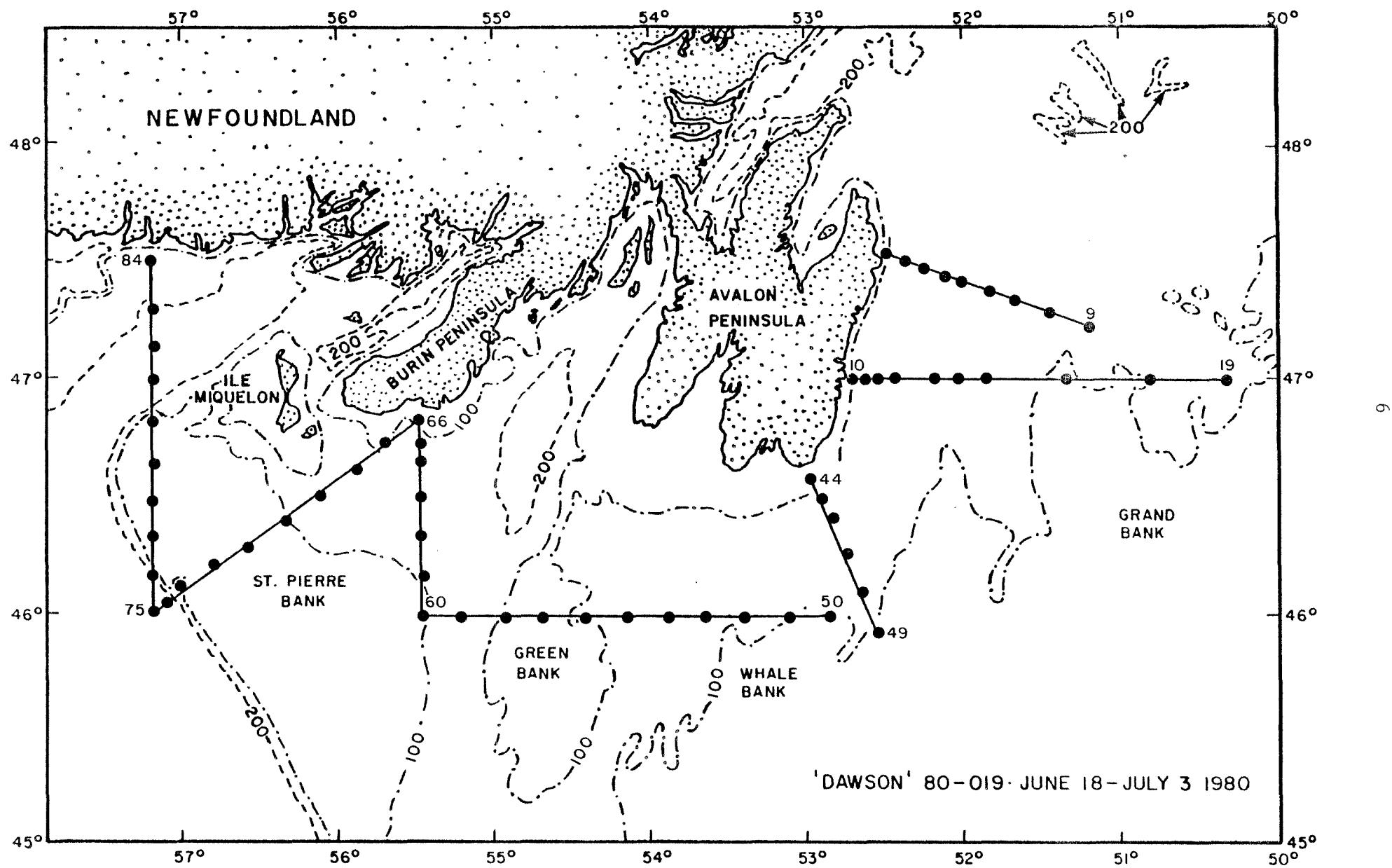


Figure 1 Station positions for Cruise 80-019

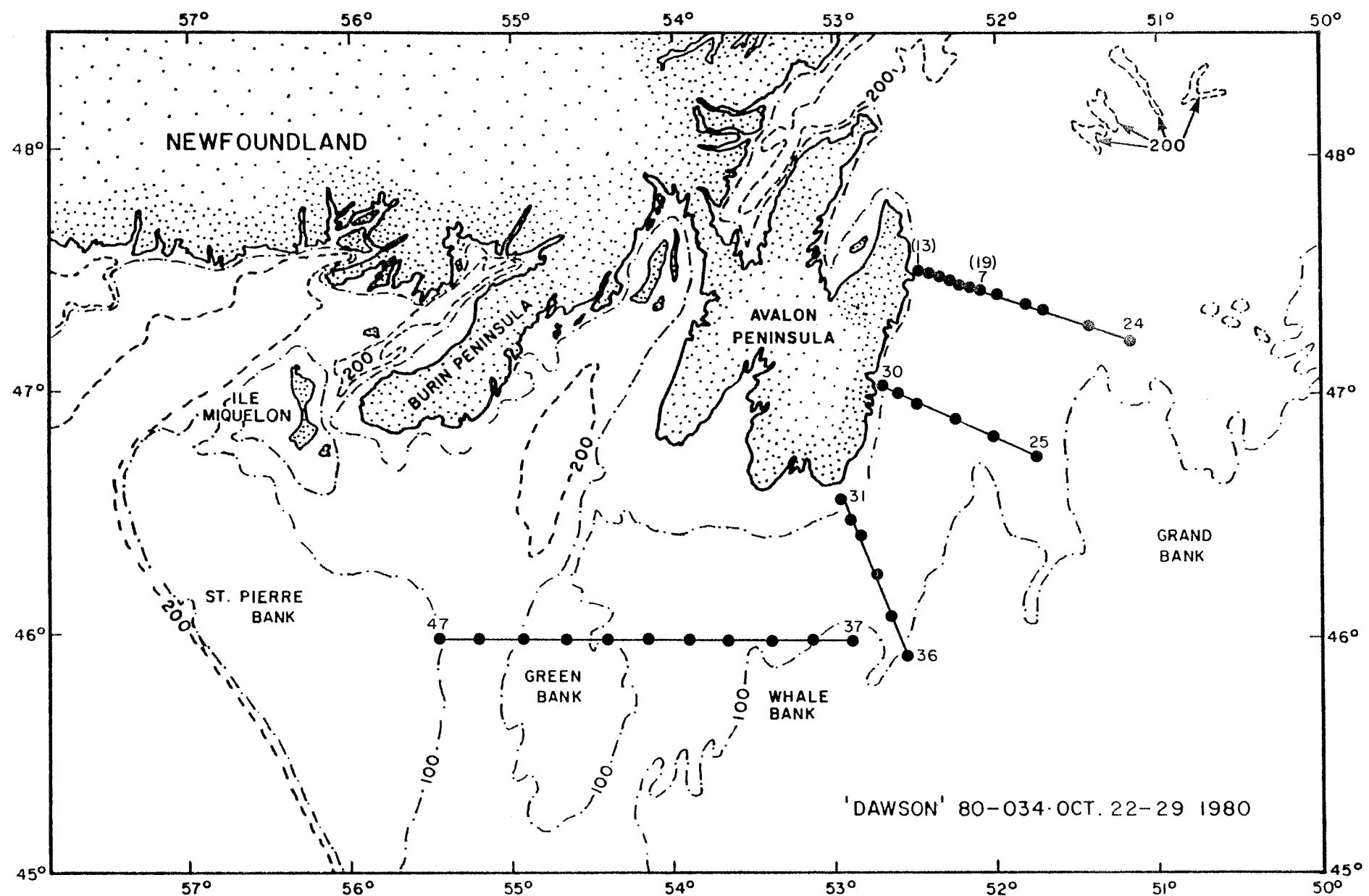


Figure 2 Station positions for cruise 80-034

TABLE 1
COMPARISON OF STATION LOCATIONS

<u>CRUISE 80-019</u>			<u>CRUISE 80-034</u>		
<u>STN</u>	<u>Latitude</u>	<u>Longitude</u>	<u>STN</u>	<u>Latitude</u>	<u>Longitude</u>
1	47° 31.0'	52° 35.0'	1,13	47° 31.0'	52° 35.0'
2	47° 30.0'	52° 28.0'	2,12,14	47° 30.5'	52° 31.5'
3	47° 28.0'	52° 20.5'	3,11,15	47° 30.0'	52° 28.0'
			4,10,16	47° 29.0'	52° 24.0'
5	47° 26.7'	52° 13.4'	5, 9,17	47° 28.0'	52° 20.0'
6	47° 25.0'	52° 06.5'	6, 8,18	47° 27.5'	52° 16.5'
7	47° 22.8'	51° 56.3'	7, 19	47° 27.0'	52° 13.0'
8	47° 20.8'	51° 48.1'	20	47° 25.0'	52° 06.0'
9	47° 18.0'	51° 34.0'	21	47° 23.0'	51° 56.0'
			22	47° 21.01'	51° 48.0'
10	47° 14.0'	51° 20.0'	23	47° 18.0'	51° 34.0'
11	47° 00.0'	52° 49.6'	24	47° 14.0'	51° 20.0'
12	46° 59.6'	52° 45.2'	30	47° 03.0'	52° 50.0'
13	47° 00.1'	52° 40.0'	29	47° 01.0'	52° 43.0'
14	47° 00.0'	52° 34.8'	28	46° 59.0'	52° 36.0'
15	47° 00.0'	52° 19.9'	27	46° 55.0'	52° 21.0'
16	47° 00.4'	52° 10.5'	26	46° 50.0'	52° 08.0'
17	47° 00.0'	52° 00.0'	25	46° 45.0'	51° 53.0'
18	47° 00.0'	51° 30.1'			
19	47° 00.0'	51° 00.0'			
44	46° 34.0'	53° 04.5'	31	46° 34.0'	53° 04.0'
45	46° 29.0'	53° 00.0'	32	46° 29.0'	53° 00.0'
46	46° 25.0'	52° 56.5'	33	46° 25.0'	52° 57.0'
47	46° 15.0'	52° 51.0'	34	46° 15.0'	52° 51.0'
48	46° 05.0'	52° 46.0'	35	46° 05.0'	52° 46.0'
49	45° 55.0'	52° 40.2'	36	45° 55.0'	52° 40.0'
60	46° 00.0'	55° 30.02'	47	46° 00.0'	55° 30.0'
59	46° 00.0'	55° 15.0'	46	46° 00.0'	55° 15.0'
58	46° 00.0'	55° 00.0'	45	46° 00.0'	55° 00.0'
57	46° 00.0'	54° 45.0'	44	46° 00.0'	54° 45.0'
56	45° 59.95'	54° 30.01'	43	46° 00.0'	54° 30.0'
55	45° 59.98'	54° 14.97'	42	46° 00.0'	54° 15.0'
54	46° 00.05'	54° 00.0'	41	46° 00.0'	54° 00.0'
53	46° 00.04'	53° 45.0'	40	46° 00.0'	53° 45.0'
52	45° 59.99'	53° 30.05'	39	46° 00.0'	53° 30.0'
51	45° 59.94'	53° 14.97'	38	46° 00.0'	53° 15.0'
50	46° 00.0'	52° 59.92'	37	46° 00.0'	53° 00.0'

TABLE 1

COMPARISON OF STATION LOCATIONS

(Continued)

<u>STN</u>	<u>Latitude</u>	<u>Longitude</u>	<u>CRUISE 80-019</u>	<u>CRUISE 80-034</u>
66	46° 50.0'	55° 30.0'		
65	46° 45.0'	55° 29.88'		
64	46° 40.11'	55° 30.12'		
63	46° 30.0'	55° 30.0'		
62	46° 20.01'	55° 29.93'		
61	46° 09.87'	55° 29.88'		
60	46° 00.0'	55° 30.02'		
66	46° 50.0'	55° 30.0'		
67	46° 45.0'	55° 45.0'		
68	46° 37.5'	55° 57.5'		
69	46° 30.07'	56° 10.04'		
70	46° 24.91'	56° 22.77'		
71	46° 17.1'	56° 35.03'		
72	46° 12.5'	56° 47.5'		
73	46° 07.5'	57° 00.0'		
74	46° 02.5'	57° 05.0'		
75	46° 00.0'	57° 10.0'		
84	47° 30.0'	57° 10.0'		
83	47° 20.0'	57° 10.0'		
82	47° 10.0'	57° 10.0'		
81	47° 00.0'	57° 10.0'		
80	46° 50.1'	57° 09.83'		
79	46° 40.0'	57° 09.8'		
78	46° 30.0'	57° 10.0'		
77	46° 20.0'	57° 10.0'		
76	46° 10.0'	57° 10.0'		
75	46° 00.0'	57° 10.0'		

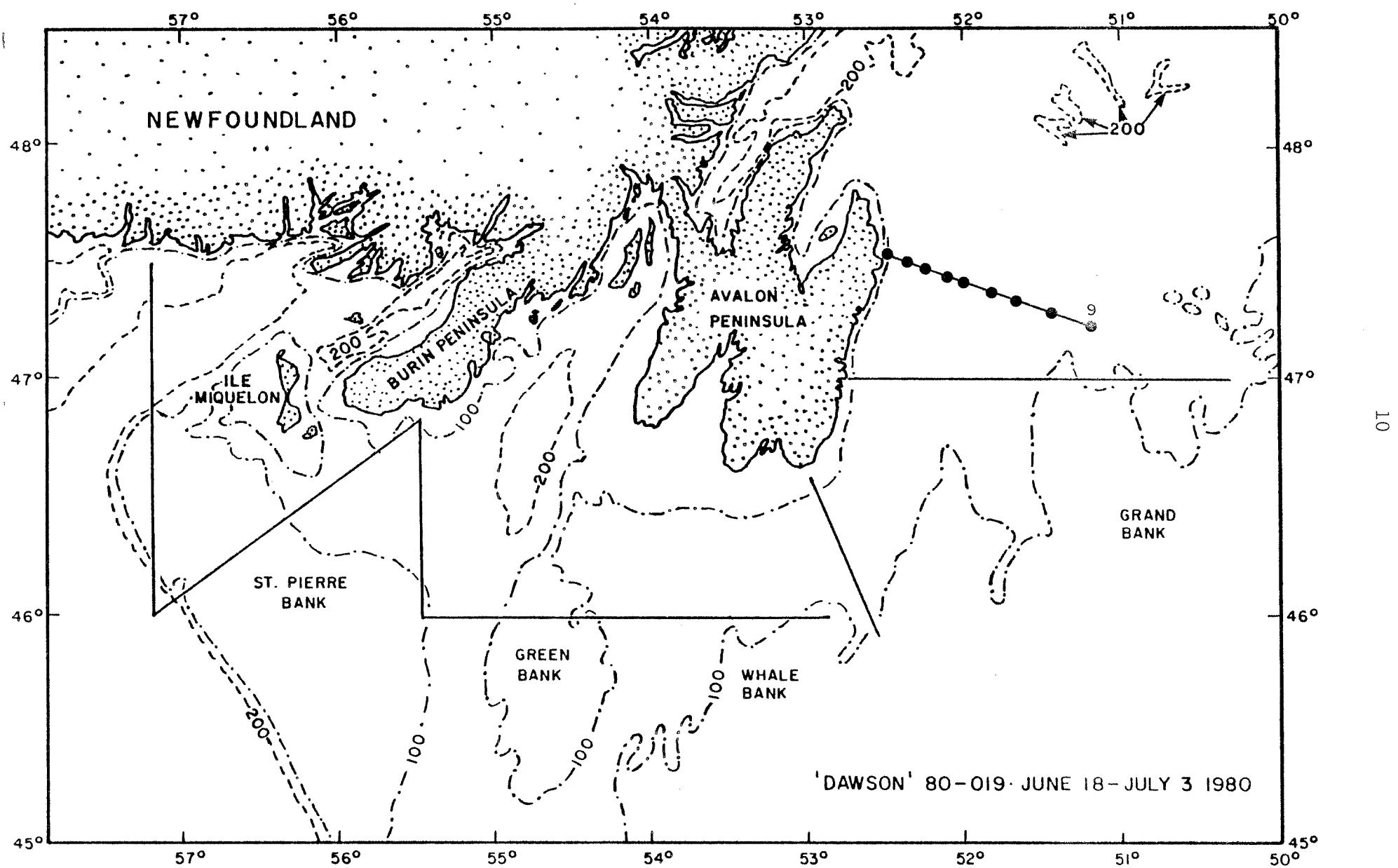
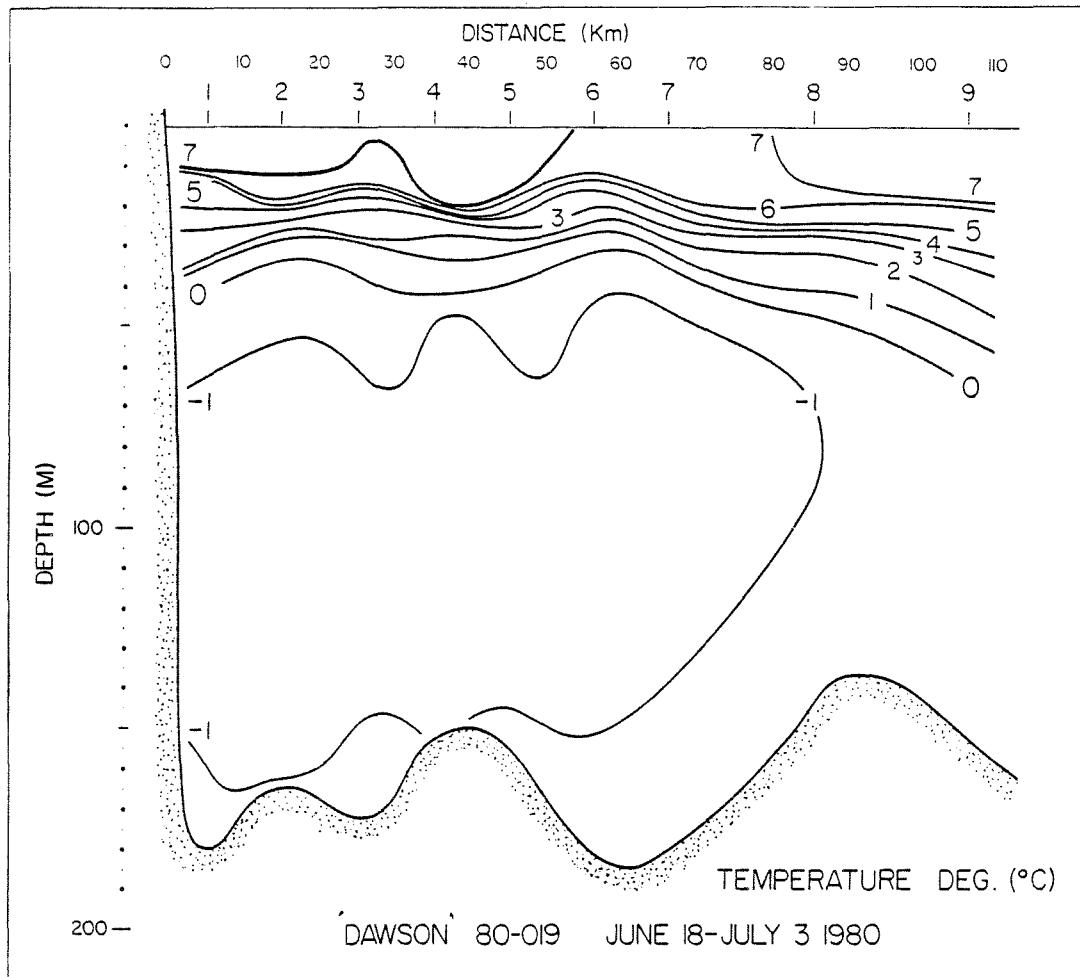
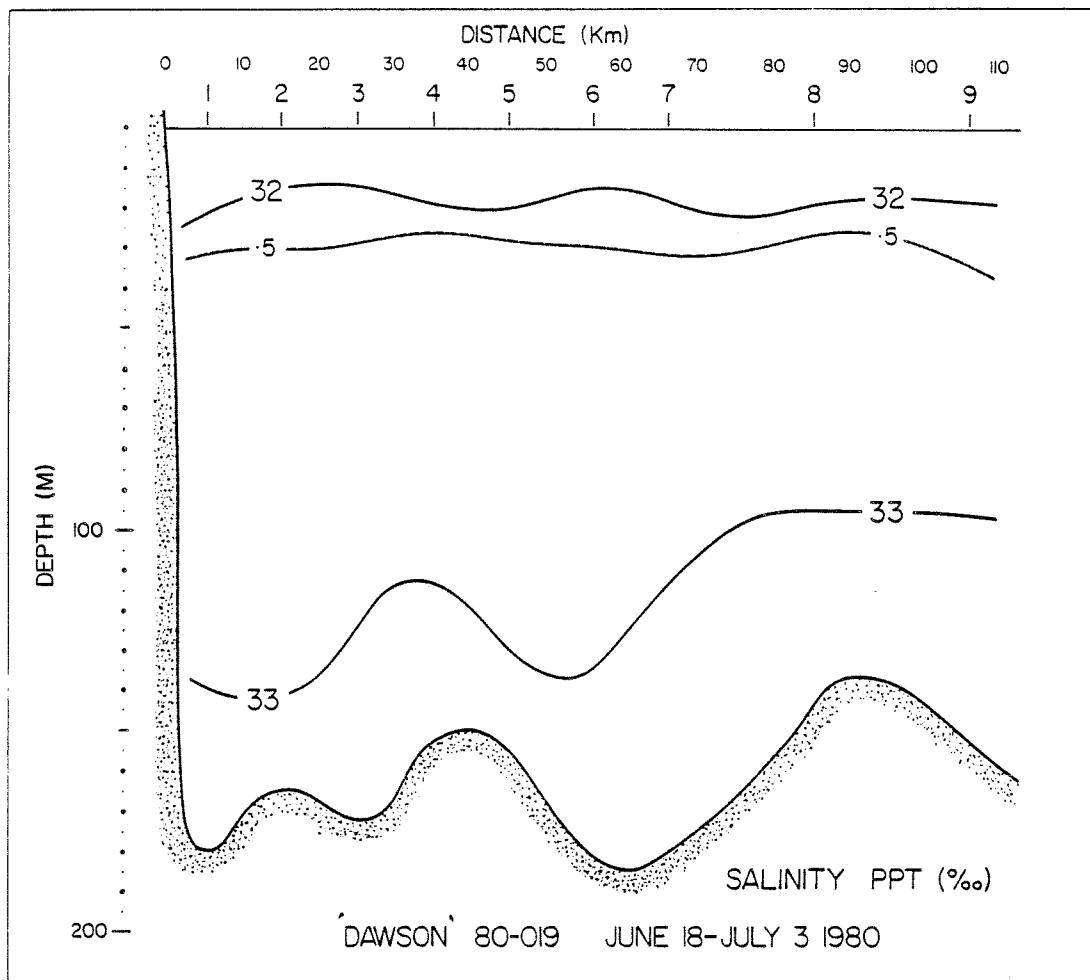
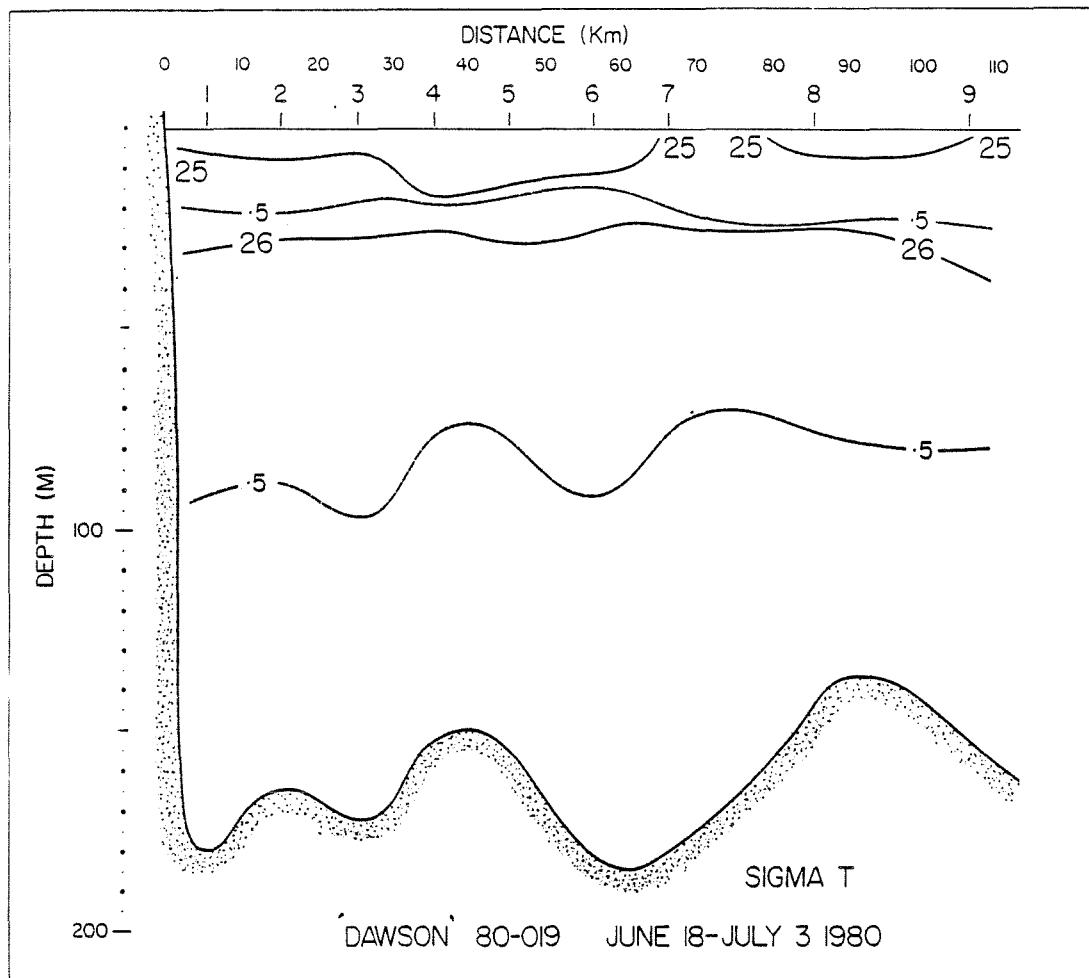


Figure 3 Position of stations 1-9







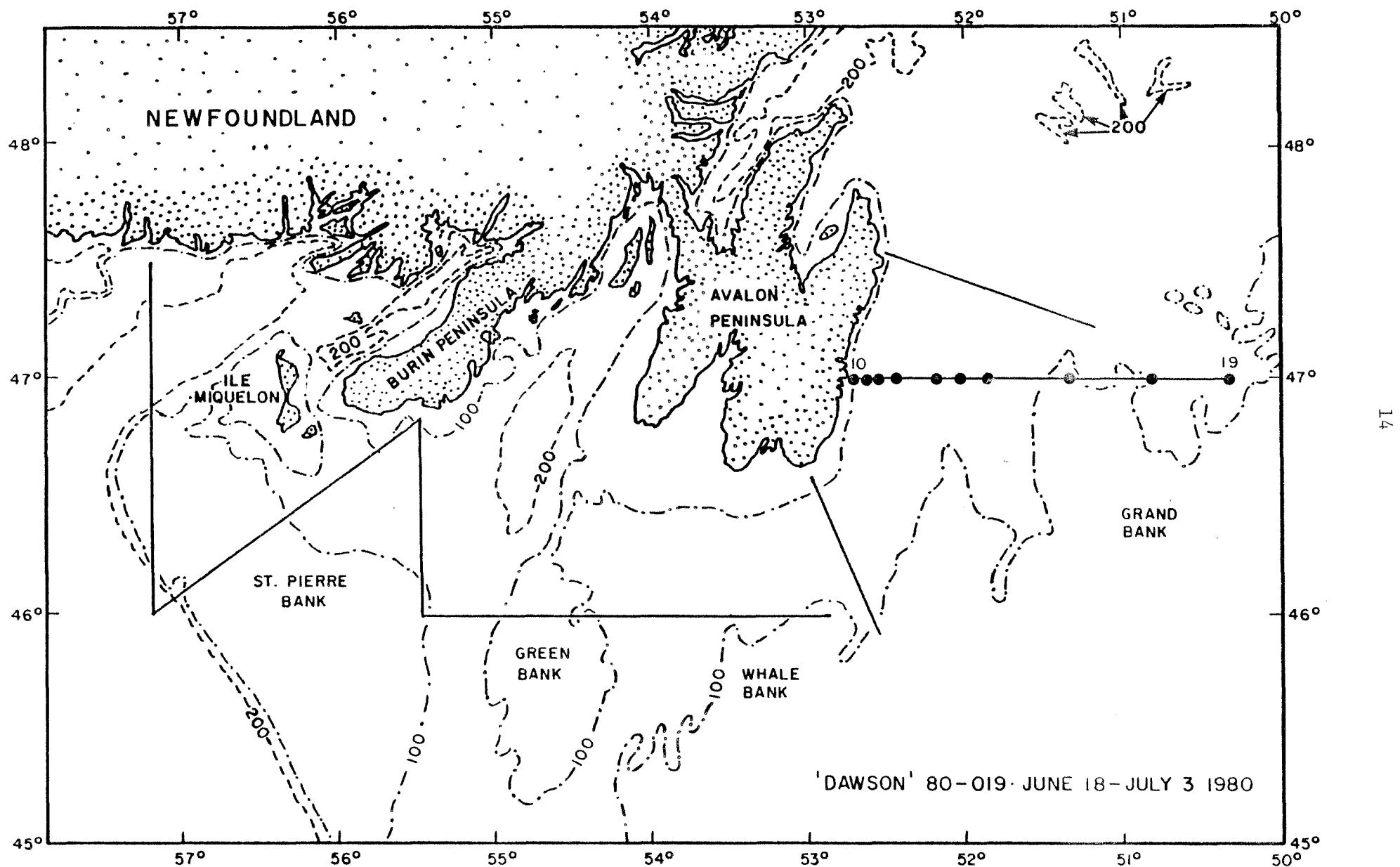
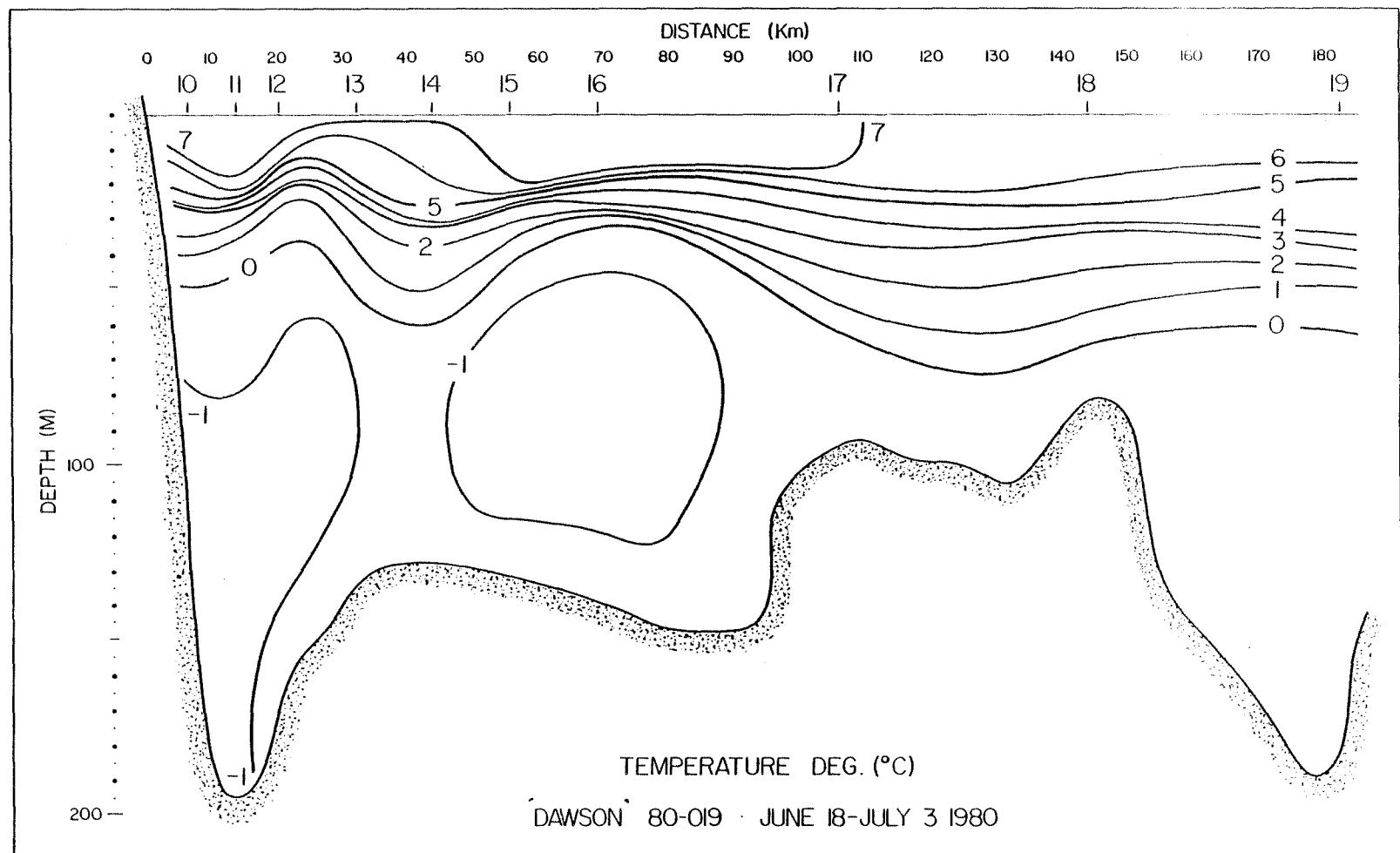
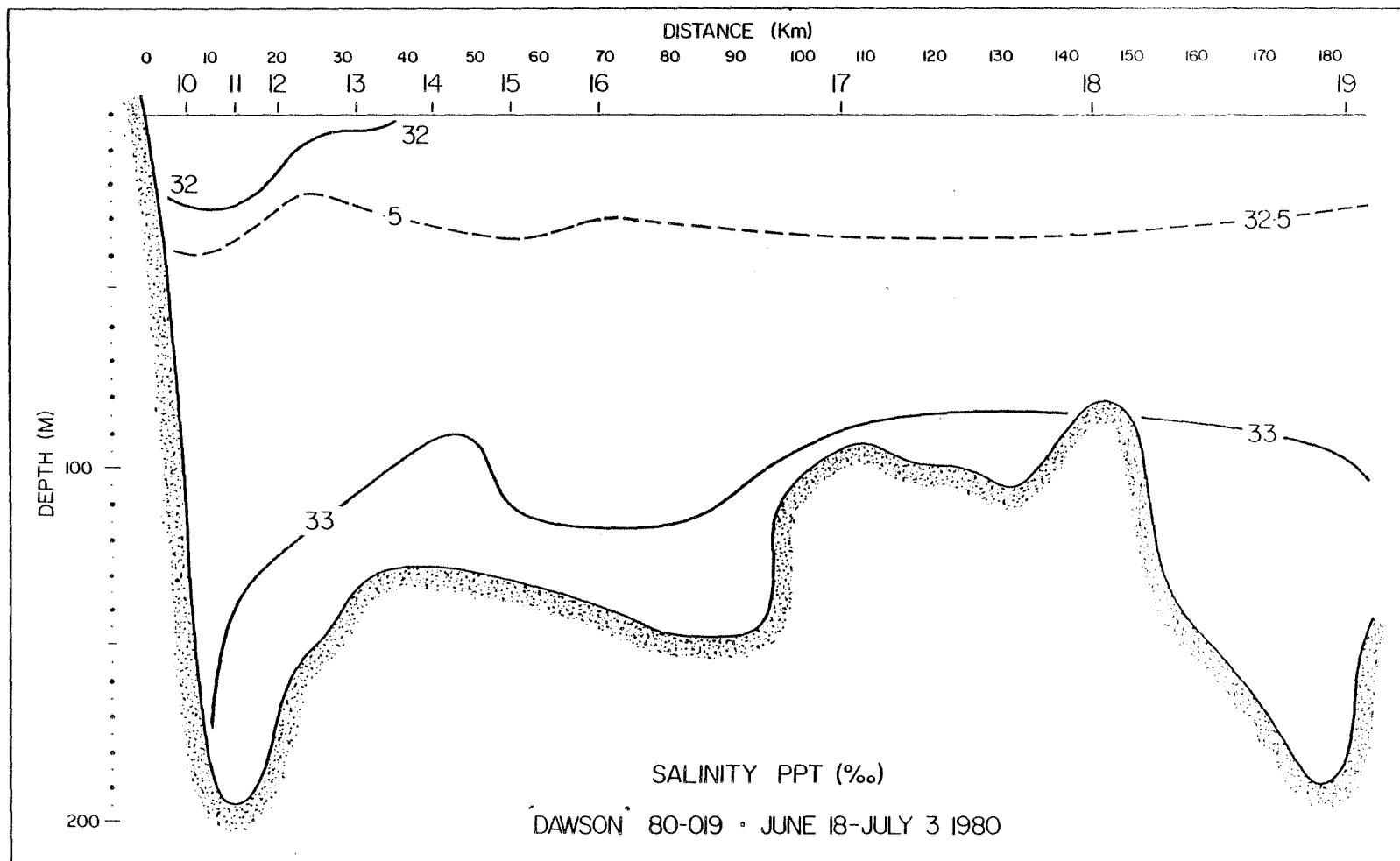
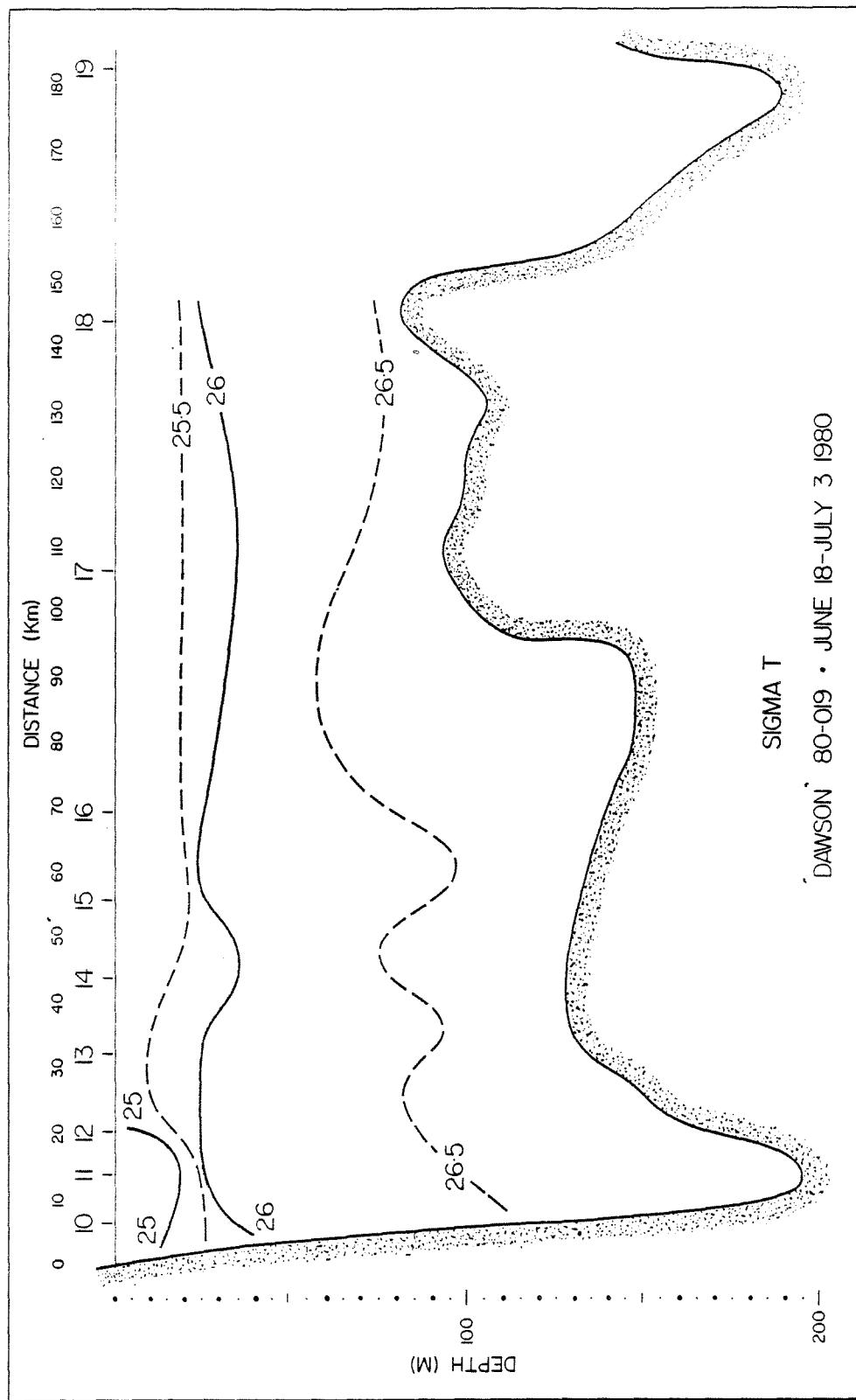


Figure 4 Position of stations 10-19







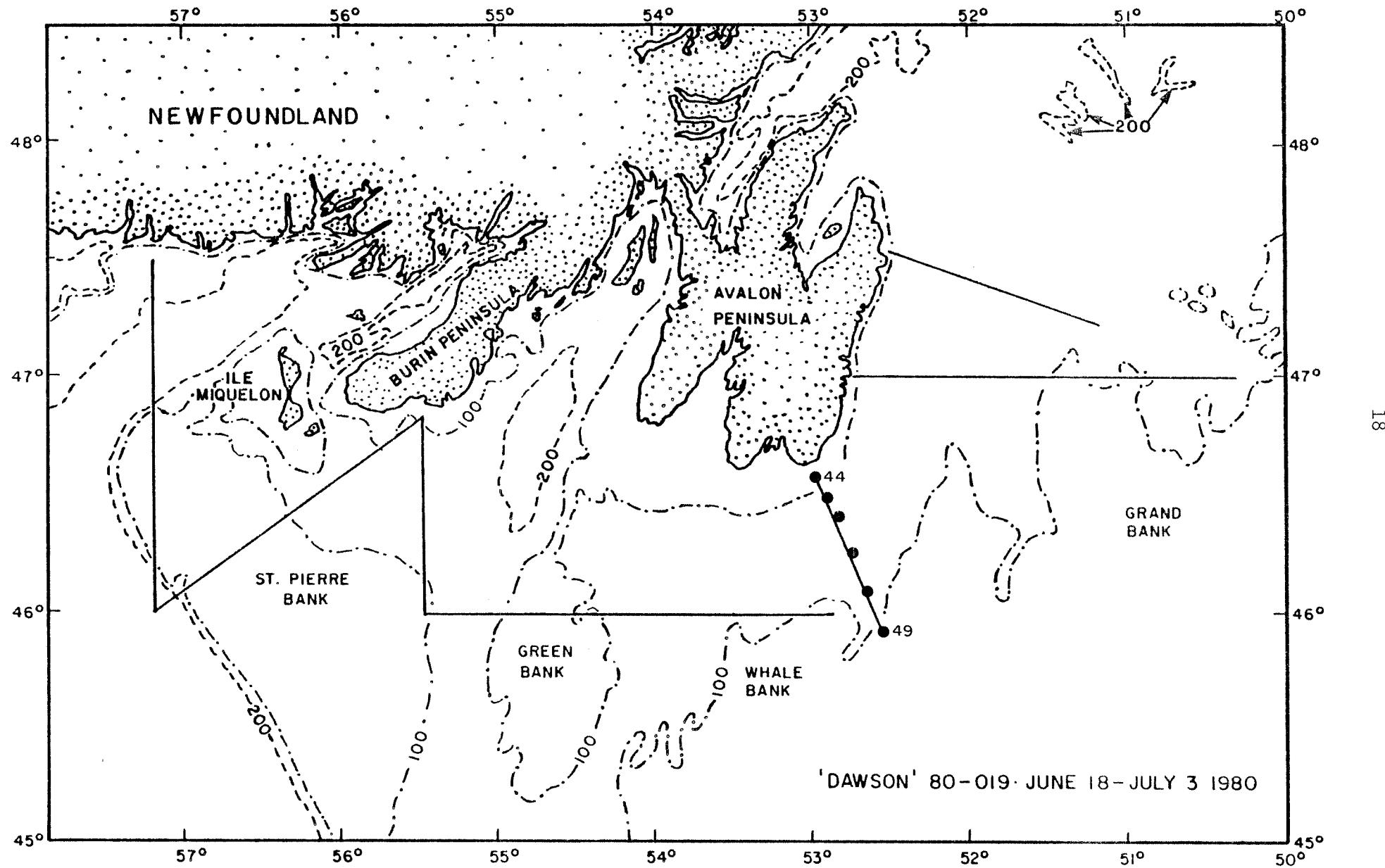
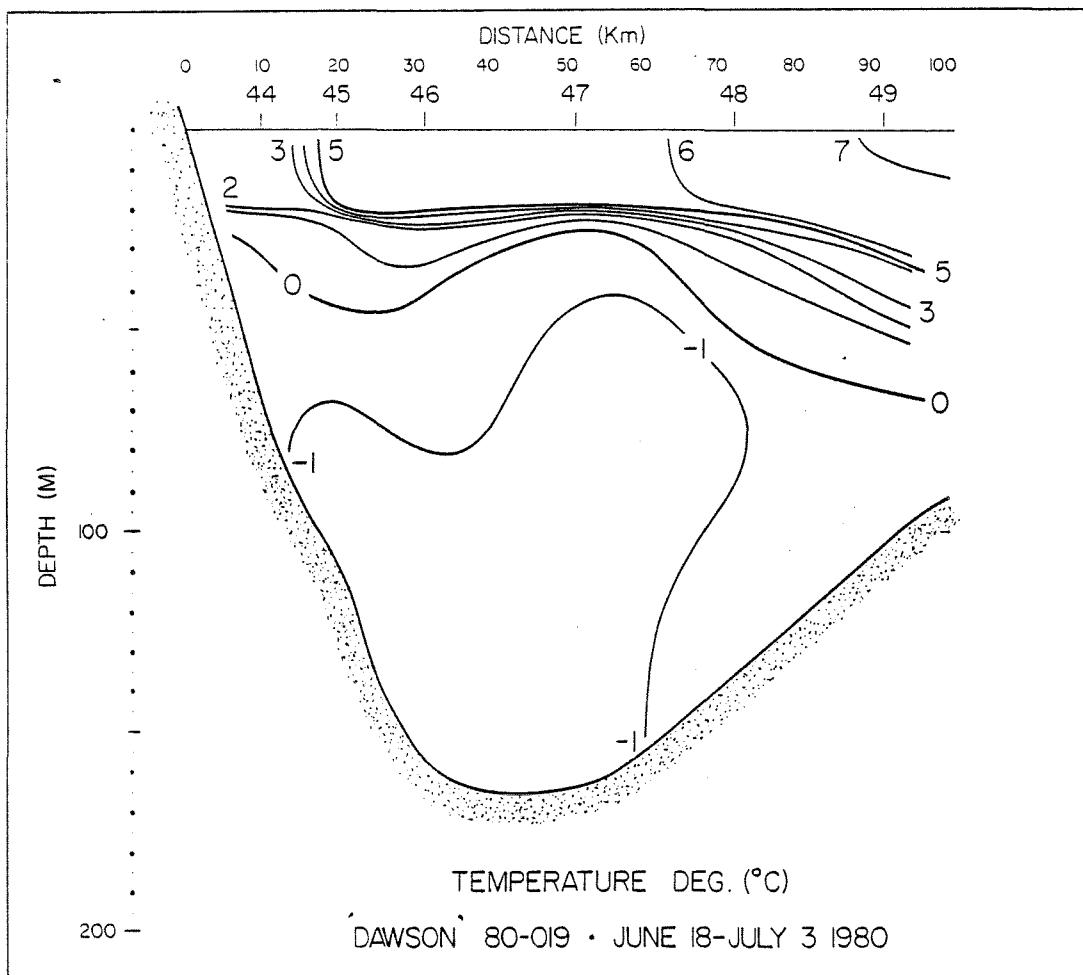
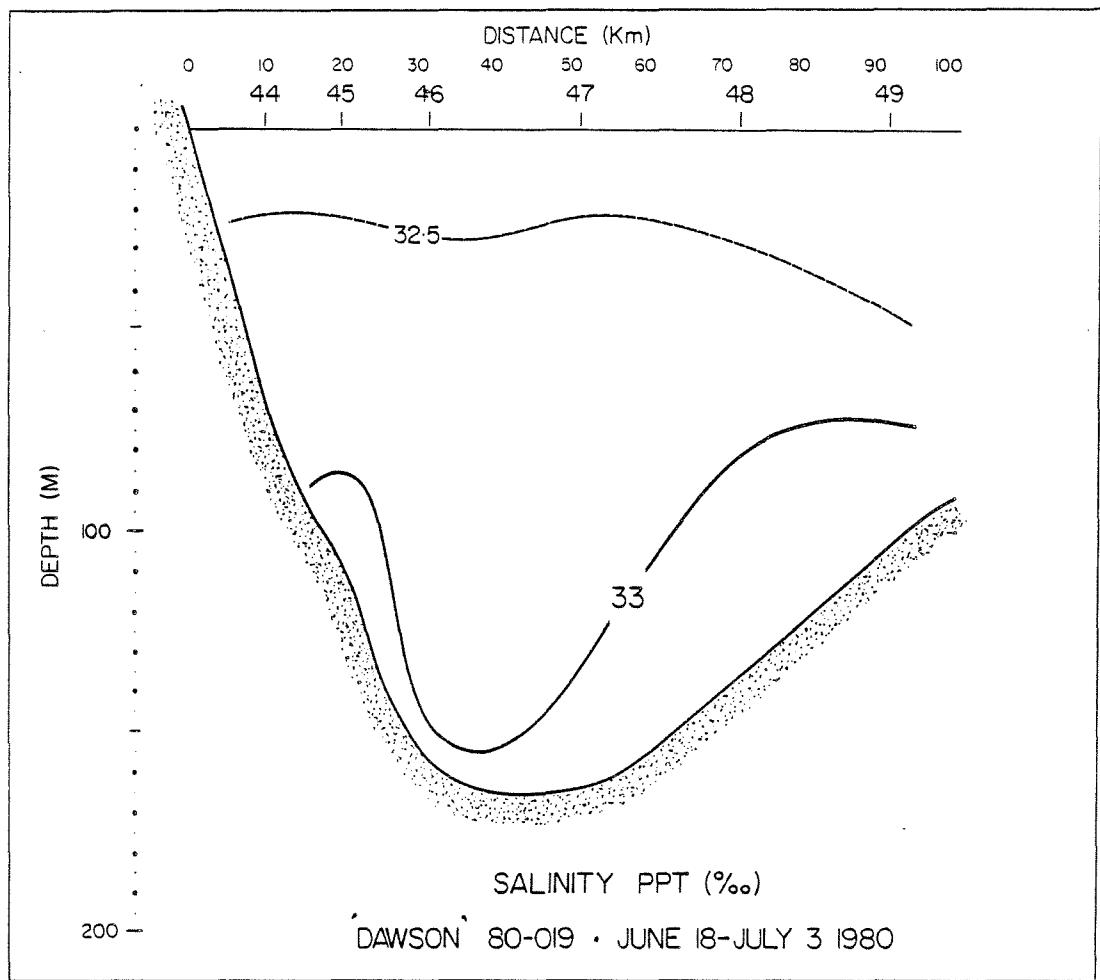
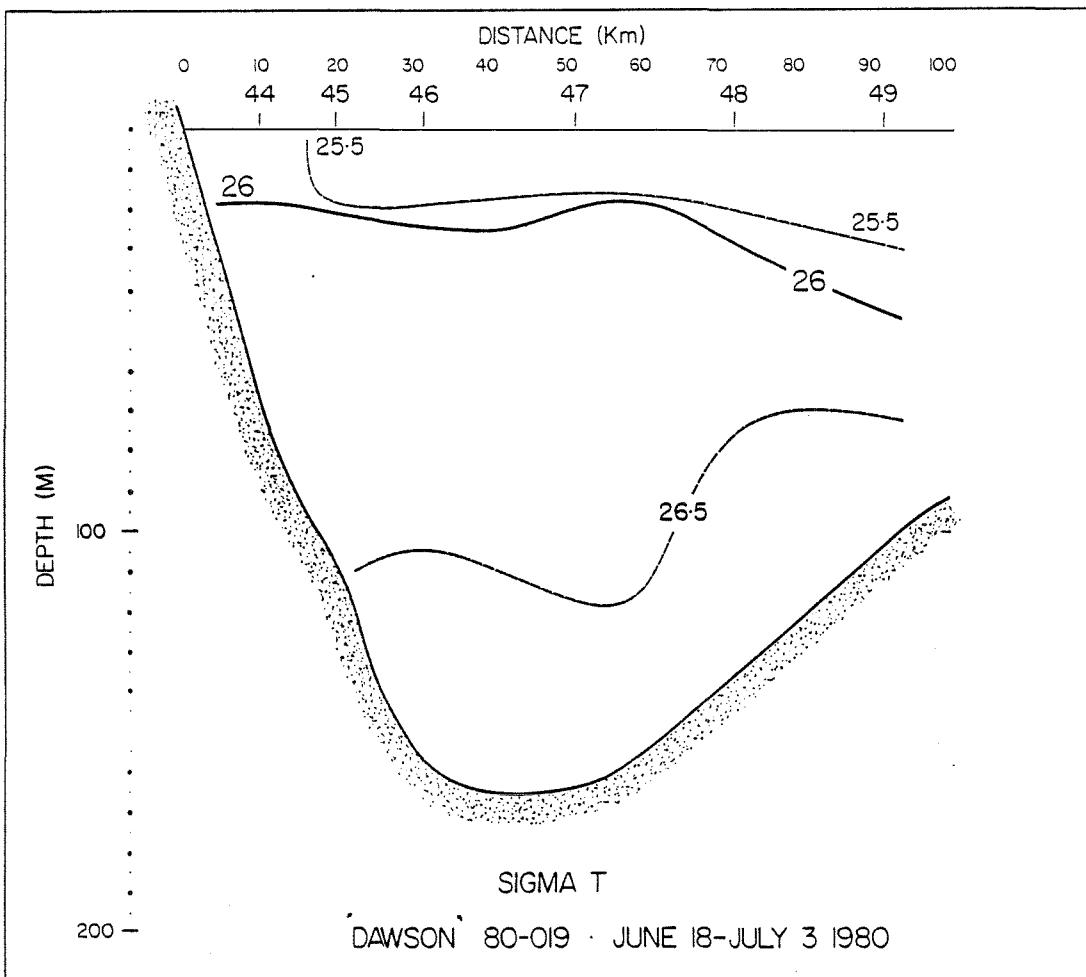


Figure 5 Position of stations 44-49







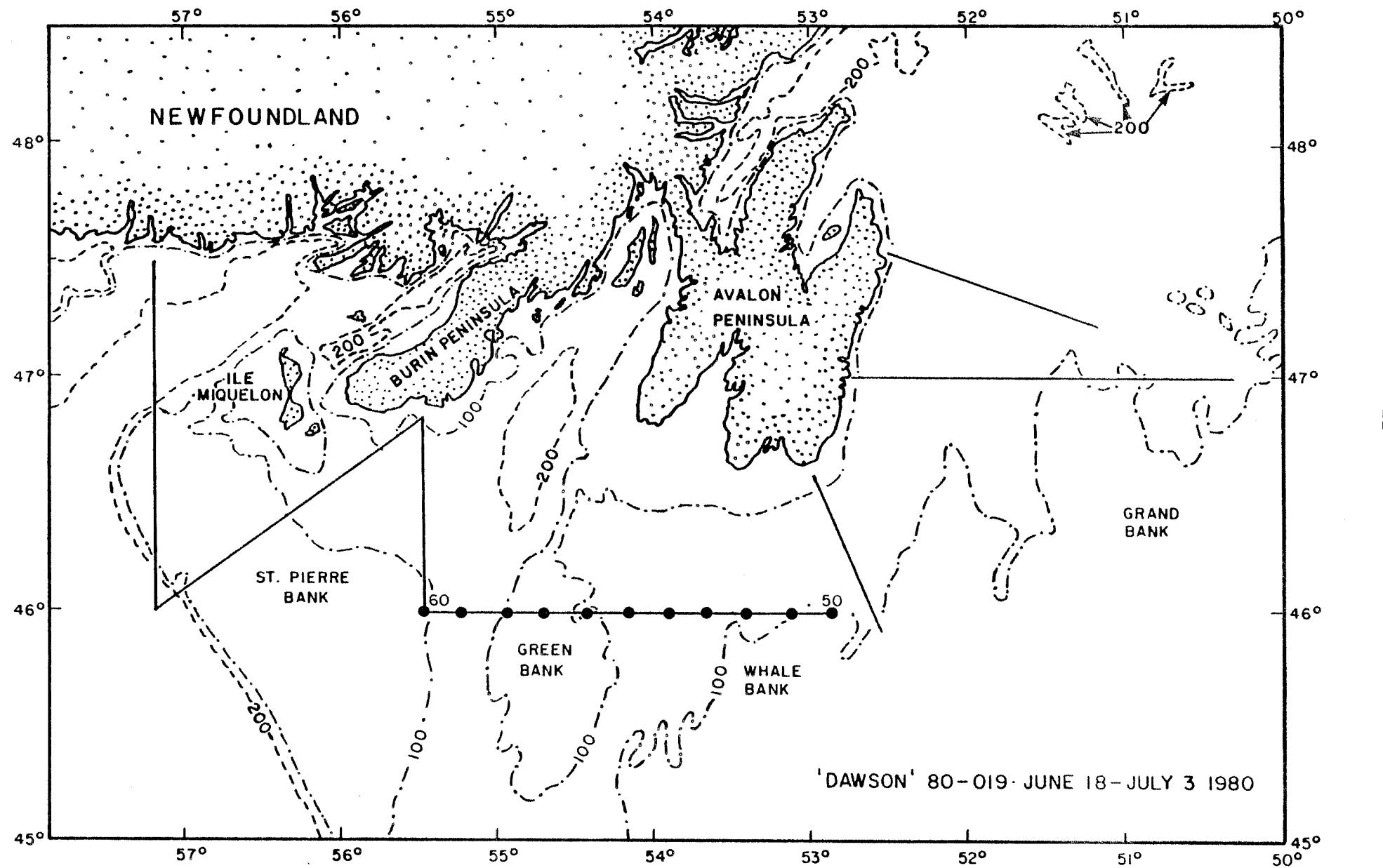
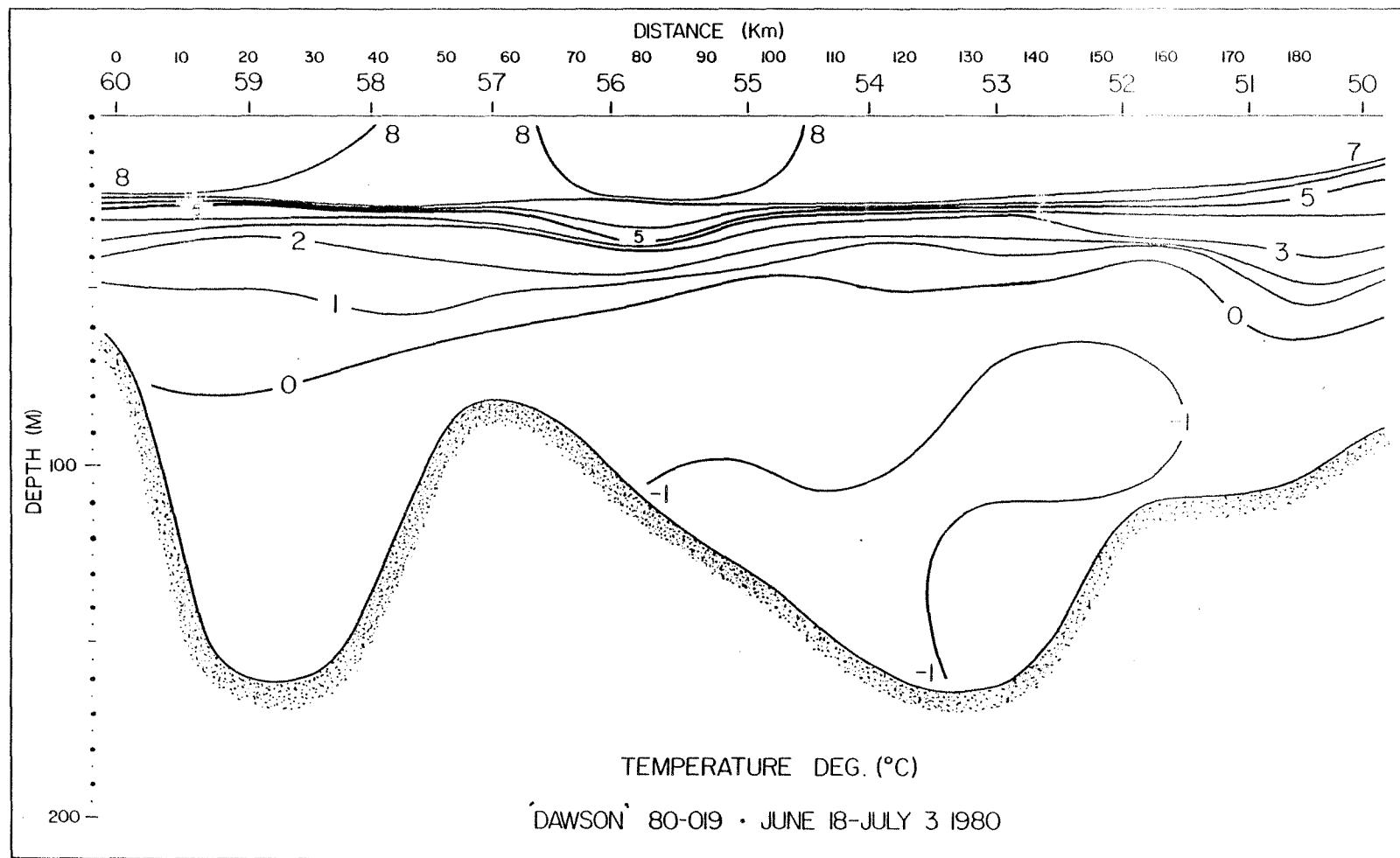
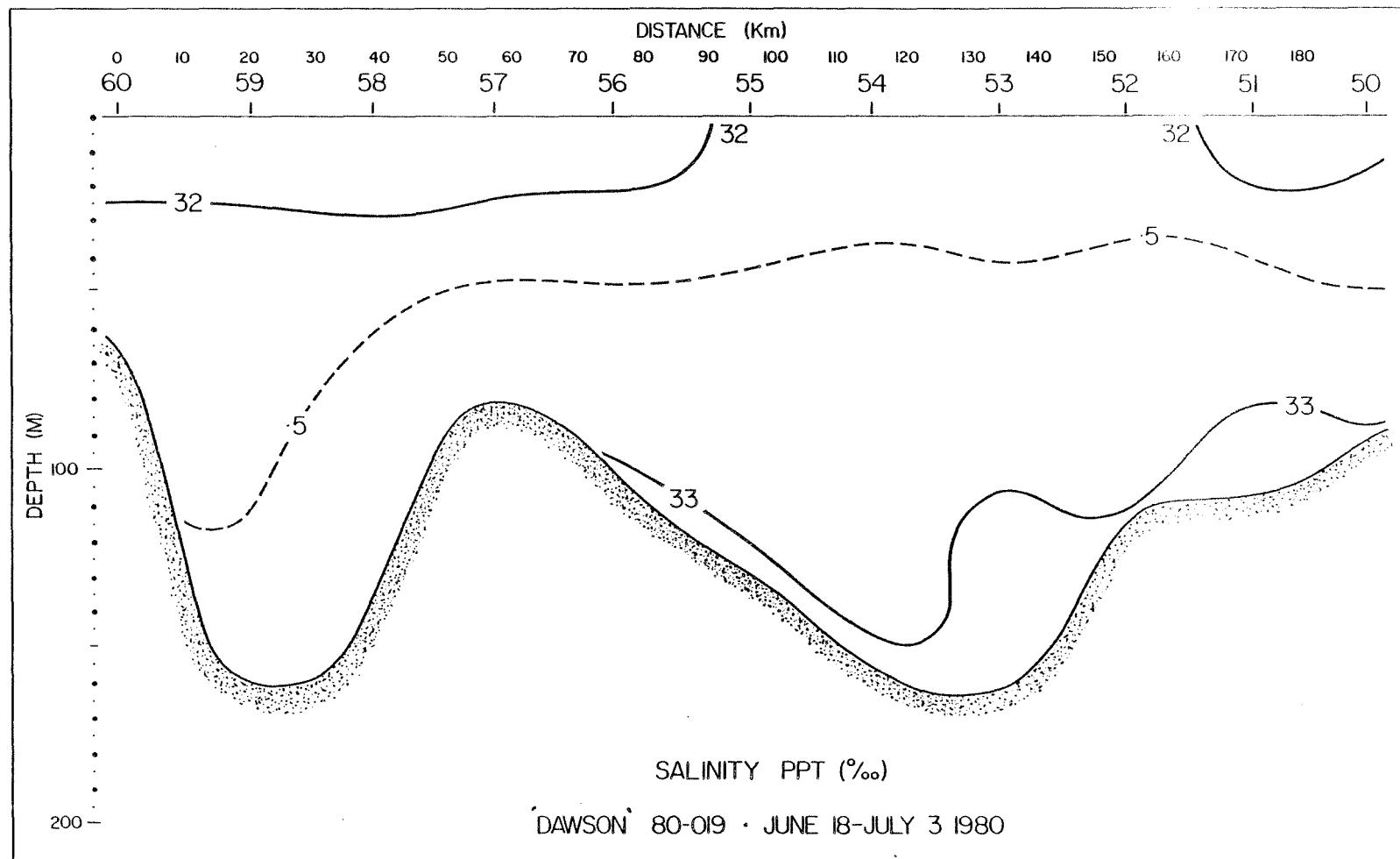
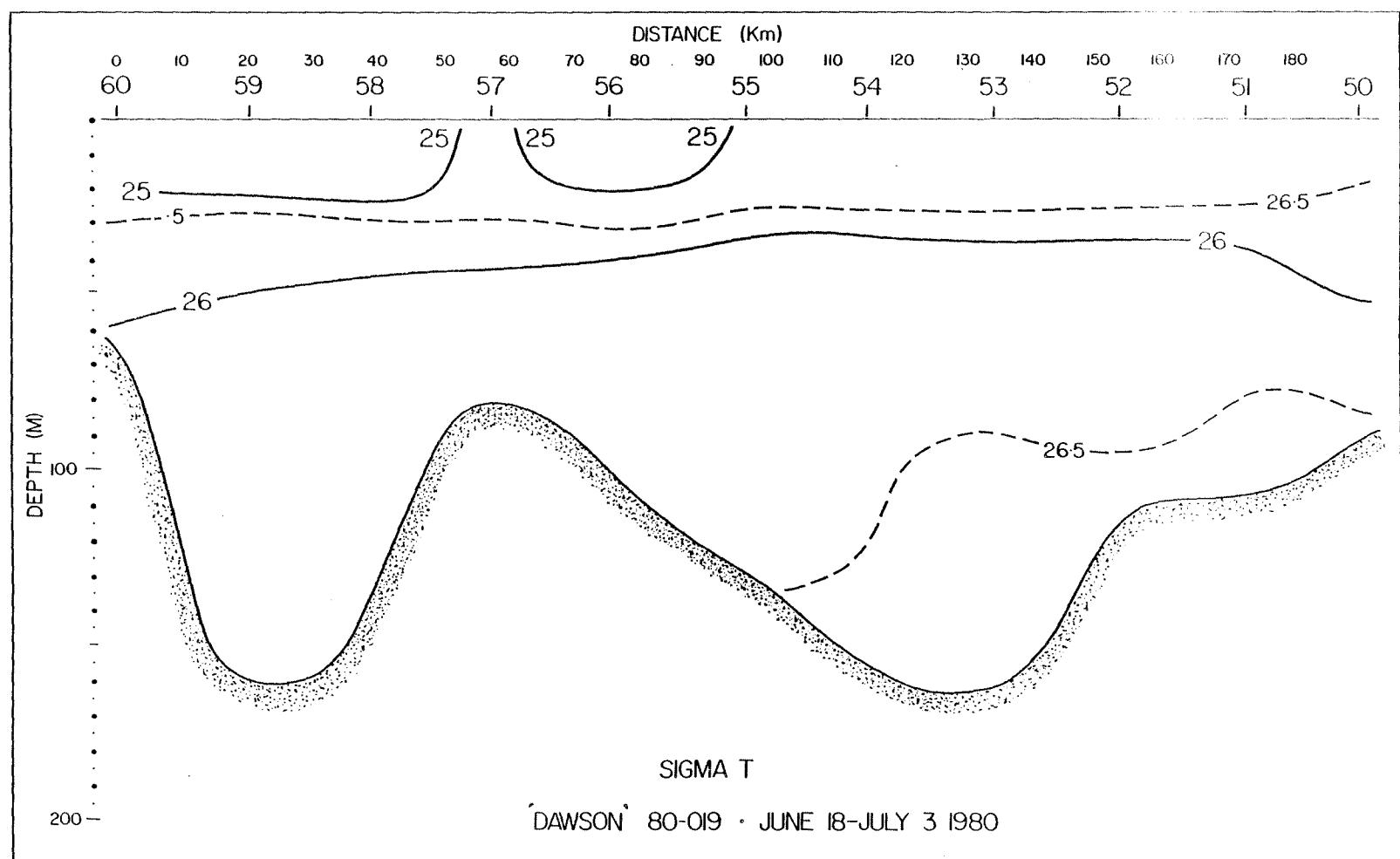


Figure 6 Position of stations 50-60







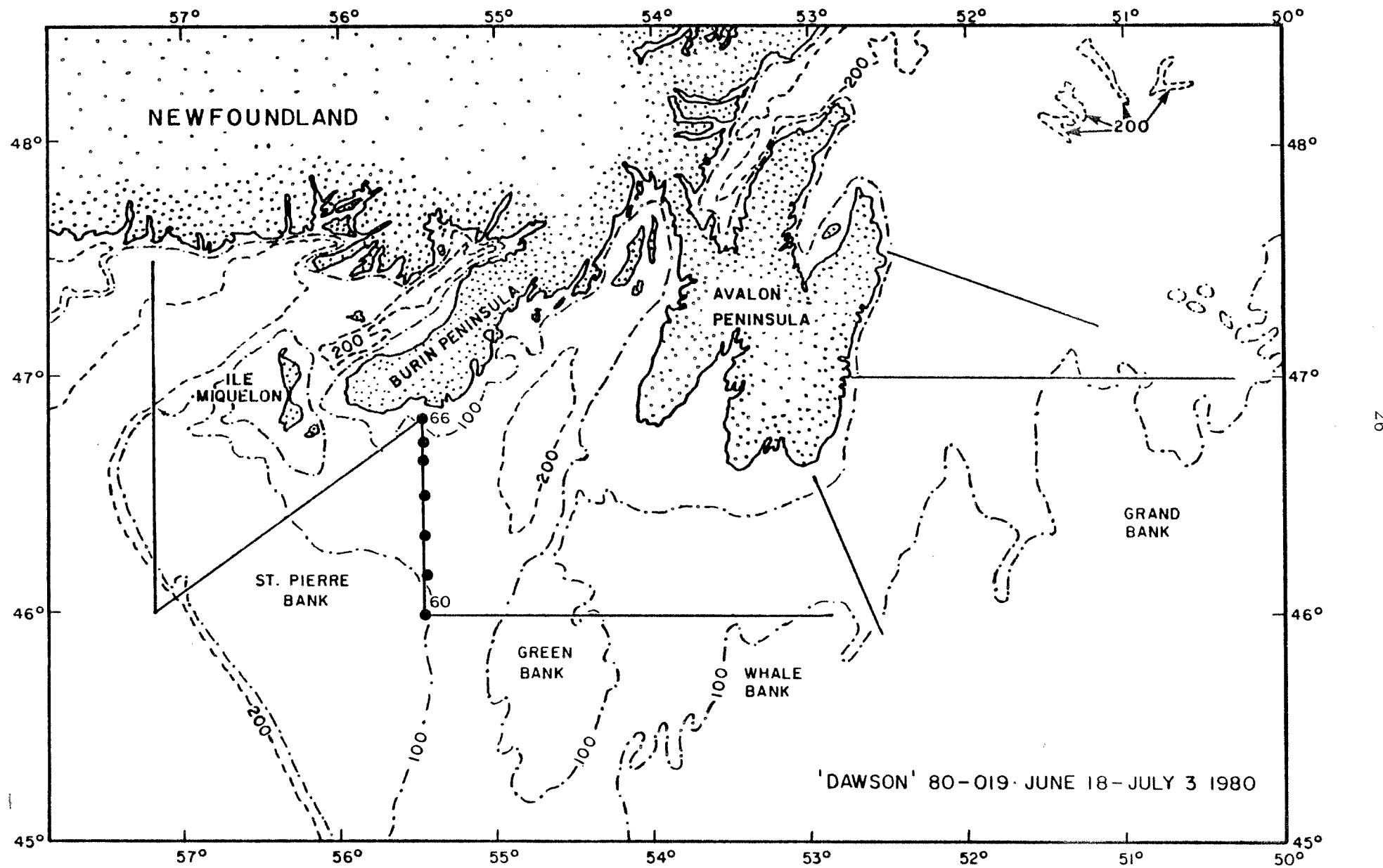
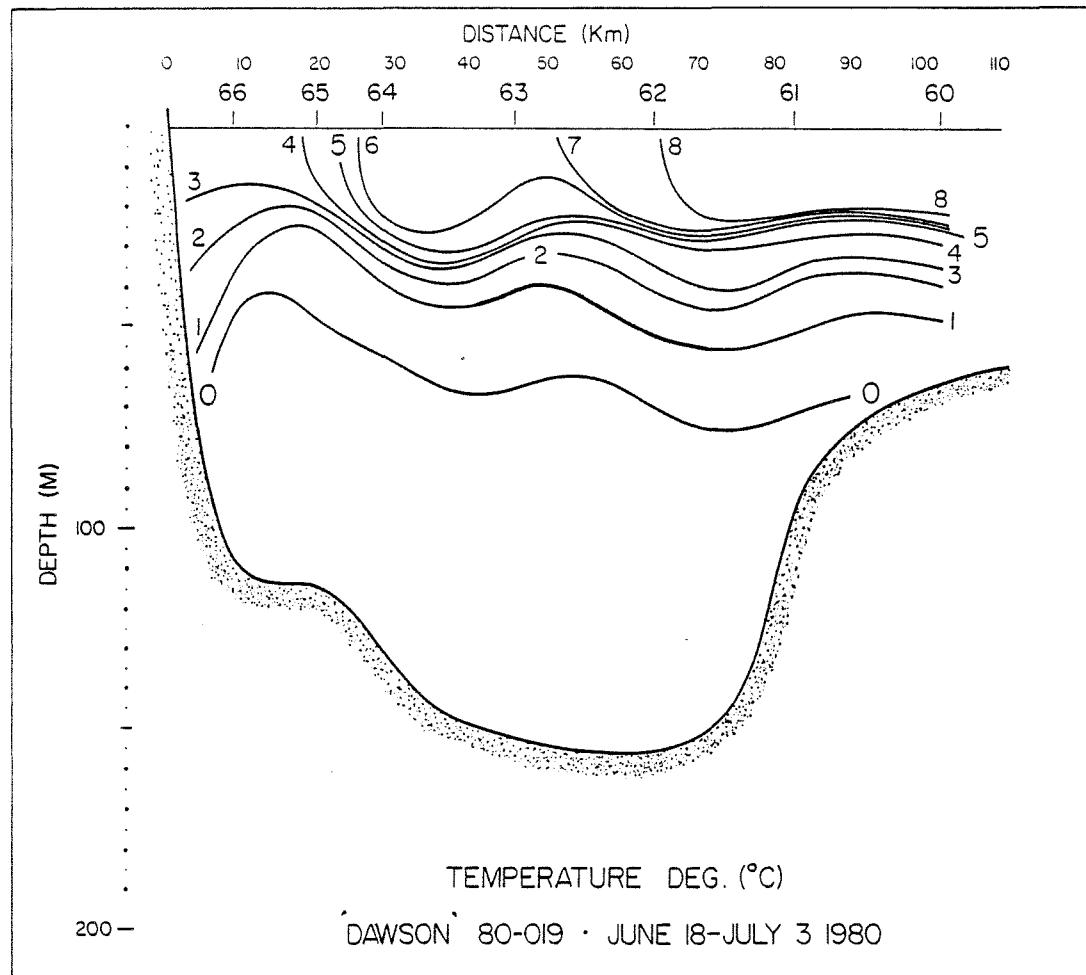
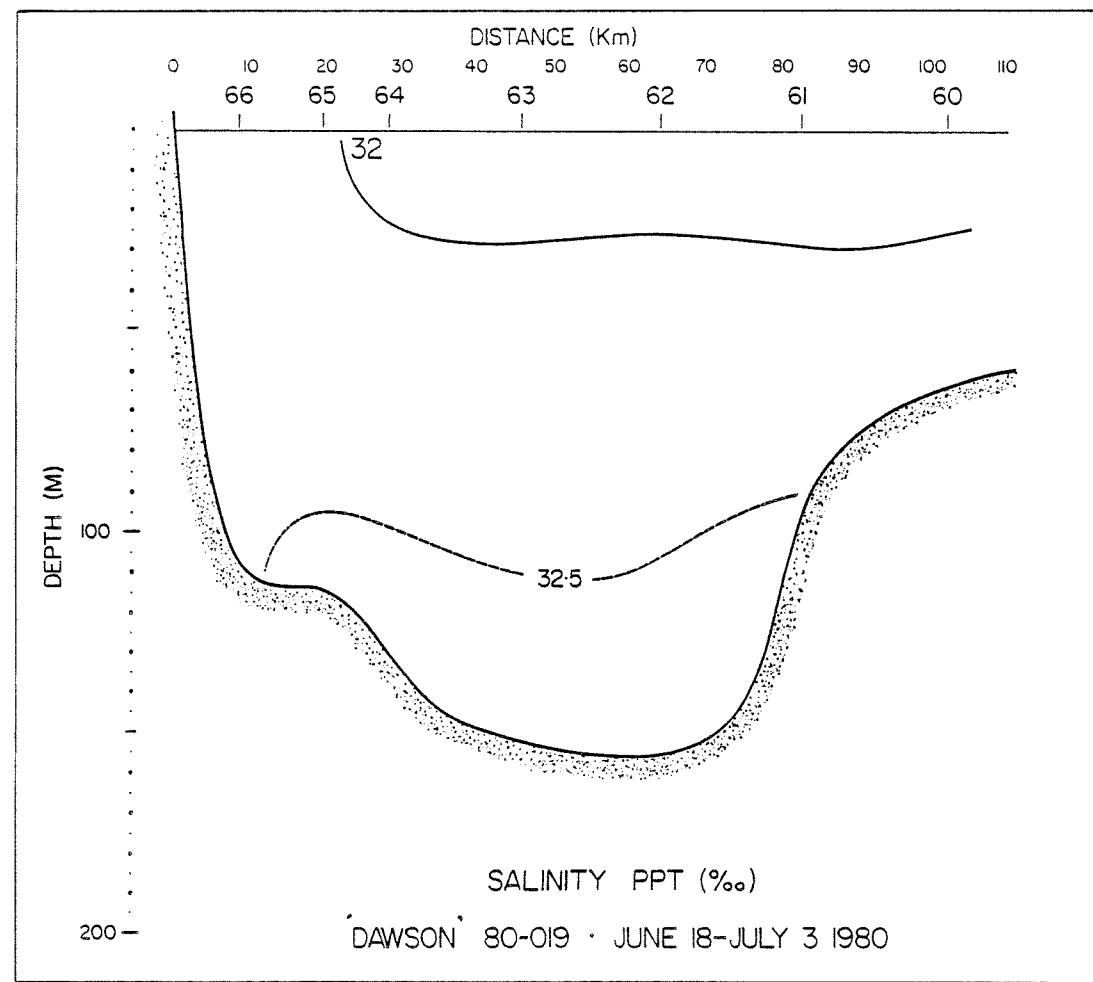
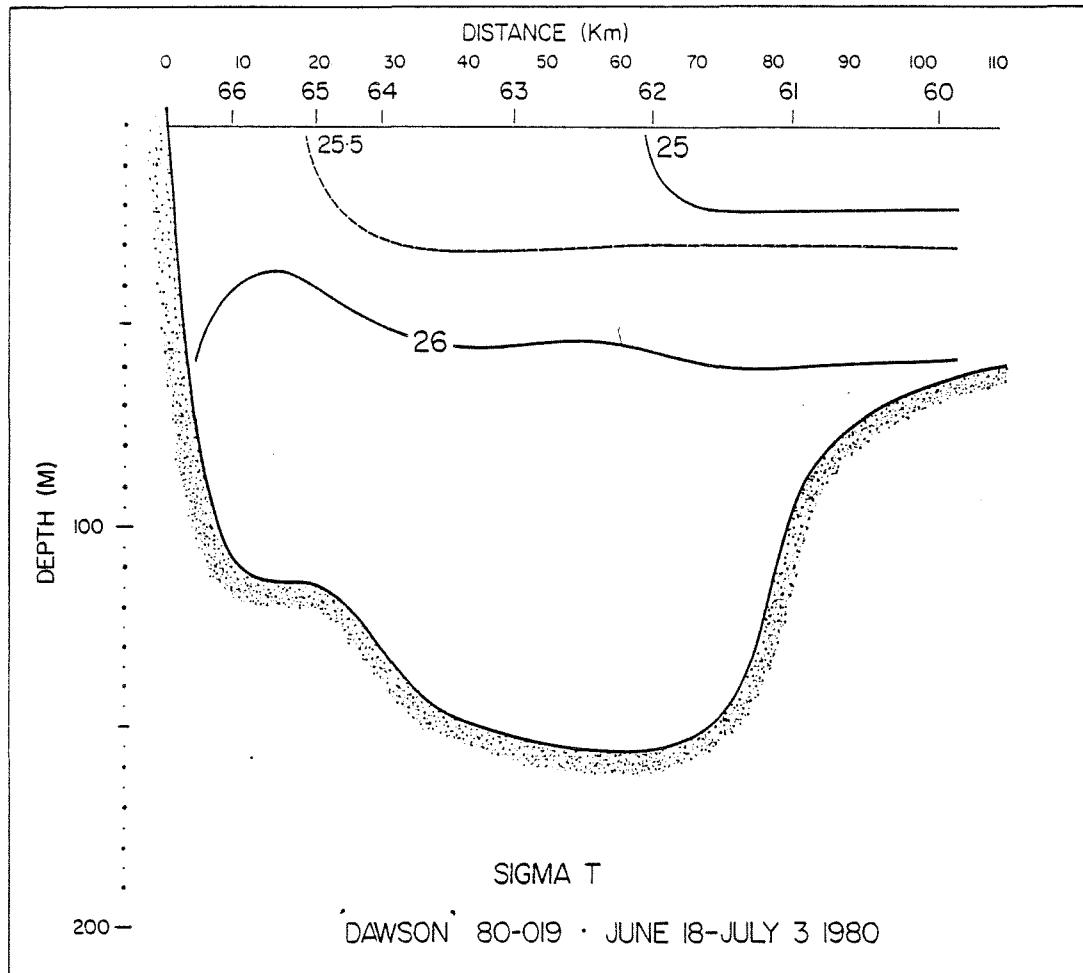


Figure 7 Position of stations 60-66







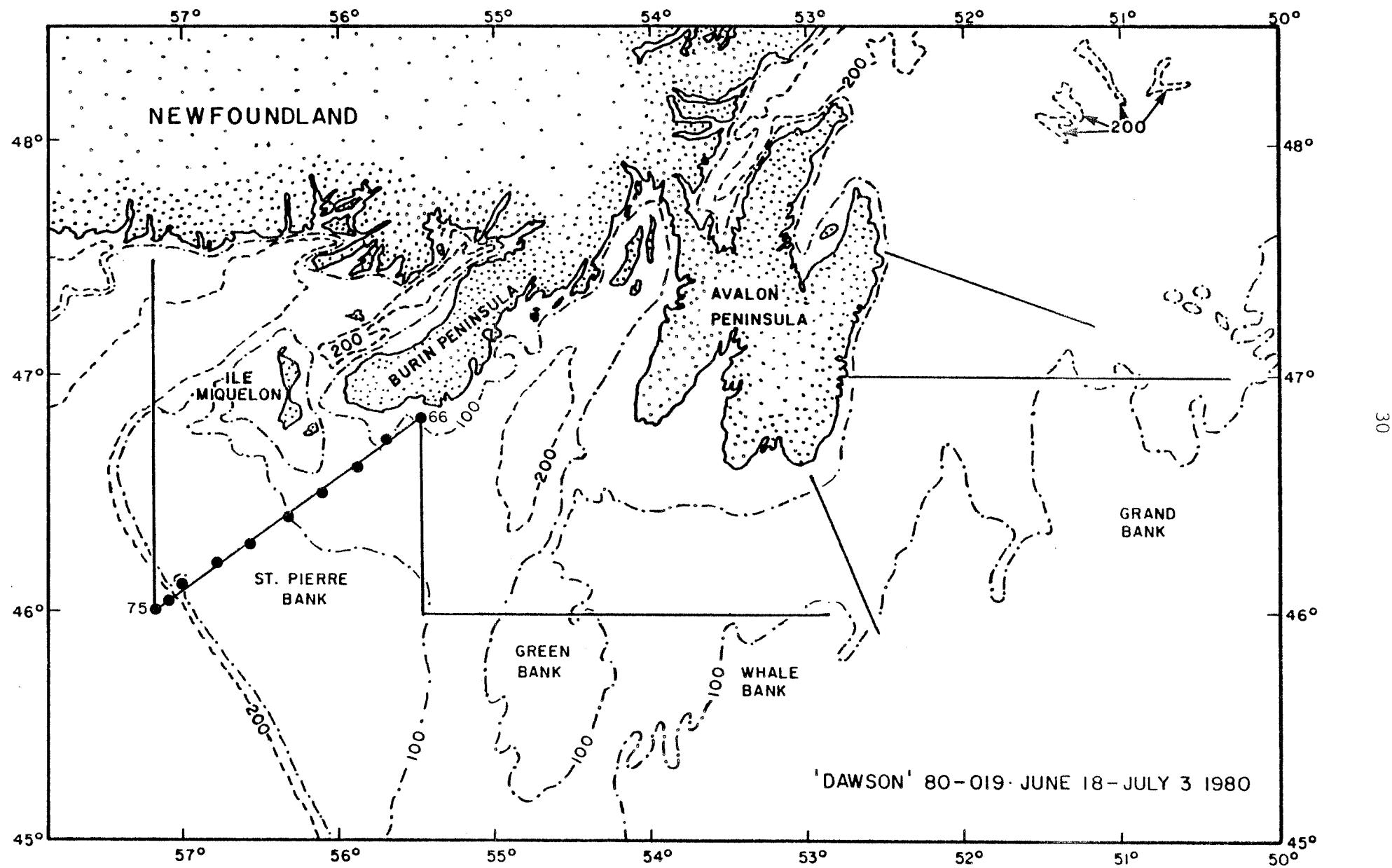
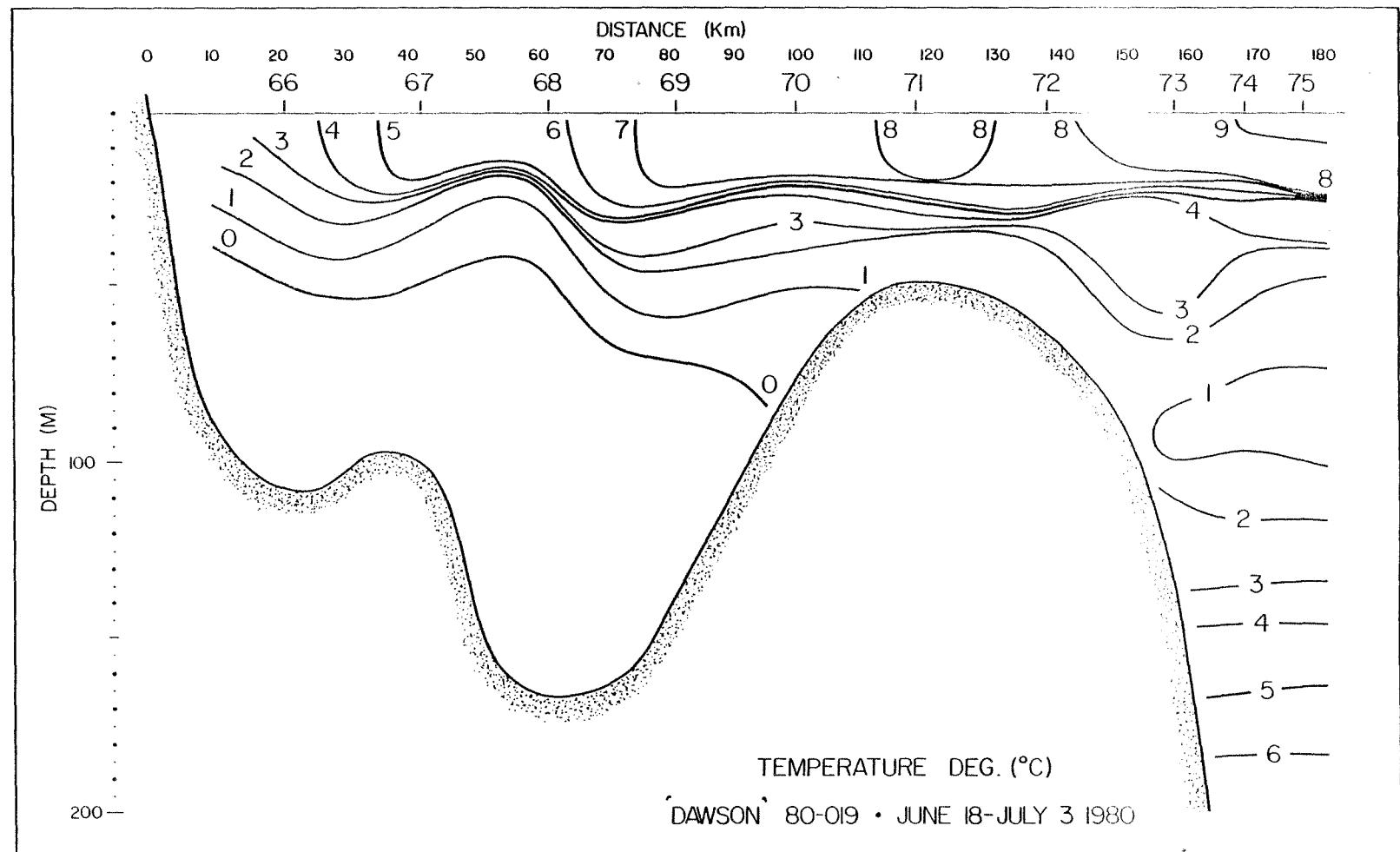
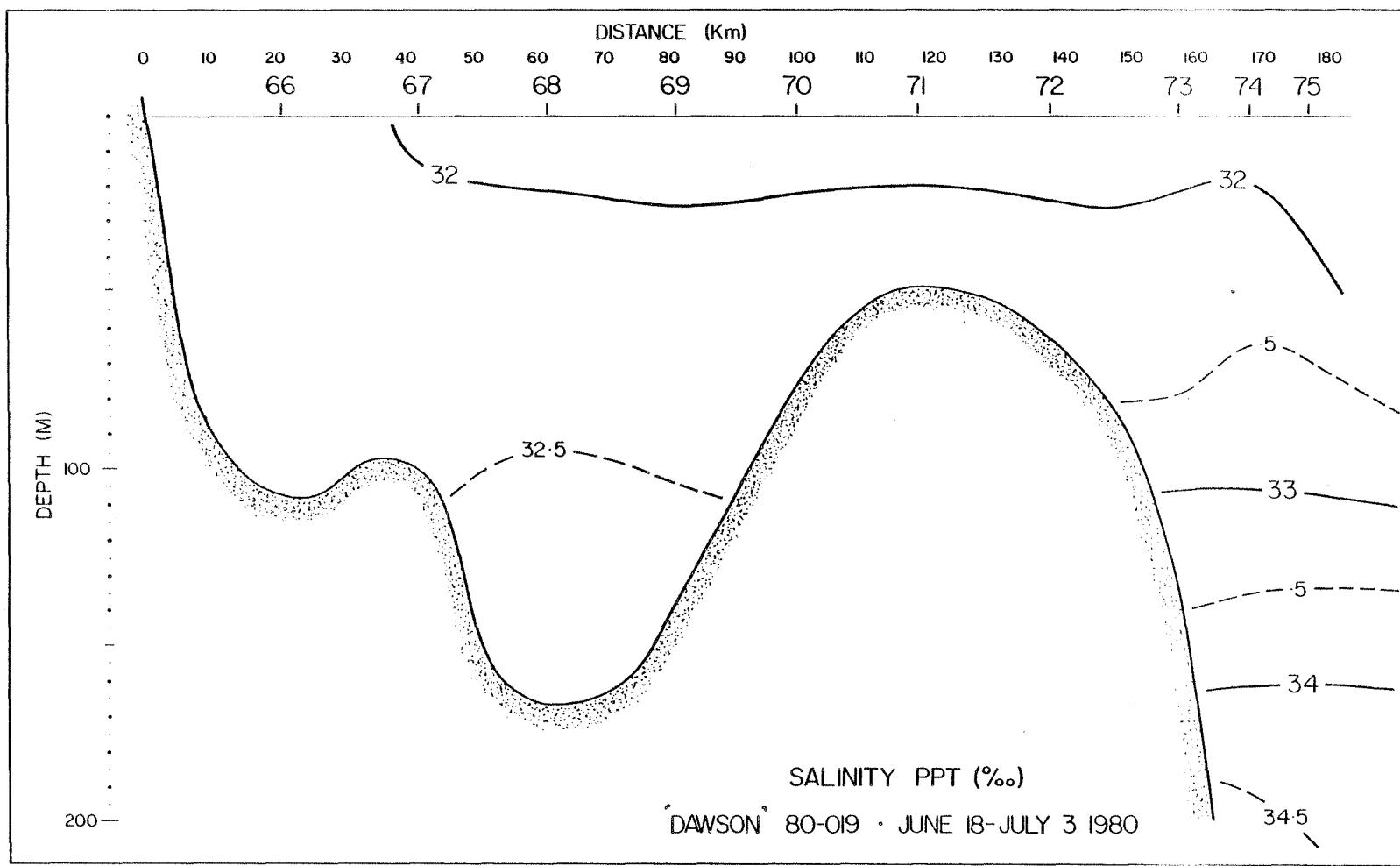
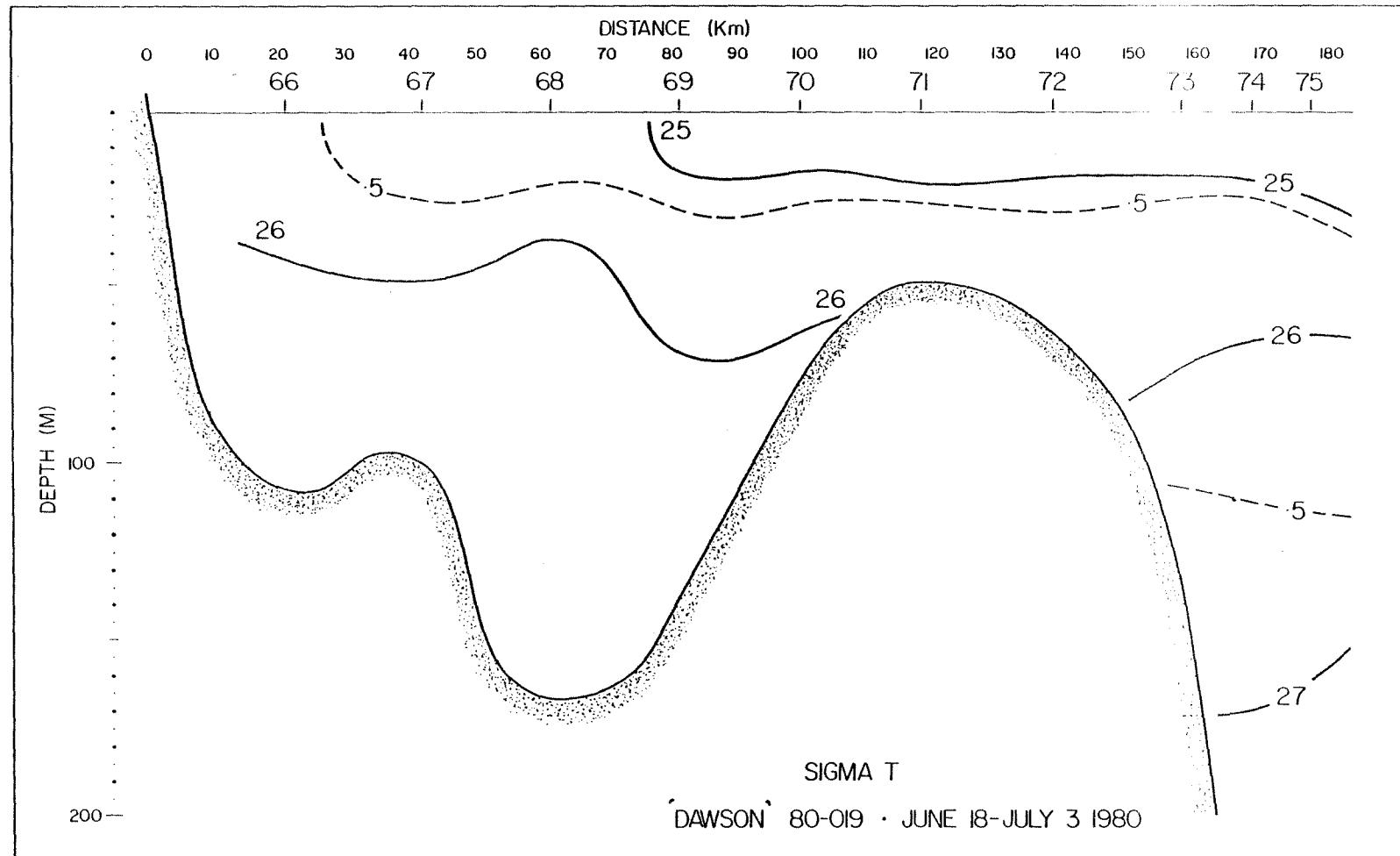


Figure 8 Position of stations 66-75







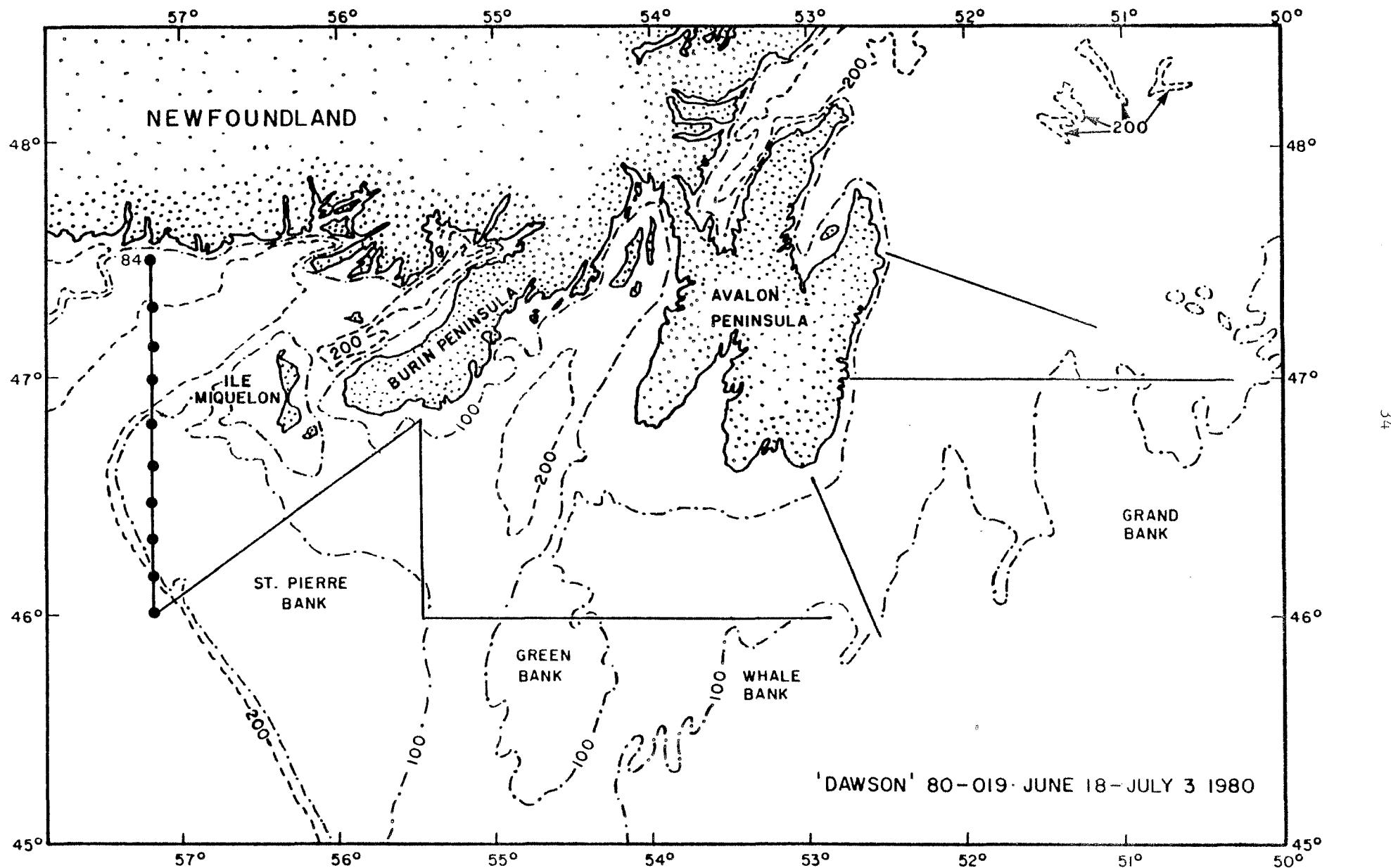
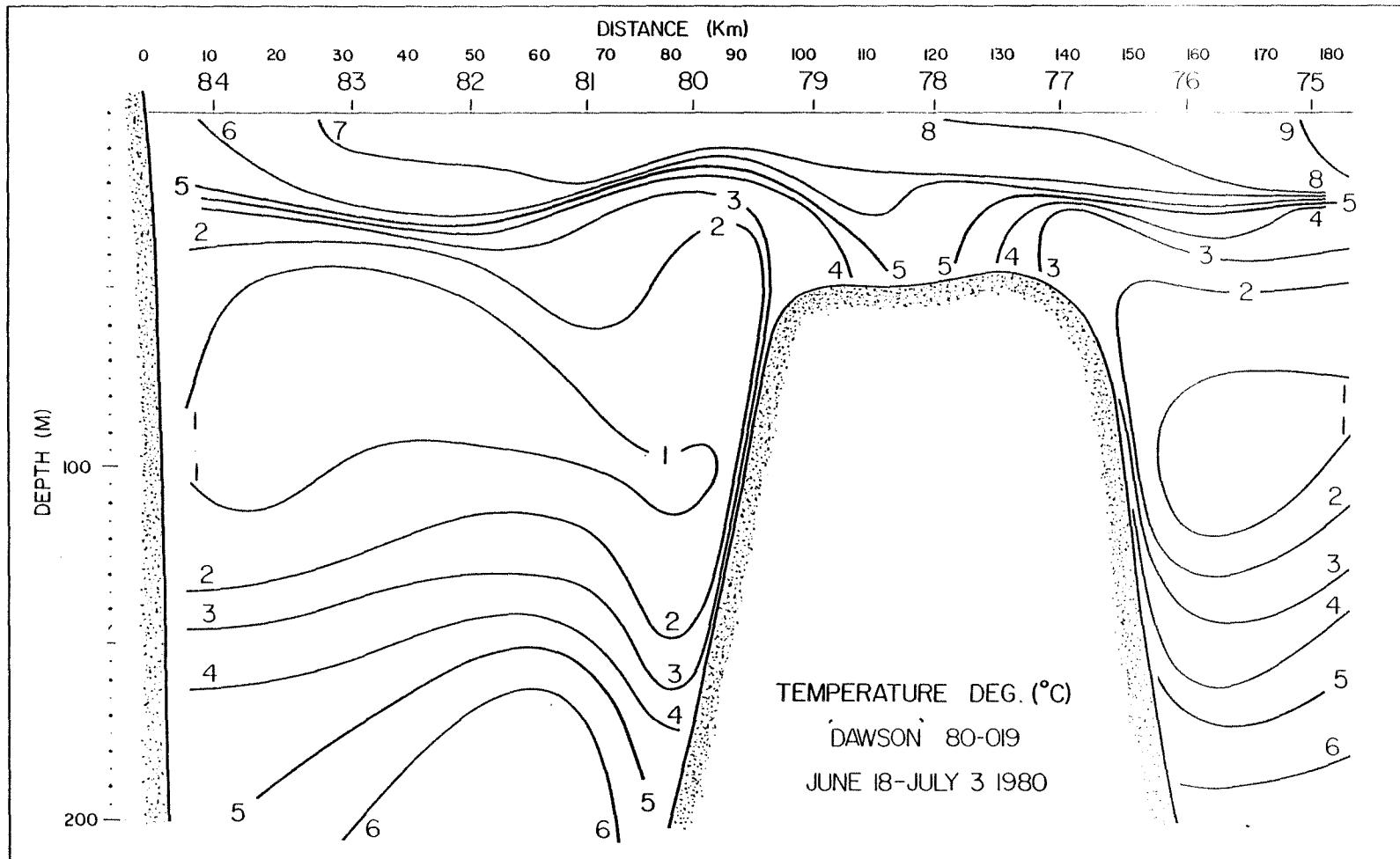
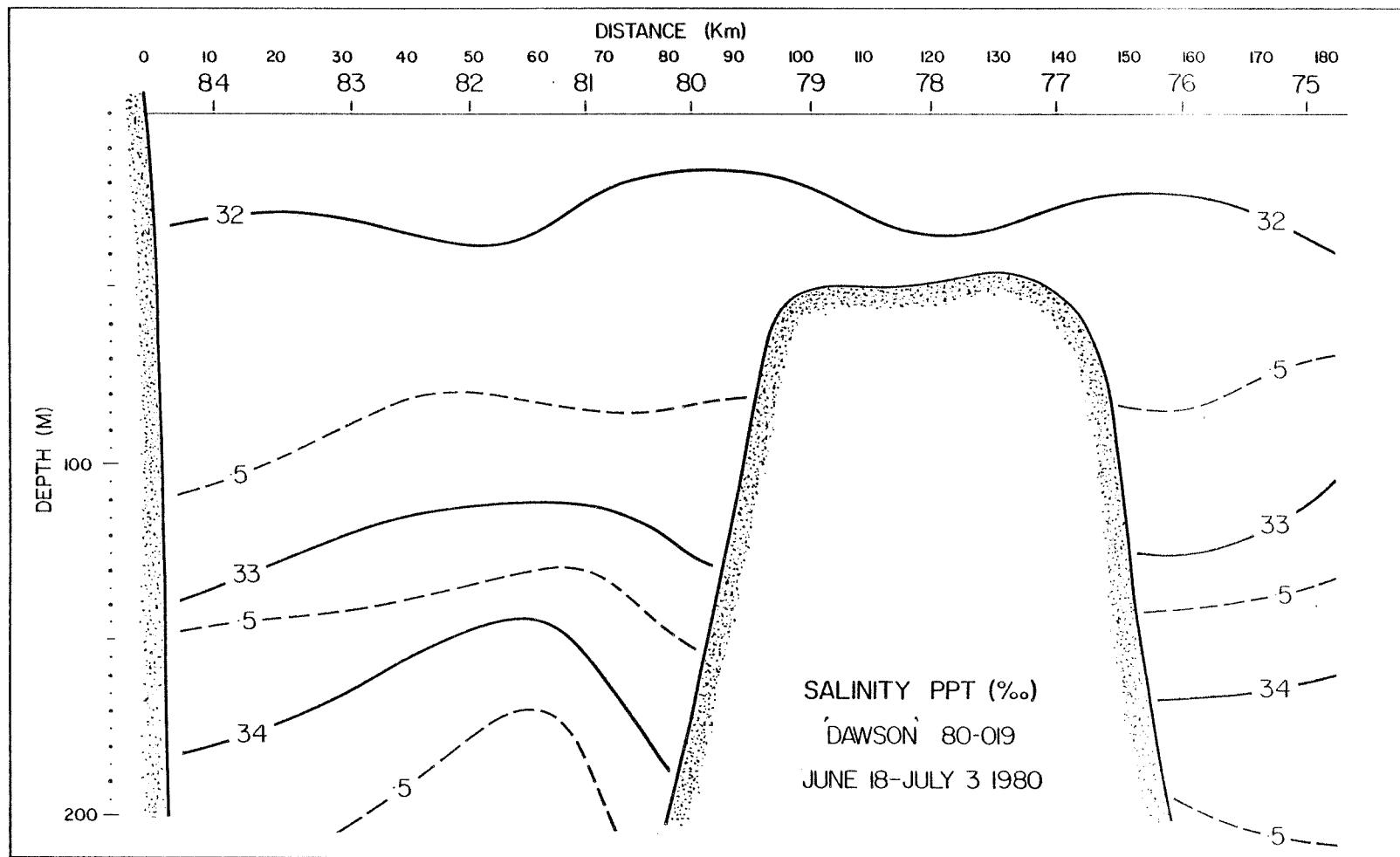
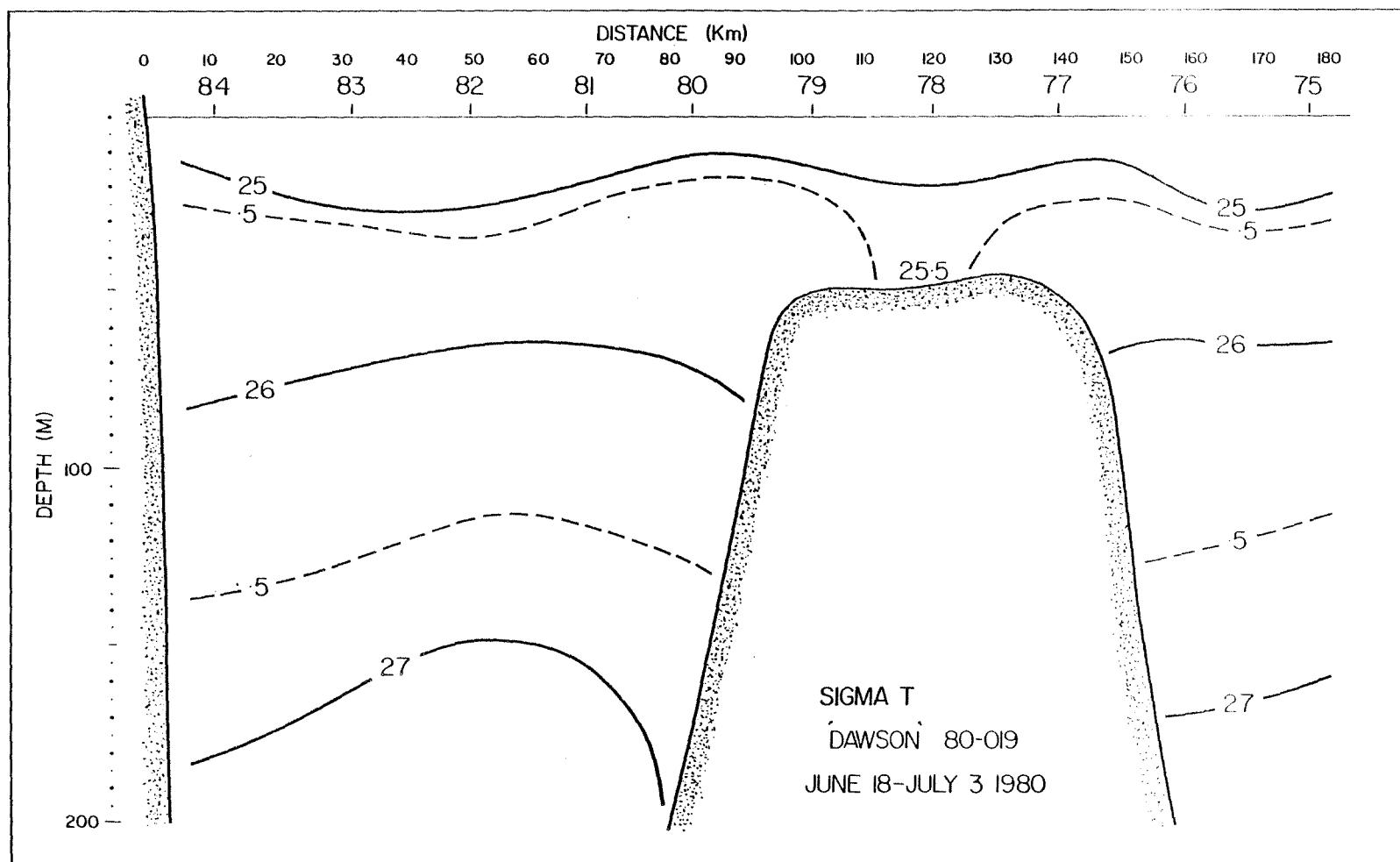


Figure 9 Position of stations 75-84







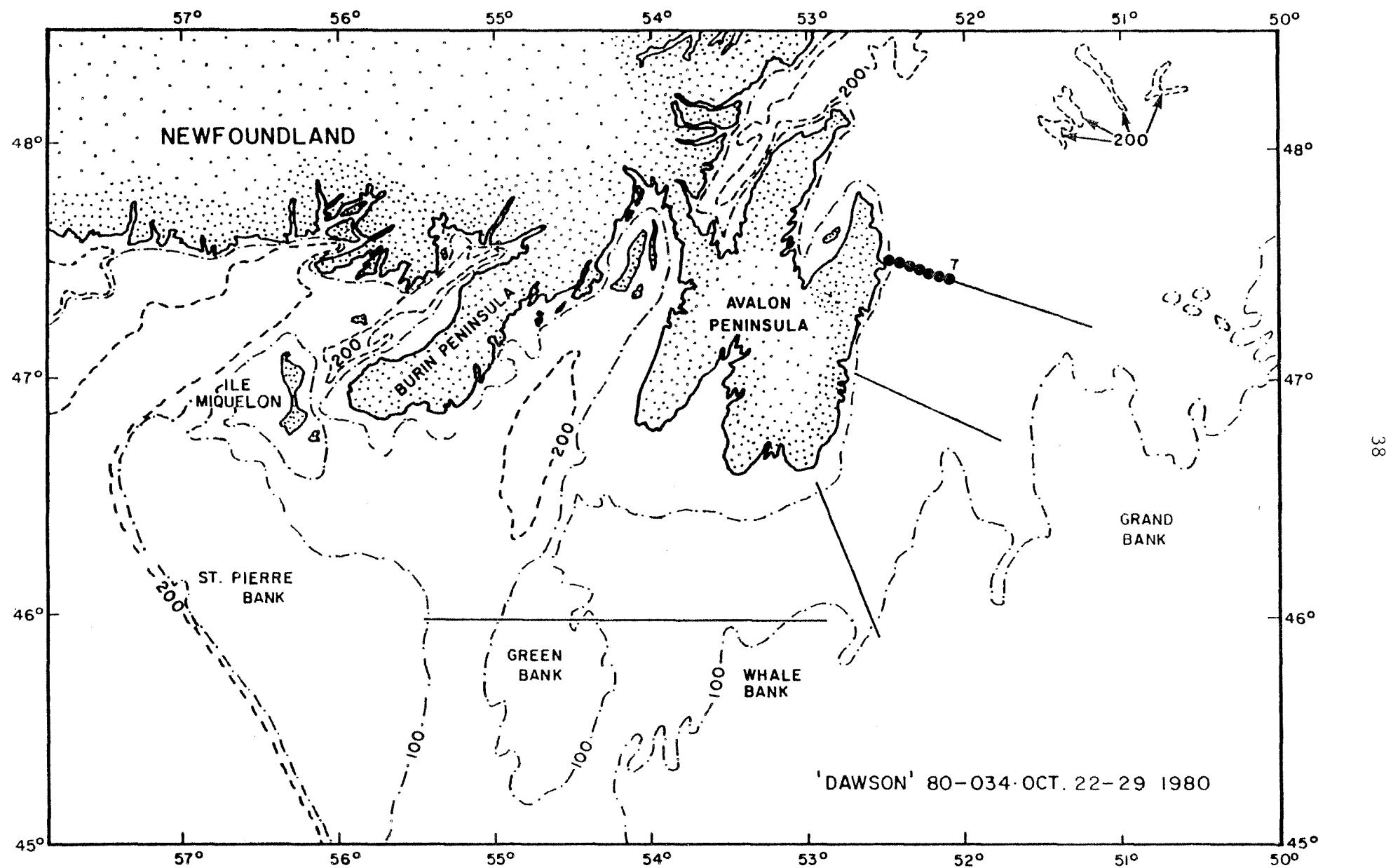
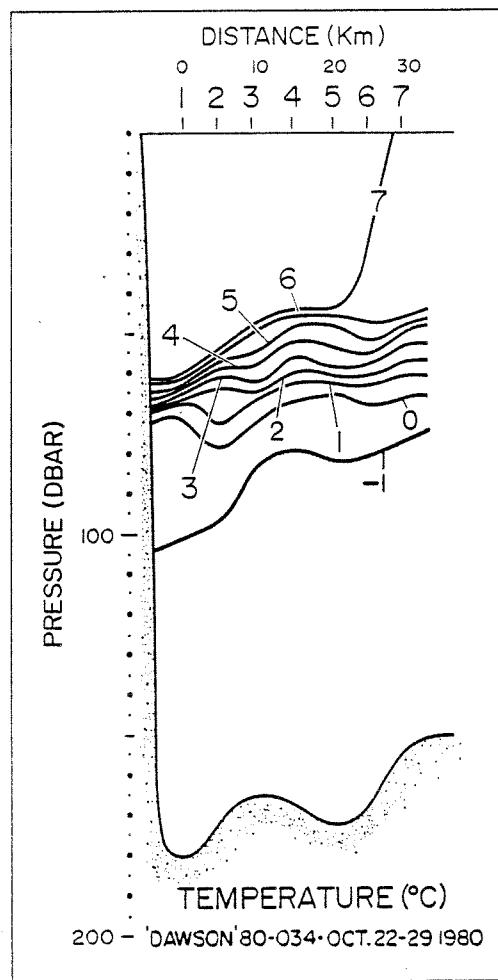
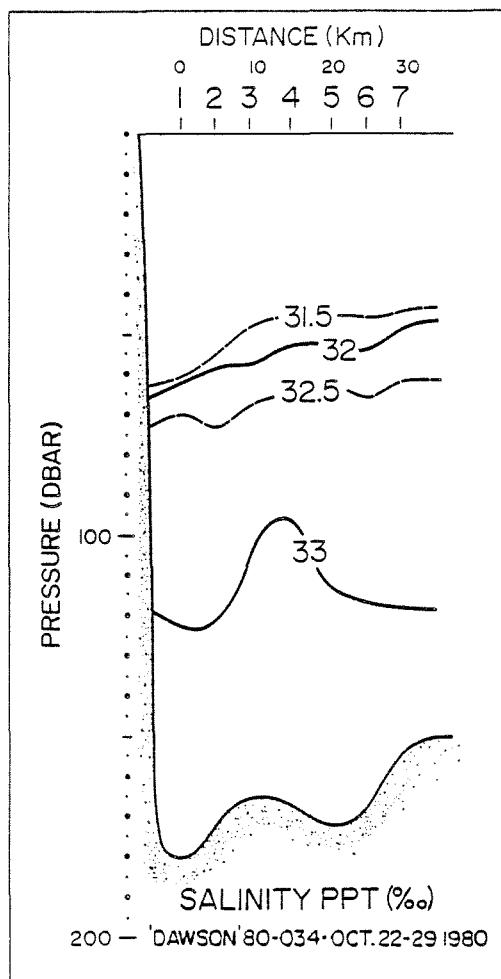
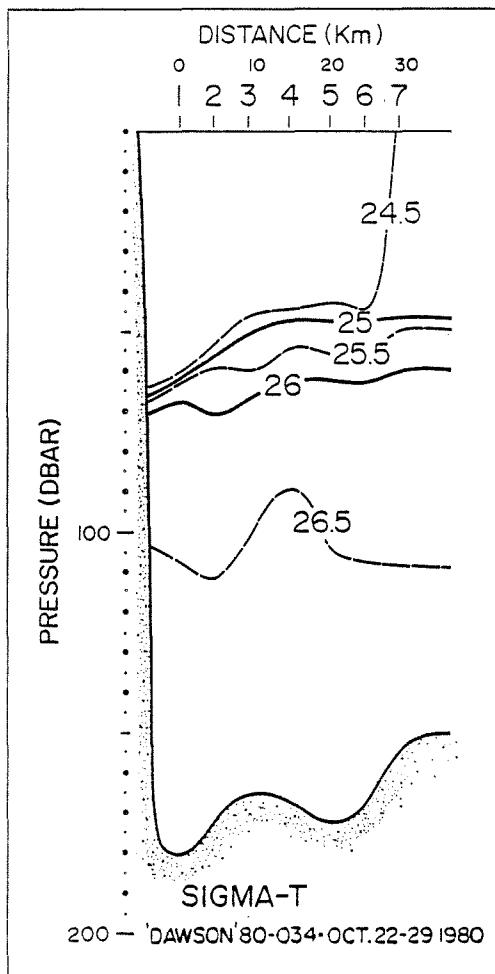


Figure 10 Position of stations 1-7







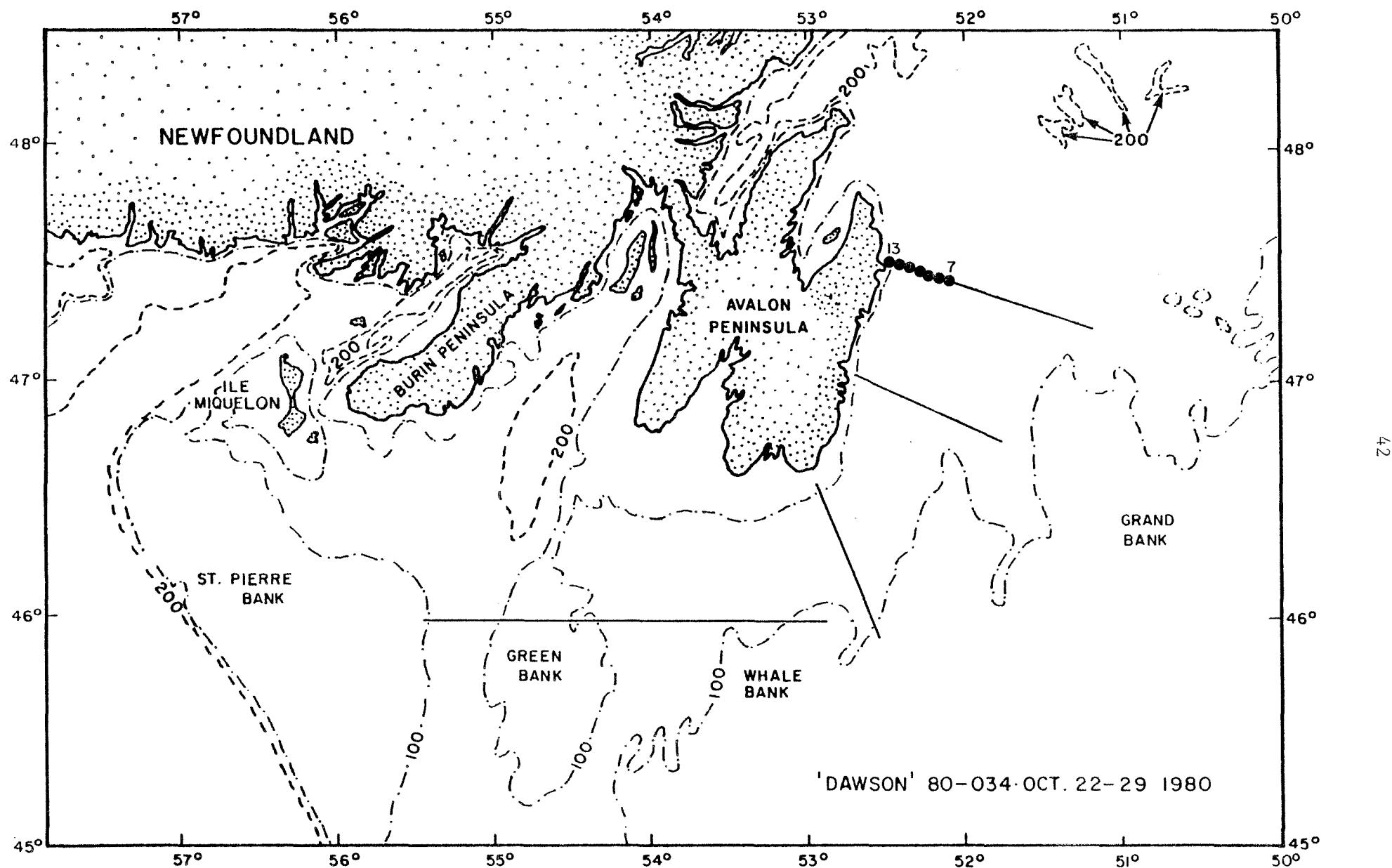
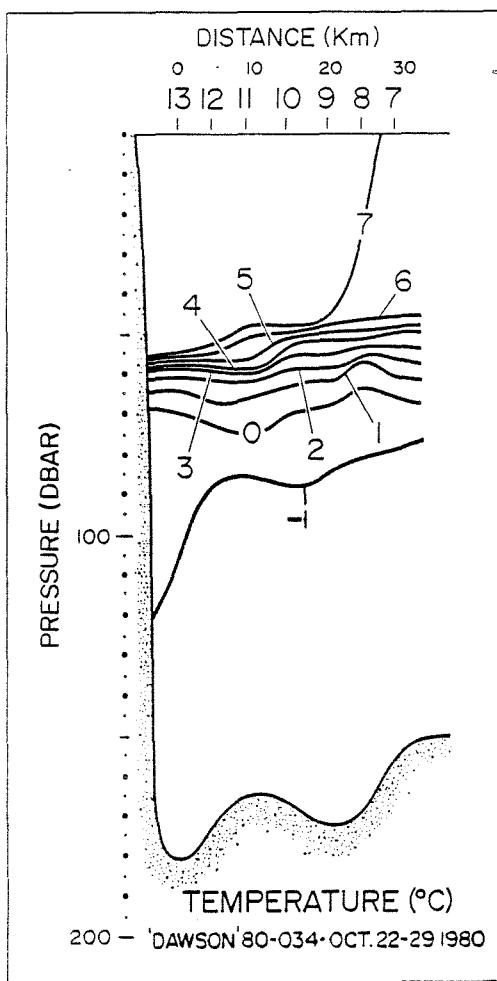
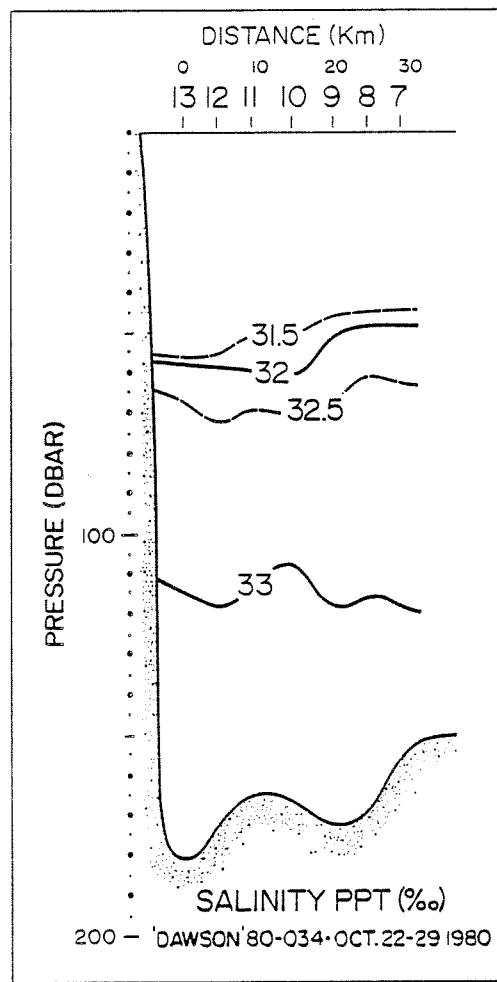
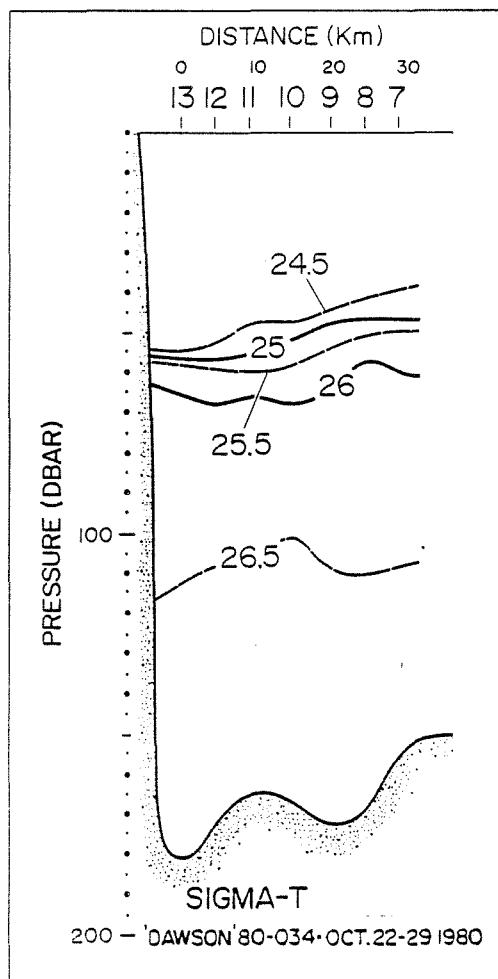


Figure 11 Position of stations 7-13







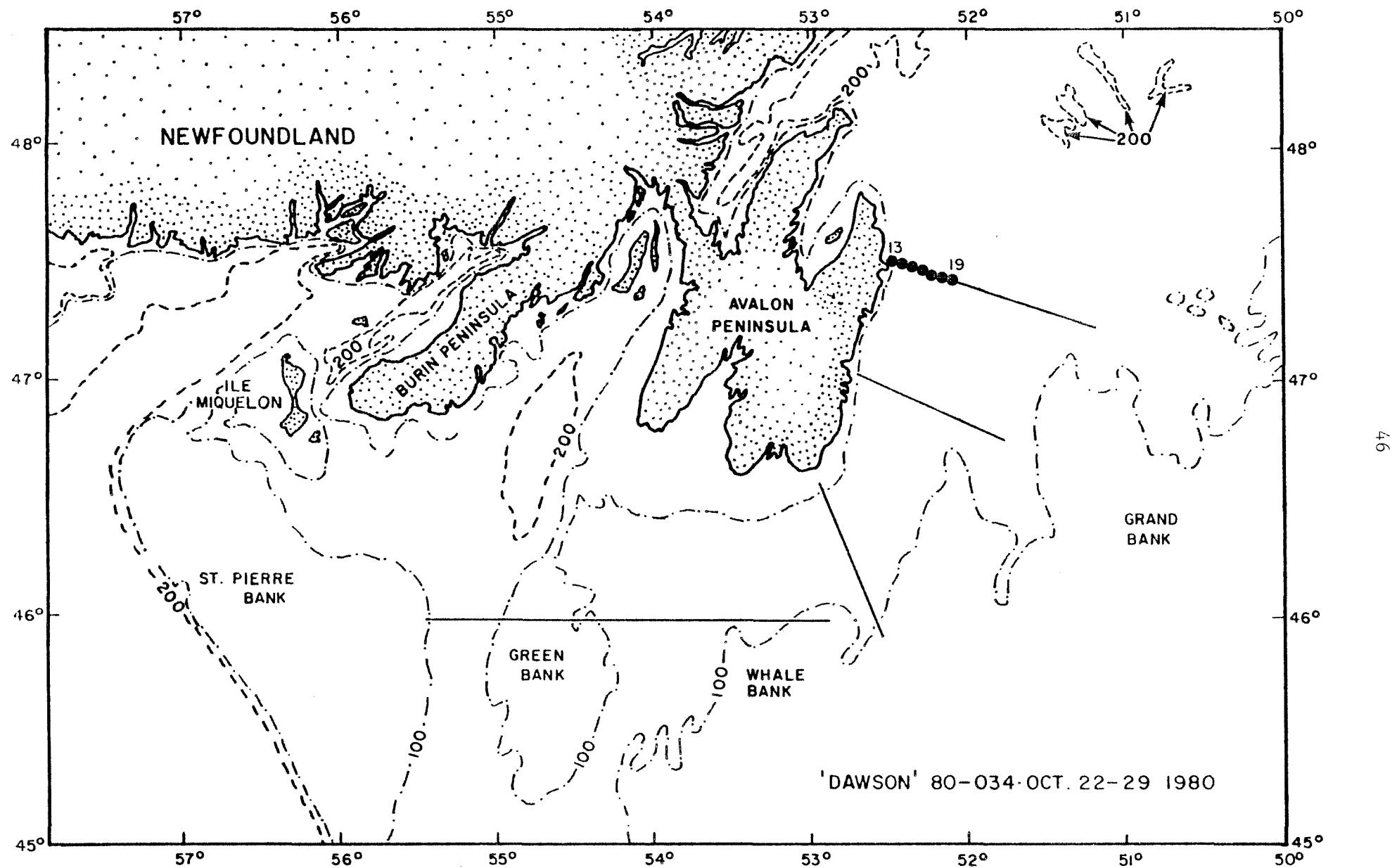
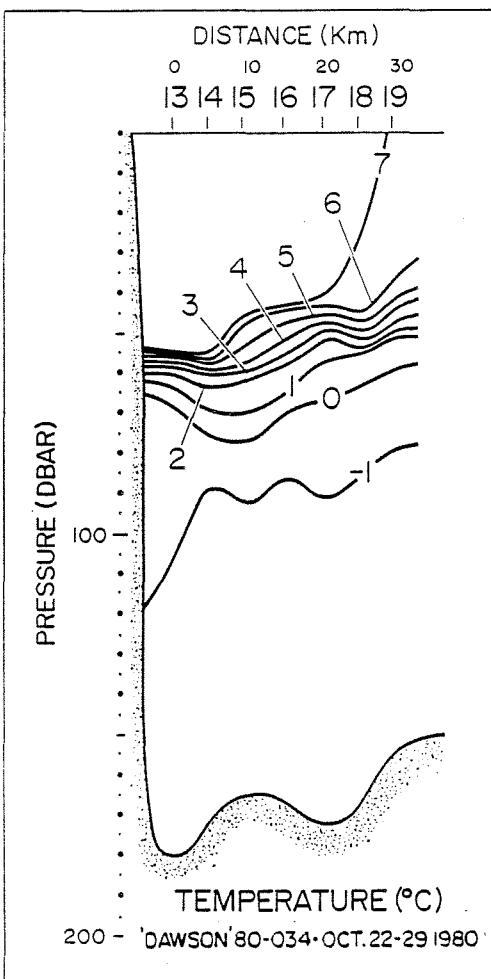
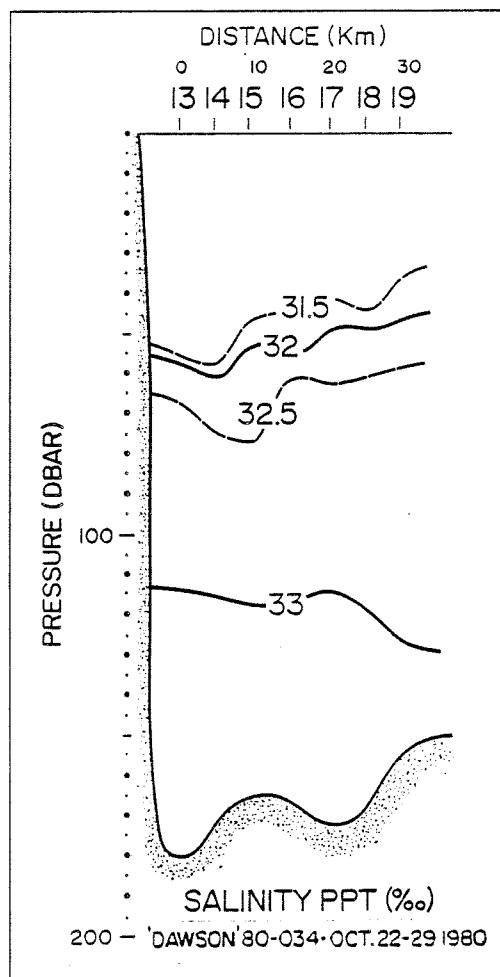
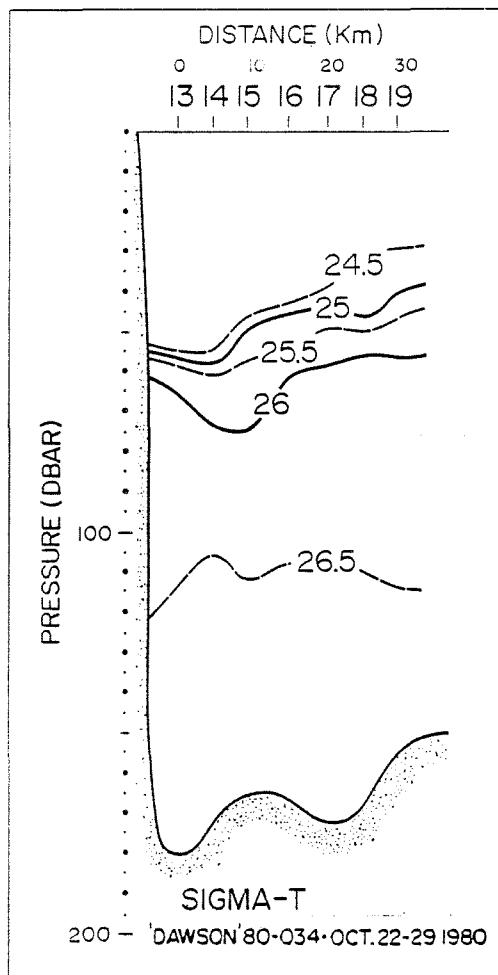


Figure 12 Position of stations 13-19







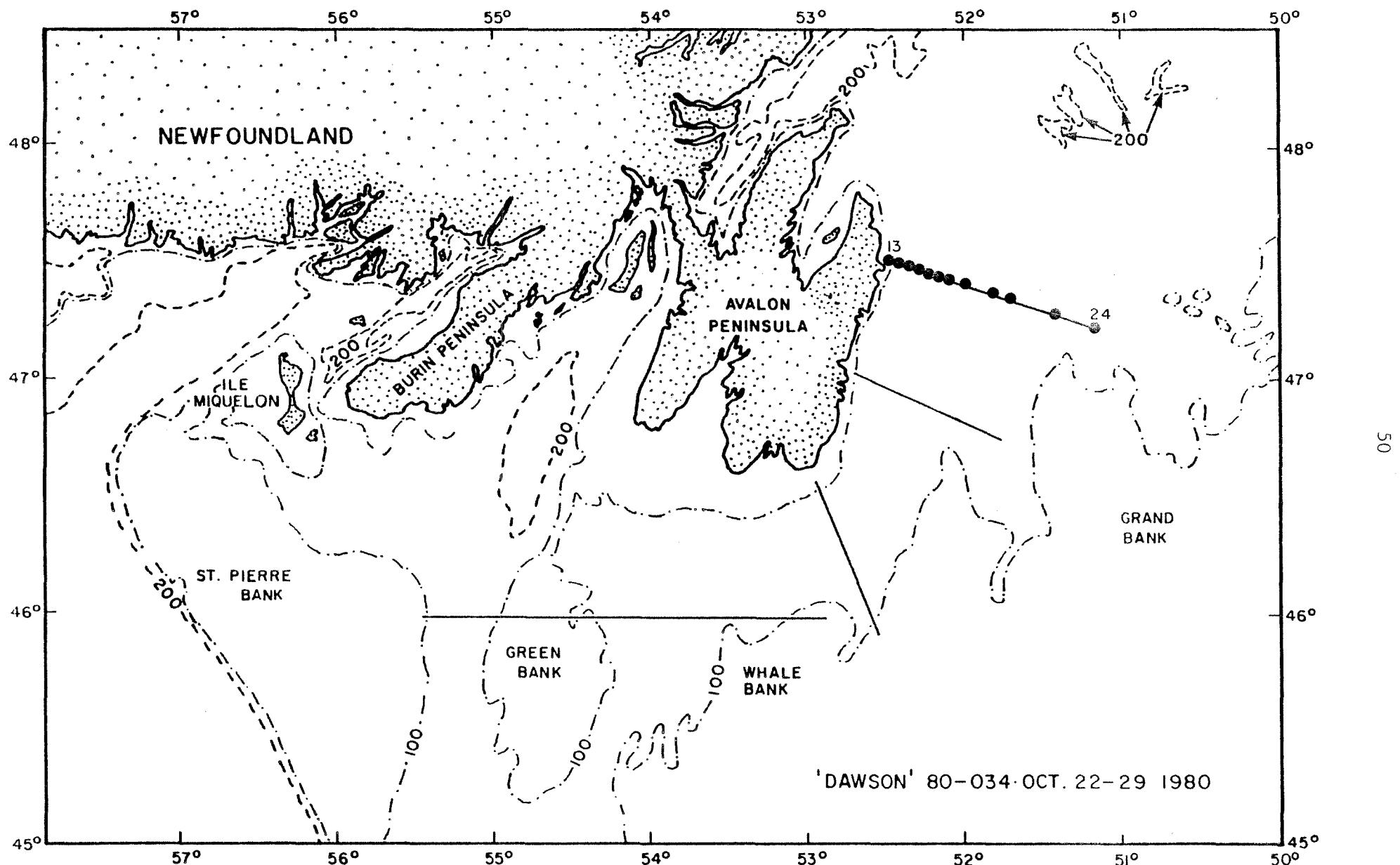
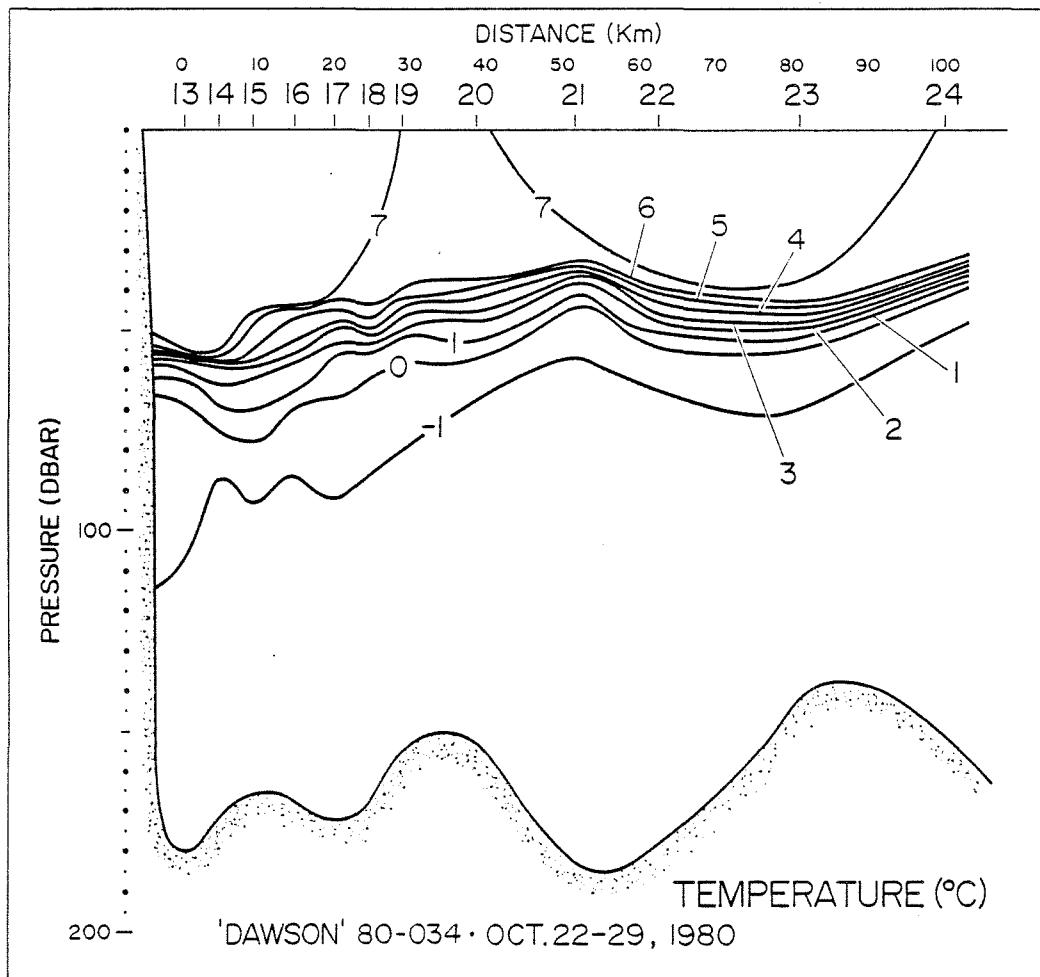
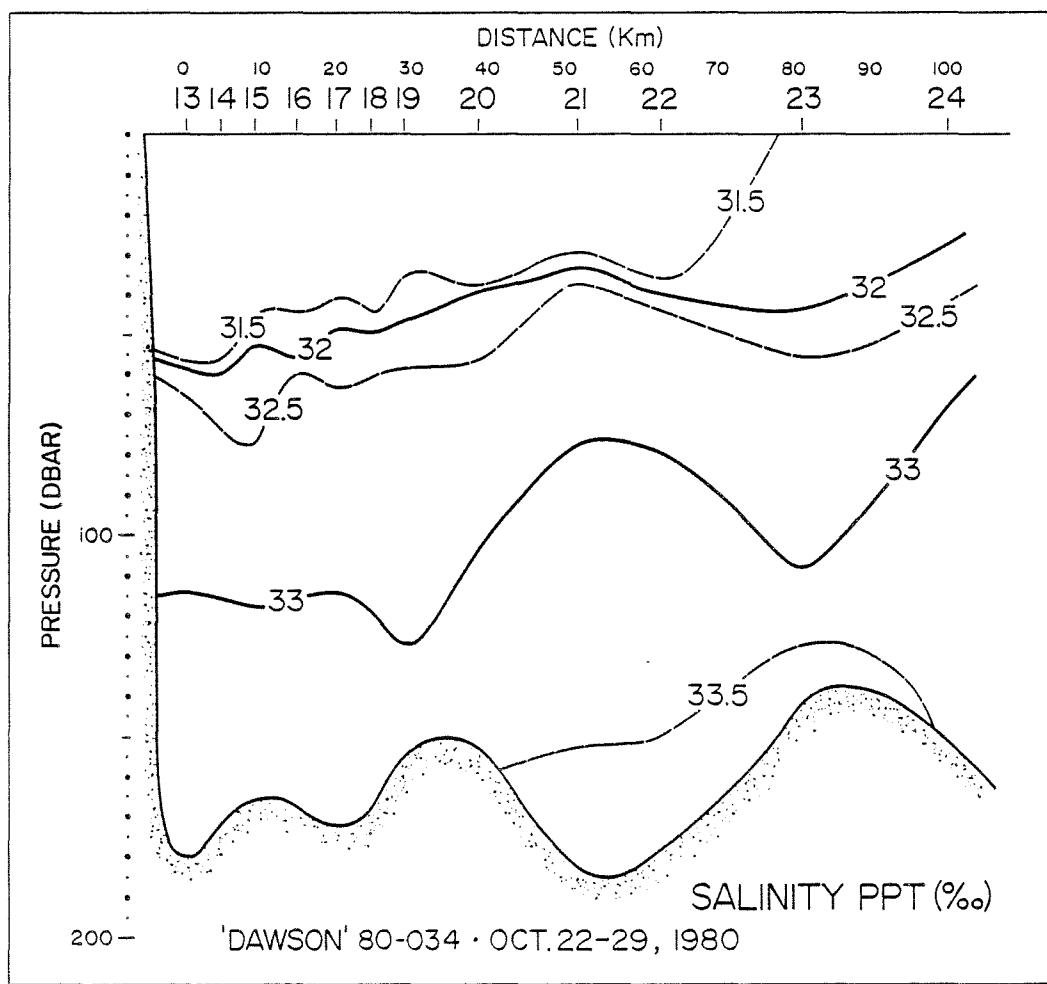
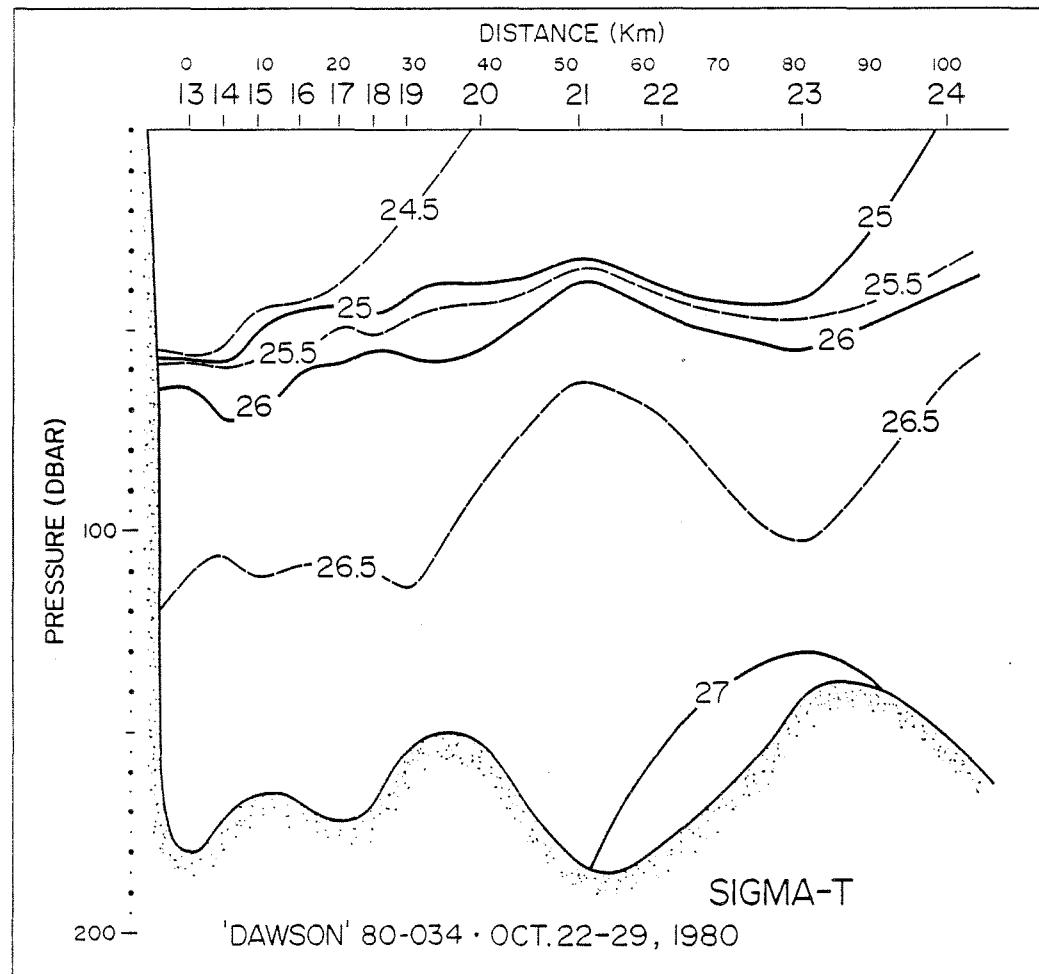


Figure 13 Position of stations 13-24







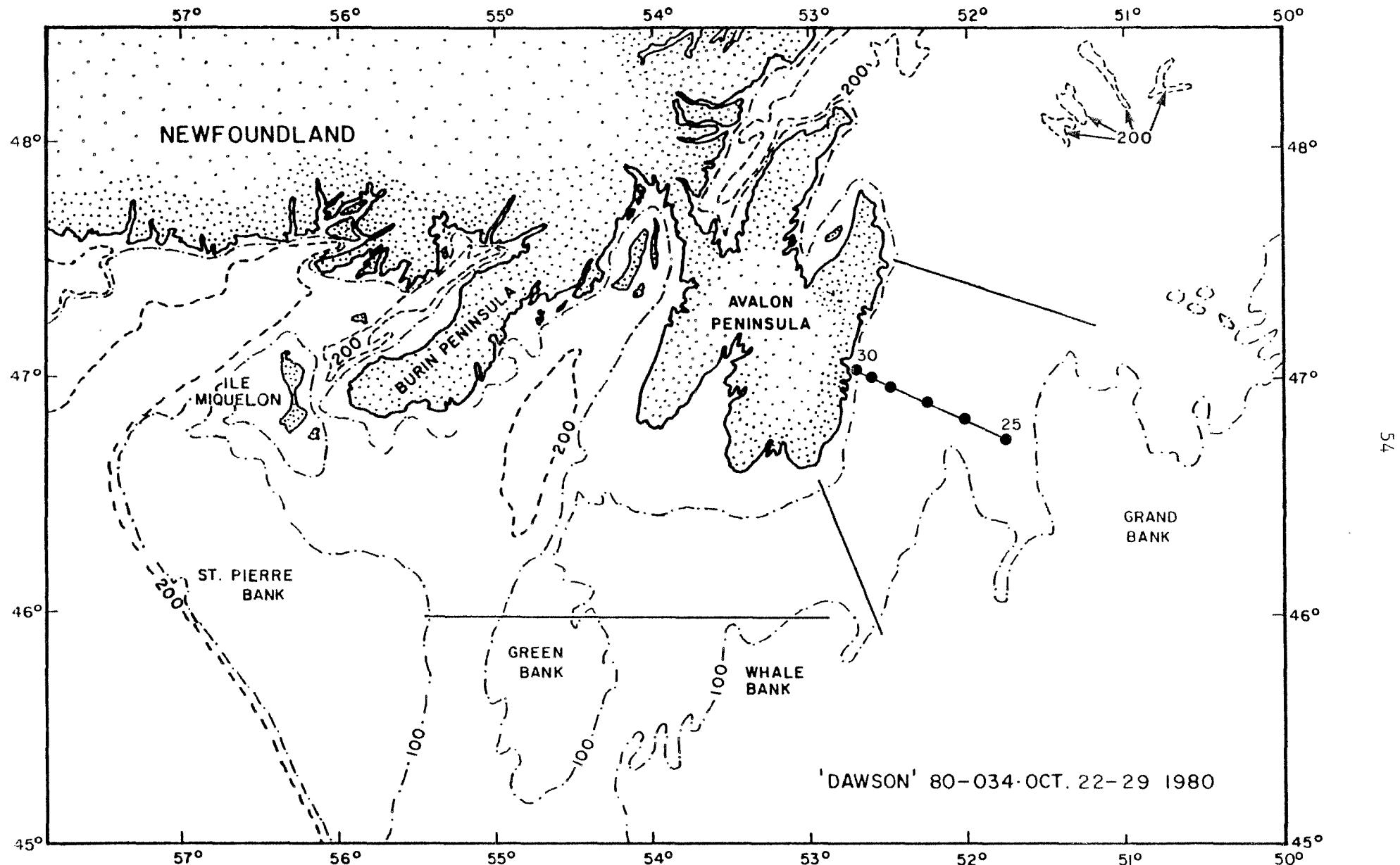
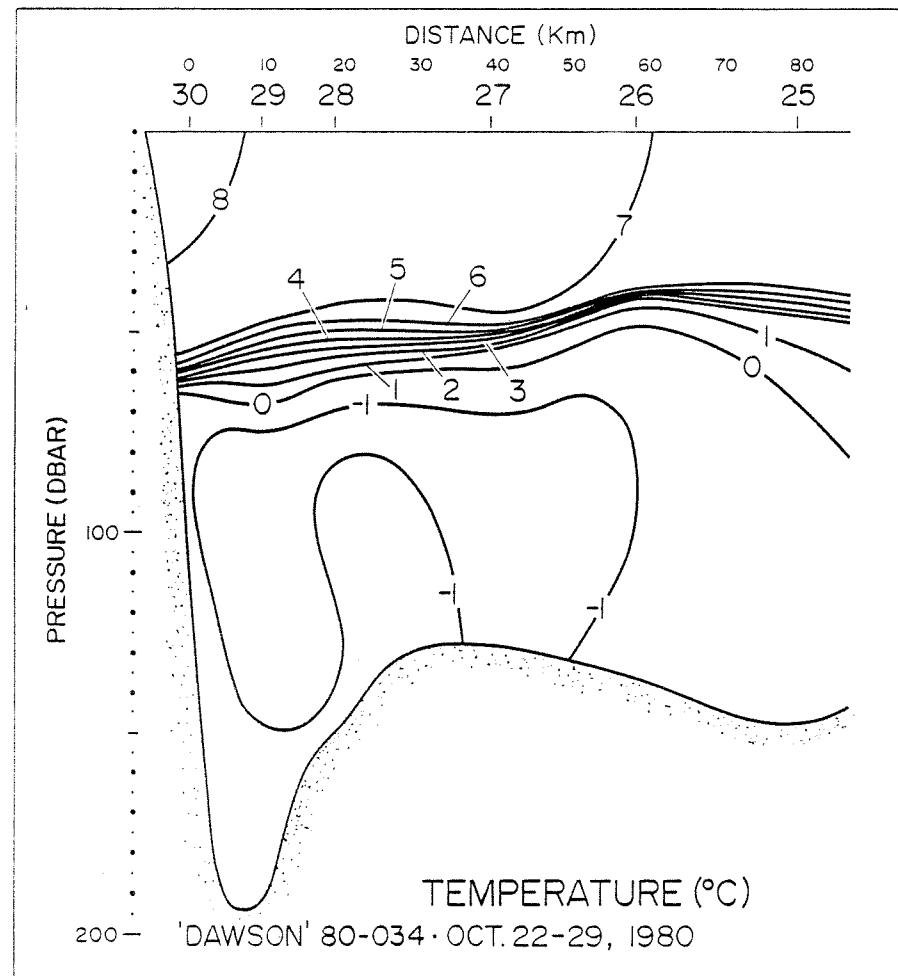
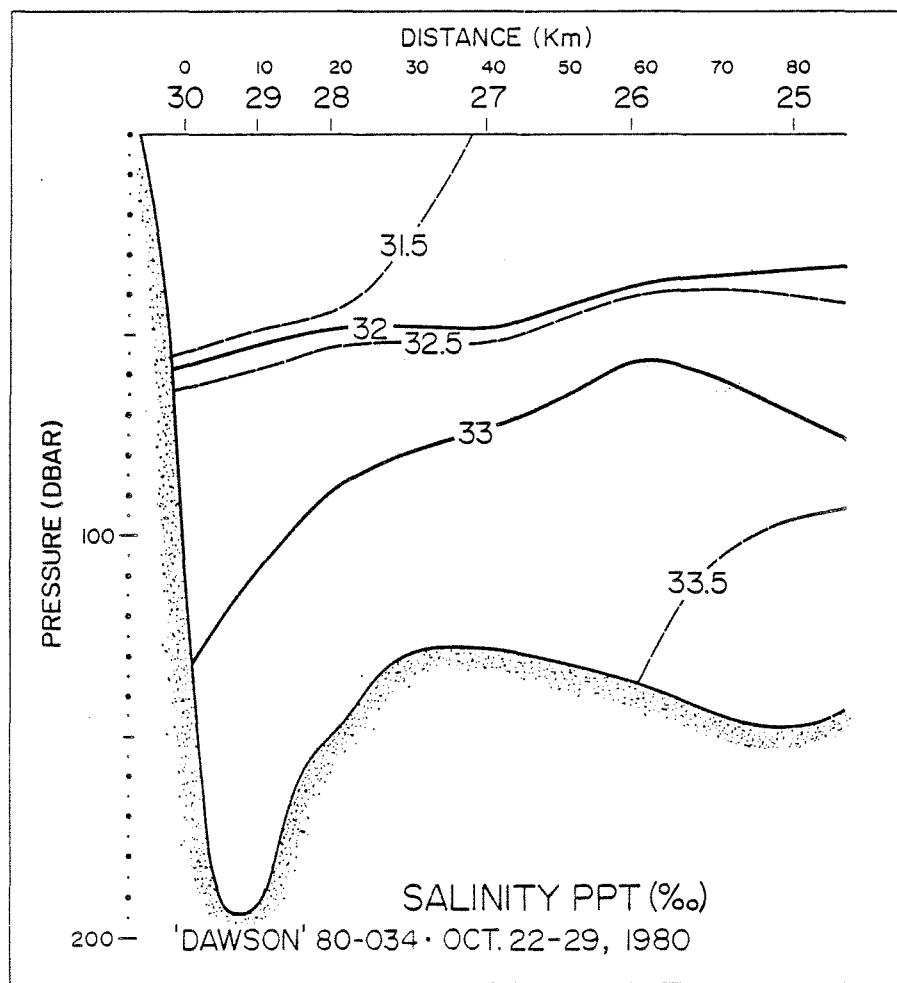
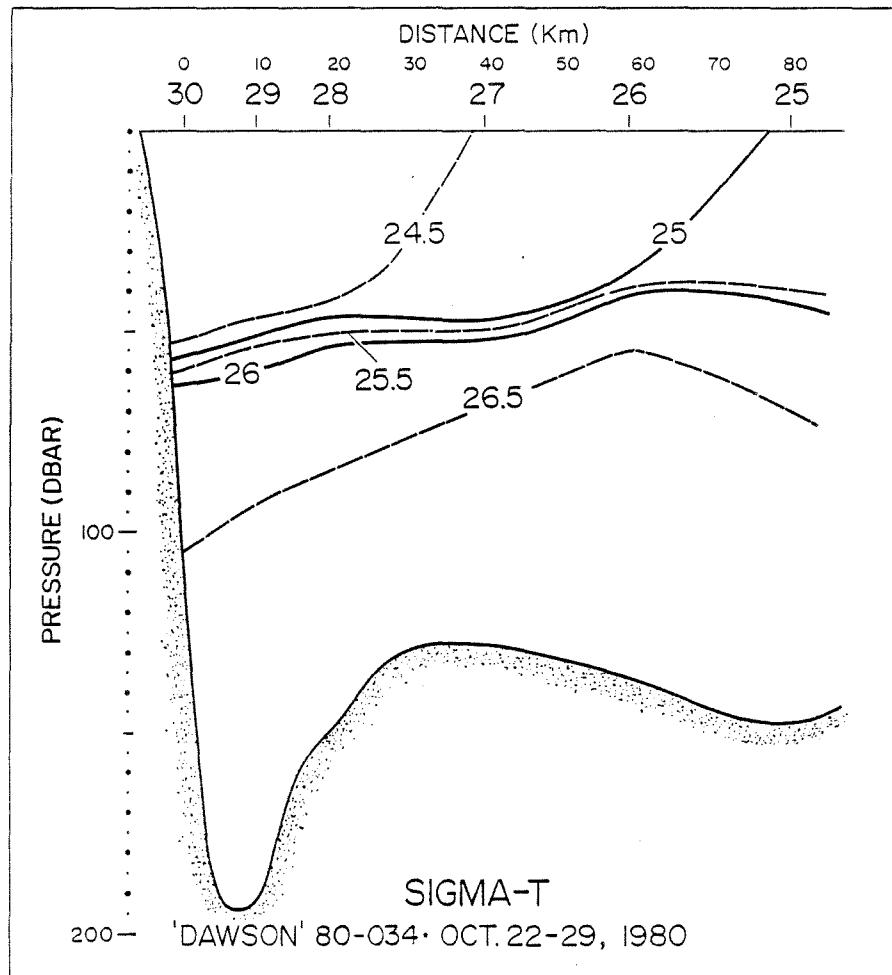


Figure 14 Position of stations 25-30







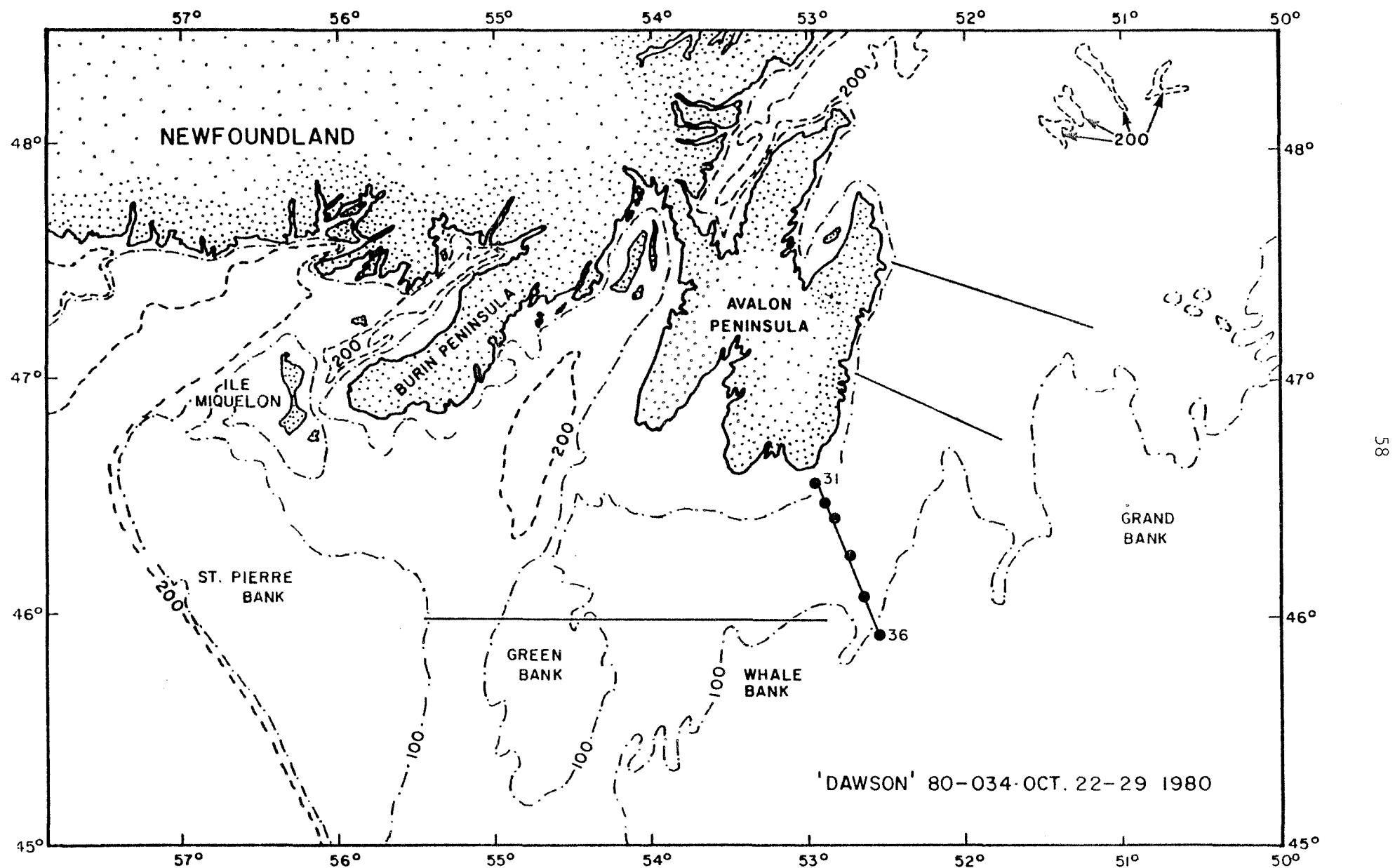
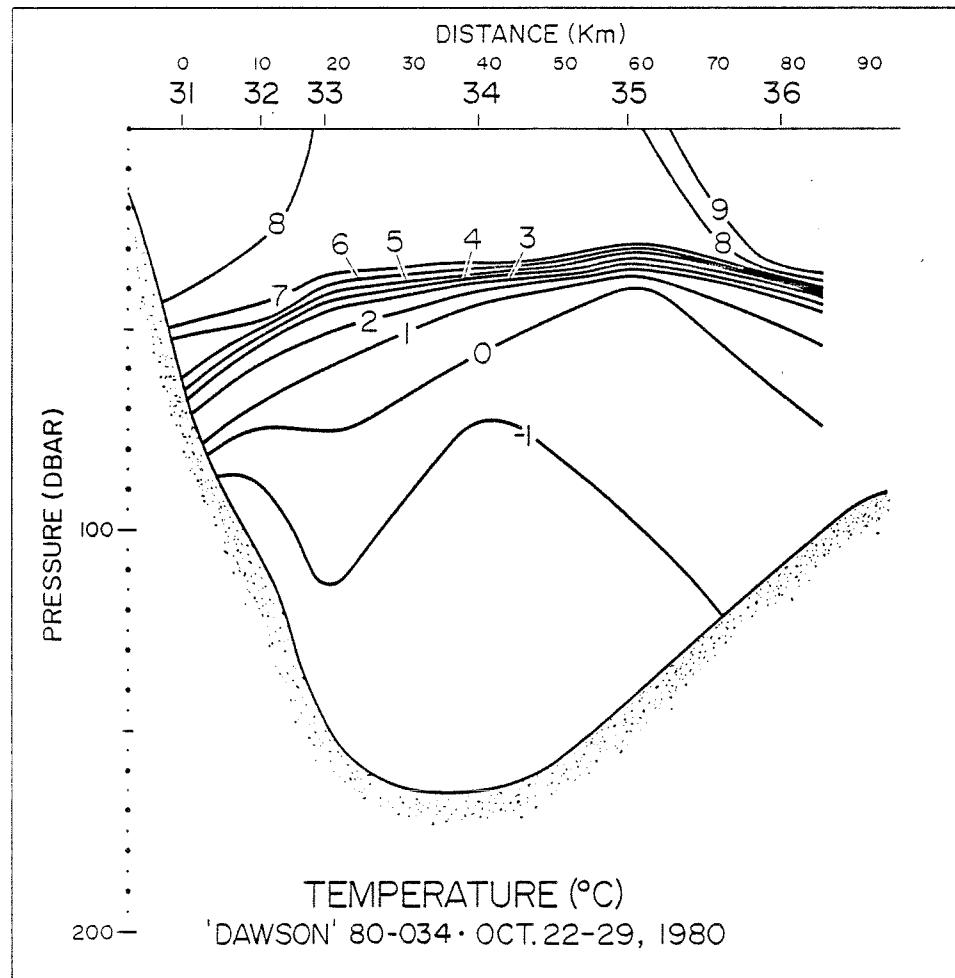
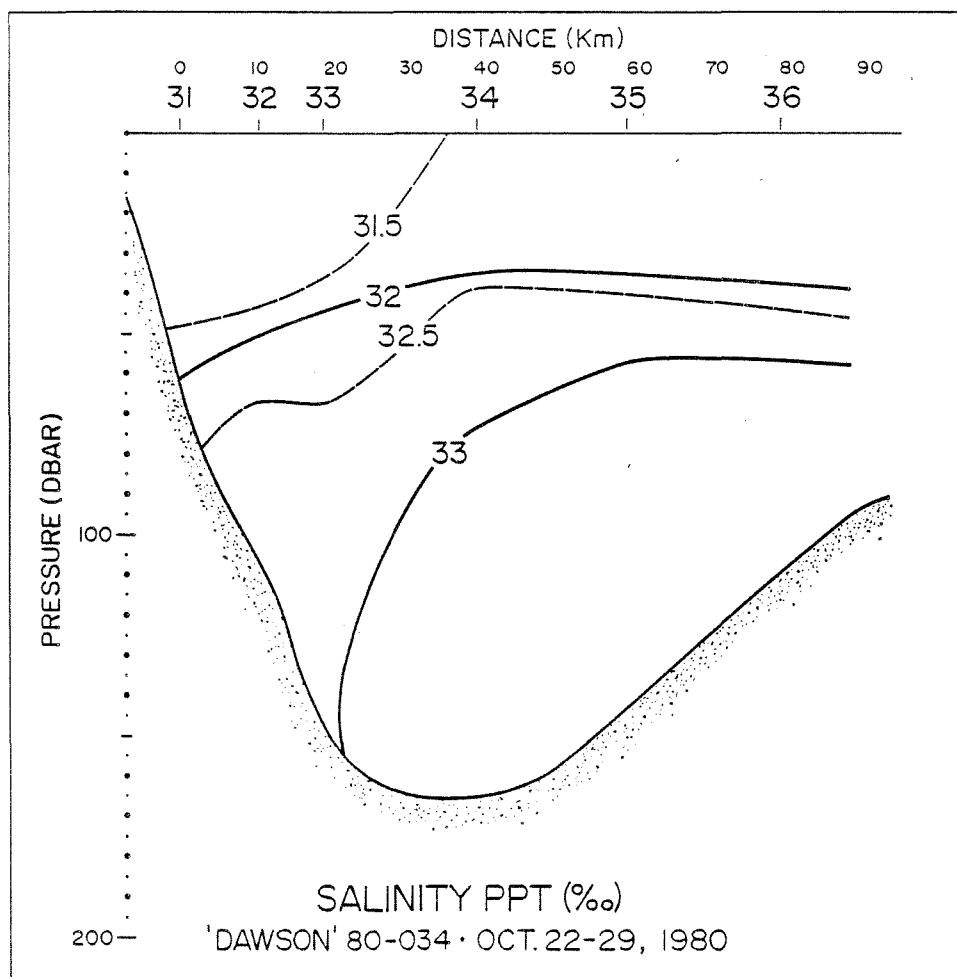
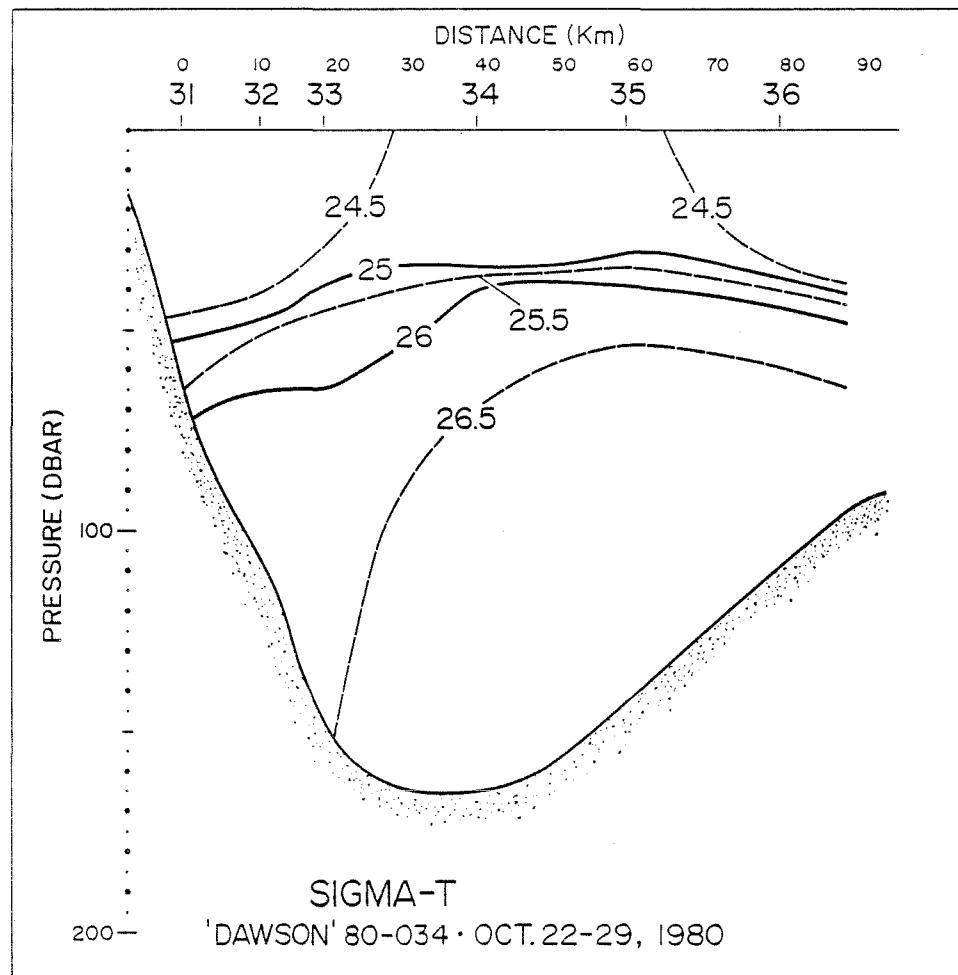


Figure 15 Position of stations 31-36







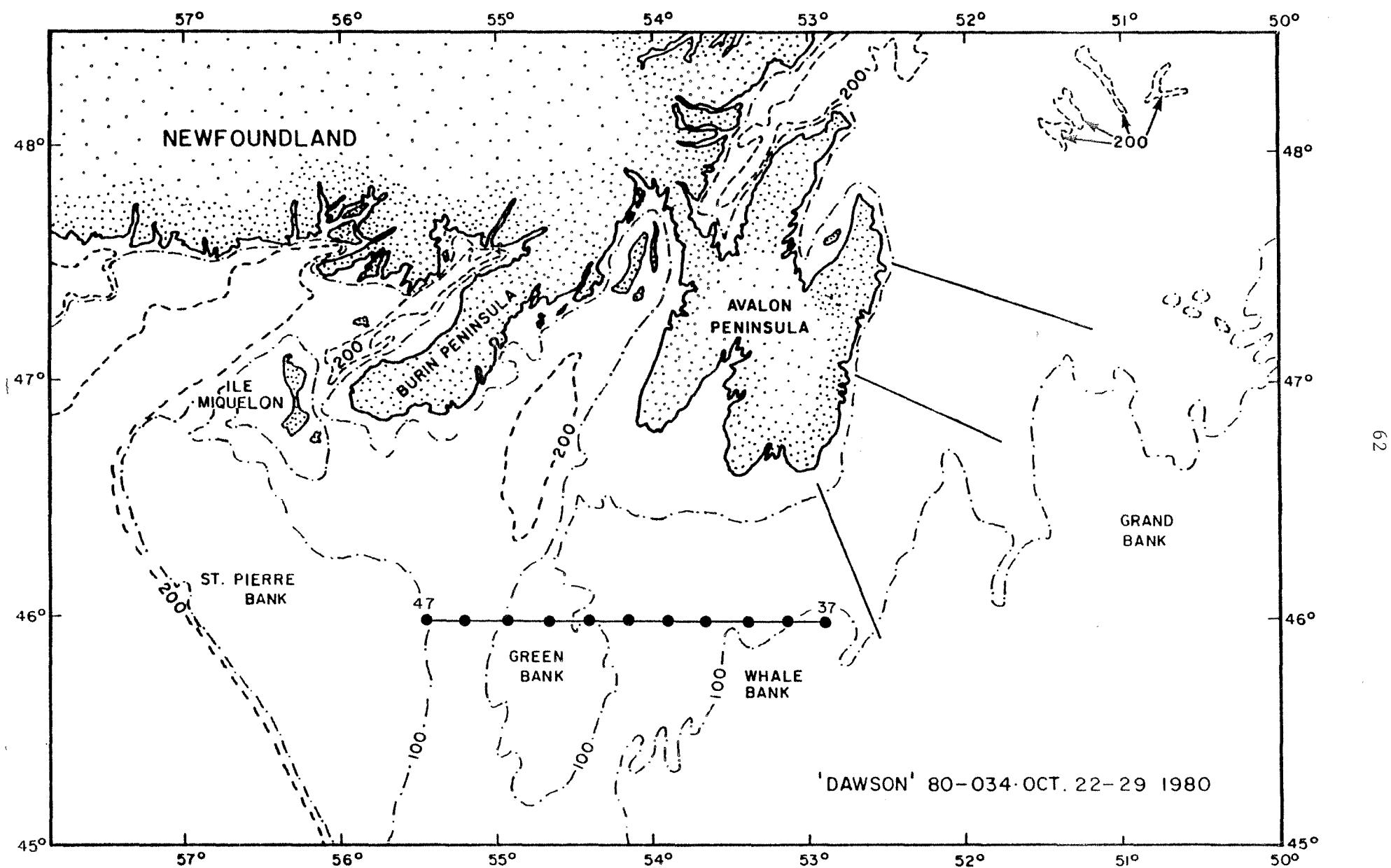


Figure 16 Position of stations 37-47

