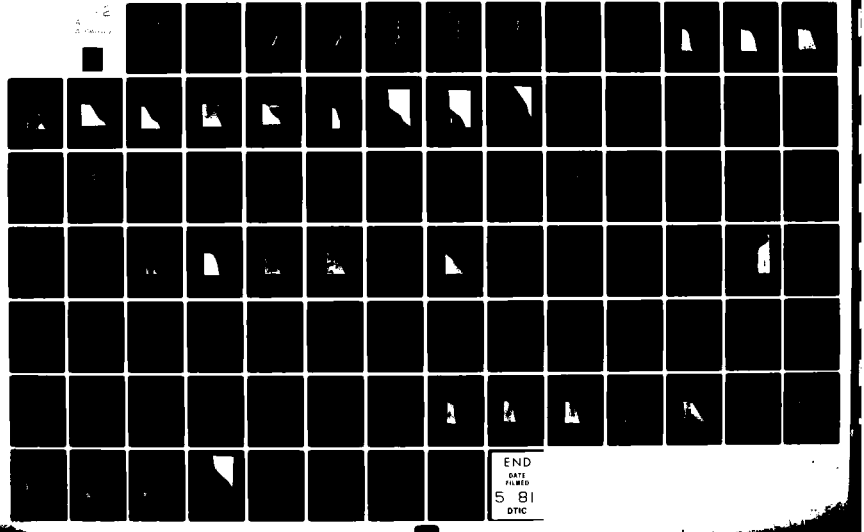
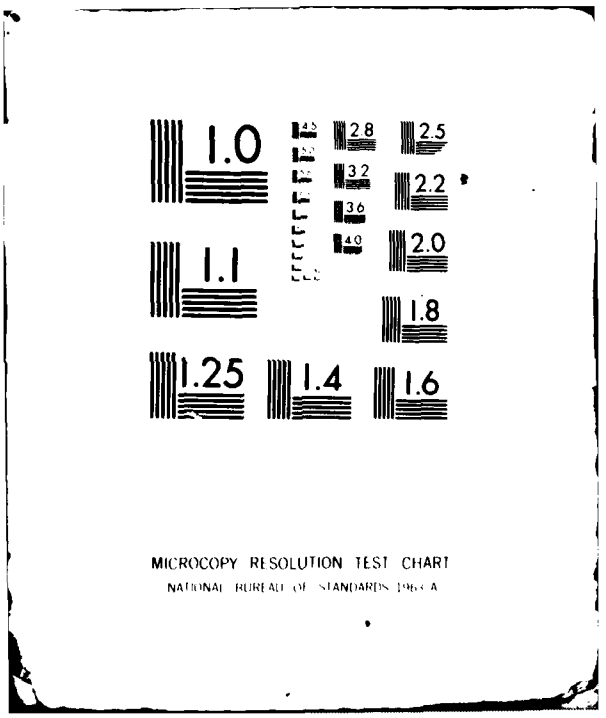
AD-A098 183 NORTH CAROLINA UNIV AT CHAPEL HILL F/G 8/10
THE GULF STREAM MEANDERS EXPERIMENT. AXBT/PRT DATA REPORT, R/A --ETC(U)
APR 81 J M BANE, D A BROOKS N00014-77-C-0354
UNCLASSIFIED CMS-81-1 NL



END
DATE FILMED
5 81
DTIC


1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

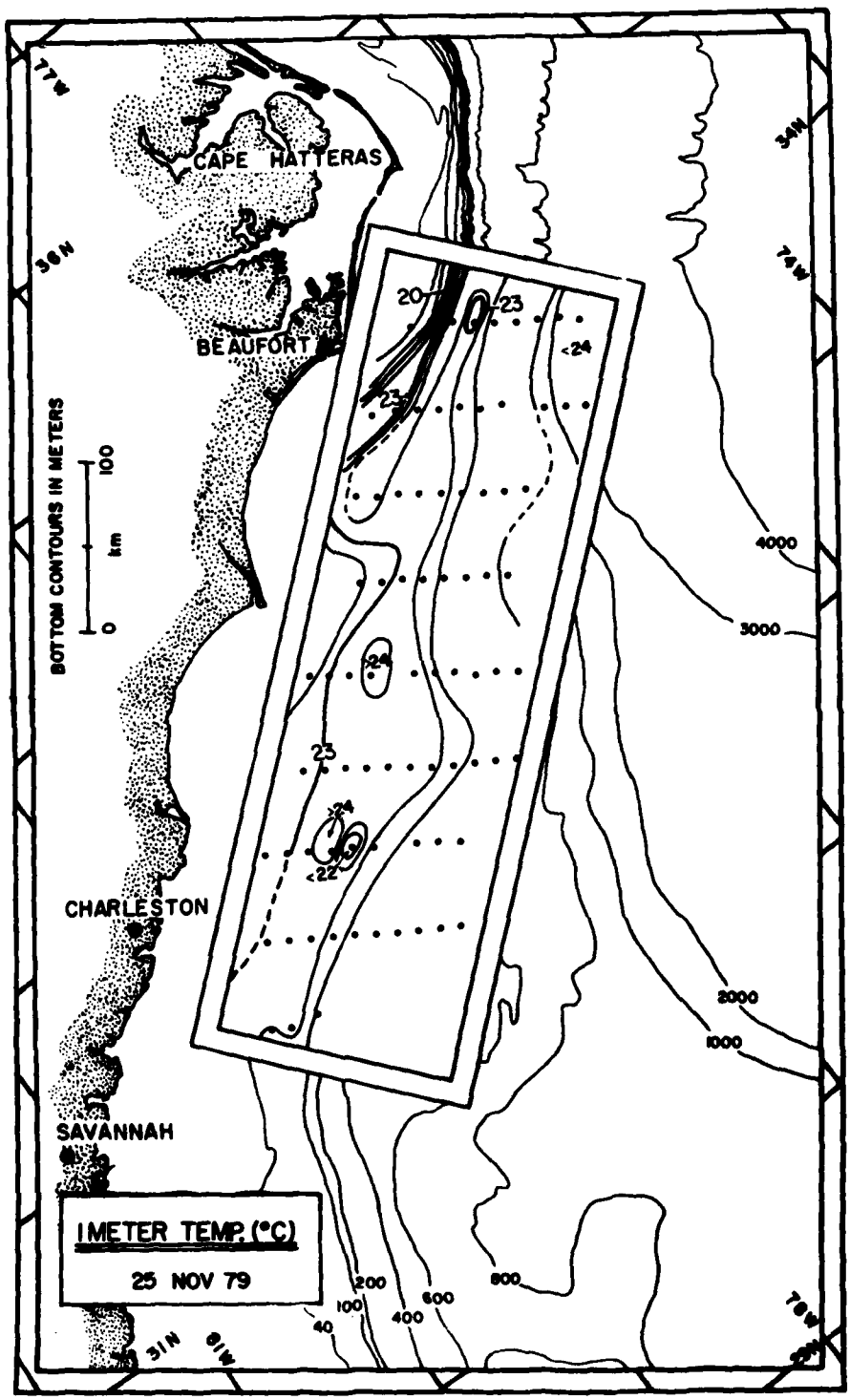


Figure 55. AXBT temperatures at 1 meter, 25 November 1979. Small solid circles indicate AXBT drop-sites.

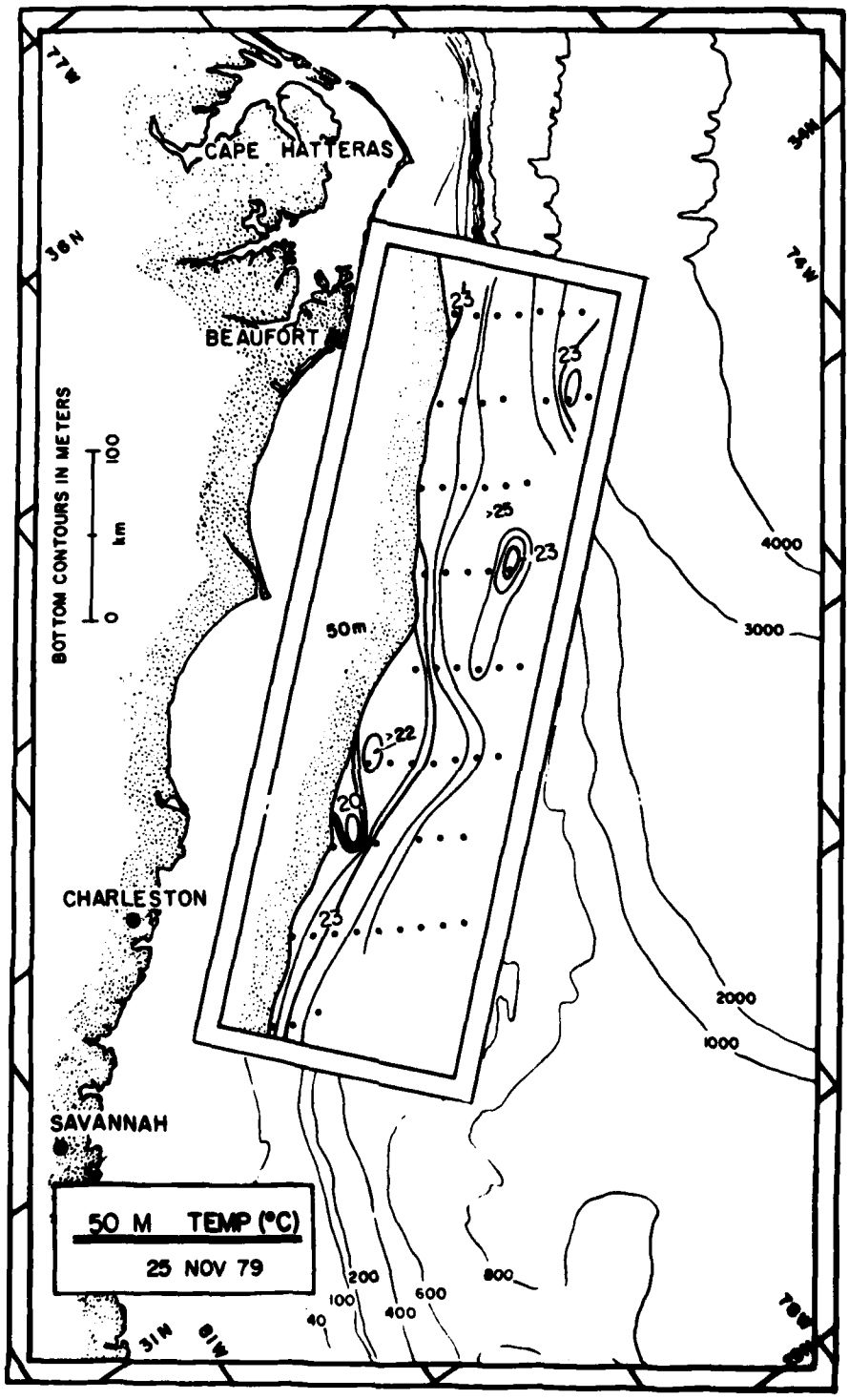


Figure 56. AXBT temperatures at 50 meters, 25 November 1979.

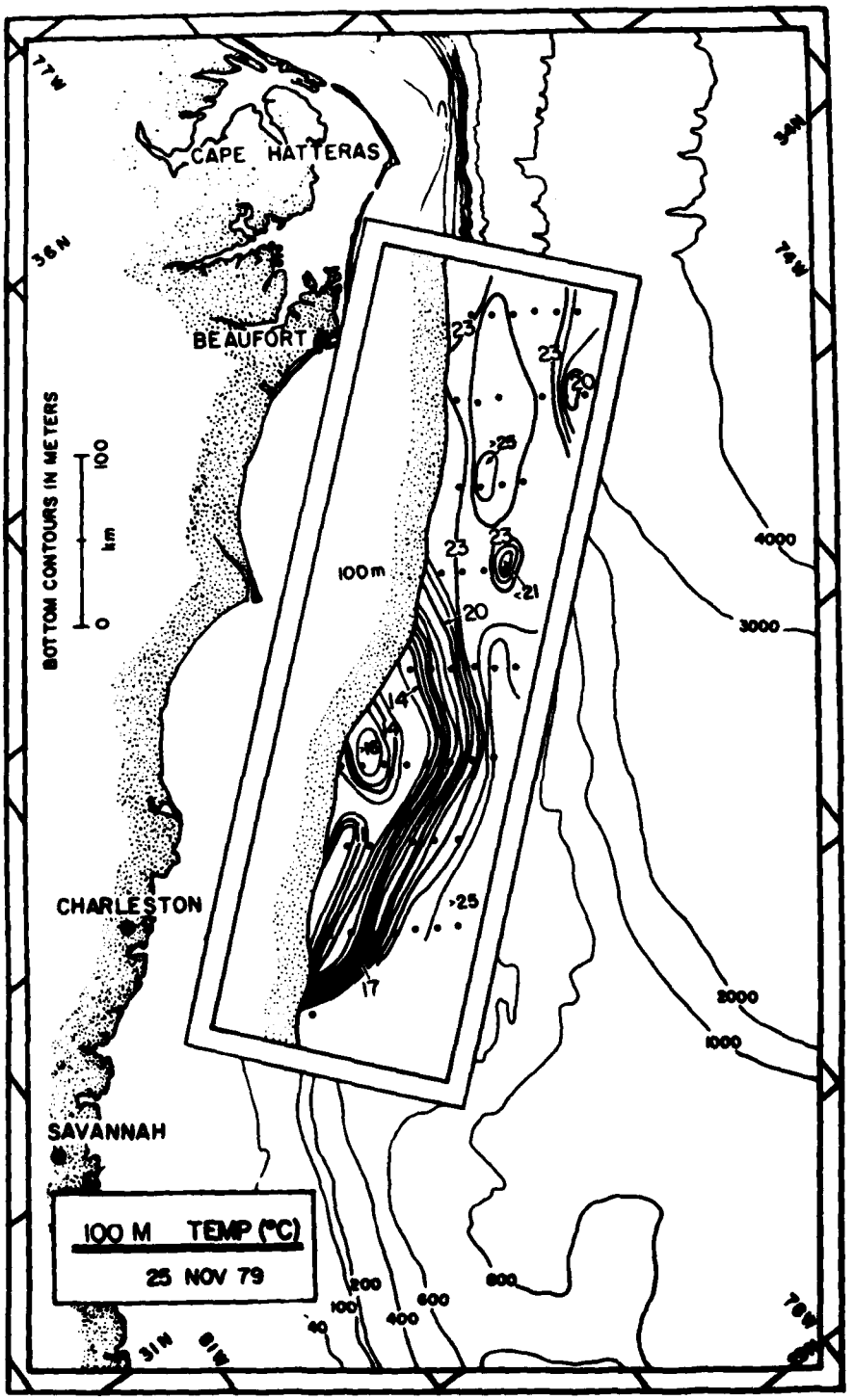


Figure 57. AXBT temperatures at 100 meters, 25 November 1979.

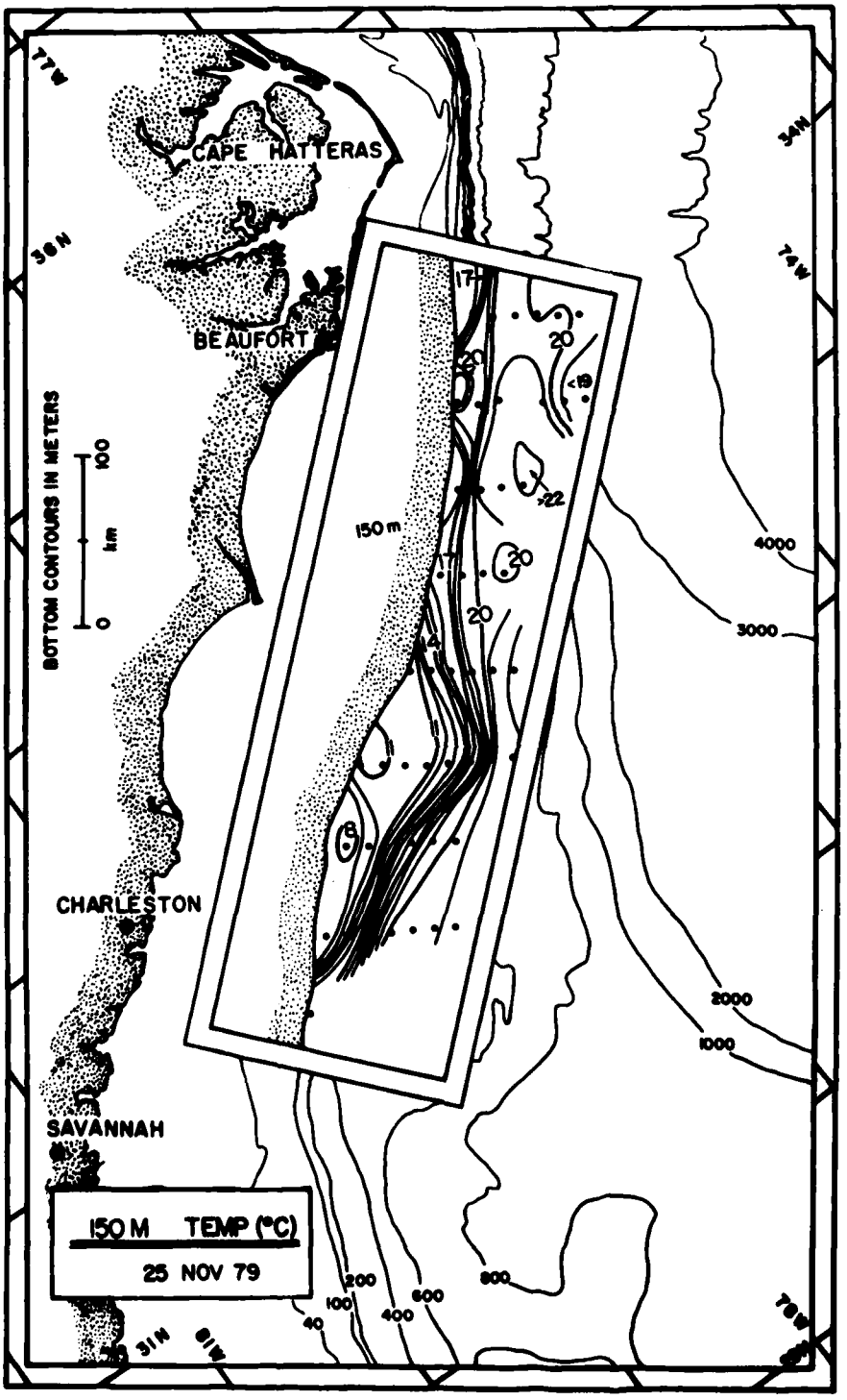


Figure 58. AXBT temperatures at 150 meters, 25 November 1979.

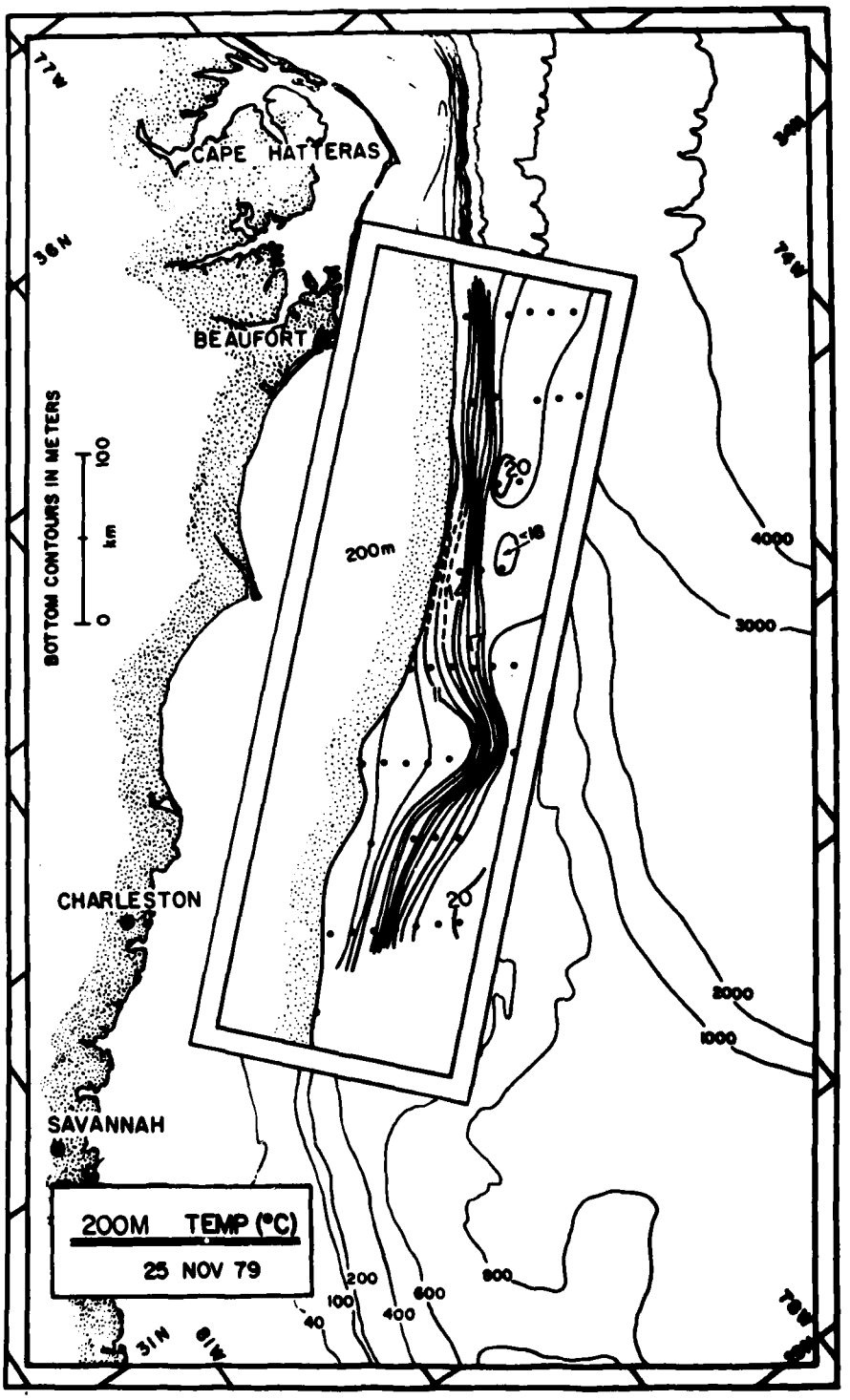


Figure 59. AXBT temperatures at 200 meters, 25 November 1979.

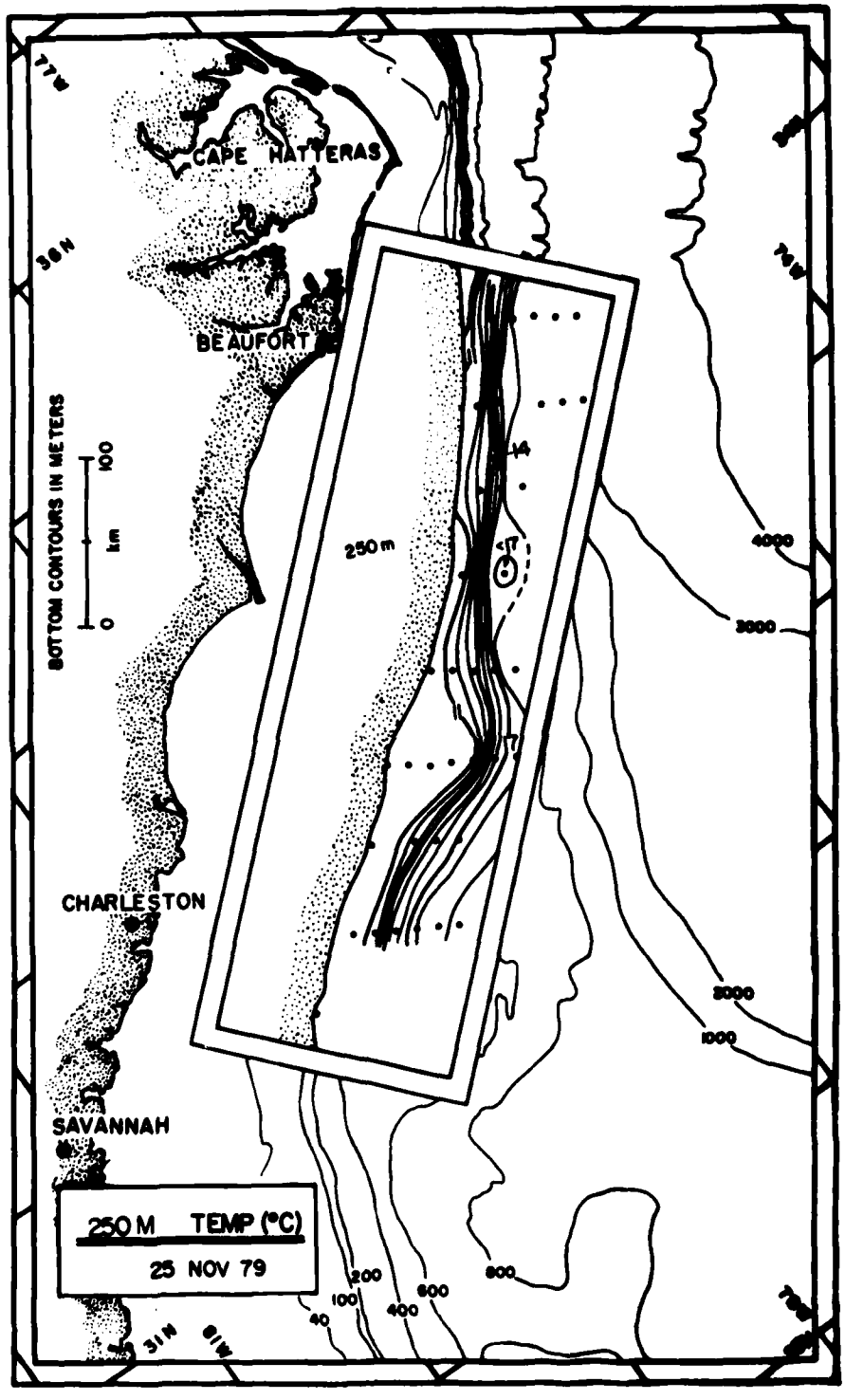


Figure 60. AXBT temperatures at 250 meters, 25 November 1979.

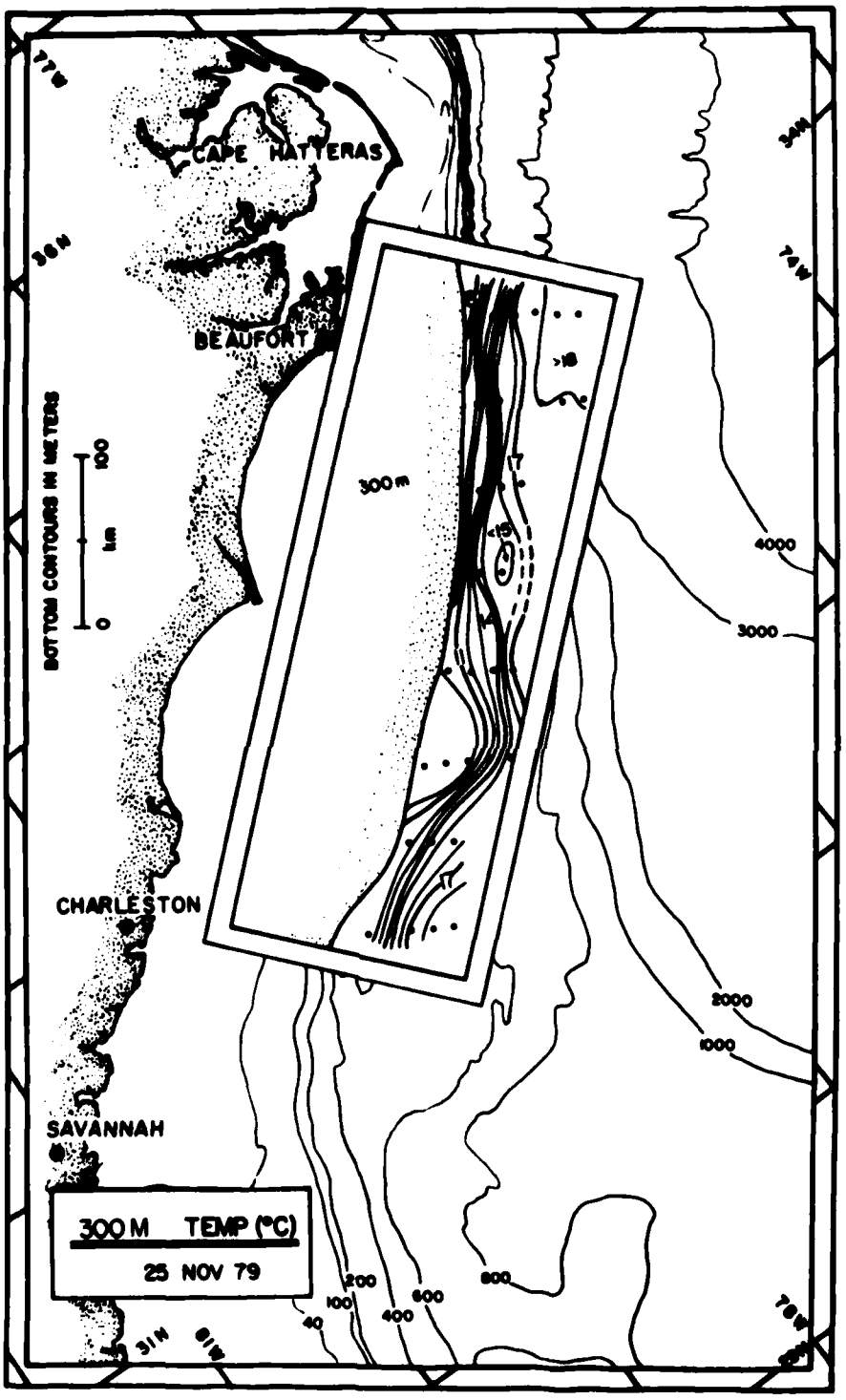


Figure 61. AXBT temperatures at 300 meters, 25 November 1979.

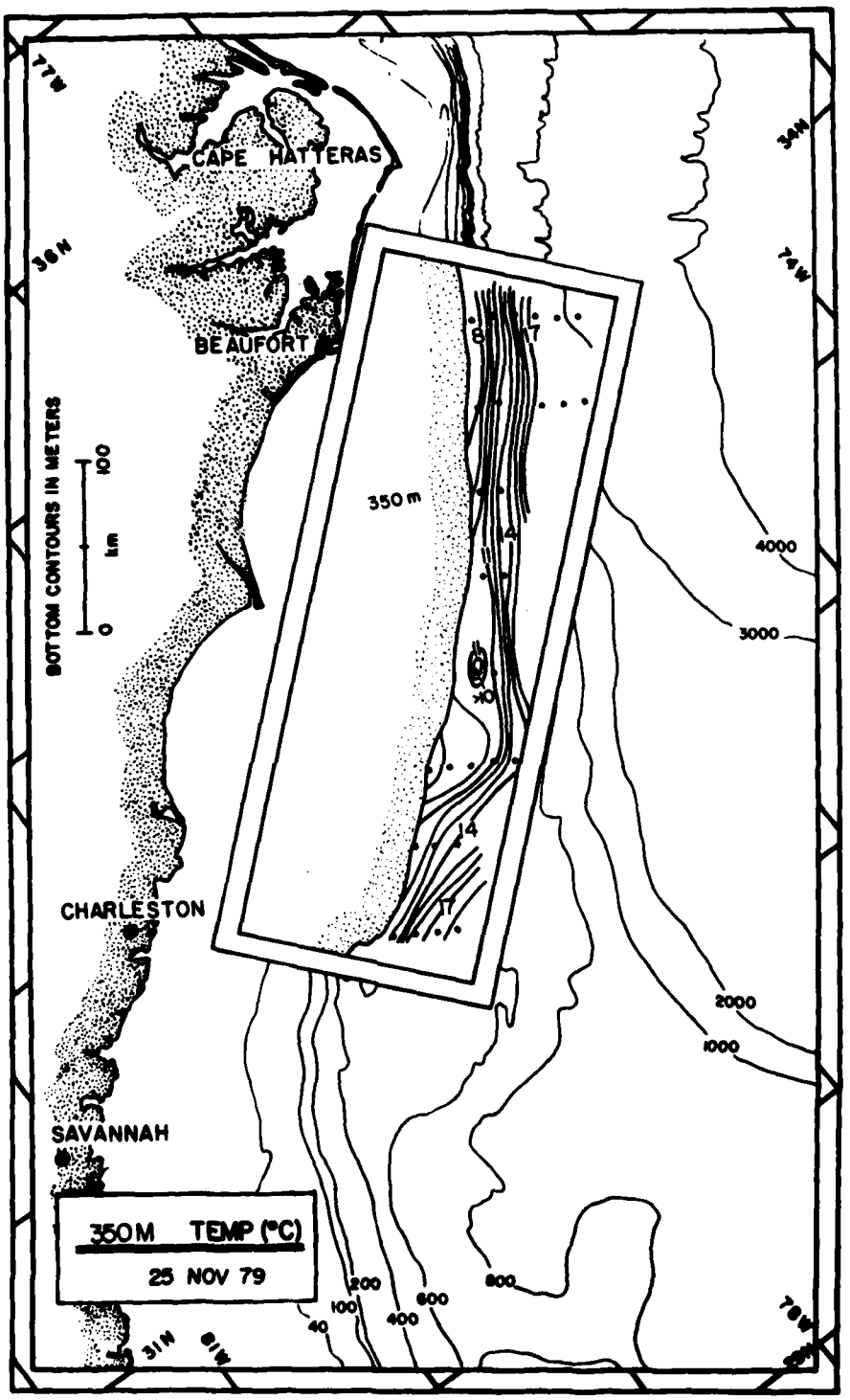


Figure 62. AXBT temperatures at 350 meters, 25 November 1979.

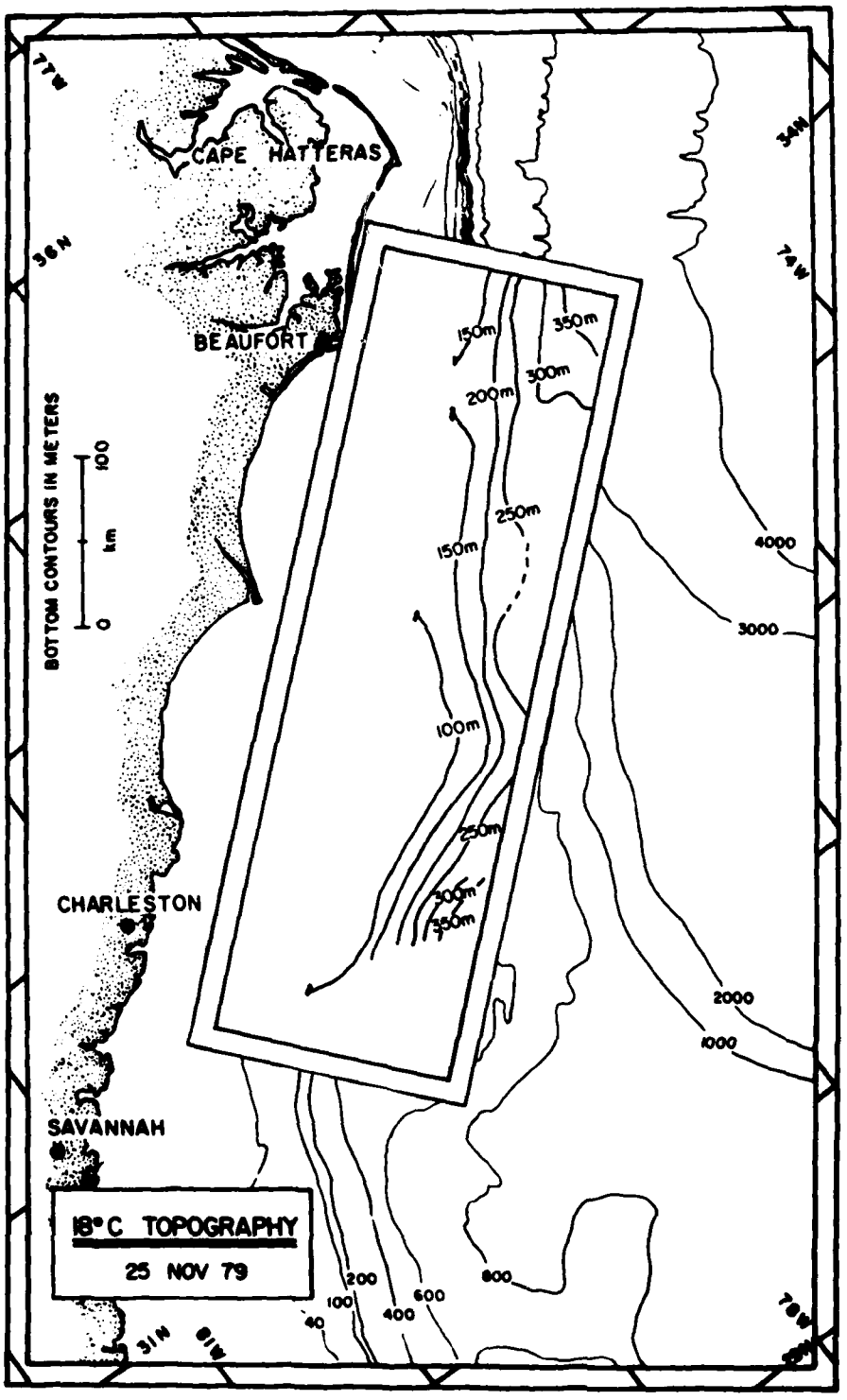


Figure 63. Topography of the 18°C isotherm, 25 November 1979.

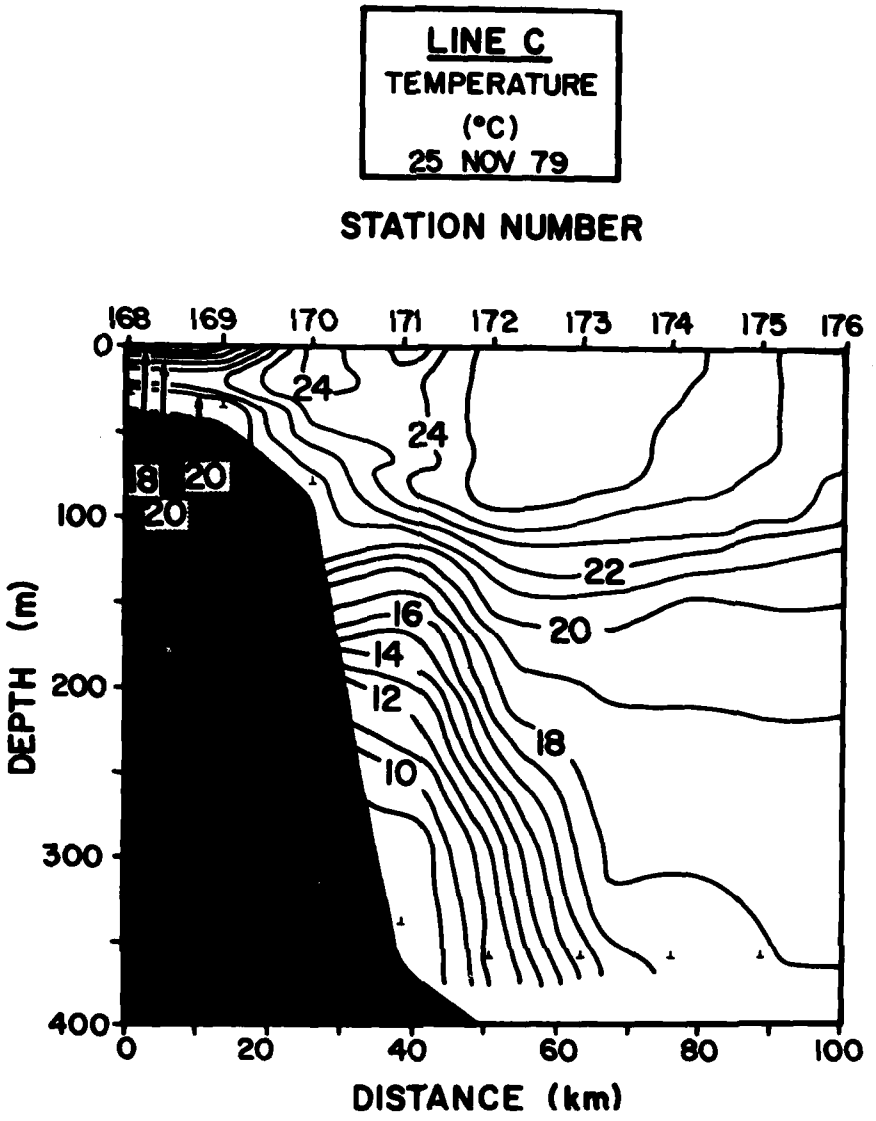


Figure 64. Cross-stream vertical temperature section along Line C, 25 November 1979.

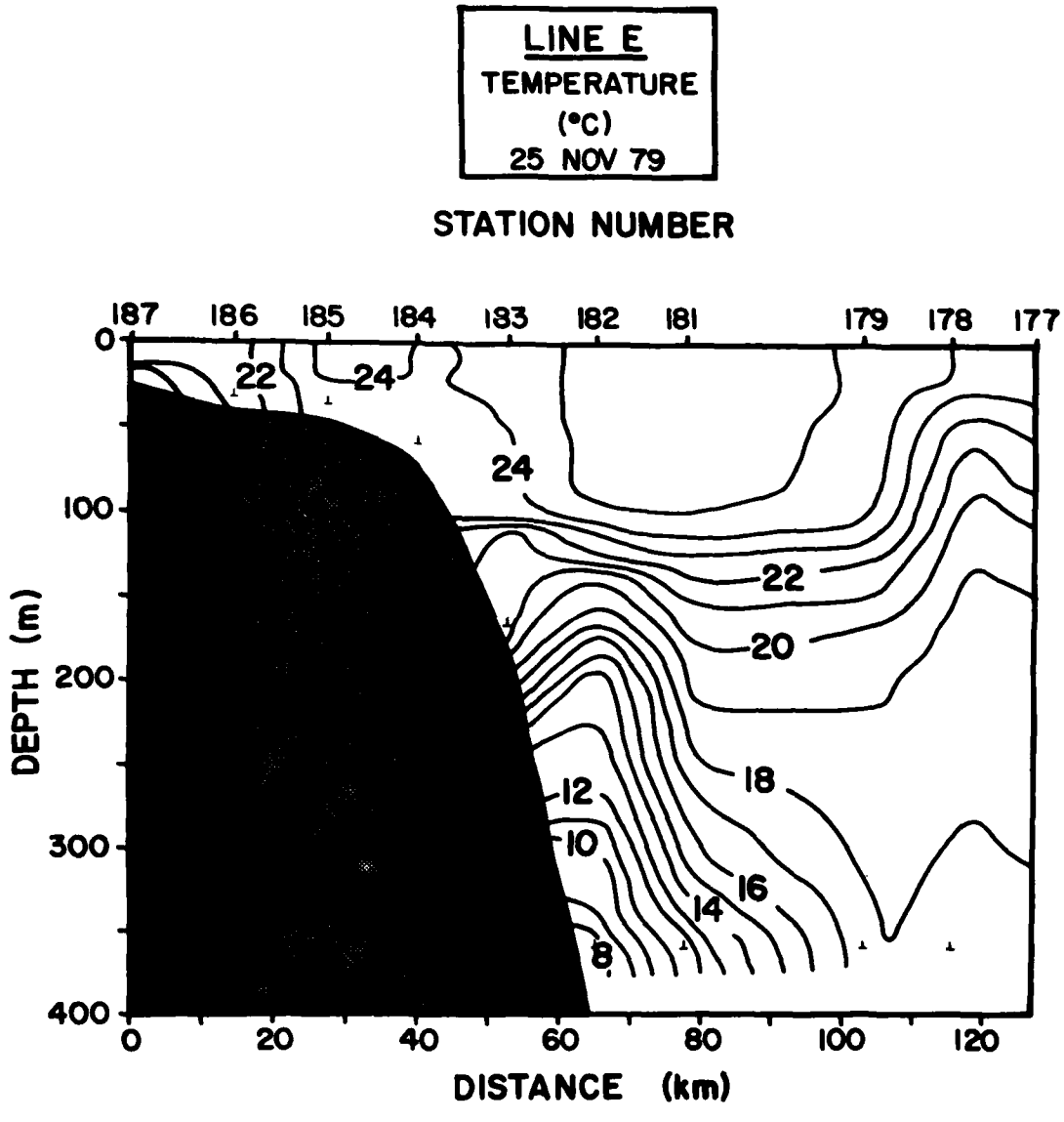


Figure 65. Cross-stream vertical temperature section along Line E, 25 November 1979.

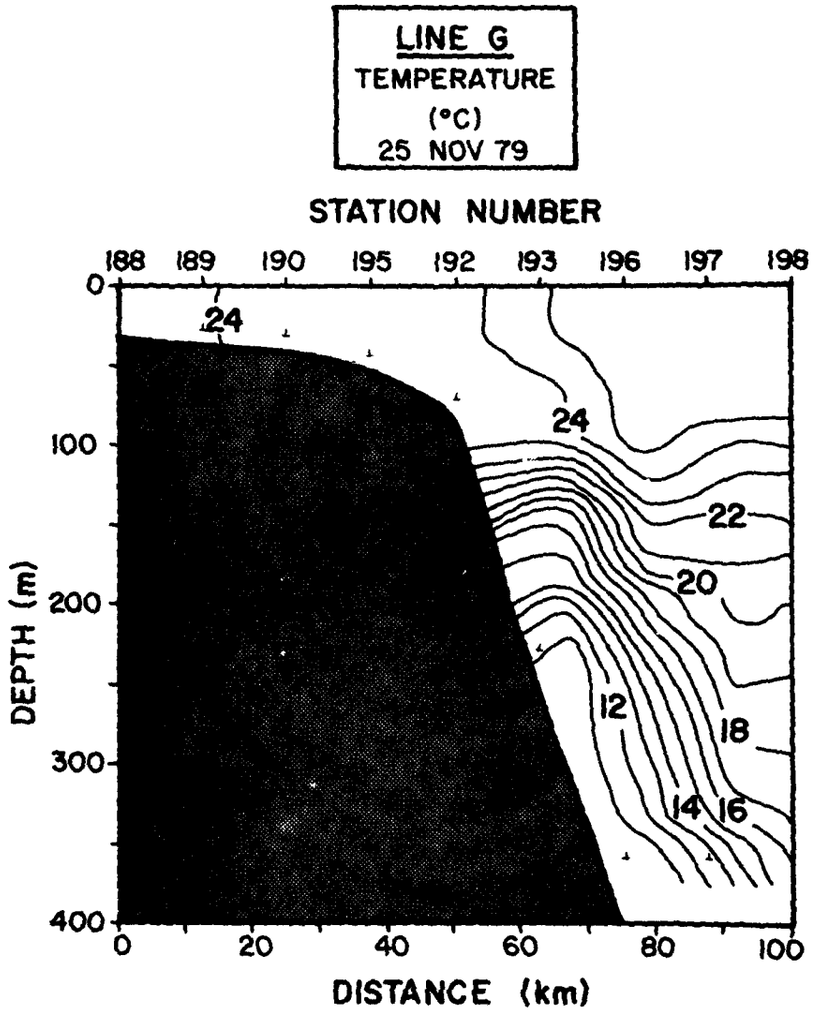


Figure 66. Cross-stream vertical temperature section along Line G, 25 November 1979.

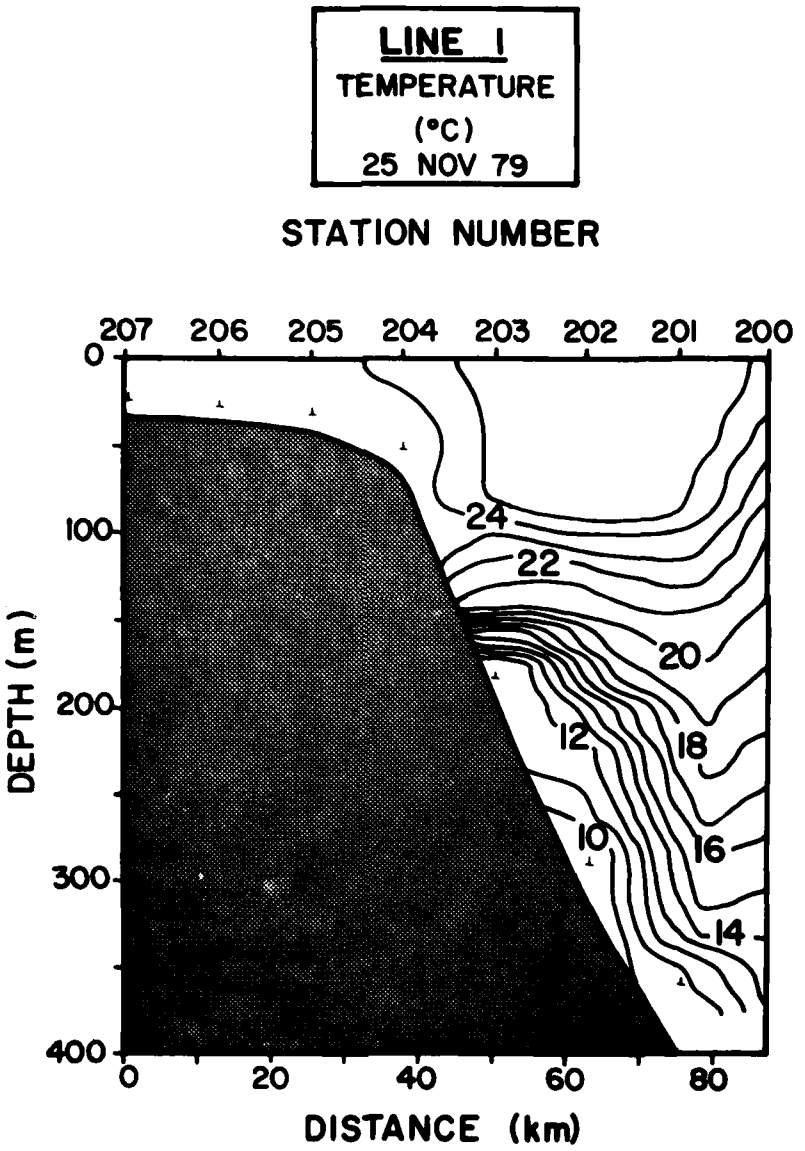


Figure 67. Cross-stream vertical temperature section along Line I, 25 November 1979.

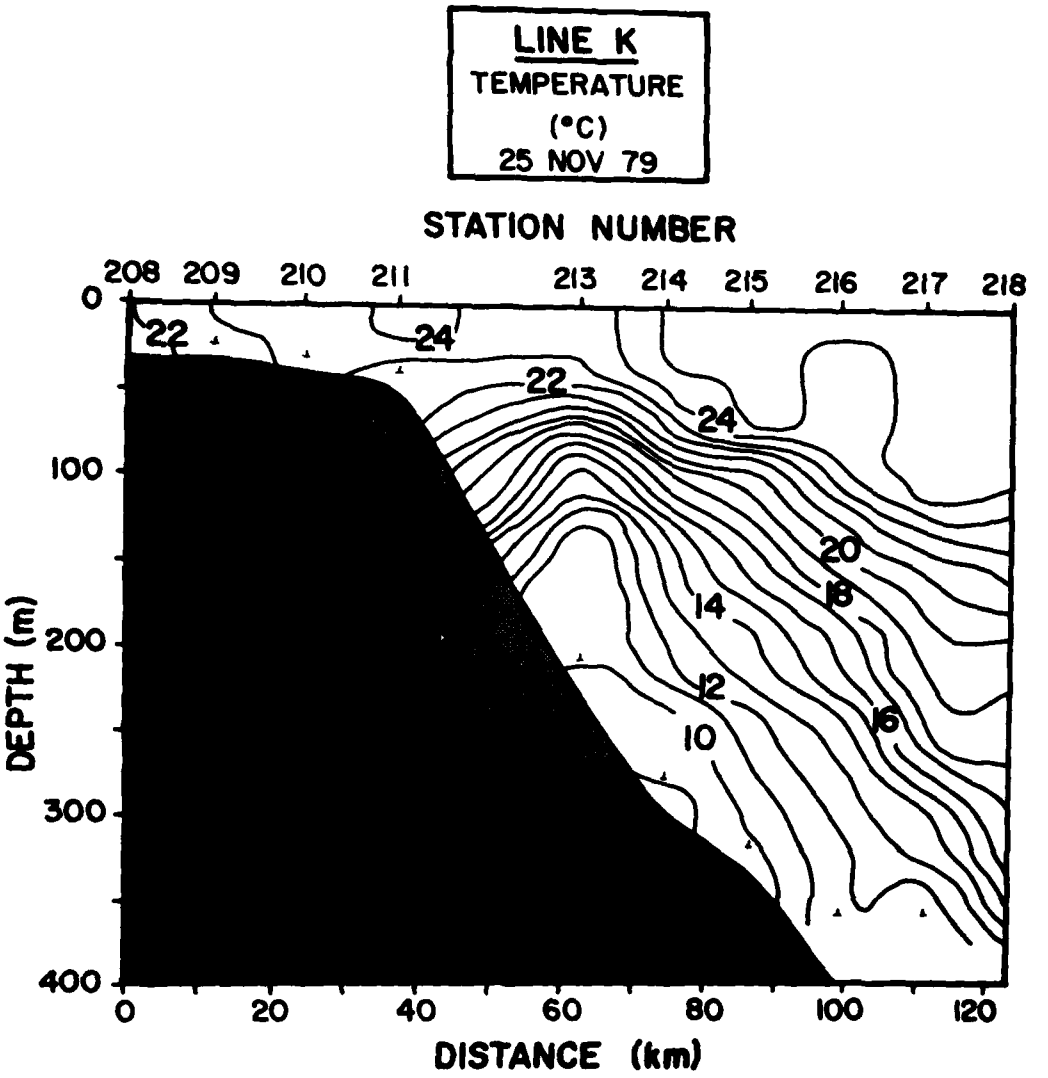


Figure 68. Cross-stream vertical temperature section along Line K, 25 November 1979.

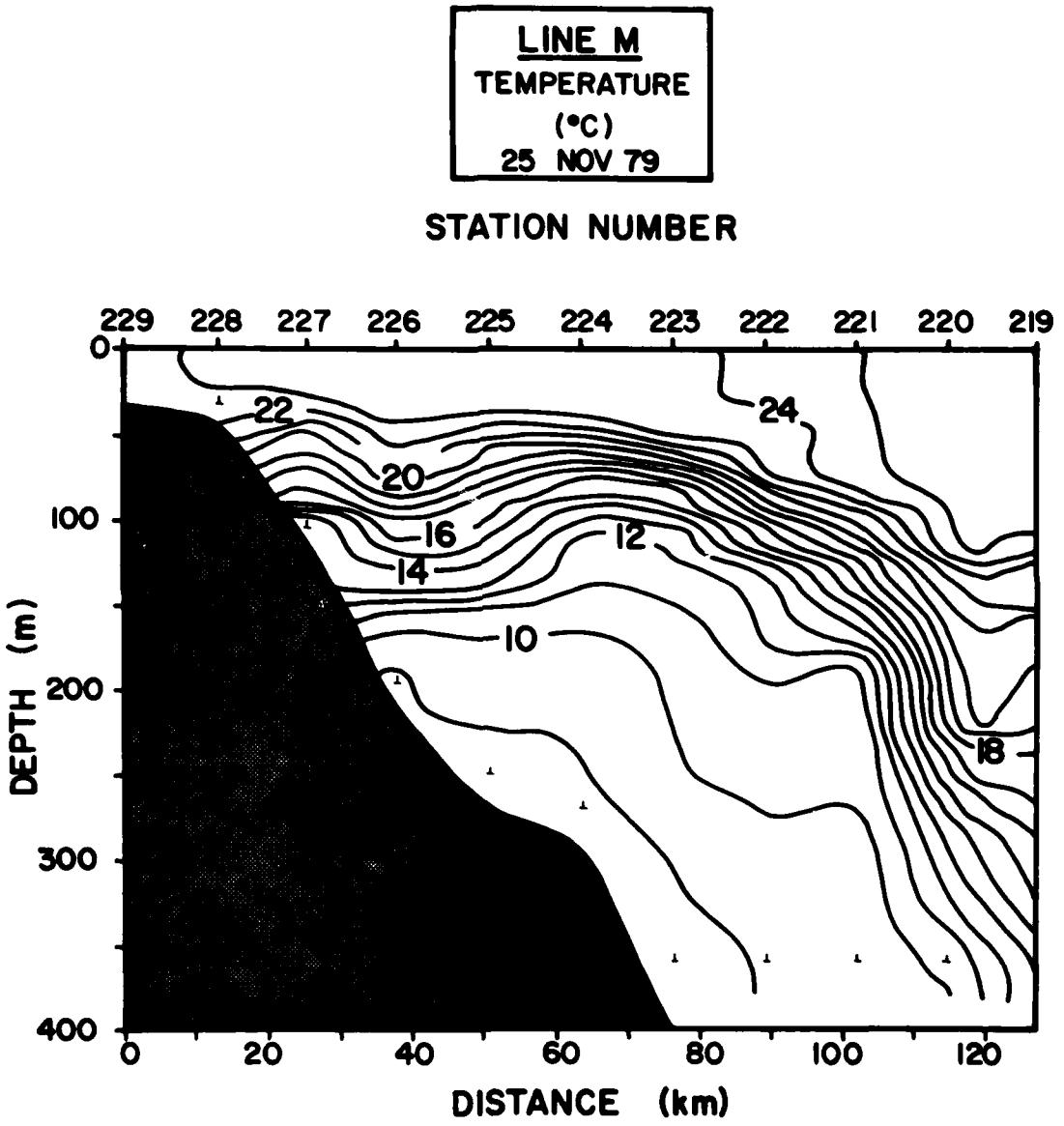


Figure 69. Cross-stream vertical temperature section along Line M, 25 November 1979.

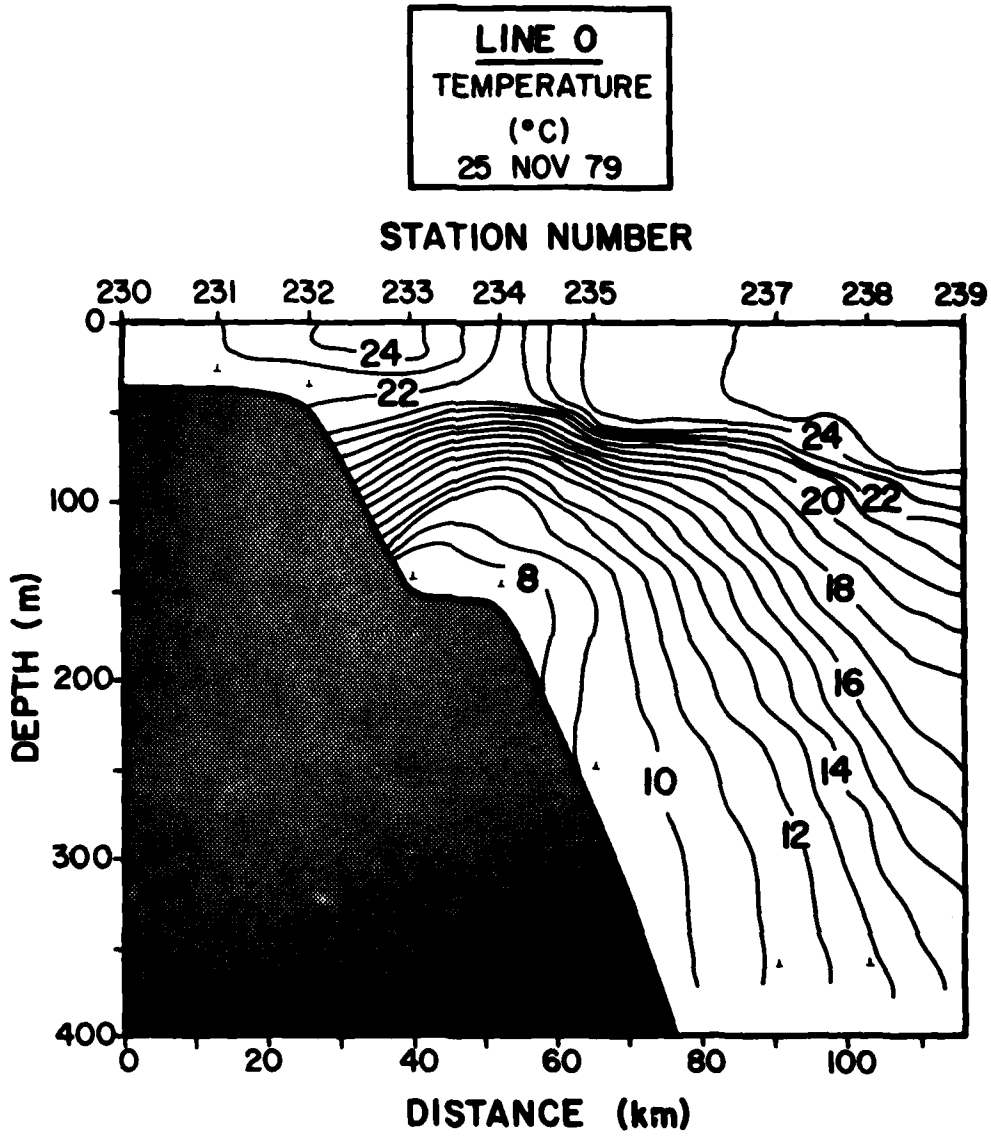


Figure 70. Cross-stream vertical temperature section along Line O, 25 November 1979.

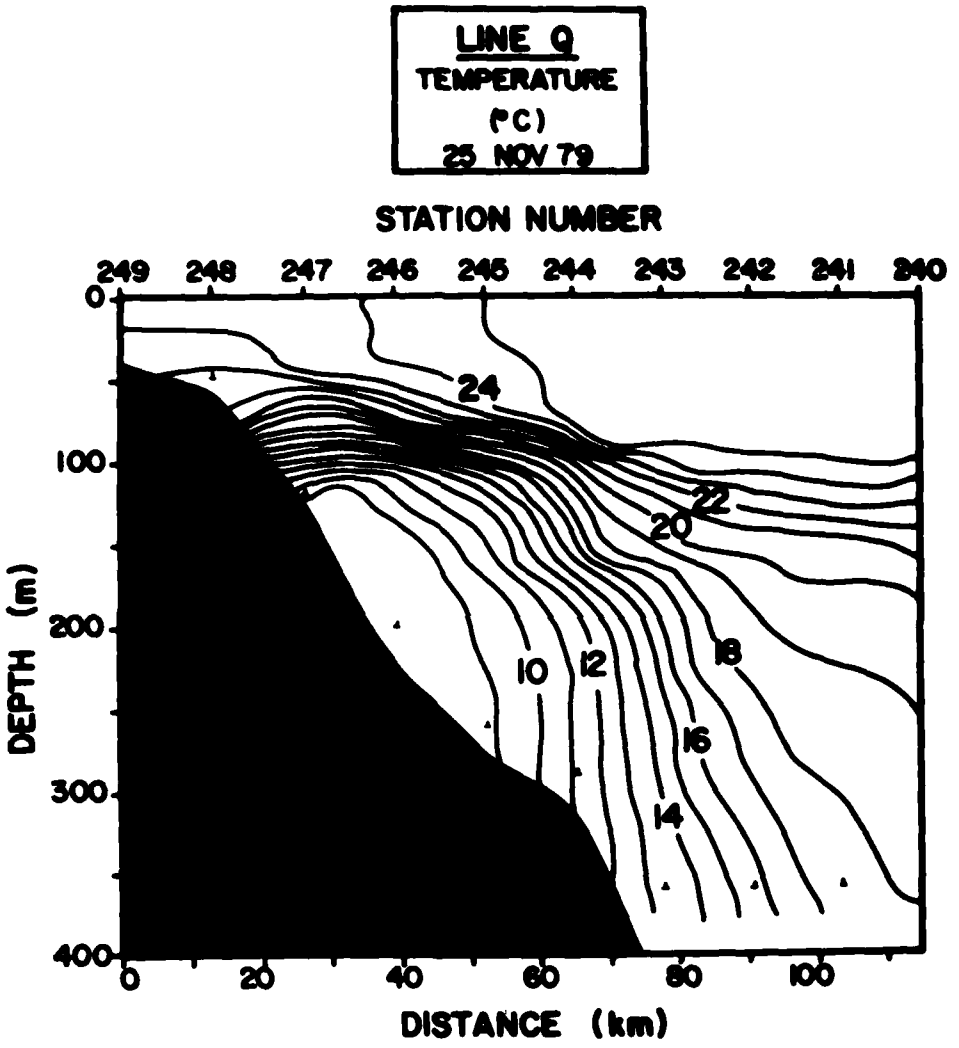


Figure 71. Cross-stream vertical temperature section along Line Q, 25 November 1979.

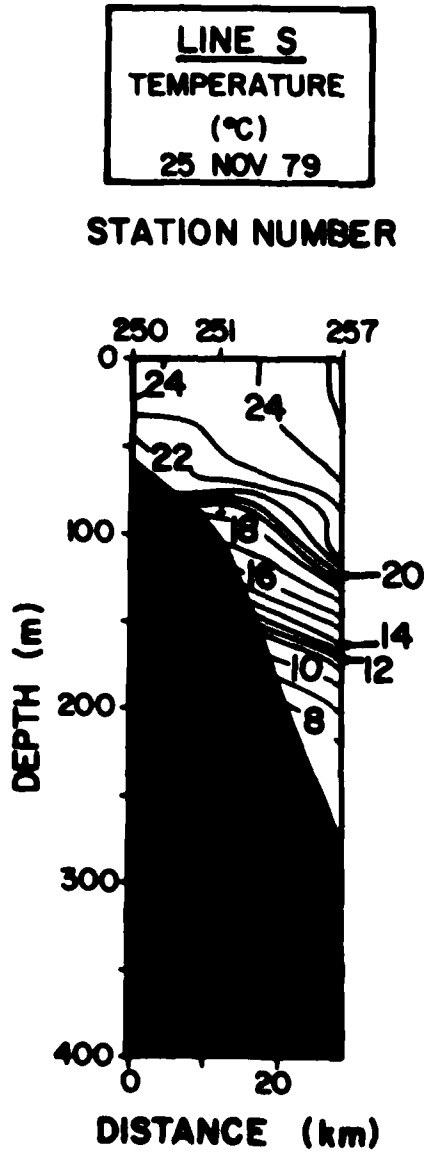


Figure 72. Cross-stream vertical temperature section along Line S, 25 November 1979.

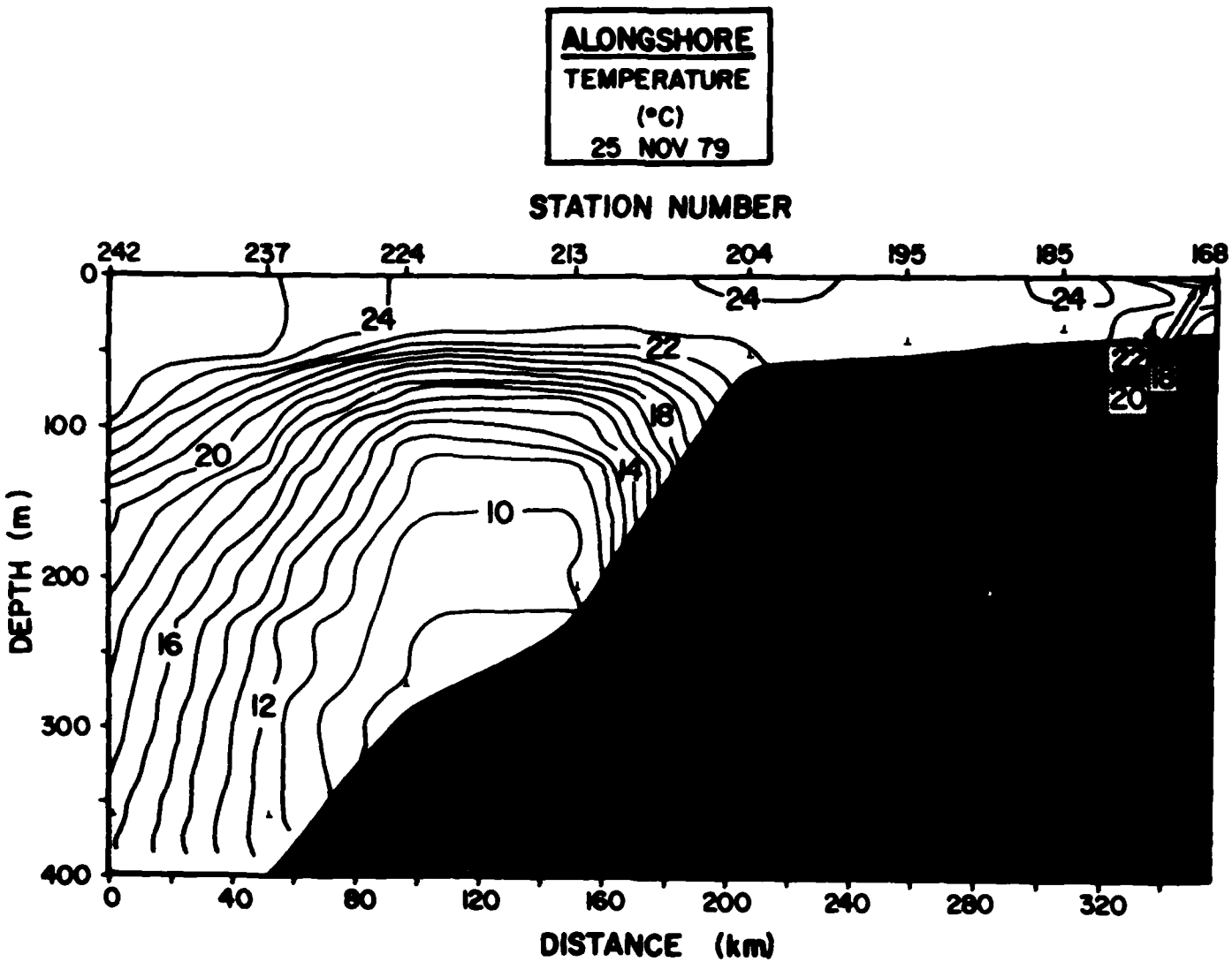


Figure 73. Alongshore vertical temperature section, 25 November 1979.

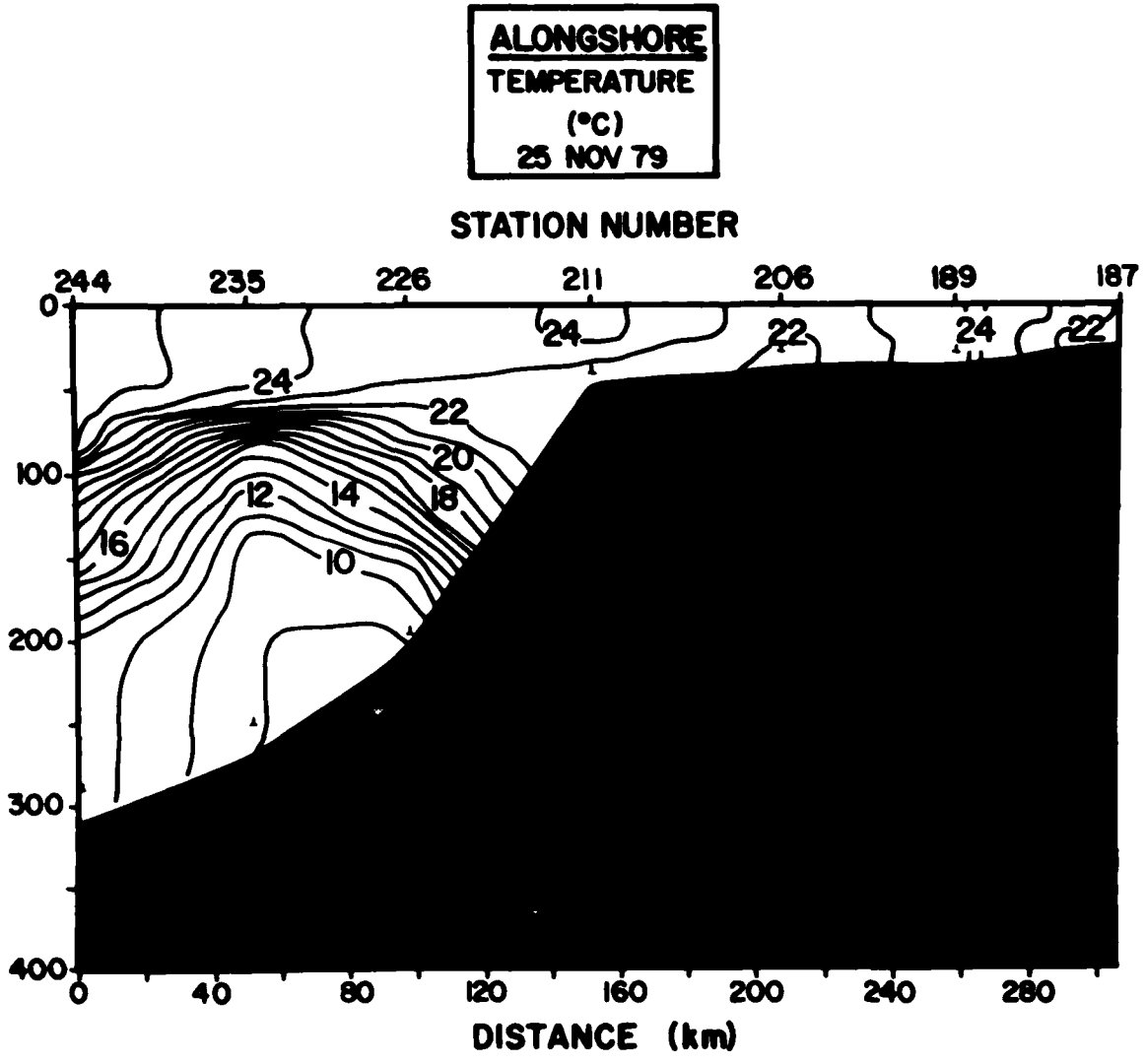


Figure 74. Alongshore vertical temperature section, 25 November 1979.

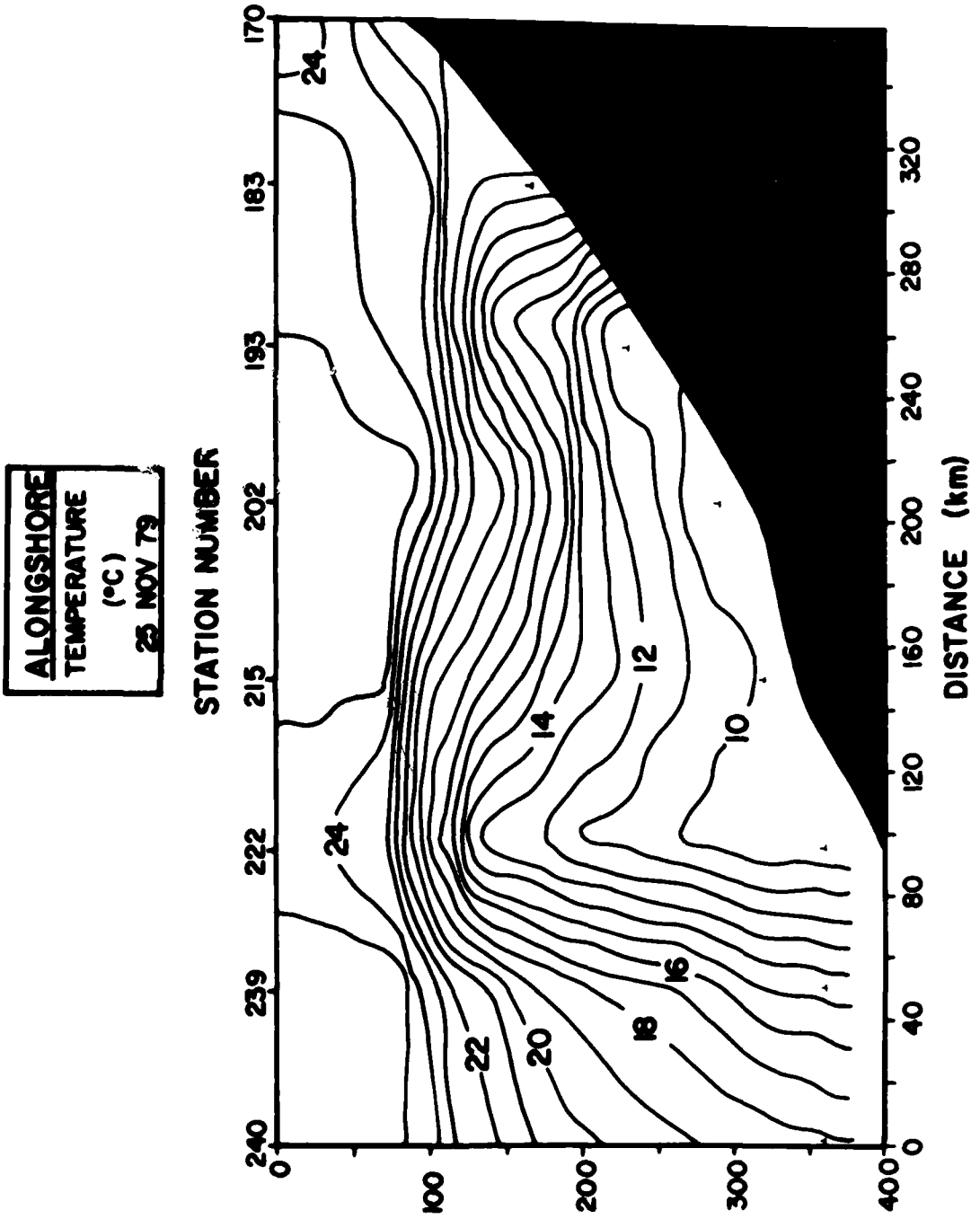


Figure 75. Alongshore vertical temperature section, 25 November 1979.

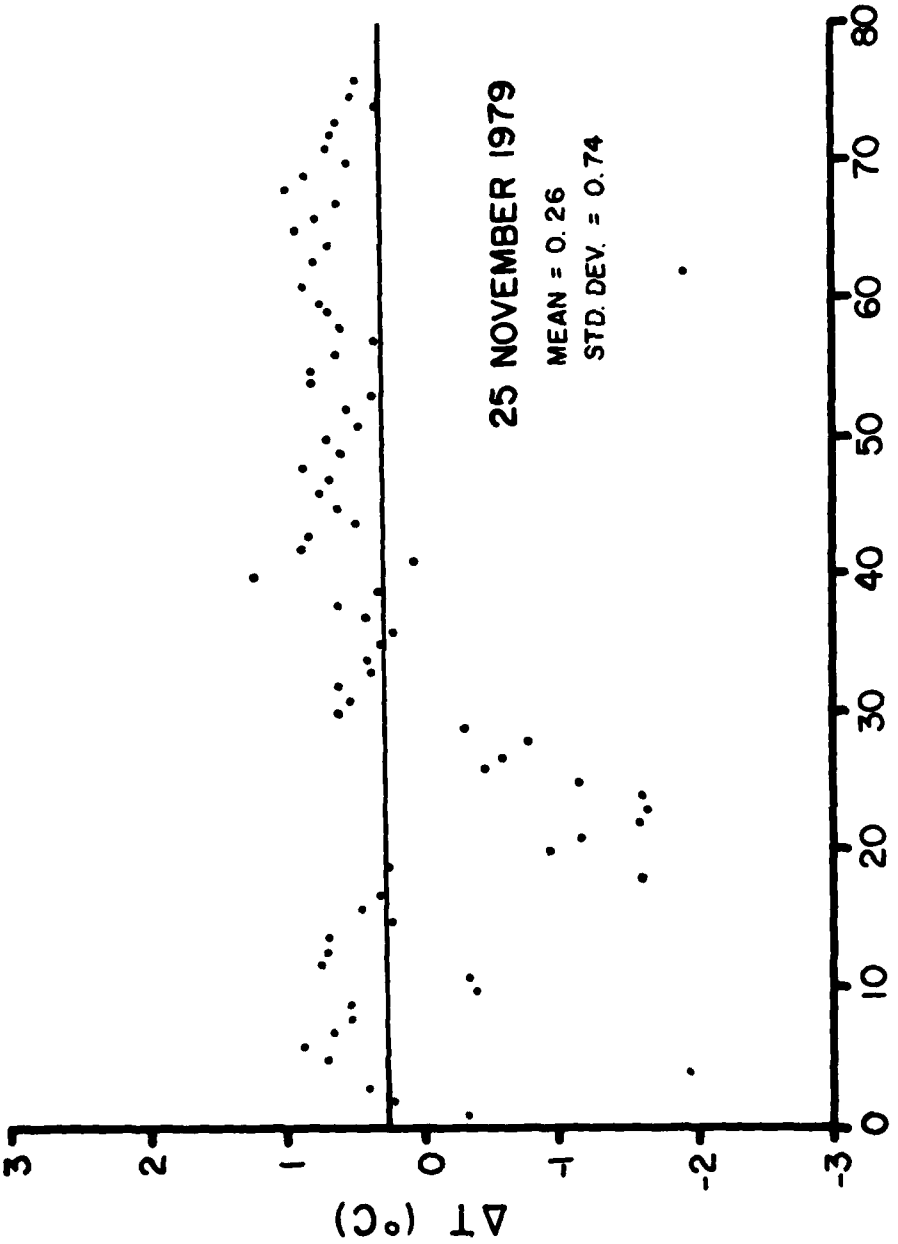


Figure 76. Difference between 1 meter AXBT and PRT temperatures ($T_{AXBT} - T_{PRT}$) versus consecutive AXBT number, 25 November 1979.

FLIGHT 4: 27 NOVEMBER 1979

Survey Time: 1521.6 to 1925.2

Table 10. 27 November 1979. Temperature difference between PRT and quartz-crystal thermometer (T_{QTZ}-T_{PRT}) at calibration temperatures and times.

Time-GMT (Hr-Min)	Calibration Temperatures (°C) 20.00	24.00	28.00
1515	-1.63	-1.41	-1.46
1555	-1.17	-1.20	-1.57
1631	-1.64	-1.65	-1.77
1656	-1.29	-1.35	-1.32
1737	-1.14	-1.20	-1.33
1813	-1.32	-1.25	-1.60
1844	-1.25	-1.36	-1.19
1909	-1.35	-1.60	-1.82
1936	-0.93	-1.19	-1.30

Table 11. 27 November 1979. PRT Line End Points.

Line	Latitude (°N)	Longitude (°W)	Time-GMT (Hr-Min)
C	34°39.7'	76°22.4'	1521.6
	34°01.3'	75°16.4'	1548.1
E	34°25.4'	76°54.8'	1621.6
	33°37.8'	75°35.6'	1558.9
G	33°59.8'	77°07.3'	1631.3
	33°25.3'	76°08.3'	1649.1
I	33°44.4'	77°37.9'	1732.0
	33°06.1'	76°34.0'	1659.0
K	33°20.5'	77°53.7'	1740.0
	32°42.6'	76°48.8'	1808.2
M	33°00.0'	78°16.9'	1836.7
	32°15.8'	77°01.0'	1816.8
O	32°43.6'	78°45.1'	1846.1
	32°03.9'	77°35.9'	1905.0
Q	32°21.3'	79°03.7'	1932.9
	31°39.4'	77°49.6'	1913.7

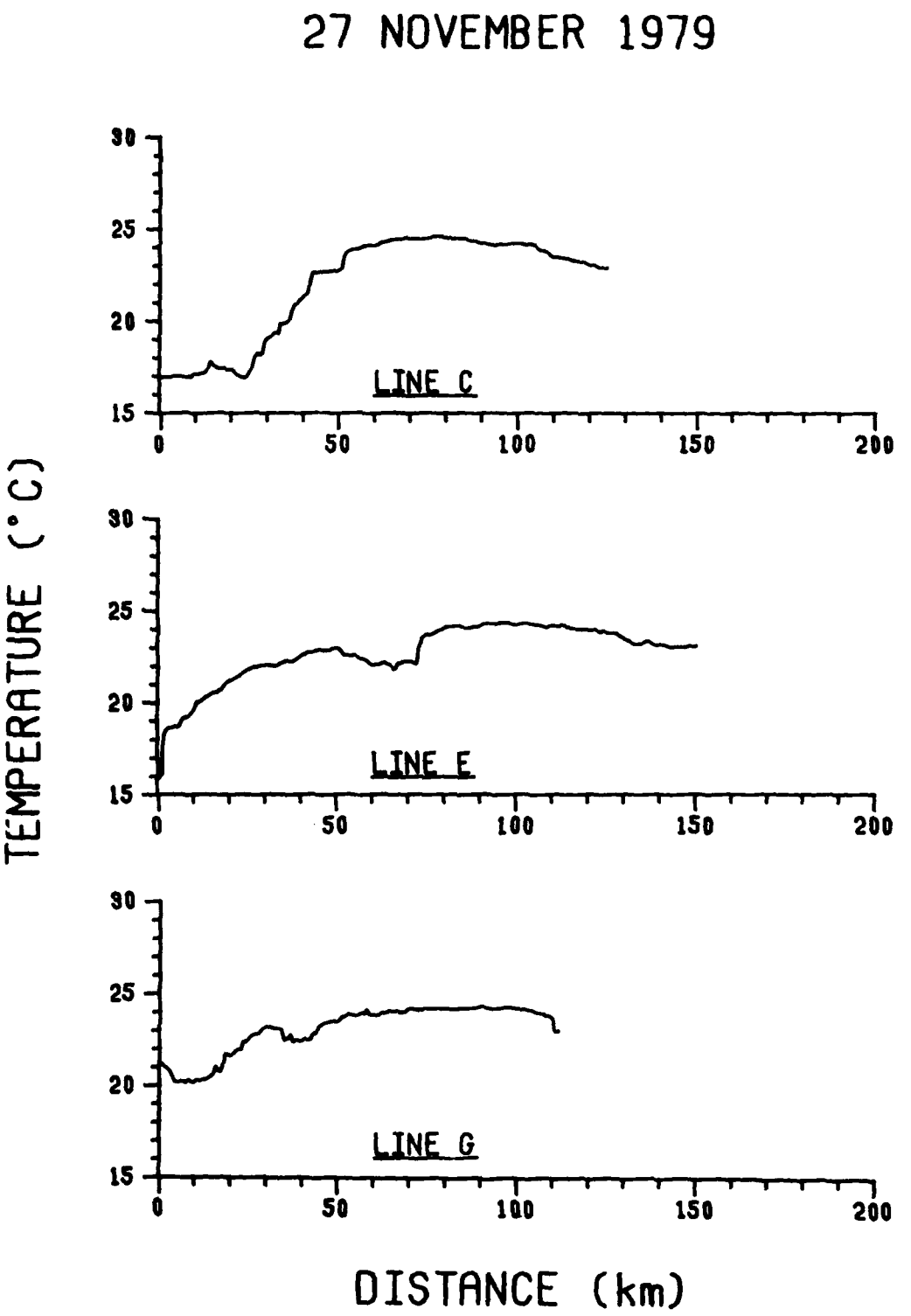


Figure 77. PRT cross-stream surface temperature profiles, 27 November 1979.

27 NOVEMBER 1979

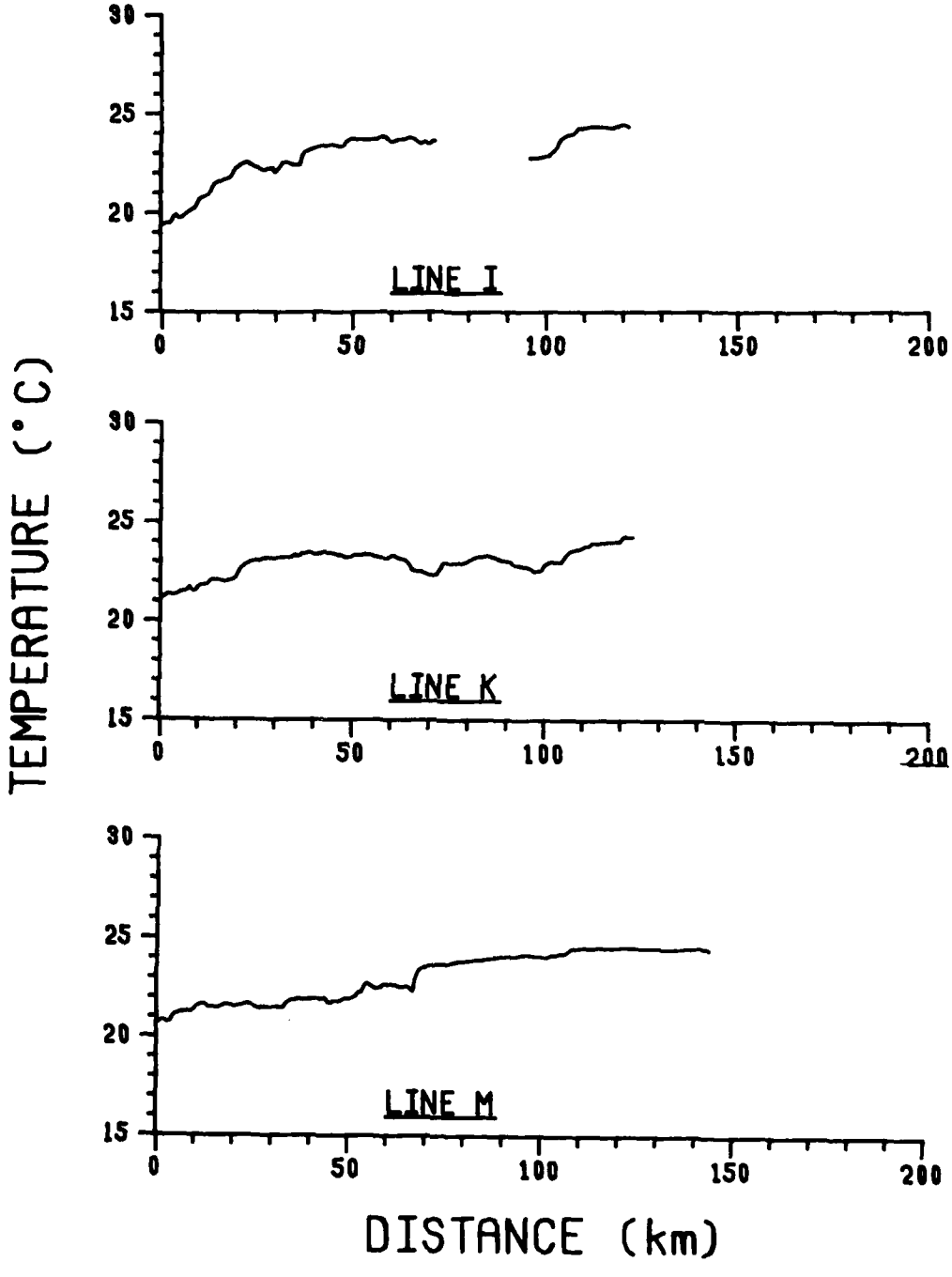


Figure 77 (cont'd).

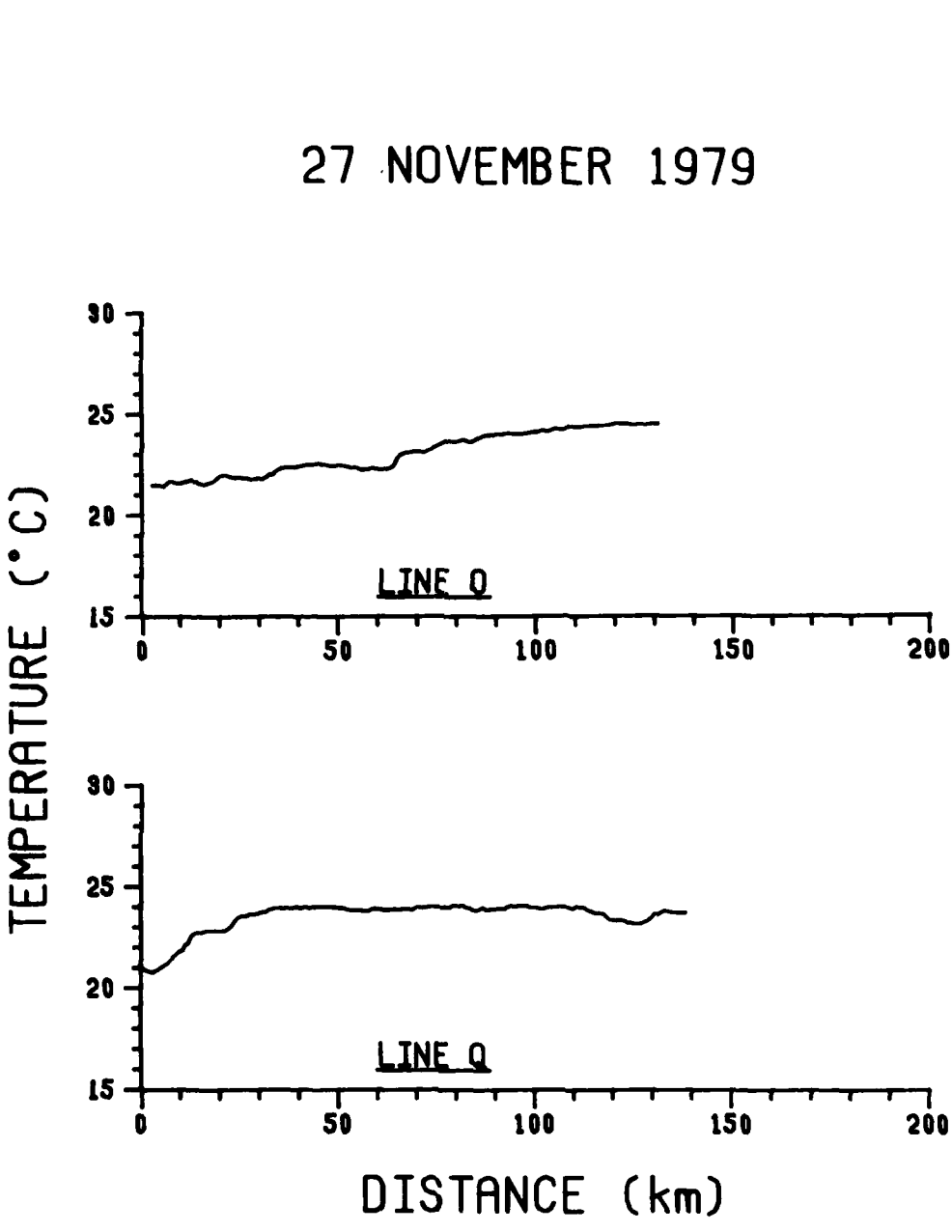


Figure 77 (cont'd).

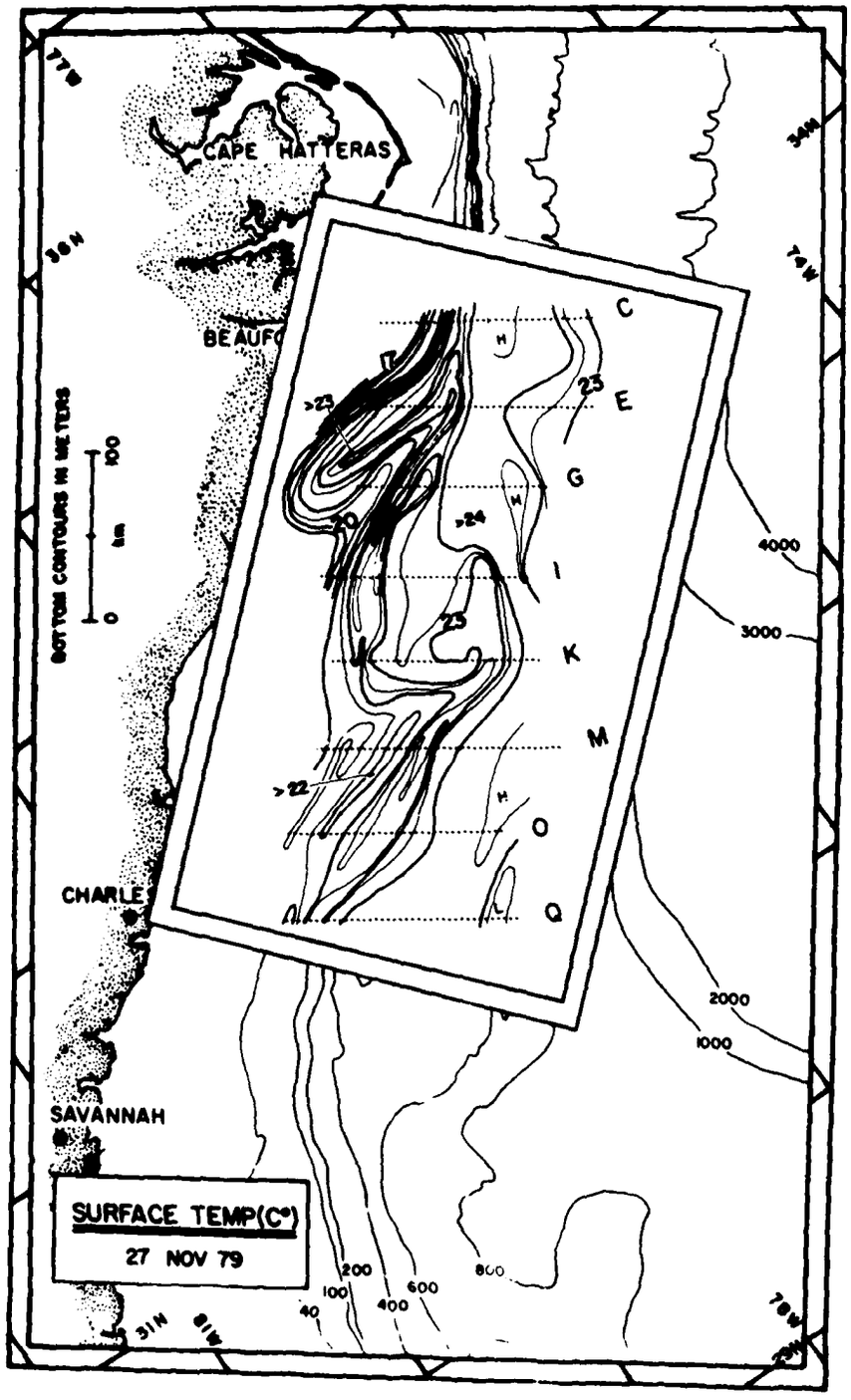


Figure 78. PRT sea surface temperature field, 27 November 1979. Dashed lines indicate positions of cross-stream data lines. Contour Intervals: 1.0° below 20°C; 0.5° above 20°C.

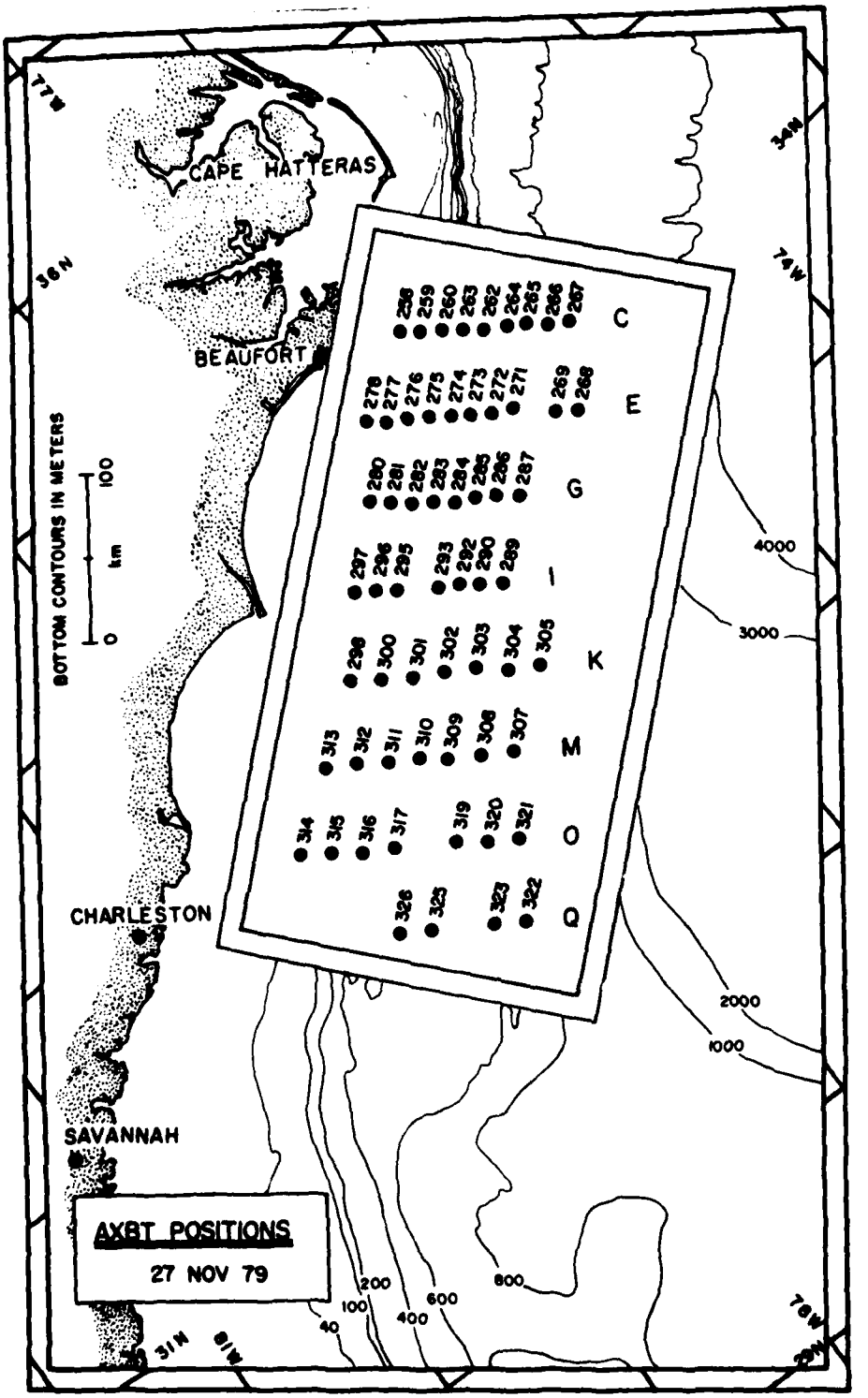


Figure 79. AXBT station locations, 27 November 1979.

Table 12. 27 November 1979. AXBT station coordinates, depths, and deployment times.

AXBT Station Number	Latitude (°N)	Longitude (°W)	Depth of Trace (m)	Time-GMT (Hr-Min)
258	34°33.1'	76°09.0'	35	1525.2
259	34°29.0'	76°02.5'	40	1527.2
260	34°25.2'	75°55.9'	98	1529.0
262	34°16.5'	75°43.5'	370	1532.6
263	34°20.7'	75°49.8'	353	1538.7
264	34°13.0'	75°35.5'	370	1542.7
265	34°09.5'	75°29.3'	370	1544.3
266	34°04.9'	75°23.3'	370	1546.2
267	34°01.3'	75°16.4'	370	1548.1
268	33°37.8'	75°35.6'	370	1558.9
269	33°42.0'	75°42.3'	370	1601.0
271	33°51.0'	75°54.4'	370	1604.5
272	33°54.1'	76°01.6'	370	1606.3
273	33°58.0'	76°08.4'	370	1608.1
274	34°02.1'	76°14.6'	175	1609.9
275	34°06.4'	76°21.1'	58	1611.9
276	34°10.1'	76°27.9'	43	1613.8
277	34°13.3'	76°35.3'	38	1615.8
278	34°18.0'	76°41.1'	32	1617.7
280	33°57.3'	76°59.7'	36	1633.4
281	33°52.7'	76°53.5'	39	1635.4
282	33°48.2'	76°47.4'	48	1637.4
283	33°44.3'	76°40.8'	70	1639.3
284	33°39.8'	76°34.7'	226	1641.3
285	33°36.8'	76°27.5'	370	1643.2
286	33°33.1'	76°20.6'	370	1645.3
287	33°29.0'	76°14.1'	370	1647.3
289	33°10.1'	76°40.2'	370	1702.0
290	33°14.8'	76°47.1'	370	1704.0
292	33°18.6'	76°52.8'	300	1719.0
293	33°22.0'	76°59.9'	190	1721.0
295	33°29.7'	77°13.2'	39	1724.9
296	33°34.0'	77°19.5'	35	1726.8
297	33°37.7'	77°26.1'	30	1728.7
298	33°16.6'	77°48.7'	38	1741.9

(continued)

Table 12. (cont'd.)

AXBT Station Number	Latitude (°N)	Longitude (°W)	Depth of Trace (m)	Time-GMT (Hr-Min)
300	33°10.6'	77°39.2'	52	1753.7
301	33°04.9'	77°29.2'	192	1756.7
302	33°00.1'	77°18.4'	300	1759.7
303	32°54.3'	77°08.6'	370	1802.4
304	32°47.9'	76°59.4'	370	1805.3
305	32°42.6'	76°48.8'	370	1808.2
307	32°26.6'	77°16.7'	370	1821.1
308	32°31.6'	77°27.5'	370	1823.7
309	32°38.1'	77°38.6'	370	1826.2
310	32°43.5'	77°46.5'	297	1828.9
311	32°49.0'	77°56.7'	188	1831.5
312	32°55.1'	78°06.5'	103	1834.0
313	33°00.0'	78°16.9'	36	1836.7
314	32°43.6'	78°45.1'	35	1846.1
315	32°38.0'	78°35.4'	59	1848.7
316	32°31.8'	78°25.7'	206	1851.3
317	32°26.5	78°15.3'	300	1854.0
319	32°15.9'	77°55.2'	370	1859.3
320	32°09.2'	77°46.2'	370	1902.1
321	32°03.9'	77°35.9'	370	1905.0
322	31°42.4'	77°53.6'	370	1914.9
323	31°48.0'	78°03.6'	370	1917.5
325	31°58.7'	78°23.8'	370	1922.6
326	32°04.1'	78°33.9'	300	1925.2

27 NOVEMBER 1979

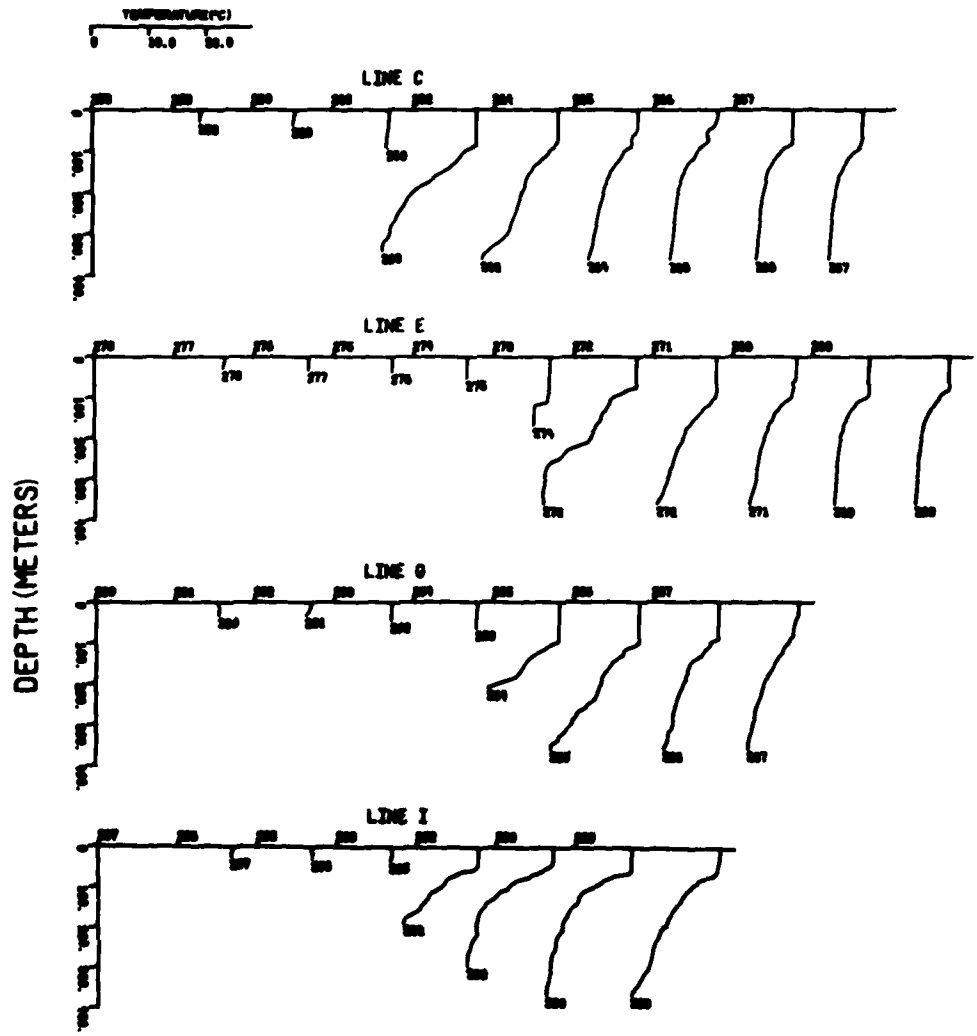


Figure 80. AXBT vertical temperature profiles, 27 November 1979.

27 NOVEMBER 1979

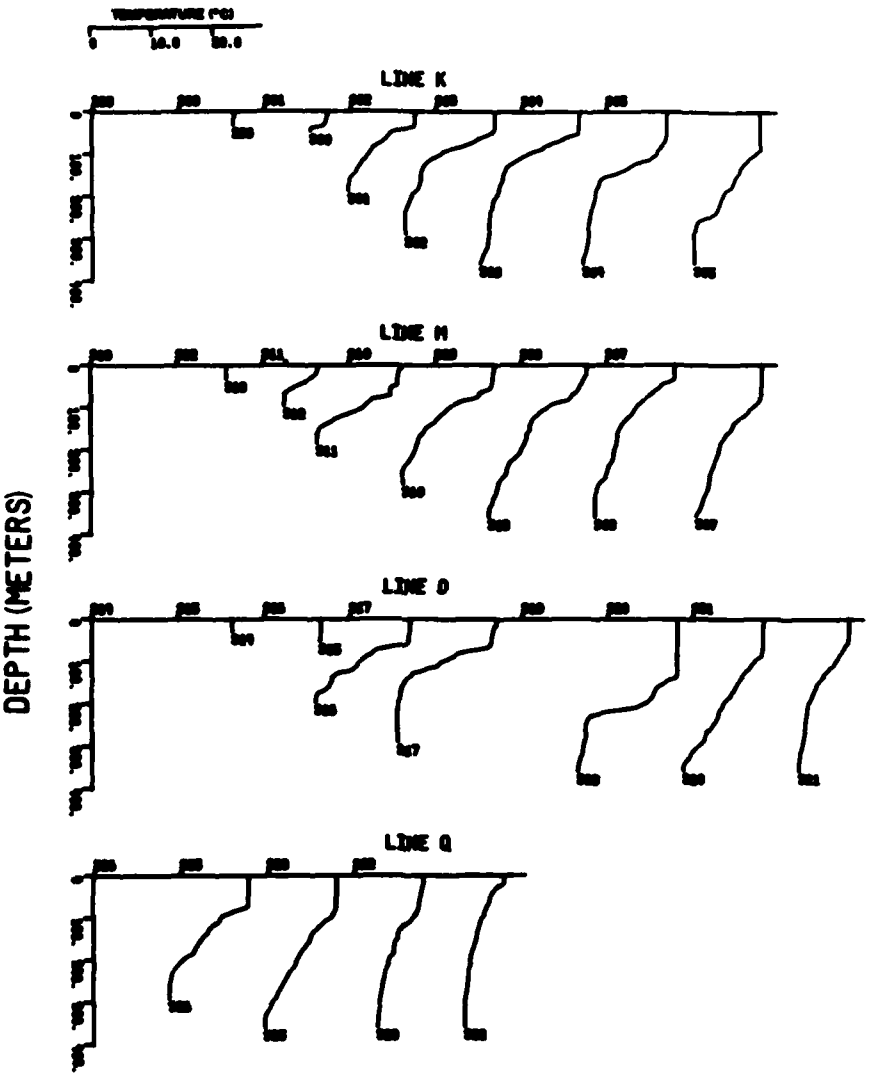


Figure 80 (cont'd).

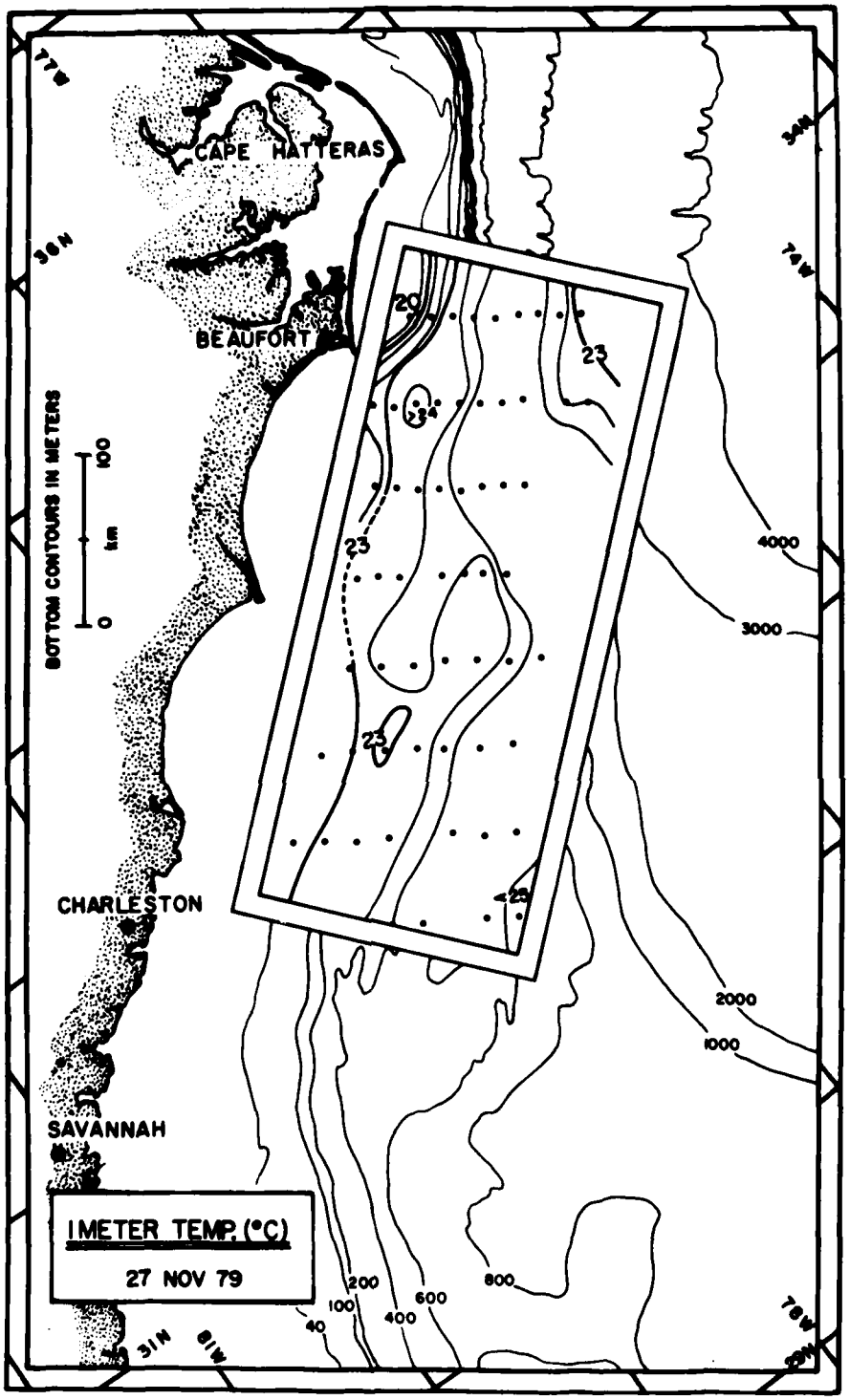


Figure 81. AXBT temperatures at 1 meter, 27 November 1979. Small solid circles indicate AXBT drop-sites.

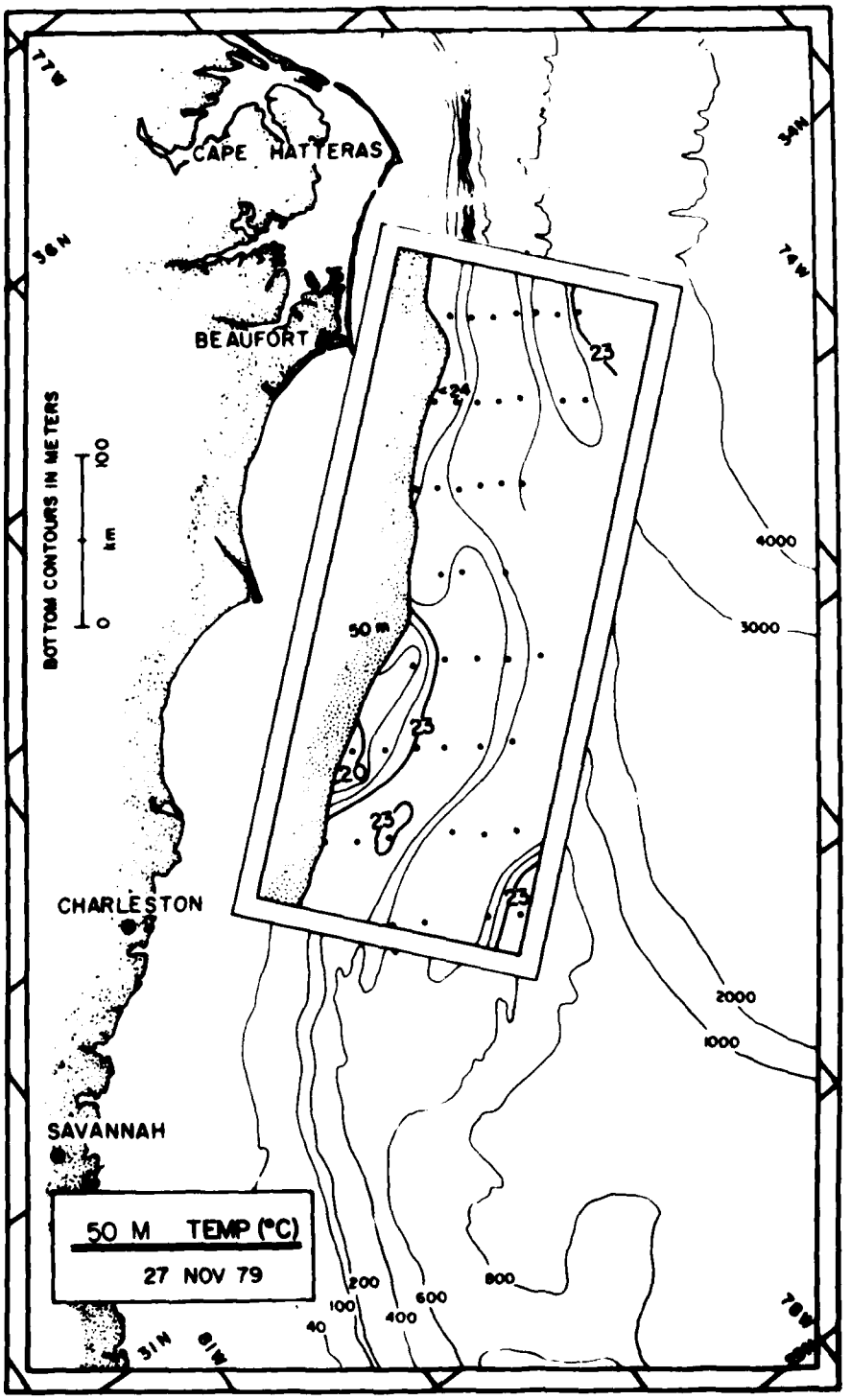


Figure 82. AXBT temperatures at 50 meters, 27 November 1979.

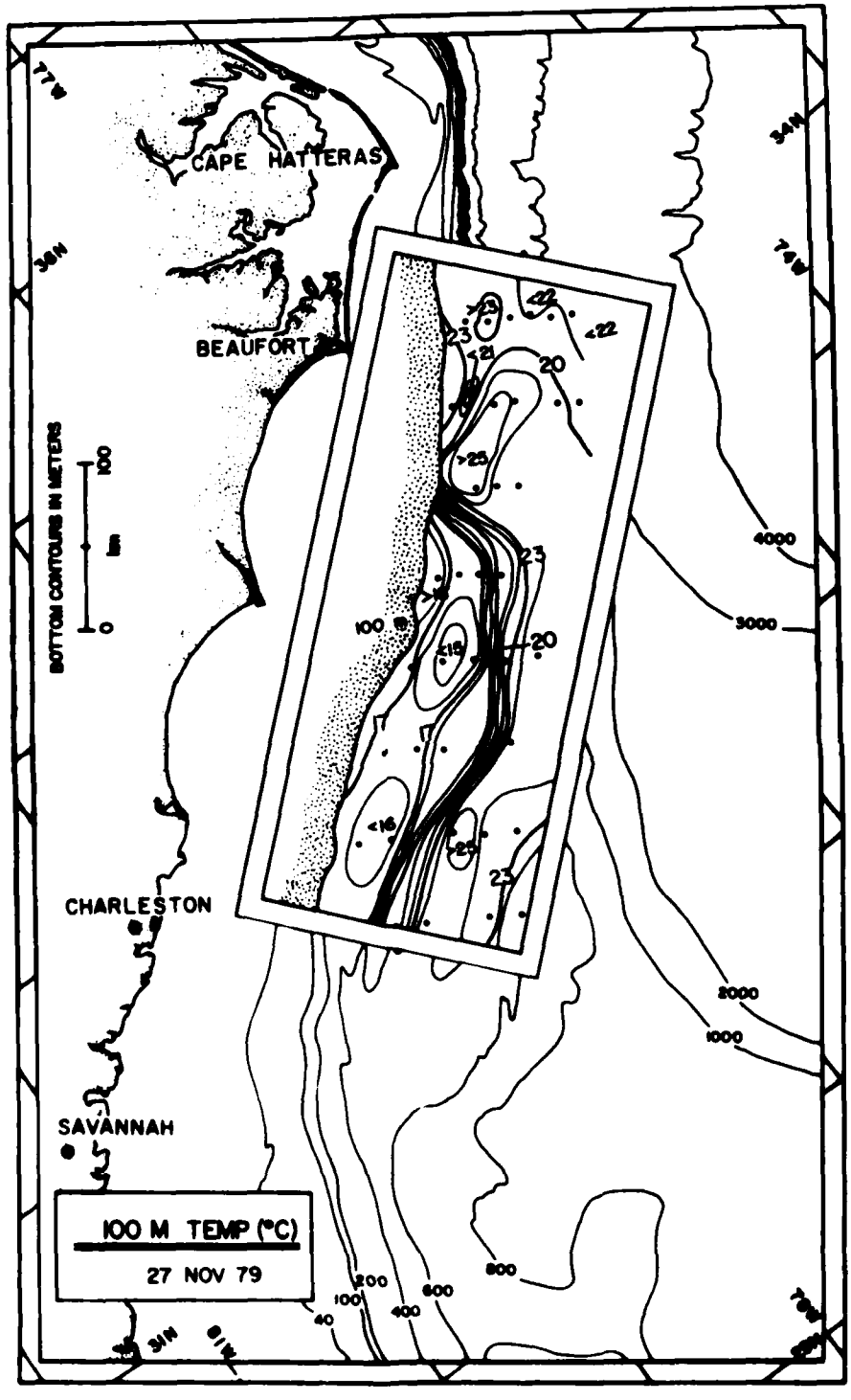


Figure 83. AXBT temperatures at 100 meters, 27 November 1979.

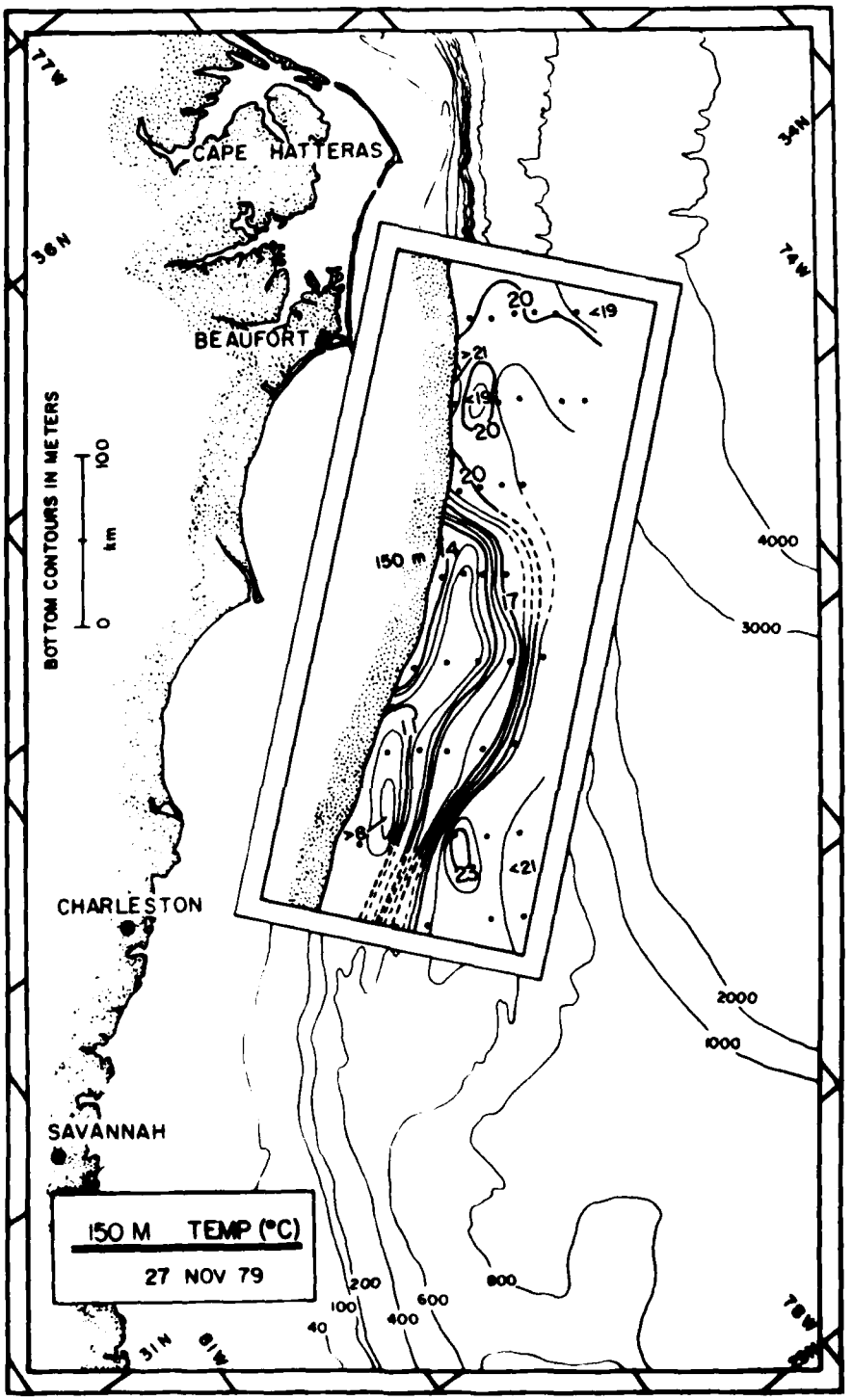


Figure 84. AXBT temperatures at 150 meters, 27 November 1979.

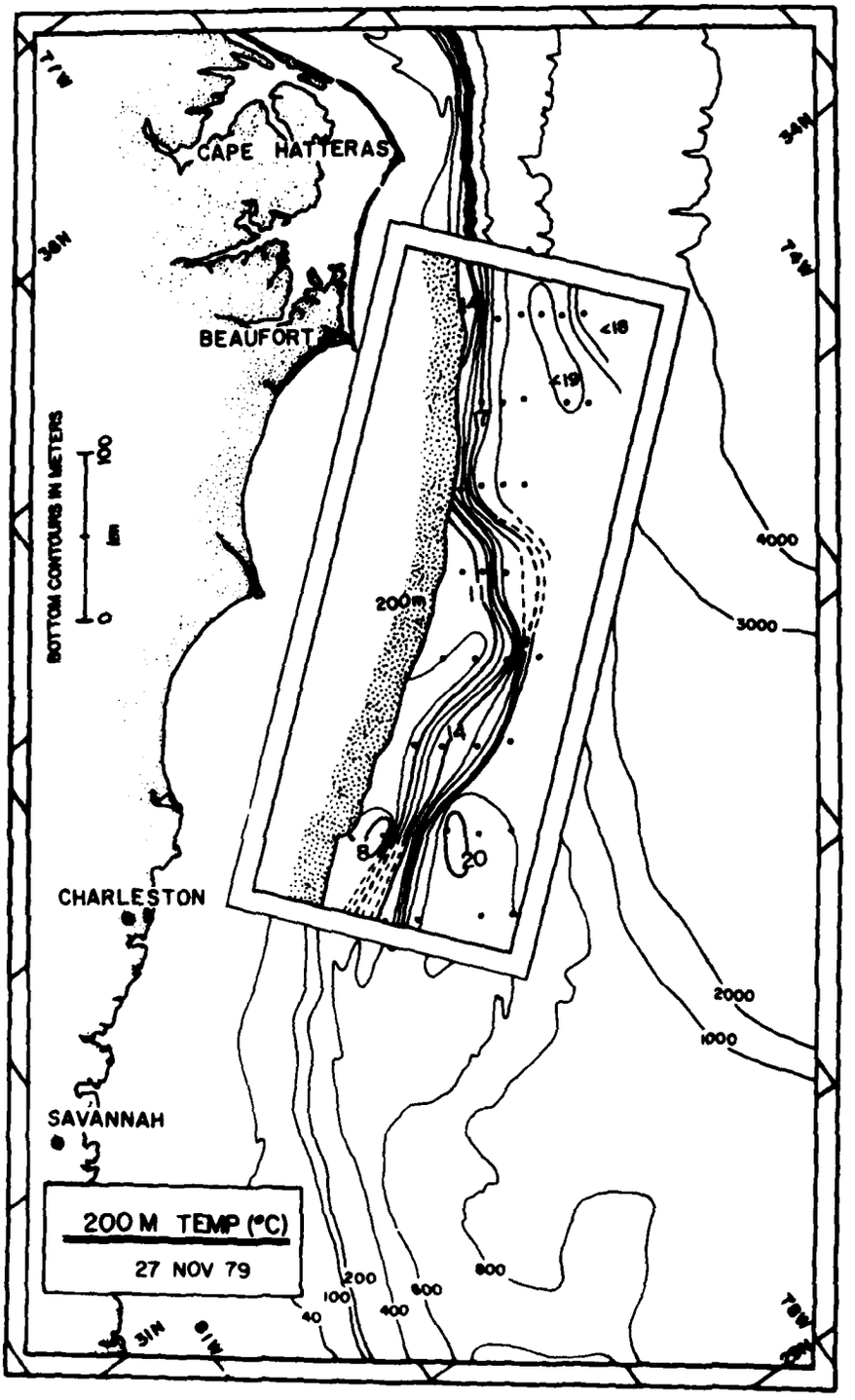


Figure 85. AXBT temperatures at 200 meters, 27 November 1979.

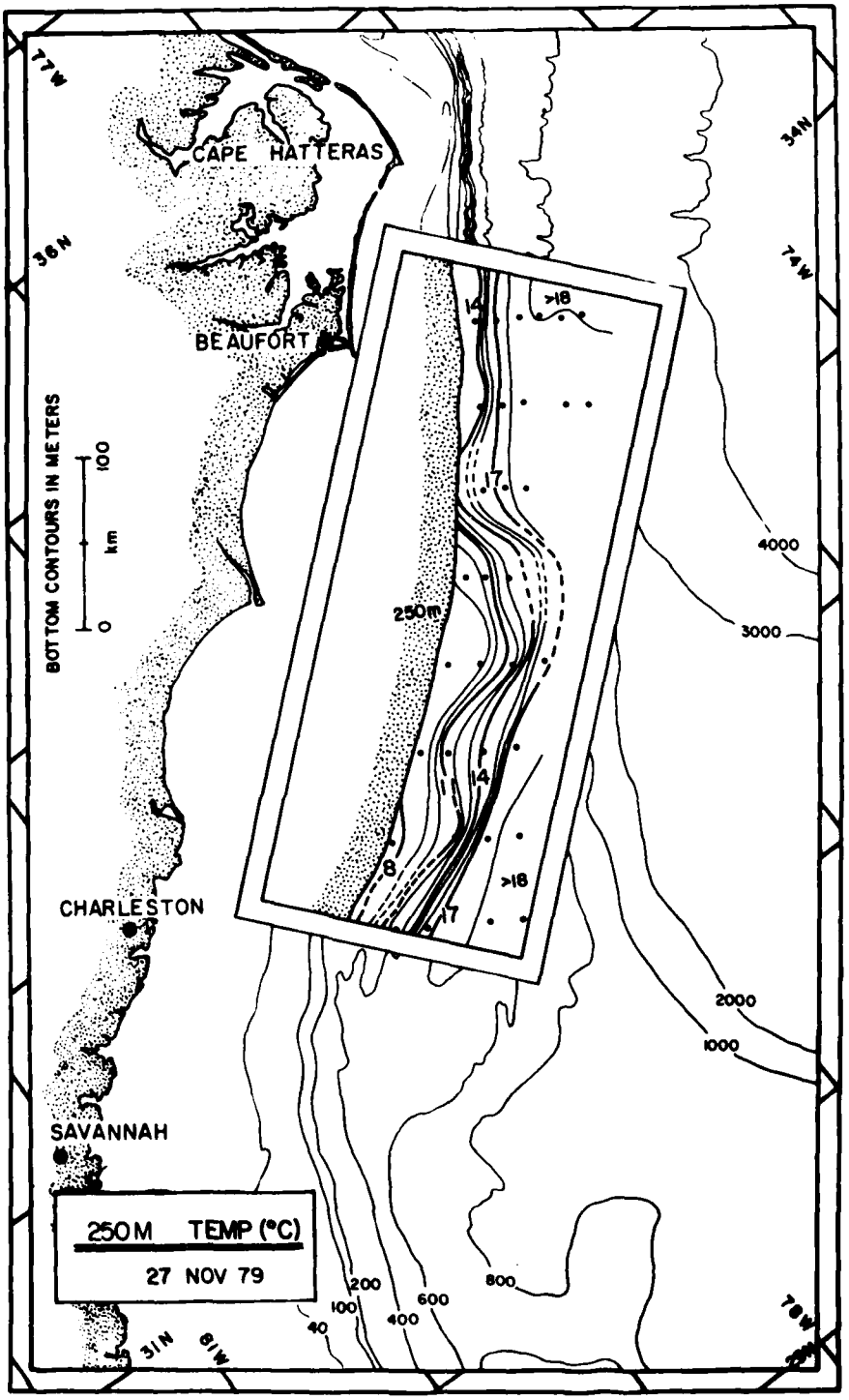


Figure 86. AXBT temperatures at 250 meters, 27 November 1979.

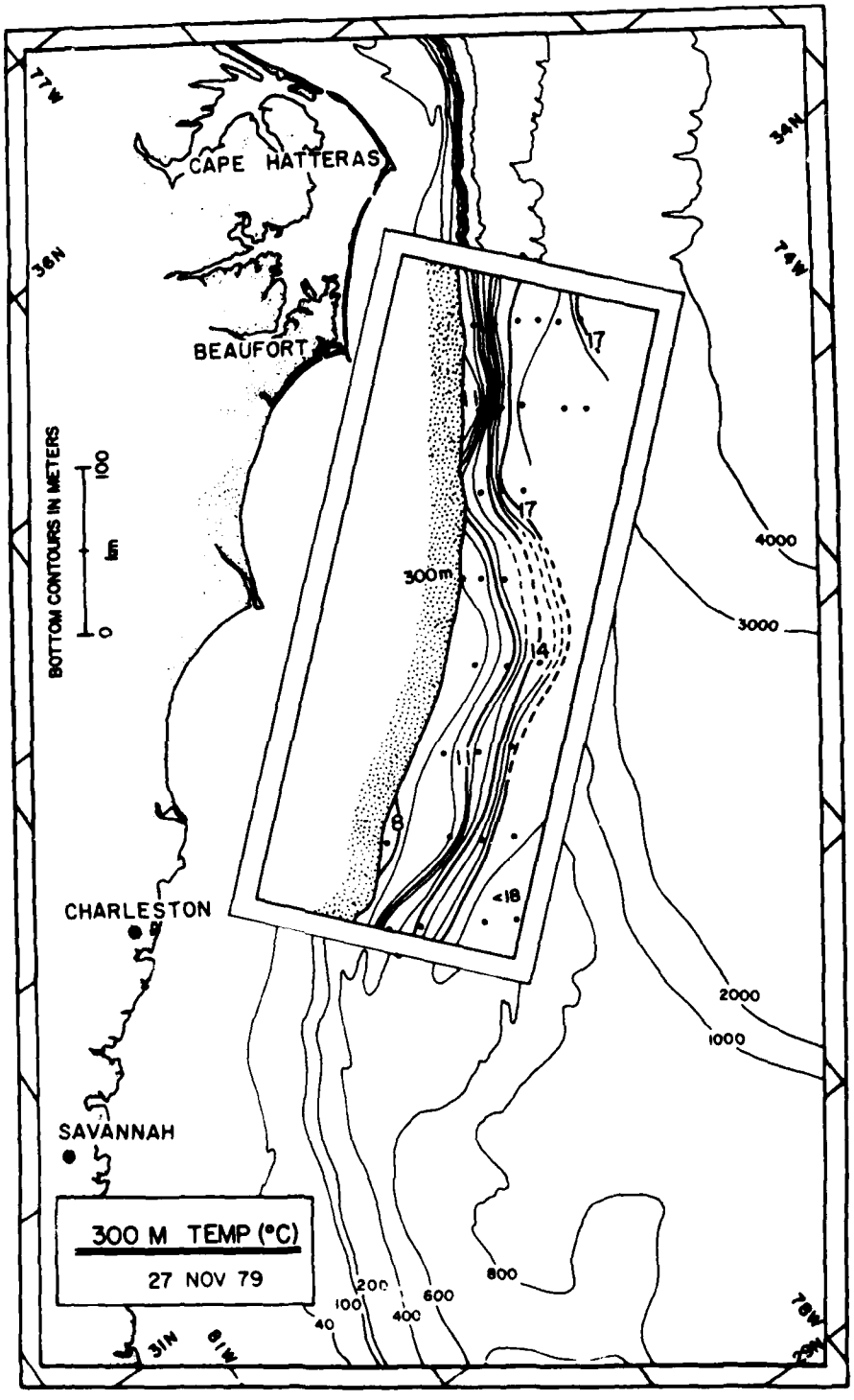


Figure 87. AXBT temperatures at 300 meters, 27 November 1979.

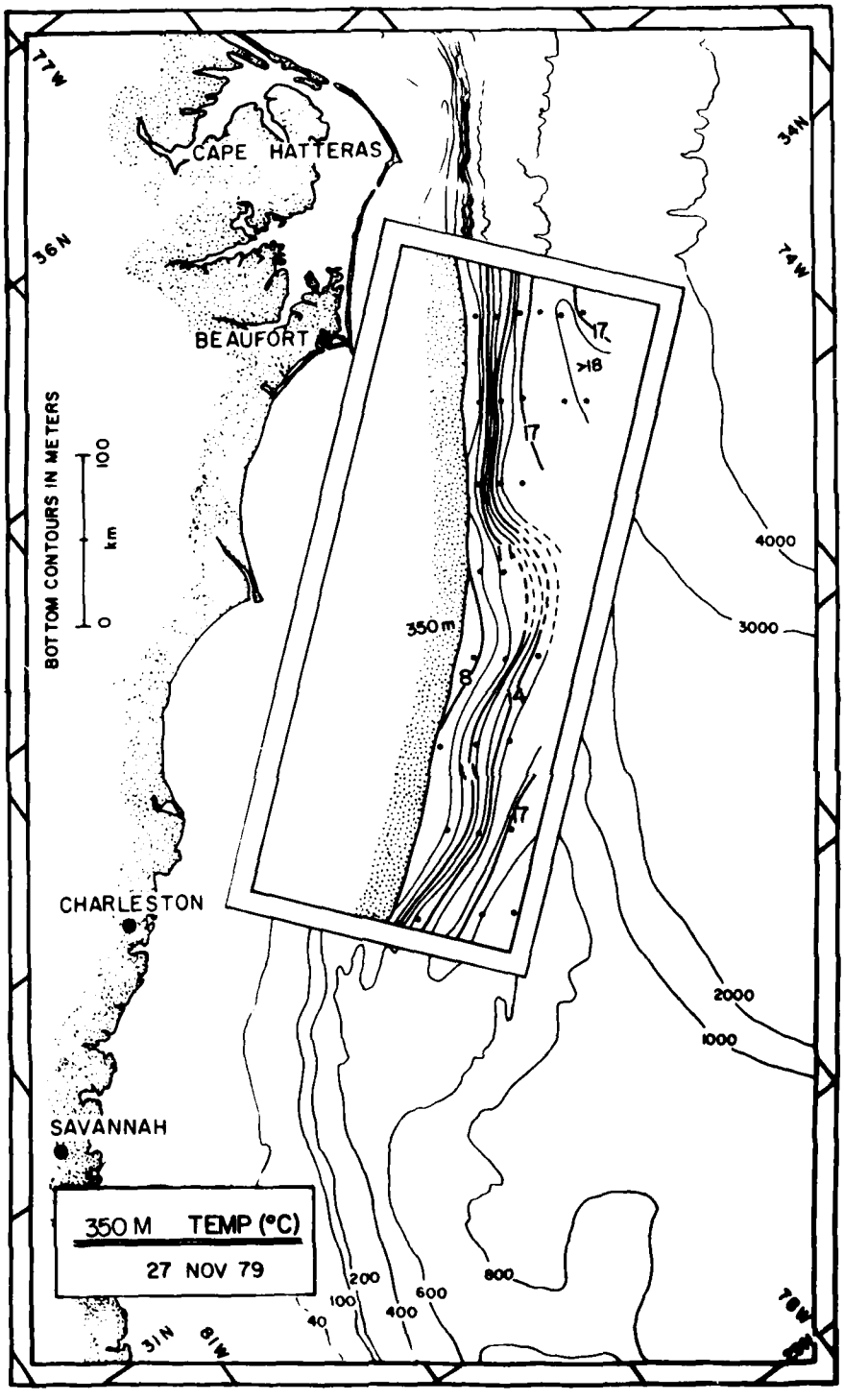


Figure 88. AXBT temperatures at 350 meters, 27 November 1979.

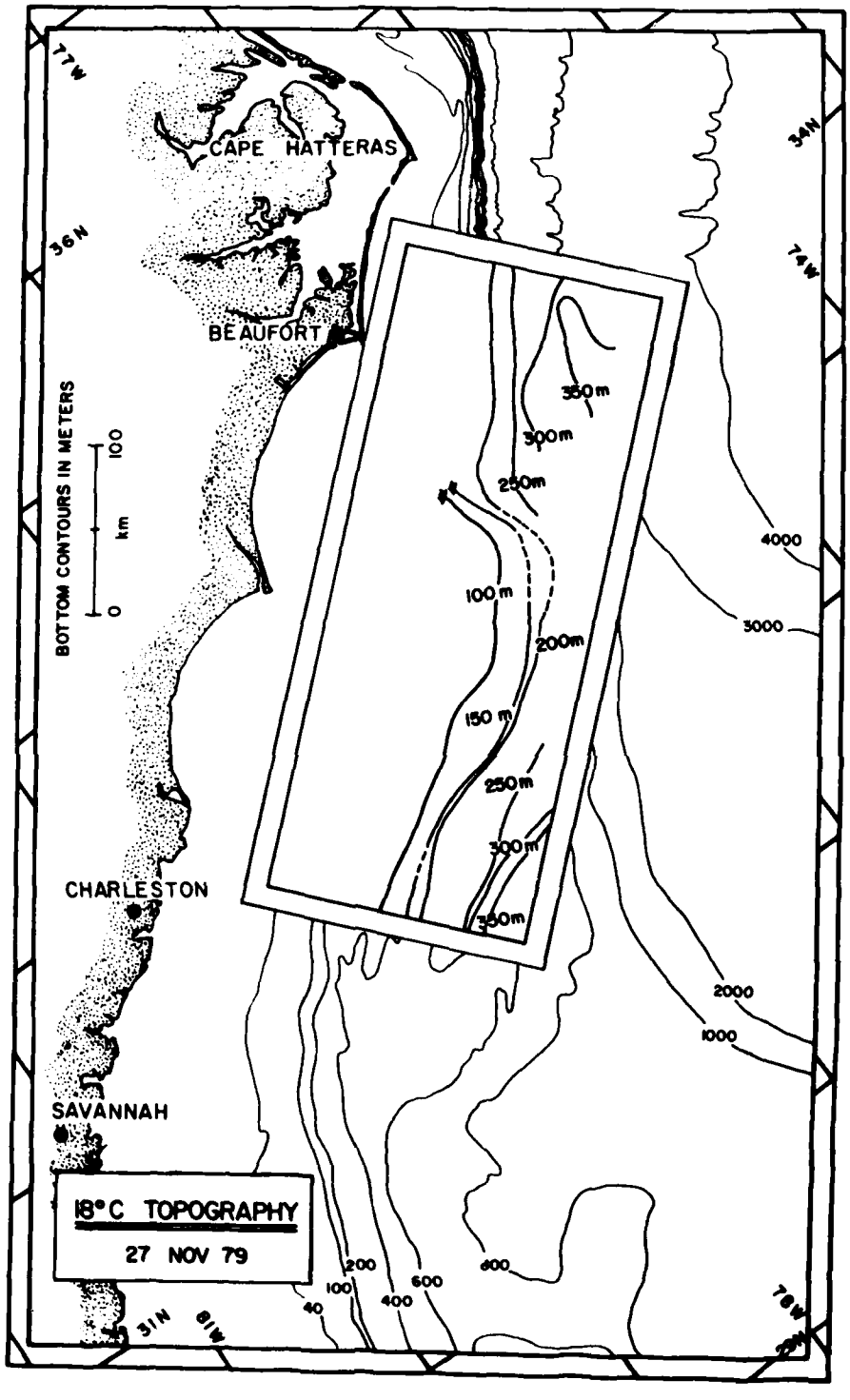


Figure 89. Topography of the 18°C isotherm, 27 November 1979.

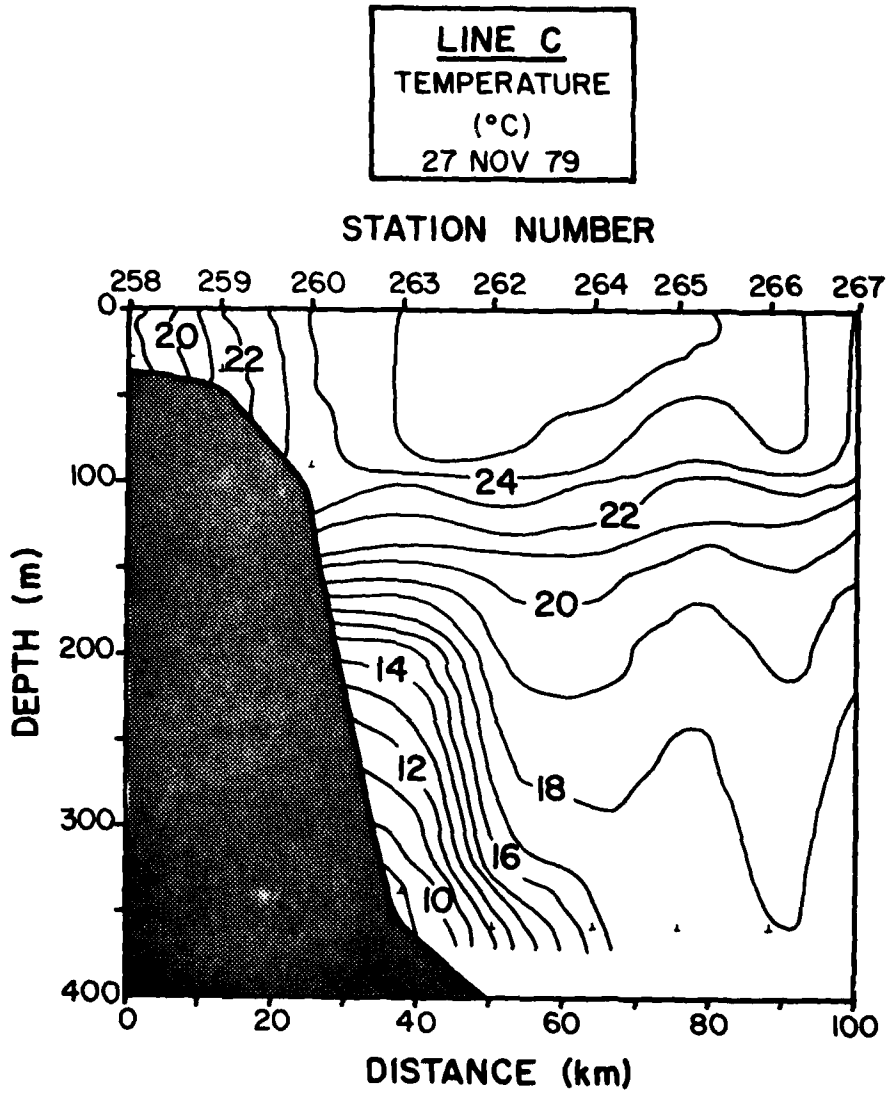


Figure 90. Cross-stream vertical temperature section along Line C, 27 November 1979.

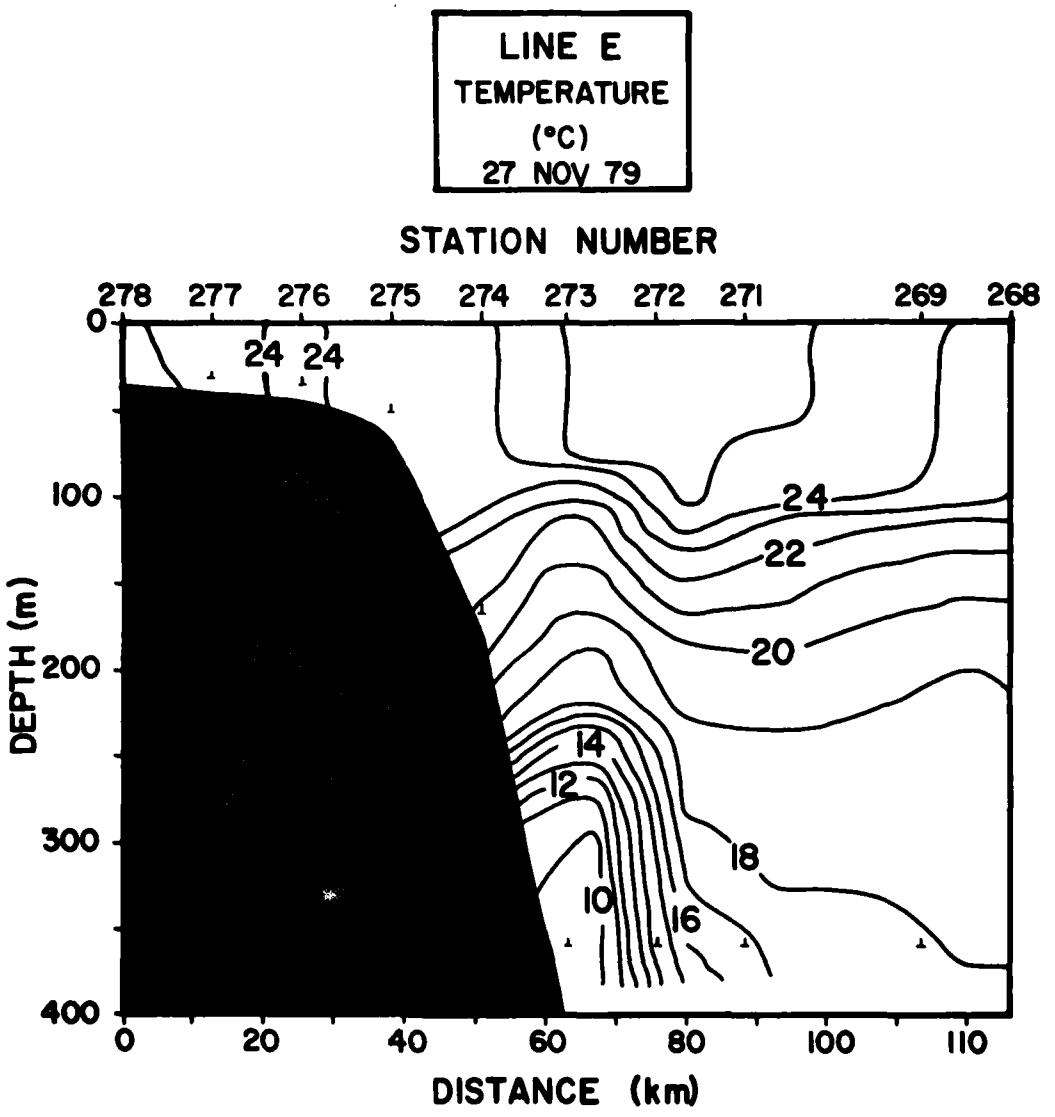


Figure 91. Cross-stream vertical temperature section along Line E, 27 November 1979.

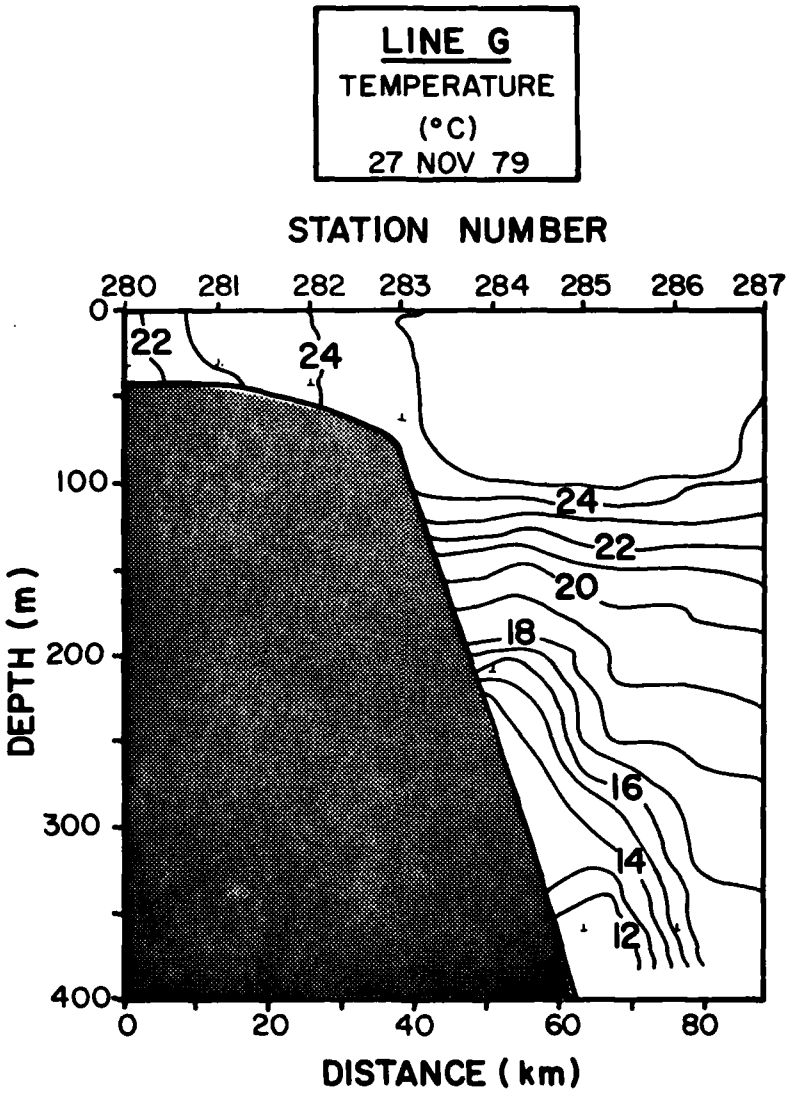


Figure 92. Cross-stream vertical temperature section along Line G, 27 November 1979.

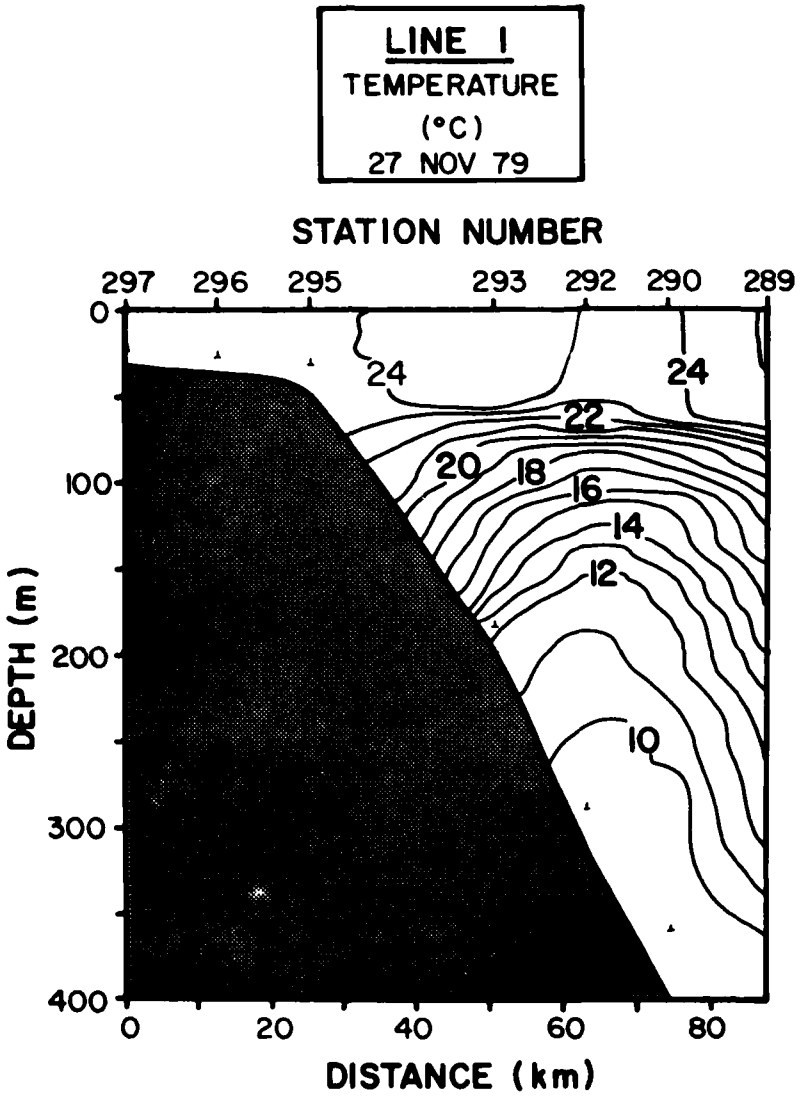


Figure 93. Cross-stream vertical temperature section along Line I, 27 November 1979.

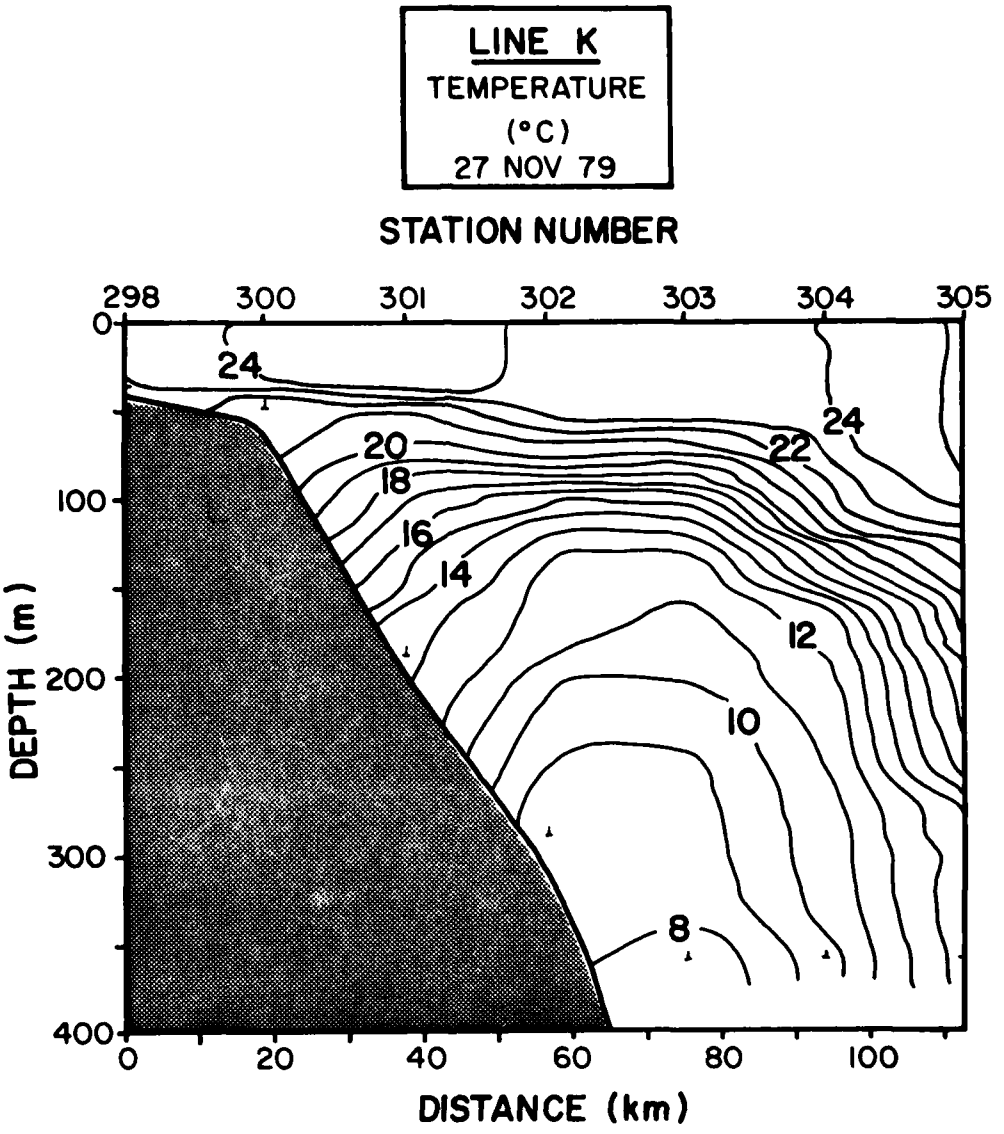


Figure 94. Cross-stream vertical temperature section along Line K, 27 November 1979.

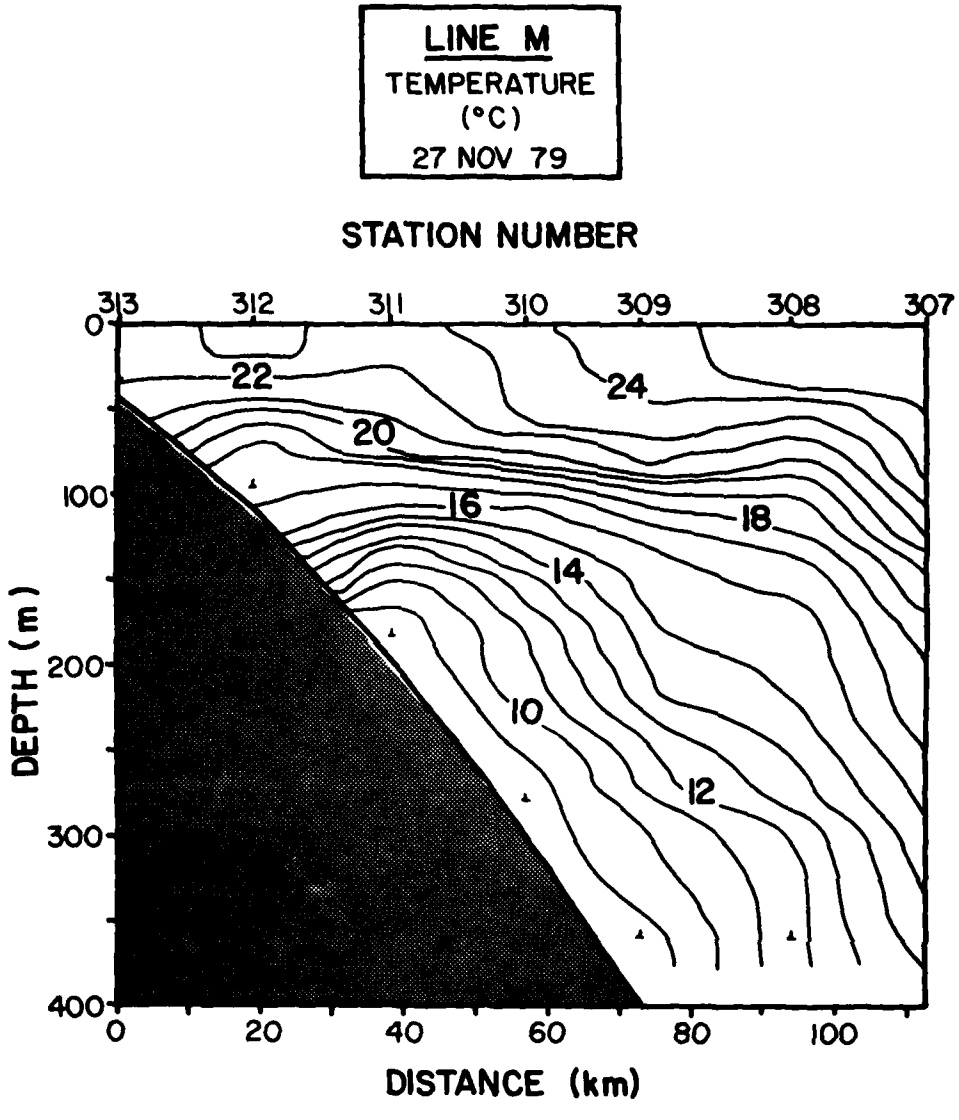


Figure 95. Cross-stream vertical temperature section along Line M, 27 November 1979.

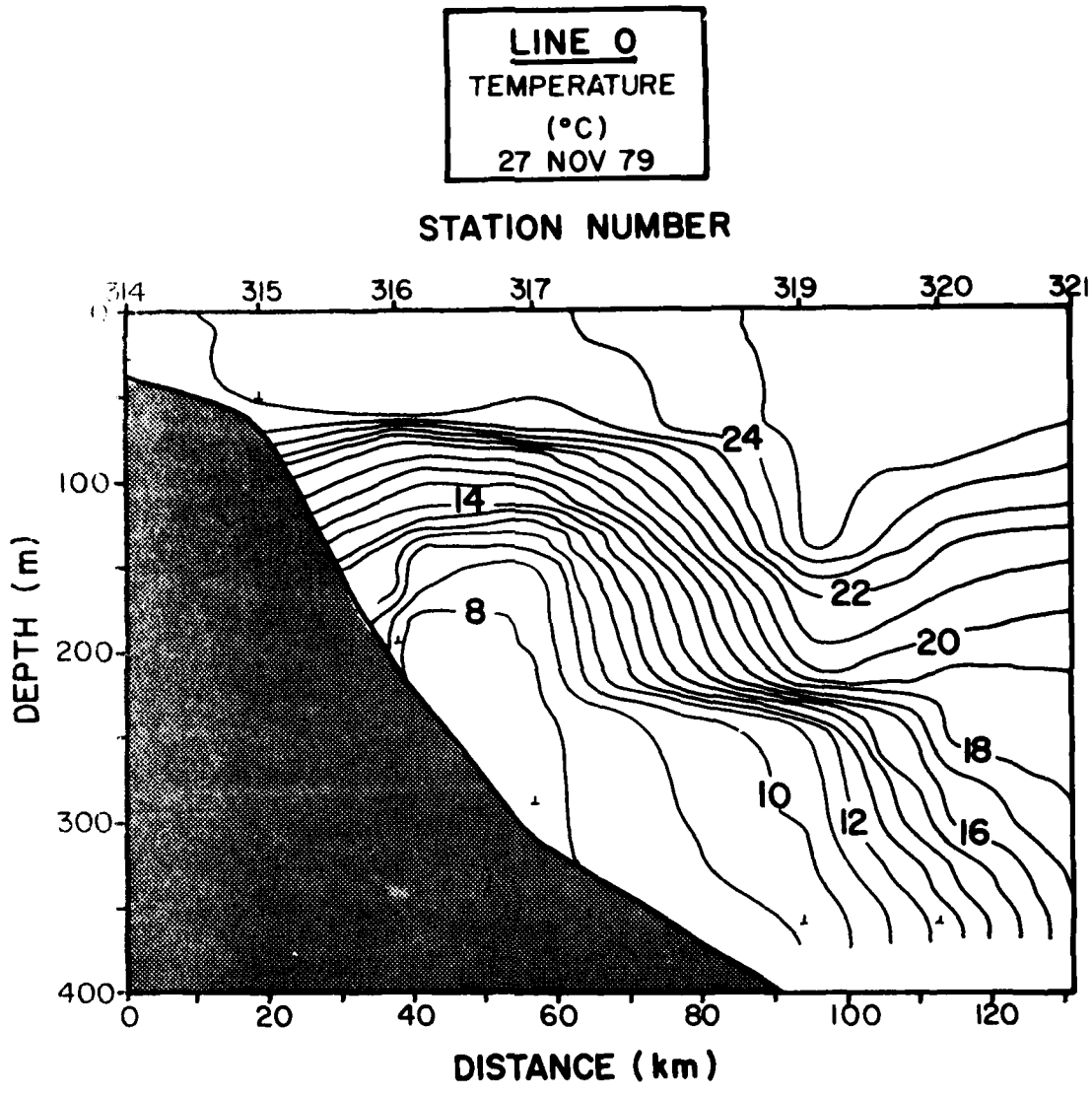


Figure 96. Cross-stream vertical temperature section along Line O, 27 November 1979.

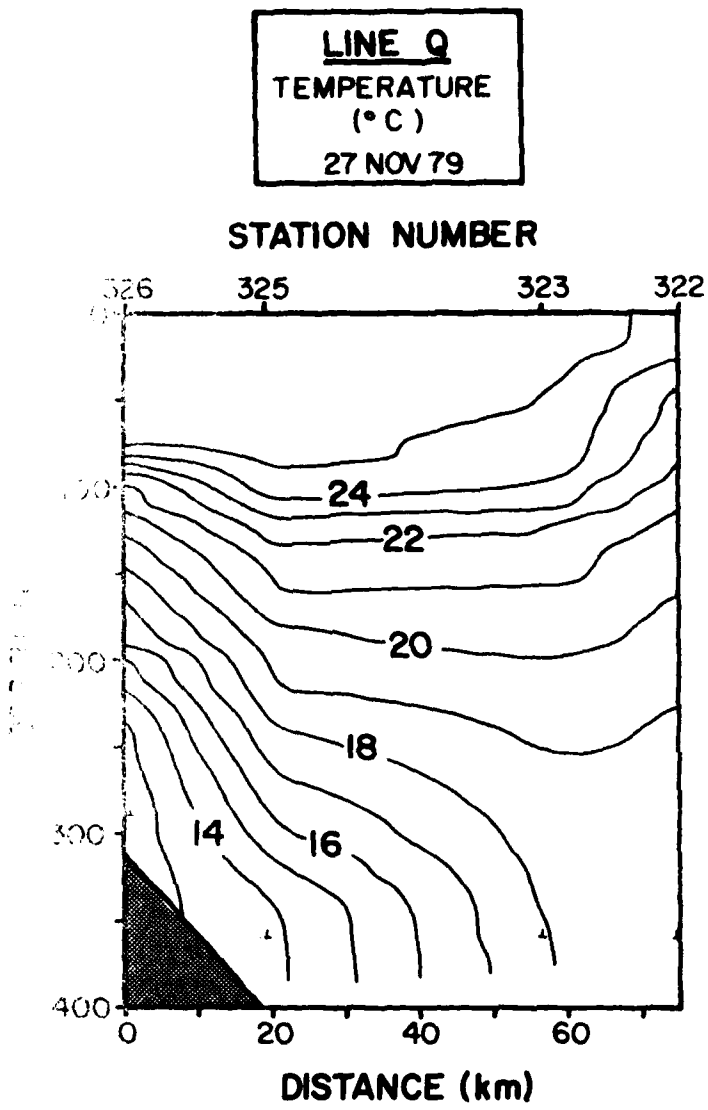


Figure 97. Cross-stream vertical temperature section along Line Q, 27 November 1979.

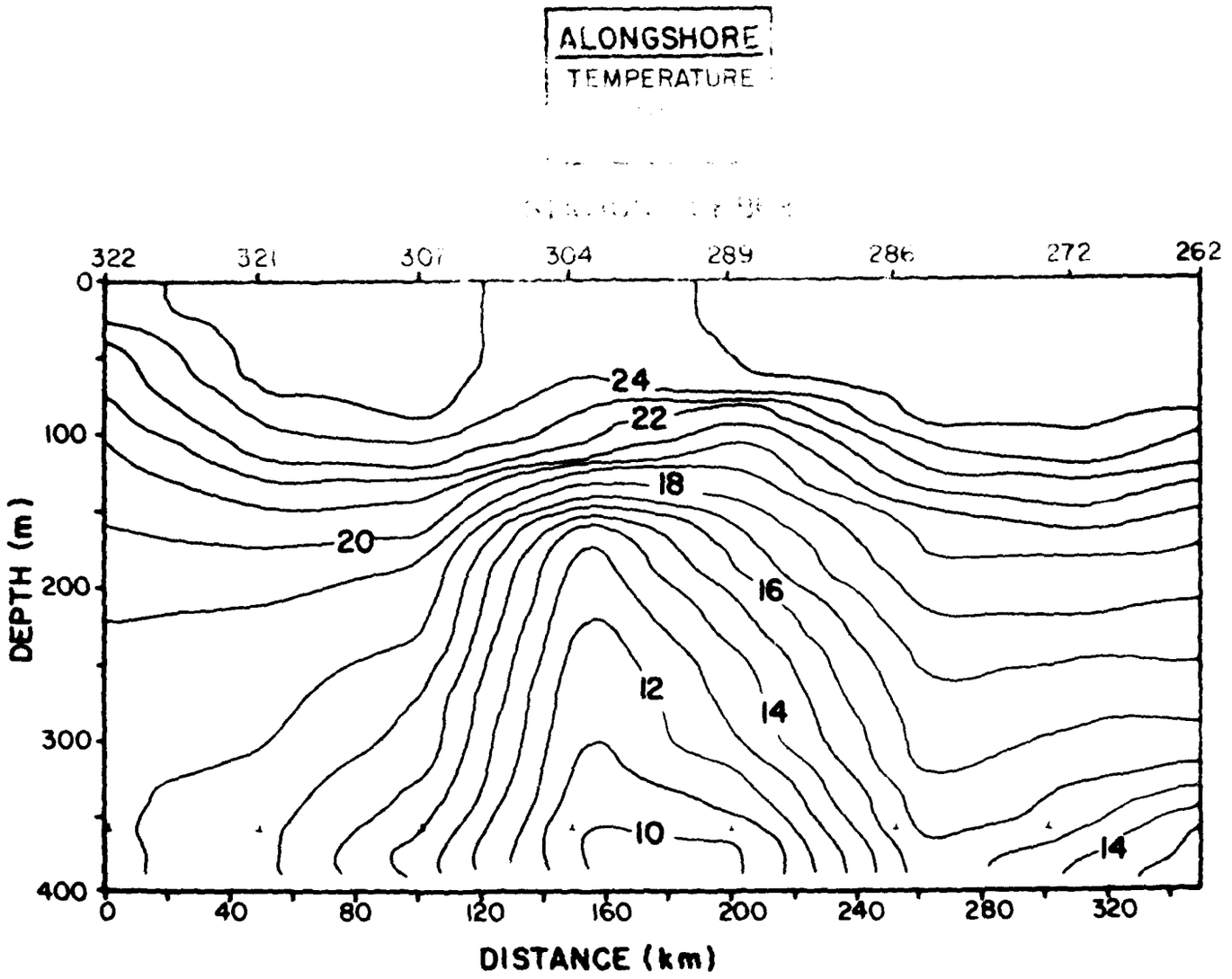


Figure 98. Alongshore vertical temperature section, 27 November 1979.

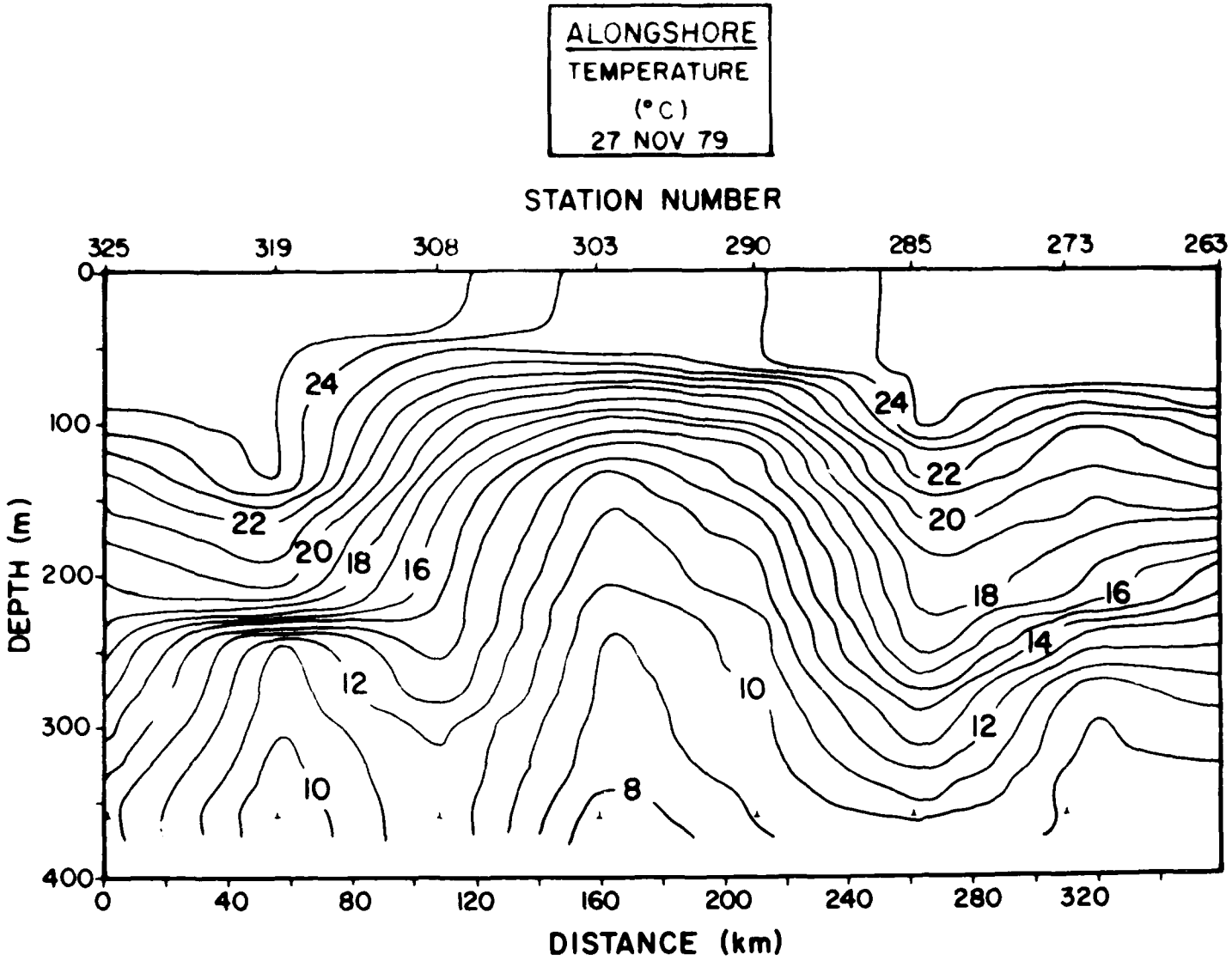


Figure 99. Alongshore vertical temperature section, 27 November 1979.

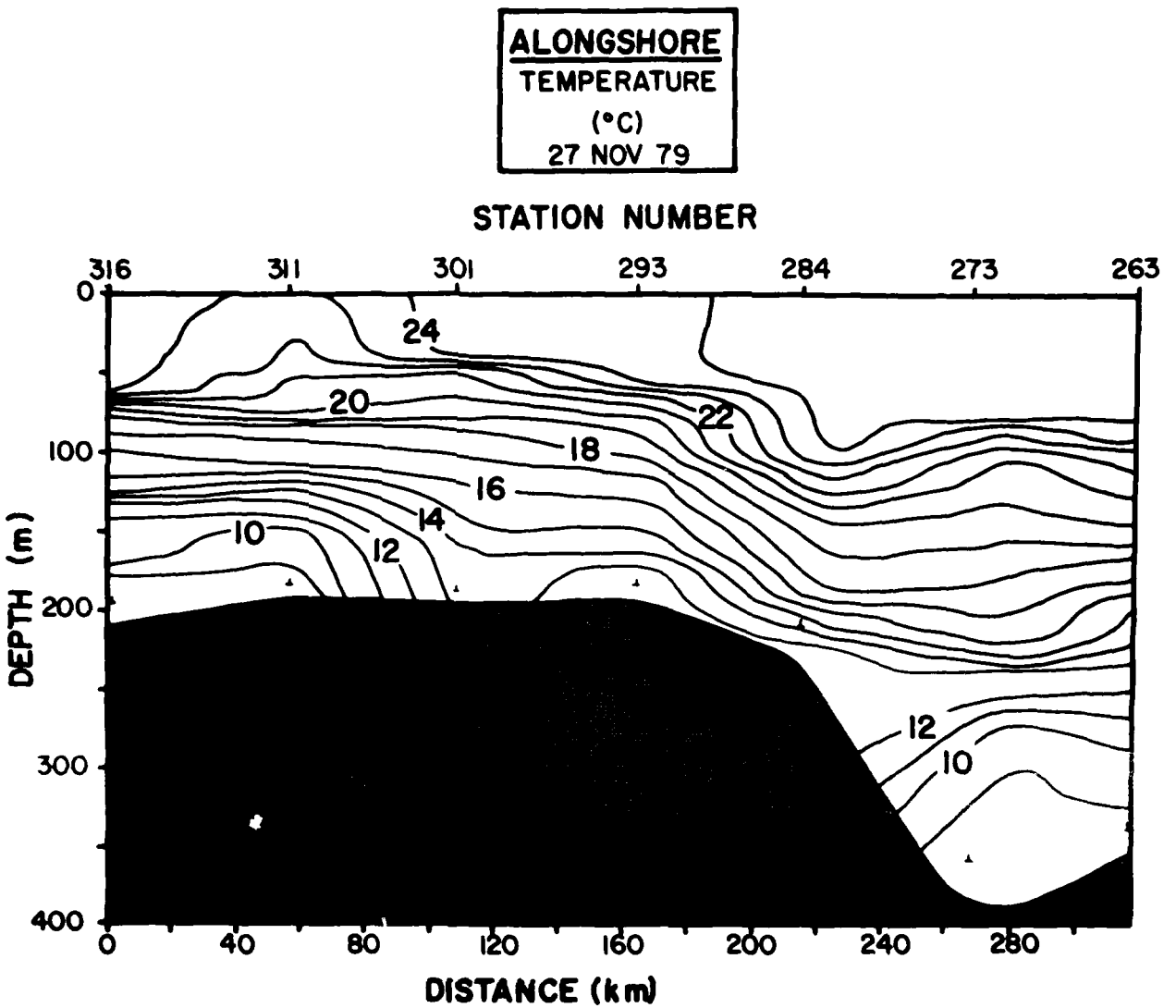


Figure 100. Alongshore vertical temperature section, 27 November 1979.

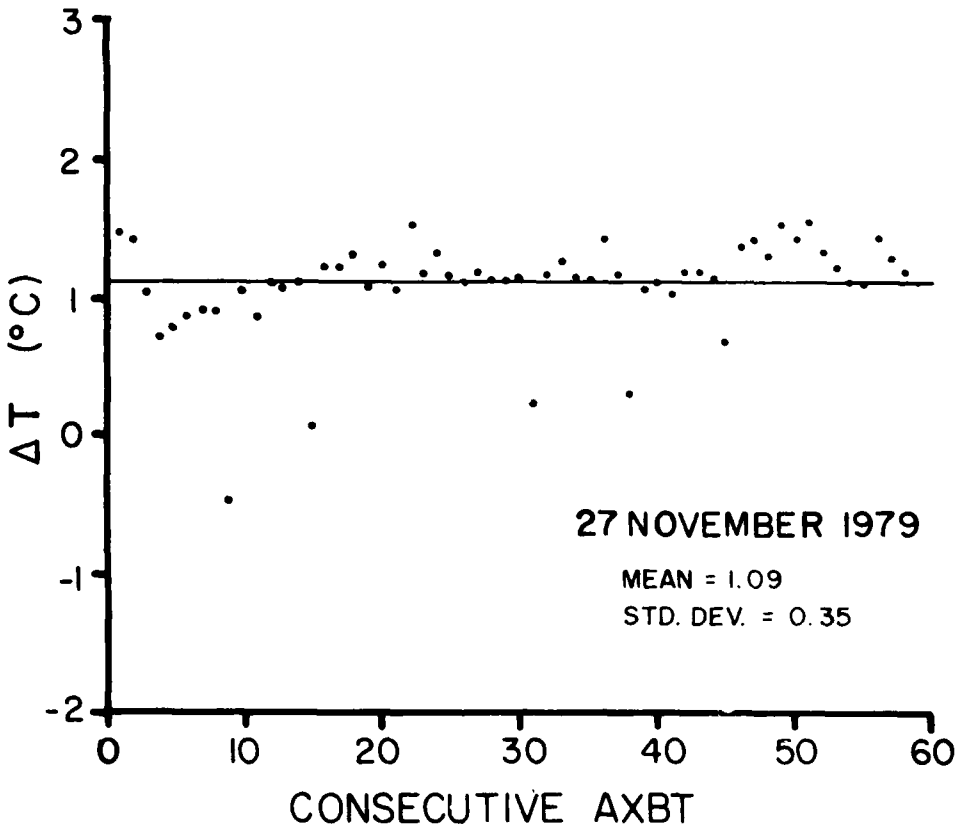


Figure 101. Difference between 1 meter AXBT and PRT temperatures ($T_{AXBT} - T_{PRT}$) versus consecutive AXBT number, 27 November 1979.

FLIGHT 5: 29 NOVEMBER 1979

Survey Time: 1811.5 to 2326.1

Table 13. 29 November 1979. Temperature difference between PRT and quartz-crystal thermometer (T_{QTZ}-T_{PRT}) at calibration temperatures and times.

Time-GMT (Hr-Min)	Calibration Temperatures (°C) 20.00	24.00	28.00
1807	-2.00	-2.18	-2.36
1833	-2.06	-2.29	-2.18
1858	-1.74	-1.98	-2.02
1934	-1.64	-1.80	-1.99
2000	-1.48	-1.58	-1.70
2027	-1.29	-1.40	-1.47
2100	-1.13	-1.23	-1.34
2148	-1.07	-1.23	-1.23
2310	-1.10	-1.31	-1.42

Table 14. 29 November 1979. PRT Line End Points.

Line	Latitude (°N)	Longitude (°W)	Time-GMT (Hr-Min)
C	34°22.5'	75°47.9'	1816.8
	34°04.4'	75°19.6'	1825.0
E	34°14.1'	76°34.5'	1852.5
	33°38.0'	75°35.5'	1835.2
G	33°55.0'	77°01.5'	1901.0
	33°20.9'	76°01.0'	1926.5
I	33°38.2'	77°29.7'	1956.5
	32°57.2'	76°16.7'	1935.2
K	33°22.0'	78°01.1'	2007.1
	32°43.7'	76°54.7'	2024.3
M	33°00.8'	78°20.0'	2054.2
	32°22.9'	77°13.1'	2034.1
O	32°43.6'	78°47.5'	2111.5
	32°03.3'	77°37.7'	2140.8
Q	32°21.8'	79°07.4'	2225.7
	31°42.2'	77°56.6'	2152.5
S	31°59.0'	79°21.0'	2245.7
	31°25.7'	78°21.0'	2301.1

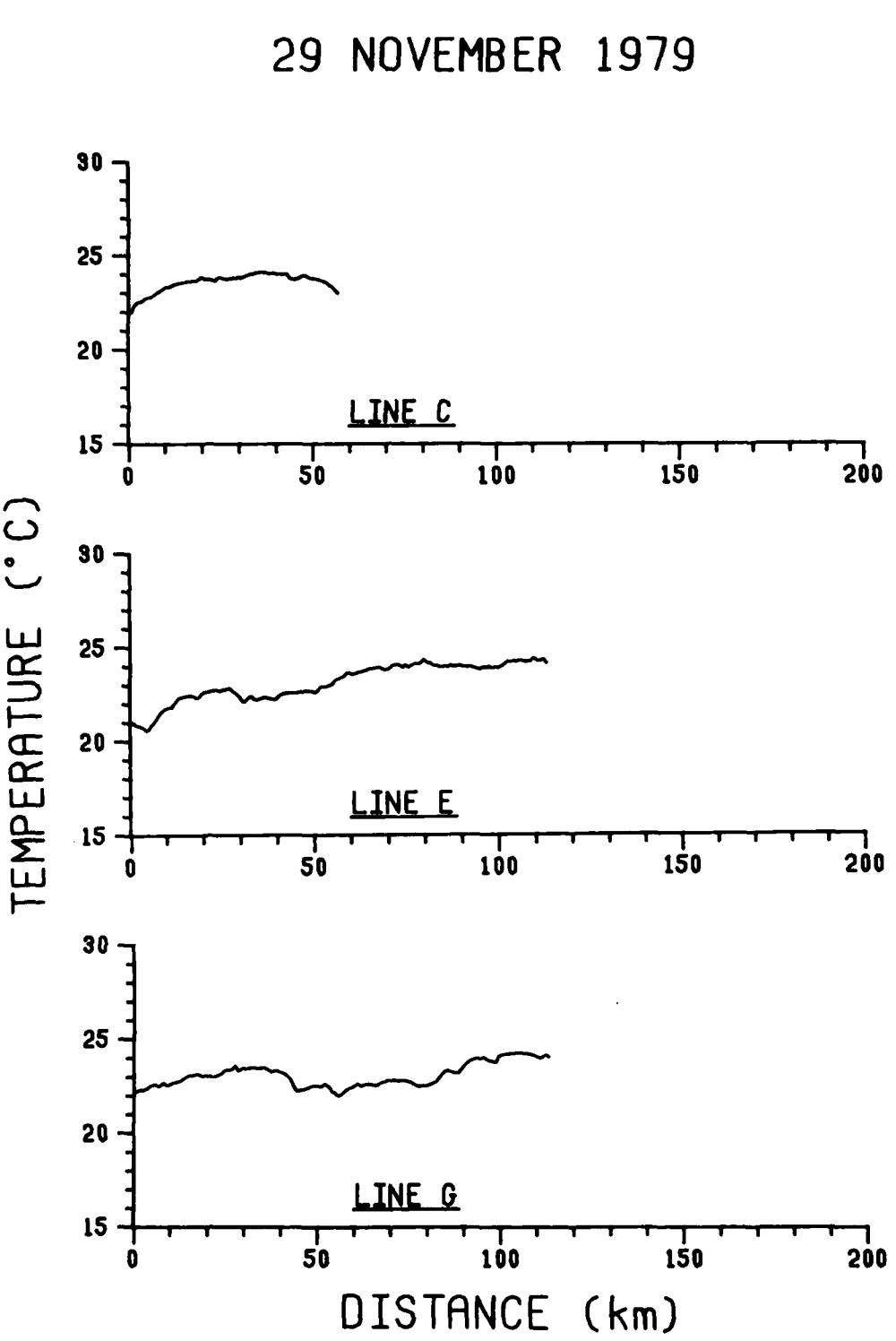


Figure 102. PRT cross-stream surface temperature profiles, 29 November 1979.

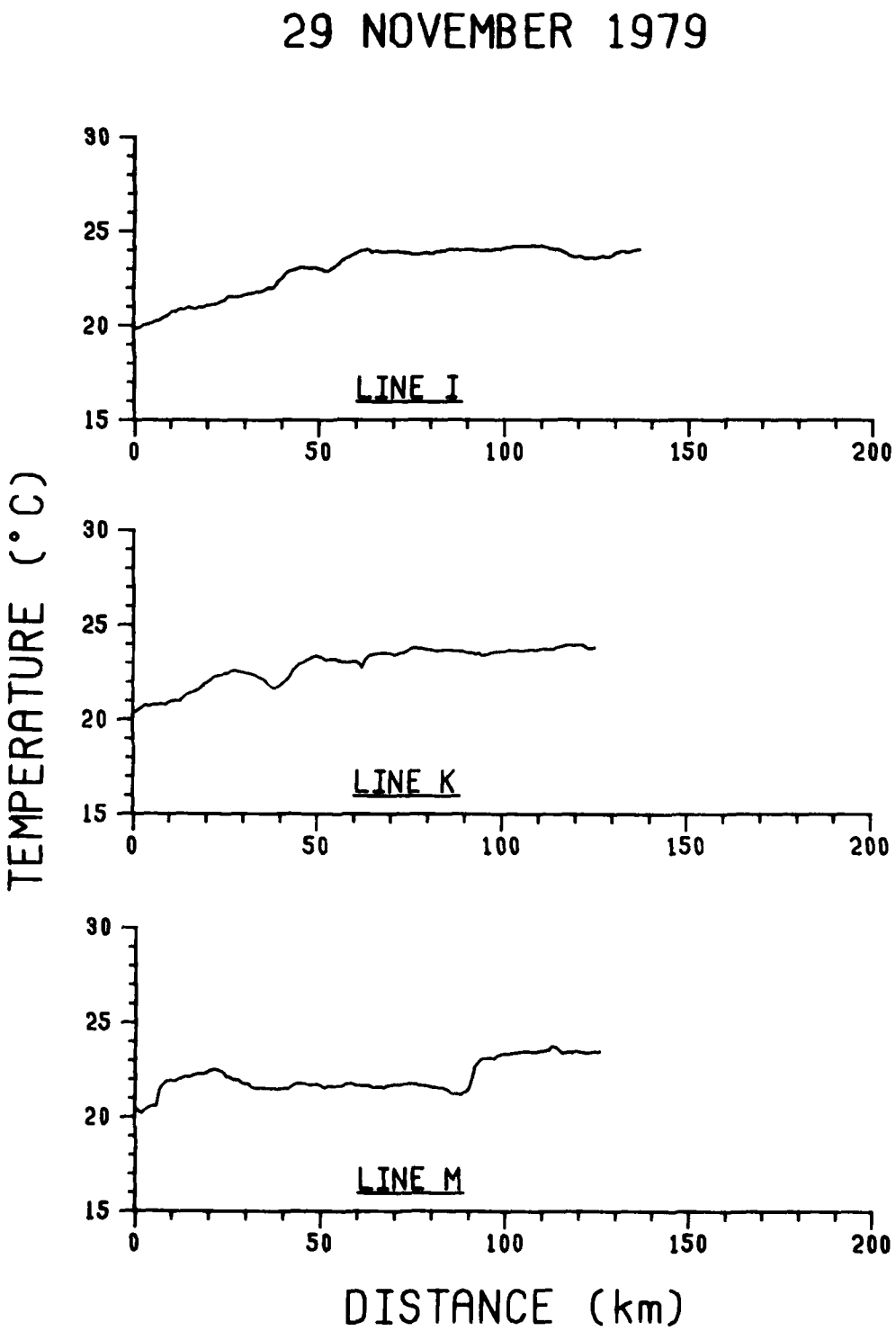


Figure 102 (cont'd).

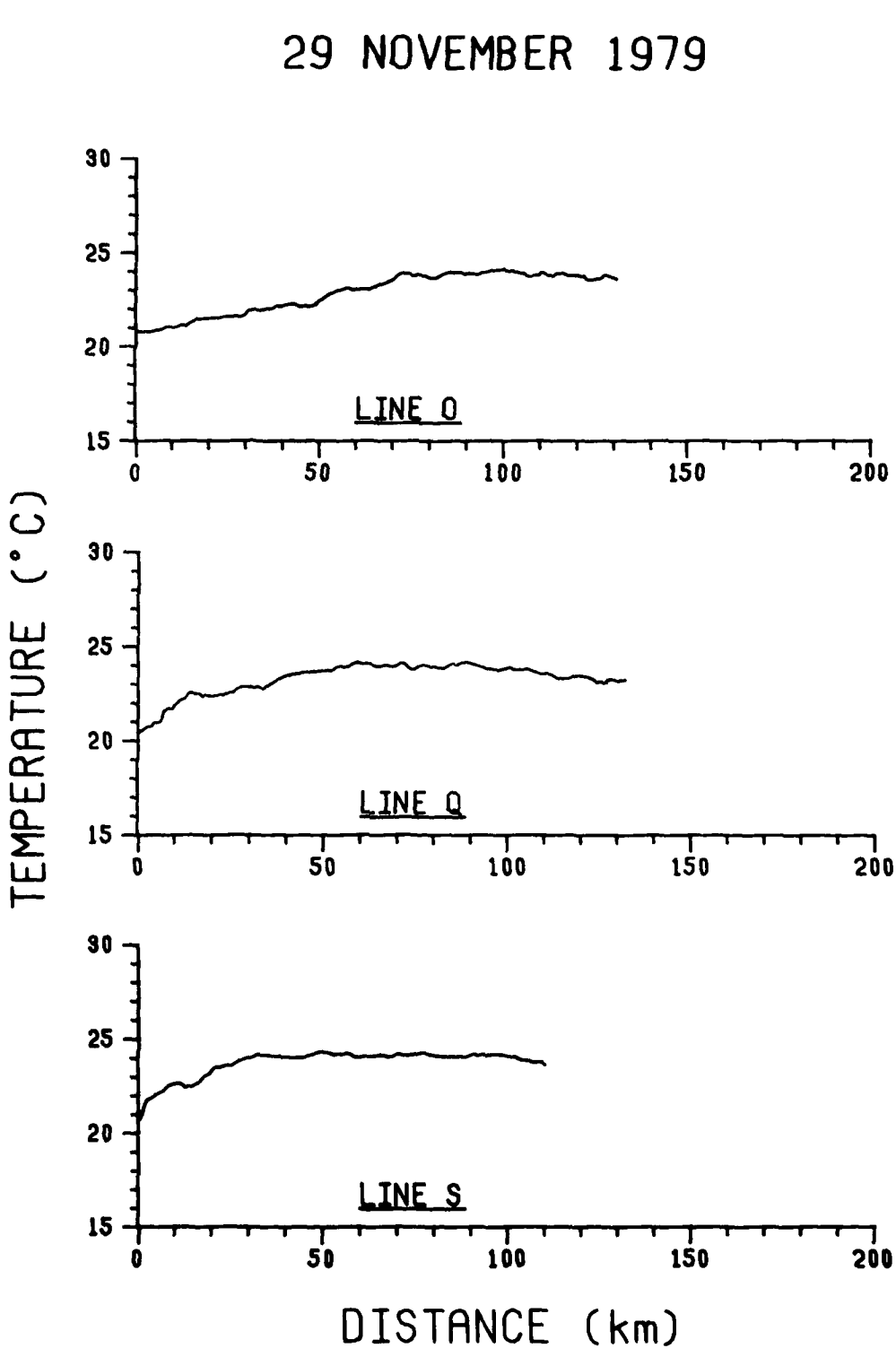


Figure 102 (cont'd).

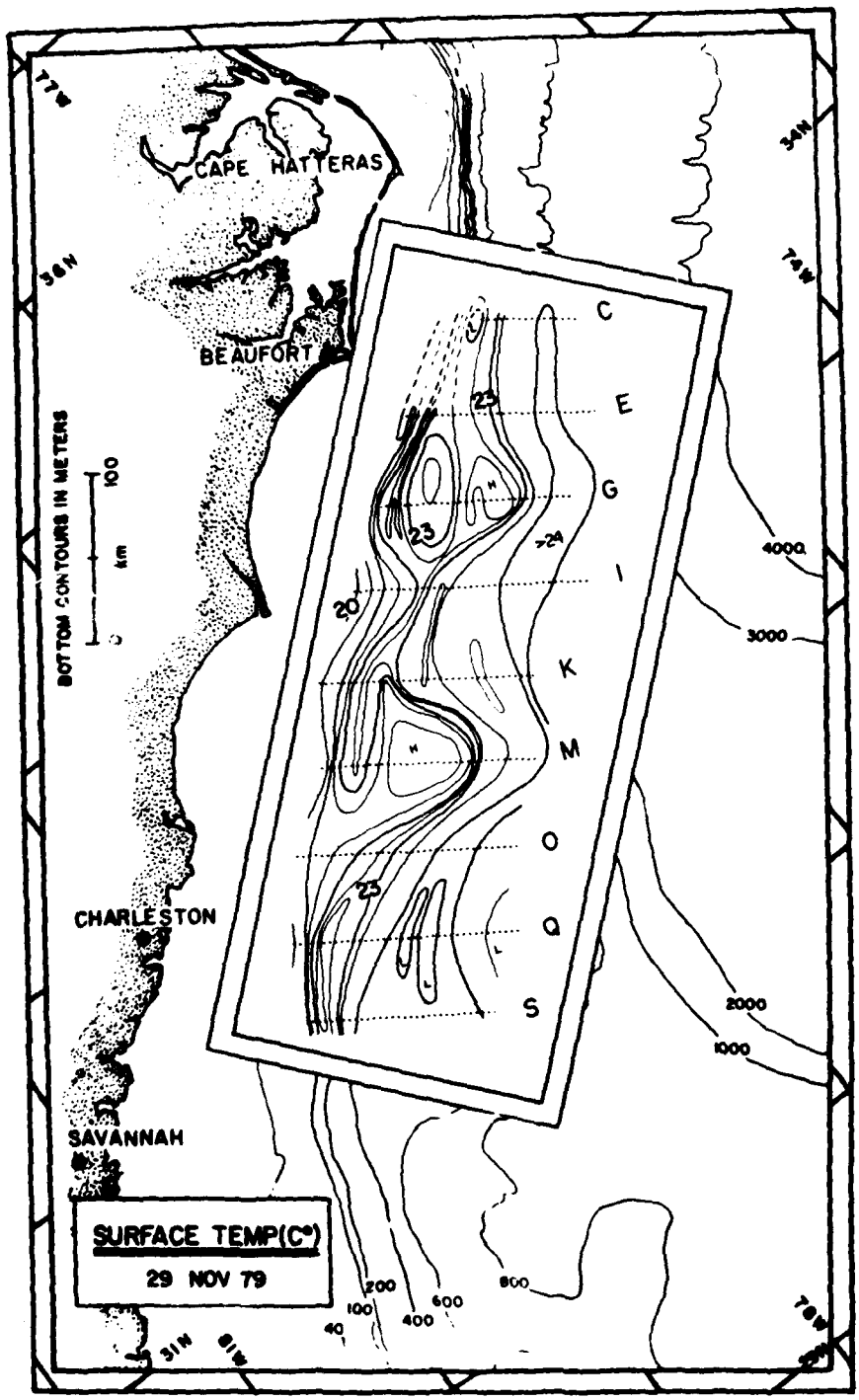


Figure 103. PRT sea surface temperature field, 29 November 1979. Dashed lines indicate positions of cross-stream data lines. Contour Intervals: 1.0° below 20°C; 0.5° above 20°C.

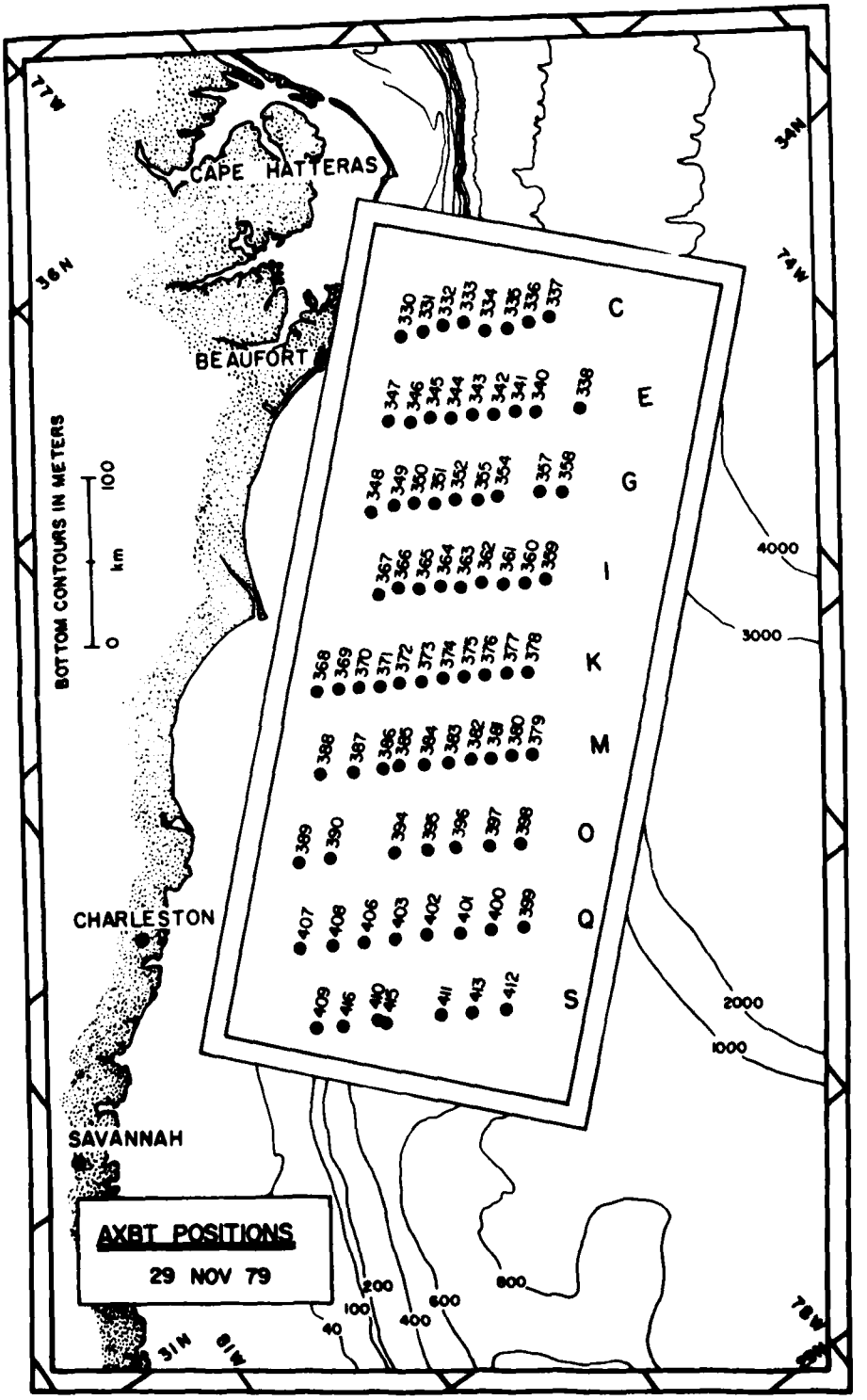


Figure 104. AXBT station locations, 29 November 1979.

Table 15. 29 November 1979. AXBT station coordinates, depths, and deployment times.

AXBT Station Number	Latitude (°N)	Longitude (°W)	Depth of Trace (m)	Time-GMT (Hr-Min)
330	34°31.9'	76°10.2'	35	1811.5
331	34°28.6'	76°02.5'	40	1813.4
332	34°26.4'	75°54.9'	87	1815.1
333	34°22.5'	75°47.9'	370	1816.8
334	34°16.2'	75°43.6'	370	1818.6
335	34°12.2'	75°37.0'	370	1820.5
336	34°09.9'	75°29.0'	370	1822.3
337	34°06.5'	75°21.7'	370	1824.1
338	33°38.0'	75°35.5'	370	1835.2
340	33°45.7'	75°49.0'	370	1839.3
341	33°50.3'	75°55.1'	370	1841.4
342	33°54.1'	76°01.8'	370	1843.2
343	33°58.2'	76°08.2'	370	1845.1
344	34°01.7'	76°15.2'	175	1846.9
345	34°06.1'	76°21.4'	63	1848.8
346	34°09.2'	76°28.6'	40	1850.6
347	34°14.1'	76°34.5'	37	1852.5
348	33°55.0'	77°01.5'	35	1901.0
349	33°51.8'	76°53.9'	39	1902.9
350	33°48.3'	76°47.3'	48	1904.5
351	33°43.8'	76°41.2'	77	1906.3
352	33°40.6'	76°34.0'	220	1907.9
354	33°32.8'	76°20.9'	370	1911.4
355	33°36.3'	76°27.6'	370	1919.6
357	33°25.4'	76°07.2'	370	1924.8
358	33°20.9'	76°01.0'	370	1926.5
359	33°02.6'	76°26.9'	370	1938.2
360	33°06.1'	76°33.8'	370	1940.2
361	33°10.1'	76°40.3'	370	1942.2
362	33°14.9'	76°46.2'	370	1944.2
363	33°18.0'	76°53.4'	300	1946.1
364	33°22.6'	76°59.4'	170	1948.0
365	33°26.0'	77°06.3'	58	1949.9
366	33°30.5'	77°12.5'	39	1951.8
367	33°33.4'	77°19.9'	35	1953.7

(continued)

Table 15. (cont'd)

AXBT Station Number	Latitude (°N)	Longitude (°W)	Depth of Trace (m)	Time-GMT (Hr-Min)
368	33°22.0'	78°01.1'	30	2007.1
369	33°18.2'	77°54.3'	34	2008.8
370	33°14.4'	77°47.8'	38	2010.5
371	33°10.4'	77°41.3'	50	2012.2
372	33°06.9'	77°34.7'	137	2013.8
373	33°02.9'	77°28.0'	220	2015.6
374	32°59.3'	77°21.1'	302	2017.3
375	32°55.8'	77°14.3'	370	2019.1
376	32°51.9'	77°07.6'	370	2020.8
377	32°47.7'	77°01.1'	370	2022.6
378	32°43.7'	76°54.7'	370	2024.3
379	32°22.9'	77°13.1'	370	2034.1
380	32°26.4'	77°19.8'	370	2036.1
381	32°30.2'	77°26.4'	370	2038.1
382	32°34.0'	77°32.1'	370	2040.2
383	32°37.7'	77°39.7'	370	2042.2
384	32°41.8'	77°47.3'	295	2044.5
385	32°47.0'	77°54.9'	270	2047.1
386	32°49.3'	78°00.0'	198	2048.3
387	32°55.0'	78°10.0'	95	2051.3
388	33°00.8'	78°20.0'	34	2054.2
389	32°43.6'	78°47.5'	35	2111.5
390	32°38.3'	78°37.3'	45	2114.0
394	32°26.6'	78°16.5'	290	2130.0
395	32°20.6'	78°06.6'	370	2132.7
396	32°15.6'	77°57.7'	370	2135.1
397	32°09.1'	77°47.3'	370	2138.1
398	32°03.3'	77°37.7'	370	2140.8
399	31°42.2'	77°56.6'	370	2152.5
400	31°48.2'	78°06.4'	370	2155.7
401	31°53.7'	78°16.6'	370	2158.8
402	31°59.9'	78°26.5'	370	2202.0
403	32°05.4'	78°36.8'	295	2205.2
406	32°11.1'	78°46.8'	310	2219.1
407	32°21.8'	79°07.4'	53	2225.7

(continued)

Table 15. (cont'd)

AXBT Station Number	Latitude (°N)	Longitude (°W)	Depth of Trace (m)	Time-GMT (Hr-Min)
408	32°16.3'	78°57.0'	180	2232.2
409	31°59.0'	79°21.0'	103	2245.7
410	31°48.4'	79°00.8'	370	2250.8
411	31°36.8'	78°41.1'	370	2256.2
412	31°25.7'	78°21.0'	370	2301.1
413	31°31.3'	78°31.3'	370	2312.2
415	31°46.7'	78°59.1'	370	2321.5
416	31°54.5'	79°12.9'	275	2326.1

29 NOVEMBER 1979

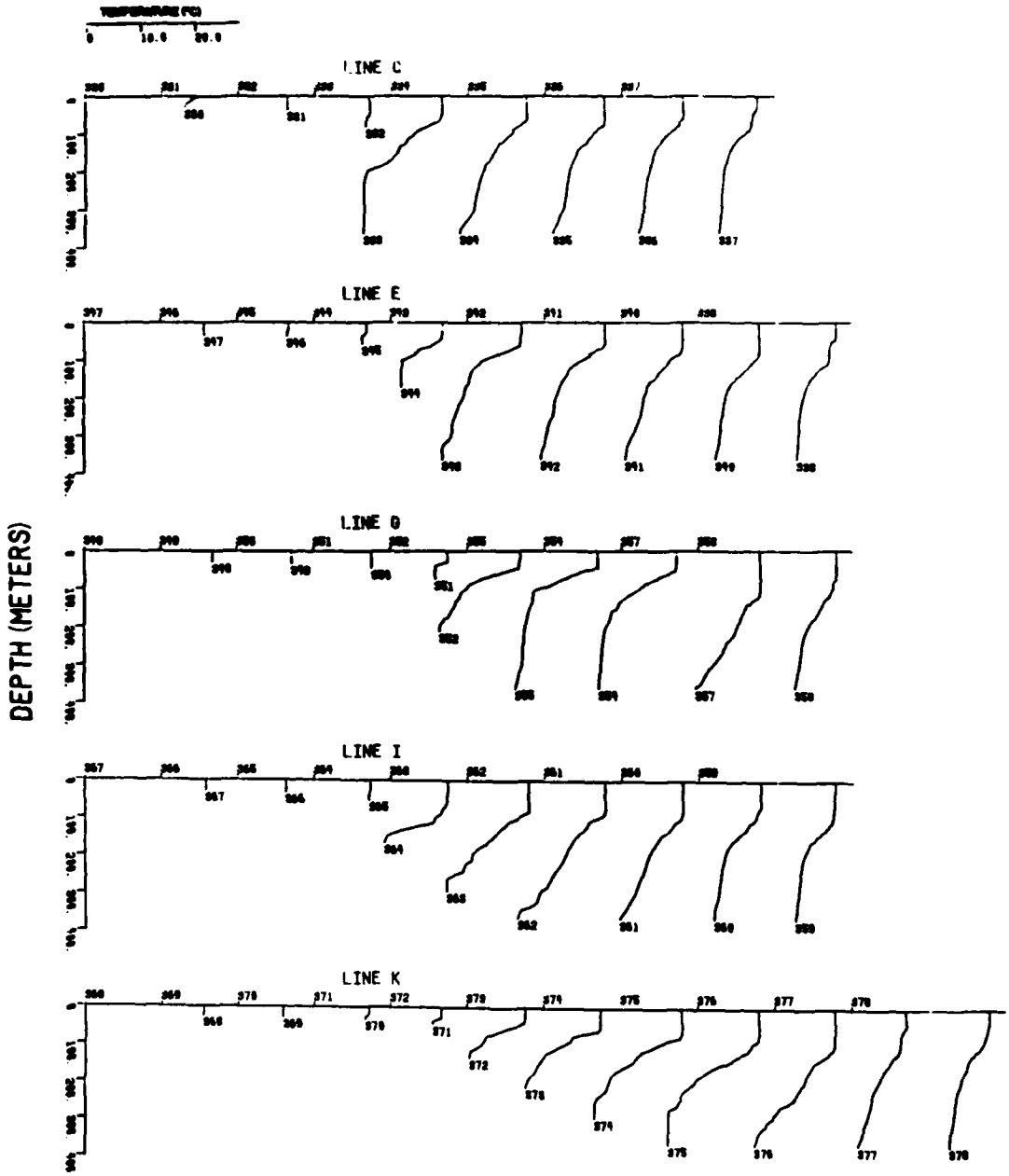


Figure 105. AXBT vertical temperature profiles, 29 November 1979.

29 NOVEMBER 1979

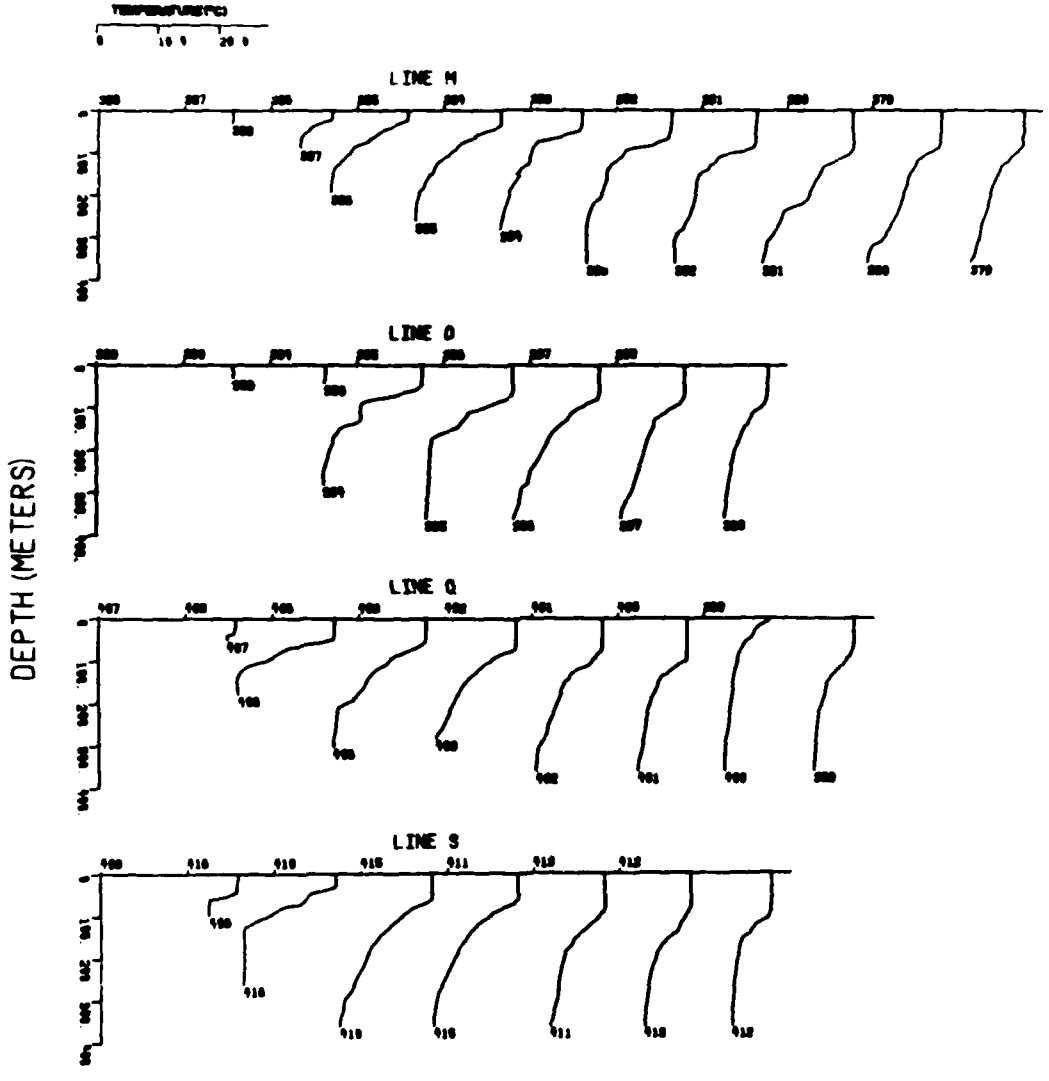


Figure 105 (cont'd).

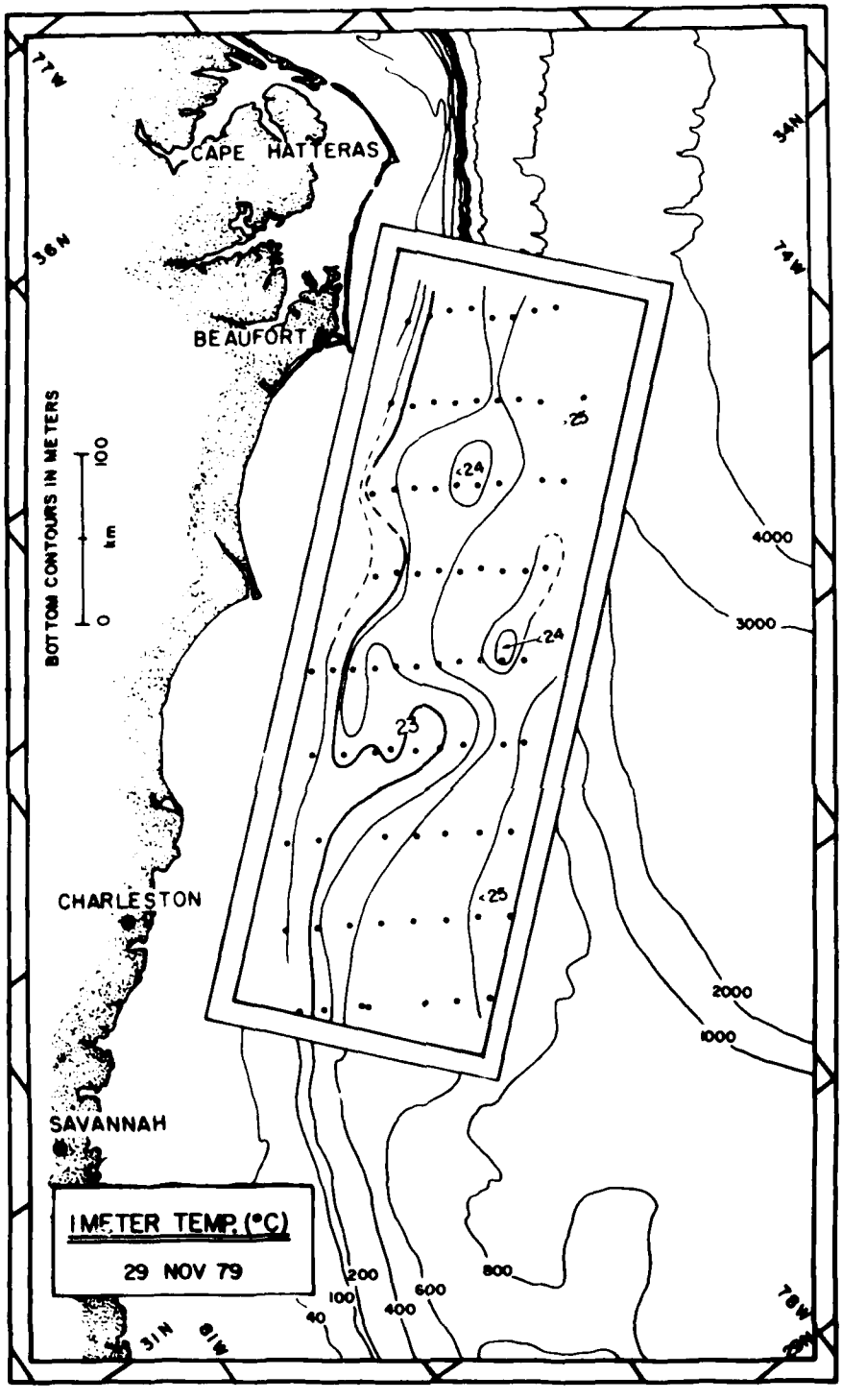


Figure 106. AXBT temperatures at 1 meter, 29 November 1979. Small solid circles indicate AXBT drop-sites.

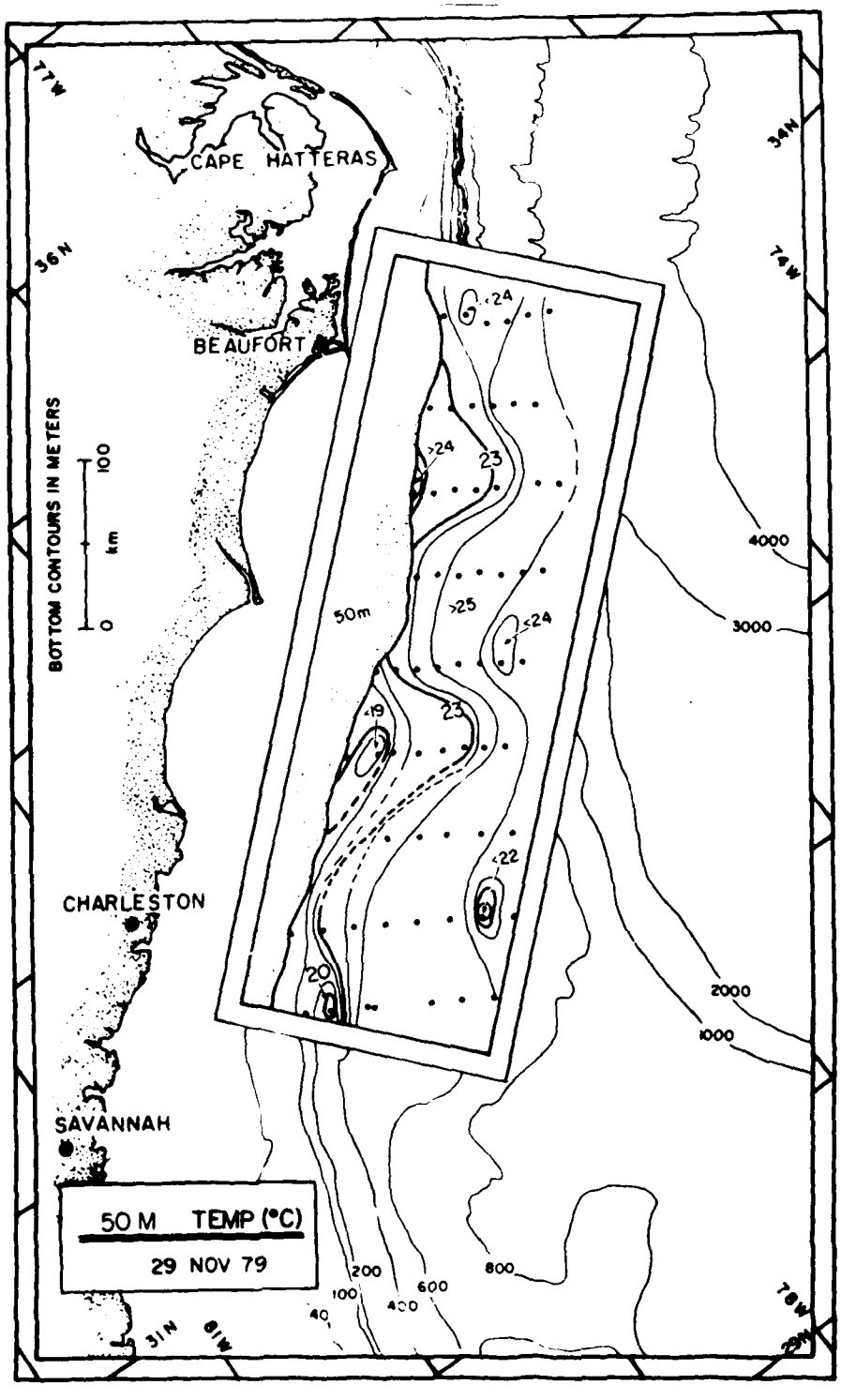


Figure 107. AXBT temperatures at 50 meters, 29 November 1979.

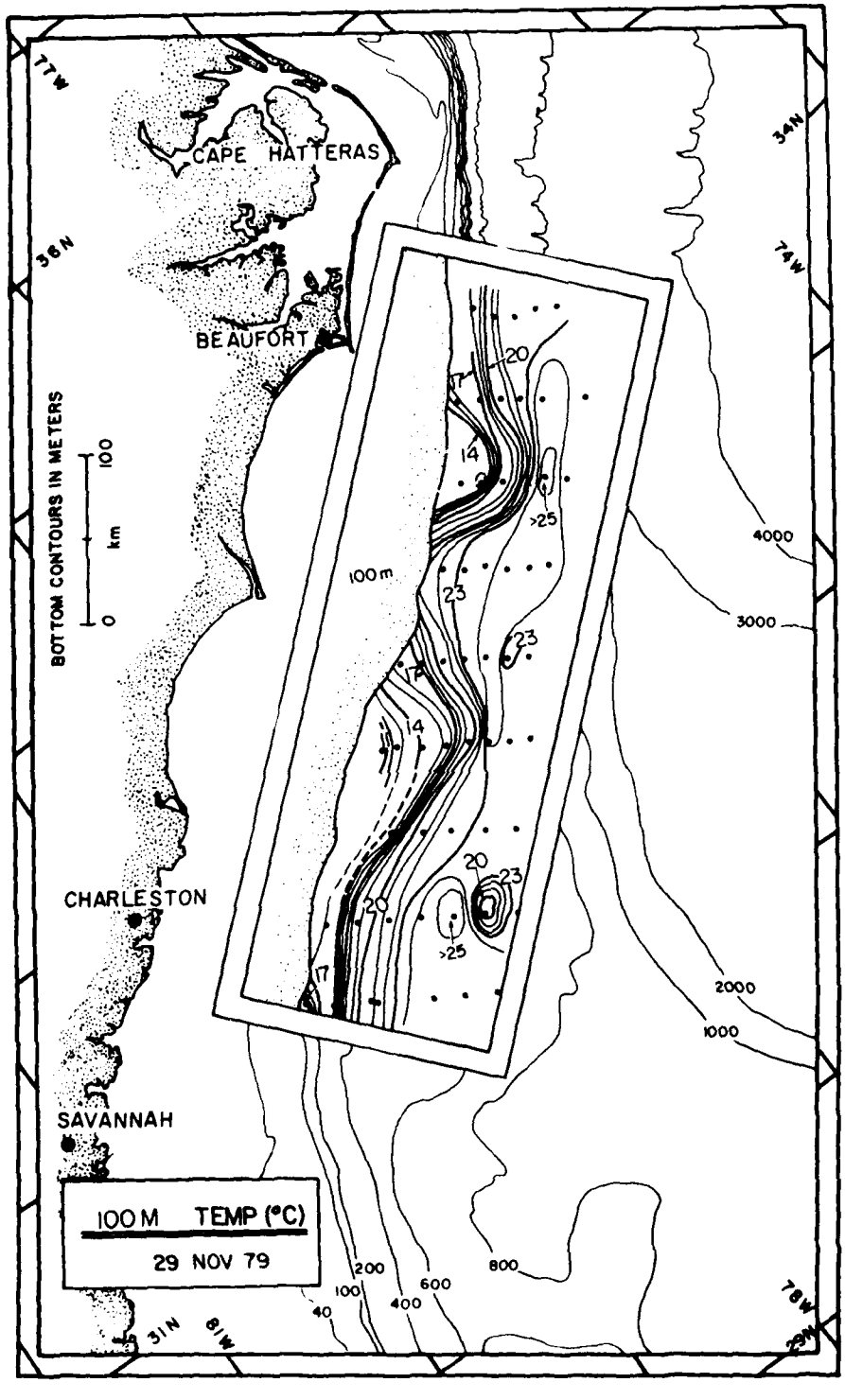


Figure 108. AXBT temperatures at 100 meters, 29 November 1979.

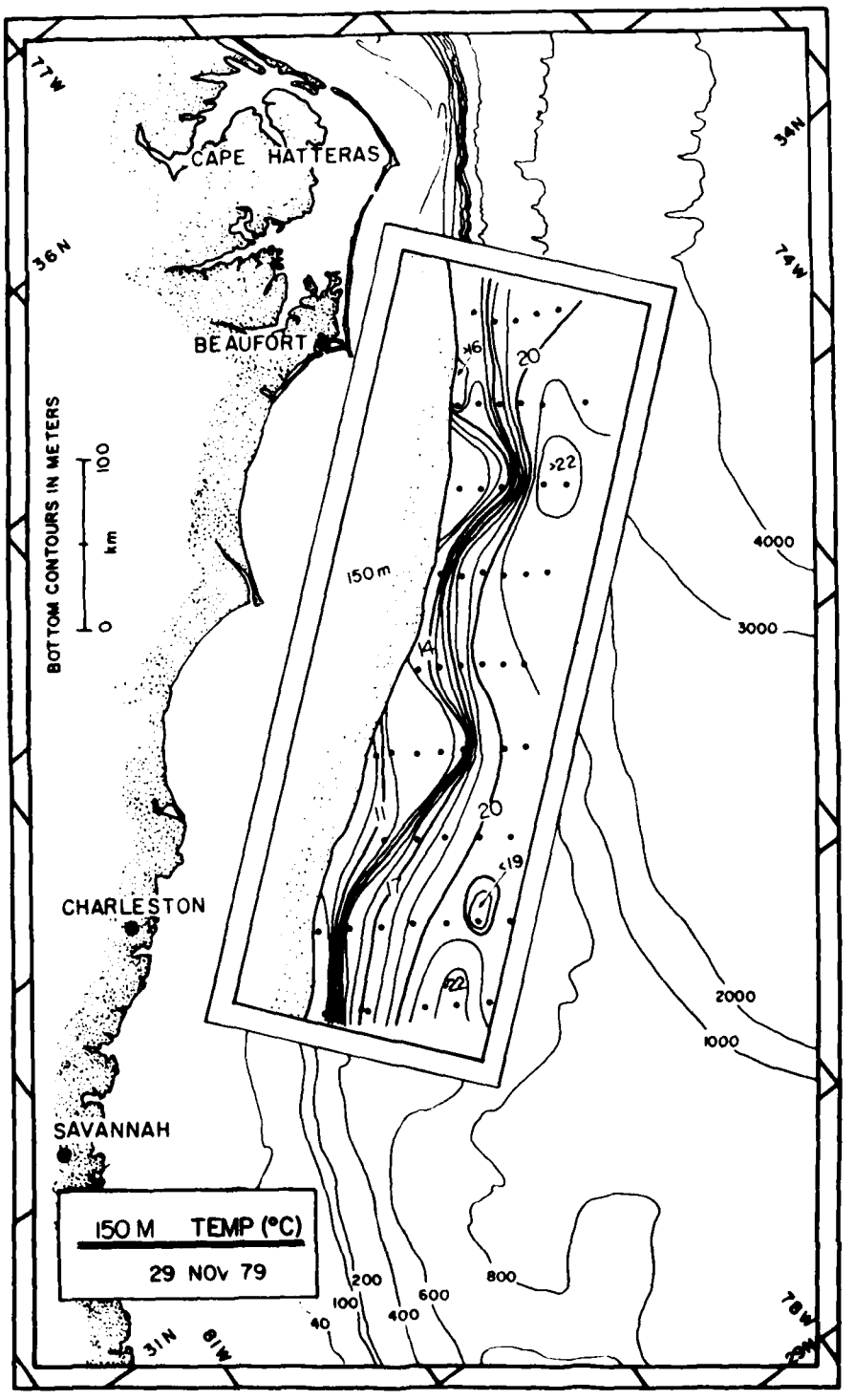


Figure 109. AXBT temperatures at 150 meters, 29 November 1979.

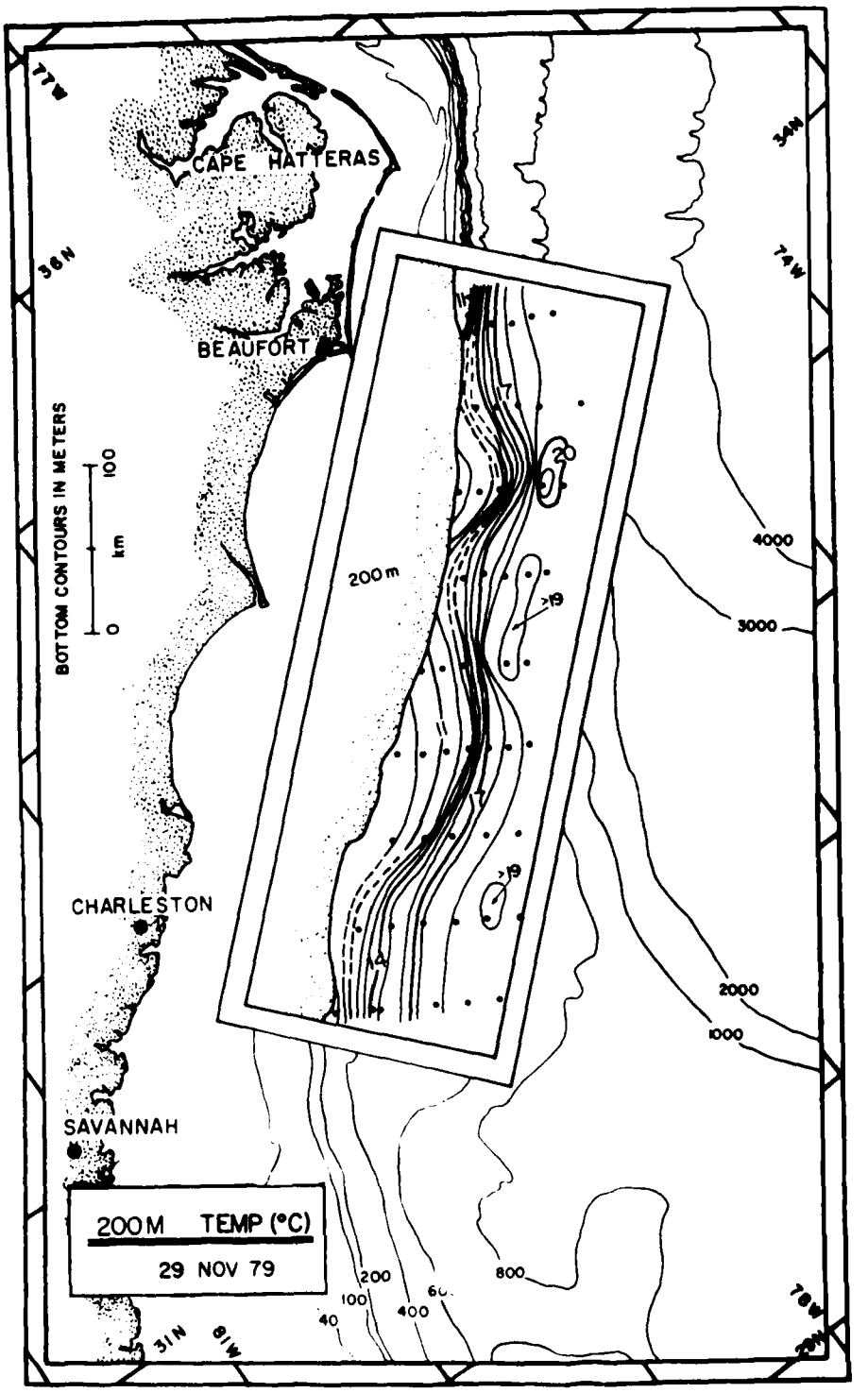


Figure 110. AXBT temperatures at 200 meters, 29 November 1979.

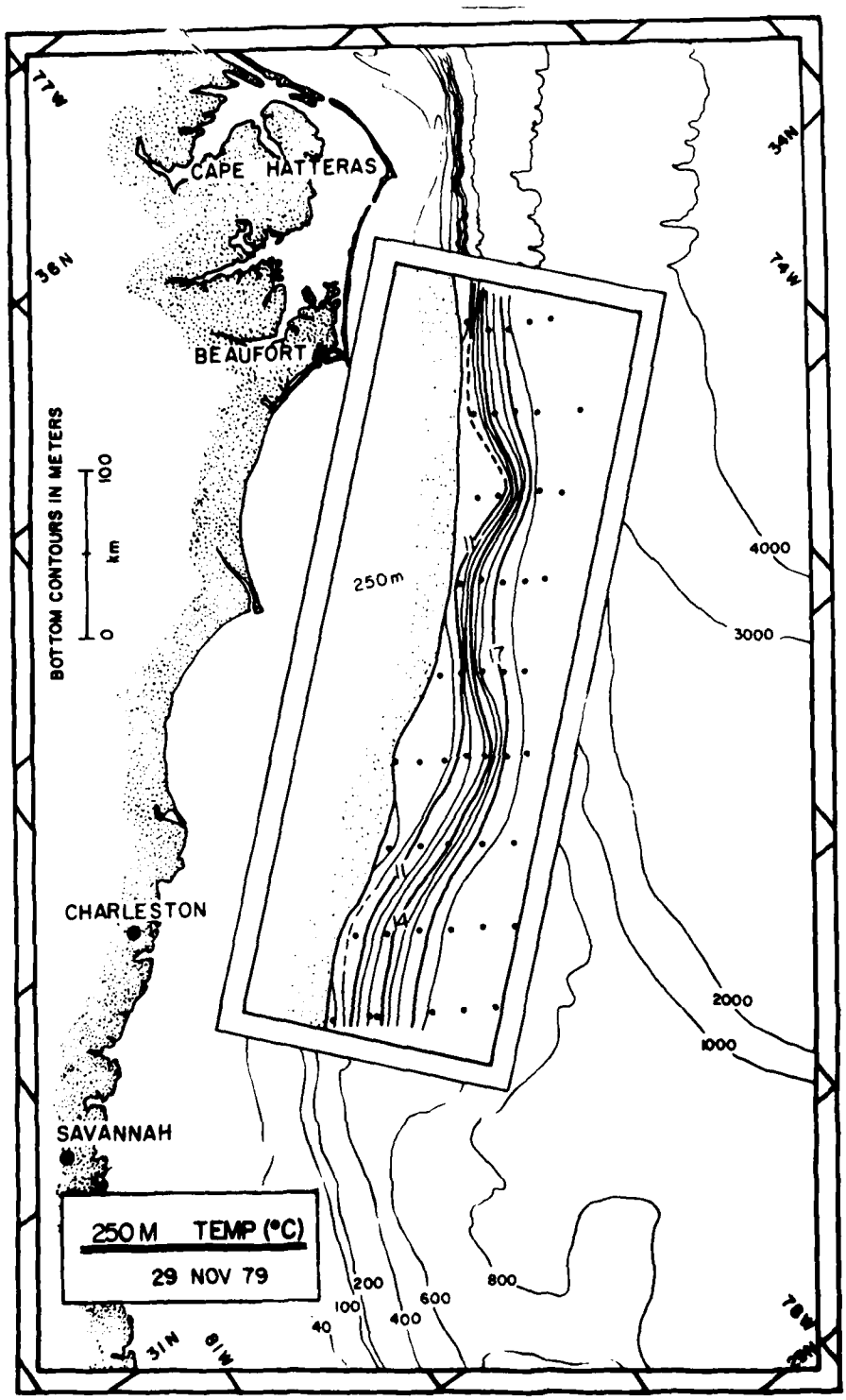


Figure 111. AXBT temperatures at 250 meters, 29 November 1979.

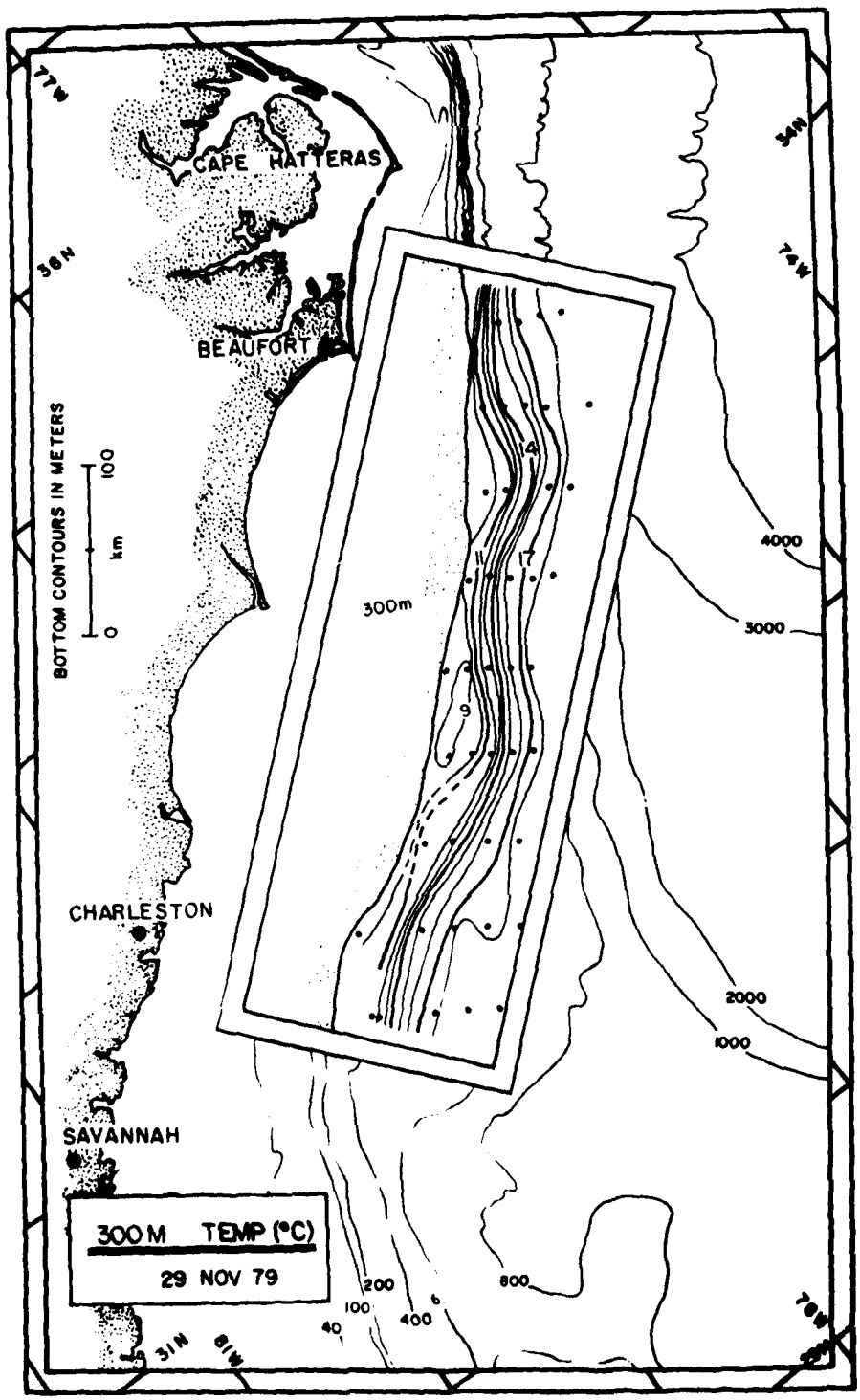


Figure 112. AXBT temperatures at 300 meters, 29 November 1979.

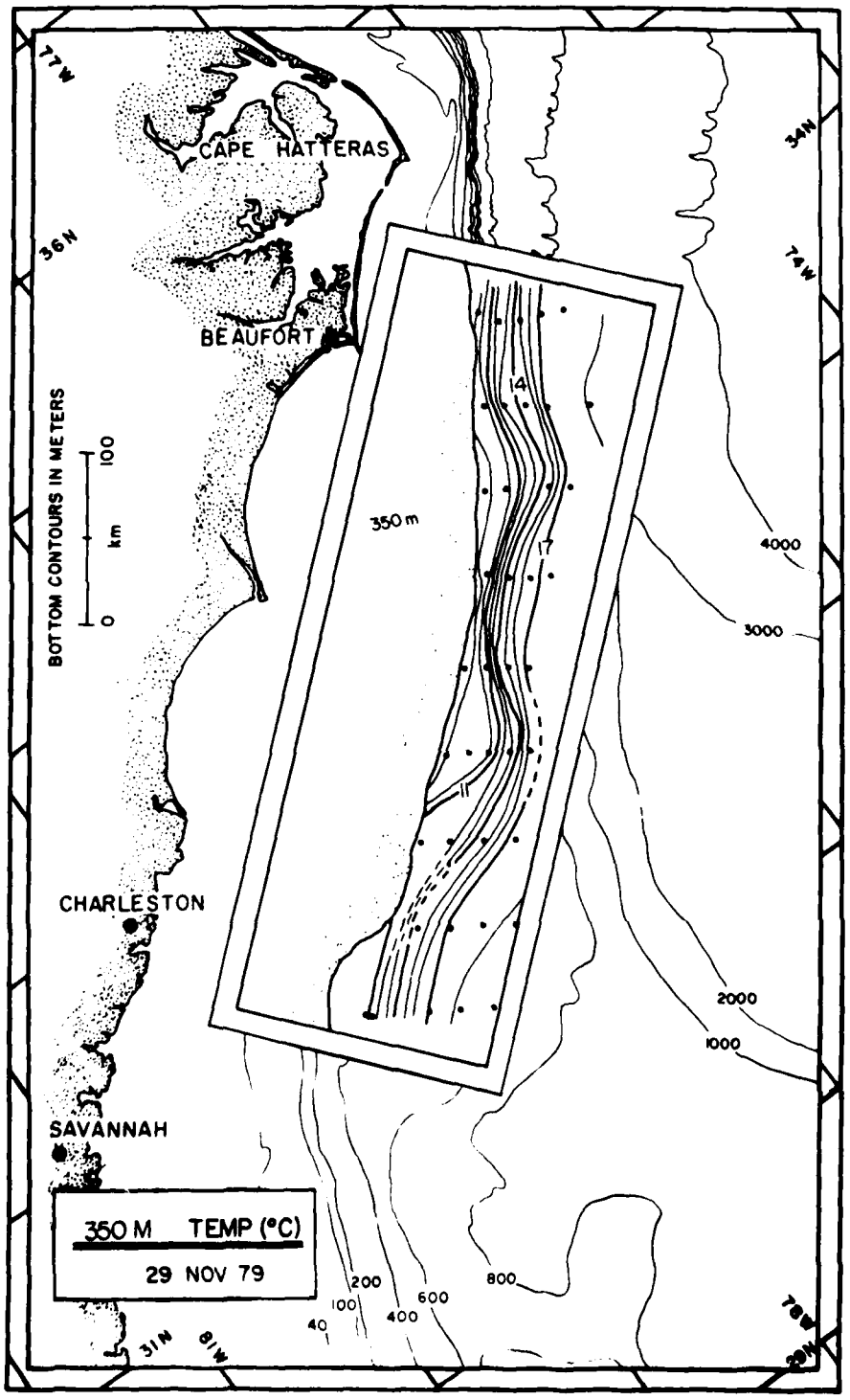


Figure 113. AXBT temperatures at 350 meters, 29 November 1979.

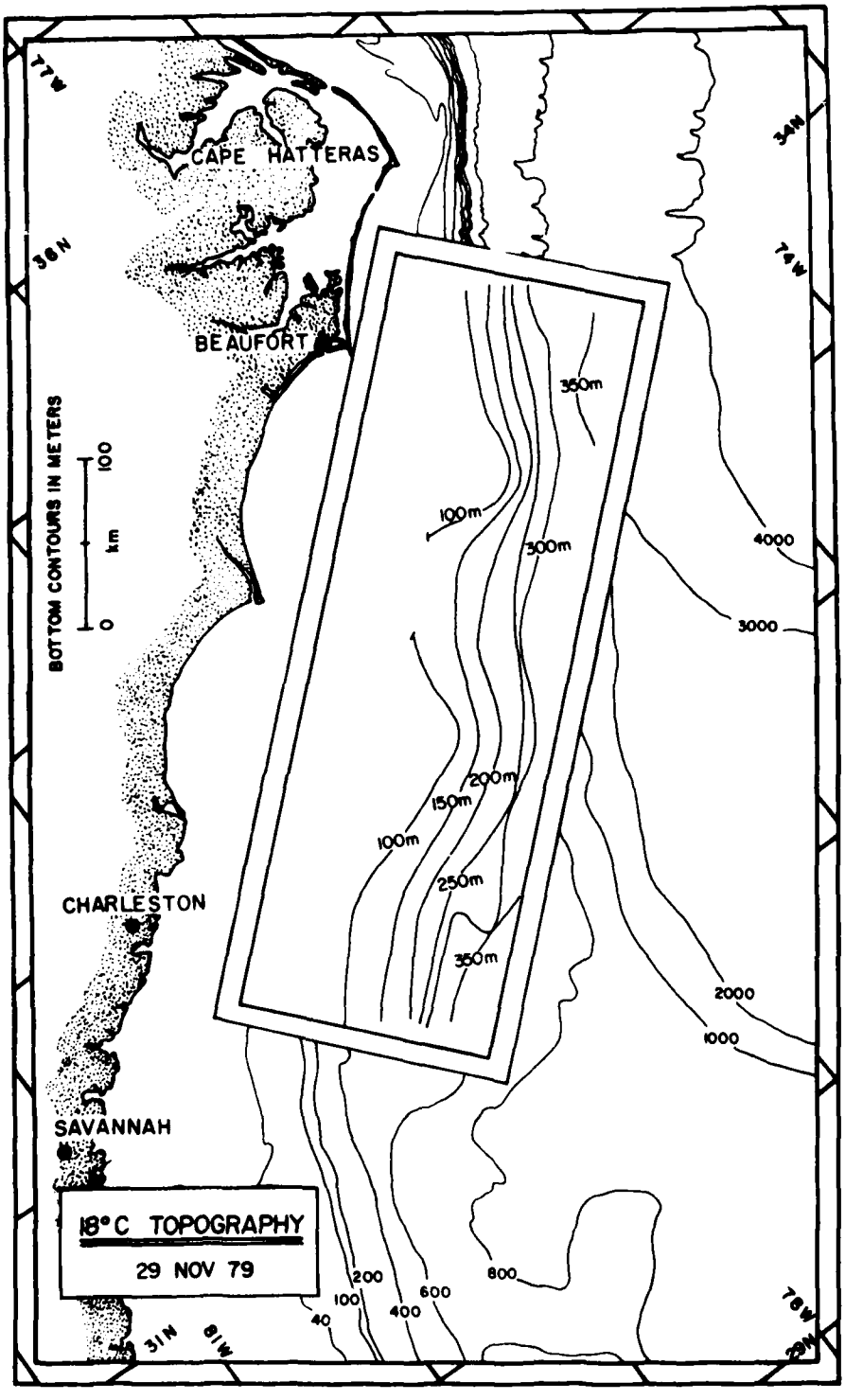


Figure 114. Topography of the 18°C isotherm, 29 November 1979.

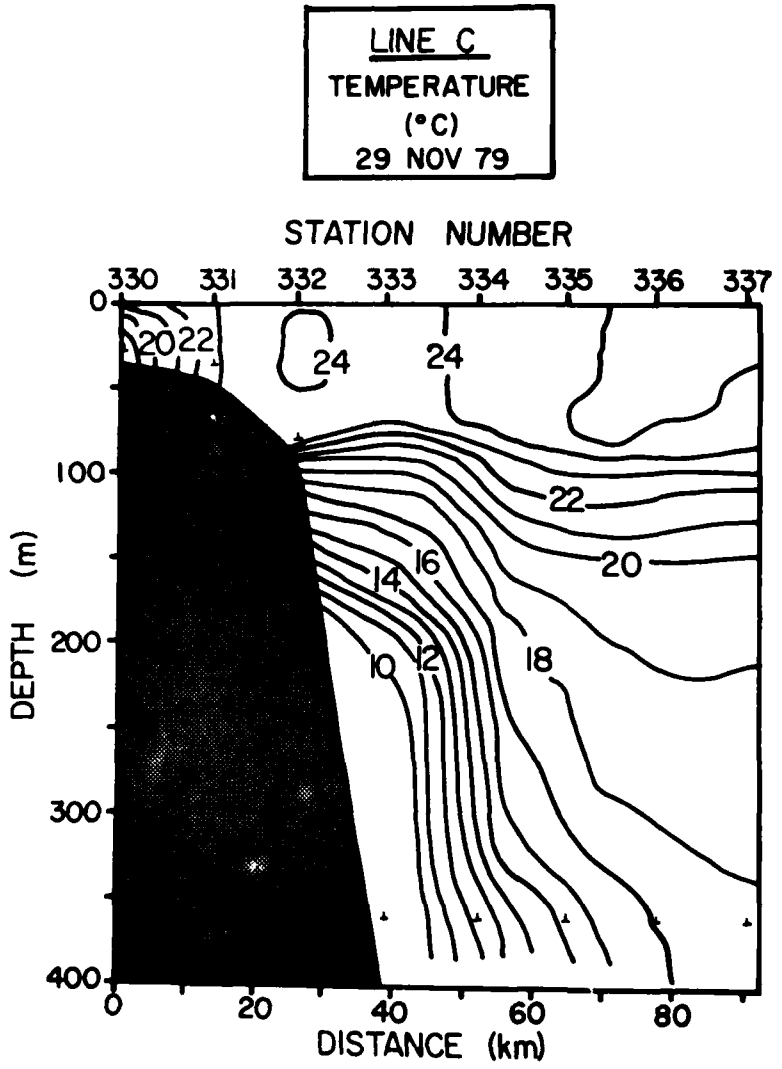


Figure 115. Cross-stream vertical temperature section along Line C, 29 November 1979.

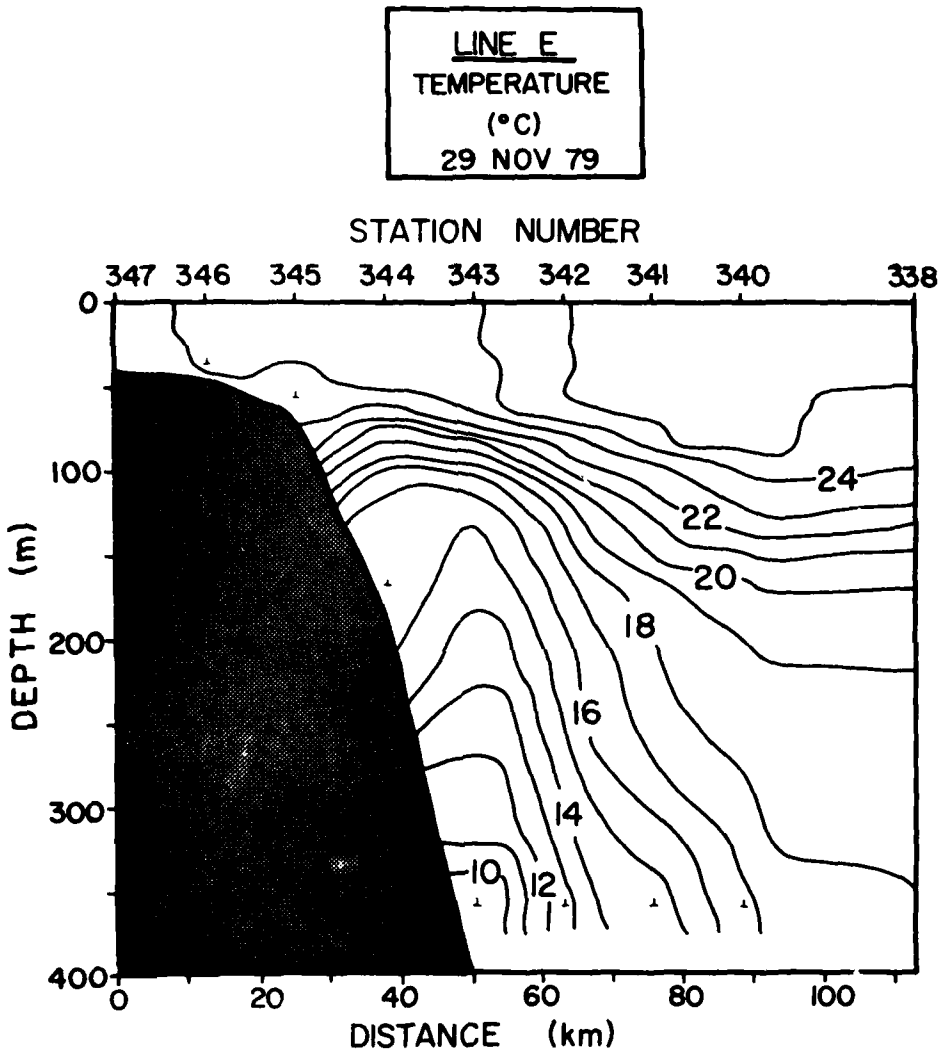


Figure 116. Cross-stream vertical temperature section along Line E, 29 November 1979.

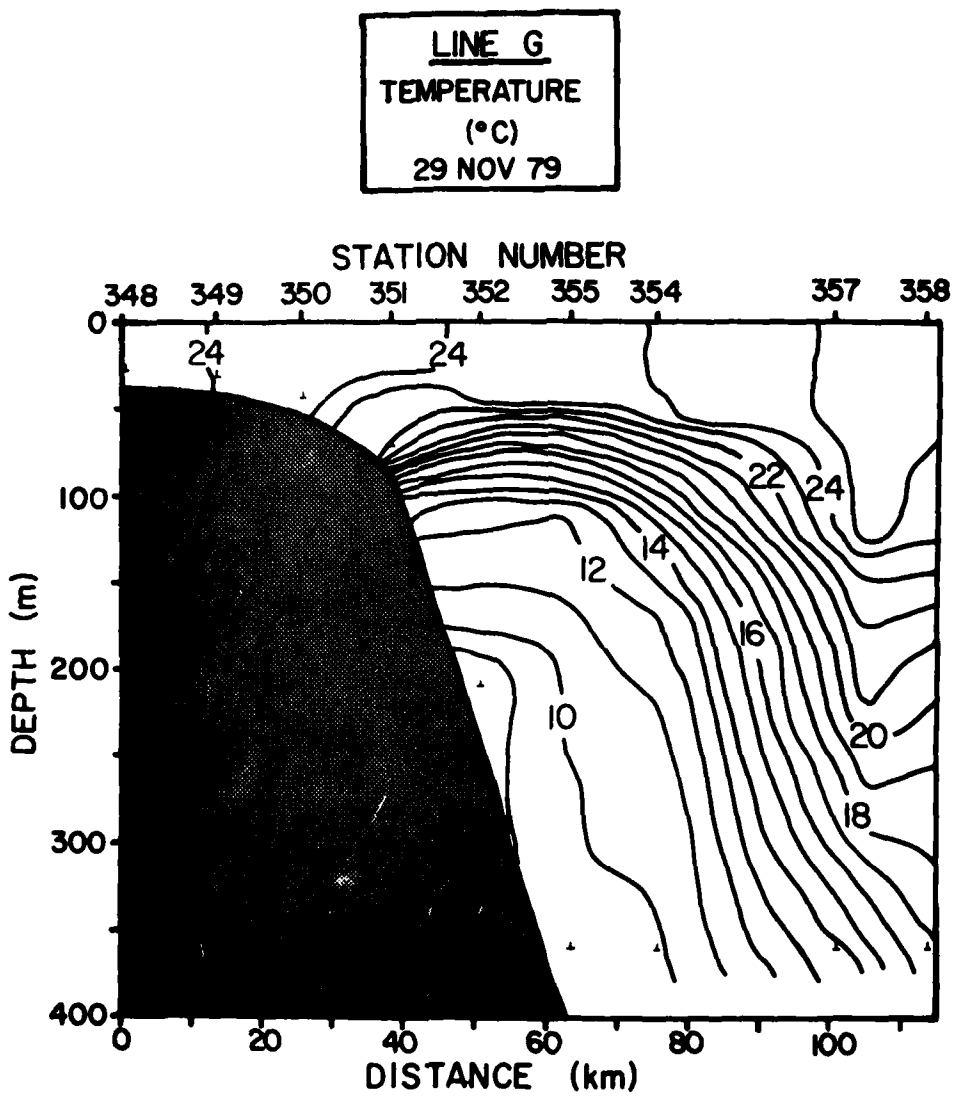


Figure 117. Cross-stream vertical temperature section along Line G, 29 November 1979.

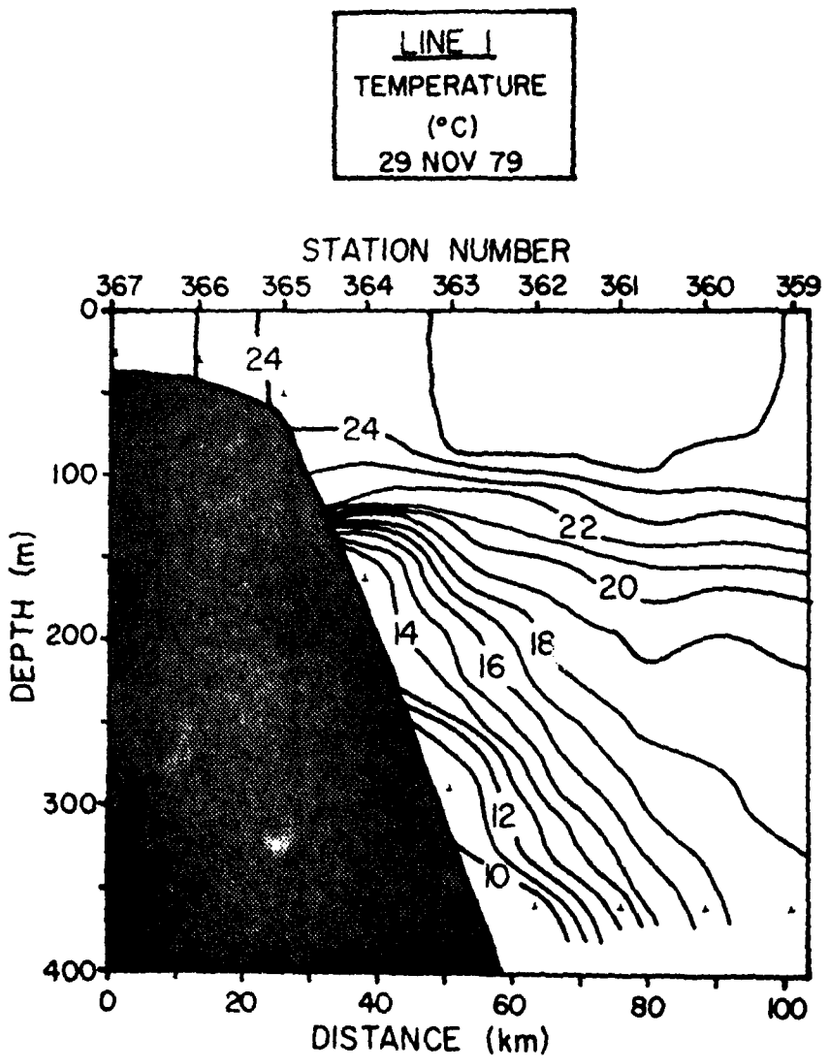


Figure 118. Cross-stream vertical temperature section along Line I, 29 November 1979.

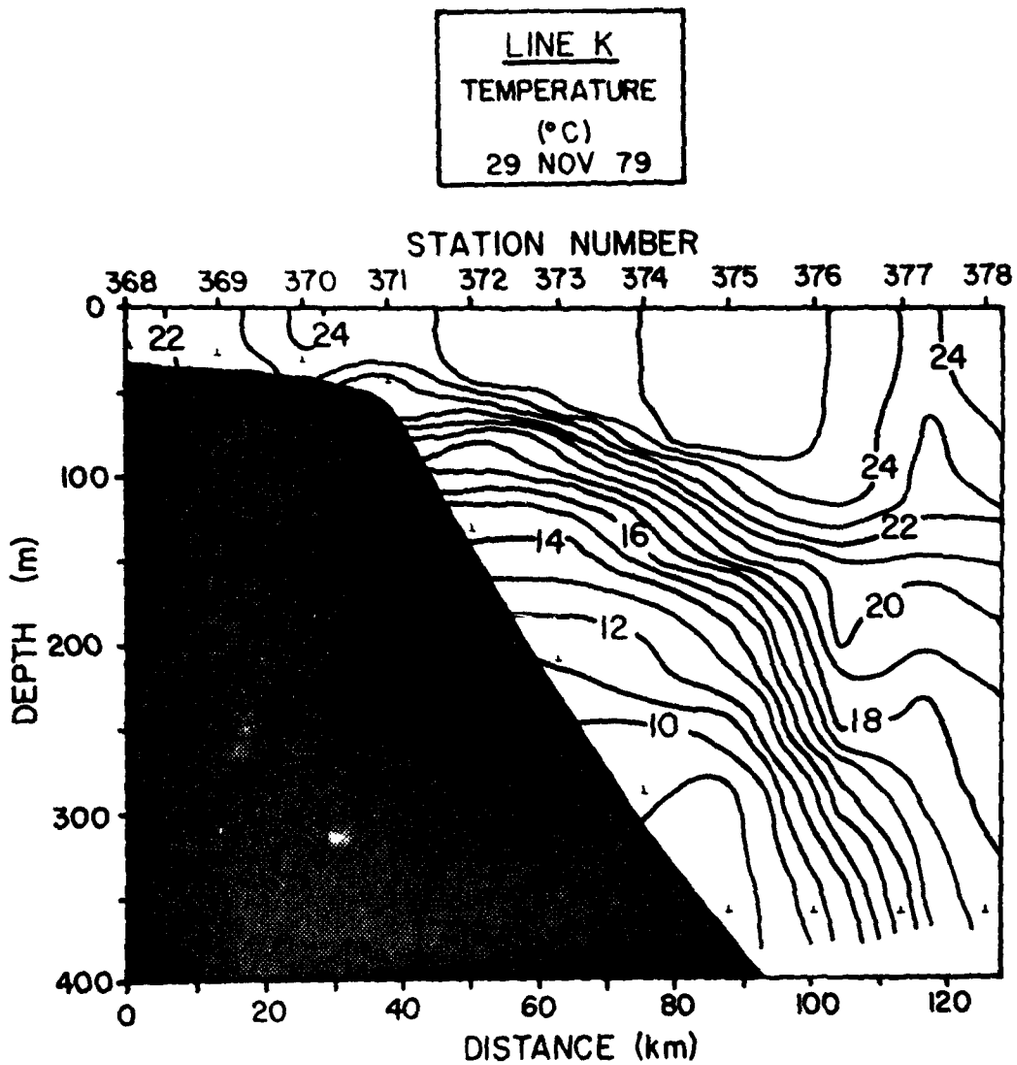


Figure 119. Cross-stream vertical temperature section along Line K, 29 November 1979.

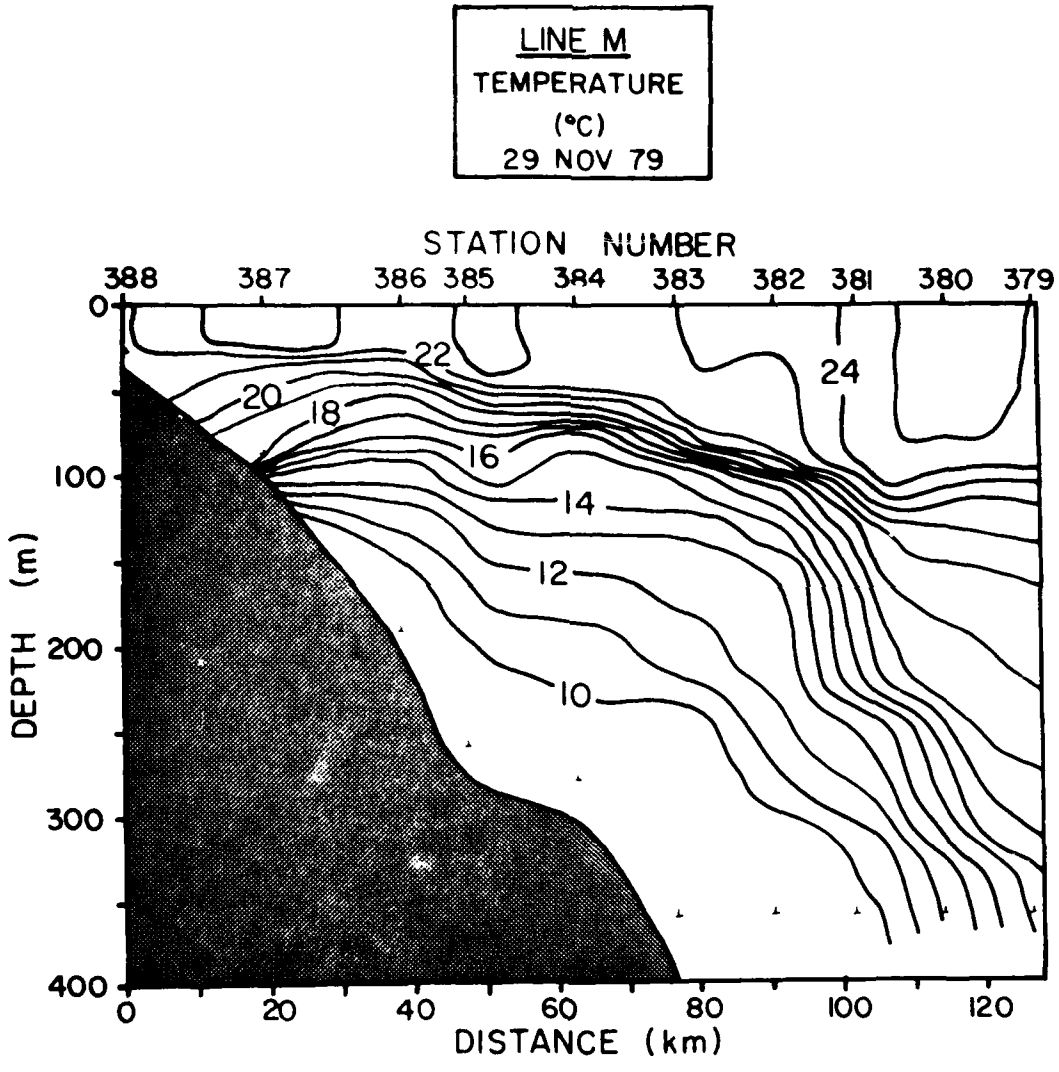


Figure 120. Cross-stream vertical temperature section along Line M, 29 November 1979.

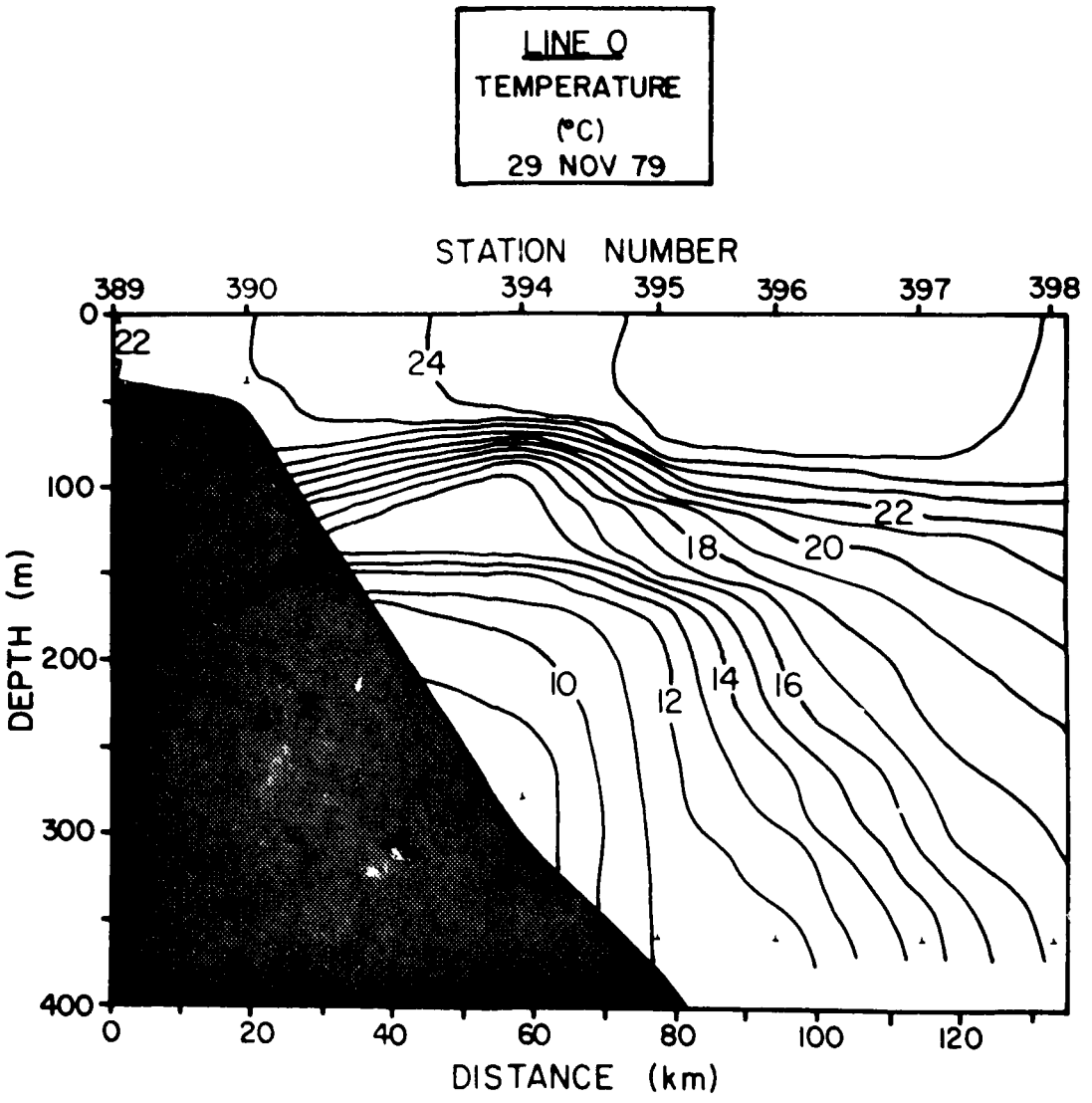


Figure 121. Cross-stream vertical temperature section along Line 0, 29 November 1979.

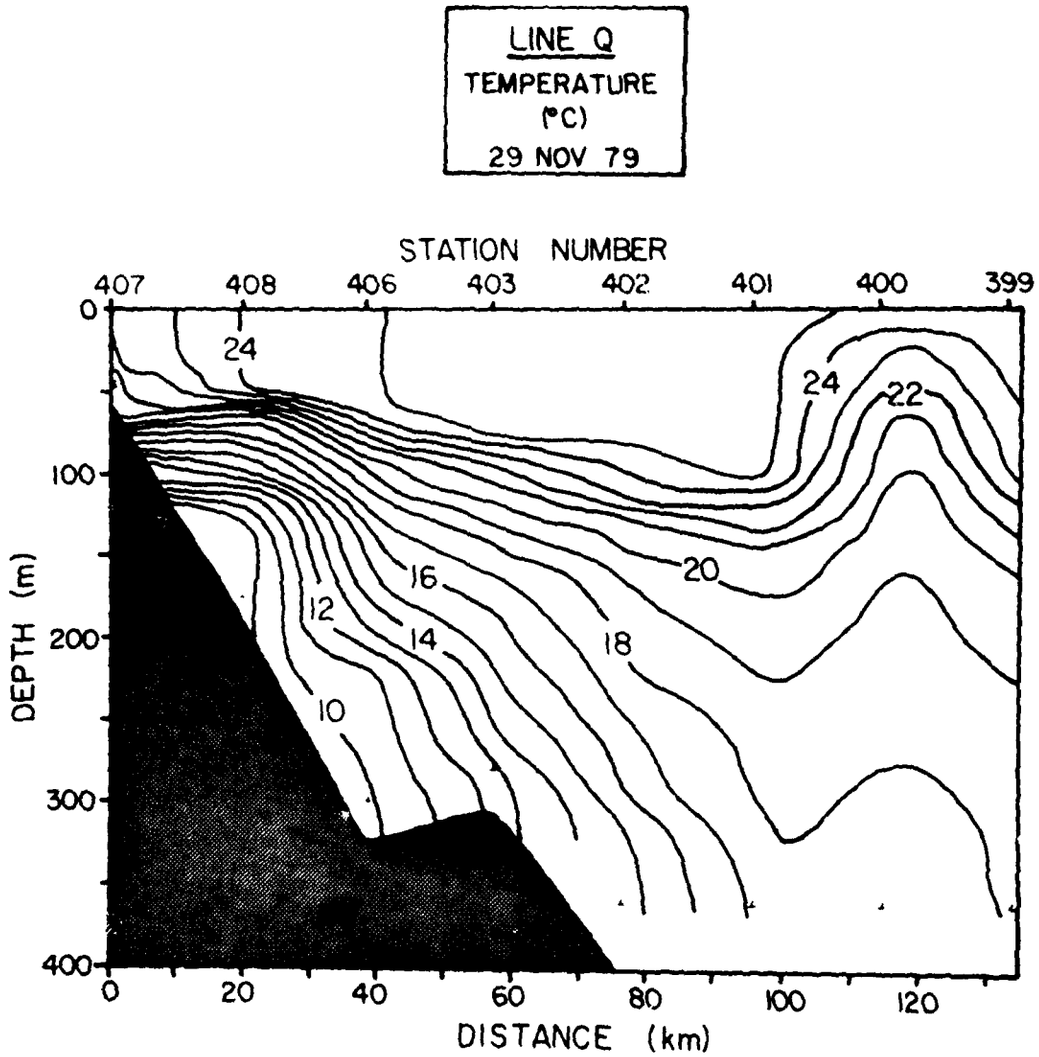


Figure 122. Cross-stream vertical temperature section along Line Q, 29 November 1979.

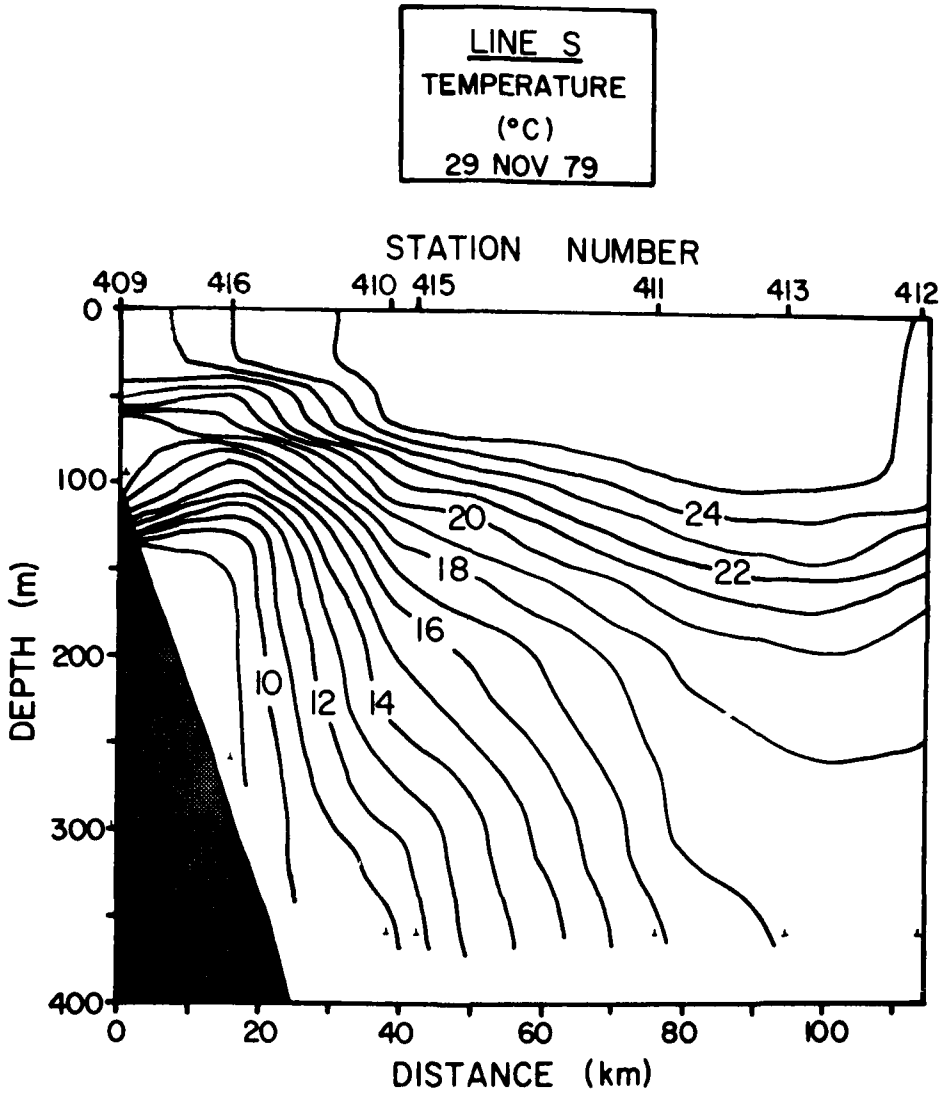


Figure 123. Cross-stream vertical temperature section along Line S, 29 November 1979.

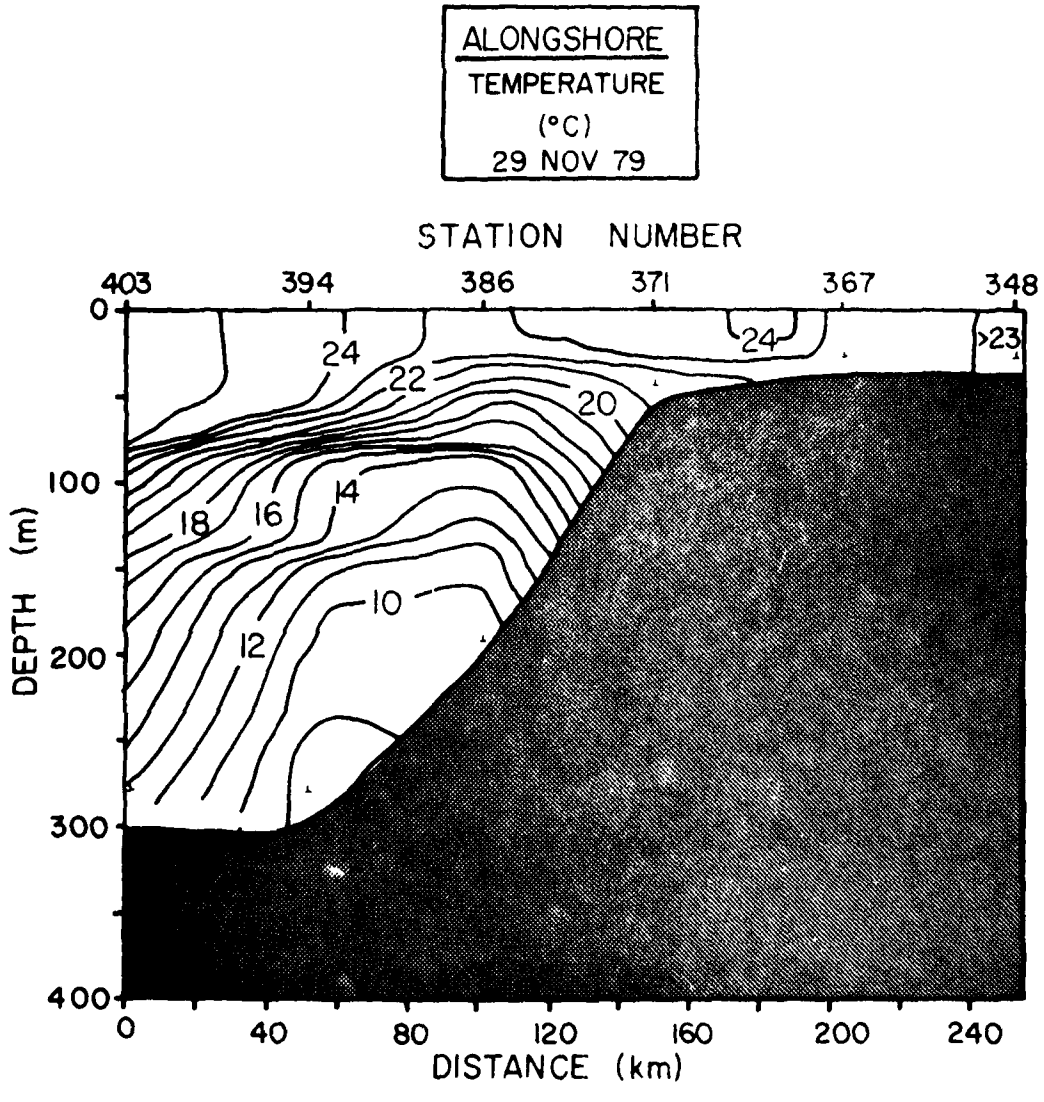


Figure 124. Alongshore vertical temperature section, 29 November 1979.

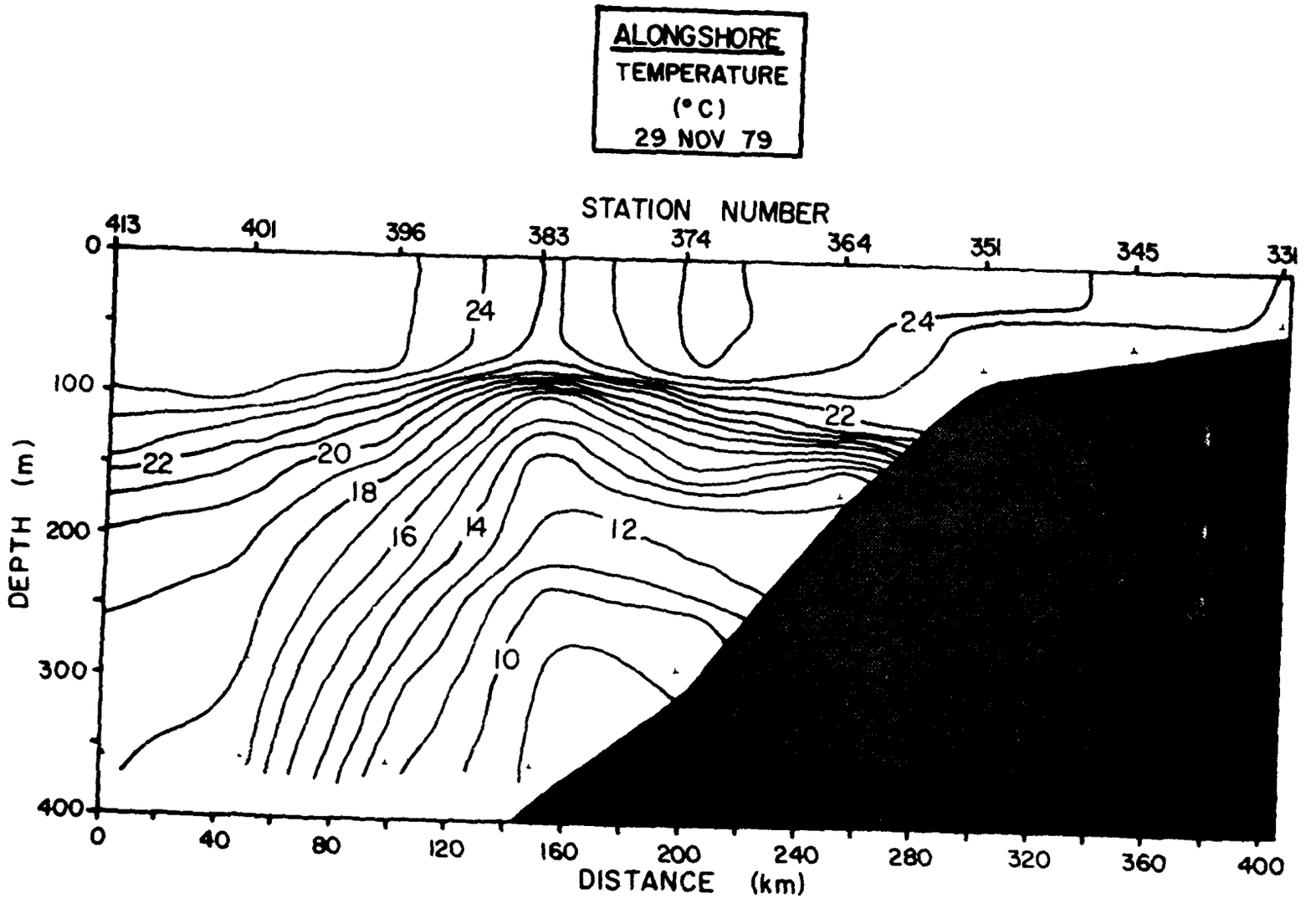


Figure 125. Alongshore vertical temperature section, 29 November 1979.

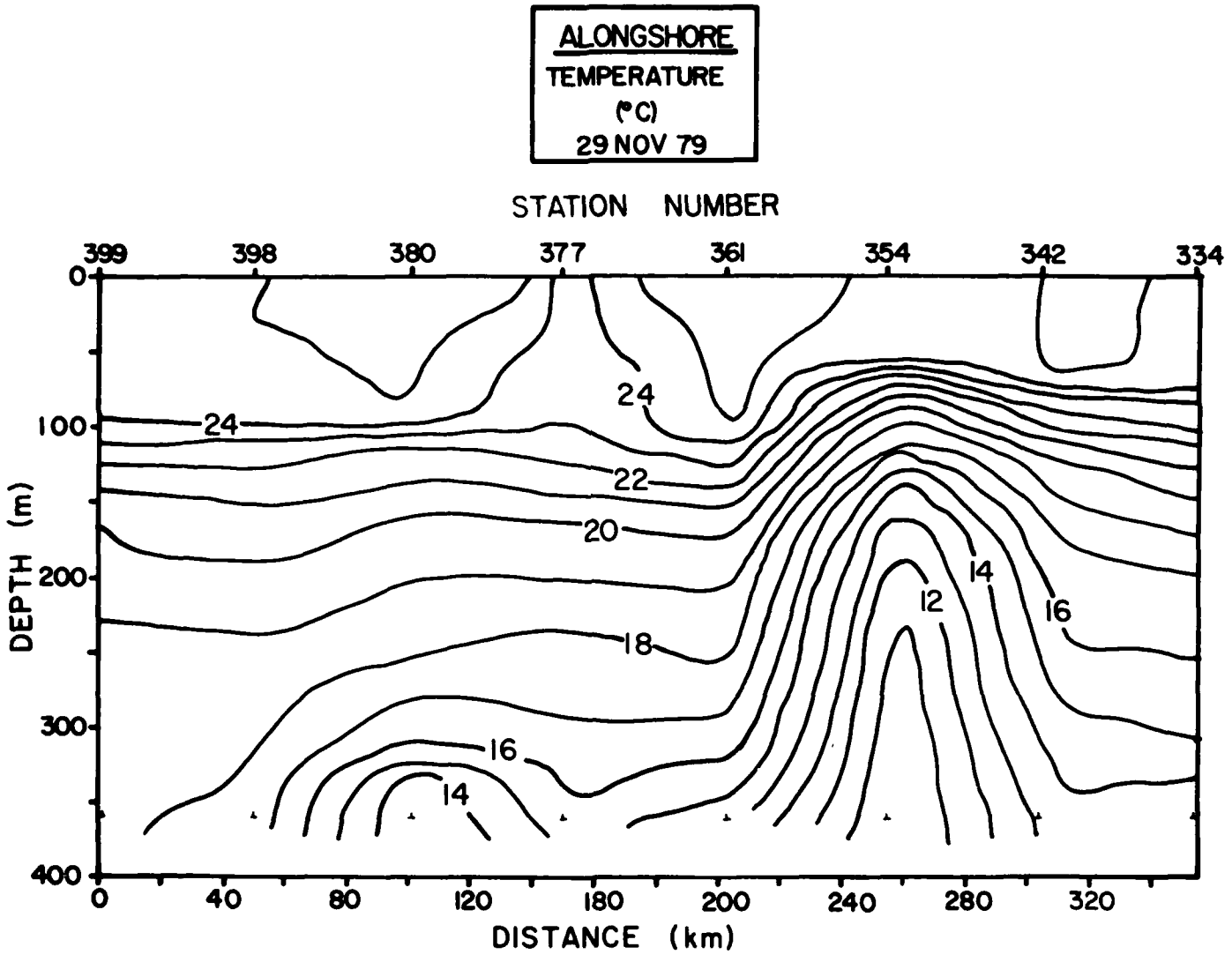


Figure 126. Alongshore vertical temperature section, 29 November 1979.

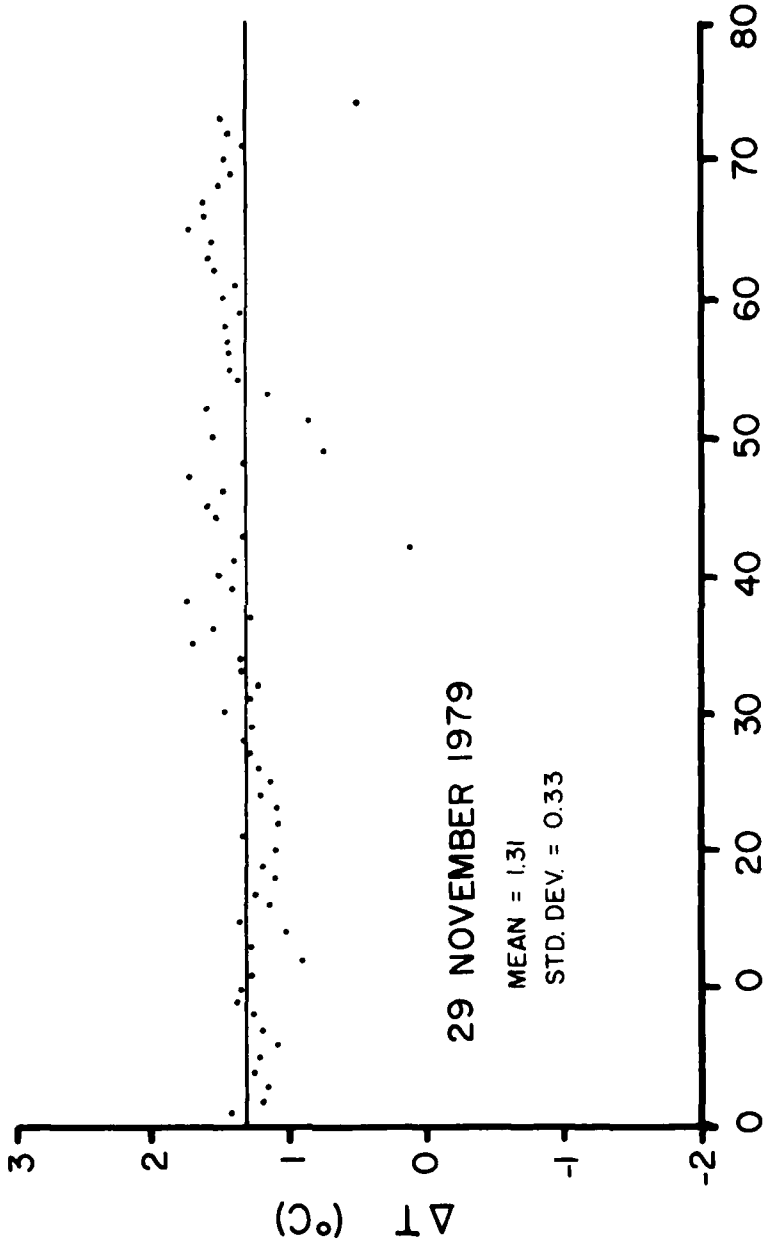


Figure 127. Difference between 1 meter AXBT and PRT temperatures ($T_{AXBT} - T_{PRT}$) versus consecutive AXBT number, 29 November 1979.

ACKNOWLEDGEMENTS

The Gulf Stream Meanders Experiment was supported by the Office of Naval Research, contract number N00014-77-C-0354, and by the National Science Foundation, grant numbers OCE 77-25682 and OCE 79-06710. We thank the crews of U.S. Navy Squadron VXN-8 and the personnel of the Airborne Oceanography Section of the U.S. Naval Oceanographic Office for their assistance in the collection of the AXBT and PRT data aboard the R/A Project Seascan. Special thanks to Messrs. Gary Athey, Jeffrey Kerling, Peter Kupstas, and Terry Kelly for their work before and during the flights. Numerous people assisted in the data collection, among them are many of the graduate students at the University of North Carolina, Texas A & M University, and North Carolina State University. We thank Russell Ault for his assistance with the tedious task of processing the data, Jean Willson for digitizing the original AXBT and PRT analog plots, Karen Lorenson and Kimberly Clark for drafting the final figures. We thank Dr. Richard Legeckis of NOAA/NESS for providing us with the satellite cover photo, which makes the motivation for this experiment clear in an instant.

REFERENCES

Bane, J.M., D.A. Brooks, and M.J. Ignaszewski. 1980a. The Gulf Stream Meanders Experiment: Hydrographic data report, R/V Endeavor cruises EN-040 (2-8 August 1979) and EN-045 (16-23 November 1979). Texas A & M University Report 80-10-T. 150 pp.

_____, D.A. Brooks, K.R. Lorenson, and C.M. Seay. 1980b. The Gulf Stream Meanders Experiment: AXBT/PRT data report, R/A Project Birdseye flights, 9-18 February 1979. University of North Carolina Report CMS-80-2. 213 pp.

Brooks, D.A., J.M. Bane, and M.J. Ignaszewski. 1980a. The Gulf Stream Meanders Experiment: Hydrographic data report, R/V Endeavor cruises EN-031 (12-19 January 1979) and EN-037 (23-29 May 1979). Texas A & M University Report 80-1-T. 145 pp.

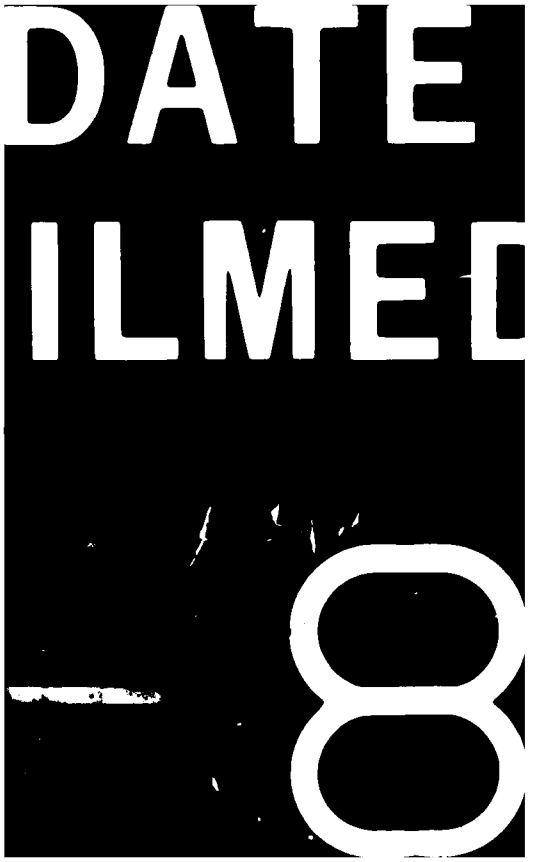
_____, J.M. Bane, R.L. Cohen, and P. Blankinship. 1980b. The Gulf Stream Meanders Experiment: Current meter, atmospheric, and sea level data report for the January to May, 1979 mooring period. Texas A & M University Report 80-8-T. 264 pp.

_____, J.M. Bane, and P. Blankinship. 1981. The Gulf Stream Meanders Experiment: Curreny meter, atmospheric, and sea level data report for the August to November, 1979 mooring period. Texas A & M University Report (in prep.).

Gent, A.E. and P.J. Heuser. 1980. A discussion of the airborne expendable bathythermograph (AXBT, SSQ-36 BTS) laboratory temperature accuracy and time constant test. Naval Oceanographic Office Technical Note TN 6300-1-80. 53 pp.

Sampson, R.J.. 1975. SURFACE II Graphics System. Lawrence, Kansas: Kansas Geological Survey. 240 pp.

Sessions, M.H. and T.P. Barnett. 1980. The airborne expendable bathythermograph for oceanographic measurements. Proceedings of the Near-surface Ocean Experimental Technology Workshop. (R.C. Swenson and R.S. Mesecar, chairmen). Naval Ocean Research and Development Activity. NSTL Station, MS. pp. 125-137.


DATE
ILMED
8