CANADA

DEPARTMENT OF ENERGY, MINES AND RESOURCES
MARINE SCIENCES BRANCH

MINISTÈRE DE L'ÉNERGIE, DES MINES ET DES RESSOURCES
DIRECTION DES SCIENCES DE LA MER

ATLANTIC OCEANOGRAPHIC LABORATORY
BEDFORD INSTITUTE

LABORATOIRE OCEANOGRAPHIQUE DE L'ATLANTIQUE
INSTITUT de BEDFORD

Dartmouth, Nova Scotia
Canada

ATLAS
of
OCEANOGRAPHIC SECTIONS

TEMPERATURE-SALINITY-DISSOLVED OXYGEN-SILICA

DAVIS STRAIT — LABRADOR BASIN — DENMARK STRAIT
NEWFOUNDLAND BASIN

1965 — 1967

A. B. GRANT

Report A.O.L. 68-5

September 1968

Programmed by
THE CANADIAN COMMITTEE ON OCEANOGRAPHY

4903

ATLANTIC OCEANOGRAPHIC LABORATORY

BEDFORD INSTITUTE

DARTMOUTH, N.S.-CANADA

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ATLAS OF OCEANOGRAPHIC SECTIONS

by

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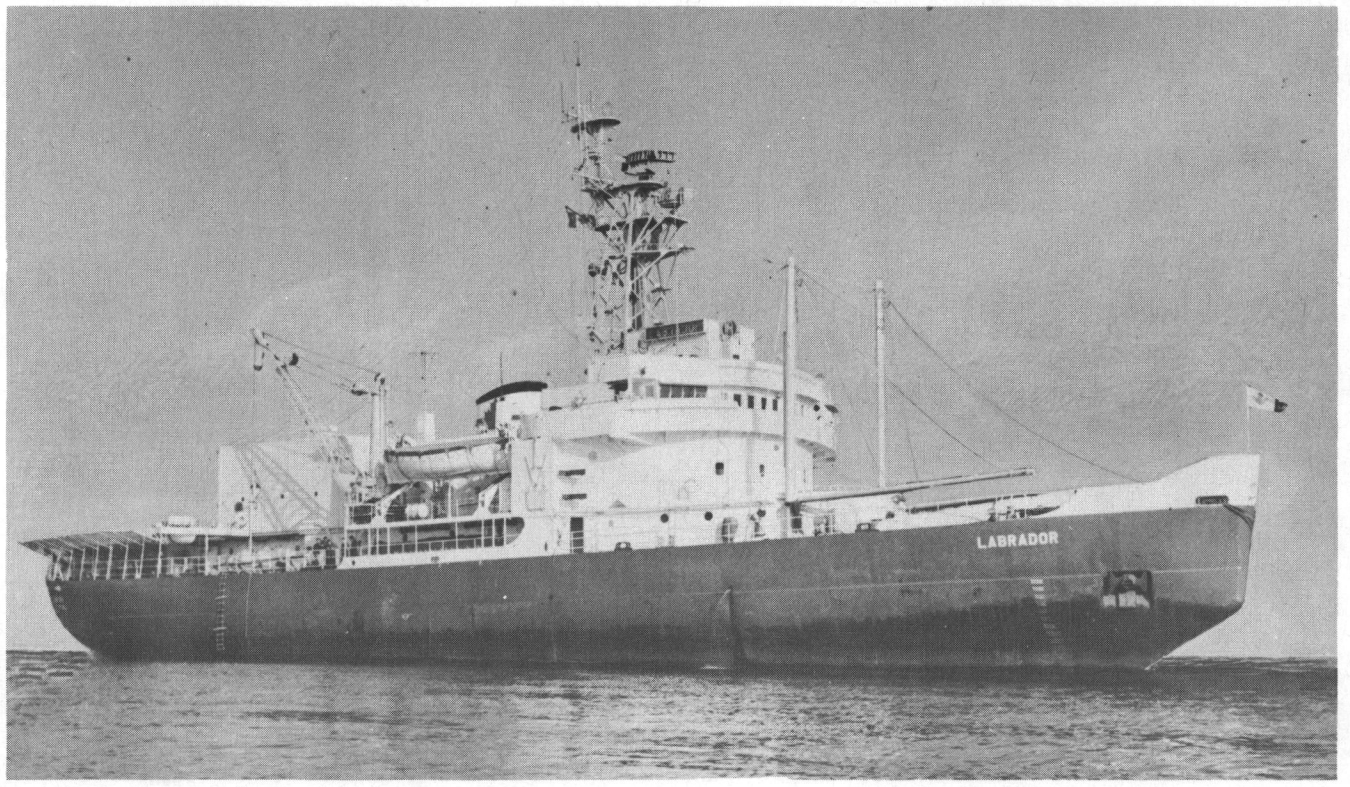

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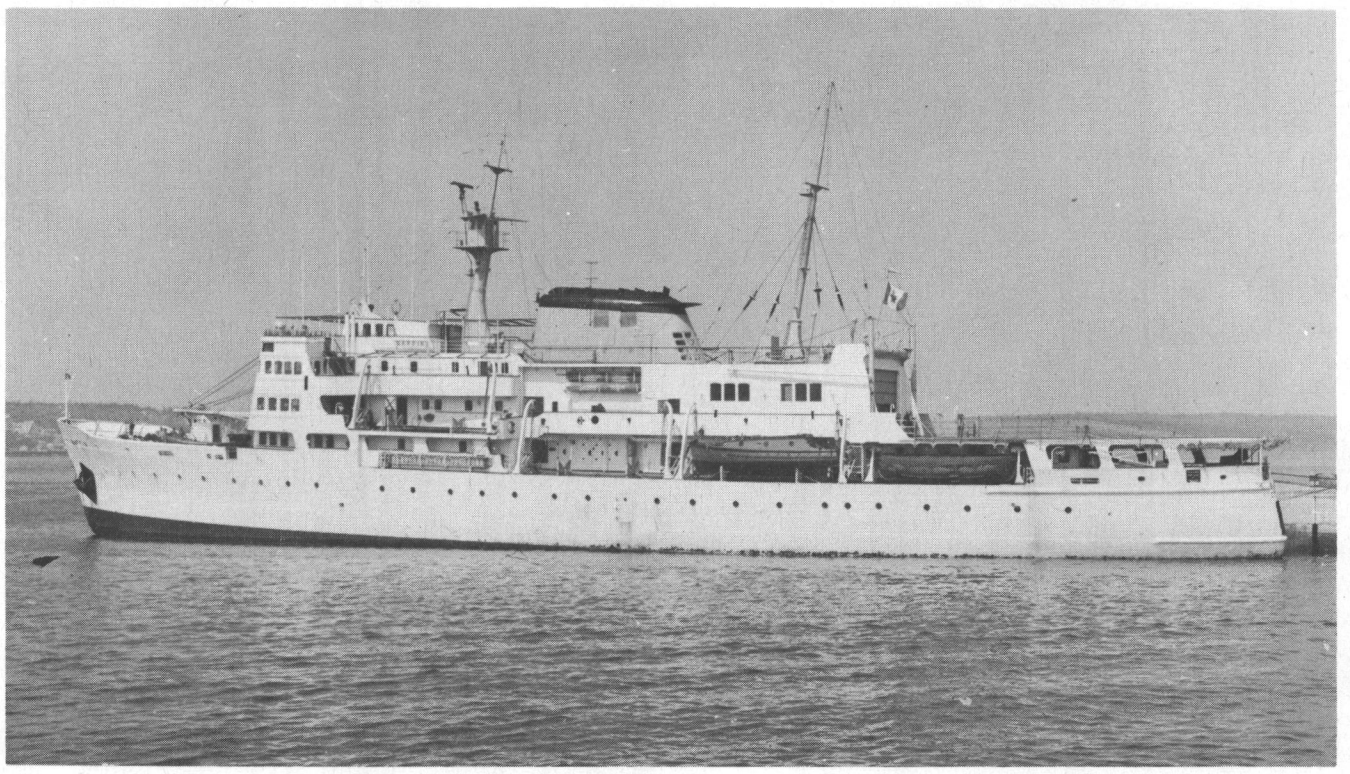

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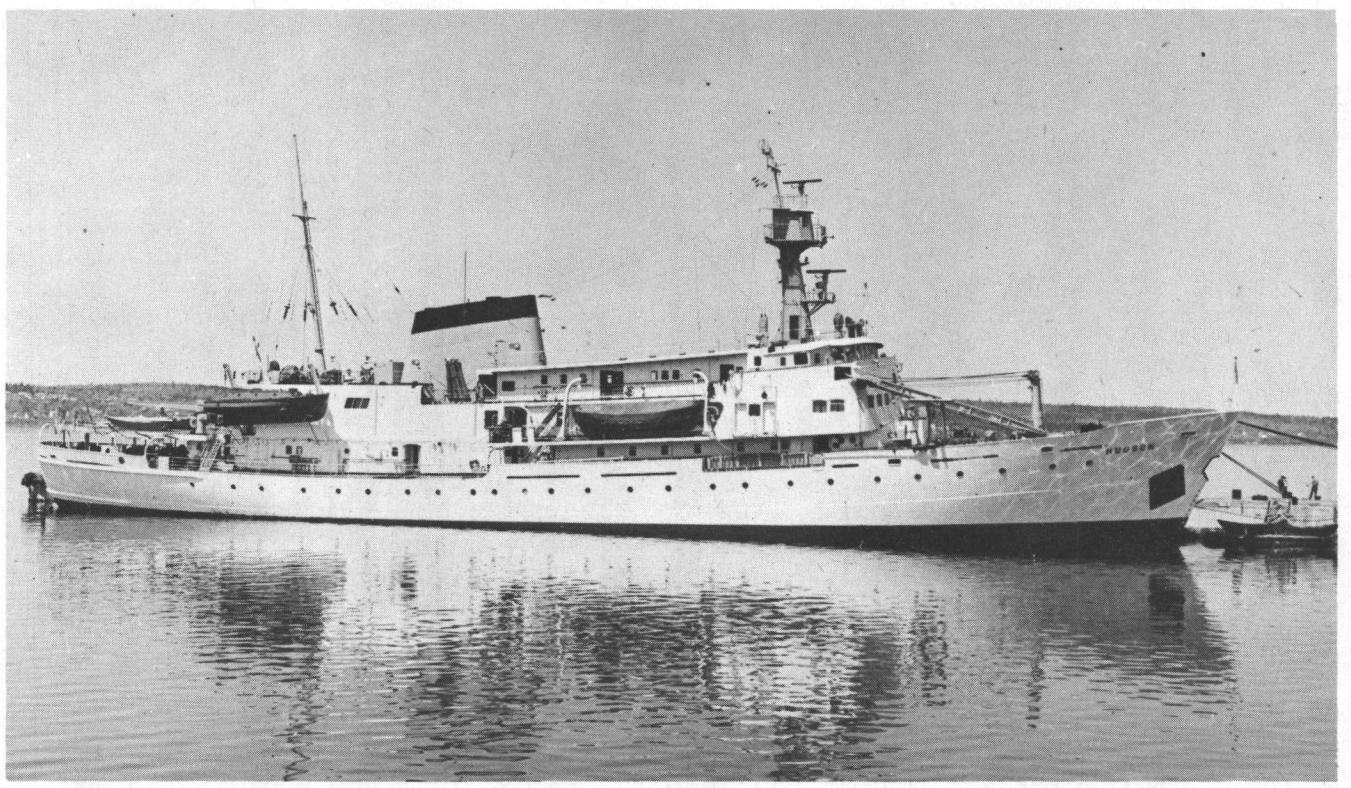

CSS HUDSON

PREFACE

The data presented in this publication were collected during cruises in the Northwest Atlantic Ocean by staff of the Atlantic Oceanographic Laboratory, Bedford Institute. Numerous observations for temperature, salinity, oxygen and silica were made in areas from the Grand Banks to the Denmark Strait. The data have been compiled in this Atlas in the form of sections. The data may be obtained from the Canadian Oceanographic Data Centre by specifying the CODC Cruise Number, Ship and Date.

Temperatures are expressed in degrees Centigrade. Sub-surface values were measured with Richter and Wiese or Yoshino reversing thermometers. Salinities are expressed in parts per thousand and are based on the conversion from conductivity ratio given in the 1961 National Institute of Oceanography Tables. Dissolved oxygen concentrations, expressed in millilitres per litre, were determined by the modified Winkler Method (Strickland, *et al.*, 1960). As there were differences in procedures when making the above observations from cruise to cruise, the accuracy of the observations is reported under each cruise. Determinations for dissolved reactive silica were made by the Grasshoff 'yellow' molybdate method (Grasshoff, 1964) using a Beckman spectrophotometer. The values are given in microgram atoms per litre and are considered accurate within 3%.

Bottom profiles have been drawn for all sections. Precision graphic recorders were used on all except the first cruise (BI 2265), and scaled soundings were corrected using the calculated sound velocity. Where soundings could not be obtained the bottom is indicated with a broken line between stations. On oceanographic stations the deepest bottle was positioned within a few metres of bottom by using a pinger attached to the wire and measuring its distance off bottom with a precision recorder or a variable persistence oscilloscope. These depths were accepted as the most reliable and were used to control the corrected soundings between them.

The data were processed on a CDC 3100 computer (Reiniger, *et al.*, 1968) and the sections plotted using a Calcomp plotter controlled by a PDP-8 computer. A vertical expansion of 250 was maintained throughout, but the scale of the smaller drawings was increased to show more detail.

Cruise Summary:

BI 2265, August 27 to October 27, 1965

Scientist-in-Charge, J. R. N. Lazier.
Canadian Coast Guard Ship *Labrador*, Capt. N. V. Clark.
125 oceanographic stations were occupied on 12 transverse sections in Davis Strait. Surface temperatures were obtained by taking a sample of water in a metal bucket and measuring its temperature with a mercury-in-glass thermometer accurate to ± 0.1°C. The standard deviation of all paired readings of sub-surface temperatures was 0.012°C. Water samples were brought back to the Bedford Institute for salinity determination on N10 salinometers Nos. 3 and 14. Duplicate samples showed differences between .005 and .010°/oo. Dissolved oxygen content was determined by the method described by Montgomery, *et al.*, (1964). An "EDO" model AN/UQN-ID echo sounder was used to obtain bottom profiles.

BI 0266, March 12 to May 12, 1966

Scientist-in-Charge, J. R. N. Lazier.
Canadian Scientific Ship *Hudson*, Captains W. J. Vieau and M. Wagner.
143 oceanographic stations were occupied on 11 sections in the Labrador Basin. Near-surface temperatures were measured with reversing thermometers. Continuous sea surface temperatures were recorded. The standard deviation of all paired temperatures was 0.020°C. Salinity determinations were made with an *Auto-lab* inductive salinometer. Those up to station 103 were made at sea while the remainder were brought back to the Bedford Institute in wax-sealed bottles. Duplicate samples showed some differences up to .004°/oo. Silica was not reported on this cruise.

BI 0566, April 12 to May 5, 1966

Scientist-in-Charge, C. R. Mann.
Canadian Scientific Ship *Baffin*, Captain W. N. Kettle.
47 oceanographic stations were occupied, 37 of which form two sections, one from the Azores to the Grand Banks, and the other across the Southeast Newfoundland Ridge. These are placed in the last group in the Atlas because of the different geographical location and because the photo-reduction of the drawings is somewhat greater to conform with the scale of sections already published in this area (Mann, *et al.*, 1965). Surface temperatures were obtained by collecting a sample of water in a metal bucket and measuring its temperature with a mercury-in-glass thermometer accurate to ± 0.1°C. The standard deviation of all paired sub-surface temperatures was 0.011°C. Water samples were brought back to the Bedford Institute for salinity determination with the N10 salinometer No. 14. They are considered accurate to ± 0.004°/oo.

BI 0267, January 16 to April 5, 1967

Scientist-in-Charge, C. R. Mann.
Canadian Scientific Ship *Hudson*, Captain W. N. Kettle.
119 oceanographic stations were occupied on 8 sections in the Denmark Strait and Irminger Sea. Stations 71 to 79 are unrelated to any section and are not shown. One temperature section by expendable bathythermograph across the Denmark Strait, north of Section 3-13, is included. Near-surface temperatures were measured with reversing thermometers. The standard deviation of all paired temperatures was 0.010°C. Salinities were determined on board by scientists from Woods Hole Oceanographic Institution using a Sleicher and Bradshaw salinometer. They are considered accurate to ± 0.003°/oo.

ACKNOWLEDGEMENTS

The author wishes to thank J. R. N. Lazier, C. R. Mann, R. F. Reiniger, and C. K. Ross who checked the contoured drawings and compilation, Miss J. Gavan for her assistance in assembling the Atlas, and the Drafting, Illustration and Photography Group for their support.

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MONTGOMERY, H. A. C., N. S. THOM, and A. COCKBURN. 1964. Determination of dissolved oxygen by the Winkler method and the solubility of oxygen in pure water and sea water. *J. Appl. Chem.*, 14 July, pp. 280-296.

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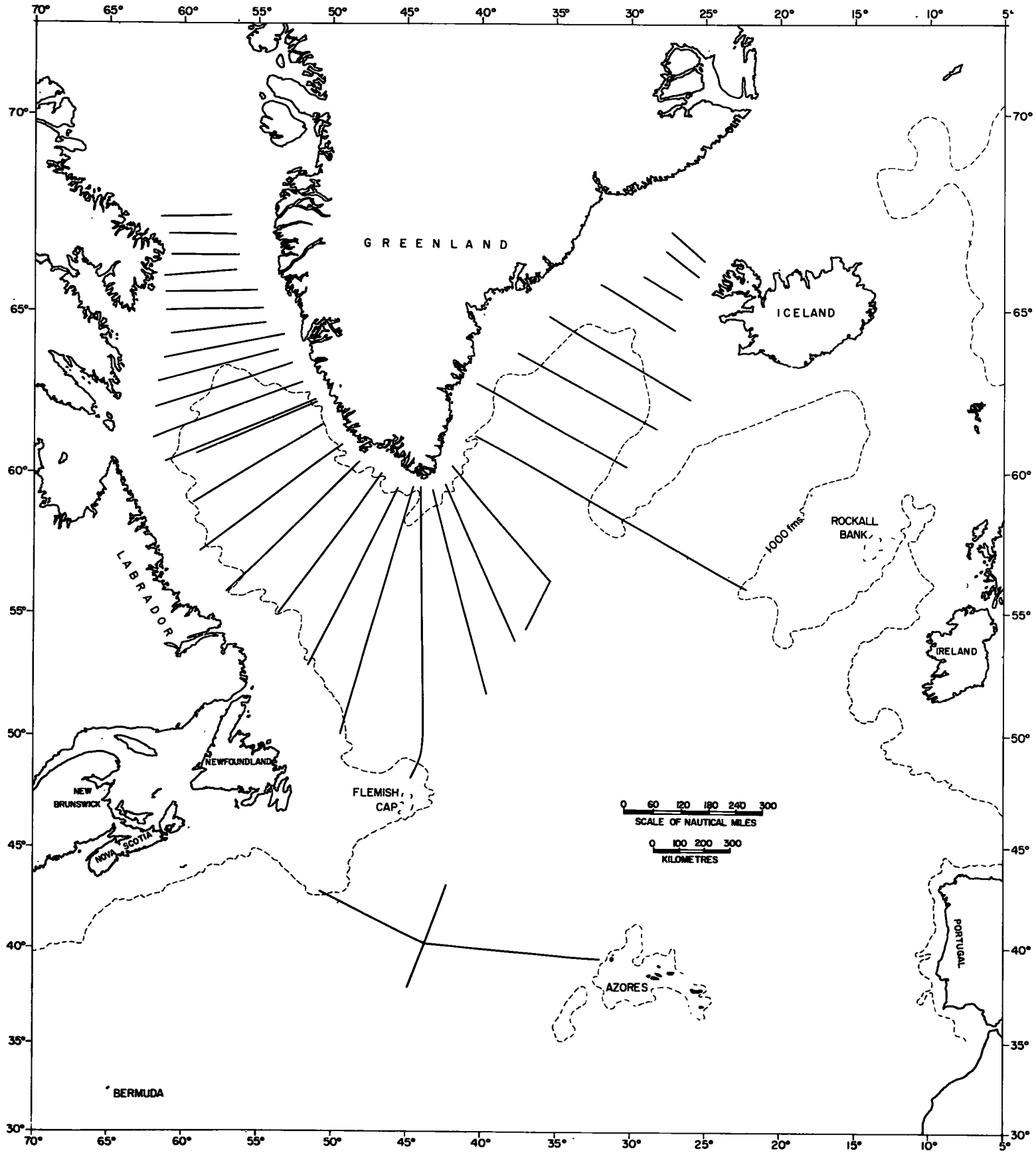

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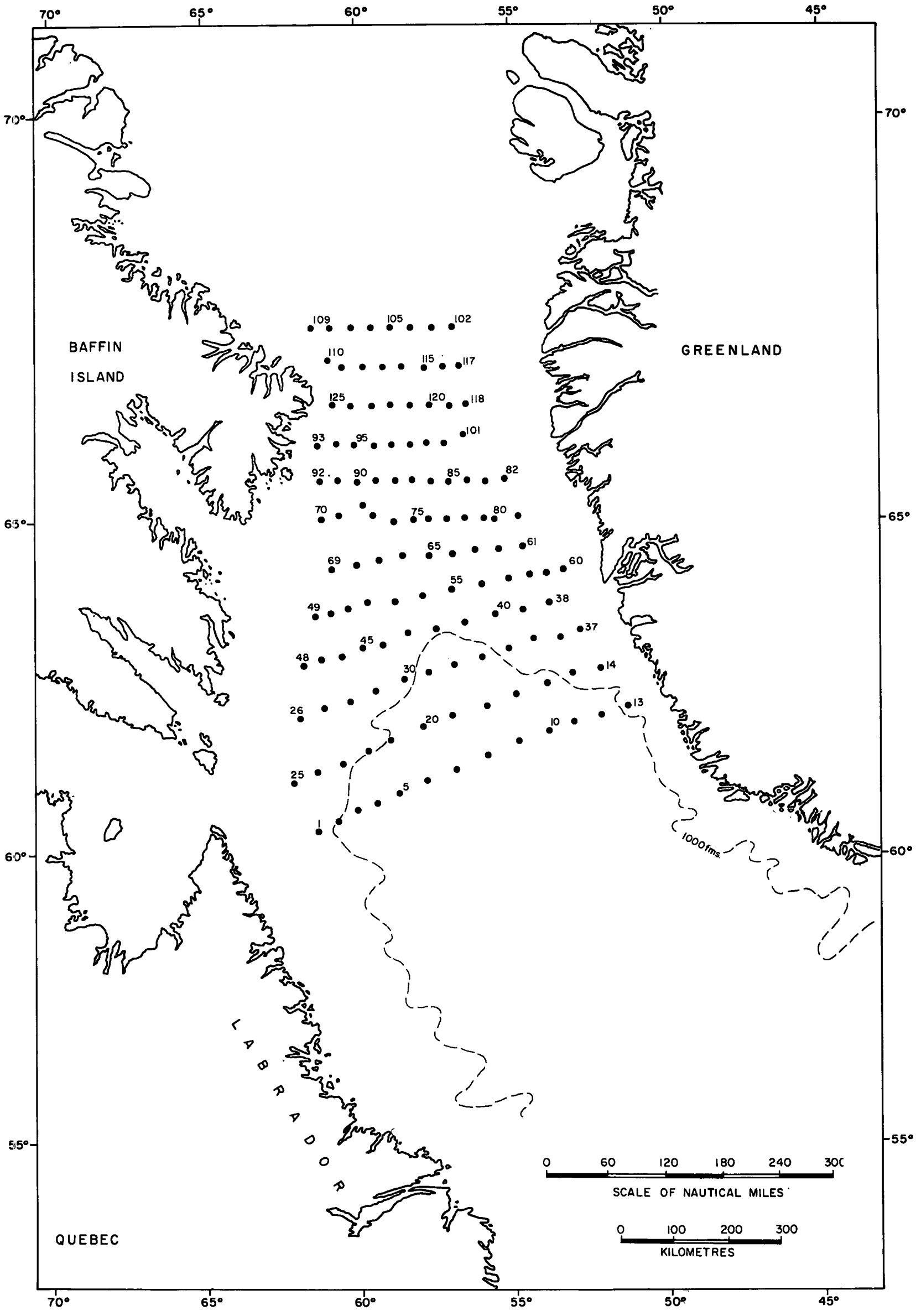
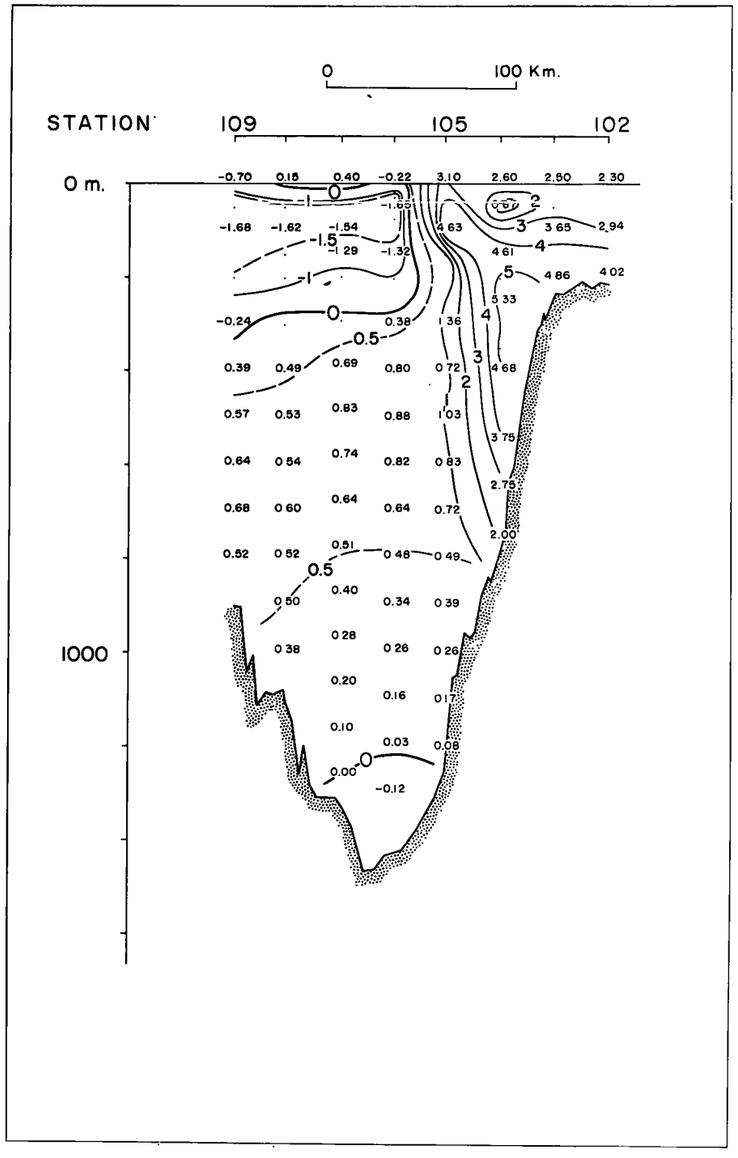


Cruise BI 2265 CCGS LABRADOR

August 27 - October 22, 1965

Scientist-in-Charge — J. R. N. Lazier



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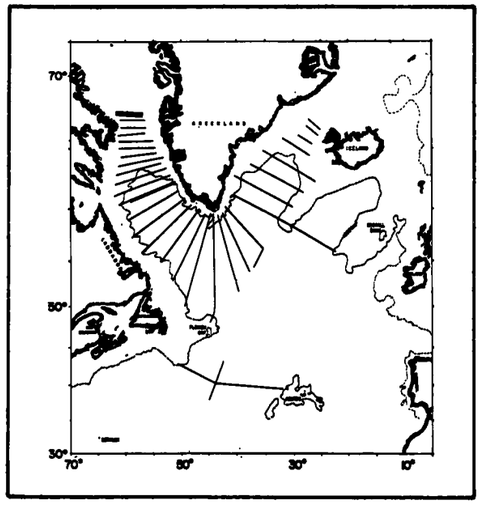

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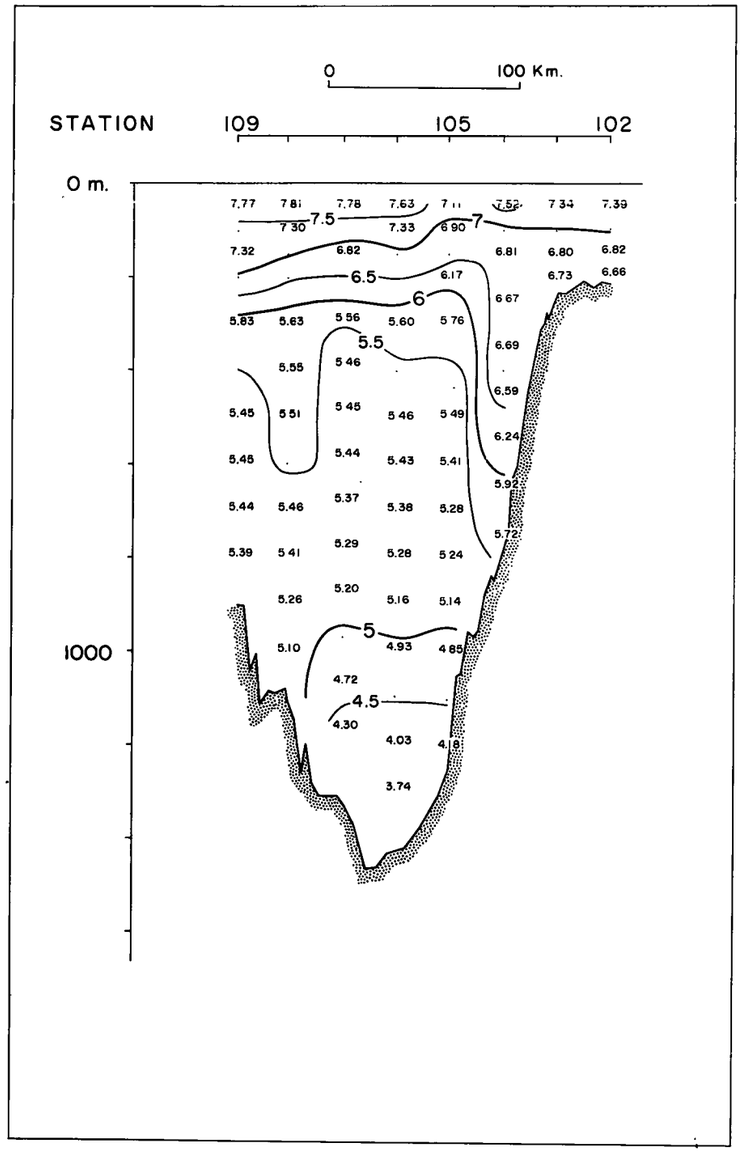

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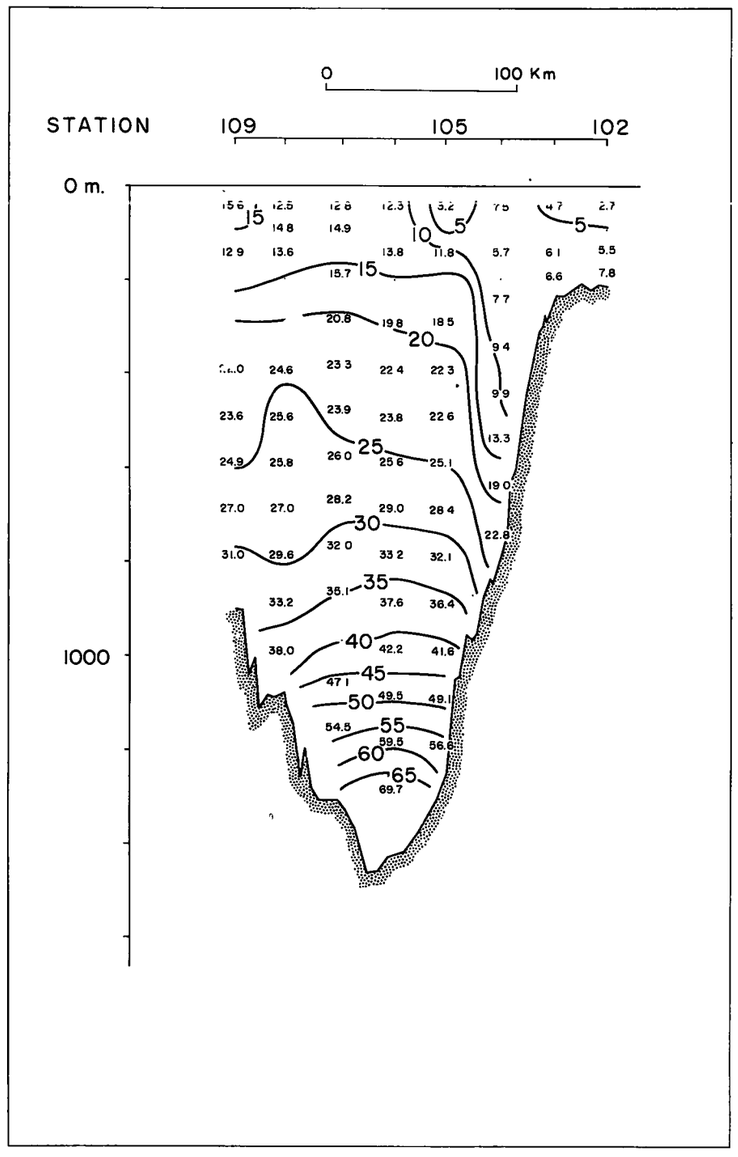

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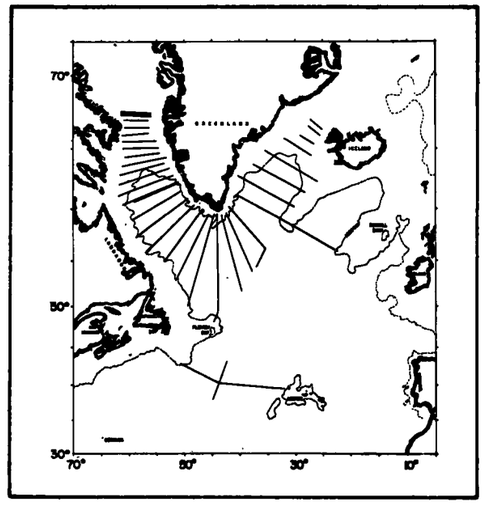

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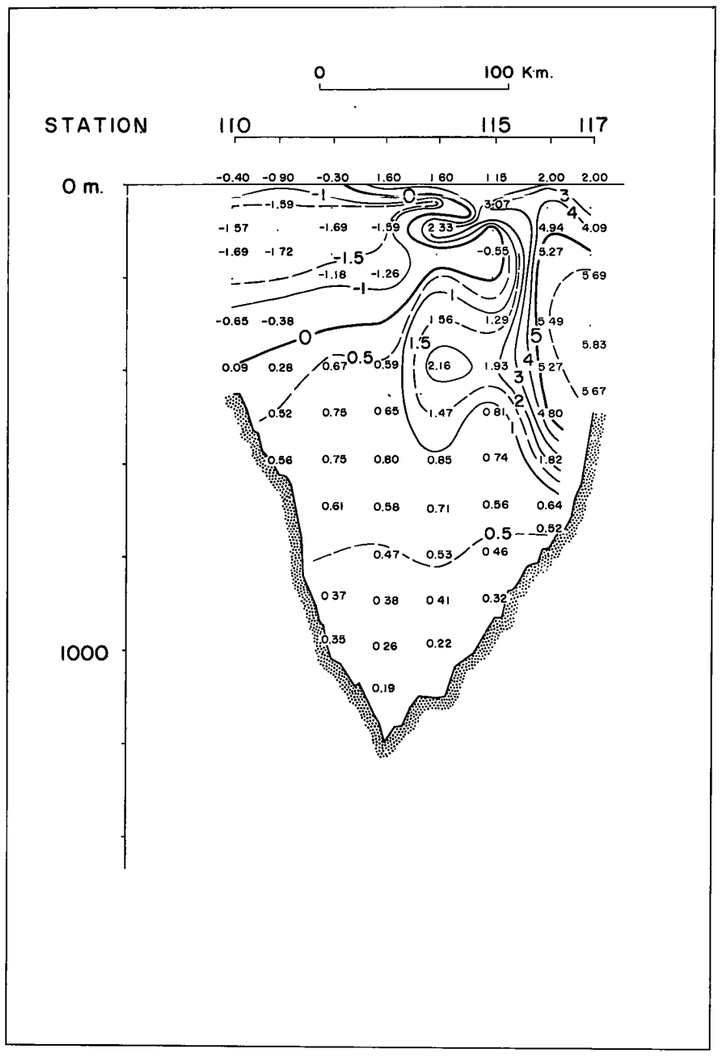

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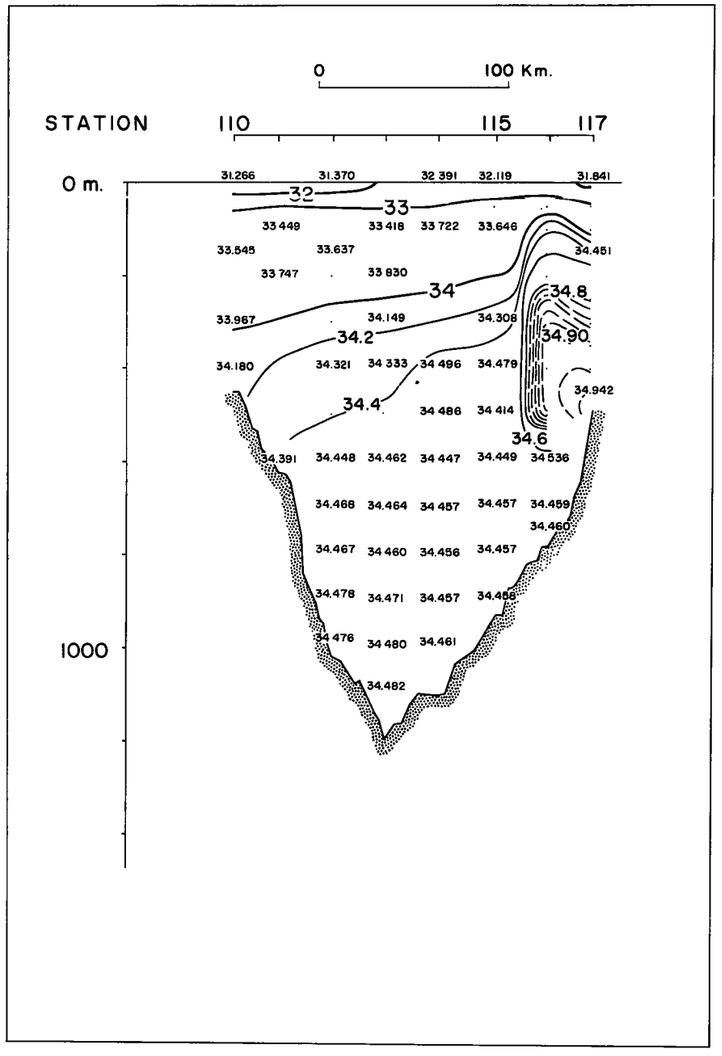

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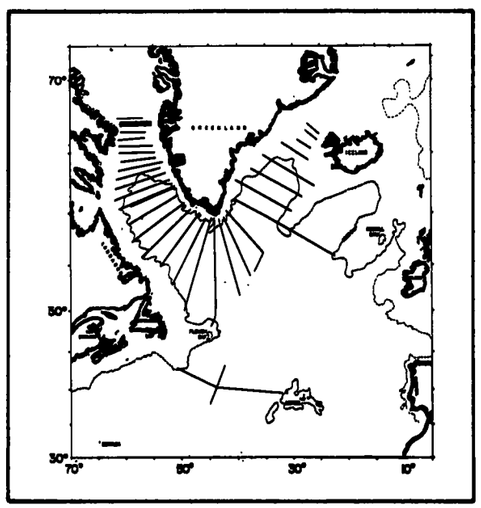

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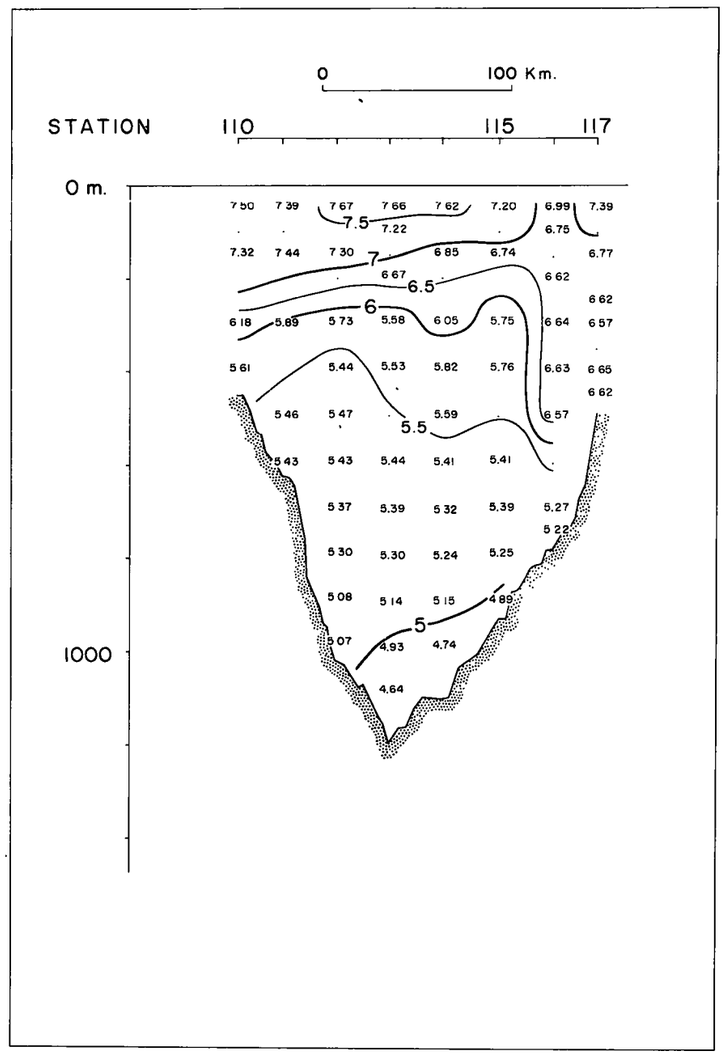

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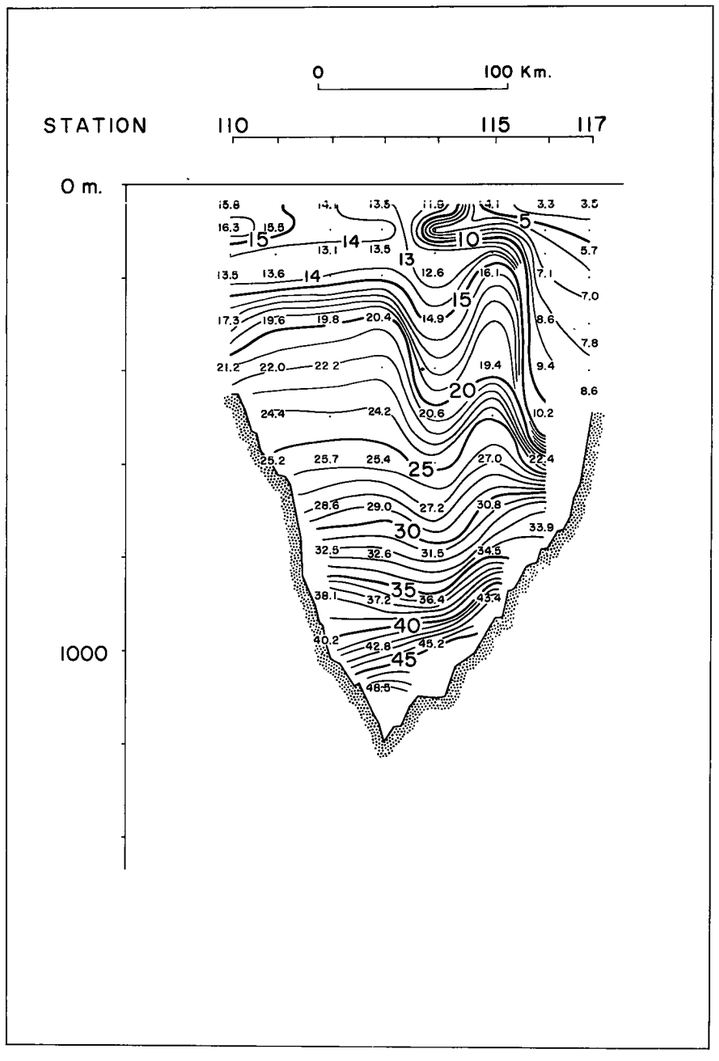

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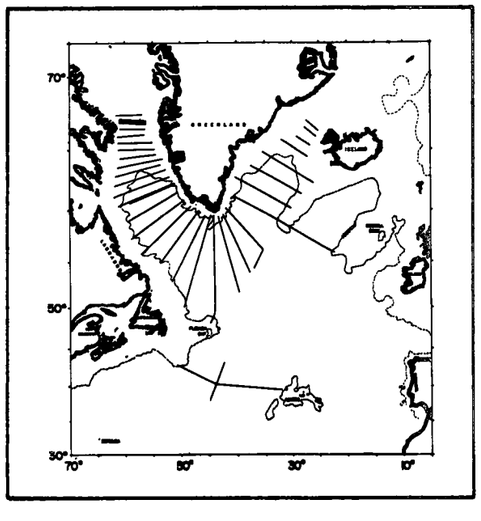

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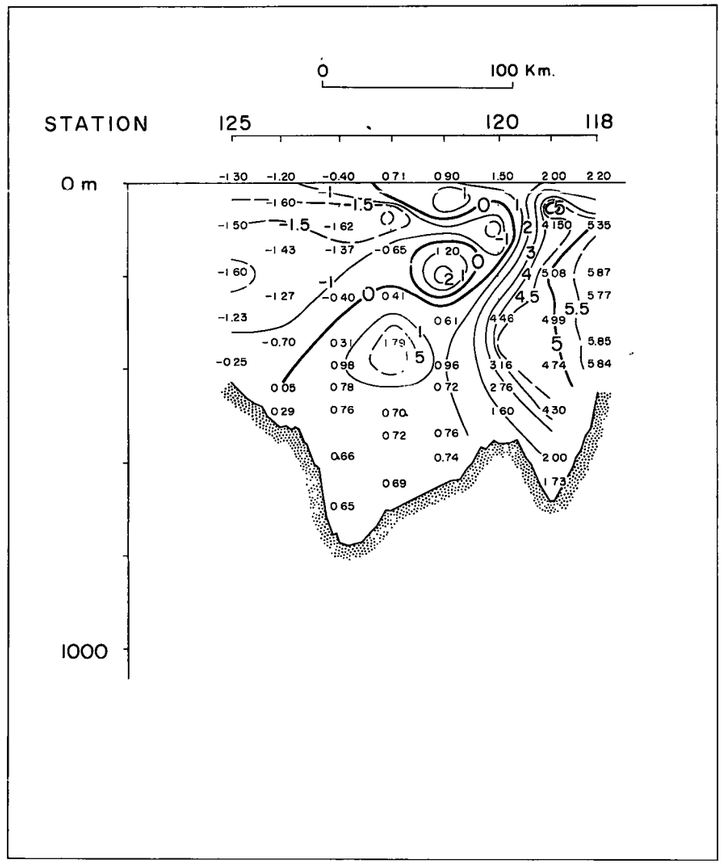

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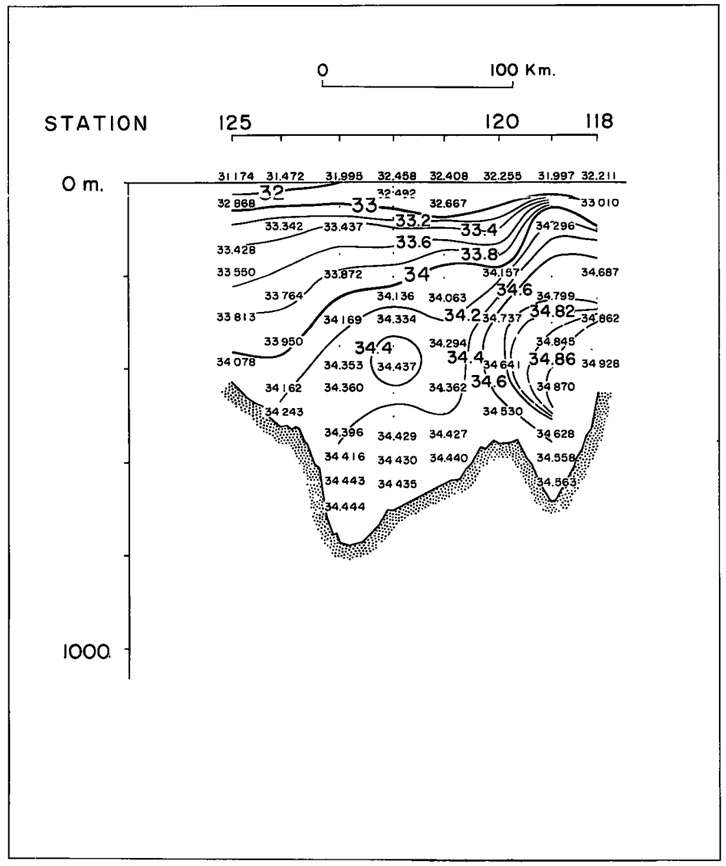

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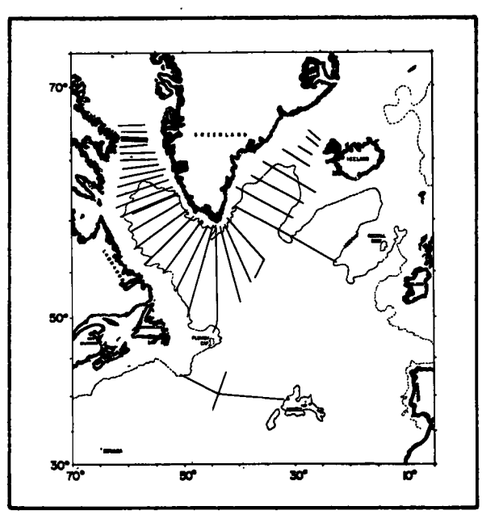

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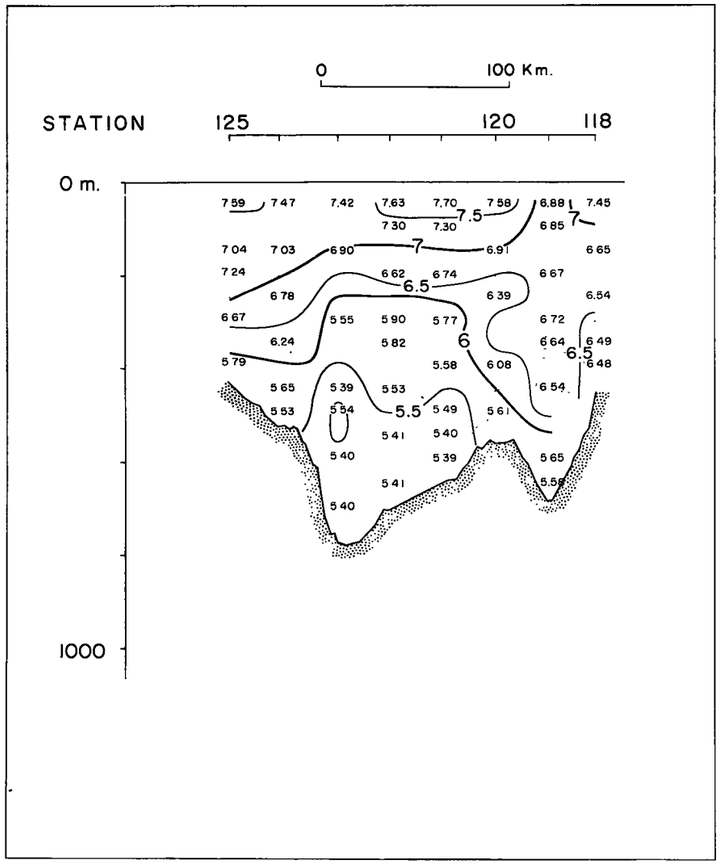

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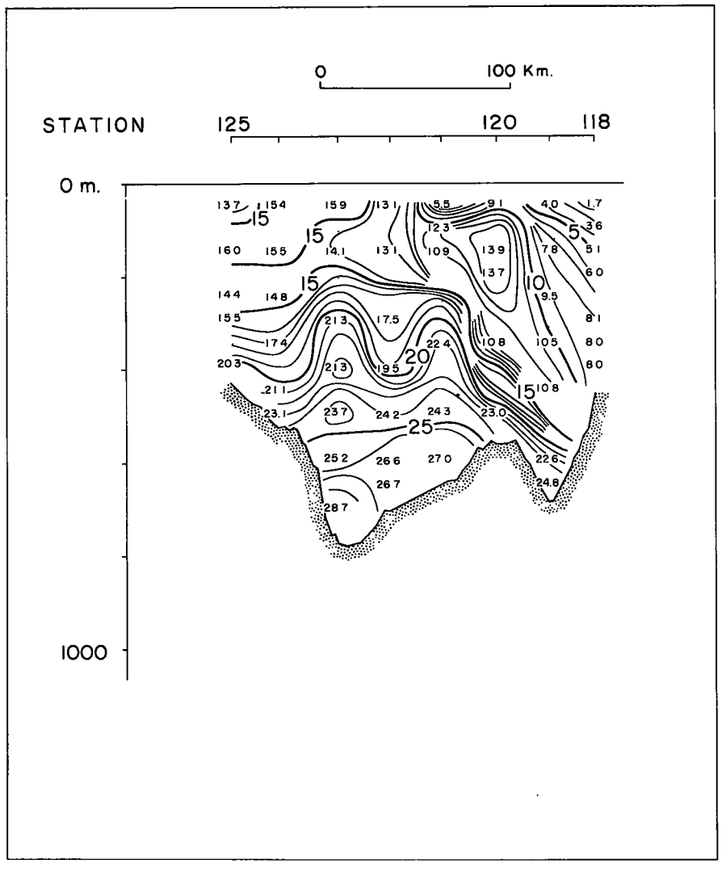

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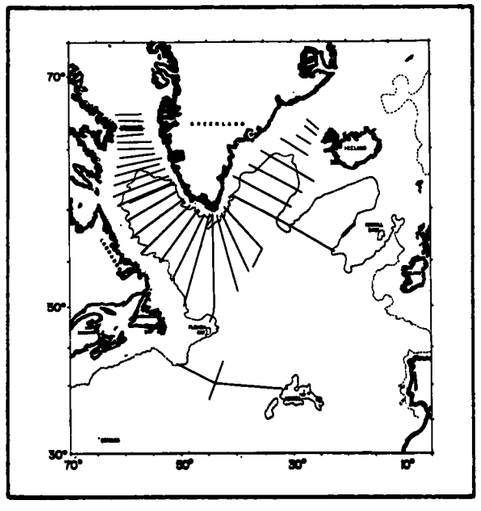

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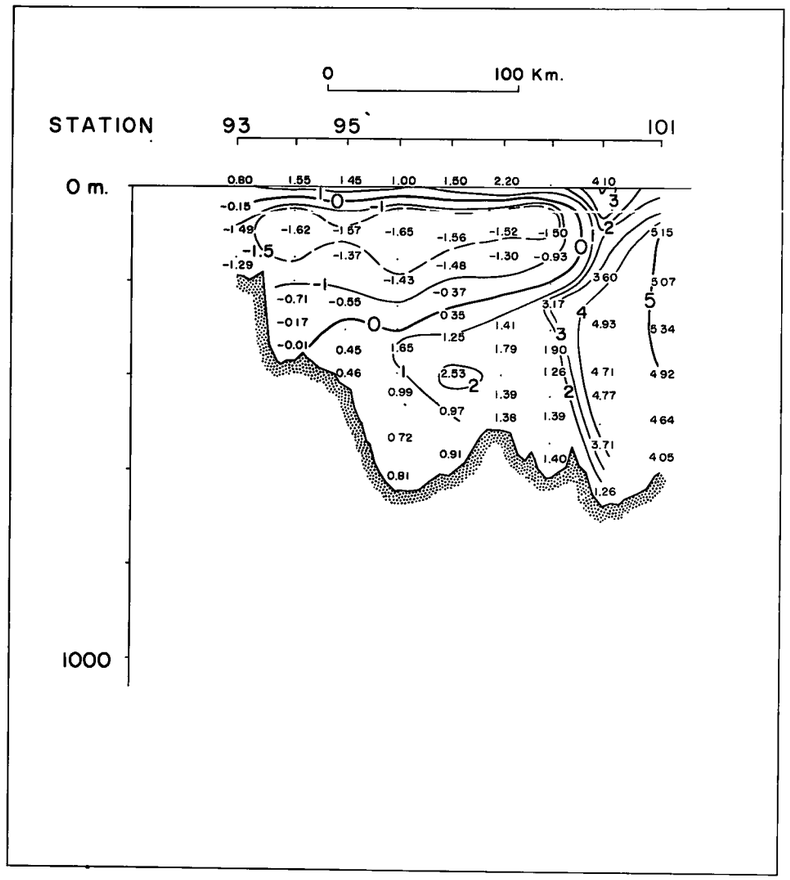

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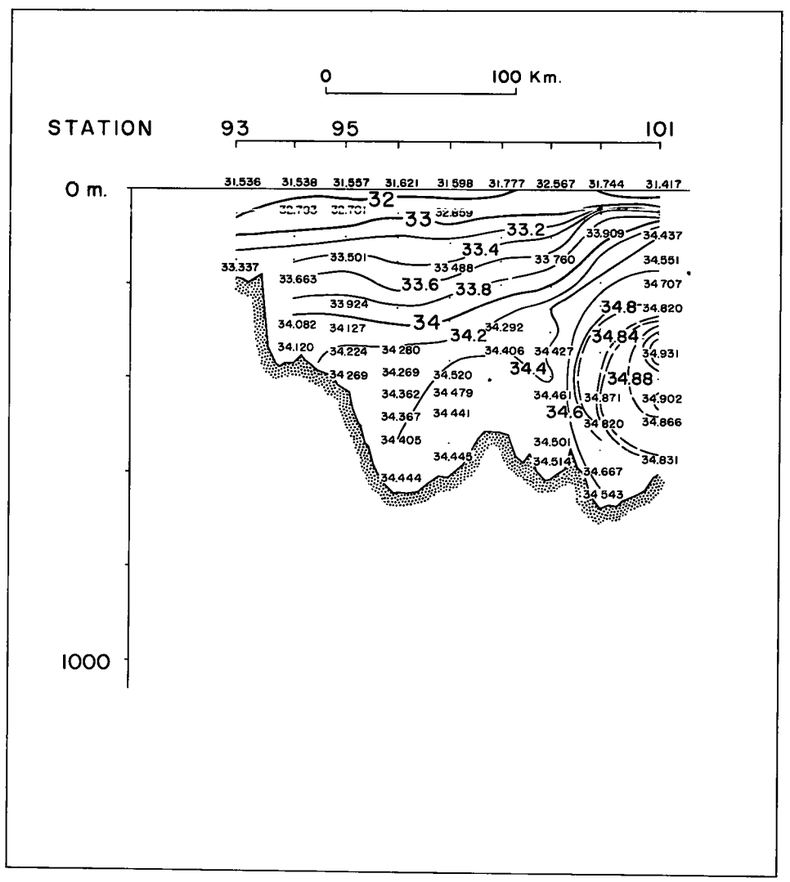

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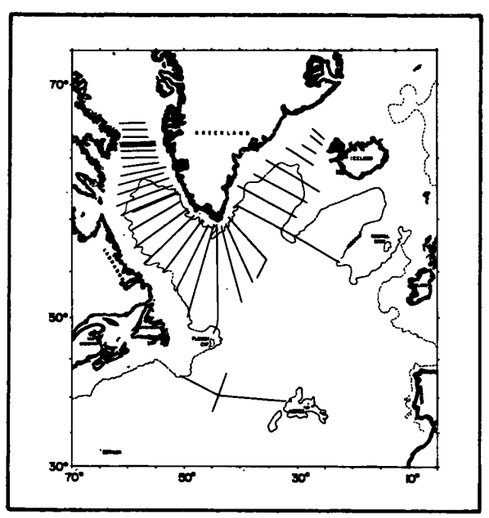

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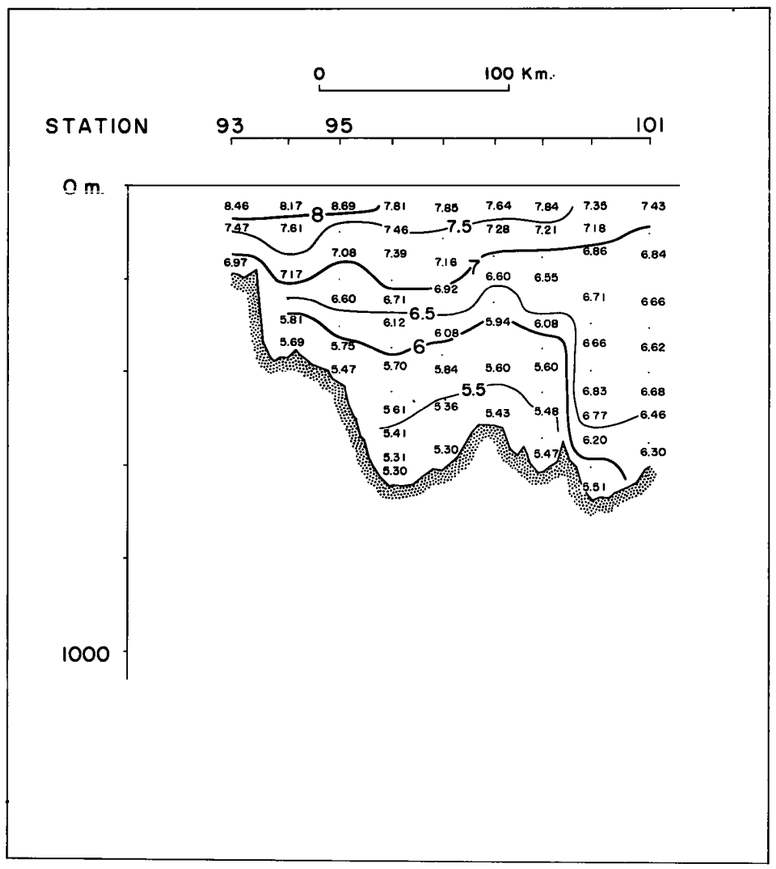

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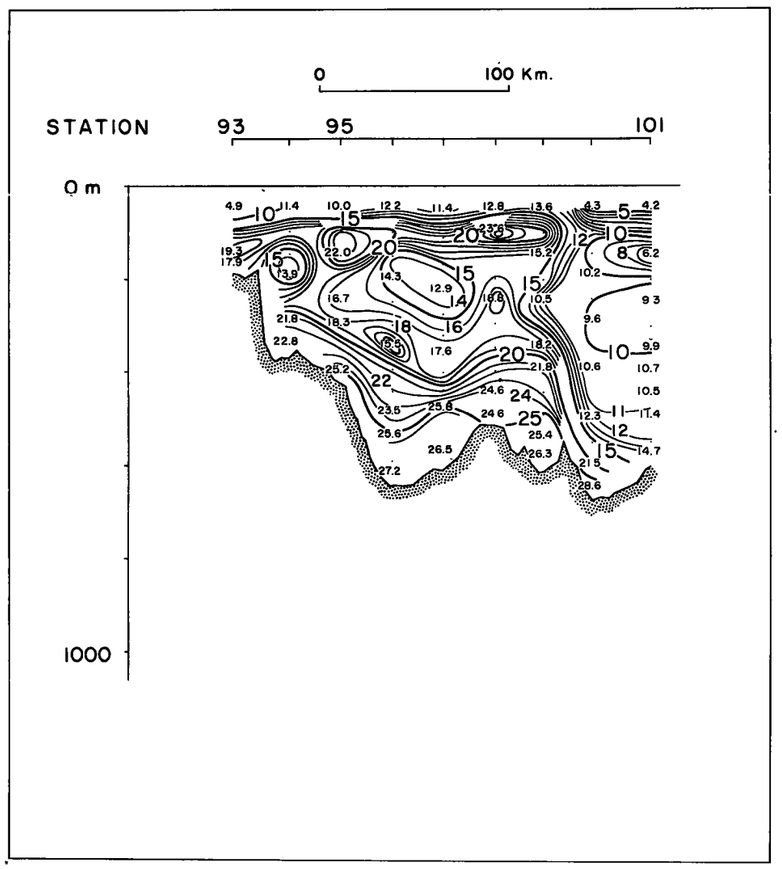

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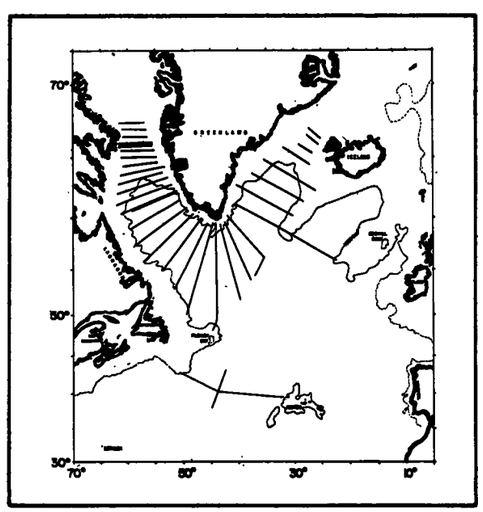

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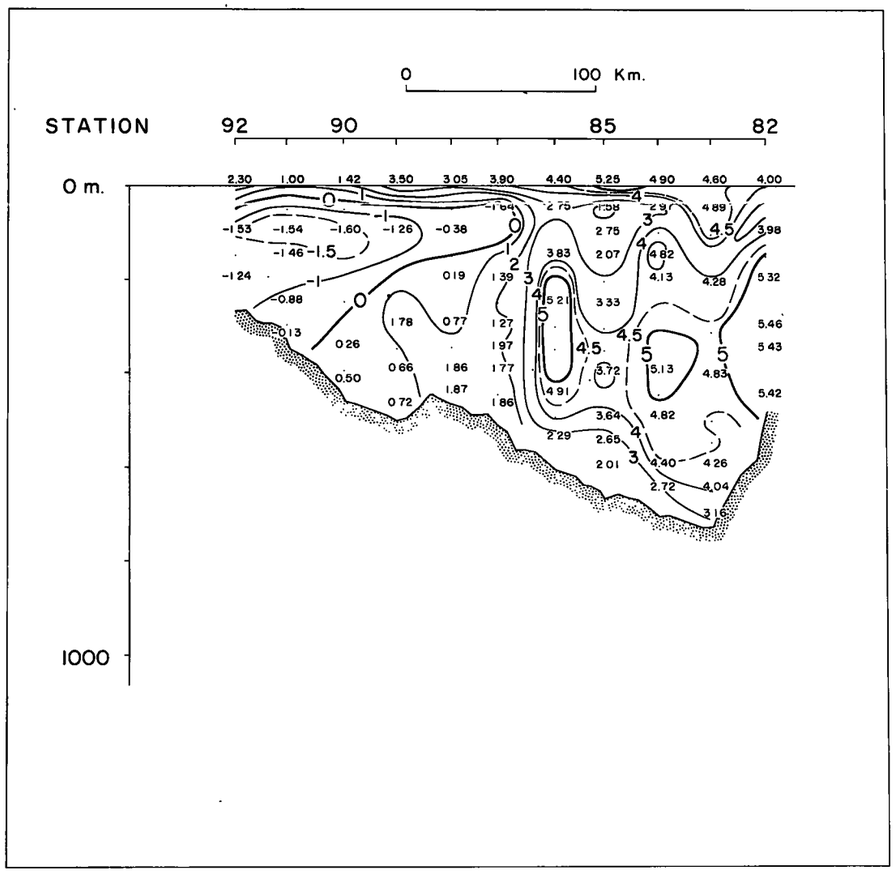

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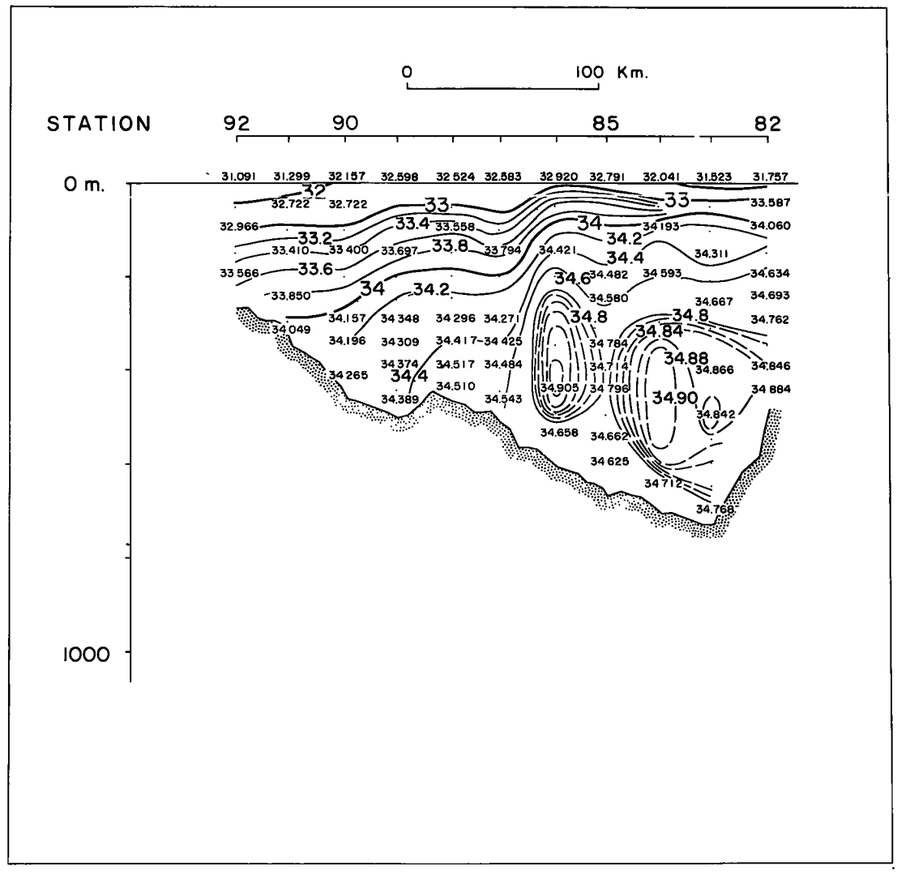

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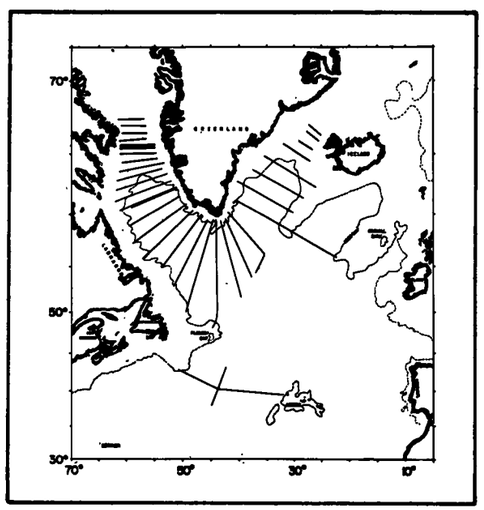

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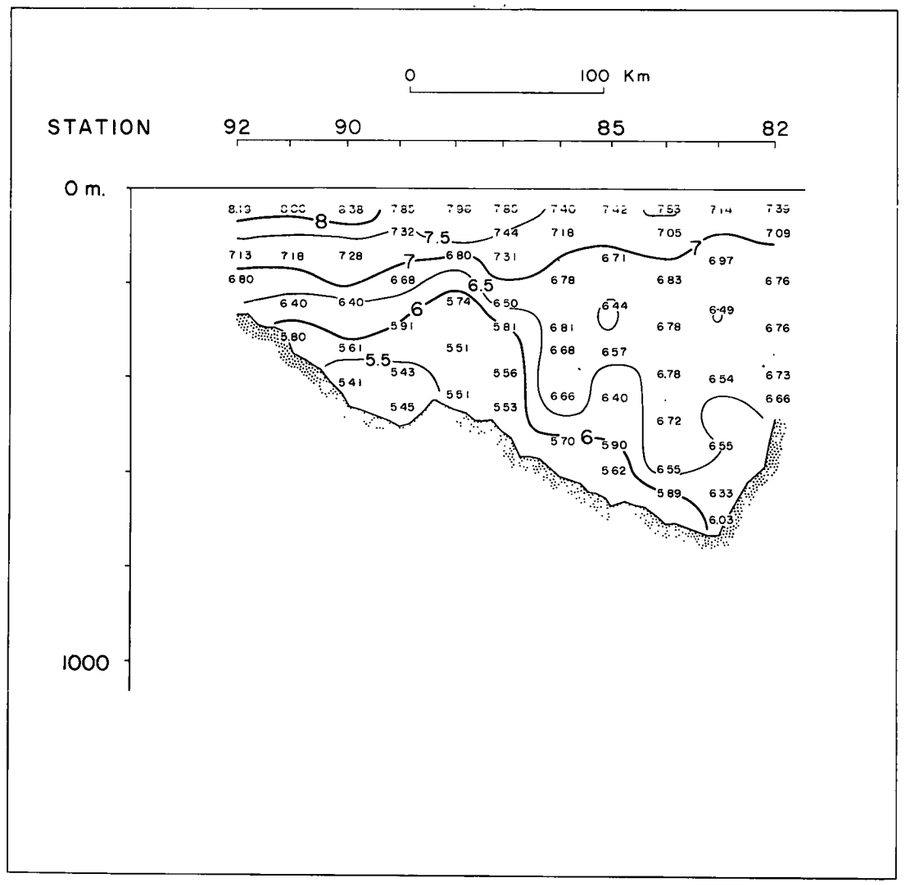

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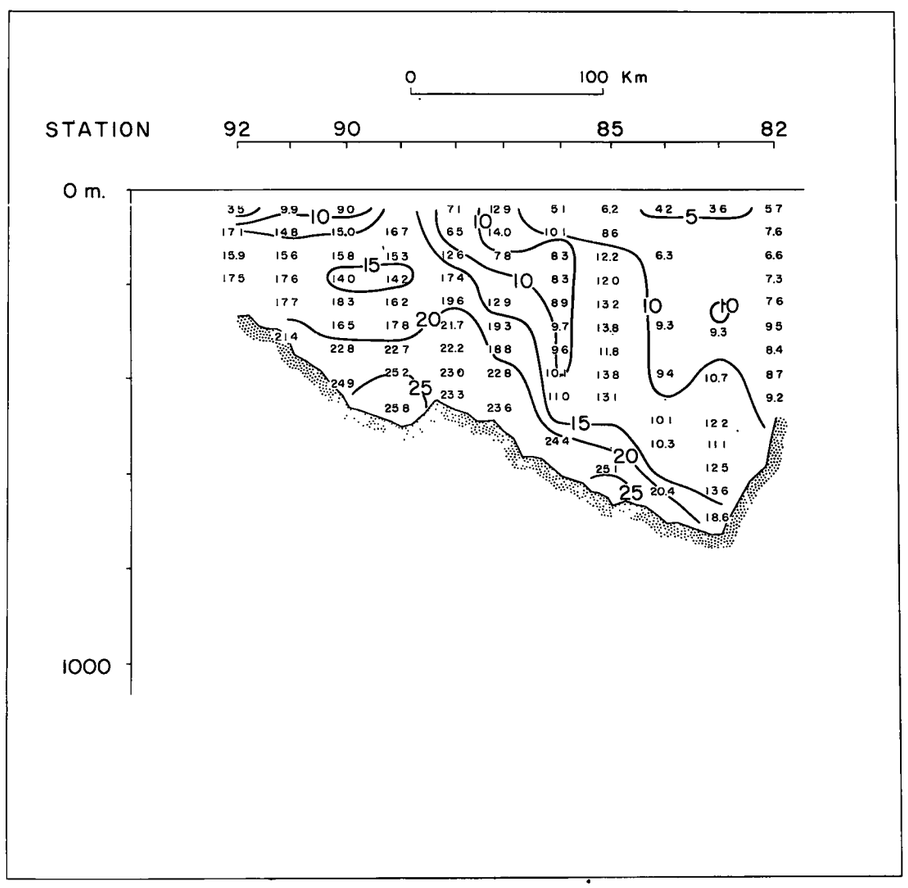

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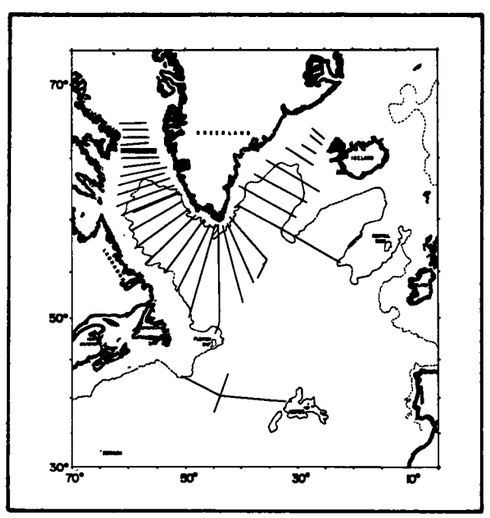

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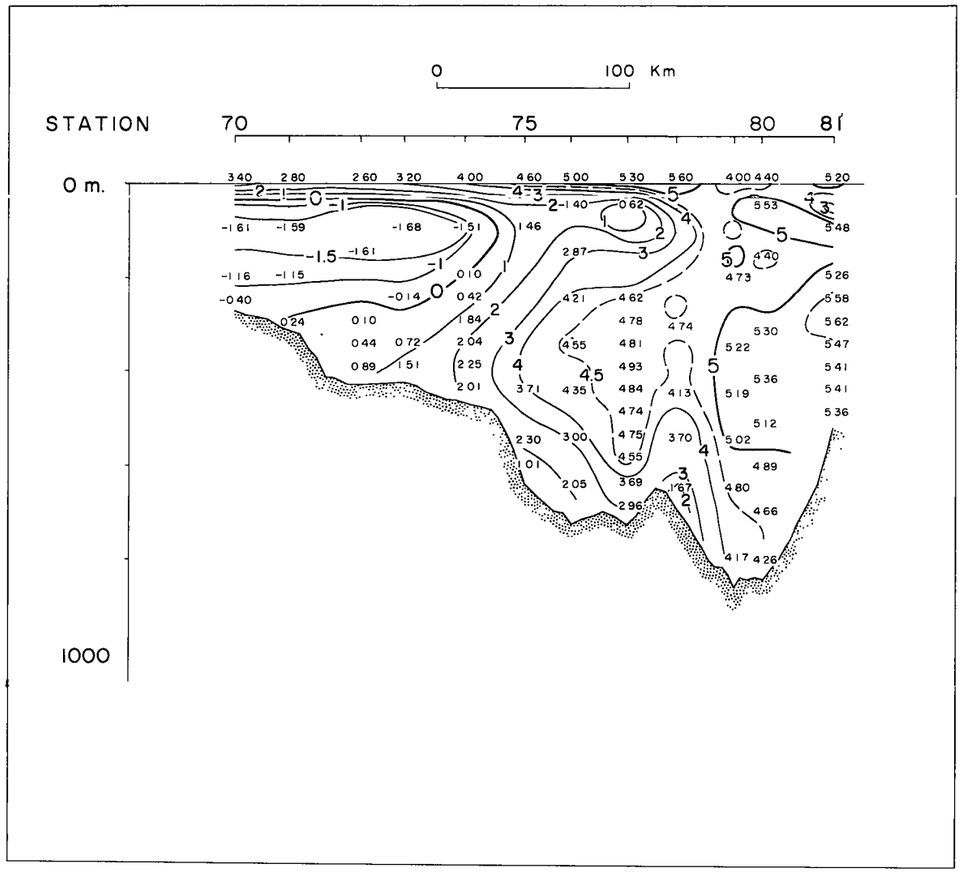

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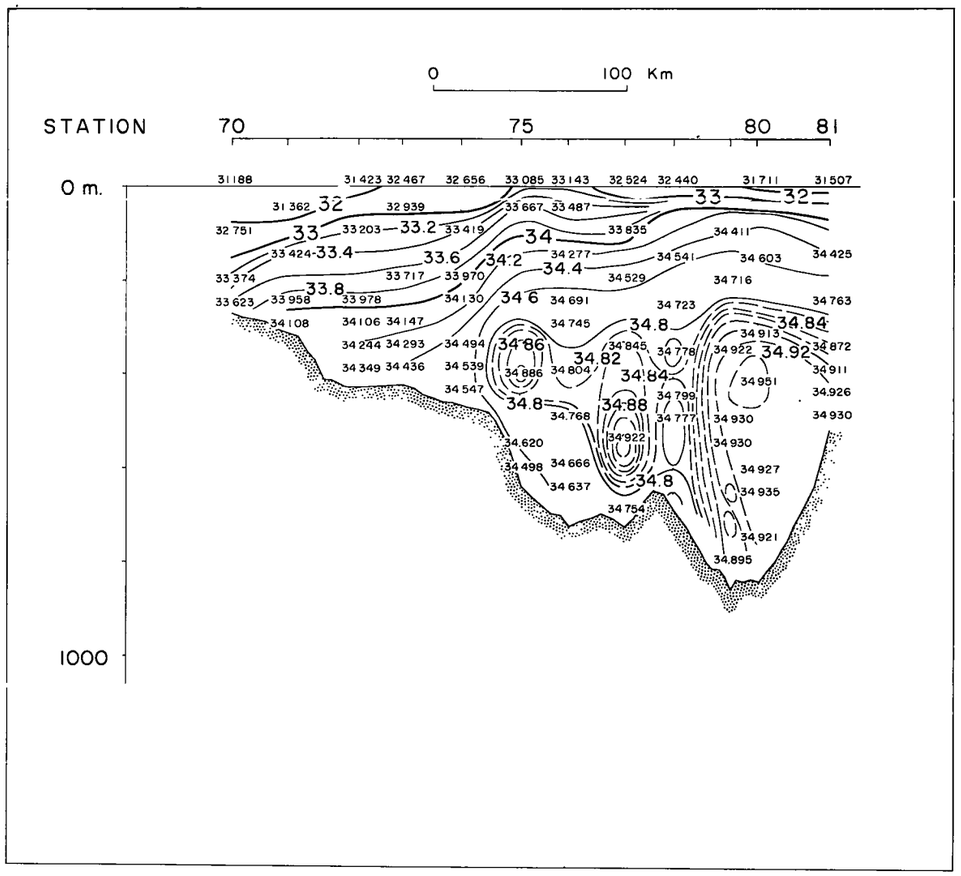

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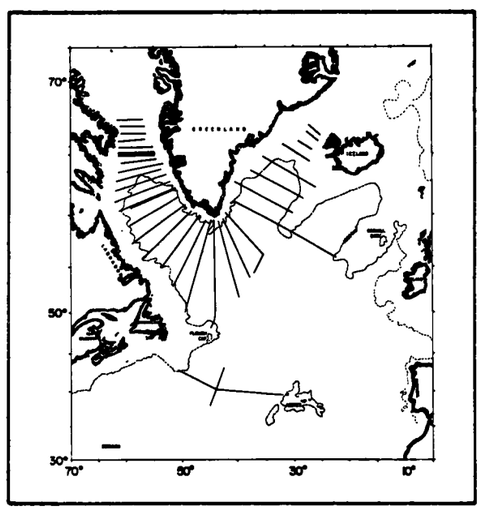

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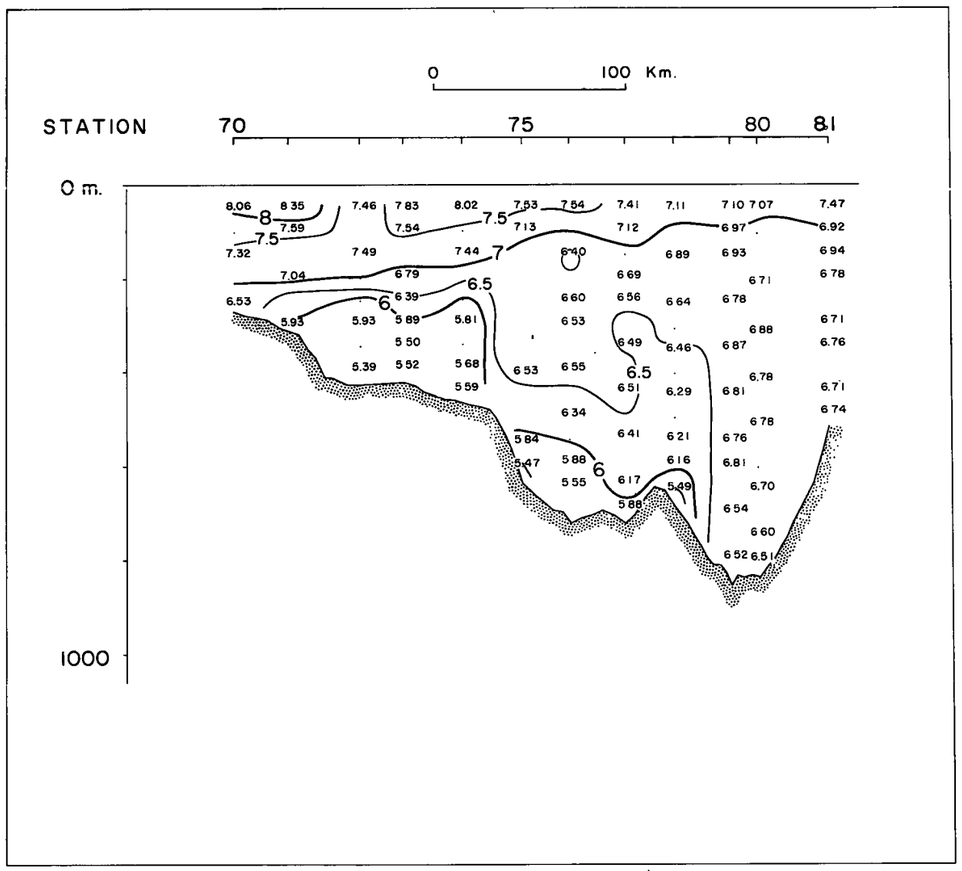

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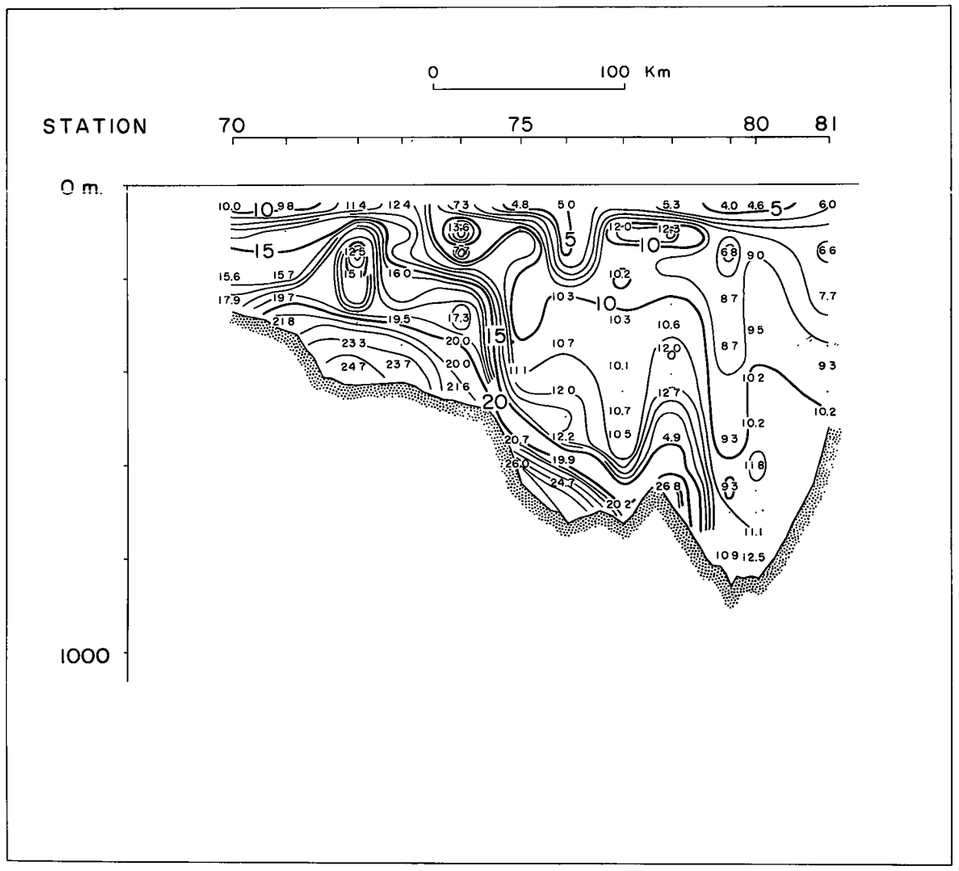

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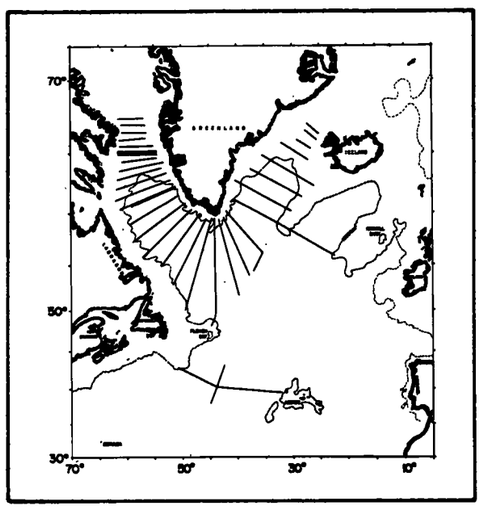

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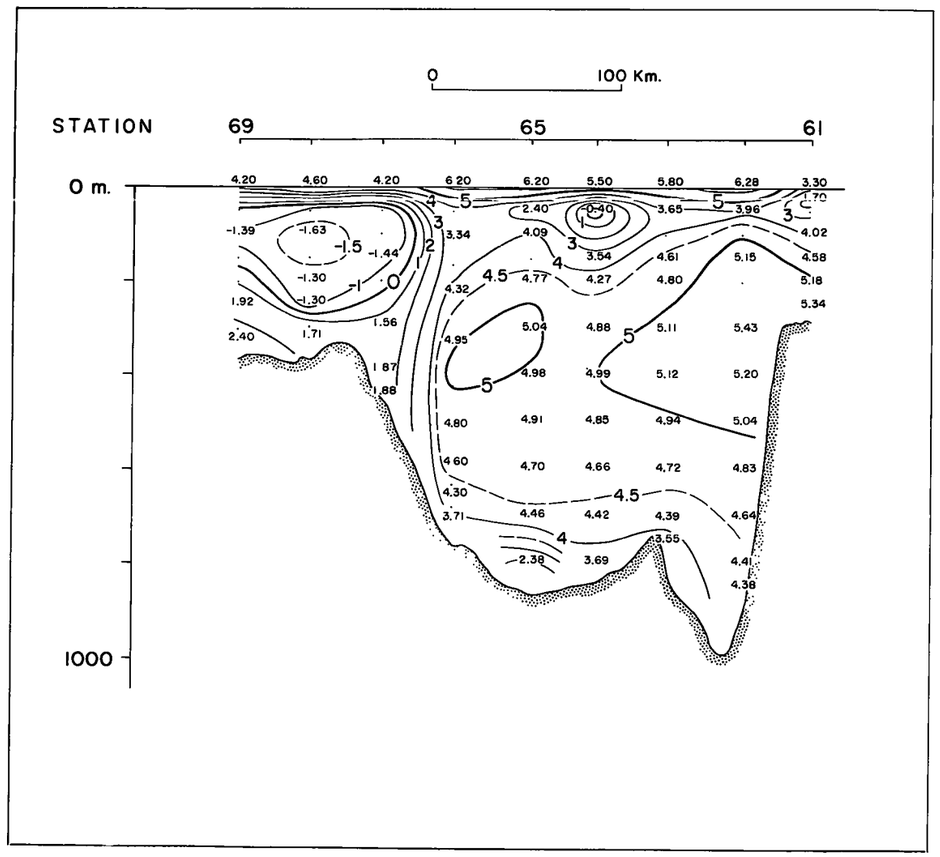

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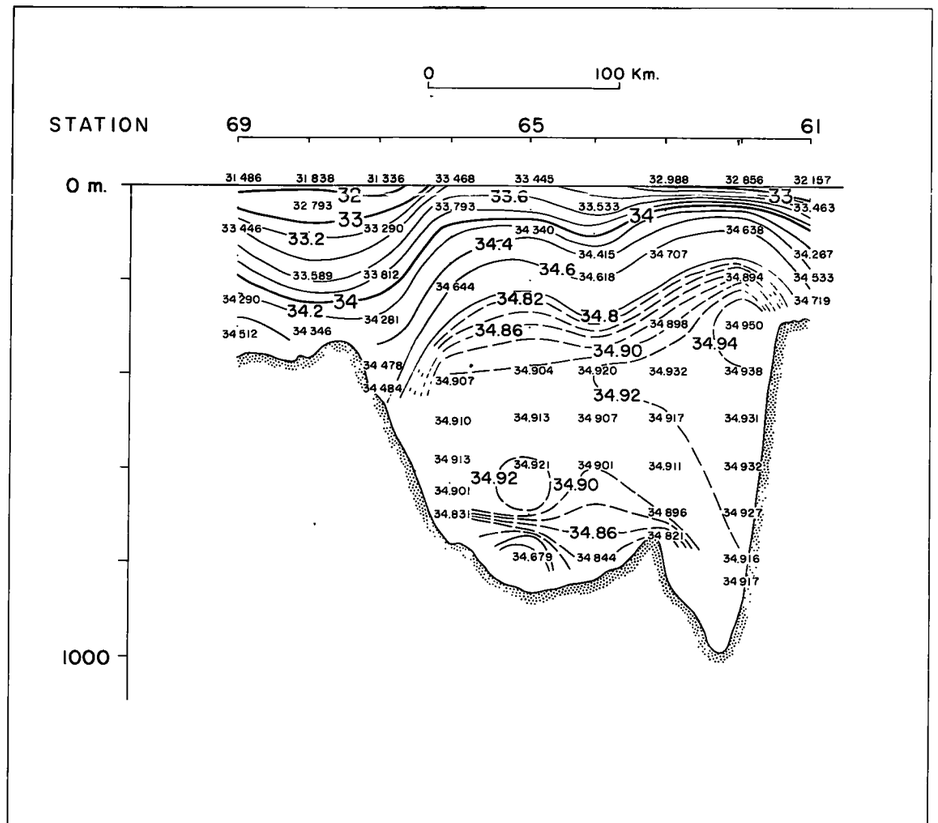

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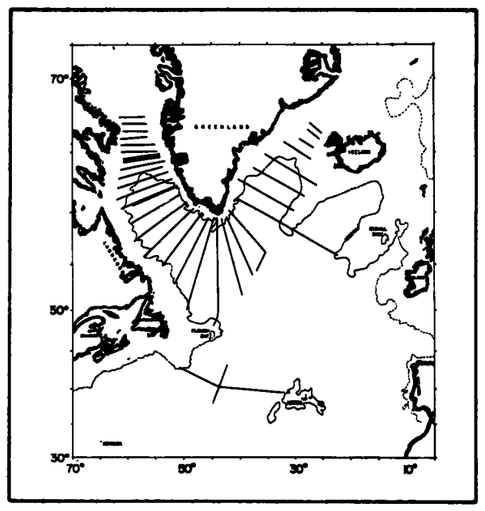

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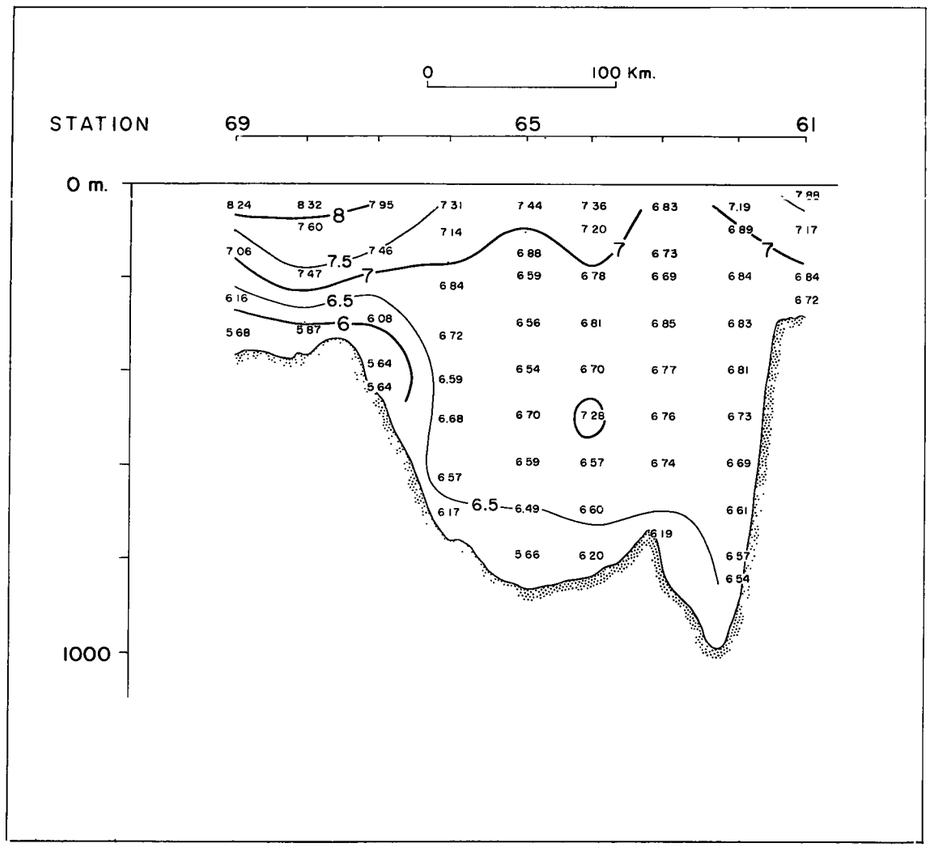
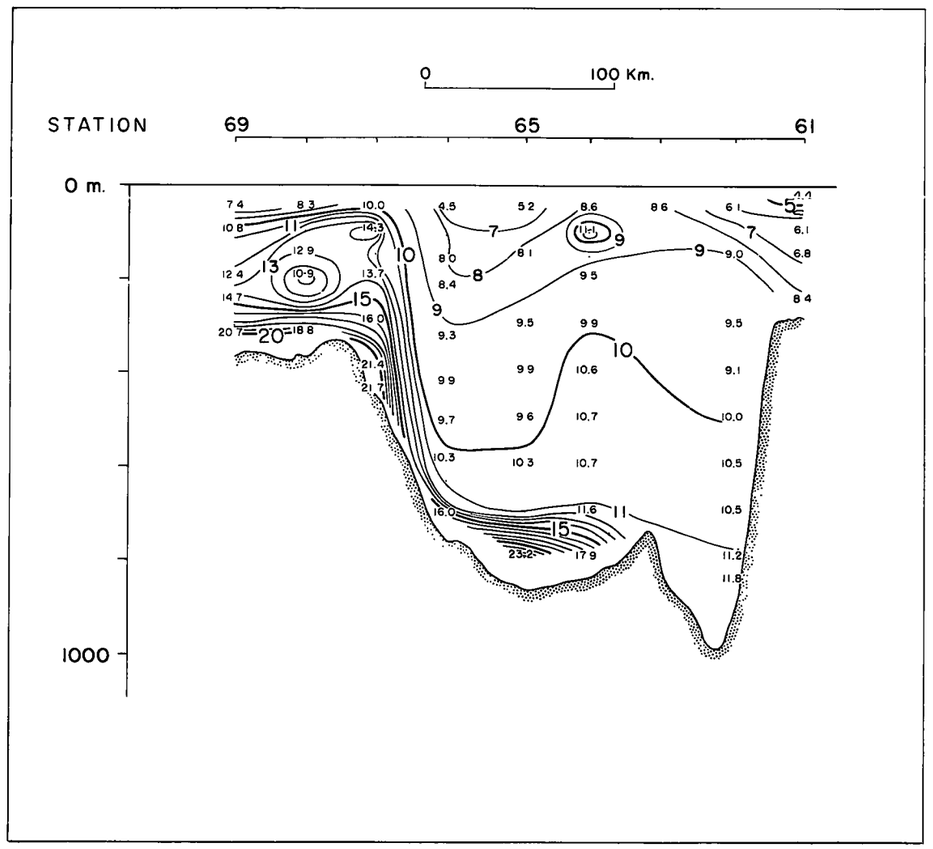
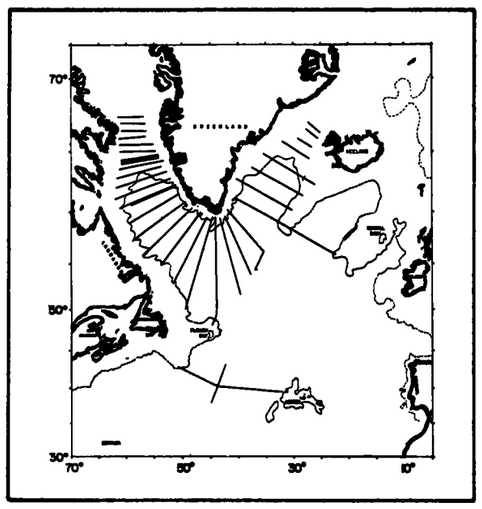


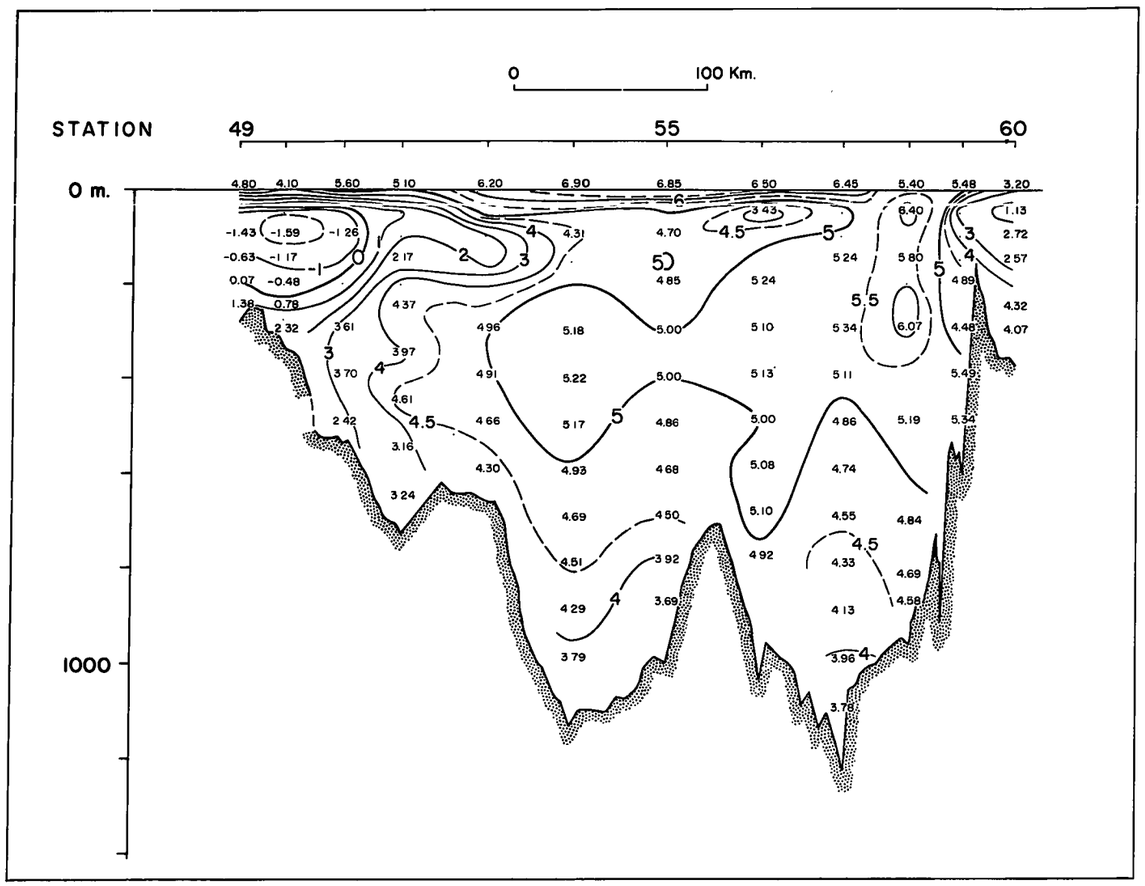
Oxygen (ml/L)



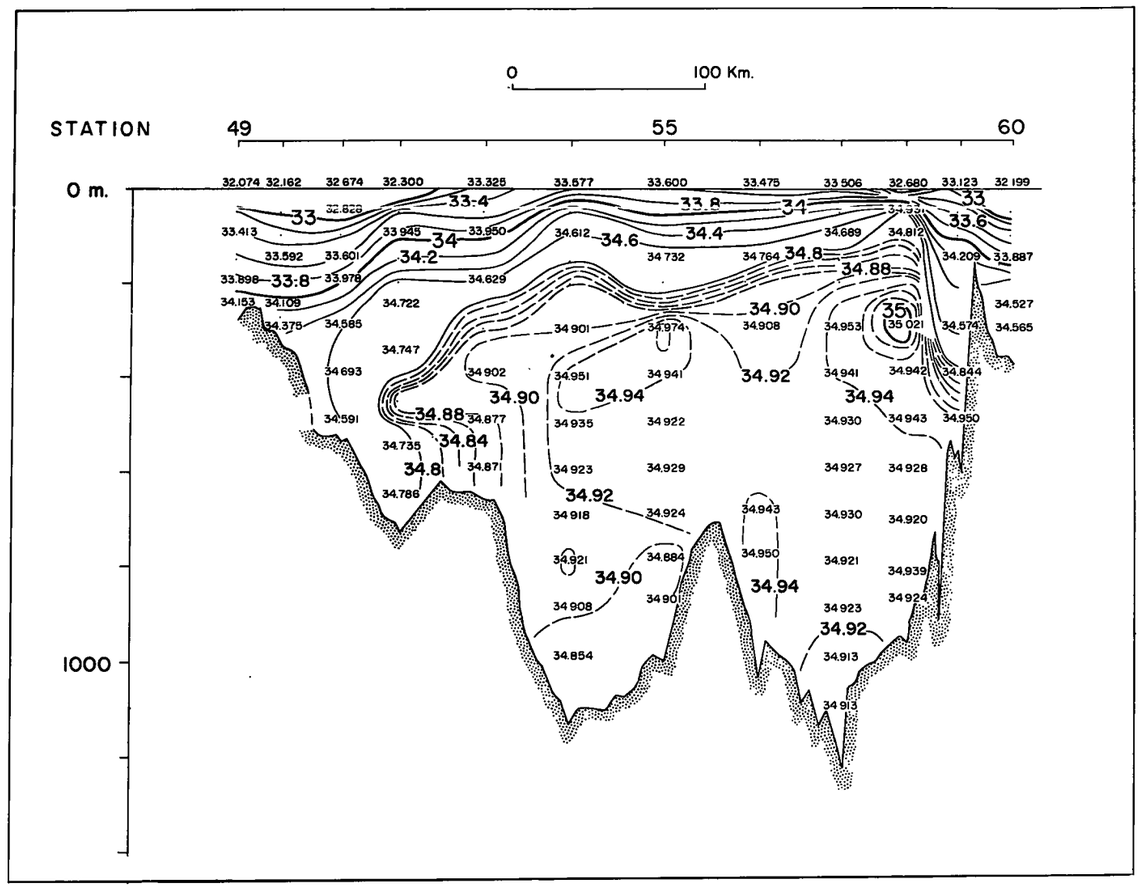
Silica (µg at/L)



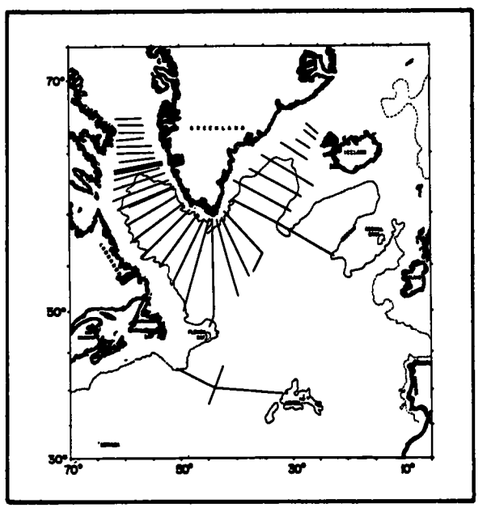
September 8 - September 9, 1965



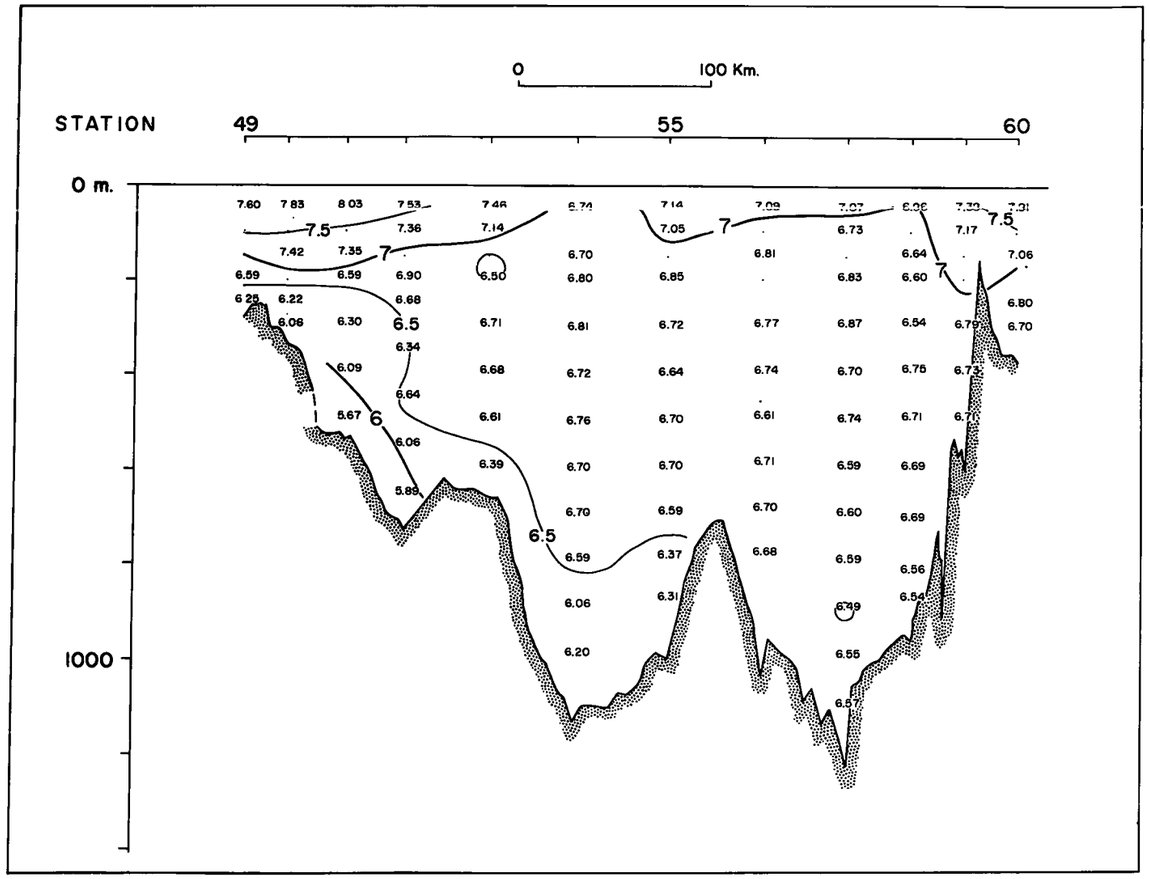
Temperature (°C)



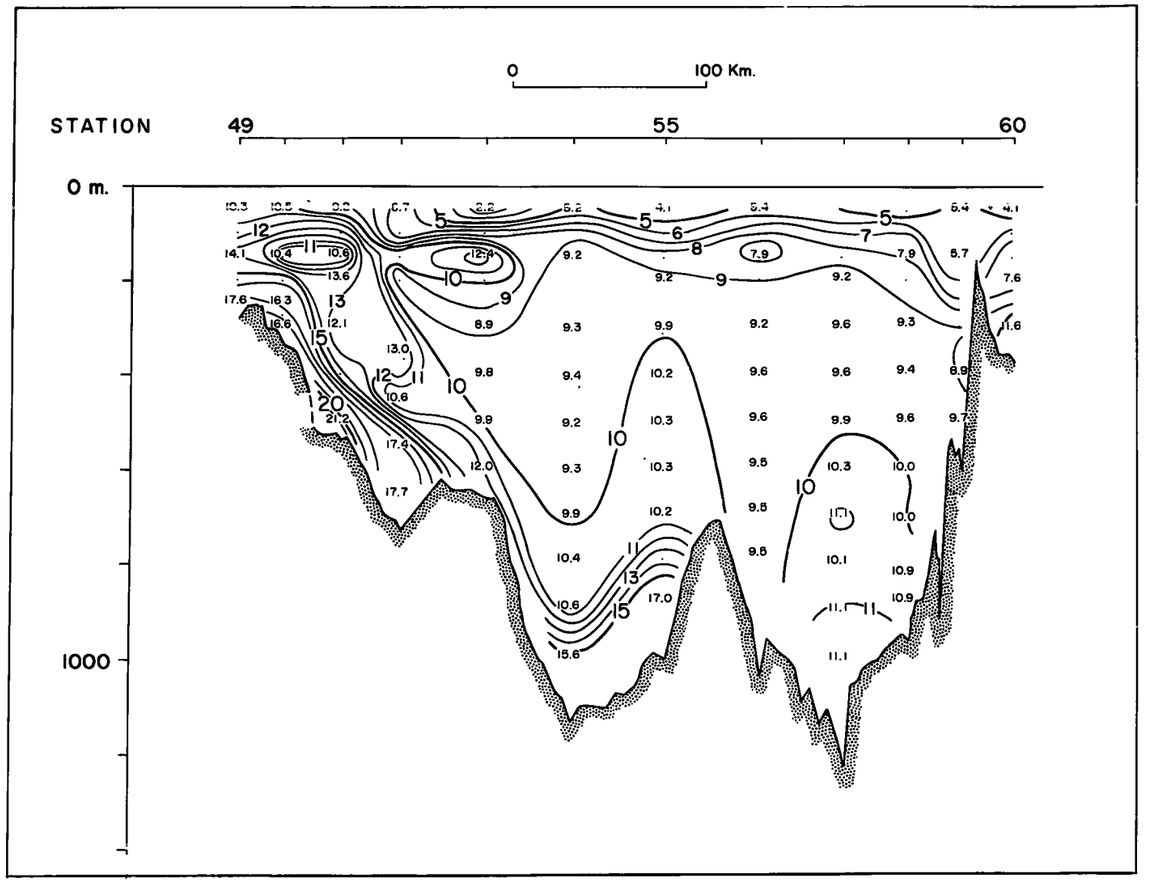
Salinity (°/₀₀)



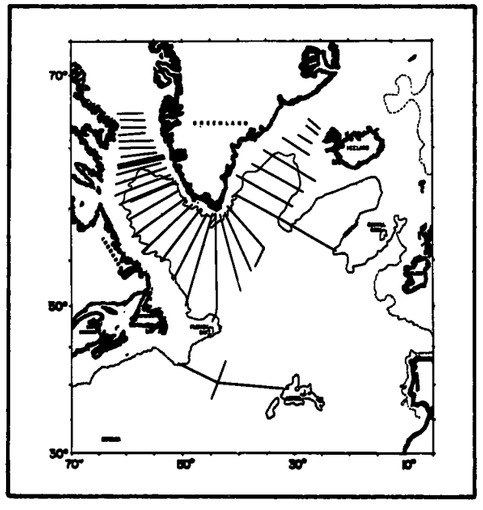
September 7 - September 8, 1965



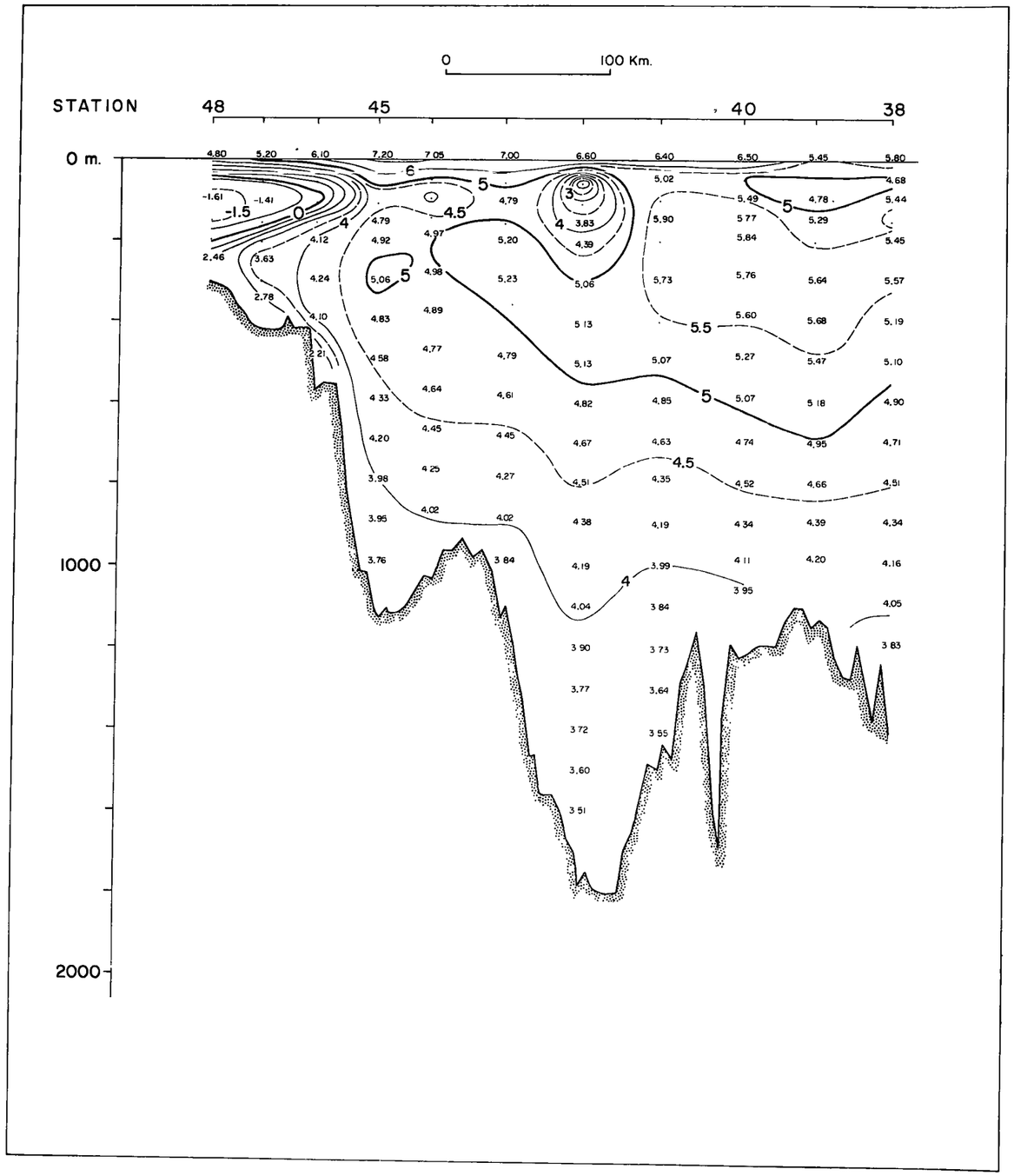
Oxygen (ml/L)



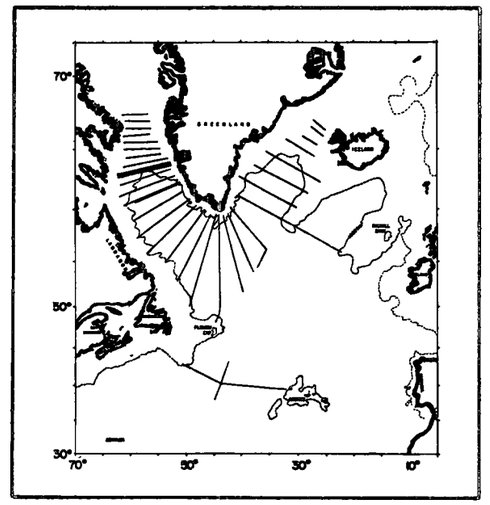
Silica (µg at/L)



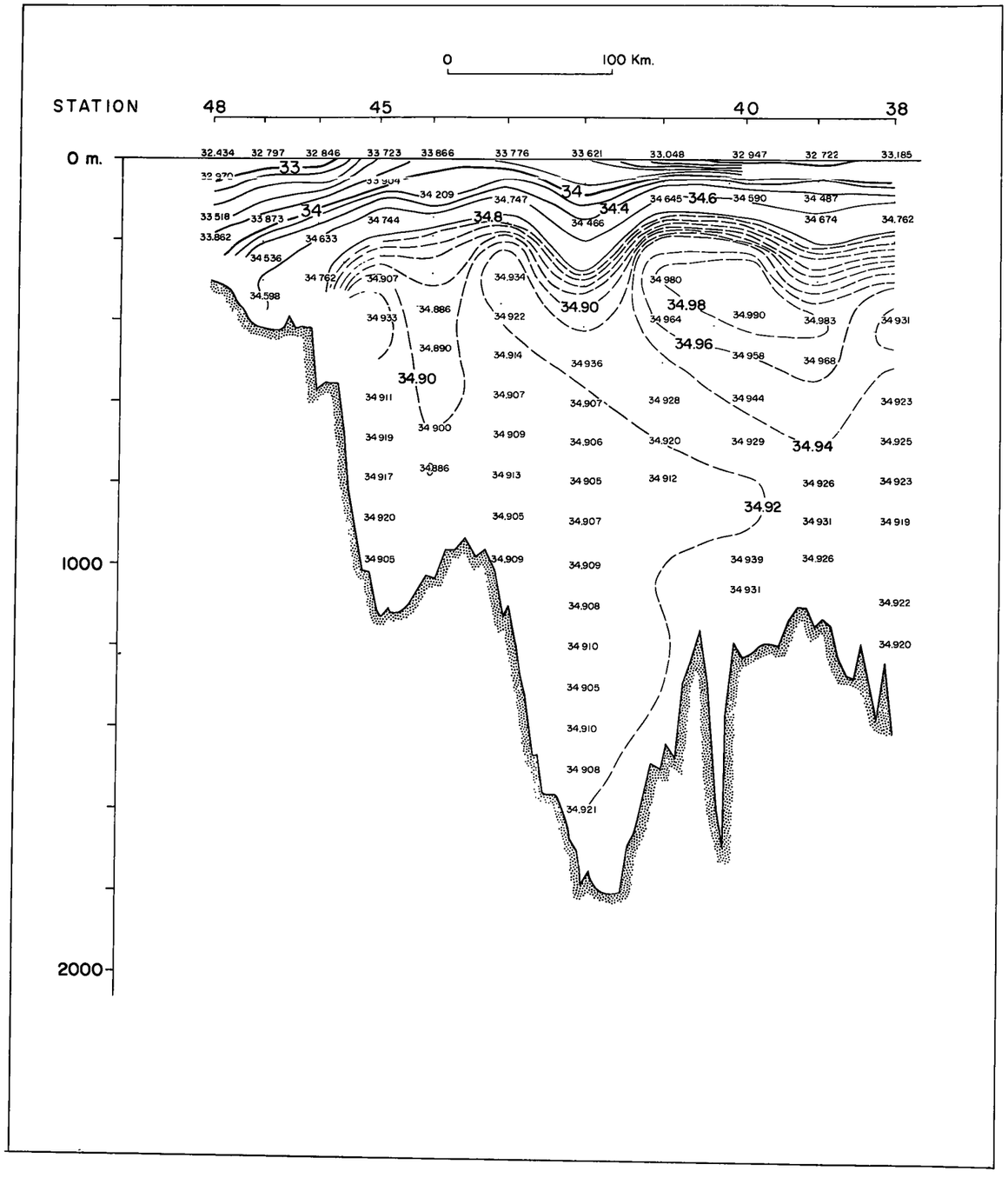
September 7 - September 8, 1965



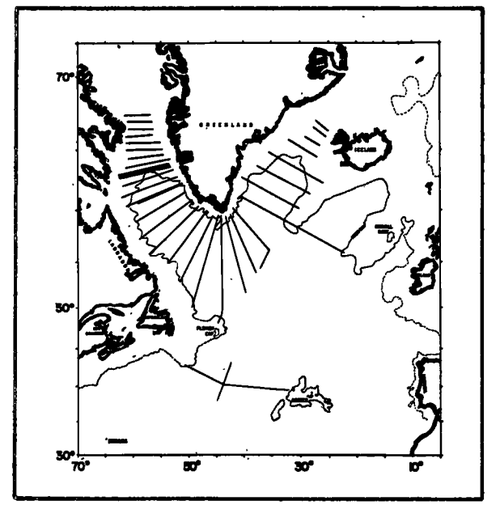
Temperature (°C)



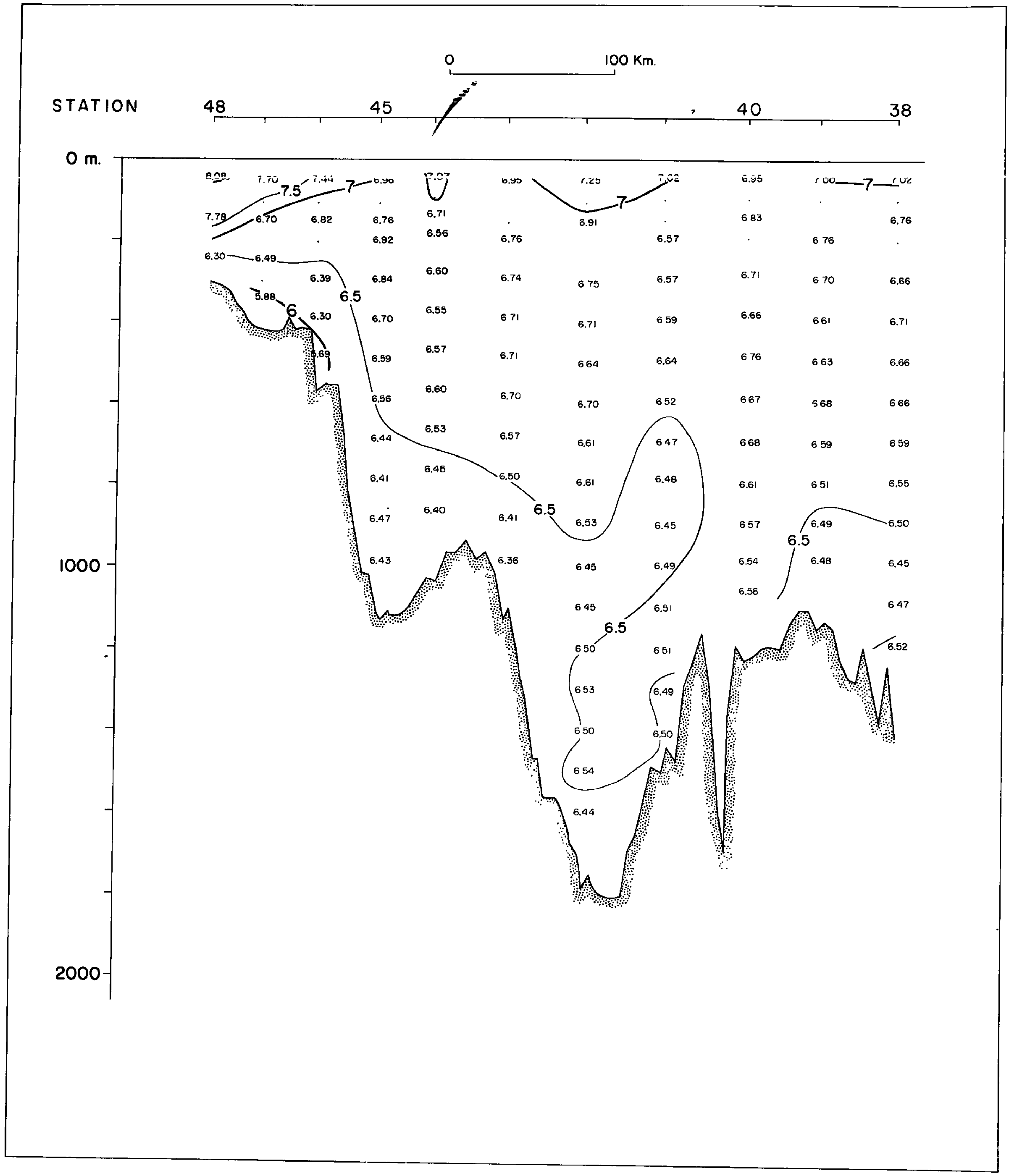
September 5 - September 7, 1965



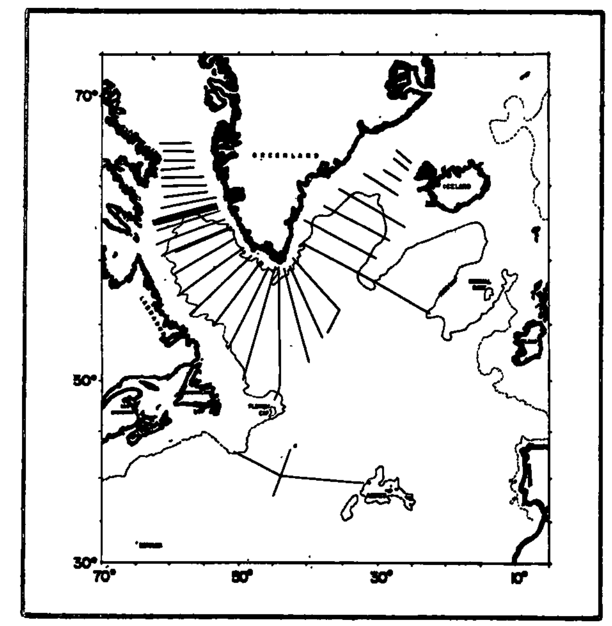
Salinity (°/₀₀)



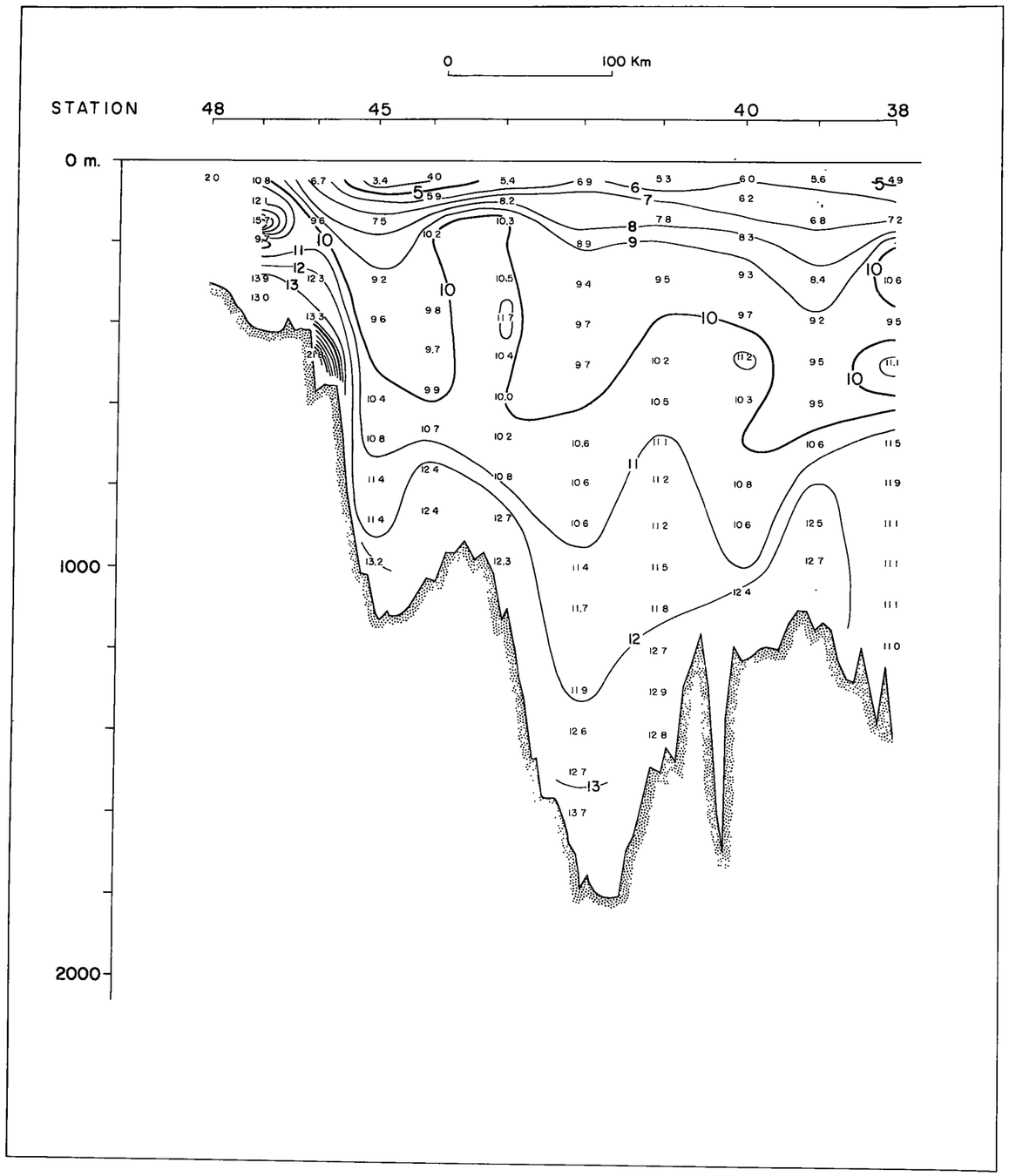
September 5 - September 7, 1965



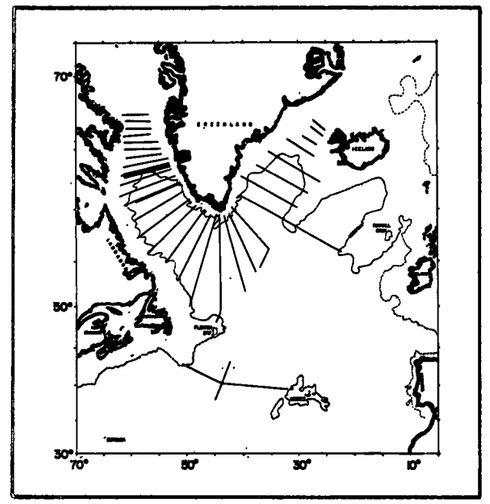
Oxygen (ml/L)



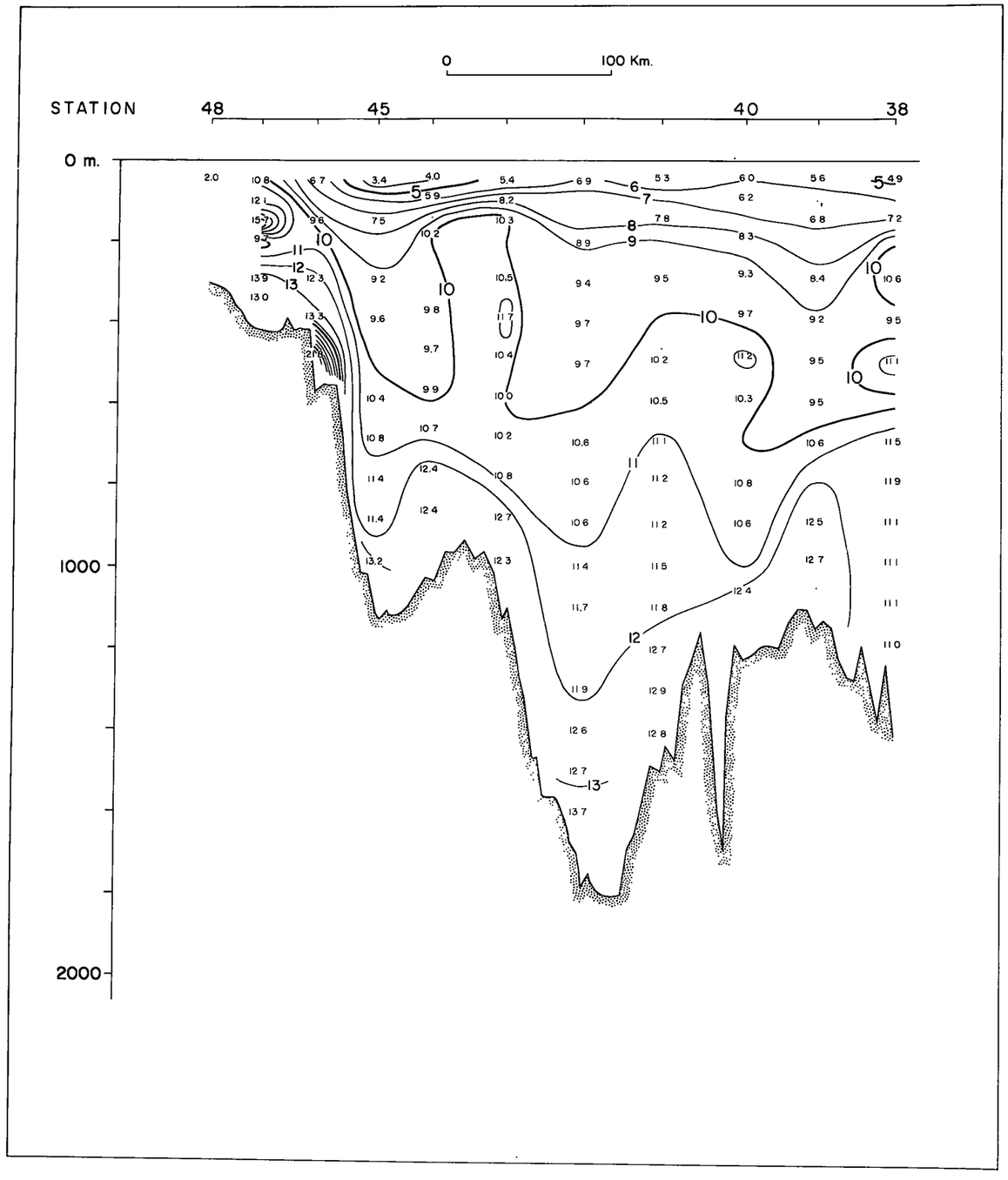
September 5 - September 7, 1965



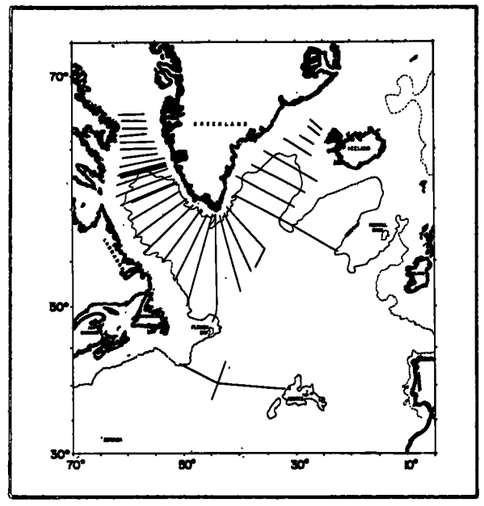
Silica (µg at/L)



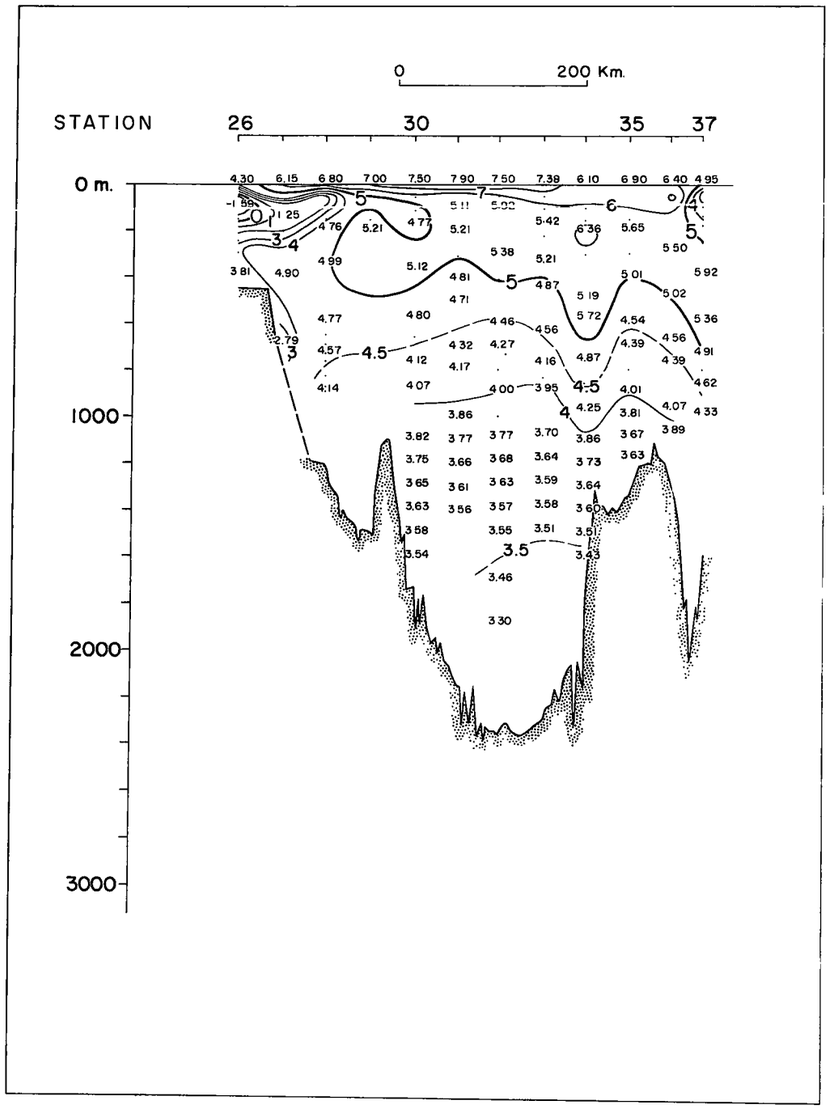
September 5 - September 7, 1965



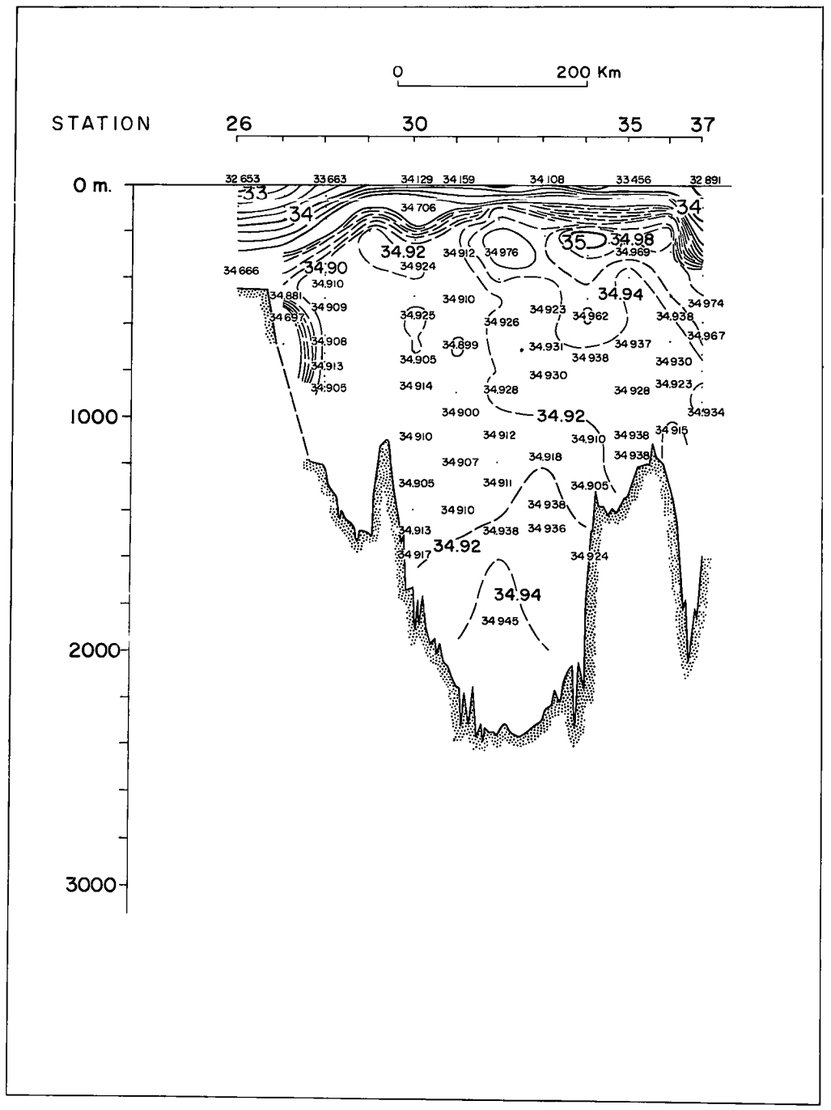
Silica (µg at/L)



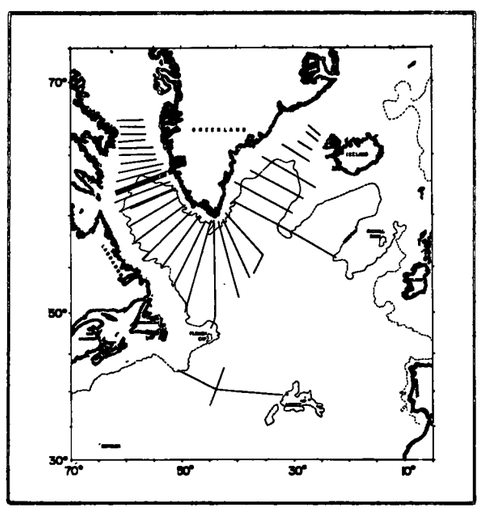
September 5 - September 7, 1965



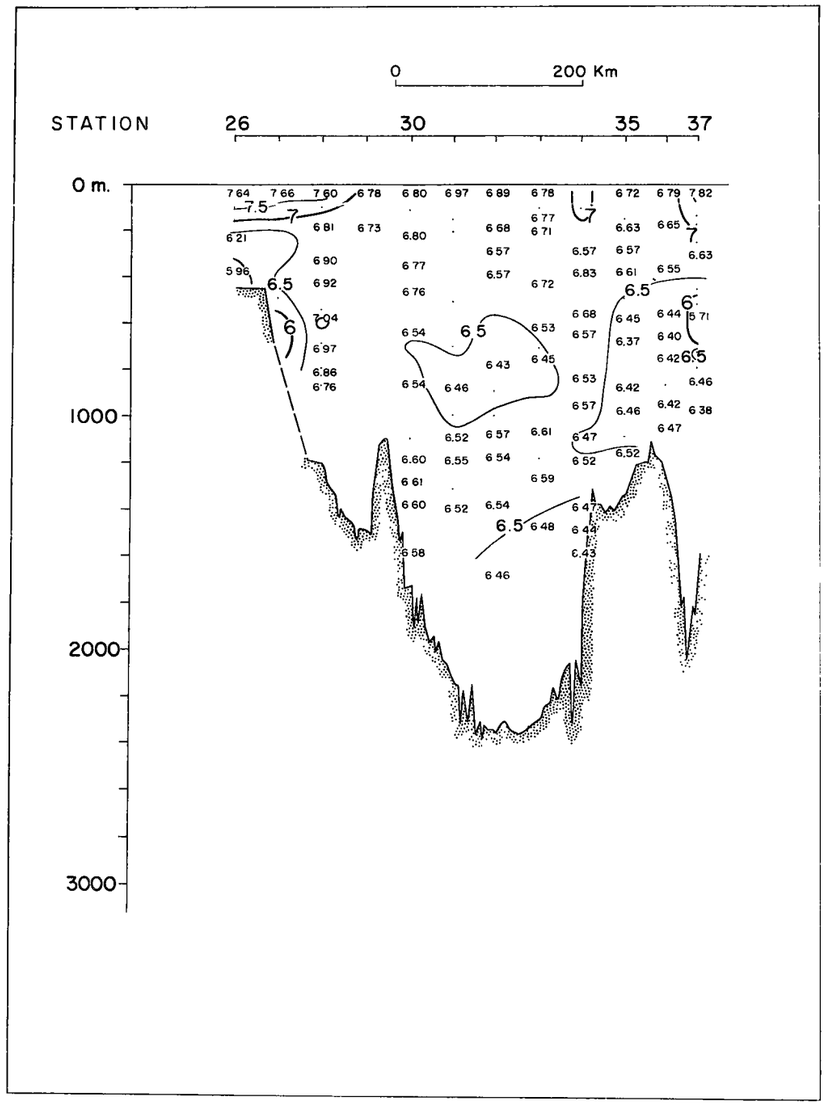
Temperature (°C)



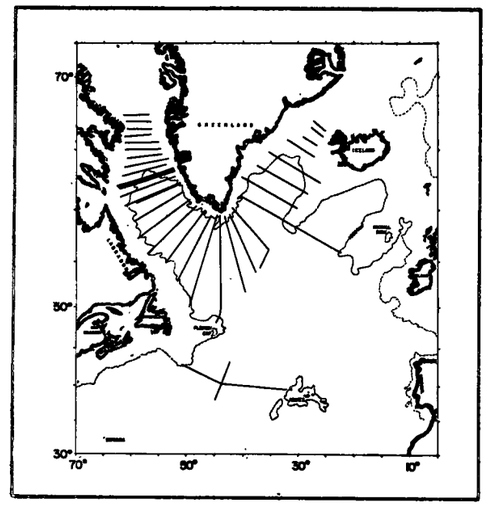
Salinity (°/₀₀)



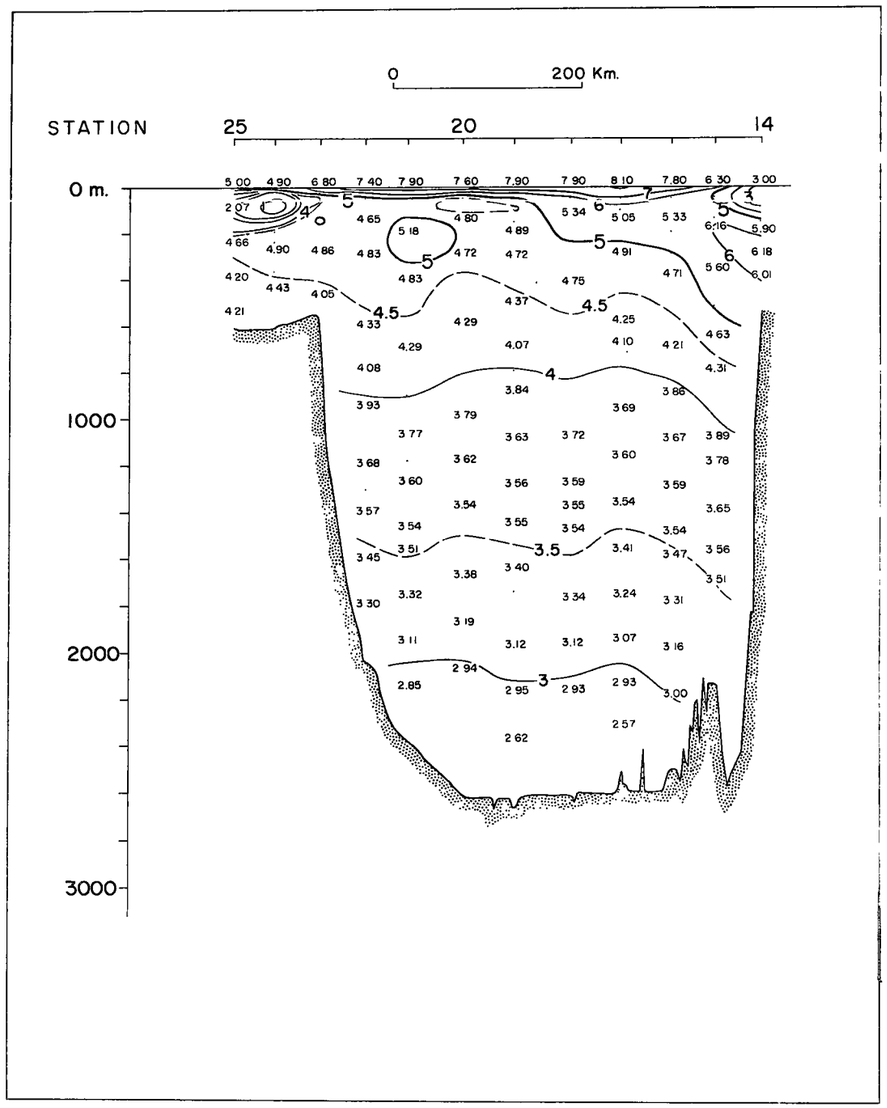
September 2 - September 5, 1965



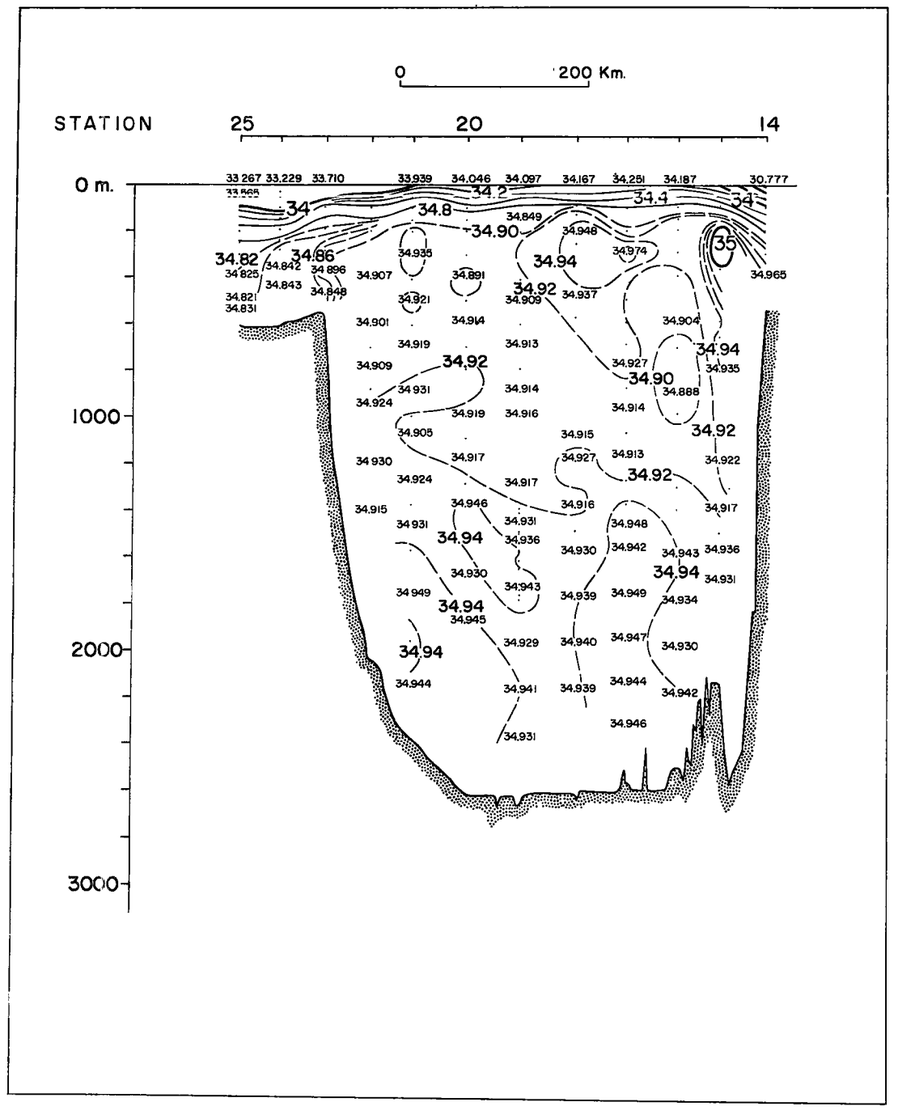
Oxygen (ml/L)



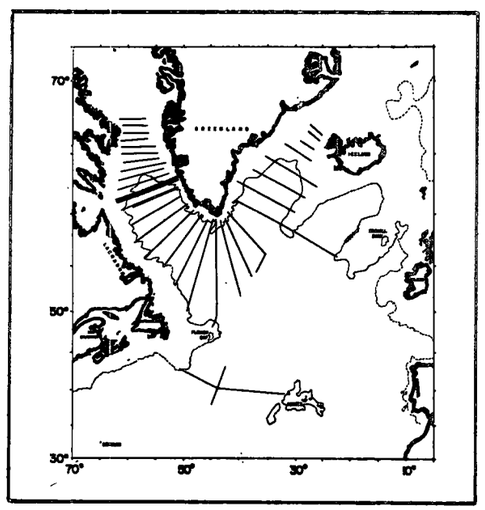
September 2 - September 5, 1965



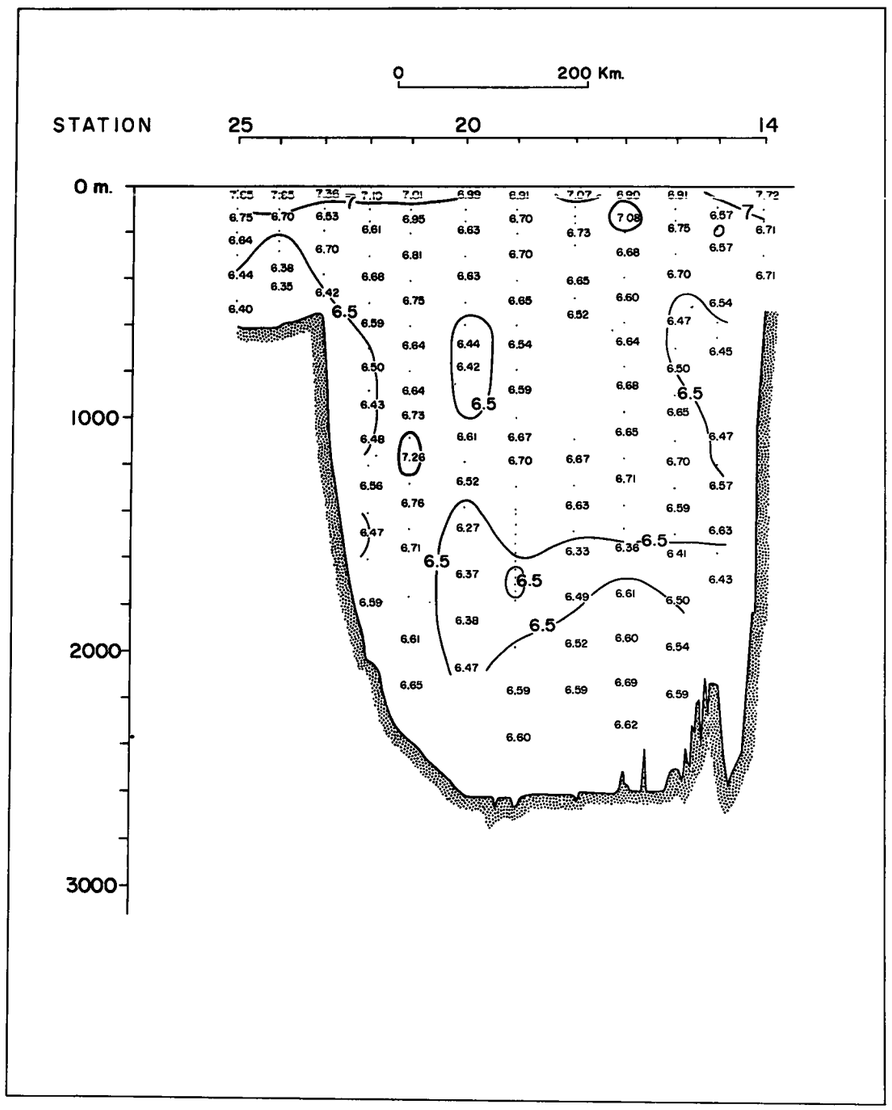
Temperature (°C)



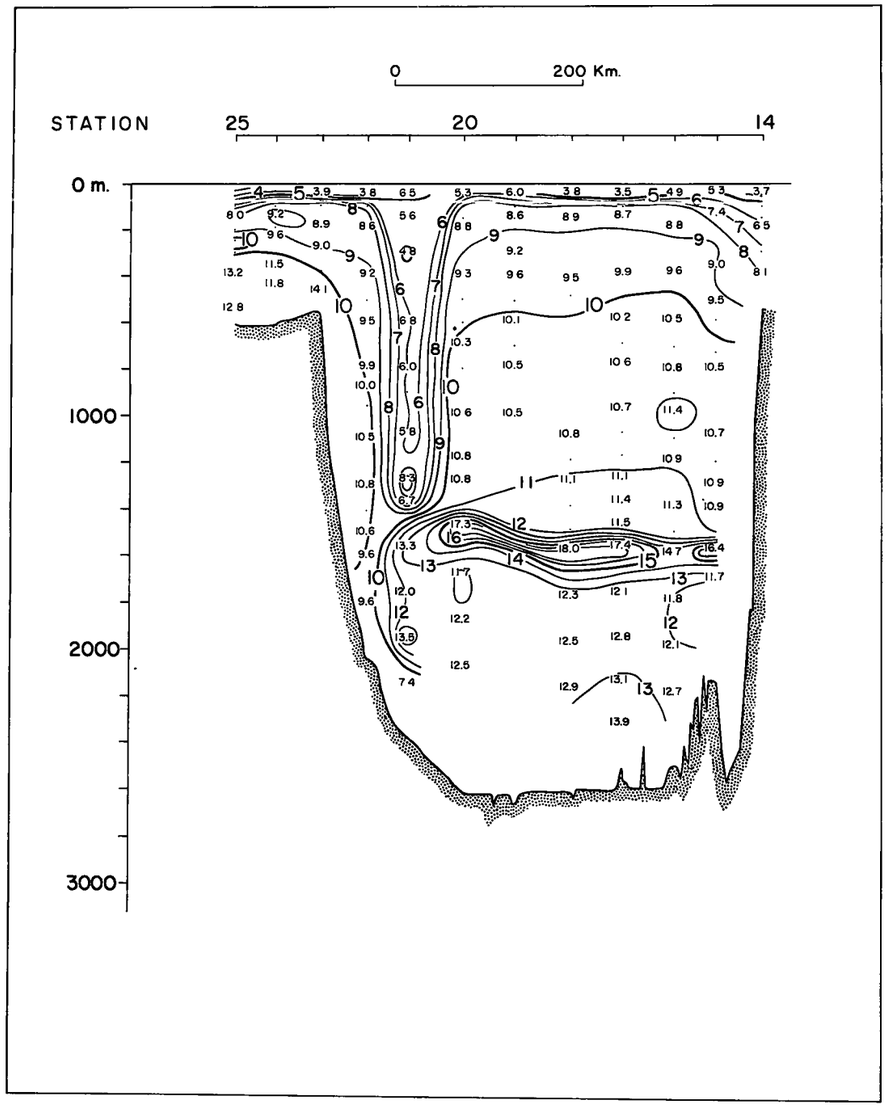
Salinity (°/₀₀)



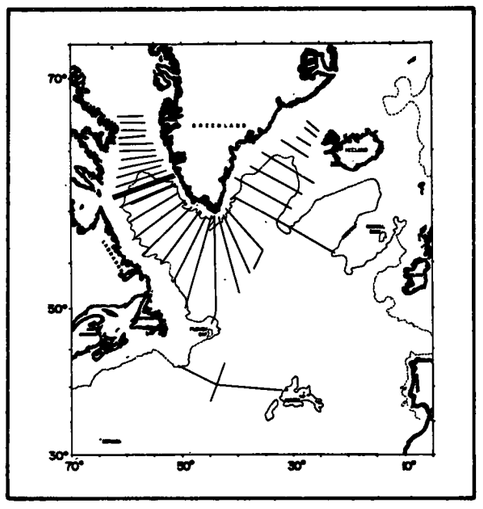
August 31 - September 2, 1965



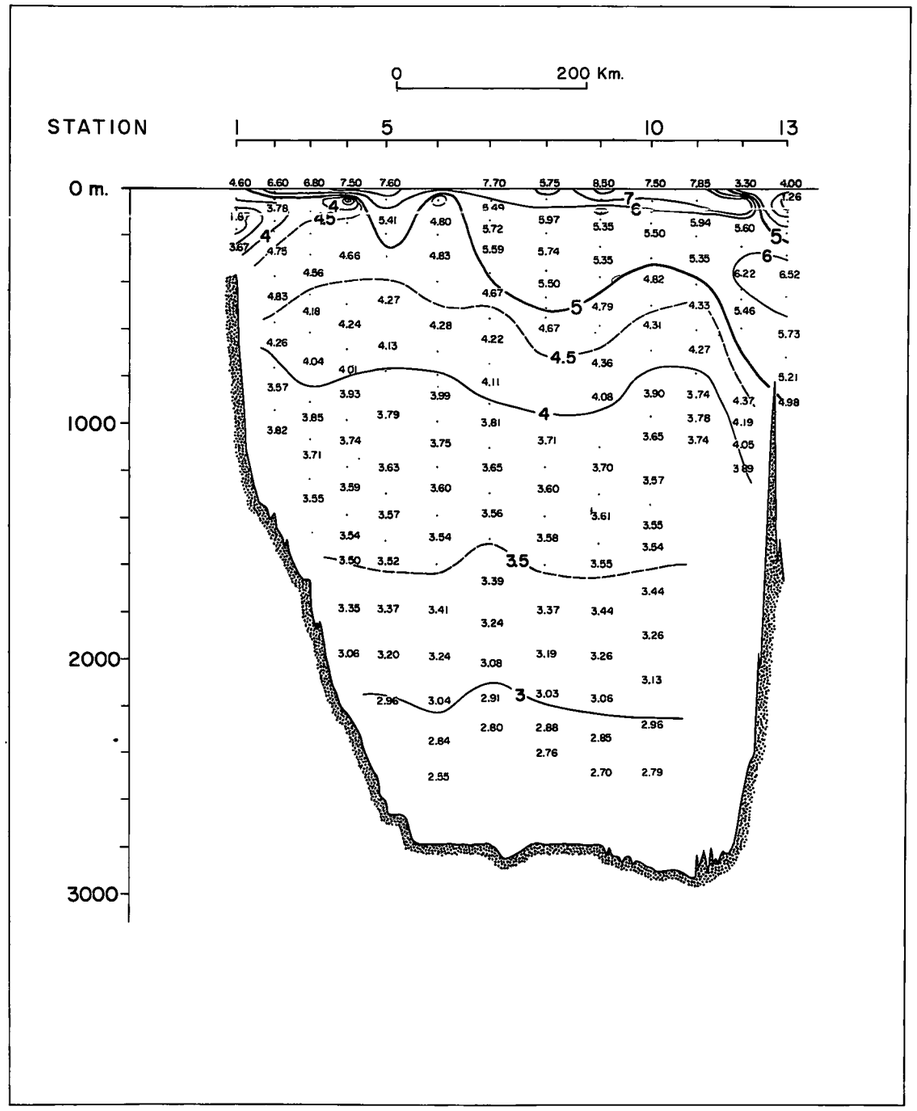
Oxygen (ml/L)



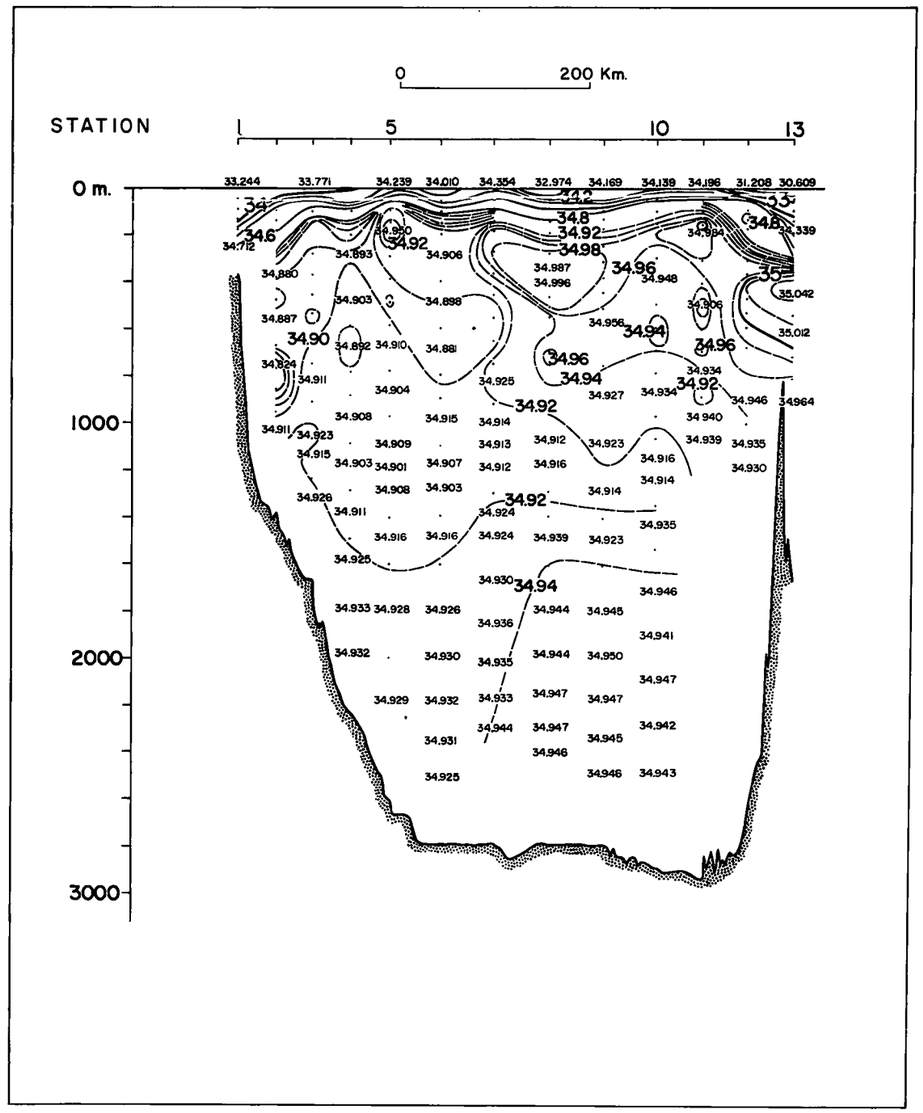
Silica (µg at/L)



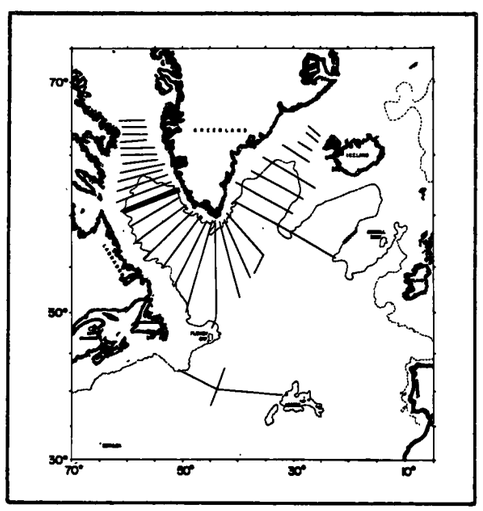
August 31 - September 2, 1965



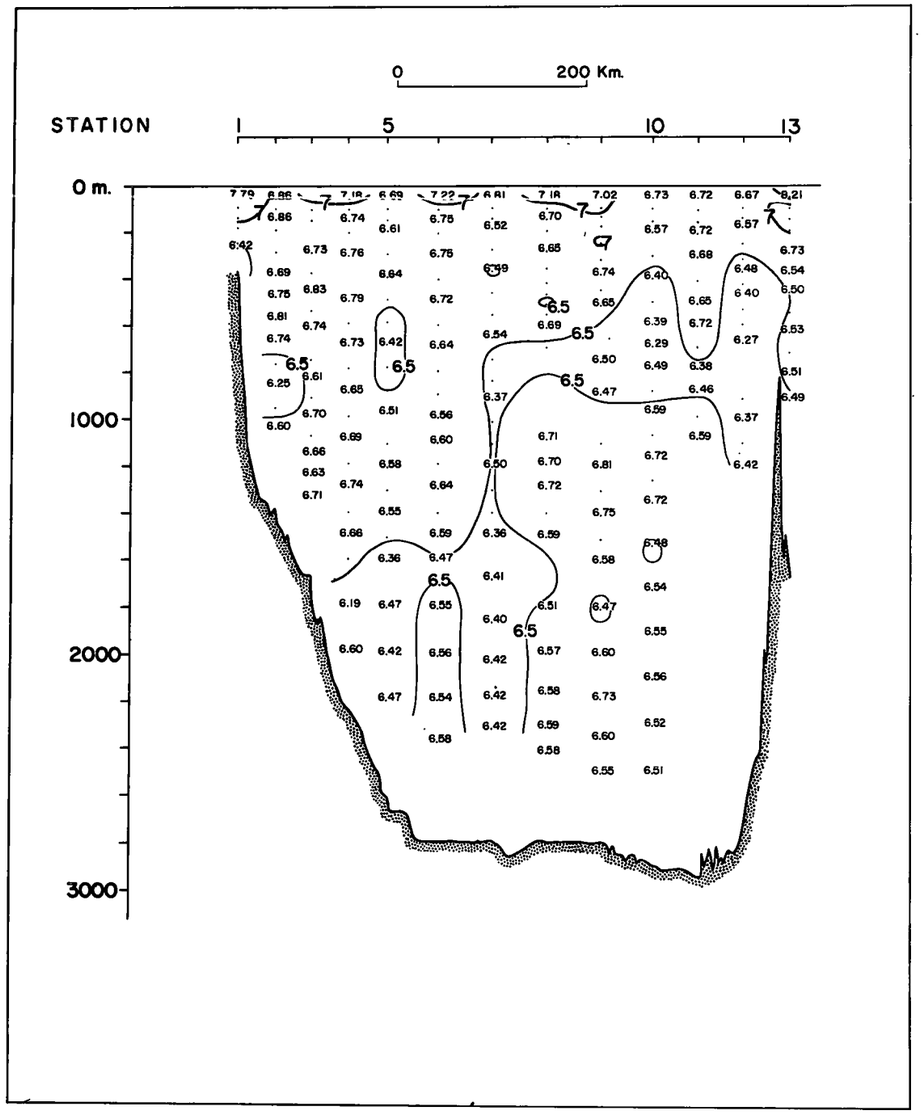
Temperature (°C)



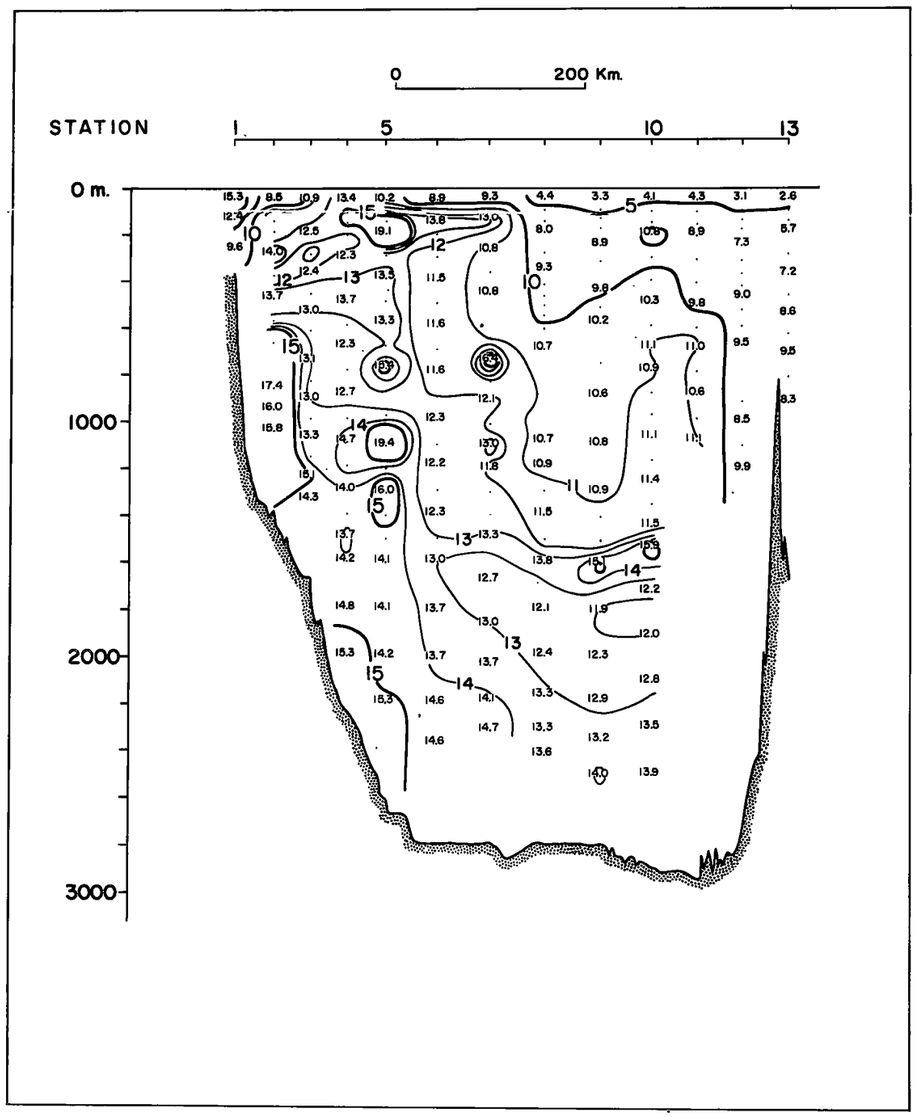
Salinity (°/₀₀)



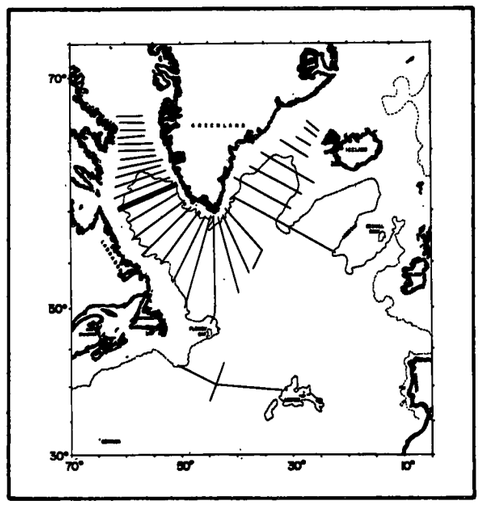
August 28 - August 31, 1965



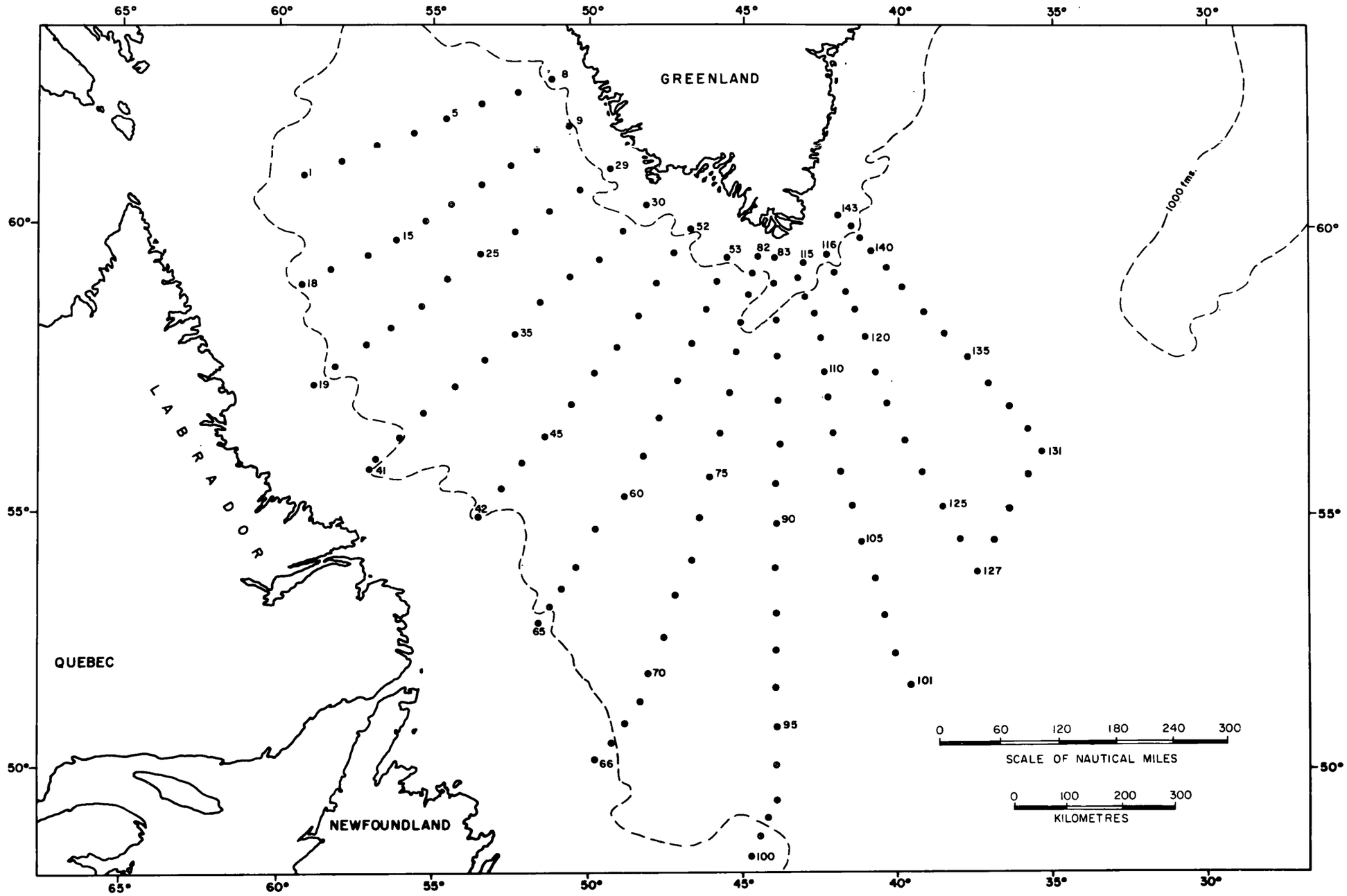
Oxygen (ml/L)



Silica (µg at/L)



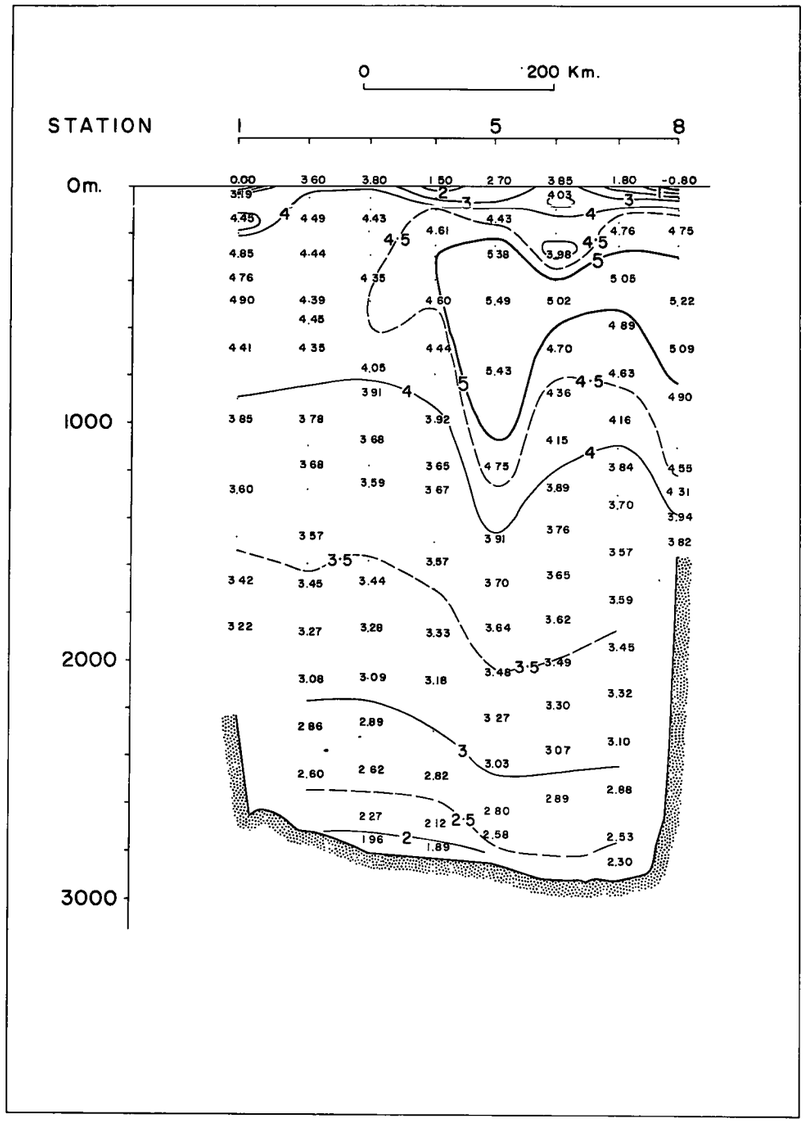
August 28 - August 31, 1965



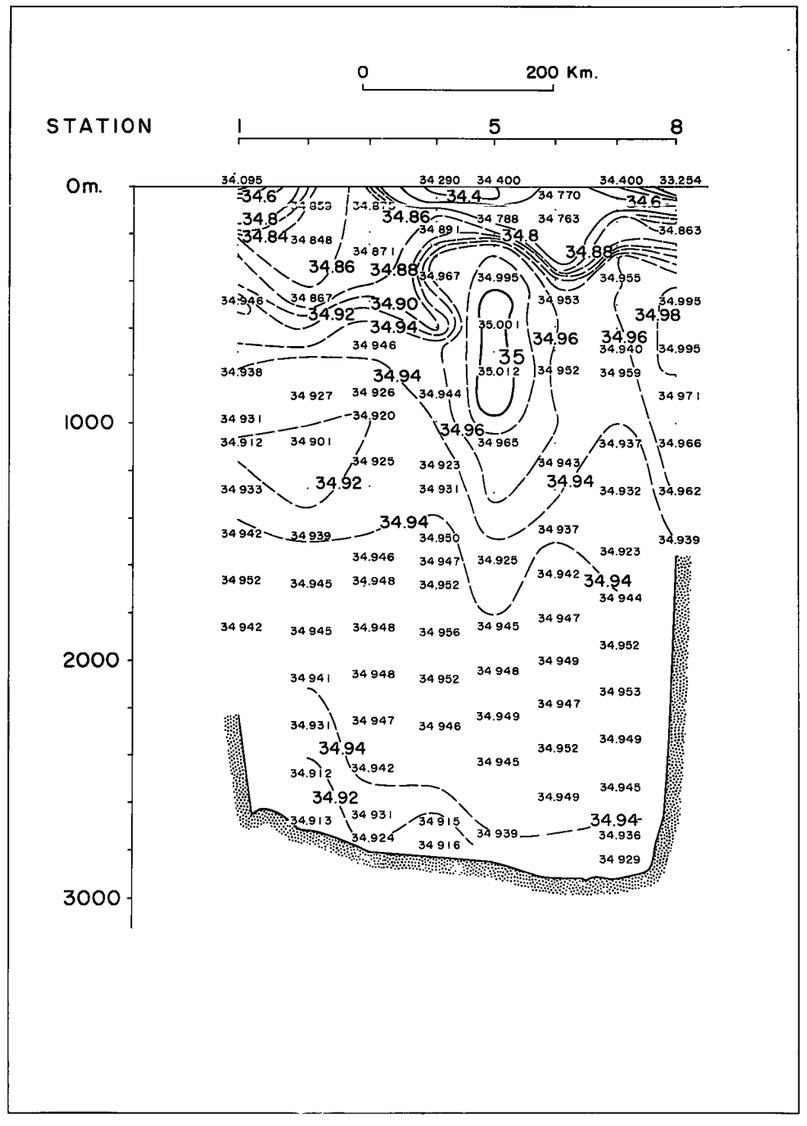
Cruise BI 0266 CSS HUDSON

March 12 - May 12, 1966

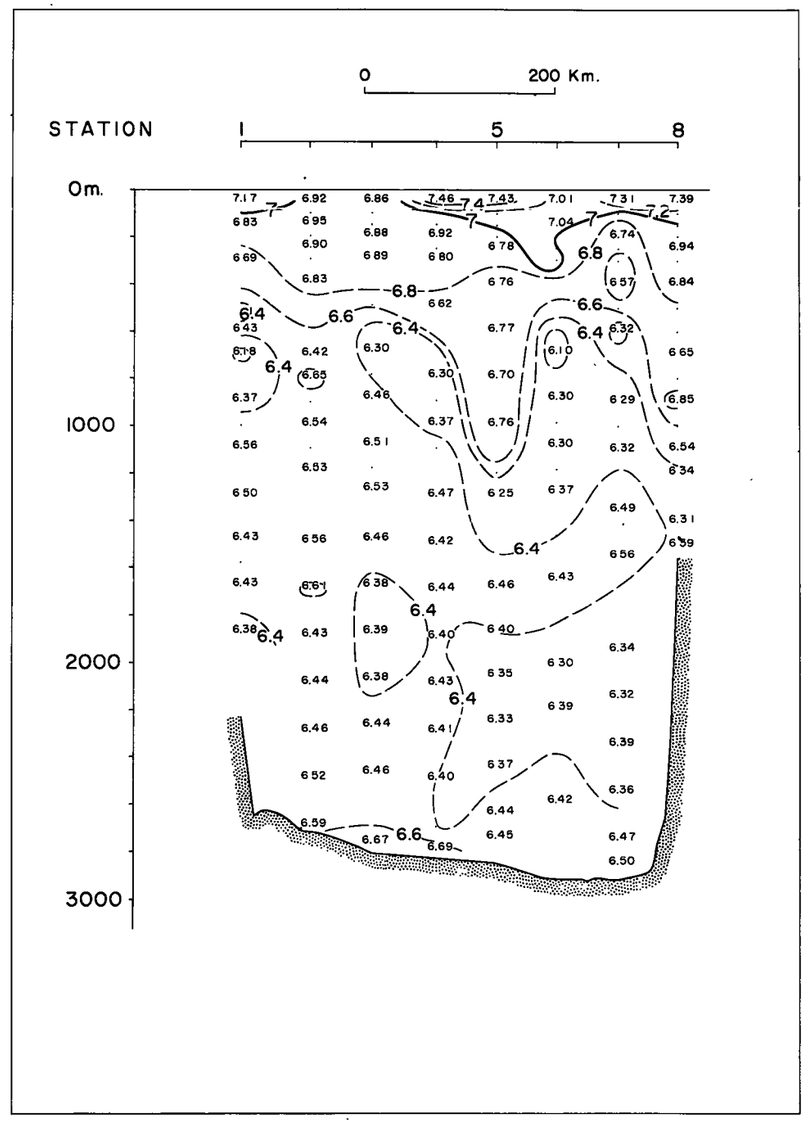
Scientist-in-Charge — J. R. N. Lazier



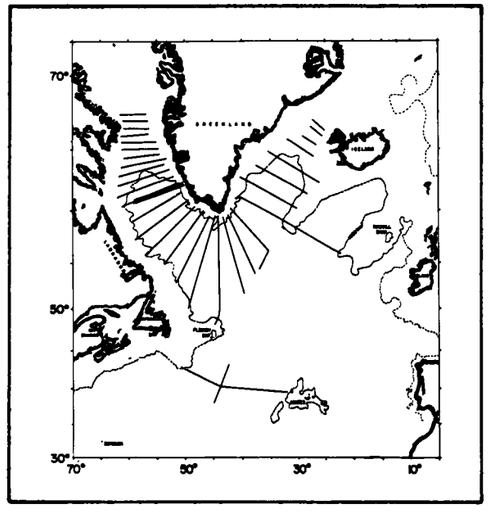
Temperature (°C)



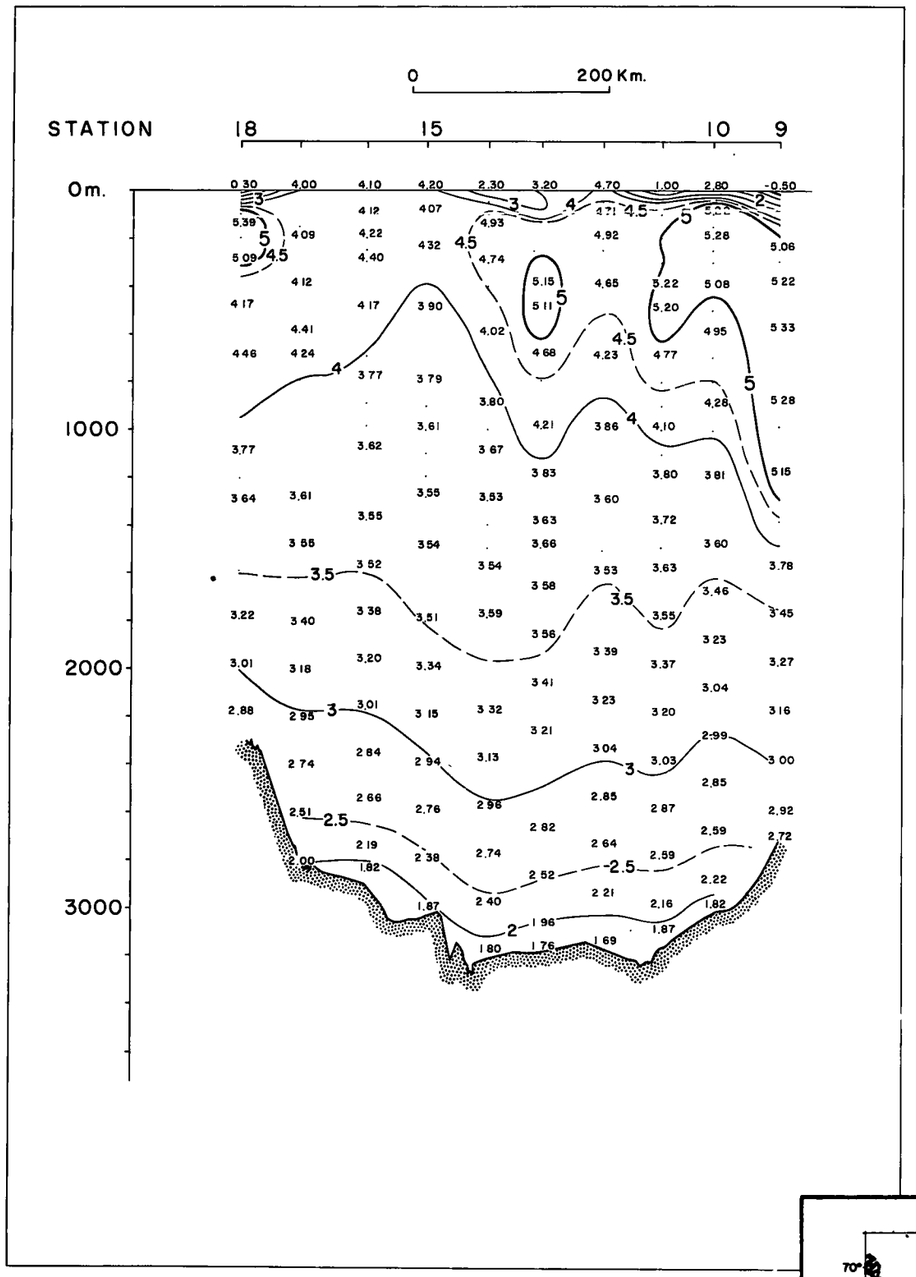
Salinity (°/₀₀)



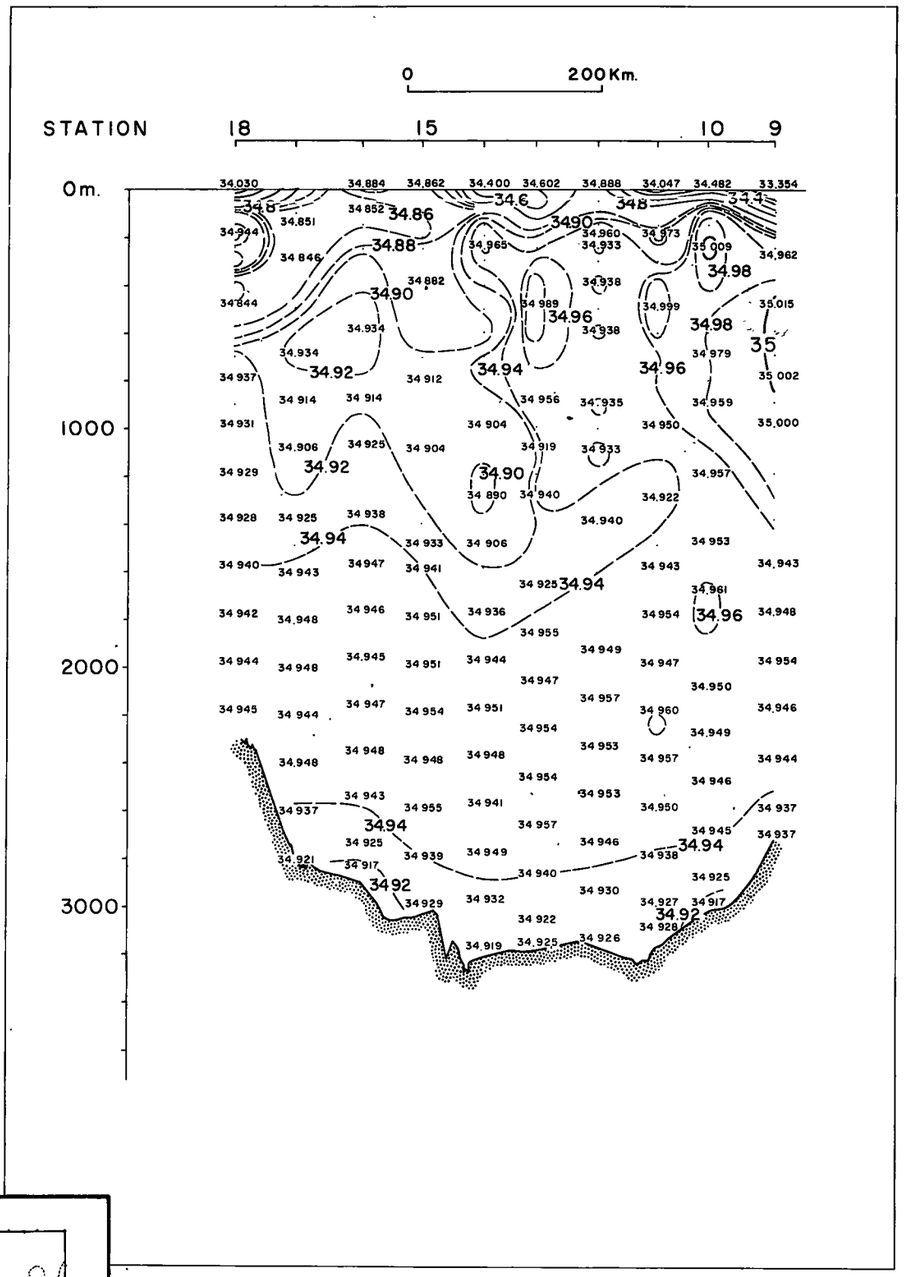
Oxygen (ml/L)



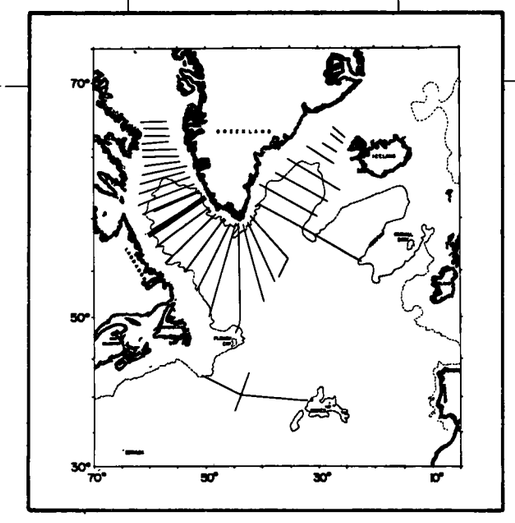
March 17 - March 19, 1966



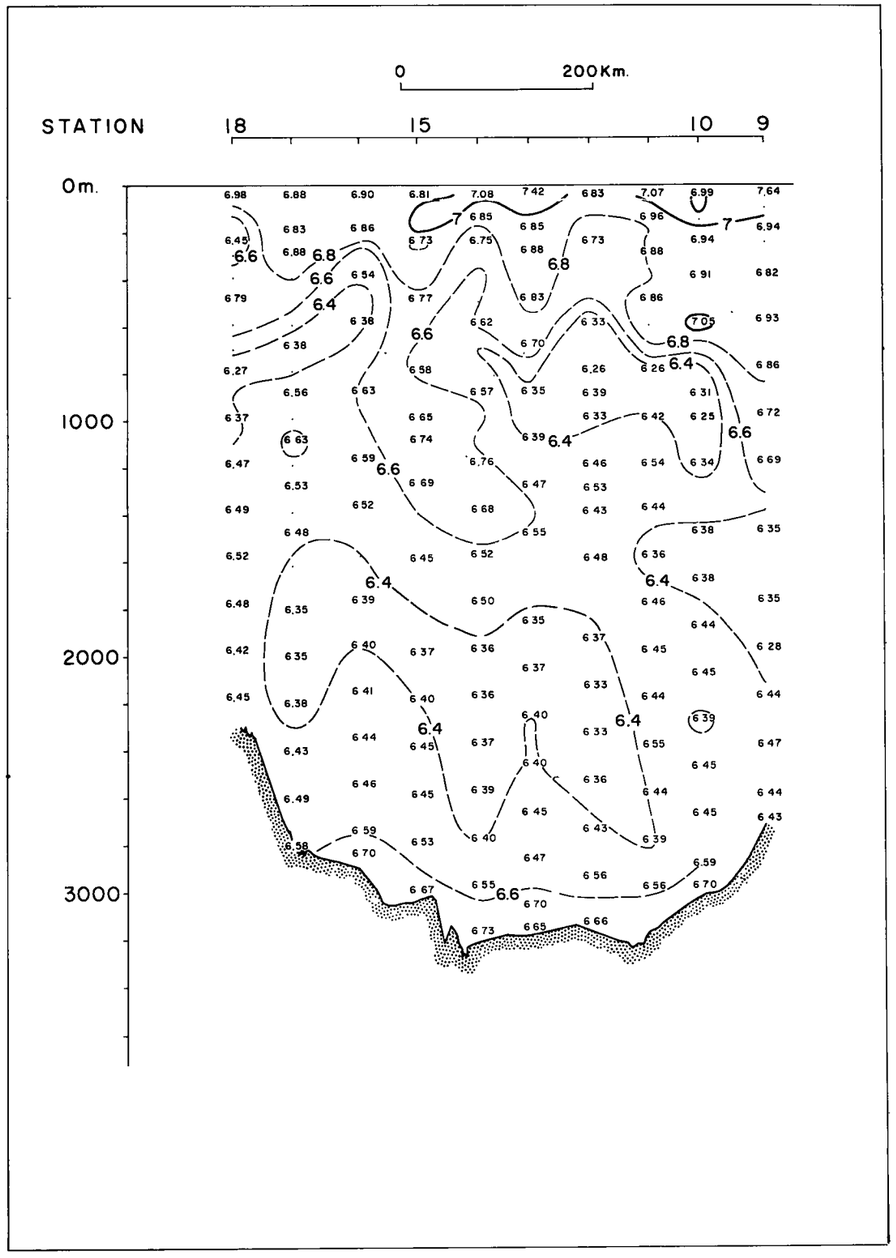
Temperature (°C)



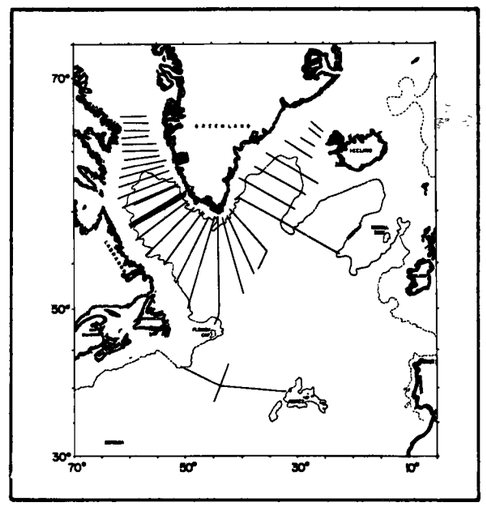
Salinity (°/oo)



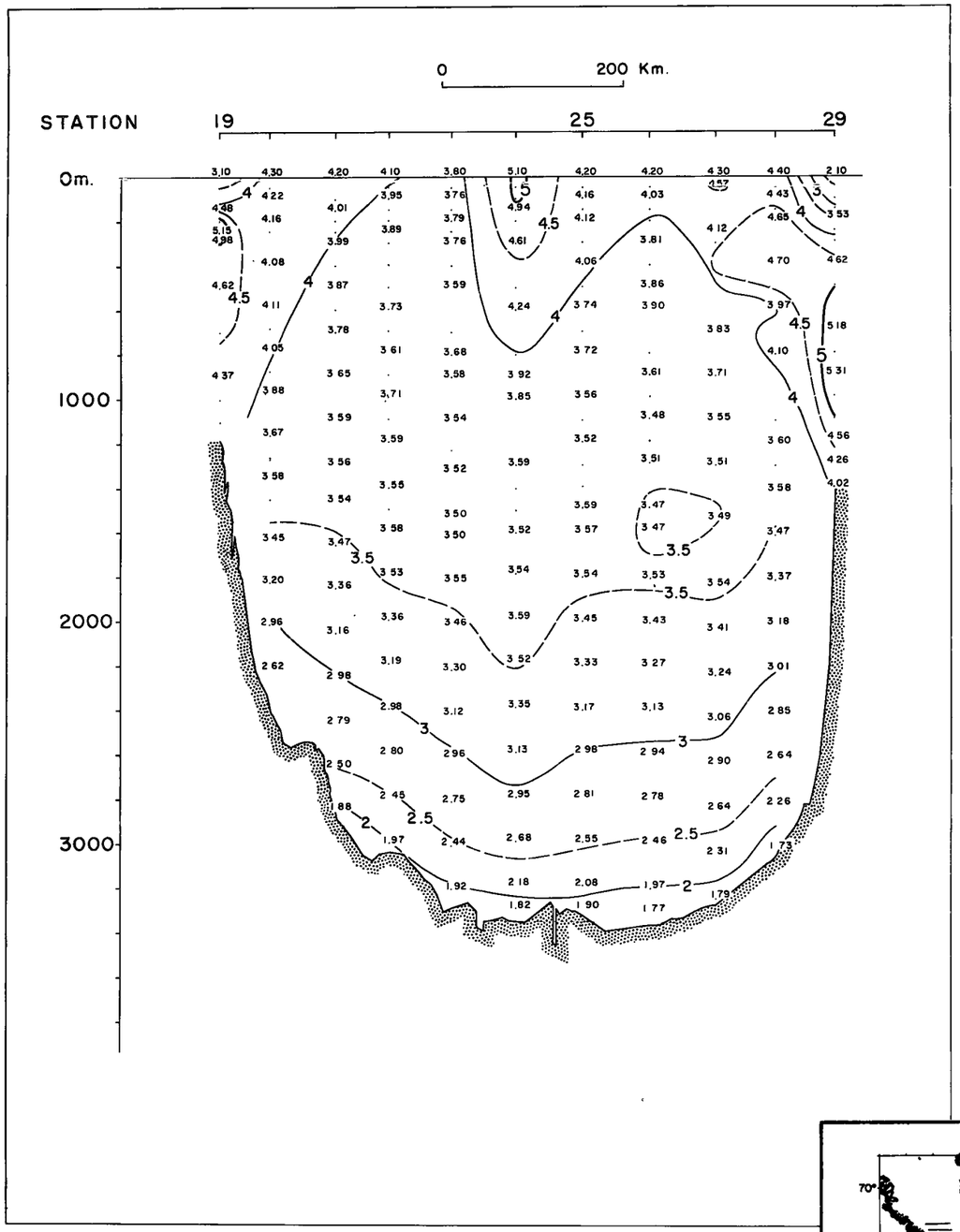
March 19 - March 21, 1966



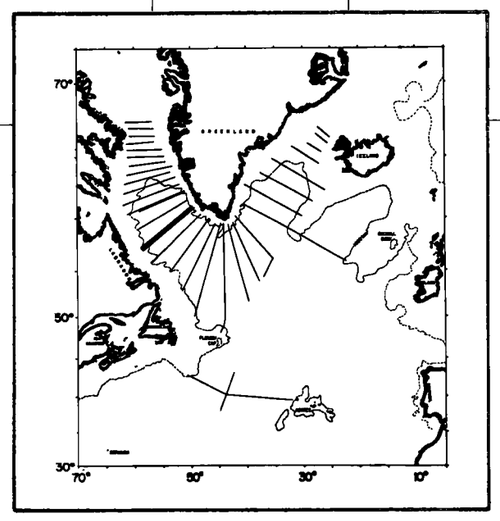
Oxygen (ml/L)

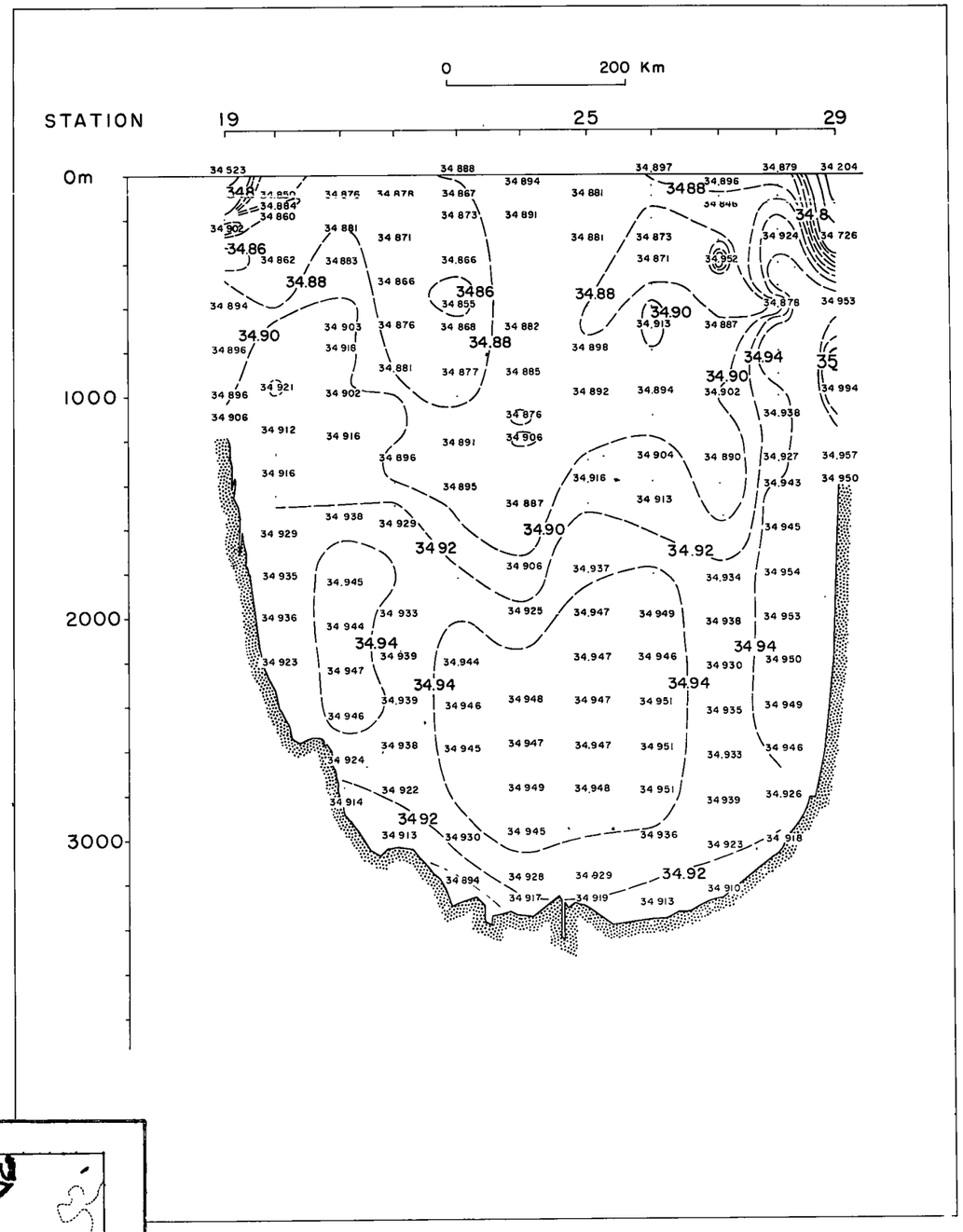


March 19 - March 21, 1966



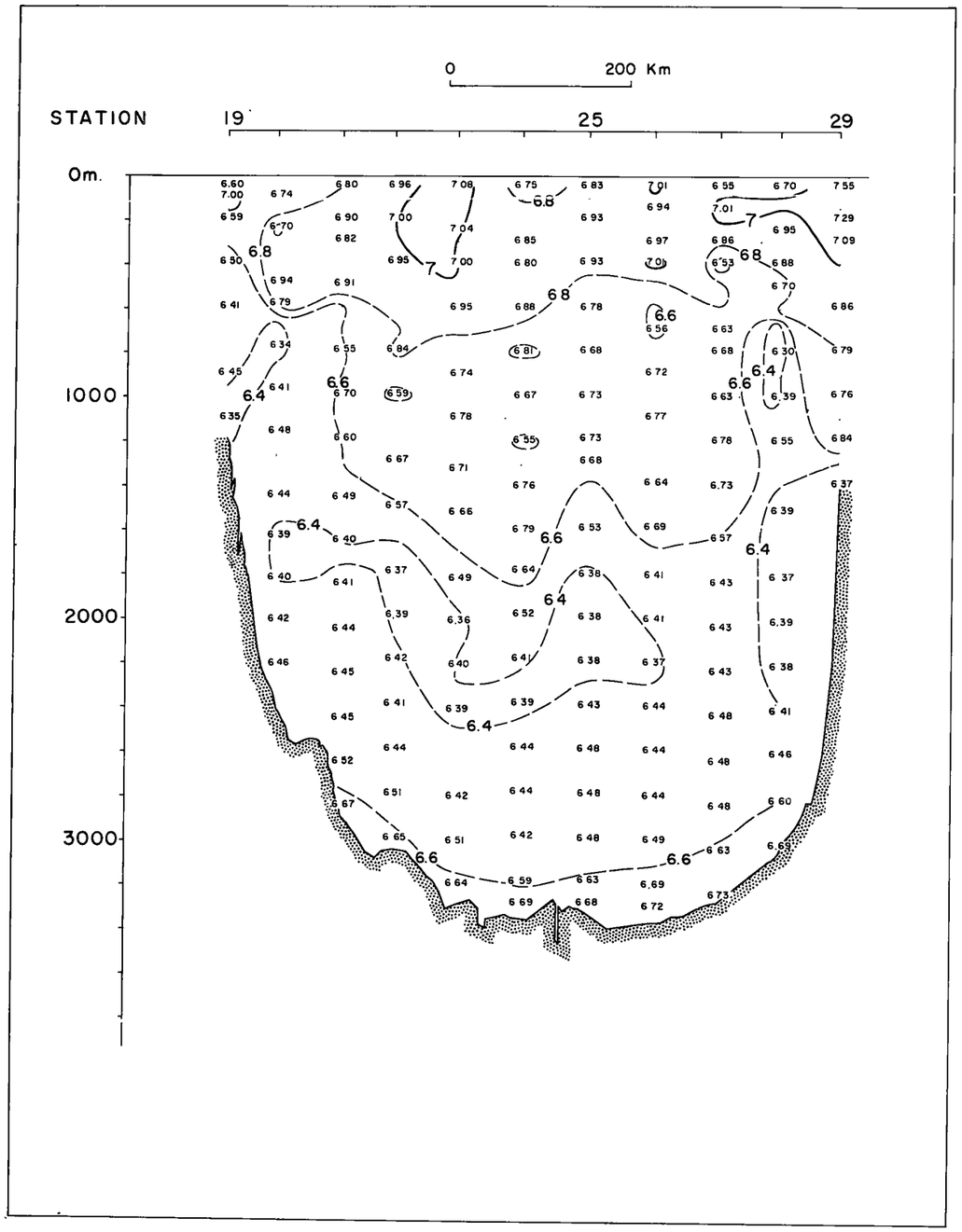
Temperature (°C)



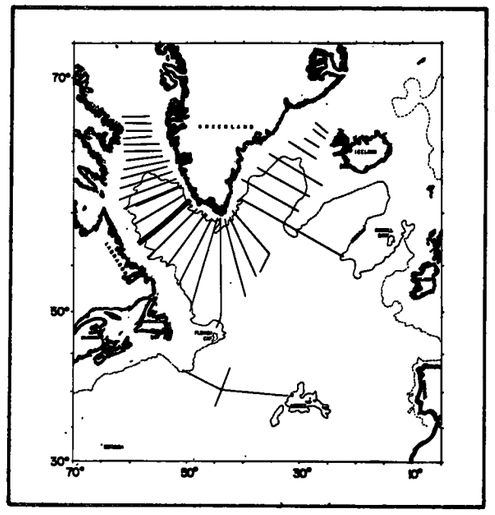


Salinity (°/₀₀)

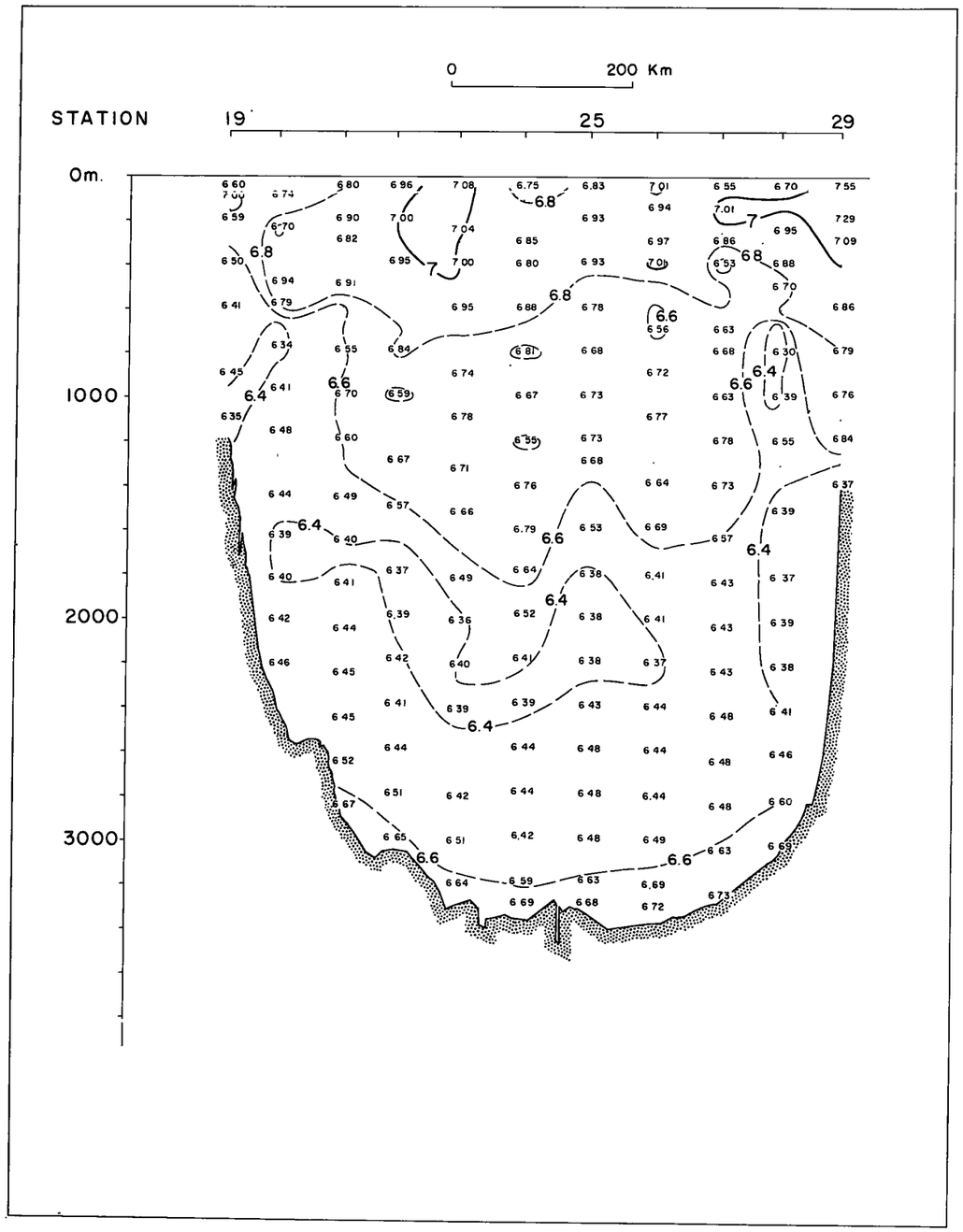
March 22 - March 24, 1966



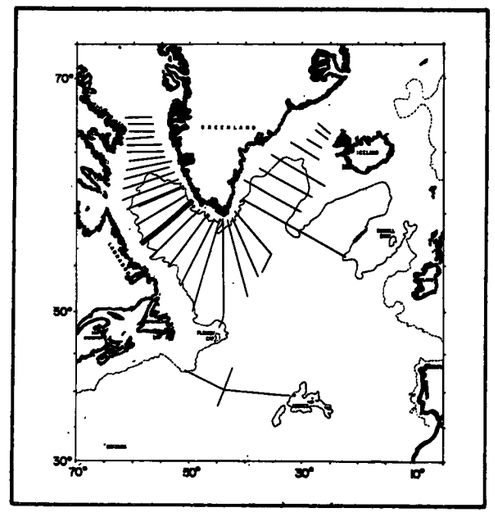
Oxygen (ml/L)



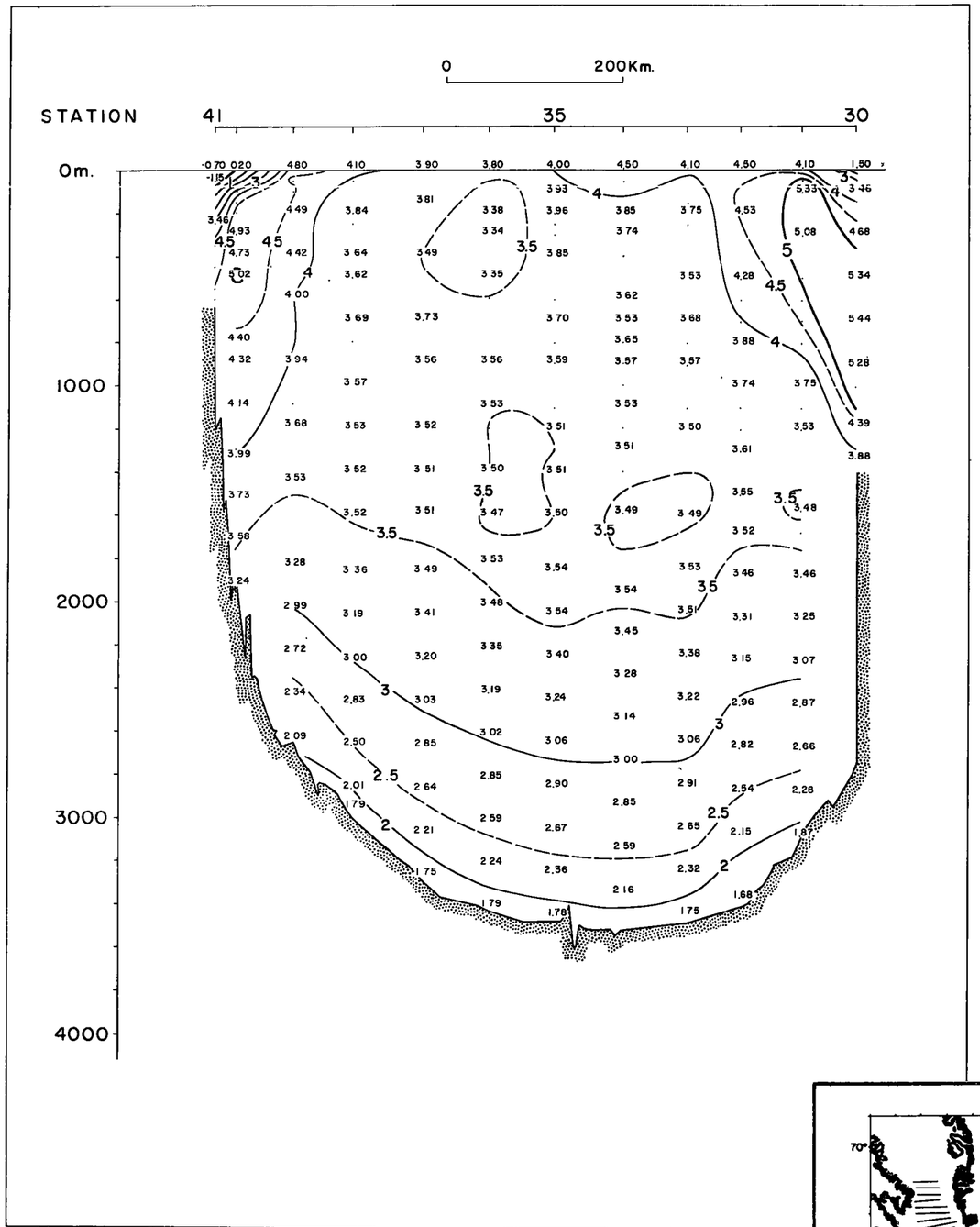
March 22 - March 24, 1966



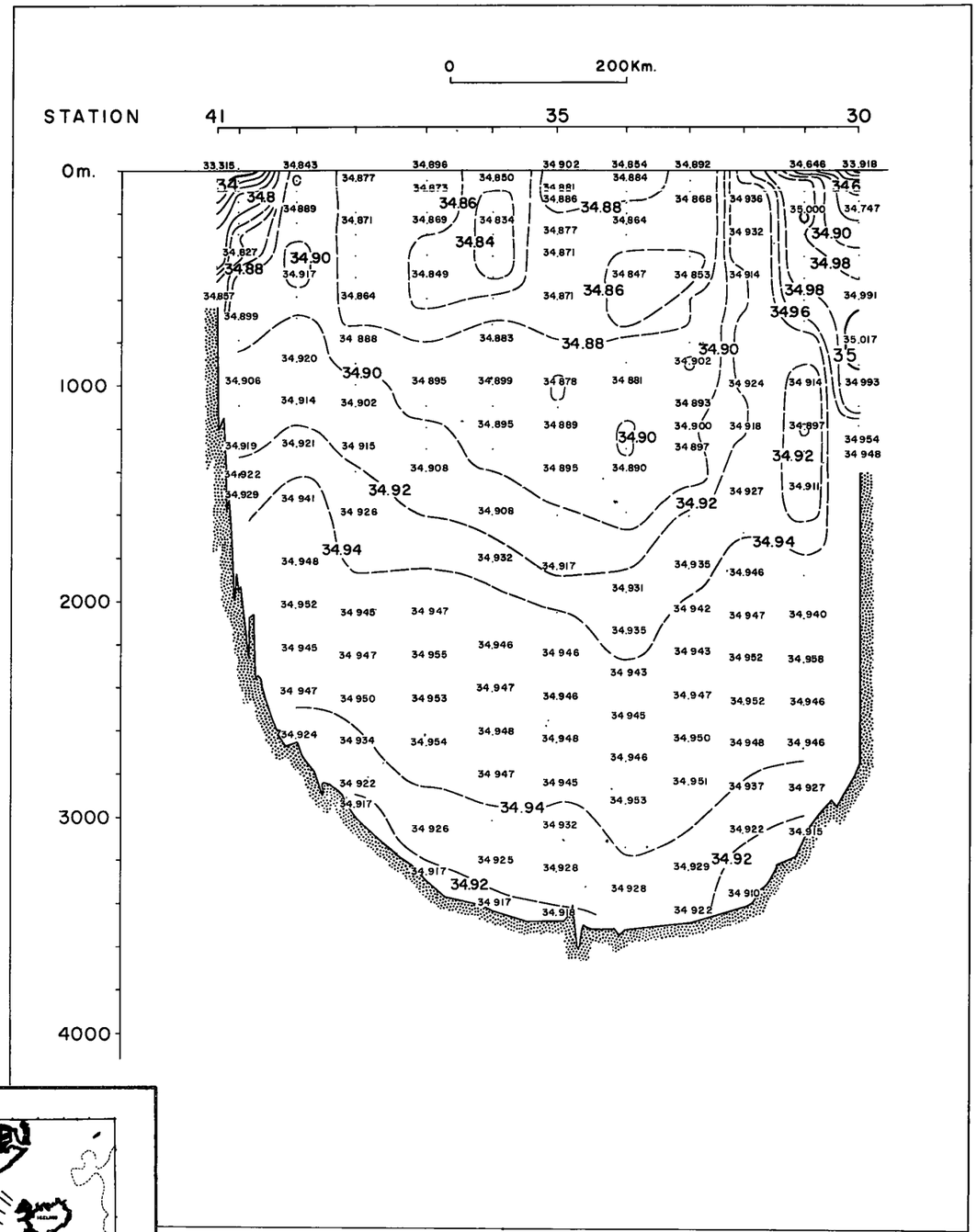
Oxygen (ml/L)



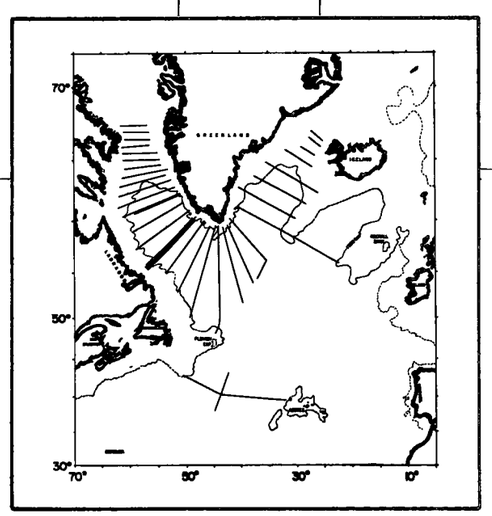
March 22 - March 24, 1966



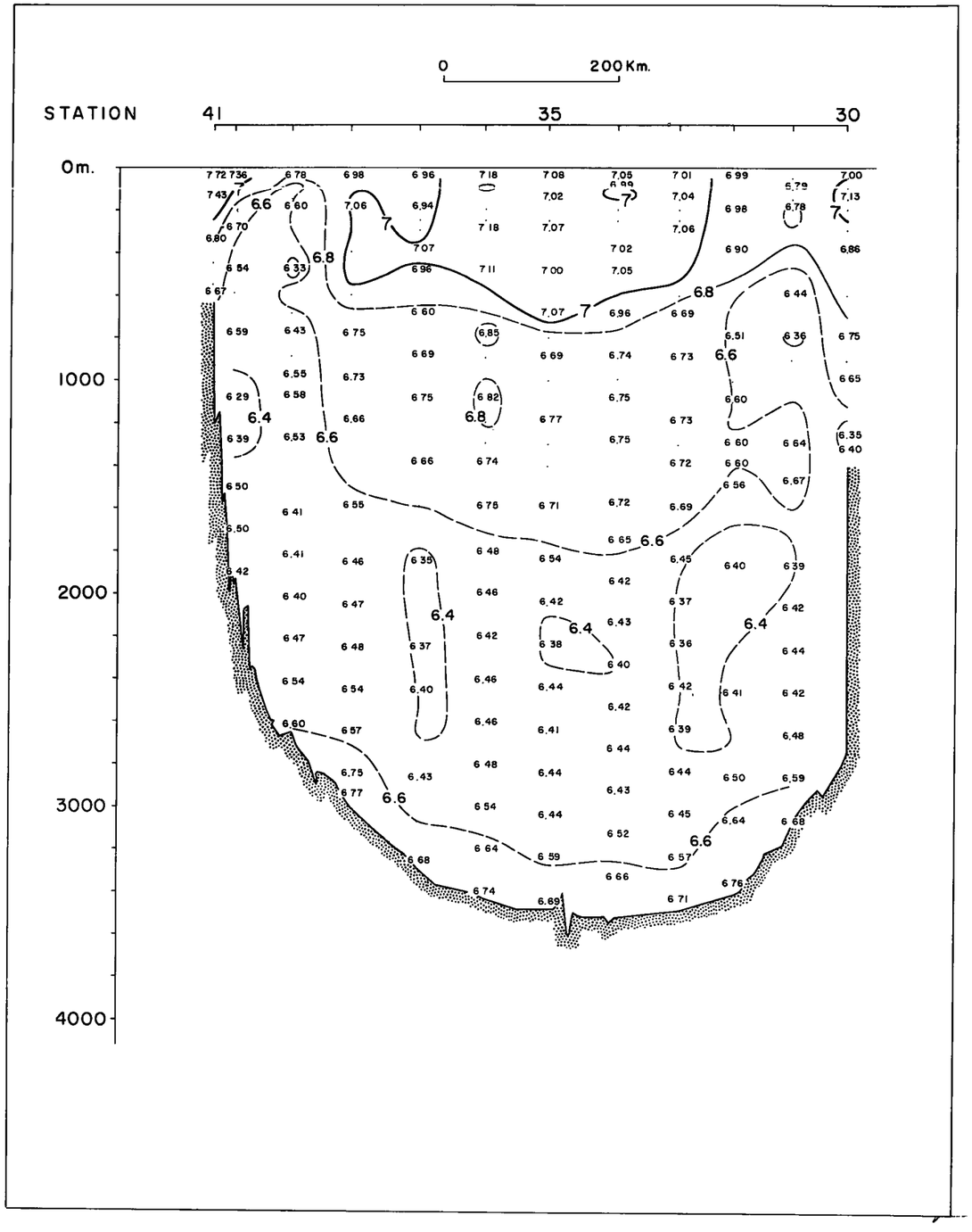
Temperature (°C)



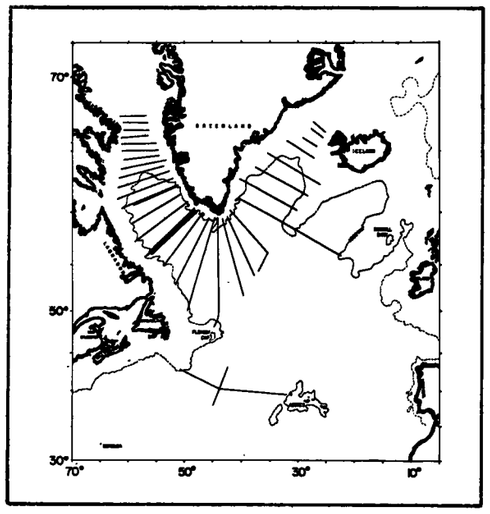
Salinity (°/oo)



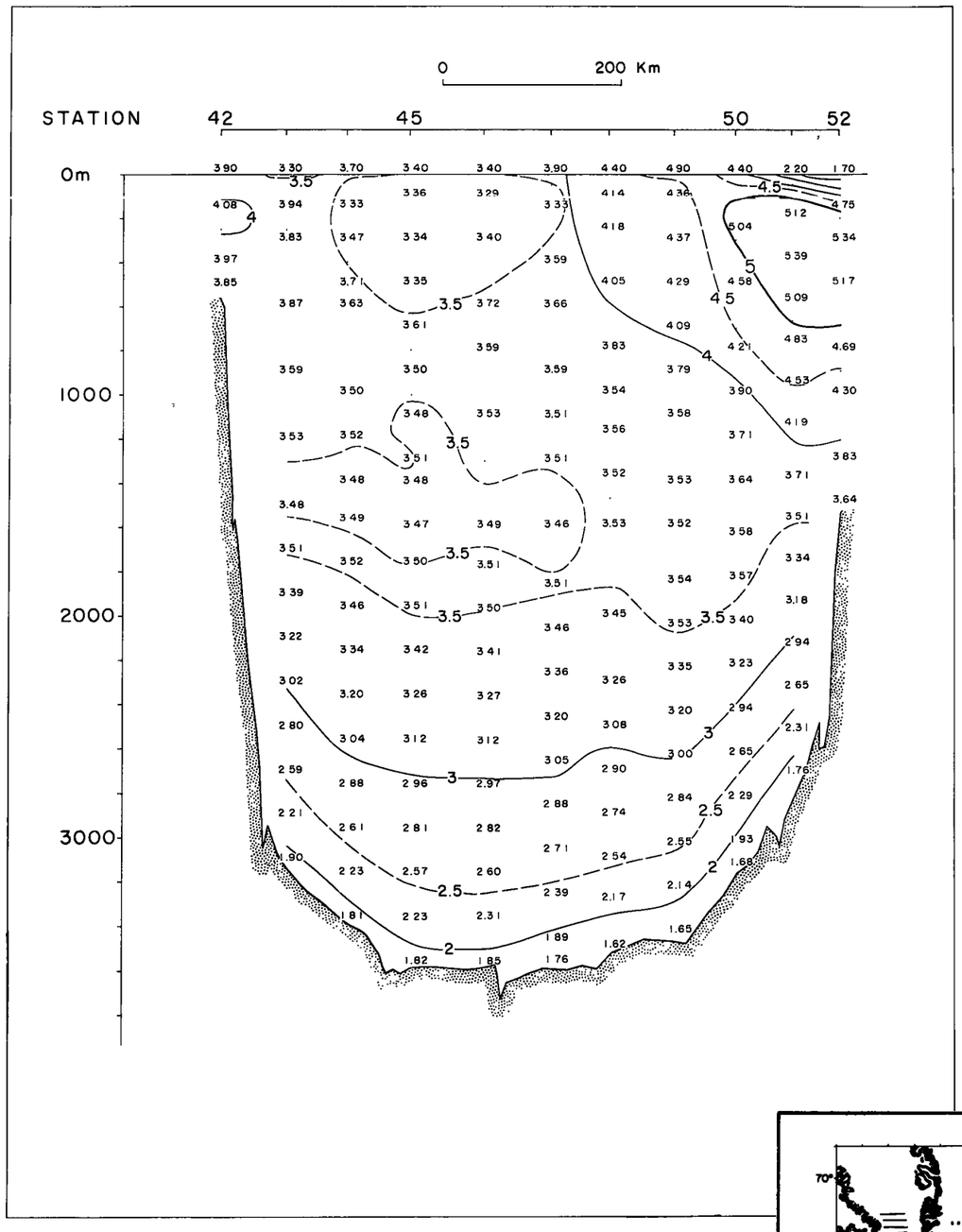
March 24 - March 26, 1966



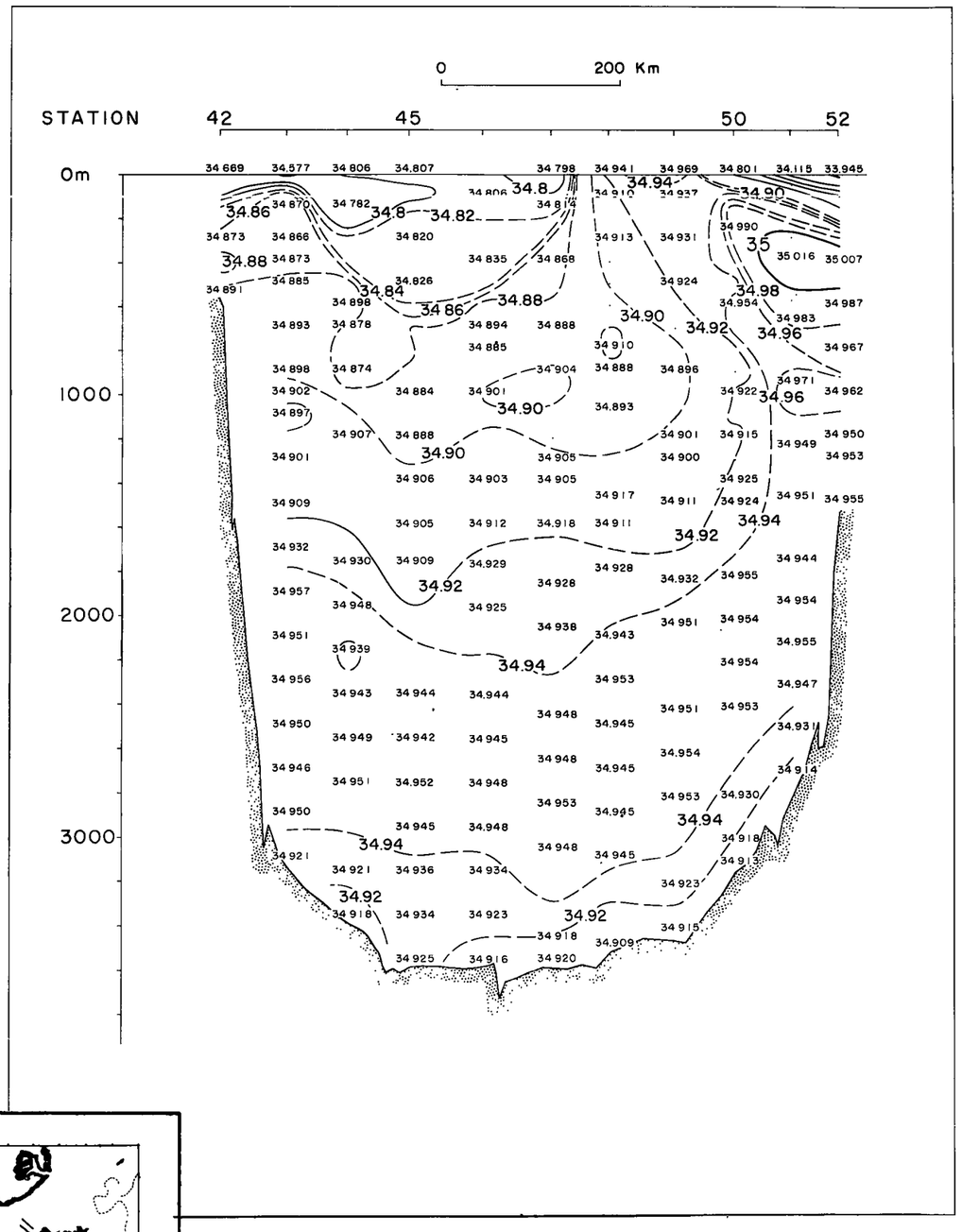
Oxygen (ml/L)



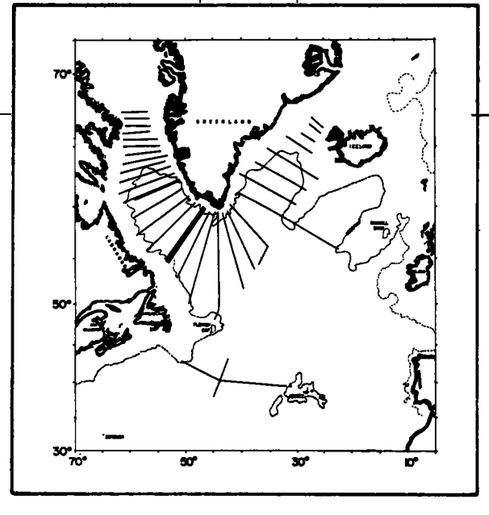
March 24 - March 26, 1966



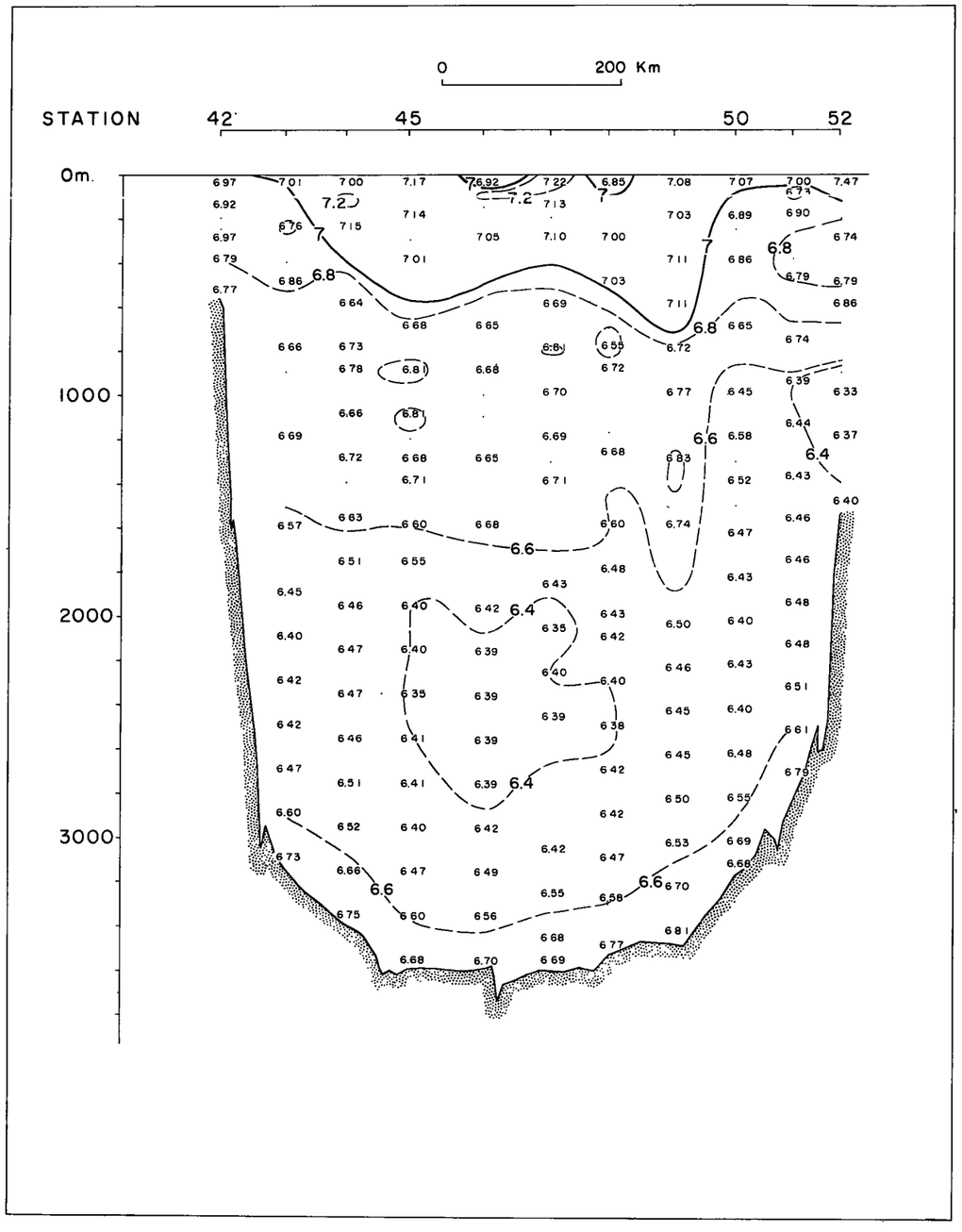
Temperature (°C)



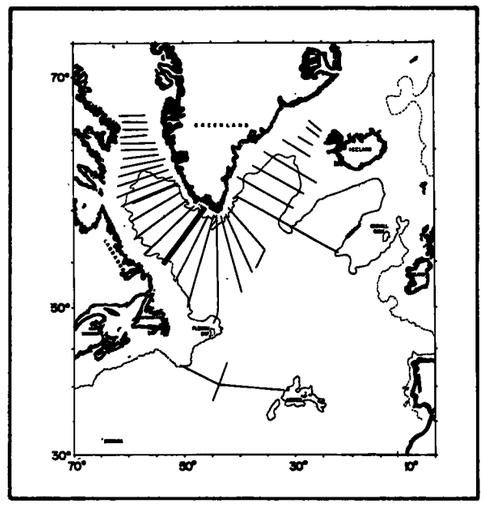
Salinity (°/₀₀)



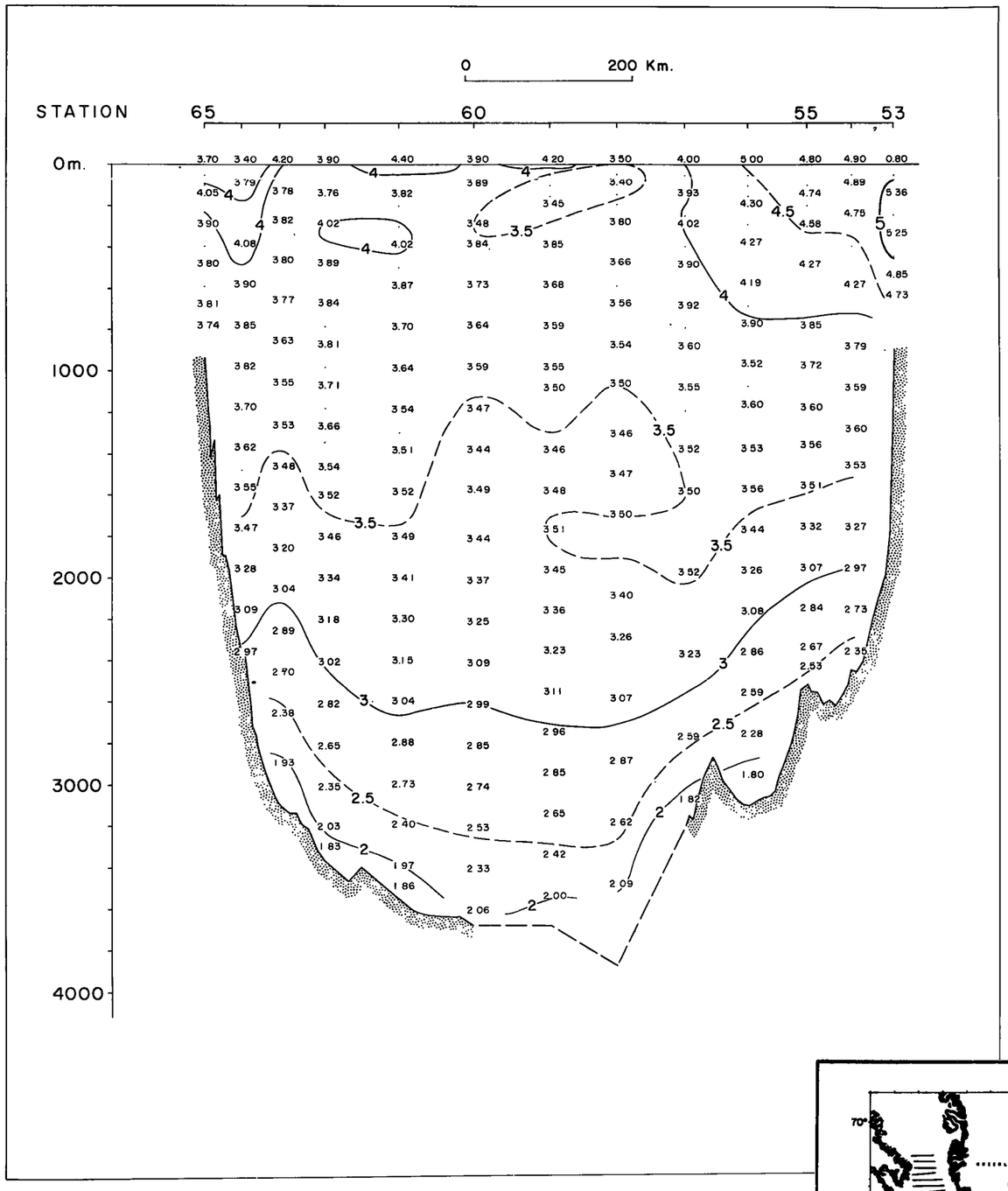
March 27 - March 30, 1966



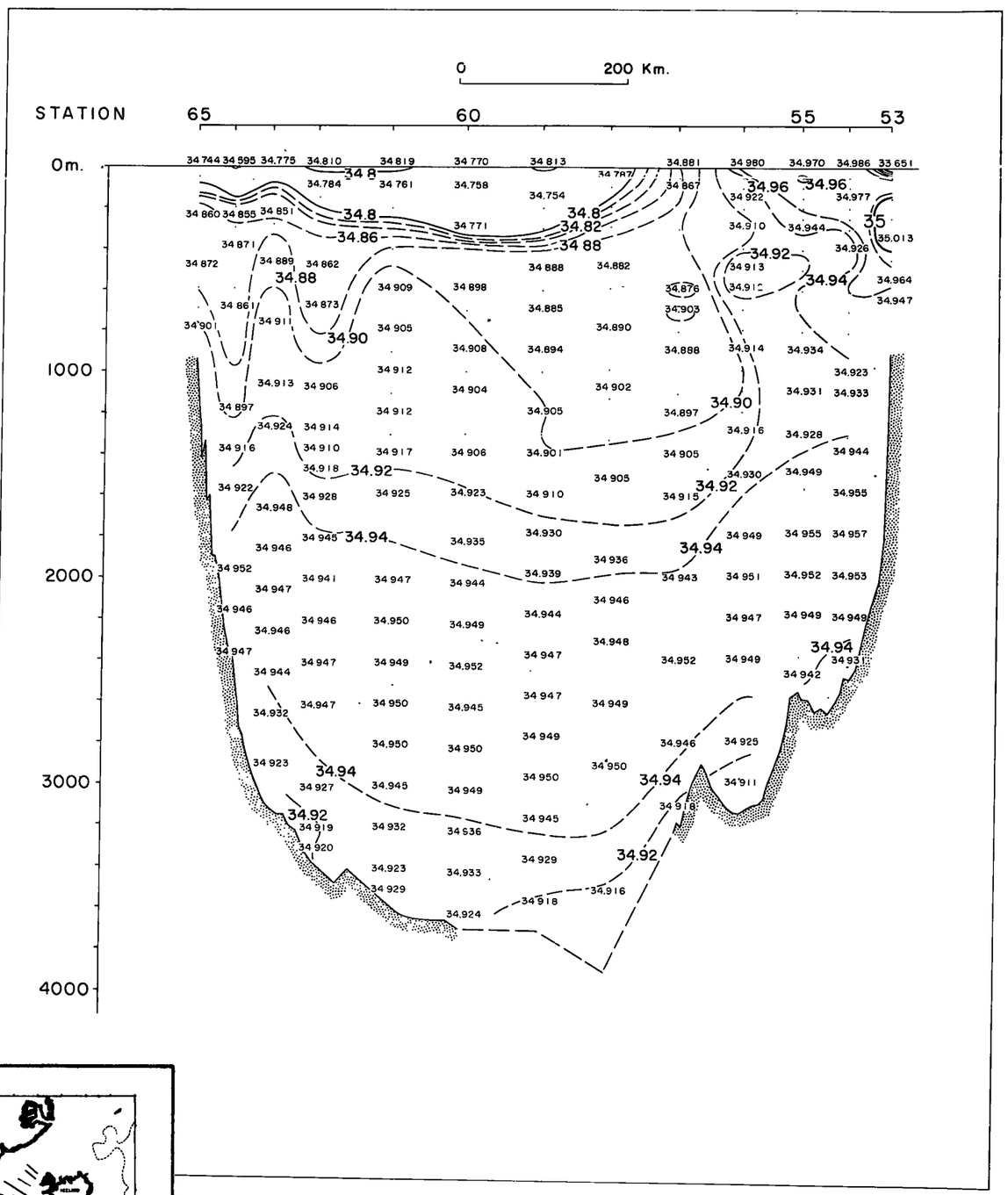
Oxygen (ml/L)



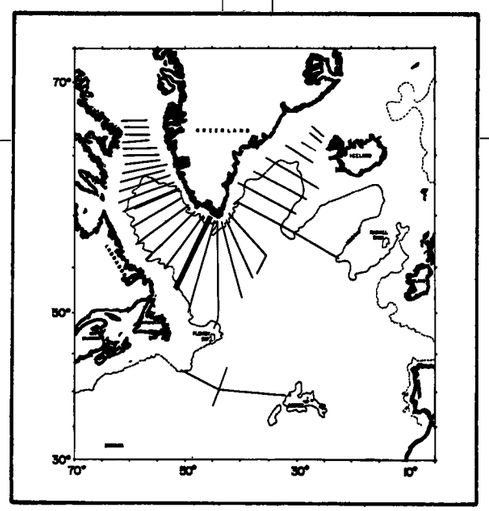
March 27 - March 30, 1966



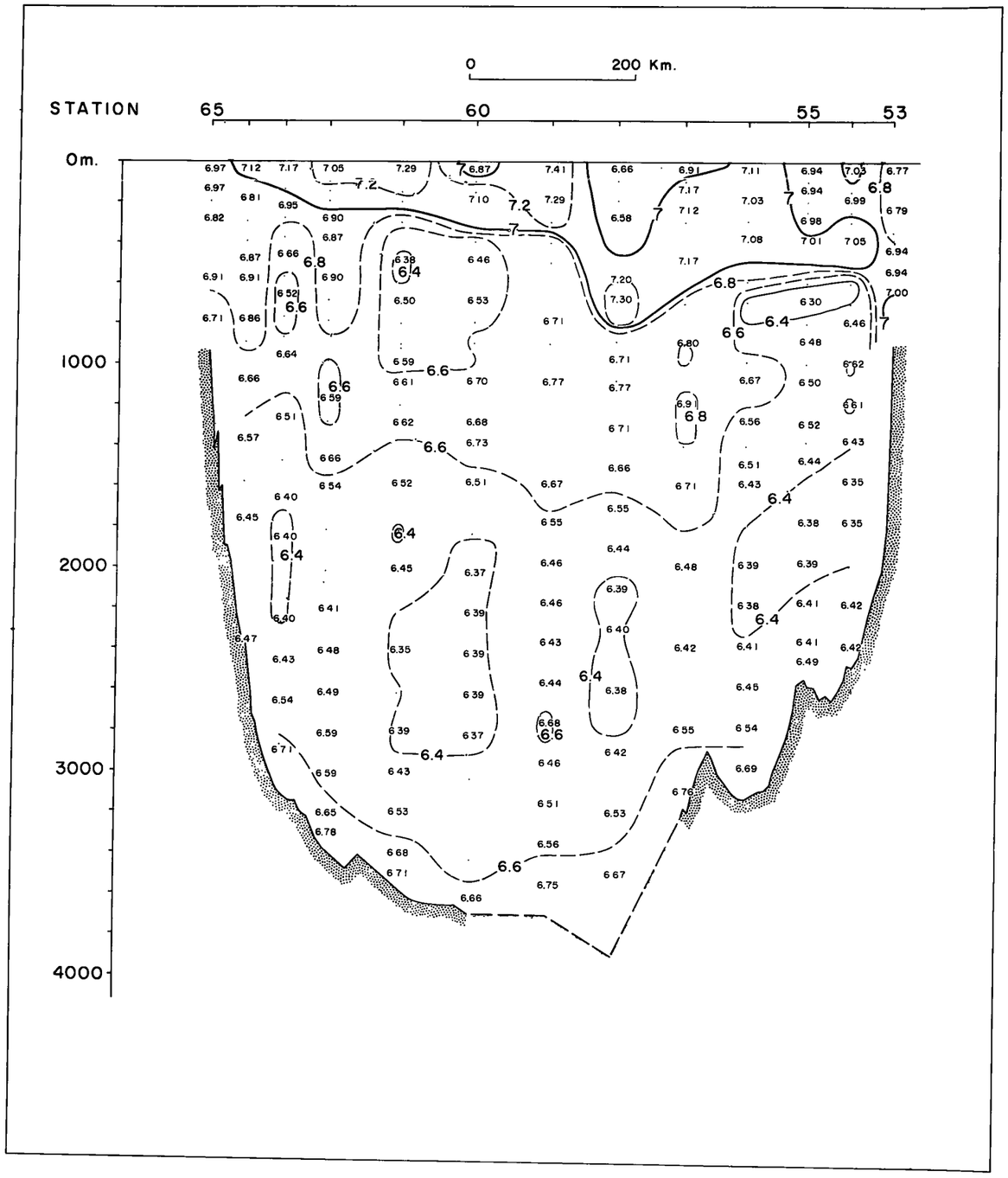
Temperature (°C)



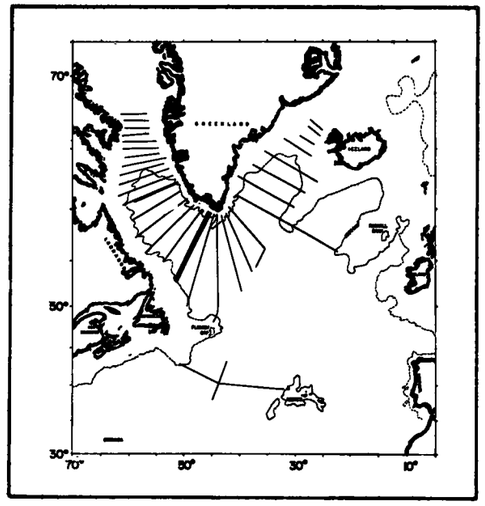
Salinity (°/oo)



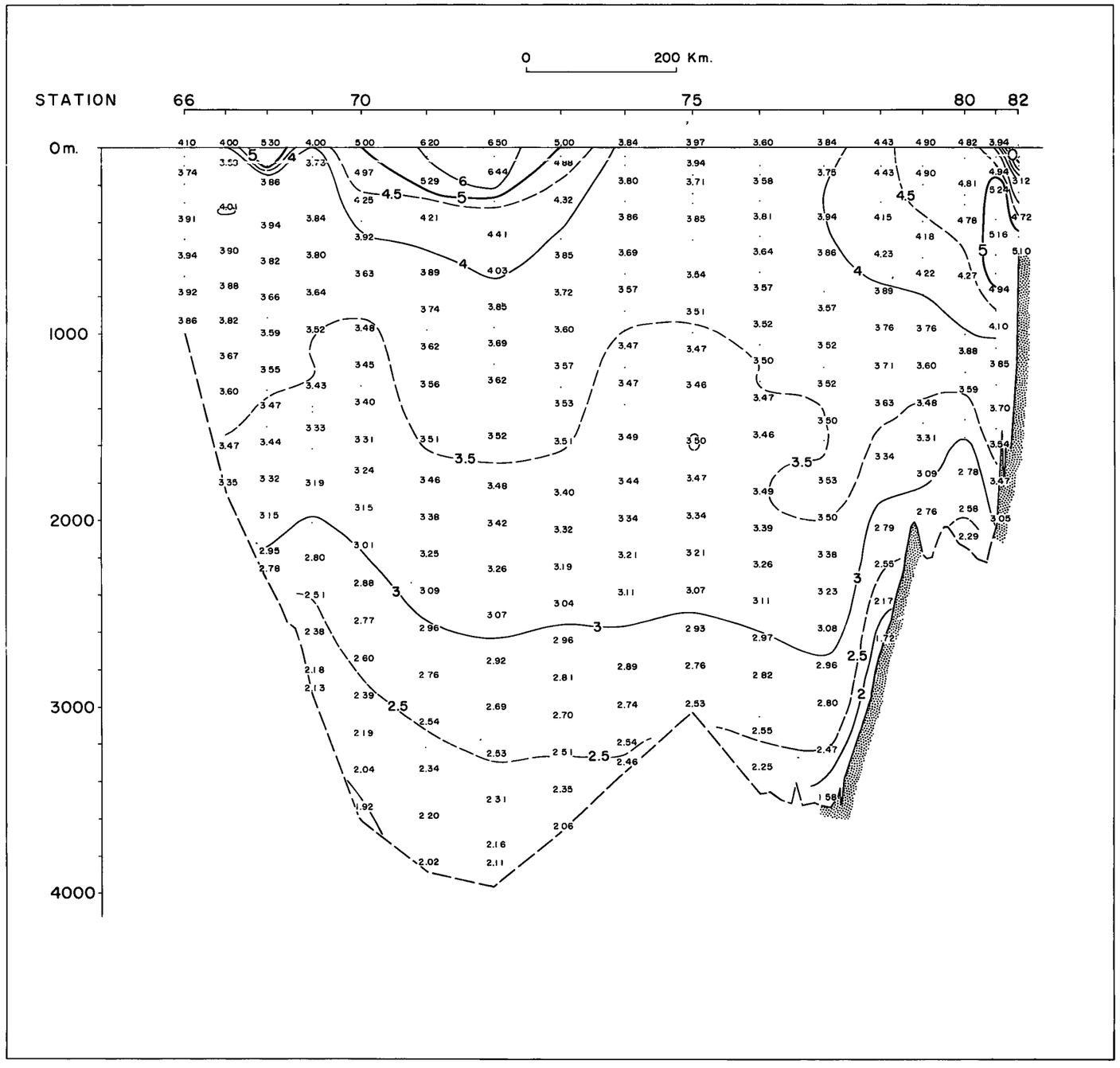
March 30 - April 2, 1966



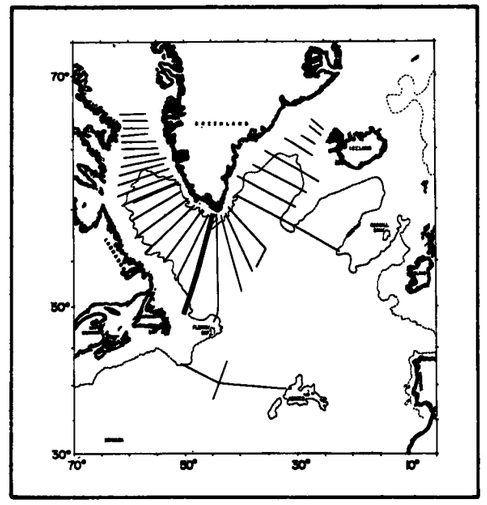
Oxygen (ml/L)



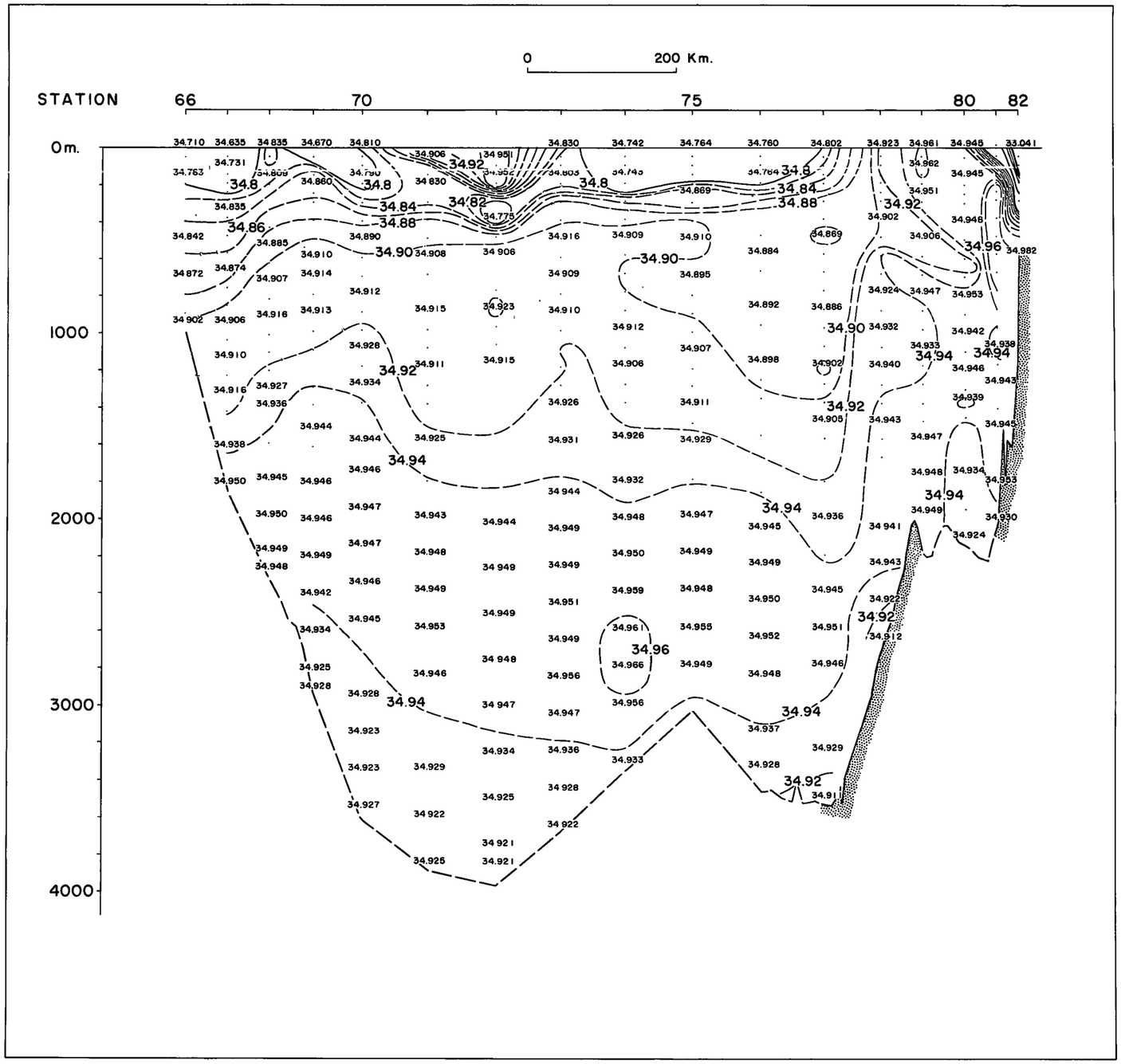
March 30 - April 2, 1966



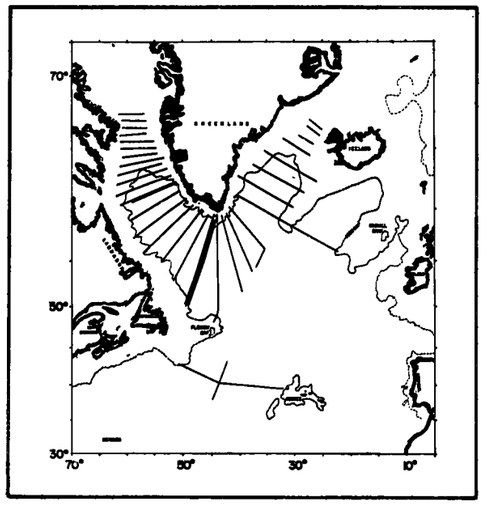
Temperature (°C)



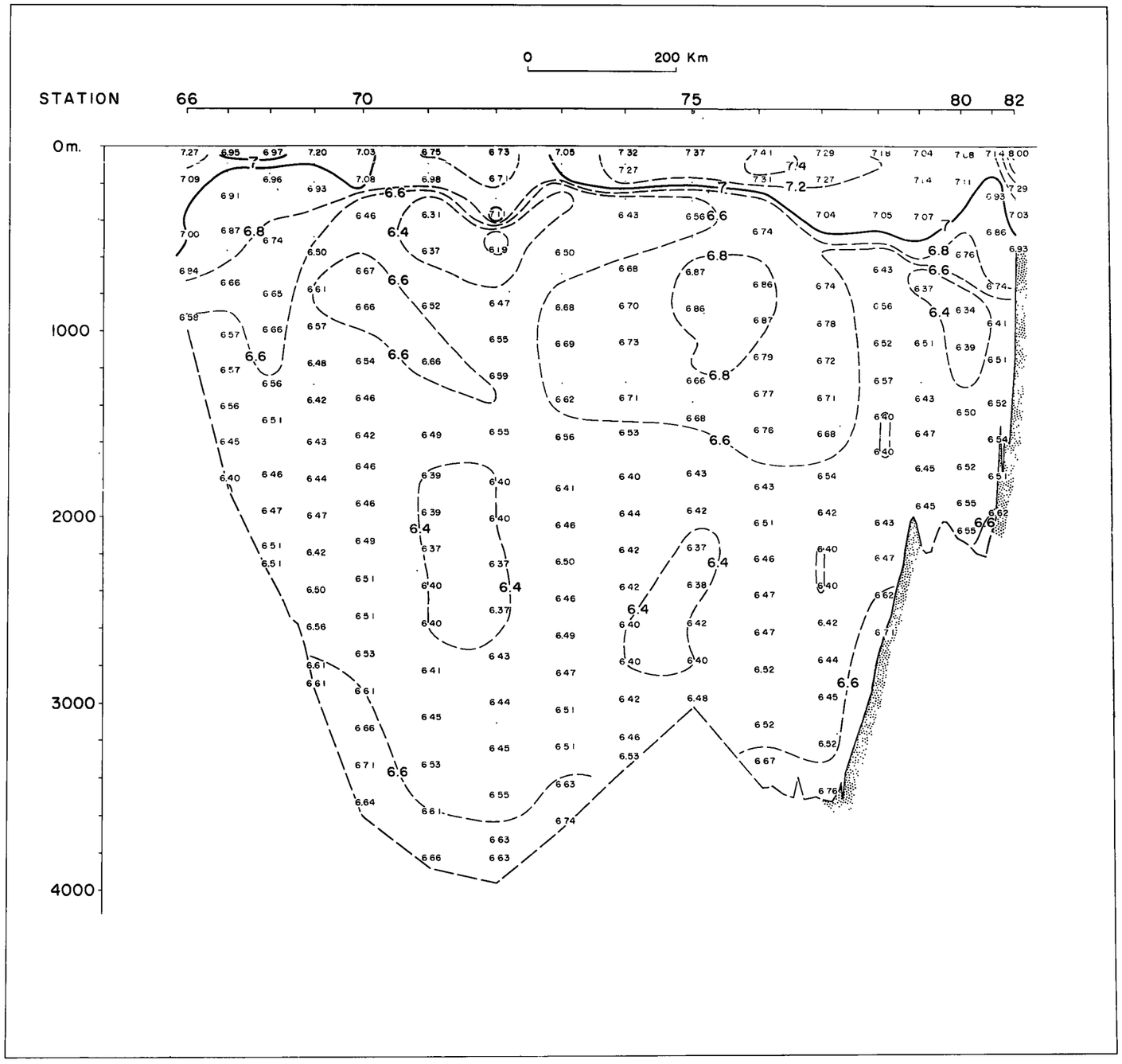
April 10 - April 14, 1966



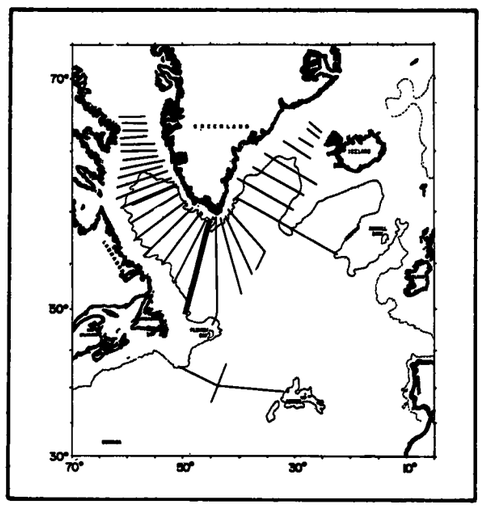
Salinity (°/₀₀)



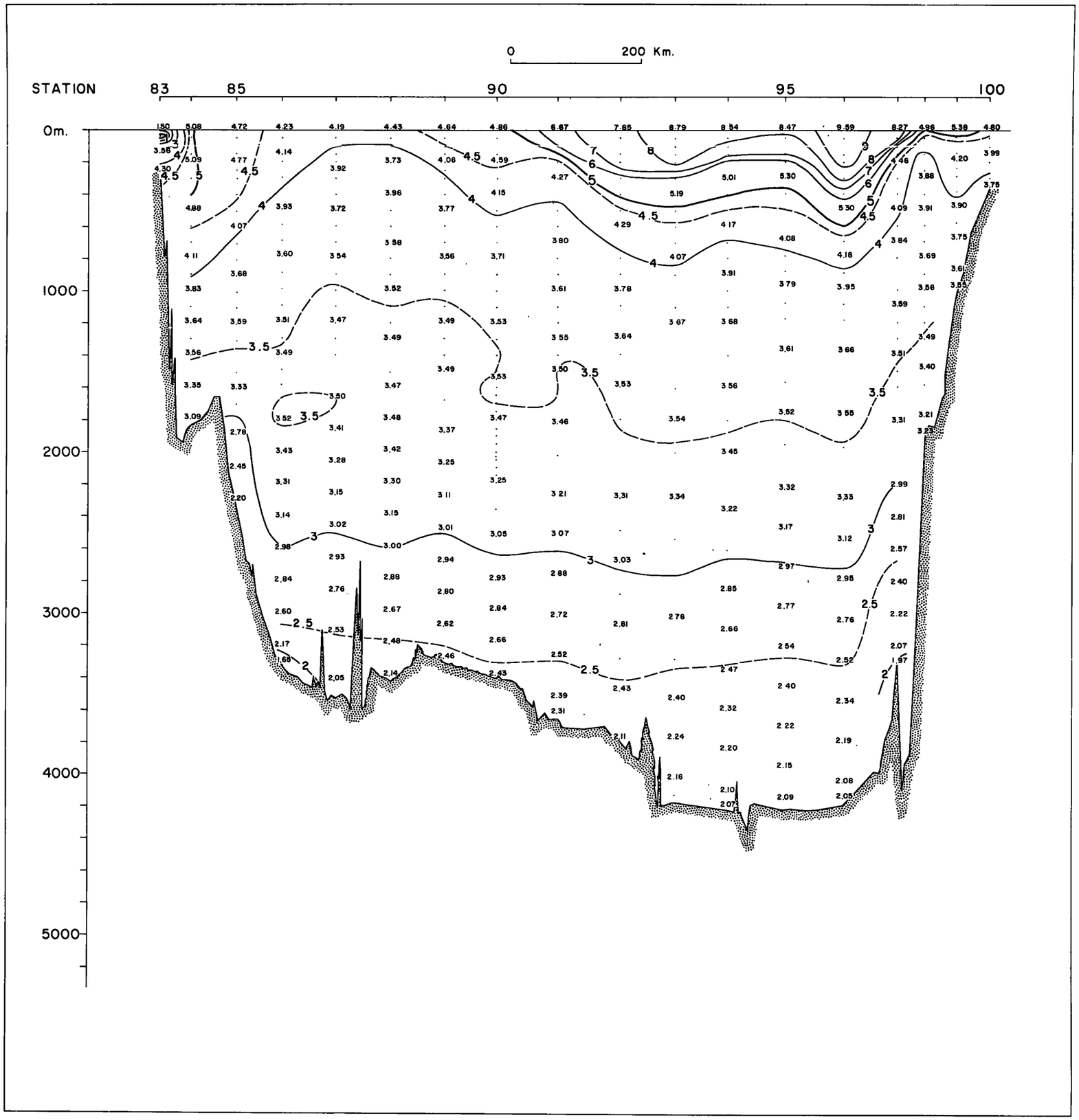
April 10 - April 14, 1966

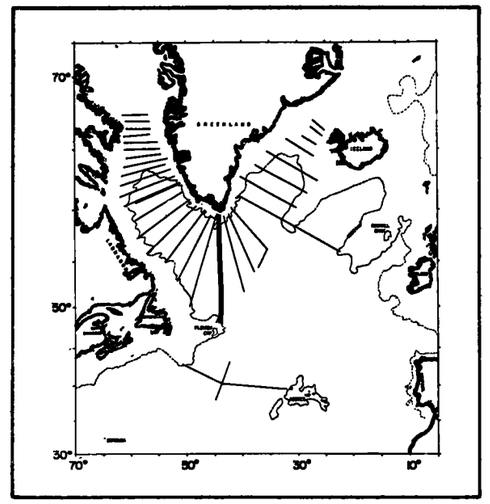


Oxygen (ml/L)



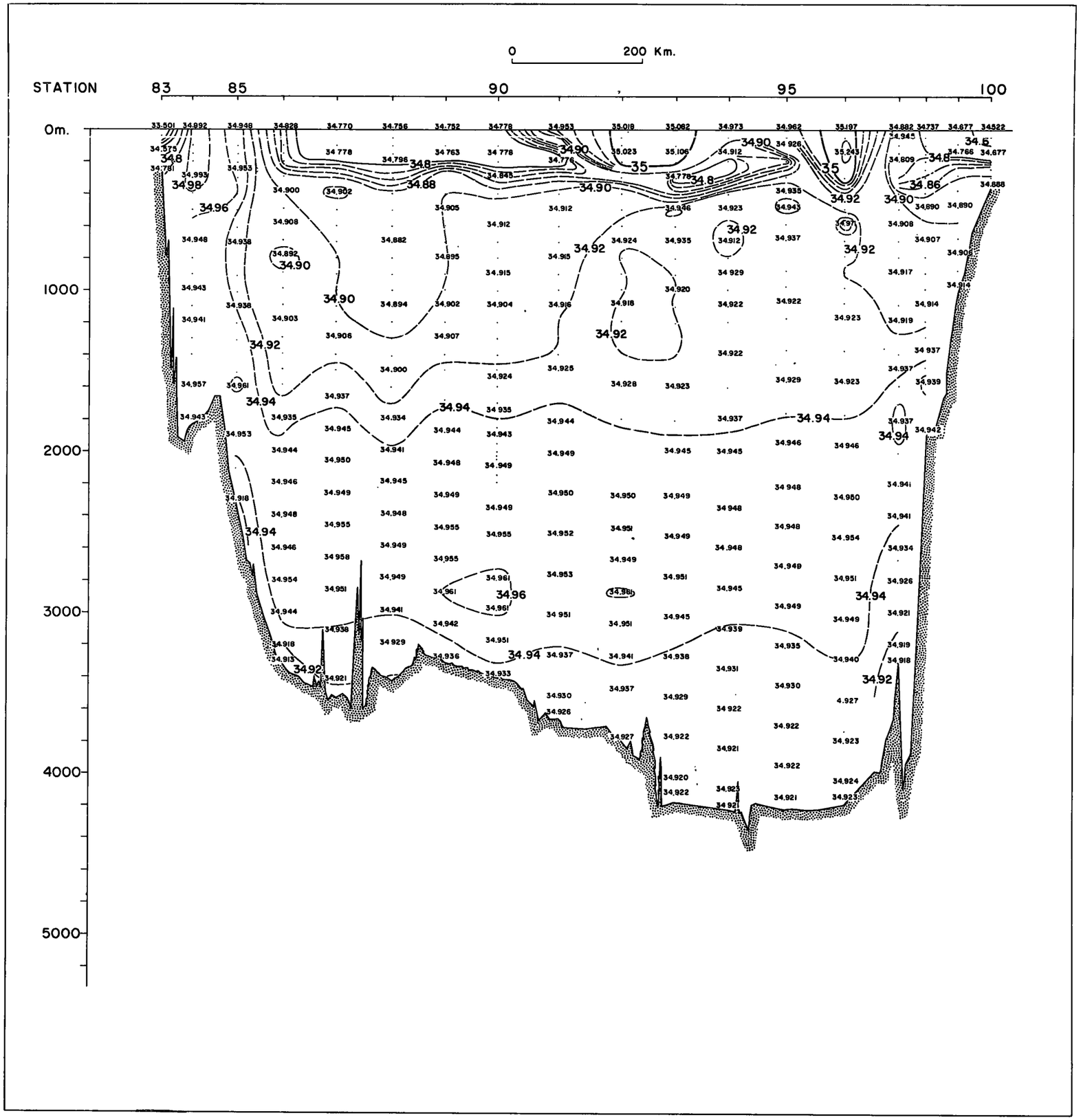
April 10 - April 14, 1966

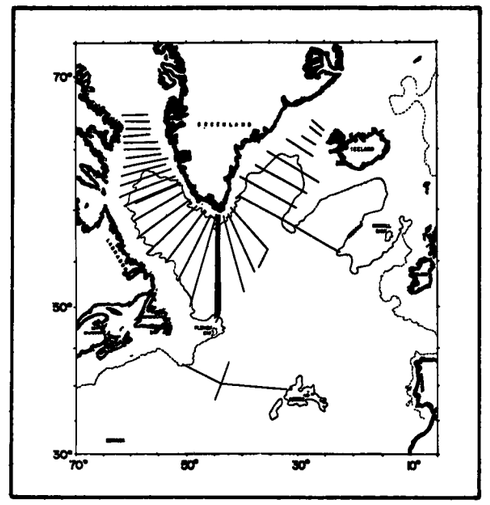




April 15 - April 19, 1966

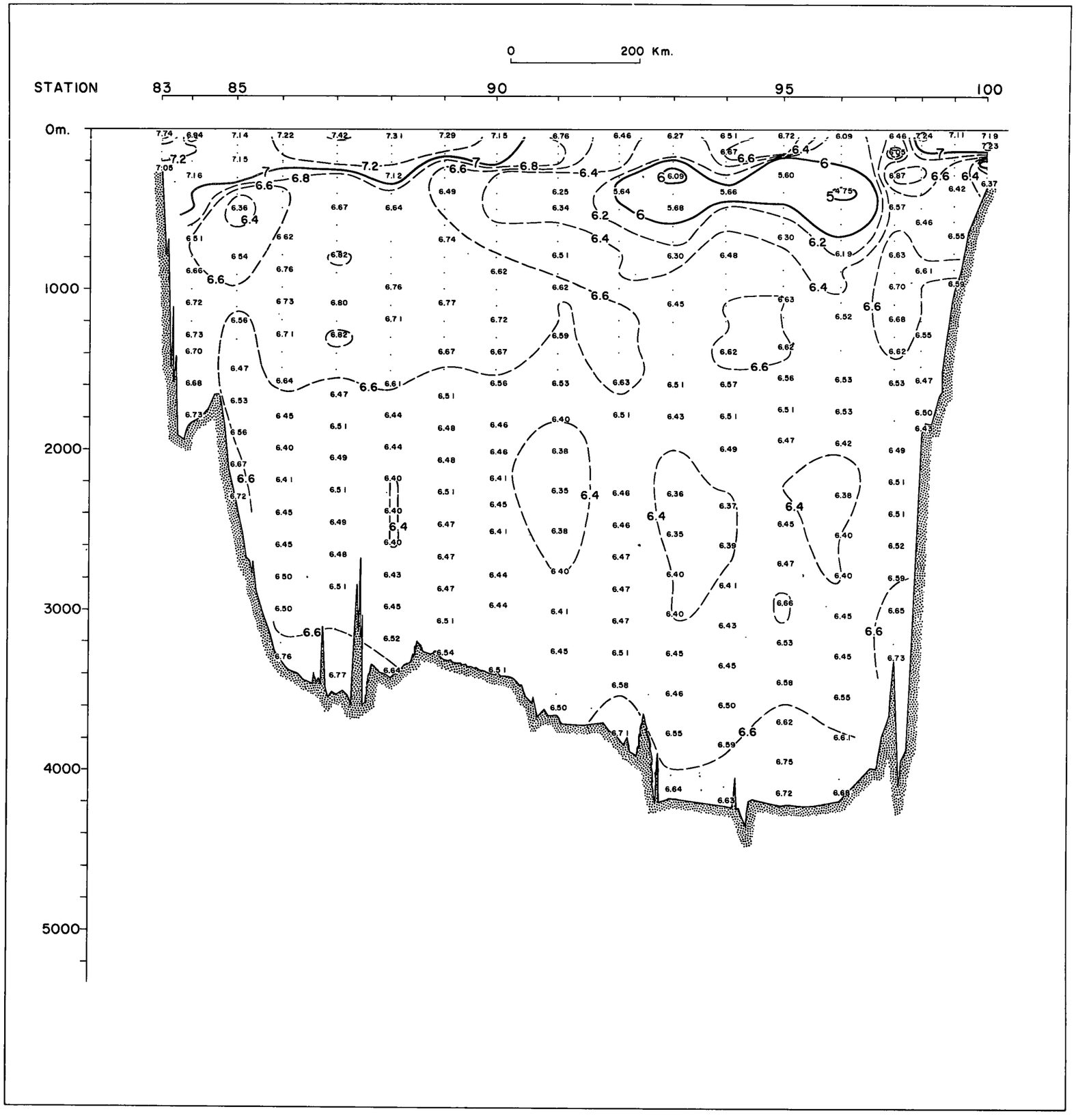
Temperature (°C)

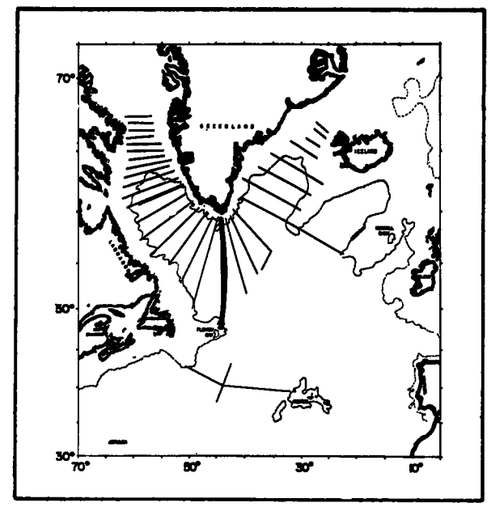




April 15 - April 19, 1966

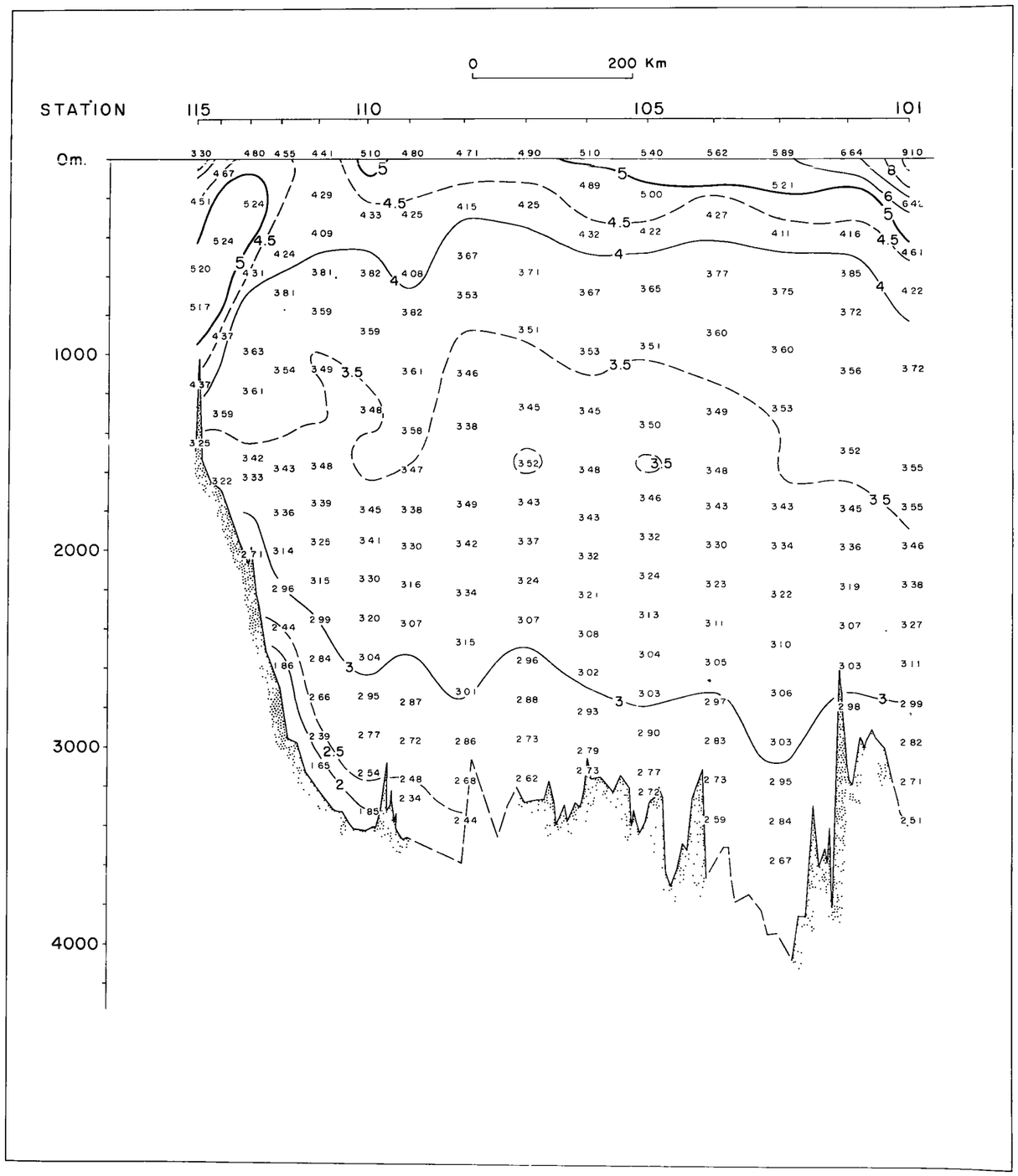
Salinity (°/₀₀)



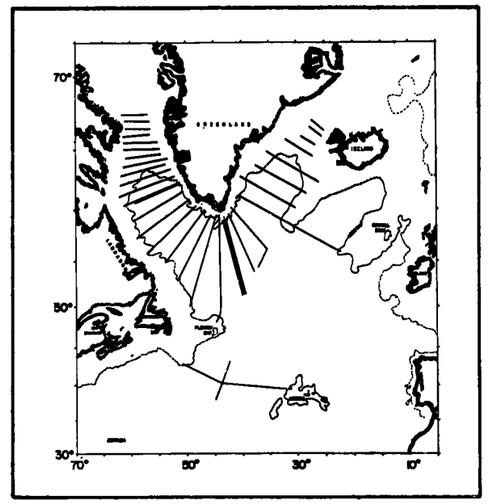


Oxygen (ml/L)

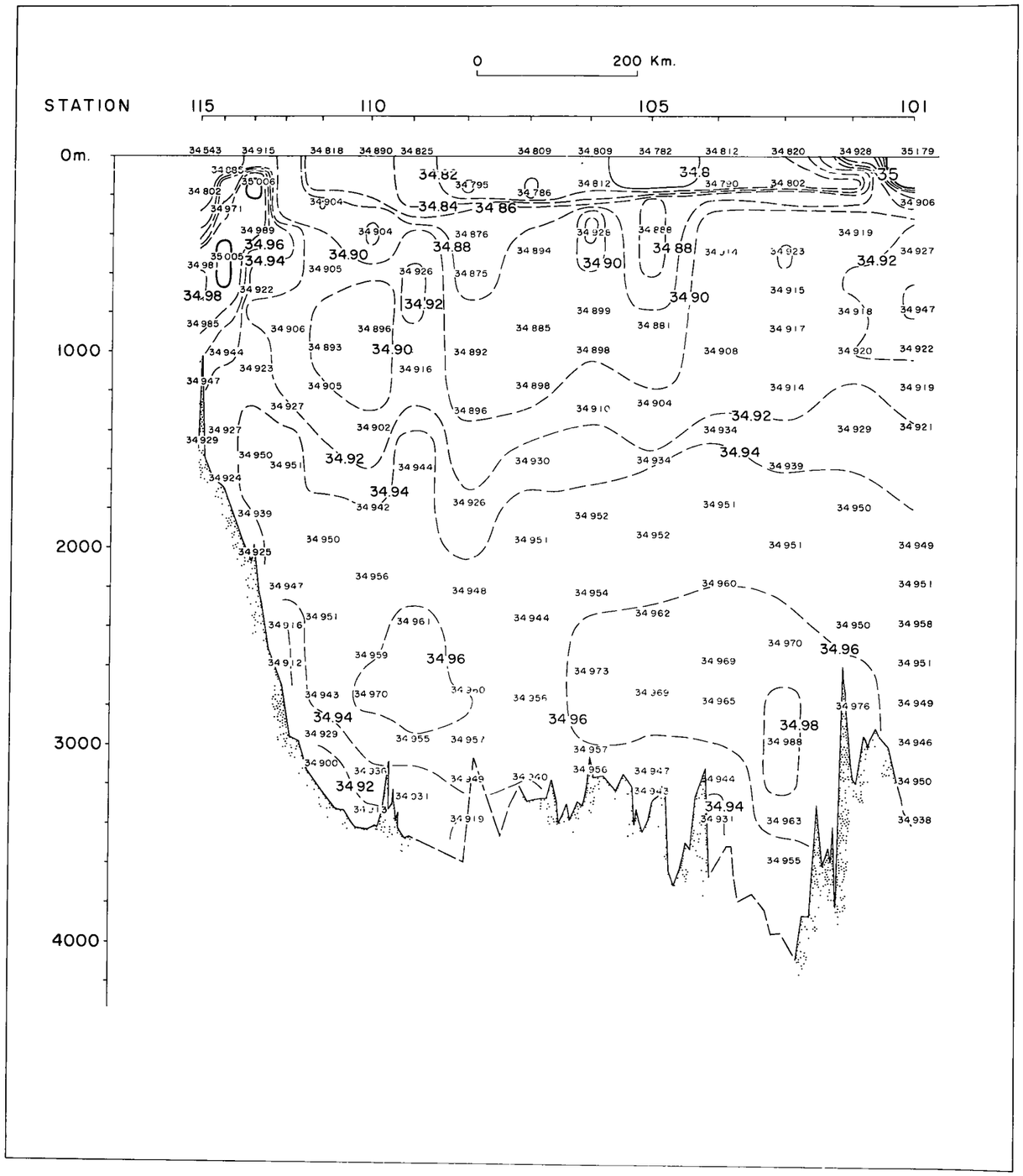
April 15 - April 19, 1966



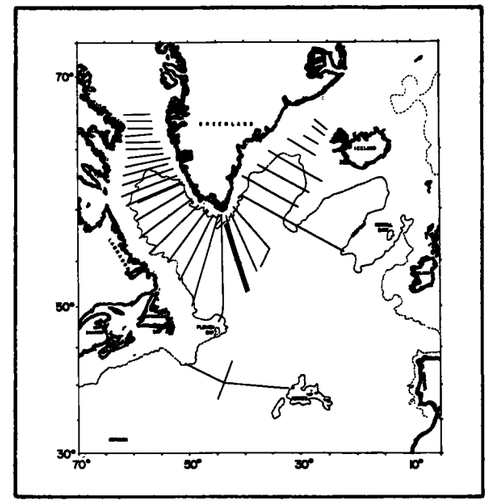
Temperature (°C)



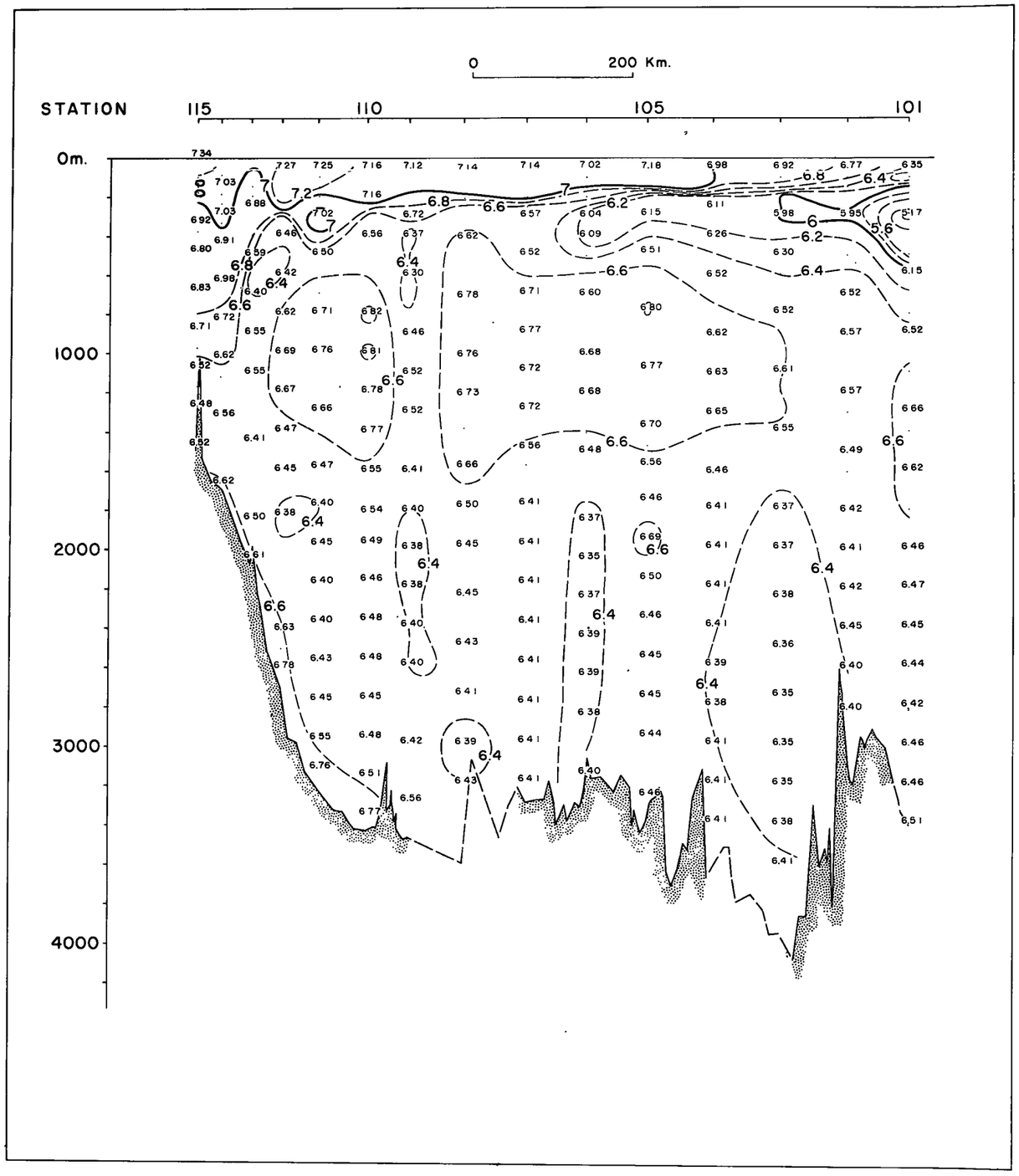
April 25 - April 29, 1966



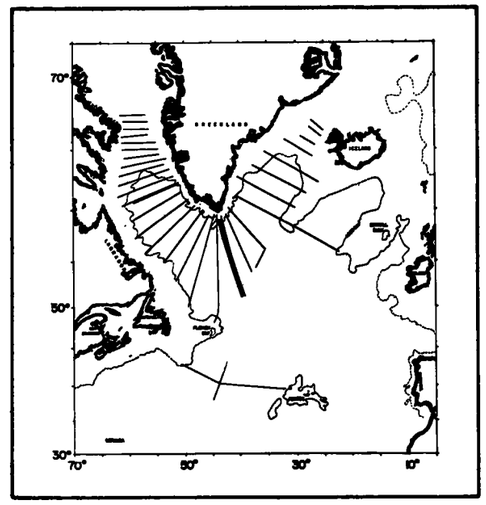
Salinity (°/₀₀)



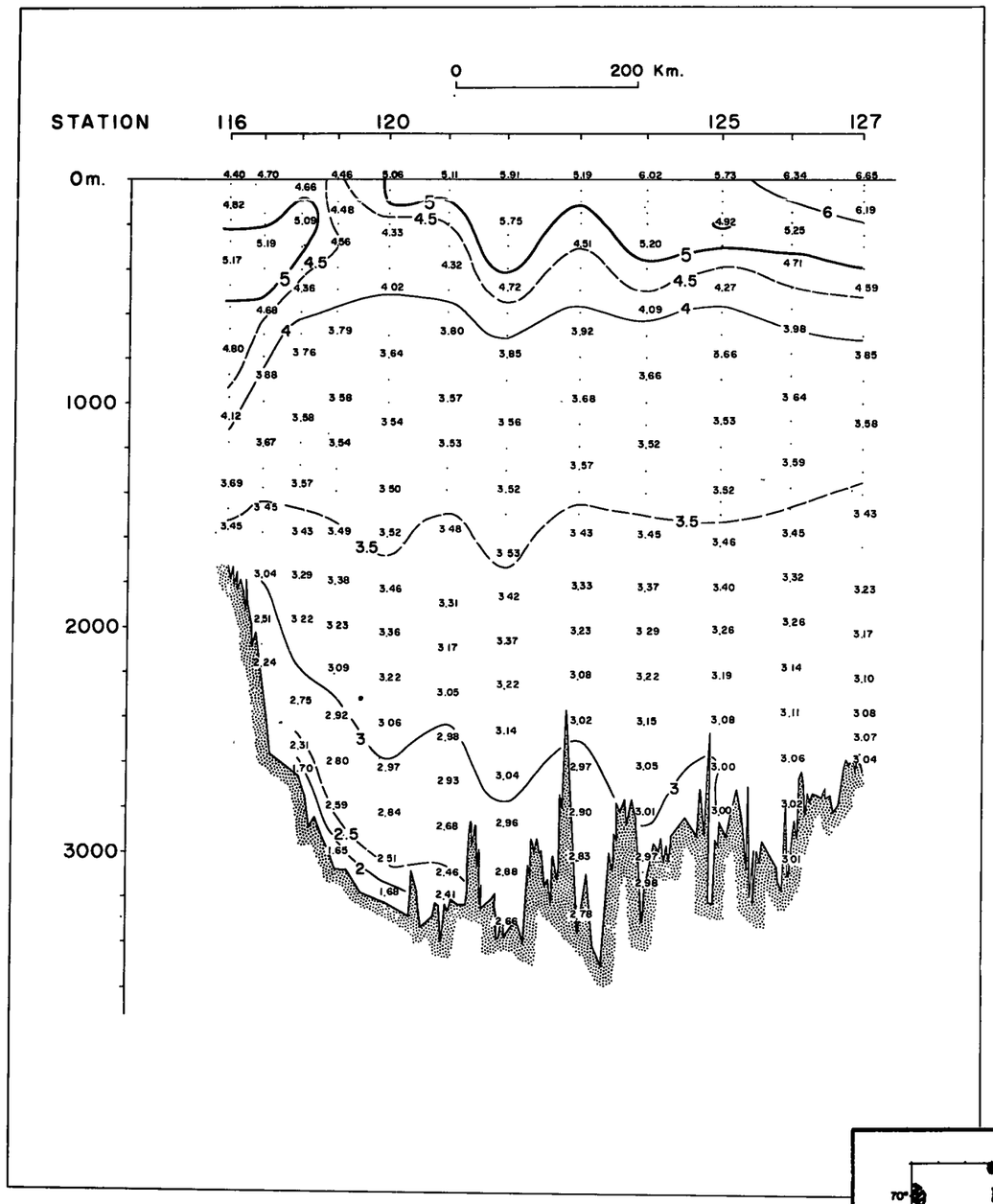
April 25 - April 29, 1966



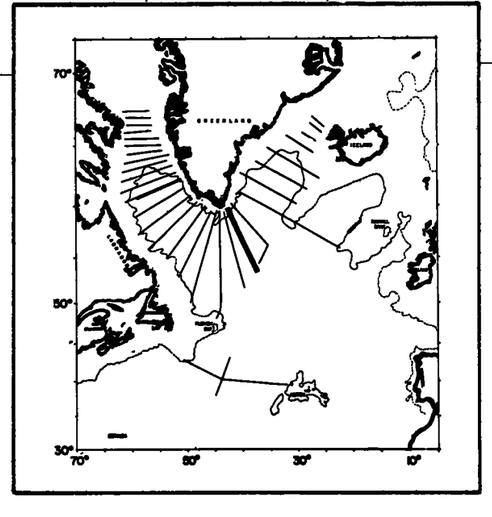
Oxygen (ml/L)

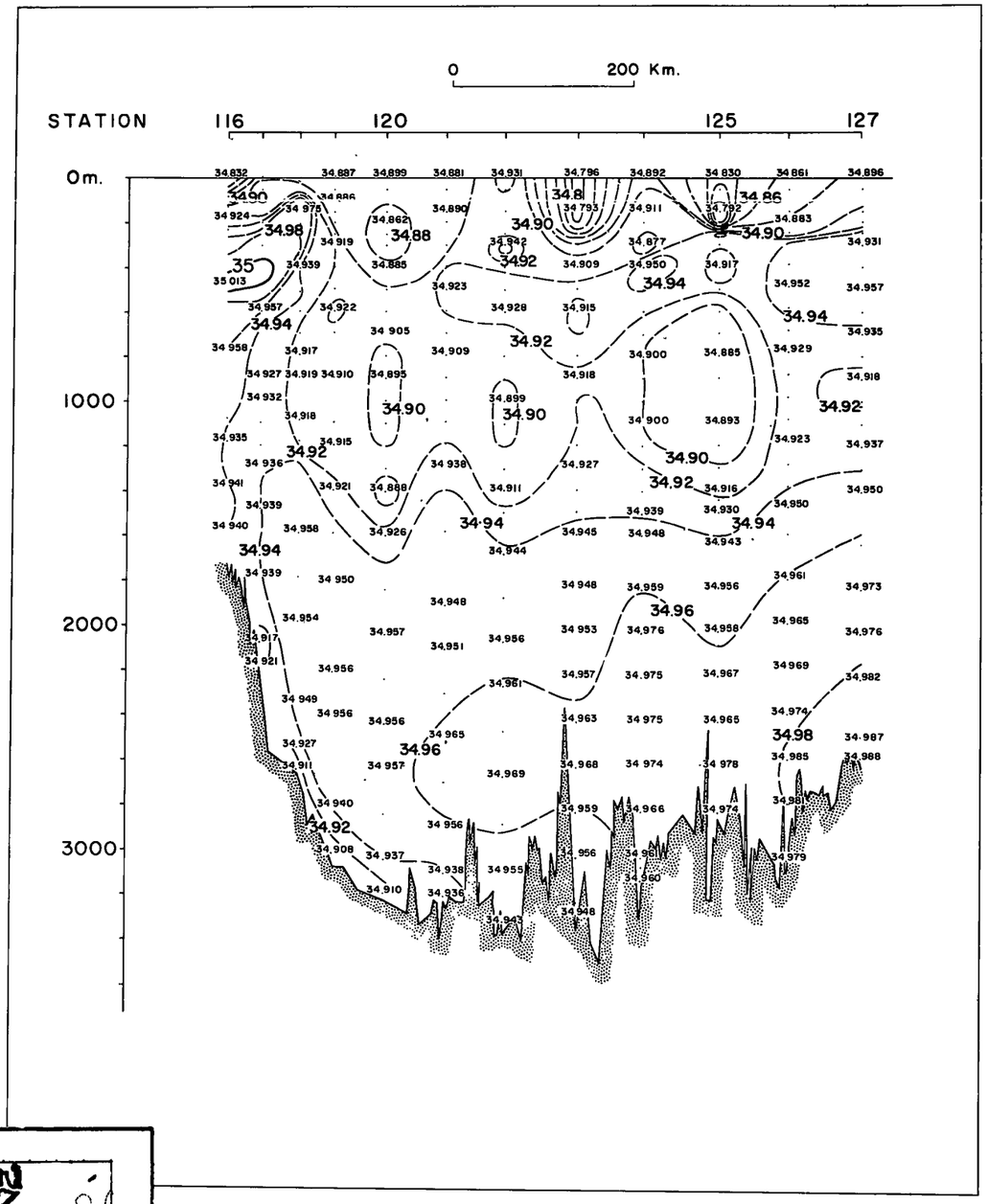


April 25 - April 29, 1966



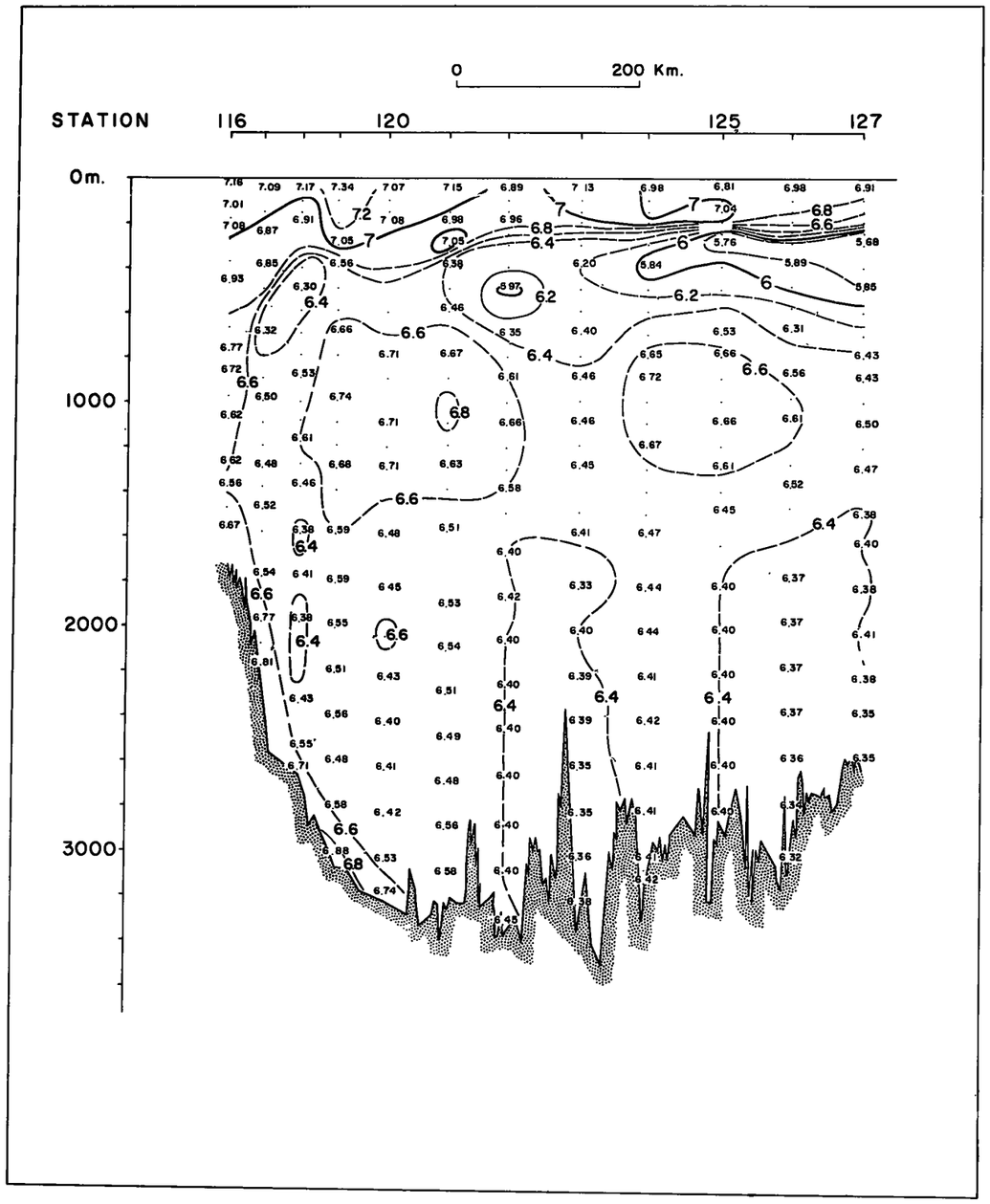
Temperature (°C)



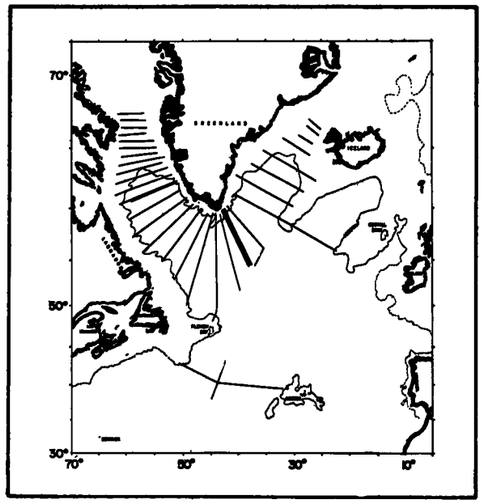


Salinity (°/₀₀)

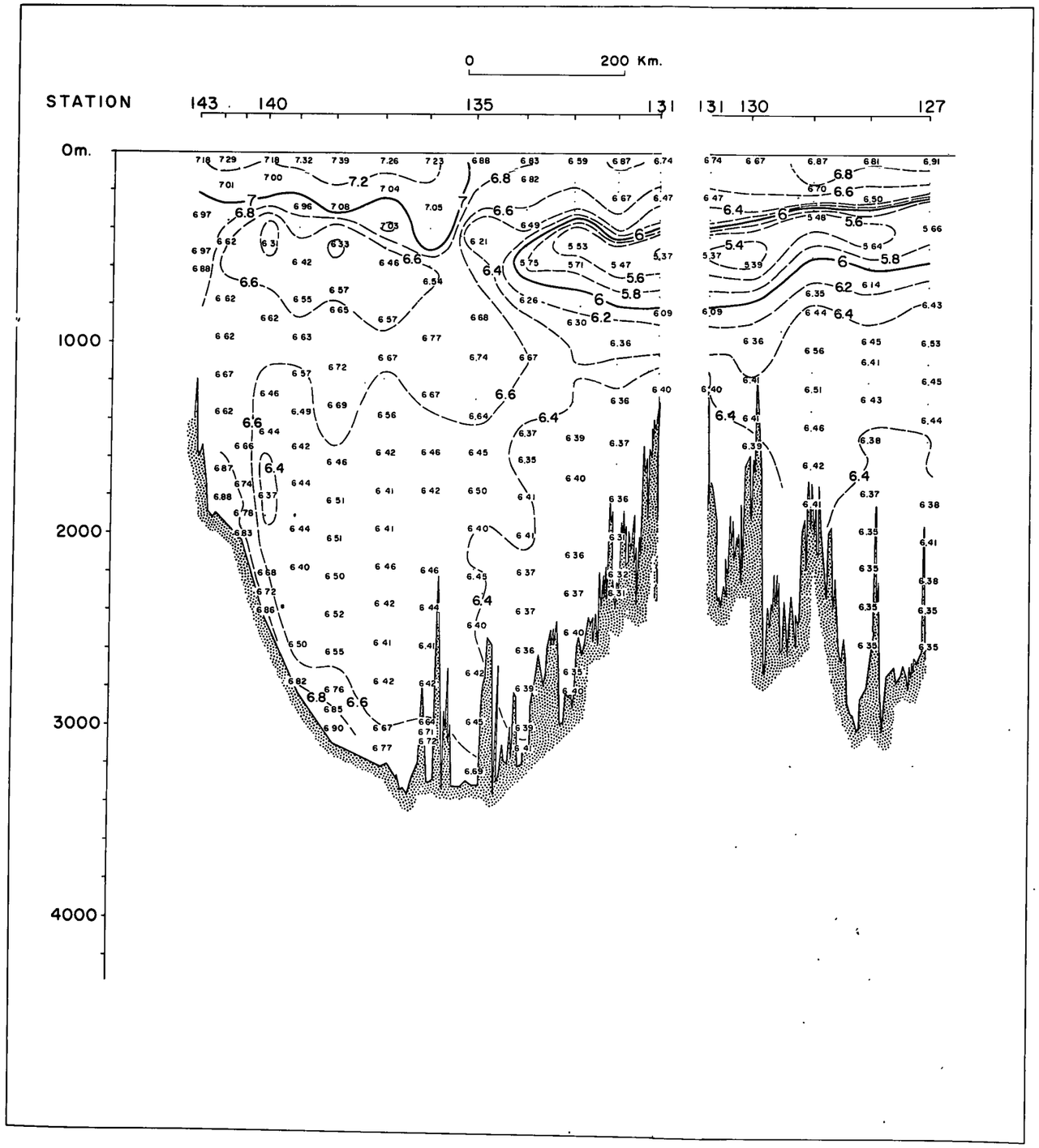
April 30 - May 3, 1966



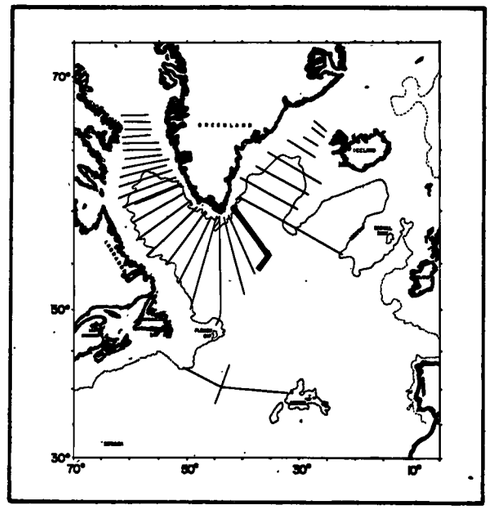
Oxygen (ml/L)



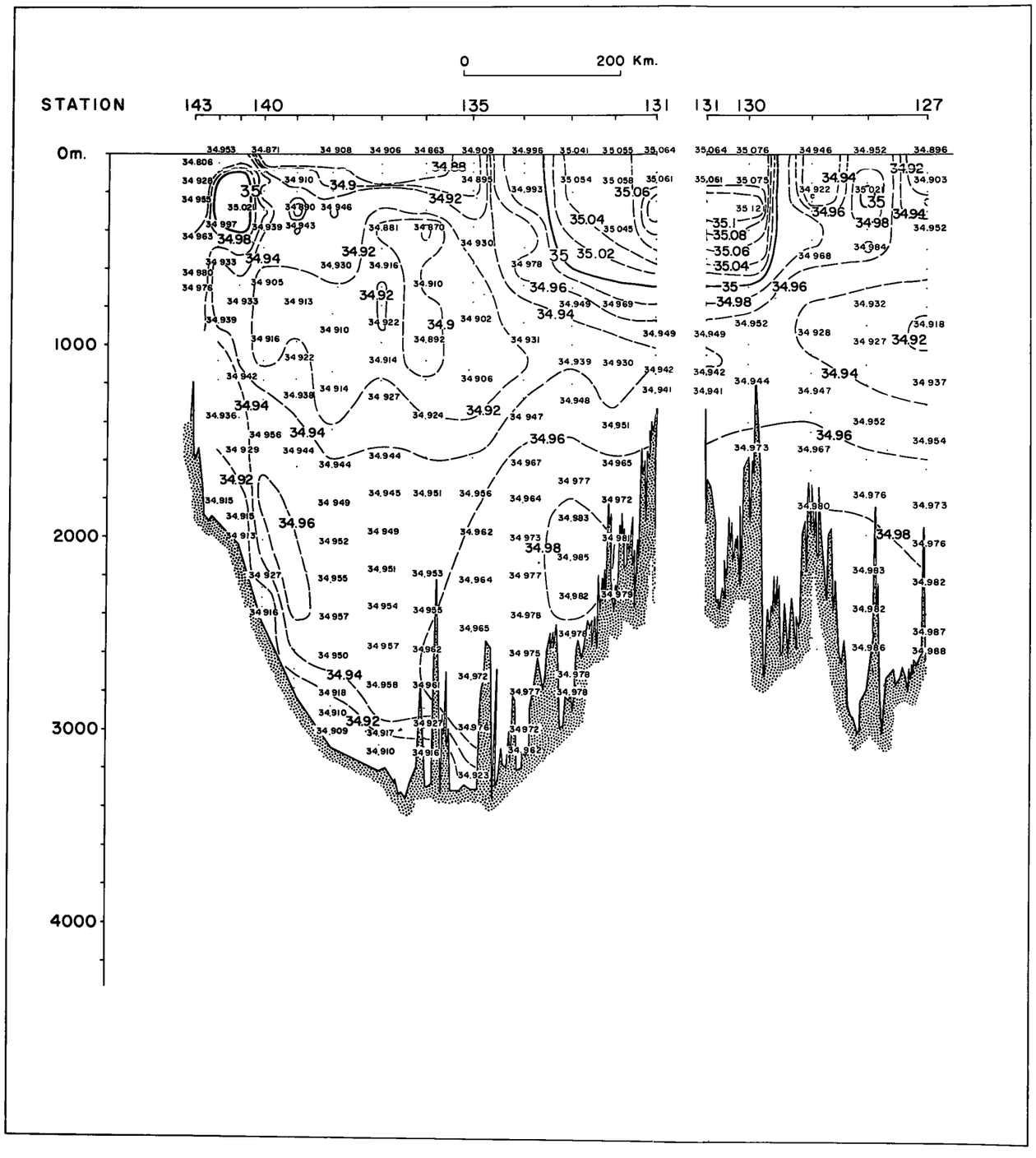
April 30 - May 3, 1966



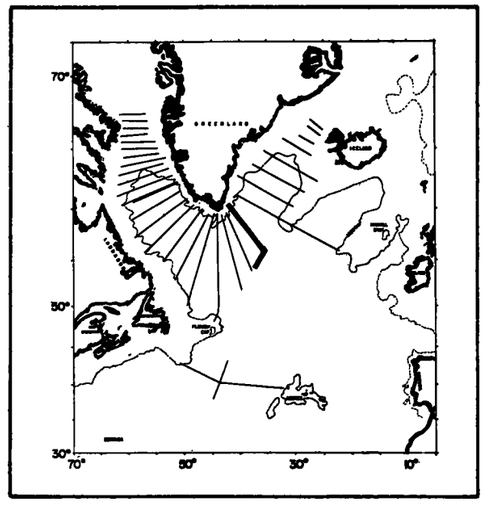
Temperature (°C)



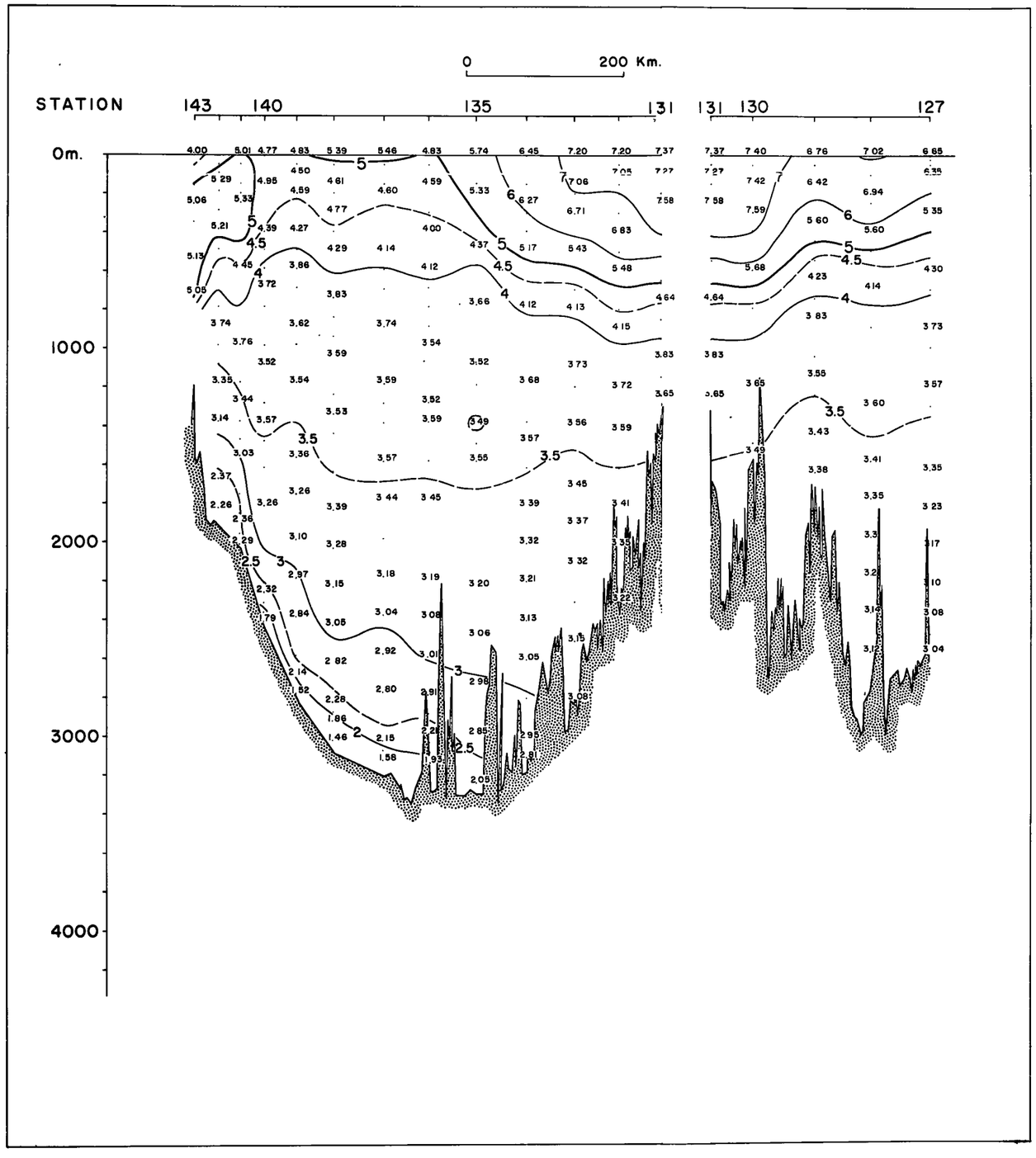
May 3 - May 7, 1966



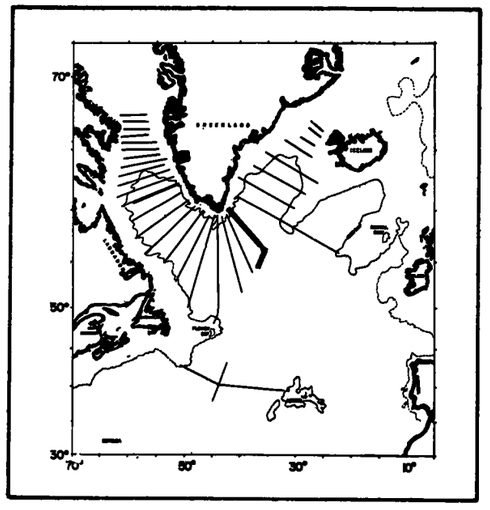
Salinity (°/₀₀)



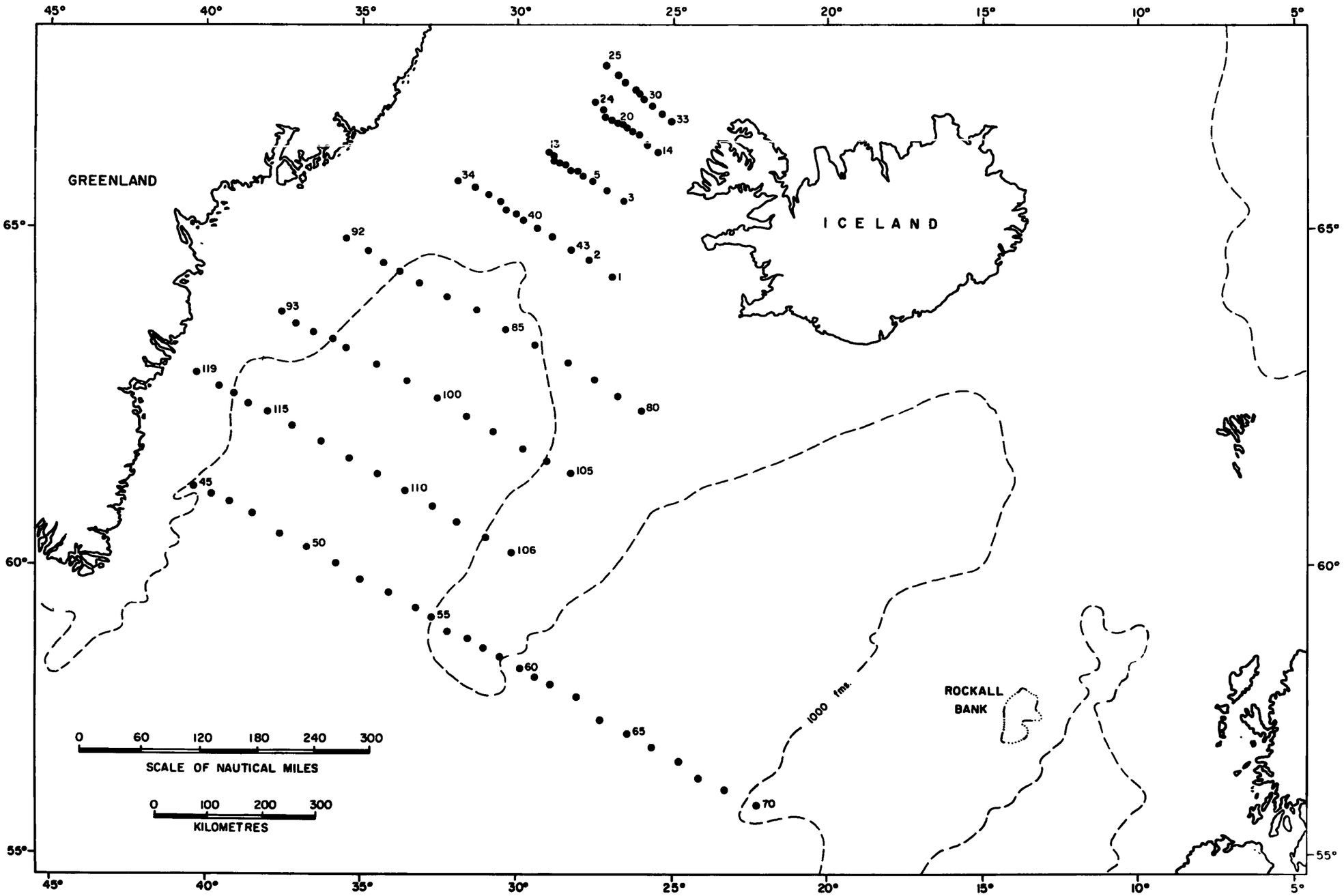
May 3 - May 7, 1966



Oxygen (ml/L)



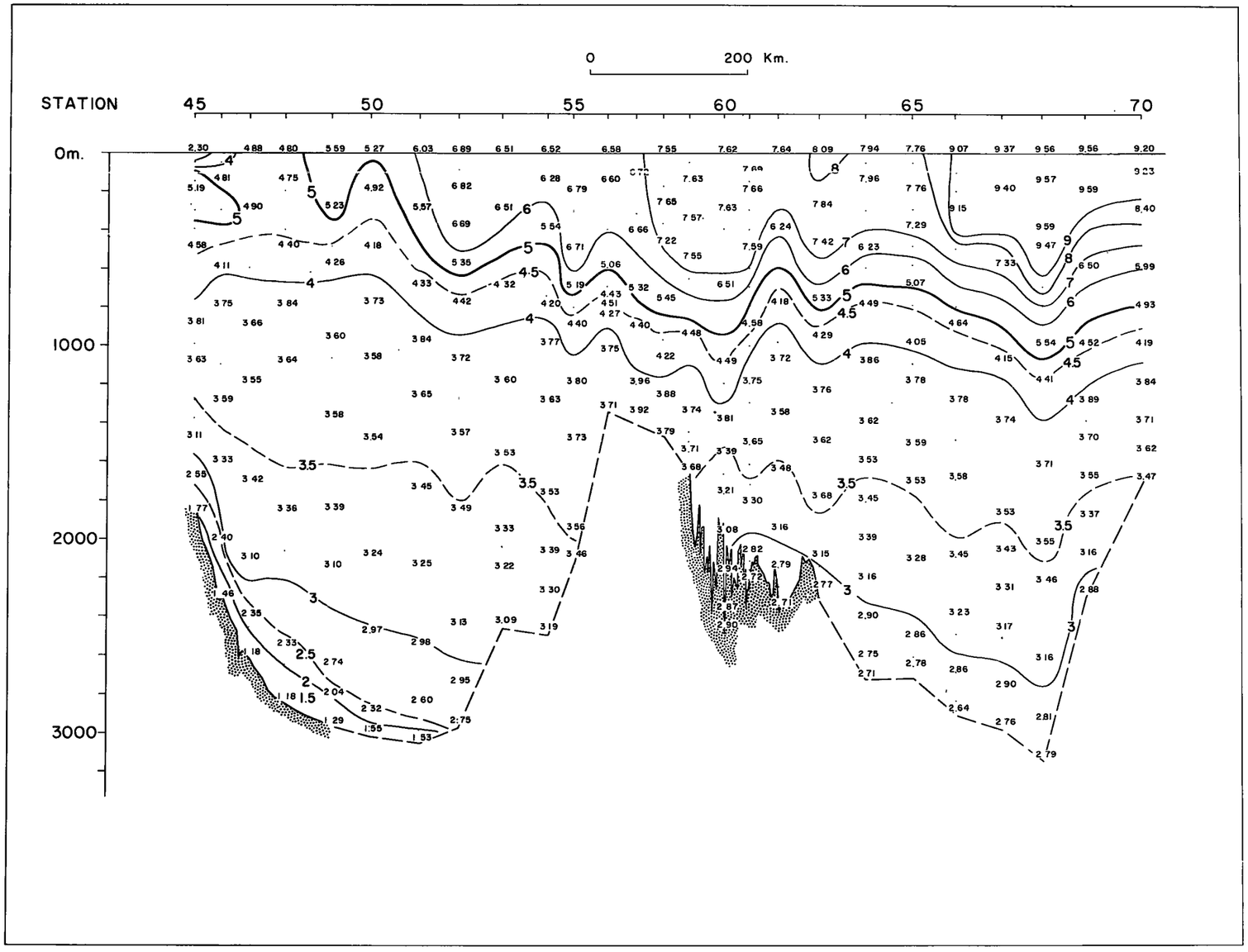
May 3 - May 7, 1966



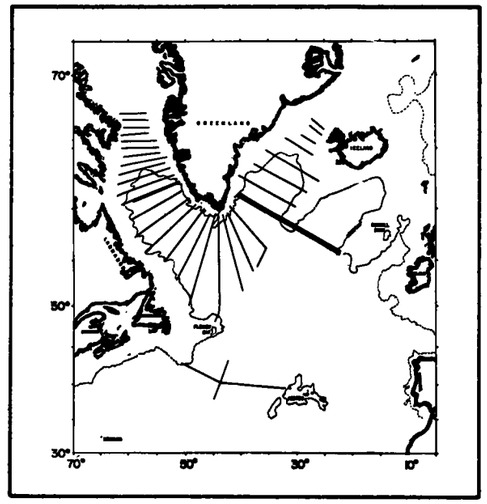
Cruise BI 0267 CSS HUDSON

January 16 - April 5, 1967

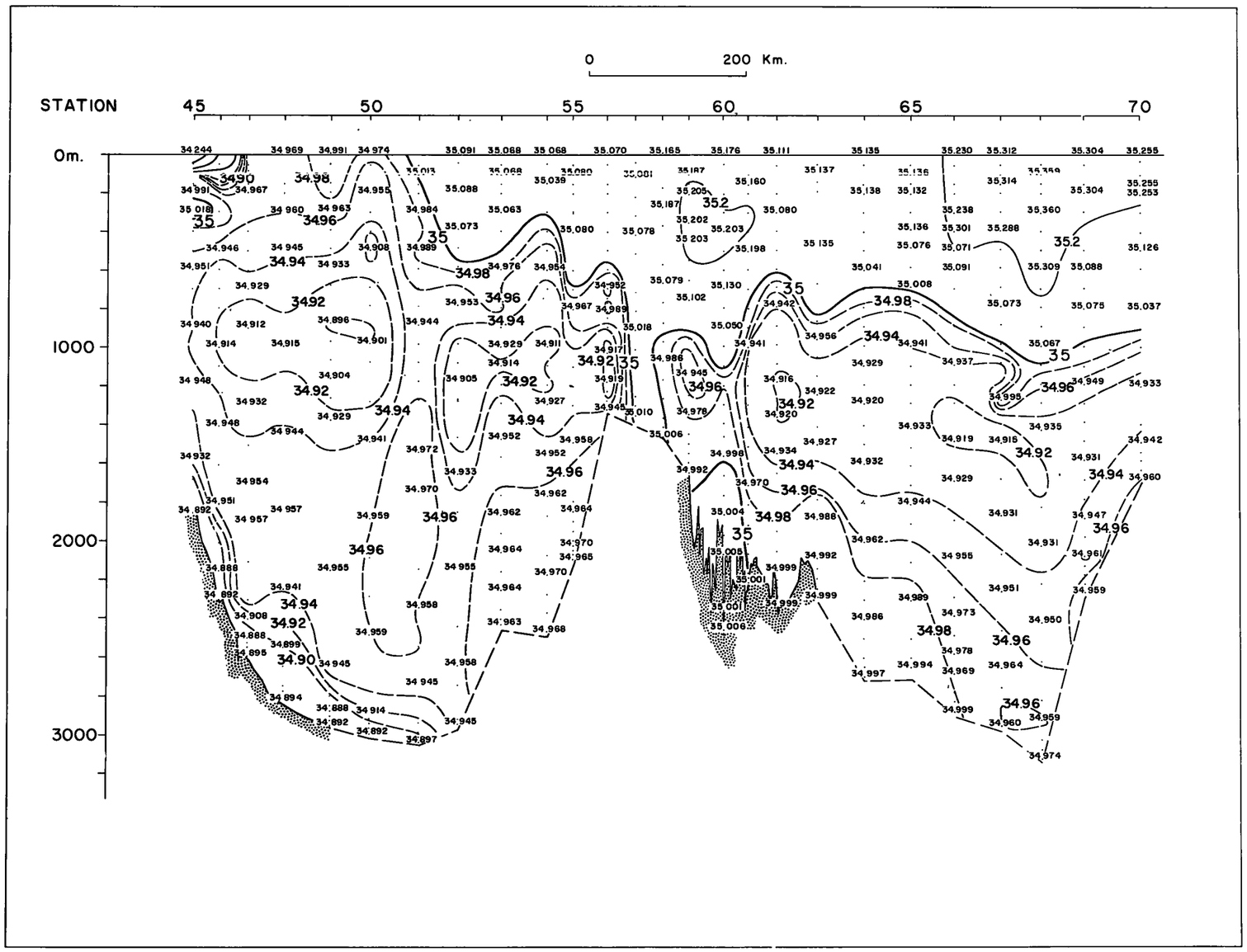
Scientist-in-Charge — C. R. Mann



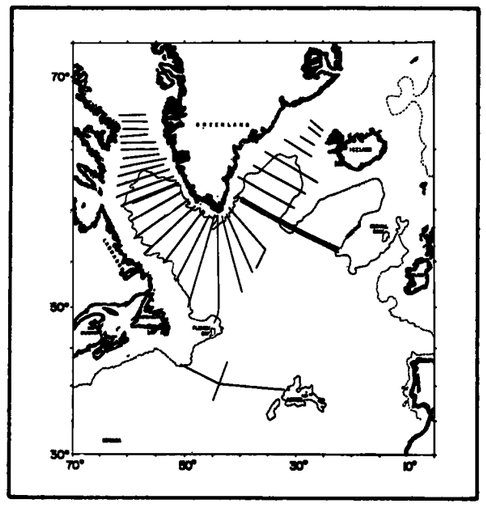
Temperature (°C)



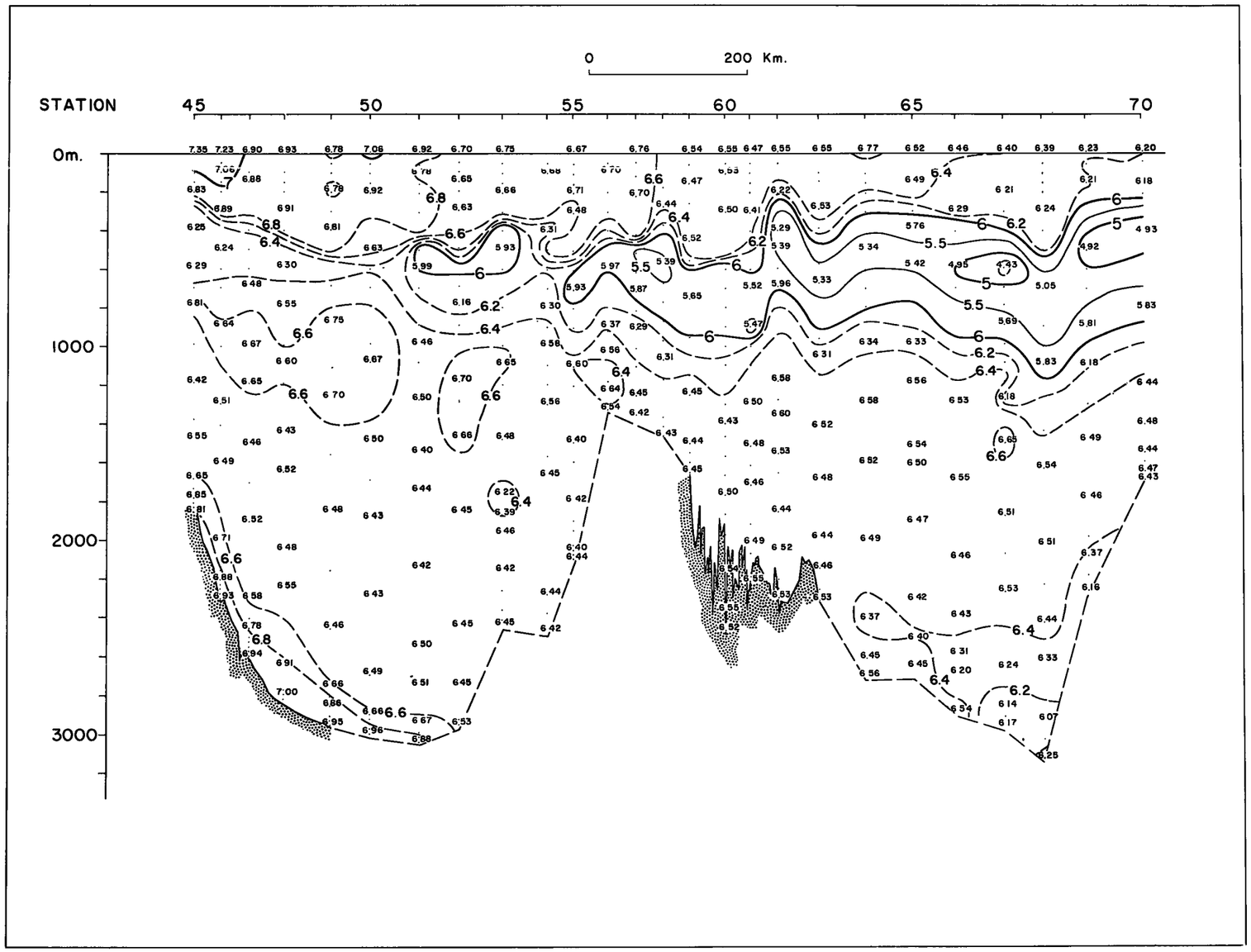
February 11 - February 22, 1967

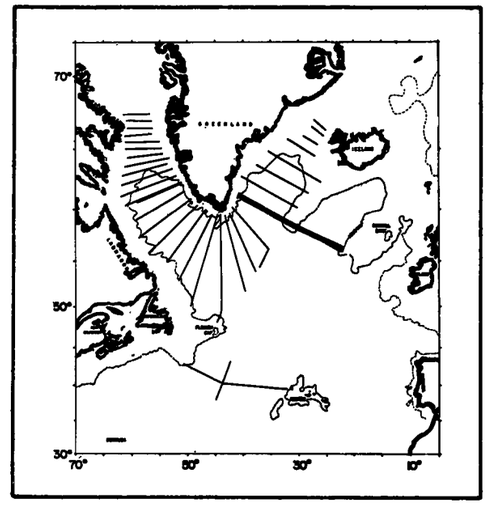


Salinity (°/₀₀)



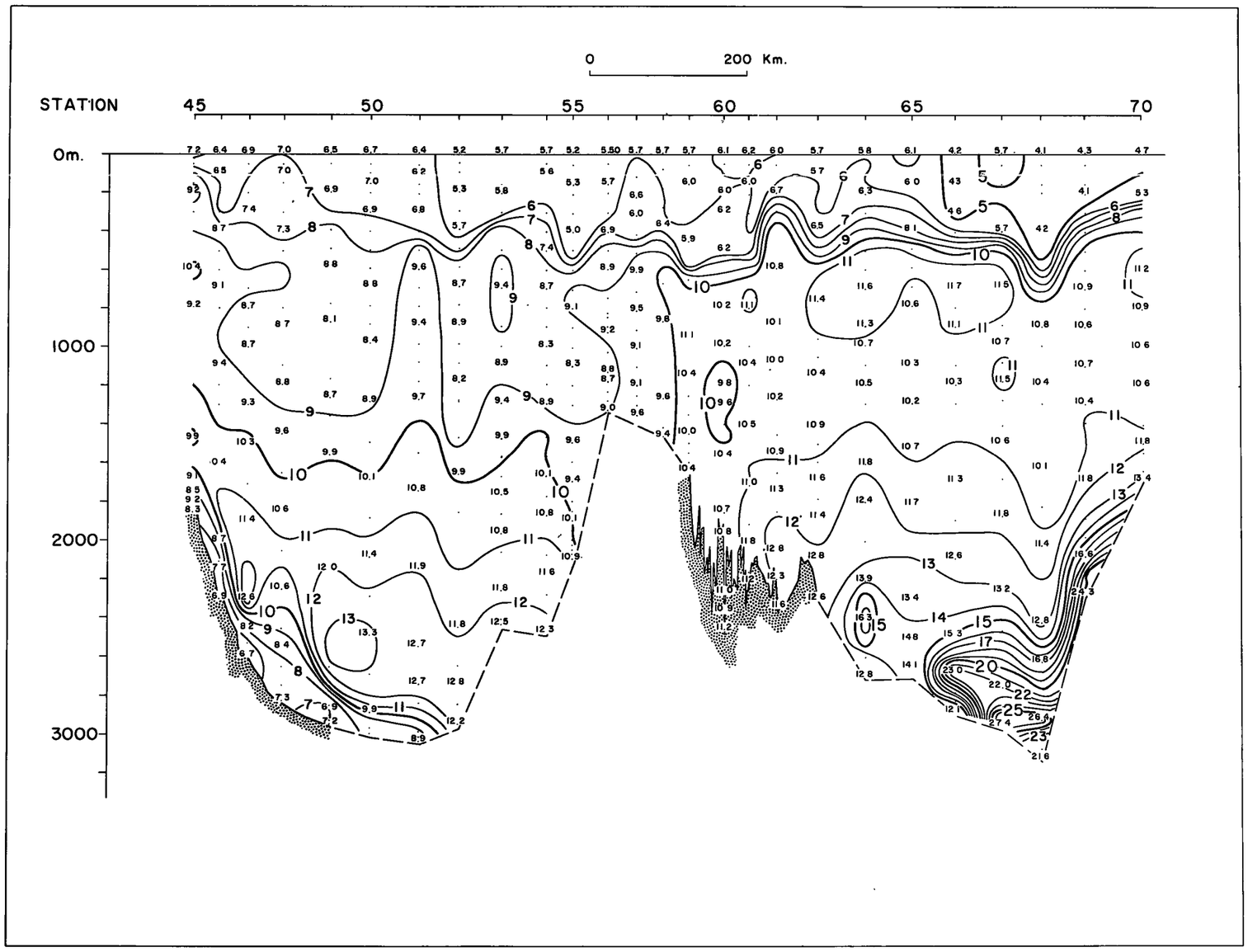
February 11 - February 22, 1967

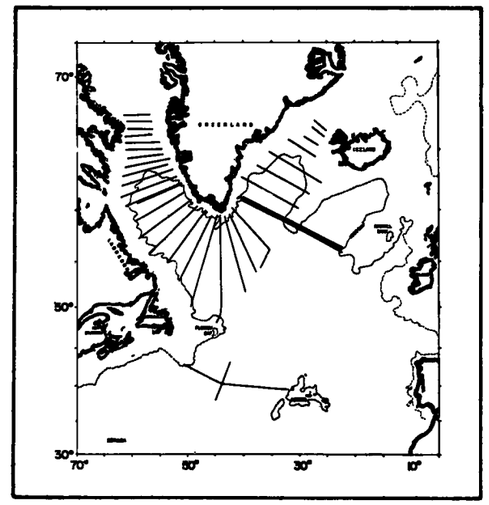




February 11 - February 22, 1967

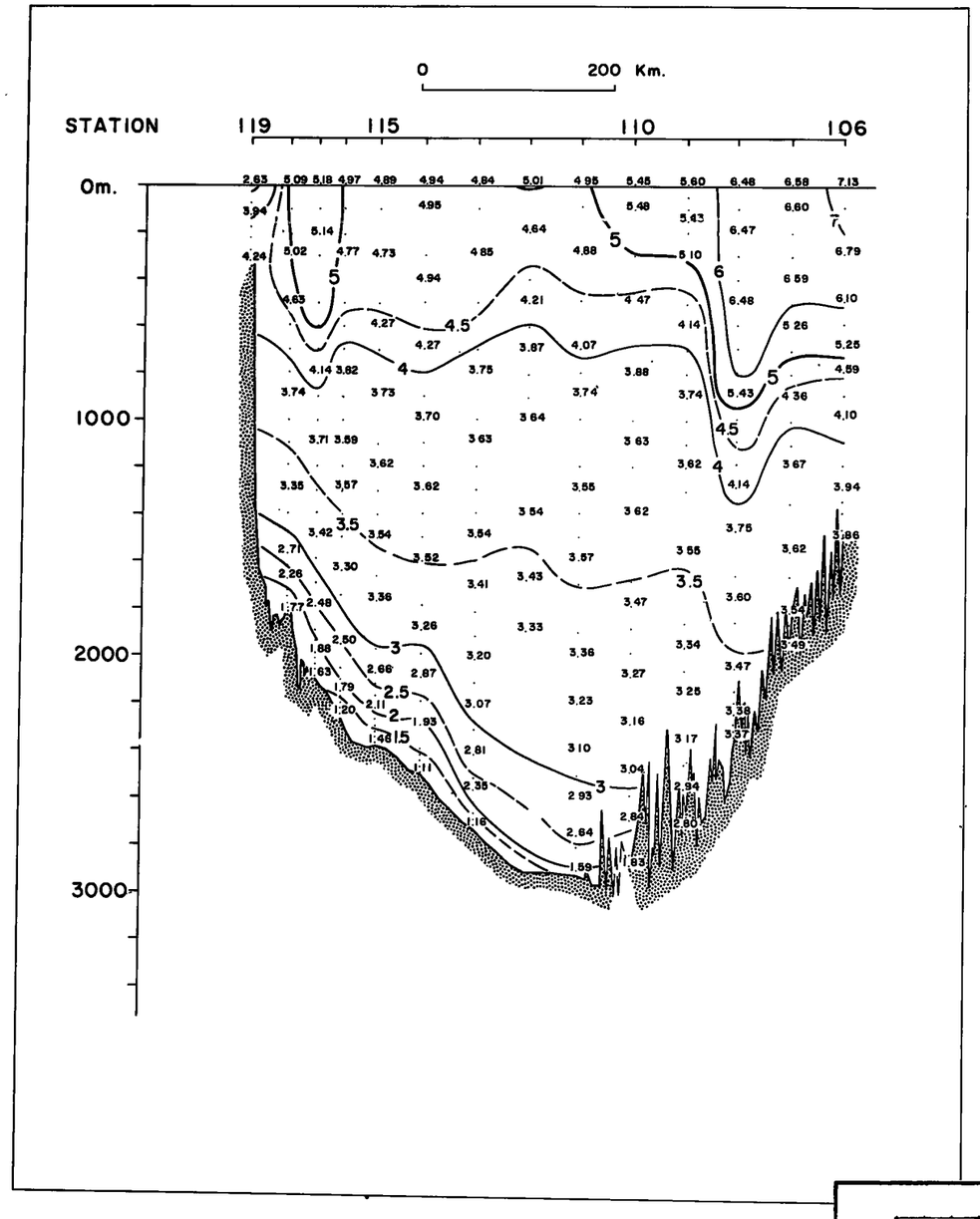
Oxygen (ml/L)



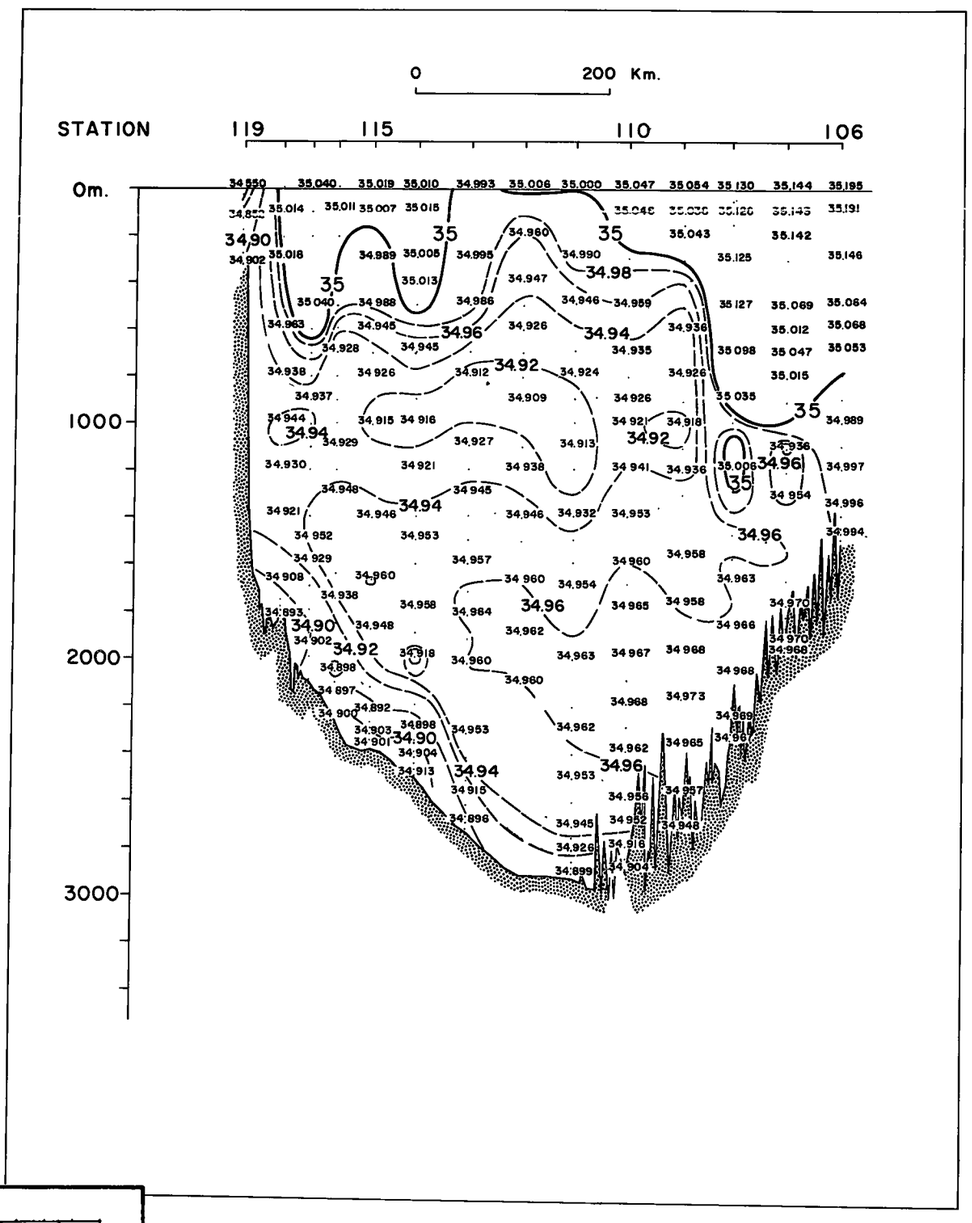


February 11 - February 22, 1967

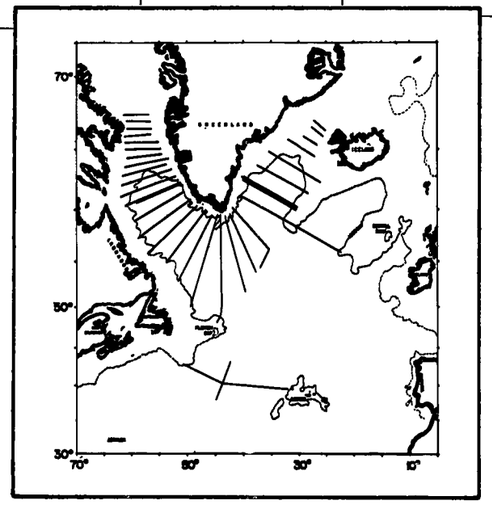
Silica (µg at/L)



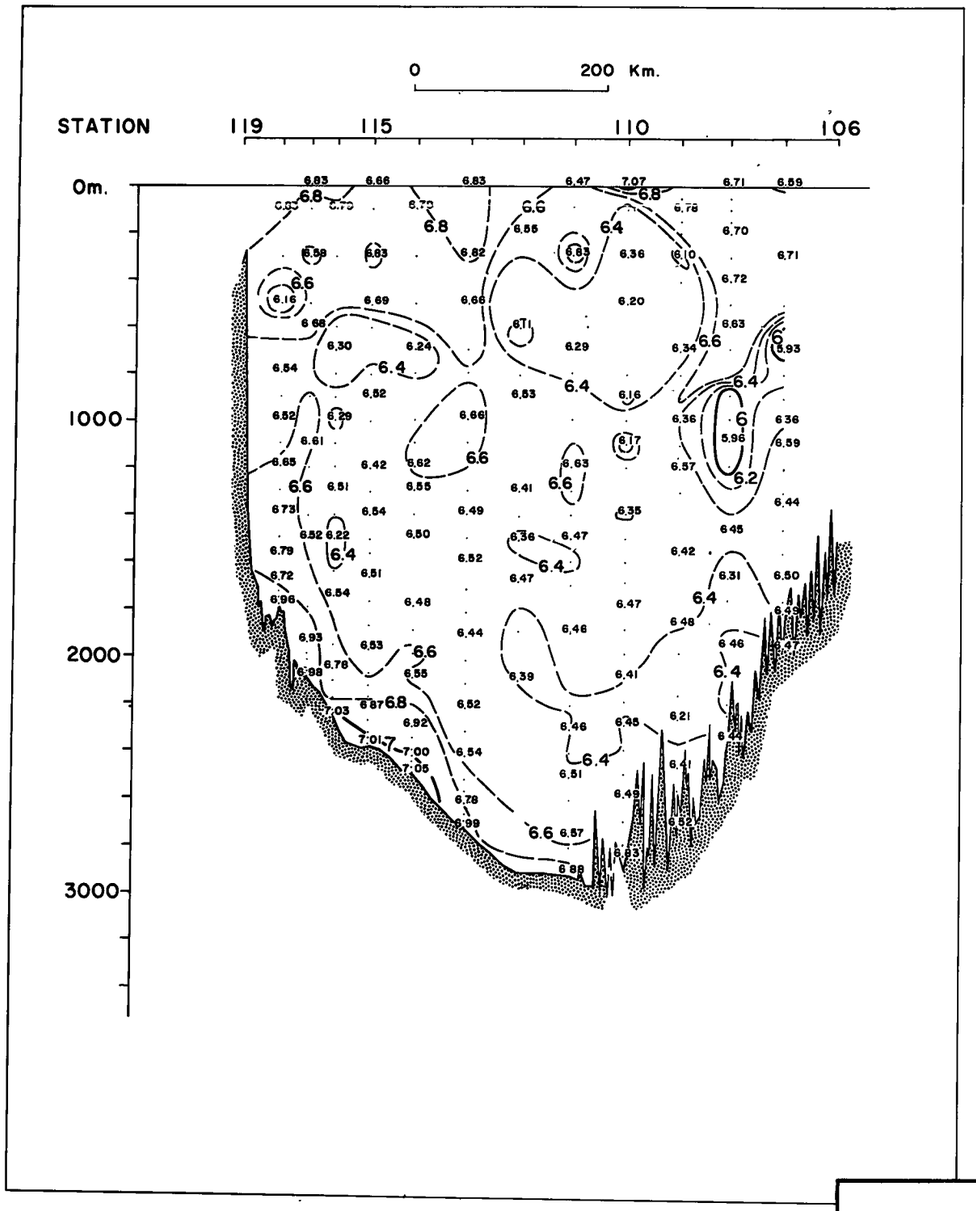
Temperature (°C)



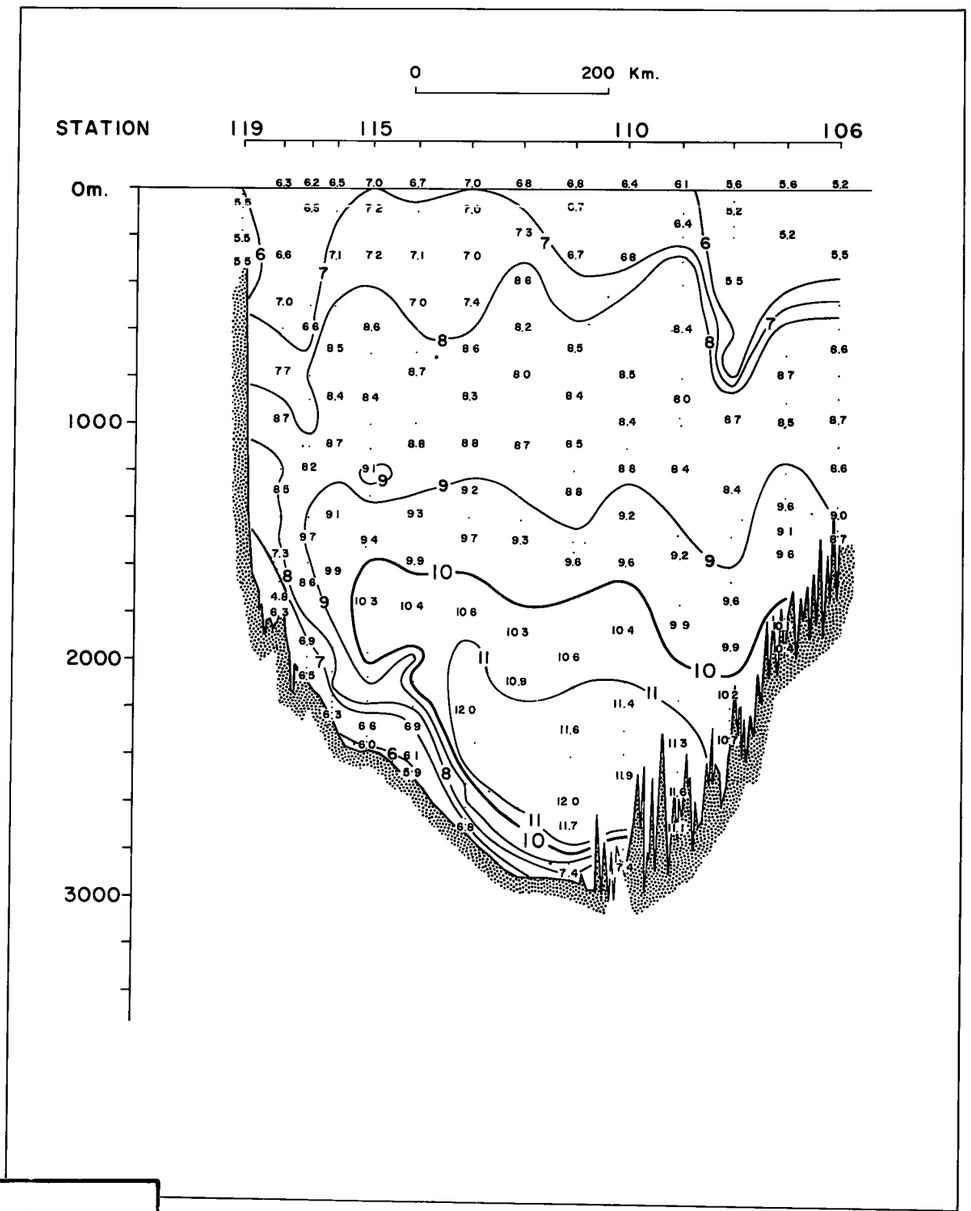
Salinity (°/₀₀)



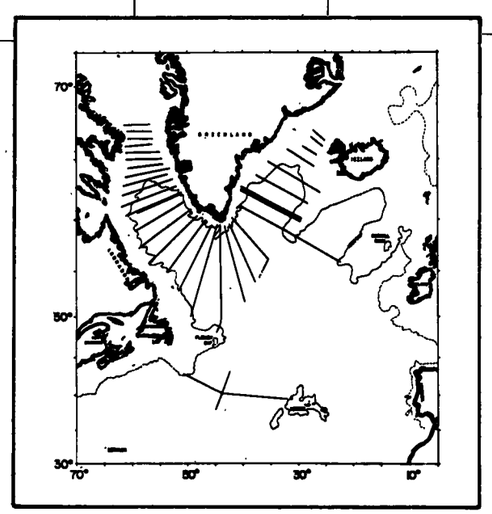
March 28 - March 30, 1967



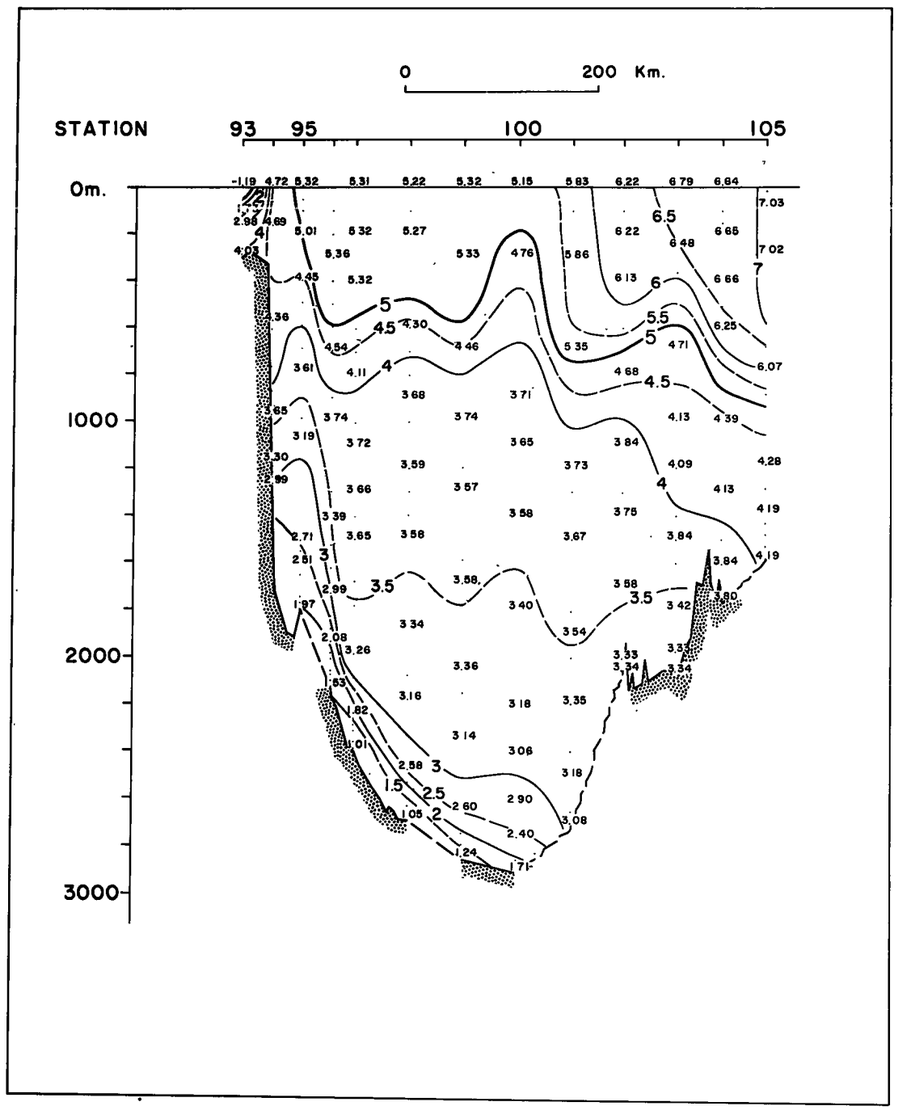
Oxygen (ml/L)



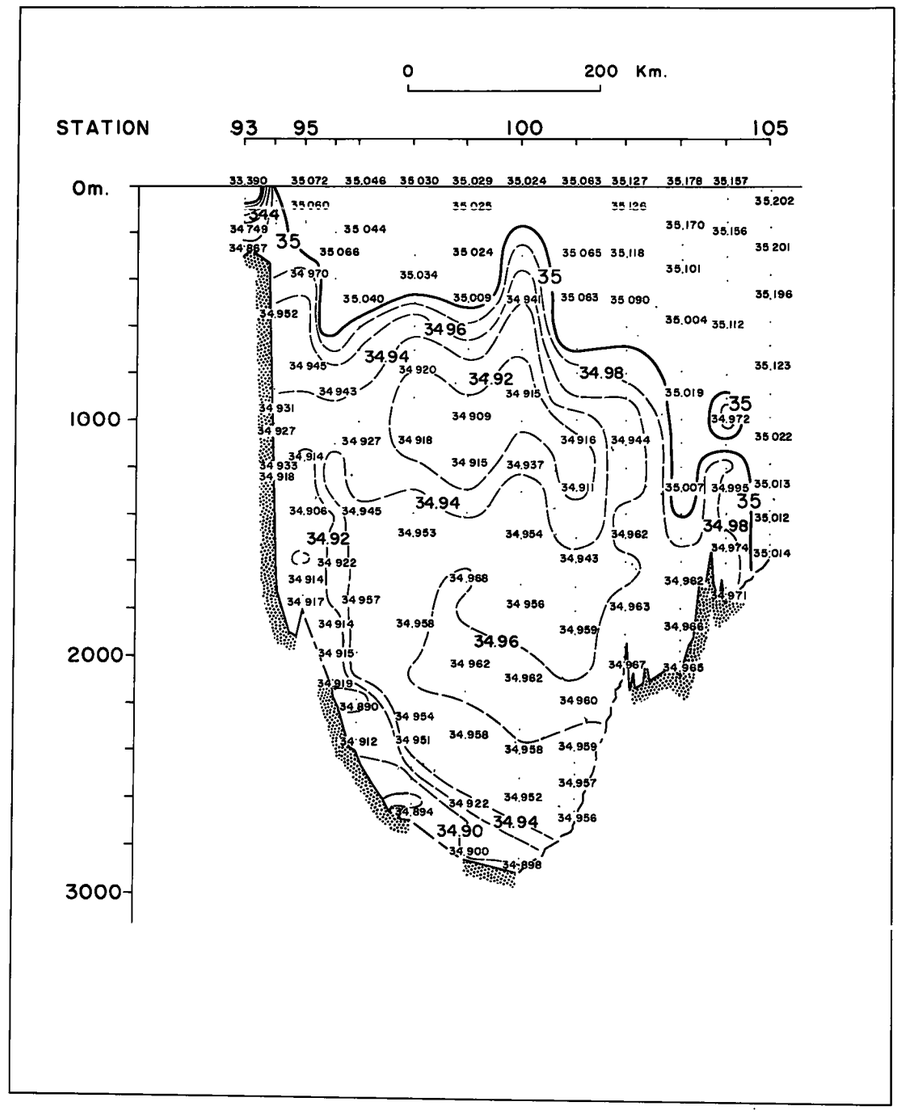
Silica (µg at/L)



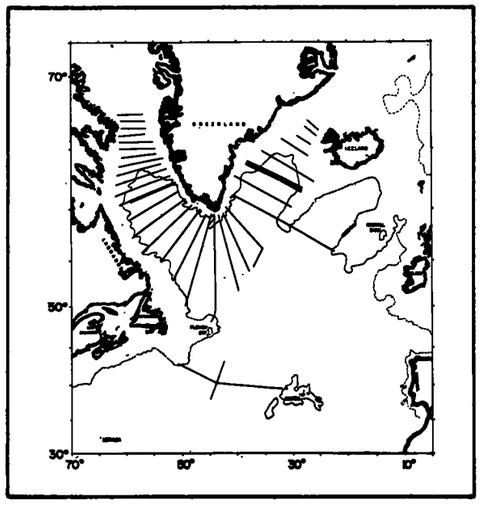
March 28 - March 30, 1967



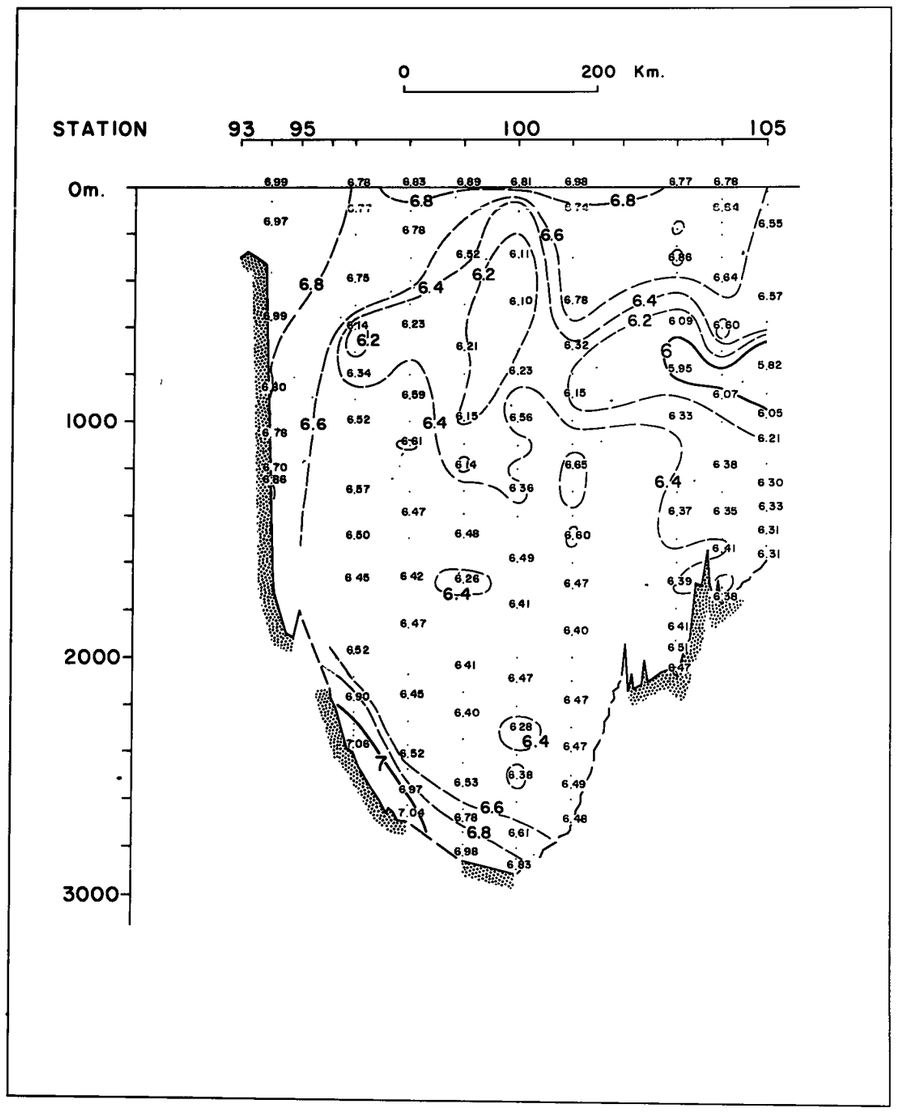
Temperature (°C)



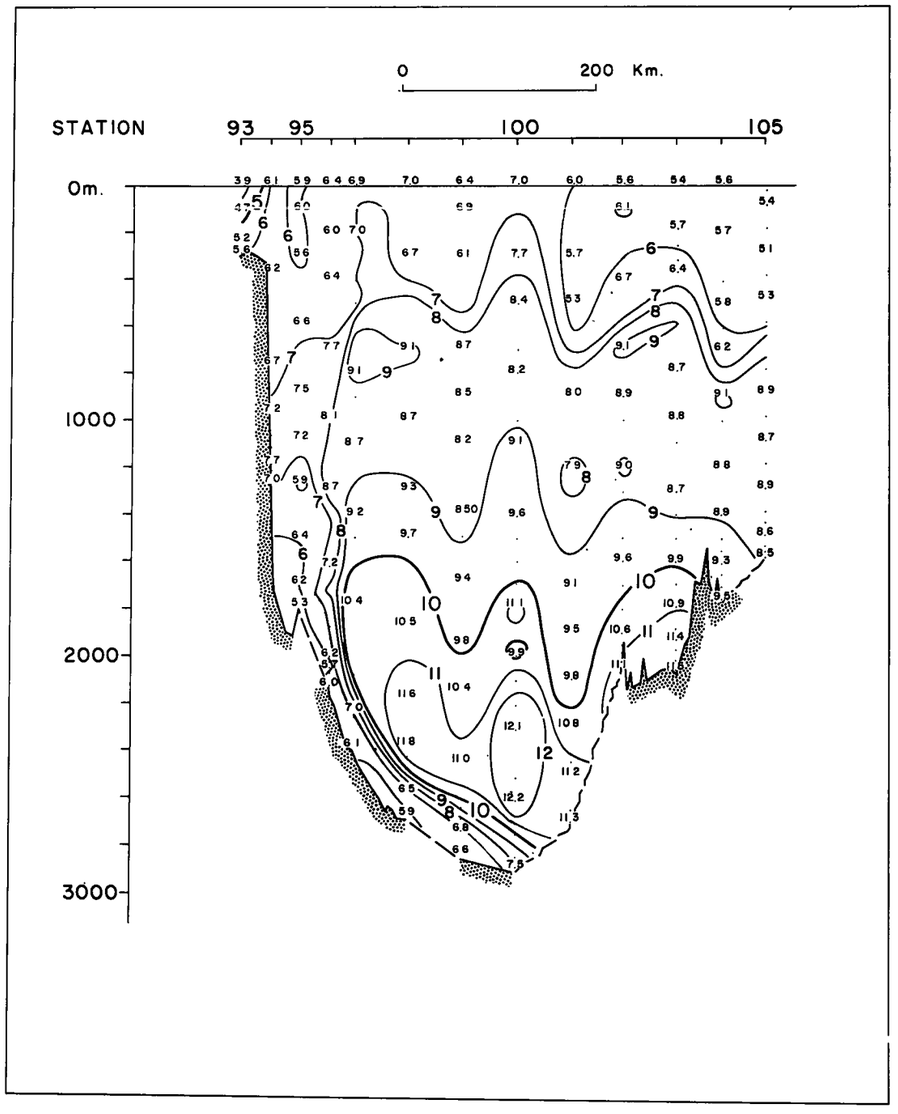
Salinity (°/₀₀)



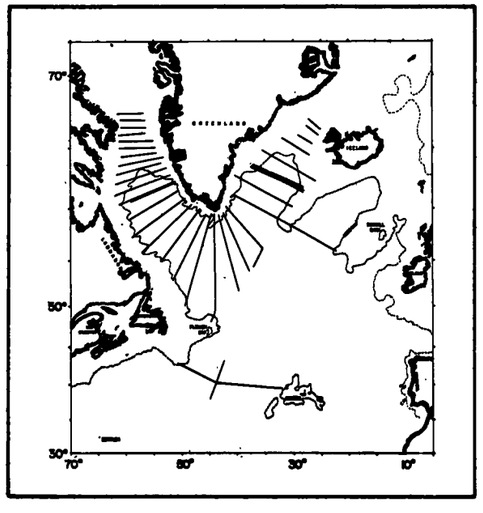
March 24 - March 27, 1967



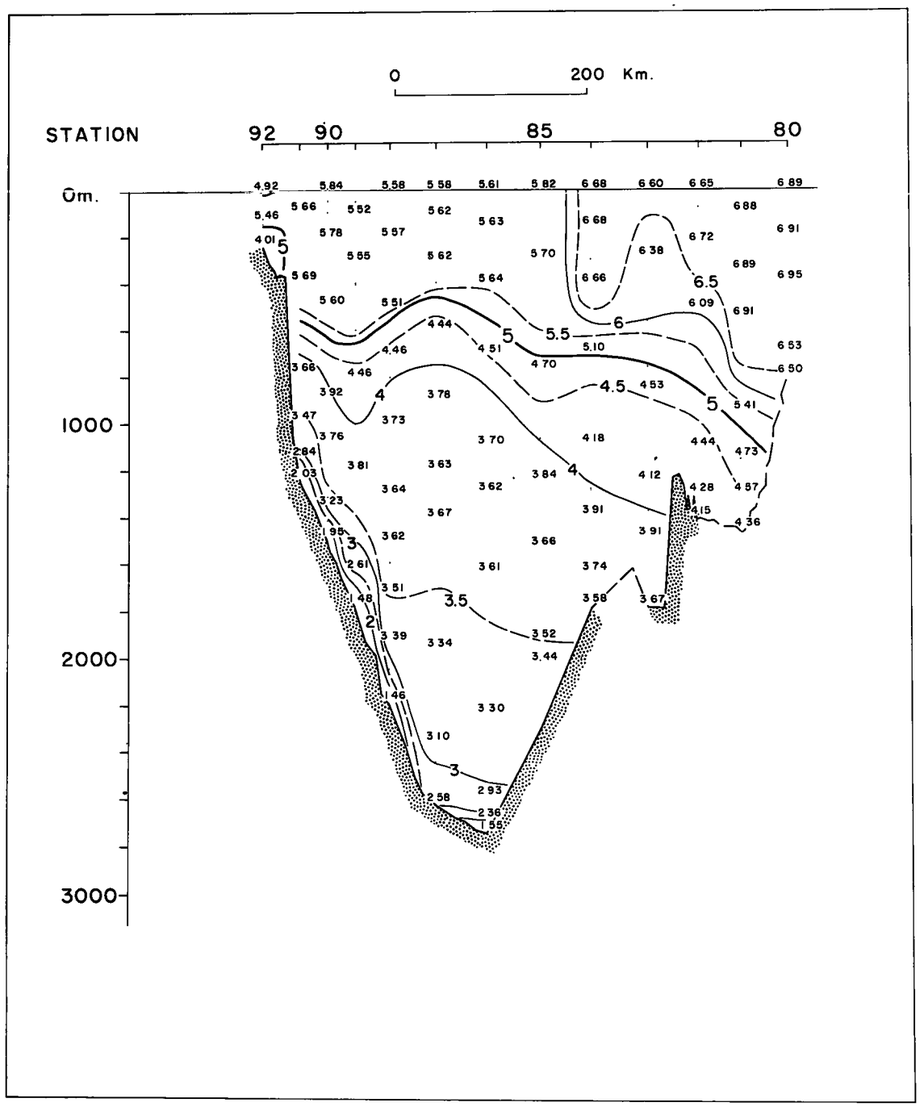
Oxygen (ml/L)



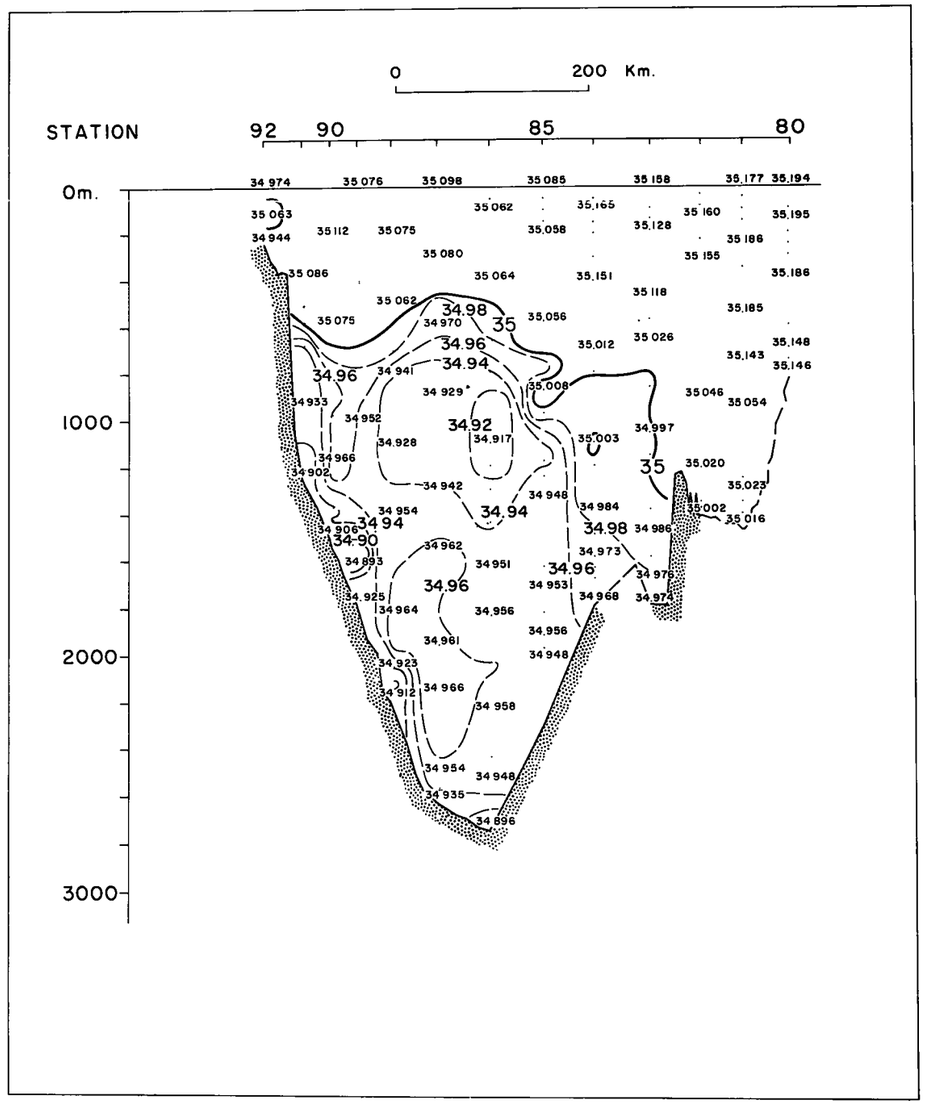
Silica (µg at/L)



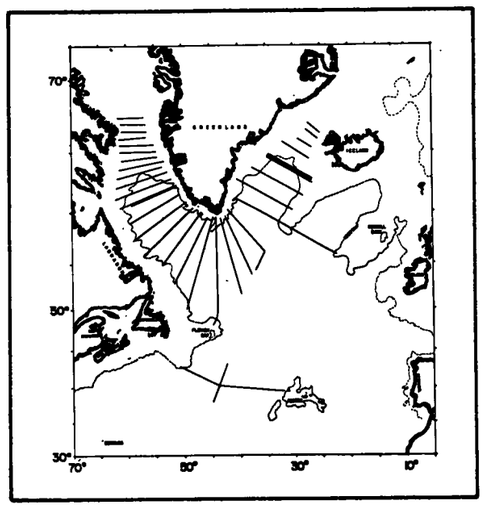
March 24 - March 27, 1967



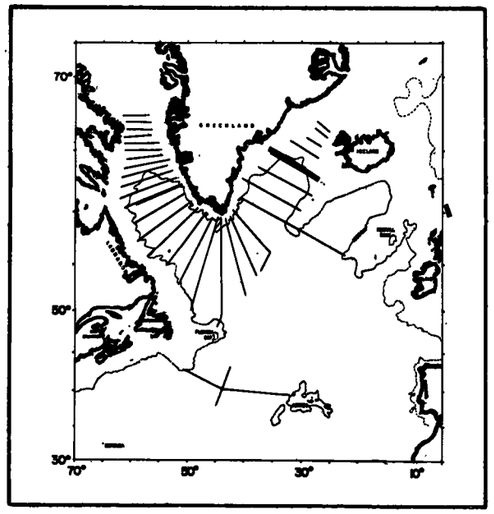
Temperature (°C)



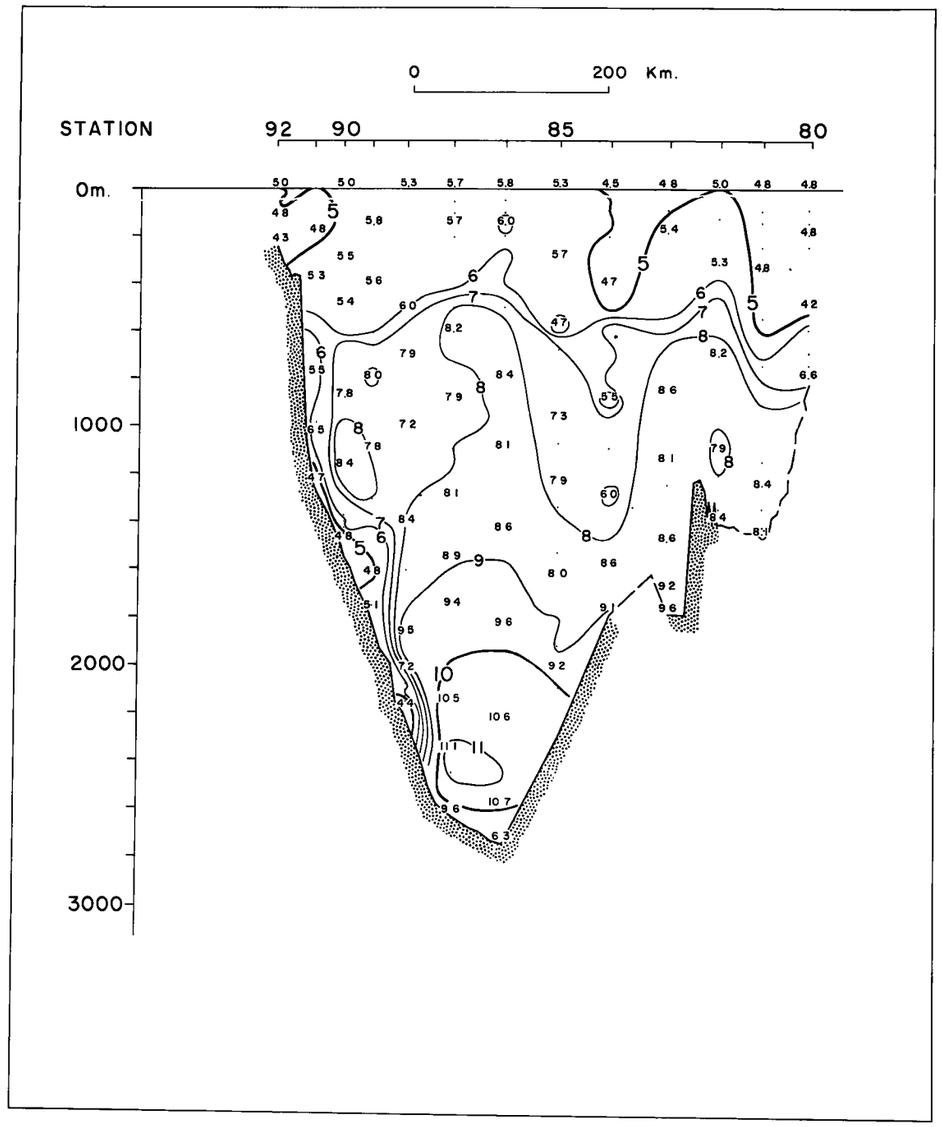
Salinity (°/₀₀)



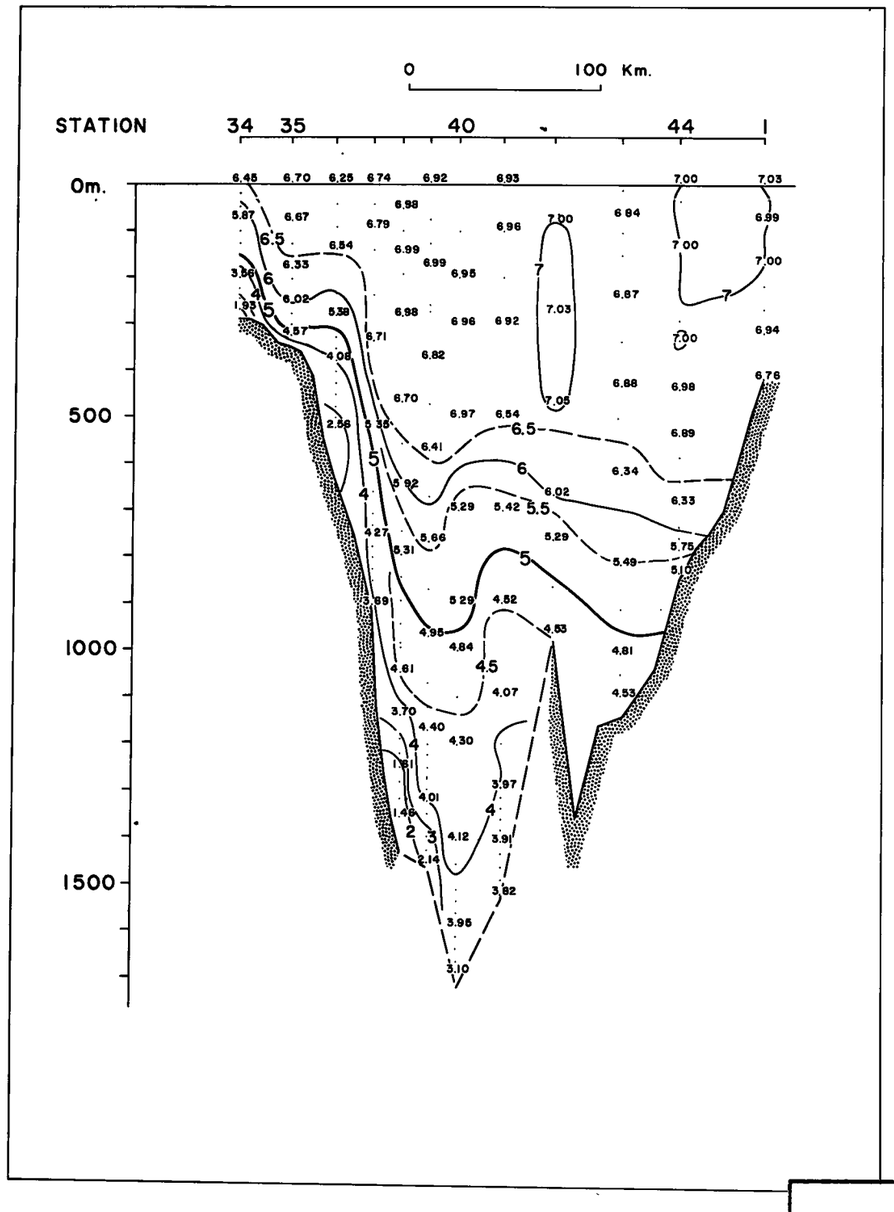
March 22 - March 24, 1967



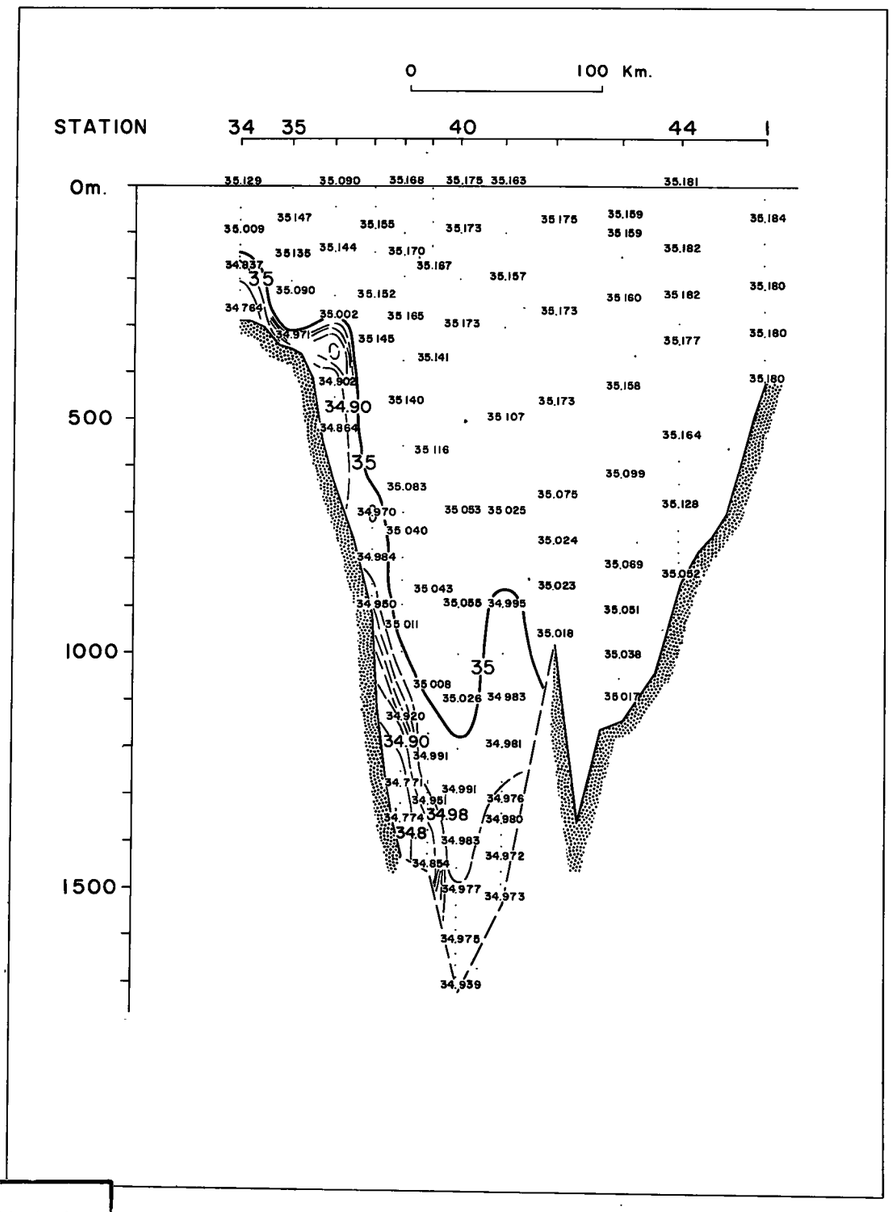
March 22 - March 24, 1967



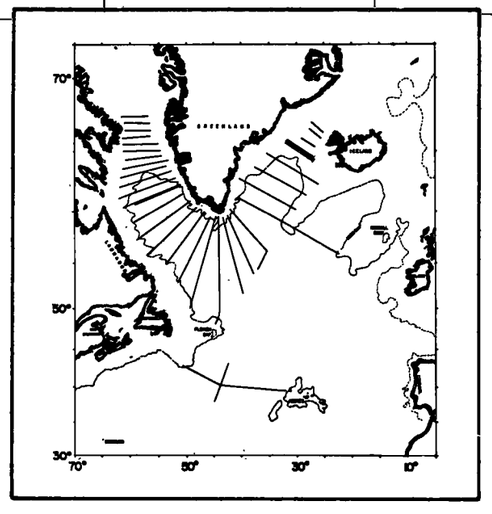
Silica (µg at/L)



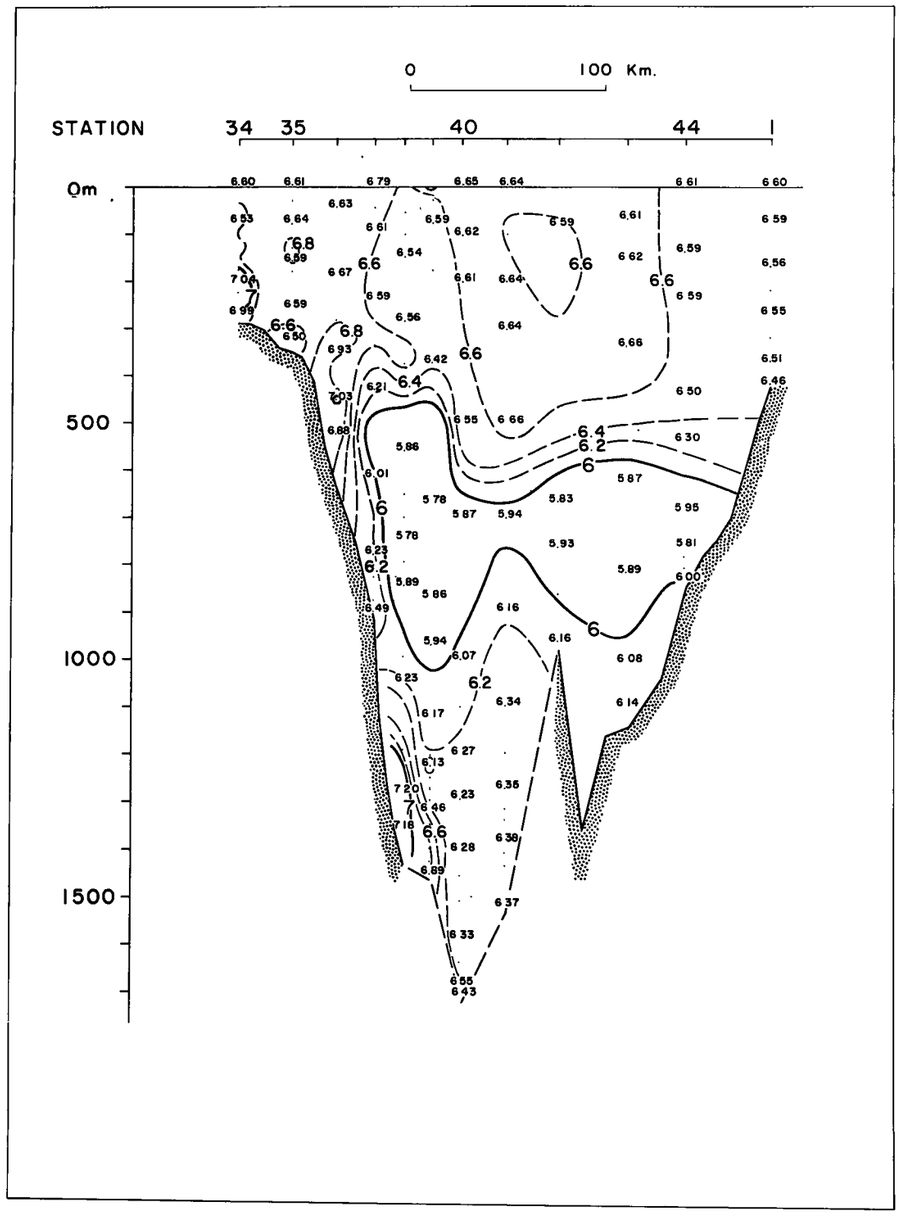
Temperature (°C)



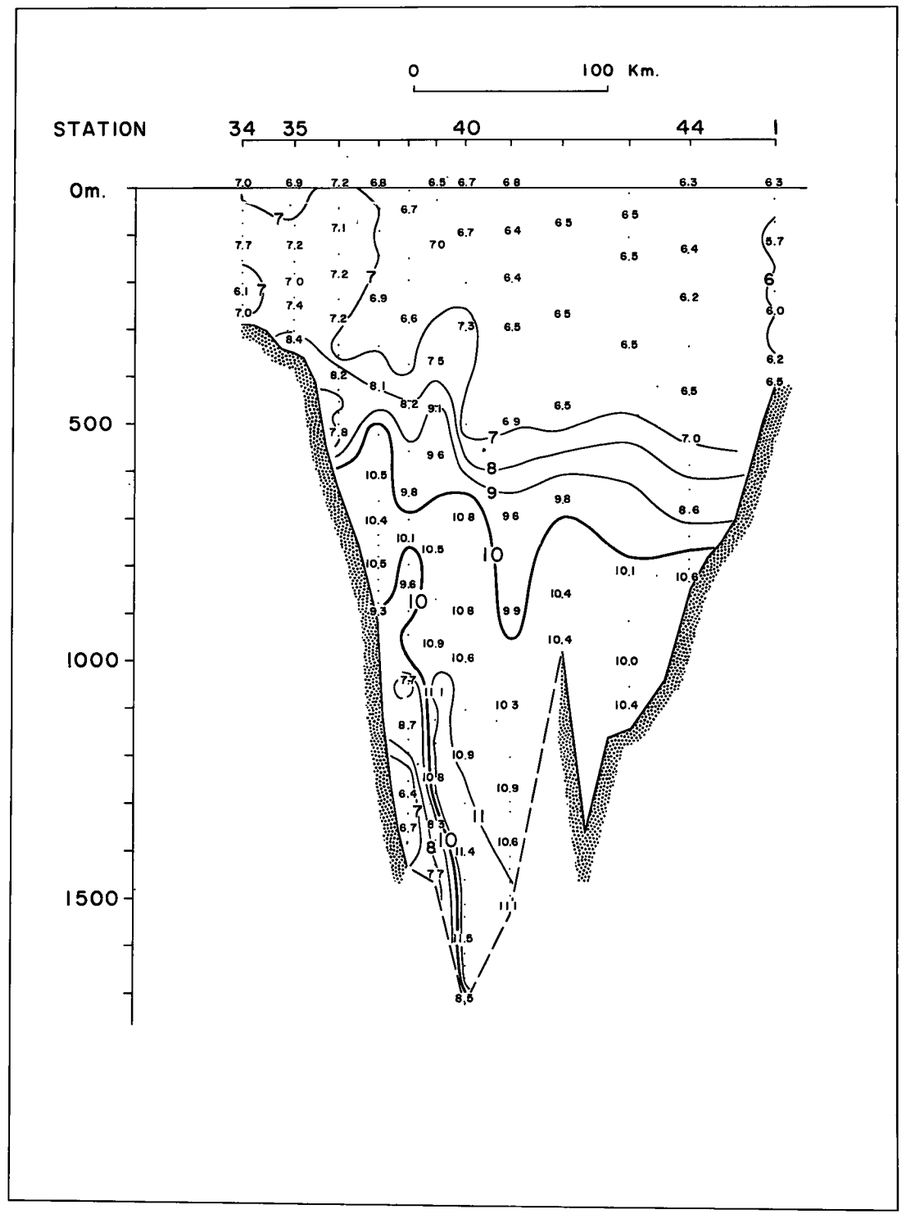
Salinity (°/₀₀)



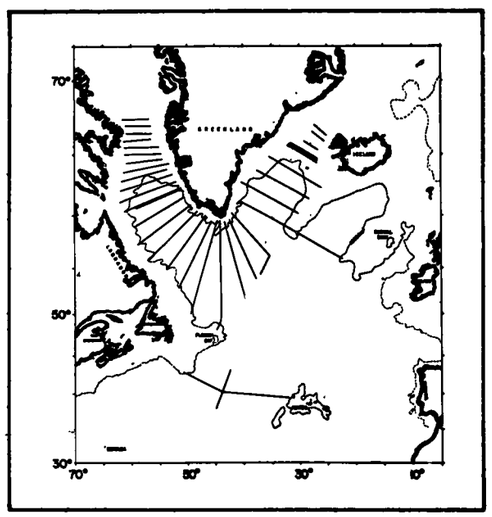
February 4 - February 6, 1967



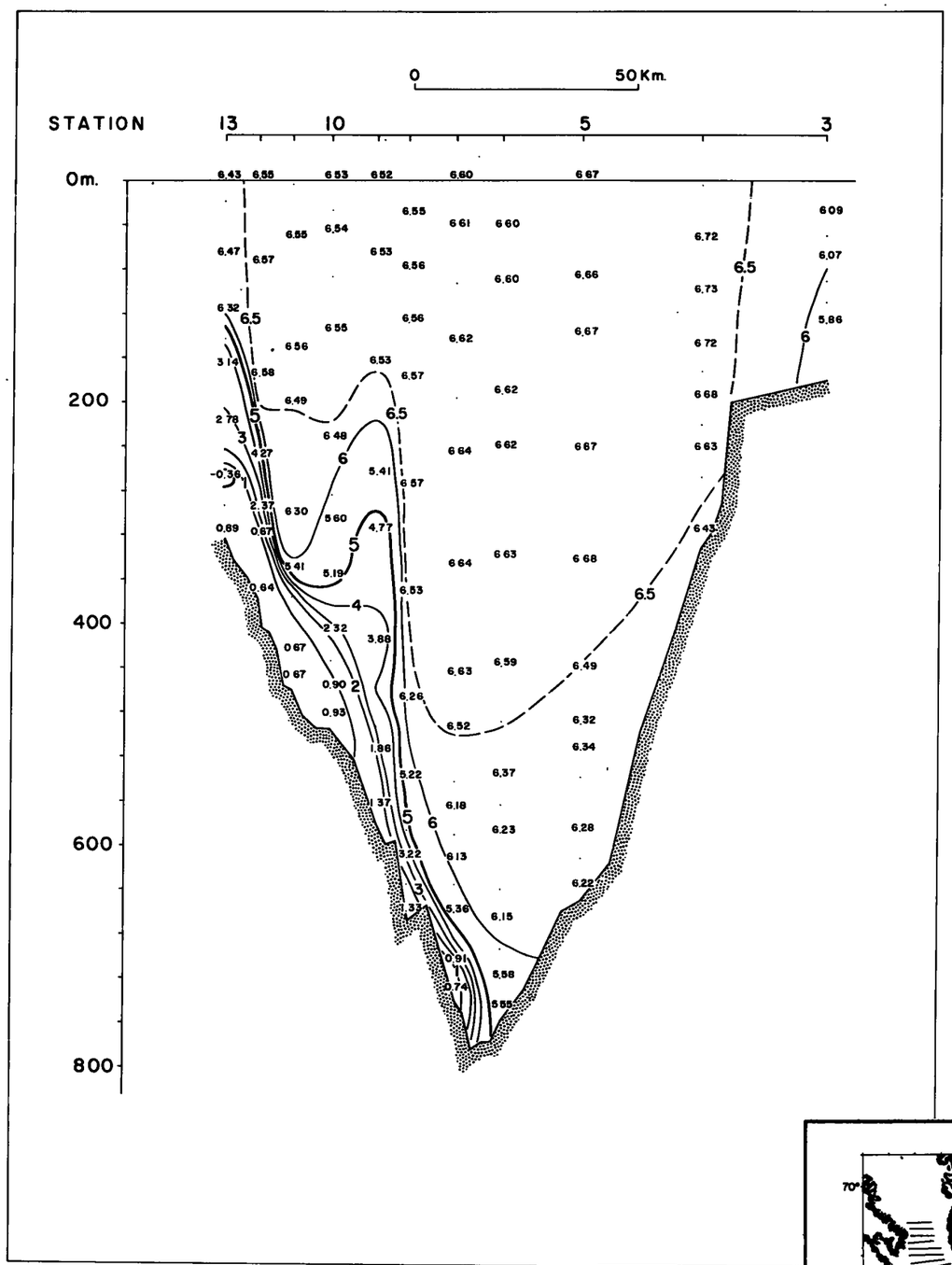
Oxygen (ml/L)



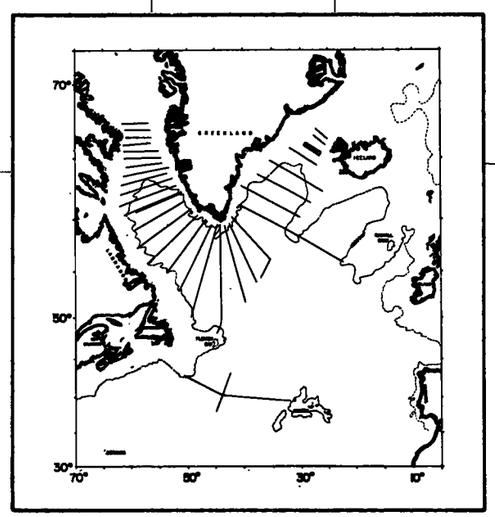
Silica (µg at/L)

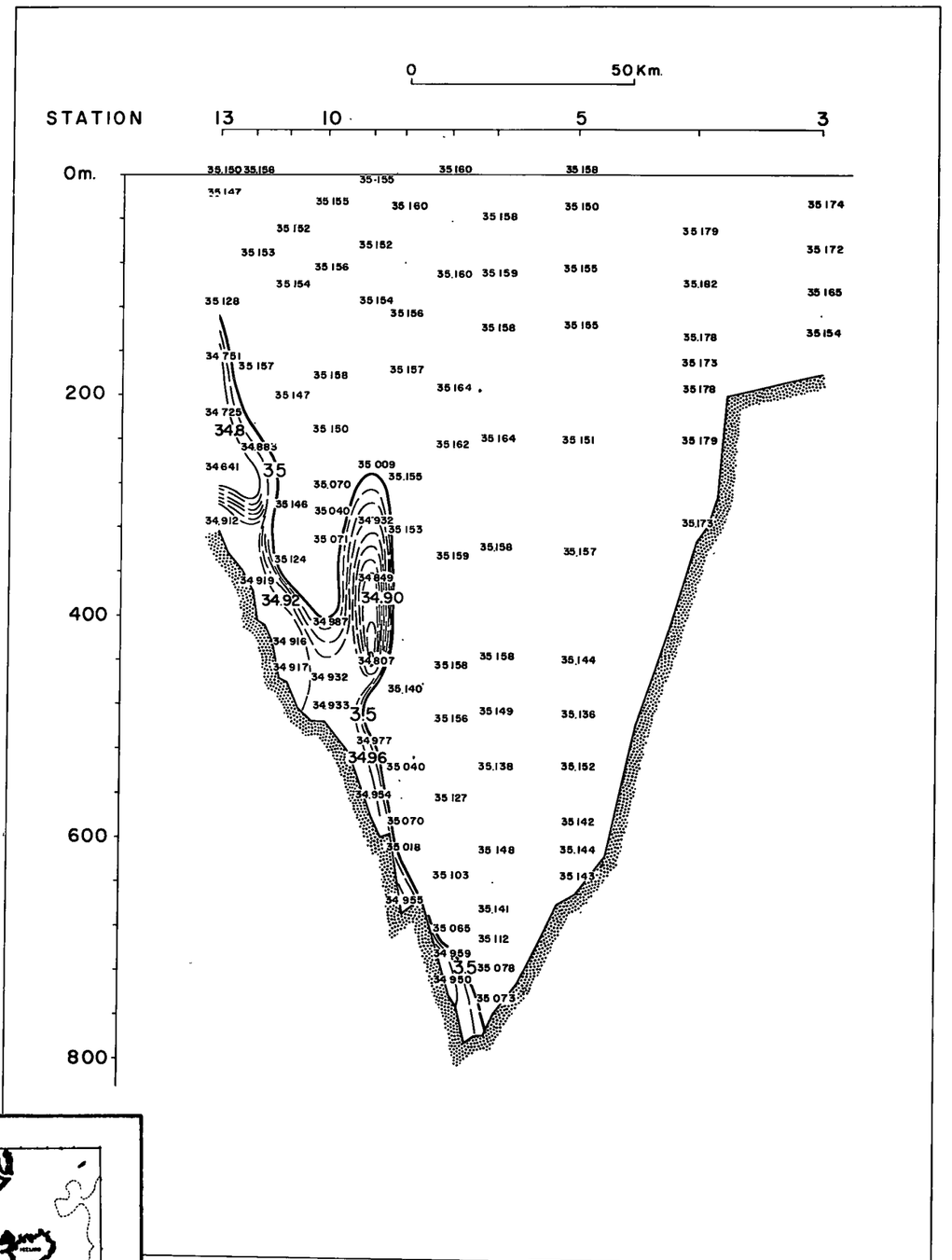


February 4 - February 6, 1967



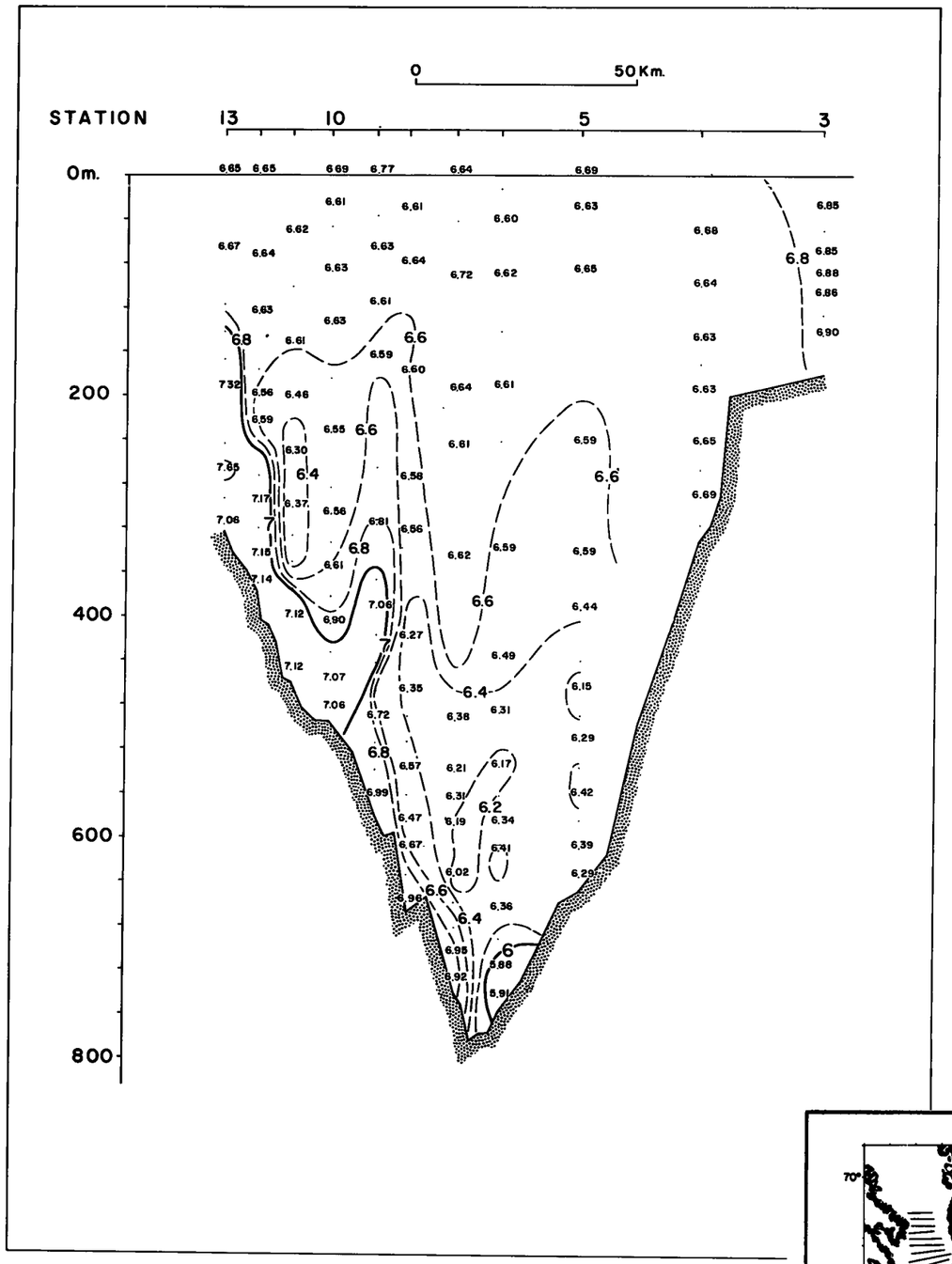
Temperature (°C)



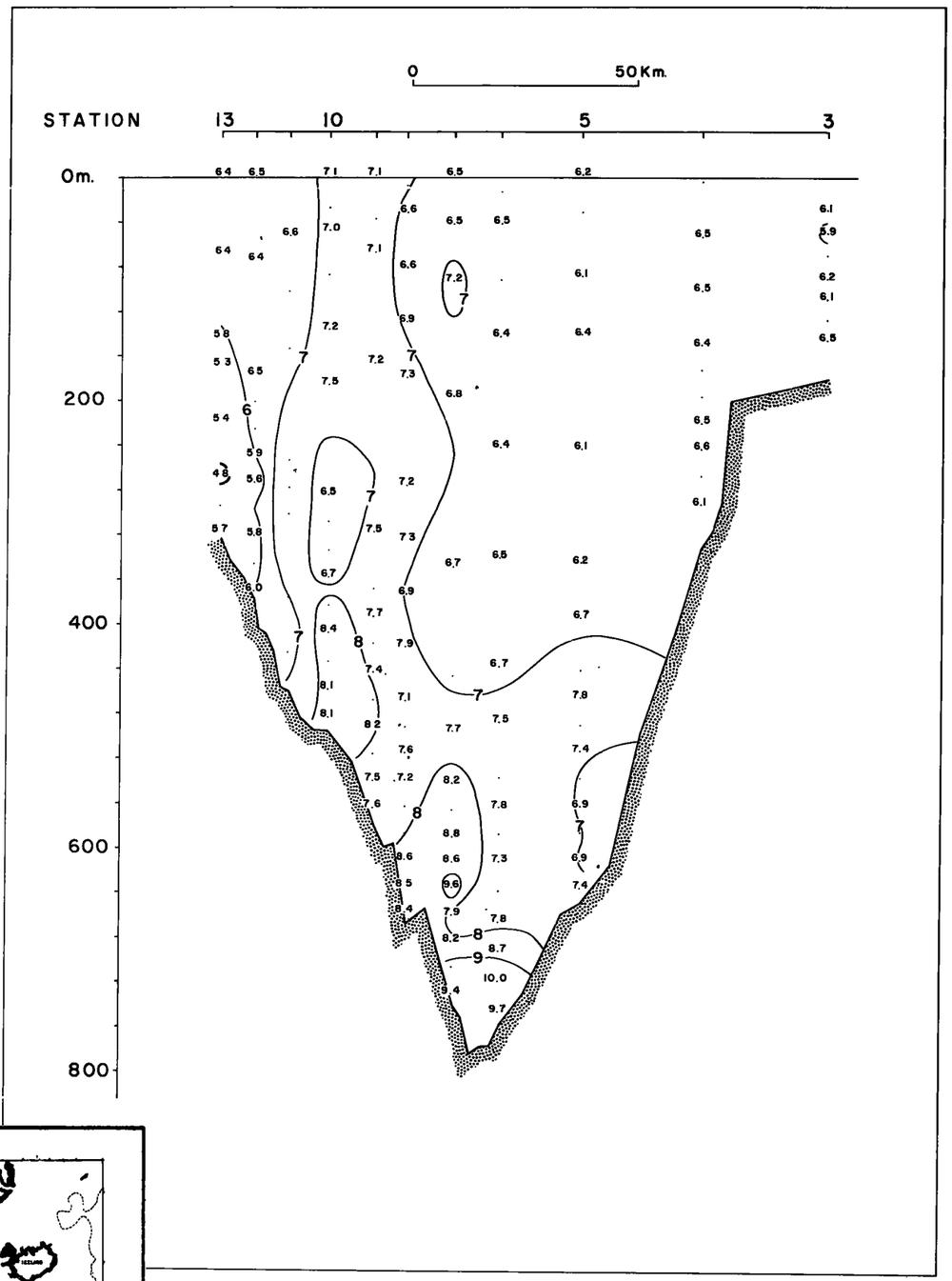


Salinity (°/₀₀)

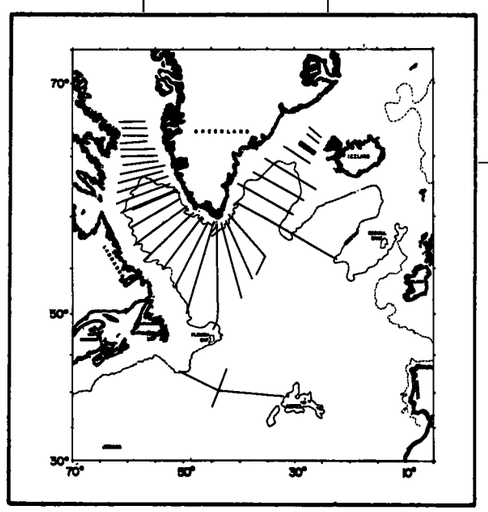
January 28 - January 29, 1967



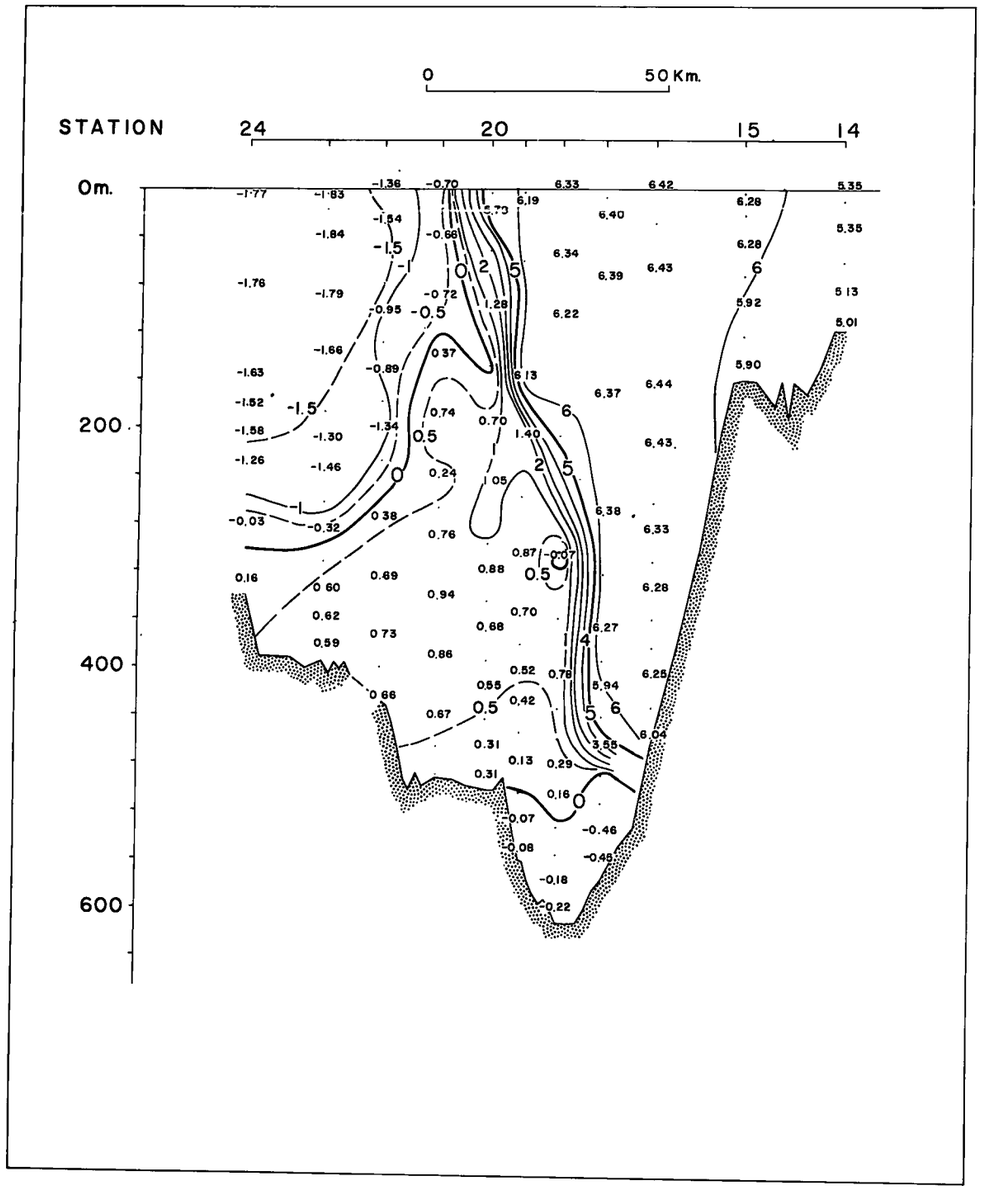
Oxygen (ml/L)



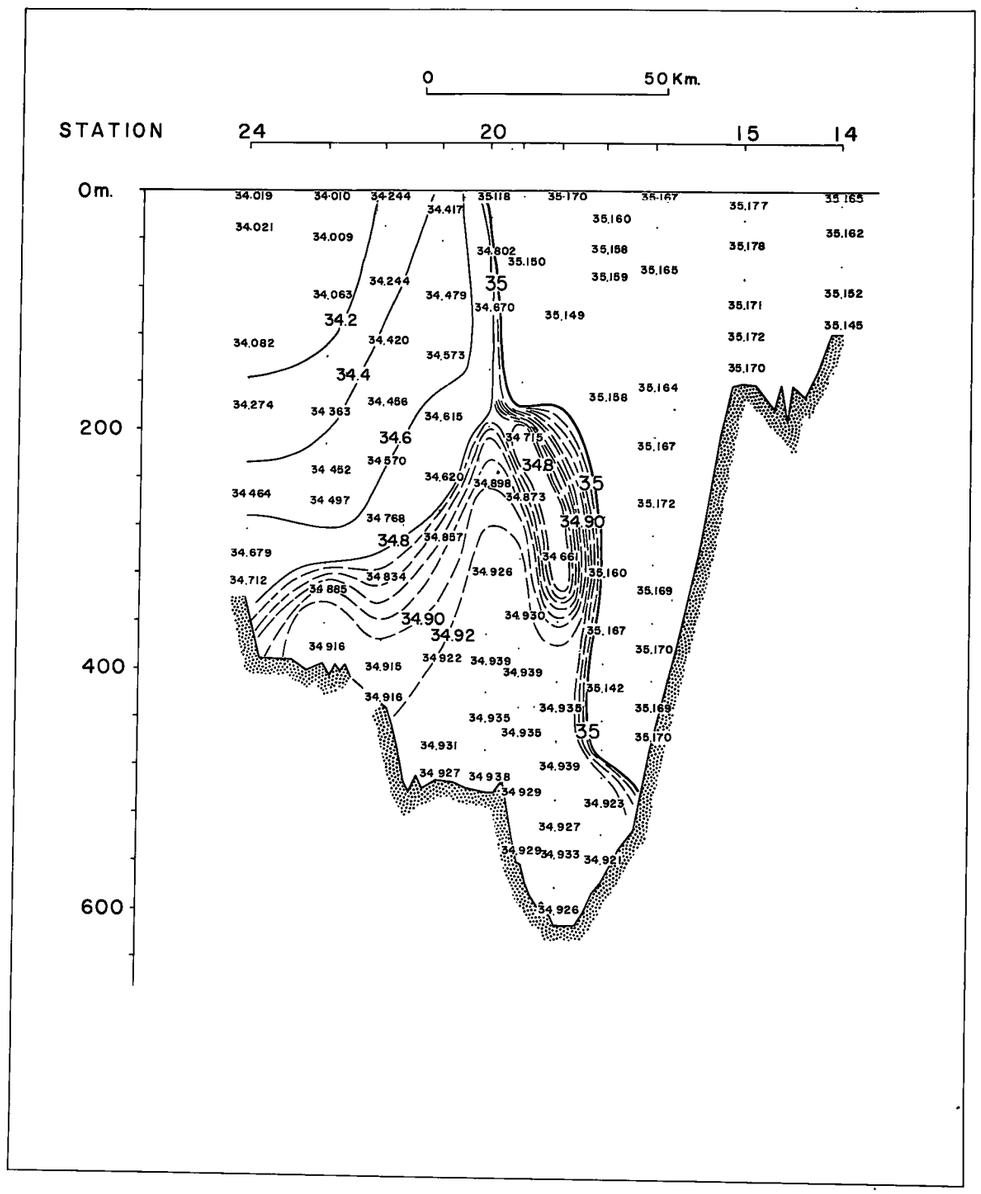
Silica (µg at/L)



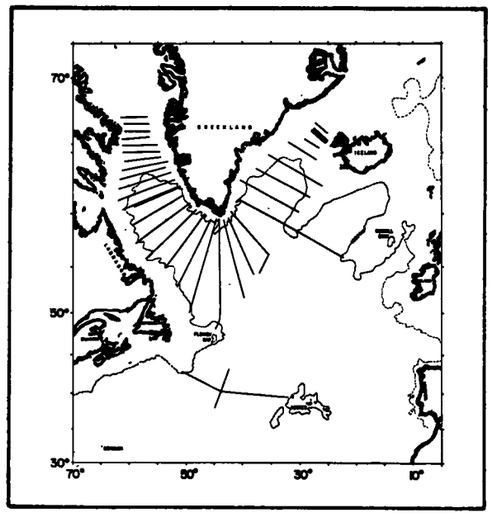
January 28 - January 29, 1967



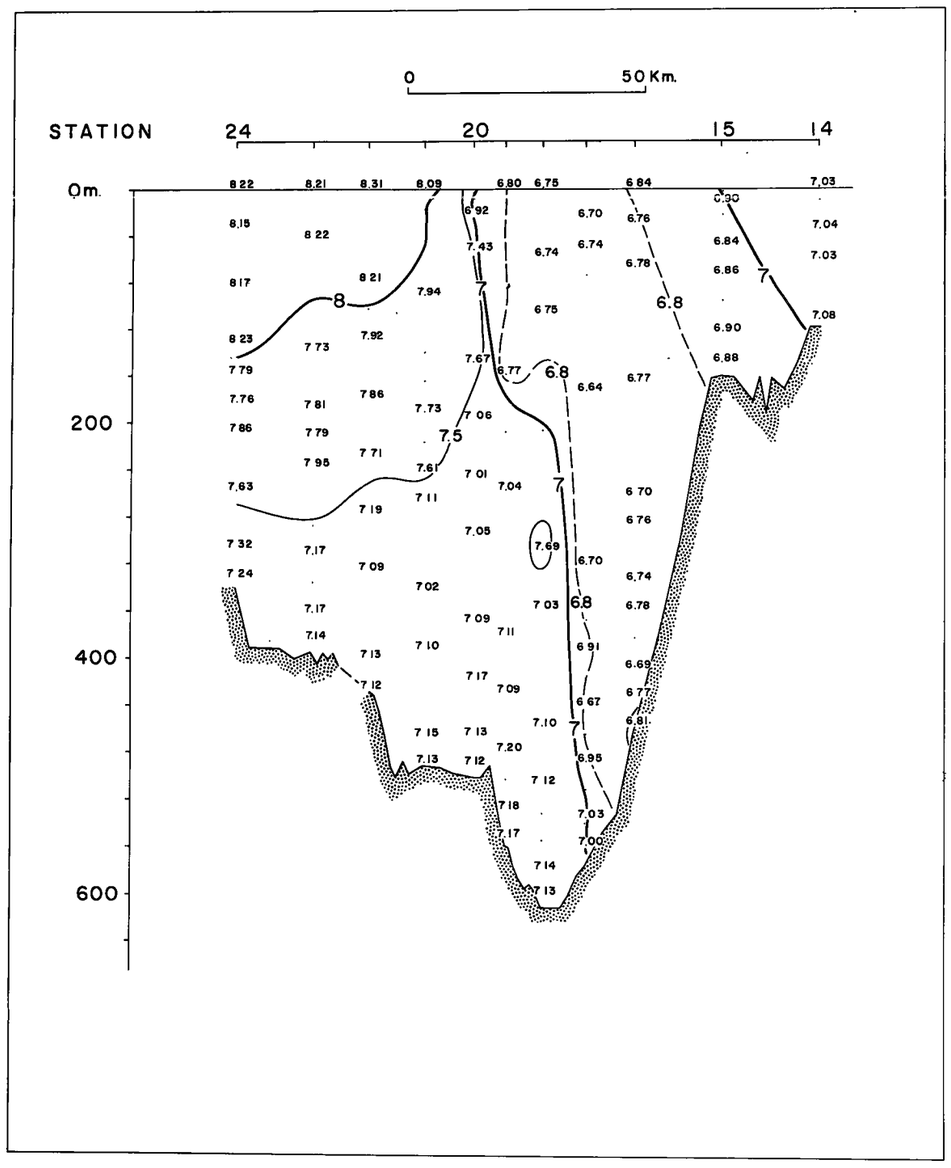
Temperature (°C)



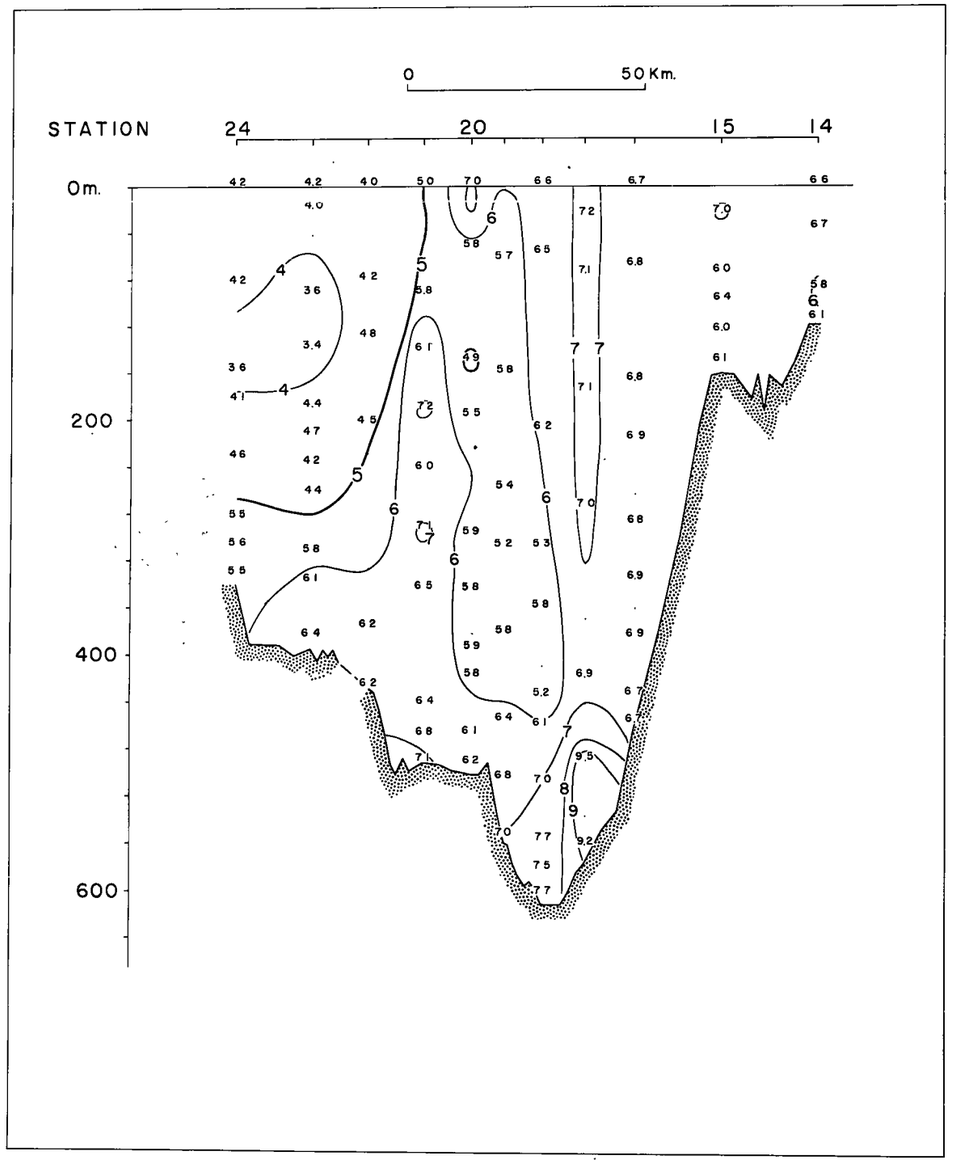
Salinity (°/₀₀)



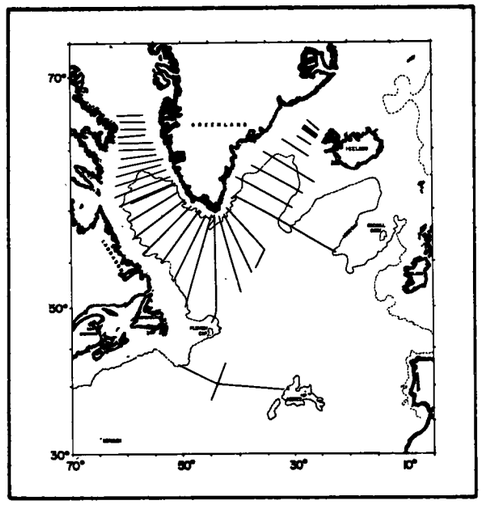
January 30 - January 31, 1967



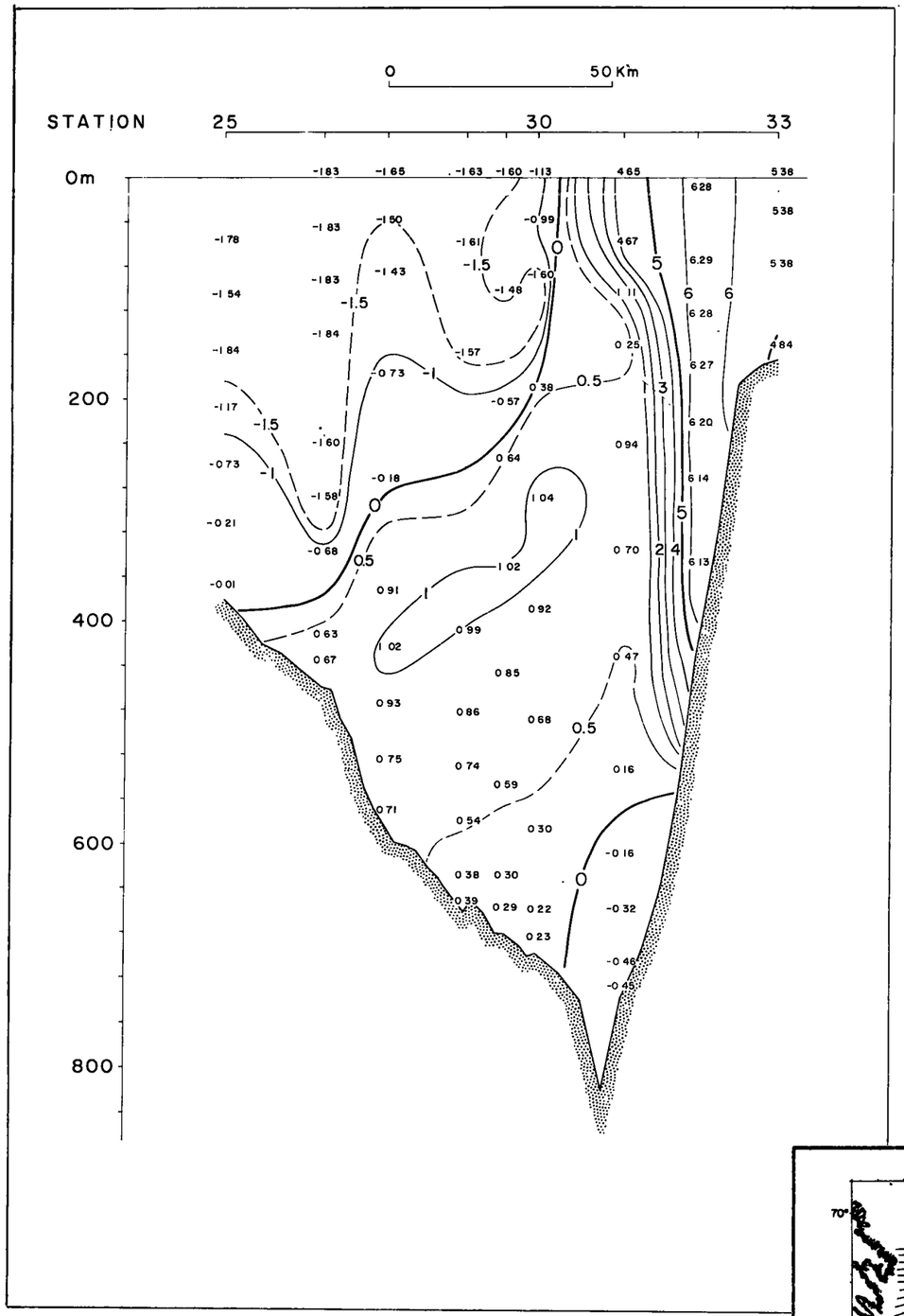
Oxygen (ml/L)



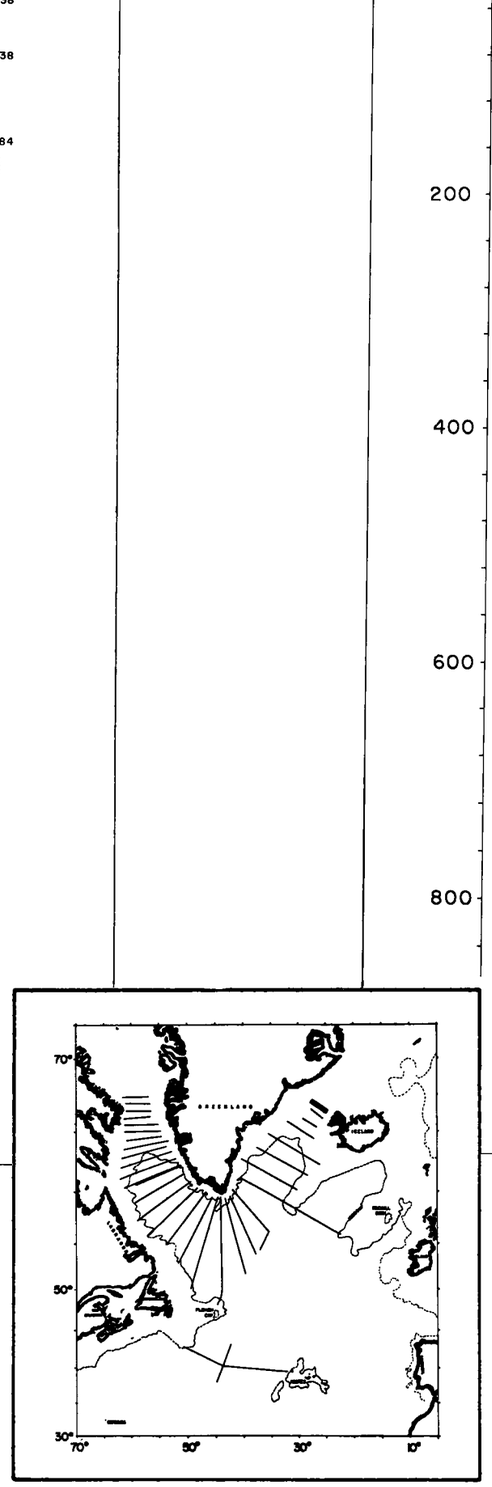
Silica (µg at/L)

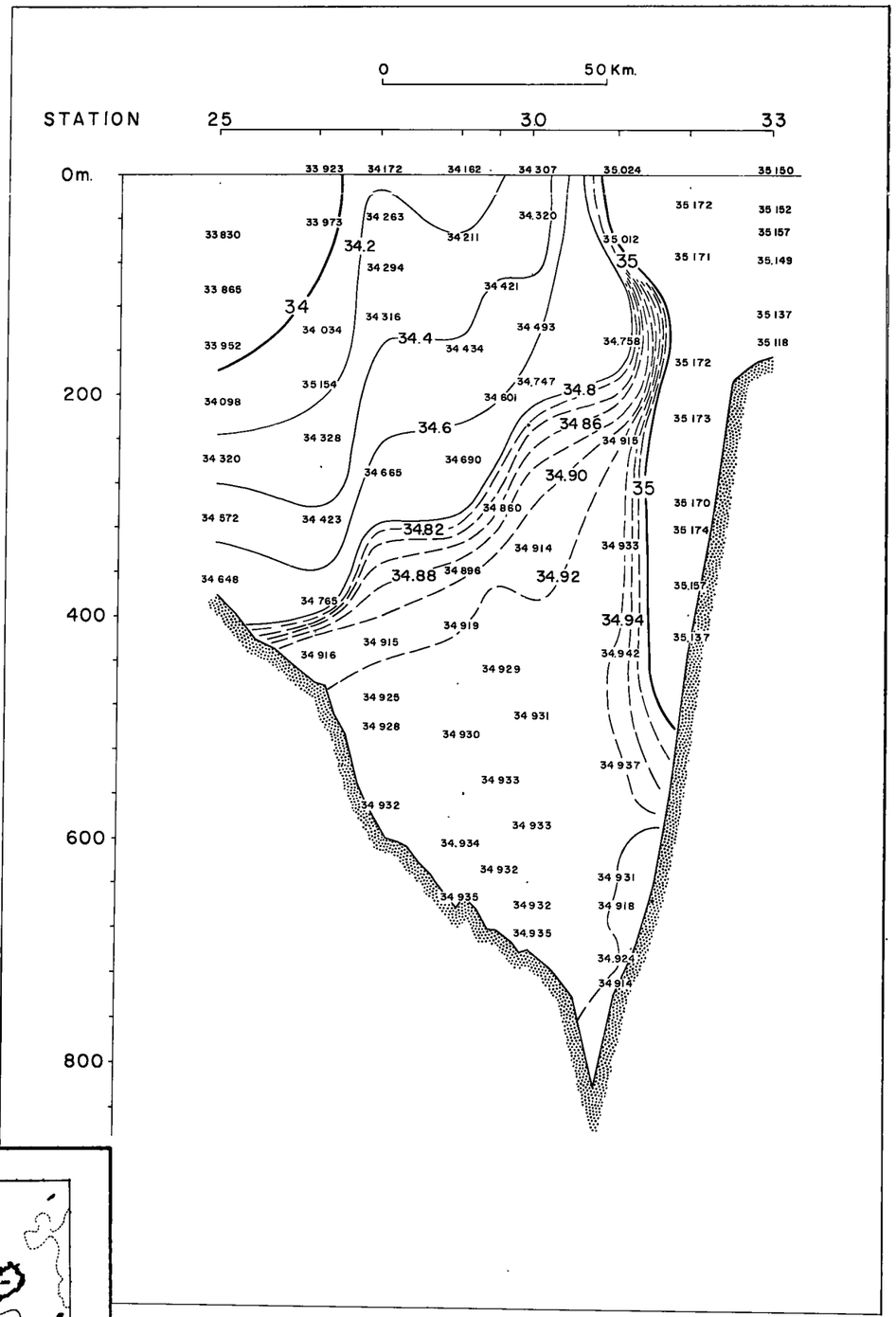


January 30 - January 31, 1967



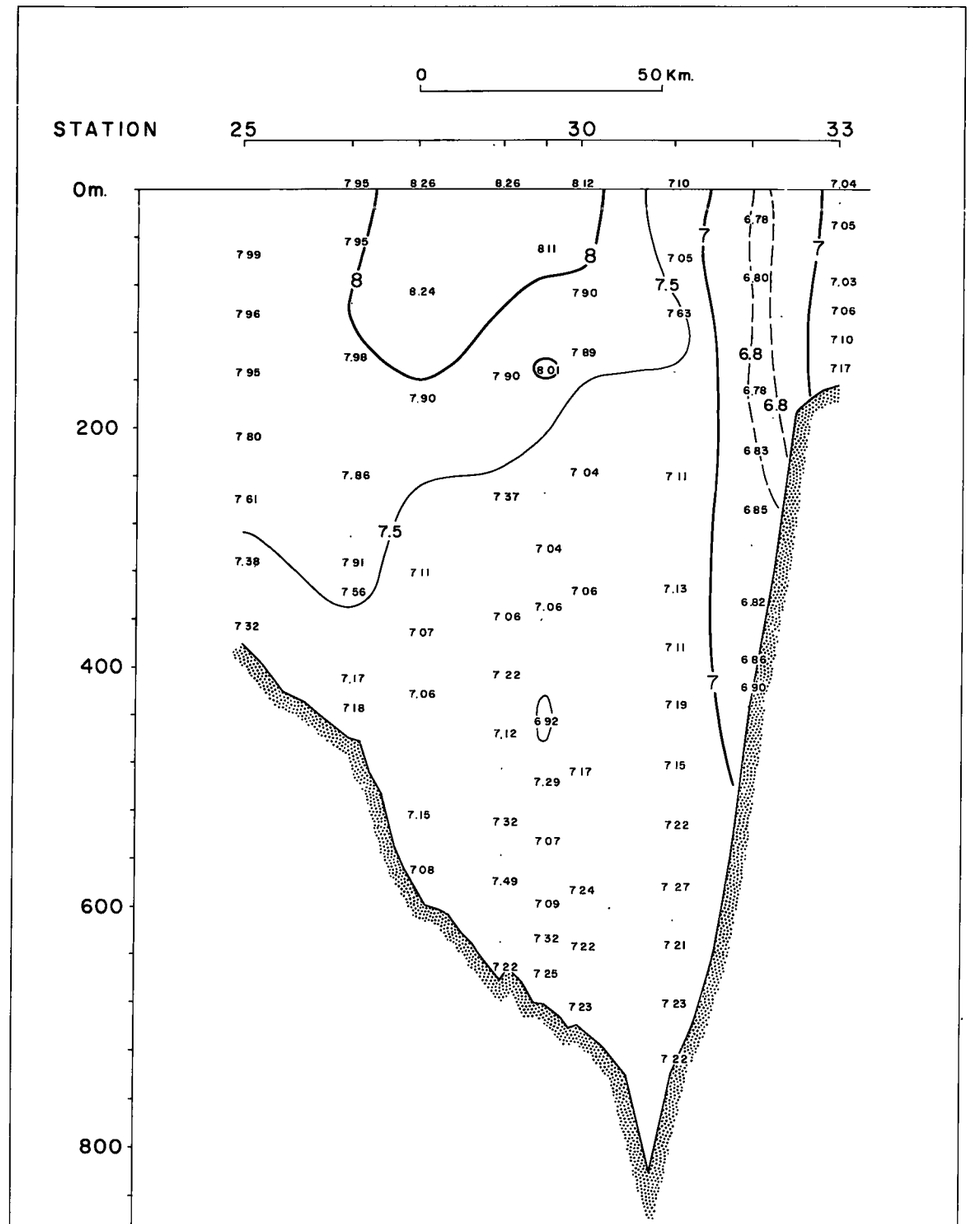
Temperature (°C)



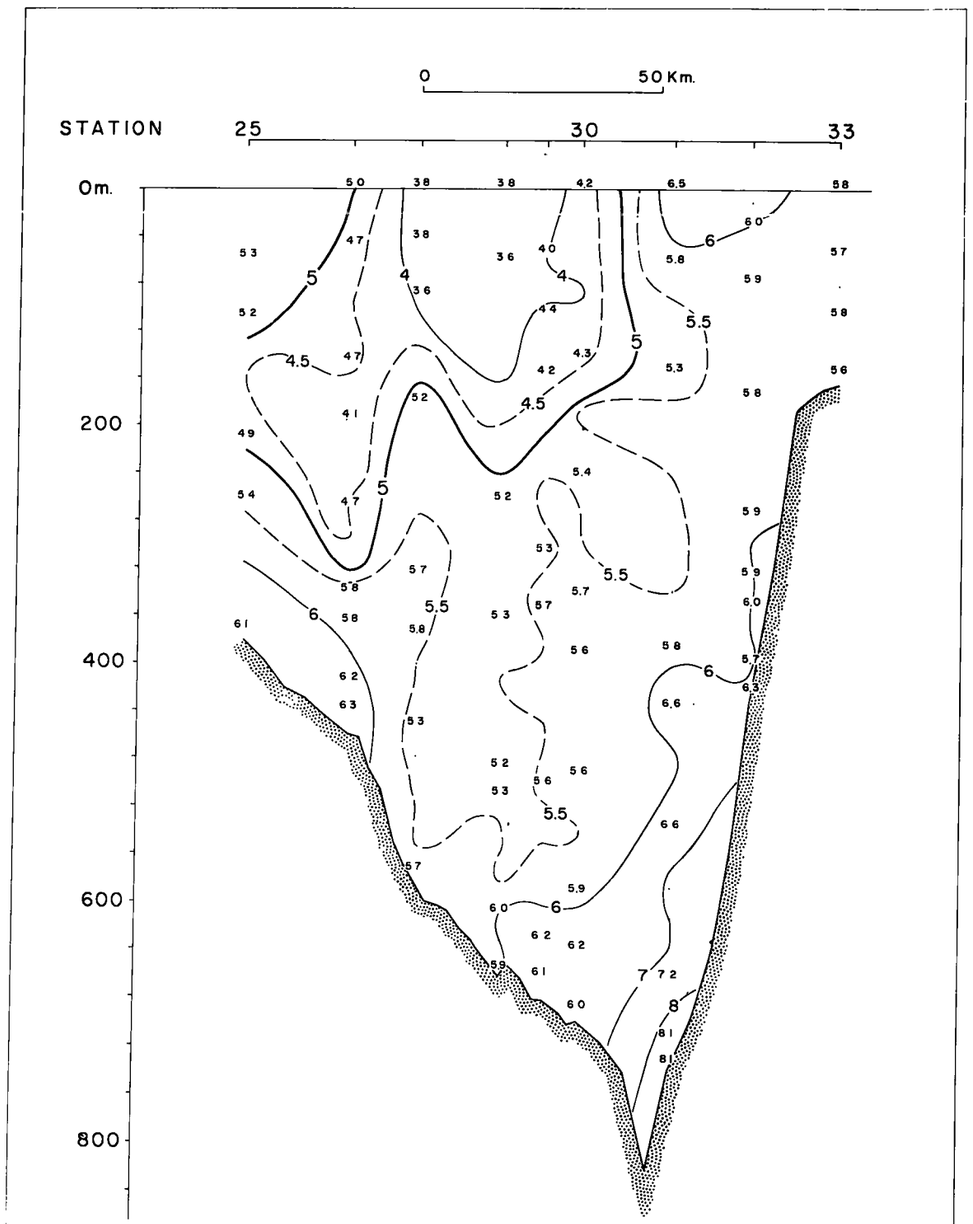


Salinity (°/₀₀)

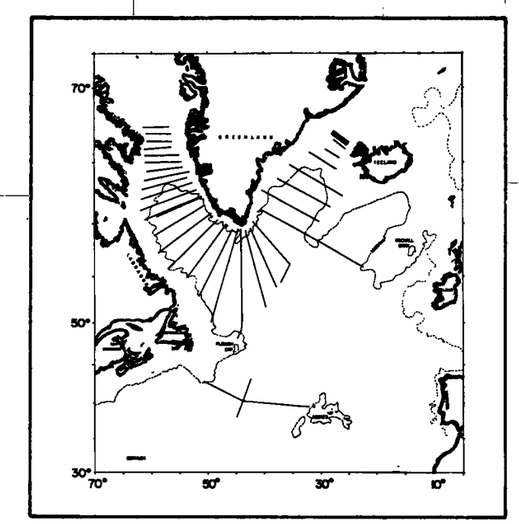
January 31 - February 1, 1967



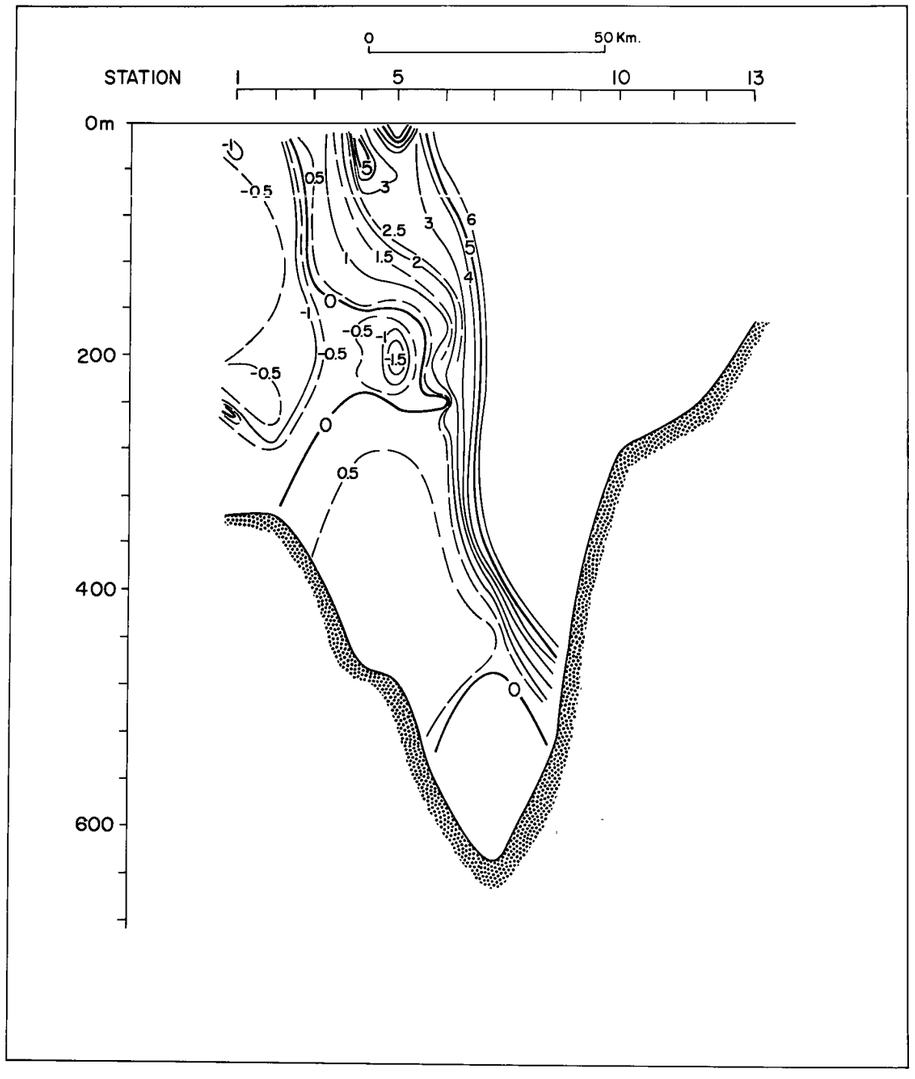
Oxygen (ml/L)



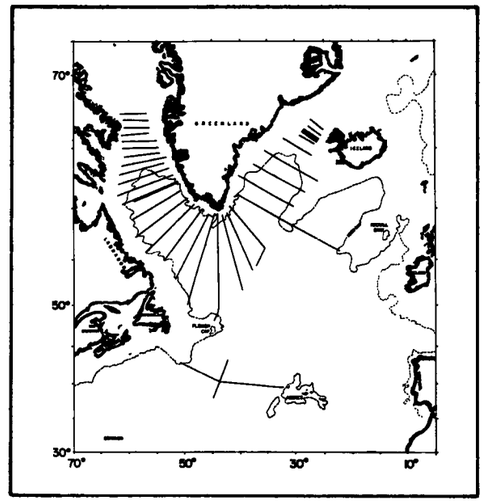
Silica (µg at/L)



January 31 - February 1, 1967

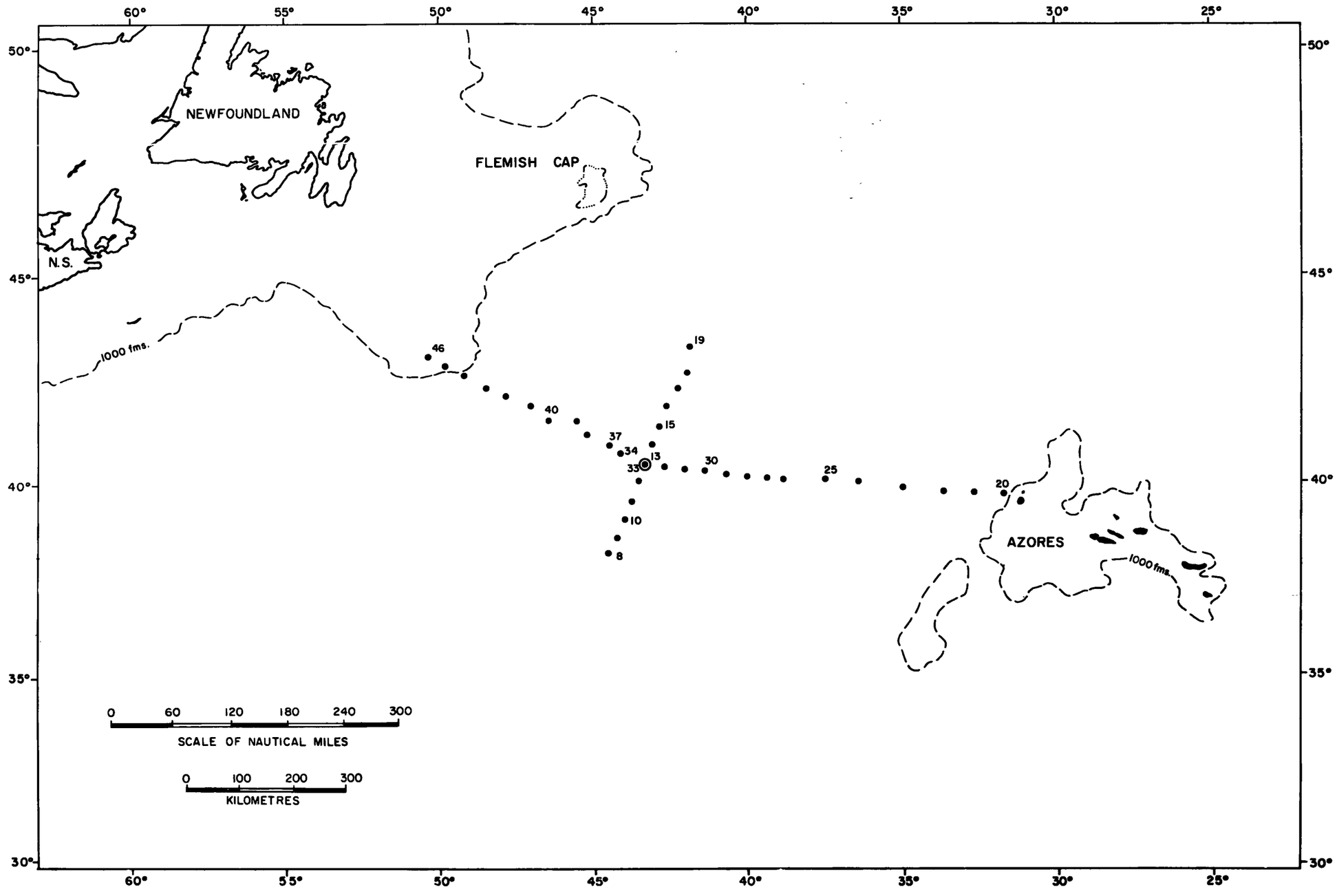


Temperature (°C)



Expendable B.T. Section

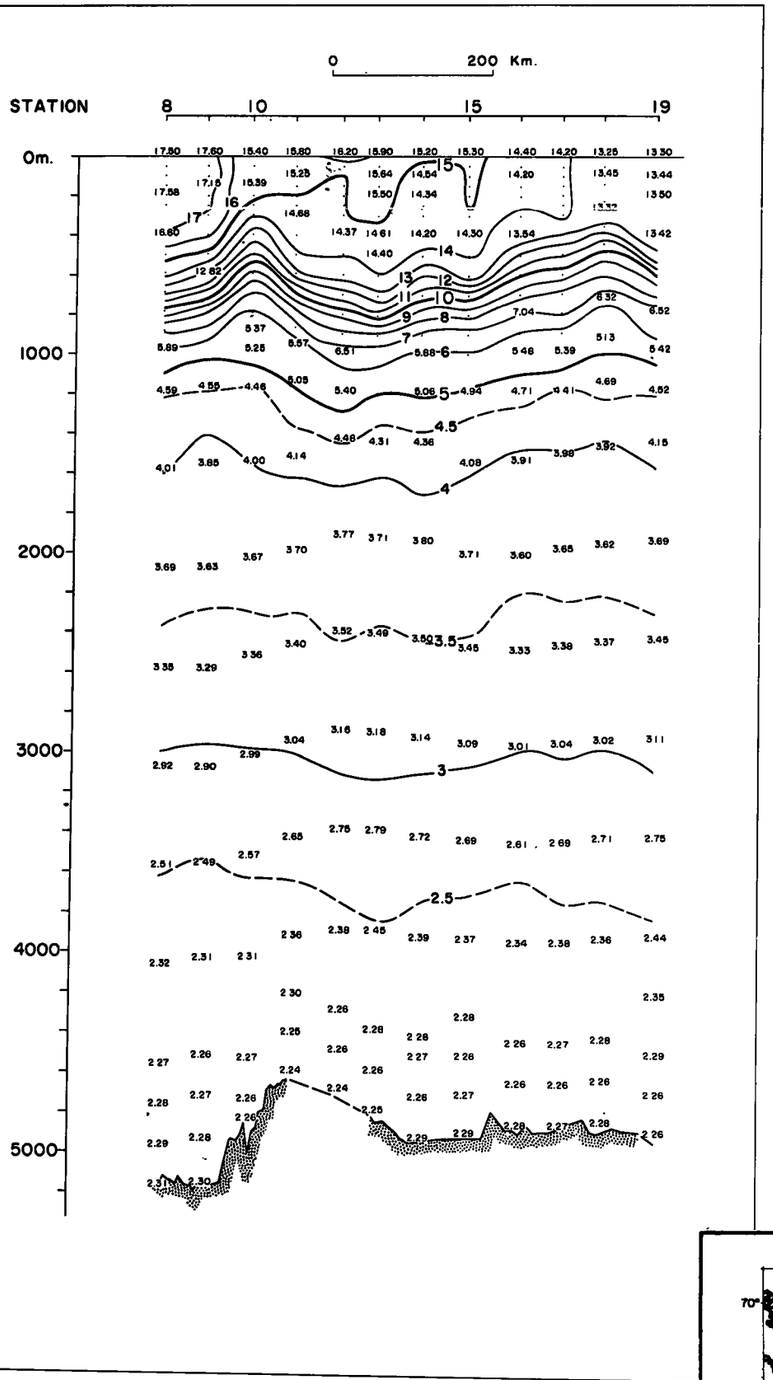
January 30, 1967.



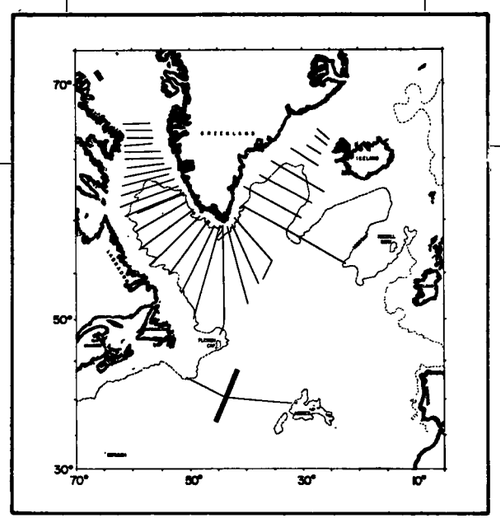
Cruise BI 0566 CSS BAFFIN

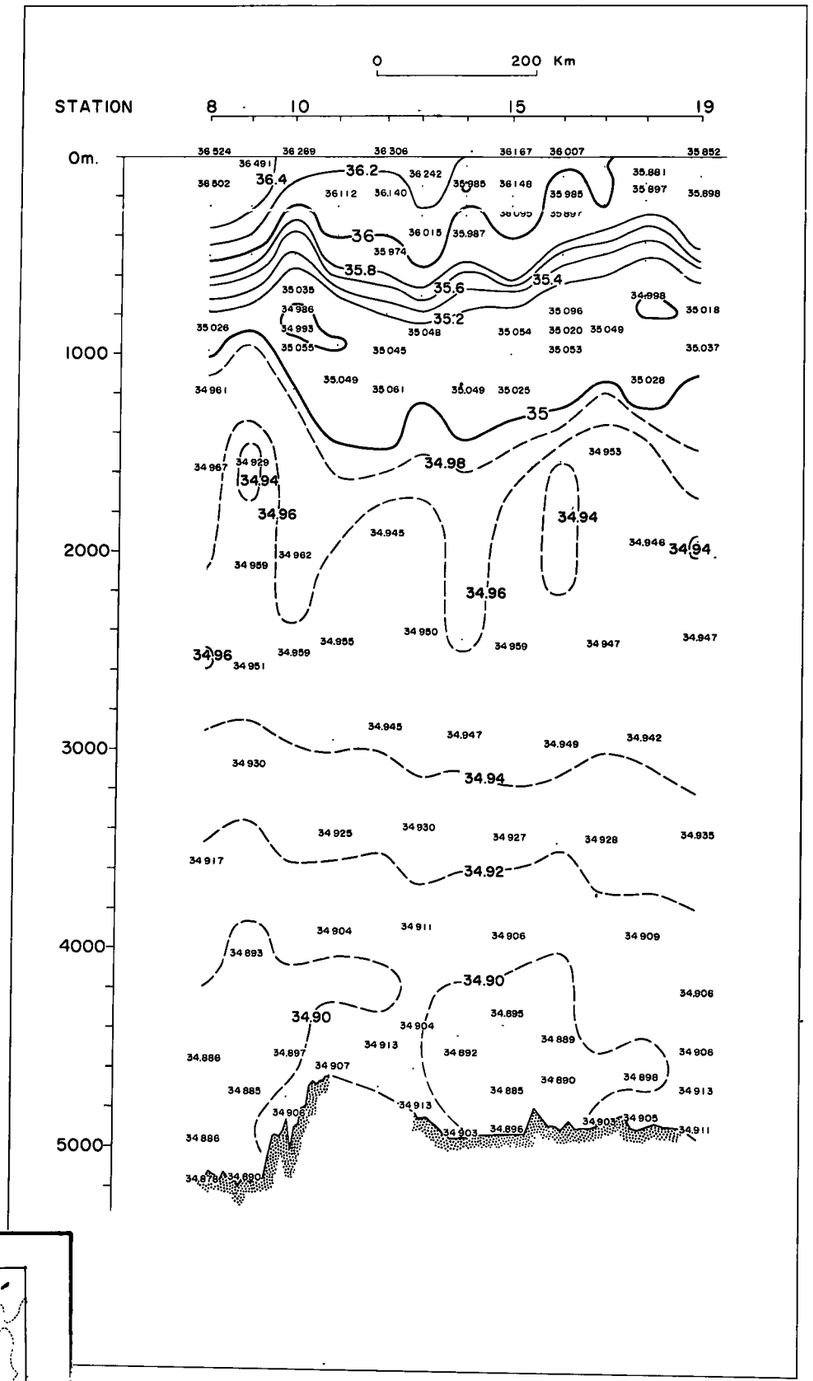
April 12 - May 5, 1966

Scientist-in-Charge — C. R. Mann



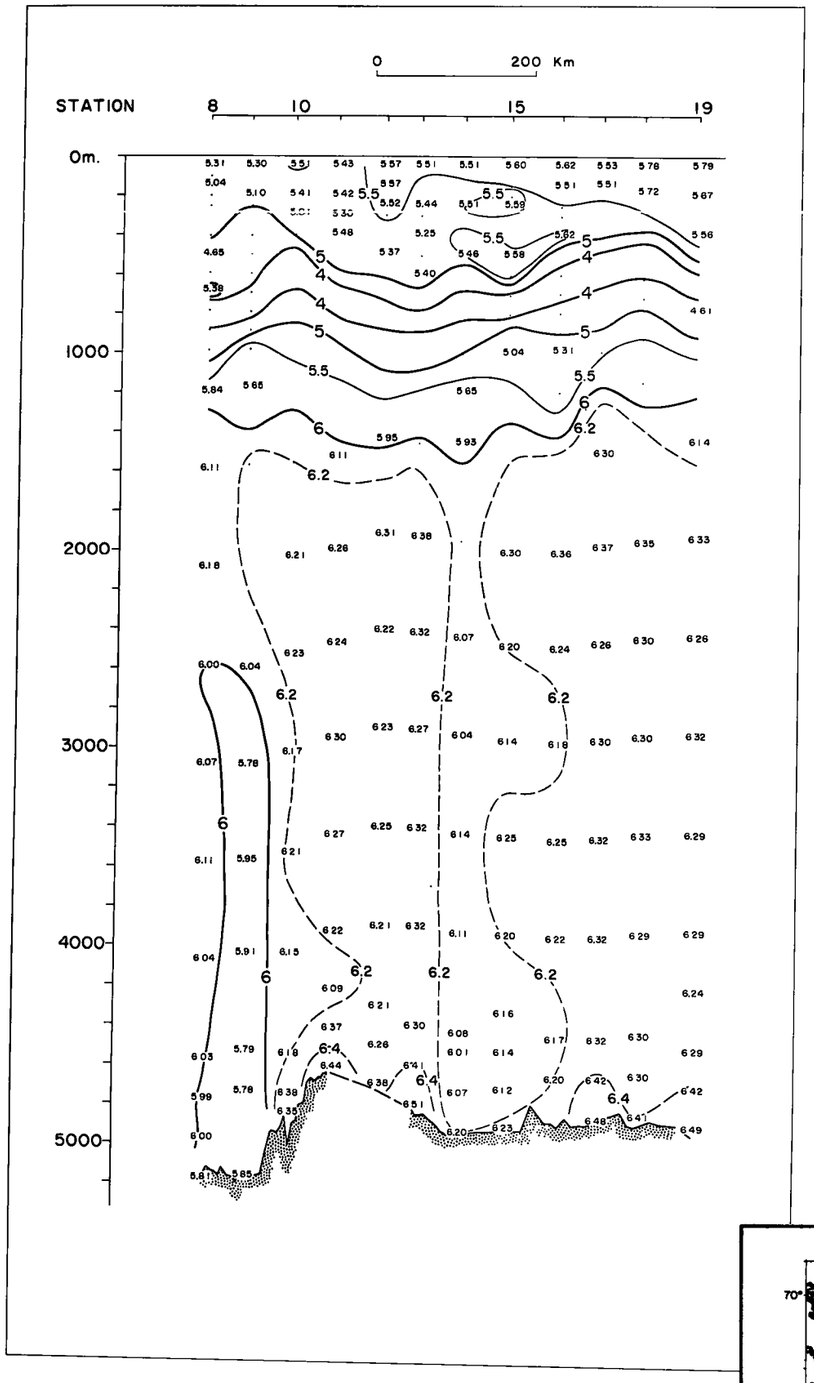
Temperature (°C)



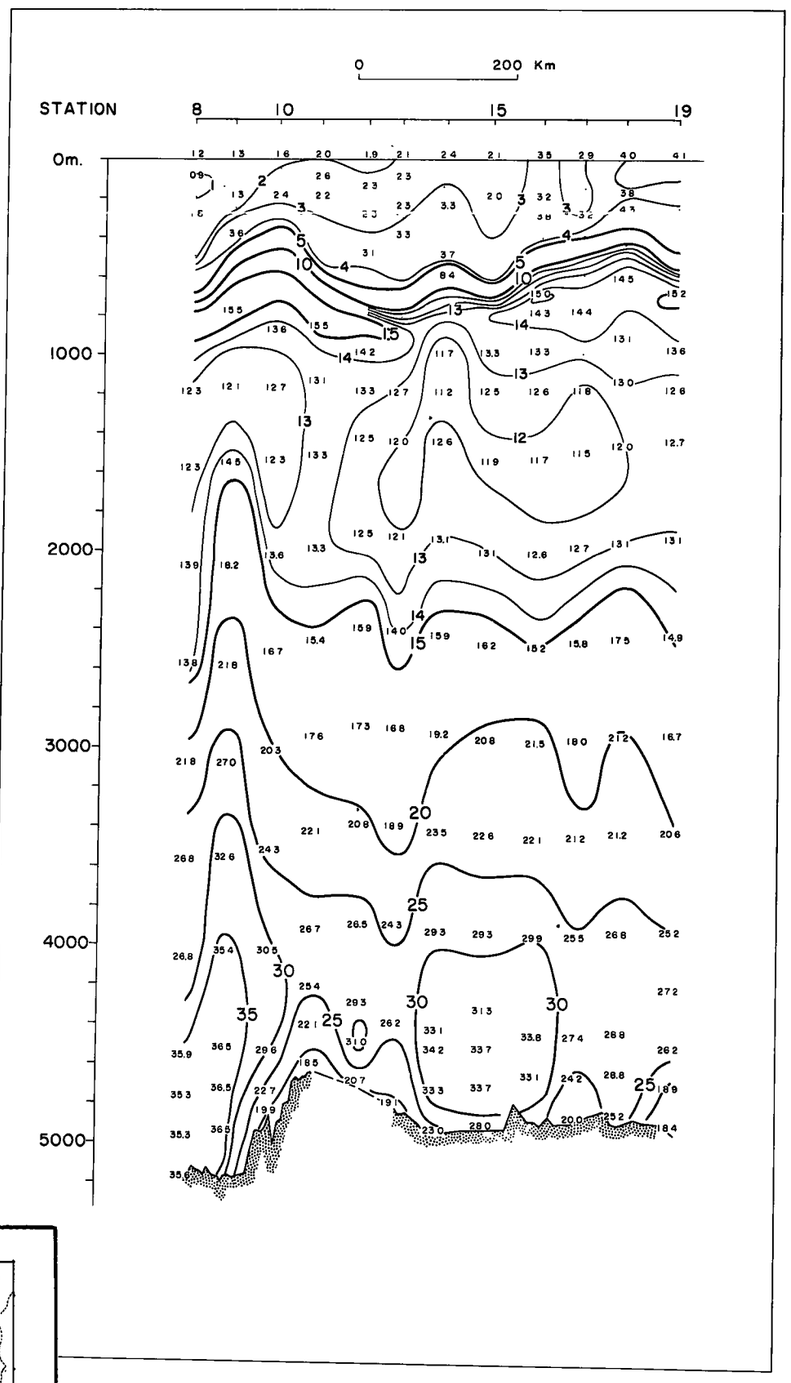


Salinity (°/oo)

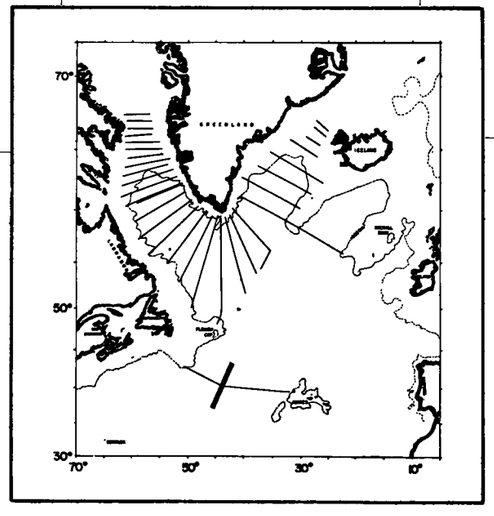
April 22 - April 25, 1966



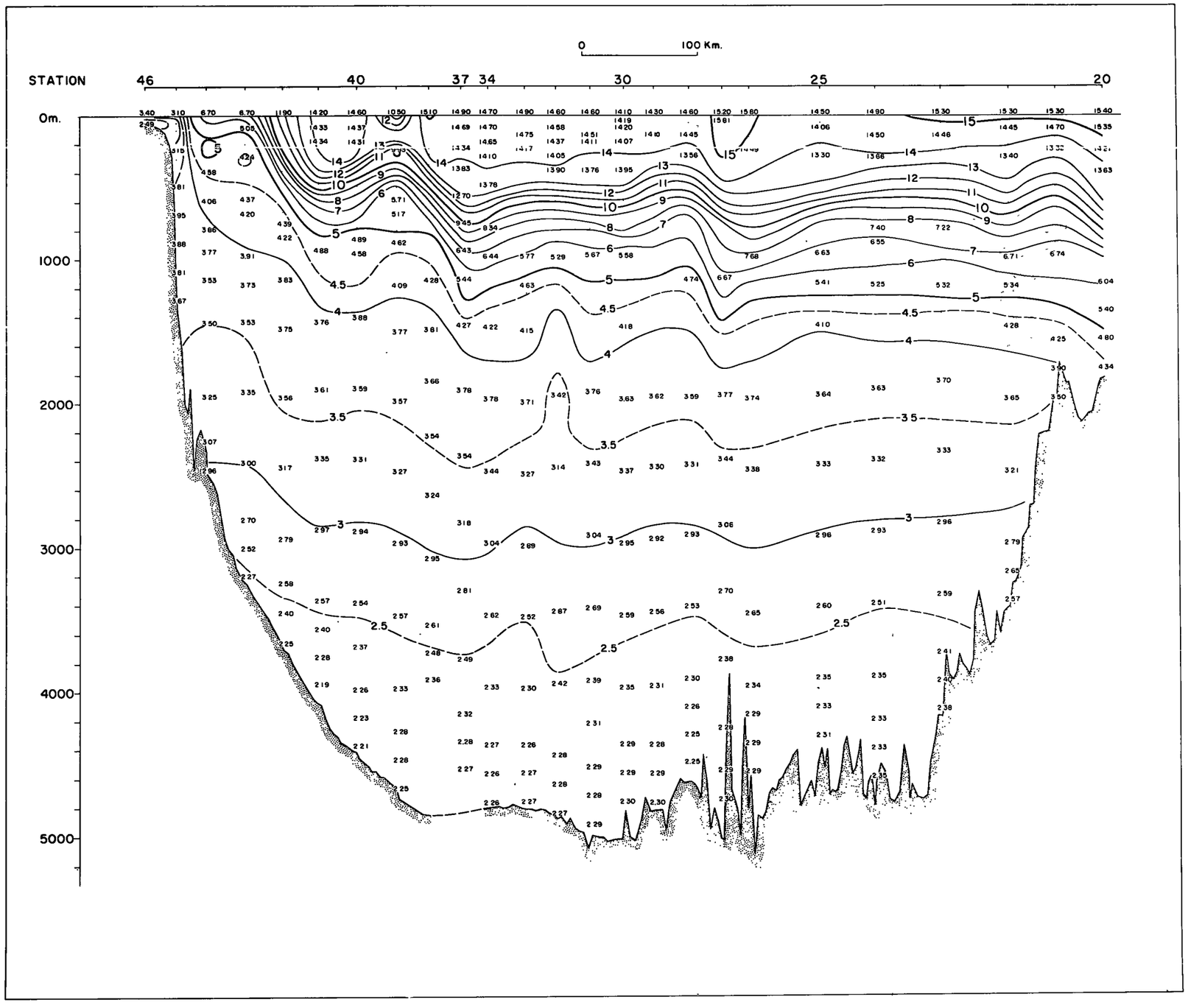
Oxygen (ml/L)



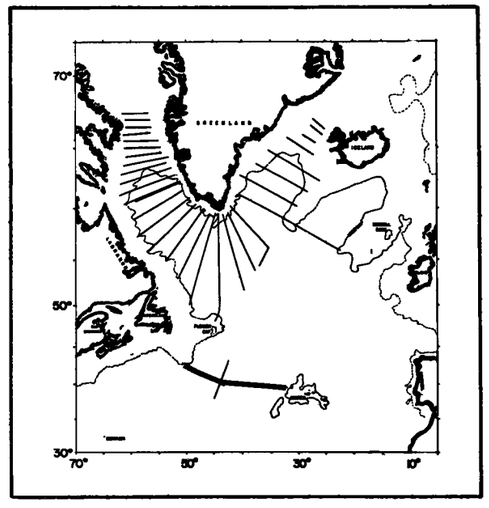
Silica (µg at/L)



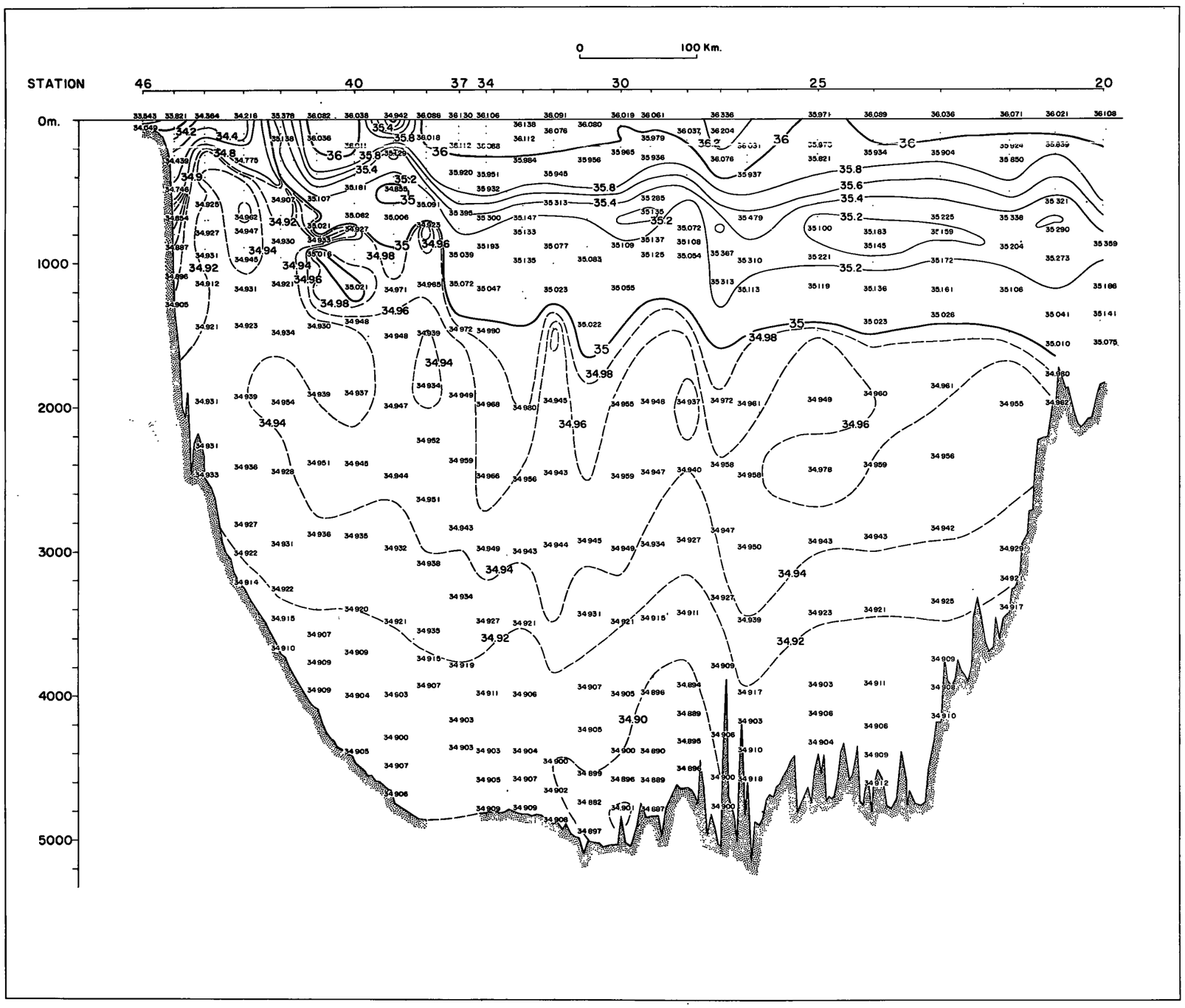
April 22 - April 25, 1966



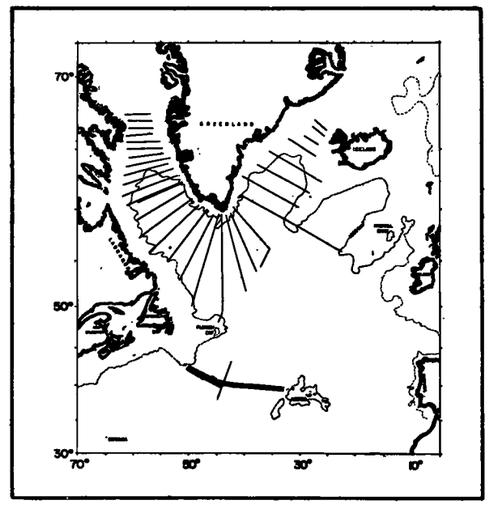
Temperature (°C)



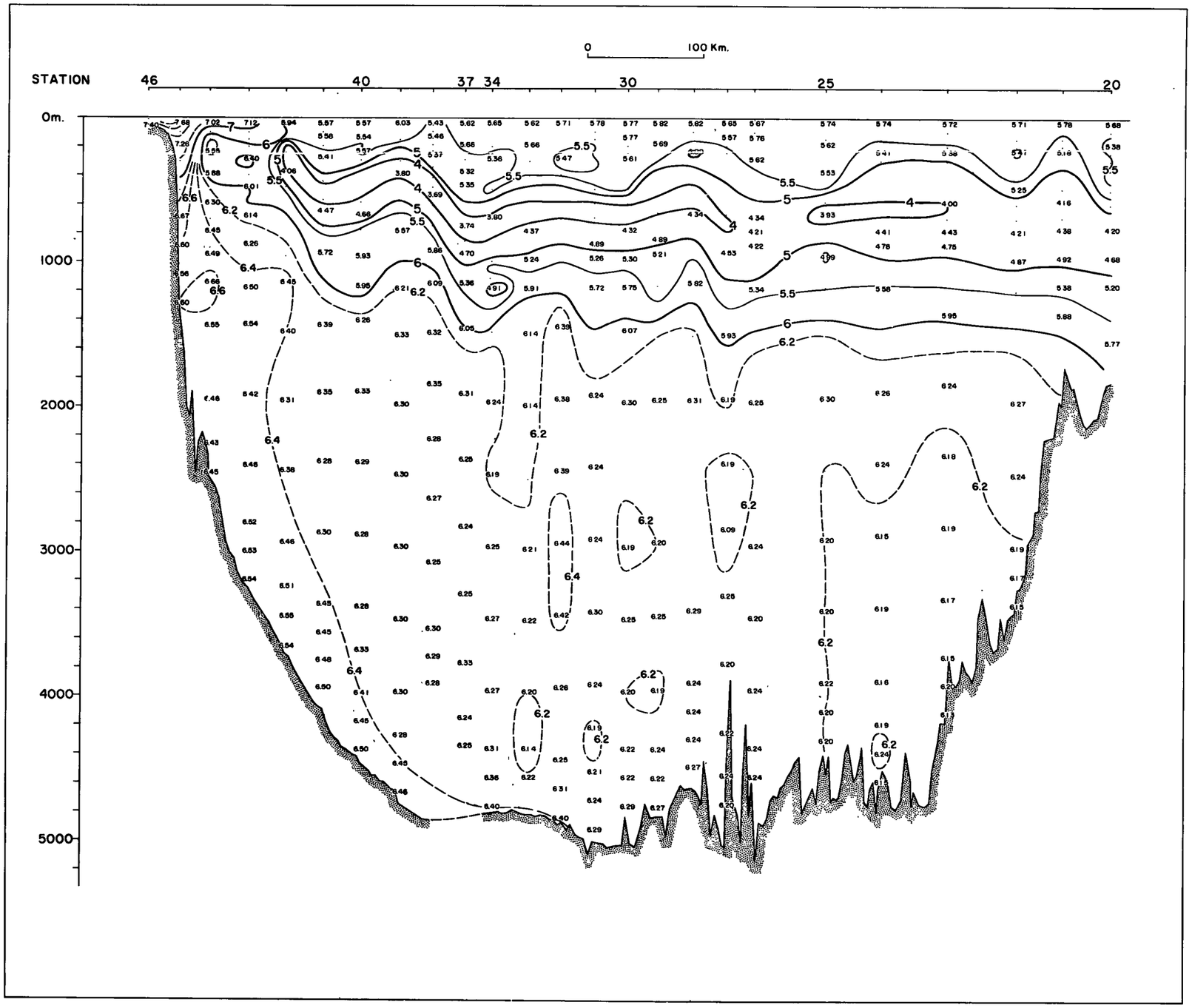
April 27 - May 4, 1966



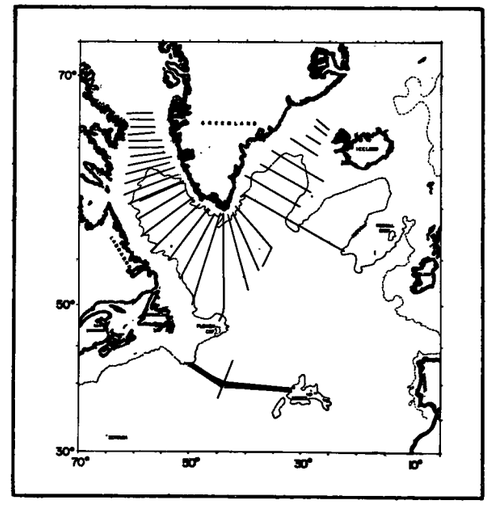
Salinity (°/₀₀)



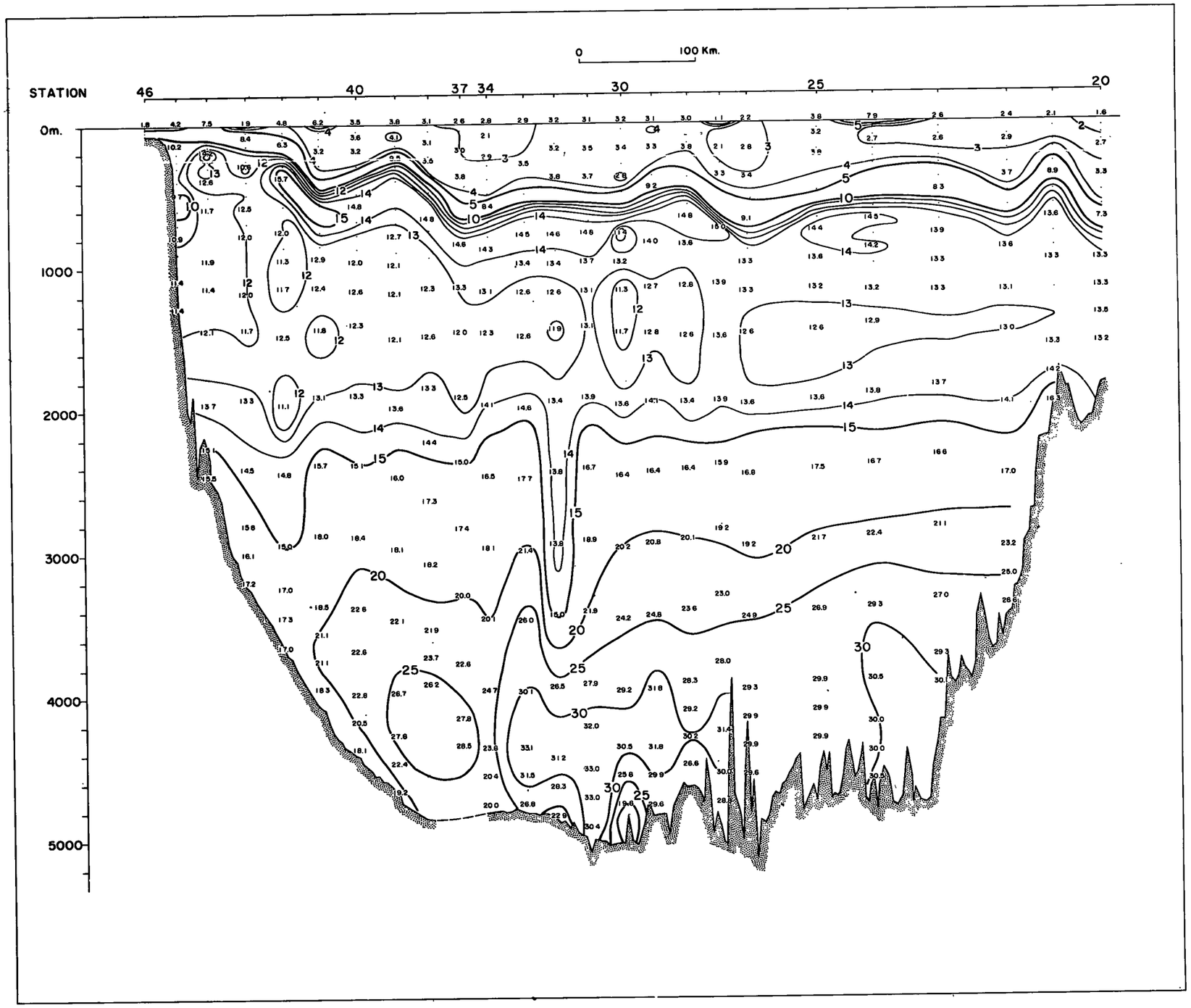
April 27 - May 4, 1966



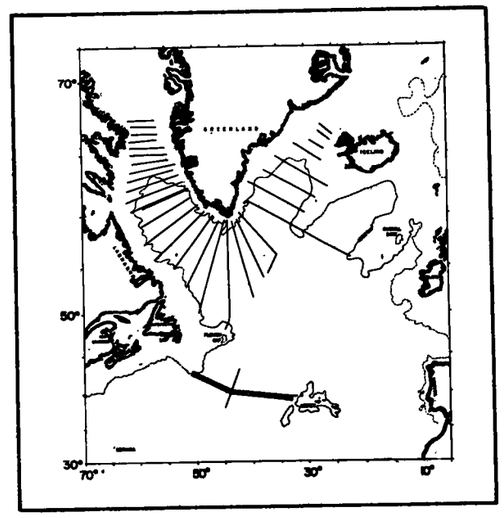
Oxygen (ml/L)



April 27 - May 4, 1966



Silica (µg at/L)



April 27 - May 4, 1966