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Satellite tracked drogue experiments in Icelandic waters 1992

by
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Introduction

In 1992 satellite drogue experiments were carried out in Icelandic waters by the Saclant Centre in La Spezia, Italy, in co-operation with the Marine Research Institute in Reykjavík. Most of the drogues were launched in the ocean area NE and E of Iceland, and will not be discussed in this paper. Three drifters were launched in the warm water on the shelf SW of Iceland (Fig. 1) in the main spawning area for Icelandic cod. From there the larvae drift with the coastal current northwards along the westcoast of Iceland and into the nursing grounds north of Iceland. From time to time larvae drift westwards into Greenland waters. The drift is variable, even drastically, from year to year and season to season as shown by 0-group investigations for cod and capelin as well as hydrographic observations. (Malmberg and Blindheim 1993, Ástthórsson et al. 1993, Magnússon and Sveinbjörnsson 1992).

The drift of the drogues will be discussed briefly and compared with bathymetry and hydrographic observations in May and August-September 1992, as well as with results of 0-group investigations in August-September 1992. Also some thoughts will be given to previous investigations on circulation in the waters in question.

Material and methods

The drogues used were WOCE/SVP Surface drifters manufactured by Clearwater Instrumentation inc. USA. The drifter consisted of a spherical surface float attached to sturdy tether terminating in a holey sock at 15 meter depth. The transmitter was set for one third duty cycle transmitting 8 hours out of every 24 in order to save battery power. The drifter was monitored by the Argos location and data collection satellite system, recording location, sea temperature, drogue presence as well as battery level.

Results

1) The first drifter (14382) was launched on April 2nd 1992. It drifted (Figs. 2,3) along the 100 m isobath around the Reykjanes Peninsula to Snæfellsnes where it circulated in the submarine valley Kolluáll marked by the 200 m depthline (May-

June). From there it continued northwards inside the 200 m isobath (July) veering to the west off the submarine valley Víkuráll (August) towards Greenland across Dohrnbank and the Storfjord depth and on to the East Greenland shelf. From there it continued southwards (September) with the cold East Greenland Current and stranded at 63°N at the end of September, almost 6 months after the launch SW of Iceland.

2) The second drifter (8632) was launched on May 26th. It followed (Figs. 4,5) a similar route as the first one around the Reykjanes Peninsula, but then it headed into Faxaflói and stranded at Akranes on June 23th or after 28 days drift.

3) The third drifter (8637) was launched on May 8th. It stranded at Garðskagi - westernmost part of Reykjanes Peninsula (Fig. 6). It was launched again at the original location on Selvogsbanki on June 20th. This time it started on a southerly course but on June the 30th it drifted northwards again (Figs. 6,7) along the same path as the previous drifters. It circulated in the entrence to Faxaflói (August) but then it headed northwards to Snæfellsnes (September) and further north to the Vestfjord Peninsula (October). From there it continued westwards to Greenland with a last recorded position on Dohrnbank (trapped in ice?) on November 14th, after 41/2 months from its southernmost position on Selvogsbanki.

Discussion

The three drifters launched on Selvogsbanki in 1992 followed in general the bottom topography (Fig. 1) as well as the general circulation in the study area, both as regards coastal currents and slope currents (Figs. 8,9). Estimated mean velocities are in accordance with previous estimates, being 3-5 n.m./24 hours in the coastal current south and west of Iceland and above 10 n.m./24 hours farther off and in the East Greenland Current.

The observed flow westwards to Greenland and not into North Icelandic waters is in accordance with previous drift bottle experiments, when most of the bottles went out away from the coast off the Vestfjord area (Hermann and Thomsen 1946). This area has been called a "deficit area" for living conditions in Icelandic waters (Einarsson 1954). This seems not to be in agreement with the observed flow of warm water into North Icelandic waters expressed by temperatures above 4-6°C as observed in May 1992 and again in August-September 1992 (Figs. 10,11), but also westwards to Greenland in August 1992. Distribution of 0-group cod in August-September 1992 also reveal a relation to the warm near-shore flow (Fig. 12) and that of 0-group capelin to the farther off-shore slope current along the boundary between warm and cold water (Fig. 13). The surface temperature conditions are furthermore shown in a IR imaginary from August 7th 1992 (Fig. 14), showing a slight intrusion of cold water along the shelf edge off the Vestfjord Peninsula, besides a distinct one off Húnaflói.

The drift of the drogues, being at only 15 m depth, seem to reveal a surface drift of different direction, to e.g. bottom currents off the Vestfjord Peninsula estimated by sea-bed drifters which reveal a flow on the shelf and at the shelfbrake NE-wards and into North Icelandic waters (Valdimarsson 1986). An experiment with different depths of drogues may give an answere to this question. An important factor, i.e.

winds, must also be looked at. The overall drift of the drogues though seems to be coupled to hydrographic conditions (bathymetry and circulation), but a detailed and intensive study of the two seperated current bands, the shallow coastal current, including the near-shore conditions of run-off (Ólafsson et al. 1993), and the flow along the slope, is still needed.

Further studies with satellite tracked drogues are planned in Icelandic waters as it is hoped that they will give valuable information on the drift of larvae from spawning to nursary grounds during their pelagic stage.

Acknowledgement

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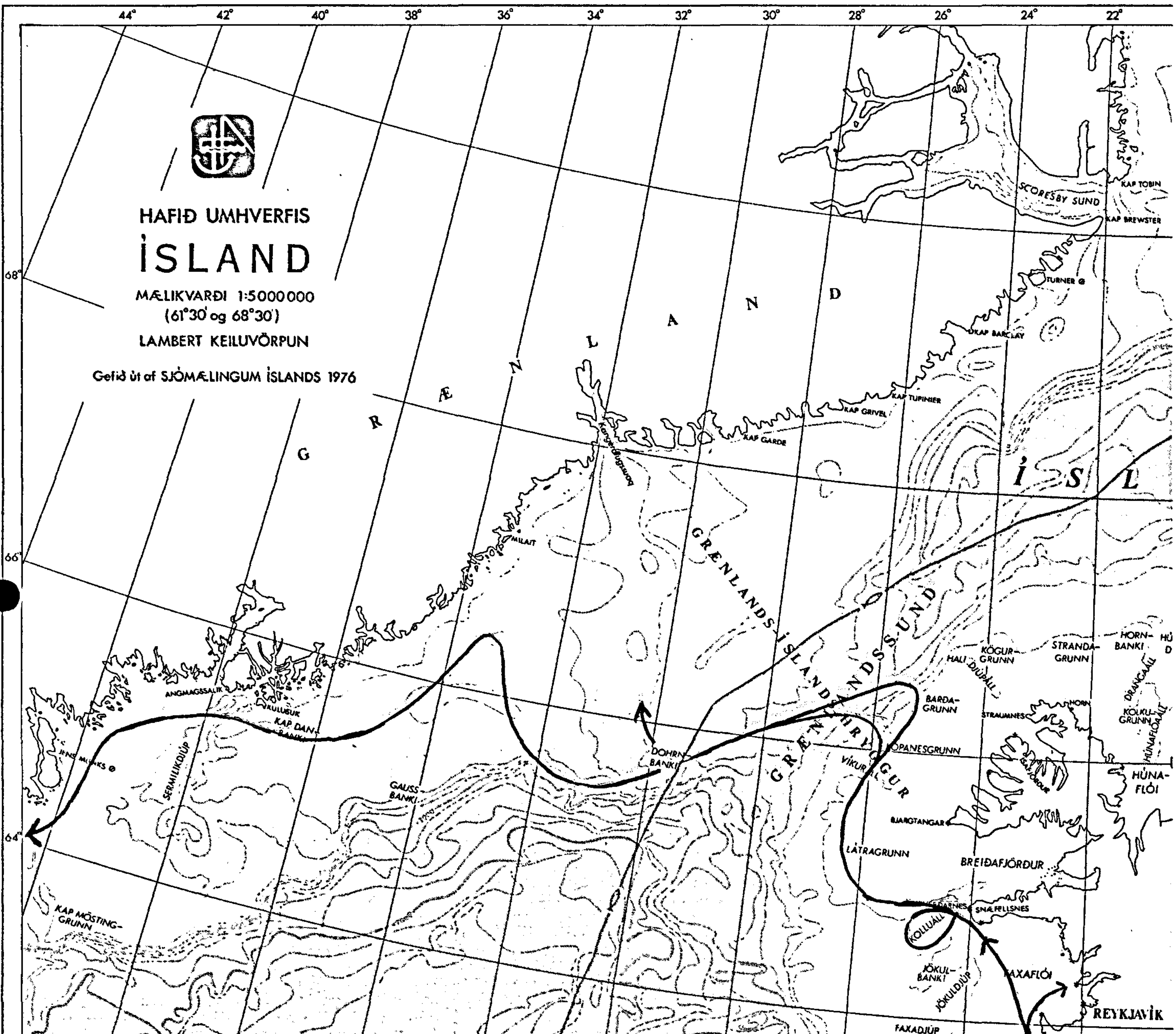
Fig. 1. Location of launch position, bathymetry and names in the survey area and main drift of satillite tracked drogues in Icelandic waters in 1992.


HAFIÐ UMHVERFIS
ÍSLAND
MÆLIKVARÐI 1:5000000
(61°30' og 68°30')
LAMBERT KEILUVÖRPUN
Gefið út af SJÓMÆLINGUM ÍSLANDS 1976
GRÆNLAND
ÍSL
GRÆNLANDSHAF
ATLA
GRÆNLANDS-ÍSLANDSSUND
GRÆNLANDSHRYGGUR
REYKJANESHRYGGUR
SCORESBY SUND
KAP TOBIN
KAP BREWSTER
TURNER Ø
KAP BARCLAY
KAP TUPINIER
KAP GRIVEL
KAP GARDE
MILAIT
ANGMAGSSALIK
KULUSUK
KAP DAN
JENS MUNKS Ø
SERMILIKDJÚP
GAUSS BANKI
DOHRN BANKI
KAP MÖSTING GRUNN
ICE CAN
KÖGUR-GRUNN
STRANDA-GRUNN
HORN-BANKI
HALI
DJÚPÁLL
BARÐA-GRUNN
STRAUMNES
HORN
KOLKU-GRUNN
DRANGÁLL
HÚNAFLÓAÁLL
HÚNA-FLÓI
KÓPANESGRUNN
VÍKURÁLL
BJARGTANGAR
LÁTRAGRUNN
BREIÐAFJÖRÐUR
SNÆFELLSNES
KOLLUÁLL
JÖKUL-BANKI
JÖKULDJÚP
FAXAFLÓI
REYKJAVÍK
FAXADJÚP
ELDEYJAR-BANKI
FAXA-BANKI
REYKJANES
ELDEY
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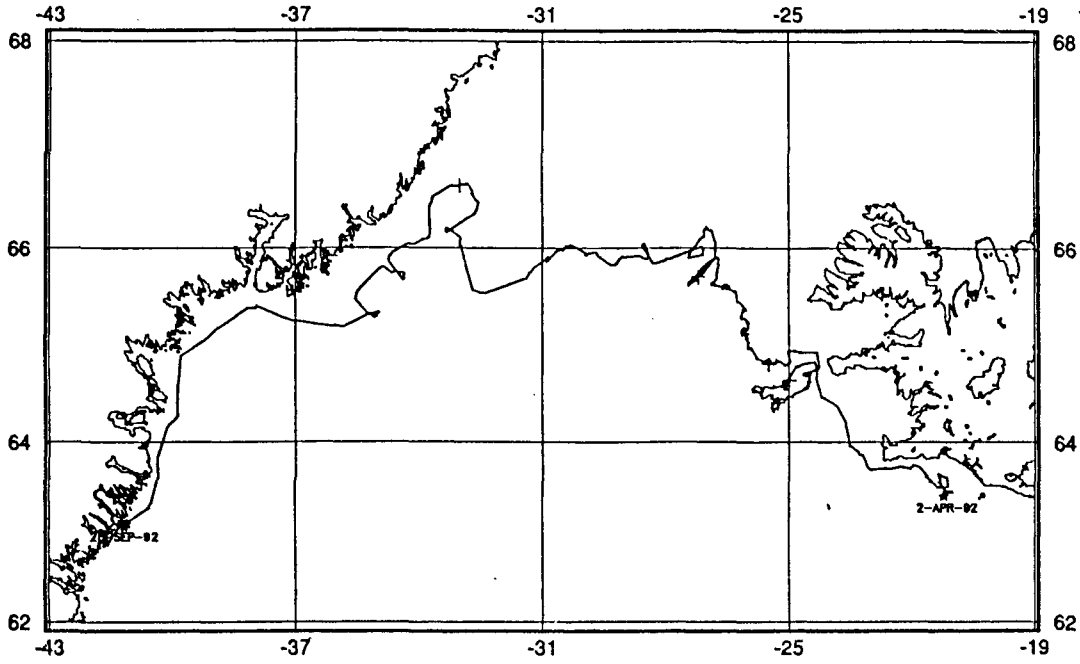


Fig. 2. Drift of drogue 14382 April-Sept. 1992.

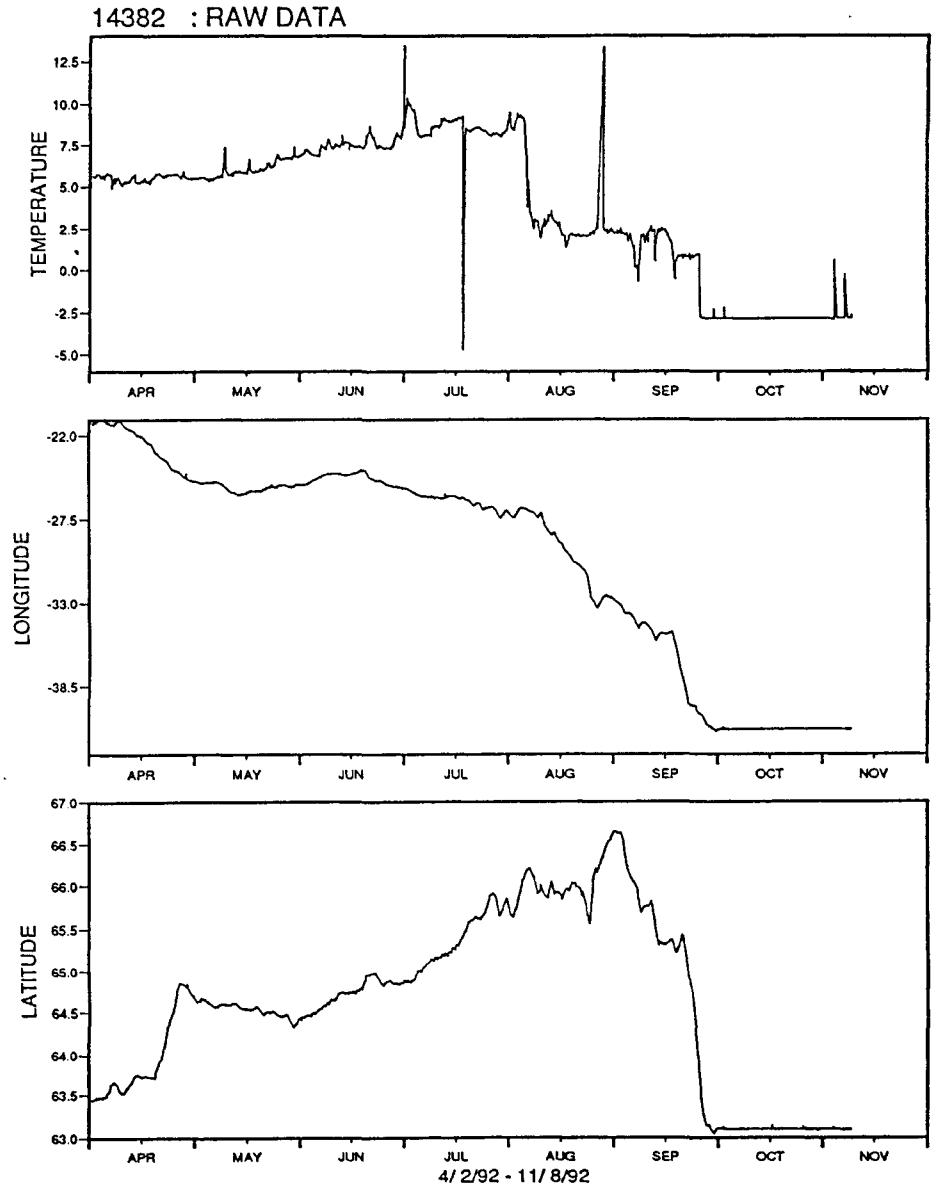


Fig. 3. Temperature and positions of drogue 14382.

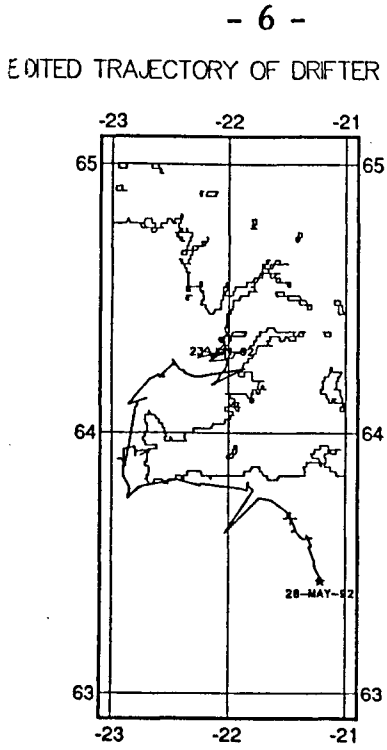


Fig. 4. Drift of drogue 8632 May-June 1992.

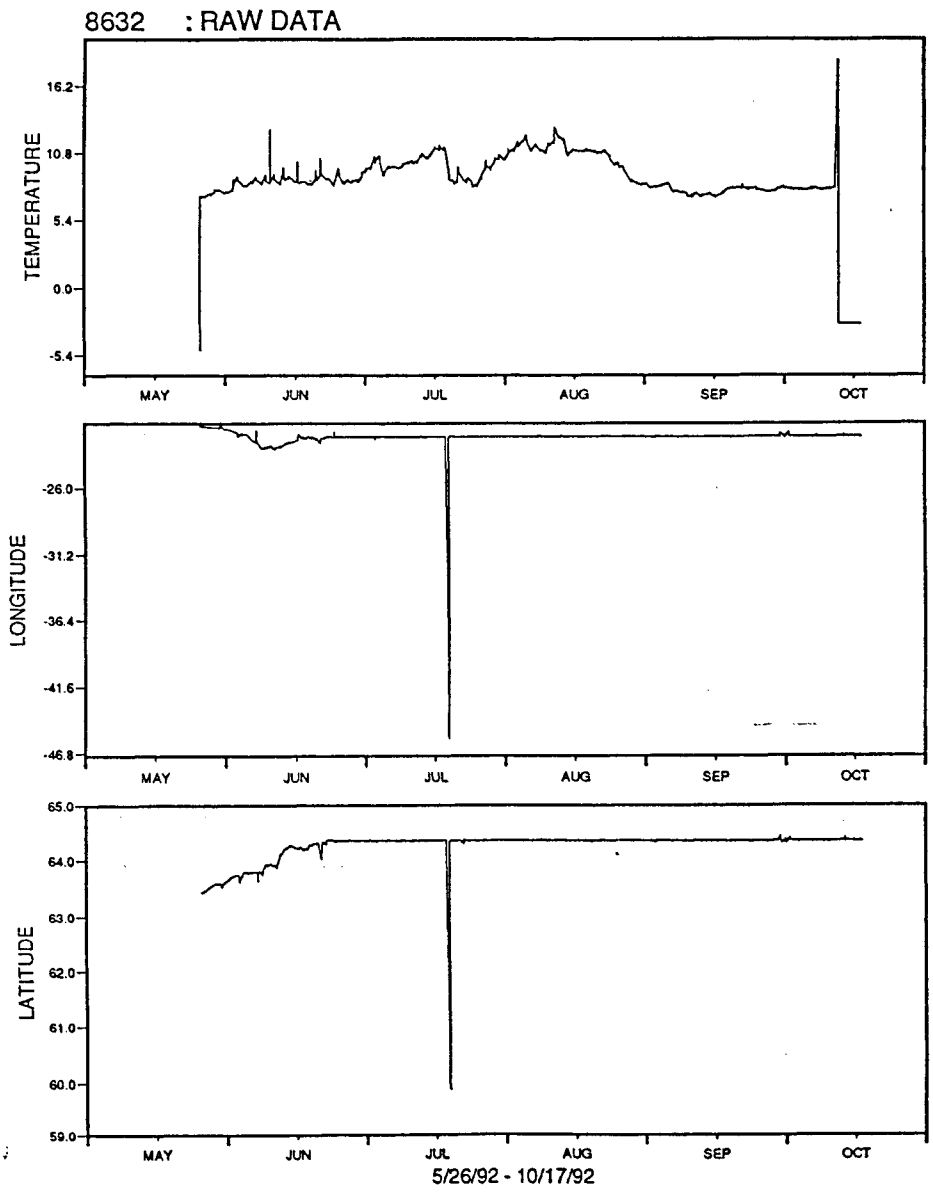


Fig. 5. Temperature and positions of drogue 8632.

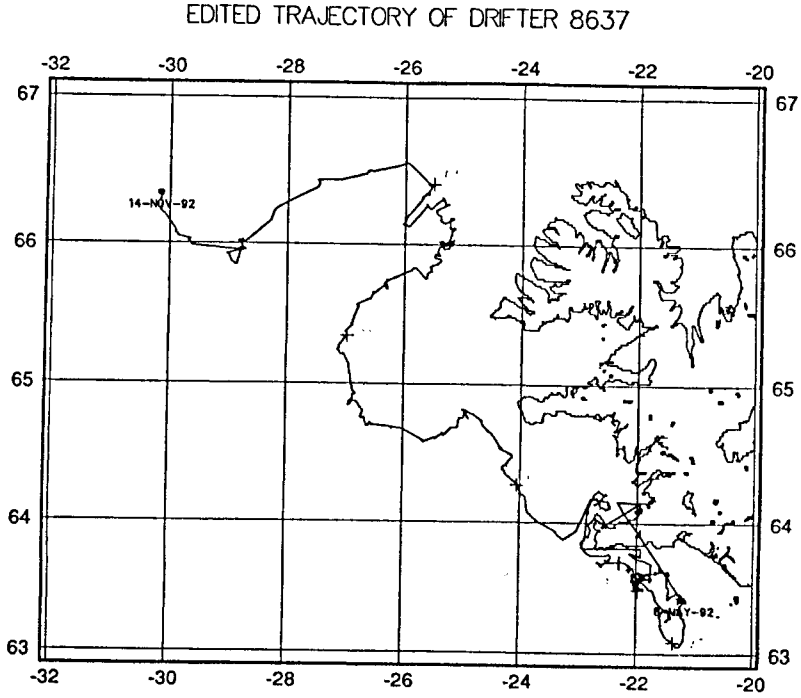


Fig. 6. Drift of drogue 8637 May-Nov. 1992.

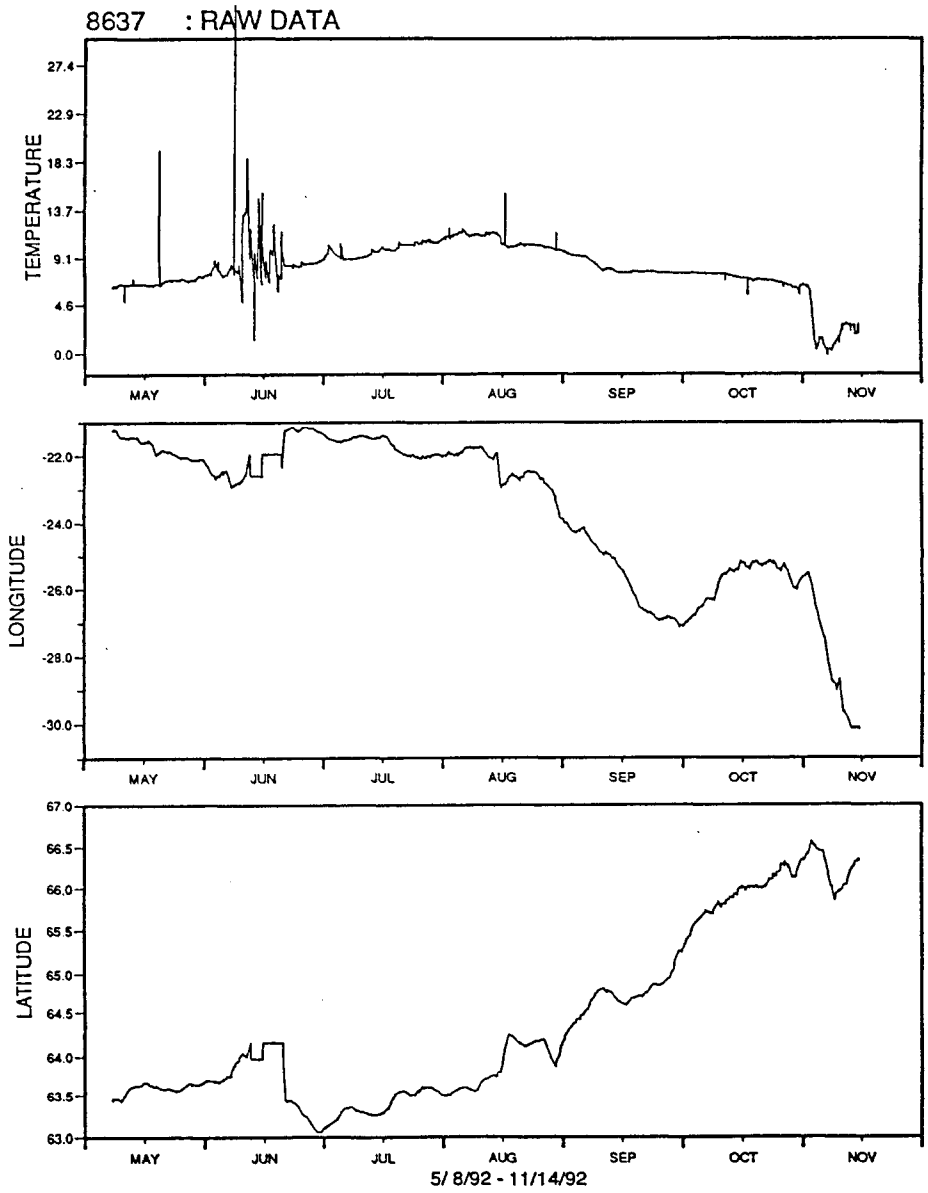


Fig. 7. Temperature and positions of drogue 8637.

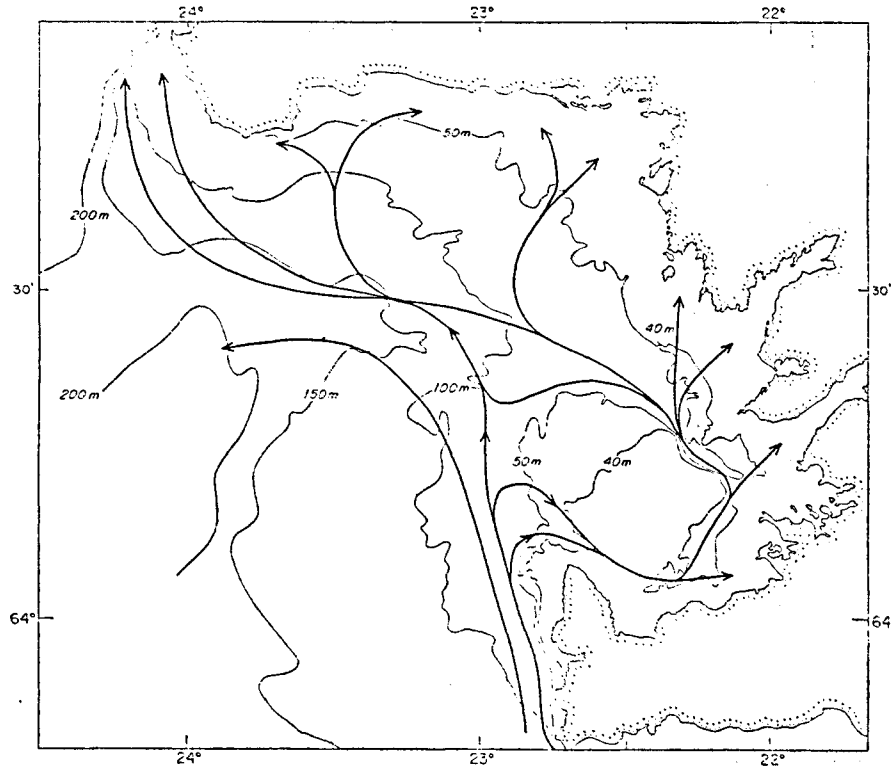


Fig. 8. General circulation in Faxaflói during summer (Malmberg 1968).

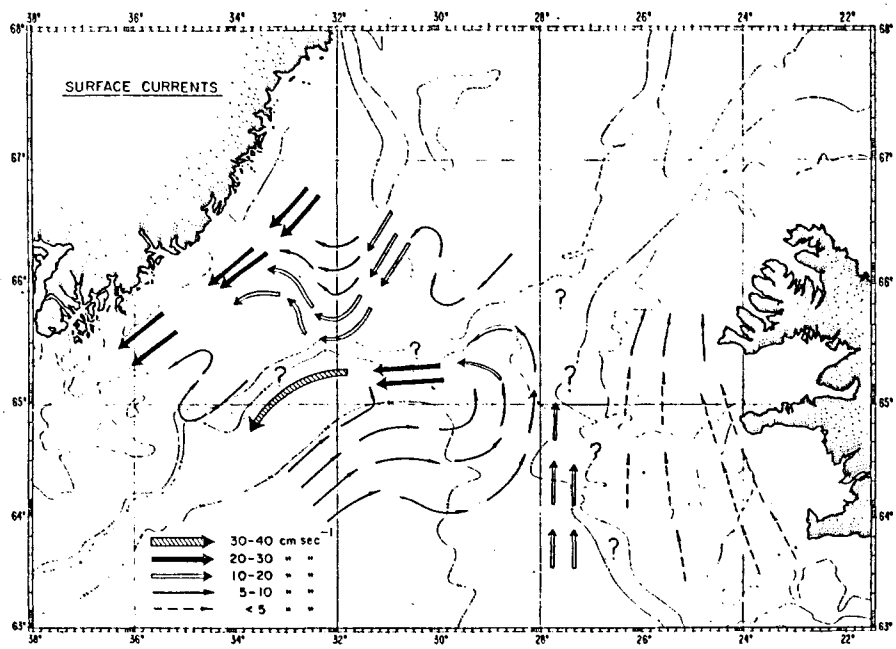


Fig. 9. Surface currents in the northern Irminger Sea based on relative dynamic topography - Sept. 1963 (Malmberg et al. 1972).

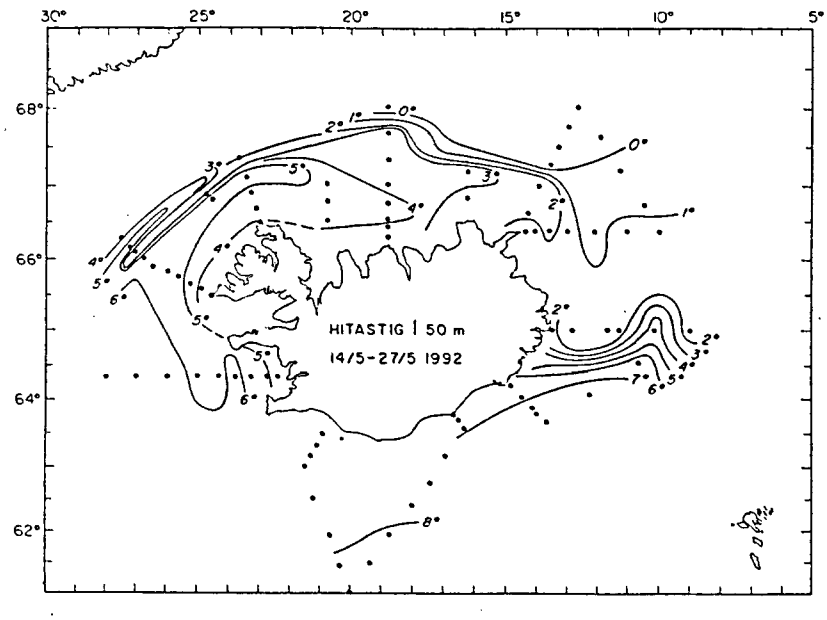


Fig. 10. Temperature, 50 m, in Icelandic waters in May 1992 (Anonymous 1992).

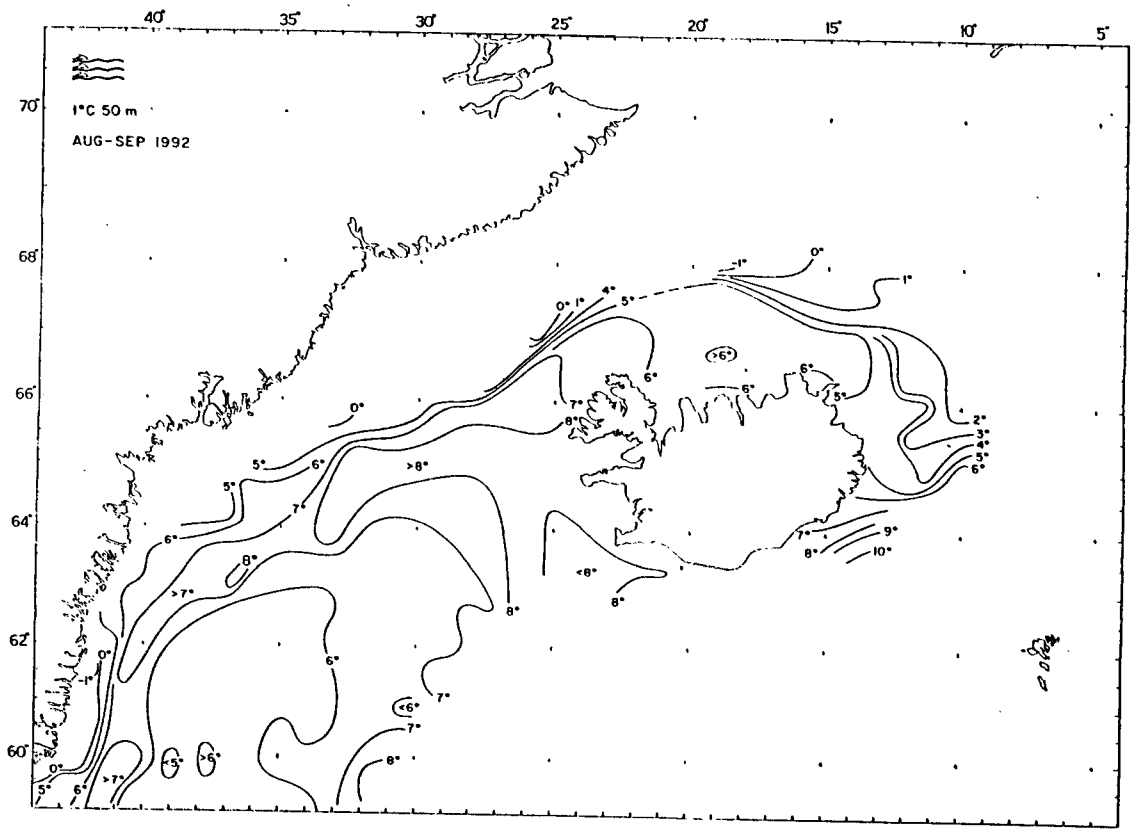


Fig. 11. Temperature, 50 m, in Icelandic and Greenland waters in August-September 1992 (Magnússon, J.V. and Sveinbjörnsson, S. 1992).

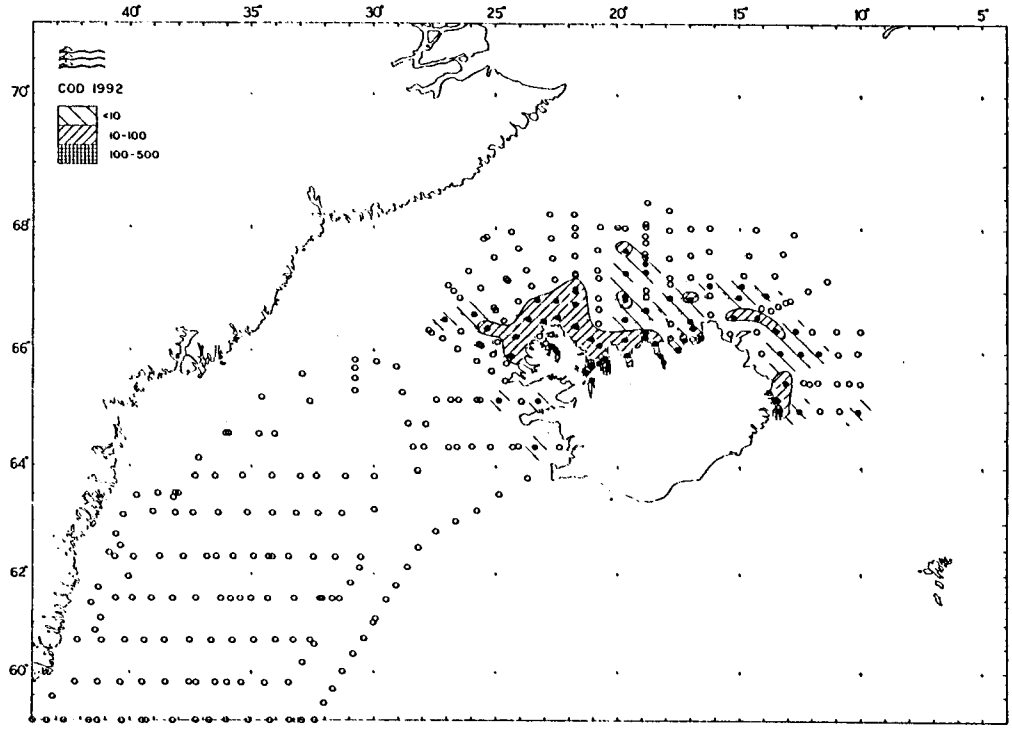


Fig. 12. Distribution and density of 0-group cod (n/1n.m.) in August-September 1992 in Icelandic and Greenland Waters (Magnússon, J.V. and Sveinbjörnsson, S. 1992).

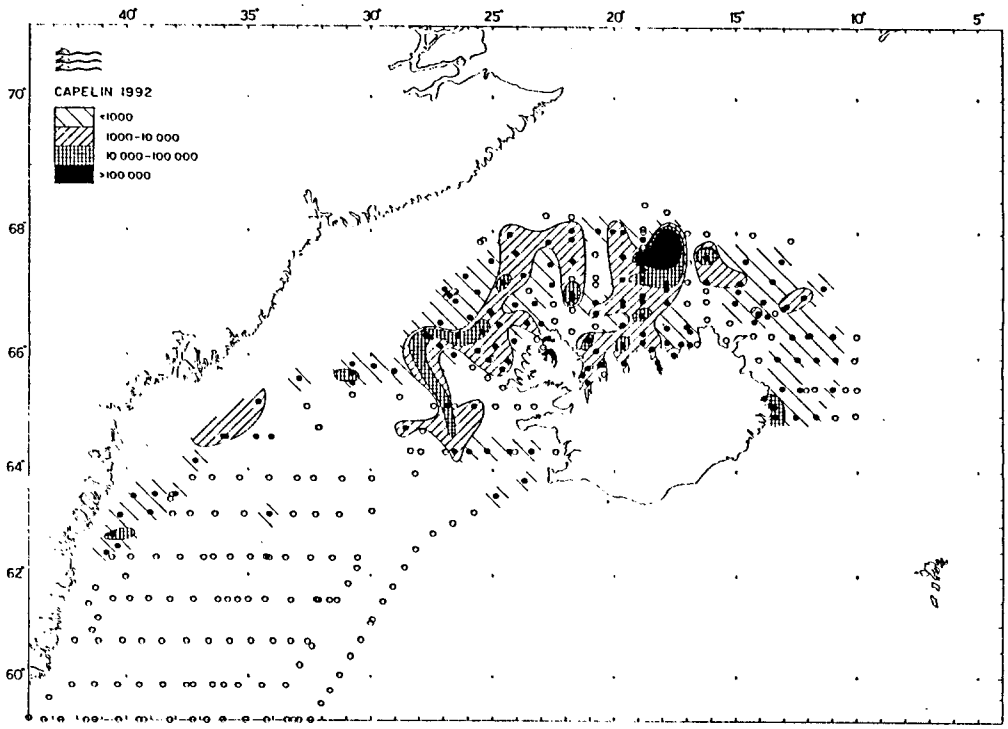
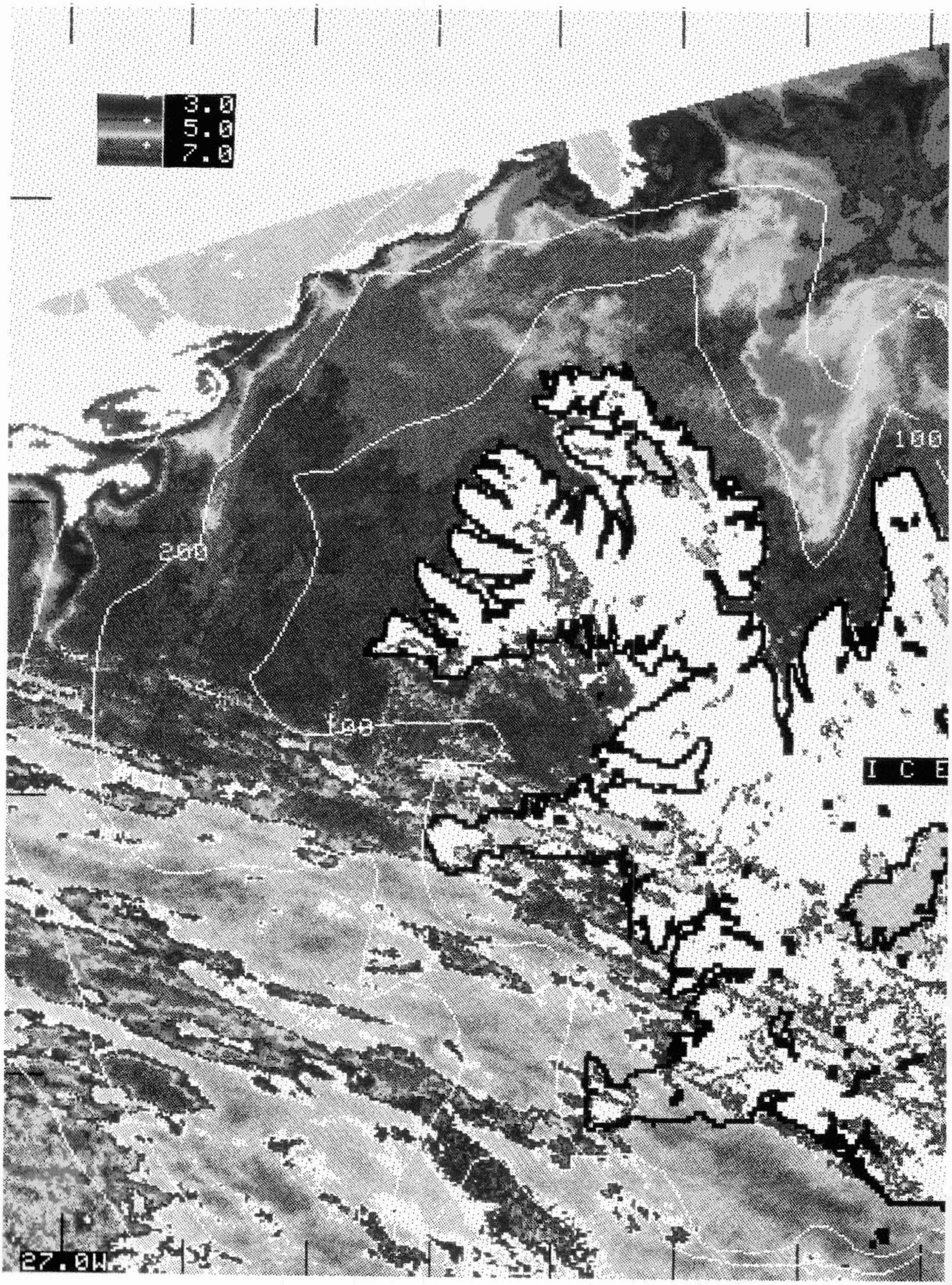


Fig. 13. Distribution and density of 0-group capelin (n/1n.m.) in August-September 1992 (Magnússon, J.V. and Sveinbjörnsson, S. 1992).

Fig. 14. IR imaginary of Icelandic waters 7 August 1992 (NOAA 11, Chan. 4; Saclant Centre, La Spezia, Italy).



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