

ICEBERGS

MAIN SOURCES: -

ICE STREAMS - GREENLAND ; (SVALBARD
FRANZ JOSEF
SHELVES - ANTARCTICA.

GLACIER ICE $\rho_i \sim 910 \text{ kg m}^{-3}$

SHELF ICE 450 kg m^{-3} at surface; 880 at 60m

RATIO: SUBMERGED \sim 0.83 SHELF BERGS
TOTAL VOL. 0.88 OTHERS

FORM CATEGORIES: TABULAR $L/H > 5:1$

BLOCKY $L/H \sim 2.5:1$

DRY DOCK - CENTRAL SLOT; DOME; PINNACLE

SIZES: ANTARCTICA:

MODAL SIZE AT M.I.Z. $\sim 0.4 \text{ km}$

" " WITHIN PACK $\sim 0.7 \text{ km}$

EXTREMES CA $\sim 100 \text{ km}$.

[?] ^{TOO} HIGH | 60-130°E
65% $\leq 200 \text{ m}$
4% $> 1 \text{ km}$
BUDD & HANLEY
ORHEIM

GREENLAND CALVING (M. Reeh, 1986) $\sim 300 \text{ km}^3 / \text{yr}$.
(w.e.)

E. Coast $\sim 135 \text{ km}^3$ (60% SE) - 3 MAJOR SOURCES

W. Coast $\sim 175 \text{ km}^3$ (65% SW) 9 " "

E. Coast: 70% $< 200 \text{ m}$ size; modal depth
400-500m.

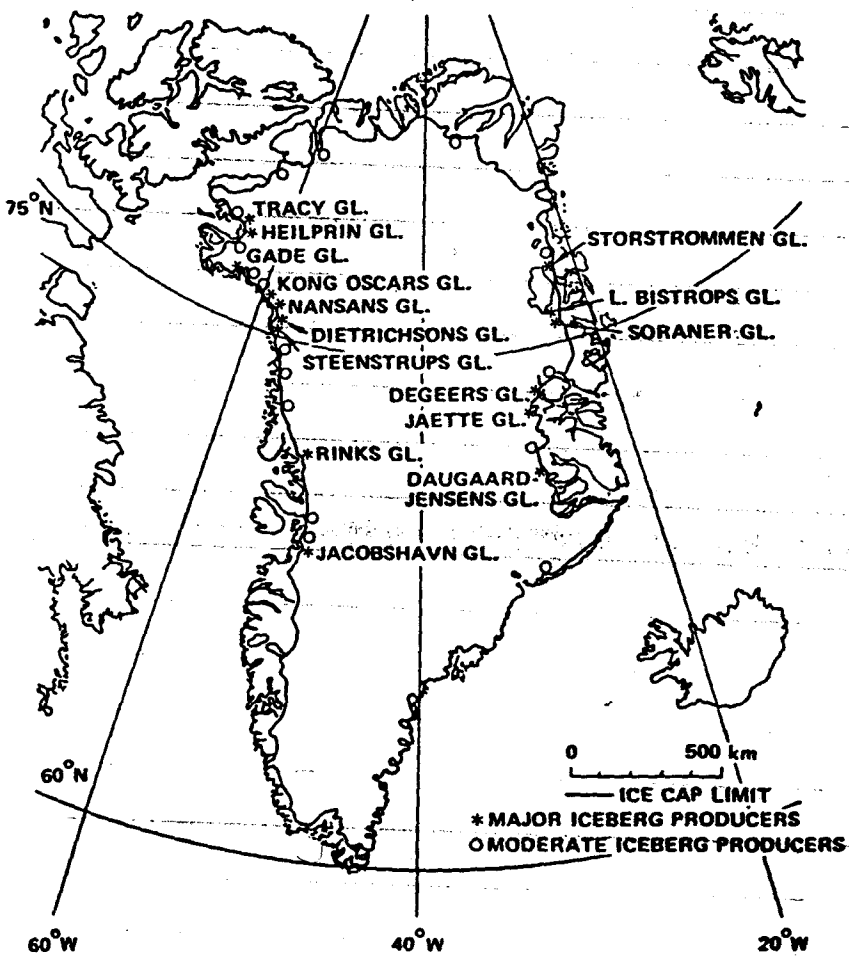


Fig. 11. Major and moderate Iceberg-producing glaciers of Greenland.

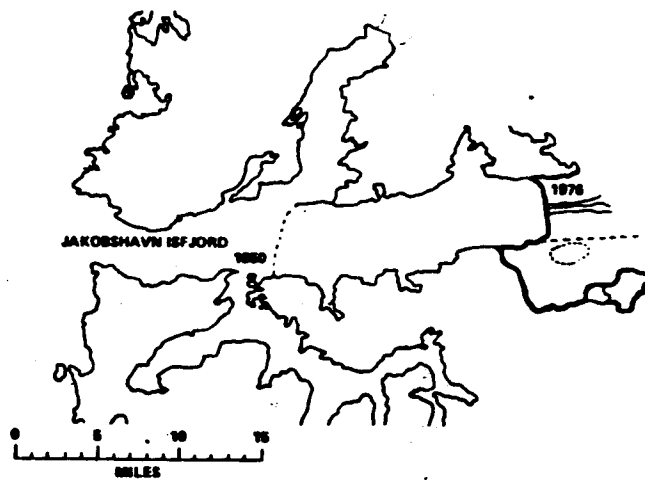
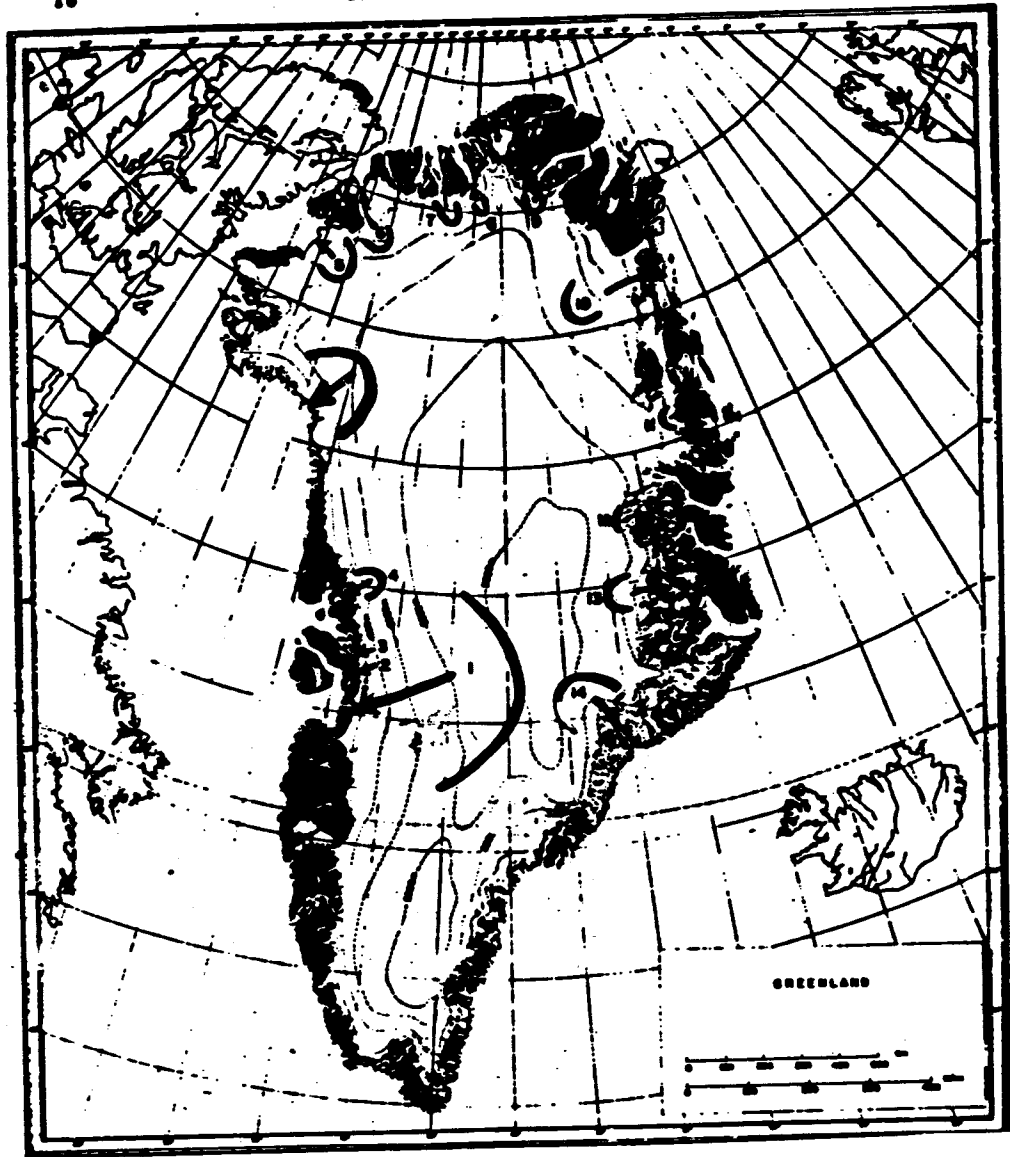


Fig. 4. Jakobshavn glacier (bold) and its 1976 location in the isfjord.

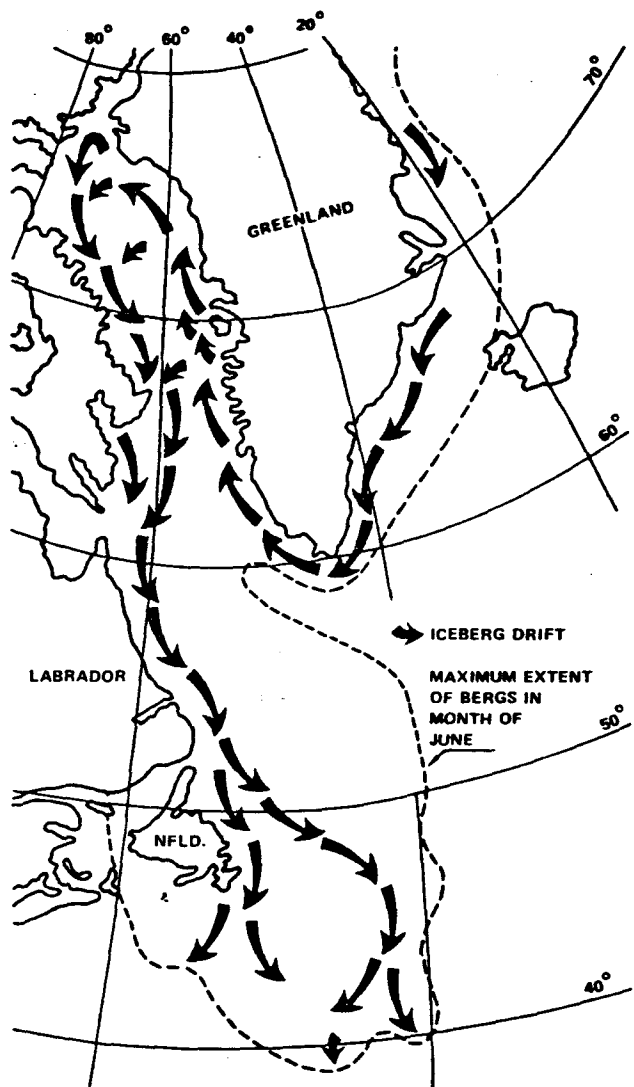


Fig. 14. Drift path of Greenland icebergs. [Redrawn from Soulis (1975).]

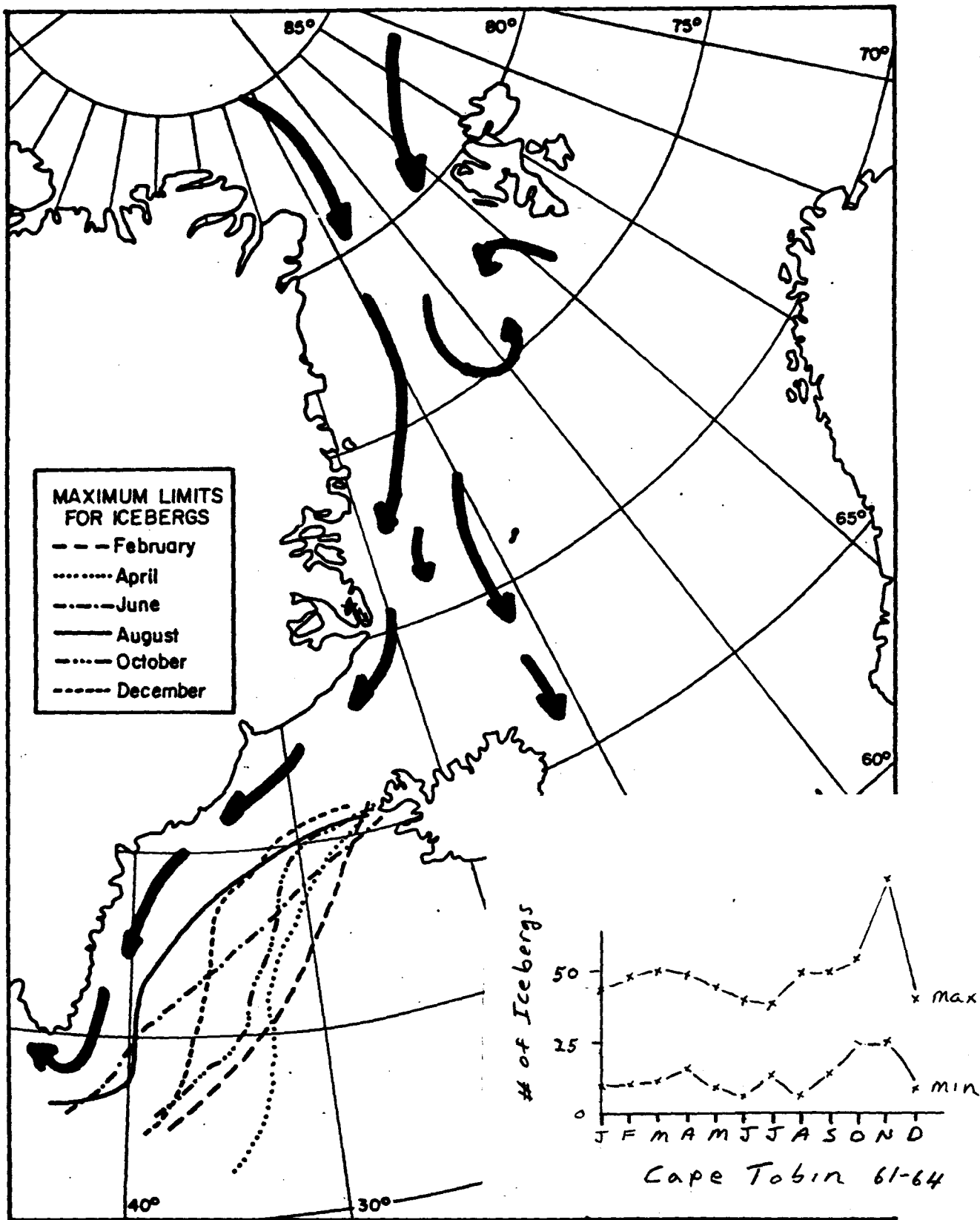


FIGURE 6.II MEAN MAXIMUM ICEBERG LIMITS FOR SELECTED MONTHS (from Arctic Pilot, 1975)

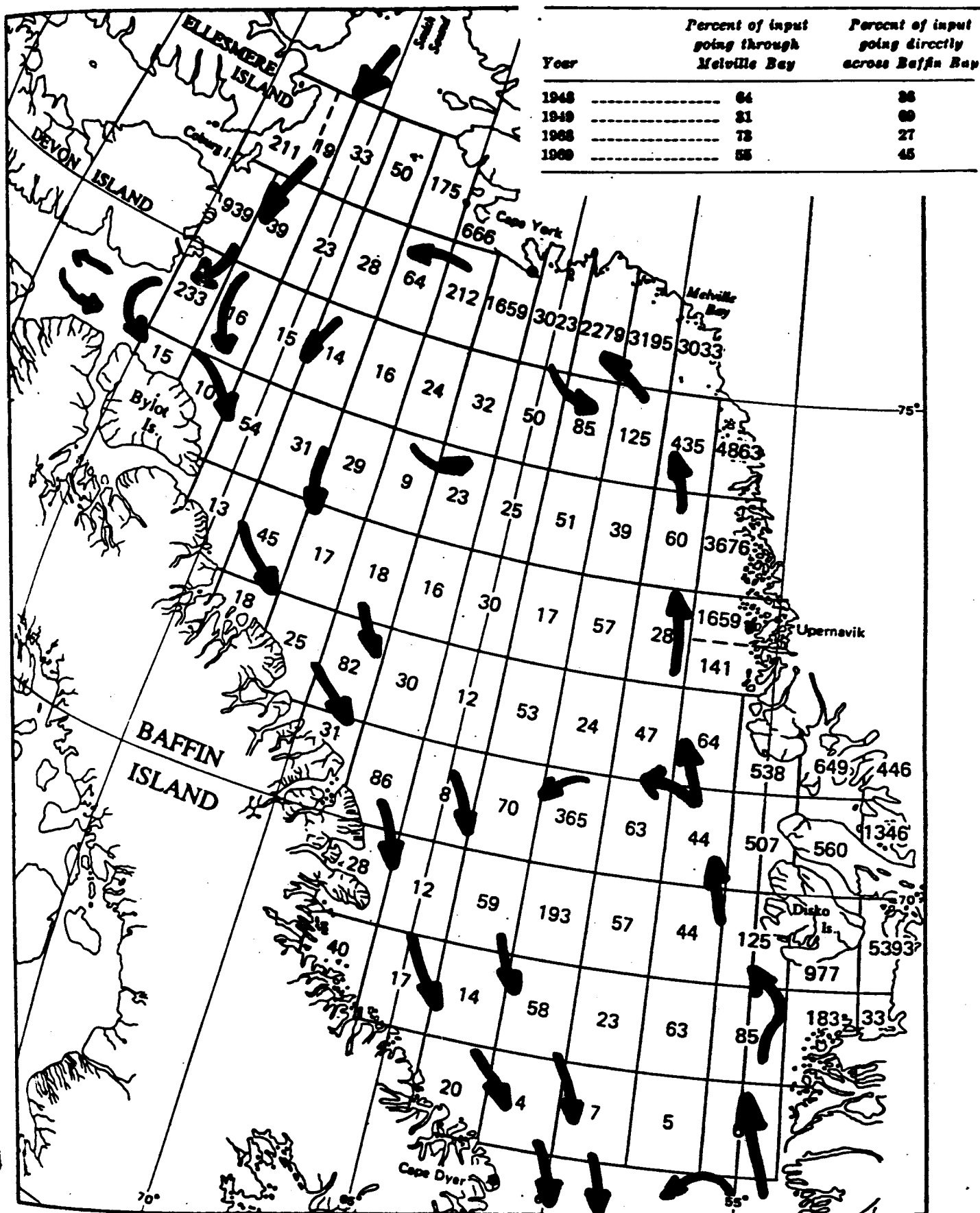
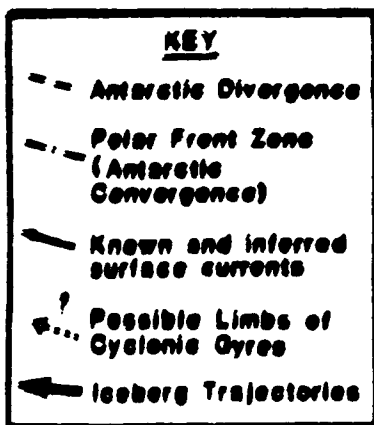
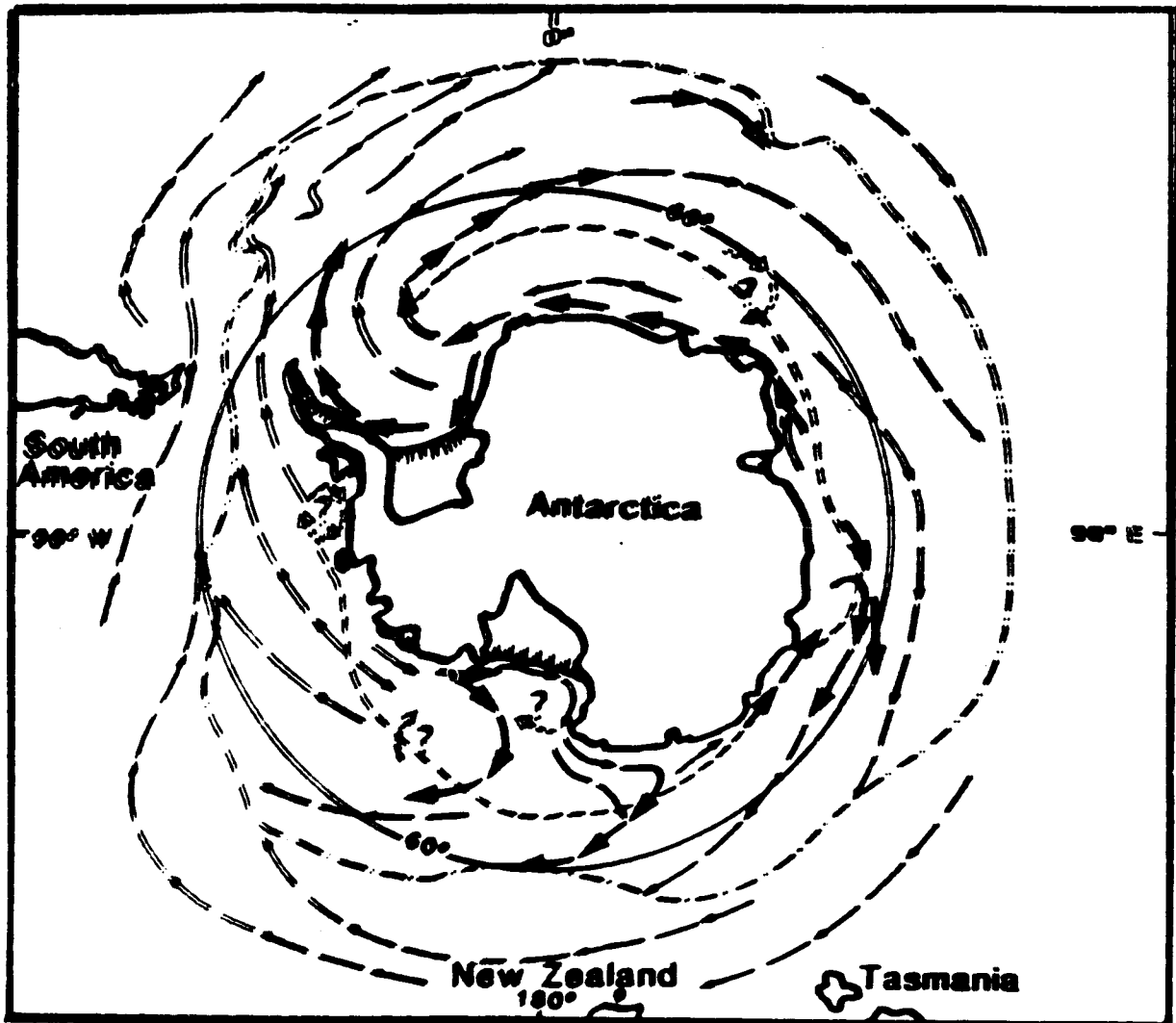


Figure 4 - Iceberg census of Baffin Bay 10-18 August, 1949 reported by International Ice Patrol (U.S. Coast Guard) after photographic analysis.



(NOTE: E'ly drift vs. Coast)

Figure 2.7 Surface circulation and published trajectories of icebergs around Antarctica. After Keys (1984).

ICEBERG DRIFT

GREENLAND - SEE FIG. (AROUND COASTS
AND RECIRCULATE BAFFIN BAY → S.

ANTARCTICA ≈ ZONAL MOTION, EXCEPT IN
WEDDELL SEA

N'wd LIMIT ≈ ANTARCTIC CONVERGENCE

60'S IN S.E. PACIFIC, 50'S - INDIAN, ATLANTIC OCEANS

DRIFT - § (WIND, WATER DRAG;
INERTIAL FORCES RELATED TO MASS, MOTION)

LABRADOR SEA - // CURRENT, 25° TO RIGHT OF
SURFACE WIND
SPEED ≈ 2.5x MEAN SURFACE CURRENT.

DECAY. - MELT (AIR EXCHANGES; SMALLONES
WATER " " ROLL-OVER
- FORCED CONVECTION. → FACTOR.

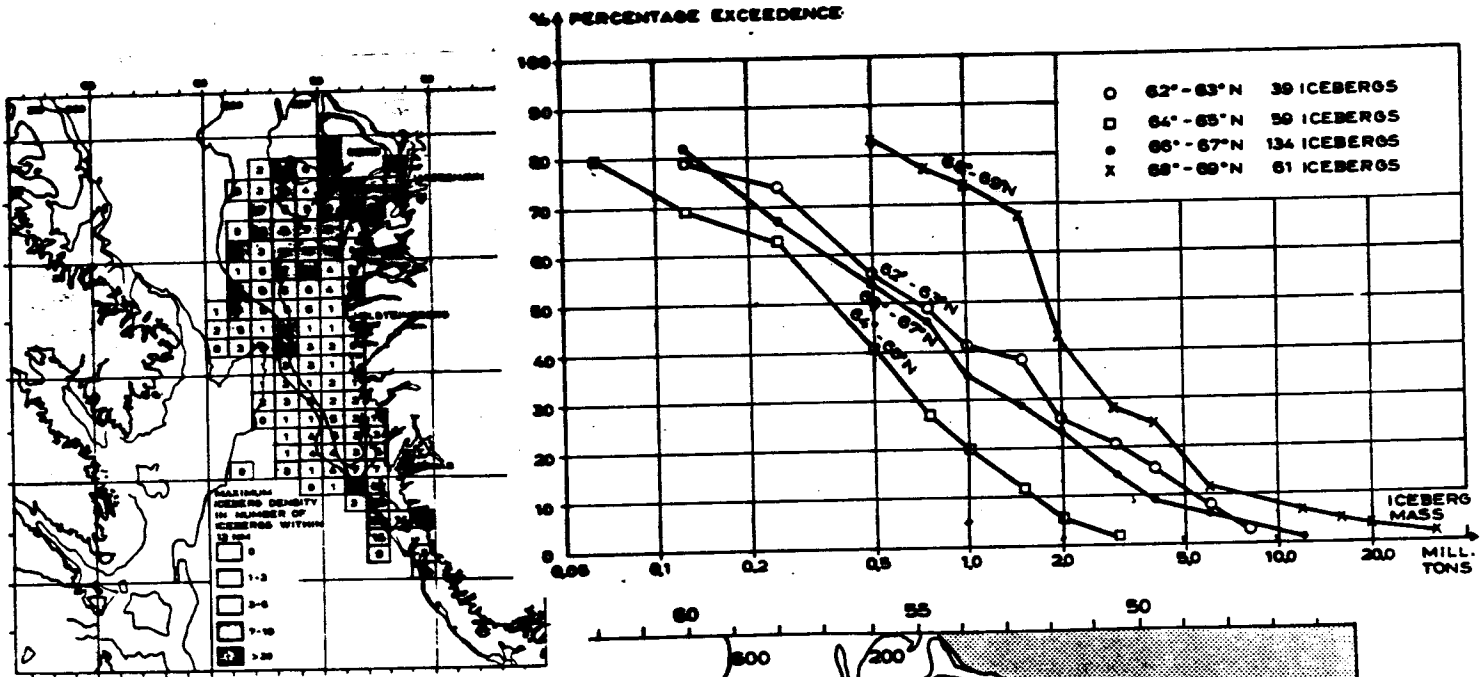
WAVE UNDERCUTTING; FLEXURE → FATIGUE
CALVING OF ICE

BEYOND SEA ICE EDGE,

10m WAVES	→	BREAKUP OF	500-750m SIZE
20m 400, 800; 1000-1100 1350-1750m SIZES
30m 350-1800; > 2200m.

TENDENCY FOR SURVIVAL OF V. LARGE BERGS
(WITHOUT CRACKS)

AND ≈ 1km SIZE. (BERGS < 1km LAST ≈ 2-3mos.)



Maximum Iceberg Density distribution,

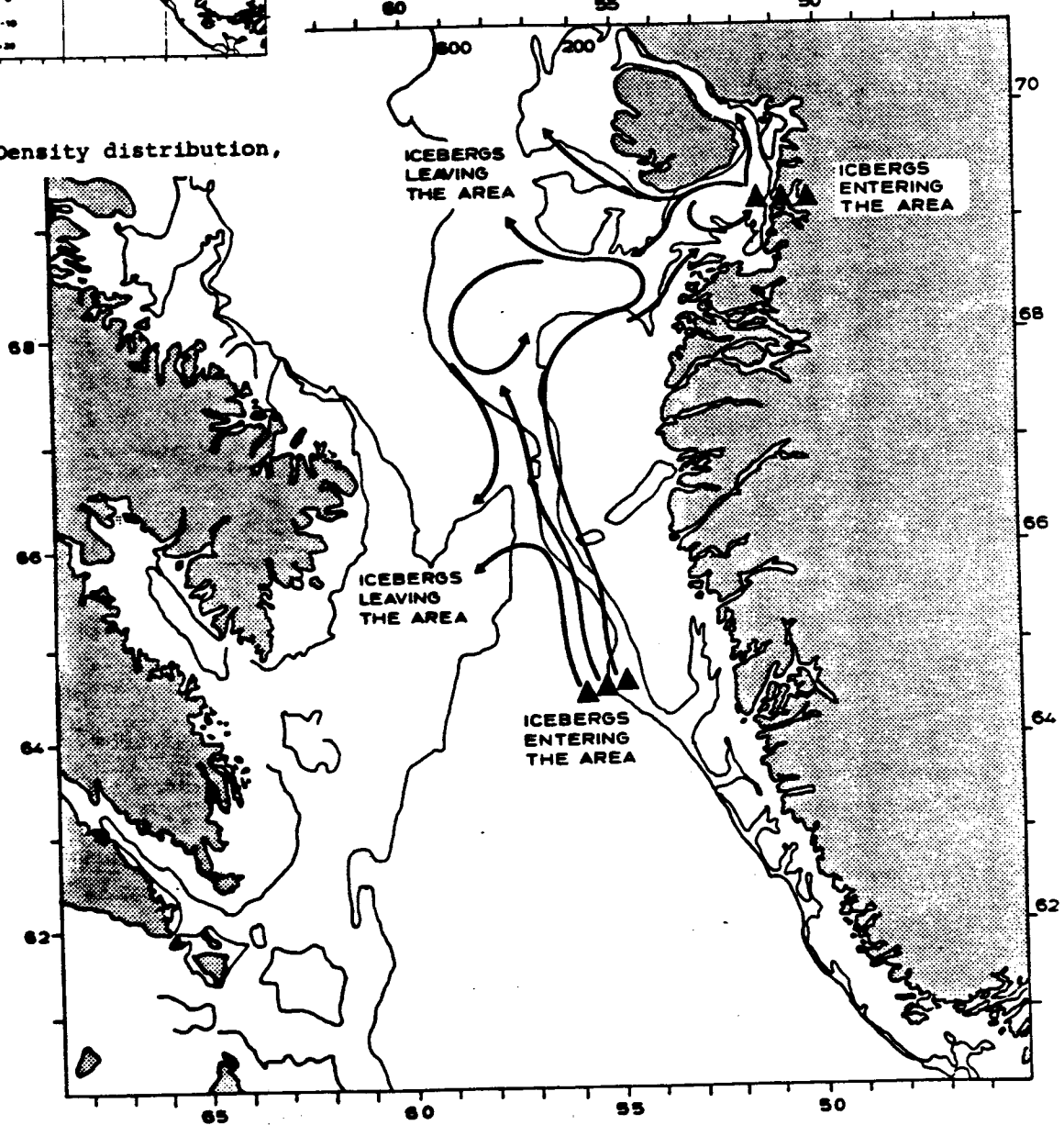
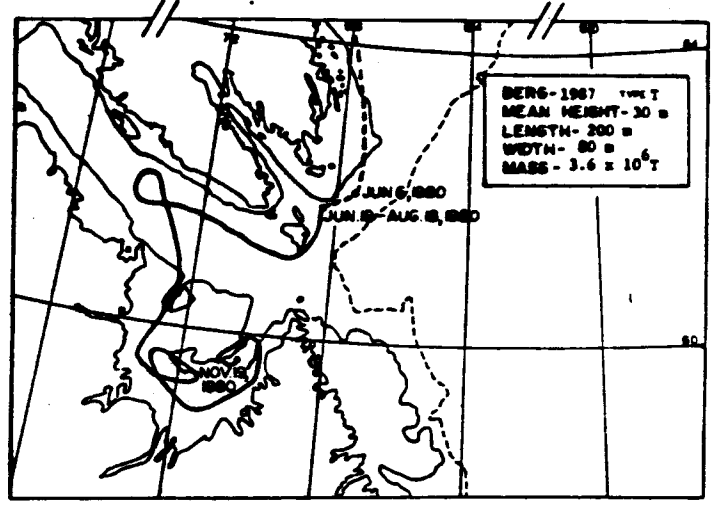
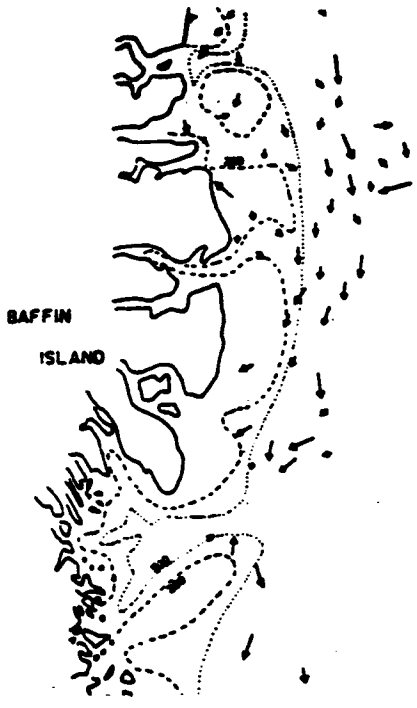


Fig. 2.12 Conclusions on Large Scale Iceberg Drift.



9. Included are the 200 and 500 m bathymetric contours, berg dimensions.

J.R. MARKO, J.R. BIRCH and M.A. WILSON

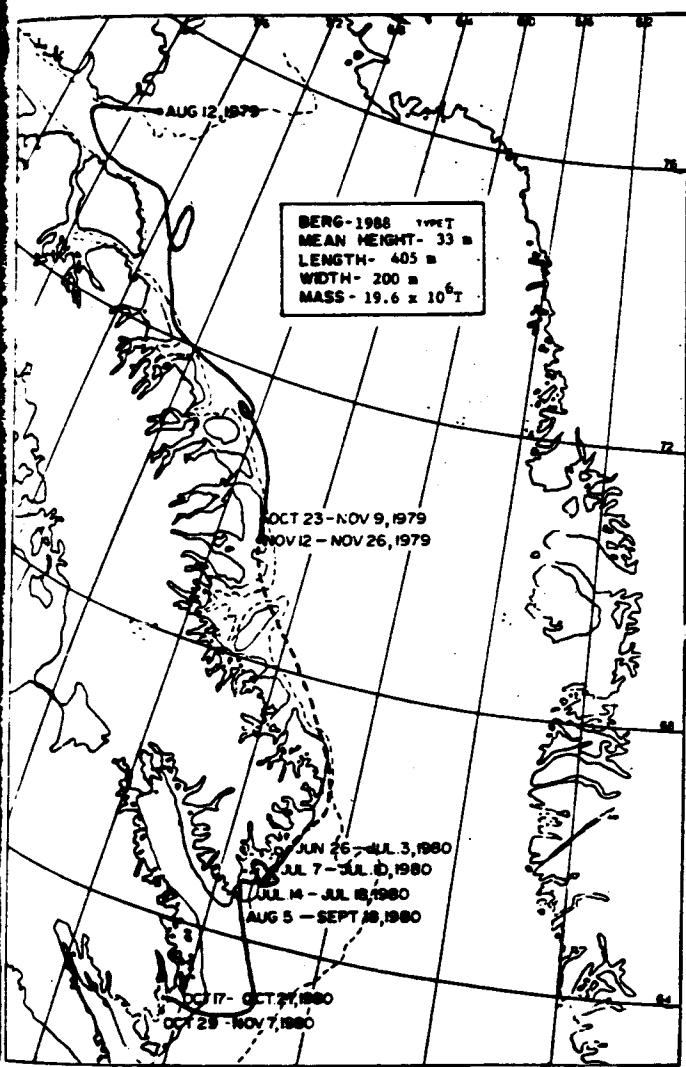


FIG. 4. Smoothed trajectory of berg 1988, initially tracked in summer 1979. Included are the 200 and 500 m bathymetric contours, berg dimensions, and type designation as in Figure 2.

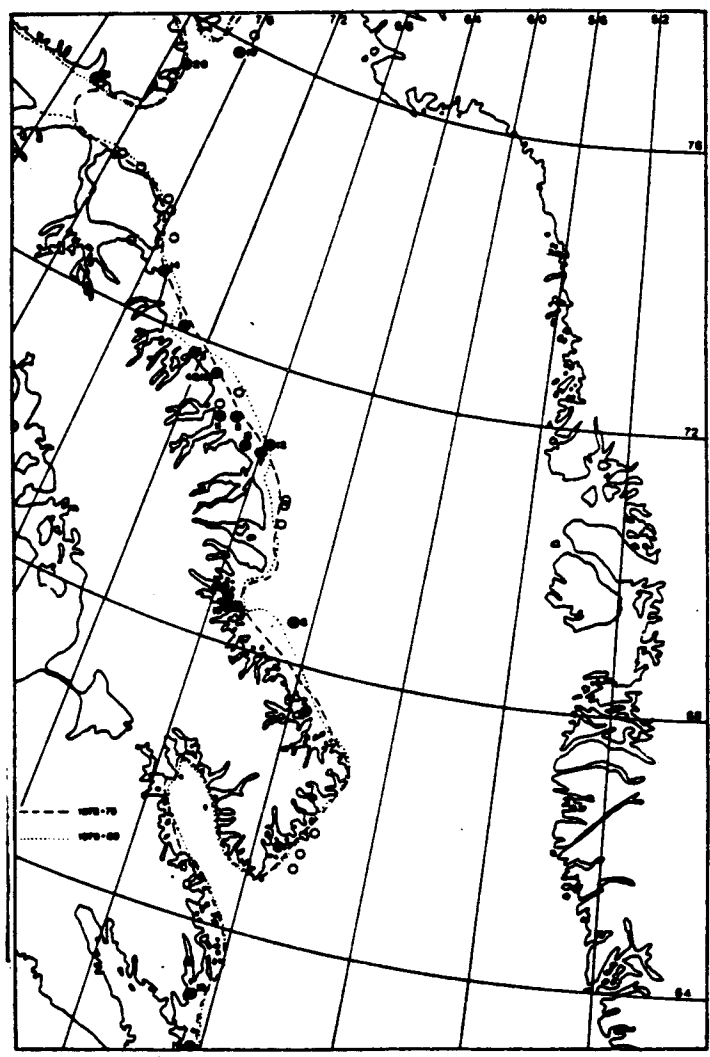


FIG. 7. Sites of long (●) and short-term (○) immobilization relative to the 1978 and 1979 seasonal landfast ice boundaries. Numbers identify each immobilization event according to the listing in Table 1.

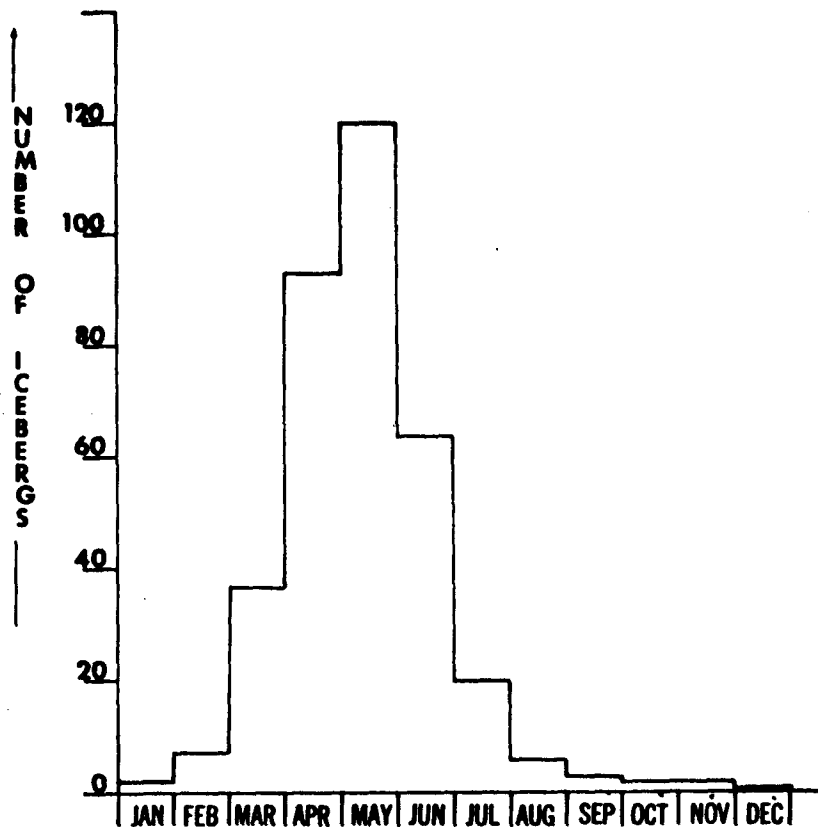


Fig. 1 - Monthly distribution of the number of icebergs south of 48° N in the Northwest Atlantic Ocean, averaged during the period 1900 to 1971.

MONTHLY DISTRIBUTION OF NUMBER
OF ICEBERGS S of 48°N in N.E. Atlantic
1900-71

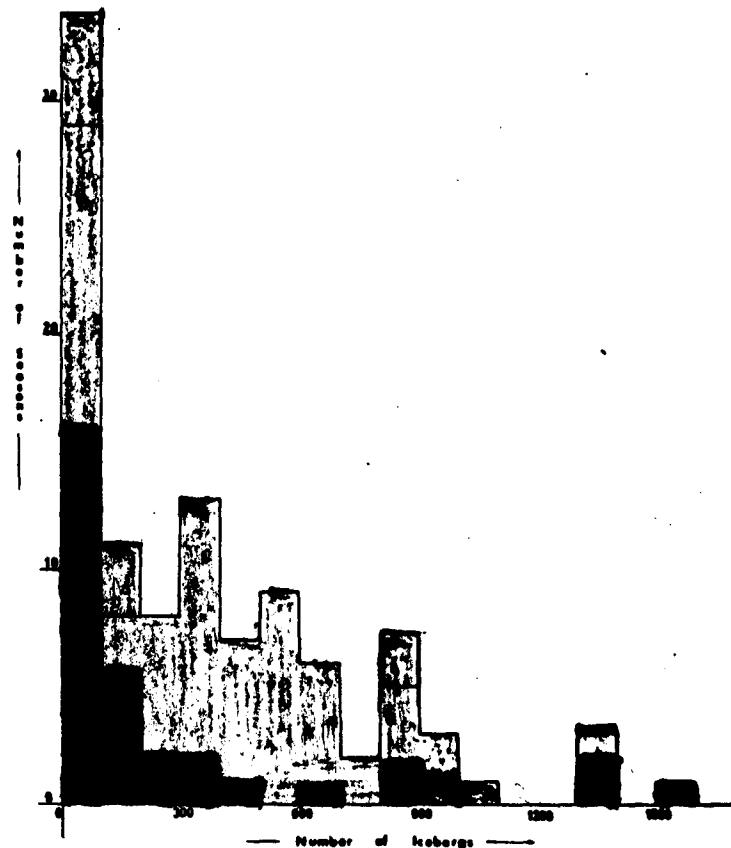


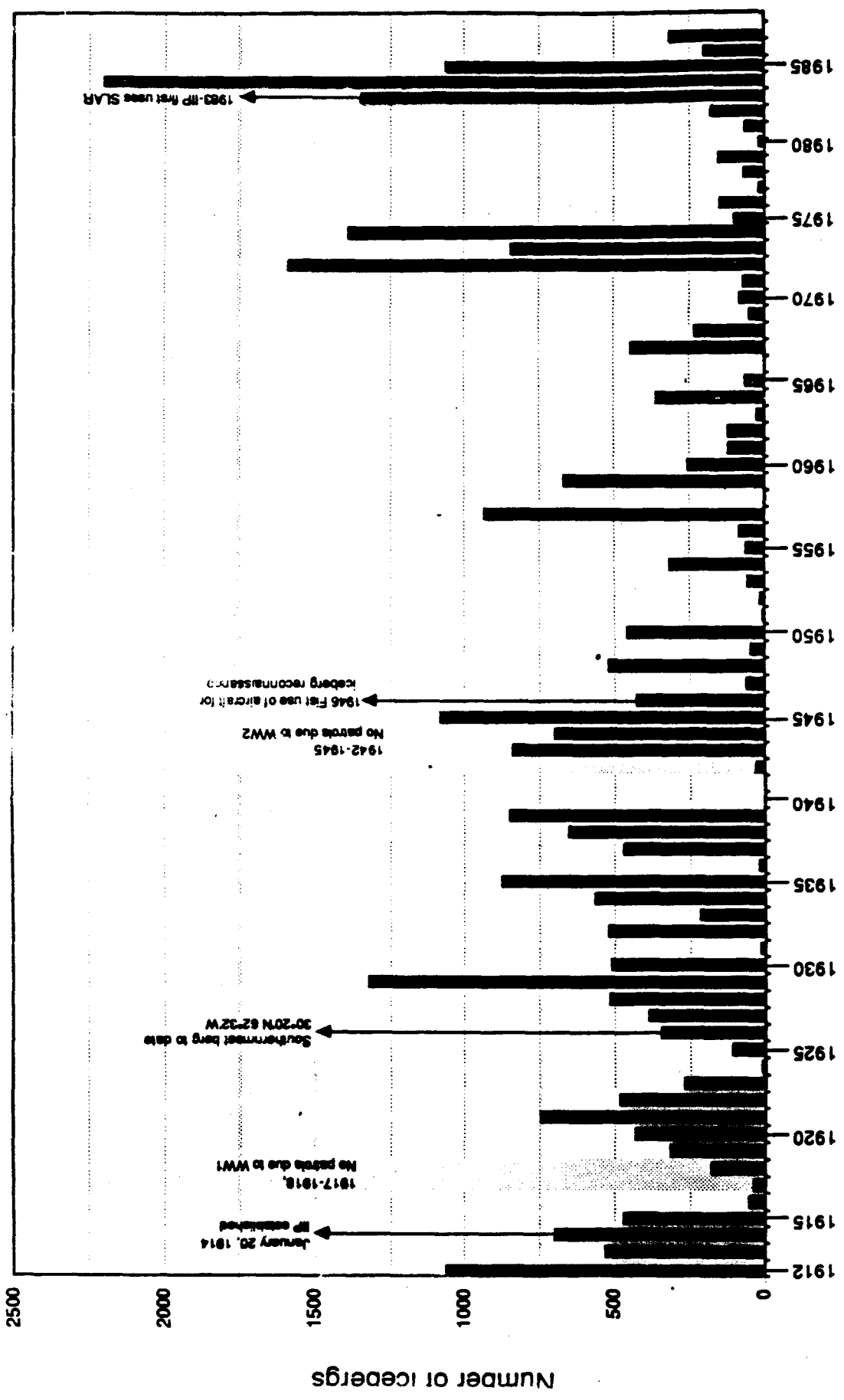
Fig. 2 - Histogram showing the number of seasons (during the years 1880 to 1972) having a given number of icebergs.

DATA = 1950-1984 35.1 ~
NUMBER OF SEASONS (Y AXIS)
WITH GIVEN NUMBER OF ICEBERGS

6.14.

2.14
2.15

Number of Icebergs South of 48°N (1912-87)



Ice Patrol Season

Number of Icebergs

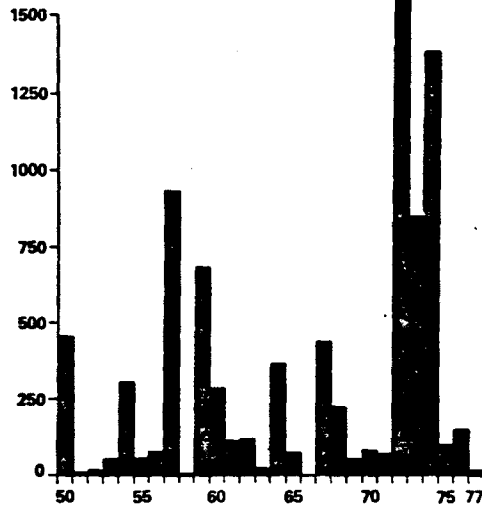


Fig. 17. Number of icebergs south of 48° N for 1950-1977. [From U.S. Coast Guard data.]

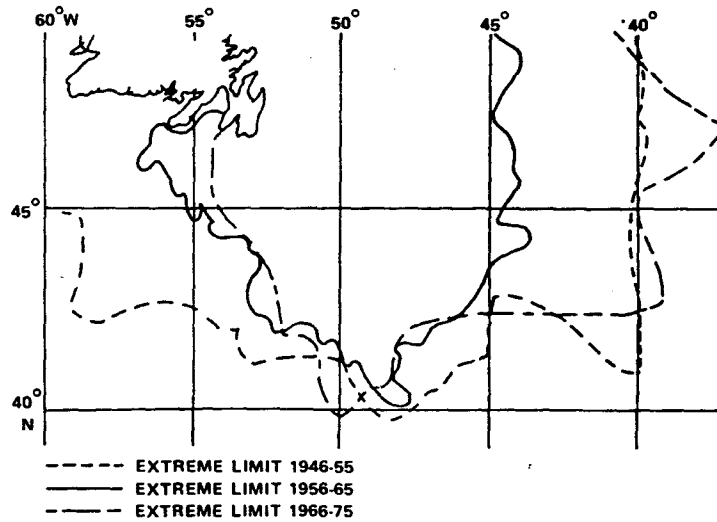


Fig. 18. Decade extreme limits of iceberg drift (from U.S. Coast Guard data). [Redrawn from Jelly and Marshall (1967).]

DECADAL EXTREME LIMITS

1972 A Record Year

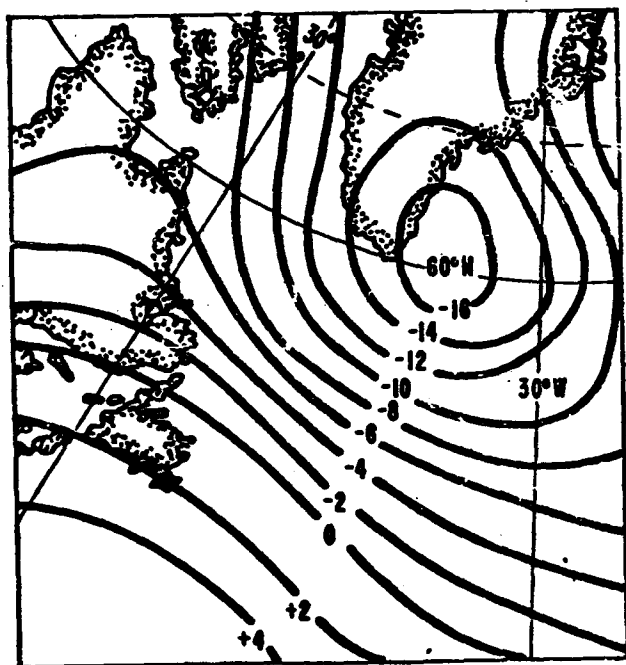
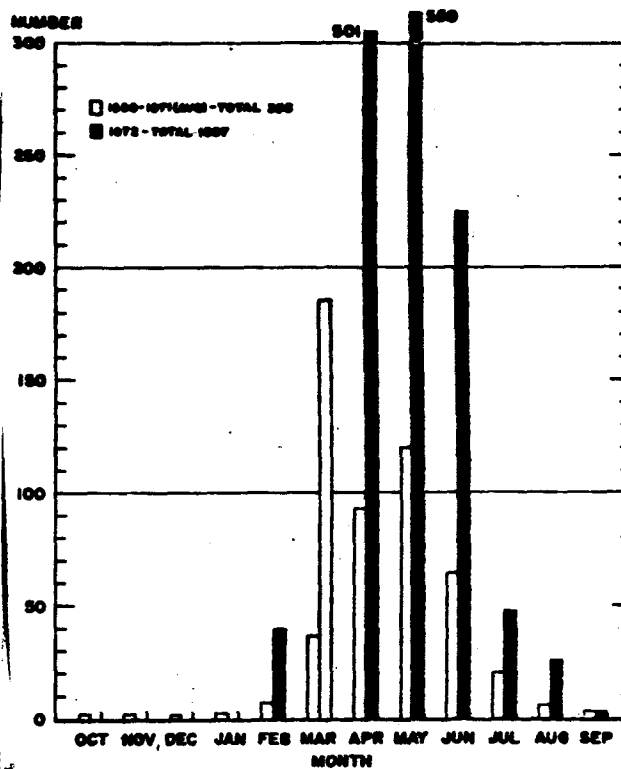
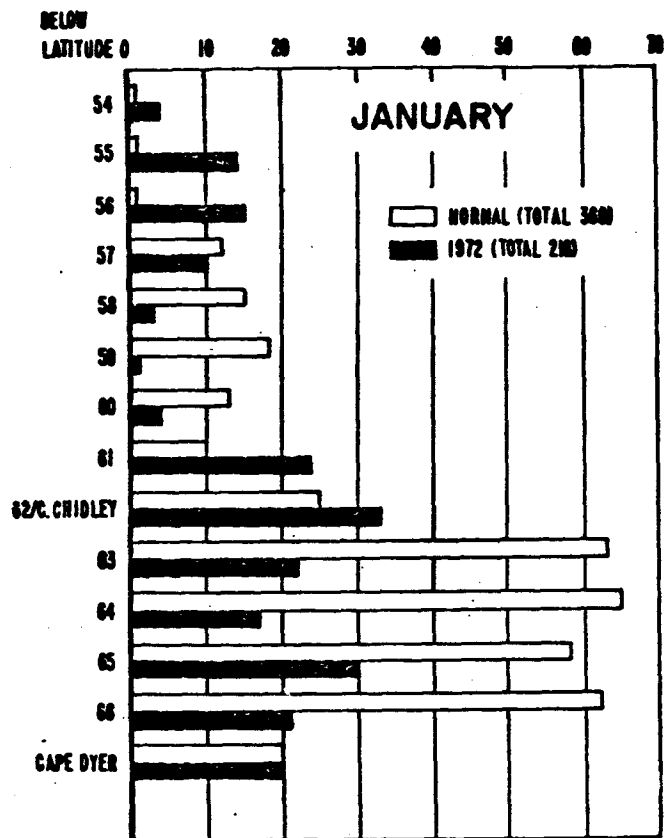


Fig. 15. Mean surface pressure anomalies (MB) for January 1972 (after Sanderson, 1972a).

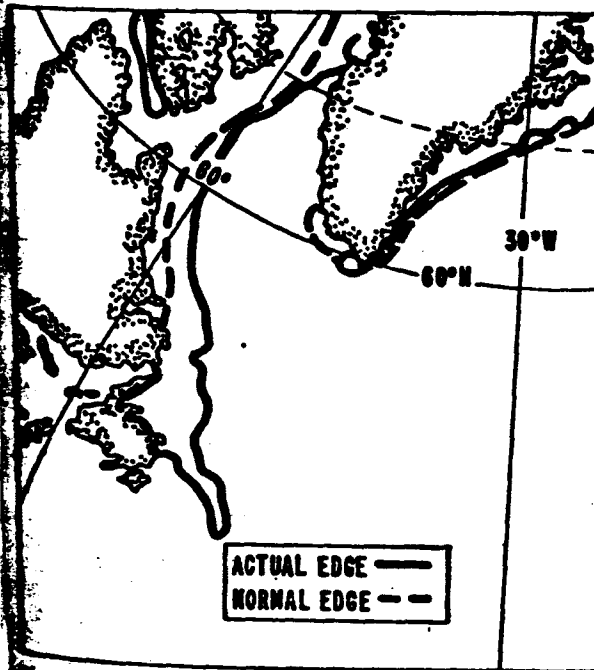
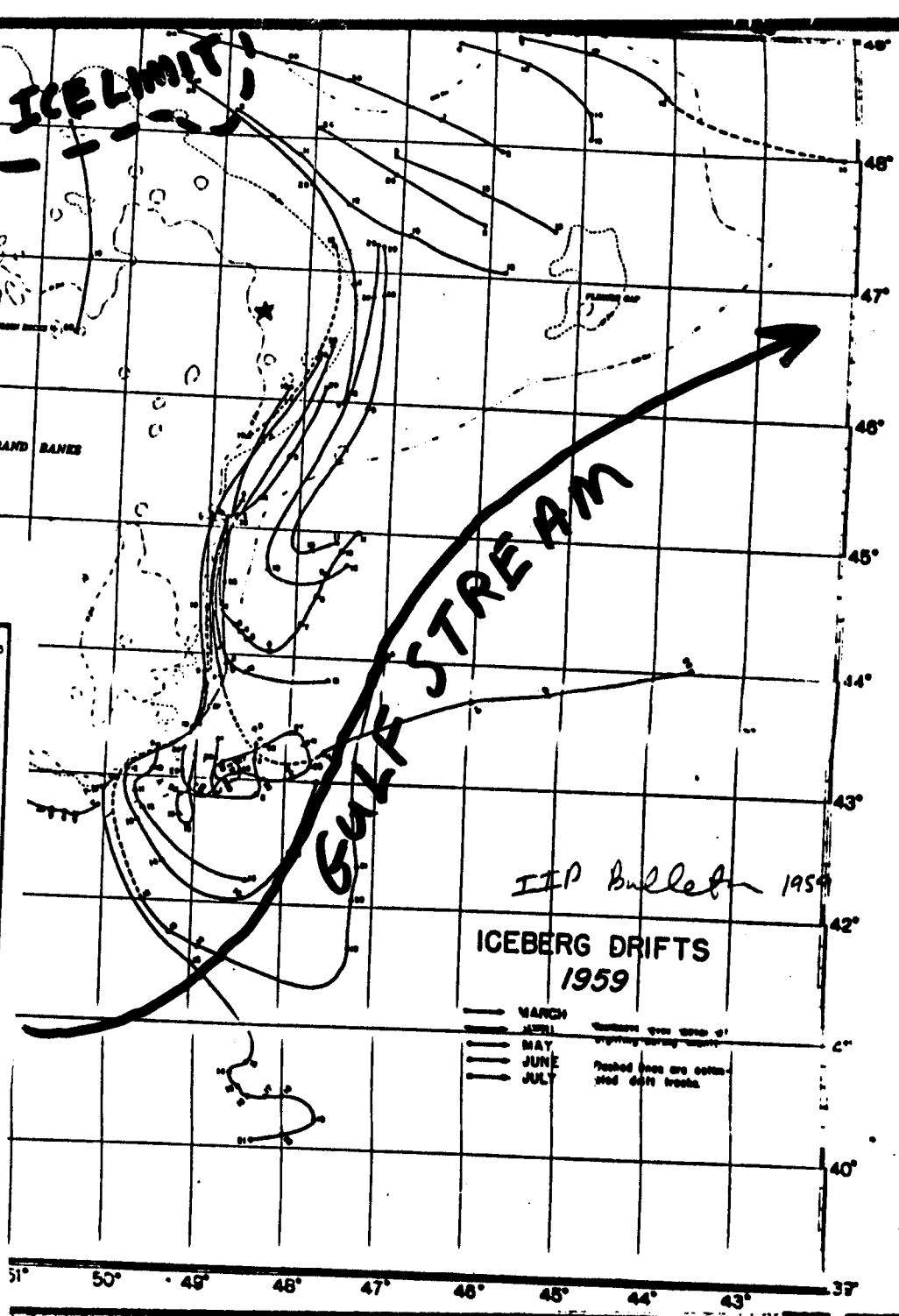
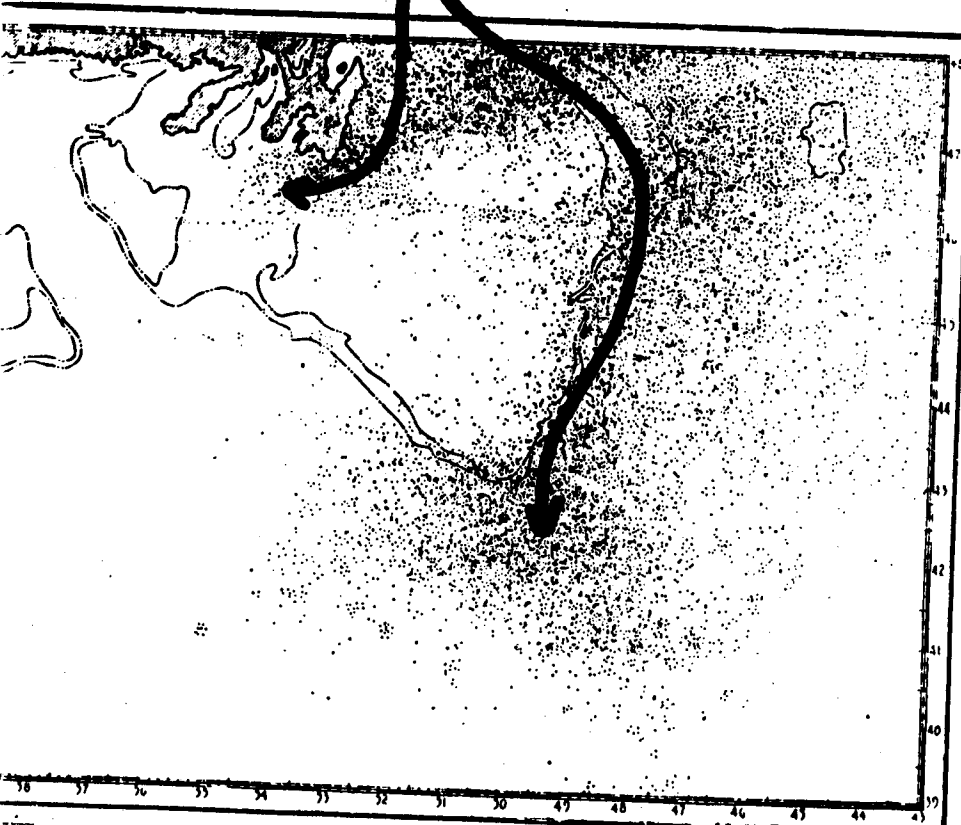
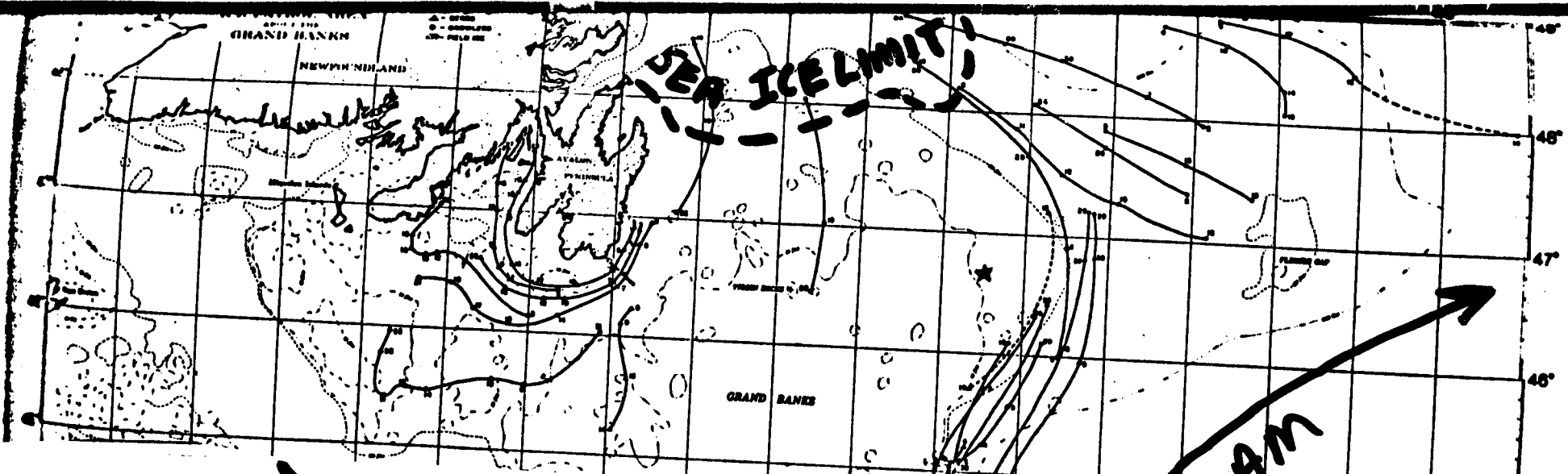


Fig. 14. Normal May and actual May 1972 extremes of open pack ice (after Sanderson, 1972b).



THIRTY YEARS OF ICEBERGS

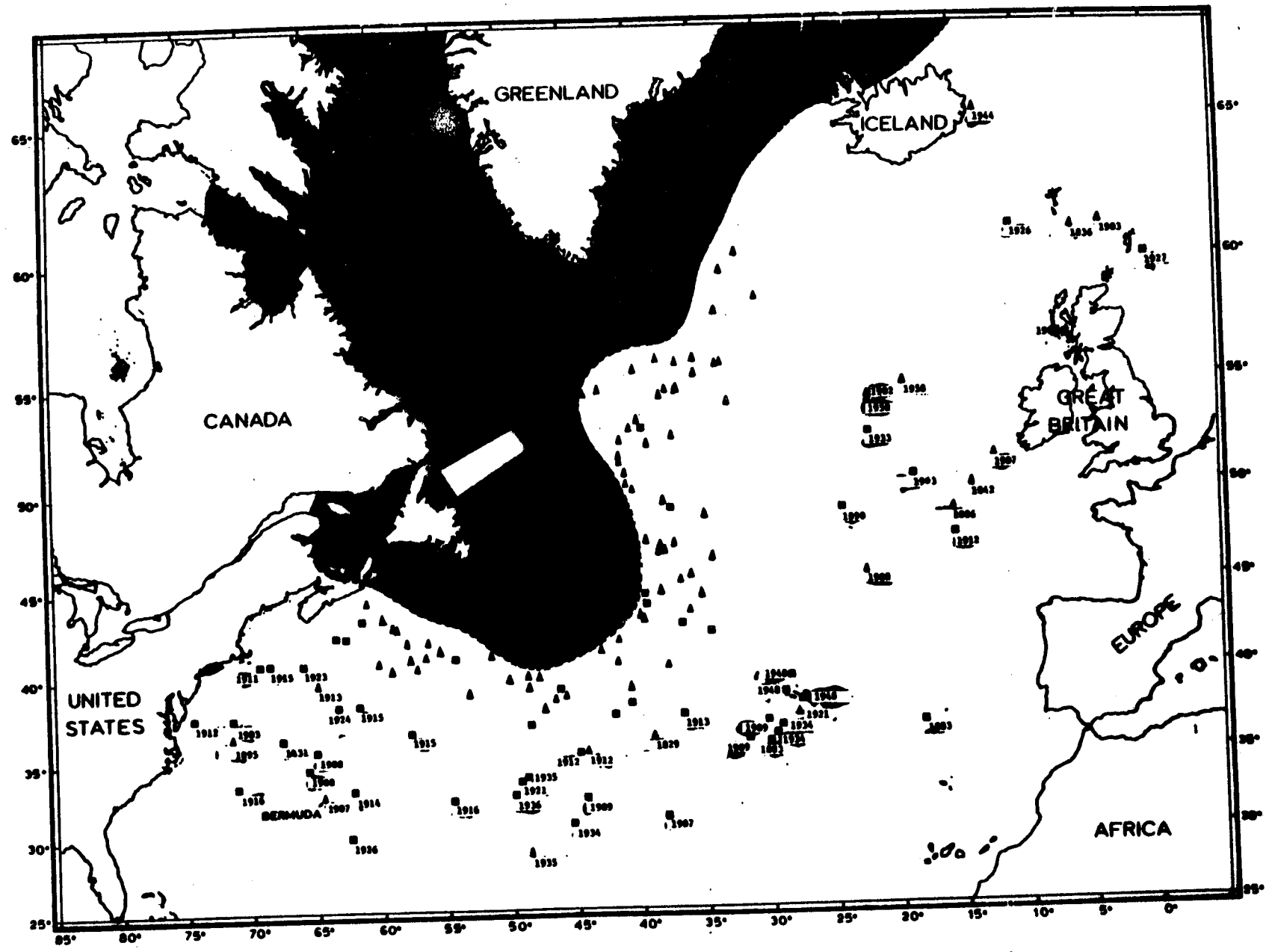
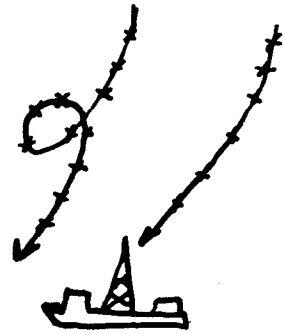


FIGURE D-1.—Maximum Mean Iceberg Limit and Reported Unusual Iceberg Sightings.

Forecasting

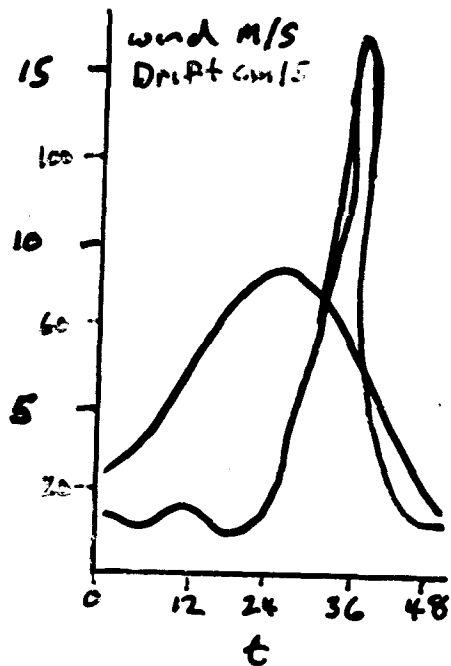
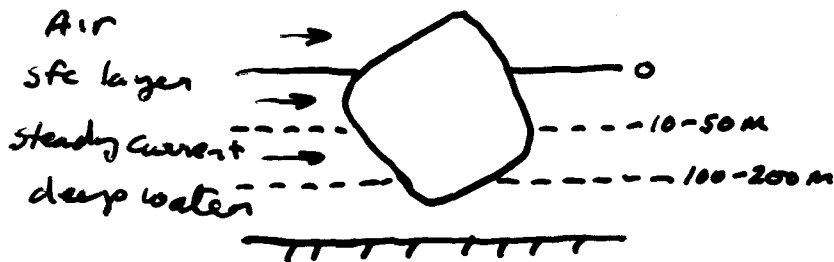
1. Tactical (0-12 hrs)

- persistence
- inertial effects
- tidal currents
- current eddies
- wind & currents variability



2. Regional (3 hrs - 5 days)

- Synoptic wind variations
- wind driven currents
- Regional current patterns
- Large Scale eddies (WE)



3. Seasonal (months)

- monthly pressure patterns (hindcast)
- upstream population

MISCELLANEOUS

1. Scours deep mean 1.5m max > 10m
 wide " 30m " > 200m
 Relic, infilling, side scan.

2. Detection

- Visual
- Ships Radar
- SLAR, SAR (ESRF)
- Satellites (Radarsat)
- HF Radar. ✓

3. Physical Properties

- density
- ice types
- strength. (limited data)
- bubble pressure?
- temp?

4. Economic Significance

- Shipping (see photo)
- floating oil Rigs (small bergs, storms)
- fixed structures (Large low bergs)
- pipelines & cables (Deep bergs)

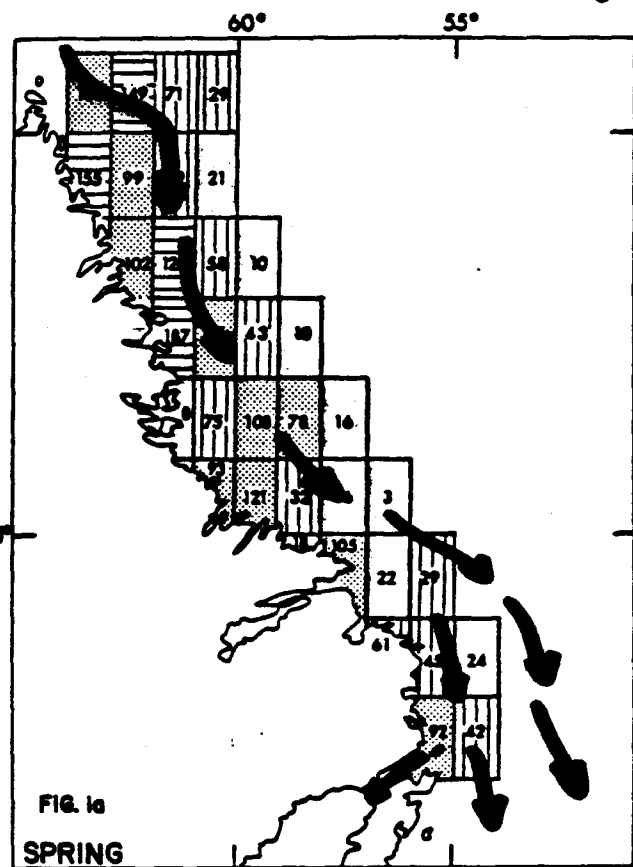
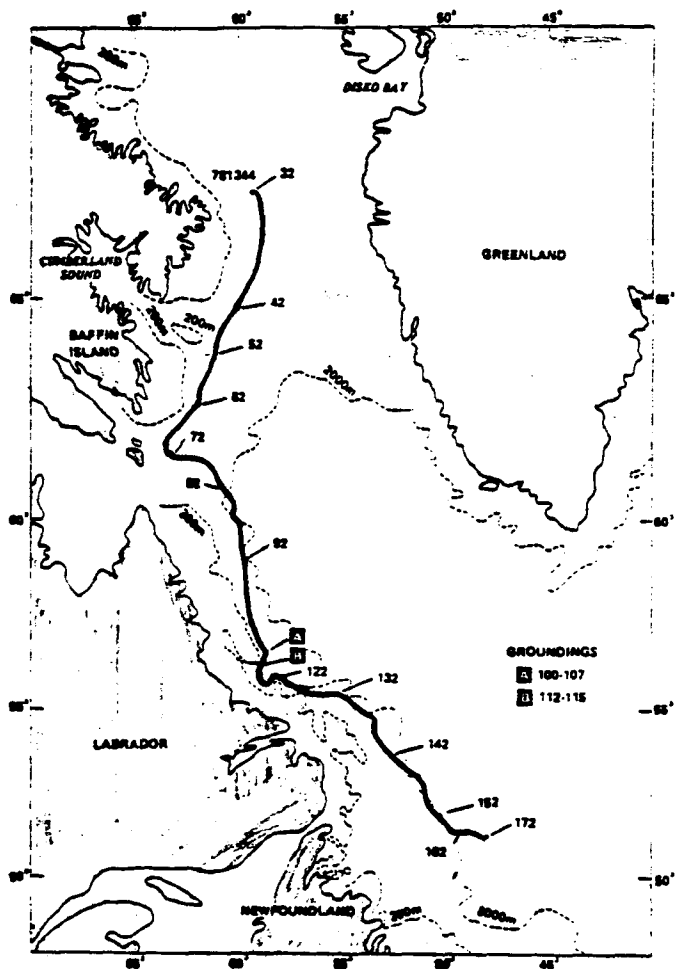


FIG. 1a
SPRING

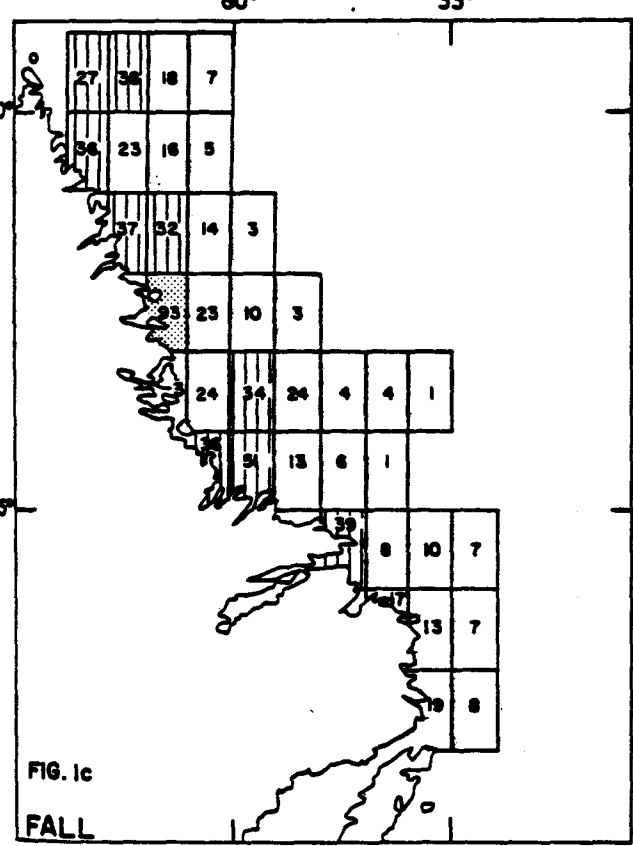
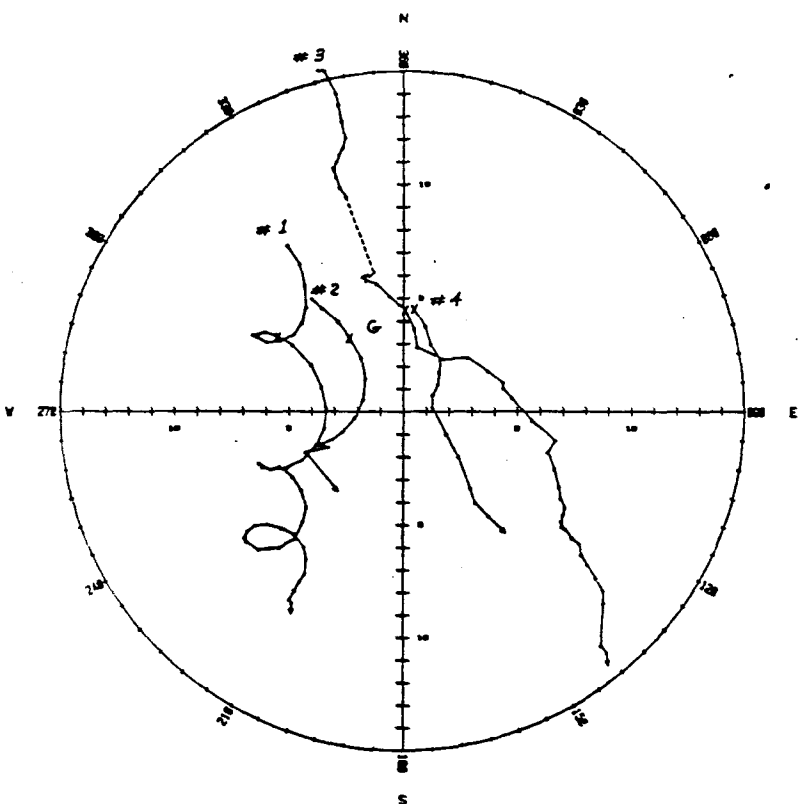
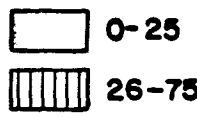


FIG. 1c
FALL



Shore Radar Lancaster Sd.

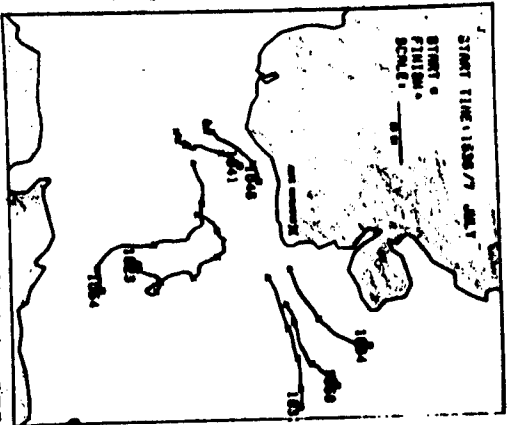


Fig. 12. Looking north from vessel 117 to 14 miles, showing a portion of island



ster

