THE PROBLEM OF THE ICEBERG POPULATION IN BAFFIN BAY AND DAVIS STRAIT AND ADVANCE ESTIMATE OF THE BERG COUNT OFF NEWFOUNDLAND*

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THE iceberg population in Baffin Bay and Davis Strait is little known, yet it is intimately connected with the problem of the advance estimation of the berg count off Newfoundland and the safety of local and trans-Atlantic navigation in that general area.

A recent formula providing such an estimate at the end of March [1] is based primarily on the December–March pressure gradient† between Labrador (Belle Isle) and southernmost Greenland (Ivigtut) on a line perpendicular to the normal direction of the isobars over that general area. This pressure gradient may be presumed to reflect the intensity of the northerly winds in that region, and since the Labrador Current is partly wind driven, the pressure gradient may be said to reflect also to a certain extent, indirectly, the strength of the Labrador Current, both of which affect the drift of the icebergs.

An independent test of the formula using the data for the twenty-five year period 1926/7–1950/1 showed rather favorable agreement between the computed and actual deviations which, expressed in terms of the simple correlation coefficient, is $r=0{\cdot}81$.[1]

The significant measure of the unresolved discrepancy between the computed and actual deviations as shown by the value of the correlation coefficient substantially less than unity (above) is probably due to no provision in the formula for direct information on (1) speed, direction and temperature of the Labrador Current, (2) the iceberg population to the north from which the berg concentration off Newfoundland is recruited and (3) wastage of the bergs also by warm rains and winds.

To remedy the lack of information about the Labrador Current, a regular program of observations of the volume and temperature of the current was begun some years ago by the U.S. Coast Guard. The data obtained to date cover the eleven years 1928, 1931–6, 1938–41, 1948.[4] An analysis of the data through 1940[3] showed that few bergs tend to be accompanied by below average values of the current heat-transfer. Further, it appears that for the three years with the smallest volume of the Labrador Current—less than 3×10^6 m.^{3}/sec. (1931, 1940, 1941)) the count of bergs on the scale of 10 was 1·8, 0·1 and 0·1 respectively, and for the three years with the largest volume —$5{\cdot}0\times10^6$ m.^{3}/sec. or more (1928, 1933, 1934) the respective counts were: 5·6, 3·8, and 5·7 (Table I). The average volume of the current is $4{\cdot}0\times10^6$ m.^{3}/sec., based on the eleven years listed and the average value of the berg count, is 4·8 on the scale of 10. On the whole the observations are as yet too few for a more detailed comparison, but it would appear (Table I) that the changes in the current alone are not likely satisfactorily to account for all the variations in the berg count. It is worth noticing too that the values of the berg count computed with the aid of the meteorological formula referred to above are in about as good an agreement with the actual berg count as the results that may be deduced from the Labrador Current shown in Table I.

To obtain adequate information on the iceberg population north of Newfoundland, a census was first made by ship in 1940[2] and later repeated on a broader scale by airplane in 1948.[4] A census

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† Strictly speaking, pressure difference, as only with the average distribution are the two identical.

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was also carried out in 1949 but none unfortunately in 1950. Indeed, censuses over a number of years in succession would probably be needed before their value in estimating in advance the severity of the iceberg season off Newfoundland could properly be assessed.

In addition to counting the number of icebergs in different sectors of Baffin Bay and Davis Strait, and deducing their movements from the presence of certain concentrations a year or two later, closer information about their actual drift once they break off the glaciers and leave the fjords is desirable. It is known that the bergs which come down off Newfoundland originate for the most part from the West Greenland glaciers with an insignificant number from the few small

TABLE I

Extreme values of Labrador Current and corresponding actual and computed severity of Iceberg season south of Newfoundland during 1928–1948 (n=11)

Year	*Volume*	*Iceberg count on the scale of 10*	
		Act.	*Comp.*
1931 ..	$1{\cdot}3 \times 10^6$ m.^{3}/sec.	1·8	3·0
1940 ..	2·8 ,,	0·1	2·1
1941 ..	2·3 ,,	0·1	3·3
1928 ..	5·1 ,,	5·6	5·1
1933 ..	7·6 ,,	3·8	4·7
1934 ..	5·0 ,,	5·7	6·2
Average all Observs.	4·0 ,, (1928–48 (n=11))	4·8 (1900–48 (n=49))	

glaciers on the North American side of Baffin Bay. The general movement of the West Greenland bergs is northward, thence westward and southward. How far north the individual bergs will travel before turning westward will depend on the westward branching of the initially northward directed warm water of south-west Greenland and to a lesser extent on the winds in that general area. Conceivably, as the warm water off south-west Greenland begins branching off westward at a lower latitude, more bergs will cross to the west at these latitudes and the length of their journey will be decreased, but their melting rate will be increased by the less cold water.

To obtain a concrete picture of the behavior of the icebergs once they leave the west Greenland fjords, it is suggested that the bergs be marked. The most practical way to do this, it would seem, is to spray groups from different glaciers by color dust from the air in the hope that enough dust in solution or otherwise will stay with the berg even after occasional overturning. These bergs could then be searched for by airplane, and from their movements estimates made as to their course of travel, average speed and mortality. A successful tracking of the bergs in conjunction with wind data should provide also valuable information on the circulation of the waters in that area.

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