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DEPARTMENT OF MINES AND TECHNICAL SURVEYS

PAPER 65-20

NOTES ON MORAINES AND RADIOCARBON DATES IN NORTHWEST BAFFIN ISLAND, MELVILLE PENINSULA, AND NORTHEAST DISTRICT OF KEEWATIN

(Report and 2 figures)

B. G. Craig

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ABSTRACT

A linear belt of end moraines lies, both spatially and chronologically, midway in the sequence of deglaciation in the northwest quadrant of the area covered by the Wisconsin Laurentide ice-sheet. The present study presents a series of new radiocarbon dates bearing on the age of these moraines, and discusses the relationship of the various segments and some aspects of their regional significance.

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INTRODUCTION

Regional airborne reconnaissance operations conducted during the last thirteen years by the Geological Survey of Canada in the Arctic mainland and Arctic islands north and west of Hudson Bay have provided an opportunity to study the history and pattern of wastage of the north and northwest part of the Laurentide ice-sheet. Following completion of the 1964 season, reconnaissance field data are at hand to allow synthesis of the deglaciation sequence of an area of some 400,000 square miles extending from Banks Island eastward to northwestern Baffin Island, and from the Parry Channel southward to the provincial boundary.

In a recent paper, Falconer, Andrews, and Ives (1965) have focused attention on morainal features in the northeastern part of this region. The present paper is intended to indicate the writer's interpretation of some of the features covered by Falconer et al, and to report new radiocarbon dates that bear upon their age.

REGIONAL DEGLACIATION SEQUENCE

From its maximum position at the climax of the last (classical Wisconsin) glaciation, the margin of the Laurentide ice-sheet retreated on all sides in a general way towards the Hudson Bay region during the interval 13,000 to 7,000 years ago. In the area of Figure 1, the ice margin stood near its maximum some 12,000 years ago. Withdrawal southeastward and southward into the country adjoining Hudson Bay - Foxe Basin followed, and was complete some 7,000 years ago. As deglaciation progressed, the sea penetrated through Hudson Strait and into Hudson Bay - Foxe Basin and the ice-sheet separated into isolated remnants east and west of Hudson Bay, on Melville Peninsula, and on Baffin Island. The sea had penetrated south of James Bay by 7,900 years ago (date I(GSC)- 14; 7,875±200; Terasmae and Hughes, 1960), and therefore probably had displaced ice throughout much of the Hudson Bay - Foxe Basin embayment by that time. In view of a single radiocarbon date on a sample from near the western end of Hudson Strait (date I-488; 10,450±250; Ives and Andrews, 1963) it is possible that part of the embayment may have been open some 9,000 to 10,000 years ago. The last ice-sheet remnants east and west of the bay probably disappeared 6,500 to 7,000 years ago although remnants larger than the present ice-caps probably persisted somewhat later on Baffin Island.

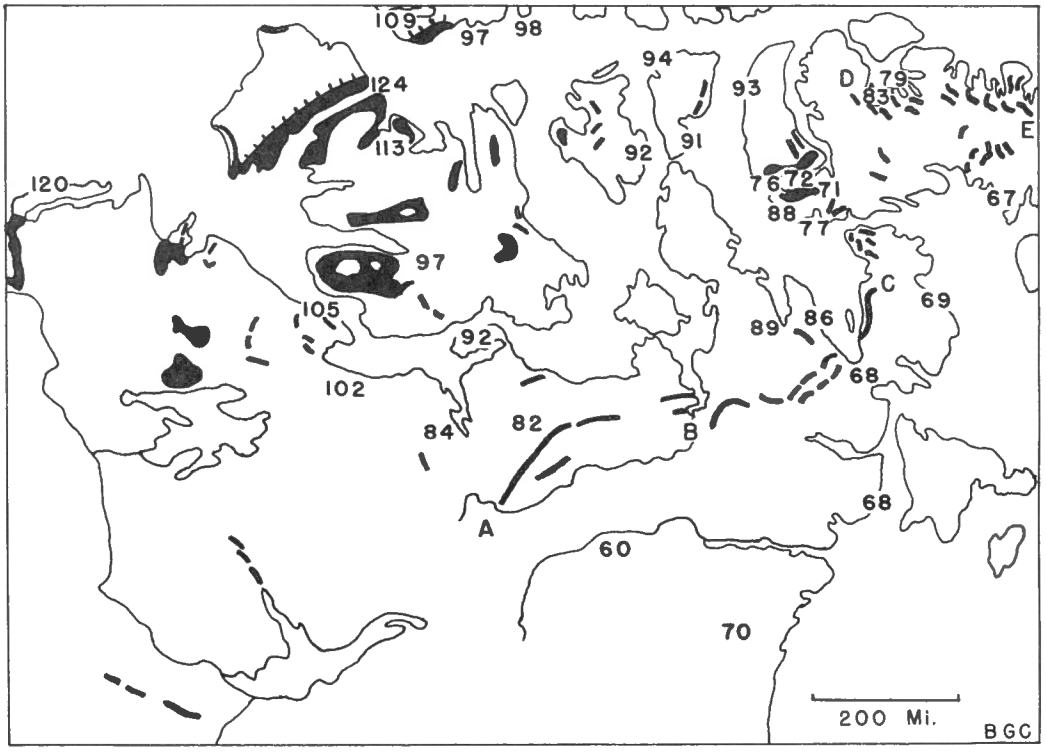

Figure 1. Moraines and early post-glacial radiocarbon dates in the northwest part of the region covered by the Wisconsin Laurentide ice-sheet. Hachured line is assumed northwest limit. Radiocarbon dates expressed in hundreds of years. This report is concerned with the moraines in the zone ABCDE.

KEEWATIN-BAFFIN MORAINES

A zone extending from the Back River near the south end of Beechey Lake at A (see Fig. 1) for about 225 miles to the northeast, thence east to the south end of Committee Bay, and thence north to midway along the west side of Melville Peninsula to point C contains a complex of single and multiple morainal ridges. Various segments of the moraines in this zone have been figured by Flint (1957, Fig. 18-3, from an unpublished map compiled by Falconer), Sim (1960), Craig (1961), Blake (1963), and Fyles and Craig (in press). Another complex system extending along the northeast side of Baffin Island (D to E and easterly) has been mapped by Ives and Andrews (1963) and named the Cockburn end-moraine system. Between these two zones (i.e. between C and D, Fig. 2) a complex of small morainal segments occurs along the northern third of the west side of Melville Peninsula (Craig, 1965) and a widespread system of massive moraines occurs in the Bernier Bay - Berlinguet Inlet and southern Admiralty Inlet regions of northwest Baffin Island (Craig, 1964).

Falconer et al have suggested that these morainal segments and systems together delineate "the northern and eastern borders of a late-Wisconsin ice sheet" centred over Hudson Bay between 8,000 and 9,500 years ago, although the whole complex of the Cockburn system on Baffin Island represents a much longer period of time. They further suggest a correlation with the Cree Lake moraine in northern Saskatchewan, moraines in northern Manitoba and Ontario, the Cochrane readvance, and a system of moraines in northern Labrador-Ungava. Their correlation across the northern part of this series is based on the near contemporaneity of the estimated ages of the various segments and the "spatial near-continuity of the system".

The concept of a continuous ice front along the Cockburn moraine system of Ives and Andrews (D to E and eastward, Fig. 1) is well documented. Similarly, the moraines in the zone A to B to C (Fig. 1) may also represent a continuous ice-frontal position although at point B correlation of the various segments of moraine cannot be done with certainty. On the other hand, from C to D, a segment some 300 miles in length of the edge of the ice-sheet as outlined by Falconer et al, the morainal features display no continuity (see Fig. 2), many are at right angles to the inferred ice-sheet margin, and some represent edges of valley ice tongues that existed during deglaciation. Furthermore, at the northern end of Melville Peninsula the moraines appear to be of more than one age.

The position of the moraine midway in the sequence of deglaciation is evident from Figure 1, both from its spatial position and the chronology

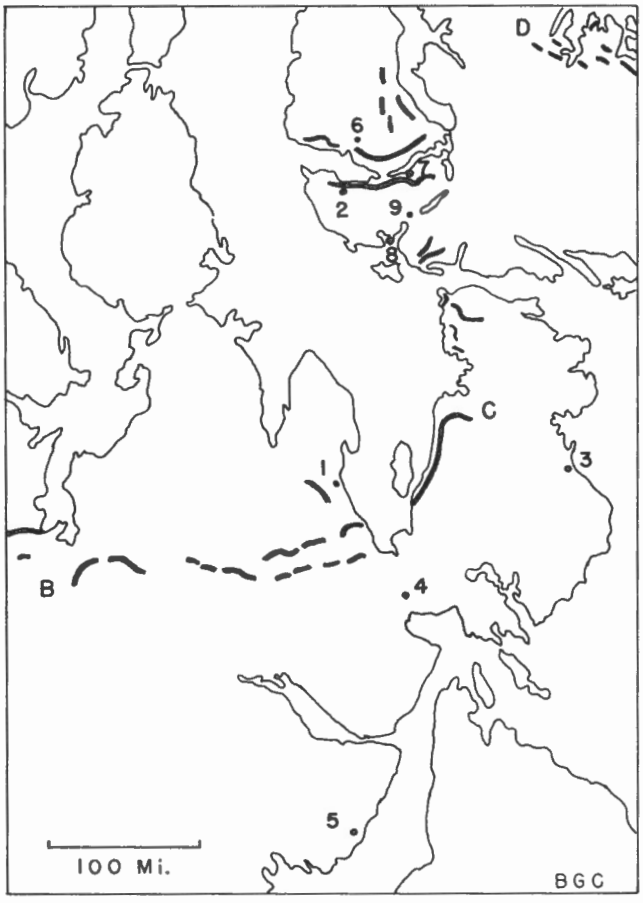

Figure 2. Generalized position of end moraines and location of radiocarbon samples in northwest Baffin Island, Melville Peninsula, and northeast District of Keewatin.

as illustrated by the distribution of radiocarbon dates. New dates bearing upon the age of these morains are presented in Table I and located on Figure 2.[1]

Dates at localities 1 and 2, together with a series of dates on samples collected by the writer some 60 miles northwest of locality 1 (Craig, 1961; Dyck and Fyles, 1962, pp. 24-25) indicate that the sea had penetrated and the ice had left the Gulf of Boothia and Committee Bay at least 8,600 years ago and perhaps a few hundred years earlier. Dates at localities 3, 4, and 5 indicate that the sea had entered this part of Foxe Basin and Hudson Bay 7,000 years ago. These two groups of dates bracket the age of the moraine segment A to B to C (Fig. 1). They are compatible with the age suggested by Blake (1963) for the segment A to B and also with the dates reported by Ives and Andrews (1963) for the segment D to E (the Cockburn moraine).

Dates from localities 2, 6, 7, 8, and 9 (Fig. 2) give some indication of the pattern and time of ice retreat in the segment C to D. In the general region of these localities tongues of active ice continued to flow in the major valleys after the higher areas around them became ice-free. The large moraines along either side of the Bernier Bay-Berlinguet Inlet trough appear to have formed along the margins of a tongue of ice in the trough, although the northern moraine is partly interlobate. Dates at localities 2, 6, and 7 show that ice may have remained inside the moraine until about 7,600 years ago but the area to the south had become ice-free at least 8,800 years ago. Collectively, the four younger dates, from localities 6, 7, 8, and 9, relate to the late valley ice tongue phase of deglaciation and closely approximate the time of formation of the moraines along the trough. The moraines northwest of locality 6 are not related to the system along the trough but appear to have been formed largely by a remnant ice mass lying to the north.

It appears from the available radiocarbon dates that the moraine segments began to form no longer than 9,000 years ago or possibly a few hundred years later, and that the ice frontal positions they represent had been abandoned before 7,000 years ago. Thus, although in the writer's opinion the distribution of the moraines does not provide an adequate basis for reconstruction of an ice marginal position between C and D as shown by Falconer et al, the available radiocarbon dates do not contradict such a reconstruction. The opening of Hudson Bay - Foxe Basin to the sea further complicates the picture as presented by Falconer et al. If the entry of the sea overlapped the time of formation of the morainal features discussed

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[1] The dates on Figure 2 and all but one of those on Figure 1 are for marine shells from close to the marine limit and thus are minimum dates for ice withdrawal. However, as the sea encroached directly over the land as the ice retreated, they probably are close to the actual time of ice withdrawal.

above, as suggested by some radiocarbon dates, their concept of a diminished Wisconsin ice-sheet is not appropriate. Furthermore, it is unknown whether or not there was a marine connection between the Gulf of Boothia and Foxe Basin while the ice still stood at some of the moraine segments within the area.

TABLE I

List of Radiocarbon Dates[1]

Locality No. (Fig. 1)	Dating No.	Elevation (ft. a.s.l.)	Location (N. Lat. -W. Long)	Age (years B.P.)
1	GSC-288	624	67°49' - 88°25'	8620 ± 140
2	GSC-183[2]	392	70°53' - 88°06'	8830 ± 170
3	GSC-291	441	67°52' - 82°10'	6880 ± 180
4	GSC-286	397	66°44' - 86°42'	6850 ± 140
5	GSC-289	415	64°19' - 88°29'	6830 ± 170
6	I-1254[2]	285	71°17' - 87°43'	7576 ± 500
7	GSC-304	293	70°55' - 86°27'	7240 ± 150
8	GSC-306	319	70°20' - 86°48'	7690 ± 140
9	GSC-307	319	70°36' - 86°08'	7120 ± 140

[1] Radiocarbon dates designated GSC- have been determined by W. Dyck of the Geological Survey.
Dating No. I-1254 determined by Isotopes Inc. of Westwood, New Jersey.

[2] see Geological Survey of Canada radiocarbon dates IV in Radiocarbon, vol. 7, 1965.

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