

- <sup>1</sup>Ice shove ridge, lake rampart, ice-push ridge, walled lake, ice terrace, ice rampart, etc.
- <sup>2</sup>Howell, J. V. ed. 1960. Glossary of geology and related sciences. Washington: American Geological Institute. 325 pp.
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#### ACCESS TO MEIGHEN ISLAND, N.W.T.\*

Meighen Island (80° N. 100° W) lies in the centre of the northwest edge of the Queen Elizabeth Islands (Fig. 1) and its northern coast fronts on the Arctic Ocean. Sverdrup and Peary Channels, which separate Meighen Island from Axel Heiberg and Ellef Ringnes Islands, are generally filled with ice during the summer months. The season of maximum open water occurs in early September, but at this time floes of heavy polar ice move into the channels. The island is one of those never visited by surface vessels, and is very likely to retain this distinction for some time as it is of little economic interest compared with other equally inaccessible islands in the western Queen Elizabeth group.

\* Based on meteorological observations recorded over three field seasons by K. C. Arnold, Canada Department of Mines and Technical Surveys, as part of the Geographical Branch's contribution to the Polar Continental Shelf Project.

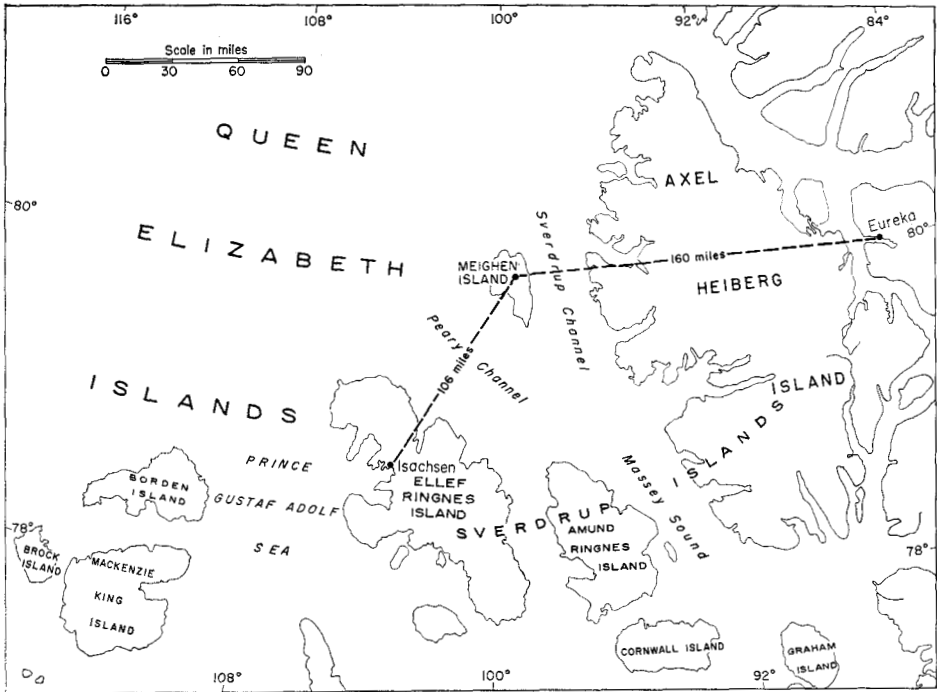


Fig. 1. Air distances from Isachsen and Eureka to Meighen Island ice cap station.

When in 1916 Stefansson discovered his "Second Land," named Meighen Island in 1921, he had made the journey from Ellef Ringnes Island by dog sledge. The same mode of travel would have been used, of course, by F. A. Cook in 1908 when, as it was later thought, he discovered Meighen Island. The most recent visit to the Island by dog sledge was in 1957 when R. Thorsteinsson of the Geological Survey of Canada found in Stefansson's discovery cairn a note left by H. K. E. Krueger who had disappeared in the vicinity in 1930.

Within the last ten years the use of light aircraft has become the principal method of reaching the remote northern islands. Meighen Island has a small ice cap that has been studied by glaciologists, geophysicists and others since 1959 as part of the work of the Polar Continental Shelf Project which had its main field base at Isachsen on Ellef Ringnes Island.

The ice cap station lies 106 air miles from the weather station and airstrip at

Isachsen (established April 1948) and 160 air miles from Eureka (established April 1947). Meighen is much easier of access from Isachsen, as the 7,000 ft. high mountains of Axel Heiberg Island lie between the ice cap station and Eureka.

Poor visibility and low ceilings are typical of the summer months in the islands close to Isachsen. The small ice cap on Meighen Island increases the likelihood of fog, and this station has always had a poor reputation among pilots working with the Polar Continental Shelf Project. This paper is intended to show how far this reputation is justified and, as the ice cap is likely to remain an object of continuing scientific interest, the data may be an aid to both long-range planning and day-by-day field and flight operations.

Table 1 (A) confirms that freezing temperatures and obstruction to vision are more common at Meighen Island than at Isachsen during the "summer" months. Wind speed at Meighen Island

was under-recorded, as the observations were taken at 6 ft. above the ice cap surface with a hand-held anemometer. The anemometer height at Isachsen is 45 ft.

During early June and late August, obstruction to vision at Isachsen and Meighen Island is mainly caused by blowing snow. Fog is frequent at Meighen Island throughout June, July and August. Table 1 (B) compares the occurrence of fog at Isachsen and the Meighen Island ice cap station on the basis of synoptic observations.

A flight from Isachsen to Meighen Island in a small aircraft such as a Beaver or an Otter would take a little less than an hour, and three hours is ample for the average round trip. To estimate the probability of a successful round trip, these criteria have been chosen:

#### At Isachsen

Visual Flight Rules minima (visibility 3 miles or over, ceiling 1,000 ft. or over)  
Success

#### At Meighen

Visual Flight Rules minima (visibility 3 miles or over, ceiling 1,000 ft. or over)  
Success  
(visibility 3 miles or over, ceiling 500 ft. or over) Probable Success

A ceiling of 500 ft. or over at the Meighen Island ice cap station, given visibility of 3 miles, is considered a probable success because:

- The ice cap station is 791 ft. above sea level; the weather station at Isachsen is 97 ft. above sea level, and the airstrip elevation is 175 ft.
- The highest point within 35 miles is the summit of the ice cap at 878 ft. (height determined in 1960). This is 1½ miles south of the ice cap station.
- An aircraft flying from Isachsen to Meighen Island would normally remain below cloud for the whole flight.

Table 1. A brief comparison of Isachsen and Meighen Island weather records.<sup>1,2,3</sup>

	1960		1961		1962	
	Isachsen	Meighen*	Isachsen	Meighen†	Isachsen	Meighen††
A: Percentage of days with condition occurring						
Freezing temperatures						
June	73	82	100	100	69	92
July	45	76	100	97	29	61
August	58	58	77	84	75	87
Precipitation						
June	41	27	83	47	61	31
July	52	28	80	24	29	29
August	32	13	55	52	63	57
Obstruction to vision (visibility ½ mile or less)						
June	5	68	16	90	27	69
July	16	72	32	94	16	48
August	39	74	0	81	54	87
Winds over 18 m.p.h.						
June	32	32	52	77	65	62
July	29	17	32	84	13	6
August	16	13	45	58	54	35
B: Percentage of observations when fog was reported						
June	15	47	54	52	22	61
July	18	47	43	75	6	24
August	21	69	42	65	35	68

Notes: 1960: Record 9-30 June (22 days) \*Irregular observations — 45% of complete record  
1962: Record 5-30 June (26 days) †Regular 3-hourly observations  
1962: Record 1-23 Aug. (23 days) ††Regular 6-hourly observations

With the assumption that observations of flying weather at a synoptic observation were representative of conditions during the following three hours, Fig. 2 was drawn to show the proportion of suitable conditions for take-off at Isachsen, for landing and take-off at Meighen Island, and for completing a round trip. Favourable opportunities tend to occur in a few long spells of fine weather. Rapid fluctuations of weather are more common at the ice cap station than at Isachsen, and Fig. 2 also indicates that weather at Meighen Island is the primary factor limiting access by air from Isachsen.

These probabilities, based on relatively good and bad seasons (Fig. 3), may be useful for planning work on Meighen Island. The pilot, however, is more interested in day-to-day probabilities with some element of prediction, and with this in mind some other parameters are considered.

A fair correlation existed between daily mean and daily maximum temperatures at Meighen Island and at

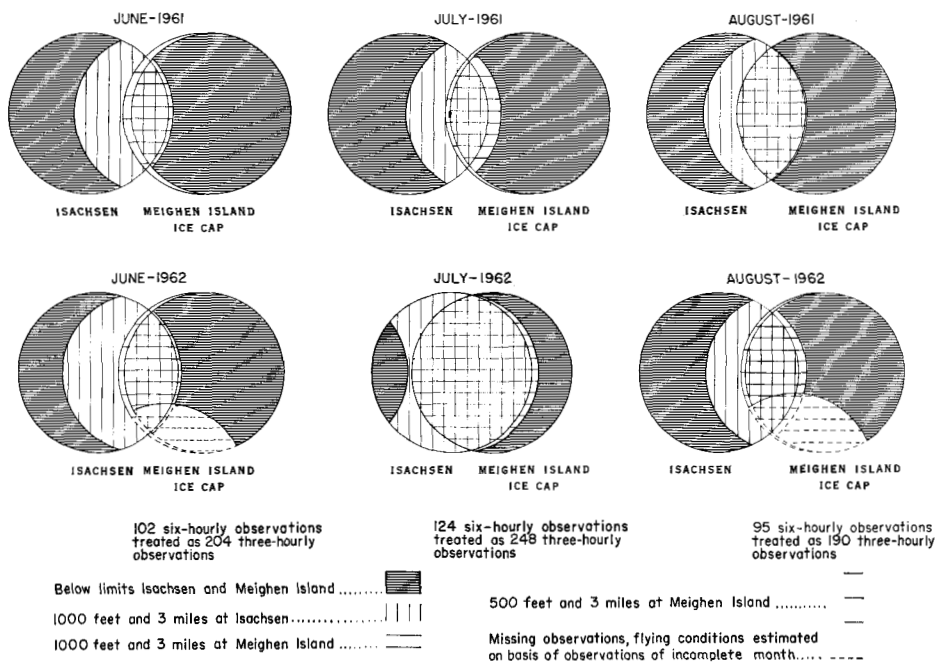
Isachsen in 1960, 1961 and 1962, with the exception of July 1960; in that month there were 23 days of fog at Meighen Island compared with 5 at Isachsen.

**Table 2.** Covariability of Isachsen and Meighen Island Temperatures<sup>1,2,3</sup> (product-moment correlation coefficients).

	<i>Daily Maximum</i>	<i>Daily Mean</i>
1960	June 0.740	0.852
	July 0.346	0.472
	August 0.609	0.826
1961	June 0.927	0.935
	July 0.849	0.765
	August 0.934	0.945
1962	June 0.696	0.645
	July 0.848	0.892
	August 0.786	0.787

As a fairly high degree of correlation exists in most months, it may be useful to examine the temperature-dew point differences. To quote from MANOBS<sup>4</sup>:

"The height of the base of cumuliform cloud may be estimated with a fair



**Fig. 2.** Flying conditions at Isachsen and Meighen ice cap, summers of 1961 and 1962.

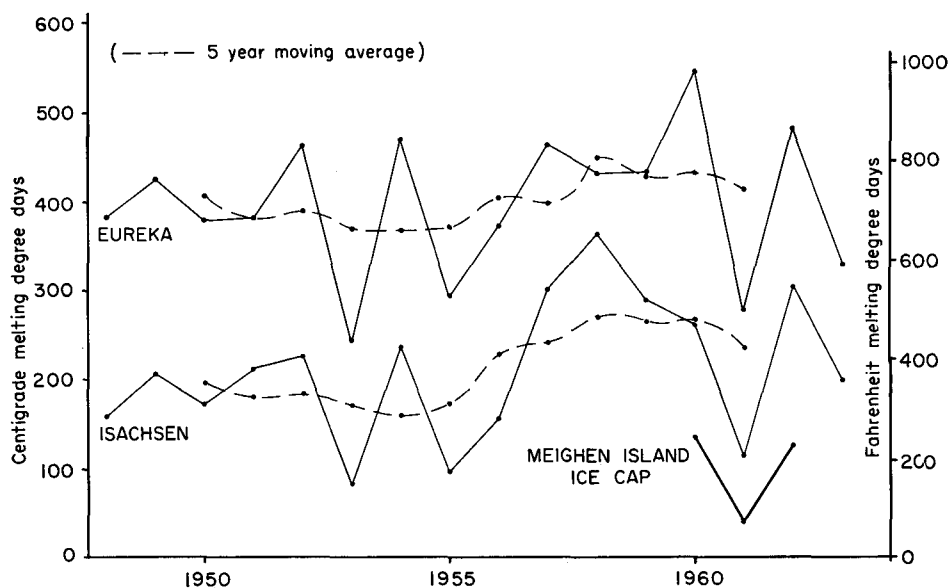


Fig. 3. Melting degree days at Isachsen, Eureka and Meighen Island ice cap stations.

degree of accuracy by multiplying the difference between the temperature and the dew point ( $^{\circ}$  F) by 225 to give the height in feet. Observers in mountainous districts should not use this rule, as it is not correct in these regions. Also this method should be used with caution when the temperature is below freezing, because of the difficulties inherent in the accurate determination of the dew point at low temperatures. To facilitate the use of this method, the following table may be used": (given in part below)

Diff. ( $^{\circ}$ F)	Hgt. (ft.)
4	900
5	1100
6	1300
7	1600
8	1800
9	2000
10	2200

The differences between dry bulb and dew point temperatures at Isachsen have been taken for the periods that a flight from Isachsen was possible, and are presented in Table 3 in relation to success, probable success and failure.<sup>2,3</sup>

This Table shows that, given favourable weather for leaving Isachsen, the chances of completing a round trip are

more favourable when there is a spread of  $5^{\circ}$  F. or more between the dry bulb and dew point temperatures. For example, in 1961 as a whole, with a  $4^{\circ}$  F. spread the chances were 2 to 1 against success; and with a  $6^{\circ}$  F. spread the chances were 2 to 1 in favour. The relationship was not so marked in 1962; in that year a  $4^{\circ}$  F. spread gave an even chance. With the exception of the unusually favourable month of July, 1962, there was little likelihood of a successful round trip with a dry bulb-dew point spread of  $2^{\circ}$  F. or less.

An attempt was made to relate failures with a high dry bulb-dew point spread to wind speed and direction, as it was thought that access to Meighen Island could be hindered by blowing snow in early June and late August, and by fog being carried in from open water areas during the middle of the season. Using the Isachsen data, no relationship could be found, and if these influences do in fact exist, they are presumably too local in character to be predictable. At Meighen Island the incidence of fog was uniformly distributed through the hours of the day, and the relationship of fog to wind direction was not consistent from month to month.

**Table 3.** Dry Bulb-Dew Point spread at Isachsen, when 1000 ft. ceiling and 3 miles visibility prevails, related to success or failure of access to Meighen Island.

Dry Bulb minus Dew Point	1961								
	June			July			August		
	Success	Probable	Failure	Success	Probable	Failure	Success	Probable	Failure
10 and over				3			7		
9	1			0			5		1
8	1			2			5		0
7	4	2	1	3		1	5		3
6	4	1	0	0		2	5		3
5	7	0	9	6		4	10		2
4	1	4	23	2		6	6		11
3	7	1	27	6		15	18	1	16
2	4	2	12	8	1	12	6	0	17
1	1	0	9	3	1	22	8	0	7
0	0	0	0	0	1	2	1	0	0
Totals	30	10	81	33	3	64	76	1	60

Dry Bulb minus Dew Point	1962								
	June			July			August		
	Success	Probable	Failure	Success	Probable	Failure	Success	Probable	Failure
10 and over				64					
9	3		1	18	1	2	1		
8	2		2	13	0	1	1		
7	3		9	10	1	3	4		2
6	5		7	11	0	4	4		2
5	6		5	17	0	4	9		1
4	13	1	17	7	0	7	8		6
3	6	2	13	13	0	14	9		13
2	5	1	14	6	0	9	3	2	14
1	1	2	14	2	0	4	3	1	12
0	0	1	2	3	0	3	0	0	0
Totals	44	7	84	164	2	51	42	3	50

It is evident from the 1961 and 1962 records representing colder and warmer than average conditions respectively, that the Meighen Island ice cap station had consistently poorer weather than Isachsen. This limits the access by light aircraft when VFR conditions exist at Isachsen. Fog is the chief hazard, but is hard to predict, and a party planning glaciological work on Meighen Island should allow an ample margin of time to cover delays due to unsuitable flying conditions.

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<sup>1</sup>Canada. Meteorological Branch. Arctic Summary, 1960.

<sup>2</sup>\_\_\_\_\_. Arctic Summary, 1961.

<sup>3</sup>\_\_\_\_\_. Arctic Summary, 1962.

<sup>4</sup>\_\_\_\_\_. Manobs. CIR-3450, OBS-300 as amended April 8, 1963. 1.7.6.5.

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### The Arctic in the news since 1929

The library of the Ecole des Hautes Etudes Commerciales in Montreal has recently been given an interesting collection of newspaper clippings dealing with the arctic regions and in the larger part with the Canadian north. These clippings have been collected since 1929 by Dr. Gerard Gardner, Professor of Biology at the school, who has been on several expeditions to Labrador and the Hudson and James Bay regions. There are about 60,000 clippings mounted in volumes by region, subject and year, from such newspapers as *The Northern Miner*, *The Northern Mail*, *The Winnipeg Free Press*, *The News of the North*, *The Evening Telegram* (St. John's, Newfoundland), *The Financial Post*, *The Gazette* (Montreal), *The Star* (Montreal), *Le Canada*, *La Presse*, *Le Devoir*, etc. Plans are being made to index the clippings in detail.

This collection, an interesting research tool for economists and historians, is available to the public for reference.