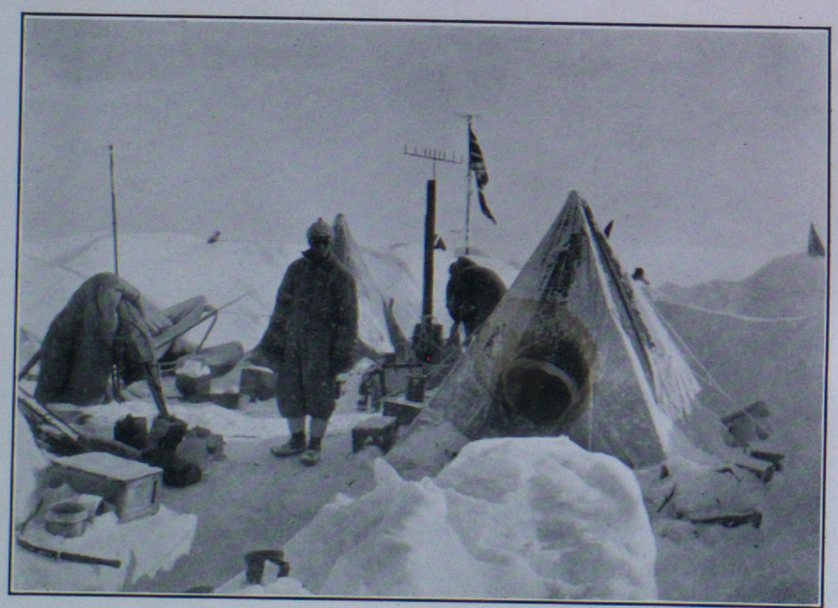
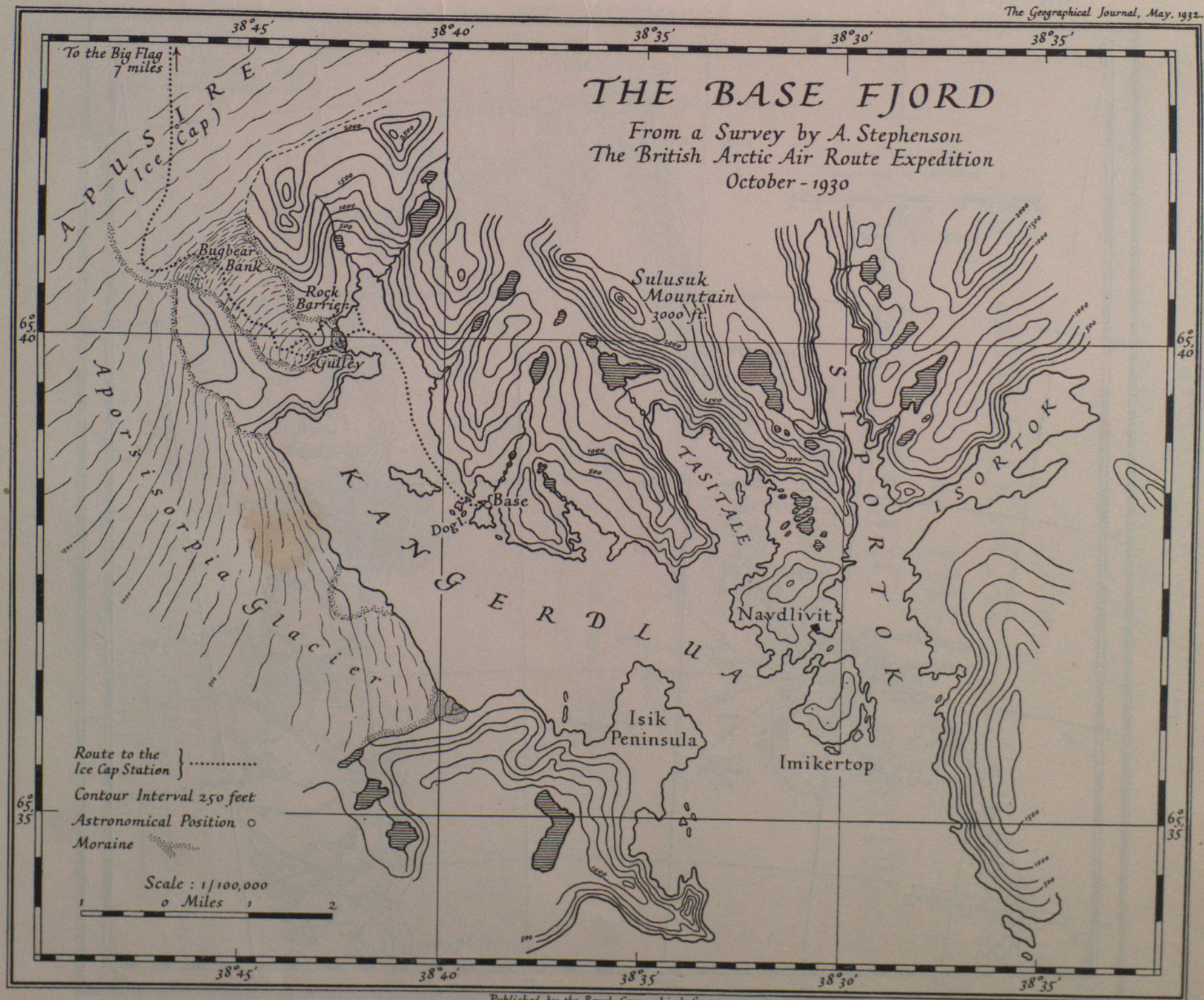
ROUTE ACROSS FJORD TO BUGBEAR BANK.
[Reproduced from the *Geographical Journal*, **79**, 1932, facing p. 358.]



THE METEOROLOGICAL STATION ON THE INLAND ICE AT AN ALTITUDE OF 8,200 FT.



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GREENLAND
British Arctic Air Route Expedition

Frontispiece II

Southern Greenland, showing the Seven Journeys of

THE BRITISH ARCTIC AIR ROUTE EXPEDITION

1930-31

The Geographical Journal, May, 1932.

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GREENLAND

British Arctic Air Route Expedition

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(*Fourth Number, Volume VII*)

METEOROLOGICAL RESULTS OF THE BRITISH ARCTIC AIR-ROUTE EXPEDITION 1930-1

By S. T. A. MIRRLEES, M.A.

Published by the Authority of the Meteorological Committee

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METEOROLOGICAL RESULTS OF THE BRITISH ARCTIC AIR-ROUTE EXPEDITION 1930-31

§ 1—INTRODUCTORY

The British Arctic Air-Route Expedition carried out a large programme of work in Greenland during parts of 1930 and 1931, the main object being to investigate the possibility of an air route from England to North America via Greenland. The expedition was under the leadership of H. G. Watkins who unfortunately lost his life in the course of a subsequent expedition. The meteorological work was in the charge of Q. Riley, who had the assistance of various members of the party in carrying on meteorological observations at the Base station of the expedition in East Greenland.

Observations were also carried on at a station on the inland ice by

Q. Riley Lieut. M. Lindsay, R.S.Fus.	Sept. 8–Oct. 4.
Flight-Lieut. N. H. D'Aeth, R.A.F. Surg.-Lieut. E. W Bingham, R.N.	Oct. 5–Dec. 4.
A. Courtauld	Dec. 5 onward.

The latter carried on the programme of observations until March 20 when the increasing deposits of drift snow prevented his egress. The barograph was kept in operation until April 26. A relief party reached the station on May 5, after which it was abandoned. Most of the work of the expedition has been fully discussed in works which have already appeared (1), (2)* but only a short preliminary account of the meteorological work has yet been published (3) and the present is intended as a more complete discussion of the records handed over to the Meteorological Office after the expedition returned to this country.

§ 2—THE OBSERVATIONS

The Base station was established near the head of a small fjord about 30 miles west of Tasiusak, the main settlement on Angmagssalik island, in lat. 65° 38′ N., long. 38° 39′ W., the barometer being at 51 feet above sea level. Observations were made at 9h., 13h. and 21h., mean time of 45th meridian (3 hrs. slow on G.M.T.), from August 5, 1930 to July 25, 1931.

The plans of the expedition included the setting-up of a station on the highest part of the inland ice between the Base and the west coast. The site chosen was approximately 140 miles north-west of the Base station, at an altitude of 8,000 feet (the question of a more accurate determination is discussed in § 11) in lat. 67° 3′ N., long. 41° 49′ W. Observations were made at every third hour from 7h. to 22h. inclusive, the standard of time being that of the Base station (i.e. 3 hours slow on G.M.T.) and continued for a period of about 8 months, from September 8, 1930 to April 26, 1931. During the latter part of this period, however, the observer was snowed up and the observations were incomplete.

The material handed over to the Meteorological Office included the " Pocket Registers," barograms and weather logs from the two stations, as well as a number of observations made during various sledge journeys (1), and observations of temperature in the upper air made during several seaplane flights. The primary object of the meteorological observations being the investigation of " flying weather "

* The numbers in brackets refer to the bibliography on p. 35.

on the Greenland coast and on the Ice Cap the various elements are discussed in the order of their importance from this point of view instead of in the traditional order, thus the first part is devoted to visibility, after which follow the sections on cloudiness, wind, temperature and pressure.

§ 3—VISIBILITY

Base.—The scheme of observations adopted was that given in the "Meteorological Observer's Handbook": objects were selected as nearly as possible at the specified distances from the point of observation and the farthest visible object was noted at each observation hour. Table I shows the objects and distances. The objects were viewed from the site of the Stevenson screen.

TABLE I—DISTANCES OF VISIBILITY OBJECTS AT BASE

Object	Standard distance	Actual distance
A	27 yards	—
B	55 ,,	45 yards
C	110 ,,	110 ,, } Fog
D	220 ,,	220 ,,
E	550 ,,	450 ,,
F	1,100 ,,	1,075 ,,
G	1¼ mi.	1¼ mi.
H	2½ ,,	2⅔ ,,
I	4 ,,	4¼ ,,
J	6¼ ,,	6¾ ,,
K	12½ ,,	} no available object
L	18⅔ ,,	
M	31 ,,	

Table II shows the percentage frequencies of occurrence of the different grades of visibility in the various months. To avoid repetition it may be noted that August to December, unless otherwise specified, are of 1930 and January to July of 1931.

TABLE II—PERCENTAGE FREQUENCY OF OCCURRENCE OF DIFFERENT GRADES OF VISIBILITY AT BASE STATION

Combined observations at 9h., 13h. and 21h.

Visibility grade	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June	July
A	—	—	—	—	—	—	—	—	—	—	—	—
B	—	—	—	—	—	1	1	—	—	—	—	—
C	1	1	—	—	—	—	1	—	—	—	—	—
D	—	1	1	3	2	7	1	1	—	—	—	—
E	2	1	4	2	2	2	3	—	8	3	—	—
F	2	—	3	—	1	1	6	15	11	1	—	—
G	2	3	9	—	4	2	—	2	—	1	—	—
H	9	10	5	1	4	3	5	3	6	5	3	—
I	23	15	8	2	4	2	1	—	3	6	—	—
J	61	67	70	92	83	82	82	79	72	84	97	100
K	—	2	—	—	—	—	—	—	—	—	—	—

The outstanding point in Table II is the large proportion of good visibilities; had suitable objects been available, it is probable that the modal visibility would have been better than Table II shows, but the restricted field of view in the enclosed fjord permitted no object more distant than $6\frac{3}{4}$ miles, and, as Table II shows, the observers on very few occasions gave estimates of the higher grades of visibility. Actually the transparency of the air appears to have been often superior to that appropriate to visibility J, and on one occasion, during a flight on August 18, it was estimated that at 10,000 feet the visibility was 180 miles. It may be noted that the distance exceeds considerably the distance of the visible horizon for the height quoted.* The lower grades of visibility appear mostly to be associated with precipitation—rain in the warmer months, driving snow in the colder months.

On several occasions, however, patches of fog were observed in the distance; these occurred mainly in the summer months and had presumably drifted in from the outer coast where fog is known to occur frequently in summer. Table III gives also, for comparison, the normal occurrences of fog at Angmagssalik.

TABLE III—OCCURRENCE OF FOG AT BASE

	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
Number of days when "fog patches" were noted at Base.. ..	1	2	1	0	2	1	3	0	0	11	4	5
Normal occurrences of fog at Angmagssalik (days per month) ..	7	4	3	1	0·4	0·8	1	1	3	7	9	8

This decrease in probability of fog towards the head of a fjord is a well-known feature of the climate of Greenland.

During several flights in summer for the survey of the coast northward of the Base it was observed that out at sea over the pack there was low fog extending up to 50 or 100 feet. Whether this is the usual state of matters, and whether a ship running into fog over the pack, when approaching the coast, could invariably depend on a belt of open water free from fog near the coast, the present data are not sufficient to say, but the observers are of opinion that this is often the case.

Ice-Cap Station.—The absence of landmarks and the difficulty of judging distances on the surface of the Ice Cap make the observations of visibility a matter of some difficulty. For part of the time the only objects available were the small flags about one foot square of red colour, which had been set up to mark the route between the Ice-Cap station and the Base; later other objects were set up, but during the whole period there were no objects for I to M inclusive. The observations began on September 8 and continued almost without interruption up to the end of January. Outdoor observations were interrupted at times in February and March

* The following other instances of excellent visibility are quoted by Fl.-Lt. N. H. D'Aeth:
August 31, Cape Dan (about 2,000 ft. high) seen 220 miles away from a height of 10,000 ft.
(several occasions) Kijilak Mt. (3,200 ft.) seen 120 miles away from a height of 10,000 ft.

and ceased after March 20. Table IV gives a list of the visibility objects which were used.

TABLE IV—VISIBILITY AT ICE CAP STATION

Object	Standard distance	Actual distance	Name of object
A	27 yards	20 yards	Stevenson screen.
B	55 ,,	55 ,,	Four-gallon paraffin tin.
C	110 ,,	110 ,,	Two four-gallon paraffin tins.
D	220 ,,	240 ,,	Two boxes (2 feet high).
E	550 ,,	440 ,,	1st flag.
F	1,100 ,,	880 ,,	2nd ,,
G	1¼ mi.	1 mi.	4th ,,
H	2½ ,,	1¾ ,,	7th ,,

B, C and D were set up on December 24.
No objects available for I to M inclusive.

Table V gives the results of the observations in similar form to Table II, also the number of days with " fog," i.e. with visibility E or lower, at one or more of the observation hours. The surprising result, that in the months November to February, with an average temperature of −27° F., " fog " is present at nearly half the observation hours, makes a closer examination of the data desirable.

TABLE V—PERCENTAGE FREQUENCY OF OCCURRENCE OF DIFFERENT GRADES OF VISIBILITY AT ICE CAP STATION

Combined observations at 7, 10, 13, 16, 19 and 22h.

Visibility grade	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.†	Mar.‡
X*	—	—	—	—	1	—	—
A	1	—	2	2	5	2	—
B	1	—	17	17	7	2	2
C	4	8	4	10	6	6	6
D	14	13	10	4	10	18	8
E	1	4	10	17	13	19	2
F	7	8	5	15	24	16	10
G	6	6	12	29	33	24	13
H	66	61	40	6	1	13	59
Total days with fog	11	14	21	21	24	18	7

* Object A not visible.
† 125 observations.
‡ 50 observations.

An examination of the weather diaries was therefore made and any notes regarding the causes of impaired visibility were summarized (Table VI).

This makes it clear that the main cause of visibility falling to E or lower was drifting snow. Frequently the layer of drift was observed to be shallow, the zenith

TABLE VI—WEATHER ASSOCIATED WITH IMPAIRED VISIBILITY AT ICE-CAP STATION

All observation hours.

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
Percentage visibilities E or lower	21	25	43	50	42	47	18
Percentage associated with drift snow ..	1	13	32	26	26	24	14
Percentage associated with precipitation	9	6	6	8	7	2	4
Percentage associated with fog	9	4	3	10	6	15	—
Percentage not accounted for	2	2	2	6	3	6	—

being clear. At its best, the visibility was probably much more than the entry H indicates, as on several occasions entries such as " excellent visibility " were made in the weather diary corresponding with entries of H in the " Pocket Register." The question arises how far the results of Tables VI and V, based on observations in widely varying intensities of illumination are fairly comparable in the different months. On the " shortest day " for example the sun at maximum altitude had only about half its diameter above the horizon, the duration of sunshine appropriate to the latitude of the station being about an hour and a half.

Table VII therefore gives in form similar to Table VI, the results for 13h. only, being the observation hour nearest to noon.

TABLE VII—WEATHER ASSOCIATED WITH IMPAIRED VISIBILITY AT ICE-CAP STATION

13h.

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
Percentage visibilities E or lower	13	19	46	45	54	54	14
Percentage associated with drift snow ..	—	10	40	28	45	46	7
Percentage associated with precipitation	4	6	3	7	6	—	7
Percentage associated with fog	9	3	3	7	3	8	—
Percentage not accounted for	—	—	—	3	—	—	—

Altogether there were 10 days, out of 182 days with observations at 13h., on which the visibility at 13h., was E or lower and on which the impaired visibility could be attributed neither to precipitation nor to the drifting of snow. The observations on these 10 days were examined for any indication whether the obscurity could be associated with the presence of water in the atmosphere whether as ice particles or as super-cooled drops—the occurrence of the latter is not uncommon on the Ice Cap of Greenland in the summer months (4), and it was hoped to investigate occurrences at lower temperatures. On one occasion only was the deposit of rime observed in association with " fog " at 13h., with an air temperature of 0° F. No

other of the 10 days mentioned above gave evidence of the possible presence of super-cooled water drops near the surface of the Ice Cap (5). On one occasion a lunar corona (6) was observed in the evening, but no optical phenomena at 13h. On three of the other eight occasions of fog at 13h., the obscurity may be inferred to be due to the presence of ice crystals, as shown by the observation of halo phenomena at the time of observation or later and on one due to " fog " formed by surface cooling during a period of intense outward radiation (air temperature —46°F.), a process which has often been observed to produce fog on the Ross Barrier of Antarctica (7).

The entries of " ground mist " which appear on several occasions in October and November may refer to the same phenomenon.

On two of the occasions the surface wind had an easterly component and it is probable that incipient condensation in the air which was ascending the slope of the Ice Cap may have been the cause of the lowered visibility. On the remaining two occasions there is no indication as to the cause of the fog. It may be mentioned that there were some observations of rime other than at 13h. (Table XVIII) not accompanied by fog, but on the whole it appears that the occurrence of super-cooled water drops near the surface of the Ice Cap is rare after September.*

The variation in illumination as between say 7h. and 13h., in the darker months makes it doubtful whether any deductions regarding an apparent diurnal variation of visibility could be regarded as of value ; it may be stated that impaired visibility due to drifting snow generally occurred more frequently from 10h. to 19h., than at 7h. or 22h.

The observations show that the chief cause of fog, that is of a horizontal range of vision less than 1,100 yards at the surface of the Ice Cap in the period September to March is drifting snow ; in a month with much wind, fog may be reported at nearly one observation in every two. On clear days, however, the visibility is extremely good (8).

It is often the case that the drifting snow is in a shallow layer at the surface and probably at times the depth of the layer of drift is only a few feet, but there are no data as to average and extreme depths of the layer. In the case of a strong wind, and more especially with precipitation, it may be expected that blizzard conditions prevail up to a considerable height.

§ 4—CLOUDINESS

Base Station.—Observations of cloud amount, in tenths of sky covered, were made regularly, and the results are summarized in Table VIII.

TABLE VIII—MEAN CLOUDINESS, IN TENTHS OF SKY COVERED AT BASE STATION

	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June	July	Year
9h.	5·7	6·9	5·7	5·6	6·3	6·4	6·2	6·1	7·5	7·2	4·7	5·2	6·1
13h.	4·8	6·2	6·5	5·8	6·9	6·2	5·8	5·7	6·9	6·7	4·8	5·5	6·0
21h.	6·0	6·0	5·3	5·1	6·1	6·3	5·3	4·6	7·0	6·4	5·7	5·0	5·7
Mean	5·5	6·4	5·8	5·5	6·4	6·3	5·8	5·5	7·1	7·0	5·1	5·2	5·9

The mean value for the year may be compared with the normal of 6·4 for Angmagssalik. April and May were the only months in which the cloudiness exceeded the normal for Angmagssalik.

*See also §12.

Table IX gives the distribution of days with mean cloudiness in specified ranges in the various months.

TABLE IX—NO. OF DAYS ON WHICH MEAN CLOUDINESS FOR THE DAY (MEAN OF ALL OBSERVATIONS) WAS WITHIN SPECIFIED LIMITS AT BASE STATION

	Limits (tenths of sky covered)					No. of days considered
	0	1–3	4–6	7–9	10	
August ..	3	5	7	12	0	27
September ..	1	7	3	10	7	28
October ..	2	11	2	9	7	31
November ..	1	10	4	10	5	30
December ..	1	6	9	6	9	31
January ..	4	4	6	8	9	31
February ..	2	7	6	9	4	28
March	5	8	3	5	10	31
April	2	4	4	5	14	29
May	5	5	4	7	10	31
June	2	9	9	6	4	30
July	2	9	1	10	3	25

Ice-Cap Station.—Tables X and XI give for the Ice-Cap station similar data to those given in Tables VIII and IX for the Base. High cloud types appear to

TABLE X—MEAN CLOUDINESS, IN TENTHS OF SKY COVERED AT ICE-CAP STATIO N

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
7h.	5·1	4·7	4·3	3·1	3·7	3·4
10h.	4·9	4·5	4·6	4·8	3·6	4·0
13h.	4·7	5·2	4·3	5·1	3·4	3·8
16h.	5·0	4·2	4·3	4·3	4·7	3·0
19h.	4·8	3·4	4·1	3·1	4·2	2·7
22h.	4·8	4·2	3·7	2·9	4·4	3·3
Mean	4·9	4·4	4·2	3·8	4·0	3·4

(Insufficient data for March).

TABLE XI—NO. OF DAYS ON WHICH MEAN CLOUDINESS FOR THE DAY (MEAN OF ALL OBSERVATIONS) WAS WITHIN SPECIFIED LIMITS AT ICE-CAP STATION

	0	1–3	4–6	7–9	10	No. of days considered
September	1	10	3	2	7	23
October	0	17	4	8	2	31
November	3	12	7	7	1	30
December	6	10	6	3	2	27
January	5	9	5	5	3*	27
February	5	9	4	5	0	23
March	6	3	0	2	4	15†

* 3 days on which the sky was covered with high cloud.
† Several days with incomplete observations: figures for March not strictly comparable.

have prevailed in the coldest months, whereas types such as St. and Nb. were reported more frequently from September to December, more particularly with winds having southerly or easterly components. Estimates of cloud height were made for part of the time, but these have not been summarized as there were several changes of observer. At times the sun was noted to be shining through the clouds described as St. or Nb. While there is a certain correlation between the cloud conditions at the two stations, it is by no means exact and to obtain some idea of the relationship an examination was made of the occurrences of clear and dull days. Calling a day on which the mean cloudiness was 1 or less "clear" and one on which the mean cloudiness was 9 or more "dull," the occurrence of such days was tabulated. In view of the comparatively small number of days available, the results for separate months are not shown, but the results for the complete period September to March may be expressed as follows:

If at the Ice Cap the day is	clear	dull
the cloudiness at the Base is on the average	4	9
whereas—		
If at the Base the day is	clear	dull
the cloudiness at the Ice Cap is on the average	2	7

These results are of significance from the point of view of forecasting; thus a clear day at the Base is likely also to be nearly clear at the Ice-Cap station, whereas if it is dull at the Ice-Cap station it is very likely to be dull also at the Base, the chances being actually 9 out of 10.

The outstanding point which appears from consideration of the figures for mean cloudiness on individual days is that at the Ice-Cap station the most probable value of the mean cloudiness for a day is from 0 to 3, and after that 10; at the Base on the other hand the most probable figure is 10, after which 0 to 3.

Days which are dull at both stations are associated generally with winds having an easterly or southerly component; on days which are dull at the Base but only partly clouded at the Ice-Cap station the winds have often an easterly or southerly component, but tend to vary more in direction, perhaps changing from one quadrant to another during the day.

The above conclusions, it should be noted, are based only on data from the period September to March.

§ 5—WIND

Base Station.—A small Robinson cup anemometer was used to measure wind velocity until October 8, when it was blown away in a gale, after a velocity of 129 m.p.h. had been observed. After this the wind force on the Beaufort scale was estimated. The anemometer was mounted about 30 feet above the general level of the ground and therefore the table of equivalents in the "Meteorological Observer's Handbook" was used to express all wind observations in Beaufort numbers.

With regard to the immediate surroundings of the Base camp the exposure of the anemometer may be regarded as conventional, but the situation of the Base in a narrow fjord almost surrounded by high ground is such that the observations of wind must be strongly influenced by the topography.

The contour map of the region* (Frontispiece) near the Base fjord, based on the survey by Mr. A. Stephenson, shows the Base to be situated on the eastern margin and about 3 miles from the head of a small fjord which runs approximately north-north-west to south-south-east. The fjord is $1\frac{1}{2}$ to 2 miles in breadth and is bounded on the eastern side by steeply rising ground, the 1,000-foot contour being reached about $1\frac{1}{4}$ miles to north-east and the summit of the Sulusuk Mountain

* Published in the *Geographical Journal*, **79**, No. 5, May, 1932.

(3,000 ft.) lying 3 miles to north-east. On the western margin and at the head of the fjord there are steep glaciers from the Ice Cap, thus the Base lies in a sort of trough, shaped so as to give a local concentration of the flow of air from the Ice Cap. The exposure seems very suitable for illustrating the well-known tendency for the prevailing winds to blow up and down the fjords of Greenland. A general summary of the results is given in Table XII.

TABLE XII—PERCENTAGE FREQUENCIES: WIND DIRECTION AND SPECIFIED RANGES OF BEAUFORT NUMBERS AT BASE STATION

Observations at 9, 13 and 21h.

	Direction								Force			
	N.	NE.	E.	SE.	S.	SW.	W.	NW.	calm	1–3	4–7	8–12
August ..	3	0	8	36	3	0	29	3	18	73	9	0
September ..	1	0	4	23	13	2	1	3	53	46	1	0
October ..	16	2	1	21	5	0	1	10	44	48	4	4
November ..	31	1	1	4	13	4	0	1	45	40	8	7
December ..	11	7	0	1	1	1	0	0	79	16	5	0
January ..	11	9	7	3	11	0	0	2	57	16	15	12
February ..	35	0	2	3	11	0	0	0	49	27	7	17
March ..	8	1	4	8	3	1	0	1	74	18	2	6
April ..	10	5	1	2	7	0	0	1	74	21	1	4
May	2	2	9	35	6	0	0	0	46	52	2	0
June.. ..	4	1	22	9	6	3	2	1	52	45	3	0
July	4	1	4	20	25	7	0	0	39	61	0	0

This shows a fairly definite seasonal variation: in summer light south-easterly winds prevail, but calms are also frequent, and gales do not occur at the observation hours; in winter northerly winds prevail, calms are more frequent and also several gales occur, December being an exception in showing no occurrence of gale. Actually this table does not give the whole régime of the winds, as is shown below (Section 6).

Ice-Cap Station.—A small Robinson cup anemometer was in use at first but early in November the observers had trouble with ice coating the instrument. Later in November observations were mainly estimates of Beaufort force, and after December 5 the anemometer was not used for the observations at fixed hours. The question of a comparable basis for the anemometer readings and the estimates of wind force is of importance. In the absence of the usual criteria for the use of the Beaufort scale on land, it is understood that the observers relied mainly on the resistance experienced when walking against the wind. It seems probable that during the period when the anemometer was in good order the observers became accustomed to associating the Beaufort numbers with the usual velocity equivalents (9) as shown below, and these have been used to convert observations of velocity into Beaufort force. The anemometer being of the cup type may be assumed to have no appreciable error due to the lower air density at the high level.

The amount of error, if any, due to the retarding effect on the anemometer of congealed oil, we have no means of determining.

Velocity Equivalents of Beaufort Scale.

Beaufort number ..	1	2	3	4	5	6	7	8	9
Equivalents in m.p.h. at 10 m. in the open (9); stations near sea level ..	1–3	4–7	8–12	13–18	19–24	25–31	32–38	39–46	47–54

The direction was observed to 16 points, but the summaries have been formed to 8 points; entries to intermediate points were divided between the two neighbouring octants, odd entries being "thrown" clockwise.

Table XIII which gives a general summary of the observations shows a régime of winds entirely different from that shown in Table XII; winds from a northerly point prevail during the whole period of observations, calms are rare and winds of force 4 to force 7 are considerably more frequent, but gales are less frequent. There appears to be little or no indication of a regular diurnal variation of wind, and for this reason the results for the different hours of observation are not given separately. The resultant winds, i.e. vector means for the various months are given in Table XIV.

TABLE XIII—PERCENTAGE FREQUENCIES: WIND DIRECTION AND SPECIFIED RANGES OF BEAUFORT NUMBERS AT ICE-CAP STATION

Observations at 7, 10, 13, 16, 19 and 22h.

	Direction								Force			
	N.	NE.	E.	SE.	S.	SW.	W.	NW.	calm	1–3	4–7	8–12
September ..	51	17	7	7	8	2	6	1	1	95	4	0
October ..	50	13	7	5	(0)*	(0)*	0	25	0	83	17	0
November ..	33	3	4	4	1	0	2	47	6	66	28	0
December ..	34	12	16	6	0	0	1	29	2	70	28	0
January ..	22	14	20	11	3	2	4	23	1	73	21	5
February ..	19	5	2	10	0	0	16	46	2	65	30	3
March† ..	30	7	3	13	0	1	1	38	7	62	30	1

* Frequency less than 1 per cent.
† Observations incomplete; 14 to 17 occasions at various hours.

TABLE XIV—RESULTANT WINDS AT ICE-CAP STATION

	Direction °veer from N.	Beaufort number.
Sept.	14	1
Oct.	2	2
Nov.	334	3
Dec.	359	2
Jan.	49	1
Feb.	314	2
Sept.-Feb.	355	2

The variations from month to month seem greater than might be expected if the surface wind circulation at the Ice-Cap station were dominated by "katabatic" effect. The monthly charts of pressure anomaly (for mean sea level) over the northern hemisphere (10) were therefore examined, to get some idea of the variations in general conditions. Regarding the pressure isanomalies as analogous to isobars one gets a "gradient wind anomaly" which represents the difference of the general wind circulation from normal in the period considered. Owing to the scarcity of data these maps give a very generalized impression of conditions near Greenland, but an attempt was made to estimate the "gradient wind anomaly," with the result shown in Table XV. The original data on which Table XIV was

based have been used in Table XV; in view of the nature of the data only an estimate of relative magnitudes has been attempted.

TABLE XV

	Ice-Cap station. Vector difference of wind from the mean for the whole period.		General circulation. Component difference from long-period normal.	
	Direction.	Relative magnitude.	Direction.	Force.
Sept.	SE.	20	SE.	strong
Oct.	NE.	15	NE.	weak
Nov.	NW.	30	NW.	moderate
Dec.	NNE.	15	N.	weak
Jan.	SE.	30	S.	moderate
Feb.	W.	40	NW.	strong

So far as the data go, they indicate that the winds at the Ice-Cap station were not entirely due to " katabatic " effects combined with the effects of the earth's rotation, but that an effect was superposed by the general conditions on the northern hemisphere. The Ice-Cap station, however, gives the mean for a single season, whilst the other data are based on long-period normals of surface conditions. Even if the comparison is open to objection on this account, the parallelism shown in Table XV is striking. The relation of conditions at the Ice-Cap station to the conditions on the Atlantic is also dealt with below (§ 6).

§ 6—GALES

Base Station.—From the weather diaries it was obvious that a number of gales had been experienced at the Base of which the observations at fixed hours gave no trace. Altogether, the records showed 42 days with winds of force 8 or above, distributed through the period of observations as shown in Table XVI.

TABLE XVI—NUMBERS OF DAYS ON WHICH GALE (FORCE 8 OR ABOVE) WAS RECORDED

Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
					Base station.						
1	0	3	4	0	11	11	6	5	0	1	0
					Ice-Cap station.						
—	0	0	0	0	4	4	1*	—	—	—	—
					Gale at Base, but not at Ice Cap.†						
—	0	3	4	0	8	7	4	—	—	—	—
					Gale at Ice Cap but not at Base.†						
—	0	0	0	0	1	0	1	—	—	—	—
					Gale at both stations on same day.†						
—	0	0	0	0	3	4	0	—	—	—	—

* Observations incomplete.
† During period of simultaneous observations.

Of these 42 days there were 17 on which the observations at fixed hours showed no gale. The hours of observation being 9, 13 and 21, the periods between consecutive observations were 4 and 8 hours in what may be called the " day " period and 12 hours in the " night " period, so that a gale of 11 hours duration might occur in the " night " period without gale being recorded at either 21h., or 9h., but a gale of that duration occurring in the " day " period would be recorded twice.

The distribution of observations of gale was as follows:

Number of observation hours at which force 8 or above was recorded on a day with gale.

Gale force at ..	0	1	2	3	.. out of 3 observation hours.
on ..	17	13	5	7	.. days with gale at some time in the 24 hours.

The observations of wind force on days with gale were divided into two categories, force 8 and above, and below force 8, and means were formed. The mean wind force at an observation hour was 10 for the first category and 2 for the second; thus the gales were not simply incidental occurrences on days with strong winds, but may rather be regarded as separate phenomena. An attempt has been made to estimate the duration of the gales, from various notes in the records combined with the appearance of the barograph traces (see below). The figures so obtained must be regarded as rough estimates: they indicate the average duration of a gale to be 12 hours with extremes of about 5 and 30 hours. Many of these gales were of great severity, force 12 being reached on 11 days, force 11 on 6 and force 10 on 2. The prevailing direction as given in the registers of observations, was northerly; in these books the directions were noted only to eight points and in another account it is stated that the prevailing direction was from NNW. Three gales were from NE., one from E. and one from S., all these were less severe than the N. or NNW. gales.

TABLE XVII—DAYS ON WHICH GALES OCCURRED

Base Station

Date.	Time of start.	Strongest wind.		Date.	Time of start.	Strongest wind.	
		Dirn.	Force.			Dirn.	Force.
Aug. 31				Feb. 12	21h.	N.	8
Oct. 8	7h.	NNW.	12	13	oh.		
27		NW.	10	14	7h.	N.	12
28				15			
				17	22h. 30m.	N.	
Nov. 6	15h. 30m.	N.	11	18	oh.	N.	12
18	4h.	N.	11	19	17h. 30m.	N.	9
25	5h.	N.	12	20	oh.	N.	
26	oh. 30m.			21	21h.	N.	8
Jan. 6		N.		Mar. 12	oh.	NE.	11
7	9h. 30m.	N.	9	18	18h.	N.	10
11	15h.	N.		19	oh.		
14	4h.	N.	11		21h.		12
16	5h.	N.	12	20	oh.	N.	
26	15h.	NE.	9	24	14h. 30m.		11
27	15h.	NE.	9	25	oh.		
28		SE.	8				
29		E.	8	Apr. 1	16h.	N.	12
		S.		2	oh.	N.	12
30				3			
31	oh.	NW.	12	11	17h.	N.	12
		N.		12			
Feb. 2	oh.	N.	8	June 28	oh.	N.	11
11	5h. 30m.	N.	12				

Ice-Cap Station

Date.	Strongest wind.		Date.	Strongest wind.	
	Dirn.	Force.		Dirn.	Force.
Jan. 4	E.	9	Feb. 14	WNW.	8
27		8	18	NW.	9
28	SE.	8	20	NW.	9
29	ESE.	9	Mar. 8	SE.	9
Feb. 11	NW.	8			

Confirmation of the estimates is available; on October 8, when the first experience of force 12 occurred 129 m.p.h. was observed with the cup anemometer during a short period. Soon after this observation the instrument was blown away; it is of interest to note that the velocity quoted above is of the same order as usually suffices to carry away small cup anemometers in West Indian hurricanes. On another occasion 90 m.p.h. was observed with an air speed recorder as used on aeroplanes. The gales appear to have been of restricted extent; only on exceptional occasions were gales experienced at Angmagssalik, and apparently a gale may occur at Angmagssalik without gale force being reached simultaneously at the Base. The northerly gales were usually associated with small cloudiness, those from other directions with much cloud and precipitation. The gales began more often between 21h. and 3h. than at other times; clouds of drifting snow from the mountains northward of the Base showed that the gale might blow on the Ice Cap for some time before reaching the Base, and gusts of wind from a southerly point were generally experienced shortly before the northerly gales struck the Base with full force. The southerly gusts are presumably examples of the "leeward-eddy." The gales generally abated suddenly, and could be seen to continue on the Ice Cap after ceasing at the Base. Southerly gusts were also observed on occasion during a temporary lull in a northerly gale and also after a northerly gale had dropped suddenly. The last gale was observed on June 28; in the afternoon of this day a southerly wind was observed at the Base about the time when a member of the expedition encountered a northerly wind of force 12 at three miles distance.

So far as the available data go, they indicate that these northerly gales are katabatic winds set in motion by a general gradient for northerly winds; the fact that the majority of the gales began in the night hours makes it difficult to determine what part is played by föhn effect, the course of temperature between 21h. and 9h. not being known. Data of relative humidity are available in only two cases: on one occasion (October) the relative humidity was 89 per cent; on the other (June) 60 per cent. Only 10 gales began in the period 9h.–21h.; four were associated with an average rise of 4° F. in temperature, two with an average fall of 3° F., and in one case there was no appreciable change in temperature. In two cases the temperatures were not recorded and in only one case was a large rise of temperature noted—20° F. on January 11. On this occasion a gale was blowing on the Ice Cap in the vicinity of the Base from 13h. to 21h. The gale blew at the Base from 15h. to 20h. 30m. and from 21h. 15m. to 22h., but at both the 13h. and 21h. observations the wind at the Base was southerly, light or moderate; temperature rose from 15° F. at 13h. to a maximum of 37° F. and was 35° F. at 21h. During the morning the wind at the Ice-Cap station was WNW. force 5, and air temperature about −10° F., air at this temperature transported direct to the Base would have been adiabatically warmed to 33° F. This is possibly a case of "total föhn" as described by de Quervain and Mercanton (11), in which the air is carried right over the Ice Cap.

During the gale of October 8 mentioned above the temperature at 9h. at the Base was 49° F. (being the highest temperature of the month) and the wind NNW. force 12; at the Ice-Cap station during the morning the wind was NW., moderate and the air temperature 4° F.; this air, transported to the Base would have been adiabatically warmed to 47° F. On February 11, with winds of force 11 or 12 all day, temperature fell 5° F., between 9h. and 13h. and rose 9° F. by 21h.

During the northerly gales irregular changes of pressure were usually shown by the barograph; three typical examples of barograms are given in Fig. 1.

On January 7, the wind blew from N. with force 9 all night (i.e. from 0h., onward). There was a brief lull from 8h. 30m. to 9h. 30m., when the wind was from S., force 3, after which a N. wind reaching force 8 set in again. The wind decreased to force 5 at 21h. and became calm about 23h. It will be seen that during some part of the period of northerly wind the barogram presents an appearance as if the level of the trace had been quickly displaced downward; this phenomenon is shown better on the barogram for January 11. The course of events seems to be as follows: before the gale reaches the Base small oscillations appear on the barogram; at about the time of arrival, perhaps shortly after, when some critical velocity of wind is reached, the sudden displacement of the trace occurs. During the continuance of the gale the

barogram shows rapid oscillations due to gusts of wind, the trace on occasions when the pen was writing very finely presenting the appearance of a gusty anemogram. Occasional larger irregular oscillations may also be superposed. When the extreme force of the gale abates the barograph pen suddenly rises, the trace appearing at times as if a change of base line had been made during the period of the gale. It may be mentioned that the " edifice effect " (12) of a wind of 90 m.p.h. blowing round the building would be a lowering of pressure by about 6 mb.

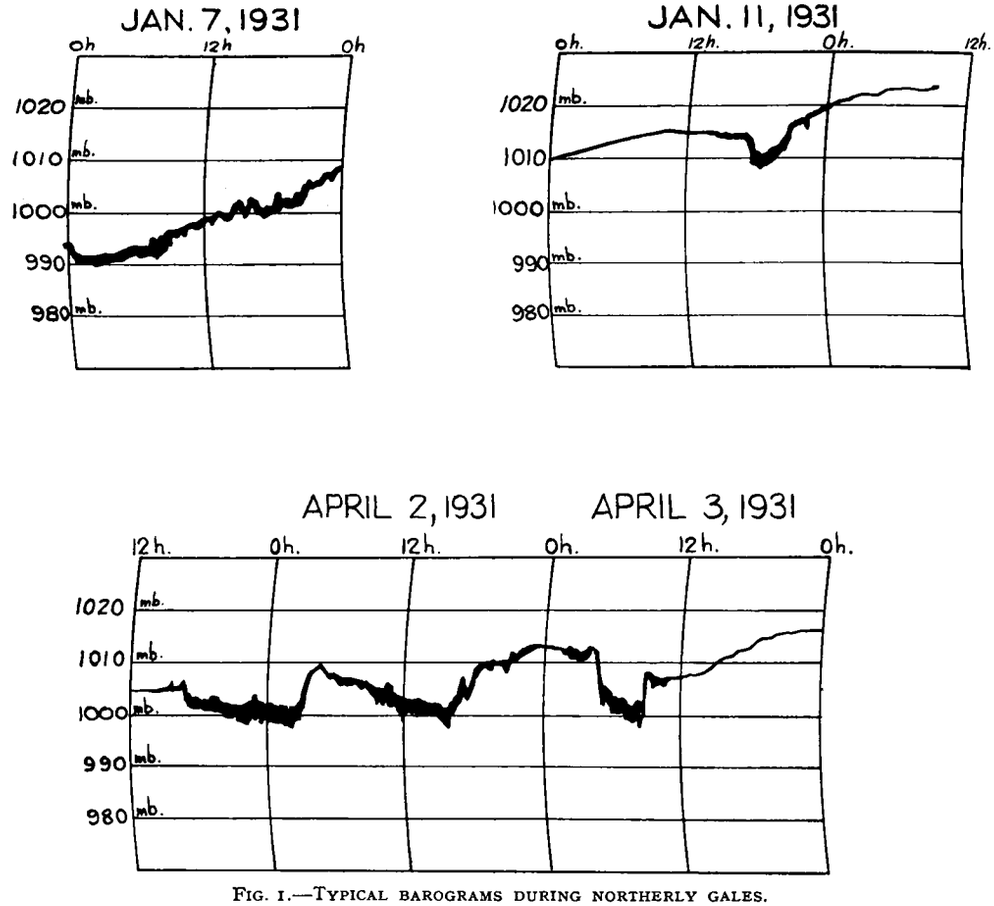

FIG. 1.—TYPICAL BAROGRAMS DURING NORTHERLY GALES.

The effect of the gustiness is well illustrated in notes made by Mr. A. Courtauld on the occasion of the gale of October 8 :—" House shaking violently. Walls visibly moving. Gusts caused uncomfortable feeling of pressure in ears and moved aneroid in house often ·06 inch." (2 mb.)

During the few gales from southerly or easterly points the large irregular oscillations and " displacements " do not appear on the barograms ; the traces present the appearance ordinarily associated with a building exposed to moderate gusts of wind. This may be due partly to the fact that these gales did not attain so great force as the northerly to north-westerly gales. The exposure for SE. to S. winds is comparatively good, the track of these winds being over the fjord for 2 to 3 miles, except for a short distance near the Base ; NE. winds, however, reach the Base over ground 3,000 feet high and might be expected to blow with severe gusts and squalls. The remarkable difference between gales from NW. to N. and gales from other quarters must therefore, from these considerations, be attributed to the difference in life history of the types of air involved : the NE. and SE. gales appear to depend more directly on the general gradient of pressure in the vicinity and are associated with dull weather, the N. to NW. gales show the violent gustiness associated with the föhn winds of Greenland and are associated with lightly clouded or even clear skies, but an explanation of what circumstances determine the advance and retreat of a northerly gale between the Ice Cap and the surface of the fjord has not been found.

The barogram of April 2–3 shows an occasion on which a gale, apparently continuous on the Ice Cap, advanced and retreated three times in the Base fjord. The gale was first observed on the Ice Cap in the early morning of April 1, but did not reach the Base until 16h. During the night April 1–2 there was a short lull, but the gale was blowing at the Base again by 6h. During the afternoon and evening of April 2 the gale is described as retreating slowly back down the fjord, the wind force at 21h., being only 2. The gale reached the Base again in the early morning of April 3, but ceased at 8h.

The topography of the region near the Base making it apparently so suitable as a sluice-way ((13) p. 88) for the flow of cold air from the Ice Cap the question of why the northerly gales were not much more frequent than was actually observed must be regarded as one for further investigation.

It is possible that in the undisturbed state a " cushion " of inert air fills the fjord to several hundreds of feet, or more, while above is a gliding surface; only when this approaches the surface of the fjord is the leeward eddy set in motion, giving southerly winds at the Base for a time.

Although the topography of the region near the Base, as mentioned above, must be presumed to have a certain effect on the strength and direction of the wind, concentrating the flow of air from the Ice Cap in the direction of the Base, at the same time it is worthy of note that on November 6, when the wind was blowing from N., force 10 at the Base, on the Ice Cap 25 miles away at an altitude of about 4,000 feet the NW. wind was described as of " hurricane force." (cf. Fig. 14.)

On March 24 a sledge party on the Ice Cap about 105 miles from the Base at an altitude of 7,000 feet recorded a change from calm to a wind of force 9 from N. between 8h. 30m. and 9h. while on the same day a northerly gale is described as setting in " very suddenly " about 14h. 30m. at the Base, force 11 being observed at 21h. The last-mentioned occurrences suggest a sort of " gale front " travelling over the Ice Cap at 20 m.p.h. but sufficient observations of the kind have not been found in the records on which to base a detailed theory of this nature.

A question which suggests itself is whether these extraordinary outflowing winds bear any direct relation to subsequent weather on the Atlantic Ocean, whether they can be regarded as " outbursts of polar air." It is noteworthy that in December there was no day with northerly gale at the Base, whereas in this month there were at least 6 days with gale in the Atlantic in the area 10°—50° W. long., 50°—60° N. lat., as shown by reports from ships in the *Daily Weather Report.*

As an index of the circulation was taken the highest wind force for the day as reported in the *Daily Weather Report* at three stations, Vestmanö, Thorshavn and Valentia. Writing down the maximum force on the first, second . . . days after the occurrence of a gale at the Base, and summing the quantities for all the occasions one obtains data from which a curve can be drawn, and if there is any tendency for conditions to be specially disturbed at some specified interval after the occurrence of a gale at the Base, it should be made evident by a peak in the curve. The data are given below :

MAXIMUM WIND FORCE (BEAUFORT NUMBER) EXPERIENCED

0, 1, 2 . . . DAYS AFTER A NW.* GALE AT THE BASE (38 OCCASIONS)

	0	1	2	3	4	5	6	7
Vestmanö ..	6·1	5·8	5·9	5·8	6·1	6·1	5·8	5·8
Thorshavn ..	4·6	4·4	4·3	4·5	4·5	4·5	5·0	5·1
Valentia ..	5·0	4·8	4·5	4·3	4·3	4·6	4·9	4·6
Mean	5·2	5·0	4·9	4·9	5·0	5·1	5·2	5·2

* i.e. the strongest gales, and not including those with an easterly component.

According to these figures a strong wind is as likely to occur on the day when a gale occurs at the Base as on any number of days up to seven thereafter. It may be objected that the method is crude and that the inclusion of consecutive days introduces a considerable smoothing effect. The process was therefore repeated with hourly velocities of wind at Valentia, and using occasions more than seven days apart, with the result shown in Fig. 2. The times were reckoned from the time of start of the gale at the Base, and the mean wind velocity was taken 12, 24, 36 . . . hours later. The number of occasions available was, by the conditions of choice, cut down to 14. The figure shows a tendency for an increase of wind at Valentia $5\frac{1}{2}$ to 6 days after the start of a gale at the Base ; the deviation at day 6 is $3\frac{1}{2}$ times the probable error and therefore presumably represents a real tendency. In view of the small number of observations, however, and the fact that the curve might almost equally well represent a $5\frac{1}{2}$-day period in wind at Valentia, corresponding with a period which several investigators have detected in European weather (14) it seems advisable to wait for further evidence.

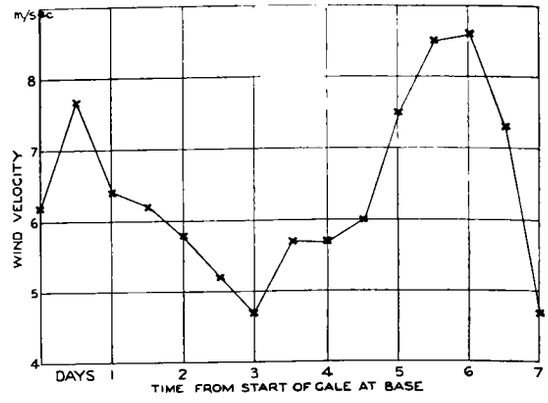

FIG. 2—WIND VELOCITY AT VALENTIA ON ONE, TWO . . . . SEVEN DAYS AFTER A GALE AT THE BASE.

Ice-Cap station.—Table XVI also shows the distribution of days with gale at the Ice-Cap station. Although on the average the wind force was greater at the Ice-Cap station than at the Base, observations of gale force were not nearly so frequent. Generally, if a gale occurred at the Ice-Cap station there was a gale on the same day at the Base, but a gale might blow at the Base on a day on which there was no more than a moderate wind at the Ice Cap. About half of the gales were from between E. and S. and half from NW. There is some reason to believe that the general level of the surface of the ice had a slight upward slope to westward of the Ice-Cap station—the fact that the prevailing winds blew from NW. favours this supposition—thus gales at the Ice-Cap station blew as often " uphill " as " downhill," and the strongest winds, estimated force 9, were from SE. as well as from NW. directions. Considering only days on which gales occurred at both stations, the average difference of daily temperature was 33° F. with SE. gales and 46° F. with NW. gales, these figures corresponding closely with saturated and dry adiabatic lapse of temperature respectively between the two stations. During the gales the drifting snow was so dense that the sky conditions could not be observed, but with light winds the SE. direction was associated with overcast skies and precipitation, the NW. with broken skies.

§ 7—PRECIPITATION

Regular measurement of the amount of precipitation was not attempted. From notes which appear in the observation records it appears that heavy precipitation

TABLE XVIII—NUMBERS OF DAYS WITH VARIOUS FORMS OF PRECIPITATION

	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July
Base Station												
Rain ..	10	12	2	1	2	0	0	4	4	4	5	3
Sleet ..	0	1	2	1	0	2	0	2	1	1	0	0
Snow ..	0	4	13	9	.9	12	7	10	8	1	0	0
Ice-Cap Station												
Snow ..	—	10	11	13	10	7	4	—	—	—	—	—
Rime ..	—	11	2	0	0	0	0	—	—	—	—	—
Ice crystals ..	—	0	0	0	0	1	0	—	—	—	—	—

was at times experienced at the Base, e.g. at 9h. on December 25, " one foot of snow since yesterday morning " ; on April 14, " eighteen to twenty inches of snow 9h.—21h.". At the Ice-Cap station, snow accumulated during the winter in sufficient depth to cover over the snow house in which the observers lived (15) ; apparently the drift snow simply piled up round an 8-foot wall of snow which had been built round the snow house. The actual change of level between September and March, as shown by a " snow-pole " in an unobstructed position was 0·65 metre.

The following note is from the weather diary of the Ice-Cap station for January 19 : " The sun was shining at 13h. and showed up ice crystals in the air. These may have been mistaken for slight snow which has been sometimes noted on cloudless days when there has been no sun."*

§ 8—AIR TEMPERATURE

Base Station.—The thermometers were exposed in a standard Stevenson screen, and observations were made from August 5 to July 25, the hours of observation being 9h., 13h. and 21h. Table XIX gives details of the mean and extreme temperatures

TABLE XIX—MEAN AND EXTREME TEMPERATURES AT BASE STATION

Mean	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Yr.
9h.	43·9	38·7	28·7	22·1	21·1	18·2	15·1	16·8	29·8	32·8	41·2	45·9	
13h.	45·4	40·6	30·5	23·0	21·2	19·7	16·6	20·1	31·1	34·8	43·5	48·5	
21h.	40·6	36·5	28·8	21·5	20·6	18·3	14·5	17·9	26·7	31·1	39·9	42·4	
Max.†	48·1	43·3	33·1	25·5	25·7	24·7	21·6	25·0	35·3	37·8	47·8	51·8	35·0
Min.†	37·2	33·2	25·5	17·2	16·0	11·8	8·1	11·4	21·8	27·4	34·9	39·2	23·6
Mean‡	42·7	38·3	29·3	21·3	20·9	18·3	14·9	18·2	28·5	32·6	41·3	45·5	29·3
Extremes.													
Highest	63	50	(49)§	38	40	38**	34	44	44	49	63	58	63
Lowest	32	26	12	10	—1	—2	—2	—6	9	22	25	35	—6

† Read and set at 21h. ; entries assigned to day of reading.
‡ ½ (Mean maximum + mean minimum).
§ Highest dry-bulb reading on a day when the maximum thermometer was not read.
** Probably exceeded on November 18 ; see pp. 30–1.

in the various months. The mean temperatures are within a degree or two of the corresponding long-period average figures for Angmagssalik except in April, which was 5° F. colder than the normal for that station.

Ice-Cap Station.—The thermometers were exposed in a standard Stevenson screen and six observations were made daily, at the times stated in § 2. In January and February the routine was interrupted at times owing to the fact that drifting snow filled up the entrance to the snow house and prevented the observer from getting out to make the observations. The interruptions were more serious in March and after March 20 outside observations ceased. The air temperatures were read to the nearest half degree ; as the thermometers in use required only fractional corrections at certain points on the range it has been assumed that the temperatures as read are sufficiently accurate, and in the tables of means the values are given to the nearest degree. When the maximum thermometer was out of action the highest reading at the fixed hours of observation was adopted as the maximum for the day. The results are in Table XX. Temperatures first began to fall to about the freezing point of mercury (—38° F.) in the end of October, apart from a single day in the beginning of that month. The inter-diurnal variation of temperature is very large and seems to depend to a large extent, if not entirely on the direction and force of the wind ; thus on December 6 and 8, the maximum temperature was —45° F., with light northerly winds, and on December 15 and 16 the minimum was 2° F.,

* Fl.-Lt. N. H. D'Aeth remarks that he observed the phenomenon of ice-crystals in the air on only one occasion during the period when he was on the Ice Cap, from September 15 to December 19. The observation was made in the course of a sledge journey ; the sky was clear in the morning, when the ice crystals were observed, but clouded over in the afternoon.

with strong easterly winds. The irregular run of the means for the different hours of observation in November is apparently due to several irregular changes of temperature, in association with changes of wind force or direction. In this month the

TABLE XX—MEAN AND EXTREME TEMPERATURES AT ICE-CAP STATION

Mean.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.‡
7h. ..	— 2	—19	—27	—24	—25	—38	—
10h. ..	4	—16	—28	—24	—23	—32	—
13h. ..	8	—13	—28	—24	—22	—28	(—20)
16h. ..	6	—17	—30	—23	—23	—30	(—19)
19h. ..	— 1	—19	—28	—24	—24	—33	—
22h. ..	— 2	—18	—27	—23	—25	—33	—
Mean ..	2	—17	—28	—24	—24	—33	—
Max.* ..	14	—10	—21	—17	—16	—22	(—12)
Min.* ..	—10	—24	—36	—31	—31	—44	(—35)
Mean† ..	2	—17	—29	—24	—23	—33	—
Extremes.							
Highest ..	29	22	7	7	20	— 6	8
Lowest ..	—27	—48	—51	—56	—52	—60	—59

* Read and set at 16h.; entries assigned to day of reading.
† ½ (Mean maximum + mean minimum).
‡ Observations interrupted; only about one-third as many observations as in the other months.

wind circulation was on the average weaker than in the other months; presumably very large inversions of temperature lapse could form near the surface of the ice. The low temperature of February is analogous with the usual delayed minimum of the annual course of temperature at stations near sea level in Greenland, but appears to be due not so much to local cooling as to an imported supply of colder air, low temperatures being associated with strong NW. winds on several occasions. In January, however, there were occasions of strong winds from easterly directions which brought a rise in temperature. The few temperatures available for March suggest a rapid upward swing of the temperature curve in that month, with the lengthening day.§

The observations collected in the course of sledge journeys on the inland ice by various expeditions ((16), p. 556) suggested that the amplitude of the regular daily temperature variation is about 11° F. in the summer months, increasing in spring and autumn; Table XX indicates that the regular amplitude decreases to very small values in midwinter. This is, however, merely the averaging out of numerous irregular changes which at times may reach large magnitude, for example, on January 26 the temperature rose from —42° to —5° F. in 15 hours in association with freshening easterly winds, on November 15 it rose from —51° to —19° F. between 19h. and 22h., the wind veering from WNW. to NW. and increasing from force 2 to force 4; falls of temperature appear to be less sudden but on February 5 temperature fell from —14° to —40° F. during the observation period. The sudden rise and less sudden fall of temperature is what might be expected if the main climatic control is the interplay between the cold air of the temperature " inversion " at the surface and relatively warm inflowing winds. In winter temperature is evidently controlled by the winds; in quiet conditions and in the absence of non-periodic changes the diurnal variation of temperature is small. The question of the difference in temperature of the two stations is mentioned below, § 11.

Temperature in the free air.—The equipment of the expedition included small seaplanes which could be transferred to ski undercarriages for winter flying, and

§ When the station was relieved on May 5 the minimum thermometer was found to be reading — 64°. No temperature so low as this was recorded during the period of regular observations.

several observations were made with strut thermometers. Complete data from 7 flights are available and are given in Table XXI. A few notes regarding temperature on other occasions were found in the observation books and these occasional observations are shown on Fig. 3 which also includes the results of certain flights, taken from Table XXI. The flights were mostly carried out in the vicinity of Angmagssalik or of Lake Fjord some distance northward; the flight of February 8, 1931 is described as from the Base to 70 miles over the Ice Cap, but the exact locality of the other flights is not stated.

One hesitates to do more than make very general inferences from the small body of data: it appears, however,

1. near the coast, in the free air the lapse rate of temperature is frequently that of the adiabatic for saturated air;
2. over the Ice Cap the lapse rate may be similar to that observed by Wegener (17) over the ice in north-east Greenland. (*c.* 3° C. per km. over the first 2·5 km.)

The inversion of temperature near the surface is a very persistent feature of the region; on December 31 the air temperature in the screen was 11° F. higher than that at the aeroplane which was on the ice of the fjord, some 50 feet lower than the screen.

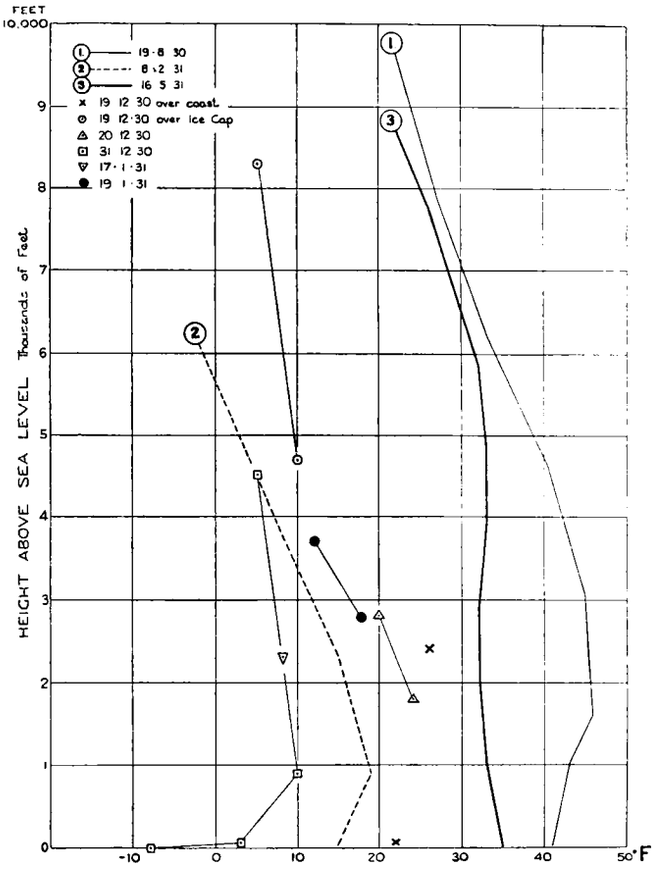

FIG. 3—SOME TEMPERATURES IN THE FREE AIR. *

The temperature inversion over the Ice Cap was described by the observers as being more remarkable than that on the coast, and reaching 30° F. in 2,000 feet.†

§ 9—ATMOSPHERIC PRESSURE

Base Station.—A small aneroid barograph was maintained at the Base station, and it has been possible to make tabulations of hourly pressure for nearly a complete year. The barograph readings have been standardized by means of the fixed-hour readings of a mercury barometer, and may therefore be regarded as reasonably accurate, but in view of the smallness of the pressure scale (1 mb. = 0·75 mm. of ordinate) the pressures were read off only to the nearest millibar. Data from the hourly readings of pressure are given in Table XXII. Harmonic analysis of the daily variation in the period October to March has been carried out, and the values of the first two terms are as follows:

$$A_1 = 55°\ ;\ P_1 = 0{\cdot}12 \text{ mb.}\ ;\ A_2 = 185°\ ;\ P_2 = 0{\cdot}11 \text{ mb.}$$

The representation of the curve by these two terms is, however, not close.

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* The reference to curve (1) should read 18. 8. 30 *not* 19. 8. 30.

† On August 18 slight formation of ice was observed on the struts and wires of the Moth, at about 10,000 ft. in a clear sky with air temperature 22° F. This was the only occasion on which any ice formed on the aircraft; there was however, no cloud flying.—Note supplied by Fl.-Lt. N. H. D'Aeth.

TABLE XXI—DATA OF OBSERVATIONS IN THE FREE AIR

Aug. 6, 1930, 11h. 20m. local mean time.

P mb.	t °F.	R.H. %	Ht. feet.
1027	42	83	0
990	40	82	900
950	38	92	2000
900	34	91	3450
850	29	89	4950
800	25	89	6500
750	27	61	8200
700	23	69	10000
690	22	68	10350

Aug. 19, 1930, 11h. 50m.

1017	41·5	87	0
980	43	83	1000
950	45	86	1850
900	44	93	3250
850	36	92	4800
800	28	90	6400
750	20	78	8000
700	12	—	9800

May 16, 1931, 14h. 30m.

1008	35	—	0
969	33	62	1000
935	32	55	2000
902	32	46	2900
869	33	55	3900
838	33	75	4850
807	32	95	5850
778	28	100	6750
750	26	100	7750
722	22	100	8700

Aug. 8, 1930, ? time.

P mb.	t °F.	R.H. %	Ht. feet.
1016	?48	—	0
979	46	—	1000
950	43	—	1800
900	39	—	3250
850	33	—	4750
800	28	—	6300
750	26	—	8000
725	25	—	8900
712	26	—	9350
700	23·5	—	9800

Aug. 30, 1930, 8h. 45m.

1017	?41	—	0
979	43	43	1000
950	43	45	1800
900	36	43	3200
850	30	39	4750
800	29	55	6300
750	24·5	66	8000
700	21·5	73	9800

Aug. 18, 1930, 10h. 45m.

P mb.	t °F.	R.H. %	Ht. feet.
1009	41	91	0
972	43	83	1000
950	46	70	1600
900	45	59	3050
850	40·5	67	4600
800	33	75	6200
750	27	91	7900
700	22	79	9650

Feb. 8, 1931, 11h. 30m.

984	15	—	0
950	19	—	900
900	15	—	2300
850	8	—	3800
800	2	—	5200
770	−6*	—	6150

* doubtful, perhaps
—2 with height 6,100.

Ice-Cap Station.—A small aneroid barograph was maintained at the Ice-Cap station. At the beginning of the period of observations considerable trouble was experienced with the barograph, the pen working very stiffly, but by the end of September satisfactory records were obtained and hourly values of pressure have been tabulated from October 1 to April 26. For part of the time the observations at fixed hours included readings of a large aneroid barometer of the type used in upper-air investigation by aeroplanes and these readings where available have been used to standardize the barograph records. From a few readings which were made before the first expedition to the Ice Cap started it appears that the readings of the aneroid were not more than 2 mb. different from the standard of the Base. The aneroid was damaged on January 22 and after this date the pressure readings depend on the barograph alone; as this instrument later was also broken it has not been possible to assess the probable degree of accuracy of the determinations of pressure at the Ice-Cap station. In the discussion it has been assumed that the readings are correct to within a millibar. The results of the tabulation are given in Table XXIII.

The tabulations are complete for the months October to March; the first two harmonic terms of the daily variation in this period are:

$$A_1 = 330°\ ;\ P_1 = 0{\cdot}23 \text{ mb.}\ ;\ A_2 = 240°\ ;\ P_2 = 0{\cdot}15 \text{ mb.}$$

Variations of pressure.—It is doubtful whether any significance need be attached to the relative values of the diurnal amplitudes shown in Tables XXII and XXIII,

the period of observations being too short to eliminate the accidental effects and give a satisfactory approximation to the true shape of the diurnal variation by the rough methods necessarily adopted. If these curves are real, and the variation at the Ice Cap is the same as that in the free air above the Base, then the computed curve of the diurnal variation (18) in the air column shows a maximum about 6h. to 8h. and a minimum at 23h. and an amplitude of about $1\frac{1}{2}$° F. The actual data are not sufficient to investigate this question, more especially in view of the horizontal distance (about 140 miles) between the stations. It may be noted, however, that at both stations the 12-hour term is in good agreement with the magnitude and phase expected by theory (19).

The ratios of the barometric ranges in the various months are in approximate agreement with the ratios of the monthly mean pressures but are noticeably lower in December and February apparently in association with a number of occasions when there were steep pressure gradients for northerly or north-easterly winds to eastward of Greenland and when large changes of pressure occurred at the Base with no corresponding changes at the Ice-Cap station. Further investigation of this point is desirable. (*See* § 14, p. 31.)

There is on the whole a high correlation between the daily ranges of pressure, but the sudden changes of the type shown in Fig. 1 and associated with northerly gales at the Base are a phenomenon of the Base station alone, and no corresponding phenomena appeared at the Ice-Cap station.

The greatest barometric range in a day (midnight to midnight) at the Ice-Cap station was 24 mb., in November; ranges of 10 to 20 mb. were not uncommon in November and from January to April; at the Base the greatest range was 34 mb. on the same day in November as that with 24 mb. at the Ice Cap. Ranges in excess of 20 mb. occurred at the Base in each of the months November to April. As regards rises or falls of pressure which continue more or less regularly for several hours the rates of such changes do not usually exceed two to three millibars per hour at the Base and two millibars per hour at the Ice Cap.

§ 10—AIR DENSITY

Table XXIV gives the computed values of average and minimum air density at the two stations. Fig. 4 shows the same data in relation to the "international standard atmosphere" and to conditions over south-east England.

§ 11—DETERMINATION OF THE ALTITUDE

Temperature difference, Base minus Ice Cap.—The altitude of the Ice-Cap station must be computed by the barometric method, and some consideration of the difference in temperature recorded at the two stations is therefore necessary in order to obtain a suitable figure for the temperature in the barometric reduction. From consideration of mean values for the period October to March, with the aid of a temperature-entropy diagram, it appears that the mean difference of temperature of 45° F. is that which would be maintained by adiabatic transport of air from the Ice-Cap station to the Base. As there were evidently large variations from this mean figure attention was directed to the simultaneous observations at 13h. The mean values of the difference in air temperature at the two stations were

Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
30°	45°	51°	44°	41°	44°	38°

and the mean of 45° F. mentioned above is evidently fortuitous, for the following reasons. The difference between the temperatures at 13h. varied from 67° F. on November 12 to 5° F. on January 13. On the latter occasion the wind at the Ice-Cap station was from SSW. force 5, and the source of the air supply was probably

TABLE XXII—MONTHLY MEANS OF PRESSURE

Mean time

Values for station level

Hour / Month	1	2	3	4	5	6	7	8	9	10	11	12	13
August* ..	012·0	011·8	011·7	011·7	*011·6*	011·7	011·9	012·0	012·0	012·0	011·9	011·9	011·7
September ..	018·0	*017·8*	017·8	018·1	018·1	018·4	018·4	018·6	018·7	**018·7**	018·7	018·4	018·4
October ..	006·9	006·8	006·9	007·0	007·0	007·1	007·2	007·3	**007·4**	007·2	007·0	006·8	006·8
November ..	000·9	000·7	000·6	000·7	000·8	000·8	000·7	000·9	**001·0**	000·9	000·9	000·8	000·6
December ..	993·8	993·6	993·7	**994·0**	994·0	993·9	993·9	993·9	993·9	993·8	993·7	993·5	*993·4*
January ..	004·8	004·6	004·5	004·3	004·3	004·3	004·2	004·1	004·3	004·2	004·2	004·0	*004·0*
February ..	001·1	000·8	*000·8*	001·1	001·1	001·0	000·9	001·0	001·3	001·2	001·0	001·1	000·9
March ..	012·8	012·6	012·7	012·9	013·0	013·0	**013·0**	012·9	013·0	012·9	012·8	012·4	012·2
April ..	005·1	005·2	**005·4**	005·4	005·3	005·0	005·0	005·2	004·9	004·6	004·5	004·4	*004·3*
May ..	019·4	019·2	019·1	019·2	019·2	019·1	*018·9*	019·1	019·3	019·1	019·1	019·3	019·2
June ..	016·0	*015·9*	016·0	016·0	016·1	016·1	016·3	016·3	**016·3**	016·2	016·1	016·1	016·2
July† ..	011·6	011·4	011·4	011·5	011·5	011·5	011·6	011·5	011·2	011·1	011·0	*010·9*	011·0
Year ..	008·5	008·4	008·4	008·5	008·5	008·5	008·5	008·6	008·6	008·5	008·4	008·3	008·2
Period Oct.–Mar.	003·4	003·2	003·2	003·3	003·4	003·3	003·3	003·3	003·5	003·4	003·3	003·1	*003·0*

* 24 days.
† 25 days.

TABLE XXIII—MONTHLY MEANS OF PRES

STA

Mean time

Values for station level

Hour / Month	1	2	3	4	5	6	7	8	9	10	11	12	13
1930.													
October ..	731·3	731·3	731·6	731·7	732·0	732·2	**732·3**	732·1	731·8	731·8	731·9	731·9	732·1
November ..	724·0	723·9	724·3	724·4	**724·5**	724·5	724·3	724·3	724·2	724·3	724·4	724·2	724·0
December ..	717·9	717·3	718·0	718·0	718·4	**718·7**	718·5	718·6	718·3	718·3	718·0	717·7	717·6
1931.													
January ..	723·5	723·6	723·9	724·0	724·2	724·3	724·3	**724·4**	724·4	724·2	723·9	723·6	723·3
February ..	718·1	717·9	717·9	718·0	718·0	718·0	718·1	718·2	718·3	718·3	718·3	718·1	718·1
March ..	729·2	729·1	729·1	729·1	729·0	729·2	729·2	729·3	729·1	729·1	729·0	729·0	728·9
April* ..	723·2	723·1	730·0	723·0	723·0	723·0	723·0	723·0	723·0	723·0	722·9	723·0	723·1
Means :— Oct.–Mar.	724·0	*723·9*	724·1	724·2	724·3	**724·5**	**724·5**	**724·5**	724·3	724·3	724·3	724·1	724·0

* 26 days only ; not included in mean values.

(mb.) AT EXACT HOURS AT BASE STATION

of 45° W.

14	15	16	17	18	19	20	21	22	23	24	Mean	Highest	Lowest	Mean daily range
011·7	011·8	012·0	012·3	012·5	012·3	012·4	**012·6**	012·4	012·3	012·3	012·0	1024	995	5·9
018·3	018·3	018·4	018·6	018·5	018·5	018·6	018·6	018·5	018·4	018·1	018·4	1034	1007	5·4
007·0	006·9	006·9	006·8	*006·8*	006·8	006·8	007·0	007·0	006·9	006·8	007·0	1026	988	7·5
000·5	000·8	000·9	000·9	*000·5*	000·6	000·6	000·7	000·9	001·0	001·0	000·8	1031	969	10·8
993·4	993·4	993·5	993·8	993·7	993·8	993·8	993·9	994·0	994·0	993·9	993·8	1023	969	8·1
004·0	004·2	004·4	004·4	004·3	004·6	004·6	004·8	004·9	**004·9**	004·8	004·4	1025	987	10·3
000·9	001·1	001·3	001·3	001·1	001·1	001·0	001·3	001·4	**001·4**	001·2	001·1	1036	965	11·0
012·1	012·3	012·2	012·5	012·5	012·5	012·5	012·6	012·8	012·9	012·7	012·7	1037	972	10·8
004·4	004·4	004·5	004·5	005·1	005·0	005·1	005·2	005·3	005·2	005·2	004·9	1030	960	8·7
019·2	019·3	019·2	019·3	019·3	019·4	019·5	019·6	019·7	**019·7**	019·5	019·3	1036	1001	5·0
016·1	016·1	016·1	016·1	016·1	016·0	016·0	016·1	016·2	016·1	016·0	016·1	0134	997	4·4
011·0	011·2	011·2	011·3	011·2	011·2	011·5	011·6	011·6	**011·6**	011·5	011·3	1020	1002	4·0
008·2	008·3	008·4	008·5	008·5	008·5	008·5	008·7	**008·7**	008·7	008·6	008·5			
003·0	003·1	003·2	003·3	003·1	003·2	003·2	003·4	003·5	**003·5**	003·4	003·3			

SURE (mb.) AT EXACT HOURS AT ICE-CAP

TION

of 45° W.

14	15	16	17	18	19	20	21	22	23	24	Mean	Highest	Lowest	Mean daily range
731·9	732·0	732·1	732·0	731·6	731·4	731·3	731·2	731·0	*730·9*	731·0	731·7	749	720	5·8
724·0	724·0	724·0	723·8	724·0	723·8	723·8	*723·6*	723·8	723·9	724·0	724·1	749	704	7·9
717·5	*717·3*	717·4	717·4	717·6	717·4	717·5	717·5	717·6	717·6	717·6	717·8	736	702	4·9
723·3	723·3	723·5	723·4	723·5	723·5	723·7	723·4	723·5	723·5	723·5	723·7	743	707	7·1
718·2	718·1	718·2	718·4	**718·5**	718·5	718·4	718·4	718·4	718·3	718·1	718·2	745	697	7·2
728·8	728·9	729·1	729·3	729·4	729·4	**729·5**	729·2	729·1	729·1	729·2	729·1	755	704	7·1
723·1	723·0	723·1	723·1	723·2	**723·3**	723·3	723·3	723·3	723·1	723·1	723·2	745	683	6·1
723·9	723·9	724·1	724·1	724·1	724·0	724·0	723·9	723·9	723·9	723·9	724·1			

TABLE XXIV—AIR DENSITY

BASE

Month.	Aug.‡	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July§	Year
Mean (gm./m.^{3}) ..	1262	1280	1291	1306	1298	1315	1324	1328	1290	1300	1272	1256	1292
Minimum (gm./m.^{3})	1214	1249	1238	1228	1230	1262	1258	1213	1246	1251	1212	1225	—

‡ 24 days. § 25 days.

ICE CAP

Month.	Sept.*	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.†	Mean
Mean (gm./m.^{3}) ..	1014	1038	1052	1034	1043	1058	1052	—
Minimum (gm./m.^{3})	949	988	950	959	950	978	958	—

* 23 days. † Few temp. obs.

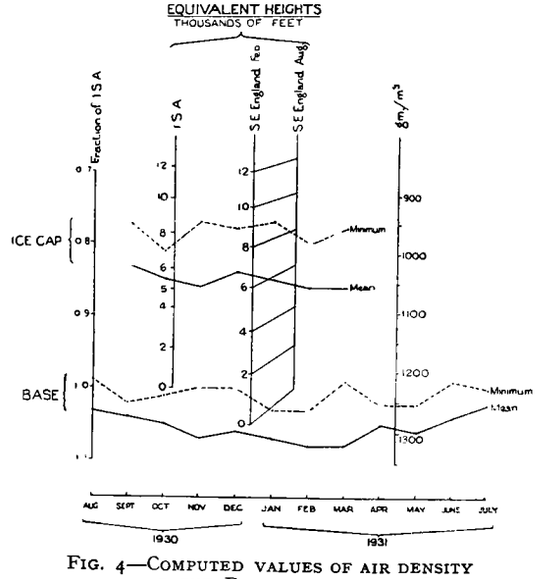

FIG. 4—COMPUTED VALUES OF AIR DENSITY AT THE BASE AND THE ICE CAP.

south-west of Greenland, thus there was no direct relation between the temperatures at the two stations. When strong south-easterly winds are blowing at both stations the temperature difference is likely to be closely equivalent to a saturated adiabatic lapse rate, several occasions having been found when the discrepancy between observed and "computed" differences was only 3° or 4° F., but even when the winds are strong and apparently blowing direct from Ice Cap to Base the temperature difference often exceeds the possible adiabatic warming. For example, take three occasions in November, January and February when strong north-westerly winds blew at the Ice Cap and a gale was recorded at the Base at all three observation hours. Air travelling at 30 m.p.h. would reach the Base from the Ice Cap in 5 hours, thus there was sufficient time for the steady state to be reached, and the average temperature difference was 55° F. The normal state of affairs at the Ice Cap is probably a surface inversion of temperature, which at times may reach large values, and from consideration of changes of temperature accompanying changes of wind is probably often of the order of 30° F.

Obviously adiabatic warming cannot produce a rise of temperature of 55° F. (*see* below) and either the air which leaves the Ice-Cap station in a NW. wind is not in general that which arrives at the Base, or else it has been mixed with warmer air from the layers at some distance above the ice. The barograms from the Base station are evidence of an extremely turbulent state of the air during the northerly gales.

It is of interest to note that computing from a modification (20) of Wenger's theory of katabatic winds (21) and assuming the air temperature at the Ice-Cap station to be 40° F. below the free-air temperature at the same level one finds

To face p. 26

TABLE XXV. MISCELLANEOUS PHENOMENA BASE

MONTH / DAY	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY
1		●		*								
2			* ●	♕	*		*					
3		●	✸	⋓	⋓	*	⋓	*		✸		
4				* ♕	⋓	✸		*	*			
5	⊕		⋓	♕		*	♕	* ✸	*			
6		●	✸ ●	♕			*	* ✸				
7		●					♕	* ●				●
8		●						●				
9	⊕		*		⋓	* ♕	♕	♕				
10		♕	♕	*		*			*			
11		♕			♕	* ♕				*		
12	●			*	♕		♕					
13		♕	*		*	*	*	♕				●
14					* ●			♕	*			
15	●	●	*	♕	* ●	*	♕		*			
16		●	*	♕	*		*				●	
17		●	* ♕	♕		*	* ♕					
18		♕	*	♕	♕	♕			* ●			●
19	●	♕	* ♕	♕					●	●	●	
20			*	*	♕	♕			●	●		
21	●		*		♕				●	●		
22	●	♕	*			♕	* ♕					
23	●	♕	♕		*	♕	*	*	*		●	
24	●	♕		♕	*		♕	*	* ✸	●	●	
25	●		♕		*	♕	♕				●	
26	●	* ●	*		♕	*	♕					
27	●	●		*	*							
28		● * ✸	* ♕	* ●		✸ *		*				
29		● *	♕	* ✸	⋓	*		● *				
30		*	♕	*		*		● *	⊕			
31			♕			♕						

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TABLE XXVI. MISCELLANEOUS PHENOMENA — ICE CAP.

MONTH / DAY	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.
1		✳	✳° ♅	♕ ♁ ♊	♊	♁	♓
2		♈ ✳ ♁	✳° ♁ ⊕ ♊	♁ ♊ ✳	✳°	✳ ♊	♕ ♅
3		✳ ♈ ⊕	♁ ♕ ✳ ♅	♕ ♊ ♄		♁	♄ ♅
4			♁ ♊ ♕	♁	♁	✳	✳ ♊
5			♓ ♊ ✳	♁	♁ ♊	♄ ♕	✳ ♁
6		♕	♁ ♊	♁ ♕		♄ ♕	♁
7			♁	♊	♊ ♕ ♁	♁	♁
8	✳°	♁ ♊	✳ ♅ ♕	♁	♁	♕	♁
9	♈ ♕		♁	♊ ✳	✳° ♕	♁ ♕	♕
10	♊ ♈ ♕	♕	♁ ✳ ♅	♕ ✳	♕	♓ ✳	♓ ♕
11	♈ ♕		✳° ♅ ♊ ♕	♕	♁ ♕	♁	♁ ♓ ♕
12			♁	♊ ♁	✳	♓ ♁ ♕	
13	♈ ♊ ♕	✳	♁ ♕	♄	♁ ♕	♁ ♕	♓ ♕
14	♈	♄	♕	♁ ✳	♁ ♕	♁	♕
15	♈ ✳°	✳ ♁	♓ ♕	♁	✳	♁ ♓ ♕	♓ ♕
16	✳	✳ ♁	♕	♁	♁ ♕	♁	♕
17	✳°	✳ ♁	♁ ♕	✳ ♕	♁ ♕	✳	♁
18	♈ ♕		♁ ♕	♕	✳ ♕		
19	♕	♁ ♕	♓ ♕	♁	♕ ←	♁ ♕	
20	✳ ♈	✳ ♁		♁ ♕	♁ ♕		♁
21	♈ ♕	✳°	♄ ✳ ♕	♕	♁ ♕	♄ ♕	
22	♕	♄ ✳° ♕	✳	✳°	♁ ♕	♁ ♕	
23	♕	♁	♕	✳ ♕	♁ ♕	♓ ♕	
24	♕	♁	✳° ♁ ⊕ ♕	♕ ✳	♁	♁ ♕ ♊	
25	♈ ♕	♕ ⊕	♁ ♕	♁ ✳	♓ ♕	♓ ♕	
26	✳°	✳	♁	♁	♁	♅	
27	♋ ✳ ♈ ♁	♁	♁ ✳° ♕	♁	♁	♕	
28	♁ ✳	♁ ♕	♁ ✳	✳ ♕	✳ ♁	♓	
29	✳	♓ ♕	✳ ♁ ♊	♓ ♊ ♕	♁		
30	✳	♊ ♕	♁ ♕ ♅	♕	✳		
31		♕		♓	♁ ♕ ♊		

a velocity of 100 m.p.h. for the katabatic wind at the Base, a value which is of the order of the wind velocities experienced during the gales there.

The mean values of the temperature difference at 13h. on days with various specified conditions are shown below ; the periods are not the same in all cases owing to the limited number of days available with the conditions specified.

	Difference ° F.
Strong E. to S. winds at both stations (Jan.–Mar.)	36
Weather at Ice Cap " dull " (Nov.–Mar.)	36
Weather at Ice Cap " clear " (Nov.–Mar.)	49
Strong W. to N. winds at both stations (Nov.–Mar.)	53

Barometric determination of the altitude.—The mean values of the temperature and pressure in the period October to March, first uncorrected and secondly with an estimate of the probable amount of temperature inversion give the altitude of the Ice-Cap station as between 8,000 and 8,400 feet. These determinations neglect the possibility that there is an appreciable pressure gradient in the upper air under average conditions between the Ice-Cap station and the free air above the Base at the same level. A selection was therefore made of days of strong E. to S. winds at both stations and of days of strong W to N. winds at both stations. Data on these two sets of days gave the altitude as between 8,200 and 7,900 feet. During a flight on December 19 a strong southerly wind was observed at 8,300 feet over the Ice Cap, the wind at the Ice-Cap station on that day being NNW. force 5–6. The temperature distribution seems to have been remarkable as shown by the data on Fig. 3, apparently a small depression was crossing Greenland. If the total difference of pressure between the Ice-Cap station and a point at the same level vertically above the Base is assumed to be —5 mb., which seems a reasonable allowance with the available data, the altitude of the Ice-Cap station is given as 8,200 feet. This has been taken as the altitude as near as can be found from the data ; it is confirmed by the computation from Fig. 8 (§ 14) assuming 30° " inversion " at the Ice-Cap station.

§ 12—OPTICAL AND OTHER PHENOMENA

Tables XXV and XXVI show the occurrences of various phenomena at the Base and Ice-Cap stations. Occurrences of fog have not been noted in these as the subject has already been treated in § 3. The occurrence of superior mirage on the inland ice of Greenland has been discussed by Koch and Wegener (16) ; it is associated with large inversion of temperature at the surface. The extent of the inversion at the Ice-Cap station on days with mirage is not known, but the temperature difference at 13h. between the two stations averaged 49° F., slightly in excess of the average for all days.

An interesting phenomenon was observed on January 6, when, to quote from the weather log, " a semi-circular bow, white, was observed at 1900 to the west, the moon at the time being about 20° altitude in the east. A certain amount of thin misty cloud was about most of the day. At 16h. the sky was overcast with it although the moon shone through."

This phenomenon was presumably not caused by ice crystals, for if ice crystals had been present conditions would have been suitable for a display of halo phenomena and none were reported. The observed diameter of the bow is consistent with the so-called " fog-bow " which is formed by small water drops. The temperature of the air at the time of the observation was —25° F. The observation of a lunar bow in such circumstances seems to be unprecedented (22). Solar bows of this type have been observed in Antarctica and in Spitsbergen with air temperatures of —21° F. and 7° F. (6).

§ 13—OBSERVATIONS DURING SLEDGE JOURNEYS

Some of these were made at times when the Ice-Cap station was not in action. Figs. 5 and 6 show the results obtained on two journeys across the Ice Cap. The figures are in suitable form for comparison with other recent work (23).

From the experience of various expeditions the existence of a " central cold zone " had been postulated ((16) p. 550) in which there was an area, not quite centrally situated in Greenland, within which temperature reached very low levels; at the borders of this zone temperature suddenly changed to a high level. Figs. 5 and 6 are in agreement with the diagram of Maurstad's work cited above, in giving no evidence of a central cold zone."*

§ 14—WEATHER AT THE TWO STATIONS IN RELATION TO THE SYNOPTIC SITUATION

The material available for this study at present, besides the British *Daily Weather Reports*, includes the *Meteorologisk Aarbog* for 1930 published by the Danish Meteorological Institute, part 2 of which includes data from several stations in Greenland. Corresponding data for 1931 not being yet available, the present

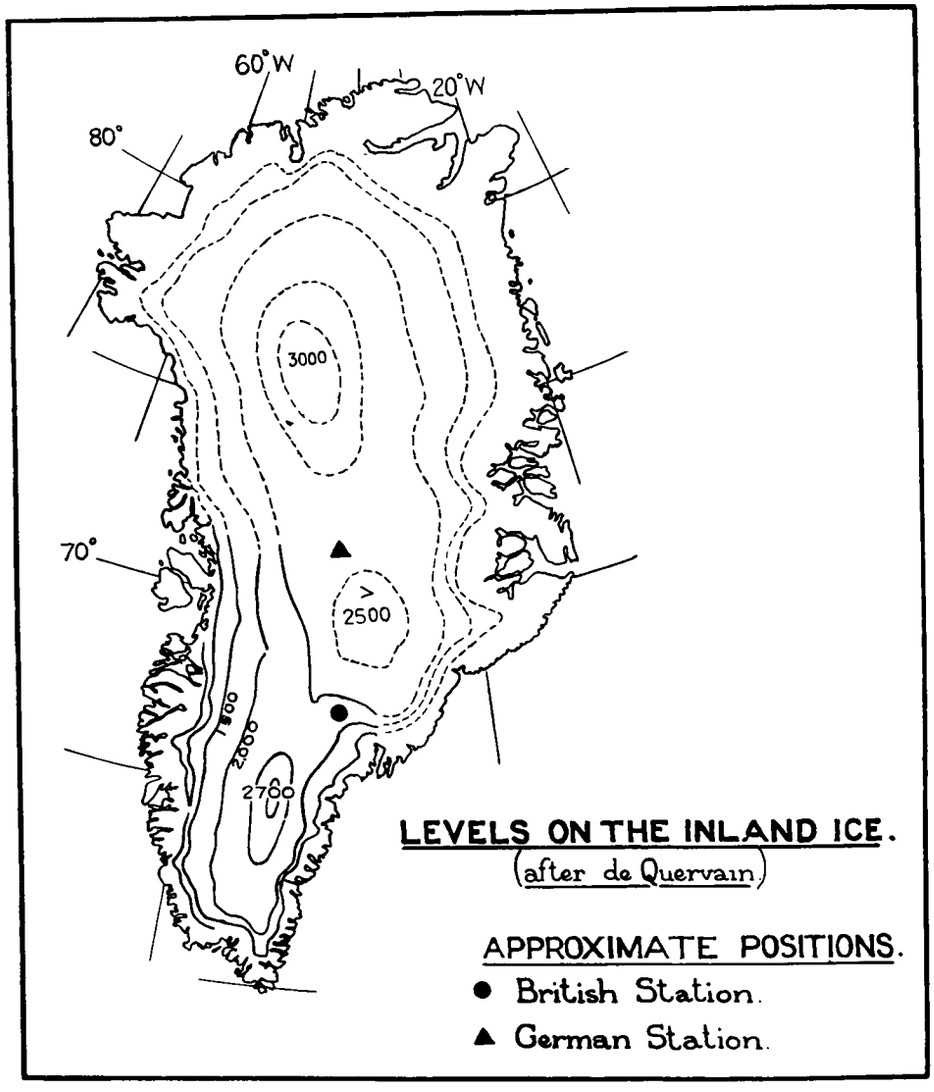


FIG. 7
(CONTOURS ARE GIVEN IN METRES).

* " Wet fog " was reported at 21h. on July 14; the air temperature was 18° and the wind was light from NE. This appears to be a fairly common phenomenon over the inland ice during the summer months: cases are quoted by Professor Hobbs in his book " Glacial Anticyclones " (13) pp. 80, 81 and 82.

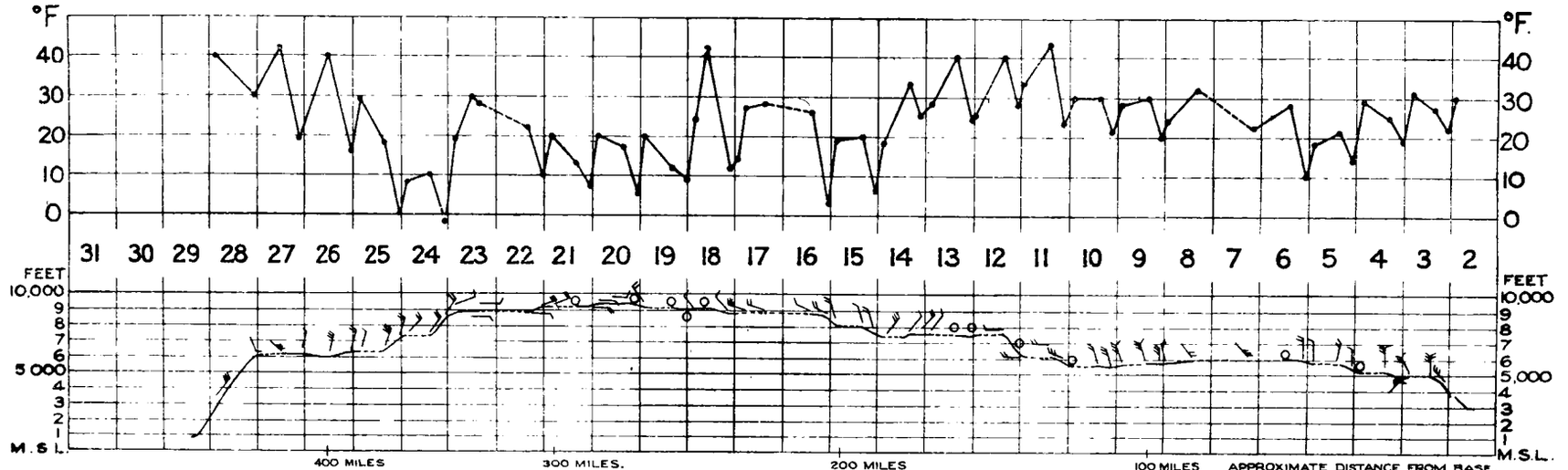


FIG. 5. TEMPERATURE, HEIGHT AND WIND OBSERVATIONS TAKEN ON THE JOURNEY FROM THE BASE — IVIGTUT, JULY 1931.

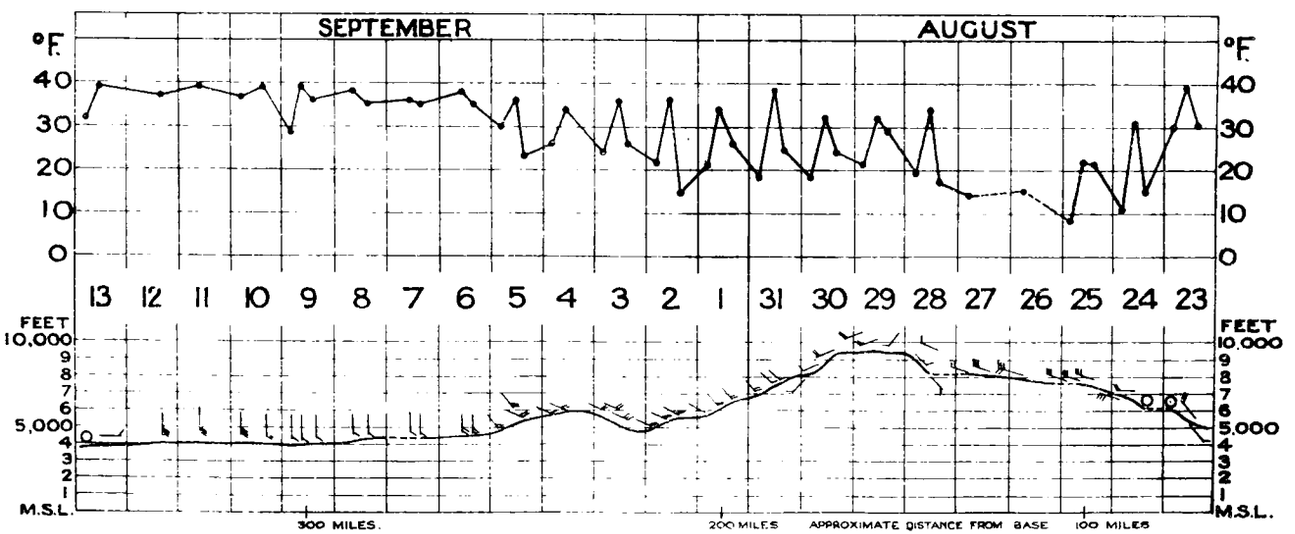


FIG. 6. TEMPERATURE, HEIGHT AND WIND OBSERVATIONS TAKEN ON JOURNEY ACROSS ICE CAP TO HOLSTEINSBORG. 1931.

Abscissae from right to left represent time measured from Ob. on July 2 (Fig.5) and August 23 (Fig.6). Against the times of observation are plotted, in the upper part of the diagram, temperatures, and in the lower, heights computed from the pressure observations, and wind force and direction. Consecutive observations are joined by straight lines, thus in estimating the character of the daily variation of temperature some allowance should be made for the variations in time of observation. Heights are indicated by the lines in the lower part of each diagram. The dotted parts of the lines indicate periods when no travel was possible owing to unfavourable weather. Wind force on the Beaufort scale is indicated by the numbers of feathers on the arrows which are oriented in the conventional manner, a N. wind, for example, from the top to the bottom of the diagram, a W. wind from left to right and so on. O indicates calm.

PLATE I

To face p. 28.

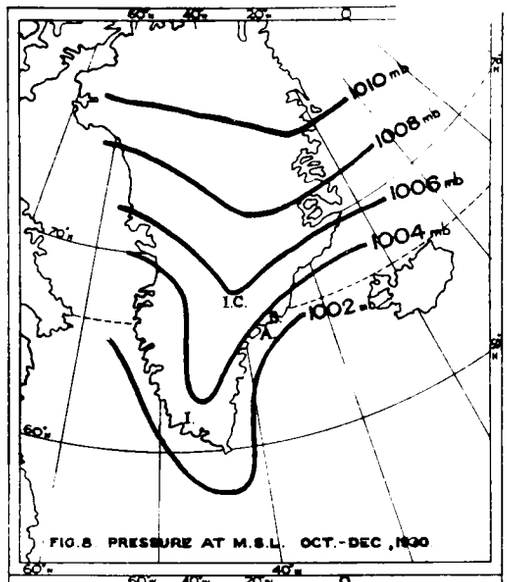


FIG. 8 PRESSURE AT M.S.L. OCT.-DEC., 1930

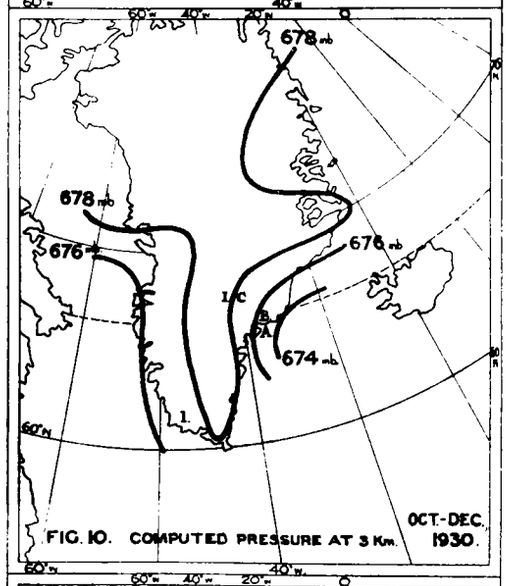


FIG. 10. COMPUTED PRESSURE AT 3 Km. OCT.-DEC. 1930.

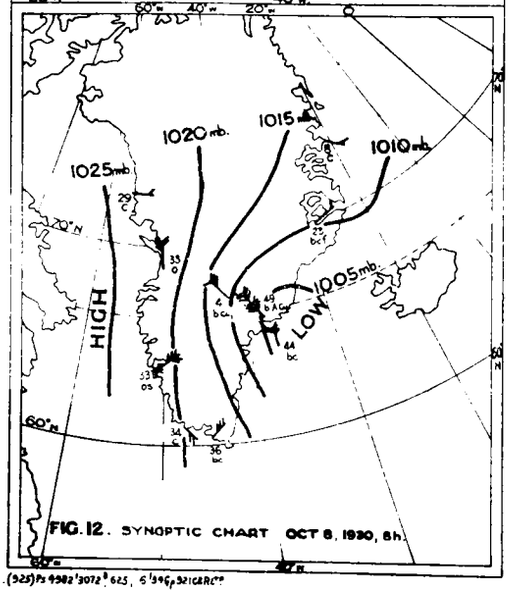


FIG. 12. SYNOPTIC CHART OCT 8, 1930, 8h.

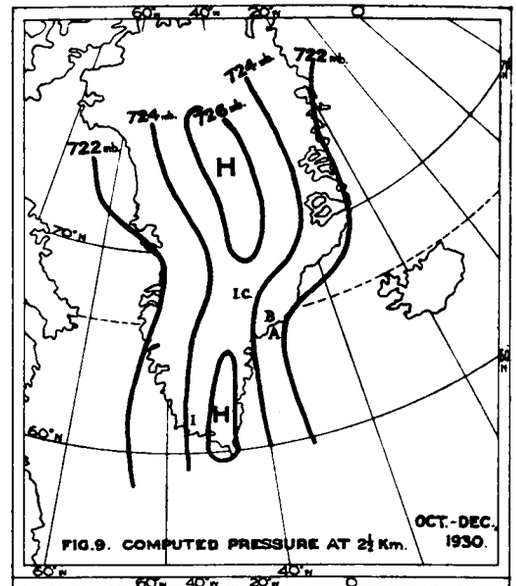


FIG. 9. COMPUTED PRESSURE AT 2½ Km. OCT.-DEC. 1930.

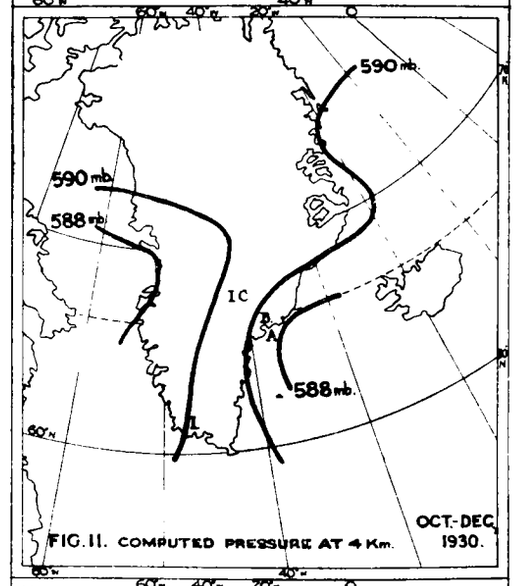


FIG. 11. COMPUTED PRESSURE AT 4 Km. OCT.-DEC. 1930.

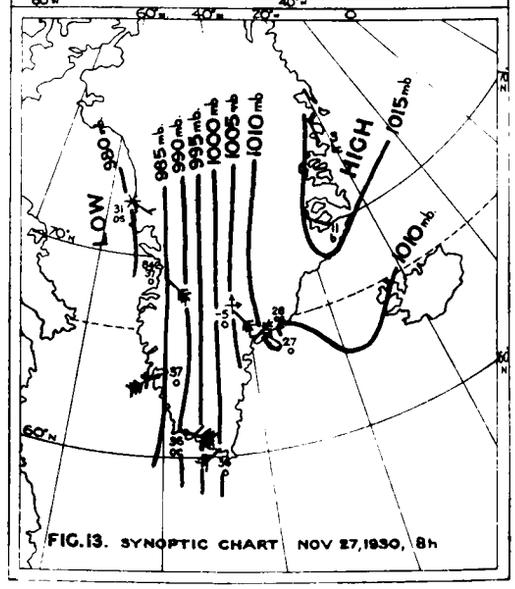


FIG. 13. SYNOPTIC CHART NOV 27, 1930, 8h

(925) Ps 4982 3072 625, 6 396 321 CARC

study is therefore incomplete and is confined to the consideration of certain occasions in 1930 which present points of special interest. It is hoped to make a more complete study when data for 1931 become available.

Fig. 8 shows the available data of mean pressure at sea level for the period October to December, 1930. Making plausible assumptions, based on the few available data of observation, as to the temperatures in the free air on the coastal regions, it is possible to compute the mean pressure distribution at $2\frac{1}{2}$ km. as shown in Fig. 9. In support of this, it may be noted that the system of isobars shown is consistent with what are believed to be the prevailing N. to NW winds at this level over east Greenland (24) and S. to SE. winds over west Greenland (25). The isobars on this map conform closely to the contour map drawn by de Quervain (11) for the inland ice, as shown on Fig. 7 and the extrapolation has therefore been carried to 3 and 4 km., Figs. 10 and 11, the last mentioned level being higher than any part of the inland ice hitherto explored. The isobars of Fig. 11 differ considerably from the customary description of a uniform decrease of pressure polewards at high levels (*see* e.g. (26) p. 259). As the computed pressures depend entirely on the assumed distribution of temperature in the upper air the question of whether the " Icelandic low " persists up to 4 km. is one which cannot be answered with certainty. A remark of Professor Wagner's is of interest in this connexion and may be quoted from the " Handbuch der Klimatologie (17) " Unerwartet ist, dass der Einfluss Grönlands bis an die Grenze der Stratosphäre noch so vorherrschend ist."

Whatever merits may be possessed by extrapolation upwards from the surface in the case of mean values, the method is of doubtful validity when applied to individual cases. It is therefore important to consider the interpretation of isobars of pressure at mean sea level, based on the observations at coastal stations. Synoptic charts have been drawn, from the data collected by the expedition, combined with the data published by the Danish Meteorological Institute. Unfortunately the term " synoptic " is not strictly applicable, the hours of observation used being 7, 13 and 22 at the Ice-Cap station, 9, 13 and 21 at the Base and 8, 14 and 21 at the other stations. The standards of time are also different ; that of the two stations of the expedition is as described above, at Scoresbysund and Sandodden (north-east Greenland) the time of the meridian of 30° W. is in use whereas at Angmagssalik and the stations in west Greenland the standard is of 45° W.

The hours of observation in G.M.T. are as follows :—

Base.	12, 16, 24h.
Ice Cap	10, 16, 01h.
Scoresbysund, Sandodden	10, 16, 23h.
Angmagssalik and West Greenland	11, 17, 24h.

Of the charts which have been drawn it is possible to select examples where the isobars of pressure at sea level give an indication of conditions at the Ice-Cap station, examples being those for 8h. on October 8, Fig. 12 and 8h. on November 27, Fig. 13. The former shows a wind of force 12 at the Base, while only force 5 is observed at Angmagssalik. The temperature of the air at the Base is 2° F. higher than that which would be attained by air brought adiabatically from the Ice-Cap station. The temperature of the air at the Ice-Cap station is within a few degrees of that to be expected in the case of air which had been brought adiabatically from sea level at west Greenland on the previous day, where strong SW. winds and precipitation were observed. The chart for 8h. November 27 shows a steep pressure gradient over a large part of Greenland ; SE. wind set in at the Ice-Cap station at 22h. on the previous day. If a sample of air is supposed to be transported adiabatically from the Base to the Ice-Cap station and thence to Jakobshavn the computed temperatures appropriate to the pressures shown on the chart are at the Ice-Cap station —4° F., at Jakobshavn 38° F., which agree closely with the observed figures of —5° and 37° F. From the examination of these and similar cases it appears reasonable to assume that in suitable circumstances air may be transported from sea level both in east and west

Greenland to the Ice-Cap station. The chart for 21h. on November 25, Fig. 15, is another example of how the lapse rate adjusts itself to approximately the adiabatic for dry air after strong N. to NW. winds have prevailed at both Base and Ice-Cap stations for several hours.

In this case air at a temperature of −29° F. brought adiabatically from the Ice-Cap station to the Base would acquire a temperature of about 14° F. which is 4° F. lower than the temperature observed at the Base but only 2° F. lower than the temperature observed at Angmagssalik.

The question may be asked how the additional warming was effected assuming that the air did travel from the Ice-Cap station to the Base. The data are not sufficient to investigate the possibilities, in particular the distribution of temperature at the surface of the ice is not known. Some remarks on the question are made in § 11 above.

The close agreement found in several cases is surprising, as air to get direct from the Ice-Cap station to the Base must be travelling over the ice surface for at least, one must assume, 3 to 4 hours. In this connexion the data collected by a sledge party, shown on Fig. 14 are of interest. On November 18 and 25, after the strong NW. winds had been blowing for several hours the lapse rate of temperature from the Ice-Cap station to the position of the sledge party and thence to the Base tended to the dry adiabatic. The sharp rise of temperature at the Ice-Cap station on November 15, is presumably associated with the temporary freshening of the wind having removed or disturbed the surface inversion of temperature. The relation of the other changes of temperature to changes of wind direction is obvious, except in the case of the strong westerly winds at the Ice-Cap station on the evening of November 17. The rise of temperature set in earlier in the day with very light winds and was presumably due to a change in the air supply. At 16h. there was calm, and afterwards the wind rose quickly to force 6 from W. During the day the sledge party experienced light winds until 20h. after which the wind rose. The direction of the wind is not stated. The changes of wind at the Ice-Cap station are consistent with the passage of a depression with centre to northward, and this appears to be the only such occasion with strong winds in the period under consideration, the sequence of changes associated with a depression centred to southward being a more common phenomenon (cf. charts for November 28, 21h., and November 29, 8h., Figs. 16 and 17).

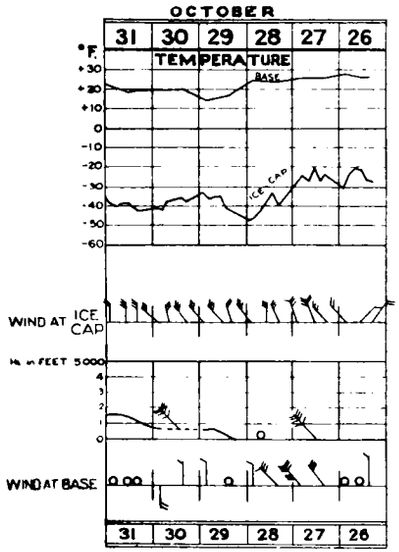
The case of November 17–18 is in fact one of outstanding interest and may be further considered. The chart for 21h. on November 17, Fig. 18, may be taken as an example of a chart on which the isobars of pressure at sea level are no guide to what is happening at the Ice-Cap station. The isobars drawn from data of pressure at stations near sea level indicate over Greenland an anticyclonic ridge, with which the strong westerly wind at the Ice-Cap station seems incongruous. It is not clear whether the setting-in of westerly winds was a sort of travelling phenomenon (cf. § 6) ; the facts of observation are :—

(a) At some time between 16h. and 22h. on November 17 the wind at the Ice-Cap station rose rapidly from calm to force 6, W. Temperature rose to 4° F with the W. wind and fell to −20° next day with a N. wind.

(b) At the position of the sledge party, about 83 miles south-east of the Ice-Cap station the wind rose to gale force during the night November 17–18, at some time after 20h. on November 17. Whether the sledge party experienced a rise in air temperature is not known. The minimum temperature for the night November 17–18 is plotted on Fig. 14 as though it had occurred at midnight, whereas it may well have occurred between 13h. and midnight, and temperature may have risen during the early morning of November 18.

(c) At the Base, a gale set in at 4h. on November 18 and after a lull between 5h. and 6h. blew with force 11 during most of the day. Fig. 19 shows the conditions at 8h. on November 18. A note in the weather diary states that the temperature during the night was 45° F. It is of interest

FIG. 14.



For convenience in paging the diagram has been divided into two parts, the lower being a continuation of the upper. Abscissae from right to left represent times measured from 0h. on October 26: against these are plotted

i. temperature at Base station, at Ice-Cap station, and at various positions on the Ice Cap between, as observed by the sledge party, and

ii. wind direction and force, with height of position of observation.

The consecutive observations of temperature made by the sledge party have been joined by a dotted line, but the resulting line may not represent closely the diurnal variation: minimum temperatures recorded in the night hours, indicated by a small circle on the diagram, are plotted on the midnight line, the exact time of occurrence not being known.

Heights on the journey have been computed from pressure observations; consecutive observations have been joined up, the dotted line indicating the periods when no travel was possible owing to unfavourable weather, thus in estimating the profile of the Ice Cap the dotted parts of the line must be disregarded.

Wind force on the Beaufort scale is indicated by the number of feathers on the arrows, which are oriented in the conventional manner, a N. wind from the top to the bottom of the diagram, a W. wind from left to right and so on. O indicates calm.

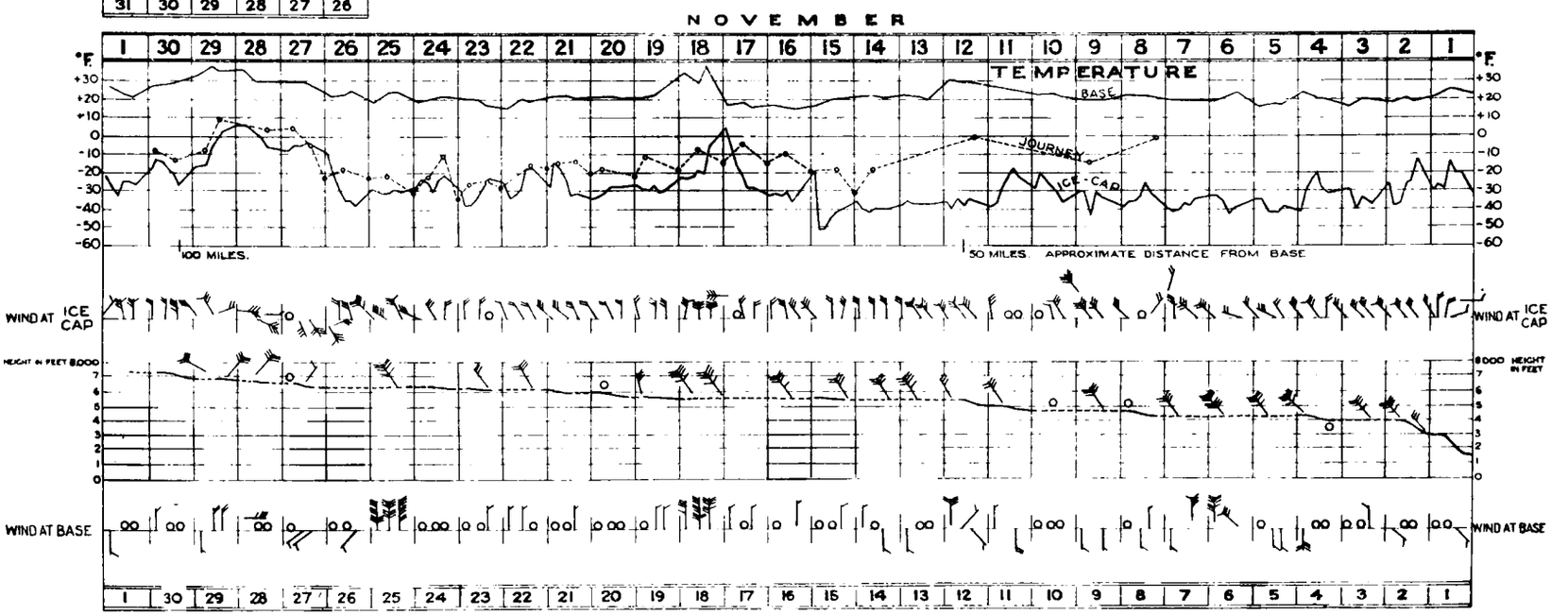


PLATE III

To face p. 31.

PLATE IV

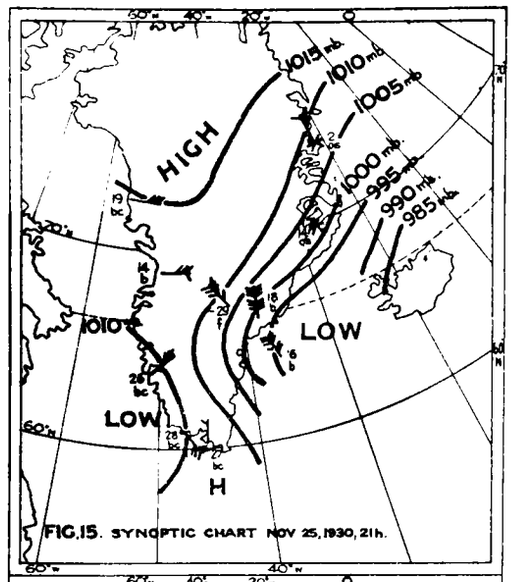


FIG. 15. SYNOPTIC CHART NOV 25, 1930, 21h.

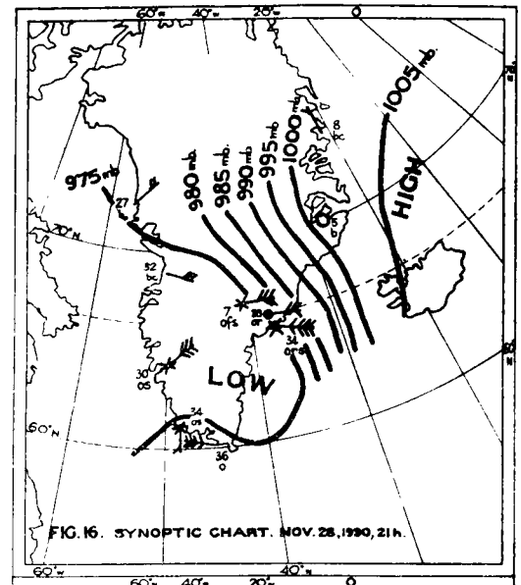


FIG. 16. SYNOPTIC CHART. NOV. 28, 1930, 21h.

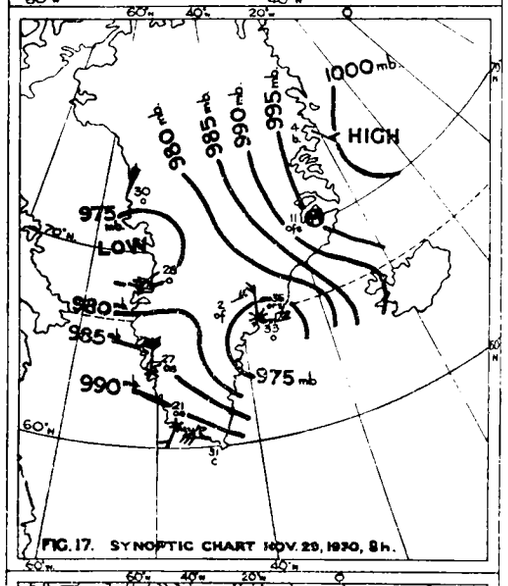


FIG. 17. SYNOPTIC CHART NOV. 29, 1930, 8h.

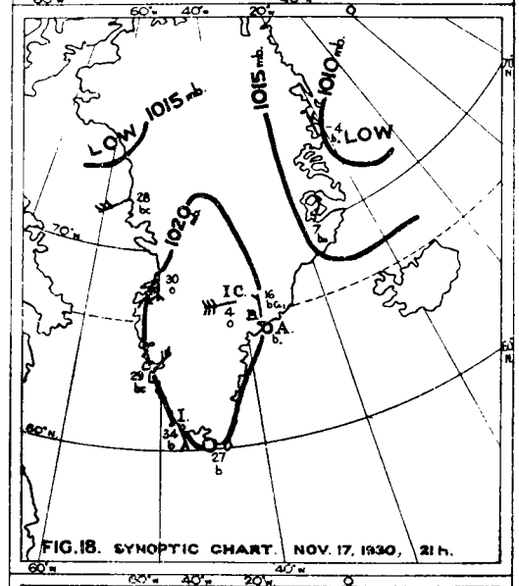


FIG. 18. SYNOPTIC CHART. NOV. 17, 1930, 21h.

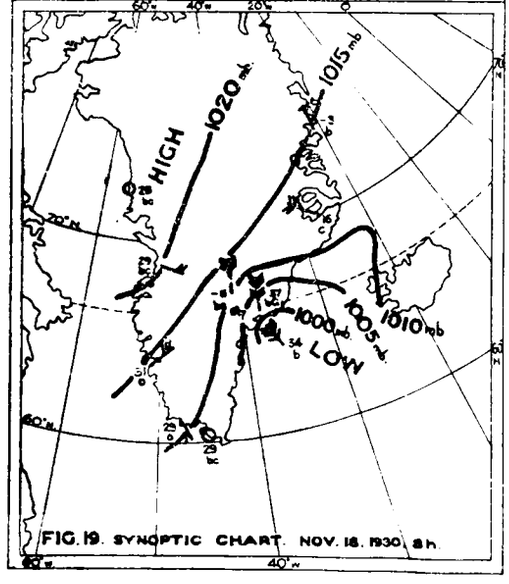


FIG. 19. SYNOPTIC CHART. NOV. 18, 1930, 8h.

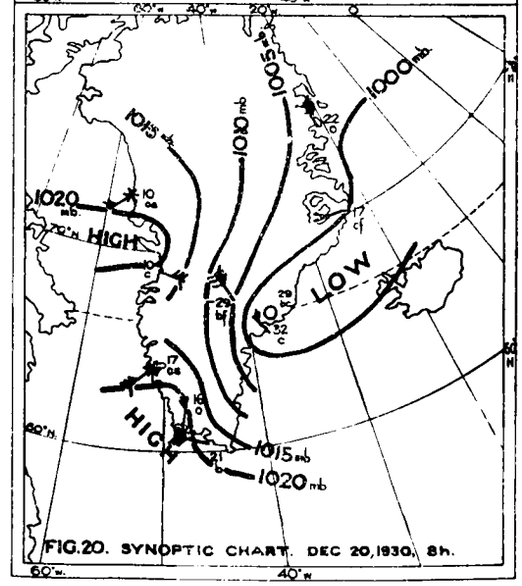


FIG. 20. SYNOPTIC CHART. DEC 20, 1930, 8h.

to note that air brought from the Ice-Cap station to the Base would have been adiabatically warmed from 4° to 46° F. The highest temperature observed at a fixed hour of observation was 37° F. at 9h. ; the maximum temperature actually reached is not accurately known.

Thus the air cannot be satisfactorily traced from Ice Cap to Base station, but the data suggest that on this particular occasion a mass of " warm air," relatively speaking, passed the Ice-Cap station and was deviated to arrive at the Base from northward or north-westward.

The isobaric charts associated with the northerly or north-westerly gales at the Base in the period under consideration (October–December, 1930) have a certain similarity of type, but apparently nearly similar isobaric situations occurred in December without gales occurring at the Base, see, for example chart of 8h., December 20, Fig. 20. The chart for 14h.December 15, Fig. 21 shows a gale at Angmagssalik and only light wind at the Base. There appears to be a tendency in these charts for the " gradient wind " to be more north-easterly than on the occasions when gales were experienced at the Base, but it is not proposed to put forward any theory at present, as the most prolonged and severe gales were experienced in the months of 1931 for which the comparative data are not yet available.

Whether on occasion a gale may occur over the Ice Cap near the Base without reaching the surface of the fjord at any time during its continuance it is not possible to say. Such a possibility seems to be implied in the " overriding of air strata " to which Professor Hobbs ((13) p. 76) alludes.

A more complete discussion of the interesting questions of the crossing of Greenland by depressions and of the effect of outflowing winds from Greenland on the Atlantic depressions * is deferred. During the period when the Ice-Cap station was occupied, the German expedition under the leadership of the late Alfred Wegener maintained a station on the inland ice in lat 71° 8′ N., long 40° W., about 275 miles northward of the Ice-Cap station. From preliminary announcements (27) it appears that there are important differences between the meteorological regimes of the two stations, in comparison with the relatively short distance between them, and a detailed comparison of the results from the two stations is necessary.

At present it appears that the depressions which have the greatest effect on conditions at the Ice Cap and Base stations are not necessarily those with the greatest effect on subsequent conditions over the western Atlantic and western Europe.

A recent work describes an " enormous cold-air invasion " in Europe (November 22–4, 1930) (28), in which the source of cold air was, partly, the Greenland region. Now on November 18 a northerly gale, reaching a maximum force of 10, blew at the Base from 4h. to 18h., at Angmagssalik gale force was observed at 8h., but the wind had dropped to force 2 by 14h., thus the gale at the Base was a rather local phenomenon, and it appears to have been due to an offshoot of a depression from the American continent.

The data studied so far are not regarded as sufficient to give any definite evidence either in favour of or against the theory of Professor Hobbs that outbursts of cold air from Greenland provide motive power for the atmospheric circulation (13). In any study of the question, however, it seems necessary to take into consideration such points as the following, which have been suggested by the study of the data of the British expedition :—

(a) Large rises of temperature at the Ice-Cap station in winter are apparently brought about in three ways, first when the surface wind increases and disturbs the inversion of temperature which tends to form in quiet conditions, secondly warm air, relatively speaking, arrives with a westerly component, and thirdly warm air arrives with an easterly component. The third mentioned is the most important factor in bringing " plus " temperatures to the Ice-Cap station : it corresponds to the " cyclone-thaw " of the low-level stations (29).

* The theory of Professor Hobbs is detailed in his book, cited above.

(b) The "warm air," still further warmed by adiabatic compression, may return to sea level on the west coast with the characteristics of a föhn wind. At the aerological station established by the University of Michigan Expeditions, 1,292 feet above sea level, in lat. 66° 56′ N., long. 50° 50′ W. föhn winds of velocity up to 100 m.p.h. have been measured with the anemometer (30), and cases are described in which the föhn air may form the warm sector of one of the secondary depressions which are often observed in the Davis Strait (31).

At the Base station, however, in the period under consideration, no case except possibly that of November 18, described above, appears in which the "warm" air may be supposed to have reached the Base after crossing the Ice Cap eastward, and the northerly or north-westerly gales although displaying certain föhn characteristics, appear as likely to produce a fall as a rise in temperature. The possibility of a depression which has crossed the inland ice being regenerated in the Davis Strait is suggested, but it is evident that the prevailing direction of motion of depressions, and the sense of the rotation of the winds must tend to produce an asymetry in conditions on the west and east sides of the Greenland "massif." An isolated observation, on December 5, at 13h. suggests that the compensation for the outflowing air may be carried out locally—on this occasion the surface wind at the Base was N. force 5, and St. Cu. cloud at 4,000 feet was observed to be moving to the north. No other observation of this nature has been noted, however, and extrapolation to the case of the gales of force 12 may not be justified.

There is some reason to believe that depressions may cross Greenland more frequently than the experience of sledge parties in summer has supposed to be the case, but on such points, as mentioned above fuller discussion must await the publication of the data from the other expeditions in the field during 1930–1. As regards the northerly gales at the Base station an interesting contrast is afforded with the experience of the Australasian Antarctic Expedition, at Cape Denison on the coast of Antarctica. The site of the observations was on the coast at the foot of the inland ice but the wind regime was, in a sense, the inverse of that described at the Base station. At Cape Denison long periods of gale alternated with short periods of calm; the mean hourly wind velocity for twenty-two months was 44 m.p.h., the highest monthly mean 56 m.p.h., and the highest daily mean 81 m.p.h. The maximum run of wind in an hour was 96 miles. For about 90 per cent of the time the wind blew from between SSE. and S. During the periods of comparative calm onshore northerly winds might be experienced while the southerly gale continued at a height of 1,000 feet or more in the upper air and on occasions sledging parties experienced strong winds at these levels about 5 miles south and walked down into a calm at the winter quarters. The calm area appears also to have been local in horizontal extent, whilst the gales extended only a few miles out to sea (32). Apart from the reversed ratio of calms to gales there is a striking resemblance between the two sets of phenomena, at Cape Denison and in the Base fjord.

As regards the different time scale of the phenomenon, some significance may be attached to the fact that the Cape Denison station was situated at the foot of a more gradual slope, rising to 4,000 feet in 50 miles.

In the study of the barometric changes at the Base and Ice-Cap stations some use has been made of isallobaric charts. Figs. 22 to 26 show barometric changes in mb. during 12-hour periods, I denoting the changes from 21h. on the previous day to 8h. on the day named, whilst II denotes the changes from 8h. to 21h. on the day named. The charts are plotted from data for stations near sea level, and it is found that the changes at the Ice-Cap station if increased in the inverse ratio of pressure at the Ice-Cap and Base stations, i.e., in the ratio of 10:7 approximately, are in close agreement with the changes shown at sea level.

For stations in the same vertical, by differentiation of the ordinary barometric height formula (18), (33)

$$\log p = \log p_0 - gh/RT_m$$

To face p.32.

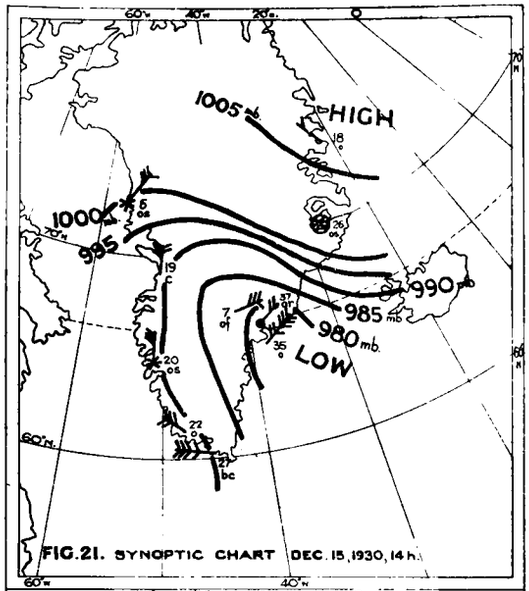


FIG.21. SYNOPTIC CHART DEC. 15, 1930, 14 h.

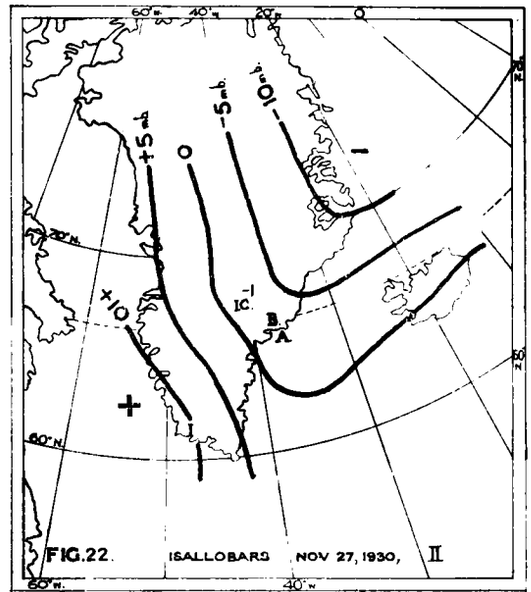


FIG.22. ISALLOBARS NOV 27, 1930, II

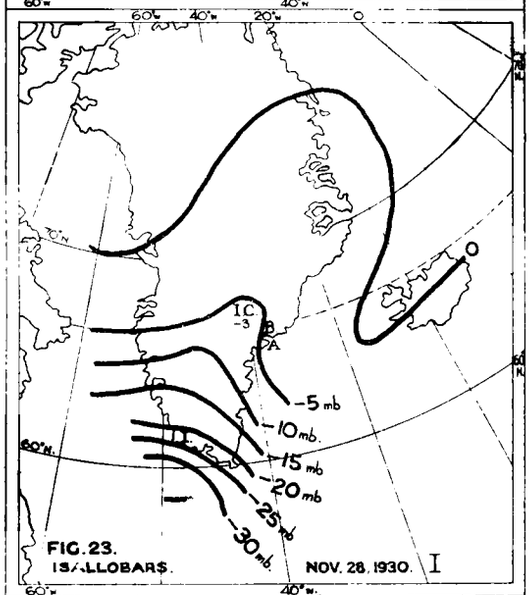


FIG.23. ISALLOBARS. NOV. 28, 1930. I

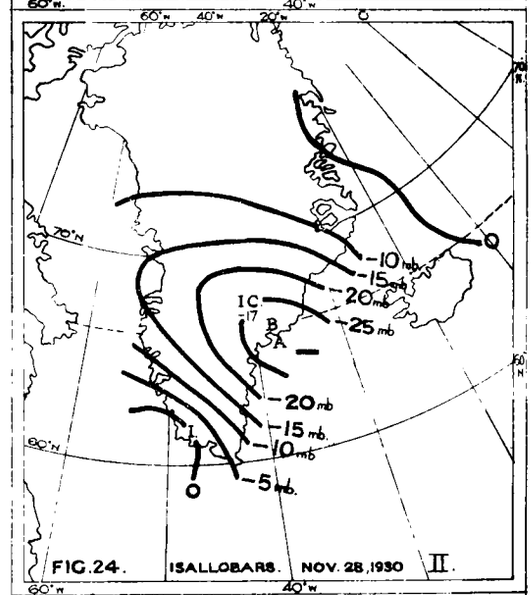


FIG.24. ISALLOBARS. NOV. 28, 1930 II.

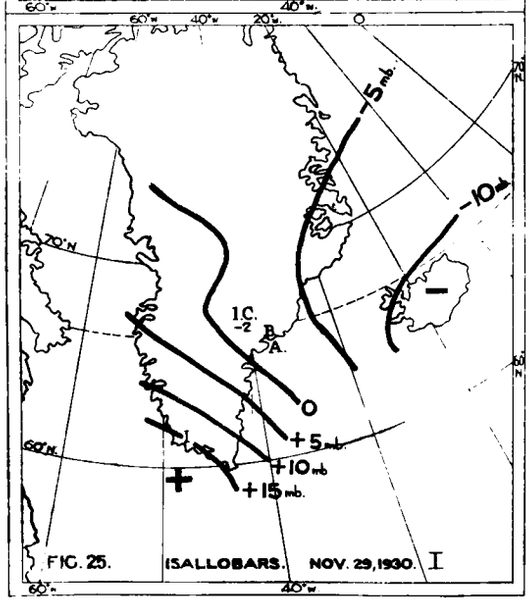


FIG. 25. ISALLOBARS. NOV. 29, 1930. I

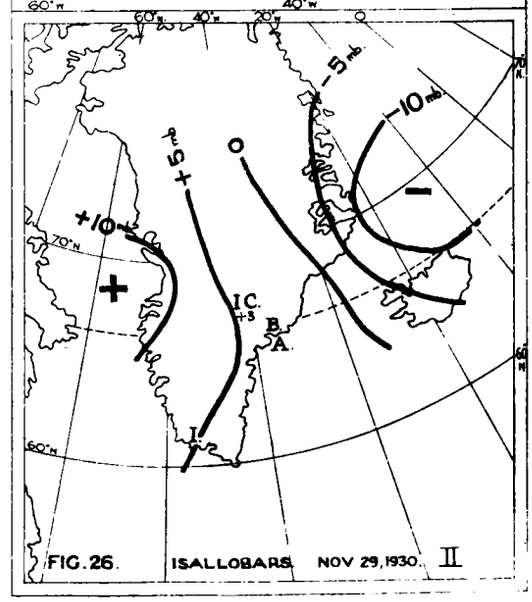


FIG. 26. ISALLOBARS. NOV 29, 1930. II

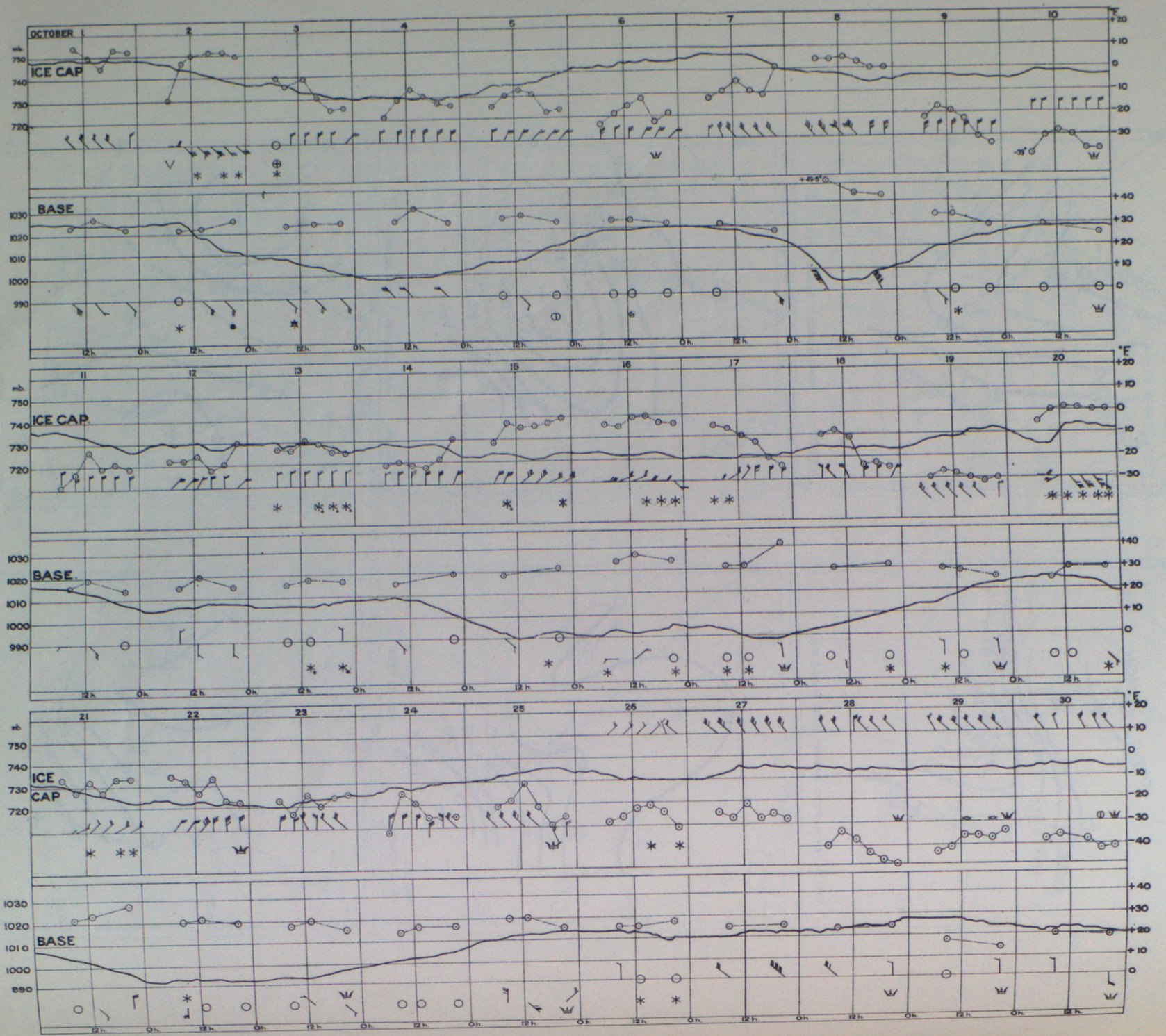

OCTOBER 1
2
3
4
5
6
7
8
9
10
mb.
750
740
730
720
ICE CAP
°F
+20
+10
0
-10
-20
-30
1030
1020
1010
1000
990
BASE
+40
+30
+20
+10
0
12h.
0h.
11
12
13
14
15
16
17
18
19
20
ICE CAP
BASE
21
22
23
24
25
26
27
28
29
30
ICE
CAP
BASE
-40

PLATE VI

October 31 – November 29

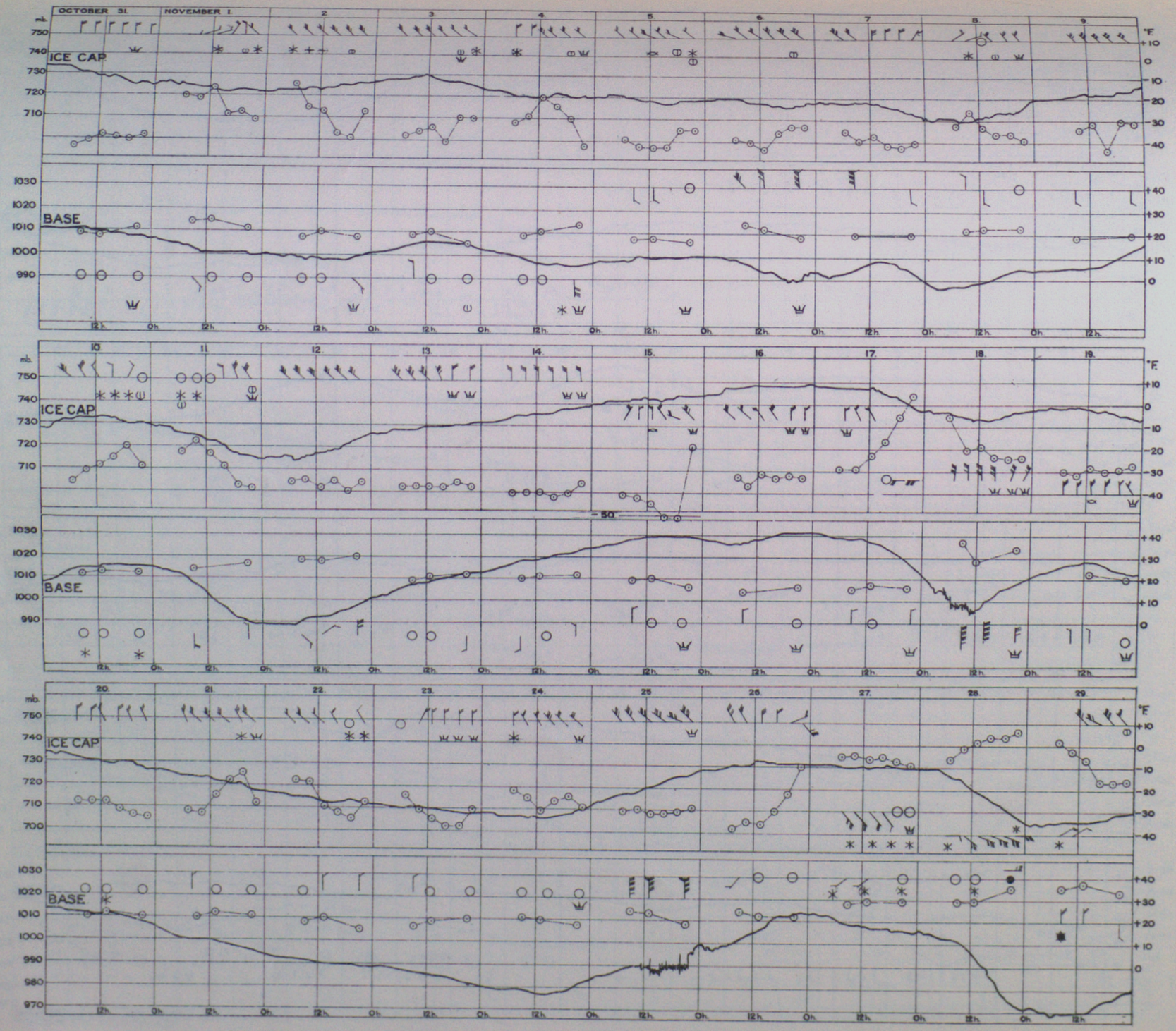


PLATE VII

November 30 - December 29

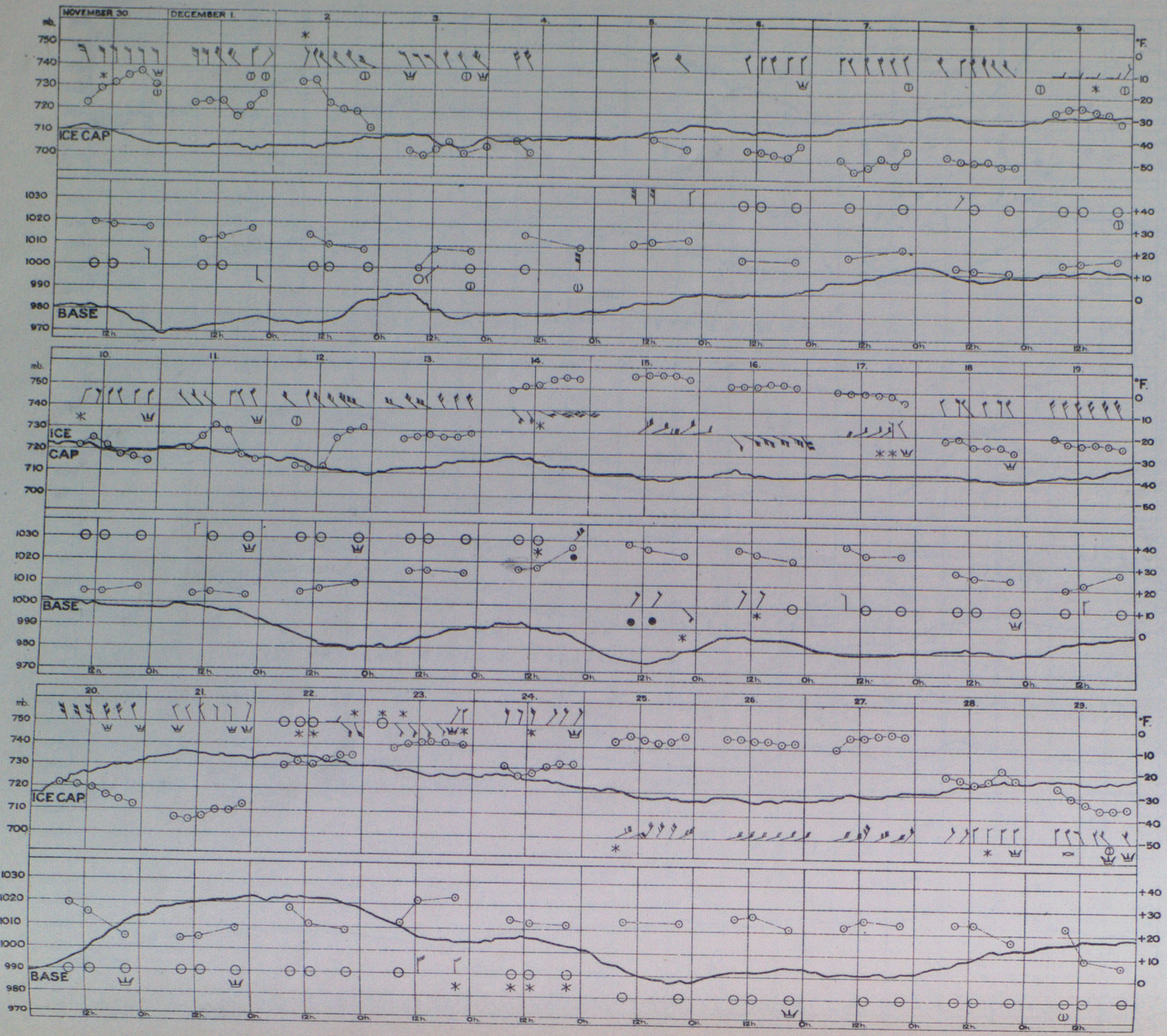


PLATE VIII

December 30 – January 28

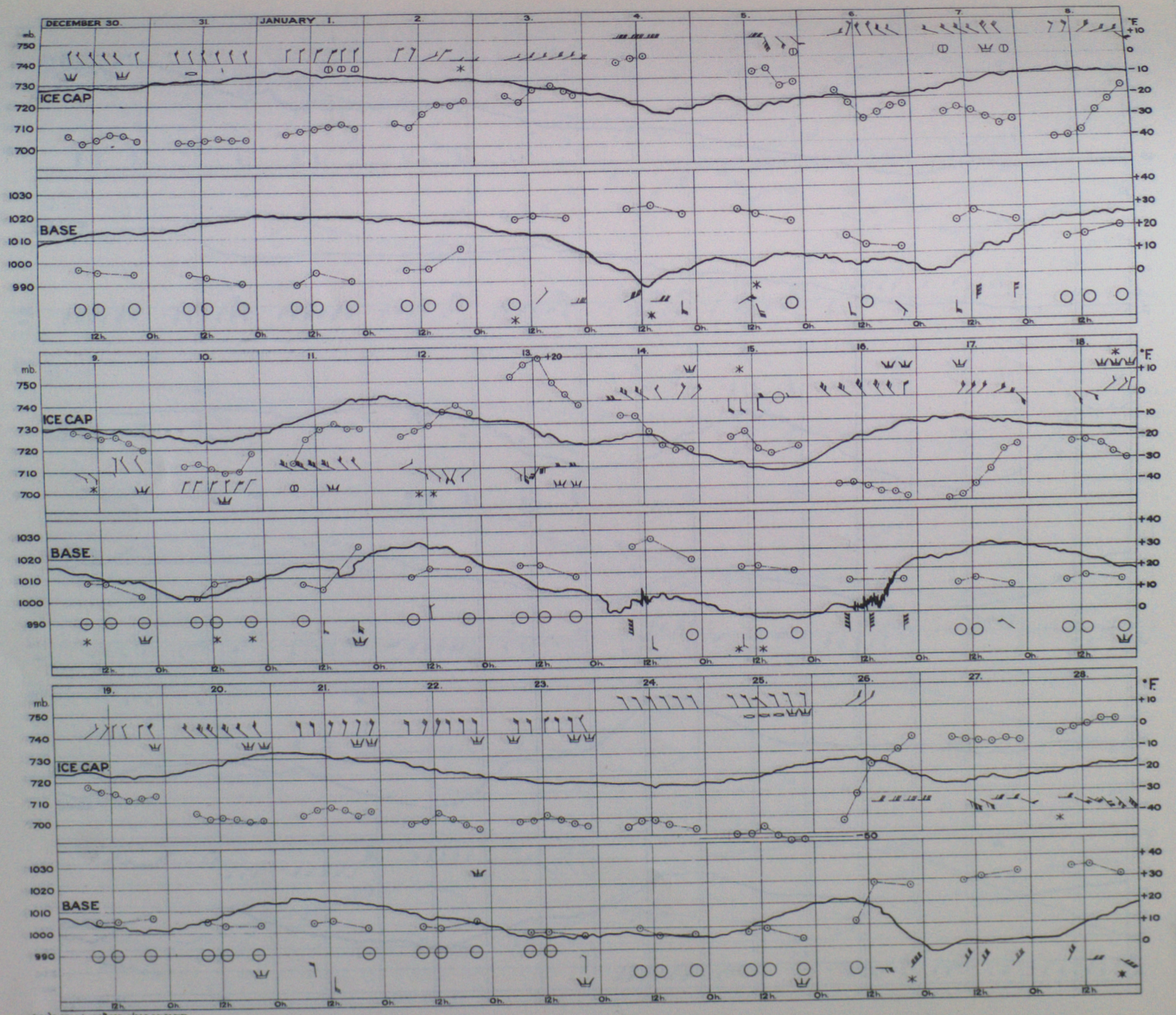


PLATE IX

January 29 - February 27

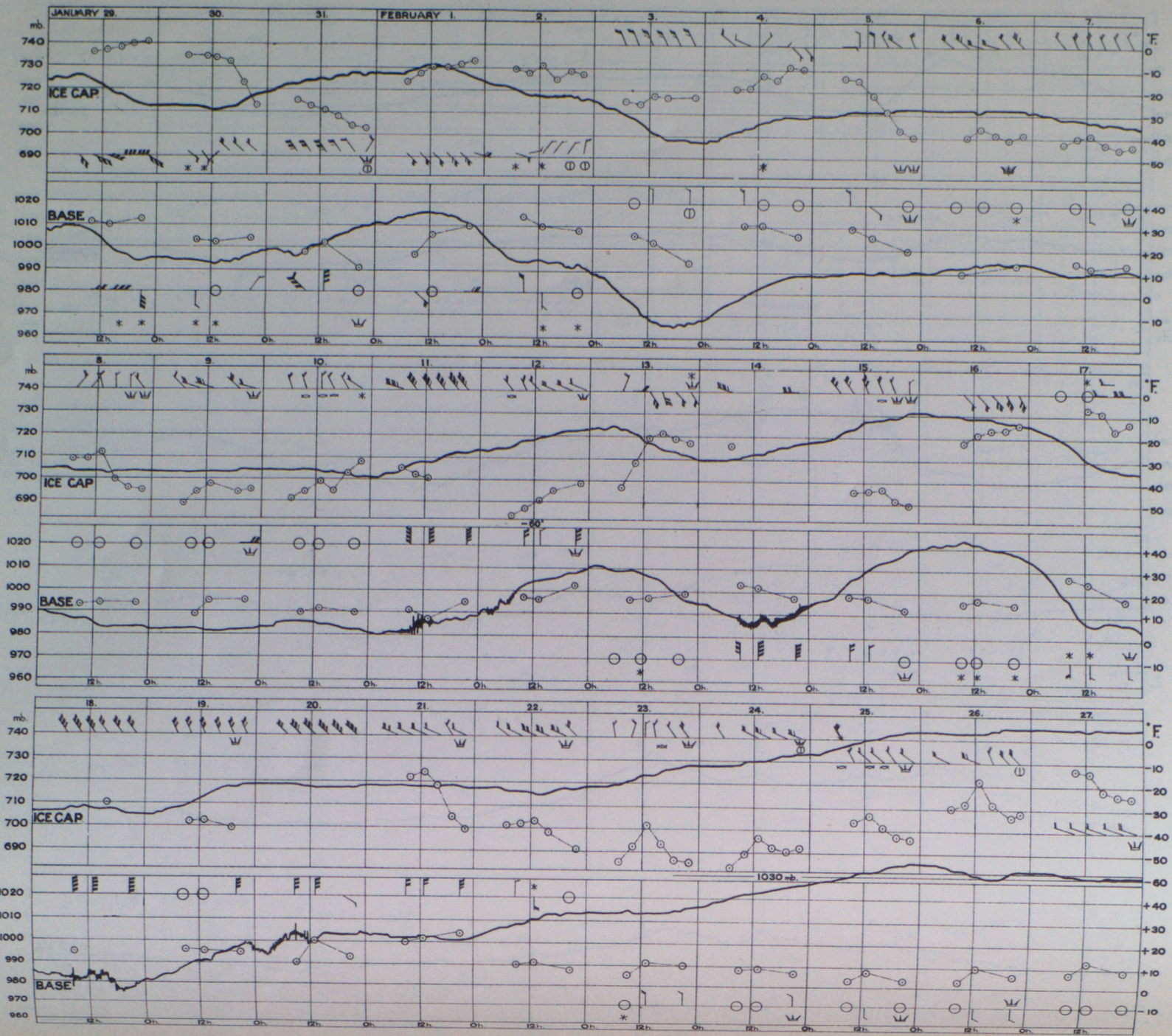


PLATE X

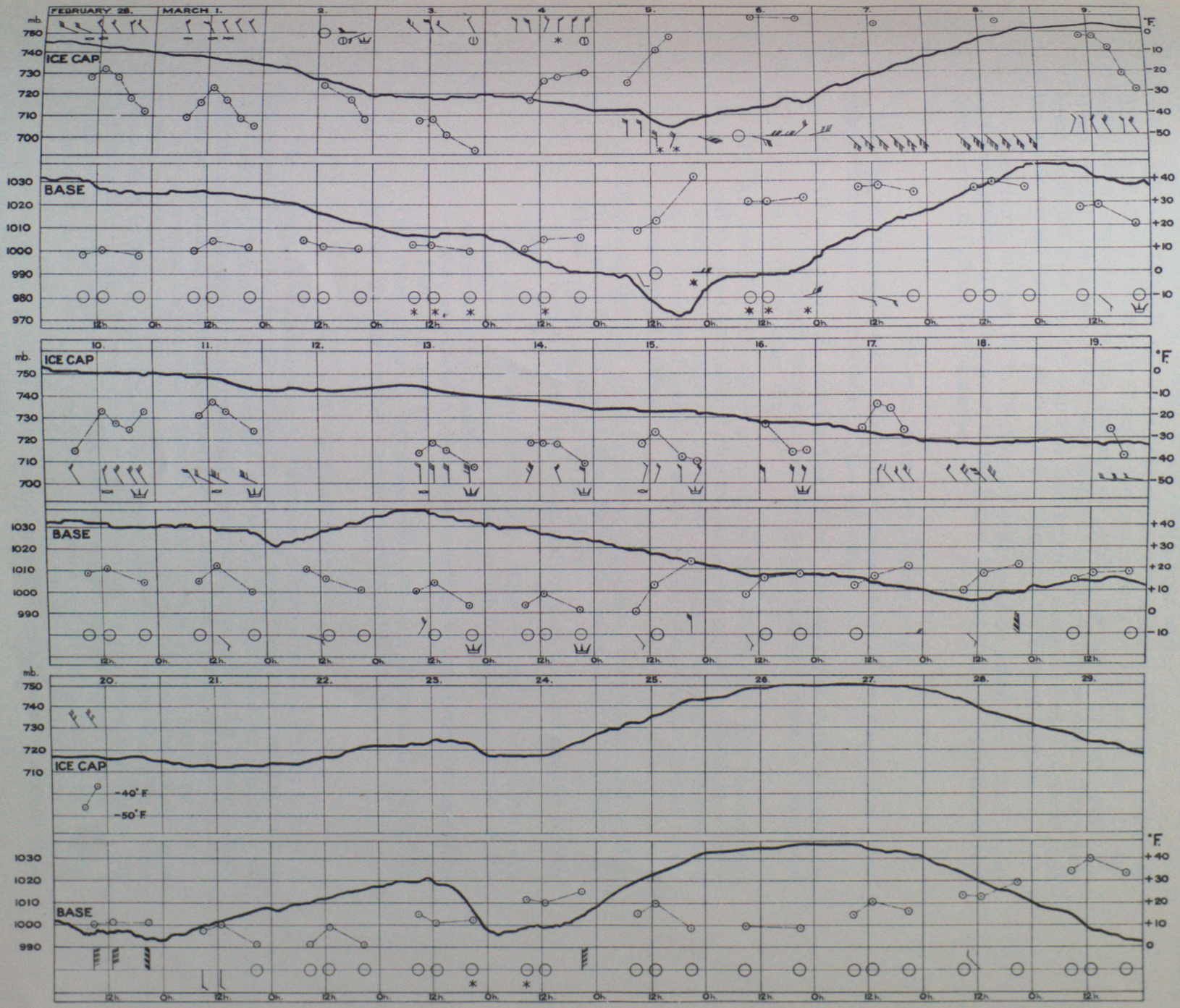

FEBRUARY 28.
MARCH 1.
2.
3.
4.
5.
6.
7.
8.
9.
mb.
°F.
ICE CAP
BASE
10.
11.
12.
13.
14.
15.
16.
17.
18.
19.
20.
21.
22.
23.
24.
25.
26.
27.
28.
29.
-40° F
-50° F
12h.
0h.

PLATE XI

one obtains an expression which, with the substitution of suitable values from the data of the Base and Ice-Cap stations reduces to the approximate form

$$\Delta p = \cdot 72\ \Delta p_0 + 0{\cdot}9\ \Delta T_m,$$

where Δp = barometric change at high-level station,

Δp_0 = barometric change at low-level station and

ΔT_m = change in the mean temperature of the intermediate air ; so long as ΔT_m is small the barometric changes are in the ratio of the pressures. In the case under consideration the amount of possible horizontal pressure gradients is not known ; on occasion they may possibly reach 5, 10 mb. or more. The experience on flights over the Ice Cap was that frequent changes of wind occurred, and the winds varied considerably in direction and force at different heights.

The charts in Figs. 22 to 26 show the progress of an isallobaric " low " across southern Greenland ; subsequent to the period of these charts a depression moved from north of Iceland to Spitsbergen.

§ 15—THE TABLES OF OBSERVATIONS

Limitations of space prohibit the publication *in extenso* of the observations ; and publication is therefore restricted to the following :

(a) All available 13h. observations at two stations, with data of maximum and minimum temperatures and a selection of " remarks," extracted from the weather diaries.

(b) All available 21h. observations at the Base station and 22h. observations at the Ice-Cap station during the period September 8 to March 21. These hours of observation are the nearest available to the hours of observations in the Greenland region as shown on the *Daily Weather Report* of the Meteorological Office.

(c) Diagrams showing the daily course of pressure, temperature and wind at the Base and Ice-Cap stations during the period October 1 to March 29. These appear on Plates VI–XI where—
thick lines represent pressure at station level, from autographic records (scale on left) ;
thin lines represent temperature (scale on right); consecutive eye readings on each day are joined up but the complete course of the temperature is unknown ;
arrows show wind observations according to the conventions described on Figs. 5, 6, and 14.
The observations in September have not been shown as the barograph at the Ice-Cap station was not working satisfactorily.

§ 16—ACKNOWLEDGMENTS

The success of the expedition in setting up a fixed observing station in central Greenland represents for meteorology a piece of pioneer work of great importance, and acknowledgments are especially due to Mr. Quintin Riley for organizing in difficult circumstances the meteorological programme as well as for taking a large share in the actual observational work at the Base and Ice-Cap stations.

The names of the various observers at the Ice-Cap station are given in § 1 ; particular mention may be made of Mr. A. Courtauld, who remained alone from December 5 to May 5, carrying on the outdoor observations until March 20. After this date Mr. Courtauld was completely snowed up by the increasing drifts, but continued to make estimates of wind and maintained the barograph record until a few days before the relief party arrived. The work of a solitary observer in keeping up observations which cover a large part of the 24-hour period is arduous even in the best conditions—continued for several months under arctic conditions it is a feat of endurance of a high order.

I am greatly indebted to Mr. Riley for assistance in discussing various points in regard to the observations, and, during Mr. Riley's absence on a subsequent expedition to Greenland, to Mr. Courtauld and to Flight-Lieutenant N. H. D'Aeth, for similar assistance. I have also had the opportunity of discussing various points with the following members of the expeditions: Mr. A. Stephenson, Mr. J. R. Rymill, Mr. L. R. Wager and Mr. W. E. Hampton. Mr. Riley also rendered assistance in preparing the material for the press.

Acknowledgment is also due to the Royal Geographical Society for permission to reproduce two maps from the *Geographical Journal* and for the loan of the block of a photograph.

The photograph of the meteorological station on the inland ice appearing on the frontispiece was kindly supplied by Flight-Lieutenant H. I. Cozens.

Mr. F. Metcalfe of the Meteorological Office has given valuable assistance in preparing the tables and diagrams.

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THE TABLES OF OBSERVATIONS

NOTES

Maximum temperature } Base: read at 21h., entries assigned to day of reading.
Minimum „ } Ice Cap: read at 16h., entries assigned to day of reading.

"Remarks": selected from all available information on the day named and do not refer only to the 13h. observation.

Cloud amount: the entries give the number of tenths of sky covered by high or low cloud.

— indicates either that no observation was made or that the observation was not taken within half an hour of the specified time.

BASE

Day	Pressure at M.S.L.	Observations at 13h.						Maximum	Minimum	Remarks
		Dry bulb	Wind		Weather	Cloud amount				
			Dir.	Force		High	Low			
	mb.	°F.						°F.	°F.	
Aug. 1930										
1	—	—	—	—	—	—	—	—	—	
2	—	—	—	—	—	—	—	—	—	
3	—	—	—	—	—	—	—	—	—	
4	—	—	—	—	—	—	—	—	—	
5	—	39·1	E.	4	bf	1	0	40	32	Fog patches spread to fjord by evening.
6	—	39·8	E.	4	b	0	0	46	32	Fine and sunny all day.
7	—	49·1	SE.	3	bc	3	0	52	36	Fine all day; much warmer.
8	1015	—	W.	1	bc	3	0	53	39	Very much warmer; W. wind.
9	1014	46·8	W.	4	bc	7	0	52	43	Cloudy morning, clear afternoon.
10	1014	—	—	—	—	—	—	—	—	Fine and sunny all day.
11	1015	—	—	—	—	—	—	49	37	Rain 17h. onward.
12	1006	—	—	—	—	—	—	—	—	Dull at first; fine afternoon and evening.
13	999	43·7	W.	3	b	2	0	46	36	Mist early, clearing 11h.
14	1006	46·7	SE.	2	bc	3	0	53	39	Fine, warm day.
15	1017	—	—	—	—	—	—	47	39	
16	1019	48·9	W.	1	c	8	0	50	38	Fine, sunny day.
17	1021	44·5	SE.	3	b	0	0	47	39	Ditto
18	1011	47·2	SE.	2	b	0	0	48	39	
19	1013	49·9	SE.	1	bc	0	7	51	37	
20	1013	51·5	W.	1	b	2	0	54	39	Very fine and sunny all day.
21	1006	47·1	W.	1	cr	0	9	48	41	Rain or drizzle all day.
22	1010	—	—	—	—	—	—	46	39	
23	1006	48·5	W.	2	c	0	9	49	39	SE. wind a.m. dropped suddenly at noon.
24	1024	43·2	SE.	4	cr	0	9	43	38	A rainy day with few fine intervals.
25	1020	43·5	SE.	2	c	0	9	45	34	Dull; some rain.
26	1023	42·8	Calm	0	c	0	9	43	39	
27	1015	—	—	—	—	—	—	45	36	Some rain p.m.
28	1012	—	—	—	—	—	—	42	35	Low mist a.m. clearing at noon.
29	1018	40·1	SE.	3	bc	3	0	45	33	Day fine, clouding towards evening.
30	1017	45·0	W.	1	c	8	0	46	35	Day fair, little sun.
31	1016	—	—	—	—	—	—	63	35	Gale in early morning.

BASE

Day	Observations at 13h.							Maximum	Minimum	Remarks
	Pressure at M.S.L.	Dry bulb	Wind		Weather	Cloud amount				
			Dir.	Force		High	Low			
	mb.	°F.						°F.	°F.	
Sept. 1930										
1	1024	42·6	SW.	3	c	9	0	44	37	Slight rain p.m.
2	1027	42·0	SSE.	3	b	1	0	48	40	Fine and clear.
3	1027	40·1	SSE.	3	crr	0	9	43	37	Very low cloud all day.
4	1024	44·0	SE.	1	c	0	9	47	40	Dull at first ; improving later.
5	1027	—	S.	2	bc	5	0	48	37	
6	1025	40·5	S.	1	c	10	0	43	35	Dull early ; a little rain later.
7	1029	41·0	Calm	0	or	0	10	44	39	Rain a.m., improving p.m.
8	1024	41·5	S.	2	or	0	10	45	40	Dull early ; rain and low cloud p.m.
9	1029	42·8	Calm	0	c	0	9	44	36	Cloud low on Ice Cap, clear sky seaward.
10	1024	44·5	ESE.	3	b	2	0	47	34	Dull early, cleared rapidly 9h. 45m.
11	1015	—	—	—	—	—	—	50	35	
12	1015	—	—	—	—	—	—	46	35	St-Cu. rapidly from seawards 18h. 30m.
13	1018	—	—	—	—	—	—	41	35	Dull early clearing in evening.
14	1018	—	—	—	—	—	—	—	—	Fine a.m. cloud and colder p.m.
15	1015	—	—	—	—	—	—	—	—	
16	1012	36·5	Calm	0	cr	0	9	—	—	Rain all day ; no wind.
17	1013	—	—	—	—	—	—	41	33	Cloud at times over Ice Cap.
18	1014	—	—	—	—	—	—	45	34	
19	1017	41·5	S.	1	b	1	0	44	31	Fine, warm day.
20	1017	41·2	—	—	b	0	0	43	29	Frost covered ground in morning.
21	1010	—	—	—	—	—	—	—	27	Half-inch fresh ice on fjord a.m.
22	1014	37·7	SE.	3	b	0	0	44	30	Fine clear day.
23	1010	44·0	Calm	0	b	0	0	45	28	Fresh ice on fjord all day.
24	1020	38·0	SE.	2	b	1	0	40	27	Ice on fjord nearly all melted.
25	1025	—	—	—	—	—	—	39	26	Fog at sea p.m., clear over Ice Cap.
26	1015	—	—	—	—	—	—	41	30	Rain 17h.–21h.
27	1014	38·5	Calm	0	ofe	0	10	40	32	Rain in evening.
28	1025	—	—	—	—	—	—	39	30	Drizzle a.m., sleet evening.
29	1033	34·0	Calm	0	od	0	10	37	30	Snow 16h. onwards.
30	1031	—	—	—	—	—	—	38	30	Mist in morning, clearing later.

BASE

Day	Observations at 13h.							Maximum	Minimum	Remarks
	Pressure at M.S.L.	Dry bulb	Wind		Weather	Cloud amount				
			Dir.	Force		High	Low			
	mb.	°F.						°F.	°F.	
Oct. 1930										
1	1026	—	—	—	—	—	—	39	30	Fog came up from south 16h.
2	1021	—	—	—	—	—	—	38	28	Snow began about 10h.
3	1007	—	—	—	—	—	—	35	31	One inch snow on ground in morning.
4	1001	39·6	NW.	2	bc	5	0	41	28	Snow lying above 300 ft.
5	1008	36·0	SE.	1	b	1	0	40	31	Sunny most of day.
6	1021	33·5	Calm	0	od	0	10	37	30	Rain or sleet most of day.
7	1020	—	—	—	—	—	—	39	27	Bay to NW. completely frozen.
8	996	—	—	—	—	—	—	—*	25	Anemometer blown away in gale.
9	1012	34·0	Calm	0	os	0	10	42	28	One inch snow fell 16h.–19h.
10	1020	—	—	—	—	—	—	31	25	Clear sky most of day.
11	1015	29·0	SE.	2	bc	0	6	30	23	Fine a.m. St–Cu. from seaward p.m.
12	1009	29·4	S.	1	b	0	1	29	23	Sunshine all day.
13	1008	—	—	—	—	—	—	28	23	Snow 14h. onwards.
14	1009	—	—	—	—	—	—	27	24	
15	992	—	—	—	—	—	—	32	27	Continuous snow p.m.
16	993	36·5	NE.	1	0	0	10	37	32	Some snow a.m. and p.m.
17	991	31·4	Calm	0	os	0	10	41	30	Two inches snow lying.
18	998	—	—	—	—	—	—	44	28	Snow 18h. onwards.
19	1010	28·3	Calm	0	0	0	10	33	22	Snow a.m. cloudy p.m.
20	1016	28·8	Calm	0	c	0	10	29	—	Snow 15h. onwards.
21	1003	33·1	SE.	1	c	0	9	38	29	Snowing early until 11h. 30m.
22	995	30·8	Calm	0	om	0	10	39	29	s_0 16h.–19h.
23	995	29·8	NW.	1	bc	3	0	31	23	Blue sky all day; some cloud over sea.
24	1004	26·1	Calm	0	b	1	0	28	19	
25	1014	30·0	SE.	4	b	0	0	33	23	Wind N. F. 6 6h. 30m.; backing SE.
26	1014	25·2	Calm	0	os	0	10	29	22	Snow 10h. 30m.–14h. 30m., 18h.–23h.
27	1014	—	—	—	—	—	—	28	19	Wind reached F. 10 22h.
28	1016	—	—	—	—	—	—	26	17	Slight snow p.m.
29	1018	—	—	—	—	—	—	24	13	Blue sky and sunshine all day.
30	1015	—	—	—	—	—	—	24	12	Fjord freezing.
31	1012	17·8	Calm	0	b	2	0	22	14	Cloud from sea in evening.

* 49° recorded at 9h. by dry bulb.

BASE

Day	Pressure at M.S.L.	Observations at 13h.						Maximum	Minimum	Remarks
		Dry bulb	Wind		Weather	Cloud amount				
			Dir.	Force		High	Low			
	mb.	°F.						°F.	°F.	
Nov. 1930										
1	1003	25·3	Calm	0	c	1	8	26	19	s_0 early.
2	1000	20·0	Calm	0	b	1	0	22	16	Blue sky and sunshine all day.
3	1008	20·2	Calm	0	bc	4	0	25	14	
4	999	20·5	Calm	0	cs_0	1	8	26	14	Slight snow 13h.; heavy 16h.–18h.
5	1000	17·5	S.	1	bc	5	0	24	15	N. wind and drift snow on glacier.
6	995	21·5	N.	4	bc	0	3	26	12	Sudden gale 15h. 30m.
7	999	—	—	—	—	—	—	20	13	
8	991	22·0	S.	1	c	8	0	22	18	Cloudy a.m. becoming dull.
9	997	—	—	—	—	—	—	22	16	
10	1017	22·5	Calm	0	c	0	9	23	19	Dull all day.
11	1002	—	—	—	—	—	—	30	21	Ditto. clearing 21h.
12	994	28·1	NE.	1	c	1	7	31	19	Cloudy most of day.
13	1011	21·0	Calm	0	o	0	10	30	17	
14	1021	21·0	Calm	0	c	0	9	22	17	
15	1031	19·9	Calm	0	bc	0	7	23	15	
16	1030	—	—	—	—	—	—	17	13	Driving snow on glacier a.m.
17	1029	17·0	Calm	0	b	1	0	19	13	
18	999	28·0	N.	11	b	1	0	—	10	Ice on fjord broken up by 13h.
19	1020	22·5	N.	1	b	2	0	26	18	
20	1013	21·0	Calm	0	os	0	10	22	17	
21	1001	21·9	Calm	0	o	0	10	22	19	
22	992	19·9	N.	1	bc	3	2	21	14	Dull early, fair later.
23	987	19·0	Calm	0	c	6	3	21	12	
24	979	20·0	Calm	0	b	0	0	23	17	Blue sky and sunshine all day.
25	991	23·1	N.	12	b	1	0	—	—	Wind dropped suddenly 21h. 10m.
26	1008	22·0	Calm	0	b	0	1	31	15	Blue sky and sunshine all day.
27	1010	29·0	SW.	1	os	0	10	30	21	Snow all day till 22h. from 6h.
28	997	28·9	Calm	0	os	0	10	36	28	
29	972	37·3	N.	2	o	0	10	38	32	Ice in fjord all gone.
30	981	27·9	Calm	0	bc	4	1	37	26	

BASE

Day.	Observations at 13h.							Maximum	Minimum	Remarks
	Pressure at M.S.L.	Dry bulb	Wind		Weather	Cloud amount				
			Dir.	Force		High	Low			
	mb.	°F.						°F.	°F.	
Dec. 1930										
1	975	22·6	Calm	0	c	8	0	28	19	
2	977	20·4	Calm	0	c	1	8	27	17	Dull till 18h. then clearing.
3	983	18·5	SW.	1	o	0	10	21	8	Snow blowing off glacier 8h.–10h.
4	981	—	—	—	—	—	—	23	10	Driving snow on glacier all day.
5	987	23·0	N.	5	bc	1	6	25	20	Cloudy all day.
6	992	—	—	—	—	—	—	24	12	
7	999	—	—	—	—	—	—	21	13	
8	1000	12·4	Calm	0	b	0	0	—	9	Blue sky all day.
9	1004	16·2	Calm	0	b	1	0	18	10	Blue sky till 19h. then high cloud.
10	1000	15·0	Calm	0	bc	6	0	18	14	
11	999	14·5	Calm	0	b	0	2	18	12	Blue sky all day.
12	983	16·4	Calm	0	c	2	6	19	12	
13	986	25·0	Calm	0	o	0	10	26	19	
14	991	27·4	Calm	0	os	0	10	37	24	Snow during day. Rain from 18h.
15	976	37·0	NE.	2	or	0	10	40	32	Rain all day. Snow from 17h.
16	987	34·9	NE.	2	os	0	10	37	30	
17	981	35·0	Calm	0	o	0	10	40	31	
18	983	25·0	Calm	0	c	9	0	36	23	
19	988	22·2	N.	1	c	9	1	28	19	
20	1002	24·8	Calm	0	b	0	1	34	14	Cloudy a.m., N. wind on glacier.
21	1022	15·0	Calm	0	bc	1	2	19	12	
22	1024	21·0	Calm	0	c	8	0	23	18	
23	1008	32·0	N.	3	o	0	10	34	19	Intermittent snow all day.
24	1008	22·3	Calm	0	os	0	10	34	22	Five inches snow lying.
25	991	—	—	—	—	—	—	29	20	Twelve inches snow since yesterday.
26	994	26·0	Calm	0	o	0	10	27	19	
27	993	25·1	Calm	0	o	0	10	27	19	Slight snow 13h. 30m.–14h. 30m.
28	1001	24·2	Calm	0	c	9	0	27	17	
29	1009	8·9	Calm	0	b	1	0	20	3	Blue sky all day.
30	1015	5·6	Calm	0	b	1	1	9	1	
31	1019	3·0	Calm	0	bc	2	1	3	−1	

BASE

Day	Pressure at M.S.L.	Observations at 13h.						Maximum	Minimum	Remarks
		Dry bulb	Wind		Weather	Cloud amount				
			Dir.	Force		High	Low			
	mb.	°F.						°F.	°F.	
Jan. 1931										
1	1022	5·0	Calm	0	bc	6	0	6	−2	
2	1018	—	—	—	—	—	—	16	0	One inch of snow during night.
3	1012	28·4	NE.	1	bc	2	5	29	15	
4	989	—	—	—	—	—	—	35	27	Gusty E. wind veering south p.m.
5	998	28·4	SSE.	4	os	0	10	33	23	Water sky out to sea a.m.
6	998	13·9	Calm	0	b	1	0	—	0	Wind roaring at head of fiord 21h.
7	1002	28·4	N.	8	b	1	0	35	13	Wind S.3 8h. 30m.–9h. 30m. ; then N. gale.
8	1016	17·2	Calm	0	o	0	10	—	16	Dull.
9	1012	18·0	Calm	0	bc	3	4	22	12	Slight snow early.
10	1005	18·1	Calm	0	os	0	10	22	6	Snow 1200 onwards.
11	1018	14·5	S.	2	b	0	1	37	5	Gale on glacier 11h., at Base 15h.
12	1025	23·0	N.	1	o	0	10	38	18	Dull.
13	1005	24·0	Calm	0	c	2	7	25	16	
14	1000	34·8	S.	2	bc	3	2	35	—	Gale 4h.–12h. ; continued on glacier till 13h.
15	989	22·0	Calm	0	osm	0	10	25	19	
16	997	—	N.	12	b	0	0	22	7	N. force 12, 5h.–18h. 15m. F.8 at 21h.
17	1021	15·0	Calm	0	c	0	10	16	8	Ice broken up south of fjord.
18	1015	14·8	Calm	0	c	3	7	16	10	
19	1004	15·0	Calm	0	bc	3	1	21	11	Driving snow on Ice Cap 13h.
20	1010	13·3	Calm	0	bc	6	1	20	12	
21	1016	14·8	S.	3	bc	1	2	18	8	Fair ; low cloud over sea and Ice Cap.
22	1007	11·0	Calm	0	b	1	0	14	7	
23	998	8·5	Calm	0	b	0	1	14	5	
24	998	6·2	Calm	0	b	1	0	13	5	Blue sky and sunshine all day.
25	1004	8·5	Calm	0	b	0	0	11	2	Ditto.
26	1010	28·9	E.	4	o	0	10	31	1	Dull all day ; snow p.m.
27	993	31·0	NE.	5	c	1	7	33	22	Gale on mountain all day.
28	1001	35·4	E.	5	os	0	10	36	31	
29	1004	30·0	E.	8	os	0	10	34	29	
30	994	22·1	Calm	0	osf	0	10	34	21	
31	1004	22·1	N.	9	b	0	0	25	8	

BASE

Day	Pressure at M.S.L.	Observations at 13h.						Maximum	Minimum	Remarks
		Dry bulb	Wind		Weather	Cloud amount				
			Dir.	Force		High	Low			
	mb.	°F.						°F.	°F.	
Feb. 1931										
1	1017	26·0	Calm	0	o	0	10	32	6	s_0 on Ice Cap 13h.
2	997	30·1	S.	1	os	0	10	34	27	Snow from 11h. 30m.
3	969	22·0	N.	1	c	4	6	34	14	
4	985	29·9	Calm	0	bc	3	3	30	14	
5	991	24·5	SE.	2	c	4	5	29	16	
6	995	—	Calm	0	b	0	2	21	4	Blue sky and sunny all day.
7	992	12·3	S.	1	bc	1	6	16	10	
8	985	14·1	Calm	0	bc	6	0	15	8	
9	983	15·0	Calm	0	b	0	0	20	5	Driving snow on glacier from 15h.
10	986	11·5	Calm	0	o	0	10	21	7	Driving snow on mountains 9h.
11	988	6·5	N.	12	b	0	0	20	6	
12	1007	16·5	N.	1	bc	6	0	23	11	Gale to 0715 ; continued on glacier later.
13	1008	16·8	Calm	0	os	0	10	26	14	
14	988	21·8	N.	12	b	1	0	25	10	
15	1013	16·7	N.	2	b	1	1	22	10	Gale continued glacier and mountains till 11h.
16	1024	16·9	Calm	0	os	0	10	17	10	
17	989	25·0	S.	1	os	0	10	26	10	
18	986	—	N.	12	b	0	0	—	—	Stevenson screen blown down.
19	993	15·0	Calm	0	bc	0	6	—	—	Gale on glacier 9h. at Base 17h. 30m.
20	1003	20·0	N.	9	c	1	8	20	4	Gale dropped 14h. 30m.
21	1004	20·5	N.	5	bc	3	0	26	13	
22	1012	10·5	S.	3	cs	0	9	25	4	
23	1015	10·8	N.	2	o	0	10	12	1	
24	1025	8·1	Calm	0	bc	0	5	12	2	Strong gusts from N. 18h.
25	1034	6·8	S.	1	bc	6	0	8	−1	Driving snow on glacier 9h.
26	1032	9·8	S.	1	b	1	0	—	−2	Gale on Ice Cap 9h.
27	1032	13·3	Calm	0	bc	4	0	14	3	
28	1029	10·1	Calm	0	b	2	0	13	4	

BASE

Day	Pressure at M.S.L.	Observations at 13h.						Maximum	Minimum	Remarks
		Dry bulb	Wind		Weather	Cloud amount				
			Dir.	Force		High	Low			
	mb.	°F.						°F.	°F.	
Mar. 1931										
1	1027	14·4	Calm	0	bc	4	0	15	3	
2	1018	12·0	Calm	0	o	0	10	13	0	
3	1009	12·6	Calm	0	os	0	10	14	9	1 inch fresh snow 9h.
4	997	15·0	Calm	0	os	0	10	17	10	1½ in. snow during day.
5	979	22·6	Calm	0	o	0	10	44	15	18h. temp. rose suddenly to 42°.
6	992	31·2	Calm	0	os	0	10	42	28	5 in. snow during night. 5 in. in day also.
7	1012	37·8	ESE.	2	c	1	8	39	33	Warm ESE. wind.
8	1031	38·9	Calm	0	o	0	10	40	34	Thawing all day.
9	1033	29·5	SE.	1	b	0	0	38	19	
10	1034	20·7	Calm	0	b	2	0	28	14	Fine.
11	1031	21·6	SE.	1	b	2	0	22	9	
12	1030	16·4	Calm	0	c	9	1	20	10	
13	1038	14·1	Calm	0	b	1	0	15	3	
14	1028	8·6	Calm	0	b	0	0	11	−3	
15	1019	12·5	Calm	0	b	1	0	24	−6	
16	1010	16·3	Calm	0	b	1	0	24	2	
17	1006	16·9	Calm	0	c	9	1	21	2	
18	998	17·9	Calm	0	b	0	0	22	10	Gale on Ice Cap a.m. Base 18h.
19	1006	17·9	Calm	0	b	2	0	24	8	
20	999	11	N.	9	b	0	0	—	—	
21	1004	10	S.	1	bc	3	0	13	1	
22	1014	9	Calm	0	b	0	0	10	−3	
23	1020	11	Calm	0	o	10	0	—	11	Snow from 21h.
24	1001	20	Calm	0	bc	2	5	—	—	Sudden gale 14h. 30m.
25	1024	20	Calm	0	bc	3	0	21	8	
26	1036	—	—	—	—	—	—	22	8	
27	1035	21	Calm	0	bc	7	0	24	16	
28	1021	23	NW.	1	o	0	10	30	—	
29	1000	40	Calm	0	o	0	10	41	32	
30	996	30	Calm	0	o	0	10	34	24	
31	991	31	Calm	0	c	0	9	31	21	

BASE

Day	Observations at 13h.							Maximum	Minimum	Remarks
	Pressure at M.S.L.	Dry bulb	Wind		Weather	Cloud amount				
			Dir.	Force		High	Low			
	mb.	°F.						°F.	°F.	
Apr. 1931										
1	1001	21	S.	1	b	0	0	—	—	Gale at glacier a.m. at Base 16h.
2	1000	—	N.	11	—	—	—	—	—	
3	1005	29	Calm	0	b	0	0	44	9	
4	1013	30	Calm	0	0	0	10	33	21	
5	1006	30	Calm	0	0	0	10	35	25	
6	993	—	—	—	—	—	—	35	20	
7	980	29	Calm	0	bc	3	0	33	15	
8	966	26	Calm	0	0	0	10	30	18	
9	973	22	S.	3	bc	3	4	30	16	
10	985	25	Calm	0	oss	0	10	27	9	Snow till 16h. 30m.
11	995	23·3	Calm	0	b	0	0	—	—	Gale at glacier 13h. ; at Base 17h.
12	1004	26·1	SE.	3	bc	4	0	27	17	Gale till 5h. on glacier until 18h.
13	1013	29	Calm	0	c	10	0	31	15	
14	996	32	Calm	0	oss	0	10	34	27	Dull with snow all day. 20 in. snow.
15	1000	30·9	Calm	0	0	0	10	33	24	
16	1031	33·8	Calm	0	b	1	0	37	25	
17	1032	33·2	Calm	0	c	8	1	35	18	
18	1018	40·9	N.	3	or_0	0	10	41	27	
19	1020	41·1	N.	2	ORR	0	10	43	32	Rain to 16h. 30m.
20	1016	35	NNE.	2	0	0	10	39	34	
21	1012	—	—	—	—	—	—	39	33	
22	1009	37·6	Calm	0	b	1	0	43	29	
23	1002	35	Calm	0	0	0	10	37	27	s_0 5h. 45m.—10h. 30m.
24	1013	33·1	NW.	2	0	0	10	37	26	
25	1011	30·9	SE.	1	0	0	10	33	25	
26	1014	35·6	Calm	0	bc	7	0	38	21	
27	1014	29	Calm	0	bc	3	2	31	21	
28	1018	30	Calm	0	b	0	0	33	13	Blue sky all day.
29	1028	35·9	Calm	0	c	9	0	37	15	
30	1022	35	Calm	0	c	9	0	37	27	

BASE

Day	Pressure at M.S.L.	Observations at 13h.						Maximum	Minimum	Remarks
		Dry bulb	Wind		Weather	Cloud amount				
			Dir.	Force		High	Low			
	mb.	°F.						°F.	°F.	
May 1931										
1	1027	32·9	SE.	2	b	1	0	37	28	Blue sky.
2	1022	—	—	—	—	—	—	37	23	
3	1021	32·5	SE.	2	c	5	5	39	28	Intermittent sleet, afternoon.
4	1027	—	—	—	—	—	—	33	29	Overcast all day.
5	1023	30·9	SE.	3	bc	0	6	31	26	Overcast most of day.
6	1025	—	—	—	—	—	—	35	22	
7	1026	32·0	SE.	1	b	0	0	33	23	
8	1025	29·8	Calm	0	c	2	6	33	25	
9	1017	37·5	Calm	0	c	9	0	39	29	
10	1012	33·2	Calm	0	c	10	0	40	23	
11	1007	31·2	SE.	1	o	0	10	33	27	
12	1007	—	—	—	—	—	—	40	28	Overcast all day.
13	1011	—	—	—	—	—	—	39	29	Ditto
14	1014	—	—	—	—	—	—	34	30	Ditto
15	1020	—	—	—	—	—	—	35	28	Fair early becoming fine.
16	1012	33·8	Calm	0	b	0	0	35	22	Blue sky all day.
17	1009	34·9	Calm	0	b	0	0	36	23	Ditto
18	1011	31·4	SE.	2	bc	0	7	32	23	
19	1013	39·0	Calm	0	or	0	10	47	24	Rain began 22h.
20	1010	41·4	Calm	0	or	0	10	46	40	Dull with rain all day.
21	1024	41·3	Calm	0	bc	0	7	49	36	Dull with rain early improving later.
22	1029	42·3	S.	2	b	2	0	47	30	
23	1025	39·8	Calm	0	bc	3	0	41	26	Cloudy, becoming fine.
24	1023	33·2	Calm	0	om	0	10	37	26	Fine early fog and rain from sea 17h.
25	1024	36·6	Calm	0	c	5	5	45	32	
26	1035	—	—	—	—	—	—	41	32	Dull early clearing 14h.
27	1031	32·2	E.	2	b	0	0	39	29	Blue sky all day.
28	1034	33·5	Calm	0	c	8	1	35	27	Open water at end of fjord.
29	1031	32·9	SE.	1	b	0	2	35	28	Fog from 18h.
30	1031	31·5	E.	2	c	8	0	35	28	Mist after 18h.
31	1031	31·5	E.	1	b	0	1	33	26	Mist after 18h.

BASE

Day	Pressure at M.S.L.	Observations at 13h.						Maximum	Minimum	Remarks
		Dry bulb	Wind		Weather	Cloud amount				
			Dir.	Force		High	Low			
	mb.	°F.						°F.	°F.	
June 1931										
1	1031	33	E.	2	b	0	0	35	25	
2	1032	37	Calm	0	b	0	0	39	27	
3	1036	39	Calm	0	c	9	0	44	27	
4	1033	45	Calm	0	b	0	0	47	33	
5	1030	40·5	Calm	0	c	10	0	45	33	Fog at mouth of fjord at 9h.
6	1030	47	E.	1	bc	7	0	48	35	
7	1024	40	SE.	2	b	2	0	49	36	
8	1029	42	E.	1	bc	4	0	45	35	
9	1030	38	E.	2	b	0	0	44	31	Fog at sea 9h.
10	1033	44	Calm	0	b	0	0	48	32	Blue sky all day.
11	1026	44	Calm	0	bc	3	0	49	36	Ditto
12	1020	47	Calm	0	bc	3	0	51	37	
13	1020	45	Calm	0	bc	3	0	50	40	
14	1017	44	E.	1	bc	7	0	48	36	
15	1014	44	E.	2	c	8	0	46	37	
16	1015	38	Calm	0	or	0	10	41	34	Dull all day.
17	1016	42	Calm	0	o	0	10	44	35	
18	1016	42	Calm	0	bc	5	0	44	34	
19	1006	42	Calm	0	or	0	10	52	38	
20	1005	42	SE.	1	bc	3	3	43	33	
21	1008	46	E.	1	bc	3	0	49	36	Blue sky all day.
22	1012	50	Calm	0	bc	3	0	52	37	Ditto
23	1009	42·8	SW.	1	o	0	10	47	35	Overcast all day ; rain from 16h.
24	1001	45·5	NW.	2	c	2	8	47	39	Overcast with rain to 10h. 45m.
25	1000	42·3	Calm	0	or	0	10	44	36	Rain 11h. 15m.–19h.
26	1002	42·8	E.	3	bc	5	1	45	35	Low cloud broke up 9h. 45m.
27	1010	46·9	N.	1	b	1	0	51	37	Blue sky all day.
28	1014	54·0	S.	4	b	1	0	63	40	
29	1013	48·5	SE.	2	bc	4	0	63	40	Squally after 18h.
30	1012	49·7	Calm	0	b	1	0	62	38	Fine becoming cloudy 21h.

BASE

Day	Pressure at M.S.L. mb.	Observations at 13h. Dry bulb °F.	Wind Dir.	Wind Force.	Weather.	Cloud amount High	Cloud amount Low	Maximum °F.	Minimum °F.	Remarks
July, 1931										
1	1009	46·9	E.	1	b	1	0	51	35	
2	1009	49·0	SSW.	2	bc	6	0	51	35	
3	1009	—	—	—	—	—	—	49	40	Blue sky all day.
4	1008	51·4	SE.	1	b	1	0	56	38	Ditto
5	1016	51·5	SE.	1	b	1	0	53	37	Ditto
6	1021	42·0	SE.	1	o	0	10	44	35	Fine early ; becoming dull by 13h.
7	1018	47·0	SE.	1	or	0	10	51	39	Dull all day ; rain from 12h. 45m.
8	1019	46·8	Calm	0	c	2	8	51	41	Dull to 16h. then clearing quickly.
9	1013	48·0	SE.	1	b	0	0	53	39	Cloudless all day.
10	1016	46·1	S.	2	c	8	0	49	40	Fair. Low fog at sea 9h.
11	1013	51·9	Calm	0	bc	3	0	52	38	Fog at sea 9h.
12	1014	45·9	S.	1	c	7	2	49	38	
13	1017	49·4	SW.	1	c	8	1	53	41	Cloudy to fair ; r_0 3h.–4h.
14	1014	52·9	Calm	0	b	1	0	58	43	
15	1004	49·7	SSE.	2	b	2	0	53	39	Blue sky all day.
16	1012	47·8	Calm	0	bc	6	0	52	36	
17	1014	46·8	N.	1	c	7	3	49	41	
18	1020	45·0	S.	1	or	0	10	49	41	Dull with rain or drizzle all day.
19	1014	51·3	Calm	0	bc	1	6	54	42	
20	1013	49·9	S.	1	c	1	8	50	40	Fog at sea 9h.
21	1009	53·0	Calm	0	o	0	10	54	39	
22	1009	49·5	S.	3	bc	6	0	55	46	
23	1009	46·8	S.	2	b	1	0	55	43	Blue sky all day.
24	1012	49·8	S.	1	bc	6	0	55	39	Fog from sea p.m.
25	1012	45·1	SSE.	2	b	1	0	49	36	Fog at sea most of the day.

ICE CAP

Day	Pressure at station level	Observations at 13h.						Maximum	Minimum	Remarks
		Dry bulb	Wind		Weather	Cloud amount				
			Dir.	Force.		High	Low			
	mb.	°F.						°F.	°F.	
Sept. 1930										
8	756	26·2	N.	3	os_0	0	10	26	—	Slight mist 16h.–22h.
9	756	23·0	NE.	2	c	0	9	26	13	
10	752	2·5	E.	2	c	0	9	11	1	
11	749	−4·0	N.	3	b	0	0	—	−14	
12	745	−1·9	N.	3	b	1	0	—	−17	b all day with bright sun.
13	747	−5·2	N.	3	b	0	0	—	−23	Ditto
14	745	−1·3	N.	2	b	1	0	0	−22	Ditto
15	746	6·5	E.	2	o	0	10	10	−24	Slight snow began 16h. Heavy 22h.
16	746	19·2	NE.	2	os	0	10	—	10	os all day ; sun through clouds 13h.–16h.
17	742	15·5	NE.	3	os_0	0	10	18	10	Improving in evening.
18	744	2·1	N.	3	b	1	0	19	− 9	Blue sky and sunshine all day.
19	742	−2·3	N.	3	b	1	0	−1	−19	Ditto
20	740	0·0	N.	2	bf	0	0	7	−27	s_0 14h.–16h.
21	738	−5·0	N.	3	b	2	0	7	−24	Blue sky and sunshine all day.
22	742	4·3	N.	2	b	2	0	7	−26	Ditto
23	744	7·5	N.	3	b	1	0	8	−12	Ditto
24	748	2·0	N.	2	b	1	0	3	−18	Ditto
25	750	0·0	N.	2	b	1	0	2	−24	Ditto. Temp. rose 17° 19h.–22h.
26	740	25·0	SW.	2	om	0	10	29	−22	o all day. Break in clouds 16h.
27	740	12·5	W.	2	bm_0	0	1	28	− 2	Cloud increasing during day.
28	744	23·0	S.	2	c	1	8	25	− 2	Wind W. backing SE.
29	752	19·9	SE.	2	os_0	0	10	22	15	oS afternoon.
30	750	12·1	S.	2	o	0	10	23	9	Wind variable W.—SE.

ICE CAP

Day	Pressure at station level	Observations at 13h.						Maximum	Minimum	Remarks
		Dry bulb	Wind		Weather	Cloud amount				
			Dir.	Force.		High	Low			
	mb.	°F.						°F.	°F.	
Oct. 1930										
1	748	9·5	NW.	3	o	o	10	22	3	o most of day. Bright 15h–17h.
2	742	10	SE.	4	oss	o	10	12	−11	os all day.
3	733	− 1	N.	2	bc	3	o	11	−10	Fine all day. Mist and rime evening.
4	729	− 6·5	N.	3	b	o	o	− 2	−20	Fine all day.
5	735	− 7·5	NNE.	3	b	2	o	—	−19	Ditto
6	744	−15·5	N.	3	b	1	o	−12	−23	Ditto
7	746	− 4·9	NW.	3	b	1	o	− 5	−20	Ditto
8	737	5	NW.	6	c	8	o	5	−11	Strong NW. winds at first.
9	737	−19·5	N.	3	bc	3	o	o	−23	Fine all day.
10	738	−28·5	N.	3	b	1	o	−28	−39	Ditto
11	733	−13·5	N.	3	c	5	4	−13	−37	Fine all day, but much warmer.
12	731	−16	NNE.	2	b	1	o	−16	−25	Fine most of the day.
13	729	− 9·5	N.	2	c	4	6	− 9	−19	Dull all day.
14	728	−21·5	N.	3	b	2	o	−15	−22	Fog to north during afternoon.
15	722	− 5	NE.	4	c	o	9	− 3	−22	o all day with drifting snow.
16	722	− 1	ENE.	3	c	1	7	− 1	− 5	Dull all day.
17	721	−10	NE.	2	c	o	8	− 3	−16	s_0s_0 improving later.
18	724	−11·5	NNW.	3	bc	3	3	− 8	−25	o in morning, fine by 16h.
19	729	−28	NW.	3	b	1	o	−23	−30	Fine all day.
20	733	1	SSE.	4	oss	o	10	1	−31	Light snow all day.
21	727	− 8	NE.	1	os	o	10	o	−13	Fog at first improving later.
22	723	−14	NE.	4	c	o	9	− 6	−14	Light snow at first, improving later.
23	722	−15	NNW.	3	bcf	o	7	−15	−25	Fine all day. Fog 11h 30m.–evening.
24	728	−19·5	N.	3	bm	o	o	−15	−32	Fine all day.
25	735	−11	NW.	4	cf	o	8	−11	−30	Double solar halo during forenoon.
26	731	−22·5	NE.	1	c	o	7	−21	−29	Dull with brighter intervals.
27	735	−21	NNW.	5	bcm	o	5	−21	−31	Fine all day, visibility poor.
28	733	−37·5	N.	3	b	o	o	−25	−43	Fine all day ; very cold.
29	734	−36	NW.	3	b	o	1	−36	−48	Fine all day ; excellent visibility.
30	735	—	—	—	—	—	—	−34	−38	Ditto
31	729	−38	N.	3	bc	3	1	−38	−43	Ditto

ICE CAP

Day	Pressure at station level	Observations at 13h.					Maximum	Minimum	Remarks
		Dry bulb	Wind		Weather	Cloud amount			
			Dir.	Force		High Low			
	mb.	°F.					°F.	°F.	
Nov. 1930									
1	723	−16·5	ENE.	1	os_0	0 10	−16	−40	0 most of day.
2	724	−27	NW.	4	bm	0 0	−15	−37	10h. 22° and 46° solar halo.
3	729	−34·5	NW.	3	bc	5 0	−27	−41	Fine all day ; poor visibility.
4	720	−20	NW.	4	of	0 10	−20	−32	Ditto
5	719	−42·5	WNW.	3	b	2 0	−30	−43	13h. mirage NE.—S.
6	717	−43	NW.	3	bm	0 0	−35	−43	Wind rose to force 6 in evening.
7	718	−37	N.	4	bm	0 0	−33	−43	Fine all day. Strong wind early.
8	712	−33	Calm	0	c	0 9	−26	−43	0 at first, improving later.
9	722	−31	NNW.	6	bf	0 0	−31	−43	Strong winds and heavy drift all day.
10	732	−29	NNW.	1	os_0	0 10	−25	−43	Wind NW. veering NNE.
11	722	−23·5	Calm	0	c	0 8	−18	−31	Bar. falling rapidly. ⓓ 22h.
12	717	−38·5	NW.	4	bc	3 2	−35	−42	Windy all day with heavy drift.
13	729	−38	NW.	5	bf	0 0	−36	−45	Visibility bad all day, heavy drift.
14	735	−40	N.	3	b	0 0	−36	−42	Fine all day. Haze WSW.
15	742	−44·5	N.	2	b	0 0	−36	−51	Mirage all day. ENE.—S.
16	748	−31	NNW.	3	b	0 1	−19	−51	Fine all day.
17	747	−22·5	NNW.	2	bc	4 3	−17	−35	First temp. above zero since Oct. 20th ; 22h.
18	734	−19	N.	6	b	0 0	4	−23	Clear sky but heavy drift.
19	738	−28	N.	3	b	1 0	−23	−32	Mirage to S. and SE. while sun was up.
20	729	−28	NNW.	2	b	2 0	−27	−31	Very fine all day. Excellent visibility.
21	721	−24·5	NW.	4	cf	1 8	−18	−38	Fine all day.
22	713	−29·5	NW.	2	b	0 1	−15	−32	Ditto. Excellent visibility.
23	710	−34·5	N.	2	bc	2 3	−24	−38	Ditto. Very good visibility.
24	706	−31	NW.	3	bf	1 2	−21	−39	s_0 7h. Fine rest of day.
25	719	−32	NW.	5	f	0 0	−24	−32	Strong winds and heavy drift.
26	732	−36	N.	3	b	0 1	−29	−39	Wind NNW. veering SE.
27	729	− 6	SE.	3	os	0 10	− 5	−30	Strong SE. wind first ; calm later.
28	719	1·5	ESE.	5	of	0 10	4	− 9	Wind SE. backing to E.
29	706	− 6	NW.	4	of	0 9	7	−16	Dull at first clearing later.
30	708	−18·5	N.	2	bc	2 1	−15	−28	22h. remarkable curtain aurora.

ICE CAP

Day	Pressure at station level	Observations at 13h.						Maximum	Minimum	Remarks
		Dry bulb	Wind		Weather	Cloud amount				
			Dir.	Force		High	Low			
	mb.	°F.						°F.	°F.	
Dec. 1930										
1	704	−26	NNW.	4	c	7	3	−13	−33	Slight drift all day.
2	705	−26	NW.	3	cf	6	2	−16	−35	
3	706	−46·5	NW.	3	cbf	2	1	−29	−49	Fine all day.
4	708	—	—	—	—	—	—	—	—	Strong wind and heavy drift.
5	712	−41	NNW.	5	b	—	—	−41	−46	
6	713	−46	N.	2	bf	2	0	−45	−47	
7	717	−52	NNW	2	b	2	0	−43	−56	High clouds to SE. all day.
8	719	−49·5	NNW.	3	bf	0	0	−45	−53	Fine and clear all day.
9	721	−24·5	E.	1	bf	0	0	−24	−53	E. winds a.m. with higher temp.
10	719	−28·5	N.	3	bc	3	0	−22	−33	Wind backing N. Ci. Cu. from E. and NE.
11	719	−19	NW.	1	c	9	0	−18	−40	
12	712	−37	NW.	4	bc	8	0	−20	−40	Cirrus cloud from N.
13	713	−22	WNW.	6	bf	0	0	—	—	Strong NW. wind all day.
14	716	1·5	ESE.	3	cfs_0	0	10	3	−24	Wind became SE. with rise of temp.
15	709	7	ENE.	4	of	—	—	6	2	Warmest day since Oct. 3.
16	711	2	ESE.	6	bcf	5	0	7	2	Heavy drift most of day.
17	712	− 0·5	ENE.	2	bcm	—	—	2	− 2	Wind backing with falling temp.
18	711	−24·5	NW.	2	b	0	2	− 1	−27	Fine day with light winds.
19	712	−23	NNW.	5	bf	—	—	−20	−30	Strong NNW. wind and heavy drift.
20	726	−31	NNW.	5	bf	1	0	−23	−35	Strong wind till 18h.
21	735	−43	NNW.	1	bc	4	0	−35	−45	
22	734	−18	Calm	0	bcm	6	0	−17	−41	Wind increasing from SSE.
23	727	− 9·5	SE.	2	c	9	0	− 9	−21	Wind SE. backing N. after 16h.
24	725	−22	NNE.	3	cfs_0	10	0	− 9	−25	
25	717	− 6	NE.	3	bf	1	0	2	−20	
26	716	− 6	ENE.	3	cf	9	0	− 4	− 8	
27	719	− 4	NE.	5	cf	10	0	− 3	−17	Sky cleared slightly in evening.
28	724	−24·5	N.	2	bc	7	0	− 3	−26	Ci. Cu. from SSE.
29	726	−32·5	NNW.	2	bm	2	0	−17	−36	Clear day, little wind or cloud.
30	728	−35·5	NW.	2	bf	2	0	−27	−38	
31	731	−36·5	NNW.	2	b	2	0	−31	−38	Mirage towards sun 10h.

ICE CAP

Day	Pressure at station level	Observations at 13h.						Maximum	Minimum	Remarks
		Dry bulb	Wind		Weather	Cloud amount				
			Dir.	Force		High	Low			
	mb.	°F.						°F.	°F.	
Jan. 1931										
1	734	−31·5	NNE.	3	bc	3	0	−30	−37	Ci. St. round horizon all day.
2	731	−25	ENE.	1	c	8	0	−20	−33	Wind veered E. with rise in temp.
3	727	−14	ENE.	2	bf	0	0	−12	−22	0, thin cloud most of day.
4	717	1	E.	8	bf	—	—	—	—	Strong E. gale all day.
5	715	− 7	E.	7	bf	—	—	3	−20	Observer snowed up till 13h.
6	720	−30	NNW.	3	bf	1	0	− 5	−36	
7	726	−27·5	WNW.	3	bf	0	0	−23	−31	
8	731	−37	NE.	3	bcf	5	0	−29	−41	Wind veered ESE. with rising temp.
9	728	−15	E.	1	bc	3	2	−12	−29	
10	723	−29	NNE.	3	b	3	0	−13	−34	Temp rising 19h.
11	736	−11	WNW.	5	bcf	4	0	− 8	−31	Bar. rising rapidly all day.
12	738	−10	SE.	1	bcs_0	—	—	− 4	−16	Still, cloudy day.
13	726	19·5	SSW.	5	bf	—	—	20	− 5	Wind veered through S. to W.
14	723	−14	WNW.	4	bf	2	0	8	−22	Bar. fell rapidly 16h. onwards.
15	708	−23	S.	1	bc	0	3	−15	−27	Wind light S. veering W.
16	722	−41	NW.	5	bf	0	0	−22	−44	Wind veered NW.–N.
17	728	−40·5	NE.	3	bcm	5	0	−34	−49	Wind veered SE. with rising temp.
18	724	−22	ESE.	2	bcs_0	3	0	−20	−34	
19	722	−26	N.	1	bc	4	0	−21	−32	Ci. cloud moving northwards.
20	727	−37·5	NW.	4	bf	0	0	−25	−40	Clear day moderate NW. wind.
21	729	−33	NNE.	3	bf	1	0	−32	−40	Bright day, N. wind.
22	722	−36·5	NNE.	3	bf	1	0	−33	−42	Fine, sunny day.
23	717	−38	N.	3	bf	1	0	−38	−45	Fine with northerly winds.
24	714	−41	NNW.	2	bf	0	0	−40	−46	Light NNW. wind and clear sky.
25	719	−45	NW.	2	b	0	0	−43	−50	Considerable mirage along horizon a.m.
26	725	−16·5	E.	3	cf	10	0	−14	−52	Wind veering E. and increasing.
27	716	− 7	ESE.	5	cf	10	0	− 4	−17	Observer snowed up at 7h.
28	720	− 0·5	ESE.	4	of	10	0	1	−10	Wind increasing and veering SE.
29	720	− 3	ESE.	9	of	—	—	1	− 4	Gale all day.
30	710	− 6	SW.	1	c	10	0	1	− 9	Wind veered through S. to NW.
31	724	−29	NW.	5	bf	0	0	− 8	−34	Wind rose about 0h.

ICE CAP

Day.	Pressure at station level	Observations at 13h.						Maximum	Minimum	Remarks
		Dry bulb	Wind		Weather	Cloud amount				
			Dir.	Force		High	Low			
	mb.	°F.						°F.	°F.	
Feb. 1931										
1	731	−10·5	SE.	3	cf	10	0	−10	−38	Wind SE. backing.
2	718	− 9	NE.	1	bcs_0	7	0	− 7	−15	Fine day with light wind.
3	701	−22·5	NNW.	4	bf	2	0	−11	−28	19h. A-Cu. from east.
4	706	−13	NE.	1	bcs_0	0	3	−13	−26	Still, cloudy day.
5	711	−22	N.	3	cbf	3	0	− 9	−30	Cloudy morning fine later.
6	711	−36	WNW.	3	bf	0	0	−29	−49	
7	707	−39	NNW.	3	bf	1	0	−38	−45	Ci. cloud most of day.
8	703	−28·5	NNW.	2	bc	3	0	−28	−49	Clear day with little wind.
9	703	−42·5	WNW.	4	bf	0	0	−41	−53	Weather continued fine.
10	703	−41·5	N.	2	bc	7	0	−41	−55	Temp. rising about 16h.
11	708	−39·5	NW.	7	bf	—	—	−32	−46	Observer snowed up part of day.
12	719	−49·5	NW.	2	b	1	0	−39	−59	
13	717	−21	SE.	5	cf	10	0	−19	−45	Wind veering SSE.
14	712	—	WNW.	5	—	—	—	—	—	Observer snowed up after 7h.
15	727	−44	NNW.	5	bf	—	—	−19*	−47	Observer snowed up 7h. and 13h.
16	729	−18·5	SE.	3	cf	10	0	−16	−52	Wind veering SE. with rising temp.
17	710	− 6·5	Calm	0	cs_0	9	0	− 6	−18	Observer snowed up 7h. and 10h.
18	707	—	NW.	8	—	—	—	− 8	−32	Gale all day ; only 16h. obs.
19	713	−38	NNW.	6	bf	0	0	−30	−43	Obs. at 10h. 30m., 13h. and 19h.
20	717	—	NW.	7	—	—	—	—	—	No observations possible.
21	718	−16·5	WNW.	3	bf	2	0	−16†	−46	Wind decreased during day.
22	715	−37	WNW.	5	cf	8	0	−24	−48	Ci. cloud 10h. and 13h.
23	723	−39	N.	1	b	2	0	−39	−56	Fine, sunny day.
24	730	−44·5	WNW.	3	bf	0	0	—	−60	Ditto
25	739	−34·5	WNW.	2	b	1	0	−34	−52	16h. Ci. cloud from WNW.
26	743	−18·5	WNW.	4	bf	0	0	−18	−46	
27	744	−14	WNW.	2	bc	5	0	−13	−37	13h. Ci. in streaks NW.—SE
28	743	−18	NW	2	bc	6	0	−18	−36	Weather continued fine and clear.

* Since 13th.
† Since 19th.

ICE CAP

Day.	Pressure at station level mb.	Observations at 13h. Dry bulb °F.	Wind Dir.	Wind Force	Weather	Cloud amount High	Cloud amount Low	Maximum °F.	Minimum °F.	Remarks
Mar. 1931										
1	736	−27	NNW.	2	b	0	0	−22	−43	Mirage all day.
2	727	−26	Calm	0	c	8	0	−26	−50	
3	717	−41·5	NNW.	3	bf	0	0	−33	−58	22h. A.-Cu. moving rapidly from SSE.
4	716	−24	NNE.	2	cm	10	0	−22	−59	Cloud from SE. or SSE.
5	707	− 9	N.	4	ofs_0	0	10	− 2	−30	Wind increased about 18h.
6	714	—	E.	5	—	—	—	8	− 3	Observer snowed up part of day.
7	729	4·5	SE.	5	of	—	—	8	− 1	Ditto
8	747	—	SE.	7	of	—	—	6	1	Ditto
9	755	− 2	NNW.	2	b	2	0	6	−11	Fine clear day.
10	751	−16·5	NNW.	2	b	2	0	− 8	−38	Fine, bright ; light NW. wind.
11	748	−13	WNW.	2	b	1	0	−13	−28	Wind backing WNW. and increasing.
12	740	—	—	—	—	—	—	—	—	Observer snowed up.
13	743	−31·5	N.	3	b	0	0	−17 *	−46	Fine bright day.
14	737	−32	—	—	—	—	—	—	−49	Fine and clear.
15	733	−27	NNE.	2	b	0	0	−27	−48	Ditto
16	728	−23·5	N.	3	b	0	0	−23	−43	Ditto
17	723	−14	N.	1	c	8	0	−14	−49	A.-Cu. from south in morning.
18	718	—	NW.	5	—	—	—	—	—	Observer snowed up.
19	718	—	—	—	—	—	—	−16 †	−45	Observer snowed up till 16h.
20	716	—	NW.	5	—	—	—	—	—	Observer snowed up after 10h.
21	712	—	NW.	5	—	—	—	—	—	Observer snowed up.
22	717	—	—	—	—	—	—	—	—	
23	725	—	—	—	—	—	—	—	—	
24	717	—	—	—	—	—	—	—	—	
25	735	—	—	—	—	—	—	—	—	
26	747	—	—	—	—	—	—	—	—	
27	748	—	—	—	—	—	—	—	—	
28	738	—	—	—	—	—	—	—	—	
29	723	—	—	—	—	—	—	—	—	
30	716	—	—	—	—	—	—	—	—	
31	715	—	—	—	—	—	—	—	—	

* Since 11th.
† Since 17th.

Day	BASE. 21h. Observations						ICE CAP. 22h. Observations					
	Barometer at M.S.L.	Temperature °F.	Wind—direction and force	Weather at 21h.	Cloud amount High	Cloud amount Low	Barometer at St. Level	Temperature °F.	Wind—direction and force	Weather at 22h.	Cloud amount High	Cloud amount Low
Sept. 1930												
1												
2												
3												
4												
5												
6												
7												
8	1026	41	Calm	orr	0	10	756	25	SE. 2	os_0m	0	10
9	1027	37	Calm	c	0	8	756	1	S. 1	bc	0	3
10	1022	35	Calm	b	0	0	752	— 4	NE. 2	b	0	0
11	1015	38	SE. 2	bc	5	0	748	—14	N. 3	b	0	0
12	1015	37	Calm	c	0	8	746	—20	N. 3	b	1	0
13	1019	36	Calm	b	0	0	747	—19	N. 2	b	1	0
14	1019	—	—	—	—	—	746	—23	N. 2	bc	3	0
15	1012	35	Calm	cr	0	9	746	10	NE. 2	os	0	10
16	1011	37	Calm	c	0	9	742	12	NE. 2	os	0	10
17	1013	36	Calm	c	0	9	744	15	E. 3	o	0	10
18	1016	—	—	—	—	—	744	—15	N. 3	b	0	0
19	1019	—	—	—	—	—	744	—23	N. 3	b	0	0
20	1015	32	SE. 2	b	0	0	739	— 1	NE. 2	of	0	10
21	1013	35	Calm	o	0	10	740	—25	N. 3	b	0	0
22	1013	32	Calm	b	0	0	743	—12	N. 2	b	0	0
23	1016	34	SE. 3	b	0	0	746	—17	N. 3	b	0	0
24	1023	31	Calm	b	0	0	748	—21	N. 2	b	1	0
25	1024	32	Calm	bc	0	4	746	— 3	Calm	b	1	0
26	1010	35	SE. 2	od	0	10	740	23	Calm	os_0	0	10
27	1016	36	Calm	ofr	0	10	740	15	SW. 3	o	0	10
28	1029	33	SE. 1	os	0	10	747	19	S. 2	os	0	10
29	1035	32	Calm	os	0	10	751	14	S. 3	os	0	10
30	1029	36	SE. 1	bc	0	5	748	22	SW. 2	o	0	10

Day	BASE. 21h. Observations						ICE CAP. 22h. Observations					
	Barometer at M.S.L.	Temperature F.	Wind—direction and force	Weather at 21h.	Cloud amount High	Cloud amount Low	Barometer at St. Level	Temperature F.	Wind—direction and force	Weather at 22h.	Cloud amount High	Cloud amount Low
Oct. 1930												
1	1026	32	SE. 1	of	0	10	748	12	N. 2	o	0	10
2	1014	35	SE. 2	or	0	10	738	10	SE. 3	oss	0	10
3	1003	34	SE. 2	bc	5	0	731	−15	NE. 2	b	0	0
4	1003	33	NW. 2	bc	0	5	730	−14	N. 3	b	1	0
5	1014	33	Calm	bc	5	0	739	−17	NE. 2	bm	0	0
6	1022	32	Calm	c	0	9	744	−19	NE. 3	b	0	0
7	1016	27	SE. 3	b	0	1	739	1	NW. 3	bc	5	0
8	1001	43	NW. 8	b	0	0	736	0	N. 5	b	0	0
9	1016	29	Calm	c	0	9	731	−34	N. 3	b	0	0
10	1020	25	Calm	b	0	0	735	−37	N. 3	b	0	0
11	1010	24	Calm	b	2	0	726	−21	N. 3	bc	4	0
12	1009	25	S. 1	b	2	0	729	−10	NE. 2	o	0	10
13	1010	26	N. 1	os_0	0	10	725	−15	N. 1	cs_0	0	8
14	1004	—	—	—	—	—	722	−10	NNE. 3	o	0	10
15	994	31	Calm	o	0	10	723	− 1	ENE. 4	os	0	10
16	997	34	Calm	os	0	10	720	− 4	SE. 2	oss	0	10
17	991	41	N. 1	bc	6	0	722	−24	N. 3	b	0	2
18	1002	31	Calm	os	0	10	723	−25	NNE. 3	b	0	2
19	1014	25	N. 1	bc	0	7	733	−31	N. 2	b	2	0
20	1012	29	SE. 1	os	0	10	732	0	S. 3	oss	0	10
21	998	37	N. 3	bc	0	6	723	− 7	ENE. 2	oss	0	10
22	994	29	Calm	o	0	10	721	−18	N. 3	b	0	0
23	999	25	SE. 1	b	1	0	725	−15	NW. 3	c	—	—
24	1007	26	Calm	c	8	0	730	−25	NW. 3	b	0	0
25	1015	25	NE. 2	b	0	0	735	−25	N. 2	b	0	0
26	1012	27	Calm	os	0	10	730	−31	NW. 2	bcs	0	4
27	1014	25	NW. 9	b	0	0	735	−28	NNW. 4	bm	0	2*
28	1017	24	N. 1	bc	0	4	733	−48	NW. 3	bc	0	3
29	1016	14	N. 1	b	1	0	733	−34	NW. 3	b	2	0
30	1013	19	S. 2	b	0	0	734	−41	NW. 3	b	1	0
31	1010	21	Calm	bc	3	0	726	−38	N. 2	bc	4	0

* Observation doubtful, owing to darkness.

Day	BASE. 21h. Observations						ICE CAP. 22h. Observations					
	Barometer at M.S.L.	Temperature °F.	Wind — direction and force	Weather at 21h.	Cloud amount		Barometer at St. Level	Temperature °F.	Wind — direction and force	Weather at 22h.	Cloud amount	
					High	Low					High	Low
Nov. 1930												
1	1003	21	Calm	bc	3	0	722	−31	NW. 2	bcs_0	0	3*
2	1002	18	SE. 1	b	1	0	726	−27	NW. 4	cm	0	9
3	1007	15	Calm	b	1	0	725	−30	NW. 2	os	0	10
4	998	23	S. 5	bc	7	0	720	−42	NW. 3	bm	0	0
5	1001	16	Calm	b	1	0	719	−35	NW. 2	bcs_0	0	3
6	992	18	N. 10	b⅁	0	0	718	−33	NW. 5	bm	0	2*
7	995	19	S. 1	o	0	10	713	−40	NNE. 2	bc	4	0
8	996	22	Calm	o	0	10	717	−39	NNW. 3	bc	3	0
9	1005	19	S. 1	c	0	9	725	−31	NW. 6	bc	5	0
10	1017	22	Calm	cs	0	9	730	−29	Calm	bc	5	0
11	992	27	N. 1	c	2	6	716	−39	NNW. 3	bc	3	0
12	1000	30	N. 5	b	1	0	724	−36	NW. 4	bm	0	0
13	1014	22	S. 1	c	0	8	731	−38	N. 3	b	0	1
14	1025	22	N. 1	o	0	10	739	−36	N. 3	b	0	0
15	1031	16	Calm	bcm	3	0	743	−19	NW. 4	bc	0	5
16	1033	16	Calm	b	1	0	748	−33	N. 2	b	0	0
17	1020	16	N. 1	b	1	0	739	4	W. 6	o	0	10
18	1010	34	N. 4	b	2	0	737	−23	NNE. 4	b	0	0
19	1015	20	Calm	b	0	0	734	−27	NNW. 2	b	0	1
20	1009	20	Calm	bc	7	0	726	−35	NNW. 2	b	0	0
21	998	21	Calm	o	0	10	718	−28	NW. 3	b	0	0
22	991	15	N. 1	bc	6	0	712	−27	NNW. 1	cs_0	0	9*
23	984	20	Calm	c	1	7	708	−30	N. 2	bc	0	4*
24	984	18	Calm	b	0	0	710	−29	NW. 3	b	0	6*
25	991	18	N. 12	b⅁	0	0	725	−29	NW. 6	F	—	—
26	1015	21	Calm	b	0	0	730	−10	SE. 4	c	0	8*
27	1008	29	Calm	os	0	10	729	− 9	Calm	bs_0	0	2*
28	977	35	E. 4	or	0	10	707	7	E. 5	oFs	0	10
29	980	33	S. 1	c	0	9	710	−16	NW. 3	bc	2	1
30	974	27	N. 1	c	0	9	704	−19	N. 2	bc	5	0

* Observation uncertain owing to darkness.

Day	BASE. 21h. Observations						ICE CAP. 22h. Observations					
	Barometer at M.S.L.	Temperature °F.	Wind – direction and force	Weather at 21h.	Cloud amount		Barometer at St. Level	Temperature °F.	Wind – direction and force	Weather at 22h.	Cloud amount	
					High	Low					High	Low
Dec. 1930												
1	979	27	S. 1	c	0	9	703	−22	NE. 1	c	10	0
2	986	18	Calm	b	1	0	708	−37	WNW. 3	bF	0	0
3	980	18	Calm	c	10	0	707	—	—	—	—	—
4	982	20	N. 6	b	2	0	709	—	—	—	—	—
5	991	24	N. 1	bc	1	2	716	—	—	—	—	—
6	993	15	Calm	c	9	0	712	−43	N. 2	bm	1	0
7	1003	21	Calm	o	0	10	720	−45	NNW. 2	b	§?	—
8	1001	11	Calm	b	0	0	718	−51	NW. 2	b	—	—
9	1004	17	Calm	bc	7	0	722	−31	NNE 1	b	—	—
10	999	17	Calm	bc	4	2	719	−35	N. 2	bc	4	0
11	996	13	Calm	b	1	0	717	−34	NNW. 3	b	0	0
12	981	19	Calm	bc	2	3	709	−19	WNW. 6	F*	—	—
13	990	24	Calm	o	0	10	716	−21	NNW. 4	F*	—	—
14	987	37	NE. 5	or	0	10	713	5	ESE. 5	oF	—	—
15	982	34	SE. 2	os	0	10	710	5	ENE. 2	cF	—	—
16	986	32	Calm	o	0	10	710	2	SE. 6	F	—	—
17	982	35	Calm	o	0	10	712	− 5	NNW. 1	bcm	0	6*
18	981	24	Calm	b	0	1	709	−27	NNW. 3	b	0	0
19	990	27	Calm	o	0	10	716	−25	NNW. 7	bF	0	0
20	1013	15	Calm	b	0	0	730	−38	NNW. 3	bm	0	0
21	1023	19	Calm	o	0	10	734	−37	NNE. 1	bc	0	4*
22	1022	19	Calm	o	0	10	730	−15	SSE. 3	cms_0	0	8*
23	1006	34	N. 2	os	0	10	727	−10	N. 2	bcs_0	3	0
24	1005	22	Calm	os	0	10	722	−18	NE. 2	bm	0	0
25	990	23	Calm	o	0	10	716	− 5	ENE. 5	F	—	—
26	996	21	Calm	b	1	0	717	− 7	ENE. 3	bc	5	0
27	994	24	Calm	o	0	10	721	− 3	NE. 3	cf	9	0
28	1005	17	Calm	b	1	0	726	−23	N. 2	bc	3	0
29	1010	6	Calm	b	1	0	727	−35	NNW. 3	b	0	0
30	1015	5	Calm	b	0	1	729	−36	NNW. 2	b	2	0
31	1021	1	Calm	b	0	0	733	−36	NNW. 2	b	1	0

§ Lunar halo observed.

* Observation uncertain, due to darkness.

Day	BASE. 21h. Observations						ICE CAP. 22h. Observations					
	Barometer at M.S.L.	Temperature °F.	Wind—direction and force	Weather at 21h.	Cloud amount		Barometer at St. Level	Temperature °F.	Wind—direction and force	Weather at 22h.	Cloud amount	
					High	Low					High	Low
Jan. 1931												
1	1021	1	Calm	b	2	0	733	−31	N. 2	b	2	0
2	1018	15	Calm	o	0	10	731	−19	E. 1	cs_0	10	0
3	1007	28	E. 4	c	10	0	724	−17	E. 3	cf	10	0
4	996	29	S. 3	c	0	9	716	—	—	—	—	—
5	1002	25	Calm	bc	0	7	719	−13	SE. 2	bm	—	—
6	998	13	SE. 1	b	0	1	721	−23	NW. 2	bc	4	0
7	1008	24	N. 5	b	0	0	730	−31	NW. 3	bf	0	0
8	1018	20	Calm	o	0	10	730	−17	ESE. 3	c	10	0
9	1011	12	Calm	b	0	0	728	−20	NW. 1	bcf	3	0
10	1011	20	Calm	os	0	10	726	−22	NNE. 1	c	9	0
11	1019	35	S. 4	b	0	0	742	−11	NW. 3	of	—	—
12	1021	23	Calm	o	0	10	734	− 4	SW. 1	c	8	0
13	1004	19	Calm	c	10	0	721	− 1	W. 5	b	0	0
14	998	26	Calm	o	0	10	716	−23	NE. 2	bcm	7	0
15	989	20	Calm	o	0	10	708	−22	W. 1	b	—	—
16	1013	15	N. 8	b≡	0	0	728	−46	N. 3	bm	0	0
17	1022	12	NW. 2	o	0	10	727	−23	SE. 3	cf	8	0
18	1010	13	Calm	c	3	7	723	−30	NE. 1	b	0	0
19	1003	17	Calm	c	10	0	722	−27	NNW. 3	b	—	—
20	1015	13	Calm	b	0	0	731	−39	NW. 3	bf	0	0
21	1014	12	Calm	bc	5	0	728	−35	NNE. 3	bf	1	0
22	1005	14	Calm	c	8	0	721	−44	N. 3	b	0	0
23	998	7	N. 1	bc	7	0	717	−43	NNW. 2	bf	0	0
24	997	7	Calm	b	0	0	715	−45	NNW. 2	b	0	0
25	1009	4	Calm	b	0	0	723	−51	N. 2	b	0	0
26	996	27	NE. 9	os≡	0	10	718	− 5	E. 5	cf	10	0
27	993	33	NE. 5	o	0	10	716	− 7	ESE. 2	cf	10	0
28	1007	31	SE. 8	ors≡	0	10	722	—	SE. 8	cF≡	10	0
29	995	32	S. 8	os≡	0	10	712	1	ESE. 9	of≡	—	—
30	999	24	NE. 1	bc	0	7	717	−27	NW. 2	c	8	0
31	1011	11	Calm	b	0	0	726	−37	NNE. 2	b	0	0

Day	BASE. 21h. Observations						ICE CAP. 22h. Observations					
	Barometer at M.S.L.	Temperature °F.	Wind—direction and force	Weather at 21h.	Cloud amount		Barometer at St. Level	Temperature °F.	Wind—direction and force	Weather at 22h.	Cloud amount	
					High	Low					High	Low
Feb. 1931												
1	1013	30	E. 4	o	o	10	726	— 7	ESE. 4	cF	10	o
2	995	28	Calm	os	o	10	716	—13	NNE. 2	bc	4	o
3	969	14	N. 1	c	8	o	697	—23	NNW. 4	cf	8	o
4	990	25	Calm	o	o	10	708	—10	SE. 2	o	o	10
5	991	19	Calm	b	o	o	712	—40	NNW. 3	b	o	o
6	996	13	Calm	bcs	1	5	712	—39	NW. 4	bF	o	o
7	993	13	Calm	o	o	10	705	—44	NNW. 1	bcf	7	o
8	985	14	Calm	bc	6	o	703	—45	NW. 2	bf	o	o
9	984	15	E. 5	b	o	o	704	—45	WNW. 2	b	o	o
10	984	10	Calm	bc	7	o	701	—32	NW. 2	cs_0	10	o
11	990	15	N. 11	b⫮	o	o	712	—	NW. 7	—	—	—
12	1010	22	N. 8	b⫮	o	o	723	—41	WNW. 2	b	o	o
13	997	19	Calm	o	o	10	711	—23	SSE. 3	cs_0	10	o
14	992	17	N. 11	bc⫮	o	4	717	—	W. 5	—	—	—
15	1020	12	Calm	bc	4	2	731	—50	N. 1	b	o	o
16	1020	15	Calm	os	o	10	727	—14	SSE. 5	of	—	—
17	989	17	S. 1	bc	o	4	706	—13	W. 6	o	10	o
18	979	—	N. 12	b⫮	o	o	705	—	NW. 6	—	—	—
19	1000	15	N. 9	b⫮	o	o	718	—	NNW. 4	—	—	—
20	1005	13	SE. 1	c	o	8	717	—	NW. 8	—	—	—
21	1003	24	N. 8	c	o	9	717	—41	WNW. 2	b	o	o
22	1015	7	Calm	c	o	8	717	—49	NW. 3	bf	o	o
23	1017	10	N. 1	o	o	10	727	—55	NW. 3	b	o	o
24	1028	6	N. 1	b	o	o	733	—48	WNW. 4	bf	o	o
25	1038	3	Calm	bc	3	o	743	—44	WNW. 2	b	o	o
26	1035	6	S. 1	b	o	1	745	—32	NW. 3	b	2	o
27	1033	9	Calm	c	o	8	745	—25	WNW. 3	b	o	o
28	1027	8	Calm	b	o	1	741	—38	NW. 2	b	2	o

Day	BASE. 21h. Observations						ICE CAP. 22h. Observations					
	Barometer at M.S.L.	Temperature °F.	Wind—direction and force	Weather at 21h.	Cloud amount		Barometer at St. Level	Temperature °F.	Wind—direction and force	Weather at 22h.	Cloud amount	
					High	Low					High	Low
March 1931												
1	1026	12	Calm	b	0	1	734	−45	NW. 2	b	0	0
2	1015	11	Calm	o	0	10	720	−42	WSW. 2	b	0	0
3	1009	10	Calm	cs	0	9	718	−56	NNW. 1	bc	4	0
4	993	16	Calm	o	0	10	713	−20	N. 3	cf	8	0
5	979	42	E. 5	crs	0	9	708	—	ESE. 6	—	—	—
6	995	33	ENE. 4	os	0	10	716	—	ENE. 5	—	—	—
7	1017	35	Calm	o	0	10	736	—	SE. 5	—	—	—
8	1039	37	Calm	c	0	9	752	—	SE. 5	—	—	—
9	1035	21	Calm	b	1	0	753	−29	NNW. 3	b	0	0
10	1033	15	Calm	b	0	0	751	−17	NW. 3	bcf	7	0
11	1030	10	Calm	bc	5	0	743	−26	NW. 4	bf	0	0
12	1034	11	Calm	b	0	1	743	—	—	—	—	—
13	1034	3	Calm	b	0	0	741	−43	N. 4	b	0	0
14	1026	1	Calm	b	0	0	735	−41	N. 3	b	0	0
15	1015	24	N. 3	bc	4	0	732	−41	NNE. 3	b	0	0
16	1010	18	Calm	b	0	0	727	−35	NNE. 3	b	0	0
17	1003	21	E. 2	c	9	0	720	—	NW. 4	—	—	—
18	1000	22	N. 10	b≡	0	0	719	—	—	—	—	—
19	1006	18	Calm	b	2	0	718	—	WNW. 1	—	—	—
20	996	11	N. 12	b≡	0	0	715	—	NW. 5	—	—	—
21	1009	1	Calm	b	0	0	713	—	NW. 1	—	—	—

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