II.1. RAISED BEACHES

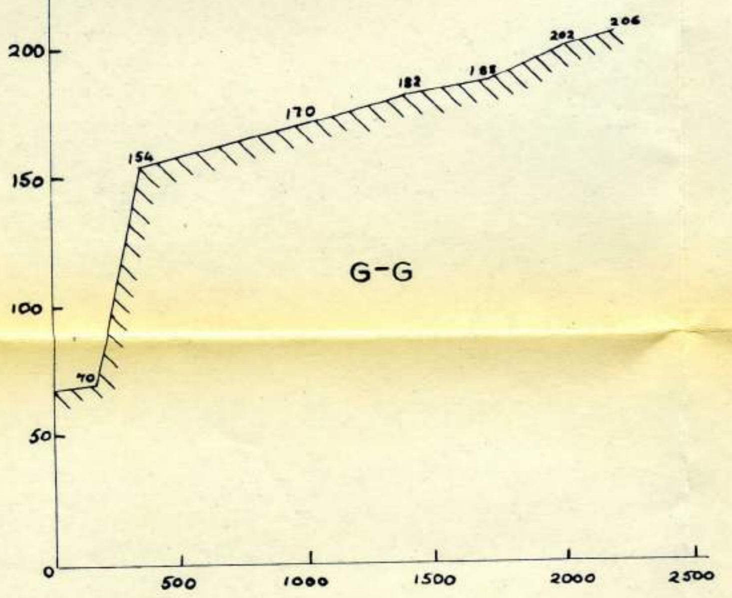
The survey of the beaches, although it covered three major areas, only yielded results for two of them namely Reydarfjordur, and Seydisfjordur. As recorded elsewhere the results from Breiddalsvik were of no use because the theodolite used in the observations was damaged, and the errors introduced were not of a type which could easily be eliminated.

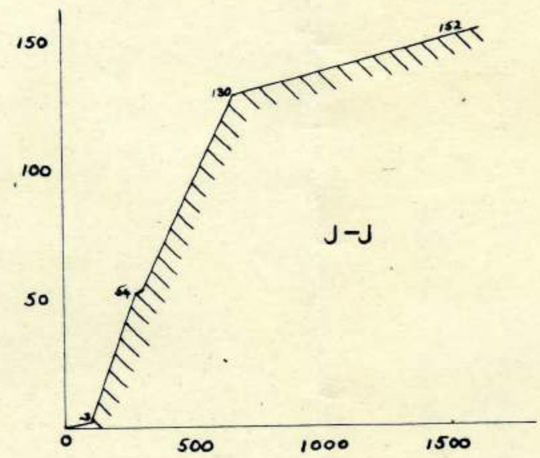
Cross-sections of each beach surveyed were drawn out (see attached prints), and from these an attempt was made to interpret the results. The first apparent feature is the lack of consistency in the heights of the beaches. The most obvious point to consider when a cursory examination is made, is the height of the point at the "front" of the beach (where it drops away rapidly). But as the beach would have sloped when originally formed, and the front of the beach has since been eroded, then the height of this point is of little use in the interpretation.

Another point which could be considered is the "nick" point, or the point where the beach abutted to the cliffs or other hinterland. On many of the profiles this point is difficult to define, but where the original cliffs can be detected this point is easily found. Here though there is again the problem of erosion. Not this time denuding the beach, but building it up at the foot of the "cliffs" with detritus from the cliff. In some cases, particularly in Seydisfjordur, the height of this point can give a good indication of the level of the old beach.

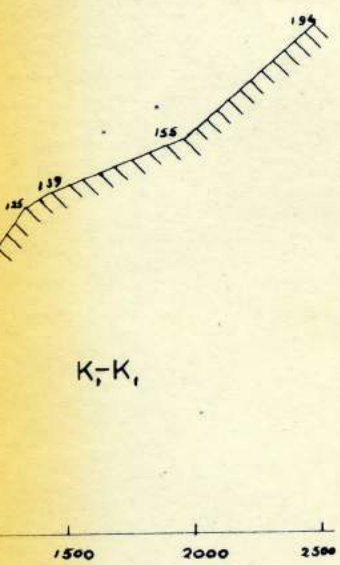
0 500 1000 1500 2000 2500 3000 3500 4000

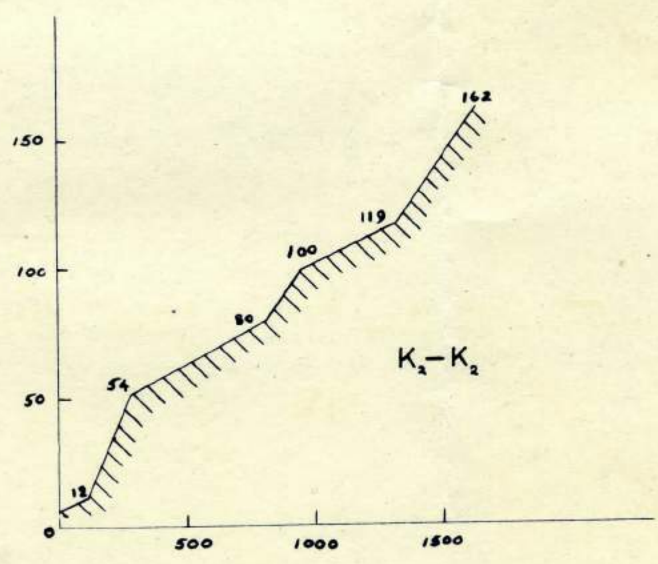
'08'



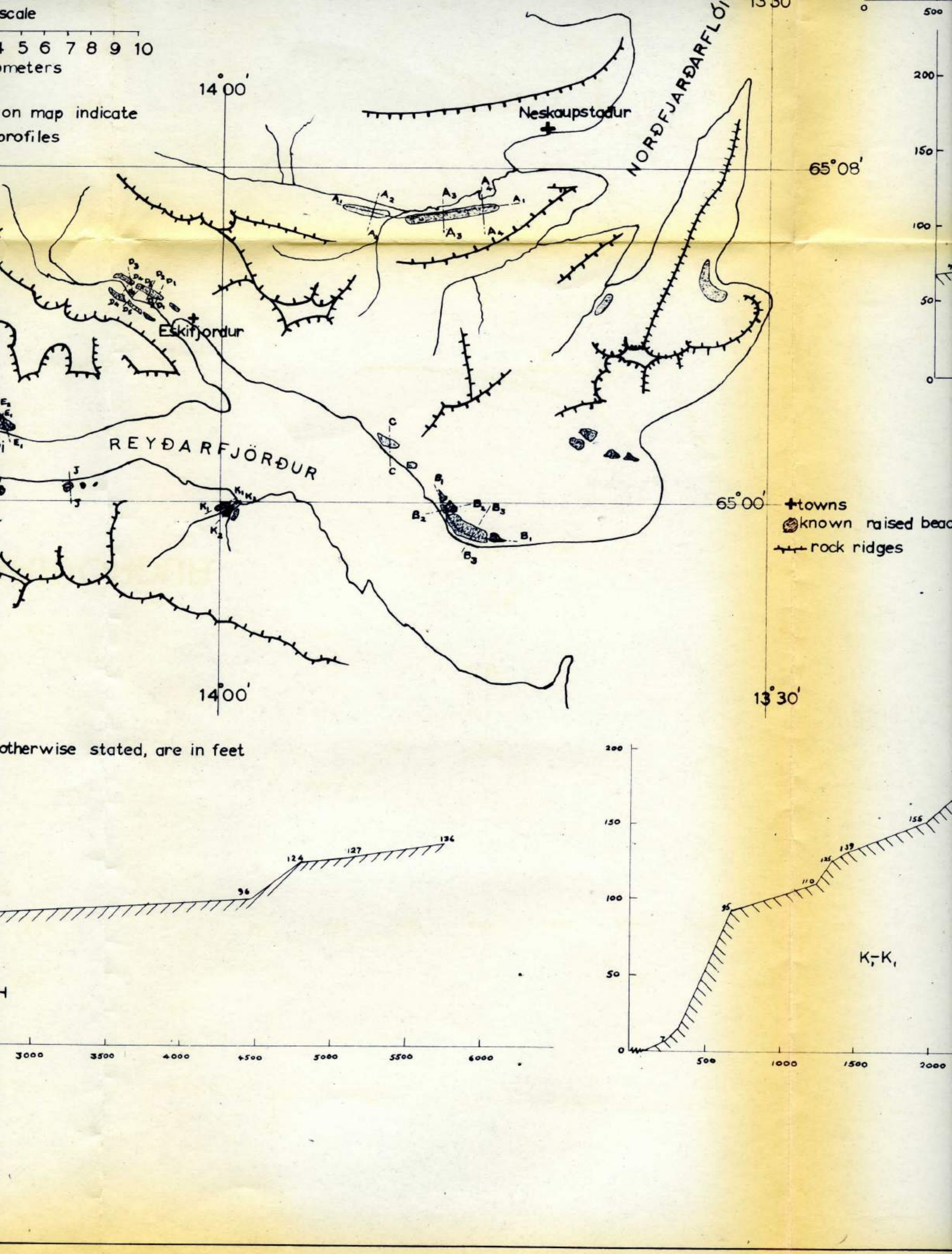


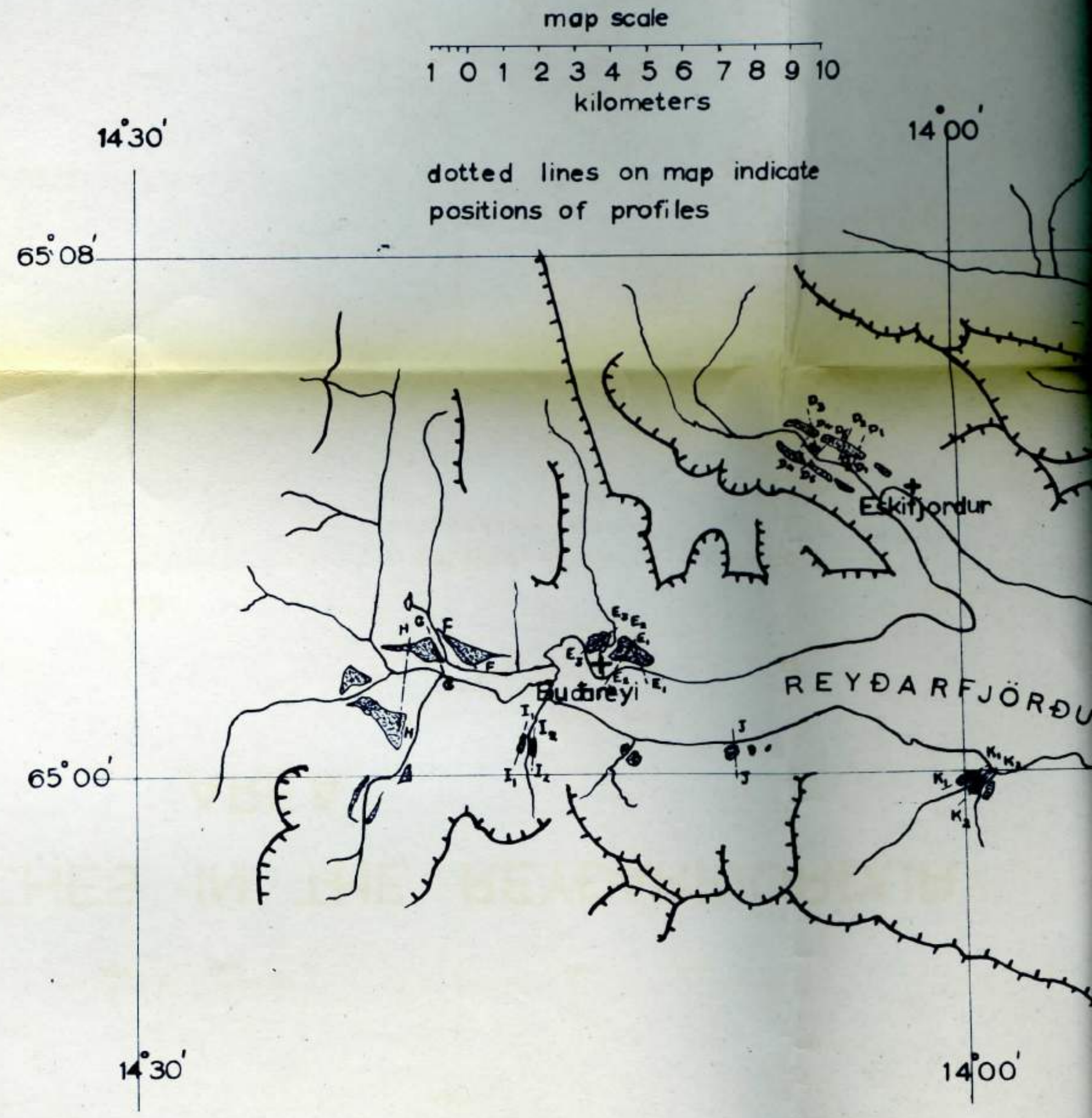
ns
own raised beaches
ock ridges



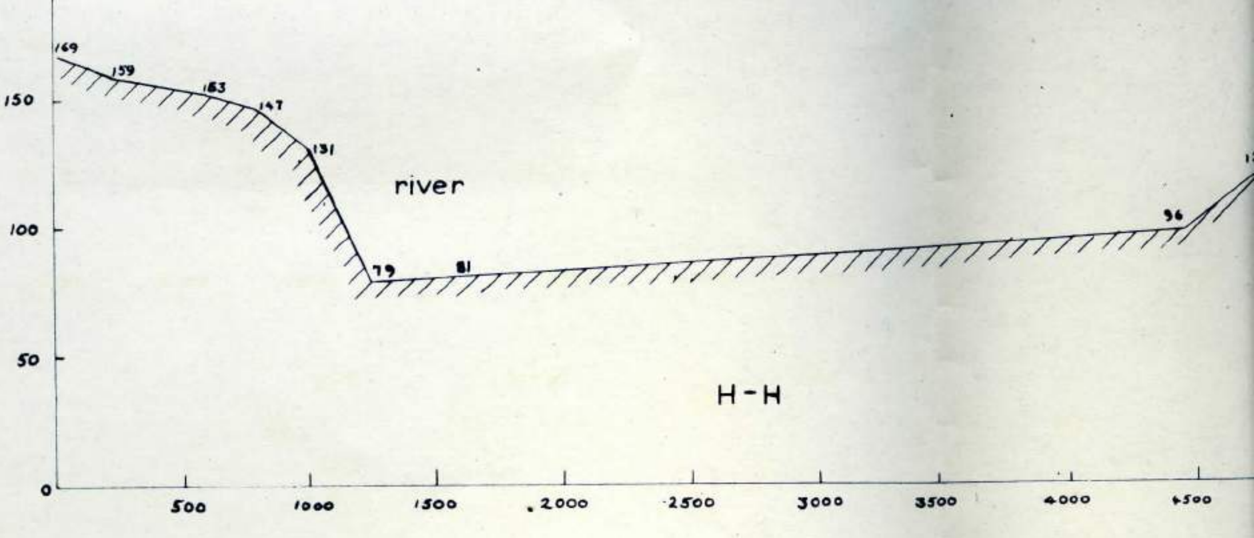


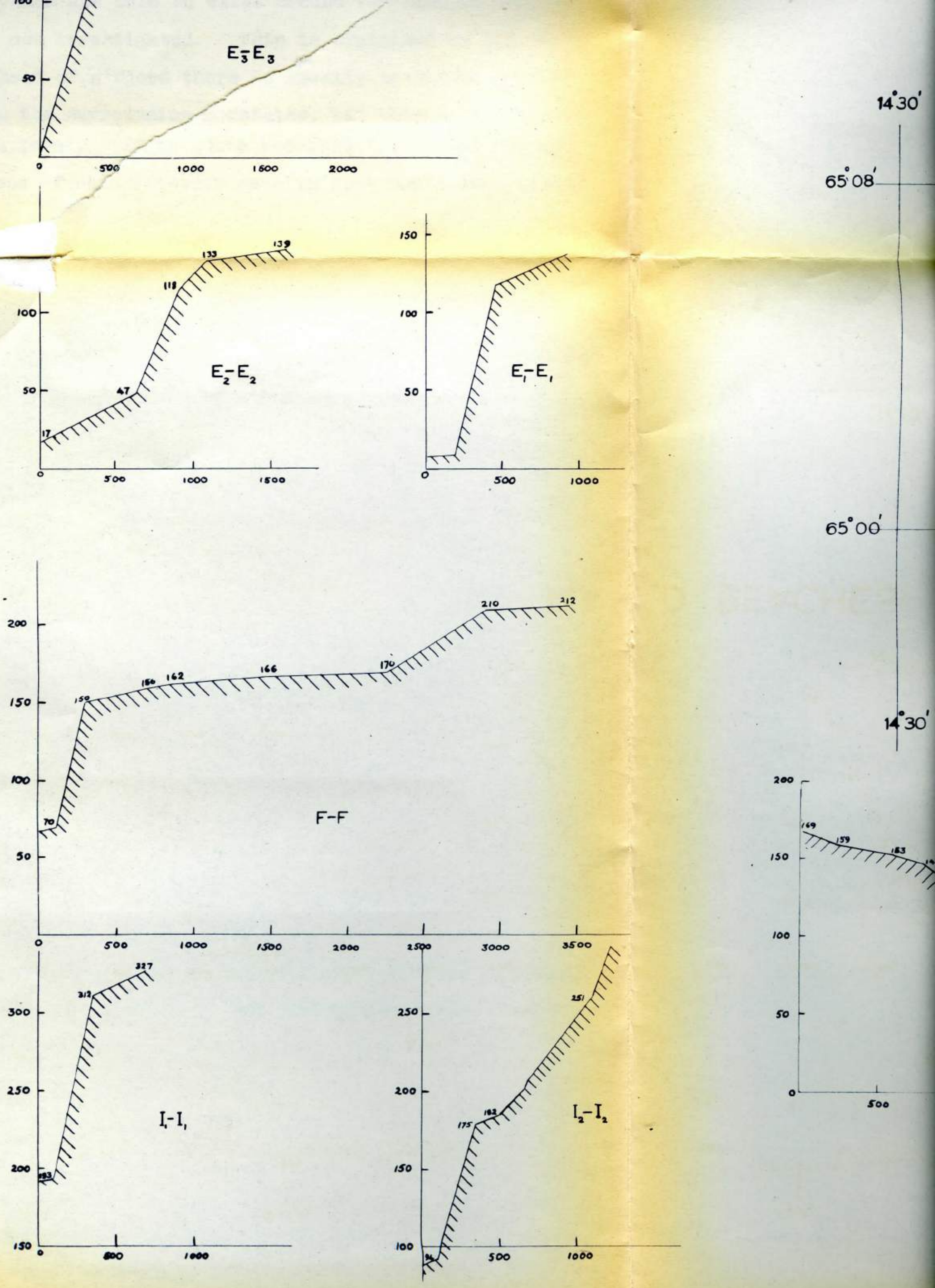
P.S. 4/59

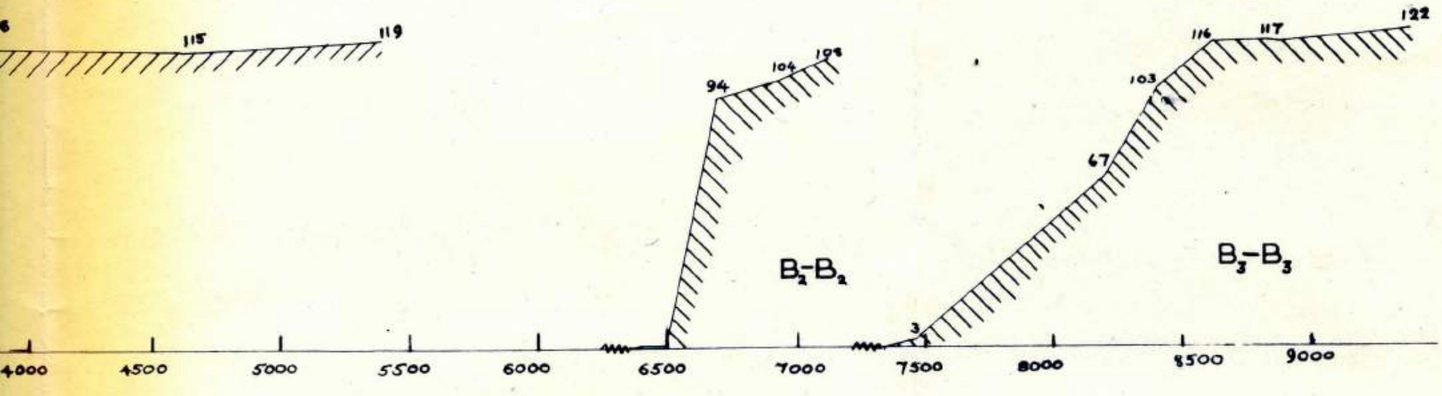

scale
4 5 6 7 8 9 10
meters
on map indicate
profiles
14°00'
Neskaupstadur
NORÐFJARÐARFLÓI
65°08'
Eskifjordur
REYÐARFJÖRÐUR
65°00'
+towns
known raised beac
rock ridges
14°00'
13°30'
otherwise stated, are in feet
K1-K1
3000
3500
4000
4500
5000
5500
6000
500
1000
1500
2000
0
50
100
150
200

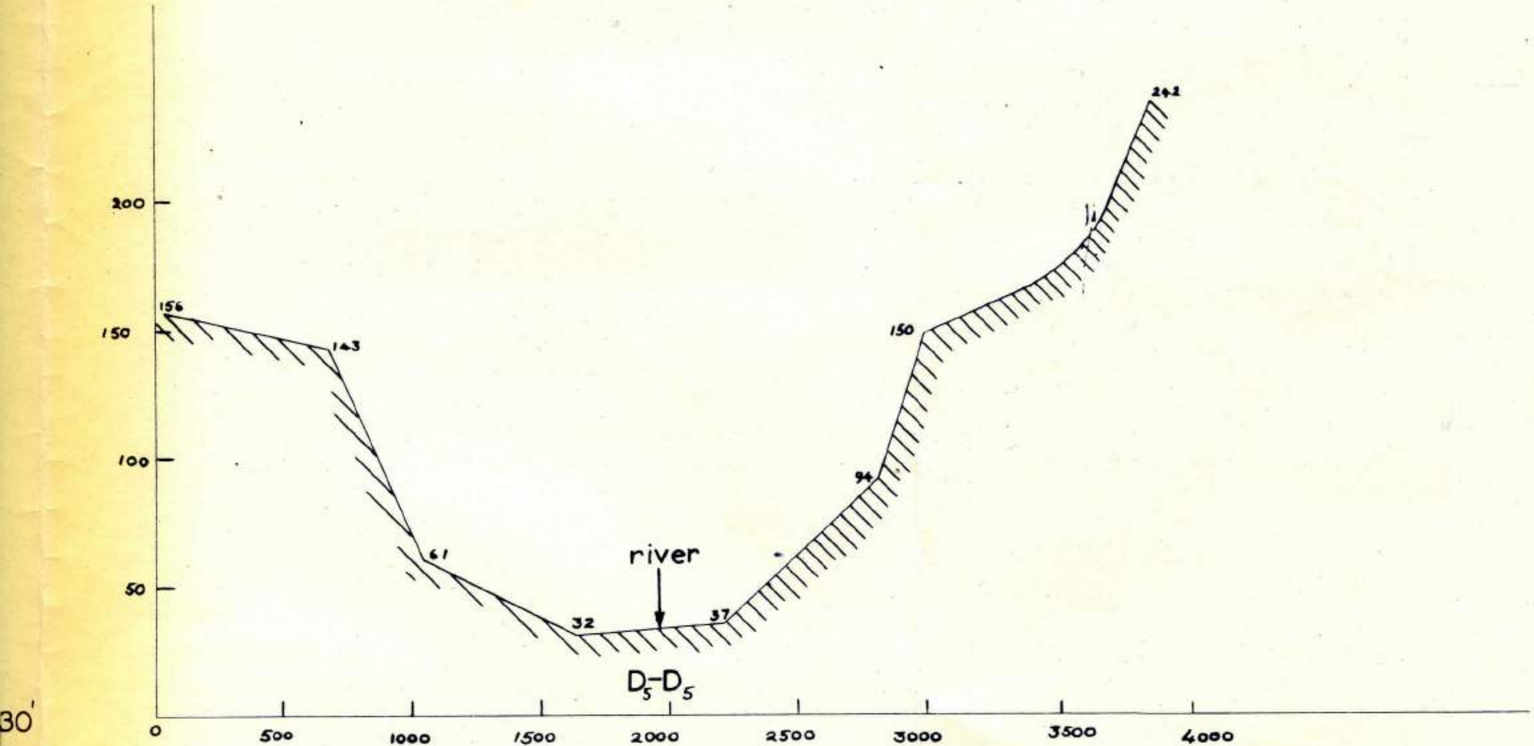


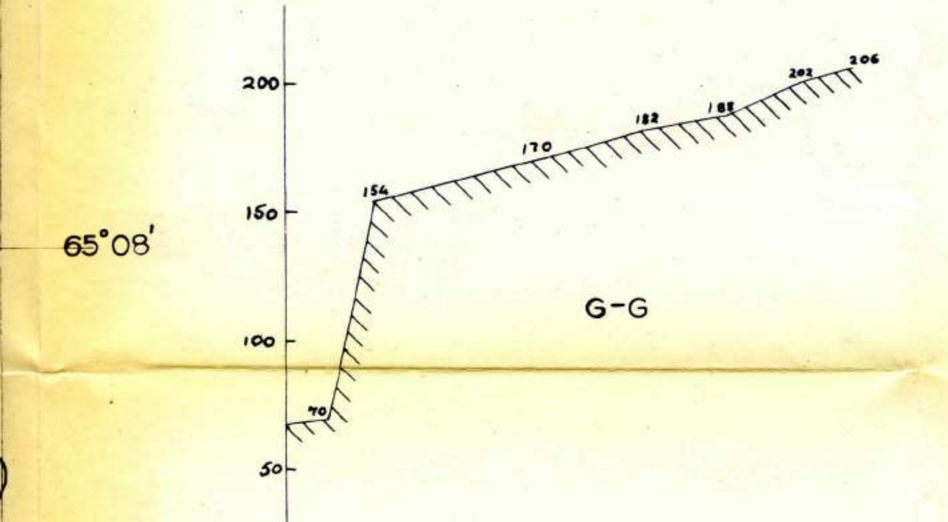
all distances, unless otherwise stated, are in feet

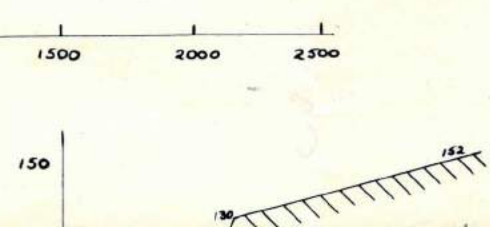


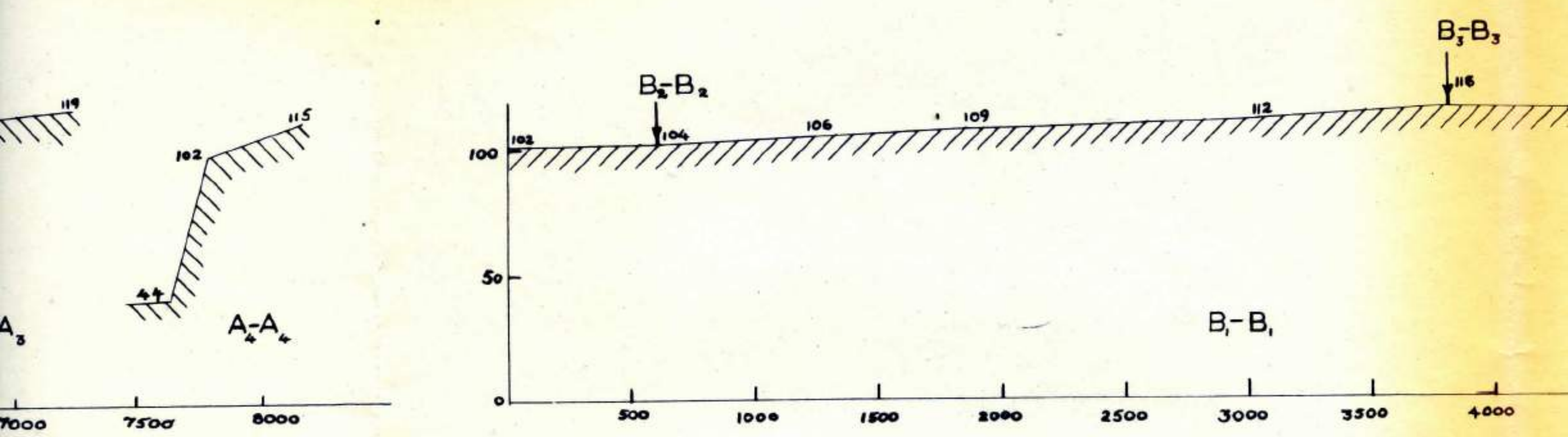

E_3-E_3
E_2-E_2
E_1-E_1
F-F
I_1-I_1
I_2-I_2
14°30'
65°08'
65°00'
14°30'

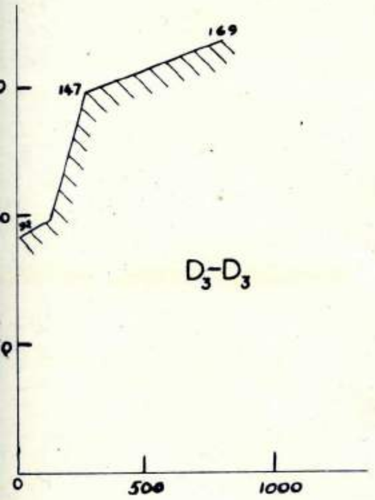

-B_3
115
119
94
104
108
103
116
117
122
67
3
B_2-B_2
B_3-B_3
4000
4500
5000
5500
6000
6500
7000
7500
8000
8500
9000

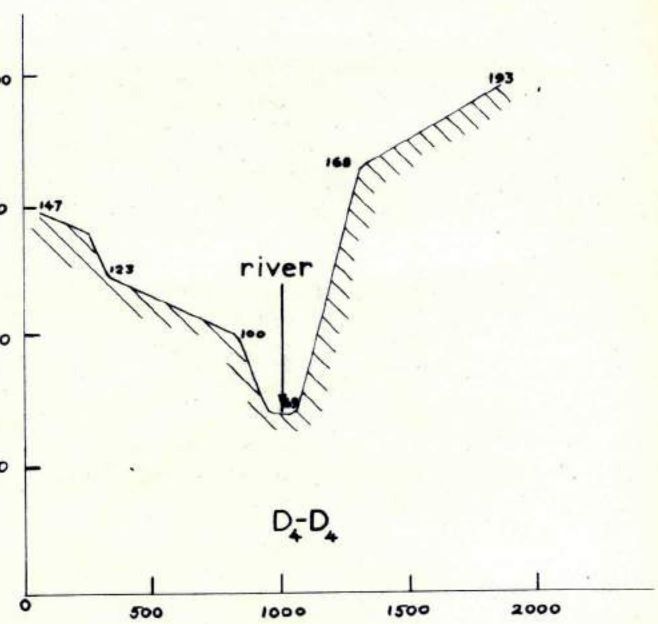

242
200
156
150
143
150
100
94
61
river
50
32
37
D_5-D_5
0
500
1000
1500
2000
2500
3000
3500
4000
30′


200
202
206
182
188
170
154
150
65°08′
G–G
100
70
50
0
500
1000
1500
2000
2500

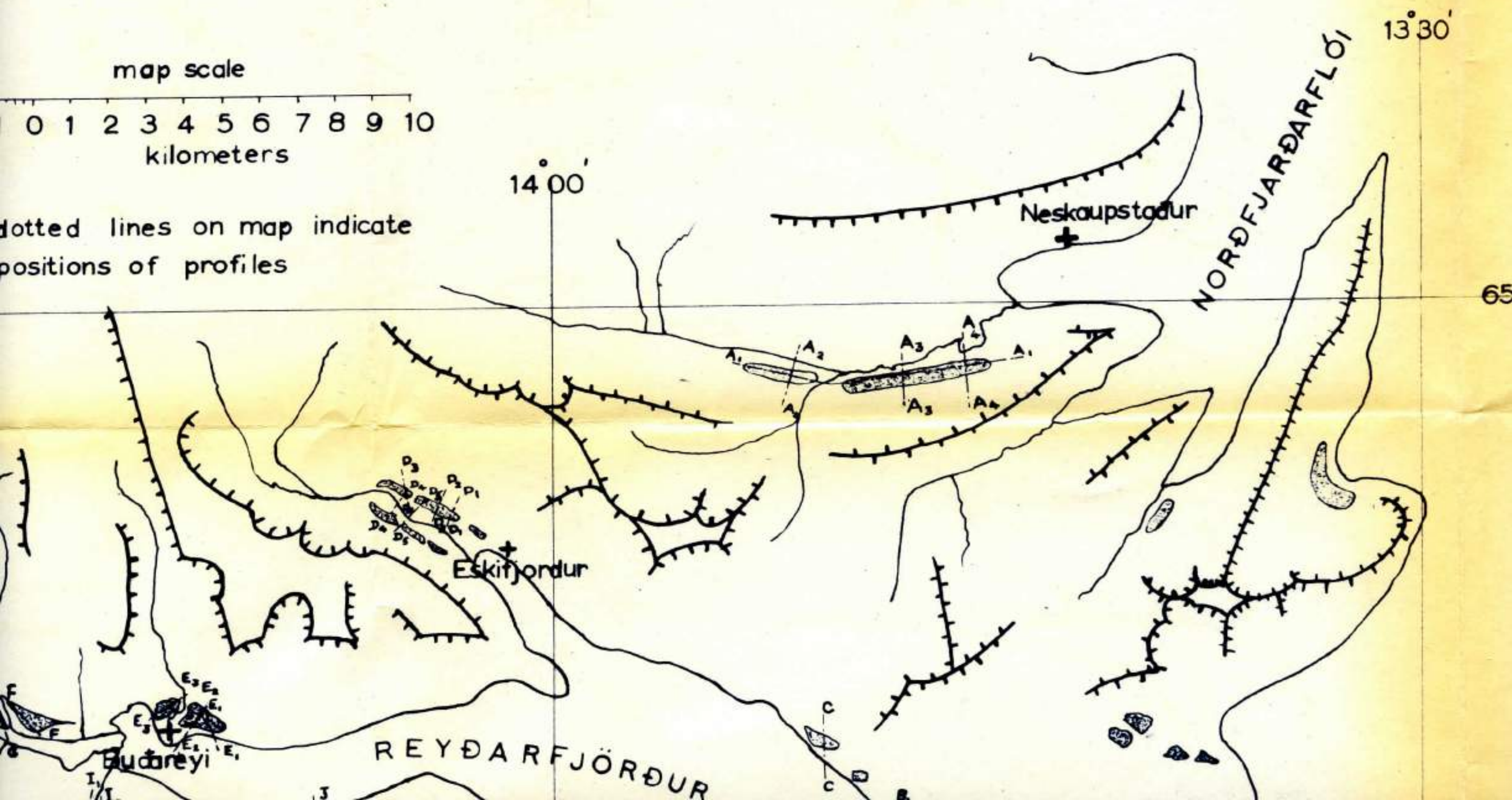

150
152
130

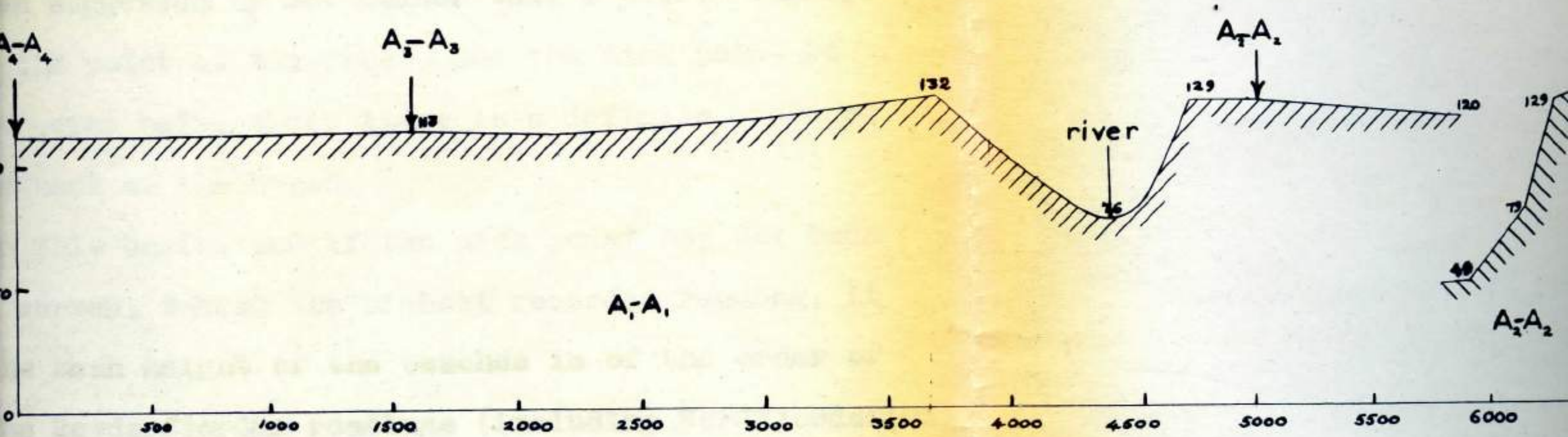


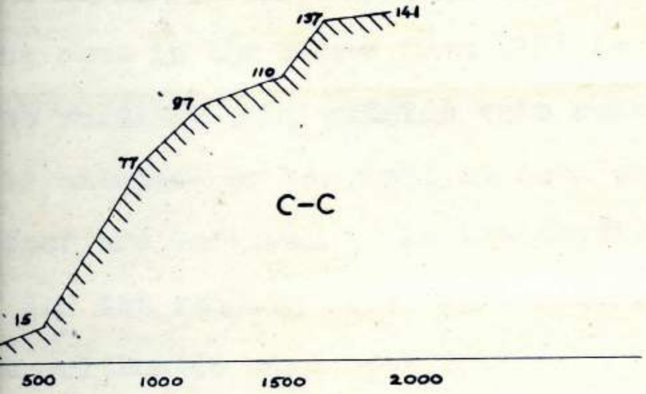


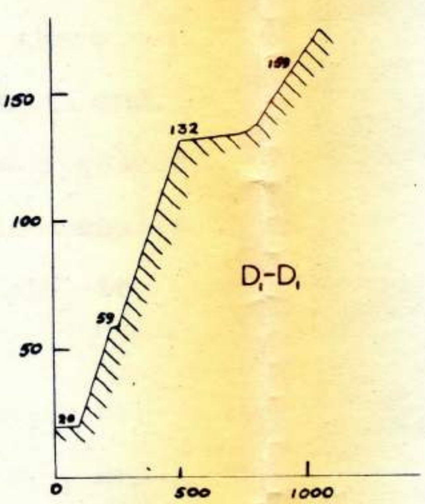


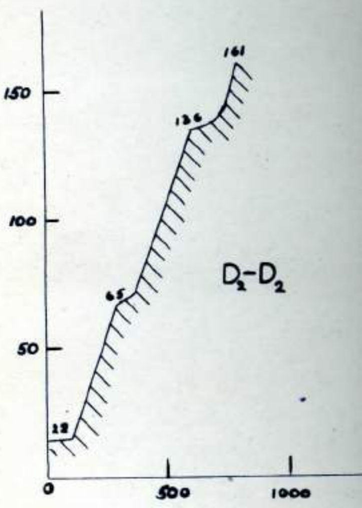
REYÐARFJÖRÐUR



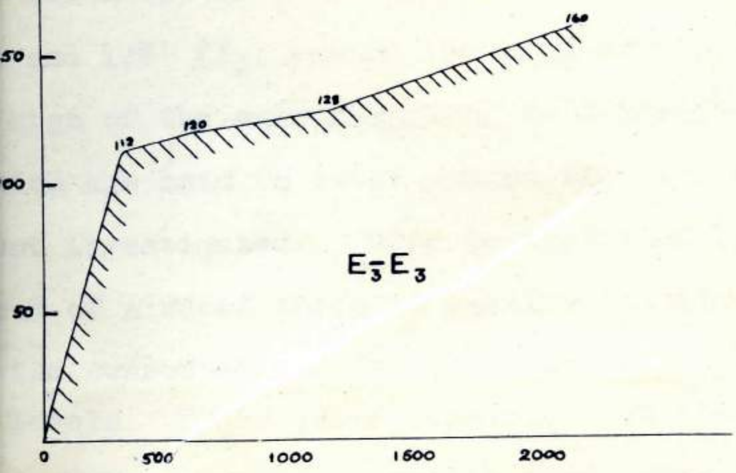


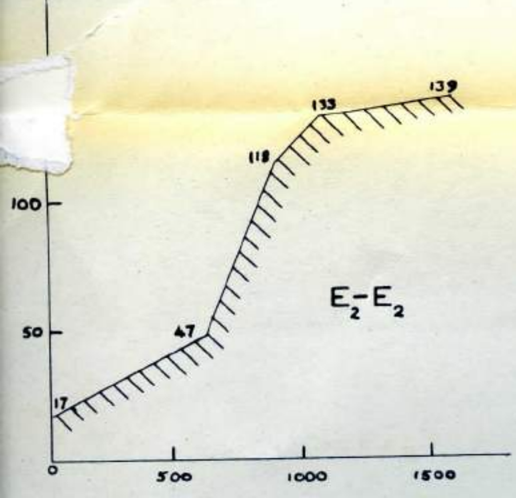


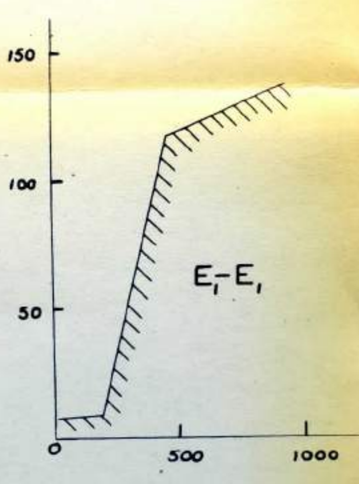


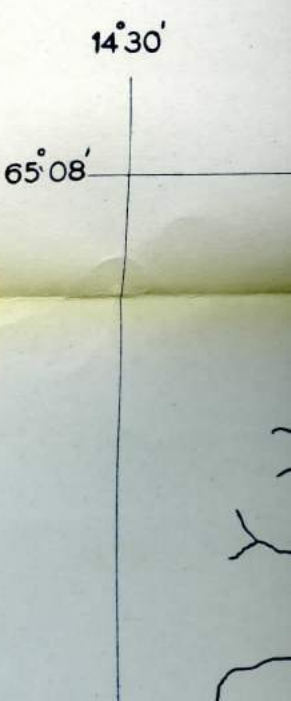


RAISED BEACHES IN
ARE









outwash fan, and not true beaches.

The heights of the beaches in the two fjords (three, if Nordfjadarfloi is included as a separate fjord) are consistent within the limits of our interpretation, and within the limits imposed by the erosion factor. This factor is indeterminate as there are no definite indications of the true sea level when the beaches were formed. If raised wave-cut platforms had been surveyed however, than some idea of the erosion could have been obtained. In Seydisfjordur the heights of the bottoms of two raised cliffs were determined, and found to be 108' (profile 9), and 131' (profile 2). (Anything obviously right out of the range being dealt with, such as the apparent cliff in Seydisfjordur, profile 1, at 187', have been ignored).

There are three possible ways in which these beaches could have been formed: 1) by isostatic uplift of the island as the ice receded.

2) by uplift of the island due to some other cause (note - the British Isles are slowly tilting due to long-term orogenic processes).

3) by a change in the actual sea-level.

The first of these was the theory which held most favour with the members of the Expedition, possibly because it afforded the simplest, and the most dramatic explanation. The initial condition would have been that the whole island was covered with ice, and that it retreated towards the centre. If this were the case, and the ice in the centre of the island was about 3,000' thick (note - it is known that the ice was at least 3,000' thick only fifteen miles inland from the head of Reydarfjordur), then the land surface in the centre of the island would have been depressed by about 1,000' (compare with the case of Greenland as outlined in "Venture to the Arctic" p.119). As the ice receded the edges of the island would have risen as they were unloaded, and as the edge of the ice became further and further from the sea the land further from the sea would have risen too. But, as this latter event occurred, the land nearest the sea would not rise so much, and so the beaches which were formed after the initial recession would be raised and tilted. So the beaches around the head of a fjord would be higher than those around the mouth, compared with present sea-level. It has been estimated that this would give a difference in level along the length of Reydarfjordur of about 70'. There is no such difference in level. It may be noted here that along the west coast of Norway the level of the raised beaches rises as the observer leaves the ocean; the gradient has been worked out in many places and the following are representative of the results obtained:

1:1000 in Velfjord

1:1500 in north Helgeland

1:1146 about Tromso.

Conditions during the Ice Age must have been similar in Eastern

Iceland, but such a gradient would give a 70' difference between the mouth and the head of Reydarfjordur and, as stated above, no such systematic difference has been detected.

Beaches have also been noted by Dr. Walker in the Lagarfljot valley due west of the head of Reydarfjordur, and a further 15 miles inland. These are near the head of the Lagarfljot, which has a surface height of about 100', and the beaches are some 40' above the lake. This seems to indicate that the beaches are of much the same height whatever distance they are from the centre of the island. This discounts the first hypothesis.

This means that the "raising" was due to one of the other two causes, or maybe to another which has not been considered. With regard to the third explanation there do appear to be beaches in other countries of about this same height, so there may have been a general world-wide change in sea level. If the sea level had dropped then it is necessary to account for the disappearance of the water. If one-quarter million cubic kilometers of ice were to melt then it would cause a rise in sea-level of 21' (ref. "Venture to the Arctic" p.122). This is the estimated volume of ice in the Greenland ice-cap. There are an estimated 28 million cubic kilometers of ice in the Antarctic icecap, and so if this were to melt too then by simple proportion the sea-level would rise by just over 250'. However as considerably more land would be flooded if the sea-level were to rise by 250' instead of 21', then it would not be unreasonable to postulate that if all the Antarctic, Greenlandic, and other ice were to melt, the general sea-level would rise by about 130'. So if when the beaches we are considering were originally formed there was no ice on the surface of the earth, and then, due to some major climatic change, the great icecaps of the world were created, then the general sea level could have been lowered by some 130', thus forming the beaches.

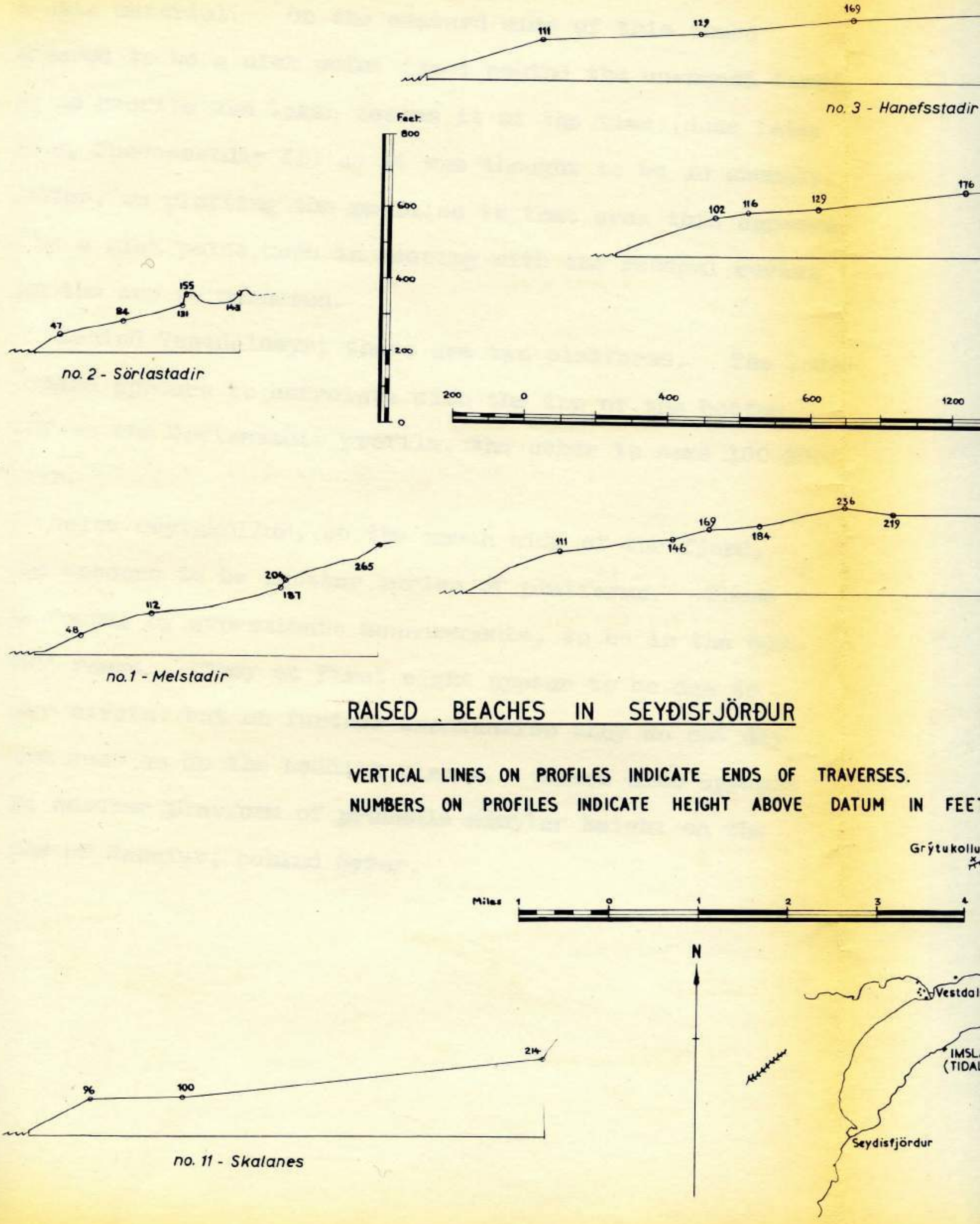
Note: Since this work was done a paper has appeared, by Jon Jonsson, in which much data is presented on beaches in other parts of Iceland. Although the observations are scattered, a beach at 40-45 m. (125-140') appears to be frequently developed around much of the coast. (Reykjavik 43 m.; Hvalfjordur and Bogarfjordur 40-45 m.; Saudarkrokur 45 m.; Husavik (near Seydisfjordur) 38 m.; Lon 40-45 m.; Hornafjordur 41.5 m. In none of these cases has the variation in height with distance from the sea been studied.

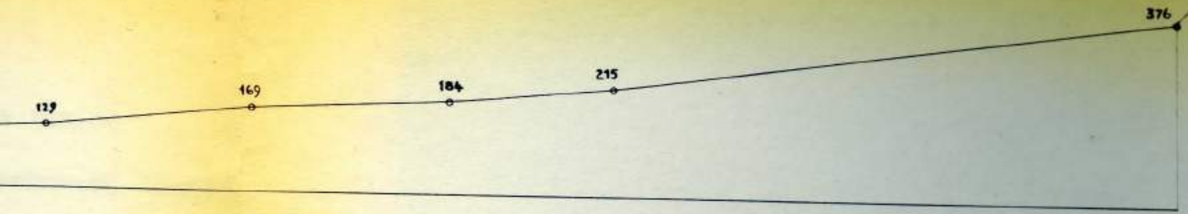
II. 2 BEACHES AND PLATFORMS IN SEYDISFJORDUR (see fig.6)

The main series of beaches lie on the southern side of the fjord, stretching almost continuously from a point about one mile west of Eyrar, near the ruined farm of Hrolfur, east to the farm of Skalanes. All of these beaches abut to the shore, and so their seaward faces are freshly eroded.

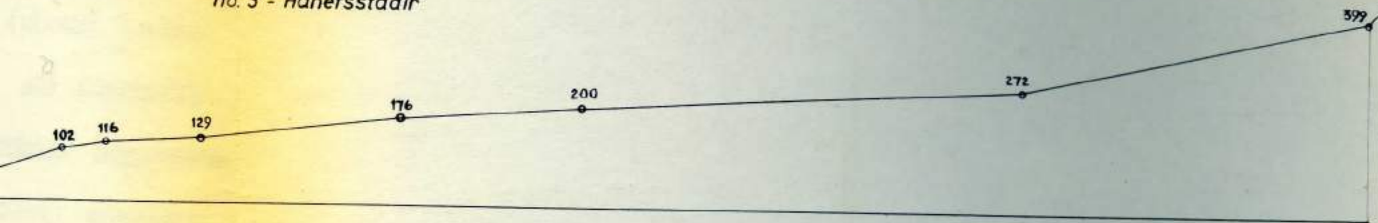
Above this series lies the East Thorarinnstadir series, which are about ½ mile long. One profile was done on this series, and at the change point the theodolite was swung round with the telescope level. (This should help detect any platforms on the same level). A platform on the Skalanes headland was discovered to be of about the same height.

Reverting to the main series, on the Sorlastadir profile, a set up was made at the top of the "cliff", and on swinging round, "cliffs" of similar height were noticed on the north shore of the fjord. This particular profile could have been carried about three miles back up the river valley, but it was thought that the level ground was probably due to a river terrace, rather than a raised beach. On this, and the next profile to the west (Melstadur) there appeared to be two nick points. Between the West Thorarinnstadir and the School profiles there was what appeared to be a heap of

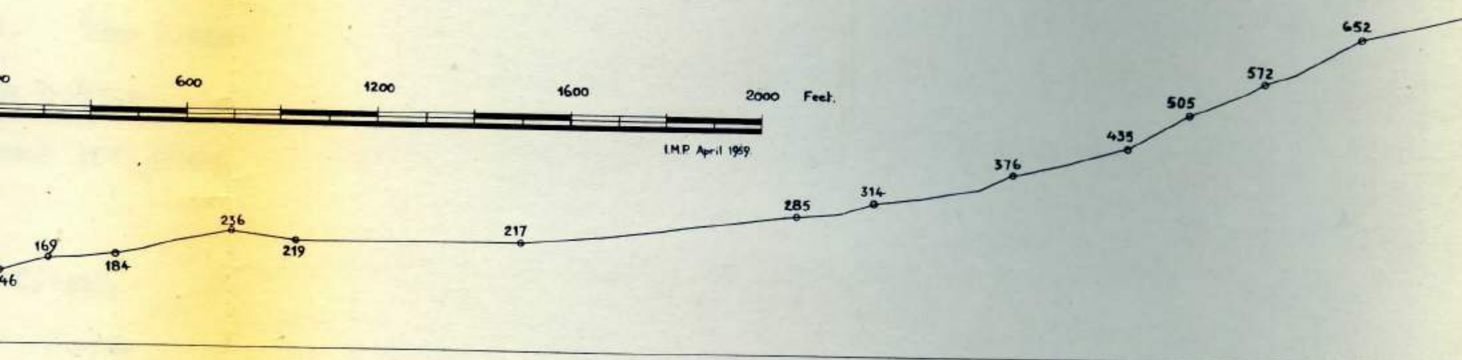

no. 3 - Hanefsstadir
111
129
169
176
102
116
129
Feet
800
600
400
200
0
155
84
47
131
143
no. 2 - Sörlastadir
200
0
400
600
1200
236
219
169
184
111
146
265
204
187
112
48
no.1 - Melstadir
RAISED BEACHES IN SEYÐISFJÖRÐUR
VERTICAL LINES ON PROFILES INDICATE ENDS OF TRAVERSES.
NUMBERS ON PROFILES INDICATE HEIGHT ABOVE DATUM IN FEET
Grýtukollu
Miles 1 0 1 2 3 4
N
Vestdal
IMSL
(TIDAL
214
96
100
no. 11 - Skalanes
Seydisfjördur



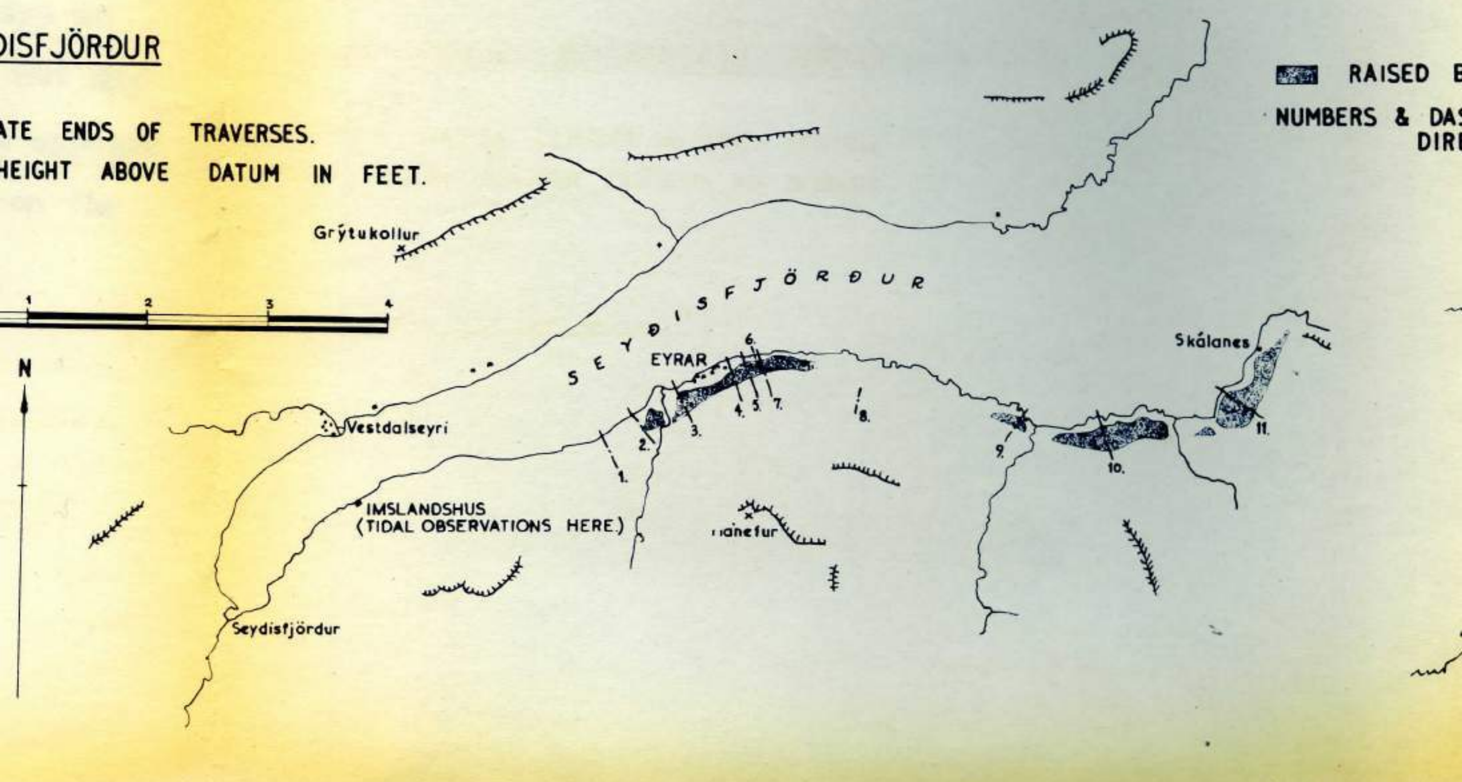
no. 3 - Hanefsstadir

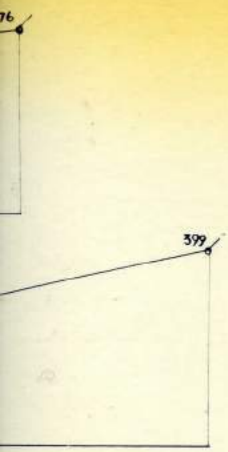


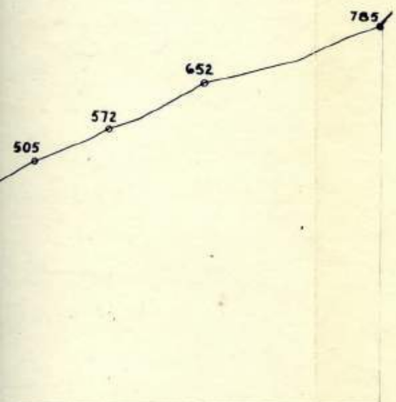
no. 4 - West School

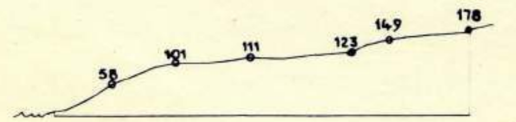


no. 5 - East School

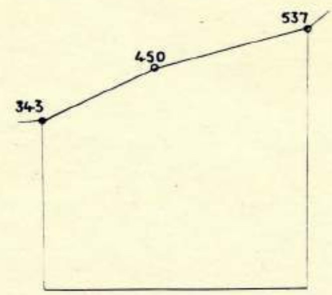




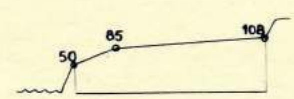




no. 6 - West Thorarinsstadir II.



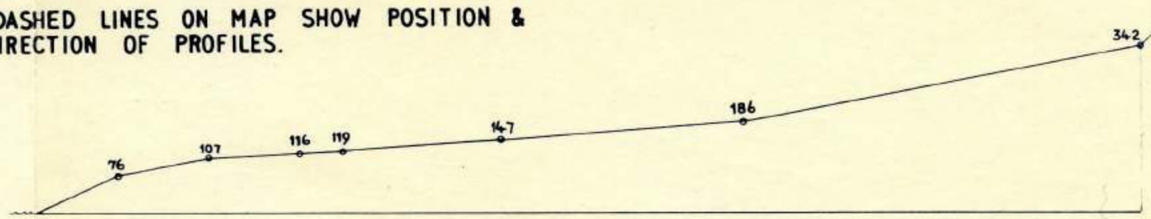
no. 8 - East Thorarinsstadir



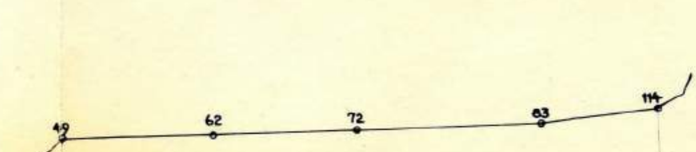
no. 9 - Austdalur

RAISED BEACHES NOTED BY DR. WALKER.

NUMBERS & DASHED LINES ON MAP SHOW POSITION & DIRECTION OF PROFILES.



no. 7 - West Thorarinsstadir I.



no. 10 - Bæjarstædi

moranic material. On the seaward side of this there appeared to be a nick point (just behind the un-named farm), but no profile was taken across it at the time (done later - see W. Thoransstdir II) as it was thought to be an anomaly. However, on plotting the profiles in that area this appears to be a nick point more in keeping with the general series than the one we measured.

Behind Vestdalseyri there are two platforms. The lower of these appears to correlate with the top of the bottom cliff on the Sorlastadir profile, the other is some 100-200' higher.

Below Grytakollur, on the north side of the fjord, there appears to be another series of platforms. These were found, by approximate measurements, to be in the 800-1,000' range. They at first sight appear to be due to harder strata, but on further examination they do not dip to the west as do the bedding planes. There also appears to be another platform of probable similar height on the slopes of Hanefur, behind Eyrar.

II. 3 SEICHES

It is obvious from the tidal graphs that, as well as the main tidal cycle, there is a secondary oscillation superimposed upon the main curves. This is most likely to be a seiche or a harmonic oscillation of the mass of water within the fjord basin. Usually seiches are initiated by the wind, but they may sometimes be caused by an earth tremor. The ones observed here were almost certainly wind activated, since they appear on both tidal cycles for Reydarfjordur and on the simultaneous Seydisfjordur observations. They are not apparent on the Breiddalsvik observations, as would be expected, since Breiddalsvik is situated on a bay and there is no fjord basin where an oscillation could be set up.

Seiches can be analysed by normal harmonic methods, and by assuming that the fjord basin is completely enclosed, the following formula for their time of oscillation can be arrived at:

$$T = \frac{2.\ell}{k.\sqrt{g.h}}$$

Where, T is the time of oscillation in seconds

ℓ is the length of the oscillating basin (in the direction of oscillation) k is an integer, 1, 2, 3 etc.

g is the gravitational constant

h is the depth of the fjord basin.

The main difficulty in applying this formula is the difficulty of deciding a reasonable value of the integer k. To avoid this necessity no absolute times of oscillation have been calculated, but it has been assumed that the form of the oscillation in both Seydisfjordur and in Reydarfjordur is the same and thus the value of the integer k is the same.

Thus we get : $$\frac{T_r}{T_s} = \frac{l_r . h_s^{\frac{1}{2}}}{l_s . h_r^{\frac{1}{2}}}$$

Where the suffixes r and s refer to Reydarfjordur and Seydisfjordur respectively.

Assuming that l applies along the main length of the basin we get from the map :

Place	Reydarfjordur	Seydisfjordur
oscillating length (metres)	17,000	15,000
average fjord depth (metres)	100	50

and $\frac{T_r}{T_s} = \frac{17.1}{15\sqrt{2}} = 0.8$

From the tidal curves it may be seen that the seiche oscillation times for the two curves are, on the average, approximately :

Reydarfjordur, 1 hour; Seydisfjordur, $1\frac{1}{4}$ hours.

Hence, $\frac{T_r}{T_s} = \frac{1}{1\frac{1}{4}} = 0.8$

The fact that the values of T_r/T_s both for the observations and for the theoretical case are both 0.8 is largely fortuitous, since a great many interpretations of both λ and h could be made from the maps. However, the fact that the observed times and the calculated times are of the same order is to some degree a verification of the theory, and adds a little to the scanty knowledge relating to oscillations in fjord basins.

I. 4. THE ICECAP OBSERVATIONS

A general description of the party's movements on and around the icecap has already been given.

The scientific work undertaken on Thrandarjokull may conveniently be divided into the following sections:

(a) The Survey of the Ice-Edge.

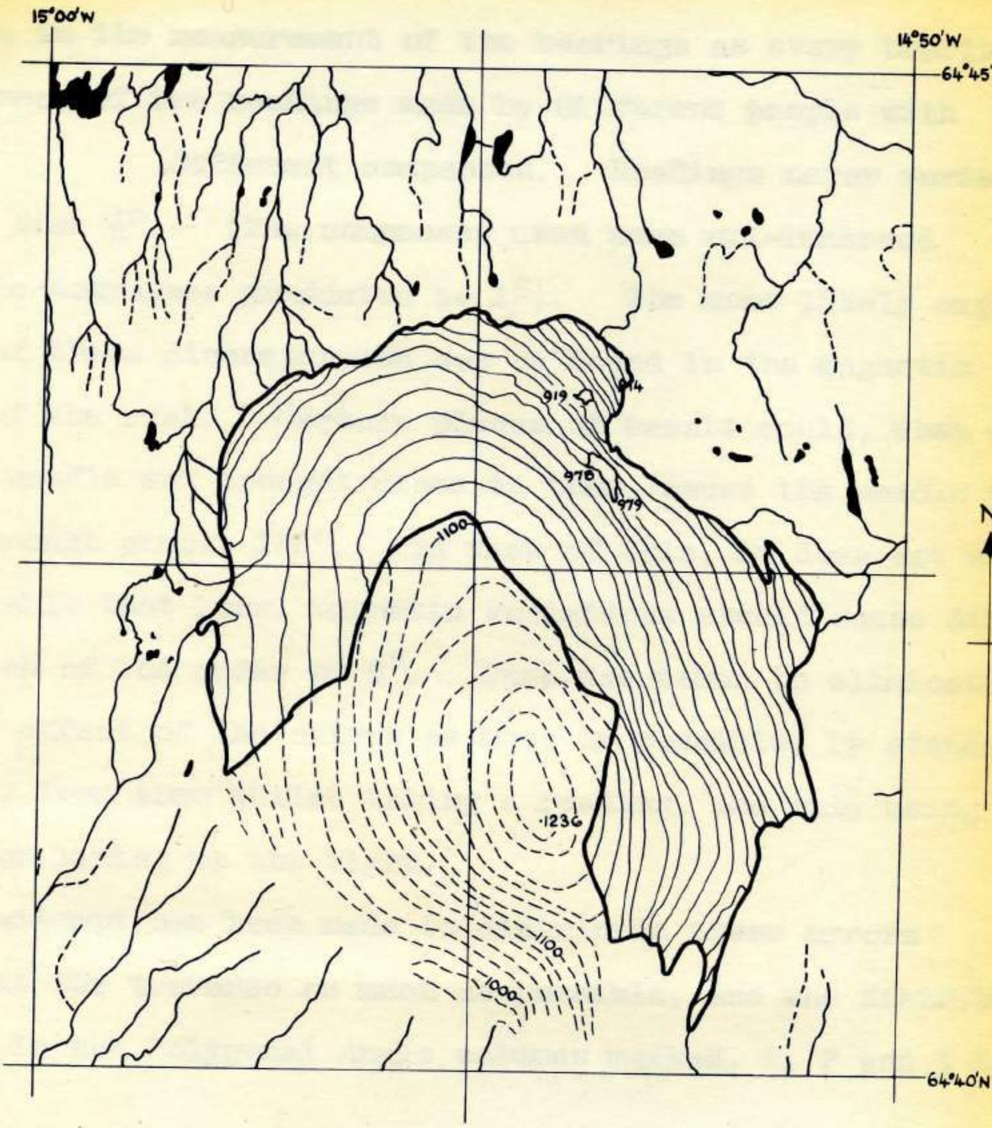
(b) General Features noted on and around the Icecap.

(a) The Survey of the Ice-Edge

The basic object of this survey was to establish a number of prominent cairns around the ice-edge and to measure the distance of the ice from the cairns along a measured magnetic bearing. This will enable a future party to make similar measurements, and so determine the rate of advance or retreat of the ice-edge.

In all, fourteen large cairns (see Fig. as a typical example) were built. The distance of the ice-edge from each cairn with the bearing along which the measurement was made, together with the bearings and distances of adjacent cairns, are shown in Table I.

From an examination of the table certain discrepencies are immediately obvious. Most important is that there appears to be a discrepency in the magnetic bearing when measured from say A to B, and then measured again from B to A. The value of this discrepency is recorded in column 4, and it can be seen to vary from zero to 9°. There is little possibility of there being



SKETCH MAP BASED ON U.S. MAPS PRODUCED BY AERIAL SURVEY (OCT. 1946)

(Note: dotted areas uncertain owing to obscurities on photographs)

SKETCH MA

COLLEGE ICELA

(Heights in metres)

Scale: kilometres

1 0 1 2 3

Scale: miles

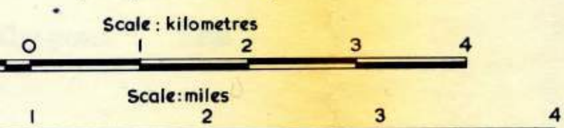
0 1 2 3

ÞRÅNDARJÖKULL - S.E. ICELAND

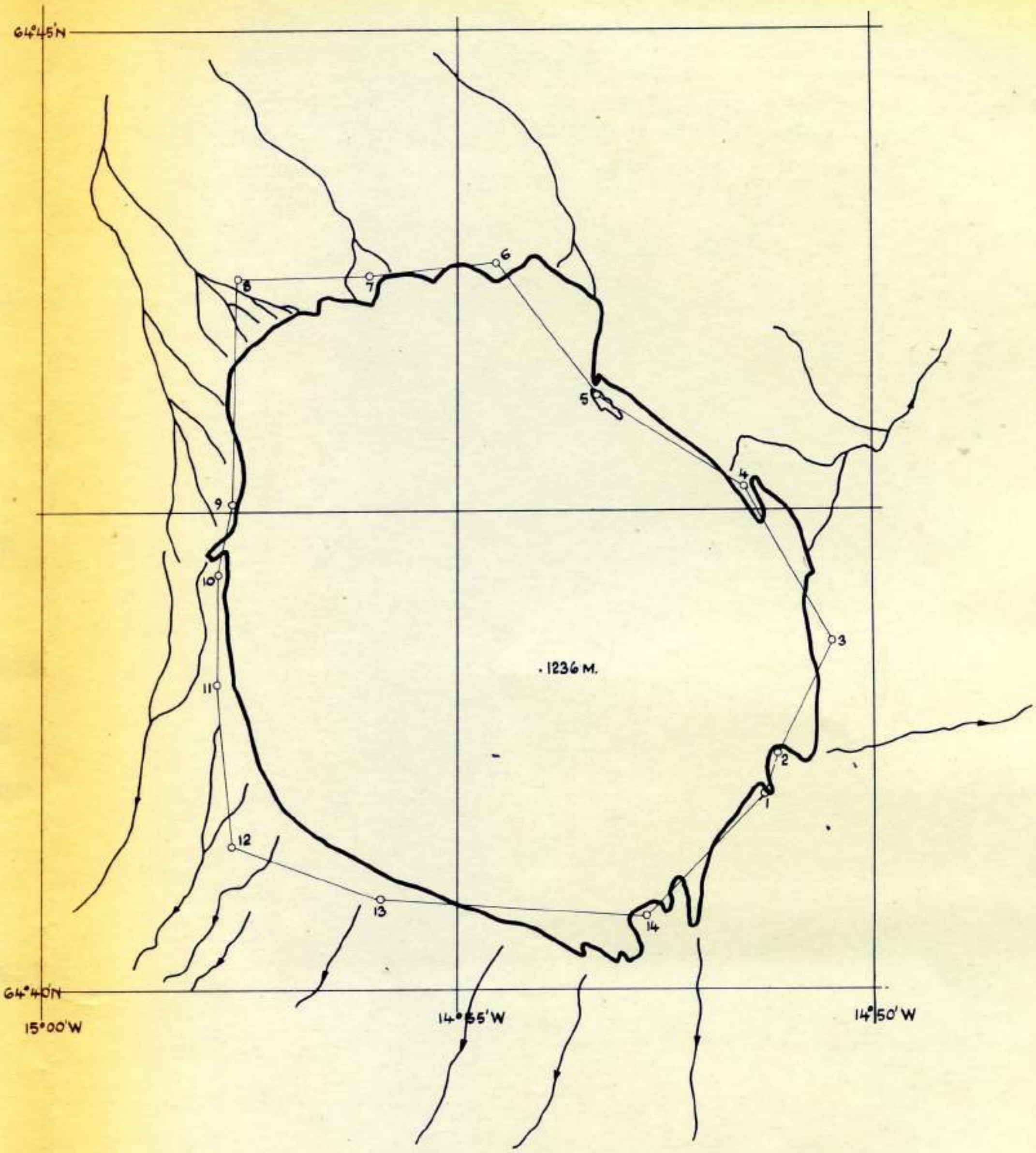
VEY (OCT. 1946)

ographs)

(Heights in metres)



NDARJÖKULL - S.E. ICELAND



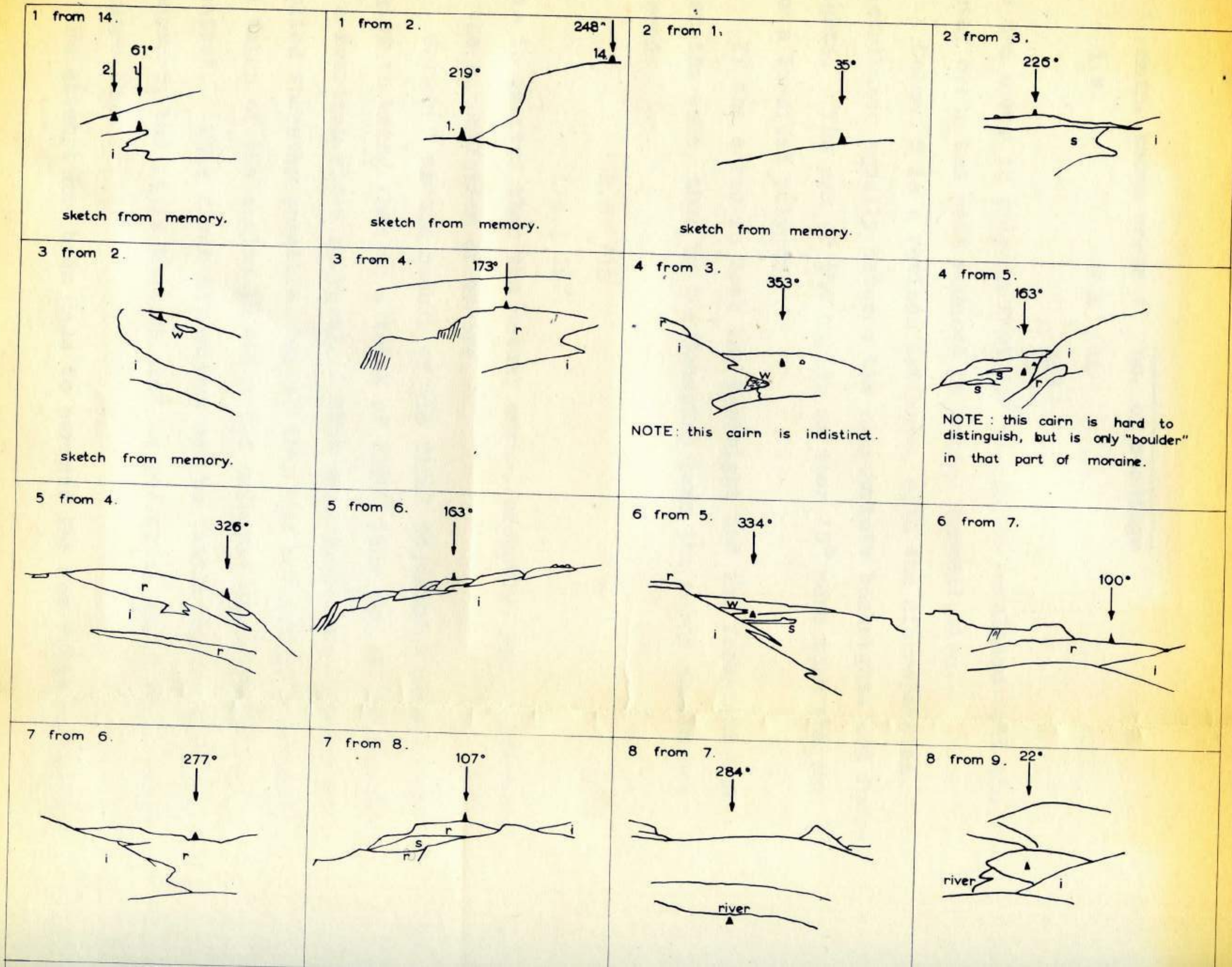
SKETCH MAP SHOWING COMPASS & PACING TRAVERSE MADE BY IMPERIAL COLLEGE ICELANDIC EXPEDITION AUGUST 1958 WITH GENERAL DRAINAGE PATTERN

(Circles & numbers indicate cairns)

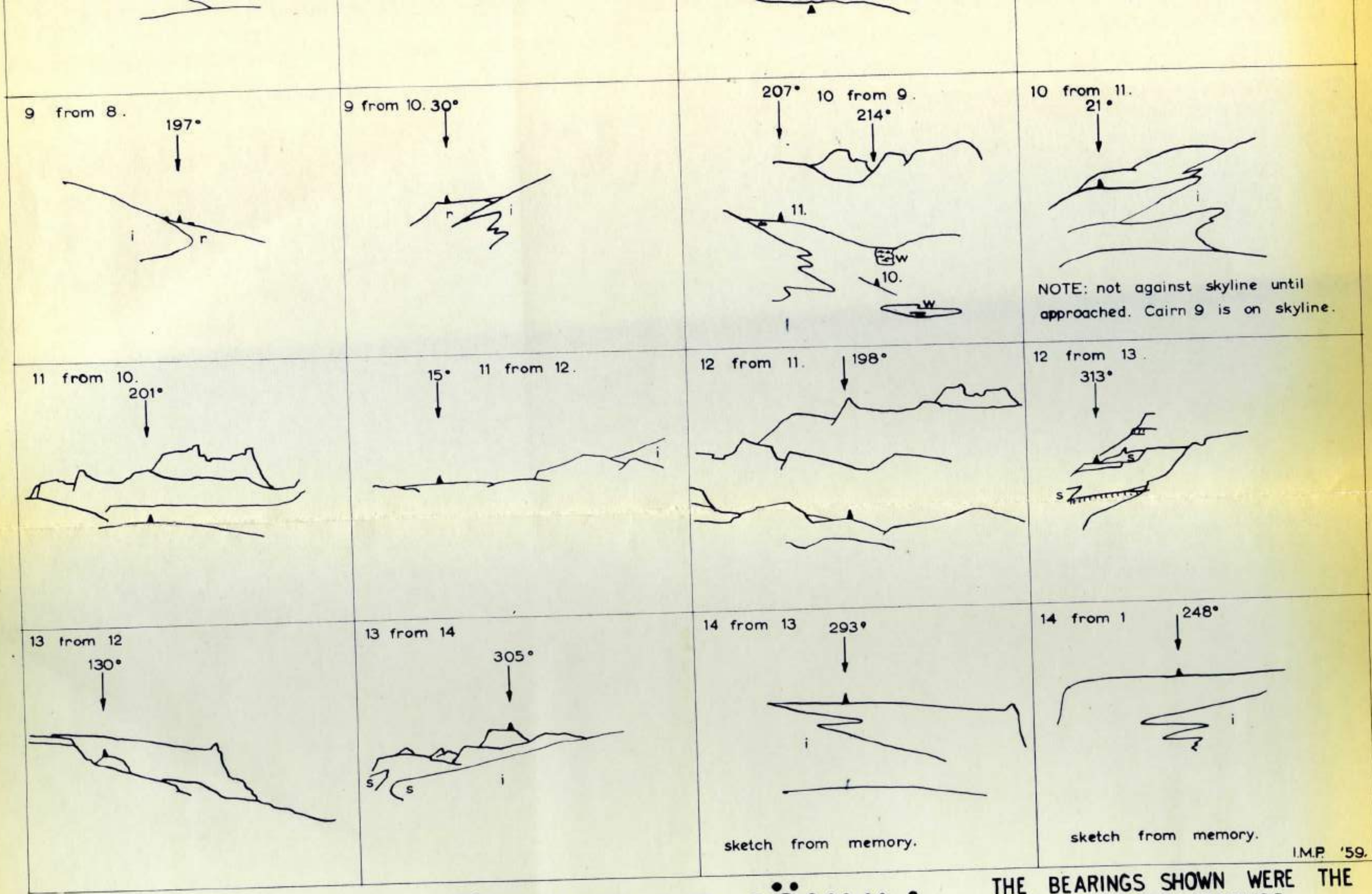
mistakes in the measurement of the bearings as every bearing is the mean of two readings made by different people with different compasses. Readings never varied by more than $\frac{1}{2}^{o}$. (The compasses used were oil-immersed prismatic compasses graduated to 1^{o}). The most likely explanation of these discrepencies can be found in the magnetic nature of the rock. Certain pieces of basalt could, when a compass needle was brought close to them, cause the needle to swing through almost 180^{o}. In view of this, it does not seem unreasonable that local magnetic variations should cause discrepencies of the order of 9^{o}. Care was taken to eliminate the magnetic effect of the cairns as much as possible, by standing well away from them whilst taking a reading, and only using the cairns for lining up the sight.

An attempt has been made to distribute these errors throughout the traverse as much as possible, and the distribution is shown in the Polygonal Angle columns marked, 1, 2 and 3 in Table I.

Column 1 is a straight back-sight/fore-sight tabulation, neglecting any magnetic discrepencies. It will be seen that the total of the internal angles as calculated by this method is only 15^{o} less than the sum for a 14-sided polygon. The expected error by the Gaussian laws is:



1 from 14.
61°
2
1
i
sketch from memory.
1 from 2.
248°
14
219°
1.
sketch from memory.
2 from 1.
35°
sketch from memory.
2 from 3.
226°
s
i
3 from 2.
w
i
sketch from memory.
3 from 4.
173°
r
i
4 from 3.
353°
r
i
w
NOTE: this cairn is indistinct.
4 from 5.
163°
i
s
s
r
NOTE : this cairn is hard to distinguish, but is only "boulder" in that part of moraine.
5 from 4.
326°
r
i
r
5 from 6.
163°
i
6 from 5.
334°
r
w
s
i
6 from 7.
100°
r
i
7 from 6.
277°
i
r
7 from 8.
107°
r
s
r
i
8 from 7.
284°
river
8 from 9.
22°
river
i



THE BEARINGS SHOWN WERE THE ACTUAL COMPASS READINGS.

i = ice; w = water; r = rock; s = snow.

ÞRANDARJÖKULL

SKETCHES SHOWING THE POSITIONS OF CAIRNS AS SEEN FROM ADJACENT CAIRNS. SKETCHES MADE MID-AUGUST 1958.

maxm. known error x $\sqrt{\text{no. of readings}}$

i.e. $9 \times \sqrt{14}$

$\doteq 32^\circ$

As the error is only in fact 15° it may be concluded that the total error has been reduced by mutual cancellation.

Column 2 is a revised estimate, with the discrepencies distributed equally between the appropriate backsights and foresights. The sum of the angles is then 10° more than the sum for a 14-sided polygon.

If the error in both the backsight and the foresight had been the same, then by the Gaussian laws the error should not exceed

$4.5 \sqrt{14}$

i.e. ± 16°.

This is greater than the actual error, probably, again, because of the cancellation of errors.

Column 3 is the result of the final adjustment made to the angles to bring them to a total of 2160° (the sum of the angles of a fourteen sided polygon). This adjustment has been evenly applied wherever possible, but if this was not possible account was taken of the angles in which the original discrepency was greatest. This final adjustment can be little better than guesswork, but it is thought that no polygonal angle is in error by more than 2°.

No attempt has been made to correct the ice front direction

Fig. 23: Typical cairn as built during the Thrandarjokull ice cap survey

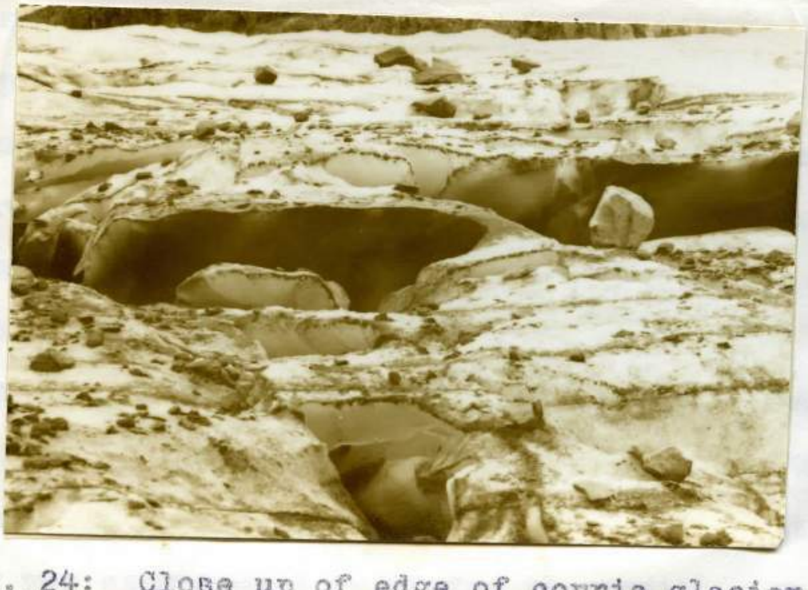


Fig. 24: Close up of edge of corrie glacier in Reydarfjordur

bearings, since it is these exact bearings which any party will need in the future, if they propose to resurvey the ice-edge. Similarly the actual observed magnetic bearings from one cairn to another have been included in Table I and on the sketches (Fig. 22) to help any future investigator wishing to locate one cairn from the next. For this purpose the sketches (Fig. 22) should be of great help. Most of them were made on the spot and show the prominent features near the cairns, and any boulders which may be confused with the cairns.

Distances to the ice-edge were measured with a linen tape, and the accuracy is probably not better than one foot. Account was only taken of steep slopes (greater than 30°) in these measurements.

Distances between cairns were paced. The distances are the mean of at least two persons' pacing. The pacing was standardised by finding the distances represented by 100 paces for each person. This was done back at Base camp, a tract of country being chosen for its similarity in conditions under foot to the terrain around the icecap. The error in the pacing is thought to be not greater than 1 in 30. As far as was possible pacing was checked, and indeed two of the legs were not paced, the distances being measured from aerial photographs, the three cairns in question having been fixed on the photographs. Aerial photographs are useful for this sort of work, but at times difficulty was experienced in fixing the position on them as the

Cairn	Back Sight °Magnetic	Fore Sight °Magnetic	Discrepancy between B.S & F.S. (°)	Distance to Ice Edge (ft.)	Bearing of Ice Edge (degrees)	Dist. between Cairns (ft.)	Polygon Angle 1	Polygon Angle 2	Polygon Angle 3	Adjustment (inches)
1	248	35	7	152	270	5992	147	152	153	0.02
2	219	46	4	363	270	1322	187	189	188	0.08
3	226	353	0	1014	288	3983	127	127	126	0.15
4	173	326	0	361	268	5730	153	153	152	0.23
5	136	334	0	58	334	5560	198	203	201	0.31
6	163	277	9	528	224	5490	114	120	122	0.37
7	100	284	3	834	206	4083	184	187	186	0.44
8	107	197	3	1992	153	4268	90	94	93	0.54
9	22	214	5	160	107	7102	192	192	191	0.58
10	30	201	4	214	121	2230	171	169	168	0.63
11	21	198	0	502	90	3454	177	175	174	0.71
12	15	130	3	2090	60	5090	115	115	114	0.78
13	313	116	3	767	50	4842	162	164	163	0.90
14	293	61	3	566	305	8097	128	130	129	1.00
			7			5292				

TABLE I

ice-edge had changed in places since the photos were flown. Changes in the moraine, and the drainage also confused the issue.

As expected, when the final plot of the traverse was made, it was found to have a misclosure. This amounted to a displacement of 1" of station 1 from the bearing from station 14 on a scale of 1:2500. This represents an overall error of 1 in 33, which, considering the magnetic nature of the rock, and the slippery ice, and muddy moraine over which the pacing was carried out, is reasonable. The last column in Table I is the shift which was applied to each cairn position to allow the traverse to close.

Fig. 21 shows the traverse made by this party, together with a copy of the map made from aerial photographs flown by the USAF in 1947. It is immediately obvious that there are certain differences in the position of the ice-edge. However, it is not possible to say whether these differences result from an actual change in the position of the ice-edge, or inaccuracies in the survey. It is probable that they result from a combination of the two. However, the ice-cap appears to be slightly smaller on the map compiled by the Expedition than on the USAF map. It would seem that there might have been a general recession since 1947. This is also indicated by the state of the moraines (see later), and from conversations with a local

Fig. 25: Partially formed dirt cone Thrandarjokull

Fig. 26: "Crag's Tail" dirt accumulated in the lee of a rock; Thrandarjokull

farmer who said that the ice-cap had been rapidly decreasing in size from 1900 until about 1948, and then much more slowly until the present day.

Despite the fact that only a general recession in the ice may be deduced from this traverse at this moment, the most significant aspect of the survey is that fourteen cairns have been established around the perimeter and the distance of each one from the ice edge has been measured along a known bearing. This will enable a future party to make similar measurements and so determine the rate of advance or retreat of the ice-edge.

(b) General features noted on and around the icecap

At the time of year the party were at the icecap (mid-August) the firn line appeared to be quite high, at about 1150 m. Fixings were not taken because of the bad weather when the party were on the top of the icecap, and because of the extreme difficulty of finding any reliable known points for resection.

It may be seen from aerial photographs (taken 31st August 1945) that there is a transition zone (presumably the firn line) at an altitude of about 1100 m. This is a little lower than the firn line was presumed to be in 1958, but may be due to the photographs being taken a little later in the year, and to any reduction in the size of the icecap in the years between 1945 and 1958.

Fig. 27: Furrows made in moraine by the advance of the ice edge

On the eastern side of the ice, distinct furrows could be seen in the ground moraine (Fig.27.). It was thought that these were either gouged out by the winter advance of the ice and were then uncovered, or that they were recently unfrozen fossilised furrows of another age. Of the two, the former is the more likely explanation, since the furrows themselves were very soft and would not have lasted for any length of time (probably even when frozen). A possible explanation of their cause is as follows:

Owing to the stress distribution caused within the ice by its own weight, the cap is constantly flowing, plastically, outwards. In summer, this advance of the ice-edge is more than compensated by melting and ablation at the lower levels, but in winter there is a relative seasonal advance. During this advance boulders and stones are picked up by the ice front and these tend to mark and gouge everything in their path. The marks and striations are subsequently uncovered the following summer by melting.

A further theory on their formation is that the furrows are a result of a solifluction effect and are similar to stone stripes. In view of the large size (note the ice axe in the photograph) of the furrows this seems unlikely.

Abundant ice scratching of rocks around the ice-cap was noted, indicating that the whole of the area had, at one time, been under ice cover.

Dirt cones along the margins of the ice in the ablation zone were noticed. These seem common on the Icelandic ice-caps, and their possible origin is explained in "The Origin of Dirt Cones on Glaciers" by C. Swithinbank (Journal of Glaciology, vol. 1, no. 8, Oct. 1950).

Another feature which was noted towards the edge of the ice was a series of boulders with a dirt tail in their lee (see photographs fig.26. These were probably caused by the protection effect which the boulders give to any accumulated dirt in their vicinity. The dirt probably arose from wind blown dust or debris brought up along shear planes.

Roche moutonneés were observed at certain places around the cap, and were particularly prevelant on the lower levels.

The moraines which surrounded the cap showed no distinct orientation, or a tendency to any one type. They were, without exception, very wet and stony. In most places a distinct series of moraines at intervals recorded the rapid retardation of the ice retreat during a certain period. In almost all places the state and position of the newest moraines indicated that the ice was still retreating slowly, but that its rate of retreat was decreasing. Only in a very few places was there any evidence of an advance, and then this proved to be very localised.

In areas where there was a sudden change in slope of the ice (not usually more than three or four degrees) a series of crevasses could be noted. These were usually not more than 18" across, but some were over 50' deep.

All over the icecap there seemed to be a distinct series of almost parallel narrow cracks (about ½" across) which seemed to run for many hundreds of yards. These were presumably small cracks indicating the general stress pattern within the ice. It is unfortunate that because of bad weather and insufficient time these were not further investigated, but a map of their distribution, direction, and spacing, should yield some interesting results.

In the ablation zone the ice was deeply cut by many melt water channels, some of which were 10' across. These could be very dangerous to an unroped party and were sometimes difficult to cross. It was interesting to note that in many instances these streams ended in moulins where the water cascaded into a hole 50' deep or more. The moulin was presumably initiated by the presence of a small crevasse or weakness in the ice, which the flowing water had gradually eroded into a deep hole.

Towards the edge of the ice melt streams often cut their way under the ice after disappearing down a "pothole", and so formed an ice-cave. Ice-caves could be useful for emergency shelter if it were found necessary.

In one place on the eastern side of the cap several melt streams had joined together and the force of the water had eroded a minor gorge, or escape channel, about 15' wide, and 15' deep, in the rock, just under the ice-edge. This was extremely difficult to cross.

Other more general things included the finding of several winged insects on the summit of the ice-cap. These had probably been blown up there by the wind. In a few places the tracks of an arctic fox were found, but the animal was never seen. The local farmers informed us that sheep were in the habit of walking on the ice, but we saw no sheep within about 2000' of the edge, and with the sparse vegetation on the peripheral moraines this would seem unlikely. The birds seen on the ice-cap are recorded elsewhere in this report.