GLACIER OBSERVATIONS IN NORDVESTFJORD, SCORESBY SUND DISTRICT

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In recent years great interest concerning the balance of the Greenland ice sheet (Indlandsisen) has developed and considerable efforts have been expended to throw light on the problem. Perhaps the biggest error in calculations is the estimation of the production of calf ice from the East Greenland glaciers, from which almost no accurate data are available.

In connection with the Survey expedition to Scoresby Sund in July-August, 1968, a glaciological programme was carried out by the authors. The main objects of the study were frontal velocities and calf ice production in the three outlet glaciers in the innermost part of Nordvestfjord (approx. 72° N, 28° W) - Daugaard-Jensen, Charcot and Graah glaciers. A small surging glacier in Stauning Alper (approx. 71° 35'N, 25° 35'W) was visited and a short study of ice velocity, surface collapse and moraine succession was undertaken.

Daugaard-Jensen glacier

Field work at Daugaard-Jensen glacier was carried out in two periods, July 20th - Aug. 2nd and Aug. 22nd - Aug. 25th.

The following work was done:

1) Establishment of a base line for theodolite measurements.
2) Surveying of characteristic points on the glacier surface once or twice a day, in order to determine position, height and flow velocity of the front.
3) Setting up a 16 mm camera for time lapse photography of the front of the glacier. The camera worked for three weeks taking one frame every 15 minutes.
4) Observations and recordings of calvings.

The provisional results are summarized below.

From fig. 4 it appears that the front has retreated about 1.5 km since 1952 (position determined from aerial photographs). However, compared to the variations in frontal positions during the observation period, this recession cannot be considered significant.

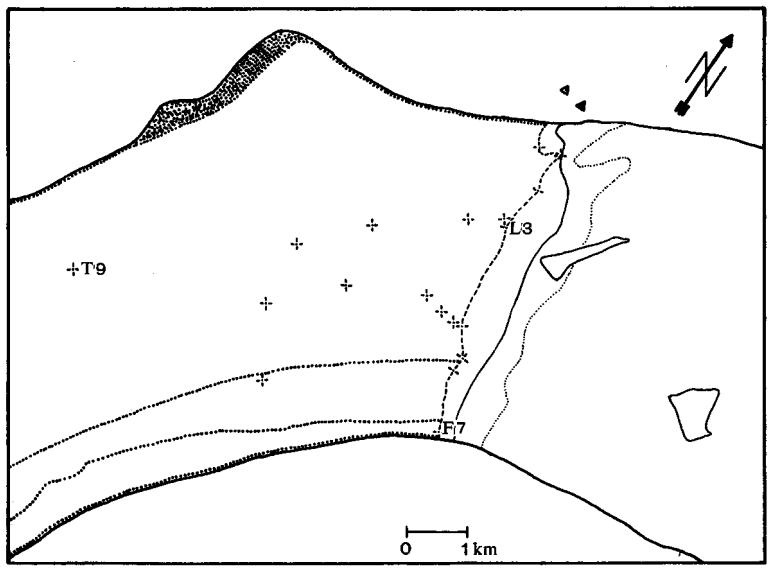

Fig. 4. Map of frontal part of Daugaard-Jensen glacier. Redrawn after Geodætisk Institut map sheet 71 Ø 3 at 1 : 200 000.
..... Moraine. ..... Front 1952. ~~~ Front before calving.
----- Front after calving. ▲ Base-point. ⊹ Points measured.

At the front the observed surface velocities vary between 12.3 m/24 h at point L3 and 8.0 m/24 h at point F7 (see fig. 4); the mean velocity is 10.2 m/24 h. These figures show that the velocity is nearly constant across the middle section of the glacier front with great velocity differences within narrow zones along the glacier margins.

In a longitudinal direction, the velocity increases in the direction of movement from 7.4 m/24 h at point T9 to 12.3 m/24 h at point L3.

The width of the glacier front is 5.7 km. From the height of the front and observations of calvings the mean thickness of the glacier is estimated as 500 m. Using these figures, the production of calf ice amounts to about 10 km^3/year.

During the period of observation four calvings were watched, of which three were minor (0.05-0.15 km^3) and one very big (1.2 km^3).

Observations indicate a certain order of events in the calving procedure. This may be inferred from the fact that the shape of the front

and the position and shape of the icebergs in front of the glacier were similar at the arrival on the site July 20th and after the big calving on Aug. 25th, the same being the case on aerial photographs from Aug. 13th 1952 and July 16th 1961. The time interval between major calvings seems to be 6-8 weeks and the amount of calf ice produced within this period is about 1.4 km^3.

Charcot and Graah glaciers

Field work at Charcot and Graah glaciers consisted of:

1) Establishment of base lines for theodolite measurements.
2) Surveying of characteristic points on the glacier surfaces, in order to determine position, height and flow velocity of the front.

As both glaciers were observed from a height of approx. 1700 m and at distances of 2-5 km, with relatively short base lines, the measurements are somewhat uncertain. However by presuming a direction of flow and using the increments of the measured angles for each point, reliable results have been obtained. The results are believed to be correct within 10 %. For results see the table.

By comparison with aerial photographs from 1950, the glacier fronts can be seen to have been very stable. Only charcot glacier has receded approx. 600 m, which cannot be considered significant.

Glacier	Width	Velocity			Mean frontal height	Mean thickness	Production per year	Points observed
		Max.	Min.	Mean				
	km	m/24 h			m	m	km^3	
Charcot	2.0	1.7	1.4	1.4	20	180	0.2	7
Graah	2.5	5.1	3.9	4.0	37	300	1.0	7
D.-J.	5.7	12.3	8.0	10.2	62	500	10.0	35

The glacier in Stauning Alper

The surging glacier in Stauning Alper was discovered by N. Henrikse and W. S. Watt on a reconnaissance expedition in Nordvestfjord in 1967. Aerial photographs from 1947 and 1950 show the glacier to be stationary, while in 1961 the glacier had advanced 3 km. In 1967 the glacier ended in the fjord, that is 7.5 km from its 1950 position, and had started to collapse.

During the stay at the glacier a cross profile was measured both by theodolite and by hand-level in order to estimate the volume loss due to surface collapse.

The age of lichens on earlier side moraines indicate that a former advance took place 150 to 250 years B. P..

K/AR AGE DETERMINATIONS

Ole Larsen

In the spring of 1968 we finished setting up and testing the K/Ar dating apparatus at Mineralogisk Museum. A small number of GGU samples were dated during the summer months. Since September a fair amount of time has been spent on testing the suitability of atomic absorbtion spectrophotometry for determining K, Rb and Sr. These efforts, however, have not yet been very successful although a considerable amount of experience has been gained. In November and December our main efforts were concentrated on the first attempts at using the solid source mass spectrometer (Atlas CH 4) at Fysisk Laboratorium II, H. C. Ørsted Institute, for isotope analysis on Rb and Sr.

K/Ar age determinations were carried out on samples from five different areas in Greenland:

1) The Agto area

Mapping in this area by Vagn Jensen has revealed some occurrences of pseudotachylite in NE-SW-striking major movement zones approximately 20 km south of Agto (Jensen, 1968). According to Vagn Jensen the movement zones with pseudotachylite are characterized by weak retrogressive metamorphism altering the surrounding enderbitic gneisses into hornblende-biotite gneiss. The whole-rock age of the pseudotachylite, which at the sample locality is still in a vitreous state, was therefore expected to be