

COMMISSION ON SNOW
AND ICE INTERNATIONAL ASSOCIATION
OF HYDROLOGY U.G.G.I.
ELEVENTH CONGRESS, TORONTO 1957

REPORT OF PROCEEDINGS

FIRST SESSION, 6TH SEPTEMBER, 09,00

Vice-President, Professor R. Finsterwalder in the chair and 45 members present.

1. The chairman prefaced his remarks with an expression of regret at the absence through ill health of the commission's president, Professor R. Haefeli and proposed that greetings and wishes for a speedy recovery be sent to him. This was heartily endorsed by the meeting.

2. Further sad news—the chairman said—was the very recent death of Dr. Harald Sverdrup, one of our best known and most active workers, and a world-wide authority on sea ice and related subjects.

3. The chairman apologised for the lack of a presidential address, but said that he had been busy both in Greenland and in the Alps during the period before the congress when it was known that Professor Haefeli was too ill to attend.

4. The secretary (Mr. Baird) read extracts from recent reports from several countries on their glaciological activities in connection with the I.G.Y. Professor Finsterwalder added news on German activities and Dr. H. Bader drew attention to the recent loss of two glaciologists working for the I.G.Y. programme on the Greenland ice cap.

5. A report on progress towards the International Greenland Glaciological Expedition (E.G.I.G.) prepared by Vice-President A. Bauer was read by Dr. de Quervain. This report appears below.

Dr. de Quervain added some information on glaciological work accomplished in central Greenland and Dr. B. Brockamp spoke on the seismic part of the programme. The difficulties of the geoditec profile measurement across the ice cap were mentioned by the chairman and Dr. T.J. Blachut spoke on recent refinements in radio-altimetry and its possible application to Greenland where the isobaric levels might be very uniform.

6. Professor G. Manley read his paper —

Studies of the frequency of snow fall in Great Britain 1868-1956

Dr. H.H. Lamb in commenting remarked that the correlation between English and Alpine snow fall appeared good, but between England and Iceland — poor. Professor Manley maintained however, that spring snows in England were related to arctic air outflow and could be tied to Icelandic conditions.

7. Dr. A. Bilello read his paper —

A survey of Arctic snow cover properties as related to climatic conditions.

8. Mr. J.G. Potter read his paper —
Mean duration and accumulation of snow cover in Canada.

SECOND SESSION, 6 SEPTEMBER, 14.00

Professor G. Manley in the chair, and 50 members present.

1. Professor J. Tuzo Wilson (Vice President of the Union) spoke on the new *Glacial Map of Canada* which is in preparation. Later the manuscript map was displayed and its symbols explained by Mrs. G. Falconer.

2. Dr. L.W. Gold read his paper —
Some observations on the influence of the snow cover on heat flow from the ground in the Ottawa area

Contributors to the following discussion were Thornwaite, de Quervain, Higashi, Manley and Hamilton. The first named stressed the importance of measuring evaporation from the snow surface which Dr. Gold said was now under way, the latter mentioned new experiments at the California Forest Experimental Station on the heat flow and evaporation in forest and open spaces.

3. Dr. A. Higashi read his paper —
Snow survey in Hokkaido

In reply to a question he stated that the power for the radio transmitting the snow depth from radio-active tracer material came from dry cells buried well below ground (and snow) level.

4. Dr. J.A. Bender read his paper —
Air permeability of snow

In the discussion Dr. Bader said that from his experience after a density of .50 to .55 is reached in snow packing, grain crushing tends to take place.

5. Mr. J.A.S. Milne read his paper —
Snow Survey by the Ontario Hydro

THIRD SESSION, 7 SEPTEMBER 09.00

Dr. H. Bader (United States) in the chair and 35 members present.

1. Extracts from the following papers were read by Dr. Higashi —
C. Kojima *Recent studies on the mechanism of snow melting in Japan*
M. Shoda *Study of snow-accretion on wires*

2. Dr. de Quervain read the paper by Professor P.L. Mercanton —
Les cinquante ans d'observations a l'Eismeer par le nivomètre.

3. Dr. G.P. Williams read his paper —
The variability of the physical characteristics of snow cover across Canada

4. Dr. de Quervain read his paper —
Pressure and temperature gradients in snow

5. The secretary read extracts from the paper by V.V. Rakhmanov (U.S.S.R.)
Influence of forests on accumulation and thawing of snow in dependence on meteorological conditions

6. Dr. Bader in the time remaining in this session gave some interesting details on recent S.I.P.R.E. work in north-west Greenland. He described the two deep holes drilled at 2260 m. altitude, 200 miles east of Thule, the second of which has reached 435 m. in depth and from which good core recovery has been made thus retrieving

ice estimated at 800 years o d. Lower core samples however, the bubbles in which reach 22 atmospheres' pressure, are much cracked by the pressure release and he believes that this is a limit of useful core recovery depth. Temperatures range from -24.6° at 20 m. depth to -25.5° at 300 m.

The design of the drill bit and the precooling of the compressed air were also described. The layer of Katmai eruption ash (1912) is traceable and in counting annual layers considerable use is being made of the O^{16}/O^{18} isotope ratio.

FOURTH SESSION, 9 SEPTEMBER 09.000

Dr. M. de Quervain in the chair and 35 members present.

1. Professor Finsterwalder read the paper by Dr. O. Schimpp —
The economy of the Hintereisferner in the years 1952/53, 1953/54.

Dr. Bader commented that the velocity of the wave of maximum velocity recorded (20 km/year) seemed to be the same as that of Alaskan glaciers after the Yakutat earthquake and felt it was important that work should be done on this phenomenon.

2. Professor L. Gherardelli read the paper by Professor M. Vanni —
L'attività del comitè glaciologico et les variations des glaciers italiens en 1956,

3. Mr. D.C. Pearce read his paper —
Ground temperature studies

4. Professor Finsterwalder read the paper by W. Hofmann —
The advance of the Nisqually glacier between 1952 and 1956

5. Mr. A. Johnson read his paper —
Investigations on Grinnel and Sperry glaciers, Montana

6. Dr. G.A. Avsiuk read his paper —
Glaciological investigations in the Soviet Union

In answer to enquiries Dr. Avsiuk said that drilling was being done in the Antarctic with a 6 inch core drill using compressed air—that 200 metres depth had been achieved at Pionerskaya, and that bedrock had been reached at 90 m. at Mirny.

7. Professor A. Marussi gave an extract from the two papers by Professor A. Desio —

a. *The Kutiah glacier and its advance in 1953*

b. *Glaciological researches on the Italian Karakorum expedition 1953/55*
and showed maps prepared by the expedition of K₂ and neighbouring glaciers.

8. Mr. R. Carter read the paper by E.P. Collier —
Glacier variation and trends in run-off in the Canadian Cordillera

9. The Secretary announced that Professor P.L. Mercanton had once more completed and submitted his Report on the variations of European glaciers 1954/57 and that this would be published in the proceedings.

FIFTH SESSION, 10TH SEPTEMBER, 09.00

Professor R. Finsterwalder in the chair and 27 members present.

1. This session being, in part, the business session of the commission, the proceedings began with the selection of officers for the coming triennium 1957-60. Dr. de Quervain, who had been appointed to the nominating committee of the

association, said that after consultation with various members of the commission he had arrived at the following suggestions: —

President Professor R. Finsterwalder (Germany)
Vice-presidents Professor A. Bauer (France)
Dr. U. Nakaya (Japan)
Secretary Mr. P.D. Baird, continuing.

Those nominations were endorsed by the meeting and transmitted to the association.

2. The Secretary made an announcement concerning the French translation of the book by Dr. P.A. Shumskiy, U.S.S.R.

«Principes de la connaissance structurale de la Glace» available from Centre d'Etudes et de documentation paléontologiques, 3 Place Valhubert, Paris V^e.

3. A discussion followed on whether the commission should have set questions for papers to be presented at the next congress, or whether the existing practice of accepting any snow and ice topic should be continued. The difficulties of rejecting any paper submitted, particularly from countries which did not possess any powerful national committee, were stressed. The meeting tentatively approved the suggestion that a small editorial committee should be appointed at the beginning of the next congress period to decide if any papers submitted were not worthy of publication by the association. But the feeling of the meeting also was that no set questions should be posed.

4. It was proposed that attempts should be made, subject to Union approval, to organise a symposium on «The physics of glacier movement» to be held in September 1958 at a suitable locality with good access to glaciers, either at Obergurgl (Austria), Chamonix (France) or elsewhere.

5. It was resolved that messages of greeting should be sent to the Honorary Presidents of the Commission, Drs. J.E. Church and P.L. Mercanton.

6. Further information on the I.G.Y. programme was provided to the meeting by Professor Manley and others. The World Data Centres for Glaciology would be:—

1. The American Geographical Society, Broadway & 156 Street, New York City.
2. Institut Gidrometeorologichiskiy, Moscow.
3. British Glaciological Society c/o Scott Polar Research Institute, Cambridge, England.

Each data centre is to produce and circulate a catalogue of its unduplicated material, e.g. photographs.

7. Dr. de Quervain reported on the International Snow Classification. He said that in 1956 he had met with representatives of W.M.O. to discuss final changes in the latter's «Cloud Atlas». There were still some small differences between our symbols and those of W.M.O., as shown in the mimeographed sheet (which was distributed) but there were more serious differences in definitions. A small working group consisting of himself, Dr. Higashi, Mr. Klein and Dr. Diamond were asked to look into these differences.

8. Dr. de Quervain then gave his paper —
Suggestions for an avalanche classification

9. Miss M. Dunbar read her paper —
Curious open water features in the ice at the head of Cambridge Fiord.

The meeting was at a loss to explain this interesting phenomenon of a late appearing circular hole. Dr. Landauer suggested tentatively that it might be from

a local salt deposit—this, or volcanic activity, would be proved only by a visit to the locality.

10. Professor Finsterwalder read his paper —

The scope, state, and development of precise glacier surveys

In reply to a question by Dr. Bader on the amount of work involved in a photogrammetric examination of a medium sized glacier the speaker said that Hofmann had taken a week to do his survey of the Nisqually glacier.

In connection with the difficulty of height contouring from aerial photographs on a uniform white snow surface, Dr. de Quervain mentioned coal dust being used in Switzerland and Dr. Meier drew attention to the Logetonic process (on exhibit at the Congress) which uses variable light scanning to produce very superior and detail-showing prints particularly of snow covered glacial areas.

11. Dr. Higashi gave a short abstract of the paper by Prof. Yoshida

Physical studies in Japan on the mechanical properties of deposited snow.

SIXTH SESSION, 10TH SEPTEMBER 14.00

Dr. M. Meier in the Chair and 40 members present.

1. Dr. S. Orvig read the paper by J.D. Ives —

Glaciation of the Torngat mountains, Labrador

2. Dr. J. Glen read the paper by J.F. Nye, W.H. Ward and himself —

Glaciological studies on Austerdalsbreen, 1955-57

In reply to a question by Dr. Bader the speaker hoped that the difference in velocity (summer/winter) of the icefall would be known at the close of the present season's work.

3. Dr. J.A. Jacobs gave extracts from the two papers by himself and Dr. R.R. Doell and by Dr. W.H. Mathews on the work on the

Salmon Glacier in British Columbia.

The meeting was astounded by the number of deep bore holes achieved in this glacier and the intensity of the seismic soundings.

4. The meeting was adjourned at this point owing to the advancing of the time for Lady Eaton's reception.

SEVENTH SESSION, 11 SEPTEMBER, 14.00

The President-elect, Professor Finsterwalder, in the Chair and 30 members present.

1. Dr. M.M. Miller read his paper —

Phenomena associated with the deformation of a glacier bore hole

Several members contributed to the discussion after this paper, including Dr. Brockamp who asserted that from the Koch-Wegener investigations on the Storstrømmen (temp. -14°C) where motion was of the order of 1700 m./year, sliding on the bed seemed to make up 95% of the motion.

2. Dr. M. Diamond read the paper by himself and R.W. Gerdel —

Radiation measurements on the Greenland Ice Cap

3. Dr. A. Epstein kindly gave some details on the glaciological application of $0^{16}/0^{18}$ analysis. The ratio of these isotopes in snow is dependant on the temperature

of original condensation hence a clear difference shows between winter and summer snowfall, the sensitivity being 250 times the experimental error.

In answer to questions he explained that a 10 mg sample is sufficient, that 30 samples can be analyzed in 24 hours by mass spectrometer, but the process is costly. It was pointed out that on the Greenland ice cap mixing between summer and winter snow was rare—only the latest fall was involved in blizzard drift.

4. Dr. J.K. Landauer read his paper

On the deformations of excavations in the Greenland névé

5. Dr. de Quervain read the paper by President Haefeli

Mesures des pressions et de déformations dans des galeries de glace.

6. Dr. M.F. Meier read his paper —

The mechanics of crevasse formation

In the discussion which followed it was agreed by all present that 40 m. still seemed to be the maximum crevasse depth observed.

7. Dr. B. Brockamp read his paper —

Recapitulation measurements of seismic reflections on the Pasterze glacier.

8. Dr. G.P. Rigsby read his paper —

He also contributed a brief note on the *Karakoram radiation and heat budget* by Dr. N. Untersteiner who is at present with the American Polar drifting station.

This drew the comment from Dr. Diamond that there seems further confirmation on the slight amount of evaporation on snow fields—from slight in low latitude mountains to negligible in Greenland and Antarctica.

9. Professor Finsterwalder read the paper by O. Pillewizer —

New knowledge about the block movement of glaciers

He also contributed a summary on a paper by Fortsch and Vidal on *seismic measurements in the eastern Alps*.

10. After further brief discussion on the proposed symposium on the «Physics of glacier movement» the meeting closed with a vote of thanks to the Chairman, President-elect Professor Finsterwalder, given by Professor Manley.

P.D. Baird, King's College, Aberdeen.