AVALANCHE NEWS NO. 28

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EDITORIAL NOTE

The intention of AVALANCHE NEWS is to assist communication between persons and organizations engaged in snow avalanche work in Canada. Short articles cover reports of accidents, upcoming and past events, new techniques and equipment, publications, personal news, activities of organizations concerned with avalanche safety, education and research.

The editor welcomes and expects contributions; all reasonable comments and discussions will be printed. The articles in AVALANCHE NEWS reflect the views of the authors, and only when it is specifically stated do they represent the opinion of the Canadian Avalanche Association.

No paid advertisements are carried. Suppliers who wish to draw attention to their products should send information to the editor who will publish a note when the equipment has value in avalanche work and safety.

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AVALANCHE NEWS
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SYMPOSIUM ON SNOW AND GLACIER RESEARCH RELATING TO HUMAN LIVING CONDITIONS

by Peter Schaerer

A conference concerned with avalanches, snow and glaciers was held 4 - 9 September 1988 at Lom in Norway. The International Glaciological Society organized the Symposium, and the Avalanche Group of the Norwegian Geotechnical Institute was responsible for the local arrangements. Lom is a small town in Central Norway close to the major avalanche areas and large glaciers in Western Norway. The local arrangements were perfect, allowing contact and discussions between the participants of the symposium.

Much useful, stimulating information was presented during four days in the meeting room, a poster session, a field trip in the middle of the week and a four-day visit of avalanche areas in Western Norway. The following number of papers were given at the Symposium:

- 25 presentations on avalanches,
- 9 presentations on snow drifting,
- 3 presentations on snow creep and glide,
- 4 presentations on snow accumulation and runoff,
- 13 presentations on glacier dynamics, glacier hazards, and floods caused by glaciers,
- 17 presentations on glacier runoff and sedimentation.

Forty conference participants had a principal interest in avalanches and the other fifty-five were primarily interested in the other topics.

Following is a summary of the papers concerned with avalanches.

Avalanche Motion

A large number of studies of avalanche motion were reported. They concerned observations on full-scale avalanches, small-scale model tests in laboratories, and numerical models.

In Japan, the observations on avalanches in the Kurobe Canyon were resumed, and observations that were carried out there in 1972-1978 were re-analyzed with respect to the character, speed, and impact forces of large-scale powder avalanches (papers by K. Kawack, N.

Maeno, K. Nishimura, N. Narita). Good observational data were presented, and we can expect to learn more from these studies in coming years.

R. M. Lang and K. Hutter, as well as K. Hutter and S. Savage, described laboratory simulations of avalanches using limestone particles and glass beads. The objectives of the experiments were to test theoretical models of avalanche flow.

G. Casassa, H. Narita and N. Maeno made measurements in the laboratory of the friction of moving snow on snow. A strong dependence of the friction coefficient on velocity, temperature, and snow properties was observed and in addition plowing was found to account considerably for the resistance force. K. Nishimura and N. Maeno studied the viscous forces of moving snow on a 5.4 m long chute and based on the results proposed a model of avalanche flow that includes a viscous resistance force.

H. Gubler compared three models for calculating avalanche speeds, flow heights, and runout distances: a) the traditional Voellmy-Salm equations; b) the Voellmy-Salm differential equation solved numerically along the profile of an avalanche path; c) a granular flow model. The different models were tested on observed avalanches. The granular flow model gave significantly higher speeds than the other models. The results were inconclusive with respect to runout distances because of the arbitrary selection of the point where the runout distance is measured from.

H. Norem, F. Irgens, and B. Schieldrop proposed equations of motion of avalanches and solved them numerically. The results were in fair agreement with observations of avalanches made by the Norwegian Geotechnical Institute at its study site, Ryggfonn. The model indicated that the maximum speed inside an avalanche is close to its front and the runout distance is dependent on the length of the avalanche.

Y. Nohguchi presented theoretical mathematical models of avalanche motion that allow the determination of the path of an avalanche on given terrain.

Snow Stability Evaluation

H. Gubler presented a model for the fracture of snow slabs by taking into account the influences of temperature and loads on a weak layer. All parameters were determined from laboratory observations.

In his presentation, B. Lackinger pointed out the significance of the forces at the crown and the flanks on the stability of a snow slab.

K. Isumi had investigated the release of large avalanches in Japan which occurred by failure of layers of wet snow. The failures were caused by weakening through solar radiation.

Full-depth avalanches initiated by snowgliding were investigated by K. Nohguchi, who proposed a model for their release.

O. Buser summarized avalanche forecasting by use of the method of nearest neighbours. The method now is successfully applied in ski areas in Switzerland where avalanche hazard forecasters consider it a valuable aid. The method does not impose a decision on the forecasters, but gives them a base for discussion.

Risk Analysis

The calculation of maximum runout distances of avalanches from terrain models was discussed in two papers. D. McClung, A. Mears, and P. Schaerer presented the results of statistical terrain models of extreme runout distances in the Canadian Rocky Mountains, Colorado Rocky Mountains, the Sierra Nevada, and Norway. K. Lied and R. Toppe applied the terrain models to digital topographic maps. At the same time they introduced additional terrain parameters, though the new parameters appear to improve little the regression equations for the runout distance.

The Norwegian Geotechnical Institute applied the digital terrain model to compile avalanche hazard maps for the Norwegian Army (papers by K. Lied, F. Sanderson, and R. Toppe).

C. Charlier and L. Buisson analyzed avalanche paths with the aid of an expert system. The system attempted to predict the location where avalanches likely would start and the size of avalanches for given weather conditions.

I. Owens and B. Fitzharris described the avalanche hazard and calculated risks on walking tracks in New Zealand. P. Schaerer presented the calculation of the avalanche hazard index and its application as a numerical expression of the hazard to traffic on a road.

G. Brugnot described the experiences in France with ropeway systems that deliver explosive charges into avalanche starting zones.

Slush Avalanches

Slush flows are a major hazard in Norway. E. Hestnes, S. Bakkehoi and F. Sandersen gave an introduction to the phenomena and listed the factors that trigger slush avalanches. L. Onesti and E. Hestnes presented the results of an international questionnaire concerning slush flows.

Avalanche Hazard Zoning

During a special session representatives from Austria, France, Italy, Norway, and Switzerland summarized the methods that they apply for determining maximum avalanche runout distances. (Note: No avalanche workers from the U.S.A. attended the symposium).

The European countries primarily use historical data of avalanche occurrences for the identification of hazardous zones and supplement them with models of avalanche dynamics.

A terrain model is applied in Norway and Canada. Discussions about the boundaries of hazard zones revealed that there is no uniform method for defining the tolerable risk levels, therefore comparisons of standards between countries are difficult.

Conclusions

The knowledge about the motion of avalanches has increased, but much more information is needed to predict the speeds, densities, and flow heights of avalanches along their path.

The difficulties of predicting the influence of the weather on the strength of snow and predicting the interaction between snow properties and terrain were pointed out at the Symposium, but little progress was reported concerning the evaluation of snow stabilities.

The rational assessment of risk levels and tolerance of risks has received increased attention and will be a concern in the future.

The papers presented at the Symposium will be published by the International Glaciological Society in Annals of Glaciology, Volume 13. The expected publication date is June 1989.

INTERNATIONAL SNOW SCIENCE WORKSHOP

Whistler, B.C., October 12 - 15, 1988
by David McClung

The workshop consisted of three days of lectures including a poster session and a new video/film on avalanche safety. In total, 49 papers are expected to be published in the proceedings. The proceedings will be published quickly,

once all the papers are received in proper camera ready form. At present, it does not look like the proceedings will appear before the end of 1988.

A significant component of the workshop this year was the occurrence of special meetings in the evenings following the regular technical sessions. These included personnel from the Canadian and American Avalanche Associations and meetings of the Committee on Snow Crystal Classification of the International Commission on Snow and Ice. These extra meetings make very long days for those involved. Perhaps an extra day should be added to future workshops to accommodate the special meetings.

The next workshop will be held in the fall of 1990 at Big Fork, Montana (less than a one-hour drive from Cranbrook, B. C.)

Dave McClung

PROFESSIONAL AVALANCHE COURSES

by Peter Schaerer

The British Columbia Institute of Technology (B.C.I.T.) has been re-organized and its funds from the provincial government have been reduced. As a result B.C.I.T. did not wish to continue administering the professional avalanche courses. Selkirk College through its Tourism Department on the Nelson campus now has asssumed the responsibilities of running the avalanche courses. Selkirk College also offers also regular courses in ski area management and tourism. As before the Canadian Avalanche Association is responsible for the standards and training objectives, the National Research Council of Canada for developing the content, and Selkirk College for the administration and local arrangements.

Selkirk College has appointed Tom Van Alstine as the co-ordinator of the avalanche courses. Tom is familiar with the industry. He has been in charge of avalanche control in ski areas, attended a Level 2 avalanche course, and is an active member of the Canadian Avalanche Association.

The curriculums and the high training standards of the avalanche courses will be the same as last winter. The course fees, however, have had to be raised because services that were free in previous years now must be paid for.

The following courses are planned for the 1988 - 1989 winter:

Avalanche Safety for Transportation and Industry - Level 1

December 5 - December 9	at Creston B.C.
December 12 - December 16	at Creston B.C.

Course Fee $440

Avalanche Safety for Ski Operations - Level 1

December 4 - December 10	at Whistler B.C.
January 16 - January 22	at Golden B.C
January 28 - February 3	at Mount Engadine Lodge, Canmore, Alberta

Course Fee $625

On demand and if the above courses should be overbooked, an additional course will be held at Boulder Lodge, near Kimberley, on February 5 - February 11.

Avalanche Safety for Ski Operations - Level 2

January 7 - January 14	at Lake Louise, Alberta

Course Fee $875

Avalanche Control

January 16 -January 20	at Whistler B.C.

Course Fee $440

Pre-requisites

Participants of the Ski Operations - Level 1 courses must be intermediate skiers and have basic ski touring experience.

Participants of the Ski Operations - Level 2 course must have:

a) advanced skiing ability;
b) a Level 1 course (or equivalent training);
c) 100 days field experience after completion of the Level 1 course;
d) participated in avalanche search and rescue practices.

Participants of the avalanche control course must have completed a Level 1 avalanche course.

Address for Information and Registration

Tourism-Avalanche Courses
Selkirk College
2001 Silver King Road
Nelson, B.C.
V1L 1C8

Telephone (604) 352-6601

Considerations for Course Location

For reasons of cost, valley locations were chosen for the courses (but with ready access to mountains). It would be an advantage, however, if ski operation courses were held in backcountry lodges close to avalanche terrain, such as was the case at Assiniboine Lodge in past years. We would like to hear from past, current, and future course participants whether or not they would be prepared to pay $50 to $100 more for a course in the backcountry. The higher cost reflects transportation by helicopters and higher cost for instruction. Future courses will be held in the backcountry if the participants wish it and are prepared to pay a higher price.

AVALANCHE AWARENESS COURSES

The following organizations and individuals offer avalanche awareness courses for the general public during the 1988 - 1989 winter.

Nordic Ski Institute (Al Schaffer)

Box 1050, Canmore, Alberta T0L 0M0
Telephone (403) 678-4102

Two-day basic avalanche awareness;
Two-day backcountry avalanche hazard evaluation;
Seven-day complete backcountry avalanche course.

Ptarmigan Tours (Art Twomey)

Box 11, Kimberley, B.C. V1A 2Y5
Telephone (604) 422-3270

Seven-day backcountry avalanche course

Alpine Style Ltd (Scott Flavelle)

Box 1518, Squamish, B.C. V0N 3G0
Telephone (604) 892-9870

Four-day ski guide preparation course (a primer for the A.C.M.G. assistant winter guides course).

Gerry Israelson

Box 2611, Jasper, B.C. T0E 1E0
Telephone (403) 852-5467

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Friends, family and colleagues were saddened by the recent passing of Whistler resident, Peter Xhignesse, following a long and difficult battle with cancer. He is survived by his wife, Janice, and their son Brian.

A popular member of the community, Peter worked as the Avalanche Forecaster for Blackcomb Mountain as well as a heli-ski guide. He was instrumental in bringing about the development of Blackcomb's Seventh Heaven region putting them at the forefront of high alpine skiing in North America. His most recent accomplishment, developing an avalanche control program for the potential expansion into the Blackcomb Glacier region, was completed in the Spring of 1988 while he was still struggling with his illness.

Peter is remembered as a diligent and innovative contributor to the avalanche industry and was especially known for his patience and sharing of knowledge with students and fellow workers. His contribution to the ski industry and to the Canadian Avalanche Association will be gratefully remembered. Blackcomb intends to dedicate the Lakeside Bowl region to his memory by renaming it Xhiggie's Meadow. In addition, a high school scholarship fund is being established by the Alta Lake Community Club in honor of his memory.

CANADIAN AVALANCHE RESCUE DOG ASSOCIATION (CARDA)

by Willi Schneider

CARDA will hold two Avalanche Rescue Dog Seminars this Winter.

Location Island Lake Lodge, 10 Km. west of Fernie, B.C. off Hwy. #3.

Date The first Seminar, an AvD 1 (Beginner's) on December 2 to December 10, 1988.

The second Seminar, an AvD 2&3; this is a Certification Course, January 7 to January 14, 1989.

Instructor's AvD 1: Willi Schneider, CARDA; assistant instructor to be named.

AvD 2&3: Hans Hiebler, Garmisch-Partenkirchen, West Germany, a 34-year veteran in avalanche rescue dog training. Assistant instructor to be named.

Cost Course fee for each course, $100 Can.
Lodging plus three meals a day, $70 Can per day.

Participants in the seminars must bring the following equipment:

- 6 foot leash
- Water bowl for the dog
- Touring skis
- Climbing skins
- Avalanche transceiver
- Avalanche shovel
- Rucksack
- First-Aid kit
- Notebook and pencil

Registration Deadline for AvD 1 registration, November 15, 1988
Deadline for AvD 2&3 registration, December 10, 1988

Payment Cash or money order only

Information and Registration

Willi Schneider
3007 Pasture, Crs.
Pt. Coquitlam, B.C.
Canada, V3C 2C3

Tel: (604) 464-0760

Training Manual CARDA's Training Manual and Certification Standards is now for sale at $50 Can . At present it is second to none, containing 40 pages of knowledge in avalanche rescue dog and handler training.

CANADIAN AVALANCHE ASSOCIATION

by John Tweedy

The Directors of the Canadian Avalanche Association, upon the recommendation of the membership committee, wish to make known the acceptance of four new Active Member applications.

A warm welcome is extended to Robert Whelan, Harry Piercy, Jocelyn Lang, and Andrew Arajs.

AVALANCHE RESOURCE AGENCIES

The list of resource agencies distributed with Avalanche News No. 26 (February 1988), and included in the course manual for participants of professional avalanche courses, will be updated. The revised list will be published with the February 1989 issue of Avalanche News.

Avalanche resource agencies are those which offer services in the following fields:

a) Daily information regarding snow stability and avalanche hazards: National and Provincial Parks, highway operations, ski areas including helicopter ski operations. These organizations usually are also equipped for search and rescue.

b) Search and rescue: avalanche dogs, emergency programs, ski patrols, mountain rescue groups.

c) Education: organizations and individuals who offer avalanche courses; sources for audio-visual material.

d) Weather information.

The Canadian Avalanche Association has ruled that consultants should not be listed, but active members who wish to teach any type of avalanche course may include their names on the list.

All avalanche workers and agencies in Canada are urged to check the last list and notify by December 31st the office of Geoff Freer (see address and telephone number on the front page of Avalanche News) concerning changes, additions, and deletions. Please, consider also whether other persons or agencies presently not listed should be included.

PUBLICATIONS

McClung, D. M.

Mechanics of Snow Slab Failure from a Geotechnical Perspective

Reprint from Avalanche Formation, Movement and Effects (Proceedings of the Davos Symposium, September 1986) IAHS Publication No. 162, pp. 475-508.

National Research Council Canada, Publication No. 28774; available from Publication Service, National Research Council, Ottawa, K1A 0R6; price $4.50 (pre-paid).

Abstract by the Author

Field observations and measurements show that all snow slab failures have some common features. The physical mechanisms governing the release can differ greatly depending on the character of the deformation in the weak layer or interface beneath the slab where the release process initiates. Here two prototypes for slab avalanche initiation are considered: I. release of dry slab avalanches where weak layer shear failure beneath the slab is required and; II. release of full depth avalanches caused by rapid gliding. For avalanches caused by glide, it is proposed that the snowpack partially separates from the glide interface. This reduces drag and increases glide speed. The deformation processes for both types of slab failure are reviewed and suggestions for future research are given.

Schaerer, Peter

Studies on Survival in Avalanches

The Canadian Alpine Journal; Vol. 71, pp. 55-56; 1988 (The Alpine Club of Canada, Banff, Alberta).

The statistics on avalanche involvements in Canada 1969-1987 are presented. Tables contain the number of fatalities and the total reported avalanche encounters stratified according to the location and condition of the victims. Comments are given on survival chances.