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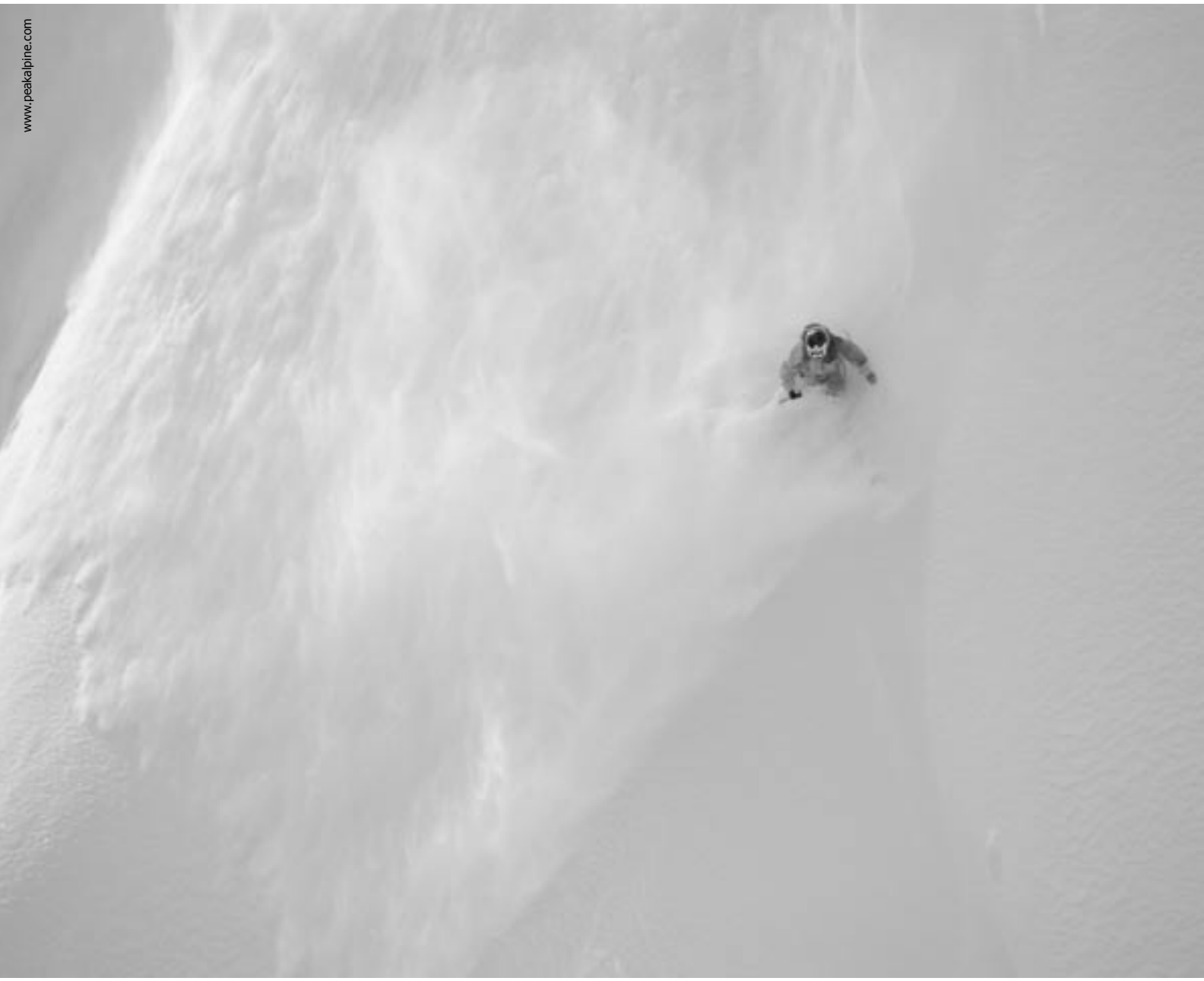
The journal of Canada's avalanche community



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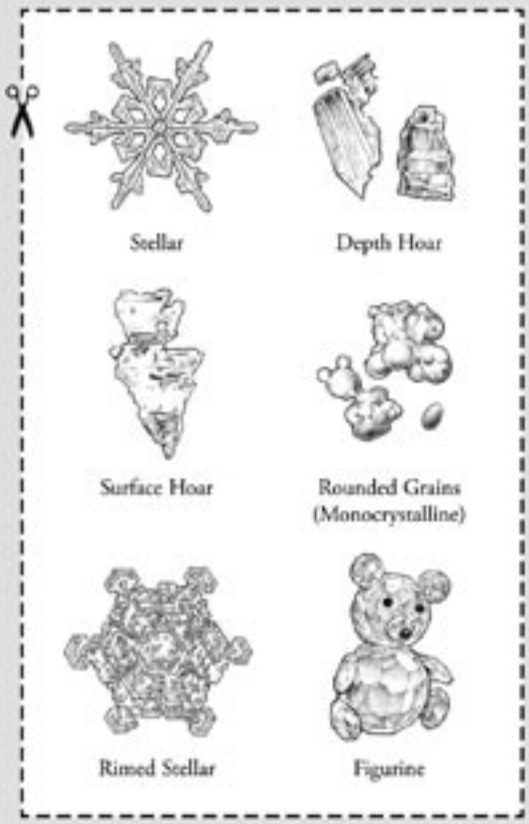
ROAD WARRIORS

THE "BURP" TEST

Book reviews, research, ensemble forecasts, and more!

Volume 79 Winter 2006/07
ISSN - 1911--5342



crystal ID card

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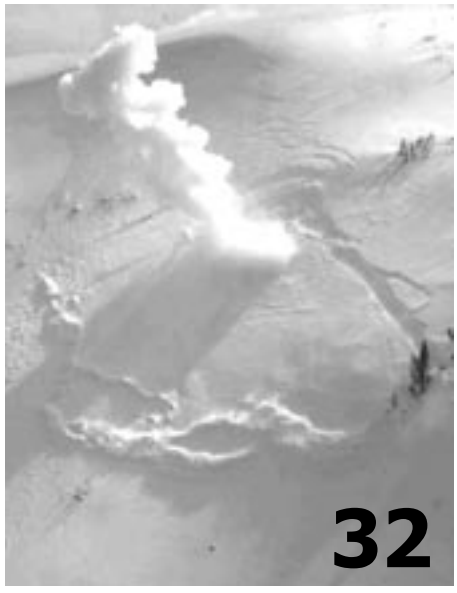
Cover Shot: Photographer and guide Jordy Shepherd captured this image of Whistler skier Mark Abma, during the shooting of a film at Northern Escape Heli-Skiing near Terrace, BC. The photo was taken from a helicopter, with Jordy leaning over the pilot's shoulder to get this angle.
Photo Jordy Shepherd/PeakAlpine.com.



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avalanche.ca
The journal of Canada's avalanche community
Volume 79 Winter 2006

Avalanche.ca is the official publication of the Canadian Avalanche Association (CAA), the Canadian Avalanche Centre (CAC) and the Canadian Avalanche Foundation (CAF). The CAA and CAC are non-profit societies based in Revelstoke, BC, serving as Canada's national organizations promoting avalanche safety. The CAF is a registered charity formed to provide a tax-deductible fundraising mechanism for the support of public avalanche safety initiatives. The CAF is based in Canmore, AB.

The goal of Avalanche.ca is to keep readers current on avalanche-related events and issues in Canada. We foster knowledge transfer and informed debate by publishing submissions from our readers. Responsibility for content in articles submitted by our readers lies with the individual or organization producing that material. Submitted articles do not necessarily reflect the views or policies of the CAA, CAC or CAF.

Avalanche.ca always welcomes your opinions, teaching tips, photos, research papers, survival stories, new product announcements, product reviews, book reviews, historical tales, event listings, job openings, humourous anecdotes and, really, anything interesting about avalanches or those people involved with them. Help us share what you have. Please send submissions to:

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Our vision:

To be a world leader in avalanche awareness, education and safety services.

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Momentum

Putting the journal together is always quite a journey, and it's exciting to see that lately we seem to be gaining momentum. The decision to expand our scope and include more stories from the members of the avalanche community has been a good one, and we've been receiving a lot more contributions from a much wider range of sources. As an editor, that's gratifying to see. It makes for a more dynamic and interesting journal, and that's what we're striving for.

As a reminder to all of us just how big our community really is, this issue includes some research en français. Dr. Bernard Hétu, from the University of Quebec at Rimouski, submitted a paper examining historical avalanche accidents in Quebec. Our resident bilingual expert John Kelly (every office should have one) kindly added an abstract in English for those of us not up to snuff in our other official language. As the avalanche centre in the Haute Gaspésie grows stronger, I expect we'll see more contributions in French.

In addition to different languages, we've got reports from all around the world—the ISSW in Colorado, the ICAR meeting in Slovenia, and an avalanche conference in Russia. There's a story about recent developments between the CAA and New Zealand, and you can find about missionary work that's been done for the CAA and the CAC in Britain. Now that's a community with momentum!

It's important for all of us that we share what we're doing. The CAA needs to hear from all corners of the industry, and all avalanche workers in this far-flung profession need to keep abreast of what's happening in their association. The CAC needs to hear from all the stakeholders in avalanche safety in this country, and everyone interested in expanding avalanche education and awareness need to know what the avalanche centre is up to.

The CAF has perhaps the widest reach of all. The fund-raising arm of our avalanche family works with a broad community whose members are often a few steps removed from the realities of the mountains. Although we may not see many CAF supporters in the backcountry, they are there in spirit. The CAF finds individuals who care enough about avalanche safety to give of their time and money to advance our cause. It's been wonderful to be able to bring the news of the CAF's good work back to the avalanche community.

As I write this we're well into a terrific early winter season. The snowfall has been phenomenal all over Western Canada, and I've been hearing epic tales of cold smoke for weeks. We'll all have good stories to tell when we're celebrating the CAA's 25th anniversary this spring. Hope to see you there, and have a great, safe winter.

Burnie Glacier Cabin in the summer sun. The lodge looking northwest with the Burnie Glacier and the Solitaire group in the horizon.


Rich Glass

A Recipe For Success?

This fall, while attending international avalanche conferences in Canada, the USA and Europe I was taken aback by the number of times I was approached by colleagues from other countries who wanted to know why our avalanche programs are so successful. I was pleased to hear these positive opinions about Canadian programs. Thinking things over for the past few weeks, I've come up with this "top ten" list of ingredients for our collective success. None of these reasons stand alone, but I believe together they are the recipe. I welcome your thoughts and feedback.

1. **An international perspective.** Early leaders such as Peter Schaerer, the Schleisses, Willi Pfisterer, Hans Gmoser, Mike Weigele and others immigrated to Canada from Europe. They knew the value of scanning the world for good ideas and then adapting international knowledge and best practices for avalanche safety programs in Canada. They worked together to establish high technical and operational standards, and shared their experience with everyone who was interested. This international perspective, established by our pioneers, continues today as a core value of the Canadian avalanche community.

2. **Focus on front line operations.** When the CAA was incorporated twenty-five years ago it was because the avalanche community needed an organization to serve the collective needs for technical standards, training and advocacy. Over the years the CAA has stayed true to this raison d'etre—delivering services that support front line operations. I often explain it like this. "The CAA (and more recently the CAC) serves as the campfire that the avalanche community chooses to gather around to advance their common goals and resolve issues. The campfire may be helpful, but it's the people, the dialogue and results that are most important."

3. **We're not government.** When I talk with colleagues in other countries where the roles of the CAA and CAC are filled by government agencies I hear frustration over stagnant programs, lack of creativity, bureaucratic program constraints or turf wars, and evolving political priorities threatening avalanche programs. Non-government, not-for-profit organizations like the CAA and CAC can be nimble and neutral, operating effectively across federal and provincial political and departmental jurisdictions, and also with the private sector. Equally important is cost effectiveness. We get maximum bang for every buck; we use both sides of the paper and publicly account for every dollar we spend. Not being government is a big advantage.

" We share a common love and respect for the mountains. We know that we are privileged to be able to do the work that we do."

4. **Spring AGM's.** Either good luck or brilliant design was at play when the CAA's founding fathers decided to have our annual general meetings in May. The entire Canadian avalanche community comes together while the issues of the winter are still fresh in our minds. As we talk, we dissect issues, perspectives and options. Directors, staff, committees and members leave the AGM with a shared understanding of our collective priorities. Over the summer and fall we all work to address these priorities. Next season these advances are implemented, the avalanche community sees real progress, and comes to the next AGM with a sense of accomplishment that serves as a springboard for taking on the next set of challenges. When I explained this to a US colleague he said "we have our AGM in the fall. We should think about moving it to the spring."

5. **Knowledge transfer.** I believe Canadian efforts to transfer new knowledge and best practices between university research programs and practitioners, and between practitioners themselves, are the best in the world. Researchers and practitioners address each other as peers. Results from research conducted during the winter are reported at AGM public and technical meetings in May. Each fall, teams of researchers fan out across western Canada giving presentations at staff training sessions held by operators, and practitioners share their operational experience and wisdom with the researchers. Staff exchanges between operations are commonplace. Hoarding or hiding knowledge for competitive advantage would contravene one of our core values. The Canadian avalanche community shares knowledge and everyone benefits.

" We're friends, and I think that's the biggest reason of all for our collective success."


CAA Archives

6. **Respect for diversity.** There is respect for the unique operational realities and challenges faced by the various sectors that make up the Canadian avalanche community. Ski patrollers, mountain guides, engineers, park wardens and rangers, avalanche control staff for highways, railways and mines, search and rescue personnel, researchers, educators and land managers all make essential contributions to avalanche protection in Canada. The specialization, professionalism and commitment of the people working in each of these sectors is celebrated. We need each other to be successful; we are an inter-connected and co-dependent network.

7. **Good governance.** Good governance has played a crucial role in making the CAA and the CAC successful service organizations. Past and present boards of directors and committees, all serving as volunteers, have consistently taken policy and strategic decisions that promote accountability, transparency and public trust. They set high standards for service delivery, insisting on "rubber on the road." They realize that credibility is our only asset with any real value. Policy and strategic options are considered carefully. Decisions are taken after consideration of implications to all members, stakeholders, and the public. Board decisions are developed to stand the test of time, while at the same time recognizing that if situations change, board policies and strategic directions may need to evolve as well. All past and present board and committee members deserve a sincere "Thank You" for their unpaid service and huge contributions to avalanche safety in Canada.

8. **Vision for the future.** A defining characteristic of leaders in the Canadian avalanche community is vision for the future. These people look backwards and forward in time to understand what we need to do, collectively and individually, to achieve our potential. Vision without capacity and determination is useless. When I think of visionaries in the Canadian avalanche community names like Chris Stethem, Geoff Freer, Peter Fuhrmann, Mike Weigele, Ron Perla, Hans Gmoser, Art Twomey, Janice Johnson, Mike Mortimer, Jack Bennetto and Peter Weir come to mind. All have very different personalities, but share one common trait—an ability to discern future needs and opportunities, and the capacity and determination to create solutions that have advanced professionalism in Canadian avalanche safety programs.

9. **Quest for excellence.** The recent member's survey provided interesting insight into the reasons that people in avalanche related-activities in Canada choose to be CAA members. The overwhelming majority of respondents cited ongoing professional development opportunities, informal learning from peers, access to research and new developments and best practices, and similar reasons as their primary reasons for membership. I believe this "quest for excellence" is a core value held by most people in the Canadian avalanche community. We realize the work we do can be difficult and sometimes dangerous, and that we owe it to ourselves, our families, our co-workers and the public that we protect to be the very best that we can be in our respective workplaces. That's a pretty cool core value.

10. **Friendship.** The Canadian avalanche community is relatively small. Perhaps a thousand or so people are avalanche workers. We share a common love and respect for the mountains. We know that we are privileged to be able to do the work that we do. We've been together through good times and bad, to each others parties, weddings, christenings and sometimes funerals. We're friends, and I think that's the biggest reason of all for our collective success.

I wish you blue skies, deep powder, and someone ten years younger out front breaking trail. Have a safe winter.

Executive Director
Canadian Avalanche Association and
Canadian avalanche Centre


Steve Blake Collection

Smooth

Rob Rohn, Clair and I stayed on the line after our last board of director's conference call. This is a regular occurrence that allows us to discuss with the Executive Director how things are going from the board's perspective. I remarked that things seem to be going smoothly—the boards and staff are functioning welland fulfilling their roles—and wondered if we weren't missing something. In some respects this is all the membership needs to know, that things are going smoothly. Smoothly does not mean in any way that that there is not much going on. Let me provide a few examples of what contributes to "smoothly".

The CAA recently replied to a BC Coroner Service report regarding a 2005 avalanche fatality. This letter saw seven drafts and incorporated changes recommended by our partner organizations like the CSGA, the ACMG and HeliCat Canada and of course, the CAA/CAC boards. In the end we have a suitable response to the coroner for the official public record. This one letter took weeks to prepare. I sent Clair a note and thanked him for all of his hard work. His reply to me included this:

"Sometimes it's a slow process, but important to continue to demonstrate our commitment to high principles, collaboration to the greatest extent possible, and our goal of representing the collective best interest of the Canadian avalanche community."

This line speaks to the type of effort that keeps things running smoothly. Thanks again Clair, your professionalism, and that of the staff you manage, continues to serve our organization very well!

The boards too are putting this type of effort into ensuring things are functioning smoothly. I will use this one example, though there are many. The boards recently faced a time-sensitive policy issue regarding the rating of avalanche terrain using the Avalanche Terrain Exposure Scale. Initially developed and implemented by Parks Canada, this system has seen wide spread acceptance and has been integrated into the Avaluator avalanche accident prevention system.

The issue for the CAA/CAC was this: Parks Canada rates the avalanche terrain using ATES on national park lands but who determines the rating on the extensive tracts of provincial lands in BC and Alberta? Boards of directors deal with policy so it was off to the policy drawing board. As is often (always!?) the case, nothing is a simple as it first seems. The boards were unable to finalize this policy during our regular call but, rather than carry it forward for the next month's call, each board member contributed to the evolving draft through email during the subsequent days. The policy was completed and put into place in the timely fashion required by CAC staff. Great work and thanks to the boards!

During the past two months the CAA/CAC has been represented at the ICAR meeting in Europe, the ISSW in the USA, the MSC avalanche conference in Vancouver and the HeliCat Canada meetings in Fernie. Sponsorship policy is being reviewed and will be formalized, *The Journal* is about to go to press, the Backcountry Avalanche Workshops are underway and public bulletin production has begun for the winter. There is more but I think you get the point. Have a look around *The Journal* and you'll get a better idea!

As the 25th Anniversary celebration draws nearer I encourage you all to block off some time in your busy schedules and try to get to Penticton for the next AGM. It should prove to be a great week. I also want to congratulate CAC Director, Mike Mortimer on his election to the position of President of the UIAA. Mike's plate will be even fuller now but he has agreed to stay on the board. We are grateful for his continued participation!

Well, winter is here in earnest and I wish you all a safe and smooth season.

Best Regards,

25 Years!

canadianavalancheassociation

25 years of service: 1982-2007

Preparations for the CAA's 25th Anniversary AGM are well underway and it is looking to be a once in a life time event. Here is a sneak peek of what will be happening.
May 7-11, 2007 @ Penticton Ramada

Tentative Itinerary;
May 7 - Committee and BOD Meetings
May 8 - CAC/CAC AGM

May 9 - CPD seminar
Celebrating 25 years of service!
Presentations, Outstanding Service Awards, Historical Slide Show, followed by BEER & BBQ PARTY!

Partners and children are welcome. Fees TBA.

May 10/11 CAA/CAC Public & Technical: Spring Conference

The Kiwi Connection

By Ian Tomm

On the 30th of September, 2006 in Telluride, CO at ISSW 2006 the CAA and the New Zealand Mountain Safety Council (NZ MSC) signed on to a long-term partnership agreement for the upgrading and delivery of New Zealand's "Stage 2" Avalanche Training. This partnership will see the CAA and NZMSC work together, using the CAA's current Avalanche Operations Level 2 core curriculum as the essential framework to upgrade and enhance New Zealand's Level 2 training. This new and upgraded program will be delivered for the first time in 2007.

> **"This agreement marks a modern milestone in an ongoing partnership between the CAA and New Zealand that goes back well into the 1970s."**

Special thanks are extended to Steve Schreiber for taking the lead and initiating the discussion and his tireless behind the scenes work to implement this change. Mark Bender, course leader with the CAA's ITP program was tasked with compiling and preparing the CAA L2 materials for New Zealand. Mark's work to organize the Level 2 curriculum for distribution to New Zealand was essential to ensure that the CAA live up to the high standards of co-operation outlined in the agreement and to ensure that we protect the CAA's Intellectual Property as per current board policy.

This agreement marks a modern milestone in an ongoing partnership between the CAA and NZ MSC that goes back well into the 1970s. That work was initiated by Blair Fitzharris and Peter Scahaerer. More information on the history of the relationship between our two organizations will be published in the next edition of The Journal.

The CAA now has on-going relationships with New Zealand, Japan and Iceland and welcome inquiries from other organizations and countries involved in avalanche safety. As we have seen in the past, curriculum and other partnership opportunities can benefit all parties. For more information on international partnership possibilities please contact Ian Tomm at itomm@avalanche.ca

>> Ian Tomm is the Operations Manager of the CAA

Industry Training Evolution

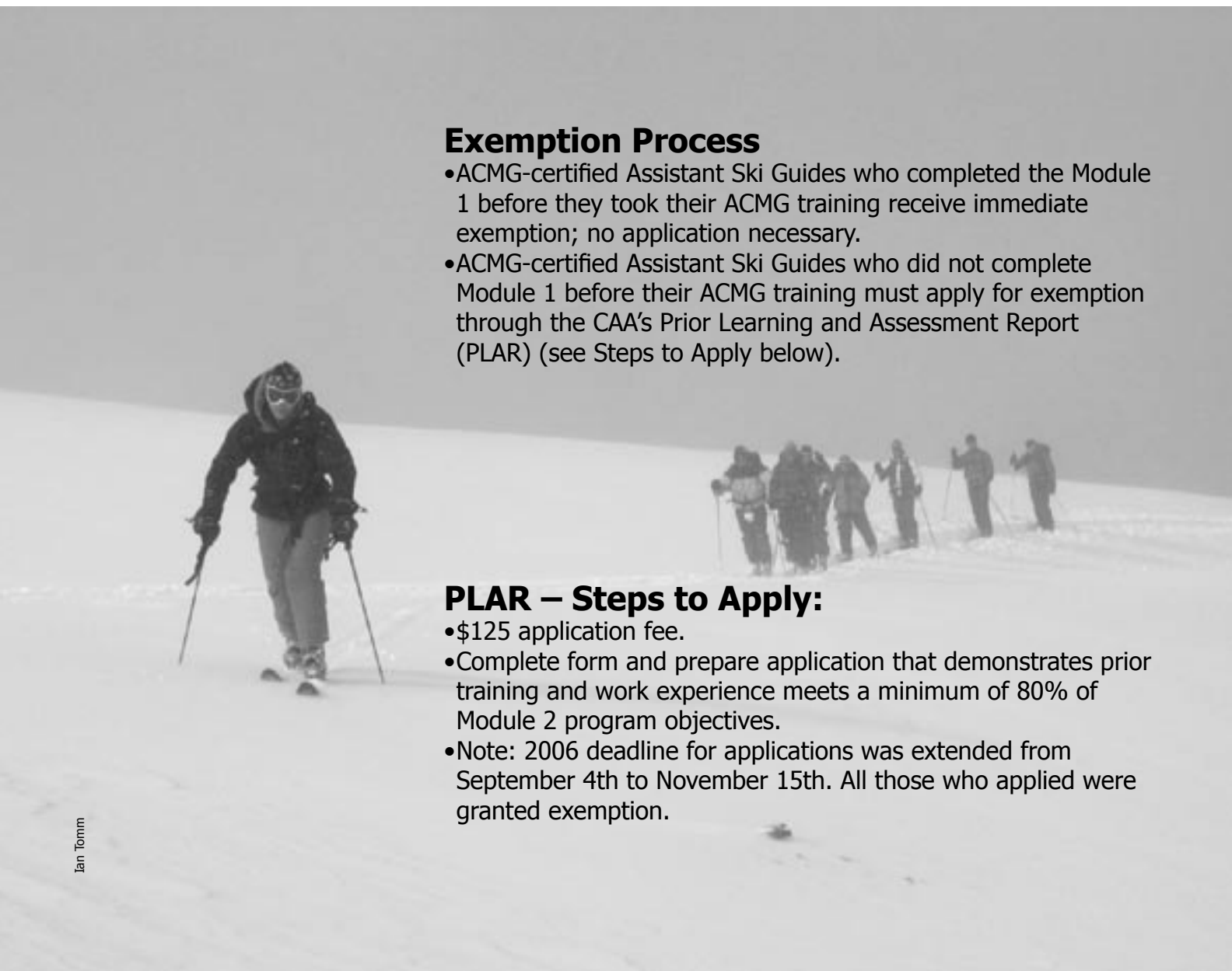
New Exemption Process in Place for Level 2 Module 2 Students

Five years ago, the NSS/NIF-funded rewrite of the CAA's Avalanche Operations Level 2 course was completed. This two-year project involved numerous industry stakeholders, content experts, managers, front-line workers and specialty consultants in risk, safety management and decision-making. The result was the current and highly successful 14-day modular Level 2 training program.

The three-course format of the new training program was phased in over a two-year period, and by the 2003-04 season all three modules were in place. Since then, the curriculum for each module has continued to grow and refine itself, a pattern that is now the core strength of the Level 2 program. As experience with Module 1, 2 and 3 program instructors was gained, students and industry partners recognized that some of the training was redundant for certain students, especially those who came from the ACMG guide-training program at Thompson River University (TRU).

In response to numerous requests from students and course instructors, the CAA met with members from the ACMG and TRU this past spring. They considered the various curriculums to determine if redundancies in training do occur, and they discussed how the three organizations could work together to enhance avalanche training for ACMG-stream guides. A formal memorandum of understanding (MOU) was signed on June 29, 2006, between the CAA, ACMG and TRU. To avoid repetitive course material, the MOU exempts ACMG-certified Assistant Ski Guides from the CAA Level 2 Module 2 course (see sidebar).

We hope to further this partnership and process with the ACMG in the coming years. For more information please contact Ian Tomm, CAA Operations Manager, at itomm@avalanche.ca.



Exemption Process

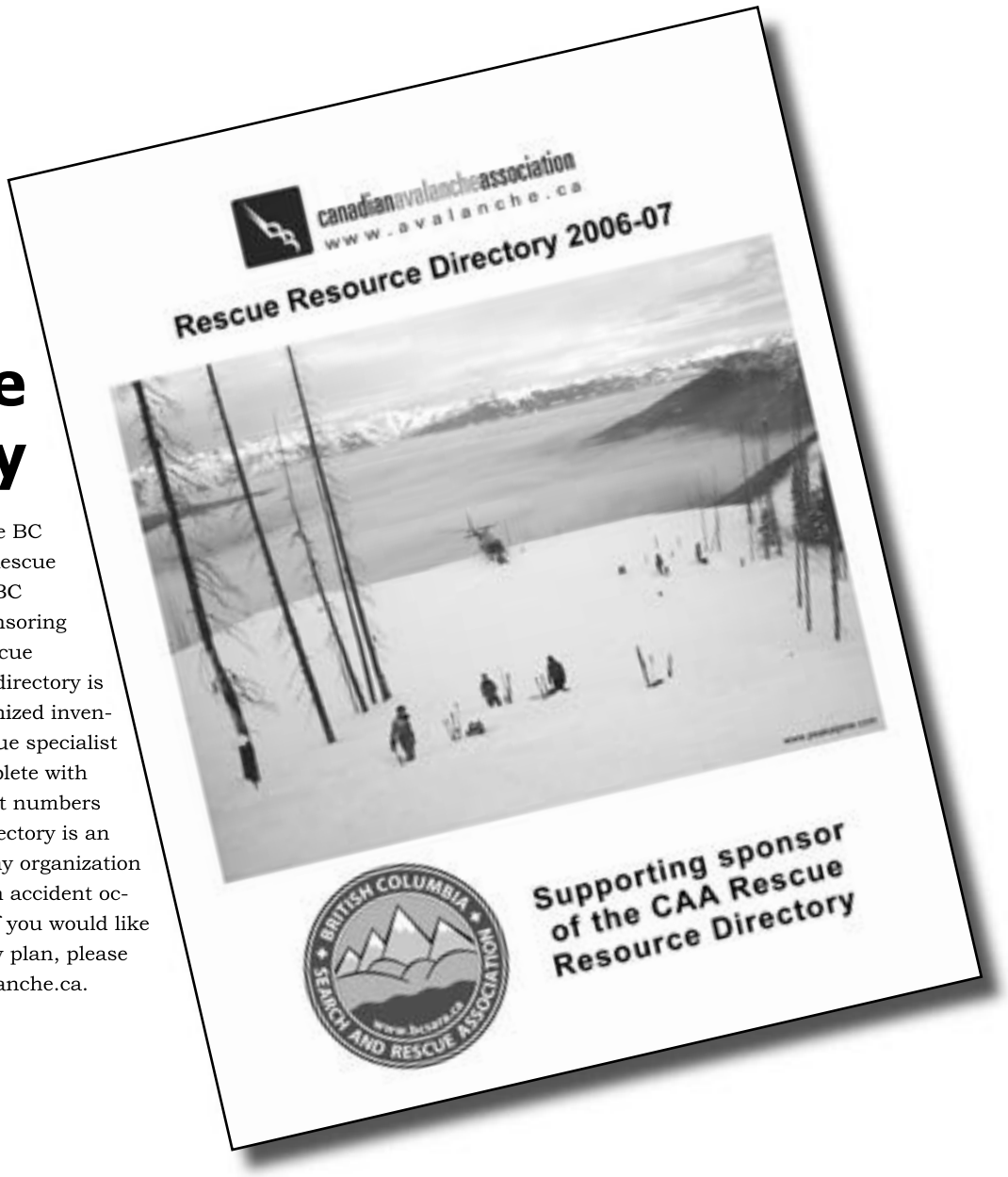
- ACMG-certified Assistant Ski Guides who completed the Module 1 before they took their ACMG training receive immediate exemption; no application necessary.
- ACMG-certified Assistant Ski Guides who did not complete Module 1 before their ACMG training must apply for exemption through the CAA's Prior Learning and Assessment Report (PLAR) (see Steps to Apply below).

PLAR – Steps to Apply:

- $125 application fee.
- Complete form and prepare application that demonstrates prior training and work experience meets a minimum of 80% of Module 2 program objectives.
- Note: 2006 deadline for applications was extended from September 4th to November 15th. All those who applied were granted exemption.

Ian Tomm

Rescue Resource Directory



Once again, the BC Search and Rescue Association (BC SARA) is sponsoring the publication of the Rescue Resource Directory. This directory is a thorough and well-organized inventory of every outdoor rescue specialist in Western Canada. Complete with names, emergency contact numbers and jurisdictions, this directory is an invaluable resource for any organization facing the possibility of an accident occurring in the outdoors. If you would like a copy for your emergency plan, please contact us at canav@avalanche.ca.

COTR Pilot Project

The CAA and the College of the Rockies (COTR) Golden Campus are pleased to announce the launch of a pilot project for COTR's Adventure Tourism program starting in January 2007. The CAA will be working with the college to deliver the CAA's Avalanche Operations Level 1 curriculum as an integrated course within their program. There are eight students in the pilot project and they will be receiving the course over a period of about two-and-a-half weeks. Classroom sessions will be roughly three hours long and will be delivered over seven to 10 days. Field sessions will take place in a variety of locations between Kicking Horse Mountain Resort, Rogers Pass and Lake Louise area. For more information contact Dave Wan at dwan@cotr.bc.ca or Ian Tomm at itomm@avalanche.ca. This pilot project is restricted to COTR Adventure Tourism students only.

COLLEGE OF THE ROCKIES

Ensemble Forecasts

By Ilya Storm

Every 20 years or so, the world of weather forecasting undergoes a major development. Modern meteorology was born the 1920s when the Norwegians, using careful observations coupled with stopwatches and notebooks, developed the initial theories of air masses and fronts. In the 1940s air force bombers encountered the jet stream and meteorologists started thinking in three dimensions. This led to radiosonde balloons sampling the air to create a 3D picture of the atmosphere. In the 60's satellite images provided birds-eye views of weather systems and their movement. Harnessing computer technology in the 80's ushered the current era of numerical weather models. Apparently we're due for another change, and ensemble forecasts seem the likely contender to move meteorology forward.

Numerical weather models are essentially big complex physics equations that represent important aspects of the atmosphere and predict how they will change over time. Typically, every 12 hours a model will ingest data of the current conditions (the model parameters) and spit out its prediction of what will happen in the next few hours and days. These models have evolved from slow clunky things that took three days to calculate tomorrow's forecast at a grid resolution of 100 km (each model point represented 10,000 sq km of the earth's surface) into high speed, high resolution (4 km grid with 16 sq km) models that take into account local topography.

However, there are a few problems with this approach. First, different models use different physics equations. None represent the atmosphere perfectly, and they all have their strengths and weaknesses. Second, the parameters used to initialize these models (current condition data) have errors themselves, so the models suffer from the problem technically known as "garbage in, garbage out." Third, the atmosphere doesn't follow the laws of physics in the way a baseball follows the laws of gravity. It's a somewhat chaotic system with perturbations affecting how weather evolves over time. This is the stuff like how a butterfly flapping its wings in Asia can affect the weather three days later in Revelstoke. Finally, the solutions these models typically provide are deterministic, meaning they provide a single, authoritative and precise solution when they state 23 cm of snow will fall in Revelstoke five days from now. A single, deterministic solution cannot convey what the margin of error may be in a forecast. Nor can it convey the entire range of solutions possible in cases such as determining the point where the leading edge of a Pineapple Express will hit downtown Vancouver.

Ensemble models will address these shortcomings. At least, that's the intention of a Canadian, USA and Mexico coalition. Ensemble forecasts can be generated in two ways. The first is by amalgamating the deterministic solutions from a number of different weather models. This is something that forecasters already do intuitively as they compare solutions from different models such as the Canadian and US models. Ensembles can also be generated within a single model by varying the initial conditions within a range of values that represent the margin of error possible in observations of current conditions such as temperature, pressure, wind etc.

"Welcome to the world of confidence intervals and spaghetti plots!"

More specifically, something like 10 or 15 solutions will be generated simultaneously within a model. These 15 solutions will then be examined to see how similar they are to one another. If the spread between solutions is low then confidence increases; if the spread is high then confidence decreases. The output from one of these runs is different in that the solutions are inherently probabilistic and so are the graphics. The real advantage of ensemble outputs is that they provide the users of weather forecasts with information that allows for a risk-based approach to making decisions and managing the possible consequences of the weather. Welcome to the world of confidence intervals and spaghetti plots!

There are several benefits to this approach. First, in the real world, weather is a probabilistic phenomenon, at least when your time frame is more than a handful of hours, and probability is up front and centre in ensemble model outputs. Second, ensemble models do a better job at longer time frames than a single deterministic model. The rule of thumb right now is that a good meteorologist can beat a deterministic model within 24 hours or so, a good deterministic model can beat an ensemble at the one- to three-day range, and beyond that the ensemble models shine. Third, it's possible to acquire a sense of how models agree, where they diverge, and how well they're handling the future.

Most of us (and I definitely include myself in this) are going to need some time to learn how to use these things and what they're telling us. So far I've figured out that you can't just look at them and take the average. At times this is the right thing to do, but other times they point to a cluster of outliers at the edge of the likely solutions, not the average. And it makes sense that the extreme storm isn't handled well by the majority of models, but one or two of them do a better job. But it takes skill (or art, or magic) to see that coming in the model outputs.

The North American Ensemble Forecast System (NAEFS) released their first public products on November 1, and they're available at http://weatheroffice.ec.gc.ca/ensemble/index_naefs_e.html. This website has a link to contact the modeling team. They're looking for feedback and they have ideas for tools you'd find useful in your avalanche work.

I'd like to thank Gabor Fricska of the Meteorological Service of Canada (MSC) for helping us at our avalanche forecaster training this fall and introducing us to the new ensemble forecasting products.

>>Ilya Storm is an avalanche forecaster at the CAC

International Commission for Alpine Rescue

2006 Annual Congress Report

By Clair Israelson

The International Commission for Alpine Rescue (ICAR) is a co-operative association of organizations and societies—called members—that are either active leaders in mountain rescue or, owing to their purpose, stakeholders in mountain rescue issues. ICAR is incorporated as a non-profit association under Swiss law, and is neutral in its political and religious beliefs. There are four ICAR working committees (they refer to themselves as "commissions")—air rescue, terrestrial rescue, avalanche, and emergency mountain medicine.

The avalanche committee is chaired by Hans-Jurg Etter of the Swiss Federal Institute for Snow and Avalanche Research (SLF) in Davos. Avalanche committee voting delegates are representatives of national organizations such as the CAA. Representatives of equipment manufacturers are invited to participate in a non-voting capacity. Working languages are English, German and French, with simultaneous translation at plenary sessions. During the avalanche committee working sessions the default language is English, with translation into French and German when technical or subtle conceptual issues required high levels of comprehension. For more about ICAR, and to see numerous documents relating to avalanche and other committees work visit their website at www.ikar-cisa.org

For many years Parks Canada has served as the Canadian ICAR member organization, paying the annual ICAR membership dues and coordinating representation to the four working committees. At the ICAR meetings professional credentials are a significant factor. Not surprisingly the Parks Canada choices for "lead representative" to each of the ICAR working committees are all UIAGM-certified mountain guides, with three of them also members of the CAA.

Past CAA vice-president, guide and rescue specialist Marc Ledwidge is co-chair of the air rescue committee and is Parks Canada's official voting delegate at the ICAR general assembly. Jeff Boyd is a long-time CMH heli-ski guide and emergency room doctor in Banff who serves on the emergency mountain medicine committee. Jeff has also been a CAA member for at least twenty years. Kirk Mauthner, the renowned technical rescue specialist, engineer and equipment designer serves on the terrestrial rescue committee. Kirk is not yet a CAA member, although certainly his winter guiding work qualifies him for membership. I hope he'll choose to join after reading this! Each ICAR member organization is invited send up to two representatives to each working committee. I represent the CAA on the avalanche committee, and was joined again this year by long-time colleague Bob Sayer representing the Canadian Ski Guides Association.

An air-miles flight got me to Venice, where US delegate Dale Atkins and I were picked up at the airport by Francois Sivardiere from France. Together we drove to Kranjska Gora, Slovenia, a quaint mountain village about ten kilometers from the Italian border. Thanks Francois!

Three days of avalanche committee working sessions were attended by forty two delegates from sixteen countries. The following are summaries of the main issues that were addressed by the avalanche committee. Opinions expressed are mine alone and are not intended to reflect any policies or positions of the CAA or ICAR.

Avalanche transceiver issues

The maximum range for any transceiver is influenced by many factors

including the technical compatibility of the sending and receiving units (there are variations between models and brands) spatial orientation of antennas, snow characteristics and burial depth, battery strength, debris such as rocks or trees in the deposit, and many other factors. For these reasons, in real-life situations a transceiver's maximum range is rarely achievable.

Last year, after much debate, the avalanche committee approved a resolution requesting that all transceiver manufacturers advertise only the effective range (approximately ten metres radius around the receiving unit) or search strip width (a diameter of approximately twenty metres) on their units. The basis for this request was the fear that if manufacturers advertised a maximum range (50 metres or more for some units), searchers in real burials could establish a search strip of a hundred metres or more. Such misunderstanding could result in buried persons being missed during searches, with fatal results.

www.peakalpine.com

This year, representatives of all major transceiver manufacturers attended the avalanche committee meetings. They requested the 2005 resolution be rescinded due to the fact that there was no definitive international technical standard for determining either effective range or search strip width. This triggered a spirited debate where several delegates reminded the transceiver reps that there are two proven methods for determining both effective range and search strip width, and that both methods yield similar results. Coffee break discussions among avalanche committee delegates produced the following recurring sentiments about the "transceiver situation."

- The international market for avalanche transceivers is highly competitive, and research and development for new, more sophisticated transceivers is costly. There is concern that new transceiver models are being rushed to market before they are fully proven to perform as advertised.
- If one definitive international technical standard for determining the effective range and search strip width of transceivers is really necessary, then the beacon manufacturers themselves should agree on that standard and have it certified by an international standards authority. Is should not be up to consumers to do this for them.
- The increasing cost of the new avalanche transceivers is becoming a deterrent for consumers. As one Polish delegate stated, "in my country a new transceiver now costs the equivalent of a month's wages. Most people can't afford this. Why can't manufacturers produce a product that is simple to use, reliable and affordable?"

My notes from these discussions read "Again manufacturers waffle—all kinds of spurious arguments, even two proven methods (for determining effective range and search strip width) exist and both deliver similar results." At the end of the meetings the 2005 resolution to beacon manufacturers was reaffirmed, with minor wording changes for clarification. From this entire debate I carried away one inescapable conclusion: Transceiver manufacturers should listen carefully to what their customers are saying, as there seems to be considerable pent up frustration among consumers.

ICAR avalanche data

Albert Lund of Norway reviewed the criteria for data fields in the ICAR avalanche database. The only issue of significance for Canada is the clarification that all groups trained and equipped to conduct avalanche rescue operations should be included in the "organized rescue" category, so avalanche rescues conducted by commercial operations and search and rescue groups in Canada should be reported here. In future years I will do my best to poll commercial operators for these statistics and include them in the Canadian data set.

Companion rescue checklist

Manuel Genswein of Switzerland presented the finalized version of this checklist for companion rescue as recommended guidance for training recreationists. This checklist is already widely followed in Canada with a few interesting exceptions that are shown below in italics. I suggest these italicized comments should be adopted by Avalanche Skills Training instructors and others who train would-be rescuers.

- Identify entry tracks
- Mark point of capture and point last seen
- Call for help (verbal, cell phone or radio if possible. Otherwise, stay and search)
- Determine primary search area
- Conduct surface search – eyes and ears

- Conduct simultaneous transceiver search
- Probing at transceiver maximum signal. Use inside to outside spiral probing technique with approximately 30 cm spacing between probe placements. Leave the probe in place to ensure contact with the object detected
- Excavate victim. Start shoveling the distance of the probe depth downhill from the victim and dig down and sideways so that the victim is approached from the side. Do not dig directly above the victim as this could result in the rescuer standing on the victim, compromising respiration and possibly causing death.
- First aid, with priority to airway and respiration
- Evacuate as appropriate

Rescue scene management

In recent years there have been at least five instances in Austria where secondary avalanches have hit or threatened rescue teams. This has also been the experience in Norway. Organized rescue teams should emphasize the need for manage access to rescue scenes so that secondary avalanches are not triggered by persons coming to help.

There is an ongoing problem with companion rescuers littering the surface of the avalanche with their gear, reducing the effectiveness of arriving rescue teams and search dogs. Additional emphasis should be given to this issue during training courses for recreationists—AST instructors please note.

Garth Lemke

"Time Is Life" avalanche rescue training DVD from ICAR

This training DVD was created under the direction of the ICAR avalanche and emergency mountain medicine committees and was released last fall. It is 90 minutes long, well produced, and covers the entire spectrum of issues relating to efficiency and best practice for treating avalanche victims. Canadian Mountain Holidays contributed financially to this ICAR project, and we all benefit. Thanks CMH!

If your organization has a role in avalanche rescue, you need to get a copy of this DVD and use it during your training sessions. Protocols and methods contained in "Time Is Life" are de facto international best practices. The CAA has been selected to be the North American distributor for this product. You can get your copy through the web store at www.avalanche.ca or by calling 250.837.2435.

Recommended criteria for new avalanche rescue equipment

For several years the avalanche committee has been working to develop recommended criteria for new avalanche rescue technologies, so that new devices developed through military, university or private endeavor are useful and effective in the real world of avalanche rescue operations. Desired criteria for weight, operating temperature ranges, waterproofing, battery life, screen resolution and lighting, radiation emissions and numerous other criteria are specified. Hans-Jurg Etter of the SLF distributed the finalized version of these criteria. Anyone interested in acquiring this information should go to the avalanche section of the ICAR website.

Multilingual glossary of avalanche search and rescue terminology

Dale Atkins of the US and Manual Genswein of Switzerland are leading this ongoing project to develop a multi-lingual glossary of avalanche search and rescue terminology to promote effective international communication. This project is especially daunting as different countries or regions use different terms to describe the same thing. If you are multi-lingual and would like to volunteer for this project please contact me and I'll connect you with Dale and Manuel. Proficiency in languages spoken in central and eastern Europe would be especially beneficial.

Risk reduction value of various types of avalanche safety equipment

There was great interest in statistically quantifying the risk reduction value of the various types of avalanche safety equipment presently available. A statistician was brought in to describe the process used to determine these values. In a separate presentation Dr. Hermann Brugger, chair of the emergency mountain medicine committee, delivered the results of an analysis of 2337 avalanche cases in Switzerland and Austria. His conclusions are as follows:

- Inflation devices such as the ABS air-

bag reduce the risk of lethal events by 92% and are the safety device of choice because they prevent burial. They may not be effective in reducing death from impact trauma.

- The combination of transceiver, shovel and probe reduces the risk of lethal events by 67% by decreasing the duration of burial. This combination is an effective safety device.
- The efficacy of devices such as the Avalung (prolongs life) and Avalanche Balloon (decreases duration of burial) cannot be quantified at this time and are thus of unknown value in reducing risk of avalanche fatalities.
- In Europe, unguided parties in the backcountry have three times the risk of a fatal avalanche accident compared to professionally guided parties.

Dr. Brugger concluded his presentation by recommending further research and development on inflation devices, and collection of better international data to document the use of all avalanche safety devices.

Snowpulse – a prototype inflation device to prevent burial

Yan Berchten of Switzerland presented a prototype inflation device to prevent burial in avalanches. Presently under development (subject to securing required capital) this device looks, prior to inflation, like a horse collar. It is worn over the head and chest and secured by a harness across the back. When inflated with compressed air, it envelopes the chest, neck and head providing trauma protection. The inflated bag deflates automatically three minutes after inflation, providing an air space if the wearer is buried in the avalanche. Field tests have proved encouraging, with the dummies consistently stopping in a face up position on the surface of the avalanche. This presentation received a significantly positive response from ICAR delegates.

ABS air-bag redesign

The German company ABS Air-Bag is redesigning their line of inflation packs. Starting next year all ABS packs will utilize a common inflation unit that can be worn alone if no carrying capacity is required. Various types and sizes of packs will be offered, all with a common zipper pattern for attachment to the inflation unit. This will increase the utility of these devices, and hopefully reduce cost. Also coming next year are ABS inflation cylinders that meet all of Canada's unique regulatory requirements for transportation, so these cylinders will no longer be classified as "dangerous goods" by Transport Canada. The Europeans simply cannot understand this position from Transport Canada, and neither can I. By next season this should no longer be an issue here.

"As one Polish delegate stated, 'in my country a new transceiver now costs the equivalent of a month's wages. Most people can't afford this. Why can't manufacturers produce a product that is simple to use, reliable and affordable?'"

Avalanche fatality prevention "best practices" initiative.

I have agreed to lead a working group consisting of Christophe Berclaz and Manuel Genswein (Switzerland) Francois Sivardiere (France) Ion Sanduloiu (Romania) and Dale Atkins (USA) to analyze avalanche fatality data from ICAR countries and attempt to determine why fatalities are increasing, decreasing or staying constant in those countries that report increasing winter use of the mountains.

We will try to correlate fatality trends with the prevention programs that exist in each of the countries and identify "best practices" for avalanche accident prevention. We will look at national programs for three discrete target audiences: amateur recreation, professionals and rescuers, public infrastructure such as roads and villages, as well as national avalanche rescue capacities. We hope to have preliminary results for discussion at next years ICAR meeting in Pontresina, Switzerland, and a final report by 2008.

Avalanche safety equipment for rescuers and workers

There was a discussion of what safety equipment could be recommended for rescuers and other workers exposed to avalanche hazards. A French delegate pointed out that there are about one thousand professional ski patrollers in the country and on average one is killed a year. When adjusted for the seasonal nature of this employment that fatality rate is approximately one for every 350 person years of avalanche-related employment, which is very similar to rates for Canada calculated by Dr. Jamieson at the University of Calgary. Tignes ski resort, one of the largest in France, has made it mandatory for all ski patrollers to wear ABS air-bag packs. Last winter they experienced three avalanche survivals they attributed to ABS.

Second ICAR membership for Canada ratified

At the annual congress that concluded this year's meeting, voting delegates unanimously accepted a second ICAR membership for Canada. Jointly held by the Canadian Ski Patrol System and the Canadian Ski Guides Association, a second membership will double the number of Canadian delegates entitled to attend ICAR meetings. I view this as

a very positive move as I am convinced we have much to learn and much to share at these international meetings, and more attendance encourages greater knowledge transfer in both directions. Congratulations to Bob Sayer and Dr. Mike Swangaard for leading this membership application to a successful conclusion.

Conclusions

There is a lot going on in the ICAR avalanche committee, and Hans-Jurg Etter is doing an excellent job as committee chair. Inflation devices are most effective in preventing avalanche fatalities and their use in Canada should be encouraged. Transceivers, shovels and probes are also effective in preventing avalanche fatalities. Transceiver manufacturers are encouraged to listen to their customers for feedback on issues of simplicity, reliability and price. The ongoing work of ICAR has significant benefit to Canada, and annual participation of the CAA and other organizations should be continued. The next ICAR annual congress will be held in Pontresina, Switzerland, from 16 to 20 October 2007. I look forward to continuing to represent the CAA and your interests at this forum. If you have any questions of comments please contact me by email at clair@avalanche.ca or by phone at 250.837.2435.

ICAR - IKAR - CISA Statement
(Avalanche Rescue, Terrestrial Rescue and Medical Commissions)

Avalanche Safety Devices and Systems
Kranjska Gora, Slovenia
October 14, 2006

Considering the ongoing development of avalanche safety devices in recent years the above commissions of ICAR–IKAR-CISA update their statement of 1999 concerning these devices and systems by highlighting the following points:

A. Most people trigger their own avalanche and this can result in death.
- ❑ The best way not to be caught is to not trigger an avalanche.
- ❑ If caught, preventing burial is the best way to stay alive.

B. The best way to avoid avalanche accidents is prevention, including information (avalanche bulletins), knowledge, experience, awareness, and caution.

C. If caught, some safety systems/devices may increase one's chances of survival. Survival depends upon quick rescue. The efficiency of the transceiver in combination with probe and shovel, and of airbag systems has been proven. At this time support for other systems is based upon personal opinion and case reports.
- ❑ However, no device or system guarantees against either injuries to or death of avalanche victims.

D. All rescue systems require training and practice.

E. For organized rescue early notification is essential, e.g., by mobile phone, satellite phone, or radio — wherever possible.

G. To be equipped with a transceiver or at least a transponder, e.g. the RECCO system, renders organized rescue more efficient.

Applied Avalanche Forecasting Course

The Rocky Road of Course Development

In the past, the CAA has received numerous requests—mostly from freshly minted Level 2 graduates—for a more comprehensive course on avalanche forecasting. The requests have recently expanded to include interest in public avalanche bulletin production and writing, data-based avalanche forecasting, and techniques common in more industrial applications like highways avalanche programs.

Coupled with an ongoing partnership and requests for a similar course from the Icelandic Search & Rescue Organization and the Icelandic Meteorological Association (IMO), the CAA initiated a small development project last winter to explore the first steps of what an Applied Avalanche Forecasting course could look like. CAC Forecaster Greg Johnson took the lead and played an instrumental role in getting the project off the ground. He developed a basic course structure, and defined goals and objectives with a large volunteer-based subject matter group.

The IMO funded 50% of this initial project. Last March, Randy Stevens and James Blench traveled to Iceland to teach a CAA level 1. They used these preliminary tools as a resource in a two-day avalanche forecasting seminar presented to IMO weather and avalanche forecasting staff.

Despite the promise of this early work, the development of the Applied Avalanche Forecasting (AAF) course poses a significant challenge to the CAA because it is the first course developed solely in-house with no appreciable external funding. Greg Johnson, the CAC forecaster team and the numerous ITP instructors and CAA members who contributed to last winter's e-mail discussions and course development in this initiative must be thanked for their extensive volunteer time, especially Ilya Storm, Karl Klassen, John Kelly and Bruce Jamieson. The interest and dedication to the development of this new and exciting program speaks volumes to its timeliness and potential value to the Canadian avalanche community.

Unfortunately, we have tried twice (spring and fall 2006) to offer a beta course to CAA members to flesh out the curriculum and produce a new regular addition to the CAA ITP course line-up. Since the CAA is shy on development dollars we've had to charge a nominal fee for course attendance. To date we have been unable to garner critical mass to run this beta course.

This fall, Alan Jones, with the help of Dave Smith (MoT), Steve Conger (UBC) and Jeff Goodrich (Parks Canada), has taken Part 2 of the development project under his belt. Another small injection of funding from the CAA's Intellectual Property Fund has helped this initiative progress, and we hope to have a fully developed, ready-to-deliver AAF course this winter.

The CAA has worked hard to develop this course as per the requests of numerous past Level 2 students and CAA members, and we are close to being ready to run a full-blown course. What we need now are students, and we are actively soliciting input from people on the best time of year to run this program. Again, great thanks again to the many members who have contributed to the development of this new program.

Interested in finding out more? Check out the CAA's Online Registration System for ITP at www.avalanche.ca/caa. As information becomes available we will post it here.

You tell us...

When is the best time of year to run an Applied Avalanche Forecasting course?

Please e-mail Ian Tomm at itomm@avalanche.ca with your input.

The Evolution of the Avalanche Terrain Evaluation Scale

By John Kelly

Background

The Avalanche Terrain Evaluation Scale (ATES) was developed in response to Parks Canada's need to inform park visitors about avalanche terrain. The mountain national parks are some of Canada's most heavily used areas where the public could be exposed to avalanche risk, either knowingly or not.

As a responsible land manager, Parks Canada discussed the degree of exposure to avalanche risk that visitors undertake. This discussion required more comprehension than simply listing the individual components of exposure, like slope angle and the presence of identifiable avalanche paths.

A team of parks avalanche experts led by Bruce McMahon and Grant Statham identified a list of components important to the character of terrain in relation to avalanches. The qualities of these components present at three degrees of relative exposure to avalanche danger were recognized, and the "simple, challenging and complex" scale (ATES) was born.

By 2004, all popular winter backcountry trips in mountain national parks were classified using the ATES scale, and the information became available to the public.

Avaluator and ATES

As with any good solution, the ATES solved more than one problem. At the same time that Parks Canada recognized the need to offer terrain information to visitors, the ADFAR (Avalanche Decision Framework for Amateur Recreationists) project was investigating decision-making tools for recreationists. A key goal of ADFAR was to incorporate terrain information into how amateurs choose their trips. The European decision-support tools that ADFAR studied as models used only slope angle to bring a terrain component into the decision-making process. The ADFAR expert panel agreed that a more comprehensive inclusion of terrain in the decision-making process was essential if a tool was to be successful, and this scale was the obvious choice.

CAC ATES Ratings

Here's the tricky part. With the ATES ratings as an essential part of the Avaluator Trip Planner tool, it's necessary to consider ratings for a large variety of trips in many regions of the country, and for an array of different activities. There were a number of questions that needed to be addressed before we could move ahead on this project: What is the process for rating trips? Who is going to do the work of evaluating the trips? Who is responsible for the accuracy of the ratings? Which ratings will be posted on our website—www avalanche.ca?

To examine these questions we turned again to the example of Parks Canada. The folks there rated terrain based on the input of a panel of local experts familiar with the terrain in question. With a rich body of expertise, the majority of ratings for popular trips in the parks were easily established with a minimal debate. In general, the people rating terrain were highly experienced individuals in both avalanches and travel in their respective territory.

ADFAR, led by Pascal Haegli, needing input on ratings to focus test the Avaluator, also began to develop a process to rate terrain. Faced with extensive territories and the fact that he could not possibly be personally familiar with all the terrain that was being rated by ADFAR, Pascal began to develop a systematic process and record of how the ratings were developed. By October 2006, there were about 400 trips rated through ADFAR in Alberta and BC.

Needless to say, ensuring terrain ratings are available to the public is a priority for the CAC. The Web is a major point of delivery for avalanche information from the CAC and to date has been our focus for publishing ATES ratings. By now many people will have seen the Avaluator Trip Planner page under the Bulletin category on the CAC website. However, distribution is only half of the problem. Expanding the number of ratings—hopefully from coast to coast to coast—is still a major challenge.

We realize the CAC will never be able to underwrite the rating process everywhere in the country, and we are not alone in recognizing the advantage to developing an extensive catalogue of ratings. Land managers, tourism organizations, community groups, clubs and activity association—to name a few—may also be interested in having their local terrain

CAA Archives

classified for use with the Avaluator.

The CAC has also had to develop a way to facilitate the inclusion of ratings from third parties into the CAC website. This adds to the complication, and perhaps amusement, of the entire process. Most people consider the CAA and the CAC as essentially the same entity, but that is not so. These two organizations simply live in the same building. The CAA represents the professional community involved in avalanche safety; basically the folks who have the goods on what practices work best with avalanches. ATES ratings are a new concept in this regard, and consequently the CAC felt that CAA members were the most suitable people to comment on how ATES ratings are produced.

After an internal process, the CAA produced a policy outlining recommendations for producing ATES ratings (available on the CAC website by entering "Approved ATES Policy" in the search window at the top of the screen). The CAC has adopted this policy as the basis for accepting third-party terrain ratings for website postings.

Process and Procedure

In addition to compliance with the CAA policy, we felt there was a need for due diligence in terms of collecting information and establishing ratings. Essentially, we needed guidelines to oversee the materials being consulted and the qualifications of the individuals performing ratings. For the benefit of our records, we also needed a system for tracking any problems encountered or comments about the rating process.

Pascal's documentation, consisting of an ATES Trip Data Spreadsheet, was appropriate for these purposes, and with the addition of an instruction document (CAC ATES Trip Data Spreadsheet Instructions) that advises how to structure ATES rating work, we are now accepting ratings from third-party sources. We anticipate receiving ratings from a variety of places this winter, including grassroots sources, and we will continue to pursue cooperative efforts in order to rate high-priority terrain directly.

>>John Kelly is Operations Manager of the CAC.

To submit a rating to the CAC website:

Download three documents from www.avalanche.ca ("Approved ATES Policy", "ATES Trip Data Spreadsheet", and "CAC ATES Trip Data Spreadsheet Instructions").

Complete "CAC ATES Trip Data Spreadsheet" and e-mail to jk@avalanche.ca.

Website News

Changes and upgrades to www.avalanche.ca

By John Kelly

By now many people in the Canadian avalanche community will have visited www.avalanche.ca and noticed that it has a new structure. We refer to the changes as our website re-branding exercise, and our goal was twofold: to provide a single portal for different facets of the avalanche safety community; and to highlight the distinction between services of the Canadian Avalanche Association (in support of industry and professionals), and the Canadian Avalanche Centre (activities and programs oriented towards public avalanche safety).

The opening page of avalanche.ca offers four choices, or as we refer to them, portals. From here you can select which organization you want to visit:

- Canadian Avalanche Association (CAA)
- Canadian Avalanche Centre (CAC)
- Canadian Avalanche Foundation (CAF) (for information on charitable fundraising activities)
- International Snow Science Workshop (for information on avalanche research and upcoming practitioner workshop–Whistler, 2008)

Once through the portal, the websites you reach should appear familiar. Slight tweaks to the navigation and information categories of these sites will hopefully help you find the information you regularly use with ease.

That being said, we recognize that website changes to the organization of information can be frustrating to users who have become accustomed to a certain set-up. Rest assured, quick and easy access to the information that you rely on remains our top priority, and we would not cause disruption to our users needlessly. However, it became critical to separate the CAC and CAA on our site. Public agencies that provide funding to CAC public avalanche safety programs and services require clear delineations of where they are directing their resources. These agencies feel that financing public avalanche safety programs is distinctly different than providing support to industry and professionals. This notion was the genesis of the CAC, and clear public distinction in the website is a positive downstream consequence.

Certain categories of information that the CAA and CAC present to the public are the same. The website attempts to combine these similarities while still providing separate portals to the CAA and CAC:

- In the navigation bar just below the organization logo, four of the nine information categories on the left-hand side are identical on the CAC and CAA sites.
- When you open the menus associated with these categories, you are presented with appropriate choices that direct you to that organization. Below a logo at the bottom, there is a menu selection that takes you to the choices available at the sister site within that same category.

The new services and advances on the website are not intended to make your life complicated, but rather to bring more functionality to our users. In particular, we are happy to provide a highly visible link where people can access the CAF website. We hope this new portal results in increased traffic on the CAF site.

On the CAC site there is a great new section on the Avaluator, complete with a snazzy interactive trip planner. There is also a new AST course listing service where providers can list course dates, locations and details. The CAC now posts a calendar of events that you can subscribe to. There is also a "members only" section for CAC members and AST providers (contact Janis H. at programservices@avalanche.ca for your password if you are yet to log on).

Avalanche bulletin information (under "Bulletin") remains the most popular content on avalanche.ca. It presents the most comprehensive, one-stop shopping hit for public avalanche information in Canada. To enhance trip planning, there are also discussion boards for backcountry travellers to exchange information on conditions and avalanche concerns (see "Discussion" on the CAC side of the website). Visit the Skeena Babine discussion board sometime for a demonstration of a lively information exchange. A highly underused feature of the discussion boards is the RSS feed (located at the bottom of each discussion home page). When properly set up in your browser, these feeds will alert you to new postings as they occur—a great way to remain up to date.

On the CAA side of things, course information and online registration for professional training courses are the most popular pages. These have remained essentially unchanged, and are accessed under the "Training" tab. Membership lists, policies of the association and professional resources are available on the CAA members-only website. For login information, contact Audrey Defant at Audrey@avlanche.ca.

The last major addition is a new home for information on the 2008 Whistler International Snow Science Workshop. This site is operational with basic information. Expect the content to be ramped up in spring 2007.

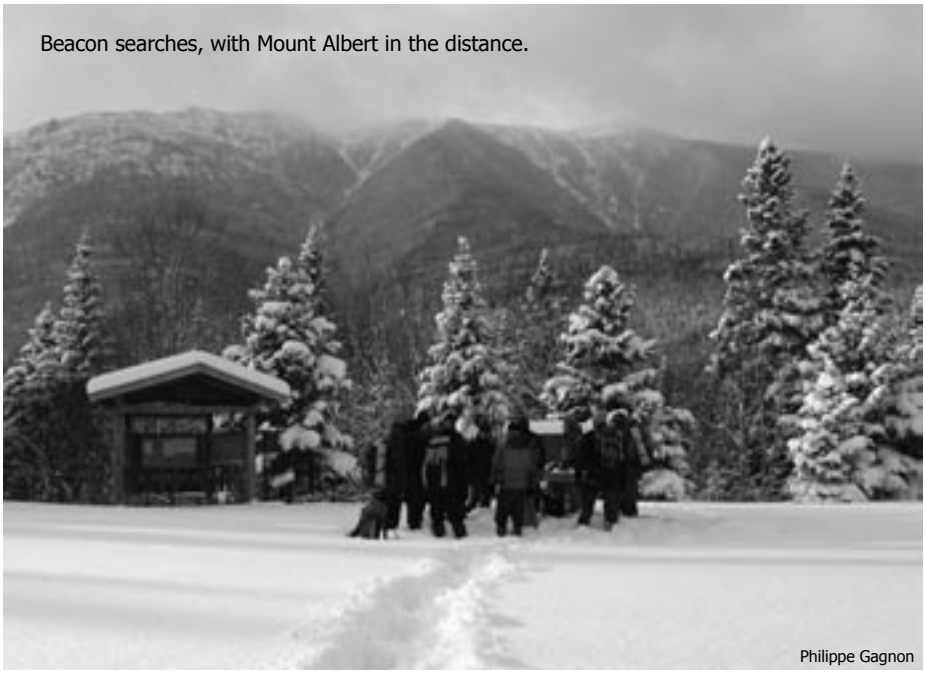
What's new? Follow these prompts on the new and improved CAC site:

- CAC → Bulletins → Avaluator
- CAC → Training → Avalanche Skills Training → AST Course List
- What's New → CAC Calendar of Events

French Lessons

CAC Operations Manager John Kelly was in Quebec in early December, participating in some Continuing Professional Development sessions for avalanche professionals in that province. Twenty CAA members attended the sessions held in the Parc de la Gaspésie, where they received information on the new AST course curriculum. Other presentations focused on new collaborativ

Quebec. Thanks to all who participated!



Beacon searches, with Mount Albert in the distance.

Philippe Gagnon

Demonstrating the Beacon Basin from Backcountry Access to AST instructors during the field day.

Philippe Gagnon

Columbia Brewery Backcountry Avalanche Workshops

Local Workshops Bring Knowledge, Experience to Backcountry Riders

This year, the CAC took our annual Backcountry Avalanche Workshop to three mountain communities over three consecutive weekends. These day-long events highlighted interactive exercises, lectures from local avalanche professionals, and introduced the newest addition to avalanche education tools—the Avaluator.

The workshops were held in Nelson BC on November 18, Whistler on November 25 and Canmore on December 3. Instructors and session leaders focused on getting the participants avalanche-ready for the coming winter season. Early input indicates that coming to the smaller communities was the way to go, and next year we expect to be focusing on similar venues.

A BAW participant writes...

I would just like to send a thank you for all the speakers and organizers of the avalanche conference in Canmore on the 3rd. I attended and found it to be very worthwhile and a good learning curve for myself as a novice at backcountry conditions, with ample time for questions and the like and good hands on discussion. Thanks again

John Kelly

Volunteer James Floyer and presenter John Buffery at the well-attended Nelson workshop.

AST Curriculum Changes

As of November 15, 2006, the Avaluator™ is the primary decision-making process taught on the AST Level 1 course. The CAC now requires the Avaluator be provided to all AST Level 1 students as part of the course material package. These changes mean all AST instructors need to become familiar with the Avaluator before the teaching season begins.

Jordy Shepherd Collection

The AST Instructor Manual has been revised, and the new Avaluator lesson plans now replace the decision making sections of the curriculum. The CAC has produced an insert to the Instructor Manual that includes lesson plan revisions and new lesson plans based on the addition of the Avaluator to AST curriculum. The insert costs $10 and can be ordered by contacting programservices@avalanche.ca or calling 250-837-2141. This lesson plan can also be used as stand-alone module for teaching more advanced students. The CAC highly recommends that all AST Level 2 students receive this training.

To facilitate this process, three CPD sessions were held in late November and early December to educate AST providers. The sessions were conducted by Dr. Pascal Haegeli and were held in Nelson, Whistler and Canmore. The sessions were extremely well received and we expect we'll do more at the beginning of next season.


Kokanee
GLACIER BEER
Kokanee
GLACIER BEER
BC'S
GLACIER
FRESH
TASTE

Prediction, Prevention, and the Language of Risk

Explaining the Avaluator™ to students

By Ian McCammon

The pointed emails started coming in weeks before the Avaluator™ was officially released. Folks wanted to know about the colors on the Trip Planner and Obvious Clues charts. Did red mean that triggering an avalanche was a certainty? Did green mean the tour was safe? And what about yellow? Did it mean there was a fifty-fifty chance of being buried?

As many of you know by now, the Avaluator is a decision aid intended to help recreationists navigate avalanche hazards in the backcountry. It is the result of an extensive research and development effort, and it incorporates a number of tools including a trip planner and a slope evaluation system. Both tools use a graduated chart to interpret terrain and snowpack conditions on a color-coded scale. Exactly what these colors mean is described in the booklet that accompanies the Avaluator, but I thought I would give a few more details here, especially for those who need to explain the Avaluator to their students or their tour partners.

Assumption of risk

The word risk seems to show up everywhere these days. So it's understandable that folks assume that it somehow relates to the colors on the Avaluator card. Trouble is, there are so many definitions of risk (some technical fields even have multiple definitions) and deeper issues of risk perception, that using the word "risk" to explain the Avaluator almost guarantees communication problems from the outset.

A bigger problem with applying the concept of risk to the Avaluator is that doing so can create the expectation that the Avaluator somehow predicts avalanches. Students hungry for a simple prediction tool might easily overlook the fact that even a rough estimate of avalanche probability isn't possible from incident data. And they might overlook the fact that avalanche prediction is hard; it takes years of training and experience and even then, most experts have a host of tricks in their back pocket in case their predictions are wrong. And finally, they might overlook the fact that if a simple checklist or graph could reliably predict avalanches, then we wouldn't need snow safety experts, forecasters, or seasoned guides. For now, there is no simple card or algorithm that predicts avalanches. It appears the best we can do is to help people recognize when things are getting dangerous, based on expert opinion and past accidents.

Prevention

So the Avaluator won't tell you when an avalanche will happen. But it can tell you if you are facing conditions similar to those that have produced accidents in the past, or conditions that experts believe are potentially dangerous. Consequently, the Avaluator can also tell you how many accidents would have been prevented by avoiding certain conditions—you'll find numerical details in the Avaluator booklet.

One metaphor I've found useful in explaining the concept of prevention is the speed trailer, a clever device that has been very successful in slowing down speeders near schools and construction zones. It consists of a speed limit sign and a radar-based display of your current speed. If you go no faster than the posted speed limit, it's very unlikely that you'll get a speeding ticket. But if you exceed the speed limit, there's some probability that you might get a ticket. That probability depends on many variables, such as whether traffic officers are present, if they are watching you, what their "grace envelope" is, and so on. Typically, you don't know the states of these variables and so you can't estimate an exact probability. In other words, you don't know the actual risk of getting a ticket. All you know is what your speed is relative to a threshold that, when drivers in the past exceeded it, resulted in some of them getting tickets.

The point of the speed trailer metaphor is that it is the driver who decides how vulnerable they want be to a negative outcome. Similarly, the Avaluator is way for people to roughly gauge their vulnerability in avalanche terrain. The strategy isn't foolproof because there's always a small chance that they will trigger an avalanche under "green" conditions (similarly, you can still get a ticket for running a stop sign even if you don't speed), but in the majority of cases, the Avaluator should help folks understand when they are less vulnerable and when they are more vulnerable to an accident.

Human nature being what it is, there will always be those who take chances under dangerous avalanche conditions, just as there will always speeders. But for recreational backcountry travellers who don't want to leave their fate to chance (or the decisions of equally inexperienced partners), the Avaluator offers a strategy for keeping their vulnerability to avalanches under their control.

The future

Like other avalanche decision tools before it, the Avaluator represents an early stage of evolution. Over time, it is possible that consistent use of the Avaluator might actually change the pattern of avalanche accidents, with a greater proportion of accidents happening at lower thresholds as people avoid more serious conditions. Design changes are inevitable, but the Avaluator is a starting point upon which future developers will hopefully build. In the meantime, it seems to be a practical tool to help users recognize the conditions that have taken lives in the past, and start them on the road to developing avalanche skills that go beyond simple checklists and reference charts.

>> Ian McCammon is an avalanche researcher, educator, and collaborator in the development of the Avaluator. He appreciates the opportunity to contribute to this exciting project, and he looks forward to more pointed emails from students.

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The Canadian Avalanche Foundation
Gala Fundraisers

Friday, February 23rd, 2007 at The Den Restaurant on the Lake at Nicklaus North Whistler.

Saturday, February 24th, 2007 at the Hyatt Regency Calgary.

This wonderful evening includes one of the best silent auctions you'll ever see, and what promises to be a riveting presentation from physician, scientist, author and deep-sea explorer Dr. Joe MacInnis.

Keynote presentation:

Dangerous Lives: Lessons From Deep-Sea Explorers

Tickets are $175 per person and are supported by a $90 tax receipt. Please contact our office at (403) 678-1235 or via email at info avalanchefoundation.ca for further information. We hope to see you in Whistler or Calgary this February

Joseph MacInnis Collection

Above: Dr. Joe MacInnis is the first person to dive and film under the North Pole. He has led or participated in more than 50 major undersea expeditions and logged more time inside the Arctic Ocean than any other scientist. As a physician, he has spent 20 years studying human performance in high-risk environments.

Top right: Dr. MacInnis was an advisor to the Titanic Discovery Team and co-leader of a $5-million expedition to film Titanic in IMAX format, inspiring director James Cameron to make his Academy Award winning movie.

Bottom right: Dr. MacInnis was among the first to descend almost four kilometers under the Atlantic Ocean. His work has earned him a number of distinctions, including the Order of Canada.

CAF Bursaries and Grants

There are two avenues in grant support for research and education under the Canadian Avalanche Foundation (CAF). The first is the which is offered to snowboarders taking advanced (Level 2) avalanche safety for operations courses. Craig Kelly was a pioneering snowboarder who lost his life in an avalanche in 2003. Craig was working towards his guide's certification, which includes advanced avalanche training. Craig's family wanted to see his interest in advancing the avalanche safety knowledge of snowboarders carried on. It is the goal of the *Craig Kelly Memorial Scholarship* for snowboarders to develop advanced skill sets which can then be passed onto the general population. Snowboarding students registered for the CAA ITP Avalanche Operations Level 2 course may apply. Up to two $1,000 scholarships may be awarded annually.

The *ISSW Fund* (International Snow Science Workshop) is the legacy of the ISSW 1996. The fund provides grants in two forms. First, Canadian practitioners or students conducting practical and/or scientific research to be presented at a subsequent ISSW may apply for a grant of up to $2,000. These funds will be delivered to approved recipients in two payments: 50% upon approval and the 50% upon delivery at the ISSW. Application should be made at least one year in advance of the subsequent ISSW.

The second element of *ISSW Fund* support is for Canadian graduate student research programs. This is available to students in Canadian research programs who demonstrate applied research initiatives that support the CAF mandates. These mandates include public avalanche warnings, public education and research in public avalanche risk reduction. There is no fixed dollar amount with this grant and applicants must present a budget for their graduate research to the CAF for consideration.

Persons interested in applying for any of these grants should contact the CAF at (403) 678-1235 or via email at info@avalanchefoundation.ca.

ISSW Fund Scholarship Winner: Stéphanie Lemieux


Stéphanie Lemieux Collection

Stéphanie Lemieux was awarded the ISSW Fund scholarship from the CAF earlier this year. This scholarship supports researchers who plan to present at the biannual International Snow Science Workshops, so Stéphanie had the pleasure of presenting at the ISSW in Telluride this fall. "One of my goals in my masters project was to present results at this conference," she says. "So this gave me motivation to a good project and, most of all, it gave me a deadline!"

Stephanie's research focuses on avalanche mapping of the Chic Choc Mountains in Quebec, and her work was accepted as a poster presentation. "I would have like the challenge of doing the oral presentation," she says. "The challenge is mostly because I have a big French accent, but the poster presentation took some stress out." Stéphanie called the experience of attending an ISSW "inspiring," especially the opportunity to meet some of the more prominent professionals in the avalanche community. "It was great to have a chance to talk, see and listen to the people I have been reading about for the past years," she says. "I attended all the presentations and that gave me a great view of the pat and future developments in the avalanche world. Most of all, they inspired me for my literature review."

For the future, Stéphanie notes there are plenty of opportunities in both Eastern and Western Canada. She wants to work in avalanche risk management, mapping and education. Congratulations on winning the ISSW Fund Scholarship Stéphanie!

Coast to Coast Support from the Canadian Avalanche Foundation

By Gord Ritchie

The Canadian Avalanche Foundation (CAF) is providing a major boost to avalanche safety right across the country this winter. The CAC will receive $20,000 in support of the Public Avalanche Bulletin and a further $30,000 specifically targeted to forecaster support for the North and Southern Rockies bulletins. However, funding doesn't stop there. The CAF is providing $5,000 to the Centre d'avalanche de la Haute Gaspesie for avalanche workshops and awareness initiatives ce
Sa
avalanche safety video for Newfoundland and Labrador.

The CAF is a key source of funding for avalanche education and together we can make an impact. Contact the CAF to make
appreciate your support.

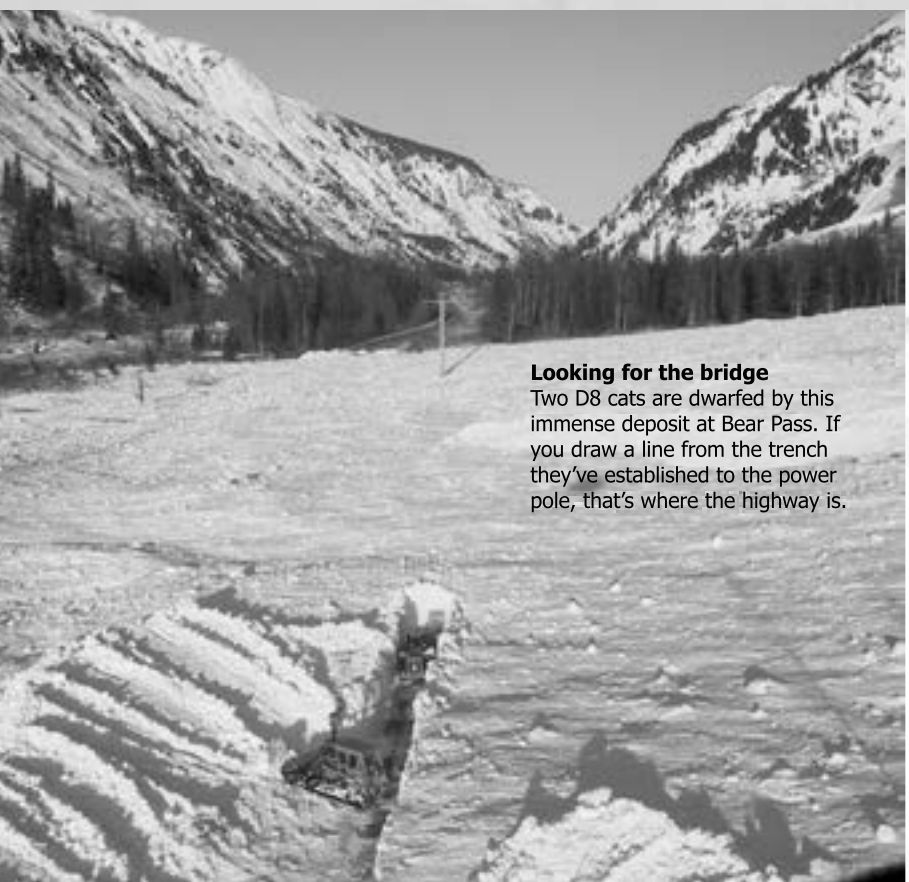
>>Gord Ritchie is the Secretary-Treasurer of the Canadian Avalanche Foundation

Road Warriors

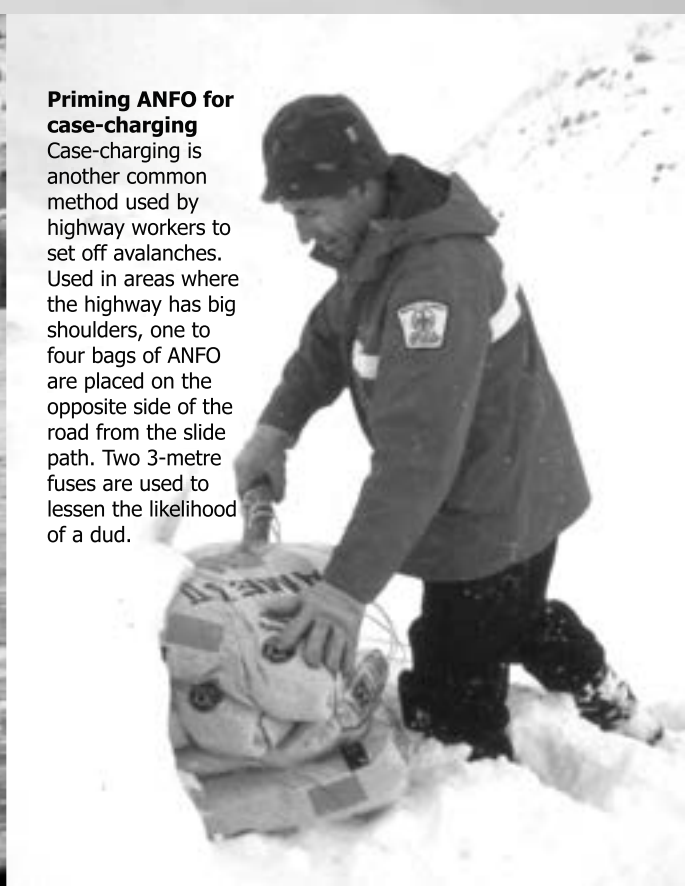
BC Ministry of Transportation Avalanche and Weather Programs

All photos Ministry of Transportation

Tools of the trade
All the highway avalanche control programs in BC make extensive use of helicopters, to access start zones for snow profiles as well as control work. They are also used to monitor and service remote weather stations



Looking for the bridge
Two D8 cats are dwarfed by this immense deposit at Bear Pass. If you draw a line from the trench they've established to the power pole, that's where the highway is.



Priming ANFO for case-charging
Case-charging is another common method used by highway workers to set off avalanches. Used in areas where the highway has big shoulders, one to four bags of ANFO are placed on the opposite side of the road from the slide path. Two 3-metre fuses are used to lessen the likelihood of a dud.

From the archives
This recoilless rifle was used in Bear Pass from 1992 to 2000. It's since been replaced by a 105 mm Howitzer.

Big avalanche country in Northwest BC
This particular fracture was created by helicopter control on a path above Highway 37 in the Ningunsaw Pass, northeast of Stewart. It's two metres deep and about 300 metres wide.

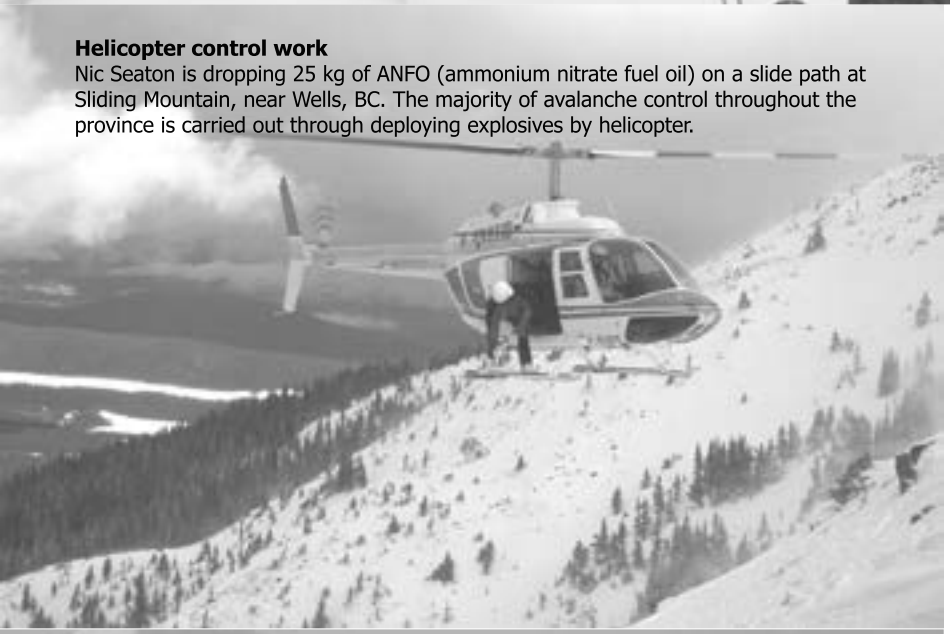
Gregor making snow
Greg Ringham cleans rime off a remote weather station near Revelstoke. These stations serve a vital role in the avalanche program, allowing technicians to assess conditions at higher elevations near the start zones.

Another day at the office for highway control workers
This spectacular bird's eye view gives a good sense of what the job entails, and the importance of regular control work to keep the highways safe.

Road work
Highway maintenance crews are an important part of the program. This snowplow is clearing off avalanche debris on the road to Telegraph Creek.

Gaz Ex maintenance at Kootenay Pass.
The first Gaz-Ex was put in Path 51 above the Duffy Lake road in 1991. Kootenay Pass now uses this technology almost exclusively, with 21 installations over 15 km of highway. The efficiency and effectiveness of the Gaz-Ex system adds significantly to the safety of highway users along one of the most avalanche-prone highways in North America.

Weathering the storm
Avalanche technicians Scott Aitken and Doug Tuck with faithful companion Decker, a fully-certified CARDA dog. This shot was taken during a spring squall in the Duffy Lake area.



Helicopter control work
Nic Seaton is dropping 25 kg of ANFO (ammonium nitrate fuel oil) on a slide path at Sliding Mountain, near Wells, BC. The majority of avalanche control throughout the province is carried out through deploying explosives by helicopter.

One of the benefits of the job—a great view
Tony Moore is one of many long-serving members of a program that sees very little staff turn over. The average length of service for technicians is 23 years.

Avalanche Index

1975	The year BC Highway's Snow Avalanche and Weather Program was established.
35	Number of people currently employed in the Snow Avalanche and Weather Program
65	The number of areas in BC where technicians are monitoring and controlling avalanche hazard above provincial highways.
1200	Kilometres of highway directly affected by avalanches in BC
1390	Number of avalanche paths affecting the highway
370	The average number of hours BC Highways are closed each winter due to avalanches
45	Number of safety courses taught each year to highway maintenance crews working in avalanche areas.
3	The number of programs using remote-controlled avalanche control technology (Gaz-Ex and Avalanche Guard)
51	The number of remote, high-level weather stations used for avalanche hazard assessment and road-closure decisions
170	The number of electronic weather stations used for avalanche control and road maintenance
700+	The record currently held by Bear Pass for the highest number of avalanche occurrences recorded in a season
105	The record currently held by Revelstoke for the most snow profiles recorded in a season
0	The number of people killed by avalanches on BC highways since the Snow Avalanche and Weather Program has been implemented

For more information, contact Mike Boissonneault, Manager, Avalanche and Weather Programs at 250-387-7523

The Kootenay Cold Smoke Powder Festival

By John Irvine

Mark your calendar and wax those boards! The first annual Cold Smoke Powder Fest is coming to Nelson, February 24- 25, 2007.

At ARC'TERYX we love backcountry skiing, and the idea for the Kootenay Cold Smoke Powder Festival came from this obsession. We wanted to get together with others who share our love for the wonder and magic of the topography, the freedom, exhilaration, and speed of travel, the sense of exploration, the rewards of great snow and long beautiful descents, and the science of navigating and decision making while traveling in the backcountry. We believe all these things come together in the backcountry, and we want to celebrate this pursuit that exemplifies freedom, discovery and beauty.

The folks at Mountain Gear in Spokane Washington knew of our interest in starting an event, and we've been working on it together. We knew we wanted to host it in a remarkable place, both in terms of terrain and people who thrive on ski and snowboard touring. We couldn't think of a better place than Nelson BC, the powder Mecca of the Kootenays.

The vision behind the Cold Smoke Powder Fest is to provide a grass-roots gathering where both experienced and debutant backcountry skiers and snowboarders can celebrate the culture of backcountry pursuits amongst breathtaking scenery and world-renowned snow. In addition to seasoned veterans, this event will also draw "keen to be" backcountry skiers and snowboarders who want to give off-piste adventures a try. Whitewater resort's terrain, combined with the Selkirk's legendary snow, provides fantastic opportunities for all levels to ski, learn, compete, and celebrate off-piste and backcountry riding.

We have a full slate that weekend, with the focal point of the festival being clinics. These workshops are aimed at telemark skiers, alpine tourers and backcountry snowboarders, and will feature programs on snow study, terrain assessment, route finding, or skiing/snowboarding skills improvement. The goal is to provide a forum for people to learn more about how to increase the fun and safety of trekking around in the winter backcountry and to share the knowledge of snow pack and avalanche risk assessment, terrain evaluation and route finding.

The other mainstays of the Festival are the socials, and we have a variety of slide shows and movies planned. Presenters thus far are Meagan Carney, Greg Hill, Andrew Maclean, Dave Heath and Bill Heath. We also have the Kootenay Cold Smoke Buff-eh and festival Party, which will take place at Whitewater Resort on Saturday night. The food at the ski hill is renowned and the dancing will no doubt prove equally memorable. Also, the wonderful folks at Nelson Brewing are supporting our event with beer, so this will also be a major focus!

Last, but not least, you gotta have some comps. For the aerobically inclined, we have the 1st Annual ROAM Randonée Rally, featuring a newly-designed course that will showcase the array of terrain offered at Whitewater Resort. Also on the calendar—the Holy Huck Invitational Powder Big Air, the Cold Smoke High Mark Contest (a 100-metre steep uphill skinning dash) and the Gerick Cycles Telemark Cup Slalom Race.

For more information on the event go to www.coldsmokepowderfest.com. Hope to see you there!

>> John Irvine is head of sports marketing for ARC'TERYX Equipment.

ArcTeryx

The New Cold War

A Report from Russia's Avalanche Institute

By John Brennan

Attendees and event organizers from almost 20 countries pose for their commemorative group photo.

John Brennan Collection

In the fall of 2006, I had the good fortune to attend Apatit's third avalanche conference in Kirovsk, Russia. Apatit is the largest mining and mineral concentrating enterprise in Europe. Its headquarters are in Kirovsk, a community well known in Russia for its mountain sports and tourism.

Apatit founded its avalanche institute back in the 1930s, and this year's conference coincided with the institute's 75th anniversary. The conference and avalanche institute are both located in the northwest corner of Russia, inside the Arctic Circle. It was necessary to obtain a visa to enter the Russia Federation, but this was easily accomplished with the incredible support of the organizing committee. Hotel reservations were equally simple.

Most attendees came through Moscow or St. Petersburg. I opted for the latter and spent a touristy day enjoying that city. A very inexpensive 18-hour train ride was nixed in favor of a $400 round-trip, two-hour flight north. Another night was spent in the coastal town of Murmansk—which played a key role during portions of World War II.

From there a three-hour van ride took folks to the small mining community of Kirovsk, where the conference took place. Slightly over 60 people from close to twenty countries were in attendance. I was the only person from North America. English was the main language of the event while a translator was present for folks who presented in Russian.

The hospitality of the organizing committee was incredible, with almost daily field trips and functions. As opposed to some other conferences, I was notified that my abstract was accepted before having to pay for the conference. Even though I was traveling on a free "Frequent Flier" trip, I would not have been able to justify the trip otherwise.

It was a great experience to both attend the conference and to visit Russia. This event is only held every five years, but Moscow will be hosting an avalanche conference in September of 2007. See www.igsoc.org/symposia/2007/russia/ for more info on that event. In any case, beam me at jb@avalanchemitigationservices.com if you have any questions.

John Brennan

The Apatit Avalanche Forecasting Center is located in Kirovsk, a small town located inside the Artic Circle in NW Russia.


John Brennan Collection

John Brennan has worked as an avalanche and explosives specialist at Snowmass, Colorado for more than a decade. He's also patrolled and done avalanche consulting at Las Leñas, Argentina. He's an affiliate member of the CAA and sits on the American Avalanche Association's board as the Rocky Mountain Section representative. John has long been fascinated by anything that blows up. Here he's holding a prime example of Russian ordnance—a 160 mm mortar round that weighs almost 40kg and packs 9kg of high explosive payload.

The British Ski and Board Show

By Brad Harrison

This summer we received an interesting idea from Peter Buchholz, a former intern here at the avalanche centre. Peter is from Britain and he's now got a business promoting backcountry skiing in Canada to the UK market. He proposed that the CAA and CAC take part in the British Ski and Board Show in Birmingham, England, one of the largest exhibitions of its kind.

The event organizers were very interested in having someone give presentations on avalanche safety, and agreed to give us a large booth at a much reduced cost. After a few quick phone calls, we brought the Backcountry Lodges of BC on board and equipment manufacturer G3. Along with Peter's company, Canadian Powder Adventures, the four organizations shared the cost of the booth.

Brad Harrison, President of the Backcountry Lodges of BC Association, volunteered to attend the show, help staff the booth with Peter, and give the public seminars. The presentations were very successful, with standing room only at almost every one of them. Brad said that, after his first presentation, he quickly realized the audience's general knowledge was quite a bit less than would be found here in Canada. He made a few changes to his delivery and was very pleased with his reception for the rest of the weekend.

After the weekend was over, one of the event's main organizers made a point of approaching Brad to tell him that the avalanche awareness presentations were one of the most popular events at the show. It remains to be seen whether we do this again next year, but it was good to hear that it went so well. Special thanks to Peter Buchholz and Brad Harrison for all their work.

>> Brad Harrison is the President of the BLBC.

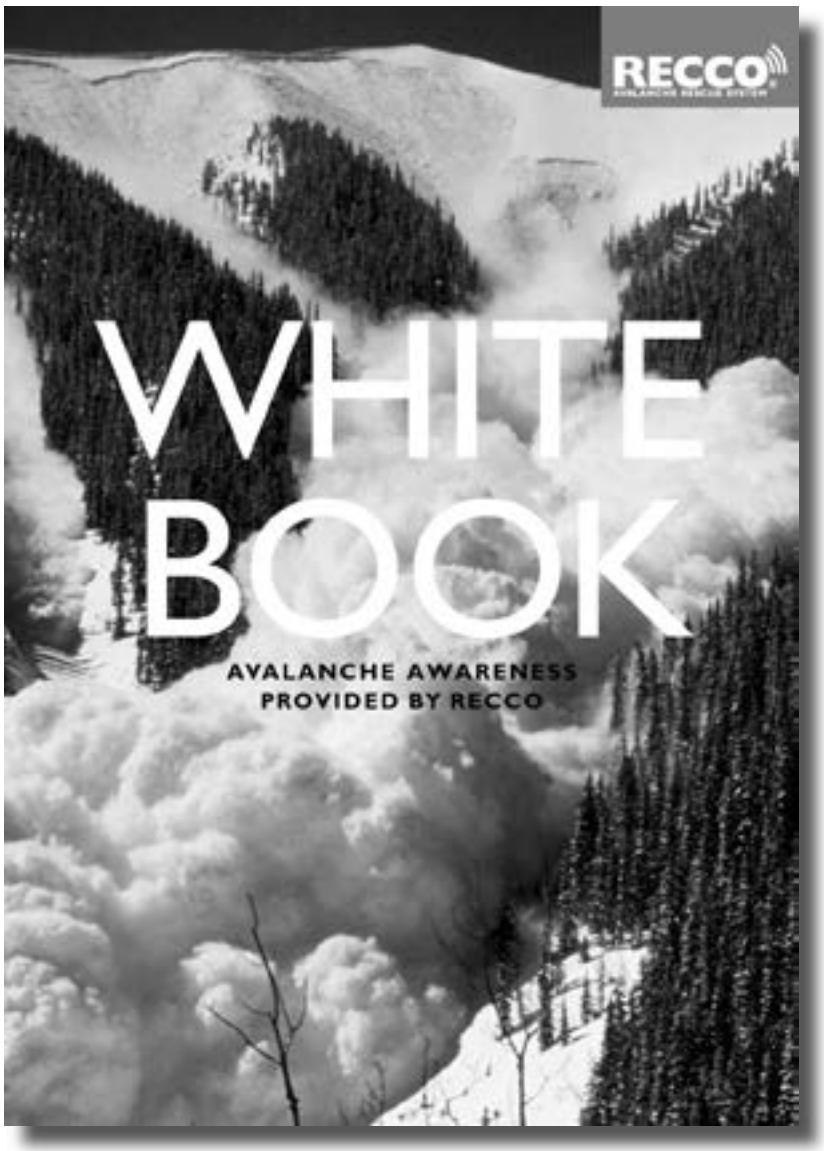
Some 26,000 people attended the exhibition over the weekend. Brad Harrison gave two 20-minute lectures a day for three days, focusing on avalanche awareness and the programs and services offered by the CAA and CAC.

Brad Harrison

Recco's White Book Challenge

A free heli-ski trip can catch the eye of even the most experienced backcountry rider. Recco is well aware of the powerful allure of untracked powder, so this winter the company is leveraging that appeal in an effort to increase avalanche awareness.

In combination with Quiksilver clothing and Bella Coola Heli Sports, Recco is mounting a challenge to riders to earn some heli-ski turns. Winners will get a five-day trip with Bella Coola Heli sports, and a head-to-toe set of Quiksilver Gore-Tex outerwear. To enter the contest, riders must first read Recco's White Book, a pocket-sized publication written by American avalanche forecaster Dale Atkins. They then must answer correctly 11 avalanche-related questions on Recco's website at www.recco.com. Two grand prize winners will be chosen on May 15 from all the correct entries. Winners will be posted on June 15.



ISSW 2006

By Stephane Gagnon

They say that half the fun is getting there. I was willing to argue that point when, right over the San Juan mountains, my flight from Denver to Montrose had engine failure. Things felt a lot better when, on the way back to Denver, the captain told us not to worry, that they were "trained professionals!" Haven't we all heard that one before? Hopefully not in that same situation.

Since the end of the 50s, researchers and practitioners of the avalanche community exchanged ideas and information in informal meetings throughout the western states. In 1982, a number of specialists from the US and Canada gathered at the University of Montana to exchange new ideas and left with the will to better structure these reunions. Two years later, these efforts paved the road to the first ISSW in Aspen, Colorado. Since then, an ISSW has been a biennial event, held in a US community for two consecutive meetings, and Canada takes over every third

This year's ISSW was held in the beautiful mountain community of Telluride, in the San Juan Mountains of Colorado. Some 750 avalanche specialists from 15 countries attended the event from October 1 – 6. Over 150 people presented their research, either through talks or poster presentations. Some of the topics presented included snowpack, avalanche dynamics, spatial variability, decision making and avalanche mapping with GIS. The presentations included a study from the Chic-Chocs by Stéphanie Lemieux from Sherbrook University. For myself, one of the highlights at this ISSW was the GIS mapping models starting to come out after many years of development. With ever-evolving technologies, it is interesting to see how some of these models are becoming more accessible, with greater definition that could help in some forcasting aplications.

Another theme that caught my attention was the emphasis placed on simplifying the way we communicate to the general public. Europe has been faced with these questions for over 10 years already, with a number of decision making tools such as Munter's popular 3 X 3 Reduction Method. Some of this research has made its way overseas and adapted through the ADFAR (Avalanche Decision Making for Amateur Recreationists) project directed by Dr. Pascal Haegeli. Dr. Haegeli's presentation of the new decision-making tool, the Avaluator, was one of a few that shows the importance of communicating and helping the general public be better prepared in the backcountry.

There is no doubt that ISSW is vital for the exchange of ideas—not only at the oral presentations but also in some of the informal exchanges during the poster presentations and the many local beer-tasting workshops. The next ISSW will be held in Whistler, BC, September 21-28, 2008, during the countdown to the 2010 Winter Olympics.

>> Stephane Gagnon is a forecaster at the Centre d'avalanche de la Haute-Gaspésie

The banquet is one of the most popular events at the ISSW. This year it was sold out weeks before the conference.

Brian Gould

As always the Canadian avalanche community was well represented.

Brian Gould

U of C researchers Laura Bakermans and Antonia Zeidler smile for the camera with CAC forecaster Ilya Storm.

ACMG honours Chris Stethem and Bruce Jamieson

On November 11, long-time CAA members Chris Stethem and Bruce Jamieson became honourary members of the Association of Canadian Mountain Guides (ACMG). Both men are well known for their contributions to the avalanche community, but this honour recognizes their specific contributions to the guiding community.

The ACMG communications committee wrote that Chris "has always been an ardent supporter of the ACMG, has trained hundreds of guides and been a mentor to many of us in this association." Bruce was recognized for the development of many practical decision-making tools, and his "influence is felt throughout all winter guiding operations in Canada." Both were honoured for their dedication to avalanche safety and the furthering of avalanche education. Congratulations!

ACMG Communications Committee

Jason Stang

ACMG President Scott Davis presents Chris Stethem with an honourary membership in the guides' association. Unfortunately the camera died before a photo could be taken of Bruce Jamieson receiving the same honour, so we found this image of Bruce happily buried in his work.

Winter Teams

The AdventureSmart teams travel throughout BC to sporting events, community events, ski resorts, schools and camps to spread the message of safe outdoor activity. Here are the members of AdventureSmart teams for this coming season.

Vancouver Team

Adam Wrohan

Adam has been exploring the BC Coast as a kayak guide in Tofino, diving in the waters of Honduras and skiing the slopes of Mt. Washington over the last five years. After traveling, Adam took the Outdoor Recreation Management Program at Capilano College and graduated in 2005. Adam's education, combined with his outdoor experiences and enthusiasm are a great combination for the Vancouver AdventureSmart Team.

Renae Hassel

Renae grew up in Canmore exploring the outdoors and took the Outdoor Leadership Program at Columbia Bible College. Renae was an adventure guide in Alberta's Kananaskis Country, leading hikers, rafters and mountain bikers on excursions. She has also lead trips to New Mexico for caving expeditions in 2005, which gained her valuable skills with the public and outdoor education. Renae is looking forward to this winter as part of the Vancouver AdventureSmart Team.

Kelowna Team

Tim Wheeler

Tim's background includes over 10 years of diverse professional and recreational experiences including trips to the high artic, canoeing various white water rivers and assisting with instruction of the Outdoor Recreation Parks and Tourism program at Lakehead University. He is excited to share his experiences as part of the Kelowna AdventureSmart Team this winter when delivering the programs to children and adults throughout BC.

Lonnie Ariss-Sanderson

Lonnie graduated from the Recreation, Fish and Wildlife Technology Program at Selkirk College in 2003. She has been working in public education with the British Columbia Conservation Foundation delivering presentations on Bear Safety throughout the Central Okanagan. Lonnie's outdoor experiences include snowboarding in the Interior, snowshoeing on local mountains and hiking the trails of BC. Her dedication and experience with public education will benefit the Kelowna AdventureSmart Team.

Emergency Management BC

A new agency called Emergency Management BC (EMBC) is now mandated to enhance all levels of government and first responder agencies' ability to assist British Columbians during man-made and natural disasters through better integration. EMBC is comprised of the Provincial Emergency Program, Office of the Fire Commissioner, and the BC Coroners Service. All consultation, policy development, planning, resource deployment and on-the-ground rescue efforts will be coordinated across agencies to ensure an increased state of readiness, and better and more timely response capabilities as well as efficiencies.

EMBC will also work to enhance the already strong partnerships that exist with federal and local governments, municipal police and fire departments, the RCMP, BC Ambulance Service and community-based search and rescue organizations.

Overseeing this new agency will be Associate Deputy Minister Wes Shoemaker. Shoemaker has spent over 25 ears in the field of emergency services and has vast experience with all types of emergencies, including fires, tornadoes, plane crashes, hazardous material spills and floods. A Harvard fellow, he has worked at the Fire and Paramedic Chief for the City of Winnipeg, and as an emergency medical technician. He has served as a board member on many community and professional associations, including the National Fire Protection Association and the Emergency Medical Services Chiefs of Canada.

The reorganization is being achieved through existing ministry resources.

MSC's International Workshop on Snow Avalanches

By Ken Kwok

The Coastal and Mountain Meteorology Laboratory of the Meteorological Service of Canada (MSC) and the Centre for Natural Hazard Research at Simon Fraser University (SFU) co-hosted their first International Workshop on Snow Avalanches from October 30 to November 2, 2006, at the SFU's Harbour Centre campus in Vancouver. Funding was provided by the National Search and Rescue's Secretariat's New Initiatives Fund, and more than 80 avalanche researchers and practitioners from around the world attended the four-day workshop.

The goals of the workshop were to:

- bring together international and national experts including members of the research modeling, weather forecasting, outdoor user, and the search and rescue communities;
- open the lines of communications among these different avalanche groups, particularly around setting priorities for addressing the various needs in avalanche forecasting;
- examine international approaches to avalanche awareness and forecasting;
- share progress in avalanche research and strategies for overcoming knowledge gaps;
- exchange methods to monitor conditions conducive to avalanches;
- build better understanding of avalanche processes; and
- share strategies for educating the public.

It was hoped that, with this workshop, more accurate and useful avalanche forecasts would reach the end user in a timely fashion so that informed decisions regarding risk factors for outdoor excursions could be made. Ultimately, a reduction in the number of search and rescue (SAR) missions would result from fewer users venturing into high-risk situations, and better-informed SAR crews would be at less risk when called out.

Speakers

Experts, researchers and avalanche practitioners were invited from France, Switzerland, India, New Zealand, USA and Canada to speak on three main themes of the workshop: Tragic Avalanche Winters and Events; Avalanche and Snow Sciences and Modeling; and Avalanche Risk Communication. Plenary speakers at the workshop included:

- Chris Stethem, founder of Chris Stethem & Associates, gave a presentation on the tragic avalanche season of 2003 in Canada.
- François Sivardière, director of l'Association nationale pour l'étude de la neige et des avalanches (ANENA) in France, presented on the causes of the record number of avalanche-related deaths in France last winter and lessons that were learned.
- John Pomeroy, professor at the Centre for Hydrology in the University of Saskatchewan, spoke on challenges of snowpack modeling in complex alpine terrain.
- Jürg Schweizer, scientist at the Swiss Federal Institute for Snow and Avalanche Research (SLF), gave a presentation on the science of fracture mechanics for dry snow slab avalanches.
- Michael Lehning, also from SLF, presented on the current state of snowpack modeling and avalanche forecasting.
- Jakob Rhyner, the third scientist from the SLF, spoke on the avalanche warning program in Switzerland.
- Ian McCammon, founder of SnowPit Technologies in USA, talked about decision making process in a presentation entitled "The Making of an Avalanche Victim"
- Ashwagosha Ganju, joint director of the Snow and Avalanche Study Establishment (SASE) in India, presented on the avalanche forecast program in his country.

In total, there were 28 presentations at the workshop revolving around the three themes.

Participants on the Coquihalla field trip enjoyed a beautiful blue-sky day.

Coquihalla Field Trip

On the second day of the workshop, Dave McClung of the University of British Columbia and Val Vitzotsky of the Avalanche Prevention Program

at the Ministry of Transportation led a full-day field trip to the Coquihalla Highway. The numerous avalanche paths and their associated risks along this busy highway were explored, including potential impacts from recent logging activities near these paths. Current and historic prevention strategies were also presented. These measures include the snowshed, the avalanche wall, historic turret platforms and bomb-carrying trams, and the many passive engineering around the highway.

Panel of Experts

A major goal in public avalanche forecasting is to interpret the results of scientific risk assessments in terms appropriate for non-expert audiences. The transition between the science of avalanche forecasting to the art of communication presents considerable challenges. To provide a forum for discussion on avalanche risk communications, the workshop also featured a panel of experts with the theme "From Science to Art – Avalanche Risk Communication"

Facilitated by Mary Clayton of the Canadian Avalanche Centre, five experts from four different countries presented the different strategies employed in communicating avalanche risk to the public. Since each of the experts' countries uses slightly different techniques and systems, discussions centreed around the different challenges in taking technical observations and translating them into meaningful products the public can understand and use.

The panel members were:
France – François Sivardière; Director, ANENA
Switzerland – Jakob Rhyner; Head, Warning and Prevention, SLF
United States – Knox Williams; Founder (retired), Colorado Avalanche Information Center
Canada – John Kelly; Operations Manager, Canadian Avalanche Centre
United States – Ian McCammon; Founder, SnowPit Technologies

Public Lecture

In keeping with one of the main themes of the workshop, a free public lecture was held at University of British Columbia's Robson Square campus where Jürg Schweizer (SLF) and Pascal Haegeli (SFU) gave presentations on public avalanche risk communications. This Wednesday evening event was highly successful; the lecture theatre was filled to capacity with over 150 attendees.

Dr. Schweizer spoke on snow avalanche hazards in Switzerland, where roughly half of the country is in the mountainous Alps. Dr. Schweizer gave a brief history of the avalanche program in his country, the major avalanche events that helped shape the program, and the challenges it faces at present.

Dr. Haegeli used the public lecture to introduce the Avaluator, a Canadian rule-based avalanche decision support tool for backcountry skiers, snowboarders, and snowmobile riders. Dr. Haegeli gave an overview of the various research projects that led to the Avaluator and spoke on how this tool fits into current avalanche awareness initiatives.

Next Steps

The workshop contributed in a significant way to connecting and integrating the avalanche community, and we feel a real synergy was generated between the various components. The next challenge will be finding a way to continue this dialogue.

A table has been proposed where opportunities to cooperate between different groups will be identified. These opportunities might include snow and atmospheric modeling, forecasting tools, and strategies in public communications of risk. The proposed table would facilitate these different opportunities. Future meetings similar to this workshop, where there are fewer participants than major conferences, will also be explored.

>>Ken Kwok is a High-Impact Weather Meteorologist for Environment Canada's Coastal & Mountain Meteorology Lab. He was one of the conference organizers.

Pascal Haegeli's1` public lecture on the Avaluator was well attended and well received.

Schedule of Coming Events

January 12-14, 2007
Avalanche Awareness Days

The CAC's annual event, presented by the Canadian Pacific Railway, just keeps getting bigger and better. This year, the national media event will be held Jan 12 at Kicking Horse Mountain Resort in Golden, BC. Over the Jan 13-14 weekend, some 30 communities and ski areas across Western Canada will take part by hosting a variety of activities aimed at avalanche awareness and education. Remember, there's always room for more volunteers!

Where: Kicking Horse Mountain Resort, and at a ski or sledding area near you.
Info: www.avalanche.ca
Contact: Call Karen Dubé (250) 837-2435 or e-mail kdube@avalanche.ca

January 31, 2007
Abstract Submission Deadline, IUGG General Assembly

The International Union of Geodesy and Geophysics meets every four years. This year, the meeting will be held in Perugia, Italy from 9 – 13 of July. A session on snow avalanches will be held, focusing on field observations and modelling. Emphasis will be on the integration of observations and the verification and improvement of models.

Info: www.iugg2007perugia.it

February 23 & 24, 2007
CAF Annual Fundraising Dinner

Once again, the Canadian Avalanche Foundation has organized two terrific benefit dinners for avalanche awareness—one in Whistler and one in Calgary. Both events will be co-hosted by CAF Director Justin Trudeau and CAF President Chris Stethem. Keynote speaker is physician, scientist, deep-sea explorer and author Dr. Joe MacInnis. Tickets are $175, and tax deductible.

Where: Feb 23 Nicklaus North, Whistler / Feb 24 Hyatt Regency, Calgary
Info: www.avalanchefoundation.ca
Contact: Call the CAF at (403) 678-1235 or email: info@avalanchefoundation.ca

February 24-25, 2007
Kootenay Cold Smoke Powder Festival

See the article on page 35 for more information on this event

Where: Nelson, BC
Info: www.coldsmokepowderfest.com

April 16-20, 2007
Western Snow Conference 2007

2007 brings the 75th anniversary—the diamond jubilee—of the Western Snow Conference. This year, organizers are going all out to mark this celebration of all things snow, ice and water.

Where: Kona, Hawaii
Info: www.westernsnowconference.org
Contact: e-mail conference chair Randall Julander: randy.julander@ut.usda.gov

May 5-6, 2007
HeliCat Canada Annual General Meeting

Where: The Grand Okanagan Lakefront Conference Centre, Kelowna BC
Contact: Call (250) 542-9020 or e-mail info@helicatcanada.com

May 7-11, 2007
Canada West Ski Areas Association Spring Conference

Where: The Grand Okanagan Lakefront Conference Centre, Kelowna BC
Info: Call (250) 542-9020 or e-mail office@cwsaa.org

May 7 – 11, 2007
CAA Annual General Meeting and Spring Meetings

Preparations for the CAA's 25th Anniversary AGM are well underway and it is already shaping up to be a once-in-a-lifetime event. See the ad on page 11 for more details on what we have planned so far. A more detailed itinerary of the week will be available in the spring issue of Avalanche.ca and on our website.

Where: Penticton, BC
Contact: Call Ian Tomm at (250) 837-2435 or email ian@avalanche.ca

Hatha Callis

Stability tests: If not, why not

By Cam Campbell

INTRODUCTION

After studying spatial variability of stability tests for several years, I've often been asked if I've lost faith in their predictive merit. My answer has always been "No" and in this article I hope to explain why. Specifically, I want to focus on the reliability of compression and rutschblock tests to indicate the likelihood of skier-triggering a particular slope.

First of all, I feel that I should remind everyone (especially myself) that spatial variability is not new. Avalanche forecasters, guides, researchers, recreationists, etc. have been dealing with it for decades in a variety of ways (Jamieson, 2003). What is new is our understanding of the effects on stability test interpretation and methods to reduce this uncertainty, such as fracture character and rutschblock release type.

Because they deal directly with load on weak layers, stability tests—such as the compression and rutschblock test—are considered highly relevant and easy to interpret Class I (Stability Factors) data. This means that compression and rutschblock tests give direct evidence of stability and the results should be interpreted with higher priority than Class II (Snowpack Factors) and Class III (Meteorological Factors) data. However, an abundance of information is still needed to compensate for uncertainties (McClung and Schaerer, 1993).

RUTSCHBLOCK TESTS

First and foremost, rutschblock tests do have predictive merit. Figure 1 shows that as rutschblock score increases, the likelihood of skier-triggering the same slope decreases. These data were collected by performing rutschblock tests at representative sites on slopes that were skier-tested. The good news is that 100% of the slopes with a rutschblock score of 1 were skier-triggered; the bad news is that 10% of the slopes with rutschblock score of 7 were skier-triggered. This is bad news because it is these false-stable results that could potentially get us into trouble. If the rutschblock test was perfect, none of the slopes with a rutschblock score of 7 would be skier-triggered.

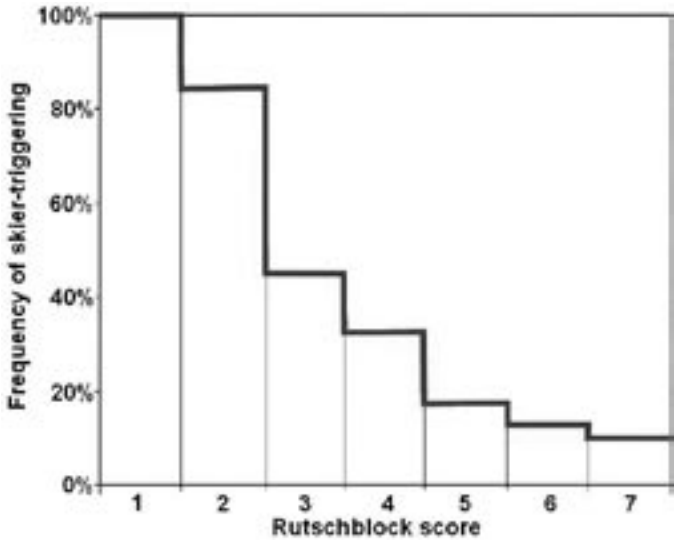


Figure 1 – Frequency of skier-triggering versus rutschblock score on slopes that were ski tested. (Applied Snow and Avalanche Research, University of Calgary (ASARC) data)

Jamieson and Johnston (1993) performed arrays of rutschblock tests on sheltered uniform slopes. They found that, even on apparently uniform slopes, you're not always going to get the same result. In fact, only 67% of the time can you expect to get a result that's representative of the entire slope (Figure 2a). What's even scarier is that 14% of the time you're likely to get results that suggest the slope is more stable than the majority of it is. Nonetheless, 97% of the time you can expect to get a rutschblock result that is within ±1 score of the slope median, which isn't bad considering all the sources of variability even on uniform slopes (i.e. variability associated with the test procedure, operator error, etc.). However, when arrays are performed on slopes with variability characteristic of avalanche start zones, and we're talking obvious variability similar to the slope shown in Figure 3, this proportion is reduced to 84% (Figure 2b). Furthermore, it is possible to get rutschblock scores of 2 and 7 on the same slope within a couple of metres of each other (Campbell, 2004).

This suggests several things. First of all, and we'll start with the obvious ones, uniform slopes are less variable than your average avalanche start zone.

Figure 3 – A slope with obvious signs of spatial variability due to wind drifting.

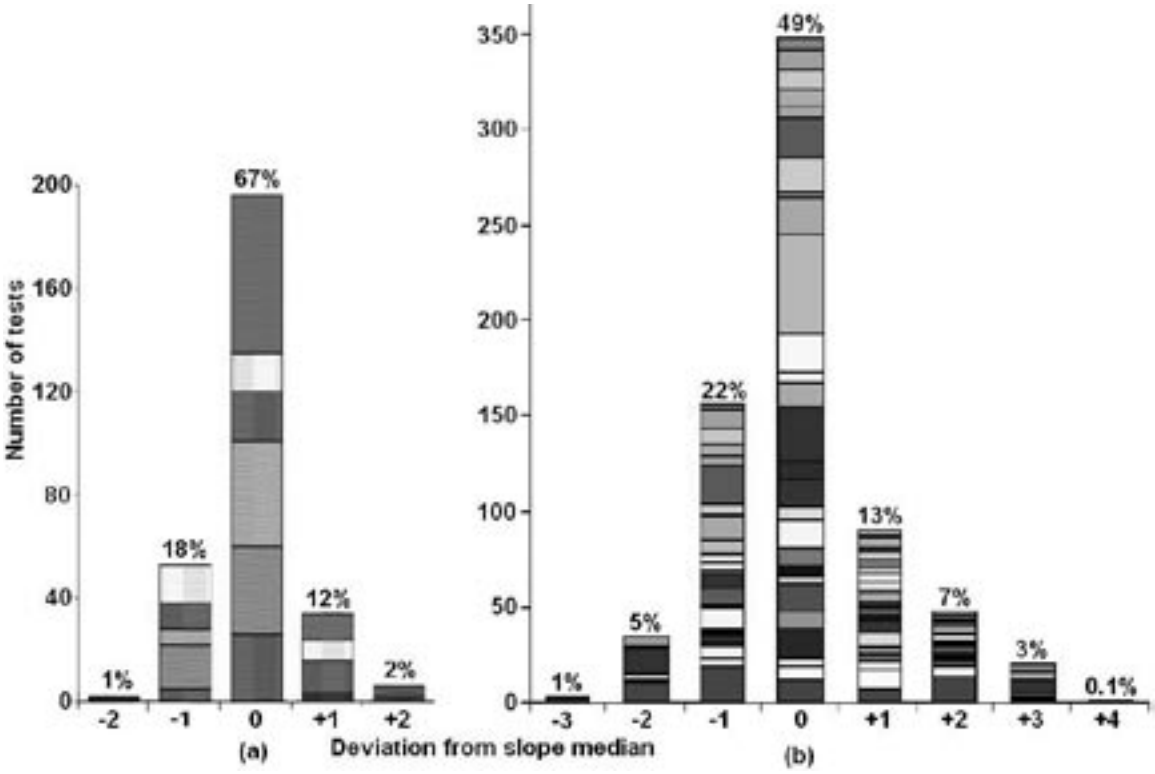


Figure 2 – Combined distribution of deviations from the slope median rutschblock score for (a) arrays performed on uniform slopes (Jamieson and Johnston, 1993) and (b) arrays performed on slopes with obvious variability (Campbell, 2004). Each shade of grey represents one array.

Secondly, there are definitely uncertainties associated with rutschblock scores. Thirdly, it is often easy to pick out areas on an obviously variable slope that will likely give abnormal rutschblock results. In fact, it is often beneficial to seek out these areas for test sites if one wants to observe the effects of, for instance, wind loading on stability. Fourthly, if performed according to standardized procedures, rutschblock tests can be reliable and results can be repeatable. Having said that, however, the results can also be misleading.

One potential way to reduce the uncertainty associated with rutschblock tests is to incorporate release-type observations (Schweizer and Wiesinger, 2001; Campbell, 2004) into test results. The proportion of the block that fails, whether it's the whole block, most of the block or only an edge, is less variable than the rutschblock score (Campbell, 2004) and may provide information about fracture propagation propensity. For example, a rutschblock score of 6 where only the edge of the block releases can be interpreted with more certainty than a rutschblock score of 6 where the whole block releases.

COMPRESSION TESTS

Like the rutschblock test, compression tests also have predictive merit (Figure 4). As the number of taps increases, the likelihood of skier-triggering the same slope decreases. These data were collected by performing two to four adjacent compression tests at representative sites on slopes that were skier-tested and averaging the taps for the primary weak layer. However, like the rutschblock test, the compression test isn't perfect. If it was, 100% of the slopes with easy compression test results would have been skier-triggered. Although it is

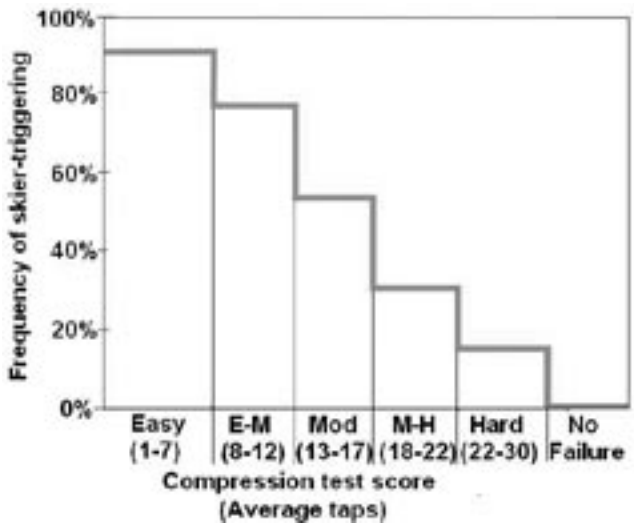


Figure 4 – Frequency of skier-triggering versus compression test score and the average number of taps on slopes that were ski-tested. The average number of taps was calculated from results of 2-4 adjacent tests. (ASARC data)

promising to note that none of the slopes for which the compression tests produced no failures were skier-triggered.

So, one way to reduce the uncertainty associated with spatial variability of compression tests has already been mentioned: if you're going to do compression tests, do at least two and average the taps for a specific layer. Secondly, only rely on the score (Very Easy, Easy, Moderate, Hard or No Failure) and don't get caught up with the actual number of taps. Due to the nature of the test, we can't ask too much from the results (i.e. don't try to differentiate between 15 and 18 taps). Finally, by incorporating fracture character observations into compression test results, not only are we reducing the uncertainty associated with spatial variability but we are also potentially gaining information on fracture propagation propensity (van Herwijnen, 2005).

DISCUSSION

At this point, I think it's safe to say that we can rely on rutschblock and compression tests to give us an indication of the likelihood of skier-triggering a particular slope. But it's only an indication and there are definitely uncertainties associated with these tests. These tests are also only indicators for the slopes on which they were performed (assuming the test was performed on a representative portion of the slope) and extrapolating the results over the surrounding terrain opens up a whole new can of worms, which is way beyond the scope of this article.

Stability tests become especially important for assessing stability when there are no other signs of instability (e.g. avalanches, whumpfing, shooting cracks, etc.) as they are the only Class I data we have. There are certain advantages to seeking instabilities when assessing a slope (McClung, 2002a, 2002b). This may mean performing stability tests in thin areas, near ridge crests or on convexities, which is easy on variable slopes. If the slope is uniform, however, seeking out instabilities may not be nearly as intuitive. In this case, it is likely that the test result will be representative of the slope.

Rest assured, even with all this recent focus on spatial variability, stability tests are just as reliable as they have always been, and perhaps even more reliable. This is because we can reduce some of the uncertainties by incorporating release type observations into rutschblock test results and fracture character observations into compression test results. It is also beneficial to perform multiple adjacent compression tests and average the taps for a particular layer but only record the ordinal score (not the number of taps). The bottom line is: diggin' it can help you dig it...you dig?

ACKNOWLEDGEMENTS

I would like to thank Bruce Jamieson for providing the graphs used in Figures 1 and 4, and Ilya Storm for proofreading.

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A Proposed Standard for Shovel Tilt Test Procedures

By Karl Klassen, October, 2006

INTRODUCTION

A number of tests are used in the Canadian avalanche industry to obtain information about bonding between layers and aid in the assessment and forecasting of snow stability. Formalized field tests include shovel shear[1], shovel compression[2], and rutschblock[3] tests. These tests are relatively simple to carry out, require no special equipment, and can be used in any field applications

While the above tests are effective in most situations, they are known to be less than ideal in identifying and assessing a known or suspected weak layer in soft snow near the surface of the snowpack (often storm snow or recently fallen new snow). Experienced practitioners have long used an informal tilt table[4] test to identify and test such weak layers in the field. A formalized procedure for a field tilt test (the Shovel Tilt Test) is proposed. The methods suggested here are based on many years using and teaching the Shovel Tilt Test and incorporate components of existing tilt table procedures.

WHY STANDARDISE

Since there are many factors and variables that affect the quality of information obtained from bonding tests, it is important to reduce inconsistency and error in testing procedures whenever and wherever possible. Doing so will help practitioners get the best possible results and will make those results more applicable to the decision making process. This has long been recognised by professional Canadian practitioners with other types of field stability tests such as shovel shear, shovel compression, and rutschblock tests, the standards for which have long been documented and accepted.

The simplest way to reduce errors and inconsistency is to carry out tests according to a recognized standard. Using standardised procedures allows practitioners to more readily discuss and compare results with others over time, from place to place, and between people and organizations. The standard proposed here uses current procedures for other types of tests described in the Canadian Avalanche Association's "Observation Guidelines and Recording Standards for Weather, Snowpack, and Avalanches" as a model. In addition, recently developed procedures for observing and recording fracture character[5] are incorporated.

COMMENTS

Previous drafts of this proposal have been reviewed by the CAA Technical Committee. Comments from the TC focussed primarily on whether the Shovel Tilt Test should include a strength component. That is, most people agreed it was possible to identify failure and characterize failure qualities, but they wondered if the number of taps used to produce failure should be standardized and/or recorded.

The discussion did not lead to a clear conclusion on this question, therefore, in the interest of obtaining feedback from a broader audience, the proposed standardization of applying force by way of taps remains in this draft of the proposal. Feedback on this proposal should be send to the CAA Technical Committee: technical.committee@avalanche.ca.

OVERVIEW

Tilt tables can be used to identify shear planes in relatively soft new/storm snow. Once a shear plane is identified, a shear frame and force gauge are used to gather data required for calculating stability ratios. Tilt tables and shear frame equipment are not practical in a backcountry environment. Other field tests, such as the shovel compression and shovel shear tests are often not effective in transferring the force applied to the shovel to weak layers in very soft and soft snow. The rutschblock test is not effective in assessing layers when skis penetrate deeper than the weak layer, a common situation when weak layers exist in soft and/or recently fallen snow near the surface of the snowpack. All this suggests that a field test that is effective for weak layers in soft snow near the surface of the pack is not only useful but desirable and necessary.

The Shovel Tilt Test (sometimes referred to as a burp test) has been used by practitioners since at least the late 80s (and probably earlier) to obtain information about bonding characteristics and by extension, snow

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[1] Observation Guidelines and Recording Standards for Weather, Snowpack, and Avalanches. Canadian Avalanche Association, September 2002, page 30.

[2] Ibid, page 32.

[3] Ibid, page 28.

[4] Ibid, page 27 "Locating the Weak Layer"

[5] Guidelines for Observation and Recording of Fractures in Small Column Snowpack Tests. Avalanche News Volume 76, Canadian Avalanche Association, Spring 2006, page 16.

Jennie McDonald uses the burb test to find some nice layers in the new snow of Cedar Bowl at Fernie Alpine Resort.

stability, in certain circumstances. This test combines elements from tilt table procedures and shovel compression tests. It yields usable information where many other field tests are less effective (i.e.. soft, new/storm snow on the surface).

OBJECTIVES

The primary objective of the Shovel Tilt Test is to identify potential failure layers in the snowpack. If failure occurs, the relative strength of the shear plane at the site tested may be indicated by the test score and fracture characteristic of the failure. Test results and scores, when carried out and recorded in a consistent manner, can be useful in assessing and forecasting snow stability. They can contribute to hazard analysis, hazard forecasting, and operational decision making.

APPLICATION

The Shovel Tilt Test is NOT effective when the tested snow:

- Is relatively hard (i.e. > 4F+ using hand resistance tests).
- Consists of thick layers of well-developed facets or other grains with very weak bonds (i.e. the column crumbles, collapses, or breaks apart when picked up on a shovel).

If any of the above conditions exist, the results of the Shovel Tilt Test are likely compromised and other tests should be used to gather information about bonding and stability.

The Shovel Tilt Test is well suited to testing:

- Storm snow as it is accumulating.
- Recently fallen new snow or decomposed and fragmented snow interfaces where hand resistance is ≤ 4F+.
- Thin weak layers (surface hoar, facets) sandwiched within new snow or within decomposed and fragmented layers with hand resistance of ≤ 4F+.

SITE CONSIDERATIONS

As with any other test, a representative site is always desirable. The more the site represents the terrain and snowpack being assessed the more relevant the results will be. Once a site has been chosen, the shovel tilt test can be carried out on any incline.

FIELD TECHNIQUE

The Shovel Tilt Test can be used in conjunction with a test or full profile where potential failure planes are identified by other observations. However, it is perhaps most useful when it is difficult to determine potential failure planes by other means (e.g. very thin layers or interfaces in storm snow that are difficult to find through other observation techniques or standard stability tests).

Use the pit wall of a snow profile, or dig a pit deep enough to create a column of snow that includes the layer(s) to be tested. This pit should be large enough to allow isolation and removal of the column (possibly in stages) by picking it up with a shovel. If possible, failure layers should be identified before applying the Shovel Tilt Test. If known or suspected failure layers have been identified (e.g. profile observations, ski testing, avalanche observations, etc.) note the locations of failure layers before proceeding. If failure layers have not been identified by other means, use steps 1 -

1. Measure and gently mark the dimensions of the shovel on the surface of the snow. Care is required not to disturb the snow that will be tested.
2. Using a saw, cut the sides of the column.
   - The width and length of these cuts should be such that the column to be tested will fit on the shovel.
   - The depth of these cuts should be the entire depth of the snow to be tested.
   - On one side of the column, cut a chimney large enough to allow a knife to be inserted for cutting the back.
   - Remove a wedge on the side of the column opposite the chimney to eliminate binding when the column is removed from the pit wall.
3. a) If failure layers have not been identified by other means:
   - Insert the blade of the shovel about 40cm below the surface, then proceed to step 4.

   b) If testing known or suspected failure layers that have been identified by other means:
   - If there is more than about 20cm of snow above the weak layer, carefully remove that snow so about 20cm of snow remains above the weak layer.
   - Insert the blade of the shovel about 20cm below the weak layer.
   - Carefully pick up the column on the shovel and remove it from the pit wall. You should now have a column of snow on the shovel that is about 40cm high, more or less fits on the shovel (perhaps with a little extra on the sides and back), and which has the weak layer about in the middle of the column.
4. Support the shovel on one knee, and place one hand at the handle edge of the shovel so the side of the hand or wrist supports the column (you want to prevent the block from sliding off the shovel as you apply force).
5. Trim any excess snow from the sides and back of the column to ensure there is no overhang.
6. Tilt the shovel (with the block on it) if necessary so the layers are inclined to about 15 degrees. If the test is carried out on a slope, tilting the shovel may not be necessary.
7. While the block is being removed from the pit wall, positioned, trimmed, and tilted watch for failure.
8. Apply force
   a. Using the tips of the fingers and moving the hand only from the wrist, tap 10 times on the bottom of the shovel
   b. Using the palm of the hand and moving the hand and lower arm only from the elbow, tap 10 times on the bottom of the shovel.

   NOTE: Experience indicates that further taps (i.e. using the whole arm from the shoulder as in shovel compression tests) is ineffective in these tests where very soft, new snow is being tested.
9. a) If failure layers were not identified by other means:
   - Note any failures,
   - Repeat steps 3.b) – 8. until the entire depth of the snow being observed has been tested.
   - It may be necessary to test the entire depth a second time to ensure all potential failure layers have been assessed. Begin the second round by removing 20cm of snow from the surface then inserting the shovel at 40cm increments below.
   - Once all potential failure layers have been identified, go back to step 3. b) and test the failure layers.

   b) If testing failure layers that have been previously identified (i.e. by pre-testing with the Shovel Tilt Test or by other means):
   - Keep a running count of the number of taps as they are applied to the shovel.
10. As you are tapping, watch the snow on the shovel. If it crumbles or falls off the shovel, there is no shear failure and the test can be halted.
11. If a shear failure is observed, stop applying load and record the failure.
12. A tilt test is considered complete when all the new snow from the surface to the old/new interface has been tested.
13. Record only the results from the final tests where the weak layer was positioned correctly (near the middle of a 40cm high column).
14. If results from the first two tests differ significantly, a third or more tests should be carried out to see if a consistent pattern develops. Additional tests from other locations may also be indicated if there is significant variation in results.
15. Observe and record any results (see following).

RECORDING

Use the same recording standards as for other, similar tests. That is: <Type of test> <Test score>

<(Fracture character)> @ <Depth in profile> on <Failure layer characteristics (grain form, grain size, date of burial, if known)>

Example: TTE 5 (SP) @ 51 on PP, 3mm, 060219

TEST SCORING SCALE AND DATA CODES

Failure Occurs:	Test Score	Data Code
While removing the block from the wall.	TT0	TTVE
When tilting the shovel.	TT0	TTVE
During first set of 10 taps	TT1 - 10 (according to the running count)	TTE
During second set of 10 taps	TT11 - 20 (according to the running count)	TTM
No failure at 20th tap	TT35	TTN

INTERPRETATION

Lower scores are often indicative of poorer stability than higher scores.

Sudden Planar and Sudden Compression fracture characteristics are often indicative of poorer stability than other types of fracture.

Consistent results from several tests are likely a more reliable indication of instability than results from only one test or results that vary considerably between tests.

Results that support or confirm conclusions drawn from other tests and observations are likely more reliable than a Shovel Tilt Test carried out in isolation.

As with all field stability tests, it must be stressed that Shovel Tilt Tests are one part of a very large and complex puzzle. Test results require interpretation by experienced practitioners before being used to assess or forecast snow stability and avalanche hazard. The results of Shovel Tilt Tests alone should not be used as an indication that a slope is stable or conditions are safe—they are a single, spot observation and must be interpreted in combination with other information in a comprehensive process if they are to be used in stability or hazard analysis and forecasting.

SUMMARY

The Shovel Tilt Test has been used for many years as an informal test. It is useful in specific conditions and snow types where other tests tend to provide inconclusive or no results. Applying the test requires no special equipment and minimal training and experience. In the hands of an experienced practitioner, information obtained from Shovel Tilt Tests can be helpful in determining bonding characteristics between layers of soft snow and can aid in the assessment and forecasting of new snow soft slab instabilities and associated avalanche hazard.

There are no formal guidelines currently in place for carrying out this test and recording results. Therefore, it is likely that different practitioners use varying procedures, making test results difficult to compare from time to time, place to place, and between observers. This paper proposes formalization of procedures and recording standards based on existing procedures and standards for other, related tests and observations.

ACKNOWLEDGEMENTS

The Shovel Tilt Test is not new and certainly not an original idea of mine. This and similar tests have been used in the National Parks Warden Service, by guides, and by avalanche professionals for many years. Nor are the procedures or standards proposed here a new or novel idea. The contributors, reviewers, and editors of the CAA's Observation Guidelines and Recording Standards for Weather, Snowpack, and Avalanches did much of the groundwork from which grew the ideas presented here. Similarly the authors of various papers over the years and work by the CAA Technical Committee provided a foundation upon which many of the ideas presented here are based.

This paper relies heavily on an early version of a standardised Shovel Tilt Test procedure created in the late 1990s. The original work from that time was made possible with support and funding from the American Institute for Avalanche Research and Education.

[6] Guidelines for Observation and Recording of Fractures in Small Column Snowpack Tests. Avalanche News Volume 76, Canadian Avalanche Association, Spring 2006, page 16.

An Update on Digital Penetrometer Technology

James Floyer, ASARC, University of Calgary

INTRODUCTION

Digital snow penetrometers offer the possibility for rapid assessment of snow stratigraphy in the field. With sub-centimetre layer resolution, these instruments are far ahead of the original Rammsonde penetrometer and there is no need to repetitively drop weights. It is quite feasible to sample multiple locations within a relatively short period of time, allowing an assessment of the spatial variability within the sample area.

Penetrometer models

Currently there are at least three models of digital penetrometer in development or use:

1. The Snow MicroPen (SMP), developed by the Swiss Federal Institute for Snow and Avalanche Research (SLF). Measures force-resistance, which is an analogue for hand hardness (Schneebeli and Johnson, 1998; Schneebeli et al., 1999; Pielmeier and Schneebeli, 2000). It is probably the probe that is in the most advanced stage of development and has the highest sampling rate of all the instruments. It uses a motor drive to push the probe into the snow at a constant rate. The most expensive of the force-resistance probes.
2. The SABRE Penetrometer, developed by Himachal Safety Systems (HSS). Measures force-resistance and snow temperature (Mackenzie and Payten, 2002). Out of the box, this is the lightest and most portable instrument and the easiest to use. For our research purposes we required more accurate depth measurements than the standard instrument was able to provide; the modifications we made to achieve this are summarized in the second half of the article.
3. The Capacitec Snow Probe, developed by Capacitec, Inc. Measures the dielectric permittivity of snow, which is an analogue for density and snow temperature (Louge et al., 1998). With further work, grain type might be deduced from the imaginary component of the dielectric permittivity signal. This unit has a low sample rate, which means that the instrument must be driven into the snow slowly to achieve a good vertical resolution, although the sample rate will be increased in the future. The instrument is driven into the snow manually and has been field tested in the Columbia Mountains (Conger, 2006).

SABRE Penetrometer transect across a gully

In order to test the ability of the SABRE penetrometer to detect variations in snow stratigraphy, a transect was taken using the SABRE penetrometer over a gully feature in the Columbia Mountains of British Columbia (Figure 1). The gully was approximately 20 m wide and 3.5 m deep. The two gully sides were not completely parallel, and faced east and south respectively. Nineteen individual profiles were taken using the penetrometer at approximately 1 m spacing. The transect was surveyed on 20 March, 2006.

The general shape of the profiles in Figure 1 shows a deepening of the snowpack in the central portion of the gully, where snow has accumulated from wind transport.

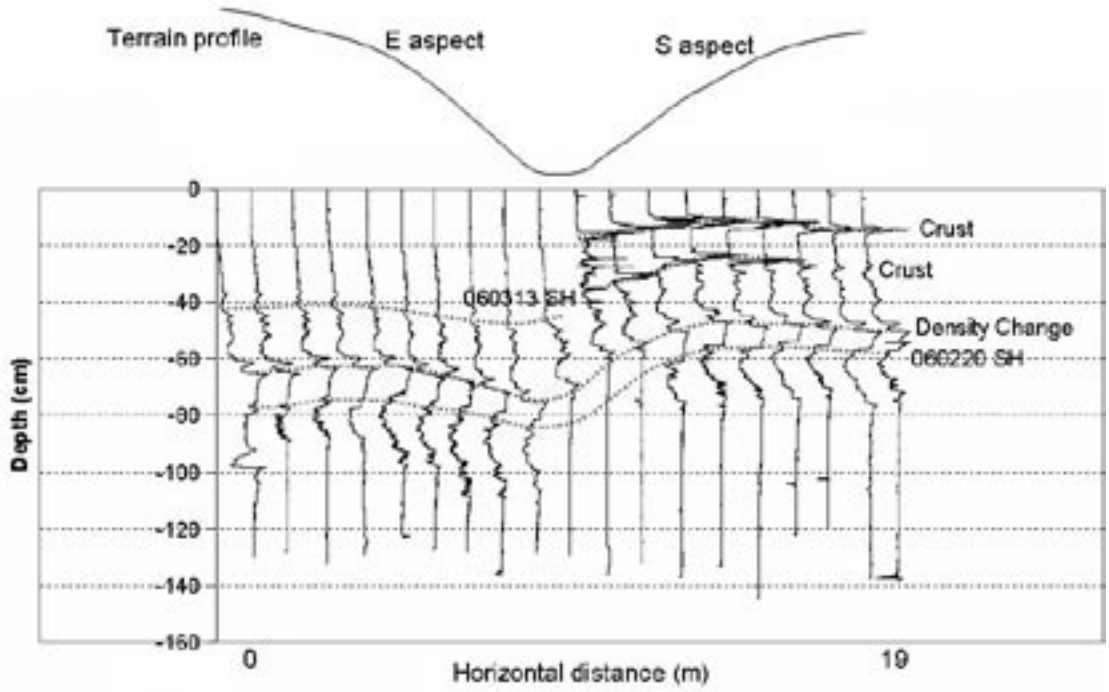


Figure 1: Transect of penetrometer profiles across a gully with interpretation of layers. The shape of the gully is shown above.

Layer depths are substantially shallower on the south-facing side of the gully compared to the east-facing side due to increased solar radiation. Also present on the south aspect are a pair of sun crusts near the surface, with the upper crust being thicker and more extensive than the lower crust.

Interpretation of the transect was aided by two manual snow profiles, one done on the east aspect near the start of the transect and one done on the south aspect, near the centre of the transect. The east aspect profile showed a thin surface hoar layer (060313) overlain by a thin layer of decomposing fragments. This layer combination is visible on the east side of the transect and is indicated by a shallow depression in the force-resistance signal but is not visible on the south aspect of the transect. At approximately 63 cm depth on the east aspect, a density change (P- to P in the manual profile) makes a convenient marker that can be traced well across the entire transect. Note that this layer boundary is only 47 cm down on the south-facing side as a result of increased ablation on the solar aspect. Beneath this there is a second layer of surface hoar (060220) that is characterised by a thinner, more abrupt depression in the force-resistance signal. Although it is lost in the central portion of the transect, this layer can be found again on the south aspect side of the gully, which means that it was burred before solar radiation had a chance to melt it out.

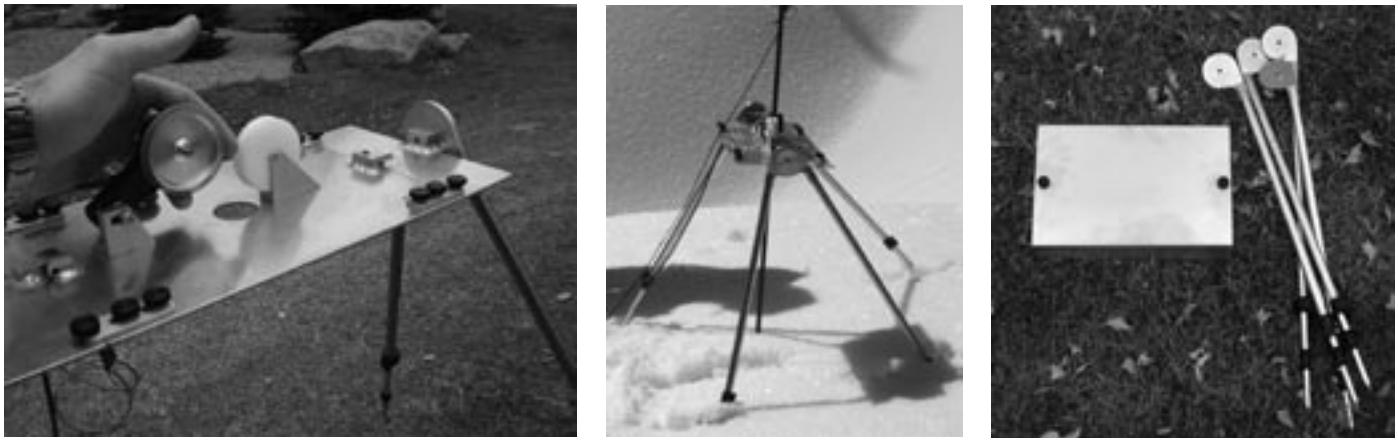
Modifications to SABRE penetrometer

We have been testing and modifying a SABRE penetrometer for the last two years. In field trials in the Columbia Mountains, depth measurements from the built-in accelerometer (a device that measures the acceleration of the instrument) varied by up to 30% from manual measurements of layer depths measured at the same location as the penetrometer pushes. In order to be able to trace layers from one profile to another and infer changes in the structure of the snow, we required a greater accuracy and precision for layer depth and thickness measurements. In order to address this, we built an external depth encoder platform. The details of this modification are described below.

U of C depth encoder platform

The depth encoder of the U of C modified SABRE penetrometer comprises of a Tru-Trac TR1 encoder wheel mounted on a custom built aluminium platform (Figure 2a). Both the depth signal from the encoder wheel and the force signal from the probe tip are recorded by a Campbell Scientific CR1000 datalogger (Figure 3).

Depth encoder platform: This is constructed from 3 mm aluminium alloy. Swivel-mounted, multi-section ski pole legs allow for rapid adjustments to uneven terrain (Figure 2b). In order to allow for field portability, the legs are removable. The two sides of the platform fold up and a thin metal cover is fitted to protect the encoder during transport (Figure 2c). Once folded up in this manner, the encoder platform easily fits into a backpack and the legs may be strapped to the outside for transport.



(a) *(b)* *(c)*

Figure 2
Legs are removable, platform sides fold up and a cover plate fits over the top to protect the unit for transport.

Depth encoder wheel: The Tru-Trac TR1 is an optical encoder wheel that pulses 1024 times each time the wheel is rotated by the descending probe. The TR1 is powered using the 5 V supply from the CR1000 datalogger and the square-wave output from the TR1 is recorded by one of the pulse counters of the CR1000. A 20 cm circumference wheel was specified; this results in approximately five pulses per millimetre.

Force data recoding: In order to synchronize the force measurements with the depth measurements, force measurements from the penetrometer tip are also

Figure 3: Recording setup. Note CR1000 datalogger, large 12 V lead acid battery for the datalogger on the left under the Palm Pilot, and 9 V battery bank for the supply voltage to the penetrometer tip.

recorded using the CR1000 datalogger. After the modifications we did not use the original red power supply/D-A converter box supplied with the penetrometer. 9 V is supplied to the penetrometer tip from a battery pack to power the electronics circuits. The force signal output from the tip is connected to 10 of the single-ended voltage inputs on the CR1000. When run at a program repetition rate of 100 Hz, this gives an overall recording rate of 1000Hz. However, an analysis of the output shows a regular pattern of duplicated values, indicating that there is another electronic component that is restricting the sampling rate to about 500 Hz.

Temperature data recording: We have not implemented this, although it should be possible to record temperature measurements along with the force measurements.

Datalogger control: The datalogger is controlled using a Palm Pilot handheld PC. We have tried a direct connection using a serial cable and an infra-red connection using an SC-IRDA cable to link the datalogger to the Palm. We found the most reliable connection to be with the serial cable, although the disadvantage to this is that only high-end Palm units are supplied with serial capability and a custom serial cable must be ordered from Campbell Scientific specific to the Palm unit that you have. CR1000 program control is quite straight forward using the Palm and data from the datalogger can be periodically uploaded onto the Palm to free up space on the datalogger for more profiles. We have found that the datalogger stores about 300 seconds of raw data, which equates to about 30 pushes (profiles) before data must be transferred to the Palm.

Performance

The modified SABRE penetrometer has performed well in field trials (Floyer and Jamieson, 2006) and has proved to be reliable. Depth accuracy is ±1 cm for a 1.5 m push; precision is <1 mm for a 10 cm layer. A significant component to the depth accuracy is locating the exact surface of the snow when starting a push, since the operator is holding the probe at head height in preparation to push it into the snow, while trying to keep the tip just resting on the surface of the snow. This can be minimised by having an assistant sighting the bottom of the penetrometer tip, however, in practice, we do not consider this error to be important to the interpretation of profile results.

FURTHER INFORMATION

Further information regarding wiring diagrams, a control program for the CR1000, or any other aspect of this modification can be obtained from James Floyer, jafloyer@ucalgary.ca.

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Inventaire des avalanches mortelles au Québec depuis 1825

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Abstract: Analysis of coroner's reports, news articles and previously published materials has permitted the research group to identify 40 avalanche accidents causing 80 deaths in Québec since 1825. This survey must be considered still incomplete as efforts to uncover archival information on avalanche accidents in all areas of the province are still underway.

Avalanches are the second leading cause of loss of life due to natural hazards in Québec, after landslides. All regions of the province are affected. A surprise finding of this research is the large number of residential avalanche accidents (18) causing 48 deaths and 47 injuries since 1825. A further 18 accidents causing 22 deaths are related to recreational activities including skiing, tobogganing, and snowmobiling. The majority of these accidents occurred on short steep slopes in the St. Lawrence valley subsequent to storm activity. The rapid rise in popularity of backcountry skiing particularly in the Chic Choc mountains of Gaspésie led to 2 deaths in March 2000, and numerous injuries since then. Avalanche accidents on roads in Gaspesie have also claimed at least 3 lives since 1935.

Three common features in the conditions leading to avalanche accidents have already been identified thanks to analysis of the historical record. Avalanche accidents are linked to periods of high snowfall followed by particularly strong winds. Severe rain-on-snow events have been responsible for several deadly avalanches including a slushflow in the Charlevoix region that caused 10 deaths and destroyed at least three houses. Many avalanches claimed lives on short slopes with less than 50 metres of vertical relief.

Conclusions to date include: It is no longer possible to maintain that avalanches are only a relevant threat to backcountry skiers frequenting the Chic Choc mountains. Avalanche accidents have occurred in many areas, including in cities and villages where the population remains exposed to this threat. The inventory of avalanche-threatened areas has never been completed in Québec and it is likely that avalanche risk is more widely spread than previously thought.

L'analyse croisée des enquêtes des coroners des districts judiciaires de Beauce (1862-1947), de Charlevoix (1862-1944), de Montmagny (1862-1952), de Québec (1765-1930), de Sherbrooke (1900-1954), de Rimouski (1948-1976) et de Gaspé (1815-1970), des articles publiés dans les journaux et des compilations déjà publiées (Stethem et Schaerer 1979; Stethem et Schaerer 1980; Schaerer 1987; Jamieson et Geldsetzer 1997; Jamieson et Brooks 1998; Boucher 2000; Gagnon 2003) a permis de dresser un premier bilan des accidents attribuables aux avalanches au Québec depuis 1825 (cf. tableau 1). Il est important de souligner qu'aucun des inventaires consultés ne peut être considéré comme exhaustif, et ce, pour au moins trois raisons : 1) ils couvrent des périodes d'une durée limitée (voir ci-dessus); 2) les enquêtes des coroners, qui n'ont commencé qu'en 1765, étaient plutôt rares durant le 18e siècle et elles étaient surtout tenues en ville ; 3) plusieurs documents ont été perdus ou détruits dans des incendies. De plus, il reste encore de nombreuses archives régionales à dépouiller, en particulier sur la Côte-Nord, en Abitibi, en Mauricie, dans Lanaudière et dans les Laurentides. Par conséquent, les chiffres présentés ici, qui sont appelés à évoluer, doivent être considérés comme provisoires. Les recherches historiques qui sont en cours actuellement à l'Université du Québec à Rimouski révèlent constamment de nouveaux cas.

Le risque avalancheux au Québec

Déjà les premiers résultats de cette recherche démontrent que les avalanches représentent au Québec une menace beaucoup plus importante que prévue. Le bilan québécois depuis 1825 s'élève, dans l'état actuel des recherches, à 41 avalanches mortelles, pour un total de 80 morts et près de 60 blessés (tableau 1), ce qui place les avalanches au 2e rang des risques naturels les plus meurtriers au Québec derrière les éboulements et les glissements de terrain. La distribution des accidents démontre que les avalanches ne sont pas confinées aux régions montagneuses telle la Gaspésie où deux skieurs hors-piste ont perdu la vie en mars 2000. Aucune région du Québec n'est épargnée (cartes 1 et 2). Au fil des ans, les avalanches ont frappé dans des régions et dans des contextes topographiques surprenants à prime abord : courtes pentes, falaises, terrils, ravins.

Accidents en milieu résidentiel

L'une des surprises de cette enquête est le grand nombre d'avalanches qui se sont produites en milieu résidentiel (type R dans le tableau 1), principalement dans les villes de Québec et de Lévis (carte 3). Nous avons placé dans cette catégorie les personnes tuées ou blessées alors que l'édifice (maison, école, hangar, grange) où elles se trouvaient était détruit ou lourdement endommagé par une avalanche. On compte pas moins de 16 accidents de ce type depuis 1825, pour un total

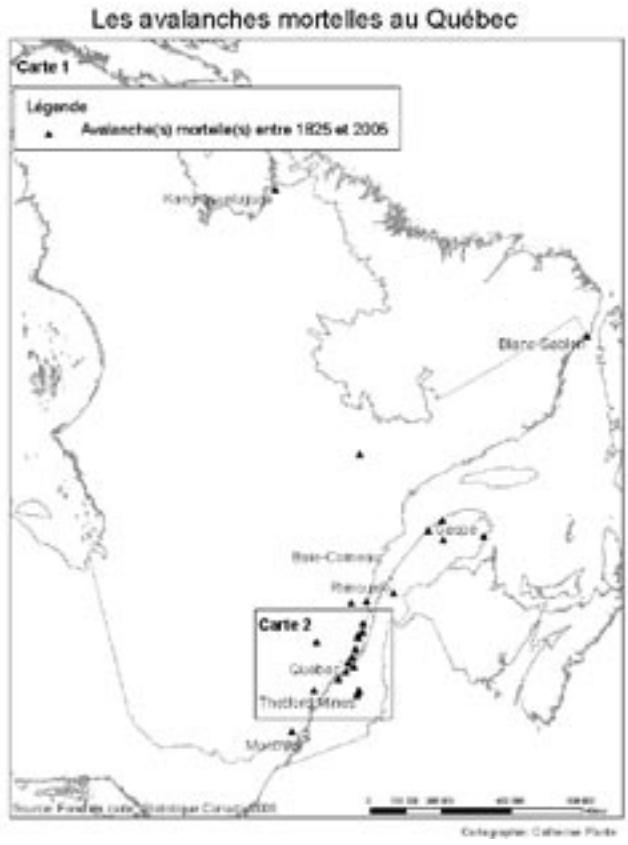
de 48 morts et 47 blessés, incluant la tristement célèbre avalanche du 1er janvier 1999 à Kangiqsualujjuak qui a fait, à elle seule, 9 morts et 25 blessés. On se souviendra qu'une école a été enfoncée par une grosse avalanche de plaque alors que les résidents du village étaient rassemblés dans le gymnase pour y fêter la Saint-Sylvestre. La carte 3 localise les secteurs où se sont produites les avalanches mortelles sur les territoires des villes de Lévis et de Québec (photo).

Québec, Cap-Diamant – Édifices adossés à une pente de 75 mètres de dénivelée. Versant raide (40° à 45°) partiellement boisé qui a produit de nombreuses avalanches mortelles.

Activités sportives

Au Québec, on compte à ce jour 18 avalanches mortelles impliquant des skieurs, des adeptes du toboggan et des motoneigistes (22 morts au total). Les accidents sont répartis sur l'ensemble du Québec habité, principalement dans la vallée du Saint-Laurent. Il s'agit pour la plupart d'accidents (14 sur 18) qui se sont produits sur de courtes pentes sur-enneigées (à la suite d'une tempête) à proximité des lieux d'habitation. Deux d'entre eux se sont produits sur les terrils des mines de Thetford Mines et de Robertsonville.

Le ski hors-piste, qui est actuellement en plein essor dans les monts Chic-Chocs, en Gaspésie, a fait deux morts (en mars 2000) et de très nombreux blessés (dont le nombre exact n'est pas connu). Compte tenu, à la fois, de l'augmentation fulgurante du nombre d'adeptes du ski hors-piste qui fréquentent les monts Chic-Chocs depuis quelques années et des récents développements touristiques dans cette région (agrandissement du Gîte du Mont Albert, ouverture de l'Auberge de Montagne des Chic-Chocs le 26 décembre 2005), il est à prévoir que le nombre d'accidents augmentera dans le futur.



Accidents routiers

En Gaspésie, le risque concerne non seulement les skieurs hors-piste qui fréquentent les Chic-Chocs, mais également plusieurs segments de routes localisés au pied de pentes avalancheuses notoires. Les routes 132 et 198 entre Sainte-Anne-des-Monts et Grande-Vallée y sont particulièrement exposées. Régulièrement, des

avalanches recouvrent partiellement ou complètement la chaussée, interrompant la circulation. Elles ont provoqué plusieurs accidents routiers, dont trois mortels (1935, 1956, 1971), tous à Mont-Saint-Pierre.

Bilan provisoire de l'enquête

L'analyse des accidents mortels connus à ce jour a permis de mieux comprendre les facteurs de terrain, les conditions météorologiques et le régime d'enneigement propices au déclenchement des avalanches au Québec. Il en découle trois constats qui pourront être intégrés dans les schémas d'aménagement et les plans de gestion :

1) La majorité des avalanches mortelles sont étroitement associées à d'importantes chutes de neige (tempêtes) couplées à des vents violents qui ont provoqué de la poudrerie. Par exemple, la tempête qui faisait rage du 21 au 23 février 1898 dans la région de Québec (60 cm de neige en trois jours avec des vents violents) a provoqué de nombreuses avalanches qui ont rasé ou fortement endommagé plusieurs maisons, faisant 4 morts et 8 blessés.
2) Les pluies hivernales représentent elles aussi une menace comme le démontre la catastrophe du 12 mars 1936 dans la région de Charlevoix. Une pluie exceptionnelle pour la saison (62,2 mm en 24 heures) a provoqué de nombreuses avalanches humides et des slushflows qui ont détruit au moins trois maisons, faisant 10 morts et plusieurs blessés.
3) Au Québec, plusieurs avalanches mortelles se sont produites sur des versants de moins de 50 mètres de dénivelé. Il faut se méfier des courtes pentes non boisées dès qu'elles tombent dans la fourchette critique des 30° à 45°, surtout si elles sont dominées par une terrasse, un plateau dénudé ou un champ ouvert propice au transport éolien.

Tableau 1 (suite) : Inventaire des accidents attribuables aux avalanches au Québec entre 1980 et 2006. Les avalanches mortelles sont indiquées en caractères gras (**1825**). Typologie des accidents : R = résidentiel; T =: transport; S = sport; A = autre.

Années	Date	Lieu	type	décès	blessés	indemnes	Sources
1981	?? mars	Montréal (Mont Royal)	S	0	0	2	Marc Deschesne (*verbatim*)
1985	03 mars	Montagne Blanche (Charlevoix)	S	1	0	0	Jamieson & Geldsetzer, 1997
H 87-88	?? ??	Mont-Albert (Cuve)	S	0	0	5	Boucher, 2000
1988	13 févr.	Shawinigan	S	1	1	0	Jamieson & Geldsetzer, 1997
H 88-89	?? ??	Mont Albert (Cuve)	S	0	0	1	Boucher, 2000
H 90-91	?? ??	Mont Albert (Cuve)	S	0	0	2	Boucher, 2000
1991	05 févr.	Rivière Malbaie	S	1	0	0	Jamieson & Geldsetzer, 1997
H 91-92	?? ??	Mont Albert (Cuve)	S	0	0	3	Boucher, 2000
1993	18 févr.	Tadoussac	S	1	0	0	Jamieson & Geldsetzer, 1997
1993	?? mars	Kangiqsualujuak	R	0	0	2	Schaerer et al., 1999
H 93-94	?? ??	Mont Hog's Back	S	0	0	1	Boucher, 2000
1995	10 mars	Blanc-Sablon	R	2	1	0	Hétu & Dubé, 1995
1995	21 déc.	Robertsonville	S	2	0	0	*Le Soleil*, 1995
1996	26 mars	Mont Groulx	S	1	0	1	Jamieson & Geldsetzer, 1997
H 96-97	?? ??	Mont Albert	S	0	0	2	Boucher, 2000
H 98-99	?? ??	Mont Xalibu	S	0	0	1	Boucher, 2000
1999	01 janv.	Kangiqsualujuak	R	9	25	>100	Hétu & Dubé, 1999
2000	14 févr.	Château-Richer	S	1	0	1	*Journal de Québec*, 2000
2000	13 mars	Monts Vallières de Saint-Réal	S	1	0	0	*Le Soleil*, 2000
2000	18 mars	Mont Albert	S	1	0	0	*Le Soleil*, 2000
2001	18 févr.	Mont Albert	S	0	1	0	Production Vic Pelletier et TVA
2003	04 mars	Mont Hog's Back	S	0	1	13	*Avalanche News*, 2003
2004	21 févr.	Saint-Augustin	?	0	1	2	J-F. Dubé, *verbatim*
2004	27 févr.	Mont Albert	S	0	1	0	D. Boucher, *verbatim*

Conclusion

L'inventaire des avalanches mortelles que nous poursuivons a déjà révélé de nombreux accidents qui démontrent de manière évidente le risque qu'elles représentent pour la population québécoise. Il n'est plus possible de soutenir que le risque d'avalanche ne concerne que les skieurs hors-piste qui fréquentent les Chic-Chocs. La majeure partie des avalanches mortelles se sont produites dans des villes et des villages et les populations qui y vivent y sont toujours exposées. Au Québec,

l'inventaire des zones avalancheuses n'a jamais été fait. Il semble d'après les résultats préliminaires de notre inventaire des avalanches mortelles que ce risque est beaucoup plus répandu qu'on ne le croyait jusqu'à maintenant.

Remerciements
Plusieurs personnes ont participé à cette enquête : Jean-Pierre Gagnon, Dominic Boucher, Catherine Plante, Samuel Bolduc, Pierre Collin, Stéphanie Friesinger, Daniel Germain et Chantal Quintin.

Tableau 1 : Inventaire des accidents attribuables aux avalanches au Québec entre 1825 et 1980.
Les avalanches mortelles sont indiquées en caractères gras (**1825**).
Typologie des accidents : R = résidentiel; T =: transport; S = sport; A = autre.

Années	Date	Lieu	type	décès	blessés	indemnes	Sources
1825	02 févr.	Saint-Joseph de Lévis	R	5	0	0	Coroner, 1825
1836	09 févr.	Cap-Diamant	R	1	0	1	Honorius Provost, 1977
1840	01 févr.	Château-Richer	?	1	0	0	Coroner, 1840
1843	18 déc.	Cap Blanc (Ville de Québec)	S	1	1	5	Coroner, 1843
1857	?? ??	Cap-Diamant	R	0	0	2 F*	Honorius Provost, 1977
1863	16 janv.	Lévis (Notre-Dame-de-la-Victoire)	S	2	0	0	Coroner, 1863
1865	10 mars	Lévis (Saint-Nicolas)	?	1	0	0	Coroner, 1865
1866	26 févr.	Les Éboulements	R	1	0	0	Coroner, 1866
1869	16 févr.	Lévis	R	1	2	3	*Glanures Lévisiennes, 1920*
1869	11 mars	Lévis	R	4	7	0	*Glanures Lévisiennes, 1920*
1875	03 févr.	Promontoir de Québec	R	8	0	5	Honorius Provost, 1977
1879	12 févr.	Lévis (Saint-David)	R	1	0	0	Coroner, 1879
1898	22 févr.	Lévis	R	4	7	1	*Le Soleil, 1898*
1898	23 févr.	Lévis	R	0	1	0	*Le Soleil, 1898*
1905	12 janv.	Ville de Québec (Saint-Sauveur)	S	1	2	0	*Le Soleil, 1905*
1912	14 mars	Baie-Saint-Paul	?	1	0	0	Coroner, 1912
1928	20 janv.	Cap-Diamant	A	0	1	5	Honorius Provost, 1977
1928	25 janv.	Lauzon	A	1	0	3	Coroner, 1928
1935	24 janv.	Mont-Saint-Pierre	T	1	0	0	Coroner, 1935
1936	12 mars	Les Éboulements	T	1	0	0	*Le Soleil, 1936*
1936	12 mars	Saint-Tite-des-Caps	R	4	0	4	*Le Soleil, 1936*
1936	12 mars	Petite-Rivière-Saint-François	R	5	0	7	*Le Soleil, 1936*
1936	12 mars	Baie-Saint-Paul	R	1	1	2	*Le Soleil,1936*
1942	25 avr.	Sainte-Antoine de Gros Morne	R	2	3	0	Coroner,1942
1950	07 mars	St-François-de-Pabos	S	1	0	1	Coroner, 1950
1956	25 janv.	Mont-Saint-Pierre	T	1	0	0	*La Voix Gaspésienne,1956*
1956	09 mars	Mont-Saint-Pierre	T	0	0	2	*La Voix Gaspésienne,1956*
1959	09 janv.	Lac-des-Aigles	S	2	0	0	Coroner, 1959
1968	15 déc.	Cap-Diamant	S	1	1	0	Honorius Provost, 1977
1971	20 déc.	Mont- Saint-Pierre	T	1	0	1	Coroner, 1971
1970	?? ??	Thetford Mines	S	2	0	0	*Le Soleil, 1995*
1976	14 janv.	Cap-santé	S	1	0	1	Stethem & Schaerer, 1979
1976	28 déc.	Tadoussac	S	1	1	0	Stethem & Schaerer, 1980
1977	??-??	Black Lake	S	2	0	0	*Le Soleil, 1995*

* 2F = 2 familles

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The Avalanche "Bible" Cometh

Book Review by Alan Jones

The Avalanche Handbook, 3rd Edition

By David McClung and Peter Schaerer, 342 pp.

With little fanfare, the newly revised 3rd Edition of The Avalanche Handbook was launched in late October. Surprisingly, this launch passed unnoticed by the eagle eye of the editor of this journal, perhaps due to the fact that this book needs no introduction and will require little advertising to get it onto the bookshelves of most folks working in the avalanche business. If you haven't already picked up a copy, you should. Here's what to expect.

As in previous editions, Mountaineers Books remain the publisher. Neither of the authors need an introduction, as both are recognized internationally for their contributions to avalanche science and education. Dave McClung heads the avalanche research group at the University of British Columbia, while Peter Schaerer spent most of his career as head of the Avalanche Research Centre of the National Research Council of Canada. This most recent edition of The Avalanche Handbook continues the tradition of avalanche manuals spanning more than 50 years since the original Forest Service Avalanche Handbook was published by Monty Atwater and Felix Koziol of the US Forest Service in 1952.

The marketing of this book to a younger crowd is obvious by the front cover shot of a snowboarder executing a turn in a plume of powder. We'll overlook that the boarder is riding into a crevasse or icefall and no avalanche seems to be present, since we know what good stuff awaits us inside. The general layout has mostly remained the same, and much of the text, photos and figures will be familiar to those who have read the 1993 version.

What has changed significantly is information on avalanche forecasting, including a new Chapter 6 titled, "The elements of Applied Avalanche Forecasting." This chapter contains an overview of avalanche forecasting, summarizing the human and physical elements. This section is mostly a reprint of a series of two papers previously published by Dave McClung in the journal Natural Hazards, and gives a very thorough overview of the process involved in avalanche forecasting.

Chapter 8—The ABCs for Backcountry Avalanche Forecasting and Decisions—also presents new information on avalanche forecasting, but from a practical backcountry traveller's perspective. This chapter aims to "put a formal structure on backcountry forecasting and decisions for people who have had some avalanche training but are not yet advanced decision-makers such as professional mountain guides." I found this chapter very informative and structured, but had to re-read it several times before I was able to follow the logic. This method is perhaps not as simple as the ABC title suggests, but it is thought provoking and useful information nonetheless.

Chapter 3, titled "Snow Formation and Growth in the Atmosphere and Snowpack," contains some important revisions and new research results developed since the previous edition of The Avalanche Handbook. Of note is the inclusion of Sam Colbeck's pioneering work on crystal grain boundary geometry and the subsequent bonding process. The term "whumpf" is also introduced in this chapter, an important development since the previous edition.

I found Chapter 4, "Avalanche Formation," to contain some of the most interesting and perhaps controversial developments since the previous editions. The authors waste no time in dismissing the term "stability" in favour of the word "instability," which they feel is what matters in avalanche formation. As a result, new terms are introduced throughout the book—Class 1 Instability Factors (instead of Stability Factors); Instability Tests (instead of Stability Tests); and "instability" in many places where "stability" was used in the previous version (and in the CAA standards and training programs). Whether this just creates confusion in the upcoming years, or whether the term "instability" will become the new standard remains to be seen.

I imagine this is something the CAA Technical Committee will need to grapple with in the near future.

The authors also dismiss the concept of a stability index, arguing that it "cannot be used to provide an estimate of whether or not a slab avalanche will take place, in spite of being used in snow stability work for more than thirty-five years." Instead, they point to the importance of fracture toughness and its relation to snow-slab stability. Unfortunately, shear fracture toughness cannot be measured or accurately calculated, and remains a poorly understood concept to most avalanche workers. So, until fracture toughness makes the transition from a theoretical concept (like super-weak or deficit zones) to a more practical concept, then perhaps our industry may be wise to retain the useful (but flawed) stability index for a few more years.

The 3rd Edition of *The Avalanche Handbook* maintains the tradition of presenting the best and most up-to-date knowledge available for avalanche science and field practice, and evolving as new knowledge becomes available. The inclusion of about 25% more pages, mostly related to avalanche forecasting, makes this edition a worthwhile read even if you have older editions. Despite the appearance of several new avalanche books in the last few years, *The Avalanche Handbook* remains the benchmark against which other books are judged, and belongs on the bookshelf of everyone venturing into avalanche terrain.

The Avalanche Handbook is available for $32 on our website at avalanche.ca.

"The authors waste no time in dismissing the term 'stability' in favour of the word 'instability,' which they feel is what matters in avalanche formation."

Arc'Teryx Fission LT Hoody

Product Review by Rob Hemming

It's 5:30 am, normally the coldest time of the day, and I find myself thinking: "Plus seven degrees Celcius—how can it be this warm?" It's Sunday, October 30th, 2006 and I'm riding my bike to the start of the Mount Revelstoke summit trail, our town's version of the Grouse grind.

I'm inflicting this bit of punishment on myself so that I can objectively test and report on the Arc'teryx Fission LT Hoody. Unfortunately it's been mostly warm and dry here in the Columbia region for some time—this summer just does not want to end. A storm last week broke the drought and deposited some snow on the local mountain tops, so with the deadline for this piece fast approaching, its high ho, high ho, I'm off to the land of wind and snow.

A vigorous cold front is crossing the province this morning imbedded in a northwest flow and I'm hoping to be on the summit in a little while to experience some nasty weather. CBC is reporting that this storm has caused massive power outages and other serious problems between Smithers and Prince George, dumping large amounts of heavy snow on the ground. The Germans have a name for this kind of a snowfall, they call it Teufeldecke or devils blanket.

As the sun comes up over Revelstoke the sky does not look threatening, just a thin high overcast so far. It may be a little darker to the northwest. The weather forecast at 5 am was for the freezing level to lower to valley bottom today and snowfall, amounts to 5 cm, beginning near noon. I see the barometer is falling sharply so I'm hopeful that the forecast is not a cartoon.

Rob Hemming Collection

I stop for a snack when I hit the snow line at 1200 metres. Even though it's still too warm, I pull the jacket out of my pack and put it on. It's time to see if this coat breathes as well as advertised.

At 1600 metres; the snow is 20 cm deep and I'm post-holing to the ground. I put on my snowshoes and continue upwards. The clouds are lowering and a light breeze is starting to push some of trees about. It begins to feel much cooler and, sure enough, within half an hour it begins to snow. Just the odd flake at first, and then graupel showers increasing in intensity as time passes.

An hour later I reach the sub-alpine and it's snowing heavily on a weak snowpack that averages 60 cm deep. Snowshoe penetration is more than 25 cm. Except for a thin layer of new snow on the surface, the snow is moist. There are four distinct layers, most notably a wet layer, 5 cm thick, down 15 cm from the surface. Needless to say, I'm moving slowly through this section as I break trail.

Around noon I'm on the summit. It's definitely storming now. Below freezing temperatures, strong gusty winds from the west, blowing snow, 100% humidity and whiteout conditions, ideal for inducing hypothermia. A supportive wind crust just below the surface makes the travelling much easier up here. I hike over to the "ice box," a rock formation that fills with ice and snow in the winter and remains most of the summer as firn that visitors to this national park find fascinating.

After 30 minutes or so I finish my lunch and head back down the mountain via the Lindmark trail, satisfied that I can now give a forthright testimonial about this product.

I can not find anything negative to say about this jacket. Arc'teryx has a reputation for making innovative and high quality apparel and the Fission LT is no exception.

Marketed as a belay jacket, it's as warm as any down coat I've ever worn. Arc'teryx has layered the thickest available Prima Loft™ with Gore Windstopper™ pile between the soft liner and shell. All I had for thermal protection on this trip was a pair of nylon hiking trousers, a thin polypropylene shirt, bald cap and the Fission LT jacket. Huffing and puffing on the way up, my shirt was soaked for several hours. The shirt was still in this condition when I reached the summit, yet the jacket did not look wet or feel clammy, remaining dry and cozy all day. The manufacturer also claims that this material is warm even when wet and dries quickly but I was not able to verify this on this trip. Even though this is not a true rain coat it appears to do a very good job repelling moisture and breathes so well I thought it was going to give me mouth to mouth.

I can testify that the jacket is absolutely windproof. Pull the drawstrings tight at the bottom of the jacket and adjust the four toggles around the collar and hood and the internal temperature goes up another few degrees despite any wind chill factors. I could not detect any leaks around the zippers or seams.

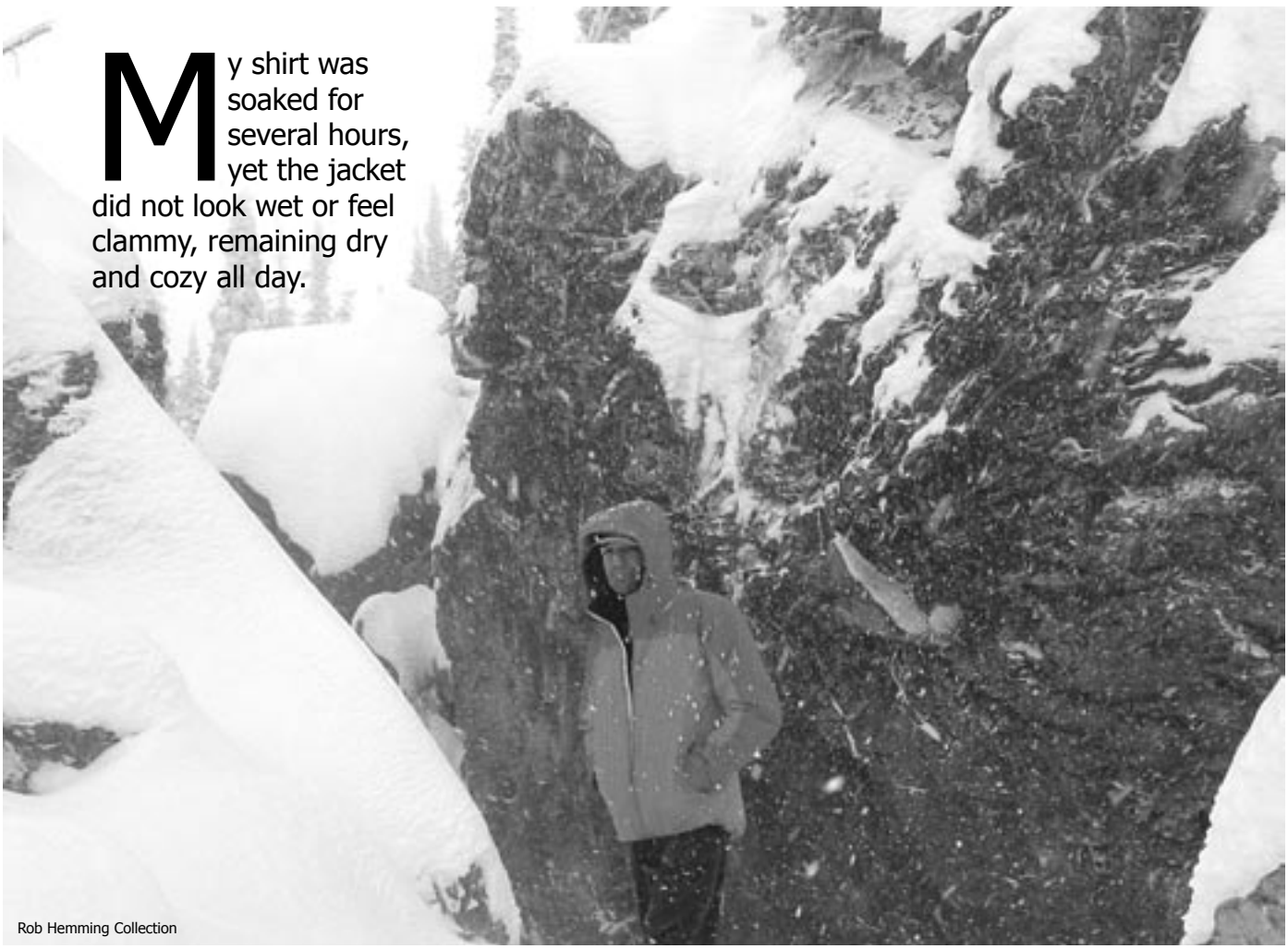
This garment really does have too many features to list. Here are the ones that I liked best. First it is manufactured in Canada. The hood design is ingenious. Large enough to pull over a climbing helmet, the hood can be cinched down with one hand to fit any shape of head using the integral draw strings. I really like the way the arms are cut long and articulate in such a way that all movement feels completely unrestrained. The wrist cuffs are comfortable and seal the heat in. The body of the jacket is cut low over the pelvis with a little extra length down the back, along the lines of a classic anorak, keeping the hips and buttocks toasty and dry. Clever design; the pockets you put your hands into on the outside have insulation on both sides for added comfort. The internal pockets are large stretchy mesh affairs that can hold tons of stuff.

The feature I liked the most was being able to stuff the jacket into a sack just a little bigger in size than a one litre water bottle. This, in combination with its light weight, (a size medium comes in at about 1000 grams), really made a strong impression on me.

I believe this jacket will be excellent for stormy belay ledges on multi-pitch mixed climbs or spotting at the crag on a cold day and would work well for many other activities. Leave the puffy down jacket at home (they are so old school anyway) and pull the rain coat out of the pack too, you won't need it in most cases if you're packing the Fission LT. The one place I wouldn't want to take it is for a ski run in the gnarly trees. The shell material has a soft and delicate feel to it that seems too fragile for extremely rugged use, no different than a lightweight down jacket. But don't take my word for it, you've got to check this jacket out for yourself.

Eleven hours round trip on the mountain and I'm back at my bike. The entire valley bottom is now covered in a thin layer of snow. The skies are clearing and the cold dry arctic air has moved in as forecasted but I'm still warm and dry. I think I should continue to test this jacket until the end of March, at least, just to see how it wears and do some serious cold weather evaluation ice climbing around Golden or skiing at Lake Louise. Yeah, I think that's a good idea. This jacket would be just the thing to take on the Level 2, Mod 3 I've signed up for in February 2007. Hopefully I'll get to meet some of you this winter where the slope is steep and the snow is deep. Later.

>> Rob Hemming has been an avalanche professional for 15 years. He is currently the Assistant Avalanche Technician for the BC Ministry of Transportation in Revelstoke, BC.



Rob Hemming Collection

Take Charge: Leading a Group Rescue

Produced by Backcountry Access and Teton Gravity Research

Product Review by Ken Wylie

Striving for avalanche rescue skill mastery? Take Charge is the recent offering in a series of video products from Backcountry Access. Narrated by Jim Conway, lead guide from Teton Gravity Research, this DVD is 21 minutes in duration, and provides information on how to lead a group rescue.

The DVD begins with an overview of the importance of organized group rescues and highlights a critical fact—there is a□

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lines, single-victim beacon search, basic multiple burials and advanced multiple burials.

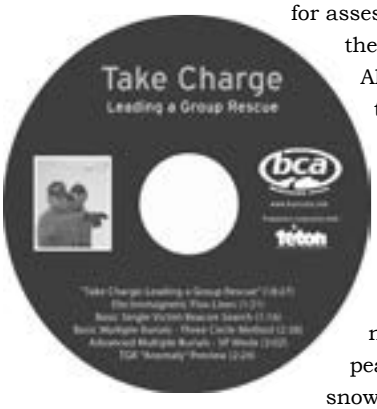
At first look, this video is impressive. There is great footage of avalanches, people in high-end terrain and the unfortunate combination. From this standpoint it is sure to catch the eye of many viewers.

The Five Red Flags are on the mark as far as recognizing conditions for avalanches. Much of the language that is used is accurate, as are the statistics. As a tool for teaching the average recreational backcountry user about group rescues, it offers a great deal of useful information. Most impressive are the graphics that lay out the position of the rescuers across the slope during the primary search. This is where the filmmakers have done their best work. This feature alone makes the video worthwhile. In fact, if I use the video, I will focus on this feature alone. This video is sure to help people become aware of the importance of organizing a rescue in order to gain efficiency. However, awareness is different from mastery.

The video suffers from a simple and common problem: too much information. It's always tempting, as an instructor, to convey competence by offering a great deal of information. However, the topic of avalanches is complicated and needs to be broken down into manageable parts that are structured so people can understand and remember them. This is particularly important when dealing with rescue procedures because we are trying to train individuals to operate under stress. When time is of the essence, we need simplicity.

Two points are missing from the film that would have organized the information in a memorable and quickly accessible way. First, the age-old teaching tool: Tell them what you are about to tell them, tell them, then tell them what you told them (or better yet quiz them). Repetition is the key for learning and remembering. Don't be afraid to repeat information when trying to convey subject matter as important as avalanche rescue protocol.

Second, presentation of information requires a structure that one can use on the slope in a group rescue. Each piece of information needs to be numbered, colour coded or structured in a way that the rescue leader can easily remember it under duress. The first aid world has known this for a long time. They use acronyms to help structure protocols so the individual can easily access them in emergency situations (e.g., ABC for airways, breathing and circulation, or PQRST for assessing chest pain). This is lacking in the video and therefore the valuable information contained in it is quickly forgotten.



Also, the group rescue portion of the video is frontloaded with the Five Red Flags of the backcountry. This is too much information for the viewer who is expecting to watch a presentation on group rescue.

Skill mastery must be kept in mind when building products for the avalanche industry. Then, informative points and interfaces need to be structured and relayed in ways that are easy to use in real-life situations. These tools need to help the person whose heart rate and respirations are peaking as they search for their best friend who is under the snow and unable to breathe. We cannot forget this simple fact.

"Take Charge" is available through BCA's website, www.bcaccess.com. It is sold to the public for $15 (Cdn). For more information, contact BCA at 800-670-8735 or info@bcaccess.com.

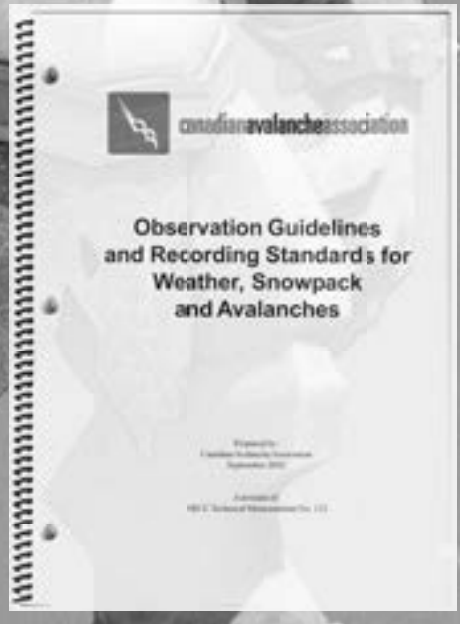
Ken Wylie Collection

Ken Wylie is an IFMGA-certified mountain guide and an instructor in the Adventure Diploma program at Thompson Rivers University. He has been teaching outdoor skills to eager students for close to 25 years, and knows a thing or two about mastery.

OGRS NEEDS YOUR HELP!

The industry bible—Observation Guidelines and Recording Standards for Weather, Snowpack and Avalanches—is scheduled for an update next year.
If you're an avalanche professional, we'd like you to think about what should be revised, and why. Send your suggestions to OGRS@avalanche.ca.

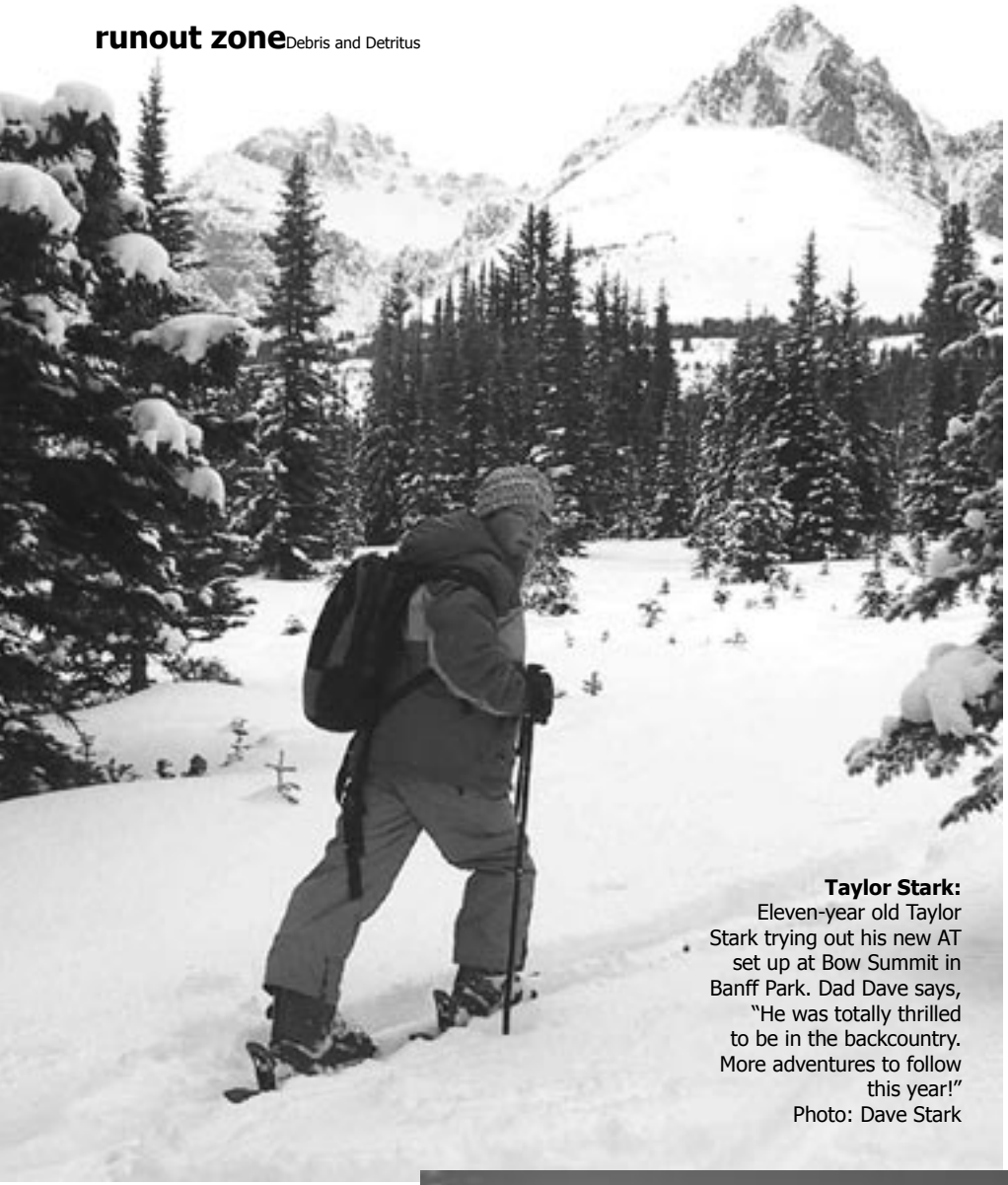
Good feedback this winter will mean the revisions committee can hit the ground running this spring, and finalize revisions before the next winter season.
If you want more information about this process, please contact the technical committee at technical.committee@avalanche.ca



Heads Up from Emergency Services

According to First Aid wizard Cyril Shokopoles, there have been documented cases of spontaneous combustion of oxygen bottles inside emergency vehicles, with catastrophic results. The cause of the fire has been identified as the plastic gaskets between the oxygen bottle and the regulator. This gasket can split, leak under pressure, and spontaneously catch fire.

The implications of this phenomenon are dire, especially if the oxygen bottle is on board a helicopter, but there is a solution. The plastic washers can be replaced by a "Vitron" washer made of brass. If your operation uses oxygen bottles, you might want to consider taking this step. Cyril has a limited supply of these new brass washers and he can be contacted at resqdyn@telusplanet.net

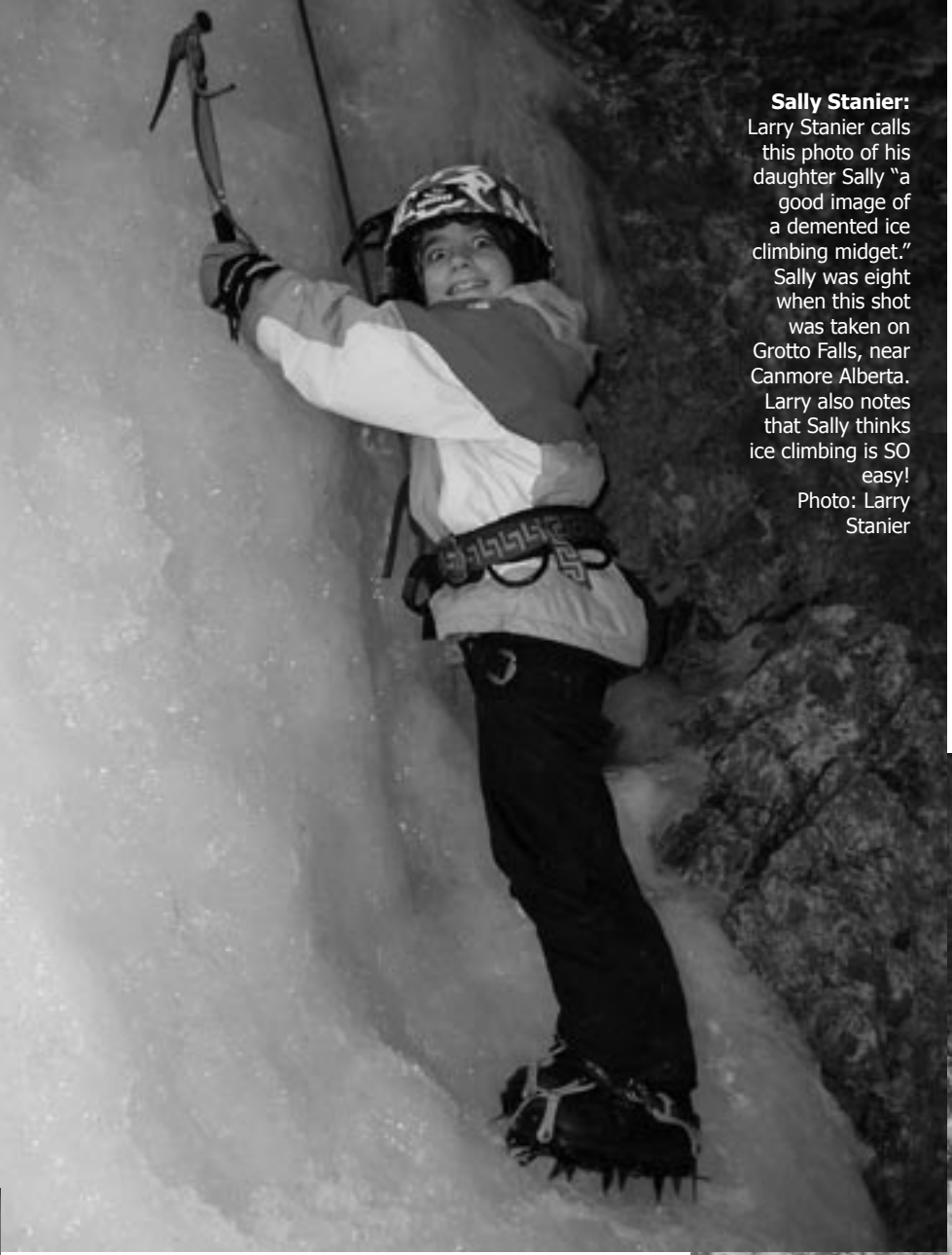


Taylor Stark:
Eleven-year old Taylor Stark trying out his new AT set up at Bow Summit in Banff Park. Dad Dave says, "He was totally thrilled to be in the backcountry. More adventures to follow this year!"
Photo: Dave Stark

Teach Your Children Well

A big part of life in the mountains involves sharing our love of the backcountry with friends and family. In this section, we want to highlight the rewards of bringing our children into this world of high, wild places. Instilling a love of adventure and respect for the mountains is a valuable and lasting legacy. If you have a photo of your young one enjoying winter in the mountains, send it in along with some information about your trip. We'd love to see it.

Ryan Statham
Ryan Statham was just seven last winter when he spent his first night in a snow cave. He and his father Grant ski toured to the site just outside the Sunshine ski area boundary. "We had a great time," says Grant. "He built a jump and took air while I slaved for two hours and made a huge cave. We spent a cozy night with candles, hot chocolate and reading Harry Potter by headlamp." Ryan's favorite part of the adventure? Peeing on the floor.
Photo: Grant Statham



Sally Stanier: Larry Stanier calls this photo of his daughter Sally "a good image of a demented ice climbing midget." Sally was eight when this shot was taken on Grotto Falls, near Canmore Alberta. Larry also notes that Sally thinks ice climbing is SO easy! Photo: Larry Stanier

Gabriel Gagnon Gabriel Gagnon, age 11, ski touring at Mont Albert, in the Chic-Choc Mountains of Quebec. Photo: Stéphane Gagnon

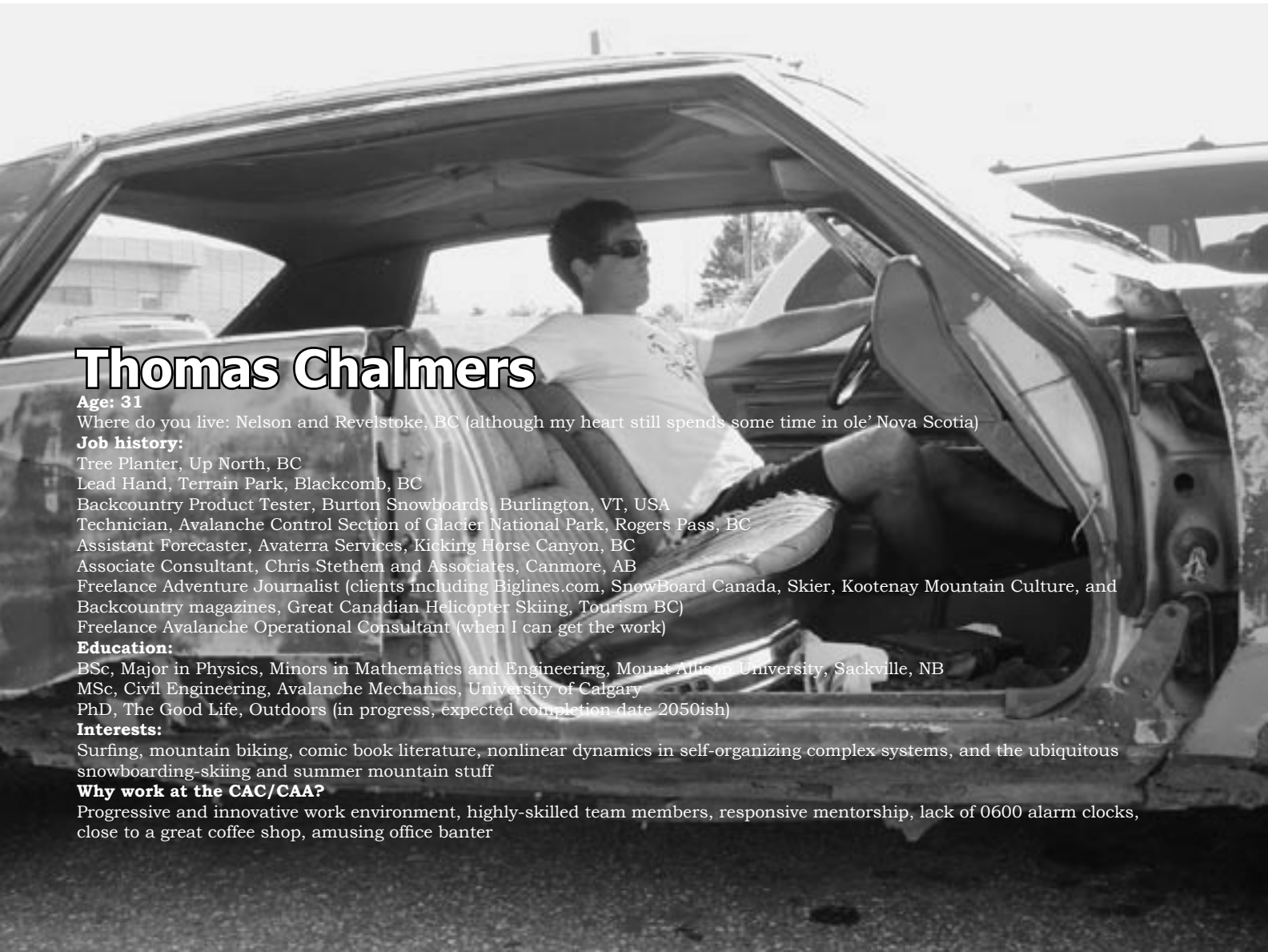
Transitions:

Reception: **Chandra Kappler**

We have a new face in our front office. Chandra Kappler comes to us from the BC Freestyle Ski Association, where she's been working as an administrator for the last several years. She has special ties to that organization as her two sons, Dean and Rylan, are very successful competitors on the provincial circuit.

Chandra moved from the flatlands of Medicine Hat, Alberta eleven years ago for the love of the mountains. Along with the rest of her family, she's an avid skier. She's also very interested in building, and says she "likes to build pretty much anything out of anything." Appropriately, she and her husband Trent are currently building "the house of their dreams" on acreage outside of town.

The last few years she has been involved in landscaping projects and this past summer started her own irrigation company. Her combination of business experience, administrative abilities and people skills are valuable assets, and we feel lucky to have her. For her part, Chandra says coming to the CAA and CAC represents a new, and welcome, challenge in life. "I love broadening my horizons," she says. "I love learning new skills and brushing up on old ones. This place is busy, busy, busy and I like to be busy."



Thomas Chalmers

Age: 31
Where do you live: Nelson and Revelstoke, BC (although my heart still spends some time in ole' Nova Scotia)
Job history:
Tree Planter, Up North, BC
Lead Hand, Terrain Park, Blackcomb, BC
Backcountry Product Tester, Burton Snowboards, Burlington, VT, USA
Technician, Avalanche Control Section of Glacier National Park, Rogers Pass, BC
Assistant Forecaster, Avaterra Services, Kicking Horse Canyon, BC
Associate Consultant, Chris Stethem and Associates, Canmore, AB
Freelance Adventure Journalist (clients including Biglines.com, SnowBoard Canada, Skier, Kootenay Mountain Culture, and Backcountry magazines, Great Canadian Helicopter Skiing, Tourism BC)
Freelance Avalanche Operational Consultant (when I can get the work)
Education:
BSc, Major in Physics, Minors in Mathematics and Engineering, Mount Allison University, Sackville, NB
MSc, Civil Engineering, Avalanche Mechanics, University of Calgary
PhD, The Good Life, Outdoors (in progress, expected completion date 2050ish)
Interests:
Surfing, mountain biking, comic book literature, nonlinear dynamics in self-organizing complex systems, and the ubiquitous snowboarding-skiing and summer mountain stuff
Why work at the CAC/CAA?
Progressive and innovative work environment, highly-skilled team members, responsive mentorship, lack of 0600 alarm clocks, close to a great coffee shop, amusing office banter

Cam Campbell

This winter you'll be seeing the initials "CC" at the end of some public bulletins, as Cam Campbell has signed on for a winter of forecasting at the avalanche centre. He's no stranger to the forecasters' office, as he was in last year to help set up a new computer modeling system. Cam lives in Vancouver with his wife Ashley and their dog Pika (no, not CARDA. Not even close.) He has a Masters in Avalanche Mechanics from the University of Calgary, and has added a couple of years at UBC as an unclassified student studying meteorology, hydrology, snow and ice processes, GIS, and remote sensing and statistics. In his off time, Cam is an avid woodworker, mountain biker, skier and Vancouver Canucks fan. When asked why he wants to work here, his answer reflects the enthusiasm he brings to the job. "I'm thrilled to be a part of the Canadian avalanche community and I want to play as big of a role as I can."

Earlier this fall, we bid a sad goodbye to former receptionist Petra Van Dijk. Petra was a great fit in our office but the position didn't take full advantage of her training. A local business made her an offer she couldn't refuse and so, our loss is their gain. We'll miss her smiling face but fortunately she's good at dropping in and saying hello. Good luck Petra!

Transitions: The Great CAA/CAC Baby Boom of '06

Last issue we had a photo of Noah, the new son of Program Services Coordinator Jennifer George. Now, we are happy to introduce even more additions to our collective family.

CAC forecaster Alan Jones, his wife Karen Paulig, and daughter Anya (also known as Sweetpea).

CAA Operations Manager Ian Tomm and his wife Tammy with daughter Sabine

Field Notes

Happy Birthday Whumpf

By Alan Jones

Whumpfs have been around as long as there's been snow and, although now a commonly accepted word, it wasn't always so. Whumpfs in Canada are, in a way, celebrating their ten-year birthday this year. It was ten years ago, in volume 49 of Avalanche News, that Bruce Jamieson and Dave McClung pooled their enormous clout in the Canadian avalanche business to propose that "whumpf" be accepted as the technical term to describe the sound generated by compressing air as a weak layer collapses in the snowpack. So where did the word whumpf come from?

The term "Whum" has been used for decades by practitioners and researchers in the German speaking part of Europe. The equivalent term in French—whoumf—has likely been used for decades as well. The term whumpf has been around in Canada at least since the 1970's but, even as late as 1993, was glaringly absent as a term in the 2nd edition of The Avalanche Handbook.

According to Bruce Jamieson of the University of Calgary, some Canadian folks in the 1990's were seeking an alternative to the terms "settlement," "rapid dynamic settlement," and "subsidence." During a meeting at the bar at CMH Bobby Burns lodge (is all the best thinking done in bars?) several prominent avalanche folks decided that we should stop using the term "settlement" and start using whumpf.. Other terms tossed around, but duly rejected, included "subsidence" and "snow quake." "Propagating shear fracture" was also proposed by Jamieson and McClung as an alternative to whumpf, but that one seems to have not caught on.

Now, over a decade later, whumpf is here to say. It is now recognized as a technical term in the CAA Operational Guidelines and Recording Standards (OGRS) and used commonly throughout our industry. Not surprisingly, it also appears throughout the newly released 3rd edition of The Avalanche Handbook (Editor's note: see a review of this book on page x).

So far, this has been a moderately informative edition of the Runout Zone, but of course it wouldn't be complete without the addition of some slightly pointless but hopefully interesting trivia. Whumpf is an onomatopoeia, which is basically a word that imitates the sound or action it is describing. Other examples of onomatopoeia include buzz, plop, bow-wow and chickadee. In Japanese, doki doki is used to indicate the increased beating of a heart (and thus excitement), and in Hindi dhadak is the word for a person's heartbeat. In Latin, tuxtax was the equivalent of "bam" or "whack" and was meant to imitate the sound of blows landing (as in a bar room brawl).

I'd like to give the last word on whumpfs to Dave Norcross, a Parks Canada Warden who worked in Lake Louise in the 1980's. Clair Israelson, when asked about his most memorable whumpf anecdote, recalled Dave's vivid description of whumpfs as "the sound of your asshole slamming shut". 'Nuff said.

>>Alan Jones is currently on parental leave from his job as a CAC avalanche forecaster.

Bruce Jamieson

A quick Google search (the source of all information of limited utility) produces a number of other interesting uses of the word whumpf, showing that the avalanche business does not have a monopoly on whumpfs:

- Person falling down on ice
- Sound of a 4′x 8′ sheet of plywood falling down
- Air rushing out of a rising loaf of bread
- A raven's beating wings
- Passing UFO
- Sound of a gas furnace kicking in
- Sound of a disappearing vampire in Buffy the Vampire Slayer
- Helicopter rotor blades
- Sound of a baboon falling through a sunroof onto the backseat during an African safari
- Exploding double decker bus

Flakes


What was it, Drugs? Booze? Gambling?
CLINK
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XXX
... the Avaluator.
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Stefan Kruezer

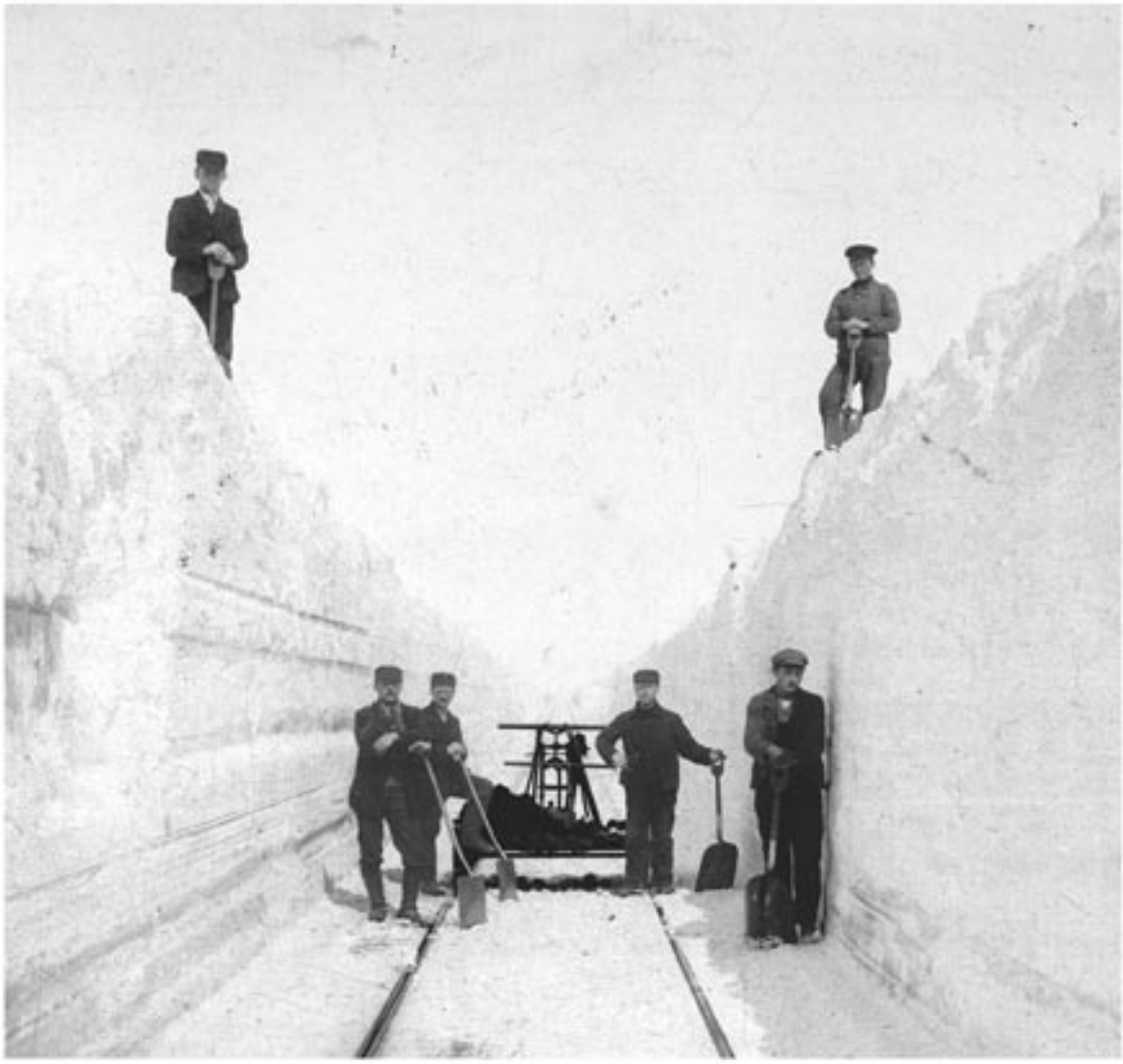

Photo: Canadian Pacific Railway Archives

Making tracks in the backcountry since 1884.

Since coming to Western Canada over 100 years ago, Canadian Pacific Railway has been a pioneer of backcountry exploration and safety. By finding the first route through Rogers Pass and opening the West. By building Mount Macdonald Tunnel, the longest railway tunnel in the western hemisphere, to avoid the avalanches and dangers of the Pass. By hiring Swiss guides to help ensure tourists stayed safe while mountaineering and exploring the backcountry. That tradition continues today through CPR's partnership with the Canadian Avalanche Association to make the backcountry a safer place for people to work and play.

To find out how you can support the Canadian Avalanche Association, please call **1-250-837-2435.**

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