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## The "New" Forest Service National Avalanche Center

By  
Karl Birkeland and Doug Abromeit

**Y**ou may have heard about the Forest Service National Avalanche Center (NAC) through our work with the military artillery program or the avalanche centers or our support of avalanche.org. Or maybe it was from someone over some beers at an JS-SWI! Over the next several years, we envision the NAC playing an increasingly active role in the U.S. avalanche community, and we want to keep the members of AAAP informed about our scope and mission. The purpose of this article is to provide a clearer picture of the NAC's history, its current projects, and our hopes for its future direction.

### Mission of the NAC

The NAC has a diverse mission. We are responsible for:

- coordinating the Forest Service's regional avalanche centers,
- coordinating and managing the Forest Service military artillery program,
- providing expertise to Forest Service field units dealing with avalanche problems,
- providing in-service and public avalanche education,
- transferring emerging avalanche technologies to the field, and
- facilitating avalanche research.

Two of the most important things we do aren't listed in our mission statement. First, we serve as representatives and advocates for the avalanche programs within the Forest Service. This isn't as fun as getting out and digging snow pits, but when the decisions regarding money and funding are made, we hope our presence will help to increase Forest Service funding for the programs. Secondly, we are establishing national level partnerships in order to obtain more resources for the regional avalanche centers.

Making all of these things happen is tall order, especially when you've only got two employees. Still, we do our best at keeping lots of plates spinning, and making progress in as many of these areas as possible.



Figure 1: The Forest Service pioneered the use of military explosives for avalanche control in the U.S. Pictured left to right are Felix Kozioł, an unidentified National Guardsman and Monty Atwater.

### History of the NAC

Forest Service snow rangers introduced avalanche control and forecasting to the U.S. in the 1940s. At the time, nearly all the U.S. ski areas with avalanche concerns were on National Forest System lands, so the Forest Service assumed responsibility for controlling these avalanche hazards. Snow rangers like Monty Atwater and Ed LaChapelle introduced the use of explosives and military artillery for avalanche control and pioneered snow stability assessment techniques (Figure 1 and 2).

However, the Forest Service gradually relinquished this role, and ski areas under Forest Service permit became increasingly responsible for their own avalanche control and forecasting. By the mid-1980s the Forest Service had backed so far out of the avalanche control and forecasting arena that there were only a few active snow rangers running a meager Forest Service avalanche program.

To buoy up the program, Forest Service Intermountain Region 4 established and funded the NAC in the late-1980s. Doug was named the NAC's director and sole employee. His original charge was to coordinate the military artillery for avalanche control program and provide on-site consultation for Forest Service ranger districts. That was about all he had time for, since he was also the winter sports coordinator on the Salt Lake Ranger District! Over the next decade, the vision of the NAC and the demands on its sole employee grew, but its funding did not.

### Getting the "National" into the NAC

All the pieces of the puzzle came together during the 1999/2000 season to finally get true national funding for the National Avalanche Center. Two regional-level Forest Service employees played a large part in making this happen. They were Bob Ross, the Recreation Director in Region 4 (Utah, southern Idaho, western Wyoming, and Nevada), and Gary Morrison, the Recreation Director in Region 1 (Montana and northern Idaho). Gary in particular understands avalanches and is a strong advocate for the avalanche programs; he worked for four years as an undergraduate intern for pioneering avalanche scientist Charles Bradley at Montana State University (MSU) in the 1960s. With Gary and Bob's support, the NAC and the

Forest Service avalanche program made it onto the agenda for a meeting of the Forest Service Recreation Directors. These folks are the management team for recreation for the entire Forest Service, and this meeting was the first time that the avalanche program had been discussed at that level in many years.

At the Recreation Director's meeting, we presented a proposal for true national funding of the NAC and increased funding for the regional avalanche centers. Although the Directors delayed a decision about increased funding for the regional centers, they did recognize the importance of the Forest Service avalanche program as a whole by funding the NAC. With that funding, the NAC staff doubled – to two! Doug continues as its Director, while Karl was hired last spring as the Avalanche Scientist and Technical Specialist. Karl will be working on a wide variety of projects with Doug, but his primary duties relate to transferring new technologies to the U.S. avalanche programs.

### Recent and Current Projects

We have been busy with a number of projects this past year. They include:

Coordinating and supporting the Forest Service's regional avalanche centers  
The NAC coordinated and hosted a meeting of the regional avalanche centers prior to the National Avalanche School last fall. Hot discussion topics included advisory format and guidelines for existing avalanche centers. The bottom line is that we are trying to maintain a flexible operating environment for the avalanche centers, while also establishing a framework that will help to give us credibility within the Forest Service. The next meeting, which will be prior to ISSW 2000, promises more spirited discussions about a variety of issues.

On a more informal basis, we email and talk on the phone with avalanche workers from all of the avalanche centers throughout the season on a number of issues. We also try to visit some of the avalanche centers. For example, we traveled to the avalanche programs in Kalispell, Missoula, and Coeur d'Alene to view their operations and to suggest ways they could maximize the services they provide to the public. We have also been working closely with the avalanche

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Figure 2: Forest Service personnel using military artillery for avalanche control work in the early days.

centers at Jackson Hole, McCall, and Mount Shasta.

The NAC has also provided more concrete assistance to the regional avalanche centers. Working for the NAC, Scott Schmidt has been setting up remote weather instrumentation for Glacier County Avalanche Center (GCAC) in Kalispell, MT (Figure 3). On another note, the NAC put together a grant for the Montana avalanche programs and was recently awarded \$30,000 from Montana Fish, Wildlife and Parks for enhancing the avalanche programs in Bozeman, Missoula, and Kalispell for next season.



Figure 3: Scott Schmidt works on weather instrumentation for the Glacier County Avalanche Center.

Another NAC project, headed by Faerthen Felix, is developing a geo-referenced database for the various avalanche centers. This project aims to create three-dimensional, clickable maps for our websites; on these maps,

the avalanche centers might post accident information, snow pit data, and provide links to remote weather instrumentation. Faerthen will be presenting some of this information at ISSW 2000. Finally, Mark Moore, Director of the Northwest Weather and Avalanche Center, is putting together a comprehensive guide to weather instruments and weather stations for the avalanche centers - and anyone else interested - that we will post on the NAC website.

Within the Forest Service, we continue to work toward better funding for our avalanche programs. We hope to make a presentation to next winter's meeting of the Recreation Directors, to report on the NAC's progress. We will also continue to press for increased Forest Service funding for the avalanche centers.

**Establishing national partnerships**

Last fall the NAC established a partnership between Patagonia and the regional avalanche centers that provided most of the folks working at the regional avalanche centers with free or greatly discounted gear. In addition to maintaining that relationship, we are working on another significant partnership. The NAC has joined forces with Jeff Brown, the new Executive Director of the AAAP, to assemble a National Avalanche Awareness Advisory Board. The advisory board, which will be comprised of prominent members of the U.S. recreational industry, will assist both the NAC and the AAAP in searching for additional funding sources for U.S. avalanche programs.

**Providing public avalanche education**

The NAC is also working on improving public avalanche education. First, we provided several instructors for the National Avalanche School and will be coordinating all NAS Phase II field courses. Secondly, we are involved in a number of avalanche safety videos. We helped fund the video *Winning the Avalanche Game* and, using a grant from the state of Idaho, produced the snowmobile avalanche awareness video *Riding Safely In Avalanche Country*. We have also started work on an avalanche awareness video geared toward non-motorized users. Third, the NAC is developing an educational website. This website will house a basic, step-by-step avalanche awareness tutorial, including interactive scenarios. The NAC and the AAAP are also working on an "avalanche smart" program with the ski and snowboard industry that will include in-store posters and hang tags. Lastly, the NAC and the AAAP plan to produce avalanche awareness TV and radio public announcements.

**Providing in-service avalanche education**

The NAC coordinated and hosted an avalanche forecasting workshop in Bozeman this past winter. All regional avalanche forecasters were invited to the workshop. Topics ranged from fundraising to weather instrumentation to recent developments in snow metamorphism research. This workshop

provided a lively exchange of ideas for all participants.

**Coordinate and manage the Forest Service military artillery program**

As mentioned earlier, the original purpose of the NAC was to coordinate the Forest Service military artillery program. Several Forest Service permitted ski areas, U.S. and Canadian highway departments, and the U.S. and

Transferring emerging avalanche technologies to the U.S. avalanche community  
The NAC actively worked this year to transfer and test some emerging avalanche technologies. Much of this work has been done with the generous cooperation of the Swiss Federal Institute for Snow and Avalanche Research (SFISAR) and Montana State University (MSU). A sampling of our

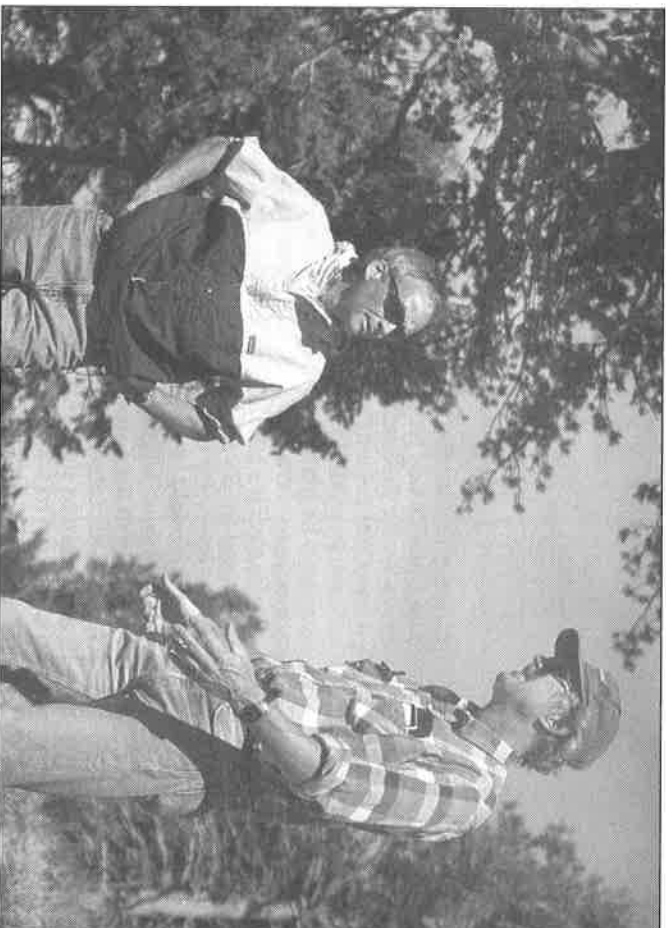


Figure 5: NAC director Doug Abramet discusses the installation of the Gaz-ex and other avalanche control issues at Snowbasin, Utah, with then-Snow Safety Director Tom Leonard.



Figure 6: Martin Gassner of the Swiss Federal Institute for Snow and Avalanche Research (left) trains Snowbasin's Brandt Hart (center) and Tom Leonard (right) in the use of NXD2000, the new Swiss nearest-neighbors avalanche forecasting program. In a cooperative arrangement between the NAC, SFISAR, and Snowbasin, this sophisticated program was installed and used last winter at the 2002 Olympic venue.

Canadian Park Services use military artillery for avalanche control (Figure 4). These weapons are surplus U.S. Army artillery pieces, some over 50 years old.

Consequently, the NAC and "Avalanche Artillery Users of North America" group have been searching for alternative control devices. While some progress has been made and a few alternative devices such as the LOCAT air launcher and Gaz-Ex exploders have been installed, military artillery continue to be the best tool for most situations.

The NAC is also working with the National Ski Areas Association (NSAA) and the explosives industry on consensus hand-charge guidelines. The NAC is helping to publicize the ski industry's remarkable safety record and the fact that avalanche control is a unique blasting situation. The NAC plans on endorsing the guidelines agreed to by the NSAA and the explosives industry.

**Providing expertise to Forest Service field units dealing with avalanche problems**

Over the past year, the NAC has consulted with several ranger districts. The wide range of topics included helicopter ski permits, a backcountry ski train, restaurants and cabins proposed in avalanche paths, 2002 Winter Olympics avalanche forecasting and control, and the effect of a prescribed burn on the avalanche danger in a particular area (Figure 5).



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Figure 4: Military artillery being used for avalanche control work at Alta, Utah (photo by Mark Kalitowski).

ongoing projects:  
**NXD2000, the Swiss Nearest Neighbors avalanche forecasting program:** We worked with Martin Gassner of the SFISAR and Tom Leonard of Snowbasin Ski Area to install NXD2000 at Snowbasin (Figure 6). This program is an excellent tool for ski area and highway avalanche forecasters, and Tom used it during the 1999/2000 season. The Swiss agreed to provide the

SNOWPACK, the Swiss snowpack evolution model: We have been working with scientists from SFISAR (Michael Lehning and Perry Bartelt), researchers at MSU (Bob Brown, Ed Adams, and Chris Lundy), avalanche workers at Snowbasin (Tom Leonard), and the Forest Service Utah Avalanche Center (Bruce Tremper) to use SNOWPACK (Figure 7). Due to instrumentation problems, we did not get complete data sets

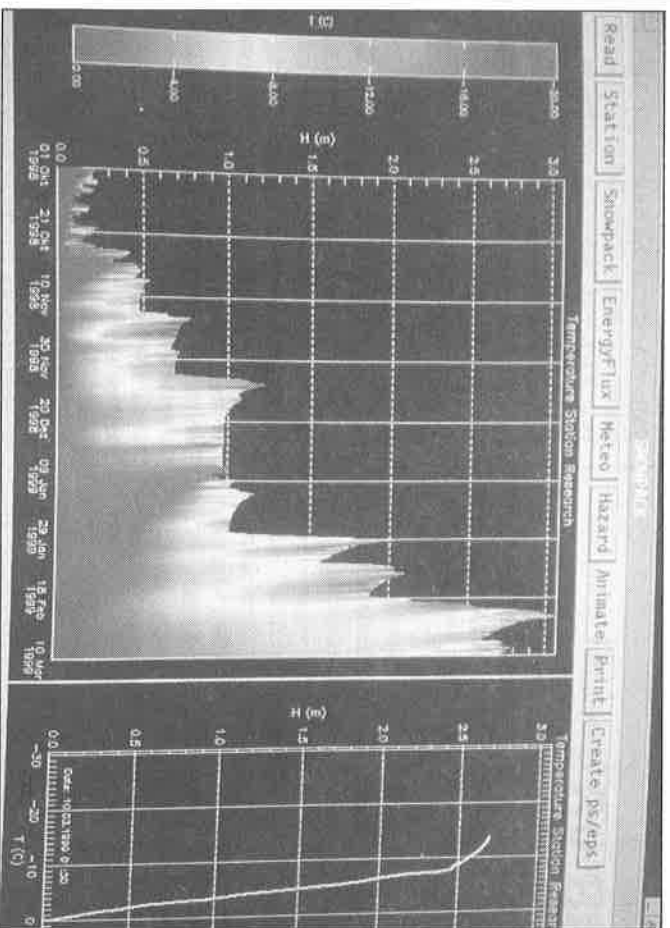


Figure 7: Sample output from SNOWPACK, the snowpack evolution model developed by the Swiss Federal Institute for Snow and Avalanche Research, with assistance from scientists at Montana State University. This particular plot shows temperature, but modeled plots for density, crystal type, and other parameters are also available. The NAC is cooperating with scientists and avalanche workers from SFISAR, MSU, the Utah Avalanche Center, and Snowbasin Ski Area to test the model this coming season.

program for free through the Olympics to demonstrate its usefulness for U.S. avalanche workers, and Snowbasin covered Martin's costs for coming to the U.S. to install the program. Both Knox Williams and Bruce Tremper have been exploring the possibility of installing this program at several sites in Colorado and Utah for next season.

from our Utah sites. However, Chris Lundy did collect a complete data set from Montana, analyzed it for part of his MS degree, and will present his results at ISSW 2000. This summer, Scott Schmidt, Michael Lehning, and Peter Gauer refined the way data are read into the model; these enhancements should allow us to more easily evaluate the

model. Next season, Chris Lundy will again collect data in Montana while Ethan Greene, forecaster for the Utah Avalanche Forecast Center, and Ph.D. student at Colorado State University, will collect and analyze data in Utah. New stability and hazard assessment applications: We are helping graduate students develop applications that may become useful for avalanche workers. First, with Montana State's Chris Landry, we are investigating a new snow stability test; the quantified loaded column test (Figure 8). Chris is specifically studying the effectiveness of using this test at a study plot to predict avalanche conditions in the surrounding terrain. He will present details of this test at ISSW 2000. Second, with Montana State's Chris McCollister, we are looking at the feasibility of using a GIS to visualize and evaluate historical avalanche data. Finally, with Colorado State's Mark Kozak, a student of Kelly Elder, we are looking at spatial and temporal changes in slab properties. We will also present results of these two projects at the ISSW in Big Sky.

**SnowMicroPen:** For next season, we are cooperating with SFISAR (Martin Schneebeli), Cold Regions Research and Engineering Laboratory (CRREL) (Jerry Johnson), and MSU (Bob Brown) to obtain a SnowMicroPen, which you may have seen at ISSW 1998. Montana State Techlink bartered this deal, whereby MSU and the NAC will receive an instrument for research and testing. This instrument provides a remarkably detailed analysis of snowpack hardness by driving a probe with an extremely sensitive load cell at its tip through the snow. It can reportedly detect thin weak layers. Testing of the instrument this winter will also involve the cooperation of CF Electronics, a firm interested in licensing and producing the instrument, and the snow safety department at Park City Ski Area.

## SECTION REPORT: COLORADO

On March 27, The Rockies Section held its Spring Meeting at Monarch, Colorado. A very gracious thank you goes out to hosts Monarch Snowcat Tours and Monarch Ski & Snowboard Area, particularly John Kreski, Snowcat Tours Manager, Gail Binder, Head Snowcat Tours Guide, and Tim Wyatt, Ski Patrol Director. 25 people attended.

John and Gail started the day with a presentation of the Snowcat Operating Plan, Snow Safety Plan, and Morning Safety Talks. The group then went into the field to directly observe the terrain and conditions in which Monarch Snowcat Tours operates. The conditions that day included soft, wind-affected powder, a dense wind slab from a recent upslope storm event, and fine corn snow in a forest of bristlecone Pine.

A lunch in the bar preceded an afternoon discussion of problems encountered with snowcat and heliski operations. Knox Williams made a brief presentation about the changes that are happening with the AAAP. Tim Wyatt demonstrated Monarch's avalanche launcher. Additional skiing completed a wonderful afternoon.

Tim Hamniford of San Juan Ski Co. LLC graciously offered to host next year's Rockies Section meeting. The group agreed to plan for

**International Snow Science Workshop 2000**

The NAC is excited to be one of the sponsoring organizations for ISSW 2000 in Big Sky. Kari is serving on the organizing committee and as the chair of the papers committee.

**The Future...**

For the future, the NAC will work toward meeting as much of our mission statement as possible given the resources we can scratch together. We will also continue to try to obtain and maintain reasonable base-level Forest Service funding for existing regional avalanche centers, as well as working with interested people living in high-use areas not covered by avalanche advisories to establish avalanche centers in those locations. In the end, we hope to be a valuable resource for the Forest Service avalanche program in particular, and the U.S. avalanche community in general.

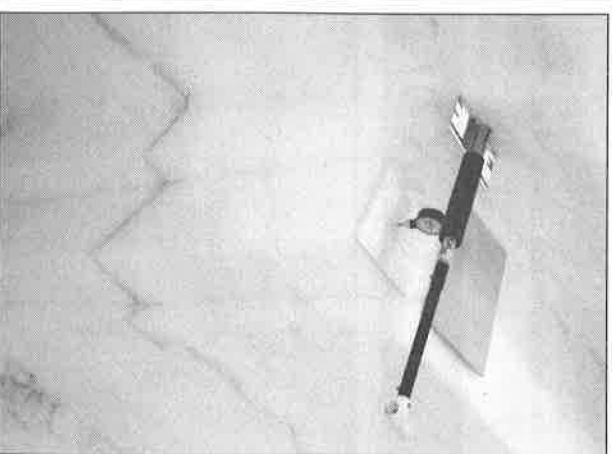


Figure 8: Equipment used for the quantified loaded column test. Information about this test will be presented at ISSW 2000 (photo by Chris Landry).

late February to ensure a quality product would be available.

Finally, no gala event can be considered complete without magnificent door prizes. I would like to extend a hearty thank you to Black Diamond, G3, Lifelink, Ortovox, and Hackshaw Publishing, Inc. for donating prizes to this event, and for their continued support of our organization and profession.

The Rockies Section also forwarded several new applications for professional membership to the board for approval. These applications indicate the growing interest in the organization here in the Rockies

Another newsworthy event from Colorado was a public hearing on the proposed changes in the state's explosive regulations. The hearing was held in Denver on February 3, 2000. The most substantive of the proposed changes concern avalanche control work performed with explosives. These new regulations will no longer defer to the Forest Service Blasting Handbook. Instead, the State will directly regulate storage, makeup of charges, transportation of charges on ski lifts open to the public, use of explosives, and training in the use of explosives.

Woody Sherwood,  
 Rockies Sectional Representative

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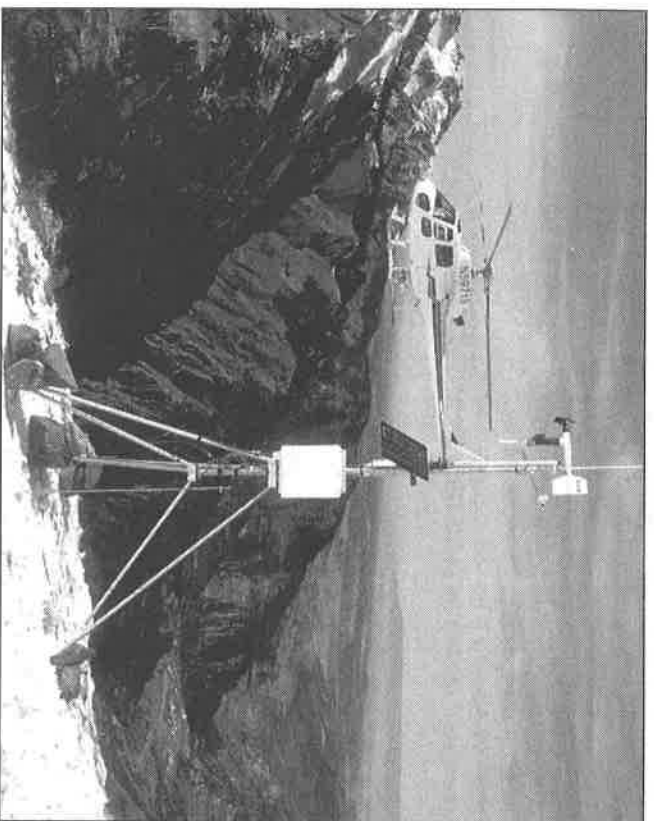


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