

# Applied Snow and Avalanche Research



## UNIVERSITY OF CALGARY

### Highlights

- Over 250 person-days of field work last winter in the Columbia, Coast and Rocky Mountains.
- Three new graduate students: Mike Conlan, Simon Horton and Alexandra Sinickas. Congratulations to Katherine Johnston, Cora Shea and Thomas Exner for defending their theses!
- Measurements at seven deep slab avalanches to build on correlations from previous winters.
- Studies of changes to critical layers with a thermal camera in Kananaskis Country and at Rogers Pass.
- Measurements of the dynamic stress under skiers, snowshoers, snowboarders and snowmobilers.
- Observations of the formation and evolution of surface hoar layers and melt-freeze crusts.



### The field team

From left to right in the photo: Ryan Buhler, Mike Conlan, Alex Sinickas, Scott Thumlert, Sascha Bellaire, Bruce Jamieson, Simon Horton. Missing from photo: Cora Shea, Michael Shynkaryk and Mike Wheater.

### Outreach, seminars and videos

At 14 sessions in Canada between November and February, we presented our results to over 350 avalanche professionals. The [list of seminars is on our website](#).

We now have 23 training videos [online](#). Some were used in Canadian Avalanche Association courses. There were played about 7000 times in the last year!

On May 3 and 4, the team will present new results in eight presentations at the Canadian Avalanche Association's Spring Conference in Penticton.

**Training December 2011** Those folks in the photo got together at Rogers Pass for eight days of training in December. Guides Sylvia Forest and Ilya Storm led three days of low-risk mountain travel and emergency response.

### Winter 2011-2012

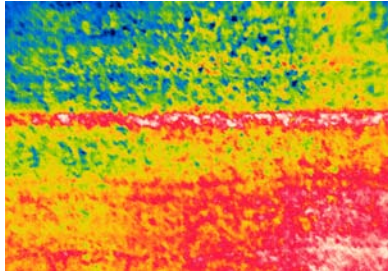
For his study of improved forecasting for deep slab avalanches, Mike Conlan and others made new and traditional measurements at seven deep slab avalanches in the Columbia and Coast Mountains (photo of deep tap test to right).

In the Columbia Mountains, Ryan, Simon and others monitored the formation of melt-freeze crusts and surface hoar over terrain, and their evolution after burial. These two



kinds of critical layers – especially the surface hoar layer buried around February 8<sup>th</sup> - produced important research results for improving avalanche forecasting.

Sascha and others observed snow profiles near treeline to calibrate the Swiss snowpack evolution model on north, south and flat aspects. The model ran at 27 sites in western Canada, predicting the snowpack and its evolution from weather forecasts - no weather stations required! The local forecasters will tell us if this approach is promising for regions with limited manual observations.



In the winter of 2010-11 in Kananaskis Country, Cora used a thermal camera to show the changing temperature profile of a shallow snowpack in high resolution. In the last winter (2011-12), she repeated the studies in a much deeper snowpack. On one night in each winter, she took hourly images of fresh pit walls. These showed strong gradients appearing near crusts when the snow surface cooled – revealing processes that a conventional temperature profile cannot. Ryan also used the

thermal camera to monitor the temperature gradients in and near crusts at Rogers Pass.

Scott measured the dynamic stress underneath snowmobiles (photo to right) and skiers (while skiing and when falling), snowshoers, snowboarders and in the columns of compression and extended column tests.



For the research topics noted above, Michael Shynkaryk and Mike Wheater helped the graduate students make many careful measurements near Blue River, BC.

**Publications**

Our [list of publications is online](#) and searchable on [our web site](#). About 100 of our publications can be directly downloaded. We estimate over 20,000 downloads per year!

**This coming summer?**

Alex and others will be surveying avalanche paths to better predict how far extreme avalanches run. All of us will be busy analyzing the winter’s data, writing papers for the 2012 International Snow Science Workshop in Alaska, and taking a couple of weeks off. Dave Tracz, Mike Smith and Ryan will be writing their theses.

**Thank you!**

We are grateful to the organizations that support the research, and to the many remarkable people we work with!

*Bruce, Sascha, Cora, Ryan, Scott, Cam, Alex, Simon, Mike Conlan, Michael Shynkaryk and Mike Wheater.*

