From the editor

The spring and summer started with a natural disaster big-bang for North America. Wildfire and flash floods caused extensive damage to the natural and built environments. John Clague's article in this edition summarizes consequences of one of the wildfires.

Risky Ground highlights releases of SFU CNHR theses, an SFU ACT climate change management white paper, and proceedings of the SFU CNHR workshop on Hazard Change Caused by Climate Change. Several conferences and training opportunities are described.

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Event Reports

The Fort McMurray Wildfire

The 2016 Fort McMurray wildfire is the most expensive natural disaster in Canadian history. Over 1600 homes and businesses were destroyed, and early estimates place the insured losses somewhere in the $3-10 billion range. In comparison, insured losses from the 1998 ice storm in southern Quebec and Ontario were $1.9 billion, and those of the 2013 southern Alberta flood were $1.8 billion. The 2011 Slave Lake wildfire, which destroyed one-third of the town of Slave Lake, Alberta, caused insured losses of approximately $750 million.

The fire started in a remote forested area about 15 km from Fort McMurray on May 1, probably due to human activity. At that time, an unusually hot, dry air mass sat over northern Alberta, and maximum temperatures reached into the low 30s the first few days of May, accompanied by humidity as low as 12%. The winter preceding the fire was drier than normal, and the thin snowpack melted quickly in the early spring. The conditions were set for an explosive wildfire.

The first sign of danger was the declaration of a local state of emergency on the evening of May 1, 2016; a trailer park and two neighbourhoods were subject to mandatory evacuation. Over the next day, however, the fire moved to the southwest away from the city, and the evacuation order was reduced to a voluntary ‘stay-in-place’ order. However, by the evening of May 3, the evacuation order was reinstated and extended to all of Fort McMurray as the situation dramatically worsened; high temperatures were accompanied by wind gusts up to 72 km/h. That same day, the neighbourhoods of Beacon Hill, Abasand, and Waterways suffered ‘serious losses’, and the Government of Alberta declared a provincial state of emergency. Evacuees who travelled north of Fort McMurray were advised to stay where they were and not to come south where the fire was still burning out of control. The wildfire, which came to be known as ‘the beast’, was large enough to create its own weather in the form of strong winds and lightning, which greatly worsened the situation. Fire fighters were endangered by the extreme heat, unpredictable winds, very rapid advance of the fire front, and low oxygen levels at ground level. Much of this time, the risk to them was so high that they could only watch and wait for conditions to improve.

The fire continued to spread south on May 5, forcing additional evacuations in the communities of Anzac, Gregoire Lake Estates, and the Fort McMurray First Nation, the last of which had graciously accepted over 8000 people during the initial evacuations.

On May 6, the RCMP began leading convoys from Fort McMurray and oil sand work camps to the north, while the fire continued to grow out of control. As the fire expanded to the northeast, the community of Fort McKay, which hosted 5000
early evacuees from Fort McMurray, was itself put under an evacuation notice. Eventually, the entire population of the city, some 80,000 people, was evacuated to sites farther south, mainly Edmonton. This was the largest evacuation of a Canadian city in the country’s history.

Figure 1. The wildfire rips through forest along Highway 63, 16 km south of Fort McMurray on May 7, 2016 (The Canadian Press/Jonathan Hayward).

The wildfire continued to grow through remote forested areas in the following week. On May 16, it reached oil sand work camps south of Fort MacKay, forcing the evacuation of 19 oil sites and camps with approximately 8000 workers. One lodge with 665 units was destroyed. On May 18 the fire burned into Saskatchewan. By June 13, the fire was 82% contained, but it could take months to totally extinguish it. At the time I wrote this article, over 600,000 ha (6000 km2) of boreal forest had burned, an area larger than Prince Edward Island.

The wildfire halted oil sands production at facilities north of Fort McMurray. One-quarter of Canada's oil production was interrupted as a result of the fire. The lost output to the Albertan economy was $70 million per day.

The strong 2015-2016 El Niño may have been partly responsible for the ferocity and size of the wildfire. It contributed to a dry fall and winter along with a warm spring, such that by the beginning of May, the forest and soils of northern Alberta and northern Saskatchewan were tinder-dry.

Controversy arose over statements that climate change was a factor that led to the fire. Some commentators said that it was insensitive to raise this matter at this time, while others argued that the crisis made it more important to talk about a possible correlation between human-influenced climate change and wildfires. Certainly, caution is required attributing individual fires, even one of the size of the Fort McMurray wildfire, to climate change.

The Fort McMurray fire and the Slave Lake fire four years earlier have highlighted a serious vulnerability of communities in the Canadian Boreal Forest. Although Fort McMurray is the largest community in this forest region, many other towns are at high risk, including a large number of First Nation communities.

The response to the wildfire risk in Canadian forests to date has been reactive – suppress the fires and evacuate residents when necessary. Although successful in protecting human life, this approach does little to reduce the risk to property and the resulting economic and social disruptions under ‘perfect storm’ weather and forest conditions such as those in northern Alberta that led to the Fort McMurray and Slave Lake fires. The economic risks posed by such wildfires might be reduced by establishing large firebreaks, fireproofing structures (especially roofs upon which burning embers might fall), and appropriate land-use planning. In contrast, uncontrolled urban expansion in forested areas is a recipe for disaster.

John J. Clague
June 2016
Adapted, in part, from Wikipedia

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**Releases**

**Low Carbon Resilience: Transformative Climate Change Planning for Canada**

Climate is changing at an alarming rate around the world, and it is now more important than ever to move as fast as possible to reduce emissions (mitigation), while reducing the impacts already evident and projected to worsen (adaptation). To our detriment, these crucial pathways are still largely considered separately. This new white paper from ACT points to the co-benefits and synergies achieved when we consider mitigation and adaptation simultaneously.

Some experts have already outlined this approach under different names, and we acknowledge and deeply appreciate their contributions. We advocate its expansion by placing ecosystem health at the centre of planning, because climate change is but one symptom of the crisis unfolding in the
biosphere. We refer to this approach as “low carbon resilience.”

We hope this paper starts a conversation, and stimulates both discussion and innovation, as we meaningfully address our challenges. To that end, we provide an online Study Edition of the report that enables online comments and other innovative options. You can link to it, and the other versions of the report (PDF and ePub), at: http://act-adapt.org/lcr-report/

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Hazard Change Caused by Climate Change: Workshop Report

A draft report of proceedings of the February 22, 2016, workshop is now available. The workshop intent was to initiate and stimulate a national discussion about weather-caused and weather-triggered hazards that are changing in a warming world. It was conceived and hosted by the Centre for Natural Hazard Research, in cooperation with Simon Fraser University’s ACT (Adaptation to Climate Change Team), Natural Resources Canada and PICS at Simon Fraser University (Pacific Institute for Climate Solutions). The two main goals of the workshop were to:

1. improve knowledge and confidence of practitioners and policy makers when making land-use decisions or changes in professional practices that require a consideration of climate change; and

2. spark a national initiative to produce an understandable document that summarizes changes to hazards driven by changes in climate.

Workshop delegates represented a cross-section of stakeholders and experts in natural hazards, risk management, policy and climate change, and included researchers, engineers, geologists, planners, officials from local, provincial, and federal government, and emergency managers.

The proceedings volume was compiled and largely written with financial support from Natural Resources Canada. The draft report is available from the workshop website: http://cnhr.mhrisk.ca/download8.php

Presentations and other workshop outputs can also be downloaded from this webpage.

The report of proceedings will be submitted for publication through the Geological Survey of Canada’s Open File series. Feedback from workshop participants and stakeholders has encouraged further workshops on targeted aspects of changing hazards. Such workshops are in the early planning stages.

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Recent Theses


Justine Cullen, 2016. Optical Dating Studies of southeastern Patagonian Sand Wedges in Chile and Argentina. MSc Thesis, Simon Fraser University Earth Sciences Department


Announcements

International Summer School on Rockslides and Related Phenomena in the Kokomeren River Valley

August 10-25, 2016, Bishkek, Kyrgyzstan

Rockslides (bedrock landslides) are among the most hazardous natural phenomena in mountainous regions. Though relatively rare, in comparison with landslides in non-lithified soils, they pose a threat to vast areas because of the enormous amount of material involved (sometimes up to billions of cubic meters), high mobility of debris and ability to create large natural dams. The dams can result in the inundation of the valleys upstream and catastrophic outburst floods downstream. Similar rock-slope failures occur sometimes in large open cast mines. The aim of the International Summer School is to demonstrate rockslides of different types – long runout rock avalanches, intact and eroded rockslide dams, along with various methods of their study (identification, mapping, dating, detail analysis of rockslide internal structure and grain-size composition) to students and young landslide researchers.

Numerous rockslides and rock avalanches of different types, ranging from a few millions to more than 1 billion cubic meters in volume are concentrated in the Kokomeren River valley (Central Tien Shan) within a limited area of about 40x60 km at a one-day trip distance from Bishkek city – capital of Kyrgyzstan. Most sites are located near a road along the Kokomeren River and require only a few hours of hiking to reach them. Due to arid climate and lack of vegetation the rockslides’ morphology is well preserved and clearly visible. Some of rockslide deposits up to 400 m thick are deeply dissected by erosion that allows study the detail of their internal structure. Evidence of valley inundation caused by rockslide damming and of associated outburst floods are present in the valley as well. Along with the bedrock slope failures several very large landslides in non-lithified Neogene and Quaternary deposits can be found in the adjacent neotectonic depressions.

Besides rockslides and landslides, the study area provides expressive manifestations of Neotectonics and Quaternary tectonics such as active faults, one of which was ruptured during the 1992 M7.3 Suusamyr earthquake, and numerous examples of the tilted and folded pre-Neogene planation surface.

One course topic describes the paleoseismology of the region, and the paleoseismological interpretation of rockslides in particular.

The annual International Summer School supported by ICL (http://www.iclhq.org) has been organized since 2006. Previous field training courses were attended by participants from Argentina, Austria, Belgium, China (including Hong Kong), Czech Republic, France, Germany, Great Britain, Italy, Japan, Kyrgyzstan, New Zealand, Russia, Switzerland, Spain, Taiwan, Tajikistan and USA.

The 2016 training course will be carried out on August 10-25. The participation fee is EURO 500, which include all costs at the site: camping (in tents; though some tents can be provided by organizers, participants will be asked to bring their own tents and sleeping bags), food, local transportation, detailed full-colour guidebook. Organizers will provide help obtaining visas if necessary.

Participants should arrive in Bishkek no later than August 10 (early morning). They will be picked up at the arrival desk of the Bishkek airport. Bishkek is connected with Moscow, Istanbul, Urumchi, Dubai, Ulan-Bator by direct flights. Arrival via Almaty airport is possible as well.

Participation fee (EURO 500 or equal amount in the US dollars or Russian roubles) should be paid by cash at the participants’ arrival. Organizers will provide cash receipt vouchers and certificates confirming attendance at the ICL field training course.

Summer School guidebook can be downloaded from the ICL homepage: http://icl.iplhq.org/category/icl/leaflet-and-publications/ (Summer_School_Guidebook-
2009.pdf) or can be provided upon request from Dr. Alexander Strom.

Those who are interested, please contact:

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The call for abstracts has been issued and is open until March 31, 2016.

The Forum is organized under five themes:

1. Sendai partnerships 2015-2025
2. Advances in landslide science
3. Advances in landslide technology
4. Diversity of landslide forms
5. Landslides in different environments

Forum chairs:

Matjaž MIKOŠ (Chairman, Slovenian National Platform for Disaster Risk Reduction)  
Yueping YIN (President, International Consortium on Landslides)  
Kyoji SASSA (Executive Director, International Consortium on Landslides)

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4th World Landslide Forum  
Landslide Research and Risk Reduction for Advancing Culture of Living with Natural Hazards  
May 29 – June 2, 2017, Ljubljana, Slovenia  
http://www.wlf4.org

The World Landslide Forum (WLF) is a triennial world conference to foster international exchange of knowledge, experiences and latest trends in science and engineering development, with a focus on landslide risk governance. The first conference was held in Tokyo, Japan (2008), followed by Rome, Italy (2011), and Beijing, China (2014).

The objective of the fourth World Landslide Forum is to have a worldwide discussion about how landslide research and landslide risk reduction can contribute to advancing a culture of living with natural hazards. The discussion of governance in landslide disaster risk reduction and management means establishing an effective bottom-up system incorporating relevant stakeholders: a governance that supports risk dialogue and enhances communication to build a sustainable system of prevention and disaster relief. The forum will be the first opportunity to evaluate progress in the implementation of the ISDR-ICL Sendai Partnerships 2015-2025 for Global Promotion of Understanding and Reducing Landslide Disaster Risk, officially accepted in 2015 at the 3rd United Nations World Conference on Disaster Risk Reduction in Sendai, Japan.
Risky Ground publishes stories and information on current topics of interest to researchers and practitioners in natural hazards and their risks to people, infrastructure and the environment. It is distributed by email as an electronic version, quarterly, near the start of each season, by the Centre for Natural Hazard Research at Simon Fraser University, Burnaby, British Columbia, Canada. Copies are hosted for download at [http://www.sfu.ca/cnhr/newsletters.html](http://www.sfu.ca/cnhr/newsletters.html)

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