

Le Groupe Canadien de Recherche en Géorno



Glacial flour, Rio Baker, Chile

No. 32, August 2012

President's Message Mot du Président

Tracy Brennand, Past President

Geomorphology in Canada is abuzz with activity underscored by our members participation in CGRG's AGM meetings and conferences with our affiliate organizations. Since the 2011 CGRG-AGM, CGRG has sponsored one international conference (Coherent flow structures in geophysical flows at the Earth's surface II) and sponsored or cosponsored 9 sessions at 3 national meetings (CANQUA-IAH, CAG, CGU-CWRA). In total >200 papers, spanning historical and process geomorphology, were presented in CGRGsponsored sessions. Notably many sessions were also interdisciplinary, underscoring the importance of interdisciplinary approaches to the understanding of surface processes and to solving problems affecting Earth's critical zone. A report on the 2012 CGRG AGM meeting can be found later in this newsletter. The 2013 CGRG AGM meeting will be held in collaboration with CANOUA (CANUA-CGRG 2013) in Edmonton, Alberta (tentatively 19-22 August, 2013).

A CGRG priority is the involvement and promotion of students. To this end we have free student memberships, and give awards for the top student talks and posters at our annual meeting and sponsored sessions. Since the 2011 CGRG-AGM

La géomorphologie au Canada bourdonne d'activités, comme en témoigne la participation de nos membres aux assemblées générales annuelles (AGA) du Groupe canadien de recherche en géomorphologie (GCRG) et aux congrès organisés par nos partenaires. Depuis la tenue de l'AGA du GCRG de 2011, le GCRG a parrainé une conférence internationale portant sur les structures de flux cohérentes dans les flux géophysiques à la surface de la Terre II (Coherent flow structures in geophysical flows at the Earth's surface II) et a également parrainé ou coparrainé neuf séances présentées dans le cadre de trois congrès nationaux (Association canadienne pour l'étude du Quaternaire et Association Internationale des hydrogéologistes, Association canadienne des géographes, Union géophysique canadienne et Association canadienne des ressources hydriques). En somme, plus de 200 communications portant sur les aspects historiques de la géomorphologie et les processus ont été données dans le cadre des séances parrainées par le GCRG. Soulignons le caractère interdisciplinaire de nombreuses séances qui montre à quel point les approches interdisciplinaires sont importantes pour mieux comprendre les processus de surface et pour résoudre des problèmes ayant des répercussions sur la zone critique de la Terre. Un

CGRG has awarded 2 Olav Slaymaker awards, 3 Jean-Claude Dionne awards and 2 Alan S. Trenhaile awards to students who have given exceptional presentations at these meetings. On behalf of CGRG I would like to congratulate these students and thank all of the student award judges. I am also very pleased to announce that Mike Church, Pascale Biron and Andre Roy have donated the royalties of their book, "Gravel-bed Rivers: Processes, Tools, Environments" publish by Wiley-Blackwell this year to support CGRG students. Proceeds will most likely be directed at grants for student travel to CGRG-sponsored conferences (details forthcoming). A big thank you to Mike, Pascale and Andre for this donation!

CGRG also celebrates the accomplishments of young Canadian geomorphologists by awarding the J. Ross Mackay (JRM) award. At our recent AGM the membership voted to modify the terms of reference for this ward to provide clearer directions for nominators and to make transparent past practices of the JRM adjudication committees. The revised wording can be viewed at http://cgrg.geog.uvic.ca/Mackayaward.pdf. An official call for nominations for this award will be sent out on the CGRG e-mail list in the Fall, but we encourage you to start thinking of deserving nominees now.

The 2012 CGRG AGM has also brought changes to the CGRG Executive. Brian Menounos (UNBC) is now CGRG President, Ian Walker (U Vic), the new Vice President, Denis Lacelle (Ottawa U), the new Secretary Treasurer, Kyle Hodder (U Sask) and Chris Hugenholtz (U Lethbridge) are new members-at-large, and I am now Past President. On behalf of the membership, I extend thanks to Greg Brooks (the previous Past President), John Tunnicliffe and Nicole Couture (past Secretary-Treasurers), and Thomas Buffin-Belanger and Andrew Stumpf (past members-at-large) for their many contributions to the Executive and the Canadian geomorphology community.



Brian Menounos, CGRG's new President headed into the field in Patagonia

compte-rendu de l'AGA du GCRG de 2012 est inclut dans ce même numéro du bulletin de nouvelles. L'AGA du GCRG de 2013 se déroulera conjointement avec l'Association canadienne pour l'étude du Quaternaire à Edmonton, Alberta (les dates provisoires sont du 19 au 22 août 2013). Nous espérons vous y voir en grand nombre.

La participation active et la valorisation des étudiants compte parmi les priorités du GCRG. Pour ce faire, les étudiants n'ont pas à payer de droits d'adhésion et nous décernons des prix aux étudiants pour les meilleures communications orales ou affichées lors de nos congrès annuels et des séances que nous parrainons. Depuis l'AGA du GCRG de 2011, le GCRG a décerné deux prix Olav Slaymaker, trois prix Jean-Claude Dionne et deux prix Alan S. Trenhaile à des étudiants pour des exposés jugés exceptionnels lors de ces congrès. Au nom du GCRG, j'aimerais féliciter ces étudiants et remercier tous les membres du jury de sélection des lauréats. Je suis également très heureuse de vous annoncer que Mike Church, Pascale Biron et André Roy ont fait don des redevances sur les ventes de leur ouvrage, « Gravel-bed Rivers: Processes, Tools, Environments » publié cette année par la maison d'édition Wiley-Blackwell afin de venir en aide aux étudiants membres du GCRG. Il est fort probable que ces revenus serviront à défrayer les coûts de déplacement des étudiants qui participeront aux congrès parrainés par le GCRG (plus de précisions à venir). Un grand merci à Mike, Pascale et André pour votre générosité !

De plus, le GCRG reconnaît les réalisations des jeunes géomorphologistes canadiens en leur décernant le prix J. Ross Mackay (JRM). Lors de notre dernière AGA, nos membres ont voté en faveur des modifications apportées aux critères de sélection de ce prix dans le but de fournir aux personnes chargées de sélectionner les lauréats des consignes plus précises et d'assurer la transparence des procédés utilisés dans le passé par les comités de sélection du prix JRM. Le nouveau libellé peut être consulté en ligne à l'adresse suivante : <u>http://cgrg.geog.uvic.ca/Mackayaward.pdf</u>. Un appel sera lancé cet automne sur la liste de diffusion du GCRG pour soumettre les dossiers de candidature, mais nous vous invitons à proposer dès maintenant des candidats qui sont dignes de mention.

Des changements ont été apportés à la composition du comité exécutif du GCRG lors de la tenue de l'AGA du GCRG en 2012. Brian Menounos (Université du Nord de la Colombie-Britannique) a été nommé président du GCRG, Ian Walker (Université de Victoria) est le nouveau viceprésident, Denis Lacelle (Université d'Ottawa) devient le secrétaire-trésorier, Kyle Hodder (Université de la Saskatchewan) et Chris Hugenholtz (Université de Lethbridge) ont adhéré à notre association et j'agis maintenant comme présidente sortante. Au nom de tous les membres, j'aimerais adresser mes remerciements à Greg Brooks (le président sortant précédent), John Tunnicliffe et Nicole Couture (les anciens secrétaires-trésoriers) et Thomas Buffin-Bélanger et Andrew Stumpf (des anciens membres actifs) pour le concours qu'ils ont apporté au comité exécutif et à la communauté canadienne de géomorphologie.

Meeting reports CGRG Awards at the 2012 CGU-CWRA Annual Meeting

CGRG held our 2012 AGM and sponsored 6 special sessions including 51 talks (18 by students) and 9 posters (5 by students) at the CWRA-CGU 2012 meeting in Banff Alberta, 5-8 June 2012. Understandably, the conference had a strong focus on fluvial systems, though other areas of geomorphology (e.g., glacial, eolian) were represented. Program details can be found at: <u>http://www.elements2012.ca/program.htm</u>. The CGRG provided awards for the top poster and top talk to the following students:

Olav Slaymaker Award (best poster): **Dominic (Nick) Reiffarth**, PhD student at the University of Northern British Columbia (with E.L. Petticrew and P.N. Owens) for his poster entitled, *Compound-specific stable isotope methods used in tracing soil and sediment movement: considerations for improved sensitivity.* (See Dominic's student profile later in this newsletter.)

Olav Slaymaker Award (best oral presentation): **Sarah Davidson**, PhD student at the University of British Columbia (with B. Eaton) for her talk, *Modeling reach-scale morphodynamic response to large wood addition*.

Additional highlights of the meeting included J. Ross Mackay award lectures by **Chris Hugenholtz** (2012 award winner) and **Michele Koppes** (2011 award winner), presentation of CGRG awards at the CGU Banquet, and presentation of the 2012 CGU Young Scientists award to **Brian Menounos**, CGRG's incoming President.



Brian Menounos (centre), winner of the CGU Young Scientist Award and incoming CGRG President, with outgoing CGRG President Tracy Brennand (left) and CGU President Gail Atkinson.



Sarah Davidson, UBC (right), winner of the Olav Slaymaker Award for best oral presentation, with CGRG President Tracy Brennand.

The 2013 CGRG Annual General Meeting will be held at the CANQUA meeting in Edmonton, Alberta in August 2013. Stay tuned for CGRG sponsored sessions at CANQUA!



Jon Tunnicliffe first contemplated sediment transport while watching massive trucks and mining machinery altering the morphology of the landscape around him. Jon's introduction to the earth sciences came as he apprenticed as a mining surveyor in his hometown of South Porcupine, in northern Ontario. He further contemplated things such as sediment consolidation and the angle of repose, as he measured the span of tailings ponds, laid out drilling transects across muskeg terrain and plumbed the depths of open pits and mining tunnels.

With an undergraduate degree from the University of Western Ontario, Jon launched his research career with Dr. Allen Gottesfeld at the University of Northern British Columbia, developing a magnetic bedload detector that could capture the signal of river gravel transport during spring flooding and salmon spawning. Living in a remote, 8x8 plywood cabin by the side of an active salmon creek in the BC mountain wilderness was a tantalizing first taste of geomorphology: he was hooked.

Following his Masters' degree Jon accepted a United Nations posting, providing technical assistance for drilling projects, developing a GIS framework for groundwater management, and working to improve geospatial capacities within the Water Environment and Sanitation Programme (UNICEF). He left Africa in 2002, to pursue a PhD with Drs. Michael Church (UBC), Olav Slaymaker (UBC) and John Clague (SFU) in Vancouver. His PhD research involved reconstructing the postglacial history of Chilliwack Valley in southwestern BC; he sought to balance estimates of Holocene erosion from hillslopes and glacial deposits with deposition in a valley-wide and in a large fan at the mouth of the valley. He used infrared luminescence dating to determine rates of river downcutting through the valley fill, geochemistry to assess sediment provenance, and an array of seismic tools to establish the stratigraphy and volumes of Holocene deposition.

An important lesson in this work was that multiple lines of inquiry can help to close, or at least constrain, landscape problems such as a large valley sediment budget. Geomorphologists are often challenged to weigh data collected at different scales, at varying time intervals and even using different instrumentation, to produce a suitably

Researcher Profile Dr. Jon Tunnicliffe Carleton University

accurate, integrated picture of long-term change. A key problem is that the balance of dominant processes and their relative rates tend to change with landscape scale. Geomorphologists have been gradually assembling a unified database of large-catchment case studies, continually adapting and innovating geochronological tools, and developing a common theoretical framework for quantifying linkages, storage and feedbacks that occur within larger catchment systems. Numerical and laboratory modeling can provide the means for further constraining initial estimates, or refining our hypotheses of system function. In his thesis and subsequent research, Jon has worked to develop 1-d and 2-d numerical morphodynamic models to route sediment from hillslopes to fans and deltas.

In 2006 Jon moved to Christchurch New Zealand with his wife Kristiann, and their then 1-year-old son, Max, to undertake work with the National Institute of Water and Atmospheric Research (NIWA). Jon had the opportunity to further refine his river modelling skills, working with Dr. Murray Hicks on problems such the response of braided rivers to altered flow regime following hydro dam impoundment. As part of NIWA's Sediment Processes Group, Jon developed models that could simulate some aspects of 3-dimensional braided river flow and sediment transport in a 1-dimensional framework. The resulting 1-d models are used to simulate rates of morphologic change in dammed or otherwise altered river systems. He also looked at some larger-scale issues, such as the impacts of historical seismicity on river systems, and river interactions with coastal sediment transfer.

Following his time at NIWA Jon returned to Canada, finding work at Carleton University as Instructor and Research Scientist in the Department of Geography and Environmental Studies. His daughter Sabina was born shortly after he began a full schedule of teaching in 2008. While at Carleton, Jon undertook several research projects with colleagues Drs. Chris Burn and Steve Kokelj, examining the influence of permafrost on various aspects of landscape evolution such as river meandering and hillslope processes. His most recent work in this regard involves modeling the impacts of large retrogressive thaw slumps in the Peel Plateau region of the Northwest Territories.

Jon will wrap up his teaching duties at Carleton this fall (2012) as he and his family get ready for the next chapter. Jon was recent appointed to the position of Lecturer in River Science at the School of Environment at the University of Auckland. Back in New Zealand, Jon looks forward to further contemplation of sediment transport and the changing landscape around him.

Student Profile Dominic Reiffarth University of Northern British Columbia

Dominic (Nick) Reiffarth is a Ph.D. student in the Department of Natural Resources and Environmental Studies at the University of Northern British Columbia (UNBC); he is working with Drs. Ellen Petticrew (Geography, UNBC) and Philip Owens (Environmental Science, UNBC) on tracing soil and sediment movement using compound-specific stable isotopes (CSSIs).

Dominic completed his B.Sc. in Chemistry at UNBC in 1998, taught English in Japan for two plus years, and then returned to Vancouver to work as a project manager for a translation and graphic design company. He eventually started his own business, focusing on technical and scientific translations, website development and desktop publishing.

After a six-year hiatus from chemistry, Dominic returned to UNBC to pursue a Masters degree in synthetic carbohydrate chemistry; the research focused on synthesizing a form of pectin, which would then be used in plant physiology studies in order to better understand cell differentiation during the growth of plants by investigating the binding properties of monoclonal antibodies to the synthetic moieties. Dominic was first author on the publication but, perhaps more importantly, gained a new appreciation for the importance of investigating and trying to understand natural processes.

While pursuing his Masters degree, Dominic was given the opportunity to teach first year chemistry lectures at a local college in the Chemistry Department. After completing his Masters degree in 2006, an opportunity arose in 2008 to teach Chemistry at UNBC as a Senior Lab Instructor. Although trained in synthetic organic chemistry, Dominic has been teaching analytical chemistry over the past several years, and has been trying to harmonize the practical skills taught in a lab with the challenges of solving "real-world" environmental issues. The opportunity arose, in the context of a Ph.D., to investigate the use of organic biomarkers i.e. plant-derived, recalcitrant carbon-containing compounds, to trace soil and sediment from source to sink based on the ¹³C:¹²C stable isotope signatures found in the biomarkers. Dominic believed he would be a good fit for this type of research based on his background in organic and analytical chemistry. The use of CSSIs for tracing is a relative new and emerging field and is plagued by many challenges, but early results have shown considerable promise of the technique as a tracing tool.



Dominic (Nick) Reiffarth (centre) with UNBC supervisors Phil Owens and Ellen Petticrew

Dominic is trying to address the sources of variability-both natural and analytical-which will allow for improved precision, better sampling design, sample processing and statistical analysis. Current publications have primarily focused on spatial variability; Dominic is also trying to address the issue of temporal variability using CSSIs.

The interdisciplinary nature of the research currently being conducted will not only allow for the evaluation, refinement and implementation of a novel tracing technique, but also demonstrate the importance of cooperation between researchers in different fields. Upon completion of his Ph.D., Dominic would like to continue conducting interdisciplinary research and continue his career in academia.

Dr. Chris Hugenholtz J. Ross Mackay Award winner

Greg Brooks, CGRG Past President

The J. Ross Mackay Award is presented annually by the CGRG in recognition of a significant achievement by a young geomorphologist within Canada. The purpose of the award is to foster the development of geomorphology in Canada and to provide recognition of young scientists in this field. On behalf of the J. Ross Mackay Award Committee, I am pleased to announce that this year's winner is Dr. Chris Hugenholtz, Department of Geography, University of Lethbridge.

Dr. Hugenholtz's nomination was based on a body of work addressing biophysical interactions between wind erosion, vegetation and sand dune activity in Prairie sandhill ecosystems. During a relatively brief research career, he has demonstrated theoretical and field-based research that spans remote sensing, process-based aeolian studies, and made conclusions with application towards ecosystem management. The three papers supporting his nomination are:

Hugenholtz CH, Barchyn, T, 2010. Spatial analysis of sand dunes with a new global topographic dataset: new approaches and opportunities. Earth Surface Processes and Landforms 35 (8): 986-992."

Hugenholtz CH, 2010. Morphodynamics of a supplylimited inland parabolic sand dune during the incipient phase of stabilization. Earth Surface Processes and Landforms, v. 35 (14), pp. 1674-1681

Hugenholtz CH, Bender D, Wolfe SA, 2010. Declining sand dune activity in the southern Canadian prairies: historical context, controls and ecosystem implications. Aeolian Research, 2 (2-3), pp. 71-82

The first paper highlights the utility of a freely-available DEM data source that provides new opportunities for investigating large aeolian sand dunes in three-dimensions. The second paper details the results of topographic change of a parabolic dune undergoing increased vegetation cover and stabilization, despite drier-than-average moisture conditions and a steady wind erosion potential. It highlights the problem of ascribing simple climatic indices to dune activity and calls for a greater accounting of spatial and temporal variations of local sand supply as a boundary condition, in order to replicate realistic geomorphic states. The third paper overviews Canadian prairie sandhills and examines the factors contributing to the historical decline of active dunes throughout the region, as well as the ecological implications of dune stabilization. It identifies that a significant implication of declining wind erosion on sand dunes is the loss of specialized habitat and, potentially, the wildlife that depend on it.



The 2011 and 2012 J. Ross Mackay awardees, Michele Koppes (left) and Chris Hugenholtz (right) received their bottles of single malt scotch from CGRG President Tracy Brennand at the CGU-CWRA Annual Meeting, June 2012.

The paper concludes that interventionist management strategies may be necessary to preserve dune-dependent species habitat and thus biodiversity of the prairie. The award committee was particularly impressed with the application of this latter research to a real world environmental problem.

Dr. Hugenholtz received his Ph.D. in Geography in 2006 from the University of Calgary and was appointed an Assistant Professor at the University of Lethbridge in 2007. His numerous accomplishments include being awarded in 2010 the Cenovus Chair in Canadian Plains Mitigation and Reclamation Research, and twice receiving the CGRG Olav Slaymaker Award (2004 and 2005). In the opinion of one of his supporters, "his best research and accolades are yet to come", a statement that the J. Ross Mackay Award Committee concurs.

The J. Ross Mackay Award is a plaque and a bottle of single malt scotch. Dr. Hugenholtz received his award and delivered the Mackay award lecture at the CGRG-CWRA annual meeting in June 2012.

Nominations are currently being sought for the 2013 J. Ross Mackay Award. Information regarding the nomination process can be found at <u>http://cgrg.geog.uvic.ca/Mackayaward.pdf</u>. Nominations must be received (preferably by e-mail) no later than *November 15, 2012.*

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Gros Morne Kitchen Party By Alison Dyer

We blew in like starlings on the wings of a gale. Knew a party had been going on for ages.

Iapetus had been there. Had a tectonic altercation with Appalachia. Didn't get the whole story. But sounds like some woman (Rodinia comes to mind) was involved.

Oh yes, we all saw the upshot of that. Cleared the table and threw near everything else out in the gardens. But they're a tuff crowd down there.

Yup, quite the kitchen party. A crowd turned up to catch the riffs and watch the hullabaloo. Not a fiddle in sight, though some accordion player -Harry - had been playing up a storm.

Jeez, he had even the plates dancing.

Later on, some elegant architects appeared on the scene. Now they created quite the show. Oh, but they were cool movers and shakers. Between you and me, they were downright erratic.

A few of their Valley crowd are still hanging about, gushing and spewing forth between Cliff and the others. On top of it all, a few had been smoking, a haze that pretty much shut everyone up.

We left kinda late, but the party was still in full tilt, albeit a bit subdued. There were some leaners out back. And a few woozles had hunkered down, waiting for someone or other to fall in their trap.

Yeah, it was time to move on. Some party though.

PhD opening at the University of Lethbridge: Wind erosion and dust emission from oil sands mining operations

A PhD project is available at the University of Lethbridge that examines wind erosion and dust emission from open-pit mining activities in Alberta's oil sands. This project is part of a largescale initiative to reduce dust emissions and airborne transport of pollutants from oil sands operations.

The successful applicant will incorporate field measurements and experimentation to address the following project milestones: (1) identify and quantify the problem, (2) design mitigation strategies, and (3) assess the outcomes. Through all stages of the project the PhD candidate will have the opportunity to engage representatives from industry and regulatory agencies. It is expected that the candidate will apply for an NSERC Industrial Postgraduate Scholarship with support from an industrial sponsor.

Students interested in this project should contact Dr. Chris Hugenholtz [chris.hugenholtz@uleth.ca]. Students should have a strong academic record and experience leading field-based research. A fundamental understanding of aeolian processes, measurements and modeling is also essential.





In Memoriam

Geoffrey Hattersley-Smith (1932-2012)



Geoffrey Hattersley-Smith, who has died aged 89, had a wider knowledge than any other person of the geography, geology, personalities and lore of the polar regions.

He went to the Antarctic for 18 months in 1948, when the Falkland Islands Dependencies Survey posted him as base leader and glaciologist on King George Island in the South Shetlands. Four years later he joined the Canadian Defence Board, which gave him the opportunity to indulge his love of the frozen wilderness in the north of the dominion, climbing and driving husky teams, employing the racquets serve he had learned at Winchester College to crack the whip over the dogs' heads.

Over more than 20 years Hattersley-Smith conducted an oceanographic survey of the Beaufort Sea with the English millionaire Tom Manning (who shot a polar bear and added an unappetising bear soup to their diet). He produced a geological map of Banks Island; made astronomical fixes for five survey stations on the mainland; dug a deep pit to measure snow and ice accumulation in the upper Seward glacier; and placed a nuclear detector on Cornwallis Island.

In 1953-54 he led the Canadian-American investigations of the ice shelf of Ellesmere Island, where he was to spend 18 summer seasons in charge of the first long-term survey of its ice cap. Although careful about committing himself on paper, his early inkling of what came to be known as global warming was later confirmed by power drilling in Greenland and dramatically demonstrated when a 25-square-mile section of the Ellesmere ice shelf broke away in 2005.

In 1966 Hattersley-Smith was appointed chairman of the committee on Canadian glaciers, while continuing with his geological and glaciological work on Ellesmere Island. One of his more unusual companions there was Count Eigil Knuth, whom he invited to inspect evidence of what Hattersley-Smith suspected was a 4,000 year-old Inuit presence. Knuth confirmed such suspicions in half an hour and also demonstrated an unusual method of crossing Arctic streams, pulling on Wellington boots but removing his trousers to wade across with bottom bared.

Geoffrey Hattersley-Smith was a fellow of the Royal Society of Canada and of the Royal Geographical Society, whose patron's gold medal he was awarded in 1966. He served at various times as president of the Canadian Arctic Circle Club, the Arctic Club of Britain and the Antarctic Club. He was belatedly awarded the Polar Medal, with Arctic and Antarctic clasps, in 2006.

The Waitaki River, looking eastward towards the coast, downstream from the dam. The process of active braiding has been somewhat inhibited by prolonged low flows, leading to the establishment of vegetation that further confines channel migration.



Join the Canadian Geomorphology Research Group

CGRG was established in 1993 at the International Association of Geomorphology Congress in Hamilton, Ontario. It provides a strong voice for geomorphology in Canada. Its objectives are to advance the science of geomorphology in Canada by 1) organizing and sponsoring technical sessions, workshops, and field trips, 2) publishing newsletters twice a year, 3) operating a listserver (CANGEORG) which maintains a comprehensive bibliography of Canadian geomorphological, Quaternary, and environmental geoscience publications, 4) supporting publication of technical reports and field guides, 5) presenting the J. Ross Mackay Award in recognition of a significant achievement by a young geomorphologist in Canada, and 6) co-operating with related earth science associations within Canada (GAC, AQQUA, CAG, CANQUA, CGU).

We encourage all earth scientists with an interest in geomorphology to join CGRG.

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