



**NEWSLETTER OF THE CANADIAN  
GEOMORPHOLOGY RESEARCH GROUP**

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**PRESIDENT'S MESSAGE - MOT DU PRÉSIDENT**

With the 2004 AGM rapidly approaching, I want to address the scheduling of the annual meetings of the CGRG. Since 1995, we have met in regular rotation with four host societies: the GAC, GAC, AQQUA and CANQUA.

In recent weeks, I have listened to constructive criticism of the meeting schedule from the CGRG executive, two past-presidents and a few other interested members who were drawn into the discussion. There seems to be unanimous, mild to strong dissatisfaction with the format of rotating meetings with the four geoscience societies. Brian Luckman expressed a common opinion: "it's about time that CGRG broke the mould of the four year rotating cycle. It was started as a mechanism to float the organisation about 10 years ago and it leads to a very patchy turnout in certain years."

As an alternative to the current format, it has been suggested, most recently by Peter Ashmore, that the CGRG sponsor or co-sponsor sessions at various conferences of geoscience societies in a given year. That is, the CGRG would go where there is interest and willingness to organize rather than impose the AGM on a host society in a fixed rotation. With this approach, the CGRG would have a presence at the meetings of our host societies more often than once every four years. Also, there could be other host societies besides the current four. In particular, several members have noted that CGU meetings have as much geomorphology or

more than the conferences of the other four societies.

One possible criticism of the proposed model (possible because no one has stated it yet) is that it spreads our members among meetings rather than concentrating us at a single venue. It's unrealistic to think, however, that we will all meet in one location each year. It's a large country and we have diverse interests. Generally, geomorphologists choose conferences for reasons other than just the presence of the CGRG AGM.

Of course, there has been no CGRG policy to prevent sponsorship of special sessions at venues besides the location of the AGM, but this has not been explicitly encouraged and the AGM takes precedence in terms of the resources of the CGRG. Under the new meetings model, the CGRG could be represented at the meetings of more than one host society each year and in various regions, facilitating student participation. The annual business meeting can be scheduled on relatively short notice according to the preference of the executive committee. The Mackay award would be presented at the location chosen by the recipient and the Slaymaker awards could be given out at one or more of the CGRG special sessions.

As it turns out, the meeting of CGRG with AQQUA next month at Laval University is backed by interest and initiative among CGRG members. Specifically, Antoni Lewkowicz has

organized a very special session on periglacial geomorphology in honour of Hugh French. Geomorphologists are involved in other sessions (Yves Bégin) and in the field trip (Yves Michaud) and Matthias Jakob will give the J.R. Mackay lecture: Degrees of Uncertainty in Applied Geomorphology. If the new meeting model is adopted at the AGM, the CGRG could meet in 2005 with the CAG in London and with CANQUA in Regina, where there are already expressions of interest in CGRG sponsored sessions.

This new meeting model will be recommended at the AGM next month. So you will have an opportunity to debate it there. If you are not able to attend the AGM in Quebec City, don't hesitate to send me ([sauchyn@uregina.ca](mailto:sauchyn@uregina.ca)) your view or post it to the CGRG list server.

One other item: there's a new header at the web site (<http://cgrg.geog.uvic.ca/>). It incorporates a new logo. Last fall, Trevor Bell solicited designs for a new logo via the Newsletter and the list server. We received one submission from Ken Josephson at U Vic. The executive committee was unanimously impressed and approved the new logo. There have been other updates to web site, which of course is expertly maintained by Dan Smith.

I hope to see many of you next month in Quebec City.



À l'aube de l'assemblée générale des membres, j'aimerais aborder l'épineuse question des rencontres annuelles du GCRG. Depuis 1995, nous avons suivi un système de rotation aux quatre ans avec nos associations mères : ACG, AGC, AQQUA et CANQUA.

Ces dernières semaines, j'ai entendu plusieurs commentaires à propos du lieu de nos rencontres en provenance de deux anciens présidents du GCRG et d'autres membres qui se sont sentis interpellés par la discussion. Il semble avoir une certaine dissidence avec le système de rotation de nos rencontres annuelles avec nos associations mères. Brian Luckman a exprimé

une opinion qui semble être partagée par plusieurs « C'est à peu près le temps que le GCRG brise la routine du cycle quadriennal. C'est un mécanisme qui a été mis en place il y a 10 ans pour permettre à l'organisation de démarrer et il a procuré selon les années des rencontres très inégales au niveau de la participation. »

À titre d'alternative au format actuel, Peter Ashmore a suggéré que le GCRG s'associe à plusieurs groupes géoscientifiques, au cours d'une même année. Ainsi, les membres du GCRG se retrouveraient à un endroit de grand intérêt plutôt que d'imposer son AGM à une des quatre associations mères sous la base d'une rotation au quatre ans. Avec cette approche, le GCRG pourrait être présent plus régulièrement avec une des quatre associations mères. De plus, cela donnerait la chance aux membres de collaborer avec une autre association comme par exemple avec le CGU où on retrouve plus de présentations en géomorphologie qu'à aucune autre des associations mères.

Un des points faibles du modèle proposé, est qu'il répartit nos membres dans plusieurs conférences plutôt que de se rassembler à un seul événement. Il est irréaliste de penser, cependant, que nous allons tous nous réunir à un seul endroit à chaque année. Le pays est très grand et nous partageons un vaste éventail d'intérêts. De toute façon, les géomorphologues choisissent leur conférence en fonction des sujets et non pas en fonction de la tenue de l'AGM du GCRG.

Évidemment, il n'existe pas de règlement dans les statuts du GCRG qui nous empêche de commanditer une session spéciale dans un congrès ailleurs que là où se tiendra l'AGM, mais cela n'a pas été encouragé par le passé et l'AG a préséance en terme de ressources investis. Selon le modèle proposé, le GCRG pourrait être représenté à plus de un congrès à chaque année et ainsi favoriser la participation des étudiants. Ainsi la rencontre annuelle de l'exécutif pourrait être appelée assez rapidement en fonction du choix du comité exécutif. Le prix J.R. Mackay serait présenté à l'endroit désigné

par le récipiendaire et les prix O. Slaymaker pourraient être remis à une ou plusieurs des sessions commanditées par le GCRG.

Ainsi, la rencontre du GCRG avec l'AQQUA le mois prochain à l'Université Laval a suscité beaucoup d'intérêt de la part des membres. Plus particulièrement de la part de Antoni Lewkowicz qui organise une session spéciale sur la géomorphologie périglaciaire en l'honneur de Hugh French. Les géomorphologues sont aussi impliqués dans d'autres sessions (Yves Bégin), l'excursion (Yves Michaud) et la présentation de Matthias Jakob pour la conférence J. R. Mackay : « Degrees of Uncertainty in Applied Geomorphology ». Si le modèle de conférence est accepté à l'AGM, le GCRG pourrait se rencontrer en 2005 avec l'ACG à London et avec la CANQUA à Régina, où il y a déjà un intérêt manifeste de la part des membres du GCRG.

Ce nouveau modèle de rencontre sera recommandé à l'AGM le mois prochain. Vous

aurez ainsi d'en débattre. Pour ceux qui ne pourront pas participer à l'AGM à Québec, n'hésitez pas à me faire part de votre opinion par l'entremise du courriel ([sauchyn@uregina.ca](mailto:sauchyn@uregina.ca)) ou de la liste de discussion du GCRG.

Dans un autre ordre d'idée, je vous invite à visiter notre site web (<http://cgrg.geog.uvic.ca/>) où on y retrouve notre nouveau logo. L'automne dernier Trevor Bell qui a sollicité la création d'un nouveau logo via le bulletin et la liste de discussion du GCRG, a reçu une seule proposition de la part de Ken Josephson de l'Université de Victoria. Le comité exécutif a donc accepté à l'unanimité le design de ce nouveau logo. Vous pourrez aussi découvrir sur le site d'autres nouveautés et modifications effectuées par les mains expertes de Dan Smith.

Au plaisir de vous rencontrer tous, le mois prochain, à Québec.

Dave Sauchyn

#### **SECRETARY-TREASURER'S REPORT**

The CGRG continues to maintain a strong financial position. Since the beginning of January, we have received over \$2,300 in membership fees from our sister organisations as well as from individual payments. Our most recent significant expense was \$854 (500 Euros + bank fees) in payment of the annual dues to the IAG. Upcoming significant expenses will include funds for the Mackay and Slaymaker award winners at the AGM.

Membership is stable with 188 current members from Canada, the U.S., England and Iran.

Thanks to Ken Josephson at UVic for the new CGRG logo. T-shirts with the new logo will be available at the AGM. If there is enough interest, we may make the T-shirts available by mail.

How to reach us: You are encouraged to contact any of the executive about newsletter items at the addresses shown at the end of the newsletter, or by Email. Newsletter items should ultimately be sent to Kevin Driscoll or Yves Michaud.

Kevin Driscoll

#### **PUBLICATION**

Greetings colleagues

We are very pleased to announce a special (temporary) PRE-PUBLICATION offer for the purchase of the next three volumes of the DPER

(Developments in Paleoenvironmental Research) Series.

Volumes 6 through 8, scheduled to be published this September, are NOW available for order at the special price of \$55US (Euro50) per book!

Please see details of this special offer at the DPER Web site  
(<http://home.cc.umanitoba.ca/~mlast/paleolim/dper.html>)

This offer is available only for credit card purchases, and the special order form (available at the above web site) must be completed and returned to Kluwer at the address or fax given on the form.

The titles/editors of these three volumes are:

Volume 8: Long-Term Environmental Change in Arctic and Antarctic Lakes  
Edited by R. Pienitz, M. S. V. Douglas and J. P. Smol  
Hardbound, ISBN 1-4020-2125-9, ~500 pages

Volume 7: Image Analysis, Sediments and Paleoenvironments  
Edited by P. Francus  
Hardbound, ISBN 1-4020-2061-9, 338 pages

Volume 6: Past Climate Variability through Europe and Africa  
Edited by R. W. Battarbee, F. Gasse and C. E. Stickley  
Hardbound, ISBN 1-4020-2120-8, ~600 pages

The detailed table of contents for these books are available at the web site above.

Finally, Volume 9 in this DPER series ("Earth Paleoenvironments: Records Preserved in Mid- and Low-Latitude Glaciers", edited by L. DeWayne Cecil et al.) will be available later this summer and is available for order (\$88USD) from Kluwer.

Please contact us ([WM\\_Last@UManitoba.ca](mailto:WM_Last@UManitoba.ca); [SmolJ@BIOLOGY.QueensU.Ca](mailto:SmolJ@BIOLOGY.QueensU.Ca)) or Ms. Judith Terpos (e-mail: [Judith.Terpos@wkap.nl](mailto:Judith.Terpos@wkap.nl)) if you have any questions.

Bill and John

## THE J. ROSS MACKAY AWARD

### **Citation for Matthias Jakob, recipient of the Mackay Award 2004**

It is with great pleasure that the CGRG presents the J. Ross Mackay Award to Dr. Matthias Jakob, P.Geo., Senior Geoscientist with Bruce Geotechnical Consultants, Vancouver. The award is given in recognition of Dr. Jakob's body of outstanding research on landslides, debris flows and the hydroclimatic forcing of hillslope failures on the west coast of North America. His publications, which have appeared in leading national and international journals, successfully bridge the theoretical and applied sides of the discipline, advance our understanding of current processes, and contribute to analyses of the impacts of future climate change. Taken together, they represent a highly significant contribution to hazard assessment in one of the most geomorphologically active regions of Canada. The Mackay Award Committee was particularly

impressed that he has managed this achievement in the short time since his Ph.D. (1996) and within the time constraints of a career in the consulting industry.

In his single and co-authored papers, Dr. Jakob has significantly contributed to:

- Evaluation and prediction of spatial impacts of logging on landslide activity in the Clayoquot Sound area of Vancouver Island (*Catena*, 2000)
- Development of a discriminant function, involving antecedent rainfall, rainfall intensity and streamflow, to permit real-time predictions of landsliding in the southern Coast Mountains (*Geomorphology*, 2002)
- Assessment of the magnitude of under-prediction of design floods in small mountain basins and recognition that this problem is due to geomorphic

processes (*Canadian Journal of Civil Engineering*, 2001)

- Understanding the links between ENSO, the Pacific Decadal Oscillation and temporal changes in short-duration rainfall in the Greater Vancouver area (*Canadian Water Resources Journal*, 2003)

Dr. Jakob's work has had significant impacts on professional practice. It led, for example, to geomorphological investigations being required as part of flood frequency analyses in British Columbia. More recently, in his desire to improve methods and techniques in the fields of geohazards and public safety, Dr. Jakob has been the force behind an Ad Hoc Working Group on *Professional Practice Guidelines for*

*Landslide Hazard Assessments in British Columbia*, formed to assist municipalities and regional districts with responsibilities newly transferred from the Province. Finally, he is using his involvement in a long-term CIDA project on geohazards in seven Andean countries to pass on his Canadian-formed knowledge to peoples at risk elsewhere in the world.

It is an honour to present the J. Ross Mackay award for 2004, for the first time, to a young *applied* geomorphologist who so clearly fulfils the criteria of "significant achievement" and of fostering "the development of geomorphology in Canada."

Antoni Lewkowicz

#### THE SLAYMAKER AWARDS

The Slaymaker awards are given out at the for the best student oral paper and best student poster presented at the CGRG Annual Meeting. These awards are named after Olav Slaymaker, one of Canada's most distinguished geomorphologists. Each winner receives a

cheque for \$250, a certificate, and the opportunity to list the honour in their resumé. We look forward to awarding the next pair of Slaymaker awards at the joint AQQUA-CGRG meeting in Québec City in May 2004.

Antoni Lewkowicz

#### RECENT THESIS ABSTRACTS IN EARTH SCIENCES

##### **Annually laminated lake sediments as proxies of hydrometeorological behaviour at White Pass, British Columbia / Alaska**

Student: Cockburn J.M.H.  
Supervisor: Scott Lamoureux  
2003, M.Sc., Department of Geography, Queen's University, Kingston, ON, 150 pp.

Annually laminated (varved) clastic lacustrine sediments are useful climate proxies because their formation has been demonstrated to be strongly dependent on hydrometeorological conditions. Varved sediments from two lakes (Summit and Meadow Lakes) in White Pass, northwest British Columbia, were used to reconstruct hydroclimatic variability over the last seven

centuries. The varve record from Summit Lake was divided into two subannual sedimentary series based upon the main sediment transfer controls that produce subannual sedimentary event laminae. Nival-glacial and rainfall-derived subannual laminae were isolated based on their sedimentological and stratigraphic characteristics. This separation permitted analysis of two independent types of hydroclimatic variability during the past 700 years. In particular increased rainfall at the end of the 17<sup>th</sup> Century appears to be associated with reduced solar irradiance and the advance of land-terminating glaciers in the region.

A varve chronology from an adjacent, but separate watershed correlates with the Summit Lake varve chronology at the decadal scale. The purpose of the Meadow Lake varve

chronology was to test whether the regional hydroclimatic behaviour and variance reconstructed from one varve record could be reproduced by an independent chronology. Annual comparison suggests that geomorphic differences between the watersheds dominated the records. However, decadal variability was well correlated and suggests that a regional hydroclimatic signal is preserved in varve records.

This study represents one of the first attempts to evaluate paleoclimate conditions using a long subannual record of hydrometeorological variability and the two records from White Pass are the longest annually-resolved paleoclimate records from this region. These results demonstrate the potential of subannual reconstructions to evaluate seasonal hydroclimatic variability caused by changing influences of synoptic climate systems common to this part of North America (e.g. Pacific Decadal Variation, Pacific Decadal Oscillation, El Niño).

### **Hydrological processes across three large middle arctic watersheds, Boothia Pen., NU**

Student : Forbes, A.C.

Supervisor: Scott Lamoureux

2003, M.Sc. thesis, Department of Geography, Queen's University, Kingston, ON, 235 pp.

A hydrological processes study was undertaken across the Lord Lindsay River and major East and West Tributary watersheds (1485, 465 and 345 km<sup>2</sup>, respectively) on the Boothia Peninsula, Nunavut. Two seasons of hydrometeorological conditions were monitored across the catchments in order to characterize the scaled hydrological response of this environment to snowmelt and rainfall events. River, snow, rain and soil water was sampled throughout the season and analysed for hydrochemistry and stable isotopes in order to isolate streamflow source components and perform hydrograph separations. Records of suspended sediment concentration (SSC) were collected and, along with estimates of river discharge, were cross-correlated with

meteorological variables to determine the climatic controls on streamflow and suspended sediment transport.

The catchments exhibited snowmelt dominated streamflow during the spring flood period followed by a progressively dominant soil water response. The relative dominance of the snowmelt water reservoir varied between streamflow seasons as well as at different watershed scales, appearing to be considerably influenced by late winter snow cover and extent that lead to subsequent variations in contributing source area. Late season contributions from a depleted source in the East Tributary appears to demonstrate the importance of persistent snow banks to streamflow and suggests a relatively limited contributing area at the watershed scale (c. 300 km<sup>2</sup>). Snow and soil water survey results showed considerable variability both at a spatial and inter-annual scales, further emphasizing the challenges of obtaining conservative and representative end member values for hydrograph separation.

Substantive suspended sediment transfer occurred only during the short-lived nival peak and the duration of the peak appears to be broadly scaled with intra-annual catchment snow water equivalence (SWE). Thermal energy was critical for initially generating streamflow and suspended sediment transfer, but only until watershed snowpack had been largely exhausted. Thus, total annual suspended sediment load in this environment is ultimately a function of total discharge through SWE rather than a function of melt energy. Specific sediment yields were some of the lowest recorded in the arctic, ranging between 0.2 to 1.9 t·km<sup>-2</sup>·a<sup>-1</sup>.

The dynamics of river response at the large scale are poorly understood as past research has focused predominantly on small watersheds and primary processes. Furthermore, hydrological research has for the most part been restricted to low and high arctic catchments, while investigations in middle arctic regions have been limited. This project serves to improve the understanding of the hydrological response of middle arctic watersheds of different scales in order to determine the sensitivity of

these environments to climate change and make inferences of past and future hydrological conditions.

**Paleoenvironmental implications of past and contemporary fossil diatom assemblages in a large middle arctic watershed: Sanagak Lake and the Lord Lindsay River, Boothia Peninsula, Nunavut, Canada.**

Student: Stewart, K.A.

Supervisor: Scott Lamoureux

2003, M.Sc. Thesis, Department of Geography, Queen's University, Kingston, 139 pp.

An assessment of the recent (~150 years) fossil diatom assemblage and contemporary river diatom (lotic) assemblage of Sanagak Lake and its major source of inflow, the Lord Lindsay River, was undertaken. In light of the large contribution of benthic species to the sedimentary assemblage, an understanding of the seasonal dynamics and ecologies of the lotic diatom assemblage is used to enhance interpretations of the lacustrine sedimentary record. A high-resolution chronology of the upper 15 cm of sediment from Sanagak Lake was developed to investigate the timing and nature of recent changes in the diatom stratigraphy that are qualitatively similar to numerous other reports of recent changes in high latitude diatom flora. In addition, isolating specific taxa that show a strong affinity for the lotic environment generated an opportunity to interpret stratigraphic changes in these species in terms of past hydrological change. Together, these records contribute to current knowledge on the character and manifestation of recent ecological changes being documented in high latitude freshwater ecosystems.

A critical objective of investigating the recent sedimentary record in Sanagak Lake was to develop a robust, high-resolution chronology that would permit precise and reliable dating of any distinct changes in the fossil diatom assemblage. To achieve this, a varve chronology was developed and verified with  $^{210}\text{Pb}$  and  $^{137}\text{Cs}$  dating methods. Results of diatom analyses indicate a gradual decline in

benthic relative to planktonic taxa, since the late 1800s and a sudden increase in the planktonics *Asterionella formosa* Hassal, *Stephanodiscus minutulus* (Kützing) Cleve & Möller, and *Cyclotella atomus* Hustedt beginning in the late 1980s. Species diversity also increases in the uppermost centimetre, corresponding to the mid-1980s, and concurrent with a distinct change in the sedimentary structure. Comparing the timing of the increase in planktonics to other studies documenting similar changes in high latitude lakes and ponds reveals a positive correlation between the apparent onset of the change and maximum lake depth ( $r^2=0.77$ ), suggesting that lake volume influences ecosystem response. Given the timing, nature and geographical extent of recent shifts in high latitude diatom assemblages, such changes may well be a response to regional and global climate trends.

Significantly higher relative abundances of *Achnanthes minutissima* Kützing, *Fragilaria capucina* Lange-Bertalot, *Diatoma tenuis* Agardh, and *Cymbella arctica* (Lagerstedt) Schmidt, *C. minuta* Hilse, *C. silesiaca* Bleisch and *C. fogedii* Hakansson in the lotic environment compared to the sedimentary record suggest that these species characterize the Lord Lindsay River diatom assemblage. The fact that the lotic assemblage changes very little throughout the sampling period, despite major changes in hydrological conditions, suggests a high degree of resiliency and inherent structure in the community. However, a decrease in diatom productivity and rapid decline in water temperature following a major rain event suggests that a tolerance threshold may exist, with potentially important implications for interpreting changes in the paleoenvironmental record. In the sedimentary record, stratigraphic changes in the lotic assemblage parallel a long-term decline in mean varve thickness, suggesting these species may be used to infer past hydrological and ecological conditions in the Lord Lindsay River.

**Long-term hydroclimatic variability in the southern Selwyn and Mackenzie Mountains, Northwest Territories, Canada.**

Student : Tomkins, J.D.  
Supervisor: Scott Lamoureux  
2003, Unpublished M.Sc. Thesis, Department of  
Geography, Queen's University, 140 pp.

Mirror Lake, Northwest Territories (62 ° N, 128 °W), is an isothermal, oligotrophic lake located within the southern Selwyn Mountains. A 550-year varve chronology developed from the sedimentary record reveals changing climatic influences on scales of decades to centuries. July temperature is the dominant control over varve formation, as indicated by comparison of the recent varve chronology and local meteorological data. Precipitation also influences varve sedimentation, particularly through the dampening effects of increased snowfall on glacier ablation. Although the influence of precipitation variables does not appear to significantly weaken the relationship between July temperature and varve formation, periods when multiple climatic factors control varve sedimentation are characterised in the sedimentary record by distinctive varves that contain two silt units or varves with faint structure. The two-silt unit varve type dominates much of the long sedimentary record, indicating periods with strong influences of both melt season temperatures and spring snowfall on varve formation, due to their respective positive and negative effects on glacier ablation.

The Mirror Lake hydrologic system therefore appears to shift between two general regimes. The first regime is present during years with reduced nival melt and pronounced glacial meltwater inflow peak, particularly in July. Melt season temperatures are the dominant influences on varve sedimentation under this regime and the resulting varve structure contains only one silt unit. The second regime operates in years with delayed glacial meltwater input due to increased snow cover and increased nival melt and August temperature influences on varve sedimentation. Varves with two silt units are produced by the second regime, as the nival and glacial melt peaks generate separate silt units due to the delayed ablation season. These varves are notably absent between 1730 to 1940,

likely due to Little Ice Age (LIA) conditions in the southern Selwyn and Mackenzie Mountains. This period appears to have been colder and drier than the present, based on varve structure and the relationship between varve thickness and climatic variables during the 1970s.

A multi-proxy examination of the Mirror Lake catchment, using both the varve chronology and a local dendroclimatological record, supports the sedimentological interpretation that July temperature was the dominant influence on varve formation during at least two periods of the LIA. Mirror Lake is the second location to report a dominance of two silt unit varves and, as the presence of this structure indicates changing climatic influences on varve sedimentation and long-term climate shifts in the Mirror Lake area, identifying this varve type in future studies potentially may be useful for interpreting climate signals within the sedimentary record from proglacial lakes.

#### **Late Holocene fluctuations of Lillooet Glacier, southern Coast Mountains, British Columbia.**

Student: Alberto V. Reyes  
2003, M.Sc. thesis, Department of Earth  
Sciences, Simon Fraser University. 76 pp.

Geomorphic reconstructions of glacier fluctuations are commonly hampered by poor preservation of landforms that predate the extensive Little Ice Age advances of the late Holocene. This thesis presents the results of a detailed study of lateral moraine stratigraphy at Lillooet Glacier in the southern Coast Mountains of British Columbia. Five tills, separated by laterally extensive organic horizons and lines of large woody debris, were found in three cross-sectional exposures through the lateral moraine and two shallow gullies incised into its steep proximal face. Eighteen new radiocarbon ages constrain the timing of five separate advances of Lillooet Glacier: (1) prior to 3000 <sup>14</sup>C yr BP; (2) ~3000 <sup>14</sup>C yr BP; (3) ~2500 <sup>14</sup>C yr BP; (4) ~1700 to 1400 <sup>14</sup>C yr BP; and (5) during the Little Ice Age, after 470 <sup>14</sup>C yr BP. The Lillooet Glacier chronology is broadly synchronous with



other glacier records from the Coast Mountains and adjacent areas. Data from Lillooet Glacier and other sites in the Coast Mountains provide clear evidence for a previously unrecognised period of glacier advance ~1700-1400 <sup>14</sup>C BP, here termed the Bridge Advance. The glacier chronology emerging from the Coast Mountains suggests that regional late Holocene climate was more variable than is apparent from many proxy paleoenvironmental records. North Pacific ocean-atmosphere variability is the dominant control on the spatial and temporal variability of present glacier mass balance regimes in the coastal cordillera of North America. Thus, changes in the intensity of North Pacific ocean-atmosphere circulation patterns may provide a plausible forcing mechanism for late Holocene glacier advances in the region, particularly during coincident periods of summer drought.

**Étude de l'interaction entre le système d'écoulement local d'une tourbière ombrotrophe et le système d'écoulement des eaux souterraines régionales dans le sud-est du Nouveau-Brunswick : Caractérisation et modélisation hydrogéologiques**

Étudiante : Cynthia Carrier

Directeurs : Michel Allard et Yves Michaud  
2003, M.Sc.Géogr., Département de géographie,  
Université Laval, 119 p.

L'étude de l'interaction entre le système d'écoulement local d'une tourbière ombrotrophe et le système d'écoulement des eaux souterraines régionales a été menée à Grand-Barachois, dans le sud-est du Nouveau-Brunswick. Le but de l'étude consiste essentiellement à estimer l'impact du drainage des tourbières commerciales sur les ressources en eau souterraine. Ce projet s'intègre dans l'Initiative sur les Eaux Souterraines dans les Maritimes qui est menée par la Commission géologique du Canada et qui vise à réaliser la caractérisation hydrogéologique régionale du bassin carbonifère dans le sud-est du Nouveau-Brunswick.

Deux campagnes de terrain réalisées en 2001 et 2002 ont permis de recueillir plusieurs données de terrain pour faire la caractérisation

hydrogéologique de la tourbière Beauséjour (46°11' N, 64°27'W) et de l'aquifère rocheux régional dans la région de Shédiac. La tourbière Beauséjour est apparentée à une nappe perchée et représente un système hydrogéologique indépendant du système régional, ce dernier étant caractérisé par une nappe semi-confinée. Plusieurs évidences appuient cette hypothèse: (1) le niveau piézométrique de la tourbière est toujours plus élevé d'au moins 1,5 m que le niveau de l'aquifère régional, (2) la différence de conductivité hydraulique entre la tourbe et le till sous la tourbière (1,8E-06 m/s vs 4,4E-09 m/s) représente une limite quasi imperméable à l'écoulement vertical entre la tourbière et l'aquifère régional sous-jacent, (3) les fluctuations piézométriques dans l'aquitard, représenté par le till, accusent un décalage d'environ deux mois par rapport aux fluctuations piézométriques dans la tourbe et dans le socle rocheux, (4) l'hydrogéochimie permet de distinguer la présence de deux nappes d'eau souterraine aux propriétés physiques et chimiques différentes et finalement, (5) la recharge potentielle estimée de 1,2 cm/an provenant de la tourbière et pouvant atteindre le sommet du socle rocheux implique des échanges hydrauliques limités et relativement peu importants par rapport à la recharge régionale qui se fait par le till de surface et qui est de 10,1 à 30 cm/an (Boisvert, 2003).

La présence de la tourbière Beauséjour est donc attribuée à la présence du till relativement imperméable et à la morphologie du fond de la tourbière et non à la résurgence des eaux souterraines régionales, qui aurait pu expliquer le développement de la tourbière à cet endroit et impliquer la présence d'une unité sous-jacente perméable par laquelle des échanges hydrologiques auraient pu se faire.

Les résultats de la modélisation numérique ont montré que l'abaissement provoqué des niveaux d'eau dans la tourbière a très peu d'influence sur les niveaux d'eau dans le socle rocheux à 50, 100 et 1000 m à l'extérieur de la tourbière ainsi que sur l'écoulement vertical entre la base de la tourbière et le sommet de l'aquifère rocheux régional.

Les données de terrain ainsi que la modélisation numérique indiquent que, dans la région de Shédiac, l'impact du drainage des tourbières commerciales sur les ressources en eau souterraine est très limité, voire négligeable.

### **Hydrogéologie des formations quaternaires et influence sur la recharge de la région de Moncton, Nouveau-Brunswick**

Étudiant : Vincent Boisvert

Directeurs : Michel Parent, Yves Michaud et René Lefebvre

2004, M.Sc. en Sciences de la Terre, INRS – Eau, Terre et Environnement, Université du Québec, 92 p.

Les eaux souterraines sont une source importante d'approvisionnement en eau potable dans les Maritimes et la majorité de cette eau provient d'aquifères rocheux. La région a toutefois subi une série d'importantes fluctuations du niveau marin relatif, allant d'une incursion marine post-glaciaire à une régression holocène majeure suivie de la transgression marine actuelle. Ce contexte géologique a grandement favorisé le confinement de plusieurs unités perméables quaternaires de dimension parfois régionale.

Ce projet, effectué dans le cadre de l'Initiative sur les Eaux Souterraines dans les Maritimes, s'inscrit dans la série d'efforts de la Commission géologique du Canada pour le développement d'une méthodologie de caractérisation et de cartographie hydrogéologique à l'échelle régionale. Les deux étés de travaux de terrain ont permis la caractérisation globale du contexte hydrogéologique des unités quaternaires confinées et de surfaces de la région de Moncton, Nouveau-Brunswick.

La stratigraphie des unités quaternaires des rivières Petitcodiac et Memramcook est présentée sous forme de coupes géologiques basées sur des relevés sismiques et des forages. Ces coupes démontrent l'existence d'un important système aquifère confiné d'étendue régionale, en lien hydraulique direct avec le roc, à la base des rivières Petitcodiac et Memramcook. Les propriétés hydrauliques des aquifères de la rivière Memramcook ont été établies à partir d'essais de perméabilité et de pompage et de l'interprétation des fluctuations de la marée. Les résultats de ces essais démontrent une conductivité hydraulique moyenne  $10^{-4}$  m/s et un coefficient d'emmagasinement de  $10^{-3}$  m<sup>-1</sup>. Ces caractéristiques hydrogéologiques couplées aux analyses chimiques ont permis de démontrer que malgré la relativement bonne conductivité hydraulique de ces aquifères, le potentiel d'utilisation de ceux-ci comme ressource en eau est faible en raison de la relativement mauvaise qualité de l'eau.

Les propriétés hydrauliques des tills ont été établies par des essais d'infiltration et démontrent que la recharge est principalement contrôlée par la présence de trois types de till de conductivité allant de  $10^{-6}$  à  $10^{-9}$  m/s.

L'établissement des zones de recharge et la quantification de la recharge régionale ont été réalisés à partir du bilan hydrologique et de l'approche darcienne afin d'être utilisée dans le modèle hydrogéologique du projet IESM. La recharge régionale a été évaluée à 191,6 mm/an dont 98 % se fait par les différents types de tills. Finalement, l'impact potentiel des changements climatiques sur cette recharge est brièvement évalué.

Yves Michaud

## **UPCOMING MEETINGS**

**ASSOCIATION QUÉBÉCOISE POUR  
L'ÉTUDE DU QUATERNAIRE  
(AQUA)  
ET**

**GRUPE CANADIEN DE RECHERCHE  
EN GÉOMORPHOLOGIE  
(GCRG)**

Organisé conjointement par le Centre d'études nordiques de l'Université Laval et le Centre

géoscientifique de Québec, le congrès conjoint de l'AQQUA et du CGRG aura lieu du 14 au 17 mai 2004, à l'Université Laval, à Québec.

Des conférences variées en géomorphologie et en Quaternaire seront présentées en plus de deux colloques thématiques sur:

- La géomorphologie périglaciaire et le pergélisol, en l'honneur de Hugh M. French. (responsable A.G. Lewkowicz)
- Les courants de glace de l'inlandsis laurentidien (responsable : M. Parent)

De plus, une journée de formation et de discussion en dendrochronologie et une excursion d'une journée sur la géologie du Quaternaire et l'hydrogéologie de région de Portneuf y seront présentés.

Pour informations supplémentaires, consulter l'une des personnes suivantes :

Michel Allard, [michel.allard@cen.ulaval.ca](mailto:michel.allard@cen.ulaval.ca)

ou

Dave Sauchyn, [sauchyn@uregina.ca](mailto:sauchyn@uregina.ca)

**CANADIAN GEOMORPHOLOGY  
RESEARCH GROUP  
(CGRG)  
AND  
ASSOCIATION QUÉBÉCOISE POUR  
L'ÉTUDE DU QUATÉNAIRE  
(AQQUA)**

Jointly hosted by Centre d'études nordiques de l'Université Laval and Centre géoscientifique de Québec, the next joint CGRG-AQQUA meeting will take place from 14 to 17 May 2004, at Université Laval, Québec city.

Presentations in all fields of geomorphology, Quaternary science and palaeoecology will be offered along with two symposia on:

- Periglacial geomorphology and permafrost, dedicated to Hugh M. French. (responsable A.G. Lewkowicz)
- Ice streams of the Laurentian ice Sheet. (responsable : M. Parent)

Also a one-day training and discussion workshop in dendrochronology and a one-day field trip in southern Québec on the Quaternary geology and hydrogeology of the Portneuf area will be offered.

For further information, please contact one of the following persons:

Michel Allard, [michel.allard@cen.ulaval.ca](mailto:michel.allard@cen.ulaval.ca)

or

Dave Sauchyn, [sauchyn@uregina.ca](mailto:sauchyn@uregina.ca)

**HALIFAX 2005 - GAC/MAC**

A joint meeting of the Geological Association of Canada, Mineralogical Association of Canada, Canadian Society of Petroleum Geologists and Canadian Society of Soil Science.

Where: Dalhousie University, Halifax, Nova Scotia

When: May 15 - 18, 2005

Conference website: [www.halifax2005.ca](http://www.halifax2005.ca)

Inquiries: [hfx2005@gov.ns.ca](mailto:hfx2005@gov.ns.ca)

**AGU-CGU JOINT ASSEMBLY 2004**

Montreal, May 17-20 has several sessions of interest to geomorphologists including the following oral session:

C41A: Ice Sheet Sediment Transfer: Modeling and Observation by combining field evidence and modeling, this session highlights the role of glaciohydraulic supercooling, jokulhlaups and ice streams in ice sheet sediment transfer. It explores the agents, processes and rates of ice sheet sediment transfer in subglacial and proglacial (sandur, glacial lake and offshore) environments and emphasizes the interactions between sediment transfer and ice and meltwater dynamics.

Chairs: Tracy Brennand (SFU), Neal Iverson (Iowa State U)

## CALENDAR

### 2004

4<sup>e</sup> rencontre ACRH-2004, CWRA-2004  
Montréal, Juin 2004  
[www.ouranos.ca/acrh](http://www.ouranos.ca/acrh)

GéoQuébec 2004  
57<sup>e</sup> congrès canadien de géotechnique et 5<sup>e</sup>  
congrès conjoint SGC/AIH, Quebec City,  
Québec, October, 2004  
[www.geoquebec2004.org](http://www.geoquebec2004.org)

#### LINKS TO WEBSITES

American Geophysical Union -  
<http://earth.agu.org/kosmos/homepage.html>

AQQUA  
<http://cgcq.rncan.gc.ca/aqqua/>

Association of American Geographers -  
<http://www.aag.org>

British Geomorphological Research Group -  
<http://boris.qub.ac.uk/bgrg>

CANQUA  
<http://www.mun.ca/canqua/>

European Union of Geosciences -  
<http://eost.u-strasbg.fr/EUG>

Geological Society of America -  
<http://www.geosociety.org>

Geomorphology Speciality Group Homepage -  
<http://www.cla.sc.edu/geog/gsgdocs>

International Association of  
Geomorphologists  
<http://www.geomorph.org>

International Association of Sedimentologists -  
<http://www.blackwell-science.com/uk/society/ias>

International Union for Quaternary Research -  
<http://inqua.nlh.no>

NSF – Geography and Regional Science -  
<http://www.nsf.gov/sbe/bcs/geograph/start.htm>

Ouranos – Consortium en Changements  
climatiques au Québec  
[www.ouranos.ca](http://www.ouranos.ca)

Quaternary Geology and Geomorphology  
Division – Geological Society of America -  
<http://www.ocean.odu.edu>

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## CONTRIBUTIONS TO FUTURE CGRG NEWSLETTERS

The CGRG newsletter is published twice annually. As with all such newsletters, its success is directly dependent on the contributions that we receive. CGRG welcomes contributions to future newsletters from any of our members. These should be of interest to the Canadian geomorphology community and could include discussions, commentaries, reviews of regional or national meetings and field trips, summaries of issues pertinent to geomorphology, and announcements of future meetings and workshops. Please forward your contributions to:

[ymichaud@nrca.gc.ca](mailto:ymichaud@nrca.gc.ca)

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) cooperating with related earth science associations within Canada (GAC, AQQUA, CAG, CANQUA). We encourage all earth scientists with an interest in geomorphology to join CGRG

## CANADIAN GEOMORPHOLOGY RESEARCH GROUP

### Registration Form

**2004**

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_ Postal Code: \_\_\_\_\_

Phone numbers: (Home) \_\_\_\_\_ (office) \_\_\_\_\_

e-mail address: \_\_\_\_\_

Institution: \_\_\_\_\_

Annual dues: \$15

New member \_\_\_\_\_; membership renewal \_\_\_\_\_ *Please check one*

Student \_\_\_\_\_ Academic \_\_\_\_\_ Government \_\_\_\_\_ Industry \_\_\_\_\_ *Please check one*

Please make cheque or money order to the Canadian Geomorphology Research Group

(Photocopy application form as necessary)

Send completed form and cheque to: Kevin , Kevin Driscoll, Secretary-Treasurer, 71 Equestrian Drive, Kanata, ON, K2M 1H7