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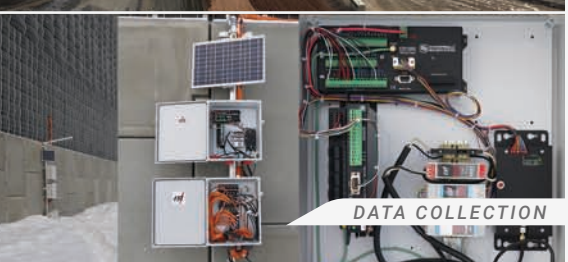
GEOTECHNICAL news

Remnants of a glacial lake outburst flood in the Rocky Mountains



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Message from the President

Mario Ruel, President of Canadian Geotechnical Society.

A word from Mario - Un mot de Mario

2019-2020 CGS President, Mario Ruel

Bonjour – Hello, my Friends and Colleagues

As I am writing these words, spring is finally popping up after a tough, cold, and snowy winter. As a cyclist this is great. For many of us in the geotechnical field, however, spring also means a lot of work; increased runoff due to snow melting, flooding, erosive river flows, slope instabilities, and the softest ground conditions. This season has always been my most intense work period. It opens the way to busy construction activities where we are implementing our designs in the field, taking advantage of long daylight hours and warm weather. For me practicing in transportation geo-hazards management, this activity has always been the most enjoyable part of the job. It highlights the importance of geotechnical engineering in our society.

As my second message as CGS President, I can tell you that I am more eager than ever to achieve our goals for the Society and its members. I am very impressed to see how much time and effort your new Executive Committee members are investing, as they are already dealing efficiently with their responsibilities. Time flies fast as the first quarter of our first-year mandate is already behind us. Thanks to the guidance of our Executive Director, Michel Aubertin; Director of Communications and Member Services, Lisa McJunkin; Director of Finance and Administration, Wayne Gibson; and Communications Coordinator, Emily Fournier; we are on track and off to a good start.

Relations with affiliated organizations

During my term, I am committing to actively representing CGS within other organizations. I participated at the last board meeting of the Canadian society for Civil Engineering (CSCE). I intend to keep close ties with this Society by meeting their national office staff in Montreal, and attending their next annual conference in Laval, Quebec, from June 12 to 15.

As CGS President, I was also invited by the American Society of Civil Engineers (ASCE) Geo-Institute to their Geo-Congress in Philadelphia in March. This was a very successful conference where I had the pleasure of working on some committees with our CGS`s Tim Newson, now North American VP ISSMGE. During this Geo-Institute event, I was very pleased to see our CGS past President and past Legget medalist, Dr. Suzanne Lacasse. She had the honour of delivering the keynote address, 'Tribute to Ralph Peck and Observational method'. I am reporting that the Geo-Institute will organize their next annual conference with our CGS in February 2020 in Minnesota. We are therefore taking advantage of our recent memorandum of understanding (MOU), which was initiated by Dr. Lacasse a few years ago, and signed by the past President, Dharma Wijewickreme, last year at GeoEdmonton 2018.

CGS will also continue to develop closer and more frequent contact with other associations such as the International Association for Engineering Geology (IAEG), where we will work with Jean Hutchinson, who was last year elected VP for North America. Other collaboration opportunities may also surface through our participation at the North American Geocoalition.

Engineering Institute of Canada

At the end of March, I had the honour of representing the CGS at the Engineering Institute of Canada (EIC) Gala Awards Dinner. The EIC provides some of the most respected engineering awards in Canada. I was very proud to see that, as per previous years, the CGS was very well represented. Our members, Suzanne Lacasse, Kevin Biggar, Jacques Locat and Doug Stead, were awarded prestigious EIC Medals. On the other hand, Jean Côté and Craig Lake were inducted as Fellows of the EIC. I want to mention that in addition to receiving the highest EIC award, the Sir John Kennedy Medal, Suzanne was also selected, earlier this year, to receive the title of Officer of the Order of Canada, our country's most prestigious service award. The first geo-member of the Order of Canada was Robert Legget, and Suzanne will be our ninth representative. In my opinion, this is further evidence of the importance of geotechnical engineering in our society.

The CGS is one of the most successful organizations within the EIC because we have been energetic with

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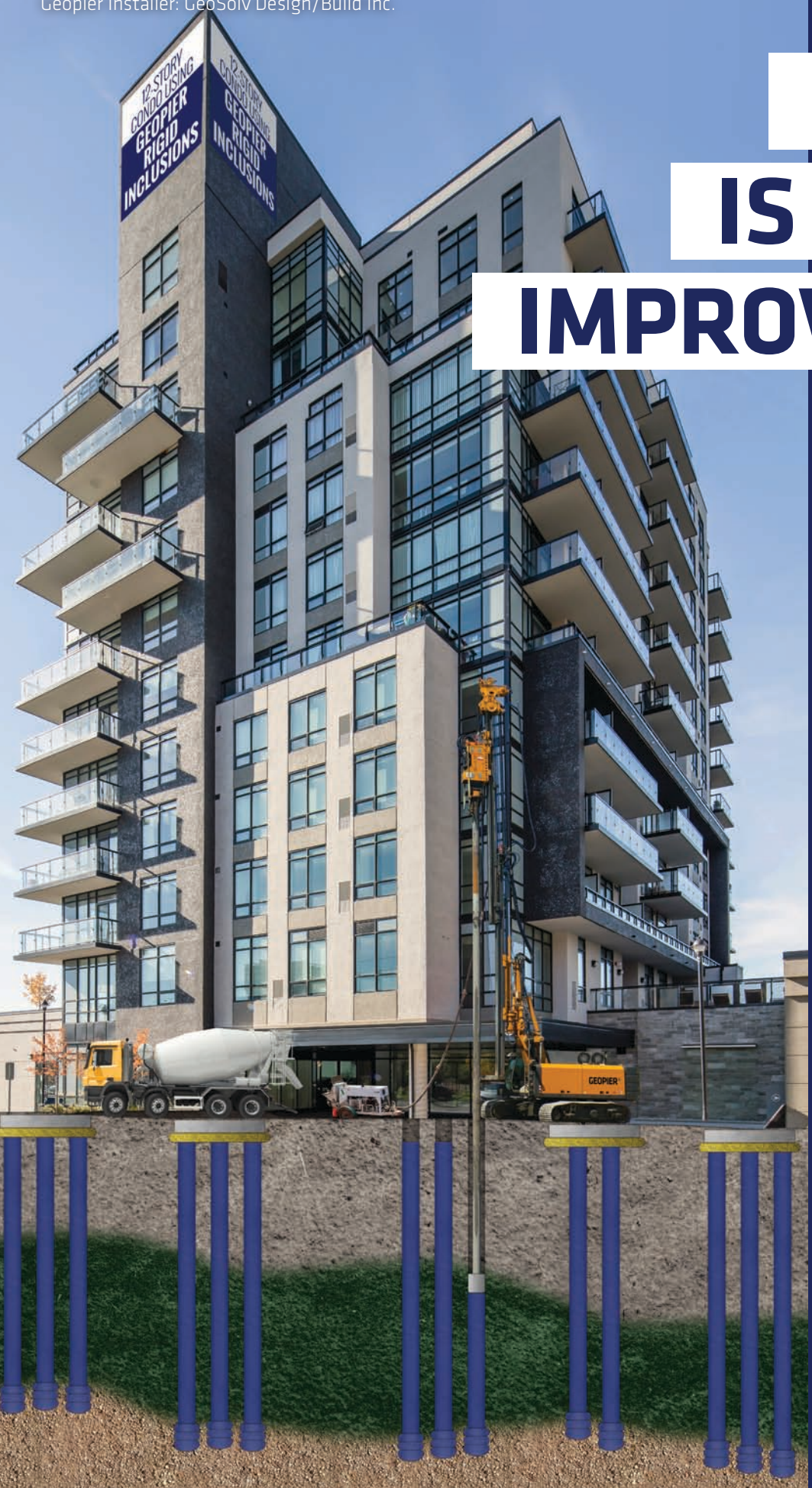

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high quality submissions highlighting the contributions of well-deserving members. Please keep this in mind and work in coming months to nominate your colleagues as EIC Fellows and Award candidates. Consult the EIC website (***eic-ici.ca***) for more details. You must make your submissions to the CGS before July 15, 2019.

Our young professionals

As we focus more interest toward the new generation, I want to highlight the importance of the CGS Colloquium, created for young members in 1977. In 2016, the Colloquium Speakers were offered by the CGS and Canadian Foundation for Geotechnique (CFG) the possibility of doing a "Lecture Series" to deliver their presentation across Canada with focus on engaging students in Universities. This was an idea coming from the CGS Executive Committee. As Kevin Biggar, CFG President, put it to me when met at the EIC Gala, "Getting our best and brightest [young geotechs] in front of university students, I think, was a stroke of brilliance".

The 2018 Colloquium speaker, Matt Lato, accepted the mandate and got organized to deliver great presentations in Universities across the country in 2019. So far, the response to these events has been very good. Such dynamic interactions with both graduate and undergraduate students really arouse their interest. This initiative contributes greatly to attracting high-quality talent to our business. Thank you, Matt, for accepting the challenge! The CGS also thanks the Canadian Foundation for Geotechnique for contributing to the funding of the Colloquium Lecture Series. We are still looking at ways of improving this program to make it even more popular than ever.

On a similar front, I was happy to act as one of the judges for the Branko Ladanyi Contest in Montreal in early March. This annual event, organized since 2009 by the local CGS Section, saw six graduate students present their research projects. We saw very dynamic demonstrations by smart students eager to apply their findings in practice. Jonathan Mole from *Université de Sherbrooke* won the competition and will receive support to attend the CGS Conference, GeoSt. John's 2019. Well done Jonathan and thanks to all others!

To further enhance our contact with students, Maraika De Groot, our Young Professional representative to the executive committee, is working on developing University Student Chapters as a pilot project this fall. This will be in addition to the CGS's strong support for the next cYGEGC 2019, which will be held a few days before GeoSt.John's 2019. The CGS VP Finance, Kent Bannister and myself are proud to have been invited to present keynote addresses by the organizing committee led by Vincent Castonguay.

In upcoming messages, I will share more ideas and initiatives taken by the CGS toward our young geoprofessionals.

Cross Canada Lecture Tour (CCLT)

The CCLT Spring 2019 speaker, Prof. Charles Shackelford (Colorado State University), should have completed most of his tour by the time this magazine is published. I also am really looking forward to seeing next fall our CCLT speaker, Ian Moore (Queen's University).

The Canadian Foundation Engineering Manual CFEM

The CGS Executive Committee made a firm commitment to show tangible progress on the CFEM. Let me provide you a brief update. The CGS VP Technical, Rob Kenyon, informs me that the Manual update is well underway. The CGS has retained Ken Skaftfeld as the Manual Coordinator. Ken had been responsible for the Errata compilation for the CFEM 4th Edition. The goal is to release online the next edition of the Manual. This will allow the CGS to gradually deliver the manual, chapter by chapter, and will facilitate later updating. Ken, Rob and the Technical Advisory Committee have completed a review of the proposed manual contents. Chapter lead authors have been and will be approached. Please do not hesitate to contact Ken Skaftfeld (***kskaftfeld@trekgeotechnical.ca***) or Rob Kenyon (***rkenyon@kgsgroup.com***) if you are able to help.

GeoSt.John's 2019

We invite you to register for the 72nd CGS Annual Conference (GeoSt. John's 2019) that will be held in St. John's, Newfoundland and Labrador, from September 29 to October 2nd!

Why should you attend?

- This is one of the best opportunities to learn from the leaders and rising young stars - and have fun doing it!
- You get exposed to the best standard of practice in the industry from the best practitioners who share both their success case histories and what they have learned from some mistakes.
- You also get to see the latest "state of the art" development through research from academia.
- Best of all, this is a very pleasant way to network with colleagues and top guns from across the country and around the world who share the same passion as you.
- By visiting exhibitors, you are up to date on the latest tools, techniques, specialized expertise and recent software developments.
- You earn professional development hours required to maintain your provincial or territorial engineering registration.

How to get permission to attend?

As a young engineer, I often used the above arguments to convince my boss to allow me to go to the CGS conference. This is an investment in the

employees with an excellent return rate. To further justify my request, I was adding that to be competitive, I had to sharpen my skills, find new methods, be more efficient, cut costs, and know latest tools to promote changes.

Show your boss and colleagues that you are proactive as you check the program and say which sessions and workshops you plan to attend. You can then commit to demonstrate what you have learned by sharing with your colleagues in a post-conference presentation when you are back in your office. Planning in advance and registering soon to take advantage of early bird savings and cheaper flights is another convincing argument.

The GeoSt.John's 2019 Organizing Committee led by Sterling Parsons has received over 435 abstracts, so the forecasted participation is looking very good. In addition to the technical value, the conference will provide a great opportunity to visit one of the oldest and most easterly cities in North America. I can guarantee that you will enjoy a unique experience with the super friendly people of St. John's.

This is one conference you do not want to miss!!!

À bientôt, mes amis – See you later, my friends!!!

Mario Ruel

Provided by Mario Ruel
CGS President 2019 - 2020

Message du président

Un mot de M. Ruel/A word from Mario

Mario Ruel, Président de la SCG 2019-2020

Hello – Bonjour amis et collègues,

Au moment où je vous écris, le printemps se pointe finalement après un hiver qui m'a semblé très rigoureux. En tant que cycliste, le retour du temps doux est formidable. Toutefois, pour beaucoup d'entre nous, dans le domaine de la géotechnique, le printemps signifie aussi beaucoup de travail en raison du ruissellement accru par la fonte des neiges, aux inondations possibles, au débit érosif des rivières, aux instabilités de pente ainsi qu'aux conditions de terrain souvent défavorables. Cette saison a toujours été ma période de travail la plus intense. Elle ouvre la voie à de vigoureuses activités de construction où nous mettons en œuvre nos conceptions sur le terrain, profitant des longues journées d'ensoleillement et du temps clément. Pour moi qui pratique en gestion des géorisques dans les transports, ces activités ont toujours été les parties la plus agréables de mon travail. Elles soulignent l'importance de la géotechnique dans notre société.

Dans mon deuxième message en tant que président de la SCG, je peux vous dire que je suis plus désireux que jamais d'atteindre nos objectifs pour la Société et ses membres. Je suis très impressionné de voir la quantité de temps et d'efforts que les nouveaux membres de votre Comité exécutif (CE) déploient, car ils s'acquittent déjà efficacement de leurs responsabilités. Le temps passe vite : le premier trimestre de la première année de notre mandat est déjà terminé. Nous avons toutefois connu un bon départ et nous sommes sur la bonne voie grâce aux conseils de notre directeur général, Michel Aubertin, de notre directrice des communications et des services aux membres, Lisa McJunkin, de notre directeur des finances et de l'administration, Wayne Gibson, ainsi que de notre coordonnatrice des communications, Emily Fournier.

Nos relations avec les organisations affiliées

Au cours de mon mandat, je m'engage à représenter activement la SCG au sein d'autres organisations. J'ai participé à la plus récente réunion du Conseil d'administration de la Société canadienne de génie civil (SCGC). J'ai l'intention d'entretenir des liens étroits avec cette Société en rencontrant le personnel de leur bureau national à Montréal et en assistant à sa prochaine conférence annuelle à Laval, au Québec, du 12 au 15 juin.

À titre de président de la SCG, j'ai également été invité par le *Geo-Institute (GI)* de l'*American Society of Civil Engineers (ASCE)* à assister à leur *Geo-Congress* qui s'est tenu à Philadelphie en mars. Ce fut une conférence très réussie où j'ai eu le plaisir de travailler à certains comités avec Tim Newson de la SCG, maintenant v.-p. nord-américain de la Société internationale de mécanique des sols et de la géotechnique (SIMSG). Au cours de cet évènement du *Geo-Institute*, j'ai été très heureux de voir notre ancienne présidente de la SCG et précédente lauréate de la Médaille Legget, Dre Suzanne Lacasse. Elle a eu l'honneur de présenter « *Tribute to Ralph Peck and Observational Method* » à titre de conférencière invitée. Je vous signale que le *Geo-Institute* organisera sa prochaine conférence annuelle avec la SCG en février 2020 au Minnesota. Nous profitons donc de notre récent protocole d'entente, initié par Dre Lacasse il y a quelques années et signé par l'ancien président, Dharma Wijewickreme, l'an dernier lors de la conférence GéoEdmonton 2018.

La SCG continuera également à établir des contacts plus étroits et plus fréquents avec d'autres organismes tels que l'Association internationale de la géologie de l'ingénieur (AIGI), où nous travaillerons avec Jean Hutchinson, qui a été élue v.-p. pour l'Amérique du Nord l'année dernière. D'autres possibilités de collaboration peuvent aussi apparaître grâce à notre participation à la *North American Geocoalition*.

L'Institut canadien des ingénieurs

À la fin de mars, j'ai eu l'honneur de représenter la SCG au gala de remise des prix de l'Institut canadien des ingénieurs (ICI). Cette association offre quelques-uns des prix les plus

estimés dans le domaine du génie au Canada. J'ai été très fier de constater que, comme par les années passées, la SCG était très bien représentée. Nos membres, Suzanne Lacasse, Kevin Biggar, Jacques Locat et Doug Stead, ont reçu de prestigieuses médailles de l'ICI. Par ailleurs, Jean Coté et Craig Lake ont été nommés Fellows de l'ICI. Je tiens à mentionner qu'en plus d'être la lauréate de la plus haute distinction de l'ICI, la Médaille Sir John Kennedy, Dre Lacasse a également été choisie plus tôt cette année pour recevoir le titre d'Officier de l'Ordre du Canada, le plus prestigieux prix pour services rendus au pays. La première personne du domaine de la géotechnique à devenir membre de l'Ordre du Canada a été Robert Legget et Dre Lacasse sera notre neuvième représentante du domaine. À mon avis, c'est une preuve supplémentaire de l'importance de la géotechnique dans notre société.

La SCG est l'une des organisations ayant connu le plus de succès au sein de l'ICI parce que nous avons été énergiques dans la présentation de propositions de grande qualité mettant en valeur les contributions de membres méritants. Je vous prie de garder ceci à l'esprit et d'œuvrer dans les prochains mois à proposer la candidature de vos collègues pour les titres de Fellows de l'ICI et comme candidats pour les prix. Consultez le site Web de l'ICI (***eic-ici.ca***) pour plus de détails. Veuillez soumettre les candidatures à la SCG avant le 15 juillet 2019.

Nos jeunes professionnels

Alors que nous tournons davantage nos efforts vers la nouvelle génération, je tiens à souligner l'importance du Colloquium de la SCG, créé pour les jeunes membres en 1977. En 2016, la SCG et la Fondation canadienne de géotechnique (FCG) ont invité les conférenciers du Colloquium à faire une série d'exposés partout au Canada en mettant l'accent sur la mobilisation d'étudiants universitaires. C'était une idée du Comité exécutif de la SCG. Comme me l'a dit Kevin Biggar, président de la FCG, lorsque nous nous sommes rencontrés au gala de l'ICI, « présenter nos meilleurs et plus brillants [jeunes géotechniciens] aux étudiants universitaires a été, je crois, une idée de génie ».

Le conférencier du Colloquium de 2018, Matt Lato, a accepté le mandat et il s'est préparé pour donner d'excellentes présentations à travers les universités du pays en 2019. Jusqu'à présent, l'accueil reçu lors de ces évènements a été très bon. Des interactions aussi dynamiques avec les étudiants gradués et du premier cycle suscitent vraiment leur intérêt. Cette initiative contribue grandement à attirer des talents de grande qualité dans notre secteur. Merci, M. Lato, d'avoir accepté le défi! La SCG remercie également la FCG d'avoir contribué au financement de la série de conférences du Colloquium. Nous cherchons encore des moyens d'améliorer ce programme pour le rendre encore plus populaire.

Dans le même ordre d'idées, j'ai eu le plaisir de participer en tant que membre du jury au concours Branko Ladanyi à Montréal au début du mois de mars. Cet évènement annuel, organisé depuis 2009 par la section locale de la SCG, a vu six étudiants gradués présenter leurs projets de recherche. Nous avons assisté à des démonstrations très dynamiques d'étudiants brillants désireux d'appliquer leurs résultats dans la pratique. Jonathan Mole, de l'Université de Sherbrooke, a remporté le concours et il bénéficiera d'un soutien financier pour assister à la conférence de la SCG, GéoSt. John's 2019. Nous le félicitons et remercions aussi tous les autres participants!

Pour améliorer nos interactions avec les étudiants, Maraika De Groot, notre représentante des jeunes professionnels à notre Comité exécutif, travaille à l'élaboration d'un projet pilote de chapitres d'étudiants universitaires qui verra le jour cet automne. Cela s'ajoutera à l'appui solide de la SCG pour la prochaine Conférence canadienne des jeunes géotechniciens et géoscientifiques 2019, qui aura lieu quelques jours avant GéoSt. John's 2019. Kent Bannister, v.p. aux finances de la SCG, et moi-même sommes fiers d'avoir été sollicités comme conférenciers invités par le comité organisateur dirigé par Vincent Castonguay.

Dans mes prochains messages, je vous parlerai d'autres idées et initiatives de la SCG à l'intention de nos jeunes professionnels en géotechnique.

La tournée de conférences pancanadiennes

Le présentateur de la conférence pancanadienne du printemps 2019, le professeur Charles Shackelford *(Colorado State University)*, devrait avoir terminé la majeure partie de sa tournée avant la publication de ce magazine. J'ai également très hâte de voir notre prochain conférencier pour cet automne, Ian Moore (Université Queen's).

Manuel canadien d'ingénierie des fondations (MCIF)

Le Comité exécutif de la SCG s'est fermement engagé à montrer des progrès tangibles en ce qui concerne le *Manuel canadien d'ingénierie des fondations* (*MCIF*). Permettez-moi de vous transmettre quelques brèves nouvelles à son sujet. Le v.-p. technique de la SCG, Rob Kenyon, m'informe que la mise à jour du *Manuel* avance bien. La SCG a retenu les services de Ken Skaftfeld comme coordonnateur du *Manuel*. M. Skaftfeld a été responsable de la compilation des errata de la 4e édition du MCIF. L'objectif est de publier en ligne la prochaine édition du *Manuel*. Cela permettra à la SCG de produire graduellement le *Manuel*, chapitre par chapitre, et cela facilitera les mises à jour ultérieures. M. Skaftfeld, M. Kenyon et le Comité consultatif technique ont terminé l'examen du contenu proposé pour le *Manuel*. Les auteurs principaux des chapitres ont été approchés ou seront contactés.

N'hésitez pas à écrire à Ken Skaftfeld (***kskaftfeld@trekgeotechnical.ca***) ou à Rob Kenyon (***rkenyon@kgsgroup.com***) si vous pouvez nous aider.

GéoSt. John's 2019

Nous vous invitons à vous inscrire à la 72e conférence annuelle de la SCG (GéoSt. John's 2019) qui se tiendra à St. John's, Terre-Neuve-et-Labrador, du 29 septembre au 2 octobre!

Pourquoi y assister?

- C'est l'une des meilleures occasions d'apprendre des leaders et des jeunes étoiles montantes, tout en s'amusant!
- Vous en connaîtrez davantage au sujet des meilleures normes de pratique de l'industrie de la bouche des praticiens les plus réputés qui partageront à la fois leurs réussites et les leçons tirées de certaines de leurs erreurs.
- Vous pouvez également voir les derniers progrès dans l'état des connaissances et de la pratique grâce aux recherches universitaires.
- Mieux encore, c'est une façon très agréable de réseauter avec des collègues et d'éminents professionnels de partout au pays et dans le monde qui partagent la même passion que vous.
- En visitant les exposants, vous découvrez les plus récents outils et développements logiciels ainsi que les toutes dernières techniques et expertises spécialisées.
- Vous obtenez des heures de formation continue requises pour maintenir votre statut d'ingénieur auprès de votre association provinciale ou territoriale.

Comment être autorisé à y assister?

Quand j'étais un jeune ingénieur, j'ai souvent utilisé les arguments ci-dessus pour convaincre mon patron de me permettre d'assister à la conférence de la SCG. C'est un investissement dans ses employés qui produit un excellent rendement. Pour justifier davantage ma requête, j'ajoutais que pour être compétitif, je devais aiguiser mes compétences, trouver de nouvelles méthodes, être plus efficace, réduire les coûts et connaître les plus récents outils pour favoriser les changements.

Montrez à votre patron et à vos collègues que vous êtes proactif en vérifiant le programme et en indiquant les sessions et les ateliers auxquels vous prévoyez d'assister. Vous pouvez ensuite vous engager à démontrer ce que vous avez appris en le présentant à vos collègues lorsque vous serez de retour au bureau après la conférence. Planifier et s'inscrire tôt pour profiter des tarifs de préinscription et de vols moins chers est un autre argument convaincant.

Le comité organisateur de GéoSt. John's 2019, dirigé par Sterling Parsons, a reçu plus de 435 résumés; la participation prévue est donc très bonne. En plus de sa valeur technique, la conférence sera une excellente occasion de visiter l'une des plus anciennes villes de l'Amérique du Nord, qui est aussi située le plus à l'est du continent. Je peux vous garantir que vous vivrez une expérience unique avec les gens très sympathiques de St. John's.

C'est une conférence à ne pas manquer!

À bientôt mes amis – See you later, my friends!

Mario Ruel

Fourni par Mario Ruel
SCG Président 2019-2020

From the Society

Call for Nominations for 2020 Awards and Fellowships Engineering Institute of Canada (EIC)

As a constituent Society of the Engineering Institute of Canada (EIC), CGS members are eligible for awards and fellowships of the EIC which are summarized below. CGS members are encouraged to submit EIC nominations of fellow members to CGS National Office by July 15, 2019.

Nominations must include:

1. a completed EIC Nomination Form which is available from ***http://eic-ici.ca/honours_awards/***)
2. a nomination letter
3. supporting letters from colleagues, preferably Fellows of the EIC (FEIC).

Past CGS member recipients of EIC Awards and Fellowships can be found on the CGS website ***http://www.cgs.ca/awards_honours_eic.php***. It is recommended that nominators review the awards details and criteria prior to preparing nominations. For more information contact CGS National Office at:

The Canadian Geotechnical Society
8828 Pigott Road
Richmond, BC
V7A 2C4, Canada,
Fax: (604) 277-7529
e-mail: ***admin@cgs.ca***

Appel de candidatures pour les prix et titres de Fellow 2020 Institut canadien des ingénieurs (ICI)

À titre de société membre de l'**Institut canadien des ingénieurs** (ICI), les membres de la SCG sont admissibles aux prix et aux titres de Fellow de l'ICI décrits ci-dessous. Les membres de la SCG sont encouragés à soumettre la candidature de collègues membres pour les distinctions de l'ICI

Award of Honour	Brief Description/Comments
Sir John Kennedy Medal	For outstanding service to the profession or for noteworthy contributions to the science of engineering, or to the benefit of the EIC. EIC's most distinguished award (awarded every two years)
Julian Smith Medal	For achievement in the development of Canada; up to two medals can be awarded
John B. Stirling Medal	For leadership and distinguished service at the national level within the EIC and/or its member societies
CP Rail Engineering Medal	For leadership and service at the regional, branch and section levels by members of EIC member societies
K.Y. Lo Medal	For significant engineering contributions at the international level, such as promotion of Canadian expertise overseas; training of foreign engineers; significant service to international engineering organizations; and advancement of engineering technology recognized internationally
Fellowship of the EIC	For excellence in engineering and services to the profession and to society
Honorary Member	For non-members of the EIC and its member societies, and on occasion non-engineers, who have achieved outstanding distinction through service to engineering and the profession of engineering in Canada

au Bureau national de la SCG d'ici le **15 juillet 2019**.

Les candidatures doivent inclure :

4. un formulaire de candidature de l'ICI dûment rempli qui est disponible sur le site ***http://eic-ici.ca/honours_awards/***;
5. une lettre de candidature;
6. des lettres de recommandation de collègues, préférablement de Fellows de l'ICI (FICI).

Les noms des membres de la SCG qui ont déjà reçu des prix et des titres de Fellow de l'ICI sont affichés sur le site Web de la SCG, à ***http://www.cgs.ca/awards_honours_eic.php?lang=fr***. Il est recommandé que les personnes qui soumettent des candidatures examinent les renseignements et les critères des prix avant de les préparer. Pour obtenir de plus amples renseignements, communiquez avec le siège social de la SCG à :

La Société canadienne de géotechnique
8828 Pigott Road
Richmond, C.-B.
V7A 2C4, Canada
Téléc. : 604-277-7529
Courriel : ***admin@cgs.ca***

Prix ou distinction	Courte description/Commentaires
Médaille Sir John Kennedy	En reconnaissance de services exceptionnels rendus à la profession d'ingénieur, ou des contributions remarquables à la science de l'ingénierie, ou au bénéfice de l'Institut. Plus prestigieux prix de l'ICI; décerné tous les deux ans.
Médaille Julian Smith	En reconnaissance des réalisations dans le développement du Canada; jusqu'à deux médailles remises chaque année.
Médaille John B. Stirling	En reconnaissance du leadership et des services rendus à l'échelle nationale à l'Institut ou à ses Sociétés Membres.
Médaille CP Rail Engineering	En reconnaissance de nombreuses années de leadership et de service par les membres des sociétés au sein de l'Institut aux niveaux régional (Direction ou section); jusqu'à deux médailles remises chaque année.
Médaille K.Y. Lo	Pour des contributions remarquables au domaine de l'ingénierie au niveau international, comme la promotion de l'expertise canadienne à l'étranger, la formation d'ingénieurs étrangers, un service exceptionnel rendu à des organisations d'ingénierie internationales et l'‘avancement d'une technologie d'ingénierie reconnu sur la scène internationale.
Titre de Fellow	Pour l'excellence en ingénierie et des services rendus à la profession et à la société.
Membre honoraire	ses sociétés membres, et occasionnellement pour des personnes qui ne sont pas des ingénieurs, qui se méritent cette remarquable distinction en raison de services rendus au domaine de l'ingénierie et à la profession de l'ingénierie au Canada.

Members in the News

In this issue of CGS News we will extend congratulations to many of our outstanding members for their achievements and awards including featuring more of the 2018 CGS award recipients. Congratulations to **Suzanne Lacasse**, Past CGS President (2003-2004) and longtime member who has been selected as an Officer of the Order of Canada for her achievements as a distinguished geotechnical engineer, notably in the area of risk assessment.

Jean Pierre Tournier (Hydro Québec), 2018 recipient of CGS's Geoffrey G Meyerhof Award, was elected President of the Canadian Dam Association (CDA) Board of Directors at their October 2018 annual general meeting. Dr. Tournier succeeds Robert (Bob) Patrick (EBA Engineering) who will now serve as CDA Past President.

The CDA also recently recognized **Norbert Morgenstern** (Professor Emeritus, University of Alberta), CGS President (1989-1990) and RF Legget Medalist (1979) with the CDA's Inge Anderson Award of Merit at their October 2018 conference. The award is presented biannually to recognize CDA members who have distinguished themselves through significant contributions to the advancement of knowledge and practices related to dams in Canada.

Jean Hutchinson, Professor in the Department of Geological Sciences and Geological Engineering at Queen's University has been selected to give the Geological Society of London's 20th Glossop Lecture in November 2019. The Glossop Lecture is the most prestigious lecture of the Engineering Group of the Geological Society and highlights the contributions made by an eminent engineering geologist in the application of engineering geology to civil engineering.

2018 CGS Award Winners

In this issue we highlight **Jean-Pierre Tournier, Iain Bruce, Larry Bentley, Mamadou Fall, Paul Simms, and Michael Porter** for the 2018 CGS awards.

2018 CGS Award - G. Geoffrey Meyerhof Award

Jean-Pierre Tournier

Jean-Pierre Tournier was the winner of the 2018 G. Geoffrey Meyerhof Award of the CGS's Soil Mechanics and Foundations Division. Established in 1993, this award honours Professor Meyerhof (1916-2003), the first President of the CGS, for his outstanding life-long contributions to the profession and the CGS, and for his numerous achievements that have received worldwide recognition.

Jean-Pierre's citation reads: "Dr. **Jean-Pierre Tournier** is a geotechnical engineer of international repute and has made significant contributions particularly in the area of large dams. He has more than thirty five years of experience in the design and construction of infrastructure projects in the public and private sectors, in particular the hydroelectric developments, both nationally and internationally. He made notable contributions in the construction of large dams such as LaGrande Complex, Eastmain, and Romaine 1 to 4. Dr. Tournier contributed significantly in developing new technologies and know-how related to dams, and, for instance, is the key person behind the successful introduction and construction of asphalt core embankment dams in Canada.

Dr. Tournier obtained his PhD from the University of Sherbrooke and defended his thesis in front of Prof. Meyerhof. He is the author or co-author of more than fifty technical publications and is a former Associate

GEO ST. JOHN'S 2019
UNDER LAND & SEA

72ND CANADIAN GEOTECHNICAL CONFERENCE
72E CONFÉRENCE GÉOTECHNIQUE CANADIENNE

September 29 to October 2 / Du 29 septembre au 2 octobre

St. John's, Newfoundland and Labrador

Join us in St. John's, NL for the **Canadian Geotechnical Society's 72nd annual conference**. As the province's capital city, St. John's is rich in culture, history and maritime heritage, all packaged in a compact, urban and welcoming environment.

The GeoSt.John's 2019 featured theme **Under Land and Sea** will highlight recent achievements in both offshore and nearshore geotechnical engineering. In addition to this maritime focus, the technical program will cover a wide range of primary and special geotechnical topics.

GeoSt.John's 2019 conference program highlights will include:

- R.M. Hardy Address presented by Dr. Ryan Phillips (C-Core)
- CGS Colloquium presented by Dr. Kathy Kalenchuk (Mine Design Engineering)
- Comprehensive Industry Trade Show with 60+ exhibitors
- 12th annual CGS Awards Gala and Local Colour Night at one of St. John's best known attractions
- Over 500 delegates and more than 200 technical and special presentations over three days!

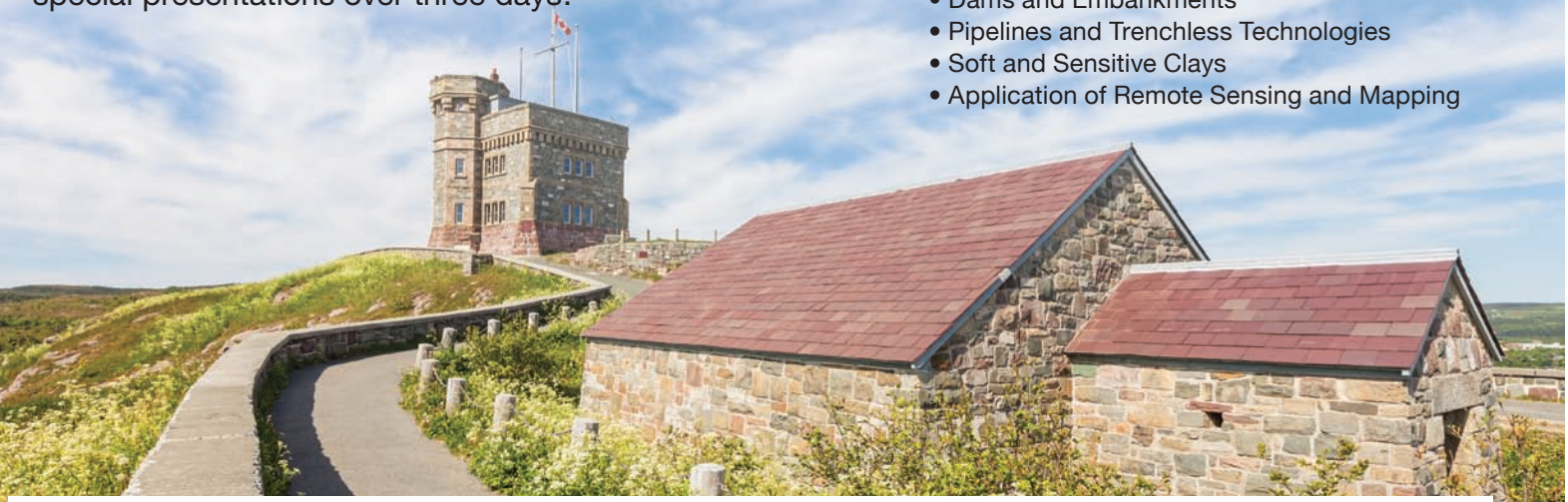
TENTATIVE TECHNICAL SESSIONS

PRIMARY GEOTECHNICAL

- Soil Mechanics and Foundations
- Rock Mechanics and Engineering Geology
- Landslides and Geohazards
- Mining Geotechnics and Hydrogeology
- Geoenvironmental Engineering
- Transportation Geotechnics
- Geosynthetics
- Cold Regions Geotechnology
- Sustainable Geotechnics
- Professional Practice

SPECIAL GEOTECHNICAL

- Offshore and Nearshore Geotechnical Issues
- Dams and Embankments
- Pipelines and Trenchless Technologies
- Soft and Sensitive Clays
- Application of Remote Sensing and Mapping



The conference will be held at the **St. John's Convention Centre**, *located in the heart of downtown and right next door to the city's famous George St. The sea (and the cod and the rum) are calling – see you in St. John's this fall!*

Go to the conference web site at www.geostjohns2019.ca for detailed conference information and to register online. Be sure to sign on before July 31, 2019 to take advantage of early pricing discounts!

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DST consulting engineers

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Golder

ConeTec

Trek Geotechnical

Editor of the Canadian Geotechnical Journal. His expertise is recognized by the international community and, since 1998, he is the Canadian Representative and a Member of the Committee on „Materials for the Fill Dams“ for the International Commission on Large Dams (ICOLD) and he is the Chairman since 2010 (renamed Embankment Dams Committee). He was the general reporter on the Safety of Fill Dams, one of the four themes of the International ICOLD Congress held at Barcelona in June 2006, Vice-Chairman for the Hydroelectricity and Dams Question at the following Congress held at Brasilia in May 2009 and Vice-Chairman for the Ageing and Upgrading Question at the last Congress held at Kyoto in June 2012. Dr. Tournier became a Fellow of the Engineering Institute of Canada in 2007.”

For his many achievements and contributions over his career, the CGS Soil Mechanics and Foundation Division is pleased to honour Professor Jean-Pierre Tournier with the 2018 G. Geoffrey Meyerhof Award.”

2018 CGS Award - Thomas Roy Award

Iain Bruce

Iain Bruce was the winner of the 2018 Thomas Roy Award of the Engineering Geology Division. Established in 1982, this award honours Thomas Roy (??-1842), who may have been the first engineering geologist in North America. The name for the award was suggested by Dr. RF Legget and recognizes outstanding contribution (publication or otherwise) to engineering geology.

Iain’s citation reads: “Dr. Iain Bruce has been awarded the 2018 Thomas Roy Award for his exceptional leadership and strong national and international contributions to the field of engineering geology. He is a recognized specialist in the design, construction or review of tailings dams as well as the design of water retaining type dams. These engineering designs incorporate aspects of the tailings and in-situ materials ensuring sustainable practices. He has also a respectable publication record associated within these domains. Dr. Iain Bruce has significant experience in areas of complex engineering geology including karst and tropical soils in high rainfall areas. Nationally, he has worked at multiple locations throughout Canada and the Northwest Territories. His international experience includes work in Papua New Guinea, Mexico, Chile, Peru, Venezuela, Costa Rica, Argentina, South Africa, Kyrgyzstan, Mongolia, Russia and the United States. His efforts have contributed to the success and growth of BGC. Dr. Iain Bruce’s industry work has also been recognised with a Fellowship of the Engineering Institute of Canada.”

2018 CGS Awards - Robert N. Farvolden Award

Larry Bentley

Larry Bentley of the BC Ministry of Environment, was presented with the 2017 Robert N Farvolden Award. This joint CGS/IAH-CNC award was established in 2000 and is named to honour Dr. Farvolden (1928-1995) who is credited with beginning the modern era of hydrogeology in Canada in the 1960s.

Larry’s citation reads: “Larry Bentley was born and raised in southern California and received his BSc degree in physics from Hamilton College and MSc in geophysics from the University of Hawaii. After 11 years of successful career in geophysical exploration, he returned to graduate school to study hydrogeology and received his PhD degree in civil engineering from Princeton University in 1990. The following year, Larry was hired to start a new hydrogeology program in the Department of Geoscience at the University of Calgary. Through his tireless efforts it developed into a vibrant program, in which he remains active as a Professor Emeritus.

Larry has a unique set of expertise in exploration geophysics and quantitative hydrogeology, which enabled him to conduct pioneering research combining near-surface geophysics with hydrogeology. Over the past three decades, he has advanced our fundamental understanding of groundwater processes in a wide range of environments including alpine headwaters, boreal forests, prairies, and northern permafrost. He has also made important contributions to groundwater contaminant remediation and water resources evaluation. Larry has been extremely generous with his time and ideas over the years, helping numerous students and colleagues to succeed in hydrogeology careers through invaluable training, mentoring, and support. He served as the President of IAH-CNC in 1996-1997 and a member of its Alberta Organizing Committee in 1997-2001. The 2018 Robert N. Farvolden award recognizes Larry Bentley’s life-long achievements in research and education, and unselfish contribution to Canadian hydrogeology.”

2018 CGS Awards - Stermac Award Winner

Mamadou Fall and Paul Simms

Mamadou Fall and Paul Simms, as Conference Chair and Technical Chair, respectively, **were both recipients** of CGS’s 2017 Stermac Award. Their citation from the 2018 Award ceremony reads: ”Professors Mamadou Fall and Paul Simms are being recognized for their dedication and service to the Canadian Geotechnical Society – most recently for their leadership at the very successful CGS conference, GeoOttawa 2017, where Mamadou served as Conference Chair and Paul chaired the Technical Subcommittee.

Celebrating 70 years of Canadian Geotechnics and Geoscience, GeoOttawa 2017 featured over 900 participants, more than 400 papers, and over 90 sponsors and exhibitors.

National conference work aside, both Mamadou and Paul are also active in other areas of the CGS. A Professor of Civil Engineering and Associate Chair Undergraduate Studies at the University of Ottawa, Dr Fall has been on the

executive of the Ottawa Geotechnical Group since 2011, and served as the CGS Ottawa Section Director from

2012 to 2015.

A Professor of Environmental Engineering at Carleton University, Dr. Simms has chaired the CGS Mining Geotechnique Committee from 2015 to the present and served as Vice Chair and Chair of the Ottawa Geotechnical Group from 2012-2016. Since 2010, Paul has also chaired the Michael Bozozuk National Graduate Scholarship Selection Committee for the Canadian Foundation for Geotechnique.

Together they can now add 2018 A. G. Stermac Awards to their list of honours and accomplishments."

2018 CGS Awards - Stermac Award Winner

Michael Porter

Michael Porter, chair 2018 Geohazards 7 conference was a recipient of CGS's 2018 Stermac Award. Alex's citation from the 2018 award ceremony reads: "With his broad background and experience in engineering geology and geotechnical engineering, Michael Porter was ideally suited to chair the 2018 Geohazards 7 conference. Held in Canmore Alberta, the event was the largest CGS specialty geohazards conference held to date. With over 200 attendees, the meeting featured over 60 oral and poster presentations, and for the first time added a site-specific field trip to compliment the wide-ranging conference sessions.

Prior to his role leading the 2018 conference, Mike chaired the CGS Landslides Committee from 2013-15 and was the driving force in rebranding that committee now known as the Geohazards Committee.

Outside of his CGS volunteer work, Michael is a Vice President at Vancouver based BGC Engineering and is an integral member of the firm's Core Management team. There he focuses on geohazard risk management in oil and gas, hydropower, transportation and mining industries, and can now add a 2018 A.G. Stermac award to his list of awards and honours."

Upcoming Conferences and Seminars

72nd Canadian Geotechnical Conference September 29 to October 2, 2019, St. John's, Newfoundland and Labrador, Canada

The **Geotechnical Society of St. John's** and the **Canadian Geotechnical Society** (CGS) invite you to **GeoSt.John's 2019**, the 72nd Canadian Geotechnical Conference. The conference will be held at the St. John's Convention Centre in St. John's, Newfoundland and Labrador, Canada from **Sunday, September 29 to Wednesday, October 2, 2019**. With a population of over 200,000, the metropolitan St. John's area is the economic and cultural centre of the province and offers a natural environment, clean air, safe streets and all the amenities of a larger city with a European flavour. Our rich history and culture and "small town" quality of life make St. John's a pleasure to visit.

For over 500 years St. John's has been visited by explorers and adventurers. Rich with history, rife with culture,

St.John's, Newfoundland and Labrador.

and sprawling with natural beauty, St. John's is a city of exaggerated proportions. All these wonders have been here for thousands of years, embraced by those who happened upon them. And while finding the true spirit of this land, you'll stumble upon everything from wildlife, to people, to amazing vistas, to an abundance of culture. In fact, being the most easterly point in North America merits our very own time zone, half-an-hour off-kilter with the rest of the world! Around every corner, around every bend, you will find a little piece of heaven, an unexpected delight, and a playful breeze that will help your journey.

The theme for **GeoSt.John's 2019** is **Under Land and Sea**. Growth of the offshore oil and gas industry in Atlantic Canada has created many opportunities for the geotechnical community. This conference intends to highlight recent achievements in offshore and nearshore geotechnical engineering. The technical program will also cover a wide range of geotechnical and hydrogeological topics, including specialty sessions that are of local and national relevance. In addition to the technical program and plenary sessions, **GeoSt.John's 2019** will include a complement of distinguished keynote speakers, high calibre short courses, social events, and technical tours. The official languages for the conference will be English and French.

For the latest information about the conference, please visit the conference website at ***http://www.geostjohns2019.ca.***

See you in St. John's!

Conférences et séminaires à venir

72e conférence canadienne de géotechnique Du 29 Septembre au 2 Octobre 2019, St. John's, Terre-Neuve-et-Labrador, Canada

La **Société géotechnique de St. John's** et la Société canadienne de géotechnique (SCG) vous invitent à **GéoSt.John's 2019,** la 72e conférence canadienne de géotechnique. La conférence aura lieu au Centre des congrès de St. John's à St. John's, à Terre-Neuve-et-Labrador, au Canada, du **dimanche 29 septembre au mercredi 2 octobre 2019**. Avec une population de plus de 200 000 personnes, la région métropolitaine de St. John's est le centre économique et culturel de la province et offre un environnement naturel, de l'air pur, des rues sûres et toutes les commodités d'une grande ville à saveur européenne. La richesse de son histoire et de sa culture ainsi que sa qualité de vie correspondant à celle d'une petite ville font de St. John's un endroit agréable à visiter.

Depuis plus de 500 ans, St. John's est visitée par des explorateurs et des aventuriers. Forte d'une histoire riche, d'une culture diversifiée et d'une beauté naturelle étendue, St. John's est une ville aux proportions exagérées. Toutes ces merveilles sont ici depuis des milliers d'années et ont été adoptées par ceux qui les ont vécues. De plus, en découvrant le véritable esprit de cette terre, vous tomberez sur tout, de la faune aux gens, en passant par les paysages magnifiques et l'abondance de la culture. Le fait d'être le point le plus à l'est de l'Amérique du Nord nous vaut notre propre fuseau horaire, une demi-heure de décalage avec le reste du monde! À chaque coin de rue, à chaque virage, vous trouverez un petit coin de paradis, un délice inattendu et une brise enjouée qui agrémentera votre voyage.

Le thème de **GéoSt.John's 2019** est **Sous la terre et la mer**. La croissance de l'industrie pétrolière et gazière extracôtière au Canada atlantique a créé de nombreuses possibilités pour la communauté géotechnique. Cette conférence a pour but de mettre en lumière les réalisations récentes dans le domaine de la géotechnique côtière et extracôtière. Le programme technique couvrira également un large éventail de sujets géotechniques et hydrogéologiques, y compris des séances spécialisées d'intérêt local et national. En plus du programme technique et des séances plénières, **GéoSt. John's 2019** comprendra un éventail d'éminents conférenciers d'honneur, de cours intensifs de haut calibre, d'activités sociales et de visites techniques. Les langues officielles de la conférence seront le français et l'anglais.

Pour obtenir les derniers renseignements sur la conférence, veuillez consulter son site Web, à ***http://www.geostjohns2019.ca/index.php?lang=fr***.

Au plaisir de se voir à St. John's!

8th International Conference on Cold Regions Engineering and the 8th Canadian Permafrost Conference August 18 to 22, 2019 Québec City, Québec

The 18th International Conference on Cold Regions Engineering and the 8th Canadian Permafrost Conference will be held at the Quebec City Convention Centre, in Canada, from August 18th to 22nd, 2019. Sustainable infrastructure development and permafrost science, in a climate change context, will be the focus of the discussions of this international conference.

More information about the conference can be found by visiting the conference website at ***http://iccre-cpc2019.com/welcome***

St.John's, Newfoundland and Labrador

2019 6th Canadian Young Geotechnical Engineers & Geoscientists Conference (cYGEGC 2019) September 26 to 28, 2019 St. John's, Newfoundland and Labrador

The cYGEGC 2019 is to be held from September 26th to 28th 2019 in the beautiful port city of St. John's, Newfoundland, at the newly opened Alt Hotel in the city's harbour. The event will be held the week prior to GeoSt.John's 2019, the 72nd Canadian Geotechnical Society (CGS) Annual Conference, making it easy for delegates to attend both conferences. After a one-day technical tour, distinguished keynote speakers will join the conference delegates for two days of technical presentations and discussions. Already confirmed as keynote speakers are CGS President Mario Ruel and CGS Vice President Finance Kent Bannister.

The cYGEGC is an event held every three years alongside the CGS annual conference. It is a conference that gathers students and young professionals from across Canada and beyond. The event focuses on providing an opportunity to young professionals and students with geotechnical and geosciences backgrounds to meet their peers, exchange technical knowledge and interact with experts in a relaxed environment.

Registration for the conference is open until July 1st 2019. Make sure to register soon, as there is a limited number of spots! To stay up-to-date with future announcements or to get more information about the cYGEGC, please visit our website ***www.cYGEGC2019.com*** and follow us on social media.

2019 6e Conférence Canadienne des Jeunes Géotechniciens et Géoscientifiques (CCJGG 2019)

La prochaine CCJGG se tiendra du 26 au 28 septembre 2019 dans la magnifique ville portuaire de St-John's, Terre-Neuve, dans le récemment construit Alt Hotel situé au cœur du havre de la ville. Cet événement se tiendra la semaine précédant GeoSt.John's 2019, la 72e Conférence annuelle de la Société canadienne de géotechnique (SCG), donnant ainsi la possibilité aux délégués de participer facilement aux deux conférences. Après une journée de visite technique, des conférenciers invités de marque se joindront aux délégués pour deux jours de présentations techniques et de discussions. Mario Ruel, Président de la SCG, et Kent Bannister, Vice-président Finances de la SCG, font partie des conférenciers invités ayant déjà confirmé leur venue à la conférence.

La CCJGG est un événement ayant lieu tous les trois ans en marge de la conférence annuelle de la Société canadienne de géotechnique. Cette conférence rassemble des étudiants et des jeunes professionnels de partout au Canada et d'ailleurs. La conférence a pour but d'offrir une opportunité à la relève des domaines de la géotechnique et des géosciences de se rencontrer afin de partager leur savoir technique, tout en côtoyant des experts reconnus, dans une ambiance détendue favorisant les échanges.

Les inscriptions pour la conférence se termineront le 1er juillet 2019. Dépêchez-vous de vous inscrire, les places sont limitées! Pour rester à l'affût d'annonces prochaines ou pour obtenir plus d'information sur la CCJGG, visitez notre site web ***cYGEGC2019.com*** et suivez-nous sur les médias sociaux.

Editor
Nicholas Beier, PhD, P.Eng.
Edmonton, AB
Tel.: 780-492-8183
email: nabeier@ualberta.ca

Canadian Legends Series/Les Légendes Canadiennes

Series Introduction/ Introduction de la série

The CGS Heritage Committee, in conjunction with the CGS Education Committee, is starting a 'Canadian Legends Series' aimed at documenting wisdom gained by distinguished Canadian geotechnical professionals; both from their lives and their professional careers. The profiles in this series will be posted in the CGS Virtual Archives available at *http://www.cgs.ca/virtual_archives_legends.php* and, from time to time, will be published in Geotechnical News. It is hoped that the series will provide students and young professionals an opportunity to learn from some of the best minds in our field.

Profiles for Evert Hoek, Suzanne Lacasse and Norbert Morgenstern, obtained as a courtesy from the American Society of Civil Engineers' Geo-Institute's GeoStrata editors, have already been uploaded. In this issue of Geotechnical News, we are pleased to present the fourth profile, the first co-authored by an undergraduate student and her faculty advisor.

Le Comité sur le Patrimoine de la SCG, en partenariat avec le Comité sur l'éducation, débute une série d'articles intitulés «Les Légendes canadiennes» visant à documenter la sagesse acquise par des spécialistes canadiens de renom dans le domaine de la géotechnique à travers leur parcours personnel et professionnel. Les profils dressés dans le cadre de cette série seront disponibles dans les Archives virtuelles de la SCG à l'adresse suivante: *http://www.cgs.ca/virtual_archives_legends.php*. Ils seront également publiés occasionnellement dans Geotechnical News dans l'espoir d'inspirer les étudiants et les jeunes professionnels et de leur fournir une opportunité d'apprendre de certains des plus brillants esprits de l'industrie.

Les profils des Evert Hoek, Suzanne Lacasse et Norbert Morgenstern, offerts gracieusement par les éditeurs de GeoStrata, affilié au Geo-Institute de l'American Society of Civil Engineers, sont déjà disponibles en ligne. Dans la présente édition de Geotechnical News, nous sommes fiers de présenter un quatrième profil, préparé par une étudiante au baccalauréat et d'un membre de sa faculté d'ingénierie.

Interview with Canadian Legend: David M. Cruden, PhD, FEIC

This interview for the Canadian Legends Series (CLS) was conducted by Yiwen Zhang, Undergraduate Student, and Lijun Deng, Assistant Professor, Department of Civil & Environmental Engineering, University of Alberta. Lijun Deng is also a member of the CGS Heritage Committee.

For more than 30 years at the University of Alberta, David M. Cruden, Emeritus Professor of Civil & Environmental Engineering and of Earth & Atmospheric Sciences, taught and researched Engineering Geology and Terrain Analysis. Among other awards, David Cruden has been the recipient of the Legget Medal of the Canadian Geotechnical Society; the Varnes Medal of the International Consortium on Landslides; the Schuster Medal of the Canadian Geotechnical Society and Association of Engineering Geologists; and the Julian Smith Medal of the Engineering Institute of Canada.

David Cruden's former students remember him fondly as someone passionate about Engineering Geology, who was in his element during field trips and enjoyed quoting seemingly obscure scientists and philosophers.

Yiwen Zhang and Lijun Deng for the CLS: Could you tell us a little bit about your background?

David Cruden: I was born in Edmonton, not the city in Alberta but an area of north London, UK, and I've always been a big fan of the Tottenham Hotspur Football Club, the local club in the English Premier League.

After a degree in Geology from Oxford University, I moved to Canada. My family has a history of emigration to Canada, so it was not unusual for me to come to the University of Alberta for my Master's in Structural Geology. I then returned to England for my PhD in Rock Mechanics at Imperial College, University of London. After my PhD, I returned to Canada and did a postdoctoral fellowship at the Mining Research Labs at Elliot Lake, a uranium mining town about a 150 kilometres west of Sudbury, Ontario.

CLS: How did you decide to study Geology and when did you know you wanted to be an Engineering Geologist?

DMC: My parents are Scottish, one from Cruden Bay (north of Aberdeen) and one from the Highlands. Many of my holidays as a teenager were spent walking the hills of Scotland. Some founders of British geology, for example James Hutton, Charles Lyell, and Archibald Geikie (my favorite

Scottish Geologist), shaped the heroic age of British geology. Geology was very much a Scottish pursuit and so I decided to be a Geologist too. Walking around the British countryside appealed to me.

After my first degree and with my additional training in statistics during the first year of my PhD research, I realized that what I was doing was Engineering Geology. My research was associated with an inter-departmental rock mechanics project. Until then I considered myself a Structural Geologist.

CLS: What have been your research interests and have they changed over time?

DMC: In the late 1960s and early 1970s at Elliot Lake, I was interested in the deformation properties of rock materials; how a cylinder of rock put in a press under constant stress would deform—a creep test. We thought then that creep had three phases: a decelerating rate, a constant rate or steady-state, and an accelerating rate –the phase before failure. I discovered that there are only two phases of creep: decelerating and accelerating. This discovery was important at the time for underground nuclear waste disposal which requires caverns in a rock mass to last for thousands of years, not the usual design life for mines. If there was steady-state creep it would become very difficult to maintain a rock cavern for a very long period of time.

When I joined the faculty of the University of Alberta in 1971, the Federal government was funding a cooperative government / university / industry Pit Slope Research Program to help develop techniques for designing stable slopes in large open-pit mines. One task of the research was to investigate previous failures. John Krahn, a graduate student at the time, and I went to the Frank Slide, the 1903 rock slide over a coal mine in the Crowsnest Pass in southern Alberta. One question we had was how had mining within the toe of the slope influenced the stability? We were fascinated.

Presently, I am interested in the ground hazards affecting Canadian railways. From a risk management point of view, it is important to have access to a long history of hazards and descriptions of how they have been managed. However, over the course of my career, I have researched a variety of topics in Engineering Geology and Rock Mechanics, especially those related to landslides.

CLS: Has there been one project that you found particularly interesting?

David M. Cruden.

DMC: I have found all of my research projects interesting, however, one project stands out. In the early 1990s, the international landslide community began a worldwide project associated with UNESCO's International Decade for Natural Disaster Reduction. During the decade, that community formed a "Working Party on World Landslide Inventory". We asked the questions: how many landslides were there in the world, and how should we count them. I chaired a group of 52 Working Party members, from 33 countries. We put together publications on defining a landslide and naming its parts, and a number of publications on suggested methods for describing landslide activity, rate of movement, causes and remedial measures. We also produced the Multilingual Landslide Glossary of the terms we had defined to describe landslides.

CLS: You are well known for your landslide research. What are the biggest challenges in this field?

DMC: Landslide research is still young. Kinematics is one of the most difficult challenges. We have few observations of landslides moving rapidly, and it's difficult to carry out mechanical analysis without knowledge of the kinematics. Did the landslide move as one body, two bodies, or many bodies? Until you answer that question, your analysis may not be very useful or helpful. We need to have more observations from displacing masses to correctly model the mechanics.

CLS: How do you think Engineering Geology has evolved during the course of your career?

DMC: It really has changed an enormous amount since I started my career. As examples, when we resumed monitoring the Frank Slide in the 1970s, we used to have to climb Turtle Mountain to make observations and take measurements. Now there are sensors installed that can be queried over the internet, and as many observations as you need can be obtained without sweating. Or you can fly your drone over an area of interest—no need to walk there to see what is going on. We are replacing field observations with instruments and the data stream has become much larger and broader. We now have more data, which means better opportunities for better diagnoses and better outcomes.

What has not changed is the natural world's ability to surprise us. Kimberlites in Alberta? Late Cretaceous bentonite seams having local sources? Oil sand tailings containing swelling clays? These are "Black Swans", in Nassim Taleb's terminology, predictably unpredicted. We must learn to expect them.

CLS: What is the biggest shortcoming in Engineering Geology?

DMC: Let me start with an analogy. When there is an unexplained death, a post-mortem is legally required to find out the cause of death. So every time somebody dies, it's a learning opportunity for the medical profession. When we have large ground movements, we should carry out careful post-mortems, such as was conducted for the Mount Polley incident in central British Columbia in 2014. After the Frank Slide in 1903, two geologists from the Geological Survey of Canada were sent to investigate the site under instructions from the Canadian Department of Mines. Their report is still interesting and valuable.

CLS: How important do you think it is to have a graduate degree in the geotechnical field?

DMC: A successful professional career is quite possible without a graduate degree. The success depends on the professional's career path, projects the professional gets involved with, and the level and quality of supervision and mentorship the professional receives. Of those who do graduate studies, some carry straight on from their undergraduate to their graduate studies, such as myself, and others pursue graduate studies after working for a while.

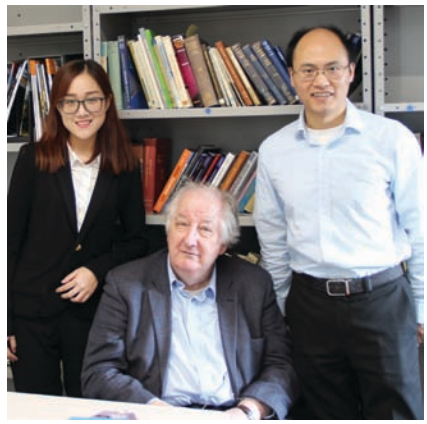
CLS: Closer to home, what do you think has been the most significant accomplishment of the UofA Geotechnical Group over the past few decades?

DMC: I'm sure each member of the Geotechnical Group would have a different answer. However, one accomplishment that I think unites us all is the training of many geotechnical professionals that have gone on to very successful careers in industry, academia and government, both in Canada and around the world. Many have become leaders in their fields.

CLS: Do you have any advice for young professionals?

DMC: Karl Popper's advice from his book Science: Conjectures and Refutations, was "Learn what people are discussing nowadays in science. Find out where difficulties arise, and take an interest in disagreements. These are the questions you should take up." This advice directed my early work and it still seems relevant today. Geotechnical professionals can find discussions in and around our technical societies. They should join those societies and join in the discussions.

The natural world is an important participant in discussions about ground movements. I've tried, with mixed success, to avoid commenting on a site that I haven't seen. If your opinion of a site is sought, ask to visit it. From the answer you get, at the least, you'll find out something about how your opinion will be valued.



Left to right: Yiwen Zhang, David Cruden and Lijun Deng.

CLS: David, thank you for your time and your insights.

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Women in Canadian Geotechnique Part 3 of 3

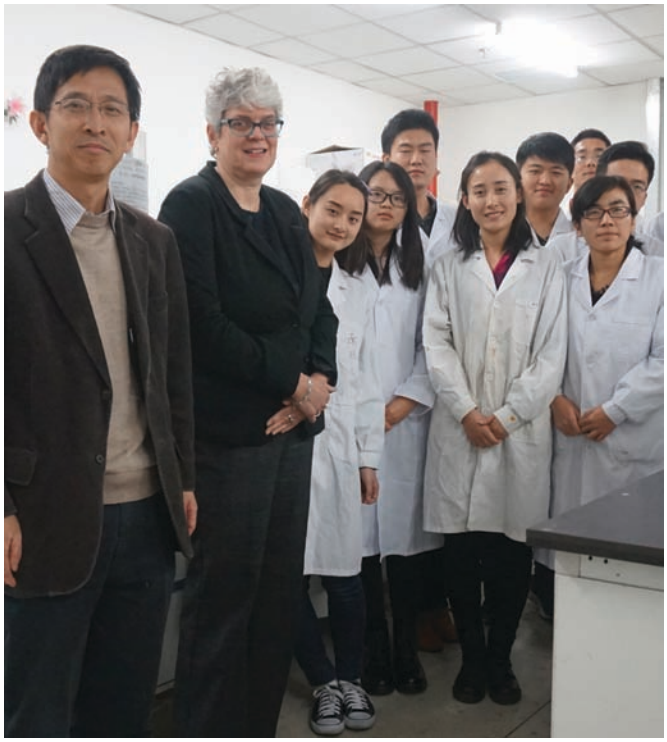
Andrea Lougheed

This is a contribution from the CGS Heritage Committee. Andrea Lougheed (BGC Engineering Inc.) is a member of this committee and its Task Force on Women in Canadian Geotechnique.

Introduction to Part 3 of the Series

Twelve 'Women in Canadian Geotechnique' were featured during the 71st Canadian Geotechnical Conference in Edmonton (GeoEdmonton 2018) where posters detailing their careers were displayed and a portion of the Heritage Luncheon was devoted to them. Parts 1 and 2 of this series were published in the September 2018 and March 2019 issues of Geotechnical News and profiled eight of the women: **Sue Aitken, Gail Atkinson, Anna Lankford Burwash, Heather Cross, Glynnis Horel, Suzanne Lacasse, Gretchen Minning** and **Danielle**

Jean Hutchinson surrounded by some Queen's students.



Catherine Mulligan with Chinese delegation.

Ziakoff. In this issue, the remaining four women are profiled.

Jean Hutchinson

Jean is known for her love of the outdoors and geology, a love that has not faded since childhood. Her father, a Professor of Civil Engineering, encouraged Jean to pursue engineering, and she completed her Bachelor's (1984, University of Toronto) and Master's (1988, University of Alberta) in Geological and Civil/Geotechnical Engineering, respectively. Her thirst for knowledge continued leading her to a PhD in Geotechnical Engineering in 1992 at University of Toronto, and a thesis on "Cablebolt reinforcement of open stopes at Ansil Mine", supervised by Evert Hoek.

Working in academia since 1997, first the University of Waterloo and then at Queen's University, Jean has taught and focused her research on rock engineering, slope stability, ground subsidence, remote sensing and GIS, to name a few. From 2009 to 2017, Jean was Head of the Geological Sciences/ Geological Engineering Department at Queen's. Her career has taken her all over Canada and to nearly every continent.

Jean has been a member of the CGS since 1987 and has served as the Chair of the Rock Mechanics Division, Division Representative on the CGS Executive Committee, and Associate Editor of the Canadian Geotechnical Journal (2002-2005). She has been the recipient of many CGS awards, including the A.G. Stermac Award (2001), John A. Franklin Award (2003), R.M. Quigley Award (2011), Thomas Roy Award (2013), and the Robert Schuster Medal (2016). She has also received several teaching awards over her career. In the fall of 2018, Jean became the Vice President North America of the International Association of Engineering Geology and was selected to give the 2019 Glossop Medal Lecture of the Engineering Group of the Geological Society (of London).

Catherine Mulligan

Catherine came to geotechnical engineering after receiving her Bachelor's (1983) and Master's (1985) in Chemical Engineering at McGill University. She became interested in geoenvironmental engineering while working on a research project involving remediation of a contaminated site in the Toronto Harbour. She subsequently completed her PhD in Civil / Geoenvironmental Engineering in 1998 at McGill University where she researched the use of biosurfactants for the removal of heavy metals from contaminated soil and sediments. Since 1999 Catherine has worked in academia at Concordia University in Montreal primarily researching environmental aspects of remediation of soil, sediments and mining residue. She is the founding Director of the Concordia Institute for Water, Energy and Sustainable Systems, and from 2008-2015, Catherine was Concordia's Associate Dean of Graduate Studies and Research.

Catherine has been involved with both the Canadian Society for Civil Engineers (CSCE) and the CGS. For the CGS, she served as Chair of the Geoenvironmental Division (2006-2010), as a founding member of the

CGS Sustainable Geotechnics Committee, as Vice President Communications for two terms (2013-2016), and as the CGS representative to the CSCE (2013-2016, 2018-2019). Catherine has also served on several conference organizing committees, including as the Technical Program Chair for the 66th Canadian Geotechnical Conference (GeoMontreal 2013). Recently, she was the co-Chair for the Geoenvironmental Speciality Conference held in conjunction with the CSCE annual meeting.

Having many notable achievements, Catherine has twice received the Petro-Canada Young Innovator Award (2003 and 2005), as well as, the Concordia Sustainability Champion Award (2013), and the ASTM Editorial Award (2014). In 2017 she was identified as a CIM Woman of Innovation. Catherine is a Fellow of both the CSCE and the EIC. In 2018, she was the recipient of the EIC's John B. Stirling Metal.

Angela Kupper

Angela Kupper.

Originally from Brazil, Angela gained an appreciation for geotechnical engineering while working as a summer intern on a large Brazilian dam project. Following completion of her Bachelor's and Master's degrees in 1979 (University of Sao Paulo) and 1983 (Catholic University of Rio de Janeiro), respectively, she worked with Geotecnica, a Brazilian consulting firm, in South America and Africa. Subsequently, she came to Canada where, in 1991, she was the first woman to receive a Doctorate in Geotechnical Engineering from the University of Alberta. Over her career she has worked with AMEC (formerly Hardy BBT) on several high profile large dams, including the Travers, Bennett and Dickson dams. Since 2013, Angela has been with BGC Engineering working, among other projects, as the Engineer of Record for the new A21 Dike at Diavik Diamond Mine in the Northwest Territories.

Angela has been involved in the Canadian geotechnical community at both the local and national levels. She served on the Executive Committee of the Edmonton Geotechnical Society from 1993 to 1997 and was Chair from 1996 to 1997. Nationally, she has served as the Technical Program Chair of the 51st Canadian Geotechnical Conference (1998) and as CGS's first female Vice President Technical, serving two terms from 2013 to 2016.

Some of Angela's other notable achievements include being a recipient of the CGS's R.M. Quigley Award (1998), the Stanley Thompson Award from the Edmonton Geotechnical Society (2010), and the Distinguished Lecturer of the American Society of Civil Engineers given at the University of California, Berkley (2011).

Anne Poschmann

Anne pursued engineering at the urging of her brothers, graduating from Queen's University as a Geological Engineer in 1978. After working with the Ontario Ministry of Natural Resources studying Champlain Sea clay in Eastern Ontario, and working for her father's pottery clay mining and supply business in Nova Scotia, Anne joined Golder Associates in Mississauga, ON in 1982. At Golder she focused on soil mechanics associated

Anne Poschmann.

with landslides, foundation engineering and tunneling. With Golder's support Anne completed her Master's at the University of Waterloo in 1986. She was appointed Golder's first female Associate in 1989, their second female Principal in 1994, and served as a member, then Chair, of the Golder Associates Ltd. (Canada) Board from 2008 to 2014.

Over her career, Anne has been involved with many organizations, including the CGS's Southern Ontario Section, Professional Engineers Ontario (PEO), Consulting Engineers of Ontario (Chair in 2005), Association of Consulting Engineering Companies-Canada (Chair 2014-2015), and WTS Canada (a group focused on advancing women in the transportation field). For the CGS national body, Anne was the Executive Committee's first female Vice President Finance 1999-2000.

In 2001 Anne received the A.G. Stermac Award from the CGS. She is a Fellow of the CSCE (2006) and Engineers Canada (2009). In 2014 Anne was named by the Women's Executive Network (WXN) as one of the Top 100 Trailblazers and Trendsetters. In 2016 Anne retired from geotechnical engineering.

Closing remarks

All twelve women profiled in the 'Women in Canadian Geotechnique' initiative are known for their technical competency, involvement with their professional communities, and their mentorship of younger geotechnical professionals. This trend continues with the growing number of women in our geotechnical profession. As stated in Part 1 of this series, the future of women in Canadian geotechnique looks very bright.

Acknowledgements

Several individuals have worked on the 'Women in Canadian Geotechnique' initiative by interviewing the profiled women, creating the posters and assisting with French translations. These individuals were acknowledged in Part 1 of the series published in the September 2018 issue of Geotechnical News.

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Book Review

Doug VanDine

How We Saw It: Interpreting Earth from Air and Space; The First 60 Years at J.D. Mollard and Associates. 2018. By Edward Willett
Published by J.D. Mollard and Associates (2010) Limited, Regina, SK. 118 p.
ISBN 978-0-9681002-3-3.

On February 5, 1956, at the age of 31, J.D. (Jack) Mollard started his namesake consulting company in Regina, SK. Jack passed away on September 13, 2017. Almost every day of the intervening 61 years, Jack put his heart and soul into his company, which has now grown into one of the foremost geological engineering and environmental consulting firms in Canada

Jack Mollard, mid-1980's.

To celebrate 60 successful years in business, the company started preparing How We Saw It in 2016. Unfortunately, Jack did not see the project completed or the book published. Had he, I am sure he would have been very pleased with the result. From the Foreword, the purpose of the book is threefold: a tribute to Jack, a description of the many areas in which J.D Mollard and Associates (JDMA) practices, and the story of how the company has continually changed and embraced new technologies.

The first two chapters are about the Jack and the early years of JDMA. They are about his growing up during the depression on a farm near Watrous, SK; his school years; his graduate work at Purdue and Cornell universities; and his early work with the Prairie Farm Rehabilitation Administration. During the first decade of JDMA, Jack was the sole professional and his wife, Mary Jean, was the secretary. As a graduate student in the late 1940s and early 1950s, Jack had developed the skill of stereoscopic air photo interpretation, which was relatively new at the time, and through JDMA he introduced that skill to Canada and to a wide variety of engineering and geological projects across the country.

The next four chapters demonstrate how Jack and his colleagues at JDMA have applied their experience and knowledge to "Terrain Analysis", "Water Resources", "Linear Routing Studies" and "Aggregate Exploration"; initially using air photo interpretation, and then with a host of expanded skill sets. The chapters briefly describe representative projects and use them as examples of how air photo interpretation and more advance technologies have been applied to meet the needs and requirements of JDMA's clients. And there were many projects to choose from – JDMA having completed more than 5000 projects over the past six decades. I was surprised to find that three of the projects described were ones with which I had been involved.

The last chapter further describes the new technologies adopted by JDMA over the decades including satellite imagery, geophysical surveys, ground-penetrating radar, GIS, 3-D modelling, LiDAR, and UAVs (drones).

The author, Edward Willett, is neither an engineer nor a geoscientist; he's a

professional writer and it shows. The text is well written, without using a lot of technical jargon. The first sentence of the first chapter drew me in. "It all started with a dog. Like many great stories, this one started with a dog." I understand that the book also benefited from the careful review and written contributions by some of the JDMA staff.

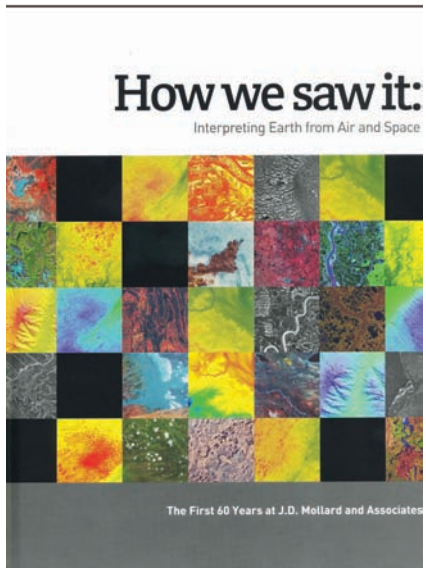
Quotes from Jack, from most of the other JDMA staff, and from some former staff are sprinkled liberally throughout the book. The author makes good use of side bars to further develop some associated topics and to introduce us to some of the background characters. I enjoyed both the quotes and the side bars as they added more technical information while, at the same time, gave the text a more personal touch.

The book was professionally designed and produced by Catharine Bradbury, and has a very appealing appearance. A minor flaw, in my opinion, was the choice of font used. For example, I found it difficult to differentiate the letter "el" (lower case L) from parentheses marks. The book has a stunning cover and many stunning photographs. The selection and quality of a few of the other photographs let me down.

My minor criticisms do not take away from the fact that I thoroughly enjoyed reading ***How We Saw It***. I believe it succeeded in its stated purpose. It would be an enjoyable read for anyone interested in: the history of the geotechnical professional in Canada; interested in finding out why JDMA has been so successful over the past 60 years (and will continue to be successful); and/or interested in learning what interesting projects a consulting geological engineering and environmental firm can get involved in, and how the work is done.

I am only aware of one other Canadian geotechnical company that has published a similar book. In the 1990s Klohn Leonoff Consulting Engineers (Leonoff 1994) produced a similar book to celebrate its 40 years in operation. It might be worthwhile for other Canadian geotechnical companies to take up the challenge!

How We Saw It is available from J.D. Mollard and Associates (2010) Limited, 1720-2002 Victoria Avenue, Regina, SK, S4P 0R7 (admin@jdmollard.com) … a mere 3-minute walk from where Jack started his company in 1956).



Cover image.

Reference: Leonoff, Cyril E. 1994. A Dedicated Team, Klohn Leonoff Consulting Engineers, 1951-1991, Klohn Leonoff Ltd., 252 p.

Doug VanDine,
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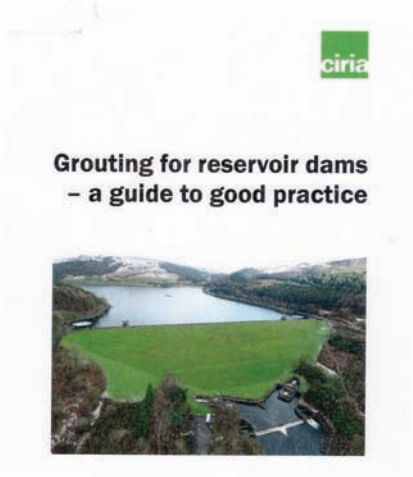
Introduction

53rd episode and for this issue an article written by me about jet grouting with a challenging project in cobbly/bouldery soils. I hope you will enjoy reading.

News from the grouting industry. I just read an excellent document that I think should be on every grouting practitioner's bookshelf. The document was prepared by a UK association based in London, CIRIA (Construction Industry Research and Information Association): Grouting for reservoir dams - a guide to good practice. The report is called C774 and can be ordered on line *https://www.ciria.org/ItemDetail?iProductCode=C774&Category=BOOK&WebsiteKey=3f18c87a-d62b-4eca-8ef4-9b09309c1c91*.



To Shadow or not to Shadow
Is it a real problem in Jet Grouting?

A case history that shows that it is not

Introduction

Shadowing is a word used very often in jet grouting. The question is: "how can shadowing be created (or occur) in this specialized area of soil treatment?"

The Cambridge dictionary defines a shadow as: "an area of darkness caused by light being blocked by something". Translated to the language of jet grouting, shadowing can happen when the jet/s of the disaggregated fluid/s (water or grout mix +/- air) are blocked by something such as cobbles, boulders or the presence of other objects in the soil.

Figure 1: The site.

It is clear that the designer and/or specialty contractor should know if one of these conditions exists, especially man-made obstructions, and consequently be able to take the appropriate action. If there are known obstructions it is quite easy to adapt the geometry and arrive at the scope of work for the jet grouting. A very interesting case history is a project of jet grouting done at the Seawall in Seattle where jet grouting was "sudoku-ed" between old timber piles. But what should be done in case of erratic and unpredictable cobbles/boulders? Discard the technology? Or?

The case history described in this article will provide some possible

Figure 2: Erratic boulder in North Vancouver(!).

answers with a potential design and operative approach.

The project

The project, the construction of a new mixed residential/retail building, is located in the District of North Vancouver at the North end of Edgemont Village. The area, resembling a distorted square, is approximately 150m wide. Figure #1. The new building comprises up to 4 levels of above ground structures and 3 to 4 levels of underground parking.

Soil conditions

The soil conditions present at site are typical of the Vancouver North shore; very heterogeneous soil and till with presence of frequent cobbles and boulders also of relevant dimensions (figure #2). Running sand and erratic perched water tables are present in the area. The typical soil is comprised of a sequence of granular soils varying from silty sand to sand.

The original design and the jet grouting alternate design

The original design called for a secant pile wall solution with 1 meter diameter piles, 0.8 m spacing and an H-beam every third pile. Based on the experience of previous excavation projects in the North Vancouver area, due to the presence of bouldery/cobbly soils, it was known that a secant pile solution can be very expensive and time consuming due to the necessity of casing and coring/chiseling the boulders with large diameter tooling. Considering that jet grouting allows for drilling of small diameter holes (5 to 6") and due to success in similar soil with this same technology, a jet grouting solution was proposed and accepted for the project by the Owner.

Columns of 1 meter diameter and steel H-beam were designed, similar to the secant pile solution. Figure #3.

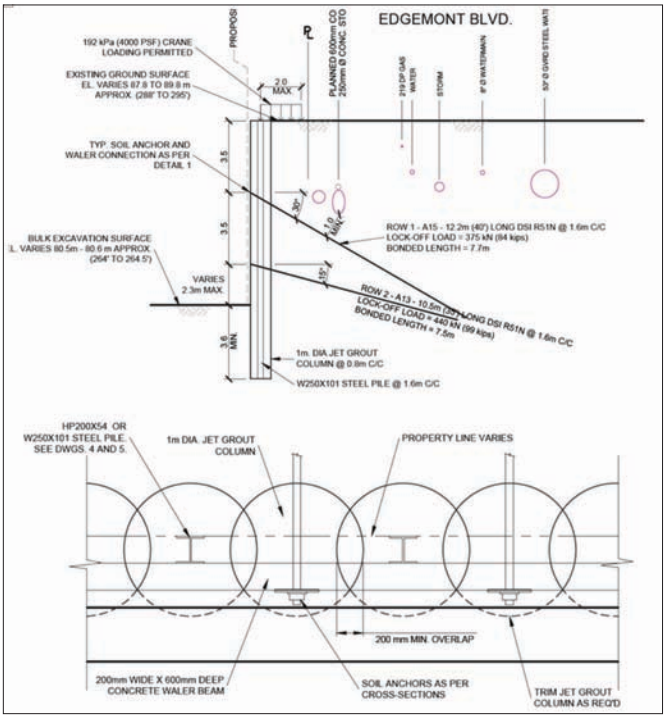


Figure 3: Typica jet grouted wall design.

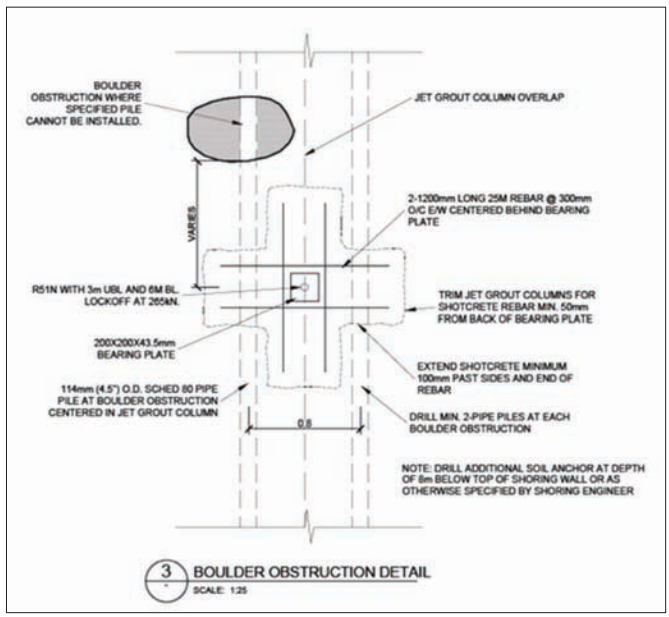


Figure 4: Boulder obstruction detail in case it was not possible to install the designed H-Beam.

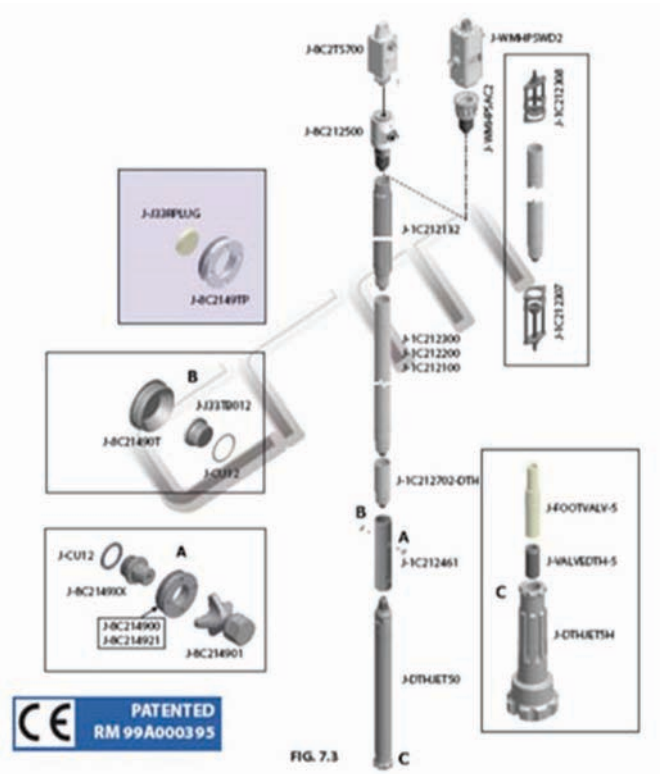


Figure 5: DTH hammer for jet grouting.

Contingencies were taken into account in case the installation of the H beam was not possible due to the presence of boulders and the small boreholes inside the boulders. Figure #4.

In this specific case, where it was not possible to install the designed H beam, smaller diameter steel pipe-piles were installed every single column, instead of every third jet grouted column.

Jet grouting execution

The main problem was definitely the drilling in this heterogeneous, cobbly/bouldery material. Usually with jet grouting in soft soil the drilling is done with simple tricone or drug-bit, but in these difficult soil conditions a special solution with dedicated jet grouting tooling was adopted; a conventional DTH with a special monitor/tooling to allow drilling and jetting without the need of pre-drilling. Figure 5.

More than 500 columns were installed from August to September, 2016, with a double fluid system up to 15 meters deep. In 50 locations (out of 250) it was not possible to install the

Figure 6: H beam installation with vibrator.

Figure 7: Excavated north wall with boulders Figure 7.jpg

Figures 8/9/10: "Embraced" boulders by jet grouting.

Figure 11: A bouldery frozen area in during winter excavation

Figure 12: Water from the drilled soil anchors.

H beam (25%). In these cases steel pipe piles 4" diameter were installed re-drilling in these bouldery zones. H beams, where possible, were installed with a dedicated vibrator as shown in figure #6.

The results

The excavation, done between September 2016 and April 2017, showed excellent results in terms of both continuity and impermeability of the wall. The excavation was completed safely, without issues and, also importantly, on schedule.

Some examples of how the jet was able to "embrace" the boulders are shown in Figure #7 to #11. No further descriptions are necessary as these figures are self-explanatory.

Figure 12 shows ingress of water once the impervious wall was drilled for the anchor installation, demonstrating the impermeability of the jetted wall.

Conclusion

And again in conclusion, after this experience, the same question: does it still make sense to talk about shadowing in jet grouting? It is clear that if the drilling for a column intercepts a boulder, the jet in this zone is not created and does not exist, and consequently no shadowing effect is created; the source of the shadow, the jet, is missing. But in the other situations, outside of the boulders, keeping a smaller column diameter and small spacing, with the right jetting parameters, very challenging projects can be solved with this versatile and flexible soil improvement technique.

As usual I conclude with the same request, asking you to send me your grouting comments or grouting stories or case histories. My coordinates remain:
Paolo Gazzarrini, paolo@paologaz.com , paologaz@shaw.ca or paolo@groutline.com.

Ciao! Cheers!

Introduction

A recent article in Nature Communications demonstrated a 60-fold increase in retrogressive thaw flows, landslides caused by melting ground ice in permafrost regions, along Banks Island in the Canadian North between the years 1984 and 2015 (Lewkowicz & Way, 2019). We've noticed similar increases in coastal retreat and thaw flows following average increases in ambient surface temperatures in recent Arctic summers (Figure 1).

Figure 1. Retrogressive thaw flows in the Canadian Arctic (photograph by Olivier Piraux).

Figure 2. Remnants of a glacial lake outburst flood in the Rocky Mountains (photograph by Rick Guthrie).

Cold region hazards, including mountain hazards (Figure 2), require careful attention in a world where global temperatures are rising, particularly in high latitudes.

In this issue, authors Marco Marcer, Xavier Bodin, and Alexander Brenning provide us with an interesting look at rock glaciers in the French Alps. These rock glaciers appear to be similarly affected by changing temperatures and are increasingly unstable. Though not common, we have comparable features in the Rocky Mountains and the Yukon. While we have less infrastructure at risk, we still need to consider linear corridors that move people and resources through these regions.

News

In a follow-up to the "Safe Work on Dangerous Slopes" article in the March 2018 issue of Geotechnical News, the Association of Geohazard Professionals (AGHP) awarded its inaugural Rope Access Safety Recognition to **GZA GeoEnvironmental, McMillen Jacobs Associates, Washington State Department of Transportation**, and **GeoStabilization International®**. Honoring best-in-class safety development and implementation initiatives within the geohazard industry, the award distinguishes those companies that foster & employ safe rope access work procedures, provide education & training to their personnel, and commit to enhancing the safety culture within their organizations.

"We are very pleased to confer these inaugural recognitions," states Ahren Bichler of Trumer Schutzbauten Canada Ltd and AGHP President. "The Safety Recognition Program is one of the core efforts of the AGHP that clearly embodies the values and goals of the Association. We believe that by distinguishing members

of our industry, such as this year's recipients, we can help build a safety culture that saves lives and instills confidence in owners and procurers when choosing partners in geohazard mitigation. Everyone benefits from our collective dedication to safety. Congratulations to this year's recipients."

Closing notes

Thank you for your letters! If you have a paper or project related to Geohazards that you think would be interesting to GN readers, please send me note at *Richard.guthrie@stantec.com.*

A methodology to assess rock glacier destabilization at the regional scale: example from the French Alps.

M. Marcer, X. Bodin, A. Brenning

Prologue

Rock glaciers are creeping landforms that are commonly found in mountain ranges rich in permafrost. Although their displacement rates normally don't exceed 1-2 m/y, in the past decade several studies showed that these values can be largely exceeded if the landform undergoes a "destabilization" phase (Roer et al, 2008; Delaloye et al, 2013). The destabilization process consists of a rapid acceleration of the landform that may last several years and causes the rock glacier to reach displacement rates of several tens of meters per year. The acceleration is preceded by the rapid development of surface features that are typically found in rotational landslides such as crevasses and scarps (Eriksen et al, 2018). The region of the rock glacier downslope of these surface features is the area that is rapidly accelerating, while upslope areas show undisturbed behaviour. Due to the high displacement rates and surface deconsolidation linked to fracturing, destabilized rock glaciers may trigger or precondition mass movements of unexpected magnitude. It is important to assess the occurrence of these landforms and integrate them into hazard assessments in regions affected by cryosphere processes.

Introduction

In the summer of 2006, a destabilized rock glacier in the Southern French Alps collapsed causing a landslide of 250,000 m^3 (Bodin et al, 2016). Although the landform was in a remote area and did not cause damage to human infrastructure, this rock glacier was unknown to the local authorities, highlighting an inadequate knowledge of the spatial footprint and characteristics of rock glaciers in the region. As a consequence, the RTM (National Environmental Protection Agency), in collaboration with the research laboratories PACTE and EDYTEM, started a GIS mapping effort at the national scale to inventory all the rock glaciers in the French Alps. This effort lasted until 2015 and resulted in the first rock glacier inventory of the region. More the 3,000 rock glaciers were identified and almost 500 of them were designated as potentially creeping (Marcer et al, 2017).

This inventory unlocked the possibility of analyzing rock glacier characteristics at a regional scale by visual inspection using orthoimages. Efforts focussed on the identification of landforms that were in high consequence settings such as those topographically connected to human activities and/or infrastructure. The systematic inventory revealed that there were several rock glaciers showing geomorphological characteristics that are typically linked to destabilization processes, suggesting a high incidence of the phenomenon. Hence, the local research institutions focused the efforts to better characterize this phenomenon, as described in Marcer et al (2019) from which this document is adapted.

The characterization of rock glacier destabilization in the French Alps was done using an approach similar to those in common landslide characterization practice: identification, modelling and susceptibility mapping (Goetz et al, 2011). A systematic identification of landforms showing evidence of destabilization was undertaken to obtain a basic assessment of the phenomenon in the region. Destabilization evidence was then used to understand typical topo-climatic characteristics of occurrence. This ultimately allowed the authors to model the local susceptibility to destabilization in relation to the terrain characteristics. Each of the three steps is described in the following sections.

Identification of destabilized rock glaciers

At a regional scale, destabilized rock glaciers are often identified using remote sensing techniques that provided displacement rates for a large number of landforms. Nevertheless, the rapid and episodic nature of the destabilization process means that some destabilizing rock glaciers may be missed using this method alone (Lambiel et al, 2011; Vivero and Lambiel, 2019). Geomorphological observations of rock glaciers in early stages of destabilization, including cracks, crevasses and scarps, can show future occurrence of the phenomenon (Figure 1).

This identification approach based on geomorphological observations was applied to the French Alps. Each active rock glacier was inspected by an operator that mapped the observable surface disturbances in the orthoimages provided by the IGN (National Institute of Geography). Observations were performed using several frames from the period 2000 to 2015, allowing the mapper to track the recent evolution of the surface disturbances. These observations were then used to assign a destabilization rating to each landform. The rating varied from zero (undisturbed landforms) to three (potentially destabilized landforms). Potentially destabilized landforms were further subdivided into two categories for either deep surface disturbances (crevasses and scarps, assigned 3a) or shallow surface cracks (assigned 3b). Rating scores of 1 or 2 were assigned to landforms with surface disturbances that did not change over the inspection interval (score of 1) or did not show a strong acceleration of the frontal lobe (score of 2).

The study showed that destabilization is common in the region, and almost 10% of the active landforms appeared to be undergoing this change. Of 46 potentially destabilized landforms, 13 of them showed deep surface disturbances. Most of these landforms were found in two regions, the Haute Maurienne and the Ubaye, where the lithology is prone to be densely jointed and composed mainly of ophiolites and schists. We therefore infer that landforms in these contexts are more prone to destabilization.

One of the landforms spotted in the identification phase is presented in Figure 2. This rock glacier, located on the North Face of the Longet summit, encountered destabilization between 2013 and 2015, reaching a displacement rate of 25 m/y in that period. The destabilization phase started in the early 2000s as several cracks started to form on the frontal lobe. In 2012 a crevasse was initiated and rapidly developed causing the destabilization phase in 2013. After 2015, displacement of the landform started to decrease, and activity will probably become suspended within few years.

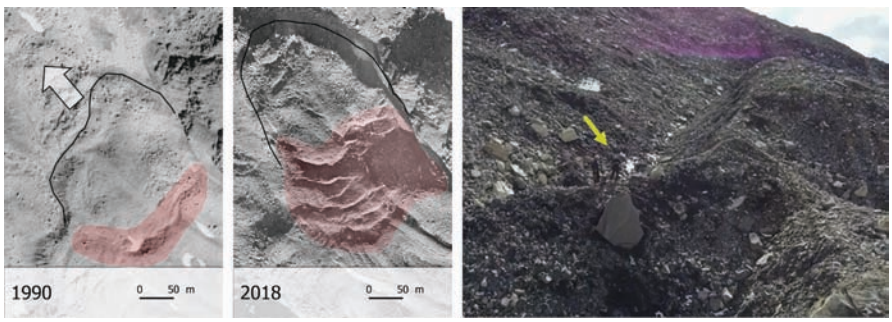


Figure 1: Orthoimages showing the evolution of a crevassed area (red shaded area) of a destabilized rock glacier (location: 45.377, 6.849) between 1990 and 2018. Rock glacier front (black outlines) moves towards North-West (direction arrow) about 100 meters. On the right, human scale (yellow arrow) compared to one crevasse of the same landform in 2017.

Modelling rock glacier stability

Knowing the locations of destabilized rock glaciers provides an opportunity to investigate the settings in which this process is most likely to occur. Using a statistical approach, we investigated the correlation between terrain parameters (such as slope angle) and destabilization occurrence, giving important insights to the underlying drivers of the phenomenon and allowing for the identification of other areas that are favourable to destabilization.

The analysis confirmed some obvious relationships between the occurrence of rock glacier destabilization and terrain such as on steep convex slopes, however, we also observed that the destabilization process was significantly more likely on north facing slopes where solar radiation is weaker. Although at the current state of the art it is not possible to provide a convincing explanation for this phenomenon, processes linked to higher meltwater availability in shaded areas through the summer season may increase the occurrence of this phenomenon (Ikeda et al, 2008). In addition, we observed that destabilization was more likely to occur at the lower margins of the permafrost zone. As these areas are considered to be vulnerable to permafrost thaw induced by the average temperature warming, this result implies a relation between permafrost degradation and destabilization. This agrees with several studies that testify to an intensification of the destabilization phenomena only in the past two-three decades (Roer et al, 2008), and is strongly suspected to be a response to climate change.

Modelling destabilization susceptibility

The destabilization process can be sudden and episodic. If indeed the phenomena is increasing, then knowing the current extent of destabilized rock glaciers is not enough: it is also important to identify the rock glaciers that are susceptible to future destabilization. The modelled susceptibility

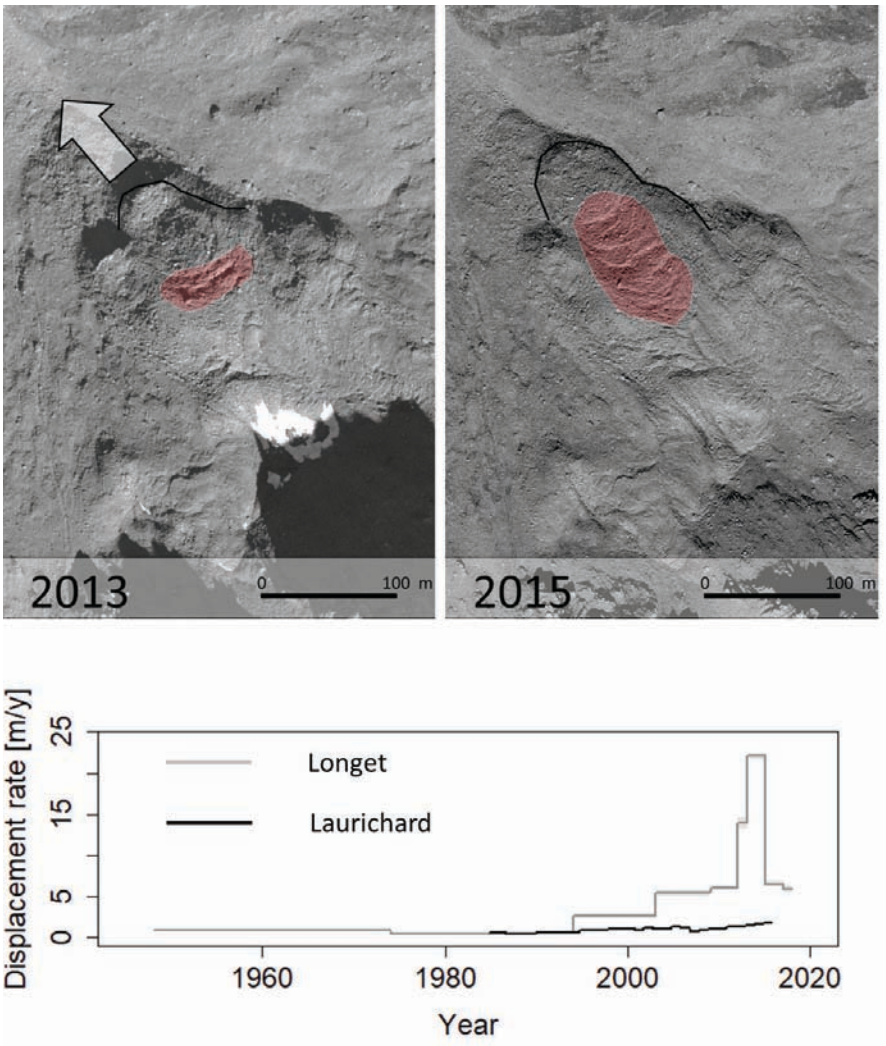


Figure 2: Orthoimages showing the rapid destabilization phase of the Longet rock glacier (location: 44.660, 6.908) between 2013 and 2015. On bottom is a graph of displacement rates since the 50s, in comparison to the Laurichard rock glacier (location: 45.017, 6.399), a reference site for displacement rate monitoring of undisturbed rock glacier in the region.

consisted of a digital map which was subdivided in five classes, from very low to very high, where very high indicates a combination of terrain parameters that are typically found in rock glaciers that show potential destabilization (Figure 3). Overall, a significant percentage of undisturbed rock glaciers was found to be highly susceptible to destabilization.

Contributions to stakeholders

Although this study provided some useful tools for local authorities dealing with natural hazards (Figure 3), uncertainties intrinsic to the method must be considered. The destabilization rating was subjective and many landforms were difficult to interpret. The susceptibility map relies on the hypothesis that the destabilization occurrence will increase in the future (Delaloye and Morand, 2011), which is still uncertain given the current state of the art. Indeed, the destabilization process itself involves several unknown issues that researchers are still far from understanding. Stakeholders should understand these uncertainties and not interpret these tools as a complete description of the phenomenon. Destabilization rating and susceptibility maps should be used as decision-support tool to define monitoring priorities and strategies. Where there is a connection between the occurrence of a rock glacier and human vulnerabilities, potentially destabilized landforms should undergo a detailed survey for precise assessment, while undisturbed landforms presenting high susceptibility may be monitored using an approach such as remote sensing.

Conclusions

This study was developed in the context of a periglacial risk assessment where the critical factor was the topographic connection between landforms and an element at risk (Kummert and Delaloye, 2018). Given that, or indeed in the framework of hazard assessment, the characterization of the destabilization phenomenon is an important step towards a comprehensive understanding of evolving periglacial hazard wherein these landforms can potentially mobilize large volumes of debris. In this context, the presented methodology allows the user to obtain a regional scale overview of the destabilization occurrence using limited resources and producing useful tools to prioritize next efforts.

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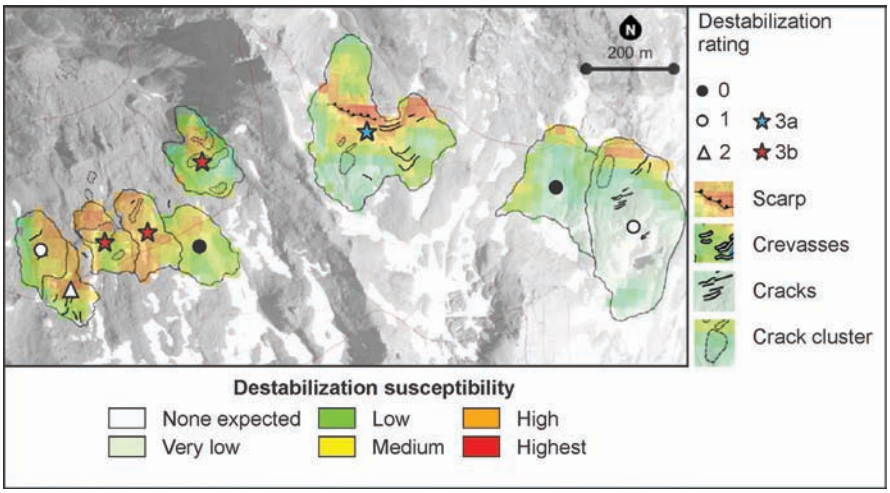

Figure 3: Examples of destabilization rates and susceptibility map of rock glaciers (location: 45.437, 7.039).

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Soil Walls and Tailings Dams: Education Outreach at the University of Alberta Geotechnical Centre

Vivian Giang

Winners of the Dr. J. Don Scott Applied Geotechnical Design Award (Team NAIT).

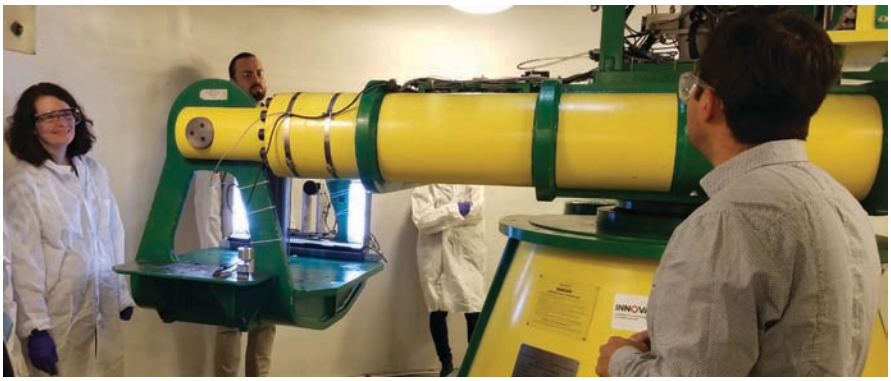
Instrumented loading frame used to test the reinforced soil walls.

Each Spring, the University of Alberta Geotechnical Centre is abuzz with education outreach efforts to bring theory into practice for students and geotechnical engineers working in industry.

On April 9, 2019, five teams of students from the University of Alberta Geotechnical Engineering graduate program and NAIT's Civil Engineering Technology program battled for the Dr. J. Don Scott Applied Geotechnical Design Award. Sponsored by the Geotechnical Society of Edmonton, BGC Engineering, Nilex, and Wood, the 17th Annual University of Alberta Applied Geotechnical Engineering Reinforced Soil Wall Design Contest continued a time-honoured tradition where theory meets mettle in a timed wall building contest.

Teams of four to five students had one hour to construct a reinforced soil wall using only five sheets of newsprint, two sheets of 15 x 30 cm geotextile, 100 paper clips and 20 popsicle sticks. Construction tools provided on the day of the contest included two rubber mallets, two scoops, two 300 mm pieces of 2 x 4" wood, one 300 mm piece of 4 x 4" wood, one pair of needle nose pliers, and one ruler. Walls were initially loaded to 200 kPa, with subsequent loads applied in 50 kPa increments. Each load increment had to be sustained for at least 10 seconds, and wall failure was defined as when sand exits from the face of the wall.

Competitors and judges of the 17th Annual University of Alberta Applied Geotechnical Engineering Reinforced Soil Wall Design Contest.



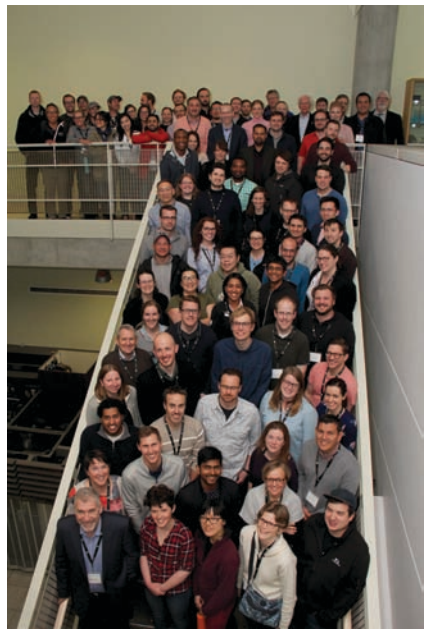
Short course attendees tour the Geomechanical Centrifuge Experimental Research Facility (GeoCERF) at the University of Alberta. (Photo courtesy of Gabriella Wahl).

Teams competed for prizes for the strongest wall, closest prediction of wall strength and best design presentation. New to this year's competition was the entry of an all-industry team from Wood and Thurber Engineering (who were not eligible for the student prizes). This year's presentations were especially creative, with current event and pop cultural references, making it a memorable and entertaining night for contest participants and judges.

Winners of the contest included:

- Strongest wall (Dr. J. Don Scott Applied Geotechnical Design Award) – Team NAIT: Brittnie Culos, Ian Grant-Weaver, Ryan Piche, Cassidy Straub, Chad Levitt (977 kPa)
- Closest prediction of wall strength – Team Wall-E Ltd. (UAlberta): Daxton Dion-Hoffman, Kwaku Amoako, Justin Park, Saeed Abdulghany, Hasmik Manadyan (Predicted: 250 kPa *vs* Measured: 276.9 kPa)
- Best design presentation – Team Wahl's of Steel (UAlberta): Gabriella Wahl, Assile Abou Daib, Yunhai Zhang, Muhammad Basim Bhatti, Muhammad Ali

The University of Alberta Geotechnical Centre thanks the Geotechnical Society of Edmonton for their generous support of the annual competition as well as BGC Engineering, Nilex, and Wood for additional contest prizes.



Participants of the Fourth International Short Course on Design and Assessment of Mine Waste Structures.

From May 2-7, 2019, the University of Alberta Geotechnical Centre hosted its 4th International Short Course on

Dr. Norbert Morgenstern presenting on Geotechnical Risk, Regulation and Public Policy.

Design and Assessment of Mine Waste Structures. This comprehensive short course was comprised of five days of 40 lecture hours and three tutorials on the design, construction, operation, monitoring, evaluation and safety of mining facilities. Eighty people participated in the workshop—including dam engineers from Argentina, Australia, Canada, the Dominican Republic, the United Kingdom and the United States.

Internationally recognized experts, including Bill Chin, Richard Dawson, Don Hayley, Scott Martens, Gord McKenna, Norbert Morgenstern, June Pollard, Andy Robertson, Peter Robertson, Dirk van Zyl, and Christina Winckler, were invited to deliver presentations along with Nicholas Beier and G. Ward Wilson at the University of Alberta Geotechnical Centre. This year's short course featured a presentation on the Alberta Energy Regulator's new Dam Safety Directive by Javid Iqbal. A special industry panel, including Norm Eenkooren, Michel Julien, Georgia Lysay, and Scott Martens, convened to discuss and compare leading dam safety practices from corporate management downward.

We wish to thank all of the guest speakers and the participants who contributed to five days of intense learning and challenging discussions, demonstrating their commitment to excellence in tailings management and corporte governance. The University of Alberta Geotechnical Centre is pleased to continue offering short courses, conferences, and other educational outreach activities to increase professional development and networking among students, researchers, practicing engineers, and policymakers.

Photos provided by Jen Stogowski and Gabriella Wahl.

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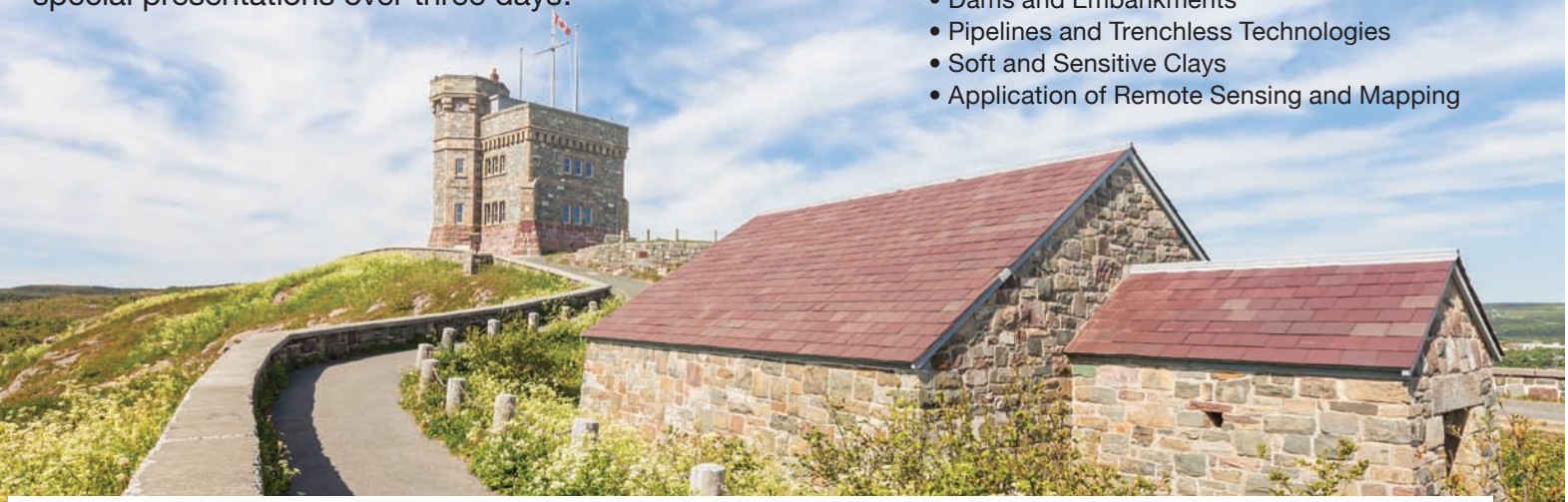

The conference will be held at the **St. John's Convention Centre**, *located in the heart of downtown and right next door to the city's famous George St. The sea (and the cod and the rum) are calling – see you in St. John's this fall!*

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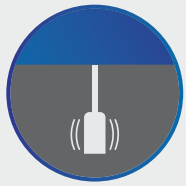

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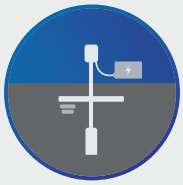

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