GEOLOG

Volume 48
Number / Numéro 1
Spring / Printemps 2019

GEOLOGICAL ASSOCIATION OF CANADA
ASSOCIATION GÉOLOGIQUE DU CANADA

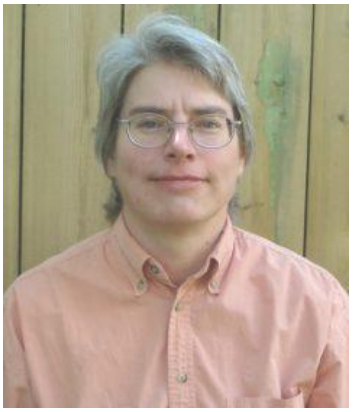
President's Preamble

Geoscience Databases: Let's Keep Canadian Geoscience Strong and Competitive

This article was inspired by conversations with Dr. Bruce Eglington and observations on the increasing prominence of data management and the application of data analytics in geoscience.

For the geoscience community GAC-MAC is a great place to bridge silos and share information and ideas. Sharing data is more challenging. As the earth sciences have evolved towards more regional or global systems thinking, the need for robust regional datasets has grown. All of us who have spent time compiling information from disparate sources to test a hypothesis or build up a regional picture have probably oscillated between a great appreciation for supplementary data files, and bouts of despair over the enormity of the task and the variability of data completeness and formatting. The challenge of access to useable data is not unique to academia. The Prospectors and Developers Association of Canada (PDAC) initiated the Exploration Assessment Digital Data Formats (EADDF) project which developed standard guidelines for digital data submitted as part of mineral exploration company assessment reports. Australia is the leader in compiling and integrating exploration industry data, and Canada is in an earlier stage of the process.

In academia the main scientific publishers are phasing in new standards for supplementary data over the next two years. One standard being promoted is the use of SESAR, the System for Earth Sample Registration which has a program for letting researchers register samples with a unique sample identifier, an alphanumeric International Geo Sample Number, or IGSN. It is like a DOI or ISBN equivalent for samples. This will ensure that basic data such as sample location are captured, and allow unambiguous linking of information where different analyses such as lithogeochemistry and U-Pb dating are done on the same sample, even when they are done at different labs and published in different papers over many different years.



This need for large amounts of data has led to a number of initiatives over the years. For example, in geochemistry we have data repositories such as EarthChem hosted at the Lamont-Doherty Earth Observatory of Columbia University and funded by the NSF, and GEOROC maintained by the Max Planck Institute for Chemistry in Mainz. The Paleobiology Database, maintained by an international team and largely funded by the NSF, is designed to be interoperable with eight other databases, including Macrostrat and Neotoma. A Global Paleomagnetic Database is available through the Geological Survey of Norway website and the PALEOMAGIA Precambrian Database through the University of Helsinki while another version is being developed offline by Dr. Sergei Pisarevsky at Curtin University, Australia, based on an original compilation by Dr. McElhinney. In Canada Bruce Eglington maintains the Dateview and StratDB geochronological databases at the Saskatchewan Isotope Laboratory as part of some IGCP projects (most recently IGCP 648). Several geological surveys, including the Geological Survey of Canada, provide various geological, geochemical and geochronological data compilations via their websites, some in quite advanced web application formats.

Cont'd on p. 4

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La MISSION de l'Association géologique du Canada est d'aider au développement scientifique et professionnel de ses membres, de favoriser les échanges géoscientifiques au Canada ainsi que de promouvoir et de diffuser l'utilisation éclairée des géosciences dans un contexte public, professionnel et académique. La VISION de l'AGC® est de faire connaître une communauté géoscientifique de grand savoir, dont les compétences professionnelles sont respectées, dont les suggestions et les avis sont pertinents, recherchés et utiles, et dont la contribution largement reconnue est considérée comme vitale pour la prospérité économique et le bien-être de la nation.

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GEOLOG

Vol. 48, No. 1 Spring / Printemps 2019

Publisher / Publié par
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GEOLOG (ISSN 0227-3713; 1712-3747) is the quarterly news-magazine of the Geological Association of Canada, St. John's, Newfoundland and Labrador. *GEOLOG* is published for the benefit of GAC® members and its content reflects the diversity of the organization. News items and short articles on topics of potential interest to the membership including public geoscience awareness are encouraged. Also encouraged are communications promoting interaction among academic, industry and government sectors. *GEOLOG* accepts and publishes contributions in both of Canada's official languages. Opinions expressed herein are those of the writers and do not necessarily represent the official positions of the GAC®. *GEOLOG* is one of several forums provided by the GAC® for scientists worldwide.

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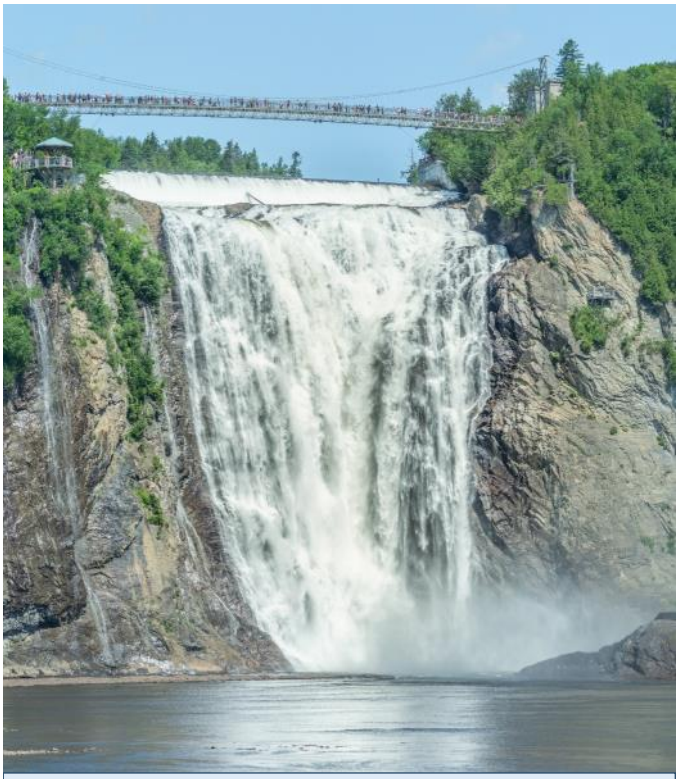
Acknowledgements and Thanks

This *GEOLOG* benefits from the contributions and assistance of / Nous voulons souligner la contribution et l'assistance de: Donnelly Archibald, Karen Dawe, Travis Ferby, Charlie Jefferson, Roger Paulen, Eleanor Penney, Bill Poole, Rob Raeside, Holly Steenkamp, Peter Stewart, Dène Tarkyth, and Mike Thomas. Apologies to any contributors that have been missed. This *GEOLOG* was produced with support from the Royal Alberta Museum. Your contributions for future editions are welcome / Désolé pour ceux qui auraient été involontairement oubliés. Cette copie de *GEOLOG* a été produite grâce à l'assistance du Royal Alberta Museum. Nous sollicitons vos contributions pour les publications à venir.

Contributions for next issue

Please send items for the next issue of *GEOLOG* by e-mail to Alwynne.Beaudoin@gov.ab.ca on or before **June 1 2019**.



Montmorency Falls, Québec, are 84 m high and a notable tourist attraction. See p. 24.
Image Wilfredor, July 2019. Reproduced from Wikimedia under CCo 1.0 Public Domain Dedication

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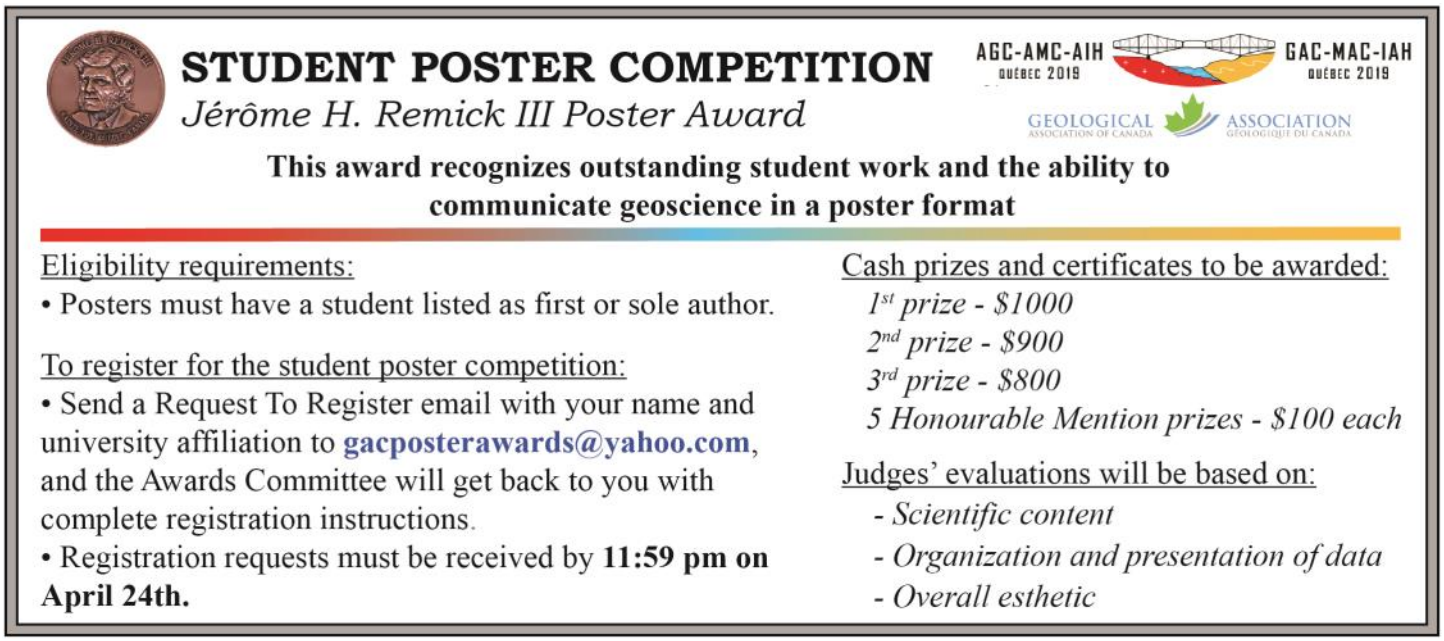
Many of these aforementioned databases tend to be relatively isolated, stand-alone initiatives that are promoted and maintained by core groups of indefatigable academics, often doing this as a side project alongside their main research and teaching roles. Voluntary data submissions represent a very incomplete sample of the published data. In contrast China recently announced $75 million in funding over ten years for a Deep Time Digital Earth (DDE) database initiative developed as an International Union of Geosciences (IUGS) project, although there is currently no funding outside of China for this. Non-experts will do much of the data harvesting, which will be verified by experts. The DDE grew out of the Geobiodiversity Database (GBDB), which was started by paleontologist Fan Junxuan of Nanjing University in 2006 and became the official database of the International Commission on Stratigraphy in 2012. DDE was officially supported by the IUGS in February 2019 as one of its projects. The US National Science Foundation funded EarthCube project to develop the cyberinfrastructure for sharing and accessing all types of geoscience data and related resources is probably the most robust data system used by the North American geoscience community, but extensive collaboration between EarthCube and DDE is unlikely at this stage due to (geo)political issues although technical discussions continue. Co-chairs of some of the working groups within the IUGS-DDE initiative include North American researchers such as Bruce Eglington and Kirsten Lehnert (geochronology, geochemistry and petrology) and Isabella Montanez (sedimentology).

Exciting data harvesting work is happening at the University of Wisconsin-Madison where Shanan Peters leads the GeoDeepDive team that uses natural language processing (NLP) to identify contextual relationships and applies text and data mining (TDM) to harvest information from close to 200,000 newly published documents per month. Shanan's team has agreements with the major publishers, excluding Springer, to access their publications.

In an age of highly collaborative research and systems thinking, efficient access to good data provides a competitive edge. As members of the geoscience community, we need to be more aware of how we might utilise and enhance these resources to improve the activities of our community. I urge all of you to get actively involved in the North American and international geoscience data initiatives, both by contributing data and by harnessing the power of big datasets to investigate your own scientific problems. Let's ensure that Canadian geoscience remains among the best in the world!

Dène Tarkyth
GAC® President
May 3, 2019



Milestones, Memories, and Tributes

Dr. Victor M. Levson
1956-2019

Victor M. Levson passed away on 31 March 2019, at the age of 62. Vic was a dedicated CANQUA member, a fixture at biennial meetings across the country, and a consistent contributor through talks and posters. Vic was a co-organizer of CANQUA 1993 (Victoria), termed "the applied meeting" by A.G. Pronk in his *Geoscience Canada* review, and served as CANQUA President from 2007-2009. A special session and field trip dedicated to Vic will be proposed for CANQUA 2020 (Prince George).

Vic's M.Sc. and Ph.D. work focused on the Quaternary sedimentology, stratigraphy, and history of the Jasper area under the supervision of Nat Rutter at the University of Alberta. He joined the British Columbia Geological Survey in 1989 and completed his Ph.D. in 1995. Upon leaving government, he formed his own consultancy, Quaternary Geosciences Inc. Throughout his career Vic was keenly interested in applied aspects of Quaternary geology, across a diverse range of research topics. He is best known for his contributions to Canadian Quaternary stratigraphy, sedimentology, and ice-flow histories, seismic hazard maps for parts of southwest British Columbia, drift prospecting method development for the Canadian Cordillera, and numerous till geochemistry data sets for central British Columbia. Vic authored or co-authored more than 150 scientific papers, reports and maps, and wrote countless conference abstracts and presentations. Known for his astute observations and keen eyes, he was a field geologist with an uncanny ability to zero in on important features that others missed, including where to find dateable wood in a section.

Vic was an Adjunct Professor in the School of Earth and Ocean Sciences, University of Victoria, where he supervised 10 graduate students. He served as an external examiner for many theses at University of Victoria and other Canadian schools. For 18 years Vic taught a fourth-year applied Quaternary geology course at the University of Victoria. A highlight of the undergraduate program, this course inspired many

Photo credit: Derek Turner

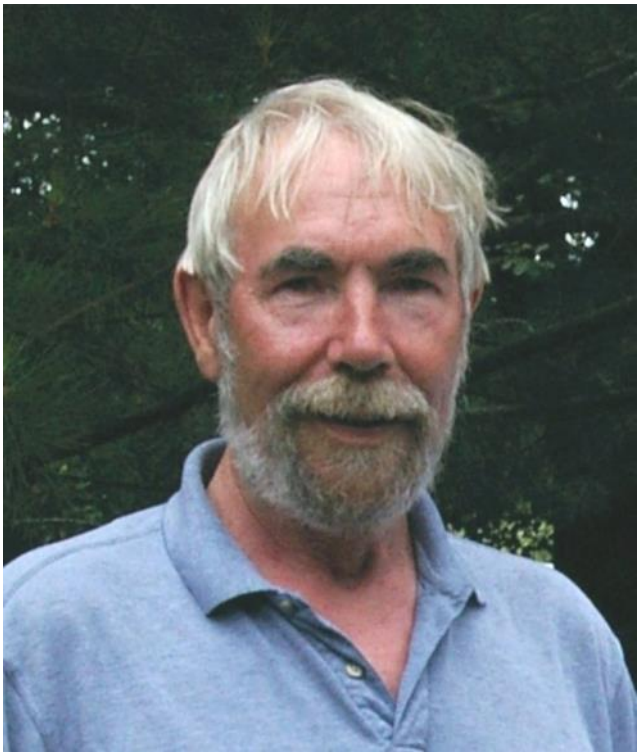
students to pursue careers in Quaternary geology. His annual four-day field trip through Washington state, with stops at the Channelled Scablands and Mount Baker, became legend. Vic also lectured in the Department of Geography (University of Victoria) and the Department of Chemistry and Geoscience (Camosun College).

Perhaps Vic's greatest contribution was how he treated people. Not only was Vic a respected geoscientist and gifted teacher, he was a selfless mentor and friend. Vic taught all of us fortunate to have worked with him how 'to do the right thing', a legacy that will endure. He also led by example and passed on a set of core values that have continued to guide us well.

Cherished by his family, Vic squeezed the most out of every day. We will miss his infectious laugh, ingenious practical jokes, and unwavering friendship.

Travis Ferbey
British Columbia Geological Survey

John William Lydon



John William Lydon passed away peacefully, at home, on Saturday August 6, 2016 surrounded by his family. He was the beloved husband of the late Florbela, and is survived by his children, Siobhan (Paul) and Michael (Bonita), and grandchildren Cameron and Liam. John attended Cowbridge Grammar School in Wales before entering Imperial College, London where he graduated with a B.Sc. degree in Geology in the early 1960s. Following graduation, he explored for sulphide deposits in Ireland, Portugal, and Spain, providing him with in-depth field knowledge of the geological settings and economic importance of such deposits. In the 1970s he embarked on post-graduate studies at Queen's University, Kingston, Ontario, graduating in 1977 on completion of his Ph.D. His thesis was entitled "The significance of metal ratios of hydrothermal ore deposits". That same year he published a co-authored paper on the geological setting of volcanogenic massive sulfide (VMS) deposits and active hydrothermal systems, and related implications for exploration.

Also in 1977, John joined the Geological Survey of Canada (GSC), Ottawa. Sulphide ore deposits and the various processes involved in their formation were to consume John's attention during his 40-year career there. He directed investigations to all aspects of these processes, using multidisciplinary approaches and drawing on experiences acquired during several years of active exploration. An early GSC project compared lead/zinc deposits in Nova Scotia and similar deposits in Spain and Portugal. Both VMS and SEDEX deposits attracted John's attention. Several key papers, some co-authored, documented his research on these deposits in the late 1970s and early 1980s.

In the 1980s he examined the Late Cretaceous Troodos ophiolite complex in Cyprus, a relatively young tectonic setting for VMS deposits, and noted the importance of genetic modelling for understanding the effects of fO_2 gradients present during ore deposition vs. those related to post-ore processes. He found that primary chemical or mineralogical zonation patterns within a VMS deposit may be modified by interaction with circulating groundwater after burial, and that such differences be considered in genetic modeling. The Troodos complex also allowed investigation of a convection cell model for hydrothermal systems, much evidence for which was based on geological observations of the classic VMS deposits in this complex. John's research favoured a hydrodynamic model, in contrast to the existing simple convection cell model. He also identified features of the Cyprus deposits not emphasized in the literature, but relevant to some Canadian VMS deposits and to modern submarine hydrothermal systems and metal deposits. John also worked for the United Nations Development Program in Pakistan, and examined ophiolite settings in Newfoundland operating from a boat.

The above studies established John's expertise in genetic modelling of base metal deposits, and their classification. Observing that most lead and zinc (± copper) deposits were precipitated from hydrothermal solutions, he suggested that hydrothermal criteria have the most fundamental significance for classifying exhale -ative base metal deposits. He proposed that the bulk chemical composition, particularly the metal ratios, and the primary structures and textures of ore deposits, are direct consequences of the chemical and physical characteristics of the hydrothermal system, and thus are important criteria for classifying such deposits.

John's studies further evolved in the 1990s by analyzing hydrothermal convection and magmatic hydrothermal systems, and proposing a new magmatic model for VMS deposits. His magmatic model improved our understanding of VMS characteristics such as clusters and preferential association with felsic volcanic rocks, other types of exhalites, and favourable horizons. His

research became more focused on SEDEX Zn-Pb deposits in the Belt-Purcell basin, Canadian Cordillera, and especially on the renowned Sullivan deposit. With closure of the Sullivan Mine looming (2001), John had the vision to capture a vast amount of undocumented data and knowledge, so that a comprehensive record of the exploration history and related geological, geochemical and geophysical data and genetic models would be available for future generations. Ultimately his "Sullivan volume" — *The Geological Environment of the Sullivan Deposit, British Columbia* — was published in 2000 as a Special Publication of the Mineral Deposits Division, Geological Association of Canada. John conceived, structured, nurtured and edited this 834-page volume of 42 papers, being sole or senior author on five and junior author on five more. These papers collectively express the diversity of John's expertise and research skills on lithostratigraphy, lithogeochemistry, isotope stratigraphy, structure, trace and rare elements, sphalerite composition and fluid inclusions. Colin J. Andrew (review in *Economic Geology*, 2002) stated, "The synopsis of the geological setting of the Sullivan deposit by John Lydon is an excellent resume, ranging from global setting to the nature of the mineralization, and it superbly sets the scene for the rest of the volume… Suffice it to say that there are several outstanding contributions within the volume that clearly advance the understanding of the setting and genesis of a fascinating orebody." This volume exemplifies John's commitment to excellence, tenacity, diligence, collaboration and ethics – especially his respect for the intellectual property of others.

John's affair with the Belt-Purcell basin and the Sullivan deposit continued throughout the 2000s and present decade, continually improving the knowledge base and genetic models of zinc-lead deposits. His work in British Columbia resulted in him becoming part of a large geological community devoted to discovery of another Sullivan ore body. John transferred his knowledge via many presentations at scientific meetings and by one-on-one discussions. As usual, not content to employ routine approaches, he used a variety of perspectives in the search for definitive answers, consistently pushing the envelope. Subjects investigated in this venture include continental cycles and the metallogeny of Canada, infiltration of Paleozoic basinal brines into rocks of the Purcell anticlinorium by basinal dewatering via the basement, implications of new zircon ages for the western margin of the Belt-Purcell basin, large igneous provinces and SEDEX deposits (example of Sullivan deposit), and leachability of metals from sedimentary rocks. In the same period, John retained a wider interest in the mineral deposits of Canada, and globally, compiling a mineral deposit data base structure and data base of VMS and SEDEX deposits as a subproject of the World Digital Map Project. The database includes 86 (the best known) SEDEX and 534 VMS deposits. His preliminary overview of Canada's mineral resources also provided key information for decision makers, both technical (e.g., explorers and researchers) and non-technical (e.g., politicians, government planners), as well as the public. A few years later, he wrote an overview of the economic and geological contexts of Canada's major mineral deposit types.

John's rich and meticulous legacy documenting geological, geochemical and mineralogical characteristics of SEDEX and VMS deposits and their genetic models brought fresh perspectives, and showed his perseverance and love of research. These generous contributions have brought him recognition as both a fine person and an expert in his field, with many seeking his opinions. A comment by BC geologist John Keating captures the essence of John, "What a nice man and such a brilliant geologist!" Fred Cook, a BC scientist, wrote, "Although I did not know him well, I have always had the greatest respect for him. Earth science has lost a good one". Wouter Bleeker, a GSC colleague, wrote, "John was a good guy, a deep thinker, interested in root causes, processes, and the bigger picture. I enjoyed having a beer with him and discussing things… and mostly listening". John Kerswill (GSC) remarked, "John was one of the few geniuses around".

A message from the Kennedy family of Kimberley, British Columbia, exemplifies the professional appreciation for John's presence in southern BC. Craig and his three sons are prospectors, all managed by Darlene. Craig wrote, "John's work and participation in the Minerals South conferences provided invaluable support for local exploration groups residing in the Kootenays. John had an obvious soft spot for prospectors, and we had the pleasure of spending time with him in the field. It's safe to say after 40 years of prospecting that John was one of the "Good Guys" and the Kennedys will always carry very fond memories of him, for the man he was and his work. Our kids were very fortunate to have spent time with John on their way up, as his ideas and experiences passed on were tremendous. Darlene always enjoyed the opportunity to discuss everything from "soup to nuts" with John

because she knew she'd always get an honest response. He will be missed." Craig added in phone conversation that John leaves behind a one-of-a-kind legacy, and attributes many of his sons' prospecting successes to John, commenting, "there is a little bit of John Lydon in all of them".

The saying goes "all work and no play makes Jack a dull boy". Well John certainly was not dull, and he played hard. Like many Welshmen, John loved rugby, starting in grammar school. This continued through university and resumed in Ottawa briefly in the late 1970s for the Ottawa Indians club. His love of rugby brought him to the Heart & Crown many winter Saturday mornings, watching the annual international tournament in Europe, cheering on Wales of course. Great times! John was a regular with the GSC's Friday Fun curling club, both playing and socializing. Probably his greatest passion was sailing, starting with lessons on a small lake in Ottawa. He joined the Britannia Yacht Club, bought himself a 22-foot sailboat named *Dulcea*, and raced intensely on Tuesday and Thursday evenings all summer. He collected more than a few trophies along the way. John was demanding – if you failed to get that spinnaker up in time, he would let you know – "no longer Mr. Nice Guy". But all was forgotten back in the clubhouse over a beer! Downhill skiing was another passion. Enduring several seasons of evening lessons in freezing temperatures at Vorlage ski slope, John became an accomplished skier and really loved challenging slopes at Tremblant and Mont Blanc in the Laurentians, The Massif and Mont St. Anne east of Quebec City, and Whistler in BC.

John also threw himself into amateur theatre with the "Isle in the River Review Theatre Co." (ITR). His first taste of this genre was helping with set design and construction in November 1991. His acting debut came the following year as Brockton the butler in "Caught in the Villain's Web" (standing ovation). John's connection with ITR took many forms, including actor (last in 2007), director, front of house, sounds and lights, programme, photography, set design, and loyal patron. In 2015 John was joint recipient of ITR's Presidents Award, for constantly demonstrating outstanding dedication to local amateur theatre.

John Lydon—nice man, brilliant geologist, keen sportsman and good fun. It is safe to say for all of us, it has been a joy and an honour to have known him.

Mike Thomas and Charlie Jefferson

Thomas (Tom) Edward Lane

Thomas (Tom) Edward Lane, Ph.D., P.Geo., passed away peacefully on March 18, 2019 in the presence of his sister, brother-in-law and friends at Mt. Sinai Hospital, Toronto, after a valiant battle with leukemia. Tom will be missed greatly by sisters (spouses): Elinor Warren (Richard), Newtown Square PA; Constance Nissley (Peter), Seattle WA; Priscilla Lane (Joji Kappes), Portland OR; and nieces and nephews: Peter Warren, Virginia Carr, David Warren, Jim Warren, Tom Nissley, Elinor Nissley, Jing Kappes.

Tom was the youngest child of the late Edward and Virginia Newcomer Lane, born in 1947 in Lancaster County, Pennsylvania and he received his early education in schools (and every hill and stream) in Delaware County, PA. He was granted degrees in geology or earth sciences from Franklin and Marshall College, Dalhousie University and Memorial University of Newfoundland. He spent over 25 years employed by Teck Corporation's exploration division in Newfoundland and Toronto in various roles including that of Senior Research Geologist before becoming in 2003 the Director, Research Development, Exploration Division of the Canadian Mineral Industry Research Organization (CAMIRO), an organization created to initiate, manage and disseminate scientific research by university researchers on real world problems and topics confronting and therefore funded by the mining industry. He developed and directed over 25 CAMIRO projects, many of which championed the development and understanding of innovative technology in exploration, and the training of geoscientists and applying geoscience, including geophysical and geochemical techniques, to mineral exploration and metallurgical processing. An adjunct professor in the Department of Earth Sciences at Laurentian University since 1996, he provided lectures, supervised graduate students, and organized workshops while serving on the advisory board of the Mineral Exploration Research Centre (MERC), most recently as Chair. Tom co-authored a seminal paper on the state of Canada's mineral exploration industry in 2010 that was instrumental in the subsequent creation of the Canadian Mining Innovation Council (CMIC) Exploration Innovation Consortium (EIC) Footprints Project, an industry-led initiative to formulate and guide the mineral exploration strategy for different deposit types across multiple disciplines and funded by NSERC, the national scientific research body. The

Canadian Institute of Mining, Metallurgy and Petroleum (CIM) awarded him the A.O. Dufresne Exploration Achievement Award in 2015 in recognition of "exceptional achievements or distinguished contributions to mining exploration in Canada", which included his important contributions to understanding the genesis of, and therefore methods to exploration for zinc deposits at Teck Corporation's mine near Daniels Harbour in western Newfoundland. Tom was invited to contribute to EU funded 2018-2020 project *Innovative Non-Invasive & Fully Acceptable Exploration Technology* (INFACT). He provided consulting services to several mining exploration companies during his time with CAMIRO. He served as Councillor for the Geological Association of Canada amongst numerous other volunteer tasks in local and national geologic organizations. He is described by one colleague at Laurentian as "one of the most dedicated people that I have ever worked with". A session at the upcoming meeting of the Geological Association of Canada in Quebec City in May has been named in his honour to celebrate Tom's contributions to the Canadian geological community.

Geology and the natural world were Tom's vocation and avocation. He was driven by his curiosity. Tom had a passion for knowledge of all things natural, especially but not limited to birding. He had little interest in the material world - family, friends, work, nature and art fulfilled him. He was a gifted teacher who patiently passed along his encyclopedic knowledge to colleagues and students, indeed, to anyone who expressed an interest. His love for being in the woods, marshes, shorelines and on the sea was built upon a foundation of life in rural Pennsylvania and family vacations to the Atlantic Coast. An avid reader, movie-goer and photographer, he took exceptional photos of rocks, wildflowers and birds, the latter he pursued avidly in travels across several continents. In addition to spirited discussions on geological field trips and chance and planned encounters at conventions, conferences and symposia, special memories that his wide circle of friends will treasure include passing time together patiently at birding vigils, attending basketball, baseball and hockey games in Toronto, enjoying live performances of jazz, folk, rock and blues music in St. John's and elsewhere, exploring art exhibitions and attending movies during TIFF. A friend recalls a recent conversation with Tom where they mused about him being the naturalist on an Antarctic cruise ship when he retired - this would have been a perfect fit, both for him and the lucky fellow passengers.

Tom was a faithful friend to those whose lives he entered, and he never lost an opportunity to overcome distance to maintain a friendship. His gentle nature and unpretentious ways endeared him to an unusually broad spectrum of society, and in turn, he was equally at home in the boardroom, a university setting, or a fisherman's kitchen in rural Newfoundland. In addition to his vast knowledge across many disciplines, few will forget his smile, giggle and sense of humour. There will be few among his friends who can forget their shock on the first occasion when they saw the generally quiet, mild mannered friend let his hair down and hit the dance floor and truly "cut the rug", as they say on the Rock!

Cremation has occurred and the family will celebrate his life privately. He will be sadly missed by those whose life he touched, but they remain inspired by the wealth of fond memories that he leaves. Donations in his honour may be directed to charitable organizations that promote science and our understanding of the natural world. Or simply go birding. Or generate any other reason to take a hike!

Peter Stewart

Memories of Bruce Sanford 1927-2018

Bruce Victor Sanford, a regional geologist for 40 years with the Geological Survey of Canada (GSC) in Ottawa and Dartmouth, Nova Scotia, died on July 23, 2018 at the age of 91 in an Ottawa hospital by elected medical assistance. In recent years, he had suffered multiple cancers, had undergone several operations, and had endured extremely unpleasant chemotherapy treatments. Further, his beloved Blanche, wife of more than 60 years had died about nine months before from Alzheimer's, leaving Bruce and their two sons Gary and John.

Bruce was well known as an ever-quiet, friendly, modest, kind and gentle person who it seems never had nasty words to say about anyone. He almost never complained and rarely talked about himself. He became the GSC person to go to for information on the geology of the Paleozoic platformal strata on the eastern Shield of southern Ontario, adjacent Québec and northern New York State, and of Hudson Bay. At the Survey he published his results steadily and was always available to contribute all he could to projects of others; the website *Geoscan* of Natural Resources Canada lists 112 GSC publications for which Bruce was the author, co-author or editor. Not listed are papers published in journals. A scan of the publication dates listed in *Geoscan* shows his work concentrated in southwestern Ontario from 1952 to the 1980s, overlapping with his northern work in the Hudson Bay region into the 1990s. As an aside, **Mike Lewis**, GSC Quaternary geologist Dartmouth (retired), recalled that Bruce dove in *Pisces* in 1969 or 1970 to identify subsea bedrock of the Niagara Escarpment north of Tobermory, Ontario. He probably also dove with an Aquitaine geologist in *Pisces* in Hudson Bay.

Bruce was born on February 8th, 1927 in Princedale, northwestern Nova Scotia. After high school, he spent two years with the Canadian Army near the end of World War II, and entered Acadia University, Wolfville, Nova Scotia in 1945. He chose to study geology and in his third undergraduate year, he accepted a summer job on a GSC field party in southern Cape Breton Island led by Dr. L. J. Weeks. Bruce's Professor Cameron laid out his own rock collection from that area and Bruce memorized the rock types from the labels. As Bruce wrote in *Memories of Geology at Acadia 1945-1949,* he enjoyed *"an enormous amount of mileage with Dr. Weeks".* Bruce worked a second summer with the GSC and in the fall of 1949, he started fulltime with GSC in Ottawa and soon began a career of studying the Paleozoic stratigraphy of southern Ontario. He retired in 1989.

Photo credit: Natural Resources Canada

Bruce received several awards in recognition of his scientific accomplishments. **Graham Williams** (see below) noted that in 1978, Bruce received the Award of Merit from the Ontario Petroleum Institute for his "outstanding contributions to the petroleum industry of Ontario". And in 1988, the Canadian Society of Petroleum Geologists awarded him the R.J.W. Douglas Medal for "Outstanding contributions to regional tectonics and petroleum and structural geology and to general understanding of sedimentary geology in Canada". Further, Bruce was invested as a Member of the Order of Canada in 2010 "for his sustained and distinguished achievements in geology, particularly during his tenure with the Geological Survey of Canada". And he received the Queen Elizabeth II Diamond Jubilee Medal in 2012. Few Canadian geologists have been granted such prestigious awards.

In 1971 GSC assigned Bruce to help build and lead what became known as the Eastern Petroleum Geology group of GSC in the Atlantic Geoscience Centre, Bedford Institute of Oceanography, Dartmouth, Nova Scotia. There the stratigraphers, sedimentologists, micropaleontologists and geophysicists were tasked with describing the geology of offshore eastern Canada and its hydrocarbon resources, a new frontier. Bruce and family moved to Dartmouth and returned to Ottawa in 1974.

Graham Williams, GSC palynologist Dartmouth, wrote that Bruce preferred to hire geologists with industry experience and skills. In 1971, Bruce offered him a job with the new Eastern Petroleum Geology group. Bruce molded several new recruits into a productive team, as attested to by the significant publications produced in

the 1970s. The group rapidly earned the respect of the industry while satisfying government's needs. A special accomplishment was the first comprehensive and continuing hydrocarbon assessment undertaken by government scientists in the offshore eastern Canada. Graham further reported that "Much of the [group's] success can be attributed to the example Bruce set through his work ethics, honesty and integrity."

Gary Grant, GSC cartographer Dartmouth (retired), wrote that Bruce was as colourful, in his own way, as the multi-colour geological maps he hand-coloured with boxes of PrismColor pencils always within reach. It wasn't unusual for Bruce to publish geological maps with 30 plus different colours to make the geological data clear for the users and give the printers nightmares. Gary recognized that Bruce was a team player and that he kept most things informal, making it great to work for him. Once he told Gary that one of the best decisions he ever made was to hire him as his compiler draftsman; he was not afraid to give a compliment. Gary finished his memories with this tribute: "Bruce, may the sound of your geological hammer forever ring through the rocks of time."

Mike Dence, GSC geophysicist Ottawa and Royal Society of Canada (retired), wrote that beginning about 1979, Bruce was assigned to assess the prospects of storage of high level radioactive waste in sedimentary formations near existing nuclear power plants on Bruce Peninsula, Ontario. At the same time and for four years, Bruce was tasked with leading a group of seconded GSC geologists and geophysicists to study the granites of northern Ontario for possible waste disposal and to report to Atomic Energy of Canada Limited (AECL). **Beth Hillary**, GSC Ottawa (retired), and **John McEwen**, geologists, were hired by AECL and seconded to Bruce's group to map parts of the plutons. Beth reported that "Bruce was a very sensible, efficient and compassionate boss." During these years, most effort was focused on crystalline Shield rocks. It seems now to Mike Dence that disposal in sedimentary rocks is the preferred medium, a tribute to Bruce's meticulous surveys of the formations of southwestern Ontario.

Sandy McCracken, GSC paleontologist (conodonts) Calgary (retired), wrote that as a new paleontologist at GSC Ottawa, in late summer 1988, he joined Bruce and the late Al Grant, geophysicist GSC Dartmouth, in Foxe Basin on Baffin Island. They needed to carry out some detailed mapping and section-measuring. As a new GSC recruit, it was rewarding to work with these two senior scientists. During the short stay of a week to ten days, a lot was accomplished. Greg Martin, GSC collections manager, and Sandy continued the project the next year. The Baffin work was later published as the multi-authored GSC Bulletin 557 (2000).

Ken Card, GSC Precambrian geologist Ottawa retired**,** wrote that he and Bruce worked together on several GSC National Atlas Series compilation maps at 1:1,000,000 scale and on a paper on the controls on emplacement of carbonatite-kimberlite intrusions in the Shield. Ken reported that Bruce was a good scientist and a great friend; he was very good to work with and he could tell you that you were wrong in the nicest way.

Bruce was busy during his retirement in Ottawa. On his own time and expense and often with his late friend Joe Wallach (retired geologist from Atomic Energy Control Board), he mapped and studied the Cambro-Ordovician Potsdam sandstone (including Ottawa Valley's Nepean sandstone) of eastern Ontario and adjacent Québec and New York State. **Bill Arnott,** professor, Earth and Environmental Sciences, University of Ottawa, supported by Joe, urged Bruce to submit a dissertation on the Potsdam for a Ph.D. degree. Bruce agreed and in 2001 was awarded his Ph.D. at the age of 80! He later commented to me that he should have done this a long time ago! He published the Potsdam results with Bill Arnott in GSC Bulletin 597 (2010). Bill recalled that once Bruce had agreed to try for a Ph.D., Bill and grad students and later Bill alone travelled the roads with Bruce in search of Potsdam strata, especially looking for angular unconformities within the Potsdam. Of their first meeting on the outcrop, Bill wrote: "So with a group of my grad students, I arranged to meet the dynamic duo [Bruce and Joe] at 'the' outcrop. As usual they arrived before us and as we walked up to them on the road I felt terribly underdressed — there was Bruce with long pants, a long-sleeve shirt, and a tie; me, in shorts and a T-shirt with no shortage of holes. After introductions I said that if we were to continue to work together, he had to lose the tie, and I had to wear clothes without holes — and that was the beginning of a wonderful friendship and many years of Bruce, Joe and I, and then Bruce and I touring the highways and byways of eastern Ontario and beyond unravelling the mysteries of the Potsdam Group. In all of that time I was

fortunate enough to come to know a thoughtful, careful and insightful geologist, but much more importantly, a gentle man and true gentleman, and for that I am truly grateful and thankful."

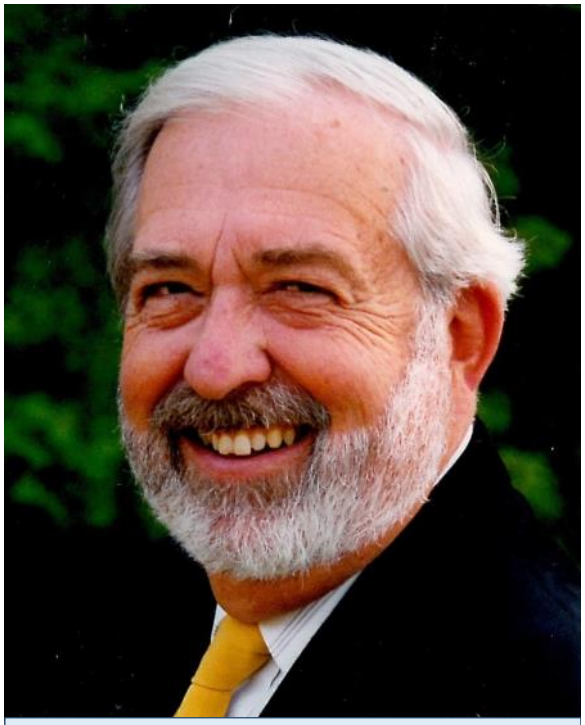
Bruce endured tragedy in his later years of retirement. About 15 years ago, while he and Blanche were walking along a path in Ottawa, Blanche was struck from the rear by a speeding bicyclist. Her head struck the pavement. The bicyclist stopped, said he was sorry and proceeded on his way. Blanche soon began to develop signs of dementia. For the past nine years until her death, she lived in a nursing home and Bruce sat with her every day. In later years, she seemed not to recognize him but it appeared that she accepted him as a friendly person. Bruce did not spread the news of her death. A daughter-in-law of **Garth Jackson**, GSC Precambrian geologist Ottawa (retired), works at the Blanche's former nursing home, and reported that Bruce and two or three musicians played guitars and sang "old songs" for the residents once or twice a week. She reported that Bruce was an accomplished guitarist and a fine singer, and was very well liked and respected by the residents.

We have lost an exceptionally good person and good friend, a genuine National Treasure.

Compiled by Bill Poole
GSC Ottawa retired, with contributions from others
February 21, 2019

Homage to Donald Frederick Sangster 1935 – 2018

Don Sangster focused on the geology and genesis of lead-zinc deposits throughout most of his career. As noted in the nomination for his Logan Medal in 1998, he had an uncanny ability to see a complex problem in its simplest elements, apply exactly the correct tools to investigate the genesis of a mineral deposit type, and then report the results and their genetic implications, elegantly and with profound insight. He showed admirable acumen when advising environmental panels, Ministers and foreign governments, and considerable skill editing significant journals and special publications. He was also a friendly, collaborative colleague with impeccable conduct, and mentored many who have since become prominent researchers. Don also made a point of leaving his geological research at work – while at home, he focused on his family, friends, expert hobbies such as making 30 beautiful and seaworthy cedar strip canoes, and his community volunteer activities such as fire fighting and Scouting. He joined the Geological Survey of Canada in 1964, and throughout his 30-year formal career, 2½ years of Emeritus and 20 years of alternating consulting and volunteering, Don was highly respected as a researcher, sought out for his sage advice, and regarded in awe for his ability "to git 'er done"



Don Sangster, family photograph, *ca.* 1995

succinctly and on time. This did not get in the way of his sense of humour. Don fashioned a nameplate for his office door, reading P.B. Zinc, and was duly recorded in the next GSC telephone directory as Zinc, P.B. From then on, he was known as Mr. P.B. Zinc!

Dr. Sangster was widely recognized for his exceptional contributions to Economic Geology. He was Distinguished Lecturer of the Canadian Institute of

Mining and Metallurgy (1973), Thayer Lindsley Distinguished Lecturer of the Society of Economic Geologists (SEG) (1983), International Lecturer of the SEG (1988), and Visiting Senior Scientist at the University of Oslo, sponsored by the Royal Norwegian Council for Scientific and Industrial Research (1992). He earned the Duncan R. Derry Medal of the Geological Association of Canada (GAC) (1981), the Silver Medal of the SEG (1984), the Past- Presidents' Medal of the Mineralogical Association of Canada (1986), and the Logan Medal of the GAC (1998). Don served in many capacities in the SEG, became its exemplary president in 1994-95 and, according to Brian Skinner, he steered it toward being a truly international organization.

Don was born on August 3, 1935 in Sherbrooke, Québec, to a family of community builders. Unsure of his career interests, he pursued his first B.Sc. in Chemistry, at Bishop's University. While in his third year, he discovered Geology while accompanying a friend's father to a job interview at a small lead-silver mine in the Gaspé Peninsula. Fascinated by the minerals he could see in the mine dump, he decided on his future profession right there and then. He finished his chemistry degree in 1955, and went on to obtain a B.Sc. and M.Sc. in Geology from McGill University in 1958 and 1961, respectively, and a Ph.D. in Economic Geology from the University of British Columbia in 1964.

Don's career with the Geological Survey of Canada (GSC) began with support of his Ph.D. thesis on iron skarn deposits in British Columbia. He became a GSC iron researcher right after graduation, and led major interdisciplinary (including geophysics) field studies to document and conceptualize iron metallogeny, terminology and processes such as skarnification. Don soon pursued Canadian volcanogenic massive sulfide (VMS) deposits research, and produced comprehensive databases and models. Jim Franklin recalls that Don was the first to recognize the Flin Flon – Snow Lake greenstone belt, and its enclosed VMS deposits, as Proterozoic rather than Archean. Don's GSC Paper 72-22 entitled "Precambrian volcanogenic massive sulphide deposits in Canada; a review", a "best-seller" among GSC publications, became the "standard of its time" for research, was required reading for students, and changed discovery concepts for these economically important deposits. It contained the first mention of "mill-rock" which became an iconic term for describing key volcanic host rock types of VMS deposits and camps. That term came from Don standing on an outcrop of volcanic breccia and telling his field trip companions that once you recognized that lithology, you could "cup a hand around your ear and hear the future mill grinding the ore, just over there".

In the early 1980s, Don delved into the sedimentary Pb-Zn realm, both Sediment-Hosted Exhalative (SEDEX) and Mississippi Valley Type (MVT) types. His constructive start for SEDEX was to organize the 1983 CIM Short Course on "Sediment-hosted stratiform lead-zinc deposits", held in Victoria. This brought together current experts, many of them exploration geologists. His Short Course Notes crystallized working knowledge as a basis for future research. Cominco highly commended Don's explanation of the Sullivan deposit; it served as their exploration model for years.

He also kicked off a major International Conference on Mississippi Valley-type Lead-Zinc Deposits with his 1983 paper, entitled "Mississippi Valley-type deposits: A Geological Mélange", that fronted the Proceedings Volume that was co-edited by G. Kisvarsanyi and others. He then studied both SEDEX and MVT deposit types, both intrinsically and in relation to each other. Into the MVT dialogue, Don introduced more of his colourful expressions, such as the unique "snow-on-the -roof" texture, resulting from internal sedimentation on collapse-breccia blocks. He further documented the importance of paleo-karst, basement and reef structures to their genesis. Don solved a fundamental blockage in the genesis of MVT lead-zinc deposits by adding high-resolution palaeomagnetic calculations from Dave Symons' lab at the University of Windsor to constrain their ages that were previously open to dispute, but now are linked to orogenic events worldwide. He and Dave published seven papers on various districts, culminating in their 1994 review: "Palaeomagnetic methods for dating the genesis of Mississippi Valley-Type lead-zinc deposits." Right after retirement from the GSC, Don chaired the major 1995 SEG International Field Conference on MVT in St. Louis, Missouri, complete with international field trips, and edited the proceedings as SEG Special Publication No. 4 (664 pp.).

Don led in the technology and delivery of government mineral resource assessments. He was one of those chained to their desks for the 1972 Operation September report, a secret national appraisal that foresaw major discoveries such as Windy Craggy. His

1983 Geoscience Canada synopsis of GSC resource assessment recruited at least one young scientist to the public service for this honest-broker task. After completing his final national assessment for mineral policy, Don joked that with its "SECRET" designation, he could no longer read his own work!

Don co-supervised formally and informally, collaborated and co-published with many young scientists and assistants, before, during and after his GSC years. Jim Franklin marvelled at Don's organizational abilities in this regard – he would be working on a paper, be interrupted by some brash young scientist, sort the person out, pick up the pen and finish the sentence! It would take most others a day to pick up the "thread". Don was an outstanding Ph.D. supervisor, constantly probing hypotheses with pointed questions. He would give students considerable autonomy and not meddle in details, but laid bare any poorly supported conclusions. Serious discussions with Don invariably devolved into humour. A desk outside his door, termed his "farm system", kept students at bay until he had finished a task and then called them in. Don also taught many how to write in English, although Don complained he had to buy a new red pen each time a student gave him a draft. Many prominent scientists in universities and geological surveys around the world (e.g., many in Canada and at least four in Morocco) owe Don their start in geoscience.

Don gave freely of his time to family and friends, students and colleagues, and to his community. He was a volunteer Firefighter, Boy Scout leader, artisanal canoe builder, pig roaster, beekeeper, storyteller, hunter, backcountry canoeist, hiker and camper. He overcame major medical challenges: such as barely surviving a ruptured spleen and broken back, suffered in a helicopter crash, quadruple bypass surgery, years of dialysis, and fighting off blood infections. Don died peacefully in hospital, in Ottawa, Canada, on December 28, 2018. He is survived by his wife of more than 50 years, Eleanor (née Doherty), his children Vicki Williams (Michael), Cameron (Alicja), Sharon and Geoffrey, his grandchildren Lewis and Sonia, his sister Janet Bourgeau (late Angus) and his brother James Sangster. To the end, Don provoked, innovated and was incredibly precise and productive in whatever he did. All who knew him enjoyed his dry wit, his easy manner and his genuine warmth. We shall miss him greatly.

Charlie Jefferson, with Georges Beaudoin,
Alex Brown, Jim Franklin, Tom Frisch, Beth McEwen
and Bill Poole

Mount Ruapehu from the Taupo Volcanic Zone on the North Island of New Zealand. See VIP Division, p.17.
Photo supplied by Donnelly Archibald

Events and Happenings

Atlantic Geoscience Society Colloquium 2019 in Fredericton

The 45th Colloquium and Annual General Meeting of the Atlantic Geoscience Society was held at the Fredericton Inn, Fredericton, New Brunswick, on February 8 to 9, 2019. A full and diverse program was enjoyed by 180 participants, pushing the boundaries of geoscience in all its branches. As usual, the event was well attended by industry, government and university participants, with several participants coming from Newfoundland, Ontario and New England. In spite of terrible weather conditions at the start of the conference, only four registrants were unable to attend, whether because of illness or cancelled flights. Generous financial support was received from several donors who are thanked for their willingness help maintain the Society's operations: New Brunswick Geological Surveys Branch, Nova Scotia Department of Energy and Mines, Engineers & Geoscientists New Brunswick, Osisko Metals, Trevali Mining Corp., Terrane Geoscience Inc., Quartermain Earth Science Centre, and UNB-Fredericton. The money generated by these donors ensures modest registration costs are maintained for the many students in attendance and provides a surplus that contributes toward the Society's many other activities.

Elisabeth Kosters (R) receiving the Laing Ferguson Award from incoming president Martha Grantham
Credit: Anthony Chu

This year's Colloquium started on the Friday morning with two well-attended half-day workshops: (1) Structural Controls on Gold Deposits by Stefan Kruse of Terrane Geoscience Inc., and (2) Creating beautiful, effective and reproducible graphics for geoscience using 'R', organized by Dewey Dunnington, former M.Sc. Geology and B.Sc. Environmental Science student at Acadia, now pursuing a Ph.D. at Dalhousie University. Poster displays started late Friday afternoon and remained available for view until late Saturday afternoon.

Three concurrent sessions ran on Friday evening: (1) a special session in memory of Trevor MacHattie focusing on mapping, petrology, geochemistry and mineral deposits; (2) Minerals, metals and fluids associated with granitoid rocks; and (3) Current research in Carboniferous geology in the Atlantic Provinces. Meanwhile, a very busy poster session was set up with 26 posters on display.

Saturday's events started early with concurrent sessions involving a special session in memory of Ron Pickerill on Paleontology and Sedimentology in Atlantic Canada, and sessions on Geohazards recent and historical, Earth Science outreach in the Atlantic Provinces, and general sessions on current research in the Atlantic Provinces.

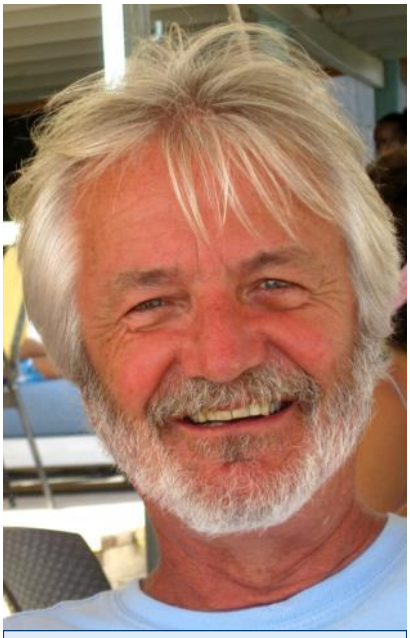
In addition to the papers and posters, a very successful outreach program was organized around the colloquium by Ann Timmermans and the Quartermain Earth Science Centre at UNB. The Earth Science café on

Tracy Webb

the Thursday evening before the colloquium attracted 90+ participants to learn about Mary Anning and the early days of paleontology. The Saturday outreach and education lectures had about 30 attendees dealing with topics as diverse as metamorphism of fossils in Ireland to a proposal for a regional Geology 101 textbook for the Maritimes. A Sunday teachers' workshop also brought in 12 participants. Clearly there is a desire to know more about Earth Science in Fredericton!

Saturday evening was the Awards Banquet and Social where, following dinner, the various AGS awards were presented in recognition of worthy student presentations and professional accomplishments. This conference always attracts many students and four student awards are made. Dylan Wyles (Acadia University) received the Rob Raeside award for the best undergraduate poster, Liam McNeil (UNB) received the Rupert MacNeill for the best undergraduate paper, Mehmut Memtimin (St. Mary's University) received the Graham Williams the best graduate student poster, and Mitch Kerr (St. Mary's University) received the Sandra Barr award for the best graduate student oral presentation. Thanks were also expressed to the small band of worthies who were responsible for organizing this year's event: Mike Parkhill and Jim Walker (NB ERD Bathurst office) who did the lion's share of organizing and abstract compilation, and Dave Lentz and graduate students at UNB who provided equipment and people-power for registration and book sales. All abstracts will be published in Atlantic Geology.

Three awards were made to AGS members to recognise their distinguished service to Earth Science and the Society. The Nelly Koziel Award was made to Tracy Webb, current chair of the AGS Education Committee. Tracy has been very active in the Society's education programs including the long-running EdGEO and has recently retired from high school teaching at Horton High School, Nova Scotia. She was about to depart for 4 months of Education intern supervision in China for Acadia University, so was unable to be present to receive the award. The Laing Ferguson Distinguished Service Award was made to Elisabeth Kosters in recognition of her many volunteer activities, including president of the Society (2012), board member of the Joggins Fossil Centre, former executive director of CFES, and prominent activist for all things geological. In her acceptance comments she announced the anticipated completion of a bronze statue and timeline in stone by Ruth Abernethy of Abraham Gesner, inventor of kerosene, to be erected at his birthplace in Chipman Corner, Kings County, Nova Scotia in the spring. The Gesner Medal and award for Distinguished Scientist was made to R. Damian Nance, Ohio University, in recognition of his many years of research in Atlantic Canada, including several terms at St. Francis Xavier University. Damian was on leave in Australia, so was unable to be present, but he sent an entertaining acceptance speech which was read by Sandra Barr, seconder of his nomination by Brendan Murphy for the award. The nominations for these awards can be found on the AGS website (atlanticgeosciencesociety.ca).



Damian Nance
Photo provided by Brendan Murphy

As usual when the geoscience population of the Maritimes region gets together, there is never enough time to squeeze in all the desired meetings and events. The Society held its council meeting and its AGM, where the new executive was appointed (Martha Grantham as president, Lynn Dafoe as past president, Dave Lentz as incoming vice-president, Rob Raeside as secretary, and Nikole Bingham-Koslowski as treasurer) and various subcommittees had a chance to hold face-to-face meetings. The Education Committee organized a very successful session and met to plan on-going activities. The Atlantic Geology editors met and displayed the entire 500-page edition of the Society's journal for 2018. The Science Atlantic (Earth Science) Committee met for the first time with its new chair, Jason Loxton, Cape Breton University. The local organizing committee for Halifax 2022 held its third meeting – the LOC is now about complete, and dates are set for 15-18 May 2022 in the new Halifax Convention Centre. And after the closing banquet, out came the music, which reportedly continued several hours past midnight. We'll do it again next year in Truro, Nova Scotia!

Rob Raeside
Acadia University

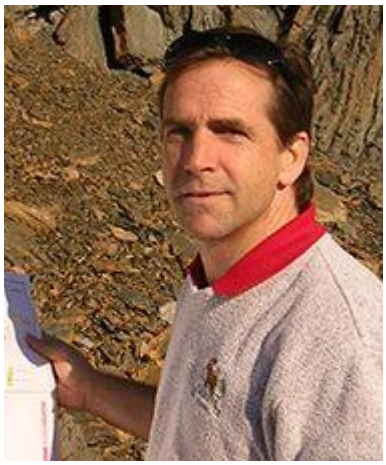
VIP Division of GAC

The Volcanology and Igneous Petrology (VIP) Division of the Geological Association of Canada is a professional organisation for volcanologists, igneous petrologists, and geologists who work on ancient volcanic and plutonic rocks. Members of the division receive the annual newsletter, *Ashfall,* with updates on members' activities, field trips, advertisements for conferences or student opportunities, and advances in volcanology and igneous petrology. We have 99 active members. Our division also presents four prestigious awards annually at the GAC-MAC meeting including a Career Achievement Award that is presented to a distinguished geoscientist for their contributions to the fields of volcanology and/or igneous petrology throughout their career. We have presented 20 Career Achievement Awards since 1993. We also award the Léopold Gélinas medals for outstanding Ph.D., M.Sc. and B.Sc. student theses. Visit our website (http://www.vip-gac.ca/About.html), Facebook (GAC-VIP Division) or Twitter (@gacvip) pages for more information.

John Greenough – Chair

John uses trace element concentrations and ratios, and in some case isotopes and geochronology, to study the petrogenesis of Earth, Lunar and Mars mafic rocks. Present emphasis is on formulating a unifying hypothesis to explain the origin and evolution of the mantle "components" seen in Oceanic Island basalts, and the signatures of basalts from the subcontinental lithospheric mantle. His trace element and exploratory statistical toolbox has also yielded publications on the trace element composition of native gold, evolution of the Martian mantle, the provenance of archaeological lithic artifacts, and the natural and anthropogenic origins of trace element patterns in agrifood products (wine and maple syrup). The most-recent research utilizes microanalytical data from the UBC Okanagan FiLTER (Fipke Laboratory for Trace Element Research) facility.

David Lentz – Vice chair



Dave's research focuses on the petrogenesis of ore deposits. He and most of his graduate students are interested in high-T magmatic hydrothermal systems, although Dave himself is also working on IOA-IOCG systems, and peralkaline magmatism and related mineralization.

Donnelly Archibald – Secretary

Donnelly focuses on the relationships between magmatism and tectonics, using both field studies, lithogeochemistry and petrochronology (how rocks and minerals grow with time). He is currently working on plutonic rocks that comprise the classic Donegal Batholith in Ireland. However, he also studies any kind of rock or mineral (e.g., detrital minerals or metamorphic rocks) to answer important geological questions.

James Braid – Treasurer

Jamie's research focuses on the tectonic processes associated with the origin of mountain belts and more specifically the first-order orogenic processes related to the final stages of supercontinent amalgamation. He is particularly interested in the formation of the supercontinent Pangea, the Late Paleozoic Appalachian -Variscan orogenic belts of eastern North America and Western Europe that record its formation as well as modern tectonic environments that record analogous processes.

Melissa Anderson – Outreach coordinator

Melissa's research examines hydrothermal vent sites on the seafloor, known as seafloor massive sulfide (SMS) deposits. These deposits are the modern analogs for ancient volcanogenic massive sulfide (VMS) deposits that are mined on land. She focuses on regional metallogenic studies that explore the relationships between regional geodynamics, crustal accretion processes, and hydrothermal activity in order to understand the fundamental geological controls on the size, location, and composition of these deposits.

Matt Manor – Student councillor

Matt's research interests are focused in the fields of igneous petrology, geochemistry, and geochronology to solve problems related to mineral deposit formation and tectonics. This involves mineral-scale and whole-rock techniques to provide insight into volcanic and plutonic processes, and the link between them, within a variety of tectonic settings in southern British Columbia and Yukon, Canadian Cordillera. Recent research has also allowed development of new workflows for determining the importance of magma petrogenesis in the formation of VMS deposits in the Yukon.

Peter Hollings – Website and past-chair

Peter's research focuses on the link between igneous petrology and ore deposit genesis, utilizing geochemistry to understand the evolution of magmatic systems prior to mineralisation. He has worked extensively in porphyry systems but has also looked at Archean orogenic gold deposits, VMS and Ni-Cu-PGE. His research also involves trying to understand the genesis of the Midcontinent Rift and the nature of Archean plate tectonics.

Peter Hollings standing at the site of the 1783 Laki fissure eruption in Iceland, 2015

Medals and Awards

The 2019 Logan Medal is awarded to
La médialle Logan 2019 est décernée à

Dr. CEES VAN STAAL

Geological Survey of Canada
Commission géologique du Canada

"For achieving unprecedented resolution in orogenic analysis, through integrated structural, stratigraphic and metamorphic geology; mafic and felsic rock geochemistry; high-precision geochronology; seismic sounding; and comparison with active Circum-Pacific tectonics, as applied to the Canadian Appalachian orogen and its extensions."

The 2019 Hutchison Medal is awarded to
La médialle Hutchison 2019 est décernée à

Dr. BRIAN KENDALL

University of Waterloo

"For the application of unconventional geochemical and isotopic techniques to address questions related to interactions between atmospheric, oceanic, and biological systems; geochronology; and the geochemical evolution of Earth from the Proterozoic to Cenozoic."

The 2019 Ambrose Medal is awarded to
La médialle Ambrose 2019 est décernée à

Dr. CAROLYN ANGLIN

Imperial Metals Corporation

"For her outstanding contributions to the scientific management of public- and private-sector geoscientific research and development, and for her long-term volunteer contributions to Canadian geoscientific organizations, including the Geological Association of Canada."

The 2019 Neale Medal is awarded to
La médialle Neale 2019 est décernée à

BETH McLARTY HALFKENNY

Carleton University

"For her continued outstanding efforts to communicate and explain geoscience topics through professional development workshops for teachers, educating students in elementary and secondary schools, and organizing and promoting outreach events for the public."

GAC®-PDAC
Logan Student Prize Winners

Congratulations to the 24 recipients of the fifth annual *GAC®-PDAC Logan Student Prize.*

- Ashton Baich, Acadia University
- Taylor McPherson, Brandon University
- Juan Chavez, Dalhousie University
- Louis Sautelli, Lakehead University
- Gerald Broughton, Laurentian University
- Maude Lemieux-Dion, McGill University
- Jacob Newman, Memorial University
- Shelby Austin-Fafard, Mount Royal University
- Hudson Sottin, Polytechnique Montréal
- Diana Ojeda Aldana, Simon Fraser University
- François Fournier-Roy, Université Laval
- Kelsey Bulbuc, University of Alberta
- Renée Larsen, University of British Columbia, Okanagan
- Dominick Mallette, University of Calgary
- Myléne O'Brien, University of Ottawa
- Rae Lyn McClintock, University of Regina
- Lyndsay Hauber, University of Saskatchewan
- Colin Roth, University of Toronto
- Chloë Immonen, University of Victoria
- Quinn Worthington, University of Waterloo
- Remy Klick, Western University
- Matthew Day, University of Windsor
- Roxane Tremblay, Université du Québec à Chicoutimi
- Jeremie Langlois, Université du Québec à Montréal

The prize is awarded annually to one undergraduate student at each CCCESD-member department. The award has a monetary prize component, a one year memberships to both GAC® and PDAC, and recognition in the form of a certificate.

The selected students are expected to be academically sound, have good leadership skills (e.g., as they pertain to organizing field trips, geology club geo-events, etc.), and have done well at field school or otherwise show proficiency in field techniques. The prize recognizes students who are leaders and participate in advancing the study and application of geoscience. Students are usually in their final (i.e., graduation) year.

Jeremie Langlois, 3rd year geology student at UQAM, receiving the GAC-PDAC Logan Student Prize certificate.
L-R: Normand Goulet (campus faculty representative), Alain Tremblay (professor and director of the Department), Jeremie Langlois, and Stephane de Souza (professor)

Logan Student Prize winner Matthew Day being presented with his award certificate by Ihsan Al-Aasm, University of Windsor.

GeoFact: *Mar 07 1785: First presentation of James Hutton's theory of the earth to the Fellows of the Royal Society of Edinburgh. This was the first of two linked lectures.*

GeoFact: *Apr 04 1785: Presentation of the second lecture prepared by James Hutton to the Fellows of the Royal Society of Edinburgh. The lecture continued his views 'Concerning the System of the Earth, Its Duration, and Stability'.*

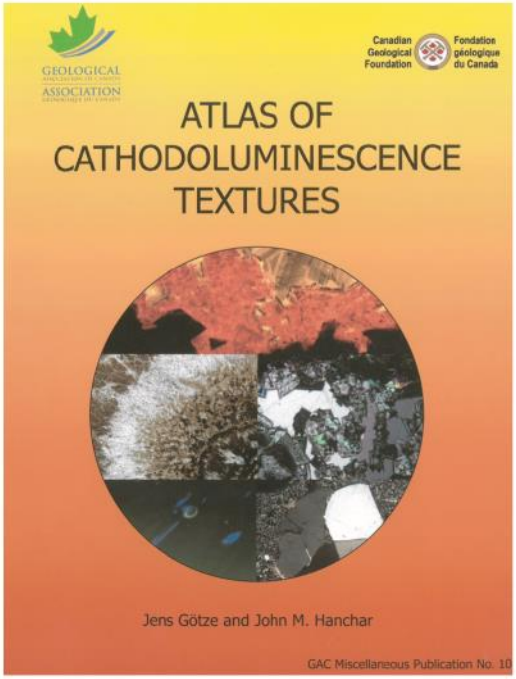
Ashton Baich (R) receiving her Logan Student Prize certificate from Sandra Barr at Acadia University

Colin Sproat presenting the Logan Student Prize certificate to Lyndsay Hauber at the University of Saskatchewan

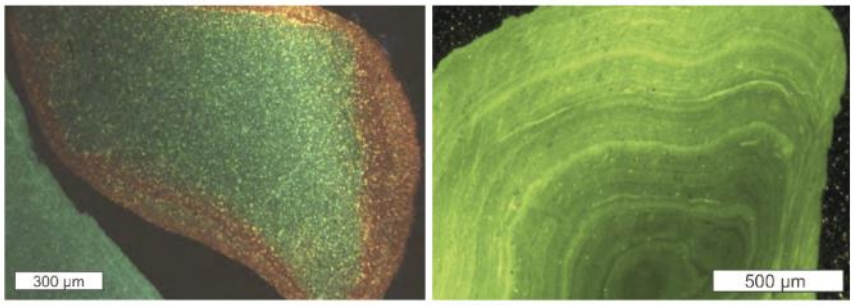
New Geological Association of Canada Publication!

GAC Miscellaneous Publication No. 10: Atlas of Cathodoluminescence Textures

by
Jens Götze and John M. Hanchar



The authors have worked extensively with cathodoluminescence techniques for more than two decades. The material presented in this atlas should help both beginners and experts in the field of luminescence to understand the physical background and principles of cathodoluminescence.



The nine chapters of this atlas illustrate cathodoluminescence properties of selected minerals and rocks, the internal cathodoluminescence textures in minerals, rocks and synthetic materials, and their interpretation for different applications in the geosciences.

Price: $75.00

GAC members: $41.25

https://gac.ca/publications/bookstore/

ISBN: 978-1-897095-86-7
ISSN: 1706-936x

Announcements

Association of Earth Science Editors 53rd Annual Meeting Regina, Saskatchewan

September 4 to 7, 2019

The 53rd annual meeting of the Association of Earth Science Editors will take place in Regina, Saskatchewan, September 4 to 7, 2019. AESE meetings are a wonderful way to learn about earth science editing, publishing and communication. Our meetings, generally small in size, consist of two days of technical sessions and a one -day field trip, and provide an unparalleled opportunity to network with other editors, publishers, educators and others working in the earth sciences.

Nicknamed 'The Queen City', Regina is the capital of the province of Saskatchewan, one of the three 'Prairie Provinces' in Canada. Settled in 1882, Regina was originally called 'Wascana', a Cree term meaning 'Pile of Bones'. Located roughly in the centre of the North American continent, Regina is like an oasis of trees, people and buildings in the heart of the Canadian prairies. With a population of over 230,000, it is the second-largest city in Saskatchewan, and a cultural and entertainment destination for many in this part of the province. Wascana Centre, the Royal Saskatchewan Museum, the RCMP Heritage Centre, and the iconic Legislative Building are just a few of the city's attractions.

The meeting is open to anyone interested in earth science editing, publishing and outreach. The program is in the initial planning stage, but meeting information is now available on AESE's web page www.aese.org. A Call for Abstracts will be issued mid Spring. We hope you'll join us for what promises to be a great meeting.

For more information, please contact meeting host Heather Brown (Saskatchewan Geological Survey), heather.brown4@gov.sk.ca, or acting Chair of the Technical Program Committee Karen MacFarlane (Yukon Geological Survey), Karen.MacFarlane@gov.yk.ca

The Saskatchewan Legislative building, lit up for the evening, is reflected in the surface of Wascana Lake against the backdrop of a typical Prairie sunset.
Photo courtesy of Tourism Regina

Regina's downtown core: a vibrant mix of the historical and the modern.
Photo courtesy of Tourism Regina

GeoFact: *Mar 22 1785: Adam Sedgwick, Woodwardian professor of geology at University of Cambridge for 55 years (1818 until his death in 1873), born in Dent, Yorkshire, England.*

GeoFact: *Jan 18 1778: George Bellas Greenough born in London, England. Greenough was a founding member and the first president of the Geological Society.*

AGC-AMC-AIH
QUÉBEC 2019
Où les géosciences convergent
12-15 mai 2019

GAC-MAC-IAH
QUÉBEC 2019
Where geosciences converge
May 12-15 2019

www.gacmac-quebec2019.ca

L'Association géologique du Canada (AGC), l'Association minéralogique du Canada (AMC) et la section nationale Canadienne de l'Association internationale des hydrogéologues (AIH/SNC) vous invitent cordialement à vous joindre à eux pendant la conférence AGC-AMC-AIH/SNC, qui se tiendra du 12 au 15 mai 2019 dans la ville historique de Québec, site du patrimoine mondial de l'UNESCO. Les participants auront l'opportunité de visiter et vivre le charme et l'hospitalité de cette merveilleuse ville ainsi que d'explorer ses nombreux sites naturels avoisinants.

Sous la bannière "Où les géosciences convergent", le comité organisateur tient à promouvoir la collaboration et les échanges stimulants entre géologues, minéralogistes, pétrologues, hydrogéologues, géophysiciens et géochimistes. La conférence mettra l'emphase sur les thèmes suivants:

- Géosystèmes et hydrogéosystèmes;
- Ressources minérales, énergie et environnement;
- Science des données en géoscience;
- Géosciences et société

Sessions générales incluant:

- Minéralogie et cristallographie;
- Pétrologie ignée et métamorphique;
- Sédimentologie, stratigraphie et paléontologie;
- Géophysique;
- Géologie structurale et tectonique;
- Hydrogéologie générale;
- Géologie glaciaire et géomorphologie au Canada.

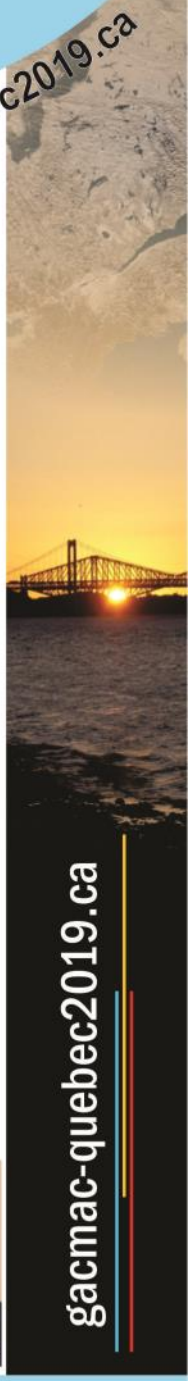
The Geological Association of Canada (GAC®), the Mineralogical Association of Canada (MAC) and the Canadian National Chapter of the International Association of Hydrogeologists (IAH/CNC) invite you to join them at the joint GAC–MAC–IAH/CNC meeting from May 12th to 15th 2019 in historic Québec City, a UNESCO World Heritage site. Participants will have the opportunity to visit and discover the warmth and charm of this beautiful city and to explore its many attractive nearby natural sites.

Under the theme "Where Geosciences Converge", the organizing committee wishes to promote collaboration and stimulating discussions among geologists, mineralogists, petrologists, hydrogeologists, geophysicists and geochemists. The conference will highlight the following themes:

- Geosystems and hydro-geosystems;
- Resources, energy and environment;
- Data science for geosciences;
- Geosciences and society

General Sessions including:

- Mineralogy and crystallography;
- Igneous and metamorphic petrology;
- Sedimentology, stratigraphy and paleontology;
- Geophysics;
- Structural geology and tectonics;
- General hydrogeology;
- Glacial geology and geomorphology in Canada.



SÉANCES PLÉNIÈRES/PLENARY SESSIONS

Dr. Barbara Sherwood Lollar	"Subsurface Habitability in the Earth's Deep Hydrosphere: Implications for Planetary Science and Astrobiology"
Mr. Darrell Beaulieu	"A Dene perspective on resource development in Canada for, by and among First Nations"
Dr. Guy Desharnais	"How BIG Data is changing Mining"

JE VEUX PARTICIPER!

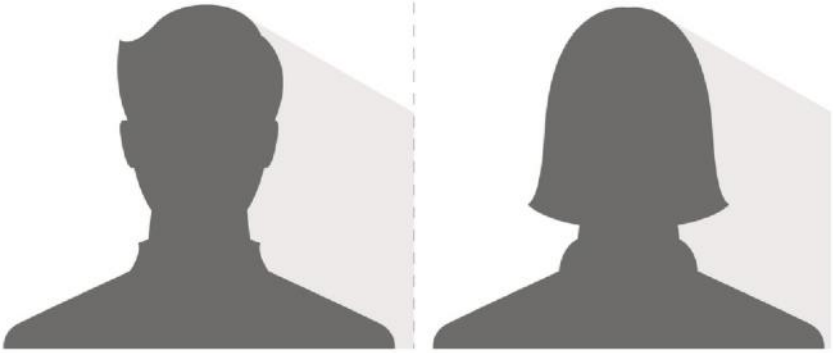
Ouverture des inscriptions : 1er mars 2019

I WANT TO ATTEND!

Registration opens: March 1st, 2019

WANTED

Geological Association of Canada
Book Editor



Qualifications

- broad knowledge of Canadian geoscience & geoscientists
- strong publication record
- demonstrated editorial skills

A dedicated, volunteer GAC Book Editor was established in 2005. The editor is responsible for managing the scientific editorial process for all publications and for editorial liaison with co-publishers. The GAC Editor is a volunteer position, intended to facilitate the publication process. The overall role is to maintain liaison with the editor(s) (or lead authors for single articles), and co-publishers, if applicable, of publications (excluding GEOLOG and Geoscience Canada) after they have been identified as potential GAC publications, during their acceptance process, and (after acceptance) during the reviewing process.

Responsibility for scientific quality of the publication, however, continues to rest in the hands of the editor(s) or lead author. Throughout this process, the GAC Editor maintains communication with GAC Council regarding the progress of publications through the editorial and publication process.

Are *YOU* the person we are looking for?

To volunteer, or for further information, contact: Sandra M. Barr
sandra.barr@acadiau.ca

Howard Street Robinson Fund

The Robinson Fund was established in 1977 by the Geological Association of Canada, using a bequest from the estate of Howard Street Robinson. The fund is dedicated to the furtherance of scientific study of Precambrian Geology and Metal Mining by:

- sponsoring an annual Distinguished Lecturer Tour whose focus alternates between Precambrian research and economic geology (lecturer alternately chosen by the GAC®'s Precambrian and Mineral Deposits divisions)
- supporting Special Projects including publications, symposia and conferences.

Proposals for special projects on Precambrian Geology or Metal Mining should be submitted to the Robinson Fund Committee. Projects should be sponsored or organized through the GAC® or one of its Divisions or Sections. Proposals that have a wide appeal or degree of accessibility to the GAC® membership are preferred.

For further information and proposal submissions, please contact: Dr. Stephen Piercey, Chair, Robinson Fund, c/o Department of Earth Sciences, Memorial University of Newfoundland, St. John's, NL A1B 3X5 Canada, E-mail: spiercey@mun.ca

Boulders at foot of Jonas Slide, Jasper National Park, 2008

Information for Contributors

Contributions should be submitted by e-mail to Alwynne.Beaudoin@gov.ab.ca, with GEOLOG in the subject line. Contributions are welcome in either of Canada's two official languages. MS Word (.doc or .docx) is the preferred format for contribution but generic word processing (.rtf or .txt) files are also fine. Please do not submit PDF files. Up to four hi-res images may be submitted per contribution: preferred format is .jpg, RGB colour, with a minimum 300 dpi resolution at 5" x 3" size. Please ensure that images are cropped and colour-corrected, and provide a caption for each image, and an image credit line if needed. Contributors are responsible for securing permission to publish for any third-party images or images of living recognizable people. Diagrams (vector graphics) may also be submitted. Preferred format for graphics is Adobe Illustrator (.ai); make sure that the file is saved with "save text as lines" option enabled to ensure no font substitutions. Additional information on other file formats can be obtained from the Editor. Please do not embed images or graphics in your text document; images or graphics should be submitted as separate files. In your text, use a call-out in parentheses to indicate the approximate placement of each image and graphic. If files are larger than 10 mb, please contact the Editor for alternate delivery arrangements. Your contribution will be copy-edited to ensure consistent spelling and orthography and to correct any obvious typos or errors. Contributions may also be edited for clarity and length. If the Editor has questions about specific information in the text, she will contact contributors for clarification. Contribution deadlines are March 1, June 1, September 1 and December 1.

Consignes aux auteurs

Les contributions d'auteur doivent être soumises par courriel à Alwynne.Beaudoin@gov.ab.ca, en indiquant GEOLOG à la rubrique Objet. Les articles seront acceptés dans l'une des deux langues officielles du Canada. Les fichiers de format MS Word (.doc ou .docx) sont préférables, mais les formats génériques (.rtf ou .txt) sont aussi acceptables. Veillez ne pas soumettre de fichiers au format PDF. Par article, jusqu'à quatre images haute résolution peuvent être soumises; format préféré est .jpg, couleurs RVB, avec un minimum de 300 PPP en taille 5 po x 3 po. Veillez vous assurez que les images sont recadrées et leurs couleurs corrigées, qu'elles sont accompagnées d'une légende ainsi que des informations de référence le cas échéant. Il est de la responsabilité des auteurs d'obtenir la permission de publier toute image de tiers ou de personne reconnaissable. Des diagrammes (graphiques vectoriels) peuvent également être soumis. Le format préféré pour les diagrammes est celui d'Adobe Illustrator (.ai); assurez-vous que le fichier est sauvegardé avec l'option « Sauvegarder le texte comme ligne » activée pour éviter toute substitution de police de caractère. On peut obtenir des informations sur d'autres formats de fichiers en communicant avec l'éditrice. S'il vous plaît ne pas incorporer d'images ou de graphiques dans votre texte; ces images ou graphiques doivent être soumis sous forme de fichiers distincts. Dans votre texte, veillez utiliser des notes numérotées entre parenthèses pour indiquer l'emplacement approximatif de chaque image et graphique. Dans le cas de fichiers dépassant 10 Mo, veuillez contacter l'éditrice pour convenir des modalités de téléchargement. Vos articles seront révisés afin d'en assurer la cohérence orthographique et corriger les fautes de frappe ou erreurs évidentes. Les articles pourront aussi être corrigés pour plus de clarté et éviter des longueurs. Dans les cas où l'éditrice aurait besoin d'informations particulières concernant le texte, elle communiquera avec les auteurs. Les dates limites pour soumettre des articles sont le 1 mars, le 1 juin, le 1 septembre et le 1 décembre.