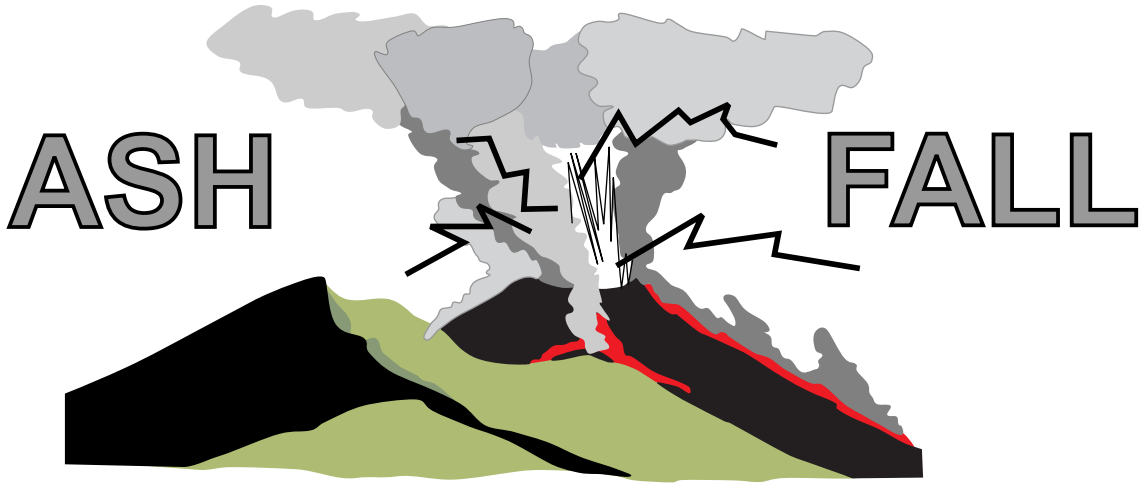


Newsletter of the Volcanology and Igneous Petrology Division
Geological Association of Canada

No. 81 December 20, 2018

In this issue

A message from the VIP Chair

The 2018 year was one to remember for the Volcanology and Igneous Petrology Division of GAC. It started with the publication of "Perspectives on lithospheric evolution through tectonomagmatic processes: a volume in honour of Jaroslav Dostal" in International Journal of Earth Sciences. If you have not yet gotten your hands on it, the opening overview article gives perspectives on the numerous excellent research papers in the volume:

Shellnutt, J.G., Murphy, J.B., Greenough, J.D. and Keppie, J.D. 2018. Perspectives on lithospheric evolution through tectonomagmatic processes: a volume in honour of Jaroslav Dostal - an introduction. International Journal of Earth Sciences (Geol Rundsch) 107, pp. 781-785.

This article and volume honours one of Canada's greatest petrologists, and a long-standing GAC and VIP supporter. In fact, Jarda continues to make major contributions. He is spearheading publication of the Igneous Rock Associations series articles in Geoscience Canada (the premiere GAC journal).

New papers include, “Experimental Petrology: Methods, examples and applications” by Cliff Shaw (published), “The Bushveld Complex, South Africa: New Insights and Paradigms” by Stephen Prevec (in press), “Carbonatites - an overview” (accepted pending revisions) and articles on Andean volcanism, S-type granites, Basaltic meteorites and MORB, in advanced stages of preparation. Hats off to *Jarda!*

There is a reminder in this Ashfall issue of the upcoming (January) nomination deadline for the VIP Career Achievement Award and slightly-later nomination deadlines for our Gold, Silver and Bronze (Ph.D., M.Sc. and B.Sc.) best-thesis awards. I did not try to assemble statistics, but qualitatively, the number of nominations for all of our awards has been increasing; a testament to how prestigious they are. Related to this, like GAC memberships, VIP membership numbers were declining, but there has been a monumental turn-around. Between January 2017 and July 2018, we saw a 33% increase in VIP memberships! From my perspective, several things have contributed to this remarkable increase; 1) the incredible job Donnelly Archibald (VIP Secretary) has done with Ashfall and communication with our membership via e-mail, 2) Melissa Anderson's VIP social media initiative, which was so successful that we added her to the executive as our Communications Officer; and 3) the July 2018 addition of Matthew Manor as the VIP student representative. He has been making a major contribution to the VIP social media initiative. Read in this issue of Ashfall about how VIP is using social media to connect with young geoscientists.

We faced a major challenge this year related to continued awarding of our 4 annual VIP medals. The decline in memberships and cost of re-stamping medals for two of our awards over the past two years left us in a compromised position to have new Gold and Silver Medals stamped for the awards to be made at the June GAC-MAC meeting in Vancouver. On the recommendation of some GAC friends, we prepared a proposal (November 2017) for help from the Canadian Geological Foundation. I am thrilled to tell you that CGF completely supported our request for $2038.40, and made an award from the Jérôme H. Remick III Endowment Trust Fund. I express my appreciation to CGF executives Jane Wynne, Kevin Ansdell, Alana Hinchey, and Eileen van der Flier-Keller for their help and support of our initiative.

I want to remind everyone to attend the annual GAC-MAC conference, Quebec 2019, in Quebec City from May 12 to 15, 2019. Abstracts can now be submitted and the abstract submission deadline is 9 AM, Eastern Standard Time, on January 28th, 2019. We will have VIP-sponsored sessions, the awarding of our four VIP medals, and the annual VIP meeting. Given our rising membership, I am hoping for a crowd at the VIP meeting that parallels the attendance we had circa 2005 and 2008 when Jarda Dostal and Sandra Barr received their Career Achievement Awards. If anyone has some ideas for how we can make the annual meeting particularly relevant to the droves of young scientists joining and following VIP on social media, I would appreciate suggestions (e-mail me: John.greenough@ubc.ca).

Finally, thanks for supporting the Volcanology and Igneous Petrology Division of GAC, and for making volcanic and igneous rocks an important part of your personal, social and professional lives. They will, and we will, rock you!

John Greenough (2017-2018 VIP Chair)

Career Achievement Award

The Volcanology and Igneous Petrology Division of the Geological Association of Canada in recognition of career achievements in the field of volcanology and/or igneous petrology present the Career Achievement Award. Candidates are judged on their lifetime scientific contributions.

Dr. Roger Mitchell for his lifetime scientific contribution to the fields of Volcanology and Igneous Petrology

Nomination Letter

I am delighted to write on behalf of Dr. Roger Howard Mitchell in support of his nomination for the prestigious 2018 Volcanology and Igneous Petrology Division Career Achievement Award. Roger has led a fascinating career and is very deserving of this nomination.

Roger began his research career in 1972 at Lakehead University, where he remains today as an active member of our department. He's currently an editor for Mineralogical Magazine, a member of the International Kimberlite Committee, continues to supervise MSc research, and every Wednesday you'll find him in the Scanning Electron Microscope Facility here at Lakehead, searching for new minerals and textures in some of the most exotic rocks on the planet.

I first met Roger in the summer of 2001, arriving to Lakehead University to start my M.Sc. Carbonatite research under his supervision. Roger was a strict supervisor, however, he was always available when I had questions and concerns, and was always helpful and encouraging. I was invited to participate on all field trips and property tours, and there were plenty! Along with some undergraduate thesis students, we toured and hiked much of Northwestern Ontario. He introduced us to other geologists that were working on REE exploration projects in the area, and allowed us to take on a few short work contracts to gain some experience. Following my thesis defense, he encouraged the preparation of a manuscript and funded a trip to the 2003 GAC-MAC meeting in Vancouver. I distinctly remember a conversation we had about the importance of attending these meetings, where it was valuable for me to present my MSc research and meet other researchers, but also for exposure of other research programs and disciplines. He's always interested in a wide variety of different topics related to the geosciences. Perhaps this is one of the reasons he has been so successful in his own research. He has always made it a priority to have his students experience these types of meetings.

This eventually led to my interests in Kimberlites, where I ended up at the University of Alberta for the PhD program. Roger always kept in contact through the years. Returning to Thunder Bay in the Fall of 2009 following the completion of my Ph.D., I began some Post Doctoral research with Roger at Lakehead. He encouraged me to complete the manuscripts from my Ph.D. that had been partially abandoned and put on hold. My family life had taken over and I was battling the work-life balance issues that many academics are faced with during their careers. Roger constantly encouraged me to carry on. He had published over 200 papers at this point in his career, but somehow understood that I didn't have the time to work on my third paper. Many colleagues haven't seen this side of Roger. He understood that there were days that I couldn't make it into work, where my children were priority and my attention was with them. Both Roger and his wife, Valerie, were so encouraging

over the last ten years. He has been very supportive from the beginning of this endeavor, and I will always be grateful for this. We have co-supervised a few H.B.Sc. research projects and a M.Sc. student whom has just completed his degree and accepted a position with Lac des Iles Pt-Pd Mine as an Exploration geologist. This has all been particularly helpful, as I've found the supervision of students to be one of the more challenging aspects of the position.

He has opened up his research lab to both myself and others within my research group. I am thankful for his continued support as I begin to develop my own research career. This past fall, Roger taught a section of our field school for the fourth year undergraduate students, and many of the students approached myself and other faculty members after the field school was complete, commenting on how much they learned and enjoyed Roger's three days with them. One of them commented "I had no idea that syenite could be so cool!" If I can come back someday to teach an undergraduate field school when I'm seventeen years past my retirement, and have students enjoy the experience as much as they did, I'd be quite pleased!

He has impacted many others throughout the years in a similar manner, and this is shown in the success of his past graduate and post-doctoral fellows. This success includes many Geological Survey of Canada and Ontario Geological Survey geoscientists, many well-known and respected exploration geoscientists, and distinguished faculty across Canada, including Dr. Anton Chakmouradian, of the University of Manitoba. In a separate nomination letter, Dr. Chakmouradian highlights Roger's many accomplishments over the years with regards to his research and his astounding contributions to mineral sciences. His contribution to kimberlite and alkaline rock research, materials sciences, mineralogy, carbonatite research and experimental petrology is phenomenal, and this breadth of research is undeniably substantial. Further to this, I believe a Career Achievement Award should also represent the impact the candidate has had on the research careers of those around them. Roger meets all of the values behind this Career Achievement Award, from his contributions to science, to his impact on the research careers of others, and to those who he has taught during his career.

Shannon Zurevinski
Lakehead University

Nomination letter

It is my great honour and privilege to provide a letter of support for the nomination of Professor Emeritus Roger Howard Mitchell for the VIP GAC Career Achievement Award. I have known Roger for 24 years and of the many exceptional Canadians working in the fields of volcanology and igneous petrology, cannot think of a better candidate for this Award.

Roger immigrated to Canada from England in 1966 to pursue his graduate studies at McMaster University and has since gone on to have an illustrious academic career. In the minds of petrologists around the world, his name has become inseparable from kimberlite and carbonatite research. However, Roger's contributions to Earth Sciences extend far beyond these exotic rock types.

His doctoral research at McMaster was focused on variations in the isotopic composition of kimberlites and carbonatites. Beyond their practical significance as primary sources of diamonds and critical metals, respectively, these rocks are an invaluable source of information about the Earth's mantle, but virtually nothing was known about the isotopic composition of kimberlites and carbonatites in the late 1960s. Roger's doctoral research not only set the tone for much of his subsequent career, but also established him as a true pioneer who was not afraid of challenging conventional wisdom. Using highly precise measurements, Roger conclusively showed that the previously proposed models of kimberlite contamination by crustal Sr were untenable and that these magmas formed by partial melting of compositionally unusual peridotites. While at McMaster, Roger also pioneered the application of isotopes to deciphering relations between carbonatites and various alkali silicate rocks found in the same geological setting. This work (Mitchell & Crocket, 1971, 1972) effectively paved the way for isotope geochemists that entered the field of mantle petrology in the 1970s.

Following his graduation, Roger spent two very productive years as a post-doctoral fellow at the Universities of Alberta and Oslo, which resulted in several high-profile publications addressing isotopic variations in the Mountain Pass rare-earth carbonatite and re-appraising the origin of kimberlites. Already these early publications reflect the diversity of Roger's research interests, spanning from specific rock types and their constituent minerals to petrologic problems of global significance.

In 1972, Roger was appointed Assistant Professor at Lakehead University, where he quickly rose through the ranks to Professor of Geology (1980) and firmly established himself as the world's foremost authority on small-volume mantle-derived rocks. His research in this area has been so incredibly diverse in scope and has such far-reaching implications that it is impossible to pigeonhole it as purely petrological, geochemical or mineralogical. Roger's work teaches the importance of studying rock microtextures and individual minerals to the understanding of macro-scale igneous processes, and the critical role of experiment in the understanding of petrographic observations.

Throughout his career, Roger has contributed to the development of analytical and experimental facilities at Lakehead University, including the establishment of radiochemistry laboratory (1973), acquisition of a gamma-ray spectrometer (1980), nuclear multichannel analyzer (1985), energy dispersive analytical system (1993), synthesis and X-ray diffraction instrumentation and software (late 1990s). He was also instrumental in securing funding from Kennecott Canada for the purchase of a state-of-the-art environmental electron microscope. It is important to note here that this equipment was (and some of it still is) available to anyone who had a practical use for it, and not just Roger's group. For example, the environmental electron microscope at the Lakehead University Centre for Analytical Services was, for many years, the workhorse of geological, chemical, engineering and forestry research and an invaluable tool in student training across these disciplines.

One of Roger's greatest strengths as an academic is his continuing commitment to student training and mentorship. He has always encouraged his students to take active part in lab work and data interpretation. This is best illustrated by the fact that about one-third of Roger's peer-reviewed publications are co-authored by his students and postdoctoral fellows. Over the course of his career, he supervised 35 theses and four postdoctoral fellows, inspiring many of his students to pursue an academic career of their own. His impressive teaching portfolio includes 15 undergraduate and three graduate courses ranging from introductory-level Geology and Palaeontology to Advanced Mineralogy and Igneous Petrogenesis.

Roger's contribution to Canadian and international geosciences is by no means limited to the ~240 journal papers and monographs. He has served on numerous professional committees under the auspices of federal and provincial granting agencies, and the Mineralogical Association of Canada (as its President in 1996-1997 and in various other functions before and after), meeting organizing committees (including, notably, the International Kimberlite Conference), and editorial panels – most recently, as Principal Editor of Mineralogical Magazine (since 2010), Associate Editor of Lithos (1996-2010), Canadian Mineralogist (1998-2001), and Guest Editor of special journal issues and conference proceedings on kimberlites (1996, 2004, 2007), carbonatites (2008) and alkaline rocks (1996). At Lakehead, Roger served as Chairman of the Department of Geology (1982-1988), as well as on several Senate, presidential and departmental committees, focusing on the promotion of research and University graduate program.

To summarize, Roger Mitchell is a towering figure in kimberlite and carbonatite research, whose authority in these fields is recognized far beyond Canada's borders and whose expertise is sought internationally. He has made a lasting impact on our understanding of continental magmatism, and of the role of isotopes and accessory minerals in petrogenetic analysis. Throughout his career, he has generously shared his knowledge with his students and colleagues, and remained an outstanding member of the Earth Science community both in Canada and internationally.

Anton R. Chakhmouradian
University of Manitoba

Roger accepting his Career Achievement Award from VIP Past-Chair Peter Hollings

Acceptance letter

I would like to thank the Volcanology and Igneous Petrology Division of the GAC for their recognition of my mineralogical and petrological work. I am honoured to accept this award, I thank all those who nominated me, and for considering that my work has been of value to the mineralogical and petrological communities.

My interest in alkaline rocks was sparked during my undergraduate years at Manchester University where Prof. Mackenzie introduced me to this branch of petrology, which was then, and still is, considered "obscure" by many petrologists. The rocks were complex in their mineralogy and composition and presented a challenge in both characterization and classification. The fact that many were bedevilled with strange type locality names added to my interest as I thought this was an untenable situation for modern petrology.

Developments in analytical methods, which I believe stemmed essentially from the lunar science programs of the 1960s and 70's, enabled me to make advances in the study of alkaline rocks;. in particular, electron microprobe analysis and scanning electron microscopy coupled with quantitative X-ray spectrometry and BSE-imaging. Without such micro-electron beam methods of analysis it is simply not possible to investigate alkaline rocks. I certainly benefited a great deal from the use of the lunar science-funded electron microprobe at Purdue University that had been awarded to my late colleague - Henry Meyer.

Much of my work has involved detailed mineralogical studies that at first sight appear to have only academic value. However, I have always tried to emphasize their economic potential. One particular case was the development of mineralogical criteria using spinel compositions for the recognition of bona fide kimberlites and their discrimination from non-diamondiferous modally similar rocks. One important example of mineralogical technology transfer was my complete revision of the nomenclature of lamproites using a typomorphic mineralogical-genetic classification. These rocks were commonly perceived to have no interest or value to the wider petrological and economic geology communities, yet the discovery, by chance, that they contained diamonds led to a revolution in the exploration for diamond deposits using my mineralogical methods.
Recently, the search for "critical metals" such as Nb, Ta, and the REE, revived interest in carbonatites - another area of petrology in which I have worked extensively. Again, my apparently 'academic' studies were shown to have real economic value.

Regarding, these rocks, some of my most petrologically important and exciting work has been on the unique active carbonatite volcano, Oldoinyo Lengai (Tanzania). For a carbonatite petrologist to camp - and live for week in the active crater of this volcano - the only known example of its type in the world - is the nearest thing to NIRVANA!

Apart from my studies of alkaline rocks my colleagues, Anton Chakhmouradian and Ruslan Liferovich and I have also made many contributions to the solid-state chemistry community by studies of perovskite group minerals and compounds. I believe that mineralogists and solid state chemists have much to learn from each other, as we use the same analytical techniques, and that a symbiotic relationship will lead to greater understanding of the genesis and crystal structures of many minerals.

From the above it should be apparent that I consider that petrological taxonomy is not an ivory tower pastime and that basic curiosity-driven research, for which applications are not immediately obvious, should be encouraged and supported financially. In this context, the Natural Sciences and Engineering Research Council of Canada (NSERC) and the Polar Continental Shelf Project have funded much of my research and I value these contributions immensely. However, in recent years I have observed that there has been a tendency both in university teaching and by funding agencies to downplay fundamental mineralogical and petrological studies in favour of diverse environmental studies with apparent immediate societal implications. Ideally, there should be a balance between these groups in a country such as Canada where much of the wealth has been derived from mineral deposits. To rectify this imbalance, It is essential that we volcanologists, ore deposit geologists, and igneous petrologists emphasize and explain to the general public and politicians the value of our work; for example ranging from understanding the hazards of degassing volcanoes through providing ore genesis models to environmental mineralogy.

It is imperative that groups such as the Geoscience Council of Canada, The Royal Society of Canada and our professional societies (PDAC; GAC; MAC) become more pro-active in the media and political spheres.

Finally, I need to recognise my late colleagues: Barry Dawson (Edinburgh); Henry Meyer (Purdue), and Alan Edgar (Western) for their support in providing logistical and other assistance, which was essential to me in undertaking the work for which this award is being presented. The assistance of Barry Hawthorne of De Beers was particularly important in furthering in my studies of kimberlites. I also recognise especially the support and encouragement provided by my wife Valerie Dennison.

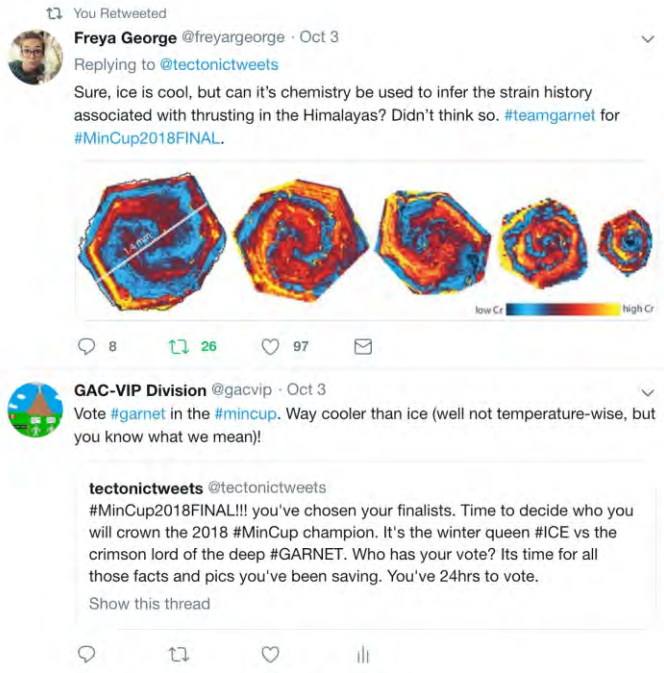
Roger Mitchell
Lakehead University

GAC-VIP on Social Media

The past year has brought a successful initiation of both social media accounts on Facebook and Twitter. From November 2017 to November 2018, our follower counts on Facebook have increased from 110 to 163 and 230 to 431 on Twitter. Not a bad first year!

Recap of the GAC-VIP social media objectives:
(1) increase public awareness of the GAC-VIP
(2) increase interaction between students and professionals/academics
(3) network and exchange ideas with the global volcanology community
(4) improve organizational communication

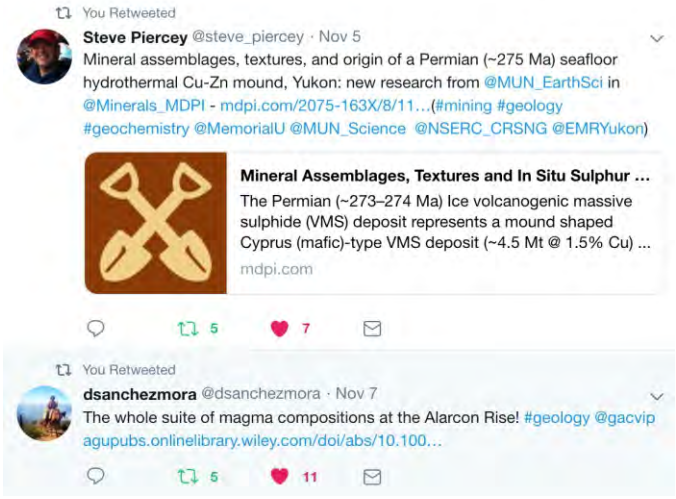
We have continued to post regularly on both platforms to increase the public visibility, primarily on the basis of sharing interesting geological information related to modern subaerial and seafloor volcanism. Facebook has proven to be a service to make followers aware of new geological research and images from around the globe. Twitter caters to a different audience, has more substantial growth and depth into the global geological community, and appears to be our most interactive social media platform. This year, tweets such as #ThinSectionThursday and #mincup have been popular topics in volcanism and igneous petrology.



#mincup and #MinCup2018FINAL were popular tweets in 2018.

Student Spotlight Series for GAC-VIP 2018-2019

The social media accounts are managed by our Student Councillor, Matt Manor, but continue to have regular support from our Communications Officer, Melissa Anderson. This year we are hoping to increase numbers for student members in the GAC-VIP section. In October, we introduced the new Student Spotlight Series to introduce students to the community with new and interesting field, lab, or other photos related to their research. We hope to get more involvement with this in the future. Twitter has also allowed us to support geological research in Canada and elsewhere, and advertise for events on behalf of organizers.



Introducing the geological community to your research, or neat papers, has never been easier.

Have an event to advertise specific to student involvement? Let us share!

If you have anything you would like to share about events or interesting research – student or not – please get in touch with Matt on one of our social media pages or by email (subject line "VIP contribution").

Matt Manor
mjmanor@mun.ca

GAC VIP Division @vipgac:
https://www.facebook.com/vipgac/

GAC VIP Division @gacvip:
https://twitter.com/gacvip

Matt Manor Biography

I am a second-year PhD candidate with Steve Piercey at Memorial University of Newfoundland. My research focuses on the petrology, geochemistry, and geochronology of felsic volcanic and intrusive rocks in southeastern Yukon. I use detailed mineral-scale and whole-rock techniques to decipher characteristics of the felsic rocks that host back arc-related VMS deposits compared to their barren regional equivalents. We hope to better constrain changes in the host rocks that record local and regional-scale mineralizing processes in VMS systems and add to the history of crustal evolution in the Yukon during the Late Devonian to Early Mississippian.

Matt Manor, VIP Student Councillor

Matt Manor - VIP Student Councillor

Advertisement for a Fipke-Sponsored Graduate Student

MSc or PhD Diamond Indicator Mineral Research Opportunity at UBC Okanagan.

The Department of Earth, Environmental and Geographical Sciences, and Drs. John Greenough and Kyle Larson, welcome applications to UBC Okanagan Graduate Studies from students interested in a M.Sc. or, if well-prepared, a Ph.D. program of study in diamond indicator minerals. The student, and their research, will be supported by a donation from the Charles E. Fipke Foundation. The research project will potentially give students access to one of the most-comprehensive indicator mineral databases and sample sets on Earth, amassed by the most-successful diamond exploration geologist of our time. Students will use the world-class UBC Okanagan micro-analytical facilities in FiLTER (Fipke Laboratory for Trace Element Research) to acquire the geochemical and isotopic data that will form the basis of their research. Instrumentation includes: an EXCIMER Photon Machines laser coupled to Thermo sector and quadrapole Inductively-Coupled Plasma Mass Spectrometers (ICP MS), a state-of-the art Cameca SX Five FE (Field Emission Gun) Electron Microprobe; and a TESCAN FEG Scanning Electron Microscope with an Energy Dispersive Spectrometer (EDS); (see the FiLTER website at http://www.filterubco.ca/. Admission would be for September 1, 2019; and application time line are short because your complete application must be received by January 31, 2019. Contact john.greenough@ubc.ca (+1 250 215 2227) or kyle.larson@ubc.ca for more information on this unique graduate studies opportunity.

GAC-MAC 2018 Field Trip Report

The Tulameen Alaskan-type ultramafic-mafic intrusion: architecture, emplacement mechanisms and Cr-PGE vs Cu-PGE "Reef-style" mineralization in a convergent margin setting

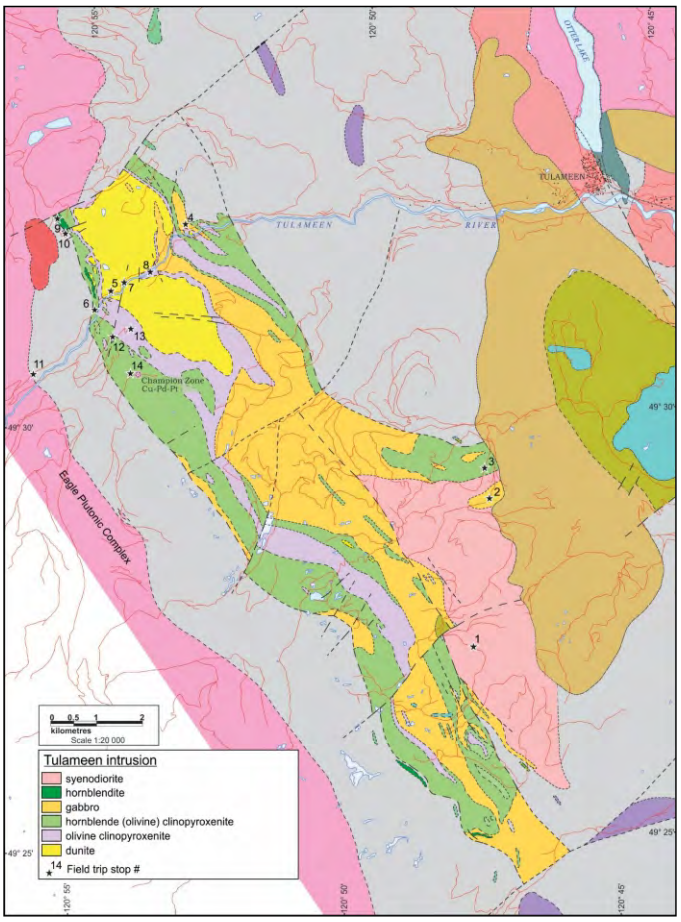
The Resources for the Future Generations conference, held in Vancouver in June, 2018, included a four-day field trip (June 21-June 24) to the Tulameen Alaskan-type intrusion. The intrusion, located ~45 minutes west of the town of Princeton, is accessible by truck via a network of logging roads. Recent mapping (Nixon, 2018), an ongoing petrochronological study, which provided seventeen preliminary U-Pb zircon ages that were presented during the field trip, and advances in models for mafic magma chamber replenishment, made this overview trip of the Tulameen intrusion timely. Seventeen attendees, including active and emeritus academic researchers, government scientists, and industry professionals explored the peculiarities of this zoned mafic-ultramafic complex under the guidance of Graham Nixon and Dejan Milidragovic, and with logistical support of the British Columbia Geological Survey.

The Tulameen intrusion is an elongate (18 km x 6 km), zoned Alaskan-type mafic-ultramafic complex emplaced in a Late Triassic supra-subduction zone setting. The two main objectives of the field trip were to examine: 1) the lithological zoning and temporal evolution of the intrusion, and 2) the contrasting styles of chromitite-PGE mineralization in the dunite core and derivative placers versus the Cu-PGE sulphide mineralization in the more differentiated ultramafic rocks. These goals were framed around two full days in the field, which included fourteen field stops.

Day 1

Drive from Vancouver to Princeton via Hope. On the opening night of the trip students Dylan Spence (UBC) and Hongtao Peng (China University of Geosciences, Wuhan) were presented with student awards from the Mineralogical Association of Canada.

Mineralogical Association of Canada student award winners Hongtao Peng (center) and Dylan Spence (right) with award presenter Dejan Milidragovic (left).



Geological map of the Tulameen Alaskan-type intrusion with stop numbers and a simplified legend. For full version of the map see Nixon (2018) http://cmscontent.nrs.gov.bc.ca/geoscience/PublicationCatalogue/OpenFile/BCGS_OF2018-02.pdf

Day 2

Drive from Princeton to the Tulameen intrusion

Stop 1. Clinopyroxene-hornblende syenodiorite with accessory Fe-Ti oxides, titanite, apatite, and zircon. The syenodiorite forms a large component at the southeastern margin of the Tulameen intrusion.

Stop 2. Saussuritized biotite-hornblende monzogabbro with accessory Fe-Ti oxides, titanite, apatite, and zircon within the hornblende clinopyroxenite unit on Tanglewood Hill.

Overview of Day 2 presented at Stop 2. Photo credit: D. Spence.

Stop 3. Intermingled magnetite-apatite hornblendite and mesocratic hornblende gabbro within the hornblende clinopyroxenite unit on Tanglewood Hill.

Intermingled hornblendite (dark grey/black) and hornblende gabbro (medium grey) at stop 3. Photo credit: D. Spence.

Stop 4. Medium- to coarse-grained saussuritized hornblende gabbro on Tulameen River road. The gabbro contains accessory apatite, magnetite, and zircon, and thin horizons of pegmatitic feldspathic hornblendite.

Stop 5. Weakly serpentinized dark grey dunite on Tulameen River road. Some of the least altered dunite in the core (LOI <2 wt.%) are found at this stop.

Stop 6. Coarse-grained magnetite-biotite-hornblende clinopyroxenite with accessory apatite and zircon on Tulameen River road.

Stop 7. Chromitite schlieren in dunite and brecciated dunite at the confluence of Britton Creek and Tulameen River.

Chromitite schlieren in a dunite boulder. Photo Credit: R. Keays

An irregular enclave of ductilly deformed dunite (black) in a medium grey olivine clinopyroxenite. The contact between dunite and olivine clinopyroxenite is mainly sharp, but in places wisps of dunite form trails that lead from dunite enclaves into olivine cllinopyroxenite.

Stop 8. Tulameen River section extending from eastern dunite contact through olivine clinopyroxenite that contains plastically deformed dunite inclusions. Two multiple hornblende gabbro dykes with conspicuous internal layering cross-cut the olivine clinopyroxenite unit in the lower part of the section. A few basaltic dykes are probably coeval with Tertiary volcanic rocks (Eocene Cedar Formation).

Day 3
Drive from Princeton to the Tulameen intrusion

Stop 9. Pegmatitic hornblendite to magnetite-hornblende clinopyroxenite unit with feldspathic segregation veins and irregular pods of interstitial feldspar adjacent to the contact with the Nicola Group (Upper Triassic) schist. Weak malachite straining betrays the presence of small amounts of magmatic Cu-Fe sulphide (chalcopyrite). Lack of penetrative fabric in these rocks is notable.

Stop 10. Amphibolite facies Nicola Group schist displaying mylonitic fabric and steeply plunging mesoscopic folds adjacent to the contact with ultramafic rocks.

Stop 11. Contact between the marginal tonalite-granodiorite phase of the Eagle pluton (Late Jurassic) and weakly mineralized (molybdenite, chalcopyrite) Nicola Group metasedimentary schist. Ductile shear zones and fabrics in the plutonic rocks are concordant with schistosity in the metasedimentary rocks and demonstrate that deformation and amphibolite facies metamorphism occurred post-Late Jurassic, but prior to the mid-Cretaceous phase of the Eagle composite pluton which cuts these fabrics.

Stop 12. Narrow fault zone separating coarse-grained to pegmatitic magnetite-hornblende clinopyroxenite/hornblendite and olivine clinopyroxenite units. The fault zone displays a well-developed fabric and disseminated pyrite and minor chalcopyrite. This is the same fault that passes through brecciated dunite at the mouth of Britton Creek (Stop 7).

Sub-vertical folds in mylonitic Nicola Group schist near the contact with the Tulameen intrusion

Magmatic layering in magnetite clinopyroxenite at stop 13.

Stop 13.
A) A roadside outcrop containing ductilly deformed phlogopite-bearing dunite in coarse-grained phlogopite-bearing olivine clinopyroxenite and cut by thin, fine-grained magnetite-hornblende clinopyroxenite dyke. These textures are identical to those examined the previous day in the Tulameen River section at the eastern margin of the intrusion.

B) Magnetite clinopyroxenite displaying mm-scale layering and low-amplitude cross-laminae. Such layering is rare in Alaskan-type intrusions in general.

GAC-MAC 2018 Field Trip Report

Stop 14. Road traverse to examine magmatic Cu-Fe sulphide mineralization hosted by magnetite-hornblende Clinopyroxenite in the Champion zone.

Drive back to Princeton and then to Hedley for dinner at the Hitching Post restaurant. Sadly, the Hitching Post was destroyed by fire in October, 2018.

Day 4. Drive back to Vancouver

The participants, trip leaders, and supporting geologists from the BCGS had many exciting and invigorating discussions during this four day field trip. We thank the Mineralogical Association of Canada for sponsoring this trip, the Volcanology and Igneous Petrology Division of the Geological Association of Canada for their help in advertising both the trip and its companion session at RFG2018, and BCGS for providing the necessary logistical support.

Contributed by
Dejan Milidragovic and Graham Nixon

Field trip participants. Top row left to right: Songbai Peng, Craig Bow, Michael Lesher, Lucas Gilsbach, Reid Keays, John Mavrogenes, Roger Scoon, John Shmyr, Graham Nixon, Philippe Page, Wouter Bleeker, Hongtao Peng, Larry Diakow, Dawn Zhou, Neil Rutherford. Bottom row left to right: Yao Cui, Dejan Milidragovic, James Scoates, Jonathon Hoye, Jennifer Roskowski, Charley Duran, Dylan Spence. Nichole Moerhuis and Jessica Norris are missing from the photograph. Photo credit: Nichole Moerhuis.

Discovery of the deepest historical volcanic eruption ever detected

GAC-VIP outreach coordinator Melissa Anderson (Assistant Prof., University of Toronto) was part of an international team of researchers that set out to find new hydrothermal vents in the Mariana back-arc, located north of Guam and to the west of the famous Mariana trench (Fig. 1).

Unexpectedly, they also discovered a newly-erupted lava flow with spectacular glassy tentacles, ~4.5 km below sea level. The timing of the eruption was constrained by collecting high-resolution bathymetry using an autonomous underwater vehicle, and comparing seafloor depth changes it to a similar survey collected two years prior. The lava flow reached a maximum thickness of 138 m, with a length of 7.3 km and a width of 200–800 m. Follow-up work included photo surveys and direct seafloor observations and sampling using a remotely-operated vehicle (Fig. 2). The lava flow was still-cooling at the time of discovery—indicated by the widespread discharge of hydrothermal fluids—and was likely only a few months old. It had just begun to be colonized by mobile creatures, like shrimp and squat lobsters, but lacked slower colonizers like sponges and anemones.

This finding represents the deepest underwater volcanic eruption during human history ever documented by scientists. The science team had expected to find only old lava flows in the back-arc region, as eruptions are expected to occur only once every few hundred years or so. As such, this discovery was enormously serendipitous.

While submarine eruptions account for ~80% of Earth's volcanism, the identification of deep-sea eruptions is rare, due to the depth and remoteness of the study sites. Before 1990, not a single submarine eruption had ever been detected. Today, even with improvements in technology and an increase in oceanic exploration, only about 40 have been found.

Discovery of the deepest historical volcanic eruption ever detected

This discovery is an opportunity to learn about a fundamental Earth process that we know little about. The relatively-unaltered young volcanic rocks provide insights into the physical and chemical processes responsible for their formation. It is also an opportunity to study diverse communities of deep-sea creatures as they emerge and change as hydrothermal systems develop and then decline, and the relationships between volcanism and the chemistry of the oceans.

The researchers reported their discovery in a recent edition of Frontiers in Earth Science (doi: 10.3389/feart.2018.00172, Open Access), led by Dr. Bill Chadwick (NOAA-PMEL). It has since been reported by international news sources and science blogs, including the New York Times and IFL Science.

This work was supported by the Schmidt Ocean Institute on expeditions FK151121 and FK151129 on R/V Falkor, in cooperation with the AUV Sentry and ROV SuBastian teams. NOAA OER also supported Okeanos Explorer operations in 2016 using the ROV Deep Discoverer.

Melissa Anderson, the VIP Division Outreach Coordinator

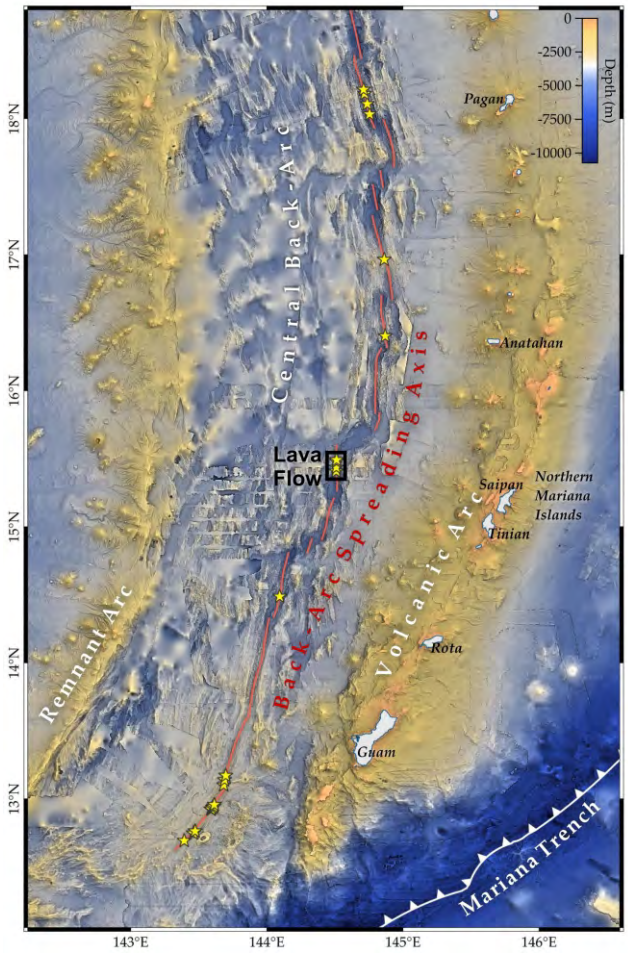


Fig. 1. Bathymetry of the Mariana region with the location of the new lava flow in the back-arc. Yellow stars are hydrothermal vent sites.

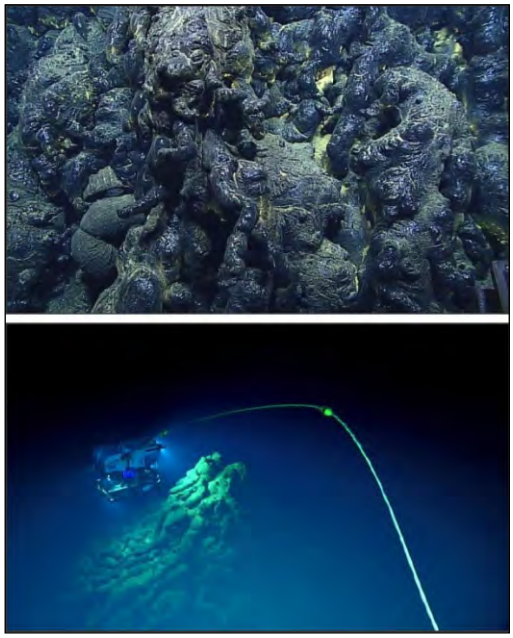
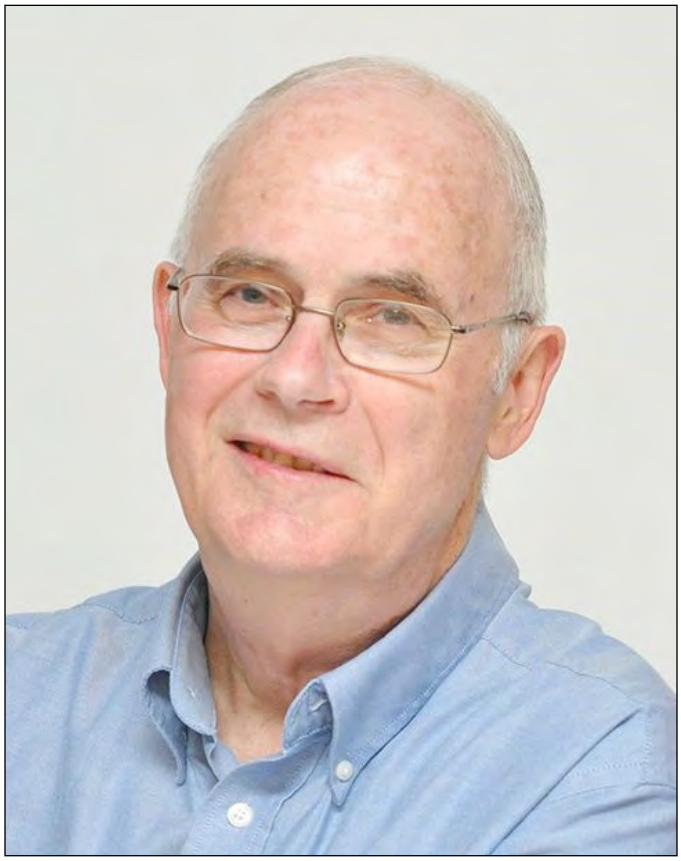


Fig. 2. Photographs of the young lava flow collected by the remotely-operated vehicle Deep Discoverer, including glassy tentacles (top), and pillow tubes with hydrothermal sediment (bottom), image courtesy of NOAA.

2018 Atlantic Geoscience Society (AGS) lecture tour of Atlantic Canada; Dr. Barrie Clarke's lectures at Department of Earth Sciences, University of New Brunswick



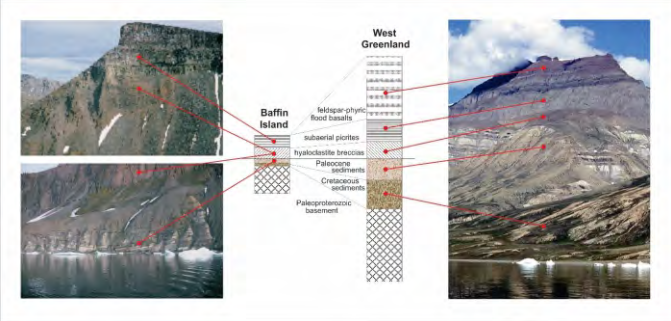
Barrie Clarke, Dalhousie University

Dr. Barrie Clarke delivered two presentations during his visit to the Department of Earth Sciences at the University of New Brunswick on 14th November 2018. He is a retired Professor of Petrology and current Adjunct, Department of Earth Sciences, Dalhousie University, Halifax, NS. Barrie Clarke obtained a BSc. (1964) and M.A. (1965) in geology from the University of Toronto, and a Ph.D. (1969) in petrology from the University of Edinburgh. He became an Assistant Professor at Dalhousie University in 1970, and spent 37 years there teaching and doing research. His research work began on volcanic rocks in Baffin Island and West Greenland, expanded into kimberlites in the Arctic and southern Africa, and then mainly concentrated on the peraluminous granites of Nova Scotia. He obtained the Career Achievement Award from GAC-VIP in 2017. He is the recipient of the Gesner Medal from the Atlantic Geoscience Society and the Hawley Medal from the Mineralogical Association of Canada, and he continues an active program of research, primarily into the mineralogy, petrology, geochemistry, and origins of peraluminous granites. Dr. Clarke gave two presentations.

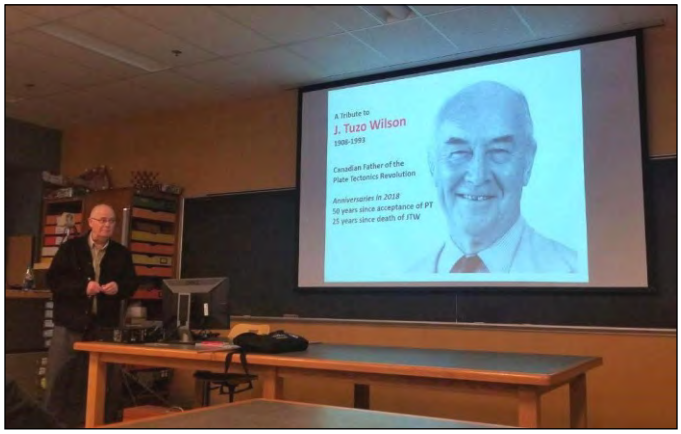
Two topics covered in his presentations were:
1: Davis Strait Paleocene Picrites: Products of a Plume or Plates?
2: The Origins of Strongly Peraluminous Granitoid Rocks

1: Davis Strait Paleocene Picrites: Products of a Plume or Plates?

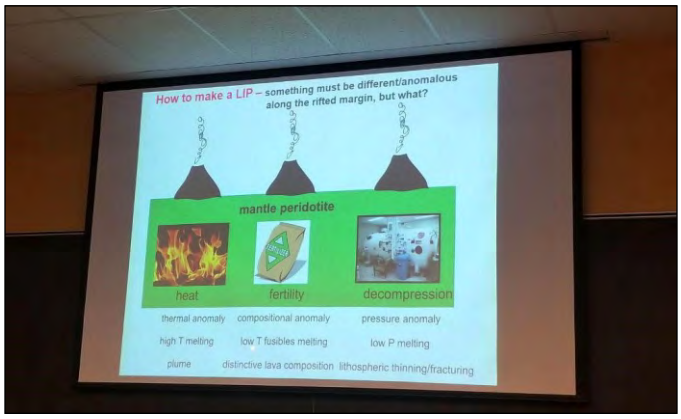
Abstract: Picrites are olivine-rich basalts. Most people believe that picrites automatically mean high temperatures and high temperatures automatically mean hot mantle plumes, but I will try to make the petrogenetic-tectonic case that picrite really means magmatic plumbing system and magmatic plumbing system means plate tectonics. The voluminous, subaerial, 62 Ma, primary picritic lavas on both sides of Davis Strait separating Baffin Island and West Greenland are among the most LILE-depleted MORBs on Earth. Tectonically, these picrites are spatially closely related to the major intersection of the Baffin Bay spreading centre and the E-W-trending thickened lithosphere of the Paleoproterozoic Nagssugtoqidian Fold Belt. Enhanced tensional forces at this intersection likely resulted in the formation of one or more pull-apart basins. As shown by finite-element modelling, trans-tensional forces easily reached depths of ~120 km, not only creating catastrophic decompression melting in the sub-continental lithospheric mantle, but also forming an open plumbing system for the picritic melts to rapidly reach the surface. This purely plate tectonic model requires no spatially or temporally improbable deep mantle plume for generation of the Paleocene picrites of Davis Strait.



A comparison of the stratigraphy of Baffin Island (left) and West Greenland (right) across Davis Strait.



Dr. Barrie Clarke talking about his collaboration with Dr. Tuzo Wilson on the Davis Strait picrites during his presentation



Three ways to generate a Large Igneous Province (LIP). The Davis Strait picrites represent a Baby LIP (BLIP).

2: "The Origins of Strongly Peraluminous Granitoid Rocks"

Abstract: Strongly peraluminous granites (SPAGs), with mol Al_2O_3/mol ($CaO+Na_2O+K_2O$) ≥ 1.20, are relatively rare in the geological record. They contain variable, but significant, modal abundances of one or more of biotite, muscovite, cordierite, garnet, andalusite, topaz, and tourmaline, all of which sequester the excess alumina. Surprisingly, SPAGs are probably not the products of dehydration partial melting of peraluminous metasedimentary rocks (A/CNK too low), or the products of extensive melting of peraluminous metasedimentary rocks (A/CNK too high). Instead, SPAGs probably originate by the modification of more normal, weakly peraluminous, granite magmas by well-known processes such as restite unmixing, fractionation, contamination, fluid stripping, and hydrothermal alteration. In this presentation, I examine the efficiency of each of these processes, and use the South Mountain Batholith as a case study.

Contributed by
Nadia Mohammadi, University of New Brunswick

Strongly peraluminous granites with dispersed peritectic cordierite (upper left), cumulus cordierite of unknown origin (upper right), magmatic garnet (lower left), and cumulus garnet of unknown origin (lower right).

A peraluminous granitoid sample with subhedral garnet that was donated to the Department of Earth Sciences, UNB by Dr. Barrie Clarke. The sample is from India with the commercial name of “Kashmir White Granite".

Carleton University Alumni Travel 2018: Iceland's Geological Marvels

Eleven alumni and friends of Carleton University spent a whirlwind ten days with me in Iceland to learn about the geology of this unique volcanic island. The trip, from June 10 to 22, was organized by the Carleton Alumni Association, Worldwide Quest Travel (Toronto) and Iceland Pro Tours (Reykjavik). The eleven participants, from Canada and the United States, were mostly non-geologists with an interest in experiential travel and a special interest in seeing Iceland for the first time. Iceland is one of the top travel destinations in the world, and one of the top reasons for its popularity is its volcanic history.

The trip began in Reykjavik with visits to the famous Hallgrímskirkja church and the Volcano Museum in the downtown area. The museum includes artifacts from volcanic eruptions in Iceland and includes a movie theatre that presents videos of the 1973 Heimaey eruption in south Iceland and the infamous Eyjafjallajokull eruption in 2010.

The group then left Reykjavik for the Snaefellsnes Peninsula, led by our Iceland Pro Tours guide Throster Sverrisson. After several short stops just north of Reykavik, the group was able to see the columnar-jointed lava flow at Gerduberg and the superb spatter cones at Grabrok Crater. From the walking path at the top of the crater, you get superb views of the surrounding young lava fields. This was a great spot to talk about the origin of volcanic vents, and compare these spatter cones with the vents that had been active on the East Rift Zone of Kilauea volcano in May and June. Day 2 on the Snaefellsnes Peninsula started with a visit to the Volcano Museum in Stykkisholmur that is run by volcanologist Haraldur Sigurdsson (University of Rhode Island). The museum includes volcanic artifacts and paintings that have been collected by Dr. Sigurdsson during his world travels, as well as detailed geological maps of the active volcanic regions in Iceland. Although this was a windy, rainy day, the group then embarked on a three-hour boat cruise on Breidafjordur Bay to find seabirds, including puffins, view wildly-columnar jointed lava flows, and enjoy fresh shellfish ("Viking Sushi") dredged by the boat from the bottom of the bay.

The tidal currents in the shallow bay are impressive! The afternoon was spent travelling around the Snaefellsnes Peninsula, stopping to see geological formations such a Kirkjufells and the nearby waterfalls, lava flows around the famous Snaefellsjokull volcano, and coastal communities. As is common in Iceland, the weather was wet and windy on the north coast, but sunny and windy on the south coast! Our accommodations on the south coast of the peninsula included superb food and a golf course!

The weather was unusually cool during this trip, and the cool weather was particularly evident on our drive from Snaefellsnes to Akureyri, a city on the north coast of the island. Most of the mountain ranges were still covered in snow.

One of the Grabrok spatter cones, surrounded by exposures of older lava flows

A fallen columnar joint at the Gerduberg locality. Pen for scale.

Carleton University Alumni Travel 2018: Iceland's Geological Marvels

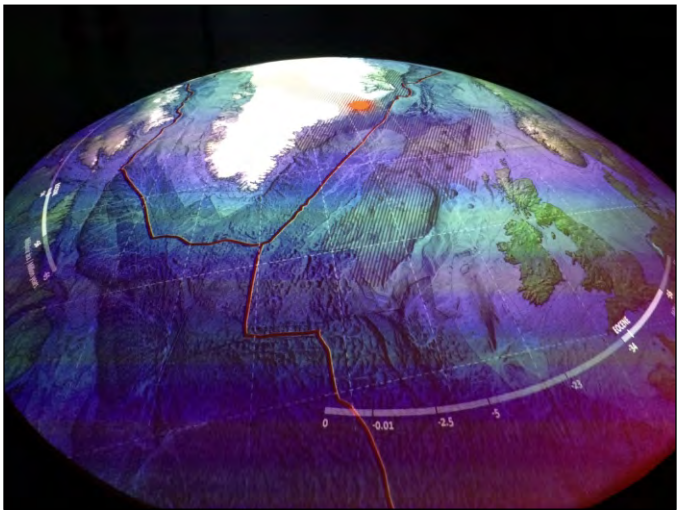
The photos were spectacular! Day 5 was spent in the Lake Myvatn area, truly a volcanologists paradise. The lake is located at the southern end of the Krafla volcanic system of the northeast rift zone. The group first investigated "rootless" cones on the western shore of the lake. Rootless cones form when lava flows overrun wetlands and water trapped at the base of the advancing flow then forms steam bubbles. The bubbles rise through the molten interior of the flow and eject spatter on top of the flow, forming a spatter cone – thus, these cones lack feeder dykes, and so are called "rootless". At other localities, farmers used to excavate a hole into the base of rootless cones and used them as pens for sheep and other animals!

The group then drove to Dimmuborgir ("Dark Castles"), a collapsed lava lake that retains fantastic examples of lava tubes and lava spires formed by water and steam migrating up through the lava lake. We moved north into the Krafla crater, passing one of several geothermal power plants in the region on our way to Viti Crater, a hydrothermal explosion crater or maar, and the Krafla lava flows and vents from activity between 1975-84. In 2009, a geothermal exploration well penetrated a magma reservoir in the Krafla system at a depth of ~2 km and recovered rhyolite magma, a reminder that Icelandic volcanoes are primarily basaltic but commonly include felsic magmatism (e.g., Hekla). Our last stop was at the Jardbodin vid Myvatn (Myvatn Nature Baths), allowing everyone to relax and swim in the hydrothermal waters of northern Iceland.

We returned to Reykjavik from Akureyri on Day 6. The group then visited the Hellisheidi geothermal power station west of Reykjavik. The power plant provides an excellent tour, explaining how steam and water are separated from hydrothermal fluid that is tapped by boreholes around the power plant; the steam is used for generating electricity and the hydrothermal water is used for home heating in Reykjavik. The power plant also has a nice museum display on how geothermal resources are harnessed, and includes short videos in a theatre.

An evening view of Snaefellsjokull volcano and glacier, view it to the west.

Lava spires and a lava tube at Dimmuborgir.



The floor-sized plate tectonic video display at the Lava and Earthquake Centre, Hvolsvollur.

The group then continued to the town of Hvolsvollur where a brand-new Lava and Earthquake Centre has opened. This is a must-see stop for anyone with an interest in volcanoes. The centre includes hands-on displays demonstrating different kinds of volcanic activity, a massive three-D video display showing the Cenozoic plate tectonic evolution of the Iceland area and how Iceland was formed, an interactive room showing the various volcanoes of the south part of Iceland, and a huge floor map of Iceland showing real-time earthquake locations and magnitudes.

Day 6 was a tour of the Thjorsa River area west of Hekla volcano, including the archeological excavation site at Stong and a reproduction of an Icelandic farm from ca. 1100AD at Thjórsárdalur. This area was devastated by the 1104 eruption of Hekla volcano that deposited a thick blanket of felsic tephra over the farms in the region. We hiked through the amazing columnar jointed lava flows and stream valley at Gjain, saw the hydroelectric Burfell Power Station, and hiked around the spectacular Hjalparfoss waterfalls. The scenery in this area is incredible.

The group embarked on a Day 7 tour around the south coast of Iceland, including stops at Skogafoss waterfall, the Eyjafjallajokull area, Black Beach, the Dyrholaey sea arch, the Myrdalssandur plain, rootless cones at Kirkjubæjarklaustur, and the Seljalandsfoss waterfall. Skogafoss is 60m high and 25m across and is one of the biggest waterfalls in Iceland. During the 2010 Eyjafjallajokull eruption, the waterfalls turned grey as a result of the huge volume of tephra that was added to the watershed above the falls. The famous farm pictured in several of the photos of the mid-April main phase of the Eyjafjallajokull eruption once hosted a small Eyjafjallajokull museum that has, unfortunately, now closed due to lack of funding. Black Beach exposes columnar-jointed flows, but also cuts into hyaloclastite and lava fragments of a sub-glacial volcanic structure. These features are typical of volcanoes on Iceland that were emplaced in the rift zones between 3.3 and 0.7 Ma. Dyrholaey is a large sea arch, and from the lookout pathway you also get excellent views of the Myrdalssandur sediment plain. The plain is produced by sub-glacial floods (jökulhlaups) associated with volcanic eruptions at Katla volcano. The Seljalandsfoss waterfall has scoured out the rock behind the waterfall, so that you can actually walk behind the falling water – it is very wet, but a great experience!

Day 8 was the high point, geologically, of the trip – a day in the Hekla area. For once, we had a cloud-free day with temperatures above 10oC, so everyone truly enjoyed the day around Iceland's most famous volcano. One of the local hotels hosts a Hekla museum, complete with a soil profile showing the timing of Icelandic volcanic activity as recorded in ash layers within the soil. The thick felsic tephra deposits of the 1104 Hekla eruption are well exposed in quarries on the northwest flank of the volcano. Mafic lava flows on the northwest flank are easily accessible with 4x4 vehicles, and we were fortunate that the roads had just been opened for the summer and were freshly graded. The group also hiked down into a threesome of maars north of the volcano near Valagja. Finally, we returned to Hvolsvollur to a perfect, cloud-free view of Eyjafjallajokull.

Wild columnar joints in lava flows or fragments adjacent to a hyaloclastite complex, Black Beach, south Iceland

Carleton University Alumni Travel 2018: Iceland's Geological Marvels

The last full day of the trip was the Golden Circle Tour: Gullfoss waterfalls, the Geysir geothermal field, and Thingvellir National Park. The 32 m-high Gullfoss waterfalls formed when layers of basalt lava over soft sedimentary layers were undercut to form two cliffs over which the water flows. Amazingly, the falls were once privately owned and a hydroelectric project was planned for the area. Local citizens managed to keep developers at bay until the falls were sold to the Icelandic government and are now protected. The term "geyser" comes from the Geysir geothermal field in Iceland. The Geysir area is on the edge of the neovolcanic zone and is slowly cooling. The original Great Geysir has been inactive since the early 20th century, but neighbouring Strokkur erupts every few minutes.

There are a number of beautifully-coloured hot water pools sprinkled over the geothermal field, and you can walk right up to them. Thingvellir is a political, cultural, and geological site that is important to Icelandic culture. After settlement in the late 900's AD, Iceland chieftains would meet at Thingvellir to create laws, settle disputes, and as such this has been termed one of the first democratic parliaments in the world. The site also occurs along the margin of the southwest rift zone, and the basalt flows are heavily fissured and commonly form tilted blocks. Although the rift zone is several kilometres wide, you can find a fissure and place one foot on either side, and consider that you are standing on the plate boundary between Eurasia and North America! The historical and geological importance of Thingvellir has resulting in its designation as a UNESCO World Heritage Site in 2004.

The trip went so quick! One day we are looking at thick basaltic lava flows and gazing at geysers, and the next morning we are on a plane heading back to Canada. It was a great pleasure for me to serve as the "Tour Expert" on this trip, my third to Iceland in the last ten years. You can find more photographs at:

http://mypage.science.carleton.ca/~bcousens/Home.html.

My next trip with alumni and friends is being planned for November of 2019: Destination Hawaii! For updates, please see the Carleton University Travel program website at:

https://alumni.carleton.ca/services/travel-program/.

Note that you do not need to be an alumnus to participate in these trips.

Contributed by
Brian Cousens, Carleton University

A rare, near-cloudless view of the northwest flank of Hekla volcano

A group photo of the trip participants, standing inside a rootless cone

Leopold Gélinas Medals

Every year, the Volcanology and Igneous Petrology Division of the Geological Association of Canada presents three medals for the most outstanding theses, written by Canadians or submitted to Canadian universities, which comprise material at least 50% related to volcanology and igneous petrology. A gold medal is awarded for the best Ph.D. thesis, a silver medal for the best M.Sc. thesis and an antique copper medal for the best B.Sc. thesis. Nominated theses are evaluated on the basis of originality, validity of concepts, organization and presentation of data, understanding of volcanology and petrology, and depth of research.

Gold Medal
Dr. Warna Susanne Downey
University of New Brunswick

The 2018 winner of the Volcanology and Igneous Petrology (VIP) Léopold Gélinas Gold Medal award for the best Ph.D. thesis goes to Warna Susanne Downey for her astounding thesis titled “The Fluid Dynamic and Thermophysical Constraints on Peperite Formation, and the Vibrational Liquefaction Model” supervised by Dr. C.S.J. Shaw at the University of New Brunswick with basaltic melt experiments performed in Dr. Donald Dingwell's laboratory at the Experimental Vulkan Labor at the Sektion Mineralogie, Petrologie, und Geochemie at Ludwig-Maximilians-Universität München.

Peperites consist of disrupted magma mingled with sediment and form when magma intrudes, or flows over, unconsolidated, wet sediments but the conditions for peperite formation were poorly constrained prior to this work. Dr. Downey created a magma analogue by adding various amounts of lithium tetraborate to a Hawaiian basalt making it “pourable” in a laboratory setting. Similarly soft “sediments” were formulated, and an apparatus manufactured that allowed the magma analogue, at ~1200°C, to be injected into the analogue, room-temperature, “wet”, soft sediment with associated sediment shaking. The experiments repeatedly failed, each time for different reasons, and the furnace had to be repeatedly rebuilt and reconfigured. In the end, peperite-like textures were created. To characterize the analogue basalt, experiments measured the viscosity, heat capacity, density, surface tension, thermal conductivity and thermal diffusivity of the Hawaiian basalt and analogue basalt and composition-based numerical modeling checked measurements (e.g. viscosity). Similarly, the analogue sediments were described using particle size analysis (several methods), specific gravity and density measurements, liquid and plastic limit measurements, and dry density, void ratio and bulk density estimates. The research indicated that sediment liquefaction is critical to peperite formation. In the vibrational-liquifaction model for peperite formation low viscosity melt contacts wet sediment forming a H_2O vapor layer between the basalt and sediment. Rhythmic expansion of this layer imparts mechanical energy into the sediment causing liquefaction, and the high-temperature basalt mingles with the sediment.

Many individual components of this research were worthy of a Ph.D., and together they are commensurate of what many scientists accomplish in a lifetime. The VIP is pleased to acknowledge this major scientific accomplishment by awarding Dr. Downey the Gélinas Gold Medal for 2018.

Citation by John Greenough

Warna's Response

It is such a great honour to be given such a prestigious distinction. I would like to thank you to VIP members who work hard to make sure these awards go out and for taking the time to review our work each and every year. My thesis would not have been possible without the ongoing support and enthusiasm of my supervisor Cliff Shaw at UNB, and the wonderful people and facilities led by Don Dingwell at the University of Munich. I also owe a great deal to Dr. David Lentz. Dave has been a fantastic mentor to me since he took me on a MSc. Student many years ago. He is constantly encouraging me to move forward and inspiring me to be better. Finally, I would like to thank my husband Vijay. I would never have met him if I hadn't taken on this project and I am thankful everyday that I did, and for our wonderful family that came as a result of that chance meeting.

Citation by Warna Downey

Silver Medal
Brigitte Gélinas
Lakehead University

This year's winner of the Leopold Gélinas Silver Medal for an outstanding MSc thesis in the fields of volcanology and/or igneous petrology is Brigitte Rachel Gélinas. The title of her thesis is: Geology and Geochemistry of the Laird Lake Property and Associated Gold Mineralization, Red Lake Greenstone Belt, Northwestern Ontario.

The thesis was completed at Lakehead University under the supervision of Peter Hollings. The goal of her research project was to acquire a better understanding of the nature and genesis of gold mineralization at the Laird Lake property, in the southwest portion of the Red Lake granite-greenstone belt in northwestern Ontario. Brigitte completed two field seasons to produce a very detailed geological map of the region. Mapping was supported by a large dataset including whole rock geochemistry, petrography, radiogenic and stable isotopes, and geochronological data. Brigitte compiled a massive dataset and was able to develop a new geological and tectonic model that has important implications for the Au-mineralization in the region. The thesis is well-written, very thorough, and deserving of the Leopold Gélinas Silver Medal.

Citation by Donnelly Archibald

Warna Downey accepting her Léopold Gélinas Gold Medal from VIP Chair John Greenough.

Brigitte Gélinas accepting her Léopold Gélinas Silver Medal from VIP Past Chair Peter Hollings.

Brigitte's Response

I am extremely honoured to receive the Léopold Gélinas Silver Medal and would like to thank the Volcanology and Igneous Petrology Division of the Geological Association of Canada for awarding me this prestigious medal. Throughout my MSc research, I have been gifted with the help of numerous individuals and organizations in which I am forever thankful to. Specifically, I`d like to thank my supervisor Dr. Pete Hollings for his guidance, encouragement and advice throughout the project. He has opened many doors for my future and has helped me become a better geologist. Many thanks to Bounty Gold Corp. for their financial and logistical support and my two field assistants Carli Nap and Matt Greco for their help during the field seasons.

Additionally, I would like to thank the Geoscience Laboratories, Ontario Geological Survey in Sudbury for in-kind support for the analysis of rock samples. Financial support was also provided by the Mitacs-Accelerate Internship program, a Society of Economic Geologists Graduate Student Fellowship and the Ontario Graduate Scholarship program. Lastly, I would like to thank the geology department at Lakehead University and all my friends and family for their moral support throughout my MSc. To be recognized for my work within this field of study is such an accomplishment and something I will always be proud of as I begin my career as an exploration geologist.

Thanks again to the GAC for awarding me with this medal, I am deeply honoured.

Citation by Brigitte Gélinas

Bronze Medal
Corin Jorgenson
Dalhousie University

This year the GAC-VIP Bronze Medal is awarded to Corin Jorgenson for her BSc honours thesis entitled "Sulphur solubility of carbonatites as a mass transfer agent in the mantle" supervised by Prof. James Brenan (Dalhousie university). This impressive thesis tackles fundamentals of sulphur solubility is the system Ca-Mg-Fe-C-O (Ni-Cu-PGEs) at 1 to 2 GPa and 1100° to 1200°C, i.e., carbonate melts. The experimental approach was to test the control of carbonate melts in the mantle of transferring sulphur and precious in the mantle. The thesis involved a detailed experimental design, meticulous methodology, and followup sample preparation for EPMA and LAICPMS on crystallized carbonate and sulphide melt (& MSS) run products. It starts out with a lucid analysis of the literature associated with carbonatites, into a review of the pertinent papers associated with sulphur and metals in carbonatites. In the thesis, the experimental method was highly detailed through to the results presentation; all very clear and well-illustrated. The pertinent phase equilibria were considered and calculated. Partition coefficients for the base and precious metal (distributions) were determined that relate to the facility of carbonate melts as mechanisms for metasomatizing the mantle and even forming some metalliferous carbonatite deposits.

Citation by Dave Lentz

Corin's Response

I would like to formally accept the Volcanology and Igneous Petrology (VIP) Gelinas Bronze Medal for the best B.Sc. thesis. My thesis would have not been possible without the help and guidance of my supervisor Dr. James Brenan so I would like to thank him for all his support. Funding for the thesis was made possible in part by an SEG grant and the Dalhousie Earth Science Faculty so I would like to thank these groups as well. Lastly I would like to thank the Geological Association of Canada Volcanology and Igneous Petrology Division for the award itself!

Citation by Corin Jorgenson

Post-conference Field-trip after IUGG2019 in Montreal, July 18-23, 2019

The Abitibi greenstone belt in Quebec and Ontario (Canada) is one of the most coherent greenstone belts in the world and hosts some of the most pristine, Archean-aged remnants of submarine volcanic complexes. Despite the old age of the rocks (2.7 Ga), metamorphic grade and tectonic deformation are locally very low, and glacially polished outcrops can yield very nice exposures, with near-perfect preservation of volcanic textures. A six-day post-conference excursion (including four complete days in the field) will examine volcanic and intrusive facies ranging in composition from komatiitic (ultramafic) to rhyolitic. We will attempt to show both explosive and effusive products for each magma type. The excursion will include visits to:

- the world-famous komatiitic lava flows at Spinifex Ridge and Pyke Hill, which include sheet flows, tube flows, and volcaniclastic rocks

- facies variations from massive to pillowed to hyaloclastite in basaltic lavas near Rouyn-Noranda, as well as a possible basaltic lava lake

- andesitic lavas and hyaloclastites in the Monsabrais area, including a possible block lava, pillows, and mass flows

- explosive andesitic products of the D'Alembert tuff, ranging from thick coarse proximal beds to distal turbidites

- various felsic lavas and domes, including the rhyodacitic lavas and volcaniclastic rocks of the Glenwood flow complex

In addition to the varying submarine volcanic rocks, participants will also have the opportunity to view mineralization and alteration associated with the volcanogenic massive sulfide (VMS) deposits of the Noranda area. On the first evening, there will be an informal poster session where participants can present their own work on submarine volcanism, from modern to ancient.

This field trip will be lead by Pierre-Simon Ross (rossps@ete.inrs.ca), Lyndsay Moore (Lyndsay.Moore@riotinto.com), Michel Houlé and Jean Goutier

For more information visit:
http://iugg2019montreal.com/

One sheet flow in the komatiitic lava sequence at Spinifex Ridge, showing the classic A (spinifex)-B (cumulate) divisions.

Msc Research Opportunity

Volcanology of the Lago de Patzcuaro and the heartland of the Tarascan State, Michoacan, Mexico

Supervisor: Dr. Graham Andrews, West Virginia University
For more details: http://graham-andrews-geologist.squarespace.com/

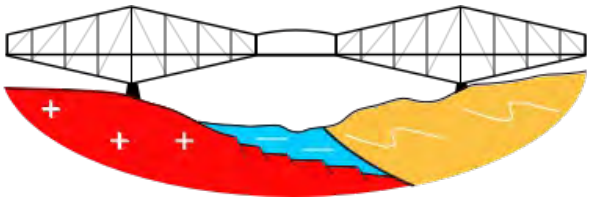
9th International Symposium on Granite Pegmatites June 11-18, 2019

The next International Symposium on Granitic Pegmatites (PEG2019) are now confirmed. The technical meeting will be held at the Pala Casino Spa and Resort, Pala, CA, USA from June 11-17, 2019.

Visit: peg2019.com

Upcoming sessions at GAC-MAC 2019 Quebec City May 12-15

AGC-AMC-AIH
QUÉBEC 2019
Où les géosciences convergent



GAC-MAC-IAH
QUÉBEC 2019
Where geosciences converge

CANADIAN VOLCANOLOGY, ARCHEAN TO RECENT, DEPTH TO SURFACE, AT HOME AND ABROAD (SS-GH3)

Leaders and affiliations : Pierre-Simon Ross (INRS); Stephan Kolzenburg (LMU Munich / McGill University); Kim Berlo (McGill University)
Pierre-Simon.Ross@ete.inrs.ca

CRUSTAL MELTING, MIGRATION, AND MINERALIZATION PROCESSES: PARTIAL MELTING THROUGH FRACTIONATION TO VOLATILE SATURATION, FROM THE MICRON TO THE CONTINENTAL SCALE (SS-GH6)

Leaders and affiliations : Matthew Steele-MacInnis (University of Alberta); Brendan Dyck (Simon Fraser University); Zeinab Azadbakht (University of New Brunswick); Ed Sawyer (UQAC)
steelema@ualberta.ca

MELT, FLUIDS AND ARCHITECTURE OF ACCRETIONARY OROGENS (SS-GH15)

Leaders and affiliations : Dawn Kellett (Geological Survey of Canada); Sandra Barr (Acadia University); Graham Layne (Memorial University); Donnelly Archibald (St. Francis Xavier University)
dawn.kellett@canada.ca

OPHIOLITES AS MARKERS OF OCEANIC AND OROGENIC SETTINGS (SS-GH17)

Leaders and affiliations : Jean Bédard (Geological Survey of Canada); Alain Tremblay (UQAM)

THE CRATONIC MANTLE, ITS CARBONATE-RICH MELTS, KIMBERLITES AND CARBONATITES (SS-RE1)

Leaders and affiliations : Maya Kopylova (University of British Colombia, Vancouver); Anton Chakhmouradian, (University of Manitoba, Winnipeg)
mkopylov@eos.ubc.ca

PANNOTIA TO PANGEA: PALEOZOIC OROGENIC CYCLES IN THE CIRCUM-NORTH ATLANTIC REGION: A CELEBRATION OF THE CAREER OF DAMIAN NANCE (SS-GH18)

Leaders and affiliations : Brendan Murphy (St. Francis Xavier University); Rob Strachan (University of Portsmouth); Cecilio Quesada (Instituto Geológico y Minero de España)
bmurphy@stfx.ca

SUBMARINE VOLCANISM AND MARINE MINERALS: KEY RESOURCES FOR THE FUTURE (SS-RE11)

Leaders and affiliations : Michelle DeWolfe (Mount Royal University, Calgary); Margaret Stewart, (University of Ottawa)
mdewolfe@mtroyal.ca

https://gacmac-quebec2019.ca/

Upcoming sessions at the AGS 45th Colloquium
Fredericton, New Brunswick
February 8-9, 2019

Special Session in Memory of Dr. Trevor MacHattie

Chairs: Geoff Baldwin, Chris White, Daniel Kontak, Jacob Hanley
Geoff.baldwin@novascotia.ca

Minerals, metals, melts and fluids associated with granitoid rocks: New insights from fundamental studies into the genesis, melt fertility, and ore-forming processes

Chairs: Nadia Mohammadi, Donnelly Archibald, Chris McFarlane, Kay Thorne
Nadia.mohammadi@unb.ca

http://ags.earthsciences.dal.ca/ags2019/

VIP Awards Reminders

The Career Achievement Award - the deadline is **31 January 2019**. Please send nominations to John (john.greenough@ubc.ca)

The Gold Gélinas medal for an outstanding PhD thesis in the fields of volcanology and igneous petrology - the deadline is **28 February 2019**. Please send nominations to John (john.greenough@ubc.ca).

The Silver Gélinas medal for an outstanding MSc thesis in the fields of volcanology and igneous petrology - the deadline is **28 February 2019**. Please send nominations to Donnelly (darchiba@stfx.ca).

The Bronze Gelinas medal for an outstanding Honours thesis in the fields of volcanology and igneous petrology - the deadline is **15 April 2019**. Please send nominations to David (dlentz@unb.ca).

2017-2018 VIP Executive

Chair:	John Greenough	john.greenough@ubc.ca
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