



# Mineralogical Association of Canada

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## MAC TRAVEL AND RESEARCH GRANT AWARDS IN 2017

The Mineralogical Association of Canada (MAC) awarded 14 student travel and research grants in 2017 that totaled \$10,000: one went to an undergraduate student, five to MSc students, and eight to PhD students. Congratulations to these deserving individuals! Excerpts of their reports follow.



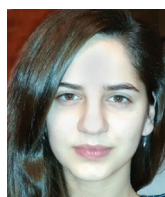
**Jamie Cutts** is a PhD student at the University of British Columbia (Canada) under the supervision of Drs. Matthijs Smit and James Scoates. He received the MAC Student Travel Grant to visit the Vegacenter at the Swedish Museum of Natural History in Stockholm to conduct U–Pb analyses on rutile using a laser ablation multi-collector inductively coupled mass spectrometer (LA–MC–ICP–MS). These analyses

are crucial to one of the chapters of his PhD dissertation, which involves constraining rates of exhumation for deeply buried continental crust. This study relies on U–Pb geochronology of rutile to investigate exhumation rates, specifically using the well-constrained closure temperature to Pb-diffusion at the rim of rutile grains (~500°C). Cutts also attended the 2017 International Eclogite Conference, which was held in Åre (Sweden).



**Garrett Harris** is an MSc student at the University of Alberta (Canada) under the supervision of Dr. D. Graham Pearson. Harris used his travel grant to attend the 11<sup>th</sup> International Kimberlite Conference in Gaborone (Botswana) in 2017. The conference included five days of technical sessions, including the topics of emplacement and economics, diamond substrate, diamonds, kimberlites and related magmas, and exploration and mining. Garrett presented his MSc research as a poster titled, “Mantle Composition, Age, and Geotherm beneath the Darby Kimberlite Field, West Central Rae Craton.” This is the world’s leading conference on the topic of diamonds and kimberlites, and Harris felt deeply honoured to receive the best student poster award. Furthermore, he attended a post-conference field trip to major mines in Botswana, which was an invaluable experience. Attending the 11<sup>th</sup> International Kimberlite Conference will be the highlight of his Master’s degree.

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**Kelsey Lamothe** is an MSc student at McGill University (Canada) under the supervision of Dr. Galen Halverson. Lamothe traveled to the Metal Geochemistry Center at Yale University in New Haven (Connecticut, USA) to measure chromium isotope ratios in a suite of shale samples from the late Mesoproterozoic Bylot Supergroup. The acquired Cr isotope data will help constrain when, during the

Proterozoic, the atmosphere started to become significantly oxygenated. This can be done because isotopic fractionation of Cr occurs during terrestrial weathering when atmospheric oxygen levels are above a known threshold. Sample preparation was done in at McGill University, including major and minor element concentration measurements, and suitable samples were selected for Cr isotope analysis. During the two weeks Lamothe spent at Yale University, she was able to learn column chemistry in a world-class laboratory and had the invaluable opportunity to ask questions of leading experts in Cr biogeochemistry. The results of this study will be published soon.



**Rebecca Lynch** is a PhD student at the University of Victoria (Canada) under the supervision of Dr. Dante Canil. The MAC travel grant has allowed her to continue her research into volcanic trace metals (e.g. Cu, Zn, V, Mo, Cd, As, which are volatile trace metals that degas from volcanoes) that are liberated to the atmosphere. Laboratory experiments allowed Lynch to collect trace metals as condensed

microscopic crystal phases. To analyze and help identify the crystals, she imaged the condensates on the scanning electron microscope (SEM) at the University of Victoria. This SEM work provided information about the crystal shape and variability of the trace-metal species in her experiments and may help to identify key variables that control trace-metal behaviour in volcanic gases. The MAC grant also helped her produce publication quality images of her experimental products.



**Svieda Ma** is an MSc student at Queen’s University (Canada) under the supervision of Drs. Dawn Kellet and Laurent Godin. Ma’s research aims to establish the deformation–temperature history of the Bathurst Fault (eastern Slave craton) through microstructural analysis and geochronology. The MAC grant allowed her to travel to the University of Massachusetts Amherst (USA) for in situ monazite dating using an

electron microprobe. This method preserves the microstructural context of monazite grains such that ages can be linked to stages of ductile deformation in the host rock. Monazite U–Th–Pb dates from synkinematic monazites suggest that ductile shearing occurred at ~1,933 Ma and 1,895 Ma in rocks affected by the Bathurst Fault, which was subsequently overprinted by brittle deformation features such as fracture networks and cataclasis. The onset of brittle deformation was constrained to  $\leq 1,839$  Ma. Brittle deformation appears to have localized along the older ~1,933–1,895 Ma ductile high-strain zone parallel to the trend of the Bathurst Fault. The brittle Bathurst Fault likely behaved as a permeable basement structure capable of transporting ore-bearing fluids.



**Emily Mick** is an undergraduate student at the University of Ottawa (Canada) under the supervision of Prof. Olivier Nadeau. The MAC travel grant allowed her to present her research on the petrography and geochemistry of fresh and hydrothermally altered rocks from the Vulcano and Campi Flegrei volcanoes (Italy) at the 2017 GAC–MAC conference as a poster. This was her first time at a conference and was, thus,

the first opportunity to show her research. Mick received invaluable feedback on her work, which she can apply going forward. From attending talks, seeing posters, and speaking to professionals over three days, she has been able to gain important insight into the industry that she hopes to join one day. She has learned a tremendous amount, which would not have been possible without this grant.



**Rhea Mitchell** is a PhD student at Carleton University (Canada) under the supervision of Profs. Sharon Carr and Robert Berman. The MAC travel grant allowed Mitchell to attend the 2017 European Geosciences Union General Assembly in Vienna (Austria) where she presented a poster based of her PhD research, “Prolonged Episodic Paleoproterozoic Metamorphism in the Thelon Tectonic Zone, Canada:

an in-situ SHRIMP/EPMA Monazite Geochronology Study” at the session New Geochronological Approaches for Quantification of Geological Processes. Mitchell also participated in the pre-meeting Reviews in Mineralogy and Geochemistry short course entitled Petrochronology: Methods and Applications. Petrochronology is a field

of study that uses geochemistry, textural analysis, thermodynamics, and modeling to provide petrological context to geochronological ages. The short course provided a broad and thorough review of cutting-edge petrochronological techniques and applications, allowing her to network with international colleagues and to provide her with a solid foundation that she can apply to her PhD research.



**Kevin Neyedley** is a PhD student at Saint Mary's University (Canada) under the supervision of Dr. Jacob Hanley. Neyedley attended the European Current Research on Fluid Inclusions (ECROFI) conference in Nancy (France), which was a great learning opportunity. Many of the presentations had a direct application to his current research project, entitled "Deciphering the Fluid and Melt History of

the Caribou Lake Gabbro through the Analysis of Fluid and Silicate Melt Inclusions". One presentation really stood out for him: mapping silicate melt inclusions using Raman spectroscopy. The presenter of this talk gave him excellent advice on how to approach a problem he has been having. It was also useful to talk with students and professors from around the globe to get their insight into his research. Networking at the ECROFI conference proved to be beneficial and may result in Neyedley participating in a summer internship.



**Stéphane Poitras** is an MSc student at the University of Alberta (Canada) under the supervision of Dr. Graham Pearson. Poitras attended the 4<sup>th</sup> International Diamond School in Bressanone/Brixen (Italy). His MSc research is on diamond exploration in part of the southwestern Northwest Territories (Canada). Poitras wants to understand the lithospheric mantle how diamonds form. processes. The

school provided an excellent venue to update his knowledge of these research topics (i.e. cratons, diamonds, and kimberlites) and to meet individuals from the diamond industry. It was a rewarding experience, one that provided many new and interesting ideas regarding his thesis project, as well as future collaborative and mentorship opportunities. In particular, meeting professors Nick Sobolev and Malcolm McCallum, whose diamond research findings Poitras extensively employed in his own research, proved very insightful. Additionally, he was able to thoroughly discuss an upcoming publication with one of his peer-reviewers, Bruce Kjarsgaard from the Geological Survey of Canada. This was most instructive to talk about some of his kimberlite indicator mineral geochemical results and viable locations for source kimberlites within the Northwest Territories.



**Marion Saby** is a PhD candidate at the Université du Québec à Montréal (UQAM, Canada) under the supervision of Profs. Daniele L. Pinti (UQAM) and Vincent Van Hinsberg (McGill University, Canada). She received a MAC grant to travel to Iceland and New Zealand. In Iceland, she analysed volcanic gases in Theistareykir, her study area. With the help of the Icelandic Geological Survey (ISOR) in Akureyri, she

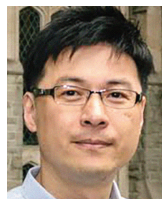
collected cuttings from geothermal wells drilled down to 2.5 km. From there, she met other ISOR geologists at the Krafla camp where she stayed for a week. Her study area was always thrilling, with geothermal wells blowing high-temperature vapours, and fumaroles and mud pots everywhere sounding like the Earth was breathing! She collected noble gases from boiling mud pots and fumaroles, water from hot and boiling springs and surface rocks in order to analyze elemental and isotope geochemistry. The results will help her decipher the sources and pathways of metals in magmatic-hydrothermal environments.



**Gavin Tolometti** is an MSc student at the University of Western Ontario (Canada) under the supervision of Drs. Gordon Osinski and Catherine Neish. Tolometti received a MAC travel grant to present his thesis work at the GAC-MAC 2017 in Kingston (Ontario, Canada). Being an international student from the UK, he found the Queen's University campus to have a European cultural appearance, which made him feel right at home. The most exciting session was that on hydrothermal processes and alteration. Tolometti presented his own poster, "Variation in Petrography of Basaltic Lava Flows with Similar Surface Roughness". The goal of this study is to use the Craters of the Moon National Monument and Preserve (Idaho, USA) as an analog for planetary lava and impact melt flows by comparing the petrography and surface roughness of the lava flows. The conference participants asked many questions and offered helpful comments on his poster.



**Connor Turvey** is a 4<sup>th</sup> year PhD student at Monash University (Australia) under the supervision of Dr. Sasha Wilson. His PhD research is on the carbon sequestration potential of hydrotalcite minerals, anionic clays that can form and trap atmospheric CO<sub>2</sub> within the waste material of some mine sites. The formation of these clays has the potential to increase the amount of CO<sub>2</sub> that is being sequestered at ultra-mafic mine sites, however these clays remain relatively poorly understood. The MAC travel grant enabled Turvey to travel to the University of British Columbia (UBC) to conduct mineral dissolution experiments on hydrotalcites using a combined flow-through reaction chamber and an ICP-MS. This research will form part of his PhD thesis. While working at UBC, he was also offered a post-doctoral research position for 2018.



**Ching-Pao Wang** is a geophysics PhD student at the University of Western Ontario (Canada) under the supervision of Prof. Sean R. Shieh. His research uses a diamond anvil cell to study nitrogen solubility in the major mantle silicates, to explore nitrogen-bearing phases, and to evaluate nitrogen storage in the deep Earth. Wang's research will first focus on the nitrogen solubility of olivine, wadsleyite, and ringwoodite, at different pressure and temperature conditions. High-pressure and high-temperature (HPHT) nitrogen solubility studies were performed at the 13-ID-D beam line of the Advanced Photon Source (APS) in Chicago (Illinois, USA). Four different nitrogen-infused olivine polymorphs were synthesized at 15–26 GPa, and 1,800–2,400 K. In situ X-ray diffraction patterns were taken on all synthesized samples to identify the different HPHT phases. Nitrogen analyses will be carried out at Department of Earth Sciences in Western University.



**Tianqi Xie** is a PhD student at the University of Western Ontario (Canada) under the supervision of Drs. Gordon Osinski and Sean R. Shieh. She received a MAC travel grant to present her work at the Lunar and Planetary Science Conference (48<sup>th</sup> LPSC) in Woodlands (Texas, USA). During her stay, she presented the poster "Raman Study of Shock Effects in Lunar Anorthite from the Apollo Mission." Not only did she discuss her data with researchers from a wide variety of backgrounds, she also received valuable feedback from experts in the field. She attended a variety of talks on the Moon and Mars that affected her profoundly, and her future research path has now changed to research more on these subjects.