

EARTH SCIENCES NEWS

For Faculty, Staff, Students, Alumni, and Friends of Dalhousie Earth Sciences

May 2018

Greetings from the Chair

It is a great pleasure to provide you a report on this year's Earth Sciences activities. As what has become an ongoing theme, the department is in a period of change, with faculty retirements, but some balance with renewals. Nick Culshaw and Charlie Walls retired at the end of June 2017 with more than 50+ years of service between them. We celebrated their careers at a reception in June, just before Nick headed off to his retirement house in Barrie's Bay Ontario, comfortably on top of his beloved Grenville Province. Charlie and Nick, we wish you well in this next stage of your lives.

The department also saw the passing of two of its much beloved former faculty, Clint Milligan (23 January, 2018) and Basil Cook (4 May, 2018). On behalf of the department, I'd like to extend my condolences to their families. We have included more on their careers in this issue.

This year, the department has established the Zentilli Graduate Student Award, recognizing the career of Professor Emeritus Marcos Zentilli, a pioneer in apatite fission-track geochronology and beloved mentor who helped shape the lives and careers of many geologists during his time at Dalhou-

sie. The award will help attract and retain the highest calibre graduate students, and was established by seed money provided by Marcos. We are in the process of building the principal of the award, so please consider making a donation (see the end of the newsletter for details).

I am grateful to the graduate students for making this year's Welcome Back BBQ and holiday potluck a success, as well as challenging the faculty to "Jeopardy!", and the faculty-student curling challenge (we won....I think). The undergrads did a fabulous job with an elegant end of the year event at the Atlantica Hotel. As you will see inside, this is a very high-achieving group, with numerous awards for their research presentations, as well as highly placed finishes in national and international competitions.

The department also sponsored an alumni reception at the PDAC in the iconic Nova Scotia room at the Royal York hotel, offering the current students a chance to connect and be mentored by our past graduates. This event had very good attendance, and we are planning more alumni-related events in the coming year, including a Q & A discussion between students and alumni at the Halifax Public Library. If you are interested in helping and have ideas for



future alumni events, please let me know.

Finally, I'd like to thank Shannon Sterling and Becky Jamieson who took the time to put together this year's newsletter. To find out more about departmental activities, visit our website and check out the department blog: <http://www.dal.ca/faculty/science/earth-sciences.html>. Comments and feedback are always welcome, and I encourage you to contact me personally.

James Brennan,

Professor & Department Chair



Photo: E. Hallyard

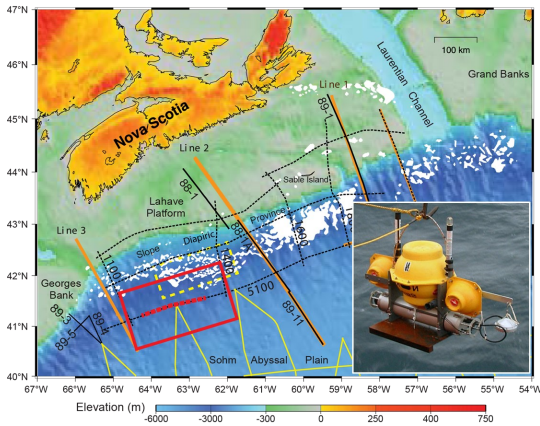
Combating increasing trace metals in Nova Scotia freshwaters: Experimental Helicopter Liming Research in West River Sheet Harbour, Nova Scotia Partnership between Dalhousie Earth Sciences (Sterling Hydrology Lab), NS Department of Natural Resources and the Nova Scotia Salmon Assoc.

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Department News

New Department Infrastructure



New National Facility for Seismic Imaging (NFSI): Mladen Nedimović and a Canada-wide group of seismologists received \$17M from the Canada Foundation for Innovation (CFI) and other agencies to establish a seismic imaging facility at Dalhousie. NFSI will be equipped with 130 state-of-the-art broadband ocean bottom seismometers (*inset*), making it the largest facility of its kind in the world.



New Earth Sciences Drill Core Lab: With funding from the Shell Experiential Learning Fund and the Faculty of Science, the long-anticipated teaching and research drill core lab opened in September, 2017. **Grant Wach** and **James Brennan** (*left*) explain the finer points of core logging to guests Ian Hill (Associate VP Research), Chris Moore (Dean of Science), Steve Harding (Assistant VP Development), and Catherine Yuill (FoS Advancement). *Right*, Carla Skinner (Dal Alumni and Shell Rep.) unveils the Drill Core Lab plaque.

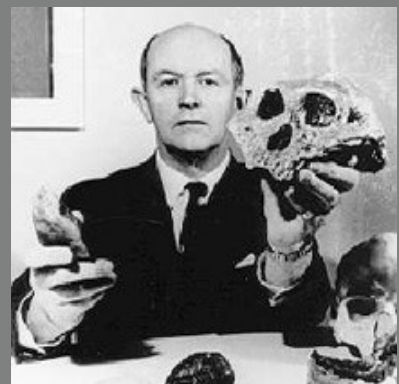
In Memoriam

The department mourns the recent passing of two giants of 20th-century Dalhousie geology.



Dr. G.C. Milligan (1919-2018)

Clint Milligan passed away in Halifax on Jan. 23, 2018, at the age of 99. A Dal graduate and World War II veteran, Clint was a skilled surveyor and legendary field geologist. As a professor in our department from 1957-1985, he taught structural geology and field methods, and was undergraduate advisor for many years. The **Milligan Room** is named in his honour.



Dr. H.B.S. Cooke (1915-2018)

Basil Cooke passed away in White Rock, BC, on 4 May 2018, at the age of 102. Originally from South Africa, Basil was a vertebrate paleontologist and professor in our department from 1961-1981. He was the first winner of the Dalhousie Alumni Teaching Award, and served 6 years as Dean of Arts & Sciences. at Dalhousie.

Honours Symposium 2018

The culmination of the undergraduate year was the Honours Symposium, held in the Lord Dalhousie Room on Saturday, April 7. Eight students presented the results of their research. Topics ranged from sediment deposition in the Gulf of Aqaba (*below*), to calcite fracture-filling, to geochronology, to Moho structure at the East Pacific Rise. The symposium was well attended by faculty and students, and the audience was treated to excellent presentations and spirited discussions. Special thanks to **Djordje Grujic**, our Honours Co-ordinator for 2017-18.

Best Thesis Award: Jacob VanderWal (*supervisor J. MacDonald, U. Glasgow*).

Best Presentation Award: Graham Kerford (*supervisor M. Nedimović*)

Djordje Grujic, left, introduces the first speaker, Ariel Greenberg.



Who's Who in Dalhousie Earth Sciences

Faculty



James Brenan
Experimental Geochemistry



Isabelle Coutand
Thermochronology / Structure



Richard Cox
Mineralogy / Petrology



Yana Fedortchouk
Petrology / Mineral Deposits



John Gosse
Geomorphology / Geochronology



Chris Greene
Geographic Information Systems



Djordje Grujic
Structure / Tectonics



Mladen Nedimovic
Geophysics



Lawrence Plug
Geomorphology



Anne-Marie Ryan
Environmental Geology



Owen Sherwood
Isotope Biogeochemistry



Shannon Sterling
Hydrology



Grant Wach
Petroleum Systems / Stratigraphy



Mike Young
Structure / Field Methods

Emeritus & Post-retirement



Barrie Clarke
Petrology



Martin Gibling
Sedimentology



Rebecca Jamieson
Metamorphism / Tectonics



David Scott
Paleontology



Marcos Zentilli
Ore Deposits / Geochronology

Special thanks to Sean Hartwell

For his help as Acting Administrator this year — we could not have managed without you!

Staff



Ann Bannon
Administrator



Tom Duffett
Geological Technologist



Norma Keeping
Administrative/Graduate Secretary



Roman Kisilitsyn
Noble Gas Lab Technologist



Brant Laidler
Teaching Lab Technician



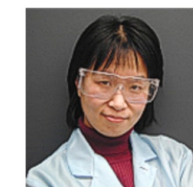
Dan MacDonald
Microprobe Lab Technologist



John Thibodeau
Computer & IT Technician



Darlene Van de Rijt
Administrative Secretary



Guang Yang
TCN Facility Manager

Honours & Awards

James Brenan: Killiam Professor, Faculty of Science, 2018-2023.

Chris Greene: Earth Sciences Professor of the Year, 2017-18.

Anne-Marie Ryan: 2017 Anne Marie MacKinnon Educational Leadership Award, presented by the Association of Atlantic Universities (AAU).

Mladen Nedimović and colleagues: CFI award for National Facility for Seismic Imaging (see p.2).

John Gosse and University of Ottawa partners: CFI award for microSTARR (Ultra-Sensitive Tracer Analysis in Radioisotope Research).

Grant Wach, Owen Sherwood, and colleagues: NRCan award for Gas Seepage Project (GaSP) to study methane emissions and mitigation in Atlantic Canada.

Owen Sherwood was awarded a CFI grant to establish his Laboratory for Stable Isotope Biogeochemistry (see p. 7).



*Moving on In June, 2017, the department gathered at the University Club to celebrate the careers of **Nick Culshaw** and **Charlie Walls**, and to wish them well in their retirements. They are greatly missed!*

Undergraduate Student News

Dawson Geology Club

The Dawson Geology Undergraduate Club organized many fun events this year, including Women in Mining Event, Board-game night, Axe-throwing night (*below*), Mooseheads game, Holiday Potluck, "Geopardy", and bowling.



2016-17 Awards

MacEachern-Ponsford Memorial Award: Charlotte Adams
 Michael J. Keen Award: Ariel Greenblat, Sarima Vahrenkamp
 Logan Prize (awarded by PDAC & GAC): Jacob VanderWal
 University Medal for 2017 Graduating Class: Erin Anderson
 David Barlow Award: Olivia Rolfe
 James L. Hall Award: Galena Roots
 G.V. Douglas Award: Olivia Rolfe
 CSPG Student Industry Field Trip (SIFT): Graham Kerford
 Student-Industry Mineral Exploration Workshop (S-IMEW): Sarah McLeod
Conference Presentations:
 AUGC Best Economic Geology Presentation: Kate Woods
 AUGC Best Student Presentation: Ariel Greenblat
 AGS Rupert McNeil Award for best undergraduate presentation: Kate Woods
 Geological Association of Canada, Volcanology/Igneous Petrology Division Bronze Medal for Best Undergraduate Thesis: Corin Jorgenson

We are hosting the 2018 Atlantic Universities Geoscience Conference (AUGC) at Dalhousie University, November 1-3, 2018. Hope to see you there!



Left, Dalhousie Earth Science students at AUGC 2017 in St. John's NL. Below, Earth Ring Ceremony, administered by past Chair Pat Ryall with Grant Wach. Congratulations to our EAGE team who will be travelling to Copenhagen in June as Worldwide Finalists in the EAGE Laurie Wake FIELD Challenge.



The Rupert MacNeill Award for best undergraduate student oral presentation to Kate Woods (Dalhousie University) and her co-author James Brenan for her talk "An experimental study of the effect of water on chromite saturation in komatiite (photo: A. Chu).



Graduate Student News

2017-18 Defences & Graduations

Graduated

Jason Loxton (Ph.D.) (M. Melchin, M. Gibling)

Zhouyuan Li (M.Sc.) (Y. Ferdortchouk)

Natasha Morrison (M.Sc.) (G. Wach)

Darragh O'Connor (M.Sc.) (G. Wach)

Defended

John Evangelatos (Ph.D.) (D. Mosher, J. Gosse)

Jennifer Frail-Gauthier (Ph.D.) (D. Scott, M. Gibling)

Taylor Campbell (M.Sc.) (G. Wach)

Rachel Milligan (M.Sc.) (Y. Ferdortchouk)



Dawson Geology Graduate Society

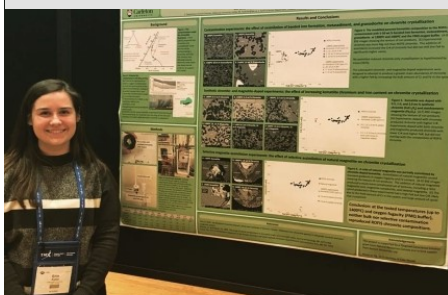
2017-18 was another busy year for DGGS! A highlight of the year was the 2-week field trip to Chile in May, with generous financial support from the Shell SELF fund, CSEG, CSPG, and PDAC. We explored the effects of the Peru-Chile subduction zone on seismic hazards, volcanism, climate, and mineral deposits. The trip included a visit to the giant Chuquibambilla copper mine (above). Other events this year included a graduate student vs faculty curling challenge (left), another successful Art Gala and Silent Auction, where students and faculty donated their handcrafts, photos, and artwork to raise funds for DGGS activities. DGGS also organized the weekly DIRT talks, a department BBQ, and a very popular holiday potluck.



Hurry hard! **Masoud Aali** and **Kim Taylor** sweep for the yellow team at the faculty vs student Curling Challenge (above).



Above, Graduate student (Grujic) **Yuqiu Zhao** collecting samples in Bhutan.



Both Dawson Club and the Dawson Geology Graduate Society led activities for the Dalhousie Open House and Discovery Day activities. Thank you! Above, **Bryan Maciag** watches as **Kate Woods** makes magma.

Congratulations to **Erin Keltie** (left) who won Best MSc Poster Award at the PDAC

DGGS Executive 2017-18:

President: Erin Keltie

Vice-President: Bryan Maciag

Treasurer: Sydney Stashin

Secretary: Laura-Ann Broom

Scholarships & Awards

Awarded and/or Held 2017/2018

PDAC-SEG M.Sc. Student Poster 1st place: Erin Keltie

Society of Economic Geologists Research Award: Erin Keltie, Bryan Maciag

NSERC Post Graduate Scholarship: Sean Kelly (PhD), Lobke Rotteveel (MSc)

Nova Scotia Graduate Scholarships: Sean Kelly (PhD), Lobke Rotteveel (MSc)

Dalhousie President's Award: Sean Kelly (PhD)

TOSST (Transatlantic Ocean System Science & Technology) award: Ana Corbalan-Castejon, Masoud Aali

ESRI Canada GIS Scholarship: Laura-Ann Bloom, Bryan Maciag, Cody Paige

Imperial Oil Scholarship: Sydney Stashin

Alumni News



Earth Sciences at PDAC 2018

The Prospectors & Developers Association of Canada (PDAC) held its annual convention in Toronto in March 2018. The department held a joint alumni reception with the Faculty of Engineering on Tuesday, March 8, in the Nova Scotia Room at the Royal York Hotel. Our special guest was Emeritus Professor **Marcos Zentilli** (*front row, centre*). In addition to many alumni, faculty members **James Brenan**, **Grant Wach**, and **Mike Young** were present along with a number of undergraduate and graduate students (*right*). It was a great night of making new acquaintances and renewing old ones, in the spirit of Champlain's Order of Good Cheer (*pictured in background*).



Alumni Honours

Dr. Sam Akande (PhD, 1983) was elected a Fellow of the Nigerian Academy of Science for 2018, an honour granted to very few geoscientists. Sam is a Professor of Geology at the University of Ilorin, Nigeria.



Dr. Kathryn D. Sullivan (*above*) (PhD, 1978) was named a "Dalhousie Original" as part of the 2018 Dalhousie 200th anniversary celebrations. Dr. Sullivan, a former NASA astronaut, recently retired as director of the National Oceanographic and Atmospheric Administration (NOAA).



Dr. Victoria Arbour (BSc, 2006) (*left*) poses with an ankylosaur tail club. Dr. Arbour is currently an NSERC post-doctoral fellow in evolutionary biology and vertebrate paleontology at the Royal Ontario Museum. Her particular interest is the ankylosaurs, a group of armoured dinosaurs noted for their "cool tail weapons". Victoria began her dinosaur research with her Dal honours thesis, supervised by **M. Graves**.



Ziapelta, an ankylosaur with a fully developed tail club. (Artist: Sydney Mohr)

Victoria and her research have been featured several times on the CBC radio show *Quirks and Quarks*.



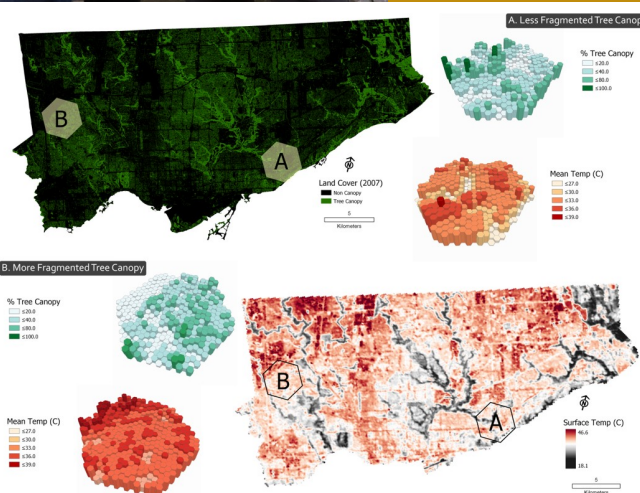
Jillian Kendrick (BSc, 2015) was awarded a prestigious Vanier Scholarship to pursue PhD research at the University of Waterloo under the supervision of fellow Dal alumnus **Dr. Chris Yakymchuk** (BSc, 2008).

Research Profiles



New faculty member Owen Sherwood will be taking part in an upcoming expedition to the Canadian Arctic aboard the *CCGS Amundsen* in August. The goal of the expedition is to core sediments and collect deep-sea corals from several sites in Baffin Bay and the Northern Labrador Sea. The sites include recently discovered deep-sea coral mounds, located off Disko Bight, Greenland, that concentrate and trap sediments. The rapidly accumulating sediments could offer unprecedented high-resolution paleoceanographic data in this climatically-sensitive environment. Materials collected during the expedition will be analyzed in the department's new, CFI-funded laboratory for Stable Isotope Biogeochemistry, located in the Steele Ocean Science Building.

Owen Sherwood (left) with PhD student Sam Davin (UQAM-GEOTOP) with a specimen of deep-sea coral collected by remotely operated vehicle on board the *Amundsen*, Baffin Bay, July 2016. (Image: Vonda Wareham)



New faculty member Chris Greene's research examines how the spatial patterns of trees and built-features affect the urban heat island (e.g., Greene & Kedron, 2018 *Applied Geography*). They found that areas with less-fragmented forest canopy had reduced daytime average surface temperatures. Image at left: comparing two study areas with similar percent tree canopy coverage but different levels of fragmentation (A = less fragmented, B = more fragmented) to highlight the influence of tree canopy configuration on surface temperatures at different scales for Toronto, ON. Hexagon heights are relative to their respective canopy percentage and mean surface temperature.

Field Notes



Our students have had a busy year in the field, including trips with the Advanced Field Mapping School in Nevada and Trinidad, the Petroleum Geoscience Field Methods course, and Shell-field trips. Above: EARTH students visiting the Dufferin Mine, November 2017. Middle, Fall petroleum field trip. Right: Serena Vahrenkamp and Max Angel conduct soil bulk density analysis and water content during a EARTH 3701 Hydrology field visit.

We thank Dalhousie University, our Alumni, and the Shell Experiential Learning Fund for their generous support of our field programme!

From all of us to all of you ...



... please keep in touch!

Dalhousie Department of Earth Sciences, October 2017

Giving to Dalhousie Earth Sciences

Your gift provides assistance to the department to support a variety of activities that enhance the learning experience. This includes our various field schools and scholarships, and support for other undergraduate and graduate activities. Please consider a donation within a specific category, or donate to the department to use in the area of greatest need. For details, visit: <https://alumniapps2.dal.ca/giving>.

Consider a donation to the new Marcos Zentilli Graduate Award!

To receive information via email about upcoming departmental events, or to receive the departmental newsletter, please ensure that your personal information on file is current. You can update your contact information at:

http://www.dal.ca/faculty/science/earth-sciences/alumni_friends/update_your_contact.html

Marcos Zentilli Graduate Award

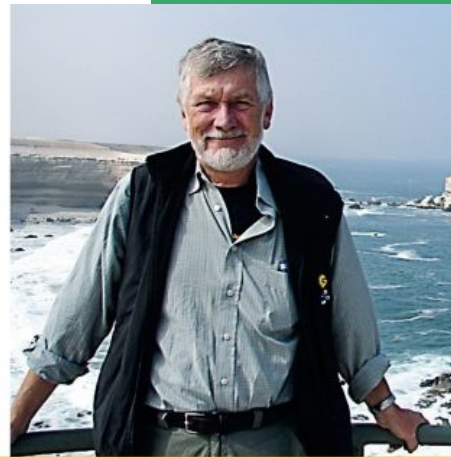
In honour of Dalhousie Emeritus Professor of Economic Geology, Marcos was a member of the Department of Earth Sciences (Geology) from 1973-2005. A pioneer in apatite fission-track geochronology and beloved mentor, he shaped the lives and careers of many Dalhousie geologists.

We invite you to support...

This award recognizes Marcos' legacy by providing support to attract and retain graduate students of the highest calibre to conduct their studies in the Department of Earth Sciences

Please support students in the Department of Earth Sciences today.

To give, please visit, giving.dal.ca/zentilli



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