EARTH AND ENVIRONMENTAL SCIENCES

DALHOUSIE UNIVERSITY

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

Greetings from the Chair

It is a great pleasure to once again provide you a report on Earth and Environmental Sciences activities for the past year.

A big upheaval has been the long-awaited renovations to the department space and significant expansion. This includes the addition of ~5000 ft^2 of office (~15 offices), research and teaching (one 1300 ft^2 classroom for GIS teaching) space to the department "footprint" on the 3rd floor of the Biology wing of the Life Sciences Centre (LSC). To improve the department teaching space for ENVS-related courses, an existing classroom has undergone renovation and includes an adjoining wet lab with a fume hood and equipment for teaching sample preparation. With that completion, all the department teaching space has now been renovated. Stay tuned for notice of an alumni event in Fall 2023 to visit the department and celebrate our expansion.

Although the Fall of 2022 saw some of our in-person events still curtailed by COVID-19, the department has still been striving to promote activities that involve our alumni. Instead of a reception at the PDAC, we decided to keep events more local this year, which recognizes the growing body of recent alumni who are finding jobs here in Nova Scotia. On March 22, 2023, the department hosted a well-attended Alumni-Student Reception at the newly reconstructed Lions Head Pub in Halifax (see photo). We are seeking to further enhance our alumni engagement, so if you are interested in helping and have ideas for future alumni events, please let me know.

This past year was also marked by the passing of our EES colleague Nick Culshaw on August 10, 2022. Nick was a faculty member from 1986-2017. I had the pleasure of co-teaching a graduate course with Nick entitled "Voyage to Early Earth", which ended with a week-long field trip to Nick's beloved northern Ontario, including a visit to the spectacular Munro Township komatiites – which he had never seen! Throughout the trip (as was in his career), Nick's observations and interpretations of the field geology were peerless. We will remember Nick as a great friend, a passionate scientist, and a dedicated teacher. He is missed, and more details on his life are provided in a separate section of the newsletter.

After seven years at the helm, I will be finishing my term as chair in December of 2023. Things are in pretty good shape: enrollments in both programs are on the upswing, we have new space to enjoy, and we hope to welcome at least one new faculty colleague in the coming months. I look forward to continuing to work with our outstanding faculty, staff and students to make EES a success.

Finally, I would like to thank Dr. Richard Cox and the department outreach committee for another outstanding job on the Newsletter. To find out more about departmental activities, visit our website: https://www.dal.ca/faculty/science/earth-environmental-sciences.html, or check out our Twitter, Facebook and Instagram feeds. Comments and feedback are always welcome, and I encourage you to contact me personally.

Sincerely,

James Brenan, Killam Professor and Department Chair

James (standing center right of photo) saying hi to everyone at the Alumni-student even at the Lions Head Pub held on Wednesday, March 22nd. What a great turnout and a wonderful evening!

Department News

A Warm Welcome Back to Campus!

The Department of Earth and Environmental Sciences was again pleased to be able to host our annual barbeque to kick-off another fun and successful year. The Earth and Environmental Science undergraduate students stepped up at the beginning of

the fall semester, to host our welcome BBQ with Emma Taniguchi cooking vegan burgers and hot dogs (Allie Pell to the right). The weather was wonderful and the event was so well attended that several batches of extra food were prepared to feed the happy and hungry attendees. The event has of course been somewhat restricted in recent years. But we were all thrilled to host everyone again, safely and in the outdoors. Thanks to everyone for getting the year off to such a great start!

Media, Events and Research News

The new teaching classroom and preparation lab facility, housed in rooms LSC2030 (top images) and LSC2020B (bottom) have now been completed. The classroom was widely used through both the Fall and Winter semesters for teaching a range of courses. This room includes new AV systems and benches that can be reconfigured quickly to host

different teaching exercises. Storage cabinets, both fixed and mobile, also allow for equipment to be easily accessible. Lighting can be fully controlled and dimmed for presentations or fully illuminated for lab work. A fully equipped preparation room which can be accessed through the classrooms (see the door on the far , back-left of the room) will also shortly be available. The fume hood has been installed along with benches and cabinets (below). All of the necessary safety certifications, will soon be completed, allowing us to begin development of new lab-based learning modules for a variety of environmental chemistry and geochemistry courses. Furthermore, the department will shortly transfer a Thermo iCAP ICP-MS from the HERC lab, along with several sample introduction systems including a laser ablation microprobe. This will be housed in room formerly assigned to the Electron Microprobe facility. These new lab and analytical facilities will greatly enhance the research for our graduate students and the teaching of analytical methods in courses across both of our degree programs.

We will be hosting an event to unveil these new facilities and introduce them to our community during the upcoming academic year. Watch for announcements on our webpage (https://www.dal.ca/faculty/science/earth-environmental-sciences/news-events.html).

The Sterling Hydrology and Climate Change Research Group has had another busy year with several ongoing projects including looking at trends in aluminum concentrations in acidified regions in northeastern North America and Europe, to assess trends and drivers of Al concentrations. This includes sampling at nearly 500 sites (photo below) to also identify the effects of climate change on excess Al.

The use of enhanced mineral weathering in fresh water systems is being studied with industry partner, CarbonRun (https://carbonrun.io/). The group is researching new ways to remove carbon dioxide from the atmosphere, to mitigate climate change, by adding natural carbonate rock dust to freshwater rivers (image below).

Continue to follow the developments of all of Dr. Sterling's research at:

https://sterlinghydrologyresearchgroup.com/research

The Stable Isotope Biogeochemistry Laboratory has been working on a number of project in their newly established analytical facility. Dr. Owen Sherwood has been supervising research specializing in high precision measurements of carbon (^{13}C) and nitrogen (^{15}N) isotopes in organic compounds, including amino acids, alkenones, fatty acids, and hydrocarbons. This is achieved using a state-of the-art IRMS with GC sample introduction systems (below).

Current research projects includes studying paeloceanogrpahy using deep-sea corals, some species of which can live for hundreds to thousands of years and preserve biogeochemical information in seasonal growth rings.

Sediment core samples from the Gulf of Maine and Scotian Shelf (above) are being used to provide proxies for paleoceanographic changes on millennial timescales and to examine biogeochemical information.

The group's research also extends to the Arctic (below), where algae are being sampled from sea ice and analyzed for amino acid C-isotopes signatures, representing the first such analysis of Arctic sea ice algae and phytoplankton.

And expanding on this research the group is working with researchers at the Universidad de la República Uruguay to analyze compound-specific isotopes in samples of particulate organic matter collected in Antarctic waters. The project is also novel in that it is the first study of amino acid isotopes in southern ocean plankton.

Closer to home, sewage wastewaters, one of the main contributors of point-source pollution to coastal marine environments, are being analyzed for their stable nitrogen isotope (δ15N) compositions. Very few studies have actually quantified the δ15N of sewage wastewater directly. This project is measureing the δ15N in dissolved and particulate forms of wastewater nitrogen at various stages of treatment.

Follow all of the group's research at:

https://www.dal-sibl.com/

The Queen Elizabeth Scholarship program at Dalhousie University focuses on the professional development of young people who have a desire to make a change for an environmentally and socially sustainable future. Dr. Tarah Wright in the Department of Earth and Environmental Sciences administers the program that enables students to engage in 4-month funded internships at the Cape Eleuthera Institute in the Bahamas. The image)above) is of Dal student Xinya Calhoun during her Winter 2023 internship, on an out planting trip with her coral team. The team takes large fragments from the CEI coral nursery and secure them back onto a coral reef to help restore the depleted Staghorn coral population in the area.

You can follow all of the developments in the QEII Scholarship Program, including our own scholars, here:

https://www.dal.ca/dept/qeii-scholarships.html

Dr. John Gosse (left), was part of team that completed a study into measuring the world's oldest sample DNA. The discovery of two-million-year-old microscopic fragments of environmental DNA, or eDNA, in sediment from the Ice Age breaks a long-standing record and ushers in a new chapter in the history of evolution. Researchers from Dalhousie and several European institutions determined the fragments are one million years older than the previous record for DNA sampled from a Siberian mammoth bone. Dr. Gosse, the director of the Department's CRISDal (Cosmic Ray Isotope Sciences at Dalhousie) Lab, helped provide ages dating of the sediments, in this case, when the sediment was deposited by a stream that no longer exists (images below).

Dr, Gosse says that the amalgamation of different dating methods, including a molecular clock based on DNA, helped improve our knowledge of this important site, and reveals a time when the Greenland Ice Sheet was at a position similar to today. To read the full report of this study you can visit our website here:

https://www.dal.ca/news/2022/12/07/dna-greenland-discovery.html

The research was also featured on Global News and you can watch this here:

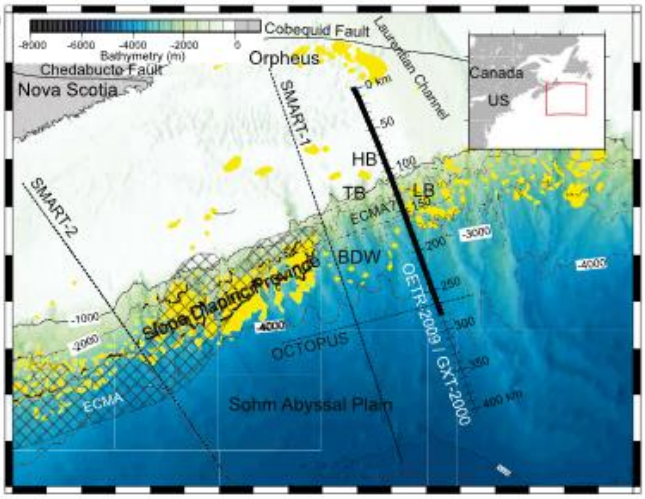
https://www.youtube.com/watch?v=D8ahCZTVvnU

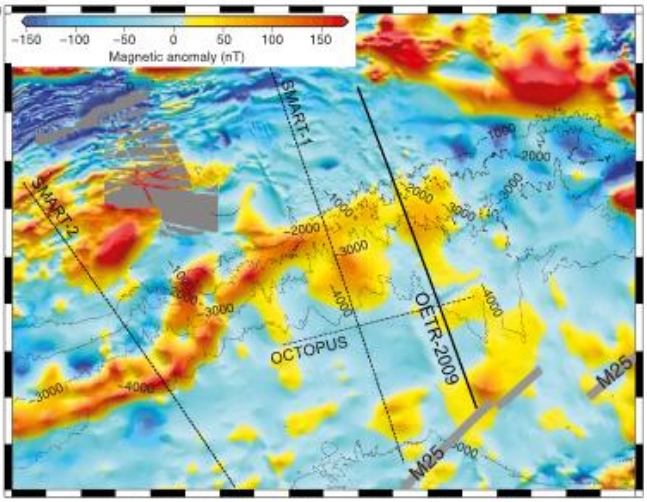
Dr. Kelvin Fong recently explained the link between urban greening and issues of health equity in an Axios article, which focused on the importance of urban forests. Dr. Fong, specializes in environmental health and justice research. He recently told Axios that the racial and social determinants that drive inequities in tree cover are not just an “urban greening problem,” but a “health equity issue."

"If you just take the health records of people over a large area, and you trace their health outcomes, you will find that those who live in areas of higher green space or tree canopy cover tend to have better health outcomes," he told them.

The full article can be found here:

https://www.axios.com/2023/05/12/tree-cover-climate-health-benefits





Recent work highlighted by the American Geophysical Union by Dal researchers (Hanchao Jian, Mladen R. Nedimović, Juan Pablo Canales, K. W. Helen Lau) offers new insights into the rifting event that created the Atlantic Ocean. The team used a technique known as full-wave inversion to analyze seismic waves, which were initially captured using 78 ocean bottom seismometers and pulses generated by an array of air guns. By including all the information in the seismic waveforms, the researchers produced a high-resolution velocity model and produced a detailed image indicating how seismic waves were reflected at different positions and depths (see images on the left for the location of the seismic lines).

On the basis of these data, Jian and colleagues identified distinct domains across the margin, representing stages of rift formation. They uncovered features suggesting that a magmatic event accompanied the final continental breakup at the Nova Scotia margin. This event forms a boundary between thinned continental crust and oceanic crust.

The EOS article and links to the published paper can be found here:

https://eos.org/research-spotlights/the-role-of-magma-in-the-birth-of-the-atlantic-ocean?

Kenneth Martyns-Yellowe, who graduated with an M.Sc. Last year, had an article published in the March/April 2023 edition of the CSPG Reservoir, entitled “The Red Head Aeolian Sandstones of the Upper Triassic Fundy Basin, Nova Scotia, Canada”. The article will be of wide interest to many who visit this classic locality each year.

Remember you can follow all of the latest EES science and news developments on our website:

https://www.dal.ca/faculty/science/earth-environmental-

Accolades

First and foremost, congratulations to Dr. Alexandra (Lexie) Arnott (below) who was voted **Professor of the Year for 2022/2023** by our undergraduate student community!

Congratulations to Mladen Nedimovic on his 5 -year appointment to a Killam Professorship. This award is meant to recognize the careers of only the most outstanding scientists. Dr. Nedimovic has been recognized for his outstanding contributions in the field of marine geophysics.

Congratulations to Dr. Kelvin Fong on being selected one of thirteen early-career health researchers in Nova Scotia to received a New Health Investigator Grant. The grant will aid Dr. Fong in the investigation of the environmental contribution to health inequalities in Nova Scotia.

Emeritus Professor Marcos Zentilli, was awarded the Queen Elizabeth II's Platinum Jubilee Medal by Lt.-Governor Arthur J. LeBlanc on Nov 24th 2022. This award is presented to Nova Scotians who have made a significant contribution to Canada, Nova Scotia, or their community. The award was made to Marcos in recognition of his volunteer work and "Contributions to International Relations" as Honorary Consul of Chile for the Atlantic Provinces since 2010.

Dr Les Eliuk (PhD with Grant Wach) was recently awarded honorary membership into the Canadian Society of Petroleum Geologists. Honorary Membership is the oldest award bestowed by the CSPG and made to persons who have contributed distinguished service to the cause of energy geosciences.

Dr. P. K. Mukhopadhyay (Muki), a good friend of EES for many years, was awarded the Gesner Medal, which recognizes " a person who has developed and promoted the advancement of geoscience in the Atlantic Region in any field of geology". Grant Wach accepted the award on Muki's behalf.

Congratulations to EES alum (BSc Honours ENVS, 2021), Samantha Howard, on being named one of Starfish Canada's Top 25 Environmentalists Under 25.

Min Liu, our current OFI Postdoc Fellow, received the distinguished PhD thesis award from the Chinese Geophysical Society (ranked#3 out of 5). This award is based on an assessment of theses in all fields of Geophysics, and there are thousands of Geophysics PhD students in China! Congratulations Min!

Congratulations to Owen Sherwood on being granted tenure and promotion to Associate Professor.

Congratulations to Yana Fedortchouk on being promoted to Full Professor.

A TRIBUTE TO NICK CULSHAW (1947-2022)

Drawing on obituary and tributes from Heubner Funeral Home, Barry's Bay, Ontario, https://www.heubnerfuneralhome.ca/obituary/Nicholas-Culshaw with notes from Martin Gibling.

Nicholas Gerard Culshaw passed away on August 10, 2022, at the age of 75. He will be remembered by generations of Dalhousie University geology students for his enthusiasm for structural geology and tectonics, his superb field skills, and his passion for teaching, as well as his memorable sense of humour and his deeply compassionate nature.

Nick spent an enormous amount of time in the field over the years, as much as anyone of his generation, and he was the consummate field geologist. He focused especially on the Grenville Province around Georgian Bay, where he made an outstanding contribution to unravelling its complex geology. He also carried out research elsewhere in the Canadian Shield, as well as in the Makkovik Province of Labrador and the Meguma Terrane of Nova Scotia. He introduced many students, colleagues, and friends to the remarkable geology of Canada, and an episode of the movie series *Geologic Journey* featured his boat skills on Georgian Bay.

A little-known fact about Nick is that he spent the austral autumn of 1971 with the British Antarctic Survey, during which he drove a sled with nine dogs. His fellow sledge-driver Brian Hill remembers him as a great companion, chipping away at the rocks wherever they could be found (which was not often). Although they were frequently storm-bound and confined to the tents, Nick was always cheerful, and his sense of humour was a great asset. As a result of his Antarctic time, he maintained a profound interest in the life of Ernest Shackleton. And he was very fond of the dogs, as he was later in life of Teddy, who often accompanied him on field trips.

Nick and I met in 1975 as fellow graduate students at University of Ottawa. He and Toby Rivers occupied a structural geology lab where visitors could barely see them through a blue haze of pipe smoke. Between them, they gave me material assistance in getting through my structural geology comprehensive exam, for which I had little aptitude, and I was delighted when we ended up as colleagues at Dalhousie. He was a capable rugby player in his youth and a keen long-distance runner until late in life, tackling the hills with remarkable speed. He had considerable knowledgeable about sports, and I learned a lot about such topics as the muscle structure of elite runners and soccer coaching strategies. We watched many Superbowls together, when he invariably supported the underdog. After he and Julie retired to the Ottawa Valley to be near family members, he developed an interest in the region's glacial deposits, sending me photos of curious features that had caught his attention.

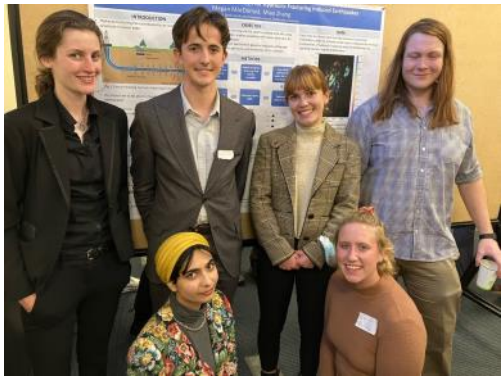
It is impossible to think of Nick without remembering his quirky sense of humour. He always saw the comedy and irony in situations, and he loved playing with words, tweaking a statement to bring out the humour. As Luke Hilchie recalled, Nick was a rare sort of brilliant person -- unusual, eccentric, a genius, funny, deeply caring and the 2012 honours trip to Romania, which he led in his inimitable fashion, resplendent in a Texas cowboy hat and red bandanna.

Nick was a deeply caring and kind person, remembered by students and colleagues for his selflessness and compassion. Nick had a living faith, worked out in humility and in practice. He was always available to students, and Duncan McLeish remembers that he became hooked on geological research as Nick took the time to explain the scientific background and motivation behind everything in their summer's work on Georgian Bay. When Duncan was working late nights in the microprobe lab for his honours thesis, Nick would regularly make the trip into the university at odd hours to bring him coffee and a Tim Horton's sandwich. He handed Duncan a key to his office so that he could work there whenever he wanted. His caring approach profoundly influenced the lives of many people.

Nick is greatly missed as a dedicated geologist, a compassionate human being, and a steadfast friend.

Undergraduate and Graduate Student News

Another fun and successful year for the Earth and Environmental Science undergraduate students! At the beginning of the fall term, we had a Welcome BBQ (see page 2). In October, some of the EES honours students presented and participated in the AUGC held at Acadia University, where Megan MacDonald won "The Canadian Society of Exploration Geophysicists Award" (left to right (standing) Megan MacDonald, Tristan Leclerc, Catherine Brenan, Erin Hillard, with Sana Salehi and Larissa Schinkel).



The Environmental Program Student Society (EPSS) had an exceptional wine and cheese networking event in the winter semester with organizations such as The Canadian Sea Turtle Network, The DSU Office of Sustainability and the Ecology Action Centre (left to right Emma Taniguchi, Catherine Brenan, Elena Milito, Julianne Jager). Finally, the EES Banquet had a great turnout with many awards, such as the Owen Hertzman Prize (Catherine Brenan and Emma Taniguchi), Miligan Undergraduate Award (Sana Salehi) and Best Honours Thesis Prize (Geneva Bahen). Thank you to everyone who made this year so unforgettable.

Congratulations to our award-winning undergraduates!!

MacEachern-Ponsford Award: Megan MacDonald

Douglas Award: Yarden Gedalia

Brian MacLean Memorial Prize: Brooke Reid

Milligan Undergraduate Award: Sana Salehi

Art and Dorothy Cooke Scholarship: Geneva Bahen

David Barlow Award: Ingrid Helmke

Environmental Science Award: Joi-Elle Charlemagne

Owen Hertzman Prize: Emma Taniguchi and Catherine Brenan

Pearson Education Canada Prize: Keir Jack

Michael J. Keen Memorial Award: Lauren Kew

Best Honours Thesis Prize: Megan MacDonald (ERTH) and Geneva Bahen (ENVS)

Best Honours Thesis Presentation Prize: Catherine Brenan (ENVS) and Erin Hilliard (ERTH)

Congratulations also to: Professor of the year: **Dr. Alexandra (Lexie) Arnott**

TA of the year: **Ray Beazley**

Scholarships & Awards and Graduating Students

Graduating Gold Medalists

Gold Medal for Earth Science:

Sef Everest (Fall graduation)

Gold medal for Environmental Science:

Emma Taniguchi

Graduate Students

Caitlin McCavour - M.Sc.

BSc Honours Students

EARTH SCIENCE

Erin Hilliard

Meghan MacDonald

ENVIRONMENTAL SCIENCE

Geneva Bahen

Catherine Brenan

Lauren Lowther

Levyn Radomske

Natashia Drage (M.Sc., 2022) was selected as the 2023 Gelinas Silver Medalist for Outstanding M.Sc. thesis from the Volcanology/ Igneous Petrology Division of the Geological Association of Canada.

The following students each received a Nova Scotia Scholarship:

Nina Golmbek, Lauren MacLellan, Nayeem Rifkhan and Peteris Rozenbaks.

The following students have received an Earth and Environmental Science Ph.D. Scholarship:

Alexadra Del Favro-Campbell, Marina Dottorw Stagna, Lydia Fairhurst, Nina Golombek, Lauren MacLellan, Michael Powell and Peteris Rozenbaks.

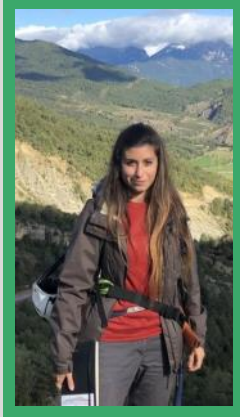
Congratulations to Levyn Radomske and Geneva Bahen who represented the department at the Science Atlantic Environment Conference. Geneva received the Science Atlantic Communication Award and Levyn was awarded the K.C. Irving Environmental Science Centre Award.

Maureen Mathew received the Sandra Barr Award for Best Graduate Student Presentation at the AGS in February. Maureen has also been awarded an NSERC scholarship, A Killam Award as well as the President's Award and also a Marcos Zentilli Graduate Award. Congratulations to Maureen.

Rachel Noddle also received a Marcos Zentilli Graduate award. Congratulations!

Ana Corbalan Castejon, Fernando Cordoba Ramirez and Pinar Gurun each received a J. Ewart Blanchard Scholarship. Pinar Gurun also received a Study Abroad award.

The Nedimovic Family Scholarship was presented to Ana Corbalan Castejon, Fernando Cordoba Ramirez and Alireza Niksejel.



Marina Dottore Stagna (left) won the AGU Outstanding Student Presentation Award at the Fall meeting in Chicago.

Congratulations to Michael Powell for winning a Society of Economic Geology Gradate Award.

Teaching Engagement, Alumni Affairs and Other Events

Open House 2022

On October 12th we welcomed prospective student to our campus for our Fall Open House. Our booth was staffed by Dr. Richard Cox (center left of left image) and Prof. James Brenan and we also had lots of help from students, namely Megan MacDonald, Sana Salehi, Sasha Chilibeck, who was in full field regalia no less, and Kailin Joy who are shown in right image from left to right, along with an unknown, "masked booth-crasher" from the Biology Dept.

We had a steady steam of visitors to our booth during the entire event, showed minerals samples, slides of our field school experiences, and what to expect in our programs. Our team of students did an outstanding job of engaging our visitors and sharing with them stories and experiences they have enjoyed while studying in our department. Thanks to them for making this such a successful event and we look forward to this again in 2023.

Prof. Grant Wach recently discussed the unusually warm weather experienced by much of Europe and the potential implications. This was part of an interview that he gave for Global News in January. The full video article can be watched here:

https://www.youtube.com/watch?v=QVBo2GMGBJU

On Wednesday March 22, the department hosted our first Alumni-Faculty-Student Mixer Night at the Lion's Head Pub which included members of our combined Earth and Environmental Science programs over the years. The event was organized by the Alumni Affairs Committee (Amy Mui, Mike Young, Scott Swinden (ERTH Alumni), and James Steenberg (ENVS Alumni)) and was a great success with over 70 guests coming to eat, drink, mingle, and be merry, as can be seen in the sampling of happy faces below!

Mike Young coordinated a 6-day alumni field trip to Nevada in during the November 2022 Reading Break. Fifteen Field School alumni attended with ages spanning from 10 months to 69 years old. There were former students and staff from each of the 9 years of the Nevada-California Field School (2011-2019). They camped out near the Nevada-Arizona border, toured the geology of the area, and shared many stories and laughs.

Thank you very much to Dean of Science Charles Macdonald and EES Chair James Brenan for providing funds for the trip. And most of all, thank you to our fabulous alumni who attended the trip. It was an honour and privilege to spend a week in the desert with everyone. The group all agreed that it will have to happen again. April 2027 Reunion Tour Redux.

Group photo: Back row (L to R): Evan Slater (2011), Art Fitzpatrick (2014, 2015, 2016), Siobhan McGoldrick (2013), Carolina Chang (2016, 2017), Monique Ruhl (2015), Jeff Minichiello (2013), James Nott (2013, 2014), Ryan Taylor (2018), Mike Young (director 2011-2023), Front Row (L to R): Richard Anderson (2013), Victoria Desjardins (2013), Amaya (future field school of 2043), Catherine Evans (2019), Madison Matthews, Alexandra Bonham (2019).

Grant Wach and the Basin & Reservoir Lab, alongside NSDNR and Net Zero Atlantic, organized and hosted the 2023 Carbon Neutrality Forum at Dalhousie in April, generously funded by NRCan. The forum was created with the intention of sharing best practices and technologies that may lesson costs and promote Canada's vision of a cleaner energy future, helping guide Canada to carbon neutrality. The forum was a resounding success with participants joining in person and online, including presenters from across Canada and Europe speaking on topics ranging from CCUS (carbon capture, utilization, and storage) projects and opportunities, the technicalities of geostorage, and the need for regulatory frameworks surrounding emerging carbon technologies.

Who's Who in Dalhousie Earth Sciences

Faculty: Instructors, Professors (Assistant, Associate, Full, and Emeritus)


Lexie Arnott


James Brenan


Isabelle Coutand


Richard Cox


Heather Cray


Yana Fedortchouk


Kelvin Fong


Caroline Franklin


Susan Gass


Martin Gibling


John Gosse


Chris Greene


Djordje Grujic


Rebecca Jamieson


Mladen Nedimovic


Vittorio Maselli


Amy Mui


Lawrence Plug

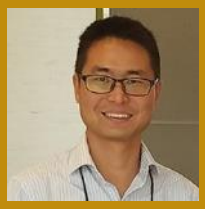

Owen Sherwood


Shannon Sterling


Grant Wach


Tarah Wright


Mike Young


Miao Zhang


Marcos Zentilli

Staff


Thomas Duffett

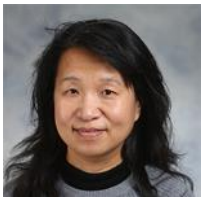

Sean Hartwell


Chelsea Fougere


Kristin Hart


Norma Keeping


Darlene Van de Rijt


Guang Yang


Alexis Imperial


Roman Kislitsyn

Not Pictured:

Dawn Hall

Chloe Younger

Helen Lau

From all of us to all of you ...

Dalhousie Department of Earth and Environmental Sciences, Fall. 2022

... please keep in touch!

Giving to Dalhousie Earth and Environmental 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.*

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

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