

EARTH SCIENCES NEWS

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

May 2019

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, and I am happy to report this year has been one of growth and renewal.

The department succeeded in two searches, one for a Canada Research Chair (CRC) in Coastal Zone Processes, and the other in Geophysics, in support of Dalhousie's Diversity hiring program. Our choice for the CRC, Dr. Vittorio Maselli, specializes in the impact of extreme events, such as storms and tsunamis, on coastlines. Dr. Miao Zhang, the successful geophysics candidate, studies the origins and location of seismic events. You can read more about them inside. A warm welcome to two brave souls who chose to move to Halifax in the winter!

Haven't attended an alumni event yet? The department sponsored alumni receptions at the PDAC in Toronto (March) and the CSPG meeting in Calgary (May), offering our current students a chance to connect and be mentored by our

past graduates. Also, last November, students, faculty and alumni gathered together for a career panel event, moderated by Becky Jamieson, and featuring panelists Scott Swinden, Jacquie Stevenson, Emmaline Atherton and Billy Garrison. 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 will be the last time I will be writing to you as the chair of Earth Sciences. Members of our department and the Environmental Science program have agreed to merge and become the new Department of Earth and Environmental Sciences. The University Senate has approved this name change, and we will have a new department in place by 1 July 2019. I look forward to working with new colleagues from the Environmental Sciences Program, and welcoming an outstanding cohort of Earth and Environmental Sciences students. Get ready for a new era in the history of Earth Sciences at Dalhousie!

Finally, I'd like to thank Shannon Sterling and the department out-



James at the unveiling of the new Parks Canada Site near Kentville honouring Abraham Gesner

reach committee for another outstanding job on the 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 Brenan,
Professor & Department Chair



Gurudongmar Lake in the north of the Indian state of Sikkim (left) is one of the research sites of Professor Djordje Grujic. Located at an altitude of 5,430 m, it is one of the highest lakes in the world. (photo D. Grujic)

In This Issue

- Department News
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Department News

Department Profile Update

This past year saw the approval to merge Earth Sciences with Environmental Science, to formally become the **Department of Earth and Environmental Sciences**, beginning in July, 2019. This change brings possibilities of exciting new ventures in research and in teaching, while maintaining independent programs at the undergraduate level.



Photo: V. Maselli

The end-of-year banquet in April was held in the Great Hall of the University Club. Good food, good company, and a good time had by all!

Outreach

Amongst the outreach activities this past year, Lexie Arnott and Richard Cox gave a session to 30 Nova Scotia teachers at the ASLA (Atlantic Science Links Association) in summer 2018.

Renovations

Renovations are a constant in the department these days! In addition to renovations to space for our new faculty members, chief amongst current renovations is the modernization of the petrology teaching lab. This includes new work areas, AV equipment, and storage for teaching materials, all supported by much-needed newly-painted walls and new flooring. The new look will be well-in place by start of the fall term in 2019, so if you are in town, do drop by!



Petrology lab during tear-down
Photo: R. Cox

Honours Symposium 2019

Five honours students presented the fruits of their year's work at the annual honours symposium in late March, and once again, the professionalism of our honours students speak very much to their credit, and the support of their supervisors. Topics ranged from meteorite chemistry, reaction textures in kimberlites and redox state of the South Mountain Batholith, to studies of a rifted passive margin in Labrador and ocean sediment offshore South Korea, and are evidence to the wide-ranging nature of the research within the department.

Best Thesis Award: Catherine Evans (supervisor: Paul Hill, Oceanography)

Best Presentation Award: Catherine Evans

New Earth Sciences Doctoral Award

This year has also seen the development of a new award for PhD graduate students, developed to support and recognize academic excellence and potential for research success. We anticipate that the first recipient will begin their studies in September.

New Faculty

We welcomed two new faculty members to the department with the arrival of **Vittorio Maselli** as Assistant Professor, and **Miao Zhang**, also as an Assistant Professor. Read more about their work on the Research page of this Newsletter. We wish them well as they establish their research and teaching portfolios in the coming years.

Faculty Awards - Congratulations to:

Richard Cox: Earth Sciences Professor of the year.

Martin Gibling: 2018 Middleton Award awarded by the Canadian Sedimentology Research Group in acknowledgement of Martin's contributions in this research area.

John Gosse: Opening Gates to Geohazard Research... principle investigator of a VPRIS grant to bring four international researchers to contribute to a workshop this summer on selected geohazards of passive continental margins, with a view to building strength in geohazard research in our department.

Anne Marie Ryan: 3M National Teaching Fellowship Award. Sponsored jointly by the Society for Teaching and Learning in Higher Education (STLHE) and 3M Canada. This is the highest recognition of individual teaching excellence and educational leadership in Canada.

Grant Wach: 2018 Stanley Slipper Gold Medal. The Stanley Slipper Medal is amongst the highest honours awarded by the Canadian Society of Petroleum Geologists. The medal is presented annually for outstanding contributions to petroleum exploration and development either in Canada or by Canadian-based petroleum geologists working internationally.

Who's Who in Dalhousie Earth Sciences

Faculty



Lexie Arnott



James Brenan
Experimental Geochemistry



Isabelle Coutand



Richard Cox



Yana Fedortchouk



John Gosse



Chris Greene
Geographic Information



Djordje Grujic
Structure/Tectonics



Mladen Nedimovic



Vittorio Maselli
Marine Geology



Lawrence Plug
Geomorphology



Anne-Marie Ryan
Environmental Geology

Geo-



Owen Sherwood
Isotope Biogeochemistry



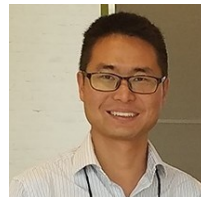
Shannon Sterling
Hydrology



Grant Wach
Petroleum Systems/
Stratigraphy



Mike Young
Structure/Field Methods



Miao Zhang
Geophysics

Welcome !
SEAN HARTWELL
joined our de-
partment as the
new full-time
administrator in
September 2018.

Staff



Thomas Duffett
Geological Technologist



Sean Hartwell
Administrator



Norma Keeping
Administrative/Graduate
Secretary

We extend a thank you for the ongoing contributions by former faculty members, particularly:

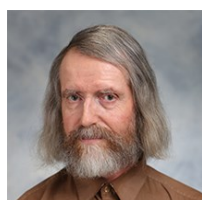
PAT RYALL, who continues to host the Ring Ceremony for our students moving into Geoscientists in Training within the Professional Geoscientist Association;

MARTIN GIBLING who stepped in to help channel and script the governance document for the merged department; and

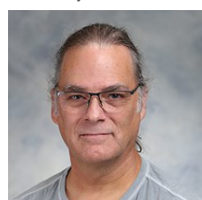
BECKY JAMIESON and **MARCOS ZENTILLI** for their ongoing regular support and input in a variety of ways within the department.



Roman Kilitsyn
Noble Gas Technologist



Brant Laidler
Teaching Lab Technician



Dan MacDonald
Microprobe Technologist

Emeritus & Post-Retirement



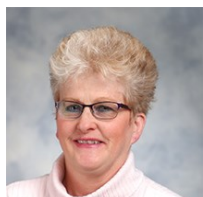
Barrie Clarke



Martin Gibling



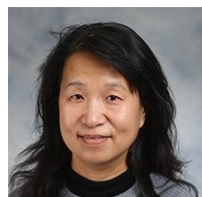
Rebecca Jamieson



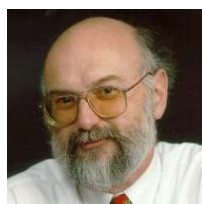
Darlene van de Rijt
Administrative Secretary



Kate Woods
Research Associate



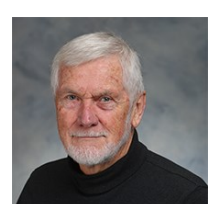
Guang Yang
TCN Facility Manager



Patrick Ryall



Dave Scott



Marcos Zentilli

Undergraduate Student News

Dawson Geology Club

The Dawson Geology Undergraduate Club organized many fun events this year, including, a Board-game night, Mooseheads game (below right), Holiday Potluck, "Geopardy", and bowling. *Below left*, members of the Dawson executive board.



2018-19 Awards

MacEachern-Ponsford Memorial Award: Bay Berry, Kanwar Multani

University Medal for 2017 Graduating Class: Erin Anderson

David Barlow Award: AUGC Planning Committee (Juan Chavez, Ryan Taylor, Kanwar Multani, Bay Berry, Tanner Milne, Jordyn Souter, Aliya Anderson, Ben Myrer)

G.V. Douglas Award: Anna Ryan

Best Thesis Award: Catherine Evans

CSPG Undergraduate Award: Max Angel, Kanwar Multani

CSPG student Industry Field Trip (SIFT): Tanner Milne

Student-Industry Mineral Exploration Workshop (S-IMEW): Juan Chavez



Above, Anna Ryan receiving the G.V. Douglas Award from faculty member Mike Young. The Douglas award is given to a student entering second year with an outstanding academic record in their first year.

November 1-3, 2018 we hosted the Atlantic Universities Geoscience Conference (AUGC). Students and industry professionals from around Nova Scotia came to present, go on field trips, and see our keynote speaker Dr. Kathryn Sullivan! (Bottom left)



Left, The 2019 Barlow award winners: the AUGC organizers. Below, Earth Ring Ceremony, administered by past Chair Pat Ryall with Grant Wach. Congratulations to our two EAGE teams who will be travelling to London in June as Worldwide Finalists in the EAGE Laurie Duke and -CO₂ Challenge.



Graduate Student News

2018/2019 Defenses & Graduations

Graduated

Taylor Campbell (MSc) - G. Wach

John Evangelatos (PhD) - J. Gosse and D. Moscher

Jennifer Frail-Gauthier (PhD) - M. Gibling and S. Sterling

Rachel Milligan (MSc) - Y. Fedorchouk

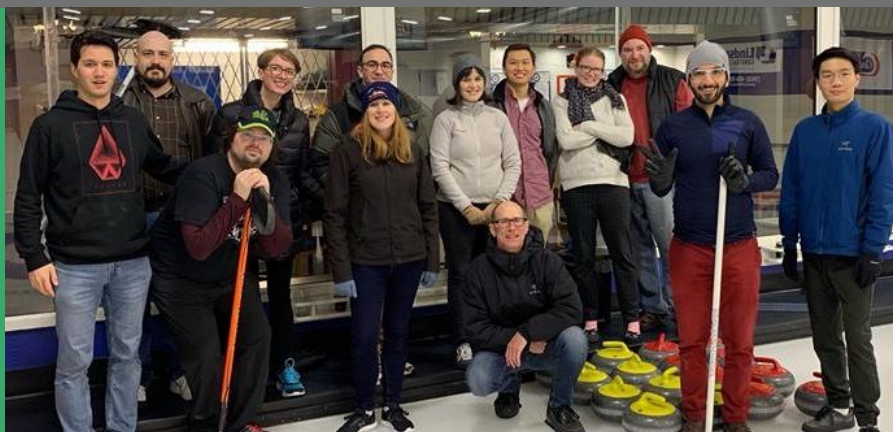
Juan Wong (MSc) - G. Wach

Defended

Laura-Ann Broom (MSc) - C. Campbell and J. Gosse

Erin Keltie (MSc) - M. Brennan

Harold Kuehn (PhD) - M. Nedimovic



Dawson Geology Graduate Society

Safe to say this past year was a resounding success for DGGS!

DGGS was well represented at this year's conferences, including the Conjugate Margins, American Geosciences Union (AGU), European Geosciences Union (EGU), and Science Atlantic Conferences. In addition to the academic success, the grads re-established themselves as the champions in the annual students vs. faculty curling match! Fun events hosted by the grads this year included the Christmas potluck, Halloween pumpkin carving, Jeopardy, and weekly Dalhousie Informal Rock Talks (DIRT). We wrapped up the year with the Wine and Cheese night, Jeopardy, the annual banquet, and the new graduate research poster session. The poster session was new this year and gives graduate students an opportunity to showcase their hard work over the last year, receive feedback on their research, and network.

DGGS Executive 2018/2019:

President: Bryan Maciag

Co-Vice Presidents: Kim Taylor and Masoud Aali

Treasurer: Sydney Stashin

Secretary: Lobke Rotteveel



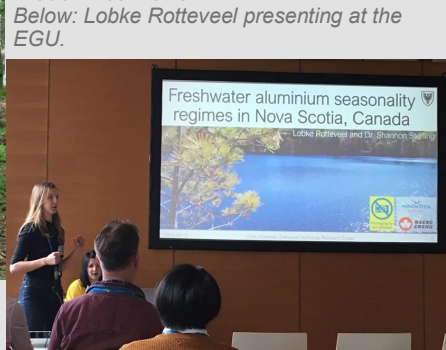
Above: PhD Student Shaomin Chen collecting samples in the Canadian Arctic.



Above: Kara Vogler and Sydney Stashin at the annual Wine and Cheese event hosted by Mladen Nedimovic.



Above: MSc student Caitlin McCavour collecting samples in Nova Scotia.



Below: Lobke Rotteveel presenting at the EGU.

Scholarships & Awards

Awarded and/or held 2018/2019

Dalhousie University President's Award: Sean Kelly (PhD)

Department of Earth Sciences TA of the Year: Sydney Stashin (MSc)

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

Nedimovic Family Graduate Scholarship: Ana Corbalan Castejon (PhD), Sydney Stashin (MSc), Yuqiu Zhao (MSc)

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

PDAD – Masters Student Poster: Erin Keltie (MSc)

Society of Economic Geologists: Erin Keltie (MSc), Bryan Maciag (MSc)

TOSST: Masoud Aali (PhD), Ana Corbalan Castejon (PhD)

Andean Back Bone—South American & Caribbean



Ricardo Boric P. (MSc Dal 2002) - was mine geologist in the giant Manto Type copper deposit El Soldado. His paper, "The Geology of the El Soldado Manto Type Cu (Ag) Deposit, Central Chile"; in Porter, T.M. (Ed.), *Hydrothermal Iron Oxide Copper-Gold & Related Deposits: A Global Perspective*, Vol. 2, 2002 is one of the most cited. He works for Anglo American on porphyry copper deposits of central Chile www.angloamerican.com



José Cembrano P. (PhD Dal 1998)- is Assoc. Prof. at the Faculty of Engineering, Universidad Católica de Chile, Santiago. He specializes on structural geology and tectonics of the Andes geothermal energy resources and mineral deposits. A member of the Center for Excellence in Geothermal Energy Research <http://www.cega-uchile.cl/en/>. A past President of the Geol. Soc. of Chile. He published "Crustal faults in the Chilean Andes." *Andean Geol* 46 (1): 32-65, Jan, 2019.



Canadian **Darryl D. Lindsay** (PhD Dal 1998, P.Geo.) - contributed the most influential study of the structural geology of the giant porphyry copper deposit Chuquicamata: "Evolution of an Active Ductile to Brittle Shear System Controlling Mineralization at the Chuquicamata Porphyry Copper Deposit", *Int. Geol. Rev.* 3i, 945-958, 1995. He lives in Chile with his young family and is Manager of Business Development - Metals for Sociedad Química y Minera de Chile (NYSE:SQM) for QM's precious and base metals prospects, evaluating over 140 mineral prospects in northern Chile and the application of a "prospect generator" business model. He was a mentor for the SEG student field trip in northern Chile.



Victor Maksae J. (PhD Dal 1990) retired after 19 years teaching economic geology at the Dept. of Geology, Universidad de Chile, Santiago, following 22 influential years in the Geological Survey of Chile. A legend since he mapped the Atacama Desert on a motorcycle. His name is synonymous with the metallogeny of Chilean porphyry copper deposits. "Fission track thermochronology of Neogene plutons in the Principal Andean Cordillera of central Chile (33-35°S)". *Andean Geology* 36 (2): 153-171. 2009.



Carlos Ulriksen G. (MSc Dal 1979). Soon after returning to Chile with his MSc, Carlos was appointed Sub-Director and Director of SERNAGEOMIN (Geological Survey of Chile) in which position he promoted regional geological mapping, magnetic surveys, and the compilation of regional metallogenic maps; e.g. "Mapa metalogénico de Chile entre los 18° y 34° S", Ulriksen, C.E. (Bull. 42, 1989). He later obtained diplomas on project management and mine evaluation and has been a busy consultant. He contributed to the discovery of Los Colorados iron deposit, Vallenar, and development of deposits in Iran. Always interested in education, he is a part-time lecturer of economic geology and mining economics at the Universidad Santo Tomás in Viña del Mar (<http://www.ust.cl/>). He is developing methodologies to use drones in mine property evaluation and geological mapping, with some young entrepreneurs.



Trinidad

Hasley Vincent, PhD Dal 2009— Is the new Subsurface Manager for Heritage Energy. Heritage has taken over the Petrotrin operations. He was formerly with BP. An Adjunct Professor at the University of West Indies and Dalhousie, each February he helps Prof. Wach lead the Petroleum Geoscience Field Methods course to Trinidad.

Dal Down Under

Perth, Australia



Ian Borg and **Rachel Milligan** (BSc Hon 2014) are in Perth. Rachel has been working on a variety of projects in Au, diamonds, Sc-Co-Ni all over the country. Ian is working on the same Ni-Cu-Co project in Uganda since 2018. (photo of Ian at Moose River Mines).



Jill McEvoy started work for Mount Gibson Iron on Koolan Island in the Kimberley (some of the highest grade iron ore in the world). Prior to this, she was working for Galaxy Lithium at their Mount Cattlin operation.

Ho Chi Minh City, Vietnam



Nick Wilson (PhD Dal 1998) is with Murphy Oil, living in Ho Chi Minh City. Before Vietnam, Nick worked in Kuala Lumpur, Malaysia, exploring offshore Brunei and Sabah, and before Calgary. His PhD thesis on the fundamental involvement of petroleum in the genesis of the giant El Soldado copper deposit in Chile is a classic (*Economic Geology*; Vol. 94, 1999, pp. 1115-1136). Nick is married with 3 children and returns to Nova Scotia every summer to spend time relaxing on the Northumberland Straits.

Europe- Switzerland



Megan Seipp (nee Macgillivray; BSc 2008) is completing a Masters at ETH Zurich, Switzerland, on clay mineralogy of a deep Seamount in the Tyrrhenian Sea (Palinuro) that has evidence of hydrothermal alteration, and a seafloor massive sulphide (SMS) occurrence; balancing care of her young family in a nearby town in Germany.

United States



Chris Hamilton (BSc Hon 2004) is Assistant Professor at the Lunar and Planetary Laboratory, University of Arizona, gave a lecture on "Flood Basalt Volcanism on Earth and Mars", in January at Dalhousie. Chris received the Geological Society of America's Early Career Award (Mineralogy, Geochemistry, Petrology and Volcanology Division).



Peter van Hengstum (PhD Dal 2011) was promoted to Associate Professor in the Department of Marine Sciences at the Galveston campus of Texas A & M University. Pete was recognized as a Montague Scholar, as one of the top young teachers and researchers at A & M. A \$2.1 Million proposal he is co-PI on has been funded from the National Science Foundation program "Prediction of and Resilience against Extreme Events". (<https://www.nsf.gov/pubs/2016/nsf16562/nsf16562.htm>). This project with Woods Hole, MIT, Princeton University, and the University of Colorado is evaluating hurricane risk in the SE United States during changing climate conditions.

Alumni News

Edited by: Grant Wach & Marcos Zentilli

Goin' Back East...eh? - Newfoundland & Labrador, New Brunswick, Nova Scotia, P.E.I., Ontario and Quebec

Nova Scotia



Tim Borque (BSc 2006) Exploration Manager (holding the core) and **Eleanor Chisholm** (class of 2019- far right) of Atlantic Gold, graced the cover of the Mineral Production Report for Nova Scotia released at PDAC. You can see a great video of Eleanor at Dal and Atlantic Gold on YouTube <https://www.youtube.com/watch?v=40YuCIBtpAQ> (Photo credit Atlantic Gold).



Terry Hennigar, (MSc Dal 1968) is contemplating retirement after 50 years as the foremost groundwater expert in Atlantic Canada. At Dal and TUNS (Technical University of Nova Scotia, now the Faculty of Engineering) Terry was an Adjunct and taught hydrology for 22 years and supervised many student projects and theses. His consulting company specializes in water and aquifer studies and geothermal applications.



David Brown (BSc Hon 1979- supervised by Paul Schenk) Retired in May as Senior Advisor - Geology from the Canada-Nova Scotia Offshore Petroleum Board. Dave was responsible for many studies of the offshore of Nova Scotia and with Prof. Wach began the Conjugate Margins Conference series. ([www. Conjugatemargins.com](http://www.Conjugatemargins.com))

At Dal Dave was the first "Social Director" of the Dawson Club, responsible for gatherings- many infamous.



The Gang- (Back) Al Coles, Tom Duffett, Peter Cook, Dave Brown Blair Parsons, Bill Cooper and Peter Vilks; (Front)- Terry Warner, Kate Jarrett, Janina Wysocka, Bernie Kelly, Steve Harnish, Alex Eames and Debbie ? (Photo- Marten Douma).

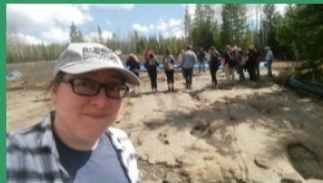


Cow Bay Field Trip Janina Wysocka, Bernie "Billy Jack" Kelly and Dave Brown (Photo Blair Parsons).



Royal BC Museum Victoria

Dr. Victoria Arbour, BSc Dal 2006 is now Curator of Paleontology at the Royal BC Museum in Victoria. Congratulations on the publication of your first book, *Zuul: Life of an Armoured Dinosaur*.



Western Canada Roundup

Calgary Alumni



Jen Russel-Houston, PhD Dal 2002 - Is incoming President of the Canadian Society of Petroleum Geologists (CSPG). Jen is sporting the latest in field gear with her Dal Earth Sciences cap and Dawson Club badge on her pack.



David Gardner, BSc Hon 2006—Has accepted a 4 year assignment to Shell in Houston

GeoConvention Calgary—May 11—17

Alumni Field Trip



On May 11th there was an Alumni Field Trip led by **Carla Skinner**. The field trip was followed by a fondue dinner at the Grizzly House Banff.

The trip began with an overview of the McConnell Thrust at Mount Yamnuska at Willow Creek, the Lewis Thrust at Galatea Lake trail head and the Upper Devonian carbonates at Grass Lake. That exhibit spectacular vuggy porosity.

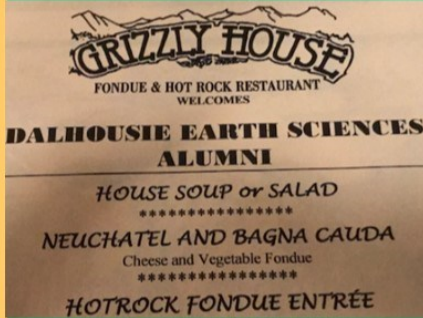


Participants included Carla Skinner, Maya Soukup, Darragh O'Connor, Dr. Les Eliuk, Carlos Wong, Sydney Stashin, Emma Xinyue Hu, Trevor Kelly, Thuy Vo, Ryan Taylor and Professor Grant Wach

Alumni News

Edited by: Grant Wach & Marcos Zentilli

Alumni Dinner– Grizzly House



After the field trip a fantastic fondue dinner was held at the Grizzly House in Banff.



Alumni Pub Night

The pub gathering was Sunday May 12 at Palomino Smoke House in Calgary



Prospectors & Developers Association of Canada March 1-4 2019

Once again, Dalhousie hosted an Earth Sciences Alumni gathering at the Prospectors and Developers Association of Canada Convention held in Toronto. The event was held at the Strathcona Hotel on Monday 4th March.



A special thanks goes out to Emeritus Professor Marcos Zentilli for helping to represent the department. Many of the alumni have very fond memories of Marcos as a mentor and teacher, as well as his exceptional ability as a resource geologist.

Alumni World Map

Tom Duffett has created a map of the distribution of Alumni worldwide. If you click on an icon you will find the details of



alumni in that region. Please send Tom (macduff@dal.ca) and Norma (Norma.Keeping@Dal.Ca) your contact details and we can keep the map updated!

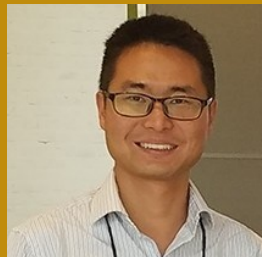
https://www.dal.ca/faculty/science/earth-sciences/alumni_friends/alumni_map.html

Research Profiles

The Department of Earth Sciences welcome two new faculty members



Vittorio Maselli is a marine geologist with expertise in sedimentology and seismic interpretation. His research work is dedicated to understanding the processes controlling the evolution of continental margins in a source to sink perspective.



Miao Zhang is a seismologist with expertise in seismic source determination and Earth's structure inversion. His research work is dedicated to monitoring natural or induced seismicity in real-time and understanding the underlying mechanisms.

NEW LABORATORY FACILITIES



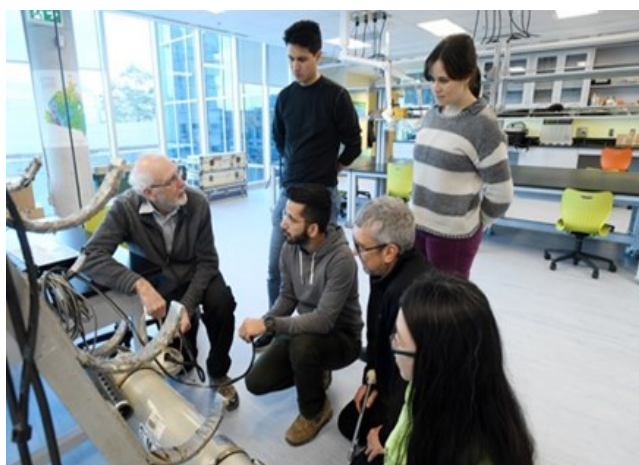
Stable Isotope Biogeochemistry Lab

The Stable Isotope Biogeochemistry Lab (PI Owen Sherwood) is equipped with a Gas Chromatograph coupled with an Isotope Ratio Mass Spectrometer for measuring the stable isotopes of hydrogen, carbon and nitrogen in organic geochemical compounds. The instrumentation was installed in January 2019, and analysis of real samples started in late March 2019.

National Facility for Seismic Imaging (NFSI)

Dalhousie University, in partnership with nine other universities from across Canada (UVic, UBC, SFU, UofM, UofT, uOttawa, UQAM, McGill and MUN) obtained funding from the Canadian Foundation for Innovation (CFI) and six provincial matching funds agencies to establish the **National Facility for Seismic Imaging (NFSI, PI Mladen Nedimović)**. The NFSI will consist of (i) 120 compact, versatile, next-generation BBOBSs; (ii) a portable lab, deployment and storage facility suitable for global marine operations; and (iii) a fixed BBOBS laboratory (located at the top floor of the Steele Ocean Sciences Building, Dalhousie University).

Dr. Keith Loudon (far left), Manager of the National Facility for Seismic Imaging describes to several other members of the Dalhousie Imaging Group (DIG) the main components of the Short Period Ocean Bottom Seismometer external sensor package.



Field Notes



Our students have had a busy year in the field with the Advanced Field Mapping School in Nevada (left) and Trinidad (middle), the Geophysics Field School (right), the Petroleum Geoscience Field Methods course, the Shell-field trips, and Camp Geddy.

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, Nov. 2018

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>.

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

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