



## Greetings from the Head of Department

### So many good things have been happening in the department!

We have welcomed and are about to welcome a host of **new faculty members!** Dr. Anna Harrison, an Environmental Geochemist, joined us in July 2018 and Dr. Elisabeth Steel, a Sedimentologist, will join us in January. We have **FOUR** searches currently underway. At a department meeting last year we set our goal at "22 in 22", that is, 22 faculty members in 2022. Who knew we'd make it to 19 in 2019!

Dr. Linda Tsuji, the new curator of the Miller Museum of Geology, comes to us from the Royal Ontario Museum. Dr. Anne Sherman (Ph.D 2001), joined us as the new Lab and TA coordinator. Anne's signature sense of humour is a great gift, particularly during the September rush. In October, we welcomed Mr. Paul Bass as the new department manager; he has made his mark already with his enthusiasm, energy and welcoming nature.

We also said goodbye and happy retirement to fantastic staff and faculty, including Mr. Mark Badham (B.Sc. 1986, M.Sc. 1997), the Curator of the Miller Museum of Geology, Dr. Ione Taylor (who designed the Masters of Earth and Energy Resources Leadership program (MEERL)), and long time faculty Dr. Ron Peterson, Dr. Doug Archibald, Dr. John Hanes. Ms. Lindsay Waffle, the first Lab and Teaching Assistant Coordinator, left us for an exciting field position. Ms. Megan Rhymer, Department Manager during the crucial and difficult months of 2017 and early 2018 was enticed back by her former employer to a very exciting new position. We wish them well in their new opportunities.

In May 2018 the last group of Geo students, faculty and TA's pulled out of Sutton Quebec. In August 2019, our newly designed, week long, 300 level field school focused on mapping will be held near Kaladar Ontario. Colin Joudrie (BSc '91) pointed out to me that a week is too short a time to fall in love, as he and his wife Dawn Russell (BSc '90) did in field school, so perhaps we will need to stretch it to 9 days! We will be introducing a new 400 level field course, the focus of which will change with the interests and foci of the instructors. Field learning continues to be the centre piece of our curricula. We thank everyone who has donated so generously to our field funds – your donations help defray the costs to students during this foundational part of their learning.

Our approximately 250 undergrads, are frequently found in the Reading and Gorman rooms, mostly working, occasionally eating and sleeping. The Reading Room, adjacent to the Earth Systems Information Laboratory and just off the main lobby of the Bruce Wing is the heart of the department during the term. We have aspirations to refresh these spaces, upgrading computer equipment, furniture, and, I hope, new flooring and paint. The research graduate programs are thriving, with about 70 graduate M.Sc. and Ph.D. students. There are a total of 17 students in the new MEERL program, with the first 8 to graduate in May 2019. This on-line program is "fantastic" in the words of alumnus Dr. Wayne Savigny (Sci '71) and two young engineers from his former company, BGC Engineering, are among our students. In

June we learned that our Geological Engineering program was awarded another "6V" which is the Canadian Engineering Accreditation's code for a 6 year accreditation, the gold standard for engineering programs in Canada. This is the third 6V we have been awarded in a row!

Our faculty and staff continue to collect an amazing array of awards, accolades and opportunities. We are very happy to report that Larke Zarichny will receive a Staff Recognition Award December 5th. Thanks to alumni for their support of the nomination.

### Plans for the future

In 2016, McLean's Magazine named us as the second best geoscience department in Canada. We aspire to be first! Our strategic plan, in preparation, will help steer our activities into the future. Priorities include: faculty renewal; increasing research intensity, rethinking and refreshing of our teaching and research spaces, and our digital strategy.

Faculty renewal has come more quickly than we had anticipated, but we will continue to request base budget faculty positions in strategic areas, aiming for 22 in 2022. We wish to upgrade research laboratories, many of which are in desperate need of attention. We would like to refresh and renovate the main lobbies of Miller and Bruce, as they are the spaces that welcome new students and visitors. Paul Bass, our new Department Manager, is spearheading a review of all facilities and spaces, with a view to providing a long term plan to upgrading.

Geologists and geological engineers are very used to big data, but we now design state-of-art data collection tools, to capture, use, and model large data sets. From drones, to satellites, to "Dirk" the use of GIS and LiDAR, our digital strategy starts with the considerable strength we already have. One of our capstone design projects is sponsored by IBM and their Watson Super Computer! While we will continue our focus on field research and learning, we wish to augment our work with AI and digital technologies and we hope, an online, "virtual museum" of our mineral, rock, and fossil holdings, laser-scanned in 3D to provide exquisite detail. We have been eyeing up the front and side lawns of Miller Hall for an Educational Rock Garden. And finally, we are working on a project to connect young alumni mentors and undergraduate mentees to help our students with cover letters, resumes, and to coach them on the job search.

As this newsletter is going to press I am returning from Vancouver after two incredible alumni events, one to honour Gordon Keep (BSc '79) and Katherine Keep (BA '81) and one in the home of Margie and Wayne Savigny (Sci '71), attended by Principal Wolfe and a host of young alumni. Former heads have told me that meeting with alumni is one of the most rewarding parts of the job, and 17 months into my Headship, I would have to agree.

  
Vicki Remenda





# DEPARTMENT NEWS

Keep up to date with the department by visiting the departmental website [queensu.ca/geol](http://queensu.ca/geol)



## Welcome Dr. Anna Harrison

The department welcomes one of its newest faculty members, Dr Anna Harrison. Dr. Harrison is a Queen's National Scholar and is jointly appointed to Geological Sciences and Geological Engineering and the School of Environmental Studies. Her research interests are in aqueous and environmental geochemistry, and include experimental, analytical, and reactive transport modelling approaches, complemented by field data. This research not only helps to address the fundamental geochemical questions of what controls mineral dissolution-precipitation reactions, but has important implications for understanding natural mineral weathering and element cycling processes over geologic time, and for issues of immediate environmental significance such as groundwater contamination, nutrient availability, and engineered CO2 sequestration under a changing environment. Welcome Dr. Harrison!



## Welcome Dr. Elisabeth Steel

We also welcome Dr. Elisabeth Steel. Dr. Steel studies clastic sedimentary systems via a combination of field work and physical modeling. She will be building an experimental facility in the Coastal Engineering Lab designed for modeling deltas and turbidity currents in order to examine the various ways that the dynamics of these systems are recorded by the morphology and architecture of their deposits. She will also develop field projects with the goal of comparing experimental results to ancient and modern systems. Ongoing work includes: quantifying the kinematics of channel networks on delta surfaces; developing methods for predicting deltaic stratigraphy based on surface kinematics; characterizing lateral spreading rates of turbidity currents; and predicting lift-off distances of lofting turbidity currents. Welcome Dr. Steel!



## Professor Rob Harrap Awarded Golden Apple Award

Congratulations to Professor Rob Harrap, who has been awarded a Golden Apple Award. The Golden Apple

Award is a faculty award given by the Engineering Society which rewards professors who consistently demonstrate superior teaching abilities and concern for students on an individual level. This was the only Golden Apple Award presented for this academic year.



## Dr. Diederichs Wins First Year Instructor Teaching Award

Congratulations to Dr. Mark Diederichs, who was chosen by the Engineering Class of 2021 as the recipient of the

Engineering and Applied Science First Year Instructor Teaching Award (Fall Term) for APSC151, The Earth's Physical Environment. The award is given each year to the instructors of first year Engineering and Applied Science courses who, in the opinion of the students, contributed most to creating a good teaching and learning environment in the classroom.



## Dr. Helmstaedt Awarded 2018 CFES Mentorship Medal

Congratulations to Dr. Herb Helmstaedt, Professor Emeritus, who has been awarded the 2018 CFES Mentorship Medal from the Canadian Federation of Earth Sciences. This award recognizes the sustained and inspirational mentorship of colleagues and employees including peers, graduate students, undergraduate students and technicians. The sole criterion for the award is excellence in mentoring over a sustained period of time.



## Dr. Hutchinson Named 2019 Glossop Medal Lecturer

Congratulations to Dr. Jean Hutchinson who has been named the 2019 Glossop Medal Lecturer, sponsored by the Engineering Group of the Geological Society (UK).

Jean will be presenting the 20th Glossop Lecture in mid-November 2019 in London, England.

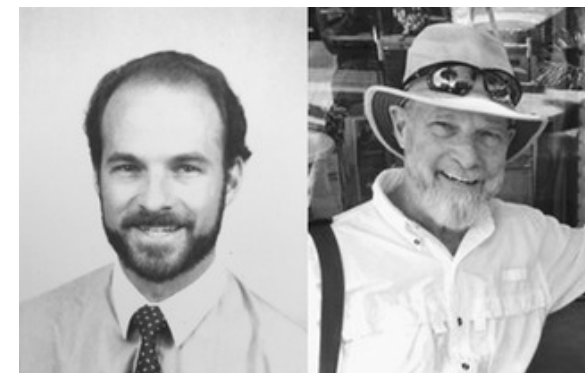
Dr. Hutchinson also received the Geoffrey Flynn Advancement Champion Award from Queen's University, Office of Advancement, in recognition of work with alumni and on advancement during the time of her Headship.

## Steve Rose, In Memoriam

Shortly before 4:00pm on Friday, June 29th, 2018, Steven Vincent Rose passed away peacefully at home surrounded by his wife and children. Steve was a loving husband, father, son, brother, mentor, and friend to many throughout his life.

Steve attended Queen's University for his Bachelors of Applied Science in Geological Engineering, starting in the infamous "Fourth McNeil" residence and falling in love with the city of Kingston, Ontario, Canada. After graduation he explored the United States and eventually started his career as an engineer in the greater Los Angeles region. He also remained active in academia, serving as an Adjunct Professor in the Department of Geological Sciences and Geological Engineering. His contributions to the 4th year capstone design projects were legendary.

A celebration of life was held on Saturday, July 28th, 2018. Donations can be made in his name to the Kingston Cancer Centre or the Al Gorman fund at Queen's University. Any questions can be forwarded to [harose22@gmail.com](mailto:harose22@gmail.com), [8beckyrose@gmail.com](mailto:8beckyrose@gmail.com), or [nicholasvrose@hotmail.com](mailto:nicholasvrose@hotmail.com). The obituary can be found at: <http://yourlifemoments.ca/sitepages/obituary.asp?oId=1083228>



## Ian Nichol, Professor Emeritus, In Memoriam



Dr. Ian Nichol, Emeritus Professor, died on April 16, 2018, in the Kingston Health Sciences Center. Dr. Nichol received his BSc from Durham University in the U.K. and his MSc from Queen's in 1958, studying the trace element geochemistry of sulphide minerals under the supervision of Professor Ed Hawley. He then returned to Durham for research on his PhD thesis, a study on the geochemistry of manganese minerals, which he completed in 1962. In 1969, Dr. Nichol was appointed as Professor of Geochemistry at Queen's and soon established an internationally recognized research programme in exploration geochemistry. He created modern laboratory facilities and, between 1969 and 1997, supervised more than 30 graduate students conducting research on a broad range of exploration geochemistry projects, mostly in Canada but also in Chile, China, Thailand and the U.S. Dr. Nichol retired in 1997 to become Professor Emeritus. After retiring, he made a major financial contribution to

the departmental field studies program. Details about Dr. Nichol's wide-ranging contributions and achievements may be read in a more extensive memorial to come in the EXPLORE Newsletter of the Association of Applied Geochemists. For anyone wishing to help honour Dr. Nichol's memory, there is a Named Field Studies Fund that helps support field education in the Department of Geological Sciences and Geological Engineering. [www.givetoqueens.ca/geological](http://www.givetoqueens.ca/geological)



## 3rd Virtual Geoscience Conference

On August 22 - 24 2018, Queen's University Department of Geological Sciences and Geological Engineering hosted the third annual Virtual Geoscience Conference (VGC). 72 participants travelled from across Canada, US, UK, Norway, Denmark, Germany, Switzerland, Austria, Italy, Spain, China, Morocco. There were keynote lectures from Norway, Switzerland, the US and Canada.



# MEERL - Master of Earth Energy Resources Leadership



The first cohort of this, MEERL'19, will be graduating in May 2019. They have already received job promotions through the program, from chief mine geologist to vice president business development, and stakeholder relations specialist to senior director of policy. We can't wait to see where they go next.

Here's what some of the students have had to say about the program:

"MEERL is more than just a Master, it's a project we as students have the honor to take part of. I'm so impressed how motivated (everyone is)"

"Overall, I am incredibly impressed with the residential week, the faculty, and the

overall program. This week has given me an impression that Queen's University is full of highly competent and engaged faculty, and that it is willing to demonstrate leadership and innovation in having created this program."

"I feel that this program is absolutely the right fit for me, and that I have both a lot to learn from the diversity of students as well as things to offer"

Students will be looking for projects to work on in summer 2019. Projects may span a year and are a great opportunity to learn what our students have to offer. If you have a project topic, email MEERL@queensu.ca. We are also looking for guest lecturers and panel presenters.



## Superconducting Gravimeter "Dirk" arrived at Queen's

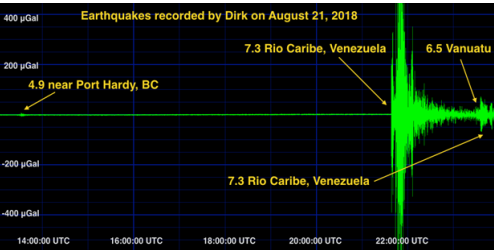


The wait is over, former graduate students Judith Elliott (MSc 2016), Katie Irwin (MAsc 2017), Kiyavash Parvar (MAsc 2015) and geological engineering student Fouad Faraj meet Dirk for the first time.

In August 2018, a new iGrav superconducting gravimeter by GWR Instruments was installed at Queen's University, specifically, in the basement of Miller Hall, on a bedrock mounted slab. The iGrav with the serial number 41 has been named 'Dirk' after Dirk Nowitzki, one of the greatest basketball players of all time and a true expert in handling spherical objects with the jersey number #41.

This instrument is one of about 30 such instruments worldwide and measures the subtle changes in the Earth's gravity field. Gravity is expressed in units of m/s<sup>2</sup> or Gal (after Galileo Galilei, 1564-1642) and the Earth's gravity field is on average 981 Gal. The iGrav is sensitive to 0.05 microGal or detects 1 part in 20 billion.

Mass transfer processes continuously change the Earth gravity field. Processes such as flooding, erosion, snowfall, glacial melting, atmospheric pressure, sea level change, or extraction of material out of the ground all cause gravity changes. Dirk measures gravity changes from the basement of Miller, from signals originated from anywhere on the globe. In fact, Dirk is a very good seismometer and sits side by and complements the Canadian Seismic Network Station KGNO. Dirkfurther measures Earth tides, similar to ocean tides, which are driven by the gravitational attraction of the Moon and the Sun. The Figure to the right shows an example of Dirk's capabilities in capturing Earthquakes. These data are from August 21, 2018. Dirk's future lies in the exploitation of its sensitivity to monitor subsurface reservoirs. Extracting heavy oil from a reservoir in Alberta or pumping groundwater to serve a pulp mill are two processes which result in the distribution of mass changes in time. In both scenarios, operators need to know how much oil or water has been extracted and from where, e.g. from the heel or toe of well X or the groundwater or surface water. Moving Dirk across the reservoir will allow for the determination of oil depletion and changes in the piezometric surface groundwater table has been lowered. The ultimate scenario for Dirk is to work in concert with another iGrav (the only other instrument in Canada, currently stored in Alberta). This will allow for gravity gradiometry, which amplifies the signals even further and allows for improved interpretations of



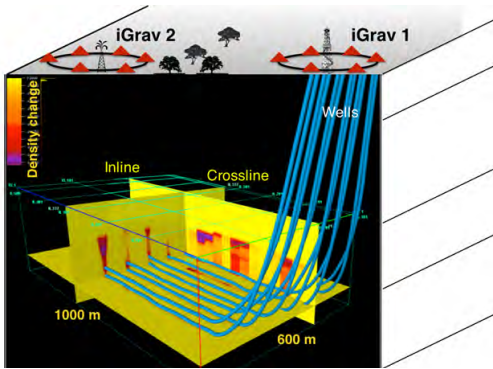
Gravity change on August 21, 2018 recorded by the iGrav. The magnitude 7.3 earthquake in Venezuela arrives first by travelling the direct path to Kingston, and then about two hours later, the seismic surface waves arrive from the opposite direction. The gravity signal of the Port Hardy earthquake is ~14 microGal.

Learning. Experience. Hands on. Results.  
Department of Geological Sciences and Geological Engineering

reservoir development (Elliott & Braun, Pure & Applied Geophysics, 2017)

GEOE/L439 (Advanced Applied Geophysics) students have been tasked with developing a live stream of data from Dirk and KGNO to be displayed on a monitor in the Miller museum, so stay tuned to see Dirk in action.

Dirk's acquisition was made possible through funding from the CFI John Evans Leaders Funds and the Ministry of Research, Innovation and Science of Ontario granted to Dr. Alexander Braun of the Geophysics and Geodesy Lab. The longstanding support and commitment of the people at GWR Instruments, specifically Richard Warburton and Eric Brinton is greatly appreciated. Dirk was installed with the invaluable help of PhD student Callum Walter, who listens to Dirk 24/7 to sense earthquakes as they happen.



Steam Assisted Gravity Drainage (SAGD) reservoir in the McMurray formation, AB. Heavy oil depletion is indicated by the red and purple colors leading to density loss and gravity change to be measured from the surface using a grid of iGrav stations.

## Welcome to New Staff

The Department would like to welcome its newest staff members:

Dr. Linda Tsuji, Museum | Curator Paul Bass, Department Manager | Dr. Anne Sherman, Laboratory and Student Coordinator | Tim Dowker, Departmental IT Service

We are excited to have their expertise in our department!

## Advancement Priorities

An update on funds in the department

Advancement priorities include:

**The Young Alumni Mentorship Program:** help us help our students make the most of their job search! We seek 25K a year for two years to establish the program. Your donations will fund a part-time employee, and we have just the person in mind, to establish the procedures and protocols, and to connect the more than 40 young alumni have expressed interest in mentoring students!

**The Named TA ships Fund:** \$5,000 a year for three years helps us hire two graduate or four senior undergraduate students a year to maintain our small lab sections and enhance the learning experience of our undergrads. Students who TA develop the invaluable skills of mentoring and communication, students who are TA'd have a chance to learn from enthusiastic, knowledgeable mentors.

**The Virtual Museum!** We are very excited by this initiative of creating an online digital museum of very high quality 3D scans of the museum holdings. Eventually the virtual museum will set the standard for other institutions to upload their high quality scans of specimens.

**Physical Spaces:** Imagine an educational outdoor laboratory of rock specimens, linked to the physical Miller Museum of Geology and its virtual partner! The educational rock garden will engage first and second year students, not to mention eager elementary students, in a laboratory just outside the front doors of Miller Hall. Both research and teaching laboratories and classrooms are need of refreshing and renovations.

**Field Fund:** And as always, we value donations to the field fund! Each donation helps us defray the costs of student trips.

To give to the department, please visit [givetoqueens.ca/geological](http://givetoqueens.ca/geological) or mail a cheque payable to Queen's University to: Attn: Lorna Dumond, 36 Union Street, Miller Hall, Queen's University, Kingston ON, K7L3N6.



### T. Kurt Kyser Memorial Scholarship Fund

The fund created in memory of Professor Kurt Kyser has sufficient funds to set up the scholarship. Thanks to support for this fund, the T. Kurt Kyser Memorial Scholarship will support graduate students studying Geological Sciences and Geological Engineering. Please help us to continue honoring Kurt's legacy by supporting this fund going forward: [www.givetoqueens.ca/kyser](http://www.givetoqueens.ca/kyser)



# Alumni Updates & Congratulations



Gord Keep BSc'79, and his wife Katherine Keep BA'81 received the Kathleen Beaumont Hill Award from the Vancouver branch of the Queen's University Alumni Association



Dr. Andrew Feustel PhD'95, returned from his six month space expedition, where he was Commander of the International Space Station.

Victoria Sterrit is leading Teck's participation in a new multi-disciplinary initiative called Canada's Digital Technology Supercluster

Amy Follwell, BSc'06 was featured in the Globe and Mail for her company "Bijoux by Amy"



Andrew Leriche, BSc'15, MASc'17, received the best thesis award from the American Rock Mechanics Association (ARMA).



Clare Miller, BSc'13 and current PhD student, received the Finnigan Award for Northern Research from the Northwest Territories and Nunavut Association of Professional Engineers and Geoscientists (NAPEG).

Share your good news stories with us! Send to [geolalum@queensu.ca](mailto:geolalum@queensu.ca), or share on the "Queen's GEO Alumni" Facebook group!



## GEOLOGY COUNCIL UPDATE

After 13 years, Roger Smith has stepped down as President of the Queen's Geology Council. We are appreciative of all his hard work including spearheading and raising money for the Field Studies Fund which currently stands at \$ 2M. This fund ensures that field work remains an important component of the program and that students can afford to participate. Andy Williamson (GeoEng '84) has agreed to take on the role of President. He can be reached at email address. We look forward to working with him and the Geology Council to help Dr Vicki Remenda in achieving her priorities.

The Geology Council meets by telephone once a month to discuss matters of the department including advancement topics, curriculum, alumni reunions, and more. Anyone who would be interested in being a part of the council is invited to reach out to us at [geolalum@queensu.ca](mailto:geolalum@queensu.ca). We welcome all interested parties and appreciate the support.

## 2018 ALUMNI REUNIONS

Visit [www.queensu.ca/geol](http://www.queensu.ca/geol) for upcoming events

Vancouver RoundUp



Geoconvention



Homecoming



Calgary 16th Annual

