

# Canada Research Chair – Fei Wang.

**Dr. Fei Wang** (Department of Environment and Geography and Centre for Earth Observation Science (CEOS)) has been named Canada Research Chair (Tier 1) in Arctic Environmental Chemistry. He will receive \$1.4M over the next seven years in support of his research.

Dr. Wang directs the Ultra-Clean Trace Elements Laboratory (UCTEL) and is the chief scientist of the Sea-ice Environmental Research Facility (SERF), the first experimental sea ice facility in Canada. He also leads the development of the Oil-in-Sea-Ice Mesocosm (OSIM) of the soon-to-be-constructed Churchill Marine Observatory (CMO). Dr. Wang is the Chair of the Environment Division of the Chemical Institute of Canada. Dr. Wang's research interests include molecular-level interactions of metal ions across environmental interfaces, and

global-scale interactions between chemical contamination and climate change. His recent research has focussed on mercury as a global contaminant, and on environmental chemistry of the rapidly changing Arctic sea ice environment.

Dr. Wang received his B.Sc. from Wuhan University (China) in 1990 and Ph.D. from Peking University (China) in 1995. From 1996 to 1998 he was a postdoctoral research fellow at Institut national de la recherche scientifique (INRS) – Eau (now INRS-ETE), Quebec City, Canada. From 1998-2000 he worked as a Natural Sciences and Engineering Research Council (NSERC) Industrial Research Fellow with EVS Environment Consultants (now Golder Associates). Dr. Wang joined the University of Manitoba in 2000 as an Assistant Professor and has been a Full Professor since 2009.





# The Prairie Northern Chapter of the Society of Environmental Toxicology and Chemistry Gathers in Winnipeg.

This past June the Society of Environmental Toxicology and Chemistry (SETAC) Prairie Northern Chapter (PNC) held its 7<sup>th</sup> annual conference at the University of Manitoba. The chapter is comprised of members from academia, industry and government, and geographically covers Manitoba, Saskatchewan, Alberta, along with the Yukon, the NWT, and Nunavut. The society's main goal is to provide a forum where scientists, students, and other professionals can share information and ideas on the study, analysis and solution of environmental problems, the management and regulation of natural resources, research and development, and environmental education. **Dr. Mark Hanson** (Department of Environment and Geography) currently serves as the SETAC PNC president. He organized this year's meeting along with help from students in the Riddell Faculty, which also provided a generous Platinum Sponsorship.

The topic of this year's conference was **Wastewaters: Many Pipes, Many Solutions** and covered such subjects as the fate and effects of microplastics, pharmaceuticals, and hydrocarbons in the environment. The meeting hosted over 100 individuals, including students, professors, government regulators, industry professionals, and members of the general public. The conference kicked off with a short course on "**experimental design and data analysis: the basics**", taught by Dr. Francis Zvomuya (University of Manitoba – Soil Science). Following the short course, **Tox on Tap** was held at The Black Rabbit Bistro Lounge where a public lecture was held on



engaging end users with the science we do in ecotoxicology by Dr. Karen Kidd (University of New Brunswick, Canadian Research Chair for Chemical Contamination of Food Webs). The plenary speakers came from across Canada, and included Dr. Michael Rennie (Lakehead University, Canadian Research Chair in Freshwater Ecology and Fisheries), and Dr. Kidd and Dr. Lee Jackson (University of Calgary, Executive Director of Advancing Canadian Wastewater Assets).

Following the presentations, a poster social was held just outside the lecture theatre where members could socialize and inquire about individual research projects. **Angela Reeves** (B.Sc. (Hons.)/17) said, "*The PNC conference is a great networking opportunity for professionals and students, providing the chance for people in the toxicology/chemistry fields to build connections across the Prairies with global leaders. And it is an excellent way to see the strong science that is done in our own backyard.*"





## International diplomatic forum on water and energy.

The Canadian Consulate in New York, USA and American Jewish Committee (AJC) headquarter in New York organized an international conference focusing on natural resource diplomacy, entitled *"Scarcity and Security"* on March 23, 2016 in which **Dr. C. Emdad Haque** was a key panel speaker. The water panel consisted of Emdad Haque, Seth Seigel -- an American entrepreneur, author and activist -- and Amir Sagie, Deputy Consul General of Israel in New York. Dr. Haque presented his thoughts and research findings on *"Water resources, risk and (in)security: Canadian perspectives"*

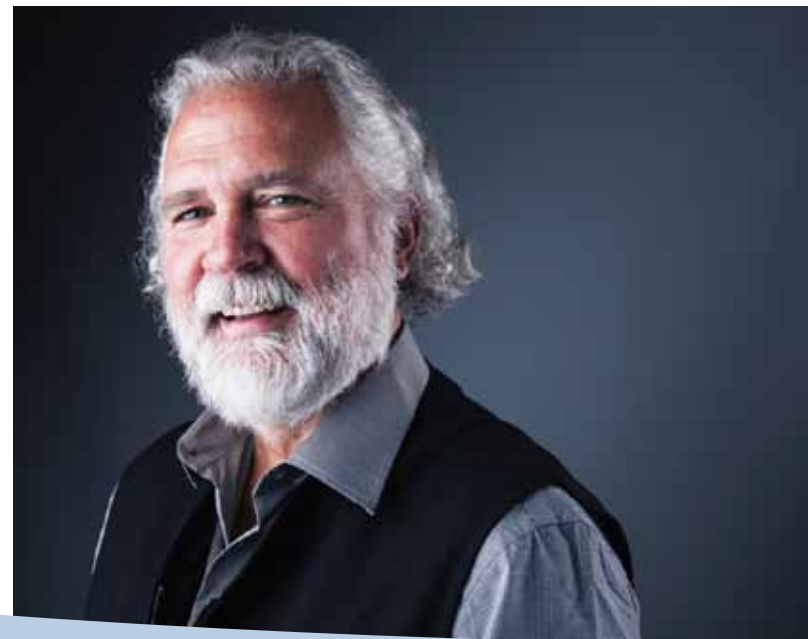
to the forum that was attended by more than 50 diplomats, senior government policy makers, philanthropists, writers, non-governmental organization representatives, activists, and investors. The forum concluded with identifying diplomatic instruments and policy action items for furthering international collaboration and cooperation on sustainable water and energy resources.

Pictured below: The panel of experts with the participants in the *'Scarcity and Security'* conference. Photo credit: Alex Bronzo, American Jewish Committee.



## Fellow of the Royal Society of Canada.

**Dr. David Barber** (Distinguished Professor, Canada Research Chair in Arctic System Science, Department of Environment and Geography and Centre for Earth Observation Science (CEOS) has been elected to the Royal Society of Canada (RSC), the country's most esteemed association of scholars and scientists. Election to the RSC is considered the highest honour an academic can achieve in the arts, humanities, and sciences. Dr. Barber is internationally recognized for his leading role in understanding the changing sea ice dynamics resulting from Arctic climate change. He has made significant, innovative, and sustained contributions to the field for over 30 years. Dr. Barber has illustrated how changes in dynamic and thermodynamic processes in sea ice have implications in both natural and human systems within and beyond the Arctic region such as the impacts on marine ecosystems, northern peoples, and the oil and gas industry.



## Grenada Memorandum.

**Dr. Nicola Koper** (Natural Resources Institute (NRI)) has been undertaking research in Grenada concentrating on the conservation of birds in Grenada's agroecosystems. The avian community includes many endemic subspecies such as the Grenada house wren and Grenada subspecies of the lesser Antillean bullfinch, and near-endemic species such as the Grenada flycatcher and lesser Antillean tanager. It includes a unique community of species and genetic characteristics found nowhere else in the world. Dr. Koper and her research group have been working with volunteers from local communities and St. George's University to conduct abundance species in rural habitats across the island, including some of the first ever surveys to mist-net and band Grenada's birds. This research has provided a tremendous opportunity for Riddell Faculty graduate students to gain international field research opportunities, and to interact and work with students from another university.

Dr. Koper will be offering a graduate field course on conservation and sustainable tourism in Grenada in February 2017. There's been tremendous interest from students so far, perhaps in part because it was a great success when it was offered in 2014. The course will include a tour of the island, meetings with conservationists and agri-tourism operators, and will focus on the ecosystems and wildlife of Grenada. In addition, students will also be involved in the development and offering of an interpretive program on bird conservation to school children, local community members, and tourists. To quote Dr. Koper *"It's going to be a lot of fun."*

Photo Credit: Dwain Thomas.





# Hominin footprints, alkaline volcanoes and trace elements.

Even the genius of John Walter Gregory, who discovered the Great Rift Valley for science and correctly interpreted it to be “**directly due to earth-movements**” (1896, p. 220), would probably be in awe of at the true magnitude of that discovery now, 120 years later. Apart from being the largest plate-tectonics feature visible from space, the East African Rift – as it is known to geologists – has many other “**firsts and mosts**” to its credit, including areas with the highest ethnic diversity, Earth’s only volcano spewing cold (500 oC!) carbonate lava, and a unique ecosystem, which sustains the eastern gorilla, Jackson’s francolin and numerous other endemic animal species. Outside of Earth Sciences, the Rift is best known, perhaps, for the diversity of paleoanthropological record of early human evolution preserved in various (epi)volcanic deposits produced by the same tectonic forces that have been splitting the African continent for the past 25 million years. Who nowadays have not heard of Lucy, Ardi, or the Oldowan stone tools?

Undoubtedly, one of the most momentous anthropological finds was made by a team headed by Mary Leaky, who took over the excavations at Oldupai1 Gorge, northern Tanzania, in 1972 and in the mid-1970s, decided to expand their search for hominin fossils to the Laetoli area some 45 km south of the Gorge. There, a 130-meter package of air-fall and aeolian tuffs, incised by dry channels and overgrown with thickets of whistling thorn, had previously yielded isolated bones of unknown age. The team soon realized that certain tuff horizons had been deposited under humid conditions and buried sufficiently fast to preserve numerous animal tracks (locally, dozens of prints per square meter). This led to the discovery

of a 25-meter long trail of footprints left on the surface of freshly deposited volcanic ash by a group of upright walking *Australopithecus afarensis* (Hay & Leaky, 1982). Subsequent isotopic studies have shown that the footprints are at least 3.5 million years old, which makes them the oldest known evidence of hominin bipedalism (Fig. 2). Far more than simply a locomotive adjustment to changing landscapes, bipedalism freed up the *Australopithecus*’s hands for creative undertakings, effectively ushering in the era of stone tool fabrication.

For their protection, the footprints were reburied and only a select few researchers from around the world could visit Laetoli and continue the excavations in the past 35 years. In July of 2016, the Government of Tanzania announced their support for a state-of-the-art indoor museum, which would allow scientists to continue digging, and the public to gain access to this important cultural site (Press Release, 2016). The project involves a significant geological component, which is aimed, among other things, at determining the source of the Footprint Tuff. For a long time, the alkaline Sadiman volcano about 20 km east of Laetoli was considered the only viable candidate (Fig. 1), but recent studies by Anatoly Zaitsev’s group at St. Petersburg University (Russia) indicated that things might not be as simple as they once seemed, and alternative sources needed to be explored (Zaitsev et al., 2011). Indicator-mineral research carried out by Anton Chakhmouradian and Katya Reguir in the Department of Geological Sciences was suggested as a potential tool to trace the origin of the Footprint Tuff, and the two joined Prof. Zaitsev’s team at

Laetoli this summer. The theory behind the indicator-mineral method is simple: the distribution of trace elements between crystals and their parental magma is a function of magma composition and, in theory, can be used to “**fingerprint**” specific rock series. The best indicator minerals are those that occur in appreciable concentrations, are able to survive erosion and transport, and show structural tolerance for a wide range of substituting elements so that compositional discrimination criteria could be optimized. This approach has already been successfully applied to identify unexposed carbonatite intrusions in Russia (Reguir et al., 2015) and to distinguish between kimberlites and texturally similar rocks in northern Manitoba (Chakhmouradian et al., 2009).

While in the field, Anton and Katya sampled the Footprint Tuff, as well as all major rock types exposed at Sadiman and its vicinity (Fig. 3), and identified several previously unseen lithological units in the process. Representative samples from other African volcanoes comprising similar volcanic material were provided for the project by the Museum of Natural History in London, UK. The next step is to find out which of the minerals in these rocks are common, robust and compositionally complex enough to be used as provenance indicators. Song Gao, who has just started in the Department as a graduate student, will help gather and interpret petrographic and analytical data on the Sadiman volcanics as part of his master’s project.

This research would not have been possible without the generous support from NSERC, GMP Consulting Engineers in Arusha, St. Petersburg State University, and C.H. Riddell Faculty of Environment, Earth, and Resources

Pictured Left (Fig. 1): A panoramic view of Sadiman (in the center) and the younger Lemagrut volcano (at right) from the rim of the Ngorongoro caldera. The painted faces of the Maasai boys in the foreground indicate that they have just been, or are about to be, initiated.

Inset (Fig. 2): The famous Laetoli Footprints unearthed for the first time since the early 1990s for the inspection by an international team of paleoanthropologists, biologists, soil scientists, conservation specialists and geologists. Note a trail of antelope footprints beside the hominin ones.

Bottom (Fig. 3): Anton and Katya studying a volcanic mudflow (lahar, beige to grey) that transported igneous rocks from Sadiman onto the surrounding plain, which was covered with basalt lavas some 1.7 million years later (black, in the foreground).





## Circumpolar Footwear Exhibit.

In the spring, the Bata Shoe Museum in Toronto launched a new Arctic exhibition, Art & Innovation: Traditional Arctic Footwear from the Bata Shoe Museum Collection. **Dr. Jill Oakes** (Department of Environment and Geography) and Dr. Rick Riewe (Retired, Department of Biological Sciences) lent their expertise to the exhibition as guest curators. The opening of Art & Innovation coincided with the Bata Shoe Museum's 20<sup>th</sup> anniversary



Image © 2017 Bata Shoe Museum, Toronto (Philip Castleton)

celebrations, once again showcasing the museum's role as a world-renowned cultural institution dedicated to exploring the role of footwear in society. Drawing from the Museum's extensive circumpolar holdings and building upon information gathered during museum funded field research trips to Arctic nations, Art & Innovation offers rare examples of footwear, clothing and tools from the permanent collection and showcases the artistry and ingenuity of the makers while celebrating the diversity and beauty of traditional Arctic attire. The objects in the exhibition were collected in the field directly from the makers and wearers who shared their knowledge with museum researchers through interviews and demonstrations. Dr. Oakes and Dr. Riewe conducted the majority of these field trips and through their efforts have helped the museum amass an extraordinarily rich and diverse Arctic collection.

To quote Dr. Oakes and Dr. Riewe: *"Living, travelling on the land and working with Inuit in the field, we were introduced to the meaning and importance of traditional clothing, footwear and tools. As one hunter in Arviat explained, his skin clothing was more important than his skidoo or gun. Our research focuses on facilitating the sharing of northern peoples' stories that their clothing tell and documenting diversity throughout the circumpolar region."*



Image © 2017 Bata Shoe Museum, Toronto (Philip Castleton)

## Environmental Science at the Experimental Lakes Area.

The International Institute for Sustainable Development's Experimental Lakes Area (IISD-ELA) is a globally renowned research station. Founded in 1968, ELA is comprised of 58 small lakes used for scientific research focused on advancing our understanding of freshwater ecosystems. For more than 40 years the ELA has been one of the only places in the world where experiments are conducted on whole ecosystems. These small lakes are manipulated and scientists are able to examine how the entire ecosystem (atmosphere to fish population) responds. In spring of 2016,

**Dr. Mark Hanson** (Department of Environment and Geography) and Dr. Chris Metcalfe (Trent University-School of the Environment) delivered a unique field course out of ELA focused on environmental monitoring techniques and the protection and evaluation of water quality within a Boreal context. Students from the University of Manitoba and Trent University participated in the course. The course

was also partly sponsored by the **NSERC CREATE H<sub>2</sub>O** program, a research initiative focusing on First Nations water and sanitation security. Guest lectures by Dr. Vince Palace (Senior Research Scientist, IISD-ELA) and **Dr. Bruce Erickson** (Department of Environment and Geography) helped round out the course and gave students different interdisciplinary perspectives on protecting water resources.

For over a week, students worked with IISD-ELA researchers to gain valuable hands-on experience in techniques to monitor the state and quality of lake systems. This included passive samplers for contaminants in water, grab samplers for sediments, seine netting, angling and trap netting for fish population and community assessments, and kick netting and emergence traps for collecting insects. A highlight of the course was training with fisheries biologists to learn non-lethal sampling and fish aging methods. Defining the age of fish is an important tool for understanding overall health and sustainability of a population's growth, life span, age at sexual maturity and more. Students also learned the science behind conducting a whole lake manipulation, and presented their own proposals to the researchers at IISD-ELA for a whole lake study following a pipeline breach and oil spill scenario. This aspect of the course gave students unique insight to how large-scale, whole-ecosystem studies of this nature are planned and carried out.

Another vital element of environmental protection is community engagement. To this end, the students travelled to the Eagle Lake First Nation community and spent a day at Migisi Sahgaigan School, engaging the community in various invertebrate, water chemistry, and fish sampling techniques utilized at IISD-ELA. IISD-ELA is striving to bridge the gap between Indigenous communities, and scientific research. Students also spent a day at the Domtar Pulp and Paper Mill in Dryden, Ontario learning about the facilities and environmental monitoring programs. Preparation for the 2017 course is underway.

Pictured: Left-top: Students helping researchers at IISD-ELA sample fish using a seine net, Left-middle: Exploring the lakes at IISD-ELA, Left-bottom: Searching for macroinvertebrates using a sweep net, Below: Dr. Mark Hanson checking on our emergence traps employed to sample aerial macroinvertebrates. Photo Credit: Sarah Warrack.





# Spring Convocation.

On May 31, 2016 the Riddell Faculty held its annual convocation lunch. The reception celebrates the accomplishments of our graduates for the year and provides an opportunity to recognize the valuable role of friends and family in supporting students to achieve and excel. Over the past year (including the Fall convocation of 2015 as well as the Spring convocation) the Riddell Faculty has seen 37 graduate students (2 Ph.D.s and 36 Masters) and 126 undergraduate students graduate from our programs. Numerous students and faculty received recognition and awards.

Of the faculty and students recognized at the event, Riddell Faculty teaching awards were presented to:

**Award of Excellence for First Year Undergraduate Teaching:** *Lisa Ford* (Department of Environment & Geography) (Pictured top right).

**Award of Excellence for Undergraduate Teaching:** *Janna Wilson* (Department of Environment & Geography) (Pictured middle right).

**Award of Excellence for Graduate Teaching:** *Andrew Frederiksen* (Department of Geological Sciences).

Also recognized was *Dr. Erin McCance* who was selected for recognition under the Students' Teacher Recognition Program organized by the Centre for the Advancement of Teaching and Learning.

*Dr. Norman Halden* (Dean) also recognized numerous students for their contributions to the Faculty as well as awards that recognize their achievements including:

University of Manitoba Gold Medal for Highest Standing in the Clayton H. Riddell Faculty: *Lindsay Warelis*. Bachelor of Environmental Science (Honours).

**Program Medals** - Awarded for highest standing in a Clayton H. Riddell Faculty program.

**Honours Degree:** *Matthew Walker*. (Pictured bottom, far left.) Bachelor of Environmental Science (Honours)

**Advanced/Major Degree:** *Tina Cliff*. Bachelor of Geological Science (Major).

**General Degree:** *Dana Dangerfield*. Bachelor of Arts in Geography (General).

**Undergraduate Thesis Prize** for the student who has submitted the best undergraduate thesis – *Yana Tyomkin*.

**V.E. Barber Memorial Fellowship in Arctic Research.** The Award is offered annually to graduate students who undertake thesis research pertaining to the Arctic. This year, 1 award was awarded, valued at \$9,000, awarded to *Karley Campbell* Ph.D. candidate, Geography. Karley receives this award for her research on *Sea Ice Microbiology Assessment of Sea Ice Algal and Bacterial Production*.



Weir Award for the most outstanding Master's Thesis presented by a student in the Department of Environment & Geography – *Tonya Burgers* for her thesis: *"Implication of a Changing Arctic on Summertime Rates of Air-Sea CO<sub>2</sub> Exchange within the Eastern Canadian Arctic"*.

Nomination - **Canadian Association of Geographers (CAG) Undergraduate Award.** Each year, the Canadian Association of Geographers (CAG) presents awards to the most outstanding students graduating in Geography honours/majors programs at universities across Canada – *Katya Boutroy* (Pictured bottom, second from left.) has been nominated by the Department of Environment and Geography. Winners will be announced on at the Annual General Meeting in Waterloo, Ontario.

**Aboriginal Issues Press Scholarship** for outstanding graduate students with a research focus on Aboriginal issues – Monica Cyr, Darrien Morton, *Jill Bueddefeld* (Pictured bottom, middle.), *Tosan Okorosobo*.

Mark G. Smerchanski Prize awarded to the student who has achieved the highest aggregate mark in courses offered by the Department of Geological Sciences – *Maxwell Day* (Pictured bottom, second from right.).

**Berkes Graduate Scholarship in Community-Based Research** for an outstanding graduate student who is pursuing studies in community-based research methods including, but not limited to, community-based resource and environmental management, conservation and planning: *Lynnea Parker*. (Pictured bottom, far right.)

**William H. Hill Memorial Award** for achievement at a high level in Geological Sciences – *Tina Cliff*.



# Picturing the Planet.

As a regular feature “Picturing the Planet” brings inspiring and informative images taken by our students, staff, and faculty.

Helmeted and respirator-masked, **Dr. Fei Wang** (Centre for Earth Observation Science (CEOS) and Department of Environment and Geography) and a small research team trekked across the fuming and mushy crater of Turrialba Volcano (3340 meters above the sea level) in central Costa Rica. The stratovolcano has been very active since the 2000s; the most recent eruption occurred in July 2016, two months before this picture was taken. As part of a research project on volcanic gas chemistry, Dr. Wang and M.Sc. student Skye Kushner (CEOS and Environment and Geography) got a rare opportunity to sample and study the plume up-close.

(Photo credit: **Skye Kushner**).

