Clayton H. Riddell Faculty of Environment, Earth, and Resources

NEWSLETTER

CEOS 25th Anniversary

This year marked the 25th Anniversary of the Centre for Earth Observation Science (CEOS). More than 60 students, staff and alumni joined CEOS in honouring its silver anniversary as part of the University of Manitoba's 2019 Homecoming celebrations. University of Manitoba President and Vice-Chancellor Dr. David T. Barnard opened the night with gracious words about the importance of continuing to develop climate knowledge during this unique and important time for the Earth.

Guests were educated and entertained by Executive Director

Dr. John lacozza's retrospective on the history of CEOS since it was established in 1994 with a mandate to research, preserve and communicate the developing knowledge of earth system processes. The research at CEOS is multidisciplinary and collaborative, seeking to understand the complex inter-relationships between elements of earth systems and how these systems will likely respond to climate change.

"In 1994, we started as a group of three researchers. CEOS has grown significantly to over 150 faculty, staff, graduate students and postdoctoral fellows," said Dr. Iacozza.

Attendees were also treated to a visionary discussion on the future of climate research from panelists *Dr. Tim Papakyriakou*, Dr. Lisa Loseto and Dr. Kathleen Munson.

After the speech and panel portion, guests gathered to catch up over refreshments on the fifth floor of the Wallace Building – a space that did not exist until the floor was added in 2013 to accommodate the growing needs of the research centre.

Pictured top right: CEOS Executive Director, Dr. John Iacozza. Photo Credit: Mike Latschislaw.

Pictured middle right: (left to right) Doctoral student Tonya Burgers receives the V.E. Barber Memorial Fellowship in Arctic Research from Dean, Dr. Norman Halden. Photo Credit: Mike Latschislaw.

Pictured bottom right: President and Vice-Chancellor, Dr. David T. Barnard; Assistant Professor at the Freshwater Institute, Dr. Lisa Loseto; Professor and former CEOS Executive Director, Dr. Tim Papakyriakou. Photo Credit: Mike Latschislaw.









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Freshwater Ecology Day

Environmentally-minded Manitoba students gathered at Fort Whyte Alive on October 2 for Freshwater Ecology Day. The next generation of water quality specialists visited learning stations about water sampling, water chemistry, shoreline erosion, aquatic invasive species, invertebrates, and their interactions within the watershed.

Aspiring ecologists had the opportunity to learn from water quality experts at the University of Manitoba's Centre for Earth Observation Science (CEOS), as well as the International Institute for Sustainable Development.

CEOS graduate students *Katelyn* **Rodgers** and **Agoston Fischer** gave demonstrations and facilitated

workshops on how to analyze the levels of key nutrients like nitrogen and phosphorus in water samples. Students also learned about testing for chlorophyll and sediments.

"The students got hands-on experience using some of the newest software for *measuring nitrogen in the water*," says Rodgers. "They also learned how we are moving toward using satellite imagery for measuring algae blooms in the Manitoba Great Lakes."

Claire Herbert is the coordinator responsible for CEOS's involvement at Freshwater Ecology Day. Herbert also leads the Canadian Watershed Information Network (CanWIN), a webbased, open access data and information network created as part of the Lake

Winnipeg Basin initiative under Canada's Action Plan on clean water.

As much as is known about water quality, there is still a lot more to learn according to Herbert.

"Without understanding the state of nutrients in the Manitoba Great Lakes system, we will not be able to adequately inform, manage or mitigate the ongoing challenges of nutrification and climate change on Lake Winnipeg or the Hudson Bay watershed."

Pictured above: (left to right) M.Sc. student Katelyn Rodgers; Canadian Watershed Information Network Coordinator Claire Herbert.

The University of Manitoba Centre for Earth Observation Science (CEOS) welcomed two senior research chairs in environmental studies this year, and it's difficult to overstate their accomplishments.



savs Dahl-Jensen.

Dr. Dahl-Jensen's face can be seen behind a sheet of thin ice on the cover of this Fall's UM Today Magazine. The inquisitive academic learns what ice core-drilling tells us about the earth's climate thousands of years ago, with study breaks for dancing to ABBA songs.

Read the full story in the Fall 2019 UM Today, The Magazine at news.umanitoba.ca/magazine/archives



Awards

Awards were presented at the 2019 Engineers Geoscientists Manitoba Association's annual Awards Gala Dinner. The Technical **Excellence** Award was

presented to **Dr. Norman**

Halden, Dean, Riddell Faculty (Pictured left, Photo Credit Leif Anderson). The Technical Excellence Award recognizes outstanding achievement, including the direct advancement of the engineering or geoscience professions, by an individual member during his or her career.

Dr. Mark Hanson.

Department Head, Environment and Geography was awarded the Outstanding Regional Chapter Member as part of the 2019 North America Award Winners of the Society of Environmental Toxicology and Chemistry (SETAC). This award goes to a North America regional chapter member who consistently contributes to the development of the society at the chapter level and who has improved the chapter's services.

Dr. Frank Hawthorne,

Geological Sciences, received the title Distinguished Professor Emeritus upon his retirement in 2018.

An honorary doctorate in the biological and environmental sciences will be conferred

on Dr. Vaclav Smil,

(Environment and Geography), an interdisciplinary scientist, who is exploring new ground in the fields of energy, environmental and population change, technical innovation, food production and nutrition, risk assessment, and public policy. The Faculty of Philosophy at the University of Helsinki confers honorary doctorates on distinguished persons from culture and society from around the world, representing the different disciplines of the Faculty.



Forum,

Dr. Stroeve is also taking part in the largest ever polar expedition, called the MOSAiC (Multidisciplinary Drifting Observatory for the Study of Arctic Climate). The MOSAiC crew includes environmental scientists from around the globe who will board the RV Polarstern, the first ever vessel scheduled for a full uninterrupted year conducting research within the Arctic circle. "We hope improved data will give us a stronger steer on how sea ice thickness is changing from year to year and over the long-term," says Stroeve.

New Research Chairs

University of Manitoba Canada Excellence Research Chair, **Dr. Dorthe Dahl**-

Jensen (Pictured left on the cover of the Fall 2019 UM Today, The Magazine), is the recipient of the 2020 Reinhard Mohn Prize, which recognizes internationally renowned individuals for their forward-thinking solutions to social and political challenges. The objective of the prize is to recognize research related to the Arctic. Further, it aims to put issues of particular relevance to the future development of the Arctic on the national and international agenda.

Dr. Dahl-Jensen will also initiate an ice-core drilling project through the Müller ice cap on Axel Heiberg, located in the Arctic Ocean in the Qikiqtaaluk Region of Nunavut. "The project will form a collaboration between Canadian and Danish researchers and allow a reconstruction of the sea ice 10,000 years back in time,"

Another CEOS research chair is also putting Arctic issues on the international agenda. From receiving a Senior Canada-150 Research Chair position to chatting with youth climate activist Greta Thunberg at the World Economic

Dr. Julienne Stroeve (Pictured below, Photo Credit: Terje Mortensen/ Arctic Frontiers 2017) has had a busy year. Most recently, the European Geosciences Union announced Dr. Stroeve will be the recipient of the 2020 Cryosphere Division Medal.

Geology of the Rocky Mountains: Field Trip August 27- September 6, 2019

Field courses are an integral component of all geology programs. These courses build on skills acquired in the classroom, while exposing students to a variety of different geologic environments. The Canadian Rocky Mountains offer not only a look at an iconic landscape, but exposure to a group of rocks that are spatially, temporally and geometrically distinct from most rocks in Manitoba.

Led by **Jeff Young** and **Dr. Paul**

Durkin (Department of Geological Sciences) we started our exploration in the foreland basin visiting Dinosaur Provincial Park, a UNESCO World Heritage site where Paul has an active research program. Here we examined complex structures in meandering river deposits preserved from late Cretaceous times. We worked our way across the Rockies, moving back through time and documenting changes from the relatively young convergent margin landscape of the mountains to older rocks reflecting a time of passive margin carbonate deposition analogous to rocks forming off the east coast of Florida today. On the west side of the Rockies and down through the Rocky Mountain Trench, we reached as far back as the late Proterozoic. These rocks document the breakup of a pre-North American continent named Rodinia and show evidence for the "*Snowball Earth*" hypothesis. For the students, it was a journey through more than 500 million years of Earth stories variably stacked on top of each other.

While we created a story of how the west coast of North America evolved, students also completed a number of field projects aimed to improve their mapping skills. At Mount Yamnuska (Pictured top right), students were expected to document the deformation associated with the McConnell thrust fault. Here we were accompanied by Imperial Oil's

Tim Hayward (B.Sc.Hon. Geophysics, 2014). Using aerial photography, students mapped storm-transported sediments of the Upper Cretaceous Cardium Formation that were deposited in shallow marine environments at Seebe and the organic-rich late Devonian Exshaw Formation at Jura Creek. The Exshaw is considered to be the source rock for much of the conventional oil in Alberta and the Cardium reservoir hosts almost one quarter of that. Students also had a chance to improve their drawing skills by creating sketch maps of a deformed sequence of Jurassic off-shore marine strata near Banff, an Upper Devonian stromatoporoid reef at Grassi Lakes above Canmore, a faulted sequence of carbonate rocks at Crowsnest Lake and cross-bedded sandstones at Lundbreck Falls. Besides specific projects, students also had the

opportunity of hiking to the UNESCO World Heritage Walcott Quarry and examining the unique fauna of the Middle Cambrian Burgess Shale (Pictured below left) and visiting Teck's Elkview Coal Mine (Pictured below right) in Sparwood B.C. as well as the Riversdale Resources Grassy Mountain Project in Blairmore. At these coal mines students received lessons in the complexity of coal mining, the environmental response of these resource projects and their consultation process.

The students received financial support from Orix Geoscience, Imperial Oil, Engineers Geoscientists Manitoba, Canadian Society of Petroleum Geologists, Manitoba Prospectors and Developers

Association, **Dr. R.J. Elias** and the Department of Geological Sciences Endowment Fund.





Sea Ice Symposium

The Centre for Earth Observation Science (CEOS) coordinated the International Glaciological Society's 2019 Sea Ice Symposium (#IGSWPG) August 19-23 at the Fort Garry Hotel. The quinquennial symposium was quite the success, receiving news coverage from CBC, CTV, Global, NBC and more.

University of Manitoba Canada Excellence Research Chair **Dr. Dorthe Dahl-Jensen** spoke with CBC's Ismaila Alfa, expanding on her IGS plenary speech on the role of Greenland ice streams in discharge of fresh water in a warming climate. U of

M Senior Canada-150 Research Chair Dr. Julienne Stroeve held a plenary on combining satellite images with prediction models for mapping pan-Arctic under-ice light availability, and discussed her broader research on CBC Radio One.

Minister of International Trade Diversification Jim Carr hosted an Arctic Economic Development panel with panelists including Town of Churchill Mayor Mike Spence, Hamlet of Chesterfield Inlet Mayor Simionie Sammurtok, CEO of Arctic Gateway Group Murad Al-Katib and University of Calgary Political Scientist Dr. Heather Exner-Pirot. Other plenary keynote speakers included Fiamma Straneo from Scripps Institution of Oceanography and Nathan Kurtz from NASA's Goddard Space Flight Centre.



Two CEOS graduate students won awards for Best Poster Presentation. Yanique Campbell was recognized for "Sensitivity analysis of a simple wave tracker for Arctic environments using a combination of empirical and numerical models" while Satwant Kaur received an award for her poster "Higher-order statistical moments to analyze sea-ice drift patterns".

CBC Up to Speed interviewed four participants throughout the days of the symposium. Grise Fiord community representative

Larry Audlaluk explained the changes he's observed living in the North Water Polynya in the high Arctic, an area of yearround open water surrounded by sea ice. Audlaluk was a distinguished guest on the Pikialsorsuaq panel on a proposed international Inuit management area.

Pictured middle: (left to right): Hamlet of Chesterfield Inlet Mayor Simionie Sammurtok; Town of Churchill Mayor Mike Spence; Minister of International Trade Diversification Jim Carr; University of Calgary Political Scientist Dr. Heather Exner-Pirot; CEO of Arctic Gateway Group Murad Al-Katib. Pictured bottom: NASA Goddard Space Flight Center's Dr. Nathan Kurtz gives his keynote plenary speech to #IGSWPG



New faculty member: Dr. Michael Schindler, Geological Sciences

Dr. Michael Schindler (Pictured right) received his B.Sc., M.Sc. and Dr. rer. nat. from the Goethe University, in Frankfurt a.M., Germany. He joined Dr. Frank Hawthorne's work group at the University of Manitoba in 1997, working on the crystal chemistry of complex salt minerals. He became a prestigious Emmy Nöther Fellow at the University of Münster, Germany in 2001 before returning back to Canada working again with Dr. Hawthorne. He became a Professor of Environmental Mineralogy at Laurentian University in Sudbury, Ontario in 2007. In 2019, Dr. Schindler decided to come back one last time to the University of Manitoba, and is now Associate Professor for Environmental Mineralogy and Geochemistry.

Dr. Schindler's research interests are in the field of Environmental Nanoscience and involve the investigation of nano-scale processes in the environment, with a particular focus on the release, transport and retention of metals and metal(loid)s in the environment. These processes can be explored using various X-ray diffraction, Electron Microscopy and spectroscopy methods. His favourite instrument is, however, the Thalos Transmission Electron Microscope at the Manitoba Institute of Materials (Pictured bottom right). This microscope is a stateof-the-art high-resolution electron microscope and allows Dr. Schindler to visualize, for example, the transport of lead, chromium and gold as nanoparticles in the environment, or to decipher previously unknown mineralogical processes in soils and volcanic regoliths. Dr. Schindler's current objectives are to understand chemical and mineralogical processes in very small pore spaces in soils, sediments and rocks, which often govern the fate of many elements and even organic molecules in the environment. Dr. Schindler received the Young Scientist Award from the Mineralogical Association of Canada in 2007 and the Fellowship of the Mineralogical Association of America in 2015.



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

This is a drone photo of Late Cretaceous deepwater turbidite deposits of the Nanaimo Group, Hornby Island, B.C.. Photo credit: Dr. Paul Durkin.



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