U of Toronto Mississauga's Igor Lehnher reveals startling new evidence of effects of climate change in the Arctic: Research led by U of T Mississauga geographer Igor Lehnherr provides startling evidence that remote areas in Canada's Arctic region—once thought to be beyond the reach of human impact—are responding rapidly to warming global temperatures. The study is the first to aggregate and analyze massive data sets on Lake Hazen, the world's largest lake by volume located north of the Arctic Circle. "Even in a place so far north, it's no longer cold enough to prevent the glaciers from shrinking," says Lehnherr, lead author on the study. "If this place is no longer conducive for glaciers to grow, there are not many other refuges left on the planet." "This study provides a high-level complete data set where all components the watershed have been studied, and reveals how different components, such as lake ice coverage, permafrost, glaciers, terrestrial environment or the lake food web, are responding to climate change over time," he says. Study collaborators collected and recorded data available from ongoing site research, which dates back to the 1950s. Some research methods provided a longer view. "This study allowed us to ask questions about the entire watershed and how the different puzzle pieces fit together," he says. "We are able to show how all of the parts are interconnected and how something like glacial mass shrinking and generating more meltwater has important impacts for the downstream lake ecosystem." "We showed that climate has many different impacts, and all components of the watershed are intricately connected," he says. "The physical, biological and chemical aspects are responding directly to climate changes." "The lake and the lake ecosystem have been in a relatively stable state for hundreds of years, but all it took was a one-degree increase in regional air temperature for it to enter a completely new state," Lehnherr says. "The biological food web looks different, the biogeochemical cycles are accelerated, and we're observing more organic nutrients, contaminants and carbon coming into the system." The study was spurred by anecdotal reports from park staff and visitors to Lake Hazen, who noticed that the lake was becoming ice-free in the summer, when previously it has been a rarity for the lake ice to melt completely during the summer months. Hikers and parks staff also noticed that it became more challenging to cross rivers, which were getting larger, deeper and faster-flowing due to glacier runoff. "The glaciers typically melt a little during the spring and summer seasons, however we noticed that they began to lose more ice than they gained in the winter," says Lehnherr. "We are now seeing the ice mass declining, which is surprising, because the lake is one of the most northerly of Canadian lakes. Water takes a lot of energy to warm up, and can store a lot of heat energy. A large lake, like Lake Hazen, theoretically should be more resilient to climate change relative to a pond or smaller body of water. If this lake is exhibiting signs of climate change, it really shows how pervasive these changes are." PhysOrg

U Northern British Columbia's Ellen Petticrew and collaborators to study impact of climate warming on the Nechako River Basin: A group of UNBC researchers will be studying the impacts of climate warming on the Nechako River Basin, thanks to a $1 million grant from the province and the mining multi-national Rio Tinto. Researchers with the integrated watershed research group announced the funding on Tuesday at UNBC. The researchers - environmental science professors Stephen Dery and Phil Owens, geography professor Ellen Petticrew, and Canada Research Chair in Health, Ecosystems and Society Margot Parkes - received a $499,950 grant from the Ministry of Forests, Lands, Natural Resources Operations & Rural Development and Rio Tinto. These funds will be matched by another source, and granted to the Nechako Environmental Enhancement Fund (NEEF). The research will form the second phase of the research group's work. The first phase examined the impact of climate change and water security, sediment sources and dynamics, and developed digital tools to help inform decision-making in the watershed. The researchers found that temperatures warmed by approximately 2 C between 1950 and 2010 across the watershed. "In Phase Two, we will address the role of observed climate change and flow regulation on streamflow volumes and water temperatures in the Nechako River," Dery said. In order to provide applications for the research, the UNBC research team has also be working with graduate students to develop web-based mapping applications that will document their research. The group hopes to create web-based tools that will provide "a single point of access to information that is relevant to the Nechako River Basin," according to the integrated watershed research group website. Prince George Citizen

Memorial U's Rodolphe Devillers receives the Graduate Supervision award from the Faculty of Humanities and Social Sciences.

McGill U Department of Geography announces that, as of the end of 2017, 800 Master's theses and PhD dissertations have been supervised by department members. McGill Geography

Memorial U graduate student Anna Crofts talks about her experience with the Teaching Skills Enhancement Program. Anna is completing a Master of Science in Geography. "Thinking about the near future, the best thing I have gotten from the program is a chance to practise public speaking (with the added challenge of disseminating knowledge that is not directly related to what I study)." Memorial U

Recent Theses and Dissertations

Gaëlle F. Gilson. 2018. Macrophysical properties and a climatology of Arctic coastal fog in East Greenland. PhD dissertation. Department of Geography, University of Lethbridge, Lethbridge, Alberta. Supervisor: Hester Jiskoot.

Clara Greig. 2018. Landscape scale spectral-temporal modelling of bamboo-dominated forest succession within the Atlantic forest of Southern Brazil. MSc thesis. Department of Geography and Environmental Studies, Wilfrid Laurier University Waterloo, Ontario. Supervisor: Colin Robertson.

Hot Papers by Canadian Geographers

Sofia Antonova, Henriette Sudhaus, Tazio Strozzi, Simon Zwieback, Andreas Kääb, Birgit Heim, Moritz Langer, Niko Bornemann and Julia Boike. 2018. Thaw subsidence of a Yedoma landscape in northern Siberia, measured in situ and estimated from TerraSAR-X interferometry. Remote Sensing 10:494. doi:10.3390/rs10040494

Jean-François Bissonnette, Jérôme Dupras, Christian Messier, Martin Lechowicz, Danielle Dagenais, Alain Paquette, Jochen A.G. Jaeger and Andrew Gonzalez. 2018. Moving forward in implementing green infrastructures: Stakeholder perceptions of opportunities and obstacles in a major North American metropolitan area. Cities. doi.org/10.1016/j.cities.2018.03.014

Matthew I. Brown, Tristan Pearce, Javier Leon, Roy Sidle and Rachele Wilson. 2018. Using remote sensing and traditional ecological knowledge (TEK) to understand mangrove change on the Maroochy River, Queensland, Australia. Applied Geography 94:71–83.

Joshua G. Cronmiller and Bram F. Noble. 2018. The discontinuity of environmental effects monitoring in the Lower Athabasca region of Alberta, Canada: institutional challenges to long-term monitoring and cumulative effects management. Environmental Reviews. doi.org/10.1139/er-2017-0083

Raymond Jahnckea. Brigitte Leblon, Peter Bushc and Armand LaRocque. 2018. Mapping wetlands in Nova Scotia with multi-beam RADARSAT-2 Polarimetric SAR, optical satellite imagery, and Lidar data. International Journal of Applied Earth Observation and Geoinformation 68:139-156.

Ping Li. Joleen C. Hadrich, Brian E. Robinson, Yulu Hou, Yating Dai and Xiangyang Hou. 2018. How do herders do well? Profitability potential of livestock grazing in Inner Mongolia, China, across ecosystem types. The Rangeland Journal 40:77-90.

Colin Robertson and Rob Feick. 2018. Inference and analysis across spatial supports in the big data era: Uncertain point observations and geographic contexts. Transactions in GIS. doi.org/10.1111/tgis.12321

S. Sookhan, N. Eyles and L. Arbelaez-Moreno. 2018. Converging ice streams: a new paradigm for reconstructions of the Laurentide Ice Sheet in southern Ontario and deposition of the Oak Ridges Moraine. Canadian Journal of Earth Sciences. doi.org/10.1139/cjes-2017-0180

Ian T. Stevens, Tristram D.L. Irvine-Fynn, Philip R. Porter, Joseph M. Cook, Arwyn Edwards, Martin Smart, Brian J. Moorman, Andy J. Hodson and Andrew C. Mitchell. 2018. Near-surface hydraulic conductivity of northern hemisphere glaciers. Hydrological Processes. doi.org/10.1002/hyp.11439

Jan T. Wollenberg, Jeff Ollerhead and Gail L. Chmura. 2018. Rapid carbon accumulation following managed realignment on the Bay of Fundy. PLOS|One. doi.org/10.1371/journal.pone.0193930

Sarah Yoga, Jean Bégin, Gaétan Daigle, Martin Riopel and Benoît St-Onge. 2018. A generalized Lidar-Based model for predicting the merchantable volume of balsam fir of sites located along a bioclimatic gradient in Quebec, Canada. Forests 9:166. DOI:10.3390/f9040166

Other "Geographical" News

Weather phenomena such as El Niño affect up to two-thirds of the world's harvests: Large-scale weather cycles, such as the one related to the El Niño phenomenon, affect two-thirds of the world's cropland. In these so called climate oscillations, air pressure, sea level temperature or other similar factors fluctuate regularly in areas far apart in a way that causes rain and temperature patterns to shift significantly. ScienceDaily

Expedition discovers deepest cave in Canada: Eleven regulation hockey rinks stacked end to end. That's how deep caver Kathleen Graham descended into the Bisaro Anima Cave on January 1, 2018, establishing a new record for the deepest cave in the country. The discovery was made during the latest expedition of the multi-year Bisaro Plateau Caves Project, which is supported by the Alberta Speleological Society and this year received funding from The Royal Canadian Geographical Society. At 5.3 kilometres long and 670 meters deep, the cave, carved into a remote mountain plateau near Fernie, B.C., is a slog. It has just one known entrance, and expedition members had to grapple with difficult terrain including deep canyons, underground waterfalls, loose rock and tight squeezes in temperatures hovering around 2 C. Canadian Geographic

13,000-year-old human footprints found off Canada's Pacific coast: Human footprints found off Canada's Pacific coast may be 13,000 years old, according to a new study. The finding adds to the growing body of evidence supporting the hypothesis that humans used a coastal route to move from Asia to North America during the last ice age. ScienceDaily

Some Not So "Geographical" News