SYMPOSIUM ÉTUDIANT DE RECHERCHE NORDIQUE D'OTTAWA-CARLETON 2018 (SERNOC)

2018 OTTAWA-CARLETON STUDENT NORTHERN RESEARCH SYMPOSIUM (OCSNRS)

Organisé par l'Université d'Ottawa /
Hosted by the University of Ottawa

15 février 2018 / February 15, 2018

Pavillon Desmarais Building, 12102

8:30 – 17:30

uOttawa

Carleton UNIVERSITY

TABLE DES MATIÈRES / TABLE OF CONTENTS

PRÉSENTATION / FOREWORD

Chaque année, des étudiants de premier cycle et des cycles supérieurs de l'Université Carleton et de l'Université d'Ottawa participent à des projets de recherche nordique de haute qualité, tant en sciences naturelles qu'en sciences sociales. En tant que plateforme mettant en valeur notre excellence et nos intérêts communs, l'Université d'Ottawa est heureuse d'accueillir le Symposium étudiant de recherche nordique d'Ottawa-Carleton 2018 (SERNOC).

Le comité organisateur aimerait remercier la Faculté des Arts, le Département de géographie, environnement et géomatique et l'Association des étudiants diplômés en géographie de l'Université d'Ottawa pour leur soutien financier, Dr. Luke Copland pour son soutien organisationnel et Dr. Gita Ljubicic pour l'actualisation du site web et son aide aux communications à l'Université Carleton.

Each year, undergraduate and graduate students from Carleton University and the University of Ottawa participate in high-quality northern research studies, both in the natural and social sciences. As a platform to showcase our excellence and common interests, the University of Ottawa is please to host the 2018 Ottawa-Carleton Northern Research Symposium (OCSNRS).

The organizing committee would like to thank the Faculty of Arts, the Department of Geography, Environment and Geomatics, and the Geography Graduate Student Association at the University of Ottawa for providing financial support for the Symposium, Dr. Luke Copland for organizational support and Dr. Gita Ljubicic for website support and aiding with communications at Carleton University.

Comité organisateur / Organizational Committee

Département de géographie, environnement et géomatique, Université d'Ottawa /
Department of Geography, Environment and Geomatics, University of Ottawa

Claire Bernard-Grand'Maison, MSc student (cbern085@uottawa.ca)
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Further details are available on the OCSNRS website.

HORAIRE / SCHEDULE

8:30 - 9:00	Enregistrement, installation des affiches / Registration, Poster Installation	
9:00 - 9:10	Mot de bienvenue, présentation du conférencier invité / Opening Remarks, Presentation of Keynote Speaker	
9:10 - 10:15	Conférencier invité / Keynote Speaker: Paul C. Sokoloff *Plants and Lichens from the Top of Canada: Arctic flora at the Canadian Museum of Nature*	
10:15 - 10:45	**Pause / Break**	
10:45 - 12:25	**Session 1: Présentations orales / Oral Presentations**	
	Titre / Title	Présentateur(trice) / Presenter
	Giant Mine, Giant Problem: Effects of Roasting Emissions on Mercury Cycling in Yellowknife, NWT	M. Azdajic
	Paleoecotoxicology: Developing Methodologies to Assess the Impact of Historic Mining Operations in Canada's North	C. L. Cheney
	Identifying Changes in High Arctic Lakes Historically Occupied by the Thule People Using $\delta^{15}N$, Sterols, and Stanols	L. R. Gallant
	Biogeochemistry of Lake Untersee Oasis, Queen Maud Land, Antarctica	B. Faucher
	Paleoecotoxicology: Determining the toxicity of oil sands emissions in dated lake sediment cores	A. Salat
12:25 - 13:25	**Dîner & présentations d'affiches (Léger dîner servi) / Lunch & Poster Session (Light Lunch Provided)**	
13:25 - 13:30	Présentation / Presentation: Association of Polar Early Career Scientists (APECS)	
13:30 - 15:10	**Session 2 : Présentations orales / Oral Presentations**	
	Titre / Title	Présentateur(trice) / Presenter
	Linking Wildfire Activity and Metal Fluxes to Northern Lakes at Decadal Timescales	N. Pelletier
	What Happens to Permafrost After 55 Years of Climate Warming and Forest Fires?	J. Holloway
	Students for Canada's North: Rebuilding Local Food Capacity in the Wapekeka First Nation	H. Thompson
	The implications of and impacts from climate change for tourism: A case study of Churchill, Manitoba's polar bear safaris	J. D'Souza
	"It feels pretty hopeless up here" Transgender Yukon residents' experiences accessing healthcare services	S. Speight
15:10 - 15:50	**Pause & Présentation d'affiches / Break & Poster Session Annonce du gagnant(e) du concours photo / Photo Contest Winner Announcement**	
15:50 - 17:00	Panel présenté par / Panel by: Permafrost Young Researcher Network – North America (PYRN-NA) *Conseils aux jeunes chercheurs de la part de chercheurs expérimentés / Young Researchers Receive Advice from Experienced Researchers* Mot de la fin / Closing Remarks	

EMPLACEMENT / LOCATION

Pavillon Desmarais Building, 12102

CONFÉRENCIER INVITÉ / KEYNOTE SPEAKER

Paul C. Sokoloff, *Senior Research Assistant, Canadian Museum of Nature*

Biography

Paul Sokoloff is a botanist at the Canadian Museum of Nature in Ottawa. Born in Newfoundland, due to his roving family he counts himself a previous resident of Indonesia, Vietnam, northern B.C., central Alberta, and rural Nova Scotia. Inspired by this nomadic upbringing, Paul has sought adventure in work and life. Paul received his B.Sc. from Carleton University in 2008, and an M.Sc. in botany from the University of Ottawa in 2010, and has been working as a senior research assistant in the botany division at the museum ever since. Following a trip to Victoria Island in Canada's Western Arctic in 2010, Paul seeks any opportunity he can to get back to Nunavut and the Northwest Territories, and is now a veteran of eight Arctic expeditions, including most recently a leg of the Canada C3 Expedition.

Talk Synopsis

Plants and Lichens from the Top of Canada: Arctic flora at the Canadian Museum of Nature

Scientists from the Canadian Museum of Nature have been collecting plants and documenting botanical diversity in the Canadian Arctic for over 100 years. To this day, you can find our team spending their summers out on the tundra, digging up samples and pressing plants in field camps across Nunavut and the Northwest Territories. Once dry, these two dimensional samples are added to the ever-growing National Herbarium of Canada, a library of flat plants continuing over one million herbarium sheets, and the best collection of Canadian Arctic Plants anywhere on the planet. These specimens from the physical backbone for plant biodiversity knowledge; by studying them researchers can answer questions about how many plant species occur in the Arctic, and where can we find them. This talk will cover the past and present of Arctic plant research at the Canadian Museum of Nature, including our most recent trip this past summer to Ellesmere Island at the very top of Nunavut.

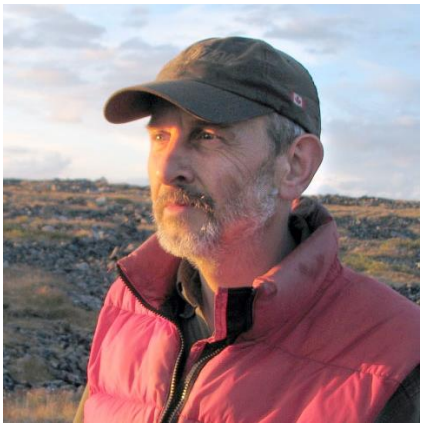
PANEL

Young Researchers Receive Advice from Experienced Researchers: A Panel presented by the PYRN-NA

Moderator: Roxanne Frappier, PhD candidate, University of Ottawa and PYRN-NA representative

The new North American branch of the Permafrost Young Researchers Network (PYRN-NA) is hosting a panel mini-tour around northeastern America which takes the form of a discussion between established researchers and students and early career northern researchers. This discussion panel represents a great opportunity for young researchers to learn about different careers paths and receive professional advice from experienced researchers. For the OCSNRS, panelists from a diverse range of north-related fields of study will share career advices and answer questions from the audience of young researchers. The goal of this panel is at the core of the PYRN purpose and is to offer guidance and inspiration to students and early career scientists. The panel will be sealed with a short presentation about the launch of the North American Branch of PYRN (PYRN-NA).

Panelists



Dr. Antoni G. Lewkowicz

Toni Lewkowicz is a Professor in the Department of Geography, Environment and Geomatics at the University of Ottawa. He works on permafrost characteristics and distribution in the Yukon, BC, western NWT and Labrador, using climate monitoring, electrical geophysics and spatial modelling. He worked for an engineering consulting company at the start of his career, then switched to academia. He was a professor at the University of Toronto before moving back to Ottawa in 1994. He was Dean of the Faculty of Arts for 6 years, editor of the journal Permafrost and Periglacial Processes and was President of the International Permafrost Association from 2012 to 2016. He is currently chairing the Steering Committee to create the Canadian Permafrost Association.

Melissa Nacke

Melissa received her Bachelors of Science in Marine Biology and Oceanography from Dalhousie University in Halifax, NS. After which, she completed her Masters of Science in Geography and Environmental Studies at Carleton University in Ottawa, ON. During her studies, Melissa conducted research on sea ice and icebergs in the Canadian and Norwegian Arctic. Her passion for the Arctic led her to the World Wildlife Fund, where she works on providing policy, science, and community research capacity on issues related to Arctic shipping and marine protection.

Paul C. Sokoloff

Paul Sokoloff is a botanist at the Canadian Museum of Nature in Ottawa. Born in Newfoundland, due to his roving family he counts himself a previous resident of Indonesia, Vietnam, northern B.C., central Alberta, and rural Nova Scotia. Inspired by this nomadic upbringing, Paul has sought adventure in work and life. Paul received his B.Sc. from Carleton University in 2008, and an M.Sc. in botany from the University of Ottawa in 2010, and has been working as a senior research assistant in the botany division at the museum ever since. Following a trip to Victoria Island in Canada's Western Arctic in 2010, Paul seeks any opportunity he can to get back to Nunavut and the Northwest Territories, and is now a veteran of eight Arctic expeditions, including most recently a leg of the Canada C3 Expedition.

PRÉSENTATIONS ORALES / ORAL PRESENTATIONS

Liste en ordre selon l'horaire du symposium / Listed in order of presentation according to the schedule

Giant Mine, Giant Problem: Effects of Roasting Emissions on Mercury Cycling in Yellowknife, NWT

Mija Azdajic[1], Emmanuel Yumvihoze[1], Alexandre Poulain[1] and Jules Blais[1]

[1] *Department of Biology, University of Ottawa, Ottawa, ON, Canada*

Mercury (Hg) is a global pollutant and potent neurotoxin that accumulates in animal tissues as monomethylmercury (MMHg). Populations that depend on local food sources, such as Canada's northern communities, are exposed to MMHg via fish consumption. Therefore, it is important to identify environmental variables that favour MMHg production. The extraction of gold from arsenopyrite at Giant Mine in Yellowknife, NWT has created strong environmental gradients of sulfate concentrations in lakes surrounding the mine. Whereas total Hg levels remain constant with increasing distance from the mine, the ratio of MMHg relative to total Hg increases with proximity to the stack. Microbial activity is the main source MMHg production, with sulfate reducing bacteria being important contributors. Therefore, we hypothesized that the sulfate reducing bacteria in lake sediments are responsible for the pattern of Hg concentrations around Giant Mine. To test our hypothesis, we sampled water and sediments from lakes spanning a range of distance to Giant Mine. We determine simultaneous methylation and demethylation rates using stable isotope analysis and characterized the microbial community using high throughput sequencing of 16S rRNA genes. By analyzing MMHg production and microbial community composition, we have identified sulphate as being the main driver of both final concentrations of MMHg and microbial community structure.

Paleoecotoxicology: Developing Methodologies to Assess the Impact of Historic Mining Operations in Canada's North

Cheney, C.L.[1], Pothier, M.P.[1], Poulain, A.J.[1], Thienpont, J.R.[1], Korosi, J.B.[2], Kimpe, L.E.[1] and Blais, J.M.[1]

[1] *Department of Biology, University of Ottawa, Ottawa, ON, Canada*
[2] *Department of Geography, York University, Toronto, ON, Canada*

Natural resource extraction has supported the development of Canada's far north, but has also resulted in environmental contamination at some operations. In some cases, the legacy of contamination cannot be determined due to a lack of historic bio-monitoring data available. Such is the case at Giant Mine, an abandoned gold mine which operated throughout the later half of the 20th century 5km north of the City of Yellowknife. Due to ore processing techniques, approximately 20000 tonnes of particulate arsenic trioxide was deposited onto the landscape surrounding the mine. Consequently, elevated surface water arsenic concentrations have been reported in lakes within 17km of the mine. Here we develop methods in paleoecotoxicology to characterize the full extent of historic metal contamination, and assess the toxicity of these historic sediments. This study examines lake sediment cores from 14 lakes within 30km of the mine. Sediments were dated using ^{210}Pb techniques, and the toxicity of dated sediment was determined using the novel application of microbial bioreporters and *Daphnia* toxicity testing. Metal profile concentrations track a peak in concentration during the height of mining operations, which decreases with distance from the mine. Initial assessments of bioavailability and acute *Daphnia* toxicity indicate that arsenic in porewater is 70% bioavailable, while sediments deposited during the time of mining operations decrease *Daphnia* survivorship. These results highlight the importance of applying techniques in paleoecotoxicology in such cases of legacy contamination, and suggest that aquatic ecosystems continue to show lingering contamination from past gold mining activities in Yellowknife.

Identifying Changes in High Arctic Lakes Historically Occupied by the Thule People Using $\delta^{15}N$, Sterols, and Stanols

Gallant, Lauren R. [1], Kimpe, Linda E.[1], Smol, John P.[2] and Blais, Jules M.[1]

[1] *Department of Biology, University of Ottawa, Ottawa, ON, Canada*
[2] *Department of Biology, Queen's University, Kingston, ON, Canada*

Thule Inuit whalers often left evidence of their presence in the high Arctic in the form of Thule whale-bone homes. Our understanding of how the Thule presence influenced the local lake systems is not fully understood. Consequently, we will analyze lake water, moss, zooplankton, periphyton, and sediments in Thule-influenced and reference lakes in order to determine whether the Thule people influenced the lake systems. Specifically, we will use $\delta^{15}N$ to identify if shifts in the nutrient composition of the lakes occurred; then, we will attempt to identify specific human biomarkers using sterols and stanols. The objectives of this project are thus to: (1) identify historical sites previously home to the Thule people through the fluctuations in the sterol and stanol profiles in lake sediment cores, and (2) determine the extent of chemical and biological changes to the lake systems impacted by the Thule people.

Lake sediment cores were collected from Thule-influenced and reference sites in high Arctic lakes. Lake sediments were analyzed for $\delta^{15}N$: preliminary results generally show an increase in $\delta^{15}N$ in the Thule-influenced sites and no change in reference sites. The sterol and stanol profiles will be constructed to identify the presence of any human biomarkers. We hypothesize that the presence of the Thule people will alter the concentration of coprostanol and nutrients. Consequently, we predict that Thule-influenced lakes will have higher concentrations of coprostanol and nutrients relative to reference lakes.

Biogeochemistry of Lake Untersee Oasis, Queen Maud Land, Antarctica

B. Faucher[1], D. Lacelle[1], W. Pollard[2], D.A. Fisher[1], A. Davila[4], M.B. Wilhelm[4] and D. T. Andersen[3]

[1] Department of Geography, Environment and Geomatics, University of Ottawa, ON, Canada
[2] McGill University, Montreal, QC, Canada
[3] SETI institute, Mountain View, CA, USA
[4] NASA Ames, Mountain View, CA, USA

Regions of juxtaposed active and relict biogeochemical cycling are rare on Earth. Lake Untersee Oasis in Dronning Maud Land, Antarctica, is one of these environments: it contains two perennially ice-covered lakes (Untersee and Obersee) with benthic, photosynthetic microbial mats, and an adjacent ice-free valley (Aurkjosen Cirque) that has evidence of a paleo-lake basin, with relic dried microbial mats shallowly buried in permafrost soils. Our broad research effort aims at: 1) characterizing the present-day hydrological conditions of Lake Untersee; 2) characterizing the dynamics of microbial ecosystem in Lake Untersee; 3) reconstructing the past hydrological conditions in the Oasis; and 4) asessing the preservation of molecular biomarkers in relic microbial mats in the Aurkjosen Cirque paleo-basin exposed to thousands of years of cold and dry conditions.

Hydrogeochemical analysis indicates that the lake's primary source of water is derived from glacial melt and that water loss is mainly through sublimation of its ice cover (with a small input contribution of groundwater). Modeling suggest that the lake's geochemistry is controlled by sublimation, which affects the amount of freezing and associated D-^{18}O and solute fractionation. δ^{18}O analysis of carbonate spherules from organic mats found in relict shorelines of Lake Untersee and Aurkjosen valleys suggests a water δ^{18}O composition evolution to higher values over the Holocene. Upcoming biogeochemical analysis (i.e. [C], [N] ^{13}Corg $^{13}C_{NMR}$, ^{14}C dating, fatty acids, hopanoids) of active and relict organics mats should provide further insights on the preservation potential of organic compounds in this cold environment.

Paleoecotoxicology: Determining the toxicity of oil sands emissions in dated lake sediment cores

Alexandre Salat[1], Michal Galus[1], Vance L. Trudeau[1] and Jules M. Blais[1]

[1] *Department of Biology, University of Ottawa, Ottawa, ON, Canada*

Commercial production of oil in the Athabasca oil sands, through open pit mining of bitumen, has resulted in the introduction of numerous toxic compounds into aquatic environments, impacting ecosystem health. An increase in anthropogenic activity has caused a shift in polycyclic aromatic hydrocarbons (PAHs) leading to a greater deposition of petrogenic PAHs in aquatic environments. PAHs are environmentally persistent as they are insoluble in water, and bind to organic particles and sediment. Their persistence in lake sediments can cause increased concentrations in aquatic ecosystems, possibly resulting in adverse health effects. Aquatic organisms, including amphibians, increased PAH levels result in developmental issues, increased mortality, and changes in gene expression in early life stages. The objective of this study is to determine if sediment profiles near mining operations in the surface minable area of the Athabasca oil sands exhibit toxicity in an amphibian model, *Xenopus tropicalis*. Exposures to PAH extracts from lake sediment cores will be used to determine various morphological endpoints of PAH toxicity. Using a different endpoint, the EROD assay, exposed amphibians will be further analysed for PAH toxicity. I predict to find an increase in PAH toxicity in recently deposited sediments due to mining activities, compared to sediments deposited before mining began. The possibility of determining how mining activities have shifted PAH toxicity provides a greater understanding of mining impacts on the environment and local communities health. This research may also result in more comprehensive policy which would be better equipped to protect the health of the local environment.

Linking Wildfire Activity and Metal Fluxes to Northern Lakes at Decadal Timescales

Nicolas Pelletier[1], Johanne Black[2], John Chetelat[3], Mike Palmer[1,4], Jody Pellisey[5], Boyan Tracz[5], Jesse Clark Vermaire[1] and Sjoerd van der Wielen[6]

[1] *Department of Geography and Environmental Studies, Carleton University, Ottawa, ON, Canada*
[2] *Yellowknife Dene First Nation*
[3] *Environment and Climate Change Canada*
[4] *Environment and Natural Resources GNWT*
[5] *Wek'èezhìi Renewable Resources Board*
[6] *Tłı̨chǫ Government*

Current drought conditions in northwestern Canada are conducive to more frequent and severe wildfires that may mobilize mercury and other metals accumulated in soil and biomass. There is evidence that wildfires can remobilize and transport mercury within and outside catchments by atmospheric volatilization, particulate emissions and catchment soil erosion. However, the effect of fires on mercury fluxes to nearby lake sediments remains unclear. In this study, we use a combination of eight dated lake sediment cores and two nearby ombrotrophic peatland cores to investigate the effects of wildfires on mercury fluxes to lake sediments. Lakes varying in catchment size and distance from recent fire events were sampled. Mercury concentrations in the environmental archives were measured, and macroscopic charcoal particles (>100 um) were counted at high resolution in the sediments to observe the co-variation of the local fire history and mercury fluxes. Mercury flux recorded in ombrotrophic peat cores provided an estimate of the historical atmospheric mercury flux from local and regional atmospheric deposition. The mercury flux recorded in lake sediments corresponds to the sum of direct atmospheric deposition and catchment transport. In combination, these archives will allow for the partitioning of mercury loading attributable to catchment transport from direct atmospheric deposition. After correcting the fluxes for particle focusing and terragenic elements input, flux from different lakes are compared based on their catchment size and their temporal and spatial proximity known fire events. Altogether, our preliminary results using these paleolimnological methods provide new insights on mercury transport processes that are predicted to become more important under a changing climate.

What Happens to Permafrost After 55 Years of Climate Warming and Forest Fires?

Jean E. Holloway[1] and Antoni G. Lewkowicz[1]

[1]*Department of Geography, Environment and Geomatics, University of Ottawa, Ottawa, ON, Canada*

Discontinuous permafrost covers millions of square kilometres in the subarctic and is protected by forest vegetation from changes in air temperature. It is thought to be sensitive to environmental change as it is thin, discontinuous, and just below 0°C. This study examined 26 sites along the Mackenzie Highway between Meander River, AB (59.05°, -117.72°) and Hay River, NT (60.82°, -115.79°) in August 2017 in order to evaluate current permafrost conditions. The sites all had permafrost when they were first examined in 1962 (Brown, 1964). Ten of the sites have subsequently experienced forest fires and the entire region has warmed by 1.7°C over the last 55 years.

The sites investigated by Brown (1964) were located in the field and probed using a 1.2 m long frost probe to establish if frozen ground was present in the area. Organic mat thickness and substrate were recorded and soil samples taken within the active layer at permafrost sites. Electrical resistivity tomography (ERT) surveys were undertaken at four sites to evaluate permafrost thickness. Our results show that permafrost has persisted at 17 of the 26 (65%) sites investigated in 1962. These sites all have a sphagnum moss cover at least 60 cm thick, and were underlain by fine-grained materials. Six of the ten burned sites still have permafrost, including sites which burned recently and others which burned several decades ago. Overall, our results suggest the importance of substrate in trajectories for warm permafrost, and that fire does not have a large impact at sites with thick organic covers.

Reference: Brown, R.J.E. (1964). Permafrost investigations on the MacKenzie highway in Alberta and MacKenzie district. Technical Paper No.175, National Research Council, Ottawa, Canada.

Students for Canada's North: Rebuilding Local Food Capacity in the Wapekeka First Nation

Heather Thompson[1] and Michael Robdioux[1]

[1] *Department of Human Kinetics, University of Ottawa, Ottawa, ON, Canada*

Northern rural Indigenous communities in Canada are facing many challenges getting regular access to nutritious foods, primarily due to the high cost of market food, restricted availability of nutritious foods, and lack of government support for nutritious food programs. The consequences of food insecurity in this context are expressed in high rates of diabetes, heart disease, and childhood obesity. In response to this health crisis, communities are seeking alternative solutions that rebuild local food capacity, such as gardening and greenhouse initiatives. Important first steps have been taken in developing local food programs, but the extent to which these projects are addressing northern food insecurity is yet to be determined. For example, how much food is being produced as a result of these initiatives? Are the food initiatives sustainable? Are there other benefits to local food initiatives, such as economic development? This presentation reports on a 2016 Student's for Canada's North project in the Wapekeka First Nation in northwestern, Ontario, where students and researchers worked with local youth and volunteers building a community greenhouse. Despite widespread and multidimensional community hardships, there was considerable community support and buy-in to the greenhouse project giving hope for future development, and providing insight for those seeking to initiate similar gardening or greenhouse initiatives in northern Indigenous communities.

The implications of and impacts from climate change for tourism: A case study of Churchill, Manitoba's polar bear safaris

Jamie D'Souza[1] and Jackie Dawson[1]

[1] *Environment, Society and Policy Group, Department of Geography, Environment and Geomatics, University of Ottawa, Ottawa, ON, Canada*

The decline of polar bear populations, due in part by climate change, has led to an increase in the volume of tourists visiting the arctic to view them. As a result, the demand for air travel has risen, intensifying greenhouse gas (GHG) emissions into the atmosphere and contributing to rising global temperatures. The severity of this situation tends to be neglected by governments and therefore excludes the tourism industry from climate change policies and mitigation strategies. The objectives of this project are 1) to examine tourist motivation for participating on polar bear viewing excursions; and 2) to estimate GHG emissions resulting from the polar bear viewing industry. This comparative study will be conducted in Churchill, Manitoba over 36 days during the main polar bear viewing season. Churchill was selected because of the visibility of the polar bears during this time and its reputation as polar bear capital of the world. The methods used in a 2007 polar bear viewing study conducted by Dr. Dawson et al. (2010) will be applied to enable a comparison between 2018 and 2007 results. These methods include 250 paper surveys with tourists participating on polar bear viewing excursions and approximately 20-30 in-depth semi-structured interviews. The greenhouse gas emissions will be estimated through the responses provided in the surveys and using online carbon calculators. The results of this study will be used to develop recommendations for a long-term strategic plan that support the polar bear viewing industry and to give the tourism industry an active role in policy planning.

"It feels pretty hopeless up here" Transgender Yukon residents' experiences accessing healthcare services

Sarah Speight[1]

[1] *Department of Geography, Environment and Geomatics, University of Ottawa, Ottawa, ON, Canada*

Residents of the Yukon face health service access challenges shared by many northern communities. Rotating physicians, a lack of comprehensive health services, and required travel outside of home communities for specialist services present a host of barriers to individuals seeking healthcare. The impacts of these challenges are further amplified for Transgender Yukon residents, who face additional barriers to healthcare access in northern and rural contexts. This participatory-action study examined the experiences of 27 Transgender Yukon residents (19+) who required travel out of their home communities for gender-affirming care, primarily to British Columbia. The questions for an online survey were designed in collaboration with a Yukon Trans advocacy organization, and the survey was then distributed utilizing chain-referral. As the Yukon government has limited policy in place related to the funding and delivery of Trans care, participants reported adverse experiences with healthcare providers, and insurance bodies, and the Yukon Government. This study makes community-guided recommendations for the improvement of Trans care for residents of Yukon.

PRÉSENTATIONS D'AFFICHES / POSTER PRESENTATIONS

Liste en ordre alphabéthique selon les présentateurs / Listed in alphabetical order of the first author

Predicting effects of climate change on Arctic-breeding shorebird communities

Christine Anderson[1], Paul Smith[1] and Lenore Fahrig[1]

[1] *Department of Biology, Carleton University, Ottawa, ON, Canada*

The objective of this project is to develop spatially explicit models of habitat selection by arctic shorebirds across the North American Arctic. We will then combine these models with habitat projections from a suite of climate change scenarios to predict how shorebird distribution and community composition could change over the next 50-100 years. This project will use data collected by the Arctic Program for Regional and International Shorebird Monitoring (PRISM) beginning in 2002. Our goal is to identify which shorebird species may be most greatly affected by habitat shifts due to climate change and to identify the Arctic regions most likely to support large numbers of shorebirds in the years to come. Temperature per se likely has little effect on shorebirds that breed in the Arctic and winter in the tropics. Range shifts with a warming climate only make sense in the context of habitat change, but predictions about Arctic habitat change at a scale relevant to birds have so far been elusive. This project is in its initial stages and we are seeking feedback on our objectives and study design.

Applications of High Resolution Satellite Imagery to Determine Ice Wedge Ice Volumes in the Canadian High Arctic

Bernard-Grand'Maison, C.[1], Pollard, W.[2] and Copland, L.[1]

[1] Department of Geography, Environment and Geomatics, University of Ottawa, Ottawa, ON, Canada
[2] McGill University, Montreal, QC, Canada

Ground ice plays a major role in the development of polar landscapes underlain by continuous permafrost. Quantifying ground ice volume on a regional scale is necessary to assess the vulnerability of permafrost landscapes to thaw induced disturbance and to quantify phenomena like potential carbon release. Ice wedges (IWs) are a ubiquitous ground ice landform in the Arctic. However, their high spatial variability makes generalizing their potential role in landscape change problematic. IWs form polygonal networks visible on satellite imagery from active layer surface troughs. This study focuses on the estimation of IW ice volume for the Fosheim Peninsula, Ellesmere Island, an area of continuous permafrost characterized by cold polar desert conditions and extensive ground ice. We perform basic GIS analyses on high resolution satellite imagery to delineate IW troughs and estimate the associated IW volume using a 3D subsurface model. We demonstrate two semi-automated IW trough delineation methods with different strengths to increase time-efficiency of this process, done manually in previous studies. Our delineating techniques yields acceptable IW ice volume estimates validating the value of GIS to estimate IW volume on much larger scales. Using surficial geology as a defining spatial parameter, we estimate that IWs are potentially present on 50 % of the Fosheim Peninsula surface area (± 3,000 km^2) where 3.81 % of the top 5.9 m of permafrost would be IW ice. Since IWs exist in a delicate balance with the depth of the active layer, any increase in thaw depth will initiate widespread terrain subsidence.

Eastern Beringian Paleodemography in Relation to Late Glacial and Holocene Environmental Change

Michelle Briere[1] and Konrad Gajewski[1]

[1] *Laboratory for Paleoclimatology and Climatology, Department of Geography, Environment and Geomatics, University of Ottawa, Ottawa, ON, Canada*

This study aims to determine how environmental changes affected the human populations of Eastern Beringia (Alaska and Yukon) over the last 15,000 years. Using the Comprehensive Archaeological Radiocarbon Database (CARD), we model paleo-population density and compare it to paleoclimate and pollen data. Climate and vegetation changes are shown to influence population growth, decline, and migrations. Significant cooling periods beginning at 11.9, 9.5 and 8.1 ka correlate with population declines, while warming periods at 14.2, 10.6 and 9.0 ka are associated with population growth. A long-term stabilization of the climate, beginning around 6.5 ka, coincided with an increase in population growth, the settlement of southern Alaska, and the development of several cultural groups. The migration of people into southern Yukon between 10.0 – 9.0 ka was associated with the establishment of spruce forests. By revealing the spatiotemporal dynamics of the Eastern Beringian paleo-populations in relation to environmental change, this study contributes to our understanding of the longest-inhabited region of the Western Hemisphere.

Understanding Icing (Aufeis) Distribution in the Mackenzie Valley Corridor from Landsat Imagery (1985-Present)

H. Crites[1], D. Lacelle[1] and P. Morse[2]

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Icings (also known as aufeis) are sheet-like layered ice bodies that develop during the winter time in various cold environments. Fed from fluvial aquifers or groundwater springs, icings can occupy large river valley or local depressions. These winter hydrological phenomenon can cause problems to local road infrastructure by blocking and destroying culverts or by completely covering roadways. Icings are of interest to geotechnical engineers for road infrastructure planning and also for northern communities that benefit from the drinking water icings provide during the winter season. The area of interest spans for about 5.9 x 10^4 km^2, from northwestern N.W.T and adjacent Yukon, Canada. The research objectives are; 1) to understand what controls icing distribution across the study area, 2) to understand icing recurrence interval during the time of available optical data (1985 to present).

The approach consists of using cloud-free, late spring remotely sensed optical imagery, namely the Landsat archive (Landsat 5, 7 and 8). A series of 3 spectral indices (NDSI, MDII and NDWI) will be used to obtain an icing classification. First, the Normalized Difference Snow Index (NDSI) is used to create a mask for the second index, the MDII. The NDSI classifies iced pixels based on the difference in reflectance between green and shortwave-infrared spectral bands. The second step, the Maximum difference ice index (MDII), further classifies ice vs snow within the masked values of the NDSI. As some lakes and rivers of the late-spring Landsat scenes are still covered by ice, a Normalized Difference Water Index (NDWI) is used on summer images to create a detailed water mask that is overlaid on the ice classification, leaving only icings.

By converting the “iced” pixels into polygons, an overlay analysis of various spatial data layers such as local geology, faults, aspect, altitude and watershed area, will permit to better understand what controls icing distribution. The temporal series produced will also help to shed light on icing recurrence.

The Importance of Carry-Over Effects on the Breeding Ecology of Arctic Shorebirds

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Arctic-breeding shorebirds are long-distance migrants, making them reliant on habitat and food resources throughout the globe. Carry-over effects, where conditions experienced during one part of the annual cycle affect subsequent behaviour and demographic rates, have been found in a wide variety of avian species. However, their effect on long-distance migrants such as shorebirds remains unclear. We aim to determine whether observed low rates of breeding success at Arctic sites is the result of local conditions, or whether conditions on wintering grounds and on migration might also influence breeding success by affecting arrival times and body condition of breeding adults. Conversely, breeding investment might influence behaviour or survival through the southbound migration. At our study site in Nunavut, Canada, we will study a suite of six shorebird species and monitor breeding performance through indicators such as arrival dates, timing of nest initiation and reproductive effort and success. We will relate levels of stress hormones in feathers grown on the wintering grounds to body condition and performance during the breeding season to assess whether the influence of wintering sites can carry-over into the breeding season. We will deploy VHF nanotags to evaluate the timing and route choice for birds migrating south and relate this to previous body condition and breeding performance. By combining remote tracking, direct observations, and physiological indicators, we hope to determine the extent to which phases of the annual cycle are interlinked, allowing us to better focus conservation action on the regions and times where it will be most beneficial.

Ground Ice Conditions in the Ogilvie Mountains, Central Yukon

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Degradation of ice-rich permafrost terrain caused by environmental and climatic disturbances has gained attention in recent years because of its impacts on ecosystems, biotas, snow depth, slope stability, soil strength, and infrastructures. The response of permafrost landscape to the ongoing warming in Arctic and Sub-Arctic regions is predicted to be a function of the ground ice content. The goal of this project is to assess the nature, condition, age and extent of ground ice in the Ogilvie Mountains (central Yukon), in order to be able to predict the effects of permafrost degradation on the landscape. The region is ice-rich as evidenced by the presence of ice-wedge polygons on the highly elevated plateaus and in the valley bottoms. It also represents a major transportation corridor (Dempster Highway) that connects northern communities. The three main objectives are: 1) Mapping of ice-wedge polygons, their geometry, their maturity, and landscape changes related to their degradation, such has changes in vegetation cover and subsidence; 2) Determining permafrost and ground ice condition in the field through assessment of the cryostratigraphy, volume of ground ice, geochemistry, and environmental conditions; 3) Using historical data of meteorological and ground conditions in order to model the evolution of ice-wedge polygons in the region.

Two-Eyed Seeing and the Development of a Country Foods Strategy in the Northwest Territories

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Governments in Canada are increasingly looking to include Indigenous voices in the development of policies as they usher in a new era of reconciliation with Indigenous communities. Two-Eyed Seeing, the practice of integrating both Western and Indigenous knowledge, offers an approach for agencies to include Indigenous voices in policy-making. Two-Eyed Seeing strives to ensure that one knowledge system does not dominate over another, allowing one eye to learn from the strengths of Indigenous knowledge systems and the other eye to learn from the strengths of Western knowledge systems.

This research examines the Two-Eyed Seeing approach, and how it might apply to the case study of the country food strategy currently being developed by the government of the Northwest Territories. Country food refers to wild-harvested native animal and plant species, and is integral to the cultural survival and increased food security of Northern Indigenous communities. Food security in Northern Indigenous communities is an increasingly pressing issue given the high costs and adverse health effects associated with store bought (market) foods.

A literature review analyzes how Two-Eyed Seeing has been applied in past research efforts and policy making. The review provides insight into the utility of the approach and finds that the most essential aspect of application is developing an intentional mindset and mutually culturally respectful relationships. More tangibly, this requires integrating decolonizing and Indigenous methodologies, which can include sharing circles, ceremony and storytelling. This knowledge helps to guide recommendations on applying Two-Eyed Seeing in a country food strategy.

Country Foods Harvesting and Accessibility Habits in Paulatuk, NWT

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Country foods, foods harvested for the land, are important to the health, culture and diet of Inuit northern Canada. So too are country food networks, the systems of exchange that enable country food distribution within and between communities. Consumption of country foods is important for addressing food insecurity issues. To understand the structure of country food accessibility in Inuit communities, this community-based research uses a case study of Paulatuk, a small, remote community in the Inuvialuit Settlement Region (ISR) in the Western Canadian Arctic. This study is based on results from a household survey completed in April 2017. The survey found that Caribou, Arctic Char, and Snow Goose comprised the largest proportion of community harvest weight respectively. Furthermore, households had different livelihood strategies that vary based on annual harvest weight of household. The survey focused on country food harvesting and sharing habits, as well as community perspectives on selling foods in stores. Results will contribute to both community- and regional-scale work toward the development of a food security strategy in the ISR.

Association of Polychlorinated Biphenyls with Type 2 Diabetes and Lipid Profile Among Canadian Inuit

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The combination of elevated blood pressure, glucose, body fat, cholesterol, and triglycerides, results in the metabolic syndrome and places individuals at high risk for diabetes and cardiovascular disease. Behavioural factors such as physical inactivity and poor diet are well-known risk factors. Exposure to persistent organic pollutants has emerged as an additional potential factor in disease pathogenesis. In this project, the association between polychlorinated biphenyls (PCBs), a ubiquitous class of persistent organic pollutant, with diabetes and lipid profile was explored among Canadian Inuit. Biomonitoring and health data from the Adult Inuit Health Survey (2007-2008), a cross-sectional study of about 2500 Inuit, were analyzed with multiple linear regression and logistic modeling. Outcomes examined were self-reported diabetes, fasting glucose, high cholesterol, total cholesterol, LDL-C, HDL-C, and triglycerides. Using different methods to incorporate serum lipids, highest vs. lowest quartile exposures to PCB-105, PCB-118, PCB-153, PCB-156, PCB-170, PCB-180, PCB-183, and ∑PCB were associated with increased risk of diabetes. The highest vs. lowest quartile exposure to most PCBs were associated with an increase of fasting glucose by 3-7%. PCBs were also associated with increased risk of high cholesterol and higher levels of serum triglycerides, total cholesterol, and LDL-C. In this cross-sectional survey of Canadian Inuit, PCBs were observed to increase the risk of both diabetes and high cholesterol, two important factors of the metabolic syndrome. Biological mechanisms provide plausibility for the effect of PCBs on glucose and lipid homeostasis. Cause-effect relationships in human populations, however, remain to be verified with more rigorous epidemiological study designs.

The Impacts of Legacy Giant Mine Activities on Arsenic Bioaccumulation and Transfer in Freshwater Food Chains

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Arsenic is a natural metalloid and is also anthropogenically released to the environment through mining activities, as well as industrial production. It has been a global endemic problem worldwide for decades, affecting millions of people. Mining industries have contributed significantly to economic growth and prosperity of the city of Yellowknife. However, the long-term damages have started to be seen from numerous cases of arsenic poisoning. Giant Mine is a currently inactive gold mine in Yellowknife, Northwest Territories, which was actively operating from 1948 to 2004. My research attempts to elucidate the dynamics of inorganic arsenic species transfer in near-shore and open-water food chains, to understand the effect of sediment exposure on inorganic arsenic bioaccumulation in freshwater organisms, and to answer the ultimate question of whether the local fish are safe for consumption. Freshwater biotic samples: periphyton, plankton, invertebrates, small and large-bodied fish, were collected for this project from 2 medium-sized lakes close to the mine and a reference lake located 27 km away. Arsenic speciation analyses will be conducted on the collected samples through HPLC-ICP-MS technique to see the extent of arsenic accumulation and metabolism of the different species. Natural isotopic ratios of C13, N15, and S34 will be analyzed from the samples through EA-IRMS to determine the primary carbon energy sources, trophic positions in the food web and magnitudes of benthivorous diet, respectively. Overall, the results from my project will serve as crucial scientific information to the on-going Giant Mine Remediation Project, to Yellowknife communities and the scientific knowledge on freshwater research.

Composition of Soil Organic Carbon in the Active Layer and Permafrost along the Eureka Sound Lowlands, Nunavut, Canada

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The dynamics of soil organic carbon (C_{org}) along the Eureka Sound Lowlands (ESL) is influenced by the terrain's vulnerability to warming temperatures, which are amplified in the High Arctic. With an estimated 1672 Pg of C_{org} stored in the northern permafrost region, permafrost degradation, which may promote the biodegradation of C_{org}, can have a significant impact on the global climate system. This study aims to examine the current state of C_{org} in active layer and permafrost soils from three sites in the ESL, where, following marine regression, permafrost aggraded during the early to mid-Holocene: Black Top (BT-2, 79°59'8.17"N, 85°42'3.28"W), Dump Slump (DS-1, 79°58'50"N, 85°47'8.75"W), and Gemini (G-3, 79°58'N, 84°10'W).

C_{org} characterization is achieved by various methods, including: 1) Loss-on-Ignition to determine organic matter and carbonate contents; 2) bulk elemental and isotopic analyses to determine Corg and total nitrogen (TN) contents and $\delta^{13}C_{org}$; 3) fractional density separation of the more bioavailable particulate organic matter (POM) from the mineral-associated organic matter (MOM) with a sodium polytungstate solution (1.6 g cm^{-3} density cut-off); and 4) fractional elemental and isotopic analyses and ^{13}C-NMR spectroscopy. Preliminary results show that the BT-2 and G-3 sites share similar C_{org} content of 5-10%. The permafrost of the three sites have similar elemental compositions, with an average of 2.80% C and 0.14% TN, for a C:N ratio near 20. The results of this study will enhance our understanding of the state of C_{org} in Canadian High Arctic soils and its potential role in the global climate system.