

2.4 Climate and Coastal Landscape Instability: Socio-Economic and Ecological Impacts

Summary

Project Leader(s)

Allard, Michel
Pollard, Wayne

The Arctic coastline is a highly dynamic environment where many landscape processes take place. Erosion, sedimentation, coastal progradation and retreat lead to sediment and carbon transfers as dissolved and particulate carbon are released into the near-shore zone. These processes are regulated by climate-controlled factors such as duration of the ice season, the dynamics of shore-fast ice, waves, tides and surges. Erosion of coastal permafrost is a fast process with many consequences for both the ecology of the landscapes and the coastal communities. The Inuit having traditionally harvested the major part of their living resources from the sea and from the coastal regions, they are a coastal people. In addition to new knowledge of the dynamics of the coastal landscape for preserving the quantity and the quality of their traditional food resources, the need to better understand permafrost dynamics in coastal regions stems from the recent modernisation that has created new requirements in public services for construction, housing and transportation, leading to development of civil engineering structures such as roads, airports, port and harbour facilities, water supply, and waste disposal facilities. The objectives of this project are: (1) to quantify the potential impact of climate change on northern landscapes and shorelines around communities and in areas of traditional land use, including evaluation of thaw subsidence, mass wasting and coastal retreat. This will include detailed study of surficial geology, permafrost and ground ice conditions around communities and seasonal camp areas and will compliment studies on coastal sensitivity (Project 1.5), water quality (Project 2.2) and carbon and contaminant cycling (Project 3.4). (2) To compare anticipated climate and landscape change with the Holocene paleoclimatic record, particularly from lakes that had their sedimentological regime affected by permafrost thawing in their catchment, and from oral histories. Recent climate variation and landscape changes will be identified through time-lapse mapping of selected sites affected by thermokarst and through cryostratigraphic investigations of changes at the active layer/permafrost boundary. This project will also be undertaken in concert with Project 2.2. (3) To evaluate the impact of landscape change on the activities of northern people, northern communities and northern resource development. (4) Through teaching, science camps, public lectures and student supervision promote a better understanding of the impact of climate change on northern peoples.

People

Network Investigators

Allard, Michel (Université Laval)
Forbes, Donald (Natural Resources Canada - Geological Survey of Canada)
Lafreniere, Melissa (Queen's University)
Lajeunesse, Patrick (Université Laval)
Lamoureux, Scott (Queen's University)
Pollard, Wayne (McGill University)

Post-Doctoral Fellows

Ford, James (McGill University)
Hoque, Azharul (McGill University)
Lewis, Ted (Queen's University)

PhD Students

Calmels, Fabrice (Centre d'études nordiques)
Chutko, Krystopher (Queen's University)
Cockburn, Jaclyn (Queen's University)
Couture, Nicole (McGill University)

Dupré, Sophie (Université Laval)
Fortier, Daniel (Université Laval)
Gagnon, Sophie (Université Laval)
Gibéryen, Tania (Centre d'études nordiques)
Hachem, Sonia (University of Alaska Fairbanks)
Haltigin, Tim (McGill University)
Heyes, Scott (McGill University)
Jolivel, Maxime (Université Laval)
Lavoie, Caroline (Université Laval)
LeBlanc, Anne-Marie (Université Laval)
Omelon, Christopher (University of Toronto)
St. Hilaire-Gravel, Dominique (Memorial University of Newfoundland)
Tomkins, Jessica (Queen's University)

Masters Students

Barrette, Carl (Université Laval)
Beaulac, Isabelle (Université Laval)
Beaulieu, Olivier (Université Laval)
Bosquet, Lynne (Queen's University)
Bouchard, Frédéric (Université Laval)
Boyer-Villemaire, Ursule (Université du Québec à Rimouski)
De Pascale, Gregory (McGill University)
Dugan, Hilary (Queen's University)
Duhamel, Denis (Université Laval)
Fletcher, James (Queen's University)
Girard-Thomas, Marilou (Université Laval)
Grom, Jackie (McGill University)
L'Hérault, Emmanuel (Université Laval)
Lajoie, Michel (Institut des sciences de la mer de Rimouski)
Lantuit, Hugues (Alfred Wegener Institute Foundation for Polar and Marine Research)
Larouche, Marie-Ève (Université Laval)
Laurin, Emil (Queen's University)
Lemelin, Dany (Centre d'études nordiques)
Lévesque, Anne-Marie (Université Laval)
Marchildon, Cynthia (Université Laval)
McDonald, Dana (Queen's University)
McLeod, Brock (Queen's University)
Rouault, Sesilina (Université Laval)
Savard, Catherine (Université Laval)
Solomon-Côté, Philippe (Université Laval)
Turner, Jennifer (University of Guelph)
Vinet, Frédéric (Université Laval)

Undergraduate Students

Bartlett, Zachary (Memorial University of Newfoundland)
Bassutti, Anthony (Queen's University)
Chudiak, Jessey (Queen's University)
Donevan, Anna
Gagnon, Véronique (Université Laval)
Gangon-Beaulieu, Marie-Jeanne
Labbé, Gabrielle (Université Laval)
Middleton, Kathryn (Queen's University)
Oliver, Nick (McGill University)
Randall, Kevin (Université Laval)

Technical Staff

Alaku, Johnny (Centre d'études nordiques)
Beasley, Erica (Ryerson University)
De Pascale, Gregory (McGill University)

Koziar, Steve (Queen's University)
L'Hérault, Emmanuel (Université Laval)
Novalinga, Peter
Novalinga, Davidee (Centre d'études nordiques)
Sala, Joshua (Centre d'études nordiques)
Sarrazin, Denis (Centre d'études nordiques)
St. Hilaire-Gravel, Dominique (Memorial University of Newfoundland)
Stephani, Eva (Université Laval)

Project Staff

Calmels, Fabrice (Centre d'études nordiques)

Partners

Ministère des affaires municipales et des régions du Québec
IPY Federal Program Office
Nunavut Research Institute
A.D. Latornell Endowment Fund
Tranports Canada
Canadian Space Agency
Indian and Northern Affairs Canada - Northern Science and Contaminants Research Directorate
Natural Resources Canada - Geological Survey of Canada
Global Environmental and Climate Change Centre (GEC3)
Transport Québec
Ouranos
Centre d'études nordiques
Alfred Wegener Institute Foundation for Polar and Marine Research
Indian and Northern Affairs Canada - Northern Scientific Training Program
McGill University
Natural Resources Canada - Polar Continental Shelf Project
Queen's University
NASA - National Aeronautics and Space Administration

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Lantuit, H., Couture, N., Pollard, W.H., 2005, Identification of stabilized and revegetated retrogressive thaw slumps floors on an ice-rich Arctic coast using Landsat near-infrared imagery, 5th Arctic Coastal Dynamics International Workshop, 13-16 October, Montreal, Canada, 1, Published

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