Project title: Permafrost dynamics in response to climate change on Victoria Island, Nunavut.

Context and objectives:

Permafrost (frozen ground) is very vulnerable to rapid changes in climate and has the potential to affect many aspects of life for the people that live there. The objective of the project is to study and monitor the permafrost in the Kitikmeot, with a focus on Cambridge Bay and Kugluktuk. This project has three specific objectives: (1) Characterize the permafrost conditions; (2) Monitor changes in permafrost landscapes; (3) Assess the impacts of permafrost disturbances on the ecosystems and (4) to investigate the seasonal responses of the tundra soil microbiome.

Project activities in 2019:

A total of eight shallow bore holes were drilled at different places near Cambridge Bay with a portable earth-drill and core samples were extracted and kept frozen for further analysis (examples: ice and water content, type of sediment). Maximum depths reached are between 2 and 3 meters. In addition, one deep bore hole (15 m) was drilled within the community with an air track drill. Its location was determined in collaboration with the hamlet of Cambridge Bay. Temperature sensors were installed in the bore holes at different depths below the ground surface to monitor the permafrost temperatures in different terrain units.

Next steps – Summer 2020:

1. We will collect permafrost samples using an auger equipped with a core barrel. Two sites will be repeatedly sampled on a monthly basis between May and October (when the ground is neither frozen nor snow-covered). All samples will be kept frozen at the Canadian High Arctic Research Station (CHARS) for laboratory analyses and permafrost characterization (examples: carbon content, amount of ice, carbon, microbial communities, DNA).
2. We will measure ground temperature using data loggers and temperature sensors installed at different depths below the ground surface. We will also measure the temperature of the air and snow temperature, the soil moisture and the depth of snow. Such measurements are needed to assess how climate change will affect the frozen ground.
3. We will detect and monitor landscape changes, such as landslides, thermal erosion gullies, and coastal erosion, using high-resolution imagery, aerial photographs and field measurements.
4. We will install two automatic cameras to monitor changes along the coast near Cambridge Bay (in collaboration with the HTO and Transport Canada).

The field team will use ATVs and small boats to access study sites located close to Cambridge Bay and Kugluktuk. The project will primarily result in the publication of scientific papers and government reports, which will be available to the public. After a two or three full years of data, we will create a poster and a booklet to present and explain some of the changes happening to the environment in permafrost areas and how they affect people and wildlife, with the general goal of making permafrost science more accessible to the general public. On the long-term, these data will be useful for future community planning and to adapt to the thawing of permafrost.

Organizations:
- Polar Knowledge Canada
- Geological Survey of Canada (NRCAN)
- Thompson Rivers University
- Pretoria University
- Université du Québec à Rimouski

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Location: All activities will take place within and around Cambridge Bay, Nunavut
Tentative dates: May 1st – October 31st , 2021