

## NIRB Uuktuutinga Ihivriuhikhamut #125305

### Permafrost dynamics in response to climate change on Victoria Island, Nunavut

**Uuktuutinga Qanurittuq:** New

**Havaap Qanurittunia:** Scientific Research

**Uuktuutinga Ublua:** 4/3/2018 4:20:00 PM

**Period of operation:** from 0001-01-01 to 0001-01-01

**Piumayaat Angirutinga:** from 0001-01-01 to 0001-01-01

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## QANURITTUT

### Tukihinnaqtunik havaariyayumayumik uqauhiyun

**Qablunaatitut:** Project title: Permafrost dynamics in response to climate change on Victoria Island, Nunavut. Project description: Permafrost (frozen ground) is very vulnerable to rapid changes in climate. As the climate warms, the ice in the permafrost melts and the ground becomes unstable as the soil collapse, causing landslides and coastal erosion. The rapid thawing of previously frozen ground can also disturb plant and animal habitats and impact water quality and the ecology of lakes. Decades of work led by various Canadian organizations provided insight into the changing state of permafrost landscapes. However, very little information exists on the permafrost conditions in the Central Canadian Arctic. It is in this context that Polar Knowledge Canada (POLAR) aims to start a research project to study the response of Victoria Island permafrost ecosystems to climate change and their environmental implications. This project will be anchored at the campus of the Canadian High Arctic Station (CHARS) located in Cambridge Bay. It will help collect baseline knowledge of permafrost and landscape changes in the Kitikmeot Region of Nunavut. Our field studies cover the southern part of Victoria Island, with a special focus on Cambridge Bay and its surrounding area. This research program has four specific objectives: (1) Characterize the permafrost conditions (2) Monitor changes in the landscape due to thawing permafrost (3) Assess the impacts of permafrost disturbances on the water quality of lakes and streams. The field methodology involves the following steps: 1-Monitor spatial changes in the landscape using a high-precision GPS and satellite images; 2-Collect permafrost samples using a portable earth drill; 3-Characterize soil and permafrost using an electronic tool to image the subsurface; 4-Measure and monitor the ground temperature using a series of sensors connected to a data logger; 5-Characterize and sample sediments found at the land surface; 6-Gather local knowledge on the changes that are happening across the Arctic landscape. The field team will use ATVs to access study sites located close to Cambridge Bay. The use of aircraft will allow the team to access remote locations. The project will primarily result in the publication of scientific papers, student theses and government reports, which will be available to the public. 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, this project aims to develop a monitoring program to measure various variables such as the ground temperature. These data will be useful for future community planning and to adapt to the thawing of permafrost.

**Uivittitut:** N/A

**Inuktitut:** N/A

**Inuinnaqtun:** Havanguyuk taiguhia: Qiqumainnarniq qanugitni hugiaqinut hilap ahianguqnia tahamani Kiilliniq Qiqirtaq, Nunavut. Havanguyuk Unniqtuta: Qiqumainnarniq (qiqumania maniqap) qanugililaqpiq qilamik ahianguqnia hilap. Piplugu hila uunakpalania, ta mna hiku qiqumainnarniqni auktuqpalia manigaqlu ingutaliqnia nuna anmukpalliqlinanut, pipkaqnia hituvaliani tagiuplu hinaa huguqpalia. Tamna qilamik auktuqpalianiq hivuani qiqumavaknia manigaq ulapihautaulaq nauhimayunut angutikhatlu nayuqpaktai aktuanilu imaqmun nakuunit uumatyutauvaluknitlu tahiqli. Ukiuni amihut havagiyaini hivuliqtauplutik allatqinit Kanatamiuni timiuyut piquqtitai ihumagiyai tahamunga ahianguqni qanugitnit qiqumainnarnianut nunanut. Kihimik, tuhagakhaqattiangittuq tahamunga qiqumainnarnianut qanugitnit tahamani Qitiqpahikniani Kanatamiut Ukiurtaqtuani. Piplugu una qanugitnigiya tapkuat Ukiuqtaqtulirinnik Quuyimaniq Kanata (POLAR) pinahuat pigiaqni naunaiyaqni havanguyuk naunaiyagaunianut hugiaqni Kiilliniq Qikirtaq qiqumainnarniqni uumatyutit hilap ahianguqnianut avatiliqutailu qanugityutai. Una havanguyuk tunngatigaqniaq talvani havakviani tapkuat Kanatamiuni Quttiktuq Ukiurtaqtuq Havakvia (CHARS) inilik talvani Ikaluktutiakmi. Ikayuqniaq katitiqinik humiumaititlugit ilitquhi ilihimani qiqumainnarniq munaplu ahianguqni tahamani Kitikmeotni Nunavut.

Maniqami naunaiyainivut piniaqtai tahamna nigiani ilagiya Kiilliniq Qikirtaq, pinahuaqniqhauplugu tamna Ikaluktutiak avatigiyalu nuna. Una naunaiyainiq havagut piqartuq hitamanik taihimayut ihumagiyaunit: (1) Pitquhit tapkuat qiqumainnaqni qanugitnit (2) Munagini ahianguqni nunap piplugu auktuqpaliani qiqumainnaqni (3) Naunaiyaqni aktuani qiqumainnaqni ulapihaqni imaqmum nakuunit tahiit kuugauyatlu. Tamna maniqami pityuhit ilagit tahapkuninga tukligiknit: 1-Munagini attaqunit ahianguqnit nunap atuqhugit nakuqpiagtut-nalaumanit GPS qangattaqhimayutlu piksaluqnit; 2-Katitqini qiqumainnaqnit naunayagat atuqhugit nuktilat nunamun ikuutagutit; 3-Pitquhi nuna qiqumainnarniqlu atuqhugit alguyartuqtut hanalgutit piksaluqninut maniqap qanga; 4-Uuktugaqni munaginilu maniqami uunaqnia atuqhugit tukligit naunaiqtutit atatyutai tuhagakhanut titigautit; 5-Pitquhi naunaiyagatlu nunavallit nalvauyut talvani nunap qangani; 6-Katitqini nunalikni ilihimanit ahianguqninut atuqtut humiliqak Ukiurtaqtuq nunaani. Tapkuat maniqami havaqatigit atuqniaqtai Hantait tikitninut naunaiyaqvik inai inilgit qaningani Ikaluktutiak. Tamna atuqnia tingmit pipkalaqtai havaqatigit tikitni tikingittut inait. Tamna havanguyuuq piniqhauniaq qanugitnit tapkunani makpigaliugat naunaiyainiqmun makpigani, ilihagut titigaqtai kavamatkutlu tuhaqhitaui, tapkuat piyaulaqniat inungnit. Pinguqniaqtavut takuyakhaliuqni taiguakhat hatqititninut unniqtuqnilu ahianguqnit atuqtauninut avatigiyauyumun qiqumainnaqninut nunat qanuqlu aktuani inungnut angutikhanutlu, pinahuarniqhauplugu pipkaqnia qiqumainnarniq naunaiyaut piyaulaqni quyagitnaq inungnut. Hivituyumun, una havanguyuuq pinahuaq pivaliatitni munagiyauni havanguyuuq piyangi aallatqit allatqikni tahapkuatut maniqap uunaqnia. Tahapkuat tuhagakhat atuqniaqapiqniat hivunikhani nunalikni parnaiyainiq auktuqpalianilu auktuqpaliani qiqumainnarniq.

## **Personnel**

Personnel on site: 5

Days on site: 30

Total Person days: 150

Operations Phase: from 2018-05-29 to 2018-08-28

## Hulilukaarutit

### Hulilukaarutit

Inigiya	Hulilukaarut Qanurittuq	Nunannga Qanurittaakhaanik	Initurlinga qanuritpa	Initurlinga utuqqarnitat unaluuniit Ingilraaqnitat Uyarannguqtut akhuurninnga	Qanitqiyauyuq qanitqiamut nunallaat kitulluuniit ahiruqtaliyainnit nuna
Wollaston_Peninsula_NU	Scientific/International Polar Year Research	Inuit Owned Surface Lands	N/A	N/A	Cambridge Bay
Cambridge_Bay_study_area	Scientific/International Polar Year Research	Inuit Owned Surface Lands	N/A	N/A	Cambridge Bay, Ovayok Territorial Park.

### Nunaliin Ilauyun, Aviktuqhimayuniitunullu Ikayuuhiarunguyun

Nunauyuq	Atia	Timiuyuq	Upluani Uqaqatigiyaungmata
Information is not available			

## Angiuttauvaktunik

### Naunaiqlugu nunanga talvani havauhikhaq ittuq

#### Angiuttauvaktunik

Munariniqmut Ayuittiaqtuq	Angirutinga Qanurittuq	Tadja Qanurittaakhaanik	Ublua Tuniyauyuq/Uuktuqtuq	Umikvikhaa Ublua
Nunavunmi Ihivriunqimut Timiqutigiyanga	Land and Water Research Application	Applied, Decision Pending		

### Project transportation types

Transportation Type	Qaffiuyut	Qanuq Atuqtauniarmangaa	Length of Use
Air	0	Helicopter	
Land	0	ATV	

### Project accomodation types

#### Nunauyuq

## Ihuaqutivaluin Atuqtauyukhan

Hanalrutit atuqtaunahuat (ukuallu ikuutat, pampiutainnik, tingmitinik, akhaluutinik, hunaluuniit)

Hanalrutit Qanurittuq	Qaffiuyut	Aktikkulaanga – Qanurittullu	Qanuq Atuqtauniarmangaa
Portable drill	1	1 m x 0.5 m x 1m	Collect undamaged permafrost samples
Ground penetrating radar (GPR)	1	1m x 1m x 1m	Non-invasive, subsurface investigation technique to map near-surface permafrost structures.
GNSS system	1	1m x 1m x 1m	High-precision mapping
ATVs	5	2.5 m x 1.2m x 1.4 m	Travel to the study sites
Cessna 206	1	8.5m x 9m x 9m	Travel to remote study sites
Helicopter	1	12m x 10m x 3m	Local work nearby Cambridge Bay

## Qanurittuq Urhuqyuaq unalu Qayangnaqtut Hunavaluit Aturninnga

Qanurittuq urhuqyuaq hunavaluit aturninnga:	Urhuqyuaq Qanurittuq	Qaffiuyut qattaryut	Qattaryuk Aktikkulaanga	Atauttimut Qaffiuyut	Ilanga	Qanuq Atuqtauniarmangaa
Gasoline	fuel	3	20	60	Liters	Portable drill refuelling

## Imaqmik Aturninnga

Ubluq qanuraaluk (m3)	Aturumayain imavaluin utiqittagaani qanuq	Atulirumayain imavaluin utiqittagani humi
0		

## Iqqakuq

### Ikkakunik Munakgiyaayunik

Havauhikhaq Hulilukaarut	Qanurittuq Iqqakut	Ihumagiyaayuq Qanuraaluktut Atuqtait	Qanuq Iqqakuurniarmangaa	Halummaqtirarnirutikhan piyutin
Information is not available				

## Avatiliriniqmut Ayurhautingit:

Drilling activities conducted for permafrost characterization will only take place in some specific areas. The potential impact would be of very local extent (approximately 15 m<sup>2</sup>) and non-permanent. The coring activities will have to be made in respect to the environment and our team is committed to act cautiously when it comes to drilling. In order to prevent soil contamination by leakage of fuel or oil, a spill-kit will always be readily available on-site prior to and during all drilling operations for an immediate clean up. A wooden board will always be used at the coring sites to protect the area around the boring hole where the active layer could be sensitive to multiple trampling. The drilling activities are always done with high environment cautiousness (e.g. spill kit, wooden boards, filling of the boring holes for permafrost to renew. As for our fieldwork activities related to mapping (GNSS) and ground-penetrating radar (GPR) surveys, the data acquisition is non-invasive, so there will be no environmental impacts.

## **Additional Information**

### **SECTION A1: Project Info**

### **SECTION A2: Allweather Road**

### **SECTION A3: Winter Road**

### **SECTION B1: Project Info**

### **SECTION B2: Exploration Activity**

### **SECTION B3: Geosciences**

### **SECTION B4: Drilling**

### **SECTION B5: Stripping**

### **SECTION B6: Underground Activity**

### **SECTION B7: Waste Rock**

### **SECTION B8: Stockpiles**

### **SECTION B9: Mine Development**

### **SECTION B10: Geology**

### **SECTION B11: Mine**

### **SECTION B12: Mill**

### **SECTION C1: Pits**

### **SECTION D1: Facility**

### **SECTION D2: Facility Construction**

### **SECTION D3: Facility Operation**

### **SECTION D4: Vessel Use**

### **SECTION E1: Offshore Survey**

### **SECTION E2: Nearshore Survey**

### **SECTION E3: Vessel Use**

### **SECTION F1: Site Cleanup**

## **SECTION G1: Well Authorization**

## **SECTION G2: Onland Exploration**

## **SECTION G3: Offshore Exploration**

## **SECTION G4: Rig**

## **SECTION H1: Vessel Use**

## **SECTION H2: Disposal At Sea**

## **SECTION I1: Municipal Development**

## **Qanurittuq Ittunik Avatinga: Avatingalluanga**

## **Qanurittuq Ittunik Avatinga: Inuuhimayunut Avatinga**

## **Qanurittuq Ittunik Avatinga: Inungit-maniliurutingit Avatinga**

## **Miscellaneous Project Information**

No research activities will take place within the boundaries of Ovayok Territorial Park.

## **Naunaiyainiq ukuninnga Ayurhautingit unalu Piumayaat Ikikliyuumiutinahuarutit**

Drilling activities conducted for permafrost characterization will only take place in some specific areas. The potential impact would be of very local extent (approximately 15 m<sup>2</sup>) and non-permanent. The coring activities will have to be made in respect to the environment and our team is committed to act cautiously when it comes to drilling. In order to prevent soil contamination by leakage of fuel or oil, a spill-kit will always be readily available on-site prior to and during all drilling operations for an immediate clean up. A wooden board will always be used at the coring sites to protect the area around the boring hole where the active layer could be sensitive to multiple trampling. The drilling activities are always done with high environment cautiousness (e.g. spill kit, wooden boards, filling of the boring holes for permafrost to renew. As for our fieldwork activities related to mapping (GNSS) and ground-penetrating radar (GPR) surveys, the data acquisition is non-invasive, so there will be no environmental impacts.

## **Tamatkiumayunik Ihuikgutivaktunik**

Impacts

Ilitariyauniq Avatiliriniqmut Ayurhautingit

Havakvinga																								
-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aulapkaininnga																								
Scientific/International Polar Year Research		P	-	P	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Piiqtauniq																								
-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

(P = Nakuuyuq, N = Nakuungittut unalu mikhilimaittuq, M = Nakuungittut unalu mikhittaaqtuq, U = Naluyauyuq)